Illinois Department of Transportation

Memorandum

To:	Carl Puzey	Attn: D. Greifzu/Matt O'Connor
From:	Paul Loete	By: Dave Broviak
Subject:	Hydraulic Report *	
Date:	March 13, 2013	

* FAS 1279 (IL 178)
Section (1)BR&I
LaSalle County
050-0088 (Existing)
Over Illinois River
Public Body of Water
P-93-035-01

Attached for your review and submittal to IDNR are two copies of the revised Hydraulic Report for the above-mentioned structure. Also, included is a disposition of comments; the CD included with each copy contains the HEC-RAS files and a PDF of the report. The report was prepared by Parsons Brinckerhoff under PTB 155/35, P-93-035-01.

If you have any questions, please contact Steve Ferguson at (815)434-8964.

BS:lw/bs 3-13-13 Hydraulic Report IL 178

HYDRAULIC REPORT

FAS 1279 (IL 178) over Illinois River
Section (1)BR & 1
S.N. 050-0088
Job No. P-93-035-01

Utica, Illinois
LaSalle County

Illinois Department of Transportation

IL 178 BRIDGE
OVER THE ILLINOIS RIVER

March 2013

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SECTION 1

HYDRAULIC REPORT OUTLINE (HRO)

Illinois Department of Transportation

HYDRAULIC REPORT OUTLINE (HRO)

In order to facilitate a more efficient and timely approval of Hydraulic Reports, a "Hydraulic Report Outline" shall be prepared and submitted with each hydraulic project. This Outline shall be submitted to the District Hydraulic Engineer along with the Hydraulic Report to aid in review of the report.

If any deviations from the procedural steps below are necessary, they must be documented in the outline. Hydraulic Reports prepared by a Qualified District Hydraulic Engineer or under his supervision, are exempt from the HRO requirement. To facilitate Pump Station Hydraulic Report reviews, the Checklist and Data Sheets from the IDOT Drainage Manual, 13-303 and 13-304, will be used. The Data Sheets must be signed by the consultant's QA/QC person or the District Hydraulic Engineer.

1. SN 050-0088 (Existing); SN N/A (Proposed)
   Route/Stream: Illinois River
   County: LaSalle

2. Prepared By: ☒ Consultant: Parsons Brinckerhoff (PB)
   ☐ District _____

3. Chapter 2 of the IDOT Drainage ☒ Yes ☐ No
   If no, explain _____
   Completed checklist (2-701.02) must be attached.

4. Design Considerations:
   a. Backwater limitations due to:
      IDNR Individual or Floodway Permit ☒ Yes ☐ No
      Sensitive Flood Receptor(s) ☒ Yes ☐ No
   b. Does proposed average design velocity through the structure exceed natural channel velocities? ☒ Yes ☐ No
   c. Is the clearance policy met? ☒ Yes ☐ No
   d. Is the freeboard policy met? ☐ Yes ☒ No

5. Project scope (check all that apply):
   a. ☒ Complete replacement.
   b. ☐ Superstructure replacement.
   c. ☐ Superstructure replacement and/or widening; Length of pier extension in the water, upstream _____ ft., downstream _____ ft.
   d. ☒ Bridge ☐ Culvert
   e. ☒ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☐ FIS ☒ Other Upper MS River System Flow Freq. Study
   Gage data utilized? ☒ Yes ☐ No

7. WIT: Attached copy of all completed WIT(s) ☒ Yes ☐ No See Section 3

8. Modeling:
   a. ☒ HEC RAS ☐ WSPRO ☐ Other _____
   b. N-values estimated according to Chapter 5 of Drainage Manual? ☒ Yes ☐ No
   c. Source of starting WSE Flood Insurance Study (FIS) Profiles
   d. Non-IDOT encroachments in survey? ☒ Yes ☐ No
      If yes, are they accounted for? ☒ Yes ☐ No N/A
   e. Tail water controls(s)? ☐ Yes ☒ No
      If yes, list: N/A
      Properly addressed? ☐ Yes ☐ No
   f. Expansion/Contraction cones addressed per Chapter 7 of Drainage Manual? ☒ Yes ☐ No
      If N/A, explain: _____

9. IDNR-OWR Permit: Drainage Area 11,060 sq. mi. ☐ Rural; ☒ Urbanizing;
   Public Water or within Public Water boundaries ☒ Yes ☐ No
   Indicate Permit Type Required:
   a. Individual ☐
   b. Statewide #2 ☐
   c. Statewide #12 ☐
   d. Floodway ☒
   e. Other: Part 3704 – Public Water Management
   f. None: ☐

10. Sensitive flood receptors ☒ Yes ☐ No
    Give type, elevations and locations: Strip Mall across from Utica Car Wash (Low Entry El. 463.79) Knights of Columbus Building (Low Entry El. 463.32); House on 502 Clark St. (Low Entry El. 462.19)
    History of flooding or overtopping problems: Yes ☒ No ☐
    Sources of observed highwater: USACE Waterway Center at Starved Rock Lock and Dam

11. Scour/migration problems: ☒ None/minimal ☐ Significant ☐ Severe
    Comments: Top of footings at Piers 3 and 4 are nearly exposed. Channel in good condition/bank needs minor repairs.
    Ice/Debris concerns: None/minimal ☒ Significant ☐ Severe ☐
    Comments: No ice jams in recent history according to the USACE Waterway Center at Starved Rock Lock and Dam
    Countermeasures proposed: None

12. Deviations from the general procedures presented above and in Chapters 6 and 7 of the Drainage Manual: None
    (Attach supporting documents if necessary)

Prepared by: Paul M. Kanellopoulos, P.E. Date: 3/8/2013

Signed: (QA/QC) _____ Date: 3/8/2013

SECTION 2

NARRATIVE

A. GENERAL PROJECT DESCRIPTION

This hydraulic report examines the replacement of the IL 178 bridge (S.N.050-0088) over the Illinois River, located approximately 0.89 miles south of Utica, IL in LaSalle County. A General Location Drainage Map showing the project limits, bridge location, and the subject waterway is shown in Exhibit 5-1.

The existing structure, located at roadway station 29+30.00 and river mile 229.6, was originally constructed in 1962. It is composed of seven spans that measure 1158'-0" back-to-back. The main span length is 378'-0" over the navigation channel of the Illinois River. The bridge roadway width measures 30'-0" face-to-face of curbs on both the approach and truss spans. On the approach spans, safety walks are 3'-0¾" wide resulting in an out-to-out deck width of 36'-1½". According to the existing plans, the navigational channel and flow attack angle to the substructure is approximately 10°, resulting in a clear channel waterway opening for navigation of 356'0" at right angles to the channel. The vertical clearance under the bridge main span is 44'-0", based on the design high water elevation. Two piers (1 and 6) are 9 ft wide and 4 piers (2, 3, 4, and 5) are 10 ft wide at the submerged portion of the pier. Existing bridge plans are presented in Section 9A.

According to the Bridge Condition Report (BCR), dated November 2011, rehabilitation or replacement of the bridge is necessary to improve the deteriorating condition of the structural components and to provide an extended service life. A description of the proposed structure recommended in the BCR is provided in Section 2F. This report discusses the hydraulics of the existing and proposed IL 178 bridges over the Illinois River.

B. DESCRIPTION OF WATERWAY AND FLOODPLAIN

The Illinois River is an IDNR-OWR designated Public Body of Water. Approximately 7,400 ft upstream of the IL 178 bridge is the Starved Rock Lock and Dam, which is one of a series of dams in the Illinois River whose sole function is to maintain a 9 ft channel depth for navigation. Beyond the small amount of storage necessary to maintain the navigation pool level, the dam passes all the river flow.

At the project location, the floodplain is a Zone AE with a designated floodway, as shown in the Flood Insurance Rate Map (Exhibit 6-1). Section 6 also shows the flood

profiles at the project location, based on the Flood Insurance Study for LaSalle County and Incorporated Areas, revised July 18, 2011.

Based on the survey notes, the channel bottom consists mainly of sand with some silt. According to the most recent underwater report available, it is indicated that the top of footings at Piers 3 and 4 are nearly exposed. There is also a large build-up of debris at the Pier 2 cap.

C. SENSITIVE FLOOD RECEPTORS

As shown in Exhibit 6-1, the 100-yr floodplain extends to the Starved Rock State Park to the south and north of the abandoned Illinois and Michigan Canal to the north. Several structures north of the Illinois River were built in the floodplain.

An aerial photograph of the study area is shown in Exhibit 8-1. The 5 buildings outlined in red were surveyed. Three of these buildings have low entry elevations below the base flood elevation. The structure shown west of IL 178 is a strip mall across from the Utica Car Wash with a low entry elevation of 463.79 ft. On the east side of IL 178 is a house on 502 Clark Street with a low entry elevation of 462.19 ft. Just east of this house is the Knights of Columbus building with a low entry elevation of 463.32 ft.

D. HIGH WATER TESTIMONIAL

The USACE Illinois Waterway Center at Starved Rock Lock and Dam was contacted on 9/21/2011 to obtain historical flooding observations. Following is the information obtained from Ms. Kathy Higdon of the Waterway Center:

- There have been 10 floods since the Waterway Center was established 33 years ago. The last one was in 2008;
- There have been no ice jams on the Illinois River in recent history. Most of the ice jam problems occur upstream near Chicago;
- Flooding was observed on a low spot on IL 178 between the bridge and the Village of Utica during the 2008 flood.

According to the IDOT Bureau of Operations there have been no pavement flooding problems around the bridge. Correspondence notes from the conversations with the Waterway Center and IDOT are shown in Section 12.

The all-time high water elevation at the bridge is 466.30 ft, which occurred on September 16, 2008. This elevation was obtained by interpolating gage data between the Starved Rock Lock and Dam and La Salle stations.

E. HYDROLOGY

Hydrologic data was obtained from the report *Upper Mississippi River System Flow Frequency Study* published in August 2003 by the USACE - Rock Island District. As part of this study, the discharge frequency relationships for the Illinois River were updated and were based on the evaluation of gage data.

According to the report, the drainage area of the Illinois River at the Starved Rock Lock and Dam (River Mile 231.0) just upstream of the IL 178 bridge is 11,060 square miles. The flows used for the hydraulic analysis of the existing and proposed IL 178 bridges were obtained from Table C-I-7 of the USACE report at River Mile 229.6. Following are the flows for the 10, 50, 100, and 500 year frequencies:

Q_{10} = 94,000 ft^3/s
Q_{50} = 124,000 ft^3/s
Q_{100} = 137,000 ft^3/s
Q_{500} = 163,000 ft^3/s

Section 7 of this report shows the cover page of the USACE study and an excerpt from Table C-I-7 showing the discharge frequency relationship along the Illinois River.

F. DESCRIPTION OF PROPOSED STRUCTURE

Based on the need to rehabilitate or replace the existing bridge, four alternatives were considered in the BCR. These alternatives were discussed with IDOT District 3 in a meeting held on June 1, 2011. This report will focus on Option D – Bridge Replacement – Plate Girder on New Alignment. The Village of Utica anticipates public comment will favor an eastern alignment that will avoid a bridge closure and the use of a long detour during construction. This type of bridge also has the lowest annualized life cycle costs of replacement as well as rehabilitation options. The proposed vertical and horizontal alignments are designed for the posted speed limit over IL 178 of 55 mph.

The replacement structure will consist of three spans crossing the Illinois River that measure 1158'-0" back-to-back, and a superstructure with a wider deck cross section of 49'-10" to accommodate roadway traffic and a shared-use path. The vertical alignment would have to be raised approximately 7.5 ft to maintain the existing vertical clearance. The proposed roadway horizontal alignment shift is 46 ft to the east, but within the existing right-of-way. The flow attack angle is approximately 10°, as in the existing structure, resulting in a low member horizontal clearance of 415'-7 1/8" at right angles to the channel. The two proposed bridge piers are assumed to have a width of 10 ft, which corresponds to the pier width of the middle four piers of the existing bridge. This is subject to refinement in the TS&L phase.

The proposed bridge plan is presented in Section 9B.

G. HYDRAULIC MODEL DEVELOPMENT

The locations of the hydraulic survey cross sections, taken on April 18-21, 2011, are shown on an aerial map in Exhibit 8-1. Stationing in River Miles corresponds to the Illinois River stationing, where the IL 178 bridge is RM 229.6. The six channel/ floodplain cross sections shown, RM 228.32, 229.38, 229.56, 229.65, 229.84, and 230.23 were used to develop an independent HEC-RAS model. RM 230.23 is located sufficiently far upstream of the bridge to account for the channel contraction rate and RM 228.32 is located sufficiently far downstream of the bridge to account for the channel expansion rate. At RM 229.38, north of the Illinois River, is a quarry which was not included in the survey. Elevations at the quarry were obtained from the USGS map and the area was modeled as permanently ineffective in the HEC-RAS model.

In addition to the six channel / floodplain cross sections, two cross sections were surveyed at the upstream and downstream faces of the IL 178 bridge, at the main channel only. These are RM 229.595 and 229.605. A 10 degree skew was applied to these in HEC-RAS since the bridge is not perpendicular to the channel. In the floodplain area, the elevations at the toe of the embankment for cross sections RM 229.56 and 229.65 were applied to cross sections 229.595 and 229.605, respectively.

Photographs at each cross section location and at the bridge are provided in Section 8B.

Manning's "n" values were determined based on these photographs and survey field notes. Base values for "n" were adjusted using the FHWA methodology presented in Chapter 5 of the IDOT Drainage Manual, as follows:

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

where n_b is a base value, n_1-n_4 are adjustments for irregularities, variations, obstructions, and vegetation, respectively, and m is a correction factor for channel meandering.

The main channel is deep, wide, and uniform and consists of sand. Therefore, $n = n_b = 0.023$. This value is within the typical range for sand and was adjusted during the model calibration, which will be discussed later.

For the floodplain, the base "n" value used is 0.026, which corresponds to coarse sand. Following the FHWA methodology with the adjustment values for floodplains, the "n" values were calculated as follows:

Woods (dense, summer)

$$n = (0.026 + 0.004 + 0 + 0 + 0.07)*(1) = 0.10$$

Grass (high)

$$n = (0.026 + 0.004 + 0 + 0 + 0.01)*(1) = 0.04$$

Field

$$n = (0.026 + 0.004 + 0 + 0 + 0.02)*(1) = 0.05$$

Quarry

$$n = (0.026 + 0.01 + 0 + 0.019 + 0)*(1) = 0.055$$

Survey data plots include the streambed profile, presented in Section 8C, the stream survey cross sections, presented in Section 8D, and the roadway profiles, shown in Section 8E. The roadway profile plot shows both existing and proposed roadway profiles and bridge pier configurations. As shown, the proposed roadway profile is higher than the existing. The roadway profile data shown on the plots was used to develop the bridge data in the independent HEC-RAS model. Field survey notes and point codes are included in Section 8F.

Ineffective flow areas were used to model the expansion and contraction reaches. A contraction ratio (CR) of 1 was used. The expansion ratio (ER) was computed based on the HEC-RAS Hydraulic Reference Manual, Table 5.1. The channel has an average slope of approximately 1 ft/mile, a ratio of bridge opening to floodplain width between 0.10 and 0.25, and overbank to mainline roughness values between 2 and 4. An ER of 1.5 is applicable under these conditions.

In addition to the surveyed cross sections, interpolated cross sections were added in the HEC-RAS model given the long reaches between surveyed cross sections. Interpolated cross sections are represented with an asterisk in HEC-RAS and help the model converge on a solution.

The HEC-RAS model was analyzed using the subcritical flow regime. The downstream boundary condition is based on known water surface elevations from the FIS profiles for the 10, 50, 100, and 500 year frequencies at RM 228.32. Elevations in both the FIS and the survey data are based on the NAVD88 datum. The model was calibrated to the published FIS profiles by slightly adjusting Manning's "n" values. The calibrated model for existing conditions agrees with the FIS profiles within 0.1 ft at the upstream end of the modeled reach, or RM 230.23. The proposed model was developed by changing the bridge and roadway profile to proposed conditions and by adjusting reach lengths to account for the 46ft alignment shift. Both existing and proposed models have the "pressure and/or weir" bridge modeling approach due to overtopping during 100 and 500 year flows. The existing and proposed bridge pier widths are adjusted automatically in HEC-RAS by applying the 10 degree skew in the Bridge Data Editor.

In addition to the proposed conditions model, a worst-case scenario model was developed. This model evaluates the maximum blockage during construction with all 6 existing and 2 proposed piers. The two bridges were modeled as a single bridge reflecting the total out-to-out width of both structures, per IDOT guidelines for dual bridges in close proximity.

The natural conditions model was developed by removing the bridge and ineffective flow areas (except at the quarry), and restoring all contraction and expansion coefficients to 0.1 and 0.3, respectively.

H. HYDRAULIC MODELING RESULTS AND CONCLUSION

HEC-RAS model input and output for natural, existing, and proposed conditions is provided in Sections 10A, 10B, and 10C, respectively. Section 10D provides a summary table comparing Proposed Option D to the existing bridge. As shown in the summary table, the proposed bridge configuration results in no increase in water surface elevation upstream of the bridge for all modeled storm events. This summary table does not include the interpolated cross sections, which were used for computational purposes only.

The Waterway Information Table for the IL 178 crossing of the Illinois River, and supporting calculations are presented in Section 3A. As shown, the proposed bridge results in no increase in headwater elevation or 10 year average velocity through the bridge. It also provides a larger bridge opening area. The vertical clearance between the two piers does not change under proposed conditions, satisfying the 8th US Coast Guard District navigation requirements. Correspondence with the US Coast Guard is summarized in Section 12.

The results also show that the existing and proposed 50 year headwater elevation are 465.16 ft and 465.15, respectively, which are slightly lower than the existing and proposed overtopping elevation of 465.18 ft at the roadway sag near Station 0+00. The modeling results are consistent with the flooding observation at the low spot on IL 178 reported by the USACE Illinois Waterway Center. Also, as shown in Exhibit 6-1, a segment of IL 178 approximately 2000 ft long is built in the floodplain. Freeboard criteria are not met at this roadway segment, which is mostly outside of the project limits for the IL 178 bridge replacement project. In order to meet freeboard criteria, the roadway profile will need to be raised from the project limits on the north side of the IL178 bridge to just south of the abandoned Illinois and Michigan Canal. This is not practical given the urban environment north of the bridge approaches and the high cost associated with addressing IDOT policy at this location given the occasional overtopping experienced by IL 178.

Contraction and local pier scour were computed using the live-bed and CSU equations, respectively, within HEC-RAS. The computations are shown in Section 11A. The live-bed equation was selected as the basis for computing contraction scour since the mean velocity at the approach cross section (RM 230.23) exceeds the critical velocity for sand. A D_{50} for sand of 0.6mm was used, which corresponds to the base value of Manning's n of 0.023 used in the main channel. Based on the HEC-18 methodology, the total scour depth is 40.74 ft for the 100 year flow and 43.62 ft for the 500 year flow.

These scour calculations assume non-cohesive material. The soil boring logs taken at the proposed pier locations show that the top of non-weathered limestone or dolomite is at 430.9 ft for the north pier and 432.9 ft at the south pier. According to the IDOT Bridge Manual, non-weathered limestone or dolomite is generally not considered susceptible to scour and, in most cases, should be assumed to arrest scour from extending below the non-weathered elevation (100% reduction in scour depth). Therefore, the IL 178 SGR recommends the scour elevations be revised to these elevations.

The worst-case scenario during construction with all 6 existing and 2 proposed piers in place was also analyzed. Increases in water surface elevation of up to 0.06 ft were observed upstream of the structure. The HEC-RAS results are included in the summary table in Section 10D. The corresponding Waterway Information Table is in Section 3B. Scour was computed for the 10-yr flow, as smaller flows have a high probability of occurring during construction. The computations are shown in Section 11B. The results obtained are similar to the proposed conditions. For example, the scour depth at existing piers 3 and 4 and proposed piers 1 and 2 ranges from 32.40 ft to 34.38 ft. Likewise, the scour elevations should be revised to the top of the non-weathered limestone or dolomite.

The Illinois River is a Public Body of Water, therefore the construction will require an IDNR – OWR Part 3704 permit. A permit under IDNR – OWR Part 3700 for construction in floodways of rivers is also required. The proposed structure meets IDNR's policy for reconstruction of bridges where the proposed bridge and approach roads shall be no more restrictive to normal and flood flows than the existing bridge.

The Hydraulic Report Outline (HRO) and Hydraulic Report Data Sheets are provided in Sections 1 and 4, respectively. An electronic copy of the HEC-RAS model is provided in Section 13.

SECTION 3

WATERWAY INFORMATION TABLES

3A – PROPOSED CONDITIONS

Illinois Department of Transportation

Waterway Information Table

Route: FAS Route 1279 (IL 178)
Section: (1)BR & 1
County: LaSalle
Date: 3/8/2013

Existing SN: 050-0088
Proposed SN: N/A
Waterway: Illinois River
Prepared by: Parsons Brinckerhoff (PB)

Existing Overtopping Elev. = 465.18 at Sta. 0+00

Drainage Area = 11,060 sq.mi — Proposed Overtopping Elev. = 465.18 at Sta. 0+00

Flood	Freq. Yr.	Q Ft^3/s	Opening - ft^2		Natural H.W.E.	Head – ft.		Headwater Elevation	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	94,000	20231	20734	461.7	0.9	0.8	462.6	462.5
Design	50	124,000	23249	23957	465.1	0.1	0.1	465.2	465.2
Base	100	137,000	24359	25146	466.3	0.1	0.1	466.4	466.4
Overtop Existing	>50								
Overtop Proposed	>50								
Max. Calc.	500	163,000	26323	27240	468.4	0.2	0.1	468.6	468.5

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 4.65 ft/s

10 YEAR VELOCITY THROUGH PROPOSED BRIDGE = 4.53 ft/s

ALL–TIME H.W.E. & DATE: 466.30 ft on 9/16/2008

Scope of Work: Bridge Replacement

EXISTING STRUCTURE

TYPE: Cantilevered Steel Through-Truss
LENGTH: 1158'-0" back-to-back
SPANS: 7
LOW BEAM: 496.40
SKEW: 10 degrees
LOW E.O.P.: 499.99

PROPOSED STRUCTURE

TYPE: Welded Steel Plate Girder
LENGTH: 1158'0" back-to-back
SPANS: 3
LOW BEAM: 494.5
SKEW: 10 degrees
LOW E.O.P.: 505.76

NOTE: PROPOSED STRUCTURE DETAILS ARE PRELIMINARY; SUBJECT TO REFINEMENT IN TSL STAGE.

PARSONS BRINCKERHOFF

ROUTE: FAS Route 1279 (IL 178) MADE BY: PMK DATE: 3/8/2013
WATERWAY: ILLINOIS RIVER CHECKED BY: SJV DATE: 3/8/2013

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

Note: U/S bridge face is taken at RM 229.65. Approach section is taken at RM 230.23.

CALCULATE CREATED HEAD AND HEADWATER ELEVATION

Frequency	Natural H.W.E. (ft)		Existing H.W.E. (ft)	Proposed H.W.E. (ft)	Created Head (ft) at Approach Section [1]		Headwater Elevation (ft) [2]	
	U/S Face of Structure	Approach Section	Approach Section	Approach Section	Existing	Proposed	Existing	Proposed
10-year	461.7	462.0	462.9	462.8	0.9	0.8	462.6	462.5
50-year	465.1	465.4	465.5	465.5	0.1	0.1	465.2	465.2
100-year	466.3	466.6	466.8	466.7	0.1	0.1	466.4	466.4
500-year	468.4	468.8	468.9	468.9	0.2	0.1	468.6	468.6

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.

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft) [3]			
Existing	Station	Proposed	Station
464.70	0+00	464.70	0+00
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
496.40	23+60	494.50	23+60
Existing Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
2.07	overtop	overtop	overtop
Proposed Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
2.21	overtop	overtop	overtop
Proposed Vertical Clearance (ft) [5]			
10-Year	50-Year	100-Year	500-Year
32.77	29.45	28.24	26.09

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. Minimum is set by USCG navigation guidelines.

PARSONS BRINCKERHOFF

ROUTE: FAS Route 1279 (IL 178) MADE BY: PMK DATE: 3/8/2013
WATERWAY: ILLINOIS RIVER CHECKED BY: SJV DATE: 3/8/2013

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

CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR BRIDGE

Initial Waterway Opening Area in Bridge (ft^2) [6]			Top Width of Flow in Bridge (ft) [6]		Area to add below/above Natural H.W.E.(ft^2) [7]		Final Waterway Opening Area (ft^2)	
Frequency	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
10-year	20919	21373	906.3	968.0	-689	-639	20231	20734
50-year	23121	23830	916.0	978.1	128	127	23249	23957
100-year	24193	24978	923.8	985.5	166	168	24359	25146
500-year	26100	27012	928.9	991.0	223	228	26323	27240

6. From HEC-RAS Bridge Output.

7. Area is difference of Existing/Proposed W.S. Elevation inside bridge and Natural H.W.E. at upstream face, mulitiplied by top width.

3B – WORST-CASE SCENARIO DURING CONSTRUCTION

Illinois Department of Transportation

Waterway Information Table

Route: FAS Route 1279 (IL 178)
Section: (1)BR & 1
County: LaSalle
Date: 3/8/2013

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Proposed SN: N/A
Waterway: Illinois River
Prepared by: Parsons Brinckerhoff (PB)

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Drainage Area = 11,060 sq.mi — Proposed Overtopping Elev. = 465.18 at Sta. 0+00

Flood	Freq. Yr.	Q Ft^3/s	Opening - ft^2		Natural H.W.E.	Head – ft.		Headwater Elevation	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
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Overtop Existing	>50								
Overtop Proposed	>50								
Max. Calc.	500	163,000	26323	25252	468.4	0.2	0.2	468.6	468.6

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 4.65 ft/s

10 YEAR VELOCITY THROUGH PROPOSED BRIDGE = 4.86 ft/s

ALL–TIME H.W.E. & DATE: 466.30 ft on 9/16/2008

Scope of Work: Bridge Replacement

EXISTING STRUCTURE

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PARSONS BRINCKERHOFF

ROUTE: FAS Route 1279 (IL 178) MADE BY: PMK DATE: 3/8/2013
WATERWAY: ILLINOIS RIVER CHECKED BY: SJV DATE: 3/8/2013

WATERWAY INFORMATION TABLE BACK-UP CALCULATIONS

Note: U/S bridge face is taken at RM 229.65. Approach section is taken at RM 230.23.

CALCULATE CREATED HEAD AND HEADWATER ELEVATION

Frequency	Natural H.W.E. (ft)		Existing H.W.E. (ft)	Proposed (Worst Case) H.W.E. (ft)	Created Head (ft) at Approach Section [1]		Headwater Elevation (ft) [2]	
	U/S Face of Structure	Approach Section	Approach Section	Approach Section	Existing	Proposed	Existing	Proposed
10-year	461.7	462.0	462.9	462.9	0.9	0.9	462.6	462.6
50-year	465.1	465.4	465.5	465.6	0.1	0.2	465.2	465.2
100-year	466.3	466.6	466.8	466.8	0.1	0.2	466.4	466.5
500-year	468.4	468.8	468.9	469.0	0.2	0.2	468.6	468.6

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.

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft) [3]			
Existing	Station	Proposed	Station
464.70	0+00	464.70	0+00
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
496.40	23+60	494.50	23+60
Existing Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
2.07	overtop	overtop	overtop
Proposed Freeboard (ft) [4]			
10-Year	50-Year	100-Year	500-Year
2.07	overtop	overtop	overtop
Proposed Vertical Clearance (ft) [5]			
10-Year	50-Year	100-Year	500-Year
32.77	29.45	28.24	26.09

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. Minimum is set by USCG navigation guidelines.

PARSONS BRINCKERHOFF

ROUTE: FAS Route 1279 (IL 178) MADE BY: PMK DATE: 3/8/2013
WATERWAY: ILLINOIS RIVER CHECKED BY: SJV DATE: 3/8/2013

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

CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR BRIDGE

Initial Waterway Opening Area in Bridge (ft^2) [6]			Top Width of Flow in Bridge (ft) [6]		Area to add below/above Natural H.W.E.(ft^2) [7]		Final Waterway Opening Area (ft^2)	
Frequency	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
10-year	20919	19966	906.3	873.4	-689	-620	20231	19346
50-year	23121	22119	916.0	883.2	128	141	23249	22260
100-year	24193	23183	923.8	890.9	166	169	24359	23352
500-year	26100	24983	928.9	896.1	223	269	26323	25252

6. From HEC-RAS Bridge Output.

7. Area is difference of Existing/Proposed W.S. Elevation inside bridge and Natural H.W.E. at upstream face, mulitiplied by top width.

SECTION 4

HYDRAULIC REPORT DATA SHEETS

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	FAS Route 1279 (IL 178)	P or D #	P-93-035-01
Section	(1)BR&1	PTB #	155-035
County	LaSalle		
Exist SN	050-0088		
Prop SN	N/A		

General Information

1. Name of the Stream: Illinois River

2. Location of the Structure: Township 33N, ¼ of the SE Range 2E ¼ of Section 17, of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Parsons Brinckerhoff (PB)
   ☐ 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.): 11,060

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

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

8. Number of Waterway Information Tables (WIT): 2
   If more than one, explain:
   In addition to the proposed conditions WIT, a worst case scenario during construction was considered in which all 6 existing and 2 proposed piers are in place (note: the existing bridge will be maintained open for traffic during constr.)

Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☒ Gage Data
   ☒ Other Upper Mississippi River System Flow Freq. Study

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: Flood Insurance Study (FIS) Profiles
    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: 1.5 (X:1)
Contraction 1.0 (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.
Strip Mall across from Utica Car Wash (Low Entry El. 463.79); Knights of Columbus Building (Low Entry El. 463.32);
House on 502 Clark Street (Low Entry El. 462.19).

13. Is there any History of Flooding or Overtopping problems? ☒ Yes ☐ No
Sources of Observed Highwater:
USACE Illinois Waterway Center at Starved Rock Lock and Dam
(Low spot on IL 178 between the bridge and Village of North Utica flooded in 2008).

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 Part 3704 - Public Water Management

Proposed Structure Data

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

17. If a bridge is proposed, supply:

Flow line elevation (ft):	424.92	Abutment type:	stub type abutment
Preliminary low beam elevation (ft):	494.50	Skew (degrees):	10
Width of deck (ft):	49'10"	Number of spans:	3
Total length from face to face of abutment (ft)	1158		

18. If a culvert is proposed, supply:

Type and size:	N/A	Length (ft):	N/A
Upstream invert elevation (ft):	N/A	Entrance type:	N/A
Downstream invert elevation (ft):	N/A	Skew (degrees):	N/A

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):	N/A	Skew (degrees):	N/A
Span (ft):	N/A	Length (ft):	N/A
Height (ft):	N/A	Number of spans:	N/A

20. a. Is the IDOT Clearance Policy Met? ☒ Yes ☐ No ☐ NA Value (ft): 29.45
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☒ No ☐ NA Value (ft): overtop

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

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments: Top of footings at Piers 3 and 4 are nearly exposed (see BCR dated Nov. 2011 Section III - 3.3).

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments: No ice jams in recent history according to the USACE Waterway Center at Starved Rock Lock & Dam

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments: Large build-up of debris noted in Pier 2 cap (see BCR dated Nov. 2011 Section III - 3.3)

Countermeasures Proposed: None

Existing Structure Data

		Structure U/S	Subject Structure	Structure D/S
23.	Distance from proposed structure: (ft.)	7,400	46	20,600
24.	Type of structure:	Dam	Bridge	Bridge (I-39)
25.	Low beam elevation:	-	494.50	-
26.	Flow line elevation:	-	424.92	-
27.	Maximum known high water elevation:	-	-	-
28.	Date of maximum high water:	-	-	-
29.	Cause (backwater, headwater, etc.):	-	-	-
30.	Does structure carry entire design flood flow?	☐ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No
	If not, state area of additional waterway opening: (ft^2)	-	-	-
31.	Type and size of existing overflow structures:	-	-	-
32.	Has adverse scour occurred under or adjacent to the structure?	-	No	-
33.	Classify type of scour and/or aggradation / degradation:	-	-	-

Required Additional Data

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:
None

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

The Starved Rock Lock & Dam is located upstream of the IL178 bridge at RM 231.0. Its sole function is to maintain a 9ft channel depth for navigation. Beyond that, the dam passes all the river flow.

36. Site Inspection made by: Lin Engineering Date: 4/18/2011 and 8/10/2011

Remarks:
Provided all photos; surveyed channel, bridge and sensitive flood receptors.

37. Prepared by: Paul M. Kanellopoulos, P.E. Date 3/8/2013

Signed (QA/QC): Date 3/8/2013

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)

SECTION 5

GENERAL LOCATION DRAINAGE MAP

EXHIBIT 5–1
GENERAL LOCATION DRAINAGE MAP
IL 178 OVER ILLINOIS RIVER
LA SALLE AND STARVED ROCK
QUADRANGLES
BASE MAP (USGS) 1993, 1970

REVISIONS		DESIGNED	INT:	DATE	CONTRACT NO.
1.	5/7/2012	MCC		10/13/2011	
2.	3/5/2013	DRAWN	INT:	HORIZ SCALE:	SHEET NO.
3.		MCC		1"=2000'	1 of 1
4.		CHECKED	INT:	VERT SCALE:	
5.		PMK		1"=2000'	

SECTION 6

FLOOD INSURANCE RATE MAP / FIS FLOOD PROFILES

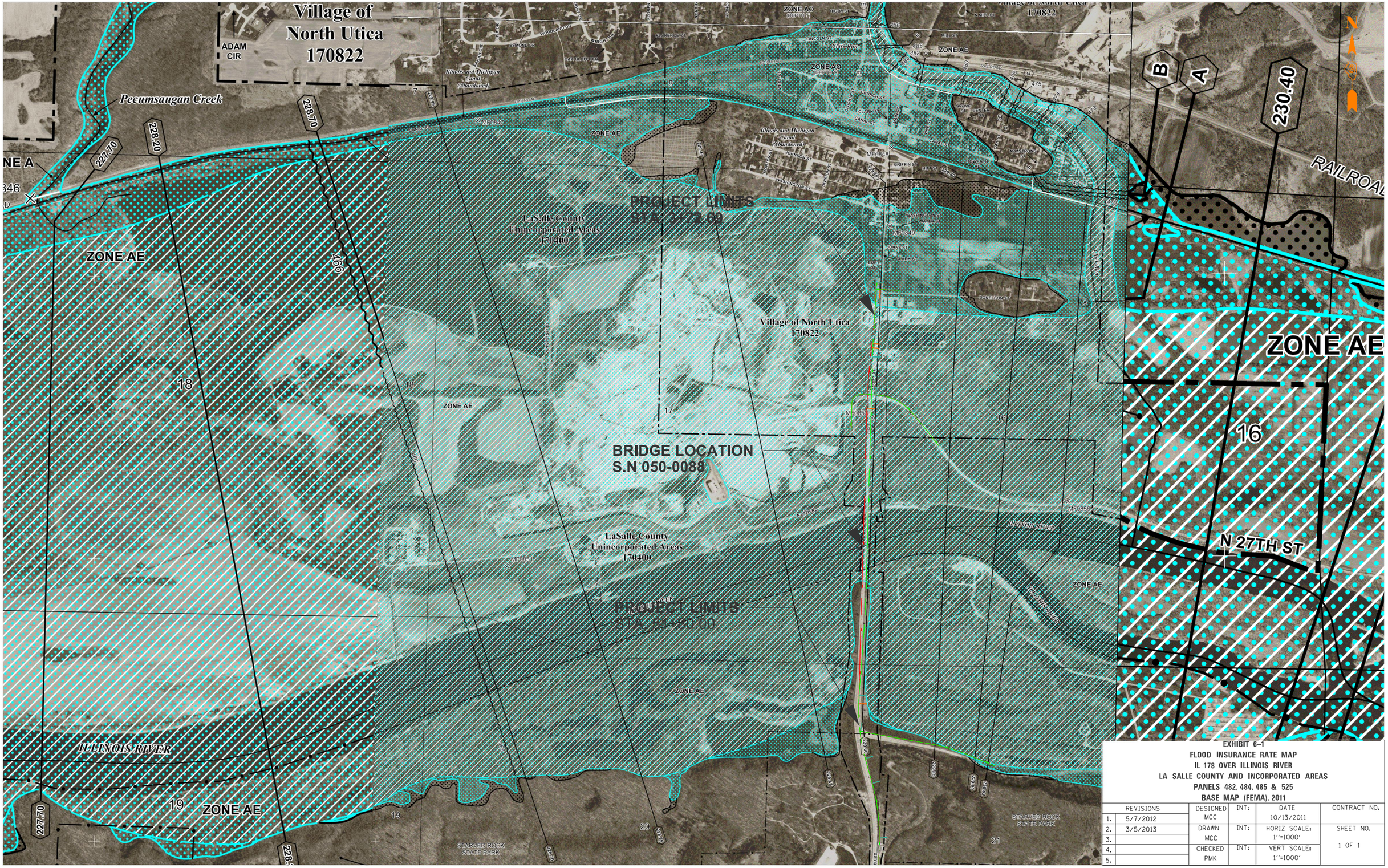
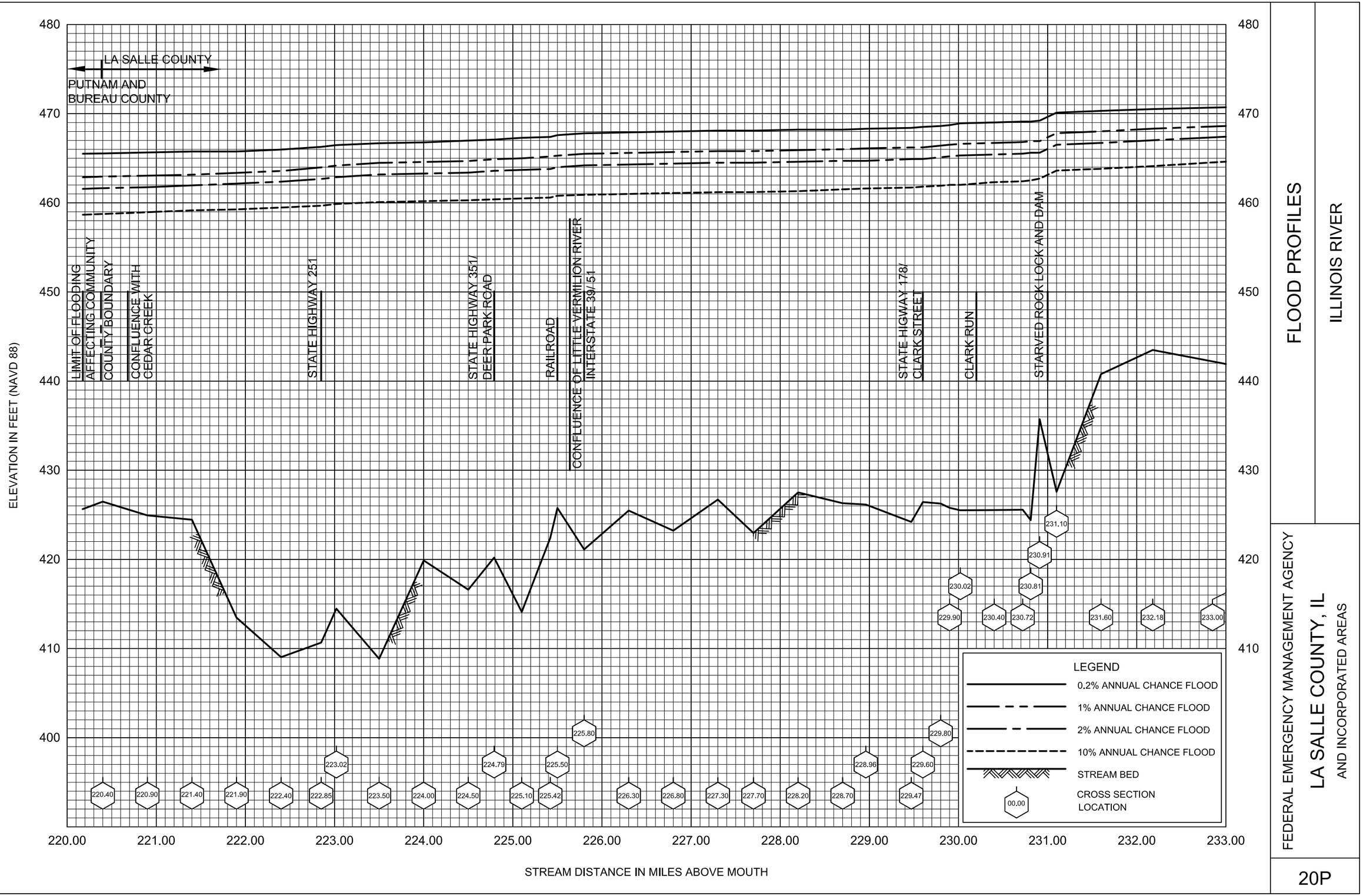


EXHIBIT 6–1
FLOOD INSURANCE RATE MAP
IL 178 OVER ILLINOIS RIVER
LA SALLE COUNTY AND INCORPORATED AREAS
PANELS 482, 484, 485 & 525
BASE MAP (FEMA), 2011

REVISIONS		DESIGNED	INT:	DATE	CONTRACT NO.
1.	5/7/2012	MCC		10/13/2011	
2.	3/5/2013	DRAWN	INT:	HORIZ SCALE:	SHEET NO.
3.		MCC		1"=1000'	
4.		CHECKED	INT:	VERT SCALE:	1 OF 1
5.		PMK		1"=1000'	



FLOOD PROFILES

ILLINOIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LA SALLE COUNTY, IL

AND INCORPORATED AREAS

20P

EXHIBIT 6-2

SECTION 7

HYDROLOGY

Upper Mississippi River System
Flow Frequency Study

Hydrology & Hydraulics
Appendix C
Illinois River

Rock Island District

August 2003

Table C-I-7

2003 Illinois River Stage and Flow Frequency Profiles (All elevations referenced to NGVD 1929)

River Mile	Exceedance Probability															
	0.5		0.2		0.1		0.04		0.02		0.01		0.005		0.002	
	feet	cfs	feet	cfs	feet	cfs	feet	cfs	feet	cfs	feet	cfs	feet	cfs	feet	cfs
225.1	455.4	71,000	459.1	100,000	460.7	118,000	462.6	140,000	463.9	158,000	465.2	175,000	466.4	191,000	467.5	209,000
225.42	455.4	71,000	459.2	100,000	460.8	118,000	462.7	140,000	464.0	158,000	465.4	175,000	466.5	191,000	467.6	209,000
225.5	455.5	72,000	459.3	100,000	461.0	118,000	462.9	140,000	464.2	158,000	465.5	175,000	466.7	191,000	467.8	209,000
225.8	455.6	72,000	459.5	100,000	461.1	118,000	463.1	140,000	464.4	158,000	465.7	176,000	466.9	191,000	468.0	209,000
226.3	455.6	57,000	459.5	78,000	461.2	93,000	463.2	109,000	464.5	123,000	465.8	136,000	467.0	148,000	468.1	163,000
226.8	455.7	57,000	459.6	78,000	461.3	93,000	463.2	109,000	464.6	124,000	465.9	136,000	467.1	149,000	468.2	163,000
227.05	455.7	57,000	459.6	78,000	461.3	93,000	463.3	109,000	464.6	124,000	466.0	136,000	467.1	149,000	468.2	163,000
227.3	455.8	57,000	459.7	78,000	461.4	93,000	463.3	109,000	464.7	124,000	466.0	136,000	467.1	149,000	468.3	163,000
227.7	455.8	57,000	459.7	78,000	461.4	94,000	463.4	109,000	464.7	124,000	466.0	137,000	467.2	149,000	468.3	163,000
228.2	455.9	57,000	459.7	79,000	461.5	94,000	463.4	109,000	464.8	124,000	466.1	137,000	467.2	149,000	468.4	163,000
228.45	455.9	57,000	459.8	79,000	461.6	94,000	463.5	109,000	464.8	124,000	466.2	137,000	467.3	149,000	468.4	163,000
228.7	455.9	57,000	459.8	79,000	461.7	94,000	463.5	109,000	464.9	124,000	466.2	137,000	467.3	149,000	468.4	163,000
228.96	456.0	57,000	459.8	79,000	461.8	94,000	463.6	109,000	464.9	124,000	466.3	137,000	467.4	149,000	468.5	163,000
229.47	456.0	58,000	459.9	79,000	461.9	94,000	463.7	109,000	465.1	124,000	466.4	137,000	467.5	149,000	468.6	163,000
229.6	456.1	58,000	459.9	79,000	462.0	94,000	463.8	109,000	465.1	124,000	466.4	137,000	467.5	149,000	468.7	163,000
229.8	456.1	58,000	460.0	79,000	462.1	94,000	463.9	109,000	465.3	124,000	466.6	137,000	467.7	149,000	468.8	164,000
229.9	456.1	58,000	460.0	79,000	462.2	94,000	464.0	109,000	465.4	124,000	466.7	137,000	467.8	149,000	468.9	164,000
230.02	456.1	58,000	460.0	79,000	462.2	94,000	464.1	109,000	465.5	124,000	466.8	137,000	467.9	149,000	469.1	164,000
230.4	456.2	58,000	460.2	79,000	462.5	94,000	464.2	109,000	465.6	125,000	466.9	137,000	468.1	149,000	469.2	164,000
230.72	456.3	58,000	460.3	79,000	462.6	94,000	464.3	109,000	465.7	125,000	467.0	137,000	468.1	150,000	469.3	164,000
230.81	456.5	58,000	460.4	79,000	462.7	94,000	464.4	109,000	465.8	125,000	467.1	137,000	468.2	150,000	469.3	164,000
230.91	456.7	58,000	460.6	79,000	462.9	94,000	464.5	110,000	465.8	125,000	467.1	137,000	468.3	150,000	469.4	164,000
231.1	458.5	58,000	461.5	79,000	463.8	94,000	465.4	110,000	466.7	125,000	468.0	137,000	469.2	150,000	470.3	164,000
231.35	458.6	58,000	461.6	79,000	463.8	94,000	465.5	110,000	466.8	125,000	468.1	137,000	469.2	150,000	470.4	164,000
231.6	458.9	58,000	461.8	79,000	464.0	94,000	465.6	110,000	466.9	125,000	468.2	138,000	469.3	150,000	470.5	164,000
231.89	459.3	58,000	462.0	79,000	464.1	94,000	465.7	110,000	467.1	125,000	468.3	138,000	469.4	150,000	470.6	164,000
232.18	459.7	58,000	462.2	79,000	464.3	94,000	465.9	110,000	467.2	125,000	468.5	138,000	469.5	150,000	470.7	164,000
232.45	460.0	58,000	462.4	79,000	464.5	94,000	466.0	110,000	467.3	125,000	468.6	138,000	469.6	150,000	470.8	164,000
232.73	460.3	58,000	462.7	80,000	464.7	94,000	466.2	110,000	467.5	125,000	468.7	138,000	469.7	150,000	470.9	164,000
233	460.6	58,000	462.9	80,000	464.8	94,000	466.3	110,000	467.6	125,000	468.8	138,000	469.9	150,000	470.9	164,000
233.25	461.0	58,000	463.2	80,000	465.0	94,000	466.5	110,000	467.7	125,000	468.9	138,000	470.0	150,000	471.0	165,000
233.5	461.2	58,000	463.4	80,000	465.2	94,000	466.6	110,000	467.8	126,000	469.0	138,000	470.1	150,000	471.1	165,000
234	461.5	58,000	463.6	80,000	465.4	94,000	466.8	110,000	468.0	126,000	469.2	138,000	470.2	150,000	471.3	165,000
234.25	461.7	58,000	463.8	80,000	465.5	94,000	466.9	110,000	468.1	126,000	469.3	139,000	470.3	151,000	471.4	165,000
234.5	461.8	58,000	464.0	80,000	465.7	94,000	467.1	110,000	468.3	126,000	469.4	139,000	470.4	151,000	471.5	165,000
235.1	462.0	58,000	464.2	80,000	466.0	94,000	467.3	110,000	468.5	126,000	469.7	139,000	470.7	151,000	471.7	165,000
235.7	462.2	58,000	464.5	80,000	466.3	94,000	467.7	110,000	468.9	126,000	470.0	139,000	471.0	151,000	472.0	165,000
235.85	462.3	58,000	464.7	80,000	466.5	94,000	467.9	110,000	469.1	126,000	470.2	139,000	471.2	151,000	472.2	166,000

SECTION 8

HYDRAULIC SURVEY DATA

8A – CROSS SECTION LOCATION MAP

N

1% ANNUAL CHANCE FLOODPLAIN BOUNDARY

FLOODWAY BOUNDARY

471.28

EL. 471.10

EL. 472.85

EL. 471.33

EL. 463.43

EL. 464.07

EL. 463.32

EL. 471.41

EL. 471.22

EL. 462.19

EL. 462.34

EL. 463.90

EL. 463.79

EL. 464.34

ILLINOIS AND MICHIGAN CANAL (ABANDONED)

EL. 466.00

PROPOSED IL 178 ALIGNMENT

964'

N. 27TH ROAD

197'

258'

51'

964'

2099'

COUNTY HIGHWAY 34

FLOW DIRECTION

5571'

STREAM FLOWLINE

RM 229.38

RM 229.56

IL 178

RM 229.595

RM 229.605

RM 229.84

RM 229.65

RM 230.23

RM 228.32

EXHIBIT 8-1
CROSS SECTION LOCATION MAP
IL 178 OVER ILLINOIS RIVER

REVISIONS		DESIGNED	INT:	DATE	CONTRACT NO.
1.	5/7/2012	MCC		10/13/2011	
2.		DRAWN	INT:	HORIZ SCALE:	SHEET NO.
3.		MCC		1"=500'	1 of 1
4.		CHECKED	INT:	VERT SCALE:	
5.		PMK		1"=500'	

8B – PHOTOGRAPHS

Photo 1: Illinois River (RM 230.23) facing upstream.

Photo 2: Illinois River (RM 230.23) facing downstream.

Photo 3: Illinois River (RM 230.23) right overbank, facing north.

Photo 4: Illinois River (RM 230.23) left overbank, facing south.

Photo 5: Illinois River (RM 229.84) facing upstream.

Photo 6: Illinois River (RM 229.84) facing downstream.

Photo 7: Illinois River (RM 229.84) right overbank, facing north.

Photo 8: Illinois River (RM 229.84) left overbank, facing south.

Photo 9: Illinois River (RM 229.65) facing upstream.

Photo 10: Illinois River (RM 229.65) facing downstream.

Photo 11: Illinois River (RM 229.65) right overbank, facing north.

Photo 12: Illinois River (RM 229.65) left overbank, facing south.

Photo 13: IL 178 over the Illinois River, downstream side, facing north.

Photo 14: Illinois River (RM 229.56) facing upstream.

Photo 15: Illinois River (RM 229.56) facing downstream.

Photo 16: Illinois River (RM 229.56) right overbank, facing north.

Photo 17: Illinois River (RM 229.56) left overbank, facing south.

Photo 18: Illinois River (RM 229.56) left overbank, facing south.

Photo 19: Illinois River (RM 229.38) facing upstream.

Photo 20: Illinois River (RM 229.38) facing downstream.

Photo 21: Illinois River (RM 229.38) right overbank, facing north.

Photo 22: Illinois River (RM 229.38) left overbank, facing south.

Photo 23: Illinois River (RM 228.32) facing upstream.

Photo 24: Illinois River (RM 228.32) facing downstream.

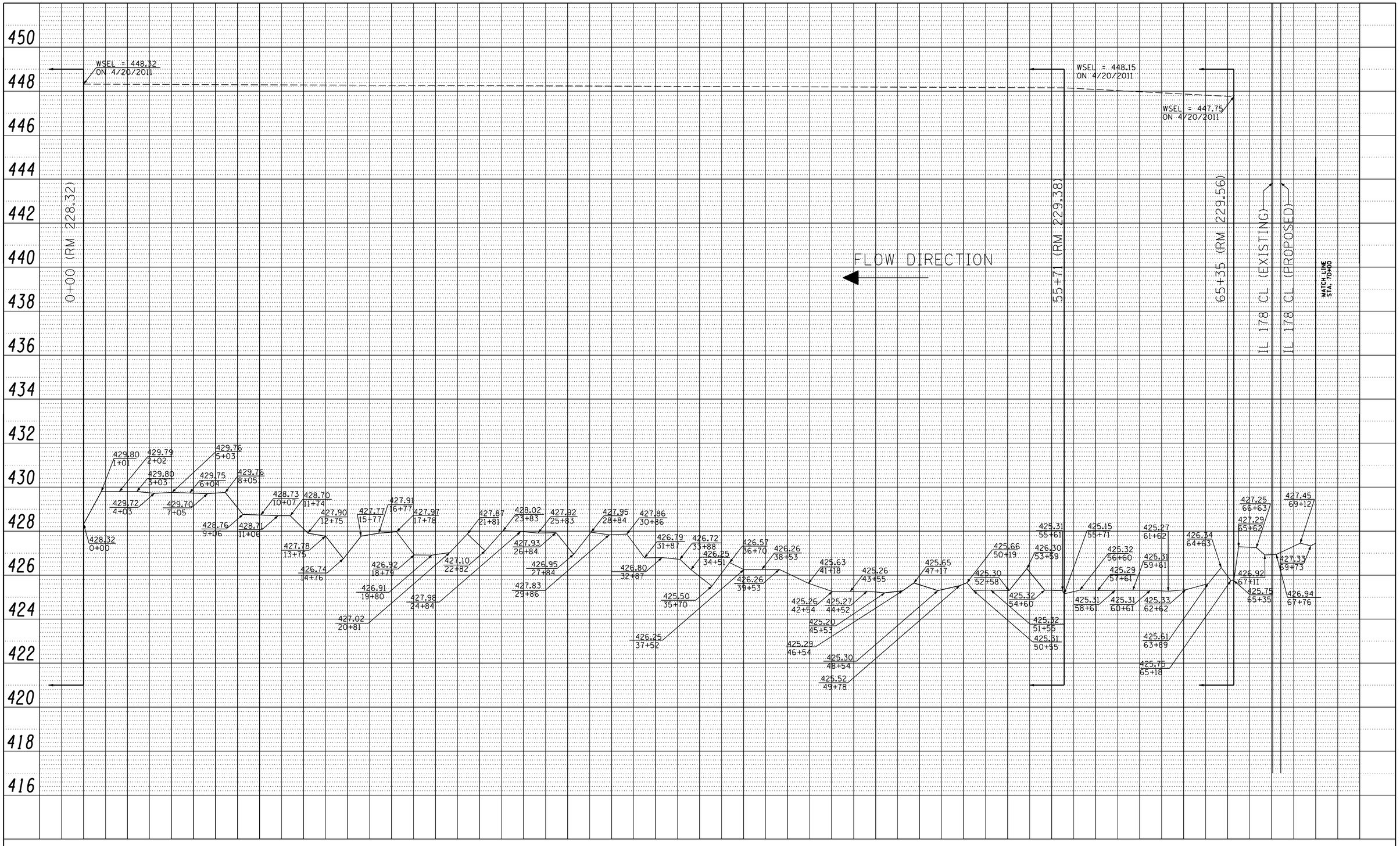
Photo 25: Illinois River (RM 228.32) right overbank, facing north.

