HYDRAULIC REPORT

PROJECT ROUTE:	Interstate 55 (Stevenson Expressway)
SECTION:	n/a
LIMITS:	Station 403+00 to Station 405+00
WATERWAY CROSSING:	Sawmill Creek
MUNICIPALITY/COUNTY:	Unincorporated DuPage County
JOB NUMBER:	P-91-762-10
EXISTING STRUCTURE NO.:	022-0207
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

Prepared by:

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CBBEL Project No. 11-203.00001

June 2017

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SECTION 1

NARRATIVE

A. PROJECT DESCRIPTION

The Illinois Department of Transportation (IDOT) is currently 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 IDOT is to evaluate the existing culvert structure carrying I-55 over Sawmill Creek located in DuPage County, Illinois. The subject 12' x 5' concrete box culvert is located between Cass Avenue and Clarendon Hills Road and crosses I-55 approximately 1900 feet east of Cass Avenue. The total drainage area to the culvert is approximately 2.14 square miles. Refer to Exhibit 4.1 for the project location shown on the USGS Quadrangle Map.

B. DESCRIPTION OF EXISTING STRUCTURE AND FLOODPLAIN

SITE DESCRIPTION

The upstream limit of the study is located approximately 1400' northeast of the I-55 crossing. Sawmill Creek passes through an open vegetated area in unincorporated DuPage County towards a single box culvert crossing beneath Historic U.S. 66 North Frontage Road before traversing a commercial property that feeds into a single box culvert under I-55. Refer to Exhibit 4.1 for the general project location.

Downstream of I-55, the Creek begins to meander. Sawmill Creek crosses under a small private bridge approximately 1170' south of the I-55 crossing. Approximately 1500' southeast of the I-55 crossing, Sawmill Creek merges with the East Branch of Sawmill Creek.

In general, upstream of I-55 the Sawmill Creek watershed is comprised of mainly an open vegetated area. Between the North Frontage Road and the culvert crossing at I-55, the waterway is composed of a straight, well defined channel supported by wooden retaining walls. The overbank in this area is composed of an unpaved commercial property lot. The watershed downstream of the crossing features largely undeveloped land uses with some

commercial properties and is heavily vegetated. Photographs of the structure and surrounding area are included in Section 5.

STRUCTURE DESCRIPTION

The structure carrying I-55 over 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 279' measured from face of headwall to face of headwall. The opening dimensions are 12'-0" wide x 5'-0" high.

The culvert is skewed to the roadway at 34.6-degrees and carries three (3) 12'-0" travel lanes, a 19-0" inside shoulder, and an 11'-0" outside shoulder in each direction of Interstate 55. In addition, the culvert carries the South Frontage Road located outside of the expressway. The frontage road is comprised of a 2-lane section with shoulders.

The culvert was inspected in 2011 and was noted to have an old patch and minor cracking within the structure. The recommended culvert repairs include full depth patching at the construction joints. The structure inspection report along with corresponding emails is provided in Section 20.

FLOODPLAIN DESCRIPTION

At the I-55 crossing, Sawmill Creek drains approximately 2.14 square miles of area and is comprised of mainly open land. The Sawmill Creek channel is found to be between 20' and 30' in width and consists of a consistent cross section throughout the study limits. There is a mapped Federal Emergency Management Agency (FEMA) floodplain and floodway for Sawmill Creek, extending upstream and downstream of the subject crossing.

The Sawmill Creek floodplain is mapped as Zone AE by FEMA with 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 4.4

C. FIELD OBSERVATIONS

Sawmill Creek field survey was performed intermittently from November 2012 to 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.

Upstream of the frontage road the floodplain is comprised of medium vegetation of grass and trees. Between the frontage road and I-55 in the overbank is a commercial unpaved lot. Downstream of I-55 the floodplain is comprised of mix of dense forests and open grass. Photographs have been included in Section 5.

A second field inspection was performed November 2013. Directly downstream of the North Frontage there was a fence that had been constructed within the floodway of Sawmill Creek. This fence had plywood extensions that likely further impeded the flow. It was determined that the property in which the fence was constructed is located within Unincorporated DuPage County. DuPage County was informed of the existence of this fence, and it was assumed for modeling purposes that it will be removed. Current (2016) Google Earth Street View shows that the fence has been reconfigured and no longer blocks flow. Photographs of the fence and channel, along with communications with DuPage County, have been provided in Section 20.

D. HISTORICAL OBSERVATIONS/RECORDS

There are no records of flooding on the I-55 pavement at the Sawmill Creek Culvert. 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 Sawmill Creek. Pavement flooding records are included in Section 20.

The 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 show historic flooding over I-55 or the U.S. 66 North Frontage Road on the plan view mapping. The HA has been provided as Exhibit 4.2 in Section 4. The Hydrologic Atlas only covers the extreme storm events from October 1954, July 1957, and September 1961 with only the September 1961 flood fully delineated on the flood profile. A record flood level of approximately 684 for the October 1954 event is shown at the U.S. 66 North Frontage Road (River mile 4.08). The September 1961 flood profile indicates a record flood level of approximately 680 at the current location of I-55 (slightly upstream of historic gage at South Frontage Road). The flood profiles from the HA are provided as Exhibit 4.3 in Section 4. The record high water elevation is above the top of culvert elevation of the I-55 culvert (inside top of culvert = 679.81) and is below the low pavement elevation. Note that the HA labels Sawmill Creek as Sawmill Creek Tributary and is not consistent with the naming conventions referenced as part of this study and used in the 2004 DuPage County Flood Insurance Study (FIS) and the 1975 Des Plaines River Study.

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 2.14 square miles. The current gage was established in 1986 and is currently active. Partial records are available from

this location beginning in year 1961. The gage datum is 630.00 (NGVD29) and the peak gage height of 17.53 feet was recorded on July 18, 1996. The projected peak water surface elevation is therefore 630.00 + 17.53 = 647.53 and corresponds with a discharge of 3,070 cfs. However, because the drainage area at the gage is so much greater than the point of interest, the gage was not used in the analysis. Copies of USGS Data and FIS Flow data have been provided in Section 6.

The following documents were utilized in developing this report:

- *USGS Hydrologic Atlas HA-149, Sag Bridge* Quadrangle, Illinois, 1967.
- Flood Plain Information Maps and Profiles, Des Plaines River, December 1975.
- 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.
- Location Drainage Study for I-55, prepared by Wight & Company, March 1994.

E. OTHER STUDIES & AFFECTED AGENCIES

The site is in unincorporated DuPage County. FEMA FIRM Panels No. 17043C0908H and No. 17043C01002H for DuPage County, Illinois and Incorporated Areas encompass the areas upstream and downstream of this crossing. According to these maps the surrounding areas of this culvert are mapped as Zone AE Floodplain with designated floodway. Applicable portions of the FIRM Panels have been provided as Exhibit 4-4 in Section 4. The FEMA study WSP-2 hydraulic modeling was completed in the 1970s and did not include any of the crossings presently on Sawmill Creek. Therefore, the peak water surface elevations from the FEMA study do not correlate well to the conditions analyzed in this report.

F. DATUM CORRELATION

A stream survey was conducted by CBBEL in 2012 with cross sections taken along Sawmill Creek. These cross sections were used to create 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 used 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 the said models have been

corrected for this factor. Datum conversion calculations from the NOAA VERTCON website have been provided in Section 18.

G. SENSITIVE FLOOD RECEPTORS

One (1) potential flood receptor is located upstream of the I-55 Crossing. While there are surveyed cross sections in this area (XS 8, 7.5, and 7) as shown on the Cross Section Location Map in Section 9, there are not low entry surveyed points. The commercial property is located near the east end of XS 7.5 and is out of the floodplain as presented by the FIRM and as modeled in the Existing Conditions Model.

H. HYDROLOGIC METHODOLOGY

This section summarizes the hydrologic methodology used to determine the peak flow rates for Sawmill Creek at the location of the I-55 crossing. The source hydrology and hydraulic model was taken from the current FEMA FIS for DuPage County, No. 17403CV000H. A review of the document identifies the "Des Plaines River Flood Plain Information Maps and Profiles" report, prepared by the Des Plaines River Steering Committees, dated December 1975, as the underlying study used in the preparation of the FIS. The Des Plaines River Study includes the analysis Sawmill Creek.

The model titled "SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HC1" as prepared by Harza Engineering Company (WSP2 format), dated 1975, is cited to be the underlying analysis referenced in the published FIS. The Illinois State Water Survey (ISWS) provided a copy of the original input files from Harza and a working WSP2 model (titled SM1975w.txt) dated 2/15/2012.

The design discharges identified in the 1975 WSP2 Model prepared by Harza are considered to be the regulatory discharges correlated with the published FIS Flows at cross section SWSW002 and are used as part of the analysis. The 1975 WSP2 model provided discharges only for the 5-year, 10-year, 25-year, and 100-year frequencies. These known frequency discharges were plotted and the 50-year and 500-year discharges were estimated using regression equations. A copy of the regression plot is provided as part of the calculations in Section 6.

The summary of the cited discharges and starting water surface elevations from the 1975 WSP2 regulatory model is contained as follows in Table H-1. The flows used at the subject culvert are from cross section SWSW007/SM039 which is located upstream of the subject crossing. The next downstream cross section, SWSW006/SM035, has much higher flows as it includes flows from the East Branch Sawmill Creek. The confluence with East Branch is located approximately 1500' downstream of I-55.

Section	Drainage Area (square miles)	Peak Discharge (CFS)					
		5-Year	10-Year	25-Year	50-Year*	100-Year	500-Year*
Section SWSW006/SM035 (1500 ft. downstream of I-55)	5.64	465.3	626.6	815.6	1010.1	1190.6	1578.8
Starting Water Surface Elevation (WSEL) @ SWSW006 (NAVD 88 feet)		671.7	672.4	672.9	673.3	673.6	674.5
Section SWSW007/SM039 (620 ft. upstream of I-55)	2.14	192.8	260.5	339.7	420.3	495.3	657
Approximate Water Surface Elevation (WSEL) at U/S face of I-55 [1]		677.6	678.0	678.1	678.3	678.5	678.9
[1] - WSELs linearly interpolated from the FIS duplicate model. * - Discharges and starting WSELs interpolated/extrapolated from the FIS values.							

Table H-1 Summary of Discharges

I. HYDRAULIC METHODOLOGY

The model titled "SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HC1" as prepared by Harza Engineering Company (WSP2 format), dated 1975, is the regulatory model. This model was used as the baseline information for this study, as well as the source of flows and stating water surface elevations. Hardcopy input and output of this model are provided as the Baseline in Section 13.A.

The provided FIS WSP-2 model includes only the two FIS cross sections representing the channel upstream and downstream of I-55. The culvert crossing at I-55 is not included as part of the 1975 WSP-2 Harza model. As a result, it would be reasonable that the inclusion of the culvert would result in an increase in the in the water surface elevations calculated between the two models. Because of this the FIS model cannot be matched to the current conditions within the allowable tolerance of 0.1 foot for each creek cross section. Therefore, two Waterway Information Tables (WITs) were prepared, one based on an independent Design Analysis including surveyed structures and cross sections and the other based on a Permit Analysis using only the regulatory FIS information with the subject structure added in the existing conditions.

For the Design Analysis, 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,

$$n = (0.025 + 0.005+ 0.003 + 0.004 + 0.01)*(1) = 0.047$$

Wood Retaining Wall Channel

The main channel, between the North Frontage Road and I-55, consists of a mixture of silt and light rocks, and is smooth with gradual variations in the cross section, negligible obstructions, small vegetation, and minor meandering. Therefore,

$$n = (0.025 + 0.001+ 0.00 + 0.001 + 0.003)*(1) = 0.030$$

Floodplains were calculated using the same methodology with adjustment factors for floodplains. These were calculated as follows:

Open Land with Medium Vegetation

The floodplain consisting of open land with medium vegetation on firm soil, and has minor irregularity, minor obstructions and medium vegetation. Therefore,

$$n = (0.025 + 0.005 + 0 + 0.005 + 0.025)*(1) = 0.06$$

Commercial Unpaved Lot

The floodplain consisting of commercial unpaved lot is covered in gravel and has minor irregularity, minor obstructions, and small vegetation. Therefore,

$$n = (0.03+ 0.002+ 0 + 0.005 + 0.008)*(1) = 0.045$$

Open land with Large Vegetation

The floodplain consisting of open land with large vegetation on firm soil has minor irregularity, minor obstructions and large vegetation. Therefore,

$$n = (0.025 + 0.005 + 0 + 0.005 + 0.030)*(1) = 0.065$$

The independent evaluation produced roughness coefficient values that generally compared well to those values used in the FIS model with the exception of the outer edges of the floodplain that are characterized by commercial developments. A table to compare the n values

used in the Design model, WSP-2 FIS model, and FIS duplicate is provided at the beginning of Section 13.

The ineffective areas use ratios of 1:1 for contraction and 2:1 for expansion based on the guidance in the HEC-RAS Hydraulic Reference Manual, Appendix B. The expansion ratio of 2:1 is at the conservative end of the range. A reference sheet has been added at the front of Tab 13.D.

J. SUMMARY OF FIS DUPLICATE – PERMIT NAUTRAL CONDITIONS

A HEC-RAS plan, titled FIS Duplicate, was prepared as a duplicate of the Baseline regulatory WPS2 model in NGVD 29. The two cross-sections from the WSP2 model were replicated in HEC-RAS. The original WSP2 model does not include any of the existing structures (private bridge, I-55 culvert, North Frontage Road culvert). When initially input into HEC-RAS, the results from the duplicate plan did not match those of the FIS WSP2. To compensate for the differences, the Manning's n values were increased to 0.087 for the overbanks and 0.067 for the channel from 0.065 and 0.05 respectively. By changing these parameters, the results of the HEC-RAS plan FIS_MOD NGVD29 match the results of the regulatory paper model within 0.10' for each storm event. A comparison table of the duplicate model, modified model, and paper WSP-2 results is provided at the beginning of Section 13. The models are provided in Section 13A.

The plan FIS_MOD NGVD29 was then converted to NAVD 88 by subtracting 0.28' from all elevations and starting water surface elevations. This plan was saved as FIS_MOD_NAVD88 and serves as Permit Natural conditions for the permit WIT. HEC-RAS input and output are provided in Section 13.B. These results were used to interpolate the Natural High Water Elevation (HWE) at the upstream of face of the existing culvert. The results are summarized on the Permit WIT and supporting calculations in Section 2A.

K. SUMMARY OF EXISTING CONDITIONS – PERMIT

A HEC-RAS plan titled Permit_Existing was prepared to model the impacts of adding the subject culvert into the natural conditions model. The surveyed structure was input into the FIS_MOD_NAVD88 model and run. HEC-RAS input and output are provided in Section 13.C. The results from this plan were used to calculate the created head under existing conditions for the Permit WIT.

It should be noted that the results from HEC-RAS indicate a decrease in water surface elevations under existing conditions, for some of the more frequent storm events. This can be attributed to the differences in streambed slope when the surveyed I-55 culvert is added. The addition of the culvert to the model causes a decrease in streambed slope upstream of the culvert and an

increase in streambed slope downstream of the culvert. The difference in streambed elevation between the surveyed downstream culvert invert and the interpolated "natural" streambed is over 2.5 feet. These geometric differences cause differences in water surface when compared to the natural conditions which has only two cross sections over approximately 2250'.

L. SUMMARY OF EXISTING CONDITIONS - DESIGN

A new HEC-RAS plan, titled Existing Conditions, includes the surveyed cross sections, I-55 culvert geometry, and the additional downstream private drive bridge and upstream Frontage Road culvert. The 2' county topographic mapping was used to extend the surveyed cross sections at certain locations. Cross section 5.7 was created using 2' topo to properly model ineffective flows downstream of I-55. The locations of the surveyed cross sections and the FIS cross sections are shown on the Cross Section Location Map in Section 9. As noted earlier, the regulatory WSP2 model does not include the culvert crossing at I-55 as part of the analysis. As such, the calculated water surface elevations presented in the regulatory model do not include the hydraulic impact of the culvert and adjacent structures, and are representative of the natural stream channel. This independent Design Analysis serves as the basis of the design and evaluation of the I-55 structure versus IDOT design criteria. HEC-RAS input and output for the Design Existing Conditions plan are provided in Section 13.D. This existing conditions plan was used to calculate the created head due to the subject culvert.

M. SUMMARY OF NATURAL CONDTIONS - DESIGN

An independent HEC-RAS plan, titled Natural Conditions, was created to reflect the natural profile of the stream based on the current survey. 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 interpolated using cross sections at River Stations 6 and 7, surveyed cross sections.

The input data and results of the HEC-RAS plan for the Natural Conditions is provided in Section 13.E.

Once the created head was calculated by comparing the Design Natural Conditions to the Design Existing Conditions it was noted that the existing culvert does cause a significant amount of created head (1.7' of head for the 50-year storm). This can partially be attributed to the culvert's flow line being approximately 1 foot above the natural flow line of creek.

N. PROPOSED STRUCTURE ANALYSIS

There are no proposed major modifications to the existing culvert since the existing culvert meets IDOT's freeboard requirements. Recommended culvert repairs include full depth patching at the construction joints. The structure inspection report along with corresponding emails is provided in Section 20. As there will be no change to the hydraulic characteristics of the culvert, no proposed structure hydraulic analysis is necessary.

O. SCOUR ANALYSIS

As a concrete culvert with a concrete bottom, scour analysis for the structure is not required. According the surveyed profile and photographs, there appears to be minor scour present on the downstream end of the I-55 Culvert. Scour countermeasures should be considered at this location as part of the proposed plans.

P. COMPENSATORY STORAGE

No compensatory storage is required since there is no proposed work within the floodway and no proposed work below the 100-year floodplain elevation.

Q. PERMIT REQUIREMENTS

Sawmill Creek has regulatory floodway. Since there is no proposed work within the floodway, there is no need for a floodway construction permit.

The inspection report recommends culvert patching. Under the Part 3708 Rules, Section 3708.30 b), repair or maintenance of structures (including culverts) in existence as of November 18, 1987 are specifically exempt from requiring a permit.

R. FREEBOARD/CLEARANCE

The IDOT Drainage Manual dated July 2011 states that a flood frequency of 50 years should be used for design purposes. The crossing was analyzed for the 50-year event, and checked for the 10-year, 100-year, and 500-year storm events. The Design High Water Elevation (Design HWE) is based on the 50-year event and 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. The IDOT freeboard policy requires a minimum freeboard distance of 3 feet. Since detailed roadway cross sections available are not available, the DuPage County 2'-contour interval topographic mapping was used to determine the approximate low edge of

pavement. The overtopping elevation was determined from the existing southbound centerline profile provided by Stantec. The upstream invert of the culvert is 674.36. The 50-year HWL is 679.99, while the approximate low edge of pavement is 688.0. The existing structure provides 8.0 feet of freeboard for the 50-year event. The I-55 roadway has 100-year edge of pavement protection and does not overtop for either the 100-year or 500-year events. The I-55 crossing of Sawmill Creek meets IDOT freeboard requirements. The IDOT requirements for clearance are not applicable to culverts.

S. CONCLUSION

The Hydrologic and Hydraulic analysis has determined that the existing culvert crossing meets the requirements of the IDOT Drainage Manual. There are no proposed hydraulic modifications to the existing culvert, nor are there any proposed impacts to the existing floodway or floodplain, so no floodway construction permit is required. Culvert patching is recommended, which is exempt from requiring a permit under the Part 3708 Rules.

Tab 2

SECTION 2

WATERWAY INFORMATION TABLES AND SUPPORTING CALCULATIONS

SECTION 2.A

WIT – PERMIT

Illinois Department of Transportation

Culvert Waterway Information Table PERMIT

Route:	Interstate 55	Existing SN:	022-0207
Waterway:	Sawmill Creek	Proposed SN:	N/A
Section:	I-355 to I-94	Prepared by: EMB	Date: 6/23/2016
County:	DuPage County	Checked by: IAD	Date: 02/10/2017

Drainage Area = 2.14 square miles

Existing Overtopping Elev. = 688.85 at Sta. 4853+50 (SB Baseline)

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	260	45	N/A	678.1	0.0	N/A	678.1	N/A
Design	50	420	49	N/A	678.5	0.0	N/A	678.5	N/A
Base	100	495	52	N/A	678.7	0.2	N/A	678.9	N/A
Scour Design Check	-	-	-	N/A	-	-	N/A	-	N/A
Overtop Existing	>500	-	-	N/A	-	-	N/A	-	N/A
Overtop Proposed	-	-	-	N/A	-	-	N/A	-	N/A
Max. Calc.	500	657	56	N/A	679.0	1.7	N/A	680.7	N/A

Datum: NAVD 88

All-Time H.W.E. & Date: Approx. 680, September 1961

Surveyed Normal Water Level: 674.81 ft.

10-Year Velocity through Existing Structure = 5.8 ft/s

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

2-Yr. Flow Rate = 89 ft^3/s

EXISTING STRUCTURE

Type:	Reinforced Concrete Box Culvert
Length/Width:	L-279.16 ft. 12.0'(W) x 5.0'(H)
# Spans/Cells:	1
Low Chord:	n/a
Skew:	34.6° (relative to road)
Clearance:	n/a
Bridge Flow Line:	- (u/s) - (d/s)
Low E.O.P:	688'
Freeboard:	9.5'
Culvert Inverts:	U/S-674.36 D/S 673.91

:

PROPOSED STRUCTURE

Culvert Type:	There are no proposed modifications to the
Length Of Span:	existing structure.
# 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.:	N/A
D/S Streambed Elev.:	N/A

PROPOSED EMBEDMENT

Depth:	N/A
U/S Streambed Elev.:	N/A
D/S Streambed Elev.:	N/A

NOTE: THERE ARE NO PROPOSED MODFICATIONS TO THE EXISTING CULVERT.

ROUTE: I-55
WATERWAY: Sawmill Creek
CROSSING: Station 403+31.79

MADE BY: EMB DATE: 6/23/2016
CHECKED BY: IAD DATE: 6/27/2016

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

CALCULATE CREATED HEAD AND HEADWATER ELEVATION

Frequency	Natural H.W.E. (ft)		Created Head (ft) at Approach Section [1]		Headwater Elevation (ft) [2]	
	U/S Face of Structure [3]	Approach Section [3]	Existing	Proposed	Existing	Proposed
10-year	678.1	678.1	0.0	N/A	678.1	N/A
50-year	678.5	678.5	0.0	N/A	678.5	N/A
100-year	678.7	678.7	0.2	N/A	678.9	N/A
500-year	679.0	679.0	1.7	N/A	680.7	N/A

1. Created Head is difference between H.W.E. at Existing/Proposed approach section and Natural approach section.

2. Headwater Elevation is Natural H.W.E. at face of structure plus created head.

3. Elevation at U/S face taken from Interpolation bewteen XS 0.5 and 9.5

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft) [3]			
Existing	Station	Proposed	Station
688.00	4851+50	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
9.89	9.54	9.15	7.33
Proposed Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
N/A	N/A	N/A	N/A
Existing/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 low road elevation in the floodplain.

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

ROUTE: I-55
WATERWAY: Sawmill Creek
CROSSING: Station 403+31.79

MADE BY: EMB DATE: 6/23/2016
CHECKED BY: IAD DATE: 6/27/2016

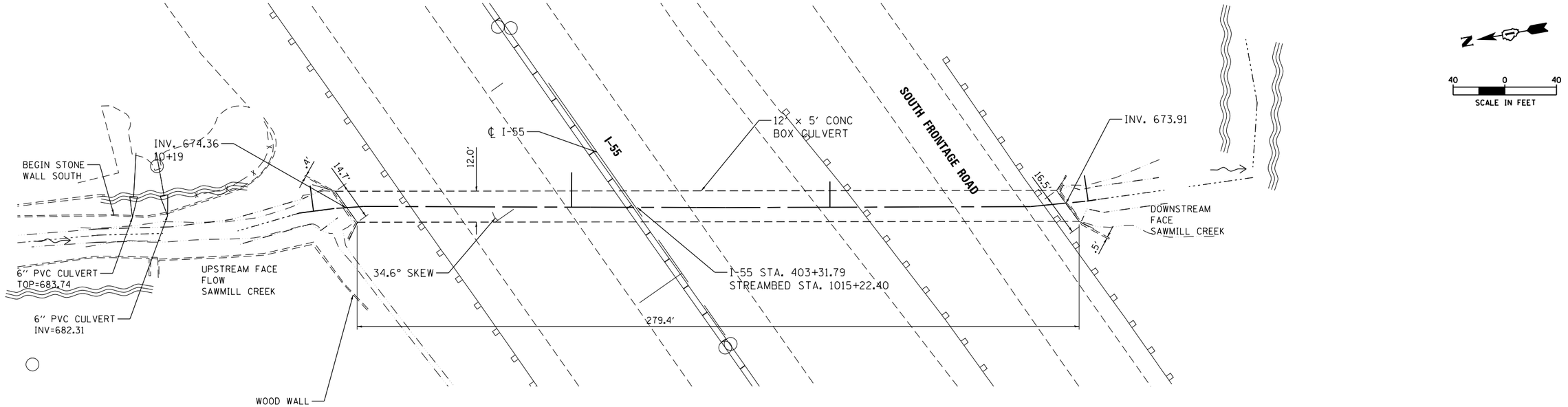
CULVERT WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

CALCULATE EXISITING EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

Frequency	Natural WSEL at Upstream Face[1]	Flowline of Upstream Face of	Water Depth at Upstream Face	Culvert Width	Waterway Opening[2]
	WSEL	Feet	Feet	Feet	Square Feet
10-year	678.1	674.36	3.75	12	45
50-year	678.5	674.36	4.10	12	49
100-year	678.7	674.36	4.30	12	52
500-year	679.0	674.36	4.65	12	56

1. Elevation at U/S face of structure interpolated from HEC-RAS FIS duplicate results.

2 Water Depth multiplied by culvert width



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DRAWN BY
CHECKED
R.O.W. CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 11-12-12 AND 11-30-12

PROFILE
SURVEYED
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DRAWN BY
CHECKED
BRIDGE
STRUCTURE NO(S).
NOTE BOOK
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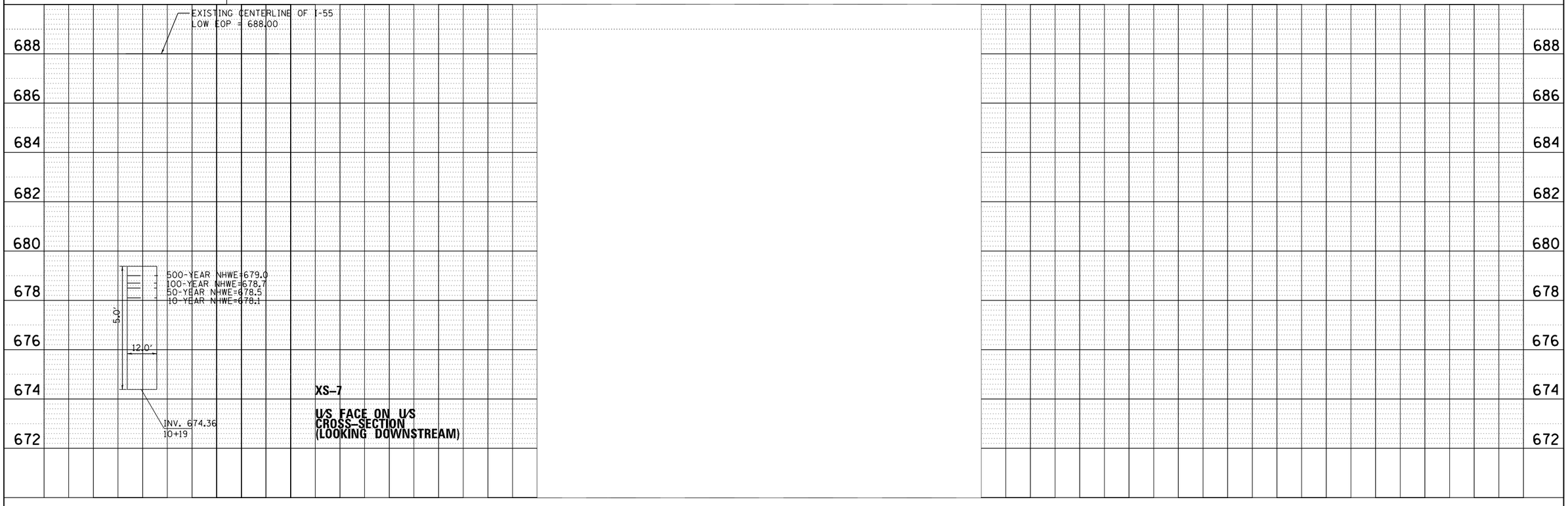

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55
CULVERT WATERWAY OPENING

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

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

SUMMARY TABLE COMPARING 10-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural WSE	Existing WSE	WSE Difference
9.5	680.25	679.89	-0.36
6.5*	678.11	677.78	-0.33
6	Culvert		
0.5	672.42	672.42	0.00

SUMMARY TABLE COMPARING 50-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural WSE	Existing WSE	WSE Difference
9.5	680.53	680.11	-0.42
6.5*	678.46	678.14	-0.32
6	Culvert		
0.5	673.26	673.26	0.00

SUMMARY TABLE COMPARING 100-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural WSE	Existing WSE	WSE Difference
9.5	680.63	680.82	0.19
6.5*	678.66	678.82	0.16
6	Culvert		
0.5	673.62	673.62	0.00

SUMMARY TABLE COMPARING 500-YEAR NATURAL TO			
Cross Section	Natural WSE	Existing WSE	WSE Difference
9.5	680.82	682.48	1.66
6.5*	679.01	680.31	1.30
6	Culvert		
0.5	674.46	674.46	0.00

1. Interpolated using linear equation see provided supporting calculations.

Linear Equation - Solve for Approx. WS of U/S Face of Structure at I-55 Approx. River Station 1014+00
I-55 over Sawmill Creek Permit Natural Conditions

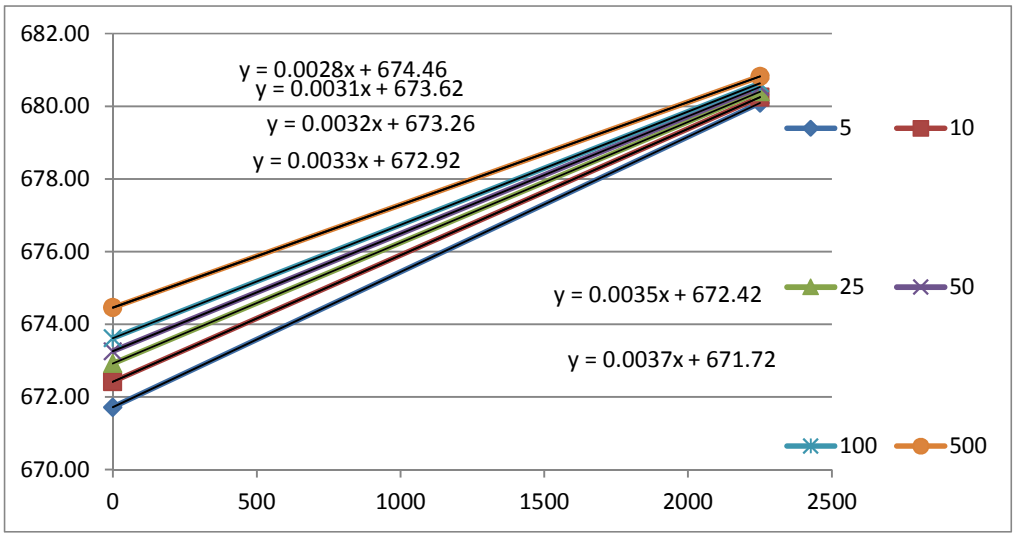
Cross Section

Return Period	SM-39	SM-35	I-55 U/S Face
5	680.09	671.72	677.73
10	680.25	672.42	678.11
25	680.40	672.92	678.28
50	680.53	673.26	678.46
100	680.63	673.62	678.66
500	680.82	674.46	679.01
X	2250	0	1625

Notes:

1 Elevations in NAVD 88

2 WSP2 model originally ran in NGVD 1929. Conversion to NAVD88 is NGVD 1929 - 0.28' = NAVD88.



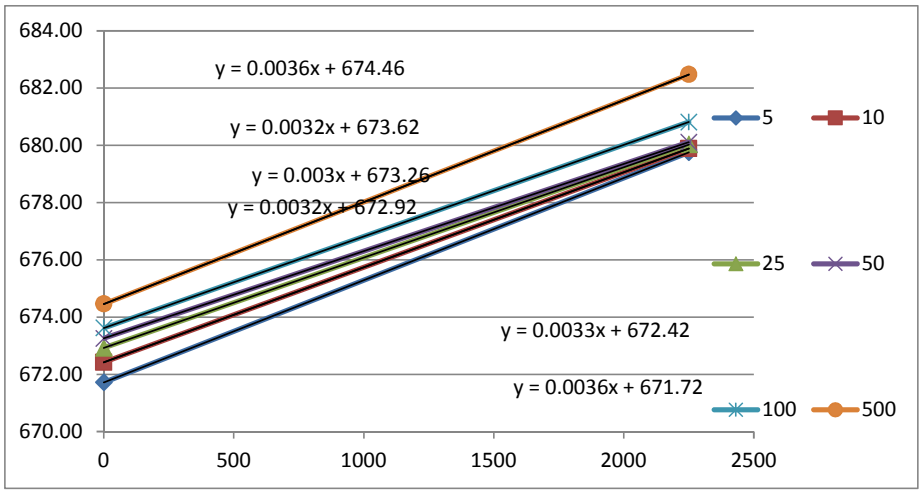
Linear Equation - Solve for Approx. WS of U/S Face of Structure at I-55 Approx. River Station 1014+00
I-55 over Sawmill Creek Permit Existing Conditions

Cross Section

Return Period	SM-39	SM-35	I-55 U/S Face
5	679.76	671.72	677.57
10	679.89	672.42	677.78
25	680.03	672.92	678.12
50	680.11	673.26	678.14
100	680.82	673.62	678.82
500	682.48	674.46	680.31
X	2250	0	1625

Notes:

1 Elevations in NAVD 88
2 WSP2 model originally ran in NGVD 1929. Conversion to NAVD88 is NGVD 1929 - 0.28' = NAVD88.



SECTION 2.B

WIT – DESIGN

Illinois Department of Transportation

Culvert Waterway Information Table DESIGN

Route:	Interstate 55	Existing SN:	022-0207		
Waterway:	Sawmill Creek	Proposed SN:	N/A		
Section:	I-355 to I-94	Prepared by:	EMB	Date:	5/31/2017
County:	DuPage County	Checked by:	IAD	Date:	5/31/2017

Drainage Area = 2.14 square miles

Existing Overtopping Elev. = 688.85 at Sta. 4853+50 (SB Baseline)

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	260	37	N/A	677.5	0.9	N/A	678.4	N/A
Design	50	420	48	N/A	678.3	1.7	N/A	680.0	N/A
Base	100	495	50	N/A	678.5	2.1	N/A	680.6	N/A
Scour Design Check	-	-	-	N/A	-	-	N/A	-	N/A
Overtop Existing	>500	-	-	N/A	-	-	N/A	-	N/A
Overtop Proposed	-	-	-	N/A	-	-	N/A	-	N/A
Max. Calc.	500	657	55	N/A	678.9	3.8	N/A	682.7	N/A

Datum: NAVD 88

All-Time H.W.E. & Date: Approx. 680, September 1961

Surveyed Normal Water Level: 674.81 ft.

10-Year Velocity through Existing Structure = 7.0 ft/s

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

2-Yr. Flow Rate = 89 ft^3/s

EXISTING STRUCTURE

Type:	Reinforced Concrete Box Culvert
Length/Width:	L-279.16 ft. 12.0'(W) x 5.0'(H)
# Spans/Cells:	1
Low Chord:	n/a
Skew:	34.6° (relative to road)
Clearance:	n/a
Bridge Flow Line:	- (u/s) - (d/s)
Low E.O.P:	688.00'
Freeboard:	8.0'
Culvert Inverts:	U/S-674.36 D/S 673.91
:	

PROPOSED STRUCTURE

Culvert Type:	There are no proposed modifications to the
Length Of Span:	existing structure.
# 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.:	N/A
D/S Streambed Elev.:	N/A

PROPOSED EMBEDMENT

Depth:	N/A
U/S Streambed Elev.:	N/A
D/S Streambed Elev.:	N/A

NOTE: THERE ARE NO PROPOSED MODFICATIONS TO THE EXISTING CULVERT.

ROUTE: I-55 MADE BY: EMB DATE:5/31/2017

WATERWAY: Sawmill Creek CHECKED BY: IAD DATE:5/31/2017

CROSSING: Station 4851+50 (SB Centerline I-55)

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

CULVERT

CALCULATED CREATED HEAD

Frequency	Natural H.W.E. (ft)		Created Head (ft) at Approach Section [1]		Headwater Elevation (ft) [2]	
	U/S Face of Structure[3]	Approach Section (XS 7)	Existing	Proposed	Existing	Proposed
10-year	677.5	677.5	0.9	N/A	678.4	N/A
50-year	678.3	678.3	1.7	N/A	680.0	N/A
100-year	678.5	678.5	2.1	N/A	680.6	N/A
500-year	678.9	678.9	3.8	N/A	682.7	N/A

1. Created Head is difference between H.W.E. at Existing/Proposed approach section and Natural approach section.

2. Headwater Elevation is Natural H.W.E. at face of structure plus created head.

3. Interpolated bewteen XS 7 and 6

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft) [3]			
Existing	Station	Proposed	Station
688.00	4851+50	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
9.59	8.02	7.40	5.26
Proposed Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
N/A	N/A	N/A	N/A
Existing/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 low road elevation in the floodplain.

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

ROUTE: I-55
WATERWAY: Sawmill Creek
CROSSING: Station 403+31.79

MADE BY: EMB DATE:5/31/2017
CHECKED BY: IAD DATE:5/31/2017

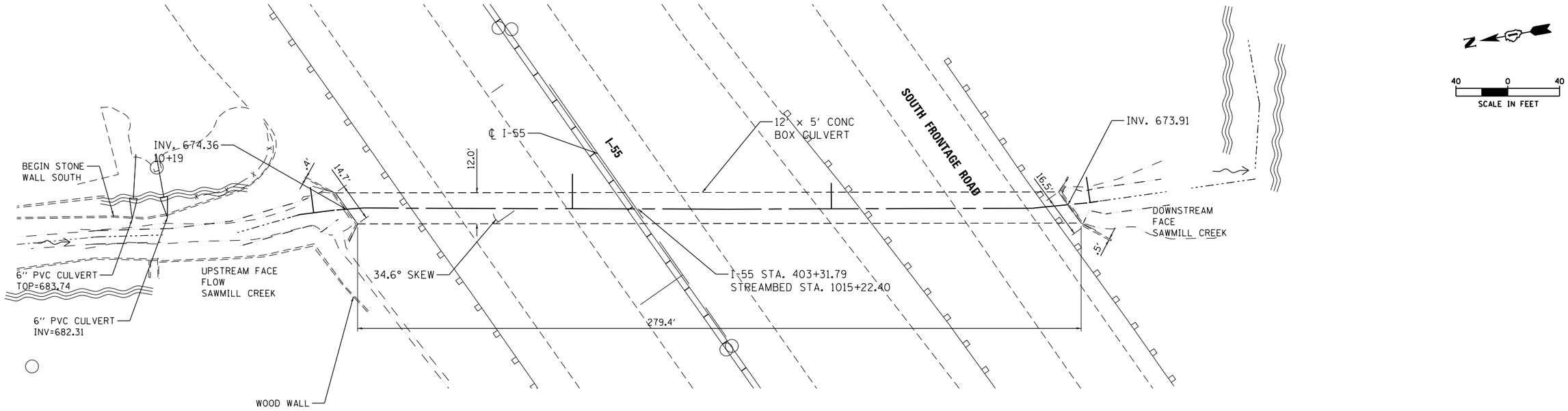
CULVERT WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

CALCULATE EXISITING EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

Frequency	Natural WSEL at Upstream Face[1]	Flowline of Upstream Face of Structure	Water Depth at Upstream Face (feet)	Culvert Width	Waterway Opening[2]
	WSEL	Feet	Feet	Feet	Square Feet
10-year	677.5	674.36	3.11	12	37.3
50-year	678.3	674.36	3.96	12	47.5
100-year	678.5	674.36	4.17	12	50.1
500-year	678.9	674.36	4.57	12	54.8

1 From HEC-RAS Output at cross section 7

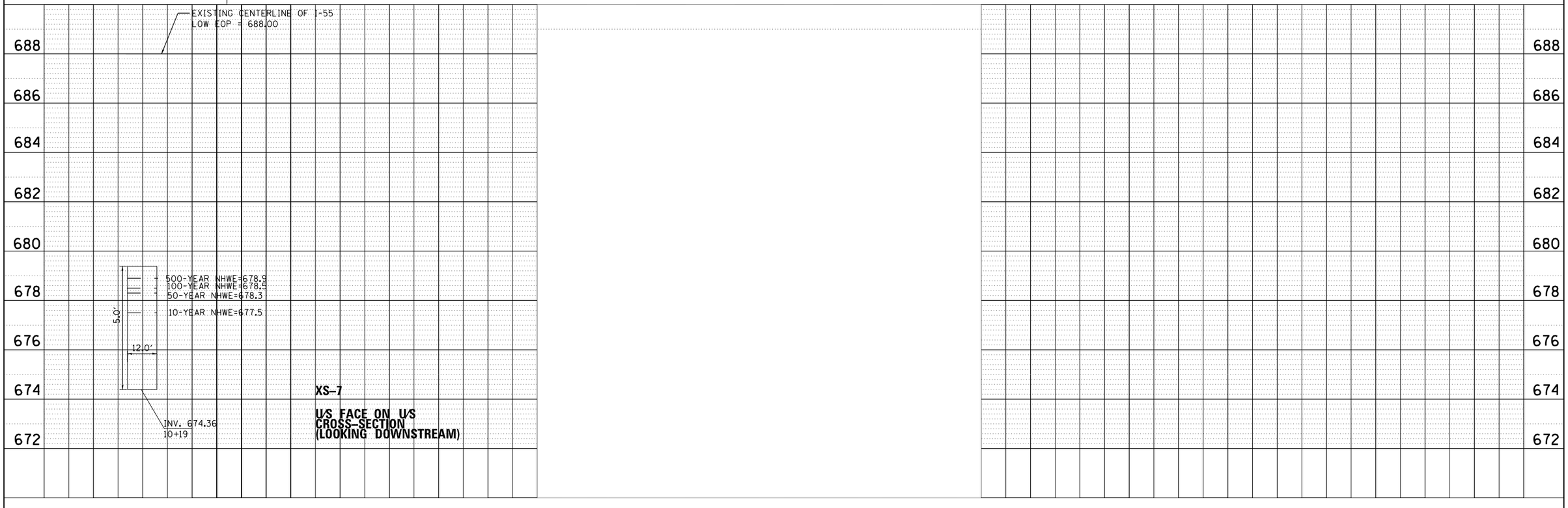
3. Interpolated bewteen XS 7 and 6



NOTE:
WATER SURFACE ELEVATION AS SURVEYED BY CBBEL DATED: 11-12-12 AND 11-30-12

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

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



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55
CULVERT WATERWAY OPENING

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

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

Interpolation for Natural Water surface at location of U/S of I-55 over Sawmill Creek

Interpolated Values	Location		
	XS 6	XS 7	Interpolated
10	676.95	677.50	677.47
50	677.91	678.34	678.32
100	678.24	678.55	678.53
500	678.88	678.93	678.93

Distance between		
XS 7- XS 6	310	ft.
XS 7- Face	19	ft.

SUMMARY TABLE COMPARING 10-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural WSE	Existing WSE	WSE Difference
11	681.31	681.31	0.00
10	680.65	680.63	-0.02
9.5	680.58	680.55	-0.03
9	680.07	680	-0.07
8.5	CULVERT		
8	679.69	679.61	-0.08
7.5	677.91	678.29	0.38
7	677.5	678.44	0.94
6.5	CULVERT		
6	676.95	677	0.05
5.7	675.79	675.79	0.00
5	674.25	674.25	0.00
4	673.65	673.65	0.00
3	673.56	673.56	0.00
2	673.34	673.34	0.00
1.9	BRIDGE		
1.8	673.05	673.05	0.00
1	672.46	672.46	0.00
0.5	672.42	672.42	0

SUMMARY TABLE COMPARING 50-YEAR NATURAL TO EXISTING WSE			
Cross Section	Natural WSE	Existing WSE	WSE Difference
11	682.4	682.38	-0.02
10	682.27	682.25	-0.02
9.5	682.26	682.24	-0.02
9	682.23	682.21	-0.02
8.5	CULVERT		
8	681	680.98	-0.02
7.5	678.75	679.86	1.11
7	678.34	680	1.66
6.5	CULVERT		
6	677.91	677.97	0.06
5.7	676.6	676.6	0.00
5	675.2	675.2	0.00
4	674.72	674.72	0.00
3	674.61	674.61	0.00
2	674.37	674.37	0.00
1.9	BRIDGE		
1.8	673.96	673.96	0.00
1	673.27	673.27	0.00
0.5	673.26	673.26	0

SUMMARY TABLE COMPARING 100-YEAR NATURAL TO EXISTING WSE

Cross Section	Natural WSE	Existing WSE	WSE Difference
11	682.65	682.65	0.00
10	682.52	682.53	0.01
9.5	682.52	682.52	0.00
9	682.49	682.49	0.00
8.5	CULVERT		
8	681.47	681.53	0.06
7.5	679.1	680.53	1.43
7	678.55	680.67	2.12
6.5	CULVERT		
6	678.24	678.34	0.10
5.7	676.94	676.94	0.00
5	675.48	675.48	0.00
4	675.02	675.02	0.00
3	674.9	674.9	0.00
2	674.65	674.65	0.00
1.9	BRIDGE		
1.8	674.28	674.28	0.00
1	673.63	673.63	0.00
0.5	673.62	673.62	0

SUMMARY TABLE COMPARING 500-YEAR NATURAL TO EXISTING WSE

Cross Section	Natural WSE	Existing WSE	WSE Difference
11	683.03	683.54	0.51
10	682.89	683.47	0.58
9.5	682.88	683.47	0.59
9	682.86	683.45	0.59
8.5	CULVERT		
8	682.37	683.25	0.88
7.5	679.77	682.65	2.88
7	678.93	682.74	3.81
6.5	CULVERT		
6	678.88	679.05	0.17
5.7	677.44	677.44	0.00
5	675.96	675.96	0.00
4	675.54	675.54	0.00
3	675.41	675.41	0.00
2	675.31	675.31	0.00
1.9	BRIDGE		
1.8	674.98	674.98	0.00
1	674.45	674.45	0.00
0.5	674.46	674.46	0

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	022-0207		
Prop SN	n/a		

General Information

1. Name of the Stream: Sawmill Creek

2. Location of the Structure: NE ¼ of the SW ¼ of Section 34, Township 38N, Range 11E of the 3 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.): 2.14

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): 2
If more than one, explain: The FIS model does not include the subject structure.
For permitting purposes, a WIT has been prepared based on the FIS model with the subject structure modeled.
For design purposes, a WIT has been prepared based on the Independent HEC-RAS 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.
Commercial building located upstream of the I-55 crossing within overbank area is above the 100 year flood elevation based on surveyed cross sections. There are not surveyed low entry elevations associated with the property.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:
Hydraulic Atlas HA-149 September 1961

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): To be determined.
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒Culvert (existing to remain)
e. ☐ New Alignment
f. Work Planned Below Q_{100} HWE? ☐ Yes ☒ No
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): 8.0'

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 ends of culvert (2.0').

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

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

Countermeasures Proposed:

Existing Structure Data

		N. Frontage Road Structure U/S	Interstate 55 Subject Structure	Private Bridge Structure D/S
23.	Distance from proposed structure: (ft.)	388	0.	1221.5
24.	Type of structure:	12'x5' RCBC	12'x5' RCBC	2-span steel bridge
25.	Low beam elevation:	N/A	N/A	673.77
26.	Flow line elevation:	674.88	674.36	669.19
27.	Maximum known high water elevation:	684 (NGVD 29)	680 (NGVD 29)	678 (NGVD 29)
28.	Date of maximum high water:	October 1954	Sept. 1961	Sept. 1961
29.	Cause (backwater, headwater, etc.):	Standard Step Backwater	Standard Step Backwater	Standard Step Backwater
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	N/A
31.	Type and size of existing overflow structures:	N/A	N/A	N/A
32.	Has adverse scour occurred under or adjacent to the structure?	N/A	Yes	N/A
33.	Classify type of scour and/or aggradation / degradation:	N/A	Culvert I/O Velocity	N/A

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: Ed Burke, CBBEL Date: November 2013

Remarks:
Inspected by Edmund Burke. Downstream of the North Frotange Road, the channel was blocked by a fence in the floodway. DuPage County was informed of the blockage, which was subsequently removed.

37. Prepared by: Edmund M. Burke Date June 2017

Signed (QA/QC): Mene A Daily Date 06/14/17

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

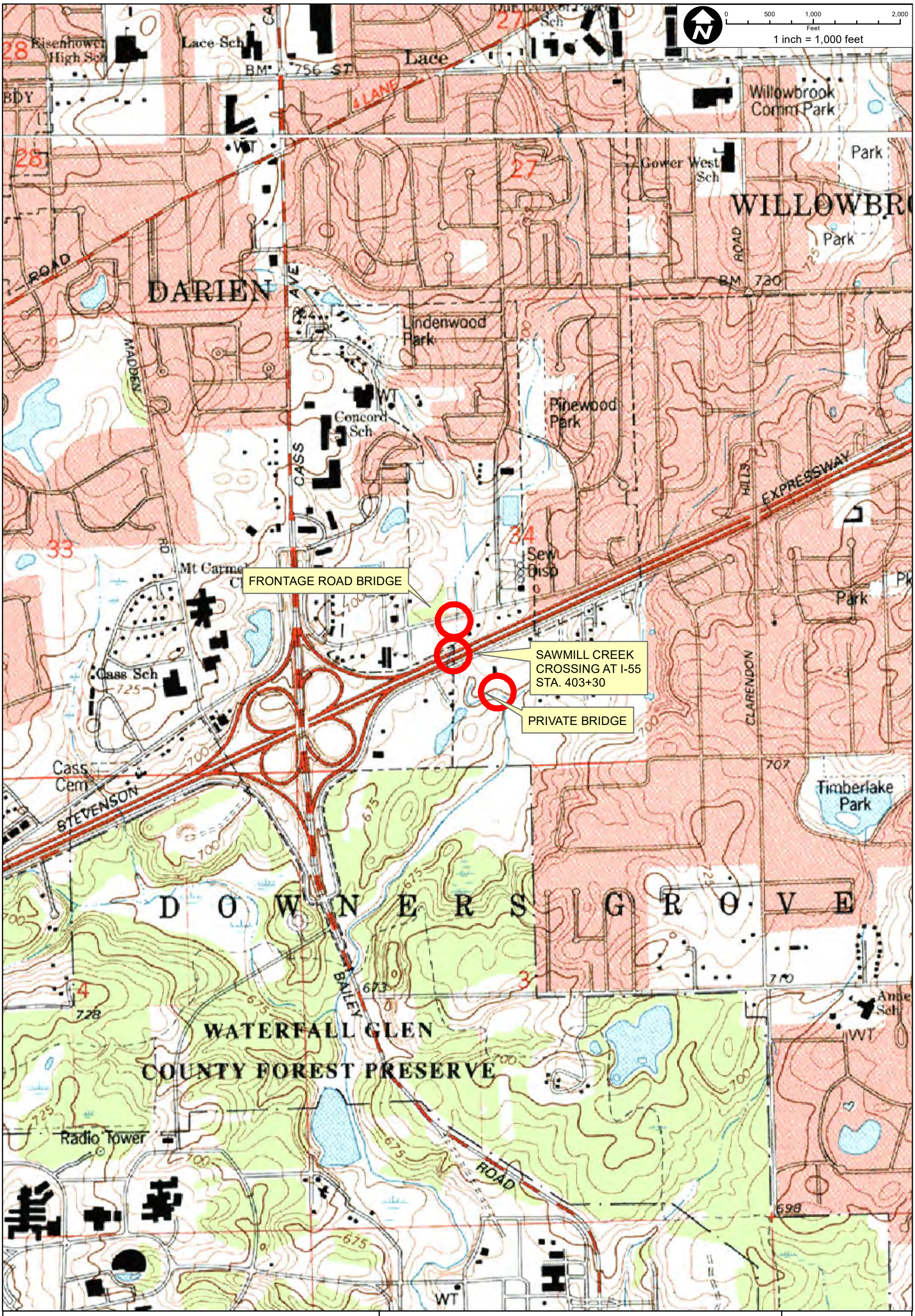
When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

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



Path: N:\dot\110203.00001\GIS\Exhibits\Sawmill Creek\Sawmill GLDM.mxd

CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

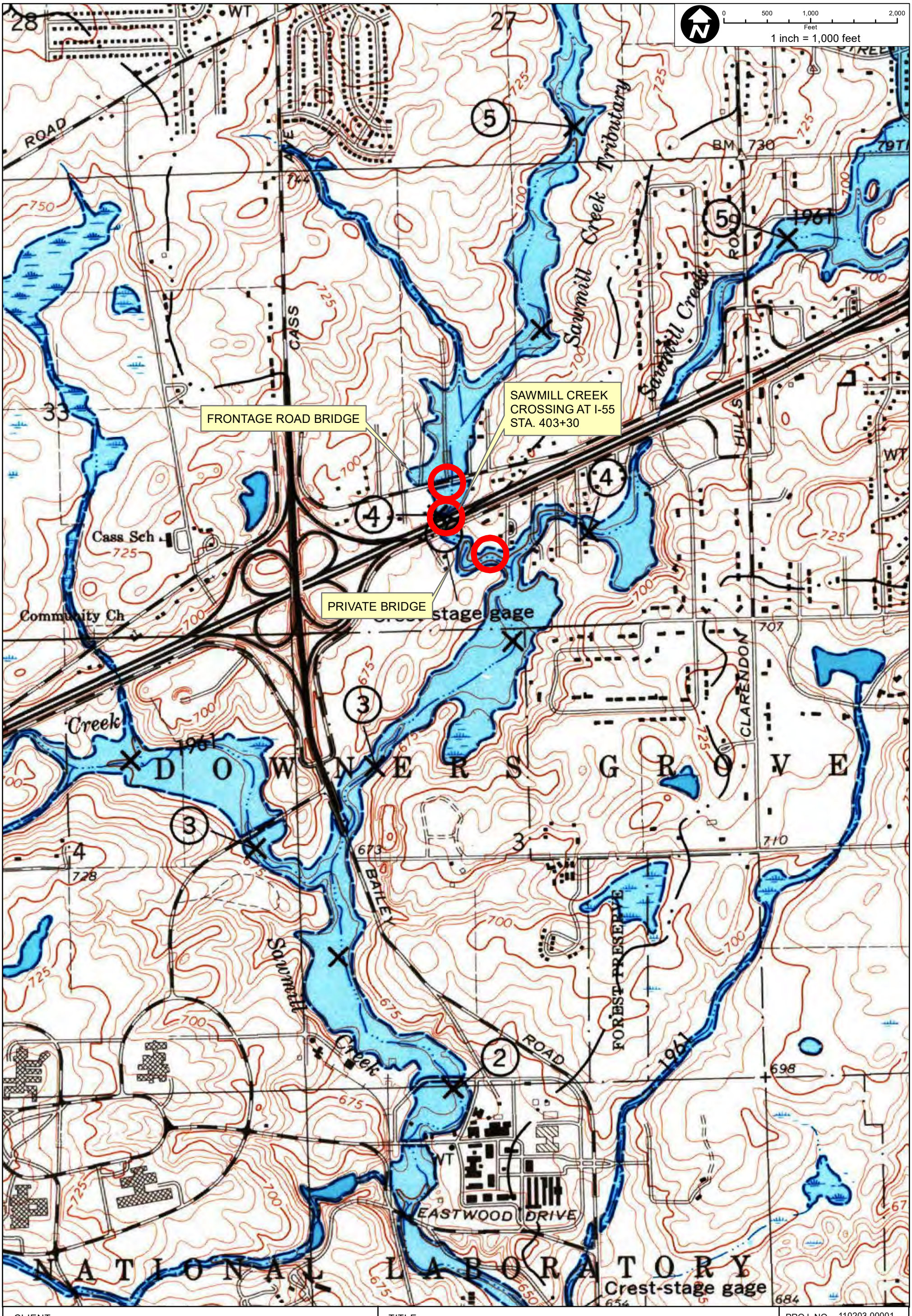
TITLE:

GENERAL LOCATION DRAINAGE MAP
SAWMILL CREEK
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.	EMB		SCALE:	1:12,000
DWN.	MDH		AUTHOR:	MDH
CHKD.	ID		PLOT DATE:	2/5/2016
FILE:	Sawmill GLDM			



CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:

GENERAL LOCATION DRAINAGE MAP
SAWMILL CREEK
SAG BRIDGE QUADRANGLE (HA-149)
BASE MAP (USGS) 1973

PROJ. NO.	110203.00001
DATE:	5/8/2013
SHEET	1 OF 1
DRAWING NO.	EXH 4.2

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

DSGN.	EMB		SCALE:	1:12,000
DWN.	MDH		AUTHOR:	MDH
CHKD.	ID		PLOT DATE:	2/5/2016
FILE:	Sawmill HADM			

Path: N:\ldot\110203.00001\GIS\Exhibits\Sawmill Creek\Sawmill HADM.mxd

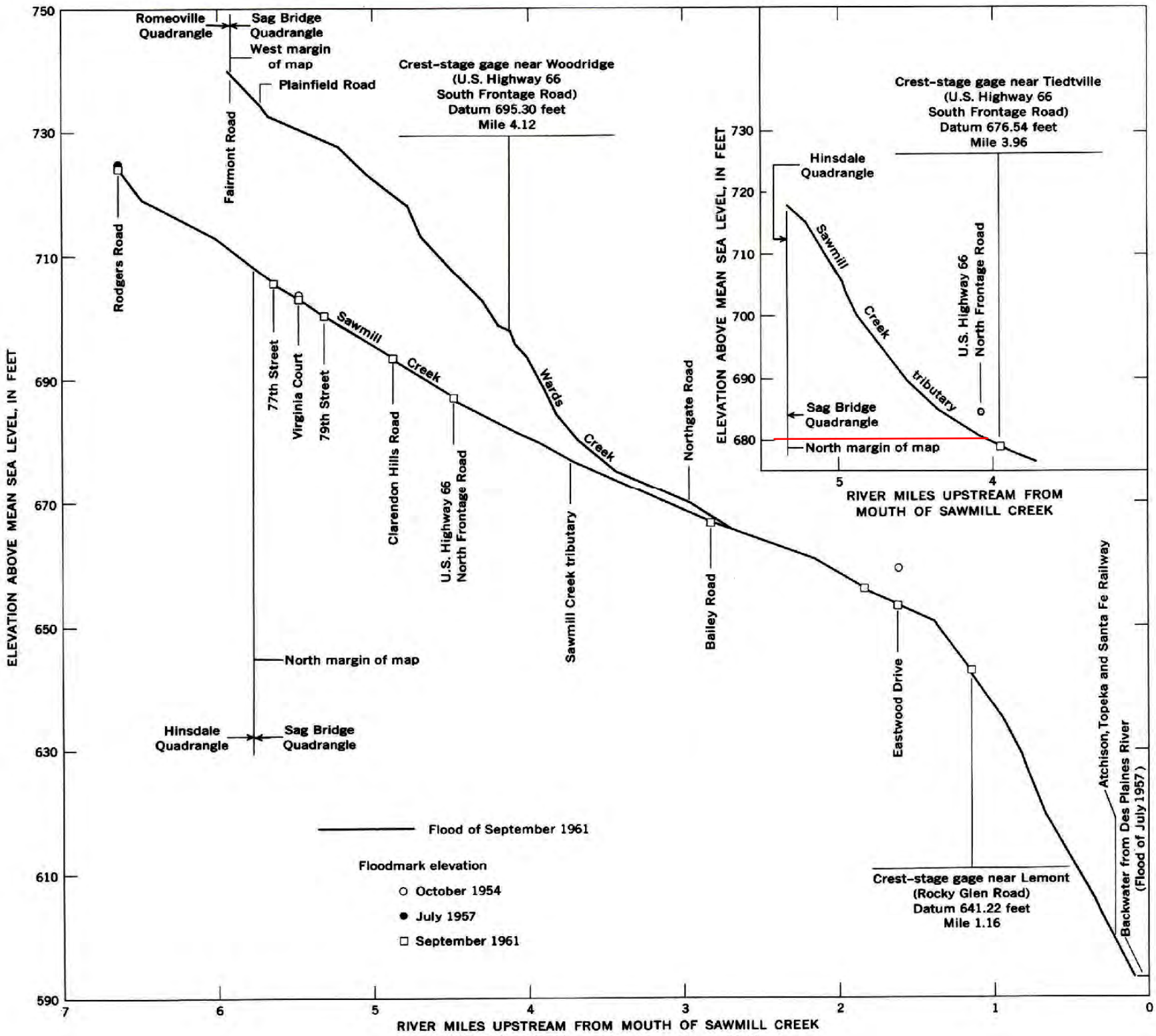


FIGURE 9.—*Profiles of floods on Sawmill Creek, Sawmill Creek tributary, and Wards Creek.*

Path: N:\ldot\110203.00001\GIS\Exhibits\Sawmill Creek\Sawmill HADM_2.mxd

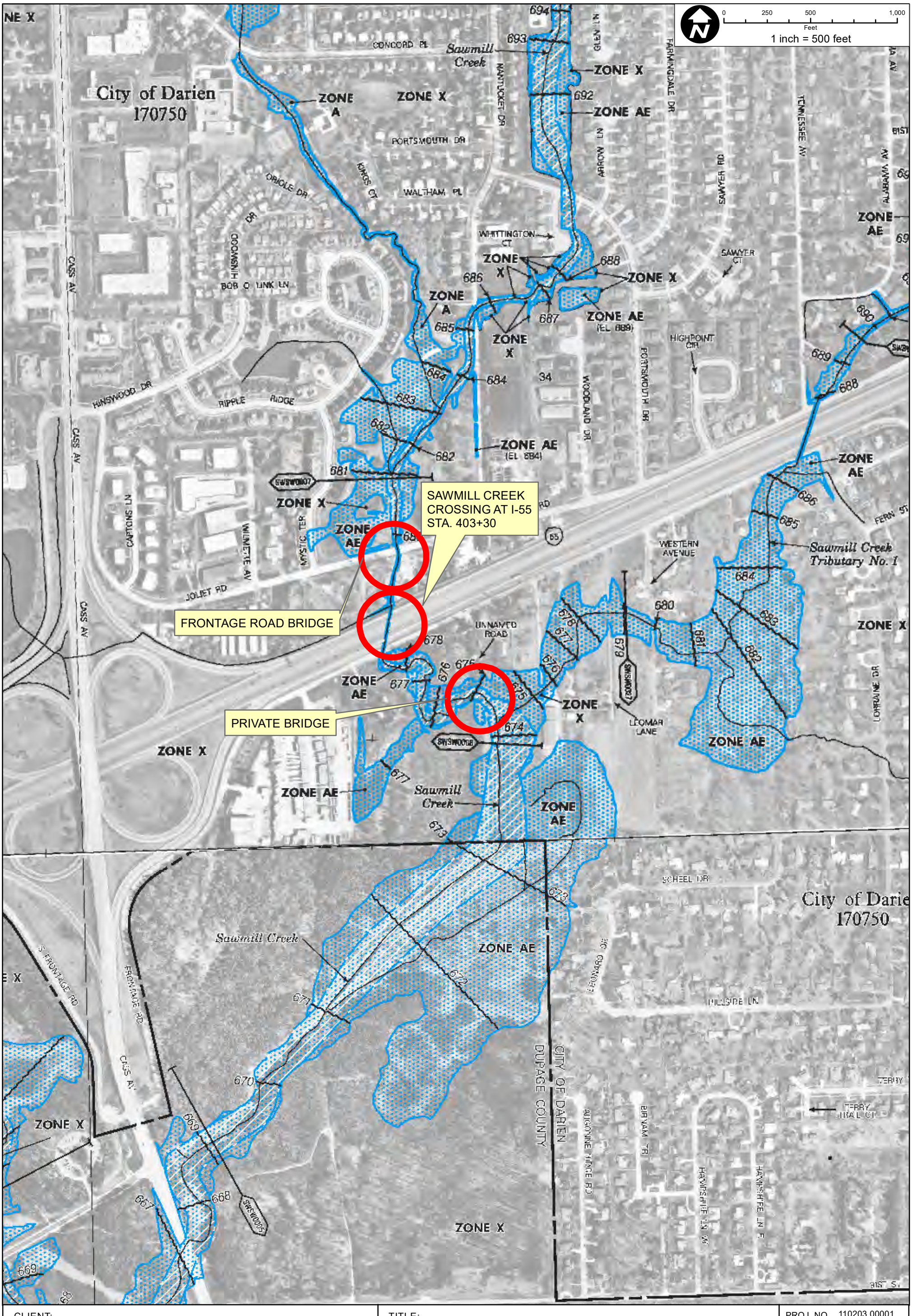
CLIENT: ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE: USGS HYDROLOGIC INVESTIGATIONS ATLAS
FLOODS IN SAG BRIDGE QUADRANGLE
HA-149
SAWMILL CREEK

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.	EMB		SCALE:	1:6,000
DWN.	MDH		AUTHOR:	MDH
CHKD.	ID		PLOT DATE:	6/22/2016
FILE:	Sawmill HADM_2			



CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:

FLOOD INSURANCE RATE MAP
SAWMILL CREEK
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 4.4

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

DSGN.	EMB		SCALE:	1:6,000
DWN.	MDH		AUTHOR:	MDH
CHKD.	ID		PLOT DATE:	2/5/2016
FILE:	Sawmill FIRM			

Path: N:\ldot\110203.00001\GIS\Exhibits\Sawmill Creek\Sawmill FIRM.mxd

Tab 5

SECTION 5

PHOTOGRAPHS

CLIENT:
ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:
PHOTOGRAPH LOCATION MAP
SAWMILL CREEK

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:	1:0
DWN.			AUTHOR:	MDH
CHKD.			PLOT DATE:	12/17/2013
FILE:	Sawmill PHOTO			

Path: N:\ldot\110203.00001\GIS\Exhibits\Sawmill Creek\Sawmill PHOTO.mxd

Refer to Photograph Location Map for locations of Photos

1. Looking Upstream at Private Bridge.

2. Looking Downstream at Private Bridge.

Refer to Photograph Location Map for locations of Photos

3. Looking at Downstream Floodplain at Private Bridge.

4. Looking at Upstream Floodplain of Private Bridge.

Refer to Photograph Location Map for locations of Photos

5. Floodplain at D/S face of I-55 culvert

6. Looking at Downstream Floodplain at I-55 Culvert.

Refer to Photograph Location Map for locations of Photos

7. Looking Downstream I-55 Culvert at U/S Face.

8. Looking Upstream North Frontage Road Culvert at D/S Face.

Refer to Photograph Location Map for locations of Photos

9. Floodplain downstream of North Frontage Road Culvert

10. North Frontage Road Culvert looking downstream at D/S Face

Refer to Photograph Location Map for locations of Photos

11. Floodplain Upstream of North Frontage Road Culvert.

12. Upstream face of North Frontage Road 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

FLOOD INSURANCE STUDY
DuPAGE COUNTY, ILLINOIS

TABLE OF CONTENTS

found suitable, but the discharges for East Branch Sawmill Creek were found to be lower than the acceptable range of discharges calculated using the State Standard Method. Therefore, the discharges submitted to the SWS for East Branch Sawmill Creek are Harza values. All of the discharges for the detailed study areas were sent to the SWS for review and approval, and the 100-year discharges were certified by the DOWR for use in its floodplain regulation program. Data are located in a repository of flood-related data administered by the SWS. Discharges for the 2-, 5-, 10-, 25-, and 100-year floods were available from the SCS TR-20 model of Sawmill Creek (U.S. Department of Agriculture, 1965). Discharges for the 10- and 100-year floods on East Branch Sawmill Creek and West Branch Sawmill Creek in the City of Darien were calculated by Harza using regional flood frequency equations (Illinois Department of Transportation, Magnitude and Frequency of Floods in Illinois, 1973). Data for the three detailed study streams were plotted separately on log-normal probability paper, and the 50- and 500-year floods were estimated by straight-line interpolation and extrapolation, respectively. The 500-year flood discharge estimates are less reliable than the others because: 1) the precipitation-frequency relationship, required for the TR-20 program, is not well defined for this rare event, and 2) the average period of record for stream gages used to derive the regional equations is about 30 years.

