HYDRAULIC REPORT

PROJECT ROUTE:	Interstate 55 (Stevenson Expressway)
SECTION:	n/a
LIMITS:	Station 360+00 to Station 362+00
WATERWAY CROSSING:	West Branch Sawmill Creek
MUNICIPALITY/COUNTY:	Darien/DuPage County
JOB NUMBER:	P-91-762-10
EXISTING STRUCTURE NO.:	n/a
PROPOSED STRUCTURE NO.:	n/a

Prepared for:

Illinois Department of Transportation
201 West Center Court
Schaumburg, Illinois 6019-1096
Job No. P-91-762-10

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CBBEL Project No. 11-0203.00001

FINAL
February 2017

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SECTION 1

NARRATIVE

SECTION 1

NARRATIVE

A. PROJECT DESCRIPTION

The Illinois Department of Transportation (IDOT) is preparing a Preliminary Engineering and Environmental Study (Phase 1) for the Interstate 55 (I-55) Managed Lanes Project. The project study area includes the I-55 corridor (Stevenson Expressway) from I-355 to I-90/94 at the east.

This project is proposed to add one managed lane in each direction within the existing median of the expressway. The term 'Managed Lanes' includes the implementation of travel lanes for High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), Congestion Pricing, as well as other concepts to improve the overall flow of traffic. This project has been identified in the Chicago Metropolitan Area for Planning (CMAP) Go To 2040 Plan as a priority project.

This report requested by the Illinois Department of Transportation is to evaluate the existing culvert structure carrying Interstate 55 (Stevenson Expressway) over West Branch Sawmill Creek located in DuPage County, Illinois. The subject box culvert is a 5' (W) X 4' (H) single reinforced concrete box culvert located between Cass Avenue and Lemont Road and crosses I-55 approximately 2400 feet west of Cass Avenue. The total drainage area to the culvert is approximately 0.75 square miles. Refer to Exhibit 4.1 for a General Location map and Exhibit 4.2 for the USGS Hydraulic Atlas.

B. DESCRIPTION OF EXISTING STRUCTURE AND FLOODPLAIN

SITE DESCRIPTION

The upstream limit of the study is located approximately 1500' north of the I-55 crossing. West Branch Sawmill Creek (West Branch) passes through an open dense vegetated area in Darien, Illinois. West Branch flows under three structures upstream of the subject I-55 crossing. The first structure is a 3.5' diameter RCP culvert under a golf course access path, approximately 800' upstream of the subject structure. Approximately 150' downstream of the access drive is an old concrete weir, also located on the golf course. This structure was modeled as an inline weir in the regulatory WSP-2. Based on site survey and photographs, West Branch now completely bypasses the weir structure, which no longer functions as a weir. The old weir is now modeled as part of a cross section. Approximately 250' downstream of the old weir, West Branch flows through a 5' (W) X 4' (H) single box culvert crossing beneath North Frontage Road. Refer to Exhibit 4.1 for the general project location.

Downstream of I-55, the Creek begins to slightly meander through unincorporated DuPage County. The model extends an additional 1000' downstream of the subject structure via

surveyed cross sections and another 2000' via regulatory cross sections. Approximately 1000' downstream of the crossing West Branch merges with Wards Creek.

In general the floodplain is constantly comprised of densely vegetated floodplain with a well-defined open channel. Refer to Section 5 for photos of the floodplain and structures.

STRUCTURE DESCRIPTION

The structure carrying I-55 over West Branch Sawmill Creek was originally constructed as part of Project F.A.I. Route 3 Section 22-2 Project I-03-6(7), the construction of the multi-lane expressway currently referred to as I-55, in 1957. Historic plan excerpts are provided in Section 8.

The existing structure is a cast-in-place reinforced concrete box culvert designated as a special culvert. The overall length of the existing structure is shown to be 232' measured from face of headwall to face of headwall. The opening dimensions are 5'-0" wide x 4'-0" high.

The culvert is not skewed to the roadway and carries three (3) 12'-0" travel lanes, a 19-0" inside shoulder, and an 11'-0" outside shoulder in each direction of I-55. In addition, the culvert carries the adjacent South Frontage Road over West Branch. The frontage road is comprised of a 2-lane section with shoulders.

FLOODPLAIN DESCRIPTION

At the I-55 crossing, West Branch Sawmill Creek drains approximately 0.75 square miles of area and the watershed is comprised mainly of open land and residential land. The West Branch channel is found to be between 20' and 40' in width and has a fairly consistent cross section throughout the study limits. There is a mapped Federal Emergency Management Agency (FEMA) floodplain for West Branch, extending upstream and downstream of the subject crossing. There is no floodway at the I-55 crossing over West Branch, but upstream of the North Frontage Road there is regulatory floodway.

Downstream of I-55 and upstream of North Frontage Road, the West Branch floodplain is mapped as Zone AE by FEMA with defined base flood elevations. Between I-55 and North Frontage Road the floodplain is mapped as Zone A without defined base flood elevations. The Flood Insurance Rate Map (FIRM) Panels No. 17043C0908H and No. 17043C01002H for DuPage County, Illinois and Incorporated Areas, effective December 16, 2004 are included in Section 4 as Exhibit 4.3.

C. FIELD OBSERVATIONS

West Branch Sawmill Creek field survey was performed by CBBEL in December 2012. The stream banks are composed of some vegetation along with some exposed rocks. The streambed consists of exposed dirt, with very little rock or stone protecting the streambed from erosion. Refer to Section 5 for a Photograph Location Map and Photos.

Both upstream and downstream of the crossing the floodplain is comprised of dense brush, with a well-defined channel.

D. HISTORICAL OBSERVATIONS/RECORDS

There are no records of flooding on the I-55 pavement at the West Branch Sawmill Creek. However, pavement flooding was reported nearby at I-55 and Cass Avenue during the July 1990, June 1993, and June 1996 storm events. This flooding appears unrelated to West Branch. Pavement flooding records are included in Section 20.

The 1966 Hydrologic Investigations Atlas, HA-149 (Sag Bridge), prepared by the United States Geological Survey in cooperation with the Northeastern Illinois Metropolitan Area Planning Commission, does not have any flood profiles for West Branch. Therefore, there is no recorded all-time high profile for West Branch Sawmill Creek. Based on the HA-149 mapping, the historic 1961 flood did not overtop I-55, and based on contour intervals, the historic flood elevation is approximately 695 feet (NGVD 29). The HA is provided as Exhibit 4.2 in Section 4.

There are no current and functioning stream gages located in the project area. Stream gage USGS 05533400 SAWMILL CREEK NEAR LEMONT, IL is identified to be the only gage found on Sawmill Creek and is well outside of the project vicinity. The drainage area at the gage is 13.00 square miles, whereas the drainage area at the project location is 0.75 square miles.

The following documents were utilized in developing this report:

- *USGS Hydrologic Atlas HA-149, Sag Bridge* Quadrangle, Illinois, 1967.
- Flood Insurance Study for DuPage County, Illinois and Incorporated Areas, 17043CV000A, March 2007.
- Flood Insurance Rate Map for DuPage County, Illinois and Incorporated Areas, Panel No. 17043C0908H, effective December 16, 2004.
- Flood Insurance Rate Map for DuPage County, Illinois and Incorporated Areas, Panel No. 17043C1002H, effective December 16, 2004.

E. OTHER STUDIES & AFFECTED AGENCIES

The Federal Emergency Management Agency (FEMA) Flood Insurance Map (FIRM) numbers 17043C0908H and 17043C01002H for DuPage County, Illinois and Incorporated Areas encompass

the areas upstream and downstream of this crossing. According to these maps the surrounding area directly upstream of this culvert is mapped as Zone A Floodplain and the area downstream is mapped as a Zone AE Floodplain associated with Wards Creek. The FIRM has been provided as Exhibit 4.3.

The FEMA study WSP-2 hydraulic modeling was completed in the 1970s and did include the I-55 crossing on West Branch Sawmill Creek.

F. DATUM CORRELATION

A stream survey was conducted by CBBEL in winter of 2012 with cross sections taken along West Branch. These cross sections were used in the HEC-RAS existing conditions model. Exhibit 9-1 in Section 9 shows the cross section locations and topography along the entire length of the hydraulic modeling. The North American Vertical Datum 1988 (NAVD 88) was used as the basis for the CBBEL survey, topographic mapping, and the hydraulic models used in this report.

The FIS referenced in this report is in NAVD 88, however the original FEMA WSP-2 regulatory model cross-sections were in National Geodetic Vertical Datum of 1929 (NGVD 29). In order to use the information found in the FIS model, a conversion factor of -0.28 feet from NGVD 29 to NAVD 88 was applied. All elevations cited in this report and used in said models have been corrected for this factor. Datum conversion, from the NOAA VERTCON website calculations, have been provided in Section 18.

G. SENSITIVE FLOOD RECEPTORS

Based on the regulatory FEMA data, modeled floodplain, and topographic maps there do not appear to be any sensitive flood receptors upstream of the subject crossing.

H. HYDROLOGIC METHODOLOGY

The source hydrology and hydraulic model was taken from the current FEMA Flood Insurance Study (FIS) for DuPage County, No. 17403CV000H. The FEMA regulatory model titled “DARIEN FLOOD INSURANCE STUDY”, prepared by Harza Engineering Company (WSP2 format), dated 1977, is cited to be the underlying analysis referenced in the published FIS. The design discharges identified in the WSP2 model are the regulatory discharges correlated with the published FIS flows and are used as part of the analysis. The flows utilized in the model for West Branch are shown in the following table.

HEC-RAS Cross Section	Peak Discharge				
	10-Year	50-Year	100-Year	500-Year	OT
11	149	245	290	420	276
10	178	290	345	495	326
0.1	478	780	923	1290	871

Table H-1 Summary of Discharges

I. HYDRAULIC METHODOLOGY

The model titled "DARIEN FLOOD INSURANCE STUDY" as prepared by Harza Engineering Company (WSP-2 format), dated 1977, is considered to be the regulatory model. This model was used as the baseline information for this study, as well as the source of flows and starting water surface elevations. It should be noted that the published FIS study limits appear to be at the North Frontage Road, yet the source WSP-2 model extends downstream of this point. The published FIS profile does not include the crossing at I-55, but the WSP-2 model does.

A Table comparing the existing conditions water surface elevations between the published FIRM, the WSP-2 model, and the surveyed cross sections is provided at the beginning of Section 13.

The WSP-2 water surface elevations at cross section 0.1 located downstream of the confluence of West Branch with Wards Creek were originally used as the starting water surface elevations (WSEs) for this study. However, when using this location for the starting WSEs, the computed 100-year flood elevation upstream near surveyed cross section 1 was significantly lower than the mapped elevation shown on the FIRM. Therefore, a copy of cross section 1 (named cross section 0.15) was placed at the confluence of the West Branch Sawmill Creek with Wards Creek, and the starting water surface elevations were taken from the Wards Creek flood profile at the confluence. Only the 10- and 100-year flood elevations were published, so these were used to interpolate/extrapolate the 50- and 500-year WSEs. Using this location for the starting WSEs had a slight effect on the tailwater elevations at I-55, but no impact on the WSEs upstream of I-55. The FIS Wards Creek flood profiles and interpolation/extrapolation spreadsheet are provided at the beginning of Section 13.

The ineffective areas at the culverts use the standard ratio of 1:1 for contraction and a computed ratio of 2:1 for expansion based on the guidance in the HEC-RAS Hydraulic Reference Manual, Appendix B, given approximately b/B = 0.25, nob/nc = 1, and a slope shallower than 1'/mile. The expansion ratio of 2:1 is at the conservative end of the range. The applicable table from Appendix B is provided at the beginning of Section 13. Ineffective area limits were determined based on guidance found in Chapters 5 and 6 of the HEC-RAS Hydraulic Reference Manual.

The computed flood profiles go supercritical at surveyed cross section 2 and near critical at surveyed cross section 11. To allow the program to calculate both subcritical and supercritical profiles, the mixed flow regime was selected for computation. The upstream boundary conditions for the supercritical run were the known water surface elevations from the WSP-2 model at cross section 11.5.

An independent evaluation of Manning's 'n' roughness coefficient values for the channel and floodplain was completed for areas that appear to have changed since the FEMA model was prepared. Manning's n-values for the channel and adjacent floodplain were determined based on photographs, aerial photos, survey notes, and field observations. Base values for 'n' were adjusted using the FHWA methodology presented in Chapter 5 of the IDOT Drainage Manual, as follows:

$$n = (n_b + n_1 + n_2 + n_3 + n_4)*m.$$

Typical Channel

The typical main channel consists of a mixture of silt and light rocks, and has minor irregularities, alternates occasionally, negligible obstructions, small vegetation, and minor meandering. Therefore,

$$n = (0.025 + 0.005+ 0.003 + 0.004 + 0.005)*(1) = 0.042$$

Wooded Floodplain

The floodplain consisting of large overgrowth has minor irregularity, minor obstructions, and dense vegetation. Therefore,

$$n = (0.025+ 0.002+ 0 + 0.02 + 0.033)*(1) = 0.08$$

Paved Surface

The floodplain that consists of a paved surface, no overgrowth, has no irregularity, negligible obstructions, and no vegetation. Therefore,

$$n = (0.015+ 0.00+ 0.000 + 0.000 + 0.000)*(1) = 0.015$$

There are five (5) plans included in the HEC-RAS model submitted. A list of the plans, including whether they are used in the WIT, is provided below:

- FIS WSP2 conversion – This plan is a straight duplicate of the FIS WSP2 model in NGVD29. This plan was not used in the WIT.
- FIS WSP2 conversion NAVD88 – The FIS WPS2 conversion plan was converted to NAVD88 for comparison purposes.
- Existing CBBEL – This is the Existing plan, based on a combination of the FIS cross sections, the surveyed CBBEL cross sections, and using the starting WSE of the FIS model cross

section SMD03 approximately 2077' downstream in Wards Creek. It was not used in the WIT.

- Ex CBBEL Start WSEL– This plan was created to better represent the starting water surface elevations at the confluence of West Branch with Wards Creek. A copy of cross section 1, named cross section 0.15, was placed at the confluence. The starting water surface elevations were taken from the Wards Creek FIS flood profiles at the confluence with West Branch Sawmill Creek. This model was used as the existing conditions for the WIT.
- Natural CBBEL Start WSEL- The natural conditions plan used for the WIT based on Ex CBBEL Start WSEL.

J. SUMMARY OF EXISTING CONDITIONS HYDRAULIC ANALYSIS - DESIGN

The FEMA regulatory WSP2 model was duplicated in HEC-RAS (HEC-RAS Plan FIS WSP2 conversion), and converted to NAVD 88 datum (HEC-RAS Plan FIS WSP2 conversion NAVD88). A new HEC-RAS plan, titled Existing CBBEL, includes corrected reach lengths, updated roadway profiles, the surveyed creek cross sections, culvert geometry, and additional upstream bridges/culverts. Site investigation reveals that the old weir located between cross sections 7 and 8 has been bypassed by the West Branch and is no longer effective. It was previously modeled as a weir in the FIS WSP2. Based on site photos and survey, the creek has meandered its way around the weir. Therefore, the old weir is now modeled as part of standard cross section 7.5. The DuPage County 2' contour interval topographic mapping was used to extend the surveyed cross sections at certain locations. For the Existing CBBEL plan, three FIS cross sections remain in use, including the downstream starting cross section on Wards Creek. Other FIS cross sections were located near the faces of the structures, and were replaced by the newly surveyed cross sections. Comparison tables including the cross section names and locations, and calculated flood elevations, are provided in Section 13. For all modeled flood events, the updated flood profiles are higher than the FIS profiles. The locations of the surveyed cross sections and the FIS cross sections are shown on the Cross Section Location Map in Section 9. The plan Existing CBBEL is provided on the CD.

To better represent the starting water surfaces, elevations at the confluence of West Branch and Wards creeks were interpolated. A plan titled EX CBBEL Start WSEL was created using this starting water surface with an additional cross section 0.15, which is a duplicate of cross section 1 copied to the confluence. This plan EX CBBEL Start WSEL was used as the basis of the existing conditions plan for the WIT.

This independent HEC-RAS design analysis serves as the basis of the design and evaluation of the IDOT design criteria. No Permit model is necessary. HEC-RAS input and output for the EX CBBEL Start WSEL plan are provided in Section 13.B.

K. SUMMARY OF NATURAL CONDTIONS HYDRAULIC ANALYSIS - DESIGN

An independent HEC-RAS plan, titled Natural CBBEL Start WSEL, was created to reflect the natural profile of the stream. The geometry information for the culvert carrying I-55 and the ineffective areas of the upstream and downstream cross sections were removed from the Existing Conditions model in order to calculate the natural water elevations for the Waterway Information Table. The water surface elevations at the upstream face of the I-55 culvert are taken from HEC-RAS cross section 4, a surveyed cross section.

The input data and results of the HEC-RAS plan Natural CBBEL are provided in Section 13.C. Digital versions of these plans are also contained on the CD in Section 21.

L. PROPOSED STRUCTURE ANALYSIS

The proposed scope of the I-55 Managed Lanes project does not call for the reconstruction of the expressway and does not allow for the existing structure to be replaced as part of this project. No culvert repair recommendations were provided by IDOT, as the existing culvert is only 5' (W) x 4' (H). IDOT's Bureau of Maintenance does not inventory or inspect culverts of that size. Email correspondence regarding this finding is included in Section 20.

As there will be no change to the hydraulic characteristics of the culvert, no proposed structure hydraulic analysis is necessary. To meet the IDOT freeboard requirements, potential future improvements at this crossing include replacing the existing culvert with a larger structure, or providing an additional structure next to the existing culvert. See narrative Section P for further discussion on freeboard.

M. SCOUR ANALYSIS

As a concrete culvert with a concrete bottom, scour analysis for the structure is not required. According to the surveyed streambed profile, there is a scour hole present at the downstream end of the I-55 culvert. Also, site photos reveal that the existence of erosion behind the wingwall on the upstream side of the culvert. The results of the existing conditions plan show high outlet velocities from the culvert, 16 fps for the 10-year flood event. These high velocities contribute to the creation of the scour hole on the downstream side.

It is recommended that the embankment behind the wingwall on the upstream side be repaired and the affected area be armored with riprap or other such material. The condition of the wingwall and surrounding area should be monitored against continued erosion. On the downstream side, it is recommended that the scour hole be repaired and the channel armored

using scour countermeasures such as a lined apron or energy dissipation structure. The condition of the downstream channel should be monitored against continued scour.

N. COMPENSATORY STORAGE

West Branch Sawmill Creek has no regulatory floodway, and the tributary drainage area is under 1 square mile. No compensatory storage is required.

O. PERMIT REQUIREMENTS

Since the West Branch Sawmill Creek drainage area is under 1 square mile, no IDNR-OWR floodway construction permit is required.

P. FREEBOARD/CLEARANCE

The IDOT Drainage Manual dated July 2011 states that a flood frequency of 50 years should be used for design purposes. The 50-year Design High Water Elevation (HWE) is shown on the Waterway Information Table located in Section 2.

Freeboard is the distance from the Design HWE to the lowest edge of pavement of the roadway within the floodplain. IDOT freeboard policy requires a minimum freeboard distance of 3 feet. Since detailed roadway cross sections are not available, the DuPage County 2'-contour interval topographic mapping was used to determine the approximate low edge of pavement. The low edge of pavement is at approximately elevation 698.0, and the 50-year HWE is 697.62, providing only 0.38' of freeboard. Therefore, the roadway does not meet the IDOT criteria for freeboard.

The roadway also does not meet the IDOT criterion for overtopping. The existing I-55 overtopping elevation was determined from the existing southbound centerline profile provided by Stantec. The 100-year HWL is 698.4, while the overtopping elevation is 698.17, resulting in the roadway being overtopped for the 100-year event. The method used to determine the overtopping return period is as follows: Various discharges were iteratively input into HEC-RAS to determine the overtopping discharge of 302 cfs. Once the overtopping discharge was determined, it was input into a regression equation to determine its return frequency, which is calculated as the 52-year discharge as shown on the spreadsheet in Section 6. The overtopping elevation is closer to the 100-year elevation because once the water overtops the road, the flow spreads out across the approximately 250' wide sag and the elevation increases slowly per added discharge. The overtopping frequency year is listed as < 100 on the WIT is Section 2.

IDOT has no reported roadway flooding events at this location. The proposed scope of the I-55 Managed Lanes project does not allow for the existing structure to be replaced as part of this project. In order to meet the IDOT freeboard requirements without the need for a roadway profile adjustment, potential future improvements at this crossing include replacing the existing

culvert with a larger structure, or providing an additional structure next to the existing culvert. The existing structure causes a significant increase (8.0') in head for the 50 -year storm. Additional opening area is anticipated to reduce the created head which would help provide the required freeboard. It should be noted that if additional opening area is added to help with freeboard, the potential impacts downstream would have to be considered.

The IDOT requirement for 2' of clearance between the design natural HWL and the low beam elevation is not applicable to culverts. Therefore a clearance analysis was not performed.

Q. CONCLUSION

The existing condition hydraulic analysis concludes that the existing culvert carrying I-55 over the West Branch Sawmill Creek does not meet the IDOT requirements for design freeboard or overtopping. The proposed scope of the I-55 Managed Lanes project does not call for the reconstruction of the expressway and does not allow for the existing structure to be replaced as part of this project. Potential future improvements to meet IDOT requirements include structure replacement, or providing an additional structure next to the existing culvert.

No structural repairs to the culvert have been recommended at this time, as IDOT has not inspected the structure. Inspection is recommended. Installation of erosion protection and scour countermeasures are recommended at each end of the culvert. No floodway construction permit is required, as the drainage area to the site is less than 1 square mile.

Tab 2

SECTION 2

WATERWAY INFORMATION TABLES AND SUPPORTING CALCULATIONS

Illinois Department of Transportation

Culvert Waterway Information Table

Route:	Interstate 55	Existing SN:	n/a
Waterway:	West Branch Sawmill Creek	Proposed SN:	
Section:	I-355 to I-94	Prepared by: EMB	Date: 08/5/2016
County:	DuPage County	Checked by: IAD	Date: 02/09/2017

Drainage Area = 0.75 square miles

Existing Overtopping Elev. = 698.17 at Sta. 4805+50 (SB Centerline)

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	178	11	-	689.2	3.9	-	693.1	-
Design	50	290	13	-	689.6	8.0	-	697.6	-
Base	100	345	14	-	689.8	8.6	-	698.4	-
Scour Design Check	-	-		-			-	-	-
Overtop Existing	< 100	302	13	-	689.6	8.6	-	698.2	-
Overtop Proposed	-	-		-			-	-	-
Max. Calc.	500	495	16	-	690.2	8.4	-	698.6	-

Datum: NAVD 88

All-Time H.W.E. & Date: ~695 (NGVD29) September 1961

Surveyed Normal Water Level: 687.22 ft.

10-Year Velocity through Existing Structure = 16 ft/s

10-Year Velocity through Proposed Structure = - ft/s

2-Yr. Flow Rate = ~112 ft^3/s

EXISTING STRUCTURE

Type:	Reinforced Concrete Box Culvert
Length/Width:	L-232.74 ft. 5.0'(W) x 4.0'(H)
# Spans/Cells:	1
Low Chord:	n/a
Skew:	0° (relative to road)
Clearance:	n/a
Bridge Flow Line:	- (u/s) - (d/s)
Low E.O.P:	698.00
Freeboard:	0.38'
Culvert Inverts:	U/S-686.93 D/S 683.12

PROPOSED STRUCTURE

Culvert Type:	
Length Of Span:	
# Cells:	
Top Of Crown Elev.: Beam:	
Skew:	(relative to road)
Culvert Invert Elev.:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

EXISTING EMBEDMENT

Depth:	n/a
U/S Streambed Elev.:	-
D/S Streambed Elev.:	-

PROPOSED EMBEDMENT

Depth:	-
U/S Streambed Elev.:	-
D/S Streambed Elev.:	-

NOTE: THERE ARE NO PROOPSED MODIFICATIONS TO THE EXISTING CULVERT.

ROUTE: I-55 MADE BY: EMB DATE: 8/5/2016

WATERWAY: West Branch Sawmill Creek CHECKED BY: IAD DATE: 8/25/16

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

CALCULATE CREATED HEAD AND HEADWATER ELEVATION

Frequency	Natural H.W.E. (ft) [1]		Greatest Created Head Upstream of Culvert from Summary Tables (ft) [2]		Headwater Elevation at U/S Face of Structure (ft) [2A]	
	U/S Face of Structure	Approach Section (XS 4)	Existing	Proposed	Existing	Proposed
10-year	688.8	689.2	3.9	N/A	693.1	N/A
50-year	689.2	689.6	8.0	N/A	697.6	N/A
EXOT	689.3	689.6	8.6	N/A	698.2	N/A
100-year	689.4	689.8	8.6	N/A	698.4	N/A
500-year	689.8	690.2	8.4	N/A	698.6	N/A

1. The natural highwater elevation is the water surface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

2. The created head is calculated at the cross section upstream of the bridge/culvert which has the greatest difference between the natural and proposed conditions. This method of calculating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative.

2A. Headwater elevations = the natural highwater elevation + the created head. (In this case, the I-55 culvert creates a level pool situation upstream. To accurately reflect the headwater elevations, the headwater elevation is calculated as the natural H.W.E. @ approach section XS 4 + the created head.)

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft) [3]			
Existing	Station	Proposed	Station
4805+00	698.00	n/a	n/a
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
n/a	n/a	n/a	n/a
Existing Freeboard (ft) [4]			
10-Year	**50-Year**	**100-Year**	**500-Year**
4.93	**0.38**	**-0.38**	**-0.60**
Proposed Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
n/a	n/a	n/a	n/a
Proposed Vertical Clearance (ft) [5]			
10-Year	50-Year	100-Year	500-Year
n/a	n/a	n/a	n/a

3. Low road elevation is calculated at the EOP and on the low side of the roadway.

4. Freeboard is calculated from the 50-yr design headwater elevation to the proposed edge of pavement in the floodplain.

5. Vertical clearance is calculated from the natural high water elevation to the low chord elevation.

ROUTE: I-55 MADE BY: EMB Rev. DATE:8/5/2016

WATERWAY: West Branch Sawmill Creek CHECKED BY: IAD DATE: 08/25/16

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS *(Continued)*

CALCULATE EXISTING EFFECTIVE WATERWAY OPENING AREA

Frequency	Flowline	Natural WSE at XS 4	Depth of Flow in Culvert (ft.)	Width of Culvert (ft.)	Area below Nat. WSE (sft.)
10-year	686.93	689.2	2.26	5	11
50-year	686.93	689.6	2.66	5	13
EXOT	686.93	689.6	2.70	5	13
100-year	686.93	689.8	2.82	5	14
500-year	686.93	690.2	3.24	5	16

Culvert is a 5' (W) x 4' (H) RCBC

SUMMARY TABLE COMPARING 10-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural Condition WSE	Existing Condition WSE	WSE Difference
11.5	714.22	714.22	0.00
11	711.85	711.85	0.00
10.5	711.61	711.61	0.00
10	711.51	711.51	0.00
9.1	CULVERT		
9	703.45	703.45	0.00
8	701.99	701.99	0.00
7.5	700.86	700.86	0.00
7	701.11	701.11	0.00
6	701.11	701.11	0.00
5.1	CULVERT		
5	691.83	693.07	1.24
4	689.19	693.07	3.88
3.1	CULVERT		
3	684.23	684.22	-0.01
2	679.96	679.96	0.00
1	679.22	679.22	0.00
0.15	679.00	679.00	0.00

SUMMARY TABLE COMPARING 50-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural Condition WSE	Existing Condition WSE	WSE Difference
11.5	714.70	714.70	0.00
11	712.49	712.49	0.00
10.5	712.19	712.18	-0.01
10	712.00	711.98	-0.02
9.1	CULVERT		
9	705.60	703.94	-1.66
8	705.65	703.35	-2.30
7.5	705.66	703.37	-2.29
7	705.67	703.43	-2.24
6	705.66	703.42	-2.24
5.1	CULVERT		
5	692.42	697.61	5.19
4	689.59	697.62	8.03
3.1	CULVERT		
3	684.99	684.99	0.00
2	680.07	680.07	0.00
1	679.64	679.64	0.00
0.15	679.40	679.40	0.00

SUMMARY TABLE COMPARING 100-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural Condition WSE	Existing Condition WSE	WSE Difference
11.5	714.90	714.90	0.00
11	712.75	712.75	0.00
10.5	712.53	712.39	-0.14
10	712.31	712.14	-0.17
9.1	CULVERT		
9	708.11	706.48	-1.63
8	708.09	706.58	-1.51
7.5	708.09	706.58	-1.51
7	708.09	706.59	-1.50
6	708.10	706.58	-1.52
5.1	CULVERT		
5	692.68	698.34	5.66
4	689.75	698.38	8.63
3.1	CULVERT		
3	685.30	685.29	-0.01
2	680.12	680.12	0.00
1	679.90	679.90	0.00
0.15	679.70	679.70	0.00

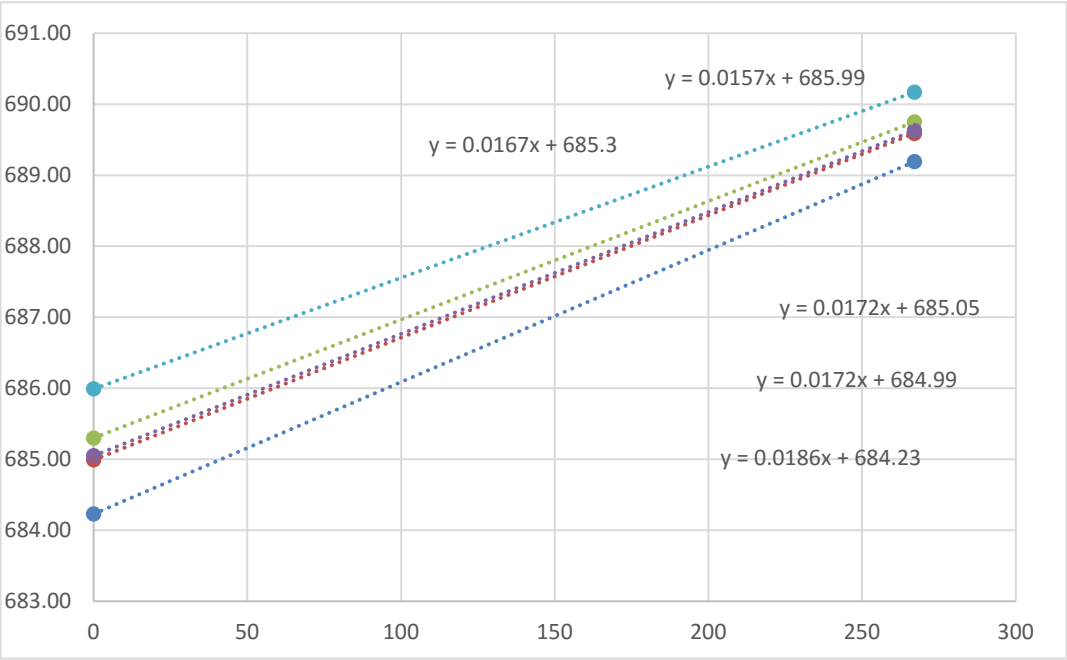
SUMMARY TABLE COMPARING 500-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural Condition WSE	Existing Condition WSE	WSE Difference
11.5	715.46	715.46	0.00
11	713.34	713.34	0.00
10.5	713.02	713.04	0.02
10	712.63	712.66	0.03
9.1	CULVERT		
9	708.59	708.46	-0.13
8	708.57	708.44	-0.13
7.5	708.57	708.44	-0.13
7	708.58	708.45	-0.13
6	708.58	708.45	-0.13
5.1	CULVERT		
5	693.23	698.53	5.30
4	690.17	698.60	8.43
3.1	CULVERT		
3	685.99	685.98	-0.01
2	680.25	680.25	0.00
1	680.24	680.24	0.00
0.15	680.00	680.00	0.00

SUMMARY TABLE COMPARING EX-OT NATURAL TO EXISTING WSE			
Cross Section	Natural Condition WSE	Existing Condition WSE	WSE Difference
11.5	714.76	714.76	0.00
11	712.56	712.56	0.00
10.5	712.25	712.22	-0.03
10	712.04	712.00	-0.04
9.1	CULVERT		
9	706.20	704.54	-1.66
8	706.27	704.47	-1.80
7.5	706.28	704.48	-1.80
7	706.28	704.50	-1.78
6	706.28	704.49	-1.79
5.1	CULVERT		
5	692.48	698.19	5.71
4	689.63	698.21	8.58
3.1	CULVERT		
3	685.05	685.05	0.00
2	680.08	680.08	0.00
1	679.79	679.79	0.00
0.15	679.60	679.60	0.00

Interpolate NHWE US Face of Existing Structure

Cross Section	4	3	Interpolated U/S Face
Distance to XS 3	267	0	244.63
10 Year	689.19	684.23	688.78
50 Year	689.59	684.99	689.20
EX OT	689.63	685.05	689.26
100 Year	689.75	685.30	689.39
500 Year	690.17	685.99	689.83

XS 4 to U/S face



PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

FILE NAME =
N:\Idot\110203.00001\CADD_Sheets\P110203-sht-detail10_1_natflow.dgn
Default

USER NAME = eburke
PLOT SCALE = $SCALE$
PLOT DATE = 9/9/2016

DESIGNED - EB
DRAWN - MYG
CHECKED - IAD
DATE - 9/9/2016

REVISED -
REVISED -
REVISED -
REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

NATURAL FLOW AREAS
I-55 OVER WEST BRANCH SAWMILL CREEK

SCALE: 1"=40' SHEET OF SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

Tab 3

SECTION 3

HYDRAULIC REPORT DATA SHEETS AND CHECKLIST

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	Interstate 55	P or D #	P-91-762-10
Section	I-355 to I-94	PTB #	158-002
County	DuPage		
Exist SN	n/a		
Prop SN	n/a		

General Information

1. Name of the Stream: West Branch Sawmill Creek

2. Location of the Structure: NW ¼ of the NE ¼ of Section 34, Township 37N, Range 11E of the 4 P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd.
☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

Site Design Data

5. Drainage Area (sq. mi.): 0.75

6. Highway Classification:
☐ Rural ☒ Principal Arterial
☒ Urban ☐ Minor Arterial
☐ Other ☐ Collector
☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
If more than one, explain:
The FIS model included the subject structure. The WIT is for the design model incorporating current survey into the FIS model.

Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☒ FIS ☐ Gage Data
☐ Other

10. Hydraulic Modeling (check all that apply):
a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
If no, explain:
c. Source of Starting WSE: FIS
d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
If yes, are they accounted for? ☒ Yes ☐ No
e. Does the Tailwater Control? ☐ Yes ☒ No
If yes, list:

f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 2 (X:1)
Contraction 1 (X:1)

IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:
September 1961 HWL estimated at approximately 695 (NGVD 29) from Hydrologic Investigations Atlas for Sag Bridge Quadrangle, 1966.

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☐ Floodway
☒ None ☐ Other

Proposed Structure Data

16. Project Scope (check all that apply): Existing culvert to remain.
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒Culvert
e. ☐ New Alignment
f. Work Planned Below Q_{100} HWE? ☒ Yes ☐ No Minor repairs recommended.
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft): N/A
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☒ No ☐ NA Value (ft): 0.38'

21. Type of streambed soil : ☐ Clay ☒ Silt ☐ Sand ☐ Loam ☐

22. Scour/ Migration Problems: ☐ None/Minimal ☒ Significant ☐ Severe
Comments: Scour holes at upstream (1.0') and downstream (2.0') ends of culvert.

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed: Repair upstream embankment erosion, install scour countermeasures.

Existing Structure Data

		N. Frontage Road Structure U/S	Interstate 55 Subject Structure	Confluence With Wards Creek
23.	Distance from proposed structure: (ft.)	240	0.	1000'
24.	Type of structure:	5'x4' RCBC	5'x4' RCBC	No Structure
25.	Low beam elevation:	N/A	N/A	No Structure
26.	Flow line elevation:	694.97	686.93	~676
27.	Maximum known high water elevation:	~695	~695	~675
28.	Date of maximum high water:	Sept. 1961	Sept. 1961	Sept. 1961
29.	Cause (backwater, headwater, etc.):	N/A	N/A	N/A
30.	Does structure carry entire design flood flow?	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No
	If not, state area of additional waterway opening: (ft^2)	N/A	N/A	No Structure
31.	Type and size of existing overflow structures:	N/A	N/A	No Structure
32.	Has adverse scour occurred under or adjacent to the structure?	Yes	Yes	No Structure
33.	Classify type of scour and/or aggradation / degradation:	Culvert I/O Velocity	Culvert I/O Velocity	No Structure

Required Additional Data

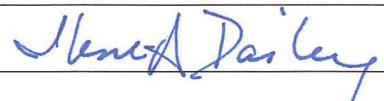
34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:
N/A

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:
N/A

36. Site Inspection made by: Christopher B Burke Engineering Ltd Date: November 2013

Remarks:
Inspected by Edmund Burke.

37. Prepared by: Edmund M. Burke Date August 5, 2016

Signed (QA/QC):  Date August 25, 2016

Hydraulic Report Checklist

The District or Consultant should complete the following checklist before submitting the Hydraulic Report for approval.

1. ☒ Title Page
2. ☒ Table of Contents
3. ☒ Narrative - (as outlined in Section 2-601.01 Item #3)
4. ☒ Waterway Information Table (WIT) - (as outlined in Section 2-601.01 Item #4)
5. ☒ Hydraulic Report Data Sheets
6. ☒ Location Map - should show the subject structure along with nearby location defining landmarks (cities, roads, highways, etc.)
7. ☒ USGS Hydraulic Investigation Map (District 1 only)
8. ☒ Photographs - (Minimum: U/S & D/S Structure Faces, Up & Down Channel, Up & Down Roadway Across Structure)
9. ☒ Hydrology (map and calculations)
10. ☒ Streambed Profile
11. ☒ Roadway Profile (existing and proposed)
12. ☒ Cross Section Plots - with plan layout preferably overlayed upon an aerial photo with the contours
13. ☒ Bridge Opening Plots
14. ☒ Natural Condition Analysis
15. ☒ Existing Condition Analysis
16. ☐ Proposed Condition Analysis

When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

17. ☐ Scour Analysis – Existing and Proposed Conditions
18. ☐ Compensatory Storage Calculations (if required)
19. ☒ Survey Notes (if available, No Electronic Point Files)
20. ☒ Correspondence Notes
21. ☒ CD with Project Files (Include pdf copy of the Hydraulic Report)

Tab 4

SECTION 4

LOCATION MAP
USGS HYDROLOGIC INVESTIGATIONS ATLAS
REGULATORY FLOOD MAP

0 500 1,000 2,000
Feet
1 inch = 1,000 feet

ACCESS DRIVE CULVERT

NORTH FRONTAGE ROAD CULVERT

WEIR #1

WEST BRANCH SAWMILL CREEK (TRIB. #4)
STA. 361+34

CLIENT:
ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:
GENERAL LOCATION DRAINAGE MAP
WEST BRANCH SAWMILL CREEK (TRIB. #4)
SAG BRIDGE QUADRANGLE
BASE MAP (USGS) 1973

PROJ. NO.	110203.00001
DATE:	5/8/2013
SHEET	1 OF 1
DRAWING NO.	**EXH 4.1**

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500

DSGN.			SCALE:	1:12,000
DWN.			AUTHOR:	MDH
CHKD.			PLOT DATE:	8/18/2015
FILE:	WB GLDM			

Path: N:\ldot\110203.00001\GIS\Exhibits\West Branch (Trib #4)\WB GLDM.mxd

0 500 1,000 2,000
Feet
1 inch = 1,000 feet

NORTH FRONTAGE ROAD CULVERT

ACCESS DRIVE CULVERT

WEIR #1

WEST BRANCH SAWMILL CREEK (TRIB. #4)
STA. 361+34

Path: N:\ldot\110203.00001\GIS\Exhibits\West Branch (Trib #4)\WB HADM.mxd

CLIENT:
ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:
USGS HYDROLOGIC INVESTIGATIONS ATLAS
FLOODS IN SAG BRIDGE QUADRANGLE
HA-149
WEST BRANCH SAWMILL CREEK (TRIB. #4)

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500

DSGN.			SCALE:	1:12,000
DWN.			AUTHOR:	MDH
CHKD.			PLOT DATE:	8/18/2015
FILE:	WB HADM			

PROJ. NO. 110203.00001
DATE: 5/8/2013
SHEET 1 OF 1
DRAWING NO.