Photo 26: Illinois River (RM 228.32) left overbank, facing south.

8C – STREAMBED PROFILE

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

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



FILE NAME = streambedPR.SHEETScompressed.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250' V: 1"=2'	CHECKED - PMK	REVISED -
	PLOT DATE = $DATE$	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAMBED PROFILE

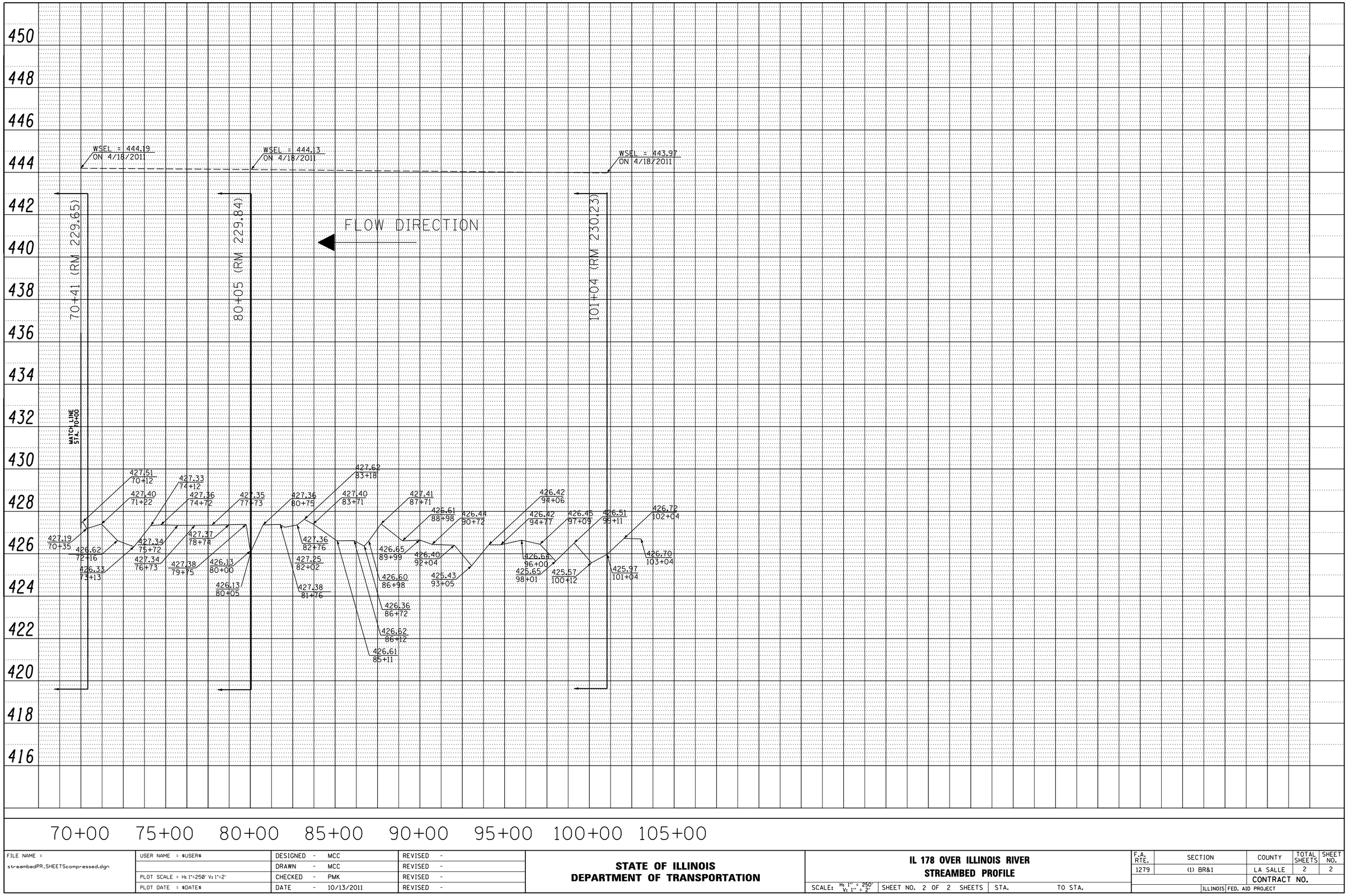
SCALE: H: 1" = 250' V: 1" = 2' | SHEET NO. 1 OF 2 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&1	LA SALLE	2	1
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

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

DATE	BY

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



FILE NAME = streambedPR.SHEETScompressed.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250' V: 1"=2'	CHECKED - PMK	REVISED -
	PLOT DATE = $DATE$	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAMBED PROFILE

SCALE: H: 1" = 250' V: 1" = 2' | SHEET NO. 2 OF 2 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&1	LA SALLE	2	2
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

8D – STREAM SURVEY CROSS SECTIONS

CROSS SECTION AT RIVER MILE 228.32
(LOOKING DOWNSTREAM)

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

PROFILE — NOTE BOOK NO. — SURVEYED / PLOTTED / GRADES CHECKED / STA. NOTED / STRUCTURE NOTAT'NS CH'KD — BY — DATE

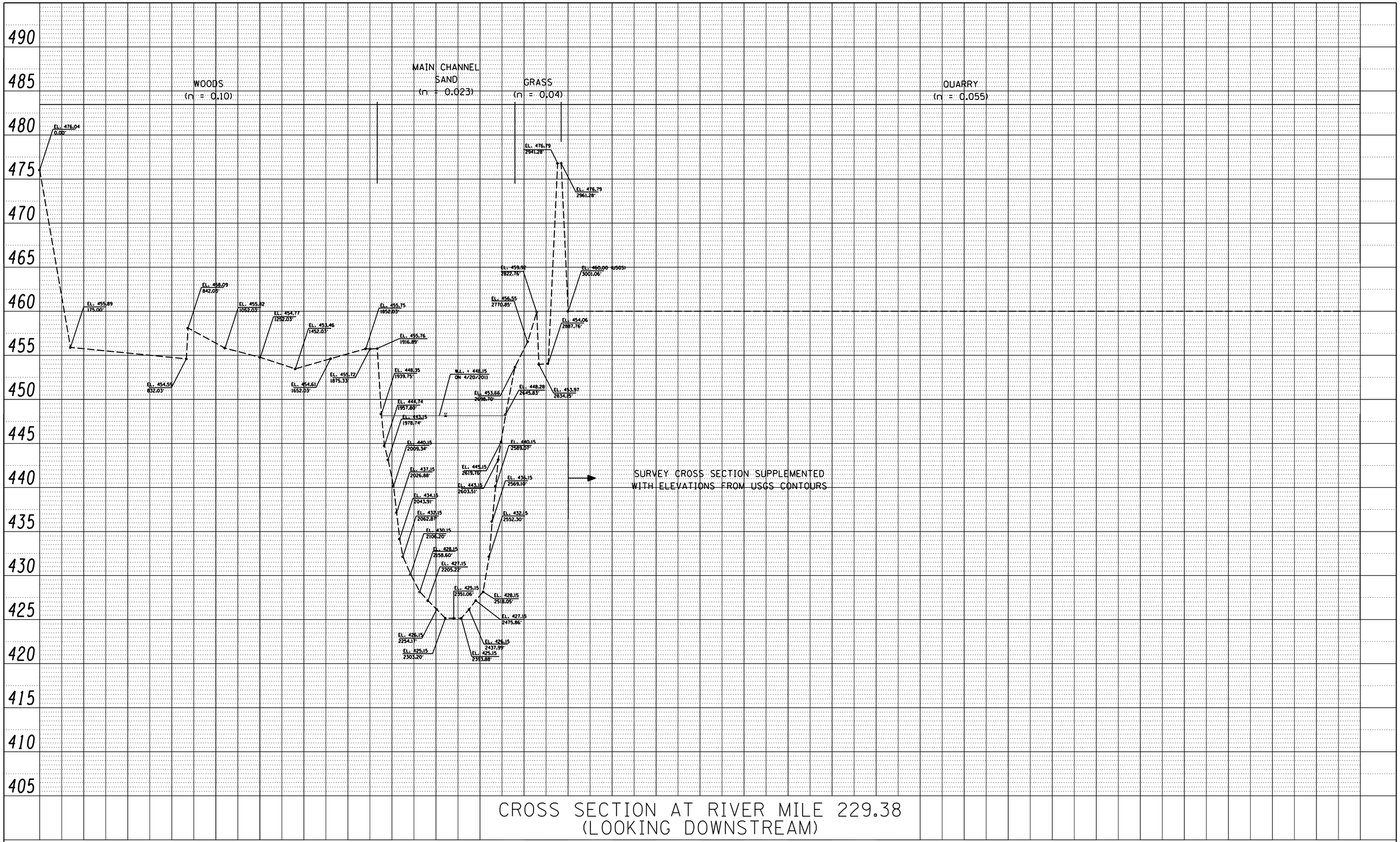
FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	IL 178 OVER ILLINOIS RIVER STREAM SURVEY CROSS SECTIONS	F.A. RTE. 1279
		DRAWN - MCC	REVISED -			SECTION (1) BR&1
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -			COUNTY LA SALLE
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -		SCALE: H: 1"=250' V: 1"=5	SHEET NO. 1 OF 8 SHEETS	STA. TO STA.	TOTAL SHEETS 8	SHEET NO. 1

CONTRACT NO.

ILLINOIS FED. AID PROJECT

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

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



SURVEY CROSS SECTION SUPPLEMENTED
WITH ELEVATIONS FROM USGS CONTOURS

CROSS SECTION AT RIVER MILE 229.38
(LOOKING DOWNSTREAM)

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 2 OF 8 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	8	2
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

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

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

490
485
480
475
470
465
460
455
450
445
440
435
430
425
420
415
410
405

WOODS
(n = 0.10)

MAIN CHANNEL
SAND
(n = 0.023)

GRASS
(n = 0.04)

El. 473.09
0.00'
El. 467.54
112.15'
El. 458.17
224.52'
El. 455.18
318.73'
El. 453.01
613.06'
El. 454.52
417.2'
El. 453.51
513.04'
El. 455.87
707.52'
El. 452.35
918.14'
El. 452.91
896.45'
El. 452.68
1213.03'
El. 452.22
1109.90'
El. 452.61
1410.45'
El. 452.73
1309.30'
El. 452.20
1016.22'
El. 454.53
1675.65'
El. 452.04
1501.51'
El. 451.79
1575.80'
El. 454.96
1736.61'
El. 454.74
1747.18'
El. 448.25
1770.21'
El. 445.32
1784.23'
El. 439.75
1815.79'
El. 437.75
1843.09'
El. 433.75
1864.35'
El. 431.75
1875.73'
El. 429.75
1922.66'
El. 427.75
1993.79'
El. 429.75
1960.97'
El. 426.75
2049.15'
El. 425.79
2108.41'
W.L. = 447.75
ON 4/20/2011
El. 461.24
2588.08'
El. 461.18
2563.90'
El. 459.60
2553.29'
El. 453.82
2476.93'
El. 448.08
2425.33'
El. 444.75
2402.65'
El. 438.75
2341.25'
El. 441.75
2376.50'
El. 432.75
2308.65'
El. 421.75
2273.02'
El. 425.75
2225.18'
El. 426.75
2164.00'
El. 455.28
2722.44'
El. 454.70
2622.90'
El. 473.31
2808.40'
El. 470.72
3462.28'
El. 467.56
3564.82'
El. 468.93
3665.02'
El. 463.67
3721.19'
El. 465.58
4617.81'
El. 462.35
5406.90'
El. 463.65
6013.60'
El. 471.95
6370.10'
El. 477.20
6594.70'
El. 479.22
6726.42'
El. 467.48
6779.10'

CROSS SECTION AT RIVER MILE 229.56
(LOOKING DOWNSTREAM)

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 3 OF 8 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	8	3
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Downstream_HYD_XS_SHEETS.dgn 10/13/2011 9:39:18 AM

NOTES:

1. THE SURVEY POINTS SHOWN WERE TAKEN AT THE DOWNSTREAM FACE OF THE BRIDGE. THE REMAINDER OF THE CROSS SECTION SHOWN MATCHES THE POINTS FROM RM 229.56 AT THE TOE OF THE EMBANKMENT.
2. THE SURVEY POINTS SHOWN WERE SKEWED BY 10 DEGREES IN THE HEC-RAS MODEL.

CROSS SECTION AT RIVER MILE 229.595
(LOOKING DOWNSTREAM)

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

PROFILE: NOTE BOOK NO. ___ SURVEYED ___ PLOTTED ___ GRADES CHECKED ___ B.M. NOTED ___ STRUCTURE NOTATN'S CH'K'D ___ | BY | DATE

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

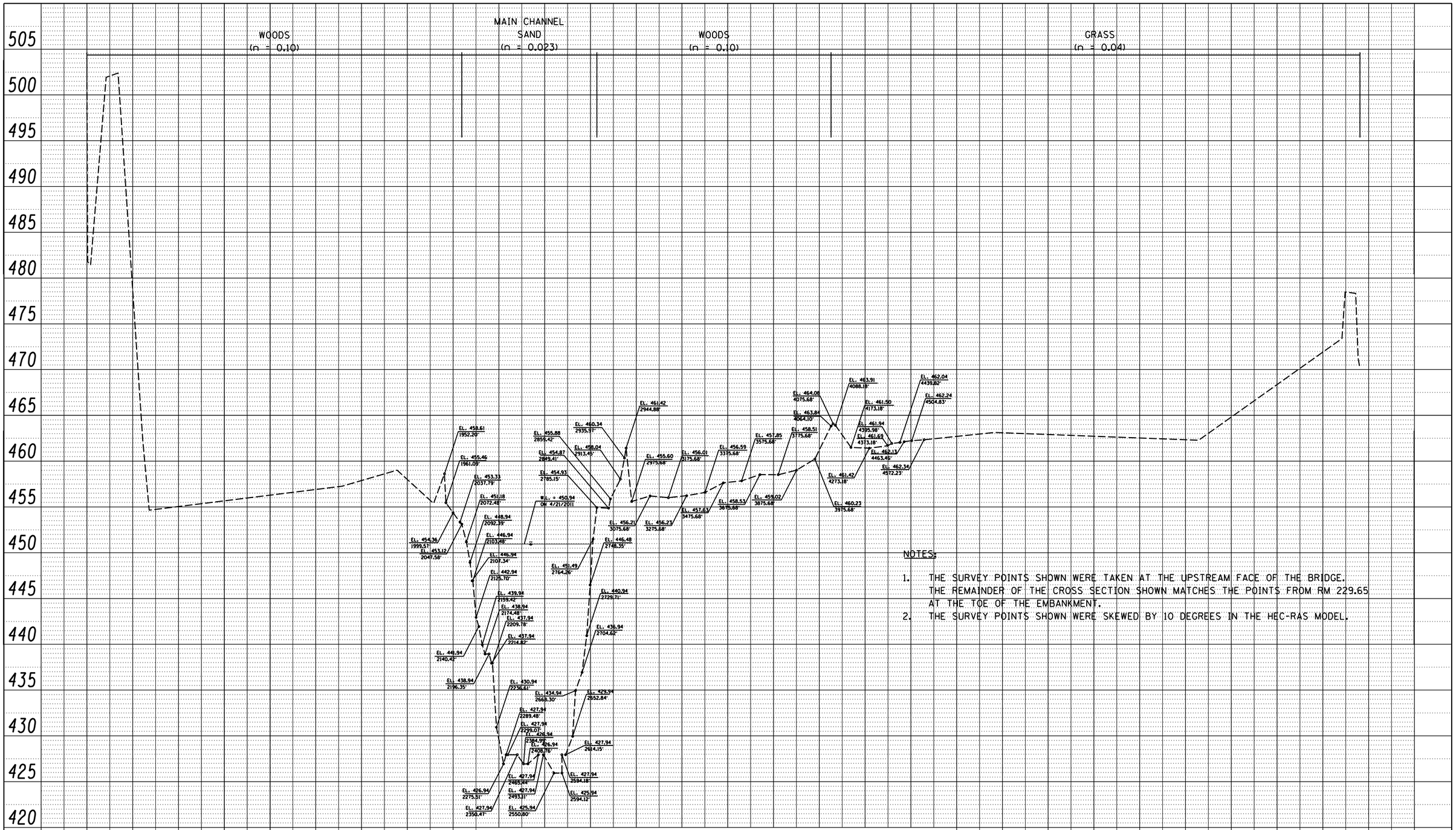
IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5 | SHEET NO. 4 OF 8 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&1	LA SALLE	8	4

CONTRACT NO.

ILLINOIS FED. AID PROJECT



NOTES:

1. THE SURVEY POINTS SHOWN WERE TAKEN AT THE UPSTREAM FACE OF THE BRIDGE. THE REMAINDER OF THE CROSS SECTION SHOWN MATCHES THE POINTS FROM RM 229.65 AT THE TOE OF THE EMBANKMENT.
2. THE SURVEY POINTS SHOWN WERE SKEWED BY 10 DEGREES IN THE HEC-RAS MODEL.

CROSS SECTION AT RIVER MILE 229.605
(LOOKING DOWNSTREAM)

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000

PLAN

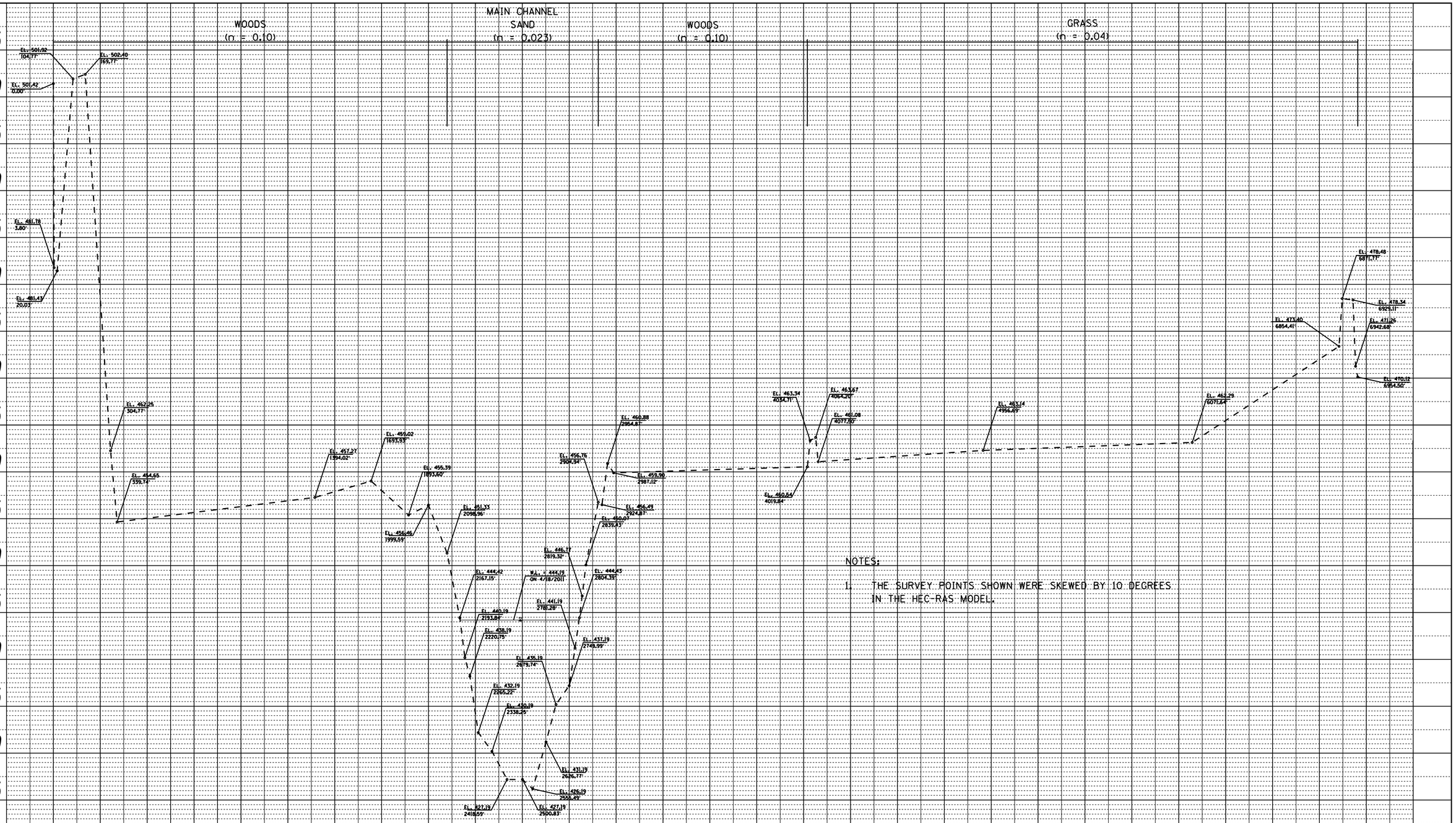
	DATE	BY
SURVEYED		
PLOTTED		
ALIGNMENT CHECKED		
RT. OF WAY CHECKED		
CADD FILE NAME		
NOTE BOOK		
NO.		

PROFILE

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

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -	**STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION**	**IL 178 OVER ILLINOIS RIVER STREAM SURVEY CROSS SECTIONS**
		DRAWN - MCC	REVISED -		
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -		SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 5 OF 8 SHEETS | STA. TO STA.
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	8	5
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



NOTES:

1. THE SURVEY POINTS SHOWN WERE SKEWED BY 10 DEGREES IN THE HEC-RAS MODEL.

CROSS SECTION AT RIVER MILE 229.65 (LOOKING DOWNSTREAM)

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 = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED - 5/7/2012
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 6 OF 8 SHEETS | STA. | TO STA.

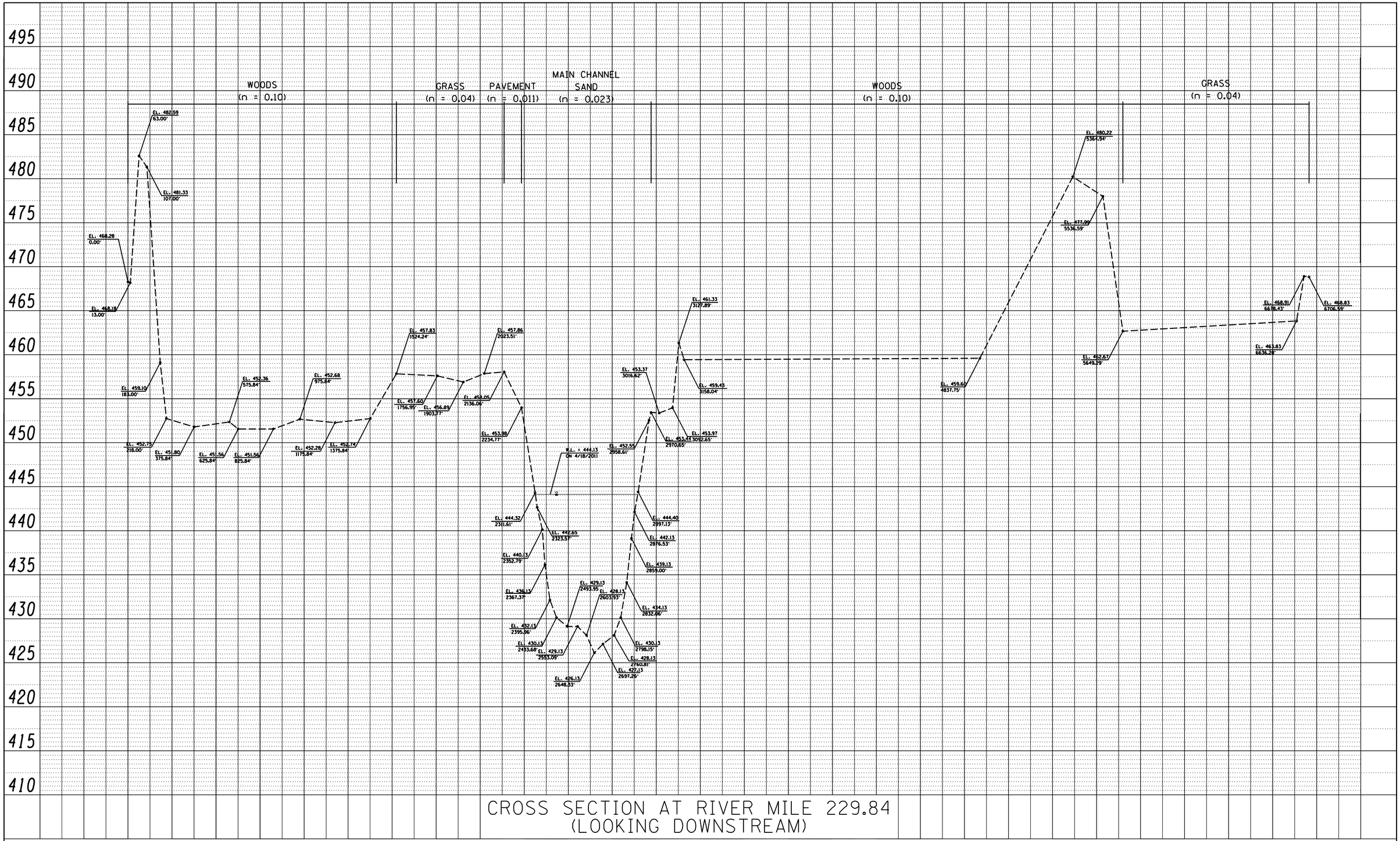
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	8	6
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

PLAN

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

PROFILE

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



CROSS SECTION AT RIVER MILE 229.84
(LOOKING DOWNSTREAM)

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 7 OF 8 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&1	LA SALLE	8	7
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

CROSS SECTION AT RIVER MILE 230.23
(LOOKING DOWNSTREAM)

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

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

FILE NAME = Downstream_HYD_XS_SHEETS.dgn	USER NAME = $USER$	DESIGNED - MCC	REVISED -
		DRAWN - MCC	REVISED -
	PLOT SCALE = H: 1"=250', V: 1"=5'	CHECKED - PMK	REVISED -
	PLOT DATE = 10/13/2011	DATE - 10/13/2011	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
STREAM SURVEY CROSS SECTIONS

SCALE: H: 1"=250' V: 1"=5' | SHEET NO. 8 OF 8 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	8	8

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

8E – ROADWAY PROFILES

PLAN

BY	DATE

SURVEYED
PLOTTED
CROSSES CHECKED
R/W MONUMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME

NOTE BOOK
NO.

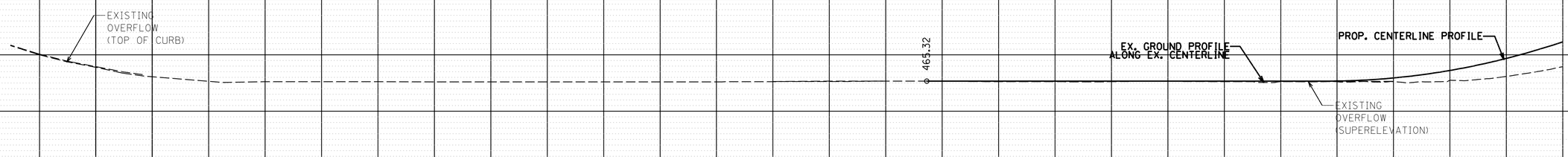
PROFILE

BY	DATE

SURVEYED
PLOTTED
CROSSES CHECKED
BM. NOTED
STRUCTURE NOTATNS CHKD

NOTE BOOK
NO.

590
580
570
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420



EXISTING	OVERFLOW		470.12	467.90															465.37	465.38	465.33	465.33	465.37						
PROPOSED			470.00	467.78	466.25	465.42	465.22	465.21	465.21	465.20	465.20	465.19	465.19	465.18	465.16 **465.32**	465.22 **465.32**	465.23 **465.32**	465.30 **465.32**	465.30 **465.32**	465.22 **465.32**	465.21 **465.32**	465.20 **465.32**	465.26 **465.32**	465.21 **465.32**	465.21 **465.32**	465.19 **465.33**	465.22 **465.87**	465.46 **467.20**	466.15 **469.34**	467.88 **472.27**	
															0+00	1+00	2+00	3+00	4+00	5+00	6+00	7+00	8+00	9+00	10+00	11+00	12+00	13+00	14+00	15+00	

FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED - MCC	REVISED - 5/7/2012	**ILLINOIS DEPARTMENT OF TRANSPORTATION**
		DRAWN - MCC	REVISED - 3/5/2013	
	PLOT SCALE = V_S 1"=10' H 1"=100'	CHECKED - PMK	REVISED -	
	PLOT DATE = $DATE$	DATE - 10/13/2011	REVISED -	

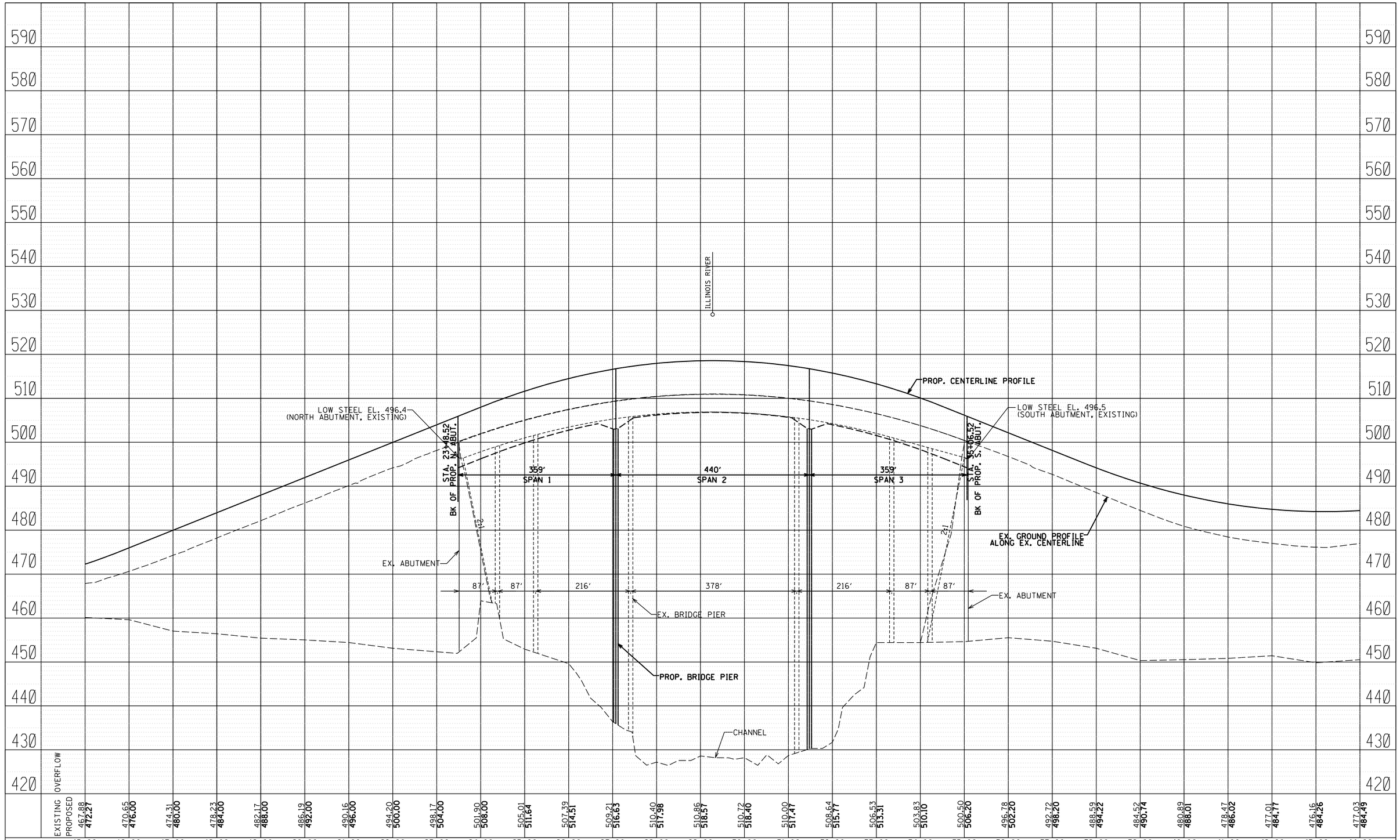
IL 178 OVER ILLINOIS RIVER
ROADWAY PROFILES

SCALE: H_S 1"=100' V_S 1"=10' | SHEET NO. 1 OF 3 SHEETS | STA. 0+00 | TO STA. 15+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	3	1
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

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

PROFILE	SURVEYED	BY	DATE
	PLOTTED		
	QUANTITIES CHECKED		
NOTE BOOK	BAR. NOTED		
NO.	STRUCTURE NOTATNS CHKD		



FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED - MCC	REVISED - 5/7/2012
		DRAWN - MCC	REVISED - 3/5/2013
	PLOT SCALE = V: 1"=10' H 1"=100'	CHECKED - PMK	REVISED -
	PLOT DATE = $DATE$	DATE - 10/13/2011	REVISED -

ILLINOIS DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
ROADWAY PROFILES

SCALE: H: 1"=100' V: 1"=10' | SHEET NO. 2 OF 3 SHEETS | STA. 15+00 TO STA. 44+00

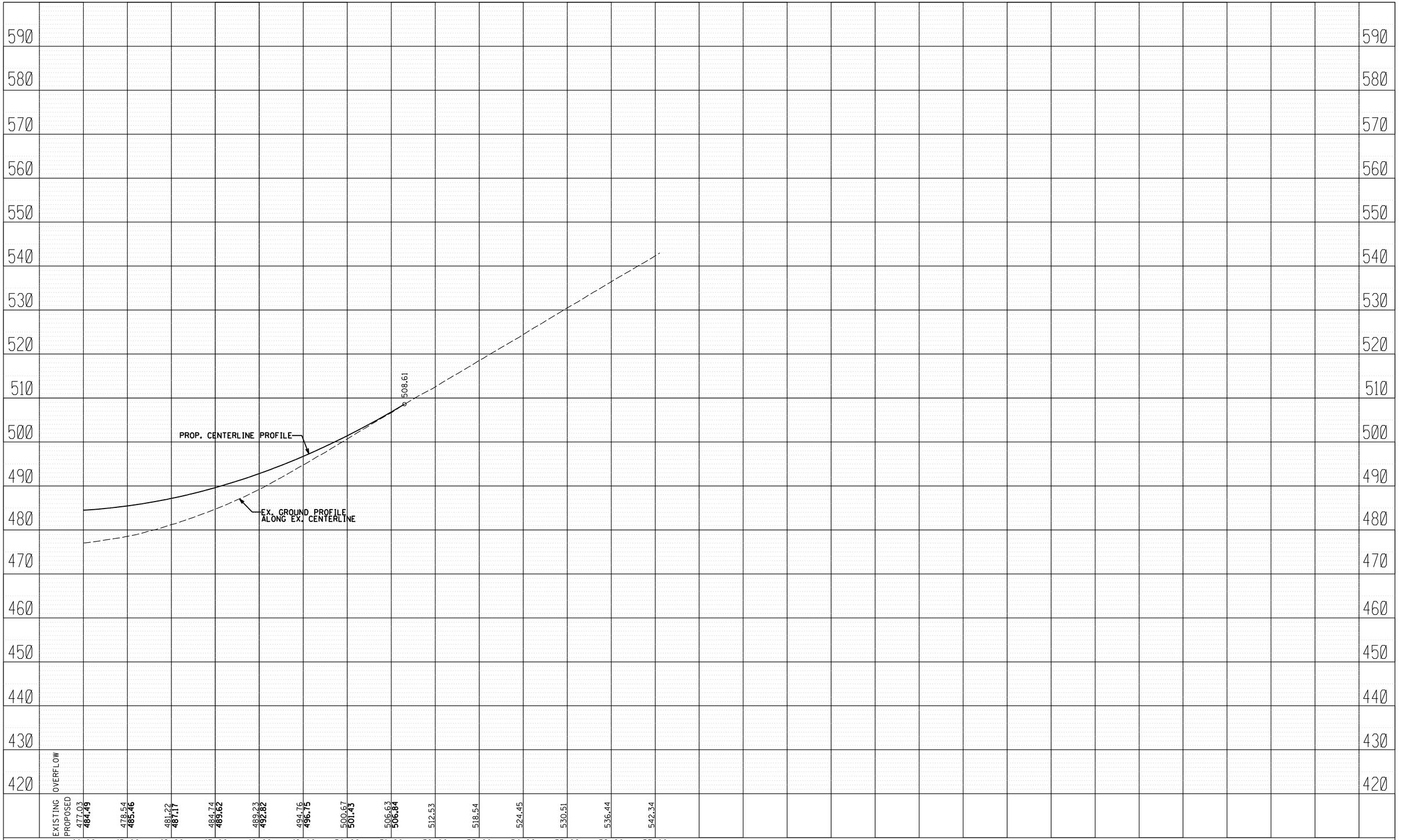
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	3	2
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

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

BY	DATE

PROFILE	
	SURVEYED
	PLOTTED
	GRADES CHECKED
NOTE BOOK	BM. NOTED
NO.____	STRUCTURE NOTATNS CHKD

BY	DATE



FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED - MCC	REVISED - 5/7/2012
		DRAWN - MCC	REVISED - 3/5/2013
	PLOT SCALE = V: 1"=10' H 1"=100'	CHECKED - PMK	REVISED -
	PLOT DATE = $DATE$	DATE - 10/13/2011	REVISED -

ILLINOIS DEPARTMENT OF TRANSPORTATION

IL 178 OVER ILLINOIS RIVER
ROADWAY PROFILES

SCALE: H: 1"=100' V: 1"=10' | SHEET NO. 3 OF 3 SHEETS | STA. 44+00 | TO STA. 57+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1279	(1) BR&I	LA SALLE	3	3
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

8F – FIELD SURVEY NOTES

SURVEY POINT CODES

Point# North(Y) East(X) Elevation(Z) Feature

2541, 1698785.0880,798222.4240,461.4230,630,_ GROUND @ PIER
2542, 1698776.1920,798222.0570,460.3400,630,_ GROUND @ PIER
4047, 1697686.8450,798023.3700,451.7910,604,_ GND
4100, 1697786.3180,798048.7580,454.5300,604,_ GND
10268,1696624.1150,798005.0870,453.5080,860,_ TOE
10270,1696724.1560,798013.2900,453.0130,860,_ TOE
10276,1696818.5660,798019.7650,455.8730,604,_ GND
10292,1697007.4910,798021.0970,452.9050,604,_ GND
10298,1697029.1340,798024.9070,452.3570,860,_ TOE
10299,1697127.2640,798021.8350,452.2030,860,_ TOE
10304,1697220.9820,798017.4260,452.2200,860,_ TOE
10305,1697324.1360,798010.9770,452.6750,860,_ TOE
10316,1697420.4730,798003.6420,452.7320,860,_ TOE
10317,1697521.5290,798002.3560,452.6110,860,_ TOE
10322,1697618.6080,798006.7850,452.0350,860,_ TOE
10850,1696527.9520,797993.2830,454.5220,860,_ TOE
10851,1696428.1140,797977.2170,455.1790,860,_ TOE
10863,1696332.5030,797972.9740,458.1670,860,_ TOE
10864,1696223.4050,798000.1680,467.5380,604,_ GND
10887,1696111.1060,798010.2920,473.0880,604,_ GND
11000,1697535.6990,801343.4160,457.4550,103,_ TRAVERSE STATION
11001,1697807.8030,798547.8500,455.7800,103,_ TRAVERSE STATION
11002,1698659.7890,798468.1880,446.7720,103,_ TRAVERSE STATION
11005,1695608.5160,800453.4890,464.8730,103,EDGE ROADWAY_ TRAVERSE STATION
11006,1696245.3170,800787.6150,455.4500,604,WOODS_ GND
11007,1696360.0970,800848.1770,452.4730,604,WOODS_ GND
11008,1696451.2050,800898.1300,452.8680,604,WOODS_ GND
11009,1696510.4920,800927.3340,454.9130,604,EDGE WOODS_ GND
11010,1696602.6600,800975.0200,455.5490,604,GRASS_ GND
11011,1696655.9500,801003.1370,455.8340,604,GRASS_ GND
11012,1696669.2210,801009.4560,454.7940,604,GRASS_ GND
11013,1696722.9740,801037.7260,456.3820,604,GRASS_ GND
11014,1696886.5420,801112.4240,444.2320,786,_ EDGE OF WATER
11015,1696903.6400,801116.0620,439.9500,793,_ FL
11016,1696929.4490,801125.0340,436.9500,793,_ FL
11017,1696966.6490,801132.8970,436.9500,793,_ FL
11018,1697018.9090,801146.7920,436.9500,793,_ FL
11019,1697073.7240,801160.4060,437.9500,793,_ FL
11020,1697113.0130,801170.8040,437.9500,793,_ FL
11021,1697149.6000,801180.7850,437.9500,793,_ FL
11022,1697180.0150,801192.7750,437.9500,793,_ FL
11023,1697211.4710,801201.1400,443.2600,860,_ TOE
11024,1697212.2340,801201.2880,444.1170,786,_ EDGE OF WATER
11025,1697220.9800,801200.9190,458.2870,861,_ TOP
11026,1697310.8550,801229.8990,454.8330,604,WOODS_ GND
11027,1697367.4020,801246.4540,453.6490,604,WOODS_ GND
11028,1697455.5550,801271.4580,457.6360,604,EDGE WOODS_ GND
11033,1697573.6500,801324.3190,457.1420,604,GRASS_ GND
11034,1697691.6920,801375.8990,455.0280,604,EDGE WOODS_ GND
11035,1697732.1430,801391.4700,456.0970,860,_ TOE
11036,1697817.3930,801428.7470,483.9070,861,_ TOP
11037,1697824.6010,801429.9220,482.5510,861,_ TOP
11040,1697867.8450,801435.3970,464.3920,604,WOODS_ GND
11041,1697886.0570,801438.7160,463.5790,604,WOODS_ GND
11042,1697933.9110,801452.5890,444.1430,786,_ EDGE OF WATER
11043,1697954.6330,801457.2470,440.9700,793,_ FL
11044,1697989.9150,801468.6160,433.9700,793,_ FL
11045,1698016.3090,801477.1410,429.9700,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11046,1698060.1170,801488.9660,426.9700,793,_ FL
11047,1698101.1930,801502.9980,426.9700,793,_ FL
11048,1698138.7380,801514.1580,425.9700,793,_ FL
11049,1698185.5510,801519.1280,426.9700,793,_ FL
11050,1698223.5730,801536.1120,427.9700,793,_ FL
11051,1698259.2210,801553.3000,428.9700,793,_ FL
11052,1698295.6210,801560.4330,428.9700,793,_ FL
11053,1698318.1000,801547.3300,434.9700,793,_ FL
11054,1698340.8670,801562.4790,437.9700,793,_ FL
11055,1698371.6430,801575.9820,442.3200,793,_ FL
11056,1698384.1110,801573.4400,444.2500,786,_ EDGE OF WATER
11057,1698410.2710,801587.6600,449.6570,604,ROADWAY TOE_ GND
11058,1698441.4590,801596.2990,462.9150,665,_ EDGE OF ROAD SURFACE
11059,1698468.7010,801605.1950,462.5220,665,_ EDGE OF ROAD SURFACE
11060,1698487.1540,801609.6920,451.6730,604,ROADWAY TOE_ GND
11061,1698544.0890,801631.2760,452.5290,604,EDGE WOODS_ GND
11064,1698706.0620,799495.8470,452.5460,103,_ TRAVERSE STATION
11067,1698901.0540,799538.0390,459.4260,665,_ EDGE OF ROAD SURFACE
11068,1698871.8070,799530.4190,461.3260,665,_ EDGE OF ROAD SURFACE
11069,1698837.6190,799521.5540,453.9670,604,ROADWAY TOE_ GND
11070,1698762.8760,799507.6070,453.3710,604,EDGE WOODS_ GND
11071,1698717.8350,799498.3820,453.4400,604,WOODS_ GND
11072,1698643.1630,799481.4210,444.3960,786,_ EDGE OF WATER
11073,1698625.5970,799479.6060,442.1300,793,_ FL
11074,1698609.0120,799472.9090,439.1300,793,_ FL
11075,1698582.4800,799468.2420,434.1300,793,_ FL
11076,1698549.0440,799462.5610,430.1300,793,_ FL
11077,1698512.9670,799452.2910,428.1300,793,_ FL
11078,1698450.7260,799439.3610,427.1300,793,_ FL
11079,1698403.1140,799427.7550,426.1300,793,_ FL
11080,1698359.5180,799419.3320,428.1300,793,_ FL
11081,1698309.8470,799408.3190,429.1300,793,_ FL
11082,1698252.3610,799393.8770,429.1300,793,_ FL
11083,1698192.7800,799384.6500,430.1300,793,_ FL
11084,1698155.9570,799376.3310,432.1300,793,_ FL
11085,1698128.1830,799369.2320,436.1300,793,_ FL
11086,1698114.2280,799364.4410,440.1300,793,_ FL
11087,1698084.3760,799365.3690,442.6540,793,_ FL
11088,1698073.5940,799357.7380,444.3210,786,_ EDGE OF WATER
11089,1697998.1520,799343.0640,453.9800,604,PARKLOT_ GND
11090,1697901.7250,799321.5350,458.0470,604,PARKLOT_ GND
11091,1697791.9200,799296.0500,457.8550,604,GRASS_ GND
11092,1697674.4710,799272.5060,456.8900,604,GRASS_ GND
11093,1697530.2040,799245.0730,457.6030,604,GRASS_ GND
11094,1697303.0370,799192.3800,457.8310,604,EDGE WOODS_ GND
11095,1697157.8240,799160.5300,452.7440,103,_ TRAVERSE STATION
11099,1698827.8490,798443.6730,459.8970,604,WOODS_ GND
11100,1698795.5550,798449.9250,460.8840,604,WOODS_ GND
11101,1698765.5400,798451.4030,456.4920,604,WOODS_ GND
11102,1698745.6020,798452.6810,456.7600,861,_ TOP
11103,1698679.9100,798467.1550,450.0670,604,_ GND
11104,1698644.8570,798468.1890,444.4330,786,_ EDGE OF WATER
11105,1698621.7530,798467.5120,441.1900,793,_ FL
11106,1698590.4630,798467.1180,437.1900,793,_ FL
11107,1698566.9790,798467.0320,435.1900,793,_ FL
11108,1698520.2200,798466.3750,431.1900,793,_ FL
11109,1698467.2470,798465.6730,426.1900,793,_ FL
11110,1698395.9650,798465.3030,427.1900,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11111,1698341.3250,798464.1000,427.1900,793,_ FL
11112,1698259.0840,798463.1440,427.1900,793,_ FL
11113,1698178.7540,798462.2270,430.1900,793,_ FL
11114,1698105.7270,798461.4710,432.1900,793,_ FL
11115,1698061.2490,798461.5400,438.1900,793,_ FL
11116,1698034.3300,798461.6230,440.1900,793,_ FL
11117,1698007.6270,798462.0160,444.4190,786,_ EDGE OF WATER
11118,1697939.4650,798459.8530,451.3260,861,_ TOP
11119,1697840.1350,798456.5470,456.4580,604,WOODS_ GND
11120,1697734.1900,798452.6700,455.3930,103,_ TRAVERSE STATION
11126,1698915.6830,797864.2250,473.3100,604,QUARRY LEVEE TOP_ GND
11127,1698828.9810,797852.5510,455.2840,604,QUARRY LEVEE TOE_ GND
11128,1698728.0890,797834.2390,454.6950,604,ROADWAY TOE_ GND
11129,1698704.0730,797832.1280,461.2370,604,ROADWAY_ GND
11130,1698669.3190,797839.7490,461.1800,604,ROADWAY_ GND
11131,1698658.7520,797840.6690,455.6010,604,ROADWAY TOE_ GND
11132,1698583.2850,797856.9350,453.8220,861,_ TOP
11133,1698532.3980,797870.4560,448.0760,786,_ EDGE OF WATER
11134,1698509.9940,797875.9190,444.7500,793,_ FL
11135,1698483.2350,797884.0660,441.7500,793,_ FL
11136,1698449.4550,797893.5570,438.7500,793,_ FL
11137,1698417.2310,797902.3150,432.7500,793,_ FL
11138,1698381.9890,797911.6090,427.7500,793,_ FL
11139,1698334.6540,797925.0670,425.7500,793,_ FL
11140,1698274.1020,797944.1830,426.7500,793,_ FL
11141,1698218.9420,797961.2970,425.7500,793,_ FL
11142,1698159.9780,797976.6240,426.7500,793,_ FL
11143,1698110.8270,797993.2690,427.7500,793,_ FL
11144,1698072.0680,798003.3510,429.7500,793,_ FL
11145,1698033.7550,798015.0850,429.7500,793,_ FL
11146,1697986.7410,798029.0730,431.7500,793,_ FL
11147,1697975.3420,798031.2590,433.7500,793,_ FL
11148,1697954.0220,798035.6810,437.7500,793,_ FL
11149,1697926.5680,798044.8050,439.7500,793,_ FL
11150,1697894.7090,798057.7360,446.3210,793,_ FL
11151,1697880.6270,798059.6040,448.2470,786,_ EDGE OF WATER
11152,1697857.4000,798066.0240,454.7430,861,_ TOP
11153,1697847.0360,798062.4300,454.9560,103,_ TRAVERSE STATION
11156,1698541.4580,796898.6200,476.7940,604,TOP QUARRY LEVEE_ GND
11157,1698488.9480,796909.8760,454.0610,604,TOE LEVEE_ GND
11158,1698436.5070,796921.6730,453.9660,604,TOE ROAD_ GND
11159,1698425.1270,796923.4180,459.9160,604,TOP ROAD_ GND
11160,1698374.4890,796935.3470,456.5510,604,TOE ROAD_ GND
11161,1698302.9310,796948.1450,453.6550,861,_ TOP
11162,1698250.7690,796958.4510,448.2780,786,_ EDGE OF WATER
11163,1698225.2630,796964.2140,445.1500,793,_ FL
11164,1698209.5600,796968.4590,443.1500,793,_ FL
11165,1698194.8740,796969.9010,440.1500,793,_ FL
11166,1698175.6100,796975.2110,436.1500,793,_ FL
11167,1698158.9920,796978.3820,432.1500,793,_ FL
11168,1698125.4510,796985.8990,428.1500,793,_ FL
11169,1698083.6260,796993.6010,427.1500,793,_ FL
11170,1698046.9890,797003.3680,426.1500,793,_ FL
11171,1698004.4160,797015.0380,425.1500,793,_ FL
11172,1697960.7900,797019.3190,425.1500,793,_ FL
11173,1697915.1650,797033.7900,425.1500,793,_ FL
11174,1697867.0820,797044.5030,426.1500,793,_ FL
11175,1697819.8720,797057.6190,427.1500,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11176,1697773.6630,797066.3730,428.1500,793,_ FL
11177,1697722.1260,797077.4640,430.1500,793,_ FL
11178,1697679.6150,797087.0070,432.1500,793,_ FL
11179,1697663.3370,797098.0960,434.1500,793,_ FL
11180,1697647.2460,797103.6830,437.1500,793,_ FL
11181,1697628.8380,797104.5540,440.1500,793,_ FL
11182,1697599.4200,797112.5070,443.1500,793,_ FL
11183,1697583.6730,797131.3990,444.7350,793,_ FL
11184,1697565.8140,797134.9130,448.3520,786,_ EDGE OF WATER
11185,1697545.3580,797146.1430,455.7560,861,_ TOP
11186,1697505.1080,797156.4890,455.7170,604,WOODS_ GND
11187,1697482.9410,797163.6860,455.7520,103,_ TRAVERSE STATION
11190,1696442.9320,791651.8130,454.3260,861,_ TOP
11191,1696418.4790,791661.9070,448.4970,786,_ EDGE OF WATER
11192,1696393.4920,791668.3450,444.3200,793,_ FL
11193,1696375.3100,791674.6670,441.3200,793,_ FL
11194,1696348.5200,791681.7380,439.3200,793,_ FL
11195,1696312.8160,791697.0490,437.3200,793,_ FL
11196,1696270.7240,791712.0560,434.3200,793,_ FL
11197,1696230.8600,791726.5380,433.3200,793,_ FL
11198,1696182.7700,791740.6900,431.3200,793,_ FL
11199,1696121.6170,791763.0330,430.3200,793,_ FL
11200,1696055.5230,791785.0580,429.3200,793,_ FL
11201,1695991.7080,791808.1180,428.3200,793,_ FL
11202,1695917.9910,791834.8050,429.3200,793,_ FL
11203,1695842.3310,791860.4710,429.3200,793,_ FL
11204,1695781.8250,791881.3460,431.3200,793,_ FL
11205,1695734.5250,791899.0790,434.3200,793,_ FL
11206,1695697.2220,791912.8660,436.3200,793,_ FL
11207,1695655.3540,791929.8320,439.3200,793,_ FL
11208,1695628.9530,791936.1320,441.3200,793,_ FL
11209,1695610.2530,791961.0980,445.3200,793,_ FL
11210,1695589.9550,791967.1600,448.5030,786,_ EDGE OF WATER
11211,1695557.4230,791981.4090,454.4130,861,_ TOP
11212,1695442.1560,792022.2730,457.6260,604,WOODS_ GND
11213,1695400.1060,792041.0350,458.2060,103,_ TRAVERSE STATION
11215,1696492.9350,791635.8140,453.9850,604,BRUSH_ GND
11216,1696895.8140,791483.0660,452.8120,604,EDGE FIELD_ GND
11217,1697239.2260,791353.5540,452.3050,604,FIELD_ GND
11218,1698109.3640,791022.9640,451.4410,604,FIELD_ GND
11219,1698786.6530,790765.4760,452.6700,604,EDGE FIELD_ GND
11220,1699251.8570,790588.6820,453.4990,604,TOE SMALL LEVEE_ GND
11221,1699273.0300,790580.8230,456.4880,604,TOP SMALL LEVEE_ GND
11225,1697711.5540,798190.5750,495.2400,699,TOP BEARING SEAT_ MISCELLANEOUS
11226,1697713.6860,798190.3220,495.1790,699,TOP BEARING SEAT_ MISCELLANEOUS
11227,1697713.8980,798190.3180,494.6750,699,TOP SLOPEWALL_ MISCELLANEOUS
11228,1697719.0650,798190.3090,494.4410,699,TOP SLOPEWALL_ MISCELLANEOUS
11229,1697792.7620,798194.9780,458.6050,630,_ GROUND @ PIER
11230,1697801.6530,798195.2530,455.4550,630,_ GROUND @ PIER
11231,1697840.0890,798197.0510,454.3610,604,_ GND
11232,1697878.1540,798200.8720,453.3290,630,_ GROUND @ PIER
11233,1697888.1860,798201.1940,453.1230,630,_ GROUND @ PIER
11234,1697912.8400,798201.9140,451.1750,786,_ EDGE OF WATER
11235,1697932.6960,798203.4890,448.9400,793,_ FL
11236,1697943.8160,798203.2470,446.9400,793,_ FL
11237,1697947.7410,798202.1000,446.9400,793,_ FL
11238,1697965.9650,798205.1240,442.9400,793,_ FL
11239,1697980.8330,798202.5420,441.9400,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11240,1697999.7990,798203.7880,439.9400,793,_ FL
11241,1698014.8320,798204.7370,438.9400,793,_ FL
11242,1698036.6680,798205.9820,438.9400,793,_ FL
11243,1698050.2490,798202.4960,437.9400,793,_ FL
11244,1698094.9900,798206.8210,0.0000,629,_ PIER
11245,1698104.9290,798207.2740,0.0000,629,_ PIER
11246,1698055.2160,798204.6570,437.9400,793,_ FL
11247,1698076.9630,798206.1140,430.9400,793,_ FL
11248,1698115.1050,798208.6560,426.9400,793,_ FL
11249,1698129.7050,798210.1940,427.9400,793,_ FL
11250,1698139.2450,798211.3920,427.9400,793,_ FL
11251,1698190.7520,798210.3040,427.9400,793,_ FL
11252,1698225.2870,798210.4590,426.9400,793,_ FL
11253,1698248.9490,798213.7280,426.9400,793,_ FL
11254,1698305.6980,798213.0420,427.9400,793,_ FL
11255,1698333.3520,798214.0820,427.9400,793,_ FL
11256,1698391.0620,798214.5010,425.9400,793,_ FL
11257,1698434.3520,798217.6750,427.9400,793,_ FL
11258,1698434.3600,798215.8630,425.9400,793,_ FL
11259,1698454.4050,798215.6550,427.9400,793,_ FL
11260,1698482.8660,798217.8030,0.0000,629,_ PIER
11261,1698472.8410,798217.3810,0.0000,629,_ PIER
11262,1698492.9330,798221.0660,429.9400,793,_ FL
11263,1698508.4660,798219.4010,434.9400,793,_ FL
11264,1698544.7540,798220.7350,436.9400,793,_ FL
11265,1698569.6590,798225.9630,440.9400,793,_ FL
11266,1698588.2760,798227.0580,446.4750,793,_ FL
11267,1698604.2630,798225.5500,451.4870,786,_ EDGE OF WATER
11268,1698625.2520,798223.0580,454.9340,604,_ GND
11269,1698689.5400,798223.3710,454.8730,630,_ GROUND @ PIER
11270,1698699.5510,798223.6240,455.8810,630,_ GROUND @ PIER
11271,1698753.8860,798234.7410,458.3010,103,_ TRAVERSE STATION
11276,1697712.5780,798154.9280,495.2380,699,TOP BEARING SEAT_ MISCELLANEOUS
11277,1697714.6230,798155.1790,495.2020,699,TOP BEARING SEAT_ MISCELLANEOUS
11278,1697714.8960,798155.1490,494.5640,699,TOP SLOPEWALL_ MISCELLANEOUS
11279,1697719.6930,798155.4000,494.3410,699,TOP SLOPEWALL_ MISCELLANEOUS
11280,1697802.7460,798155.1270,455.5840,630,_ GROUND @ PIER
11281,1697837.9380,798154.6600,454.6620,604,_ GND
11282,1697879.4760,798153.8270,452.8030,630,_ GROUND @ PIER
11283,1697889.4740,798153.9580,451.8990,630,_ GROUND @ PIER
11284,1697894.4070,798153.7740,451.3480,786,_ EDGE OF WATER
11285,1697902.0610,798153.7110,449.8450,793,_ FL
11286,1697914.7020,798150.6030,447.9200,793,_ FL
11287,1697934.1300,798147.2350,443.9200,793,_ FL
11288,1697968.8910,798151.9180,440.9200,793,_ FL
11289,1698010.6090,798152.2100,437.9200,793,_ FL
11290,1698031.6900,798151.6110,436.9200,793,_ FL
11291,1698044.3870,798153.8150,434.9200,793,_ FL
11292,1698071.7570,798154.4000,430.9200,793,_ FL
11293,1698106.1550,798159.9650,0.0000,629,_ PIER
11294,1698096.0850,798159.6820,0.0000,629,_ PIER
11295,1698095.2960,798159.2860,431.0350,630,_ GROUND @ PIER
11296,1698105.1960,798157.7150,428.2610,630,_ GROUND @ PIER
11297,1698127.7110,798156.4020,426.9200,793,_ FL
11298,1698169.9360,798157.9940,426.9200,793,_ FL
11299,1698231.8360,798159.4380,426.9200,793,_ FL
11300,1698314.9900,798161.7590,425.9200,793,_ FL
11301,1698378.7680,798163.6030,425.9200,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11302,1698436.3600,798164.6870,424.9200,793,_ FL
11303,1698474.1010,798170.1120,0.0000,629,_ PIER
11304,1698484.1670,798170.3450,0.0000,629,_ PIER
11305,1698475.2290,798167.2760,428.7690,630,_ GROUND @ PIER
11306,1698500.3920,798168.4440,432.9200,793,_ FL
11307,1698524.7730,798168.6280,435.9200,793,_ FL
11308,1698557.2720,798168.4240,440.9200,793,_ FL
11309,1698583.2680,798169.3300,448.1480,793,_ FL
11310,1698596.3500,798169.7830,451.5000,786,_ EDGE OF WATER
11311,1698629.5250,798173.6790,454.6740,604,_ GND
11312,1698690.8600,798176.2660,455.6650,630,_ GROUND @ PIER
11313,1698700.8720,798176.4500,456.3470,630,_ GROUND @ PIER
11314,1698773.5780,798174.3440,460.7030,103,_ TRAVERSE STATION
11319,1698753.6540,798222.1800,458.0420,604,_ GND
11322,1698857.7839,798222.2044,494.3400,699,TOP SLOPEWALL_ MISCELLANEOUS
11323,1698864.3919,798222.2119,494.3050,699,TOP SLOPEWALL_ MISCELLANEOUS
11324,1698864.5060,798222.2140,495.1890,699,TOP BEARING SEAT_ MISCELLANEOUS
11325,1698866.7410,798222.2430,495.2670,699,TOP BEARING SEAT_ MISCELLANEOUS
11328,1698754.8470,798181.0910,459.0140,604,_ GND
11329,1698777.3360,798182.0090,460.5120,630,_ GROUND @ PIER
11330,1698786.2890,798182.2090,461.9540,630,_ GROUND @ PIER
11331,1698858.6620,798186.8580,494.3870,699,TOP SLOPEWALL_ MISCELLANEOUS
11332,1698865.0740,798186.9090,494.5930,699,TOP SLOPEWALL_ MISCELLANEOUS
11333,1698865.6270,798186.9230,495.3130,699,TOP BEARING SEAT_ MISCELLANEOUS
11334,1698867.7360,798186.9950,495.3690,699,TOP BEARING SEAT_ MISCELLANEOUS
11336,1695891.6280,797692.9760,455.8920,103,GROUND SHOT XS2_ TRAVERSE STATION
12000,1699102.9010,801782.6050,455.6620,604,_ GND
12001,1699447.0370,801874.2350,454.6130,604,_ GND
12002,1700419.3130,802134.4800,458.3370,604,_ GND
12003,1700682.6570,802205.6770,462.0250,604,_ GND
12004,1701546.7960,802437.0340,463.1510,604,_ GND
12005,1701727.7570,802486.0430,467.5370,861,CANAL_ TOP
12006,1699860.0860,798491.4950,460.5420,860,ROAD_ TOE
12007,1699874.9130,798494.1410,463.3390,861,ROAD_ TOP
12008,1699904.3780,798495.7480,463.6710,861,ROAD_ TOP
12009,1699917.6690,798496.4070,461.0780,860,ROAD_ TOE
12010,1700796.2100,798538.0190,463.1370,604,_ GND
12011,1701910.1590,798591.8910,462.2890,604,_ GND
12012,1702692.1710,798629.4040,473.3950,604,_ GND
12013,1702709.5000,798630.6180,478.4790,604,_ GND
12014,1702766.7870,798633.4430,478.3350,604,_ GND
12015,1702780.2770,798633.6480,471.2600,604,_ GND
12016,1702792.1620,798634.3100,470.1190,861,CANAL_ TOP
12017,1700576.8770,799703.6670,459.5960,604,_ GND
12018,1701098.0000,799783.4130,480.2180,604,_ GND
12019,1701255.8220,799881.8380,477.9900,604,80FT EAST_ GND
12020,1701380.5660,799816.8850,462.6670,604,_ GND
12021,1702362.4620,799924.8600,463.8300,604,_ GND
12022,1702404.3680,799929.6070,468.9050,604,_ GND
12023,1702432.3450,799932.9070,468.8290,861,CANAL_ TOP
12024,1702881.7770,798348.4410,467.4760,861,CANAL_ TOP
12025,1695944.9720,798415.3230,501.9210,604,TOP ROADWAY EMBANKMENT_ GND
12026,1695860.2030,798961.1980,482.5890,604,TOP ROADWAY EMBANKMENT_ GND
12027,1695840.7789,798426.1043,501.4220,604,TOP BLUFF_ GND
12028,1702722.7390,798722.2950,472.8530,600,_ COMMERCIAL BUILDING
12029,1702752.3960,798730.3020,471.4260,600,_ COMMERCIAL BUILDING
12030,1702758.2580,798726.2760,471.1970,600,_ COMMERCIAL BUILDING
12031,1702775.1940,798664.4390,471.2840,600,_ COMMERCIAL BUILDING