A summary of the drainage area-peak discharge relationships for the portions of the streams studied by detailed methods is shown in Table SWSW.2.

Table SWSW.2: Sawmill Creek Summary of Discharges

Summary of Discharges

Flooding Source And Location	Drainage Area (mi^2)	Peak Discharges (cfs) 10-yr	50-yr	100-yr	500-yr
Sawmill Creek - East Branch					
- at 79th Street	2.10	253	410	481	690
- at 75th Street	0.99	178	290	340	480
- at Elm Street	0.55	123	200	235	332
- at Janet Road	0.32	89	140	170	239
- at Rodger Road	0.24	75	120	140	200
- at 68th Street	0.20	65	103	120	170
Sawmill Creek -					
- approx. 80 ft u/s of Bluff Road (I-55 crossing)	13.00	1,363	*	2,588	*
- at 79th Street	1.24	294	476	566	800
- at 75th Street	0.97	243	394	467	660
Sawmill Creek -					

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
Sawmill Creek (SWSW)								
SWSW0001	4,136[1]	80	383	6.8	623.7	623.7	623.7	0.0
SWSW0002	8,240[1]	160	787	3.3	652.0	652.0	652.0	0.0
SWSW0003	11,850[1]	380[2]	1,425	1.7	659.7	659.7	659.7	0.0
SWSW0004	14,352[1]	150	718	3.1	665.3	665.3	665.3	0.0
SWSW0005	16,016[1]	170	578	2.3	669.2	669.2	669.2	0.0
SWSW0006 I-55 crossing	19,054[1]	260	551	2.2	673.9	673.9	673.9	0.0
SWSW0007	21,603[1]	70	439	1.1	680.9	680.9	680.9	0.0
SWSW0008	25,020[1]	99	299	2.1	694.5	694.5	694.6	0.1
SWSW0009	26,910[1]	266	215	2.6	709.5	709.5	709.6	0.1
SWSW0010	28,414[1]	40	104	4.5	721.5	721.5	721.6	0.1

[1] In feet above confluence with Des Plaines River

[2] Actual floodway width cannot be shown on FIRM due to redelineation of floodplain

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY
AND INCORPORATED AREAS

FLOODWAY DATA

SAWMILL CREEK (SWSW)

ELEVATION IN FEET (NGVD 29)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH DES PLAINES RIVER

DATA NOT AVAILABLE

FLOOD PROFILES

SAWMILL CREEK (SWSW)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL

AND INCORPORATED AREAS

139P

Linear Equation - Solve for Aprrox WS of U/S Face of Structure at I-55 Approx River Station 1014+00
I-55 over Sawmill Creek

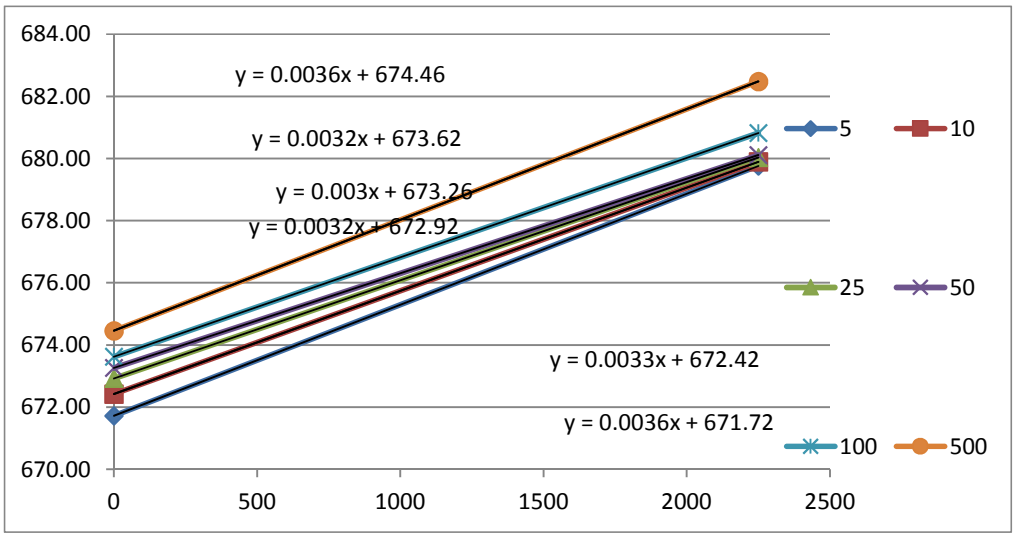
Cross Section

Return Period	SM-39	SM-35	I-55 U/S Face
5	679.76	671.72	677.57
10	679.89	672.42	677.78
25	680.03	672.92	678.12
50	680.11	673.26	678.14
100	680.82	673.62	678.82
500	682.48	674.46	680.31
X	2250	0	1625

Notes:

1 Elevations in NAVD 88

2 WSP2 model orginally ran in NGVD 1929. Conversion to NAVD88 is NGVD 1929 - 0.28' = NAVD88.



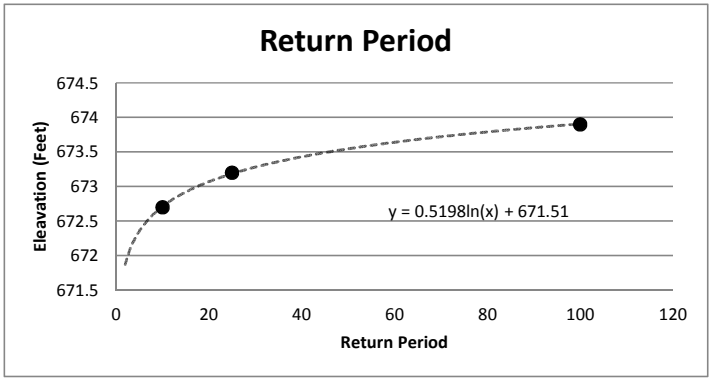
Regression Equation - Solve for WS for 500 and 50 year SM 035 (from WSP 2 Model)/SWS 0006 (FIRM)/Approx River Station 1033+60

I-55 over Sawmill Creek

Input Data	
Return Period	Actual Elevation
5	672
10	672.7
25	673.2
100	673.9

Calculated Data			
Return Period	Actual Elevation	Calculated Elevation	Corrected Elevation[1]
5	672	672.3	671.72
10	672.7	672.7	672.42
25	673.2	673.2	672.92
50	-	673.5	673.26
100	673.9	673.9	673.62
500	-	674.7	674.46

1. FIS elevation are in Datum NGVD 29 a correction factor of -0.28 was applied, to incorporate these elevations into the model which is based in

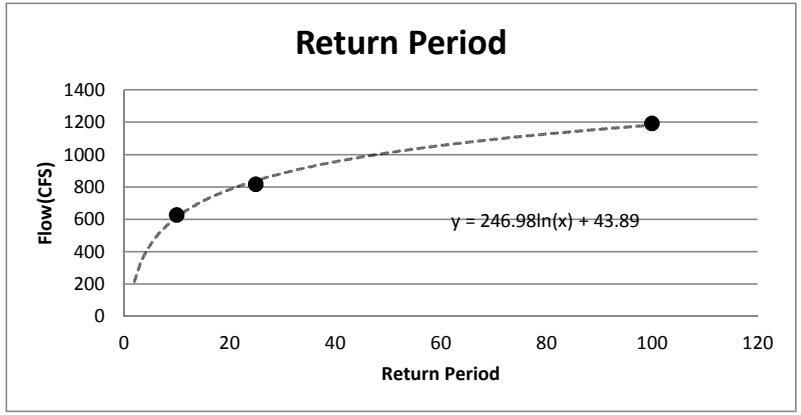


Regression Equation - Solve for Q for 500 and 50 year SM 035 (from WSP 2 Model)/SWS 0006 (FIRM)/Approx River Station 1033+60

I-55 over Sawmill Creek

Input Data	
Return Period	Actual Q
5	465.33
10	626.64
25	815.57
100	1190.58

Calculated Data		
Return Period	Actual Q	Calculated Q
2	-	215.08
5	465.33	441.39
10	626.64	612.58
25	815.57	838.89
50	-	1010.08
100	1190.58	1181.27
500	-	1578.77



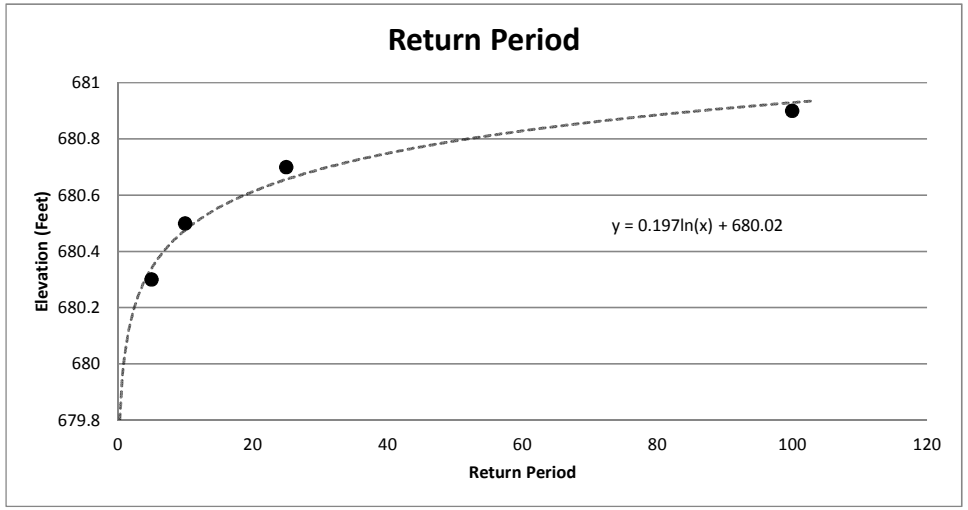
Regression Equation - Solve for WS for 500 and 50 year SM 039 (from WSP 2 Model)/SWS 0007 (FIRM)/Approx River Station 1006+50

I-55 over Sawmill Creek

Input Data	
Return Period	Actual Elevation
5	680.3
10	680.5
25	680.7
100	680.9

Calculated Data			
Return Period	Actual Elevation	Calculated Elevation	Corrected Elevation[1]
5	680.3	680.3	680.02
10	680.5	680.5	680.22
25	680.7	680.7	680.42
50	-	680.8	680.51
100	680.9	680.9	680.62
500	-	681.2	680.96

1. FIS elevation are in Datum NGVD 29 a correction factor of -0.28 was applied, to incorporate these elevations into the model which is based in

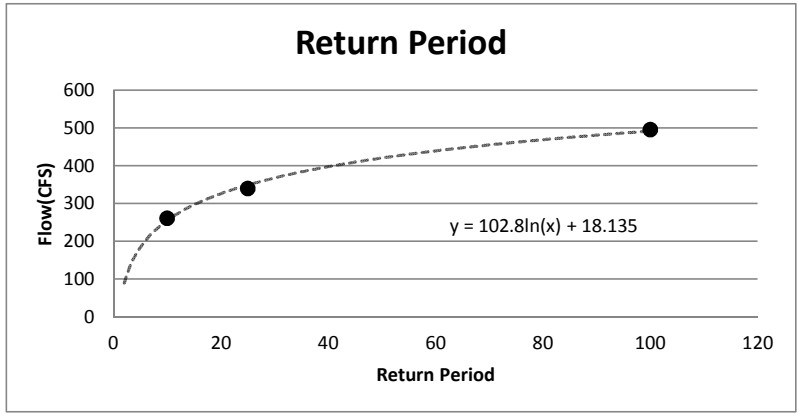


Regression Equation - Solve for Q for 500 and 50 year SM 039 (from WSP 2 Model)/SWS 0007 (FIRM)/Approx River Station 1007+65

I-55 over Sawmill Creek

Input Data	
Return Period	Actual Q
5	192.82
10	260.48
25	339.66
100	495.27

Calculated Data		
Return Period	Actual Q	Calculated Q
5	192.82	183.59
10	260.48	254.84
25	339.66	349.04
50	-	420.29
100	495.27	491.55
500	-	657.00



USGS Home
Contact USGS
Search USGS

National Water Information System: Web Interface

USGS Water Resources

Data Category: Surface Water | Geographic Area: Illinois | GO

News - updated May 28,2013

Peak Streamflow for Illinois
USGS 05533400 SAWMILL CREEK NEAR LEMONT, IL

Available data for this site: Surface-water: Peak streamflow | GO

Du Page County, Illinois
Hydrologic Unit Code 07120004
Latitude 41°42'28", Longitude 87°57'46" NAD83
Drainage area 13.0 square miles
Contributing drainage area 13.00 square miles
Gage datum 630.00 feet above NGVD29

Output formats

- Table
- Graph
- Tab-separated file
- peakfq (watstore) format
- Reselect output format

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1961	Sep. 14, 1961	1.59	924
1962	Mar. 12, 1962	-0.86	195
1963	Apr. 30, 1963	-1.62	59.0
1964	1964		156[4,B]
1965	1965		395[4,B]
1966	May 12, 1966	1.72	984
1967	Jun. 10, 1967	1.08	725
1968	Aug. 17, 1968	0.29	472
1969	Apr. 04, 1969	0.55	541
1970	May 14, 1970	-0.50	279
1971	1971		385[4,B]
1972	Aug. 26, 1972	1.49	883
1973	Dec. 30, 1972	1.06	718
1974	May 16, 1974	0.88	654
1990	May 09, 1990	15.46	1,730
1991	Nov. 27, 1990	14.57	1,260
1992	Dec. 08, 1991	11.41	241[D,E]
1993	Jun. 07, 1993	15.60	1,600
1994	Aug. 11, 1994	12.56	526
1995	Jan. 14, 1995	12.43	456
1996	Jul. 18, 1996	17.53	3,070[C]
1997	Feb. 21, 1997	14.64	1,360[C]
1998	Aug. 04, 1998	13.75	968[C]
1999	Apr. 09, 1999	12.61	576[C,D]
2000	May 28, 2000	12.87	655[C]
2001	Feb. 09, 2001	12.26	479[C,E]
2002	May 12, 2002	13.97	1,060[C]

1975	Apr. 18, 1975	1.72	984
1976	Jun. 13, 1976	1.69	970
1977	Sep. 01, 1977	0.53	535
1978	Jul. 21, 1978	1.37	835
1979	Mar. 04, 1979	1.57	916
1986	Sep. 26, 1986	12.52	494
1987	Aug. 26, 1987	13.50	560
1988	Dec. 20, 1987	12.76	396
1989	Sep. 01, 1989	13.17	912
2003	May 09, 2003	11.90	387[C,E]
2004	Aug. 28, 2004	12.74	615[C]
2005	Jan. 13, 2005	12.42	522[C]
2006	Sep. 11, 2006	11.81	493[C,E]
2007	Oct. 03, 2006	12.99	821[C]
2008	Sep. 14, 2008	13.07	832[C]
2009	Dec. 27, 2008	13.60	1,020[C]
2010	Jul. 24, 2010	13.41	948[C]
2011	Jun. 09, 2011	13.67	1,040[C]
2012	May 07, 2012	11.38	375[C,E]

Peak Streamflow Qualification Codes.

- 4 -- Discharge less than indicated value, which is Minimum Recordable Discharge at this site
- B -- Month or Day of occurrence is unknown or not exact
- C -- All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other
- D -- Base Discharge changed during this year
- E -- Only Annual Maximum Peak available for this year

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help

Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility Plug-Ins FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

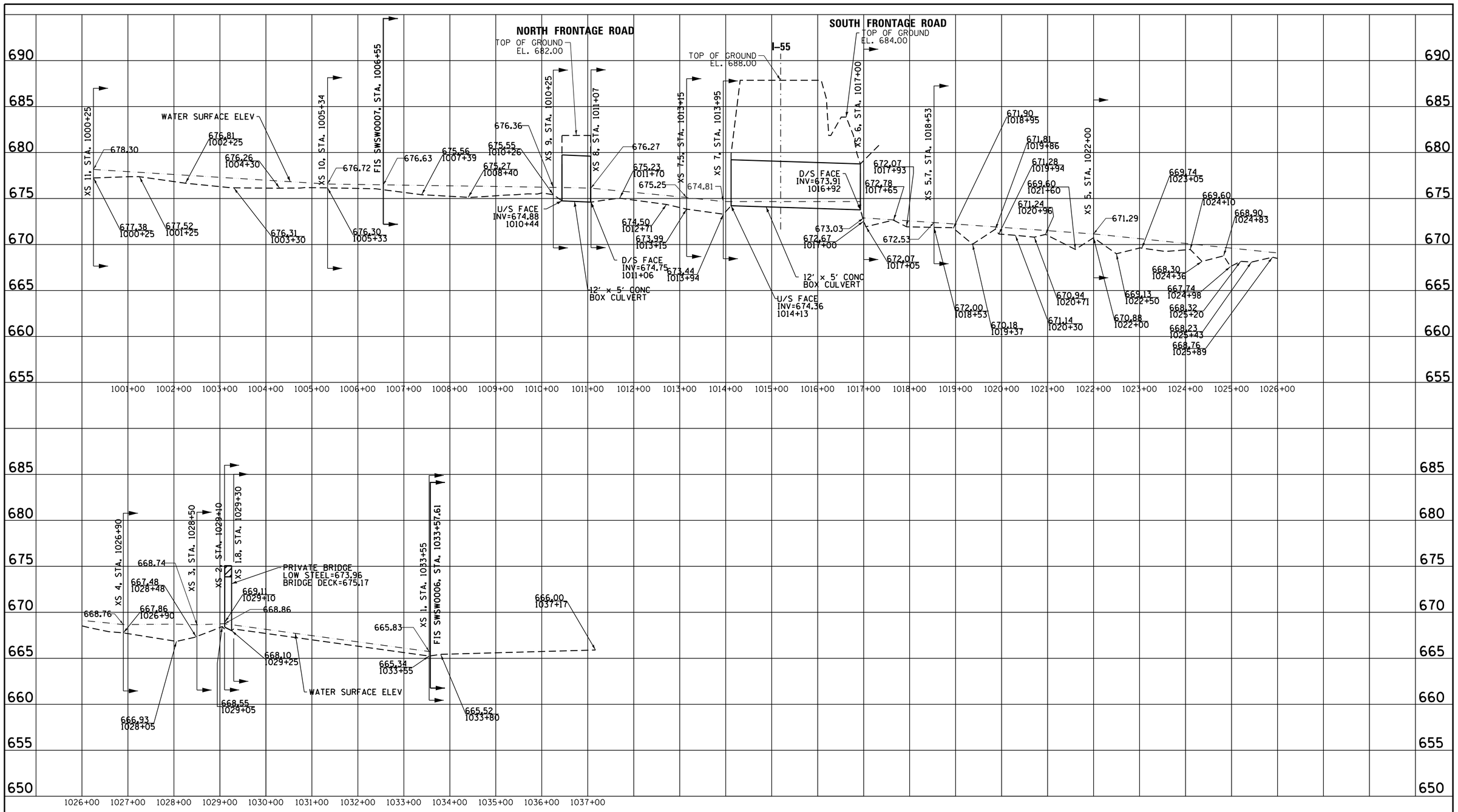
Title: Surface Water for Illinois: Peak Streamflow
URL: http://nwis.waterdata.usgs.gov/il/nwis/peak?

Page Contact Information: Illinois Water Data Maintainer
Page Last Modified: 2013-06-25 14:19:34 EDT
0.26 0.27 nadww01

Tab 7

SECTION 7

STREAMBED PROFILE



NOTE:
WATER SURFACE ELEVATION AS SURVEYED BY CBBEL DATED: 11-12-12 AND 11-30-12

ROUTE INTERSTATE 55
SECTION
WATERCOURSE SAWMILL CREEK
EXISTING S.N. 022-0207
SCALE: 1'' = 100' HOR, 1'' = 5' VERT
PLOTTED BY: MYG DATE:
CHECKED BY: EMB DATE:
SURVEY DATE: 11/30/12, 12/5/12

FILE NAME = N:\dot\110203.00001\CADD_Sheets\P1110203-sht-drngr02.dgn

TAB 8

SECTION 8

ROADWAY PLAN AND PROFILE

DATUM: NGVD88

6" PVC CULVERT
TOP=683.74

6" PVC CULVERT
INV=682.31

144"X60" CONC BOX CULVERT
INV=674.36

OVERHEAD SIGN

I-55 SB ℄

℄ I-55

I-55 STA. 403+31.79
STREAMBED STA. 1015+22.40

4850+00 | 4855+00 | 4860+00
400+00 | 405+00 | 410+00
2850+00 | 2855+00 | 2860+00

12' x 5' CONC BOX CULVERT

I-55 FRONTAGE S

144"X60" CONC BOX CULVERT
INV=673.91

FLOODWAY

FLOODPLAIN

SAWMILL CREEK

PROFILE SOURCE: STANTEC EXISTING SOUTHBOUND PGL

EXHIBIT 1-00B.

PROFILE OF I-55 SB ℄

OVERTOPPING ELEVATION=688.85' @ STATION 4853+50

100-YR WSEL
EL. 680.66

SAWMILL CREEK CULVERT
I-55 ℄ STA 403+31.79
U/S INV = 674.36
D/S INV = 673.91

℄ INV = ±674.13

690 | 685 | 680 | 675 | 670 | 665

691.34 | 691.10 | 690.84 | 690.55 | 690.38 | 690.14 | 689.92 | 689.78 | 689.48 | 689.04 | 689.01 | 688.97 | 689.01 | 688.88 | 688.85 | 689.10 | 689.27 | 689.47 | 689.73 | 690.10 | 690.42 | 690.77 | 690.98 | 691.21 | 691.48 | 691.80 | 692.16 | 692.32 | 692.63 | 693.00 | 693.42

4847+00 | 4848+00 | 4849+00 | 4850+00 | 4851+00 | 4852+00 | 4853+00 | 4854+00 | 4855+00 | 4856+00 | 4857+00 | 4858+00 | 4859+00 | 4860+00 | 4861+00

FILE NAME = N:\dot\110203.00001\CADD_Sheets\DIP9176210-130-EB Sawmill Creek Plan&Prof.dgn

Default

I-55 MANAGED LANE PROJECT

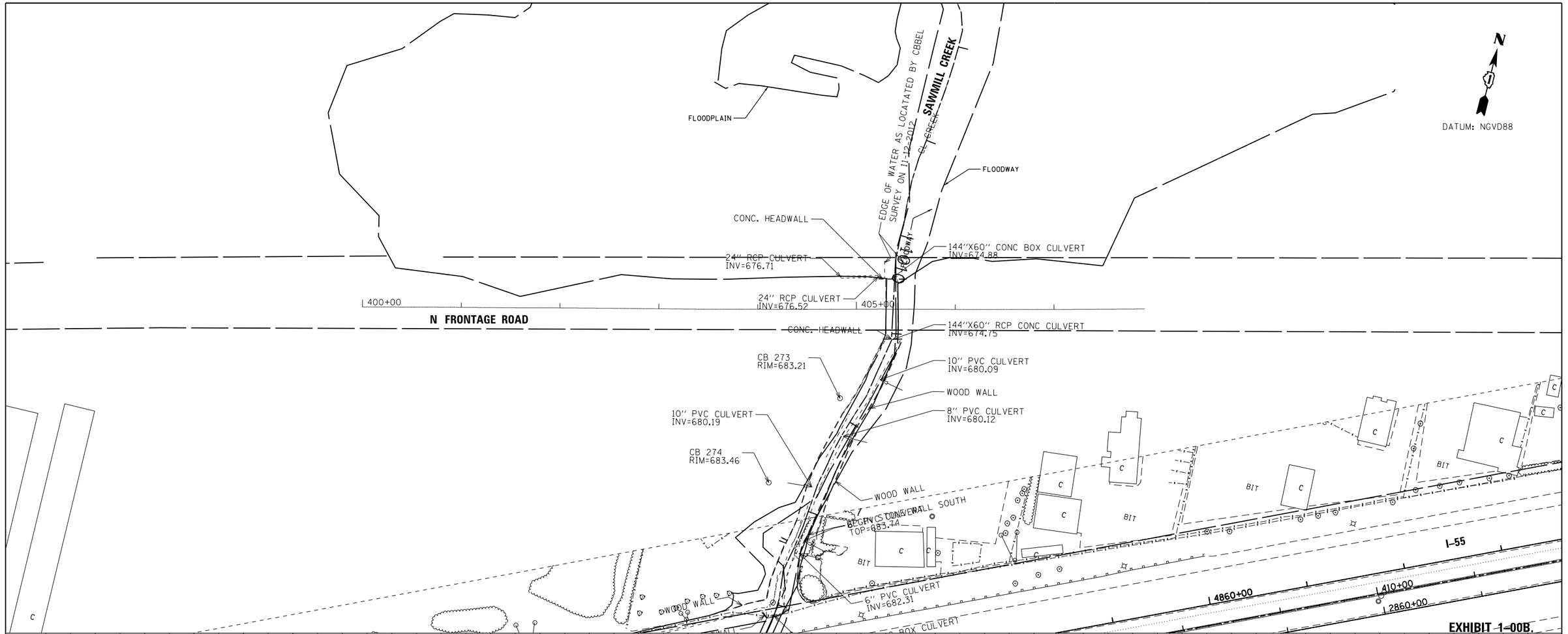
USER NAME = eburke	DESIGNED - EDB	REVISED -	
	DRAWN - MYG	REVISED -	
PLOT SCALE = 100.0000 ' / in.	CHECKED - IAD	REVISED -	
PLOT DATE = 2/9/2016	DATE - 2/9/2016	REVISED -	

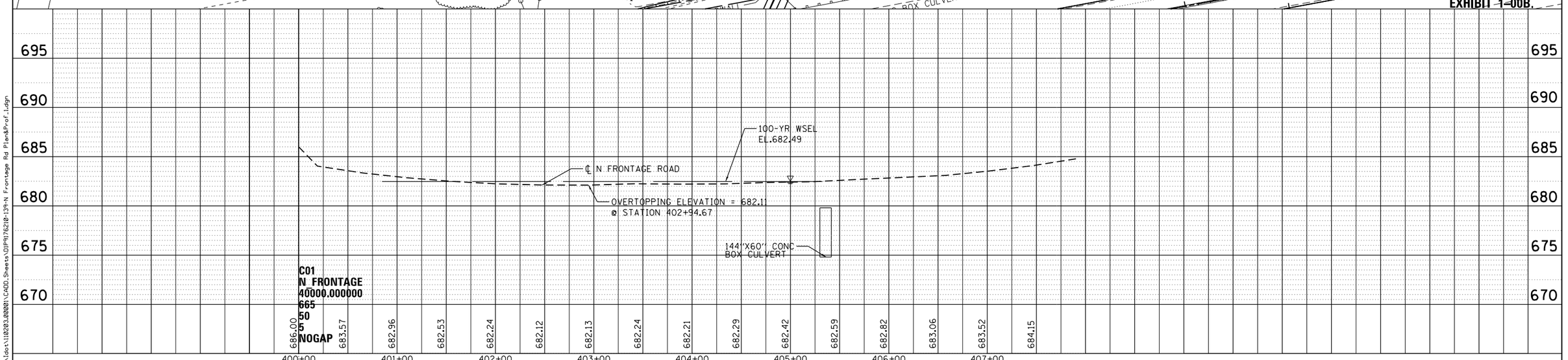
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 MANAGED LANE STUDY
SAWMILL CREEK - PLAN AND PROFILE

SCALE: $SCALE | SHEET OF SHEETS | STA. | TO STA.

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





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USER NAME = eburke	DESIGNED - EDB	REVISED -	
	DRAWN - MYG	REVISED -	
PLOT SCALE = 100.0000 ' / in.	CHECKED - IAD	REVISED -	
PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 MANAGED LANE STUDY
N FRONTAGE ROAD – PLAN AND PROFILE

SCALE: $SCALE | SHEET OF SHEETS | STA. | TO STA.

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

DATUM: NGVD88

EDGE OF WATER AS LOCATATED BY CBBEL SURVEY ON 11-30-2012

1035

CL CREEK

EDGE OF WATER AS LOCATATED BY CBBEL SURVEY ON 11-30-2012

SAWMILL CREEK

CONC. WALL

FLOODWAY

FLOODPLAIN BY ELEVATION

1030

108"X72" STEEL BOX CULVERT
INV=668.16
LOW STEEL=674.09
LOW STEEL=668.45
LOW STEEL=669.86
LOW STEEL=674.00

108"X72" STEEL BOX CULVERT
INV=668.16
LOW STEEL=673.98
LOW STEEL=668.07

℄ PRIVATE ROAD

10

15

PRIVATE ROAD

LOW STEEL=669.19
LOW STEEL=673.96

108"X60" STEEL BOX CULVERT
INV=669.19
(1' HIGH X 4" WIDE BLOCKING LIP)

108"X60" STEEL BOX CULVERT
INV=669.11
(1' HIGH X 4" WIDE BLOCKING LIP)

EDGE OF WATER AS LOCATATED BY CBBEL SURVEY ON 11-30-2012

1025

ROCK

PE

ROCK

CE

ROCK

FRONTAGE ROAD

CE

BIT

EXHIBIT 1–00B.

680
675
670
665
660
655

OVERTOPPING ELEVATION = 673.77 @ STATION 2+98.15

100-YR WSEL
EL. 674.28

SURVEYED WSEL=668.86
DATE=12-5-12

677.52 676.73 676.33 675.89 675.16 675.20 673.79 674.78 675.78 676.00 676.00

-+00 1+00 2+00 3+00 4+00 5+00

FILE NAME = N:\docs\10283.00001\CADD Sheets\DP9176210-146-Private Bridge Plan&Prof.dgn

Default

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	DRAWN - MYG	REVISED -
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PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

I-55 MANAGED LANE PROJECT

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 MANAGED LANE STUDY
PRIVATE ROAD – PLAN AND PROFILE

SCALE: $SCALE | SHEET OF SHEETS | STA. | TO STA.

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

FEDERAL AID ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.I. 03	22-2	DU PAGE	13	1
FED. ROAD DIST. NO. 7	ILLINOIS	PROJECT	I-03-6(7)	

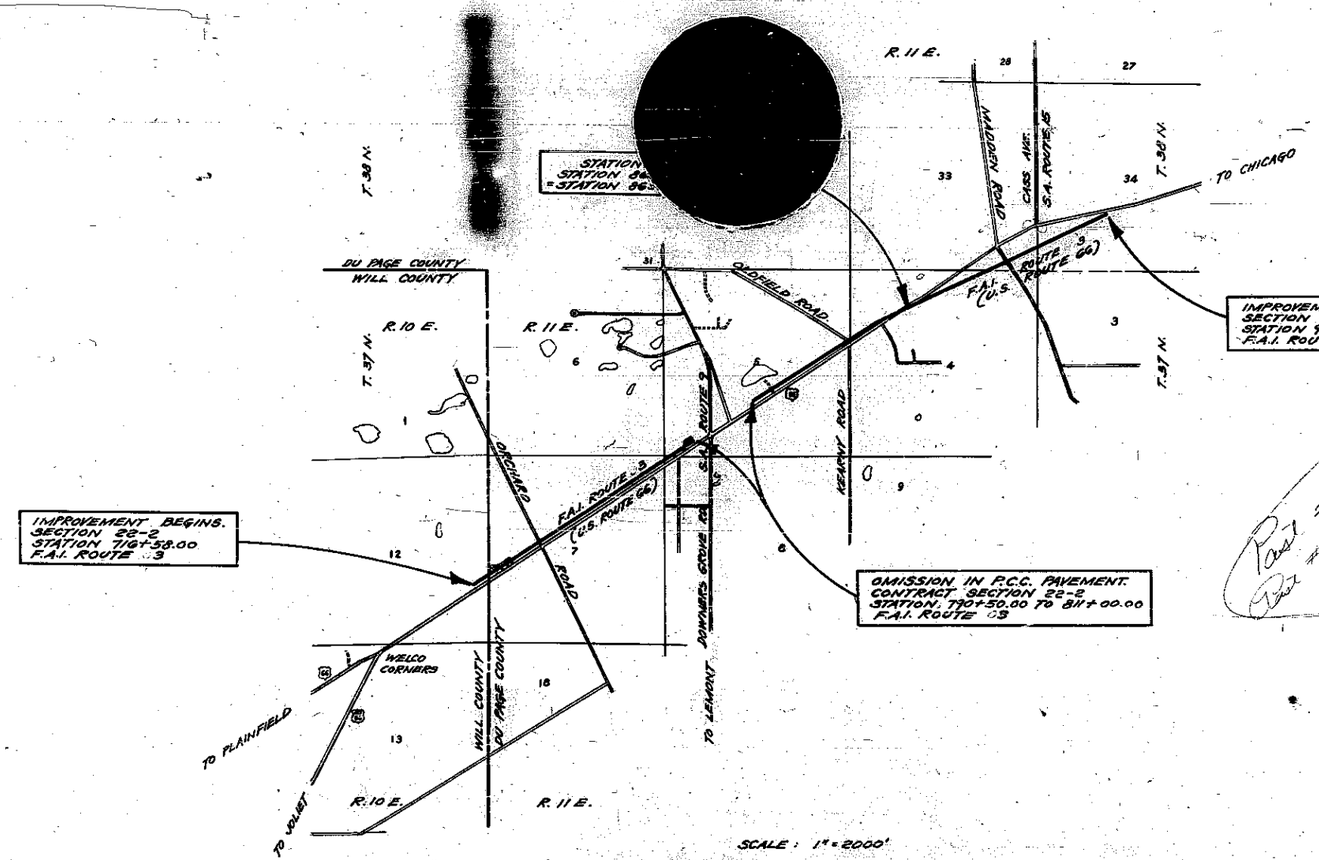
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

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

LOCATION OF SECTION INDICATED THUS:—



Pass #375 to Bid #376
Pass #376 to Bid #377

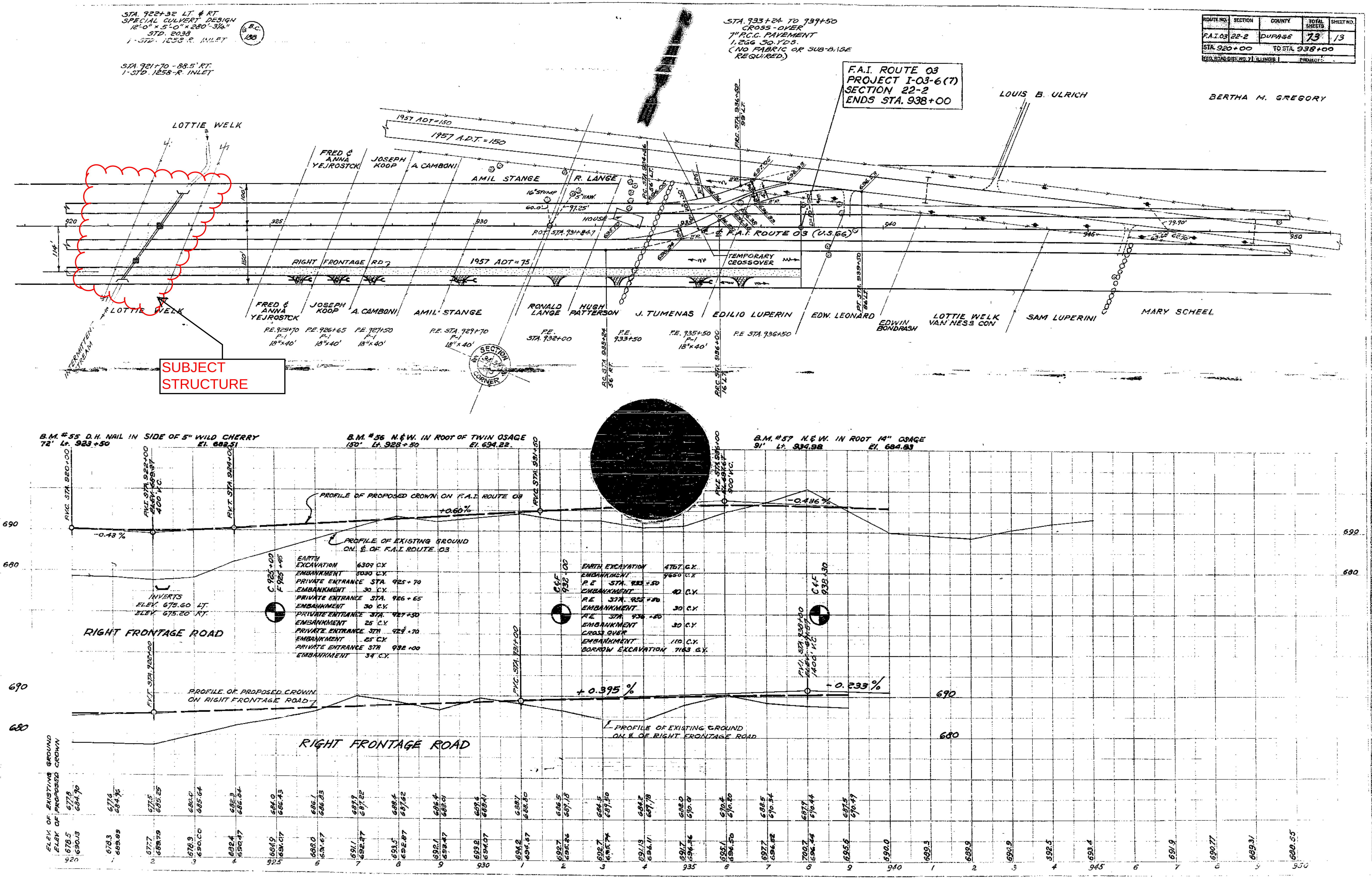
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

SUBMITTED JUN 20 1957 D. S. Morrison DISTRICT ENGINEER
EXAMINED July 2 1957 Ralph T. Burns BUREAU OF ROAD PLANS AND CONTRACTS
PASSED July 2 1957 [redacted] ENGINEER OF ORDER
APPROVED July 2 1957 P. M. Bateman CHIEF HIGHWAY ENGINEER
APPROVED July 2 1957 [redacted] DIRECTOR

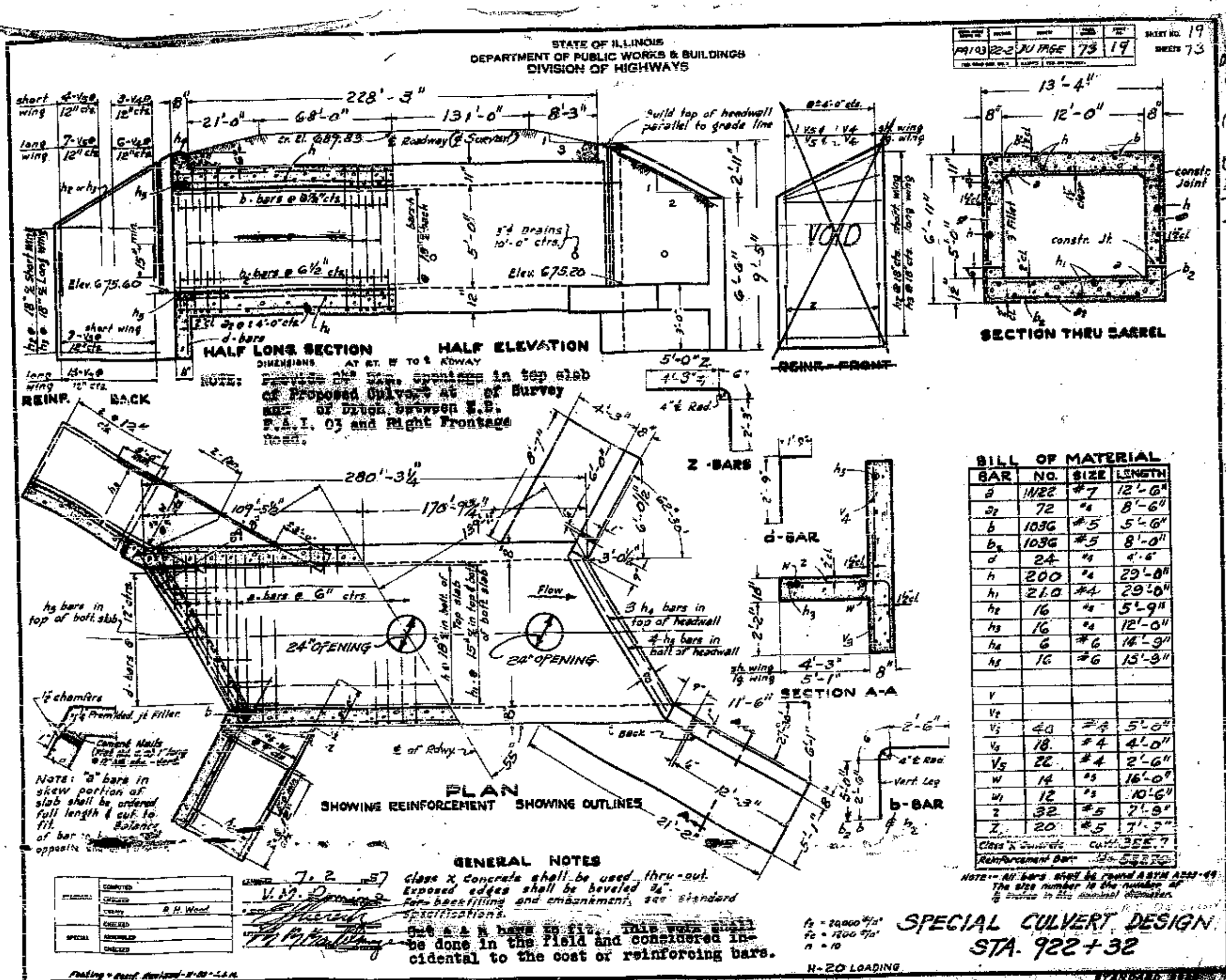
DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
APPROVED [redacted]
DIVISION ENGINEER — DATE

SCALE : 1" = 2000'

GROSS LENGTH 22,137.50 FEET = 4.193 MILES
PROJECT LENGTH — OMISSION 50 FEET = 3.905 MILES


ROUTE NO. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO.
F.A.I. 03 | 22-2 | DUPAGE | 73 | 13
STA. 920+00 TO STA. 938+00
FED. ROAD DIST. NO. 7 | ILLINOIS | PROJECT
STA. 922+32 LT. & RT.
SPECIAL CULVERT DESIGN
12'-0" x 5'-0" x 280'-3¼"
STD. 2038
1-STD. 1258-R. INLET
STA. 921+70 - 88.5' RT.
1-STD. 1258-R. INLET
STA. 933+24 TO 939+50
CROSS-OVER
7" P.C.C. PAVEMENT
1,266 SQ. YDS.
(NO FABRIC OR SUB-BASE REQUIRED)
F.A.I. ROUTE 03
PROJECT I-03-6(7)
SECTION 22-2
ENDS STA. 938+00
LOTTIE WELK
FRED & ANNA YEJROSTCK
JOSEPH KOOP
A. CAMBONI
AMIL STANGE
R. LANGE
RONALD LANGE
HUGH PATTERSON
J. TUMENAS
EDILIO LUPERIN
EDW. LEONARD
EDWIN BONDRASH
LOTTIE WELK VAN NESS CON
SAM LUPERINI
MARY SCHEEL
LOUIS B. ULRICH
BERTHA M. GREGORY
1957 ADT=150
1957 A.D.T.=150
1957 ADT=75
RIGHT FRONTAGE RD.
℄ F.A.I. ROUTE 03 (U.S. 66)
TEMPORARY CROSSOVER
HOUSE
16" STUMP
5" HAW.
P.O.T. STA. 931+84.7
P.C. STA. 934+26 56' LT.
P.R.C. STA. 936+52 99' LT.
P.C. STA. 935+24 56' RT.
P.R.C. STA. 936+00 16' LT.
PT. STA. 939+50 86' LT.
INTERMITTENT STREAM
P.E. 925+70 P-1 18"x40'
P.E. 926+65 P-1 18"x40'
P.E. 927+50 P-1 18"x40'
P.E. STA. 929+70 P-1 18"x40'
P.E. STA. 932+00
P.E. 933+50
P.E. 935+50 P-1 18"x40'
P.E. STA. 936+50
SECTION CORNER
SUBJECT STRUCTURE
B.M. #55 D.H. NAIL IN SIDE OF 5" WILD CHERRY 72' Lt. 923+50 El. 682.51
B.M. #56 N.&W. IN ROOT OF TWIN OSAGE 150' Lt. 928+50 El. 694.22.
B.M. #57 N.&W. IN ROOT 14" OSAGE 91' Lt. 934.98 El. 684.83
P.V.C. STA. 920+00
P.V.I. STA. 922+00 ELEV. 689.27 400' V.C.
P.V.T. STA. 924+00
P.V.C. STA. 931+50
P.V.I. STA. 936+00 EL. 687.67 900' V.C.
-0.43 %
+0.60 %
-0.436 %
PROFILE OF PROPOSED CROWN ON F.A.I. ROUTE 03
PROFILE OF EXISTING GROUND ON ℄ OF F.A.I. ROUTE 03
INVERTS
ELEV. 675.60 LT.
ELEV. 675.20 RT.
C 925+00
F 925+45
EARTH EXCAVATION 6309 C.Y.
EMBANKMENT 5090 C.Y.
PRIVATE ENTRANCE STA. 925+70
EMBANKMENT 30 C.Y.
PRIVATE ENTRANCE STA. 926+65
EMBANKMENT 30 C.Y.
PRIVATE ENTRANCE STA. 927+50
EMBANKMENT 25 C.Y.
PRIVATE ENTRANCE STA. 929+70
EMBANKMENT 25 C.Y.
PRIVATE ENTRANCE STA. 932+00
EMBANKMENT 34 C.Y.
C&F 932+00
EARTH EXCAVATION 4767 C.Y.
EMBANKMENT 9650 C.Y.
P.E. STA. 933+50
EMBANKMENT 40 C.Y.
P.E. STA. 935+50
EMBANKMENT 30 C.Y.
P.E. STA. 936+50
EMBANKMENT 30 C.Y.
CROSS OVER
EMBANKMENT 110 C.Y.
BORROW EXCAVATION 7163 C.Y.
C&F 938+30
RIGHT FRONTAGE ROAD
P.V.T. STA. 926+00
P.V.C. STA. 931+00
P.V.I. STA. 938+00 ELEV. 691.57 1400' V.C.
+0.395 %
-0.233 %
PROFILE OF PROPOSED CROWN ON RIGHT FRONTAGE ROAD
PROFILE OF EXISTING GROUND ON ℄ OF RIGHT FRONTAGE ROAD
ELEV. OF EXISTING GROUND
ELEV. OF PROPOSED CROWN
690
680

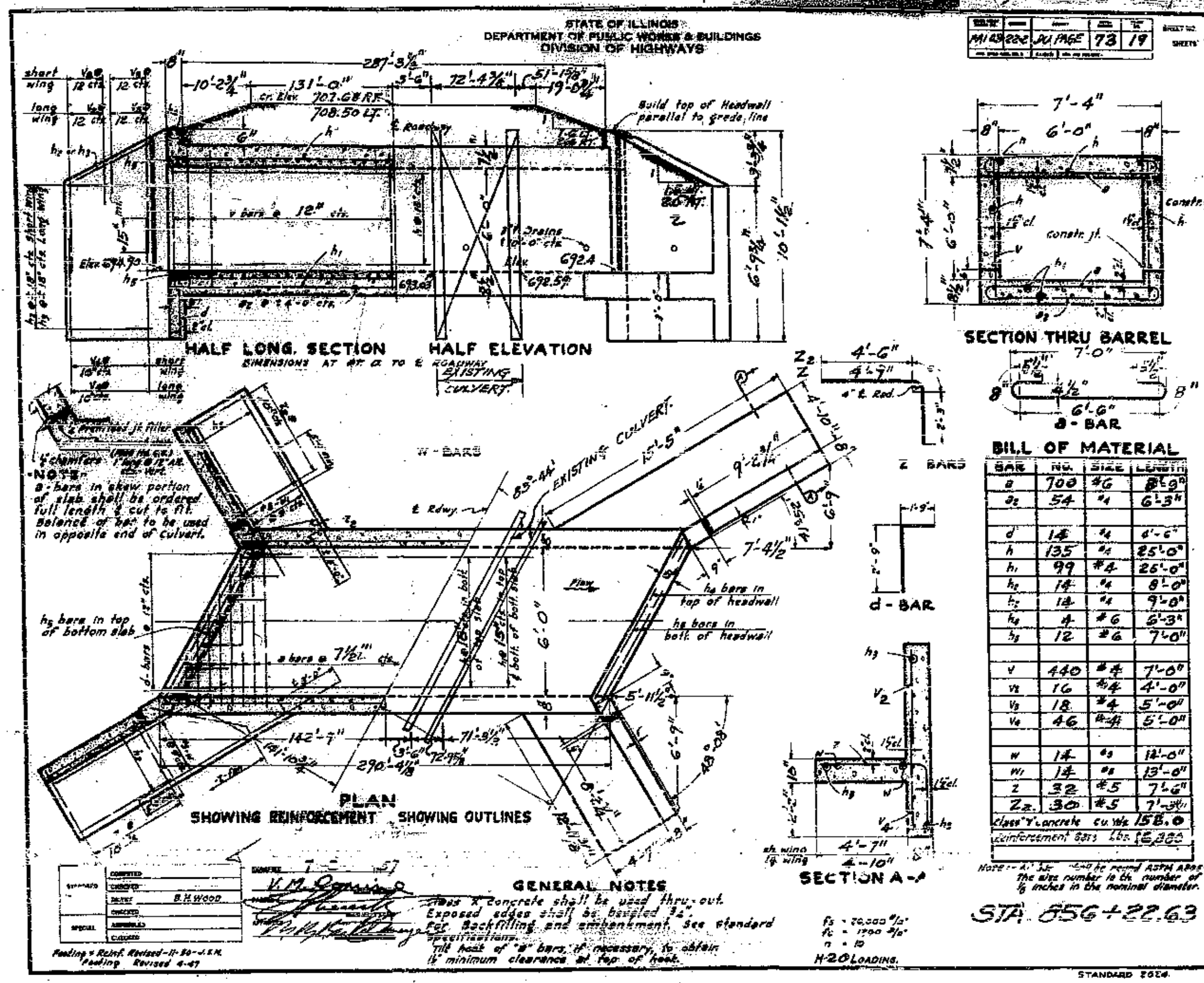
FAI 55


STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
HALF LONG. SECTION
HALF ELEVATION
SECTION THRU BARREL
REINF. FRONT
VOID
NOTE: Provide 24" dia. openings in top slab of Proposed Culvert at ℄ of Survey and ℄ of Ditch between S.B. F.A.I. 03 and Right Frontage Road.
PLAN
SHOWING REINFORCEMENT
SHOWING OUTLINES
24" OPENING
SECTION A-A
d-BAR
Z-BARS
b-BAR
GENERAL NOTES
Class X concrete shall be used thru-out.
Exposed edges shall be beveled 3/4".
For backfilling and embankment, see standard specifications.
Cut a & h bars to fit. This work shall be done in the field and considered incidental to the cost of reinforcing bars.
H-20 LOADING
SPECIAL CULVERT DESIGN
STA. 922+32

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	1122	#7	12'-6"
a₂	72	#4	8'-6"
b	1036	#5	5'-6"
b₂	1036	#5	8'-0"
d	24	#4	4'-6"
h	200	#4	29'-8"
h₁	210	#4	29'-0"
h₂	16	#4	5'-9"
h₃	16	#4	12'-0"
h₄	6	#6	14'-9"
h₅	16	#6	15'-9"
v			
v₂			
v₃	40	#4	5'-0"
v₄	18	#4	4'-0"
v₅	22	#4	2'-6"
w	14	#5	16'-0"
w₁	12	#5	10'-6"
z	32	#5	7'-9"
z₁	20	#5	7'-3"
Class X Concrete		Cu. Yds.	355.7
Reinforcement Bars		Lbs.	[illegible]

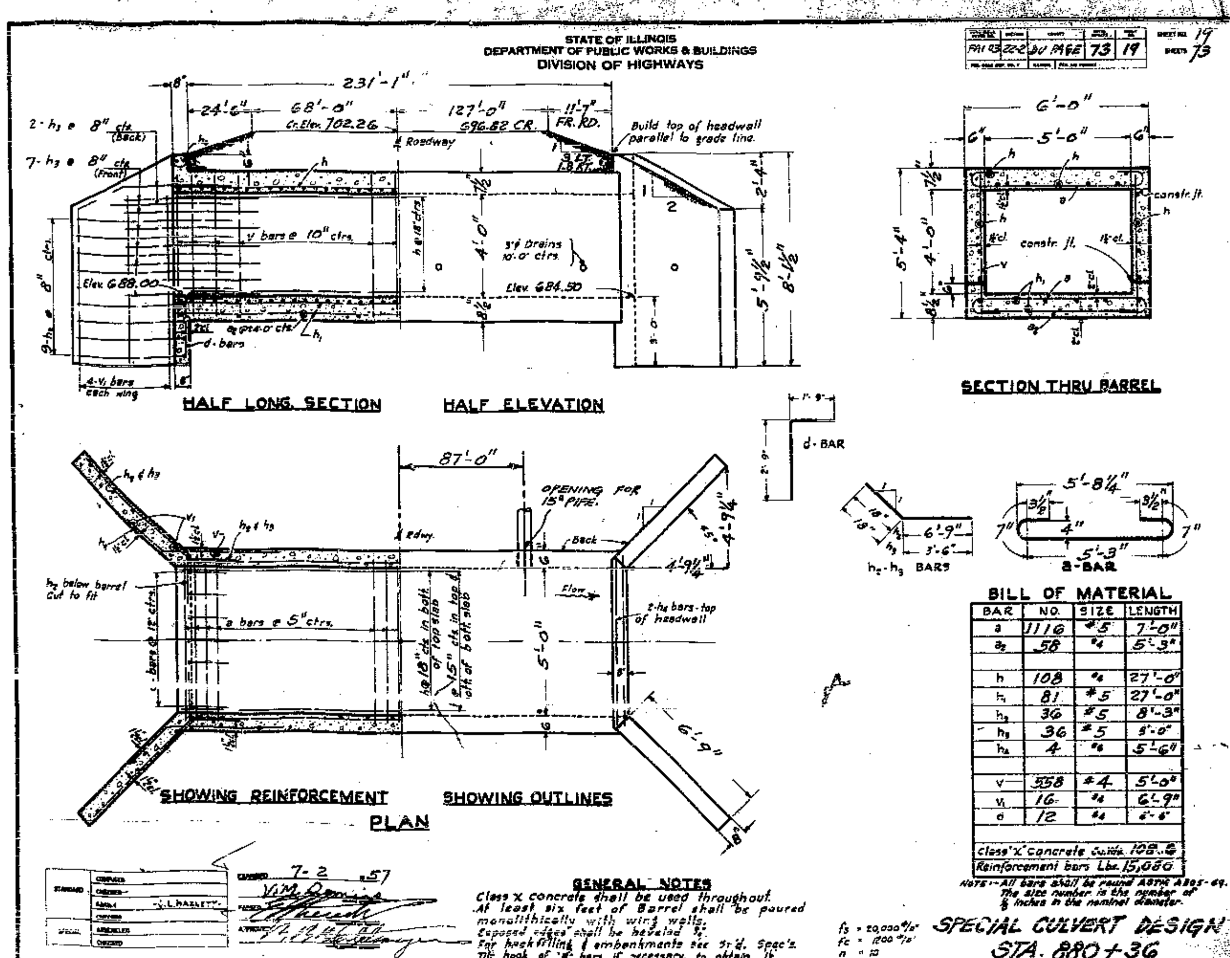
NOTE:– All bars shall be round ASTM A305-49. The size number is the number of 1/8 inches in the nominal diameter.


STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
HALF LONG. SECTION
HALF ELEVATION
SECTION THRU BARREL
EXISTING CULVERT
PLAN
SHOWING REINFORCEMENT
SHOWING OUTLINES
SECTION A-A
d-BAR
Z BARS
a-BAR
GENERAL NOTES
Class X concrete shall be used thru-out.
Exposed edges shall be beveled 3/4".
For backfilling and embankment, see standard specifications.
H-20 LOADING
STA. 856+22.63

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	700	#6	8'-9"
a₂	54	#4	6'-3"
d	14	#4	4'-6"
h	135	#4	25'-0"
h₁	99	#4	26'-0"
h₂	14	#4	8'-0"
h₃	14	#4	9'-0"
h₄	4	#6	6'-3"
h₅	12	#6	7'-0"
v	440	#4	7'-0"
v₂	16	#4	4'-0"
v₃	18	#4	5'-0"
v₄	46	#4	5'-0"
w	14	#5	12'-0"
w₁	14	#5	13'-0"
z	32	#5	7'-6"
z₂	30	#5	7'-3"
Class "X" Concrete		Cu. Yds.	158.0
Reinforcement Bars		Lbs.	16,300

NOTE:– All bars shall be round ASTM A305-47. The size number is the number of 1/8 inches in the nominal diameter.


STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
HALF LONG. SECTION
HALF ELEVATION
SECTION THRU BARREL
d-BAR
a-BAR
PLAN
SHOWING REINFORCEMENT
SHOWING OUTLINES
OPENING FOR 15" PIPE
GENERAL NOTES
Class X concrete shall be used throughout.
At least six feet of Barrel shall be poured monolithically with wing walls.
Exposed edges shall be beveled 3/4".
For backfilling & embankments see Std. Spec's.
Tilt hook of "a" bars, if necessary, to obtain 1½" minimum clearance at top of hook.
H-20 LOADING
SPECIAL CULVERT DESIGN
STA. 880+36

BILL OF MATERIAL

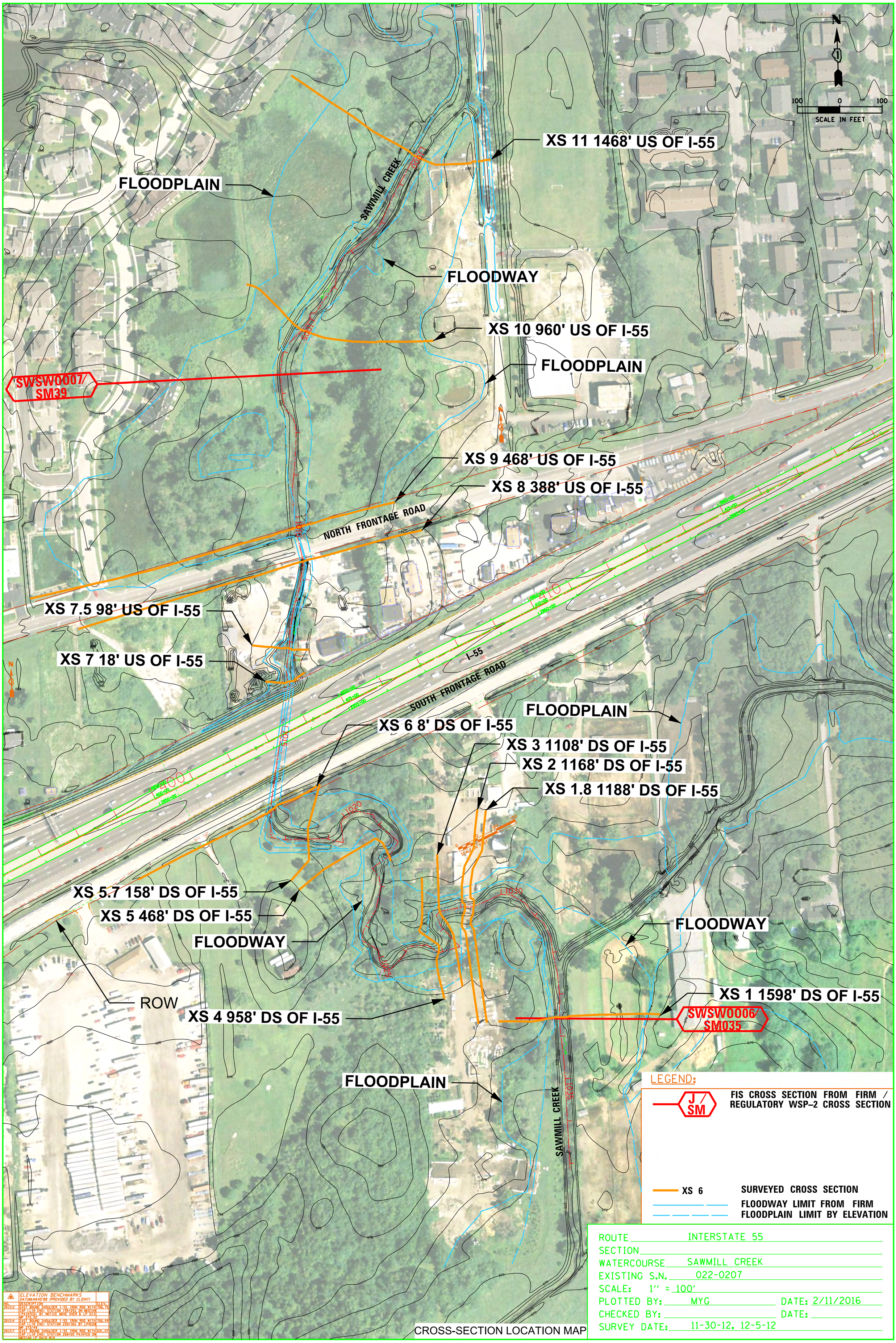
BAR	NO.	SIZE	LENGTH
a	1116	#5	7'-0"
a₂	58	#4	5'-3"
h	108	#4	27'-0"
h₁	81	#5	27'-0"
h₂	36	#5	8'-3"
h₃	36	#5	5'-0"
h₄	4	#6	5'-6"
v	558	#4	5'-0"
v₁	16	#4	6'-9"
d	12	#4	4'-6"
Class "X" Concrete		Cu. Yds.	108.6
Reinforcement Bars		Lbs.	15,050

NOTE:– All bars shall be round ASTM A305-49. The size number is the number of 1/8 inches in the nominal diameter.

TAB 9

SECTION 9

STREAM CROSS SECTION LOCATION MAP
STREAM CROSS SECTION PLOTS



LEGEND:

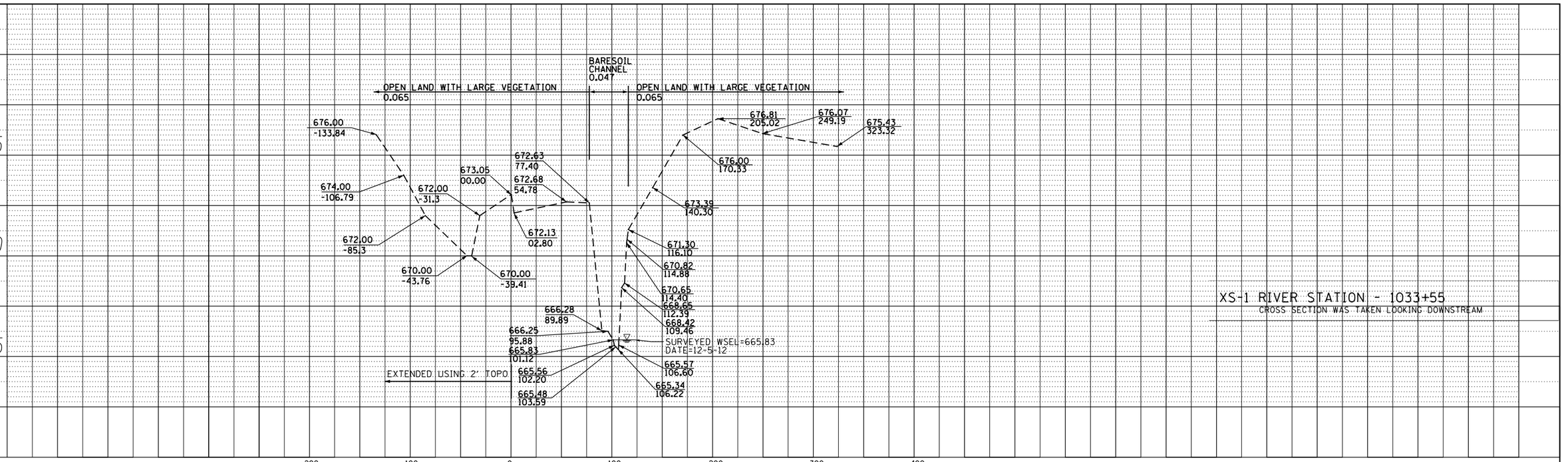
- J/SM — FIS CROSS SECTION FROM FIRM / REGULATORY WSP–2 CROSS SECTION
- XS 6 — SURVEYED CROSS SECTION
- FLOODWAY LIMIT FROM FIRM
- FLOODPLAIN LIMIT BY ELEVATION

ELEVATION BENCHMARKS
DATUM=NAVD'88 (PROVIDED BY CLIENT)

NO.	DESCRIPTION	ELEV.
201212	EAST BOUND SHOULDER I-55 IRON ROD WITH CAP (LIN ENG) STATION 195+25± ON MEDIAN (PAINTED) BY NOTICE MOVE OVER & LP EC3 MP 272.02	706.75
201214	EAST BOUND SHOULDER I-55 IRON ROD WITH CAP (LIN ENG) STATION 220+30± BY LP4E08 MP 272.49	700.49
201217	EAST BOUND SHOULDER I-55 IRON ROD WITH CAP (LIN ENG) STATION 268+05 PAINTED ON MEDIAN LP OHIO WIO	691.07

ROUTE INTERSTATE 55
SECTION
WATERCOURSE SAWMILL CREEK
EXISTING S.N. 022-0207
SCALE: 1" = 100'
PLOTTED BY: MYG DATE: 2/11/2016
CHECKED BY: DATE:
SURVEY DATE: 11-30-12, 12-5-12

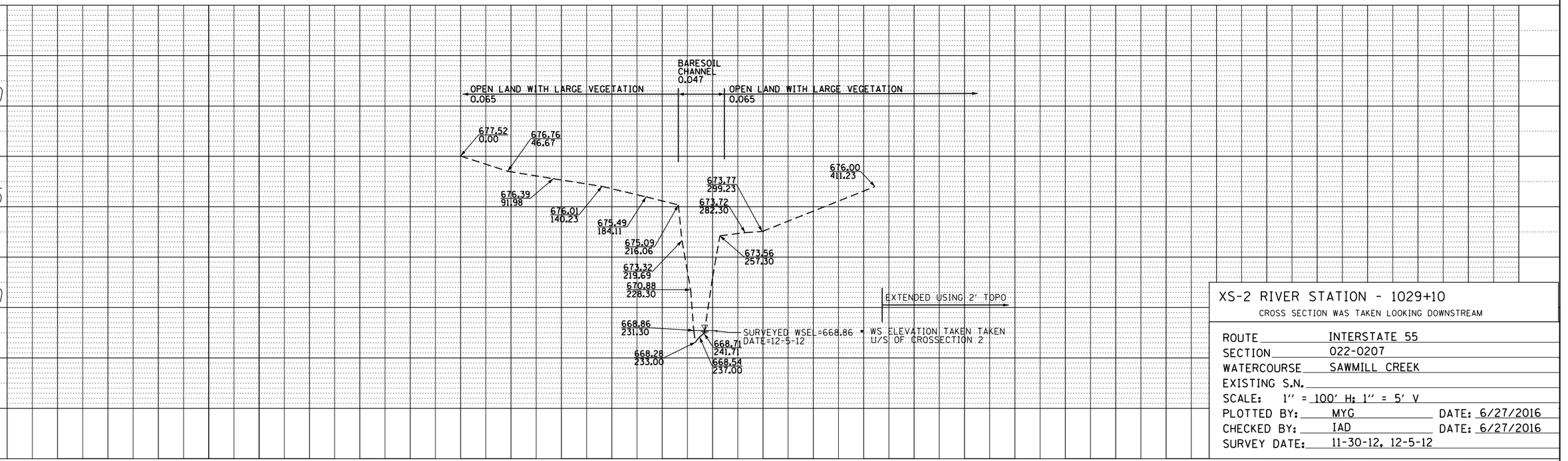
FILE NAME = N:\Idot\110203.00001\CADD_Sheets\P1110203-sht-drnpln02.dgn



XS-1 RIVER STATION - 1033+55

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

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



XS-2 RIVER STATION - 1029+10

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

PROFILE — SURVEYED; PLOTTED; ALIGNMENT CHECKED; R/W NOTED; STRUCTURE NOTATNS CHKD; NOTE BOOK; NO. ____; BY; DATE

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N. ____
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

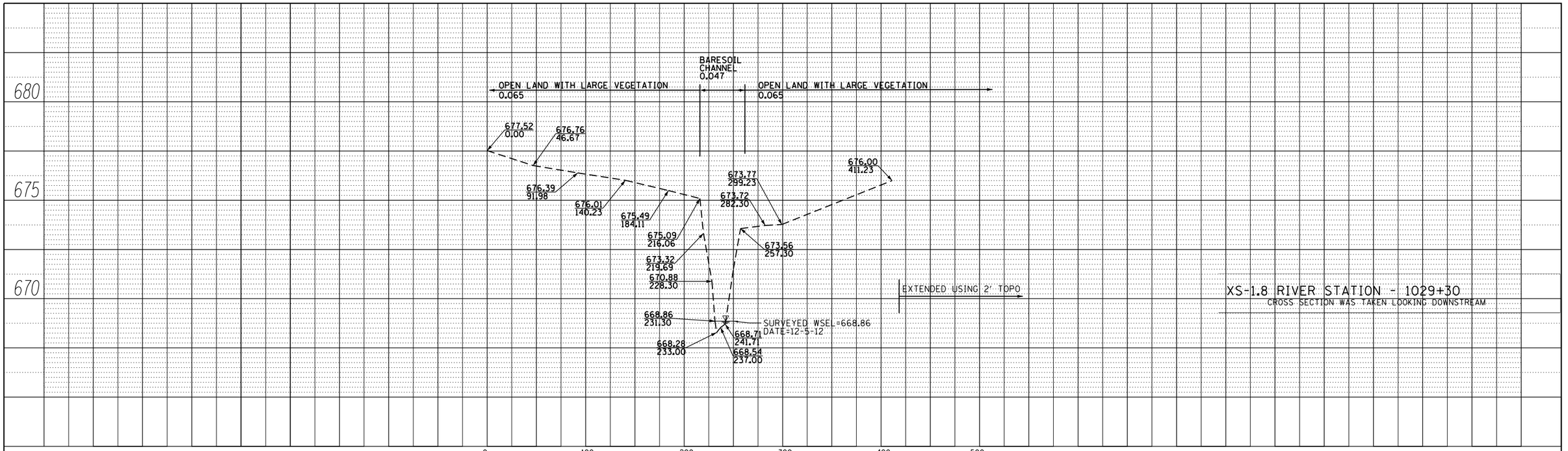
CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

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

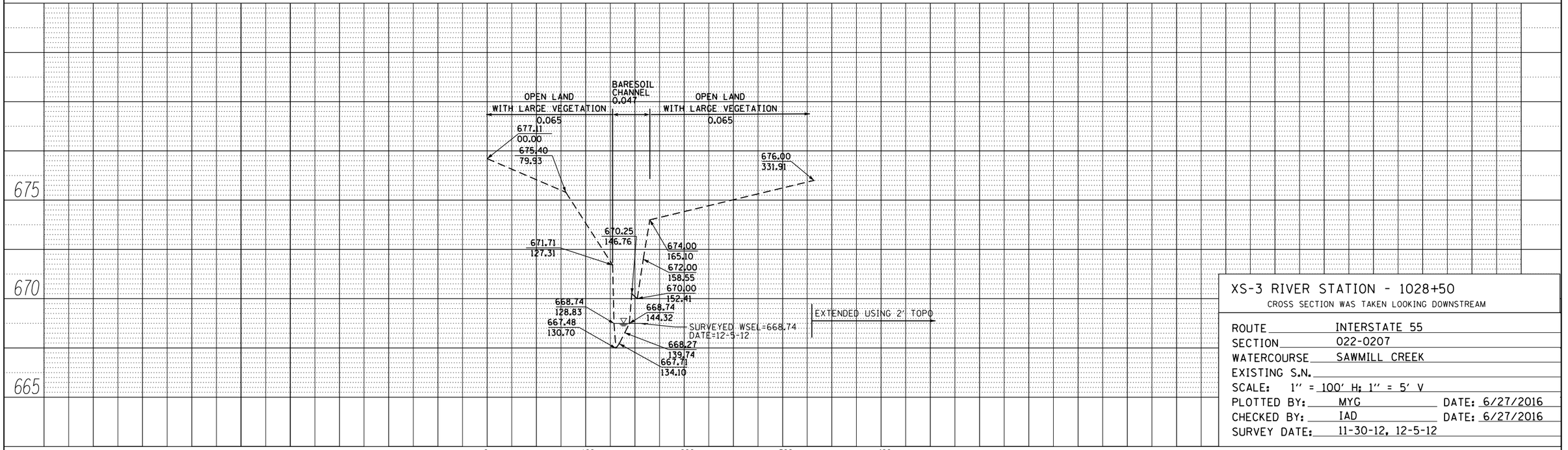


PLAN

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

XS-1.8 RIVER STATION - 1029+30

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM



PROFILE

SURVEYED	BY
PLOTTED	DATE
ADJUSTMENT CHECKED	
R/W NOTED	
STRUCTURE NOTATNS CHKD	
NOTE BOOK	
NO.	

XS-3 RIVER STATION - 1028+50

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
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

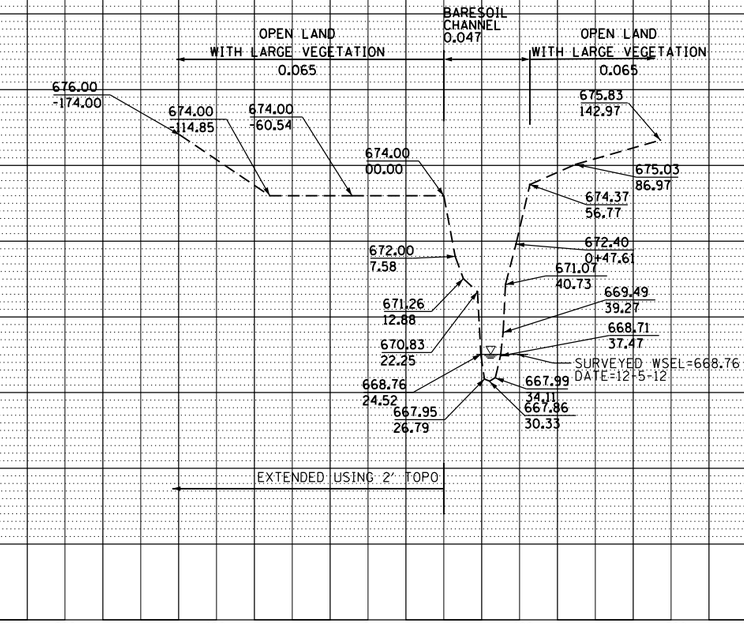
PLAN

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

NOTE BOOK
NO.

BY

DATE



XS-4 RIVER STATION - 1026+90

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

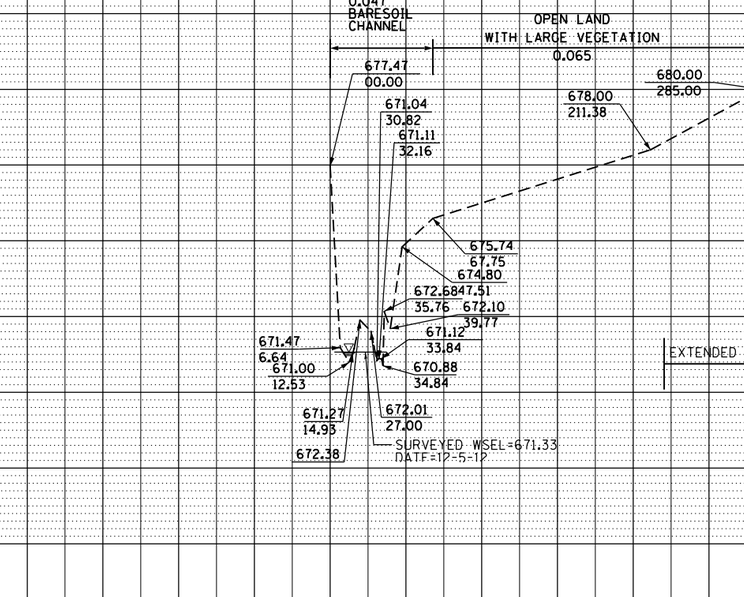
PROFILE

SURVEYED
PLOTTED
ALIGNMENT CHECKED
R.O.W. NOTED
STRUCTURE NOTATNS CHKD

NOTE BOOK
NO.

BY

DATE



XS-5 RIVER STATION - 1022+00

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

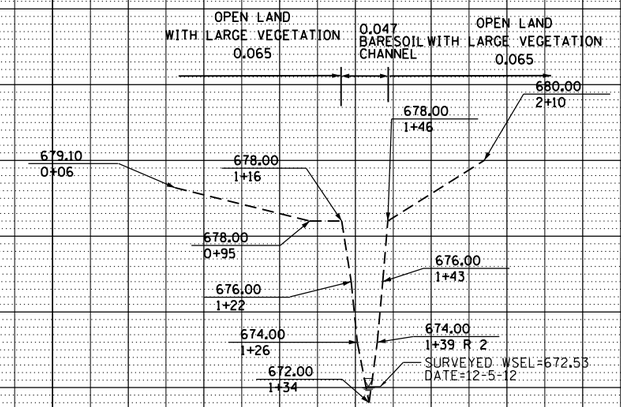
CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

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

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

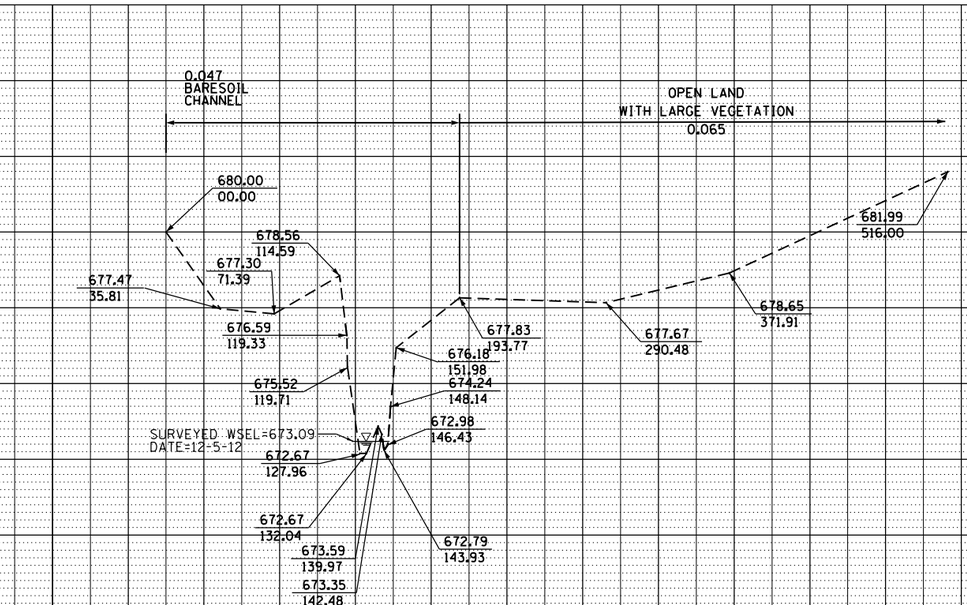
CONTRACT NO.

ILLINOIS FED. AID PROJECT



XS-5.7 RIVER STATION - 1018+53
NOTE-THIS CROSSECTION WAS CONSTRUCTED USING ONLY 2' TOPO
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

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



XS-6 RIVER STATION - 1017+00
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

PROFILE
SURVEYED
PLOTTED
ALIGNMENT CHECKED
R.W. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
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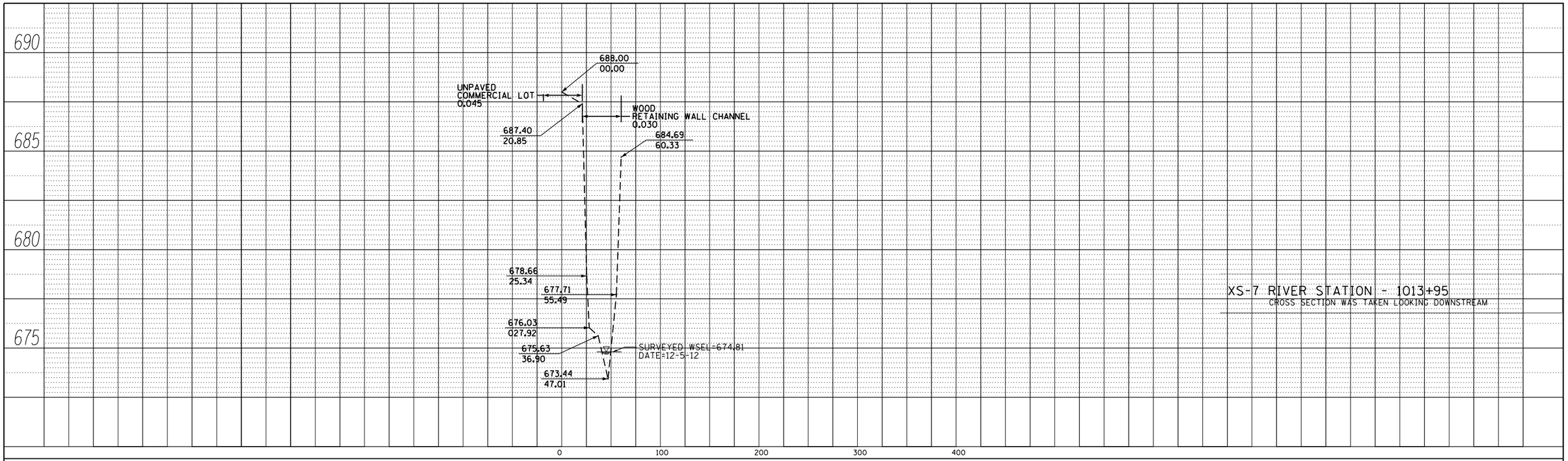
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

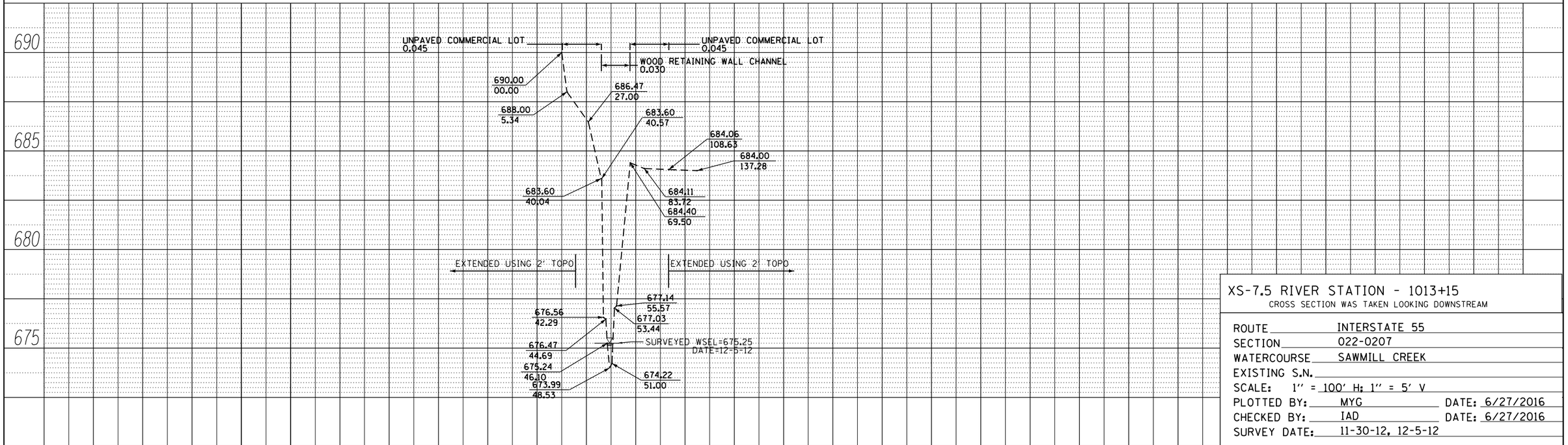
SCALE: 100'H 5'V | SHEET 4 OF 7 SHEETS

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



XS-7 RIVER STATION - 1013+95
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

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



XS-7.5 RIVER STATION - 1013+15
CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

PROFILE
SURVEYED
PLOTTED
ALIGNMENT CHECKED
R/W NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
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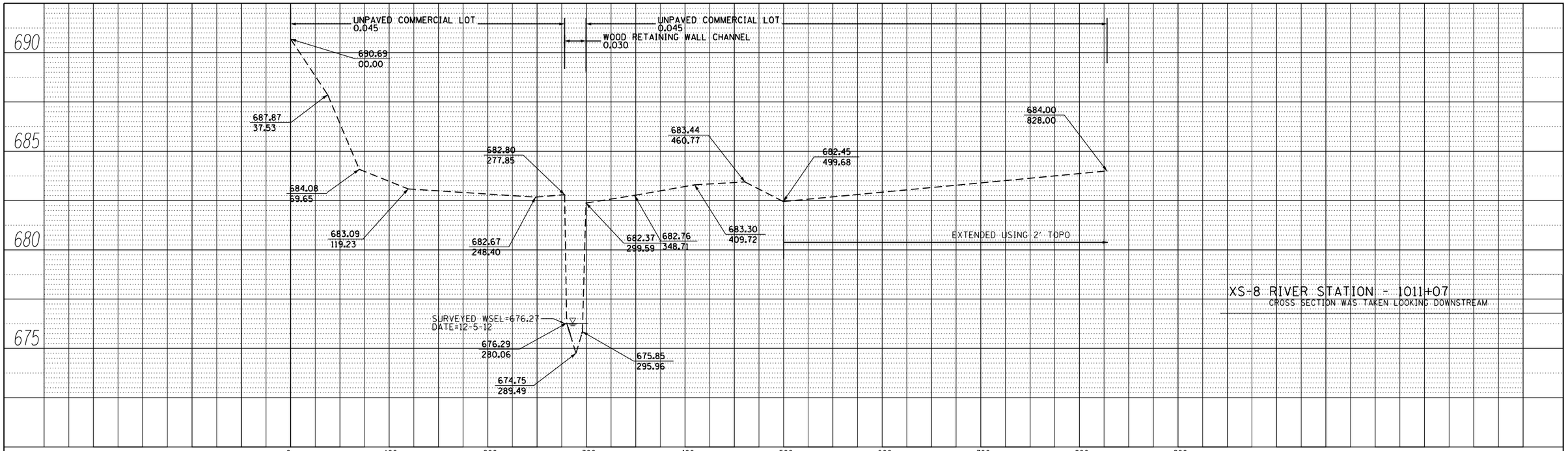
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

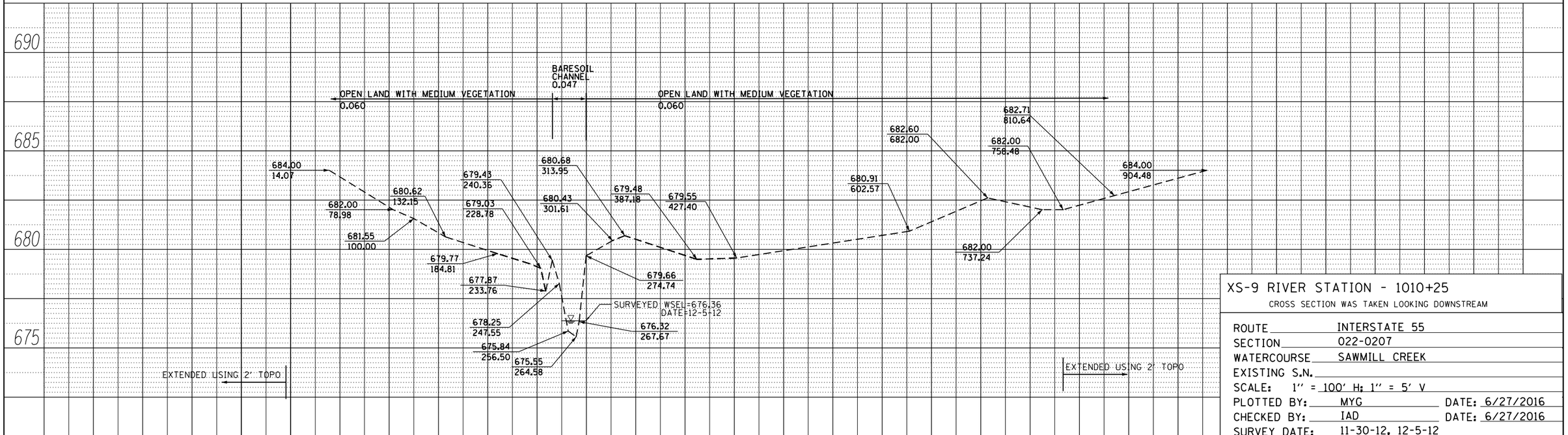
SCALE: 100'H 5'V | SHEET 5 OF 7 SHEETS

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



XS-8 RIVER STATION - 1011+07

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM



XS-9 RIVER STATION - 1010+25

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

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

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

FILE NAME = N:\Idot\110203.0000\CADD_Sheets\P1110203-sht-xssht.dgn	USER NAME = eburke	DESIGNED - EMB	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

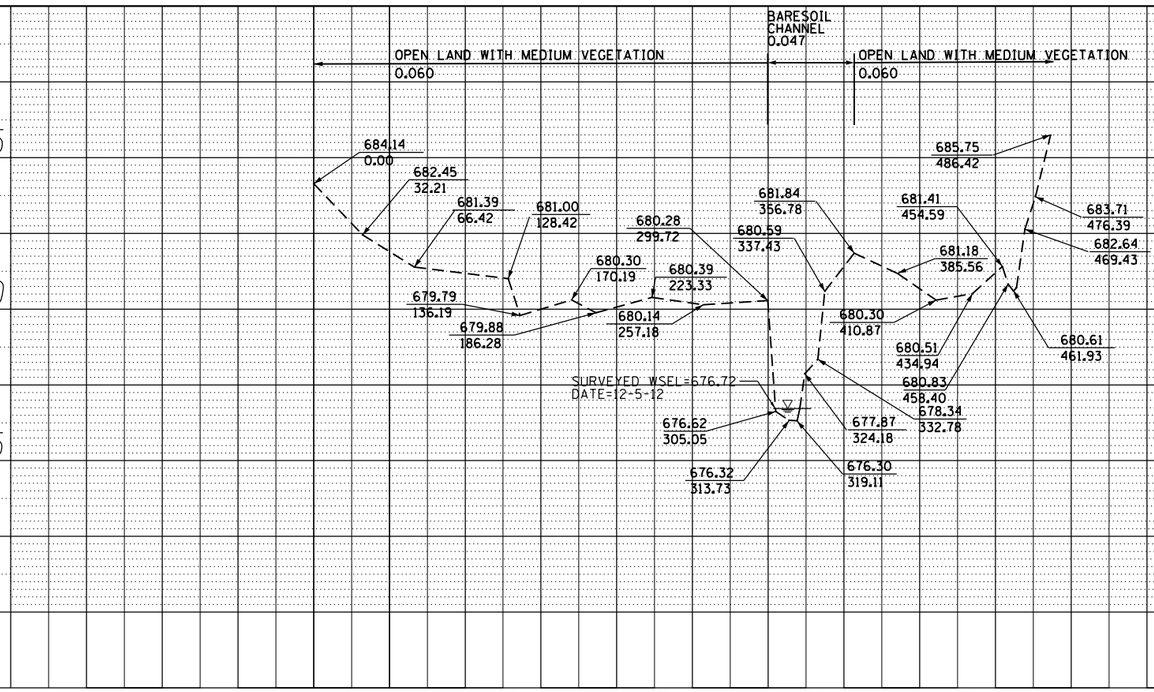
CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

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

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

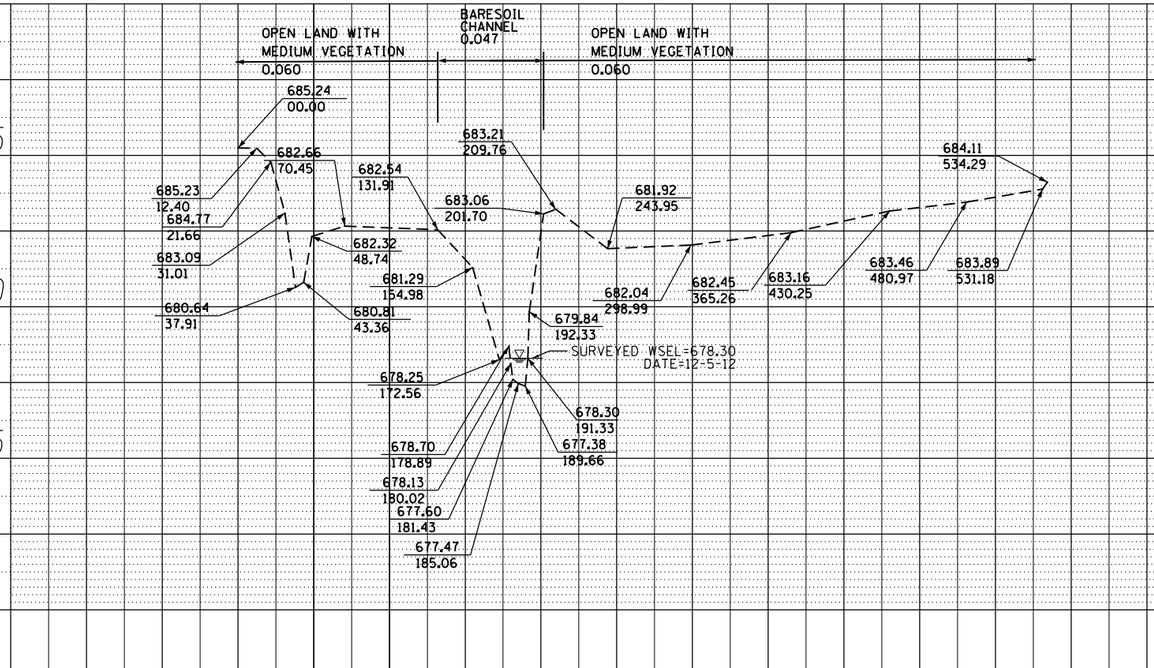
CONTRACT NO.

ILLINOIS FED. AID PROJECT



XS-10 RIVER STATION - 1005+34

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM



XS-11 RIVER STATION - 1000+25

CROSS SECTION WAS TAKEN LOOKING DOWNSTREAM

ROUTE INTERSTATE 55
SECTION 022-0207
WATERCOURSE SAWMILL CREEK
EXISTING S.N.
SCALE: 1'' = 100' H; 1'' = 5' V
PLOTTED BY: MYG DATE: 6/27/2016
CHECKED BY: IAD DATE: 6/27/2016
SURVEY DATE: 11-30-12, 12-5-12

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

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

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Default	PLOT DATE = 6/27/2016	DATE - 6/27/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS-SECTIONS
SAWMILL CREEK TRIBUTARY

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

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

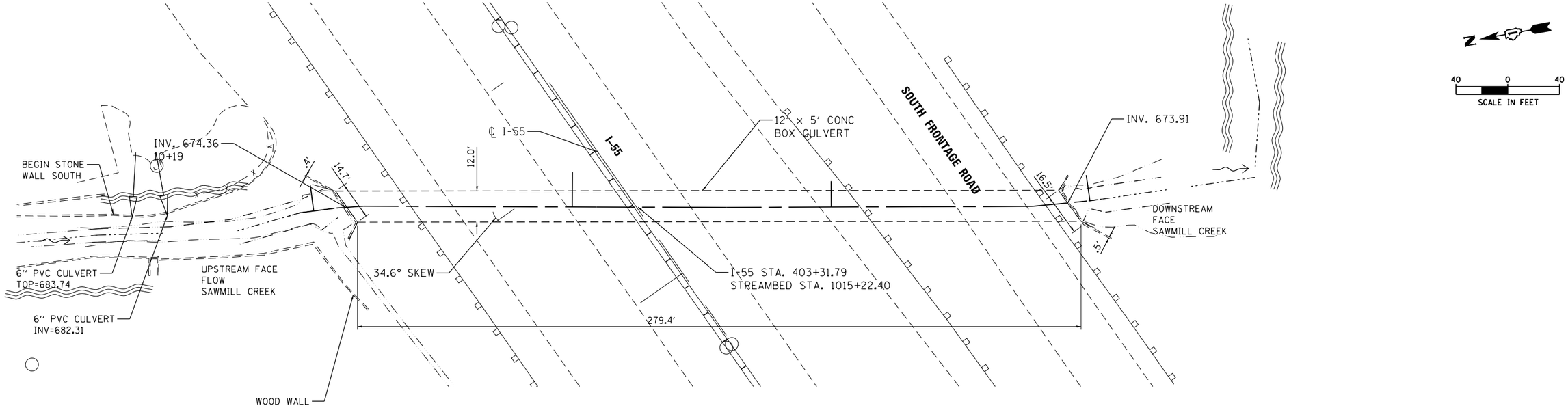
CONTRACT NO.

ILLINOIS FED. AID PROJECT

TAB 10

SECTION 10

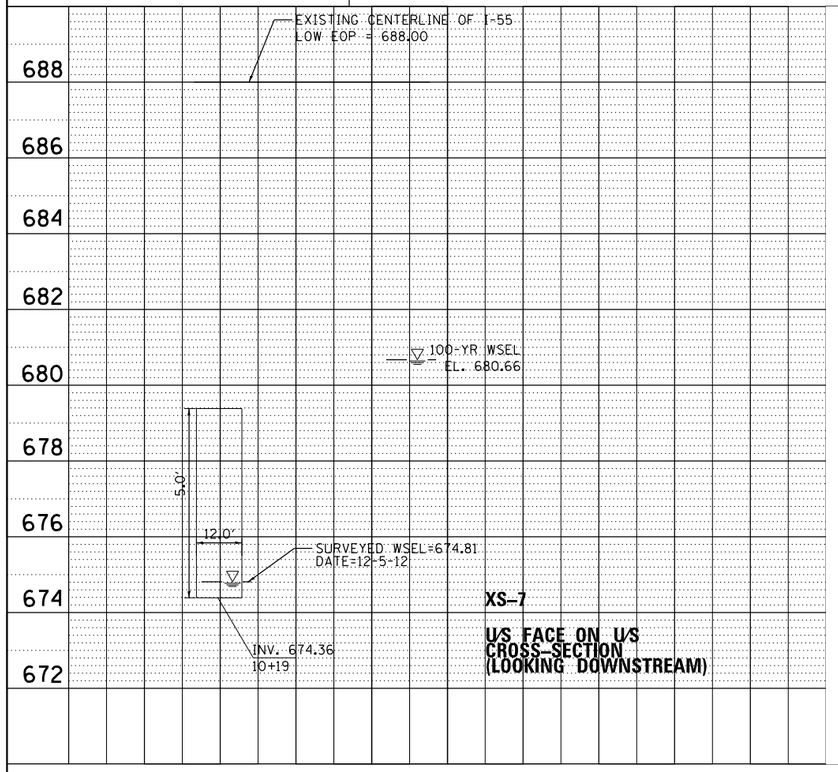
STRUCTURE / PLAN DRAWING PLOTS

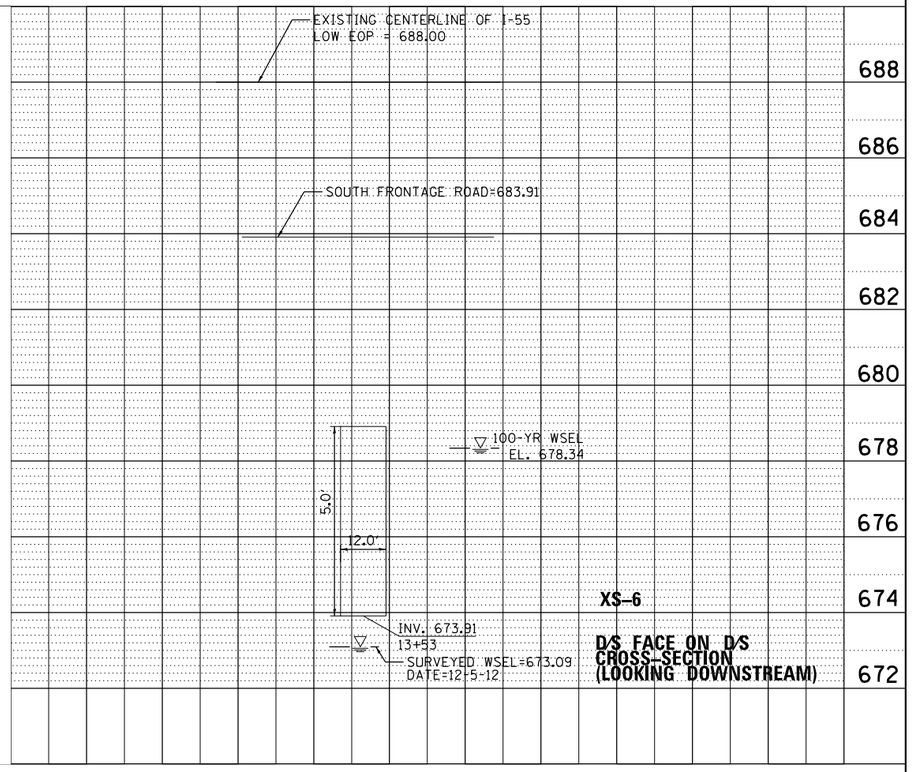


NOTE:
WATER SURFACE ELEVATION AS SURVEYED BY CBBEL DATED: 11-12-12 AND 11-30-12

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

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





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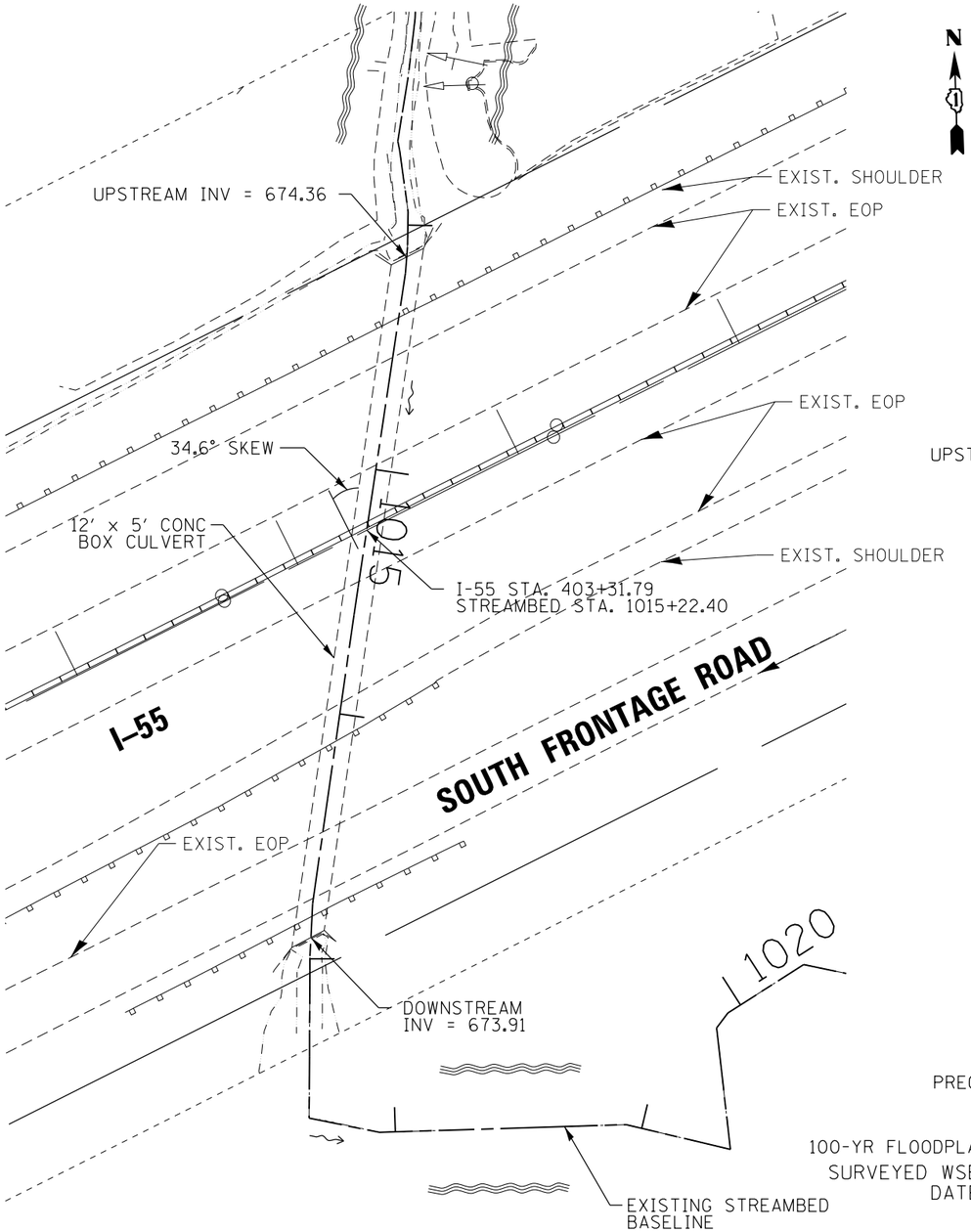
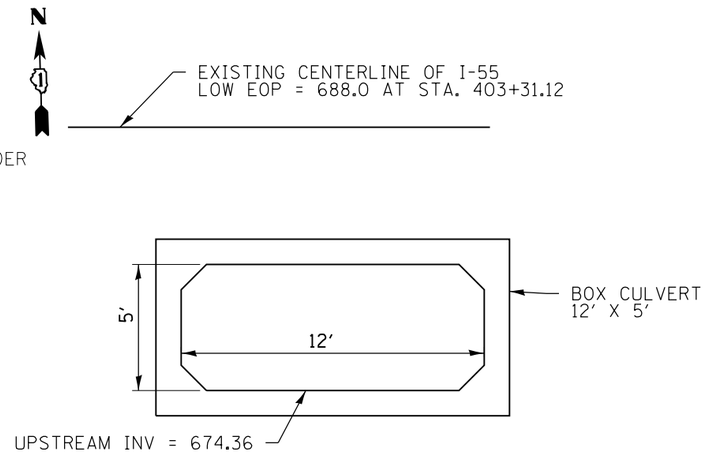
	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

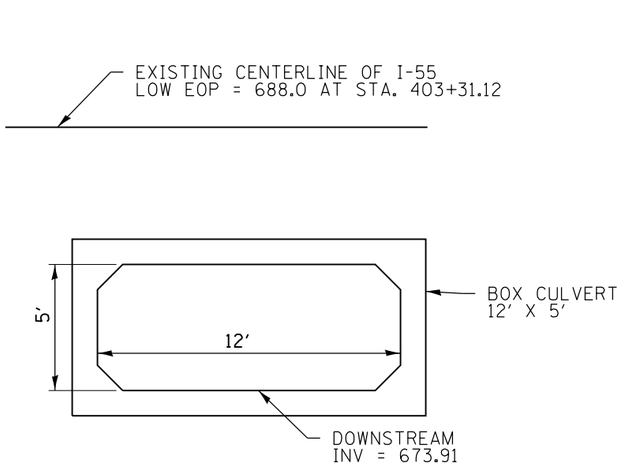
I-55
STRUCTURE /PLAN DRAWING OVER SAWMILL CREEK
SCALE: 1"=40' | SHEET OF SHEETS | STA. TO STA.

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

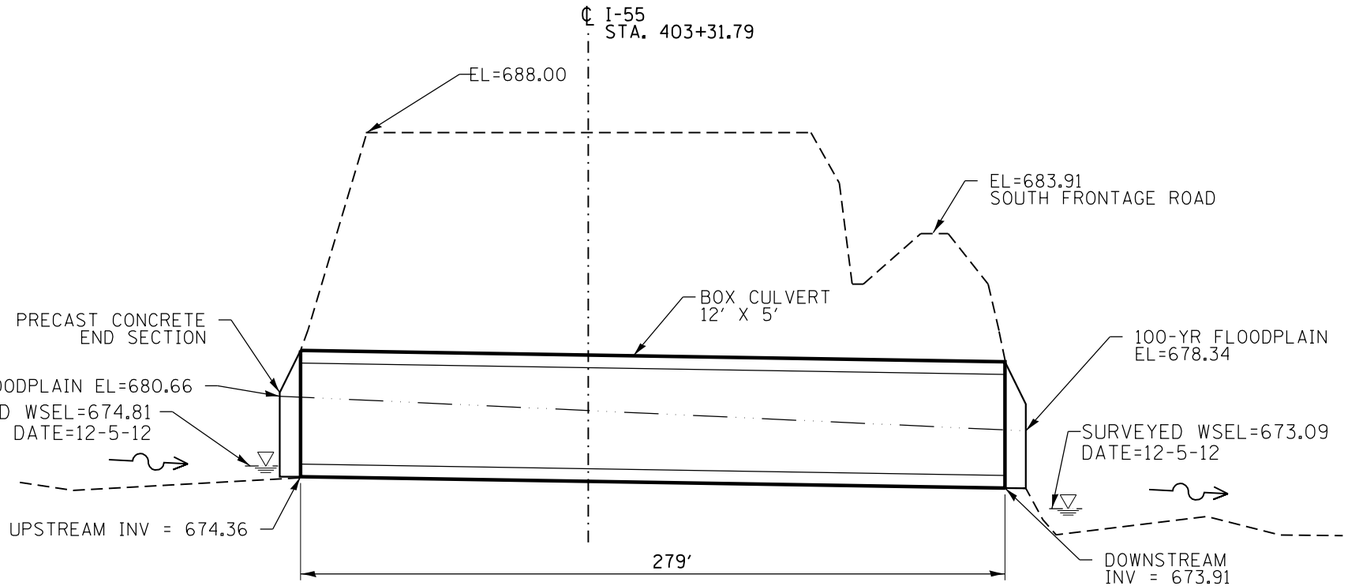




BOX CULVERT
U/S FACE
CROSS-SECTION
(LOOKING DOWNSTREAM)



BOX CULVERT
D/S FACE
CROSS-SECTION
(LOOKING DOWNSTREAM)



BOX CULVERT
LONGITUDINAL-SECTION

NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 11-12-12 AND 11-30-12

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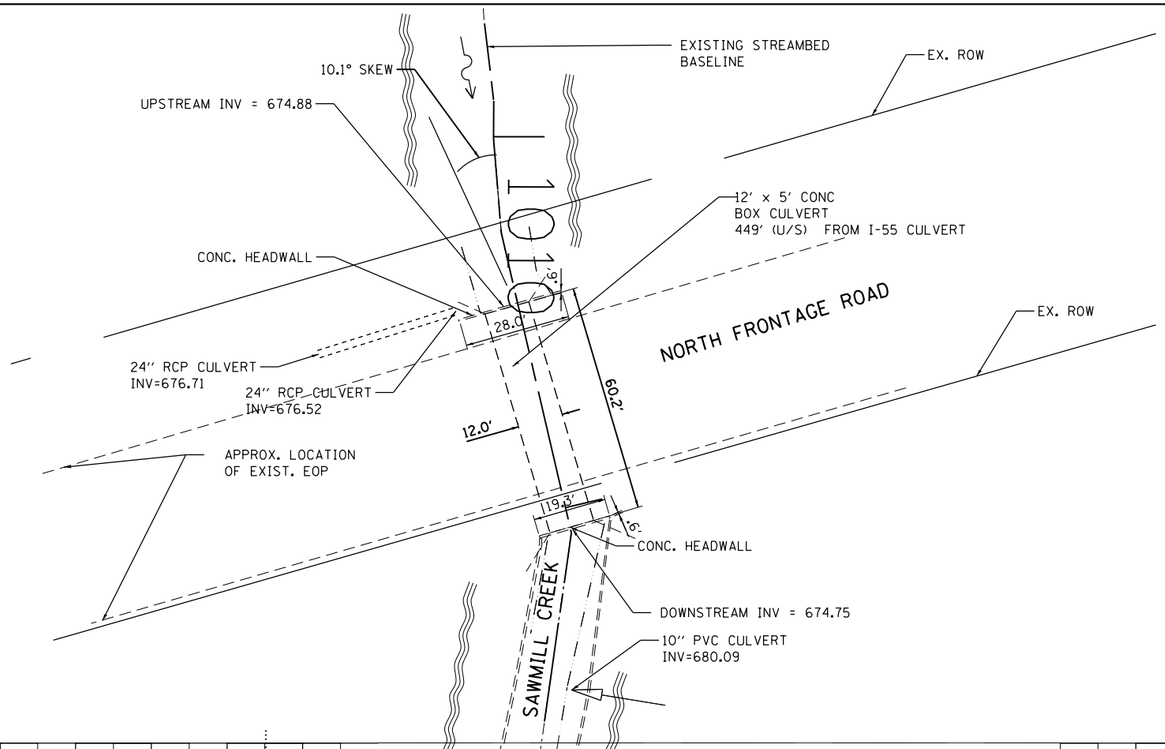
	PLOT SCALE = 60.0000 ' / in.	CHECKED - IAD	REVISED -
Default	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55 STRUCTURE /PLAN DRAWING

SCALE: 1" = 30' | SHEET OF SHEETS | STA. | TO STA.