EXH 4.2

0 250 500 1,000
Feet
1 inch = 500 feet

ACCESS DRIVE CULVERT

WEIR #1

NORTH FRONTAGE ROAD CULVERT

WEST BRANCH SAWMILL CREEK (TRIB. #4)
STA. 361+34

HEC-RAS
XS 0.1

ZONE AE
ZONE X
ZONE A
West Branch Sawmill Creek
Wards Creek
Culvert #5
Culvert #4
Culvert #3
Culvert #2
Culvert
Weir
0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
City of Darien 170750
DuPage County Unincorporated Areas 170197
LIMIT OF DETAILED STUDY
ARGONNE NATIONAL LABORATORY BOUNDARY
SWSW0022
SWSW0021
SWSW0020
SWSW0019
SWSW0018
SWSW0017
SWSW0016
SWSW0015
SWSW0014
SWSW0013
SWSW0012
SWSW0011
SWSW0004
GOLF VIEW DR
PINEHURST DR
PINE COVE CT
BAILEY RD
HINSWOOD DR
CASS AV
CAPTONS LN
HEATHER LN
FOX HILL PL
GLENERYE RD
EVERGREEN LN
WINTERBERRY LN
WILLOW CREEK LN
LAUREL PL
CARRIAGE
COACHMANS RD
THISTLEWOOD LN
ROYAL OAK RD
CARRIAGE GREENS DR
OLD OAK PL
JOLIET RD
N FRONTAGE RD
S FRONTAGE RD
WHITE DEER DR
GLEN RD
91ST ST
NORTHGATE DR
FRONTAGE RD
I 55
55
DuPage

CLIENT: ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE: FLOOD INSURANCE RATE MAP
WEST BRANCH SAWMILL CREEK (TRIBUTARY #4)
DUPAGE COUNTY AND INCORPORATED AREAS
PANELS 0908 & 1002, BASE MAP (FEMA), 2004

PROJ. NO. 110203.00001
DATE: 5/8/2013
SHEET 1 OF 1
DRAWING NO. EXH 4.3

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500

DSGN.			SCALE:	1:6,000
DWN.			AUTHOR:	MDH
CHKD.			PLOT DATE:	8/18/2015
FILE:	WB FRIM			

Path: N:\ldot\110203.00001\GIS\Exhibits\West Branch (Trib #4)\WB FRIM.mxd

Tab 5

SECTION 5

PHOTOGRAPHS

CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:

PHOTOGRAPH LOCATION MAP
WEST BRANCH SAWMILL CREEK (TRIB. #4)

PROJ. NO.	110203.00001
DATE:	5/8/2013
SHEET	1 OF 1
DRAWING NO.	EXH

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500

DSGN.			SCALE:	1:1,800
DWN.			AUTHOR:	MDH
CHKD.			PLOT DATE:	8/24/2015
FILE:	WB PHOTO			

Path: N:\ldot\110203.00001\GIS\Exhibits\West Branch (Trib #4)\WB PHOTO.mxd

Refer to Photograph Location Map for locations of Photos

28. Downstream Face of I-55 Structure Culvert

29. Upstream Face of I-55 Structure Culvert

Refer to Photograph Location Map for locations of Photos

30. Upstream Face of I-55 Culvert

31. Downstream Face of North Frontage Road Culvert

Refer to Photograph Location Map for locations of Photos

32. Upstream face of North Frontage Road Culvert

34. Downstream Face of Weir showing creek bypass

Refer to Photograph Location Map for locations of Photos

35. Photo along Face of Weir

36. Upstream face of Weir showing creek bypass

Refer to Photograph Location Map for locations of Photos

37. Downstream face of Golf Cart Culvert

38.Upstream face of Golf Cart Culvert

Tab 6

SECTION 6

HYDROLOGY

The Federal Emergency Management Agency
in Cooperation with
DuPage County, Illinois Presents:

FLOOD INSURANCE STUDY

A Report of Flood Hazards in:

DUPAGE COUNTY, ILLINOIS AND INCORPORATED AREAS

Prepared, in parts, by:

FEMA
Region V
536 South Clark Street
Chicago, Illinois 60605

and

Nika Engineering
421 Mill Street
Batavia, Illiois 60510

March 2007
1 7043CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: December 4, 1985
Revised Countywide FIS Date: June 16, 2004

Tributary 1					
- at river mile 0.23	2.33	324	*	617	*
Sawmill Creek - Tributary 3					
- at mouth	1.14	241	427	559	960
Sawmill Creek - West Branch					
- at I-55	0.75	178	290	345	495
- near Cass School	0.58	149	245	290	420
- near Bay View	0.42	146	238	285	402

3.6.1.3 Hydraulic Analysis

Analysis of the hydraulic characteristics of flooding from the sources studied was carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

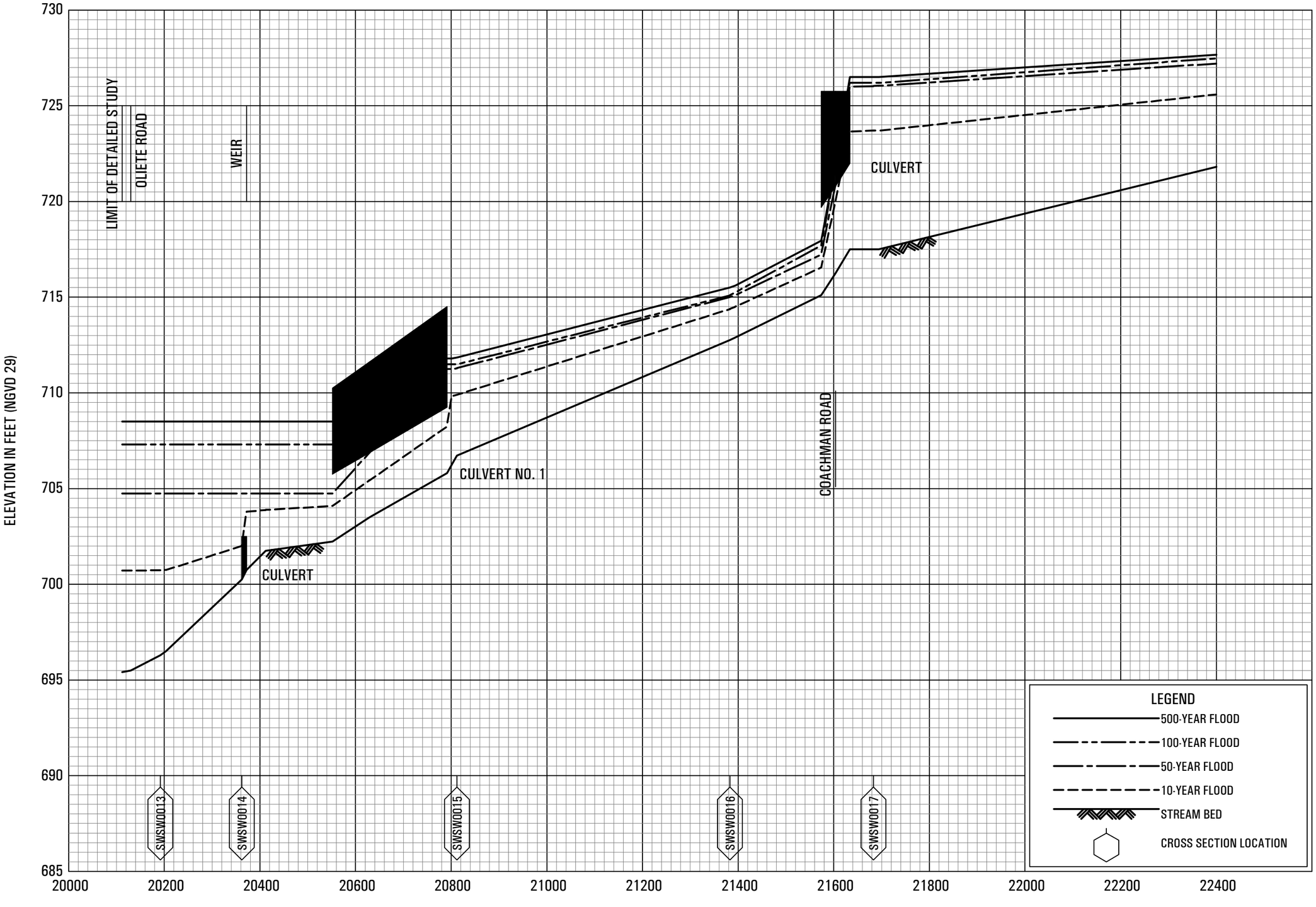
Channel cross-section data were obtained from field surveys. All bridges and culverts were surveyed to obtain elevation data and structural geometry

Locations of selected cross-sections used in the hydraulic analysis are shown on the Flood Profiles and on the Flood Insurance Rate Map.

The water-surface elevations for the streams studied in detail and limited detail were computed using either the SCS WSP-2 backwater computer program or the USACE HEC-2 step-backwater computer program (U.S. Department of Agriculture, 1974; USACE, HEC-2 Water-Surface Profiles, Computer Program723-X6-L202A, 1973). The USACE HEC-2 model was used for all streams studied in detail and limited detail except for Meacham Creek, Sawmill Creek, Salt Creek, Spring Brook, and Westwood Creek, which were modeled utilizing the SCS WSP-2 program (U.S. Department of Agriculture, 1974).

Stream cross-sections and bridge sections for East Branch Sawmill Creek, Sawmill Creek, and West Branch Sawmill Creek were surveyed using land survey techniques. All of the cross sections on Sawmill Creek and the cross sections downstream from 75th Street on East Branch Sawmill Creek were surveyed by the SCS; upstream sections were surveyed by Harza. All sections on West Branch Sawmill Creek were surveyed by Harza.

Water-surface elevations for floods of the selected recurrence intervals were computed using hydraulic models for East Branch Sawmill Creek and Sawmill Creek prepared by the SCS (Des Plaines River Watershed



FLOOD PROFILES

WEST BRANCH SAWMILL CREEK (SWSW)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL

AND INCORPORATED AREAS

141P

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Sawmill Creek (SWSW)								
SWSW0013	20,192[1]	85	572	0.6	707.3	707.3	707.4	0.1
SWSW0014	20,362[1]	60	291	1.2	707.3	707.3	707.4	0.1
SWSW0015	20,812[1]	28	78	4.4	711.5	711.5	711.6	0.1
SWSW0016	21,383[1]	39	70	4.2	715.1	715.1	715.2	0.1
SWSW0017	21,683[1]	57	338	0.9	726.2	726.2	726.3	0.1
SWSW0018	22,630[1]	61	188	1.5	728.4	728.4	728.5	0.1
SWSW0019	22,825[1]	55	161	1.8	729.9	729.9	723.0	0.1
SWSW0020	23,035[1]	88	226	1.3	731.8	731.8	731.9	0.1
SWSW0021	23,315[1]	15	265	1.1	733.2	733.2	733.3	0.1
SWSW0022	23,693[1]	66	85	3.3	734.2	734.2	734.3	0.1
SWSW0023	24,696[1]	53	279	0.4	738.7	738.7	738.8	0.1
SWSW0024	25,116[1]	402	2,131	0.1	738.7	738.7	738.8	0.1
SWSW0025	25,945[1]	29	24	3.4	742.0	742.0	742.1	0.1
SWSW0026	26,679[1]	15	16	5.1	759.0	759.0	759.1	0.1

[1] In feet above confluence with Sawmill Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY

AND INCORPORATED AREAS

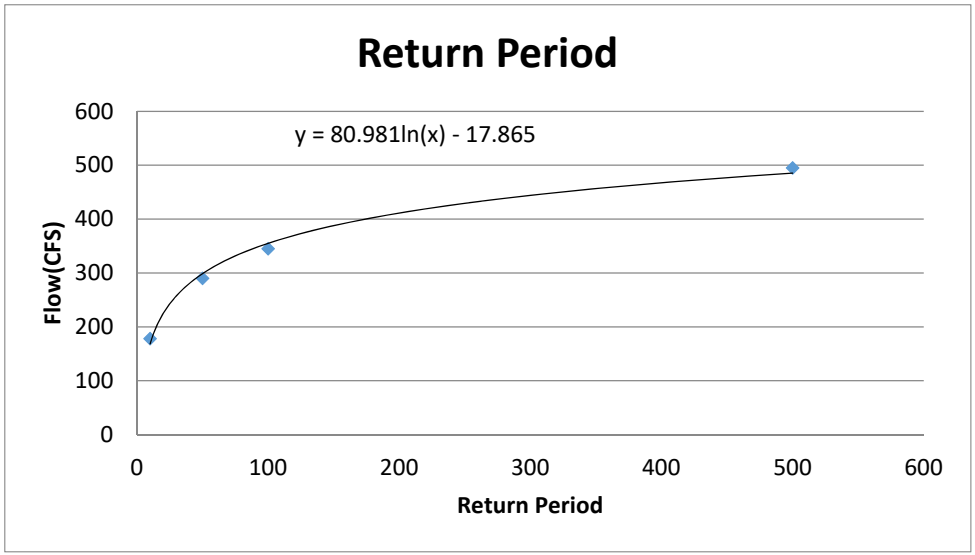
FLOODWAY DATA

WEST BRANCH SAWMILL CREEK (SWSW)

Regression Equation - Solve for 2 year Q for WSAS1C and OVT
I-55 over West Branch Sawmill Creek

Input Data	
Return Period	Actual Q
10	178
50	290
100	345
500	495

Calculated Data			
Return Period	Actual Q	Calculated Q	
2	-	38	
10	178	169	
50	290	299	
100	345	355	
500	495	485	
52	-	302	OVT



NOTES:

Overtopping flow of 302 cfs determined from HEC-RAS by iteration.

By Excel Trendline calculation, x = return period in years, y = flow in cfs: 80.981 ln (52) - 17.865 = 302.

Therefore, overtopping return period = 52 years.

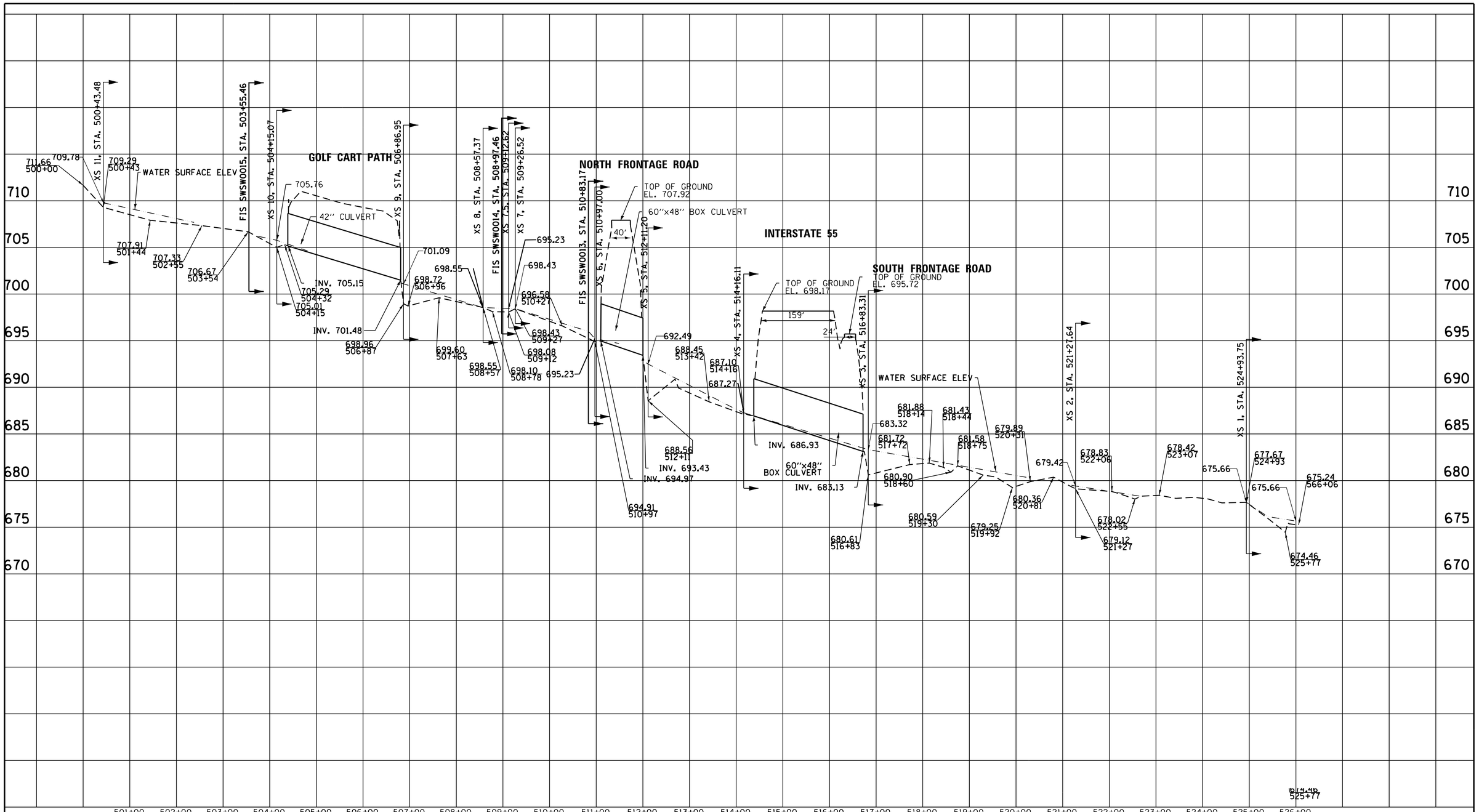
Tab 7

SECTION 7

STREAMBED PROFILE

STREAMBED PLAN AND PROFILE

Please refer to Section 9 for Full sized plan view of Stream bed alignment.



NOTE:
WATER SURFACE ELEVATION AS SURVEYED BY CBBEL DATED: 12-04-12 AND 12-05-12

EXHIBIT 4.5

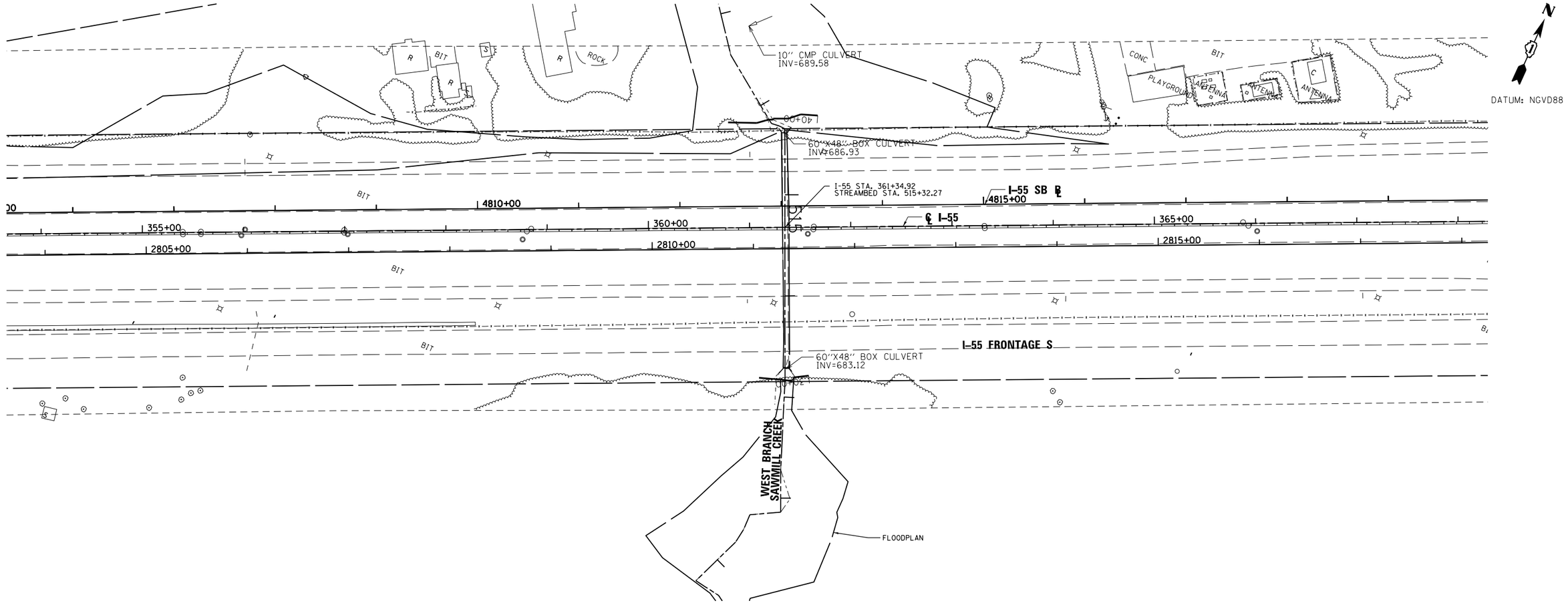
ROUTE INTERSTATE 55
SECTION
WATERCOURSE WEST BRANCH SAWMILL CREEK
EXISTING S.N.
SCALE: 1" = 100' HOR, 1" = 5' VERT
PLOTTED BY: MYG DATE: 8/25/2015
CHECKED BY: EMB DATE: 02/24/16
SURVEY DATE: 12/04/12, 12/5/12

FILE NAME = N:\dot\110203.00001\CADD_Sheets\P1110203-sht-drnpr101.dgn

TAB 8

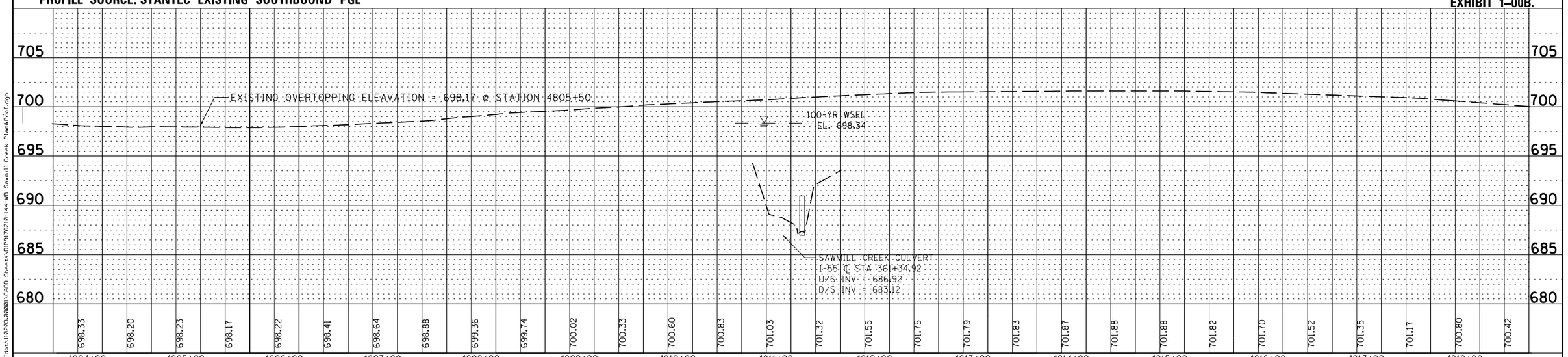
SECTION 8

ROADWAY PLAN AND PROFILE



PROFILE SOURCE: STANTEC EXISTING SOUTHBOUND PGL

EXHIBIT 1-00B.



FILE NAME = N:\Idot\110203.0000\CADD\Sheets\DIP9176210-I44-WB Sawmill Creek Plan&Prof.dgn

Default

I-55 MANAGED LANE PROJECT

USER NAME = eburke	DESIGNED - EDB	REVISED -
	DRAWN - MYG	REVISED -
PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 MANAGED LANE STUDY
WB SAWMILL CREEK – ROADWAY PLAN AND PROFILE

SCALE: 100' | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
$FAI	$SECTION	$COUNTY	82	
		CONTRACT NO. $CONTRACT		
	ILLINOIS FED. AID PROJECT			

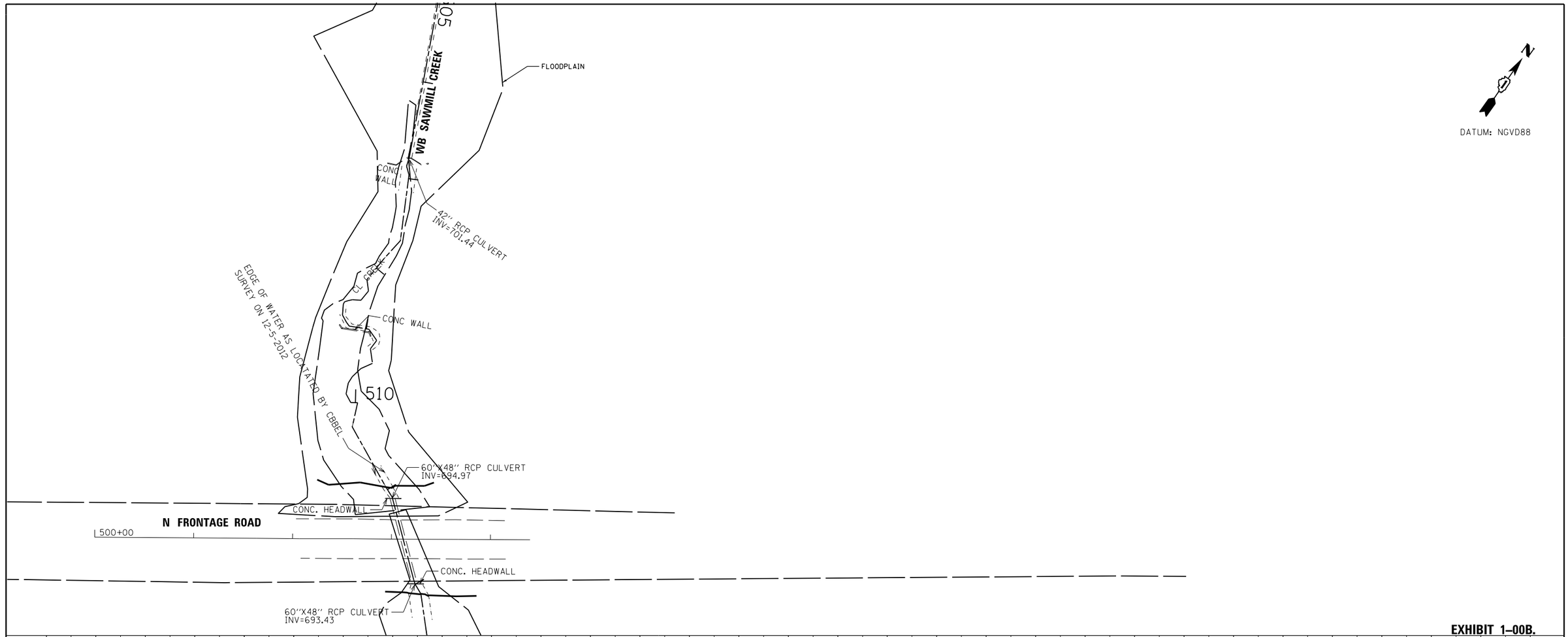
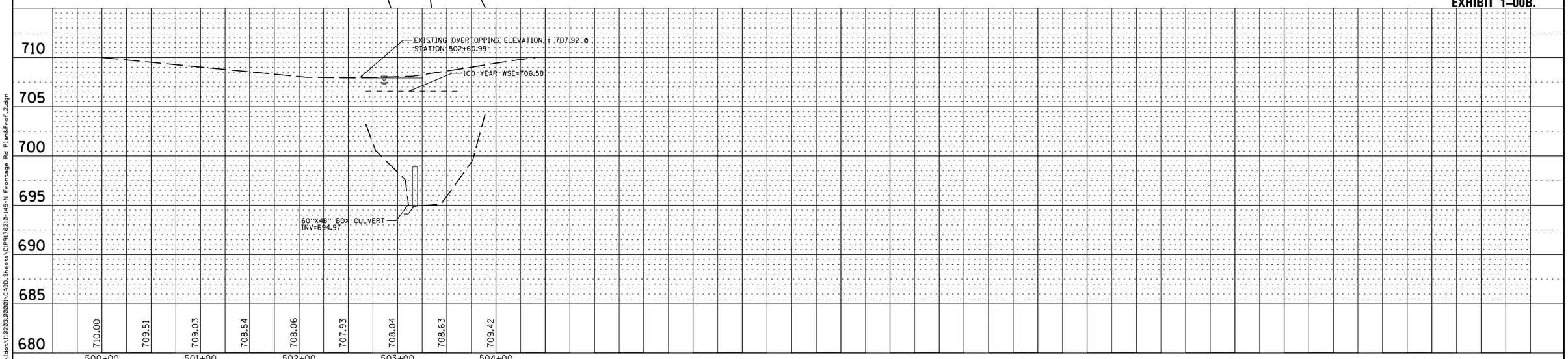


EXHIBIT 1–00B.



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Default

I-55 MANAGED LANE PROJECT

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	DRAWN - MYG	REVISED -
PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 MANAGED LANE STUDY
N FRONTAGE ROAD OVER WB SAWMILL CREEK –
ROADWAY PLAN AND PROFILE

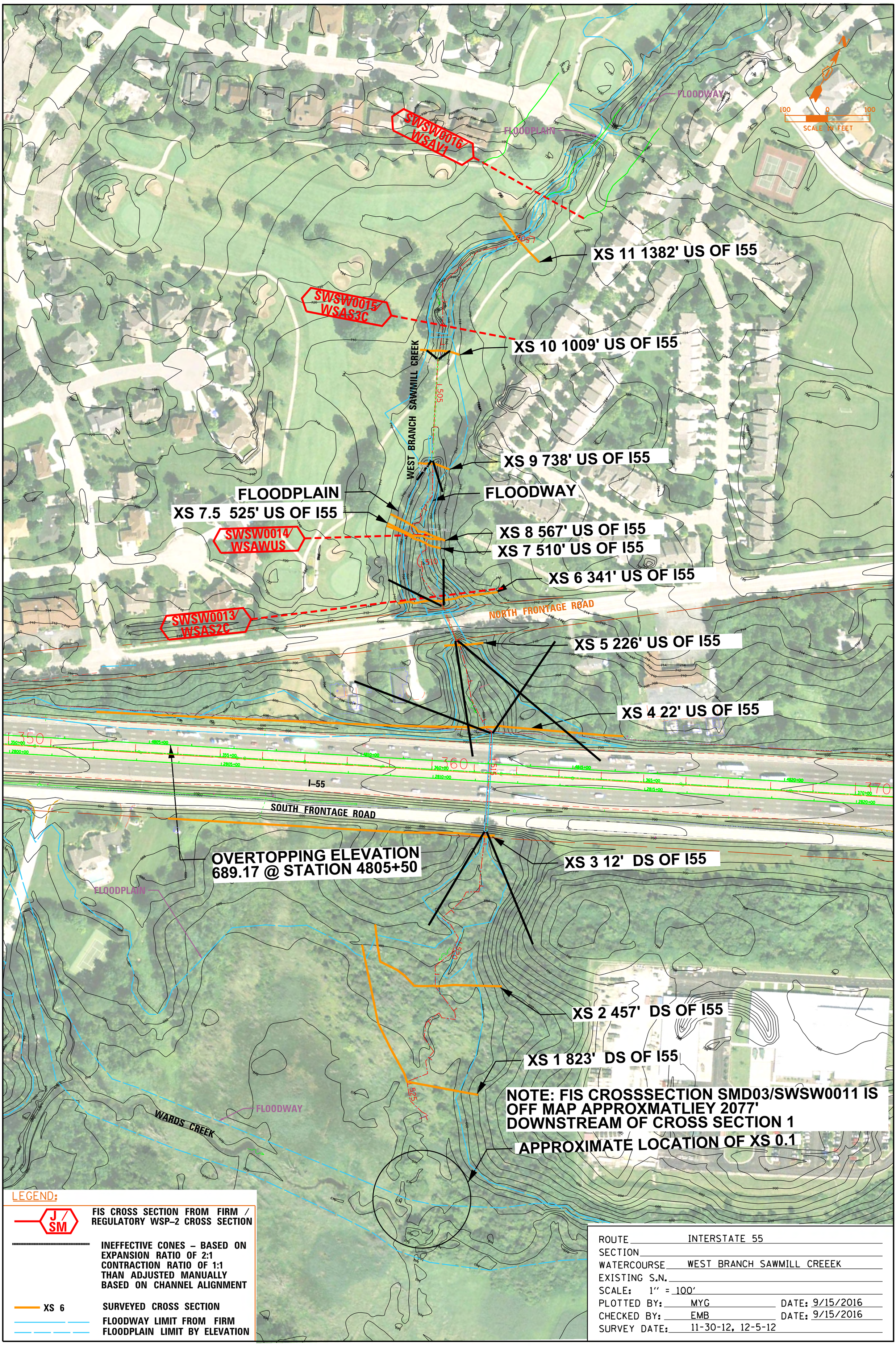
SCALE: 100' | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
$FAI	$SECTION	$COUNTY	82	
		CONTRACT NO. $CONTRACT		
	ILLINOIS FED. AID PROJECT			

TAB 9

SECTION 9

STREAM CROSS SECTION LOCATION MAP
STREAM CROSS SECTION PLOTS



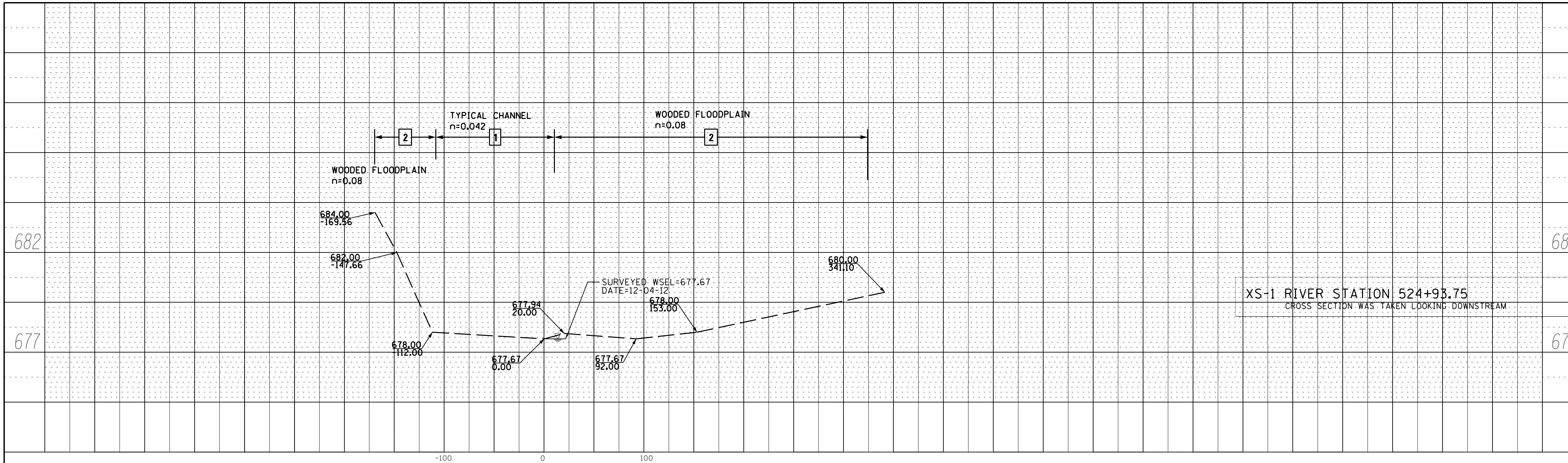
LEGEND:

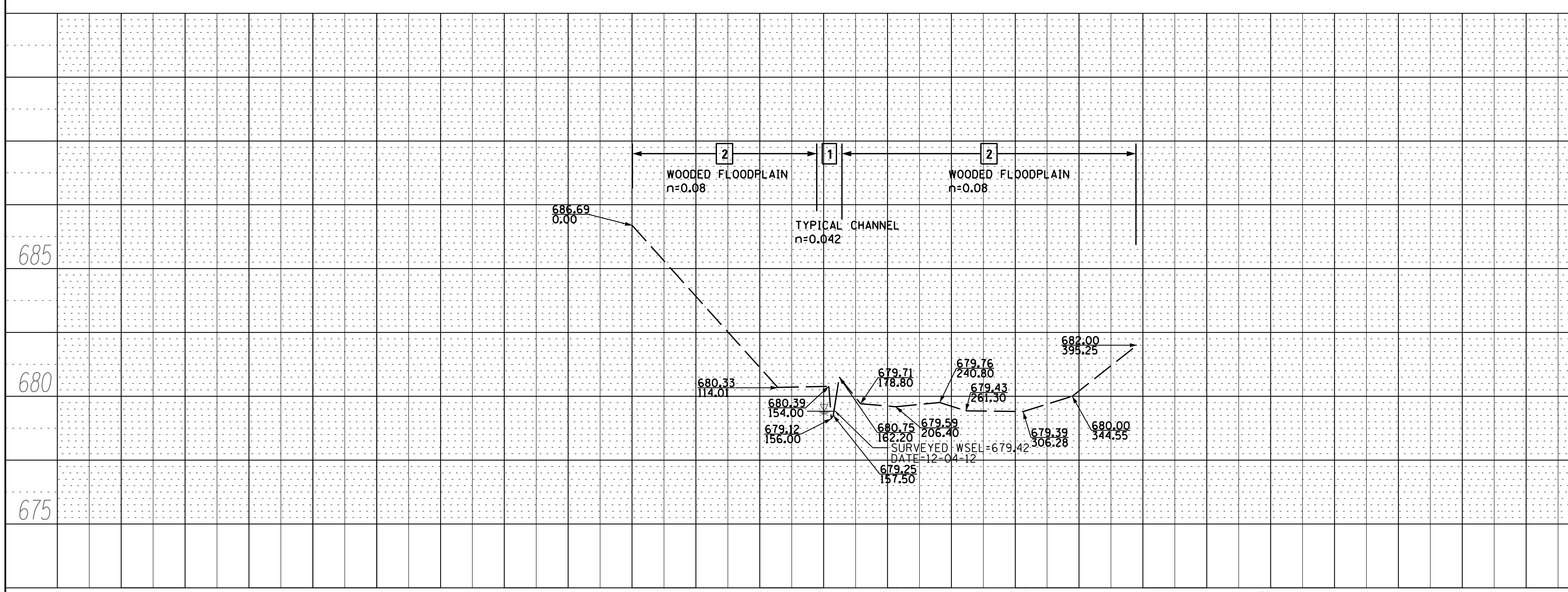
- J/SM — FIS CROSS SECTION FROM FIRM / REGULATORY WSP–2 CROSS SECTION
- INEFFECTIVE CONES – BASED ON EXPANSION RATIO OF 2:1 CONTRACTION RATIO OF 1:1 THAN ADJUSTED MANUALLY BASED ON CHANNEL ALIGNMENT
- XS 6 — SURVEYED CROSS SECTION
- FLOODWAY LIMIT FROM FIRM
- FLOODPLAIN LIMIT BY ELEVATION

ROUTE	INTERSTATE 55
SECTION	
WATERCOURSE	WEST BRANCH SAWMILL CREEEK
EXISTING S.N.	
SCALE:	1" = 100'
PLOTTED BY:	MYG DATE: 9/15/2016
CHECKED BY:	EMB DATE: 9/15/2016
SURVEY DATE:	11-30-12, 12-5-12

FILE NAME = N:\Idot\110203.00001\CADD_Sheets\P1110203-sht-drnpln01.dgn

CROSS SECTION LOCATION MAP





XS-2 RIVER STATION 521+27.64

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1" = 100' H; 1" = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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		DRAWN - MYG	REVISED -
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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

SCALE: 100'H 5'V | SHEET 1 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

PLAN: NOTE BOOK NO. — SURVEYED, PLOTTED, ALIGNMENT CHECKED, R.O.W. CHECKED, CADD FILE NAME — BY — DATE

PROFILE: NOTE BOOK NO. — SURVEYED, PLOTTED, GRADES CHECKED, B.M. NOTED, STRUCTURE NOTATIONS CHKD — BY — DATE

PLAN

DATE	BY	
		SURVEYED
		PLOTTED
		ALIGNMENT CHECKED
		RT. OF WAY CHECKED
		CADD FILE NAME
		NOTE BOOK
		NO.

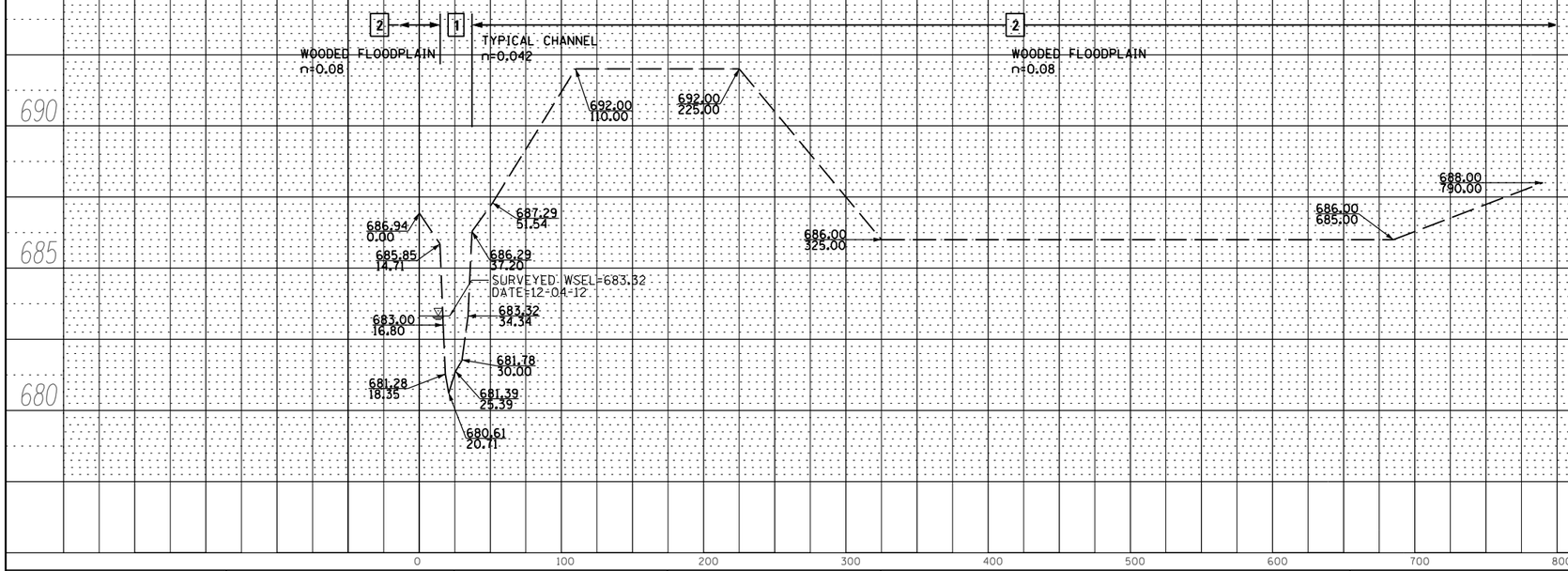
680

675

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PROFILE

DATE	BY	
		SURVEYED
		PLOTTED
		CROSS SECTIONS CHECKED
		B.M. NOTED
		STRUCTURE NOTATNS CHKD
		NOTE BOOK
		NO.