Point# North(Y) East(X) Elevation(Z) Feature

12032,1701870.1830,798814.1760,463.9020,600,_ COMMERCIAL BUILDING
12033,1701967.1400,798816.8870,463.9520,600,_ COMMERCIAL BUILDING
12034,1701965.7080,798866.8400,464.0680,600,_ COMMERCIAL BUILDING
12035,1701868.3140,798868.9910,463.3210,600,_ COMMERCIAL BUILDING
12036,1701910.0690,798446.2810,462.1880,600,_ COMMERCIAL BUILDING
12037,1701907.5750,798484.2100,462.3440,600,_ COMMERCIAL BUILDING
12038,1702507.7120,798458.5710,471.3310,600,_ COMMERCIAL BUILDING
12039,1702508.8120,798414.1980,471.2240,600,_ COMMERCIAL BUILDING
12040,1702558.2390,798410.4700,471.4740,600,_ COMMERCIAL BUILDING
12041,1701009.8120,798272.4510,465.9960,600,_ COMMERCIAL BUILDING
12042,1701010.3150,798253.2690,464.3410,600,_ COMMERCIAL BUILDING
12043,1701270.3610,798251.0080,463.7910,600,_ COMMERCIAL BUILDING
BD16,1696840.3230,801100.6300,456.5940,103,TOP OF BANK_ TRAVERSE STATION
DH12017,1699832.2490,797991.5790,463.6740,604,_ GND
DH12018,1700627.7920,798101.8200,465.5770,604,_ GND
DH12019,1701513.7680,798224.4650,462.3480,604,_ GND
DH12020,1702117.3380,798307.9320,463.6520,604,_ GND
DH12021,1702472.4670,798343.6930,471.9510,604,_ GND
DH12022,1702697.6080,798338.8690,477.2040,604,_ GND
DH12023,1702829.0630,798347.6500,479.2180,604,_ GND
XS100,1695306.7784,792076.9511,457.0500,604,WOODS_ GND
XS101,1695213.4508,792112.8671,452.0000,604,WOODS_ GND
XS102,1695120.1233,792148.7832,459.1300,604,WOODS_ GND
XS103,1695026.7957,792184.6993,471.4300,604,WOODS_ GND
XS104,1695003.4638,792193.6783,476.0300,604,WOODS_ GND
XS200,1697293.0407,797226.4386,454.6100,604,WOODS_ GND
XS201,1697103.1405,797289.1912,453.4600,604,WOODS_ GND
XS202,1696913.2402,797351.9437,454.7700,604,WOODS_ GND
XS203,1696723.3399,797414.6963,455.8200,604,WOODS_ GND
XS204,1696523.9446,797480.5865,458.0900,604,TOP BANK AT POND_ GND
XS205,1696514.4496,797483.7242,454.5900,604,EDGE POND_ GND
XS206,1695725.3142,797747.4252,476.0400,604,WOODS_ GND
XS401,1697534.4312,798442.8501,459.0200,604,WOODS_ GND
XS402,1697234.7931,798428.1202,457.2700,604,WOODS_ GND
XS403,1696009.6278,798408.6430,502.4000,604,TOP ROADWAY EMBANKMENT_ GND
XS404,1696143.9130,798394.7691,462.2500,604,_ GND
XS405,1696178.7277,798391.1721,454.6500,604,TOE ROADWAY EMBANKMENT_ GND
XS406,1695860.4233,798424.0702,481.4300,604,TOE ROADWAY EMBANKMENT_ GND
XS407,1695844.5082,798425.7168,481.7800,604,BASE OF BLUFF_ GND
XS500,1696960.1437,799130.1570,452.2800,604,WOODS_ GND
XS501,1696762.4635,799099.7841,452.6800,604,WOODS_ GND
XS502,1696614.2033,799077.0043,451.5600,604,EDGE MARSHY GROUND_ GND
XS503,1696416.5230,799046.6314,451.5600,604,EDGE MARSHY GROUND_ GND
XS504,1696367.1030,799039.0381,452.3600,604,WOODS_ GND
XS505,1696169.4227,799008.6652,451.8000,604,WOODS_ GND
XS513,1695810.7832,798953.6030,468.1800,604,TOE ROADWAY EMBANKMENT_ GND
XS514,1695797.9341,798951.6283,468.2800,604,BASE OF BLUFF_ GND
XS515,1695903.6929,798967.8786,481.3300,604,TOP ROADWAY EMBANKMENT_ GND
XS516,1695978.8117,798979.4179,459.1000,604,_ GND
XS517,1696013.4060,798984.7320,452.7500,604,TOE ROADWAY EMBANKMENT_ GND
XS600,1695879.5701,800582.0568,453.1700,604,WOODS_ GND
XS601,1695680.7971,800487.7737,454.6700,604,WOODS_ GND
XS602,1695620.2617,800459.0603,461.0900,604,TOE ROADWAY_ GND
XS603,1695587.7352,800443.6321,465.1200,604,EDGE ROADWAY_ GND
XS604,1695579.6036,800439.7751,462.1600,604,TOE ROADWAY_ GND
XS605,1695485.6381,800395.2049,468.5700,604,WOODS_ GND
XS606,1695472.9890,800389.2051,470.7700,604,WOODS_ GND
11079,1698403.1140,799427.7550,426.1300,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

11111,1698341.3250,798464.1000,427.1900,793,_ FL
11141,1698218.9420,797961.2970,425.7500,793,_ FL
11253,1698248.9490,798213.7280,426.9400,793,_ FL
11299,1698231.8360,798159.4380,426.9200,793,_ FL
12287,1698373.6120,799631.7620,427.2510,793,_ FL
12308,1697209.8860,795066.5450,426.2510,793,_ FL
12311,1697329.6590,795343.5130,426.2480,793,_ FL
12312,1697361.8630,795438.5470,426.2590,793,_ FL
12313,1697406.8890,795528.4060,426.2590,793,_ FL
12316,1697532.1880,795802.9480,425.2570,793,_ FL
12317,1697573.2360,795895.3100,425.2580,793,_ FL
12318,1697610.2140,795988.2940,425.2710,793,_ FL
12319,1697639.5200,796085.0070,425.1960,793,_ FL
12320,1697671.1360,796180.7360,425.2890,793,_ FL
12322,1697732.7860,796371.3500,425.2960,793,_ FL
12324,1697794.0720,796562.7540,425.3070,793,_ FL
12325,1697826.5630,796657.3950,425.3150,793,_ FL
12326,1697856.2410,796753.4020,425.2970,793,_ FL
12327,1697887.9370,796849.1320,426.2960,793,_ FL
12328,1697924.3620,796943.3640,425.3180,793,_ FL
12329,1697954.9350,797039.4600,425.3060,793,_ FL
12330,1697980.7380,797136.1210,425.3160,793,_ FL
12331,1698011.3360,797231.6980,425.2940,793,_ FL
12332,1698039.1670,797328.1080,425.3090,793,_ FL
12333,1698062.6650,797426.1090,425.3130,793,_ FL
12334,1698087.8780,797524.0100,425.3080,793,_ FL
12335,1698109.1880,797622.8060,425.2690,793,_ FL
12336,1698135.9770,797719.4570,425.3340,793,_ FL
12338,1698184.5420,797914.5960,426.3430,793,_ FL
12339,1698197.2890,798014.8150,427.2900,793,_ FL
12340,1698216.6600,798114.1360,427.2530,793,_ FL
12343,1698277.4530,798409.0500,427.3300,793,_ FL
12348,1698390.7780,798899.5720,427.3610,793,_ FL
12349,1698399.0030,798999.6730,427.3420,793,_ FL
12350,1698408.0500,799100.0950,427.3390,793,_ FL
12351,1698417.9370,799200.2350,427.3510,793,_ FL
12352,1698422.0810,799300.5390,427.3720,793,_ FL
12353,1698427.6180,799401.4970,427.3790,793,_ FL
12354,1698435.0420,799501.9000,427.3600,793,_ FL
12355,1698442.9350,799602.6470,427.3840,793,_ FL
12356,1698434.8590,799703.0000,427.3610,793,_ FL
12357,1698423.5560,799802.5030,427.3950,793,_ FL
12360,1698367.1690,800098.4460,426.3620,793,_ FL
12361,1698341.7760,800195.2840,427.4070,793,_ FL
12364,1698280.4000,800491.0980,426.4360,793,_ FL
12368,1698211.5680,800887.8130,426.4200,793,_ FL
12414,1698357.2930,798550.0060,427.3950,793,_ FL
12416,1698422.7970,798739.2430,426.3330,793,_ FL
12417,1698451.1130,798836.5170,427.3300,793,_ FL
12447,1698172.4170,801423.5820,425.5650,793,_ FL
12448,1698190.3300,801324.2520,426.5140,793,_ FL
12450,1698229.1190,801126.4070,426.4450,793,_ FL
12453,1698271.0730,800825.8580,426.4190,793,_ FL
12454,1698281.0940,800725.4960,425.4280,793,_ FL
12455,1698294.1430,800625.4110,426.3980,793,_ FL
12498,1697172.9980,795013.2550,426.7180,793,_ FL
12499,1697143.8140,794916.9290,426.7990,793,_ FL
12500,1697112.2570,794821.7570,426.7880,793,_ FL

Point# North(Y) East(X) Elevation(Z) Feature

12501,1697077.5250,794726.7890,427.8640,793,_ FL
12502,1697042.3170,794632.4490,427.8300,793,_ FL
12503,1697003.5440,794539.0890,427.9510,793,_ FL
12504,1696971.3230,794444.3650,426.9460,793,_ FL
12505,1696937.5120,794349.9240,427.9300,793,_ FL
12506,1696908.6960,794253.0800,427.9150,793,_ FL
12507,1696880.7880,794156.8490,427.9830,793,_ FL
12508,1696853.0220,794060.0610,428.0160,793,_ FL
12509,1696820.0590,793964.5010,427.1040,793,_ FL
12510,1696788.0910,793868.5440,427.8710,793,_ FL
12511,1696744.9490,793778.0690,427.0220,793,_ FL
12512,1696707.8070,793683.9350,426.9110,793,_ FL
12513,1696676.7860,793587.7500,426.9190,793,_ FL
12514,1696640.4790,793493.7280,427.9720,793,_ FL
12515,1696600.4660,793400.9830,427.9070,793,_ FL
12516,1696566.0240,793306.8710,427.7720,793,_ FL
12517,1696535.8030,793210.7330,426.7420,793,_ FL
12518,1696494.4080,793118.4980,427.7750,793,_ FL
12519,1696462.6950,793022.7330,427.9030,793,_ FL
12520,1696434.8690,792925.6060,428.6990,793,_ FL
12605,1696014.8590,791829.3130,428.9530,793,_ FL
12606,1696052.9560,791923.1890,429.8000,793,_ FL
12607,1696081.0350,792020.0010,429.7930,793,_ FL
12608,1696112.2330,792116.0650,429.7980,793,_ FL
12609,1696147.6130,792210.0610,429.7230,793,_ FL
12610,1696176.4580,792306.0300,429.7590,793,_ FL
12611,1696214.6650,792399.4320,429.7540,793,_ FL
12612,1696253.8460,792492.1640,429.7040,793,_ FL
12613,1696288.9460,792586.7650,429.7610,793,_ FL
12614,1696319.3420,792682.8240,428.7570,793,_ FL
12615,1696343.5140,792781.2830,428.7320,793,_ FL
12616,1696362.7960,792879.5190,428.7090,793,_ FL
12714,1697219.7640,795189.9960,425.5000,793,_ FL
12715,1697258.9560,795282.3950,426.5720,793,_ FL
12728,1697741.9810,796498.3640,425.5230,793,_ FL
12742,1698167.7280,797842.4020,425.6120,793,_ FL
12747,1698273.2200,798348.2460,427.4490,793,_ FL
12748,1698295.5290,798446.3720,427.5100,793,_ FL
12761,1698395.7430,799746.0150,427.6170,793,_ FL
12765,1698371.6870,800125.1030,426.5970,793,_ FL
12767,1698367.7810,800326.5080,426.6110,793,_ FL
12768,1698356.1870,800426.6780,426.6520,793,_ FL
12774,1698235.1290,801017.0360,426.6440,793,_ FL
12776,1698198.3730,801214.7240,425.6450,793,_ FL
12779,1698148.2170,801512.9500,425.7590,793,_ FL
12780,1698129.8160,801611.5540,426.7240,793,_ FL
12781,1698108.9200,801709.6440,426.7020,793,_ FL
12789,1697480.2660,795677.4960,425.6290,793,_ FL
12795,1697699.9040,796237.6920,425.6460,793,_ FL
12798,1697792.4890,796525.1510,425.6570,793,_ FL
12820,1698404.9130,798639.5580,426.6170,793,_ FL
12833,1698410.0820,799941.6920,426.6080,793,_ FL
12834,1698407.3560,800042.5320,426.6230,793,_ FL
11324,1698864.5060,798222.2140,495.1890,699,TOP BEARING SEAT
11333,1698865.6270,798186.9230,495.3130,699,TOP BEARING SEAT
12855,1697713.7580,798190.5070,0.0000,699,CORNER OF BEARING SEAT
12856,1697714.6560,798155.1740,0.0000,699,CORNER OF BEARING SEAT
12857,1697713.8870,798176.7530,495.2600,699,TOP OF BEARING SEAT

Point# North(Y) East(X) Elevation(Z) Feature

12858,1697792.6570,798194.8440,0.0000,629,_ PIER
12859,1697801.6240,798195.1320,0.0000,629,_ PIER
12860,1697802.7610,798155.2080,0.0000,629,_ PIER
12861,1697879.5120,798153.8470,0.0000,629,_ PIER
12862,1697878.1710,798200.7930,0.0000,629,_ PIER
12863,1697888.1590,798201.0680,0.0000,629,_ PIER
12864,1698096.0160,798159.7320,0.0000,629,_ PIER
12865,1698094.8580,798206.7170,0.0000,629,_ PIER
12866,1698104.8880,798207.1500,0.0000,629,_ PIER
12867,1698472.8910,798217.1580,0.0000,629,_ PIER
12868,1698482.8440,798217.5280,0.0000,629,_ PIER
12869,1697880.5100,798192.5030,0.0000,629,_ PIER
12870,1697880.3090,798198.3740,0.0000,629,_ PIER
12871,1697886.2290,798198.5520,0.0000,629,_ PIER
12872,1697880.8650,798197.6830,500.4240,631,_ PIER TOP
12873,1697881.7370,798159.3770,500.4340,631,_ PIER TOP
12874,1697881.2570,798162.3720,0.0000,629,_ PIER
12875,1697881.4410,798156.3760,0.0000,629,_ PIER
12876,1698103.8740,798168.4260,0.0000,629,_ PIER
12877,1698097.9430,798168.2930,0.0000,629,_ PIER
12878,1698098.1020,798162.3720,0.0000,629,_ PIER
12879,1698098.5700,798163.1940,502.2610,631,_ PIER TOP
12880,1698097.5690,798202.3370,502.2660,631,_ PIER TOP
12881,1698097.1130,798198.4540,0.0000,629,_ PIER
12882,1698096.9590,798204.3680,0.0000,629,_ PIER
12883,1698102.8770,798204.4760,0.0000,629,_ PIER
12884,1698480.8740,798214.9220,0.0000,629,_ PIER
12885,1698474.9130,798214.7300,0.0000,629,_ PIER
12886,1698475.1070,798208.8170,0.0000,629,_ PIER
12887,1698475.4280,798214.0700,502.2720,631,_ PIER TOP
12888,1698692.2980,798219.9300,500.4070,631,_ PIER TOP
12889,1698691.8660,798214.7860,0.0000,629,_ PIER
12890,1698691.6110,798220.7250,0.0000,629,_ PIER
12891,1698697.5410,798220.9010,0.0000,629,_ PIER
12892,1697800.5060,798162.6370,0.0000,629,_ PIER
12893,1697800.7540,798157.8980,0.0000,629,_ PIER
12894,1697800.3320,798160.2220,499.2840,627,_ LOW STEEL
12895,1697788.8220,798159.9290,498.9750,627,_ LOW STEEL
12901,1697799.9410,798187.7830,0.0000,629,_ PIER
12902,1697799.7150,798192.5820,0.0000,629,_ PIER
12903,1697794.9180,798192.5290,0.0000,629,_ PIER
12904,1697787.7370,798189.9000,498.9490,627,_ LOW STEEL
12905,1697799.0650,798190.2190,499.2400,627,_ LOW STEEL
12909,1698699.4970,798223.5430,0.0000,629,_ PIER
12910,1698689.5210,798223.2450,0.0000,629,_ PIER
12911,1698690.7990,798176.2870,0.0000,629,_ PIER
12912,1698779.1360,798189.6910,0.0000,629,_ PIER
12913,1698779.3300,798184.7920,0.0000,629,_ PIER
12914,1698779.0990,798187.2400,499.2710,627,_ LOW STEEL
12915,1698692.7960,798184.7460,0.0000,629,_ PIER
12916,1698692.9720,798178.9490,0.0000,629,_ PIER
12917,1698693.4590,798180.0660,500.4450,631,_ PIER TOP
12918,1698481.5270,798174.2950,502.3020,631,_ PIER TOP
12919,1698482.1050,798172.9310,0.0000,629,_ PIER
12920,1698481.9250,798178.9020,0.0000,629,_ PIER
12921,1698475.9430,798178.7810,0.0000,629,_ PIER
12925,1698784.7190,798221.8680,462.9850,108,Y231_ VERTICAL CONTROL STATION
12926,1698785.1160,798222.2020,0.0000,629,_ PIER

Point# North(Y) East(X) Elevation(Z) Feature

12927,1698786.1120,798182.5230,0.0000,629,_ PIER
12928,1698777.3330,798182.1270,0.0000,629,_ PIER
12935,1698783.1860,798214.6590,0.0000,629,_ PIER
12936,1698783.2320,798219.7220,0.0000,629,_ PIER
12937,1698788.0530,798217.0530,498.9550,627,_ LOW STEEL

Name LIN ENGINEERING

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Projects ... INDEX

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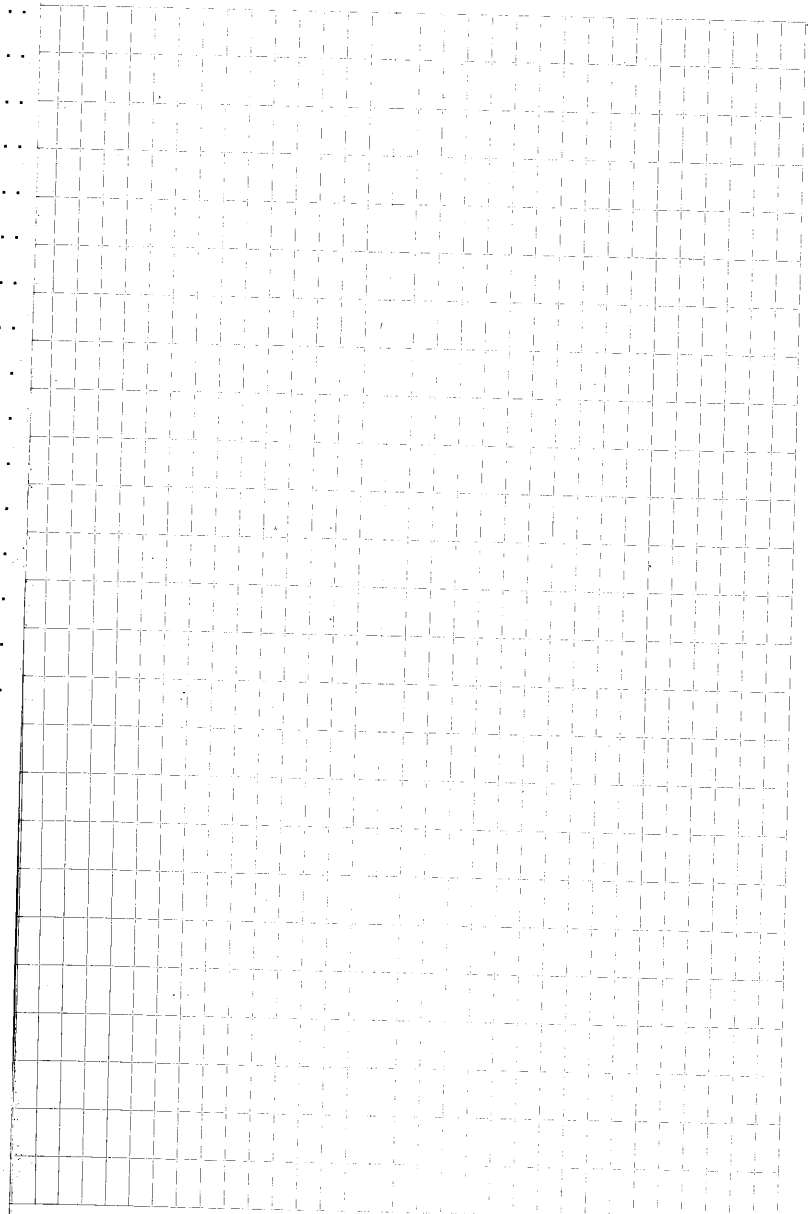
Projects (continued)

LOCATE BUILDING COR 40



04/18/11 JWD, DJH, WAR

BEGIN HYDRAULIC SURVEY OF IL 178 OVER ILLINOIS RIVER

USED 300 GPS & GEODIMETER #101

SET UP WORK IN 300 CONTROLLER FILE NAME: 1020_HYD 041811

SET HOR. TO NAD83_EAST ZONE

04/18/11

50° Cloudy, WINDY

BASE AT BD16

IH= 5.82

△ BD8 CHECK INTO

ΔH= 0.01' ΔV= 0.02'

CHECK INTO VRSBD7

ΔH= 0.04' ΔV= 0.10'

CHECK INTO BD15

ΔH= 0.08' ΔV= 0.02'

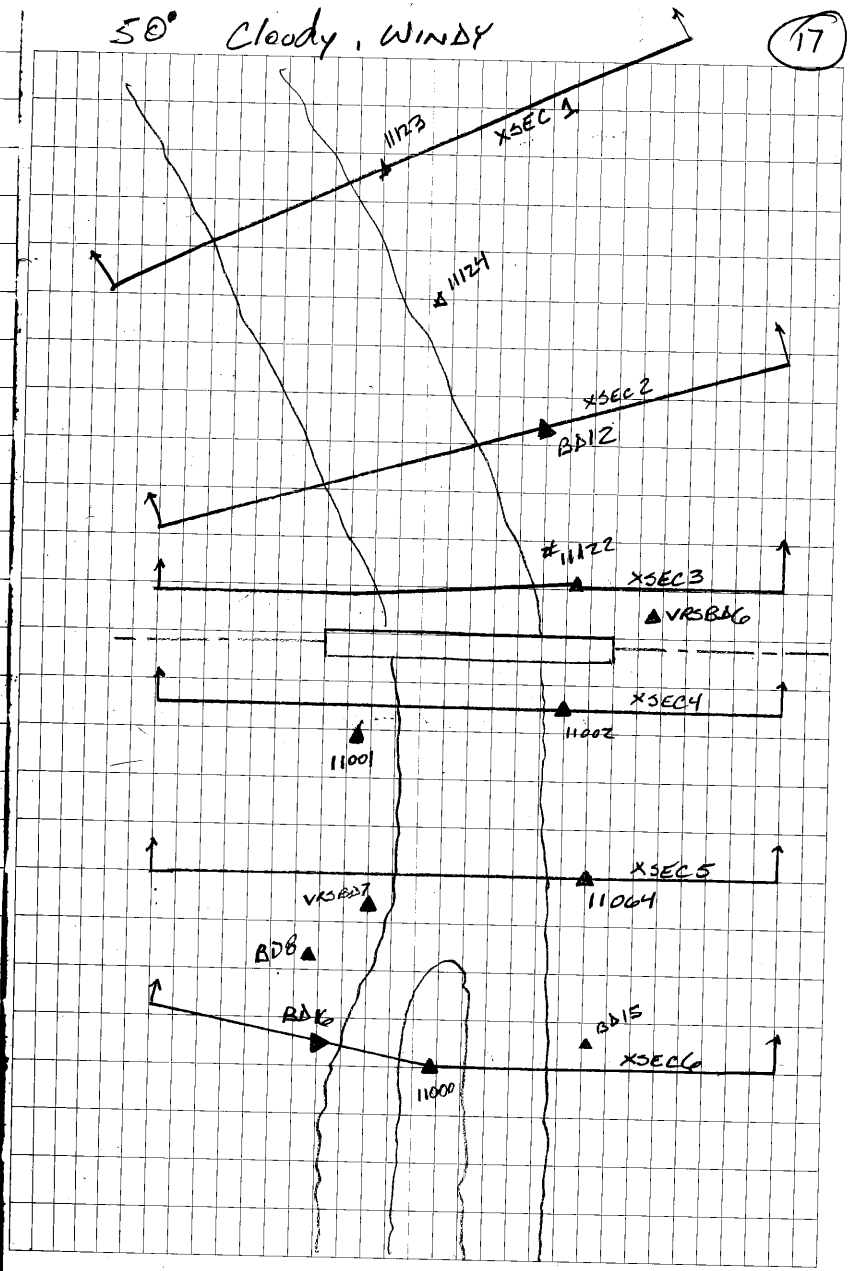
SET 1/2" RBAR/RED CAP ON ISLAND FOR XSEC 6 PT # 11000 Elev.= 457.46

SET 1/2" REBAR/RED CAP NEAR XSEC 4 ON SOUTH BANK PT # 11001

SET 1/2" RBAR/RED CAP ON XSEC 4 NORTH CHANNEL BANK PT # 11002

CHECK OUT VRSBD7

ΔH= 0.02' ΔV= 0.08'



04/18/11 (CONT)

BEGIN SECTION XSEC 6

℄ BD16 — BS 11000 SH 5.10

IH = 5.40 — HI → 736.572

11003	Δ 11000	ΔH = 0.03'	ΔV = 0.06'
11004	Δ BD8	ΔH = 0.004	ΔV = 0.03'

SET LATHE & NAIL @ SOUTH END (EDGE ROAD) OF SECTION

11005 Elev. = 464.87

BEGIN SEC NORTH 11005-

USE BD16 AS TOP BANK

CHECKED DEPTH FINDER @ 7' ✓

11029	Δ 11000	ΔH = 0.04'	ΔV = 0.003'
11030 / 11031	Δ BD8	ΔH = 0.04	Δ = 0.02

SHOTS IN CHANNEL (SECONDARY CHANNEL)

PT #	ELEV.	WATER DEPTH	ADJUSTED ELEV.
11014	EDGE WATER		443.95
11015	443.98	4'	439.95
11016	443.99	7'	436.95
11017	443.93	7'	436.95
11018	443.91	7'	436.95
11019	443.92	6'	437.95
11020	443.95	6'	437.95
11021	443.89	6'	437.95
11022	443.97	6'	437.95
11023	TOE	—	
11024	EDGE WATER		

AVERAGE ELEV. WATER SURFACE 443.95

JWD

Outfall (CONT)

℄ 11000 BS BD16 SH 5.1
IH = 5.32 HD → 736.577

11032 ∆ BD16 ΔH = 0.03' ΔV = 0.05'

Pts 11033 - 11037
SECTION ACROSS ISLAND

11038 ∆ BD16 ΔH = 0.03 ΔV = 0.06

℄ BD15 BS ON BD10 5.10
IH = 5.38 HD = 830.319

11039 ∆ BD10 ΔH = 0.01 ΔV = 0.04
Pt's 11040 - 11061
Section Across River

11062 ∆ BD10 ΔH = 0.01' ΔV = 0.05'

MAIN CHANNEL X SEC 6

PT #	Elev.	WATER DEPTH	ADJUSTED ELEV
11042	EDGE WATER		
11043	443.89	3'	440.97
11044	443.91	10'	433.97
11045	443.95	14'	429.97
11046	443.92	17'	426.97
11047	443.98	17'	426.97
11048	444.00	18'	425.97
11049	443.95	17'	426.97
11050	443.97	16'	427.97
11051	443.97	15'	428.97
11052	444.03	15'	428.97
11053	444.18	9'	434.97
11054	443.95	6'	437.97
11055	FL DIRECT READ		
11056	EDGE WATER		

ENDED SECTION @ EDGE TIMBER # 11061
FINISH WITH GPS

AVERAGE WATER SURFACE ELEV 443.97

JWD

04/18/11 (CONT)

⊼ BD11		BS BD10 SH=5.1'	
IH=5.14		HD→ 783.80'	
11063	Δ BD10	ΔH=0.02'	ΔV=0.04'
11064	SET 60D NAIL AT NORTH CHANNEL BANK XSEC 5 MEASURED 3X		
⊼ 11064		BS BD11	SH=5.1
IH=5.14		HD→ 455.509	
11065	Δ BD11	ΔH=0'	ΔV=0'
11066	Δ VRSBD7 SH=5.5	ΔH=0.07'	ΔV=0.12'
BEGIN XSEC 5 NORTH TO SOUTH 11067 - 11095			
11095 - SET NAIL TO CONT. SECTION ELEV. 452.74			
11096	Δ VRSBD7	ΔH=0.06'	ΔV=0.11'
11097	Δ BD11	ΔH=0.01'	ΔV=0'

MAIN CHANNEL XSEC 5

PT #	ELEV.	WATER DEPTH	ADJUSTED ELEV.
11072	EDGE WATER		
11073	444.11	2'	442.13
11074	444.13	5'	439.13
11075	444.12	10'	434.13
11076	444.15	14'	430.13
11077	444.12	16'	428.13
11078	444.12	17'	427.13
11079	444.12	18'	426.13
11080	444.09	16'	428.13
11081	444.11	15'	429.13
11082	444.14	15'	429.13
11083	444.14	14'	430.13
11084	444.15	12'	432.13
11085	444.13	8'	436.13
11086	444.14	4'	440.13
11087	DIRECT SHOT		
11088	EDGE WATER		

AVERAGE WATER SURFACE ELEV 444.13

JWD

04/18/11 (CONT)

XSEC 4

π 11002 BS VRSBD7 SH=5.5

IH= 5.12' HD→ 1152.663'

11098 ΔVRSBD7 ΔH= 0.02' ΔV= 0.21'

XSEC 4 NORTH TO SOUTH

11099 – 11120

11120 SET NAIL @ SOUTH END FOR
Elev 455.39

11121 ΔVRSBD7

ΔH= 0.2' ΔV= 0.18'

CONTROLLER LOST POWER

MAIN CHANNEL XSEC 4

PT #	ELEV	WATER DEPTH	ADJUST ELEV
11104	EDGE WATER		
11105	444.19	3'	441.19
11106	444.21	7'	437.19
11107	444.20	9'	435.19
11108	444.19	13'	431.19
11109	444.18	18'	426.19
11110	444.19	17'	427.19
11111	444.18	17'	427.19
11112	444.18	17'	427.19
11113	444.19	14'	430.19
11114	444.17	12'	432.19
11115	444.20	6'	438.19
11116	444.20	4'	440.19
11117	EDGE WATER		

AVERAGE WATER SURFACE ELEV. 444.19

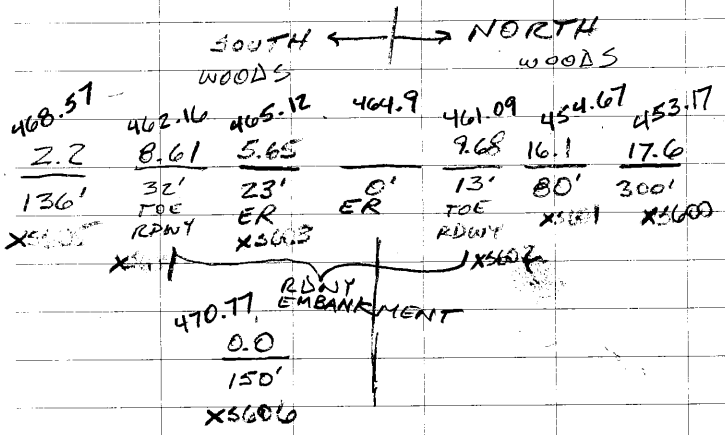
04/19/11 JWD, WAR, DJH
Rainy & Wet 35°

EXTEND SECTIONS FROM PREVIOUS
Day on SOUTH END TO
Elev. 474.00

XSEC 6

BEGIN AT 11005 (464.87)

DESC	+	HI	−	ELEV.
11005				464.87
	5.90	470.77		



5.90	464.87

04/20/11 JWD, WAR, AJH

50° cloudy

RECOVER / SET CONTROL FOR DOWNSTREAM SECTIONS

300 GPS
300 CONTROLLER 1020_HYD042011

BASE @ BD16
IH = 5.96

CHECK INTO BDB ΔH = 0.01' ΔV = 0.004'
CHECK INTO ΔH = ΔV =

PT # 11122 SET 1/2" REBAR ON XSEC @ NORTH SIDE RIVER

PT # 11123 SET 1/2" REBAR ON XSEC NORTH SIDE RIVER

PT # 11124 SET 1/2" REBAR AS BACKSIGHT ST 11123

CHECK OUT VRSBD7 ΔH = 0.05' ΔV = 0.18'

04/20/11 (CONT)

BEGIN CHANNEL SECTION
XSEC 3

GEODIMETER GUN #101

T .11122 BS VRSBΔ6 SH=5.1
IH=5.65 HΔ=

11125 ΔVRSBΔ6
ΔH=0.07 ΔV=0.07

POINTS 11126 — 11153
BEGIN SECTION NORTH-SOUTH
USE 11122 AS EDGE ROADWAY

11154 ΔVRSBO6
ΔH=0.06 ΔV=0.06

CHANNEL SHOTS XSEC 3

PT #	ELEV.	WATER DEATH	ADJUSTED ELEV.
11133	EDGE WATER		
11134	447.724	3'	444.75
11135	447.722	6'	441.75
11136	447.718	9'	438.75
11137	447.74	15'	432.75
11138	447.75	20'	427.75
11139	447.71	22'	425.75
11140	447.72	21'	426.75
11141	447.74	22'	425.75
11142	447.71	21'	426.75
11143	447.74	20'	427.75
11144	447.75	18'	429.75
11145	447.74	18'	429.75
11146	447.75	16'	431.75
11147	447.82	14'	433.75
11148	447.82	10'	437.75
11149	447.86	5'	439.75
11150	DIRECT READ		
11151	EDGE WATER		

AVERAGE WATER SURFACE ELEV. 447.75

SWD

04/20/11 (CONT)

RIVER SECTION XSEC 2

Δ BD12 BS 11122 SH=5.50'
IH=5.45' HD=

11155 Δ 11122
ΔH=0.13 ΔV=0.05

PTS 11156 - 11187
SECTION XSEC2 NORTH TO SOUTH
* USE BD12 AS Roadway TOP TO the South *

11188 Δ 11122
ΔH = 0.13 ΔV = 0.07

CHANNEL SHOTS XSEC 2

PT #	ELEV.	WATER DEPTH	ADJUSTED ELEV.
11162	Water EDGE		
11163	448.10	3'	445.15
11164	448.12	5'	443.15
11165	448.12	8'	440.15
11166	448.15	12'	436.15
11167	448.08	16'	432.15
11168	448.14	20'	428.15
11169	448.10	21'	427.15
11170	448.14	22'	426.15
11171	448.17	23'	425.15
11172	448.16	23'	"
11173	448.19	23'	"
11174	448.20	22'	426.15
11175	448.18	21'	427.15
11176	448.15	20'	428.15
11177	448.17	18'	430.15
11178	448.14	16'	432.15
11179	448.15	14'	434.15
11180	448.17	11'	437.15
11181	448.19	8'	440.15
11182	448.23	5'	443.15
11183	DIRECT READ		

AVERAGE WATER SURFACE ELEV 448.15 JM

8/4/2011 (CONT)

RIVER SECTION XSEC 1

℄ 11123 BS 11124 SH= 5.1

IH= 5.17 HD →

11189 Δ 11124 ΔH= 0.05

ΔV= 0.02

POINTS 11190 - 11213

SECTION NORTH TO SOUTH

11214 Δ 11124 ΔH= 0.05

ΔV= 0.05

SET NAIL @ SOUTH END

11213 458.21

CHANNEL SHOTS XSEC 1

POINT #	ELEV.	WATER DEPTH	ADJUSTED ELEV.
11191	EDGE WATER		
11192	448.27	4'	444.32
11193	448.31	7'	441.32
11194	448.28	9'	439.32
11195	448.29	11'	437.32
11196	448.32	14'	434.32
11197	448.31	15'	433.32
11198	448.31	17'	431.32
11199	448.30	18'	430.32
11200	448.31	19'	429.32
11201	448.31	20'	428.32
11202	448.32	19'	429.32
11203	448.33	19'	429.32
11204	448.32	17'	431.32
11205	448.38	14'	434.32
11206	448.34	12'	436.32
11207	448.35	9'	439.32
11208	448.36	7'	441.32
11209	448.36	3'	445.32
11210	EDGE WATER		

AVERAGE WATER SURFACE ELEV. 448.32

JWD

04/20/11 (CONT.)

EXTEND XSEC 1 NORTH

WITH GPS

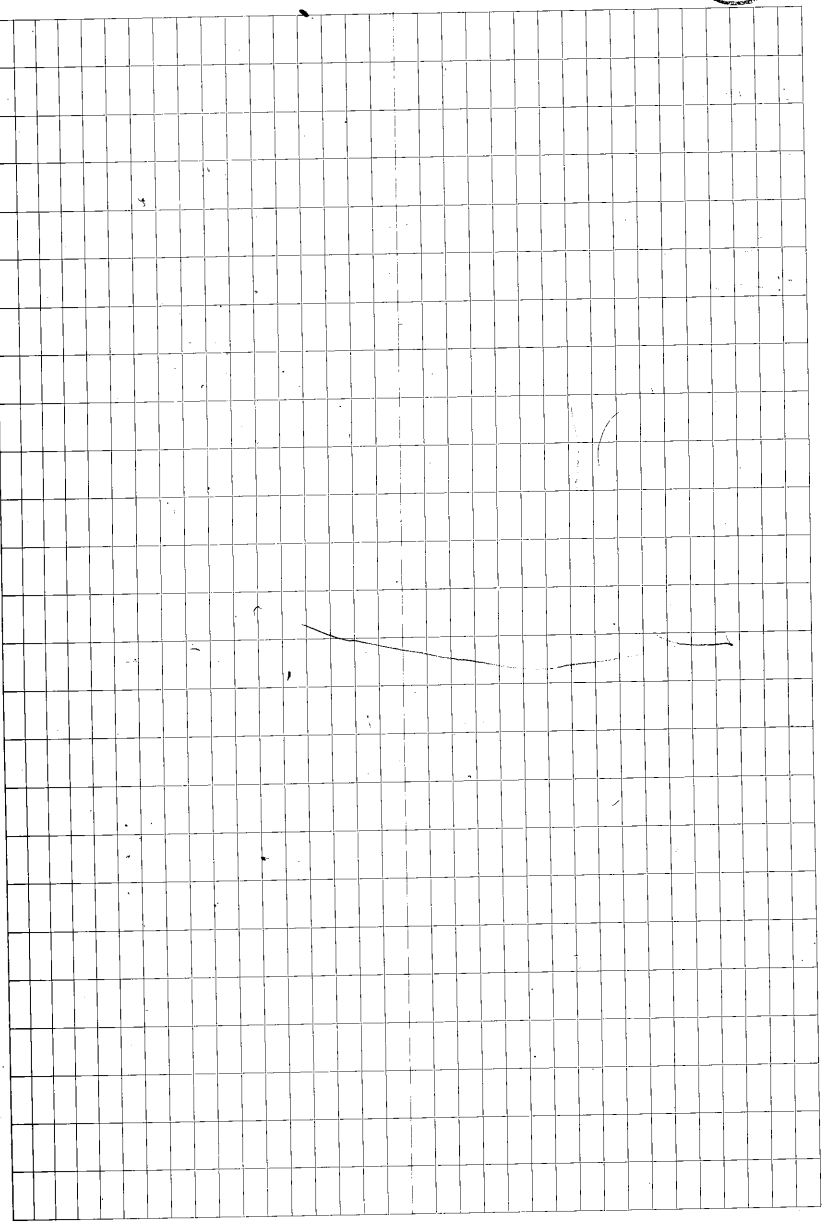
BASE @ 11123

IH = 5.59

CHECK INTO 11124 ΔH = 0.13'

ΔV = 0.04'

POINTS 11215 - 11221



04/20/11 (CONT)

EXTEND XSEC 1 SOUTH WITH LEVEL
FROM PT # 11213 (0')

DESC	+	HI	-	ELEV.	
11213				458.21	
	2.94	461.15			
100' (WOODED)			4.1	457.05	x=100
200' (WOODED)			9.15	452.00	x=102
0			2.06	459.09	
	21.34	480.43			
300' (WOODED)			21.3	459.13	x=102
400' (WOODED)			9.0	471.43	x=153
425' (WOODED)			4.4	476.03	x=104
0			14.56	465.87	
	1.57	467.44			
0			11.93	455.51	
	7.85	463.36			
11213			5.13	458.23	✓

FLOOD PLAIN SOUTH OF RIVER
ALL IN WOODS.