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

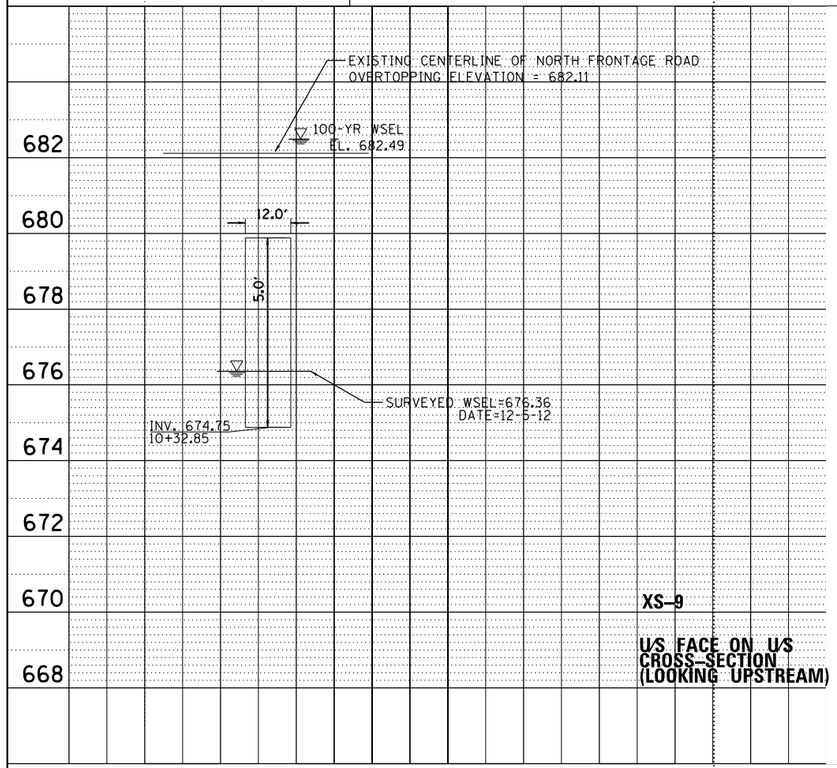


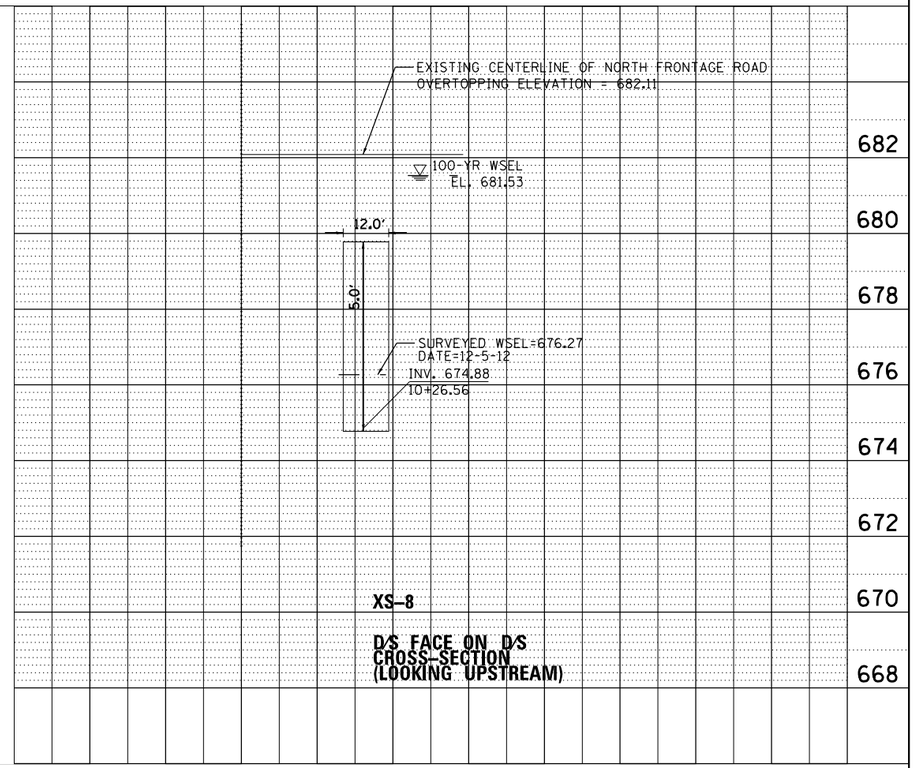
N

40 0 40

SCALE IN FEET

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





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

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
BAR. NOTED
STRUCTURE NOTATNS CHKED
NOTE BOOK
NO.
BY
DATE

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		DRAWN - MYG	REVISED -
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	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

NORTH FRONTAGE ROAD
STRUCTURE /PLAN DRAWING OVER 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
PLOTTED
ALIGNMENT CHECKED
GRADES CHECKED
STAN. NOTES CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PRIVATE BRIDGE OVER SAWMILL CREEK
LOW STEEL = 673.96
OVERTOPPING = 673.77

UPSTREAM INV = 669.19

SAWMILL CREEK

1030

17.9'
1.8'
17.2'

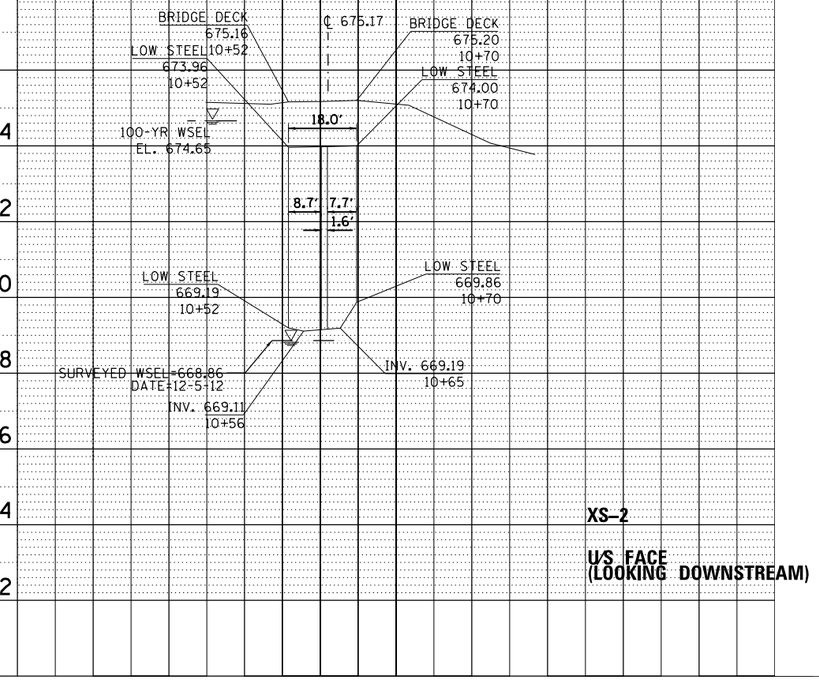
EXISTING STREAMBED
BASELINE

N

40 0 40
SCALE IN FEET

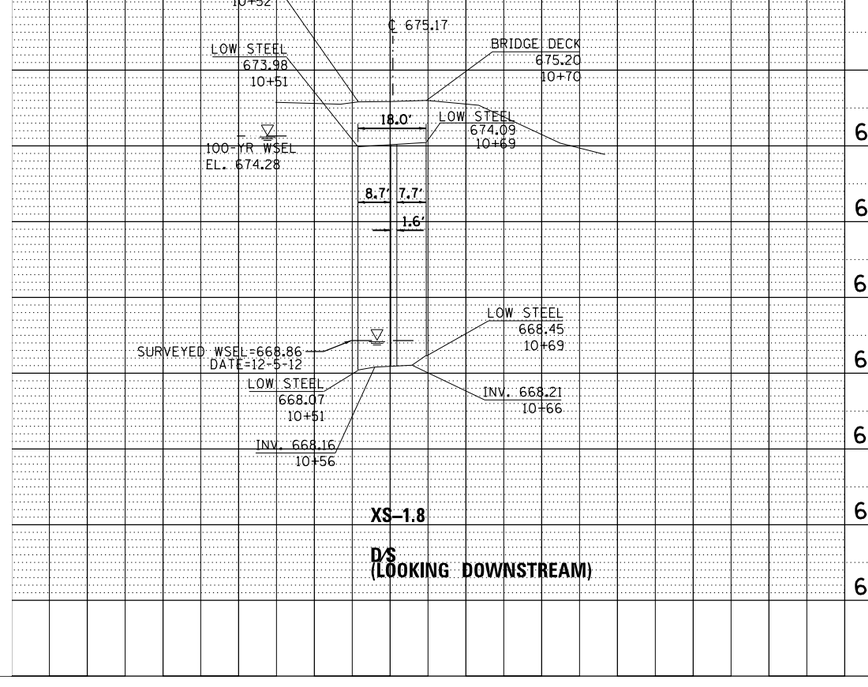
NOTE:
WATER SURFACE ELEVATION AS SURVEYED
BY CBBEL DATED: 12-05-12

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
STAN. NOTES CHECKED
STRUCTURE NOTATING CHKD
NOTE BOOK
NO.
BY
DATE



XS–2

US FACE
(LOOKING DOWNSTREAM)



XS–1.8

DS
(LOOKING DOWNSTREAM)

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Default	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRIVATE ROAD
BRIDGE LAYOUT /PLAN OVER SAWMILL CREEK

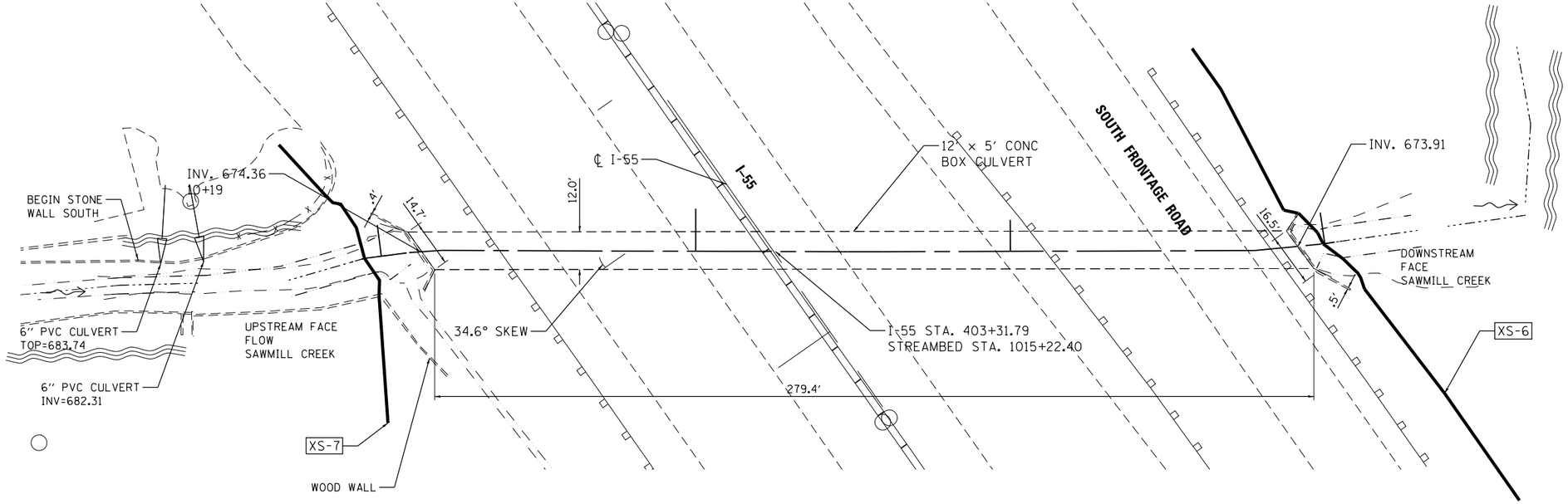
SCALE: 1"=40' | SHEET OF SHEETS | STA. | TO STA.

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

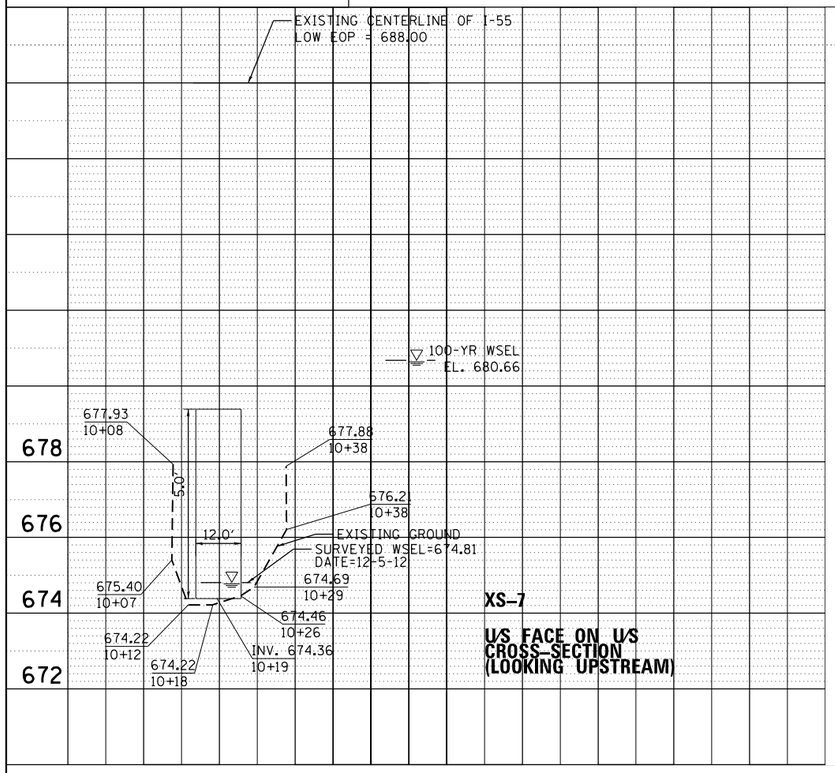
TAB 11

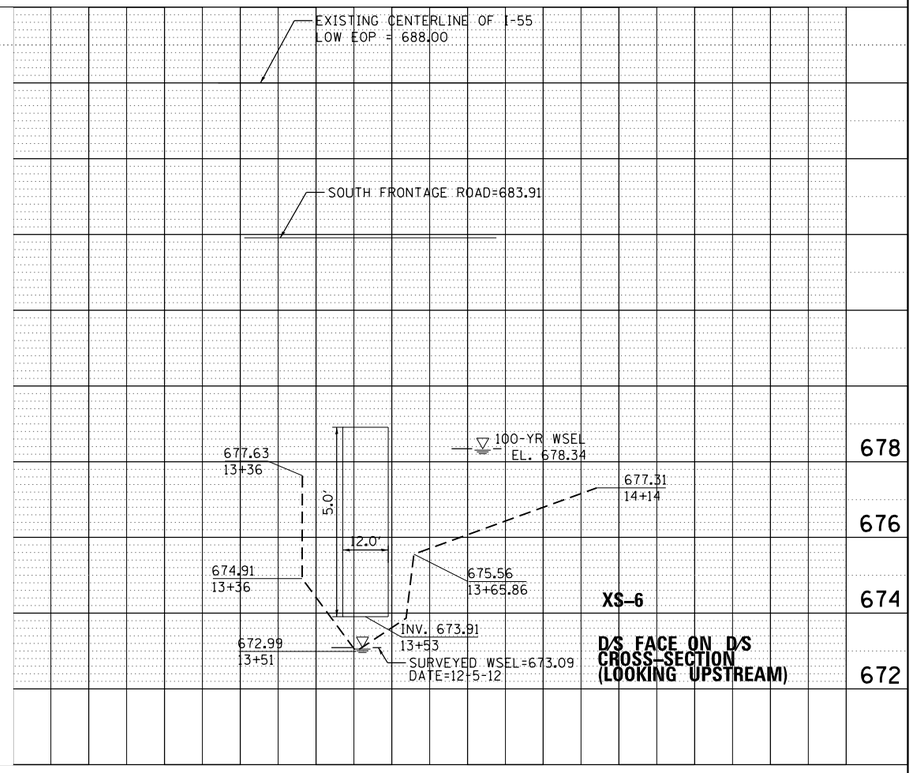
SECTION 11

BRIDGE/CULVERT CROSS SECTION PLOTS – EXISTING CONDITIONS



NOTE:
WATER SURFACE ELEVATION AS SURVEYED BY CBBEL DATED: 11-12-12 AND 11-30-12





PLAN: SURVEYED, PLOTTED, GRADES CHECKED, ALIGNMENT CHECKED, CADD FILE NAME, NOTE BOOK, NO., BY, DATE

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, ALIGNMENT CHECKED, STRUCTURE NO(S), NOTE BOOK, NO., BY, DATE, CHKD

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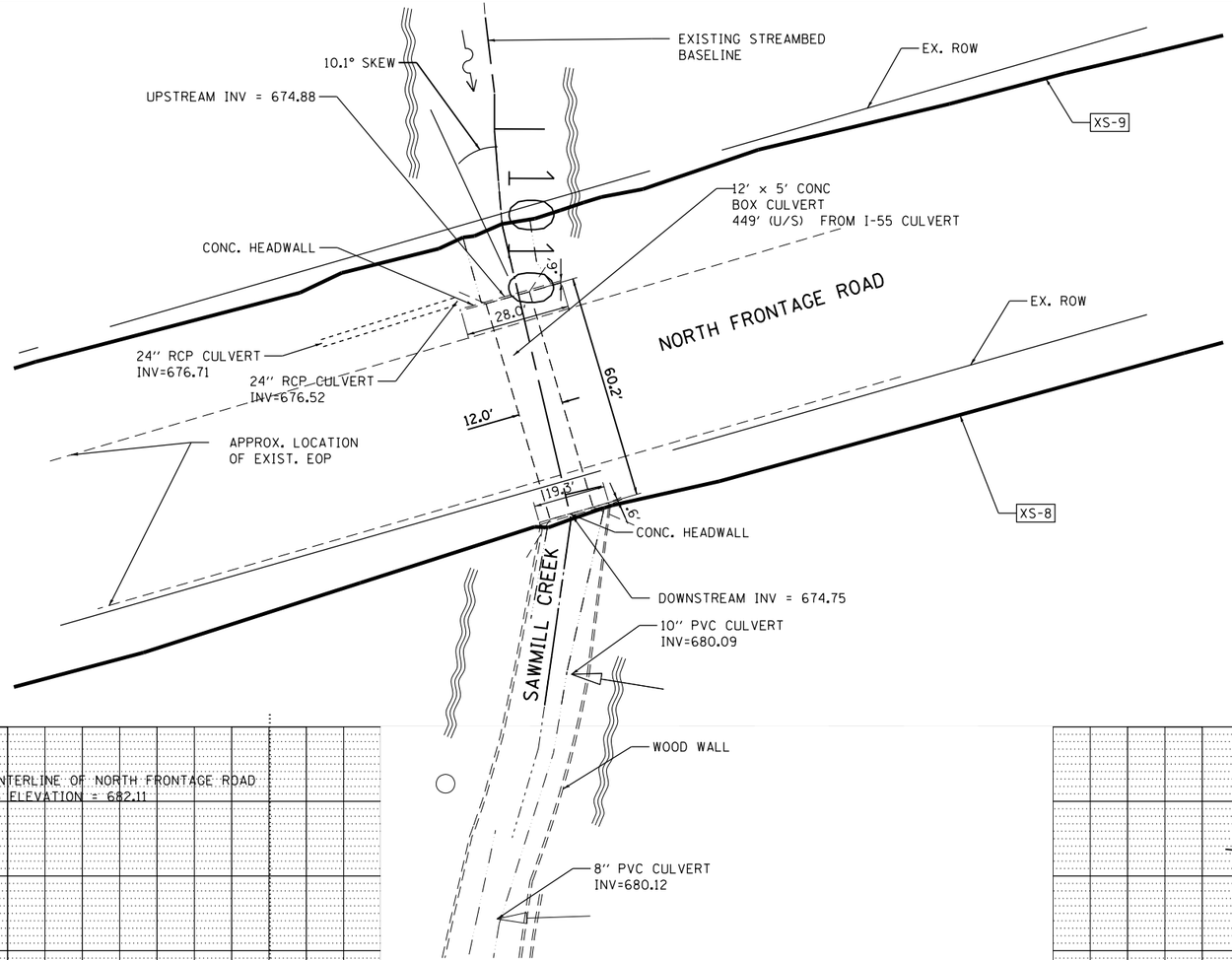
	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-55
CULVERT OPENING SUPERIMPOSED ON CREEK XS

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

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



N

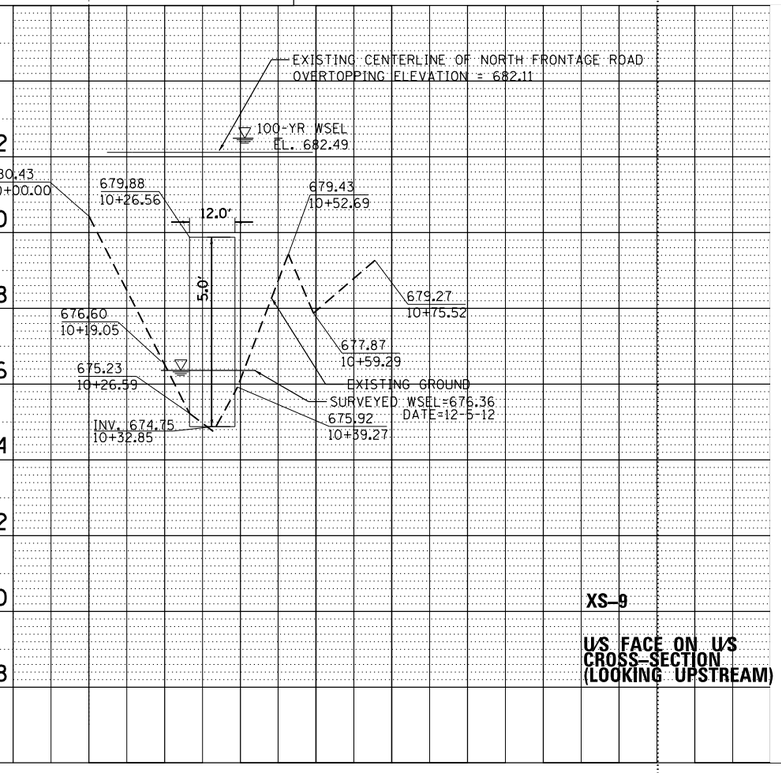
40 0 40

SCALE IN FEET

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

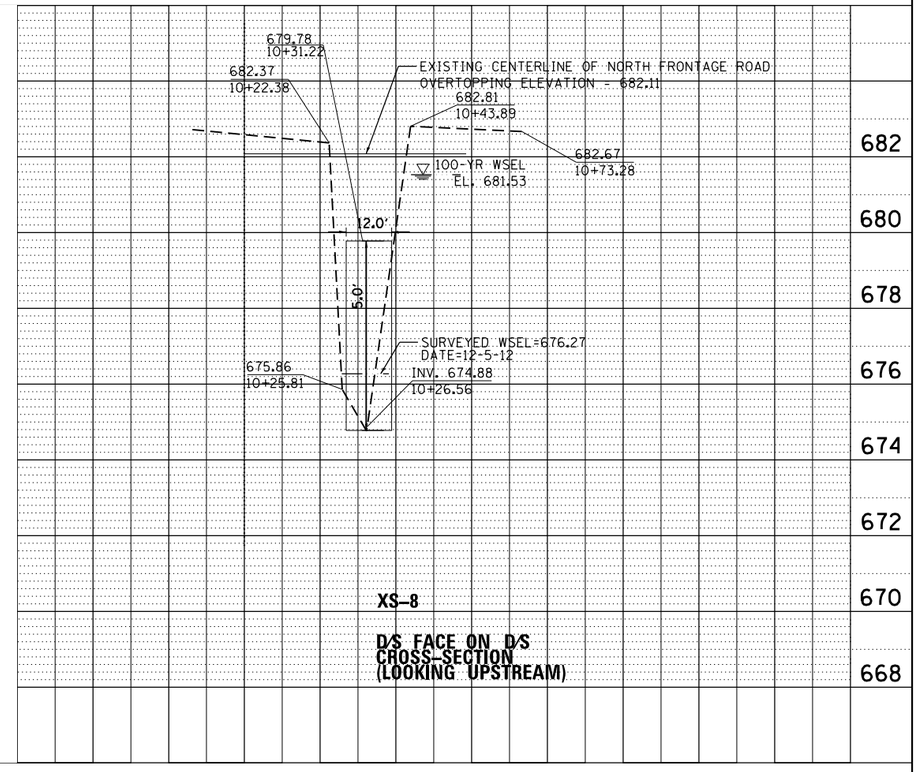
PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
ALL DATA VERIFIED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
ALL DATA VERIFIED
STRUCTURE NO
FA'NS CK'KD
NOTE BOOK
NO.
BY
DATE



XS-9

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



XS-8

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

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	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

NORTH FRONTAGE ROAD
CULVERT OPENING SUPERIMPOSED ON CREEK XS

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
NOTE BOOK
NO.
SURVEYED
PLOTTED
ALIGNMENT CHECKED
PLT. DGN. FILE CHECKED
CADD FILE NAME
BY
DATE

PROFILE
NOTE BOOK
NO.
SURVEYED
PLOTTED
GRADES CHECKED
ALIGNMENT
STRUCTURE NO(S).
BY
CHKD
DATE

PRIVATE BRIDGE OVER SAWMILL CREEK
LOW STEEL = 673.96
OVERTOPPING = 673.77

UPSTREAM INV = 669.19

XS-1.8

XS-2

SAWMILL CREEK

1030

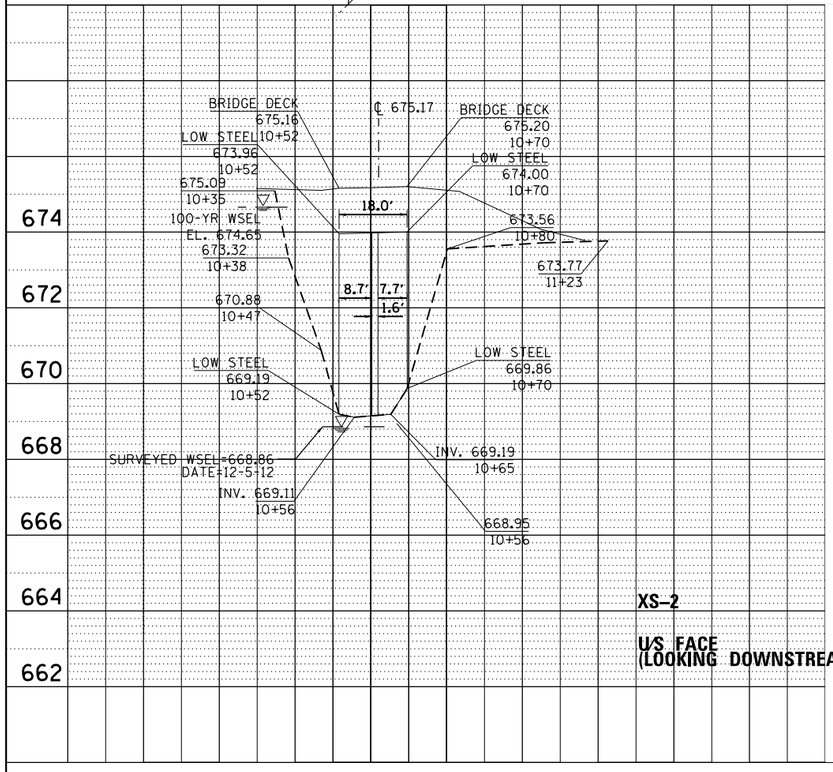
EXISTING STREAMBED
BASELINE

17.9'
1.8'
17.2'

N

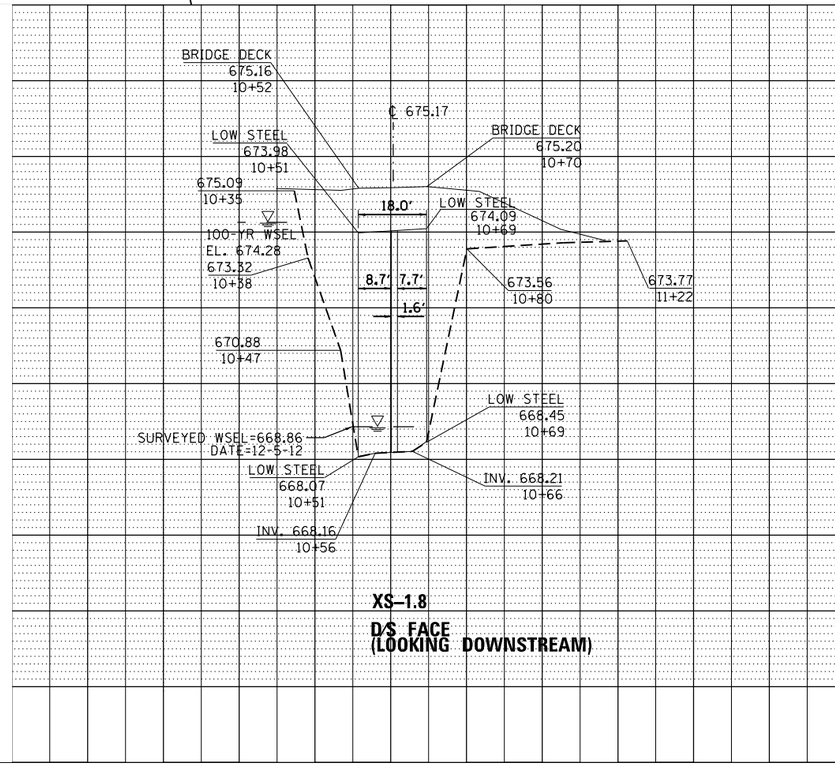
40 0 40
SCALE IN FEET

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



XS–2

U/S FACE
(LOOKING DOWNSTREAM)



XS–1.8

D/S FACE
(LOOKING DOWNSTREAM)

FILE NAME = N:\ldot\110203.00001\CADD_Sheets\P1110203-sht-detail05.dgn	USER NAME = eburke	DESIGNED - EB	REVISED -
		DRAWN - MYG	REVISED -
Default	PLOT SCALE = $SCALE$	CHECKED - IAD	REVISED -
	PLOT DATE = 6/6/2017	DATE - 6/6/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRIVATE ROAD
BRIDGE OPENING SUPERIMPOSED ON CREEK XS

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

BRIDGE/CULVERT CROSS SECTION PLOTS – PROPOSED CONDITIONS

BRIDGE 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

Comparison of Permit Model Results

	5-Year		
Cross Section	WSP-2 Paper Results	HEC-RAS FIS_Duplicate	Modified HEC-RAS FIS_MOD_NGVD29
SM035	672.0	672.00	672.00
SM039	680.3	680.20	680.37

	10-Year		
Cross Section	WSP-2 Paper Results	HEC-RAS FIS_Duplicate	Modified HEC-RAS FIS_MOD_NGVD29
SM035	672.7	672.70	672.70
SM039	680.5	680.38	680.53

	25-Year		
Cross Section	WSP-2 Paper Results	HEC-RAS FIS_Duplicate	Modified HEC-RAS FIS_MOD_NGVD29
SM035	673.2	673.20	673.20
SM039	680.7	680.51	680.68

	100-Year		
Cross Section	WSP-2 Paper Results	HEC-RAS FIS_Duplicate	Modified HEC-RAS FIS_MOD_NGVD29
SM035	673.9	673.90	673.90
SM039	680.9	680.71	680.91

Note: Results in NGVD 29. Convert to NAVD 88 by subtracting 0.28'.

Note: Modified HEC-RAS includes revision to Manning's n-values. No other changes.

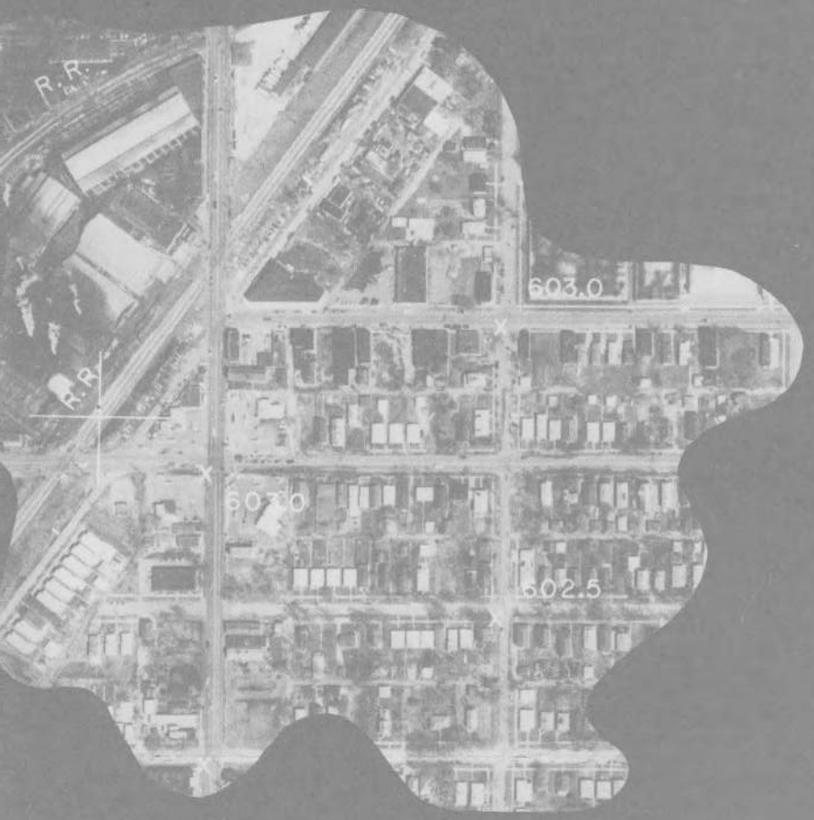
River Station	Design Manning's N Values				WSP-2 Manning's n Values			HEC-RAS FIS Duplicate Adjusted Manning's n Values		
	Frctn (n/K)	n #1	n #2	n #3	n #1	n #2	n #3	n #1	n #2	n #3
11	n	0.06	0.047	0.06	-	-	-	-	-	-
10	n	0.06	0.047	0.06	-	-	-	-	-	-
9.5	n	0.065	0.055	0.065	0.065	0.055	0.065	0.087	0.067	0.087
9	n	0.06	0.047	0.06	-	-	-	-	-	-
8.5	Culvert				-	-	-	-	-	-
8	n	0.045	0.03	0.045	-	-	-	-	-	-
7.5	n	0.045	0.03	0.045	-	-	-	-	-	-
7	n	0.045	0.03	0.045	-	-	-	-	-	-
6.5	Culvert				-	-	-	-	-	-
6	n	0.065	0.047	0.065	-	-	-	-	-	-
5.7	n	0.065	0.047	0.065	-	-	-	-	-	-
5	n	0.065	0.047	0.065	-	-	-	-	-	-
4	n	0.065	0.047	0.065	-	-	-	-	-	-
3	n	0.065	0.047	0.065	-	-	-	-	-	-
2	n	0.065	0.047	0.065	-	-	-	-	-	-
1.9	Bridge				-	-	-	-	-	-
1.8	n	0.065	0.047	0.065	-	-	-	-	-	-
1	n	0.065	0.047	0.065	-	-	-	-	-	-
0.5	n	0.07	0.055	0.08	0.07	0.055	0.08	0.087	0.067	0.087

TAB A

SECTION 13.A

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

Flood Plain Information Maps and Profiles



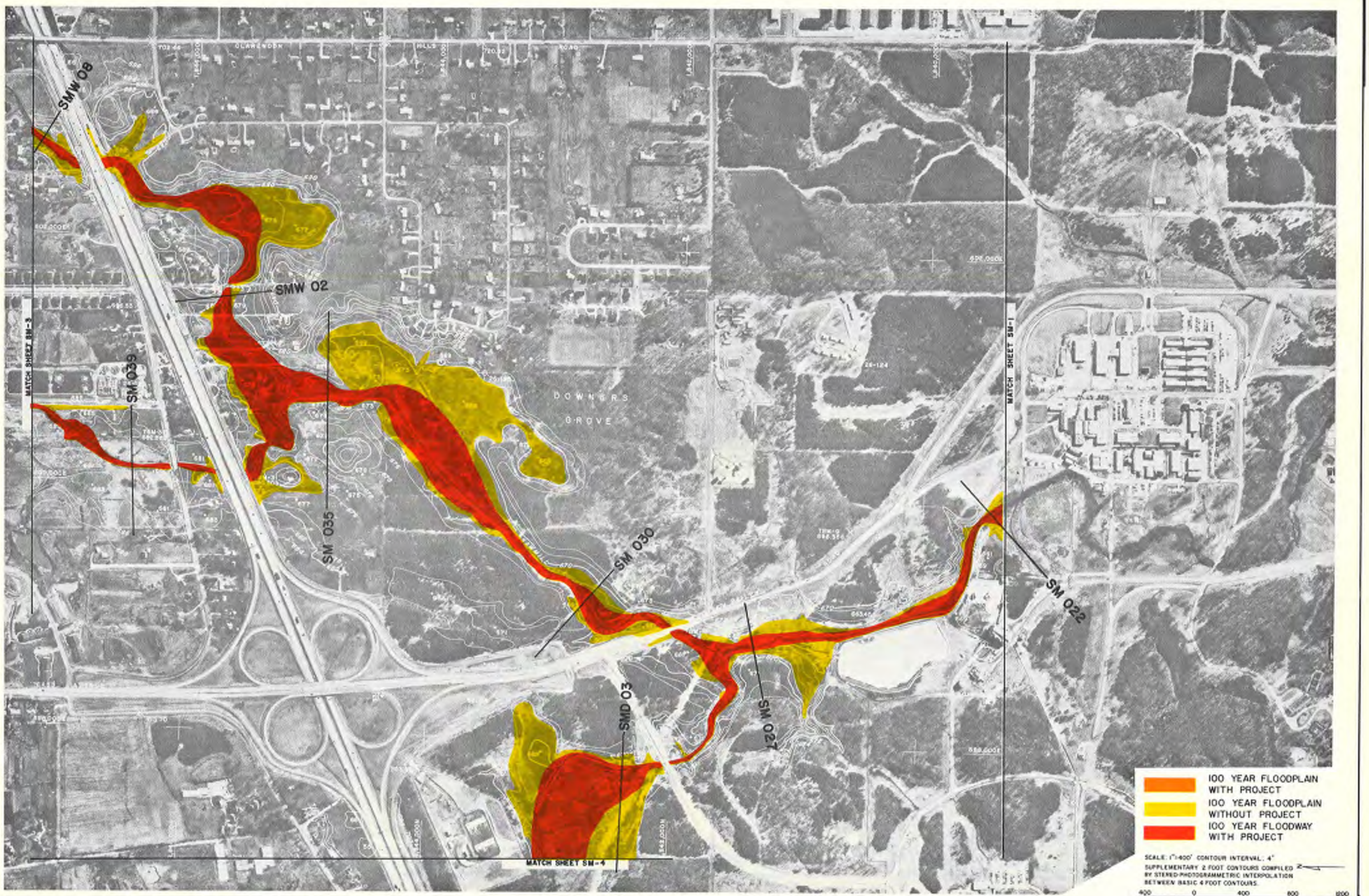
DES PLAINES RIVER

Cook and DuPage Counties, Illinois

DECEMBER 1975

Prepared by:
Des Plaines River Steering Committees

With assistance by:
U.S. Department of Agriculture
Soil Conservation Service and Forest Service
Metropolitan Sanitary District of Greater Chicago
Illinois Department of Conservation



PREPARED BY ALSTER & ASSOCIATES INC. MADISON, WISCONSIN	DATE OF PHOTOGRAPHY MARCH 7, 1974 DATE OF MAPPING SPRING, 1974	PREPARED FOR U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO	FLOODPLAIN TOPOGRAPHIC MAP DES PLAINES RIVER WATERSHED DU PAGE AND COOK COUNTIES ILLINOIS	SHEET SM-2

SAWMILL CREEK

EAST BRANCH + SAWMILL CREEK & LOWER WARDS CREEK

LISTING FROM SCS ← i.e. FPI 1975

INPUT ONLY

~~THIS FILE PROVIDED FOR INFORMATIONAL PURPOSE — NOT VERIFIED AS FINAL FIS MODEL~~

~~SAM~~ 12/~~16~~/17

THIS MODEL APPARENTLY USED FOR DUPAGE COUNTY UNINC. AREAS FIS 1982/1985 REACHES (LOWER XS OF THIS MODEL).

DARIEN / WILLOWBROOK / "DOWNERS GROVE" REACHES SUPERSEDED BY (1) LATER WSP-2 RUNS, SHOWN ON COMMUNITY ESDP MICROFICHES, AND (2) LOMRS AS NOTED.

-WS/ISWS 2/15/2012

```
WSP2        SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HCI
            SM002   591.6      2658.3
            SM003   598.1      2649.6
            SM008   623.7      2623.2
            SM016   652.0      2588.0
            019SM   657.24     2395.26
            SM022   659.7      2395.3
            SM027   665.3      2256.3
            SM030   669.2      1299.0
            SM035   673.9      1190.6
            SM039   680.9      495.3
            SM046   693.6      378.5
            SM049   709.0      313.2
            SM052   720.4      226.1
            SMW02   679.2      733.0
            SMW08   689.6      617.4
            SMW11   694.6      566.0
            SMW17   700.4      480.6
            18SMW   702.40     410.69
            SMW19   705.3      410.7
            SMW22   710.6      339.5
            SMD03   670.3      923.1
            SMD10   688.8      661.3
            13SDM   704.16     599.10
            SMD13   704.2      509.1
            SMD18   715.3      477.3
            SMD26   731.0      353.3   (1)
TITLE       DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
TITLE       PRESENT CONDITION WITHOUT PROJECT
TRIB        SM027      SM035
DISCHARGE   -1.0       1.0        2.0        3.0        2.0        5.0
DISCHARGE   -1.0       10.0       25.0       100.0
OUTPUT      RPS
                       DA         CH L       OB L
REACH       SM002      13.70      850.0      750.0      750.0
FLOW-FREQ   SM002                 2658.34    1819.11    1400.15    1042.71    633.81
FLOW-FREQ   SM002      42.0       28.0       14.0
REACH       SM003      13.65      820.0      770.0      770.0
FLOW-FREQ   SM003                 2649.56    1813.11    1395.52    1039.25    631.69
FLOW-FREQ   SM003      42.0       28.0       14.0
REACH       SM008      13.50      2630.0     2580.0     2580.0
FLOW-FREQ   SM008                 2623.20    1795.09    1381.62    1028.86    625.33
FLOW-FREQ   SM008      42.0       28.0       14.0
REACH       SM016      13.30      3900.0     3500.0     3500.0
FLOW-FREQ   SM016                 2588.00    1771.04    1363.07    1015.00    616.85
FLOW-FREQ   SM016      39.0       26.0       13.0
ROAD        019SM      2.7        1800.0     1550.0                           12.55
REACH       SM022      12.21      1610.0     1600.0     1600.0
FLOW-FREQ   SM022                 2395.26    1639.30    1261.47    939.08     570.41
FLOW-FREQ   SM022      36.0       24.0       12.0
REACH       SM027      11.43      2450.0     2450.0     2450.0
FLOW-FREQ   SM027                 2256.34    1544.35    1188.25    884.39     536.97
FLOW-FREQ   SM027      33.0       22.0       11.0
REACH       SM030      6.21       1550.0     1500.0     1500.0
FLOW-FREQ   SM030                 1298.98    889.72     683.75     507.90     307.22
FLOW-FREQ   SM030      18.0       12.0       6.0
REACH       SM035      5.64       2750.0     2750.0     2750.0
FLOW-FREQ   SM035                 1190.58    815.57     626.64     465.33     281.31
FLOW-FREQ   SM035      18.0       12.0       6.0
REACH       SM039      2.14       2250.0     1950.0     1950.0
FLOW-FREQ   SM039                 495.27     339.66     260.48     192.82     115.87
                                  100        25         10         5          2
```

CASS AVE.

I-55 & N. IS. FRONTAGE ROADS

LOMR 92-05-081P SUPERSEDES

LOMRS 92-05-088P & 97-05-381P SUPERSEDE

-WS/ISWS 2/15/2012

E. BR. (Willowbrook Br.)

WARDS CK. (Downers Br.)

MODEL SUBMITTED FOR LOMR 97-05-053P INCLUDES REVISED DATA

-WS/ISWS 2/15/2012

HARZA ENGINEERING COMPANY

```
                  250.0     664.0     290.0     662.0     300.0     661.4SM027  2 5
                  350.0     660.0     357.0     656.4     377.0     656.4SM027  3 5
                  380.0     660.0     450.0     670.0     650.0     672.0SM027  4 5
                  800.0     674.0                                         SM027  5 5
ENDTABLE
SEGMENT    SM030      1          D          300.0
NVALUE     0.085
SEGMENT    SM030      2          C          360.0
NVALUE     0.054
SEGMENT    SM030      3          D          1032.0
NVALUE     0.085
SECTION    SM030
                    0.0     677.9      50.0     672.4     100.0     670.2SM030  1 9
                  200.0     667.7     300.0     666.0     312.0     665.0SM030  2 9
                  318.0     663.4     322.0     663.1     330.0     665.0SM030  3 9
                  360.0     666.4     370.0     668.3     400.0     668.2SM030  4 9
                  450.0     671.9     490.0     674.9     600.0     670.6SM030  5 9
                  700.0     669.8     768.0     673.8     783.0     672.9SM030  6 9
                  800.0     675.0     840.0     674.6     850.0     674.2SM030  7 9
                  864.0     672.4     900.0     672.9    1000.0     674.1SM030  8 9
                 1032.0     678.5                                         SM030  9 9
ENDTABLE
SEGMENT    SM035      1          D          628.0
NVALUE     0.070
SEGMENT    SM035      2          C          658.0
NVALUE     0.055
SEGMENT    SM035      3          D          1600.0
NVALUE     0.080
SECTION    SM035
                    0.0     681.4     100.0     676.1     200.0     673.9SM035  112
                  300.0     675.2     400.0     676.7     453.0     672.3SM035  212
                  471.0     671.4     482.0     672.1     500.0     671.0SM035  312
                  515.0     672.3     563.0     672.5     600.0     672.9SM035  412
                  624.0     672.9     628.0     671.3     633.0     667.5SM035  512
                  634.0     668.4     639.0     665.2     644.0     665.1SM035  612
                  648.0     665.5     652.0     665.4     658.0     671.1SM035  712
                  661.0     672.6     675.0     672.3     700.0     674.4SM035  812
                  746.0     677.5     800.0     675.8     900.0     676.0SM035  912
                 1000.0     676.5    1100.0     677.3    1200.0     675.9SM035 1012
                 1300.0     675.5    1400.0     677.3    1500.0     675.7SM035 1112
                 1600.0     676.2                                         SM035 1212
ENDTABLE
SEGMENT    SM039      1          D          492.0
NVALUE     0.065
SEGMENT    SM039      2          C          502.0
NVALUE     0.055
SEGMENT    SM039      3          D          1000.0
NVALUE     0.065
SECTION    SM039
                    0.0     686.4       7.0     685.8      24.0     684.3SM039  110
                   37.0     684.4      50.0     684.2      61.0     683.4SM039  210
                   71.0     681.7     156.0     681.7     166.0     682.5SM039  310
                  200.0     681.7     262.0     680.7     264.0     681.3SM039  410
                  274.0     681.2     278.0     680.6     300.0     680.3SM039  510
                  400.0     680.3     481.0     679.8     492.0     679.0SM039  610
                  493.0     678.2     495.0     676.8     498.0     677.4SM039  710
                  501.0     678.2     502.0     679.1     512.0     680.5SM039  810
                  600.0     679.8     700.0     679.4     800.0     682.0SM039  910
                  900.0     685.0    1000.0     685.3                     SM039 1010
ENDTABLE
```

LOMR 92-05-081P SUPERSEDES
-WS/ ISWS 2/15/2012

HARZA

```
♀◘
*************************************************************************
*                                   * (program) S/N:                    *
*                                   * HMVersion    :  2.20              *
*               WSP-2               * Date         :  2/15/**           *
*                                   * Time         : 11:31:42           *
*     L I S L E   V E R S I O N     * Input file   : SM1975x.wsp        *
*    (Updated for FLOW-FREQ input)  * Output file  : SM1975w.txt        *
*                                   *                                   *
*                                   *                                   *
*************************************************************************
```

```
x        xxxxx   xxxxx   x        xxxxxxx
x          x    x     x  x        x
x          x    x        x        x
x          x     xxxxx   x        xxxxx
x          x          x  x        x
x          x    x     x  x        x
xxxxxxx  xxxxx   xxxxx   xxxxxxx  xxxxxxx
```

```
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::  Full Microcomputer Implementation   :::
:::                 by                   :::
:::        Haestad Methods, Inc.         :::
:::                                      :::
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

```
♀◘

  EXECUTION STARTED AT   11:31:42
♀◘
    WSP2   XEQ  2/15/**
                PAGE   1
          REV 09/01/82

   LISLE  Rev 06-01-87
               Haestad Methods

------------------------------80/80 LIST OF INPUT DATA-----------------------------
                                      Page 1
```

```
*
*          [ THIS DATA SCANNED BY WS/ISWS FROM HARZA PRINTOUT OF SCS ]
*          [ FPI 1975 WSP2 FLDWY INPUT DATA. ABRIDGED AS APPLIES.    ]
*
*          [ NOTE: FILE CONTAINS LOWER MAIN STEM (SM0__), LOWER E BR/]
*          [ TRIB 1 (SMW__) AND LOWER WARDS CREEK (SMD___) SEGMENTS. ]
*
*          [ * & [  ] COMMENTS BY WS/ISWS (2/15/2012).               ]
*
*
WSP2       SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HCI
TITLE      DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
TITLE      PRESENT CONDITION WITHOUT PROJECT
TRIB       SM027     SM035
OUTPUT     RS
DISCHARGE        -1         5        10        25       100
STARTE     SM002         591.6     591.6     591.6     591.6
REACH      SM002          13.7       850       750       750
FLOW-FREQ  SM002       2658.34   1819.11   1400.15   1042.71
REACH      SM003         13.65       820       770       770
FLOW-FREQ  SM003       2649.56   1813.11   1395.52   1039.25
REACH      SM008          13.5      2630      2580      2580
FLOW-FREQ  SM008        2623.2   1795.09   1381.62   1028.86
REACH      SM016          13.3      3900      3500      3500
FLOW-FREQ  SM016          2588   1771.04   1363.07      1015
REACH      019SM           2.7      1800      1550                12.55
REACH      SM022         12.21      1610      1600      1600
FLOW-FREQ  SM022       2395.26    1639.3   1261.47    939.08
REACH      SM027         11.43      2450      2450      2450
FLOW-FREQ  SM027       2256.34   1544.35   1188.25    884.39
REACH      SM030          6.21      1550      1500      1500
FLOW-FREQ  SM030       1298.98    889.72    683.75     507.9
REACH      SM035          5.64      2750      2750      2750
FLOW-FREQ  SM035       1190.58    815.57    626.64    465.33
REACH      SM039          2.14      2250      1950      1950
FLOW-FREQ  SM039        495.27    339.66    260.48    192.82
*
*          *** [ LOMR 95-05-081P SUPERSEDES SM039-SM046          ] ***
*
*          *** [ LOMR 92-05-088P & 97-05-331P SUPERSEDE SM046-   ] ***
*
SEGMENT    SM002             1        D        250
NVALUE         0.08
SEGMENT    SM002             2        C        310
NVALUE         0.06
♀◘
    WSP2   XEQ  2/15/**         DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
                PAGE   1
           REV 09/01/82         PRESENT CONDITION WITHOUT PROJECT

   LISLE   Rev 06-01-87
                Haestad Methods


------------------------------80/80 LIST OF INPUT DATA-----------------------------
SEGMENT    SM002             3        D        520
NVALUE         0.08
SECTION    SM002
                 0       596       110       594       150       595
               200       594       210       592       230       591
               250       590       270       588       290       588
               310       592       320       594       500       596
               520       597
```

```
NVALUE      0.054
SEGMENT   SM030            3        D       1032
NVALUE      0.085
SECTION   SM030
              0     677.9         50     672.4        100     670.2
            200     667.7        300       666        312       665
            318     663.4        322     663.1        330       665
            360     666.4        370     668.3        400     668.2
            450     671.9        490     674.9        600     670.6
            700     669.8        768     673.8        783     672.9
            800       675        840     674.6        850     674.2
            864     672.4        900     672.9       1000     674.1
           1032     678.5
ENDTABLE
SEGMENT   SM035            1        D        628
NVALUE      0.07
SEGMENT   SM035            2        C        658
NVALUE      0.055
SEGMENT   SM035            3        D       1600
NVALUE      0.08
SECTION   SM035
♀◘
    WSP2   XEQ  2/15/**          DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
                PAGE   4
           REV 09/01/82         PRESENT CONDITION WITHOUT PROJECT

   LISLE   Rev 06-01-87
                Haestad Methods

------------------------------80/80 LIST OF INPUT DATA------------------------------
              0     681.4        100     676.1        200     673.9
            300     675.2        400     676.7        453     672.3
            471     671.4        482     672.1        500       671
            515     672.3        563     672.5        600     672.9
            624     672.9        628     671.3        633     667.5
            634     668.4        639     665.2        644     665.1
            648     665.5        652     665.4        658     671.1
            661     672.6        675     672.3        700     674.4
            746     677.5        800     675.8        900       676
           1000     676.5       1100     677.3       1200     675.9
           1300     675.5       1400     677.3       1500     675.7
           1600     676.2
ENDTABLE
SEGMENT   SM039            1        D        492
NVALUE      0.065
SEGMENT   SM039            2        C        502
NVALUE      0.055
SEGMENT   SM039            3        D       1000
NVALUE      0.065
SECTION   SM039
              0     686.4          7     685.8         24     684.3
             37     684.4         50     684.2         61     683.4
             71     681.7        156     681.7        166     682.5
            200     681.7        262     680.7        264     681.3
            274     681.2        278     680.6        300     680.3
            400     680.3        481     679.8        492       679
            493     678.2        495     676.8        498     677.4
            501     678.2        502     679.1        512     680.5
            600     679.8        700     679.4        800       682
            900       685       1000     685.3
ENDTABLE
*
```

```
*          *** [ LOMR 95-05-081P SUPERSEDES SM039-SM046          ] ***
*
*          *** [ LOMR 92-05-088P & 97-05-331P SUPERSEDE SM046-   ] ***
*
COMPUTE    SM002      SM039       SM002
------------------------------END OF 80/80 LIST-----------------------------
♀◘
                     COMPUTE    SM002      SM039       SM002



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

♀◘
    WSP2    XEQ  2/15/**          DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
                 PAGE   5
            REV 09/01/82          PRESENT CONDITION WITHOUT PROJECT

   LISLE   Rev 06-01-87
                Haestad Methods


    RATING TABLE FOR SECTION SM002              Given DA=      13.7
         NO.       ELEV        AREA       CFS          ---------ACRES FLOODED--------
 FREQUENCY          CRIT    FRICTION
                                                      DAMAGE      CHANNEL      NON-DAM
  (YEARS)           ELEV     SLOPE
           0       588.0         0.0         0.0
  BANK FULL        590.0        70.0       579.3          .00          .00          .00
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED
LINEARLY FROM CHANNEL BOTTOM*****
  ZERO DAMG        590.0        70.0       579.3          .00          .00          .00
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED
LINEARLY FROM CHANNEL BOTTOM*****
           1       591.6       182.0      1042.7         1.55          .00          .00
   5.00            591.1      .01740
           2       591.6       182.0      1400.2         1.55          .00          .00
  10.00            591.5      .03138
           3       591.6       182.0      1819.1         1.55          .00          .00
  25.00            591.9      .05296
           4       591.6       182.0      2658.3         1.55          .00          .00
 100.00            592.6      .11310


    SEGMENT TABLE FOR SECTION SM002
                                                          SEG NO
    CSM                           TOTAL          1            2            3
                                                 D            C            D
-------------------------------------------------------------------------------
-----------------------------------
   1     DISCHARGE CFS         1042.71          58.         985.           0.
     76. VELOCITY FPS             6.15         2.25         6.30         .00
   2     DISCHARGE CFS         1400.15          77.        1323.           0.
    102. VELOCITY FPS             8.26         3.02         8.46         .00
   3     DISCHARGE CFS         1819.11         100.        1719.           0.
    133. VELOCITY FPS            10.73         3.92        10.99         .00
   4     DISCHARGE CFS         2658.34         147.        2512.           0.
    194. VELOCITY FPS            15.68         5.73        16.06         .00

   1  ELEV   591.6  KD           7904.          436.        7468.           1.
   2  ELEV   591.6  KD           7904.          436.        7468.           1.
```

(YEARS)	NO.	ELEV	AREA	CFS	DAMAGE	CHANNEL	NON-DAM
	0	663.1	0.0	0.0			
BANK FULL		666.0	55.1	324.2	.00	.00	.00

*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****

ZERO DAMG		666.0	55.1	324.2	.00	.00	.00

*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****

	1	667.6	237.0	507.9	5.55	.00	.00
5.00		666.4	.00324				
	2	668.1	314.6	683.8	6.58	.00	.00
10.00		666.8	.00306				
	3	668.5	411.5	889.7	7.97	.00	.00
25.00		667.0	.00279				
	4	669.2	580.3	1299.0	9.41	.00	.00
100.00		667.4	.00268				

SEGMENT TABLE FOR SECTION SM030

CSM		TOTAL	SEG NO 1 D	2 C	3 D
1	DISCHARGE CFS	507.90	75.	430.	3.
82.	VELOCITY FPS	2.69	.92	2.85	.76
2	DISCHARGE CFS	683.75	134.	542.	8.
110.	VELOCITY FPS	2.82	1.05	3.07	.73
3	DISCHARGE CFS	889.72	213.	661.	16.
143.	VELOCITY FPS	2.89	1.16	3.24	.67
4	DISCHARGE CFS	1298.98	376.	871.	52.
209.	VELOCITY FPS	3.06	1.33	3.57	.96
1	ELEV 667.6 KD	8866.	1213.	7604.	49.
2	ELEV 668.1 KD	12310.	2292.	9899.	120.
3	ELEV 668.5 KD	16755.	3891.	12591.	273.
4	ELEV 669.2 KD	24946.	7108.	16971.	866.

LISLE Rev 06-01-87
Haestad Methods

RATING TABLE FOR SECTION SM035 Given DA= 5.6

FREQUENCY (YEARS)	NO.	ELEV CRIT ELEV	AREA FRICTION SLOPE	CFS	---------ACRES FLOODED-------- DAMAGE	CHANNEL	NON-DAM
	0	665.1	0.0	0.0			
ZERO DAMG		671.0	124.5	395.3	.00	.00	.00

*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****

BANK FULL		671.1	127.9	402.0	4.45	.00	.00

*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****

	1	672.0	182.8	465.3	5.15	.00	.00
5.00		668.4	.00161				
	2	672.7	283.9	626.6	11.14	.00	.00
10.00		668.9	.00161				

	3	673.2	367.5	815.6	15.43	.00	.00
25.00		669.5	.00186				
	4	673.9	557.2	1190.6	17.70	.00	.00
100.00		670.5	.00185				

SEGMENT TABLE FOR SECTION SM035

CSM		TOTAL	SEG NO 1 D	2 C	3 D
1	DISCHARGE CFS	465.33	16.	449.	1.
83.	VELOCITY FPS	2.87	.59	2.91	.49
2	DISCHARGE CFS	626.64	70.	552.	5.
111.	VELOCITY FPS	3.00	.70	3.15	.53
3	DISCHARGE CFS	815.57	136.	668.	12.
145.	VELOCITY FPS	3.27	.84	3.56	.64
4	DISCHARGE CFS	1190.58	353.	799.	38.
211.	VELOCITY FPS	3.24	1.16	3.80	.90
1	ELEV 672.0 KD	11454.	229.	11216.	9.
2	ELEV 672.7 KD	15321.	1385.	13862.	74.
3	ELEV 673.2 KD	18809.	2961.	15597.	251.
4	ELEV 673.9 KD	27256.	7658.	18795.	803.

LISLE Rev 06-01-87
Haestad Methods

RATING TABLE FOR SECTION SM039 Given DA= 2.1

NO.	ELEV	AREA	CFS	---------ACRES FLOODED--------		
FREQUENCY	CRIT	FRICTION		DAMAGE	CHANNEL	NON-DAM
(YEARS)	ELEV	SLOPE				
0	676.8	0.0	0.0			
BANK FULL	679.0	13.2	120.5	.00	.00	.00
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****						
ZERO DAMG	679.0	13.2	120.5	.00	.00	.00
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****						
1	680.3	184.5	192.8	17.66	.00	.00
5.00	679.8	.00320				
2	680.5	245.5	260.5	19.83	.00	.00
10.00	679.9	.00303				
3	680.7	328.7	339.7	20.79	.00	.00
25.00	680.0	.00257				
4	680.9	446.5	495.3	22.15	.00	.00
100.00	680.1	.00214				

SEGMENT TABLE FOR SECTION SM039

CSM		TOTAL	SEG NO 1 D	2 C	3 D
1	DISCHARGE CFS	192.82	23.	67.	103.

90.	VELOCITY FPS	1.79	.52	2.56	.90
2	DISCHARGE CFS	260.48	47.	70.	144.
122.	VELOCITY FPS	1.70	.69	2.49	.96
3	DISCHARGE CFS	339.66	83.	68.	189.
159.	VELOCITY FPS	1.56	.78	2.28	.98
4	DISCHARGE CFS	495.27	141.	77.	277.
231.	VELOCITY FPS	1.42	.88	2.40	1.09

1	ELEV	680.3	KD	3260.	375.	1249.	1636.
2	ELEV	680.5	KD	4639.	660.	1383.	2596.
3	ELEV	680.7	KD	6457.	1219.	1529.	3708.
4	ELEV	680.9	KD	10504.	2774.	1750.	5981.

LISLE Rev 06-01-87
Haestad Methods

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

```
TITLE      SAWMILL CREEK TRIB TO WILLOWBROOK
REACH      SMW02          3.3      1100      1000      1000
FLOW-FREQ  SMW02       732.97    502.41    385.63    285.86
REACH      SMW08         2.73      3250      2900      2900
FLOW-FREQ  SMW08       617.38    423.28    324.77     240.6
REACH      SMW11         2.48      1450      1400      1400
FLOW-FREQ  SMW11       565.98    388.08     297.7    220.48
REACH      SMW17         2.07      2900      2600      2600
FLOW-FREQ  SMW17       480.59     329.6    252.75    187.08
ROAD       18SMW           2.7       500       400                1.74
REACH      SMW19         1.74      1000       950      1350
FLOW-FREQ  SMW19       410.69    281.72    215.96    159.76
REACH      SMW22         1.41      1250      1250      1250
FLOW-FREQ  SMW22       339.51    232.95     178.5    131.96
SEGMENT    SMW02              1         D        -13
NVALUE        0.075
SEGMENT    SMW02              2         C         23
NVALUE        0.055
SEGMENT    SMW02              3         D        400
NVALUE         0.08
SECTION    SMW02
              -400        690      -250        682      -150        680
               -13        677        -7        674         0        674
                 7        674        23        682       100        686
               300        684       380        686       400        690
ENDTABLE
SEGMENT    SMW08              1         D        -11
NVALUE        0.075
SEGMENT    SMW08              2         C          7
NVALUE        0.061
SEGMENT    SMW08              3         D        180
NVALUE         0.07
SECTION    SMW08
              -240        696      -130        692       -80        690
               -20        688       -11      686.6        -6      682.6
                 0      682.6         6      682.6         7      686.6
                20        688        85        690       160        694
               180        696
ENDTABLE
SEGMENT    SMW11              1         D        -24
NVALUE         0.09
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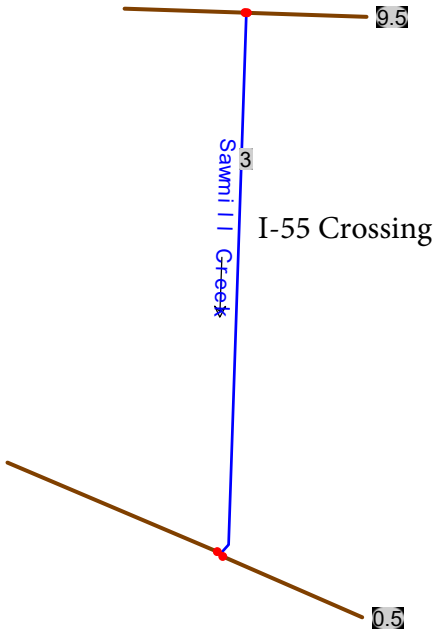
FIS DUPLICATE (NGVD29)



None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Sawmill_Creek
Project File : Sawmill_Creek.prj
Run Date and Time: 2/10/2016 10:29:45 AM

Project in English units

Project Description:
Feb 2016 Submittal CBBEL- I-55 Over Sawmill Creek. Existing and Natural Conditions Only for 2 WITs one based on Design and one for Permit. All Models run in NAVD 88.
Conversion is NAVD 88 = NGVD 29 - 0.28'.