XS-3 RIVER STATION 516+83.31

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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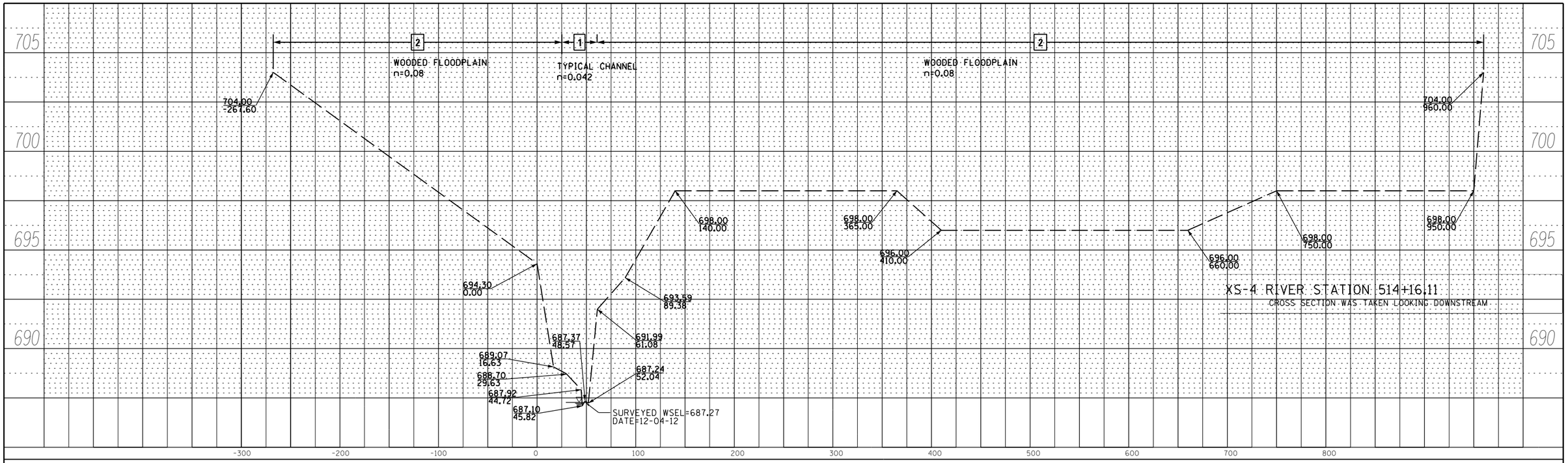
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

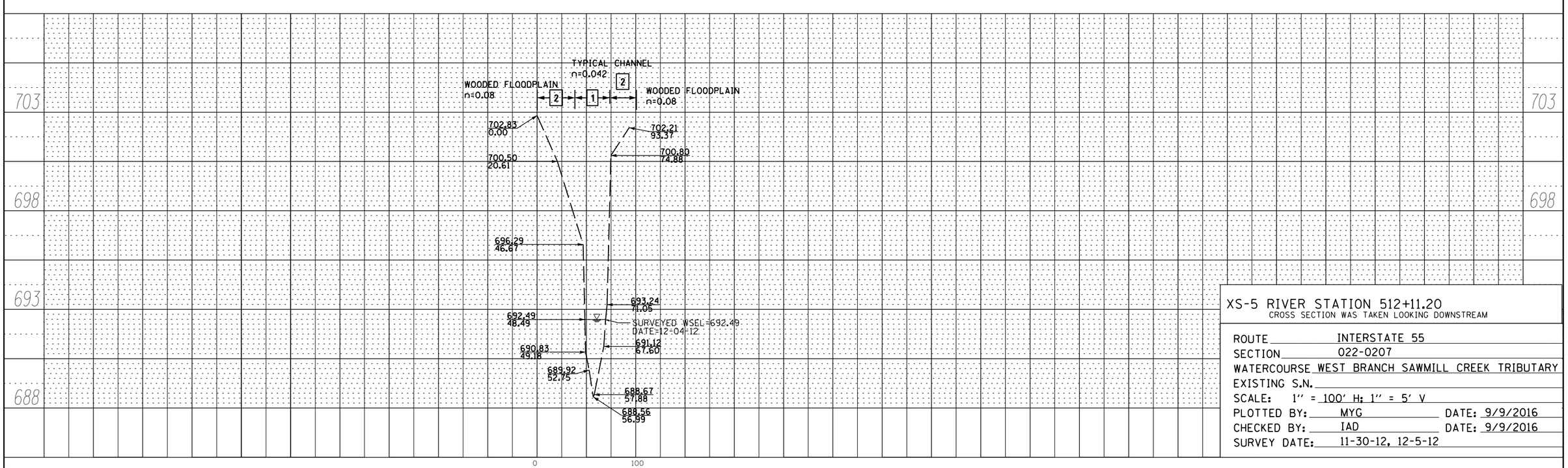
SCALE: 100'H 5'V | SHEET 2 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



PLAN
SURVEYED
PLOTTED
DRAWN
CHECKED
NOTE BOOK
NO.
BY
DATE
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME

XS-4 RIVER STATION 514+16.11
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM



PROFILE
SURVEYED
PLOTTED
DRAWN
CHECKED
NOTE BOOK
NO.
BY
DATE
CROSS CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD

XS-5 RIVER STATION 512+11.20
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

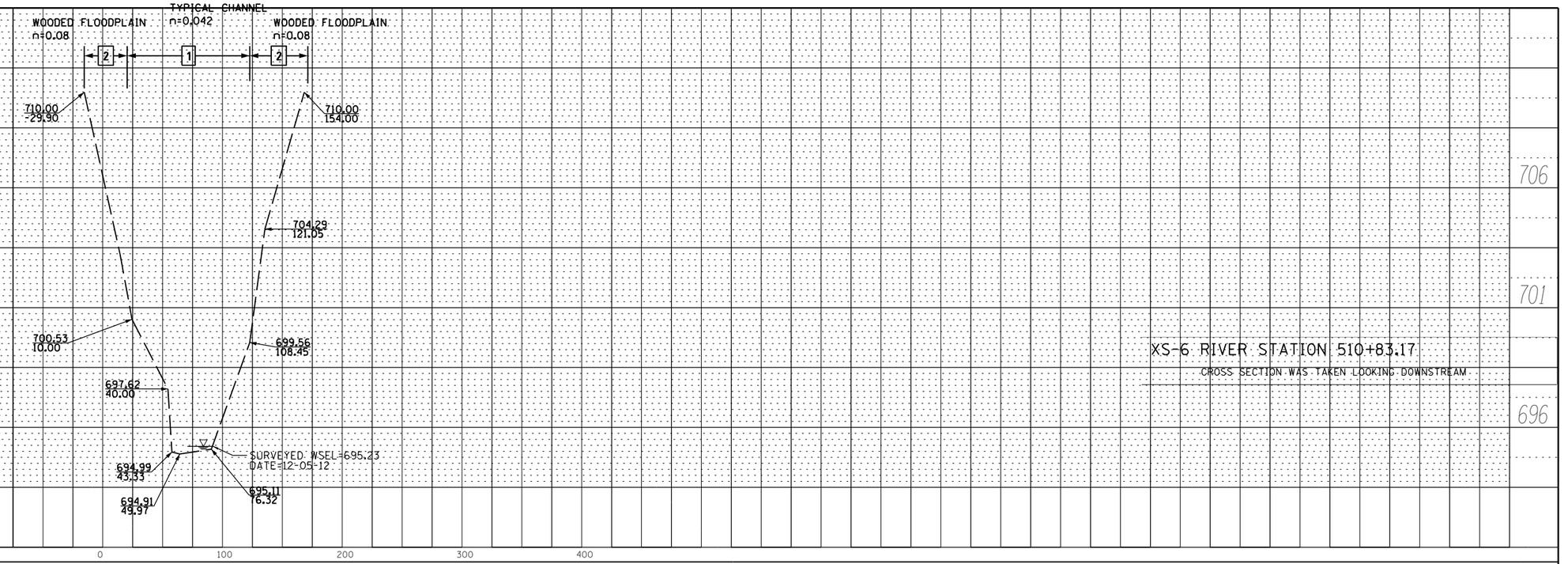
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

SCALE: 100'H 5'V | SHEET 3 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

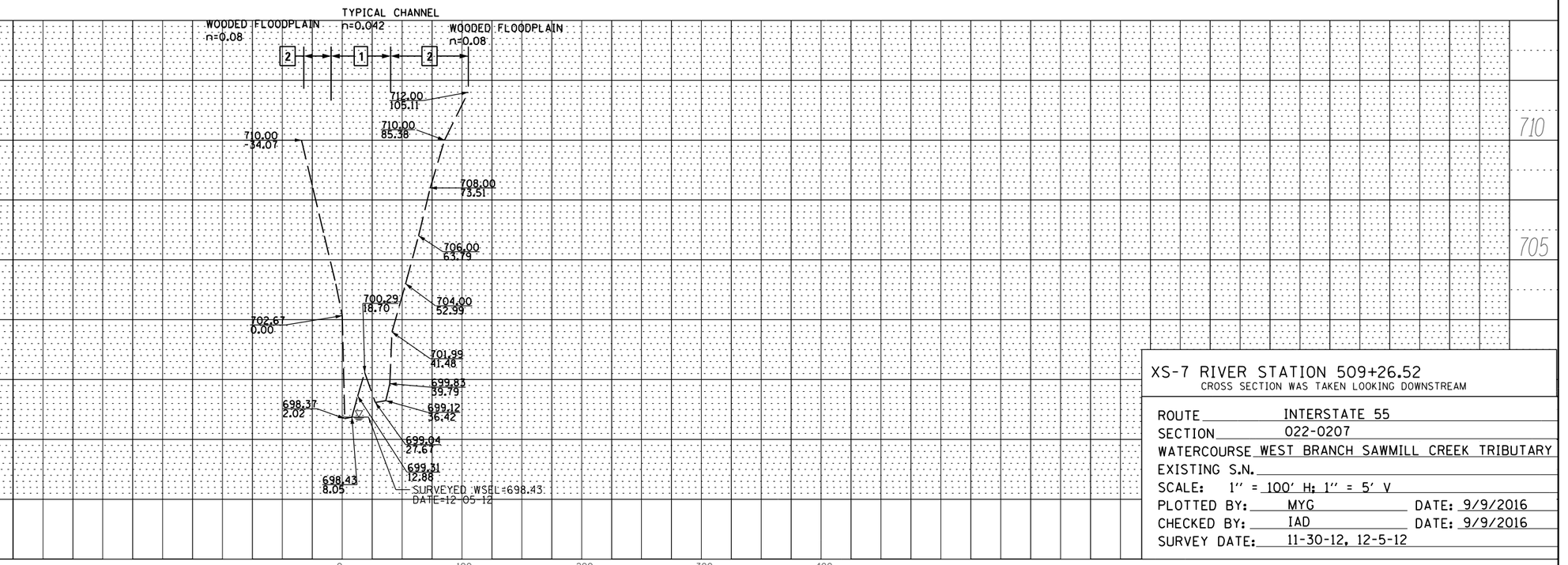
PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
DATE
BY



XS-6 RIVER STATION 510+83.17

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PROFILE
SURVEYED
PLOTTED
CROSS SECTIONS CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
DATE
BY



XS-7 RIVER STATION 509+26.52

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

SCALE: 100'H 5'V | SHEET 4 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

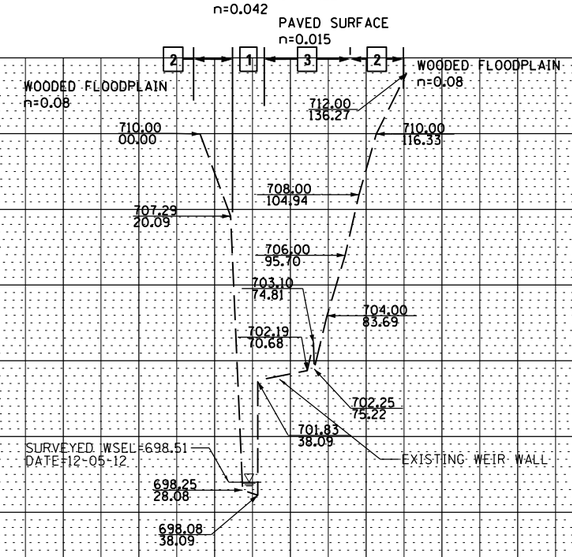
PLAN

DATE	BY
SURVEYED	
PLOTTED	
DRAWN	
ALIGNMENT CHECKED	
RT. OF WAY CHECKED	
CADD FILE NAME	
NOTE BOOK	
NO.	

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PROFILE

DATE	BY
SURVEYED	
PLOTTED	
DRAWN	
CHECKED	
B.M. NOTED	
STRUCTURE NOTATNS CHKD	
NOTE BOOK	
NO.	



XS-7.5 RIVER STATION 509+12.72

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1" = 100' H; 1" = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

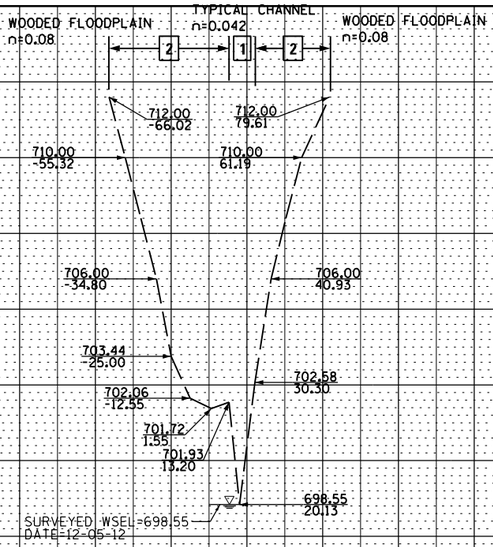
CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

SCALE: 100'H 5'V | SHEET 5 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT



XS-8 RIVER STATION 508+57.37

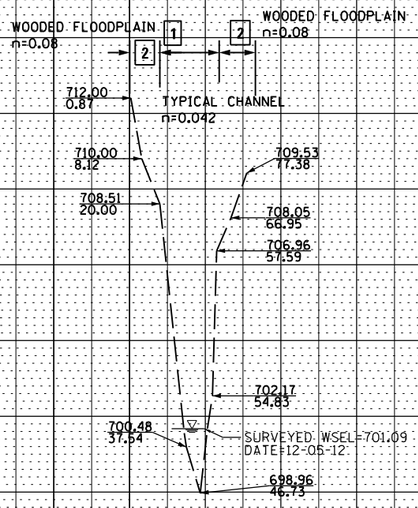
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PLAN

DATE	BY	
		SURVEYED
		PLOTTED
		ALIGNMENT CHECKED
		RT. OF WAY CHECKED
		CADD FILE NAME

NOTE BOOK

NO.



PROFILE

DATE	BY	
		SURVEYED
		PLOTTED
		CROSS SECTIONS CHECKED
		B.M. NOTED
		STRUCTURE NOTATNS CHKD

NOTE BOOK

NO.

XS-9 RIVER STATION 506+86.95

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55

SECTION 022-0207

WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY

EXISTING S.N.

SCALE: 1'' = 100' H; 1'' = 5' V

PLOTTED BY: MYG DATE: 9/9/2016

CHECKED BY: IAD DATE: 9/9/2016

SURVEY DATE: 11-30-12, 12-5-12

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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

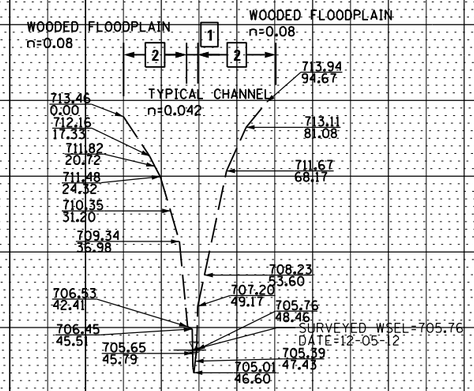
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY

SCALE: 100'H 5'V | SHEET 6 OF 7 SHEETS

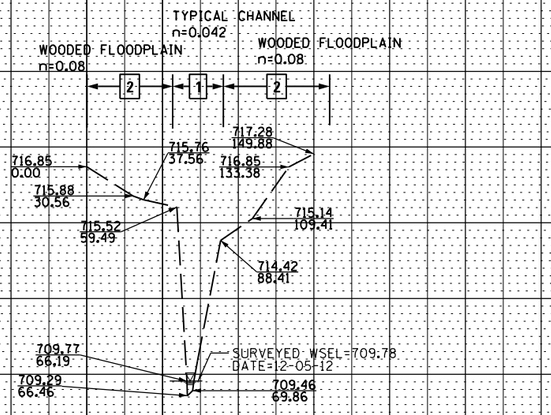
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
DATE
BY



XS-10 RIVER STATION 504+15.07
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PROFILE
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
DATE
BY



XS-11 RIVER STATION 500+43.48
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE WEST BRANCH SAWMILL CREEK TRIBUTARY
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 9/9/2016
CHECKED BY: IAD DATE: 9/9/2016
SURVEY DATE: 11-30-12, 12-5-12

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Default	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
WEST BRANCH SAWMILL CREEK TRIBUTARY
SCALE: 100'H 5'V | SHEET 7 OF 7 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

TAB 10

SECTION 10

CULVERT LAYOUT / PLAN DRAWING PLOTS

PLAN
SURVEYED
PLOTTED
CHANGES CHECKED
ALIGNMENT
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

EX. ROW

STA. 515+34.74 WEST BRANCH SAWMILL CREEK CREEK

60"X48" BOX CULVERT
INV=683.12

232.7'

XS-3

INTERSTATE 55

515

EX. ROW

60"X48" BOX CULVERT
INV=686.93

XS-4

WEST BRANCH SAWMILL CREEK

EXISTING
WEST BRANCH SAWMILL CREEK CREEK
ALIGNMENT

40 0 40
SCALE IN FEET

N

NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

PROFILE
SURVEYED
PLOTTED
CHANGES CHECKED
BM. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

EXISTING CENTERLINE OF SOUTHBOUND FRONTAGE RI
OVERTOPPING ELEVATION = 693.61

100-YR WSEL
EL. 685.29

60"X48" BOX CULVERT
INV=683.12

XS-3

D/S FACE ON D/S
CROSS-SECTION
(LOOKING DOWNSTREAM)

100-YR WSEL
EL. 698.38

EXISTING CENTERLINE OF I-55
OVERTOPPING ELEVATION = 698.17

60"X48" BOX CULVERT
INV=686.93

XS-4

U/S FACE ON U/S
CROSS-SECTION
(LOOKING DOWNSTREAM)

696	694	692	690	688	686	684	682	680

686.94 687.18 694.30 687.34

FILE NAME = N:\Idot\110203.00001\CADD_Sheets\P1110203-sht-detail10_1.dgn Default	USER NAME = eburke	DESIGNED - EB	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

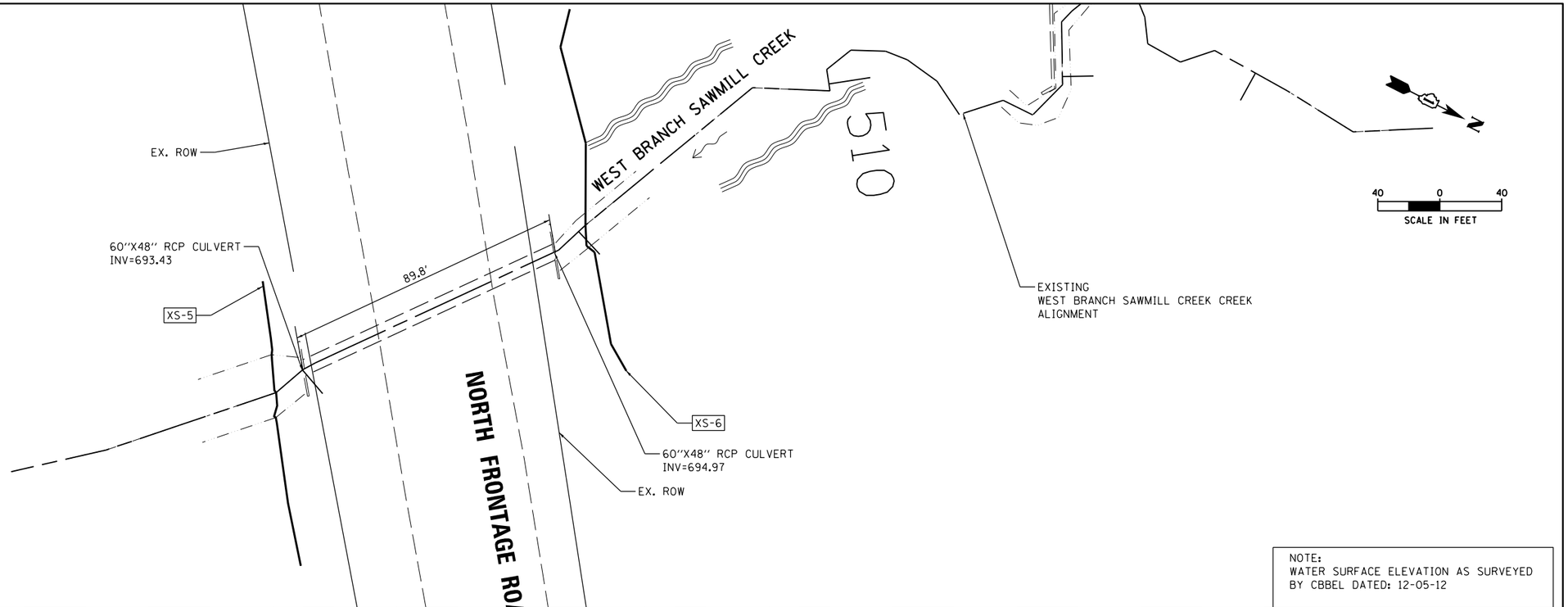
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CULVERT LAYOUT /PLAN DRAWING PLOTS
I-55 OVER WEST BRANCH SAWMILL CREEK

SCALE: 1"=40' | SHEET OF SHEETS | STA. | TO STA.

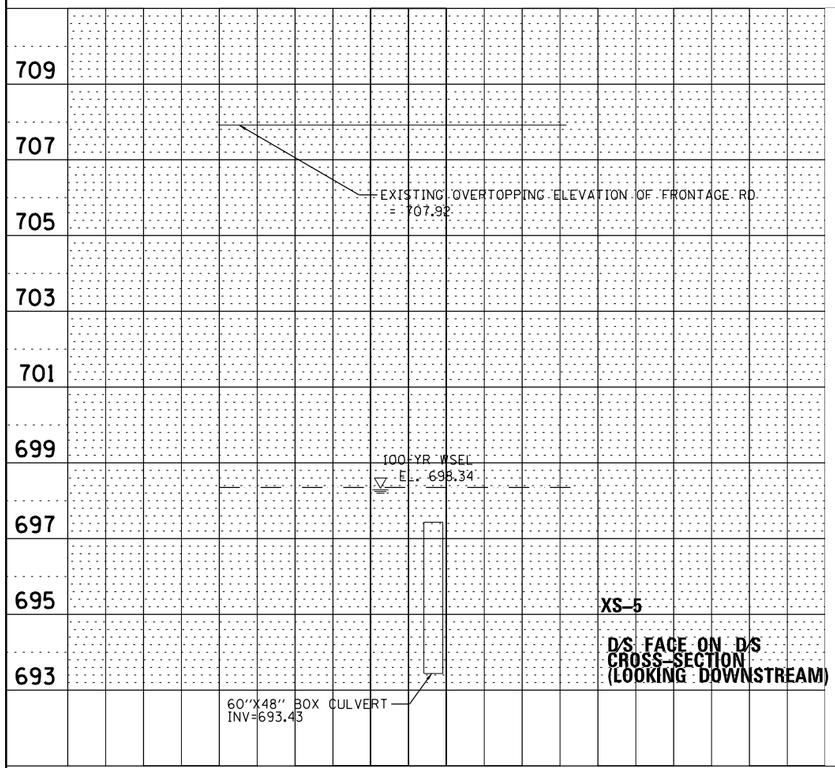
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

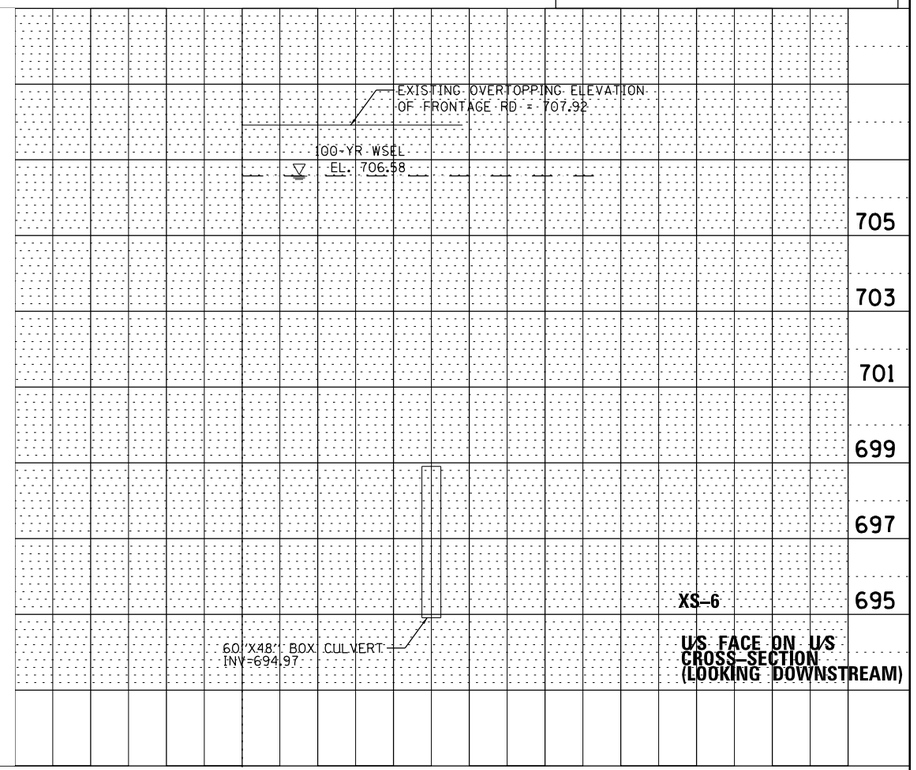
PLAN
SURVEYED — BY — DATE
PLOTTED
NOTE BOOK — ALIGNMENT CHECKED
NO. ____ — RT. OF WAY CHECKED
CADD FILE NAME



NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

PROFILE
SURVEYED — BY — DATE
PLOTTED
NOTE BOOK — GRADES CHECKED
NO. ____ — B.M. NOTED
STRUCTURE NO.&ITMS CHKD





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		DRAWN - MYG	REVISED -
Default	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CULVERT LAYOUT /PLAN DRAWING PLOTS
N FRONTAGE RD OVER WEST BRANCH SAWMILL CREEK

SCALE: 1"=40' | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

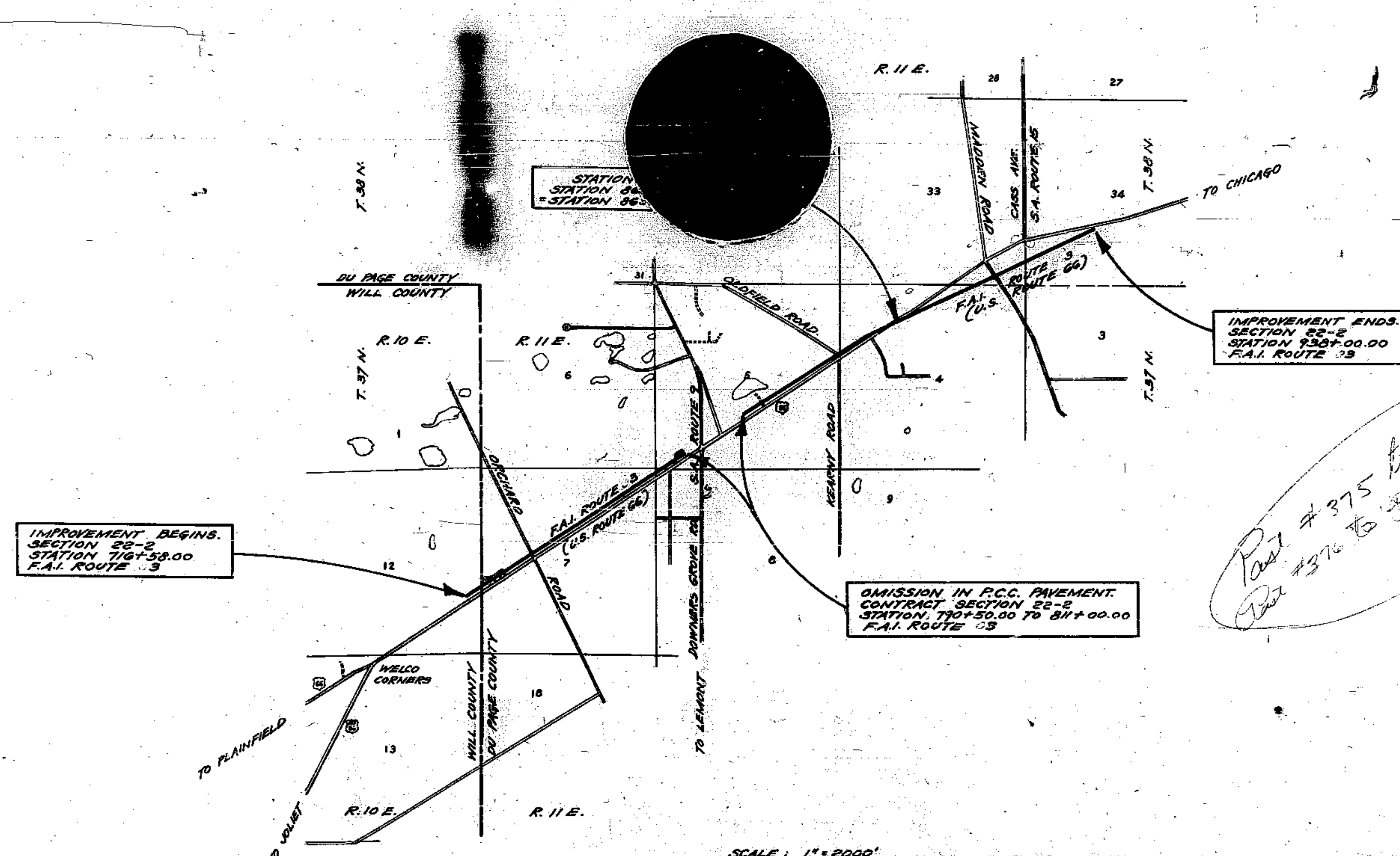
FEDERAL AID ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.I. 03	22-2	DU PAGE	73	1
FED. ROAD DIST. NO. 7	ILLINOIS	PROJECT	I-03-6(7)	

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
PLANS FOR PROPOSED
FEDERAL AID HIGHWAY

SCALES

PLAN	1 INCH	100 FT.
PROFILE, HOR.	1 INCH	100 FT.
PROFILE, VERT.	1 INCH	10 FT.
CROSS-SECTIONS	1 INCH	5 FT. VERT.
	1 INCH	10 FT. HORZ.
	1 INCH	5 FT. HORZ.

F.A.I. ROUTE 3 SECTION 22-2
PROJECT I-03-6(7)
DU PAGE COUNTY



SCALE: 1" = 2000'

GROSS LENGTH 22,139.50 FEET = 4.193 MILES
PROJECT LENGTH ~~20,1~~ 50 FEET = 3.805 MILES

Past #375 to Def #376
Det #376 to Def #377

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

SUBMITTED JUN 20 1957 19
D. S. Magnoan
DISTRICT ENGINEER

EXAMINED July 2 1957
[signature] Jr.
ENGINEER OF ROAD PLANS AND CONTRACTS

PASSED July 2 1957
[signature]
ENGINEER OF DESIGN

APPROVED July 2 1957
[signature]
CHIEF HIGHWAY ENGINEER

APPROVED July 2 1957
[signature]
DIRECTOR

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
APPROVED [redacted] [redacted]
DIVISION ENGINEER DATE

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.I.-05	22-2	DUPAGE	73	11
STA. 860+00	TO STA. 890+00			
FED. ROAD DIST. NO. 7	ILL. RTE.	PROJECT		

NOTE: 1258 R. INLET @ STA. 865+07 ℄ SHALL BE COVERED TO PREVENT TEMP. CROSS OVER EMBANKMENT FROM FALLING IN.

FOR DETAIL OF COLLAR CONNECTIONS AT STA. 865+00, SEE SHEET No. 17

ESTHER M. SMART ESTATE

END CONSTRUCTION LEFT FRONTAGE ROAD STA. 863+24

CURVE DATA: LEFT EDGE OF LEFT FRONTAGE ROAD - 124' LT. OF ℄ F.A.I. ROUTE 03
P.I. STA. 865+60.25
Δ 10°-13'-00"
D 2°-32'-00"
R 2261.68'
L 402.63'
T 201.85'
E 8.99'

CURVE DATA: ℄ LT. FR. RD. 118' LT. OF ℄ F.A.I. ROUTE 03
P.I. STA. 866+17.60
Δ 10°-12'-00"
D 3°-24'-28"
R 1649.12'
L 293.58'
T 147.18'
E 6.56
S.E. 0.03½
SE. ATTAINED FROM STA. 864+10 TO 865+30
STA. 867+04 TO 868+24

CURVE DATA: RIGHT EDGE OF LEFT FRONTAGE ROAD - 104' LT. OF ℄ F.A.I. ROUTE 03
P.I. STA. 866+74.94
Δ 10°-12'-00"
D 5°-31'-39"
R 1036.55'
L 184.53'
T 92.51'
E 4.12'

STA. 865+07 F.A.I. RTE. 03
4 - STD. 1258-R INLETS
1 - STD. 1976-D 30-2 HDWL
24"x 25' P-1
18"x 15' P-1
30"x 59' P-2
30"x 82' P-2
30"x 51' P-2
G.B.C. 33
S.S.R.C.C.P.

PROVIDE OPENING FOR 18" PIPE IN EXIST. 6'x2' CONC. CULVERT. COST TO BE INCLUDED IN UNIT PRICE OF CLASS "X" CONCRETE

P.C. STA. 864+20.42 104' LT. OF F.A.I. RTE. 03

P.T. STA. 867+62.45 140' LT. OF F.A.I. ROUTE 03

P.T. STA. 868+36 TEMP. DETOUR 132' LT. OF F.A.I. RT. 03

1957 A.D.T. = 100

MRS. ROSE WELCH

T 38 N. RIIE. OF 3RD P.M.
T 37 N. RIIE. OF 3RD P.M.

B.M. 47 ELEV. 709.37
N. ℄ W. IN ROOT OF 23" OAK
192' RT. OF STA. 862+61

F.C.C. STA. 860+45 TEMP. DETOUR 104' LT.

TO STA. 862+00 TEMP. DETOUR 129' RT.

P.E. STA. 861+60 P-1 15"x 40'

P.E. STA. 863+70 RT P-1 15"x 40'

P.R.C. STA. 865+70 TEMPORARY DETOUR

INV. 845.20 11' LT. OF F.A.I. ROUTE 03

TEMPORARY DETOUR SEE SPECIAL PROVISIONS.

℄ F.A.I. ROUTE 03 (U.S. 66)

R.O.W.

T. BARN

P.O.T. STA. 881+14.44

STA. 690+26.2

STA. 863+54.84 (AHEAD) = P.T. STATION EQUATION ℄ F.A.I. ROUTE 03 STA. 863+15.36 (BACK)

STA. 866+50 TO 879+50 RT. 1300 LIN. FT. SPECIAL TYPE 2 PAVE DITCH

STA. 870+00 LT. ℄ RT.
P-2 S.S.R.C.C.P.
24"x 214'
STD. 1976 D 24-2 (2 HDW'LS)
G.B.C. 22
1-STD. 1258-R INLET

STA. 869+85 - 92' RT.
1-TYPE A INLET
TYPE 3 FRAME
TOP OF FRAME ELEV. 692.98
INVERT ELEV. 690.40
15"x 13' C.M.P.

STA. 875+00 LT. ℄ RT.
P-2, S.S.R.C.C.P.
24"x 209'
STD. 1976 D 24-2 (2 HDW'LS)
1-STD. 1258 R INLET.
G.B.C. 22

STA. 875+15, 92' RT.
1-TYPE A INLET
TYPE 3 FRAME
TOP OF FRAME ELEV. 692.04
INVERT ELEV. 688.46
15"x 13' C.M.P.

STA. 877+00, 92' RT.
1-TYPE A INLET
TYPE 3 FRAME
TOP OF FRAME ELEV. 691.41
INVERT ELEV. 688.83
15"x 47' P-1
STD. 1976 D 15-2 (1 HDW'L)

STA. 880+36 LT. ℄ RT.
SPECIAL CULVERT DESIGN
5'-0" x 4'-0" x 231'-1"
STD. 2020
G.B.C. 134

STA. 881+00 - 37' RT.
1-STD. 1258-R INLET
15"x 62' C.M.P.

B.M. 48 ELEV. 688.28
N. ℄ W. IN ROOT OF 26" OAK
140' RT. OF STA. 865+88

B.M. 49 ELEV. 690.89
N. ℄ W. IN ROOT OF 40" OAK
55' RT. OF STA. 873+75

B.M. 50 ELEV. 691.24
N. ℄ W. IN ROOT OF 25" OAK
183' RT. OF STA. 881+15

CHICAGO TITLE ℄ TRUST CO. TRUSTEE

30" OAK
16" OAK
TAN. LINE ℄ F.A.I. RTE. 03
IRON PIN
16" OAK

TIES TO P.T. STA. 863+54.84 F.A.I. ROUTE 03

N. ℄ W. IN TWIN 10" THORN AP
"X" IN TOP OF R.O.W. MARKER
N. ℄ W. INT. POLE
℄ F.A.I. RTE. 03
P.O.T. IRON PIPE

TIES TO P.O.T. STA. 867+ F.A.I. ROUTE 03

"X" IN RED GRANITE BOULDER
℄ F.A.I. RTE. 03
P.O.T. IRON PIPE
N. ℄ W. TWIN OAK
N. ℄ W. IN THORN AP

TIES TO P.O.T. STA. 881+14.44 F.A.I. ROUTE 03

STA. 860+15 TO 866+04 TREE REMOVAL 4.04 ACRES

GREENWOOD ACRES SUB.

ESTHER M. SMART ESTATE

MRS. ROSE WELCH

EXIST. GROUND

PROFILE OF PROPOSED CROWN ON ℄ OF LT. FR. RD.

LEFT FRONTAGE ROAD

-1.90%

+1.90%

-0.50%

PROFILE OF PROPOSED CROWN ON F.A.I. ROUTE 03

PRO

INVERTS: ELEV. 694.80 LT. ELEV. 692.90 RT.

INV. 695.80 LT.

INV. 685.50 RT.

INVERTS: ELEV. 694.80 LT. ELEV. 686.50 RT.

PROFILE OF EXISTING GROUND ON ℄ OF F.A.I. ROUTE 03

+0.85%

-0.85%

INVERTS: ELEV. 688.00 LT. ELEV. 684.50 RT.

EARTH EXCAVATION 81 C.Y.
EMBANKMENT 8645 C.Y.
10,372 C.Y. EXCESS EXCAVATION OBTAINED FROM STA. 890+00 TO 895+85 TO BE PLACED IN EMBANKMENT STA. 874+28 TO 876+06.

EARTH EXCAVATION 13,30 C.Y.
EMBANKMENT 58,857 C.Y.
BORROW EXCAVATION 20,536 C.Y.

THE FOLLOWING EXCESS EXCAVATION QUANTITIES SHALL BE PLACED IN EMBANKMENT STA. 863+64 TO 874+28.
13,978 C.Y. FROM STA. 731+00 TO 742+00
13,618 C.Y. FROM STA. 742+00 TO 753+00
2,975 C.Y. FROM STA. 759+00 TO 762+00
4,491 C.Y. FROM STA. 762+00 TO 779+68
14,289 C.Y. FROM STA. 851+38 TO 867+00

EARTH EXCAVATION C.Y.
EMBANKMENT 30,433 C.Y.