04/21/11 JWD, WAR, CSC

XSECTION BRIDGE OPENINGS

UPSTREAM FACE

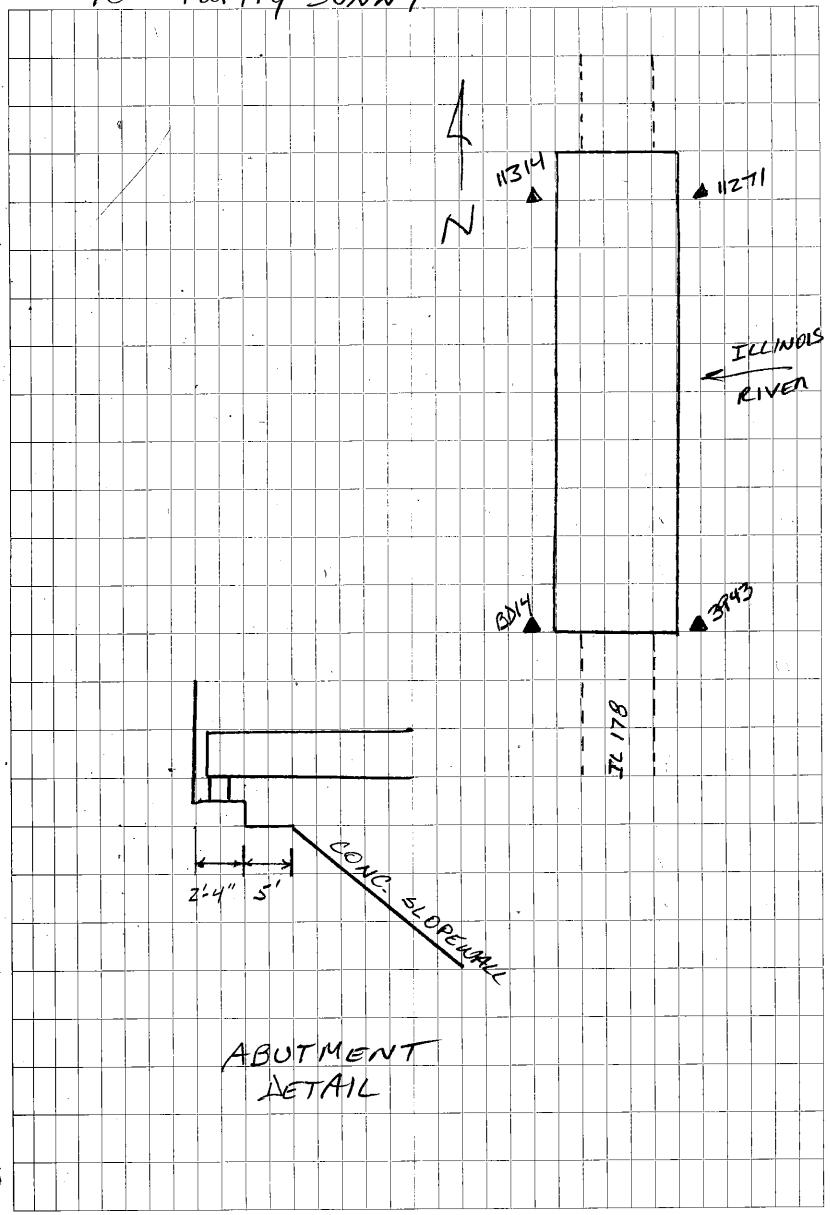
300 CONTROLLER FILE 1020_HYD 04/21/11

T 3943	BS BD1	
IH = 5.16'	HD →	
11222	ΔBD1	ΔH = 0.002'
11223	ΔBM41 (500.93)	ΔV = 0.02'
11224	ΔBD14	ΔH = 0.01' ΔV = 0.00'

POINTS 11225 - 11270 UPSTREAM FACE SOUTH TO NORTH

11271	SET NAIL TO FINISH UPSTRM FACE	
11272	ΔBD1	ΔH = 0.005'
11273	ΔBM41	ΔV = 0.02'

40° Partly Sunny



ABUTMENT DETAIL

04/21/11 (CONT)

CHANNEL SHOTS UPSTREAM FACE

PT #	Elev	WATER DEPTH	ADJUSTED ELEV.
11234	EDGE	WATER	
11235	450.97	2'	448.94
11236	450.92	4'	446.94
11237	450.94	4'	446.94
11238	450.96	8'	442.94
11239	450.96	9'	441.94
11240	450.85	11'	439.94
11241	450.89	12'	438.94
11242	450.81	12'	438.94
11243	450.93	13'	437.94
* WATER DEPTH 25' FACE PIER (SOUTH) (MEAS) *			(425.94)
11246	450.91	13'	437.94
11247	450.98	20'	430.94
11248	451.06	24'	426.94
11249	451.02	23'	427.94
11250	450.89	23'	"
11251	450.99	23'	"
11252	451.06	24'	426.94
11253	450.87	24'	"
11254	450.89	23'	427.94
11255	450.71	23'	"
11256	450.95	25'	425.94

CHANNEL SHOTS UPSTREAM FACE (CONT)

PT #	Elev	WATER DEPTH	ADJUSTED ELEV.
11257	450.69	23'	427.94
11258	450.91	25'	425.94
11259	450.93	23'	427.94
* WATER DEPTH 20' FACE NORTH PIER *			(430.94)
11262	451.05	21'	429.94
11263	451.17	16'	434.94
11264	451.02	14'	436.94
11265	450.94	10'	440.94
11266	SHOT DIRECT		
11267	EDGE WATER		

AVERAGE WATER SURFACE ELEV. 450.94

NOTE: TRIED TO DIRECT MEASURE THE DEPTH AT FACE OF PIERS, BUT CURRENT TOO POWERFUL.

JWD

04/21/11 (CONT)

DOWNSTREAM OPENING SECTION

℄ BD14 BS BD1

IH = 5.24 HD=

11274 Δ BD1 ΔH= 0.005'

11275 Δ BM41 500.93 ΔV= 0.01'

POINTS 11276 – 11313

DOWNSTREAM FACE SOUTH TO NORTH

CHANNEL SHOTS DOWNSTREAM FACE

PT #	ELEV	WATER DEPTH	ADJUSTED ELEV
11284	EDGE WATER		
11285	SHOT DIRECT		
11286	451.01	3'	447.92
11287	451.04	7'	443.92
11288	451.01	10'	440.92
11289	450.98	13'	437.92
11290	450.93	14'	436.92
11291	450.93	16'	434.92
11292	450.80	20'	430.92
11295	DIRECT SHOT FACE SOUTH PIER		
11296	" " " "		

CHANNEL DOWNSTRM FACE CONT.

PT #	ELEV.	WATER DEPTH	ADJUSTED ELEV
11297	450.98	24'	426.92
11298	450.99	24'	"
11299	450.96	24'	"
11300	451.07	25'	425.92
11301	451.08	25'	"
11302	450.96	26'	424.92
11305	DIRECT SHOT FACE NORTH PIER		
11306	451.02	18'	432.92
11307	451.11	15'	435.92
11308	451.02	10'	440.92
11309	SHOT DIRECT		
11310	EDGE WATER		
11314	SET NAIL TO FINISH SECTION		
11315	Δ BD 1	ΔH= 0.04'	
11316	Δ BM 41	ΔV= 0.01'	

AVERAGE WATER SURFACE ELEV. 450.92

04/21/11 (CONT)

FINISH BRIDGE OPENING

℄ 11271 BS 3943

IH = 5.60 HD =

11317 Δ 3943 ΔH = 0.18' ΔV = 0.07'

11318 Δ 11314 ~~ΔH =~~ ΔV = 0.09'

POINTS 11319 - 11325

FINISH UPSTRM FACE SECTION

℄ 11314 BS BD14

IH = 5.45 HD =

11326 Δ BD14 ΔH = 0.02' ΔV = 0.11'

11327 Δ 11271 ~~ΔH =~~ ΔV = 0.10'

POINTS 11328 - 11334

FINISH DWNSTRM FACE SECTION

4-21-11 CONT

SET PT #TO FINISH S.END X-SEC 2

BASE @ WP30 HT: 5.90

11335 ✓ VPSWP3 135
ΔH=0.09 ΔV=0.06

11336 SET 60D NAIL @ S TOE
OF POND ALONG X-SEC 2
S. OF RIVER ELEV = 455.89

DH8 ✓ WP8 135
ΔH=0.01 ΔV 0.01

✓DH

CREW DS/DH/WR EQUIP 400 GPS
300 CONTROLER

(33)

EXTEND S END OF XSEC 2
FROM PT# 11336 (0')

DESC	+	HI	—	ELEV
11336 (0')				455.89
	22.40	478.29	—	

USE PT #/ELEV AS PART OF XSEC 2

2.25 XS206
175'
GND
476.04

01 $2\frac{51}{}$ $2\frac{25}{}$

11336 — $22\frac{67}{}$ 455.88 455.89
0.01'

✓DH

4-21-11 CONT

EXTEND XSEC 2 FROM PT# 11187

HEADING SOUTH

DESC	DIST	+	HI	—	ELEV
11187	0'	4.41	460.16		455.75
GND	200' XS200			5.55	454.61
GND	400' XS201			6.70	453.46
01		6.90	460.37	6.69	453.47
GND	600' XS202			5.60	454.77
GND	800' XS203			4.55	455.82
02		8.09	463.89	4.57	455.80
TOB @ POND	1010' XS204			5.80	458.09
TOS @ POND	1020' XS205			9.30	454.59

CONT OPPOSITE SIDE OF POND W/GPS COULDN'T CROSS POND H2O TO DEEP

03		5.20	8.65	455.24
04		5.78	6.25	454.19
05		4.64	4.19	
11187			4.67	455.75
				EC 0.00

SEE PG 33 FOR OPPOSITE SIDE OF POND JDH

EXTEND XSEC 5 FROM PT# 11095

HEADING SOUTH

DESC.	DIST	+	HI	—	ELEV
11095	0'	5.09	457.83		452.74
GND	200' XS500			5.55	452.28
GND	400' XS501			5.15	452.68 WOODS
01		4.54	457.21	5.16	452.67
EDGE MARSH	550' XS502			5.65	451.56
EDGE MARSH	750' XS503			5.65	451.56 WOODS
GND	800' XS504			4.85	452.36
02		4.71	457.05	4.87	452.32
GND	1000' XS505			5.25	451.80
GND	1200'			4.75	452.30 WOODS
03		15.21	467.61	4.73	452.32
TOE	1230			13.65	453.96
GND	1298			0.15	467.46

RERAN LINE PAGE 39

CONT. → NEXT PG

✓DS

04/21/11

EXTEND XSEC 5 CONT.

⊙4	23.93	491.38	0.16	467.45
⊙5	6.43	497.71	0.10	491.28
TOB 1485'			4.20	493.51
TOB 1525'			4.25	493.46
TOE 1565'			19.00	478.71
BASE OF BLUFF 1580'			18.70	479.01

ROADWAY EMBANKMENT

50'± TO TOP OF ROCK BLUFF

⊙6	11.46		0.66	
⊙7	8.96		1.29	
BMJD1			3.99	512.19 / 512.09

0.10

✓DS

SHOTS WERE RERAN PAGE 39

6/6/11

EXTEND X-SEC's ALONG IL RIVER FOR IL RT 178

BASE AT: 178505 BASE HT: 6.01

√ IN AT BD4 AS WR4
HD=0.03 VD=0.02

EXTEND XS6 TO CANAL (11061-XS6)
PT #'s 12000-12005

EXTEND XS5 TO CANAL (11067-XS5)
PT #'S 12017-12023

EXTEND XS4 TO CANAL (11099-XS4)
PT #'s 12006-12016

√ OUT AT BD4 AS DH4
HD=0.03 VD=0.04

WR-DH

JOB: 1020_0606 11

GPS: # 400

COLLECTOR: #300

95° SUNNY (36)

← 12019 - HAD TO TAKE SHOT 80'± EAST OF LINE BECAUSE IT FELL IN FENCED IN BACK YARD - THE ELEV. APPEARED TO BE CLOSE TO THE SAME WHERE THE SHOT WAS TAKEN AND WHERE THE X-SEC WAS

✓ DS

6/7/11

CONT. EXTEND HYDRAULIC X-SEC'S

BASE AT #17850'S BASE HT = 6.11

VIN AT BD4 AS WR4
HD = 0.04 VD = 0.05

EXTEND X-SEC 3 TO CANAL (11127 - XS3)
PT #'S 12017 - 12024

12025 - SET 60D NAIL ON N XSEC 4
AT ENTRANCE TO STATE PARK - N. SIDE RD

12026 - SET 60D NAIL ON XSEC 5
AT ENTRANCE TO STATE PARK - N. SIDE RD

VOUT AT BD4 AS DH4
HD = 0.04 VD = 0.01

PTS 12017 - 12023 DUPLICATE
ADDED PREFIX DH TO #'S

DH - WR

98° SUNNY HUMID

37

JOB: 1020 - 060711

BPS: #400

COLLECTOR: #300

MANUAL EXT. X-SEC 4 FROM PT # 11120 TO SOUTH

DESC	DIST	+	HI	—	ELEV	
11120		9.53 [464.920]			455.39	
GND	200'			5.90	459.02	XS401
01		5.51 [465.07]		5.36	459.56	
GND	500'			7.80	457.27	XS402
VERY FLAT FROM HEAT TO TOE OF ROAD SLOPE						
02	5.06			10.34	454.73	
11001				4.05	455.74	455.78
					0.04	

X-SEC 4 FROM #12025 TO NORTH

DESC	DIST	+	HI	—	ELEV	
12025 @ TOB SOUTH	6.18 [508.10]				501.92	
TOB	65' NORTH			5.70	502.40	XS403
01		0.95 [485.55]		23.60		

CONT. NEXT PAGE →

✓ DS

6/7/11 (CONT'D)

DESC			
GRND	200' NORTH	23.30	462.26 x5404
02	2.97 [465.60]	22.92	
TOE NORTH	235' NORTH	10.95	454.65 x5405
03	20.15	2.97	
04	24.50	0.42	
05	4.30	6.10	
06	8.48 [492.13]	21.41	
TOE SOUTH	85' SOUTH	10.70	481.43 x5406
BASE BLUFF	101' SOUTH	10.35	481.78 x5407
07	15.58	0.85	
WP 15		3.95	502.91 502.93 (0.02)

← FROM HERE VERY FLAT TO NORTH TOWARD PT # 11120

← FROM HERE CONNECT TO PT # 12027 ON TOP OF BLUFF

✓ DS

6/7/11 (CONT'D)

SHOTS ON XSS AT ENT. TO STATE PARK

DESC.	DIST	+	HI	−	ELEV.
12026 @ TOP SLOPE SOUTH	5.24	[487.83]			482.59
TOE SOUTH	50'S, XS513		19.65		468.18
BASE BLUFF	63'S, XS514		19.55		468.28
TOP NORTH	44'N, XS515		6.50		481.33
01	6.92		7.24		
02	6.24	[470.50]	23.25		
GRND	120'	XS516	11.4		459.10
TOE NORTH	155'	XS517	17.75		452.75
03	23.32		6.35		
04	8.69		0.39		
WP13			11.20		494.57 494.56

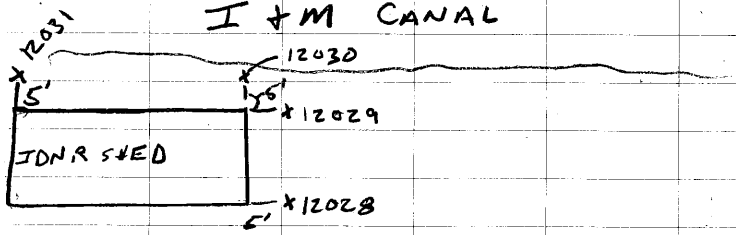
↑ 0.01 ↓

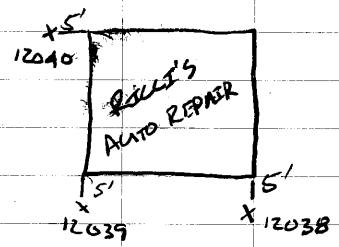
DS

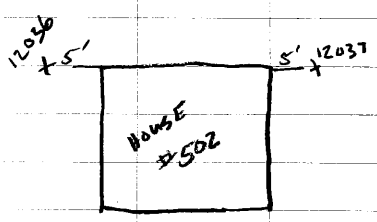
6/7/11 (CONT'D)

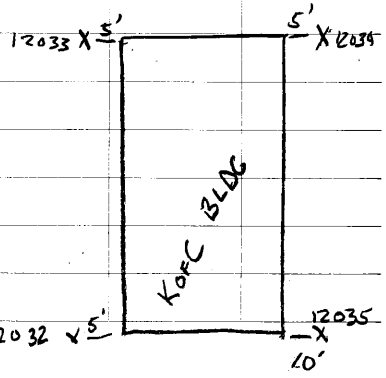
SHOOT BUILDING CORNERS

I + M CANAL

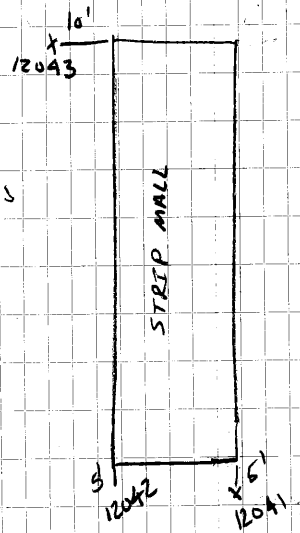








ON SOUTH END OF TOWN WEST SIDE
IL 178 - ACROSS FROM UTICA CAR WASH



JWA ✓

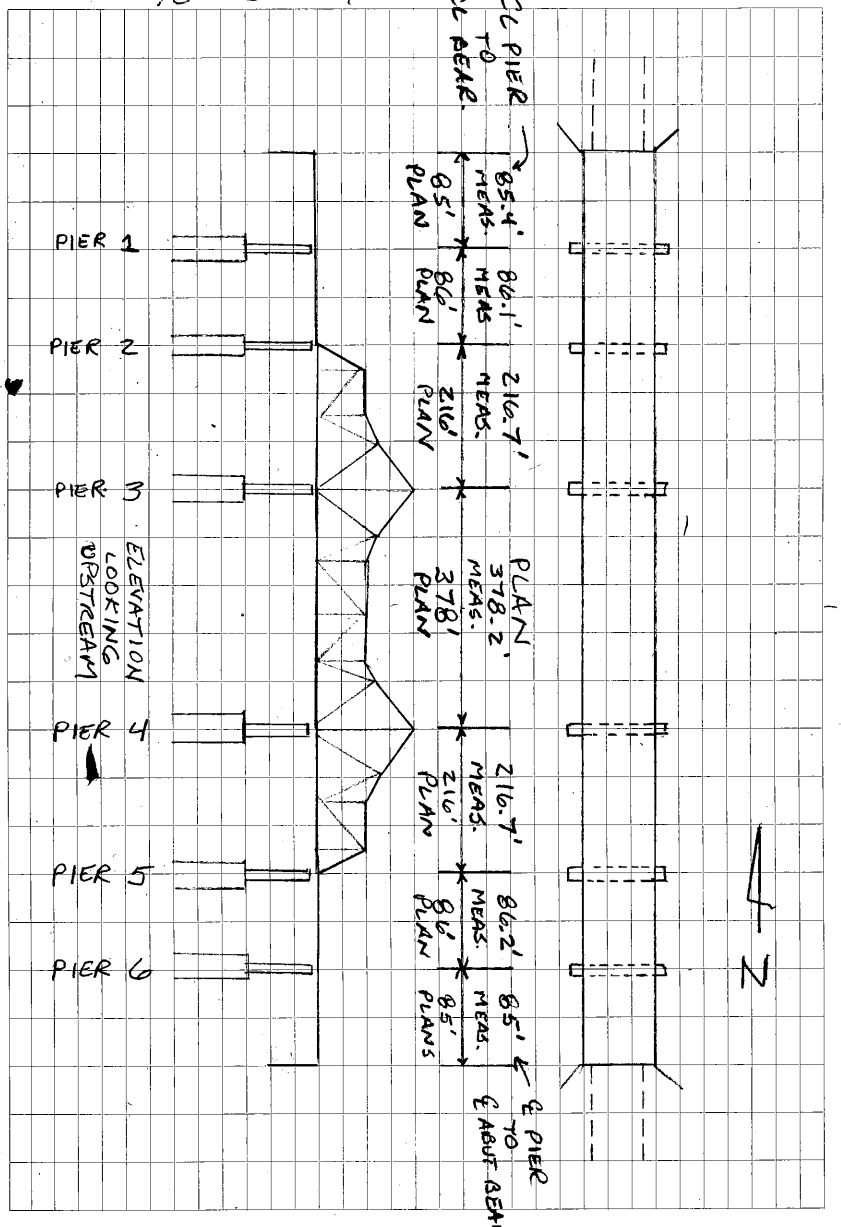
08/10/11 JWD, AJH, RFS

70° SUNNY

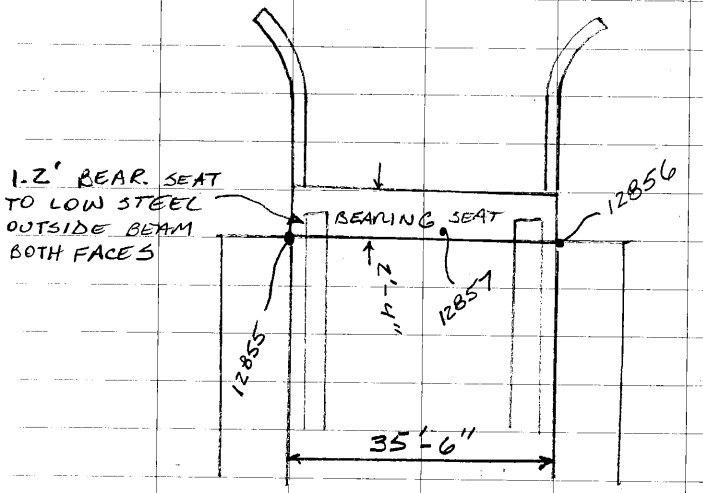
SURVEY OF BRIDGE STRUCTURE DETAILS

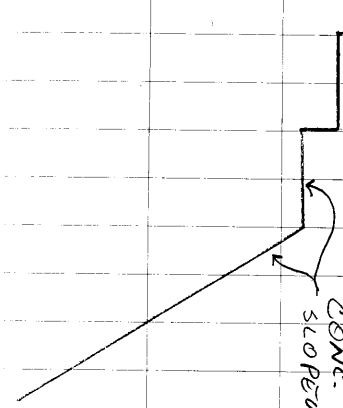
GEODIMETER GUN 102
300 Controller File: 1020_MY081011

K 4056		BS 3915
IH = 5.43		SH = 5.10'
12853	✓3915	ΔH = 0.01'
		ΔV = 0.10'
12854	✓3943	ΔH = 0.05'
		ΔV = 0.03'
12896	SET NAIL & COLLECT 3x	
12897	SET NAIL & COLLECT 3x	
12898	✓3915	ΔH = 0.02'
		ΔV = 0.09'



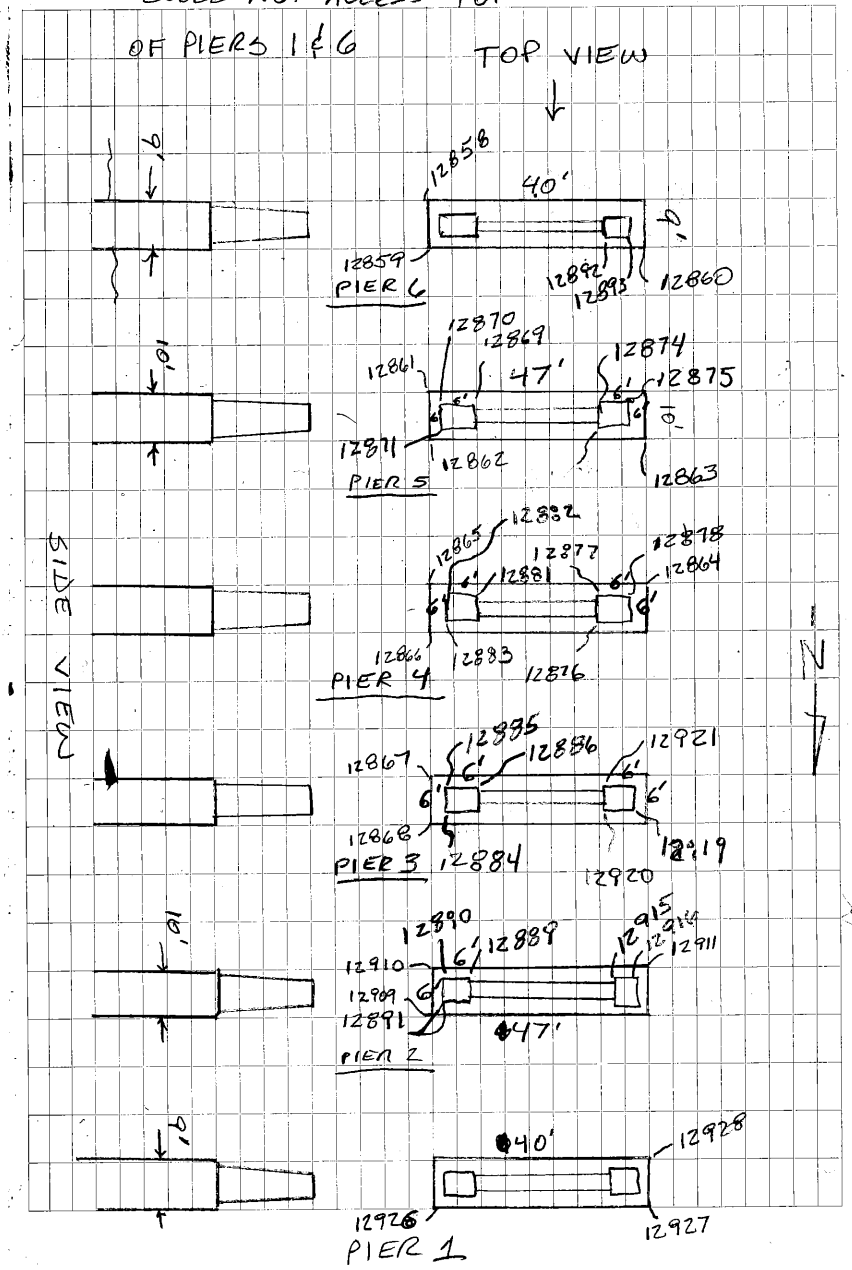
08/10/11 CONTINUE BRIDGE SURVEY





BRIDGE ABUTMENT TYP. BOTH ENDS.

COULD NOT ACCESS TOP OF PIERS 1 & 6



08/10/11 CONTINUE BRIDGE SURVEY

S.E. CORNER PIER 5 1.45' TO LOW STEEL
NE. CORNER PIER 5 1.50' TO LOW STEEL
PIER 5 TOP OF PIER 6'X6' EAST SIDE
12872 = TOP OF PIER 5 ELEV EAST SIDE
S.W. CORNER PIER 5 1.45' TO LOW STEEL
N.W CORNER PIER 5 1.50' TO LOW STEEL
PIER 5 TOP OF PIER 6'X6' WEST SIDE
12873 = TOP OF PIER 5 ELEV WEST SIDE

PIER 4 TOP OF PIER W. SIDE 6'X6'
PIER 4 N.W. CORNER 3.85' TO LOW STEEL
PIER 4 S.W. CORNER 3.80' TO LOW STEEL
12879 TOP OF PIER 4 ELEV
PIER 4 TOP OF PIER EAST SIDE ELEV
PIER 4 SE. CORNER 3.80' TO LOW STEEL
PIER 4 NE. CORNER 3.85' TO LOW STEEL
12880 PIER 4 E. SIDE TOP OF PIER ELEV

PIER 3 EAST SIDE TOP OF PIER 6'X6'
PIER 3 S.E. CORNER 3.80' TO LOW STEEL
PIER 3 N.E. CORNER 3.80' TO LOW STEEL
12887 PIER 3 EAST SIDE TOP OF PIER ELEV

PIER 2 EAST SIDE TOP OF PIER 6'X6'
PIER 2 SE CORNER 1.50' TO LOW STEEL
PIER 2 NE CORNER 1.30' TO LOW STEEL
12888 PIER 2 EAST SIDE TOP OF PIER ELEV
12892, 12893 DIRECT REFLEX PIER CORNERS PIER 6 WEST SIDE

12894 DIRECT REFLEX LOW STEEL NW COR PIER 6
12895 " " " " SW COR PIER 6

08/10/11 CONTINUE BRIDGE SURVEY

↑ 12896 BS 4056
IH= 5.37

12899 ✓ 4056 ΔH= 0.01'
ΔV= 0.01'

12900 ✓ 3915 ΔH= 0.02'
ΔV= 0.08'

12901 - 12903
~~12901 - 12903~~ TOP CORNERS EAST END PIER 6
~~12901~~ WITH DIRECT REFLEX

12904 LOW STEEL SE COR. PIER 6 DIR. REFLEX
12905 " " NE " " " " " "

12906 ✓ 4056 ΔH= 0.01'
ΔV= 0.01'

12922 ✓ 4170 ΔH= 0.09'
ΔV= 0.01'

↑ 12897 BS 4056
IH= 5.58

12907 ✓ 4056 ΔH= 0.014'
ΔV= 0.043'

12908 ✓ 11002 ΔH= 0.08'
ΔV= 0.074'

12912 DIRECT REFLEX SE COR. PIER COR. WEST END PIER 1
12913 SW PIER COR. PIER 1
↑ IVY ON PIERS - NEED TO REVIEW SHOT LOCATION.
12914 LOW STEEL AT WEST END PIER 1 WITH DIRECT REFLEX

LOW STEEL SW COR. PIER 2 1.5'
NW COR. PIER 2 1.5'
12917 TOP OF WEST END PIER 2 ELEV.

PIER 3 N.W. CORNER 3.75' TO LOW STEEL
PIER 3 S.W. CORNER 3.80' TO LOW STEEL
12918 TOP OF PIER 3 ELEV WEST END

08/11/11 CONTINUE BRIDGE SURVEY

IN FILE 1020_HY 08101/

T 4170 BS 12897

IH = 5.76 SH = 5.1

12923 ✓ 12897 ΔH = 0.03'

ΔV = 0.01'

12924 ✓ 4174 ΔH = 0.07'

ΔV = 0.02'

12925 USC&GS BRASS DISC SET IN TOP OF LOWER WALL OF PIER #1 AT NE COR. DISC IS STAMPED Y231.

12929 - 12934 EXTEND RDWAY SECTIONS AT NORTH ABUT.

12935 - 12936 SHOTS AT TOP COR. PIER 1 ON EAST SIDE (DIRECT REFLEX) LOT OF IVY, SHOTS NEED CHECKED

12937 DIRECT REFLEX LOW STEEL AT EAST END PIER 1 (SEVERE GUN ANGLE)

12938 ✓ 12897 ΔH = 0.03'

ΔV = 0.02'

T 4174 BS 4170

IH = 5.05 SH = 5.1

12939 ✓ 4170 ΔH = 0.05'

ΔV = 0.02'

12940 - 12949 X SECTIONS @ NORTH ABUT.

12950 ✓ 4170 ΔH = 0.09'

ΔV = 0.02'

T VRSBDG BS 11122

IH = 5.33' SH 5.1

12951 ✓ 11122 ΔH = 0.05'

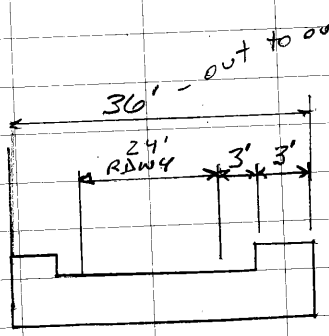
ΔV = 0.07'

12952 - 12967 FINISH XSECTIONS AT NORTH ABUT.

12968 ✓ 11122 ΔH = 0.06'

ΔV = 0.07'

08/11/11 CONTINUE BRIDGE SURVEY



BRIDGE DECK ELEV.

INSPECTION OF THE CHANNER BANKS THROUGHOUT THE SURVEY LIMITS SHOW MATERIAL IS SAND. SAMPLES WERE TAKEN IN THE RIVER WERE ALSO SAND WITH SOME SILT.

SECTION 9

BRIDGE PLANS

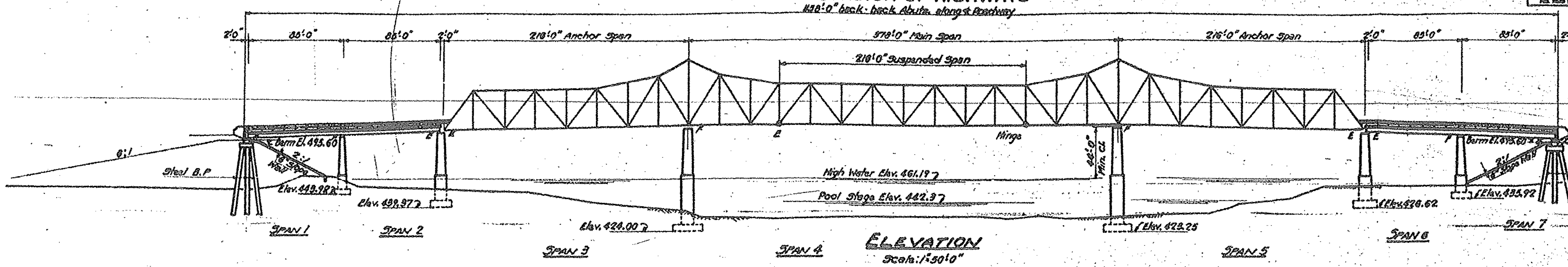
9A – EXISTING BRIDGE

B.M.: U.S.G.S. B.M. on top of East end of North Pier Elev. 468.(X)
□ on top of Pier Cap on East end of South Pier Elev. 470.56

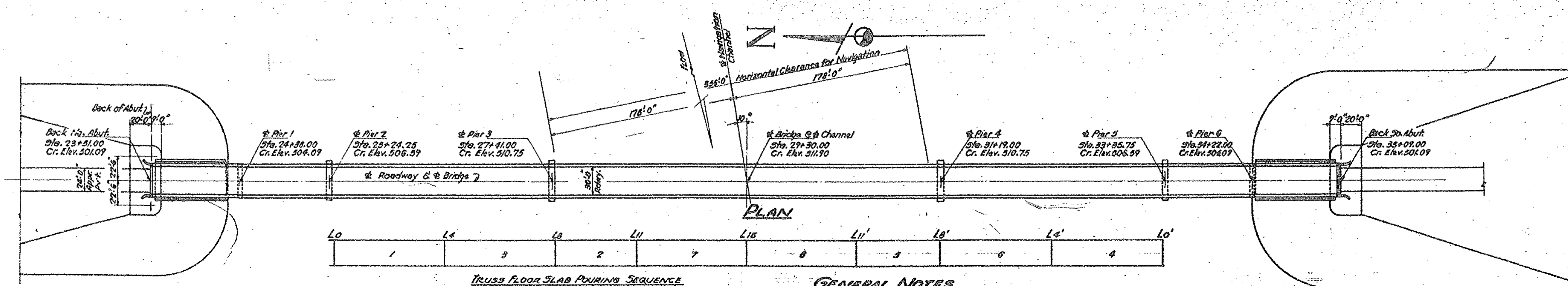
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.S. 256	1D 1P	LASALLE	22 25	6

SHEET NO. 8
27 SHEETS



ELEVATION
Scale: 1" = 50'-0"



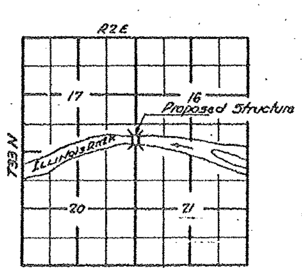
PLAN

Lo	L4	L8	L11	L15	L11'	L8'	L4'	Lo'
1	3	2	7	8	5	6	4	

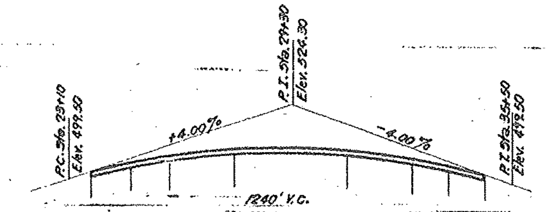
TRUSS FLOOR SLAB POURING SEQUENCE

GENERAL NOTES

Class-X- Concrete shall be used throughout except as noted.
Handrail Concrete shall be used in Abutment Posts.
The Concrete floor slab shall be poured in one continuous operation between construction joints.
The Concrete floor slab shall be finished in accordance with Art. 51.19(B) of the Standard Specifications.
High strength steel bolts may be substituted for field rivets. See Special Provisions.
All rockers, bolsters, bearing plates and lead plates shall be fabricated and set in accordance with Art. 51.15 of the Standard Specifications.
Roadway expansion guards shall be assembled in the shop in their proper position with adjacent ends in place and shall be left assembled for shop inspection.
Plates shall be flame cut in accordance with Art. 54.5(ℓ) of the Standard Specifications.
Structural Steel-Carbon shall conform to Art. 124.3 or 124.7 of the Standard Specifications.
Structural Steel-Low Alloy (A242) shall conform to Art. 124.4 of the Standard Specifications.
Cast Steel shall conform to Art. 124.13 of the Standard Specifications.
Unless otherwise noted, Structural Steel, Cast Steel and Metal Handrail shall be given one shop coat of red lead paint and two field coats of Aluminum paint.
All paint shall be furnished and applied by the Contractor involved.
Metal Handrail on truss spans and bushings shall be included in quantity of Structural Steel-Carbon.
Open Steel Floor shall be furnished and installed by the Contractor for Section 1-E.
All Structural Steel shall be carbon except as noted.



LOCATION SKETCH



PROPOSED GRADE PROFILE

TOTAL BILL OF MATERIAL

ITEM	UNIT	SECTION 1D	SECTION 1E	SECTION 1F	SECTION 1P
Class-X- Concrete	Cu.Yds.	884.3			
Handrail Concrete	Cu.Yds.	3.4			
Reinforcement Bars	Lbs.	193,090			
Structural Steel-(Carbon)	Lbs.	6990	2231640	2231640	2237970
Structural Steel-(Low Alloy)	Lbs.		441250	441250	441250
Open Steel Floor	Sq.Ft.		4845		4845
Name Plates	Each	1			
Metal Handrail	Lin.Ft.	691			691
Cast Steel	Lbs.		18830	18830	18830
Stud Anchors	Each	810			
Navigation Lighting System	Each	1			
Bridge Seat Sealant	L.S.	L.S.			

DESIGNED H. Owen
CHECKED James I. Rayburn
DRAWN M. Miller
CHECKED J.I.R.

SEPT. 18 1959
EXAMINED V. M. Romine — Engineer of Bridge and Traffic Structures
PASSED E. ... — Engineer of Design
APPROVED R. R. Bartelsmeyer — Chief Highway Engineer

WATERWAY INFORMATION

Drainage Area	6060,000 Acres
Character	
Required Opening (50 Yr. Flood)	20,000 Sq. Ft.
Present Opening	14060 Sq. Ft.
Proposed Opening	20800 Sq. Ft.
Ordinary Water Elev.	442.3 Peoria Pool

STATION 29+30
ILLINOIS RIVER
BUILT 19
F.A.S. RT. 256~SEC. 1-D
F.A. PROJECT S-116 (7)
LOADING H20-S16

LETTERING FOR NAME PLATE
See Standard 2113

DESIGN STRESSES

	Carbon	Low Alloy
Structural Steel		
Axial Tension	18000 #/□"	27000 #/□"
Axial Compression	15000-¼ L²/r²	22000-.55 L²/r²
Reinforcement Bars	fs = 20000 #/□"	
Concrete	fc = 1400 #/□" n=10	

Loading H20-S16-44

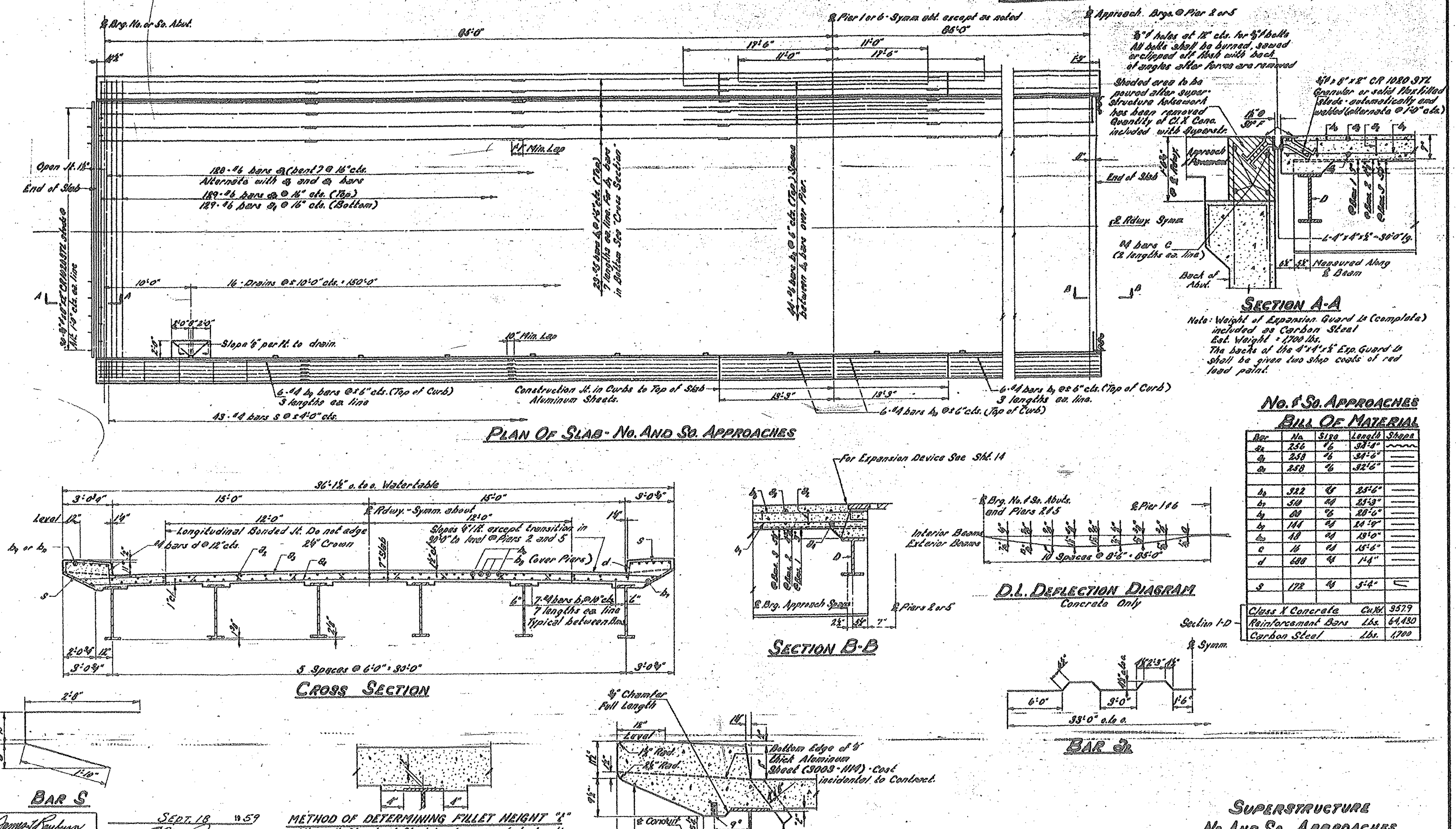
GENERAL PLAN & ELEVATION
ILLINOIS RIVER BRIDGE AT UTICA
PROJECT S-116(6)
F.A.S. RTE. 256~SEC. 1-D-E-F-P
LASALLE COUNTY
STATION 29+30

Rev. 12-1-60. H.L.O. & H.O. Raised curb 9" to 11". Increased Slab Reinf. as per T.8(59) A.A.S.H.O.

Revisions of Sec. 1-D -12-21-61-WJM In TOTAL BILL OF MATERIAL, changed quantity of Class X Concrete from 882.4 to 884.3 Cu. Yds. to include 1.9 Cu. Yds. for filling steel grid over piers. Also added pay item "Bridge Seat Sealant-Lump Sum".

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

SHEET NO. 2
27 SHEETS



Note: Weight of Expansion Guard Ls (complete) included as Carbon Steel. Est. Weight = 1,700 lbs. The backs of the 4"x4"x5/8" Exp. Guard Ls shall be given two shop coats of red lead paint.

No. & So. Approaches Bill Of Material

Bar	No.	Size	Length	Shape
a2	256	#6	34'-4"	
a3	258	#6	34'-6"	
a4	258	#6	32'-6"	
b6	322	#5	25'-6"	
b7	510	#4	25'-3"	
b8	60	#6	28'-6"	
b9	144	#4	24'-9"	
b10	48	#4	19'-0"	
c	16	#4	15'-6"	
d	688	#4	1'-4"	
s	172	#4	3'-4"	

Section 1-D

Class X Concrete	Cu.Yd.	957.9
Reinforcement Bars	Lbs.	64,430
Carbon Steel	Lbs.	1,700

METHOD OF DETERMINING FILLET HEIGHT "f"

After all Structural Steel has been erected elevations of the top flanges of the beams shall be taken at intervals not to exceed 10 Ft. From these elevations subtract the increment of deflections for these points, determined from the D.L. Deflection Diagram. The elevations so attained subtracted from the theoretical grade elevations, minus floor thickness equals the fillet heights above top of beam.

DESIGNED	James L. Rayburn
CHECKED	T. M.
DRAWN	P. Lawler
CHECKED	

SEPT. 18 1959

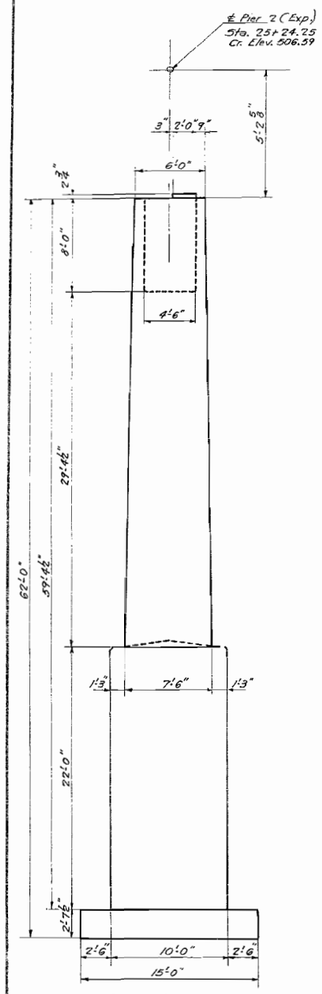
EXAMINED — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED — ENGINEER OF DESIGN
APPROVED R.R. Bartelsmeyer — CHIEF HIGHWAY ENGINEER

SUPERSTRUCTURE
NO. AND SO. APPROACHES
ILLINOIS RIVER BRIDGE @ UTICA
F.A.S. RT. 256. SEC. 1D-E-F-P
LA SALLE COUNTY
STATION 29 + 30

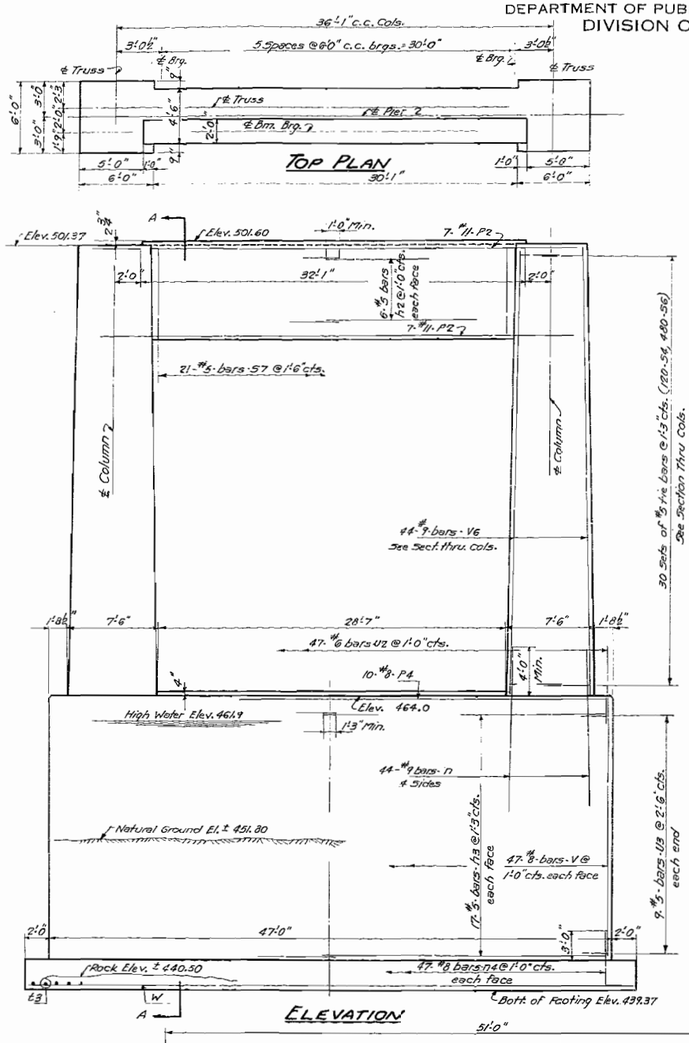
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

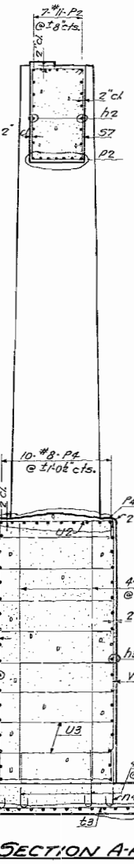
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.S. 256	1B	La Salle	30	10
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT.		

SHEET NO. 4
10 SHEETS

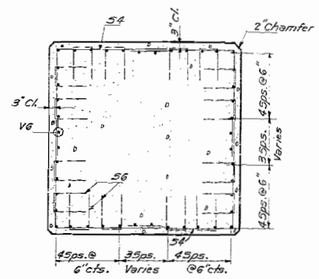


END VIEW

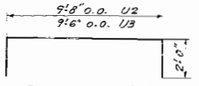

36'-1" c.c. Cols.
3'-0½"
5 Spaces @ 6'-0" c.c. brgs. = 30'-0"
3'-0½"
℄ Brg.
℄ Brg.
℄ Truss
℄ Truss
℄ Truss
℄ Pier 2
℄ Bm. Brg.
6'-0"
3'-0"
3'-0"
1'-9"
2'-3"
4'-6"
5'-0"
6'-0"
1'-0"
5'-0"
6'-0"
TOP PLAN
30:1"
Elev. 501.37
Elev. 501.60
1'-0" min.
7-#11-P2
2'-0"
32'-1"
2'-0"
6-#5 bars h2 @ 1'-0" cts. each face
7-#11-P2
21-#5 bars S7 @ 1'-6" cts.
℄ Column
℄ Column
#8-#9 bars V6
See Sect. thru cols.
30 Sets of #5 tie bars @ 1'-3" cts. (220-36, 480-516)
See Section Thru Cols.
1'-8½"
7'-6"
28'-7"
7'-6"
1'-8½"
47-#6 bars U2 @ 1'-0" cts.
10-#8-P4
4'-0" min.
℄ Elev. 464.0
High Water Elev. 461.9
1'-3" Min.
14-#9 bars n ℄ Sides
Natural Ground El. ± 451.80
17-#6 bars h3 @ 1'-3" cts. each face
47-#8 bars V @ 1'-0" cts. each face
9-#5 bars U3 @ 2'-6" cts. each end
2'-0"
47'-0"
3'-0"
2'-0"
Rock Elev. ± 440.50
47-#6 bars n4 @ 1'-0" cts. each face
b3
W
A
Bott. of Footing Elev. 439.37
ELEVATION



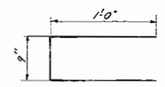
SECTION A-A



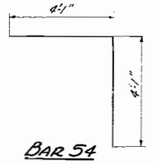
SECTION THRU COLS.



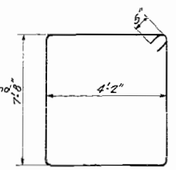
BARS U2 & U3



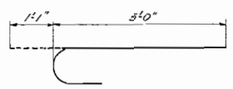
BAR S6



BAR S4



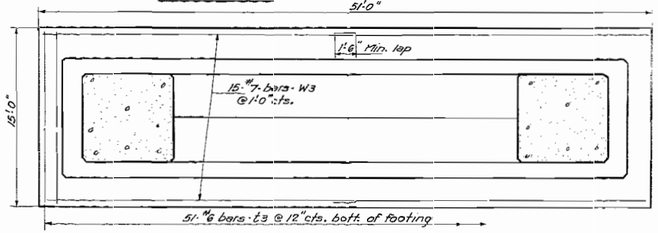
BAR S7



BAR n4

BILL OF MATERIAL

Bar	No.	Size	Length	Shape
h3	68	#5	24'-0"	
h2	24	#5	17'-0"	
V7	102	#8	21'-9"	
V6	88	#9	37'-9"	
P2	14	#11	41'-0"	
P4	10	#8	46'-9"	
S6	960	#5	2'-9"	
S4	240	#5	8'-2"	
S7	21	#5	24'-6"	
U2	47	#6	13'-8"	
U3	18	#5	13'-6"	
b3	31	#6	14'-9"	
W3	30	#7	26'-0"	
n	88	#9	20'-0"	
n4	102	#8	6'-1"	
Class A Concrete			Cu. Yds.	626.1
Reinforcement Bars			Lbs.	40410
Cofferdam Excavation			Cu. Yds.	440
Rock Excav. for Structure			Cu. Yds.	30
Cofferdam			Each	1



FOOTING PLAN

DESIGNED Mukhtiar Ozzurd
CHECKED T. M. Yang
DRAWN Mukhtiar Ozzurd
R. Miller
CHECKED T. M. Yang

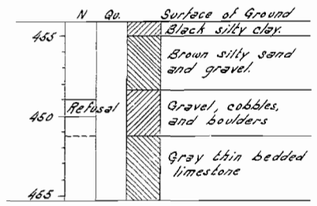
EXAMINED June 2 19 57
PASSED
APPROVED
ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
ENGINEER OF DESIGN
CHIEF HIGHWAY ENGINEER

PIER 2
ILLINOIS RIVER BRIDGE AT UTICA
F.A.S. RT. 256 - SEC. 1-B
LASALLE COUNTY
STATION 29+30

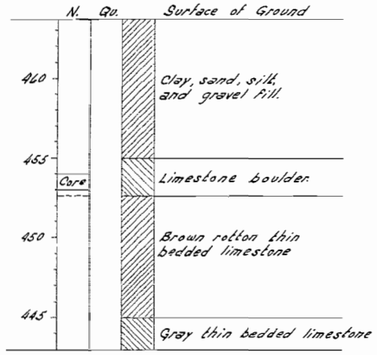
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
Bridge F.A.S. 256	1B	La Salle	30	15
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT		

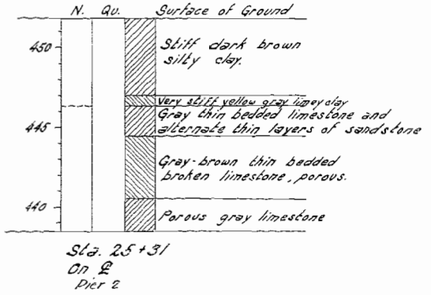
SHEET NO 9
10 SHEETS



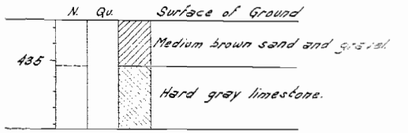
Sta. 23+34
27 Ft. Rt. ℄
North Abutment



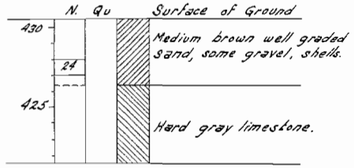
Sta. 24+24
On ℄
Pier 1



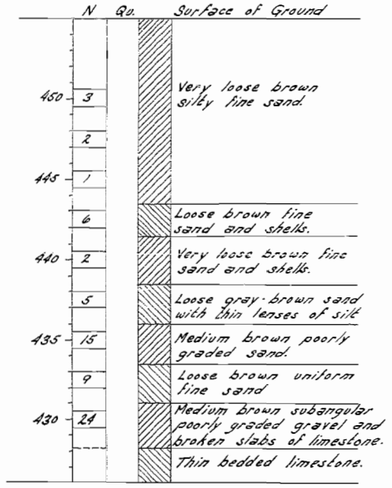
Sta. 25+31
On ℄
Pier 2



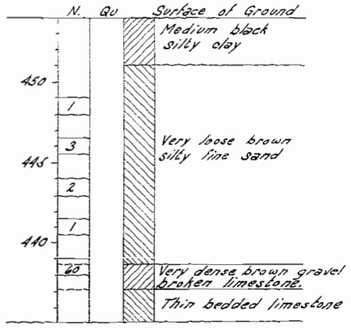
Sta. 27+21
On ℄
Pier 3



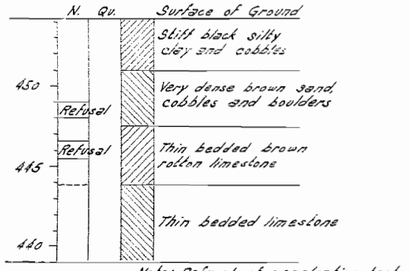
Sta. 31+22
On ℄
Pier 4



Sta. 33+08
On ℄
Pier 5



Sta. 34+23
On ℄
Pier 6



Note: Refusal of penetration tests in this boring was because of the large size of rocks rather than their compactness.

