March 2025

BRIDGE HYDRAULICS REPORT

I-95/State Road (SR) 9 Project Development and Environment (PD&E) Study
From South of SR 860/Miami Gardens Drive to North of Broward County Line
Miami-Dade County, Florida

Financial Management Number: 414964-1-22-01
Federal Aid Project Number: N/A
Efficient Transportation Decision Making (ETDM): 14419

DISTRICT VI

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

Bridge Hydraulics Report

Florida Department of Transportation

District Six

I-95/State Road (SR) 9 Project Development and Environment (PD&E) Study

From South of SR 860/Miami Gardens Drive to North of Broward County Line

Miami-Dade County, Florida

Financial Management Number: 414964-1

ETDM Number: 14419

March 2025

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 26, 2022 and executed by Federal Highway Administration and FDOT.

Table of Contents

Figures

Tables

Appendix

1. Introduction

1.1 Project Description

The I-95 / State Road (SR) 9 project is intended to enhance the efficiency of I-95, recognizing its importance to the larger transportation network within the State of Florida as part of the Strategic Intermodal System (SIS) and to be consistent with other adjacent capacity projects. The construction of the express lanes and/or general-use lanes will require the I-95 Bridges over the C-9 (Snake Creek) Canal to be widened. There are two bridges within this project: the bridge number for the northbound bridge is 870093 and the bridge number for the southbound bridge is 870094. The project is located within Miami-Dade County. The location of the I-95 Bridges over C-9 Canal is shown in Figure 1.

This bridge replacement project is at the Project Development and Environment (PD&E) study phase, and the design of the bridges is not finalized yet.

The datum used in this project is based on the North American Vertical Datum of 1988 (NAVD 88).

1.2 Purpose

This Bridge Hydraulics Report provides a preliminary evaluation of the hydrologic and hydraulic impacts of replacing the existing, six-lane northbound bridge and five-lane southbound bridge over Snake Creek Canal (C-9 Canal East). The existing bridges are proposed to be replaced with single span bridges with prestressed beams (no piers in the water) for capacity improvements at this stage of the project development. The analysis contained within this report was completed in accordance with the requirements outlined in the Florida Department of Transportation (FDOT) Drainage Manual dated January 2023 and the FDOT Bridge Scour Manual dated June 2022. This report will show that the proposed bridge design meets current FDOT criteria.

1.3 Bridge and Canal Information

Each of the existing I-95 Bridges over the C-9 Canal is comprised of four 33-foot spans yielding an overall length of 132 feet. The bridges were originally constructed in 1948, widened in 1968, in 1983 and again in 2014. The bridge widening proposed as a part of this roadway improvement project will increase the low member elevation in the current design stage.

The bridges are proposed to be replaced by single span bridges with prestressed beams as of the preliminary design stage in this project. The proposed bridges will span over Snake Creek Canal, and there will be no piles needed for supporting the new bridges. So, under the proposed condition, the piles of the existing I-95 bridges will be removed from Snake Creek Canal.

The recommended draft bridge design proposes raising the superstructure over the Snake Creek Canal higher than the existing bridge. This will increase elevation of the bridge low girder from 6.91 (NAVD 88) feet to 16.24 feet. The profile grade of the bridge will be raised 9.33 feet to accommodate the increased beam depths required for the longer spans. In the proposed bridge design, the low member elevation will meet a ten-feet minimal vertical clearance requirement over

the proposed Snake Creek Trail. Please refer to Figure 1 for a plan view of the proposed main bridge crossing of the C-9 Canal. The size and the limits of the riprap revetment are estimated for the proposed bridges over C-9 Canal. Please refer to Section 6 and Appendix C for details.

The Snake Creek Canal (C-9 Canal) is a controlled canal owned and maintained by the South Florida Water Management District (SFWMD). The purpose of the C-9 Canal is to provide flood protection and drainage for the C-9 Basin, to supply irrigation and municipal water for the basin and to maintain a groundwater table elevation that will prevent saltwater intrusion into the local groundwater. The I-95 bridges over the C-9 Canal are located between control structures S-29 and S-30, which are both gated spillways (See Appendix A for the control structure locations).

The peak flood of record on C-9 Canal is a 50-year flood magnitude, and it occurred on April 2, 2000, with a peak flowrate of 3,616 cfs (derived from recorded Station S-29 flowrate from 1985 till date). This is the largest flood of record indicated in the past 38 years of gage readings (see Appendix A).

1.4 Floodplains

The C-9 Canal is not a regulated floodway and no other regulatory floodway exists within the project limits. FEMA has defined the areas directly downstream and upstream of the I-95 Bridges as Zone AE with a base flood elevation of 6.5 feet (NAVD 88). The FEMA Flood Insurance Rate Map for the project area have been included in Appendix A.

1.5 Rules and Regulations

Since the C-9 Canal is a controlled canal owned and maintained by SFWMD, the design and the construction of the proposed I-95 bridge will be coordinated with SFWMD. The documentation contained within this report shows that the proposed design meets current FDOT criteria, as well as SFWMD canal crossing criteria.

Figure 1. Bridge Location Map

2. Hydrologic Analysis

2.1 Drainage Basin

This bridge replacement project is located within the C-9 Basin. The drainage basin has a drainage area of approximately 98 square miles, and it can be divided into two sub-basins, which are C-9 East Basin and C-9 West Basin. The SFWMD Basin Map for the sub-basins is provided in Appendix A. The C-9 Canal drains into Dumbfoundling Bay approximately 3 miles downstream of the proposed I-95 Bridge over C-9 Canal project location. The land use for the C-9 Basin is mostly developed urban area. As stated in Section 1.3, the I-95 bridge over the C-9 Canal is located between two control structures. S-29 is a gated spillway located downstream of the project just east of US 1. A headwater stage of 2.0 feet is maintained at S-29. S-30 is located upstream of the project, which is a gated spillway located west of US 27.

2.2 Peak Flow and Design Frequency

The guidelines set forth in Section 4.3.1 of the FDOT Drainage Manual dated January 2023 were used to determine the design storm for this analysis. According to the manual, the I-95 over C-9 Canal Bridges are on the mainline interstate roadway, so the 50-year storm event is to be used as the design frequency storm. According to Section 4.9.2.2 in the FDOT Drainage Manual, the scour evaluation at the proposed bridge location would be using 100-year storm, and the scour design check flood frequency is using 500-year storm.

Based on the information provided in the SFWMD Permit No. 85-00070-S (dated May 2, 2012) documentation (see Appendix B) for the existing I-95 bridges across C-9 Canal, the flow data used in the original Hydrologic Engineering Center's River Analysis System (HEC-RAS) hydraulic model for the I-95 crossing were listed below in Table 1.

FEMA recently did a preliminary report for revising the Flood Insurance study (12086CV001B, 002B and 008B) dated February 25, 2021, and the flowrates for the 50-year, 100-year and 500-year storm have also been summarized in Table 1 for comparison with the SFWMD Permit No. 85-00070-S in 2012. It can be observed that the FEMA flowrates for 50-year and 100-year storm are higher than the BHR reported ones in 2012, and the 500-year storm flowrate is lower than the original reported one.

Table 1. Flowrates at the I-95 Bridges

	SFWMD Permit 85-00070-S Flowrate (cfs)	FEMA (I 95 EXPY &SR 9) Flowrate (cfs)
50-yr FDOT design storm	2972	3849
100-yr	3395	4117
250-yr	4200	N/A
500-yr	5777	4769

3. Hydraulic Analysis

3.1 General Hydraulics Information

Due to the limit information available at the current PD&E stage of this bridge replacement project, the HEC-RAS hydraulic model for the I-95 bridge over C-9 canal in SFWMD Permit No. 85-00070-S was used for evaluating the water surface profiles for the 50-, 100- and 500-year storm events (See Appendix B for the original printout of the HEC-RAS model). Based on the new FEMA preliminary report for revising the Flood Insurance study as shown in Table 1, the water surface elevation can be interpolated from the available data derived from the SFWMD permit in 2012. No HEC-RAS water surface profile analysis was performed for the proposed conditions.

3.2 Model Calibration and Results

The correlation of water surface elevations with flowrates obtained from the 2012 HEC-RAS model at the location of the I-95 Bridges over C-9 Canal (inside bridge cross section 515+06.02 upstream in the model) were used for developing a regression line. A linear relationship between the flowrate and the water surface elevation was established, and the coefficient of determination (R^2) is 0.994, which indicates that the linear model can perfectly predict the outcome (Figure 2).

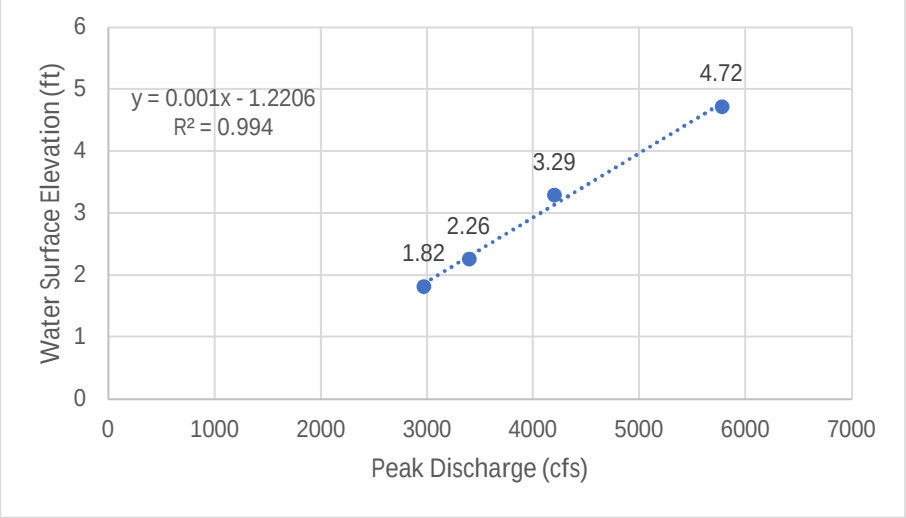


Figure 2. Linear Regression Relationship between Flowrates and Bridge Stage

The water surface elevations calculated by the above regression method have been summarized in Table 2 below. Since the FEMA peak discharge flowrates for 50-year and 100-year are higher than the SFWMD 2012 data, this water surface elevation is higher compared with SFWMD, though lower compared with the FEMA report.. However, for the 500-year peak discharge, the flow rate is smaller than the SFWMD permit data, and the water surface elevation is calculated lower than the original one reported in the SFWMD Permit. The preliminary results from the FEMA revised flood insurance study are also listed in Table 2 for comparison. The differences of the water surface elevations derive from different hydraulics models and hypotheses these two studies were using. It will be further studied once the FEMA XP-SWMM model is available for this bridge replacement project.

Table 2. Water Surface Elevation Results at the I-95 Bridges

	SFWMD Permit 85-00070-S		FEMA 2021 Study		
	Peak Discharge (cfs)	Stage (in 2012 BHR) (ft)	Peak Discharge (cfs)	Stage (Interpolated from 2012 BHR) (ft)	Stage (in FEMA Report) (ft)
50-yr FDOT design storm	2972	1.82	3849	**2.63**	**5.70**
100-yr	3395	2.26	4117	**2.90**	**6.50**
250-yr	4200	3.29	N/A	**N/A**	**N/A**
500-yr	5777	4.72	4769	**3.55**	**7.70**

According to the SFWMD requirements, a minimum vertical clearance of 2 feet above the Design Water Surface Elevation (determined from the 50 yr Design Storm) or 6 feet above the Optimum Water Surface Elevation (= Normal High Water Elevation), whichever produces the higher elevation, should be maintained at the I-95 Bridge Crossing over the C-9 Canal. FDOT requires that the minimum vertical clearance between the design flood stage and the low member of a bridge is 2 feet, and 6 feet above the control elevation for regulated/controlled lakes and canals, which in this case is the same as the Normal High Water Elevation. Vertical clearances for the existing and proposed I-95 bridges are calculated and provided in Table 3.

Please note that the low member elevation of the proposed bridge is 16.24 ft at this preliminary design stage, while the low member elevation of the existing bridge is 6.91 ft. The normal high water (NHW) elevation at the location of the bridges is set to be at 0.43 ft to be consistent with the SFWMD 2012 Permit. To be conservative, the new NHW elevation (last column in Table 3) for the C-9 Canal at the location of the bridge is set to be 3.10 ft (10-year storm event as reported in FEMA Report, see Appendix B for reference). The use of the 10-year storm event NHW Elevation of 3.10 ft is a conservative estimate when compared to the actual NHW Elevation of 0.43 ft as presented in the SFWMD 2012 Permit. The use of Elevation 3.10 ft will also bring the design consistent with the criteria set forth in the FEMA Study. As the clearance shown in Table 3, the improvements project will meet the above mentioned SFWMD and FDOT clearance requirements under either condition. A further study is needed when the FEMA hydraulics model is available to us.

Table 3. Vertical Clearances at the I-95 Bridges

	(LOW MEMBER EL. = 6.91) Existing (SFWMD Permit 85-00070-S) (ft)	(LOW MEMBER EL. = 16.24) Proposed (using 2012 BHR NHW) (ft)	(LOW MEMBER EL. = 16.24) Proposed (using FEMA Reported 10-yr WSE as NHW) (ft)
Above Normal High Water	6.48 (NHW=0.43')[1] (6' min. reqd.)	**15.81** (NHW=0.43')[1] (6' min. reqd.)	**13.14** (NHW=3.10')[2] (6' min. reqd.)
Above 50-year Design Storm	5.09 (DHW=1.82')[3] (2' min. reqd.)	**13.61** (DHW=2.63')[4] (2' min. reqd.)	**10.54** (DHW=5.70')[5] (2' min. reqd.)

1 - Taken from 2012 BHR (see Appendix B)
2 - Taken from FEMA Flood Insurance Study (see Appendix A)
3 - Taken from BHRS in 2012 BHR (see Table 2 and Appendix B)
4 - Taken from Linear Regression Relationships (see Figure 2 and Table 2)
5 - Taken from FEMA Flood Insurance Study (see Appendix A)

4. Channel Excavation

Since the proposed project improvements do not require any alterations to the existing channel geometry, therefore, no channel excavation is required. The piles supporting the existing I-95 bridges will be removed from C-9 Canal since the new bridges are proposed without using piles. The proposed bridges are single span bridges with prestressed beams, and the coordination with SFWMD will be needed for removing the existing piles. The channel should be returned to its normal condition after the removal of the piles.

5. Scour Estimation

No electronic version of the floodplain was available at the time of this report. A request to FEMA will be made to provide an electronic version of the regulatory floodplain model for the benefit of future design phases. For this phase, scour calculations were made using a pdf copy of the 2012 BHR (see Reference 3).

5.1 General Scour Analysis Information

Scour for both the scour design flood event (100 year storm) and the scour check flood event (500 year storm) were calculated at the I-95 Bridges. The scour estimation flood events were selected based on Table 4.2 in Section 4.9.2.2 in the FDOT Drainage Manual (January 2023). Typically, the total scour is the sum of the long-term scour, the contraction scour and the pier scour. However, since the C-9 Canal is a controlled canal that is maintained on a regular basis and the channel cross sections do not indicate the presence of long-term scour, general scour was not considered as part of this analysis.

5.2 Contraction Scour Analysis

The contracted section can be represented as the downstream end of the bridge where the flow is still contracted. The main channel section is considered to be about one bridge length upstream where the flow is uniform and not influenced by the bridge contraction. Both of the existing I-95 bridges have a length of 132 feet. The stream cross-sections at Section 516+91.44 and Bridge Section 515+06.02 are, therefore, taken as the normal and contracted sections respectively.

The abutments are located at the edge of the main channel indicating a flow condition similar to Case 1b in HEC-18 Figure 6.2.

Due to the increase of the 100-year peak discharge recently reported by FEMA preliminary flood insurance report as shown in Table 1, the 250-year peak discharge used in the HEC-RAS model of the original 2012 BHR was used for the new scour computation of the 100-year storm event in this report. The FEMA 500-year peak discharge is less than the original 2012 HEC-RAS model, to be conservative, the larger flowrate of 5,777 cfs is used in this report for the contraction scour analysis for the scour design check flood frequency of 500-year storm, which is required by FDOT.

Due to the lack of geotechnical investigation for the project at this stage of design, the soil particle D-50 value utilized in the scour calculations at the I-95 Bridges is 0.25 mm. The grain size distribution curves are provided in Appendix B, which were investigated in the 2012 BHR for the bridge widening project. The soil boring information and laboratory test will be necessary for the final design phase of this project.

The next step is to determine if the contraction scour is clear-water scour or live-bed scour. To determine if the flow upstream of the bridge is transporting bed material, calculate the critical velocity for beginning of motion Vc of the D_{50} size of the bed material being considered for movement and compare it with the mean velocity V of the flow in the main channel area upstream of the bridge opening. If the critical velocity of the bed material is larger than the mean velocity (Vc > V), then clear-water contraction scour will exist. If the critical velocity is less than the mean velocity (Vc < V), then live-bed contraction scour will exist. The following equation is used to calculate Vc:

$$Vc = K_u y^{1/6} D^{1/3} \qquad \text{Equation 6.1 HEC-18 Manual}$$

Where, *Vc* = Critical velocity above which bed material of size D and smaller will be transported, feet/s

y = Average depth of flow upstream of the bridge, feet

D = Particle size for Vc, feet

D_{50} = Particle size in a mixture of which 50 percent are smaller, feet

K_u = 11.17 English units

The calculated results indicate that the live-bed contraction scour exists in the main channel (Table 4). Therefore, the modified version of Laursen's equation (1960) for live-bed scour (Equation 6.2 of HEC-18) is used to predict the depth of scour in the main channel section.

Table 4. Contraction Scour Conditions for 100- and 500-Year Storm Events

	100-Year	500-Year
Avg. Velocity (V) (ft/s)	1.97	2.35
Ku (English Units)	11.17	11.17
Avg depth of flow upstream of bridge (y) (ft)	16.64	18.18
Particle size for Vc (ft)	0.00082	0.00082
Critical Velocity (Vc) (ft/s) Eq 5.1, HEC-18	1.67	1.70
Contraction Scour Condition	Vc<V, Live-Bed Scour	Vc<V, Live-Bed Scour

Based on the results show in Table 4, it has been determined that the contraction scour for the main channel will be live-bed scour. The fall velocity for bed material with a particle size of 0.25 mm is around 0.035 m/sec or 0.115 ft/sec (main channel), based on Figure 6.8, HEC-18 (as shown in Figure 3).

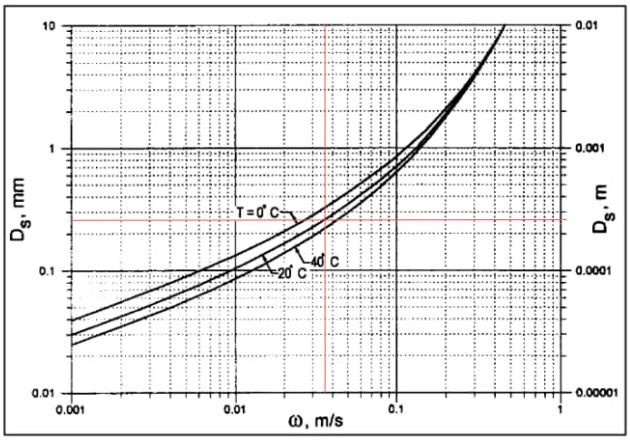


Figure 3. Particle Fall Velocities (Figure 6.8, HEC-18 Manual)

The HEC-RAS analysis carried out for the 250-year (used for 100-year storm event here) and 500-year storm events gives average depths in the upstream main channel and the average energy slopes between the approach section and bridge section. Table 5 below summarizes the determination of k1.

Table 5. Determination of k1 Factor for the Main Channel

Storm	Energy Slope	Average Depth (y1) (ft)	Shear Velocity (ft/s)	Fall Velocity (ft/s)	Ratio – Shear / Fall Velocity (ft/s)	k_1	Sediment Movement
100-Year	0.000104	16.64	0.24	0.115	2.06	0.69	Mostly suspended bed material discharge
500-Year	0.000135	18.18	0.28	0.115	2.45	0.69	Mostly suspended bed material discharge

The modified version of Laursen's equation for live-bed scour (Equation 6.2 of HEC-18) is used to predict the depth of scour in a contracted section. Laursen's equation for estimating scour in a contracted section in a rectangular channel can be expressed as follows:

$$y_2/y_1 = (Q_2/Q_1)^{6/7} (W_1/W_2)^{k1}$$ Equation 6.2 HEC-18 Manual

y_s = Average contraction scour depth = $y_2 - y_o$

where,

y_1, y_2 = Average Flow depths in the upstream main channel and the contracted section

y_o = Existing depth in the contracted section before scour

Q_1, Q_2 = Flows in the upstream main channel and the contracted section

W_1, W_2 = Bottom widths of the upstream main channel and the contracted section

k_1 = exponent related to sediment transport.

This is a comparative equation, which balances the rates of sediment transport at the un-contracted and contracted sections. The contraction scour is computed for the main channel areas, and the results are summarized in Table 6.

Table 6. Live-Bed Contraction Scour Results

	100-Year	500-Year
Average depth in upstream main channel (y_1) (ft)	16.64	18.18
Flow in the upstream channel transporting sediment (Q_1) (ft^3/s)	4200.00	5777.00
Flow in the contracted channel (Q_2) (ft^3/s)	4200.00	5777.00
Width of the upstream main channel that is transporting bed material (W_1) (ft)	190	209
Width of the main channel in the contracted section (W_2) (ft)	104	127
Exponent K_1	0.69	0.69
Average depth in the contracted section (y_2) (ft) – Eq 6.2, HEC-18	25.21	25.65
WSEL	3.37	4.85
Average Bed Elevation	-13.99	-13.99
Existing depth in the contracted section before scour (y_o)(ft)	17.36	18.84
Average contraction scour depth (y_s) (ft) = y_2 - y_0 – Eq. 6.3, HEC-18	**7.85**	**6.81**

As seen in Table 6, scour was computed for both the scour design flood event (100-year storm) and the scour check flood event (500-year storm). These represent the total scour depths for the proposed I-95 bridge location, since there is no long-term scour in the C-9 Canal. When comparing the average contraction scour depth results, the 500-year scour depth is lower than the 100-year scour depth. In this case, with not particularly high scour calculated, the higher water depth of the 500-year storm event actually keeps the contraction scour down.

Pressure flow scour will not be considered in this study since it only applies to conditions involving a submerged bridge superstructure. For the current analysis, pressure flow conditions are not presented under the 100-year and 500-year storm events, so this scour situation is not presented in this study.

Since the existing bridge piers will be removed under the proposed condition, there is no need for the scour analysis for the piers. The existing bridge abutments are protected with riprap. The proposed bridge abutment area will also be protected with riprap. Therefore, abutment scour was not computed in this report.

6. Countermeasures

Riprap was sized using HEC-23 methodology for an abutment scour protection countermeasure for 100-yr storm event. See Table 7 for a summary table and Appendix C for detailed computations.

$$D_{50} = \frac{K}{S_s - 1}\left[\frac{V^2}{gy}\right]y \qquad \text{Eq. 14.1 HEC-23 Manual}$$

D_{50} = median stone diameter, (ft)

V = characteristic average velocity in the contracted section (fps)

S_s = specific gravity of rock riprap

g = gravitational acceleration (32.2 ft/s^2)

y = depth of flow in the contracted bridge opening, (ft)

K = 0.89 for Spill-through abutment.

Table 7. Riprap Sizing for Abutment Scour Protection

	Left and Right Abutment
Channel Flow (cfs)	4200
Flow Area in the channel (sf)	1619.18
Depth of flow in the contracted bridge opening (ft)	17.74
V (ft/s)	3.48
FR	0.15
D_{50} (ft)	0.26

Appendix C provides the design of riprap countermeasures proposed for the abutments. The following gives a summary:

- Provide Rubble Riprap D_{50} = 0.5 foot (6 inches) based on FDOT Standard Sizes.
- The apron at the toe of the abutment should extend along the entire length of the toe of extended abutments.
- The apron should extend from the toe of the abutment into the bridge waterway at a distance equal to twice the flow depth (2 x flow depth=34.6 feet) or 25 feet, whichever is less (refer to Figure 5).
- The apron should extend for a minimum length of twice the flow depth (2 x flow depth=34.6 feet) or 25 feet, whichever is greater, beyond the bridge on either side (refer to Figure 5).
- Provide Rubble Riprap 2.5 feet thick over filter fabric Type D-2 based on FDOT Standard.

Standard method of placement of riprap is shown in Figures 4 and 5. The detailed computation can be found in Appendix B.

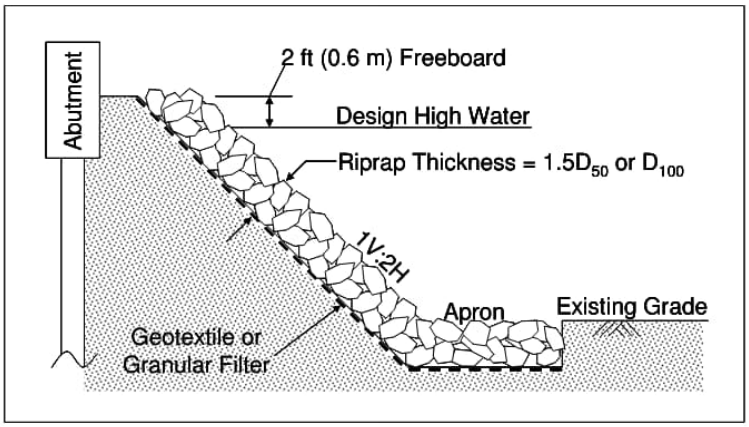


Figure 4. Riprap Revetment Details (DG-14 HEC-23)

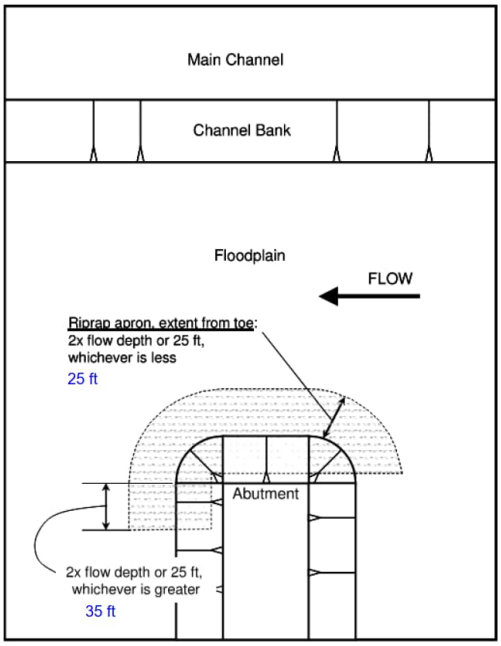


Figure 5. Scour Countermeasures at Bridge Abutment (HEC-23 Manual)

7. Conclusions and Recommendations

As discussed throughout this report, the proposed replacement of the I-95 Bridges over the C-9 Canal will not adversely impact the bridge clearance along the C-9 Canal and will provide the FDOT required 2 feet of drift clearance above the 50-year stage. The proposed bridge design is such that contraction scour will not be an issue due to the riprap countermeasures being proposed. The abutments through the limits of the proposed replacement will be protected with riprap.

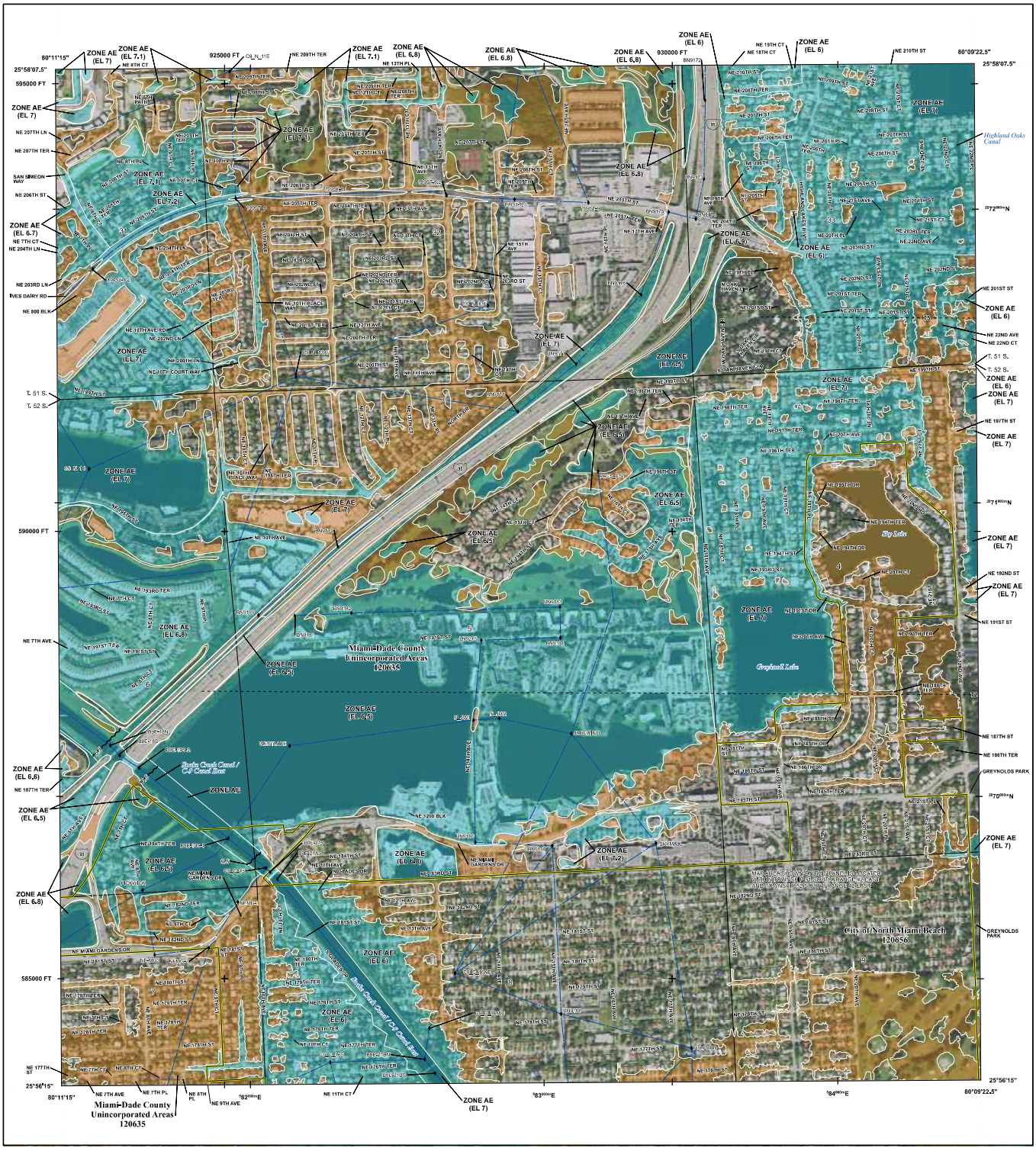
The South Florida Water Magnement District (SFWMD) C-9 (Snake Creek) Canal is a Central and Southern Florida (C&SF) federal flood control project, and as such, a U.S. Army Corps of Engineers (USACE) Section 408 Civil Works Approval is required. In addition to FDOT and SFWMD criteria, the project will be required to meet USACE criteria consistent with the original canal design section and data.

As for the limited information available at the current PD&E study stage of the project, a more detailed bridge hydrologic and hydraulic study will be needed when the design of the bridge is final, and must include information as required by the FDOT Drainage Manual Section 4.11.2.4 for category 1 and 2 bridges. The FEMA hydraulics model is needed for the designer to evaluate the effect of the bridge improvement. A more detailed updated geotechnical study in the bridge replacement area is needed for the scour analysis.

8. References

1. Florida Department of Transportation. Bridge Scour Manual. June 2022.
2. Florida Department of Transportation. Drainage Manual. January 2023.
3. Reynolds, Smith and Hills, Inc. I-95 Bridges over Snake Creek (C-9) Canal Bridge Hydraulics Report. September 2009.
4. US Department of Transportation Federal Highway Administration. Hydraulic Engineering Circular No. 18. Evaluating Scour at Bridges (Fifth Edition). April 2012.
5. US Department of Transportation Federal Highway Administration. Hydraulic Engineering Circular No. 23. Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance (Third Edition) Volume 2. September 2009.

Appendix A FEMA FIRM Maps and SFWMD Basin Maps



FLOOD HAZARD INFORMATION

SEE ITS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to 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.

Base map information shown on this FIRM was provided in digital format by Miami-Dade County, dated 2001, 2018 and 2019; the South Florida Water Management District, dated 2003; the U.S. Army Corps of Engineers, dated 2020; and the U.S. Department of Agriculture, dated 2020.

SCALE

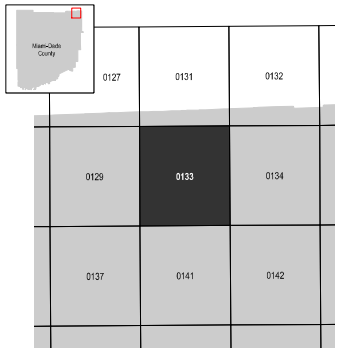
Map Projection:
State Plane Transverse Mercator, Florida East Zone 0901; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR



FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA
and Incorporated Areas

PANEL **133** OF **1031**

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
MIAMI-DADE COUNTY	120635	0133	M
NORTH MIAMI BEACH, CITY OF	120656	0133	M

PRELIMINARY
2/25/2021

VERSION NUMBER
2.6.3.5

MAP NUMBER
12086C0133M

MAP REVISED

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 8

MIAMI-DADE COUNTY, FLORIDA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AVENTURA, CITY OF	120676	MIAMI-DADE COUNTY, UNINCORPORATED AREAS	120635
BAL HARBOUR VILLAGE, VILLAGE OF	120636	MIAMI GARDENS, CITY OF	120345
BAY HARBOR ISLANDS, TOWN OF	120637	MIAMI LAKES, TOWN OF	120686
BISCAYNE PARK, VILLAGE OF	120638	MIAMI SHORES VILLAGE, VILLAGE OF	120652
CORAL GABLES, CITY OF	120639	MIAMI SPRINGS, CITY OF	120653
CUTLER BAY, TOWN OF	120218	NORTH BAY VILLAGE, CITY OF	120654
DORAL, CITY OF	120041	NORTH MIAMI, CITY OF	120655
EL PORTAL, VILLAGE OF	120640	NORTH MIAMI BEACH, CITY OF	120656
FLORIDA CITY, CITY OF	120641	OPA-LOCKA, CITY OF	120657
GOLDEN BEACH, TOWN OF	120642	PALMETTO BAY, VILLAGE OF	120687
HIALEAH, CITY OF	120643	PINECREST, VILLAGE OF	120425
HIALEAH GARDENS, CITY OF	120644	SOUTH MIAMI, CITY OF	120658
HOMESTEAD, CITY OF	120645	SUNNY ISLES BEACH, CITY OF	120688
INDIAN CREEK VILLAGE, VILLAGE OF	120646	SURFSIDE, TOWN OF	120659
KEY BISCAYNE, VILLAGE OF	120648	SWEETWATER, CITY OF	120660
MEDLEY, TOWN OF	120649	VIRGINIA GARDENS, VILLAGE OF	120661
MIAMI, CITY OF	120650	WEST MIAMI, CITY OF	120662
MIAMI BEACH, CITY OF	120651		

PRELIMINARY

02/25/2021

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER
12086CV001B
Version Number 2.6.3.5

FEMA

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Snake Creek Canal (C-9)	AQUA BOWL LAKE	88.92	3,596	4,241	4,743	5,320	6,513
Snake Creek Canal (C-9)	N GLADES DR & NE 167TH ST	88.59	3,533	4,127	4,559	5,074	6,043
Snake Creek Canal (C-9)	NE 168TH ST & S GLADES DR	87.28	3,528	4,118	4,549	5,061	6,022
Snake Creek Canal (C-9)	WILSHIRE POND	85.09	3,419	3,953	4,343	4,779	5,732
Snake Creek Canal (C-9)	NE 15TH AVE & NE 171ST ST	85.09	3,419	3,953	4,343	4,779	5,732
Snake Creek Canal (C-9)	NE 176TH TER & S GLADES DR	84.88	3,417	3,951	4,340	4,775	5,725
Snake Creek Canal (C-9)	PICKWICK LAKE	82.14	3,365	3,858	4,200	4,572	5,442
Snake Creek Canal (C-9)	NE 185TH ST & SR 860	82.02	3,363	3,856	4,196	4,567	5,435
Snake Creek Canal (C-9)	WEST LAKE	81.75	3,171	3,589	3,849	4,117	4,769
Snake Creek Canal (C-9)	I 95 EXPY & SR 9	81.75	3,171	3,589	3,849	4,117	4,769
Snake Creek Canal (C-9)	CHAMPION LAKES	78.48	3,169	3,587	3,845	4,109	4,762
Snake Creek Canal (C-9)	SIERRA DR & NE 3RD AVE	76.44	2,935	3,330	3,580	3,852	4,543
Snake Creek Canal (C-9)	EAST ANDOVER CANAL	75.65	2,925	3,319	3,561	3,797	4,259
Snake Creek Canal (C-9)	NE 199TH ST & IVES DAIRY RD	75.48	2,925	3,318	3,560	3,795	4,255
Snake Creek Canal (C-9)	NW 2ND AVE & SR 7	73.29	2,727	2,975	3,136	3,313	3,515

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 8

MIAMI-DADE COUNTY, FLORIDA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AVENTURA, CITY OF	120676	MIAMI-DADE COUNTY, UNINCORPORATED AREAS	120635
BAL HARBOUR VILLAGE, VILLAGE OF	120636	MIAMI GARDENS, CITY OF	120345
BAY HARBOR ISLANDS, TOWN OF	120637	MIAMI LAKES, TOWN OF	120686
BISCAYNE PARK, VILLAGE OF	120638	MIAMI SHORES VILLAGE, VILLAGE OF	120652
CORAL GABLES, CITY OF	120639	MIAMI SPRINGS, CITY OF	120653
CUTLER BAY, TOWN OF	120218	NORTH BAY VILLAGE, CITY OF	120654
DORAL, CITY OF	120041	NORTH MIAMI, CITY OF	120655
EL PORTAL, VILLAGE OF	120640	NORTH MIAMI BEACH, CITY OF	120656
FLORIDA CITY, CITY OF	120641	OPA-LOCKA, CITY OF	120657
GOLDEN BEACH, TOWN OF	120642	PALMETTO BAY, VILLAGE OF	120687
HIALEAH, CITY OF	120643	PINECREST, VILLAGE OF	120425
HIALEAH GARDENS, CITY OF	120644	SOUTH MIAMI, CITY OF	120658
HOMESTEAD, CITY OF	120645	SUNNY ISLES BEACH, CITY OF	120688
INDIAN CREEK VILLAGE, VILLAGE OF	120646	SURFSIDE, TOWN OF	120659
KEY BISCAYNE, VILLAGE OF	120648	SWEETWATER, CITY OF	120660
MEDLEY, TOWN OF	120649	VIRGINIA GARDENS, VILLAGE OF	120661
MIAMI, CITY OF	120650	WEST MIAMI, CITY OF	120662
MIAMI BEACH, CITY OF	120651		

PRELIMINARY

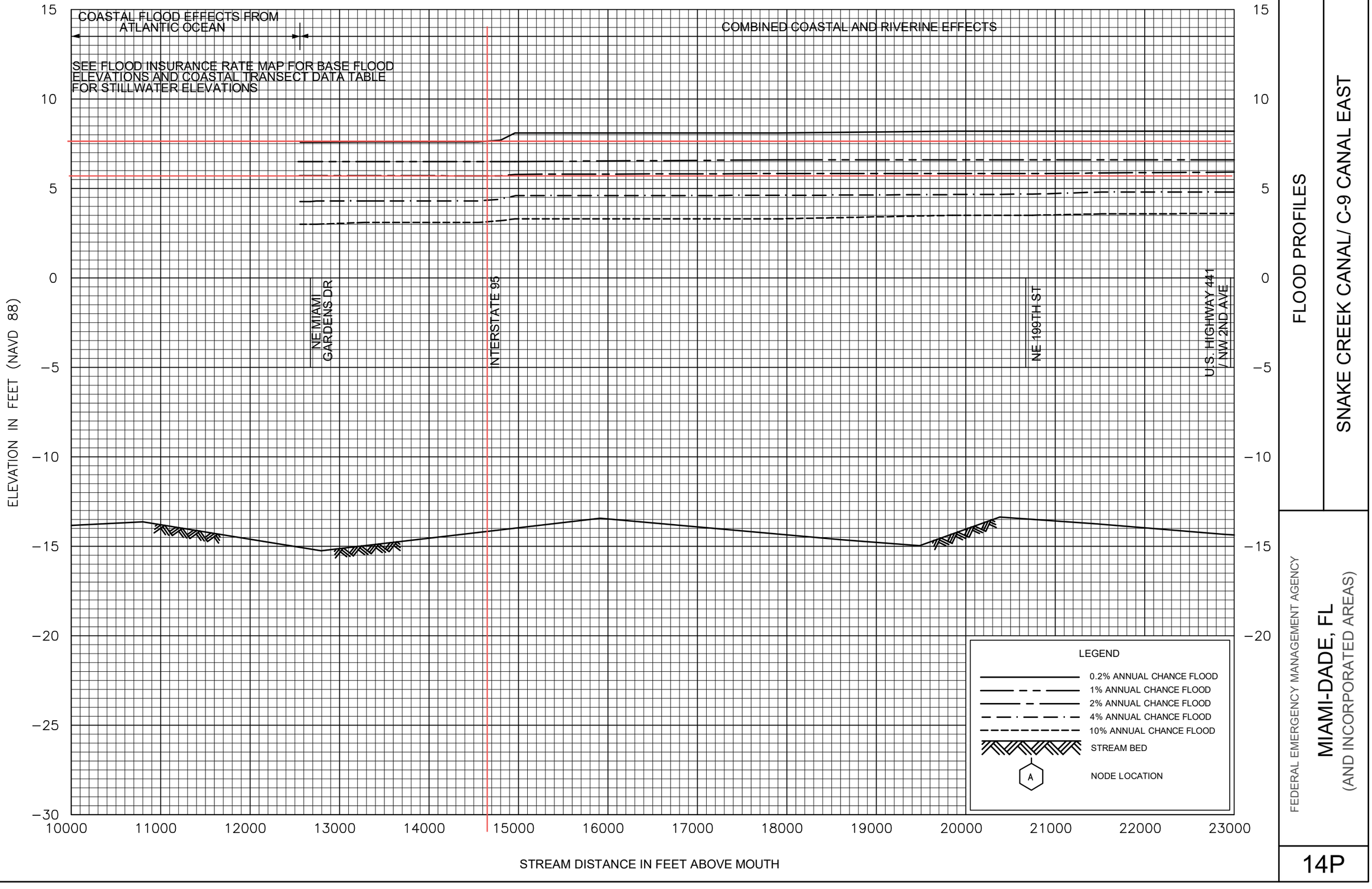
02/25/2021

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER
12086CV002B
Version Number 2.6.3.5

FEMA



FLOOD PROFILES

SNAKE CREEK CANAL/ C-9 CANAL EAST

FEDERAL EMERGENCY MANAGEMENT AGENCY

MIAMI-DADE, FL

(AND INCORPORATED AREAS)

14P

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 8 OF 8

MIAMI-DADE COUNTY, FLORIDA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AVENTURA, CITY OF	120676	MIAMI-DADE COUNTY, UNINCORPORATED AREAS	120635
BAL HARBOUR VILLAGE, VILLAGE OF	120636	MIAMI GARDENS, CITY OF	120345
BAY HARBOR ISLANDS, TOWN OF	120637	MIAMI LAKES, TOWN OF	120686
BISCAYNE PARK, VILLAGE OF	120638	MIAMI SHORES VILLAGE, VILLAGE OF	120652
CORAL GABLES, CITY OF	120639	MIAMI SPRINGS, CITY OF	120653
CUTLER BAY, TOWN OF	120218	NORTH BAY VILLAGE, CITY OF	120654
DORAL, CITY OF	120041	NORTH MIAMI, CITY OF	120655
EL PORTAL, VILLAGE OF	120640	NORTH MIAMI BEACH, CITY OF	120656
FLORIDA CITY, CITY OF	120641	OPA-LOCKA, CITY OF	120657
GOLDEN BEACH, TOWN OF	120642	PALMETTO BAY, VILLAGE OF	120687
HIALEAH, CITY OF	120643	PINECREST, VILLAGE OF	120425
HIALEAH GARDENS, CITY OF	120644	SOUTH MIAMI, CITY OF	120658
HOMESTEAD, CITY OF	120645	SUNNY ISLES BEACH, CITY OF	120688
INDIAN CREEK VILLAGE, VILLAGE OF	120646	SURFSIDE, TOWN OF	120659
KEY BISCAYNE, VILLAGE OF	120648	SWEETWATER, CITY OF	120660
MEDLEY, TOWN OF	120649	VIRGINIA GARDENS, VILLAGE OF	120661
MIAMI, CITY OF	120650	WEST MIAMI, CITY OF	120662
MIAMI BEACH, CITY OF	120651		

PRELIMINARY

02/25/2021

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER
12086CV008B
Version Number 2.6.3.5

FEMA

Appendix A: XP-SWMM Node Location Elevations (continued)

Flooding Source	Node ID	Elevations (feet NAVD88)				
		(10 YR Storm) 10% Annual Chance	(25 YR Storm) 4% Annual Chance	(50 YR Storm) 2% Annual Chance	(100 YR Storm) 1% Annual Chance	(500 YR Storm) 0.2% Annual Chance
Snake Creek Canal, C-9	B9E-12E	4.2	5.2	6.0	6.6	8.2
Snake Creek Canal, C-9	B9E-13AE	4.1	5.2	6.0	6.6	8.2
Snake Creek Canal, C-9	B9E-16E	3.6	4.8	5.9	6.6	8.2
Snake Creek Canal, C-9	B9E-16W	3.7	4.9	5.9	6.6	8.2
Snake Creek Canal, C-9	B9E-17S	3.5	4.7	5.8	6.6	8.2
Snake Creek Canal, C-9	B9E-18N	3.2	4.4	5.8	6.5	7.8
Snake Creek Canal, C-9	B9E-18S	3.1(NHW)	4.4	5.7	6.5	7.7
Snake Creek Canal, C-9	B9E-19S-1	3.0	4.3	5.7	6.5	7.6
Snake Creek Canal, C-9	B9E-19S-2	3.1	4.3	5.7	6.5	7.7
Snake Creek Canal, C-9	B9E-20AN	*	*	*	*	*
Snake Creek Canal, C-9	B9E-20AS	*	*	*	*	*
Snake Creek Canal, C-9	B9E-20S	*	*	*	*	*
Snake Creek Canal, C-9	B9E-21AS	*	*	*	*	*
Snake Creek Canal, C-9	B9E-21BN	*	*	*	*	*
Snake Creek Canal, C-9	B9E-21BS	*	*	*	*	*
Snake Creek Canal, C-9	B9E-21S	3.0	4.2	5.7	6.5	7.6
Snake Creek Canal, C-9	B9E-23E	*	*	*	*	*
Snake Creek Canal, C-9	B9E-24E	*	*	*	*	*
Snake Creek Canal, C-9	B9E-25E	*	*	*	*	*
Snake Creek Canal, C-9	B9E-26AE	*	*	*	*	*
Snake Creek Canal, C-9	B9E-26E	*	*	*	*	*
Snake Creek Canal, C-9	B9E-6DS	4.4	5.4	6.1	6.6	8.3
Snake Creek Canal, C-9	B9E-7E	4.7	5.5	6.1	6.6	8.3
Snake Creek Canal, C-9	BC_S29_H(t)	*	*	*	*	*
Snake Creek Canal, C-9	BC_S29_Q(t)	*	*	*	*	*
Snake Creek Canal, C-9	BC_S29E	*	*	*	*	*
Snake Creek Canal, C-9	BC_S29H	*	*	*	*	*
Snake Creek Canal, C-9	BN9000	*	*	*	*	*
Snake Creek Canal, C-9	BN9001	6.8	7.0	7.1	7.0	7.0
Snake Creek Canal, C-9	BN9002	6.8	7.0	7.1	7.0	7.0
Snake Creek Canal, C-9	BN9124	4.7	5.2	5.6	5.8	8.4
Snake Creek Canal, C-9	BN9125	4.7	5.2	5.6	5.8	8.4