RIGHT FRONTAGE ROAD -0.22%

-1.80%

+3.64%

-1.93%

PROFILE OF PROPOSED CROWN ON ℄ OF RIGHT FRONTAGE ROAD

PROFILE OF EXISTING GROUND ON ℄ OF RIGHT FRONTAGE ROAD

ELEV. OF EXISTING GROUND

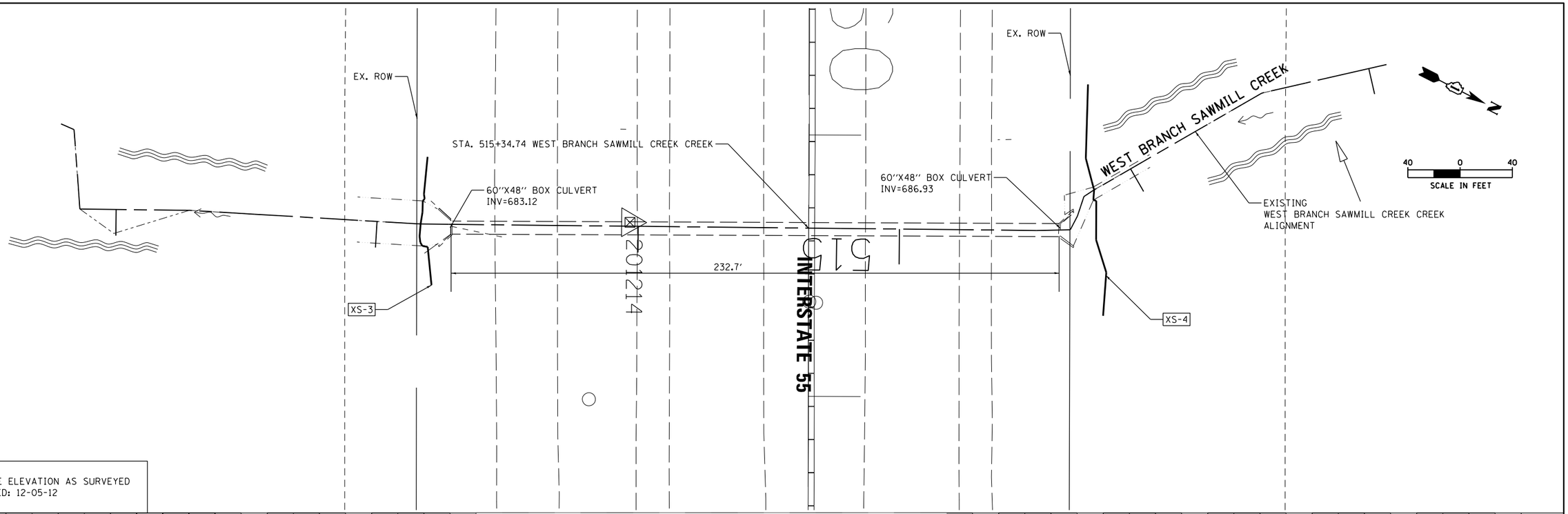
ELEV. OF PROPOSED CROWN

PLANT MEASURE DRAWING

TAB 11

SECTION 11

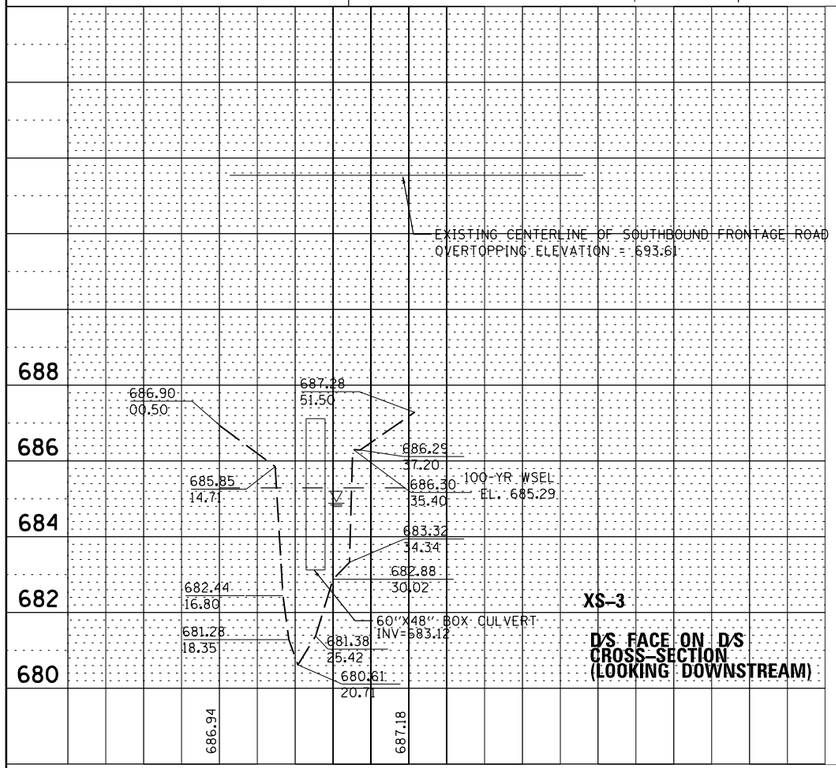
CULVERT CROSS SECTION PLOTS – EXISTING CONDITIONS



NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

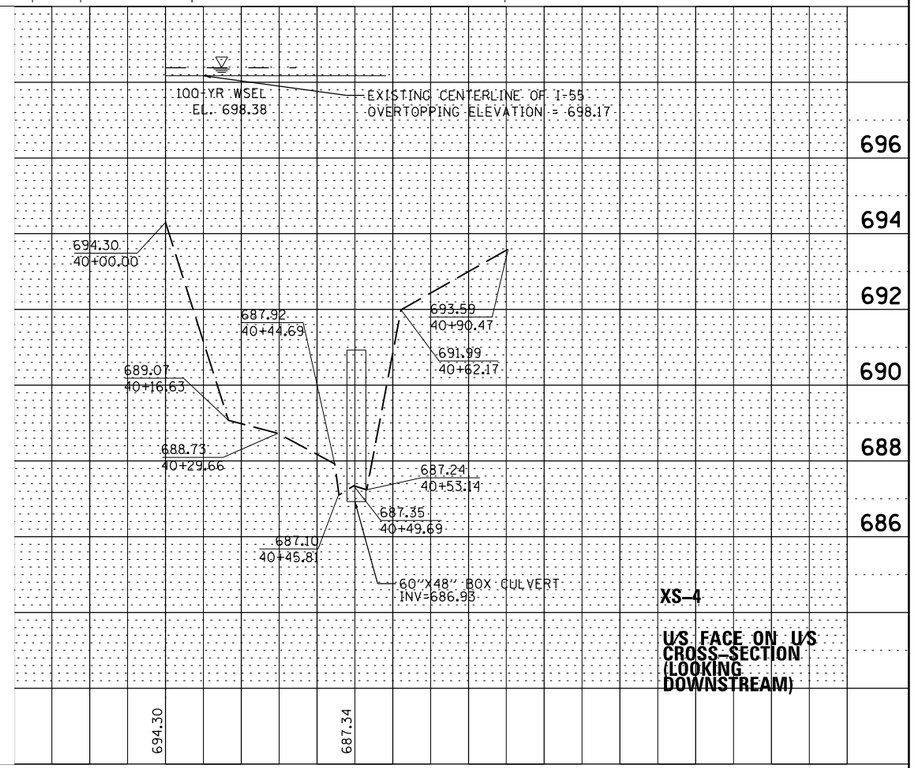
PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
R/W CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
CROSS SECTIONS CHECKED
B.M. NOTED
STRUCTURE NO'S/TNS CHKD
NOTE BOOK
NO.
BY
DATE



XS-3

D/S FACE ON D/S CROSS-SECTION (LOOKING DOWNSTREAM)



XS-4

U/S FACE ON U/S CROSS-SECTION (LOOKING DOWNSTREAM)

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Default		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

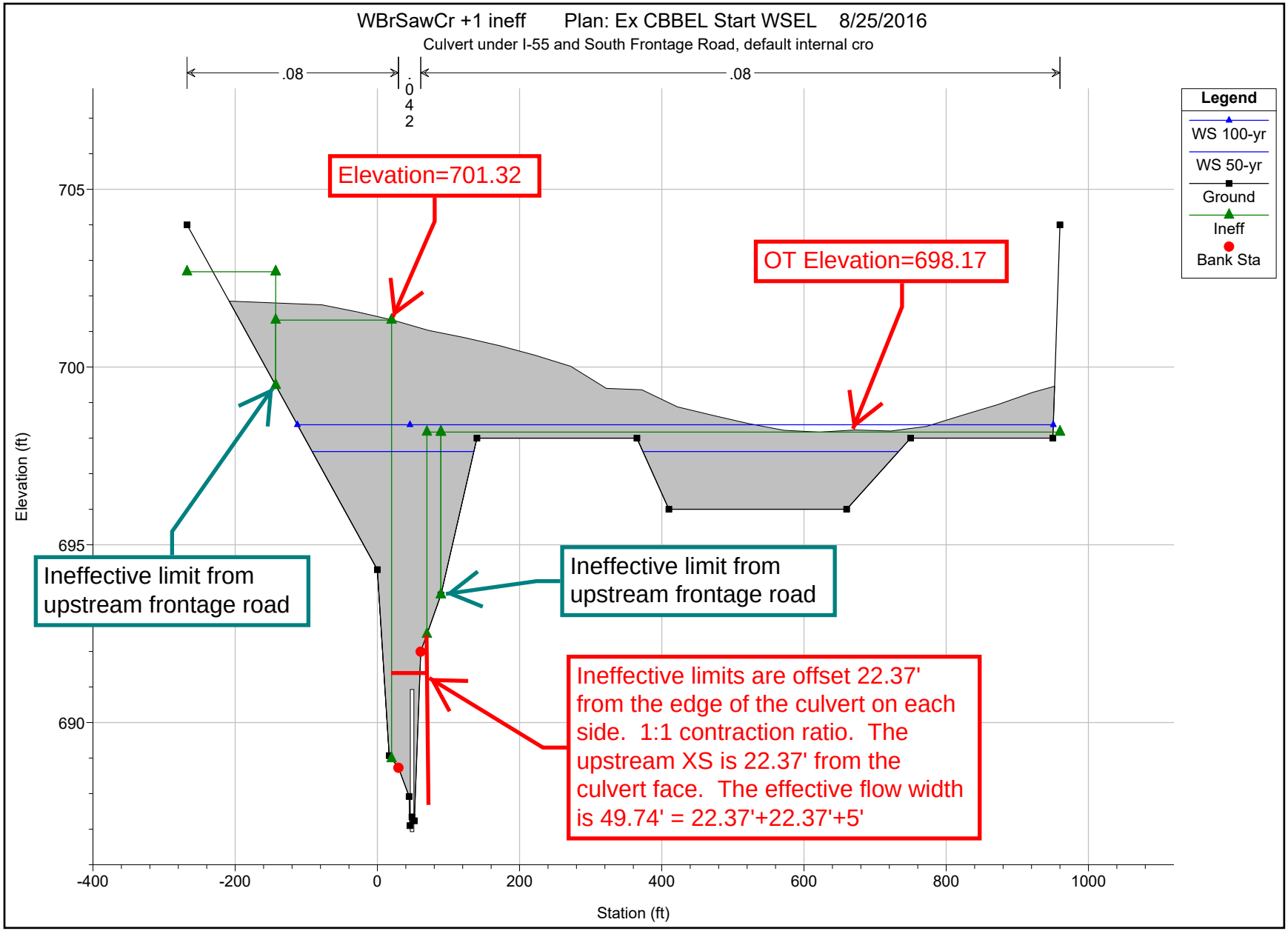
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CULVERT CROSS SECTION PLOTS
I-55 OVER WEST BRANCH SAWMILL CREEK

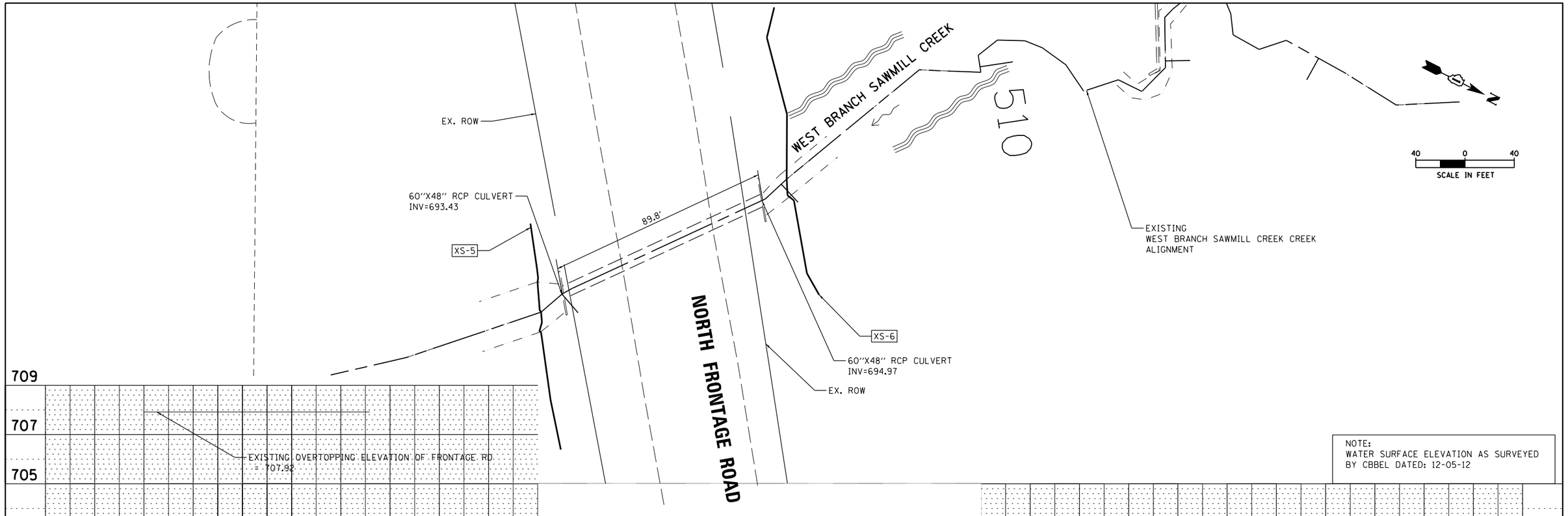
SCALE: 1"=40' | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Upstream Face I-55
5' (W) x 4' (H) RC Box Culvert



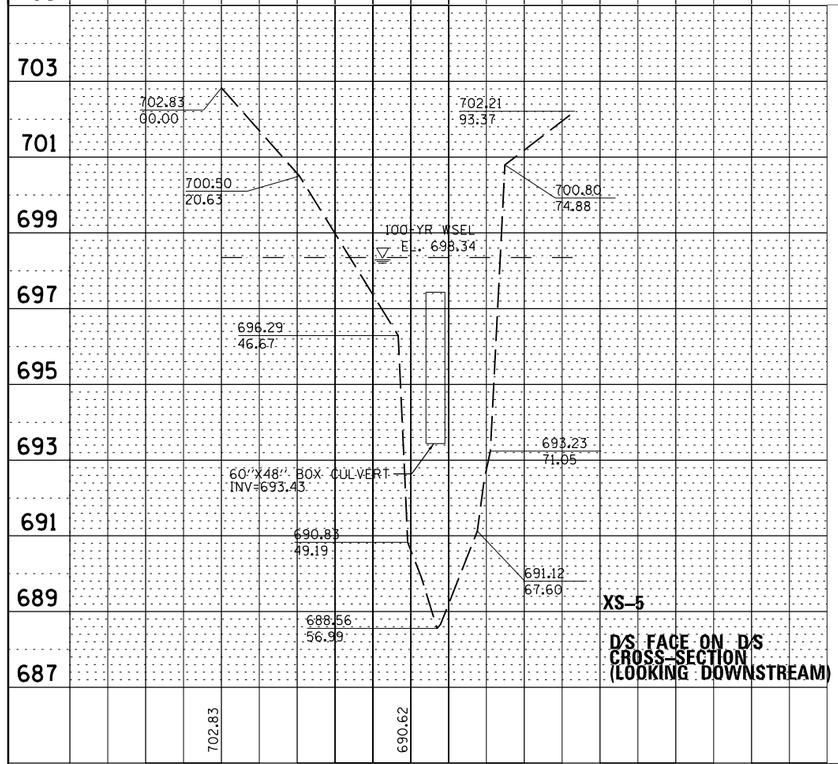
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

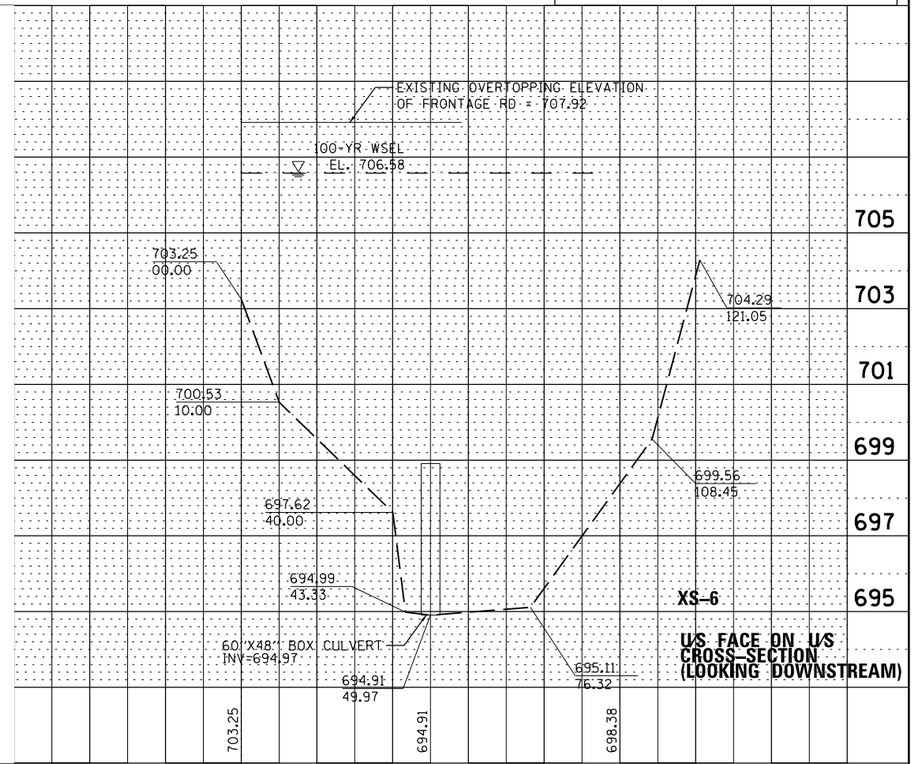
PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
R.T. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
DATE
BY

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
DATE
BY



XS–5

D/S FACE ON D/S
CROSS-SECTION
(LOOKING DOWNSTREAM)



XS–6

U/S FACE ON U/S
CROSS-SECTION
(LOOKING DOWNSTREAM)

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		DRAWN - MYG	REVISED -
Default	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 9/9/2016	DATE - 9/9/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CULVERT CROSS SECTION PLOTS
N FRONTAGE RD OVER WEST BRANCH SAWMILL CREEK

SCALE: 1"=40' | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

TAB 12

SECTION 12

CULVERT CROSS SECTION PLOTS – PROPOSED CONDITIONS

CULVERT CROSS SECTION PLOTS – PROPOSED CONDITIONS

There are no proposed modifications to the existing culvert.
Please refer to Section 11 for the existing culvert plots.

TAB 13

SECTION 13

HYDRAULIC ANALYSES

I-55 Managed Lanes

EXISTING CONDITIONS WSEL SUMMARY TABLE

West Branch Sawmill Creek

HEC-RAS HYDRAULIC MODEL RESULTS VS. 1977 DuPage Co. WSP2

	orig.	updated	updated	updated
	iad, CBBEL	emb, CBBEL	emb, CBBEL	iad, CBBEL
	8/20/2015	2/10/2016	5/26/2016	8/26/2016

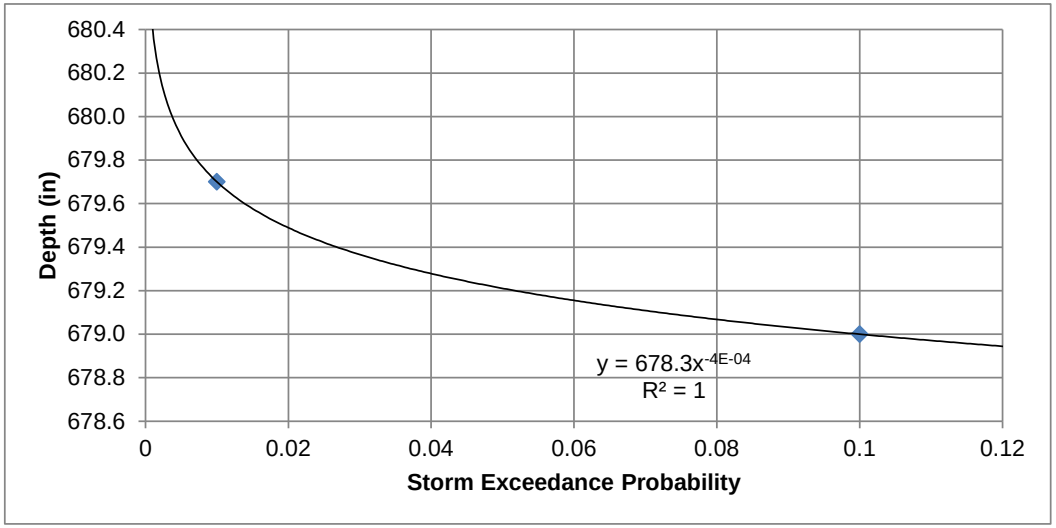
WATERWAY	HEC-RAS REACH	HEC-RAS XS ID	WSP2 / Survey XS Reference	DPC FIS XS Ref. *	WSP2 HC 10-YR WSEL NGVD29	WSP2 HC 10-YR WSEL NAVD 88	HEC-RAS 10-YR WSEL 714.22	WSP2 HC 50-YR WSEL NGVD 29	WSP2 HC 50-YR WSEL NAVD 88	HEC-RAS 50-YR WSEL NAVD 88
W. Br. Sawmill Ck.	I-55	11.5	WSAV1	**SWSW 0016**	714.4	714.1	711.85	715.0	714.7	714.70
W. Br. Sawmill Ck.	I-55	11.0	XS 11				711.61			712.49
W. Br. Sawmill Ck.	I-55	10.5	WSAS3C	**SWSW 0015**	709.7	709.4	711.51	711.3	711.0	712.18
W. Br. Sawmill Ck.	I-55	10.0	XS 10				711.51			711.98
W. Br. Sawmill Ck.	I-55	9.1	WSAS3R / Access Rd.							
W. Br. Sawmill Ck.	I-55	9.0	WSAS2A / XS 9		703.7	703.4	703.45	704.6	704.3	703.94
W. Br. Sawmill Ck.	I-55	8.0	WSAWV2 / XS 8	**SWSW 0014**	703.6	703.3	701.99	704.6	704.3	703.35
W. Br. Sawmill Ck.	I-55	7.5	WSAWUS / WSAWDS / Weir				700.86			703.37
W. Br. Sawmill Ck.	I-55	7.0	WSAWV1 / XS 7		702.0	701.7	701.11	704.6	704.3	703.43
W. Br. Sawmill Ck.	I-55	6.0	WSAS2C / XS 6	**SWSW 0013**	700.8	700.5	701.11	704.6	704.3	703.42
W. Br. Sawmill Ck.	I-55	5.1	WSAS2R / N. Frontage Rd.							
W. Br. Sawmill Ck.	I-55	5.0	WSAS1C / XS 5		692.4	692.1	693.07	695.2	694.9	697.61
W. Br. Sawmill Ck.	I-55	4.0	XS 4				693.07			697.62
W. Br. Sawmill Ck.	I-55	3.1	WSAS1R / I-55							
W. Br. Sawmill Ck.	I-55	3.0	XS 3				684.22			684.99
W. Br. Sawmill Ck.	I-55	2.0	XS 2				679.96			680.07
W. Br. Sawmill Ck.	I-55	1.0	XS 1				679.22			679.64
W. Br. Sawmill Ck.[1]	I-55	0.15	Copy of CBBEL XS 1 extended with 2' topo for use as assumed XS at confluence with Wards Creek. No vertical adjustment to XS 0.15 to be conservative.		-	-	679.00	-	-	679.40
W. Br. Sawmill Ck.	I-55	0.100	SMD03		669.80	669.50	-	670.20	669.90	-

WATERWAY	HEC-RAS REACH	HEC-RAS XS ID	WSP2 XS Reference	DPC FIS XS Ref. *	2004 FIS 100-YR WSEL NGVD29	WSP2 HC 100-YR WSEL NGVD 29	**WSP2 HC 100-YR WSEL NAVD 88**	HEC-RAS 100-YR WSEL NAVD 88	WSP2 HC 500-YR WSEL NGVD 29	WSP2 HC 500-YR WSEL NAVD 88	HEC-RAS 500-YR WSEL NAVD 88
W. Br. Sawmill Ck.	I-55	11.5	WSAV1	**SWSW 0016**	715.1	715.1	**714.8**	**714.90**	715.5	715.2	715.46
W. Br. Sawmill Ck.	I-55	11.0	XS 11					**712.75**			713.34
W. Br. Sawmill Ck.	I-55	10.5	WSAS3C	**SWSW 0015**	711.5	711.5	**711.2**	**712.39**	711.7	711.4	713.04
W. Br. Sawmill Ck.	I-55	10.0	XS 10					**712.14**			712.66
W. Br. Sawmill Ck.	I-55	9.1	WSAS3R / Access Rd.								
W. Br. Sawmill Ck.	I-55	9.0	WSAS2A / XS 9			707.3	**707.0**	**706.48**	708.5	708.2	708.46
W. Br. Sawmill Ck.	I-55	8.0	WSAWV2 / XS 8	**SWSW 0014**	707.3	707.3	**707.0**	**706.58**	708.5	708.2	708.44
W. Br. Sawmill Ck.	I-55	7.5	WSAWUS / WSAWDS / Weir					**706.58**			708.44
W. Br. Sawmill Ck.	I-55	7.0	WSAWV1 / XS 7			707.3	**707.0**	**706.59**	708.5	708.2	708.45
W. Br. Sawmill Ck.	I-55	6.0	WSAS2C / XS 6	**SWSW 0013**	707.3	707.3	**707.0**	**706.58**	708.5	708.2	708.45
W. Br. Sawmill Ck.	I-55	5.1	WSAS2R / N. Frontage Rd.								
W. Br. Sawmill Ck.	I-55	5.0	WSAS1C / XS 5			697.1	**696.8**	**698.34**	701.5	701.2	698.53
W. Br. Sawmill Ck.	I-55	4.0	XS 4					**698.38**			698.60
W. Br. Sawmill Ck.	I-55	3.1	WSAS1R / I-55								
W. Br. Sawmill Ck.	I-55	3.0	XS 3					**685.29**			685.98
W. Br. Sawmill Ck.	I-55	2.0	XS 2					**680.12**			680.25
W. Br. Sawmill Ck.	I-55	1.0	XS 1					**679.90**			680.24
W. Br. Sawmill Ck.[1]	I-55	0.15	Copy of CBBEL XS 1 extended with 2' topo for use as assumed XS at confluence with Wards Creek. No vertical adjustment to XS 0.15 to be conservative.			-	-	**679.70**	-	-	680.00
W. Br. Sawmill Ck.	I-55	0.100	SMD03			670.3	670	-	670.7	670.4	-

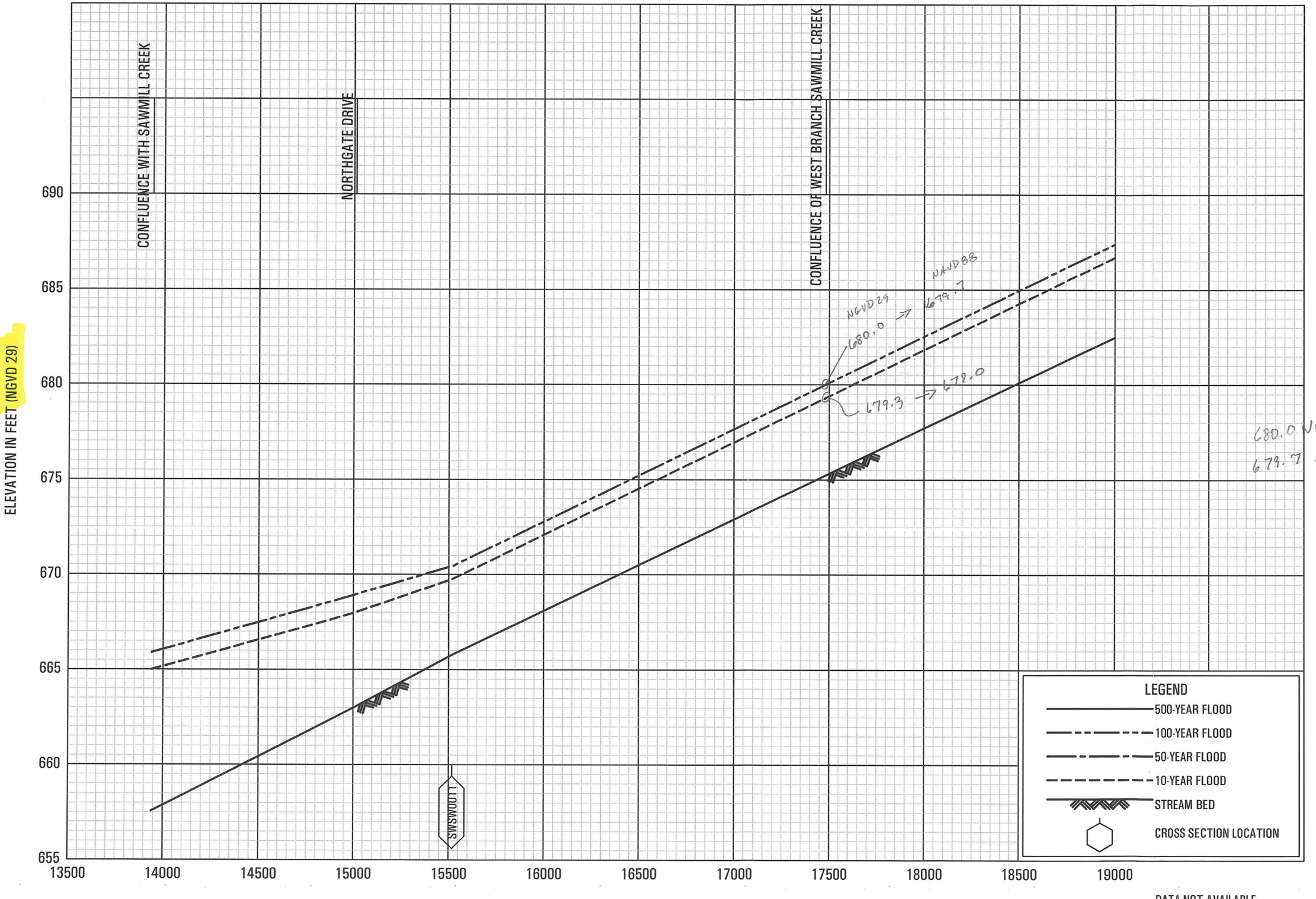
* FIS mapped cross section locations approximated to appropriate WSP-2 section by location and distance.

1. Starting water surface elevations interpolated from FIS Flood Profiles. See Hydology in Section 6.

Flow Rates			
Event	**Storm Exceedance Probability**	**FIS WSEL (NAVD88)**	***Calculated WSEL***
2-yr	0.5		*678.5*
10-year	0.1	**679.0**	*678.9*
30-yr	0.03		*679.2*
50-year	0.02		*679.4*
100-year	0.01	**679.7**	*679.6*
200-yr	0.005		*679.7*
500-year	0.002		*680.0*
Note: 2-, 30-, and 200-year WSELs interpolated/extrapolated using a power regression trendline.			



West Branch Sawmill Creek starting WSELs from DuPage County FIS Wards Creek flood profile, March 2007



FLOOD PROFILES

WARDS CREEK (SWSW)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL

AND INCORPORATED AREAS

146P

Expansion Reach Lengths

In some types of studies, a high level of sophistication in the evaluation of the transition reach lengths is not justified. For such studies, and for a starting point in more detailed studies, Table B-2 offers ranges of expansion ratios, which can be used for different degrees of constriction, different slopes, and different ratios of overbank roughness to main channel roughness. Once an expansion ratio is selected, the distance to the downstream end of the expansion reach (the distance Le on Figure B-1) is found by multiplying the expansion ratio by the average obstruction length (the average of the distances A to B and C to D from Figure B-1). The average obstruction length is half of the total reduction in floodplain width caused by the two bridge approach embankments. In Table B-2, b/B is the ratio of the bridge opening width to the total floodplain width, nob is the Manning n value for the overbank, nc is the n value for the main channel, and S is the longitudinal slope. The values in the interior of the table are the ranges of the expansion ratio. For each range, the higher value is typically associated with a higher discharge.

Table B-2 Ranges of Expansion Ratios

		nob / nc = 1	nob / nc = 2	nob / nc = 4
b/B = 0.10	S = 1 ft/mile	1.4 – 3.6	1.3 – 3.0	1.2 – 2.1
	5 ft/mile	1.0 – 2.5	0.8 – 2.0	0.8 – 2.0
	10 ft/mile	1.0 – 2.2	0.8 – 2.0	0.8 – 2.0
b/B = 0.25	S = 1 ft/mile	1.6 – 3.0	1.4 – 2.5	1.2 – 2.0
	5 ft/mile	1.5 – 2.5	1.3 – 2.0	1.3 – 2.0
	10 ft/mile	1.5 – 2.0	1.3 – 2.0	1.3 – 2.0
b/B = 0.50	S = 1 ft/mile	1.4 – 2.6	1.3 – 1.9	1.2 – 1.4
	5 ft/mile	1.3 – 2.1	1.2 – 1.6	1.0 – 1.4
	10 ft/mile	1.3 – 2.0	1.2 – 1.5	1.0 – 1.4

The ranges in Table B-2, as well as the ranges of other parameters to be presented later in this appendix, capture the ranges of the idealized model data from this study. Another way of establishing reasonable ranges would be to compute statistical confidence limits (such as 95% confidence limits) for the regression equations. Confidence limits in multiple linear regression equations have a different value for every combination of values of the independent variables (Haan, 1977). The computation of these limits entails much more work and has a more restricted range of applicability than the corresponding limits for a regression, which is based on only one independent variable. The confidence limits were, therefore, not computed in this study.

Extrapolation of expansion ratios for constriction ratios, slopes or roughness ratios outside of the ranges used in this table should be done with care. The expansion ratio should not exceed 4:1, nor

Project #:	11-203.00001
Stream:	West Branch Sawmill Creek
Route:	I-55
By:	EMB
Date:	8/16/2016
Structure:	I-55

Structure Opening Width:	5
Expansion Ratio:	2
Contraction Ratio:	1
Top of Structure Opening D/S:	687.12

	Upstream	Downstream
Left Overtopping	701.32	694.22
Right Overtopping	698.17	692.65

HEC-RAS Station	Distance To Structure	Effective Opening	Notes
5	226.37	502.48	Wider than Channel Width
4	22.37	49.74	N. Frontage Road Ineffectives encroach
3.1 I-55	-	5	-
3	11.89	16.89	-
2	445	461.89	Wider than Channel Width

Project #:	11-203.00001
Stream:	West Branch Sawmill Creek
Route:	I-55
By:	EMB
Date:	8/16/2016
Structure:	North Frontage Road

Structure Opening Width:	5
Expansion Ratio:	2
Contraction Ratio:	1
Top of Structure Opening D/S:	697.43

	Upstream	Downstream
Left Overtopping	707.92	702.68
Right Overtopping	707.92	702.68

HEC-RAS Station	Distance To Structure	Effective Opening	Notes
7	183	397	Wider than Channel Width
6	13	31	-
5.1 North Frontage Road	-	5	-
5	11.7	16.7	-
4	215.7	232.4	Ineffective area overlaps with I-55 ineffectives
3.1	I-55 Culvert		

Project #:	11-203.00001
Stream:	West Branch Sawmill Creek
Route:	I-55
By:	EMB
Date:	8/16/2016
Structure:	Access Road

Structure Opening Width:	3.5
Expansion Ratio:	2
Contraction Ratio:	1
Top of Structure Opening D/S:	704.93

	Upstream	Downstream
Left Overtopping	710.72	707.83
Right Overtopping	711	707.97

HEC-RAS Station	Distance To Structure	Effective Opening	Notes
11	74	200.64	Wider than Channel Width
10	24.57	52.64	-
9.1 Access Road	-	3.5	-
9	6.02	9.52	-
8	177.02	186.54	Wider than Channel Width

TAB A

SECTION 13.A

BASELINE (FEMA) WSP- 2 Model (NGVD 1929)

---------------------------------80/80 LIST OF INPUT DATA---------------------------------

WSP2

TITLE	DARIEN FLOOD INSURANCE STUDY					
TITLE	SAWMILL CREEK WESTERN TRIB					
DISCHARGE	-1.0	10	50	100	500	
STARTE	SMD03	669.8	670.2	670.3	670.7	
OUTPUT	S		100-YR			
FLOW-FREQ	SMD03	1290	923	780	478	
FLOW-FREQ	WSAS1C	495	345 ✓①	290	178	
FLOW-FREQ	WSAS2C	495	345	290	178	
FLOW-FREQ	WSAWV1	495	345	290	178	
FLOW-FREQ	WSAWDS	495	345	290	178	
FLOW-FREQ	WSAWUS	495	345	290	178	
FLOW-FREQ	WSAWV2	495	345	290	178	
FLOW-FREQ	WSAS2A	495	345	290	178	
FLOW-FREQ	WSAS3C	495	345	290	178	
FLOW-FREQ	WSAV1	420	290 ✓①	245	149	
FLOW-FREQ	WSAS5C	420	290	245	149	
FLOW-FREQ	WSAS6C ✓	420	290	245	149	
FLOW-FREQ	WSAS6B	420	290	245	149	
FLOW-FREQ	WSAS6D	420	290	245	149	
FLOW-FREQ	WSAS6F	420	290	245	149	
FLOW-FREQ	WSAV2	402	285 ✓①	238	146	
FLOW-FREQ	WSAV3	402	285	238	146	
FLOW-FREQ	WSAV4	199	141	118	72	
REACH	SMD03	5.12	0	0	XS 0.1	
ROAD	WSAS1R	2.7	2889	2800	I-55	
REACH	WSAS1C	0.75	70	70		
ROAD	WSAS2R	2.7	155	155	N. Frontage Road	
REACH	A WSAS2C A	0.75	75	75		
REACH	WSAWV1	0.75	169	169		
REACH	WSAWDS	0.75	1	1		
REACH	B WSAWUS	0.75	1	1		
REACH	WSAWV2	0.75	1	1		
REACH	C WSAS2A	0.75	48	48		
ROAD	WSAS3R	2.7	135	135		
REACH	D WSAS3C	0.75	25	25		
REACH	E WSAV1	0.58	420	420		
ROAD	WSAS5R	2.7	193	193		
REACH	F WSAS5C	0.58	50	50		
ROAD	WSAS6R	2.7	855	855		
REACH	G WSAS6V	0.58	25	25		
ROAD	WSAS6A	2.7	112	112		
REACH	H WSAS6B	0.58	30	30		
ROAD	WSAS6C	2.7	119	119		
REACH	I WSAS6D	0.58	25	25		

FINAL

OK

① AGREES w/ DARIEN FIS 1989

ELEVATIONS AGREE w/ DARIEN FIS 1989

SAM 12/15/97

[superseded by 1979 run inserting "L" & "M" sections
SUPERSEDED BY LOMR 96-05-279P (11/26/1997) ~WS/ISWS]

[= I-55 ?]