Sta. 35+08
On ℄
South Abutment

DESIGNED	Mukhtiar Chopra
CHECKED	T. M. Leung
DRAWN	P. Lawler
CHECKED	

EXAMINED June 2 19 59
CHIEF ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED
ENGINEER OF DESIGN
APPROVED
CHIEF HIGHWAY ENGINEER

Note: N = Blows per foot of penetration of sampling spoon. Hammer Weight = 350 lbs. Drop = 12 inches.
Qu. = Unconfined compressive strength in tons per square foot.

BORING DATA
ILLINOIS RIVER BRIDGE @ UTICA
F.A.S. RT. 256 - SEC. 1-B
LA SALLE COUNTY
STATION 29+30

9B – PROPOSED BRIDGE

Bench Mark: U.S. Army Corps of Engineers brass disc at top of existing bridge curb of Illinois River Bridge: N.E. quadrant, Sta. 23+55.23 (existing ℄), Offset 15.55' (Lt.), Elev. 501.027.

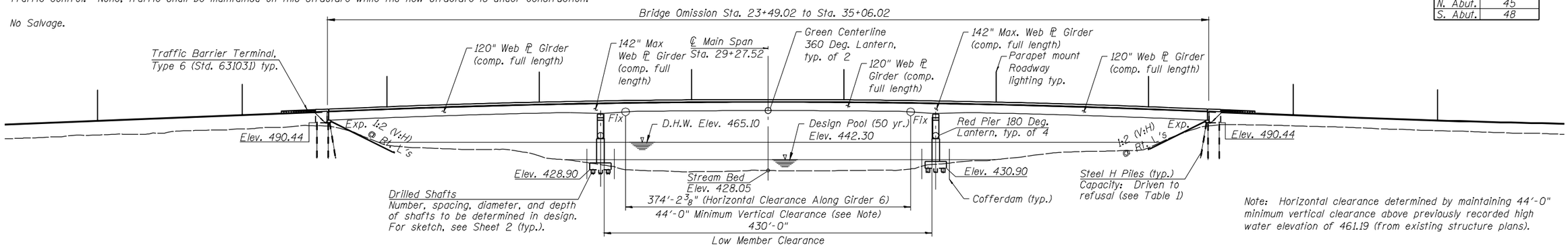
Existing Structure: Structure No. 050-0088 was constructed in 1962 as F.A.S. Route 256, Section I-D-E-F-P. This structure consists of 3 steel truss spans and 4 steel beam approach spans. The piers are supported on spread footing and the abutments are supported on concrete encased piles. The overall length is 1158'-0", back-to-back abutments. Structure provides 30'-0" roadway width face-to-face of curbs.

Traffic control: None, traffic shall be maintained on this structure while the new structure is under construction.

No Salvage.

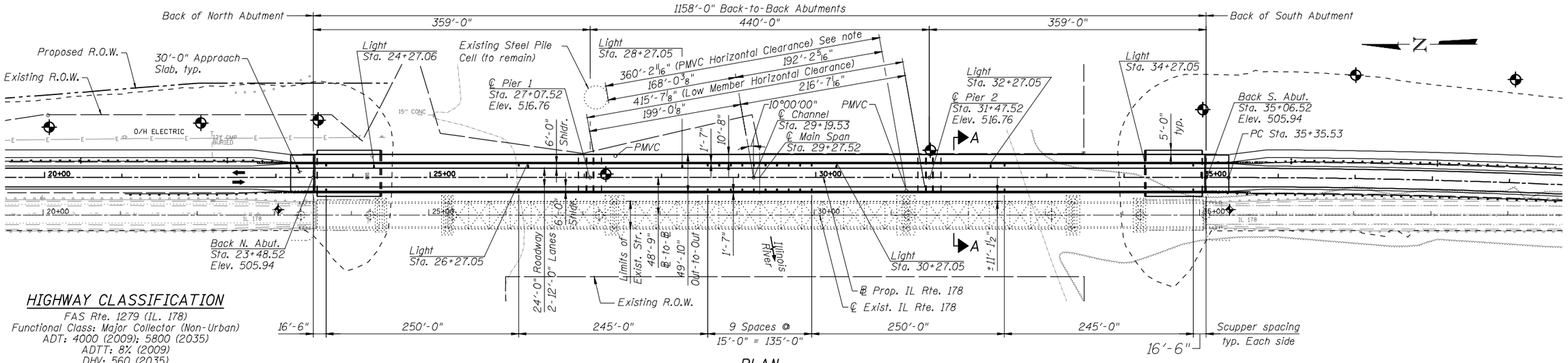
TABLE 1

Location	Estimated Pile Length (ft)
N. Abut.	45
S. Abut.	48



ELEVATION
(Looking East)

Note: Horizontal clearance determined by maintaining 44'-0" minimum vertical clearance above previously recorded high water elevation of 461.19 (from existing structure plans).



PLAN

HIGHWAY CLASSIFICATION

FAS Rte. 1279 (IL. 178)
Functional Class: Major Collector (Non-Urban)
ADT: 4000 (2009); 5800 (2035)
ADTT: 8% (2009)
DHV: 560 (2035)
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
Two-Way Traffic

LOADING HL-93

Allow 50#/sq. ft. for future wearing surface.

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications, 6th Edition, with 2012 Interims

DESIGN STRESSES

FIELD UNITS

f'_c = 3,500 psi
f_y = 60,000 psi (reinforcement)
f_y = 50,000 psi (M270 Grade 50W)
f_y = 70,000 psi (M270 Grade 70W), for flanges over piers only

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.04
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.11
Soil Site Class = B

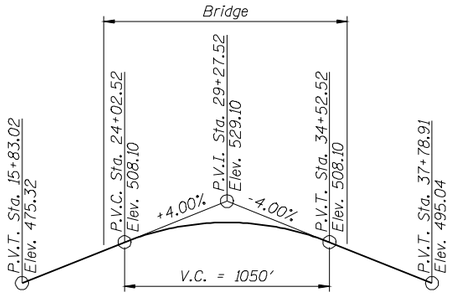
DESIGN SCOUR (Q_{100} & Q_{500}) ELEVATION TABLE

Design Scour Elevation (ft.)	N. Abut.	Pier 1	Pier 2	S. Abut.
	490.44	430.90	432.90	490.44

WATERWAY INFORMATION

Drainage Area = 11,060 sq. mi. Low Grade Elev. 465.18 Ft. @ Sta. 00+00.00
Max. Recorded HWE = 466.30 Ft. (@ ℄ Rdwy.)

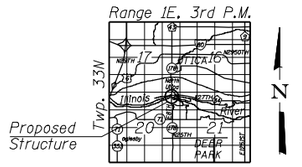
Flood	Freq. Yr.	Q (cfs)	Opening (sq. ft.) Exist.	Opening (sq. ft.) Prop.	Natural H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	94,000	20231	20734	461.7	0.9	0.8	462.6	462.5
Design	50	124,000	23249	23957	465.1	0.1	0.1	465.2	465.2
Base	100	137,000	24359	25146	466.3	0.1	0.1	466.4	466.4
Max. Calc.	500	163,000	26323	27240	468.4	0.2	0.1	468.6	468.5



PROPOSED PROFILE GRADE

LEGEND

Existing Bridge
Proposed Bridge
Soil Boring Location Performed by IDOT (2012)
Soil Boring Location
PMVC Point of Minimum Vertical Clearance



LOCATION SKETCH

GENERAL PLAN
IL 178 OVER
ILLINOIS RIVER (PUBLIC WATER)
F.A.S. ROUTE 1279 - SEC. (1)BR & 1
LASALLE COUNTY,
STATION 29+19.53
STRUCTURE NO. 050-0256

T:\16870\Structl\Cadd\ts&l\0500088-66992-TSL-001.dgn
07-MAR-2013 16:42

PARSONS BRINCKERHOFF

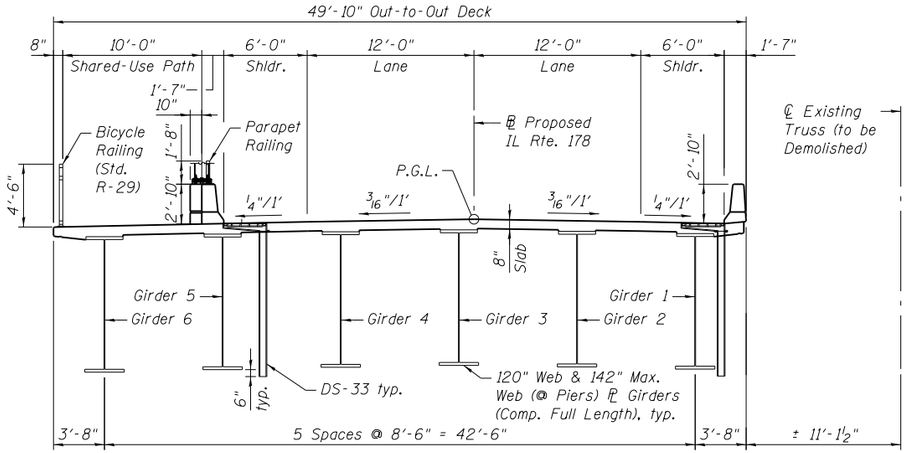
FILE NAME = 0500088-66992-TSL-001.dgn	DESIGNED - Y. Ali	REVISED -	
	CHECKED - A. Hammad	REVISED -	
PLOT SCALE = NONE	DRAWN - D. C. Patel	REVISED -	
PLOT DATE = 07-MAR-2013 16:42	CHECKED - Y. Ali	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

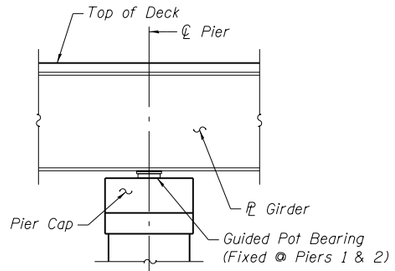
GENERAL PLAN & ELEVATION

SHEET NO. 1 OF 2 SHEETS

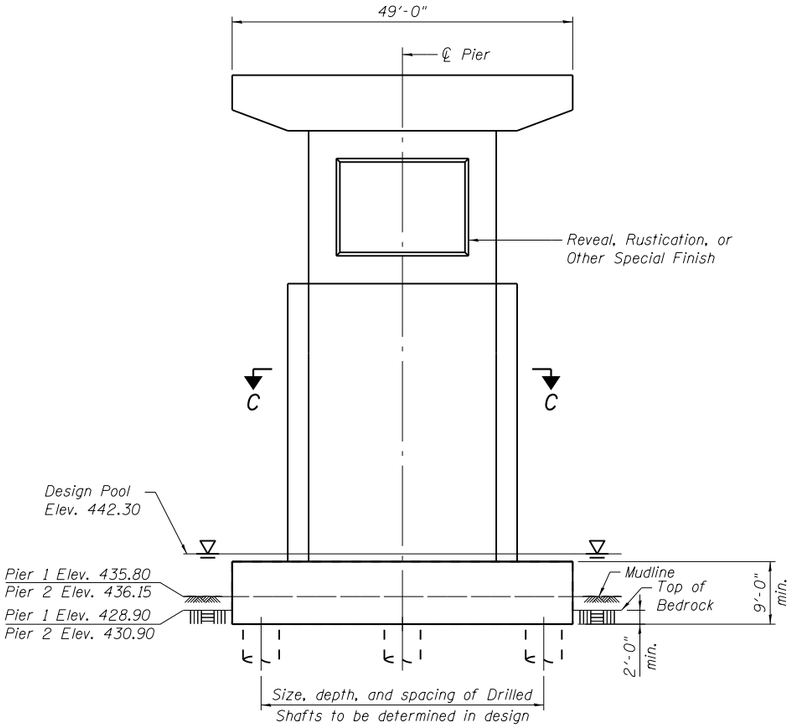
F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
178	(1)BR & 1	LASALLE		
		CONTRACT NO. 66992		
		ILLINOIS FED. AID PROJECT		



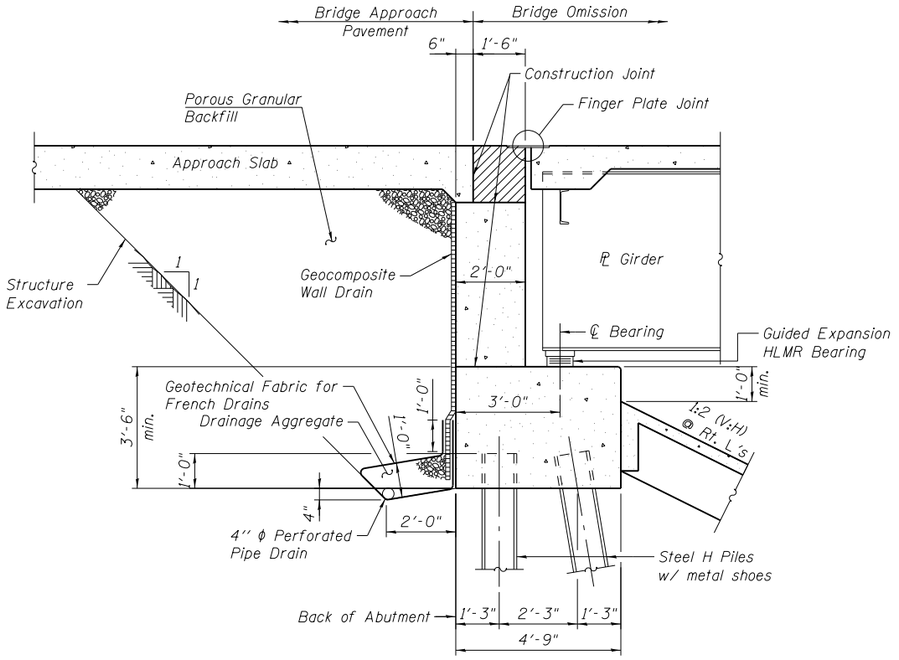
SECTION A-A
(Looking South)



SECTION THRU PIER 1 & 2

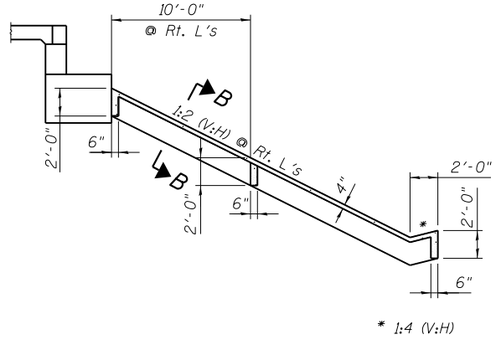


PIER SKETCH
(Piers 1 & 2)



All drainage system components shall extend to 2'-0" from the end of each wingwall except an outlet pipe shall extend until intersecting with the side slopes. The pipes shall drain into concrete headwalls. See Article 601.05 of the Standard Specifications and Highway Standards, 601101.

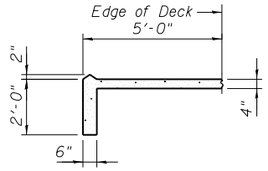
SECTION THRU PILE SUPPORTED STUB ABUTMENT
(Horiz. dim. @ Rt. L's)



* 1:4 (V:H)

SECTION THRU SLOPEWALL

SECTION C-C



SECTION B-B

DETAILS
IL 178 OVER
ILLINOIS RIVER (PUBLIC WATER)
F.A.S. ROUTE 1279 - SEC. (1)BR & 1
LASALLE COUNTY,
STATION 29+19.53
STRUCTURE NO. 050-0256

T:\16870\StructCaddts&I\0500088-66992-TSL-002.dgn
06-MAR-2013 15:55

PARSONS BRINCKERHOFF	FILE NAME = 0500088-66992-TSL-002.dgn	DESIGNED - Y. Ali	REVISED -
		CHECKED - A. Hammad	REVISED -
	PLOT SCALE = NONE	DRAWN - D. C. Patel	REVISED -
	PLOT DATE = 3/6/2013	CHECKED - Y. Ali	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DETAILS
SHEET NO. 2 OF 2 SHEETS

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
178	(1)BR & 1	LASALLE		
		CONTRACT NO. 66992		
	ILLINOIS	FED. AID PROJECT		

SECTION 10

HEC-RAS MODEL

10A – NATURAL CONDITIONS MODEL - INPUT AND OUTPUT

```
 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: IL 178 over Illinois River
Project File : IL178.prj
Run Date and Time: 3/8/2013 3:42:32 AM

Project in English units


PLAN DATA

Plan Title: Natural
Plan File : t:\16870\Civil\Drainage\HEC-RAS\IL178.p02

           Geometry Title: Natural
           Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g02

           Flow Title    : Upper Mississippi Flow Frequency Study
           Flow File     : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Plan Summary Information:
Number of:  Cross Sections =   17    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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



FLOW DATA

Flow Title: Upper Mississippi Flow Frequency Study
Flow File : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Flow Data (cfs)


  River           Reach      RS             10 YR           50 YR          100 YR          500 YR
  Illinois River  Main       230.23         94000          124000          137000          163000



Boundary Conditions

  River           Reach           Profile        Upstream                 Downstream

  Illinois River  Main            10 YR                                    Known WS = 461.55
  Illinois River  Main            50 YR                                    Known WS = 464.85
  Illinois River  Main            100 YR                                   Known WS = 466.05
  Illinois River  Main            500 YR                                   Known WS = 468.15
```

GEOMETRY DATA

Geometry Title: Natural
Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g02

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.23

INPUT
Description: RM 230.23
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.77	14	468.57	118	462.16	127	465.12	150	464.87
163	461.09	230	454.67	450	453.17	869.03	455.45	998.81	452.47
1102.68	452.87	1168.76	454.91	1272.53	455.55	1332.78	455.83	1347.47	454.79
1408.21	456.38	1541.34	456.59	1587.82	444.23	1604.71	439.95	1631.78	436.93
1668.56	436.95	1721.57	436.95	1776.82	437.95	1816.75	437.95	1854.08	437.95
1886.71	437.95	1918.74	443.26	1919.49	444.12	1927.27	458.29	2021.02	454.83
2079.35	453.65	2170.01	457.64	2272.73	457.46	2299.39	457.14	2428.21	455.03
2481.5	456.1	2564.54	483.91	2571.61	482.55	2613.4	464.39	2631.42	463.58
2680.84	444.14	2701.72	440.97	2738.62	433.97	2766.24	429.97	2811.18	426.97
2854.47	426.97	2893.4	425.97	2938.49	426.97	2980.12	427.97	3019.64	428.97
3055.98	428.97	3071.79	434.97	3098.6	437.97	3132.19	442.32	3142.78	444.25
3172.37	449.66	3204.51	462.92	3233.1	462.52	3251.89	451.67	3312.76	452.53
3888.16	455.66	4242.45	454.61	5245.2	458.34	5517.26	462.03	6409.74	463.15
6596.88	467.54	6996.88	470						

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1168.76	.04	1541.34	.023	1927.27	.1	2170.01	.04
2428.21	.1	2631.42	.023	3172.37	.04	3312.76	.1		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2631.42 3172.37 699.67 699.67 699.67 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
3204.51	6996.88	462.92	F

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.1*

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	13.3	468.44	14.54	468.39	70.45	470.77	112.07	468.61
119.66	470.3	120.62	470.44	142.46	468.37	154.81	464.77	204.65	457.07
218.44	455.4	243.8	453.91	420.31	452.75	427.39	452.72	643.98	453.73
699.89	453.67	825.37	454.15	923.56	452.57	948.62	452.22	1047.28	452.71
1091.31	453.76	1110.04	454.16	1208.59	454.52	1265.81	454.68	1279.77	453.97
1314.97	454.6	1337.45	455.03	1463.89	455.26	1508.04	447.05	1524.08	444.2
1538.64	443.07	1549.79	442.31	1584.72	442.68	1635.07	443.2	1687.54	444.4
1704.6	444.58	1725.47	444.57	1760.92	444.56	1791.91	444.55	1822.33	448.08
1823.04	448.66	1830.43	458.1	1919.47	455.77	1964.84	455.11	1974.87	454.95
2060.98	457.49	2129.04	457.31	2158.54	457.34	2183.86	457.19	2262.95	456.47
2306.2	456	2356.82	456.73	2388.81	464.27	2435.68	474.71	2442.4	473.72
2482.09	461.13	2499.2	460.38	2557.27	444.4	2558.15	444.15	2566.31	442.95
2583.06	440.89	2588.39	440.13	2599.4	437.62	2621.01	434	2627.08	433.21
2649.51	430.87	2660.03	429.95	2695.05	428.38	2713.63	427.69	2739.74	427.69
2765.27	427.47	2778.16	427.17	2811.71	426.02	2856.25	426.98	2859.14	427.04
2902.92	427.96	2914.1	428.2	2944.49	429.29	2948.1	429.36	2978.97	430.69
2982.71	430.94	2999.34	436.07	3003.49	436.65	3019.45	438.78	3027.54	439.68
3038.2	440.99	3062.87	444.21	3074.01	446.04	3094.17	449.35	3105.13	450.92
3137.02	459.74	3151.83	459.6	3165.39	459.51	3184.04	452.32	3229.06	452.86
3244.44	454.06	3264.86	455.54	3295.48	455.02	3815.39	456.93	4166.95	456.25
5001.74	458.36	5161.96	460.82	5431.92	466.74	5537.26	468.18	5711.62	467.59
5826.11	462.58	6317.51	463.18	6503.2	466.18	6828.7	467.65	6871.51	469.52
6900.12	469.61								

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1110.04	.047	1463.89	.031	1704.6	.062	1830.43	.078

```
 2060.98    .035  2306.2    .072 2388.81    .048  2499.2    .023 3105.13     .06
 3244.44    .099 5826.11     .08 6900.12     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        2499.2 3105.13           699.67  699.67  699.67             .1       .3

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.97*

INPUT
Description:
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.11   12.59  468.32   13.77  468.28   66.73  476.68  106.14  475.07
  113.33  475.82  114.24  475.76  134.93  471.87  146.62  468.45  193.83  458.09
  206.89  456.13   230.9  453.33  398.08  452.27  404.78  452.27  609.91  453.04
  662.87  452.62   781.7  452.86   874.7  452.07  898.44  451.97  991.87  452.55
 1033.57  453.22 1051.31   453.4 1144.65   453.5 1198.85  453.52 1212.06  453.16
 1245.41  453.44  1266.7  453.68 1386.45  453.92 1428.26  449.86 1443.45  448.46
 1457.24  447.91  1467.8   447.7 1500.89  448.42 1548.57  449.45 1598.27  450.85
 1614.42   451.2 1634.18  451.19 1667.76  451.17 1697.11  451.15 1725.92   452.9
  1726.6  453.19  1733.6  457.91 1817.93   456.7  1860.9  456.35 1870.39  456.25
 1951.94  457.34  2016.4   457.1 2044.34  457.22 2068.32  457.24 2143.23  457.17
  2184.2  456.96 2232.13  457.37 2262.44  461.16 2306.83  465.52 2313.19   464.9
 2350.78  457.87 2366.99  457.18 2434.44  444.36 2435.47  444.15 2444.94   442.8
  2464.4  440.82 2470.59  440.13 2483.39  436.88 2508.48  433.07 2515.54  432.46
 2541.59   430.5 2553.81  429.92  2594.5  428.76 2616.09  428.41 2646.42  428.41
 2676.07  427.97 2691.04  427.65 2730.02  426.08 2776.76  427.06 2779.78  427.11
 2825.72  427.95 2837.46  428.17 2869.34   429.6 2873.12  429.74 2905.51  432.41
 2909.44  432.92 2926.89  437.18 2931.25  437.89 2947.99  440.46 2956.48   441.4
 2967.67  442.69 2993.55   446.1 3005.23  447.83 3026.39  450.95 3037.89  452.18
 3069.53  456.57 3084.22  456.48 3097.68  456.49 3116.18  452.97 3160.85  453.42
 3176.11   455.6 3196.37  458.43 3226.76  457.22 3742.63  458.21 4091.45  457.88
 4919.74  458.98 5078.72  463.29 5346.58  471.45  5451.1   474.2 5624.11  472.79
  5737.7  462.62 6225.28  463.21 6409.53  464.82 6732.49  465.74 6774.97  469.21
 6803.35  469.22

Manning's n Values        num=      13
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1051.31    .054 1386.45     .04 1614.42    .051  1733.6    .056
 1951.94     .03  2184.2    .043 2262.44     .03 2366.99    .023 3037.89     .08
 3176.11    .098  5737.7     .06 6803.35     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2366.99 3037.89           699.67  699.67  699.67             .1       .3

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.84

INPUT
Description: RM 229.84
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.28      13  468.18      63  482.59     107  481.33     183   459.1
     218  452.75  375.84   451.8  575.84  452.36  625.84  451.56  825.84  451.56
  975.84  452.68 1175.84  452.28 1375.84  452.74 1524.24  457.83 1756.95   457.6
 1903.77  456.89 2023.51  457.86 2136.06  458.05 2234.77  453.98 2311.61  444.32
 2323.57  442.65 2352.79  440.13 2367.37  436.13 2395.96  432.13 2433.68  430.13
 2493.95  429.13 2553.09  429.13 2603.93  428.13 2648.33  426.13 2697.26  427.13
 2760.81  428.13 2798.15  430.13 2832.06  434.13    2859  439.13 2876.53  442.13
 2897.13   444.4 2958.61  452.55 2970.65  453.44 3016.62  453.37 3092.65  453.97
 3127.89  461.33 3158.04  459.43 4837.75   459.6 5364.94  480.22 5536.59  477.99
 5649.29  462.67 6636.28  463.83 6678.43  468.91 6706.59  468.83

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1524.24     .04 2136.06    .011 2234.77    .023 2970.65      .1
 5649.29     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2234.77 2970.65             482     482     482             .1       .3

CROSS SECTION
```

RIVER: Illinois River
REACH: Main RS: 229.745*

INPUT
Description:
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	484.85	3.92	475.01	12.6	474.89	20.68	476	61.09	486.74
103.75	491.11	108.16	490.96	175.26	481.08	177.44	480.44	211.38	472.37
314.63	457.18	350.73	453.27	364.42	453.24	558.34	453.75	606.82	453.41
800.75	453.65	946.19	454.38	1140.11	454.42	1334.03	454.88	1439.12	456.86
1477.92	457.66	1703.56	458.18	1748.73	458.2	1845.92	457.1	1954.86	456.6
1962.02	456.66	2064.28	457.25	2071.15	457.08	2166.86	452.65	2231.85	445.32
2247.7	443.05	2257.28	441.62	2260.28	441.3	2282.92	439.49	2291.02	438.59
2306.35	435.5	2325.3	432.9	2336.43	432	2376.11	430.43	2394.89	430.01
2439.51	428.79	2471.45	428.16	2501.72	428.16	2549.82	427.71	2555.2	427.61
2601.91	426.16	2652.9	428.52	2670.42	429.29	2719.12	431.57	2721.34	431.72
2758.04	433.2	2788.86	435.4	2793.37	435.96	2818.94	439.94	2821.45	440.34
2839.71	443.18	2841.15	443.36	2855.5	445.28	2861.18	446.07	2874.83	448.1
2925.25	453.99	2937.79	455.1	2956.95	454.95	2985.69	457.12	2985.79	457.13
3016.79	456.75	3064.92	456.95	3101.63	460.64	3133.05	459.7	4009.52	460.03
4023.82	461.43	4052.17	461.59	4064.95	460.3	4883.26	461.34	4910.1	461.87
5432.58	471.47	5611.44	470.29	5728.87	462.58	5981.87	462.62	6734.33	468.6
6751.02	471.15	6757.28	471.15	6801.2	473.63	6806.14	473.62	6819.18	470.06
6830.54	469.47								

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1477.92	.044	2071.15	.019	2166.86	.023	2937.79	.1
4009.52	.058	5728.87	.04	6830.54	.04				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2166.86	2937.79	482	482	.1	.3

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.65

INPUT
Description: RM 229.65
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	501.42	3.742	481.78	19.726	481.43	103.178	501.92	167.191	502.4
300.14	462.25	334.579	454.651372.842		457.271668.195		459.021864.832		455.39
1969.212	456.462067.072		451.332134.226		444.422160.511		440.192187.012		438.19
2230.806	432.192302.727		430.192381.846		427.192462.837		427.192516.666		426.19
2586.864	431.192639.029		435.192708.211		437.192739.026		441.192761.785		444.43
2776.488	446.772796.292		450.072860.807		456.762880.435		456.492909.979		460.88
2941.739	459.9	3958.77	460.543973.414		463.344002.456		463.674015.553		461.08
4881.387	463.145979.398		462.296750.276		473.46767.372		478.486823.841		478.34
6837.205	471.266848.845		470.12						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12067.072		.0232860.807		.1	3958.77	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2067.072	2860.807	258	258	.1	.3