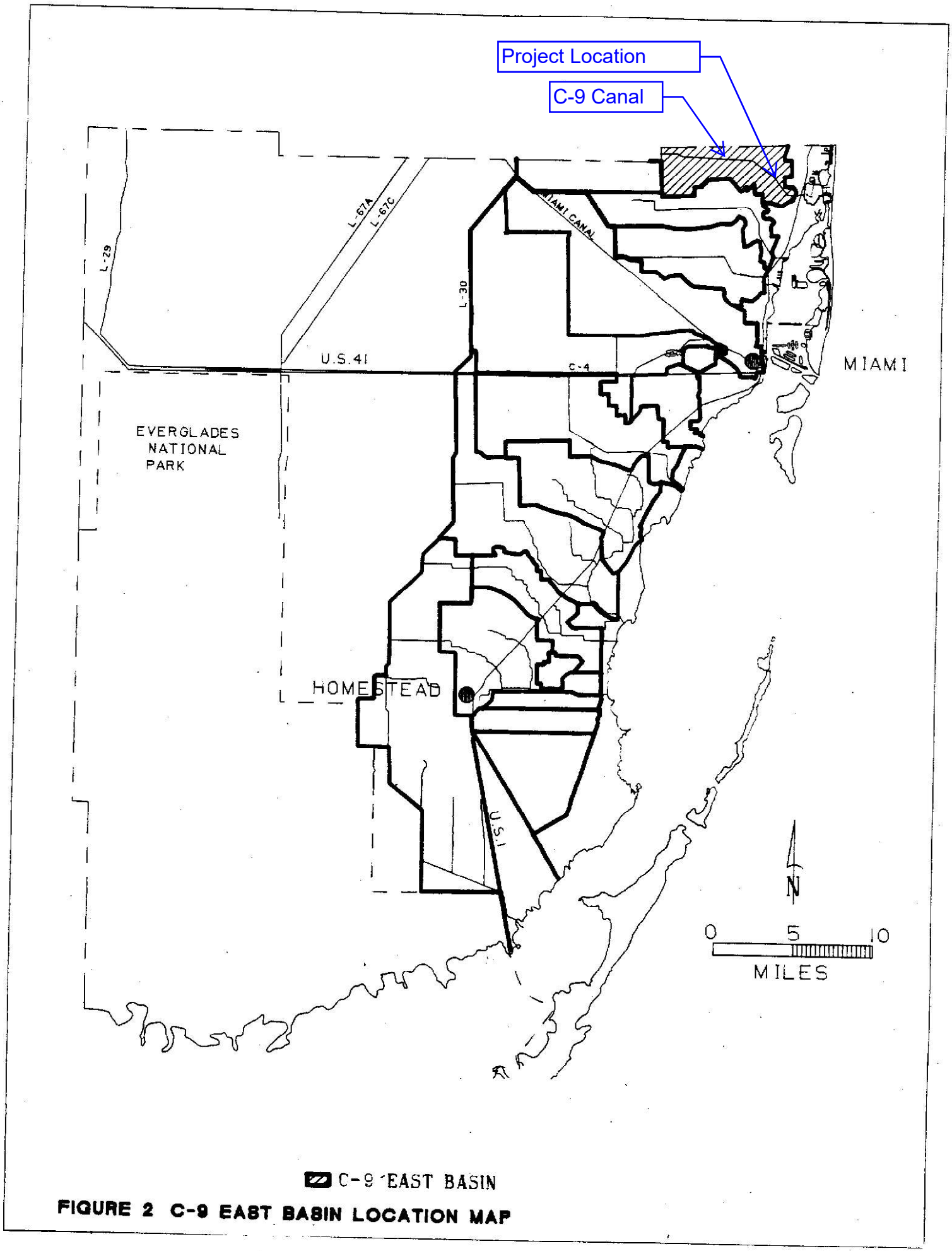


FIGURE 2 C-9 EAST BASIN LOCATION MAP

C-9 EAST

~34.000 ACRES

~14.000 ACRES DADE

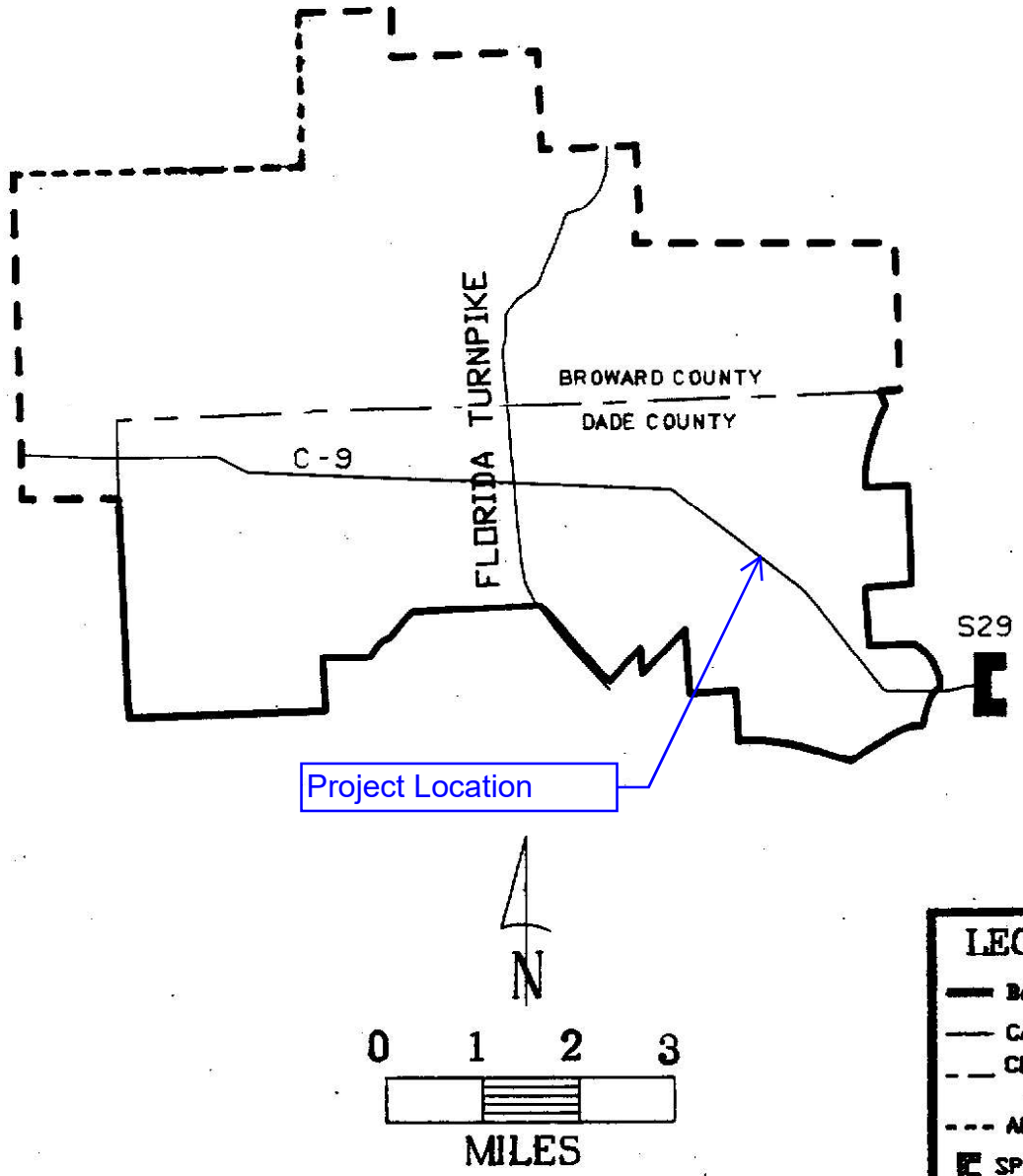


FIGURE 3 C-9 EAST BASIN MAP

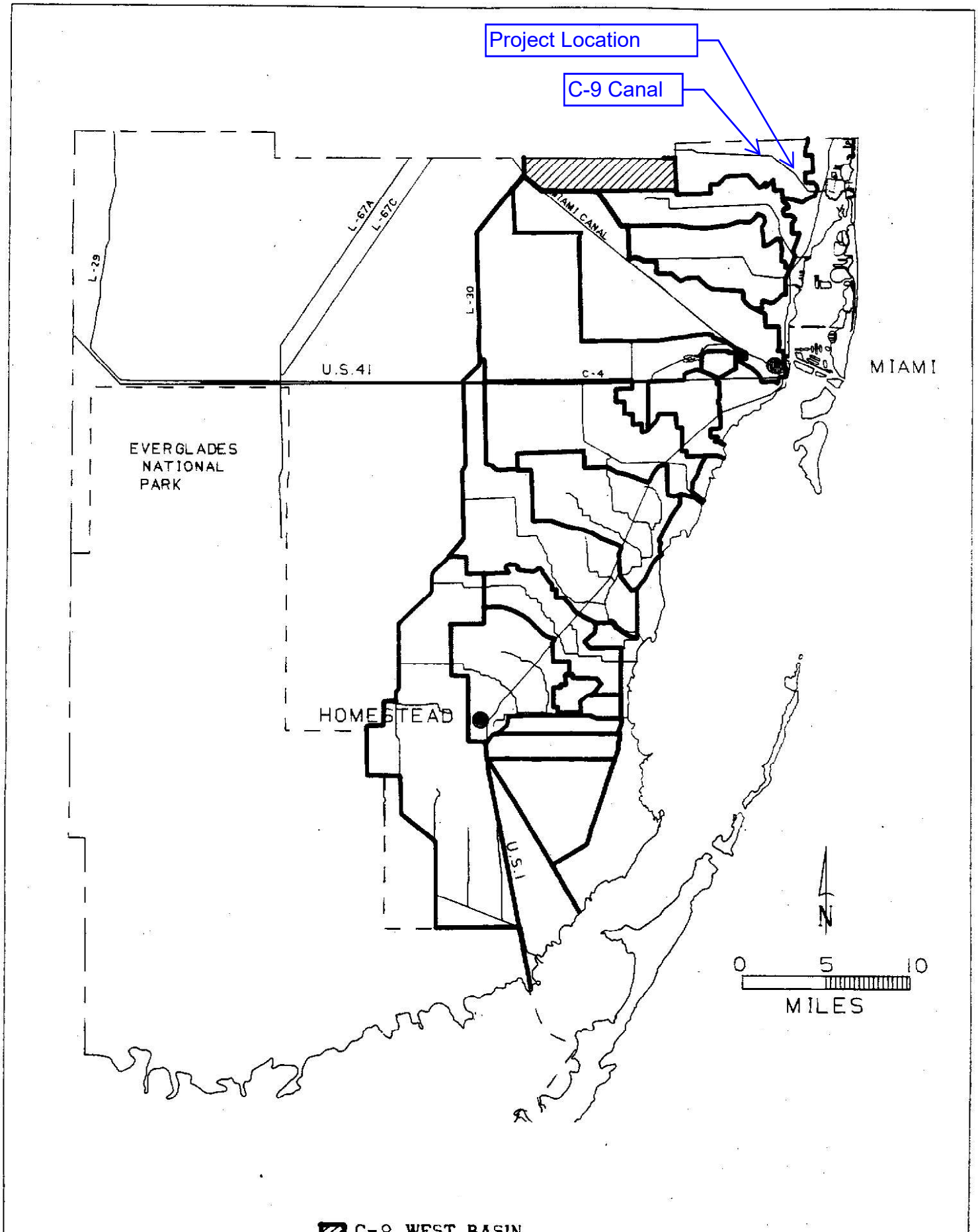


FIGURE 4 C-9 WEST BASIN LOCATION MAP

C-9 WEST

~29,000 ACRES

~ 11,000 ACRES DADE

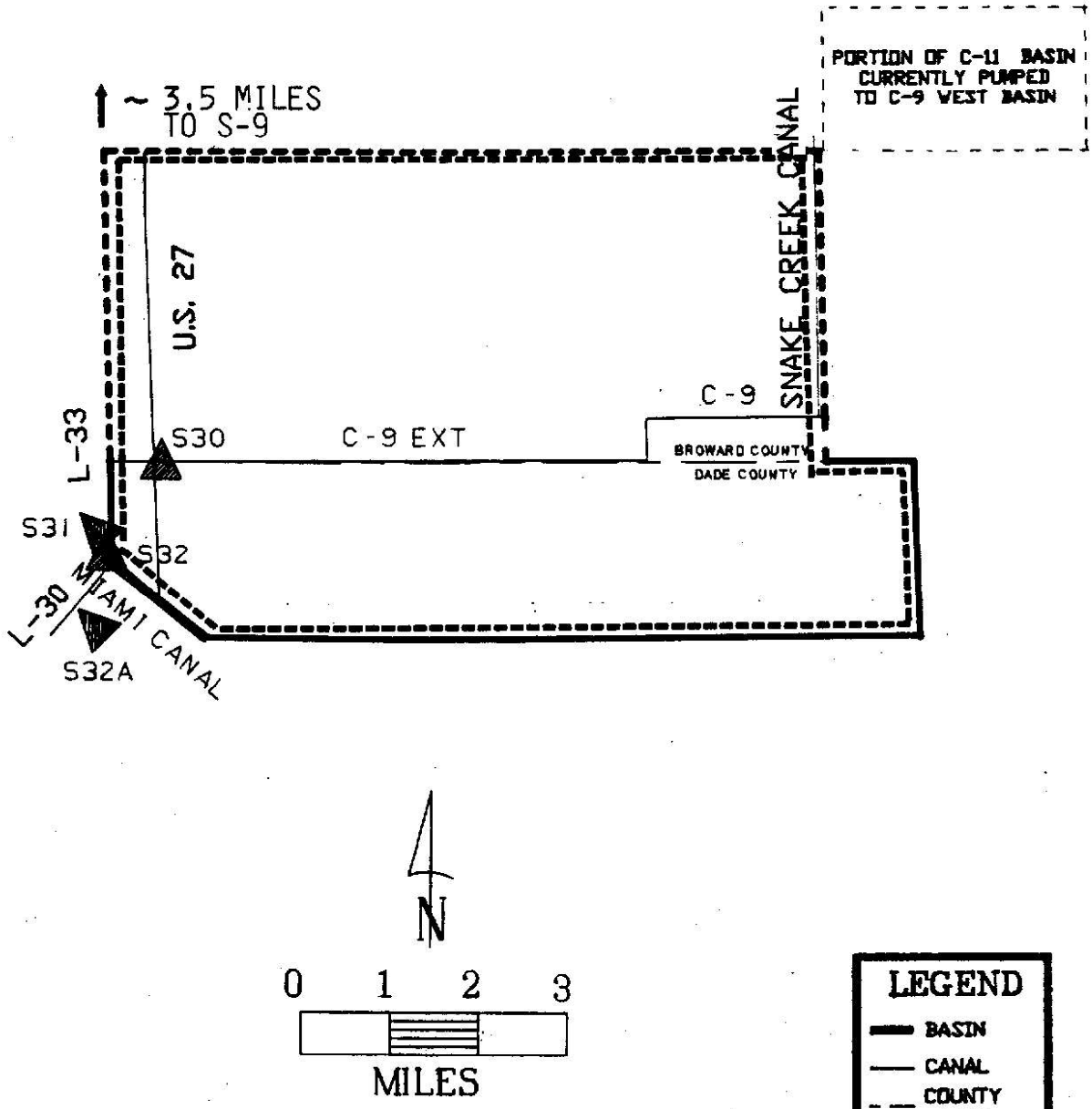
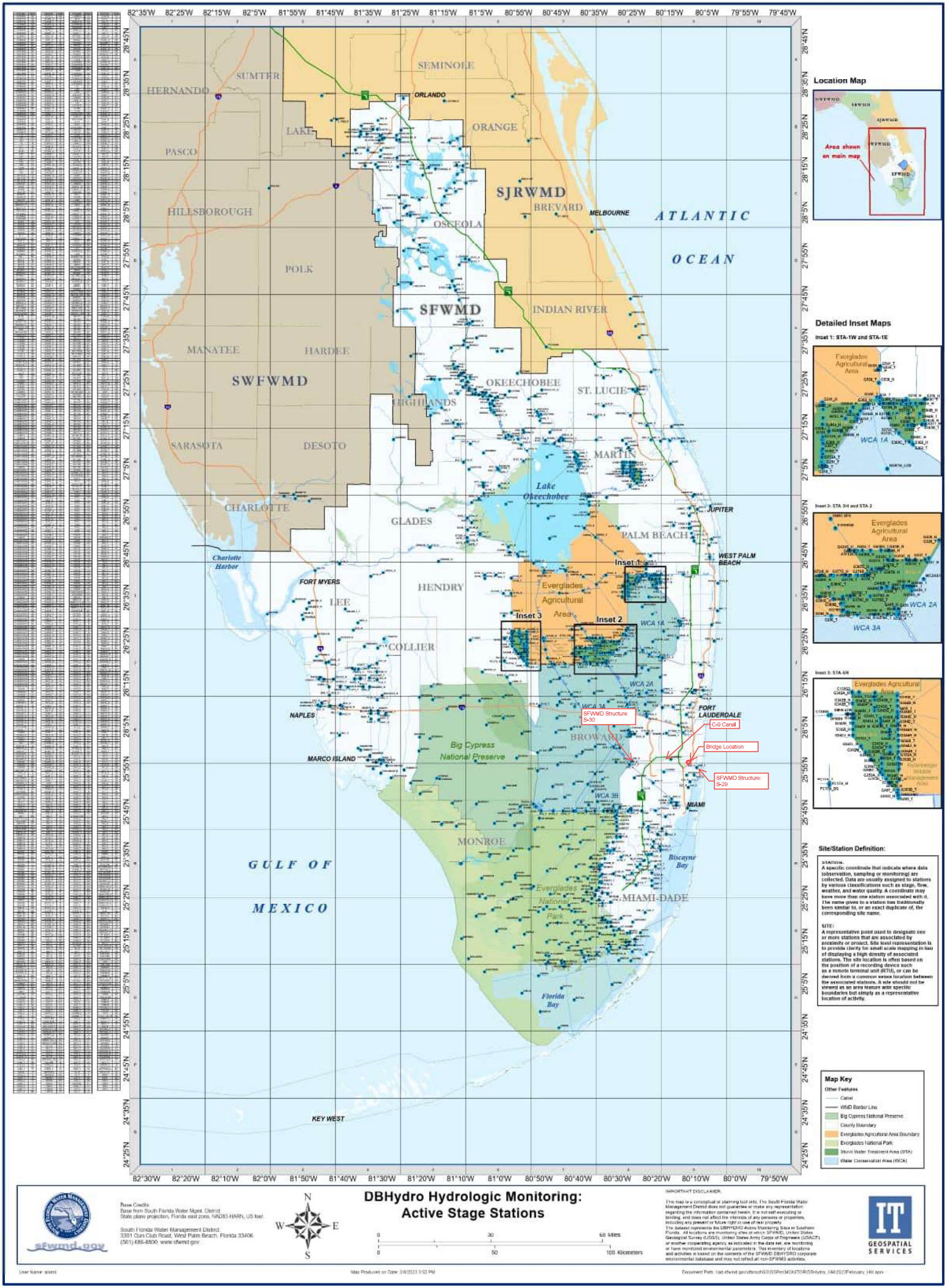
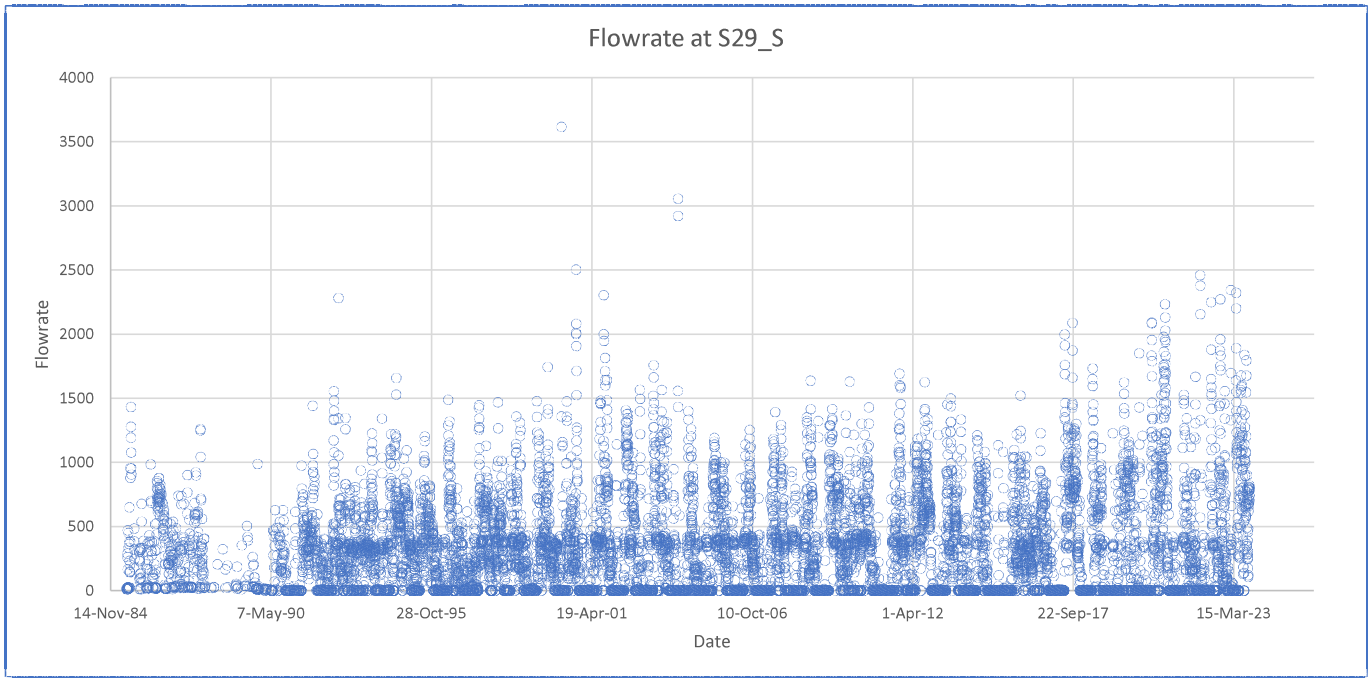


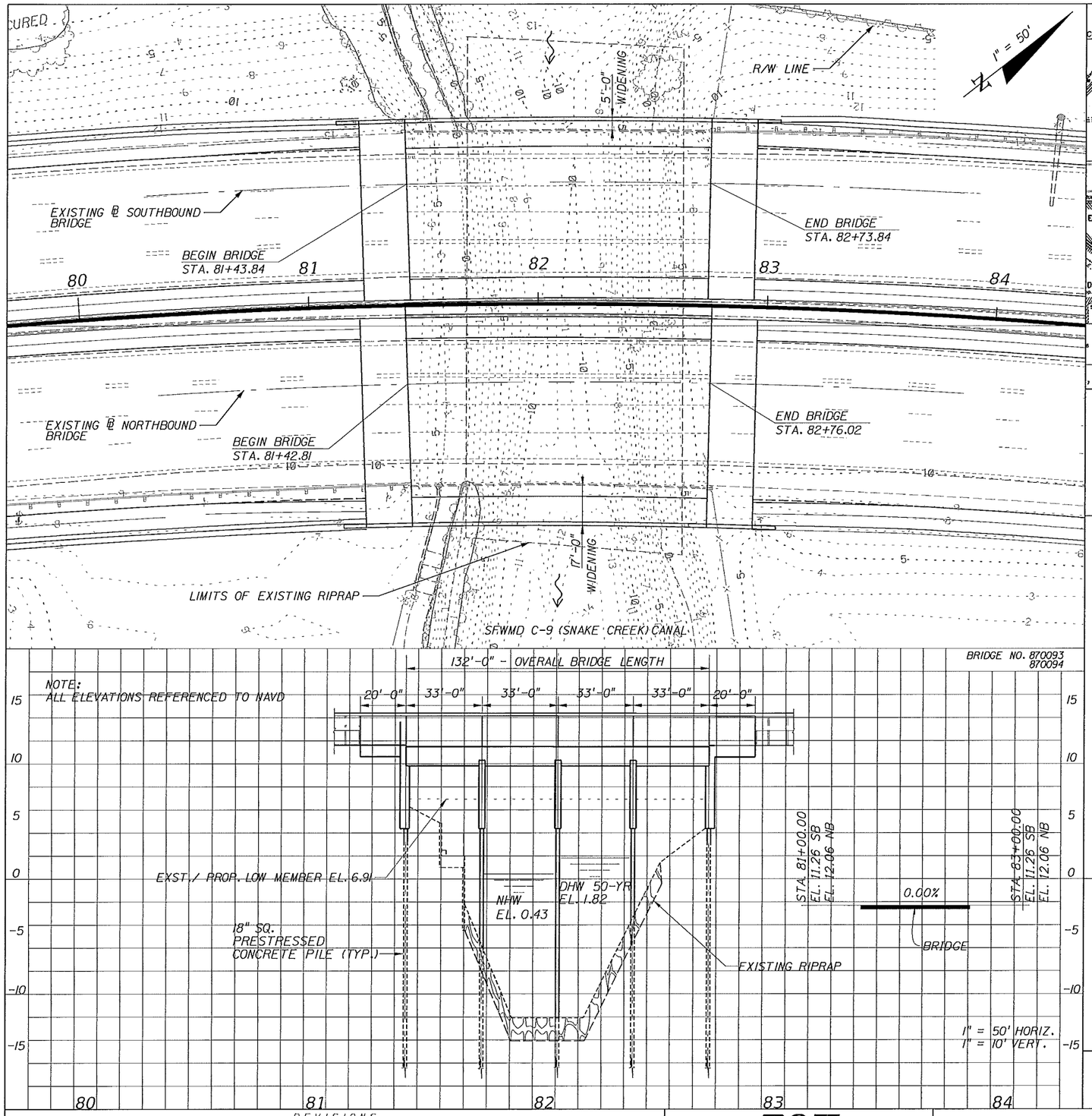
FIGURE 5 C-9 WEST BASIN MAP

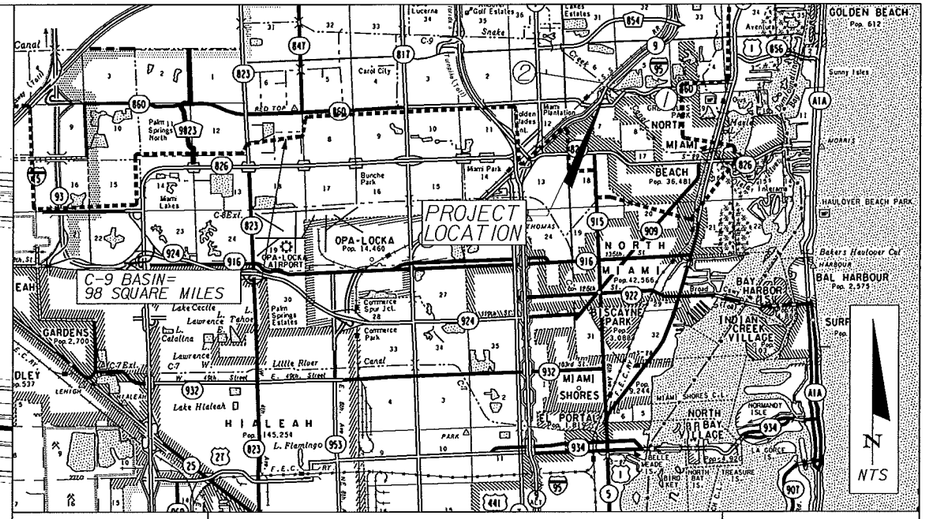

DBHydro Hydrologic Monitoring:
Active Stage Stations
Location Map
Area shown on main map
Detailed Inset Maps
Inset 1: STA-1W and STA-1E
Inset 2: STA-3/4 and STA-2
Inset 3: STA-5/6
Site/Station Definition:
STATION:
A specific coordinate that indicate where data (observation, sampling or monitoring) are collected. Data are usually assigned to stations by various classifications such as stage, flow, weather, and water quality. A coordinate may have more than one station associated with it. The name given to a station has traditionally been similar to, or an exact duplicate of, the corresponding site name.
SITE:
A representative point used to designate one or more stations that are associated by proximity or project. Site level representation is to provide clarity for small scale mapping in lieu of displaying a high density of associated stations. The site location is often based on the position of a recording device such as a remote terminal unit (RTU), or can be derived from a common sense location between the associated stations. A site should not be viewed as an area feature with specific boundaries but simply as a representative location of activity.
Map Key
Other Features
Canal
WMD Border Line
Big Cypress National Preserve
County Boundary
Everglades Agricultural Area Boundary
Everglades National Park
Storm Water Treatment Area (STA)
Water Conservation Area (WCA)
SFWMD
SJRWMD
SWFWMD
ATLANTIC OCEAN
GULF OF MEXICO
Lake Okeechobee
Everglades Agricultural Area
WCA 1A
WCA 2A
WCA 3A
WCA 3B
SFWMD Structure S-30
SFWMD Structure S-29
C-9 Canal
Bridge Location
Inset 1
Inset 2
Inset 3
ORLANDO
MELBOURNE
FORT MYERS
NAPLES
MARCO ISLAND
KEY WEST
FORT LAUDERDALE
MIAMI
WEST PALM BEACH
JUPITER
Charlotte Harbor
Biscayne Bay
Florida Bay
SEMINOLE
ORANGE
BREVARD
OSCEOLA
INDIAN RIVER
OKEECHOBEE
ST. LUCIE
MARTIN
PALM BEACH
BROWARD
MIAMI-DADE
MONROE
COLLIER
LEE
HENDRY
GLADES
CHARLOTTE
SARASOTA
MANATEE
HARDEE
DESOTO
HIGHLANDS
POLK
HILLSBOROUGH
PASCO
LAKE
SUMTER
HERNANDO
Base Credits
Base from South Florida Water Mgmt. District
State plane projection, Florida east zone, NAD83-HARN, US feet
South Florida Water Management District
3301 Gun Club Road, West Palm Beach, Florida 33406
(561) 686-8800 www.sfwmd.gov
N
S
E
W
0
30
60 Miles
0
50
100 Kilometers
IMPORTANT DISCLAIMER:
This map is a conceptual or planning tool only. The South Florida Water Management District does not guarantee or make any representation regarding the information contained herein. It is not self-executing or binding, and does not affect the interests of any persons or properties, including any present or future right or use of real property.
The dataset represents the DBHYDRO Active Monitoring Sites in Southern Florida. All locations are monitoring sites at which SFWMD, United States Geological Survey (USGS), United States Army Corps of Engineers (USACE), or another cooperating agency, as indicated in the data set, are monitoring or have monitored environmental parameters. The inventory of locations and activities is based on the contents of the SFWMD DBHYDRO corporate environmental database and may not reflect all non-SFWMD activities.
GEOSPATIAL SERVICES



SFWMD Control Structure S-29 Flowrate Record

Appendix B Excerpts from 2012 Bridge Hydraulics Report of I-95 Bridges over Snake Creek (C-9) Canal





(REFERENCE)	(1)	(2)	(3)	(4)	PROPOSED STRUCTURE
FOUNDATION	18"X18" CONC. PILES	CONC. PILES			18"X18" CONC. PILES
OVERALL LENGTH	132'	172'			132'
SPAN LENGTH	33'	VARIES			33'
TYPE CONSTRUCTION	CONCRETE	CONC. TRESTLE			CONCRETE
AREA OF OPENING @ D.F.	1220 SF	1876 SF			1220 SF
BRIDGE WIDTH	150' TOTAL NB/SB	29.1'			172' TOTAL NB/SB
ELEV. LOW MEMBER	6.91	8.63			6.91

HYDRAULIC DESIGN DATA

NOTE:
The hydraulic data is shown for informational purposes only to indicate the flood discharges and water surface elevations which may be anticipated in any given year. This data was generated using highly variable factors determined by a study of the watershed. Many judgements and assumptions are required to establish these factors. The resultant hydraulic data is sensitive to changes, particularly antecedent conditions, urbanization, channelization and land use. Users of this data are cautioned against the assumption of precision which cannot be obtained.

TERMS:
Design Flood: Utilized to assure a desired level of hydraulic performance.
Base Flood: Has a 1% chance of being exceeded in any given year (100 year frequency)
Overtopping Flood: Causes flow over the highway, over a watershed divide, or thru emergency relief structures.
Greatest Flood: The most severe that can be predicted where overtopping is not practicable.

WATER SURFACE ELEVATIONS: N.H.W. (Non-Tidal) 0.43 M.H.W. (Tidal) ____
CONTROL (Non-Tidal) ____ M.L.W. (Tidal) ____

FLOOD DATA:	MAX. EVENT OF RECORD	DESIGN FLOOD	BASE FLOOD	☐ OVERTOPPING or ☒ GREATEST FLOOD
STAGE ELEV. NAVD (ft)	N.A.	1.82	2.26	4.72
DISCHARGE (cfs)	N.A.	2972	3395	5777
AVERAGE VELOCITY (f/s)	N.A.	2.84	3.11	4.33
EXCEEDANCE PROB. (%)	N.A.	2	1	0.2
FREQUENCY (yr.)	N.A.	50	100	500

SCOUR PREDICTIONS FOR PROPOSED STRUCTURE DESCRIBED ABOVE:

PIER INFORMATION		LONG TERM	TOTAL SCOUR ELEVATION	
NUMBERS	SIZE AND TYPE	SCOUR ELEV.	WORST CASE < 100 yr. FREQ. (yr.) 100	WORST CASE < 500 yr. FREQ. (yr.) 500
ALL	18" X 18" CONCRETE PILES	N/A	-20.74	-21.97

HYDRAULIC RECOMMENDATIONS

1. BEGIN BRIDGE STATION 81+42.81 END BRIDGE STATION 82+76.02 SKEW ANGLE 0°
2. CLEARANCE PROVIDED: NAV: HORIZ. 31.5' VERT. 6.5' ABOVE EL. 0.43 DRIFT: HORIZ. N/A VERT. 5.1' ABOVE EL. 1.82
3. MINIMUM CLEARANCE: NAV: HORIZ. 20' VERT. 6.0' ABOVE EL. 0.43 DRIFT: HORIZ. N/A VERT. 2.0' ABOVE EL. 1.82
4. ABUTMENTS:

	BEGIN BRIDGE	END BRIDGE
RUBBLE GRADE:		
SLOPE:		
BURIED OR NON-BURIED HORIZ. TOE:		
TOE HORIZ. DISTANCE:		
LIMIT OF PROTECTION:		

5. DECK DRAINAGE: EXISTING SCUPPERS WITHIN THE LIMITS OF THE BRIDGE WIDENING (NB) WILL BE REPLACED WITH TYPE II TRENCH DRAIN.

REMARKS:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RS&H
IMPROVING YOUR WORLD
3125 West Commercial Boulevard, Suite 130
Fort Lauderdale, Florida 33309
954-474-3005
Certificate of Authorization No. 5620
Engineer of Record: James A. Fike, P.E. No.: 67096
Architectural, Engineering, Planning and Environmental Services

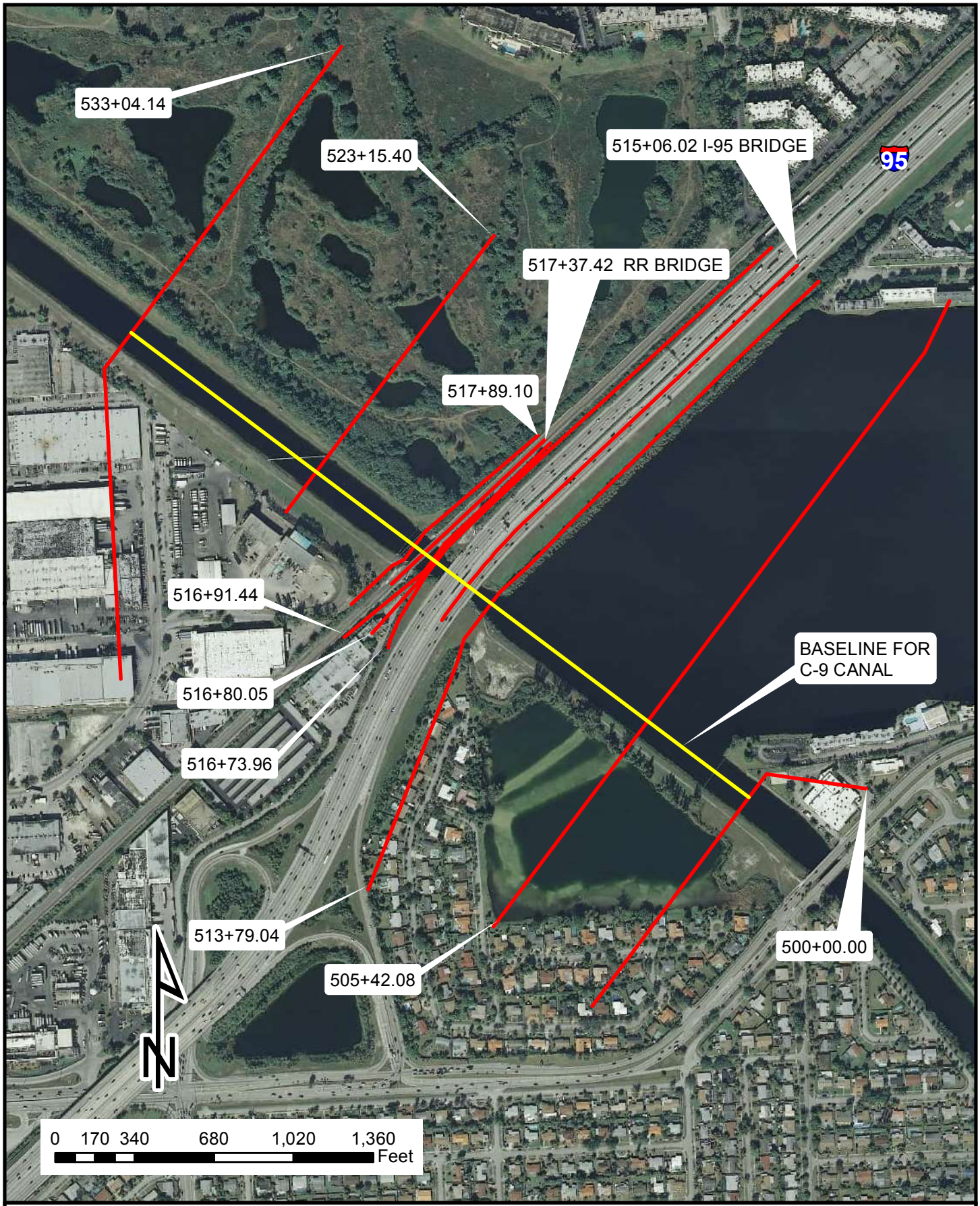
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	BROWARD MIAM-DADE	422796-1-52-01 422796-2-52-02

(EXISTING BRIDGE)
BRIDGE HYDRAULIC RECOMMENDATIONS

SHEET NO.

HEC-RAS EXISTING CONDITIONS MODEL



I-95 (SR 9) from North of Golden Glades Interchange to South of Broward Blvd Park and Ride

AEP: 106-0905-101
FPID: 422796-1-52-01 & 422796-2-52-01
Broward & Miami-Dade County, Florida

X:\P\41454715201

RS&H
IMPROVING YOUR WORLD
Reynolds, Smith and Hills, Inc.

Reynolds, Smith, & Hills, Inc.
3125 West Commercial Blvd, Suite 103
Ft. Lauderdale, Florida 33309
www.rsandh.com

HEC-RAS CROSS SECTIONS

HEC-RAS Plan: Prop River: Snake Creek Reach: C9 Canal

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)	
C9 Canal	53304.14	50 yr	2972.00	-11.07	2.00	-8.15	2.04	0.000048	1.62	1831.27	257.00	0.09
C9 Canal	53304.14	100 yr	3395.00	-11.07	2.48	-7.89	2.53	0.000055	1.77	1914.82	264.09	0.09
C9 Canal	53304.14	250 yr	4200.00	-11.07	3.56	-7.42	3.62	0.000063	2.00	2104.61	352.45	0.10
C9 Canal	53304.14	500 yr	5777.00	-11.07	5.11	-6.59	5.20	0.000083	2.42	2416.11	1080.07	0.12
C9 Canal	52315.40	50 yr	2972.00	-13.15	1.95	-8.92	1.99	0.000046	1.60	1860.14	472.87	0.09
C9 Canal	52315.40	100 yr	3395.00	-13.15	2.42	-8.62	2.47	0.000053	1.75	1943.20	481.32	0.09
C9 Canal	52315.40	250 yr	4200.00	-13.15	3.49	-8.08	3.55	0.000065	1.97	2136.73	553.16	0.10
C9 Canal	52315.40	500 yr	5777.00	-13.15	5.03	-7.22	5.12	0.000088	2.35	2462.45	890.90	0.12
C9 Canal	51789.10	50 yr	2972.00	-14.80	1.93	-10.54	1.97	0.000039	1.61	1844.02	145.48	0.08
C9 Canal	51789.10	100 yr	3395.00	-14.80	2.40	-10.23	2.45	0.000046	1.77	1912.80	148.99	0.09
C9 Canal	51789.10	250 yr	4200.00	-14.80	3.46	-9.69	3.52	0.000059	2.03	2073.91	208.25	0.10
C9 Canal	51789.10	500 yr	5777.00	-14.80	4.97	-8.76	5.07	0.000082	2.48	2325.06	634.48	0.12
C9 Canal	51737.42 Railroad		Bridge									
C9 Canal	51691.44	50 yr	2972.00	-15.64	1.90		1.95	0.000047	1.74	1708.93	138.67	0.09
C9 Canal	51691.44	100 yr	3395.00	-15.64	2.36		2.42	0.000055	1.91	1773.66	140.16	0.09
C9 Canal	51691.44	250 yr	4200.00	-15.64	3.42		3.49	0.000079	2.17	1937.82	224.69	0.11
C9 Canal	51691.44	500 yr	5777.00	-15.64	4.91		5.02	0.000103	2.64	2190.25	420.58	0.13
C9 Canal	51680.05	50 yr	2972.00	-14.65	1.89		1.94	0.000062	1.90	1562.77	137.85	0.10
C9 Canal	51680.05	100 yr	3395.00	-14.65	2.35		2.42	0.000080	2.08	1628.99	150.62	0.11
C9 Canal	51680.05	250 yr	4200.00	-14.65	3.40		3.48	0.000107	2.33	1806.25	334.09	0.13
C9 Canal	51680.05	500 yr	5777.00	-14.65	4.90		5.02	0.000132	2.79	2087.28	765.17	0.14
C9 Canal	51673.96	50 yr	2972.00	-13.99	1.87	-9.10	1.94	0.000077	2.08	1425.84	129.96	0.11
C9 Canal	51673.96	100 yr	3395.00	-13.99	2.33	-8.74	2.41	0.000088	2.29	1485.14	157.08	0.12
C9 Canal	51673.96	250 yr	4200.00	-13.99	3.37	-8.14	3.48	0.000104	2.59	1621.25	427.66	0.13
C9 Canal	51673.96	500 yr	5777.00	-13.99	4.85	-7.10	5.01	0.000135	3.18	1815.93	1248.44	0.15
C9 Canal	51506.02 I95		Bridge									
C9 Canal	51379.04	50 yr	2972.00	-14.80	1.52		1.60	0.000096	2.29	1298.99	120.88	0.12
C9 Canal	51379.04	100 yr	3395.00	-14.80	1.96		2.06	0.000111	2.51	1353.44	122.20	0.13
C9 Canal	51379.04	250 yr	4200.00	-14.80	2.99		3.12	0.000130	2.84	1480.28	755.92	0.14
C9 Canal	51379.04	500 yr	5777.00	-14.80	4.42		4.60	0.000172	3.48	1658.62	1630.56	0.17
C9 Canal	50542.08	50 yr	2972.00	-31.57	1.56		1.56	0.000000	0.20	14676.75	2657.81	0.01

HEC-RAS Plan: Prop River: Snake Creek Reach: C9 Canal (Continued)

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)	
C9 Canal	50542.08	100 yr	3395.00	-31.57	2.01		2.01	0.000000	0.23	14971.32	3139.39	0.01
C9 Canal	50542.08	250 yr	4200.00	-31.57	3.05		3.05	0.000000	0.27	15651.11	3218.72	0.01
C9 Canal	50542.08	500 yr	5777.00	-31.57	4.51		4.51	0.000001	0.35	16605.10	3281.67	0.01
C9 Canal	50000.00	50 yr	2972.00	-18.64	1.53	-15.68	1.55	0.000014	1.13	2631.10	509.63	0.05
C9 Canal	50000.00	100 yr	3395.00	-18.64	1.98	-15.41	2.00	0.000017	1.26	2704.73	540.81	0.05
C9 Canal	50000.00	250 yr	4200.00	-18.64	3.01	-14.93	3.04	0.000022	1.46	2876.84	633.99	0.06
C9 Canal	50000.00	500 yr	5777.00	-18.64	4.44	-14.07	4.49	0.000035	1.85	3127.34	674.19	0.08

HEC-RAS Plan: Prop River: Snake Creek Reach: C9 Canal

Reach	River Sta		Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
				(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
C9 Canal	51506.02 I95	BR U	50 yr	1.94	1.82	-8.77			98.77		2972.00		2.80
C9 Canal	51506.02 I95	BR U	100 yr	2.41	2.26	-8.36			99.44		3395.00		3.07
C9 Canal	51506.02 I95	BR U	250 yr	3.47	3.29	-7.62			100.98		4200.00		3.48
C9 Canal	51506.02 I95	BR U	500 yr	5.00	4.72	-6.37			119.99		5777.00		4.25
C9 Canal	51506.02 I95	BR D	50 yr	1.61	1.49	-9.08			98.28		2972.00		2.84
C9 Canal	51506.02 I95	BR D	100 yr	2.08	1.93	-8.67			98.94		3395.00		3.11
C9 Canal	51506.02 I95	BR D	250 yr	3.14	2.94	-7.93			100.47		4200.00		3.52
C9 Canal	51506.02 I95	BR D	500 yr	4.63	4.34	-6.66			102.56		5777.00		4.33

HEC-RAS Plan: Prop River: Snake Creek Reach: C9 Canal

Reach	River Sta		Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
				(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
C9 Canal	51737.42 Railroad	BR U	50 yr	1.96	1.91	-10.27	0.00	0.00	131.88		2972.00		1.79
C9 Canal	51737.42 Railroad	BR U	100 yr	2.44	2.38	-9.95	0.01	0.00	132.72		3395.00		1.97
C9 Canal	51737.42 Railroad	BR U	250 yr	3.51	3.43	-9.39	0.01	0.00	144.35		4200.00		2.25
C9 Canal	51737.42 Railroad	BR U	500 yr	5.06	4.94	-8.35	0.01	0.00	137.51		5777.00		2.78
C9 Canal	51737.42 Railroad	BR D	50 yr	1.96	1.90	-10.62	0.00	0.01	125.16		2972.00		1.92
C9 Canal	51737.42 Railroad	BR D	100 yr	2.43	2.36	-10.28	0.00	0.01	126.65		3395.00		2.11
C9 Canal	51737.42 Railroad	BR D	250 yr	3.50	3.41	-9.67	0.00	0.01	149.17		4200.00		2.40
C9 Canal	51737.42 Railroad	BR D	500 yr	5.04	4.91	-8.59	0.01	0.01	139.97	0.08	5776.92		2.94

HEC-RAS Version 4.1.0 Jan 2010
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: Snake Creek
Project File : SnakeCreek.prj
Run Date and Time: 2/2/2012 11:33:55 AM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : w:\Water_Resources\I-95 Express Lanes Design Build\HEC RAS\SnakeCreek.p03

Geometry Title: Proposed
Geometry File : w:\Water_Resources\I-95 Express Lanes Design Build\HEC RAS\SnakeCreek.g03

Flow Title : Snake Creek
Flow File : w:\Water_Resources\I-95 Express Lanes Design Build\HEC RAS\SnakeCreek.f01

Plan Summary Information:
Number of: Cross Sections = 9 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Snake Creek
Flow File : w:\Water_Resources\I-95 Express Lanes Design Build\HEC RAS\SnakeCreek.f01

Flow Data (cfs)

River	Reach	RS	50 yr	100 yr	250 yr	500 yr
Snake Creek	C9 Canal	53304.14	2972	3395	4200	5777

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Snake Creek	C9 Canal	50 yr		Known WS = 1.53
Snake Creek	C9 Canal	100 yr		Known WS = 1.98
Snake Creek	C9 Canal	250 yr		Known WS = 3.01
Snake Creek	C9 Canal	500 yr		Known WS = 4.44

GEOMETRY DATA

Geometry Title: Proposed
Geometry File : w:\Water_Resources\I-95 Express Lanes Design Build\HEC RAS\SnakeCreek.g03