PLAN DATA

Plan Title: FIS_Duplicate
Plan File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.p04

Geometry Title: WSP_FIS
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g04

Flow Title : FIS NGVD29
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f03

Plan Description:
Duplication of FIS WSP2 model, NGVD29. Manning's N from regulatory WSP2.

Plan Summary Information:

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

Computational Information

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

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

FLOW DATA

Flow Title: FIS NGVD29
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f03

Flow Data (cfs)

River	Reach	RS	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Sawmill Creek	3	9.5	192.8	260.5	339.7	420.3	495.3	657
Sawmill Creek	3	0.5	465.3	626.6	815.6	1010.1	1190.6	1578.8

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	3	5 Year		Known WS = 672
Sawmill Creek	3	10 Year		Known WS = 672.7
Sawmill Creek	3	25 Year		Known WS = 673.2
Sawmill Creek	3	50 Year		Known WS = 673.54
Sawmill Creek	3	100 Year		Known WS = 673.9
Sawmill Creek	3	500 Year		Known WS = 674.74

GEOMETRY DATA

Geometry Title: WSP_FIS
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g04

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 9.5

INPUT
Description: FIS Cross Section SM039 from WSP2 Model
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.4	7	685.8	24	684.3	37	684.4	50	684.2
61	683.4	71	681.7	156	681.7	166	682.5	200	681.7
262	680.7	264	681.3	274	681.2	278	680.6	300	680.3
400	680.3	481	679.8	492	679	493	678.2	495	676.8
498	677.4	501	678.2	502	679.1	512	680.5	600	679.8
700	679.4	800	682	900	685	1000	685.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	492	.055	502	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
492	502	1950	2250	1950	0	0

CROSS SECTION

RIVER: Sawmill Creek

REACH: 3 RS: 0.5

INPUT
Description: FIS Cross Section SM035 from WSP2 Model
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681.4	100	676.1	200	673.9	300	675.2	400	676.7
453	672.3	471	671.4	482	672.1	500	671	515	672.3
563	672.5	600	672.9	624	672.9	628	671.3	633	667.5
634	668.4	639	665.2	644	665.1	648	665.5	652	665.4
658	671.1	661	672.6	675	672.3	700	674.4	746	677.5
800	675.8	900	676	1000	676.5	1100	677.3	1200	675.9
1300	675.5	1400	677.3	1500	675.7	1600	676.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	628	.055	658	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
628	658	0	0	0	0

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3
3	9.5	.065	.055	.065
3	0.5	.07	.055	.08

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
3	9.5	1950	2250	1950
3	0.5	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

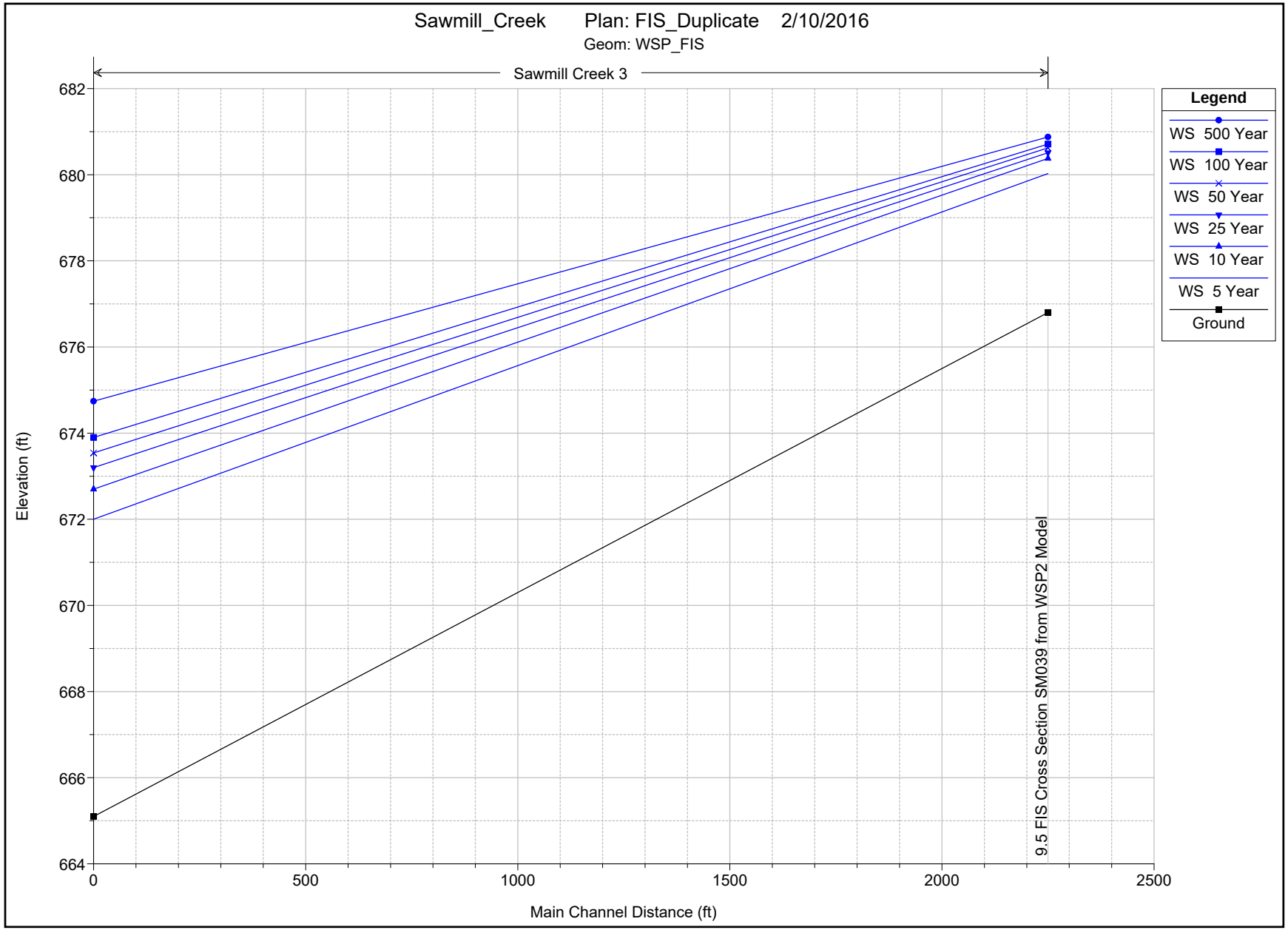
Reach	River Sta.	Contr.	Expan.
3	9.5	0	0
3	0.5	0	0

HEC-RAS Plan: FIS River: Sawmill Creek Reach: 3

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)	
3	9.5	5 Year	192.80	676.80	680.03	680.03	680.24	0.011922	4.80	90.69	216.64	0.55
3	9.5	10 Year	260.50	676.80	680.38	680.15	680.46	0.005240	3.49	195.33	427.20	0.38
3	9.5	25 Year	339.70	676.80	680.51		680.58	0.004940	3.50	254.42	458.27	0.37
3	9.5	50 Year	420.30	676.80	680.62		680.68	0.004671	3.50	305.77	469.15	0.36
3	9.5	100 Year	495.30	676.80	680.71		680.77	0.004564	3.53	347.15	473.77	0.36
3	9.5	500 Year	657.00	676.80	680.88		680.94	0.004447	3.61	427.41	492.12	0.36
3	0.5	5 Year	465.30	665.10	672.00	668.37	672.13	0.001690	2.97	174.60	82.88	0.23
3	0.5	10 Year	626.60	665.10	672.70	668.93	672.85	0.001746	3.29	262.67	188.58	0.24
3	0.5	25 Year	815.60	665.10	673.20	669.48	673.36	0.001787	3.52	374.75	243.56	0.25
3	0.5	50 Year	1010.10	665.10	673.54	670.01	673.71	0.001888	3.75	458.94	251.70	0.26
3	0.5	100 Year	1190.60	665.10	673.90	670.45	674.06	0.001798	3.79	551.11	260.32	0.25
3	0.5	500 Year	1578.80	665.10	674.74	671.41	674.86	0.001394	3.60	821.56	384.23	0.23

HEC-RAS Plan: FIS River: Sawmill Creek Reach: 3

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)
3	9.5	5 Year	680.24	680.03	0.22			10.36	111.86	70.58	216.64
3	9.5	10 Year	680.46	680.38	0.08	7.60	0.00	28.18	93.78	138.54	427.20
3	9.5	25 Year	680.58	680.51	0.07	7.23	0.00	57.66	98.72	183.33	458.27
3	9.5	50 Year	680.68	680.62	0.06	6.98	0.00	87.53	102.36	230.41	469.15
3	9.5	100 Year	680.77	680.71	0.06	6.71	0.00	116.47	106.28	272.55	473.77
3	9.5	500 Year	680.94	680.88	0.06	6.07	0.00	180.50	114.74	361.76	492.12
3	0.5	5 Year	672.13	672.00	0.13			10.42	454.54	0.34	82.88
3	0.5	10 Year	672.85	672.70	0.15			51.46	572.61	2.52	188.58
3	0.5	25 Year	673.36	673.20	0.16			138.73	665.00	11.87	243.56
3	0.5	50 Year	673.71	673.54	0.17			241.41	746.24	22.45	251.70
3	0.5	100 Year	674.06	673.90	0.16			359.41	795.30	35.90	260.32
3	0.5	500 Year	674.86	674.74	0.12			660.25	845.92	72.63	384.23


Sawmill_Creek Plan: FIS_Duplicate 2/10/2016
Geom: WSP_FIS
Sawmill Creek 3
Legend
WS 500 Year
WS 100 Year
WS 50 Year
WS 25 Year
WS 10 Year
WS 5 Year
Ground
Elevation (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
9.5 FIS Cross Section SM039 from WSP2 Model

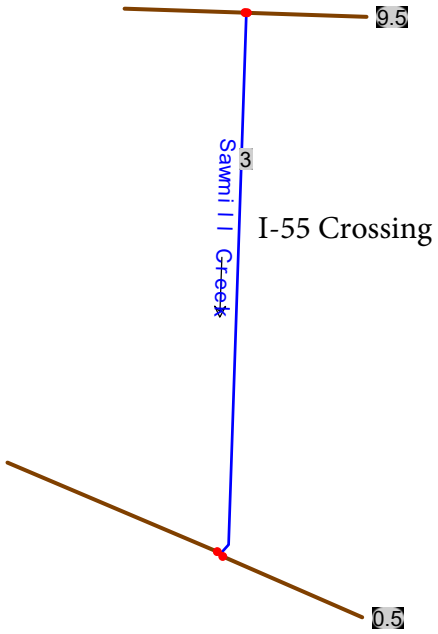
Errors Warnings and Notes for Plan : FIS

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 5 Year
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:	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 10 Year
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:	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 25 Year
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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 100 Year

Errors Warnings and Notes for Plan : FIS (Continued)

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:	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 500 Year
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:	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: Sawmill Creek Reach: 3 RS: 0.5 Profile: 5 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 0.5 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 0.5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

FIS MOD (NGVD29)



None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Sawmill_Creek
Project File : Sawmill_Creek.prj
Run Date and Time: 2/10/2016 10:38:44 AM

Project in English units

Project Description:
Feb 2016 Submittal CBBEL- I-55 Over Sawmill Creek. Existing and Natural Conditions Only for 2 WITs one based on Design and one for Permit. All Models run in NAVD 88.
Conversion is NAVD 88 = NGVD 29 - 0.28'.

PLAN DATA

Plan Title: FIS_MOD_NGVD29
Plan File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.p07

Geometry Title: WSP_FIS_MOD NGVD29
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g05

Flow Title : FIS NGVD29
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f03

Plan Description:
Duplication of FIS WSP2 model, NGVD29. Manning's N values raised to match results of regulatory WSP2.

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

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

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

FLOW DATA

Flow Title: FIS NGVD29
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f03

Flow Data (cfs)

River	Reach	RS	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Sawmill Creek	3	9.5	192.8	260.5	339.7	420.3	495.3	657
Sawmill Creek	3	0.5	465.3	626.6	815.6	1010.1	1190.6	1578.8

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	3	5 Year		Known WS = 672
Sawmill Creek	3	10 Year		Known WS = 672.7
Sawmill Creek	3	25 Year		Known WS = 673.2
Sawmill Creek	3	50 Year		Known WS = 673.54
Sawmill Creek	3	100 Year		Known WS = 673.9
Sawmill Creek	3	500 Year		Known WS = 674.74

GEOMETRY DATA

Geometry Title: WSP_FIS_MOD NGVD29
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g05

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 9.5

INPUT
Description: FIS Cross Section SM039 from WSP2 Model
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.4	7	685.8	24	684.3	37	684.4	50	684.2
61	683.4	71	681.7	156	681.7	166	682.5	200	681.7
262	680.7	264	681.3	274	681.2	278	680.6	300	680.3
400	680.3	481	679.8	492	679	493	678.2	495	676.8
498	677.4	501	678.2	502	679.1	512	680.5	600	679.8
700	679.4	800	682	900	685	1000	685.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.087	492	.067	502	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
492	502	1950	2250	1950	0	0

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 0.5

INPUT
Description: FIS Cross Section SM035 from WSP2 Model
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681.4	100	676.1	200	673.9	300	675.2	400	676.7
453	672.3	471	671.4	482	672.1	500	671	515	672.3
563	672.5	600	672.9	624	672.9	628	671.3	633	667.5
634	668.4	639	665.2	644	665.1	648	665.5	652	665.4
658	671.1	661	672.6	675	672.3	700	674.4	746	677.5
800	675.8	900	676	1000	676.5	1100	677.3	1200	675.9
1300	675.5	1400	677.3	1500	675.7	1600	676.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.087	628	.067	658	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
628	658	0	0	0	0

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3
3	9.5	.087	.067	.087
3	0.5	.087	.067	.087

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
3	9.5	1950	2250	1950
3	0.5	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

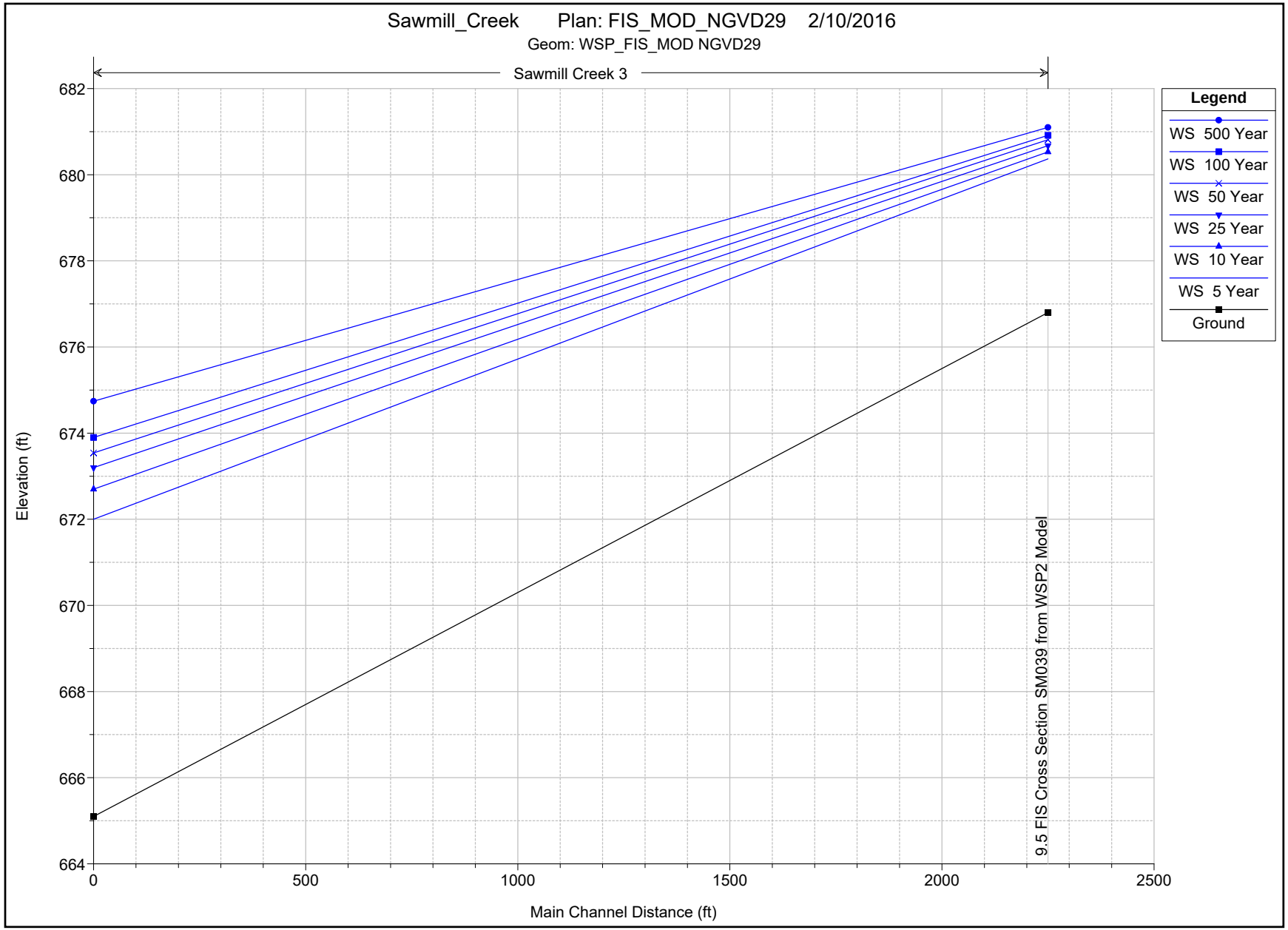
Reach	River Sta.	Contr.	Expan.
3	9.5	0	0
3	0.5	0	0

HEC-RAS Plan: MOD 29 River: Sawmill Creek Reach: 3

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)	
3	9.5	5 Year	192.80	676.80	680.37	680.06	680.42	0.005055	2.81	190.29	424.30	0.30
3	9.5	10 Year	260.50	676.80	680.53	680.17	680.57	0.004516	2.76	263.22	460.41	0.29
3	9.5	25 Year	339.70	676.80	680.68		680.71	0.004207	2.76	330.94	471.57	0.28
3	9.5	50 Year	420.30	676.80	680.81		680.85	0.003915	2.74	395.78	484.97	0.27
3	9.5	100 Year	495.30	676.80	680.91		680.95	0.003867	2.78	446.45	496.38	0.27
3	9.5	500 Year	657.00	676.80	681.10		681.13	0.003958	2.92	539.47	516.67	0.28
3	0.5	5 Year	465.30	665.10	672.00	668.37	672.13	0.002510	2.98	174.60	82.88	0.23
3	0.5	10 Year	626.60	665.10	672.70	668.92	672.86	0.002597	3.30	262.67	188.58	0.24
3	0.5	25 Year	815.60	665.10	673.20	669.48	673.36	0.002661	3.53	374.75	243.56	0.25
3	0.5	50 Year	1010.10	665.10	673.54	670.01	673.71	0.002814	3.76	458.94	251.70	0.26
3	0.5	100 Year	1190.60	665.10	673.90	670.45	674.06	0.002681	3.80	551.11	260.32	0.25
3	0.5	500 Year	1578.80	665.10	674.74	671.41	674.86	0.002080	3.61	821.56	384.23	0.23

HEC-RAS Plan: MOD 29 River: Sawmill Creek Reach: 3

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)
3	9.5	5 Year	680.42	680.37	0.05	8.29	0.00	18.99	75.06	98.75	424.30
3	9.5	10 Year	680.57	680.53	0.04	7.72	0.00	44.84	78.36	137.30	460.41
3	9.5	25 Year	680.71	680.68	0.04	7.36	0.00	74.85	82.19	182.66	471.57
3	9.5	50 Year	680.85	680.81	0.03	7.15	0.00	107.59	85.40	227.31	484.97
3	9.5	100 Year	680.95	680.91	0.03	6.90	0.00	137.57	89.60	268.13	496.38
3	9.5	500 Year	681.13	681.10	0.04	6.27	0.00	202.67	99.43	354.90	516.67
3	0.5	5 Year	672.13	672.00	0.13			10.22	454.71	0.38	82.88
3	0.5	10 Year	672.86	672.70	0.16			50.50	573.27	2.83	188.58
3	0.5	25 Year	673.36	673.20	0.16			136.20	666.09	13.32	243.56
3	0.5	50 Year	673.71	673.54	0.17			237.11	747.79	25.20	251.70
3	0.5	100 Year	674.06	673.90	0.16			353.11	797.18	40.31	260.32
3	0.5	500 Year	674.86	674.74	0.12			648.94	848.27	81.59	384.23


Sawmill_Creek Plan: FIS_MOD_NGVD29 2/10/2016
Geom: WSP_FIS_MOD NGVD29
Sawmill Creek 3
Legend
WS 500 Year
WS 100 Year
WS 50 Year
WS 25 Year
WS 10 Year
WS 5 Year
Ground
Elevation (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
9.5 FIS Cross Section SM039 from WSP2 Model

Errors Warnings and Notes for Plan : MOD 29

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 5 Year
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:	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 25 Year
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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 50 Year
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:	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 100 Year
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7

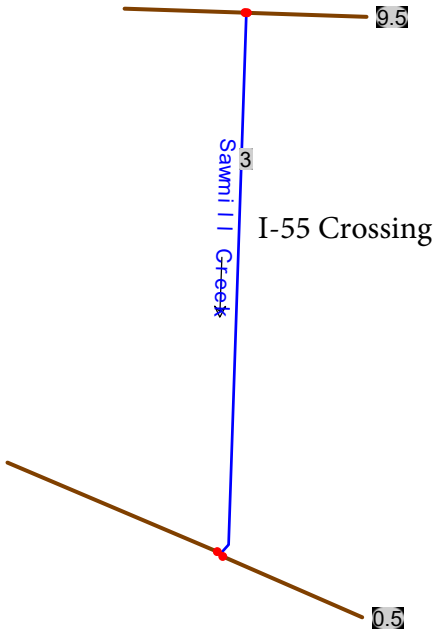
Errors Warnings and Notes for Plan : MOD 29 (Continued)

	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: Sawmill Creek Reach: 3 RS: 9.5 Profile: 500 Year
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:	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: Sawmill Creek Reach: 3 RS: 0.5 Profile: 5 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 0.5 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 0.5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

TAB B

SECTION 13.B

FIS DUPLICATE (PERMIT NATURAL CONDITIONS)



None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: Sawmill_Creek
Project File : Sawmill_Creek.prj
Run Date and Time: 2/11/2016 8:53:11 AM

Project in English units

Project Description:
Feb 2016 Submittal CBBEL- I-55 Over Sawmill Creek. Existing and Natural Conditions Only for 2 WITs one based on Design and one for Permit. All Models run in NAVD 88.
Conversion is NAVD 88 = NGVD 29 - 0.28'.

PLAN DATA

Plan Title: FIS_MOD_NAVD88
Plan File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.p06

Geometry Title: WSP_FIS_MOD NAVD88
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g03

Flow Title   : FIS NAVD88
Flow File   : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f02

Plan Description:
Duplication of FIS WSP2 model, converted to NAVD 88
NGVD29 - 0.28' = NAVD88.
Manning's N values raised to match results of regulatory WSP2.

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

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

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Program Selects Appropriate method

Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: FIS NAVD88
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f02

Flow Data (cfs)

River	Reach	RS	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Sawmill Creek	3	9.5	192.8	260.5	339.7	420.3	495.3	657
Sawmill Creek	3	0.5	465.3	626.6	815.6	1010.1	1190.6	1578.8

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	3	5 Year	Known WS = 671.72	
Sawmill Creek	3	10 Year	Known WS = 672.42	
Sawmill Creek	3	25 Year	Known WS = 672.92	
Sawmill Creek	3	50 Year	Known WS = 673.26	
Sawmill Creek	3	100 Year	Known WS = 673.62	
Sawmill Creek	3	500 Year	Known WS = 674.46	

GEOMETRY DATA

Geometry Title: WSP_FIS_MOD NAVD88
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g03

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 9.5

INPUT
Description: FIS Cross Section SM039 from WSP2 Model
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.12	7	685.52	24	684.02	37	684.12	50	683.92
61	683.12	71	681.42	156	681.42	166	682.22	200	681.42
262	680.42	264	681.02	274	680.92	278	680.32	300	680.02
400	680.02	481	679.52	492	678.72	493	677.92	495	676.52
498	677.12	501	677.92	502	678.82	512	680.22	600	679.52
700	679.12	800	681.72	900	684.72	1000	685.02		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.087	492	.067	502	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
492	502	1950	2250	1950	0	0

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 0.5

INPUT
Description: FIS Cross Section SM035 from WSP2 Model
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681.12	100	675.82	200	673.62	300	674.92	400	676.42
453	672.02	471	671.12	482	671.82	500	670.72	515	672.02
563	672.22	600	672.62	624	672.62	628	671.02	633	667.22
634	668.12	639	664.92	644	664.82	648	665.22	652	665.12
658	670.82	661	672.32	675	672.02	700	674.12	746	677.22
800	675.52	900	675.72	1000	676.22	1100	677.02	1200	675.62
1300	675.22	1400	677.02	1500	675.42	1600	675.92		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.087	628	.067	658	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
628	658	0	0	0	0

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3
3	9.5	.087	.067	.087
3	0.5	.087	.067	.087

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
3	9.5	1950	2250	1950
3	0.5	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.
3	9.5	0	0
3	0.5	0	0

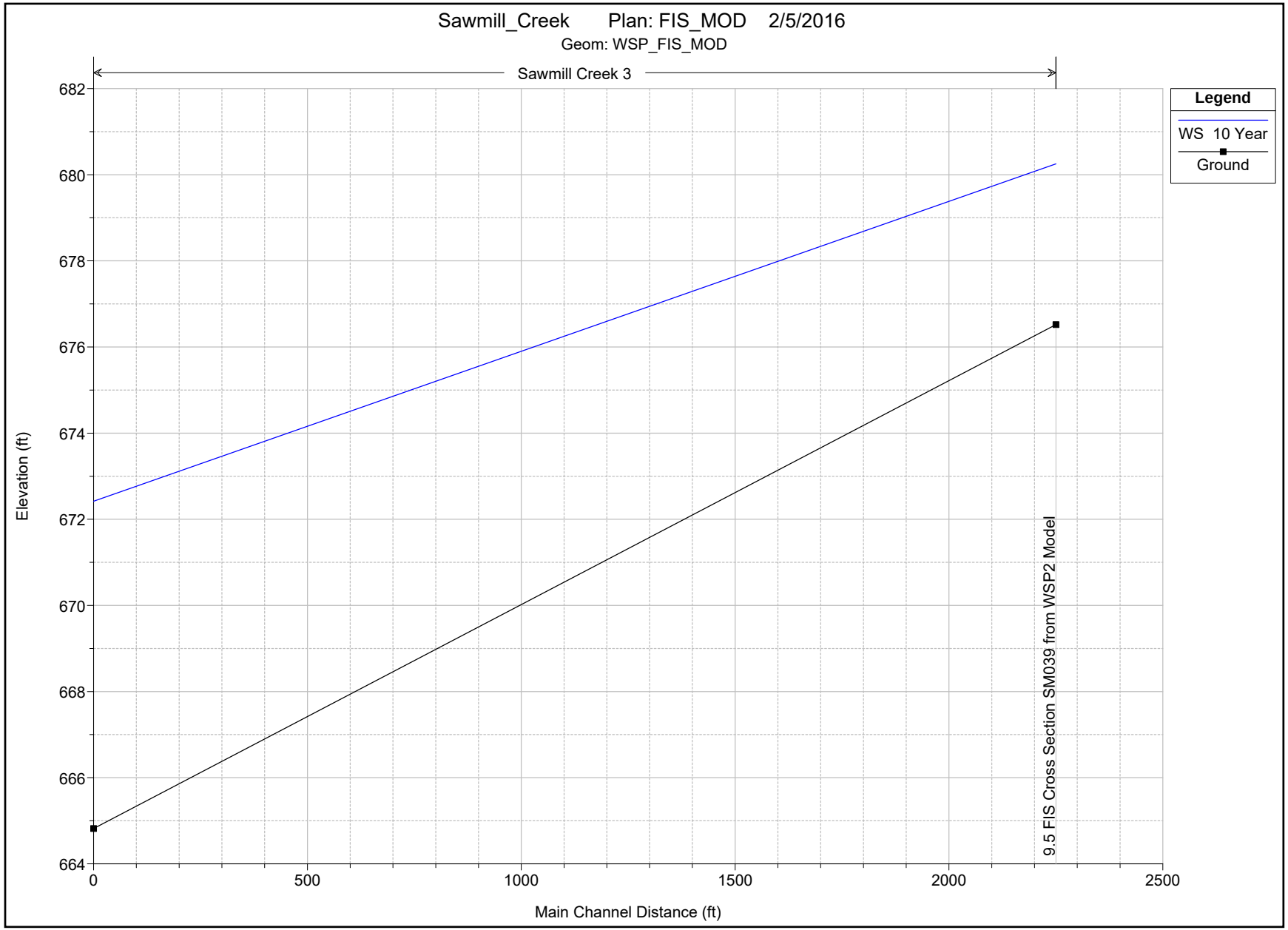
10-Year Permit Natural

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 10 Year

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)	
3	9.5	10 Year	260.50	676.52	680.25	679.89	680.29	0.004516	2.76	263.23	460.41	0.29
3	0.5	10 Year	626.60	664.82	672.42	668.64	672.58	0.002597	3.30	262.66	188.58	0.24

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 10 Year

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)
3	9.5	10 Year	680.29	680.25	0.04	7.72	0.00	44.83	78.36	137.31	460.41
3	0.5	10 Year	672.58	672.42	0.16			50.50	573.27	2.83	188.58


Sawmill_Creek Plan: FIS_MOD 2/5/2016
Geom: WSP_FIS_MOD
Sawmill Creek 3
Legend
WS 10 Year
Ground
9.5 FIS Cross Section SM039 from WSP2 Model
Elevation (ft)
Main Channel Distance (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500

Errors Warnings and Notes for Plan : MOD

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 0.5 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.

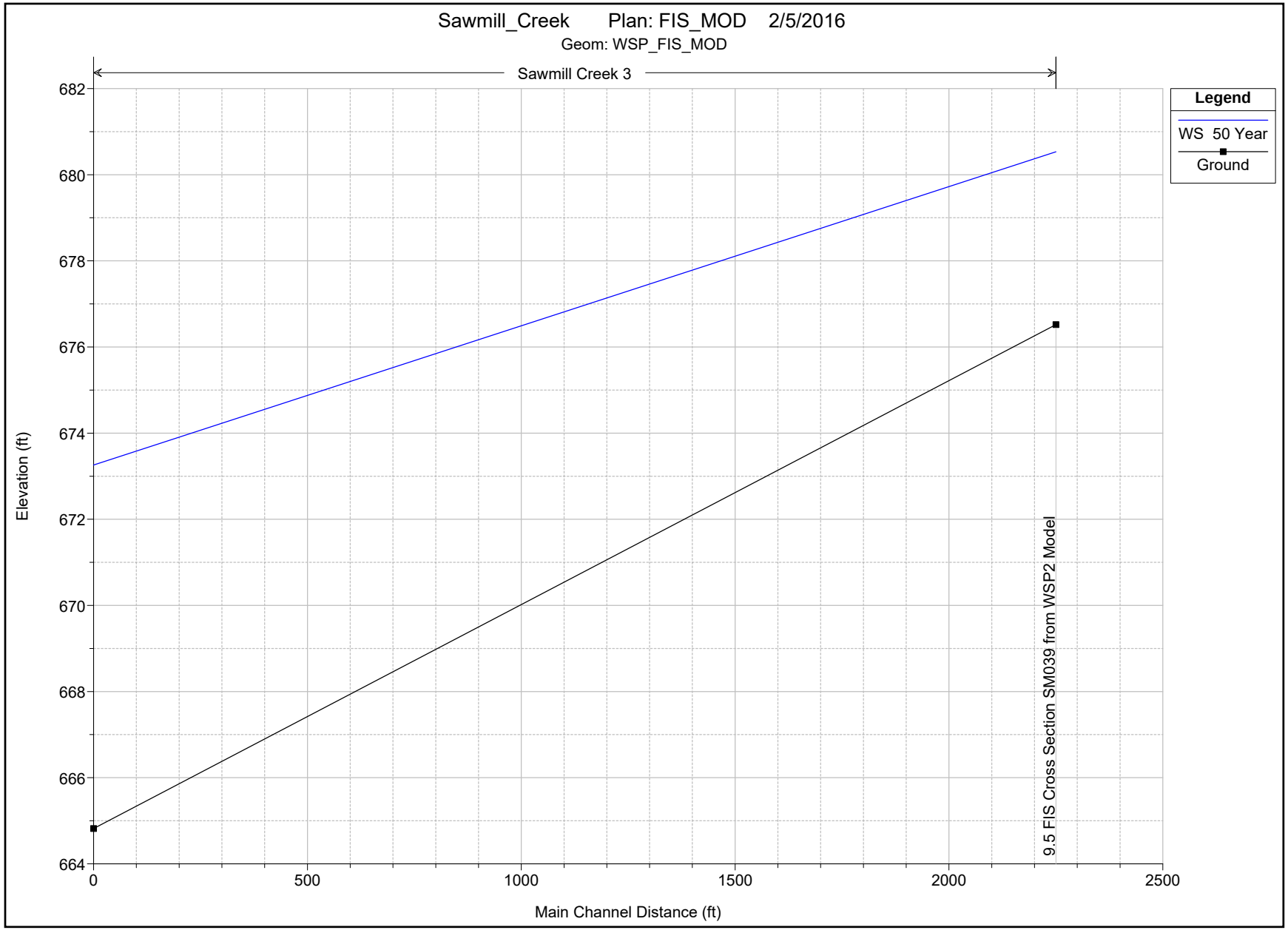
50-Year Permit Natural

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 50 Year

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)	
3	9.5	50 Year	420.30	676.52	680.53		680.57	0.003915	2.74	395.79	484.98	0.27
3	0.5	50 Year	1010.10	664.82	673.26	669.72	673.43	0.002814	3.76	458.95	251.70	0.26

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 50 Year

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)
3	9.5	50 Year	680.57	680.53	0.03	7.15	0.00	107.59	85.40	227.31	484.98
3	0.5	50 Year	673.43	673.26	0.17			237.12	747.78	25.20	251.70


Sawmill_Creek Plan: FIS_MOD 2/5/2016
Geom: WSP_FIS_MOD
Sawmill Creek 3
Legend
WS 50 Year
Ground
9.5 FIS Cross Section SM039 from WSP2 Model
Elevation (ft)
Main Channel Distance (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500

Errors Warnings and Notes for Plan : MOD

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 50 Year
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:	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.

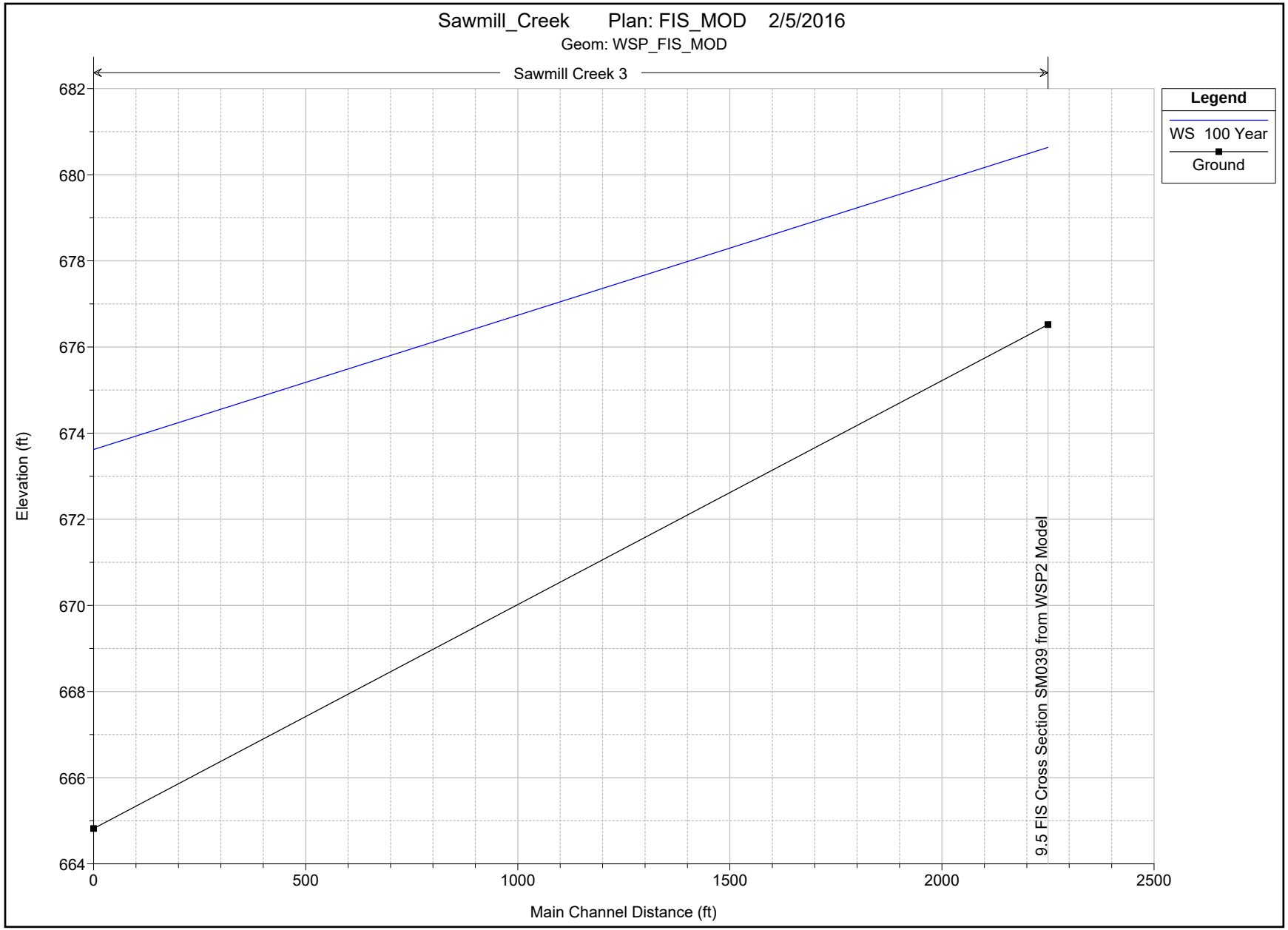
100-Year Permit Natural

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 100 Year

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)	
3	9.5	100 Year	495.30	676.52	680.63		680.67	0.003867	2.78	446.43	496.38	0.27
3	0.5	100 Year	1190.60	664.82	673.62	670.17	673.78	0.002681	3.80	551.11	260.32	0.25

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 100 Year

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)
3	9.5	100 Year	680.67	680.63	0.03	6.90	0.00	137.56	89.61	268.14	496.38
3	0.5	100 Year	673.78	673.62	0.16			353.10	797.19	40.31	260.32


Sawmill_Creek Plan: FIS_MOD 2/5/2016
Geom: WSP_FIS_MOD
Sawmill Creek 3
Legend
WS 100 Year
Ground
Elevation (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
9.5 FIS Cross Section SM039 from WSP2 Model

Errors Warnings and Notes for Plan : MOD

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 100 Year
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:	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.

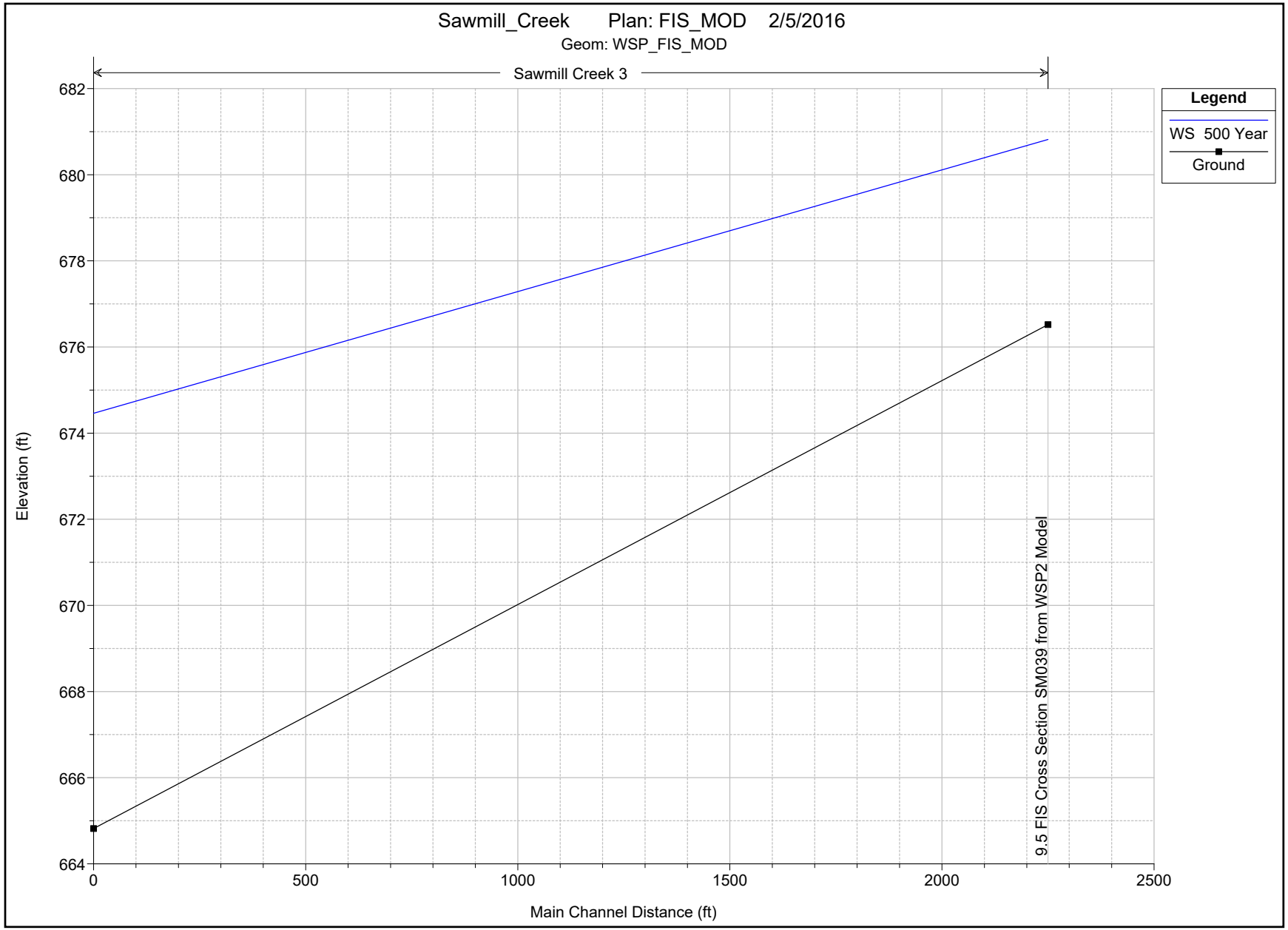
500-Year Permit Natural

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 500 Year

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)	
3	9.5	500 Year	657.00	676.52	680.82		680.85	0.003961	2.92	539.33	516.64	0.28
3	0.5	500 Year	1578.80	664.82	674.46	671.13	674.58	0.002080	3.61	821.58	384.24	0.23

HEC-RAS Plan: MOD River: Sawmill Creek Reach: 3 Profile: 500 Year

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)
3	9.5	500 Year	680.85	680.82	0.04	6.27	0.00	202.64	99.45	354.91	516.64
3	0.5	500 Year	674.58	674.46	0.12			648.95	848.27	81.59	384.24


Sawmill_Creek Plan: FIS_MOD 2/5/2016
Geom: WSP_FIS_MOD
Sawmill Creek 3
Legend
WS 500 Year
Ground
Elevation (ft)
682
680
678
676
674
672
670
668
666
664
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
9.5 FIS Cross Section SM039 from WSP2 Model

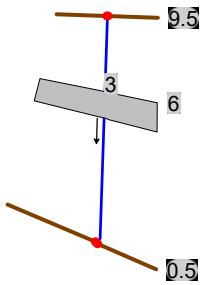
Errors Warnings and Notes for Plan : MOD

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 500 Year
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:	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: Sawmill Creek Reach: 3 RS: 0.5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

TAB C

SECTION 13.C

PERMIT EXISTING CONDITIONS



I-55 Crossing

None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Sawmill_Creek
Project File : Sawmill_Creek.prj
Run Date and Time: 2/5/2016 2:50:53 PM

Project in English units

Project Description:
2015 Submittal CBBEL- I-55 Over Sawmill Creek. Existing and Natural Conditions Only for 2 WITs one based on Design and one for Permit. All Models ran in NAVD 88. Conversion from NAVD 88 to NGVD 29= NGVD 29-0.28.

PLAN DATA

Plan Title: Permit_Existing
Plan File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.p05

Geometry Title: WSP_FIS_Culvert
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g06

Flow Title : FIS
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f02

Plan Description:
Duplication of FIS WSP2 model, Converted to NAVD 88
NGVD29 - 0.28' = NAVD88.
Manning's N values adjuestd to match results of WSP2. Existing Structure over Sawmill Creek added.

Plan Summary Information:

Number of:	Cross Sections	= 2	Multiple Openings	=	0
	Culverts	= 1	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: Program Selects Appropriate method

Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: FIS
Flow File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.f02

Flow Data (cfs)

River	Reach	RS	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Sawmill Creek	3	9.5	192.8	260.5	339.7	420.3	495.3	657
Sawmill Creek	3	0.5	465.3	626.6	815.6	1010.1	1190.6	1578.8

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	3	5 Year		Known WS = 671.72
Sawmill Creek	3	10 Year		Known WS = 672.42
Sawmill Creek	3	25 Year		Known WS = 672.92
Sawmill Creek	3	50 Year		Known WS = 673.26
Sawmill Creek	3	100 Year		Known WS = 673.62
Sawmill Creek	3	500 Year		Known WS = 674.46

GEOMETRY DATA

Geometry Title: WSP_FIS_Culvert
Geometry File : N:\Idot\110203.00001\Drain\Model\HEC-RAS\Sawmill Ck\Sawmill_Creek.g06

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 9.5

INPUT
Description: FIS Cross Section SM039 from WSP2 Model
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.12	7	685.52	24	684.02	37	684.12	50	683.92
61	683.12	71	681.42	156	681.42	166	682.22	200	681.42
262	680.42	264	681.02	274	680.92	278	680.32	300	680.02
400	680.02	481	679.52	492	678.72	493	677.92	495	676.52
498	677.12	501	677.92	502	678.82	512	680.22	600	679.52
700	679.12	800	681.72	900	684.72	1000	685.02		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.087	492	.067	502	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
492	502	1950	2250	1950	0	0

CULVERT

RIVER: Sawmill Creek
REACH: 3 RS: 6

INPUT
Description:
Distance from Upstream XS = 760
Deck/Roadway Width = 263
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 26

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-95	690.81	670	-45	690.51	670	5	690.28	670
55	690.04	670	105	689.83	670	155	689.62	670
205	689.43	670	255	689.18	670	305	688.97	670
355	688.89	670	405	688.9	670	455	688.9	670
505	688.99	670	555	689.18	670	605	689.42	670
655	689.74	670	705	689.97	670	755	690.27	670
805	690.52	670	855	690.85	670	905	691.06	670
955	691.4	670	1005	691.74	670	1055	692.03	670
1105	692.26	670	1155	692.59	670			

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	683.99	7	683.39	24	681.89	37	681.99	50	681.79
61	680.99	71	679.29	156	679.29	166	680.09	200	679.29
262	678.29	264	678.89	274	678.79	278	678.19	300	677.89
400	677.89	481	677.39	492	676.59	493	675.79	495	674.39
498	674.99	501	675.79	502	676.69	512	678.09	600	677.39
700	676.99	800	679.59	900	682.59	1000	682.89		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	492	.055	502	.065

Bank Sta: Left	Right	Coeff Contr.	Expan.
492	502	0	0

Downstream Deck/Roadway Coordinates
num= 28

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	690.81	660	54	690.81	660	104	690.51	660
154	690.28	660	204	690.04	660	254	689.83	660
304	689.62	660	354	689.43	660	404	689.18	660
454	688.97	660	504	688.89	660	554	688.9	660
604	688.9	660	654	688.99	660	704	689.18	660
754	689.42	660	804	689.74	660	854	689.97	660
904	690.27	660	954	690.52	660	1004	690.85	660
1054	691.06	660	1104	691.4	660	1154	691.74	660
1204	692.03	660	1254	692.26	660	1304	692.59	660
1600	692.59	660						

Downstream Bridge Cross Section Data
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	690.21	100	684.91	200	682.71	300	684.01	400	685.51
453	681.11	471	680.21	482	680.91	500	679.81	515	681.11
563	681.31	600	681.71	624	681.71	628	680.11	633	676.31
634	677.21	639	674.01	644	673.91	648	674.31	652	674.21
658	679.91	661	681.41	675	681.11	700	683.21	746	686.31
800	684.61	900	684.81	1000	685.31	1100	686.11	1200	684.71
1300	684.31	1400	686.11	1500	684.51	1600	685.01		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	628	.055	658	.08

Bank Sta: Left	Right	Coeff Contr.	Expan.
628	658	0	0

```
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 =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      12
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
               746  279.16     .012     .012        0                  .5               1
Upstream   Elevation =  674.39
           Centerline Station =  495
Downstream Elevation =  673.91
           Centerline Station =  644

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 0.5

INPUT
Description: FIS Cross Section SM035 from WSP2 Model
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  681.12     100  675.82     200  673.62     300  674.92     400  676.42
     453  672.02     471  671.12     482  671.82     500  670.72     515  672.02
     563  672.22     600  672.62     624  672.62     628  671.02     633  667.22
     634  668.12     639  664.92     644  664.82     648  665.22     652  665.12
     658  670.82     661  672.32     675  672.02     700  674.12     746  677.22
     800  675.52     900  675.72    1000  676.22    1100  677.02    1200  675.62
    1300  675.22    1400  677.02    1500  675.42    1600  675.92

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .087     628    .067     658    .087

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           628     658                0       0       0              0       0



SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

      Reach          River Sta.       n1        n2        n3

 3                    9.5              .087      .067      .087
 3                    6            Culvert
 3                    0.5              .087      .067      .087




SUMMARY OF REACH LENGTHS

River: Sawmill Creek

      Reach          River Sta.      Left     Channel    Right

 3                    9.5              1950      2250      1950
 3                    6            Culvert
```

3	0.5	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.
3	9.5	0	0
3	6	Culvert	
3	0.5	0	0

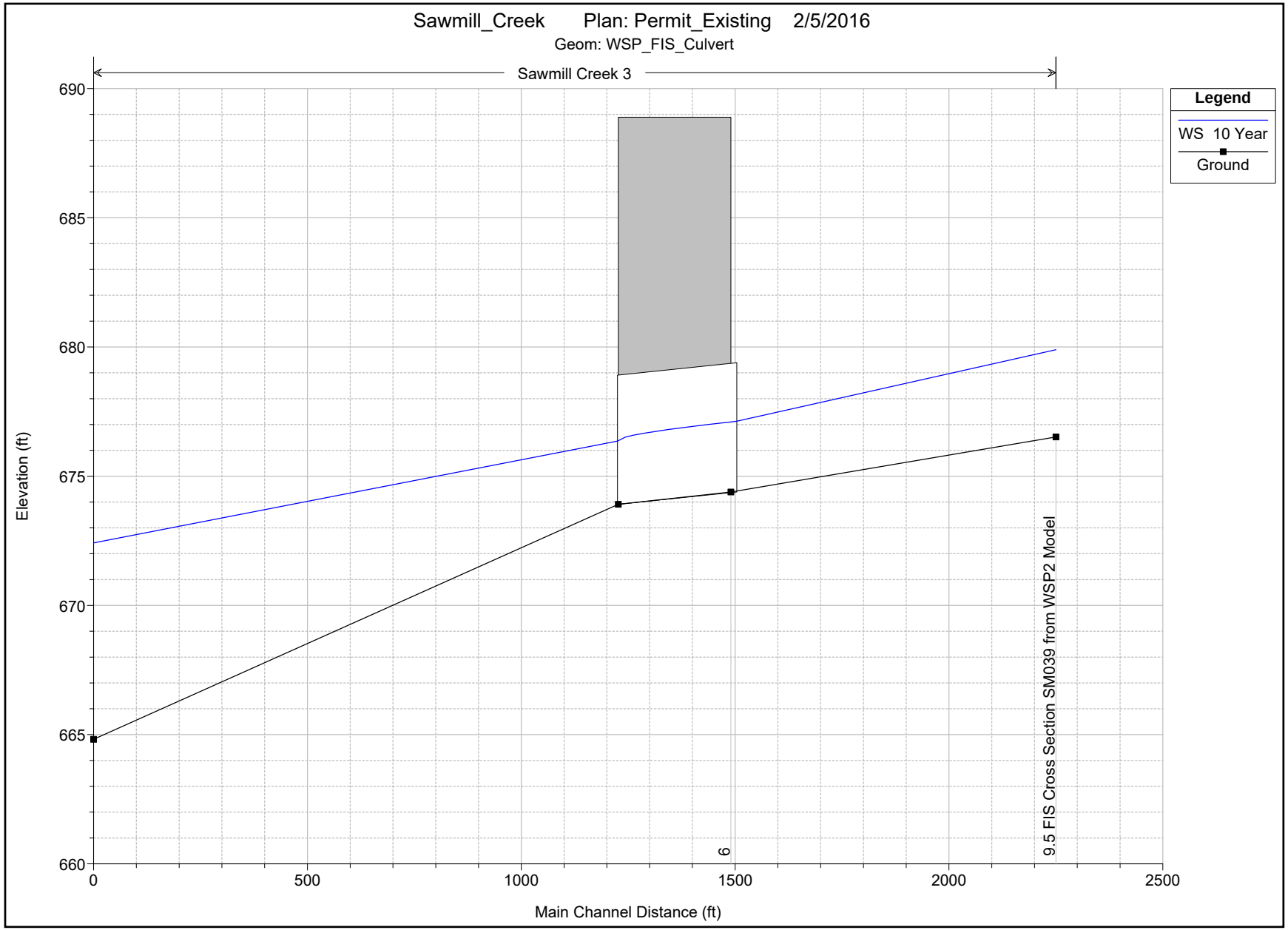
10-Year Permit Existing

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 10 Year

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)	
3	9.5	10 Year	260.50	676.52	679.89	679.89	680.11	0.019116	5.20	126.09	265.57	0.58
3	6		Culvert									
3	0.5	10 Year	626.60	664.82	672.42	668.64	672.58	0.002597	3.30	262.66	188.58	0.24

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 10 Year

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)
3	9.5	10 Year	680.11	679.89	0.22			19.79	128.74	111.97	265.57
3	6		Culvert								
3	0.5	10 Year	672.58	672.42	0.16			50.50	573.27	2.83	188.58


Sawmill_Creek Plan: Permit_Existing 2/5/2016
Geom: WSP_FIS_Culvert
Sawmill Creek 3
Legend
WS 10 Year
Ground
Elevation (ft)
690
685
680
675
670
665
660
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
6
9.5 FIS Cross Section SM039 from WSP2 Model

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 10 Year

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)	
3	9.5	10 Year	260.50	676.52	679.89	679.89	680.11	0.019116	5.20	126.09	265.57	0.58
3	6		Culvert									
3	0.5	10 Year	626.60	664.82	672.42	668.64	672.58	0.002597	3.30	262.66	188.58	0.24

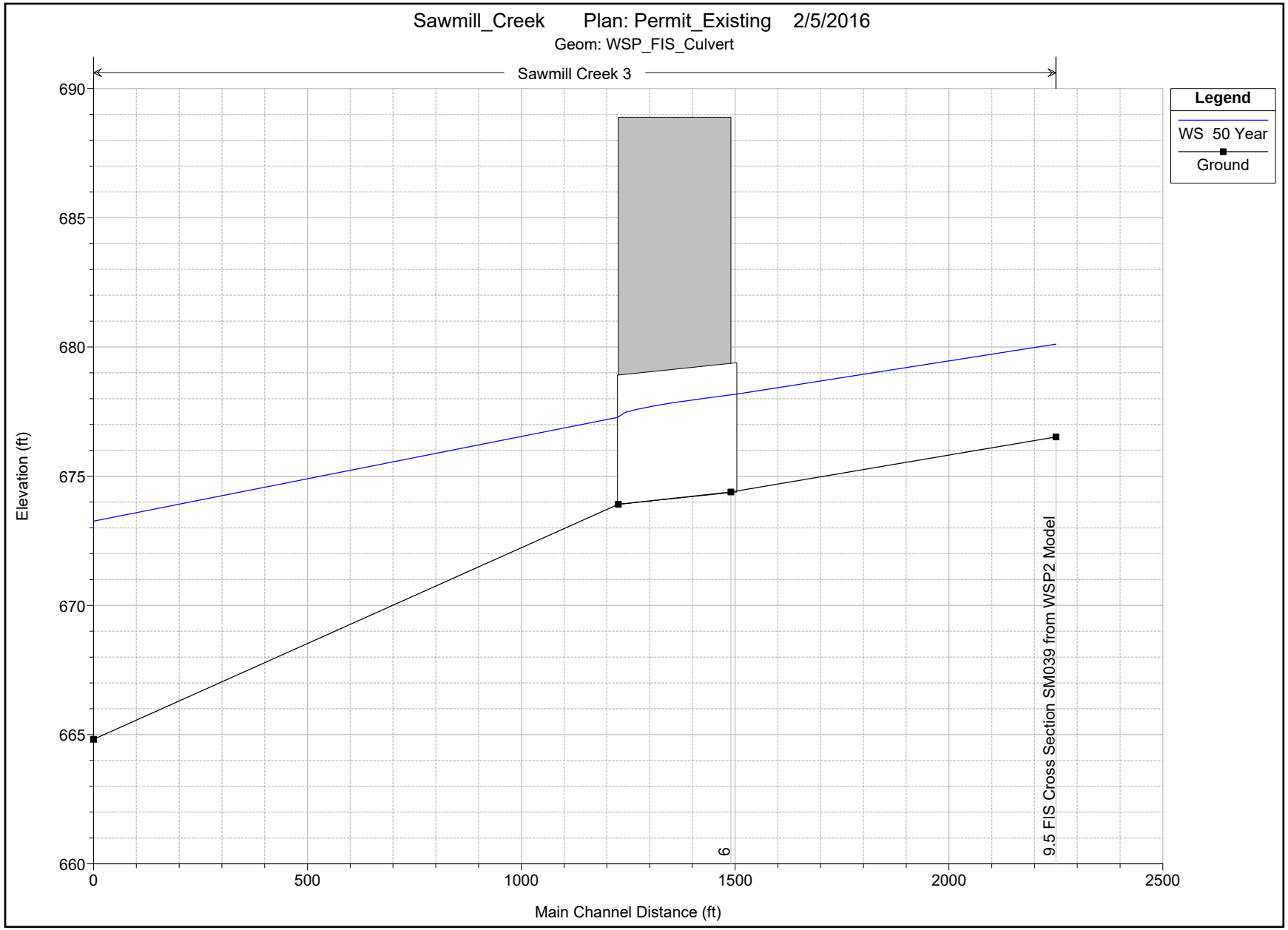
50-Year Permit Existing

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 50 Year

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)	
3	9.5	50 Year	420.30	676.52	680.11	680.11	680.33	0.021729	5.86	199.92	429.82	0.63
3	6		Culvert									
3	0.5	50 Year	1010.10	664.82	673.26	669.72	673.43	0.002814	3.76	458.95	251.70	0.26

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 50 Year

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)
3	9.5	50 Year	680.33	680.11	0.23			46.13	157.81	216.36	429.82
3	6		Culvert								
3	0.5	50 Year	673.43	673.26	0.17			237.12	747.78	25.20	251.70


Sawmill_Creek Plan: Permit_Existing 2/5/2016
Geom: WSP_FIS_Culvert
Sawmill Creek 3
Legend
WS 50 Year
Ground
690
685
680
675
670
665
660
Elevation (ft)
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
6
9.5 FIS Cross Section SM039 from WSP2 Model

Errors Warnings and Notes for Plan : Perm_Ex

Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 50 Year
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 50 Year
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.