----------80/80 LIST OF INPUT DATA----------

[redacted]

```
ROAD      WSAS6E    2.7       129       129
REACH     WSAS6F    0.58      35        35
REACH     WSAV2     0.42      380       380
REACH     WSAV3     0.44      725.      725.
REACH     L         .13       750.      750.
REACH     M         .13       680.      680.
REACH     WSAV4     0.13      770.      770.
SEGMENT   SMD03     1         D         262.0
NVALUE    0.080
SEGMENT   SMD03     2         C         290.0
NVALUE    0.055
SEGMENT   SMD03     3         D         1100.0
NVALUE    0.080
SECTION   SMD03
            0.0     677.0      50.0     674.0     100.0     671.4SMD03  1 7
          150.0     669.4     200.0     669.2     262.0     668.7SMD03  2 7
          274.0     667.3     279.0     666.2     282.0     665.6SMD03  3 7
          285.0     665.8     289.0     667.3     290.0     669.3SMD03  4 7
          400.0     668.5     500.0     668.9     600.0     670.1SMD03  5 7
          700.0     670.1     800.0     670.4     900.0     671.7SMD03  6 7
         1000.0     673.8    1100.0     678.1                 SMD03  7 7
ENDTABLE
CULV1     WSAS1R    1         41111
CULV2     5.3       5.0       231.0     687.1     684.4
SECTION   WSAS1R
            0       701.9      100      701.4      200      701.1
ENDTABLE
SEGMENT   WSAS1C    1         N         -8
NVALUE    .045
SEGMENT   WSAS1C    2         C         3
NVALUE    .045
SEGMENT   WSAS1C    3         N         50
NVALUE    .05
SECTION   WSAS1C
         -141       701.5     -140      701.5     -100      700.0
          -50       694.4      -25      692.9      -18      691.5
           -8       690.1       -7      689.2       -1      688.9
            0       688.8        1      688.8        2      689.1
            3       689.3       13      690.2       23      693.0
           50       695.2      100      700.0      130      704.0
ENDTABLE
CULV1     WSAS2R    1         41111
CULV2     4.2       5.3       89.7      695.4     693.8
```

----------80/80 LIST OF INPUT DATA----------

```
SECTION   WSAS2R
                0     709.7       50     709.2      100     708.1
              150     707.9      200     708.0
ENDTABLE
SEGMENT   WSAS2C     1          N         -10
NVALUE    .045
SEGMENT   WSAS2C     2          C          10
NVALUE    .045
SEGMENT   WSAS2C     3          N          50
NVALUE    .05
SECTION   WSAS2C
              -82     710.0      -81     710.0      -80     710.0
              -50     706.2      -35     704.2      -25     701.7
              -10     700.0       -6     699.7       -5     697.0
               -2     696.5        0     696.2        2     696.6
                3     698.8       10     699.3       25     699.6
               35     702.0       50     704.6       80     710.0
ENDTABLE
SEGMENT   WSAWV1     1          N         -15
NVALUE    .045
SEGMENT   WSAWV1     2          C          25
NVALUE    .045
SEGMENT   WSAWV1     3          N         100
NVALUE    .05
SECTION   WSAWV1
              -50     710.0      -25     704.4      -24     703.6
              -20     702.0      -18     701.4      -15     701.6
              -11     700.8       -8     700.7       -2     700.6
                0     700.3        1     700.6        3     700.7
                4     700.5        5     700.7       11     700.6
               25     700.9       50     707.6      100     711.0
ENDTABLE
SEGMENT   WSAWDS     1          N         -17
NVALUE    .045
SEGMENT   WSAWDS     2          C          17
NVALUE    .045
SEGMENT   WSAWDS     3          N         100
NVALUE    .05
SECTION   WSAWDS
              -50     710.0      -24     704.4      -24     703.6
              -20     702.2      -18     700.8      -17     700.8
              -17     703.5      -14     703.5      -14     702.5
               14     702.5       14     703.6       17     703.6
               17     701.2       25     701.9       50     707.6
              100     711.0
```

----------80/80 LIST OF INPUT DATA----------

```
ENDTABLE
SEGMENT   WSAWUS     1          N         -17
NVALUE    .045
SEGMENT   WSAWUS     2          C          17
```

80/80 LIST OF INPUT DATA

```
NVALUE    .014
SEGMENT   WSAWUS    3          N          100
NVALUE    .05
SECTION   WSAWUS
               -50     710.0       -25     704.4       -24     703.6
               -20     702.2       -18     700.8       -17     700.8
               -17     703.5       -14     703.5       -14     702.5
                14     702.5        14     703.6        17     703.6
                17     701.2        25     701.9        50     707.6
               100     711.0
ENDTABLE
SEGMENT   WSAWV2    1          N          -15
NVALUE    .045
SEGMENT   WSAWV2    2          C           25
NVALUE    .045
SEGMENT   WSAWV2    3          N          100
NVALUE    .05
SECTION   WSAWV2
               -50     710.5       -25     704.9       -24     704.1
               -20     702.5       -18     701.9       -15     702.1
               -11     701.3        -8     701.2        -2     701.1
                 0     700.8         1     701.1         3     701.2
                 4     701.0         5     701.2        11     701.1
                25     701.4        50     708.1       100     711.5
ENDTABLE
SEGMENT   WSAS2A    1          N          -15
NVALUE    .040
SEGMENT   WSAS2A    2          C           25
NVALUE    .035
SEGMENT   WSAS2A    3          N          100
NVALUE    .040
SECTION   WSAS2A
               -50     711.5       -25     705.9       -15     703.1
               -11     702.3        -8     702.2        -2     702.1
                 0     701.8         1     702.1         3     702.2
                 4     702.0         5     702.2        11     702.1
                25     702.4        50     709.1       100     712.5
ENDTABLE
CULV1     WSAS3R    1          22552
CULV2     3.5                  239.5      705.6      702.1
SECTION   WSAS3R
              -100     713.3       -50     710.9         0     710.3
                50     711.9       100     712.6
ENDTABLE
SEGMENT   WSAS3C    1          N          -10
```

```
----------80/80 LIST OF INPUT DATA----------
NVALUE    .04
SEGMENT   WSAS3C    2         C         10
NVALUE    .045
SEGMENT   WSAS3C    3         N         50
NVALUE    .04
SECTION   WSAS3C
              -50     714.3      -25     711.7      -10     709.8
               -2     707.6       -1     707.2        0     706.6
                2     707.1        3     708.0       10     709.6
               25     712.7       50     714.6
ENDTABLE
SEGMENT   WSAV1     1         N        -15
NVALUE    .04
SEGMENT   WSAV1     2         C         15
NVALUE    .045
SEGMENT   WSAV1     3         N        100
NVALUE    .040
SECTION   WSAV1
             -100     718.7      -50     718.5      -25     717.0
              -15     713.9      -10     713.5       -1     713.4
                0     712.8        5     713.1       15     713.6
               25     713.6       35     715.9       50     718.6
               75     721.1      100     722.0
ENDTABLE
CULV1     WSAS5R    1         22552
CULV2     4.3                 62.0      717.5     715.2
SECTION   WSAS5R
             -150     728.6      -100    727.7       -50     726.8
                0     725.7        50    725.8       100     726.3
              150     726.7
ENDTABLE
SEGMENT   WSAS5C    1         N        -10
NVALUE    .050
SEGMENT   WSAS5C    2         C         2
NVALUE    .045
SEGMENT   WSAS5C    3         N         35
NVALUE    .040
SECTION   WSAS5C
             -112     728.0      -111    728.0      -110     728.0
              -50     726.3       -40    723.9       -25     720.3
              -10     718.9        -3    718.6        -2     717.8
                0     717.5         1    717.6         2     718.5
                8     721.0        25    724.5        35     726.7
ENDTABLE
CULV1     WSAS6R    1         22552
```

```
----------80/80 LIST OF INPUT DATA----------
CULV2     3.5                  60        722.9     722.7
SECTION   WSAS6R
              -150    729.5      -100    730.7      -50    729.2
                 0    727.1        50    727.8      100    729.0
               150    730.2
ENDTABLE
SEGMENT   WSAS6V    1          N          37
NVALUE    .05
SEGMENT   WSAS6V    2          C          49
NVALUE    .045
SEGMENT   WSAS6V    3          N          100
NVALUE    .04
SECTION   WSAS6V
                 0    729.0        24    727.6        31    726.6
                37    725.0        40    724.2        42    723.9
                45    723.9        49    724.1        56    724.6
                75    726.3       100    727.3       240    729.0
ENDTABLE
CULV1     WSAS6A    1          22552
CULV2     3.5                  58        724.2     723.9
SECTION   WSAS6A
               -50    730.0         0    728.6        50    730.0
ENDTABLE
SEGMENT   WSAS6B    1          N          37
NVALUE    .05
SEGMENT   WSAS6B    2          C          56
NVALUE    .045
SEGMENT   WSAS6B    3          N          100
NVALUE    .040
SECTION   WSAS6B
                 0    730.8        24    729.4        31    728.4
                37    726.8        40    726.0        42    725.7
                45    725.7        49    725.9        56    726.4
                75    728.1       100    729.1       120    731.0
ENDTABLE
CULV1     WSAS6C    1          22552
CULV2     3.0                  66        726.4     726.3
SECTION   WSAS6C
              -150    732.0      -149    732.0      -148    732.0
                 0    730.8        50    732.0        70    734.0
ENDTABLE
SEGMENT   WSAS6D    1          N          -5
NVALUE    .05
SEGMENT   WSAS6D    2          C          7
NVALUE    .045
```

```
----------80/80 LIST OF INPUT DATA----------
SEGMENT   WSAS6D    3          N          58
NVALUE    .04
SECTION   WSAS6D
              -150     732.0       -42     730.6       -18     730.5
               -11     729.8        -5     728.2        -2     727.3
                 0     727.1         3     727.1         7     727.3
                14     727.8        33     729.5        58     732.0
ENDTABLE
CULV1     WSAS6E    1          22534
CULV2     2.5                  116        728.5     727.8
SECTION   WSAS6E
              -200     736.0      -140     734.0         0     732.0
                90     734.0       180     735.0
ENDTABLE
SEGMENT   WSAS6F    1          N          37
NVALUE    .05
SEGMENT   WSAS6F    2          C          56
NVALUE    .045
SEGMENT   WSAS6F    3          N          142
NVALUE    .04
SECTION   WSAS6F
              -102     734.0      -101     734.0      -100     734.0
                 0     732.4        24     732.1        31     731.4
                37     729.8        40     728.9        42     728.7
                45     728.7        49     728.9        56     729.4
                75     731.1       100     731.8       142     732.0
               170     735.0
ENDTABLE
SEGMENT   WSAV2     1          N          -10
NVALUE    .05
SEGMENT   WSAV2     2          C          10
NVALUE    .045
SEGMENT   WSAV2     3          N          200
NVALUE    .040
SECTION   WSAV2
              -272     736.0      -271     736.0      -270     736.0
              -250     734.3      -200     734.2      -150     734.3
              -100     734.0       -40     733.8       -30     737.6
               -25     737.4       -20     736.2       -10     732.5
                -3     729.9        -2     729.5         0     729.1
                 2     729.5         3     730.4        10     733.0
                25     733.8        50     735.0       150     735.9
               200     737.7
ENDTABLE
SEGMENT   WSAV3     1          N          -12
```

LOMR 96-05-2797 (11/26/1997) SUPERSEDES!

HARZA ENGINEERING COMPANY

```
----------80/80 LIST OF INPUT DATA----------
NVALUE    .06
SEGMENT   WSAV3     2         C        11
NVALUE    .045
SEGMENT   WSAV3     3         N       500
NVALUE    .055
SECTION   WSAV3
              -500     739.9      -400     743.9      -300     741.8
              -200     738.2      -100     738.2       -50     737.3
               -25     736.9       -17     736.2       -12     735.7
               -10     734.6        -8     732.4        -5     732.3
                -3     732.0         0     731.7         4     731.9
                 6     732.4        11     735.3        18     738.6
                25     739.6        50     739.7       100     739.1
               200     740.7       400     751.8       500     755.3
ENDTABLE
SEGMENT   WSAV4     1         N        98
NVALUE    0.06
SEGMENT   WSAV4     2         C       103
NVALUE    0.045
SEGMENT   WSAV4     3         N       300
NVALUE    0.055
SECTION   WSAV4
              -100     760.2       -50     759.5         0     758.7
                50     757.4        75     757.6        98     758.0
                98     758.0        99     757.0       100     756.7
               102     757.1       103     758.2       125     757.8
               150     758.1       200     756.6       250     758.9
               300     760.6
ENDTABLE
COMPUTE   SMD03     WSAV4
----------END OF 80/80 LIST----------
```

23 JAN 79 RUN SUPERSEDES
↓
LOMR 96-05-279P (11/26/1997) SUPERSEDES!
-wsfsws 1/25/2012

COMPUTE SMD03 WSAV4

----------STARTING DATA FROM GIVEN ELEVATION----------

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION SMD03 DA= 5.1

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	665.6	0.0	0.0						
ZERO DAMG	668.5	41.1	330.0	.00	.00	.00			
BANK FULL	668.7	63.5	352.8	.00	.00	.00			
1	669.8	397.8	478.0	.00	.00	.00	10.00	669.0	.00285
2	670.2	612.3	780.0	.00	.00	.00	50.00	669.2	.00323
3	670.3	665.9	923.0	.00	.00	.00	100.00	669.3	.00370
4	670.7	934.3	1290.0	.00	.00	.00	500.00	669.5	.00313

SEGMENT TABLE FOR SECTION SMD03

CSM		TOTAL	SEG NO 1	SEG NO 2	SEG NO 3
			D	C	D
1	DISCHARGE CFS	478.	60.	202.	216.
93.	VELOCITY FPS	1.86	.75	2.68	.89
2	DISCHARGE CFS	780.	138.	264.	378.
152.	VELOCITY FPS	2.01	1.05	3.05	.96
3	DISCHARGE CFS	923.	171.	301.	452.
180.	VELOCITY FPS	2.16	1.18	3.37	1.05
4	DISCHARGE CFS	1290.	251.	322.	717.
252.	VELOCITY FPS	2.04	1.24	3.21	1.13
1	ELEV 669.8 KD	8947.	1114.	3782.	4051.
2	ELEV 670.2 KD	13629.	2290.	4753.	6586.
3	ELEV 670.3 KD	15119.	2715.	5017.	7388.
4	ELEV 670.7 KD	22869.	4461.	6100.	12308.

ELEVB= 692.37	EWSBD= 687.73	HDLOSS=	4.64
ELEVB= 695.23	EWSBD= 688.11	HDLOSS=	7.12
ELEVB= 697.07	EWSBD= 688.19	HDLOSS=	8.88
ELEVB= 701.50	EWSBD= 688.38	HDLOSS=	13.12

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

[I-55?]

ROAD SECTION WSAS1R

NO.	HW	CFS	HL	TW	CSM
0	687.10	0.00	0.00	0.00	0.00
1	692.37	178.00	4.64	687.73	10.00
2	695.23	290.00	7.12	688.11	50.00
3	697.07	345.00	8.88	688.19	100.00
4	701.50	495.00	13.12	688.38	500.00

MIN ROAD ELEVATION 701.10

OPENING NO.	NO. CULVERTS	CULV. CODE	HEIGHT OR DIAM	WIDTH	LENGTH	U/S INVERT	D/S INVERT	(N) COEFF
1	1	41111.	5.30	5.00	231.00	687.10	684.40	.012

WSP2 XEQ 24 J 77
REV 03/11/74

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAS1C DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	688.8	0.0	0.0						
BANK FULL	689.3	3.0	24.7	.00	.00	.00			
1	692.4	90.0	178.0	.00	.00	.00	10.00	690.7	.00128
2	695.2	298.2	290.0	.00	.00	.00	50.00	691.2	.00020
3	697.1	529.7	345.0	.00	.00	.00	100.00	691.4	.00007
ZERO DAMG	701.5	1374.2	494.9	.00	.00	.00			
4	701.5	1374.8	495.0	.00	.00	.00	500.00	691.8	.00001

**********PROFILE NO 4 EXCEEDS SURVEY DATA**********

SEGMENT TABLE FOR SECTION WSAS1C

CSM		TOTAL	SEG NO 1 N	SEG NO 2 C	SEG NO 3 N
1	DISCHARGE CFS	178.	25.	94.	59.
237.	VELOCITY FPS	2.17	1.37	2.57	1.67
2	DISCHARGE CFS	290.	87.	105.	98.
387.	VELOCITY FPS	1.13	.80	1.55	.80
3	DISCHARGE CFS	345.	128.	92.	125.
460.	VELOCITY FPS	.73	.60	1.04	.55
4	DISCHARGE CFS	495.	206.	82.	207.
660.	VELOCITY FPS	.39	.33	.60	.33
1 ELEV	692.4 KD	4983.	695.	2639.	1649.
2 ELEV	695.2 KD	20296.	6093.	7349.	6854.

HARZA ENGINEERING COMPANY

3	ELEV	697.1	KD	42304.	15632.	11337.	15335.	
4	ELEV	701.5	KD	142488.	59298.	23661.	59529.	
ELEVB=	700.72	EWSBD=	695.76	HDLOSS=	4.96			
ELEVB=	704.57	EWSBD=	696.65	HDLOSS=	7.92			
ELEVB=	707.29	EWSBD=	697.45	HDLOSS=	9.84			
ELEVB=	708.47	EWSBD=	701.51	HDLOSS=	6.96			

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

ROAD SECTION WSAS2R

NO.	HW	CFS	HL	TW	CSM
0	695.40	0.00	0.00	0.00	0.00
1	700.72	178.00	4.96	695.76	10.00
2	704.57	290.00	7.92	696.65	50.00
3	707.29	345.00	9.84	697.45	100.00
4	708.47	495.00	6.96	701.51	500.00

MIN ROAD ELEVATION 707.90

OPENING NO.	NO. CULVERTS	CULV. CODE	HEIGHT OR DIAM	WIDTH	LENGTH	U/S INVERT	D/S INVERT	(N) COEFF
1	1	41111.	4.20	5.30	89.70	695.40	693.80	.012

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAS2C DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	696.2	0.0	0.0						
BANK FULL	699.3	24.6	118.9	.00	.00	.00			
1	700.8	80.0	178.0	.00	.00	.00	10.00	699.4	.00220
2	704.6	334.6	290.0	.00	.00	.00	50.00	700.0	.00012
3	707.3	620.9	345.0	.00	.00	.00	100.00	700.2	.00003
4	708.5	777.2	495.0	.00	.00	.00	500.00	700.6	.00004

SEGMENT TABLE FOR SECTION WSAS2C

CSM	TOTAL	SEG NO 1	2	3
		N	C	N

HARZA ENGINEERING COMPANY

1	DISCHARGE CFS	178.	3.	137.	38.
237.	VELOCITY FPS	2.44	.93	2.62	1.56
2	DISCHARGE CFS	290.	50.	142.	98.
387.	VELOCITY FPS	.94	.69	1.12	.73
3	DISCHARGE CFS	345.	80.	137.	128.
460.	VELOCITY FPS	.60	.45	.75	.49
4	DISCHARGE CFS	495.	127.	180.	188.
660.	VELOCITY FPS	.69	.53	.88	.57
1	ELEV 700.8 KD	3771.	50.	2939.	783.
2	ELEV 704.6 KD	26241.	4513.	12913.	8816.
3	ELEV 707.3 KD	59033.	13625.	23447.	21962.
4	ELEV 708.5 KD	78886.	20153.	28741.	29991.

RATING TABLE FOR SECTION WSAWV1 DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	700.3	0.0	0.0						
BANK FULL	700.9	8.0	62.4	.00	.00	.00			
1	702.0	55.8	178.0	.00	.00	.00	10.00	701.6	.00740
2	704.6	204.5	290.0	.00	.00	.00	50.00	701.9	.00037
3	707.3	408.4	345.0	.00	.00	.00	100.00	702.0	.00008
4	708.5	521.5	495.0	.00	.00	.00	500.00	702.4	.00008

SEGMENT TABLE FOR SECTION WSAWV1

CSM		TOTAL	SEG NO 1 N	SEG NO 2 C	SEG NO 3 N
1	DISCHARGE CFS	178.	4.	170.	4.
237.	VELOCITY FPS	3.30	1.69	3.32	1.71
2	DISCHARGE CFS	290.	24.	244.	22.
387.	VELOCITY FPS	1.49	1.01	1.57	.85
3	DISCHARGE CFS	345.	40.	263.	42.
460.	VELOCITY FPS	.92	.58	1.00	.55
4	DISCHARGE CFS	495.	67.	366.	62.
660.	VELOCITY FPS	1.06	.68	1.18	.55
1	ELEV 702.0 KD	2067.	38.	1984.	45.
2	ELEV 704.6 KD	14987.	1213.	12644.	1130.
3	ELEV 707.3 KD	39763.	4582.	30361.	4820.
4	ELEV 708.5 KD	54052.	7333.	39967.	6751.

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAWDS DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM		CRIT ELEV	FRICTION SLOPE
0	700.8	0.0	0.0							
BANK FULL	700.8	.0	.0	.00	.00	.00				
1	703.0	35.2	178.0	.00	.00	.00	10.00	C	703.0	.03866
2	704.6	120.5	290.0	.00	.00	.00	50.00		703.3	.00281
3	707.3	322.0	345.0	.00	.00	.00	100.00		703.5	.00022
4	708.5	434.8	495.0	.00	.00	.00	500.00		703.8	.00020

SEGMENT TABLE FOR SECTION WSAWDS

CSM		TOTAL	SEG NO 1 N	SEG NO 2 C	SEG NO 3 N
1	DISCHARGE CFS	178.	40.	57.	80.
237.	VELOCITY FPS	5.57	6.44	3.98	5.52
2	DISCHARGE CFS	290.	43.	156.	91.
387.	VELOCITY FPS	2.43	2.57	2.44	2.29
3	DISCHARGE CFS	345.	49.	193.	103.
460.	VELOCITY FPS	1.11	.89	1.23	.93
4	DISCHARGE CFS	495.	80.	273.	141.
660.	VELOCITY FPS	1.21	.97	1.39	.91
1	ELEV 703.0 KD	887.	212.	255.	420.
2	ELEV 704.6 KD	5469.	821.	2921.	1726.
3	ELEV 707.3 KD	23442.	3336.	13123.	6983.
4	ELEV 708.5 KD	34720.	5617.	19175.	9927.

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAWUS DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM		CRIT ELEV	FRICTION SLOPE
0	700.8	0.0	0.0							
BANK FULL	700.8	.0	.0	.00	.00	.00				
1	703.0	35.2	178.0	.00	.00	.00	10.00	C	703.0	.01431
2	704.5	116.7	290.0	.00	.00	.00	50.00		703.3	.00066
3	707.3	322.7	345.0	.00	.00	.00	100.00		703.5	.00004
4	708.4	434.9	495.0	.00	.00	.00	500.00		703.8	.00004

B

SEGMENT TABLE FOR SECTION WSAWUS

HARZA
ENGINEERING COMPANY

CSM		TOTAL	SEG NO 1 N	2 C	3 N
1	DISCHARGE CFS	178.	23.	108.	47.
237.	VELOCITY FPS	6.46	3.76	7.46	3.22
2	DISCHARGE CFS	290.	21.	227.	42.
387.	VELOCITY FPS	3.33	1.23	3.70	1.09
3	DISCHARGE CFS	345.	24.	276.	46.
460.	VELOCITY FPS	1.59	.41	1.77	.42
4	DISCHARGE CFS	495.	38.	393.	63.
660.	VELOCITY FPS	1.81	.45	2.01	.41
1	ELEV 703.0 KD	1452.	212.	820.	420.
2	ELEV 704.5 KD	11285.	805.	8836.	1644.
3	ELEV 707.3 KD	52385.	3566.	41880.	6939.
4	ELEV 708.4 KD	76926.	5929.	61147.	9850.

RATING TABLE FOR SECTION WSAWV2 DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	700.8	0.0	0.0						
BANK FULL	701.4	8.0	37.9	.00	.00	.00			
1	703.6	114.4	178.0	.00	.00	.00	10.00	702.1	.00081
2	704.6	173.2	290.0	.00	.00	.00	50.00	702.4	.00061
3	707.3	365.6	345.0	.00	.00	.00	100.00	702.5	.00010
4	708.5	470.6	495.0	.00	.00	.00	500.00	702.9	.00011

SEGMENT TABLE FOR SECTION WSAWV2

CSM		TOTAL	SEG NO 1 N	2 C	3 N
1	DISCHARGE CFS	178.	10.	160.	8.
237.	VELOCITY FPS	1.62	1.04	1.67	.89
2	DISCHARGE CFS	290.	22.	249.	19.
387.	VELOCITY FPS	1.76	1.19	1.84	.99
3	DISCHARGE CFS	345.	37.	269.	39.
460.	VELOCITY FPS	1.02	.64	1.11	.60
4	DISCHARGE CFS	495.	63.	371.	61.
660.	VELOCITY FPS	1.16	.74	1.28	.64
1	ELEV 703.6 KD	6239.	332.	5622.	285.
2	ELEV 704.6 KD	11700.	867.	10063.	770.
3	ELEV 707.3 KD	34134.	3666.	26591.	3876.
4	ELEV 708.5 KD	47663.	6049.	35737.	5876.

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAS2A DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	701.8	0.0	0.0						
BANK FULL	702.4	8.0	56.8	.00	.00	.00			
1	703.7	61.9	178.0	.00	.00	.00	10.00	703.1	.00303
2	704.6	108.9	290.0	.00	.00	.00	50.00	703.4	.00143
3	707.3	279.7	345.0	.00	.00	.00	100.00	703.5	.00013
4	708.5	373.3	495.0	.00	.00	.00	500.00	703.9	.00012

SEGMENT TABLE FOR SECTION WSAS2A

CSM		TOTAL	SEG NO 1 N	SEG NO 2 C	SEG NO 3 N
1	DISCHARGE CFS	178.	1.	173.	5.
237.	VELOCITY FPS	2.96	.95	2.97	1.50
2	DISCHARGE CFS	290.	5.	271.	14.
387.	VELOCITY FPS	2.79	1.17	2.84	1.48
3	DISCHARGE CFS	345.	21.	290.	34.
460.	VELOCITY FPS	1.34	.66	1.43	.76
4	DISCHARGE CFS	495.	41.	396.	58.
660.	VELOCITY FPS	1.47	.75	1.59	.84
1	ELEV 703.7 KD	3230.	8.	3140.	82.
2	ELEV 704.6 KD	7666.	120.	7192.	354.
3	ELEV 707.3 KD	30068.	1853.	25273.	2942.
4	ELEV 708.5 KD	44714.	3679.	35807.	5228.

ELEVB= 705.94 EWSBD= 704.04 HDLOSS= 1.60
BRIDGE HEADWATER BELOW CRITICAL DEPTH ON APPROACH SECTION, HW PRESUMED AT CRITICAL**********
ELEVB= 711.40 EWSBD= 704.84 HDLOSS= 6.56
ELEVB= 711.55 EWSBD= 707.31 HDLOSS= 4.24
ELEVB= 711.84 EWSBD= 708.48 HDLOSS= 3.36

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

ROAD SECTION WSAS3R

NO.	HW	CFS	HL	TW	CSM

0	705.60	0.00	0.00	0.00	0.00
1	708.68	178.00	4.64	704.04	10.00
2	711.40	290.00	6.56	704.84	50.00
3	711.55	345.00	4.24	707.31	100.00
4	711.84	495.00	3.36	708.48	500.00

MIN ROAD ELEVATION 710.30

OPENING NO.	NO. CULVERTS	CULV. CODE	HEIGHT OR DIAM	WIDTH	LENGTH	U/S INVERT	D/S INVERT	(N) COEFF
1	1	22552.	3.50		239.50	705.60	702.10	.012

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAS3C DA= .7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM		CRIT ELEV	FRICTION SLOPE
0	706.6	0.0	0.0							
BANK FULL	709.6	25.3	173.5	.00	.00	.00				
1	709.7	27.0	178.0	.00	.00	.00	10.00	C	709.7	.02834
2	711.3	77.2	290.0	.00	.00	.00	50.00		710.3	.00410
3	711.5	83.2	345.0	.00	.00	.00	100.00		710.5	.00480
4	711.7	94.3	495.0	.00	.00	.00	500.00		711.0	.00729

SEGMENT TABLE FOR SECTION WSAS3C

CSM		TOTAL	SEG NO 1 N	2 C	3 N
1	DISCHARGE CFS	178.	0.	178.	0.
237.	VELOCITY FPS	6.66	.00	6.63	.00
2	DISCHARGE CFS	290.	19.	255.	16.
387.	VELOCITY FPS	4.05	2.01	4.24	2.15
3	DISCHARGE CFS	345.	27.	297.	22.
460.	VELOCITY FPS	4.49	2.32	4.71	2.47
4	DISCHARGE CFS	495.	48.	410.	37.
660.	VELOCITY FPS	5.76	3.12	6.05	3.32
1	ELEV 709.7 KD	1057.	1.	1054.	1.
2	ELEV 711.3 KD	4521.	289.	3988.	244.
3	ELEV 711.5 KD	4967.	364.	4302.	300.
4	ELEV 711.7 KD	5756.	506.	4845.	405.

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

RATING TABLE FOR SECTION WSAV1 DA= .6

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	CSM	CRIT ELEV	FRICTION SLOPE
0	712.8	0.0	0.0						
BANK FULL	713.6	7.7	74.3	.00	.00	.00			
1	714.4	41.1	149.0	.00	.00	.00	10.00	714.2	.01248
2	715.0	67.5	245.0	.00	.00	.00	50.00	714.5	.00722
3	715.1	73.5	290.0	.00	.00	.00	100.00	714.6	.00777
4	715.5	95.6	420.0	.00	.00	.00	500.00	714.9	.00733

SEGMENT TABLE FOR SECTION WSAV1

CSM		TOTAL	SEG NO 1 N	SEG NO 2 C	SEG NO 3 N
1	DISCHARGE CFS	149.	0.	118.	31.
257.	VELOCITY FPS	3.67	.00	3.79	3.27
2	DISCHARGE CFS	245.	4.	182.	59.
422.	VELOCITY FPS	3.70	2.06	3.80	3.35
3	DISCHARGE CFS	290.	5.	213.	72.
500.	VELOCITY FPS	4.02	2.27	4.14	3.65
4	DISCHARGE CFS	420.	12.	298.	110.
724.	VELOCITY FPS	4.50	2.72	4.64	4.07
1	ELEV 714.4 KD	1334.	6.	1053.	275.
2	ELEV 715.0 KD	2880.	42.	2145.	693.
3	ELEV 715.1 KD	3287.	56.	2423.	808.
4	ELEV 715.5 KD	4899.	126.	3494.	1278.

ELEVB= 723.58 EWSBD= 716.86 HDLOSS= 6.72
ELEVB= 726.09 EWSBD= 717.13 HDLOSS= 8.96
ELEVB= 726.24 EWSBD= 717.36 HDLOSS= 8.88
ELEVB= 726.50 EWSBD= 717.70 HDLOSS= 8.80

WSP2 XEQ 24 J 77
REV 03/11/74

DARIEN FLOOD INSURANCE STUDY
SAWMILL CREEK WESTERN TRIB

ROAD SECTION WSAS5R

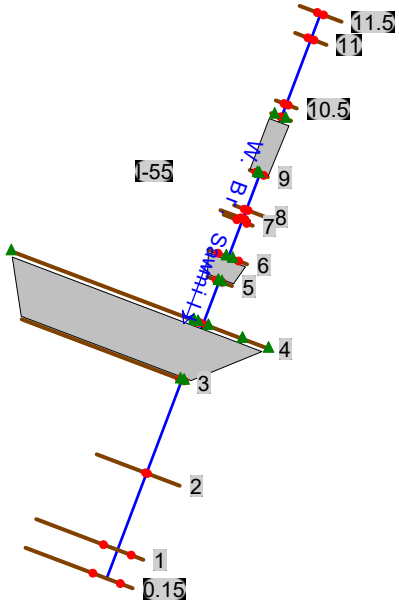
NO.	HW	CFS	HL	TW	CSM
0	717.50	0.00	0.00	0.00	0.00
1	723.58	149.00	6.72	716.86	10.00
2	726.09	245.00	8.96	717.13	50.00
3	726.24	290.00	8.88	717.36	100.00
4	726.50	420.00	8.80	717.70	500.00

MIN ROAD ELEVATION 725.70

TAB B

SECTION 13.B

DESIGN EXISTING CONDITIONS



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

HEC-RAS HEC-RAS 5.0.1 April 2016
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
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PROJECT DATA
Project Title: WBrSawCr
Project File : WBrSawCr.prj
Run Date and Time: 9/9/2016 3:17:30 PM

Project in English units

Project Description:
2016 CBBEL model for I-55 over Sawmill Creek.

PLAN DATA

Plan Title: Ex CBBEL Start WSEL
Plan File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.p06

Geometry Title: Mod Ex Start WSEL
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.g06

Flow Title : Ex CBBEL Start WSEL
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.f03

Plan Description:
Existing conditions of I-55 over West Branch of Sawmill Creek. Created from
2012 CBBEL survey Cross sections, structures, and select FIS cross sections.
Starting water surface and flows from FIS profile near confluence with Wards
Creek. Proper ineffective cones and expansion/contraction coefficients used.
All elevations presented in NAVD 88.

Plan Summary Information:

Number of:	Cross Sections	= 15	Multiple Openings	=	0
	Culverts	= 3	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

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

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

FLOW DATA

Flow Title: Ex CBBEL Start WSEL
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.f03

Flow Data (cfs)

River	Reach	RS	10-yr	50-yr	100-yr	500-yr	OT
W. Br. Sawmill	I-55	11.5	149	245	290	420	257.17
W. Br. Sawmill	I-55	10.5	178	290	345	495	302
W. Br. Sawmill	I-55	0.15	478	780	923	1290	804

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
W. Br. Sawmill	I-55	10-yr	Known WS = 711.1	Known WS = 679
W. Br. Sawmill	I-55	50-yr	Known WS = 714.7	Known WS = 679.4
W. Br. Sawmill	I-55	100-yr	Known WS = 714.8	Known WS = 679.7
W. Br. Sawmill	I-55	500-yr	Known WS = 715.2	Known WS = 680
W. Br. Sawmill	I-55	OT	Known WS = 714.8	Known WS = 679.6

GEOMETRY DATA

Geometry Title: Mod Ex Start WSEL
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.g06

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 11.5

INPUT
Description: SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	718.42	-50	718.22	-25	716.72	-15	713.62	-10	713.22
-1	713.12	0	712.52	5	712.82	15	713.32	25	713.32
35	715.62	50	718.32	75	720.82	100	721.72		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-100	.04	-15	.045	15	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-15	15	83	120	146	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 11

INPUT

Description: CBBEL XS 11
500+43.39
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	716.852	30.56	715.885	37.56	715.758	59.49	715.517	66.19	709.774
66.46	709.295	69.86	709.461	70.78	709.782	73.17	710.437	88.41	714.419
109.41	715.141	133.38	716.846	149.88	717.276				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	59.49	.042	88.41	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.49	88.41	255	312	290	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 10.5

INPUT
Description: SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	714.02	-25	711.42	-10	709.52	-2	707.32	-1	706.92
0	706.32	2	706.82	3	707.72	10	709.32	25	712.42
50	714.32								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.04	-10	.045	10	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-10	10	61	61	61	.3	.5

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 10

INPUT
Description: CBBEL XS 10 - U/S of Access Road
504+15.12
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.46	17.33	712.16	20.72	711.82	24.32	711.48	31.2	710.35
36.98	709.34	42.41	706.53	45.51	706.45	45.79	705.65	45.93	705.19
46.6	705.01	47.43	705.39	48.46	705.76	49.17	707.2	53.6	708.23
68.17	711.67	81.08	713.11	94.67	713.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	42.41	.042	49.17	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.41	49.17	273	271	269	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	25	710.72	F
77.64	94.67	711	F

CULVERT

RIVER: W. Br. Sawmill
REACH: I-55 RS: 9.1

INPUT
Description: Culvert Under Access Road, default internal cross sections, deck

length = culvert length.

Distance from Upstream XS = 24.57
Deck/Roadway Width = 240.41
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 10

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-75	712.4	0	-50	711.7	0	-32	711.39	0
-22	711.23	0	0	711.02	0	9	711	0
18	710.72	0	50	710.88	0	93	711.18	0
137	711.14	0						

Upstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.46	17.33	712.16	20.72	711.82	24.32	711.48	31.2	710.35
36.98	709.34	42.41	706.53	45.51	706.45	45.79	705.65	45.93	705.19
46.6	705.01	47.43	705.39	48.46	705.76	49.17	707.2	53.6	708.23
68.17	711.67	81.08	713.11	94.67	713.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	42.41	.042	49.17	.08

Bank Sta: Left Right Coeff Contr. Expan.
42.41 49.17 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	25	710.72	F
77.64	94.67	711	F

Downstream Deck/Roadway Coordinates
num= 10

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-75	712.4	0	-50	711.7	0	-32	711.39	0
-22	711.23	0	0	711.02	0	9	711	0
18	710.72	0	50	710.88	0	93	711.18	0
137	711.14	0						

Downstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-19.128	712	-11.879	710	0	708.51	16.16	700.94	17.54	700.48
26.73	698.96	31.41	701.09	34.83	702.17	37.59	706.96	46.95	708.05
57.38	709.53	67	711						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-19.128	.08	0	.042	37.59	.08

Bank Sta: Left Right Coeff Contr. Expan.
0 37.59 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-19.128	20.54	707.83	F
30.06	67	707.97	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Access Road	Circular	3.5	

FHWA Chart # 1 - Concrete Pipe Culvert

FHWA Scale # 2 - Groove end entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	24.57	240.41	.013	.013	0	.2	1

Upstream Elevation = 705.15
Centerline Station = 46.9
Downstream Elevation = 701.44
Centerline Station = 26.73

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 9

INPUT
Description: CBBEL XS 9 - D/S of Access Road
506+86.95
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-19.128	712	-11.879	710	0	708.51	16.16	700.94	17.54	700.48
26.73	698.96	31.41	701.09	34.83	702.17	37.59	706.96	46.95	708.05
57.38	709.53	67	711						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-19.128	.08	0	.042	37.59	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	37.59	162	171	140	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-19.128	20.54	707.83	F
30.06	67	707.97	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 8

INPUT
Description: CBBEL XS 8 - U/S of inline weir
508.57.37
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-66.02	712	-55.32	710	-45.04	708	-34.8	706	-25	703.44
-12.55	702.06	1.55	701.72	13.2	701.93	20.13	698.55	30.3	702.58
40.93	706	50.77	708	61.19	710	79.61	712		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-66.02	.08	13.2	.042	30.3	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
13.2	30.3	6	42	22	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 7.5

INPUT
Description: CBBEL XS 7.5 includes concrete wall that was an existing weir
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	710	20.09	707.29	28.08	698.25	38.09	698.08	38.09	701.83
70.68	702.19	74.81	703.1	75.22	702.25	83.69	704	95.7	706
104.94	708	116.33	710	136.27	712				

```
Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08   28.08    .042   38.09    .015   83.69     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         20.09   38.09               18      14       3             .1       .3

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 7

INPUT
Description: CBBEL XS 7 -
509+26.76
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -34.07     710  -24.62     708     -15     706    -5.4     704       0  702.67
    2.02  698.37    8.05  698.43   12.88  699.31    18.7  700.29   27.67  699.04
   36.42  699.12   39.79  699.83   41.48  701.99   52.99     704   63.79     706
   73.51     708   85.38     710  105.11     712

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -34.07     .08    -5.4    .042   41.48     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -5.4   41.48              137     170     167             .3       .5

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 6

INPUT
Description: CBBEL XS 6 - U/S of N. Frontage Road
510+97.00
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -29.9     710       0  703.25      10  700.53      40  697.62   43.33  694.99
   49.97  694.91   76.32  695.11  108.45  699.56  121.05  704.29     154     710

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -29.9     .08      10    .042  108.45     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            10  108.45             114.5   114.5     126             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   -29.9      38  707.92       F
      69     154  707.92       F

CULVERT


RIVER: W. Br. Sawmill
REACH: I-55               RS: 5.1

INPUT
Description: Culvert under N. Frontage Road, default internal cross sections,
             deck length = culvert length.


Distance from Upstream XS =      13
Deck/Roadway Width        =    89.8
Weir Coefficient          =     2.7
Upstream  Deck/Roadway Coordinates
```

```
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -103.59  709.65       0     -53   708.9       0       0  708.09       0
      47  707.92       0     107  707.99       0     313     710       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -29.9     710       0  703.25      10  700.53      40  697.62   43.33  694.99
   49.97  694.91   76.32  695.11  108.45  699.56  121.05  704.29     154     710

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -29.9     .08      10    .042  108.45     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
           10  108.45            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   -29.9      38  707.92       F
      69     154  707.92       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     -96  709.65       0     -50   708.9       0       0  708.09       0
      56  707.92       0     110  707.99       0     316     710

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  702.83   20.61   700.5   46.67  696.29   48.49  692.49   49.18  690.83
   52.75  689.92   56.99  688.56   57.88  688.67    67.6  691.12   69.44  692.49
   71.05  693.24   74.88   700.8   93.37  702.21   117.7     704

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08   46.67    .042   74.88     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
         46.67   74.88            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    48.5  702.68       F
    65.2   117.7  702.68       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Cul Frontage         Box       4       5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                13    89.8     .013     .013        0                    .4                1
Upstream   Elevation =  694.97
           Centerline Station =  49.97
Downstream Elevation =  693.43
           Centerline Station =  57.2

CROSS SECTION
```

RIVER: W. Br. Sawmill
REACH: I-55 RS: 5

INPUT
Description: CBBEL XS 5 - D/S of N. Frontage Road
512+11.70
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	702.83	20.61	700.5	46.67	696.29	48.49	692.49	49.18	690.83
52.75	689.92	56.99	688.56	57.88	688.67	67.6	691.12	69.44	692.49
71.05	693.24	74.88	700.8	93.37	702.21	117.7	704		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	46.67	.042	74.88	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
46.67	74.88	325	204	173	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	48.5	702.68	F
65.2	117.7	702.68	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 4

INPUT
Description: CBBEL XS 4 - U/S of I-55 and S. Frontage Road
514+16.11
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-267.6	704	0	694.3	16.63	689.071	29.66	688.728	44.72	687.921
45.82	687.1	48.6	687.347	52.04	687.238	61.08	691.994	89.38	693.591
140	698	365	698	410	696	660	696	750	698
950	698	960	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-267.6	.08	29.66	.042	61.08	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
29.66	61.08	321	267	267	.3	.5

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-267.6	-143	702.68	F
-143	20	701.32	F
69.74	89.4	698.17	F
89.4	960	698.17	F

CULVERT

RIVER: W. Br. Sawmill
REACH: I-55 RS: 3.1

INPUT
Description: Culvert under I-55 and South Frontage Road, default internal cross sections, deck length = culvert length.

Distance from Upstream XS = 22.37
Deck/Roadway Width = 232.74
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 26

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-278	701.88		-228	701.87		-178	701.83	
-128	701.79		-78	701.75		-28	701.55	

22	701.32	72	701.03	122	700.83						
172	700.6	222	700.33	272	700.02						
322	699.4	372	699.36	422	698.88						
472	698.64	522	698.41	572	698.22						
622	698.17	672	698.23	722	698.2						
772	698.33	822	698.64	872	698.94						
922	699.29	972	699.57								

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-267.6	704	0	694.3	16.63	689.071	29.66	688.728	44.72	687.921
45.82	687.1	48.6	687.347	52.04	687.238	61.08	691.994	89.38	693.591
140	698	365	698	410	696	660	696	750	698
950	698	960	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-267.6	.08	29.66	.042	61.08	.08

Bank Sta: Left	Right	Coeff Contr.	Expan.
29.66	61.08	.3	.5

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-267.6	-143	702.68	F
-143	20	701.32	F
69.74	89.4	698.17	F
89.4	960	698.17	F

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-37	701.55		13	701.32	0	63	701.03	0
113	700.83	0	163	700.6	0	213	700.33	0
263	700.02	0	313	699.4	0	363	699.36	
413	698.88		463	698.64		513	698.41	
563	698.22		613	698.17		663	698.23	
713	698.2		763	698.33		813	698.64	

Downstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.94	14.71	685.85	16.8	683	18.35	681.28	20.71	680.61
25.41	681.37	30.02	681.76	32.85	682.782	34.34	683.32	35.4	684.42
37.2	686.29	51.54	687.29	110	692	225	692	325	686
685	686	790	688						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	14.71	.042	37.2	.08

Bank Sta: Left	Right	Coeff Contr.	Expan.
14.71	37.2	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	15.5	694.22	F
32.39	790	692.65	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culv # 1	Box	4	5

FHWA Chart # 8 - flared wingwalls

FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	22.37	232.74	.013	.013	0	.4	1

Upstream Elevation = 686.93
Centerline Station = 48.89
Downstream Elevation = 683.12
Centerline Station = 23.95

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 3

INPUT
Description: CBBEL XS 3 - D/S of I-55 and S. Frontage Road
516+83.31
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.94	14.71	685.85	16.8	683	18.35	681.28	20.71	680.61
25.41	681.37	30.02	681.76	32.85	682.782	34.34	683.32	35.4	684.42
37.2	686.29	51.54	687.29	110	692	225	692	325	686
685	686	790	688						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	14.71	.042	37.2	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
14.71	37.2	364	445	326	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	15.5	694.22	F
32.39	790	692.65	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 2

INPUT
Description: CBBEL XS 2
521+27.64
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.69	114	680.35	154	680.39	156	679.12	157.5	679.25
159	679.74	162.2	680.75	178.8	679.71	206.4	679.59	240.8	679.76
261.3	679.43	306.3	679.4	344.55	680	395.25	682		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	154	.042	162.2	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
154	162.2	255	366	108	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 1

INPUT
Description: CBBEL XS 1 extended with 2' topo 524+93.75
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-169.56	684	-147.66	682	-130	680	-112	678	0	677.67
20	677.94	92	677.67	153	678	341.1	680		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-169.56	.08	-112	.042	20	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-112	20	500	136	350	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 0.15

INPUT
Description: Copy of CBBEL XS 1 extended with 2' topo for use as assumed XS at confluence with Wards Creek. No vertical adjustment to XS 0.15 to be conservative.