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 53304.14

INPUT
Description:
Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7.5	1.25	7.62	5.74	6.98	7.7	7.36	12.91	6.69
17.52	6.53	20.25	6.63	22.37	6.44	27.2	6.56	31.16	6.36
33.54	6.51	34.66	6.26	37.66	6.45	39.15	6.11	44.25	6.59
48.63	6.35	50.67	6.06	57.25	5.88	61.12	6.01	66.38	5.68
74.27	5.86	80.41	6.12	84.04	5.74	88.27	5.7	92.24	6.2
97.51	5.86	102.03	6.07	105.97	6.44	110.41	6.5	115.07	7.38
119.78	7.25	122.6	6.91	125.69	6.86	129.92	5.42	132.76	5.56
133.81	5.16	137.86	4.93	143.57	5.09	151.01	4.41	159.42	3.88
162.69	3.99	171.13	4.76	177.69	4.47	180.74	4.61	183.98	4.09
186.7	3.94	191.46	4.1	194.76	4.37	200.53	4.39	204.41	4.25
211.81	4.34	217.44	5.1	220.74	5.38	224.45	4.82	228.87	5.41
237.12	5.72	241.22	5.5	250.64	6.37	255.71	6.31	257.85	6.52
259.7	6.1	262.19	5.88	263.51	6.1	270.64	6.22	277.32	6.08
279	5.82	289.4	6.5	293.29	6.66	295.38	6.4	297.56	6.61
301.39	6.45	307.29	5.92	312.32	5.87	314.91	6.33	317.32	6.48
325.32	6.12	330.63	5.99	333.17	6.72	335.21	6.89	337.27	6.47
340.82	6.82	345.73	6.92	350.76	6.82	354.85	6.25	357.45	6.18
362.81	5.49	366.71	5.71	373.25	5.69	377.18	5.36	380.17	4.76
383.27	5.55	388.47	5.35	391.95	5.07	395.41	5.16	398.76	5.82
404.19	5.99	404.77	6.15	410.54	5.74	415.15	5.97	420.01	5.14
424.66	5.54	430.47	5.78	434.24	5.73	439.06	5.84	442.34	5.66
447.62	6.08	453.32	5.65	457.98	6.03	462.5	5.65	470.68	6.17
475.16	6.15	476.59	6.29	480.5	6.13	483.08	6.22	486.76	5.63
490.97	5.58	494.76	5.71	497.9	5.05	500.9	5.6	503.45	5.33
506.43	5.79	509.67	5.88	512.11	5.75	515.86	5.97	523.35	5.42
525.8	5.82	532.88	5.7	538.82	5.96	543.55	5.85	547.07	6.04
552.7	6.56	558.83	6.8	566.33	7.55	571.94	7.43	573.37	7.17
581.08	7.06	584.07	6.73	588.39	6.56	590.68	5.92	592.91	5.82
605.26	6.73	607.45	6.48	610.32	6.49	614.42	5.83	619.88	5.74
625.26	5.39	630.87	5.68	635.83	5.29	638.83	5.71	644.1	6.15
648.14	5.6	657.52	5.85	662.32	6.76	666.79	6.58	669.82	6.91
674.88	6.91	679.31	7.17	684.96	7.84	688.48	7.92	691.82	7.68
694.69	8.07	696.48	7.89	701.94	7.99	706	7.33	715.29	7.07
719.04	6.72	723.15	6.63	726.18	6.83	729.9	6.65	735.61	5.97
737.25	5.55	739.37	5.71	742.05	5.58	751.4	5.7	756.47	5.67
759.12	5.01	763.18	4.87	770	4.89	771.98	5.12	775.32	4.77
777.11	4.78	782.11	4.41	785.63	4.63	793.79	4.56	796.76	4.05
798.89	4.46	802.61	4.84	805.08	4.78	814.92	5.05	817.71	4.68
821.49	5.33	822.99	5.37	825.53	5.94	830.78	5.99	836.16	4.97
842.47	5.55	845.15	5.98	849.26	5.81	851.19	5.48	856.52	5.64
860.81	5.57	871.79	4.41	874.61	3.01	886.92	3.24	890.74	3.21
908.47	4.36	914.15	4.1	916.54	4.41	922.77	4.34	925.35	3.99
928.28	4.13	933.52	3.65	941.1	3.41	946.19	2.45	954.52	1.51
956.79	1.03	961.65	.63	965.11	-.56	973	.58	981.48	.7

988.25	.58	1016.35	.2	1027.47	-.02	1029.57	.77	1035.28	2.36
1038.24	2.91	1040.85	4.23	1047.26	5.32	1051.82	6.46	1054.93	6.69
1057.62	7.51	1061.91	8.42	1064.04	8.09	1065.83	8.6	1069	8.95
1071.96	8.67	1077.68	9.18	1082.12	9.05	1092.49	7.93	1096.3	7.2
1101.74	6.66	1105.12	5.5	1109.64	4.82	1112.05	5.17	1116.84	5.42
1120.68	5.05	1125.93	5.24	1135.81	4.81	1137.78	4.64	1151.16	6.14
1154.64	6.28	1159.81	6.1	1165.31	5.75	1168.39	6.46	1176.08	6.65
1180.12	7.19	1183.08	7.01	1185.64	6.44	1188.53	7.05	1191.49	7.39
1195.2	8.04	1200.13	7.98	1203.98	8.56	1205.37	8.42	1215.1	8.46
1220.79	8.79	1224.17	8.51	1233	8.84	1241.62	8.68	1245.58	8.97
1249.06	9.01	1251.69	8.82	1255.64	9.12	1258.63	8.99	1260.79	8.33
1265.06	7.69	1266.3	7.81	1268.99	7.55	1274.82	7.75	1284.33	8.21
1285.84	8.44	1289.27	7.98	1294.91	7.44	1300.64	7.17	1304.69	7.56
1307.89	7.48	1321.42	6.16	1325.54	5.16	1333.52	5.18	1340.29	5.67
1351.76	6.34	1358.92	6.1	1368.1	5.9	1373.8	5.94	1375.39	6.07
1377.66	5.65	1383.29	5.2	1386.66	4.78	1392.72	4.43	1402.08	4.13
1407	4.19	1411.32	3.91	1413.85	4.13	1419.38	4.33	1422.79	3.85
1425.58	2.75	1428.53	-.13	1469.79	-11.07	1569.79	-11.07	1596.55	-.29
1599.34	1.75	1602.15	4.49	1604.31	5.01	1608.11	5.03	1611.6	4.81
1612.99	4.54	1616.72	4.5	1620.05	4.16	1625.28	4.21	1629.9	3.95
1634.47	3.9	1638.27	3.42	1646.03	3.23	1653.38	3.19	1667.08	3.37
1673.46	3.65	1677.59	3.96	1681.21	4	1683.32	4.24	1686.56	4.07
1691.23	4.11	1694.29	4.38	1697.94	4.21	1704.76	5.02	1709.85	5.21
1714.64	4.61	1715.78	4.77	1728.82	4.67	1735.21	4.97	1738.74	4.79
1744.8	5.2	1756.87	5.18	1783.71	4.87	1795.76	4.55	1800.01	4.67
1809.32	4.57	1814.06	4	1817.5	3.98	1822.87	3.76	1824.47	3.9
1831.49	3.75	1834.95	3.54	1838.58	3.85	1845.63	3.45	1852.73	3.5
1858.24	3.77	1862.13	3.76	1866.01	3.51	1869.96	3.82	1876.06	3.74
1883.75	4.49	1887.77	4.71	1890.51	5.07	1933.88	4.94	2102.17	5.07
2104.38	4.77	2110.33	4.6	2114.52	4.86	2122.48	4.78	2126.21	4.85
2130.08	4.58	2133.62	4.64	2144.09	4.57	2147.66	4.1	2151.27	4.25
2154.38	3.96	2156.13	4.13	2166.08	4.03	2168.38	4.18	2182.25	3.74
2197.56	4.12	2204.16	4.16	2207.74	4.46	2211.4	4.54	2214.68	4.97
2217.3	4.55	2225.72	4.3	2236.17	4.58	2245.51	4.34	2247.44	4.1
2257.23	3.69	2270.83	3.85	2299.63	3.6	2303.22	3.64	2328.76	3.37
2331.4	3.65	2338.83	3.86	2340.91	3.73	2348.66	3.69	2350.2	3.53
2359.82	3.12	2378.12	2.94	2384.86	2.93	2389.78	3.92	2397.47	3.83
2400.83	3.96	2405.42	3.91	2412.5	4.12	2416.81	3.88	2428.54	4.04
2430.33	4.18	2441.65	4.23	2446.15	4.37	2448.33	4.24	2451.78	4.35
2460.39	4.02	2465.99	3.91	2469.84	4.02	2477.28	3.86	2481.13	4.02
2485.3	4	2489.85	4.21	2496.57	4.04	2504.84	4.33	2517.06	4.13
2532.24	4.16	2666.04	4.84	2678.55	4.36	2698.58	5.31	2701.89	5.35
2704.28	5.16	2711.97	5.26	2715.88	5.21	2718.82	5	2723	5.18
2727.24	5.05	2735.4	5.07	2739.05	4.67	2750.77	4.64	2758.42	4.76
2762.26	4.4	2770.85	4.66	2773.75	4.42	2777.56	4.6	2785.2	4.13
2788.73	4.68	2795.92	4.26	2799.5	4.52	2804.69	4.21	2808.58	4.45
2816.25	4.42	2820.1	4.58	2823.94	4.32	2827.71	4.68	2835.02	4.59
2841.37	4.9	2844.25	4.51	2852.61	3.92	2860.53	3.74	2862.68	3.92
2866.45	3.66	2871.58	3.84	2878.37	3.88	2885.43	3.38	2888.73	4.27
2892.18	4.61	2895.43	4.29	2899.68	5.01	2906.82	5.06	2912.57	5.53
2917.5	3.95	2924.3	3.98	2927.48	3.89	2931.12	4.13	2937.06	3.56
2937.86	3.67	2987.79	4.5	2994.37	4.22	2995.97	4.33	3039.47	4.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	1419.38	.03	1604.31	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1419.38	1604.31	1010	988.74	800	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1383	11.71	F
1608	3039.47	11.71	F

Blocked Obstructions num= 4

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
1710	1810	12	1890	2105	12	2216	2705	12
2936	3039.47	12						

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 52315.40

INPUT
Description:
Station Elevation Data num= 500

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7.11	.91	7.08	1.8	7.11	4.33	7	5.06	6.94
6.49	6.64	7.41	6.63	8.58	6.47	9.66	6.44	10.68	6.29
12.48	6.17	16.93	5.65	17.47	5.5	19.33	5.48	20.68	5.29
23.2	5.05	27.6	5	28.85	4.93	30.03	4.91	30.94	5.1
32.56	5.24	33.71	5.28	36.95	5.34	37.49	5.48	39.87	5.97
40.84	6.24	43.48	6.16	46.07	5.85	48.27	5.85	53.12	6.36
53.83	6.41	57.31	6.39	57.74	6.34	60.31	6.57	62.18	6.38
63.67	6.06	64.48	5.99	66.68	5.62	68.2	5.14	69.75	5.02
72.11	4.99	74.42	4.94	75.88	5.06	78.45	4.76	80.11	4.76
83.03	4.89	84.91	4.73	85.75	4.6	88.31	4.81	90.22	4.83
90.8	4.8	93.38	4.83	95.26	4.97	98.04	4.85	99.71	5.12
100.47	5.19	103.27	5.08	104.62	5.23	105.65	5.3	107.99	5.35
109.08	5.4	111.19	5.33	112.57	5.18	113.84	5.23	117.04	5.28
119.58	5.21	120.89	5.14	121.91	5.15	123.71	5.41	125.09	5.39
126.64	5.26	128.07	5.35	129.37	5.69	131.28	5.87	134.3	6.76
137.63	6.92	141.08	6.99	143.15	7.22	145.13	7.38	146.82	7.25
148.75	7.21	150.15	7.23	151.46	7.14	153.77	6.7	154.67	6.65
156.06	6.64	158.08	6.79	160.23	6.76	162.83	6.35	163.51	6.2
165.14	6.08	166.02	6.34	168.64	6.94	174.97	7.21	177.46	7.37
180.38	7.47	183.3	7.26	184.58	7.02	187.19	6.74	191.5	6.61
192.51	6.51	194.1	6.28	196.97	6.5	199.97	6.53	203.25	6.32
203.63	6.22	205.7	6.32	208.52	6.38	210.83	6.52	215.04	6.18
218.39	6.18	220.65	5.99	221.47	6.05	224.43	6.4	227.74	6.27
228.13	6.27	230.04	5.89	232.97	5.7	235.98	5.68	238.03	5.62
238.7	5.51	240.29	5.43	249.56	5.43	251.26	5.37	256.6	5.47
257.92	5.3	259.09	5.32	261.92	5.83	263.87	6.03	268.42	6.46
271.04	6.66	271.59	6.77	274.36	7.14	276.95	6.89	277.85	6.99
280.49	6.81	282.28	6.95	284.08	7.12	284.81	7.12	286.73	7.04
289.38	7.29	290.16	7.31	293.88	7.06	294.6	7.12	296.66	6.92
298.32	6.9	305.33	7.06	306.81	7.12	310.42	7.32	312.01	7.38
313.64	7.36	314.2	7.4	315.94	7.18	326.86	6	330.46	5.71
335.51	4.77	337.33	4.15	338.19	3.96	339.46	3.93	340.71	3.38
342.55	2.94	344.51	1.21	345.08	.82	346.25	.77	350.45	.88
353.67	.11	357.55	.03	368.27	.88	369.42	.9	371.91	.83
377.57	.46	380.35	.32	388.79	-.08	391.98	.14	470.31	-.12
481.36	-.07	491.96	0	533.17	.71	535.08	.7	544.61	.7
545.51	.78	546.08	1.02	547.65	1.57	549.28	2.08	550.73	2.47
552.2	2.67	556.13	3.77	559.52	3.61	560.28	3.72	561	3.7
565.97	4.02	576.72	4.89	578.23	4.94	580.09	4.94	582.02	5
583.81	4.99	587.54	5.08	590.31	4.94	591.92	4.92	593.92	5.34
594.78	5.45	595.4	5.46	596.69	5.39	598.38	5.42	600.06	5.39
602.58	4.46	604.55	4.27	605.1	4.28	607.49	4.14	610.1	4.25
612.05	4.16	615.67	4.53	617.11	4.8	621.49	4.94	623.22	5.01
627.41	4.91	628.99	4.95	631.53	4.95	635.71	5.09	638.88	5.29
641.61	5.03	643.37	5.12	647.36	5.5	648.77	5.55	649.43	5.53
651.86	5.18	652.46	5.25	654.06	5.32	656.48	5.15	657.68	5.22
658.14	5.29	660.37	5.31	665.45	5.48	666.05	5.58	667.89	5.48
669.9	5.56	673.6	5.6	674.98	5.74	677.8	5.5	679.36	5.22
681.27	5.3	685.79	5.02	689.91	4.92	694.15	4.9	694.67	4.98
697.99	5.12	700.75	5.45	702.53	5.41	703.1	5.36	708.67	4.57
712.18	4.42	713.17	4.32	714.95	4.19	716.45	4.24	717.47	4.15
718.06	4.19	718.66	4.33	729.34	4.5	735.06	4.7	737.62	4.8
738.76	4.91	741.1	4.84	744.14	4.18	745.27	4.12	747.78	4.05
750.52	3.46	751.57	3.13	755.67	2.02	757.46	1.71	758.72	1.53
760.94	.95	762.4	.33	780.89	-.05	836.56	-.01	837.65	.16
837.85	-.06	840.74	.77	844.97	1.08	846.34	.92	846.73	.93
848.18	1.55	850.32	2.17	856.23	3.23	878.83	6.16	882.82	6.78
886.3	6.67	887.92	6.77	891.27	6.53	892.27	6.49	894.79	6.49
899.08	6.74	903.06	6.46	904.1	6.6	909.16	5.95	910.64	5.62
913.39	5.25	915.09	4.86	917.79	4.39	918.45	4.43	920.49	4.46
922.91	4.11	928.33	5.21	929.83	5.27	931.94	5.27	932.64	5.33
934.3	5.36	935.6	5.43	940.87	5.18	941.64	5.32	949.67	5.7
953.86	5.85	960.15	6.66	963.95	6.89	966.98	6.83	968.63	6.82
969.33	6.67	972.53	6.15	973.41	6.05	976.2	5.87	977.74	5.87

978.96	5.99	980.79	5.95	985.45	6.43	987.21	6.46	993.52	7
997.29	7.83	997.92	7.86	1000.95	7.76	1013.86	7.27	1023.02	5.35
1026.16	4.92	1028.35	4.74	1035.59	4.77	1041.13	4.6	1044.71	4.38
1045.07	4.46	1051.98	4.6	1055.42	4.06	1062.54	3.95	1090.18	6.45
1097.54	6.98	1101.84	7.47	1103.72	7.32	1105.78	7.32	1110.74	7.12
1127.82	5.69	1130.71	5.31	1132.33	5.13	1135.95	4.77	1136.58	4.74
1140.27	4.19	1144.21	3.76	1145.23	3.68	1147.9	3.67	1150.44	3.74
1153.29	3.54	1159.37	3.48	1160.89	3.41	1163.81	3.19	1167.09	3.03
1171.14	2.19	1172.88	1.48	1173.33	.93	1176.57	.2	1179.25	-.44
1182.12	-.93	1183.8	-1.43	1198.8	-5.1	1203.32	-7.34	1205.92	-7.64
1207.89	-8.4	1209.45	-8.72	1211.52	-9.62	1213.43	-9.98	1215.51	-10.34
1218.67	-10.7	1220.18	-10.74	1221.63	-11.07	1223.53	-11.2	1227.04	-11.03
1228.41	-11.21	1230.27	-11.34	1231.62	-11.6	1233.38	-12.06	1234.71	-12.2
1236.49	-12.6	1238.14	-12.78	1239.56	-12.78	1241.75	-13.07	1243.19	-13.07
1245.21	-12.89	1247.3	-12.95	1249.32	-12.85	1252.39	-12.55	1254.14	-12.5
1255.73	-12.5	1257.47	-12.65	1259.55	-12.7	1261.24	-12.9	1262.84	-13
1264.49	-13.15	1269.01	-13.14	1270.84	-13.04	1273.05	-12.99	1274.68	-12.9
1276.33	-12.68	1278.26	-12.35	1279.93	-12.19	1281.45	-12.1	1285.2	-12
1286.75	-12.05	1288.39	-12.15	1290.76	-12.11	1292.48	-12.21	1294.87	-12.06
1296.52	-11.82	1298.18	-11.53	1300.5	-11.27	1305.27	-10.81	1308.89	-10.14
1310.8	-9.99	1312.48	-9.77	1314.14	-8.97	1321.76	-8.22	1323.72	-8.12
1325.45	-7.12	1328.21	-5.83	1333.66	-4.18	1336.18	-2.75	1337.85	-2.37
1338.2	-1.83	1344.03	.88	1344.98	.89	1346.27	2.35	1346.75	2.81
1347.97	3.56	1349.4	3.88	1351.82	4.4	1354.75	4.5	1356.11	4.35
1356.87	4.42	1358.25	4.85	1359.54	4.78	1361.83	4.78	1364.34	4.44
1367.59	4.32	1368.09	4.37	1370.99	4.18	1372.57	3.88	1373.51	3.96
1375.25	3.88	1376.31	3.93	1379.1	3.87	1382.52	3.74	1385.58	3.93
1388.62	3.46	1389.48	3.37	1390.52	3.37	1393.35	3.32	1395.87	3.17
1397.73	3.04	1398.35	3.08	1401.91	3	1403.43	3	1406.6	3.14
1407.44	3.09	1408.32	3.11	1410.62	3.07	1412.21	3.16	1415.29	3.02
1418.14	3.16	1422.07	3.21	1426.27	3.37	1428.15	3.51	1428.73	3.5
1430.36	3.6	1432.51	3.44	1435.04	3.79	1436.55	3.78	1437.92	3.69
1439.18	3.78	1440.53	3.82	1442.16	3.99	1443.48	4.08	1444.6	4.07
1447.19	3.96	1449.25	3.98	1450.21	3.96	1453.78	3.94	1457.35	3.87
1459.55	3.93	1460.49	4	1461.51	4.19	1463.05	4.76	1463.79	4.98
1468.48	6.09	1471.52	7.15	1472.27	7.35	1475.54	8.87	1477.1	9.69

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	1140.27	.03	1349.4	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1140.27	1349.4	630	526.3	490	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1132	11.71	T
1358	1477.1	11.71	F

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51789.10

INPUT
Description: Upstream of Railroad Bridge
Station Elevation Data num= 424

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7.24	3.96	6.67	6.58	6.26	7.36	6.28	10.43	5.98
21.23	5.4	32.58	5.53	35.8	5.41	37.92	5.41	38.77	5.44
39.32	5.45	58.85	5.49	75.7	5.65	84.26	7.73	85.01	7.65
102.41	5.98	104.28	5.79	109.19	6.18	134.24	5.8	136.87	5.9
138.71	5.88	140.87	5.85	142.51	6.03	144.02	5.58	145.45	5.32
146.16	5.26	147	5.09	147.65	5.04	154.23	4.56	156.89	4.3
160.26	4.19	162.75	4.53	168.85	4.47	175.18	5.44	184.84	4.8
191.95	4.91	197.19	4.67	197.57	4.75	198.73	4.75	210.59	5.11
219.92	4.12	222.88	3.7	226.1	3.96	228.03	3.54	236.5	4.6
252.83	3.87	256.28	3.69	259.65	3.08	259.95	3.25	260.97	3.68
265.57	4.8	268.24	5.14	286.49	4.25	290.56	4.37	297.4	3.99
300.55	4.61	303.65	5.2	311.3	5.81	314.37	5.62	316.82	4.99
322.17	3.59	337.94	3.6	339.84	3.77	340.5	3.84	357.72	5.55

358.41	5.55	359.62	5.64	365.11	5.66	365.95	5.62	376.41	4.67
384.08	2.54	392.55	2.37	397.9	2.97	408.85	3.02	414.1	2.9
419.82	3.15	422.34	3.61	423.11	3.51	425.65	3.63	432.21	3.76
438.09	3.88	439.58	3.5	443.27	3.47	443.78	3.44	462.25	3.94
465.24	4.15	467.27	4.1	468.27	4.1	469.62	3.93	476.62	3.68
478.63	3.78	484.44	3.46	485.73	3.34	486.74	3.56	491.76	3.54
495.05	3.46	501.39	3.61	503.44	3.61	510.36	3.59	514.12	3.34
520.26	4.45	520.6	4.56	524.4	4.47	526.58	4.26	528.2	4.47
529.17	4.48	530.77	4.44	531.44	4.41	532.72	4.3	533.21	4.32
534.44	4.41	536.08	4.42	538.78	4.71	540.78	4.71	541.57	4.69
543.03	4.73	544.37	4.76	545.13	4.82	546.85	4.91	547.86	4.94
549.88	5.03	551.25	5.04	551.76	5.07	553.08	5.16	554.4	5.18
555.66	5.22	557.58	5.34	559.26	5.34	560.4	5.36	562.57	5.44
562.97	5.43	563.3	5.46	564.83	5.44	565.29	5.41	566.58	5.33
567.5	5.33	568	5.31	569.1	5.35	571.03	5.42	571.58	5.47
572.81	5.53	574.66	5.49	575.33	5.51	575.88	5.45	576.86	5.47
579.33	5.35	581.36	5.61	582.05	5.61	582.76	5.61	583.74	5.56
584.61	5.45	585.43	5.38	585.9	5.43	588.1	5.53	589.63	5.55
590.03	5.57	591.16	5.47	592.16	5.59	593.02	5.66	594.38	5.57
595.03	5.65	596.13	5.51	597.28	5.48	597.63	5.43	599.84	5.4
600.35	5.41	601.6	5.41	602.42	5.45	602.81	5.4	603.89	5.34
604.52	5.29	605.55	5.47	606.64	5.52	608.16	5.59	608.49	5.66
610.25	5.48	610.71	5.51	612.37	5.58	612.94	5.6	614.72	5.39
616.43	5.07	616.78	4.77	622.85	4.93	623.94	4.96	625.36	4.99
628.68	5.08	629.37	5.1	629.89	5.11	630.96	5.14	633.13	4.4
633.62	4.11	639.59	.76	640.74	.46	643.4	-2.03	650.61	-8.53
652.04	-9.2	656.94	-11.22	657.17	-11.41	657.41	-11.5	660.21	-12.78
660.44	-12.83	660.69	-12.87	664.29	-13.64	667.47	-13.92	671.12	-13.92
674.44	-14.01	674.88	-14.04	678.75	-14.23	681.95	-14.42	682.27	-14.42
682.45	-14.38	687.81	-14.42	688	-14.42	692.87	-14.45	695.97	-14.33
697.49	-14.28	702.33	-14.8	706.47	-14.71	706.62	-14.71	708.01	-14.62
709.79	-14.51	713.08	-14.4	717.23	-14.59	717.34	-14.59	721.83	-14.22
721.93	-14.21	722.03	-14.2	725.93	-13.93	726.06	-13.92	729	-13.56
729.25	-13.57	732.19	-13.32	732.43	-13.26	735.26	-12.91	735.82	-12.84
739.51	-12.4	742.97	-11.87	743.32	-11.86	746.18	-11.15	746.67	-11.14
749.43	-10.73	749.85	-10.7	752.63	-10.17	755.26	-8.63	755.64	-8.5
764.94	-7.99	765.06	-7.92	770.39	-6.46	770.57	-6.21	775.45	-1.43
779.56	.87	779.89	.63	784.19	2.43	784.33	2.47	785.78	3.12
786.8	2.85	788.18	3.03	789.32	3.13	790.58	3.21	790.88	3.22
792.13	3.21	794.59	3.48	795.9	3.73	797.09	3.86	798.36	3.82
798.79	3.8	799.14	3.83	799.84	3.87	801.23	4.08	802.42	4.23
803.9	4.23	804.29	4.22	804.76	4.23	807.07	4.13	807.61	4.1
808.03	4.14	808.68	4.21	809.15	4.35	811.8	4.36	812.14	4.35
812.8	4.36	813.99	4.44	816.23	4.48	816.98	4.55	817.8	4.84
818.26	4.77	818.67	5	823.01	5.73	823.95	5.46	828.87	5.87
831.11	5.76	832.24	5.84	832.64	5.83	833.26	5.87	834.59	5.82
836.49	5.54	837.34	5.43	838.05	5.33	839.55	5.38	840.22	5.49
840.67	5.49	842.77	5.41	843.43	5.47	844.1	5.5	845.08	5.64
846.18	5.79	847.57	5.88	848.35	5.94	851.54	5.99	852.33	5.98
854.1	6.11	854.88	6.14	855.84	6.12	857.11	6.06	857.53	6.02
859.9	6	861.03	5.98	862.94	5.83	864.72	5.97	865.84	5.99
867.56	5.8	870.19	5.79	872.95	5.63	873.8	5.61	875.9	6.07
876.62	6.07	878.82	5.56	880.15	5.63	882.32	5.63	883.04	5.66
885.08	5.88	886.41	6.02	888.36	6.26	889.35	6.34	892.26	5.84
894	5.91	896.05	6.14	896.51	6.16	898.27	6.44	901.32	6.87
901.89	6.77	903.89	6.56	906.71	6.5	909.61	6.15	911.61	6.05
912.02	6.04	912.99	5.98	914.26	5.83	916.95	5.34	920.02	5.21
921.79	5.23	924.04	5.38	925.09	5.45	927.2	5.05	927.95	5.06
930.39	5.31	932.95	5.44	933.36	5.46	936.68	5.52	937.45	5.52
939.24	5.57	940.69	5.44	942.95	5.33	945.02	5.1	945.91	5.18
948.15	5.31	949.15	5.17	950.56	5.06	952.19	4.8	955.2	5.01
958.11	4.63	961.2	4.41	962.12	4.37	964.68	4.44	966.09	4.36
967.83	4.22	968.37	4.21	970.87	4.44	971.6	4.35	973.96	4.36
975.38	4.4	977	4.53	978.89	4.48	980.19	4.21	981.68	4.24
983.32	4.58	984.09	4.63	985.05	4.72	989.54	4.43	989.96	4.4
991.12	4.26	993.99	3.96	995.77	4.07	997.33	4.45	998.76	4.44
1002	4.5	1002.97	4.45	1004.99	4.54	1005.36	4.56	1005.79	4.58
1009.48	4.89	1014.26	4.5	1016.96	4.59	1029.23	5.2	1041.95	5.32
1042.26	5.29	1045.31	4.95	1047.83	4.44	1050.51	4.76	1051.54	4.77
1053.98	4.62	1055.73	4.44	1058.35	4.47	1058.9	4.46	1059.71	4.52
1062.05	4.36	1065.19	4.89	1066.56	4.9	1067.64	4.95	1070.47	5.89

```
 1072.73    6.21 1075.32    6.55 1078.15    7.53 1080.12    8.41

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .11  629.89     .03  801.23     .11

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        629.89  801.23                  80   97.66     100             .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     629   11.71        T
     800 1080.12   11.71        T

BRIDGE


RIVER: Snake Creek
REACH: C9 Canal           RS: 51737.42

INPUT
Description:
Distance from Upstream XS =   32.19
Deck/Roadway Width        =    29.1
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   11.71          614.82   11.71          627.98   11.71
  627.98   11.71    7.06  797.98   11.71    7.06  797.98   11.71
  811.14   11.71         1080.12   11.71

Upstream Bridge Cross Section Data
Station Elevation Data    num=     424
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    7.24    3.96    6.67    6.58    6.26    7.36    6.28   10.43    5.98
   21.23     5.4   32.58    5.53    35.8    5.41   37.92    5.41   38.77    5.44
   39.32    5.45   58.85    5.49    75.7    5.65   84.26    7.73   85.01    7.65
  102.41    5.98  104.28    5.79  109.19    6.18  134.24     5.8  136.87     5.9
  138.71    5.88  140.87    5.85  142.51    6.03  144.02    5.58  145.45    5.32
  146.16    5.26     147    5.09  147.65    5.04  154.23    4.56  156.89     4.3
  160.26    4.19  162.75    4.53  168.85    4.47  175.18    5.44  184.84     4.8
  191.95    4.91  197.19    4.67  197.57    4.75  198.73    4.75  210.59    5.11
  219.92    4.12  222.88     3.7   226.1    3.96  228.03    3.54   236.5     4.6
  252.83    3.87  256.28    3.69  259.65    3.08  259.95    3.25  260.97    3.68
  265.57     4.8  268.24    5.14  286.49    4.25  290.56    4.37   297.4    3.99
  300.55    4.61  303.65     5.2   311.3    5.81  314.37    5.62  316.82    4.99
  322.17    3.59  337.94     3.6  339.84    3.77   340.5    3.84  357.72    5.55
  358.41    5.55  359.62    5.64  365.11    5.66  365.95    5.62  376.41    4.67
  384.08    2.54  392.55    2.37   397.9    2.97  408.85    3.02   414.1     2.9
  419.82    3.15  422.34    3.61  423.11    3.51  425.65    3.63  432.21    3.76
  438.09    3.88  439.58     3.5  443.27    3.47  443.78    3.44  462.25    3.94
  465.24    4.15  467.27     4.1  468.27     4.1  469.62    3.93  476.62    3.68
  478.63    3.78  484.44    3.46  485.73    3.34  486.74    3.56  491.76    3.54
  495.05    3.46  501.39    3.61  503.44    3.61  510.36    3.59  514.12    3.34
  520.26    4.45   520.6    4.56   524.4    4.47  526.58    4.26   528.2    4.47
  529.17    4.48  530.77    4.44  531.44    4.41  532.72     4.3  533.21    4.32
  534.44    4.41  536.08    4.42  538.78    4.71  540.78    4.71  541.57    4.69
  543.03    4.73  544.37    4.76  545.13    4.82  546.85    4.91  547.86    4.94
  549.88    5.03  551.25    5.04  551.76    5.07  553.08    5.16   554.4    5.18
  555.66    5.22  557.58    5.34  559.26    5.34   560.4    5.36  562.57    5.44
  562.97    5.43   563.3    5.46  564.83    5.44  565.29    5.41  566.58    5.33
   567.5    5.33     568    5.31   569.1    5.35  571.03    5.42  571.58    5.47
  572.81    5.53  574.66    5.49  575.33    5.51  575.88    5.45  576.86    5.47
  579.33    5.35  581.36    5.61  582.05    5.61  582.76    5.61  583.74    5.56
  584.61    5.45  585.43    5.38   585.9    5.43   588.1    5.53  589.63    5.55
  590.03    5.57  591.16    5.47  592.16    5.59  593.02    5.66  594.38    5.57
  595.03    5.65  596.13    5.51  597.28    5.48  597.63    5.43  599.84     5.4
  600.35    5.41   601.6    5.41  602.42    5.45  602.81     5.4  603.89    5.34
  604.52    5.29  605.55    5.47  606.64    5.52  608.16    5.59  608.49    5.66
  610.25    5.48  610.71    5.51  612.37    5.58  612.94     5.6  614.72    5.39
  616.43    5.07  616.78    4.77  622.85    4.93  623.94    4.96  625.36    4.99
```

628.68	5.08	629.37	5.1	629.89	5.11	630.96	5.14	633.13	4.4
633.62	4.11	639.59	.76	640.74	.46	643.4	-2.03	650.61	-8.53
652.04	-9.2	656.94	-11.22	657.17	-11.41	657.41	-11.5	660.21	-12.78
660.44	-12.83	660.69	-12.87	664.29	-13.64	667.47	-13.92	671.12	-13.92
674.44	-14.01	674.88	-14.04	678.75	-14.23	681.95	-14.42	682.27	-14.42
682.45	-14.38	687.81	-14.42	688	-14.42	692.87	-14.45	695.97	-14.33
697.49	-14.28	702.33	-14.8	706.47	-14.71	706.62	-14.71	708.01	-14.62
709.79	-14.51	713.08	-14.4	717.23	-14.59	717.34	-14.59	721.83	-14.22
721.93	-14.21	722.03	-14.2	725.93	-13.93	726.06	-13.92	729	-13.56
729.25	-13.57	732.19	-13.32	732.43	-13.26	735.26	-12.91	735.82	-12.84
739.51	-12.4	742.97	-11.87	743.32	-11.86	746.18	-11.15	746.67	-11.14
749.43	-10.73	749.85	-10.7	752.63	-10.17	755.26	-8.63	755.64	-8.5
764.94	-7.99	765.06	-7.92	770.39	-6.46	770.57	-6.21	775.45	-1.43
779.56	.87	779.89	.63	784.19	2.43	784.33	2.47	785.78	3.12
786.8	2.85	788.18	3.03	789.32	3.13	790.58	3.21	790.88	3.22
792.13	3.21	794.59	3.48	795.9	3.73	797.09	3.86	798.36	3.82
798.79	3.8	799.14	3.83	799.84	3.87	801.23	4.08	802.42	4.23
803.9	4.23	804.29	4.22	804.76	4.23	807.07	4.13	807.61	4.1
808.03	4.14	808.68	4.21	809.15	4.35	811.8	4.36	812.14	4.35
812.8	4.36	813.99	4.44	816.23	4.48	816.98	4.55	817.8	4.84
818.26	4.77	818.67	5	823.01	5.73	823.95	5.46	828.87	5.87
831.11	5.76	832.24	5.84	832.64	5.83	833.26	5.87	834.59	5.82
836.49	5.54	837.34	5.43	838.05	5.33	839.55	5.38	840.22	5.49
840.67	5.49	842.77	5.41	843.43	5.47	844.1	5.5	845.08	5.64
846.18	5.79	847.57	5.88	848.35	5.94	851.54	5.99	852.33	5.98
854.1	6.11	854.88	6.14	855.84	6.12	857.11	6.06	857.53	6.02
859.9	6	861.03	5.98	862.94	5.83	864.72	5.97	865.84	5.99
867.56	5.8	870.19	5.79	872.95	5.63	873.8	5.61	875.9	6.07
876.62	6.07	878.82	5.56	880.15	5.63	882.32	5.63	883.04	5.66
885.08	5.88	886.41	6.02	888.36	6.26	889.35	6.34	892.26	5.84
894	5.91	896.05	6.14	896.51	6.16	898.27	6.44	901.32	6.87
901.89	6.77	903.89	6.56	906.71	6.5	909.61	6.15	911.61	6.05
912.02	6.04	912.99	5.98	914.26	5.83	916.95	5.34	920.02	5.21
921.79	5.23	924.04	5.38	925.09	5.45	927.2	5.05	927.95	5.06
930.39	5.31	932.95	5.44	933.36	5.46	936.68	5.52	937.45	5.52
939.24	5.57	940.69	5.44	942.95	5.33	945.02	5.1	945.91	5.18
948.15	5.31	949.15	5.17	950.56	5.06	952.19	4.8	955.2	5.01
958.11	4.63	961.2	4.41	962.12	4.37	964.68	4.44	966.09	4.36
967.83	4.22	968.37	4.21	970.87	4.44	971.6	4.35	973.96	4.36
975.38	4.4	977	4.53	978.89	4.48	980.19	4.21	981.68	4.24
983.32	4.58	984.09	4.63	985.05	4.72	989.54	4.43	989.96	4.4
991.12	4.26	993.99	3.96	995.77	4.07	997.33	4.45	998.76	4.44
1002	4.5	1002.97	4.45	1004.99	4.54	1005.36	4.56	1005.79	4.58
1009.48	4.89	1014.26	4.5	1016.96	4.59	1029.23	5.2	1041.95	5.32
1042.26	5.29	1045.31	4.95	1047.83	4.44	1050.51	4.76	1051.54	4.77
1053.98	4.62	1055.73	4.44	1058.35	4.47	1058.9	4.46	1059.71	4.52
1062.05	4.36	1065.19	4.89	1066.56	4.9	1067.64	4.95	1070.47	5.89
1072.73	6.21	1075.32	6.55	1078.15	7.53	1080.12	8.41		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	629.89	.03	801.23	.11

Bank Sta: Left	Right	Coeff Contr.	Expan.
629.89	801.23	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	629	11.71	T
800	1080.12	11.71	T

Downstream Deck/Roadway Coordinates num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	11.71		614.82	11.71		627.98	11.71	
627.98	11.71	7.06	797.98	11.71	7.06	797.98	11.71	
811.14	11.71		1213.2	11.71				

Downstream Bridge Cross Section Data
Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6.5	.78	6.42	3.78	6.38	4.17	6.39	6.88	7.01

10.47	6.97	10.79	6.91	13.64	6.69	16.52	6.58	17.22	6.6
18.73	6.64	20.36	6.8	21.03	6.81	23.92	6.79	24.28	6.78
25.41	6.72	26.64	6.62	27.04	6.66	29.22	6.92	30.46	6.99
32.43	7.28	33.55	7.34	35.41	7.36	36.9	7.1	40.07	7.05
41.5	7.05	43.55	6.95	45.47	7.03	46.55	7.22	49.46	6.98
50.04	6.97	52.9	7.34	56.01	6.87	56.32	6.86	59.12	7
60.35	7	60.67	7	62.4	6.67	65.81	6.56	70.72	6.46
73.7	6.54	75.79	6.51	76.45	6.47	79.3	6.24	83.8	6.39
84.38	6.44	93.19	6.95	97.53	6.37	98.4	6.36	107.76	6.02
111.59	6.26	113	6.47	113.98	6.49	116.72	6.08	118.42	5.82
119.09	5.71	119.73	5.73	120.48	5.77	122.29	5.83	129.06	6.3
135.02	5.94	135.45	5.9	136.64	5.83	139.68	5.56	141.06	5.27
143.75	5	145.23	5.45	146.58	5.88	148.33	5.72	148.9	5.68
150.98	5.66	151.42	5.67	152	5.66	157.34	5.66	160.74	5.83
161.08	5.8	161.43	5.83	162.14	5.92	165.12	6.23	166.94	6.28
168.84	6.09	170.05	5.95	171.16	5.83	173.77	5.76	174.26	5.77
175.56	5.98	176.41	5.97	179.04	5.9	179.72	6.12	181.11	6.19
181.43	6.12	185.04	6.12	185.55	6.14	189.69	5.82	192.88	5.92
196.4	5.87	197.02	5.7	197.69	5.73	198.84	6.03	200.79	6.14
203.05	5.68	206.26	6.15	208.88	6.41	210.41	6.24	211.92	6.02
213.62	6.06	214.89	6.29	217.87	6.44	222.7	6.64	224.94	6.61
226.71	6.04	227.77	5.79	228.75	5.73	229.81	5.73	234.38	6.14
235.51	6.11	237.79	6.1	239.11	6.02	243.3	6.19	249.55	6.01
252.22	5.86	254.3	5.82	256.11	5.49	257.92	5.47	260	5.4
261.08	5.49	262.32	5.64	264.31	5.97	264.78	6.08	265.59	6.28
266.64	6.47	268.82	6.8	269.31	6.75	272.16	6.79	274.65	6.27
276.97	5.76	278.39	5.51	278.98	5.42	281.43	5.64	283.44	5.68
287.49	5.53	288.56	5.49	289.16	5.57	289.48	5.58	290.25	5.55
296.35	5.94	297	5.93	300.4	5.97	301.39	5.98	301.72	6.09
302.58	6.08	305.18	5.79	306.9	5.57	310.47	5.39	313.62	5.4
313.96	5.4	314.56	5.41	315.7	5.33	317.06	5.34	319.76	5.46
320.89	5.49	321.55	5.45	323.87	5.29	324.57	5.21	326.47	5.03
328.69	5.29	329.55	5.36	330.9	5.26	332.87	5.04	333.5	5.1
334.21	5.14	336.44	5.35	338.72	5.28	339.37	5.24	341.27	5.27
343.13	5.34	343.91	5.37	346.89	5.24	347.85	5.37	350.17	5.04
350.87	5.16	352	5.22	353.77	5.45	354.52	5.39	358.63	5.35
365.13	5.29	366.53	5.54	368.72	5.18	374.81	4.25	375.77	4.45
378.56	4.39	379.49	4.34	380.48	4.14	381.79	4.13	384.74	3.92
385.22	3.89	385.88	3.83	386.81	3.76	390.26	3.75	391.45	3.62
392.47	3.51	393.33	3.42	397.55	3.06	397.88	3.04	399.42	3.22
405.34	2.75	405.78	2.71	406.08	2.72	406.55	2.66	412.78	3.07
413.85	3.01	415.26	2.88	417.17	2.89	420.58	3.09	421.7	3.15
423.13	3.18	425.37	3.21	427.83	3.1	428.57	3.24	429.96	3.63
430.35	3.67	433.74	3.92	441.28	4.65	442.45	4.67	458.05	4.83
458.54	4.78	462.16	4.34	462.87	4.36	470.36	5.01	471.86	5.07
483.6	5.6	486.86	5.77	487.91	5.89	490	5.53	490.62	5.51
493.04	5.73	496.46	5.56	513.54	5.48	514.1	5.49	515.32	5.49
516.16	5.49	524.72	5.48	525.74	5.48	530.22	5.7	530.67	5.7
538.32	4.65	539.11	4.65	548.97	5.94	558.67	5.9	559.31	5.82
559.91	5.81	560.64	5.9	561.79	5.59	572.26	4.58	577.34	4.55
578.98	4.88	579.57	5.07	585.23	5.26	586.27	5.25	591.62	5.18
596.32	5.36	608.29	6.5	610.86	6.6	612.32	6.57	612.69	6.59
613.27	6.61	614.17	6.74	616.86	6.68	617.57	6.56	619.97	6.6
622.37	6.09	626.75	5.08	628.24	4.85	628.84	4.6	629.91	4.25
631.55	3.71	635.88	2.29	639.97	.93	644.34	-.06	648.45	-2.2
650.79	-3.14	656.41	-5.73	656.74	-5.88	657.45	-6.06	663.34	-9.78
665.91	-11.11	668.88	-12.46	669.37	-12.93	672.04	-13.88	672.67	-14.17
675.83	-15.13	676.26	-15.29	679.28	-15.64	679.83	-15.64	683.94	-15.4
684.34	-15.33	687.67	-15	688.12	-15.07	688.55	-15.13	693.4	-14.85
693.88	-14.84	696.62	-14.65	697.19	-14.65	699.93	-14.37	703.78	-14.55
704.23	-14.56	704.73	-14.62	708.02	-14.56	710.01	-14.53	710.4	-14.58
715.26	-15.13	715.59	-15.1	718.75	-14.75	719.04	-14.68	722.01	-14.23
722.27	-14.2	725.86	-14.02	726.11	-14.04	726.47	-14.07	729.88	-13.61
730.28	-13.6	733.2	-13.32	736.1	-13.32	736.35	-13.3	741.61	-13.21
741.87	-13.23	744.69	-13.18	744.97	-13.12	747.89	-12.39	748.19	-12.37
751.12	-11.42	757.38	-8.97	758.04	-8.59	758.88	-7.86	763.17	-4.89
763.43	-4.65	769.38	-2.52	771.69	-1.01	773.48	.27	774.04	.63
774.42	.79	775.55	.65	775.64	1.48	775.85	2.56	783.4	2.73
784.45	2.74	786.91	2.76	786.99	3.85	787.11	5.71	787.66	5.7
787.89	5.7	788.13	5.69	788.16	4.99	788.37	2.77	796.83	2.86
798.09	2.86	799.16	2.86	800.5	2.87	802.91	2.88	806.23	2.9

```
  809.42    2.92  814.84    2.96  818.94    2.99  820.74    3.24  821.73    3.31
  823.94    3.56  827.14    3.62  829.67    3.78  832.74    3.66  833.33    3.67
  833.85    3.69  836.11    3.78  837.09    3.91  837.75       4  858.29    7.12
  864.39    6.98  869.57    7.08  871.11    7.16  881.26    6.16  881.86    6.07
  885.37    6.28  885.86    6.29  887.03    6.18  892.77    6.41  898.08    6.93
  902.07    6.92  905.16     6.9  907.99    6.56     911    6.57   912.3     6.6
  915.81    6.69  917.83    6.74  919.08    6.66  920.99    6.85  921.91    6.72
  922.61    6.76   926.8    6.44  928.57    6.42  930.51    6.41  933.59    6.41
  944.38    6.26  948.27    5.87  950.14    5.47  953.47    5.37  954.72    5.22
  957.41    5.45  972.35    4.72  978.43     5.9   980.9    5.46  983.69     5.5
  986.02    5.37  988.13    5.52  991.98    5.13  993.34    5.07   997.3    4.89
 1008.61     4.8  1011.6    4.91 1013.44    4.92 1014.66     4.7 1016.15    4.52
 1017.45    4.36 1018.26    4.16 1018.79     4.2 1022.12    4.64 1026.73    4.91
 1031.52     4.9 1036.81    4.93 1039.58    5.17 1043.71    4.86 1044.93    4.78
 1047.48    4.82 1051.08    4.63 1063.21    5.11 1065.73    5.32 1067.35     5.3
 1069.85    4.91 1071.99     4.7 1073.11    4.69 1074.02    4.71 1078.54    4.69
 1079.05    4.72 1080.43    4.71 1084.77    5.22 1092.28    4.53 1092.67    4.56
  1094.3    4.81  1098.8    5.75 1099.25    5.78 1099.89    5.84 1103.76    5.38
 1104.75    5.33 1106.12    5.59 1108.75    5.53    1110    5.34 1112.11    4.76
 1114.95    4.76 1116.27     4.5 1119.22    4.36 1121.49    4.36 1126.12    5.17
 1126.61    5.16 1127.71    5.07 1129.94    4.83 1135.38    5.01 1139.85    5.77
 1143.58    6.03 1150.24    6.55 1151.95    6.59 1157.03    6.26 1160.82     6.4
 1163.51    6.05 1171.68    6.15 1172.06    6.21    1173    6.13 1177.33    6.07
  1179.6    6.12 1188.06    5.26  1189.9    5.34 1190.37    5.48 1191.79    5.59
 1195.29    6.47 1196.85     6.4  1202.8    6.41  1209.8    6.95 1210.98     6.9
 1211.59    6.79  1213.2    7.24

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .11  629.91     .03  837.75     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
        629.91  837.75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     629    11.5       T
     800  1213.2    11.5       T

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 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 Piers =  8

Pier Data
Pier Station     Upstream=  643.67    Downstream=  643.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
      1.5    -30      1.5   4.06     2.82   4.06     2.82      9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
      1.5    -30      1.5   4.06     2.82   4.06     2.82      9

Pier Data
Pier Station     Upstream=  665.67    Downstream=  665.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
        3    -30        3   4.06        6   4.06        6      9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
        3    -30        3   4.06        6   4.06        6      9

Pier Data
Pier Station     Upstream=  687.67    Downstream=  687.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
      1.5    -30      1.5   4.06     2.82   4.06     2.82      9
```

```
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9

Pier Data
Pier Station     Upstream=  703.17    Downstream=  703.17
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9

Pier Data
Pier Station     Upstream=  724.17    Downstream=  724.17
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9

Pier Data
Pier Station     Upstream=  739.67    Downstream=  739.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9

Pier Data
Pier Station     Upstream=  761.67    Downstream=  761.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
       3     -30       3    4.06       6    4.06       6       9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
       3     -30       3    4.06       6    4.06       6       9

Pier Data
Pier Station     Upstream=  783.67    Downstream=  783.67
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
     1.5     -30     1.5    4.06    2.82    4.06    2.82       9

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =       2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Snake Creek
REACH: C9 Canal           RS: 51691.44
```