Skew Angle = 10

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.605

INPUT
Description:
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	501.42	3.742	481.78	19.726	481.43	103.178	501.92	167.191	502.4
300.14	462.25	334.579	454.651372.842		457.271668.195		459.021864.832		455.39
1922.542	458.611931.297		455.461969.192		454.362006.831		453.332016.473		453.12
2040.994	451.182060.602		448.942071.522		446.942075.325		446.942093.406		442.94
2107.902	441.942126.614		439.942141.445		438.942162.983		438.942176.208		437.94
2181.172	437.942202.631		430.94 2240.94		426.942254.698		427.942264.142		427.94
2314.761	427.942348.757		426.942372.166		426.942427.983		427.942455.234		427.94
2512.049	425.942554.709		425.942554.769		427.942574.435		427.942612.537		429.94
2627.762	434.942663.531		436.94 2688.24		440.942706.596		446.482722.265		451.49

```
2742.837  454.932806.121  454.872815.979  455.882869.188  458.042891.366  460.34
2900.139  461.422930.473   455.63028.952  456.213127.434  456.013225.915  456.23
3324.396  456.593422.875  457.633521.357  457.853619.838  458.533718.319  458.51
  3816.8  459.02 3915.28  460.234002.357  463.844013.761  464.084026.071  463.91
 4109.78   461.54208.262  461.424306.743  461.694329.194  461.944372.369  462.04
 4395.65  462.134436.393  462.244502.768  462.344881.387  463.145979.398  462.29
6750.276   473.46767.372  478.486823.841  478.346837.205  471.266848.845  470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12016.473    .0232742.837      .14002.357     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      2016.4732742.837               51      51      51             .1       .3
Skew Angle = 10

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.595

INPUT
Description:
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09 111.037  467.54 221.109  458.17 313.888  455.18 410.862  454.52
 505.246  453.51 603.746  453.01 696.771  455.87 882.831  452.91 904.191  452.36
1000.781   452.21093.038  452.221194.601  452.681289.409  452.731389.022  452.61
1484.608  452.04 1551.86  451.791666.344  455.581700.999  454.661741.908   452.8
1751.746   451.91756.611  451.351764.155  449.851776.642  447.921795.866  443.92
1829.979  440.921871.056  437.921891.816  436.921904.313  434.921931.267  430.92
1954.469  431.041964.209  428.261986.367  426.922027.965  426.922088.935  426.92
2170.841  425.922233.672  425.922290.397  424.922328.706  428.772353.503  432.92
2377.513  435.922409.509  440.922435.124  448.152448.015   451.5 2480.75  454.67
2541.198  455.672551.056  456.352604.303  459.012622.799  460.622626.461  460.51
2635.285  461.952668.376  453.252766.857  453.272865.337  453.862963.818  455.08
3062.299  455.36 3160.78  456.19 3259.26  457.533357.741  458.063456.222  459.43
3554.703  460.443653.185  461.293731.968  465.24 3746.74  466.013763.482  465.81
3786.625  461.143806.223  461.473818.631  461.413850.145  461.223949.118  461.06
4047.599  461.48 4146.08  461.324244.562  461.185324.757  462.355922.241  463.65
6273.325  471.956494.513   477.26624.229  479.22 6676.11  467.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .11741.908    .023 2480.75      .13731.968     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      1741.908 2480.75               90     197     320             .1       .3
Skew Angle = 10

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.56

INPUT
Description: RM 229.56
Station Elevation Data    num=      57
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09  112.75  467.54  224.52  458.17  318.73  455.18   417.2  454.52
  513.04  453.51  613.06  453.01  707.52  455.87  896.45  452.91  918.14  452.36
 1016.22   452.2  1109.9  452.22 1213.03  452.68  1309.3  452.73 1410.45  452.61
 1507.51  452.04  1575.8  451.79 1675.65  454.53 1736.61  454.96 1747.18  454.74
 1770.21  448.25 1784.23  446.32 1815.79  439.75 1843.09  437.75 1864.35  433.75
 1875.73  431.75 1922.66  429.75 1960.97  429.75 1999.79  427.75 2049.15  426.75
 2108.41  425.75    2164  426.75 2225.18  425.75 2273.02  427.75 2308.65  432.75
 2341.26  438.75  2375.5  441.75 2402.65  444.75 2425.33  448.08 2476.93  453.82
 2553.29   455.6  2563.9  461.18 2599.08  461.24  2622.9   454.7 2722.44  455.28
  2808.4  473.31 3462.28  470.72 3564.82  467.56 3665.02  468.93 3721.19  463.67
 4517.61  465.58  5406.9  462.35  6013.6  463.65  6370.1  471.95  6594.7   477.2
 6726.42  479.22  6779.1  467.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1747.18    .023 2476.93     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1747.18 2476.93               482     482     482             .1       .3
Ineffective Flow     num=       1
```

```
   Sta L   Sta R    Elev  Permanent
  2808.4  6779.1  473.31       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.445*

INPUT
Description:
Station Elevation Data    num=      93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.57  118.23  464.67  167.25  459.76  235.42  456.96  334.21  455.36
  437.46  454.93  537.96  454.32  642.83  453.96  741.88  455.29   795.2  454.83
  804.76  456.51  939.99  454.74  962.73  454.33 1005.46  454.06 1065.57  453.84
  1163.8  453.59 1196.61  453.56 1271.94  453.47 1372.89  453.15 1387.75  453.09
 1478.95  453.31  1578.9  453.33 1580.72  453.33 1652.33  453.42 1757.03   455.1
 1770.05  455.18 1792.31  455.24 1820.95  455.35 1832.04  455.25 1854.15  448.53
 1855.86  448.12 1870.37  445.66 1871.62   445.4 1891.88  442.57 1903.03  440.89
 1921.48   439.3 1931.27  438.08 1938.45   436.8 1953.27   434.1 1954.93  433.81
 1965.05   432.4 1973.28  431.78 2013.61  429.99  2015.2  429.95 2053.25   429.2
  2065.9  428.64 2093.41  427.64 2111.01  427.28 2144.49   426.6 2158.37  426.34
  2205.8  425.45 2255.18  425.95 2260.55   425.9 2309.53  425.45  2349.8  426.71
 2362.41  427.13 2384.37  428.84  2401.8  430.18 2422.89  432.21 2437.85  434.41
 2454.16   436.1  2469.5   438.7 2475.69  439.63 2487.73  441.55 2500.91  443.71
 2505.71  444.27 2515.75  445.62 2530.78   447.6 2539.55  448.62 2587.81  453.74
 2653.22  455.87 2672.96  456.78 2684.79     460 2700.27  460.56 2710.59  457.59
 2724.02  457.62 2750.58  454.37  2833.3  475.05  2849.3  475.05  2882.9  466.65
 2957.43  466.65 3686.56  465.36  3800.9  463.78 3912.63  464.46 3975.26  461.84
 4863.34  462.79 5854.97  461.17 6531.49  461.83 6929.01  465.98 7179.46   468.6
 7326.34  469.61 7348.82  467.36 7385.08  468.74

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1832.04    .023 2587.81     .04  2849.3    .047 7385.08    .047

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1832.04 2587.81              482     482     482             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  2849.3 7385.08  475.05       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.38

INPUT
Description: RM 229.38
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04     175  455.89  832.03  454.59  842.03  458.09 1052.03  455.82
 1252.03  454.77 1452.03  453.46 1652.03  454.61 1852.03  455.75 1875.33  455.72
 1916.89  455.76 1939.75  448.35  1957.8  444.74 1978.74  443.15 2009.34  440.15
 2026.88  437.15 2043.91  434.15 2062.87  432.15  2106.2  430.15  2158.6  428.15
 2205.22  427.15 2254.17  426.15  2303.2  425.15 2351.06  425.15 2393.88  425.15
 2437.99  426.15 2475.86  427.15 2518.05  428.15  2552.3  432.15  2569.1  436.15
 2589.07  440.15 2603.51  443.15 2619.76  445.15 2645.83  448.28  2698.7  453.66
 2770.85  456.55 2822.76  459.92 2834.15  453.97 2887.76  454.06 2941.28  476.79
 2961.28  476.79 3001.06     460 7951.06     460 7991.06     470

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1916.89    .023  2698.7     .04 2961.28    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1916.89  2698.7             928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2941.28 7991.06  476.79       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.175*

INPUT
Description:
```

```
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   71.48  467.52  154.86  457.88  357.42  456.05  643.36  454.33
  736.27  454.43  745.12  457.37   929.3  456.04  930.95  456.03 1107.94  455.27
 1215.24  454.68 1284.92   454.2 1346.92  454.49  1461.9  454.94 1638.88  455.61
  1659.5  455.56 1696.28  455.54 1719.94  448.59 1726.62   447.3 1738.62  445.01
 1744.69  444.47  1760.3  443.05 1767.44  442.28 1790.65  440.12 1791.97  439.99
 1810.13  437.26 1827.75  434.53 1829.28  434.38 1847.38  432.67 1863.29  431.92
 1892.23  430.51 1906.19  429.92 1946.46  428.43 1960.87   428.1 1994.72  427.51
 2029.12  426.95 2045.38  426.64 2096.13  425.68 2136.02  425.68  2171.7  425.68
 2219.11  426.66 2219.97  426.68 2261.41  427.66 2267.74  427.79 2307.58  428.66
 2313.23  429.18 2345.06  432.32 2348.16  432.91 2363.44  435.76  2377.8  438.03
  2385.3   439.3  2401.1  442.05 2409.02  442.92 2418.88  443.97 2436.15  445.76
 2447.41  446.98 2455.41  447.74 2468.86  449.28 2486.79  451.37 2505.26  453.77
 2551.52  455.22 2579.39  456.11 2632.72  458.89 2644.43  453.93 2699.51  453.97
 2754.49  472.89 2775.04  472.87 2815.91  458.86 2931.68   458.8 3255.51  458.72
 4076.77  458.57 4716.08  458.78 5155.17  458.92  5175.1  459.42 5195.02  458.92
 7901.59     460 7907.39  461.18 7942.68     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1696.28    .023 2505.26    .042 2775.04    .055 5155.17    .062
 7942.68    .062

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1696.28 2505.26            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2775.04 7942.68  472.87       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   62.19   468.3  134.72  459.87  310.94  456.67  559.69  453.87
  640.52  454.27  648.22  456.66  808.44  456.24  809.88  456.23  963.84  455.77
 1057.19  455.39 1117.81  454.94 1171.75  455.12 1271.77  455.26 1425.74  455.48
 1443.68   455.4 1475.67  455.31 1500.13  448.83 1507.04  447.54 1519.45  445.29
 1525.72  444.64 1541.86  442.96 1549.24  442.09 1573.24  439.96  1574.6  439.84
 1593.37  437.37  1611.6  434.91 1613.17  434.77 1631.88  433.19 1648.34   432.4
 1678.25  430.87 1692.69   430.2 1734.33  428.72 1749.22  428.34 1784.21  427.87
 1819.78  427.42  1836.6  427.13 1889.06  426.21 1920.97  426.21 1949.52  426.21
 2001.01  427.19 2001.95  427.21 2046.96  428.16 2053.84   428.3 2097.11  429.17
 2103.25  429.61 2137.82  432.48 2141.18  432.99 2157.78  435.38 2173.37  437.29
 2181.52  438.45 2198.68  440.95 2207.29   441.8    2218  442.78 2236.76  444.47
 2248.99  445.68 2257.67  446.46 2272.29  448.29 2291.76  450.79 2311.83  453.88
 2359.32  454.97 2387.93  455.67 2442.69  457.86  2454.7  453.88 2511.25  453.88
  2567.7  468.98  2588.8  468.96 2630.76  457.72 2749.62   457.6 3082.09  457.44
 3925.26  457.15 4581.63  457.56 5032.43  457.83 5052.89  458.83 5073.34  457.83
 7852.11     460 7858.07  460.94  7894.3     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1475.67    .023 2311.83    .043  2588.8    .055 5032.43     .07
  7894.3     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1475.67 2311.83            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  2588.8  7894.3  468.96       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.825*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   52.89  469.08  114.58  461.87  264.45  457.28  476.02   453.4
  544.76  454.12  551.31  455.94  687.58  456.45   688.8  456.44  819.75  456.27
  899.15  456.09   950.7  455.68  996.57  455.75 1081.65  455.59 1212.59  455.34
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 1227.85  455.23 1255.06  455.09 1280.32  449.08 1287.46  447.78 1300.27  445.56
 1306.75  444.81 1323.41  442.86 1331.04   441.9 1355.82   439.8 1357.23  439.68
 1376.62  437.48 1395.44  435.29 1397.07  435.16 1416.39   433.7 1433.38  432.88
 1464.28  431.22 1479.19  430.48 1522.19     429 1537.57  428.59 1573.71  428.23
 1610.44   427.9 1627.81  427.61 1681.99  426.73 1705.93  426.73 1727.33  426.73
 1782.92  427.73 1783.92  427.74 1832.51  428.67 1839.93   428.8 1886.63  429.67
 1893.26  430.04 1930.57  432.65 1934.21  433.07 1952.13  434.99 1968.95  436.55
 1977.75   437.6 1996.27  439.85 2005.56  440.68 2017.12   441.6 2037.37  443.18
 2050.56  444.38 2059.94  445.17 2075.71   447.3 2096.73  450.22 2118.39  453.99
 2167.12  454.73 2196.47  455.23 2252.65  456.83 2264.98  453.84    2323   453.8
 2380.92  465.08 2402.56  465.04 2445.61  456.58 2567.56   456.4 2908.67  456.15
 3773.75  455.72 4447.17  456.34 4909.69  456.75 4930.67  458.24 4951.66  456.75
 7802.64  459.99 7808.75  460.71 7845.92     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1255.06    .023 2118.39    .045 2402.56    .055 4909.69    .078
 7845.92    .078

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1255.06 2118.39            928.5   928.5   928.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2380.92 7845.92  465.08       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.65*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03   43.59  469.87   94.44  463.86  217.97   457.9  392.35  452.93
  449.01  453.96   454.4  455.23  566.72  456.65  567.73  456.64  675.66  456.77
   741.1   456.8  783.59  456.42   821.4  456.37  891.52  455.92  999.45  455.21
 1012.02  455.07 1034.45  454.86 1060.52  449.32 1067.87  448.02  1081.1  445.84
 1087.78  444.98 1104.97  442.77 1112.84   441.7 1138.41  439.64 1139.86  439.53
 1159.86  437.59 1179.28  435.68 1180.96  435.54  1200.9  434.22 1218.43  433.36
  1250.3  431.58 1265.69  430.76 1310.05  429.28 1325.92  428.83 1363.21   428.6
 1401.11  428.37 1419.02   428.1 1474.93  427.26 1490.88  427.26 1505.15  427.26
 1564.82  428.26  1565.9  428.28 1618.06  429.18 1626.03  429.31 1676.16  430.18
 1683.28  430.46 1723.33  432.81 1727.23  433.15 1746.47  434.61 1764.53  435.81
 1773.97  436.74 1793.86  438.76 1803.83  439.56 1816.24  440.41 1837.97   441.9
 1852.14  443.09 1862.21  443.89 1879.14   446.3  1901.7  449.65 1924.95   454.1
 1974.92  454.48 2005.01  454.79 2062.61   455.8 2075.25  453.79 2134.74  453.71
 2194.13  461.17 2216.32  461.13 2260.46  455.45  2385.5  455.21 2735.24  454.87
 3622.23  454.29 4312.71  455.11 4786.95  455.67 4808.46  457.66 4829.98  455.67
 7753.16  459.99 7759.43  460.47 7797.55     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1034.45    .023 1924.95    .047 2216.32    .055 4786.95    .085
 7797.55    .085

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1034.45 1924.95            928.5   928.5   928.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2194.13 7797.55  461.17       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.475*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03    34.3  470.65    74.3  465.85  171.48  458.51  308.67  452.47
  353.25   453.8  357.49  454.51  445.86  456.85  446.65  456.85  531.57  457.27
  583.05   457.5  616.48  457.16  646.22     457  701.39  456.24   786.3  455.07
   796.2  454.91  813.84  454.64  840.71  449.56  848.29  448.26  861.92  446.11
  868.81  445.15  886.53  442.67  894.64  441.51  920.99  439.48  922.49  439.37
  943.11   437.7  963.12  436.06  964.86  435.93  985.41  434.74 1003.47  433.84
 1036.33  431.94 1052.19  431.04 1097.91  429.56 1114.27  429.08 1152.71  428.96
 1191.77  428.85 1210.23  428.59 1267.86  427.79 1275.84  427.79 1282.97  427.79
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 1346.73  428.79 1347.88  428.81 1403.61  429.68 1412.12  429.81 1465.69  430.69
 1473.29  430.89 1516.09  432.98 1520.26  433.24 1540.81  434.22 1560.11  435.06
  1570.2  435.89 1591.44  437.66  1602.1  438.44 1615.36  439.23 1638.58  440.61
 1653.72  441.79 1664.47   442.6 1682.56  445.31 1706.67  449.07 1731.52  454.21
 1782.71  454.24 1813.55  454.34 1872.58  454.77 1885.53  453.75 1946.49  453.62
 2007.34  457.26 2030.08  457.21 2075.31  454.31 2203.44  454.01 2561.82  453.59
 3470.72  452.87 4178.26  453.89  4664.2  454.58 4686.25  457.07  4708.3  454.58
 7703.69  459.99 7710.11  460.24 7749.17     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  813.84    .023 1731.52    .048 2030.08    .055  4664.2    .093
 7749.17    .093

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        813.84 1731.52           928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2007.34 7749.17  457.26       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.32

INPUT
Description: RM 228.32
Station Elevation Data    num=      39
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03      25  471.43     125  459.13     225     452     325  457.05
     425  458.21  471.05  457.63  593.23  454.41  628.71   448.5  649.84  445.32
  676.44  441.32  703.58  439.32  748.75  436.32  788.52  434.32  838.69  431.32
  902.62  429.32  982.43  429.32 1060.79  428.32 1128.63  429.32 1198.22  430.32
 1263.31  431.32 1313.28  433.32 1355.69  434.32 1400.37  437.32 1439.19  439.32
 1466.74  441.32 1485.99  444.32 1511.64   448.5 1538.08  454.32 1590.51  453.99
 2021.38  452.81  2388.4  452.31 3319.21  451.44  4043.8  452.67 4541.46   453.5
 4564.04  456.49 4586.62   453.5 7660.79     460 7700.79     470

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  593.23    .023 1538.08     .05 4541.46      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        593.23 1538.08               0       0       0             .1       .3
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SUMMARY OF MANNING'S N VALUES

River:Illinois River

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13
Main	230.23	.1	.04	.023	.1	.04	.1	.023	.04	.1				
Main	230.1*	.1	.047	.031	.062	.078	.035	.072	.048	.023	.06	.099	.08	.08
Main	229.97*	.1	.054	.04	.051	.056	.03	.043	.03	.023	.08	.098	.06	.06
Main	229.84	.1	.04	.011	.023	.1	.04							
Main	229.745*	.1	.044	.019	.023	.1	.058	.04	.04					
Main	229.65	.1	.023	.1	.04									
Main	229.605	.1	.023	.1	.04									
Main	229.595	.1	.023	.1	.04									
Main	229.56	.1	.023	.04										
Main	229.445*	.1	.023	.04	.047	.047								
Main	229.38	.1	.023	.04	.055									
Main	229.175*	.1	.023	.042	.055	.062	.062							
Main	229.*	.1	.023	.043	.055	.07	.07							
Main	228.825*	.1	.023	.045	.055	.078	.078							
Main	228.65*	.1	.023	.047	.055	.085	.085							
Main	228.475*	.1	.023	.048	.055	.093	.093							
Main	228.32	.1	.023	.05	.1									

SUMMARY OF REACH LENGTHS

River: Illinois River

Reach	River Sta.	Left	Channel	Right
Main	230.23	699.67	699.67	699.67
Main	230.1*	699.67	699.67	699.67
Main	229.97*	699.67	699.67	699.67
Main	229.84	482	482	482
Main	229.745*	482	482	482
Main	229.65	258	258	258
Main	229.605	51	51	51
Main	229.595	90	197	320
Main	229.56	482	482	482
Main	229.445*	482	482	482
Main	229.38	928.5	928.5	928.5
Main	229.175*	928.5	928.5	928.5
Main	229.*	928.5	928.5	928.5
Main	228.825*	928.5	928.5	928.5
Main	228.65*	928.5	928.5	928.5
Main	228.475*	928.5	928.5	928.5
Main	228.32	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Illinois River

Reach	River Sta.	Contr.	Expan.
Main	230.23	.1	.3
Main	230.1*	.1	.3
Main	229.97*	.1	.3
Main	229.84	.1	.3
Main	229.745*	.1	.3
Main	229.65	.1	.3
Main	229.605	.1	.3
Main	229.595	.1	.3
Main	229.56	.1	.3
Main	229.445*	.1	.3
Main	229.38	.1	.3
Main	229.175*	.1	.3
Main	229.*	.1	.3
Main	228.825*	.1	.3
Main	228.65*	.1	.3
Main	228.475*	.1	.3
Main	228.32	.1	.3

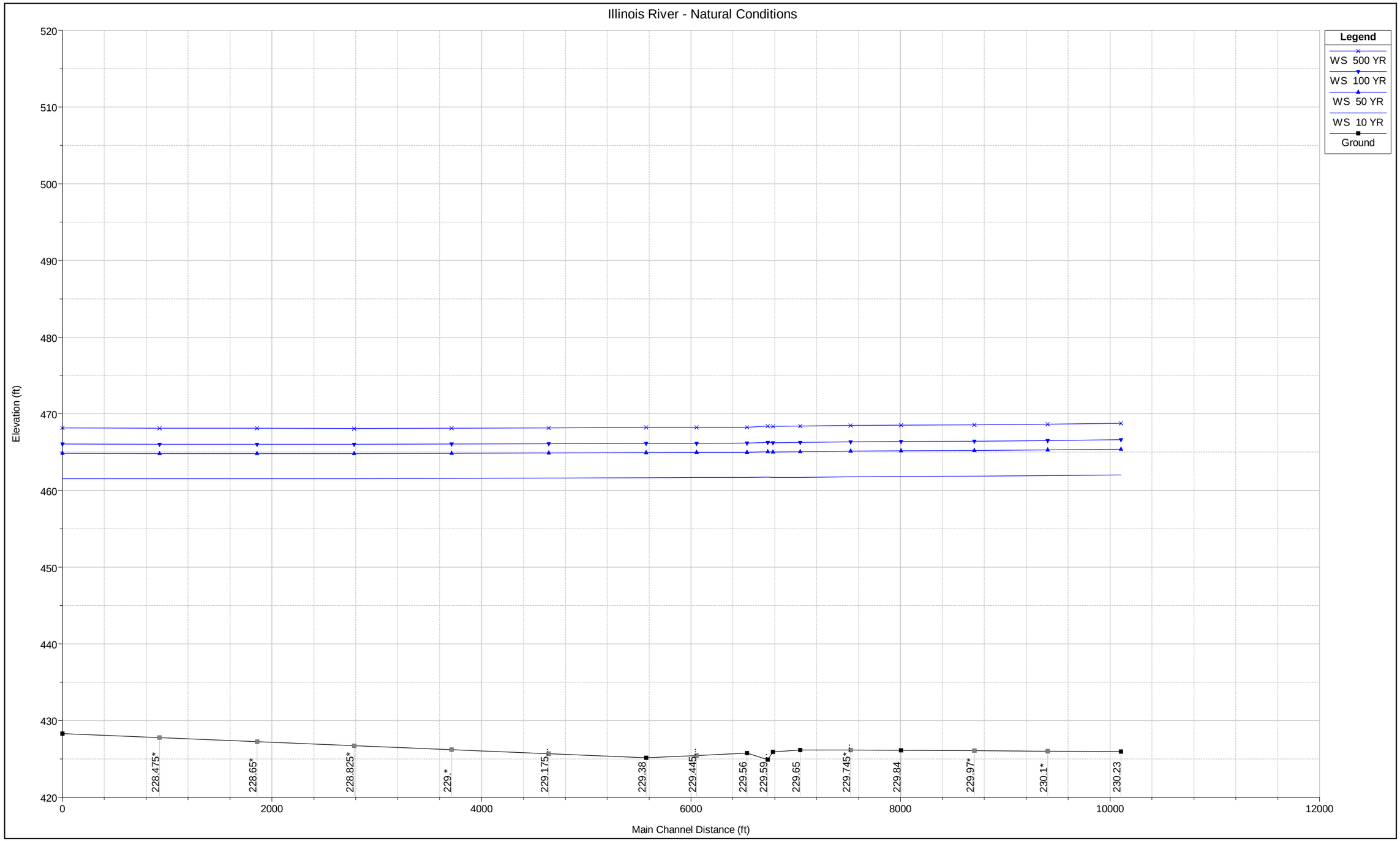
Profile Output Table - Standard Table 1

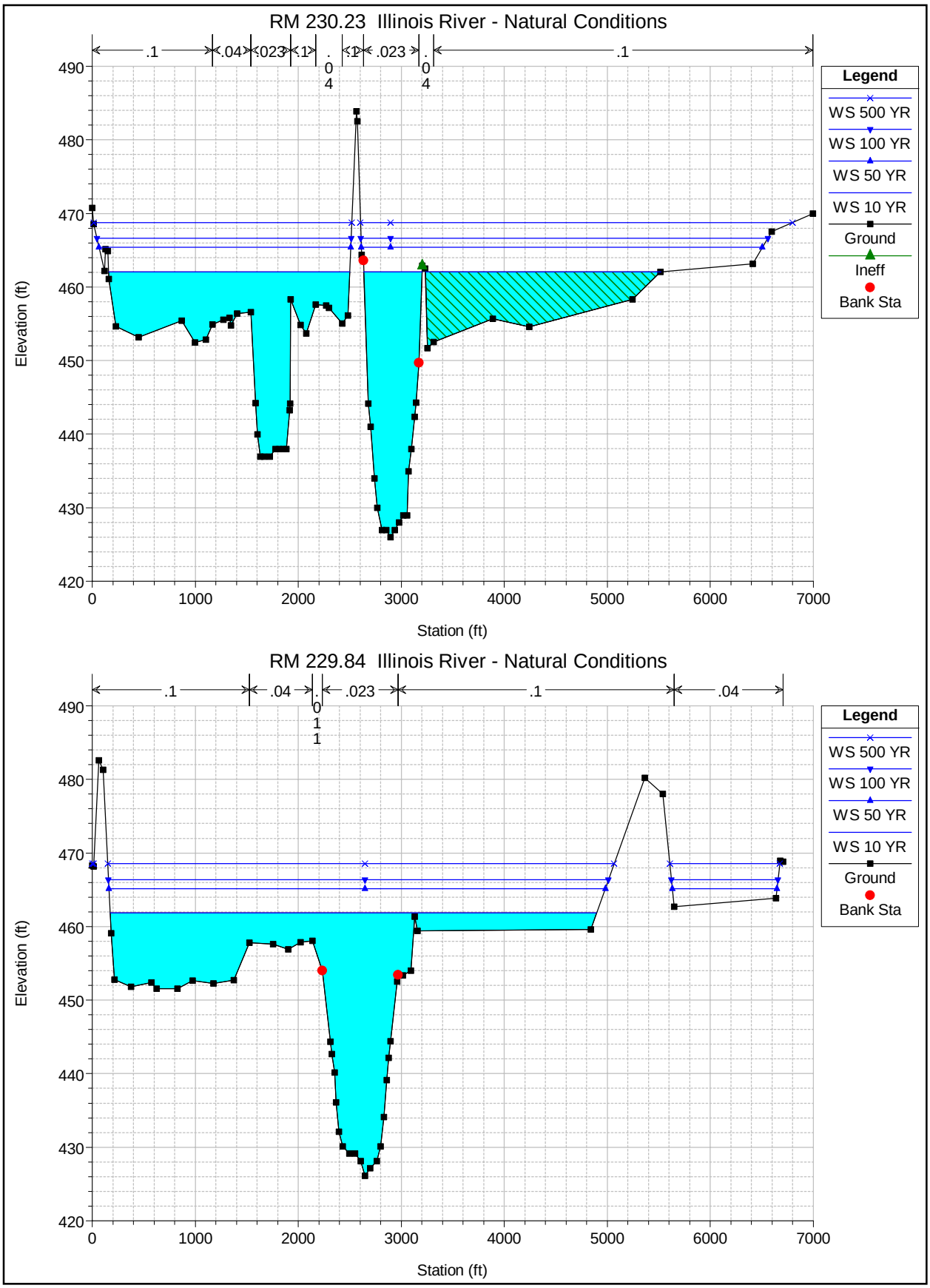
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	230.23	10 YR	94000.00	425.97	462.03	441.93	462.20	0.000044	3.91	37290.86	5192.98	0.13
Main	230.23	50 YR	124000.00	425.97	465.40	443.74	465.55	0.000040	4.02	71436.68	6338.47	0.13
Main	230.23	100 YR	137000.00	425.97	466.62	444.40	466.78	0.000040	4.14	79221.66	6416.76	0.13
Main	230.23	500 YR	163000.00	425.97	468.77	445.63	468.93	0.000042	4.39	93214.77	6699.33	0.13
Main	229.84	10 YR	94000.00	426.13	461.83		462.08	0.000054	4.23	40396.54	4721.16	0.14
Main	229.84	50 YR	124000.00	426.13	465.17		465.43	0.000053	4.54	58262.45	5834.57	0.15
Main	229.84	100 YR	137000.00	426.13	466.39		466.66	0.000053	4.65	65419.07	5889.07	0.15
Main	229.84	500 YR	163000.00	426.13	468.54		468.81	0.000053	4.87	78152.88	5999.03	0.15
Main	229.65	10 YR	94000.00	426.19	461.73		462.02	0.000062	4.42	31712.30	3938.16	0.15
Main	229.65	50 YR	124000.00	426.19	465.05		465.37	0.000063	4.84	49259.57	5879.73	0.16
Main	229.65	100 YR	137000.00	426.19	466.26		466.60	0.000063	4.96	56480.93	5968.35	0.16
Main	229.65	500 YR	163000.00	426.19	468.41		468.75	0.000063	5.19	69439.94	6124.16	0.16
Main	229.605	10 YR	94000.00	425.94	461.71		462.00	0.000058	4.45	34236.00	3854.70	0.15
Main	229.605	50 YR	124000.00	425.94	465.02		465.36	0.000060	4.90	51557.48	5878.17	0.16
Main	229.605	100 YR	137000.00	425.94	466.24		466.58	0.000060	5.04	58767.11	5966.67	0.16
Main	229.605	500 YR	163000.00	425.94	468.38		468.73	0.000061	5.29	71706.08	6122.29	0.16
Main	229.595	10 YR	94000.00	424.92	461.74		461.99	0.000049	4.18	39584.81	4457.25	0.14
Main	229.595	50 YR	124000.00	424.92	465.06		465.34	0.000051	4.59	57556.31	5802.64	0.14
Main	229.595	100 YR	137000.00	424.92	466.27		466.56	0.000052	4.72	64682.20	5907.33	0.15
Main	229.595	500 YR	163000.00	424.92	468.41		468.72	0.000052	4.97	77451.70	6034.32	0.15
Main	229.56	10 YR	94000.00	425.75	461.71		461.98	0.000054	4.32	34206.63	2570.77	0.14
Main	229.56	50 YR	124000.00	425.75	464.99		465.32	0.000060	4.92	42723.01	4577.84	0.16
Main	229.56	100 YR	137000.00	425.75	466.18		466.54	0.000063	5.17	45862.33	5073.09	0.16
Main	229.56	500 YR	163000.00	425.75	468.26		468.69	0.000069	5.66	51409.92	5302.93	0.17
Main	229.38	10 YR	94000.00	425.15	461.68		461.92	0.000045	4.02	34786.75	7741.72	0.13
Main	229.38	50 YR	124000.00	425.15	464.96		465.26	0.000051	4.60	43954.08	7798.74	0.14
Main	229.38	100 YR	137000.00	425.15	466.15		466.48	0.000054	4.84	47314.24	7819.46	0.15
Main	229.38	500 YR	163000.00	425.15	468.23		468.62	0.000060	5.30	53225.90	7855.67	0.16
Main	228.32	10 YR	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	50 YR	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	100 YR	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	500 YR	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10

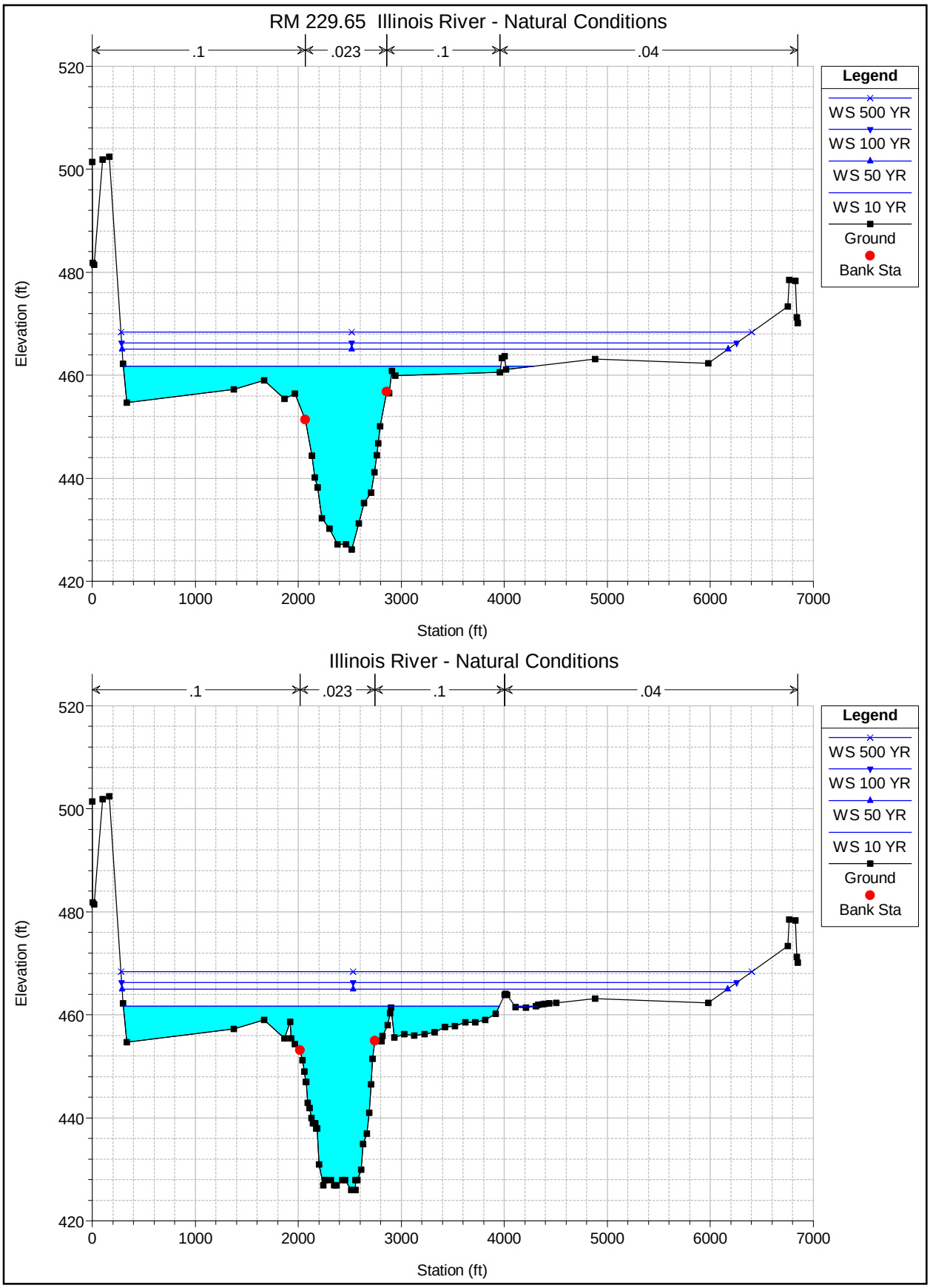
Profile Output Table - Standard Table 2

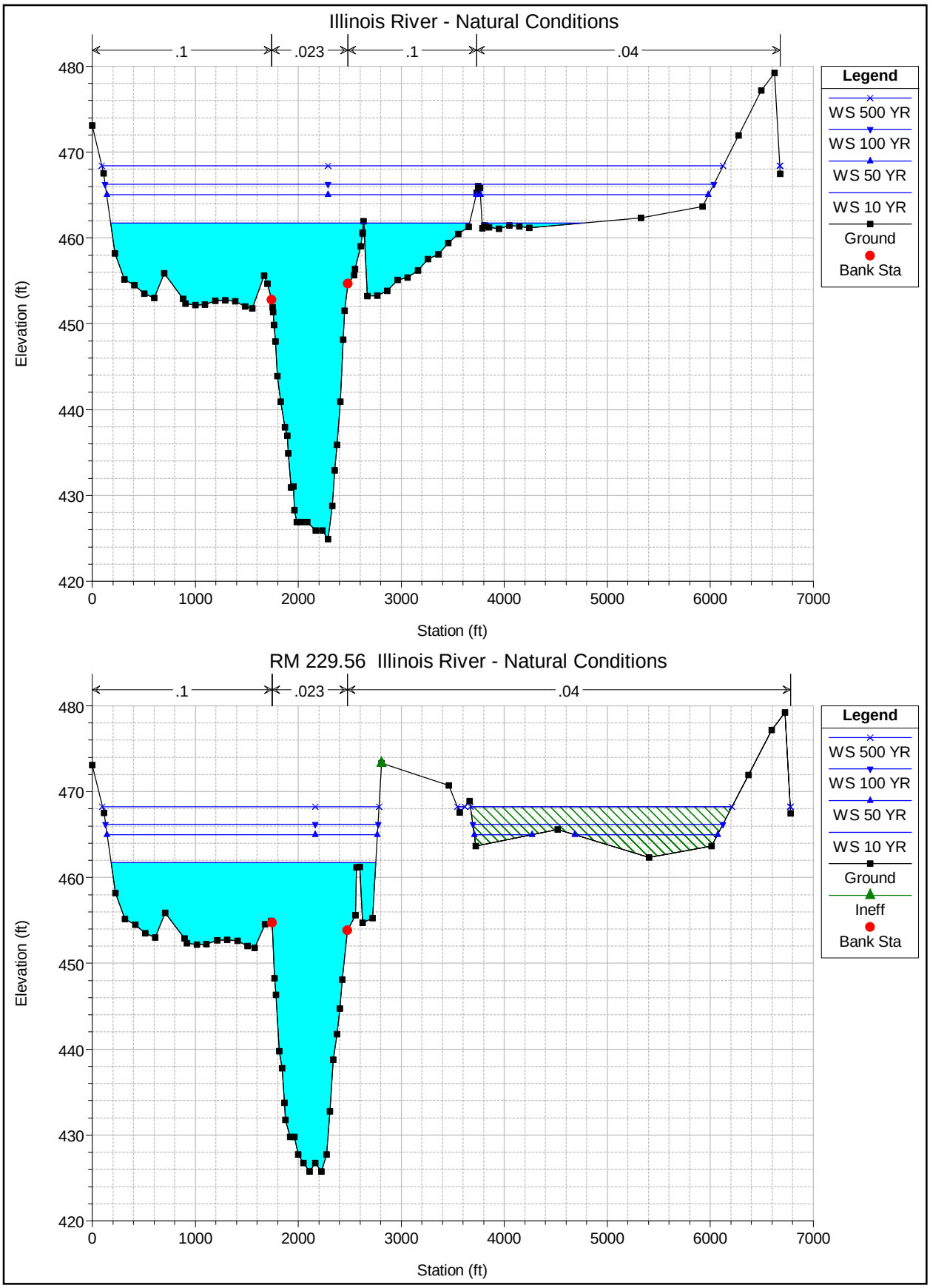
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Main	230.23	10 YR	462.20	462.03	0.16	0.03	0.01	34897.71	58956.52	145.77	5192.98
Main	230.23	50 YR	465.55	465.40	0.15	0.03	0.01	46596.61	67886.30	9517.09	6338.47
Main	230.23	100 YR	466.78	466.62	0.16	0.03	0.01	52192.77	72620.65	12186.58	6416.76
Main	230.23	500 YR	468.93	468.77	0.17	0.03	0.01	63496.91	82134.40	17368.70	6699.33
Main	229.84	10 YR	462.08	461.83	0.25	0.03	0.00	9634.58	83279.66	1085.76	4721.16
Main	229.84	50 YR	465.43	465.17	0.26	0.03	0.00	18580.60	100505.90	4913.48	5834.57
Main	229.84	100 YR	466.66	466.39	0.27	0.03	0.00	22444.02	107155.80	7400.15	5889.07
Main	229.84	500 YR	468.81	468.54	0.27	0.03	0.00	30099.24	119911.10	12989.70	5999.03
Main	229.65	10 YR	462.02	461.73	0.29	0.02	0.00	3365.02	90338.36	296.62	3938.16
Main	229.65	50 YR	465.37	465.05	0.33	0.02	0.00	7582.10	111600.60	4817.35	5879.73
Main	229.65	100 YR	466.60	466.26	0.33	0.02	0.00	9419.18	119233.50	8347.36	5968.35
Main	229.65	500 YR	468.75	468.41	0.34	0.02	0.00	13047.00	133449.70	16503.32	6124.16
Main	229.605	10 YR	462.00	461.71	0.29	0.00	0.01	3047.36	89433.09	1519.55	3854.70
Main	229.605	50 YR	465.36	465.02	0.33	0.00	0.02	7031.10	110316.30	6652.63	5878.17
Main	229.605	100 YR	466.58	466.24	0.34	0.00	0.02	8789.97	117828.00	10382.06	5966.67
Main	229.605	500 YR	468.73	468.38	0.35	0.00	0.01	12287.25	131802.10	18910.66	6122.29
Main	229.595	10 YR	461.99	461.74	0.25	0.01	0.00	5245.88	86926.37	1827.75	4457.25
Main	229.595	50 YR	465.34	465.06	0.28	0.01	0.01	9424.55	106765.70	7809.77	5802.64
Main	229.595	100 YR	466.56	466.27	0.29	0.01	0.01	11189.65	114153.10	11657.20	5907.33
Main	229.595	500 YR	468.72	468.41	0.30	0.01	0.01	14607.52	128002.60	20389.90	6034.32
Main	229.56	10 YR	461.98	461.71	0.27	0.02	0.00	5481.55	87342.38	1176.06	2570.77
Main	229.56	50 YR	465.32	464.99	0.34	0.03	0.00	10138.21	111119.10	2742.67	4577.84
Main	229.56	100 YR	466.54	466.18	0.37	0.03	0.00	12255.18	121254.00	3490.77	5073.09
Main	229.56	500 YR	468.69	468.26	0.43	0.03	0.00	16573.59	141356.10	5070.29	5302.93

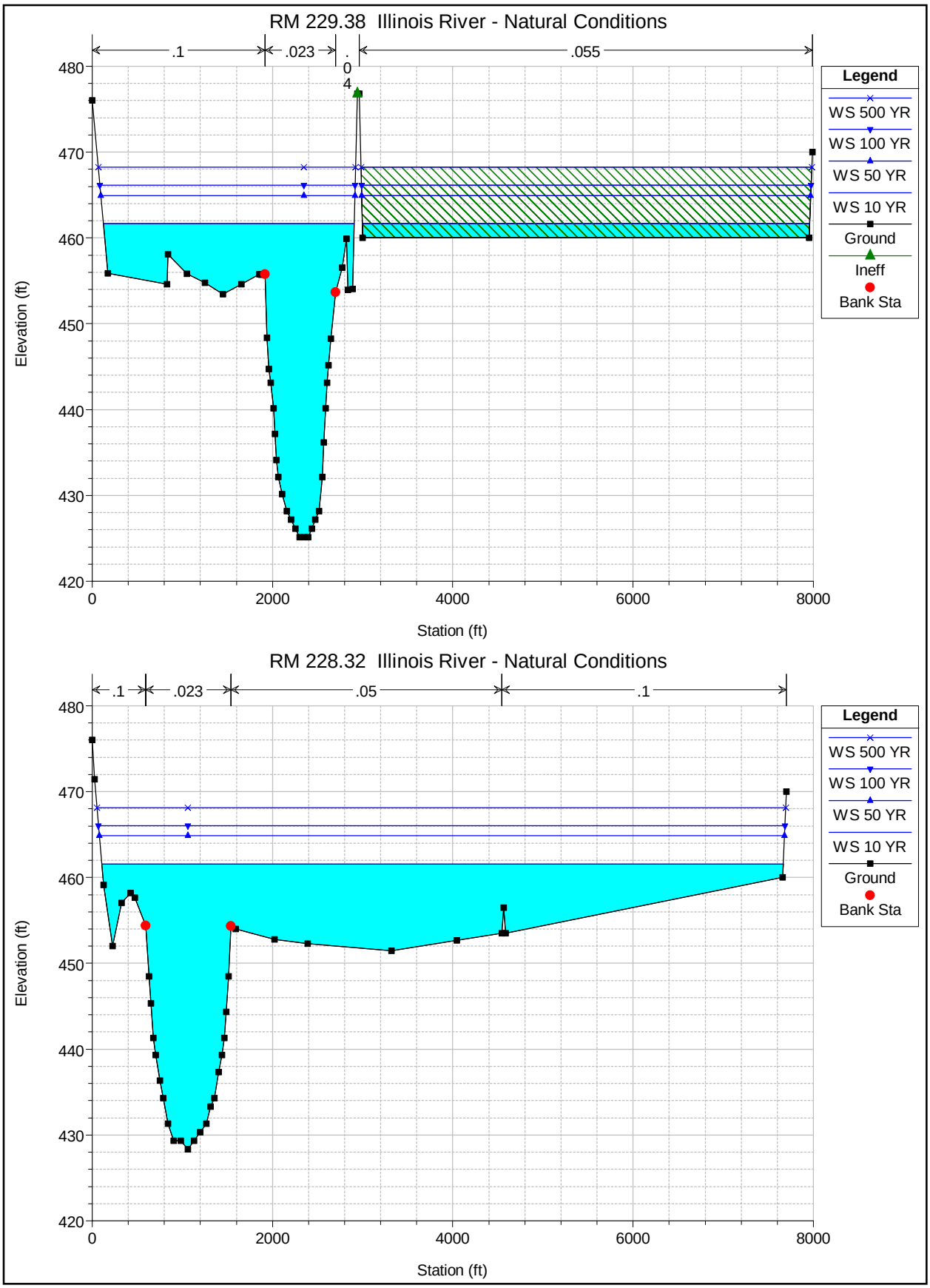
Main	229.38	10 YR	461.92	461.68	0.24	0.04	0.00	3923.10	89137.62	939.28	7741.72
Main	229.38	50 YR	465.26	464.96	0.30	0.05	0.00	8266.78	113644.90	2088.36	7798.74
Main	229.38	100 YR	466.48	466.15	0.33	0.05	0.00	10292.29	124076.60	2631.07	7819.46
Main	229.38	500 YR	468.62	468.23	0.39	0.06	0.00	14508.66	144722.50	3768.86	7855.67
Main	228.32	10 YR	461.65	461.55	0.10			575.87	72490.02	20934.11	7561.67
Main	228.32	50 YR	464.95	464.85	0.10			1248.00	86206.04	36545.96	7601.69
Main	228.32	100 YR	466.15	466.05	0.10			1552.00	92104.02	43343.99	7616.25
Main	228.32	500 YR	468.26	468.15	0.11			2173.37	103867.30	56959.29	7641.72


Illinois River - Natural Conditions
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Elevation (ft)
520
510
500
490
480
470
460
450
440
430
420
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)
228.475*
228.65*
228.825*
229.*
229.175*
229.38
229.445*
229.56
229.59*
229.65
229.745*
229.84
229.97*
230.1*
230.23


RM 230.23 Illinois River - Natural Conditions
.1
.04
.023
.1
.04
.023
.04
.1
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RM 229.84 Illinois River - Natural Conditions
.1
.04
.023
.01
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


RM 229.65 Illinois River - Natural Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000
Illinois River - Natural Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Illinois River - Natural Conditions
.1
.023
.1
.04
Elevation (ft)
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta
RM 229.56 Illinois River - Natural Conditions
.1
.023
.04
Elevation (ft)
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta


RM 229.38 Illinois River - Natural Conditions
.1
.023
.04
.055
Elevation (ft)
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
RM 228.32 Illinois River - Natural Conditions
.1
.023
.05
.1
Elevation (ft)
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta

10B – EXISTING CONDITIONS MODEL - INPUT AND OUTPUT

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: IL 178 over Illinois River
Project File : IL178.prj
Run Date and Time: 3/8/2013 4:16:33 AM

Project in English units

PLAN DATA

Plan Title: Existing
Plan File : t:\16870\Civil\Drainage\HEC-RAS\IL178.p01

Geometry Title: Existing
Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g01

Flow Title : Upper Mississippi Flow Frequency Study
Flow File : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Plan Summary Information:
Number of: Cross Sections = 17 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

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

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

FLOW DATA

Flow Title: Upper Mississippi Flow Frequency Study
Flow File : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Flow Data (cfs)

River	Reach	RS	10 YR	50 YR	100 YR	500 YR
Illinois River	Main	230.23	94000	124000	137000	163000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Illinois River	Main	10 YR		Known WS = 461.55
Illinois River	Main	50 YR		Known WS = 464.85
Illinois River	Main	100 YR		Known WS = 466.05
Illinois River	Main	500 YR		Known WS = 468.15

GEOMETRY DATA

Geometry Title: Existing
Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g01

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.23

INPUT
Description: RM 230.23
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.77	14	468.57	118	462.16	127	465.12	150	464.87
163	461.09	230	454.67	450	453.17	869.03	455.45	998.81	452.47
1102.68	452.87	1168.76	454.91	1272.53	455.55	1332.78	455.83	1347.47	454.79
1408.21	456.38	1541.34	456.59	1587.82	444.23	1604.71	439.95	1631.78	436.93
1668.56	436.95	1721.57	436.95	1776.82	437.95	1816.75	437.95	1854.08	437.95
1886.71	437.95	1918.74	443.26	1919.49	444.12	1927.27	458.29	2021.02	454.83
2079.35	453.65	2170.01	457.64	2272.73	457.46	2299.39	457.14	2428.21	455.03
2481.5	456.1	2564.54	483.91	2571.61	482.55	2613.4	464.39	2631.42	463.58
2680.84	444.14	2701.72	440.97	2738.62	433.97	2766.24	429.97	2811.18	426.97
2854.47	426.97	2893.4	425.97	2938.49	426.97	2980.12	427.97	3019.64	428.97
3055.98	428.97	3071.79	434.97	3098.6	437.97	3132.19	442.32	3142.78	444.25
3172.37	449.66	3204.51	462.92	3233.1	462.52	3251.89	451.67	3312.76	452.53
3888.16	455.66	4242.45	454.61	5245.2	458.34	5517.26	462.03	6409.74	463.15
6596.88	467.54	6996.88	470						

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1168.76	.04	1541.34	.023	1927.27	.1	2170.01	.04
2428.21	.1	2631.42	.023	3172.37	.04	3312.76	.1		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2631.42 3172.37 699.67 699.67 699.67 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
6728.65	6996.88	465.18	T
3204.51	6728.65	462.92	F

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.1*

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	13.3	468.44	14.54	468.39	70.45	470.77	112.07	468.61
119.66	470.3	120.62	470.44	142.46	468.37	154.81	464.77	204.65	457.07
218.44	455.4	243.8	453.91	420.31	452.75	427.39	452.72	643.98	453.73
699.89	453.67	825.37	454.15	923.56	452.57	948.62	452.22	1047.28	452.71
1091.31	453.76	1110.04	454.16	1208.59	454.52	1265.81	454.68	1279.77	453.97
1314.97	454.6	1337.45	455.03	1463.89	455.26	1508.04	447.05	1524.08	444.2
1538.64	443.07	1549.79	442.31	1584.72	442.68	1635.07	443.2	1687.54	444.4
1704.6	444.58	1725.47	444.57	1760.92	444.56	1791.91	444.55	1822.33	448.08
1823.04	448.66	1830.43	458.1	1919.47	455.77	1964.84	455.11	1974.87	454.95
2060.98	457.49	2129.04	457.31	2158.54	457.34	2183.86	457.19	2262.95	456.47
2306.2	456	2356.82	456.73	2388.81	464.27	2435.68	474.71	2442.4	473.72
2482.09	461.13	2499.2	460.38	2557.27	444.4	2558.15	444.15	2566.31	442.95
2583.06	440.89	2588.39	440.13	2599.4	437.62	2621.01	434	2627.08	433.21
2649.51	430.87	2660.03	429.95	2695.05	428.38	2713.63	427.69	2739.74	427.69
2765.27	427.47	2778.16	427.17	2811.71	426.02	2856.25	426.98	2859.14	427.04
2902.92	427.96	2914.1	428.2	2944.49	429.29	2948.1	429.36	2978.97	430.69
2982.71	430.94	2999.34	436.07	3003.49	436.65	3019.45	438.78	3027.54	439.68
3038.2	440.99	3062.87	444.21	3074.01	446.04	3094.17	449.35	3105.13	450.92
3137.02	459.74	3151.83	459.6	3165.39	459.51	3184.04	452.32	3229.06	452.86
3244.44	454.06	3264.86	455.54	3295.48	455.02	3815.39	456.93	4166.95	456.25
5001.74	458.36	5161.96	460.82	5431.92	466.74	5537.26	468.18	5711.62	467.59
5826.11	462.58	6317.51	463.18	6503.2	466.18	6828.7	467.65	6871.51	469.52
6900.12	469.61								

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1110.04	.047	1463.89	.031	1704.6	.062	1830.43	.078
2060.98	.035	2306.2	.072	2388.81	.048	2499.2	.023	3105.13	.06
3244.44	.099	5826.11	.08	6900.12	.08				

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        2499.2 3105.13           699.67  699.67  699.67             .1      .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 5947.29 6900.12  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.97*

INPUT
Description:
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.11   12.59  468.32   13.77  468.28   66.73  476.68  106.14  475.07
  113.33  475.82  114.24  475.76  134.93  471.87  146.62  468.45  193.83  458.09
  206.89  456.13   230.9  453.33  398.08  452.27  404.78  452.27  609.91  453.04
  662.87  452.62   781.7  452.86   874.7  452.07  898.44  451.97  991.87  452.55
 1033.57  453.22 1051.31   453.4 1144.65   453.5 1198.85  453.52 1212.06  453.16
 1245.41  453.44  1266.7  453.68 1386.45  453.92 1428.26  449.86 1443.45  448.46
 1457.24  447.91  1467.8   447.7 1500.89  448.42 1548.57  449.45 1598.27  450.85
 1614.42   451.2 1634.18  451.19 1667.76  451.17 1697.11  451.15 1725.92   452.9
  1726.6  453.19  1733.6  457.91 1817.93   456.7  1860.9  456.35 1870.39  456.25
 1951.94  457.34  2016.4   457.1 2044.34  457.22 2068.32  457.24 2143.23  457.17
  2184.2  456.96 2232.13  457.37 2262.44  461.16 2306.83  465.52 2313.19   464.9
 2350.78  457.87 2366.99  457.18 2434.44  444.36 2435.47  444.15 2444.94   442.8
  2464.4  440.82 2470.59  440.13 2483.39  436.88 2508.48  433.07 2515.54  432.46
 2541.59   430.5 2553.81  429.92  2594.5  428.76 2616.09  428.41 2646.42  428.41
 2676.07  427.97 2691.04  427.65 2730.02  426.08 2776.76  427.06 2779.78  427.11
 2825.72  427.95 2837.46  428.17 2869.34   429.6 2873.12  429.74 2905.51  432.41
 2909.44  432.92 2926.89  437.18 2931.25  437.89 2947.99  440.46 2956.48   441.4
 2967.67  442.69 2993.55   446.1 3005.23  447.83 3026.39  450.95 3037.89  452.18
 3069.53  456.57 3084.22  456.48 3097.68  456.49 3116.18  452.97 3160.85  453.42
 3176.11   455.6 3196.37  458.43 3226.76  457.22 3742.63  458.21 4091.45  457.88
 4919.74  458.98 5078.72  463.29 5346.58  471.45  5451.1   474.2 5624.11  472.79
  5737.7  462.62 6225.28  463.21 6409.53  464.82 6732.49  465.74 6774.97  469.21
 6803.35  469.22

Manning's n Values        num=      13
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1051.31    .054 1386.45     .04 1614.42    .051  1733.6    .056
 1951.94     .03  2184.2    .043 2262.44     .03 2366.99    .023 3037.89     .08
 3176.11    .098  5737.7     .06 6803.35     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2366.99 3037.89           699.67  699.67  699.67             .1      .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  294.11  476.16       F
 5165.93 6803.35  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.84

INPUT
Description: RM 229.84
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.28      13  468.18      63  482.59     107  481.33     183   459.1
     218  452.75  375.84   451.8  575.84  452.36  625.84  451.56  825.84  451.56
  975.84  452.68 1175.84  452.28 1375.84  452.74 1524.24  457.83 1756.95   457.6
 1903.77  456.89 2023.51  457.86 2136.06  458.05 2234.77  453.98 2311.61  444.32
 2323.57  442.65 2352.79  440.13 2367.37  436.13 2395.96  432.13 2433.68  430.13
 2493.95  429.13 2553.09  429.13 2603.93  428.13 2648.33  426.13 2697.26  427.13
 2760.81  428.13 2798.15  430.13 2832.06  434.13    2859  439.13 2876.53  442.13
 2897.13   444.4 2958.61  452.55 2970.65  453.44 3016.62  453.37 3092.65  453.97
 3127.89  461.33 3158.04  459.43 4837.75   459.6 5364.94  480.22 5536.59  477.99
 5649.29  462.67 6636.28  463.83 6678.43  468.91 6706.59  468.83

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1524.24     .04 2136.06    .011 2234.77    .023 2970.65      .1
 5649.29     .04

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

```
       2234.77 2970.65              482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  912.09  476.16       F
 4384.57 6706.59  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.745*

INPUT
Description:
Station Elevation Data    num=      86
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  484.85    3.92  475.01    12.6  474.89   20.68     476   61.09  486.74
  103.75  491.11  108.16  490.96  175.26  481.08  177.44  480.44  211.38  472.37
  314.63  457.18  350.73  453.27  364.42  453.24  558.34  453.75  606.82  453.41
  800.75  453.65  946.19  454.38 1140.11  454.42 1334.03  454.88 1439.12  456.86
 1477.92  457.66 1703.56  458.18 1748.73   458.2 1845.92   457.1 1954.86   456.6
 1962.02  456.66 2064.28  457.25 2071.15  457.08 2166.86  452.65 2231.85  445.32
  2247.7  443.05 2257.28  441.62 2260.28   441.3 2282.92  439.49 2291.02  438.59
 2306.35   435.5  2325.3   432.9 2336.43     432 2376.11  430.43 2394.89  430.01
 2439.51  428.79 2471.45  428.16 2501.72  428.16 2549.82  427.71  2555.2  427.61
 2601.91  426.16  2652.9  428.52 2670.42  429.29 2719.12  431.57 2721.34  431.72
 2758.04   433.2 2788.86   435.4 2793.37  435.96 2818.94  439.94 2821.45  440.34
 2839.71  443.18 2841.15  443.36  2855.5  445.28 2861.18  446.07 2874.83   448.1
 2925.25  453.99 2937.79   455.1 2956.95  454.95 2985.69  457.12 2985.79  457.13
 3016.79  456.75 3064.92  456.95 3101.63  460.64 3133.05   459.7 4009.52  460.03
 4023.82  461.43 4052.17  461.59 4064.95   460.3 4883.26  461.34  4910.1  461.87
 5432.58  471.47 5611.44  470.29 5728.87  462.58 5981.87  462.62 6734.33   468.6
 6751.02  471.15 6757.28  471.15  6801.2  473.63 6806.14  473.62 6819.18  470.06
 6830.54  469.47

Manning's n Values        num=       8
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1477.92    .044 2071.15    .019 2166.86    .023 2937.79      .1
 4009.52    .058 5728.87     .04 6830.54     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2166.86 2937.79              482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1295.58  476.16       F
 3804.06 6830.54  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.65

INPUT
Description: RM 229.65
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  501.42   3.742  481.78  19.726  481.43 103.178  501.92 167.191   502.4
  300.14  462.25 334.579 454.651372.842  457.271668.195  459.021864.832  455.39
1969.212  456.462067.072 451.332134.226  444.422160.511  440.192187.012  438.19
2230.806  432.192302.727 430.192381.846  427.192462.837  427.192516.666  426.19
2586.864  431.192639.029 435.192708.211  437.192739.026  441.192761.785  444.43
2776.488  446.772796.292 450.072860.807  456.762880.435  456.492909.979  460.88
2941.739   459.9 3958.77 460.543973.414  463.344002.456  463.674015.553  461.08
4881.387  463.145979.398 462.296750.276   473.46767.372  478.486823.841  478.34
6837.205  471.266848.845 470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12067.072    .0232860.807      .1 3958.77     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      2067.0722860.807              258     258     258             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  1690.6  476.16       F
 3235.086848.845  465.18       T
Skew Angle = 10

CROSS SECTION
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```
RIVER: Illinois River
REACH: Main               RS: 229.605

INPUT
Description: Upstream Face of IL 178 Bridge
Station Elevation Data    num=      80
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  501.42   3.742  481.78  19.726  481.43 103.178  501.92 167.191   502.4
  300.14  462.25 334.579  454.651372.842  457.271668.195  459.021864.832  455.39
1922.542  458.611931.297  455.461969.192  454.362006.831  453.332016.473  453.12
2040.994  451.182060.602  448.942071.522  446.942075.325  446.942093.406  442.94
2107.902  441.942126.614  439.942141.445  438.942162.983  438.942176.208  437.94
2181.172  437.942202.631  430.94 2240.94  426.942254.698  427.942264.142  427.94
2314.761  427.942348.757  426.942372.166  426.942427.982  427.942455.234  427.94
 2512.05  425.942554.709  425.942554.769  427.942574.435  427.942612.537  429.94
2627.762  434.942663.531  436.94 2688.24  440.942706.596  446.482722.265  451.49
2742.837  454.932806.121  454.872815.979  455.882869.188  458.042891.366  460.34
2900.138  461.422930.473   455.6 3028.95  456.213127.434  456.013225.915  456.23
3324.396  456.593422.875  457.633521.357  457.853619.838  458.533718.319  458.51
  3816.8  459.02 3915.28  460.234002.357  463.844013.761  464.084026.071  463.91
 4109.78   461.54208.264  461.424306.745  461.694329.194  461.944372.369  462.04
 4395.65  462.134436.395  462.244502.768  462.344881.387  463.145979.398  462.29
6750.276   473.46767.372  478.486823.841  478.346837.205  471.266848.845  470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12016.473    .0232742.837      .14002.357     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      2016.4732742.837               51      51      51             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1896.77  476.16       F
 2925.246848.845  465.18       T
Skew Angle = 10

BRIDGE


RIVER: Illinois River
REACH: Main               RS: 229.60

INPUT
Description:
Distance from Upstream XS =       8
Deck/Roadway Width        =  36.125
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =      10
Bridge Pier Skew          =      10
Upstream  Deck/Roadway Coordinates
    num=      96
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -59.088  527.16         -21.863  524.44          27.378  521.49
  76.618  518.54         125.858  515.56         224.339  509.61
  273.58  506.55          322.82   503.7          372.06   500.7
 421.301  497.82         470.541   494.8         519.781  492.03
 569.022  489.23         618.262  487.02         667.503   484.8
 716.743  483.01         765.982  481.23         815.224   479.9
 864.464  478.55         913.705  477.79         962.945  477.02
1012.185  476.59        1061.426  476.16        1110.666  476.59
1159.907  477.01        1209.147  477.73        1258.387  478.45
1307.628  479.67        1356.868  480.88        1406.109   482.7
1455.349  484.51        1504.589  486.51         1553.83  488.51
 1603.07  490.64         1652.31  492.75        1701.551  494.76
1750.791  496.77        1800.032  498.62        1843.757   500.3     420
1843.757   500.3   496.51849.272   500.5   496.71947.753  503.83  500.03
2046.234  506.53  502.732144.714  508.64  504.842243.195     510   506.2
2341.676  510.72  506.922440.157  510.86  507.062538.637   510.4   506.6
2637.118  509.21  505.412735.599  507.39  503.59 2834.08  505.01  501.21
2932.562   501.9   498.1 2980.23  500.19   496.4 2980.23  500.19     420
3031.041   498.2        3080.282  496.19        3129.522  494.16
3178.762  492.14        3228.003  490.13        3277.243  488.15
3326.484  486.16        3375.724  484.15        3424.964  482.13
3474.205  480.16        3523.445  478.18        3572.688  476.24
3621.926  474.31        3671.166  472.48        3720.407  470.65
3769.647  469.26        3818.887  467.88        3868.128  466.91
3917.368  466.15        3966.609  465.59        4015.849  465.46
4065.089   465.2         4114.33  465.37         4163.57  465.37
4212.811  465.33        4262.051  465.27        4311.291  465.33
 4360.53   465.4        4409.772  465.38        4459.012   465.4
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 4508.25  465.37        4600.234   465.2        4614.612   465.2
4948.462  465.32        5221.746  465.29         5296.69  465.18
6171.688  465.22        6296.664   466.5        6334.086  467.03
6383.327  467.98        6432.567  468.94        6728.007  473.63

Upstream Bridge Cross Section Data
Station Elevation Data    num=      80
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  501.42   3.742  481.78  19.726  481.43 103.178  501.92 167.191   502.4
  300.14  462.25 334.579  454.651372.842  457.271668.195  459.021864.832  455.39
1922.542  458.611931.297  455.461969.192  454.362006.831  453.332016.473  453.12
2040.994  451.182060.602  448.942071.522  446.942075.325  446.942093.406  442.94
2107.902  441.942126.614  439.942141.445  438.942162.983  438.942176.208  437.94
2181.172  437.942202.631  430.94 2240.94  426.942254.698  427.942264.142  427.94
2314.761  427.942348.757  426.942372.166  426.942427.982  427.942455.234  427.94
 2512.05  425.942554.709  425.942554.769  427.942574.435  427.942612.537  429.94
2627.762  434.942663.531  436.94 2688.24  440.942706.596  446.482722.265  451.49
2742.837  454.932806.121  454.872815.979  455.882869.188  458.042891.366  460.34
2900.138  461.422930.473   455.6 3028.95  456.213127.434  456.013225.915  456.23
3324.396  456.593422.875  457.633521.357  457.853619.838  458.533718.319  458.51
  3816.8  459.02 3915.28  460.234002.357  463.844013.761  464.084026.071  463.91
 4109.78   461.54208.264  461.424306.745  461.694329.194  461.944372.369  462.04
 4395.65  462.134436.395  462.244502.768  462.344881.387  463.145979.398  462.29
6750.276   473.46767.372  478.486823.841  478.346837.205  471.266848.845  470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12016.473    .0232742.837      .14002.357     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
      2016.4732742.837             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1896.77  476.16       F
 2925.246848.845  465.18       T
Skew Angle = 10

Downstream  Deck/Roadway Coordinates
    num=      91
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  507.26           49.24   503.7          98.481   500.7
 147.721  497.82         196.962   494.8         246.202  492.03
 295.442  489.23         344.683  487.02         393.923   484.8
 443.163  483.01         492.404  481.23         541.644   479.9
 590.885  478.55         640.125  477.79         689.365  477.02
 738.606  476.59         787.846  476.16         837.087  476.59
 886.327  477.01         935.567  477.73         984.808  478.45
1034.048  479.67        1083.288  480.88        1132.529   482.7
1181.769  484.51         1231.01  486.51         1280.25  488.51
 1329.49  490.64        1378.731  492.75        1427.971  494.76
1477.212  496.77        1526.452  498.62        1570.177   500.3     420
1570.177   500.3   496.51575.692   500.5   496.71674.173  503.83  500.03
1772.654  506.53  502.731871.135  508.64  504.841969.615     510   506.2
2068.096  510.72  506.922166.577  510.86  507.062265.058   510.4   506.6
2363.539  509.21  505.412462.019  507.39  503.59  2560.5  505.01  501.21
2658.981   501.9   498.1 2706.65  500.19   496.4 2706.65  500.19     420
2757.462   498.2        2806.702  496.19        2855.942  494.16
2905.183  492.14        2954.423  490.13        3003.664  488.15
3052.904  486.16        3102.144  484.15        3151.385  482.13
3200.625  480.16        3249.865  478.18        3299.106  476.24
3348.346  474.31        3397.587  472.48        3446.827  470.65
3496.067  469.26        3545.308  467.88        3594.548  466.91
3643.789  466.15        3693.029  465.59        3742.269  465.46
 3791.51   465.2         3840.75  465.37         3889.99  465.37
3939.231  465.33        3988.471  465.27        4037.712  465.33
4086.952   465.4        4136.192  465.38        4185.433   465.4
4234.673  465.37        4326.652   465.2        4341.033   465.2
4674.882   465.3        4948.167  465.29         5023.11  465.18
 5898.11  465.22        6023.084   466.5        6060.507  467.03
6109.747  467.98        6158.987  468.94        6208.228  470.22
6257.468   471.8

Downstream Bridge Cross Section Data
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09 111.037  467.54 221.109  458.17 313.888  455.18 410.862  454.52
 505.246  453.51 603.746  453.01 696.771  455.87 882.831  452.91 904.191  452.36
1000.781   452.21093.038  452.221194.601  452.681289.409  452.731389.022  452.61
1484.608  452.04 1551.86  451.791666.344  455.581700.999  454.661741.908   452.8
1751.746   451.91756.611  451.351764.155  449.851776.642  447.921795.866  443.92
1829.979  440.921871.056  437.921891.816  436.921904.313  434.921931.267  430.92
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1954.469  431.041964.209  428.261986.367  426.922027.965  426.922088.935  426.92
2170.841  425.922233.672  425.922290.397  424.922328.706  428.772353.503  432.92
2377.513  435.922409.509  440.922435.124  448.152448.015   451.5 2480.75  454.67
2541.198  455.672551.056  456.352604.303  459.012622.799  460.622626.461  460.51
2635.284  461.952668.376  453.252766.857  453.272865.337  453.862963.818  455.08
3062.299  455.36 3160.78  456.19 3259.26  457.533357.741  458.063456.222  459.43
3554.703  460.443653.186  461.293731.968  465.24 3746.74  466.013763.482  465.81
3786.625  461.143806.223  461.473818.631  461.413850.145  461.223949.118  461.06
4047.599  461.48 4146.08  461.324244.562  461.185324.757  462.355922.243  463.65
6273.327  471.956494.515   477.26624.229  479.22 6676.11  467.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .11741.908    .023 2480.75      .13731.968     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
      1741.908 2480.75            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1619.88  476.16       F
 2654.97 6676.11  465.18       T
Skew Angle = 10

Upstream Embankment side slope             =       2 horiz. to 1.0 vertical
Downstream Embankment side slope           =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  465.18
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream     num=       2
     Sta    Elev     Sta    Elev
 1843.76   496.5 1956.76     440
Downstream     num=       2
     Sta    Elev     Sta    Elev
1570.177   496.51683.177     440

Abutment Data
Upstream     num=       2
     Sta    Elev     Sta    Elev
 2867.23     4402979.229   496.4
Downstream     num=       2
     Sta    Elev     Sta    Elev
 2593.65     440 2706.65   496.4

Number of Piers =  6

Pier Data
Pier Station     Upstream=1927.466    Downstream=1653.886
Upstream     num=       2
    Width   Elev    Width   Elev
   15.14     420   15.14  499.34
Downstream     num=       2
    Width   Elev    Width   Elev
   15.14     420   15.14  499.34

Pier Data
Pier Station     Upstream=2012.159    Downstream= 1738.58
Upstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12   501.8
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12   501.8

Pier Data
Pier Station     Upstream=2224.878    Downstream=1951.298
Upstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12  505.95
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12  505.95

Pier Data
Pier Station     Upstream=2597.135    Downstream=2323.555
Upstream     num=       2
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    Width   Elev    Width   Elev
   16.12     420   16.12  505.89
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12  505.89

Pier Data
Pier Station     Upstream=2809.853    Downstream=2536.274
Upstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12   501.8
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12   501.8

Pier Data
Pier Station     Upstream=2894.547    Downstream=2620.967
Upstream     num=       2
    Width   Elev    Width   Elev
   15.14     420   15.14   503.1
Downstream     num=       2
    Width   Elev    Width   Elev
   15.14     420   15.14   499.3

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: Illinois River
REACH: Main               RS: 229.595