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-169.56	684	-147.66	682	-130	680	-112	678	0	677.67
20	677.94	92	677.67	153	678	341.1	680		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-169.56	.08	-112	.042	20	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-112	20	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:W. Br. Sawmill

Reach	River Sta.	n1	n2	n3	n4
I-55	11.5	.04	.045	.04	
I-55	11	.08	.042	.08	
I-55	10.5	.04	.045	.04	
I-55	10	.08	.042	.08	
I-55	9.1	Culvert			
I-55	9	.08	.042	.08	
I-55	8	.08	.042	.08	
I-55	7.5	.08	.042	.015	.08
I-55	7	.08	.042	.08	
I-55	6	.08	.042	.08	
I-55	5.1	Culvert			
I-55	5	.08	.042	.08	
I-55	4	.08	.042	.08	
I-55	3.1	Culvert			
I-55	3	.08	.042	.08	
I-55	2	.08	.042	.08	
I-55	1	.08	.042	.08	
I-55	0.15	.08	.042	.08	

SUMMARY OF REACH LENGTHS

River: W. Br. Sawmill

Reach	River Sta.	Left	Channel	Right
I-55	11.5	83	120	146
I-55	11	255	312	290
I-55	10.5	61	61	61
I-55	10	273	271	269
I-55	9.1	Culvert		

I-55	9	162	171	140
I-55	8	6	42	22
I-55	7.5	18	14	3
I-55	7	137	170	167
I-55	6	114.5	114.5	126
I-55	5.1	Culvert		
I-55	5	325	204	173
I-55	4	321	267	267
I-55	3.1	Culvert		
I-55	3	364	445	326
I-55	2	255	366	108
I-55	1	500	136	350
I-55	0.15	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: W. Br. Sawmill

Reach	River Sta.	Contr.	Expan.
I-55	11.5	.1	.3
I-55	11	.1	.3
I-55	10.5	.3	.5
I-55	10	.3	.5
I-55	9.1	Culvert	
I-55	9	.3	.5
I-55	8	.1	.3
I-55	7.5	.1	.3
I-55	7	.3	.5
I-55	6	.3	.5
I-55	5.1	Culvert	
I-55	5	.3	.5
I-55	4	.3	.5
I-55	3.1	Culvert	
I-55	3	.3	.5
I-55	2	.1	.3
I-55	1	.1	.3
I-55	0.15	.1	.3

10-Year

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 10-yr

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)	
I-55	11.5	10-yr	149.00	712.52	714.22	713.89	714.39	0.008935	3.39	45.64	45.88	0.56
I-55	11	10-yr	149.00	709.30	711.85	711.85	712.59	0.026100	6.92	21.54	14.80	1.01
I-55	10.5	10-yr	178.00	706.32	711.61	709.40	711.67	0.000769	2.06	100.93	47.88	0.19
I-55	10	10-yr	178.00	705.01	711.51	708.75	711.60	0.001032	2.98	109.87	43.48	0.22
I-55	9.1		Culvert									
I-55	9	10-yr	178.00	698.96	703.45	701.78	703.81	0.003195	4.81	37.02	24.76	0.43
I-55	8	10-yr	178.00	698.55	701.99	701.99	702.64	0.018188	6.49	30.47	38.43	0.87
I-55	7.5	10-yr	178.00	698.08	700.86	700.24	701.41	0.018540	5.93	30.00	12.32	0.67
I-55	7	10-yr	178.00	698.37	701.11		701.20	0.002287	2.43	73.38	40.06	0.32
I-55	6	10-yr	178.00	694.91	701.11	696.10	701.12	0.000077	0.99	180.27	104.71	0.07
I-55	5.1		Culvert									
I-55	5	10-yr	178.00	688.56	693.07	691.19	693.22	0.001804	3.17	56.19	22.46	0.30
I-55	4	10-yr	178.00	687.10	693.07	689.18	693.09	0.000126	1.07	192.85	76.23	0.09
I-55	3.1		Culvert									
I-55	3	10-yr	178.00	680.61	684.22	683.05	684.47	0.004127	4.08	43.67	19.30	0.44
I-55	2	10-yr	178.00	679.12	679.96	679.96	680.11	0.083200	6.09	62.56	171.82	1.53
I-55	1	10-yr	178.00	677.67	679.22	678.09	679.23	0.000185	0.60	447.37	390.96	0.09
I-55	0.15	10-yr	478.00	677.67	679.00	678.33	679.04	0.002455	1.95	363.01	368.05	0.32

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 10-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	10-yr	714.39	714.22	0.17	1.75	0.06	0.90	116.14	31.95	45.88
I-55	11	10-yr	712.59	711.85	0.74	0.61	0.21		149.00		14.80
I-55	10.5	10-yr	711.67	711.61	0.06	0.05	0.01	17.98	145.94	14.08	47.88
I-55	10	10-yr	711.60	711.51	0.09			28.37	110.86	38.78	43.48
I-55	9.1		Culvert								
I-55	9	10-yr	703.81	703.45	0.36	1.08	0.09		178.00		24.76
I-55	8	10-yr	702.64	701.99	0.65	0.77	0.03	2.42	175.58		38.43
I-55	7.5	10-yr	701.41	700.86	0.55	0.07	0.14		178.00		12.32
I-55	7	10-yr	701.20	701.11	0.09	0.04	0.04		178.00		40.06
I-55	6	10-yr	701.12	701.11	0.02				178.00		104.71
I-55	5.1		Culvert								
I-55	5	10-yr	693.22	693.07	0.16	0.07	0.07		178.00		22.46
I-55	4	10-yr	693.09	693.07	0.02			22.13	154.55	1.33	76.23
I-55	3.1		Culvert								
I-55	3	10-yr	684.47	684.22	0.26	4.31	0.05		178.00		19.30
I-55	2	10-yr	680.11	679.96	0.15	0.13	0.04		15.03	162.97	171.82
I-55	1	10-yr	679.23	679.22	0.00	0.18	0.00	1.22	110.28	66.50	390.96
I-55	0.15	10-yr	679.04	679.00	0.04			2.60	300.41	174.99	368.05

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016

W. Br. Sawmill I-55

Legend

WS 10-yr

Ground

Elevation (ft)

710

700

690

680

0

500

1000

1500

2000

2500

3000

Main Channel Distance (ft)

1 CBBEL ...

2 CBBEL XS 2

3 CBBEL XS 3 - D/...

3.1 Culvert under I-55 and South Fron...

5 CBBEL XS 5 - D/S of N. Frontage Road

5.1 Culvert under N. Frontage Road, default internal cross se...

7 CBBEL XS 7 -

8 CBBEL XS 8 - U/S of inline weir

9 CBBEL XS 9 - D/S of Access Road

9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert length...

10 CBBEL XS 10 - U/S of Access Road

10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88

11 CBBEL XS 11

11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Ex Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 10-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 10-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 10-yr Culv: Access Road
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 10-yr

Errors Warnings and Notes for Plan : Ex Start WSEL (Continued)

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Note:	During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 10-yr Culv: Cul Frontage
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Note:	During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 10-yr Culv: Culv # 1
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 1 Profile: 10-yr
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.

50-Year

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 50-yr

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)	
I-55	11.5	50-yr	245.00	712.52	714.70	714.18	714.91	0.006838	3.75	68.43	49.50	0.52
I-55	11	50-yr	245.00	709.30	712.49	712.49	713.40	0.024429	7.65	32.03	17.99	1.01
I-55	10.5	50-yr	290.00	706.32	712.18	709.98	712.27	0.001062	2.67	130.60	56.13	0.23
I-55	10	50-yr	290.00	705.01	711.98	709.55	712.16	0.001896	4.27	132.21	51.83	0.31
I-55	9.1		Culvert									
I-55	9	50-yr	290.00	698.96	703.94	702.63	704.69	0.005677	6.94	41.76	26.11	0.58
I-55	8	50-yr	290.00	698.55	703.35		703.60	0.004387	4.51	96.57	56.86	0.47
I-55	7.5	50-yr	290.00	698.08	703.37		703.51	0.001001	1.78	114.42	57.10	0.15
I-55	7	50-yr	290.00	698.37	703.43		703.47	0.000436	1.70	175.76	52.79	0.15
I-55	6	50-yr	290.00	694.91	703.42	696.53	703.44	0.000068	1.15	251.78	119.46	0.07
I-55	5.1		Culvert									
I-55	5	50-yr	290.00	688.56	697.61	691.80	697.68	0.000278	2.20	131.99	34.73	0.14
I-55	4	50-yr	290.00	687.10	697.62	689.58	697.63	0.000030	0.83	419.35	586.97	0.05
I-55	3.1		Culvert									
I-55	3	50-yr	290.00	680.61	684.99	683.66	685.40	0.004831	5.12	56.67	20.61	0.49
I-55	2	50-yr	290.00	679.12	680.07	680.07	680.29	0.094643	6.99	82.26	178.69	1.66
I-55	1	50-yr	290.00	677.67	679.64	678.19	679.65	0.000194	0.73	619.60	433.98	0.10
I-55	0.15	50-yr	780.00	677.67	679.40	678.53	679.46	0.002327	2.30	518.49	409.27	0.32

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 50-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	50-yr	714.91	714.70	0.20	1.44	0.07	3.74	182.00	59.26	49.50
I-55	11	50-yr	713.40	712.49	0.91	0.80	0.25		245.00		17.99
I-55	10.5	50-yr	712.27	712.18	0.09	0.08	0.03	40.21	219.83	29.96	56.13
I-55	10	50-yr	712.16	711.98	0.18			50.96	172.31	66.73	51.83
I-55	9.1		Culvert								
I-55	9	50-yr	704.69	703.94	0.75	0.84	0.25		290.00		26.11
I-55	8	50-yr	703.60	703.35	0.25	0.06	0.04	64.44	224.98	0.58	56.86
I-55	7.5	50-yr	703.51	703.37	0.13	0.01	0.03		113.48	176.52	57.10
I-55	7	50-yr	703.47	703.43	0.04	0.02	0.01		288.18	1.82	52.79
I-55	6	50-yr	703.44	703.42	0.02				290.00		119.46
I-55	5.1		Culvert								
I-55	5	50-yr	697.68	697.61	0.08	0.01	0.03		290.00		34.73
I-55	4	50-yr	697.63	697.62	0.01			36.86	238.49	14.65	586.97
I-55	3.1		Culvert								
I-55	3	50-yr	685.40	684.99	0.41	5.01	0.09		290.00		20.61
I-55	2	50-yr	680.29	680.07	0.22	0.14	0.06		21.39	268.61	178.69
I-55	1	50-yr	679.65	679.64	0.01	0.18	0.01	2.73	174.68	112.59	433.98
I-55	0.15	50-yr	679.46	679.40	0.06			6.21	477.55	296.25	409.27

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016

W. Br. Sawmill I-55

Legend

WS 50-yr

Ground

Elevation (ft)

710

700

690

680

0

500

1000

1500

2000

2500

3000

Main Channel Distance (ft)

1 CBBEL ...

2 CBBEL XS 2

3 CBBEL XS 3 - D/...

3.1 Culvert under I-55 and South Fron...

5 CBBEL XS 5 - D/S of N. Frontage Road

5.1 Culvert under N. Frontage Road, default internal cross se...

7 CBBEL XS 7 -

8 CBBEL XS 8 - U/S of inline weir

9 CBBEL XS 9 - D/S of Access Road

9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert length...

10 CBBEL XS 10 - U/S of Access Road

10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88

11 CBBEL XS 11

11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Ex Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 50-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 50-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 50-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 50-yr Culv: Access Road
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 50-yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 50-yr Culv: Cul Frontage
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore,

Errors Warnings and Notes for Plan : Ex Start WSEL (Continued)

	the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet
	answer will be used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Note:	During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 50-yr Culv: Culv # 1
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 50-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 1 Profile: 50-yr
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.

100-Year

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 100-yr

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)	
I-55	11.5	100-yr	290.00	712.52	714.90	714.31	715.12	0.006271	3.88	78.53	51.02	0.51
I-55	11	100-yr	290.00	709.30	712.75	712.75	713.71	0.023370	7.85	36.95	19.31	1.00
I-55	10.5	100-yr	345.00	706.32	712.39	710.25	712.50	0.001195	2.93	142.95	59.23	0.25
I-55	10	100-yr	345.00	705.01	712.14	709.95	712.37	0.002378	4.87	140.55	54.80	0.35
I-55	9.1		Culvert									
I-55	9	100-yr	345.00	698.96	706.48	703.00	706.90	0.001759	5.24	65.87	32.97	0.35
I-55	8	100-yr	345.00	698.55	706.58		706.61	0.000276	1.86	318.41	81.53	0.13
I-55	7.5	100-yr	345.00	698.08	706.58		706.61	0.000034	0.40	330.82	77.67	0.03
I-55	7	100-yr	345.00	698.37	706.59		706.60	0.000074	1.03	392.81	84.48	0.07
I-55	6	100-yr	345.00	694.91	706.58	696.74	706.60	0.000032	0.99	349.89	149.02	0.05
I-55	5.1		Culvert									
I-55	5	100-yr	345.00	688.56	698.34	692.07	698.43	0.000292	2.39	144.31	39.68	0.14
I-55	4	100-yr	345.00	687.10	698.38	689.75	698.38	0.000016	0.64	1632.82	1063.10	0.04
I-55	3.1		Culvert									
I-55	3	100-yr	345.00	680.61	685.29	683.94	685.78	0.005153	5.59	61.68	21.12	0.52
I-55	2	100-yr	345.00	679.12	680.12	680.12	680.37	0.094961	7.23	91.80	181.14	1.67
I-55	1	100-yr	345.00	677.67	679.90	678.23	679.91	0.000168	0.75	737.35	461.10	0.09
I-55	0.15	100-yr	923.00	677.67	679.70	678.61	679.75	0.001746	2.24	645.90	440.19	0.29

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 100-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	100-yr	715.12	714.90	0.22	1.34	0.07	5.64	211.83	72.53	51.02
I-55	11	100-yr	713.71	712.75	0.96	0.87	0.25		290.00		19.31
I-55	10.5	100-yr	712.50	712.39	0.11	0.10	0.04	52.70	253.77	38.53	59.23
I-55	10	100-yr	712.37	712.14	0.23			62.96	201.49	80.55	54.80
I-55	9.1		Culvert								
I-55	9	100-yr	706.90	706.48	0.43	0.10	0.20		345.00		32.97
I-55	8	100-yr	706.61	706.58	0.03	0.00	0.00	137.96	195.61	11.43	81.53
I-55	7.5	100-yr	706.61	706.58	0.03	0.00	0.00		45.75	299.25	77.67
I-55	7	100-yr	706.60	706.59	0.02	0.01	0.00	3.00	325.42	16.58	84.48
I-55	6	100-yr	706.60	706.58	0.02				345.00		149.02
I-55	5.1		Culvert								
I-55	5	100-yr	698.43	698.34	0.09	0.01	0.04		345.00		39.68
I-55	4	100-yr	698.38	698.38	0.00			31.01	199.54	114.44	1063.10
I-55	3.1		Culvert								
I-55	3	100-yr	685.78	685.29	0.49	5.28	0.12		345.00		21.12
I-55	2	100-yr	680.37	680.12	0.25	0.12	0.07		24.30	320.70	181.14
I-55	1	100-yr	679.91	679.90	0.01	0.15	0.00	3.78	204.09	137.13	461.10
I-55	0.15	100-yr	679.75	679.70	0.05			9.02	553.68	360.30	440.19

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016

W. Br. Sawmill I-55

Legend

WS 100-yr

Ground

Elevation (ft)

720

710

700

690

680

670

0

500

1000

1500

2000

2500

3000

Main Channel Distance (ft)

1 CBBEL XS 1 extend...

2 CBBEL XS 2

3 CBBEL XS 3 - D/S of I-55...

3.1 Culvert under I-55 and South Frontage ...

5 CBBEL XS 5 - D/S of N. Frontage Road

5.1 Culvert under N. Frontage Road, default internal cross se...

7 CBBEL XS 7 -

8 CBBEL XS 8 - U/S of inline weir

9 CBBEL XS 9 - D/S of Access Road

9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert ...

10 CBBEL XS 10 - U/S of Access Road

10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88

11 CBBEL XS 11

11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Ex Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 100-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 100-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10.5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 100-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 100-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 100-yr Culv: Cul Frontage
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore,
	the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet
	answer will be used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water

Errors Warnings and Notes for Plan : Ex Start WSEL (Continued)

	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 100-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 100-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 100-yr Culv: Culv # 1
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 100-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 1 Profile: 100-yr
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.

500-Year

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 500-yr

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)	
I-55	11.5	500-yr	420.00	712.52	715.46	714.62	715.70	0.004997	4.13	107.94	55.22	0.47
I-55	11	500-yr	420.00	709.30	713.34	713.34	714.47	0.022752	8.53	49.26	22.27	1.01
I-55	10.5	500-yr	495.00	706.32	713.04	710.80	713.17	0.001326	3.38	185.57	73.63	0.27
I-55	10	500-yr	495.00	705.01	712.66	710.76	712.99	0.003312	6.06	171.94	66.29	0.41
I-55	9.1		Culvert									
I-55	9	500-yr	495.00	698.96	708.46	703.94	708.54	0.000417	2.19	234.59	49.75	0.16
I-55	8	500-yr	495.00	698.55	708.44		708.47	0.000193	1.85	487.41	100.34	0.12
I-55	7.5	500-yr	495.00	698.08	708.44		708.47	0.000022	0.36	489.22	95.90	0.02
I-55	7	500-yr	495.00	698.37	708.45		708.46	0.000062	1.10	566.48	102.88	0.07
I-55	6	500-yr	495.00	694.91	708.45	697.19	708.45	0.000006	0.42	1380.37	168.10	0.02
I-55	5.1		Culvert									
I-55	5	500-yr	495.00	688.56	698.53	692.71	698.70	0.000561	3.36	147.36	40.90	0.20
I-55	4	500-yr	495.00	687.10	698.60	690.17	698.60	0.000027	0.83	1836.32	1069.50	0.05
I-55	3.1		Culvert									
I-55	3	500-yr	495.00	680.61	685.98	684.62	686.69	0.005974	6.75	73.28	23.89	0.57
I-55	2	500-yr	495.00	679.12	680.25	680.25	680.56	0.092739	7.70	116.57	187.33	1.68
I-55	1	500-yr	495.00	677.67	680.24	678.35	680.25	0.000193	0.88	897.78	473.25	0.10
I-55	0.15	500-yr	1290.00	677.67	680.00	678.80	680.07	0.001993	2.65	782.59	471.10	0.32

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 500-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	500-yr	715.70	715.46	0.24	1.14	0.09	13.09	294.39	112.51	55.22
I-55	11	500-yr	714.47	713.34	1.13	0.95	0.30		420.00		22.27
I-55	10.5	500-yr	713.17	713.04	0.14	0.12	0.06	96.78	336.45	61.77	73.63
I-55	10	500-yr	712.99	712.66	0.34			100.00	272.30	122.70	66.29
I-55	9.1		Culvert								
I-55	9	500-yr	708.54	708.46	0.07	0.05	0.02		491.95	3.05	49.75
I-55	8	500-yr	708.47	708.44	0.03	0.00	0.00	213.29	253.85	27.86	100.34
I-55	7.5	500-yr	708.47	708.44	0.02	0.00	0.00	0.29	53.91	440.79	95.90
I-55	7	500-yr	708.46	708.45	0.02	0.00	0.01	11.65	446.63	36.72	102.88
I-55	6	500-yr	708.45	708.45	0.00			13.09	468.62	13.29	168.10
I-55	5.1		Culvert								
I-55	5	500-yr	698.70	698.53	0.18	0.01	0.08		495.00		40.90
I-55	4	500-yr	698.60	698.60	0.01			41.38	265.85	187.77	1069.50
I-55	3.1		Culvert								
I-55	3	500-yr	686.69	685.98	0.71	5.92	0.20		495.00		23.89
I-55	2	500-yr	680.56	680.25	0.31	0.13	0.09		32.20	462.80	187.33
I-55	1	500-yr	680.25	680.24	0.01	0.17	0.01	6.29	281.66	207.05	473.25
I-55	0.15	500-yr	680.07	680.00	0.07			14.86	758.03	517.11	471.10

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016

W. Br. Sawmill I-55

Legend

WS 500-yr

Ground

Elevation (ft)

720

710

700

690

680

670

0

500

1000

1500

2000

2500

3000

Main Channel Distance (ft)

1 CBBEL XS 1 extend...

2 CBBEL XS 2

3 CBBEL XS 3 - D/S of I-55...

3.1 Culvert under I-55 and South Frontage ...

5 CBBEL XS 5 - D/S of N. Frontage Road

5.1 Culvert under N. Frontage Road, default internal cross se...

7 CBBEL XS 7 -

8 CBBEL XS 8 - U/S of inline weir

9 CBBEL XS 9 - D/S of Access Road

9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert ...

10 CBBEL XS 10 - U/S of Access Road

10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88

11 CBBEL XS 11

11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Ex Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 500-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 500-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10.5 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 500-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 500-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 500-yr Culv: Cul Frontage
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore,
	the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet
	answer will be used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water

Errors Warnings and Notes for Plan : Ex Start WSEL (Continued)

	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 500-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3.1 Profile: 500-yr Culv: Culv # 1
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore,
	the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet
	answer will be used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 500-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 1 Profile: 500-yr
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.

Existing Structure Tables

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55

Reach	River Sta		Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
				(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
I-55	9.1	Access Road	10-yr	711.60	711.51	711.60	711.06	710.78	111.04	66.96	8.06	11.54	14.74
I-55	9.1	Access Road	50-yr	712.17	711.98	712.17	711.44	710.78	118.84	170.40	8.04	12.35	15.01
I-55	9.1	Access Road	100-yr	712.37	712.14	712.35	712.37	710.78	115.79	229.21	5.66	12.03	12.03
I-55	9.1	Access Road	500-yr	712.99	712.66	712.92	712.99	710.78	101.56	393.44	4.19	10.56	10.56
I-55	9.1	Access Road	OT	712.20	712.00	712.20	711.46	710.78	119.32	182.68	7.46	12.40	15.02
I-55	5.1	Cul Frontage	10-yr	701.12	701.11	701.12	700.75	707.93	178.00		8.04	8.90	15.52
I-55	5.1	Cul Frontage	50-yr	703.44	703.42	705.67	703.44	707.93	290.00		5.81	14.50	14.50
I-55	5.1	Cul Frontage	100-yr	706.60	706.58	708.70	706.60	707.93	345.00		8.24	17.25	17.25
I-55	5.1	Cul Frontage	500-yr	708.45	708.45	708.56	708.45	707.93	378.39	115.20	9.92	18.92	18.92
I-55	5.1	Cul Frontage	OT	704.51	704.49	706.29	704.51	707.93	302.00		6.31	15.10	15.10
I-55	3.1	Culv # 1	10-yr	693.09	693.07	693.09	692.71	698.18	178.00		8.85	8.90	15.93
I-55	3.1	Culv # 1	50-yr	697.63	697.62	697.63	695.50	698.18	290.00		12.63	14.50	18.97
I-55	3.1	Culv # 1	100-yr	698.38	698.38	698.38	695.97	698.18	304.50	40.50	13.09	15.23	19.42
I-55	3.1	Culv # 1	500-yr	698.60	698.60	698.60	698.60	698.18	351.14	143.86	12.62	17.56	17.56
I-55	3.1	Culv # 1	OT	698.21	698.21	698.21	695.87	698.18	301.34	0.66	13.16	15.07	19.32

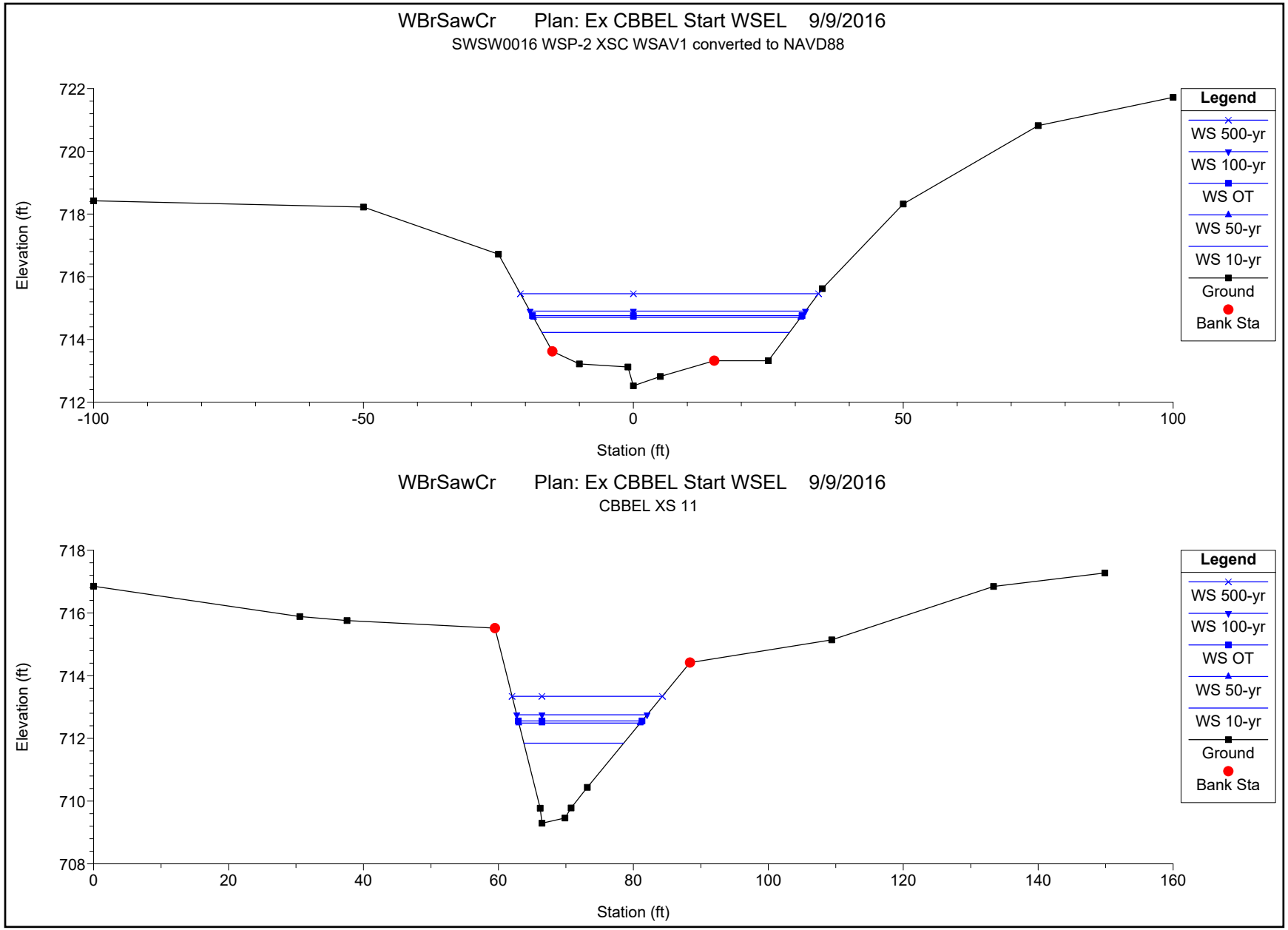
HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	10.5	10-yr	711.67	711.61	0.06	0.05	0.01	17.98	145.94	14.08	47.88
I-55	10.5	50-yr	712.27	712.18	0.09	0.08	0.03	40.21	219.83	29.96	56.13
I-55	10.5	100-yr	712.50	712.39	0.11	0.10	0.04	52.70	253.77	38.53	59.23
I-55	10.5	500-yr	713.17	713.04	0.14	0.12	0.06	96.78	336.45	61.77	73.63
I-55	10.5	OT	712.31	712.22	0.10	0.09	0.03	42.62	227.73	31.65	56.67
I-55	10	10-yr	711.60	711.51	0.09			28.37	110.86	38.78	43.48
I-55	10	50-yr	712.16	711.98	0.18			50.96	172.31	66.73	51.83
I-55	10	100-yr	712.37	712.14	0.23			62.96	201.49	80.55	54.80
I-55	10	500-yr	712.99	712.66	0.34			100.00	272.30	122.70	66.29
I-55	10	OT	712.19	712.00	0.19			53.37	178.99	69.64	52.27
I-55	9.1		Culvert								
I-55	9	10-yr	703.81	703.45	0.36	1.08	0.09		178.00		24.76
I-55	9	50-yr	704.69	703.94	0.75	0.84	0.25		290.00		26.11
I-55	9	100-yr	706.90	706.48	0.43	0.10	0.20		345.00		32.97
I-55	9	500-yr	708.54	708.46	0.07	0.05	0.02		491.95	3.05	49.75
I-55	9	OT	705.17	704.54	0.63	0.34	0.27		302.00		27.72
I-55	8	10-yr	702.64	701.99	0.65	0.77	0.03	2.42	175.58		38.43
I-55	8	50-yr	703.60	703.35	0.25	0.06	0.04	64.44	224.98	0.58	56.86
I-55	8	100-yr	706.61	706.58	0.03	0.00	0.00	137.96	195.61	11.43	81.53
I-55	8	500-yr	708.47	708.44	0.03	0.00	0.00	213.29	253.85	27.86	100.34
I-55	8	OT	704.56	704.47	0.09	0.01	0.01	96.61	202.07	3.32	65.10
I-55	7	10-yr	701.20	701.11	0.09	0.04	0.04		178.00		40.06
I-55	7	50-yr	703.47	703.43	0.04	0.02	0.01		288.18	1.82	52.79
I-55	7	100-yr	706.60	706.59	0.02	0.01	0.00	3.00	325.42	16.58	84.48
I-55	7	500-yr	708.46	708.45	0.02	0.00	0.01	11.65	446.63	36.72	102.88
I-55	7	OT	704.53	704.50	0.03	0.01	0.01	0.06	296.33	5.60	63.50
I-55	6	10-yr	701.12	701.11	0.02				178.00		104.71
I-55	6	50-yr	703.44	703.42	0.02				290.00		119.46
I-55	6	100-yr	706.60	706.58	0.02				345.00		149.02

HEC-RAS Plan: Ex Start WSEL River: W. Br. Sawmill Reach: I-55 (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	6	500-yr	708.45	708.45	0.00			13.09	468.62	13.29	168.10
I-55	6	OT	704.51	704.49	0.02				302.00		127.71
I-55	5.1		Culvert								
I-55	5	10-yr	693.22	693.07	0.16	0.07	0.07		178.00		22.46
I-55	5	50-yr	697.68	697.61	0.08	0.01	0.03		290.00		34.73
I-55	5	100-yr	698.43	698.34	0.09	0.01	0.04		345.00		39.68
I-55	5	500-yr	698.70	698.53	0.18	0.01	0.08		495.00		40.90
I-55	5	OT	698.26	698.19	0.07	0.01	0.03		302.00		38.62
I-55	4	10-yr	693.09	693.07	0.02			22.13	154.55	1.33	76.23
I-55	4	50-yr	697.63	697.62	0.01			36.86	238.49	14.65	586.97
I-55	4	100-yr	698.38	698.38	0.00			31.01	199.54	114.44	1063.10
I-55	4	500-yr	698.60	698.60	0.01			41.38	265.85	187.77	1069.50
I-55	4	OT	698.21	698.21	0.00			28.73	185.06	88.21	1058.24
I-55	3.1		Culvert								
I-55	3	10-yr	684.47	684.22	0.26	4.31	0.05		178.00		19.30
I-55	3	50-yr	685.40	684.99	0.41	5.01	0.09		290.00		20.61
I-55	3	100-yr	685.78	685.29	0.49	5.28	0.12		345.00		21.12
I-55	3	500-yr	686.69	685.98	0.71	5.92	0.20		495.00		23.89
I-55	3	OT	685.48	685.05	0.43	5.07	0.10		302.00		20.72
I-55	2	10-yr	680.11	679.96	0.15	0.13	0.04		15.03	162.97	171.82
I-55	2	50-yr	680.29	680.07	0.22	0.14	0.06		21.39	268.61	178.69
I-55	2	100-yr	680.37	680.12	0.25	0.12	0.07		24.30	320.70	181.14
I-55	2	500-yr	680.56	680.25	0.31	0.13	0.09		32.20	462.80	187.33
I-55	2	OT	680.31	680.08	0.22	0.11	0.07		21.93	280.07	179.47