INPUT
Description: Downstream of Railroad Bridge
Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6.5	.78	6.42	3.78	6.38	4.17	6.39	6.88	7.01
10.47	6.97	10.79	6.91	13.64	6.69	16.52	6.58	17.22	6.6
18.73	6.64	20.36	6.8	21.03	6.81	23.92	6.79	24.28	6.78
25.41	6.72	26.64	6.62	27.04	6.66	29.22	6.92	30.46	6.99
32.43	7.28	33.55	7.34	35.41	7.36	36.9	7.1	40.07	7.05
41.5	7.05	43.55	6.95	45.47	7.03	46.55	7.22	49.46	6.98
50.04	6.97	52.9	7.34	56.01	6.87	56.32	6.86	59.12	7
60.35	7	60.67	7	62.4	6.67	65.81	6.56	70.72	6.46
73.7	6.54	75.79	6.51	76.45	6.47	79.3	6.24	83.8	6.39
84.38	6.44	93.19	6.95	97.53	6.37	98.4	6.36	107.76	6.02
111.59	6.26	113	6.47	113.98	6.49	116.72	6.08	118.42	5.82
119.09	5.71	119.73	5.73	120.48	5.77	122.29	5.83	129.06	6.3
135.02	5.94	135.45	5.9	136.64	5.83	139.68	5.56	141.06	5.27
143.75	5	145.23	5.45	146.58	5.88	148.33	5.72	148.9	5.68
150.98	5.66	151.42	5.67	152	5.66	157.34	5.66	160.74	5.83
161.08	5.8	161.43	5.83	162.14	5.92	165.12	6.23	166.94	6.28
168.84	6.09	170.05	5.95	171.16	5.83	173.77	5.76	174.26	5.77
175.56	5.98	176.41	5.97	179.04	5.9	179.72	6.12	181.11	6.19
181.43	6.12	185.04	6.12	185.55	6.14	189.69	5.82	192.88	5.92
196.4	5.87	197.02	5.7	197.69	5.73	198.84	6.03	200.79	6.14
203.05	5.68	206.26	6.15	208.88	6.41	210.41	6.24	211.92	6.02
213.62	6.06	214.89	6.29	217.87	6.44	222.7	6.64	224.94	6.61
226.71	6.04	227.77	5.79	228.75	5.73	229.81	5.73	234.38	6.14
235.51	6.11	237.79	6.1	239.11	6.02	243.3	6.19	249.55	6.01
252.22	5.86	254.3	5.82	256.11	5.49	257.92	5.47	260	5.4
261.08	5.49	262.32	5.64	264.31	5.97	264.78	6.08	265.59	6.28
266.64	6.47	268.82	6.8	269.31	6.75	272.16	6.79	274.65	6.27
276.97	5.76	278.39	5.51	278.98	5.42	281.43	5.64	283.44	5.68
287.49	5.53	288.56	5.49	289.16	5.57	289.48	5.58	290.25	5.55
296.35	5.94	297	5.93	300.4	5.97	301.39	5.98	301.72	6.09
302.58	6.08	305.18	5.79	306.9	5.57	310.47	5.39	313.62	5.4
313.96	5.4	314.56	5.41	315.7	5.33	317.06	5.34	319.76	5.46
320.89	5.49	321.55	5.45	323.87	5.29	324.57	5.21	326.47	5.03
328.69	5.29	329.55	5.36	330.9	5.26	332.87	5.04	333.5	5.1
334.21	5.14	336.44	5.35	338.72	5.28	339.37	5.24	341.27	5.27
343.13	5.34	343.91	5.37	346.89	5.24	347.85	5.37	350.17	5.04
350.87	5.16	352	5.22	353.77	5.45	354.52	5.39	358.63	5.35
365.13	5.29	366.53	5.54	368.72	5.18	374.81	4.25	375.77	4.45
378.56	4.39	379.49	4.34	380.48	4.14	381.79	4.13	384.74	3.92
385.22	3.89	385.88	3.83	386.81	3.76	390.26	3.75	391.45	3.62
392.47	3.51	393.33	3.42	397.55	3.06	397.88	3.04	399.42	3.22
405.34	2.75	405.78	2.71	406.08	2.72	406.55	2.66	412.78	3.07
413.85	3.01	415.26	2.88	417.17	2.89	420.58	3.09	421.7	3.15
423.13	3.18	425.37	3.21	427.83	3.1	428.57	3.24	429.96	3.63
430.35	3.67	433.74	3.92	441.28	4.65	442.45	4.67	458.05	4.83
458.54	4.78	462.16	4.34	462.87	4.36	470.36	5.01	471.86	5.07
483.6	5.6	486.86	5.77	487.91	5.89	490	5.53	490.62	5.51
493.04	5.73	496.46	5.56	513.54	5.48	514.1	5.49	515.32	5.49
516.16	5.49	524.72	5.48	525.74	5.48	530.22	5.7	530.67	5.7
538.32	4.65	539.11	4.65	548.97	5.94	558.67	5.9	559.31	5.82
559.91	5.81	560.64	5.9	561.79	5.59	572.26	4.58	577.34	4.55
578.98	4.88	579.57	5.07	585.23	5.26	586.27	5.25	591.62	5.18
596.32	5.36	608.29	6.5	610.86	6.6	612.32	6.57	612.69	6.59
613.27	6.61	614.17	6.74	616.86	6.68	617.57	6.56	619.97	6.6
622.37	6.09	626.75	5.08	628.24	4.85	628.84	4.6	629.91	4.25
631.55	3.71	635.88	2.29	639.97	.93	644.34	-.06	648.45	-2.2
650.79	-3.14	656.41	-5.73	656.74	-5.88	657.45	-6.06	663.34	-9.78
665.91	-11.11	668.88	-12.46	669.37	-12.93	672.04	-13.88	672.67	-14.17
675.83	-15.13	676.26	-15.29	679.28	-15.64	679.83	-15.64	683.94	-15.4
684.34	-15.33	687.67	-15	688.12	-15.07	688.55	-15.13	693.4	-14.85
693.88	-14.84	696.62	-14.65	697.19	-14.65	699.93	-14.37	703.78	-14.55
704.23	-14.56	704.73	-14.62	708.02	-14.56	710.01	-14.53	710.4	-14.58
715.26	-15.13	715.59	-15.1	718.75	-14.75	719.04	-14.68	722.01	-14.23
722.27	-14.2	725.86	-14.02	726.11	-14.04	726.47	-14.07	729.88	-13.61
730.28	-13.6	733.2	-13.32	736.1	-13.32	736.35	-13.3	741.61	-13.21
741.87	-13.23	744.69	-13.18	744.97	-13.12	747.89	-12.39	748.19	-12.37

751.12	-11.42	757.38	-8.97	758.04	-8.59	758.88	-7.86	763.17	-4.89
763.43	-4.65	769.38	-2.52	771.69	-1.01	773.48	.27	774.04	.63
774.42	.79	775.55	.65	775.64	1.48	775.85	2.56	783.4	2.73
784.45	2.74	786.91	2.76	786.99	3.85	787.11	5.71	787.66	5.7
787.89	5.7	788.13	5.69	788.16	4.99	788.37	2.77	796.83	2.86
798.09	2.86	799.16	2.86	800.5	2.87	802.91	2.88	806.23	2.9
809.42	2.92	814.84	2.96	818.94	2.99	820.74	3.24	821.73	3.31
823.94	3.56	827.14	3.62	829.67	3.78	832.74	3.66	833.33	3.67
833.85	3.69	836.11	3.78	837.09	3.91	837.75	4	858.29	7.12
864.39	6.98	869.57	7.08	871.11	7.16	881.26	6.16	881.86	6.07
885.37	6.28	885.86	6.29	887.03	6.18	892.77	6.41	898.08	6.93
902.07	6.92	905.16	6.9	907.99	6.56	911	6.57	912.3	6.6
915.81	6.69	917.83	6.74	919.08	6.66	920.99	6.85	921.91	6.72
922.61	6.76	926.8	6.44	928.57	6.42	930.51	6.41	933.59	6.41
944.38	6.26	948.27	5.87	950.14	5.47	953.47	5.37	954.72	5.22
957.41	5.45	972.35	4.72	978.43	5.9	980.9	5.46	983.69	5.5
986.02	5.37	988.13	5.52	991.98	5.13	993.34	5.07	997.3	4.89
1008.61	4.8	1011.6	4.91	1013.44	4.92	1014.66	4.7	1016.15	4.52
1017.45	4.36	1018.26	4.16	1018.79	4.2	1022.12	4.64	1026.73	4.91
1031.52	4.9	1036.81	4.93	1039.58	5.17	1043.71	4.86	1044.93	4.78
1047.48	4.82	1051.08	4.63	1063.21	5.11	1065.73	5.32	1067.35	5.3
1069.85	4.91	1071.99	4.7	1073.11	4.69	1074.02	4.71	1078.54	4.69
1079.05	4.72	1080.43	4.71	1084.77	5.22	1092.28	4.53	1092.67	4.56
1094.3	4.81	1098.8	5.75	1099.25	5.78	1099.89	5.84	1103.76	5.38
1104.75	5.33	1106.12	5.59	1108.75	5.53	1110	5.34	1112.11	4.76
1114.95	4.76	1116.27	4.5	1119.22	4.36	1121.49	4.36	1126.12	5.17
1126.61	5.16	1127.71	5.07	1129.94	4.83	1135.38	5.01	1139.85	5.77
1143.58	6.03	1150.24	6.55	1151.95	6.59	1157.03	6.26	1160.82	6.4
1163.51	6.05	1171.68	6.15	1172.06	6.21	1173	6.13	1177.33	6.07
1179.6	6.12	1188.06	5.26	1189.9	5.34	1190.37	5.48	1191.79	5.59
1195.29	6.47	1196.85	6.4	1202.8	6.41	1209.8	6.95	1210.98	6.9
1211.59	6.79	1213.2	7.24						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	629.91	.03	837.75	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
629.91	837.75	15	11.39 30	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	629	11.5	T
800	1213.2	11.5	T

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51680.05

INPUT
Description:
Station Elevation Data num= 407

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7.1	.35	7.12	10.43	4.99	18.35	5.34	22.43	4.58
26.96	4.73	33.06	5.24	35.97	5.41	37.52	5.2	41	5.12
46	5.03	47.54	5.01	49.25	4.67	58.44	4.74	59.72	4.82
66.81	4.12	70.06	4.04	72.05	3.94	72.44	3.94	72.76	3.94
77.27	2.93	78.16	2.89	80.64	3.34	84.58	3.55	88.08	3.51
96.9	3.53	97.76	3.52	98.22	3.55	109.08	5.29	111.11	5.21
122.74	3.56	123.87	3.29	125.6	2.97	133.37	3.68	134.39	3.75
137.98	4.24	138.49	4.25	142.53	3.68	146.24	3.18	147.56	3.2
148.79	3.37	149.99	3.47	155.14	3.37	155.71	3.39	156.55	3.32
158.31	3.28	159.22	3.27	162.35	3.14	165.59	3.46	166.15	3.51
167.07	3.38	172.08	3.44	173.79	3.56	174.93	3.37	177.75	3.32
180.69	3.33	182.3	3.41	183.75	3.36	185.49	3.41	192.34	3.35
193.7	3.36	199.65	3.07	202.17	3.15	204.72	3.49	205.79	3.49
207.13	3.12	207.61	3.04	211.51	3.14	211.95	3.14	212.31	3.15
217.73	3.51	218.43	3.64	224.57	3.9	224.87	3.95	226.17	3.9
230.78	3.67	233.02	3.62	234.93	3.65	235.58	3.61	236.64	3.08
237.2	2.98	237.84	2.96	247.41	3.78	251.21	4.21	254.89	4.42

256.16	4.2	257.44	4.31	265.09	4.54	268.27	4.25	268.69	4.26
269.29	4.24	270.25	4.28	271.78	4.45	272.89	4.34	276.11	4.23
277.33	4.12	282.18	4.04	285.24	4.14	287.08	3.98	296.59	4.52
297.61	4.42	299.07	4.7	300.9	4.7	304.42	4.58	305.4	4.5
308.02	4.3	321.82	3.28	323.59	2.87	325.61	2.96	326.92	2.96
327.54	3.15	334.83	3.16	341.9	2.55	344.01	2.62	346.52	3.21
351.16	3.04	352.26	3.02	353.02	3.01	364.99	2.94	365.58	2.9
366.76	2.95	371.78	2.47	374.3	2.56	376.27	2.72	377.19	2.75
378.09	2.78	381.06	3.12	382.84	3.18	387.66	3.22	390.53	3.32
400.36	3.66	401.44	3.54	402.14	3.56	408.2	3.77	410.26	3.95
411.74	4	417.76	4.21	422.33	4.42	423.93	4.48	426.78	4.58
427.36	4.52	428.12	4.55	431.07	4.55	436.96	4.56	443.65	4.53
446.58	4.53	453.01	4.54	457.37	4.54	459.77	4.54	460.81	4.54
468.02	4.55	469.28	4.61	469.72	4.61	473.26	4.62	475.43	4.32
476.03	4.32	477.53	4.32	479.66	4.32	480.3	4.32	483.58	4.32
484.87	4.32	487.7	4.69	491.28	4.68	493.97	4.68	500.21	4.68
504.95	4.68	508.73	4.27	510.68	4.27	514.15	4.27	516.37	4.42
517.03	4.42	518.68	4.42	519.34	4.42	521.28	4.43	537.02	3.1
538.17	3.16	550.35	5.06	552.45	5.07	567.19	3.54	572.63	1.86
573.03	1.73	574.99	1.69	576.53	1.26	581.29	-.04	582.19	-.14
584.77	-1.55	589.68	-3.63	591.74	-4.43	593.03	-4.81	594.56	-5.15
595.79	-5.43	596.39	-5.65	596.89	-5.94	597.41	-6.26	597.99	-6.65
598.59	-7.18	599.32	-7.45	601.88	-9.09	604.52	-10.46	607.54	-11.81
608.86	-12.5	611.56	-13.41	614.68	-14.3	617.61	-14.63	621.56	-14.35
623.28	-14.59	624.07	-14.65	627.25	-14.29	631.81	-14.07	634.45	-13.92
635.35	-14.09	637.98	-13.85	641.7	-14.03	642.45	-13.97	642.93	-14.04
645.9	-13.98	647.98	-13.94	648.54	-13.83	649.07	-14.06	653.59	-14.53
654.3	-14.53	654.85	-14.46	657.74	-14.1	658.37	-13.98	661.04	-13.55
661.66	-13.33	664.87	-13.16	667.9	-12.75	668.7	-12.58	671.29	-12.34
673.87	-12.34	674.66	-12	675.35	-11.76	680	-11.67	680.73	-11.48
683.2	-11.42	685.74	-10.76	686.54	-10.43	689.09	-9.58	691.5	-8.26
702.7	-2.05	703.77	-1.33	705.57	-.3	708.24	.84	708.36	1.25
708.43	1.88	709.29	1.84	710.38	1.82	710.47	2.4	710.52	2.73
715.5	2.85	716.04	2.87	720.57	3.01	720.65	4.65	720.73	5.9
721.35	5.9	721.7	5.9	721.82	3.43	721.91	2.02	725.54	2.08
736.73	2.48	740.93	2.51	743.15	2.69	743.35	2.71	743.78	2.75
745.22	2.87	746.37	2.77	750.85	4.17	751.13	4.24	752.39	4.07
755.95	4.18	758.42	4.1	759.61	4.04	760.15	3.99	768.15	4.16
769.12	4.09	770.17	3.99	772.07	3.92	780.96	4.02	781.87	4.06
787.2	4.28	788.02	4.31	788.57	4.33	790.04	4.39	790.48	4.41
791.18	4.44	796.97	4.54	801.33	4.62	806.48	4.71	810.7	4.78
811.02	4.79	811.51	4.81	812.51	4.85	813.26	4.87	813.65	4.89
814.91	4.93	815.49	4.95	817.04	5.01	818.28	5.05	818.94	5.07
819.39	5.09	822.2	5.19	823.86	5.25	825.24	5.3	828.15	5.4
832.85	5.57	833.4	5.59	834.2	5.61	834.9	5.64	836.33	5.69
837.6	5.74	838.83	5.78	841.68	5.88	842.18	5.9	844.08	6.7
845	6.73	847.57	6.73	848.47	6.74	851.06	6.72	851.65	6.64
852.01	6.63	852.51	6.62	854.02	6.59	855.96	6.03	857.85	5.99
864.55	5.87	867.31	5.78	868.54	5.7	869.72	5.65	870.86	5.65
875.11	5.58	877.34	5.58	880.07	5.49	881.32	5.48	885.53	5.41
886.59	5.38	889.26	5.32	891.7	5.39	892.53	5.32	894.86	5.35
896.23	5.35	897.62	5.32	899.37	5.2	899.85	5.19	900.72	5.17
904.28	5.22	906.29	5.24	907.4	5.25	909.12	5.24	910.06	5.24
911.55	5.2	913.08	5.16	914.05	5.16	916.91	5.16	918.88	5.17
920.03	5.23	922.97	5.31	923.88	5.21	926.88	5.08	929.58	5.04
930.77	5.17	932.36	5.22	933.95	5.19	935.18	5.19	937.75	5.02
940.84	5.01	941.57	5	943.44	4.96	944.65	4.97	945.64	5.02
947.13	5.03	949.79	5.05	951.59	5.05	951.97	5.07	954.5	4.98
955.37	4.94	957.48	4.94	958.58	4.96	960.91	4.94	961.91	4.95
962.99	4.96	964.81	5.01	965.38	5	967.9	4.96	969.67	4.81
970.78	4.74	971.64	4.84	972.18	4.86	978.75	5.72	979.35	5.66
980.99	5.68	982.09	5.74	982.67	5.79	987.17	5.76	995.27	5.74
1000.55	5.6	1008.3	5.89	1010.05	5.9	1021.72	5.68	1026.08	5.33
1027.17	5.39	1043.74	5.75	1045.85	5.84	1046.95	5.81	1049.63	5.81
1054.01	5.42	1055.36	5.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	567.19	.03	745.22	.11

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

```
       567.19  745.22                3    6.09      35             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     552    11.5       T
     751 1055.36    11.5       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     984 1055.36      12

CROSS SECTION


RIVER: Snake Creek
REACH: C9 Canal           RS: 51673.96

INPUT
Description: Upstream of I-95 Bridge
Station Elevation Data    num=     500
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    6.75   11.19    6.82   14.62    6.76   18.23     7.1    23.9    7.36
   26.73    7.07   29.42    6.99   39.28    7.16   44.05    7.08    48.6    7.06
    55.8    6.87   56.78    6.79   62.03    6.82   66.68    6.77   71.57    7.08
   76.95    7.21   82.98     6.6    83.9     6.4   86.68    6.24   91.48    6.44
   92.31    6.38   94.04    6.58   97.94    6.29   98.97    6.08  101.54    6.24
  104.61    6.27  106.45    6.51  113.73    6.28  118.64    6.29  120.77    6.19
  126.18    6.22  132.43    6.78  145.83    6.68  153.19    6.68  158.31    6.87
  161.51    6.45  166.22    6.25  167.32    6.27  169.64    6.07  179.77    5.99
  181.03    5.95  182.83    6.09     185    6.41  186.92    6.35  191.99    6.73
  194.84    6.77  199.39    6.18  200.67    6.23  203.56    6.13  207.92    6.16
  212.61    6.25  215.14    6.16  220.93     6.4  223.41    6.17  226.67    6.23
  234.03     6.1  235.51    6.03  238.15    6.13  243.78    5.98  252.17    5.86
  252.92     5.9  256.95    6.51  259.27    5.97   260.6     5.8  263.91    5.94
  271.34    6.71  273.54    6.68  282.17    6.09  286.77    5.82  289.34    5.86
  290.16    5.97  293.19       6  296.47    6.43  298.47    6.41   301.7    5.94
  305.54    5.83  309.06     5.8  315.14    5.88  319.15     5.5  323.03    6.22
   325.9    6.21  331.01    5.62  335.58    5.49  344.37    5.66  351.55     5.5
  352.47    5.43  358.51    5.66  368.97    5.54  377.03    4.87  383.32    4.94
  385.89    5.18  408.92    5.21  411.01    5.15  412.77    4.93  419.11    4.97
  425.98    4.85  435.04     5.1   436.1    4.82  437.06    4.88  442.07    4.73
  443.49     4.8  448.89    4.69  454.39    4.96  455.08    4.88  459.74    5.04
   462.4    4.77   473.8    4.85  478.37    4.78  480.91    4.86  481.94    4.79
  486.86    4.83  490.64       5  504.88    4.77  509.66    5.33  513.98    5.16
   516.1    4.99  520.87    5.06  522.82    4.74  524.43    4.99  527.86    4.93
  528.74    4.77  530.36    4.99  535.21     4.9  539.89    4.91  541.12    4.84
  542.96    5.09  545.95     5.1   547.2    4.89  548.37    5.15  551.91    4.67
  558.03    4.72  559.35    5.15  560.58    5.34  565.96     5.4  579.21    6.06
   581.3    5.67  584.65    5.37  586.24    5.15  589.62    5.17   591.1    5.35
  594.56    5.29  599.55    5.37  603.83    5.09  605.01    5.18  606.46    5.06
  607.42    5.18  609.57     5.1  611.88    5.27  615.08    5.02  616.38    5.27
  626.18    5.06   630.1    5.29  632.18    5.11   636.5    4.62  639.97    5.22
  642.01    5.66  644.59    5.58  660.72    5.76  661.98    5.75   668.6    5.06
     670    5.15  675.29    5.05  681.24    4.85   686.2    4.88  689.31    5.13
  691.82    4.77   693.2    5.08  695.16    5.34  699.33     5.7   704.5    5.54
   719.2    5.34  721.74    5.25  731.97    5.15  736.36    4.93  742.89    4.81
   754.1    5.53  755.07    5.76  758.74    6.16  761.13    6.31  761.93    6.47
  767.99    6.39   770.1     6.2     781    6.25  781.62     6.3  789.08     5.6
  789.96    5.36  799.59    5.71  807.62    5.31  809.79    5.31  814.59    5.42
  815.35    5.55  820.65    5.99   825.7    6.01   831.6     5.9  834.39    5.63
  840.49    5.53  846.16    5.03  847.48    5.12  851.26    5.68  857.32    6.17
  868.31    6.54  869.21    6.52  872.01    6.74  874.31    6.47   879.3    5.99
  880.42    5.75  890.99    5.11  892.24    5.37  908.33    4.87  919.44    4.87
   926.4    5.01  926.81    4.97  939.16    4.62  944.46    4.69  948.64    4.45
  966.38    5.59  972.22    4.95  973.37    5.14  984.06    6.25  988.15    5.28
  991.99    5.87  994.37    5.81 1001.33    5.48 1004.79    5.85 1012.13    5.75
 1019.08    5.32 1023.77     4.7 1026.94    4.43  1031.3    4.39 1033.53     4.3
 1036.02    4.42 1039.36       4 1041.99    3.99 1046.66    4.14 1048.21    4.49
 1050.55    4.55 1052.73    4.72 1059.06    4.32 1065.91    4.38 1076.66    4.35
 1077.53    4.56 1081.92    5.27 1088.04    5.55  1089.6    5.03 1092.23    5.14
 1094.41    5.13 1096.68     4.6 1099.76    4.13 1102.09    4.48 1107.07    4.38
 1113.38    4.07 1115.48    4.05 1117.07    4.42 1118.19    4.23 1121.02    4.33
 1128.85    4.89 1130.15    4.88 1131.13    4.66  1134.8    5.03 1141.72    5.07
```

```
 1146.53    5.18 1154.36    4.56 1158.38    4.63 1159.19    4.51 1172.57    4.31
 1174.69    4.18 1179.31    4.11 1180.86    3.65 1185.18    4.08 1186.93    4.31
 1194.41    4.39 1202.25    4.77 1205.93    4.61  1212.4    3.87 1213.81    3.88
  1217.1    4.14 1220.93    3.83 1223.44    4.29 1227.07     4.4 1232.18    4.62
 1237.89    6.46  1242.2    6.98 1245.65    6.69 1251.25    7.31 1254.51    5.92
 1256.76    6.02 1257.96    6.21 1259.13    5.99 1265.85    5.07 1270.02    5.21
 1279.64    5.04 1288.08    5.16 1290.53    4.83 1294.36    4.19 1295.72    4.11
 1296.97     4.4 1302.89    6.21  1312.9    6.84 1317.52    7.57 1321.46    7.71
 1334.48    4.96 1340.74    5.23 1345.65    4.32 1349.01    4.44 1356.08    5.03
 1357.94    5.14 1358.94    5.01 1368.24    4.85 1369.46    4.62 1380.57     4.7
 1381.22    4.74 1384.87    4.38 1390.56    4.14 1392.56    4.12 1396.56    3.18
 1399.95    3.35 1402.26    3.29 1403.64    3.54 1405.15    3.62  1407.4    3.44
 1416.66    3.52  1417.8    3.42 1419.38    3.66 1420.46    3.62  1430.4    5.21
 1432.03    5.15 1443.05    3.58 1444.48    3.74 1445.91    3.23 1446.93    3.05
 1449.81     3.3 1458.92    4.54 1460.18    4.55 1469.13    3.28 1471.14    3.72
 1471.96    3.62 1475.65    3.75 1478.38    3.43 1482.26    3.38 1493.77    3.85
 1502.66    3.85 1504.07    3.92 1510.06    3.69 1516.15     3.7 1520.38    3.49
 1527.34    3.68 1529.23    3.26 1530.05    2.93 1532.33    2.98 1533.59     3.4
 1538.93    3.75 1540.07    3.95 1545.52    4.18 1546.06    4.26 1556.29    3.77
 1558.52    3.39  1560.8    3.33 1569.16    4.03 1573.92    4.57 1575.73    4.67
 1577.92    4.29 1580.14    4.49 1585.48    4.64 1587.74    4.44 1591.03    4.39
 1592.91    4.47 1597.71    4.32 1599.71    4.13 1603.88    4.06 1606.56    4.14
 1608.69    3.96 1616.96    4.43  1618.6    4.28 1619.86    4.52 1620.63    4.45
 1625.98    4.51 1628.16    4.42 1643.13    3.32 1644.47    3.01 1651.18    3.22
 1661.61    2.24 1664.97    2.34 1667.77       3 1670.04    3.26 1674.14    3.11
 1686.53    3.03 1693.47    2.41 1700.38     2.7 1702.52    2.95 1707.88    3.03
 1722.13    3.51 1722.85    3.43 1730.45    3.69 1731.75     3.8 1748.06    4.38
 1763.43    4.36 1789.99    4.36 1795.31    4.39 1796.35    4.25 1807.63    4.25
 1808.93    4.42 1827.67    4.38 1829.34    4.21 1836.09     4.2 1837.05    4.26
 1843.41    4.25 1849.87    3.69 1865.71    3.66 1870.58    4.41 1873.71    4.41
 1878.06    3.92  1885.3    3.89 1886.07    3.63 1888.84    3.48 1895.97    2.76
 1898.75    2.02 1907.14   -1.24 1909.47   -1.92 1914.46   -3.04 1915.56   -3.45
 1918.47   -5.27 1919.54   -6.23 1920.88   -6.71 1923.07   -8.11 1925.33   -9.29
 1927.93  -10.44 1930.33   -11.7 1932.64  -12.48 1935.29  -13.24  1937.8  -13.52
 1941.17  -13.28  1944.2   -13.7 1945.57  -13.81 1948.27  -13.51 1954.42  -13.19
 1956.03  -13.49 1958.26  -13.29 1961.42  -13.43 1962.77  -13.33 1963.66  -13.45
 1967.96  -13.37 1968.96  -13.17 1969.92  -13.59 1973.77  -13.98    1975  -13.99
 1978.43  -13.57 1981.78  -12.99 1982.83  -12.61 1985.55  -12.46 1988.13  -12.12
 1989.47  -11.82 1991.67  -11.62 1993.85  -11.62 1996.37  -10.63  2000.3  -10.56
 2001.54  -10.23 2003.62  -10.18 2005.77   -9.62 2009.28   -8.35 2011.32   -7.24
 2026.28    1.07 2029.06    1.71 2029.25    2.81 2039.23    3.05 2039.41    5.99
 2040.35    5.98 2040.61    2.28 2051.98    2.18 2062.28    2.36 2066.85    2.32
 2068.02    2.53 2079.36    2.49  2088.6    2.63 2099.94    2.76 2118.92    2.91
 2124.67    2.97 2132.46    3.01 2142.76    3.16  2146.4    3.27 2162.93    3.55
 2171.78    3.67 2178.32    3.71 2204.65    3.65 2229.71    3.57 2242.17    3.52
 2252.67    3.44 2260.85    3.07 2282.92    2.76 2289.78    2.73 2344.34    3.73
 2344.86    7.37 2344.98    7.07 2349.43    6.91 2351.59     6.2 2353.06    6.26
 2358.02    5.75 2365.05    6.08 2376.92    6.59  2381.4    6.71 2387.09    7.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .11 1870.58     .03 2171.78     .11

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1870.58 2171.78              270  294.92     295             .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1900    11.5       T
    2032 2387.09    11.5       T

BRIDGE


RIVER: Snake Creek
REACH: C9 Canal           RS: 51506.02

INPUT
Description:
Distance from Upstream XS =   51.31
Deck/Roadway Width        =   176.4
Weir Coefficient          =     2.6
```

Upstream Deck/Roadway Coordinates

num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	9.09		1899.33	11.5		1899.33	11.5	6.91
2027.33	11.5	6.91	2027.33	11.5		2151.14	11.25	
2387.09	10.78							

Upstream Bridge Cross Section Data

Station Elevation Data num= 500

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6.75	11.19	6.82	14.62	6.76	18.23	7.1	23.9	7.36
26.73	7.07	29.42	6.99	39.28	7.16	44.05	7.08	48.6	7.06
55.8	6.87	56.78	6.79	62.03	6.82	66.68	6.77	71.57	7.08
76.95	7.21	82.98	6.6	83.9	6.4	86.68	6.24	91.48	6.44
92.31	6.38	94.04	6.58	97.94	6.29	98.97	6.08	101.54	6.24
104.61	6.27	106.45	6.51	113.73	6.28	118.64	6.29	120.77	6.19
126.18	6.22	132.43	6.78	145.83	6.68	153.19	6.68	158.31	6.87
161.51	6.45	166.22	6.25	167.32	6.27	169.64	6.07	179.77	5.99
181.03	5.95	182.83	6.09	185	6.41	186.92	6.35	191.99	6.73
194.84	6.77	199.39	6.18	200.67	6.23	203.56	6.13	207.92	6.16
212.61	6.25	215.14	6.16	220.93	6.4	223.41	6.17	226.67	6.23
234.03	6.1	235.51	6.03	238.15	6.13	243.78	5.98	252.17	5.86
252.92	5.9	256.95	6.51	259.27	5.97	260.6	5.8	263.91	5.94
271.34	6.71	273.54	6.68	282.17	6.09	286.77	5.82	289.34	5.86
290.16	5.97	293.19	6	296.47	6.43	298.47	6.41	301.7	5.94
305.54	5.83	309.06	5.8	315.14	5.88	319.15	5.5	323.03	6.22
325.9	6.21	331.01	5.62	335.58	5.49	344.37	5.66	351.55	5.5
352.47	5.43	358.51	5.66	368.97	5.54	377.03	4.87	383.32	4.94
385.89	5.18	408.92	5.21	411.01	5.15	412.77	4.93	419.11	4.97
425.98	4.85	435.04	5.1	436.1	4.82	437.06	4.88	442.07	4.73
443.49	4.8	448.89	4.69	454.39	4.96	455.08	4.88	459.74	5.04
462.4	4.77	473.8	4.85	478.37	4.78	480.91	4.86	481.94	4.79
486.86	4.83	490.64	5	504.88	4.77	509.66	5.33	513.98	5.16
516.1	4.99	520.87	5.06	522.82	4.74	524.43	4.99	527.86	4.93
528.74	4.77	530.36	4.99	535.21	4.9	539.89	4.91	541.12	4.84
542.96	5.09	545.95	5.1	547.2	4.89	548.37	5.15	551.91	4.67
558.03	4.72	559.35	5.15	560.58	5.34	565.96	5.4	579.21	6.06
581.3	5.67	584.65	5.37	586.24	5.15	589.62	5.17	591.1	5.35
594.56	5.29	599.55	5.37	603.83	5.09	605.01	5.18	606.46	5.06
607.42	5.18	609.57	5.1	611.88	5.27	615.08	5.02	616.38	5.27
626.18	5.06	630.1	5.29	632.18	5.11	636.5	4.62	639.97	5.22
642.01	5.66	644.59	5.58	660.72	5.76	661.98	5.75	668.6	5.06
670	5.15	675.29	5.05	681.24	4.85	686.2	4.88	689.31	5.13
691.82	4.77	693.2	5.08	695.16	5.34	699.33	5.7	704.5	5.54
719.2	5.34	721.74	5.25	731.97	5.15	736.36	4.93	742.89	4.81
754.1	5.53	755.07	5.76	758.74	6.16	761.13	6.31	761.93	6.47
767.99	6.39	770.1	6.2	781	6.25	781.62	6.3	789.08	5.6
789.96	5.36	799.59	5.71	807.62	5.31	809.79	5.31	814.59	5.42
815.35	5.55	820.65	5.99	825.7	6.01	831.6	5.9	834.39	5.63
840.49	5.53	846.16	5.03	847.48	5.12	851.26	5.68	857.32	6.17
868.31	6.54	869.21	6.52	872.01	6.74	874.31	6.47	879.3	5.99
880.42	5.75	890.99	5.11	892.24	5.37	908.33	4.87	919.44	4.87
926.4	5.01	926.81	4.97	939.16	4.62	944.46	4.69	948.64	4.45
966.38	5.59	972.22	4.95	973.37	5.14	984.06	6.25	988.15	5.28
991.99	5.87	994.37	5.81	1001.33	5.48	1004.79	5.85	1012.13	5.75
1019.08	5.32	1023.77	4.7	1026.94	4.43	1031.3	4.39	1033.53	4.3
1036.02	4.42	1039.36	4	1041.99	3.99	1046.66	4.14	1048.21	4.49
1050.55	4.55	1052.73	4.72	1059.06	4.32	1065.91	4.38	1076.66	4.35
1077.53	4.56	1081.92	5.27	1088.04	5.55	1089.6	5.03	1092.23	5.14
1094.41	5.13	1096.68	4.6	1099.76	4.13	1102.09	4.48	1107.07	4.38
1113.38	4.07	1115.48	4.05	1117.07	4.42	1118.19	4.23	1121.02	4.33
1128.85	4.89	1130.15	4.88	1131.13	4.66	1134.8	5.03	1141.72	5.07
1146.53	5.18	1154.36	4.56	1158.38	4.63	1159.19	4.51	1172.57	4.31
1174.69	4.18	1179.31	4.11	1180.86	3.65	1185.18	4.08	1186.93	4.31
1194.41	4.39	1202.25	4.77	1205.93	4.61	1212.4	3.87	1213.81	3.88
1217.1	4.14	1220.93	3.83	1223.44	4.29	1227.07	4.4	1232.18	4.62
1237.89	6.46	1242.2	6.98	1245.65	6.69	1251.25	7.31	1254.51	5.92
1256.76	6.02	1257.96	6.21	1259.13	5.99	1265.85	5.07	1270.02	5.21
1279.64	5.04	1288.08	5.16	1290.53	4.83	1294.36	4.19	1295.72	4.11
1296.97	4.4	1302.89	6.21	1312.9	6.84	1317.52	7.57	1321.46	7.71
1334.48	4.96	1340.74	5.23	1345.65	4.32	1349.01	4.44	1356.08	5.03

1357.94	5.14	1358.94	5.01	1368.24	4.85	1369.46	4.62	1380.57	4.7
1381.22	4.74	1384.87	4.38	1390.56	4.14	1392.56	4.12	1396.56	3.18
1399.95	3.35	1402.26	3.29	1403.64	3.54	1405.15	3.62	1407.4	3.44
1416.66	3.52	1417.8	3.42	1419.38	3.66	1420.46	3.62	1430.4	5.21
1432.03	5.15	1443.05	3.58	1444.48	3.74	1445.91	3.23	1446.93	3.05
1449.81	3.3	1458.92	4.54	1460.18	4.55	1469.13	3.28	1471.14	3.72
1471.96	3.62	1475.65	3.75	1478.38	3.43	1482.26	3.38	1493.77	3.85
1502.66	3.85	1504.07	3.92	1510.06	3.69	1516.15	3.7	1520.38	3.49
1527.34	3.68	1529.23	3.26	1530.05	2.93	1532.33	2.98	1533.59	3.4
1538.93	3.75	1540.07	3.95	1545.52	4.18	1546.06	4.26	1556.29	3.77
1558.52	3.39	1560.8	3.33	1569.16	4.03	1573.92	4.57	1575.73	4.67
1577.92	4.29	1580.14	4.49	1585.48	4.64	1587.74	4.44	1591.03	4.39
1592.91	4.47	1597.71	4.32	1599.71	4.13	1603.88	4.06	1606.56	4.14
1608.69	3.96	1616.96	4.43	1618.6	4.28	1619.86	4.52	1620.63	4.45
1625.98	4.51	1628.16	4.42	1643.13	3.32	1644.47	3.01	1651.18	3.22
1661.61	2.24	1664.97	2.34	1667.77	3	1670.04	3.26	1674.14	3.11
1686.53	3.03	1693.47	2.41	1700.38	2.7	1702.52	2.95	1707.88	3.03
1722.13	3.51	1722.85	3.43	1730.45	3.69	1731.75	3.8	1748.06	4.38
1763.43	4.36	1789.99	4.36	1795.31	4.39	1796.35	4.25	1807.63	4.25
1808.93	4.42	1827.67	4.38	1829.34	4.21	1836.09	4.2	1837.05	4.26
1843.41	4.25	1849.87	3.69	1865.71	3.66	1870.58	4.41	1873.71	4.41
1878.06	3.92	1885.3	3.89	1886.07	3.63	1888.84	3.48	1895.97	2.76
1898.75	2.02	1907.14	-1.24	1909.47	-1.92	1914.46	-3.04	1915.56	-3.45
1918.47	-5.27	1919.54	-6.23	1920.88	-6.71	1923.07	-8.11	1925.33	-9.29
1927.93	-10.44	1930.33	-11.7	1932.64	-12.48	1935.29	-13.24	1937.8	-13.52
1941.17	-13.28	1944.2	-13.7	1945.57	-13.81	1948.27	-13.51	1954.42	-13.19
1956.03	-13.49	1958.26	-13.29	1961.42	-13.43	1962.77	-13.33	1963.66	-13.45
1967.96	-13.37	1968.96	-13.17	1969.92	-13.59	1973.77	-13.98	1975	-13.99
1978.43	-13.57	1981.78	-12.99	1982.83	-12.61	1985.55	-12.46	1988.13	-12.12
1989.47	-11.82	1991.67	-11.62	1993.85	-11.62	1996.37	-10.63	2000.3	-10.56
2001.54	-10.23	2003.62	-10.18	2005.77	-9.62	2009.28	-8.35	2011.32	-7.24
2026.28	1.07	2029.06	1.71	2029.25	2.81	2039.23	3.05	2039.41	5.99
2040.35	5.98	2040.61	2.28	2051.98	2.18	2062.28	2.36	2066.85	2.32
2068.02	2.53	2079.36	2.49	2088.6	2.63	2099.94	2.76	2118.92	2.91
2124.67	2.97	2132.46	3.01	2142.76	3.16	2146.4	3.27	2162.93	3.55
2171.78	3.67	2178.32	3.71	2204.65	3.65	2229.71	3.57	2242.17	3.52
2252.67	3.44	2260.85	3.07	2282.92	2.76	2289.78	2.73	2344.34	3.73
2344.86	7.37	2344.98	7.07	2349.43	6.91	2351.59	6.2	2353.06	6.26
2358.02	5.75	2365.05	6.08	2376.92	6.59	2381.4	6.71	2387.09	7.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	1870.58	.03	2171.78	.11

Bank Sta: Left	Right	Coeff Contr.	Expan.
1870.58	2171.78	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1900	11.5	T
2032	2387.09	11.5	T

Downstream Deck/Roadway Coordinates

num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	9.09		1899.33	11.5		1899.33	11.5	6.91
2027.33	11.5	6.91	2027.33	11.5		2151.14	11.25	
3305.2	8.94							

Downstream Bridge Cross Section Data

Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	9.16	6.15	9.07	19.3	7.36	28.1	6.54	45.16	4.86
46.8	5.34	58.36	4.57	64.93	3.41	67.64	3.1	70.09	3.32
73.46	4.04	79.48	4.26	82.63	4.11	93.86	4.3	104.15	4.16
106.48	4.05	113.82	4.06	119.57	4.23	125.32	4.22	128.78	4.08
135.86	4.01	146.76	3.62	149.03	3.28	154.98	3.03	157.2	3.15
160.56	2.95	165.11	2.93	170.23	2.64	180.23	2.46	182.8	2.64
188.43	2.7	197.57	2.55	202.28	2.37	209.84	2.27	214.07	2.44
217.44	2.36	227.17	2.69	231.86	2.46	234.06	2.63	240.32	2.53
252.77	2.63	259.36	2.57	262.53	2.67	266.53	2.55	269.36	2.87
273.14	2.67	284.13	2.76	286.74	2.6	288.73	2.76	295.54	2.52

300.51	2.17	304.29	2.21	308.06	2.56	312.96	2.45	315.07	2.57
321.43	2.29	326.16	2.45	331.69	2.42	337.54	2.71	341.2	2.39
342.89	2.73	346.32	2.57	355.83	2.66	359.35	2.81	360.2	2.64
364	2.81	371.98	2.6	376.67	2.87	380.42	2.79	384.36	3.06
386.58	2.84	389.61	2.88	391.09	2.64	393.74	2.95	396.28	2.81
399.68	2.97	401.21	2.71	409.4	2.87	413.87	2.6	424.26	2.82
430.94	2.53	432.42	2.78	440.67	2.85	442.8	2.77	452.06	2.9
457.48	2.68	466.15	2.92	468.03	2.79	471.19	2.97	472.35	2.8
477.22	2.92	480.12	2.78	488.11	2.69	492.83	2.82	498.35	2.77
503.33	2.91	512.09	2.72	517.22	2.79	518.45	2.61	520.43	2.97
526.01	2.44	532.63	2.72	536.52	2.6	544.05	2.71	546.19	2.86
549.2	2.54	555.5	2.98	558.97	2.79	563.91	2.84	569.16	2.67
570.15	2.85	574.39	2.72	577.48	2.81	580.25	2.65	587.85	2.82
593.74	2.51	598.13	2.92	600.56	2.71	603.48	3.02	606.27	2.82
609.02	2.98	610.95	2.72	614.9	2.68	617.44	2.85	620.83	2.77
623.27	2.93	634.56	2.59	636.6	2.84	639.36	2.81	642.14	2.4
647.35	2.79	650.64	2.87	653.19	2.64	656.57	2.78	669.42	2.81
672.13	2.95	685.71	2.77	689.31	2.91	696.18	2.63	698.9	2.8
707.31	2.67	710.86	2.79	713.52	2.66	716.88	2.88	719.55	2.48
722.72	2.66	729.07	2.5	732.69	2.62	739.02	2.62	748.16	2.78
754.35	2.66	757.59	2.43	760.36	2.69	764.1	2.56	770.52	2.68
782.97	3.19	786.81	3.24	789.55	3.07	796.31	3.25	801.28	3.03
805.2	3.36	814.66	3.19	823.84	3.11	830.13	3.3	834.82	3.31
836.49	3.49	843.27	3.4	846.27	3.54	849.22	3.3	852.04	3.6
855.56	3.49	861.99	3.84	872.61	3.59	874.69	3.75	879.6	3.48
885.55	3.6	892.72	3.39	897.67	3.35	899.82	3.67	905.44	3.49
908.02	3.61	910.81	3.28	914.11	3.58	919.02	3.48	920.33	3.61
940.78	3.45	951.78	3.43	956.94	3.3	960.03	3.62	962.91	3.67
974.5	3.06	988.56	3.79	997.91	3.5	1003.02	3.57	1013.9	3.41
1022.79	3.39	1030.13	3.58	1033.1	3.96	1038.84	3.97	1052.24	3.83
1054.75	4.08	1058.45	3.86	1060.78	3.5	1068.76	2.98	1076.37	4.04
1079.86	4.1	1085.02	3.91	1091.6	4.03	1094.7	4.3	1099.11	4.22
1105.68	3.59	1110.34	3	1115.81	2.95	1119.82	3.33	1125.57	4.09
1129.58	4.09	1135.51	3.85	1142.16	3.11	1148.12	3.39	1150.46	3.32
1159.85	3.44	1169.75	3.65	1172.33	4.2	1181.43	4.62	1183.18	4.41
1190.93	4.19	1196.47	4.25	1199.69	4.12	1206.69	4.34	1210.97	4.2
1216.37	4.25	1218.96	3.97	1221.76	4.17	1238.21	3.57	1247.17	3.47
1254.02	4.53	1258.22	4.57	1273.97	3.7	1285.05	4.49	1286.44	4.49
1293.47	3.94	1300.52	4.36	1308.2	4.49	1322.15	4.49	1327.86	4.14
1332.73	4.39	1339.13	4.34	1345.06	4.95	1348.52	4.87	1352.08	5.06
1353.9	4.8	1361.95	5.21	1373.88	5.29	1378.6	5.16	1397.41	4.97
1398.47	5.05	1410.28	5.2	1421.72	4.04	1425.62	3.77	1434.13	3.95
1442.56	4.36	1446.6	3.94	1452.08	3.66	1457.55	3.74	1467.4	4.56
1468.75	4.59	1475.93	3.9	1487.12	4.23	1493.79	3.69	1504.97	3.52
1515.63	4.35	1520.52	4.06	1532.17	3.54	1541.45	4.28	1542.87	4.3
1547.49	3.85	1551.35	3.72	1558.37	3.98	1565.75	4.47	1566.96	4.25
1573.66	4.84	1579.8	4.35	1586.9	4.15	1587.95	3.96	1594.58	3.56
1604.96	3.81	1609.37	3.39	1615.64	3.37	1622.74	2.86	1627.16	2.69
1631	3.05	1638.37	3.16	1649.3	3.86	1664.11	4.09	1687.08	4.38
1703.05	4.53	1733.78	4.61	1761.36	4.61	1784.03	4.75	1802.15	4.93
1807.67	5.03	1836.91	5.31	1850.68	5.41	1872.29	5.09	1884.99	5.43
1894.3	5.21	1895.46	4.9	1899.36	2.76	1902.83	.59	1905.89	.39
1908.62	-.54	1913.73	-3.24	1916.78	-4.46	1925.05	-9.15	1932.87	-11.17
1938.69	-13.32	1942.21	-13.91	1949.7	-14.16	1954.33	-14.8	1961.96	-14.72
1964.99	-14.5	1975.16	-13.22	1982.29	-12.77	1986.84	-12.32	1990.46	-11.78
2004.18	-6.73	2006.55	-6.01	2012.86	-2.85	2020.19	0	2027.26	5.25
2028.61	5.4	2028.8	6.6	2036.82	6.76	2036.95	6.36	2042.98	6.68
2058.17	6.4	2099.68	6.33	2118.83	6.44	2127.49	6.38	2139.44	6.15
2163.88	5.9	2169.5	5.74	2190.41	4.98	2196.68	5.07	2208.32	5.52
2226.21	5.32	2244.4	4.97	2287.04	4.52	2295.04	4.46	2296.71	5.26
2301.08	5.67	2306.29	4.47	2312.4	4.47	2317.21	4.78	2323.32	4.84
2334.4	5.97	2339.41	5.88	2343.02	5.11	2346.23	5.67	2347.58	5.42
2352.22	5.3	2355.09	4.56	2378.48	5.19	2385.23	4.75	2388.6	5.07
2396.64	5.06	2408.43	5.55	2413.73	5.4	2423.79	5.55	2437.36	5.38
2445.23	5.74	2450.42	5.51	2456.52	5.78	2458.61	5.55	2464.81	5.64
2467.09	5.44	2468.84	5.7	2479.83	5.71	2487.79	5.59	2491.65	5.71
2497.16	5.55	2509.69	5.83	2513.3	5.59	2525.11	5.61	2528	5.79
2539.47	5.64	2565.79	5.42	2574.03	5.48	2580.68	5.33	2587.79	5.32
2591.63	5.47	2601.38	5.6	2604.81	5.3	2617.78	5.41	2638.29	5.76
2645.44	6.14	2649.59	5.97	2654.53	6.14	2662.97	6.2	2665.67	5.91
2670.7	5.78	2675.7	5.84	2686.65	5.81	2694.1	5.62	2715.02	6.2

```
 2719.39    6.24 2738.45    4.84 2741.58    4.69 2747.98    5.59 2752.92     5.8
 2759.53    5.75 2762.17     5.6 2765.24    5.79 2768.89    5.71 2792.48     5.8
 2795.92    5.58 2809.22    5.53 2814.77    5.72 2817.42    5.65 2823.58    5.88
 2831.32    5.77 2837.85    6.16  2846.6    6.25 2866.54    6.11 2870.41    6.22
 2885.37    5.87 2890.28    6.01 2897.27    5.77 2900.28    5.92 2906.44     5.9
 2912.28     5.7 2943.79    5.61 2948.97     6.1  2956.8    6.35 2960.24    6.27
 2964.86    5.91 2967.73    6.23 2972.98     6.3 2982.54    6.14 2988.13    6.27
 2999.24    6.23 3019.25       6  3022.4    5.86 3030.21    6.13 3035.82       6
 3041.39    6.13 3051.53    6.12 3070.06    6.21 3073.91    6.53 3079.99    6.72
 3083.63    6.63 3091.89    6.05 3099.23    6.38 3101.72    6.22  3108.5    6.12
 3115.45    6.68 3127.16    6.47 3140.52    6.06 3157.64    5.81 3175.96    6.07
 3178.91    5.93 3186.33    6.02 3187.63    5.92 3201.22    5.82 3203.52    5.93
 3209.18    5.82 3219.19    5.93 3221.45    6.04 3229.46    5.78  3246.2    5.94
  3252.2    6.33 3259.18    6.29 3267.29    6.35 3269.79    6.59 3280.72    6.72
 3283.33    7.01  3285.1    6.93 3288.47    7.31    3297    7.54  3305.2    7.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .11 1884.99     .03 2028.61     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
      1884.99 2028.61             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1900      10        T
    2032  3305.2      10        T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    2190  3305.2      12

Upstream Embankment side slope              =       4 horiz. to 1.0 vertical
Downstream Embankment side slope            =       6 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 Abutments =  2

Abutment Data
Upstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 1899.33     4.5 1909.33     4.5 1929.33   -8.83 1939.33   -15.5
Downstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 1899.33     4.5 1909.33     4.5 1929.33   -8.83 1939.33   -15.5

Abutment Data
Upstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 1981.03  -17.09 1991.03  -10.42 2006.03    -.42 2006.03     1.3 2016.63     1.3
 2016.63     4.5 2027.33     4.5
Downstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 1981.03  -17.09 1991.03  -10.42 2006.03    -.42 2006.03     1.3 2016.63     1.3
 2016.63     4.5 2027.33     4.5

Number of Piers =  3

Pier Data
Pier Station     Upstream= 1930.33    Downstream= 1930.33
Upstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
      1.5     -30      1.5    4.38    2.67    4.38    2.67       8
Downstream     num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
      1.5     -30      1.5    4.38    2.67    4.38    2.67       8

Pier Data
Pier Station     Upstream= 1963.33    Downstream= 1963.33
```

Upstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
1.5	-30	1.5	4.38	2.67	4.38	2.67	8

Downstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
1.5	-30	1.5	4.38	2.67	4.38	2.67	8

Pier Data
Pier Station Upstream= 1996.33 Downstream= 1996.33
Upstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
1.5	-30	1.5	4.38	2.67	4.38	2.67	8

Downstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
1.5	-30	1.5	4.38	2.67	4.38	2.67	8

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Momentum Cd = 2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51379.04

INPUT
Description: Downstream of I-95 Bridge
Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	9.16	6.15	9.07	19.3	7.36	28.1	6.54	45.16	4.86
46.8	5.34	58.36	4.57	64.93	3.41	67.64	3.1	70.09	3.32
73.46	4.04	79.48	4.26	82.63	4.11	93.86	4.3	104.15	4.16
106.48	4.05	113.82	4.06	119.57	4.23	125.32	4.22	128.78	4.08
135.86	4.01	146.76	3.62	149.03	3.28	154.98	3.03	157.2	3.15
160.56	2.95	165.11	2.93	170.23	2.64	180.23	2.46	182.8	2.64
188.43	2.7	197.57	2.55	202.28	2.37	209.84	2.27	214.07	2.44
217.44	2.36	227.17	2.69	231.86	2.46	234.06	2.63	240.32	2.53
252.77	2.63	259.36	2.57	262.53	2.67	266.53	2.55	269.36	2.87
273.14	2.67	284.13	2.76	286.74	2.6	288.73	2.76	295.54	2.52
300.51	2.17	304.29	2.21	308.06	2.56	312.96	2.45	315.07	2.57
321.43	2.29	326.16	2.45	331.69	2.42	337.54	2.71	341.2	2.39
342.89	2.73	346.32	2.57	355.83	2.66	359.35	2.81	360.2	2.64
364	2.81	371.98	2.6	376.67	2.87	380.42	2.79	384.36	3.06
386.58	2.84	389.61	2.88	391.09	2.64	393.74	2.95	396.28	2.81
399.68	2.97	401.21	2.71	409.4	2.87	413.87	2.6	424.26	2.82
430.94	2.53	432.42	2.78	440.67	2.85	442.8	2.77	452.06	2.9
457.48	2.68	466.15	2.92	468.03	2.79	471.19	2.97	472.35	2.8
477.22	2.92	480.12	2.78	488.11	2.69	492.83	2.82	498.35	2.77
503.33	2.91	512.09	2.72	517.22	2.79	518.45	2.61	520.43	2.97
526.01	2.44	532.63	2.72	536.52	2.6	544.05	2.71	546.19	2.86
549.2	2.54	555.5	2.98	558.97	2.79	563.91	2.84	569.16	2.67
570.15	2.85	574.39	2.72	577.48	2.81	580.25	2.65	587.85	2.82
593.74	2.51	598.13	2.92	600.56	2.71	603.48	3.02	606.27	2.82
609.02	2.98	610.95	2.72	614.9	2.68	617.44	2.85	620.83	2.77
623.27	2.93	634.56	2.59	636.6	2.84	639.36	2.81	642.14	2.4
647.35	2.79	650.64	2.87	653.19	2.64	656.57	2.78	669.42	2.81
672.13	2.95	685.71	2.77	689.31	2.91	696.18	2.63	698.9	2.8

707.31	2.67	710.86	2.79	713.52	2.66	716.88	2.88	719.55	2.48
722.72	2.66	729.07	2.5	732.69	2.62	739.02	2.62	748.16	2.78
754.35	2.66	757.59	2.43	760.36	2.69	764.1	2.56	770.52	2.68
782.97	3.19	786.81	3.24	789.55	3.07	796.31	3.25	801.28	3.03
805.2	3.36	814.66	3.19	823.84	3.11	830.13	3.3	834.82	3.31
836.49	3.49	843.27	3.4	846.27	3.54	849.22	3.3	852.04	3.6
855.56	3.49	861.99	3.84	872.61	3.59	874.69	3.75	879.6	3.48
885.55	3.6	892.72	3.39	897.67	3.35	899.82	3.67	905.44	3.49
908.02	3.61	910.81	3.28	914.11	3.58	919.02	3.48	920.33	3.61
940.78	3.45	951.78	3.43	956.94	3.3	960.03	3.62	962.91	3.67
974.5	3.06	988.56	3.79	997.91	3.5	1003.02	3.57	1013.9	3.41
1022.79	3.39	1030.13	3.58	1033.1	3.96	1038.84	3.97	1052.24	3.83
1054.75	4.08	1058.45	3.86	1060.78	3.5	1068.76	2.98	1076.37	4.04
1079.86	4.1	1085.02	3.91	1091.6	4.03	1094.7	4.3	1099.11	4.22
1105.68	3.59	1110.34	3	1115.81	2.95	1119.82	3.33	1125.57	4.09
1129.58	4.09	1135.51	3.85	1142.16	3.11	1148.12	3.39	1150.46	3.32
1159.85	3.44	1169.75	3.65	1172.33	4.2	1181.43	4.62	1183.18	4.41
1190.93	4.19	1196.47	4.25	1199.69	4.12	1206.69	4.34	1210.97	4.2
1216.37	4.25	1218.96	3.97	1221.76	4.17	1238.21	3.57	1247.17	3.47
1254.02	4.53	1258.22	4.57	1273.97	3.7	1285.05	4.49	1286.44	4.49
1293.47	3.94	1300.52	4.36	1308.2	4.49	1322.15	4.49	1327.86	4.14
1332.73	4.39	1339.13	4.34	1345.06	4.95	1348.52	4.87	1352.08	5.06
1353.9	4.8	1361.95	5.21	1373.88	5.29	1378.6	5.16	1397.41	4.97
1398.47	5.05	1410.28	5.2	1421.72	4.04	1425.62	3.77	1434.13	3.95
1442.56	4.36	1446.6	3.94	1452.08	3.66	1457.55	3.74	1467.4	4.56
1468.75	4.59	1475.93	3.9	1487.12	4.23	1493.79	3.69	1504.97	3.52
1515.63	4.35	1520.52	4.06	1532.17	3.54	1541.45	4.28	1542.87	4.3
1547.49	3.85	1551.35	3.72	1558.37	3.98	1565.75	4.47	1566.96	4.25
1573.66	4.84	1579.8	4.35	1586.9	4.15	1587.95	3.96	1594.58	3.56
1604.96	3.81	1609.37	3.39	1615.64	3.37	1622.74	2.86	1627.16	2.69
1631	3.05	1638.37	3.16	1649.3	3.86	1664.11	4.09	1687.08	4.38
1703.05	4.53	1733.78	4.61	1761.36	4.61	1784.03	4.75	1802.15	4.93
1807.67	5.03	1836.91	5.31	1850.68	5.41	1872.29	5.09	1884.99	5.43
1894.3	5.21	1895.46	4.9	1899.36	2.76	1902.83	.59	1905.89	.39
1908.62	-.54	1913.73	-3.24	1916.78	-4.46	1925.05	-9.15	1932.87	-11.17
1938.69	-13.32	1942.21	-13.91	1949.7	-14.16	1954.33	-14.8	1961.96	-14.72
1964.99	-14.5	1975.16	-13.22	1982.29	-12.77	1986.84	-12.32	1990.46	-11.78
2004.18	-6.73	2006.55	-6.01	2012.86	-2.85	2020.19	0	2027.26	5.25
2028.61	5.4	2028.8	6.6	2036.82	6.76	2036.95	6.36	2042.98	6.68
2058.17	6.4	2099.68	6.33	2118.83	6.44	2127.49	6.38	2139.44	6.15
2163.88	5.9	2169.5	5.74	2190.41	4.98	2196.68	5.07	2208.32	5.52
2226.21	5.32	2244.4	4.97	2287.04	4.52	2295.04	4.46	2296.71	5.26
2301.08	5.67	2306.29	4.47	2312.4	4.47	2317.21	4.78	2323.32	4.84
2334.4	5.97	2339.41	5.88	2343.02	5.11	2346.23	5.67	2347.58	5.42
2352.22	5.3	2355.09	4.56	2378.48	5.19	2385.23	4.75	2388.6	5.07
2396.64	5.06	2408.43	5.55	2413.73	5.4	2423.79	5.55	2437.36	5.38
2445.23	5.74	2450.42	5.51	2456.52	5.78	2458.61	5.55	2464.81	5.64
2467.09	5.44	2468.84	5.7	2479.83	5.71	2487.79	5.59	2491.65	5.71
2497.16	5.55	2509.69	5.83	2513.3	5.59	2525.11	5.61	2528	5.79
2539.47	5.64	2565.79	5.42	2574.03	5.48	2580.68	5.33	2587.79	5.32
2591.63	5.47	2601.38	5.6	2604.81	5.3	2617.78	5.41	2638.29	5.76
2645.44	6.14	2649.59	5.97	2654.53	6.14	2662.97	6.2	2665.67	5.91
2670.7	5.78	2675.7	5.84	2686.65	5.81	2694.1	5.62	2715.02	6.2
2719.39	6.24	2738.45	4.84	2741.58	4.69	2747.98	5.59	2752.92	5.8
2759.53	5.75	2762.17	5.6	2765.24	5.79	2768.89	5.71	2792.48	5.8
2795.92	5.58	2809.22	5.53	2814.77	5.72	2817.42	5.65	2823.58	5.88
2831.32	5.77	2837.85	6.16	2846.6	6.25	2866.54	6.11	2870.41	6.22
2885.37	5.87	2890.28	6.01	2897.27	5.77	2900.28	5.92	2906.44	5.9
2912.28	5.7	2943.79	5.61	2948.97	6.1	2956.8	6.35	2960.24	6.27
2964.86	5.91	2967.73	6.23	2972.98	6.3	2982.54	6.14	2988.13	6.27
2999.24	6.23	3019.25	6	3022.4	5.86	3030.21	6.13	3035.82	6
3041.39	6.13	3051.53	6.12	3070.06	6.21	3073.91	6.53	3079.99	6.72
3083.63	6.63	3091.89	6.05	3099.23	6.38	3101.72	6.22	3108.5	6.12
3115.45	6.68	3127.16	6.47	3140.52	6.06	3157.64	5.81	3175.96	6.07
3178.91	5.93	3186.33	6.02	3187.63	5.92	3201.22	5.82	3203.52	5.93
3209.18	5.82	3219.19	5.93	3221.45	6.04	3229.46	5.78	3246.2	5.94
3252.2	6.33	3259.18	6.29	3267.29	6.35	3269.79	6.59	3280.72	6.72
3283.33	7.01	3285.1	6.93	3288.47	7.31	3297	7.54	3305.2	7.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
      0     .11 1884.99     .03 2028.61     .11

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      1884.99 2028.61              720  836.96     720            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1900      10       T
    2032  3305.2      10       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    2190  3305.2      12