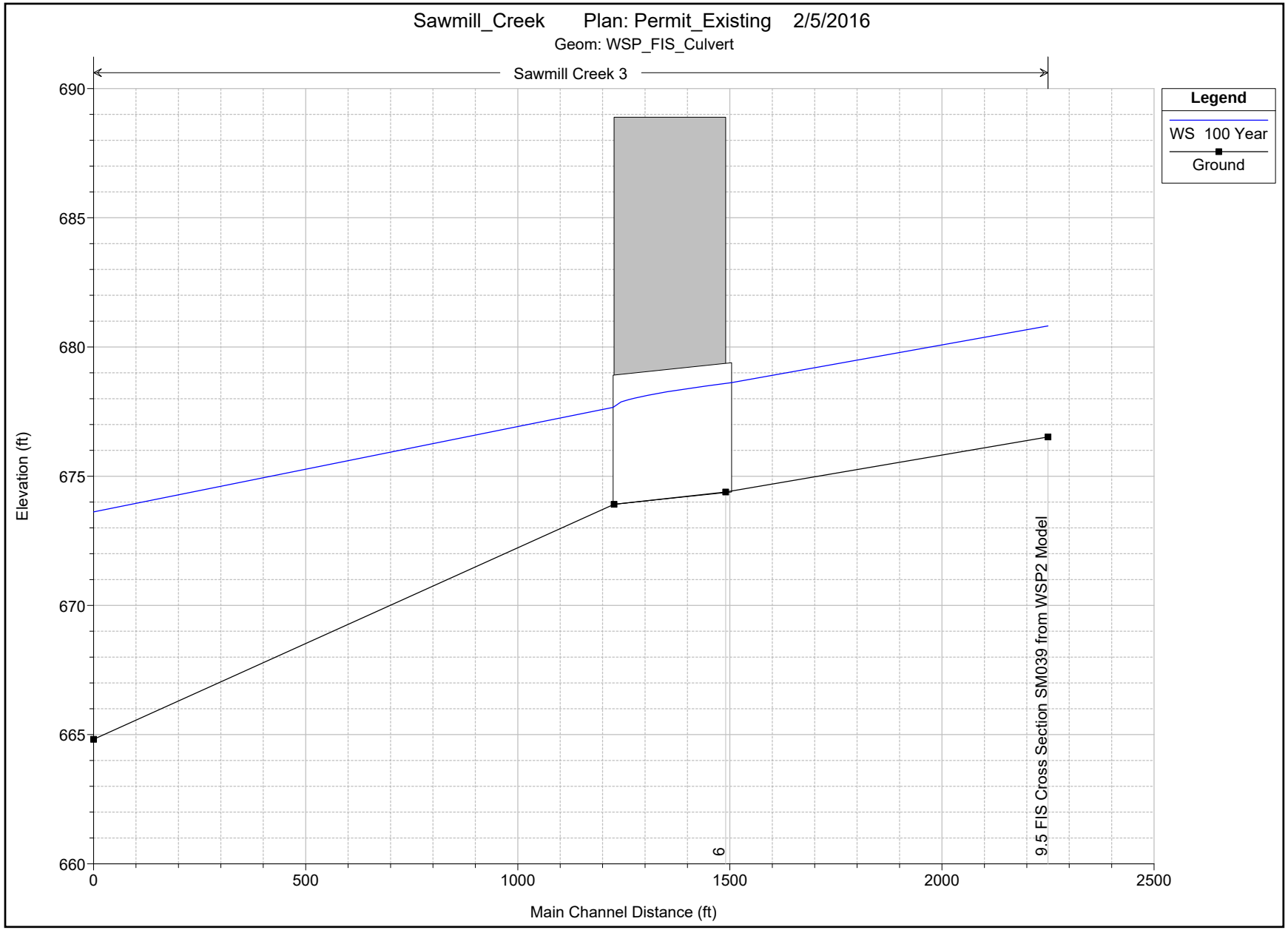
100-Year Permit Existing

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 100 Year

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)	
3	9.5	100 Year	495.30	676.52	680.82	680.17	680.84	0.002261	2.21	538.48	516.46	0.21
3	6		Culvert									
3	0.5	100 Year	1190.60	664.82	673.62	670.19	673.78	0.002681	3.80	551.11	260.32	0.25

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 100 Year

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)
3	9.5	100 Year	680.84	680.82	0.02			152.64	75.09	267.57	516.46
3	6		Culvert								
3	0.5	100 Year	673.78	673.62	0.16			353.10	797.19	40.31	260.32


Sawmill_Creek Plan: Permit_Existing 2/5/2016
Geom: WSP_FIS_Culvert
Sawmill Creek 3
Legend
WS 100 Year
Ground
Elevation (ft)
690
685
680
675
670
665
660
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
6
9.5 FIS Cross Section SM039 from WSP2 Model

Errors Warnings and Notes for Plan : Perm_Ex

	No Errors, Warnings or Notes in Computations

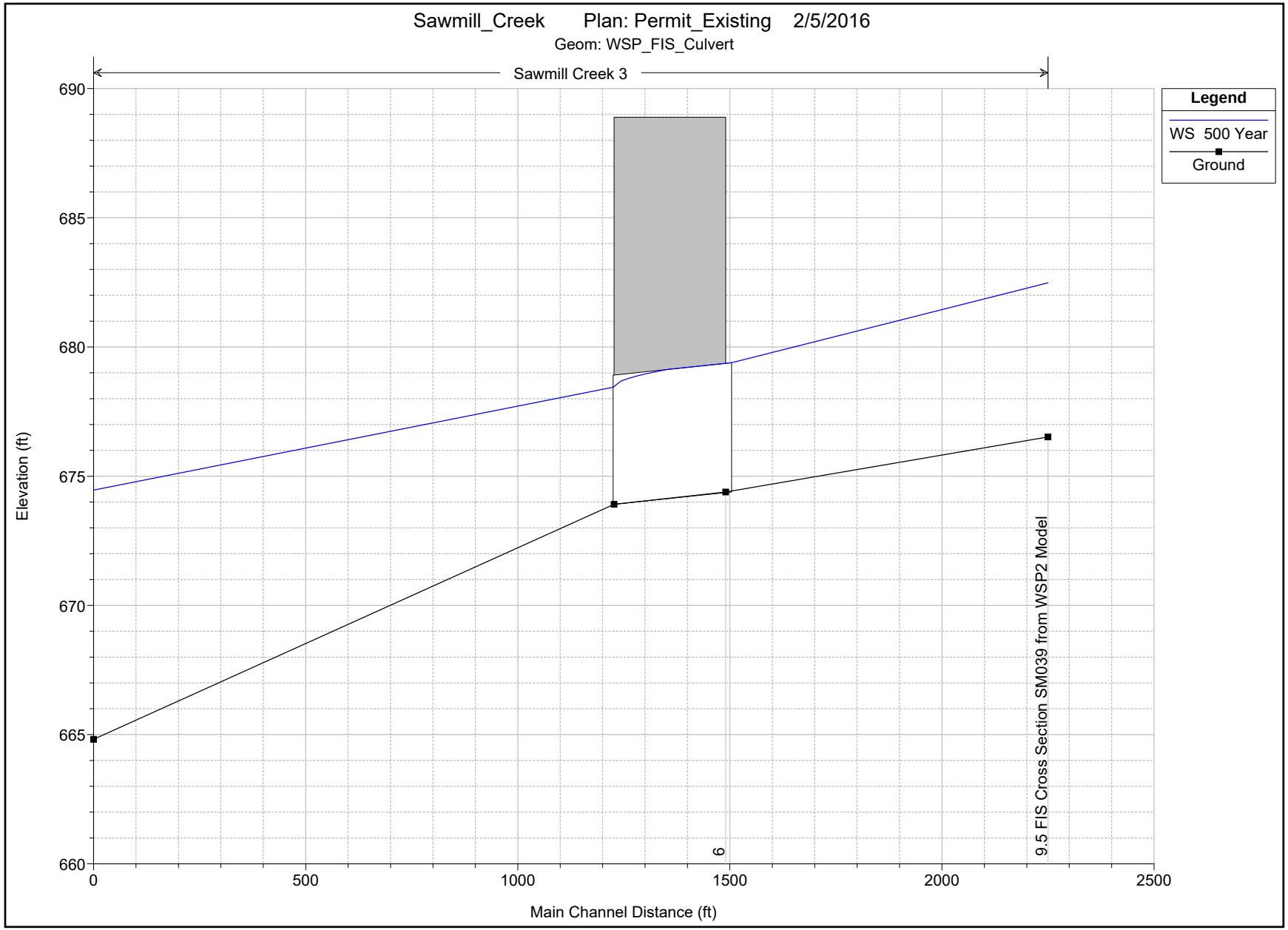
500-Year Permit Existing

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 500 Year

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)	
3	9.5	500 Year	657.00	676.52	682.48	680.27	682.49	0.000184	0.82	1643.73	760.76	0.06
3	6		Culvert									
3	0.5	500 Year	1578.80	664.82	674.46	671.14	674.58	0.002080	3.61	821.58	384.24	0.23

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3 Profile: 500 Year

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)
3	9.5	500 Year	682.49	682.48	0.00			281.78	41.66	333.56	760.76
3	6		Culvert								
3	0.5	500 Year	674.58	674.46	0.12			648.95	848.27	81.59	384.24


Sawmill_Creek Plan: Permit_Existing 2/5/2016
Geom: WSP_FIS_Culvert
Sawmill Creek 3
Legend
WS 500 Year
Ground
690
685
680
675
670
665
660
Elevation (ft)
0
500
1000
1500
2000
2500
Main Channel Distance (ft)
6
9.5 FIS Cross Section SM039 from WSP2 Model

Errors Warnings and Notes for Plan : Perm_Ex

Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 500 Year Culv: Culvert #1
Note:	The normal depth exceeds the height of the culvert. The program assumes that the normal depth is
	equal to the height of the culvert.
Note:	During supercritical analysis, the culvert direct step method went to critical depth. The program then
	assumed critical depth at the outlet.
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: Sawmill Creek Reach: 3 RS: 0.5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

Culvert Tables Permit Existing

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3

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)
3	6 Culvert #1	10 Year	678.59	679.89	678.31	678.59	688.90	260.50		7.47	7.93	8.87
3	6 Culvert #1	50 Year	680.17	680.11	679.84	680.17	688.90	420.30		6.85	9.25	10.41
3	6 Culvert #1	100 Year	680.84	680.82	680.71	680.84	688.90	495.30		7.20	9.75	10.99
3	6 Culvert #1	500 Year	682.49	682.48	682.85	682.49	688.90	657.00		8.02	10.95	12.08

HEC-RAS Plan: Perm_Ex River: Sawmill Creek Reach: 3

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)
3	9.5	10 Year	680.11	679.89	0.22			19.79	128.74	111.97	265.57
3	9.5	50 Year	680.33	680.11	0.23			46.13	157.81	216.36	429.82
3	9.5	100 Year	680.84	680.82	0.02			152.64	75.09	267.57	516.46
3	9.5	500 Year	682.49	682.48	0.00			281.78	41.66	333.56	760.76
3	6		Culvert								
3	0.5	10 Year	672.58	672.42	0.16			50.50	573.27	2.83	188.58
3	0.5	50 Year	673.43	673.26	0.17			237.12	747.78	25.20	251.70
3	0.5	100 Year	673.78	673.62	0.16			353.10	797.19	40.31	260.32
3	0.5	500 Year	674.58	674.46	0.12			648.95	848.27	81.59	384.24

TAB D

SECTION 13.D

INEFFECTIVE AREA DETERMINATIONS

Since these Froude numbers are for the main channel only, the value of Fc1 also happens to reflect to some extent the distribution of flow between the overbanks and main channel.

There was no support from these investigations for the WSPRO concept of the expansion reach length being proportional to or equal to the bridge opening width.

Contraction Reach Lengths (Lc on Figure B-1)

While the apparent contraction ratios of the five field prototype cases were all below 1:1, the contraction ratios (CR on Figure B-1) for the idealized cases ranged from 0.7:1 to 2.3:1. As with the expansion reach lengths, these values correlated strongly with the same Froude number ratio. A more important independent variable, however, is the decimal fraction of the total discharge conveyed in the overbanks (Qob / Q) at the approach section. A strong regression equation was developed for the contraction length and is presented later in this appendix.

Because the mean and median values of the contraction ratios were both around 1:1, there is some support from this study for the rule of thumb which suggests the use of a 1:1 contraction ratio. There is no support, however, for the concept of the contraction reach length being equal to or proportional to the bridge opening width.

Expansion Coefficients

Regression analysis for this parameter was only marginally successful. The resulting relationship is a function of the ratio of hydraulic depth in the overbank to that in the main channel for undisturbed conditions (evaluated at Section 1). Perhaps more interesting are the summary statistics, which indicate lower values for this coefficient than the traditional standard values for bridges.

Contraction Coefficients

Owing to the nature of this data (69 out of 76 cases had the minimum value of 0.10), a regression analysis was not fruitful. Like the expansion coefficients, the prevailing values are significantly lower than the standard recommended values.

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.

For Culvert 8.5
nob/nch = .065/.047 = 1.4:1
b/B = 12'/30.99' = 0.01
S = 2.71'/862' x 5280' = 16.6'/mile
(from XS 10 to XS 7.5)

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

For Culvert 6.5
nob/nch = .065/.047 = 1.4:1
b/B = 12'/30.99' = 0.38
S = 3.86'/1175' x 5280' = 17.3'/mile
(from XS 8 to XS 5)

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

I-55 U/S XS and U/S face, plan view

N

1" = 10'

WOOD WALL

SAWMILL CK.

FP LIMIT

XS 7

Ineff. @ 65.99, 688.00

Ground 60.33, 684.69

XS 7

EL 100 = 680.67

Ground 20.85, 687.40

Ineff. @ 19.67, 688.18

Ineff. width = 12' + 17.16' + 17.16' = 46.32'

1:1 CONTRACTION RATIO

Ineff. Limits

65.99 - 19.67 = 46.32' ✓

100-YR Effective Flow Limits

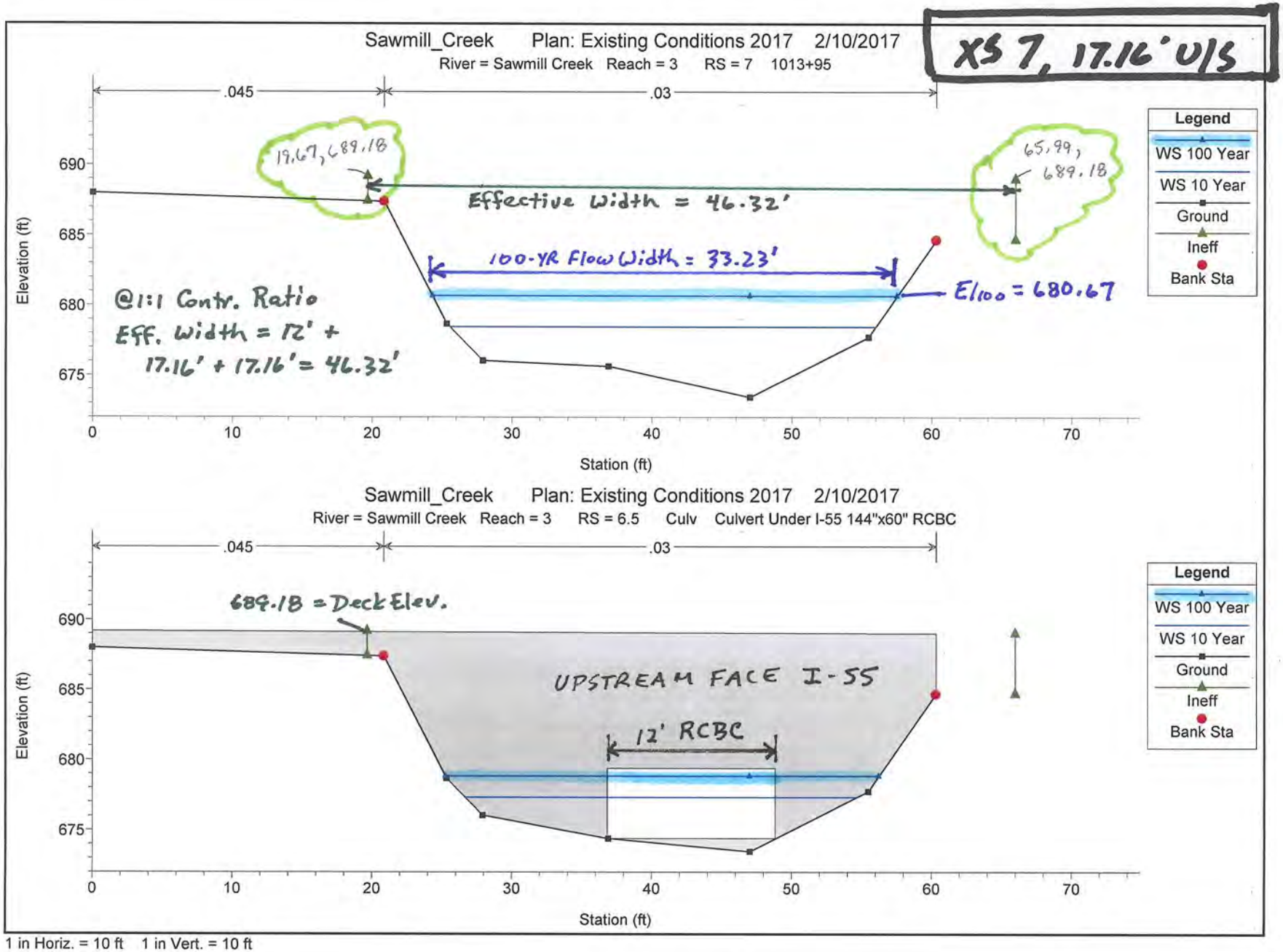
17.16' to U/S XS

12' RCBC

WALL

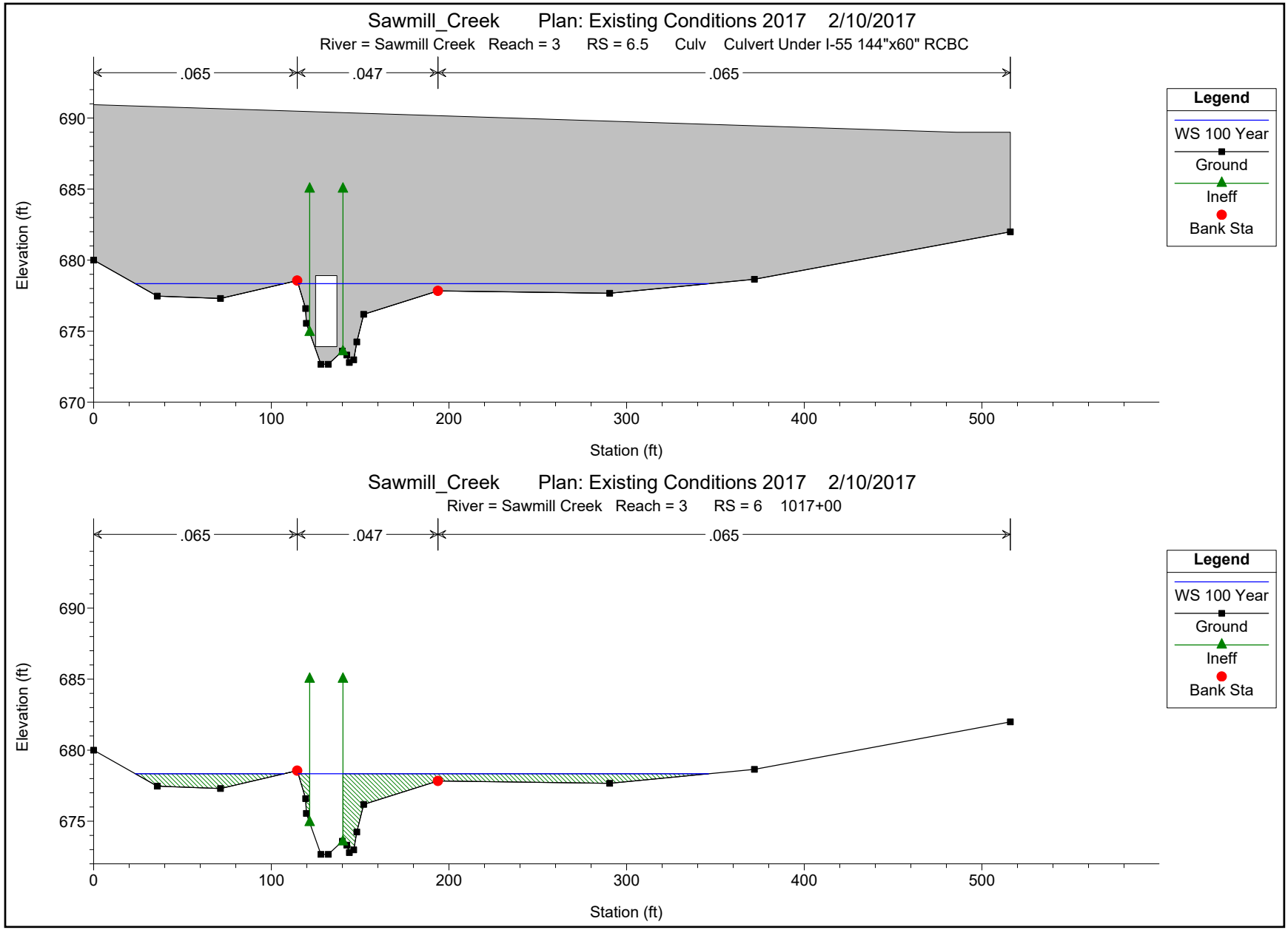
SAWMILL CK.
@ I-55
U/S CULVERT FACE

I-55 U/S XS and U/S face



1 in Horiz. = 10 ft 1 in Vert. = 10 ft

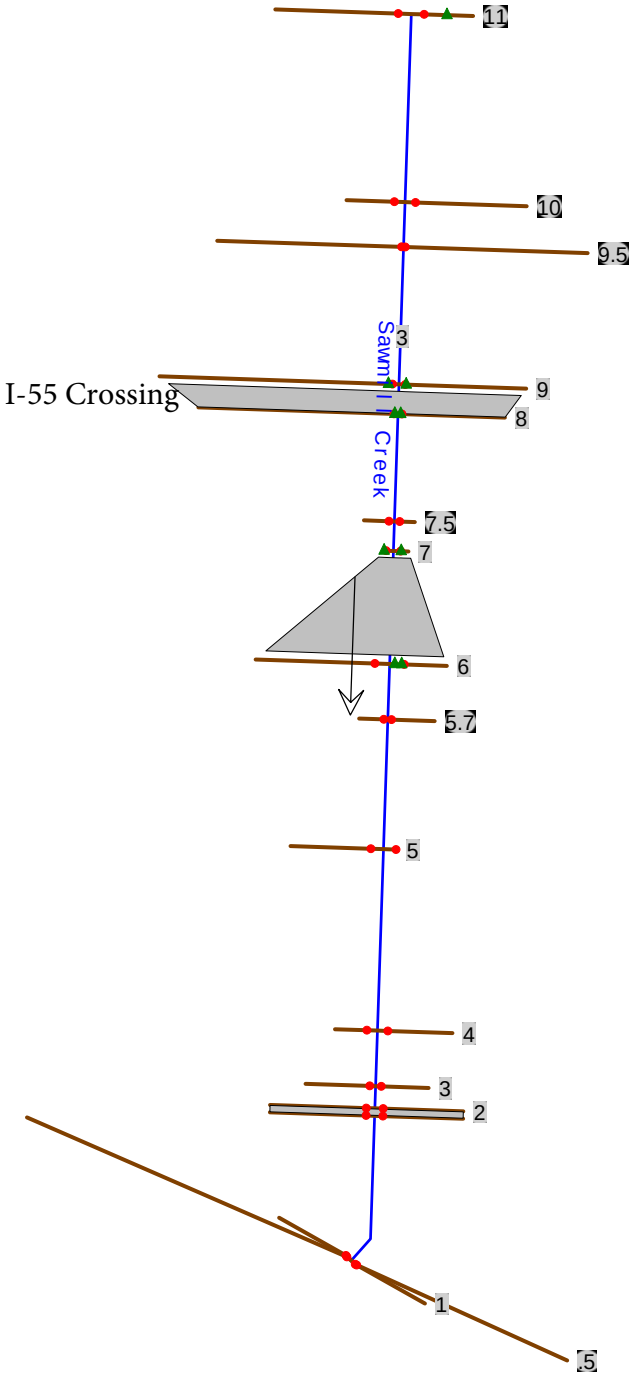
I-55 D/S face and D/S XS



1 in Horiz. = 80 ft 1 in Vert. = 10 ft

SECTION 13.D

DESIGN EXISTING CONDITIONS



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

HEC-RAS HEC-RAS 5.0.3 September 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: Sawmill_Creek
Project File : Sawmill_Creek.prj
Run Date and Time: 6/6/2017 8:00:57 AM

Project in English units

Project Description:
June. 2017 submittal CBBEL - added ineffective areas at Private Road bridge,
Existing and Natural Plans only.
June 2016 submittal CBBEL- I-55 Over Sawmill
Creek. Existing and Natural Conditions Only for 2 WITs one based on Design and
one for Permit. All Models run in NAVD 88.
Conversion is NAVD 88 = NGVD 29 -
0.28'.

PLAN DATA

Plan Title: Existing Conditions 2017
Plan File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.3 Sawmill May 2017\Sawmill_Creek.p01

Geometry Title: Existing 2017
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.3 Sawmill May
2017\Sawmill_Creek.g01

Flow Title : Existing
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.3 Sawmill May
2017\Sawmill_Creek.f01

Plan Description:
Private Road bridge length adjusted May 2017. Added ineff areas for Private
Road bridge Feb. 2017. Existing Conditions of I-55 over Sawmill Creek. Model
includes Surveyed Cross sections and Structures, along with 2 FIS cross
Sections. Proper contraction/expansion cones and coefficient used at
structures. NAVD 88.

Plan Summary Information:

Number of:	Cross Sections	= 16	Multiple Openings	=	0
	Culverts	= 2	Inline Structures	=	0
	Bridges	= 1	Lateral Structures	=	0

Computational Information

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

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

FLOW DATA

Flow Title: Existing
Flow File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.3 Sawmill May 2017\Sawmill_Creek.f01

Flow Data (cfs)

River	Reach	RS	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Sawmill Creek	3	11	192.8	260.5	339.7	420.3	495.3	657
Sawmill Creek	3	1	465.3	626.6	815.6	1010.1	1190.6	1578.8

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	3	5 Year	Normal S = 0.0025	Known WS = 671.72
Sawmill Creek	3	10 Year	Normal S = 0.0025	Known WS = 672.42
Sawmill Creek	3	25 Year	Normal S = 0.0025	Known WS = 672.92
Sawmill Creek	3	50 Year	Normal S = 0.0025	Known WS = 673.26
Sawmill Creek	3	100 Year	Normal S = 0.0025	Known WS = 673.62
Sawmill Creek	3	500 Year	Normal S = 0.0025	Known WS = 674.46

GEOMETRY DATA

Geometry Title: Existing 2017
Geometry File : n:\Idot\110203.00001\Drain\Model\HEC-RAS 5.0.3 Sawmill May 2017\Sawmill_Creek.g01

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 11

INPUT
Description: 1000+25
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	685.239	12.4	685.234	21.66	684.773	31.01	683.093	37.91	680.64
43.36	680.81	48.74	682.32	70.45	682.661	131.91	682.541	154.98	681.293
172.56	678.254	178.89	678.701	180.02	678.128	181.43	677.604	185.06	677.467
189.66	677.384	191.33	678.301	192.33	679.837	201.7	683.064	209.75	683.22
243.95	681.917	298.99	682.039	365.26	682.448	430.25	683.162	480.97	683.456
531.18	683.886	534.29	684.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0     .06  131.91    .047   201.7     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        131.91   201.7              508     508     508             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   70.46  682.66       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 10

INPUT
Description: 1005+33
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 684.144   32.21 682.453   66.42 681.393  128.42 681.009  136.19 679.793
  170.19 680.308  186.28 679.881  223.33 680.394  257.18 680.148  299.72 680.288
  305.05 676.627  313.75 676.337   319.1 676.322  320.88  676.71  324.18 677.872
  332.78 678.347  337.43 680.593  356.78 681.849  385.55 681.174  410.87 680.303
  434.94 680.516  454.59 681.412   458.4 680.831  461.92 680.601  463.87 680.713
  469.43 682.641  476.39 683.714  486.42 685.756

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06  299.72    .047  356.78     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        299.72  356.78              121     121     121             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 9.5

INPUT
Description: SWS0007 SM039 WSP 2 Model
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  686.12       7  685.52      24  684.02      37  684.12      50  683.92
      61  683.12      71  681.42     156  681.42     166  682.22     200  681.42
     262  680.42     264  681.02     274  680.92     278  680.32     300  680.02
     400  680.02     481  679.52     492  678.72     493  677.92     495  676.52
     498  677.12     501  677.92     502  678.82     512  680.22     600  679.52
     700  679.12     800  681.72     900  684.72    1000  685.02

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065     492    .055     502    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          492     502              371     371     371             .3       .5

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 9

INPUT
Description: 1010+25_ Extended using 2' topo
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -85.93     684  -21.02     682       0  681.55   32.15  680.62   84.81  679.77
  117.47  679.26  128.78  679.03  133.76  677.87  140.36  679.43  147.55  678.25
   156.5  675.84  164.58  675.55  167.67  676.32  174.74  679.66  201.61  680.43
  213.95  680.68  287.18  679.48   327.4  679.55  502.57  680.91     582   682.6
  637.24     682  658.48     682  804.48     684
```

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-85.93	.06	140.36	.047	174.74	.06

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

140.36	174.74	80	80	80	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-85.93	134	682.69	F
183.44	804.48	682.11	F

CULVERT

RIVER: Sawmill Creek
REACH: 3 RS: 8.5

INPUT
Description: US 66 N Frontage Road 144"x60" RCBC
Distance from Upstream XS = 19
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 20

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-100.17	684.796	670	-55.43	684.1	670	-10.5	683.54	670
34.07	683.1	670	78.62	682.88	670	122	682.69	670
167.74	682.46	670	212.11	682.38	670	258	682.24	670
303.57	682.2	670	349.72	682.25	670	396.83	682.11	670
443.93	682.12	670	489.53	682.23	670	534.94	682.48	670
581.91	682.86	670	626.48	683.34	670	690.83	684	670
827.83	686	670	924.83	688	670			

Upstream Bridge Cross Section Data
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-85.93	684	-21.02	682	0	681.55	32.15	680.62	84.81	679.77
117.47	679.26	128.78	679.03	133.76	677.87	140.36	679.43	147.55	678.25
156.5	675.84	164.58	675.55	167.67	676.32	174.74	679.66	201.61	680.43
213.95	680.68	287.18	679.48	327.4	679.55	502.57	680.91	582	682.6
637.24	682	658.48	682	804.48	684				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-85.93	.06	140.36	.047	174.74	.06

Bank Sta: Left Right Coeff Contr. Expan.

140.36	174.74	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-85.93	134	682.69	F
183.44	804.48	682.11	F

Downstream Deck/Roadway Coordinates
num= 20

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
37.53	684.796	670	82.27	684.1	670	127.01	683.54	670
171.75	683.1	670	216.49	682.88	670	261.23	682.69	670
305.97	682.46	670	350.71	682.38	670	395.45	682.24	670
440.19	682.2	670	484.93	682.25	670	529.67	682.11	670
574.41	682.12	670	619.15	682.23	670	663.89	682.48	670
708.63	682.86	670	753.37	683.34	670	798.11	684	670
842.85	686	670	887.59	688	670			

Downstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	690.69	37.53	687.87	69.65	684.08	119.23	683.09	248.4	682.67
277.85	682.8	280.06	676.29	289.49	674.75	295.96	675.85	299.59	682.37
348.71	682.76	409.72	683.3	460.77	683.44	499.68	682.45	828	684

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045  277.85     .03  299.59    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
        277.85  299.59             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   282.5  680.75       F
   296.5     828  680.75       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 =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      12
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
                18 61.8482     .012     .012        0                   .5                1
Upstream   Elevation =  674.88
           Centerline Station =  162
Downstream Elevation =  674.751
           Centerline Station =  289.494

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 8

INPUT
Description: 1011+05_Exttended using 2' topo
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  690.69   37.53  687.87   69.65  684.08  119.23  683.09   248.4  682.67
  277.85   682.8  280.06  676.29  289.49  674.75  295.96  675.85  299.59  682.37
  348.71  682.76  409.72   683.3  460.77  683.44  499.68  682.45     828     684

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045  277.85     .03  299.59    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        277.85  299.59              290     290     290             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   282.5  680.75       F
   296.5     828  680.75       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 7.5

INPUT
Description: 1013+15_Extended using 2' topo
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     690    5.34     688      27  686.47   40.04   683.6   40.57   683.6
```

```
   42.29  676.56   44.69  676.47    46.1  675.24   48.53  673.99      51  674.22
   51.47  674.82   53.44  677.03   55.57  677.14    69.5   684.4   83.72  684.11
  108.63  684.06  137.28     684

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   40.57     .03    69.5    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         40.57    69.5               80      80      80             .3       .5

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                  RS: 7

INPUT
Description: 1013+95
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     688   20.85   687.4   25.34  678.66   27.92  676.03    36.9  675.63
   47.01  673.44   55.49  677.71   60.33  684.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   20.85     .03   60.33    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         20.85   60.33              305     305     305             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   19.67  689.18       F
   65.99   60.33     689       F

CULVERT


RIVER: Sawmill Creek
REACH: 3                  RS: 6.5

INPUT
Description: Culvert Under I-55 144"x60" RCBC
Distance from Upstream XS =      18
Deck/Roadway Width        =     263
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
-621.675     691     670      61     689     670

Upstream Bridge Cross Section Data
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     688   20.85   687.4   25.34  678.66   27.92  676.03    36.9  674.36
   47.01  673.44   55.49  677.71   60.33  684.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   20.85     .03   60.33    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
         20.85   60.33             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   19.67  689.18       F
   65.99   60.33     689       F

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

```
 -13.741     691     670 485.939     689     670     516     689

Downstream Bridge Cross Section Data
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     680   35.81  677.47   71.39   677.3  114.59  678.56  119.33  676.59
  119.74  675.55  127.96  672.67  132.04  672.67  139.97  673.59  142.45  673.32
  143.93  672.79  146.43  672.98  148.14  674.24  151.98  676.18  193.77  677.83
  290.48  677.67  371.91  678.65     516  681.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  114.59    .047  193.77    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
        114.59  193.77             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  121.57     685       F
  140.31     516     685       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 =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      12
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
           17.1569  279.16     .012     .012        0                  .5               1
Upstream   Elevation =  674.36
           Centerline Station =  42.8343
Downstream Elevation =  673.91
           Centerline Station =  130.9385

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 6

INPUT
Description: 1017+00
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     680   35.81  677.47   71.39   677.3  114.59  678.56  119.33  676.59
  119.74  675.55  127.96  672.67  132.04  672.67  139.97  673.59  142.45  673.32
  143.93  672.79  146.43  672.98  148.14  674.24  151.98  676.18  193.77  677.83
  290.48  677.67  371.91  678.65     516  681.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  114.59    .047  193.77    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        114.59  193.77               95     150     140             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  121.57     685       F
  140.31     516     685       F

CROSS SECTION
```

RIVER: Sawmill Creek
REACH: 3 RS: 5.7

INPUT
Description: 1018+60-Created using 2' topo shifted 116' right.
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6	679.096	94.78	678	116	678	122.23	676	126.26	674
134	672	139.4	674	143.04	676	146.33	678	210	680

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
6	.065	122.23	.047	143.04	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
122.23	143.04	374	350	182	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 5

INPUT
Description: 1022+00_Extended and modfided Using 2' Topo.
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	677.47	6.644	671.47	12.51	671	14.91	671.28	15.85	671.45
19.68	672.38	27	672.01	28.69	671.55	30.82	671.04	32.15	671.12
33.82	671.1	34.82	670.89	35.74	672.66	39.75	672.11	47.51	674.8
67.75	675.74	211.38	678	285	680				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	0	.047	67.75	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	67.75	270	490	495	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 4

INPUT
Description: 1026+90_Extended using 2' Topo
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-174	676	-114.85	674	-60.54	674	0	674	7.58	672
12.88	671.26	22.25	670.83	24.52	668.76	26.79	667.95	30.34	667.88
34.09	668	37.46	668.73	39.26	669.5	40.73	671.07	47.61	672.4
56.77	674.37	86.97	675.03	142.97	675.83				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-174	.065	0	.047	56.77	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	56.77	88	150	30	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: 3 RS: 3

INPUT
Description: 1028+50_Extended using 2' topo

```
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 677.108   79.93 675.398   127.4 671.709  128.92  668.74  130.79  667.48
  134.19 667.712  139.83  668.27  144.41  668.74  146.85 670.253   152.5     670
  158.64     672  165.19     674     332     676

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065   127.4    .047  158.64    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         127.4  158.64              60      60      90             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      80   675.1       F
   223.5     332  673.75       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                  RS: 2

INPUT
Description: 1029+10
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  677.52   46.67  676.76   91.98  676.39  140.23  676.01  184.11  675.49
  216.06  675.09  219.69  673.32   228.3  670.88   231.3  668.86     233  668.28
     237  668.54     239  668.61   241.7  668.72     250  671.51   257.3  673.56
   282.3  673.72  299.23  673.77  411.23     676  515.23     676

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  216.06    .047   257.3    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.06   257.3              20      20      20             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     232   675.1       F
     253  515.23  673.75       F

BRIDGE


RIVER: Sawmill Creek
REACH: 3                  RS: 1.9

INPUT
Description: Private Bridge - pressure/weir
Distance from Upstream XS =     1.5
Deck/Roadway Width        =    17.2
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 140.232 675.841         184.112 675.436             188 675.216
 228.303 675.104             233  675.16  673.96   242.5 675.173  673.98
     251 675.203     674 264.813 675.075         286.315 674.074
 298.145 673.773

Upstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  677.52   46.67  676.76   91.98  676.39  140.23  676.01  184.11  675.49
  216.06  675.09  219.69  673.32   228.3  670.88     233  669.19     237  669.11
  246.68  669.19     251  669.86  261.66  673.56  287.09  673.72  304.02  673.77
  416.78     676  521.78     676

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  216.06    .047  261.66    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
        216.06  261.66             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     232   675.1       F
     253  521.78  673.75       F

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 140.232 675.841         184.112 675.436             188 675.216
 228.303 675.104             233  675.16  673.98   242.5 675.173  674.04
     251 675.203  674.09 264.813 675.075         286.315 674.074
 298.145 673.773

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  677.52   46.67  676.76   91.98  676.39  140.23  676.01  184.11  675.49
  216.06  675.09  219.69  673.32   228.3  670.88     233  668.07  237.43  668.16
  247.27  668.21     251  668.45  261.66  673.56  287.09  673.72  304.02  673.77
  416.78     676  521.78     676

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  216.06    .047  261.66    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
        216.06  261.66             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  232.25   674.5       F
  254.25  521.78  673.56       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 =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=   242.5    Downstream=   242.5
Upstream     num=       2
    Width   Elev    Width   Elev
     1.6     660      1.6 675.591
Downstream     num=       2
    Width   Elev    Width   Elev
     1.6     660      1.6 675.591

Number of Bridge Coefficient Sets =  1

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

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
```

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

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 1.8

INPUT
Description: 1029+30 Copied from XS 2
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  677.52   46.67  676.76   91.98  676.39  140.23  676.01  184.11  675.49
  216.06  675.09  219.69  673.32   228.3  670.88   231.3  668.86     233  668.28
     237  668.54     239  668.61   241.7  668.72     250  671.51   257.3  673.56
   282.3  673.72  299.23  673.77  411.23     676  515.23     676

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065  216.06    .047   257.3    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.06   257.3              410     410     390             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  232.25   674.5       F
  254.25  515.23  673.56       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: 1

INPUT
Description: 1033+55_ Extended using 2' Topo
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -133.84     676 -106.79     674   -85.3     672  -43.76     670  -39.41     670
   -31.3     672       0  673.05     2.8  672.13   54.78  672.68    77.4  672.63
   89.89  666.28   95.88  666.25  101.12  665.83   102.2  665.56  103.59  665.48
  106.22  665.34   106.6  665.57  109.46  668.42  112.39  668.65   114.4  670.65
  114.88  670.82   116.1   671.3   140.3  673.39  170.33     676  205.02  676.81
  249.19  676.07  323.32  675.43

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -133.84    .065    77.4    .047   116.1    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          77.4   116.1                1       1       1             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -133.84 -133.84   674.5       F
  298.16  323.32  673.56       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: 3                 RS: .5

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  681.12     100  675.82     200  673.62     300  674.92     400  676.42
     453  672.02     471  671.12     482  671.82     500  670.72     515  672.02
```

563	672.22	600	672.62	624	672.62	628	671.02	633	667.22
634	668.12	639	664.92	644	664.82	648	665.22	652	665.12
658	670.82	661	672.32	675	672.02	700	674.12	746	677.22
800	675.52	900	675.72	1000	676.22	1100	677.02	1200	675.62
1300	675.22	1400	677.02	1500	675.42	1600	675.92		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	628	.055	658	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
628	658	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3
3	11	.06	.047	.06
3	10	.06	.047	.06
3	9.5	.065	.055	.065
3	9	.06	.047	.06
3	8.5	Culvert		
3	8	.045	.03	.045
3	7.5	.045	.03	.045
3	7	.045	.03	.045
3	6.5	Culvert		
3	6	.065	.047	.065
3	5.7	.065	.047	.065
3	5	.065	.047	.065
3	4	.065	.047	.065
3	3	.065	.047	.065
3	2	.065	.047	.065
3	1.9	Bridge		
3	1.8	.065	.047	.065
3	1	.065	.047	.065
3	.5	.07	.055	.08

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
3	11	508	508	508
3	10	121	121	121
3	9.5	371	371	371
3	9	80	80	80
3	8.5	Culvert		
3	8	290	290	290
3	7.5	80	80	80
3	7	305	305	305
3	6.5	Culvert		
3	6	95	150	140
3	5.7	374	350	182
3	5	270	490	495
3	4	88	150	30
3	3	60	60	90
3	2	20	20	20
3	1.9	Bridge		
3	1.8	410	410	390
3	1	1	1	1
3	.5	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.
3	11	.1	.3
3	10	.1	.3
3	9.5	.3	.5
3	9	.3	.5
3	8.5	Culvert	
3	8	.3	.5
3	7.5	.3	.5
3	7	.3	.5
3	6.5	Culvert	
3	6	.3	.5
3	5.7	.1	.3
3	5	.1	.3
3	4	.1	.3
3	3	.3	.5
3	2	.3	.5
3	1.9	Bridge	
3	1.8	.3	.5
3	1	.1	.3
3	.5	.1	.3

10-Year Design Existing

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 10 Year

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)	
3	11	10 Year	260.50	677.38	681.31	679.66	681.42	0.002601	2.72	95.82	51.06	0.32
3	10	10 Year	260.50	676.32	680.63		680.68	0.000909	1.93	200.53	243.72	0.20
3	9.5	10 Year	260.50	676.52	680.55		680.56	0.000820	1.53	404.21	486.89	0.15
3	9	10 Year	260.50	675.55	680.00	677.97	680.10	0.001779	2.59	106.65	246.14	0.27
3	8.5		Culvert									
3	8	10 Year	260.50	674.75	679.61	677.56	679.90	0.001210	4.37	59.61	19.12	0.37
3	7.5	10 Year	260.50	673.99	678.29		679.04	0.008209	6.93	37.61	15.91	0.79
3	7	10 Year	260.50	673.44	678.44	676.60	678.57	0.000894	2.89	90.15	30.44	0.30
3	6.5		Culvert									
3	6	10 Year	260.50	672.67	677.00	675.08	677.22	0.002454	3.72	70.10	54.49	0.34
3	5.7	10 Year	260.50	672.00	675.79	675.31	676.37	0.014700	6.07	42.90	20.02	0.73
3	5	10 Year	260.50	670.89	674.25		674.36	0.002732	2.72	95.66	42.36	0.32
3	4	10 Year	260.50	667.88	673.65		673.70	0.000770	1.73	150.77	52.13	0.18
3	3	10 Year	260.50	667.48	673.56	670.28	673.61	0.000541	1.84	160.88	60.09	0.16
3	2	10 Year	260.50	668.28	673.34	671.06	673.51	0.002047	3.35	77.68	36.85	0.31
3	1.9		Bridge									
3	1.8	10 Year	260.50	668.28	673.05	671.10	673.26	0.002902	3.65	71.28	34.87	0.36
3	1	10 Year	626.60	665.34	672.46	669.18	672.58	0.001260	2.98	282.26	156.55	0.24
3	.5	10 Year	626.60	664.82	672.42	668.64	672.57	0.001746	3.29	262.66	188.58	0.24

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 10 Year

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)
3	11	10 Year	681.42	681.31	0.11	0.73	0.02		260.50		51.06
3	10	10 Year	680.68	680.63	0.05	0.10	0.01	34.60	224.20	1.70	243.72
3	9.5	10 Year	680.56	680.55	0.01	0.43	0.03	68.94	48.06	143.50	486.89
3	9	10 Year	680.10	680.00	0.10			10.39	249.40	0.71	246.14
3	8.5		Culvert								
3	8	10 Year	679.90	679.61	0.30	0.73	0.13		260.50		19.12
3	7.5	10 Year	679.04	678.29	0.75	0.16	0.31		260.50		15.91
3	7	10 Year	678.57	678.44	0.13				260.50		30.44
3	6.5		Culvert								
3	6	10 Year	677.22	677.00	0.21	0.74	0.11		260.50		54.49
3	5.7	10 Year	676.37	675.79	0.57	1.87	0.14		260.50		20.02
3	5	10 Year	674.36	674.25	0.12	0.64	0.02		260.50		42.36
3	4	10 Year	673.70	673.65	0.05	0.09	0.00		260.50		52.13
3	3	10 Year	673.61	673.56	0.05	0.06	0.04	11.04	247.73	1.73	60.09
3	2	10 Year	673.51	673.34	0.17				260.50		36.85
3	1.9		Bridge								
3	1.8	10 Year	673.26	673.05	0.21	0.64	0.04		260.50		34.87
3	1	10 Year	672.58	672.46	0.12	0.00	0.00	81.35	540.87	4.38	156.55
3	.5	10 Year	672.57	672.42	0.15			51.46	572.62	2.52	188.58

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017

Sawmill Creek 3

Legend

WS 10 Year

Ground

Elevation (ft)

690

685

680

675

670

665

660

0

500

1000

1500

2000

2500

3000

3500

Main Channel Distance (ft)

1.8 1029+30 Copied from XS 2

3 1028+50_Extended using 2' to...

4 1026+90_Extended using 2' Topo...

5 1022+00_Extended and modfided Using 2' Top...

5.7 1018+60-Created using 2' topo shifted 116' ri...

6 1017+00

6.5 Culvert Under I-55 144"x60" RCBC

7.5 1013+15_Extended using 2' topo

8 1011+05_Extended using 2' topo

8.5 US 66 N Frontage Road 144"x60" RCBC

9.5 SWS0007 SM039 WSP 2 Model

10 1005+33

11 1000+25

Errors Warnings and Notes for Plan : Existing2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 10 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 10 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 9 Profile: 10 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 7.5 Profile: 10 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 7 Profile: 10 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 5.7 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 10 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 10 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 10 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 10 Year Downstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: .5 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.

50-Year Design Existing

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 50 Year

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)	
3	11	50 Year	420.30	677.38	682.38	680.24	682.49	0.002290	2.63	188.07	207.95	0.30
3	10	50 Year	420.30	676.32	682.25		682.25	0.000161	0.90	773.42	429.43	0.09
3	9.5	50 Year	420.30	676.52	682.24		682.24	0.000061	0.56	1458.06	751.13	0.04
3	9	50 Year	420.30	675.55	682.21	678.69	682.21	0.000090	0.86	930.82	646.61	0.07
3	8.5		Culvert									
3	8	50 Year	420.30	674.75	680.98	678.38	681.25	0.001286	4.24	99.20	20.34	0.34
3	7.5	50 Year	420.30	673.99	679.86		680.51	0.004614	6.44	65.24	19.31	0.62
3	7	50 Year	420.30	673.44	680.00	677.18	680.14	0.000627	3.01	139.47	32.43	0.26
3	6.5		Culvert									
3	6	50 Year	420.30	672.67	677.97	675.76	678.32	0.002977	4.77	88.14	264.48	0.39
3	5.7	50 Year	420.30	672.00	676.60		677.37	0.013512	7.05	60.35	23.65	0.73
3	5	50 Year	420.30	670.89	675.20		675.34	0.002775	3.02	139.05	53.55	0.33
3	4	50 Year	420.30	667.88	674.72		674.77	0.000611	1.81	303.18	208.99	0.17
3	3	50 Year	420.30	667.48	674.61	670.87	674.68	0.000593	2.22	248.18	126.03	0.17
3	2	50 Year	420.30	668.28	674.37	671.86	674.58	0.002164	3.73	143.60	111.97	0.32
3	1.9		Bridge									
3	1.8	50 Year	420.30	668.28	673.96	671.91	674.26	0.003489	4.41	106.43	90.48	0.40
3	1	50 Year	1010.10	665.34	673.27	670.23	673.43	0.001498	3.59	456.02	237.93	0.27
3	.5	50 Year	1010.10	664.82	673.26	669.72	673.43	0.001888	3.75	458.95	251.70	0.26

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 50 Year

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)
3	11	50 Year	682.49	682.38	0.10	0.20	0.03		402.50	17.80	207.95
3	10	50 Year	682.25	682.25	0.01	0.01	0.00	189.71	176.44	54.15	429.43
3	9.5	50 Year	682.24	682.24	0.00	0.03	0.00	172.83	26.98	220.48	751.13
3	9	50 Year	682.21	682.21	0.01			12.01	147.68	260.61	646.61
3	8.5		Culvert								
3	8	50 Year	681.25	680.98	0.28	0.64	0.11		420.30		20.34
3	7.5	50 Year	680.51	679.86	0.64	0.11	0.25		420.30		19.31
3	7	50 Year	680.14	680.00	0.14				420.30		32.43
3	6.5		Culvert								
3	6	50 Year	678.32	677.97	0.35	0.83	0.13		420.30		264.48
3	5.7	50 Year	677.37	676.60	0.77	1.84	0.19	0.64	419.35	0.31	23.65
3	5	50 Year	675.34	675.20	0.14	0.54	0.03		420.30		53.55
3	4	50 Year	674.77	674.72	0.05	0.09	0.00	38.91	380.89	0.50	208.99
3	3	50 Year	674.68	674.61	0.07	0.06	0.04	38.56	373.19	8.55	126.03
3	2	50 Year	674.58	674.37	0.20				393.88	26.42	111.97
3	1.9		Bridge								
3	1.8	50 Year	674.26	673.96	0.30	0.76	0.07		413.62	6.68	90.48
3	1	50 Year	673.43	673.27	0.16	0.00	0.00	225.52	764.86	19.71	237.93
3	.5	50 Year	673.43	673.26	0.17			241.42	746.23	22.45	251.70

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017

Sawmill Creek 3

Legend

WS 50 Year

Ground

Elevation (ft)

690

685

680

675

670

665

660

0

500

1000

1500

2000

2500

3000

3500

Main Channel Distance (ft)

1.8 1029+30 Copied from XS 2

3 1028+50_Extended using 2' to...

4 1026+90_Extended using 2' Topo...

5 1022+00_Extended and modfided Using 2' Top...

5.7 1018+60-Created using 2' topo shifted 116' ri...

6 1017+00

6.5 Culvert Under I-55 144"x60" RCBC

7.5 1013+15_Extended using 2' topo

8 1011+05_Extended using 2' topo

8.5 US 66 N Frontage Road 144"x60" RCBC

9.5 SWS0007 SM039 WSP 2 Model

10 1005+33

11 1000+25

Errors Warnings and Notes for Plan : Existing2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 50 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 50 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 7.5 Profile: 50 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 7 Profile: 50 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 50 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 50 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year Upstream
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.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 50 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

100-Year Design Existing

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 100 Year

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)	
3	11	100 Year	495.30	677.38	682.65	680.47	682.75	0.002079	2.60	247.75	322.69	0.29
3	10	100 Year	495.30	676.32	682.53		682.53	0.000147	0.90	895.58	438.32	0.08
3	9.5	100 Year	495.30	676.52	682.52		682.52	0.000056	0.56	1671.57	762.19	0.04
3	9	100 Year	495.30	675.55	682.49	678.97	682.50	0.000088	0.88	1077.01	716.03	0.07
3	8.5		Culvert									
3	8	100 Year	495.30	674.75	681.53	678.75	681.84	0.001316	4.48	110.68	20.84	0.34
3	7.5	100 Year	495.30	673.99	680.53		681.14	0.003849	6.30	78.59	20.75	0.57
3	7	100 Year	495.30	673.44	680.67	677.41	680.81	0.000567	3.07	161.22	33.23	0.25
3	6.5		Culvert									
3	6	100 Year	495.30	672.67	678.34	676.04	678.76	0.003203	5.21	95.15	314.58	0.41
3	5.7	100 Year	495.30	672.00	676.94		677.78	0.012705	7.38	68.84	25.30	0.73
3	5	100 Year	495.30	670.89	675.48		675.64	0.003092	3.19	155.15	59.97	0.35
3	4	100 Year	495.30	667.88	675.02		675.07	0.000583	1.87	369.17	231.56	0.16
3	3	100 Year	495.30	667.48	674.90	671.10	674.98	0.000646	2.40	288.81	153.97	0.18
3	2	100 Year	495.30	668.28	674.65	672.20	674.86	0.002223	3.95	172.61	126.48	0.33
3	1.9		Bridge									
3	1.8	100 Year	495.30	668.28	674.28	672.23	674.59	0.003445	4.62	132.96	106.90	0.40
3	1	100 Year	1190.60	665.34	673.63	670.77	673.78	0.001432	3.66	541.69	245.82	0.27
3	.5	100 Year	1190.60	664.82	673.62	670.17	673.78	0.001798	3.79	551.11	260.32	0.25

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 100 Year

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)
3	11	100 Year	682.75	682.65	0.10	0.19	0.03	0.53	445.49	49.28	322.69
3	10	100 Year	682.53	682.53	0.01	0.01	0.00	231.73	192.13	71.44	438.32
3	9.5	100 Year	682.52	682.52	0.00	0.03	0.00	214.95	28.35	252.00	762.19
3	9	100 Year	682.50	682.49	0.01			13.48	159.84	321.98	716.03
3	8.5		Culvert								
3	8	100 Year	681.84	681.53	0.31	0.61	0.09		495.30		20.84
3	7.5	100 Year	681.14	680.53	0.62	0.09	0.24		495.30		20.75
3	7	100 Year	680.81	680.67	0.15				495.30		33.23
3	6.5		Culvert								
3	6	100 Year	678.76	678.34	0.42	0.85	0.13		495.30		314.58
3	5.7	100 Year	677.78	676.94	0.84	1.94	0.20	2.10	492.18	1.03	25.30
3	5	100 Year	675.64	675.48	0.16	0.54	0.03		495.30		59.97
3	4	100 Year	675.07	675.02	0.05	0.09	0.00	68.94	423.83	2.53	231.56
3	3	100 Year	674.98	674.90	0.08	0.07	0.04	51.88	425.06	18.36	153.97
3	2	100 Year	674.86	674.65	0.22				444.42	50.88	126.48
3	1.9		Bridge								
3	1.8	100 Year	674.59	674.28	0.32	0.73	0.08		470.09	25.21	106.90
3	1	100 Year	673.78	673.63	0.15	0.00	0.00	330.92	829.73	29.95	245.82
3	.5	100 Year	673.78	673.62	0.16			359.40	795.30	35.90	260.32

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017

Sawmill Creek 3

Legend

WS 100 Year

Ground

Elevation (ft)

690

685

680

675

670

665

660

0

500

1000

1500

2000

2500

3000

3500

Main Channel Distance (ft)

1.8 1029+30 Copied from XS 2

3 1028+50_Extended using 2' to...

4 1026+90_Extended using 2' Topo...

5 1022+00_Extended and modfided Using 2' Top...

5.7 1018+60-Created using 2' topo shifted 116' ri...