Cross Section Plots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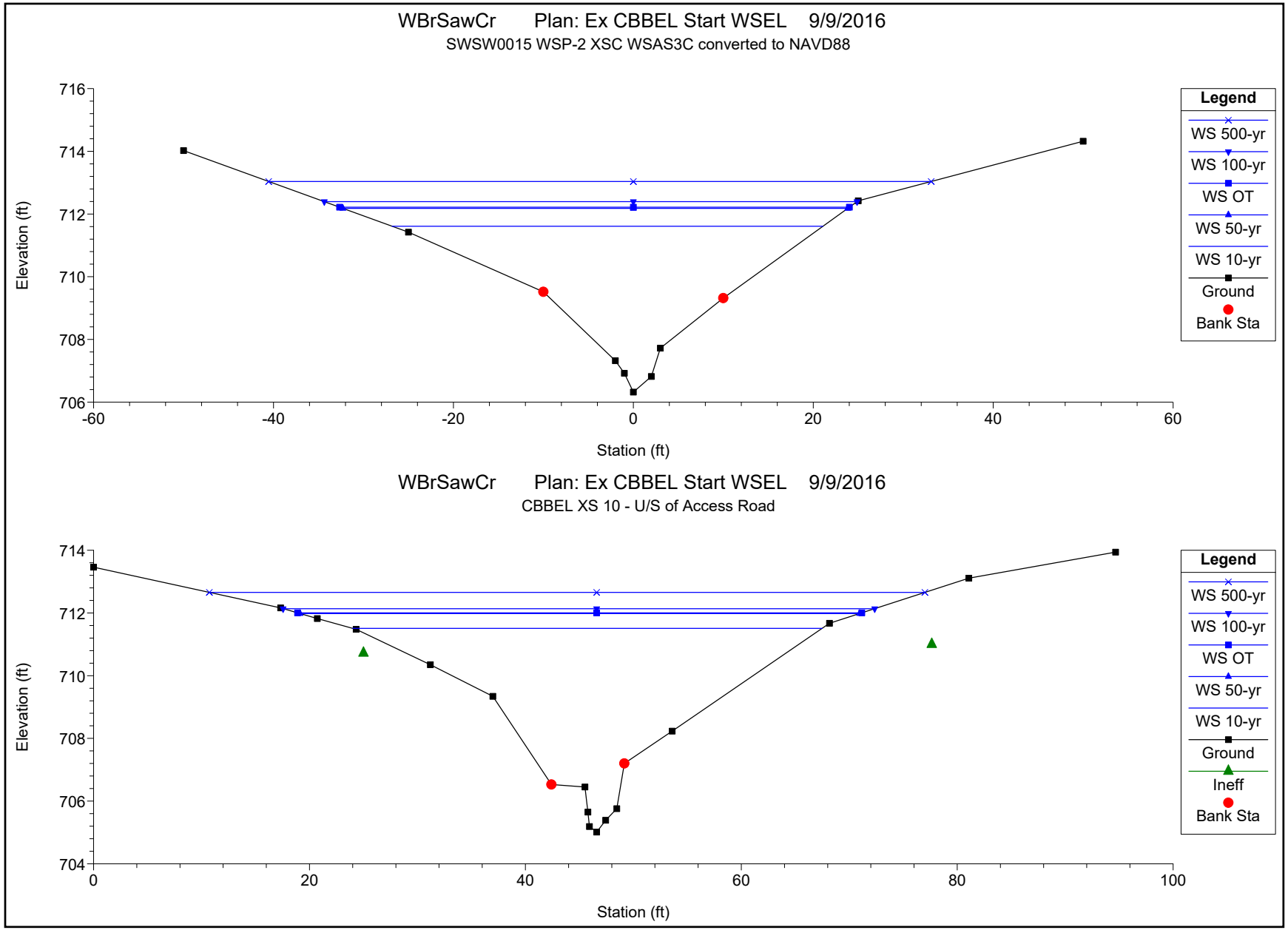
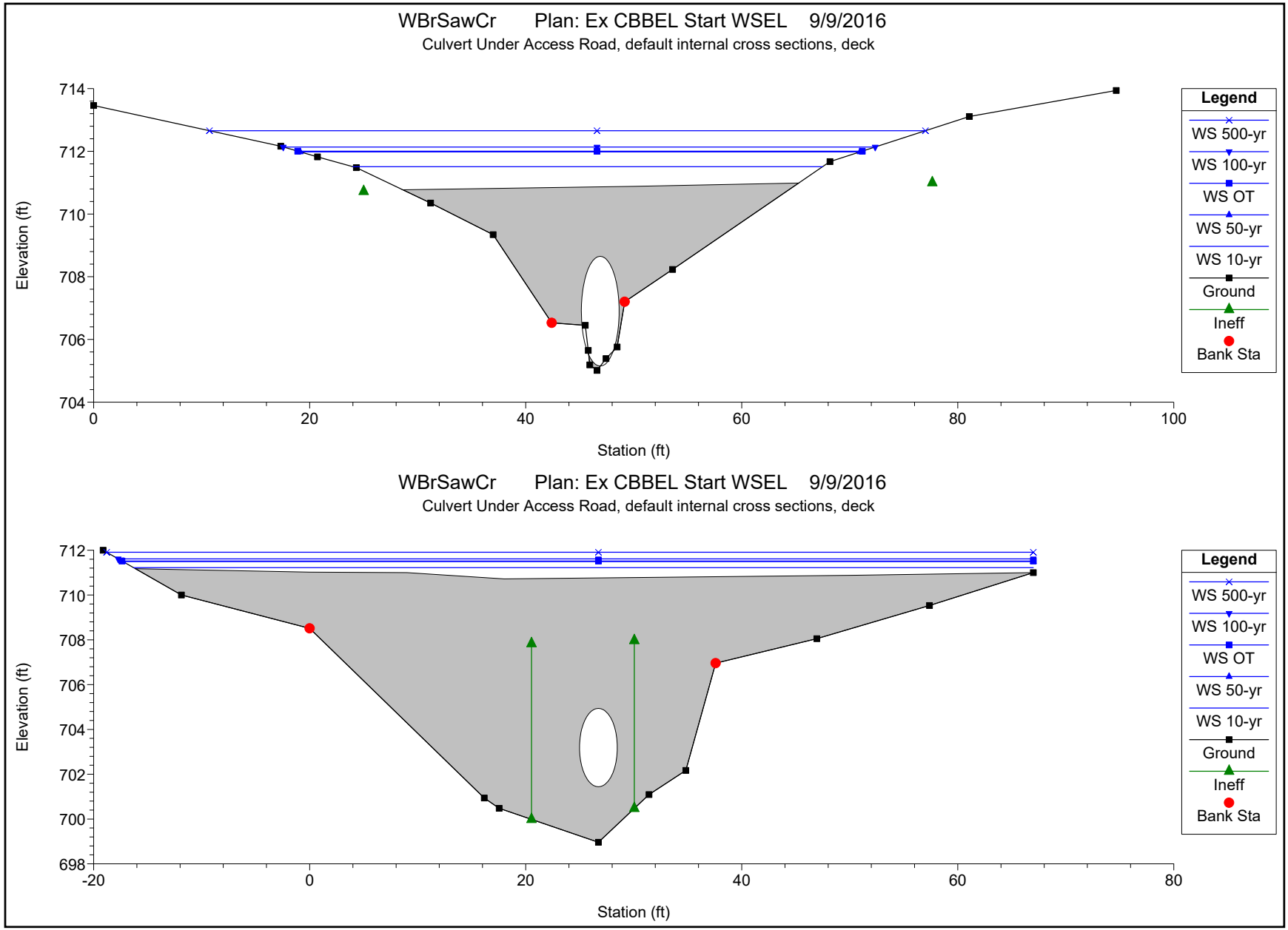
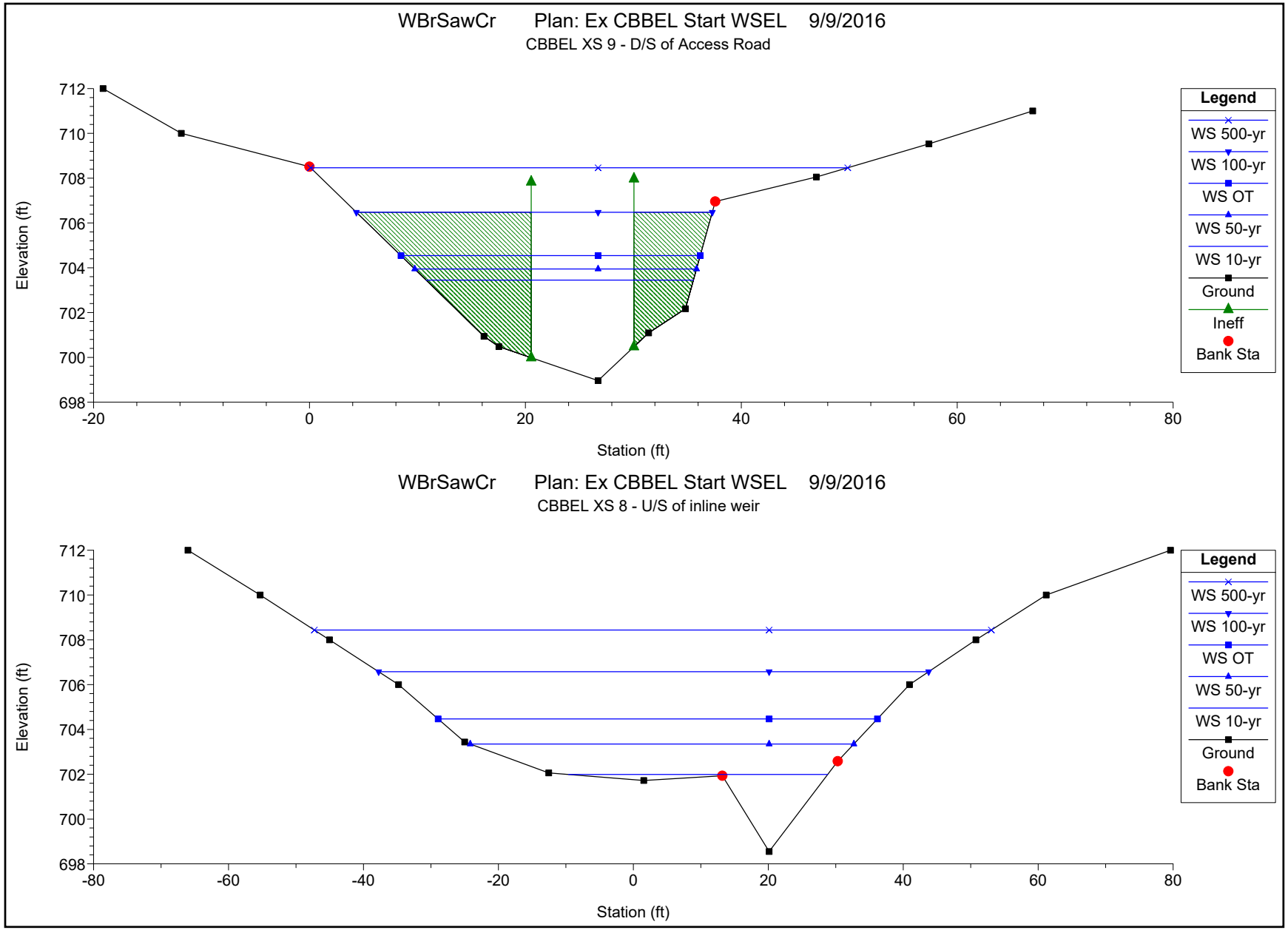
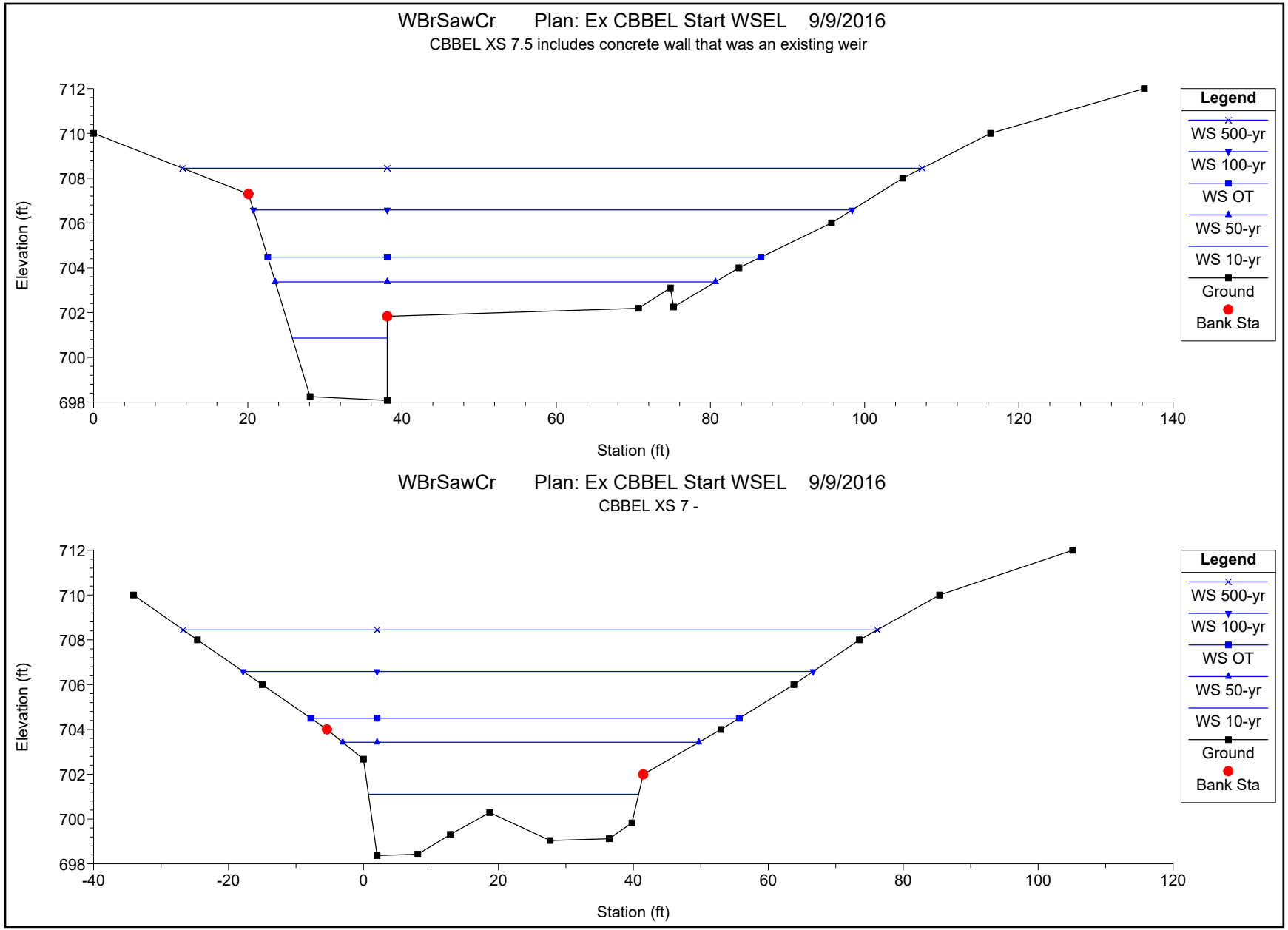
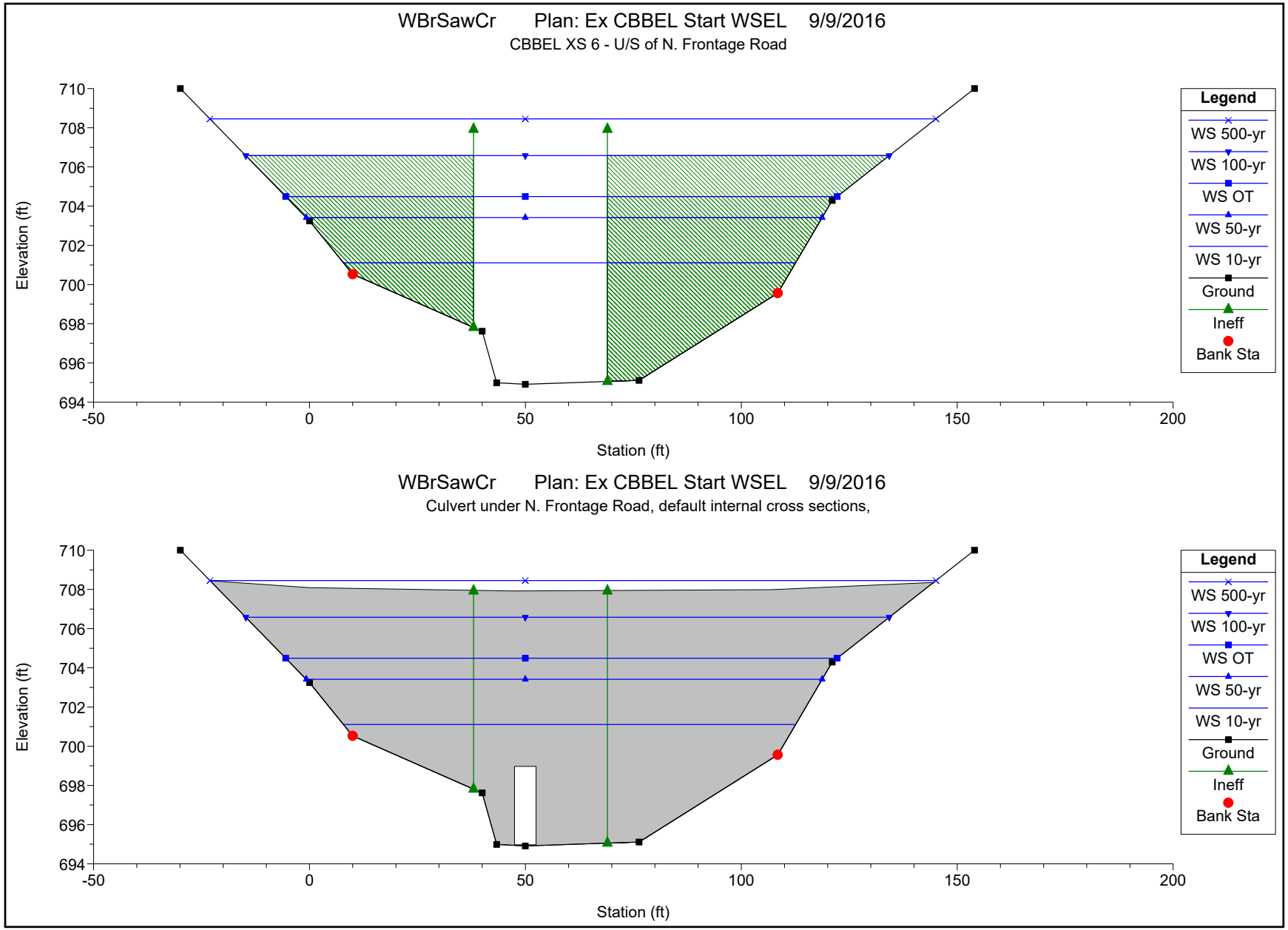
SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88
Elevation (ft)
722
720
718
716
714
712
-100
-50
0
50
100
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 11
Elevation (ft)
718
716
714
712
710
708
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta

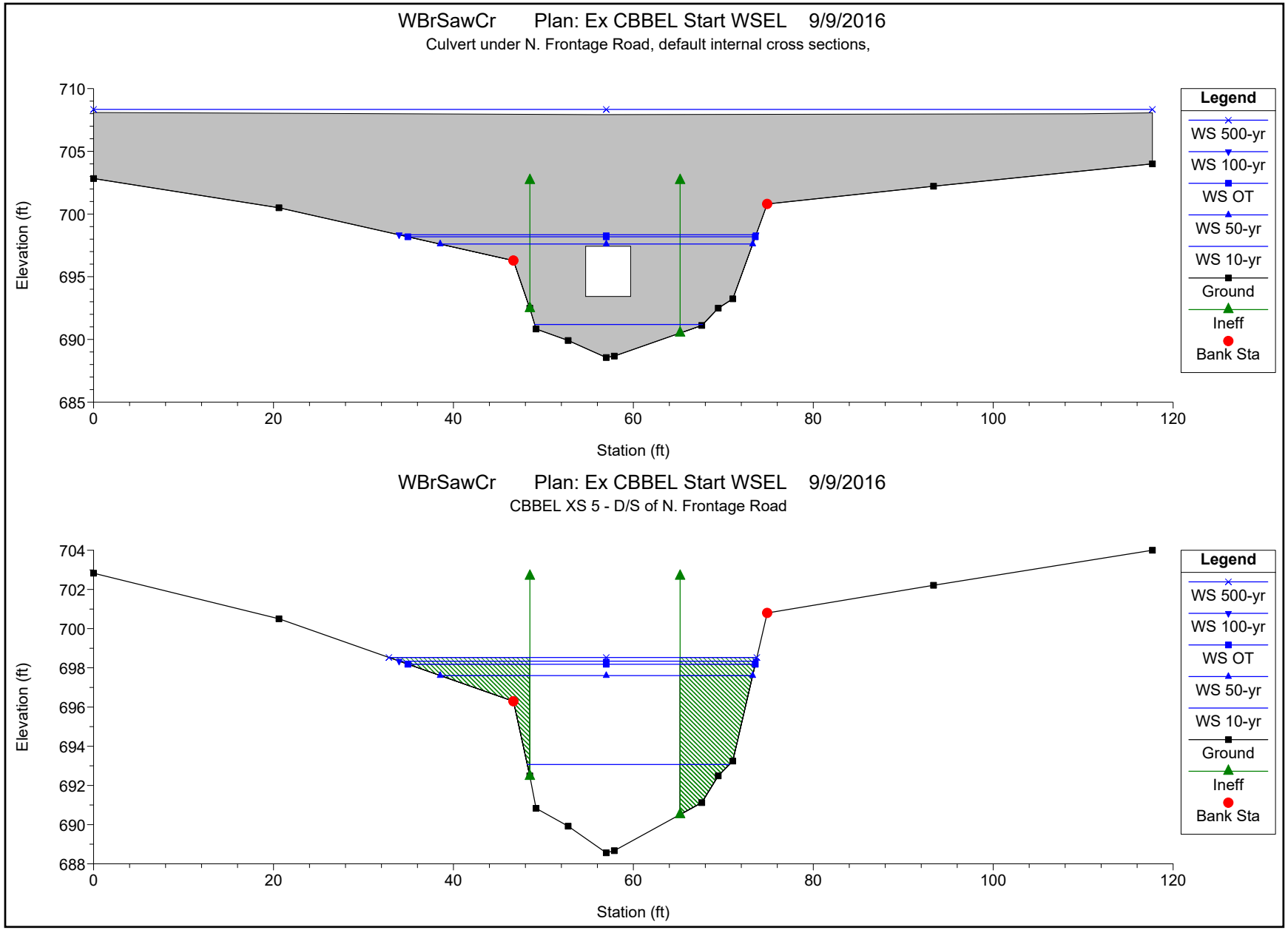

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
Elevation (ft)
716
714
712
710
708
706
-60
-40
-20
0
20
40
60
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 10 - U/S of Access Road
Elevation (ft)
714
712
710
708
706
704
0
20
40
60
80
100
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta

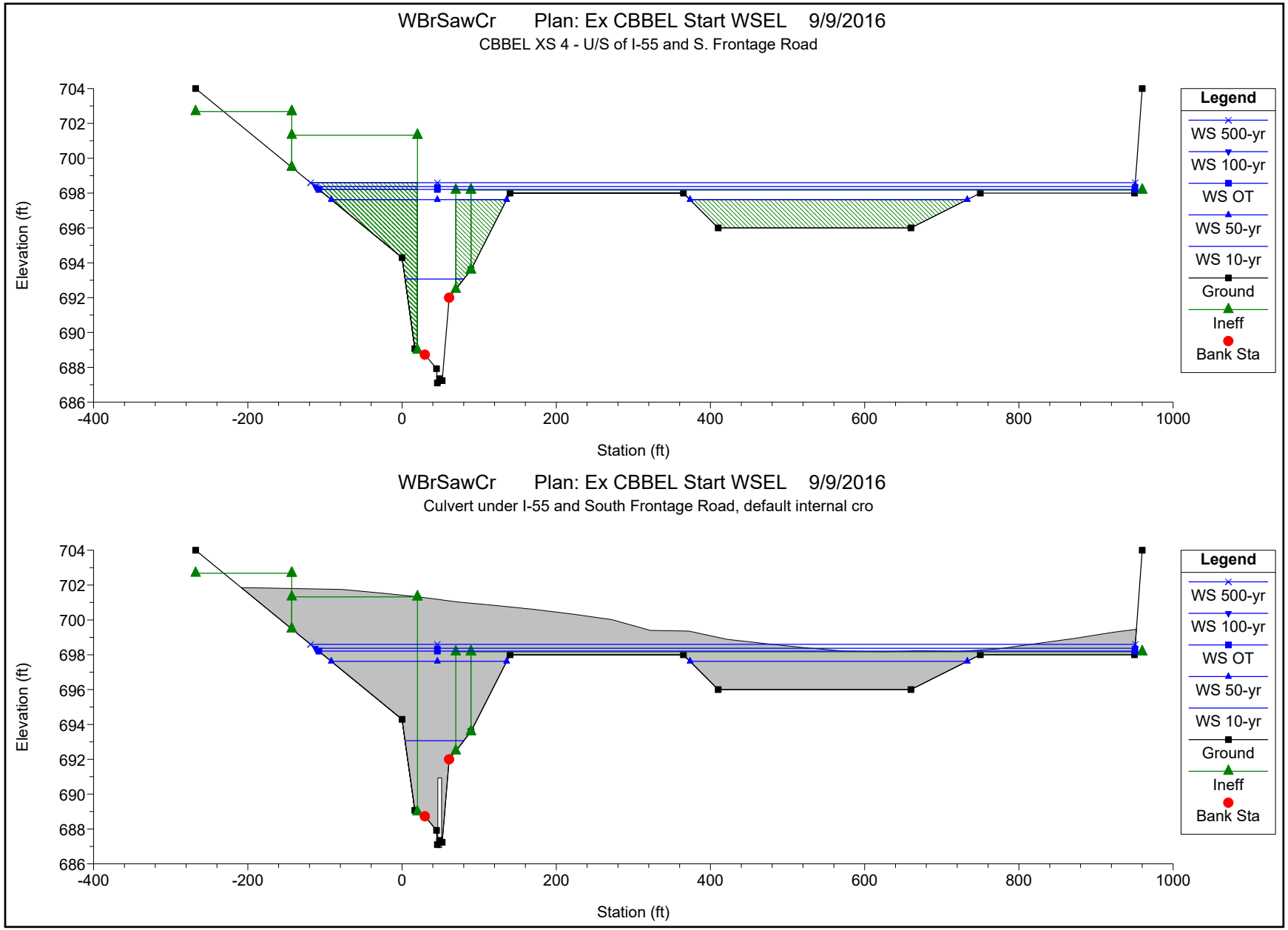

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert Under Access Road, default internal cross sections, deck
Elevation (ft)
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert Under Access Road, default internal cross sections, deck
Elevation (ft)
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta

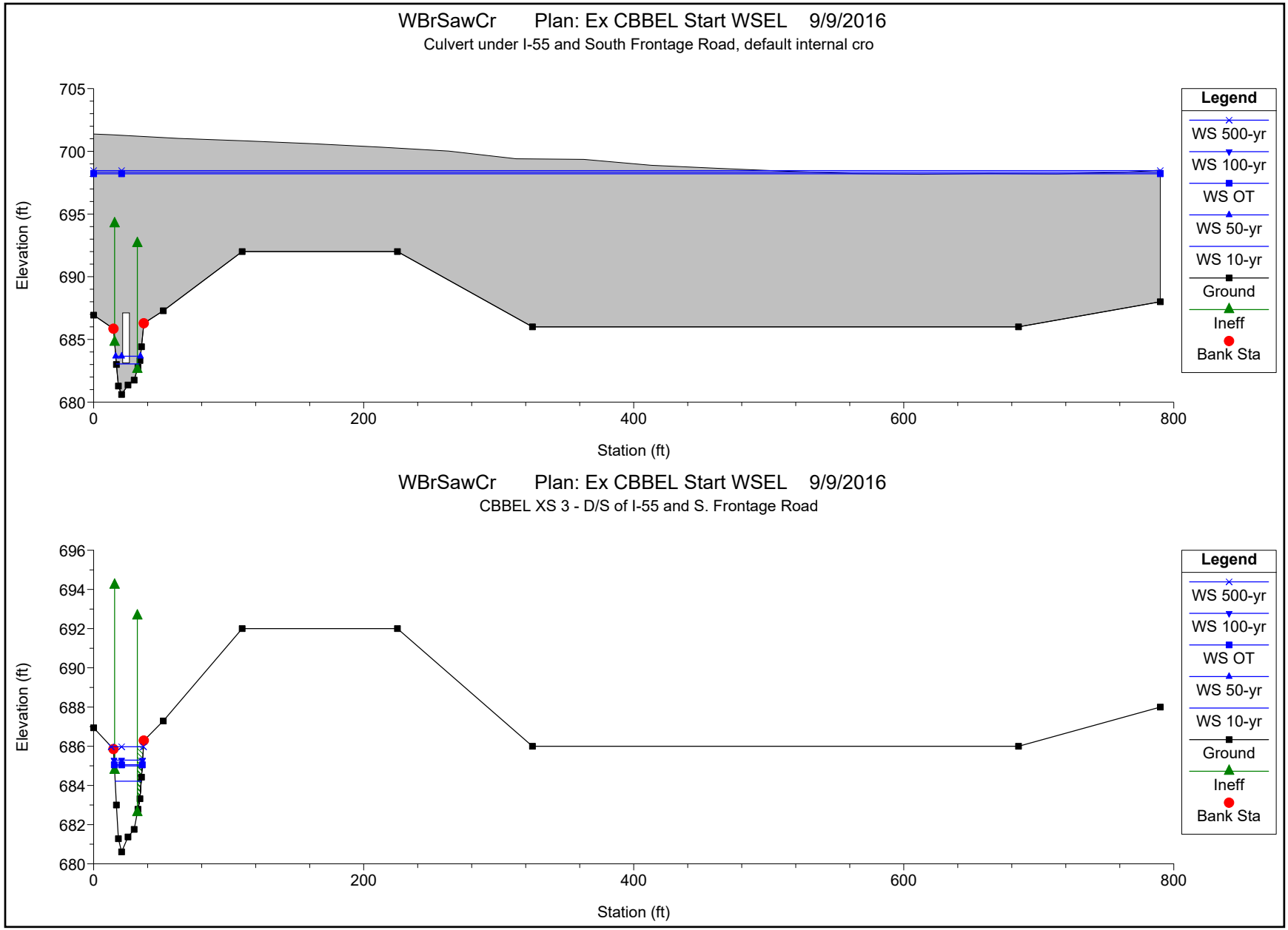

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 9 - D/S of Access Road
Elevation (ft)
712
710
708
706
704
702
700
698
-20
0
20
40
60
80
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 8 - U/S of inline weir
Elevation (ft)
712
710
708
706
704
702
700
698
-80
-60
-40
-20
0
20
40
60
80
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta

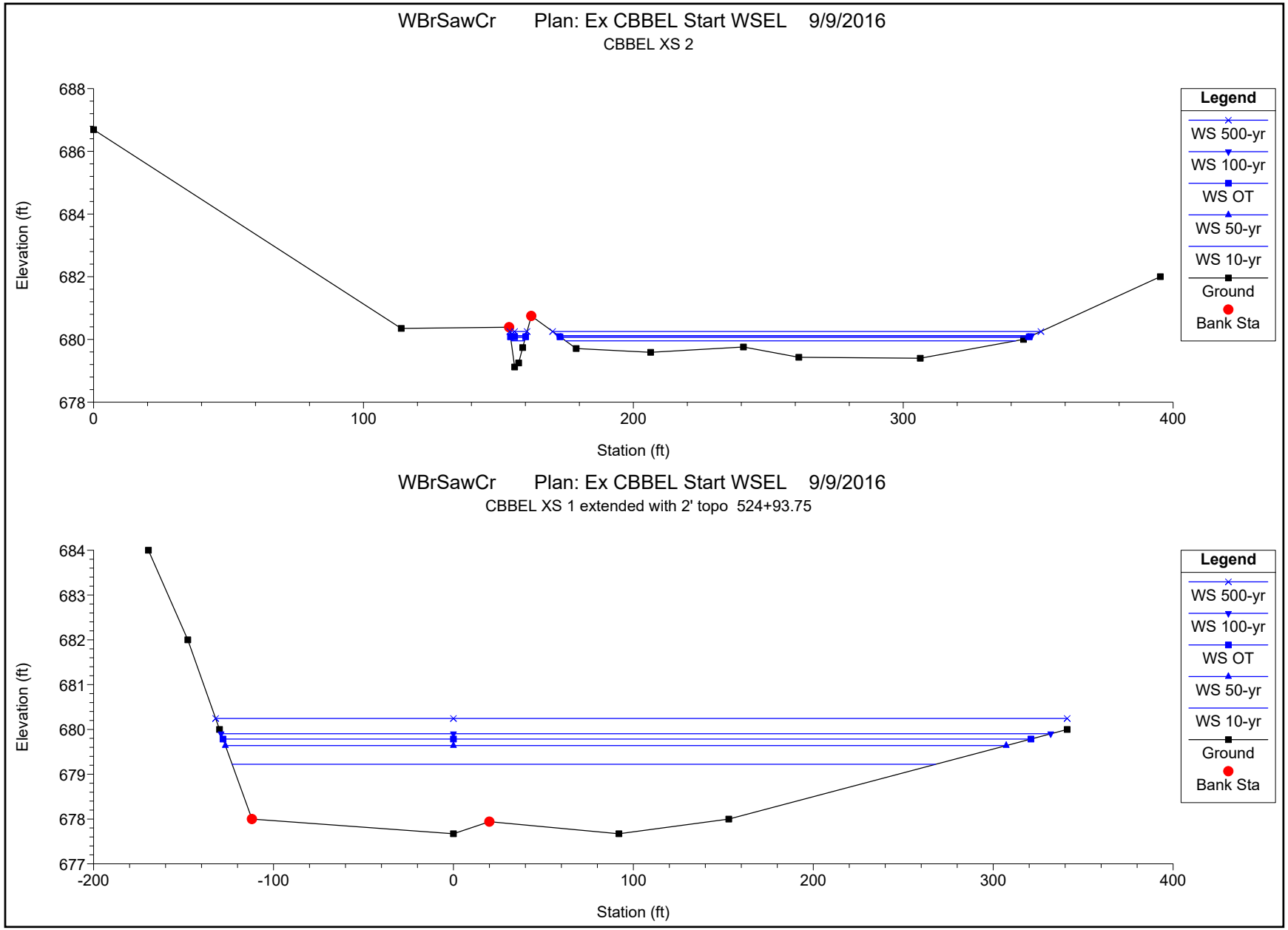

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 7.5 includes concrete wall that was an existing weir
Elevation (ft)
712
710
708
706
704
702
700
698
0
20
40
60
80
100
120
140
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 7 -
Elevation (ft)
712
710
708
706
704
702
700
698
-40
-20
0
20
40
60
80
100
120
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta

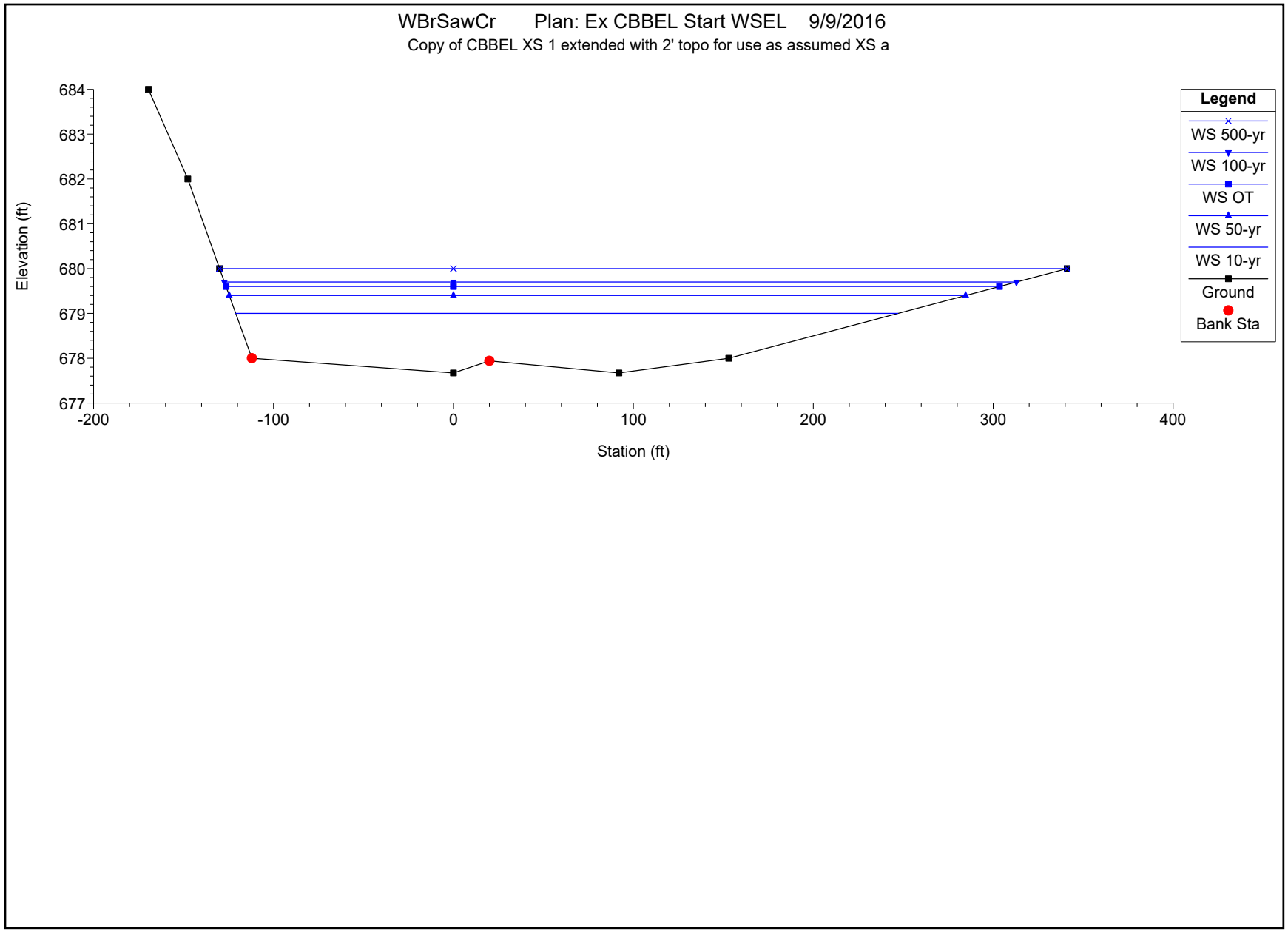

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 6 - U/S of N. Frontage Road
Elevation (ft)
710
708
706
704
702
700
698
696
694
-50
0
50
100
150
200
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert under N. Frontage Road, default internal cross sections,
Elevation (ft)
710
708
706
704
702
700
698
696
694
-50
0
50
100
150
200
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta


WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert under N. Frontage Road, default internal cross sections,
Elevation (ft)
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 5 - D/S of N. Frontage Road
Elevation (ft)
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta


WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 4 - U/S of I-55 and S. Frontage Road
Elevation (ft)
704
702
700
698
696
694
692
690
688
686
-400
-200
0
200
400
600
800
1000
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert under I-55 and South Frontage Road, default internal cro
Elevation (ft)
704
702
700
698
696
694
692
690
688
686
-400
-200
0
200
400
600
800
1000
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta


WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Culvert under I-55 and South Frontage Road, default internal cro
Elevation (ft)
705
700
695
690
685
680
0
200
400
600
800
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 3 - D/S of I-55 and S. Frontage Road
Elevation (ft)
696
694
692
690
688
686
684
682
680
0
200
400
600
800
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta

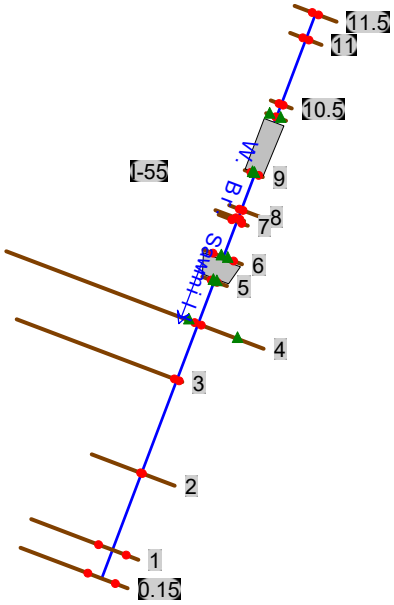

WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 2
Elevation (ft)
688
686
684
682
680
678
0
100
200
300
400
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta
WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
CBBEL XS 1 extended with 2' topo 524+93.75
Elevation (ft)
684
683
682
681
680
679
678
677
-200
-100
0
100
200
300
400
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta


WBrSawCr Plan: Ex CBBEL Start WSEL 9/9/2016
Copy of CBBEL XS 1 extended with 2' topo for use as assumed XS a
Elevation (ft)
684
683
682
681
680
679
678
677
-200
-100
0
100
200
300
400
Station (ft)
Legend
WS 500-yr
WS 100-yr
WS OT
WS 50-yr
WS 10-yr
Ground
Bank Sta

TAB C

SECTION 13.C

DESIGN NATURAL CONDITIONS



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

HEC-RAS HEC-RAS 5.0.1 April 2016
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: WBrSawCr
Project File : WBrSawCr.prj
Run Date and Time: 8/25/2016 8:21:29 PM

Project in English units

Project Description:
2016 CBBEL model for I-55 over Sawmill Creek.

PLAN DATA

Plan Title: Natural CBBEL Start WSEL
Plan File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.p07

Geometry Title: Natural Start WSEL
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.g07

Flow Title : Ex CBBEL Start WSEL
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.f03

Plan Description:
Natural conditions of I-55 over West Branch of Sawmill Creek. Created from 2012 CBBEL survey Cross sections, structures, and select FIS cross sections. Starting water surface and flows from FIS profile near confluence with Wards Creek. Proper ineffective cones and expansion/contraction coefficients used. All elevations presented in NAVD 88.

Plan Summary Information:

Number of:	Cross Sections	= 15	Multiple Openings	=	0
	Culverts	= 2	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

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

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

FLOW DATA

Flow Title: Ex CBBEL Start WSEL
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.f03

Flow Data (cfs)

River	Reach	RS	10-yr	50-yr	100-yr	500-yr	OT
W. Br. Sawmill	I-55	11.5	149	245	290	420	257.17
W. Br. Sawmill	I-55	10.5	178	290	345	495	302
W. Br. Sawmill	I-55	0.15	478	780	923	1290	804

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
W. Br. Sawmill	I-55	10-yr	Known WS = 711.1	Known WS = 679
W. Br. Sawmill	I-55	50-yr	Known WS = 714.7	Known WS = 679.4
W. Br. Sawmill	I-55	100-yr	Known WS = 714.8	Known WS = 679.7
W. Br. Sawmill	I-55	500-yr	Known WS = 715.2	Known WS = 680
W. Br. Sawmill	I-55	OT	Known WS = 714.8	Known WS = 679.6

GEOMETRY DATA

Geometry Title: Natural Start WSEL
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.1\W BR Sawmill Ck\WBrSawCr.g07

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 11.5

INPUT
Description: SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	718.42	-50	718.22	-25	716.72	-15	713.62	-10	713.22
-1	713.12	0	712.52	5	712.82	15	713.32	25	713.32
35	715.62	50	718.32	75	720.82	100	721.72		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-100	.04	-15	.045	15	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
-15 15 83 120 146 .1 .3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 11

INPUT

Description: CBBEL XS 11
500+43.39
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	716.852	30.56	715.885	37.56	715.758	59.49	715.517	66.19	709.774
66.46	709.295	69.86	709.461	70.78	709.782	73.17	710.437	88.41	714.419
109.41	715.141	133.38	716.846	149.88	717.276				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	59.49	.042	88.41	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.49	88.41	255	312	290	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 10.5

INPUT
Description: SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	714.02	-25	711.42	-10	709.52	-2	707.32	-1	706.92
0	706.32	2	706.82	3	707.72	10	709.32	25	712.42
50	714.32								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.04	-10	.045	10	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-10	10	61	61	61	.3	.5

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 10

INPUT
Description: CBBEL XS 10 - U/S of Access Road
504+15.12
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.46	17.33	712.16	20.72	711.82	24.32	711.48	31.2	710.35
36.98	709.34	42.41	706.53	45.51	706.45	45.79	705.65	45.93	705.19
46.6	705.01	47.43	705.39	48.46	705.76	49.17	707.2	53.6	708.23
68.17	711.67	81.08	713.11	94.67	713.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	42.41	.042	49.17	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.41	49.17	273	271	269	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	25	710.72	F
77.64	94.67	711	F

CULVERT

RIVER: W. Br. Sawmill
REACH: I-55 RS: 9.1

INPUT
Description: Culvert Under Access Road, default internal cross sections, deck

length = culvert length.