CROSS SECTION


RIVER: Snake Creek
REACH: C9 Canal           RS: 50542.08

INPUT
Description:
Station Elevation Data    num=     500
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0     6.53     1.73      6.4     2.68     6.28     3.34     6.24     6.65     5.95
    7.44     5.79     9.33     5.34     9.94     5.23    14.74     4.49    17.84     3.95
   18.62     3.92    19.91     3.55    21.64     3.22     22.9     3.05    23.89     2.89
   24.88     2.14    27.93      .52    37.47    -5.13    47.45   -11.01    50.73   -11.36
   64.55   -11.93    70.76   -12.18    72.84   -12.28    77.57   -12.49    87.51   -12.91
   89.34   -13.01   104.62   -13.65   107.39   -13.77   112.23   -14.01   121.05    -14.2
  124.55   -14.37   132.81   -14.48   140.97   -14.81   148.77   -15.14    149.4   -15.16
  155.69   -15.47    164.3   -16.01   168.88   -16.29   170.48   -16.36   176.18   -16.59
  182.37   -16.79   190.85    -17.1   195.54   -17.26   198.78   -17.36   203.72   -17.48
  205.02   -17.53   211.52   -17.82   220.19   -18.32   224.42   -18.66   229.98   -18.97
  234.88   -19.25   238.32   -19.49   247.78   -20.03   249.77   -20.06   256.13   -20.38
   257.6   -20.46   270.47    -20.9    273.7   -21.03   287.26   -21.97   293.75   -22.29
   300.3    -22.6   300.87   -22.57   306.65   -22.86   314.28   -22.81   314.48    -22.8
   323.1   -22.74   323.95   -22.73    343.5   -22.78   351.63   -22.63    352.5   -22.59
  362.29   -22.34   369.27   -22.22   373.79   -22.15    381.2   -22.01   383.21      -22
  387.21   -21.83   392.83    -21.6   395.15   -21.58   403.67   -21.29   405.89   -21.27
  414.26   -20.99   419.92   -20.96   423.15   -20.96    428.8   -20.82   430.77   -20.78
  433.77   -20.81   436.69    -20.8   439.31   -20.82   449.16   -20.63   450.78   -20.64
  454.48   -20.64   461.24   -20.48   466.24   -20.47   467.77   -20.46   475.33   -20.31
  478.71   -20.33   487.33    -20.4   492.46   -20.42   501.84   -20.39   514.85   -20.45
  522.14   -20.65   531.02   -20.82   536.73   -20.85   540.94   -20.74   545.32   -20.72
  559.46   -20.85   564.78   -20.82   566.01   -20.82   582.59   -20.73   586.57   -20.73
  592.57   -20.74   596.42   -20.64   600.84   -20.67   602.56   -20.69   607.16   -20.67
  612.95    -20.7   619.03   -20.61   623.65   -20.58   629.73   -20.62   639.32   -20.58
  643.09   -20.59   644.17   -20.57   650.86   -20.48   654.09   -20.47   661.53    -20.5
  661.98   -20.49   667.33   -20.47   675.54   -20.43   679.75   -20.38   690.77   -20.27
  694.13   -20.23   697.46   -20.22   703.06   -20.24   706.13   -20.26   713.23   -20.22
  724.73   -20.17   728.52   -20.15    729.7   -20.13   739.78   -20.14   744.98   -20.15
  746.41   -20.14   748.56   -20.15   758.88   -20.11   769.11   -20.16   789.19   -20.06
  790.72   -20.06   799.47   -20.03   801.33   -20.03   812.18      -20   814.53   -19.98
  823.36   -19.95   837.57   -19.91    838.5   -19.86   841.54   -19.85   846.95   -19.82
  860.31   -19.77    861.9   -19.79   864.57   -19.77   873.93   -19.81   875.88    -19.8
  878.84   -19.82   884.88   -19.85   887.08   -19.84   895.78   -20.03   898.98   -19.97
  912.23    -19.9   915.33   -19.83   917.97   -19.79   924.91   -19.67   928.11   -19.74
   932.5   -19.73   941.75   -19.74   947.32   -19.71   951.29   -19.58   957.94   -19.54
  968.26   -19.54   972.61   -19.28   981.63   -19.28   984.81   -19.22   988.43   -19.17
  993.11   -19.09  1002.53   -19.07  1004.51   -19.06  1016.79   -18.96  1022.42   -18.97
 1027.95   -18.93  1034.37   -18.65   1039.4   -18.37   1043.7   -18.37  1044.57   -18.27
 1048.92   -17.73  1059.47   -17.68  1064.76   -17.61  1070.43   -17.65  1076.97   -18.07
 1084.76   -17.99  1088.99   -17.94  1092.48   -17.98  1100.25   -17.83  1103.54   -17.83
 1110.24   -18.42  1113.37   -18.46  1121.08    -18.8  1124.66    -18.8  1133.38   -18.87
 1137.35   -18.88  1138.12   -18.89  1141.16   -18.89  1143.55   -18.87  1150.67   -19.78
 1153.12   -19.79  1161.29   -21.67  1163.54   -21.69  1173.11   -22.29  1179.85   -22.73
 1181.56   -22.75  1189.73   -23.26  1191.42    -23.3  1199.74   -23.74  1201.21   -23.74
 1209.69   -24.21   1218.6   -24.51  1219.83   -24.48  1222.75   -24.58  1228.87    -24.8
 1229.77   -24.82  1239.06   -25.06  1241.43    -25.1  1251.99   -25.24  1254.62   -25.25
  1268.7   -25.35  1271.54   -25.36  1283.46   -25.39  1284.88   -25.39   1299.4   -25.19
  1302.7   -25.15  1303.45   -25.13   1314.6    -25.7  1316.85   -25.65  1325.97   -25.74
 1327.12   -25.72  1342.54   -24.85  1344.77   -24.86  1349.33   -25.27  1355.78   -25.86
```

1357.68	-25.87	1360.13	-25.83	1368.36	-26.39	1370.97	-26.11	1374.11	-26
1382.33	-26.25	1390.2	-26.52	1393.19	-26.52	1403.91	-26.67	1407.89	-26.74
1415.83	-26.82	1419.14	-26.73	1427.35	-26.81	1429.8	-26.83	1435.43	-26.74
1441.99	-26.8	1445.95	-26.76	1450.11	-26.83	1452.97	-26.87	1458.23	-26.86
1466.39	-27	1472.23	-27.4	1476.47	-27.43	1482.04	-27.69	1487.34	-28.1
1492.16	-28.17	1497.25	-28.82	1502.71	-29.54	1507.36	-29.74	1513.13	-30.36
1518.14	-30.96	1524.98	-31.06	1529.77	-31.34	1537.32	-31.26	1541.89	-31.48
1546.25	-31.57	1551.47	-31.54	1559.76	-31.3	1563.88	-31.22	1568.03	-31.13
1574.16	-30.99	1577.65	-30.96	1586.88	-30.75	1590.09	-30.69	1597.11	-30.69
1600.11	-30.66	1607.88	-30.62	1609.05	-30.61	1611.83	-30.5	1619.43	-30.42
1619.88	-30.41	1627.11	-30.43	1630.16	-30.32	1637.63	-30.19	1641.91	-30.08
1643.19	-30.07	1651.39	-30.05	1653.43	-30.02	1659.9	-29.91	1662.91	-29.9
1668.61	-29.68	1677.86	-29.31	1679.97	-29.17	1694.41	-28.7	1696.97	-28.56
1707.74	-28.2	1708.75	-28.13	1717.48	-27.93	1720.31	-27.81	1728.85	-27.46
1738.29	-26.94	1739.2	-26.9	1747.99	-26.4	1748.92	-26.4	1794.66	-25.51
1802.75	-25.36	1836.16	-24.71	1849.89	-24.44	1880.77	-23.84	1902.75	-23.41
1918.37	-23.11	1950.89	-22.47	1952.19	-22.45	1983.87	-21.82	2002.76	-21.45
2005.59	-21.39	2034.41	-20.83	2047.57	-20.52	2051.99	-20.45	2059.65	-20.31
2067.66	-20.1	2074.57	-19.96	2080.44	-19.81	2084.38	-19.7	2091.82	-19.54
2096.7	-19.52	2103.29	-19.21	2105.72	-19.08	2111.22	-18.95	2114.64	-18.84
2119.66	-18.75	2123.73	-18.66	2128.18	-18.48	2131.95	-18.3	2135.03	-18.21
2137.77	-18.22	2140.55	-17.86	2145.28	-18.25	2145.54	-18.26	2150.53	-18.29
2150.78	-18.3	2156.69	-18.32	2156.92	-18.33	2160.19	-18.24	2165.99	-18.15
2169.5	-18.05	2173.74	-17.85	2177.25	-17.95	2177.36	-17.94	2181.88	-17.92
2185.99	-17.8	2189.12	-17.69	2189.37	-17.67	2194.5	-17.56	2198.11	-17.46
2201.38	-17.36	2205.03	-17.28	2208.43	-17.1	2211.52	-17.01	2215.19	-16.83
2219.21	-16.74	2222.81	-16.74	2223.01	-16.75	2226.21	-16.76	2229.3	-16.66
2234.04	-16.16	2237.1	-16.56	2240.42	-16.36	2243.66	-16.06	2246.92	-15.17
2251.69	-14.67	2254.73	-14.37	2257.9	-13.48	2261.12	-12.87	2265.57	-11.89
2267.67	-11.4	2270.81	-10.54	2273.89	-9.53	2276.91	-8.07	2280.22	-6.32
2283.22	-4.36	2287.41	-4.69	2290.42	-3.08	2290.56	-3.02	2298.83	-.36
2301.77	.92	2305.38	1.9	2313.76	2.57	2313.96	2.59	2314.65	4.18
2315.11	4.18	2318.09	4.01	2319.87	4.01	2320.89	4.14	2322.89	4.13
2325.63	3.91	2327.84	3.8	2328.32	3.73	2330.96	3.44	2334.71	3.62
2335.96	3.87	2339.08	4.39	2342.09	4.42	2343.93	4.47	2345.23	4.48
2347.17	4.37	2348.67	4.32	2351.61	4.14	2354.95	4.07	2355.25	4.05
2358.95	2.6	2359.35	2.39	2359.82	2.27	2363.21	1.93	2365.88	2.32
2368.4	2.25	2378.72	2.64	2383.94	3.61	2390.04	2.28	2403.66	.82
2405.45	.72	2512.48	1.43	3000.8	1.89	3011.14	2.62	3029.97	2.2
3032.17	2.06	3043.43	1.44	3076.98	.89	3078.99	1.19	3089.17	1.52
3095.1	1.79	3109.45	1.58	3112.46	1.74	3118.86	1.7	3136	2.09
3142.57	1.86	3145.3	1.17	3149.99	1.03	3154.33	1.19	3159.46	1.46
3163.89	1.88	3169.21	1.29	3172.56	1.23	3183.15	1.43	3187.57	1.44
3190.08	1.61	3193.55	1.55	3204.64	1.68	3210.44	1.77	3212.13	2.01
3217.68	1.75	3225.23	2.04	3232.91	1.69	3239.75	1.41	3243.03	1.28
3248.22	1.51	3253.59	1.42	3262.35	1.72	3267.01	1.33	3267.94	1.11
3270.64	.33	3271.79	.62	3274.34	.5	3279.7	.41	3283.13	.43
3285.47	1.61	3286.85	2.13	3289.65	2.72	3290.09	2.8	3290.9	3.09
3292.25	3.61	3293	3.8	3294.91	4.14	3297.09	4.72	3297.75	4.94
3300.4	5.76	3302.95	5.95	3305.38	6.54	3306.64	6.75	3308.36	6.88
3310.24	6.85	3312.25	7.04	3312.93	7.08	3315.91	7.17	3316.85	7.16

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	0	.03	2314.65	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	2314.65	542.08	542.08	800	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1659	10	T
2315	3316.85	10	T

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 50000.00

INPUT
Description:

Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	9.96	1.45	9.86	2.01	9.79	4.21	9.33	4.93	9.24
6.71	9.18	7.5	9.17	9.02	9.25	11.03	9.14	11.46	9.08
12.37	9.08	14.07	9.03	16.13	8.89	20.82	8.64	21.15	8.63
23.26	8.68	24	8.71	25.69	8.63	27.58	8.64	28.85	8.62
30.37	8.57	31.15	8.47	32.75	8.3	35.16	8.38	35.71	8.34
37.46	8.36	39.44	8.2	39.82	8.23	42.17	8.23	42.73	8.18
44.63	8.3	46.18	8.17	46.92	8.14	48.88	8.18	49.98	8.15
51.61	8.25	52.78	8.24	54.1	8.17	55.11	8.08	56.41	8.09
58.33	8.24	59.16	8.25	61.17	8.1	62.56	8.12	65.9	8.23
67.07	8.13	68.39	8.23	69.52	8.36	70.67	8.34	74.17	8.72
77.88	8.79	96.1	8.85	99.18	9.15	101.32	9.14	103.57	8.97
104.59	9.03	108.34	8.96	110.1	8.95	113.49	9.04	120.74	8.69
211.58	7.71	212.92	7.71	218.97	7.61	223.36	7.25	223.83	7.23
226.86	7.05	229.32	6.86	231.52	7.07	235.42	6.82	245.23	6.74
246.52	6.75	247.03	6.73	248.34	6.74	249.15	6.67	250.52	6.71
253.01	6.83	253.82	6.82	255.08	6.72	257.24	6.64	258.71	6.64
260.7	6.6	261.15	6.62	263.5	6.56	264.91	6.54	266.82	6.45
268.15	6.48	270.18	6.47	271.75	6.48	273.13	6.59	277.95	6.4
282.73	6.42	284.5	6.28	285.1	6.21	285.69	6.2	287.48	6.21
288.47	6.19	291.55	6.15	292.73	6.11	294.7	6	297.06	6.12
299.5	5.95	300.62	5.94	301.78	6.02	303.24	5.89	305.22	5.81
306.69	5.81	308.8	5.73	311.46	5.86	313.45	5.71	313.85	5.71
316.13	5.64	321.14	5.53	323.4	5.61	325.13	5.57	325.95	5.54
326.55	5.59	328.43	5.71	329.96	5.66	331.22	5.56	333.32	5.29
335.55	5.25	338.01	5.16	340.86	5.37	342.54	5.55	344.31	5.56
345.78	5.6	347.8	5.64	349.55	5.72	350.06	5.76	350.66	5.75
352.64	5.76	354.14	5.72	355.04	5.75	357.54	5.9	357.91	5.88
359.9	5.88	361.29	5.97	362.37	5.87	364.17	5.83	366.46	5.84
368.89	5.91	369.62	5.85	372.05	5.96	374.42	5.79	377.01	5.84
381.88	5.77	383.67	5.72	385.06	5.74	386.65	5.83	388.85	5.72
389.42	5.71	391.59	5.75	393.46	5.75	393.9	5.79	394.5	5.76
396.45	5.81	398.13	5.68	398.65	5.65	401.24	5.69	402.69	5.66
403.59	5.61	405.14	5.64	406.54	5.63	408.52	5.71	410.71	5.53
413.81	5.74	415.98	5.87	416.88	5.85	418.33	5.99	419.26	5.86
422.52	5.94	423.13	5.94	425.85	6	428.09	5.97	430.58	6.02
433.9	5.94	435.12	5.96	437.85	6.07	440.43	6.05	441.75	6.02
443.89	6.07	445.87	6.02	447.16	5.94	449.11	6.13	449.69	6.15
451.7	5.95	454.53	5.69	455.53	5.61	469.88	4.5	471.52	3.96
474.53	2.67	475.57	2.18	476.65	1.55	478.22	.77	478.68	.48
506.41	-18.64	606.4	-18.64	636.99	.89	637.38	1.02	638.47	1.22
640.25	1.88	641.15	2.19	643.8	3.16	644.98	3.62	645.79	3.82
646.18	3.89	647.09	3.95	648.58	3.92	649.18	3.93	649.93	4.05
650.64	4.12	652.74	4.25	654.62	4.46	655.05	4.48	656.51	4.8
657.7	4.82	658.21	4.86	660.66	4.66	663.76	4.81	664.87	4.74
666.16	4.87	666.82	4.88	668.28	4.79	670.52	4.74	671.91	4.58
672.56	4.45	673.93	4.54	674.49	4.63	676.26	4.56	676.88	4.61
678.11	4.62	679.9	4.6	680.49	4.67	681.3	4.69	681.85	4.66
682.42	4.66	683.27	4.6	684.98	4.45	685.93	4.4	687.72	4.13
688.67	4.1	691.24	3.8	692.49	3.67	694.4	3.56	695.87	3.39
698.14	3.17	699.34	3.1	700.86	2.98	701.22	2.97	703.55	3.14
705.54	2.77	706.93	2.6	708	2.55	710.24	2.76	712.11	2.78
713.09	2.75	715.49	2.7	716.18	2.71	717.21	2.81	718.43	2.84
720.57	2.68	722.66	2.69	724.21	2.67	725.11	2.69	725.83	2.68
727.65	2.68	728.36	2.69	730.51	2.65	731.12	2.69	731.49	2.67
733.31	2.66	735.12	2.64	736.05	2.62	737.93	2.61	739.96	2.55
741.58	2.59	742.8	2.63	743.96	2.64	744.68	2.57	745.53	2.62
746.7	2.73	748.88	2.83	751.7	2.97	754.92	3.03	757.29	2.94
757.75	2.88	759.24	2.9	761.23	2.74	762.39	2.87	763.18	2.74
765.03	2.49	765.48	2.44	766.47	2.21	767.91	1.74	768.79	1.39
770.46	.75	772	.24	772.31	.15	773.77	.17	792.3	1.5
808.59	2.08	811.87	2.27	812.19	2.26	821.42	2.43	824	2.42
831.03	1.61	831.84	1.56	1112.6	.73	1159.34	.89	1160.2	1.1
1161.45	1.49	1162.22	1.45	1163.3	1.33	1163.62	1.35	1164.25	1.51
1165.37	1.97	1166.71	2.5	1168.54	2.89	1169.02	3.05	1172.17	4.06
1173.84	4.29	1175.52	4.51	1179.12	5.46	1180.28	5.56	1182.46	5.7
1182.99	5.78	1186.34	6.41	1189.94	6.79	1190.89	6.85	1191.63	6.97
1193.31	7.13	1194.66	7.34	1196.44	7.42	1197.91	7.22	1199.53	6.86
1202.78	6.87	1203.49	6.84	1206.51	6.62	1207.24	6.66	1209.15	6.54
1210.78	6.49	1215.58	6.44	1221.3	6.48	1221.87	6.49	1224.64	6.51

1226.71	6.5	1229.93	6.33	1231.19	6.32	1232.42	6.25	1251.02	6.64
1257.48	6.69	1259.67	6.64	1260.54	6.67	1270.07	6.94	1272.62	6.99
1277.34	6.92	1294.83	6.6	1311.53	7.57	1312.15	7.55	1314.73	7.35
1315.78	7.25	1318.01	6.95	1319.2	6.91	1321.15	6.83	1322.7	6.91
1324.24	6.85	1325.18	6.69	1329.18	6.43	1333.41	5.85	1336.94	5.99
1337.44	5.98	1339.46	5.73	1342.33	5.53	1343.26	5.52	1345.56	5.6
1349.44	5.47	1351.75	5.46	1354.25	5.33	1355.21	5.34	1356.85	5.41
1357.86	5.38	1359.76	5.42	1361.2	5.41	1362.64	5.46	1364.96	5.41
1368.18	5.39	1372.32	5.4	1372.72	5.42	1377.89	5.4	1378.82	5.38
1381.62	5.27	1384.74	5.21	1386.76	5.16	1387.66	5.21	1389.71	5.19
1395.05	5.5	1398.77	5.43	1400.99	5.58	1402.19	5.62	1404.61	5.58
1405.48	5.51	1406.82	5.56	1409.21	5.47	1411.73	5.46	1413.51	5.49
1416.03	5.65	1417.32	5.65	1420.88	5.76	1422.98	5.88	1423.95	5.85
1425.62	6	1429.52	6.33	1431.97	6.48	1434.38	6.46	1436.04	6.41
1446	6.39	1447.14	6.36	1450.66	6.2	1455.33	6	1462.35	5.94
1478.14	6.36	1481.92	6.32	1495.37	6.42	1497.9	6.51	1499.37	6.46
1507.99	6.33	1512.77	6.35	1525.25	6.29	1530.1	6.32	1532.75	6.32
1534.94	6.38	1537.52	6.3	1539.49	6.33	1541.57	6.41	1542.17	6.46
1545.95	6.73	1547.16	6.67	1550.35	6.58	1553.33	6.69	1554.27	6.6
1567.81	6.96	1573.07	7.03	1574.86	6.93	1579.41	6.98	1581.49	6.94
1588.6	6.86	1591.2	6.92	1593.01	7.02	1595.96	7.02	1598.71	6.99
1601.82	7.08	1603.99	7.13	1605.59	7.14	1609.84	7.25	1614.19	7.14
1615.29	7.16	1617.09	7.15	1618.9	7.18	1619.74	7.17	1621.28	7.22
1626.19	7.09	1626.65	7.11	1632.53	7.1	1634.13	7.1	1637.72	7.05
1643.75	7.4	1645.02	7.56	1646.15	7.57	1647.99	7.3	1649.45	7.25
1653.36	6.74	1653.81	6.8	1657.31	7.33	1658.93	7.42	1663.64	7.52
1665.15	7.66	1669.1	7.74	1670.38	7.74	1673.18	8.14	1674.31	8.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	449.69	.03	658.21	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
449.69	658.21	0	0	0	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
667	1674.31	10	T

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
1188	1336	12	1423	1674.31	12

SUMMARY OF MANNING'S N VALUES

River:Snake Creek

Reach	River Sta.	n1	n2	n3
C9 Canal	53304.14	.11	.03	.11
C9 Canal	52315.40	.11	.03	.11
C9 Canal	51789.10	.11	.03	.11
C9 Canal	51737.42	Bridge		
C9 Canal	51691.44	.11	.03	.11
C9 Canal	51680.05	.11	.03	.11
C9 Canal	51673.96	.11	.03	.11
C9 Canal	51506.02	Bridge		
C9 Canal	51379.04	.11	.03	.11
C9 Canal	50542.08	.11	.03	.11
C9 Canal	50000.00	.11	.03	.11

SUMMARY OF REACH LENGTHS

River: Snake Creek

Reach	River Sta.	Left	Channel	Right
C9 Canal	53304.14	1010	988.74	800

C9 Canal	52315.40	630	526.3	490
C9 Canal	51789.10	80	97.66	100
C9 Canal	51737.42	Bridge		
C9 Canal	51691.44	15	11.39	30
C9 Canal	51680.05	3	6.09	35
C9 Canal	51673.96	270	294.92	295
C9 Canal	51506.02	Bridge		
C9 Canal	51379.04	720	836.96	720
C9 Canal	50542.08	542.08	542.08	800
C9 Canal	50000.00	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Snake Creek

Reach	River Sta.	Contr.	Expan.
C9 Canal	53304.14	.3	.5
C9 Canal	52315.40	.3	.5
C9 Canal	51789.10	.3	.5
C9 Canal	51737.42	Bridge	
C9 Canal	51691.44	.3	.5
C9 Canal	51680.05	.3	.5
C9 Canal	51673.96	.3	.5
C9 Canal	51506.02	Bridge	
C9 Canal	51379.04	.3	.5
C9 Canal	50542.08	.3	.5
C9 Canal	50000.00	.3	.5

HEC-RAS Version 4.1.0 Jan 2010
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: Snake Creek
Project File : SnakeCreek.prj
Run Date and Time: 2/2/2012 12:33:55 PM

Project in English units

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 53304.14

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	2.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.00	Reach Len. (ft)	1010.00	988.74	800.00
Crit W.S. (ft)	-8.15	Flow Area (sq ft)		1831.27	
E.G. Slope (ft/ft)	0.000048	Area (sq ft)	123.91	1831.27	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	257.00	Top Width (ft)	83.76	173.24	
Vel Total (ft/s)	1.62	Avg. Vel. (ft/s)		1.62	
Max Chl Dpth (ft)	13.07	Hydr. Depth (ft)		10.57	
Conv. Total (cfs)	428434.3	Conv. (cfs)		428434.3	
Length Wtd. (ft)	988.74	Wetted Per. (ft)		178.39	
Min Ch El (ft)	-11.07	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	3039.47	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	11.09	935.00	3.40
C & E Loss (ft)	0.00	Cum SA (acres)	6.59	45.16	9.81

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.48	Reach Len. (ft)	1010.00	988.74	800.00
Crit W.S. (ft)	-7.89	Flow Area (sq ft)		1914.82	
E.G. Slope (ft/ft)	0.000055	Area (sq ft)	165.64	1914.82	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	264.09	Top Width (ft)	89.86	174.23	
Vel Total (ft/s)	1.77	Avg. Vel. (ft/s)		1.77	
Max Chl Dpth (ft)	13.55	Hydr. Depth (ft)		10.99	
Conv. Total (cfs)	459145.0	Conv. (cfs)		459145.0	
Length Wtd. (ft)	988.74	Wetted Per. (ft)		179.76	
Min Ch El (ft)	-11.07	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	3039.47	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	14.27	955.72	10.27

C & E Loss (ft)	0.00	Cum SA (acres)	6.80	45.33	18.42

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.56	Reach Len. (ft)	1010.00	988.74	800.00
Crit W.S. (ft)	-7.42	Flow Area (sq ft)		2104.61	
E.G. Slope (ft/ft)	0.000063	Area (sq ft)	276.25	2104.61	9.62
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	352.45	Top Width (ft)	125.61	177.66	49.18
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		2.00	
Max Chl Dpth (ft)	14.63	Hydr. Depth (ft)		11.85	
Conv. Total (cfs)	529383.9	Conv. (cfs)		529383.9	
Length Wtd. (ft)	988.74	Wetted Per. (ft)		183.90	
Min Ch El (ft)	-11.07	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	3039.47	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	23.78	1003.40	30.89
C & E Loss (ft)	0.00	Cum SA (acres)	13.71	46.04	21.57

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.110	0.030	0.110
W.S. Elev (ft)	5.11	Reach Len. (ft)	1010.00	988.74	800.00
Crit W.S. (ft)	-6.59	Flow Area (sq ft)	28.25	2387.52	0.34
E.G. Slope (ft/ft)	0.000083	Area (sq ft)	633.90	2387.52	455.61
Q Total (cfs)	5777.00	Flow (cfs)	2.98	5774.01	0.01
Top Width (ft)	1080.07	Top Width (ft)	392.58	184.93	502.56
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)	0.11	2.42	0.03
Max Chl Dpth (ft)	16.18	Hydr. Depth (ft)	0.80	12.91	0.09
Conv. Total (cfs)	635704.7	Conv. (cfs)	328.0	635375.8	1.0
Length Wtd. (ft)	988.74	Wetted Per. (ft)	35.45	191.70	3.69
Min Ch El (ft)	-11.07	Shear (lb/sq ft)	0.00	0.06	0.00
Alpha	1.02	Stream Power (lb/ft s)	3039.47	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	55.59	1071.68	67.93
C & E Loss (ft)	0.00	Cum SA (acres)	32.12	46.87	28.91

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 52315.40

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.95	Reach Len. (ft)	630.00	526.30	490.00
Crit W.S. (ft)	-8.92	Flow Area (sq ft)		1860.14	
E.G. Slope (ft/ft)	0.000046	Area (sq ft)	512.81	1860.14	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	472.87	Top Width (ft)	298.68	174.19	
Vel Total (ft/s)	1.60	Avg. Vel. (ft/s)		1.60	
Max Chl Dpth (ft)	15.10	Hydr. Depth (ft)		10.68	
Conv. Total (cfs)	437818.2	Conv. (cfs)		437818.2	
Length Wtd. (ft)	526.30	Wetted Per. (ft)		179.57	
Min Ch El (ft)	-13.15	Shear (lb/sq ft)		0.03	

Alpha	1.00	Stream Power (lb/ft s)	1477.10	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	3.71	893.11	3.40
C & E Loss (ft)	0.00	Cum SA (acres)	2.16	41.22	9.81

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.42	Reach Len. (ft)	630.00	526.30	490.00
Crit W.S. (ft)	-8.62	Flow Area (sq ft)		1943.20	
E.G. Slope (ft/ft)	0.000053	Area (sq ft)	655.94	1943.20	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	481.32	Top Width (ft)	304.99	176.34	
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)		1.75	
Max Chl Dpth (ft)	15.57	Hydr. Depth (ft)		11.02	
Conv. Total (cfs)	466685.5	Conv. (cfs)		466685.5	
Length Wtd. (ft)	526.30	Wetted Per. (ft)		182.00	
Min Ch El (ft)	-13.15	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	1477.10	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	4.74	911.94	10.27
C & E Loss (ft)	0.00	Cum SA (acres)	2.22	41.35	18.42

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.49	Reach Len. (ft)	630.00	526.30	490.00
Crit W.S. (ft)	-8.08	Flow Area (sq ft)		2136.73	
E.G. Slope (ft/ft)	0.000065	Area (sq ft)	991.40	2136.73	12.75
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	553.16	Top Width (ft)	322.60	189.91	40.65
Vel Total (ft/s)	1.97	Avg. Vel. (ft/s)		1.97	
Max Chl Dpth (ft)	16.64	Hydr. Depth (ft)		11.25	
Conv. Total (cfs)	520340.1	Conv. (cfs)		520340.1	
Length Wtd. (ft)	526.30	Wetted Per. (ft)		196.00	
Min Ch El (ft)	-13.15	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	1477.10	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	9.09	955.27	30.68
C & E Loss (ft)	0.00	Cum SA (acres)	8.51	41.86	20.75

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.110	0.030	0.110
W.S. Elev (ft)	5.03	Reach Len. (ft)	630.00	526.30	490.00
Crit W.S. (ft)	-7.22	Flow Area (sq ft)	2.61	2454.18	5.67
E.G. Slope (ft/ft)	0.000088	Area (sq ft)	1602.20	2454.18	147.03