6 1017+00

6.5 Culvert Under I-55 144"x60" RCBC

7.5 1013+15_Extended using 2' topo

8 1011+05_Exttended using 2' topo

8.5 US 66 N Frontage Road 144"x60" RCBC

9.5 SWS0007 SM039 WSP 2 Model

10 1005+33

11 1000+25

Errors Warnings and Notes for Plan : Existing2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 100 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 100 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 100 Year Culv: Culvert #1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 7.5 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 7 Profile: 100 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 6.5 Profile: 100 Year Culv: Culvert #1
Note:	During subcritical analysis, the culvert direct step method, the solution went to normal depth.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 100 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 100 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 100 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

500-Year Design Existing

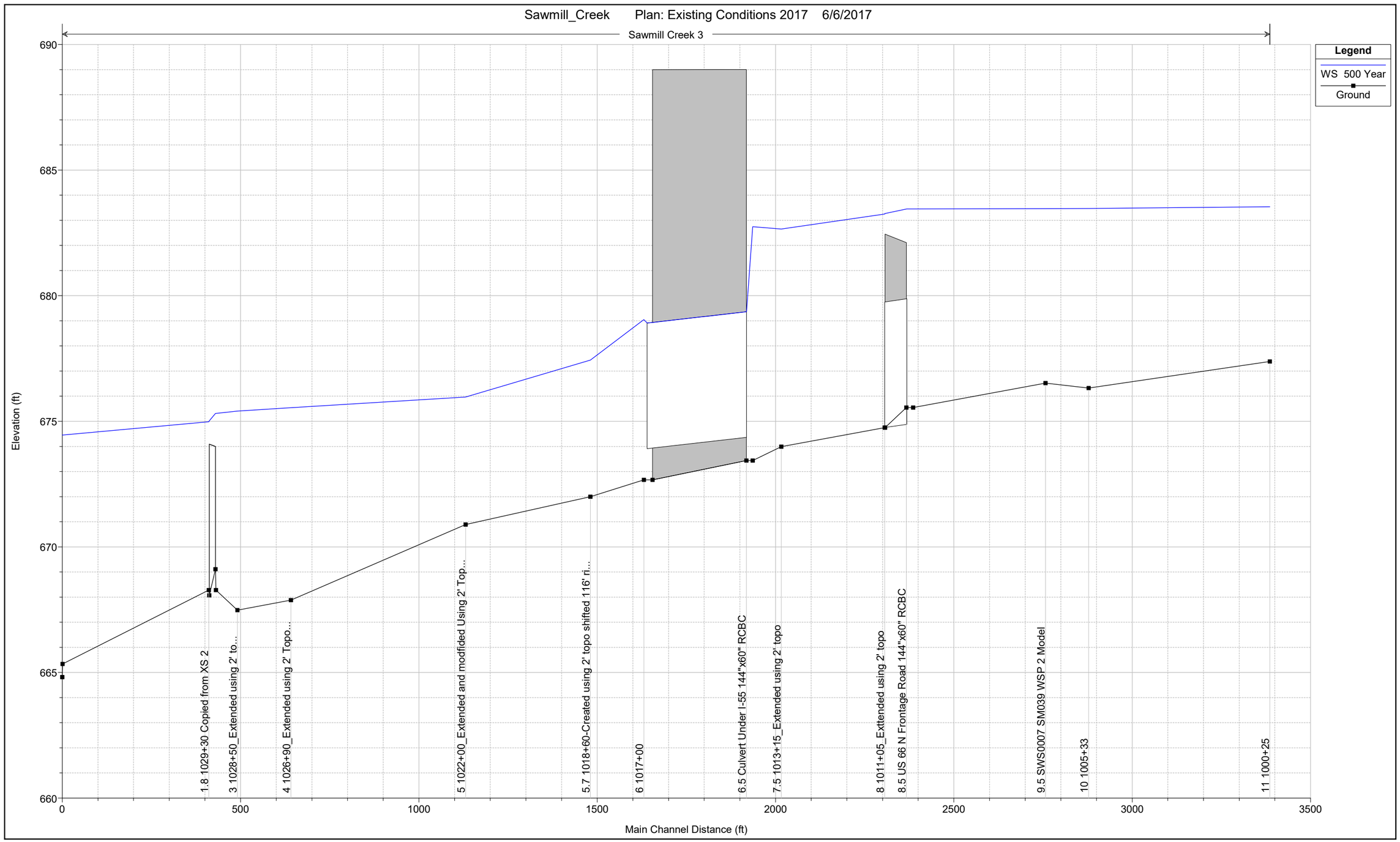
HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 500 Year

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)	
3	11	500 Year	657.00	677.38	683.54	680.92	683.57	0.000654	1.77	620.55	462.46	0.17
3	10	500 Year	657.00	676.32	683.47		683.48	0.000082	0.78	1319.43	461.97	0.06
3	9.5	500 Year	657.00	676.52	683.47		683.47	0.000032	0.47	2410.12	801.99	0.03
3	9	500 Year	657.00	675.55	683.45	679.45	683.46	0.000035	0.62	2170.08	832.73	0.04
3	8.5		Culvert									
3	8	500 Year	657.00	674.75	683.25	679.44	683.45	0.000723	3.81	340.22	495.01	0.26
3	7.5	500 Year	657.00	673.99	682.65		683.07	0.001819	5.15	127.63	25.35	0.40
3	7	500 Year	657.00	673.44	682.74	677.88	682.87	0.000343	2.82	232.91	35.74	0.19
3	6.5		Culvert									
3	6	500 Year	657.00	672.67	679.05	676.64	679.62	0.003643	6.06	108.46	375.73	0.44
3	5.7	500 Year	657.00	672.00	677.44	676.91	678.52	0.013624	8.40	81.91	27.65	0.77
3	5	500 Year	657.00	670.89	675.96		676.16	0.003356	3.53	187.79	80.29	0.37
3	4	500 Year	657.00	667.88	675.54		675.59	0.000556	1.98	502.87	283.09	0.16
3	3	500 Year	657.00	667.48	675.41	671.59	675.50	0.000736	2.71	378.89	202.87	0.19
3	2	500 Year	657.00	668.28	675.31	672.75	675.43	0.001330	2.99	311.97	178.40	0.25
3	1.9		Bridge									
3	1.8	500 Year	657.00	668.28	674.98	672.84	675.14	0.001896	3.41	259.37	143.71	0.30
3	1	500 Year	1578.80	665.34	674.45	671.62	674.58	0.001157	3.59	752.95	265.49	0.24
3	.5	500 Year	1578.80	664.82	674.46	671.14	674.58	0.001394	3.60	821.58	384.24	0.23

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 Profile: 500 Year

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)
3	11	500 Year	683.57	683.54	0.03	0.09	0.01	82.14	412.80	162.06	462.46
3	10	500 Year	683.48	683.47	0.00	0.01	0.00	332.84	209.30	114.87	461.97
3	9.5	500 Year	683.47	683.47	0.00	0.01	0.00	314.81	28.44	313.75	801.99
3	9	500 Year	683.46	683.45	0.00			154.87	133.90	368.23	832.73
3	8.5		Culvert								
3	8	500 Year	683.45	683.25	0.19	0.32	0.07	30.08	562.90	64.02	495.01
3	7.5	500 Year	683.07	682.65	0.41	0.05	0.14		657.00		25.35
3	7	500 Year	682.87	682.74	0.12				657.00		35.74
3	6.5		Culvert								
3	6	500 Year	679.62	679.05	0.57	0.95	0.15		657.00		375.73
3	5.7	500 Year	678.52	677.44	1.08	2.10	0.27	6.66	647.06	3.27	27.65
3	5	500 Year	676.16	675.96	0.19	0.52	0.04		656.51	0.49	80.29
3	4	500 Year	675.59	675.54	0.05	0.09	0.00	137.57	507.36	12.07	283.09
3	3	500 Year	675.50	675.41	0.09	0.06	0.01	81.67	523.25	52.08	202.87
3	2	500 Year	675.43	675.31	0.12			0.38	544.74	111.88	178.40
3	1.9		Bridge								
3	1.8	500 Year	675.14	674.98	0.16	0.54	0.02		573.19	83.81	143.71
3	1	500 Year	674.58	674.45	0.13	0.00	0.00	588.92	929.31	60.57	265.49
3	.5	500 Year	674.58	674.46	0.12			660.26	845.91	72.63	384.24

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017



Errors Warnings and Notes for Plan : Existing2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 500 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 500 Year
Warning:	The weir over culvert is submerged.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 500 Year Culv: Culvert #1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 7 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: .5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

Structure Tables Design Existing

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3

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)
3	8.5 Culvert #1	10 Year	680.10	680.00	678.80	680.10	682.46	260.50		0.39	4.59	4.47
3	8.5 Culvert #1	50 Year	682.21	682.21	680.33	682.21	682.46	420.30		1.23	7.01	7.01
3	8.5 Culvert #1	100 Year	682.50	682.49	681.20	682.50	682.46	370.97	124.33	0.96	6.18	6.18
3	8.5 Culvert #1	500 Year	683.46	683.45	683.34	683.46	682.46	54.61	602.39	0.20	0.91	0.91
3	6.5 Culvert #1	10 Year	678.57	678.44	678.28	678.57	689.01	260.50		1.43	7.40	7.02
3	6.5 Culvert #1	50 Year	680.15	680.00	679.81	680.15	689.01	420.30		2.04	8.75	8.64
3	6.5 Culvert #1	100 Year	680.82	680.67	680.68	680.82	689.01	495.30		2.33	9.28	9.32
3	6.5 Culvert #1	500 Year	682.87	682.74	682.82	682.87	689.01	657.00		3.69	10.95	10.95

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3

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)
3	9.5	10 Year	680.56	680.55	0.01	0.43	0.03	68.94	48.06	143.50	486.89
3	9.5	50 Year	682.24	682.24	0.00	0.03	0.00	172.83	26.98	220.48	751.13
3	9.5	100 Year	682.52	682.52	0.00	0.03	0.00	214.95	28.35	252.00	762.19
3	9.5	500 Year	683.47	683.47	0.00	0.01	0.00	314.81	28.44	313.75	801.99
3	9	10 Year	680.10	680.00	0.10			10.39	249.40	0.71	246.14
3	9	50 Year	682.21	682.21	0.01			12.01	147.68	260.61	646.61
3	9	100 Year	682.50	682.49	0.01			13.48	159.84	321.98	716.03
3	9	500 Year	683.46	683.45	0.00			154.87	133.90	368.23	832.73
3	8.5		Culvert								
3	8	10 Year	679.90	679.61	0.30	0.73	0.13		260.50		19.12
3	8	50 Year	681.25	680.98	0.28	0.64	0.11		420.30		20.34
3	8	100 Year	681.84	681.53	0.31	0.61	0.09		495.30		20.84
3	8	500 Year	683.45	683.25	0.19	0.32	0.07	30.08	562.90	64.02	495.01
3	7.5	10 Year	679.04	678.29	0.75	0.16	0.31		260.50		15.91
3	7.5	50 Year	680.51	679.86	0.64	0.11	0.25		420.30		19.31
3	7.5	100 Year	681.14	680.53	0.62	0.09	0.24		495.30		20.75
3	7.5	500 Year	683.07	682.65	0.41	0.05	0.14		657.00		25.35
3	7	10 Year	678.57	678.44	0.13				260.50		30.44
3	7	50 Year	680.14	680.00	0.14				420.30		32.43
3	7	100 Year	680.81	680.67	0.15				495.30		33.23
3	7	500 Year	682.87	682.74	0.12				657.00		35.74
3	6.5		Culvert								
3	6	10 Year	677.22	677.00	0.21	0.74	0.11		260.50		54.49
3	6	50 Year	678.32	677.97	0.35	0.83	0.13		420.30		264.48
3	6	100 Year	678.76	678.34	0.42	0.85	0.13		495.30		314.58
3	6	500 Year	679.62	679.05	0.57	0.95	0.15		657.00		375.73
3	5.7	10 Year	676.37	675.79	0.57	1.87	0.14		260.50		20.02
3	5.7	50 Year	677.37	676.60	0.77	1.84	0.19	0.64	419.35	0.31	23.65

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3 (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)
3	5.7	100 Year	677.78	676.94	0.84	1.94	0.20	2.10	492.18	1.03	25.30
3	5.7	500 Year	678.52	677.44	1.08	2.10	0.27	6.66	647.06	3.27	27.65

HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3

Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Prs O WS	Q Total	Min El Weir Flow	Q Weir	Delta EG	BR Sluice Coef
			(ft)	(ft)	(sq ft)	(ft)	(cfs)	(ft)	(cfs)	(ft)	
3	1.9	10 Year	673.51	674.00	77.69		260.50	673.76		0.25	
3	1.9	50 Year	674.58	674.00	77.69	674.54	420.30	673.76	58.35	0.32	0.34
3	1.9	100 Year	674.86	674.00	77.69		495.30	673.76	113.62	0.27	
3	1.9	500 Year	675.43	674.00	77.69		657.00	673.76	323.04	0.29	

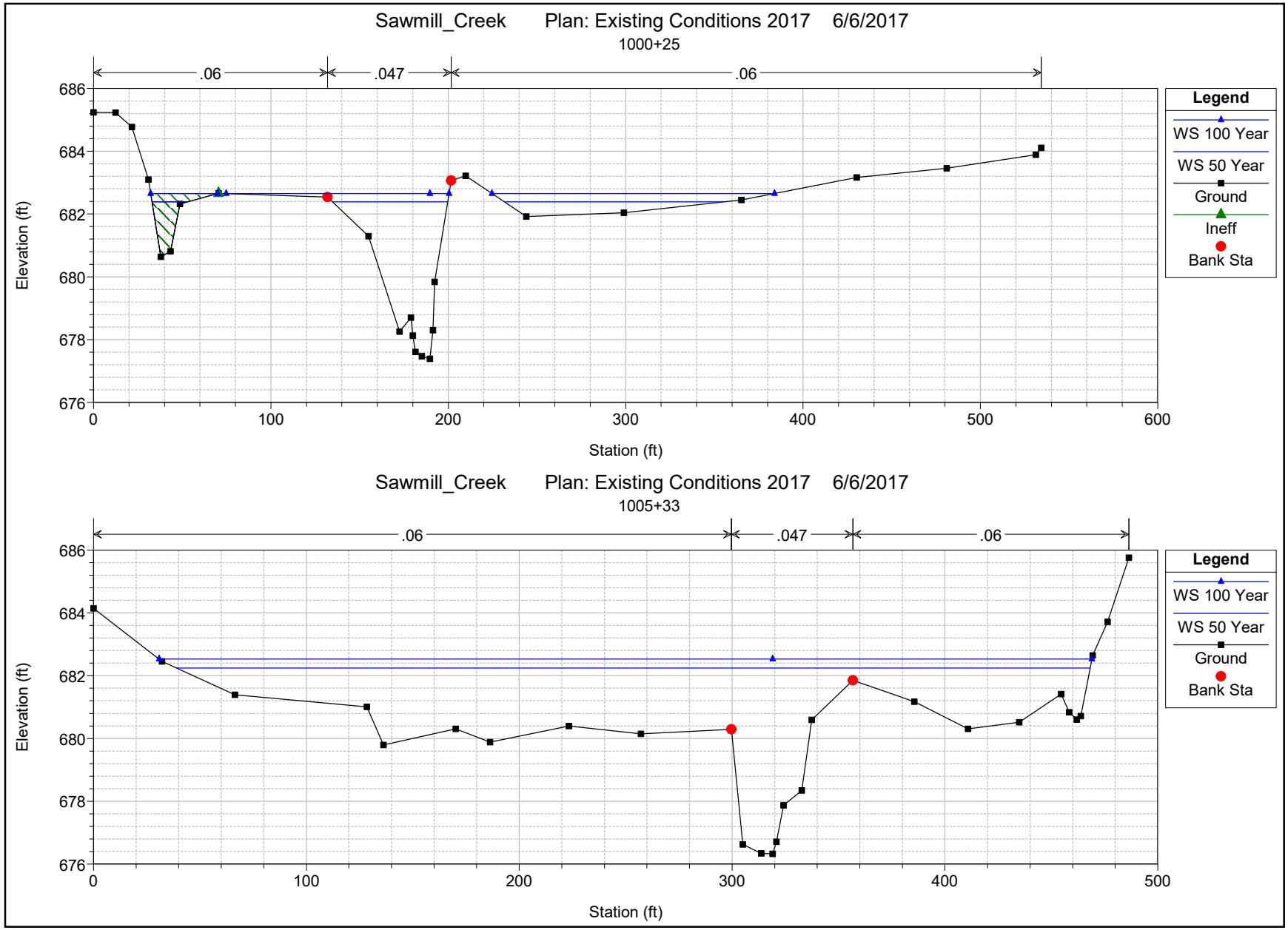
HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3

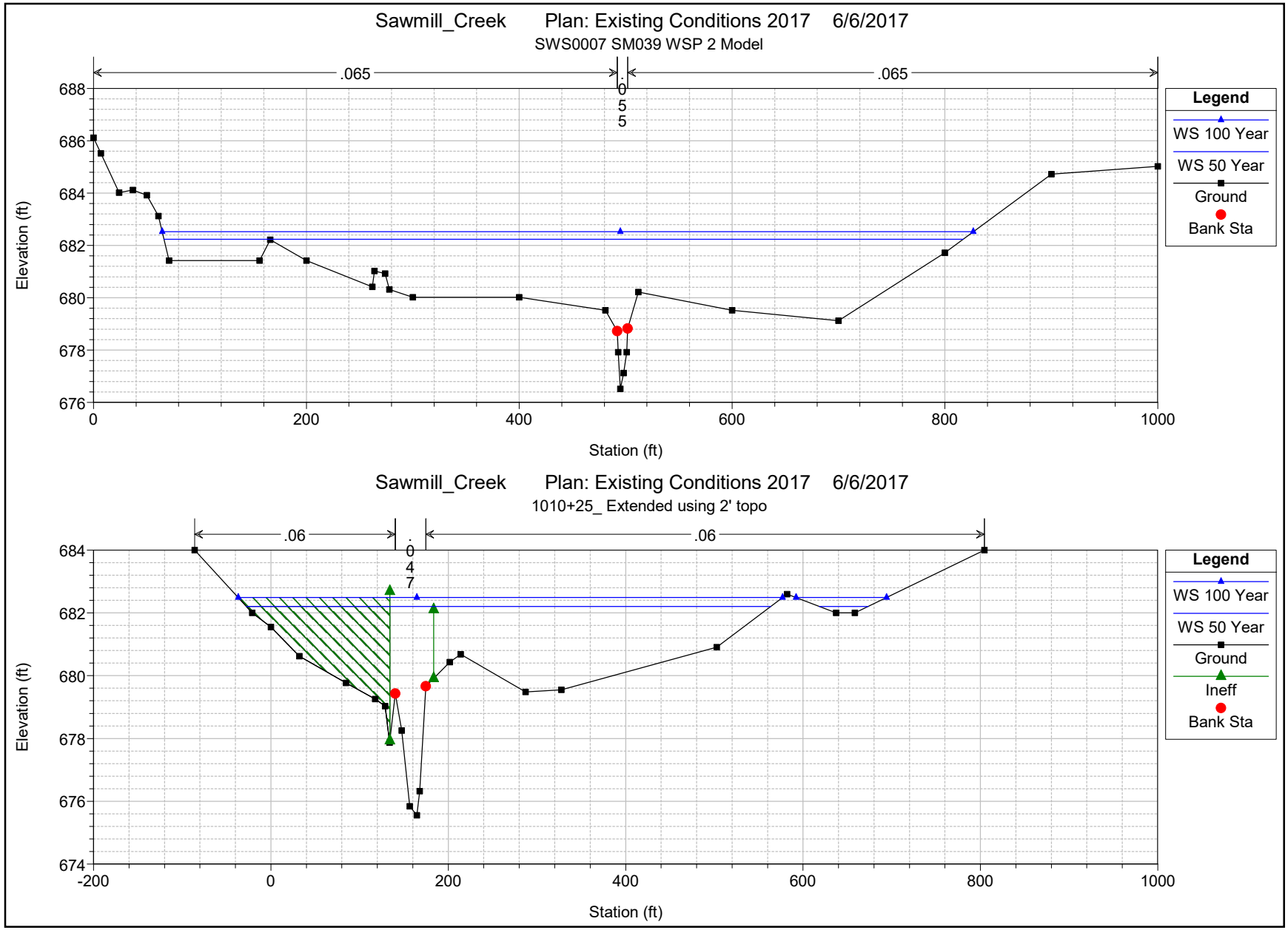
Reach	River Sta	Profile	E.G. US.	W.S. US.	BR Sel Method	Energy EG	Momen. EG	Yarnell EG	WSPRO EG	Prs O EG	Prs/Wr EG	Energy/Wr EG
			(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
3	1.9	10 Year	673.51	673.34	Momentum	673.43	673.51					
3	1.9	50 Year	674.58	674.37	Press/Weir	674.58				674.71	674.58	
3	1.9	100 Year	674.86	674.65	Press/Weir	675.05				675.26	674.86	
3	1.9	500 Year	675.43	675.31	Press/Weir	675.65				676.72	675.43	

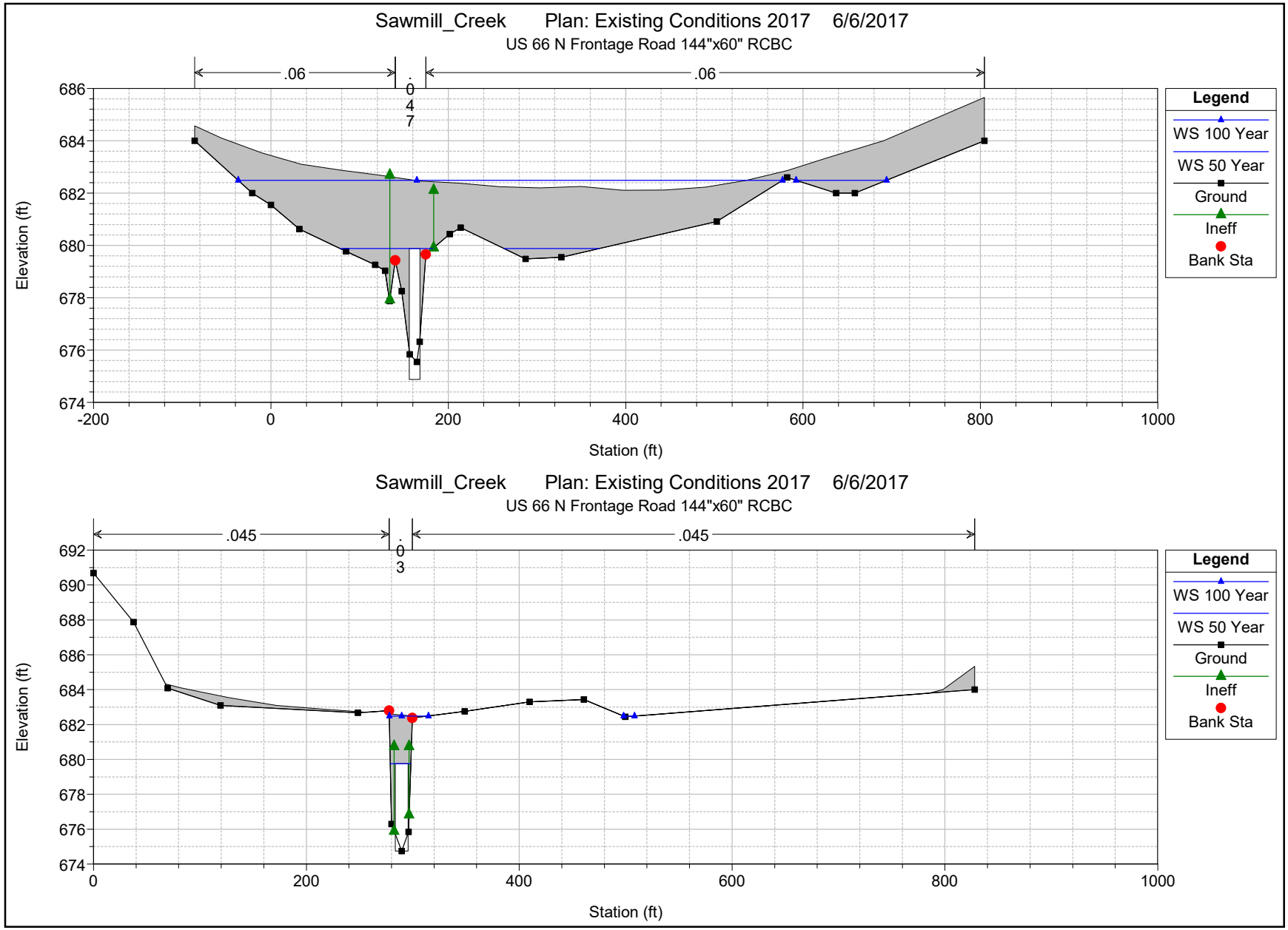
HEC-RAS Plan: Existing2017 River: Sawmill Creek Reach: 3

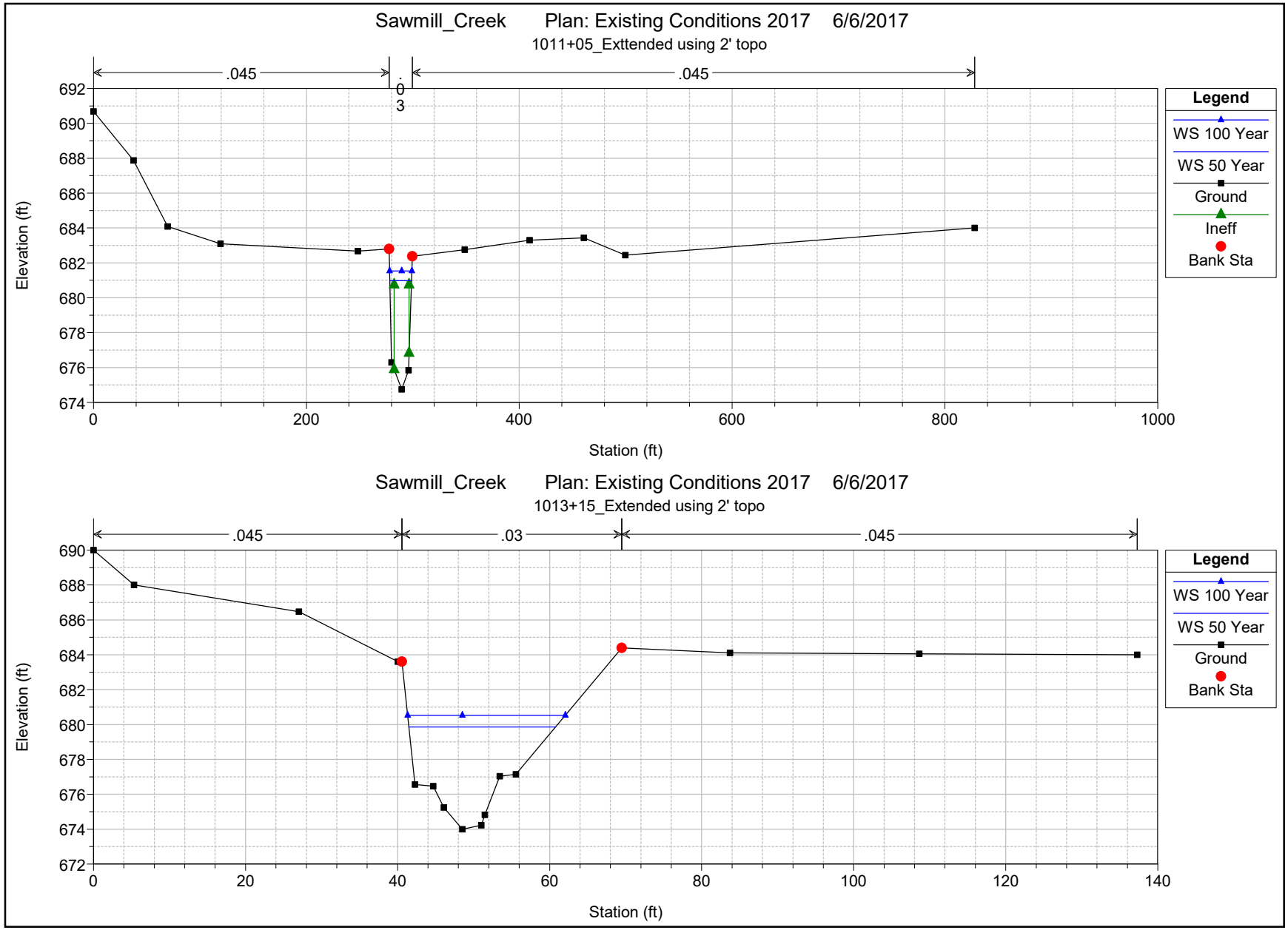
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
3	3	10 Year	673.61	673.56	670.28	0.06	0.04	60.09	11.04	247.73	1.73	1.84
3	3	50 Year	674.68	674.61	670.87	0.06	0.04	126.03	38.56	373.19	8.55	2.22
3	3	100 Year	674.98	674.90	671.10	0.07	0.04	153.97	51.88	425.06	18.36	2.40
3	3	500 Year	675.50	675.41	671.59	0.06	0.01	202.87	81.67	523.25	52.08	2.71
3	2	10 Year	673.51	673.34	671.06			36.85		260.50		3.35
3	2	50 Year	674.58	674.37	671.86			111.97		393.88	26.42	3.73
3	2	100 Year	674.86	674.65	672.20			126.48		444.42	50.88	3.95
3	2	500 Year	675.43	675.31	672.75			178.40	0.38	544.74	111.88	2.99
3	1.9 BR U	10 Year	673.48	673.23	671.24			16.41		260.50		3.98
3	1.9 BR U	50 Year	674.58	674.37	671.98			54.60		361.95	58.09	4.66
3	1.9 BR U	100 Year	674.87	674.65	672.29			74.60		381.68	116.04	4.91
3	1.9 BR U	500 Year	675.43	675.31	672.93			183.71	3.00	354.97	299.03	3.93
3	1.9 BR D	10 Year	672.32	672.06	670.18			16.42		260.50		4.10
3	1.9 BR D	50 Year	674.52	674.35	670.92			52.82		361.95	58.09	3.77
3	1.9 BR D	100 Year	674.78	674.56	671.24			68.13		381.68	116.04	3.98
3	1.9 BR D	500 Year	675.36	675.02	671.87			100.91	3.00	354.97	299.03	3.27
3	1.8	10 Year	673.26	673.05	671.10	0.64	0.04	34.87		260.50		3.65
3	1.8	50 Year	674.26	673.96	671.91	0.76	0.07	90.48		413.62	6.68	4.41
3	1.8	100 Year	674.59	674.28	672.23	0.73	0.08	106.90		470.09	25.21	4.62
3	1.8	500 Year	675.14	674.98	672.84	0.54	0.02	143.71		573.19	83.81	3.41
3	1	10 Year	672.58	672.46	669.18	0.00	0.00	156.55	81.35	540.87	4.38	2.98
3	1	50 Year	673.43	673.27	670.23	0.00	0.00	237.93	225.52	764.86	19.71	3.59
3	1	100 Year	673.78	673.63	670.77	0.00	0.00	245.82	330.92	829.73	29.95	3.66
3	1	500 Year	674.58	674.45	671.62	0.00	0.00	265.49	588.92	929.31	60.57	3.59

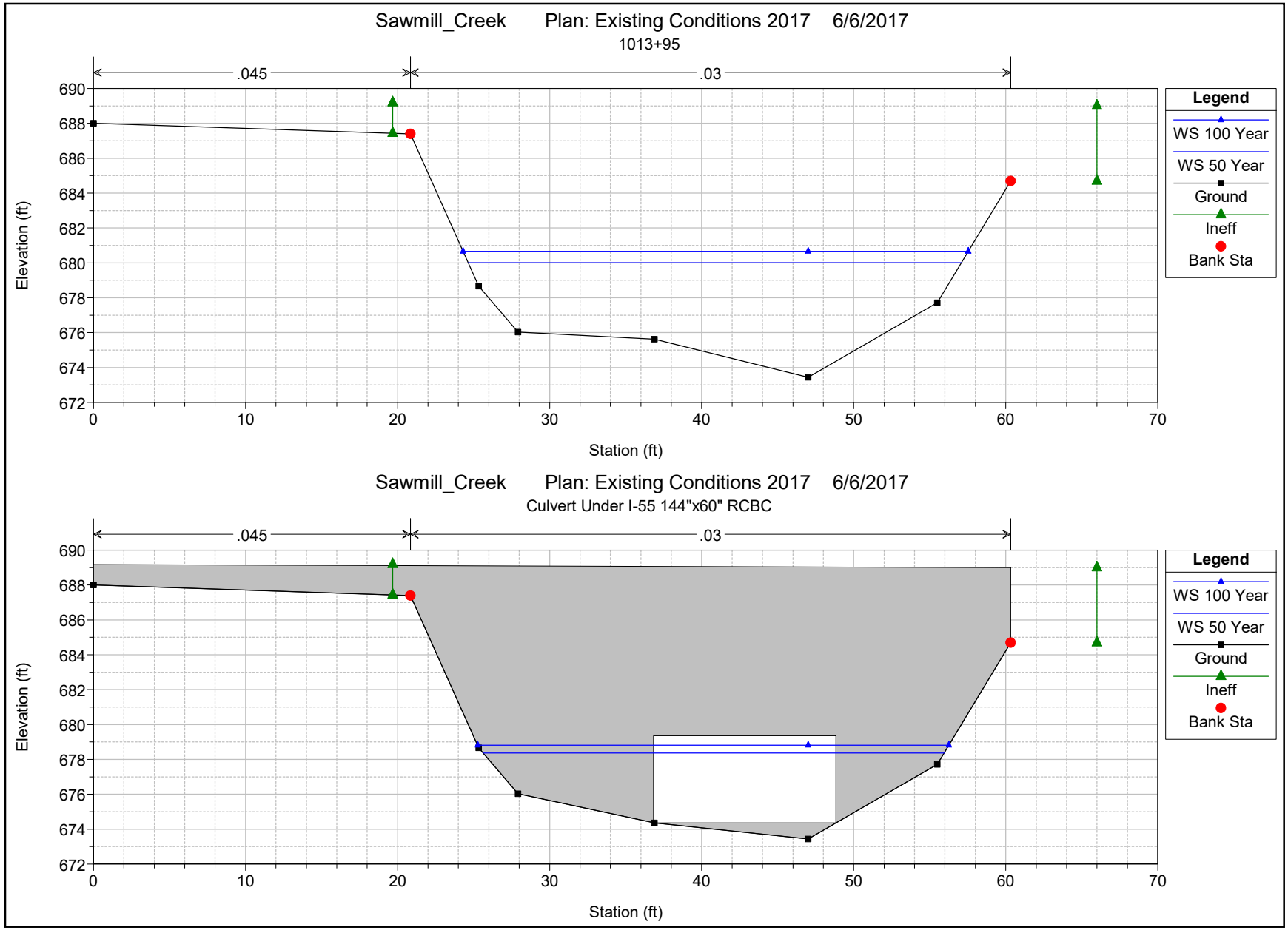
Cross Section Plots

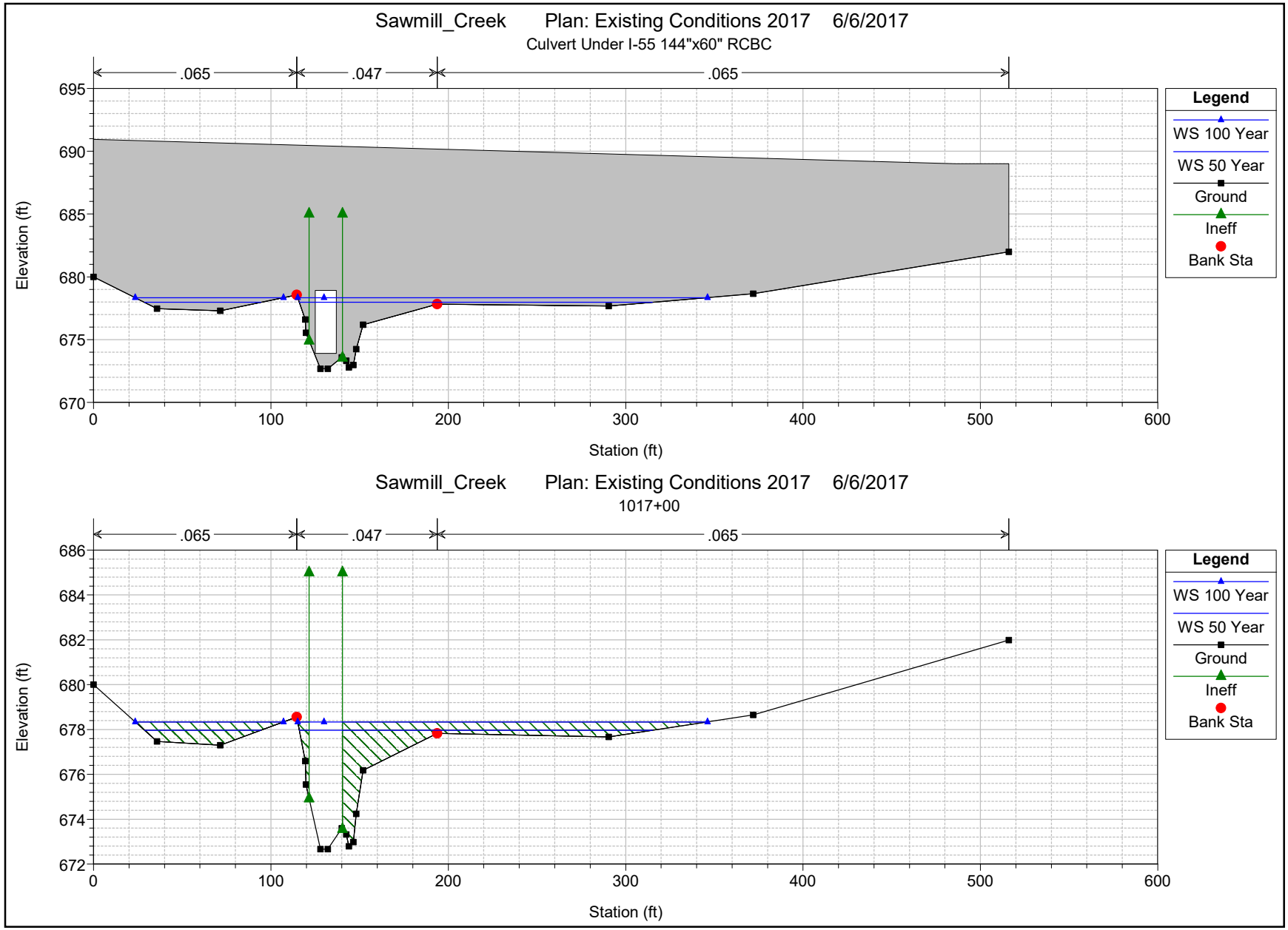

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1000+25
.06
.047
.06
686
684
682
680
678
676
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1005+33
.06
.047
.06
686
684
682
680
678
676
Elevation (ft)
0
100
200
300
400
500
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta

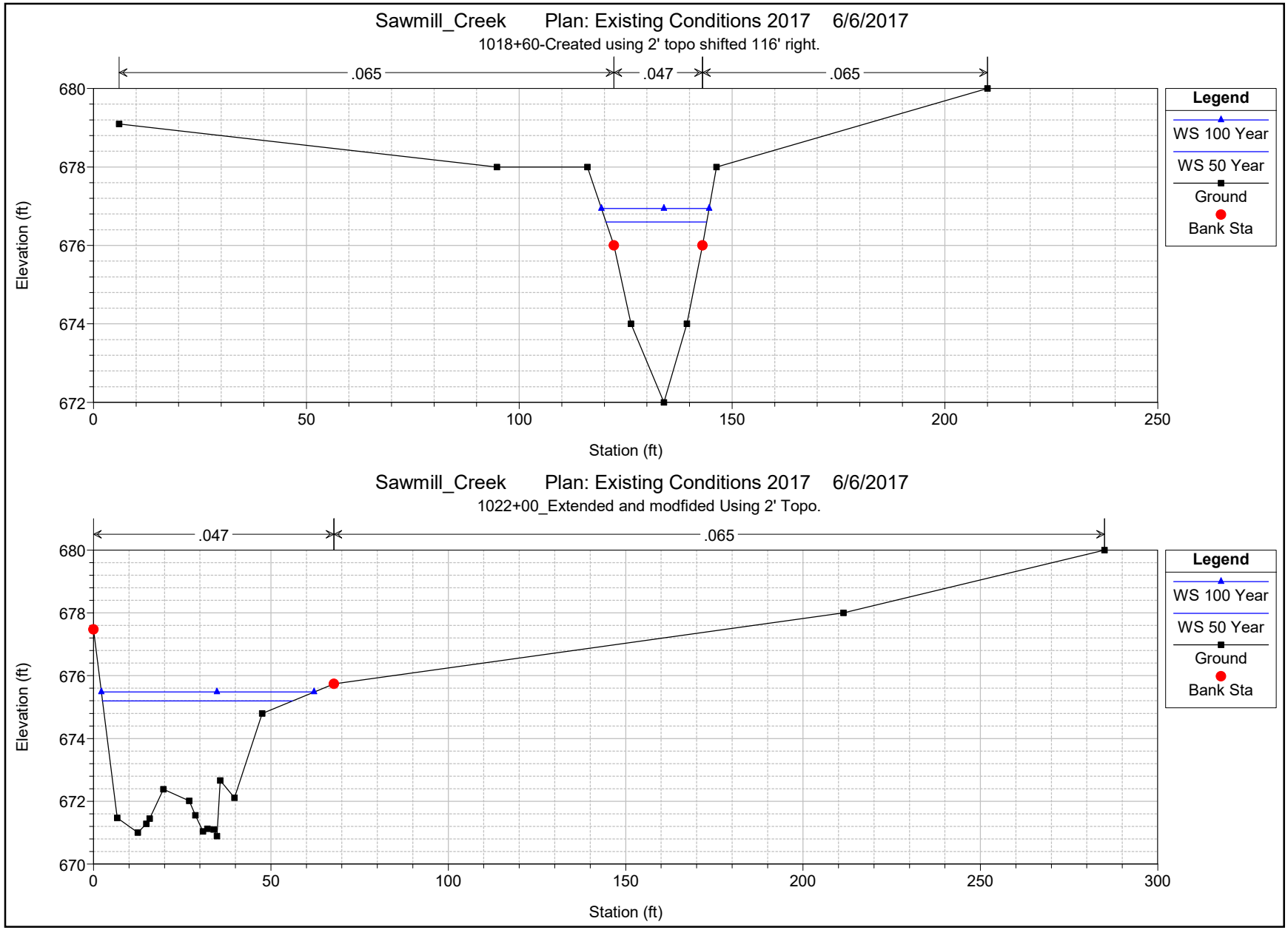

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
SWS0007 SM039 WSP 2 Model
.065
.055
.065
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1010+25_ Extended using 2' topo
.06
.047
.06
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

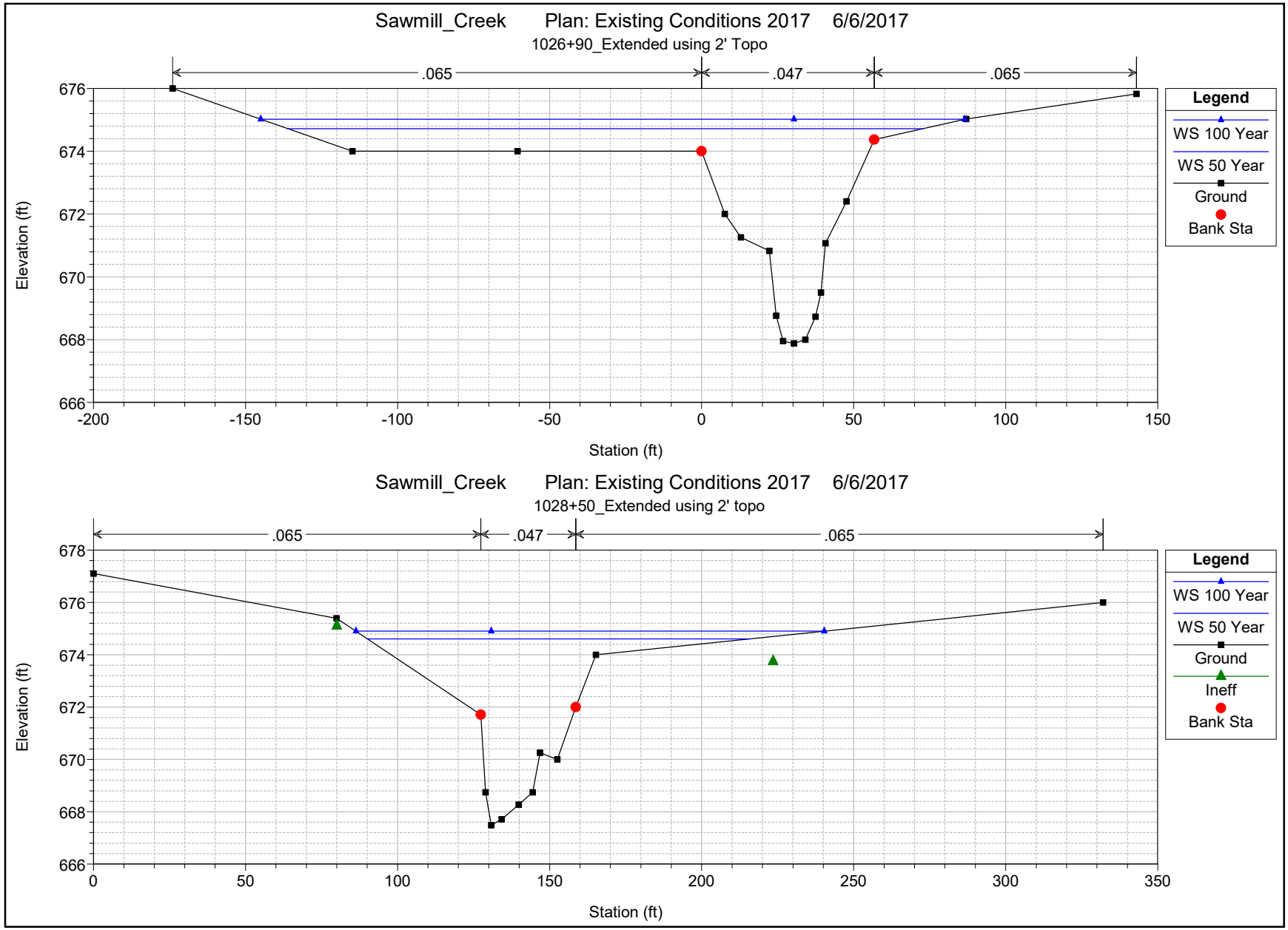

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
US 66 N Frontage Road 144"x60" RCBC
.06
.047
.06
Elevation (ft)
686
684
682
680
678
676
674
-200
0
200
400
600
800
1000
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
US 66 N Frontage Road 144"x60" RCBC
.045
.03
.045
Elevation (ft)
692
690
688
686
684
682
680
678
676
674
0
200
400
600
800
1000
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta

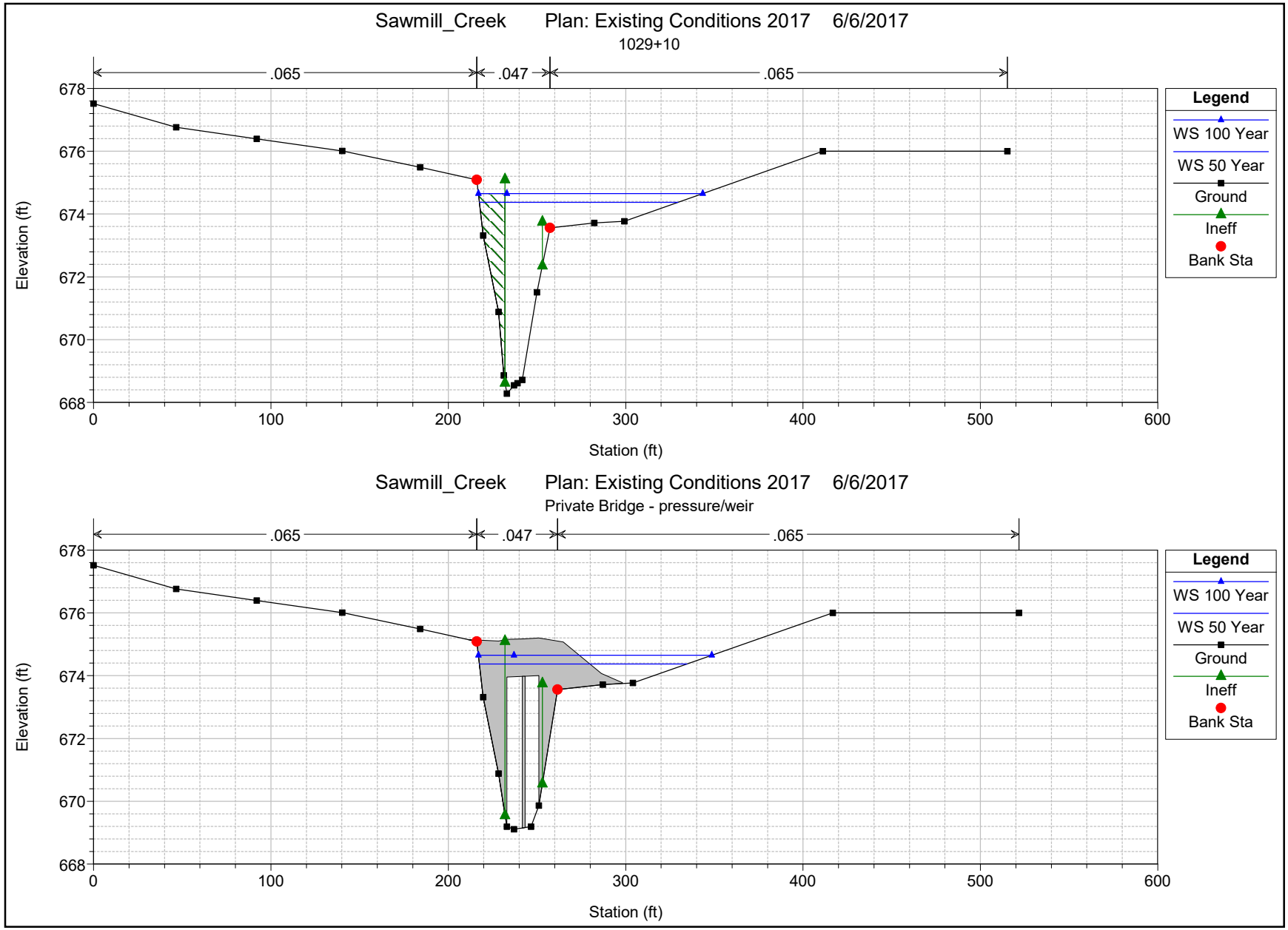

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1011+05_Exttended using 2' topo
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1013+15_Extended using 2' topo
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta

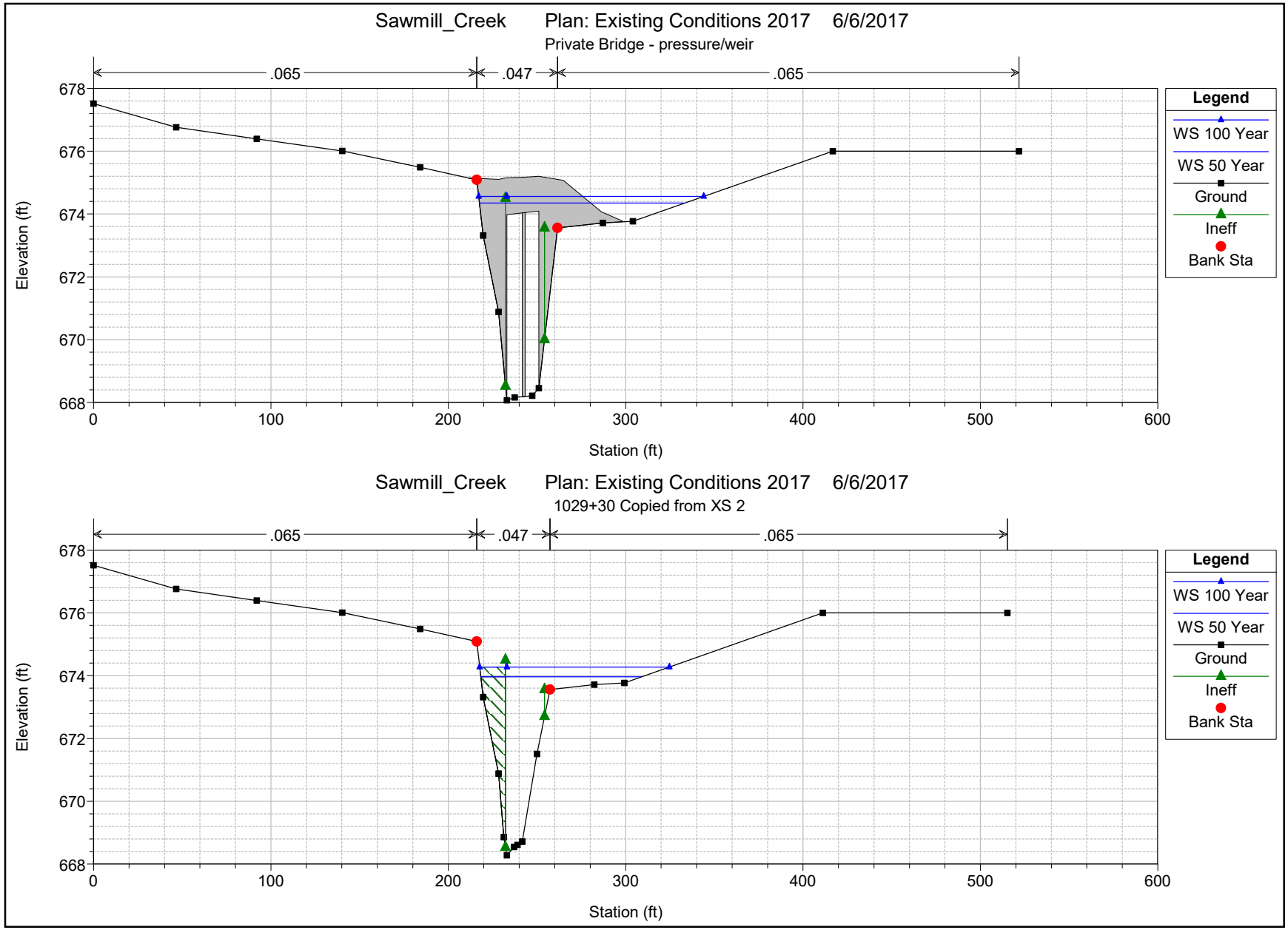

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1013+95
.045
.03
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
Culvert Under I-55 144"x60" RCBC
.045
.03
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta

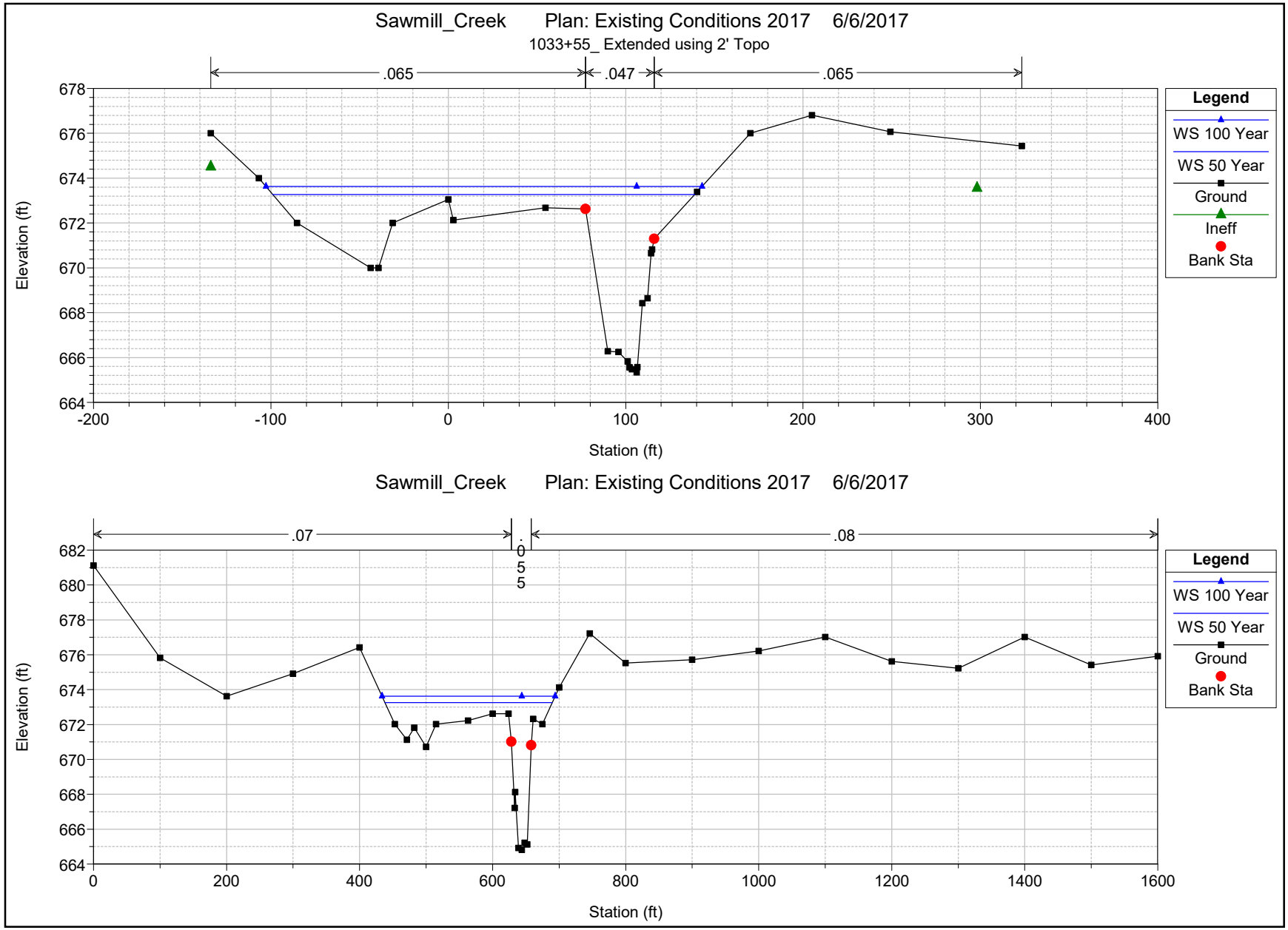

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
Culvert Under I-55 144"x60" RCBC
.065
.047
.065
695
690
685
680
675
670
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1017+00
.065
.047
.065
686
684
682
680
678
676
674
672
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta


Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1018+60-Created using 2' topo shifted 116' right.
.065
.047
.065
680
678
676
674
672
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1022+00_Extended and modfided Using 2' Topo.
.047
.065
680
678
676
674
672
670
Elevation (ft)
0
50
100
150
200
250
300
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta


Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1026+90_Extended using 2' Topo
.065
.047
.065
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1028+50_Extended using 2' topo
.065
.047
.065
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta


Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1029+10
.065
.047
.065
678
676
674
672
670
668
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
Private Bridge - pressure/weir
.065
.047
.065
678
676
674
672
670
668
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta

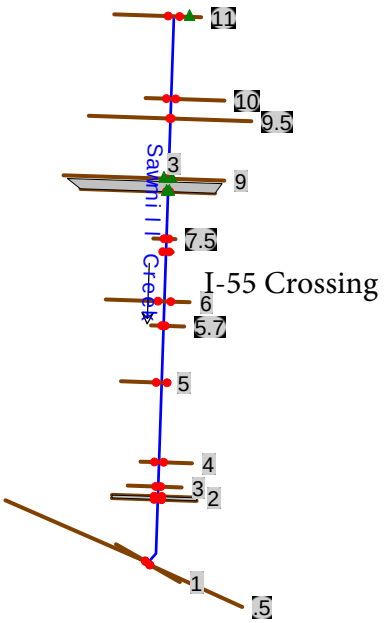

Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
Private Bridge - pressure/weir
.065
.047
.065
678
676
674
672
670
668
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1029+30 Copied from XS 2
.065
.047
.065
678
676
674
672
670
668
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta


Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
1033+55_ Extended using 2' Topo
.065
.047
.065
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Ineff
Bank Sta
Sawmill_Creek Plan: Existing Conditions 2017 6/6/2017
.07
.055
.08
Elevation (ft)
Station (ft)
Legend
WS 100 Year
WS 50 Year
Ground
Bank Sta

TAB E

SECTION 13.E

DESIGN NATURAL CONDTIONS



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

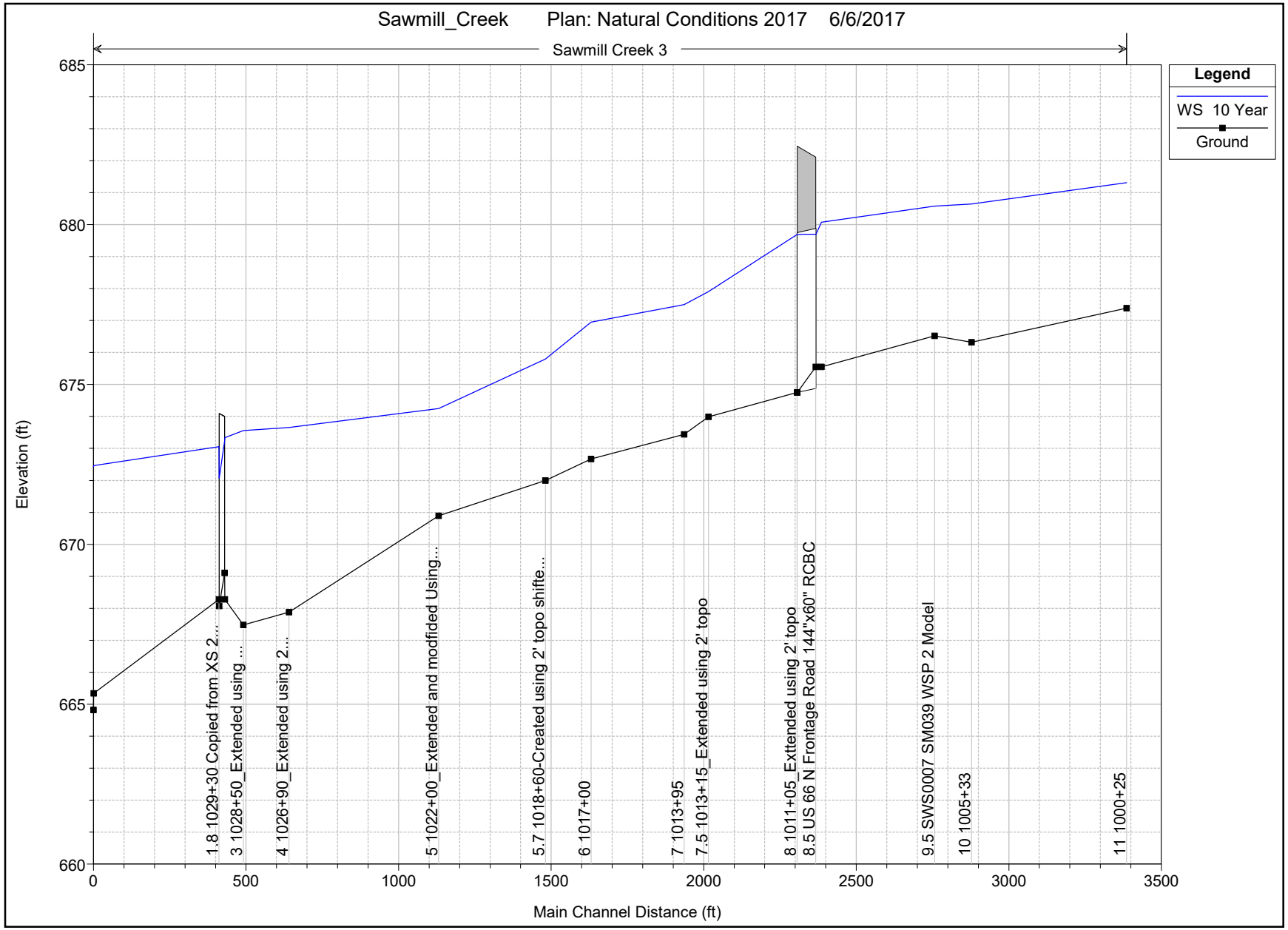
10 Year Design Natural

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 10 Year

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)	
3	11	10 Year	260.50	677.38	681.31	679.66	681.43	0.002592	2.71	95.99	51.17	0.32
3	10	10 Year	260.50	676.32	680.65		680.70	0.000879	1.90	205.85	246.01	0.19
3	9.5	10 Year	260.50	676.52	680.58		680.59	0.000747	1.47	417.56	489.91	0.15
3	9	10 Year	260.50	675.55	680.07	677.97	680.17	0.001620	2.51	110.32	267.38	0.26
3	8.5		Culvert									
3	8	10 Year	260.50	674.75	679.69	677.56	679.98	0.001133	4.28	60.80	19.19	0.36
3	7.5	10 Year	260.50	673.99	677.91	677.91	678.96	0.013382	8.23	31.65	15.08	1.00
3	7	10 Year	260.50	673.44	677.50		677.77	0.002729	4.18	62.38	28.59	0.50
3	6	10 Year	260.50	672.67	676.95		677.03	0.001876	2.24	116.09	53.01	0.27
3	5.7	10 Year	260.50	672.00	675.79	675.31	676.37	0.014700	6.07	42.90	20.02	0.73
3	5	10 Year	260.50	670.89	674.25		674.36	0.002732	2.72	95.66	42.36	0.32
3	4	10 Year	260.50	667.88	673.65		673.70	0.000770	1.73	150.77	52.13	0.18
3	3	10 Year	260.50	667.48	673.56	670.27	673.61	0.000541	1.84	160.87	60.07	0.16
3	2	10 Year	260.50	668.28	673.34	671.06	673.51	0.002047	3.35	77.68	36.85	0.31
3	1.9		Bridge									
3	1.8	10 Year	260.50	668.28	673.05	671.10	673.26	0.002902	3.65	71.28	34.87	0.36
3	1	10 Year	626.60	665.34	672.46	669.18	672.58	0.001260	2.98	282.26	156.55	0.24
3	.5	10 Year	626.60	664.82	672.42	668.64	672.57	0.001746	3.29	262.66	188.58	0.24

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 10 Year

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)
3	11	10 Year	681.43	681.31	0.11	0.71	0.02		260.50		51.17
3	10	10 Year	680.70	680.65	0.05	0.10	0.01	36.72	221.82	1.96	246.01
3	9.5	10 Year	680.59	680.58	0.01	0.39	0.03	70.48	46.55	143.47	489.91
3	9	10 Year	680.17	680.07	0.09			10.86	248.54	1.10	267.38
3	8.5		Culvert								
3	8	10 Year	679.98	679.69	0.29	0.79	0.23		260.50		19.19
3	7.5	10 Year	678.96	677.91	1.05	0.41	0.23		260.50		15.08
3	7	10 Year	677.77	677.50	0.27	0.68	0.06		260.50		28.59
3	6	10 Year	677.03	676.95	0.08	0.61	0.05		260.50		53.01
3	5.7	10 Year	676.37	675.79	0.57	1.87	0.14		260.50		20.02
3	5	10 Year	674.36	674.25	0.12	0.64	0.02		260.50		42.36
3	4	10 Year	673.70	673.65	0.05	0.09	0.00		260.50		52.13
3	3	10 Year	673.61	673.56	0.05	0.06	0.04	11.02	247.75	1.73	60.07
3	2	10 Year	673.51	673.34	0.17				260.50		36.85
3	1.9		Bridge								
3	1.8	10 Year	673.26	673.05	0.21	0.64	0.04		260.50		34.87
3	1	10 Year	672.58	672.46	0.12	0.00	0.00	81.35	540.87	4.38	156.55
3	.5	10 Year	672.57	672.42	0.15			51.46	572.62	2.52	188.58


Sawmill_Creek Plan: Natural Conditions 2017 6/6/2017
Sawmill Creek 3
Legend
WS 10 Year
Ground
Elevation (ft)
685
680
675
670
665
660
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)
1.8 1029+30 Copied from XS 2...
3 1028+50_Extended using ...
4 1026+90_Extended using 2...
5 1022+00_Extended and modfided Using...
5.7 1018+60-Created using 2' topo shifte...
6 1017+00
7 1013+95
7.5 1013+15_Extended using 2' topo
8 1011+05_Exttended using 2' topo
8.5 US 66 N Frontage Road 144"x60" RCBC
9.5 SWS0007 SM039 WSP 2 Model
10 1005+33
11 1000+25

Errors Warnings and Notes for Plan : Natural 2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 10 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: 3 RS: 9.5 Profile: 10 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 9 Profile: 10 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 10 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 6 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 5.7 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 10 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 10 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 10 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 10 Year Downstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 10 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: .5 Profile: 10 Year
Warning:	Divided flow computed for this cross-section.