INPUT
Description: Downstream Face of IL 178 Bridge
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09 111.037  467.54 221.109  458.17 313.888  455.18 410.862  454.52
 505.246  453.51 603.746  453.01 696.771  455.87 882.831  452.91 904.191  452.36
1000.781   452.21093.038  452.221194.601  452.681289.409  452.731389.022  452.61
1484.608  452.04 1551.86  451.791666.344  455.581700.999  454.661741.908   452.8
1751.746   451.91756.611  451.351764.155  449.851776.642  447.921795.866  443.92
1829.979  440.921871.056  437.921891.816  436.921904.313  434.921931.267  430.92
1954.469  431.041964.209  428.261986.367  426.922027.965  426.922088.935  426.92
2170.841  425.922233.672  425.922290.397  424.922328.706  428.772353.503  432.92
2377.513  435.922409.509  440.922435.124  448.152448.015   451.5 2480.75  454.67
2541.198  455.672551.056  456.352604.303  459.012622.799  460.622626.461  460.51
2635.284  461.952668.376  453.252766.857  453.272865.337  453.862963.818  455.08
3062.299  455.36 3160.78  456.19 3259.26  457.533357.741  458.063456.222  459.43
3554.703  460.443653.186  461.293731.968  465.24 3746.74  466.013763.482  465.81
3786.625  461.143806.223  461.473818.631  461.413850.145  461.223949.118  461.06
4047.599  461.48 4146.08  461.324244.562  461.185324.757  462.355922.243  463.65
6273.327  471.956494.515   477.26624.229  479.22 6676.11  467.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .11741.908    .023 2480.75      .13731.968     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      1741.908 2480.75              90     197     320             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1619.88  476.16       F
 2654.97 6676.11  465.18       T
```

Skew Angle = 10

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.56

INPUT
Description: RM 229.56
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.09	112.75	467.54	224.52	458.17	318.73	455.18	417.2	454.52
513.04	453.51	613.06	453.01	707.52	455.87	896.45	452.91	918.14	452.36
1016.22	452.2	1109.9	452.22	1213.03	452.68	1309.3	452.73	1410.45	452.61
1507.51	452.04	1575.8	451.79	1675.65	454.53	1736.61	454.96	1747.18	454.74
1770.21	448.25	1784.23	446.32	1815.79	439.75	1843.09	437.75	1864.35	433.75
1875.73	431.75	1922.66	429.75	1960.97	429.75	1999.79	427.75	2049.15	426.75
2108.41	425.75	2164	426.75	2225.18	425.75	2273.02	427.75	2308.65	432.75
2341.26	438.75	2375.5	441.75	2402.65	444.75	2425.33	448.08	2476.93	453.82
2553.29	455.6	2563.9	461.18	2599.08	461.24	2622.9	454.7	2722.44	455.28
2808.4	473.31	3462.28	470.72	3564.82	467.56	3665.02	468.93	3721.19	463.67
4517.61	465.58	5406.9	462.35	6013.6	463.65	6370.1	471.95	6594.7	477.2
6726.42	479.22	6779.1	467.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1747.18	.023	2476.93	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1747.18	2476.93	482	482	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1481.05	476.16	F
2808.4	6779.1	473.31	T

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.445*

INPUT
Description:
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.57	118.23	464.67	167.25	459.76	235.42	456.96	334.21	455.36
437.46	454.93	537.96	454.32	642.83	453.96	741.88	455.29	795.2	454.83
804.76	456.51	939.99	454.74	962.73	454.33	1005.46	454.06	1065.57	453.84
1163.8	453.59	1196.61	453.56	1271.94	453.47	1372.89	453.15	1387.75	453.09
1478.95	453.31	1578.9	453.33	1580.72	453.33	1652.33	453.42	1757.03	455.1
1770.05	455.18	1792.31	455.24	1820.95	455.35	1832.04	455.25	1854.15	448.53
1855.86	448.12	1870.37	445.66	1871.62	445.4	1891.88	442.57	1903.03	440.89
1921.48	439.3	1931.27	438.08	1938.45	436.8	1953.27	434.1	1954.93	433.81
1965.05	432.4	1973.28	431.78	2013.61	429.99	2015.2	429.95	2053.25	429.2
2065.9	428.64	2093.41	427.64	2111.01	427.28	2144.49	426.6	2158.37	426.34
2205.8	425.45	2255.18	425.95	2260.55	425.9	2309.53	425.45	2349.8	426.71
2362.41	427.13	2384.37	428.84	2401.8	430.18	2422.89	432.21	2437.85	434.41
2454.16	436.1	2469.5	438.7	2475.69	439.63	2487.73	441.55	2500.91	443.71
2505.71	444.27	2515.75	445.62	2530.78	447.6	2539.55	448.62	2587.81	453.74
2653.22	455.87	2672.96	456.78	2684.79	460	2700.27	460.56	2710.59	457.59
2724.02	457.62	2750.58	454.37	2833.3	475.05	2849.3	475.05	2882.9	466.65
2957.43	466.65	3686.56	465.36	3800.9	463.78	3912.63	464.46	3975.26	461.84
4863.34	462.79	5854.97	461.17	6531.49	461.83	6929.01	465.98	7179.46	468.6
7326.34	469.61	7348.82	467.36	7385.08	468.74				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1832.04	.023	2587.81	.04	2849.3	.047	7385.08	.047

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1832.04	2587.81	482	482	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1249.29	476.16	F
2849.3	7385.08	475.05	T

CROSS SECTION

RIVER: Illinois River

REACH: Main RS: 229.38

INPUT
Description: RM 229.38
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	476.04	175	455.89	832.03	454.59	842.03	458.09	1052.03	455.82
1252.03	454.77	1452.03	453.46	1652.03	454.61	1852.03	455.75	1875.33	455.72
1916.89	455.76	1939.75	448.35	1957.8	444.74	1978.74	443.15	2009.34	440.15
2026.88	437.15	2043.91	434.15	2062.87	432.15	2106.2	430.15	2158.6	428.15
2205.22	427.15	2254.17	426.15	2303.2	425.15	2351.06	425.15	2393.88	425.15
2437.99	426.15	2475.86	427.15	2518.05	428.15	2552.3	432.15	2569.1	436.15
2589.07	440.15	2603.51	443.15	2619.76	445.15	2645.83	448.28	2698.7	453.66
2770.85	456.55	2822.76	459.92	2834.15	453.97	2887.76	454.06	2941.28	476.79
2961.28	476.79	3001.06	460	7951.06	460	7991.06	470		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1916.89	.023	2698.7	.04	2961.28	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1916.89	2698.7	928.5	928.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1022.23	476.16	F
2941.28	7991.06	476.79	T

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.175*

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	476.04	71.48	467.52	154.86	457.88	357.42	456.05	643.36	454.33
736.27	454.43	745.12	457.37	929.3	456.04	930.95	456.03	1107.94	455.27
1215.24	454.68	1284.92	454.2	1346.92	454.49	1461.9	454.94	1638.88	455.61
1659.5	455.56	1696.28	455.54	1719.94	448.59	1726.62	447.3	1738.62	445.01
1744.69	444.47	1760.3	443.05	1767.44	442.28	1790.65	440.12	1791.97	439.99
1810.13	437.26	1827.75	434.53	1829.28	434.38	1847.38	432.67	1863.29	431.92
1892.23	430.51	1906.19	429.92	1946.46	428.43	1960.87	428.1	1994.72	427.51
2029.12	426.95	2045.38	426.64	2096.13	425.68	2136.02	425.68	2171.7	425.68
2219.11	426.66	2219.97	426.68	2261.41	427.66	2267.74	427.79	2307.58	428.66
2313.23	429.18	2345.06	432.32	2348.16	432.91	2363.44	435.76	2377.8	438.03
2385.3	439.3	2401.1	442.05	2409.02	442.92	2418.88	443.97	2436.15	445.76
2447.41	446.98	2455.41	447.74	2468.86	449.28	2486.79	451.37	2505.26	453.77
2551.52	455.22	2579.39	456.11	2632.72	458.89	2644.43	453.93	2699.51	453.97
2754.49	472.89	2775.04	472.87	2815.91	458.86	2931.68	458.8	3255.51	458.72
4076.77	458.57	4716.08	458.78	5155.17	458.92	5175.1	459.42	5195.02	458.92
7901.59	460	7907.39	461.18	7942.68	470				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1696.28	.023	2505.26	.042	2775.04	.055	5155.17	.062
7942.68	.062								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1696.28	2505.26	928.5	928.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	185.095	476.16	F
2775.04	7942.68	472.87	T

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.*

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	476.04	62.19	468.3	134.72	459.87	310.94	456.67	559.69	453.87
640.52	454.27	648.22	456.66	808.44	456.24	809.88	456.23	963.84	455.77
1057.19	455.39	1117.81	454.94	1171.75	455.12	1271.77	455.26	1425.74	455.48
1443.68	455.4	1475.67	455.31	1500.13	448.83	1507.04	447.54	1519.45	445.29
1525.72	444.64	1541.86	442.96	1549.24	442.09	1573.24	439.96	1574.6	439.84

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 1593.37  437.37  1611.6  434.91 1613.17  434.77 1631.88  433.19 1648.34   432.4
 1678.25  430.87 1692.69   430.2 1734.33  428.72 1749.22  428.34 1784.21  427.87
 1819.78  427.42  1836.6  427.13 1889.06  426.21 1920.97  426.21 1949.52  426.21
 2001.01  427.19 2001.95  427.21 2046.96  428.16 2053.84   428.3 2097.11  429.17
 2103.25  429.61 2137.82  432.48 2141.18  432.99 2157.78  435.38 2173.37  437.29
 2181.52  438.45 2198.68  440.95 2207.29   441.8    2218  442.78 2236.76  444.47
 2248.99  445.68 2257.67  446.46 2272.29  448.29 2291.76  450.79 2311.83  453.88
 2359.32  454.97 2387.93  455.67 2442.69  457.86  2454.7  453.88 2511.25  453.88
  2567.7  468.98  2588.8  468.96 2630.76  457.72 2749.62   457.6 3082.09  457.44
 3925.26  457.15 4581.63  457.56 5032.43  457.83 5052.89  458.83 5073.34  457.83
 7852.11     460 7858.07  460.94  7894.3     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1475.67    .023 2311.83    .043  2588.8    .055 5032.43     .07
  7894.3     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1475.67 2311.83            928.5   928.5   928.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  2588.8  7894.3  468.96       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.825*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   52.89  469.08  114.58  461.87  264.45  457.28  476.02   453.4
  544.76  454.12  551.31  455.94  687.58  456.45   688.8  456.44  819.75  456.27
  899.15  456.09   950.7  455.68  996.57  455.75 1081.65  455.59 1212.59  455.34
 1227.85  455.23 1255.06  455.09 1280.32  449.08 1287.46  447.78 1300.27  445.56
 1306.75  444.81 1323.41  442.86 1331.04   441.9 1355.82   439.8 1357.23  439.68
 1376.62  437.48 1395.44  435.29 1397.07  435.16 1416.39   433.7 1433.38  432.88
 1464.28  431.22 1479.19  430.48 1522.19     429 1537.57  428.59 1573.71  428.23
 1610.44   427.9 1627.81  427.61 1681.99  426.73 1705.93  426.73 1727.33  426.73
 1782.92  427.73 1783.92  427.74 1832.51  428.67 1839.93   428.8 1886.63  429.67
 1893.26  430.04 1930.57  432.65 1934.21  433.07 1952.13  434.99 1968.95  436.55
 1977.75   437.6 1996.27  439.85 2005.56  440.68 2017.12   441.6 2037.37  443.18
 2050.56  444.38 2059.94  445.17 2075.71   447.3 2096.73  450.22 2118.39  453.99
 2167.12  454.73 2196.47  455.23 2252.65  456.83 2264.98  453.84    2323   453.8
 2380.92  465.08 2402.56  465.04 2445.61  456.58 2567.56   456.4 2908.67  456.15
 3773.75  455.72 4447.17  456.34 4909.69  456.75 4930.67  458.24 4951.66  456.75
 7802.64  459.99 7808.75  460.71 7845.92     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1255.06    .023 2118.39    .045 2402.56    .055 4909.69    .078
 7845.92    .078

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1255.06 2118.39            928.5   928.5   928.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2380.92 7845.92  465.08       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.65*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03   43.59  469.87   94.44  463.86  217.97   457.9  392.35  452.93
  449.01  453.96   454.4  455.23  566.72  456.65  567.73  456.64  675.66  456.77
   741.1   456.8  783.59  456.42   821.4  456.37  891.52  455.92  999.45  455.21
 1012.02  455.07 1034.45  454.86 1060.52  449.32 1067.87  448.02  1081.1  445.84
 1087.78  444.98 1104.97  442.77 1112.84   441.7 1138.41  439.64 1139.86  439.53
 1159.86  437.59 1179.28  435.68 1180.96  435.54  1200.9  434.22 1218.43  433.36
  1250.3  431.58 1265.69  430.76 1310.05  429.28 1325.92  428.83 1363.21   428.6
 1401.11  428.37 1419.02   428.1 1474.93  427.26 1490.88  427.26 1505.15  427.26
 1564.82  428.26  1565.9  428.28 1618.06  429.18 1626.03  429.31 1676.16  430.18
 1683.28  430.46 1723.33  432.81 1727.23  433.15 1746.47  434.61 1764.53  435.81
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 1773.97  436.74 1793.86  438.76 1803.83  439.56 1816.24  440.41 1837.97   441.9
 1852.14  443.09 1862.21  443.89 1879.14   446.3  1901.7  449.65 1924.95   454.1
 1974.92  454.48 2005.01  454.79 2062.61   455.8 2075.25  453.79 2134.74  453.71
 2194.13  461.17 2216.32  461.13 2260.46  455.45  2385.5  455.21 2735.24  454.87
 3622.23  454.29 4312.71  455.11 4786.95  455.67 4808.46  457.66 4829.98  455.67
 7753.16  459.99 7759.43  460.47 7797.55     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1034.45    .023 1924.95    .047 2216.32    .055 4786.95    .085
 7797.55    .085

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      1034.45 1924.95            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2194.13 7797.55  461.17       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.475*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03    34.3  470.65    74.3  465.85  171.48  458.51  308.67  452.47
  353.25   453.8  357.49  454.51  445.86  456.85  446.65  456.85  531.57  457.27
  583.05   457.5  616.48  457.16  646.22     457  701.39  456.24   786.3  455.07
   796.2  454.91  813.84  454.64  840.71  449.56  848.29  448.26  861.92  446.11
  868.81  445.15  886.53  442.67  894.64  441.51  920.99  439.48  922.49  439.37
  943.11   437.7  963.12  436.06  964.86  435.93  985.41  434.74 1003.47  433.84
 1036.33  431.94 1052.19  431.04 1097.91  429.56 1114.27  429.08 1152.71  428.96
 1191.77  428.85 1210.23  428.59 1267.86  427.79 1275.84  427.79 1282.97  427.79
 1346.73  428.79 1347.88  428.81 1403.61  429.68 1412.12  429.81 1465.69  430.69
 1473.29  430.89 1516.09  432.98 1520.26  433.24 1540.81  434.22 1560.11  435.06
  1570.2  435.89 1591.44  437.66  1602.1  438.44 1615.36  439.23 1638.58  440.61
 1653.72  441.79 1664.47   442.6 1682.56  445.31 1706.67  449.07 1731.52  454.21
 1782.71  454.24 1813.55  454.34 1872.58  454.77 1885.53  453.75 1946.49  453.62
 2007.34  457.26 2030.08  457.21 2075.31  454.31 2203.44  454.01 2561.82  453.59
 3470.72  452.87 4178.26  453.89  4664.2  454.58 4686.25  457.07  4708.3  454.58
 7703.69  459.99 7710.11  460.24 7749.17     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  813.84    .023 1731.52    .048 2030.08    .055  4664.2    .093
 7749.17    .093

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       813.84 1731.52            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2007.34 7749.17  457.26       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.32

INPUT
Description: RM 228.32
Station Elevation Data    num=      39
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03      25  471.43     125  459.13     225     452     325  457.05
     425  458.21  471.05  457.63  593.23  454.41  628.71   448.5  649.84  445.32
  676.44  441.32  703.58  439.32  748.75  436.32  788.52  434.32  838.69  431.32
  902.62  429.32  982.43  429.32 1060.79  428.32 1128.63  429.32 1198.22  430.32
 1263.31  431.32 1313.28  433.32 1355.69  434.32 1400.37  437.32 1439.19  439.32
 1466.74  441.32 1485.99  444.32 1511.64   448.5 1538.08  454.32 1590.51  453.99
 2021.38  452.81  2388.4  452.31 3319.21  451.44  4043.8  452.67 4541.46   453.5
 4564.04  456.49 4586.62   453.5 7660.79     460 7700.79     470

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  593.23    .023 1538.08     .05 4541.46      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       593.23 1538.08               0       0       0             .1       .3
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SUMMARY OF MANNING'S N VALUES

River:Illinois River

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13
Main	230.23	.1	.04	.023	.1	.04	.1	.023	.04	.1				
Main	230.1*	.1	.047	.031	.062	.078	.035	.072	.048	.023	.06	.099	.08	.08
Main	229.97*	.1	.054	.04	.051	.056	.03	.043	.03	.023	.08	.098	.06	.06
Main	229.84	.1	.04	.011	.023	.1	.04							
Main	229.745*	.1	.044	.019	.023	.1	.058	.04	.04					
Main	229.65	.1	.023	.1	.04									
Main	229.605	.1	.023	.1	.04									
Main	229.60	Bridge												
Main	229.595	.1	.023	.1	.04									
Main	229.56	.1	.023	.04										
Main	229.445*	.1	.023	.04	.047	.047								
Main	229.38	.1	.023	.04	.055									
Main	229.175*	.1	.023	.042	.055	.062	.062							
Main	229.*	.1	.023	.043	.055	.07	.07							
Main	228.825*	.1	.023	.045	.055	.078	.078							
Main	228.65*	.1	.023	.047	.055	.085	.085							
Main	228.475*	.1	.023	.048	.055	.093	.093							
Main	228.32	.1	.023	.05	.1									

SUMMARY OF REACH LENGTHS

River: Illinois River

Reach	River Sta.	Left	Channel	Right
Main	230.23	699.67	699.67	699.67
Main	230.1*	699.67	699.67	699.67
Main	229.97*	699.67	699.67	699.67
Main	229.84	482	482	482
Main	229.745*	482	482	482
Main	229.65	258	258	258
Main	229.605	51	51	51
Main	229.60	Bridge		
Main	229.595	90	197	320
Main	229.56	482	482	482
Main	229.445*	482	482	482
Main	229.38	928.5	928.5	928.5
Main	229.175*	928.5	928.5	928.5
Main	229.*	928.5	928.5	928.5
Main	228.825*	928.5	928.5	928.5
Main	228.65*	928.5	928.5	928.5
Main	228.475*	928.5	928.5	928.5
Main	228.32	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Illinois River

Reach	River Sta.	Contr.	Expan.
Main	230.23	.1	.3
Main	230.1*	.1	.3
Main	229.97*	.1	.3
Main	229.84	.1	.3
Main	229.745*	.1	.3
Main	229.65	.1	.3
Main	229.605	.3	.5
Main	229.60	Bridge	
Main	229.595	.3	.5
Main	229.56	.1	.3
Main	229.445*	.1	.3
Main	229.38	.1	.3
Main	229.175*	.1	.3
Main	229.*	.1	.3
Main	228.825*	.1	.3
Main	228.65*	.1	.3
Main	228.475*	.1	.3
Main	228.32	.1	.3

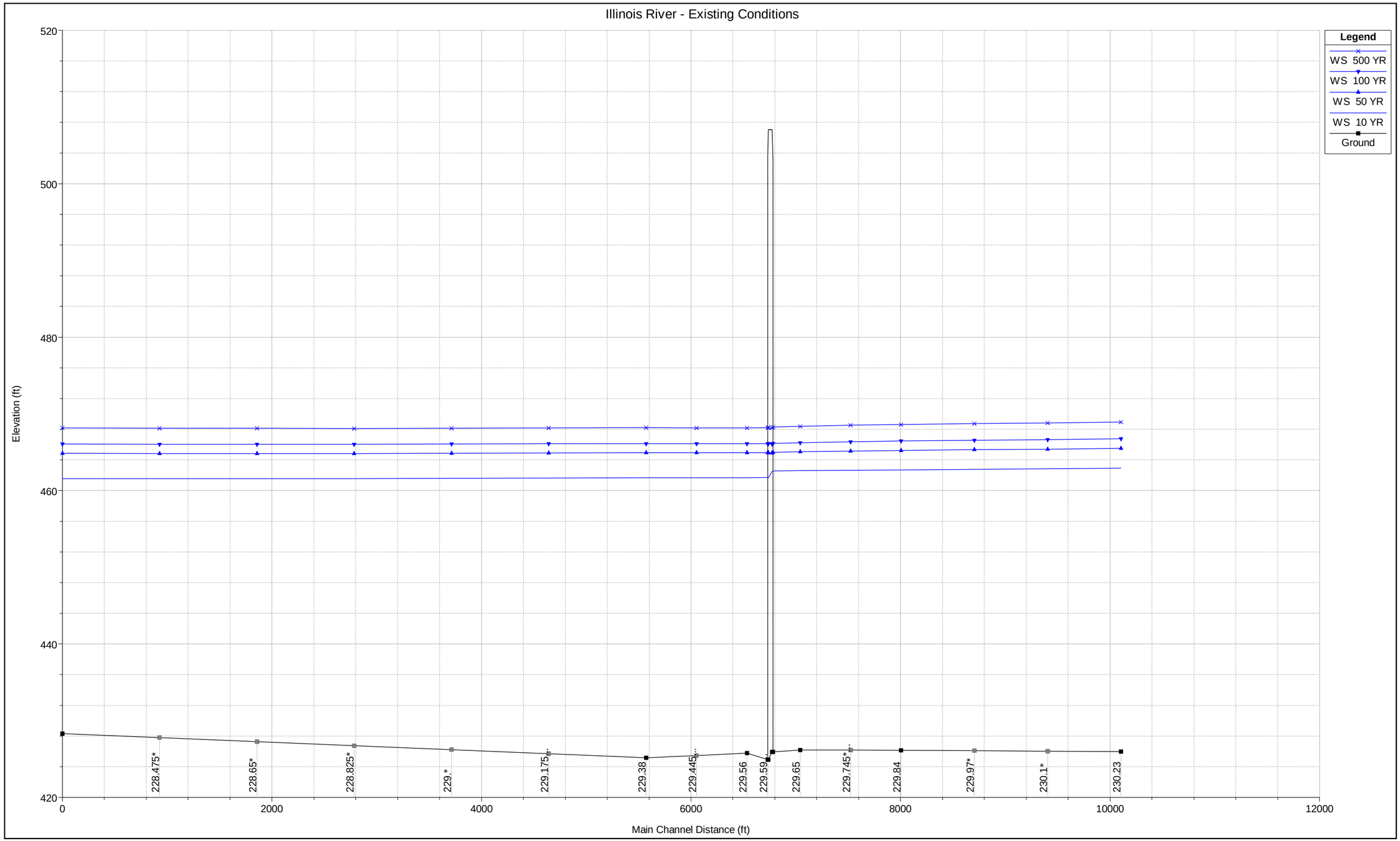
Profile Output Table - Standard Table 1

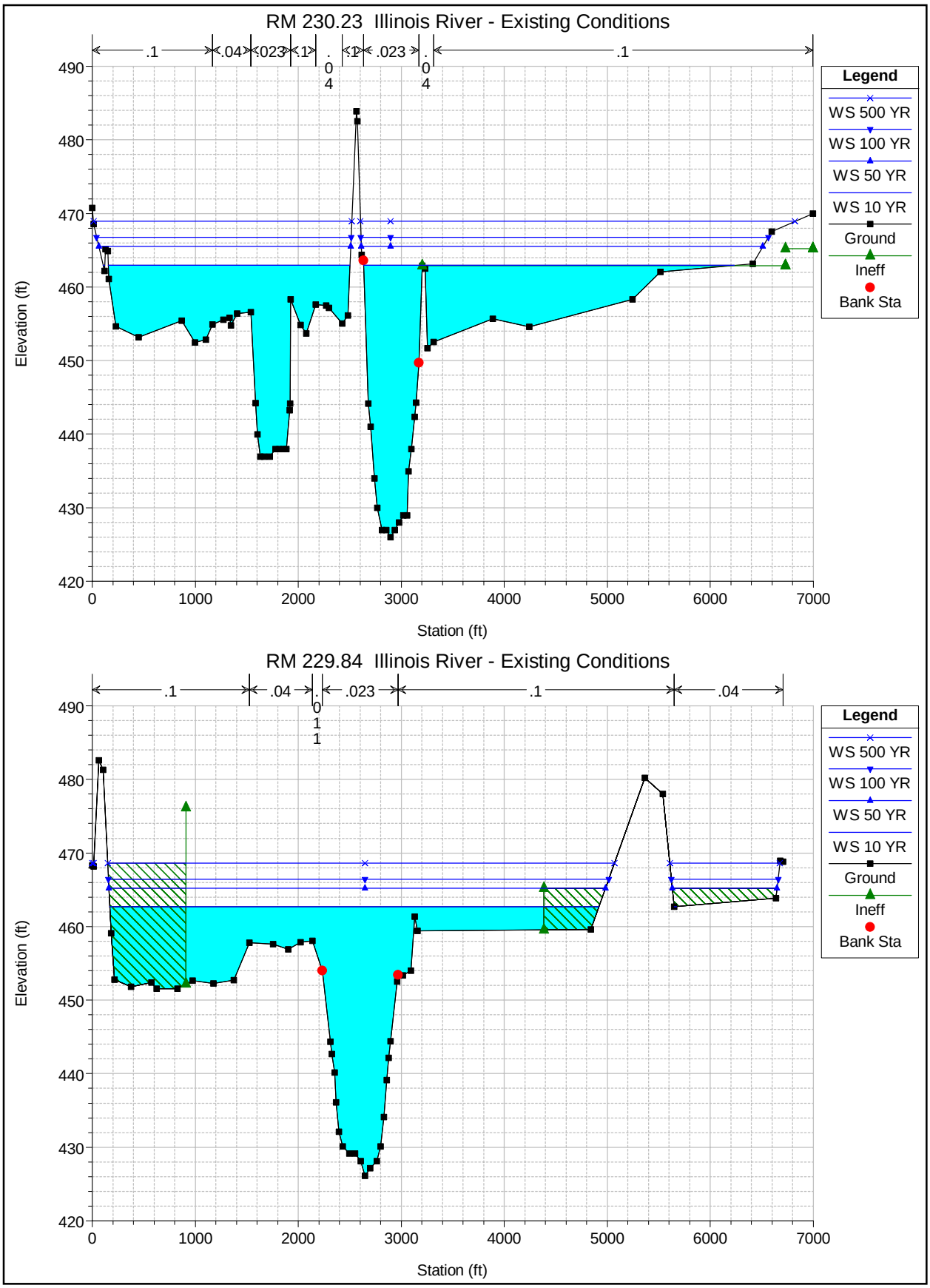
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	230.23	10 YR	94000.00	425.97	462.93	441.93	463.05	0.000035	3.54	56046.36	5958.44	0.12
Main	230.23	50 YR	124000.00	425.97	465.51	443.74	465.66	0.000039	3.99	72153.00	6345.71	0.13
Main	230.23	100 YR	137000.00	425.97	466.75	444.40	466.91	0.000040	4.11	80074.45	6425.28	0.13
Main	230.23	500 YR	163000.00	425.97	468.92	445.63	469.09	0.000041	4.35	94269.82	6726.72	0.13
Main	229.84	10 YR	94000.00	426.13	462.70	440.09	462.94	0.000051	4.19	35227.84	4769.11	0.14
Main	229.84	50 YR	124000.00	426.13	465.22	442.38	465.54	0.000060	4.84	44053.47	5836.66	0.16
Main	229.84	100 YR	137000.00	426.13	466.45	443.28	466.78	0.000061	5.00	50251.45	5891.65	0.16
Main	229.84	500 YR	163000.00	426.13	468.61	444.94	468.96	0.000062	5.27	61253.95	6002.42	0.16
Main	229.65	10 YR	94000.00	426.19	462.59	440.80	462.89	0.000058	4.39	24704.46	4726.31	0.15
Main	229.65	50 YR	124000.00	426.19	465.04	442.83	465.46	0.000075	5.26	28489.31	5879.56	0.17
Main	229.65	100 YR	137000.00	426.19	466.24	443.64	466.70	0.000078	5.53	33500.90	5966.59	0.18
Main	229.65	500 YR	163000.00	426.19	468.36	445.16	468.87	0.000082	5.92	43348.87	6121.00	0.18
Main	229.605	10 YR	94000.00	425.94	462.56	439.56	462.87	0.000057	4.50	22615.82	4572.46	0.15
Main	229.605	50 YR	124000.00	425.94	464.98	441.69	465.44	0.000074	5.45	25109.63	5875.24	0.17
Main	229.605	100 YR	137000.00	425.94	466.17	442.56	466.68	0.000079	5.78	29570.14	5961.20	0.18
Main	229.605	500 YR	163000.00	425.94	468.27	444.11	468.85	0.000085	6.23	38888.02	6114.29	0.19
Main	229.60		Bridge									
Main	229.595	10 YR	94000.00	424.92	461.69	438.69	462.01	0.000057	4.50	22404.25	4414.37	0.15
Main	229.595	50 YR	124000.00	424.92	464.94	440.93	465.37	0.000068	5.29	25768.25	5793.77	0.17
Main	229.595	100 YR	137000.00	424.92	466.12	441.78	466.61	0.000073	5.61	30127.02	5899.25	0.17
Main	229.595	500 YR	163000.00	424.92	468.22	443.37	468.76	0.000079	6.06	39455.16	6021.37	0.18
Main	229.56	10 YR	94000.00	425.75	461.68	439.24	461.99	0.000059	4.54	23894.67	2570.33	0.15
Main	229.56	50 YR	124000.00	425.75	464.94	441.48	465.35	0.000069	5.28	28061.22	4541.40	0.17
Main	229.56	100 YR	137000.00	425.75	466.12	442.35	466.58	0.000074	5.58	29584.89	5069.01	0.17
Main	229.56	500 YR	163000.00	425.75	468.18	443.96	468.74	0.000083	6.18	32258.88	5287.73	0.19
Main	229.38	10 YR	94000.00	425.15	461.67	437.79	461.93	0.000047	4.10	29516.04	7741.57	0.14
Main	229.38	50 YR	124000.00	425.15	464.94	439.84	465.27	0.000054	4.74	35677.82	7798.41	0.15
Main	229.38	100 YR	137000.00	425.15	466.12	440.71	466.49	0.000058	5.01	37920.59	7819.04	0.15
Main	229.38	500 YR	163000.00	425.15	468.19	442.32	468.63	0.000065	5.54	41844.41	7855.06	0.17
Main	228.32	10 YR	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	50 YR	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	100 YR	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	500 YR	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Main	230.23	10 YR	463.05	462.93	0.13	0.03	0.01	34099.46	55062.16	4838.37	5958.44
Main	230.23	50 YR	465.66	465.51	0.15	0.03	0.01	46659.72	67679.42	9660.85	6345.71
Main	230.23	100 YR	466.91	466.75	0.15	0.03	0.01	52264.76	72372.85	12362.38	6425.28
Main	230.23	500 YR	469.09	468.92	0.16	0.03	0.01	63599.00	81849.59	17551.41	6726.72
Main	229.84	10 YR	462.94	462.70	0.25	0.03	0.00	7490.48	85159.02	1350.49	4769.11
Main	229.84	50 YR	465.54	465.22	0.32	0.03	0.00	13892.42	107348.20	2759.42	5836.66
Main	229.84	100 YR	466.78	466.45	0.33	0.03	0.00	17209.89	115266.20	4523.91	5891.65
Main	229.84	500 YR	468.96	468.61	0.35	0.03	0.01	23785.01	129965.30	9249.70	6002.42
Main	229.65	10 YR	462.89	462.59	0.30	0.01	0.00	1017.94	92739.06	242.99	4726.31
Main	229.65	50 YR	465.46	465.04	0.42	0.02	0.00	1932.76	121294.70	772.54	5879.56
Main	229.65	100 YR	466.70	466.24	0.46	0.02	0.00	2430.26	132902.90	1666.79	5966.59
Main	229.65	500 YR	468.87	468.36	0.51	0.02	0.01	3392.58	152187.50	7419.91	6121.00
Main	229.605	10 YR	462.87	462.56	0.31			368.17	93266.59	365.24	4572.46
Main	229.605	50 YR	465.44	464.98	0.46	0.00	0.02	680.18	122560.70	759.09	5875.24
Main	229.605	100 YR	466.68	466.17	0.51	0.00	0.02	850.68	134826.80	1322.54	5961.20
Main	229.605	500 YR	468.85	468.27	0.57	0.00	0.02	1179.17	154889.60	6931.20	6114.29
Main	229.60		Bridge								
Main	229.595	10 YR	462.01	461.69	0.31	0.01	0.00	364.09	93406.52	229.39	4414.37
Main	229.595	50 YR	465.37	464.94	0.43	0.01	0.01	743.45	122633.80	622.72	5793.77
Main	229.595	100 YR	466.61	466.12	0.48	0.01	0.01	919.90	134923.00	1157.09	5899.25
Main	229.595	500 YR	468.76	468.22	0.54	0.02	0.01	1258.35	155237.50	6504.17	6021.37
Main	229.56	10 YR	461.99	461.68	0.31	0.03	0.01	1082.78	91690.51	1226.73	2570.33

Main	229.56	50 YR	465.35	464.94	0.42	0.03	0.01	2004.02	119076.60	2919.41	4541.40
Main	229.56	100 YR	466.58	466.12	0.46	0.03	0.01	2425.90	130833.60	3740.45	5069.01
Main	229.56	500 YR	468.74	468.18	0.56	0.04	0.02	3296.90	154213.40	5489.74	5287.73
Main	229.38	10 YR	461.93	461.67	0.25	0.04	0.01	2272.73	90772.62	954.66	7741.57
Main	229.38	50 YR	465.27	464.94	0.33	0.05	0.01	4668.29	117183.60	2148.10	7798.41
Main	229.38	100 YR	466.49	466.12	0.37	0.05	0.01	5786.32	128496.10	2717.57	7819.04
Main	229.38	500 YR	468.63	468.19	0.44	0.06	0.02	8116.56	150964.10	3919.35	7855.06
Main	228.32	10 YR	461.65	461.55	0.10			575.87	72490.02	20934.11	7561.67
Main	228.32	50 YR	464.95	464.85	0.10			1248.00	86206.04	36545.96	7601.69
Main	228.32	100 YR	466.15	466.05	0.10			1552.00	92104.02	43343.99	7616.25
Main	228.32	500 YR	468.26	468.15	0.11			2173.37	103867.30	56959.29	7641.72


Illinois River - Existing Conditions
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Elevation (ft)
520
500
480
460
440
420
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)
228.475*
228.65*
228.825*
229.*
229.175*
229.38
229.445*
229.56
229.59*
229.65
229.745*
229.84
229.97*
230.1*
230.23


RM 230.23 Illinois River - Existing Conditions
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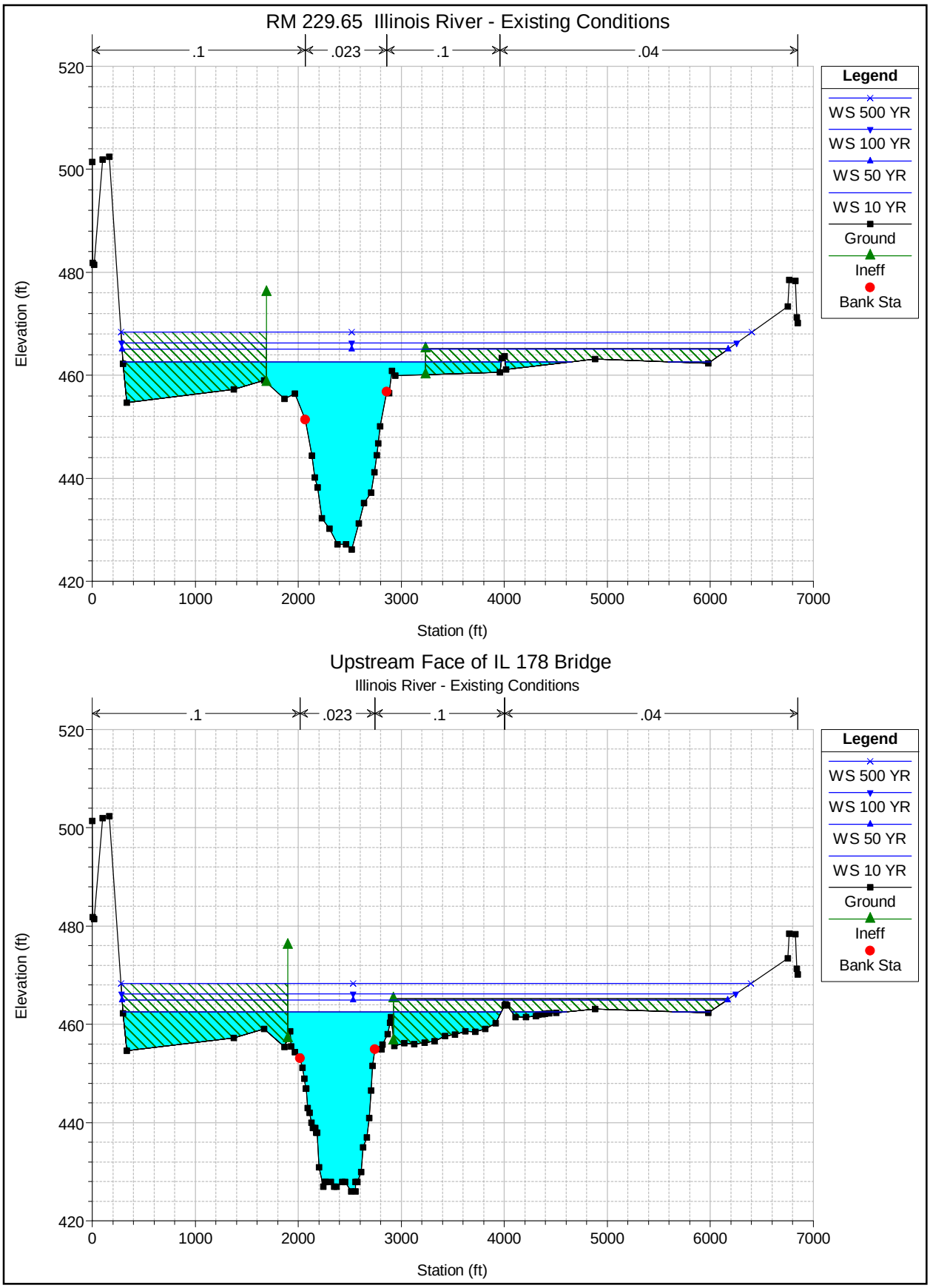
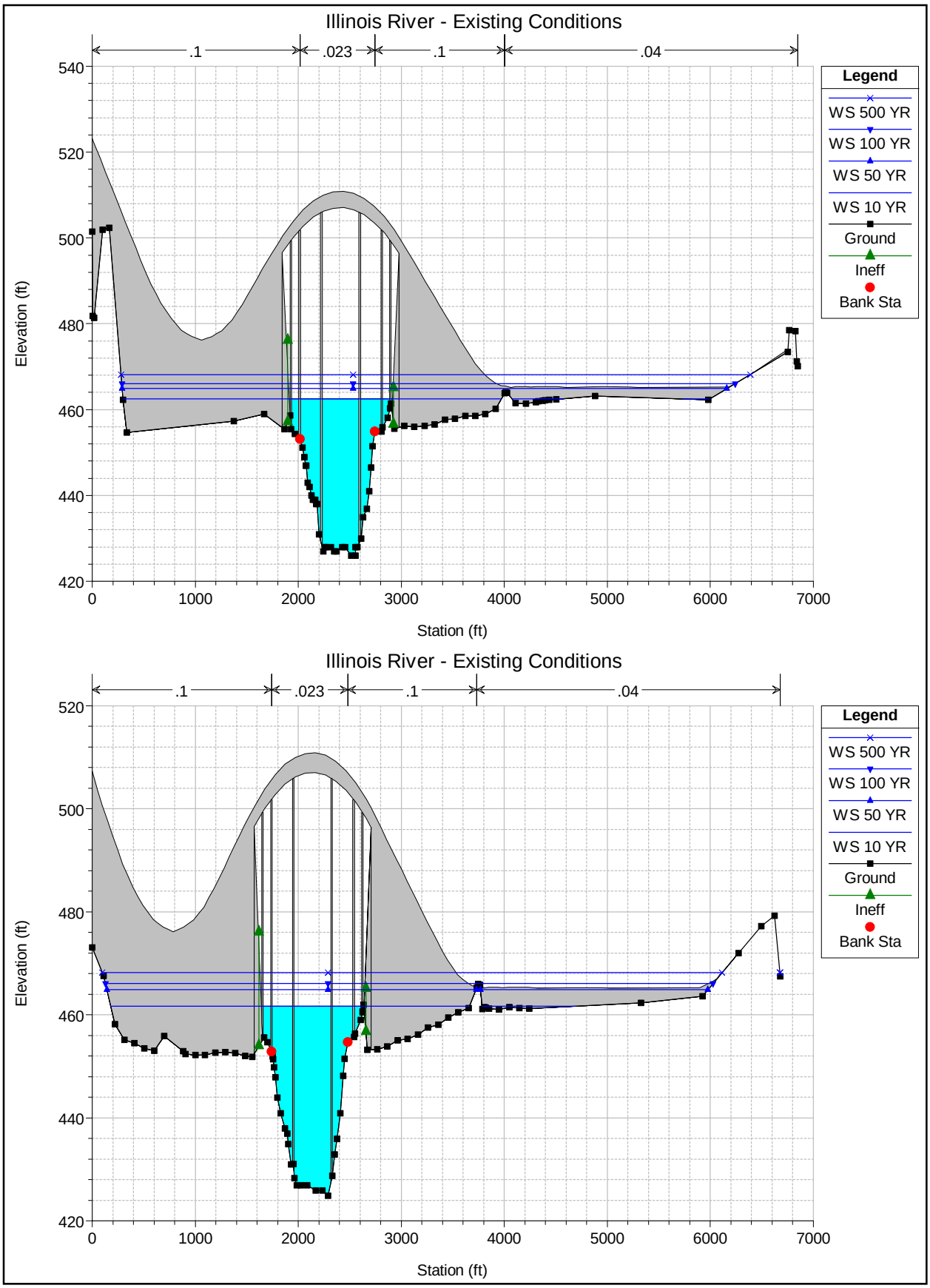
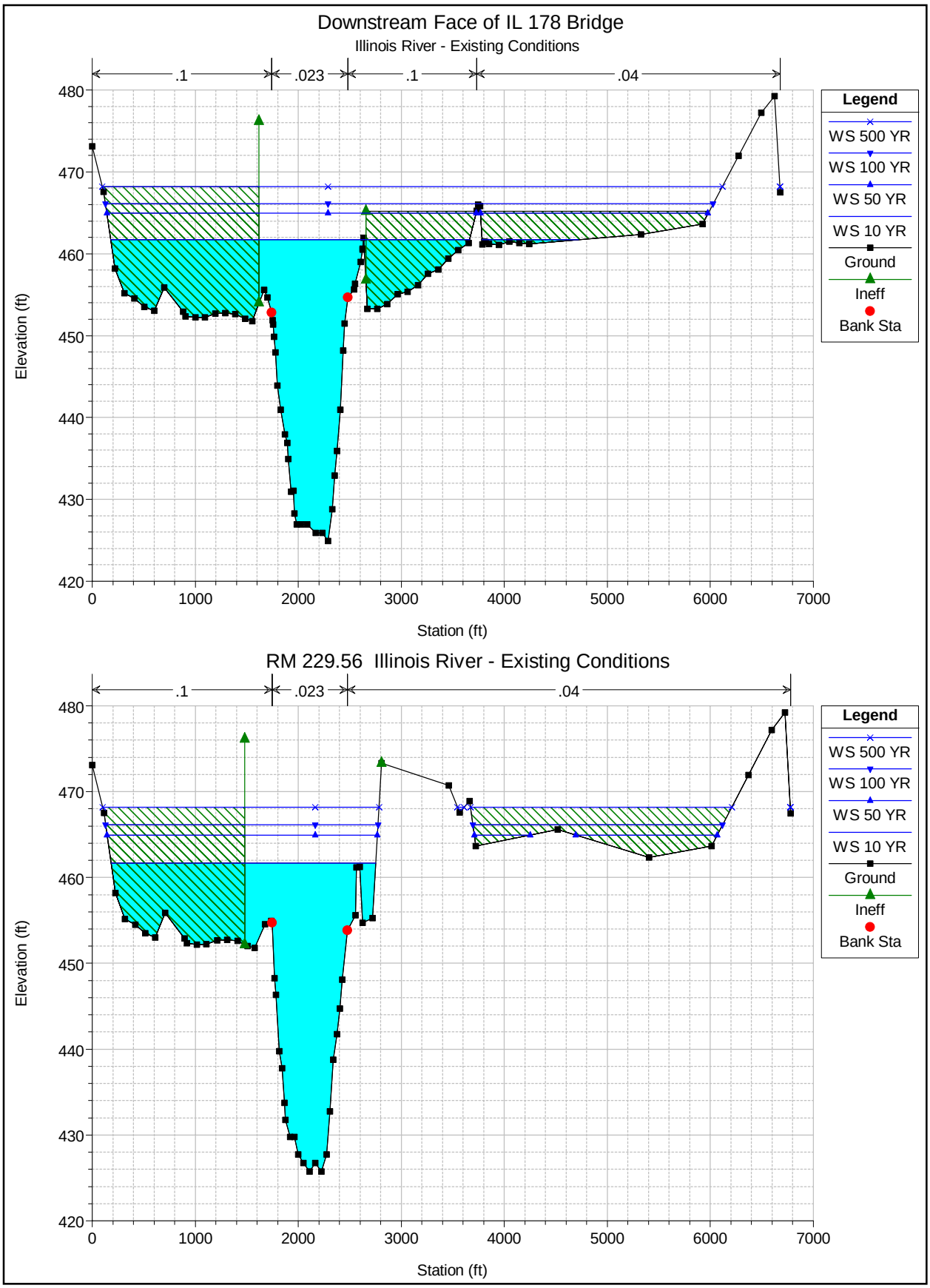
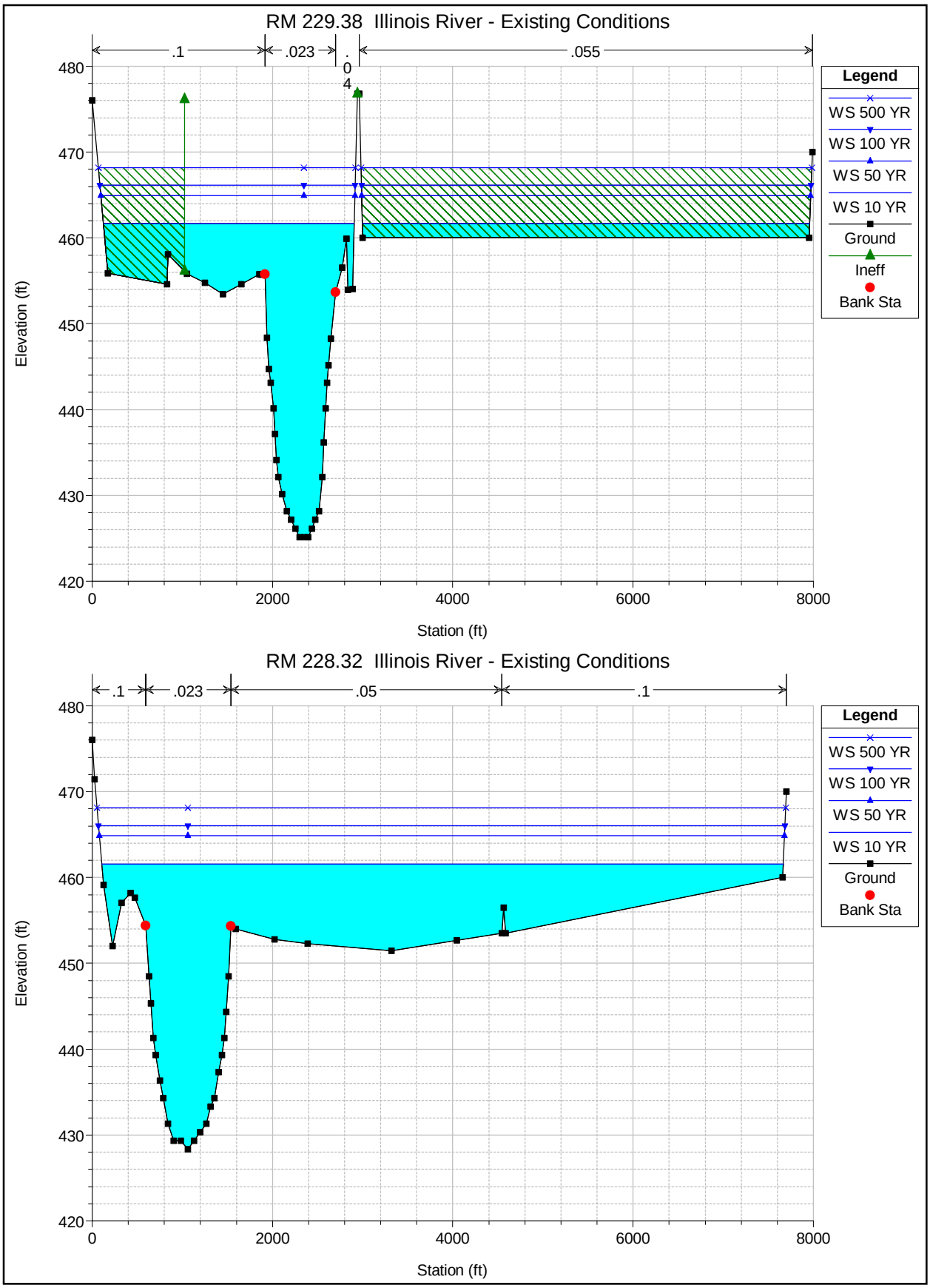
.04
.023
.1
.04
.023
.04
.1
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RM 229.84 Illinois River - Existing Conditions
.1
.04
.023
.01
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


RM 229.65 Illinois River - Existing Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000
Upstream Face of IL 178 Bridge
Illinois River - Existing Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Illinois River - Existing Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000
Illinois River - Existing Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Downstream Face of IL 178 Bridge
Illinois River - Existing Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RM 229.56 Illinois River - Existing Conditions
.1
.023
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


RM 229.38 Illinois River - Existing Conditions
.1
.023
.04
.055
Elevation (ft)
480
470
460
450
440
430
420
0
2000
4000
6000
8000
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
RM 228.32 Illinois River - Existing Conditions
.1
.023
.05
.1
Elevation (ft)
480
470
460
450
440
430
420
0
2000
4000
6000
8000
Station (ft)
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta

10C – PROPOSED CONDITIONS MODEL - INPUT AND OUTPUT

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: IL 178 over Illinois River
Project File : IL178.prj
Run Date and Time: 3/8/2013 4:31:54 AM

Project in English units

PLAN DATA

Plan Title: Proposed-D
Plan File : t:\16870\Civil\Drainage\HEC-RAS\IL178.p03

Geometry Title: Proposed-D
Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g03

Flow Title : Upper Mississippi Flow Frequency Study
Flow File : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Plan Summary Information:
Number of: Cross Sections = 17 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

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

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

FLOW DATA

Flow Title: Upper Mississippi Flow Frequency Study
Flow File : t:\16870\Civil\Drainage\HEC-RAS\IL178.f01

Flow Data (cfs)

River	Reach	RS	10 YR	50 YR	100 YR	500 YR
Illinois River	Main	230.23	94000	124000	137000	163000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Illinois River	Main	10 YR		Known WS = 461.55
Illinois River	Main	50 YR		Known WS = 464.85
Illinois River	Main	100 YR		Known WS = 466.05
Illinois River	Main	500 YR		Known WS = 468.15

GEOMETRY DATA

Geometry Title: Proposed-D
Geometry File : t:\16870\Civil\Drainage\HEC-RAS\IL178.g03

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.23

INPUT
Description: RM 230.23
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.77	14	468.57	118	462.16	127	465.12	150	464.87
163	461.09	230	454.67	450	453.17	869.03	455.45	998.81	452.47
1102.68	452.87	1168.76	454.91	1272.53	455.55	1332.78	455.83	1347.47	454.79
1408.21	456.38	1541.34	456.59	1587.82	444.23	1604.71	439.95	1631.78	436.93
1668.56	436.95	1721.57	436.95	1776.82	437.95	1816.75	437.95	1854.08	437.95
1886.71	437.95	1918.74	443.26	1919.49	444.12	1927.27	458.29	2021.02	454.83
2079.35	453.65	2170.01	457.64	2272.73	457.46	2299.39	457.14	2428.21	455.03
2481.5	456.1	2564.54	483.91	2571.61	482.55	2613.4	464.39	2631.42	463.58
2680.84	444.14	2701.72	440.97	2738.62	433.97	2766.24	429.97	2811.18	426.97
2854.47	426.97	2893.4	425.97	2938.49	426.97	2980.12	427.97	3019.64	428.97
3055.98	428.97	3071.79	434.97	3098.6	437.97	3132.19	442.32	3142.78	444.25
3172.37	449.66	3204.51	462.92	3233.1	462.52	3251.89	451.67	3312.76	452.53
3888.16	455.66	4242.45	454.61	5245.2	458.34	5517.26	462.03	6409.74	463.15
6596.88	467.54	6996.88	470						

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1168.76	.04	1541.34	.023	1927.27	.1	2170.01	.04
2428.21	.1	2631.42	.023	3172.37	.04	3312.76	.1		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2631.42 3172.37 699.67 699.67 699.67 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
6681.65	6996.88	465.18	T
3204.51	6681.65	462.92	F

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 230.1*

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	13.3	468.44	14.54	468.39	70.45	470.77	112.07	468.61
119.66	470.3	120.62	470.44	142.46	468.37	154.81	464.77	204.65	457.07
218.44	455.4	243.8	453.91	420.31	452.75	427.39	452.72	643.98	453.73
699.89	453.67	825.37	454.15	923.56	452.57	948.62	452.22	1047.28	452.71
1091.31	453.76	1110.04	454.16	1208.59	454.52	1265.81	454.68	1279.77	453.97
1314.97	454.6	1337.45	455.03	1463.89	455.26	1508.04	447.05	1524.08	444.2
1538.64	443.07	1549.79	442.31	1584.72	442.68	1635.07	443.2	1687.54	444.4
1704.6	444.58	1725.47	444.57	1760.92	444.56	1791.91	444.55	1822.33	448.08
1823.04	448.66	1830.43	458.1	1919.47	455.77	1964.84	455.11	1974.87	454.95
2060.98	457.49	2129.04	457.31	2158.54	457.34	2183.86	457.19	2262.95	456.47
2306.2	456	2356.82	456.73	2388.81	464.27	2435.68	474.71	2442.4	473.72
2482.09	461.13	2499.2	460.38	2557.27	444.4	2558.15	444.15	2566.31	442.95
2583.06	440.89	2588.39	440.13	2599.4	437.62	2621.01	434	2627.08	433.21
2649.51	430.87	2660.03	429.95	2695.05	428.38	2713.63	427.69	2739.74	427.69
2765.27	427.47	2778.16	427.17	2811.71	426.02	2856.25	426.98	2859.14	427.04
2902.92	427.96	2914.1	428.2	2944.49	429.29	2948.1	429.36	2978.97	430.69
2982.71	430.94	2999.34	436.07	3003.49	436.65	3019.45	438.78	3027.54	439.68
3038.2	440.99	3062.87	444.21	3074.01	446.04	3094.17	449.35	3105.13	450.92
3137.02	459.74	3151.83	459.6	3165.39	459.51	3184.04	452.32	3229.06	452.86
3244.44	454.06	3264.86	455.54	3295.48	455.02	3815.39	456.93	4166.95	456.25
5001.74	458.36	5161.96	460.82	5431.92	466.74	5537.26	468.18	5711.62	467.59
5826.11	462.58	6317.51	463.18	6503.2	466.18	6828.7	467.65	6871.51	469.52
6900.12	469.61								

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
       0      .1 1110.04    .047 1463.89    .031  1704.6    .062 1830.43    .078
 2060.98    .035  2306.2    .072 2388.81    .048  2499.2    .023 3105.13     .06
 3244.44    .099 5826.11     .08 6900.12     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        2499.2 3105.13           699.67  699.67  699.67             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 5900.29 6900.12  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.97*

INPUT
Description:
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.11   12.59  468.32   13.77  468.28   66.73  476.68  106.14  475.07
  113.33  475.82  114.24  475.76  134.93  471.87  146.62  468.45  193.83  458.09
  206.89  456.13   230.9  453.33  398.08  452.27  404.78  452.27  609.91  453.04
  662.87  452.62   781.7  452.86   874.7  452.07  898.44  451.97  991.87  452.55
 1033.57  453.22 1051.31   453.4 1144.65   453.5 1198.85  453.52 1212.06  453.16
 1245.41  453.44  1266.7  453.68 1386.45  453.92 1428.26  449.86 1443.45  448.46
 1457.24  447.91  1467.8   447.7 1500.89  448.42 1548.57  449.45 1598.27  450.85
 1614.42   451.2 1634.18  451.19 1667.76  451.17 1697.11  451.15 1725.92   452.9
  1726.6  453.19  1733.6  457.91 1817.93   456.7  1860.9  456.35 1870.39  456.25
 1951.94  457.34  2016.4   457.1 2044.34  457.22 2068.32  457.24 2143.23  457.17
  2184.2  456.96 2232.13  457.37 2262.44  461.16 2306.83  465.52 2313.19   464.9
 2350.78  457.87 2366.99  457.18 2434.44  444.36 2435.47  444.15 2444.94   442.8
  2464.4  440.82 2470.59  440.13 2483.39  436.88 2508.48  433.07 2515.54  432.46
 2541.59   430.5 2553.81  429.92  2594.5  428.76 2616.09  428.41 2646.42  428.41
 2676.07  427.97 2691.04  427.65 2730.02  426.08 2776.76  427.06 2779.78  427.11
 2825.72  427.95 2837.46  428.17 2869.34   429.6 2873.12  429.74 2905.51  432.41
 2909.44  432.92 2926.89  437.18 2931.25  437.89 2947.99  440.46 2956.48   441.4
 2967.67  442.69 2993.55   446.1 3005.23  447.83 3026.39  450.95 3037.89  452.18
 3069.53  456.57 3084.22  456.48 3097.68  456.49 3116.18  452.97 3160.85  453.42
 3176.11   455.6 3196.37  458.43 3226.76  457.22 3742.63  458.21 4091.45  457.88
 4919.74  458.98 5078.72  463.29 5346.58  471.45  5451.1   474.2 5624.11  472.79
  5737.7  462.62 6225.28  463.21 6409.53  464.82 6732.49  465.74 6774.97  469.21
 6803.35  469.22

Manning's n Values        num=      13
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1051.31    .054 1386.45     .04 1614.42    .051  1733.6    .056
 1951.94     .03  2184.2    .043 2262.44     .03 2366.99    .023 3037.89     .08
 3176.11    .098  5737.7     .06 6803.35     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2366.99 3037.89           699.67  699.67  699.67             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  341.11  484.26       F
 5118.93 6803.35  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.84

INPUT
Description: RM 229.84
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.28      13  468.18      63  482.59     107  481.33     183   459.1
     218  452.75  375.84   451.8  575.84  452.36  625.84  451.56  825.84  451.56
  975.84  452.68 1175.84  452.28 1375.84  452.74 1524.24  457.83 1756.95   457.6
 1903.77  456.89 2023.51  457.86 2136.06  458.05 2234.77  453.98 2311.61  444.32
 2323.57  442.65 2352.79  440.13 2367.37  436.13 2395.96  432.13 2433.68  430.13
 2493.95  429.13 2553.09  429.13 2603.93  428.13 2648.33  426.13 2697.26  427.13
 2760.81  428.13 2798.15  430.13 2832.06  434.13    2859  439.13 2876.53  442.13
 2897.13   444.4 2958.61  452.55 2970.65  453.44 3016.62  453.37 3092.65  453.97
 3127.89  461.33 3158.04  459.43 4837.75   459.6 5364.94  480.22 5536.59  477.99
 5649.29  462.67 6636.28  463.83 6678.43  468.91 6706.59  468.83

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1524.24     .04 2136.06    .011 2234.77    .023 2970.65      .1
```