Distance from Upstream XS = 24.57
Deck/Roadway Width = 240.41
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 10

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-75	712.4	0	-50	711.7	0	-32	711.39	0
-22	711.23	0	0	711.02	0	9	711	0
18	710.72	0	50	710.88	0	93	711.18	0
137	711.14	0						

Upstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.46	17.33	712.16	20.72	711.82	24.32	711.48	31.2	710.35
36.98	709.34	42.41	706.53	45.51	706.45	45.79	705.65	45.93	705.19
46.6	705.01	47.43	705.39	48.46	705.76	49.17	707.2	53.6	708.23
68.17	711.67	81.08	713.11	94.67	713.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	42.41	.042	49.17	.08

Bank Sta: Left Right Coeff Contr. Expan.
42.41 49.17 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	25	710.72	F
77.64	94.67	711	F

Downstream Deck/Roadway Coordinates
num= 10

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-75	712.4	0	-50	711.7	0	-32	711.39	0
-22	711.23	0	0	711.02	0	9	711	0
18	710.72	0	50	710.88	0	93	711.18	0
137	711.14	0						

Downstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-19.128	712	-11.879	710	0	708.51	16.16	700.94	17.54	700.48
26.73	698.96	31.41	701.09	34.83	702.17	37.59	706.96	46.95	708.05
57.38	709.53	67	711						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-19.128	.08	0	.042	37.59	.08

Bank Sta: Left Right Coeff Contr. Expan.
0 37.59 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-19.128	20.54	707.83	F
30.06	67	707.97	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Access Road	Circular	3.5	

FHWA Chart # 1 - Concrete Pipe Culvert

FHWA Scale # 2 - Groove end entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	24.57	240.41	.013	.013	0	.2	1

Upstream Elevation = 705.15
Centerline Station = 46.9
Downstream Elevation = 701.44
Centerline Station = 26.73

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 9

INPUT
Description: CBBEL XS 9 - D/S of Access Road
506+86.95
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-19.128	712	-11.879	710	0	708.51	16.16	700.94	17.54	700.48
26.73	698.96	31.41	701.09	34.83	702.17	37.59	706.96	46.95	708.05
57.38	709.53	67	711						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-19.128	.08	0	.042	37.59	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	37.59	162	171	140	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-19.128	20.54	707.83	F
30.06	67	707.97	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 8

INPUT
Description: CBBEL XS 8 - U/S of inline weir
508.57.37
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-66.02	712	-55.32	710	-45.04	708	-34.8	706	-25	703.44
-12.55	702.06	1.55	701.72	13.2	701.93	20.13	698.55	30.3	702.58
40.93	706	50.77	708	61.19	710	79.61	712		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-66.02	.08	13.2	.042	30.3	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
13.2	30.3	6	42	22	.1	.3

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 7.5

INPUT
Description: CBBEL XS 7.5 includes concrete wall that was an existing weir
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	710	20.09	707.29	28.08	698.25	38.09	698.08	38.09	701.83
70.68	702.19	74.81	703.1	75.22	702.25	83.69	704	95.7	706
104.94	708	116.33	710	136.27	712				

```
Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08   28.08    .042   38.09    .015   83.69     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         20.09   38.09               18      14       3             .1       .3

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 7

INPUT
Description: CBBEL XS 7 -
509+26.76
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -34.07     710  -24.62     708     -15     706    -5.4     704       0  702.67
    2.02  698.37    8.05  698.43   12.88  699.31    18.7  700.29   27.67  699.04
   36.42  699.12   39.79  699.83   41.48  701.99   52.99     704   63.79     706
   73.51     708   85.38     710  105.11     712

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -34.07     .08    -5.4    .042   41.48     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -5.4   41.48              137     170     167             .3       .5

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 6

INPUT
Description: CBBEL XS 6 - U/S of N. Frontage Road
510+97.00
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -29.9     710       0  703.25      10  700.53      40  697.62   43.33  694.99
   49.97  694.91   76.32  695.11  108.45  699.56  121.05  704.29     154     710

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -29.9     .08      10    .042  108.45     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            10  108.45             114.5   114.5     126             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   -29.9      38  707.92       F
      69     154  707.92       F

CULVERT


RIVER: W. Br. Sawmill
REACH: I-55               RS: 5.1

INPUT
Description: Culvert under N. Frontage Road, default internal cross sections,
             deck length = culvert length.


Distance from Upstream XS =      13
Deck/Roadway Width        =    89.8
Weir Coefficient          =     2.7
Upstream  Deck/Roadway Coordinates
```

```
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -103.59  709.65       0     -53   708.9       0       0  708.09       0
      47  707.92       0     107  707.99       0     313     710       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -29.9     710       0  703.25      10  700.53      40  697.62   43.33  694.99
   49.97  694.91   76.32  695.11  108.45  699.56  121.05  704.29     154     710

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -29.9     .08      10    .042  108.45     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
           10  108.45            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   -29.9      38  707.92       F
      69     154  707.92       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     -96  709.65       0     -50   708.9       0       0  708.09       0
      56  707.92       0     110  707.99       0     316     710

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  702.83   20.61   700.5   46.67  696.29   48.49  692.49   49.18  690.83
   52.75  689.92   56.99  688.56   57.88  688.67    67.6  691.12   69.44  692.49
   71.05  693.24   74.88   700.8   93.37  702.21   117.7     704

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08   46.67    .042   74.88     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
         46.67   74.88            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    48.5  702.68       F
    65.2   117.7  702.68       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Cul Frontage         Box       4       5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                13    89.8     .013     .013        0                    .4                1
Upstream   Elevation =  694.97
           Centerline Station =  49.97
Downstream Elevation =  693.43
           Centerline Station =  57.2

CROSS SECTION
```

RIVER: W. Br. Sawmill
REACH: I-55 RS: 5

INPUT
Description: CBBEL XS 5 - D/S of N. Frontage Road
512+11.70
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	702.83	20.61	700.5	46.67	696.29	48.49	692.49	49.18	690.83
52.75	689.92	56.99	688.56	57.88	688.67	67.6	691.12	69.44	692.49
71.05	693.24	74.88	700.8	93.37	702.21	117.7	704		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	46.67	.042	74.88	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
46.67	74.88	325	204	173	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	48.5	702.68	F
65.2	117.7	702.68	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 4

INPUT
Description: CBBEL XS 4 - U/S of I-55 and S. Frontage Road
514+16.11
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-267.6	704	0	694.3	16.63	689.071	29.66	688.728	44.72	687.921
45.82	687.1	48.6	687.347	52.04	687.238	61.08	691.994	89.38	693.591
140	698	365	698	410	696	660	696	750	698
950	698	960	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-267.6	.08	29.66	.042	61.08	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
29.66	61.08	321	267	267	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-267.6	-143	702.68	F
89.4	960	702.68	F

CROSS SECTION

RIVER: W. Br. Sawmill
REACH: I-55 RS: 3

INPUT
Description: CBBEL XS 3 - D/S of I-55 and S. Frontage Road
516+83.31
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.94	14.71	685.85	16.8	683	18.35	681.28	20.71	680.61
25.41	681.37	30.02	681.76	32.85	682.782	34.34	683.32	35.4	684.42
37.2	686.29	51.54	687.29	110	692	225	692	325	686
685	686	790	688						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	14.71	.042	37.2	.08

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         14.71    37.2              364     445     326             .1       .3

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 2

INPUT
Description: CBBEL XS 2
521+27.64
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  686.69     114  680.35     154  680.39     156  679.12   157.5  679.25
     159  679.74   162.2  680.75   178.8  679.71   206.4  679.59   240.8  679.76
   261.3  679.43   306.3   679.4  344.55     680  395.25     682

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08     154    .042   162.2     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          154   162.2              255     366     108             .1       .3

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 1

INPUT
Description: CBBEL XS 1 extended with 2' topo  524+93.75
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -169.56     684 -147.66     682    -130     680    -112     678       0  677.67
      20  677.94      92  677.67     153     678   341.1     680

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -169.56     .08    -112    .042      20     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -112      20              500     136     350             .1       .3

CROSS SECTION


RIVER: W. Br. Sawmill
REACH: I-55               RS: 0.15

INPUT
Description: Copy of CBBEL XS 1 extended with 2' topo for use as assumed XS at
             confluence with Wards Creek.   No vertical adjustment to XS 0.15
             to be conservative.
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -169.56     684 -147.66     682    -130     680    -112     678       0  677.67
      20  677.94      92  677.67     153     678   341.1     680

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -169.56     .08    -112    .042      20     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -112      20                0       0       0             .1       .3



SUMMARY OF MANNING'S N VALUES
```

River:W. Br. Sawmill

Reach	River Sta.	n1	n2	n3	n4
I-55	11.5	.04	.045	.04	
I-55	11	.08	.042	.08	
I-55	10.5	.04	.045	.04	
I-55	10	.08	.042	.08	
I-55	9.1	Culvert			
I-55	9	.08	.042	.08	
I-55	8	.08	.042	.08	
I-55	7.5	.08	.042	.015	.08
I-55	7	.08	.042	.08	
I-55	6	.08	.042	.08	
I-55	5.1	Culvert			
I-55	5	.08	.042	.08	
I-55	4	.08	.042	.08	
I-55	3	.08	.042	.08	
I-55	2	.08	.042	.08	
I-55	1	.08	.042	.08	
I-55	0.15	.08	.042	.08	

SUMMARY OF REACH LENGTHS

River: W. Br. Sawmill

Reach	River Sta.	Left	Channel	Right
I-55	11.5	83	120	146
I-55	11	255	312	290
I-55	10.5	61	61	61
I-55	10	273	271	269
I-55	9.1	Culvert		
I-55	9	162	171	140
I-55	8	6	42	22
I-55	7.5	18	14	3
I-55	7	137	170	167
I-55	6	114.5	114.5	126
I-55	5.1	Culvert		
I-55	5	325	204	173
I-55	4	321	267	267
I-55	3	364	445	326
I-55	2	255	366	108
I-55	1	500	136	350
I-55	0.15	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: W. Br. Sawmill

Reach	River Sta.	Contr.	Expan.
I-55	11.5	.1	.3
I-55	11	.1	.3
I-55	10.5	.3	.5
I-55	10	.3	.5
I-55	9.1	Culvert	
I-55	9	.3	.5
I-55	8	.1	.3
I-55	7.5	.1	.3
I-55	7	.3	.5
I-55	6	.3	.5
I-55	5.1	Culvert	
I-55	5	.3	.5
I-55	4	.3	.5

I-55	3	.1	.3
I-55	2	.1	.3
I-55	1	.1	.3
I-55	0.15	.1	.3

10-Year

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 10-yr

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)	
I-55	11.5	10-yr	149.00	712.52	714.22	713.89	714.39	0.008935	3.39	45.64	45.88	0.56
I-55	11	10-yr	149.00	709.30	711.85	711.85	712.59	0.026100	6.92	21.54	14.80	1.01
I-55	10.5	10-yr	178.00	706.32	711.61	709.40	711.67	0.000769	2.06	100.93	47.88	0.19
I-55	10	10-yr	178.00	705.01	711.51	708.75	711.60	0.001032	2.98	109.87	43.48	0.22
I-55	9.1		Culvert									
I-55	9	10-yr	178.00	698.96	703.45	701.78	703.81	0.003195	4.81	37.02	24.76	0.43
I-55	8	10-yr	178.00	698.55	701.99	701.99	702.64	0.018188	6.49	30.47	38.43	0.87
I-55	7.5	10-yr	178.00	698.08	700.86	700.24	701.41	0.018540	5.93	30.00	12.32	0.67
I-55	7	10-yr	178.00	698.37	701.11		701.20	0.002287	2.43	73.38	40.06	0.32
I-55	6	10-yr	178.00	694.91	701.11	696.10	701.12	0.000077	0.99	180.27	104.71	0.07
I-55	5.1		Culvert									
I-55	5	10-yr	178.00	688.56	691.83	691.19	692.22	0.007799	4.99	35.67	19.79	0.60
I-55	4	10-yr	178.00	687.10	689.19	689.19	689.68	0.021726	5.68	34.38	39.51	0.93
I-55	3	10-yr	178.00	680.61	684.23	683.06	684.45	0.004137	3.81	46.69	19.31	0.43
I-55	2	10-yr	178.00	679.12	679.96	679.96	680.11	0.083200	6.09	62.56	171.82	1.53
I-55	1	10-yr	178.00	677.67	679.22	678.09	679.23	0.000185	0.60	447.37	390.96	0.09
I-55	0.15	10-yr	478.00	677.67	679.00	678.33	679.04	0.002455	1.95	363.01	368.05	0.32

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 10-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	10-yr	714.39	714.22	0.17	1.75	0.06	0.90	116.14	31.95	45.88
I-55	11	10-yr	712.59	711.85	0.74	0.61	0.21		149.00		14.80
I-55	10.5	10-yr	711.67	711.61	0.06	0.05	0.01	17.98	145.94	14.08	47.88
I-55	10	10-yr	711.60	711.51	0.09			28.37	110.86	38.78	43.48
I-55	9.1		Culvert								
I-55	9	10-yr	703.81	703.45	0.36	1.08	0.09		178.00		24.76
I-55	8	10-yr	702.64	701.99	0.65	0.77	0.03	2.42	175.58		38.43
I-55	7.5	10-yr	701.41	700.86	0.55	0.07	0.14		178.00		12.32
I-55	7	10-yr	701.20	701.11	0.09	0.04	0.04		178.00		40.06
I-55	6	10-yr	701.12	701.11	0.02				178.00		104.71
I-55	5.1		Culvert								
I-55	5	10-yr	692.22	691.83	0.39	2.51	0.03		178.00		19.79
I-55	4	10-yr	689.68	689.19	0.49	2.15	0.13	4.55	173.45		39.51
I-55	3	10-yr	684.45	684.23	0.23	4.32	0.02		178.00		19.31
I-55	2	10-yr	680.11	679.96	0.15	0.13	0.04		15.03	162.97	171.82
I-55	1	10-yr	679.23	679.22	0.00	0.18	0.00	1.22	110.28	66.50	390.96
I-55	0.15	10-yr	679.04	679.00	0.04			2.60	300.41	174.99	368.05

WBrSawCr Plan: Natural CBBEL Start WSEL 8/25/2016

W. Br. Sawmill I-55

Legend

WS 10-yr

Ground

Elevation (ft)

715
710
705
700
695
690
685
680
675

0
500
1000
1500
2000
2500
3000

Main Channel Distance (ft)

1 CBBEL ...
2 CBBEL XS 2
3 CBBEL XS 3 - D/...
4 CBBEL XS 4 - U/S of I-55 and S. Fro...
5 CBBEL XS 5 - D/S of N. Frontage Road
5.1 Culvert under N. Frontage Road, default internal cross se...
7 CBBEL XS 7 -
8 CBBEL XS 8 - U/S of inline weir
9 CBBEL XS 9 - D/S of Access Road
9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert length...
10 CBBEL XS 10 - U/S of Access Road
10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
11 CBBEL XS 11
11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Nat Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 10-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 10-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 10-yr Culv: Access Road
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 10-yr

Errors Warnings and Notes for Plan : Nat Start WSEL (Continued)

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 10-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Note:	During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 10-yr Culv: Cul Frontage
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 10-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 10-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.

50-Year

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 50-yr

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)	
I-55	11.5	50-yr	245.00	712.52	714.70	714.18	714.91	0.006838	3.75	68.43	49.50	0.52
I-55	11	50-yr	245.00	709.30	712.49	712.49	713.40	0.024429	7.65	32.03	17.99	1.01
I-55	10.5	50-yr	290.00	706.32	712.19	709.98	712.28	0.001047	2.65	131.36	56.32	0.23
I-55	10	50-yr	290.00	705.01	712.00	709.55	712.17	0.001873	4.25	133.02	52.13	0.31
I-55	9.1		Culvert									
I-55	9	50-yr	290.00	698.96	705.60	702.63	705.99	0.001955	5.04	57.50	30.59	0.36
I-55	8	50-yr	290.00	698.55	705.65		705.69	0.000379	1.96	247.05	73.32	0.15
I-55	7.5	50-yr	290.00	698.08	705.66		705.69	0.000051	0.47	261.36	72.10	0.03
I-55	7	50-yr	290.00	698.37	705.67		705.68	0.000088	1.02	318.97	75.38	0.07
I-55	6	50-yr	290.00	694.91	705.66	696.53	705.67	0.000030	0.90	321.31	139.62	0.05
I-55	5.1		Culvert									
I-55	5	50-yr	290.00	688.56	692.42	691.80	693.06	0.009662	6.38	45.47	20.84	0.68
I-55	4	50-yr	290.00	687.10	689.59	689.59	690.23	0.020478	6.59	50.66	41.55	0.94
I-55	3	50-yr	290.00	680.61	684.99	683.66	685.33	0.004816	4.68	61.96	20.61	0.48
I-55	2	50-yr	290.00	679.12	680.07	680.07	680.29	0.094643	6.99	82.26	178.69	1.66
I-55	1	50-yr	290.00	677.67	679.64	678.19	679.65	0.000194	0.73	619.60	433.98	0.10
I-55	0.15	50-yr	780.00	677.67	679.40	678.53	679.46	0.002327	2.30	518.49	409.27	0.32

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 50-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	50-yr	714.91	714.70	0.20	1.44	0.07	3.74	182.00	59.26	49.50
I-55	11	50-yr	713.40	712.49	0.91	0.79	0.25		245.00		17.99
I-55	10.5	50-yr	712.28	712.19	0.09	0.08	0.03	40.47	219.42	30.11	56.32
I-55	10	50-yr	712.17	712.00	0.18			51.15	172.02	66.83	52.13
I-55	9.1		Culvert								
I-55	9	50-yr	705.99	705.60	0.40	0.12	0.18		290.00		30.59
I-55	8	50-yr	705.69	705.65	0.04	0.00	0.00	108.66	174.50	6.83	73.32
I-55	7.5	50-yr	705.69	705.66	0.03	0.00	0.00		46.26	243.74	72.10
I-55	7	50-yr	705.68	705.67	0.02	0.01	0.00	1.01	278.99	10.00	75.38
I-55	6	50-yr	705.67	705.66	0.01				290.00		139.62
I-55	5.1		Culvert								
I-55	5	50-yr	693.06	692.42	0.63	2.82	0.00		290.00		20.84
I-55	4	50-yr	690.23	689.59	0.63	2.35	0.15	18.73	271.27		41.55
I-55	3	50-yr	685.33	684.99	0.34	5.00	0.04		290.00		20.61
I-55	2	50-yr	680.29	680.07	0.22	0.14	0.06		21.39	268.61	178.69
I-55	1	50-yr	679.65	679.64	0.01	0.18	0.01	2.73	174.68	112.59	433.98
I-55	0.15	50-yr	679.46	679.40	0.06			6.21	477.55	296.25	409.27

WBrSawCr Plan: Natural CBBEL Start WSEL 8/25/2016

W. Br. Sawmill I-55

Legend

WS 50-yr

Ground

Elevation (ft)

715
710
705
700
695
690
685
680
675

0
500
1000
1500
2000
2500
3000

Main Channel Distance (ft)

1 CBBEL ...
2 CBBEL XS 2
3 CBBEL XS 3 - D/...
4 CBBEL XS 4 - U/S of I-55 and S. Fro...
5 CBBEL XS 5 - D/S of N. Frontage Road
5.1 Culvert under N. Frontage Road, default internal cross se...
7 CBBEL XS 7 -
8 CBBEL XS 8 - U/S of inline weir
9 CBBEL XS 9 - D/S of Access Road
9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert leng...
10 CBBEL XS 10 - U/S of Access Road
10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
11 CBBEL XS 11
11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Nat Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 50-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 50-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9.1 Profile: 50-yr Culv: Access Road
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore,
	the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet
	answer will be used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 50-yr
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 50-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Note:	During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 50-yr Culv: Cul Frontage
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 50-yr

Errors Warnings and Notes for Plan : Nat Start WSEL (Continued)

Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 50-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 50-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 50-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.

100-Year

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 100-yr

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)	
I-55	11.5	100-yr	290.00	712.52	714.90	714.31	715.12	0.006271	3.88	78.53	51.02	0.51
I-55	11	100-yr	290.00	709.30	712.75	712.75	713.71	0.023370	7.85	36.95	19.31	1.00
I-55	10.5	100-yr	345.00	706.32	712.53	710.25	712.63	0.001042	2.79	151.46	62.20	0.23
I-55	10	100-yr	345.00	705.01	712.31	709.95	712.51	0.002096	4.65	150.09	58.48	0.33
I-55	9.1		Culvert									
I-55	9	100-yr	345.00	698.96	708.11	703.00	708.15	0.000243	1.62	217.42	46.47	0.12
I-55	8	100-yr	345.00	698.55	708.09		708.11	0.000112	1.38	453.18	96.74	0.09
I-55	7.5	100-yr	345.00	698.08	708.09		708.11	0.000013	0.27	456.54	91.32	0.02
I-55	7	100-yr	345.00	698.37	708.09		708.10	0.000035	0.81	531.04	99.14	0.05
I-55	6	100-yr	345.00	694.91	708.10	696.74	708.10	0.000003	0.30	1321.65	164.50	0.02
I-55	5.1		Culvert									
I-55	5	100-yr	345.00	688.56	692.68	692.07	693.43	0.010231	6.95	49.65	21.44	0.71
I-55	4	100-yr	345.00	687.10	689.75	689.75	690.46	0.020678	7.01	57.25	42.35	0.96
I-55	3	100-yr	345.00	680.61	685.30	683.93	685.69	0.005143	5.05	68.33	21.13	0.49
I-55	2	100-yr	345.00	679.12	680.12	680.12	680.37	0.094961	7.23	91.80	181.14	1.67
I-55	1	100-yr	345.00	677.67	679.90	678.23	679.91	0.000168	0.75	737.35	461.10	0.09
I-55	0.15	100-yr	923.00	677.67	679.70	678.61	679.75	0.001746	2.24	645.90	440.19	0.29

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 100-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	100-yr	715.12	714.90	0.22	1.34	0.07	5.64	211.83	72.53	51.02
I-55	11	100-yr	713.71	712.75	0.96	0.78	0.26		290.00		19.31
I-55	10.5	100-yr	712.63	712.53	0.10	0.09	0.03	56.06	249.80	39.14	62.20
I-55	10	100-yr	712.51	712.31	0.21			64.99	197.91	82.10	58.48
I-55	9.1		Culvert								
I-55	9	100-yr	708.15	708.11	0.04	0.03	0.01		343.88	1.12	46.47
I-55	8	100-yr	708.11	708.09	0.02	0.00	0.00	147.06	180.10	17.85	96.74
I-55	7.5	100-yr	708.11	708.09	0.01	0.00	0.00	0.09	38.50	306.42	91.32
I-55	7	100-yr	708.10	708.09	0.01	0.00	0.00	7.04	313.91	24.04	99.14
I-55	6	100-yr	708.10	708.10	0.00			8.51	327.88	8.61	164.50
I-55	5.1		Culvert								
I-55	5	100-yr	693.43	692.68	0.75	2.94	0.02		345.00		21.44
I-55	4	100-yr	690.46	689.75	0.71	2.46	0.16	26.60	318.40		42.35
I-55	3	100-yr	685.69	685.30	0.40	5.28	0.04		345.00		21.13
I-55	2	100-yr	680.37	680.12	0.25	0.12	0.07		24.30	320.70	181.14
I-55	1	100-yr	679.91	679.90	0.01	0.15	0.00	3.78	204.09	137.13	461.10
I-55	0.15	100-yr	679.75	679.70	0.05			9.02	553.68	360.30	440.19

WBrSawCr Plan: Natural CBBEL Start WSEL 8/25/2016

W. Br. Sawmill I-55

Legend

WS 100-yr

Ground

Elevation (ft)

715
710
705
700
695
690
685
680
675

0
500
1000
1500
2000
2500
3000

Main Channel Distance (ft)

1 CBBEL...
2 CBBEL XS 2
3 CBBEL XS 3 - D/...
4 CBBEL XS 4 - U/S of I-55 and S. Fro...
5 CBBEL XS 5 - D/S of N. Frontage Road
5.1 Culvert under N. Frontage Road, default internal cross se...
7 CBBEL XS 7 -
8 CBBEL XS 8 - U/S of inline weir
9 CBBEL XS 9 - D/S of Access Road
9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert length...
10 CBBEL XS 10 - U/S of Access Road
10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88
11 CBBEL XS 11
11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Nat Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 100-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 100-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10.5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 100-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 100-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 100-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 100-yr Culv: Cul Frontage
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Warning:	During the culvert outlet control computations, the program could not balance the culvert/weir
	flow. The reported outlet energy grade answer may not be valid.

Errors Warnings and Notes for Plan : Nat Start WSEL (Continued)

Note:	Culvert critical depth exceeds the height of the culvert.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 100-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 100-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 100-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.

500-Year

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 500-yr

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)	
I-55	11.5	500-yr	420.00	712.52	715.46	714.62	715.70	0.004997	4.13	107.94	55.22	0.47
I-55	11	500-yr	420.00	709.30	713.34	713.34	714.47	0.022752	8.53	49.26	22.27	1.01
I-55	10.5	500-yr	495.00	706.32	713.02	710.80	713.16	0.001350	3.40	184.13	73.19	0.27
I-55	10	500-yr	495.00	705.01	712.63	710.76	712.97	0.003381	6.11	170.13	65.67	0.42
I-55	9.1		Culvert									
I-55	9	500-yr	495.00	698.96	708.59	703.94	708.66	0.000389	2.14	241.11	51.41	0.15
I-55	8	500-yr	495.00	698.55	708.57		708.60	0.000180	1.81	500.66	101.70	0.11
I-55	7.5	500-yr	495.00	698.08	708.57		708.60	0.000020	0.36	501.90	97.62	0.02
I-55	7	500-yr	495.00	698.37	708.58		708.59	0.000058	1.08	580.02	104.27	0.06
I-55	6	500-yr	495.00	694.91	708.58	697.19	708.58	0.000005	0.41	1402.40	169.43	0.02
I-55	5.1		Culvert									
I-55	5	500-yr	495.00	688.56	693.23	692.71	694.33	0.011959	8.41	58.84	22.88	0.79
I-55	4	500-yr	495.00	687.10	690.17	690.17	691.03	0.019696	7.79	75.40	44.47	0.96
I-55	3	500-yr	495.00	680.61	685.99	684.56	686.54	0.005951	5.94	83.51	24.09	0.54
I-55	2	500-yr	495.00	679.12	680.25	680.25	680.56	0.092739	7.70	116.57	187.33	1.68
I-55	1	500-yr	495.00	677.67	680.24	678.35	680.25	0.000193	0.88	897.78	473.25	0.10
I-55	0.15	500-yr	1290.00	677.67	680.00	678.80	680.07	0.001993	2.65	782.59	471.10	0.32

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 Profile: 500-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	11.5	500-yr	715.70	715.46	0.24	1.14	0.09	13.09	294.39	112.51	55.22
I-55	11	500-yr	714.47	713.34	1.13	0.97	0.30		420.00		22.27
I-55	10.5	500-yr	713.16	713.02	0.14	0.12	0.06	96.18	337.35	61.47	73.19
I-55	10	500-yr	712.97	712.63	0.34			99.44	273.26	122.31	65.67
I-55	9.1		Culvert								
I-55	9	500-yr	708.66	708.59	0.07	0.04	0.02	0.00	491.34	3.66	51.41
I-55	8	500-yr	708.60	708.57	0.03	0.00	0.00	214.10	252.17	28.73	101.70
I-55	7.5	500-yr	708.60	708.57	0.02	0.00	0.00	0.38	53.45	441.17	97.62
I-55	7	500-yr	708.59	708.58	0.02	0.00	0.01	12.24	445.21	37.55	104.27
I-55	6	500-yr	708.58	708.58	0.00			13.42	467.94	13.64	169.43
I-55	5.1		Culvert								
I-55	5	500-yr	694.33	693.23	1.10	3.18	0.12		495.00		22.88
I-55	4	500-yr	691.03	690.17	0.86	2.67	0.15	51.44	443.56		44.47
I-55	3	500-yr	686.54	685.99	0.55	5.90	0.07	0.03	494.97		24.09
I-55	2	500-yr	680.56	680.25	0.31	0.13	0.09		32.20	462.80	187.33
I-55	1	500-yr	680.25	680.24	0.01	0.17	0.01	6.29	281.66	207.05	473.25
I-55	0.15	500-yr	680.07	680.00	0.07			14.86	758.03	517.11	471.10

WBrSawCr Plan: Natural CBBEL Start WSEL 8/25/2016

W. Br. Sawmill I-55

Legend

WS 500-yr

Ground

Elevation (ft)

720

710

700

690

680

670

0

500

1000

1500

2000

2500

3000

Main Channel Distance (ft)

1 CBBEL XS 1 extend...

2 CBBEL XS 2

3 CBBEL XS 3 - D/S of I-55...

4 CBBEL XS 4 - U/S of I-55 and S. Frontage...

5 CBBEL XS 5 - D/S of N. Frontage Road

5.1 Culvert under N. Frontage Road, default internal cross se...

7 CBBEL XS 7 -

8 CBBEL XS 8 - U/S of inline weir

9 CBBEL XS 9 - D/S of Access Road

9.1 Culvert Under Access Road, default internal cross sections, deck length = culvert ...

10 CBBEL XS 10 - U/S of Access Road

10.5 SWSW0015 WSP-2 XSC WSAS3C converted to NAVD88

11 CBBEL XS 11

11.5 SWSW0016 WSP-2 XSC WSAV1 converted to NAVD88

Errors Warnings and Notes for Plan : Nat Start WSEL

Location:	River: W. Br. Sawmill Reach: I-55 RS: 11.5 Profile: 500-yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 11 Profile: 500-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10.5 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 10 Profile: 500-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 9 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 8 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7.5 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 7 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 6 Profile: 500-yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 500-yr
Warning:	The flow through the culvert is supercritical. However, since there is flow over the road (weir
	flow), the program cannot determine if the downstream cross section should be subcritical or
	supercritical. The program used the downstream subcritical answer, even though it may not be
	valid.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 5.1 Profile: 500-yr Culv: Cul Frontage
Warning:	During the supercritical analysis, the program could not converge on a supercritical answer in the
	downstream cross section. The program used the solution with the least error.
Note:	Culvert critical depth exceeds the height of the culvert.
Note:	The flow in the culvert is entirely supercritical.

Errors Warnings and Notes for Plan : Nat Start WSEL (Continued)

Location:	River: W. Br. Sawmill Reach: I-55 RS: 5 Profile: 500-yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 4 Profile: 500-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 3 Profile: 500-yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 2 Profile: 500-yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical
	depth, the calculated water surface came back below critical depth. This indicates that there is not
	a valid subcritical answer. The program defaulted to critical depth.
Location:	River: W. Br. Sawmill Reach: I-55 RS: 1 Profile: 500-yr
Warning:	The cross-section end points had to be extended vertically for the computed water surface.

Natural Structure Tables

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55

Reach	River Sta	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
I-55	9.1 Access Road	10-yr	711.60	711.51	711.60	711.06	710.78	111.04	66.96	8.06	11.54	14.74
I-55	9.1 Access Road	50-yr	712.18	712.00	712.18	712.18	710.78	122.44	167.56	6.40	12.73	12.73
I-55	9.1 Access Road	100-yr	712.51	712.31	712.35	712.51	710.78	100.16	244.84	4.20	10.41	10.41
I-55	9.1 Access Road	500-yr	712.97	712.63	712.92	712.97	710.78	99.86	395.14	4.04	10.38	10.38
I-55	9.1 Access Road	OT	712.24	712.04	712.21	712.24	710.78	117.25	184.75	5.84	12.19	12.19
I-55	5.1 Cul Frontage	10-yr	701.12	701.11	701.12	700.75	707.93	178.00		9.28	8.90	15.52
I-55	5.1 Cul Frontage	50-yr	705.67	705.66	705.67	703.54	707.93	290.00		13.23	14.50	19.89
I-55	5.1 Cul Frontage	100-yr	708.10	708.10	708.10	705.20	707.93	334.79	12.90	15.42	16.74	22.06
I-55	5.1 Cul Frontage	500-yr	708.58	708.58	708.58	705.59	707.93	343.04	151.96	15.36	17.15	22.48
I-55	5.1 Cul Frontage	OT	706.29	706.28	706.29	703.93	707.93	302.00		13.79	15.10	20.45

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	10.5	10-yr	711.67	711.61	0.06	0.05	0.01	17.98	145.94	14.08	47.88
I-55	10.5	50-yr	712.28	712.19	0.09	0.08	0.03	40.47	219.42	30.11	56.32
I-55	10.5	100-yr	712.63	712.53	0.10	0.09	0.03	56.06	249.80	39.14	62.20
I-55	10.5	500-yr	713.16	713.02	0.14	0.12	0.06	96.18	337.35	61.47	73.19
I-55	10.5	OT	712.34	712.25	0.09	0.09	0.03	43.25	226.73	32.02	57.12
I-55	10	10-yr	711.60	711.51	0.09			28.37	110.86	38.78	43.48
I-55	10	50-yr	712.17	712.00	0.18			51.15	172.02	66.83	52.13
I-55	10	100-yr	712.51	712.31	0.21			64.99	197.91	82.10	58.48
I-55	10	500-yr	712.97	712.63	0.34			99.44	273.26	122.31	65.67
I-55	10	OT	712.23	712.04	0.19			53.84	178.29	69.87	52.97
I-55	9.1		Culvert								
I-55	9	10-yr	703.81	703.45	0.36	1.08	0.09		178.00		24.76
I-55	9	50-yr	705.99	705.60	0.40	0.12	0.18		290.00		30.59
I-55	9	100-yr	708.15	708.11	0.04	0.03	0.01		343.88	1.12	46.47
I-55	9	500-yr	708.66	708.59	0.07	0.04	0.02	0.00	491.34	3.66	51.41
I-55	9	OT	706.55	706.20	0.35	0.09	0.16		302.00		32.22
I-55	8	10-yr	702.64	701.99	0.65	0.77	0.03	2.42	175.58		38.43
I-55	8	50-yr	705.69	705.65	0.04	0.00	0.00	108.66	174.50	6.83	73.32
I-55	8	100-yr	708.11	708.09	0.02	0.00	0.00	147.06	180.10	17.85	96.74
I-55	8	500-yr	708.60	708.57	0.03	0.00	0.00	214.10	252.17	28.73	101.70
I-55	8	OT	706.30	706.27	0.03	0.00	0.00	118.63	174.32	9.05	78.46
I-55	7	10-yr	701.20	701.11	0.09	0.04	0.04		178.00		40.06
I-55	7	50-yr	705.68	705.67	0.02	0.01	0.00	1.01	278.99	10.00	75.38
I-55	7	100-yr	708.10	708.09	0.01	0.00	0.00	7.04	313.91	24.04	99.14
I-55	7	500-yr	708.59	708.58	0.02	0.00	0.01	12.24	445.21	37.55	104.27
I-55	7	OT	706.29	706.28	0.01	0.01	0.00	2.04	286.82	13.14	81.51
I-55	6	10-yr	701.12	701.11	0.02				178.00		104.71
I-55	6	50-yr	705.67	705.66	0.01				290.00		139.62
I-55	6	100-yr	708.10	708.10	0.00			8.51	327.88	8.61	164.50

HEC-RAS Plan: Nat Start WSEL River: W. Br. Sawmill Reach: I-55 (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I-55	6	500-yr	708.58	708.58	0.00			13.42	467.94	13.64	169.43
I-55	6	OT	706.29	706.28	0.01				302.00		145.91
I-55	5.1		Culvert								
I-55	5	10-yr	692.22	691.83	0.39	2.51	0.03		178.00		19.79
I-55	5	50-yr	693.06	692.42	0.63	2.82	0.00		290.00		20.84
I-55	5	100-yr	693.43	692.68	0.75	2.94	0.02		345.00		21.44
I-55	5	500-yr	694.33	693.23	1.10	3.18	0.12		495.00		22.88
I-55	5	OT	693.14	692.48	0.66	2.86	0.00		302.00		20.94
I-55	4	10-yr	689.68	689.19	0.49	2.15	0.13	4.55	173.45		39.51
I-55	4	50-yr	690.23	689.59	0.63	2.35	0.15	18.73	271.27		41.55
I-55	4	100-yr	690.46	689.75	0.71	2.46	0.16	26.60	318.40		42.35
I-55	4	500-yr	691.03	690.17	0.86	2.67	0.15	51.44	443.56		44.47
I-55	4	OT	690.28	689.63	0.65	2.38	0.15	20.39	281.61		41.73

TAB D

SECTION 13.D

PROPOSED CONDITIONS

PROPOSED ANALYSIS

There are no proposed modifications to the existing culvert. Please refer to the existing conditions analysis in Section 13 C .

TAB 14

SECTION 14

SCOUR ANALYSIS

SCOUR ANALYSIS

Scour analysis is not required for culverts.

TAB 15

SECTION 15

RIPRAP SIZING

RIPRAP SIZING

There appear to be scour holes present at the ends of the I-55 culvert. Proper scour countermeasures including riprap apron should be considered.

Tab 16

SECTION 16

FLOODWAY PERMIT SUMMARY FORM
RELATED EXHIBITS AND FILL CALCULATIONS

FLOODWAY PERMIT SUMMARY FORM
RELATED EXHIBITS AND FILL CALCULATIONS

There is no regulatory floodway present and the drainage area is less than 1 square mile, therefore there is no permit summary form required.

Tab 17

SECTION 17

COMPENSATORY STORAGE

COMPENSATORY STORAGE

There is no regulatory floodway present and the drainage area is less than 1 square mile, therefore there is no compensatory storage required.

Tab 18

SECTION 18

SURVEY NOTES

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 41 43 59

Longitude: 87 57 00

NGVD 29 height:

Datum shift(NAVD 88 minus NGVD 29): -0.086 meter ≈ 0.28 Feet

---

pg 138

12/5/12
OW/JH
SUNNY 50

110203

FILE 20121205.DW

PTS 2000 — 2196

TC 1435 BS 1436 CHECK 2083

1844353.8035 1844580.1804

1080031.0499 1080012.4682

708.0' 712.0

710.2239 709.1387

HI 5.11
HR 6.00

TC CP 1435

KNOWN C CP 1436

1844580.1804

1080012.4682

709.1387

BS C CP 1436

CHECK SHOT 2083

1844580.2345

1080012.4677

709.0876

BS CHECK SHOT 2145

1844580.2022

1080012.4805

709.0653

HI 5.06
HR 6.00

TC CP 1436

KNOWN C CP 1435

1844353.8035

1080031.0499

710.2239

BS C CP 1435

CHECK SHOT 2146

1844353.7885

1080031.0431

710.2852

BS CHECK SHOT 2196

1844353.7856

1080031.0306

710.2945

FB 162 PG 146 11/06/12 TW/JH

CONTROL

110208.0001 I 55 TOLLWAY STREAM CLOUDY/RAIN 55°

FILE 20121106TW PTS ~~0023,24~~ - 0026 - 0032

HI 1.314

TP @ CP 301215

1844559.196

1083004.674

692.144

CHECK @ CP ~~201231~~ 301216

1845224.187

1083444.575

691.071

CHECK @ CP 201231

1855453.469

1101219.778

668.946

CHECK @ CP 201233

1855678.295

1104267.027

644.053

CHECK @ CP 201211

1842381.058

1077585.312

715.871

8 8/8 CHECK # 0026

1845224.152

1083444.537

691.058

8 8/8 CHECK 0027

1855453.440

1101219.707

668.841

F7/7 CHECK 0028

1855678.224

1104266.904

643.962

8 2/2 CHECK ~~0032~~ 0033

1842381.006

1077585.327

715.911

FB 162 PG 147 11/07/12 TW/JH

110303 I 55 STREAM #1 CLOUDY 50

FILE 20121107TW

HI

BASE @ CP 201216

1845224.184

1083444.575

691.071

CHECK @ 201217

~~#0043 (950) HI 21.03~~ NOT ~~25.10~~ 6.5617 TBW

~~#0045 (950) HI 21.07~~ NOT 25.10

PTS 0034 - 0073

CHECK 0034

1845886.396

1084869.029

690.960

11/08/12 TW SUNNY 45

FILE 20121108TW PTS 74-99 600-

HI 1.420 BASE @ CP 301216

1845224.184

1083444.575

691.071

CHECK @ CP 201217

1845886.434

1084869.042

691.068

694 BFE +1

CHECK 0074

1845886.405

1084868.962

690.953

FB162 PG 148

11/08/12
TW
Cloudy 45°

110203 I55 STROHM #1
File 20121108TW

5.07
6.0

⊼ 0079 BS CP0080 CHECK 81

	1842678.8482	1842677.0559	1842677.0780
6.562	1078845.0846	1078799.4303	1078799.434
3.82	695.4285	696.5958	696.6297
10.382			

CHECK 0095
1842677.0566
1078799.4286
696.6298

11/09/12
TW

FILE 20121109TW PTS 593-853

HI =
BASE @ 201216
1845224.184
1083444.575
~~TB~~ 691.07

9 7/7 GPOP 3.2
CHECK 0593

CHECK @ CP 201217	
1845886.424	1845886.445
1084869.042	1084869.000
691.068	690.961

4.010
25.10
-3.97
21.13
2
3.
9.14
3.97

HR ~~13.11~~ 9.04 NOT 13.11 # 465
HR 9.24 NOT 13.11 # 466
#680 HR 5.94 NOT 9.04
708 HR 21.13 NOT 35.10
PTS 853
TRW

FB162 PG 149

11/12/12
TW HA
Sunny

110203 I55 STROHM #1

HI 5.33
HR 6.0

⊼ @ CP 722 BS CP 721 CHECK 855

1843775.2688	1843654.488	1843654.5706
1077482.0939	1077456.0265	1077456.0279
712.1504	714.8194	714.8045

CHECK 0985
1843654.5663
1077456.0596
714.8162

FILE 20121112TW PTS 480-499, INST 986-1008, GPS 1006-1074

HI 1.226 BASE @ 201216
1845224.184
1083444.575
691.07

9 8/8 GPOP 2.80
CHECK 1006

CHECK @ CP 201217	
1845886.424	1845886.453
1084869.042	1084868.971
691.068	690.957

500' 682 BFE
1000' 684 BFE

Tab 19

SECTION 19

ESTIMATED WATER SURFACE ELEVATION (EWSE) DATA

EWSE Data

Date of survey: November, 2012
Existing water surface elevation = 687.22
Streambed elevation = 687.10
Top of bank elevation = 698.00
There is no gaging station data at or near the I-55 crossing over West Branch Sawmill Creek

Tab 20

SECTION 20

CORRESPONDENCE NOTES

Ed Burke

From: Ilene Dailey
Sent: Thursday, February 11, 2016 11:17 AM
To: Ed Burke
Subject: Fwd: I-55 culvert conditions
Attachments: img-824133158-0001.pdf; ATT00001.htm; img-824133149-0001.pdf; ATT00002.htm

Sent from my iPhone

Begin forwarded message:

> **From:** "Book, Dustin" <Dustin.Book@stantec.com>
> **Date:** February 11, 2016 at 10:59:38 AM CST
> **To:** "Ilene Dailey (Ilene Dailey) (idailey@cbbel.com)" <idailey@cbbel.com>
> **Subject: FW: I-55 culvert conditions**
>
> Ilene -
>
> Attached, please find the bridge condition report for the Sawmill Creek culvert (022-02071).
>
> As noted below, The West Branch Sawmill Creek is a 5'X4' culvert and BOM does not inventory or inspect culverts of that size.
>
> -----Original Message-----
> From: O'Holleran, John
> Sent: Thursday, September 03, 2015 8:02 AM
> To: Book, Dustin; Mike Matkovic, P.E.; Ilene Dailey (Ilene Dailey) (idailey@cbbel.com) (idailey@cbbel.com)
> Subject: FW: I-55 culvert conditions
>
> FYI
>
> John V. O'Holleran, P.E.
> Principal
> 135 South LaSalle Street
> Suite 3100

Chicago, IL 60603-4139
Direct 312.262.2400
Cell 312.287.1863
John.oholleran@stantec.com

Stantec
stantec.com

-----Original Message-----
From: Smith, Corey J. [mailto:Corey.Smith@Illinois.gov]
Sent: Thursday, September 03, 2015 7:56 AM
To: O'Holleran, John
Cc: Baldauf, John E.; Wojcik, Rick F
Subject: FW: I-55 culvert conditions

John O',

The Bureau of Maintenance is recommending repairs based on the inspections of the three structures listed below. The West Branch Sawmill Creek is a 5'X4' culvert and BOM does not inventory or inspect culverts of that size. Let me know if you need any other information.

Thanks,

Corey Smith
847.705.4086

-----Original Message-----
From: Mastny, Steve C
Sent: Monday, August 24, 2015 1:43 PM
To: Smith, Corey J.
Cc: Wilson, Sarah M; Abudan, Jamal; Tayyab, Kaamil R.; Baldauf, John E.

Subject: RE: I-55 culvert conditions

Hello Corey,

A quick question, any reason you asked about the below structures, but not 022-0514, which also carries I-55 in this area?

I've scanned and attached recent inspection reports for 022-0516, 022-0207, and 022-0513. I also included scanned plans for 022-0516, 022-0207, and a coring report for 022-0513.

Full size copies of inspection photos are located in the Pontis directory, which you should be able to access if you have access to SIMS: \\central\co\pontis\

For the structure you call out as:

No SN I-55 over West Branch Sawmill Creek

I'm not sure where exactly this is. Can you give me an exact location? Also, do you happen to know what size structure it is?

Reviewing the conditions based on our recent inspecitons, here's my take on reasonable scopes of work:

022-0516 - culvert repairs, including full depth patching at the construction joints, dumped rip rap in areas of erosion in channel

022-0207 - culvert repairs, including full depth patching at the construction joints

022-0513 - culvert repairs, including full depth patching at the construction joints, dumped rip rap in areas of erosion in channel

Steve

Steve Mastny, P.E.
IDOT - District One
South Area Bridge Inspection Engineer
steve.mastny@illinois.gov
847-956-1494

From: Wilson, Sarah M
Sent: Saturday, August 22, 2015 7:06 AM
To: Mastny, Steve C
Subject: FW: I-55 culvert conditions

Steve - please pull this information together and send your thoughts on the need for replacement / repairs to Corey, with a cc to me.

Thanks.

From: Smith, Corey J.
Sent: Thursday, August 20, 2015 8:02 AM
To: Wilson, Sarah M
Cc: Baldauf, John E.
Subject: I-55 culvert conditions

Sarah,

Could you please let us know the condition and provide the inspection reports for the following structures:

022-0516 I-55 over Wards Creek
022-0207 I-55 over Sawmill Creek
022-0513 I-55 over East Branch Sawmill Creek No SN I-55 over West Branch Sawmill Creek

We would like to find out if they need to be replaced as part of the I-55 Managed Lane project.

Thanks,

Corey Smith
Illinois Department of Transportation
Bureau of Programming | Consultant Studies Unit
201 W. Center Court | Schaumburg, IL 60196
Direct: 847.705.4086

Tab 21

SECTION 21

CD WITH PROJECT FILES

CD POCKET INSERTED HERE