50 Year Design Natural

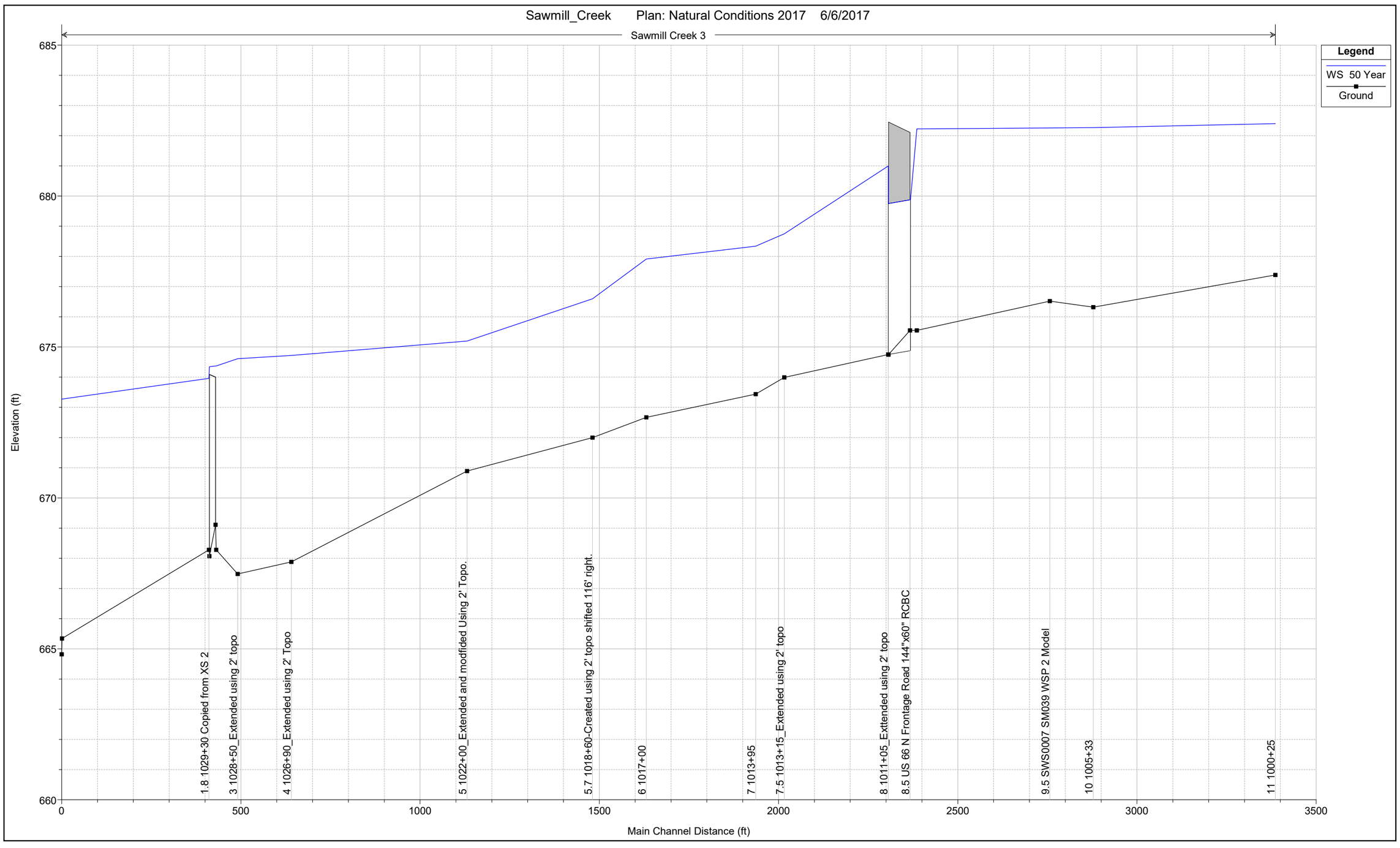
HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 50 Year

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)	
3	11	50 Year	420.30	677.38	682.40	680.24	682.50	0.002243	2.60	190.96	212.14	0.30
3	10	50 Year	420.30	676.32	682.27		682.27	0.000156	0.89	781.81	430.11	0.08
3	9.5	50 Year	420.30	676.52	682.26		682.26	0.000060	0.55	1472.92	751.90	0.04
3	9	50 Year	420.30	675.55	682.23	678.69	682.23	0.000088	0.85	940.93	651.69	0.07
3	8.5		Culvert									
3	8	50 Year	420.30	674.75	681.00	678.38	681.27	0.001271	4.22	99.62	20.36	0.34
3	7.5	50 Year	420.30	673.99	678.75	678.75	680.10	0.012791	9.31	45.16	16.91	1.00
3	7	50 Year	420.30	673.44	678.34		678.70	0.002569	4.82	87.26	30.28	0.50
3	6	50 Year	420.30	672.67	677.91		677.99	0.001690	2.23	225.00	257.51	0.26
3	5.7	50 Year	420.30	672.00	676.60		677.37	0.013512	7.05	60.35	23.65	0.73
3	5	50 Year	420.30	670.89	675.20		675.34	0.002775	3.02	139.05	53.55	0.33
3	4	50 Year	420.30	667.88	674.72		674.77	0.000611	1.81	303.17	208.99	0.17
3	3	50 Year	420.30	667.48	674.61	670.87	674.68	0.000593	2.22	248.14	126.00	0.17
3	2	50 Year	420.30	668.28	674.37	671.86	674.58	0.002164	3.73	143.60	111.97	0.32
3	1.9		Bridge									
3	1.8	50 Year	420.30	668.28	673.96	671.91	674.26	0.003489	4.41	106.43	90.48	0.40
3	1	50 Year	1010.10	665.34	673.27	670.23	673.43	0.001498	3.59	456.02	237.93	0.27
3	.5	50 Year	1010.10	664.82	673.26	669.72	673.43	0.001888	3.75	458.95	251.70	0.26

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 50 Year

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)
3	11	50 Year	682.50	682.40	0.10	0.20	0.03		401.35	18.95	212.14
3	10	50 Year	682.27	682.27	0.01	0.01	0.00	190.23	175.41	54.65	430.11
3	9.5	50 Year	682.26	682.26	0.00	0.03	0.00	173.59	26.75	219.96	751.90
3	9	50 Year	682.23	682.23	0.01			11.96	146.74	261.60	651.69
3	8.5		Culvert								
3	8	50 Year	681.27	681.00	0.28	0.85	0.32		420.30		20.36
3	7.5	50 Year	680.10	678.75	1.35	0.39	0.30		420.30		16.91
3	7	50 Year	678.70	678.34	0.36	0.63	0.09		420.30		30.28
3	6	50 Year	677.99	677.91	0.07	0.55	0.07	14.14	401.16	5.00	257.51
3	5.7	50 Year	677.37	676.60	0.77	1.84	0.19	0.64	419.35	0.31	23.65
3	5	50 Year	675.34	675.20	0.14	0.54	0.03		420.30		53.55
3	4	50 Year	674.77	674.72	0.05	0.09	0.00	38.91	380.90	0.50	208.99
3	3	50 Year	674.68	674.61	0.07	0.06	0.04	38.51	373.25	8.54	126.00
3	2	50 Year	674.58	674.37	0.20				393.88	26.42	111.97
3	1.9		Bridge								
3	1.8	50 Year	674.26	673.96	0.30	0.76	0.07		413.62	6.68	90.48
3	1	50 Year	673.43	673.27	0.16	0.00	0.00	225.52	764.86	19.71	237.93
3	.5	50 Year	673.43	673.26	0.17			241.42	746.23	22.45	251.70

Sawmill_Creek Plan: Natural Conditions 2017 6/6/2017



Errors Warnings and Notes for Plan : Natural 2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 50 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 50 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 50 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 6 Profile: 50 Year
Warning:	Divided flow computed for this cross-section.
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.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 50 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year Upstream
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.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 50 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 50 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 50 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

100 Year Design Natural

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 100 Year

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)	
3	11	100 Year	495.30	677.38	682.65	680.47	682.75	0.002091	2.61	246.81	320.39	0.29
3	10	100 Year	495.30	676.32	682.52		682.53	0.000148	0.90	893.76	438.23	0.08
3	9.5	100 Year	495.30	676.52	682.52		682.52	0.000056	0.56	1668.40	762.03	0.04
3	9	100 Year	495.30	675.55	682.49	678.97	682.49	0.000088	0.88	1074.65	714.97	0.07
3	8.5		Culvert									
3	8	100 Year	495.30	674.75	681.47	678.75	681.79	0.001358	4.53	109.43	20.79	0.35
3	7.5	100 Year	495.30	673.99	679.10	679.10	680.56	0.012586	9.69	51.10	17.65	1.00
3	7	100 Year	495.30	673.44	678.55		678.98	0.002890	5.29	93.56	30.62	0.53
3	6	100 Year	495.30	672.67	678.24		678.30	0.001308	2.13	315.90	301.10	0.23
3	5.7	100 Year	495.30	672.00	676.94		677.78	0.012705	7.38	68.84	25.30	0.73
3	5	100 Year	495.30	670.89	675.48		675.64	0.003092	3.19	155.15	59.97	0.35
3	4	100 Year	495.30	667.88	675.02		675.07	0.000583	1.87	369.17	231.56	0.16
3	3	100 Year	495.30	667.48	674.90	671.12	674.98	0.000646	2.40	288.77	153.94	0.18
3	2	100 Year	495.30	668.28	674.65	672.20	674.86	0.002223	3.95	172.61	126.48	0.33
3	1.9		Bridge									
3	1.8	100 Year	495.30	668.28	674.28	672.23	674.59	0.003445	4.62	132.96	106.90	0.40
3	1	100 Year	1190.60	665.34	673.63	670.77	673.78	0.001432	3.66	541.69	245.82	0.27
3	.5	100 Year	1190.60	664.82	673.62	670.17	673.78	0.001798	3.79	551.11	260.32	0.25

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 100 Year

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)
3	11	100 Year	682.75	682.65	0.10	0.19	0.03	0.49	445.89	48.92	320.39
3	10	100 Year	682.53	682.52	0.01	0.01	0.00	231.61	192.35	71.34	438.23
3	9.5	100 Year	682.52	682.52	0.00	0.03	0.00	214.80	28.40	252.10	762.03
3	9	100 Year	682.49	682.49	0.01			13.49	160.04	321.76	714.97
3	8.5		Culvert								
3	8	100 Year	681.79	681.47	0.32	0.89	0.34		495.30		20.79
3	7.5	100 Year	680.56	679.10	1.46	0.42	0.31		495.30		17.65
3	7	100 Year	678.98	678.55	0.44	0.57	0.11		495.30		30.62
3	6	100 Year	678.30	678.24	0.06	0.44	0.08	30.26	436.76	28.28	301.10
3	5.7	100 Year	677.78	676.94	0.84	1.94	0.20	2.10	492.18	1.03	25.30
3	5	100 Year	675.64	675.48	0.16	0.54	0.03		495.30		59.97
3	4	100 Year	675.07	675.02	0.05	0.09	0.00	68.94	423.83	2.53	231.56
3	3	100 Year	674.98	674.90	0.08	0.07	0.04	51.82	425.12	18.36	153.94
3	2	100 Year	674.86	674.65	0.22				444.42	50.88	126.48
3	1.9		Bridge								
3	1.8	100 Year	674.59	674.28	0.32	0.73	0.08		470.09	25.21	106.90
3	1	100 Year	673.78	673.63	0.15	0.00	0.00	330.92	829.73	29.95	245.82
3	.5	100 Year	673.78	673.62	0.16			359.40	795.30	35.90	260.32

Sawmill_Creek Plan: Natural Conditions 2017 6/6/2017

Sawmill Creek 3

Legend

WS 100 Year

Ground

Elevation (ft)

685

680

675

670

665

660

0

500

1000

1500

2000

2500

3000

3500

Main Channel Distance (ft)

1.8 1029+30 Copied from XS 2

3 1028+50_Extended using 2' topo

4 1026+90_Extended using 2' Topo

5 1022+00_Extended and modfided Using 2' Topo.

5.7 1018+60-Created using 2' topo shifted 116' right.

6 1017+00

7 1013+95

7.5 1013+15_Extended using 2' topo

8 1011+05_Exttended using 2' topo

8.5 US 66 N Frontage Road 144"x60" RCBC

9.5 SWS0007 SM039 WSP 2 Model

10 1005+33

11 1000+25

Errors Warnings and Notes for Plan : Natural 2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 100 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 100 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 100 Year Culv: Culvert #1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 100 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 7 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 6 Profile: 100 Year
Warning:	Divided flow computed for this cross-section.
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.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 100 Year
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, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 100 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 100 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 100 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

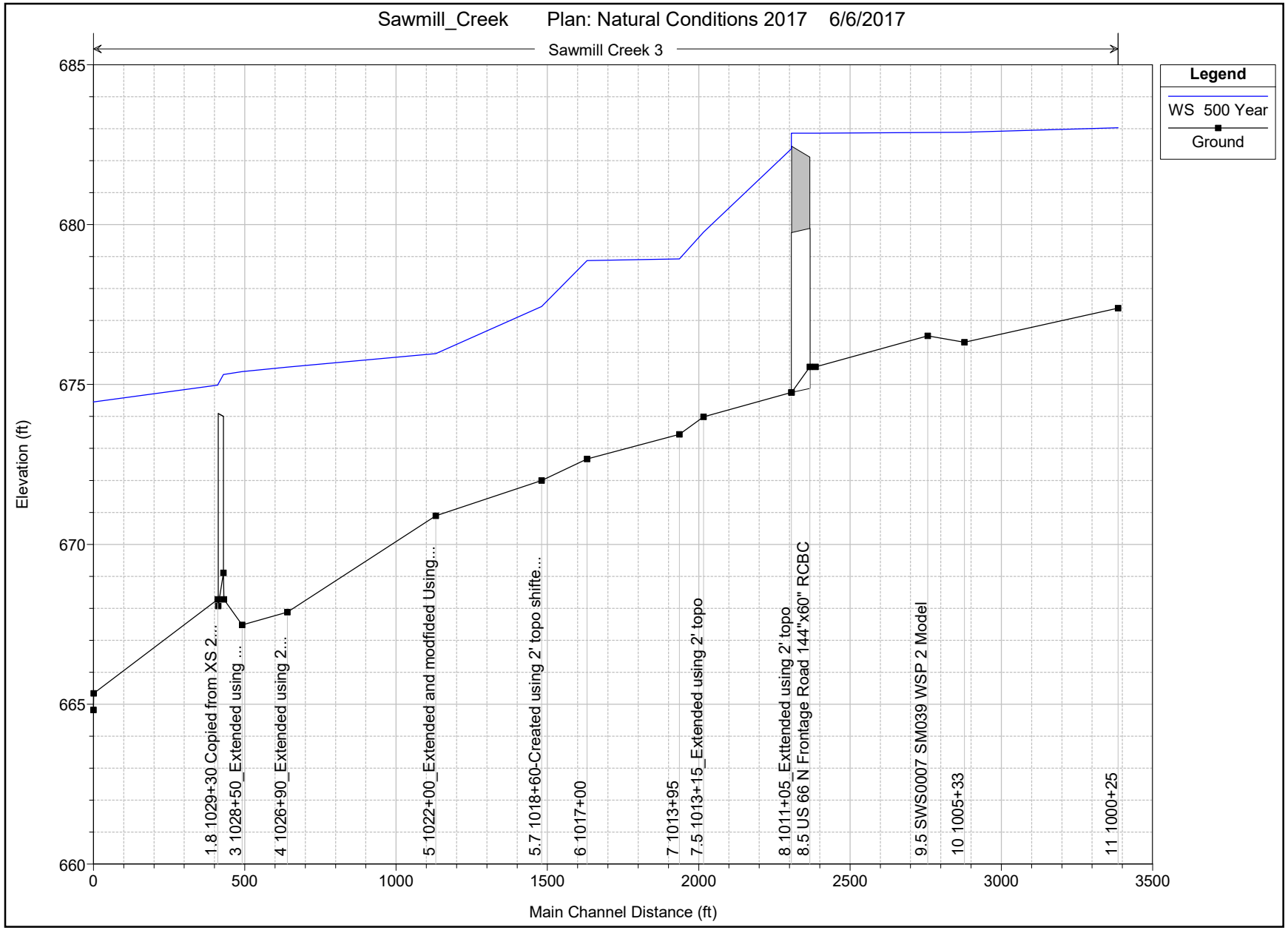
500 Year Design Natural

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 500 Year

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)	
3	11	500 Year	657.00	677.38	683.03	680.92	683.11	0.001633	2.51	406.00	374.03	0.26
3	10	500 Year	657.00	676.32	682.89		682.90	0.000160	1.00	1055.74	447.16	0.09
3	9.5	500 Year	657.00	676.52	682.88		682.88	0.000061	0.61	1949.81	776.38	0.05
3	9	500 Year	657.00	675.55	682.86	679.45	682.86	0.000070	0.82	1691.89	769.80	0.06
3	8.5		Culvert									
3	8	500 Year	657.00	674.75	682.37	679.44	682.78	0.001531	5.11	128.53	22.09	0.37
3	7.5	500 Year	657.00	673.99	679.77	679.77	681.43	0.012177	10.36	63.44	19.10	1.00
3	7	500 Year	657.00	673.44	678.93		679.53	0.003566	6.25	105.20	31.13	0.60
3	6	500 Year	657.00	672.67	678.88		678.92	0.000783	1.89	532.27	365.81	0.19
3	5.7	500 Year	657.00	672.00	677.44	676.91	678.52	0.013624	8.40	81.91	27.65	0.77
3	5	500 Year	657.00	670.89	675.96		676.16	0.003356	3.53	187.79	80.29	0.37
3	4	500 Year	657.00	667.88	675.54		675.59	0.000556	1.98	502.86	283.08	0.16
3	3	500 Year	657.00	667.48	675.41	671.59	675.50	0.000736	2.71	378.84	202.78	0.19
3	2	500 Year	657.00	668.28	675.31	672.75	675.43	0.001330	2.99	311.97	178.40	0.25
3	1.9		Bridge									
3	1.8	500 Year	657.00	668.28	674.98	672.84	675.14	0.001896	3.41	259.37	143.71	0.30
3	1	500 Year	1578.80	665.34	674.45	671.62	674.58	0.001157	3.59	752.95	265.49	0.24
3	.5	500 Year	1578.80	664.82	674.46	671.14	674.58	0.001394	3.60	821.58	384.24	0.23

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3 Profile: 500 Year

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)
3	11	500 Year	683.11	683.03	0.08	0.19	0.02	50.44	494.96	111.60	374.03
3	10	500 Year	682.90	682.89	0.01	0.01	0.00	319.29	233.54	104.17	447.16
3	9.5	500 Year	682.88	682.88	0.00	0.02	0.00	299.50	33.25	324.25	776.38
3	9	500 Year	682.86	682.86	0.00			154.84	159.00	343.16	769.80
3	8.5		Culvert								
3	8	500 Year	682.78	682.37	0.41	0.97	0.38		657.00	0.00	22.09
3	7.5	500 Year	681.43	679.77	1.67	0.48	0.32		657.00		19.10
3	7	500 Year	679.53	678.93	0.61	0.44	0.17		657.00		31.13
3	6	500 Year	678.92	678.88	0.04	0.30	0.10	73.32	483.50	100.18	365.81
3	5.7	500 Year	678.52	677.44	1.08	2.10	0.27	6.66	647.06	3.27	27.65
3	5	500 Year	676.16	675.96	0.19	0.52	0.04		656.51	0.49	80.29
3	4	500 Year	675.59	675.54	0.05	0.09	0.00	137.57	507.37	12.07	283.08
3	3	500 Year	675.50	675.41	0.09	0.06	0.01	81.66	523.28	52.07	202.78
3	2	500 Year	675.43	675.31	0.12			0.38	544.74	111.88	178.40
3	1.9		Bridge								
3	1.8	500 Year	675.14	674.98	0.16	0.54	0.02		573.19	83.81	143.71
3	1	500 Year	674.58	674.45	0.13	0.00	0.00	588.92	929.31	60.57	265.49
3	.5	500 Year	674.58	674.46	0.12			660.26	845.91	72.63	384.24


Sawmill_Creek Plan: Natural Conditions 2017 6/6/2017
Sawmill Creek 3
Legend
WS 500 Year
Ground
Elevation (ft)
685
680
675
670
665
660
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)
1.8 1029+30 Copied from XS 2...
3 1028+50_Extended using ...
4 1026+90_Extended using 2...
5 1022+00_Extended and modfided Using...
5.7 1018+60-Created using 2' topo shifte...
6 1017+00
7 1013+95
7.5 1013+15_Extended using 2' topo
8 1011+05_Exttended using 2' topo
8.5 US 66 N Frontage Road 144"x60" RCBC
9.5 SWS0007 SM039 WSP 2 Model
10 1005+33
11 1000+25

Errors Warnings and Notes for Plan : Natural 2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 500 Year Culv: Culvert #1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 7 Profile: 500 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 500 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: .5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

Errors Warnings and Notes for Plan : Natural 2017

Location:	River: Sawmill Creek Reach: 3 RS: 11 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 10 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 9 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 8.5 Profile: 500 Year Culv: Culvert #1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Location:	River: Sawmill Creek Reach: 3 RS: 8 Profile: 500 Year
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.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: Sawmill Creek Reach: 3 RS: 7.5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 7 Profile: 500 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 6 Profile: 500 Year
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.
Location:	River: Sawmill Creek Reach: 3 RS: 5.7 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 5 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 3 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: 2 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year
Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Upstream
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge
	modeling method does not compute answers inside the bridge.
Location:	River: Sawmill Creek Reach: 3 RS: 1.9 Profile: 500 Year Downstream
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.
Note:	For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.
Location:	River: Sawmill Creek Reach: 3 RS: 1.8 Profile: 500 Year
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: Sawmill Creek Reach: 3 RS: 1 Profile: 500 Year
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: 3 RS: .5 Profile: 500 Year
Warning:	Divided flow computed for this cross-section.

Structure Tables Design Natural

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3

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)
3	8.5 Culvert #1	10 Year	680.17	680.07	678.80	680.17	682.46	260.50		0.38	4.51	4.39
3	8.5 Culvert #1	50 Year	682.23	682.23	680.33	682.23	682.46	420.30		1.23	7.01	7.01
3	8.5 Culvert #1	100 Year	682.49	682.49	681.20	682.49	682.46	381.47	113.83	1.01	6.36	6.36
3	8.5 Culvert #1	500 Year	682.86	682.86	682.78	682.86	682.46	172.76	484.24	0.48	2.88	2.88

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3

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)
3	9.5	10 Year	680.59	680.58	0.01	0.39	0.03	70.48	46.55	143.47	489.91
3	9.5	50 Year	682.26	682.26	0.00	0.03	0.00	173.59	26.75	219.96	751.90
3	9.5	100 Year	682.52	682.52	0.00	0.03	0.00	214.80	28.40	252.10	762.03
3	9.5	500 Year	682.88	682.88	0.00	0.02	0.00	299.50	33.25	324.25	776.38
3	9	10 Year	680.17	680.07	0.09			10.86	248.54	1.10	267.38
3	9	50 Year	682.23	682.23	0.01			11.96	146.74	261.60	651.69
3	9	100 Year	682.49	682.49	0.01			13.49	160.04	321.76	714.97
3	9	500 Year	682.86	682.86	0.00			154.84	159.00	343.16	769.80
3	8.5		Culvert								
3	8	10 Year	679.98	679.69	0.29	0.79	0.23		260.50		19.19
3	8	50 Year	681.27	681.00	0.28	0.85	0.32		420.30		20.36
3	8	100 Year	681.79	681.47	0.32	0.89	0.34		495.30		20.79
3	8	500 Year	682.78	682.37	0.41	0.97	0.38		657.00	0.00	22.09
3	7.5	10 Year	678.96	677.91	1.05	0.41	0.23		260.50		15.08
3	7.5	50 Year	680.10	678.75	1.35	0.39	0.30		420.30		16.91
3	7.5	100 Year	680.56	679.10	1.46	0.42	0.31		495.30		17.65
3	7.5	500 Year	681.43	679.77	1.67	0.48	0.32		657.00		19.10

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3

Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Prs O WS	Q Total	Min El Weir Flow	Q Weir	Delta EG	BR Sluice Coef
			(ft)	(ft)	(sq ft)	(ft)	(cfs)	(ft)	(cfs)	(ft)	
3	1.9	10 Year	673.51	674.00	77.69		260.50	673.76		0.25	
3	1.9	50 Year	674.58	674.00	77.69	674.54	420.30	673.76	58.35	0.32	0.34
3	1.9	100 Year	674.86	674.00	77.69		495.30	673.76	113.62	0.27	
3	1.9	500 Year	675.43	674.00	77.69		657.00	673.76	323.04	0.29	

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3

Reach	River Sta	Profile	E.G. US.	W.S. US.	BR Sel Method	Energy EG	Momen. EG	Yarnell EG	WSPRO EG	Prs O EG	Prs/Wr EG	Energy/Wr EG
			(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
3	1.9	10 Year	673.51	673.34	Momentum	673.43	673.51					
3	1.9	50 Year	674.58	674.37	Press/Weir	674.58				674.71	674.58	
3	1.9	100 Year	674.86	674.65	Press/Weir	675.05				675.26	674.86	
3	1.9	500 Year	675.43	675.31	Press/Weir	675.65				676.72	675.43	

HEC-RAS Plan: Natural 2017 River: Sawmill Creek Reach: 3

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
3	3	10 Year	673.61	673.56	670.27	0.06	0.04	60.07	11.02	247.75	1.73	1.84
3	3	50 Year	674.68	674.61	670.87	0.06	0.04	126.00	38.51	373.25	8.54	2.22
3	3	100 Year	674.98	674.90	671.12	0.07	0.04	153.94	51.82	425.12	18.36	2.40
3	3	500 Year	675.50	675.41	671.59	0.06	0.01	202.78	81.66	523.28	52.07	2.71
3	2	10 Year	673.51	673.34	671.06			36.85		260.50		3.35
3	2	50 Year	674.58	674.37	671.86			111.97		393.88	26.42	3.73
3	2	100 Year	674.86	674.65	672.20			126.48		444.42	50.88	3.95
3	2	500 Year	675.43	675.31	672.75			178.40	0.38	544.74	111.88	2.99
3	1.9 BR U	10 Year	673.48	673.23	671.24			16.41		260.50		3.98
3	1.9 BR U	50 Year	674.58	674.37	671.98			54.60		361.95	58.09	4.66
3	1.9 BR U	100 Year	674.87	674.65	672.29			74.60		381.68	116.04	4.91
3	1.9 BR U	500 Year	675.43	675.31	672.93			183.71	3.00	354.97	299.03	3.93
3	1.9 BR D	10 Year	672.32	672.06	670.18			16.42		260.50		4.10
3	1.9 BR D	50 Year	674.52	674.35	670.92			52.82		361.95	58.09	3.77
3	1.9 BR D	100 Year	674.78	674.56	671.24			68.13		381.68	116.04	3.98
3	1.9 BR D	500 Year	675.36	675.02	671.87			100.91	3.00	354.97	299.03	3.27
3	1.8	10 Year	673.26	673.05	671.10	0.64	0.04	34.87		260.50		3.65
3	1.8	50 Year	674.26	673.96	671.91	0.76	0.07	90.48		413.62	6.68	4.41
3	1.8	100 Year	674.59	674.28	672.23	0.73	0.08	106.90		470.09	25.21	4.62
3	1.8	500 Year	675.14	674.98	672.84	0.54	0.02	143.71		573.19	83.81	3.41
3	1	10 Year	672.58	672.46	669.18	0.00	0.00	156.55	81.35	540.87	4.38	2.98
3	1	50 Year	673.43	673.27	670.23	0.00	0.00	237.93	225.52	764.86	19.71	3.59
3	1	100 Year	673.78	673.63	670.77	0.00	0.00	245.82	330.92	829.73	29.95	3.66
3	1	500 Year	674.58	674.45	671.62	0.00	0.00	265.49	588.92	929.31	60.57	3.59

TAB F

SECTION 13.F

PROPOSED CONDITIONS

PROPOSED ANALYSIS

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

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

Illinois Department of Transportation

Permit Summary for Floodway Construction in Northeast Illinois

Applicant Agency:	IDOT	County:	DuPage
Route:	I-55	Stream:	Sawmill Creek
Section:	I-355 to I-94	SN:	022-0207

General Description: The existing 12’ (W) x 5’ (H) RCBC conveys Sawmill Creek under I-55. The existing culvert is to remain as is with only minor repairs considered.
Existing Facility: 12’ (W) x 5’ (H) RCBC Length =279.16’
Proposed Improvement: There is no proposed modification to the existing culvert nor is there any work proposed below the 100-year floodplain except for repairs that are exempt from permitting under the Part 3708 Rules.

1. Is the proposed work classified as repairs such as deck replacement, pavement resurfacing, or the armoring or filling of a scour hole? ☒ Yes ☐ No

2. Does the proposed work only consist of modifications to the existing structure which will occur above the regulatory 100-year flood profile? ☐ Yes ☒ No

Note: If the answer to question 1 or 2 is yes, no permit is required and questions 3 through 12 may be omitted.

3. Does the proposed work below the regulatory 100-year flood profile consist of widening of the existing structure by 12 feet or less? ☐ Yes ☐ No

Note: If yes, Regional Permit No. 2 applies and questions 4 through 9 may be omitted.

4. Is the proposed improvement, including the approach roadway, more restrictive to normal and flood flows than the existing structure? ☐ Yes ☐ No

5. Is a Channel Modification proposed? ☐ Yes ☐ No

6. Are there any buildings or structures located upstream in the 100-year floodplain within the influence of the structure backwater? ☐ Yes ☐ No

   6a. If no, does the backwater of the proposed improvement exceed the backwater of the existing structure by more than 0.1 foot? ☐ Yes ☐ No

   6b. If yes, does the proposed backwater exceed the natural high water elevation by more than 0.1 foot? ☐ Yes ☐ No

7. Are transitions required for this project? ☐ Yes ☐ No

8. Is the flood profile at the project site impacted by backwater from a downstream receiving stream? ☐ Yes ☐ No

   If yes, list frequency of starting elevation for analysis:

9. Is backwater from a downstream structure affecting the flood profile at the project site? ☐ Yes ☐ No

9a. Was the existing downstream structure used in the analysis for determining flood profile at the project site? years? (Attach documentation) ☐ Yes ☐ No

9b. Is the downstream structure scheduled for improvement in the next 5 ☐ Yes ☐ No

9c. Was the proposed downstream improvement used in the analysis? ☐ Yes ☐ No

10. Is a floodway map change required due to the proposed project? ☐ Yes ☐ No

11. Will fill or material be placed in the floodway due to the proposed work? ☐ Yes ☐ No

11a. If yes, is compensatory storage provided at the project location? (Attach a copy of completed Attachment A) ☐ Yes ☐ No

11b. If the answer to 11a is no, is compensatory storage provided at another location? If yes, give location and attach a copy of completed Attachment A. ☐ Yes ☐ No

11c. Has compensatory storage relief been granted? (Attach Documentation) ☐ Yes ☐ No

12. Coordination based on Memorandum of Agreement has occurred with Agency(ies) (Attach documentation):. ☐ Yes ☐ No

---

All engineering analysis has been performed by me or under my direct supervision.

Signature: Kevin A Dailey IL/P.E. #: 062-47420

Date: 02/18/16 P.E. Expiration Date: 11/30/2017

FOR DEPARTMENTAL USE ONLY

Is a permit required for this project? ☐ Yes ☐ No

If yes, specify type of permit: ☐ Floodway, ☐ Regional 1, ☐ Regional 2

Permit Summary
(Attachment A - Compensatory Storage)

Part of Permit Summary for Floodway Construction in Northeast Illinois:

☒ Phase I (Preliminary) ☐ Phase II (Final)

Applicant Agency:	IDOT	County:	DuPage
Route:	I-55	Stream:	Sawmill Creek
Section:	I-355 to I-94	SN:	n/a

Provide the following information for Item 11:

a. Flood Water Elevations (Natural): 100-year 678.7 ft. 10-year 678.1 ft.
Normal 674.8 ft.

b. Determine the amount of fill or material being placed in the floodway:

1. Between the 100-year and 10-year flood elevation 0 cu. yds.
2. Between the 10-year and normal water elevation 0 cu. yds.

c. Determine the volume being provided to compensate for above item b:
(i.e. from structures removal, excavation, etc.)

1. Between the 100-year and 10-year flood elevation n/a cu. yds.
2. Between the 10-year and normal water elevation n/a cu. yds.

d. Mark on the exhibits the location and amount of compensatory storage to be excavated. Also show the location of floodway and floodplain boundaries. (Include a set of plans and cross sections)

Attach copy of calculations and Exhibit(s) reflecting the above finding.

All engineering analysis has been performed by me or under my direct supervision.

Signature:	Irene A Dailey	IL/P.E. #:	062-47420
Date:	02/10/16	P.E. Expiration Date:	11/30/2017

Tab 17

SECTION 17

COMPENSATORY STORAGE

COMPENSATORY STORAGE

There is no fill proposed below the 100-year floodplain elevations within the floodway. Therefore there is no required compensatory storage.

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

---

Tab 19

SECTION 19

ESTIMATED WATER SURFACE ELEVATION (EWSE) DATA

ESTIMATED WATER SURFACE ELEVATION

Date of Survey November 12 2012

Water Surface XS 7=674.81

Top of Bank=684.69

Stream Gauge USGS 05533400 SAWMILL NEAR LEMONT,IL is identified as only gage found on Sawmill Creek and is well outside project vicinity.

Tab 20

SECTION 20

CORRESPONDENCE NOTES

STATE OF ILLINOIS DISTRICT ONE OPERATIONS COMMUNICATION CENTER
DEPARTMENT OF TRANSPORTATION FLOODING REPORT

(4)

DATE: 07-20-90 DAY: Friday PAGE 1 OF

ITEM #	DISP	INFORMANT TIME REC'D	DIR	LOCATION	LANE #S	EST. DEPTH	PASSABLE (Y or N)	CONTACTED	TIME	DURATION OF CLOSURE	VERIFIED (NAME)	TIME/DATE DISP
A	USD	Kendall County Kim 0001		Rt 30 + Rt 34	all	6	Y	Walsh Naperville	0010		QC	
B	USD	Plainfield Rd OC 0041		N/b main Rt 59 at viaduct	all		Y	Pickens Joliet	0204			
C	USD	Joliet Rd Tinsley 0031		SB Joliet Rd under I55	all		N	Rt 83 Joliet	0240	1 hr 50 min	ME JAHN	430 AM 7-20-90 BLT
D	USD	Dist 2 #3742		Rt 83 Bound SB I 55			Y	Jahn I-55 ~~Alsip~~	0237	NEG PER	RE 852 JAHN	3:03A 7-20
E	USD	Plainfield Rd. 0100		Rt 59 & Renwick		6	Y	Pickens Joliet	0104			
F	USD	SPD 4		Rt 45 + Rt 83		6	Y	Dreher Crandlake	0213	SEE	90-M1	8.59
G	USD	Dist 2		SB I55 to Cass			Y	Jahn I-55	0214	NEG PER	RE 852 JAHN	3:05A 7-20
H	USD	RC 903 7004		SB Ryan Rd	all	6	N	Watson Ryan	0112	5 HOURS 40 MIN.	RC 903	0545 7-20 USD
I	USD	0238		Rt 45 + 173				TRCH Alsip	311 A			
J	USD	Lake Forest PD & Gil 8153	SB	159th E/o Crawford				MADISON HARVEY	313 A	NEG PER	REASOS TAVOLETTI	3:48A 7-20
K	USD	Orland Park Rd @ 0202		Rt 45 Viaduct N/O 143	all		Y	TRCH ALSIP	311 AM			

CC KLAFETA,KOWALSKI,MURZYN,KOSTUR

LMS 5/90

90 F – # 00007

ILLINOIS DEPARTMENT OF TRANSPORTATION
DISTRICT ONE
OPERATIONS AND COMMUNICATIONS CENTER
INCIDENT REPORT

TIME/DATE RECEIVED–	INFORMANT–
12:26 hrs. 6/7/93	District #2 SPD

SUBJECT–

Closure of expresway due to flooding

LOCATION–	LOAD/WEIGHT/TYPE(FOR TRUCKS)
SB I-55 @ Cass	

PUBLIC/MEDIA EMERGENCY INFORMATION DISTRIBUTION

FOR EACH ENTER TIME OR N/A	CONGESTION LIMITS DUE TO INCIDENT
CRT 12:43 hrs	
HAR CMS	DOT-INFO EXT#

SPRINGFIELD NOTIFIED (WHO/TIME) FAX TO SPFLD.(TIME)

DETAILS AND NOTIFICATIONS

12:26 hrs. Control advised of the above. Requesting assistance. I-55 yard advised.
12:27 hrs. Control called JT; left a message with Marnie.
12:31 hrs. Control advised Mr. Klafeta (in Comcenter).
12:43 hrs. Advised Tim @ Station 1.

TUESDAY. 6-8-93 – PER MR. WOLOWICZ THIS WAS NEVER FULLY CLOSED TRAFFIC MADE ITS WAY THRU AND THE WATER RECEEDED AROUND 200PM MON. 6-7-93. (AN)

VEHICLE INFO:	EMC #	
DRIVER/OWNER NAME:	PLATE #	STATE:
ADDRESS:	CITY:	STATE:
ACCIDENT RPT. #	COMMERCIAL RPT(METAL COILS);	
VERIFIED: MR. WOLOWICZ @ 745A 6-8-93	#	

COPIES SENT TO:	COMMUNICATIONS SPECIALIST(S)
MR. MARCOTTE, Mr. Klafeta, Mr J. Kos Mr. McDermott, MR. WANG	MTR

INCIDENT REPORT #

93 – 1231

TAKAHASHI 3/92 UPDATED 1/93

Bureau of Maintenance
Flood Location Data

Comm. Center Report Number _____
(Ask Dispatcher)

Location: (Route) I-55 S/B Flow Cass Ave to 135 Municipality Darien/Woodridge

Date: 7-18-96 Time notified: 5:30 P Time at scene: _____

Source of notification: Comm Center
(If other than Comm. Center - Notify Comm. Center)

DETAILS OF FLOODED LOCATION

Pavement flooding

Direction S/B I-55 Exit Ramp to S/B I-55
Lanes involved LANE 2
Average depth of water 3-4"
Length of standing water 25'
Passable to automobile traffic Yes ✓ No _____

R.O.W. flooding

Shoulder _____ Parkway _____
Direction _____
Average depth of water _____
Length of standing water _____

Apparent cause of flooding LOW LYING AREA

Corrective measures implemented: placed water on pavement
SIGNS

Duration of Closure 8 HRS
Name of Reporter R Perkins
Phone: _____

Ed Burke

From: Ilene Dailey <idailey@cbbel.com>
Sent: Thursday, December 05, 2013 4:01 PM
To: edburke@cbbel.com
Subject: FW: I-55 Managed Lanes Study - Sawmill Creek

From: Winklebleck, David [mailto:David.Winklebleck@dupageco.org]
Sent: Thursday, December 05, 2013 3:58 PM
To: 'Book, Dustin'; Klepp, Christine
Cc: Ilene Dailey (Ilene Dailey) (idailey@cbbel.com); Heffter, Clayton
Subject: RE: I-55 Managed Lanes Study - Sawmill Creek

Dustin,

Thank you for the information. We will be looking into this probable violation. Your assumption is correct that if it is a violation of the stormwater ordinance then it should be removed. Please let me know if you have any additional questions.

-Dave

From: Book, Dustin [mailto:Dustin.Book@stantec.com]
Sent: Tuesday, December 03, 2013 11:43 AM
To: Klepp, Christine; Winklebleck, David
Cc: Ilene Dailey (Ilene Dailey) (idailey@cbbel.com)
Subject: I-55 Managed Lanes Study - Sawmill Creek

Christine and David,

Good morning. If you recall, I met with you earlier this year to discuss a Location Drainage Study (LDS) that we are conducting on behalf of IDOT for the Interstate 55 corridor. The LDS is included as part of the overall Phase 1 study to introduce and implement a managed lane extending from Interstate 355 in DuPage County to Interstate 90/94 in the City of Chicago. As part of the LDS, we are preparing a hydraulic analysis of the existing culvert carrying Interstate 55 over Sawmill Creek, located in unincorporated DuPage County. A location map is attached to this email for your reference. The hydraulic report is being prepared in accordance with IDOT requirements to determine the adequacy of the existing culvert and provide recommendations for proposed improvements, if the structure is found to be deficient.

During a recent field check of the site, it was observed that a solid plank fence has been installed upstream of the subject crossing at I-55 and extends across the Creek and adjacent floodplain. The initial results of the hydraulic modeling suggest that the placement of the fence will impact the water surface elevations of the stream and reduce the overall conveyance through the channel. The attached google earth picture and

photograph shows the fence in plan and profile views. The flow of Sawmill Creek at this location is from north to south and the subject culvert is located downstream of the fence location and is cut off from the aerial photograph.

I am writing to seek your input as part of a recommendation to IDOT as it pertains to our modeling approach of the culvert for the Hydraulic Report. If the fence was not likely a structure permitted by the County, we would assume that eventually the fence would be removed and would then recommend that the impacts of the fence not be considered in the analysis. However, if this fence is a permitted structure, we would then recommend that the analysis fully considers the impact of the fence.

Please feel free to contact me a should you have any additional questions or would like to further discuss this matter in detail.

Dustin Book, P.E.
Transportation Engineer

Stantec
135 S. LaSalle Street, Suite 3100 Chicago IL 60603-4139

Phone: (312) 262-2233
Fax: (312) 262-2301

Dustin.Book@stantec.com

Design with community in mind

stantec.com


© 2013 Google Image Date: September 2012
Report a problem
Map
Labels
Interstate 55 Frontage N
Interstate 55 Frontage N
Interstate 55 Frontage N

Fence Reconfiguration, Sawmill Creek
South of North Frontage Road, 2016

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

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

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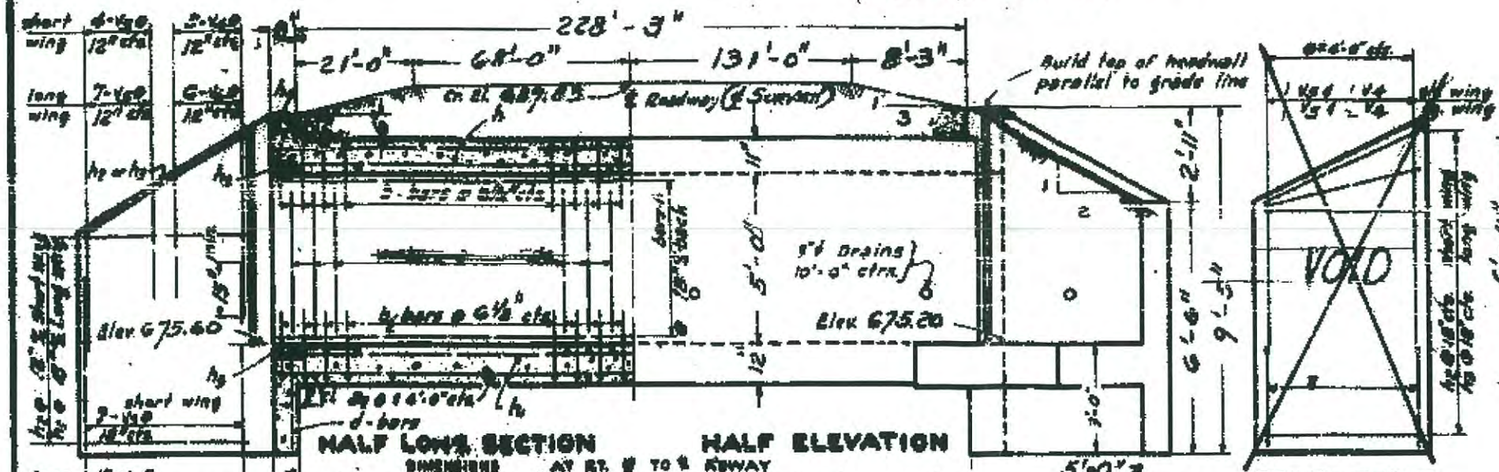
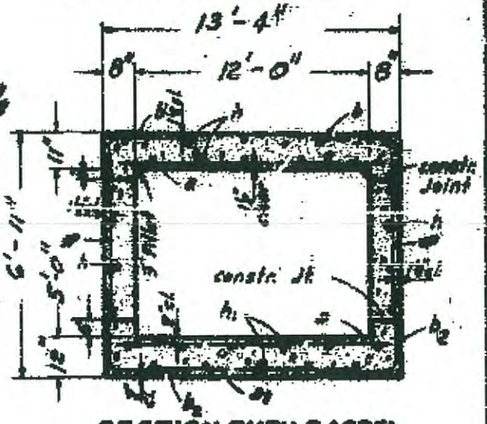
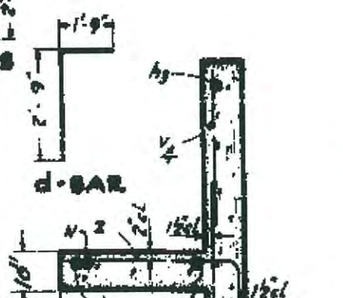
sheet no. 19
sheets 73







BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	1182	#7	12'-6"
a_2	72	#4	8'-6"
b	1056	#5	5'-6"
b_2	1056	#5	8'-0"
d	24	#4	4'-8"
h	200	#4	29'-8"
h_1	210	#4	29'-8"
h_2	16	#4	5'-9"
h_3	16	#4	12'-6"
h_4	6	#6	14'-9"
h_5	16	#6	15'-9"
r			
r_2			
V_1	40	#4	5'-0"
V_2	18	#4	4'-0"
V_3	22	#4	2'-6"
w	14	#3	16'-0"
w_1	12	#3	10'-6"
z	32	#5	7'-8"
Z_1	20	#5	7'-0"
Class 'X' Concrete		Cu. Yds.	355.7
Reinforcement Bars		Lbs.	53870

NOTE:- All bars shall be round ASTM A615-68. The size number is the number of ⅛ inches in the nominal dimension.

Note: "a" bars in skew portion of slab shall be entered full length & cut to fit. Balance of bar to be used in opposite end of Culvert.

GENERAL NO. 28

Class 'X' Concrete shall be used thruout. Exposed edges shall be beveled ½". For backfilling and embankment, see standard specifications.

Cut & & & bars to fit. This work shall be done in the field and considered incidental to the cost of reinforcing bars.

f_s = 20000 #/□"
f_c = 1200 #/□"
n = 10

H-20 LOADING

SPECIAL CULVERT DESIGN
STA. 922+20

022-0207

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

Mile	Sec.	Co.	Page	Sheet No.
M 1.0	22-2	W Mad	73	19

Sheet No. 19
Sheets 73

022-0207

HALF LONG. SECTION — HALF ELEVATION

SECTION THRU BARREL

PLAN
SHOWING REINFORCEMENT — SHOWING OUTLINES

SECTION A-A

Z-BARS

d-BAR

b-BAR

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	1182	#7	12'-6"
a_1	72	#6	8'-6"
b	1036	#5	5'-6"
b_2	1036	#5	8'-0"
d	24	#4	4'-6"
h	200	#4	29'-8"
h_1	210	#4	29'-0"
h_2	16	#4	5'-9"
h_3	16	#4	12'-0"
h_4	6	#6	12'-9"
h_5	16	#6	15'-9"
r			
r_1			
r_2	40	#4	5'-0"
r_4	18	#4	4'-0"
r_5	22	#4	2'-6"
w	16	#5	16'-0"
w_1	12	#5	10'-6"
z	32	#6	7'-8"
z_1	20	#5	7'-0"

Class 'A' Concrete ... cu.yds. 358.7
Reinforcement Bars Lbs. 64,520

NOTE - All bars shall be round ASTM designation. The size number is the number of ⅛ inches in the nominal diameter.

GENERAL NOTES

Class 'A' concrete shall be used throughout. Exposed edges shall be beveled ¾". Backfilling and embankments see Standard specifications.

Where bars are to be placed in the field and dowels are to be used, they shall be placed symmetrical to the east or residential to the west of reinforcing bars.

f_s = Stress in steel
f_c = Stress in concrete
n = 10

H-20 LOADING

SPECIAL CULVERT DESIGN
STA. 922+

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

Mile	Sec.	Co.	Page	Sheet No.
M 1.0	22-2	W Mad	73	19

HALF LONG. SECTION — HALF ELEVATION

SECTION THRU BARREL

PLAN
SHOWING REINFORCEMENT — SHOWING OUTLINES

SECTION A-A

W-BARS

Z-BARS

d-BAR

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	700	#6	35'0"
a_3	54	#4	6'-3"
f	18	#4	4'-6"
h	135	#4	26'-0"
h_1	99	#4	26'-0"
h_2	14	#4	8'-0"
h_3	14	#4	9'-0"
h_4	4	#6	6'-3"
h_5	12	#6	7'-0"
v	440	#4	7'-0"
v_1	16	#4	4'-0"
v_2	18	#4	5'-0"
v_4	46	#4	6'-0"
w	14	#5	18'-0"
w_1	14	#5	18'-0"
z	32	#5	7'-6"
z_1	30	#5	7'-0"

Class 'A' Concrete cu.yds. 158.0
Reinforcement Bars Lbs. 16,800

NOTE - All bars shall be round ASTM designation. The size number is the number of ⅛ inches in the nominal diameter.

GENERAL NOTES

Class 'A' concrete shall be used throughout. Exposed edges shall be beveled ¾". Backfilling and embankments see Standard specifications.

Where bars are to be placed in the field and dowels are to be used, they shall be placed symmetrical to the east or residential to the west of reinforcing bars.

f_s = 20000 #/in²
f_c = 1200 #/in²
n = 10

H-20 LOADING

STANDARD 1954

STA. 956+22.63

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

HALF LONG. SECTION — HALF ELEVATION

SECTION THRU BARREL

PLAN
SHOWING REINFORCEMENT — SHOWING OUTLINES

d-BAR

h_2-h_5 BARS

a-BAR

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH
a	1116	#8	7'-0"
a_3	58	#4	5'-3"
h	108	#4	27'-0"
h_1	81	#5	22'-0"
h_2	36	#5	8'-3"
h_3	36	#5	8'-8"
h_4	4	#6	5'-6"
v	358	#4	5'-0"
v_1	16	#4	6'-9"
d	12	#4	8'-6"

Class 'A' Concrete cu.yds. 108.6
Reinforcement Bars Lbs. 15,080

NOTE - All bars shall be round ASTM designation. The size number is the number of ⅛ inches in the nominal diameter.

GENERAL NOTES

Class 'A' concrete shall be used throughout. At least six feet of barrel shall be poured monolithically with wing walls. Exposed edges shall be beveled ¾". For backfilling & embankments see 914. Spec's. The bank at 10 bars, if necessary, to obtain minimum clearance at top of inside.

f_s = 20000 #/in²
f_c = 1200 #/in²
n = 10

SPECIAL CULVERT DESIGN
STA. 880+36

Still to do:

Check if plans match culvert.
(plans found later)

Illinois Department of Transportation

Printed 12/19/2011

NBI Field Inspection Report

SN: 0220207 **District:** 1 **Spans:** 0 **Appr. Spans:** 0 **Skew:** 00 **ADT:** 168400 **Truck Pct:** 8 **ADT Un:** 0

Facility Carried: I- 55 **Name:**

Feature Crossed: ~~DITCH~~ STREAM **Location:** .4 M E OF CASS

Inspection Date: 12/20/2011 **Inspection Notes:** Station 262+00

Inspector 1: Mickael D. Muller

Inspector 2:

Temp: 35

Resources

Time to Insp:	1:30	Trffc Ctrl:		Boat:		Waders:	W	Snooper:	
		Ladder:		Manlift:		Other:	Flashlight		

Inspector's Appraisals

	Prev	New
58-Deck Condition:		N
59-Superstructure Cond:		N
60-Substructure Cond:		N

	Prev	New
62-Culvert Condition:		6
61-Channel Condition:		7
71-Waterway Adequacy:		6

	Prev	New
72-Approach Rdwy Align:		8
111-Pier Navig Protection:		N

Additional Inspection Data

	Prev	New
36A-Bridge Railing Adequacy:		N
Approach Guardrail Adequacy: 36B-Transitions:		N
36C-Guardrail:		3
36D-Ends:		3
108A-Wearing Surface Type:		N
108B-Type of Membrane:		N
108C-Deck Protection:		N
108D-Total Deck Thickness (In.):	0.0	
59A-Paint Date (Mo/Yr):	/	
59B-Paint Systems:		
59C-Utilities Attached:		NNN
70D2-Posting OTAT:		
70A2-Single:		
70B2-Comb 3S1:		
70C2-Comb 3S2:		

Remarks: Old patch (F.D?) → worse condition repaired. Unknown date.
Longit cracking w/ rust, water seeping & efflorescence (worse @ mid-section)
HL vert cracking in walls
Xverse cracks in pavement

Inspected By: MDM

12/28/11

Illinois Department of Transportation
Structures Information Management System
Inspector's Inventory Report (S-114)

Date: 12/23/2011

changes by Mickael D. Muller

Structure Number: 022-0207

District: 1
Municipality:
Facility Carried: I- 55
Feature Crossed: ~~DITCH~~ STREAM
(21) Maintenance Resp: I.D.O.T.
(22A) Reporting Agency: I.D.O.T. - BUREAU OF MAINTENANCE
(41) Bridge Status: 8 (OPEN-NOT INSPECTED)
(41A) Status Date: 05/2011
(41B) Status Remarks: BRIDGE OPENED AUTOMATICALLY BY KEY ROUTE ON UPDATE TRANSACTION

Maintenance County: DUPAGE
Maint Township:
Bridge Name:
Location: .4 M E OF CASS

Construction Information

Item No. / Name	Existing Values Original	Existing Values Reconstruction
(27/27A) Year/Type:		
(27B) Route:		
(27C) Section:		
(27D) Station:		
(27E) Contract :		
(27F) Project:		
(27G) Built By:		
(27H) Remarks:		

SCREEN 1

Item No. / Name	Existing Values	Revisions
(101) Parallel Designation:		
(35) Structure Flared:		
(31) Design Load:		
(31A) Struct Steel Weight (Lbs.):	0	
(60A/B) Substr Matrl:		
(8A1) Bridge Remarks (Existing):		
Bridge Remarks (Revised):		

Item No. / Name	Existing Values		Revisions
(49) Structure Length (Ft.):		~~11.0~~	12.8
(112) AASHTO Bridge Length (Ft.):		~~10.0~~	11.8
(51) Bridge Roadway Width (Ft.):		~~72.0~~	178.0
(32) Approach Roadway Width (Ft.):		~~72.0~~	178.0
(52) Deck Width (Ft.):		0.0	
(48) Length of Longest Span (Ft.):		0.0	
(107/A) Deck Type/Thickness (In.):	N	0.0	
(45/6) Nbr Spans Main/Approach:	~~0~~	0	1/0
(43A/B) Main Span Material/Type:	1	19	
(44AN/BN) Near Appr Span Matrl/Type #1:			
(44AN/BN) Near Appr Span Matrl/Type #2:			
(44AF/BF) Far Appr Span Matrl/Type #1:			
(44AF/BF) Far Appr Span Matrl/Type #2:			

SCREEN 2

Item No. / Name	Existing Values	Revisions
(34A) Skew Dir/Angle (Deg-Min-Sec):	/ 00 00 ~~00~~	L / 32 0 0
(33) Bridge Median Type:	0	
(33A) Bridge Median Width (Ft):	0	
(38) Navigation Control:	0	
(39) Navigation Vert Clear (Ft):	0	
(40) Navigation Horiz Clea (Ft):	0	
(50A) Sidewalk Width On - Right (Ft):	0.0	
(50B) Sidewalk Width On - Left (Ft):	0.0	
(50C) Sidewalks Under Structure:		

Item No. / Name	Existing Values	Revisions
(36E) Guardrails On - Right:		
(36F) Guardrails On - Left:		
(55B1) RR Lateral Underclearance (Ft.):	00.0	
(54B3) RR Vert Underclearance (Ft. - In.):	00 - 00	
(62A) Culvert Cells (Count):	1	
(62B) Culvert Cell Width (Ft.):	~~12.00~~	10.0
(62C) Culvert Cell Height (Ft.):	5.00	
(62D) Culvert Cell Opening Area (Sq. Ft.):	~~0.0~~	50.0
(62E) Culvert Fill Depth (Ft.):	5.0	

SCREEN 9

Key Route On

Item No. / Name	Existing Values	Revisions
(28) Number Of Lanes:	~~6~~	8
(102) One Or Two Way Traffic:	2	

	South Or East Value	South Or East Revisions	North Or West Value	North Or West Revisions
(47) Max Rdwy Width (Ft.):	~~036.0~~	76.0		
(47A/B) Horizontal (Ft.):	~~048.0~~	77.0	000.0	

SCREEN 10

Key Route Under

Item No. / Name	Existing Values	Revisions
(28) Number Of Lanes:		
(102) One Or Two Way Traffic:		

	South Or East Value	South Or East Revisions	North Or West Value	North Or West Revisions
(47) Max Rdwy Width (Ft.):				
(47A/B) Horizontal (Ft.):				
(55B/56) Min Lateral:				

0220207-20111220-0025-Elevation~N Elevation.jpg

0220207-20111220-0000-Approach~I 55 NB lkg E...

0220207-20111220-0001-Deck Surface~Typ surface...

0220207-20111220-0002-Deck Surface~Surface alo...

0220207-20111220-0003-Channel~Channel on N si...

0220207-20111220-0004-Wingwalls~Channel on N...

0220207-20111220-0005-Approach~Frontage Rd lk...

0220207-20111220-0006-Approach~Typ wear on Fr...

0220207-20111220-0007-Deck Surface~Extra fill un...

0220207-20111220-0008-Elevation~S Elevation.jpg

0220207-20111220-0009-Elevation~S Elevation.jpg

0220207-20111220-0010-Culvert~General culvert co...

0220207-20111220-0011-Culvert~General culvert co...

0220207-20111220-0012-Culvert~Longit crack w effl...

0220207-20111220-0013-Culvert~At inlet manhole.jpg

0220207-20111220-0014-Culvert~HL cracking on w...

0220207-20111220-0015-Culvert~Longit crack at sof...

0220207-20111220-0016-Culvert~Stage joint minor...

0220207-20111220-0017-Culvert~Inlet Note electri...

0220207-20111220-0018-Culvert~Old patch estima...

0220207-20111220-0019-Culvert~Old patch estima...

0220207-20111220-0020-Culvert~North end general...

0220207-20111220-0021-Culvert~End of cable Esti...

0220207-20111220-0022-Channel~Channel at end o...

0220207-20111220-0023-Wingwalls~Efflorescence...

0220207-20111220-0024-Channel~Debris at N chan...

Google

Address **Historic U.S. 66**
Willowbrook, IL 60527

022-0207
0.4mi E of Cass

Tab 21

SECTION 21

CD WITH PROJECT FILES

CD POCKET INSERTED HERE