Q Total (cfs)	5777.00	Flow (cfs)	0.17	5776.29	0.54
Top Width (ft)	890.90	Top Width (ft)	567.16	209.13	114.61
Vel Total (ft/s)	2.35	Avg. Vel. (ft/s)	0.07	2.35	0.10
Max Chl Dpth (ft)	18.18	Hydr. Depth (ft)	0.38	11.74	0.66
Conv. Total (cfs)	615744.5	Conv. (cfs)	18.2	615668.9	57.4
Length Wtd. (ft)	526.30	Wetted Per. (ft)	7.00	215.31	8.72
Min Ch El (ft)	-13.15	Shear (lb/sq ft)	0.00	0.06	0.00
Alpha	1.01	Stream Power (lb/ft s)	1477.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	29.66	1016.73	62.39
C & E Loss (ft)	0.00	Cum SA (acres)	21.00	42.40	23.25

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51789.10

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.93	Reach Len. (ft)	32.19	32.19	32.19
Crit W.S. (ft)	-10.54	Flow Area (sq ft)		1844.02	
E.G. Slope (ft/ft)	0.000039	Area (sq ft)		1844.02	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	145.48	Top Width (ft)		145.48	
Vel Total (ft/s)	1.61	Avg. Vel. (ft/s)		1.61	
Max Chl Dpth (ft)	16.73	Hydr. Depth (ft)		12.68	
Conv. Total (cfs)	477237.0	Conv. (cfs)		477237.0	
Length Wtd. (ft)	32.19	Wetted Per. (ft)		154.39	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	1080.12	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		870.73	3.40
C & E Loss (ft)	0.00	Cum SA (acres)		39.29	9.81

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.40	Reach Len. (ft)	32.19	32.19	32.19
Crit W.S. (ft)	-10.23	Flow Area (sq ft)		1912.80	
E.G. Slope (ft/ft)	0.000046	Area (sq ft)	0.02	1912.80	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	148.99	Top Width (ft)	1.55	147.44	
Vel Total (ft/s)	1.77	Avg. Vel. (ft/s)		1.77	
Max Chl Dpth (ft)	17.20	Hydr. Depth (ft)		12.97	
Conv. Total (cfs)	502563.5	Conv. (cfs)		502563.5	
Length Wtd. (ft)	32.19	Wetted Per. (ft)		156.57	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	1080.12	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.00	888.64	10.27
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	39.40	18.42

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.46	Reach Len. (ft)	32.19	32.19	32.19
Crit W.S. (ft)	-9.69	Flow Area (sq ft)		2073.91	
E.G. Slope (ft/ft)	0.000059	Area (sq ft)	25.37	2073.91	
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	208.25	Top Width (ft)	48.66	159.59	
Vel Total (ft/s)	2.03	Avg. Vel. (ft/s)		2.03	
Max Chl Dpth (ft)	18.26	Hydr. Depth (ft)		13.00	
Conv. Total (cfs)	546043.3	Conv. (cfs)		546043.3	
Length Wtd. (ft)	32.19	Wetted Per. (ft)		169.22	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	1080.12	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	1.73	929.83	30.61
C & E Loss (ft)	0.00	Cum SA (acres)	5.83	39.75	20.52

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.030	
W.S. Elev (ft)	4.97	Reach Len. (ft)	32.19	32.19	32.19
Crit W.S. (ft)	-8.76	Flow Area (sq ft)		2325.06	
E.G. Slope (ft/ft)	0.000082	Area (sq ft)	342.61	2326.27	52.03
Q Total (cfs)	5777.00	Flow (cfs)		5777.00	
Top Width (ft)	634.48	Top Width (ft)	351.92	169.78	112.77
Vel Total (ft/s)	2.48	Avg. Vel. (ft/s)		2.48	
Max Chl Dpth (ft)	19.77	Hydr. Depth (ft)		13.79	
Conv. Total (cfs)	637391.3	Conv. (cfs)		637391.3	
Length Wtd. (ft)	32.19	Wetted Per. (ft)		178.56	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)	1080.12	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	15.60	987.85	61.27
C & E Loss (ft)	0.01	Cum SA (acres)	14.35	40.11	21.97

BRIDGE

RIVER: Snake Creek
REACH: C9 Canal RS: 51737.42

BRIDGE OUTPUT Profile #50 yr

E.G. US. (ft)	1.97	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1.93	E.G. Elev (ft)	1.96	1.96
Q Total (cfs)	2972.00	W.S. Elev (ft)	1.91	1.90
Q Bridge (cfs)	2972.00	Crit W.S. (ft)	-10.27	-10.62
Q Weir (cfs)		Max Chl Dpth (ft)	16.71	17.54
Weir Sta Lft (ft)		Vel Total (ft/s)	1.79	1.92
Weir Sta Rgt (ft)		Flow Area (sq ft)	1663.50	1547.08
Weir Submerg		Froude # Chl	0.09	0.10
Weir Max Depth (ft)		Specif Force (cu ft)	12144.13	11563.70
Min El Weir Flow (ft)	11.72	Hydr Depth (ft)	12.61	12.36
Min El Prs (ft)	7.06	W.P. Total (ft)	326.62	306.89
Delta EG (ft)	0.02	Conv. Total (cfs)	243902.8	225289.8
Delta WS (ft)	0.03	Top Width (ft)	131.88	125.16
BR Open Area (sq ft)	2268.36	Frctn Loss (ft)	0.00	0.00
BR Open Vel (ft/s)	1.92	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.05	0.05
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

BRIDGE OUTPUT Profile #100 yr

E.G. US. (ft)	2.45	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2.40	E.G. Elev (ft)	2.44	2.43
Q Total (cfs)	3395.00	W.S. Elev (ft)	2.38	2.36
Q Bridge (cfs)	3395.00	Crit W.S. (ft)	-9.95	-10.28
Q Weir (cfs)		Max Chl Dpth (ft)	17.18	18.00
Weir Sta Lft (ft)		Vel Total (ft/s)	1.97	2.11
Weir Sta Rgt (ft)		Flow Area (sq ft)	1725.25	1605.46
Weir Submerg		Froude # Chl	0.10	0.10
Weir Max Depth (ft)		Specif Force (cu ft)	12977.47	12340.32
Min El Weir Flow (ft)	11.72	Hydr Depth (ft)	13.00	12.68
Min El Prs (ft)	7.06	W.P. Total (ft)	334.58	315.32
Delta EG (ft)	0.02	Conv. Total (cfs)	255052.7	235344.5
Delta WS (ft)	0.03	Top Width (ft)	132.72	126.65
BR Open Area (sq ft)	2268.36	Frctn Loss (ft)	0.01	0.00
BR Open Vel (ft/s)	2.11	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.06	0.07
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

BRIDGE OUTPUT Profile #250 yr

E.G. US. (ft)	3.52	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	3.46	E.G. Elev (ft)	3.51	3.50
Q Total (cfs)	4200.00	W.S. Elev (ft)	3.43	3.41
Q Bridge (cfs)	4200.00	Crit W.S. (ft)	-9.39	-9.67
Q Weir (cfs)		Max Chl Dpth (ft)	18.23	19.05
Weir Sta Lft (ft)		Vel Total (ft/s)	2.25	2.40
Weir Sta Rgt (ft)		Flow Area (sq ft)	1869.51	1753.15
Weir Submerg		Froude # Chl	0.11	0.10
Weir Max Depth (ft)		Specif Force (cu ft)	14957.69	14192.30
Min El Weir Flow (ft)	11.72	Hydr Depth (ft)	12.95	11.75
Min El Prs (ft)	7.06	W.P. Total (ft)	363.43	355.45
Delta EG (ft)	0.03	Conv. Total (cfs)	275937.7	251604.5
Delta WS (ft)	0.04	Top Width (ft)	144.35	149.17
BR Open Area (sq ft)	2268.36	Frctn Loss (ft)	0.01	0.00
BR Open Vel (ft/s)	2.40	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.07	0.09
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

.

BRIDGE OUTPUT Profile #500 yr

E.G. US. (ft)	5.07	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4.97	E.G. Elev (ft)	5.06	5.04
Q Total (cfs)	5777.00	W.S. Elev (ft)	4.94	4.91
Q Bridge (cfs)	5777.00	Crit W.S. (ft)	-8.35	-8.59
Q Weir (cfs)		Max Chl Dpth (ft)	19.74	20.55
Weir Sta Lft (ft)		Vel Total (ft/s)	2.78	2.94
Weir Sta Rgt (ft)		Flow Area (sq ft)	2081.22	1967.80
Weir Submerg		Froude # Chl	0.11	0.11
Weir Max Depth (ft)		Specif Force (cu ft)	18135.84	17191.77
Min El Weir Flow (ft)	11.72	Hydr Depth (ft)	15.14	14.16
Min El Prs (ft)	7.06	W.P. Total (ft)	408.86	399.94
Delta EG (ft)	0.05	Conv. Total (cfs)	305035.9	282300.0
Delta WS (ft)	0.06	Top Width (ft)	137.51	139.97
BR Open Area (sq ft)	2268.36	Frctn Loss (ft)	0.01	0.01
BR Open Vel (ft/s)	2.94	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.11	0.13
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51691.44

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.90	Reach Len. (ft)	15.00	11.39	30.00
Crit W.S. (ft)		Flow Area (sq ft)		1708.93	
E.G. Slope (ft/ft)	0.000047	Area (sq ft)		1708.93	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	138.67	Top Width (ft)		138.67	
Vel Total (ft/s)	1.74	Avg. Vel. (ft/s)		1.74	
Max Chl Dpth (ft)	17.54	Hydr. Depth (ft)		12.32	
Conv. Total (cfs)	433655.8	Conv. (cfs)		433655.8	
Length Wtd. (ft)	11.39	Wetted Per. (ft)		147.37	
Min Ch El (ft)	-15.64	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	1213.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		867.00	3.40
C & E Loss (ft)	0.00	Cum SA (acres)		38.99	9.81

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.36	Reach Len. (ft)	15.00	11.39	30.00
Crit W.S. (ft)		Flow Area (sq ft)		1773.66	
E.G. Slope (ft/ft)	0.000055	Area (sq ft)		1773.66	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	140.16	Top Width (ft)		140.16	
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)		1.91	
Max Chl Dpth (ft)	18.00	Hydr. Depth (ft)		12.65	
Conv. Total (cfs)	457356.3	Conv. (cfs)		457356.3	
Length Wtd. (ft)	11.39	Wetted Per. (ft)		149.32	
Min Ch El (ft)	-15.64	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	1213.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.00	884.78	10.27
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	39.10	18.42

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.42	Reach Len. (ft)	15.00	11.39	30.00
Crit W.S. (ft)		Flow Area (sq ft)		1937.82	
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	13.74	1947.87	
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	224.69	Top Width (ft)	35.82	188.87	
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)		2.17	
Max Chl Dpth (ft)	19.06	Hydr. Depth (ft)		11.66	
Conv. Total (cfs)	473436.1	Conv. (cfs)		473436.1	
Length Wtd. (ft)	11.39	Wetted Per. (ft)		176.89	
Min Ch El (ft)	-15.64	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	1213.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	1.72	925.62	30.61
C & E Loss (ft)	0.00	Cum SA (acres)	5.80	39.40	20.52

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.110	0.030	
W.S. Elev (ft)	4.91	Reach Len. (ft)	15.00	11.39	30.00
Crit W.S. (ft)		Flow Area (sq ft)	0.47	2189.78	
E.G. Slope (ft/ft)	0.000103	Area (sq ft)	106.49	2252.31	18.91
Q Total (cfs)	5777.00	Flow (cfs)	0.04	5776.96	
Top Width (ft)	420.58	Top Width (ft)	115.91	206.73	97.94
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)	0.09	2.64	
Max Chl Dpth (ft)	20.55	Hydr. Depth (ft)	0.52	12.96	
Conv. Total (cfs)	568324.7	Conv. (cfs)	3.9	568320.8	
Length Wtd. (ft)	11.39	Wetted Per. (ft)	0.96	182.57	
Min Ch El (ft)	-15.64	Shear (lb/sq ft)	0.00	0.08	
Alpha	1.00	Stream Power (lb/ft s)	1213.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	15.43	983.11	61.25
C & E Loss (ft)	0.00	Cum SA (acres)	14.17	39.76	21.88

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51680.05

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.89	Reach Len. (ft)	3.00	6.09	35.00

Crit W.S. (ft)		Flow Area (sq ft)		1562.77	
E.G. Slope (ft/ft)	0.000062	Area (sq ft)		1562.77	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	137.85	Top Width (ft)		137.85	
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)		1.90	
Max Chl Dpth (ft)	16.54	Hydr. Depth (ft)		11.34	
Conv. Total (cfs)	376488.2	Conv. (cfs)		376488.2	
Length Wtd. (ft)	6.09	Wetted Per. (ft)		145.69	
Min Ch El (ft)	-14.65	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)	1055.36	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		866.57	3.40
C & E Loss (ft)	0.00	Cum SA (acres)		38.96	9.81

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.35	Reach Len. (ft)	3.00	6.09	35.00
Crit W.S. (ft)		Flow Area (sq ft)		1628.99	
E.G. Slope (ft/ft)	0.000080	Area (sq ft)		1628.99	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	150.62	Top Width (ft)		150.62	
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)		2.08	
Max Chl Dpth (ft)	17.00	Hydr. Depth (ft)		10.82	
Conv. Total (cfs)	380221.9	Conv. (cfs)		380221.9	
Length Wtd. (ft)	6.09	Wetted Per. (ft)		159.24	
Min Ch El (ft)	-14.65	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	1055.36	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.00	884.33	10.27
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	39.06	18.42

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.030	0.110
W.S. Elev (ft)	3.40	Reach Len. (ft)	3.00	6.09	35.00
Crit W.S. (ft)		Flow Area (sq ft)		1804.95	1.30
E.G. Slope (ft/ft)	0.000107	Area (sq ft)	43.36	1804.95	1.30
Q Total (cfs)	4200.00	Flow (cfs)		4199.90	0.10
Top Width (ft)	334.09	Top Width (ft)	154.58	176.35	3.17
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)		2.33	0.08
Max Chl Dpth (ft)	18.05	Hydr. Depth (ft)		10.24	0.41
Conv. Total (cfs)	405538.8	Conv. (cfs)		405529.3	9.5
Length Wtd. (ft)	6.09	Wetted Per. (ft)		186.83	3.27
Min Ch El (ft)	-14.65	Shear (lb/sq ft)		0.06	0.00
Alpha	1.00	Stream Power (lb/ft s)	1055.36	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	1.71	925.13	30.61
C & E Loss (ft)	0.01	Cum SA (acres)	5.76	39.35	20.52

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.110	0.030	0.110
W.S. Elev (ft)	4.90	Reach Len. (ft)	3.00	6.09	35.00
Crit W.S. (ft)		Flow Area (sq ft)	8.86	2069.53	8.88
E.G. Slope (ft/ft)	0.000132	Area (sq ft)	538.44	2069.53	47.07
Q Total (cfs)	5777.00	Flow (cfs)	1.06	5774.15	1.79
Top Width (ft)	765.17	Top Width (ft)	515.78	176.95	72.44
Vel Total (ft/s)	2.77	Avg. Vel. (ft/s)	0.12	2.79	0.20
Max Chl Dpth (ft)	19.55	Hydr. Depth (ft)	0.68	11.70	1.54
Conv. Total (cfs)	503408.9	Conv. (cfs)	92.1	503160.9	155.9
Length Wtd. (ft)	6.09	Wetted Per. (ft)	13.14	190.30	6.00
Min Ch El (ft)	-14.65	Shear (lb/sq ft)	0.01	0.09	0.01
Alpha	1.02	Stream Power (lb/ft s)	1055.36	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	15.32	982.54	61.23
C & E Loss (ft)	0.01	Cum SA (acres)	14.06	39.71	21.82

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51673.96

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.87	Reach Len. (ft)	51.31	51.31	51.31
Crit W.S. (ft)	-9.10	Flow Area (sq ft)		1425.84	
E.G. Slope (ft/ft)	0.000077	Area (sq ft)		1425.99	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	129.96	Top Width (ft)		129.96	
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)		2.08	
Max Chl Dpth (ft)	15.86	Hydr. Depth (ft)		11.05	
Conv. Total (cfs)	338283.7	Conv. (cfs)		338283.7	
Length Wtd. (ft)	51.31	Wetted Per. (ft)		136.01	
Min Ch El (ft)	-13.99	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	2387.09	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		866.37	3.40
C & E Loss (ft)		Cum SA (acres)		38.94	9.81

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.33	Reach Len. (ft)	51.31	51.31	51.31
Crit W.S. (ft)	-8.74	Flow Area (sq ft)		1485.14	
E.G. Slope (ft/ft)	0.000088	Area (sq ft)	0.19	1487.83	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	157.08	Top Width (ft)	4.05	153.03	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29	
Max Chl Dpth (ft)	16.32	Hydr. Depth (ft)		11.50	
Conv. Total (cfs)	361230.0	Conv. (cfs)		361230.0	
Length Wtd. (ft)	51.31	Wetted Per. (ft)		136.47	
Min Ch El (ft)	-13.99	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)	2387.09	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	884.11	10.27
C & E Loss (ft)		Cum SA (acres)	0.00	39.04	18.42

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.37	Reach Len. (ft)	51.31	51.31	51.31
Crit W.S. (ft)	-8.14	Flow Area (sq ft)		1621.25	
E.G. Slope (ft/ft)	0.000104	Area (sq ft)	37.61	1705.64	26.75
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	427.66	Top Width (ft)	95.56	261.34	70.76
Vel Total (ft/s)	2.59	Avg. Vel. (ft/s)		2.59	
Max Chl Dpth (ft)	17.36	Hydr. Depth (ft)		12.28	
Conv. Total (cfs)	411596.2	Conv. (cfs)		411596.2	
Length Wtd. (ft)	51.31	Wetted Per. (ft)		139.71	
Min Ch El (ft)	-13.99	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)	2387.09	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	1.71	924.88	30.60
C & E Loss (ft)		Cum SA (acres)	5.75	39.32	20.49

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	5.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.030	
W.S. Elev (ft)	4.85	Reach Len. (ft)	51.31	51.31	51.31
Crit W.S. (ft)	-7.10	Flow Area (sq ft)		1815.93	
E.G. Slope (ft/ft)	0.000135	Area (sq ft)	596.87	2133.71	258.51
Q Total (cfs)	5777.00	Flow (cfs)		5777.00	
Top Width (ft)	1248.44	Top Width (ft)	775.61	300.11	172.72
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)		3.18	
Max Chl Dpth (ft)	18.84	Hydr. Depth (ft)		13.76	
Conv. Total (cfs)	497225.0	Conv. (cfs)		497225.0	
Length Wtd. (ft)	51.31	Wetted Per. (ft)		139.71	
Min Ch El (ft)	-13.99	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)	2387.09	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	15.28	982.25	61.10
C & E Loss (ft)		Cum SA (acres)	14.02	39.68	21.73

BRIDGE

RIVER: Snake Creek
REACH: C9 Canal RS: 51506.02

BRIDGE OUTPUT Profile #50 yr

E.G. US. (ft)	1.94	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1.87	E.G. Elev (ft)	1.94	1.61
Q Total (cfs)	2972.00	W.S. Elev (ft)	1.82	1.49
Q Bridge (cfs)	2972.00	Crit W.S. (ft)	-8.77	-9.08
Q Weir (cfs)		Max Chl Dpth (ft)	15.81	16.29
Weir Sta Lft (ft)		Vel Total (ft/s)	2.80	2.84
Weir Sta Rgt (ft)		Flow Area (sq ft)	1061.43	1047.03
Weir Submerg		Froude # Chl	0.15	0.15
Weir Max Depth (ft)		Specif Force (cu ft)	7508.63	7452.26
Min El Weir Flow (ft)	11.50	Hydr Depth (ft)	10.75	10.65
Min El Prs (ft)	6.91	W.P. Total (ft)	179.37	178.48
Delta EG (ft)	0.34	Conv. Total (cfs)	172001.9	168684.9
Delta WS (ft)	0.36	Top Width (ft)	98.77	98.28
BR Open Area (sq ft)	1619.18	Frctn Loss (ft)		
BR Open Vel (ft/s)	2.84	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.11	0.11
Br Sel Method	Momentum	Power Total (lb/ft s)	0.00	0.00

BRIDGE OUTPUT Profile #100 yr

E.G. US. (ft)	2.41	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2.33	E.G. Elev (ft)	2.41	2.08
Q Total (cfs)	3395.00	W.S. Elev (ft)	2.26	1.93
Q Bridge (cfs)	3395.00	Crit W.S. (ft)	-8.36	-8.67
Q Weir (cfs)		Max Chl Dpth (ft)	16.25	16.73
Weir Sta Lft (ft)		Vel Total (ft/s)	3.07	3.11
Weir Sta Rgt (ft)		Flow Area (sq ft)	1105.82	1090.57
Weir Submerg		Froude # Chl	0.16	0.17
Weir Max Depth (ft)		Specif Force (cu ft)	8059.26	7990.40
Min El Weir Flow (ft)	11.50	Hydr Depth (ft)	11.12	11.02
Min El Prs (ft)	6.91	W.P. Total (ft)	183.31	182.37
Delta EG (ft)	0.35	Conv. Total (cfs)	181507.3	177962.9
Delta WS (ft)	0.37	Top Width (ft)	99.44	98.94
BR Open Area (sq ft)	1619.18	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.11	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.13	0.14
Br Sel Method	Momentum	Power Total (lb/ft s)	0.00	0.00

BRIDGE OUTPUT Profile #250 yr

E.G. US. (ft)	3.48	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	3.37	E.G. Elev (ft)	3.47	3.14
Q Total (cfs)	4200.00	W.S. Elev (ft)	3.29	2.94
Q Bridge (cfs)	4200.00	Crit W.S. (ft)	-7.62	-7.93
Q Weir (cfs)		Max Chl Dpth (ft)	17.28	17.74
Weir Sta Lft (ft)		Vel Total (ft/s)	3.48	3.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	1208.38	1191.91
Weir Submerg		Froude # Chl	0.18	0.18
Weir Max Depth (ft)		Specif Force (cu ft)	9373.02	9281.65
Min El Weir Flow (ft)	11.50	Hydr Depth (ft)	11.97	11.86
Min El Prs (ft)	6.91	W.P. Total (ft)	192.32	191.32
Delta EG (ft)	0.36	Conv. Total (cfs)	203798.8	199884.3
Delta WS (ft)	0.38	Top Width (ft)	100.98	100.47
BR Open Area (sq ft)	1619.18	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.52	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.17	0.17
Br Sel Method	Momentum	Power Total (lb/ft s)	0.00	0.00

BRIDGE OUTPUT Profile #500 yr

E.G. US. (ft)	5.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4.85	E.G. Elev (ft)	5.00	4.63
Q Total (cfs)	5777.00	W.S. Elev (ft)	4.72	4.34
Q Bridge (cfs)	5777.00	Crit W.S. (ft)	-6.37	-6.66
Q Weir (cfs)		Max Chl Dpth (ft)	18.71	19.14
Weir Sta Lft (ft)		Vel Total (ft/s)	4.25	4.33
Weir Sta Rgt (ft)		Flow Area (sq ft)	1357.75	1333.83
Weir Submerg		Froude # Chl	0.17	0.21
Weir Max Depth (ft)		Specif Force (cu ft)	11518.85	11364.22
Min El Weir Flow (ft)	11.50	Hydr Depth (ft)	11.38	13.00
Min El Prs (ft)	6.91	W.P. Total (ft)	228.08	203.62
Delta EG (ft)	0.40	Conv. Total (cfs)	220896.9	231289.4
Delta WS (ft)	0.43	Top Width (ft)	119.99	102.56
BR Open Area (sq ft)	1619.18	Frctn Loss (ft)		
BR Open Vel (ft/s)	4.33	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.25	0.26
Br Sel Method	Momentum	Power Total (lb/ft s)	0.00	0.00

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 51379.04

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.52	Reach Len. (ft)	720.00	836.96	720.00
Crit W.S. (ft)		Flow Area (sq ft)		1298.99	
E.G. Slope (ft/ft)	0.000096	Area (sq ft)		1298.99	
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	120.88	Top Width (ft)		120.88	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29	
Max Chl Dpth (ft)	16.32	Hydr. Depth (ft)		10.75	
Conv. Total (cfs)	302940.1	Conv. (cfs)		302940.1	
Length Wtd. (ft)	836.96	Wetted Per. (ft)		127.14	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)	3305.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		858.82	3.40
C & E Loss (ft)	0.04	Cum SA (acres)		38.23	9.81

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.96	Reach Len. (ft)	720.00	836.96	720.00
Crit W.S. (ft)		Flow Area (sq ft)		1353.44	
E.G. Slope (ft/ft)	0.000111	Area (sq ft)		1353.44	
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	122.20	Top Width (ft)		122.20	
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)		2.51	
Max Chl Dpth (ft)	16.76	Hydr. Depth (ft)		11.08	
Conv. Total (cfs)	321710.9	Conv. (cfs)		321710.9	
Length Wtd. (ft)	836.96	Wetted Per. (ft)		128.74	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)	3305.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		876.25	10.27
C & E Loss (ft)	0.05	Cum SA (acres)		38.32	18.42

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.99	Reach Len. (ft)	720.00	836.96	720.00
Crit W.S. (ft)		Flow Area (sq ft)		1480.28	
E.G. Slope (ft/ft)	0.000130	Area (sq ft)	186.25	1480.60	
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	755.92	Top Width (ft)	630.64	125.28	
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)		2.84	
Max Chl Dpth (ft)	17.79	Hydr. Depth (ft)		11.92	
Conv. Total (cfs)	368809.1	Conv. (cfs)		368809.1	
Length Wtd. (ft)	836.96	Wetted Per. (ft)		131.21	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)	3305.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	1.54	916.24	30.58
C & E Loss (ft)	0.06	Cum SA (acres)	5.21	38.53	20.45

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	4.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.030	
W.S. Elev (ft)	4.42	Reach Len. (ft)	720.00	836.96	720.00
Crit W.S. (ft)		Flow Area (sq ft)		1658.62	
E.G. Slope (ft/ft)	0.000172	Area (sq ft)	1651.92	1662.30	
Q Total (cfs)	5777.00	Flow (cfs)		5777.00	
Top Width (ft)	1630.56	Top Width (ft)	1500.77	129.80	
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)		3.48	
Max Chl Dpth (ft)	19.22	Hydr. Depth (ft)		13.15	
Conv. Total (cfs)	440466.5	Conv. (cfs)		440466.5	
Length Wtd. (ft)	836.96	Wetted Per. (ft)		133.60	
Min Ch El (ft)	-14.80	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)	3305.20	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	13.65	972.43	60.95
C & E Loss (ft)	0.09	Cum SA (acres)	12.40	38.80	21.62

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 50542.08

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	

W.S. Elev (ft)	1.56	Reach Len. (ft)	542.08	542.08	800.00
Crit W.S. (ft)		Flow Area (sq ft)		14676.75	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		52432.88	110.14
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	2657.81	Top Width (ft)		2278.13	379.68
Vel Total (ft/s)	0.20	Avg. Vel. (ft/s)		0.20	
Max Chl Dpth (ft)	33.13	Hydr. Depth (ft)		22.75	
Conv. Total (cfs)	5814816.0	Conv. (cfs)		5814816.0	
Length Wtd. (ft)	542.08	Wetted Per. (ft)		648.76	
Min Ch El (ft)	-31.57	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)	3316.85	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		342.62	2.49
C & E Loss (ft)	0.01	Cum SA (acres)		15.19	6.67

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
W.S. Elev (ft)	2.01	Reach Len. (ft)	542.08	542.08	800.00
Crit W.S. (ft)		Flow Area (sq ft)		14971.32	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		53472.19	417.40
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	3139.39	Top Width (ft)		2281.65	857.74
Vel Total (ft/s)	0.23	Avg. Vel. (ft/s)		0.23	
Max Chl Dpth (ft)	33.58	Hydr. Depth (ft)		23.11	
Conv. Total (cfs)	5993930.0	Conv. (cfs)		5993930.0	
Length Wtd. (ft)	542.08	Wetted Per. (ft)		651.47	
Min Ch El (ft)	-31.57	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)	3316.85	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		349.55	6.82
C & E Loss (ft)	0.01	Cum SA (acres)		15.22	11.33

CROSS SECTION OUTPUT Profile #250 yr

E.G. Elev (ft)	3.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.05	Reach Len. (ft)	542.08	542.08	800.00
Crit W.S. (ft)		Flow Area (sq ft)		15651.11	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		55853.66	1358.43
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	3218.72	Top Width (ft)		2291.28	927.44
Vel Total (ft/s)	0.27	Avg. Vel. (ft/s)		0.27	
Max Chl Dpth (ft)	34.62	Hydr. Depth (ft)		23.89	
Conv. Total (cfs)	6403899.0	Conv. (cfs)		6403899.0	
Length Wtd. (ft)	542.08	Wetted Per. (ft)		659.18	
Min Ch El (ft)	-31.57	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)	3316.85	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		365.43	19.35
C & E Loss (ft)	0.01	Cum SA (acres)		15.31	12.78

CROSS SECTION OUTPUT Profile #500 yr

E.G. Elev (ft)	4.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	0.110
W.S. Elev (ft)	4.51	Reach Len. (ft)	542.08	542.08	800.00
Crit W.S. (ft)		Flow Area (sq ft)		16604.98	0.11
E.G. Slope (ft/ft)	0.000001	Area (sq ft)		59194.52	2738.66
Q Total (cfs)	5777.00	Flow (cfs)		5777.00	0.00
Top Width (ft)	3281.67	Top Width (ft)		2300.02	981.64
Vel Total (ft/s)	0.35	Avg. Vel. (ft/s)		0.35	0.01
Max Chl Dpth (ft)	36.08	Hydr. Depth (ft)		25.33	0.33
Conv. Total (cfs)	7058744.0	Conv. (cfs)		7058743.0	0.7
Length Wtd. (ft)	542.08	Wetted Per. (ft)		660.41	0.35
Min Ch El (ft)	-31.57	Shear (lb/sq ft)		0.00	0.00
Alpha	1.00	Stream Power (lb/ft s)	3316.85	0.00	0.00

Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	387.78	38.32
C & E Loss (ft)	0.02	Cum SA (acres)	15.46	13.51

CROSS SECTION

RIVER: Snake Creek
REACH: C9 Canal RS: 50000.00

CROSS SECTION OUTPUT Profile #50 yr

E.G. Elev (ft)	1.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.53	Reach Len. (ft)			
Crit W.S. (ft)	-15.68	Flow Area (sq ft)		2631.10	
E.G. Slope (ft/ft)	0.000014	Area (sq ft)		2631.10	160.66
Q Total (cfs)	2972.00	Flow (cfs)		2972.00	
Top Width (ft)	509.63	Top Width (ft)		162.62	347.02
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)		1.13	
Max Chl Dpth (ft)	20.17	Hydr. Depth (ft)		16.18	
Conv. Total (cfs)	794986.6	Conv. (cfs)		794986.6	
Length Wtd. (ft)		Wetted Per. (ft)		174.63	
Min Ch El (ft)	-18.64	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)	1674.31	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #100 yr

E.G. Elev (ft)	2.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.030	
W.S. Elev (ft)	1.98	Reach Len. (ft)			
Crit W.S. (ft)	-15.41	Flow Area (sq ft)		2704.73	
E.G. Slope (ft/ft)	0.000017	Area (sq ft)		2704.73	325.51
Q Total (cfs)	3395.00	Flow (cfs)		3395.00	
Top Width (ft)	540.81	Top Width (ft)		164.63	376.18
Vel Total (ft/s)	1.26	Avg. Vel. (ft/s)		1.26	
Max Chl Dpth (ft)	20.62	Hydr. Depth (ft)		16.43	
Conv. Total (cfs)	825452.2	Conv. (cfs)		825452.2	
Length Wtd. (ft)		Wetted Per. (ft)		176.84	
Min Ch El (ft)	-18.64	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)	1674.31	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

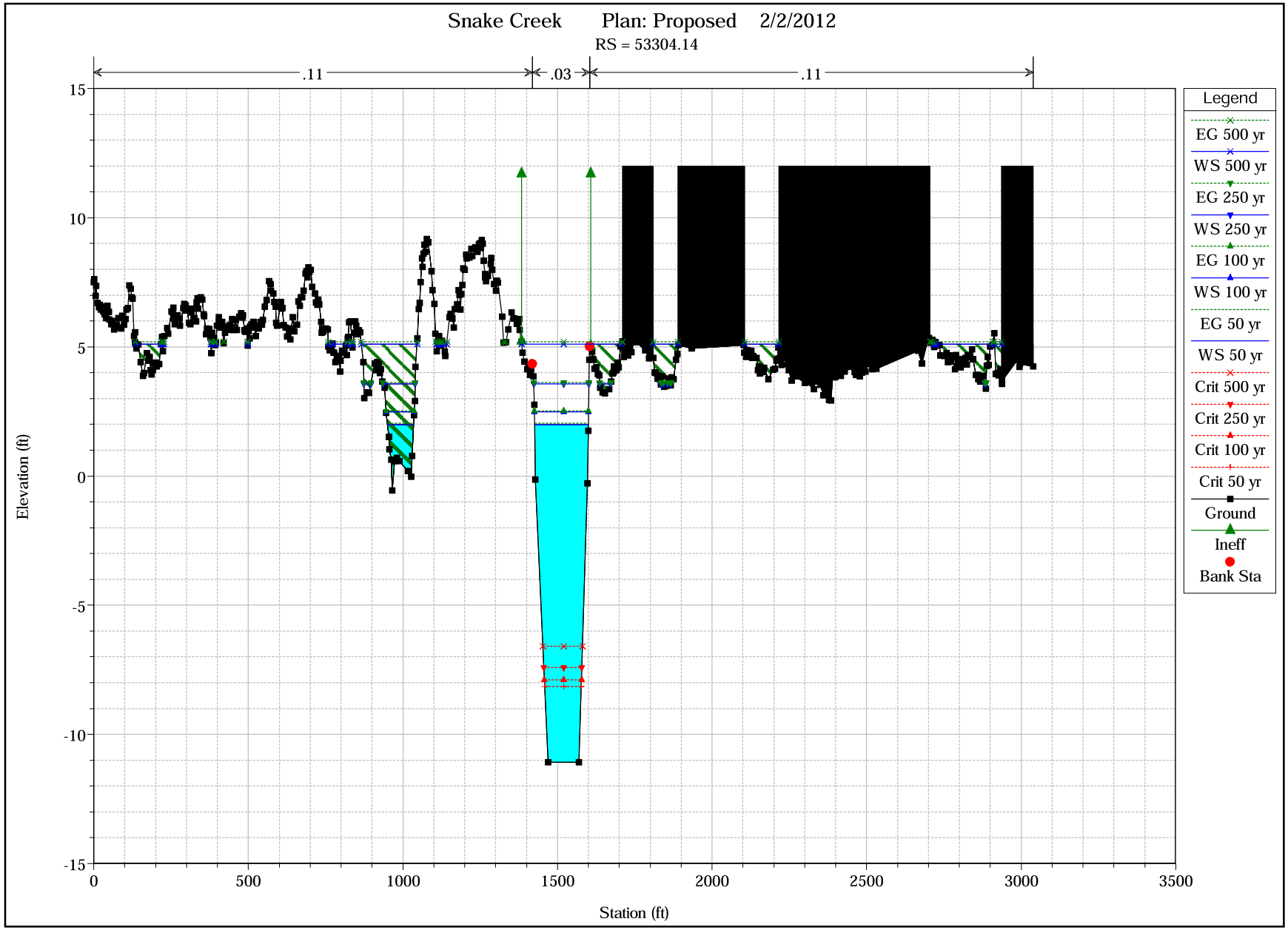
CROSS SECTION OUTPUT Profile #250 yr

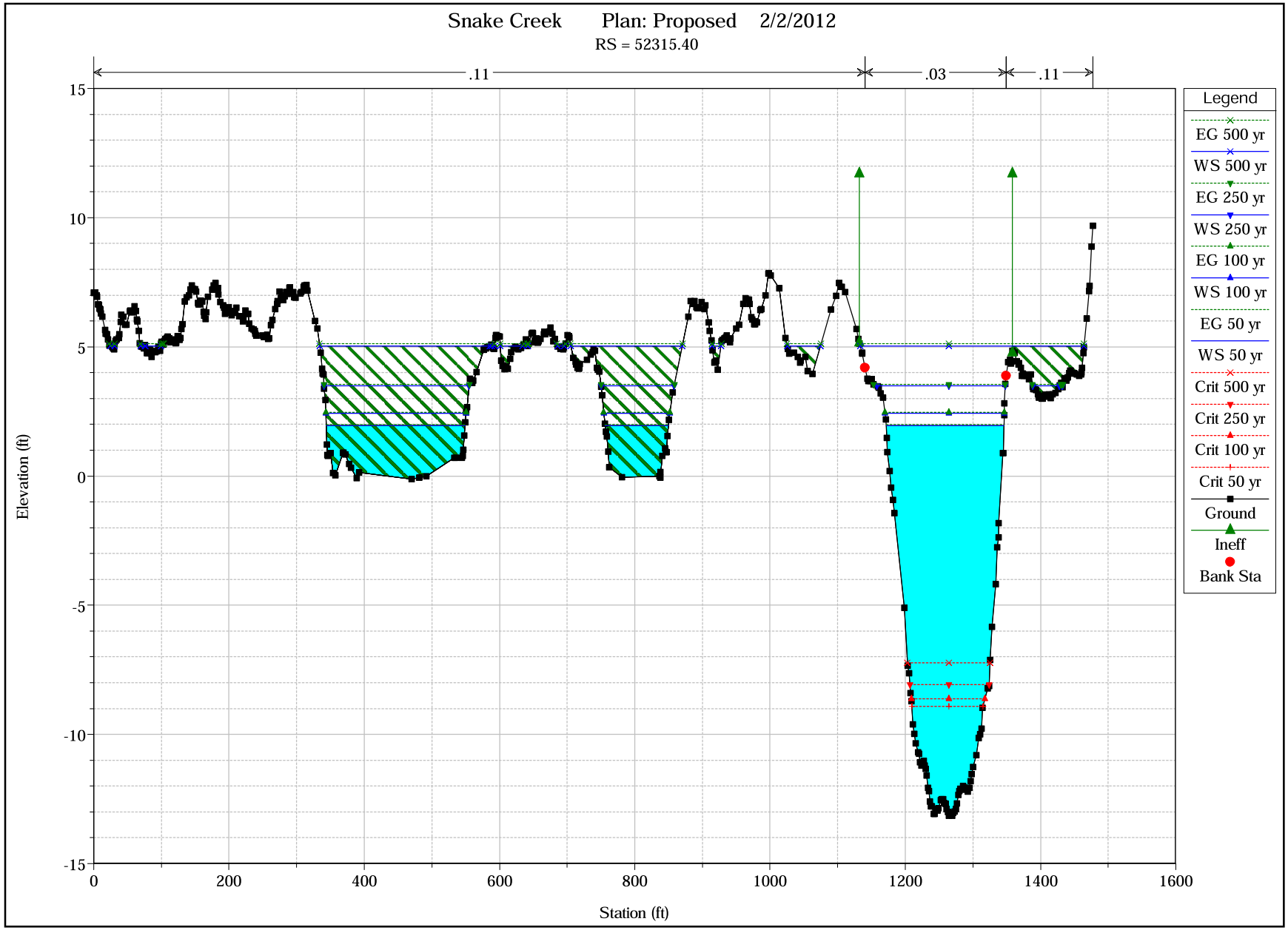
E.G. Elev (ft)	3.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.030	
W.S. Elev (ft)	3.01	Reach Len. (ft)			
Crit W.S. (ft)	-14.93	Flow Area (sq ft)		2876.84	
E.G. Slope (ft/ft)	0.000022	Area (sq ft)		2876.84	749.31
Q Total (cfs)	4200.00	Flow (cfs)		4200.00	
Top Width (ft)	633.99	Top Width (ft)		169.65	464.34
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)		1.46	
Max Chl Dpth (ft)	21.65	Hydr. Depth (ft)		16.96	
Conv. Total (cfs)	896546.5	Conv. (cfs)		896546.5	
Length Wtd. (ft)		Wetted Per. (ft)		182.28	
Min Ch El (ft)	-18.64	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)	1674.31	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

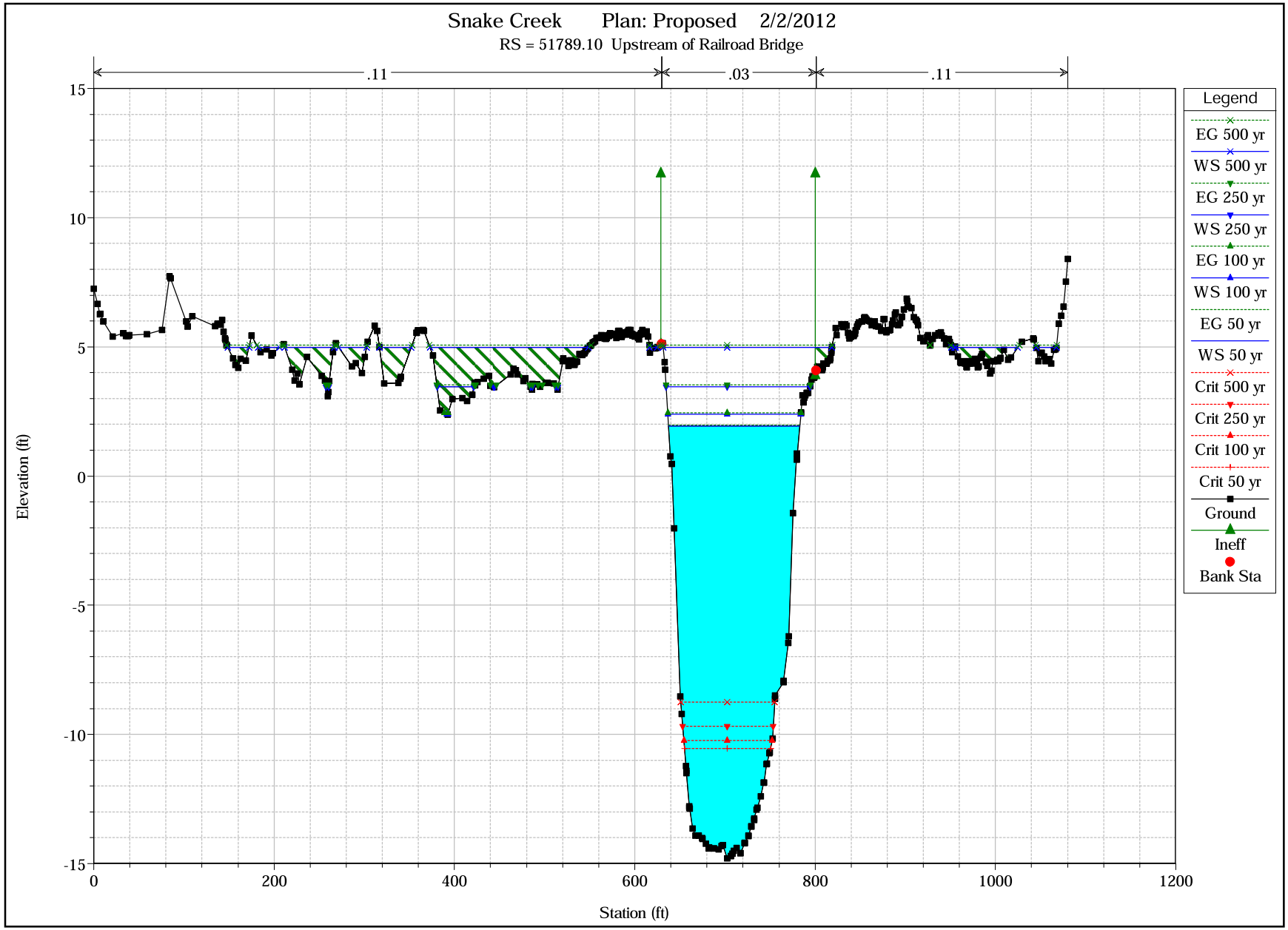
CROSS SECTION OUTPUT Profile #500 yr

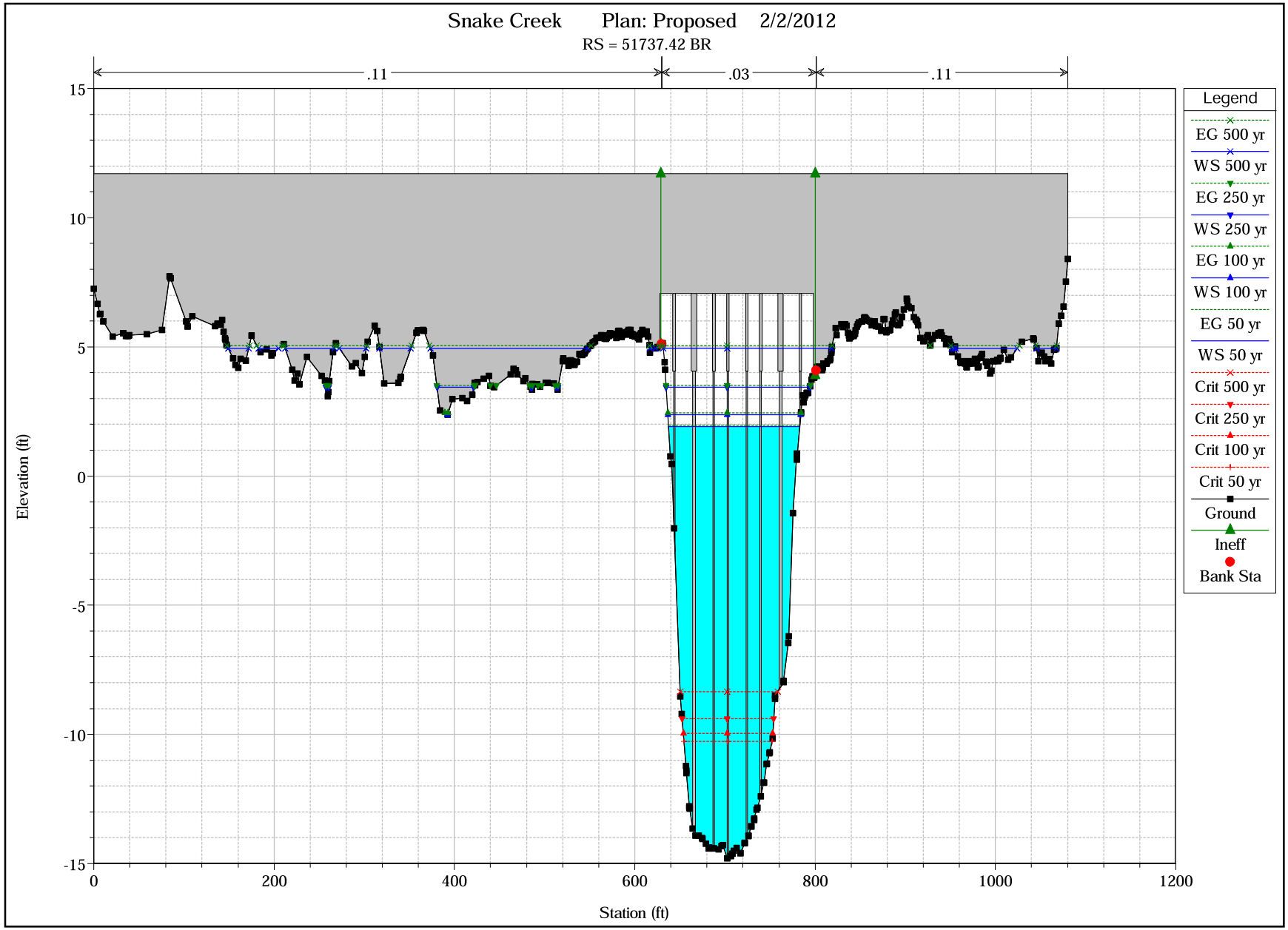
E.G. Elev (ft)	4.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
W.S. Elev (ft)	4.44	Reach Len. (ft)			
Crit W.S. (ft)	-14.07	Flow Area (sq ft)		3127.34	
E.G. Slope (ft/ft)	0.000035	Area (sq ft)		3127.34	1434.01
Q Total (cfs)	5777.00	Flow (cfs)		5777.00	
Top Width (ft)	674.19	Top Width (ft)		184.38	489.82
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)		1.85	
Max Chl Dpth (ft)	23.08	Hydr. Depth (ft)		16.96	
Conv. Total (cfs)	976918.6	Conv. (cfs)		976918.6	
Length Wtd. (ft)		Wetted Per. (ft)		197.45	
Min Ch El (ft)	-18.64	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	1674.31	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

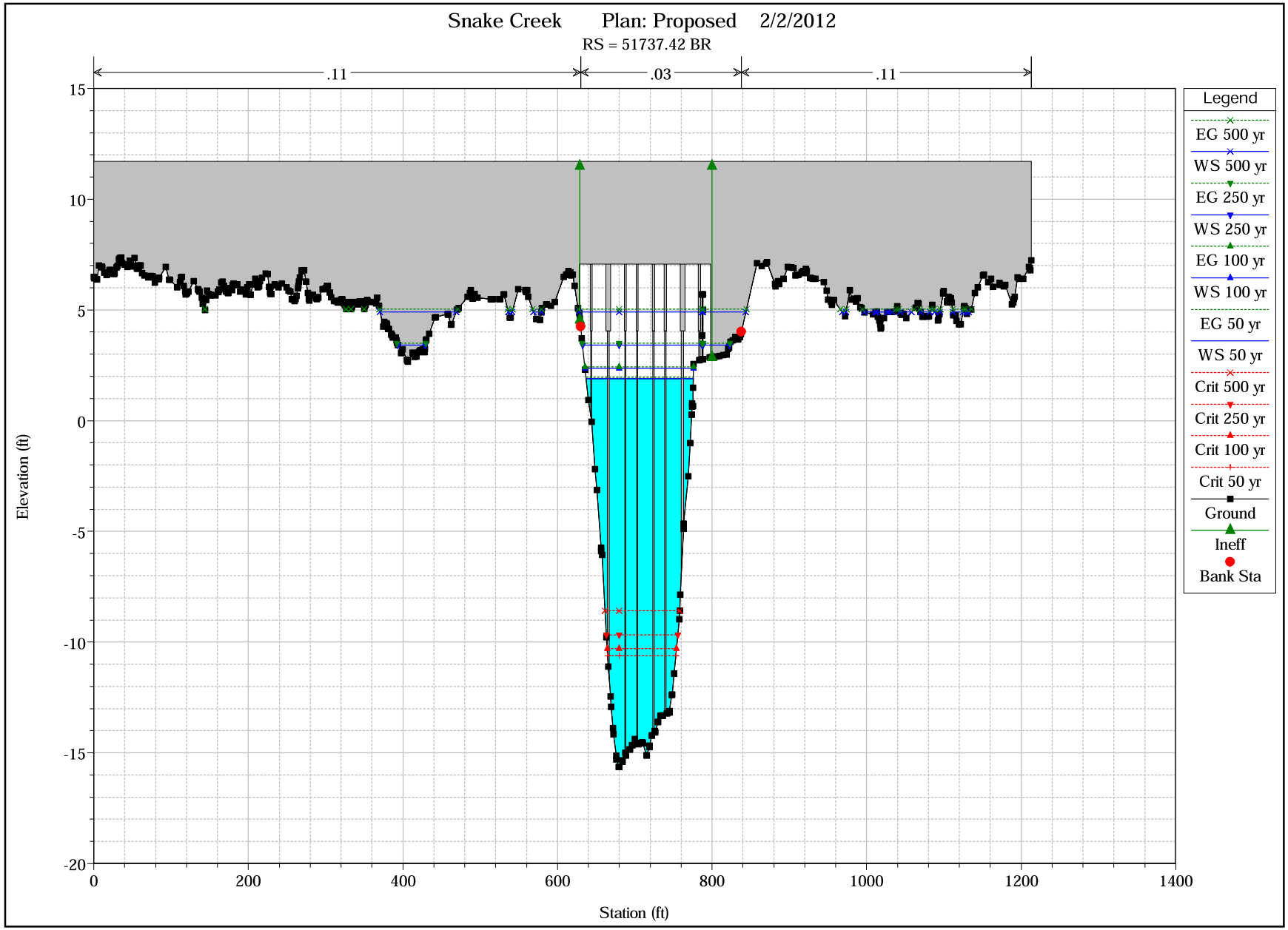
.

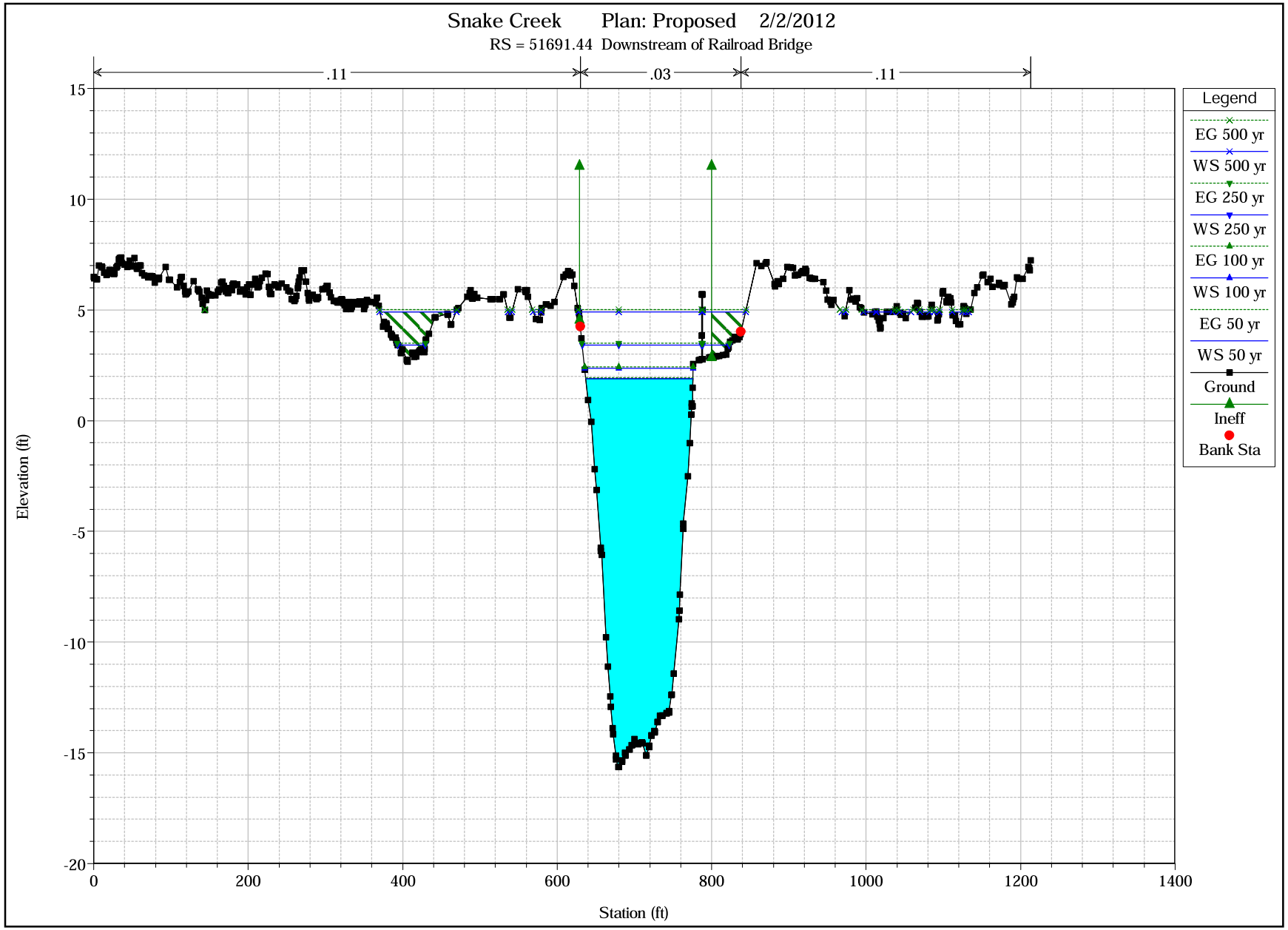

Snake Creek Plan: Proposed 2/2/2012
RS = 53304.14
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500
3000
3500
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta

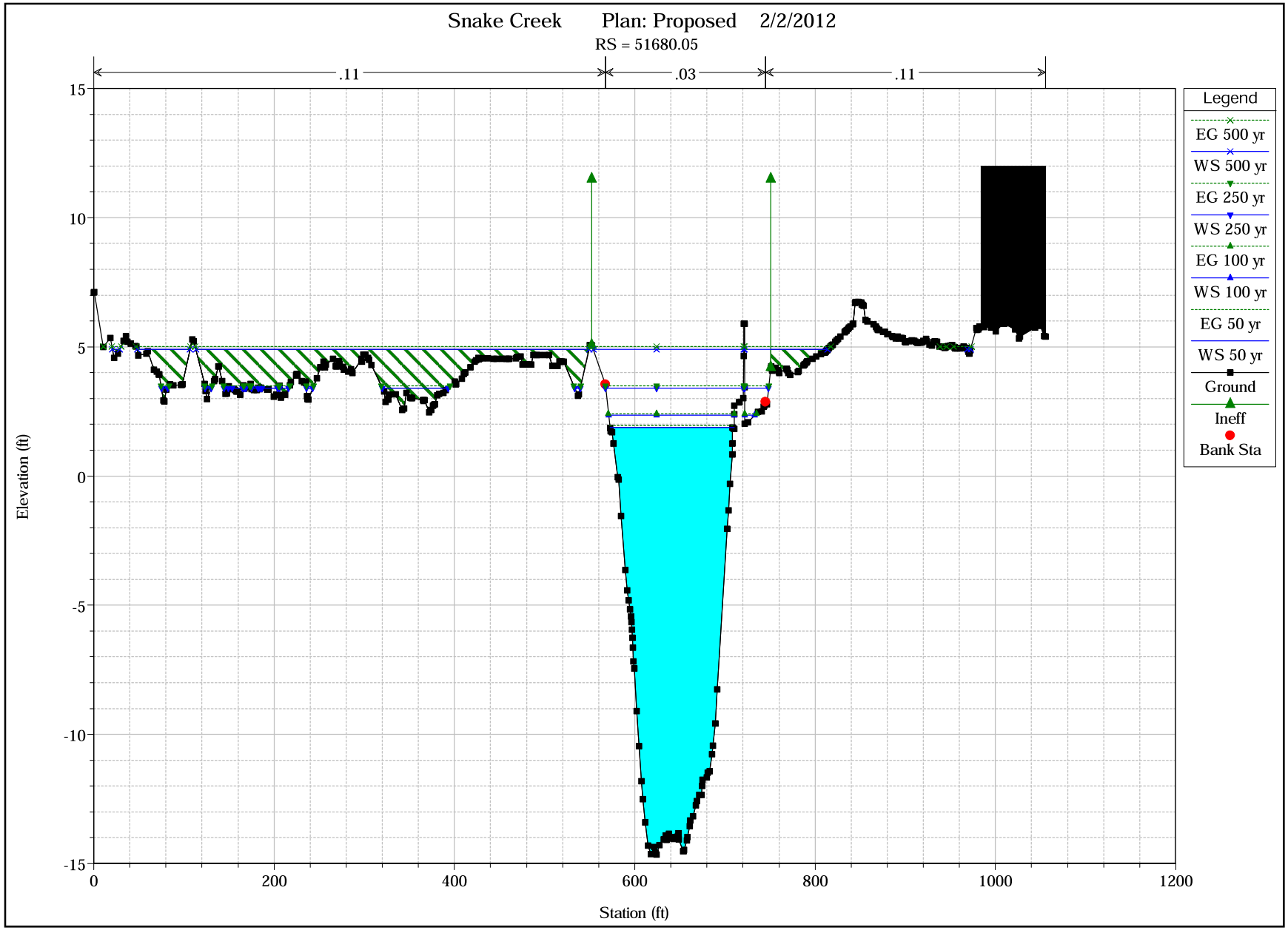

Snake Creek Plan: Proposed 2/2/2012
RS = 52315.40
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta

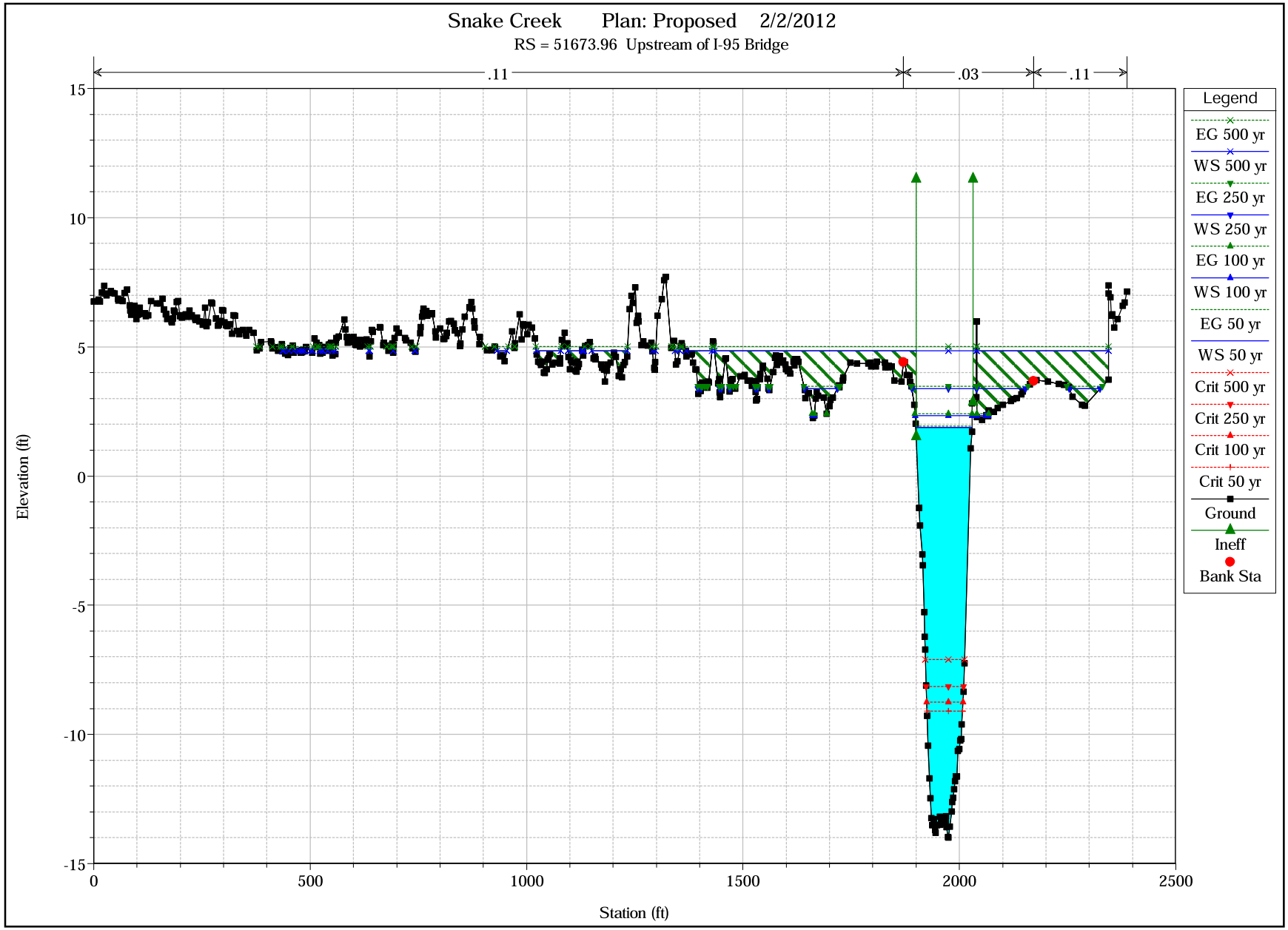

Snake Creek Plan: Proposed 2/2/2012
RS = 51789.10 Upstream of Railroad Bridge
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta

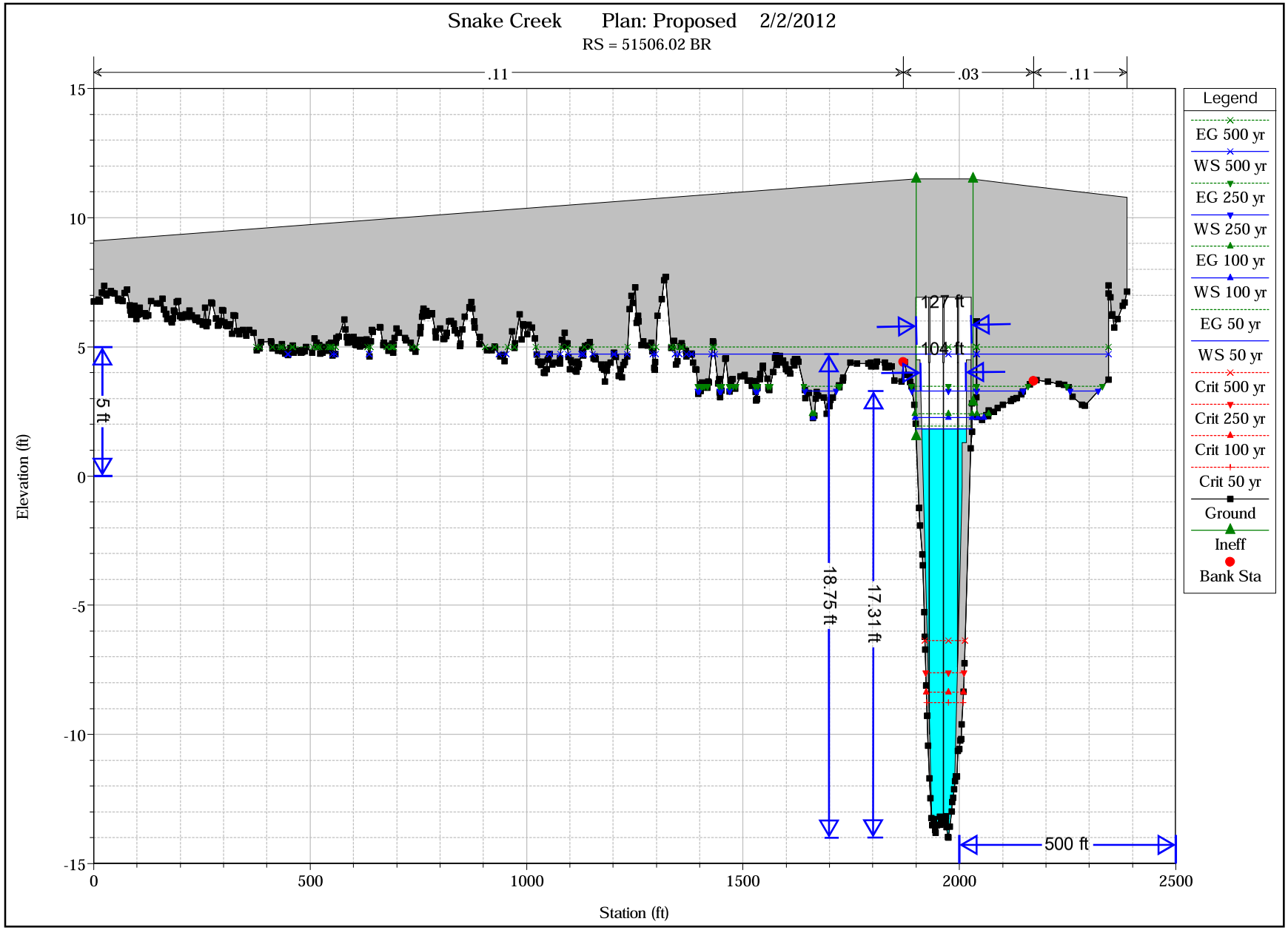

Snake Creek Plan: Proposed 2/2/2012
RS = 51737.42 BR
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta

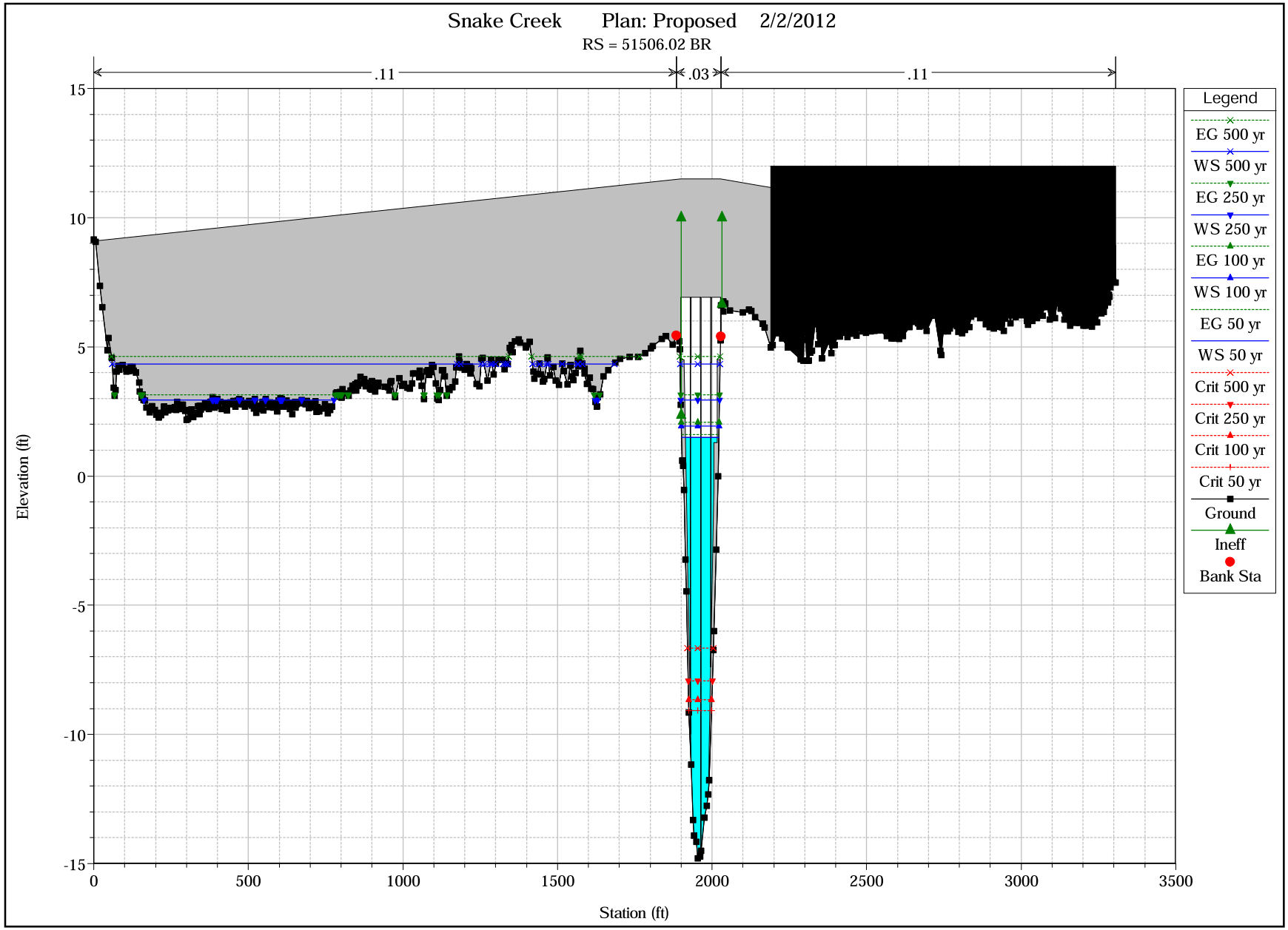

Snake Creek Plan: Proposed 2/2/2012
RS = 51737.42 BR
.11
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta
Elevation (ft)
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400
Station (ft)

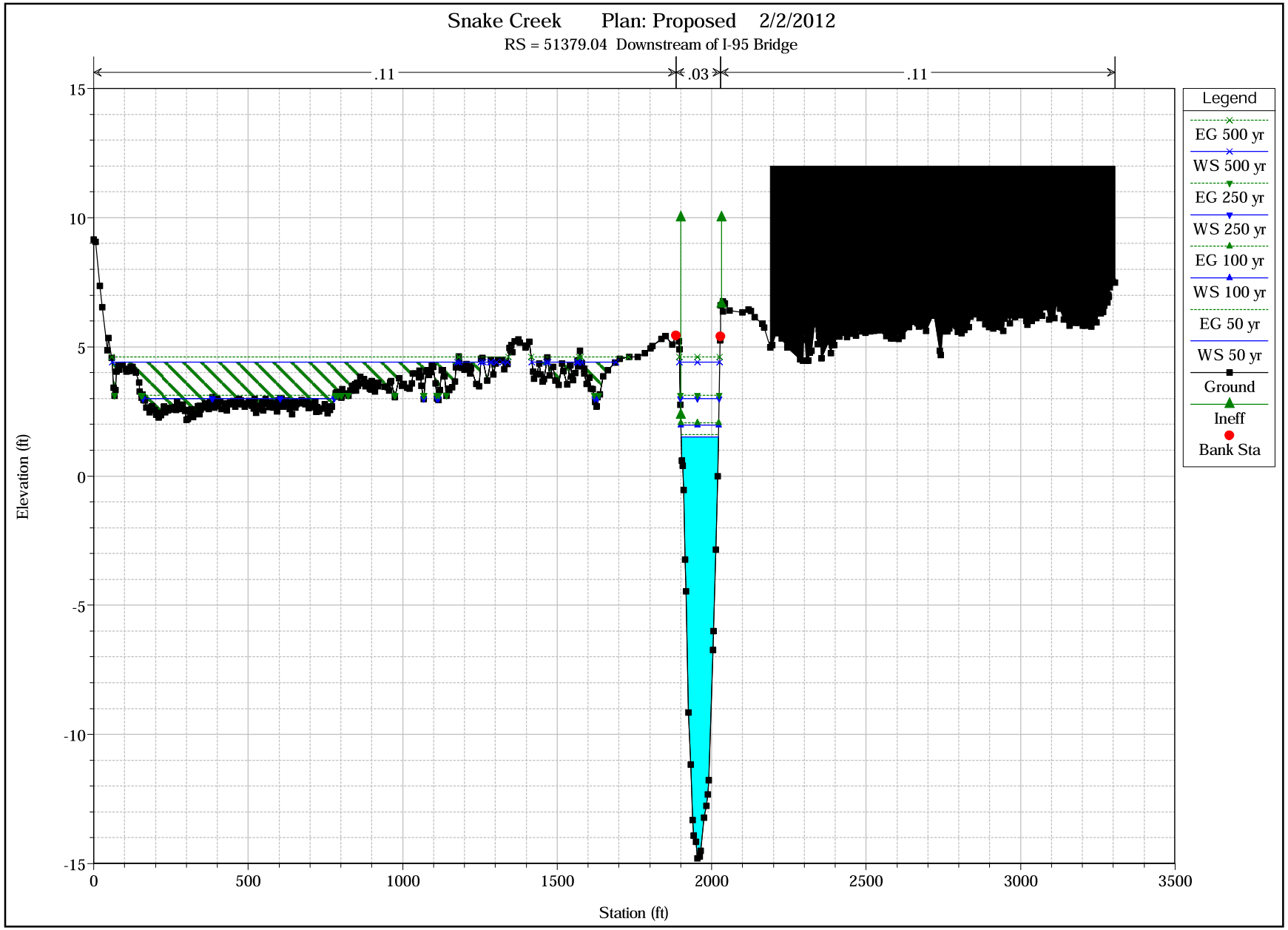

Snake Creek Plan: Proposed 2/2/2012
RS = 51691.44 Downstream of Railroad Bridge
.11
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400

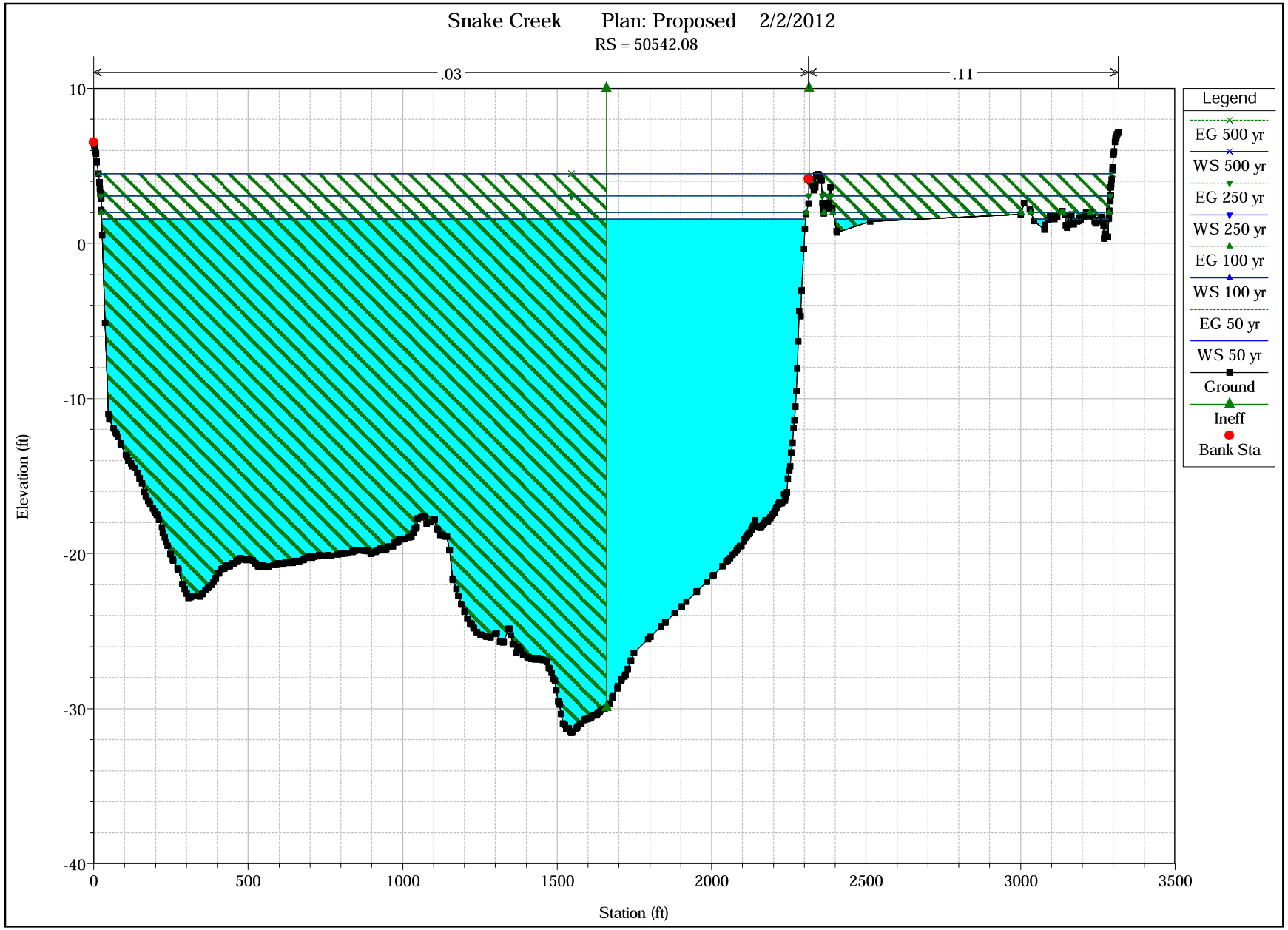

Snake Creek Plan: Proposed 2/2/2012
RS = 51680.05
.11
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200

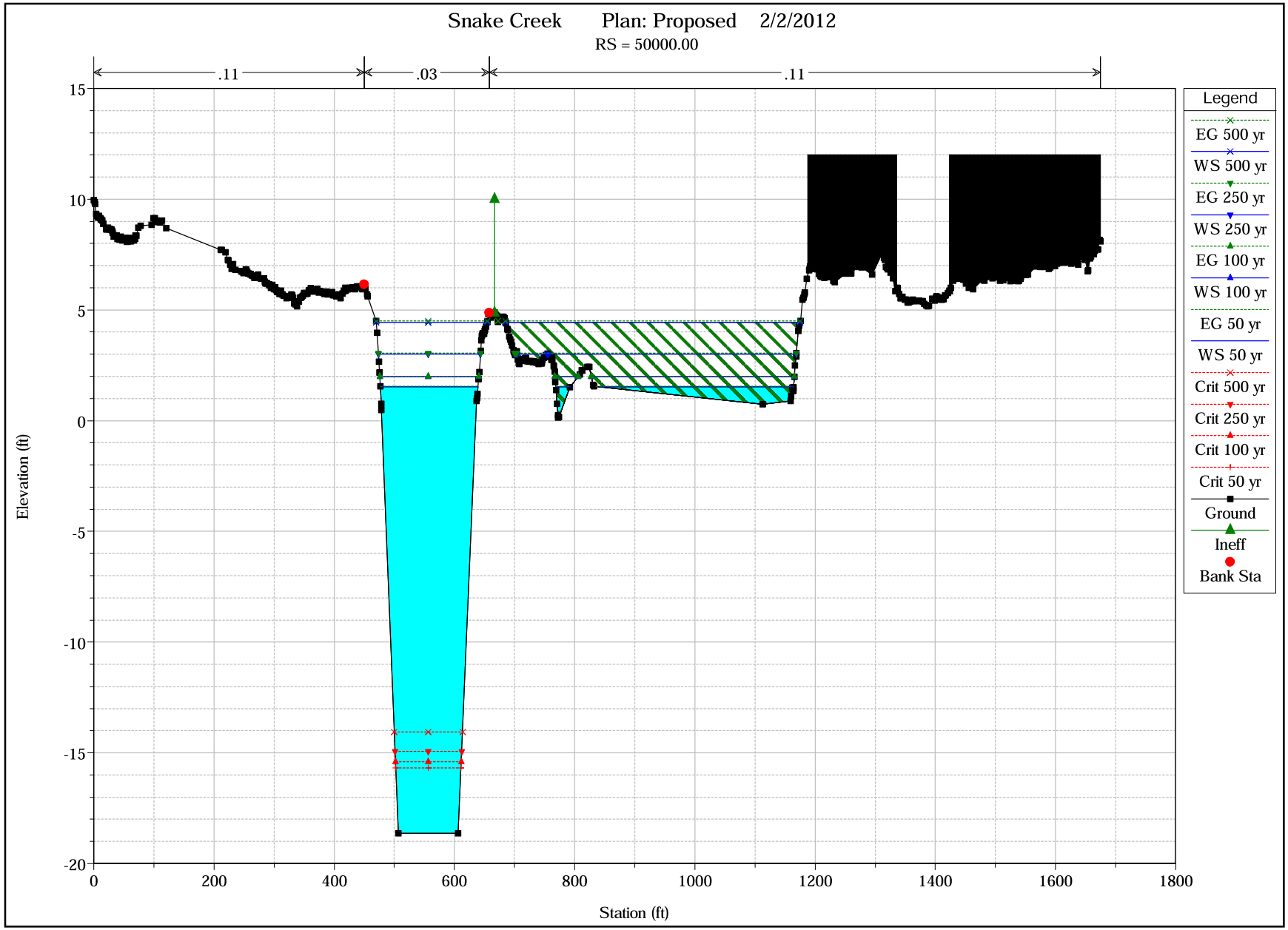

Snake Creek Plan: Proposed 2/2/2012
RS = 51673.96 Upstream of I-95 Bridge
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta


Snake Creek Plan: Proposed 2/2/2012
RS = 51506.02 BR
.11
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta
127 ft
104 ft
5 ft
18.75 ft
17.31 ft
500 ft
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500


Snake Creek Plan: Proposed 2/2/2012
RS = 51506.02 BR
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500
3000
3500
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta


Snake Creek Plan: Proposed 2/2/2012
RS = 51379.04 Downstream of I-95 Bridge
.11
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500
3000
3500


Snake Creek Plan: Proposed 2/2/2012
RS = 50542.08
.03
.11
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
10
0
-10
-20
-30
-40
0
500
1000
1500
2000
2500
3000
3500


Snake Creek Plan: Proposed 2/2/2012
RS = 50000.00
.11
.03
.11
Elevation (ft)
Station (ft)
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400
1600
1800
Legend
EG 500 yr
WS 500 yr
EG 250 yr
WS 250 yr
EG 100 yr
WS 100 yr
EG 50 yr
WS 50 yr
Crit 500 yr
Crit 250 yr
Crit 100 yr
Crit 50 yr
Ground
Ineff
Bank Sta

C-9 CANAL

Geotechnical Report

Tierra South Florida, Inc.

I-95 Express Lanes – in Broward and Miami-Dade County, Florida
FPID Nos.: 422796-1-52-01 & 422796-2-52-01

TSF Project No. 7111-11-297

I-95 Over Snake Creek Canal
Soil Parameters for Bridge Hydraulic Study

D_{50}, D_{90}, D_{95} Values

Boring Number	Sample Depth Below the Existing Ground (feet)	D_{50} (mm)	D_{90} (mm)	D_{95} (mm)
BSC-1	13.5 – 15.0	0.30	21*	22*
	18.5 – 20.0	0.21	0.40	0.87
	23.5 – 25.0	0.20	1.0	1.4
BSC-2	13.5 – 15.0	0.21	0.51	1.00
	18.5 – 20.0	0.23	0.70	1.20
	23.5 – 25.0	0.25	0.50	1.00
	28.5 – 30.0	0.2	0.38	0.45
BSC-5	8.0 – 10.0	0.35	20*	22*
	13.5 – 15.0	0.22	1.3*	8.5*
	23.5 – 25.0	0.25	0.51	1.0
	28.5 – 30.0	0.22	0.40	0.60
Canal	At the Canal Bottom	0.31	4.0*	14*
	Average Values =	**0.25**	**0.55**	**0.94**

* High values were ignored to obtain the average values.

Summary of Laboratory Test Results
I-95 Express Lanes - Over the Snake Creek Canal
FPID Nos.: 422796-1-52-01 & 422796-2-52-01
TSF Project No: 7111-11-297

Boring Number	Sample Depth (ft)	Stratum Number	USCS Symbol	Sieve Analysis								Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
				3/4"	3/8"	#4	#10	#40	#60	#100	#200	Liquid Limit	Plastic Limit	Plasticity Index		
BSC-1	13.5 - 15.0		SP	81	81	81	81	66	36	7	3					19
BSC-1	18.5 - 20.0		SP				100	91	64	8	1					23
BSC-1	23.5 - 25.0		SP				100	76	38	5	1					21
BSC-2	13.5 - 15.0		SP				100	88	63	14	4					22
BSC-2	18.5 - 20.0		SP				100	86	50	5	2					22
BSC-2	23.5 - 25.0		SP				100	89	48	8	5					16
BSC-2	28.5 - 30.0		SP				100	95	74	19	4					22
BSC-5	8.0 - 10.0		SP	87	84	81	78	58	33	8	5					17
BSC-5	13.5 - 15.0		SP	100	96	93	92	84	54	6	1					26
BSC-5	23.5 - 25.0		SP				100	88	49	7	1					24
BSC-5	28.5 - 30.0		SP				100	93	57	5	1					23
Canal	Canal Bottom*		SP	96	94	91	87	63	31	6	3					19

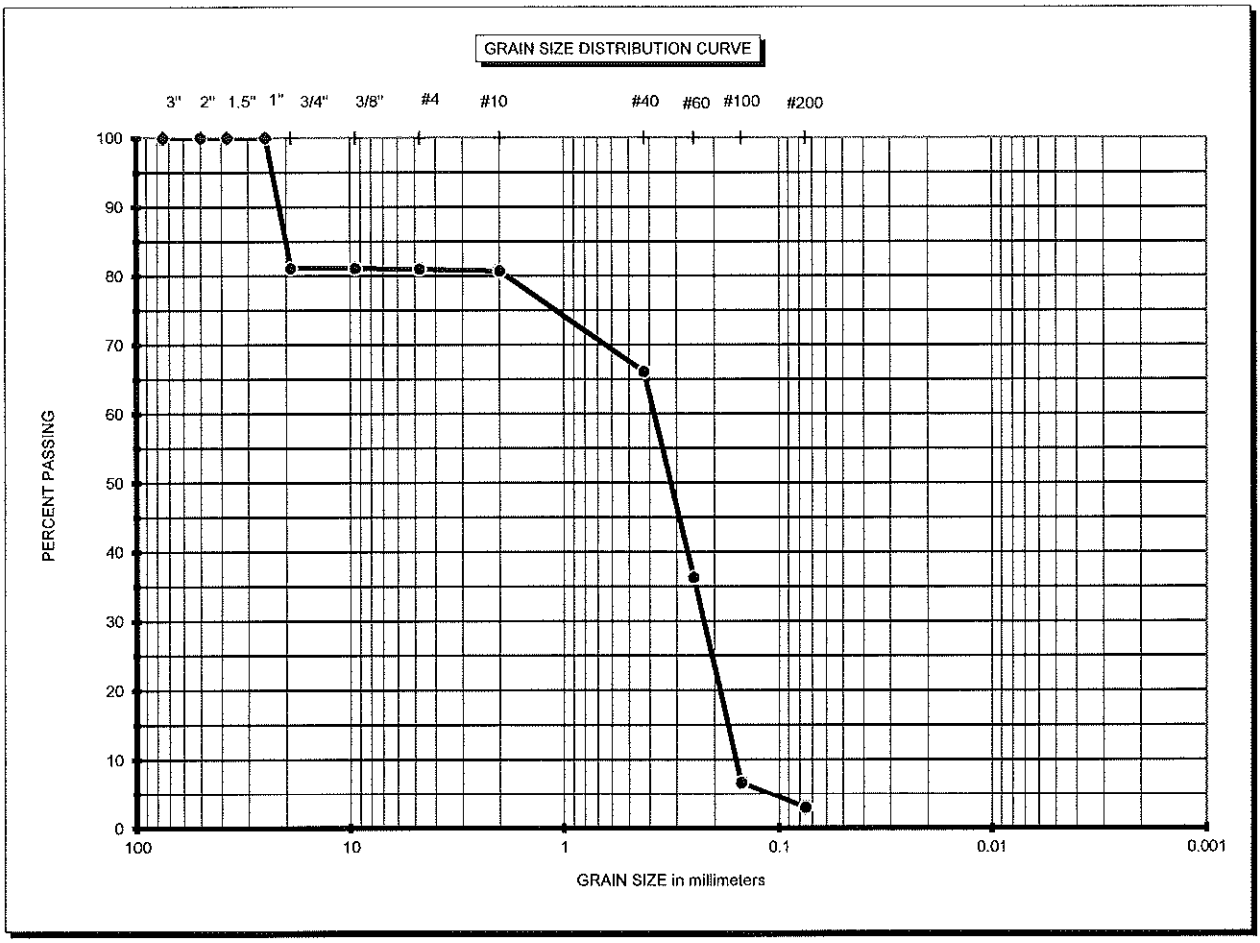
* The sample was obtained from the canal bottom

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-1 **OFFSET (ft)** _____ **DEPTH (ft):** 13.5 - 15.0

SOIL CLASSIFICATION: SP

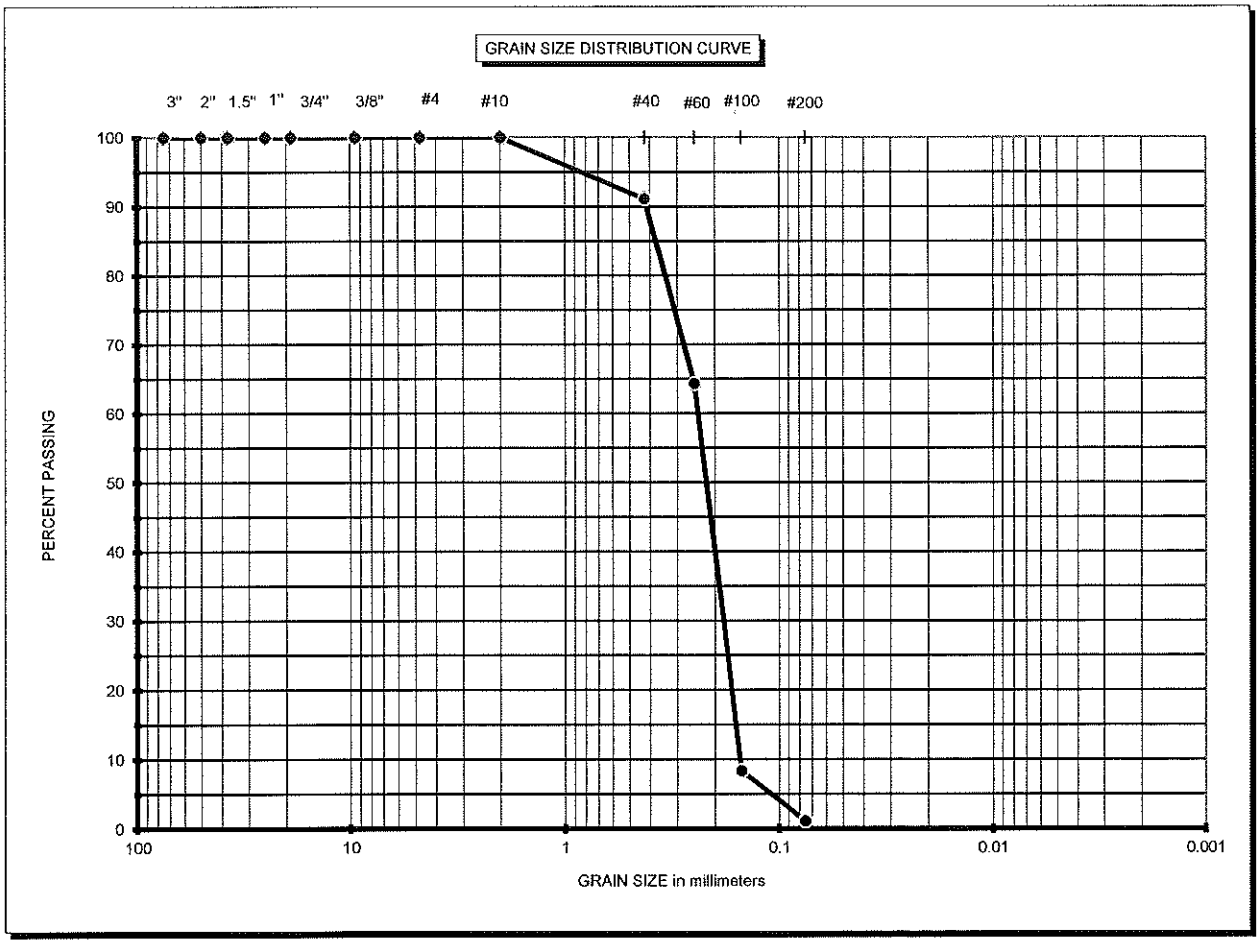
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-1 **OFFSET (ft)** **DEPTH (ft):** 18.5 - 20.0

SOIL CLASSIFICATION: SP

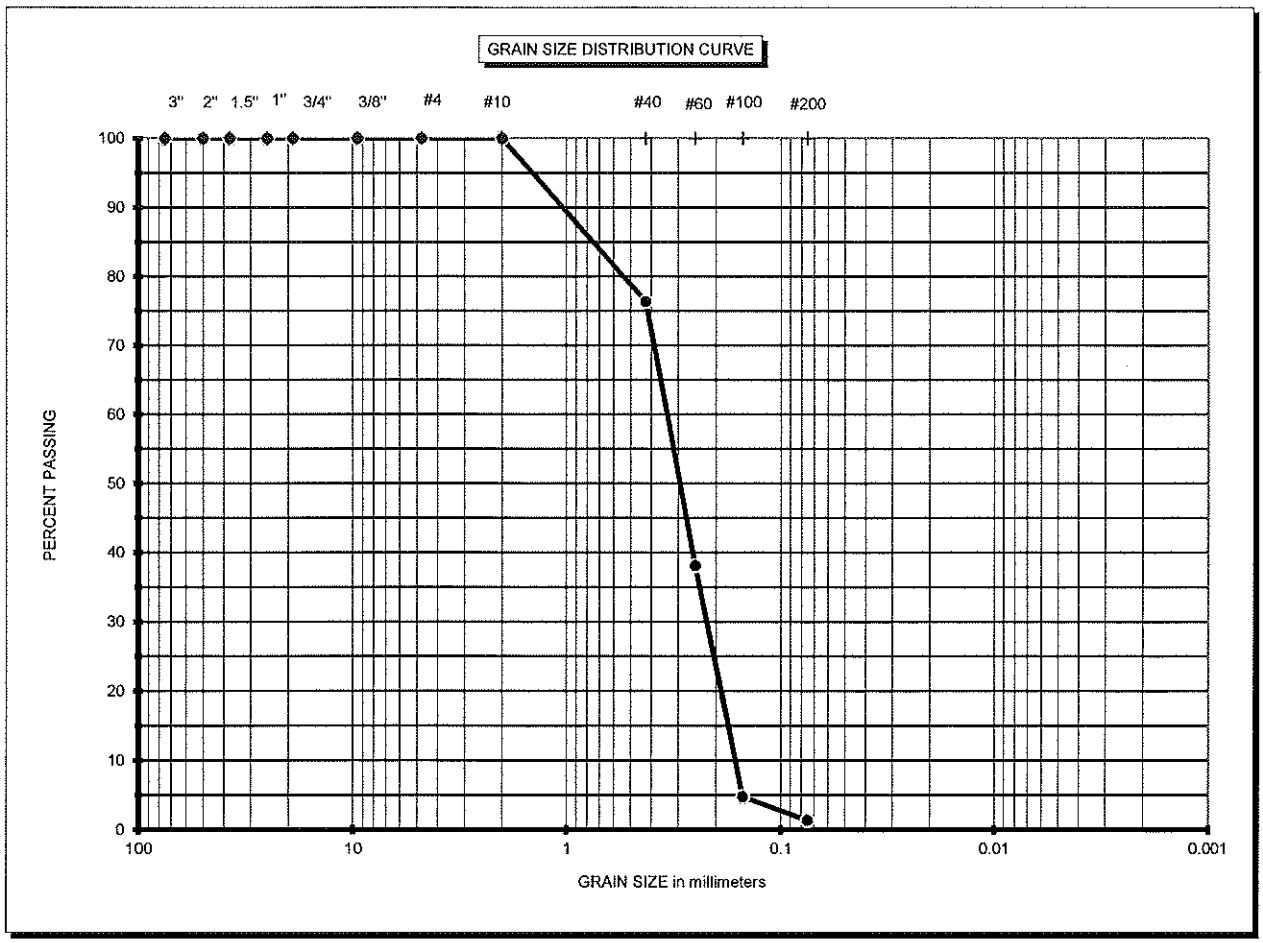
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-1 **OFFSET (ft)** **DEPTH (ft):** 23.5 - 25.0

SOIL CLASSIFICATION: SP

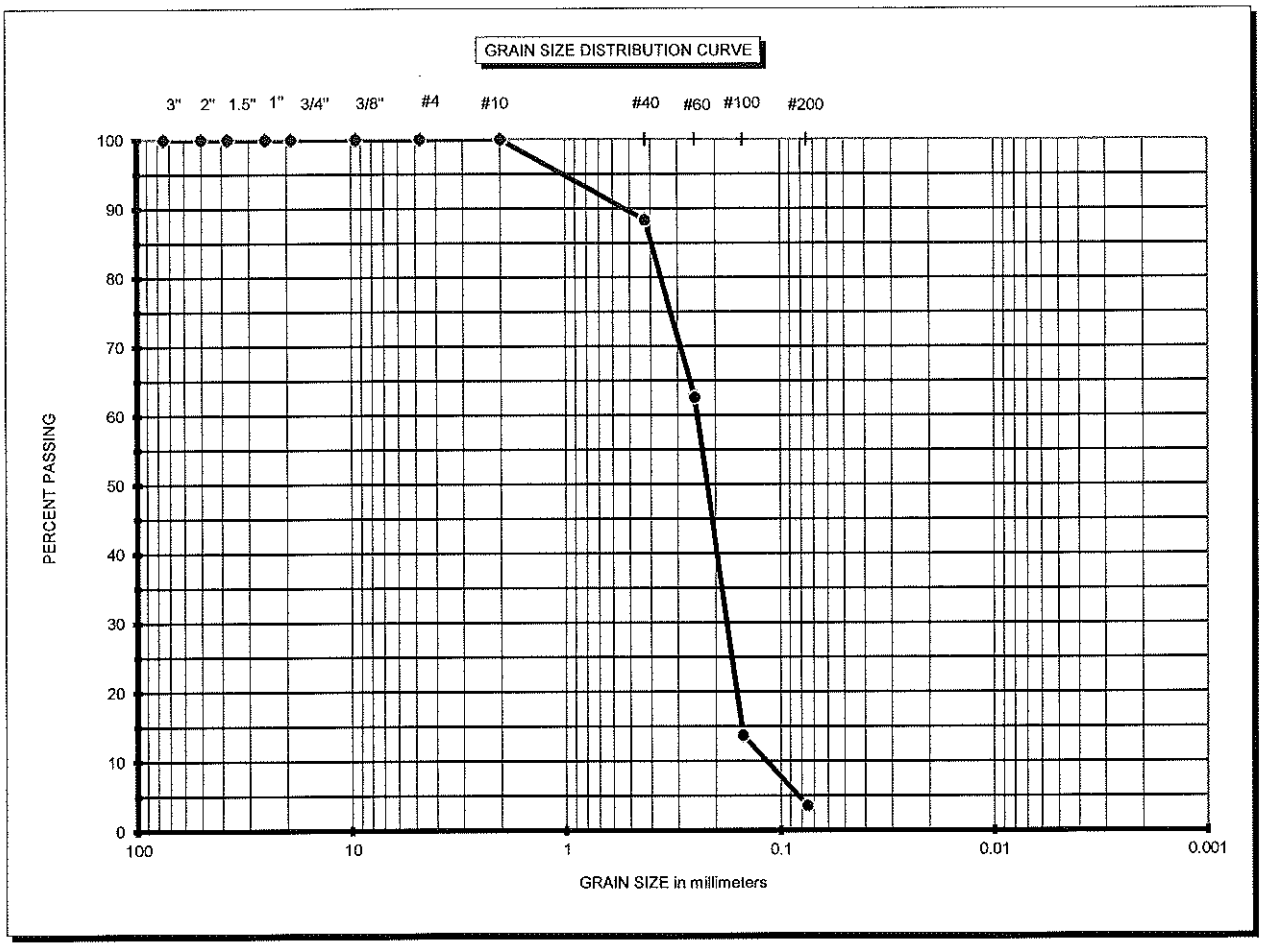
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-2 **OFFSET (ft)** **DEPTH (ft):** 13.5 - 15.0

SOIL CLASSIFICATION: SP

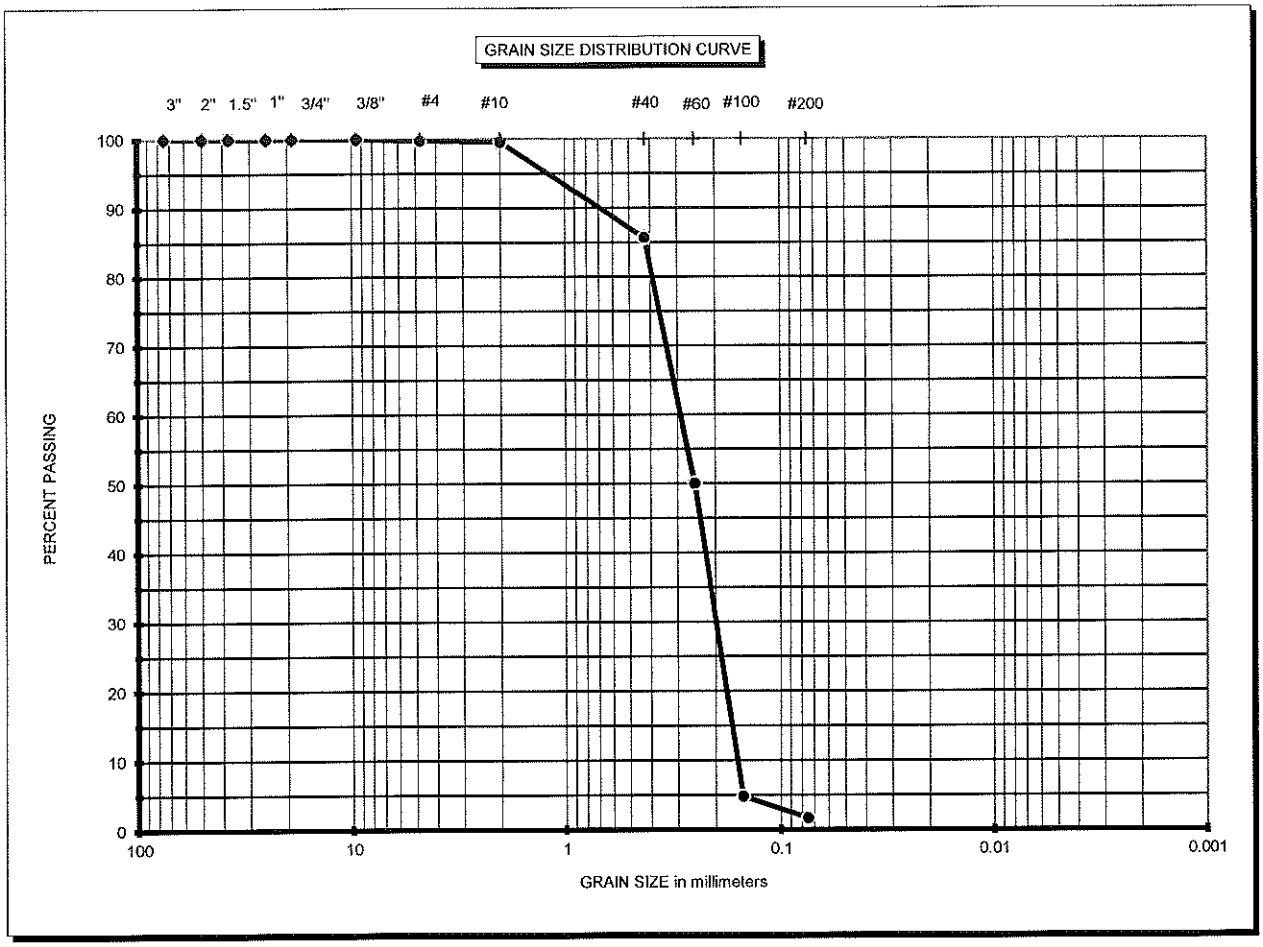
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-2 **OFFSET (ft)** _____ **DEPTH (ft):** 18.5 - 20.0

SOIL CLASSIFICATION: SP

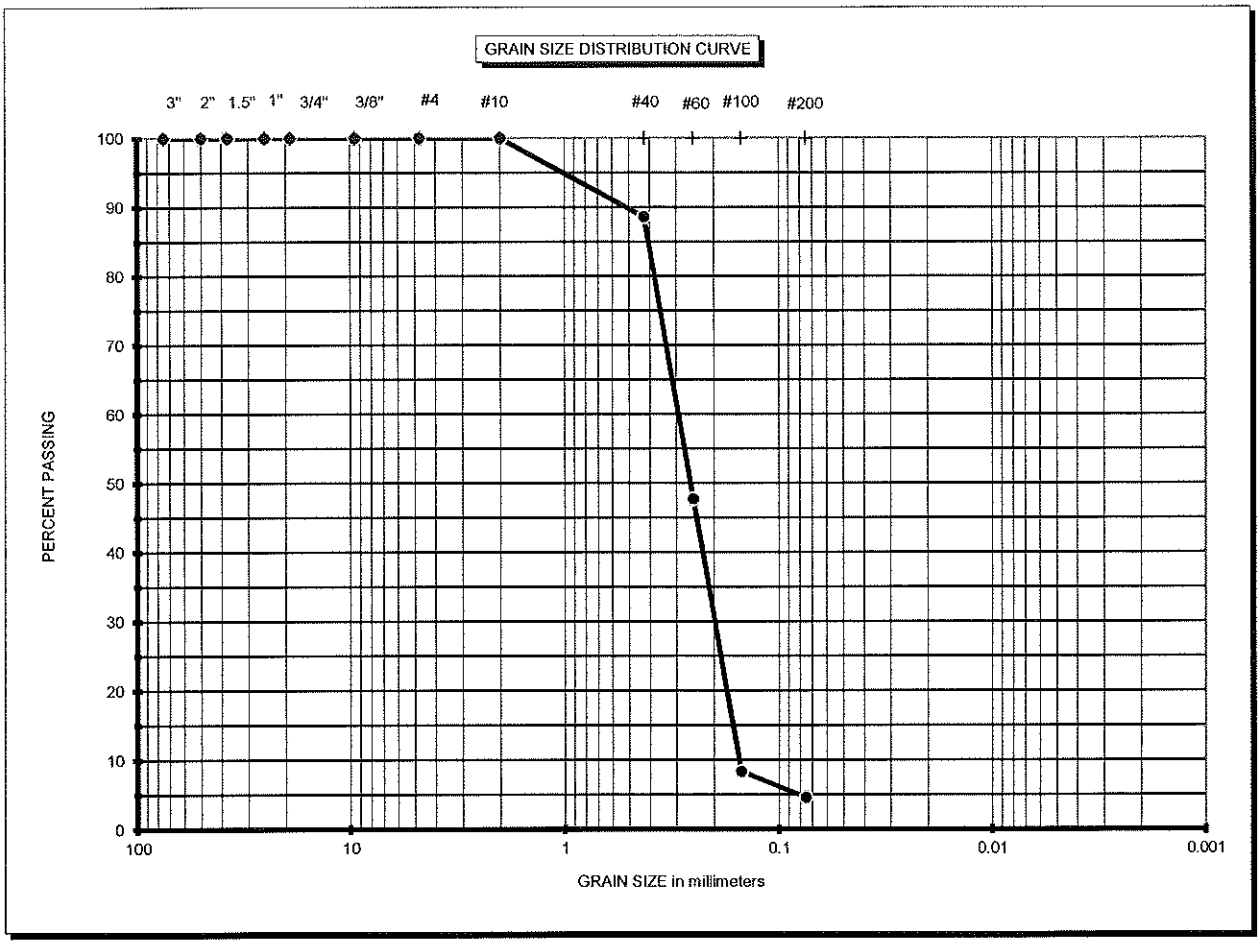
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-2 **OFFSET (ft)** _____ **DEPTH (ft):** 23.5 - 25.0

SOIL CLASSIFICATION: SP

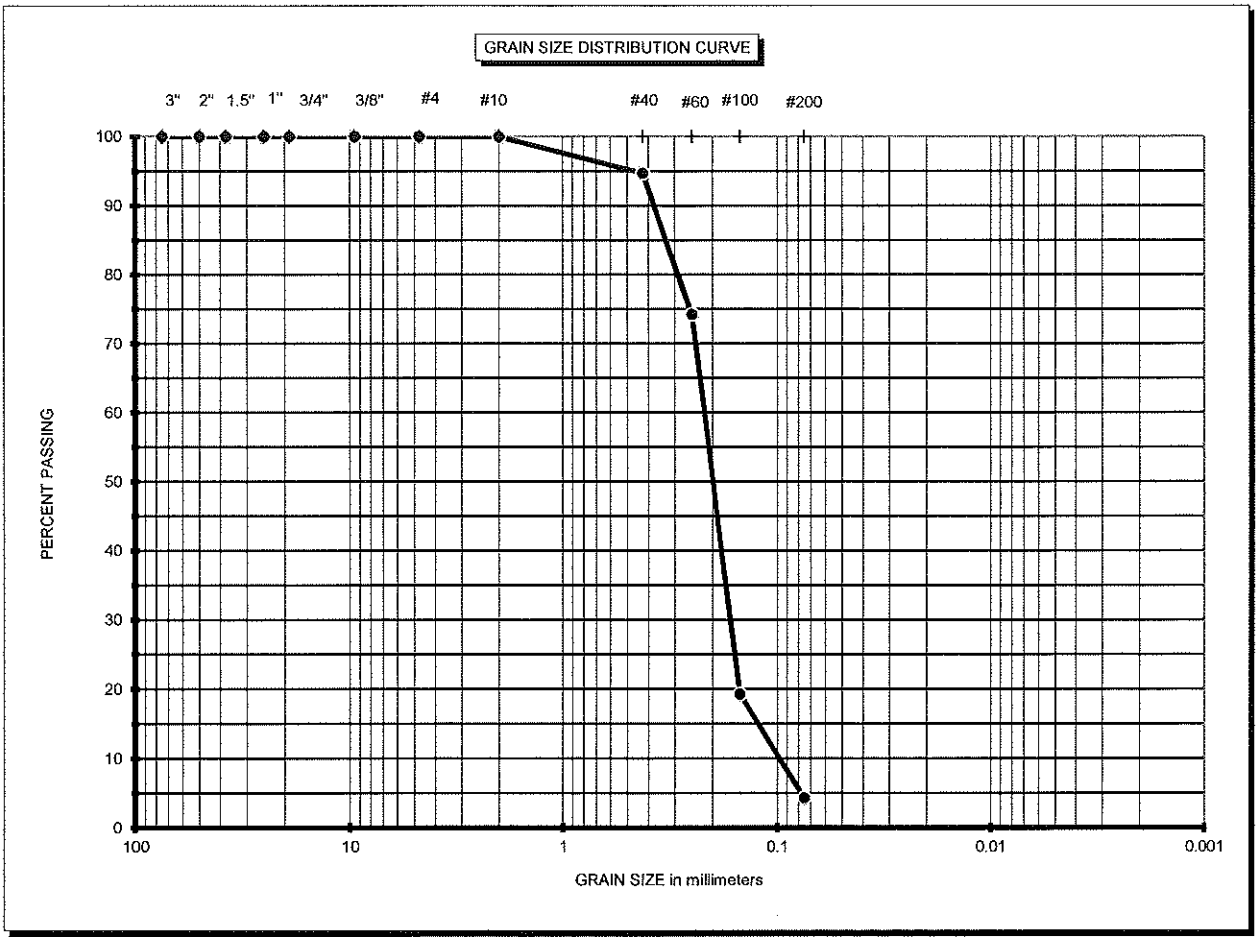
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-2 **OFFSET (ft)** _____ **DEPTH (ft):** 28.5 - 30.0

SOIL CLASSIFICATION: SP

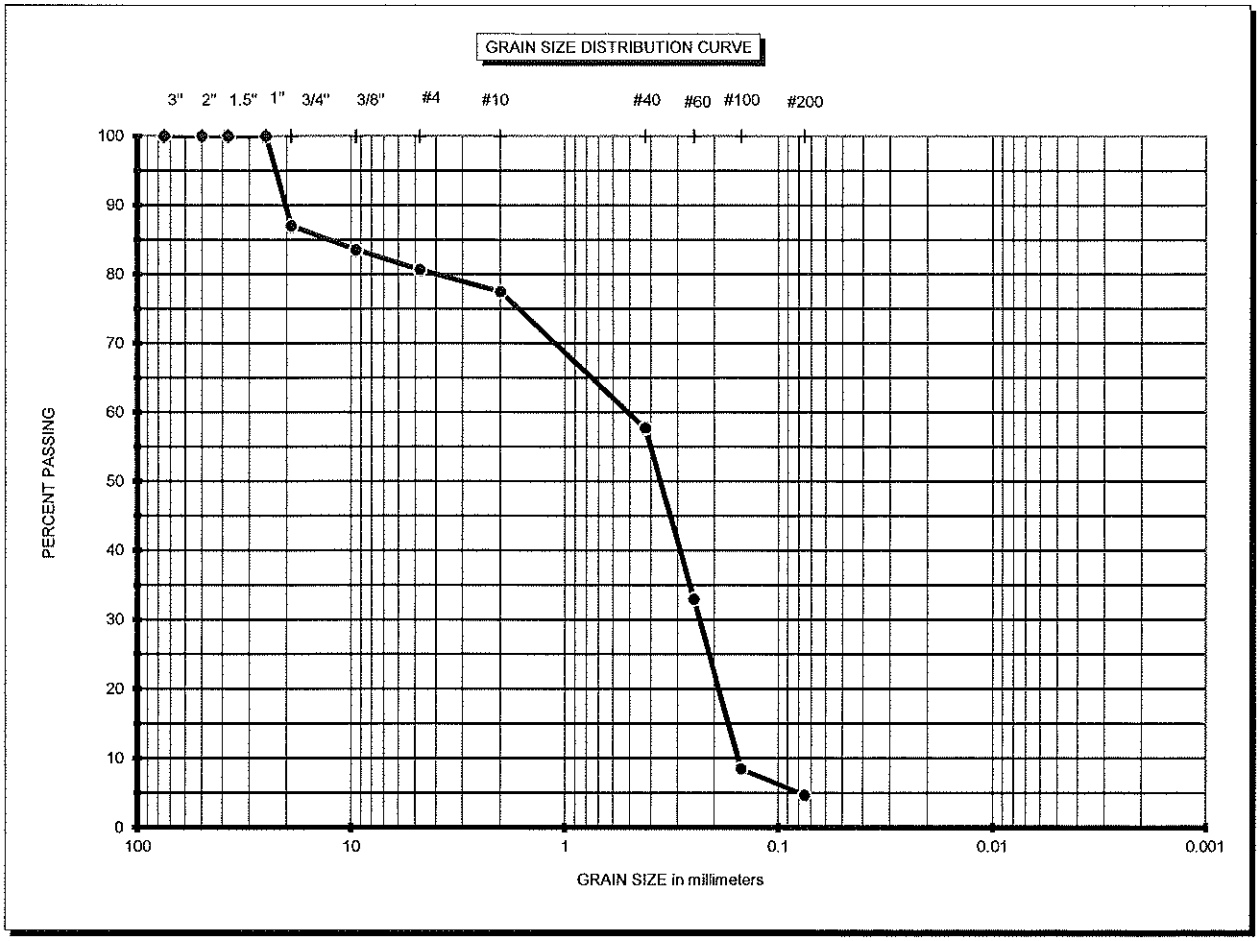
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-5 **OFFSET (ft)** _____ **DEPTH (ft):** 8.0 - 10.0

SOIL CLASSIFICATION: SP

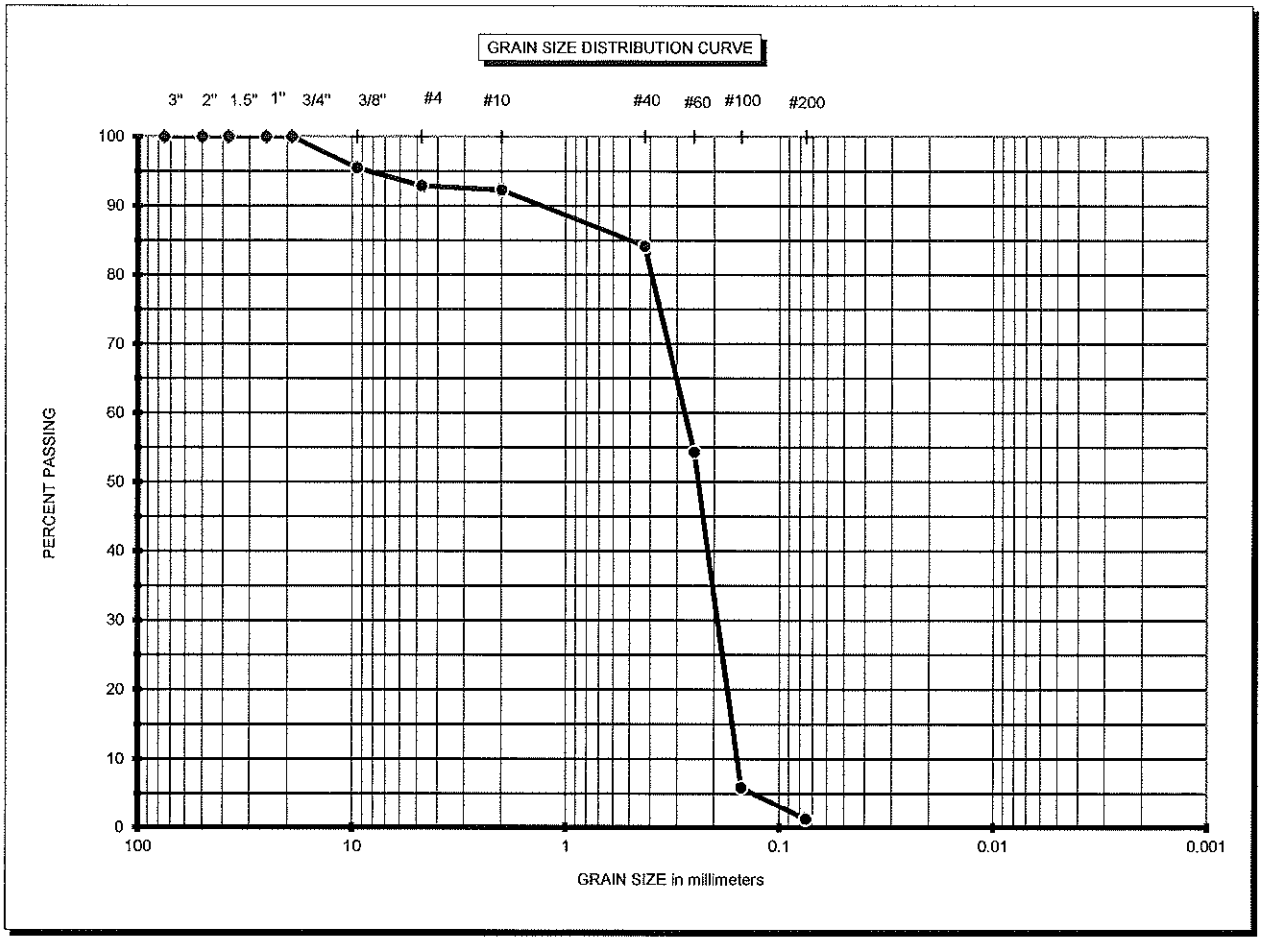
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-5 **OFFSET (ft)** _____ **DEPTH (ft):** 13.5 - 15.0

SOIL CLASSIFICATION: SP

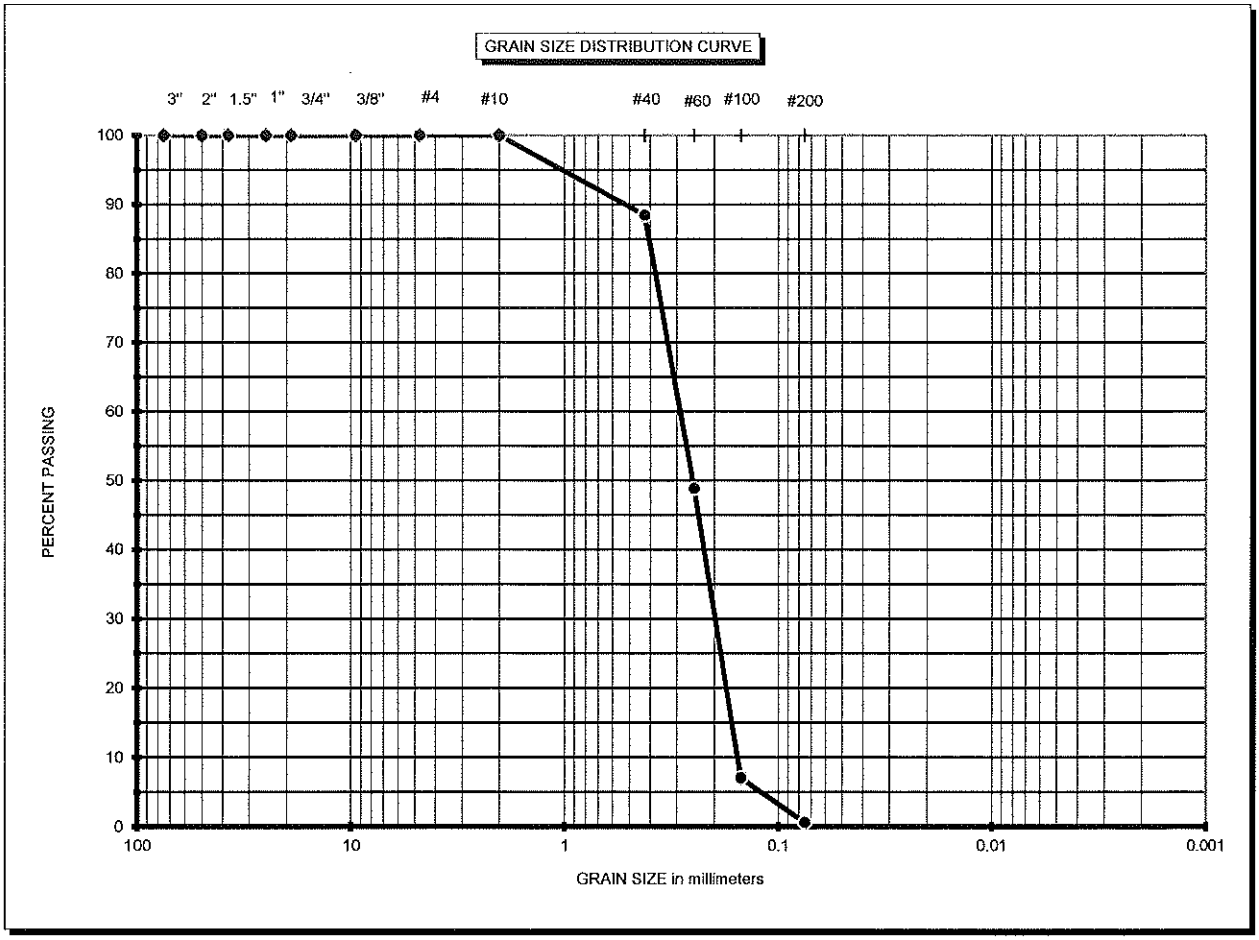
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-5 **OFFSET (ft)** _____ **DEPTH (ft):** 23.5 - 25.0

SOIL CLASSIFICATION: SP

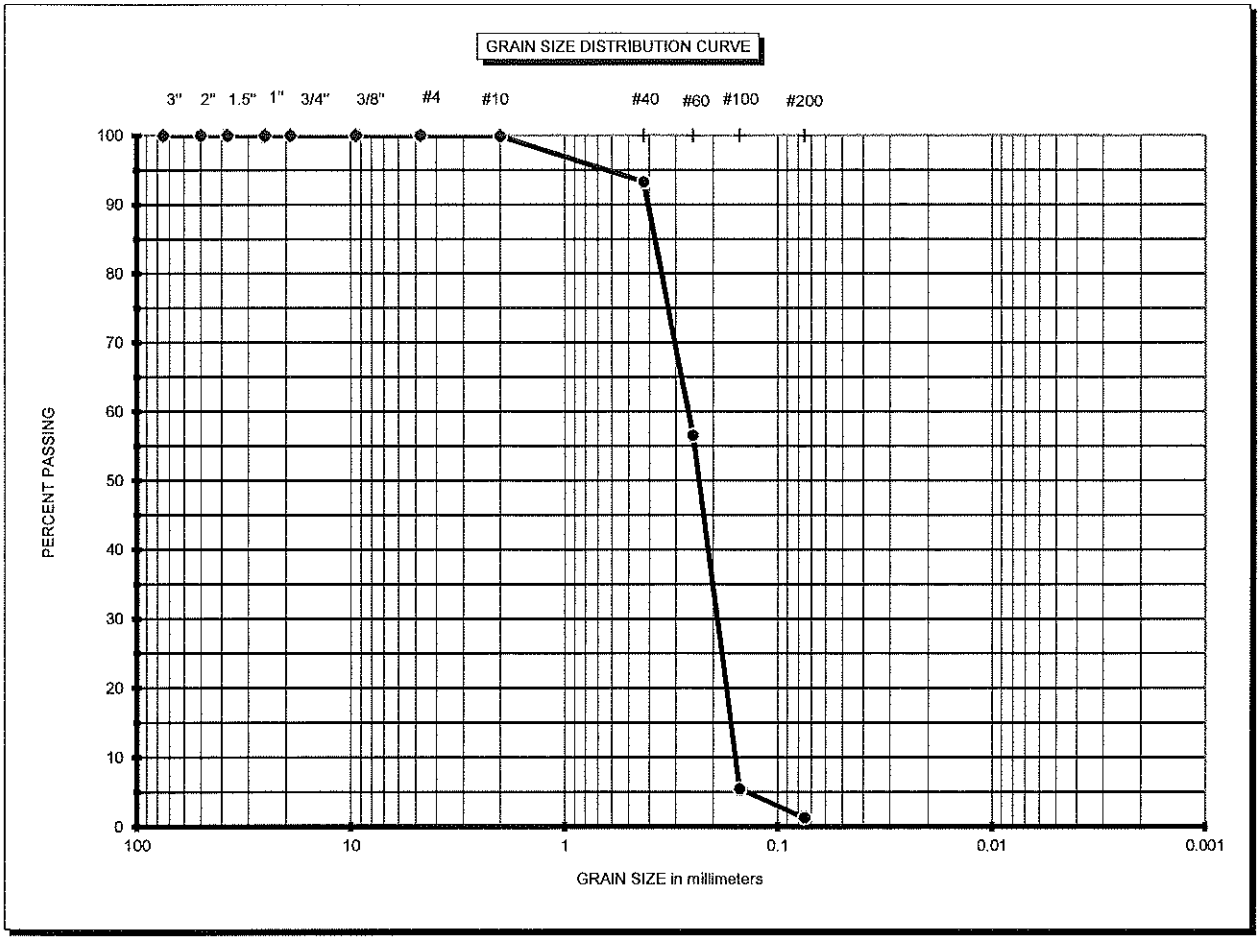
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # BSC-5 **OFFSET (ft)** **DEPTH (ft):** 28.5 - 30.0

SOIL CLASSIFICATION: SP

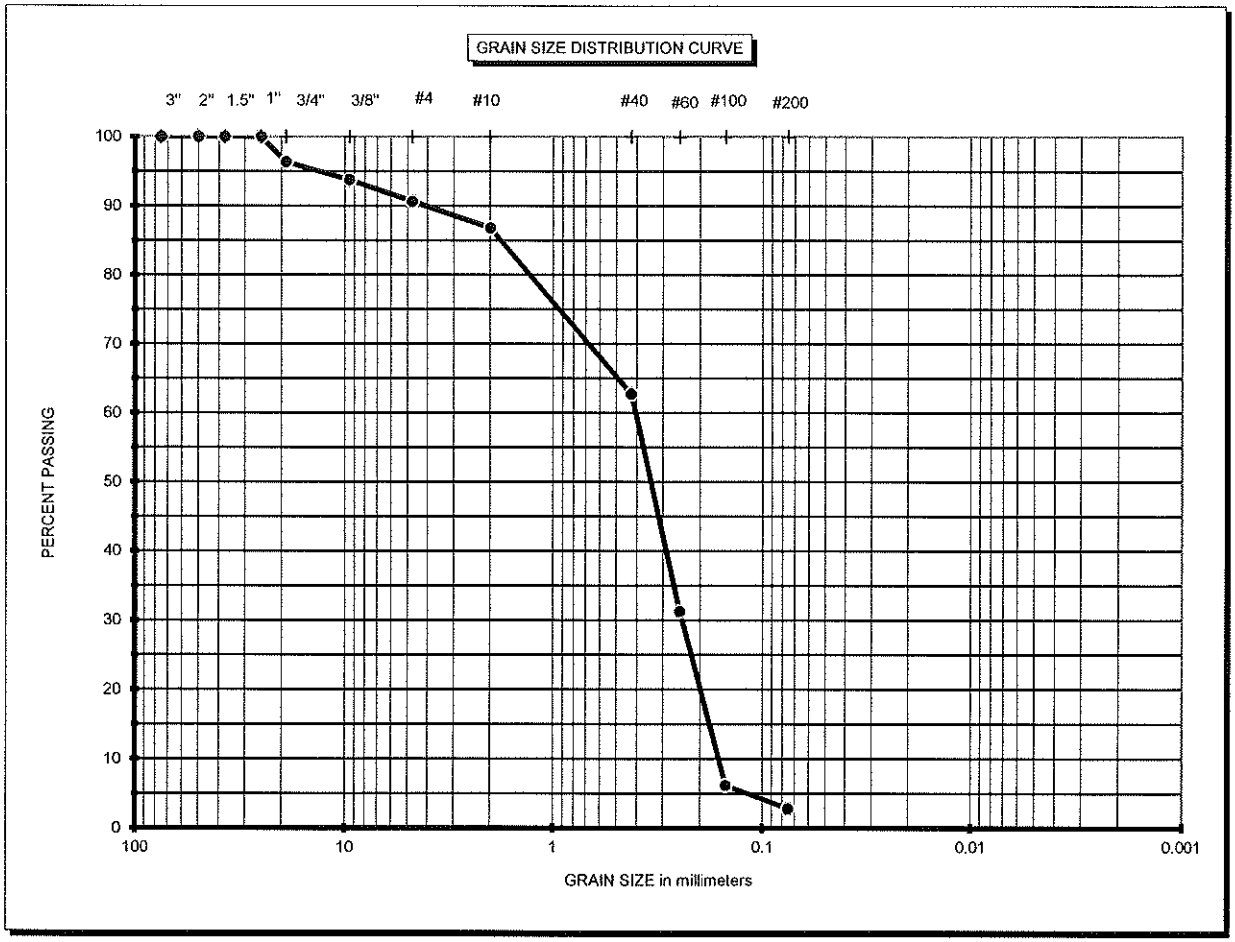
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

tierra SOUTH FLORIDA

GRAIN SIZE DATA SHEET

PROJECT NAME: I-95 Over Snake Creek Canal **DATE:** 12/27/2011

PROJECT #: 7111-11-297



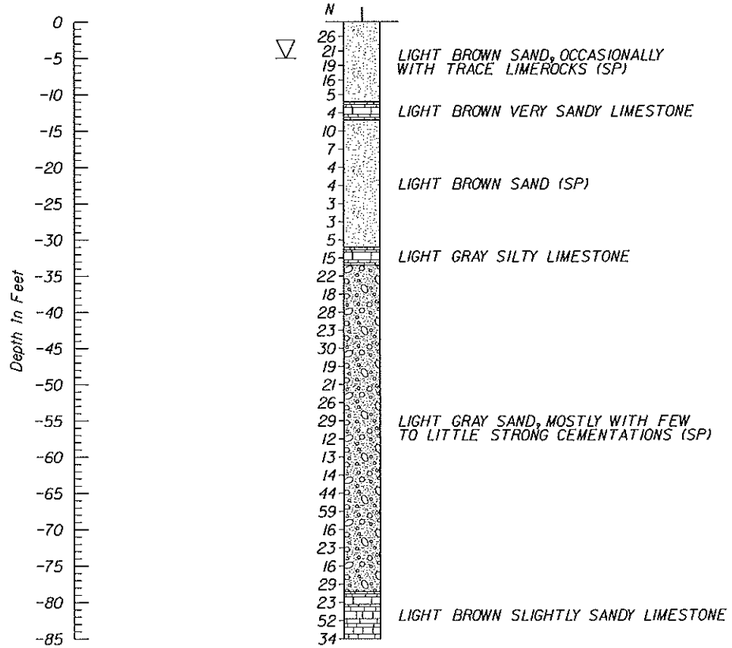
ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # Canal **OFFSET (ft)** _____ **DEPTH (ft):** At the Bottom

SOIL CLASSIFICATION: SP

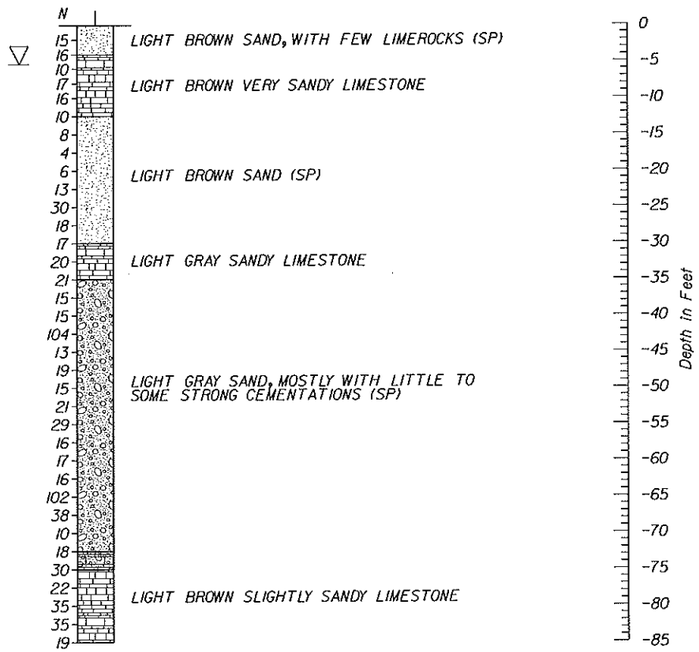
ATTERBERG LIMIT (- #40 Material)
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX

BOR # BSC-1
STA. 81+18.42
OFF. 73.56' LT
ELEV. N/A
DATE 12/22/2011
HAMMER Safety
RIG CME-55
NORTHING 587397.7176
EASTING 923821.0697

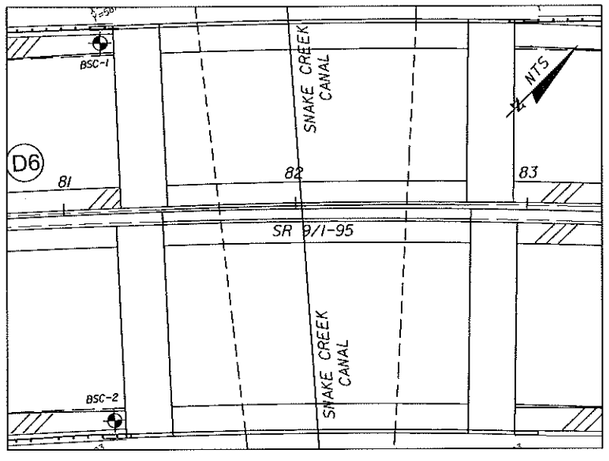


Boring Terminated at Depth -85ft

BOR # BSC-2
STA. 81+18.03
OFF. 88.44' RT
ELEV. N/A
DATE 12/22/2011
HAMMER Auto
RIG CME-45
NORTHING 587301.4380
EASTING 933951.3585



Boring Terminated at Depth -85ft



Asphalt
Sand
Limestone
Gravelly Sand

NOTES:

▽ ENCOUNTERED WATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION. (UNLESS OTHERWISE NOTED.)

MC=	NATURAL MOISTURE CONTENT (%)
-200=	FINES PASSING #200 SIEVE (%)
OC=	ORGANIC CONTENT (%)
LL=	LIQUID LIMIT (%)
PI=	PLASTICITY INDEX (%)
NP=	INDICATES NON-PLASTIC
WOH=	WEIGHT OF HAMMER

STRATA BOUNDARIES ARE APPROXIMATE AND MAY VARY BETWEEN OR AWAY FROM BORING LOCATIONS.

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA.	1.375 Inches
SPOON OUTSIDE DIA.	2.0 Inches
AVG. HAMMER DROP	30.0 Inches
HAMMER WEIGHT	140.0 pounds

SPT CONSISTENCY CHART

SILTS AND CLAYS

CONSISTENCY	SAFETY HAMMER SPT N-VALUE (BLOW/FOOT)	AUTOMATIC HAMMER SPT N-VALUE (BLOW/FOOT)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 - 4	1 - 3
FIRM	4 - 8	3 - 6
STIFF	8 - 15	6 - 12
VERY STIFF	15 - 30	12 - 24
HARD	GREATER THAN 30	GREATER THAN 24

SPT DENSITY CHART

GRANULAR MATERIALS

RELATIVE DENSITY	SAFETY HAMMER SPT N-VALUE (BLOW/FOOT)	AUTOMATIC HAMMER SPT N-VALUE (BLOW/FOOT)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 - 10	3 - 8
MEDIUM	10 - 30	8 - 24
DENSE	30 - 50	24 - 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE:

SUPERSTRUCTURE:

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

DRAWN BY:	NG 1-12
CHECKED BY:	NM 1-12
DESIGNED BY:	NM 1-12
CHECKED BY:	RK 1-12

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01

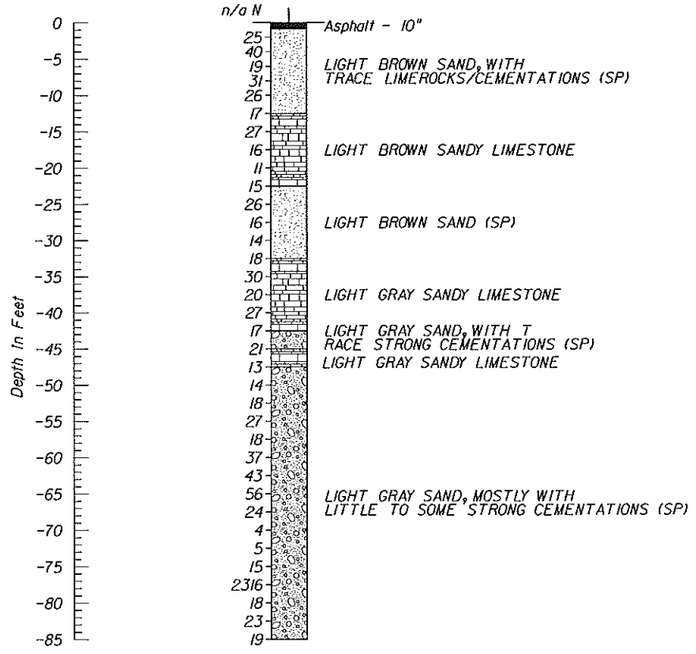
SHEET TITLE: REPORT OF CORE BORINGS

REF. DWG. NO.:

PROJECT NAME: I-95 OVER SNAKE CREEK CANAL

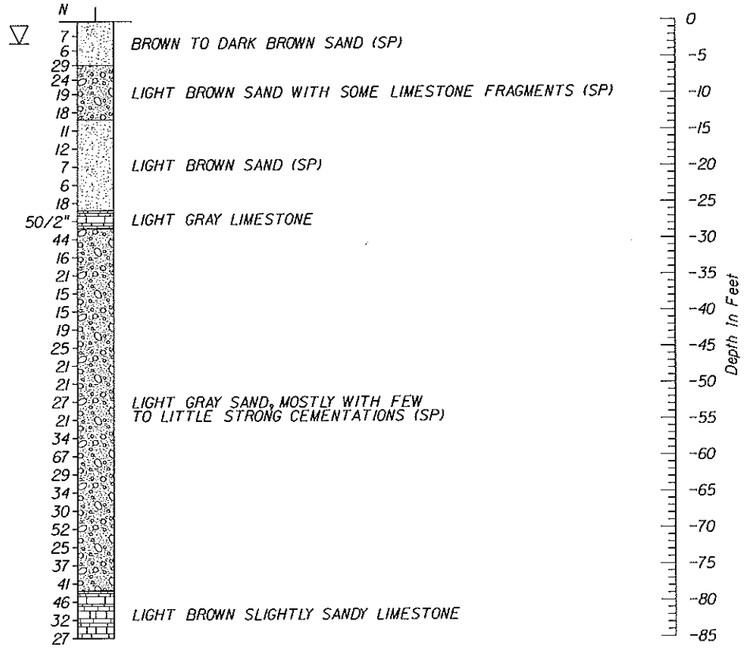
SHEET NO.:

BOR # BSC-4
STA. 84+00
OFF. 75.00' LT
ELEV. N/A
DATE 1/9/2012
HAMMER Auto
RIG CME-45
NORTHING 587554.5613
EASTING 923929.1127

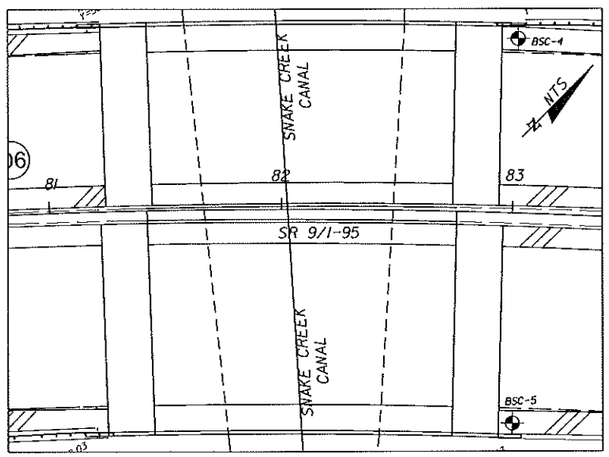


Boring Terminated at Depth -85ft

BOR # BSC-5
STA. 84+03
OFF. 90.00' RT
ELEV. N/A
DATE 12/21/2011
HAMMER Auto
RIG CME-45
NORTHING 587441.3908
EASTING 924063.3406



Boring Terminated at Depth -85ft



Asphalt

Sand

Limestone

Gravelly Sand

NOTES:

▽ ENCOUNTERED WATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION. (UNLESS OTHERWISE NOTED.)

MC=	NATURAL MOISTURE CONTENT (%)
-200=	FINES PASSING #200 SIEVE (%)
OC=	ORGANIC CONTENT (%)
LL=	LIQUID LIMIT (%)
PI=	PLASTICITY INDEX (%)
NP=	INDICATES NON-PLASTIC
WOH=	WEIGHT OF HAMMER

STRATA BOUNDARIES ARE APPROXIMATE AND MAY VARY BETWEEN OR AWAY FROM BORING LOCATIONS.

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA.	1.375 Inches
SPOON OUTSIDE DIA.	2.0 Inches
AVG. HAMMER DROP	30.0 Inches
HAMMER WEIGHT	140.0 pounds

SPT CONSISTENCY CHART

SILTS AND CLAYS

CONSISTENCY	SAFETY HAMMER SPT N-VALUE (BLOW/FOOT)	AUTOMATIC HAMMER SPT N-VALUE (BLOW/FOOT)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 - 4	1 - 3
FIRM	4 - 8	3 - 6
STIFF	8 - 15	6 - 12
VERY STIFF	15 - 30	12 - 24
HARD	GREATER THAN 30	GREATER THAN 24

SPT DENSITY CHART

GRANULAR MATERIALS

RELATIVE DENSITY	SAFETY HAMMER SPT N-VALUE (BLOW/FOOT)	AUTOMATIC HAMMER SPT N-VALUE (BLOW/FOOT)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 - 10	3 - 8
MEDIUM	10 - 30	8 - 24
DENSE	30 - 50	24 - 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE:

SUPERSTRUCTURE:

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

DRAWN BY: NG 1-12
CHECKED BY: RM 1-12
DESIGNED BY: RM 1-12
CHECKED BY: RK 1-12

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01

SHEET TITLE: REPORT OF CORE BORINGS

REF. DWG. NO.

PROJECT NAME: I-95 OVER SNAKE CREEK CANAL

SHEET NO.

Appendix C Sizing Riprap at Abutments

APPENDIX

SIZING ROCK RIPRAP AT ABUTMENTS

NOTE: Design Guideline 14 of HEC-23 outlines the sizing of rock riprap for abutments. The following are the additional protection measures taken for this bridge.

Riprap sizing is done for the 100-Year Design Storm Event.

CASE A

Froude Number > 0.80 (from Abutment Scour Computations, HEC-23). Use the following relationship:

$D_{50} = (K / (S_s - 1)) \times (V^2 / g\ y)^{0.14} \times y$ … Equation 14.1 (DG14.6 HEC23)

CASE B

Froude Number ≤ 0.80 (from Abutment Scour Computations, HEC-23). Use the following relationship:

$D_{50} = (K / (S_s - 1)) \times (V^2 / g\ y) \times y$ … Equation 14.2 (DG14.6 HEC23)

Where. V = characteristic average velocity in the contracted section (feet / second)

S_s = specific gravity of riprap (2.65)

g = 32.2 feet / second^2

y = depth of flow in the contracted bridge opening (feet)

K = 1.02 for vertical wall abutment and 0.89 for a spill-through abutment.

Step 1 - If SBR (set-back length / average channel flow depth) > 5, characteristic average velocity in the contracted section (Q/A) is computed for the overbank section flow only. If SBR < 5, compute characteristic average velocity based on the entire contracted area through the bridge opening.

Left Bank Length =	ft
Depth of Flow =	ft
SBR =	
Right Bank Length =	ft
Depth of Flow =	ft
SBR =	

Since there is no set-back distance fro the bridge abutment, based on the geometry and the 100yr design flow, SBR < 5 for both abutments

Computations below are based on the entire contracted area through the bridge opening. The same stone will be placed at BOTH abutments.

		Channel	
Depth of flow in the contracted bridge opening =		17.74	feet
Flow area in main channel =		1619.18	sq ft
Channel flow =		4200.00	cfs
V =		3.48	ft/s
FR = V / (g x y) ^{½} =		0.15	
D_{50} =		**0.26**	feet

use 250-yr data from 2012 report
flow comparable to 250-yr storm

Froude Number < 0.80. Use the following equation:

$D_{50} = (K / (S_s - 1)) \times (V^2 / g\ y) \times y$

K = 0.89 Spill-through abutment

Provide Rubble Riprap D_{50} = 6 inches based on FDOT Standard Sizes.

Step 2 - Determine riprap extent and layout

1. The apron at the toe of the abutment should extend along the entire length of the toe of abutments and wingwalls.
2. The apron should extend from the toe of the abutment into the bridge waterway at a distance equal to twice the flow depth (max 25ft).

   2 x flow depth = 35.5 ft **Provide 25 feet on both sides**
3. Riprap mattress thickness = 2.5 ft (FDOT Standard Specification 530)
4. The apron should extend for a minimum length of 35 feet beyond the bridge on either side.

Provide rubble Riprap 2.5 feet thick over filter fabric Type D-2.

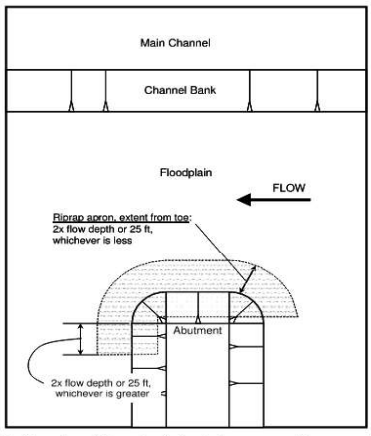
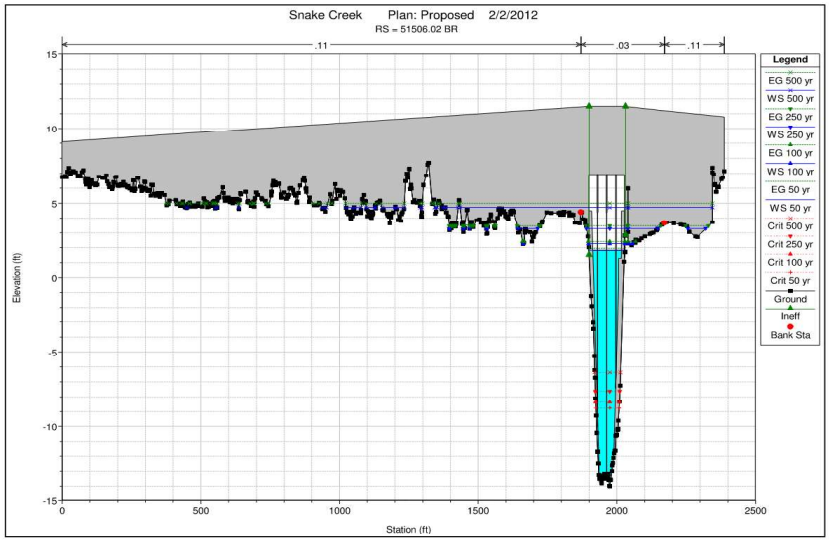


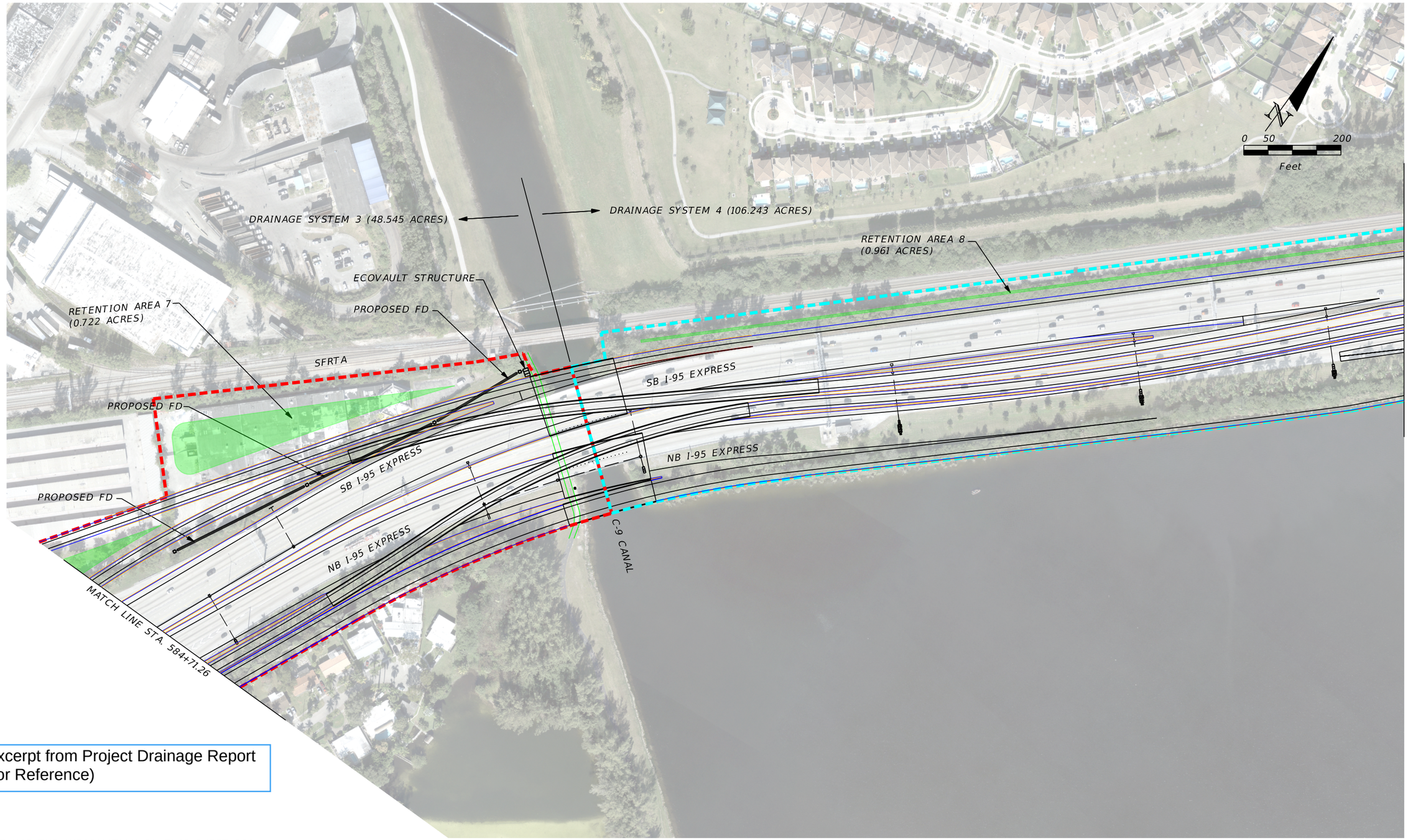
Figure 14.7. Plan view of the extent of rock riprap apron (Lagasse et al. 2006).

BRIDGE OUTPUT Profile #250 yr

E.G. US. (ft)	3.48	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	3.37	E.G. Elev (ft)	3.47	3.14
Q Total (cfs)	4200.00	W.S. Elev (ft)	3.29	2.94
Q Bridge (cfs)	4200.00	Crit W.S. (ft)	-7.62	-7.93
Q Weir (cfs)		Max Chl Dpth (ft)	17.28	17.74
Weir Sta Lft (ft)		Vel Total (ft/s)	3.48	3.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	1208.38	1191.91
Weir Submerg		Froude # Chl	0.18	0.18
Weir Max Depth (ft)		Specif Force (cu ft)	9373.02	9281.65
Min El Weir Flow (ft)	11.50	Hydr Depth (ft)	11.97	11.86
Min El Prs (ft)	6.91	W.P. Total (ft)	192.32	191.32
Delta EG (ft)	0.36	Conv. Total (cfs)	203798.8	199884.3
Delta WS (ft)	0.38	Top Width (ft)	100.98	100.47
BR Open Area (sq ft)	1619.18	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.52	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.17	0.17
Br Sel Method	Momentum	Power Total (lb/ft s)	0.00	0.00



Appendix D Preliminary Proposed Bridge Plan



Excerpt from Project Drainage Report (for Reference)

DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 5

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$