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 5649.29     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2234.77 2970.65             482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  959.09  484.26       F
 4337.57 6706.59  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.745*

INPUT
Description:
Station Elevation Data    num=      86
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  484.85    3.92  475.01    12.6  474.89   20.68     476   61.09  486.74
  103.75  491.11  108.16  490.96  175.26  481.08  177.44  480.44  211.38  472.37
  314.63  457.18  350.73  453.27  364.42  453.24  558.34  453.75  606.82  453.41
  800.75  453.65  946.19  454.38 1140.11  454.42 1334.03  454.88 1439.12  456.86
 1477.92  457.66 1703.56  458.18 1748.73   458.2 1845.92   457.1 1954.86   456.6
 1962.02  456.66 2064.28  457.25 2071.15  457.08 2166.86  452.65 2231.85  445.32
  2247.7  443.05 2257.28  441.62 2260.28   441.3 2282.92  439.49 2291.02  438.59
 2306.35   435.5  2325.3   432.9 2336.43     432 2376.11  430.43 2394.89  430.01
 2439.51  428.79 2471.45  428.16 2501.72  428.16 2549.82  427.71  2555.2  427.61
 2601.91  426.16  2652.9  428.52 2670.42  429.29 2719.12  431.57 2721.34  431.72
 2758.04   433.2 2788.86   435.4 2793.37  435.96 2818.94  439.94 2821.45  440.34
 2839.71  443.18 2841.15  443.36  2855.5  445.28 2861.18  446.07 2874.83   448.1
 2925.25  453.99 2937.79   455.1 2956.95  454.95 2985.69  457.12 2985.79  457.13
 3016.79  456.75 3064.92  456.95 3101.63  460.64 3133.05   459.7 4009.52  460.03
 4023.82  461.43 4052.17  461.59 4064.95   460.3 4883.26  461.34  4910.1  461.87
 5432.58  471.47 5611.44  470.29 5728.87  462.58 5981.87  462.62 6734.33   468.6
 6751.02  471.15 6757.28  471.15  6801.2  473.63 6806.14  473.62 6819.18  470.06
 6830.54  469.47

Manning's n Values        num=       8
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1477.92    .044 2071.15    .019 2166.86    .023 2937.79      .1
 4009.52    .058 5728.87     .04 6830.54     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       2166.86 2937.79             482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1342.58  484.26       F
 3757.06 6830.54  465.18       T

CROSS SECTION


RIVER: Illinois River
REACH: Main              RS: 229.65

INPUT
Description: RM 229.65
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  501.42   3.742  481.78  19.726  481.43 103.178  501.92 167.191   502.4
  300.14  462.25 334.579  454.651372.842  457.271668.195  459.021864.832  455.39
1969.212  456.462067.072  451.332134.226  444.422160.511  440.192187.012  438.19
2230.806  432.192302.727  430.192381.846  427.192462.837  427.192516.666  426.19
2586.864  431.192639.029  435.192708.211  437.192739.026  441.192761.785  444.43
2776.488  446.772796.292  450.072860.807  456.762880.435  456.492909.979  460.88
2941.739   459.9 3958.77  460.543973.414  463.344002.456  463.674015.553  461.08
4881.387  463.145979.398  462.296750.276   473.46767.372  478.486823.841  478.34
6837.205  471.266848.845  470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12067.072    .0232860.807      .1 3958.77     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      2067.0722860.807             211     211     211             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  1737.6  484.26       F
 3188.086848.845  465.18       T
Skew Angle = 10
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CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 229.605

INPUT
Description: Upstream Face of IL 178 Bridge
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	501.42	3.742	481.78	19.726	481.43	103.178	501.92	167.191	502.4
300.14	462.25	334.579	454.65	1372.842	457.27	1668.195	459.02	1864.832	455.39
1922.542	458.61	1931.297	455.46	1969.192	454.36	2006.831	453.33	2016.473	453.12
2040.994	451.18	2060.602	448.94	2071.522	446.94	2075.325	446.94	2093.406	442.94
2107.902	441.94	2126.614	439.94	2141.445	438.94	2162.983	438.94	2176.208	437.94
2181.172	437.94	2202.631	430.94	2240.94	426.94	2254.698	427.94	2264.142	427.94
2314.761	427.94	2348.757	426.94	2372.166	426.94	2427.982	427.94	2455.234	427.94
2512.05	425.94	2554.709	425.94	2554.769	427.94	2574.435	427.94	2612.537	429.94
2627.762	434.94	2663.531	436.94	2688.24	440.94	2706.596	446.48	2722.265	451.49
2742.837	454.93	2806.121	454.87	2815.979	455.88	2869.188	458.04	2891.366	460.34
2900.138	461.42	2930.473	455.6	3028.95	456.21	3127.434	456.01	3225.915	456.23
3324.396	456.59	3422.875	457.63	3521.357	457.85	3619.838	458.53	3718.319	458.51
3816.8	459.02	3915.28	460.23	4002.357	463.84	4013.761	464.08	4026.071	463.91
4109.78	461.54	4208.269	461.42	4306.75	461.69	4329.194	461.94	4372.369	462.04
4395.65	462.13	4436.395	462.24	4502.768	462.34	4881.387	463.14	5979.398	462.29
6750.276	473.46	7372	478.48	6823.841	478.34	6837.205	471.26	6848.845	470.12

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	016.473	.02	32742.837	.14	002.357	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2016.4732742.837 52 52 52 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1896.77	484.26	F
2925.246	848.845	465.18	T

Skew Angle = 10

BRIDGE

RIVER: Illinois River
REACH: Main RS: 229.60

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 49.83
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 10
Bridge Pier Skew = 10
Upstream Deck/Roadway Coordinates
num= 109

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-59.088	526.74		-21.863	524.45		27.378	521.48	
76.618	518.54		125.858	515.52		175.099	512.53	
224.339	509.75		273.58	506.84		322.82	504.04	
372.06	501.43		421.301	499		470.541	496.75	
519.781	494.69		569.022	492.82		618.262	491.13	
667.503	489.62		716.743	488.3		765.982	487.17	
815.224	486.22		864.464	485.46		913.705	484.88	
962.945	484.49		1012.185	484.28		1061.426	484.26	
1110.666	484.42		1159.907	484.77		1209.147	485.3	
1258.387	486.02		1307.628	486.92		1356.868	488.01	
1406.109	489.28		1455.349	490.74		1504.589	492.39	
1553.83	494.22		1603.07	496.2		1652.31	498.2	
1701.551	500.2		1750.791	502.2		1800.032	504.2	
1842.772	505.94		4201842.772	505.94		496.51849.272	506.2	496.7
1898.512	508.2		498.71947.753	510.1		500.61996.993	511.8	502.3
2046.234	513.31		503.812095.474	514.64		505.142144.714	515.77	506.27
2193.957	516.71		507.212243.195	517.47		507.972292.438	518.03	508.53
2341.676	518.4		508.92390.916	518.58		509.082440.157	518.57	509.07
2489.397	518.37		508.872538.637	517.98		508.482587.878	517.4	507.9
2637.118	516.63		507.132686.359	515.67		506.172735.599	514.51	505.01
2784.839	513.17		503.67 2834.08	511.64		502.14 2883.32	509.91	500.41
2932.562	508		498.5 2979.24	506.1		496.4 2979.24	506.1	420
2981.801	506		3031.041	504		3080.282	502	
3129.522	500		3178.762	498		3228.003	496	
3277.243	494		3326.484	492		3375.724	490	

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3424.964     488        3474.205     486        3523.445     484
3572.688     482        3621.926     480        3671.166     478
3720.407     476        3769.647  474.04        3818.887  472.27
3868.128  470.71        3917.368  469.34        3966.609  468.17
4015.849   467.2        4065.089  466.44         4114.33  465.87
 4163.57   465.5        4212.811  465.33        4262.051  465.32
4311.291  465.32         4360.53  465.32        4409.772  465.32
4459.012  465.32         4508.25  465.32        4600.234  465.32
4614.612  465.32        4948.462  465.32        5221.746  465.29
 5296.69  465.18        6171.688  465.22        6296.664   466.5
6334.086  467.03        6383.327  467.98        6432.567  468.94
6728.001  473.63

Upstream Bridge Cross Section Data
Station Elevation Data    num=      80
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  501.42   3.742  481.78  19.726  481.43 103.178  501.92 167.191   502.4
  300.14  462.25 334.579  454.651372.842  457.271668.195  459.021864.832  455.39
1922.542  458.611931.297  455.461969.192  454.362006.831  453.332016.473  453.12
2040.994  451.182060.602  448.942071.522  446.942075.325  446.942093.406  442.94
2107.902  441.942126.614  439.942141.445  438.942162.983  438.942176.208  437.94
2181.172  437.942202.631  430.94 2240.94  426.942254.698  427.942264.142  427.94
2314.761  427.942348.757  426.942372.166  426.942427.982  427.942455.234  427.94
 2512.05  425.942554.709  425.942554.769  427.942574.435  427.942612.537  429.94
2627.762  434.942663.531  436.94 2688.24  440.942706.596  446.482722.265  451.49
2742.837  454.932806.121  454.872815.979  455.882869.188  458.042891.366  460.34
2900.138  461.422930.473   455.6 3028.95  456.213127.434  456.013225.915  456.23
3324.396  456.593422.875  457.633521.357  457.853619.838  458.533718.319  458.51
  3816.8  459.02 3915.28  460.234002.357  463.844013.761  464.084026.071  463.91
 4109.78   461.54208.269  461.42 4306.75  461.694329.194  461.944372.369  462.04
 4395.65  462.134436.395  462.244502.768  462.344881.387  463.145979.398  462.29
6750.276   473.46767.372  478.486823.841  478.346837.205  471.266848.845  470.12

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .12016.473    .0232742.837      .14002.357     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
      2016.4732742.837             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1896.77  484.26       F
 2925.246848.845  465.18       T
Skew Angle = 10

Downstream  Deck/Roadway Coordinates
    num=     103
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  506.84            49.24  504.04           98.481  501.43
 147.721     499         196.962  496.75         246.202  494.69
 295.442  492.82         344.683  491.13         393.923  489.62
 443.163   488.3         492.404  487.17         541.644  486.22
 590.885  485.46         640.125  484.88         689.365  484.49
 738.606  484.28         787.846  484.26         837.087  484.42
 886.327  484.77         935.567   485.3         984.808  486.02
1034.048  486.92        1083.288  488.01        1132.529  489.28
1181.769  490.74         1231.01  492.39         1280.25  494.22
 1329.49   496.2        1378.731   498.2        1427.971   500.2
1477.212   502.2        1526.452   504.2        1569.193  505.94     420
1569.193  505.94   496.51575.692   506.2   496.71624.933   508.2   498.7
1674.173   510.1   500.61723.414   511.8   502.31772.654  513.31  503.81
1821.894  514.64  505.141871.135  515.77  506.271920.375  516.71  507.21
1969.615  517.47  507.972018.856  518.03  508.532068.096   518.4   508.9
2117.337  518.58  509.082166.577  518.57  509.072215.817  518.37  508.87
2265.058  517.98  508.482314.298   517.4   507.92363.539  516.63  507.13
2412.779  515.67  506.172462.019  514.51  505.01 2511.26  513.17  503.67
  2560.5  511.64  502.14 2609.74  509.91  500.412658.981     508   498.5
2705.661   506.1   496.42705.661   506.1     4202708.221     506
2757.462     504        2806.702     502        2855.942     500
2905.183     498        2954.423     496        3003.664     494
3052.904     492        3102.144     490        3151.385     488
3200.625     486        3249.865     484        3299.106     482
3348.346     480        3397.587     478        3446.827     476
3496.067  474.04        3545.308  472.27        3594.548  470.71
3643.789  469.34        3693.029  468.17        3742.269   467.2
 3791.51  466.44         3840.75  465.87         3889.99   465.5
3939.231  465.33        3988.471  465.32        4037.712  465.32
4086.952  465.32        4136.192  465.32        4185.433  465.32
4234.673  465.32         4326.65  465.32        4341.033  465.32
4674.882  465.32        4948.167  465.29         5023.11  465.18
 5898.11  465.22        6023.084   466.5        6060.507  467.03
```

```
6109.747  467.98        6158.987  468.94        6208.228  470.22
6257.468   471.8

Downstream Bridge Cross Section Data
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09 111.037  467.54 221.109  458.17 313.888  455.18 410.862  454.52
 505.246  453.51 603.746  453.01 696.771  455.87 882.831  452.91 904.191  452.36
1000.781   452.21093.038  452.221194.601  452.681289.409  452.731389.022  452.61
1484.608  452.04 1551.86  451.791666.344  455.581700.999  454.661741.908   452.8
1751.746   451.91756.611  451.351764.155  449.851776.642  447.921795.866  443.92
1829.979  440.921871.056  437.921891.816  436.921904.313  434.921931.267  430.92
1954.469  431.041964.209  428.261986.367  426.922027.965  426.922088.935  426.92
2170.841  425.922233.672  425.922290.397  424.922328.706  428.772353.503  432.92
2377.513  435.922409.509  440.922435.124  448.152448.015   451.5 2480.75  454.67
2541.198  455.672551.056  456.352604.303  459.012622.799  460.622626.461  460.51
2635.284  461.952668.376  453.252766.857  453.272865.337  453.862963.818  455.08
3062.299  455.36 3160.78  456.19 3259.26  457.533357.741  458.063456.222  459.43
3554.703  460.443653.186  461.293731.968  465.24 3746.74  466.013763.482  465.81
3786.625  461.143806.223  461.473818.631  461.413850.145  461.223949.118  461.06
4047.599  461.48 4146.08  461.324244.562  461.185324.757  462.355922.244  463.65
6273.328  471.95 6494.52   477.26624.229  479.22 6676.11  467.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .11741.908    .023 2480.75      .13731.968     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
      1741.908 2480.75            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1619.88  484.26       F
 2654.97 6676.11  465.18       T
Skew Angle = 10

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =  465.18
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream     num=       2
     Sta    Elev     Sta    Elev
1842.772   496.5 1955.77     440
Downstream     num=       2
     Sta    Elev     Sta    Elev
1569.193   496.5 1682.19     440

Abutment Data
Upstream     num=       2
     Sta    Elev     Sta    Elev
2866.438     440 2979.24   496.4
Downstream     num=       2
     Sta    Elev     Sta    Elev
 2592.66     4402705.661   496.4

Number of Piers =  2

Pier Data
Pier Station     Upstream=2194.349    Downstream=1920.769
Upstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12     511
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12     511

Pier Data
Pier Station     Upstream=2627.664    Downstream=2354.084
Upstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12     511
Downstream     num=       2
    Width   Elev    Width   Elev
   16.12     420   16.12     511
```

```
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: Illinois River
REACH: Main               RS: 229.595

INPUT
Description: Downstream Face of IL 178 Bridge
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09 111.037  467.54 221.109  458.17 313.888  455.18 410.862  454.52
 505.246  453.51 603.746  453.01 696.771  455.87 882.831  452.91 904.191  452.36
1000.781   452.21093.038  452.221194.601  452.681289.409  452.731389.022  452.61
1484.608  452.04 1551.86  451.791666.344  455.581700.999  454.661741.908   452.8
1751.746   451.91756.611  451.351764.155  449.851776.642  447.921795.866  443.92
1829.979  440.921871.056  437.921891.816  436.921904.313  434.921931.267  430.92
1954.469  431.041964.209  428.261986.367  426.922027.965  426.922088.935  426.92
2170.841  425.922233.672  425.922290.397  424.922328.706  428.772353.503  432.92
2377.513  435.922409.509  440.922435.124  448.152448.015   451.5 2480.75  454.67
2541.198  455.672551.056  456.352604.303  459.012622.799  460.622626.461  460.51
2635.284  461.952668.376  453.252766.857  453.272865.337  453.862963.818  455.08
3062.299  455.36 3160.78  456.19 3259.26  457.533357.741  458.063456.222  459.43
3554.703  460.443653.186  461.293731.968  465.24 3746.74  466.013763.482  465.81
3786.625  461.143806.223  461.473818.631  461.413850.145  461.223949.118  461.06
4047.599  461.48 4146.08  461.324244.562  461.185324.757  462.355922.244  463.65
6273.328  471.95 6494.52   477.26624.229  479.22 6676.11  467.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .11741.908    .023 2480.75      .13731.968     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      1741.908 2480.75             136     243     366             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1619.88  484.26       F
 2654.97 6676.11  465.18       T
Skew Angle = 10

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.56

INPUT
Description: RM 229.56
Station Elevation Data    num=      57
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.09  112.75  467.54  224.52  458.17  318.73  455.18   417.2  454.52
  513.04  453.51  613.06  453.01  707.52  455.87  896.45  452.91  918.14  452.36
 1016.22   452.2  1109.9  452.22 1213.03  452.68  1309.3  452.73 1410.45  452.61
 1507.51  452.04  1575.8  451.79 1675.65  454.53 1736.61  454.96 1747.18  454.74
 1770.21  448.25 1784.23  446.32 1815.79  439.75 1843.09  437.75 1864.35  433.75
 1875.73  431.75 1922.66  429.75 1960.97  429.75 1999.79  427.75 2049.15  426.75
 2108.41  425.75    2164  426.75 2225.18  425.75 2273.02  427.75 2308.65  432.75
 2341.26  438.75  2375.5  441.75 2402.65  444.75 2425.33  448.08 2476.93  453.82
 2553.29   455.6  2563.9  461.18 2599.08  461.24  2622.9   454.7 2722.44  455.28
  2808.4  473.31 3462.28  470.72 3564.82  467.56 3665.02  468.93 3721.19  463.67
 4517.61  465.58  5406.9  462.35  6013.6  463.65  6370.1  471.95  6594.7   477.2
 6726.42  479.22  6779.1  467.48
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1747.18    .023 2476.93     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1747.18 2476.93             482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1450.23  484.26       F
  2808.4  6779.1  473.31       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.445*

INPUT
Description:
Station Elevation Data    num=      93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.57  118.23  464.67  167.25  459.76  235.42  456.96  334.21  455.36
  437.46  454.93  537.96  454.32  642.83  453.96  741.88  455.29   795.2  454.83
  804.76  456.51  939.99  454.74  962.73  454.33 1005.46  454.06 1065.57  453.84
  1163.8  453.59 1196.61  453.56 1271.94  453.47 1372.89  453.15 1387.75  453.09
 1478.95  453.31  1578.9  453.33 1580.72  453.33 1652.33  453.42 1757.03   455.1
 1770.05  455.18 1792.31  455.24 1820.95  455.35 1832.04  455.25 1854.15  448.53
 1855.86  448.12 1870.37  445.66 1871.62   445.4 1891.88  442.57 1903.03  440.89
 1921.48   439.3 1931.27  438.08 1938.45   436.8 1953.27   434.1 1954.93  433.81
 1965.05   432.4 1973.28  431.78 2013.61  429.99  2015.2  429.95 2053.25   429.2
  2065.9  428.64 2093.41  427.64 2111.01  427.28 2144.49   426.6 2158.37  426.34
  2205.8  425.45 2255.18  425.95 2260.55   425.9 2309.53  425.45  2349.8  426.71
 2362.41  427.13 2384.37  428.84  2401.8  430.18 2422.89  432.21 2437.85  434.41
 2454.16   436.1  2469.5   438.7 2475.69  439.63 2487.73  441.55 2500.91  443.71
 2505.71  444.27 2515.75  445.62 2530.78   447.6 2539.55  448.62 2587.81  453.74
 2653.22  455.87 2672.96  456.78 2684.79     460 2700.27  460.56 2710.59  457.59
 2724.02  457.62 2750.58  454.37  2833.3  475.05  2849.3  475.05  2882.9  466.65
 2957.43  466.65 3686.56  465.36  3800.9  463.78 3912.63  464.46 3975.26  461.84
 4863.34  462.79 5854.97  461.17 6531.49  461.83 6929.01  465.98 7179.46   468.6
 7326.34  469.61 7348.82  467.36 7385.08  468.74

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1832.04    .023 2587.81     .04  2849.3    .047 7385.08    .047

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1832.04 2587.81             482     482     482             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 1218.47  484.26       F
  2849.3 7385.08  475.05       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.38

INPUT
Description: RM 229.38
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04     175  455.89  832.03  454.59  842.03  458.09 1052.03  455.82
 1252.03  454.77 1452.03  453.46 1652.03  454.61 1852.03  455.75 1875.33  455.72
 1916.89  455.76 1939.75  448.35  1957.8  444.74 1978.74  443.15 2009.34  440.15
 2026.88  437.15 2043.91  434.15 2062.87  432.15  2106.2  430.15  2158.6  428.15
 2205.22  427.15 2254.17  426.15  2303.2  425.15 2351.06  425.15 2393.88  425.15
 2437.99  426.15 2475.86  427.15 2518.05  428.15  2552.3  432.15  2569.1  436.15
 2589.07  440.15 2603.51  443.15 2619.76  445.15 2645.83  448.28  2698.7  453.66
 2770.85  456.55 2822.76  459.92 2834.15  453.97 2887.76  454.06 2941.28  476.79
 2961.28  476.79 3001.06     460 7951.06     460 7991.06     470

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1916.89    .023  2698.7     .04 2961.28    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1916.89  2698.7             928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

```
       0  991.41  484.26       F
 2941.28 7991.06  476.79       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.175*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   71.48  467.52  154.86  457.88  357.42  456.05  643.36  454.33
  736.27  454.43  745.12  457.37   929.3  456.04  930.95  456.03 1107.94  455.27
 1215.24  454.68 1284.92   454.2 1346.92  454.49  1461.9  454.94 1638.88  455.61
  1659.5  455.56 1696.28  455.54 1719.94  448.59 1726.62   447.3 1738.62  445.01
 1744.69  444.47  1760.3  443.05 1767.44  442.28 1790.65  440.12 1791.97  439.99
 1810.13  437.26 1827.75  434.53 1829.28  434.38 1847.38  432.67 1863.29  431.92
 1892.23  430.51 1906.19  429.92 1946.46  428.43 1960.87   428.1 1994.72  427.51
 2029.12  426.95 2045.38  426.64 2096.13  425.68 2136.02  425.68  2171.7  425.68
 2219.11  426.66 2219.97  426.68 2261.41  427.66 2267.74  427.79 2307.58  428.66
 2313.23  429.18 2345.06  432.32 2348.16  432.91 2363.44  435.76  2377.8  438.03
  2385.3   439.3  2401.1  442.05 2409.02  442.92 2418.88  443.97 2436.15  445.76
 2447.41  446.98 2455.41  447.74 2468.86  449.28 2486.79  451.37 2505.26  453.77
 2551.52  455.22 2579.39  456.11 2632.72  458.89 2644.43  453.93 2699.51  453.97
 2754.49  472.89 2775.04  472.87 2815.91  458.86 2931.68   458.8 3255.51  458.72
 4076.77  458.57 4716.08  458.78 5155.17  458.92  5175.1  459.42 5195.02  458.92
 7901.59     460 7907.39  461.18 7942.68     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1696.28    .023 2505.26    .042 2775.04    .055 5155.17    .062
 7942.68    .062

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1696.28 2505.26            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0 154.275  484.26       F
 2775.04 7942.68  472.87       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 229.*

INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.04   62.19   468.3  134.72  459.87  310.94  456.67  559.69  453.87
  640.52  454.27  648.22  456.66  808.44  456.24  809.88  456.23  963.84  455.77
 1057.19  455.39 1117.81  454.94 1171.75  455.12 1271.77  455.26 1425.74  455.48
 1443.68   455.4 1475.67  455.31 1500.13  448.83 1507.04  447.54 1519.45  445.29
 1525.72  444.64 1541.86  442.96 1549.24  442.09 1573.24  439.96  1574.6  439.84
 1593.37  437.37  1611.6  434.91 1613.17  434.77 1631.88  433.19 1648.34   432.4
 1678.25  430.87 1692.69   430.2 1734.33  428.72 1749.22  428.34 1784.21  427.87
 1819.78  427.42  1836.6  427.13 1889.06  426.21 1920.97  426.21 1949.52  426.21
 2001.01  427.19 2001.95  427.21 2046.96  428.16 2053.84   428.3 2097.11  429.17
 2103.25  429.61 2137.82  432.48 2141.18  432.99 2157.78  435.38 2173.37  437.29
 2181.52  438.45 2198.68  440.95 2207.29   441.8    2218  442.78 2236.76  444.47
 2248.99  445.68 2257.67  446.46 2272.29  448.29 2291.76  450.79 2311.83  453.88
 2359.32  454.97 2387.93  455.67 2442.69  457.86  2454.7  453.88 2511.25  453.88
  2567.7  468.98  2588.8  468.96 2630.76  457.72 2749.62   457.6 3082.09  457.44
 3925.26  457.15 4581.63  457.56 5032.43  457.83 5052.89  458.83 5073.34  457.83
 7852.11     460 7858.07  460.94  7894.3     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1 1475.67    .023 2311.83    .043  2588.8    .055 5032.43     .07
  7894.3     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1475.67 2311.83            928.5   928.5   928.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  2588.8  7894.3  468.96       T

CROSS SECTION
```

RIVER: Illinois River
REACH: Main RS: 228.825*

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	476.04	52.89	469.08	114.58	461.87	264.45	457.28	476.02	453.4
544.76	454.12	551.31	455.94	687.58	456.45	688.8	456.44	819.75	456.27
899.15	456.09	950.7	455.68	996.57	455.75	1081.65	455.59	1212.59	455.34
1227.85	455.23	1255.06	455.09	1280.32	449.08	1287.46	447.78	1300.27	445.56
1306.75	444.81	1323.41	442.86	1331.04	441.9	1355.82	439.8	1357.23	439.68
1376.62	437.48	1395.44	435.29	1397.07	435.16	1416.39	433.7	1433.38	432.88
1464.28	431.22	1479.19	430.48	1522.19	429	1537.57	428.59	1573.71	428.23
1610.44	427.9	1627.81	427.61	1681.99	426.73	1705.93	426.73	1727.33	426.73
1782.92	427.73	1783.92	427.74	1832.51	428.67	1839.93	428.8	1886.63	429.67
1893.26	430.04	1930.57	432.65	1934.21	433.07	1952.13	434.99	1968.95	436.55
1977.75	437.6	1996.27	439.85	2005.56	440.68	2017.12	441.6	2037.37	443.18
2050.56	444.38	2059.94	445.17	2075.71	447.3	2096.73	450.22	2118.39	453.99
2167.12	454.73	2196.47	455.23	2252.65	456.83	2264.98	453.84	2323	453.8
2380.92	465.08	2402.56	465.04	2445.61	456.58	2567.56	456.4	2908.67	456.15
3773.75	455.72	4447.17	456.34	4909.69	456.75	4930.67	458.24	4951.66	456.75
7802.64	459.99	7808.75	460.71	7845.92	470				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1255.06	.023	2118.39	.045	2402.56	.055	4909.69	.078
7845.92	.078								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1255.06	2118.39	928.5	928.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2380.92	7845.92	465.08	T

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 228.65*

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	476.03	43.59	469.87	94.44	463.86	217.97	457.9	392.35	452.93
449.01	453.96	454.4	455.23	566.72	456.65	567.73	456.64	675.66	456.77
741.1	456.8	783.59	456.42	821.4	456.37	891.52	455.92	999.45	455.21
1012.02	455.07	1034.45	454.86	1060.52	449.32	1067.87	448.02	1081.1	445.84
1087.78	444.98	1104.97	442.77	1112.84	441.7	1138.41	439.64	1139.86	439.53
1159.86	437.59	1179.28	435.68	1180.96	435.54	1200.9	434.22	1218.43	433.36
1250.3	431.58	1265.69	430.76	1310.05	429.28	1325.92	428.83	1363.21	428.6
1401.11	428.37	1419.02	428.1	1474.93	427.26	1490.88	427.26	1505.15	427.26
1564.82	428.26	1565.9	428.28	1618.06	429.18	1626.03	429.31	1676.16	430.18
1683.28	430.46	1723.33	432.81	1727.23	433.15	1746.47	434.61	1764.53	435.81
1773.97	436.74	1793.86	438.76	1803.83	439.56	1816.24	440.41	1837.97	441.9
1852.14	443.09	1862.21	443.89	1879.14	446.3	1901.7	449.65	1924.95	454.1
1974.92	454.48	2005.01	454.79	2062.61	455.8	2075.25	453.79	2134.74	453.71
2194.13	461.17	2216.32	461.13	2260.46	455.45	2385.5	455.21	2735.24	454.87
3622.23	454.29	4312.71	455.11	4786.95	455.67	4808.46	457.66	4829.98	455.67
7753.16	459.99	7759.43	460.47	7797.55	470				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1034.45	.023	1924.95	.047	2216.32	.055	4786.95	.085
7797.55	.085								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1034.45	1924.95	928.5	928.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2194.13	7797.55	461.17	T

CROSS SECTION

RIVER: Illinois River
REACH: Main RS: 228.475*

```
INPUT
Description:
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03    34.3  470.65    74.3  465.85  171.48  458.51  308.67  452.47
  353.25   453.8  357.49  454.51  445.86  456.85  446.65  456.85  531.57  457.27
  583.05   457.5  616.48  457.16  646.22     457  701.39  456.24   786.3  455.07
   796.2  454.91  813.84  454.64  840.71  449.56  848.29  448.26  861.92  446.11
  868.81  445.15  886.53  442.67  894.64  441.51  920.99  439.48  922.49  439.37
  943.11   437.7  963.12  436.06  964.86  435.93  985.41  434.74 1003.47  433.84
 1036.33  431.94 1052.19  431.04 1097.91  429.56 1114.27  429.08 1152.71  428.96
 1191.77  428.85 1210.23  428.59 1267.86  427.79 1275.84  427.79 1282.97  427.79
 1346.73  428.79 1347.88  428.81 1403.61  429.68 1412.12  429.81 1465.69  430.69
 1473.29  430.89 1516.09  432.98 1520.26  433.24 1540.81  434.22 1560.11  435.06
  1570.2  435.89 1591.44  437.66  1602.1  438.44 1615.36  439.23 1638.58  440.61
 1653.72  441.79 1664.47   442.6 1682.56  445.31 1706.67  449.07 1731.52  454.21
 1782.71  454.24 1813.55  454.34 1872.58  454.77 1885.53  453.75 1946.49  453.62
 2007.34  457.26 2030.08  457.21 2075.31  454.31 2203.44  454.01 2561.82  453.59
 3470.72  452.87 4178.26  453.89  4664.2  454.58 4686.25  457.07  4708.3  454.58
 7703.69  459.99 7710.11  460.24 7749.17     470

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  813.84    .023 1731.52    .048 2030.08    .055  4664.2    .093
 7749.17    .093

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        813.84 1731.52            928.5   928.5   928.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 2007.34 7749.17  457.26       T

CROSS SECTION


RIVER: Illinois River
REACH: Main               RS: 228.32

INPUT
Description: RM 228.32
Station Elevation Data    num=      39
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  476.03      25  471.43     125  459.13     225     452     325  457.05
     425  458.21  471.05  457.63  593.23  454.41  628.71   448.5  649.84  445.32
  676.44  441.32  703.58  439.32  748.75  436.32  788.52  434.32  838.69  431.32
  902.62  429.32  982.43  429.32 1060.79  428.32 1128.63  429.32 1198.22  430.32
 1263.31  431.32 1313.28  433.32 1355.69  434.32 1400.37  437.32 1439.19  439.32
 1466.74  441.32 1485.99  444.32 1511.64   448.5 1538.08  454.32 1590.51  453.99
 2021.38  452.81  2388.4  452.31 3319.21  451.44  4043.8  452.67 4541.46   453.5
 4564.04  456.49 4586.62   453.5 7660.79     460 7700.79     470

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  593.23    .023 1538.08     .05 4541.46      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        593.23 1538.08               0       0       0              .1       .3
```

SUMMARY OF MANNING'S N VALUES

River:Illinois River

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13
Main	230.23	.1	.04	.023	.1	.04	.1	.023	.04	.1				
Main	230.1*	.1	.047	.031	.062	.078	.035	.072	.048	.023	.06	.099	.08	.08
Main	229.97*	.1	.054	.04	.051	.056	.03	.043	.03	.023	.08	.098	.06	.06
Main	229.84	.1	.04	.011	.023	.1	.04							
Main	229.745*	.1	.044	.019	.023	.1	.058	.04	.04					
Main	229.65	.1	.023	.1	.04									
Main	229.605	.1	.023	.1	.04									
Main	229.60	Bridge												
Main	229.595	.1	.023	.1	.04									
Main	229.56	.1	.023	.04										
Main	229.445*	.1	.023	.04	.047	.047								
Main	229.38	.1	.023	.04	.055									
Main	229.175*	.1	.023	.042	.055	.062	.062							
Main	229.*	.1	.023	.043	.055	.07	.07							
Main	228.825*	.1	.023	.045	.055	.078	.078							
Main	228.65*	.1	.023	.047	.055	.085	.085							
Main	228.475*	.1	.023	.048	.055	.093	.093							
Main	228.32	.1	.023	.05	.1									

SUMMARY OF REACH LENGTHS

River: Illinois River

Reach	River Sta.	Left	Channel	Right
Main	230.23	699.67	699.67	699.67
Main	230.1*	699.67	699.67	699.67
Main	229.97*	699.67	699.67	699.67
Main	229.84	482	482	482
Main	229.745*	482	482	482
Main	229.65	211	211	211
Main	229.605	52	52	52
Main	229.60	Bridge		
Main	229.595	136	243	366
Main	229.56	482	482	482
Main	229.445*	482	482	482
Main	229.38	928.5	928.5	928.5
Main	229.175*	928.5	928.5	928.5
Main	229.*	928.5	928.5	928.5
Main	228.825*	928.5	928.5	928.5
Main	228.65*	928.5	928.5	928.5
Main	228.475*	928.5	928.5	928.5
Main	228.32	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Illinois River

Reach	River Sta.	Contr.	Expan.
Main	230.23	.1	.3
Main	230.1*	.1	.3
Main	229.97*	.1	.3
Main	229.84	.1	.3
Main	229.745*	.1	.3
Main	229.65	.1	.3
Main	229.605	.3	.5
Main	229.60	Bridge	
Main	229.595	.3	.5
Main	229.56	.1	.3
Main	229.445*	.1	.3
Main	229.38	.1	.3
Main	229.175*	.1	.3
Main	229.*	.1	.3
Main	228.825*	.1	.3
Main	228.65*	.1	.3
Main	228.475*	.1	.3
Main	228.32	.1	.3

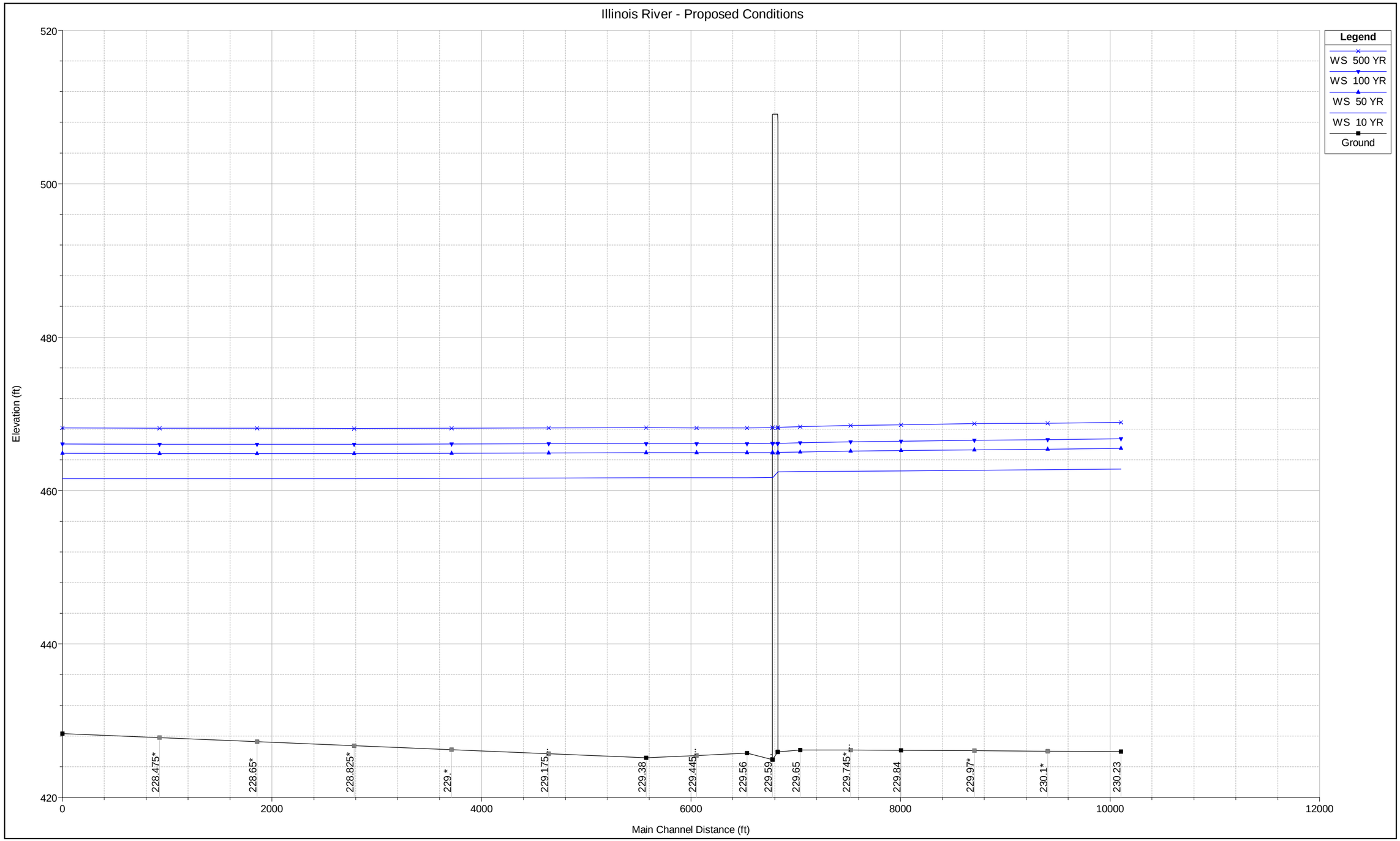
Profile Output Table - Standard Table 1

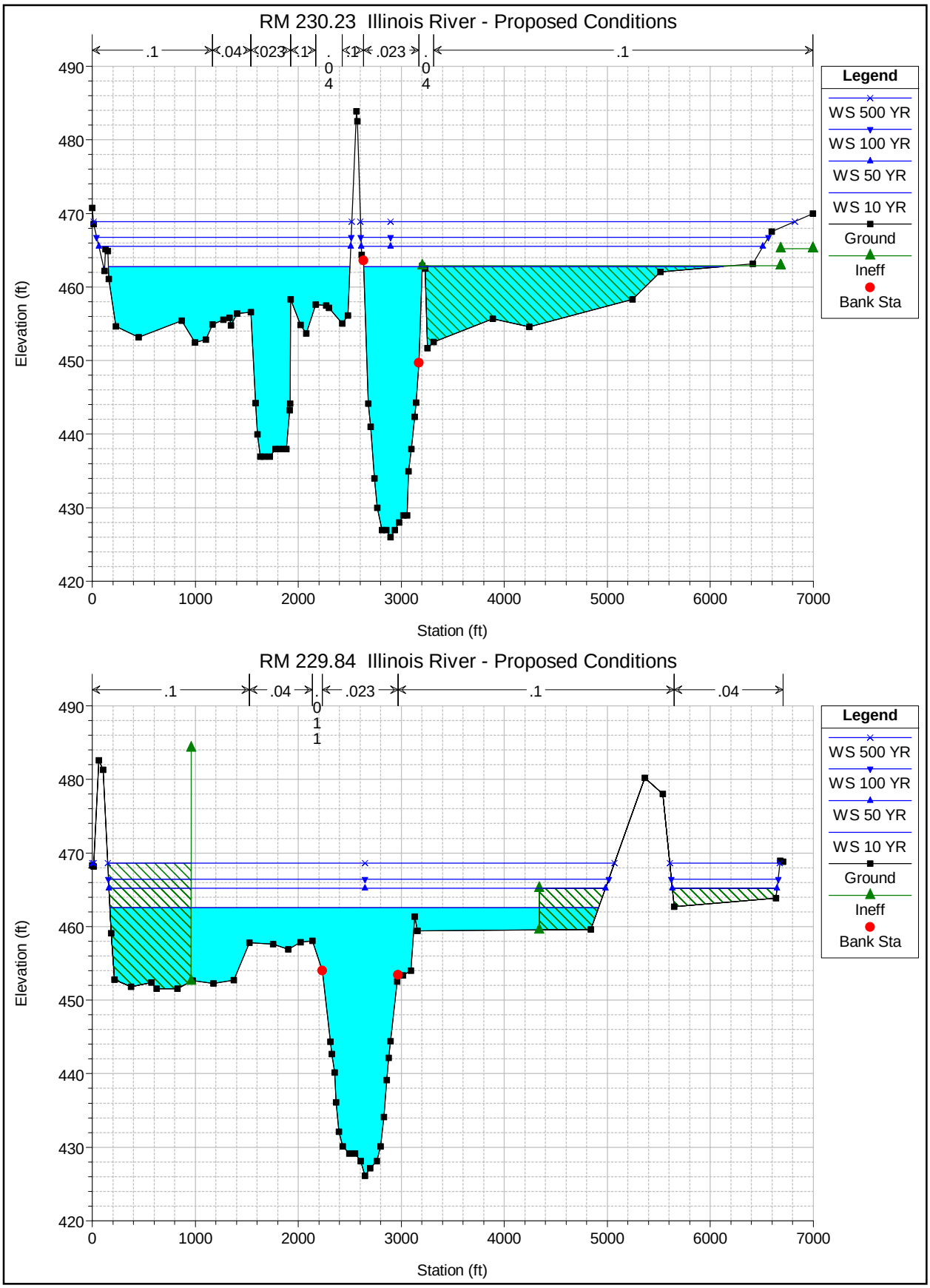
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	230.23	10 YR	94000.00	425.97	462.79	441.93	462.94	0.000039	3.75	39493.93	5835.90	0.12
Main	230.23	50 YR	124000.00	425.97	465.50	443.74	465.65	0.000039	4.00	72079.98	6344.98	0.13
Main	230.23	100 YR	137000.00	425.97	466.74	444.40	466.90	0.000040	4.11	79996.22	6424.50	0.13
Main	230.23	500 YR	163000.00	425.97	468.91	445.63	469.07	0.000041	4.36	94175.20	6724.27	0.13
Main	229.84	10 YR	94000.00	426.13	462.57	440.09	462.83	0.000052	4.23	34183.23	4742.69	0.14
Main	229.84	50 YR	124000.00	426.13	465.20	442.38	465.53	0.000061	4.87	43100.83	5835.90	0.16
Main	229.84	100 YR	137000.00	426.13	466.43	443.28	466.77	0.000062	5.02	49231.79	5890.81	0.16
Main	229.84	500 YR	163000.00	426.13	468.59	444.95	468.94	0.000063	5.30	60119.13	6001.40	0.16
Main	229.65	10 YR	94000.00	426.19	462.47	440.80	462.77	0.000059	4.42	24203.54	4510.25	0.15
Main	229.65	50 YR	124000.00	426.19	465.03	442.82	465.45	0.000075	5.27	27910.57	5878.45	0.17
Main	229.65	100 YR	137000.00	426.19	466.22	443.64	466.69	0.000079	5.55	32801.18	5965.30	0.18
Main	229.65	500 YR	163000.00	426.19	468.34	445.19	468.86	0.000083	5.94	42530.06	6119.45	0.18
Main	229.605	10 YR	94000.00	425.94	462.44	439.57	462.76	0.000057	4.52	22495.74	4351.01	0.15
Main	229.605	50 YR	124000.00	425.94	464.98	441.70	465.43	0.000075	5.46	25100.41	5874.59	0.17
Main	229.605	100 YR	137000.00	425.94	466.16	442.56	466.67	0.000080	5.78	29524.46	5960.44	0.18
Main	229.605	500 YR	163000.00	425.94	468.26	444.11	468.83	0.000085	6.23	38832.71	6113.40	0.19
Main	229.60		Bridge									
Main	229.595	10 YR	94000.00	424.92	461.70	438.68	462.01	0.000057	4.50	22406.67	4416.65	0.15
Main	229.595	50 YR	124000.00	424.92	464.95	440.92	465.38	0.000068	5.29	25771.79	5794.04	0.17
Main	229.595	100 YR	137000.00	424.92	466.13	441.77	466.61	0.000073	5.61	30143.16	5899.44	0.17
Main	229.595	500 YR	163000.00	424.92	468.22	443.34	468.76	0.000079	6.06	39458.32	6021.42	0.18
Main	229.56	10 YR	94000.00	425.75	461.68	439.24	461.99	0.000059	4.53	24185.41	2570.35	0.15
Main	229.56	50 YR	124000.00	425.75	464.94	441.48	465.35	0.000069	5.26	28453.21	4542.58	0.17
Main	229.56	100 YR	137000.00	425.75	466.12	442.33	466.58	0.000073	5.57	30013.64	5069.14	0.17
Main	229.56	500 YR	163000.00	425.75	468.18	443.96	468.74	0.000083	6.17	32752.12	5288.21	0.19
Main	229.38	10 YR	94000.00	425.15	461.67	437.79	461.93	0.000047	4.09	29681.85	7741.58	0.14
Main	229.38	50 YR	124000.00	425.15	464.94	439.86	465.27	0.000054	4.74	35944.84	7798.42	0.15
Main	229.38	100 YR	137000.00	425.15	466.12	440.71	466.49	0.000058	5.01	38224.43	7819.05	0.15
Main	229.38	500 YR	163000.00	425.15	468.19	442.32	468.63	0.000065	5.53	42212.78	7855.08	0.17
Main	228.32	10 YR	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	50 YR	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	100 YR	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	500 YR	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10

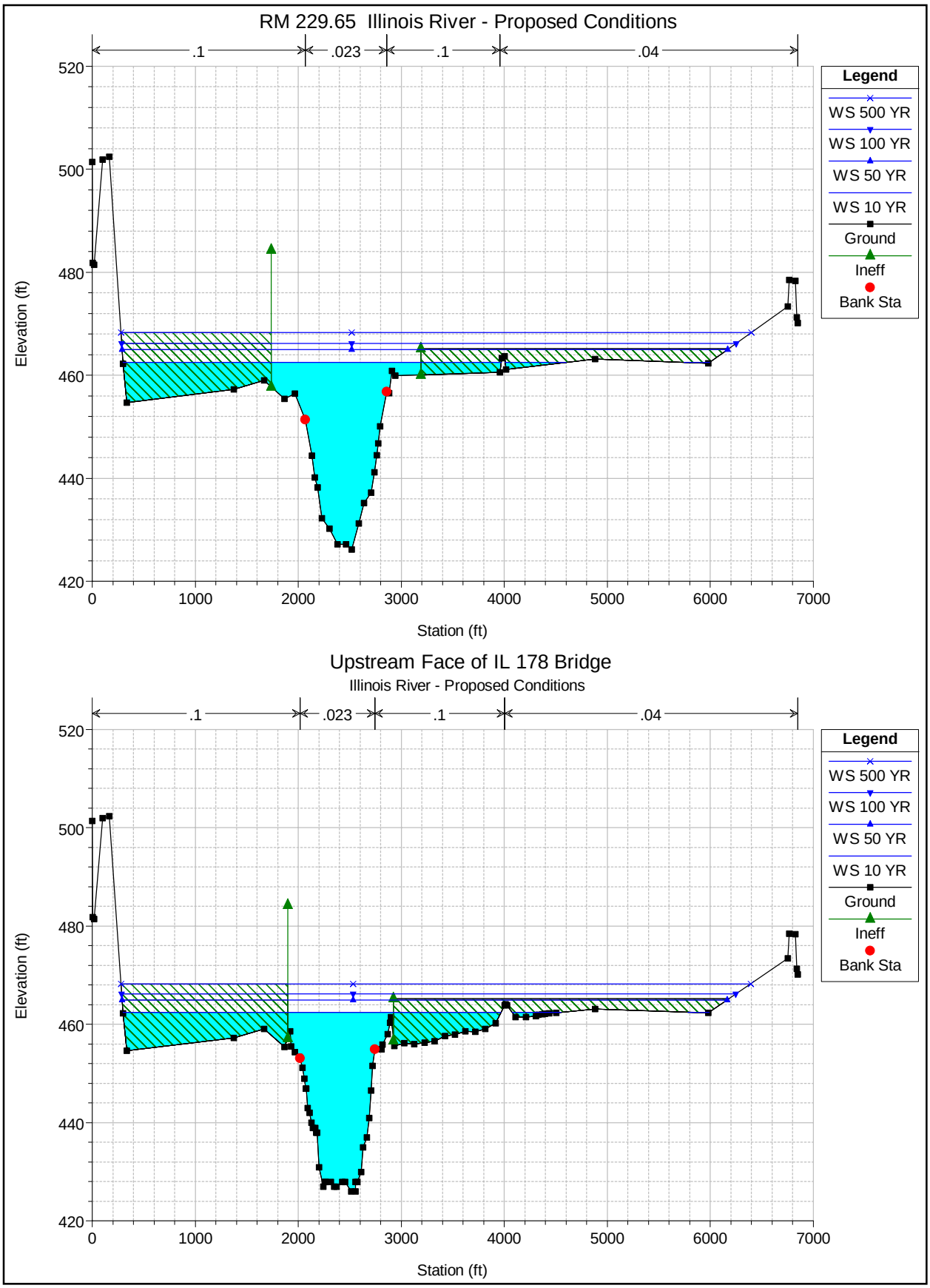
Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Main	230.23	10 YR	462.94	462.79	0.15	0.03	0.00	35738.29	58100.36	161.35	5835.90
Main	230.23	50 YR	465.65	465.50	0.15	0.03	0.01	46653.34	67700.42	9646.24	6344.98
Main	230.23	100 YR	466.90	466.74	0.15	0.03	0.01	52258.21	72395.48	12346.31	6424.50
Main	230.23	500 YR	469.07	468.91	0.16	0.03	0.01	63589.92	81874.99	17535.08	6724.27
Main	229.84	10 YR	462.83	462.57	0.25	0.03	0.00	7118.95	85617.87	1263.19	4742.69
Main	229.84	50 YR	465.53	465.20	0.32	0.03	0.00	13543.28	107835.70	2620.98	5835.90
Main	229.84	100 YR	466.77	466.43	0.33	0.03	0.00	16811.71	115829.20	4359.08	5890.81
Main	229.84	500 YR	468.94	468.59	0.35	0.03	0.01	23294.52	130648.10	9057.36	6001.40
Main	229.65	10 YR	462.77	462.47	0.30	0.01	0.00	944.89	92849.98	205.14	4510.25
Main	229.65	50 YR	465.45	465.03	0.42	0.02	0.00	1792.89	121523.10	684.00	5878.45
Main	229.65	100 YR	466.69	466.22	0.47	0.02	0.00	2240.67	133222.80	1536.55	5965.30
Main	229.65	500 YR	468.86	468.34	0.51	0.02	0.01	3103.75	152675.20	7221.10	6119.45
Main	229.605	10 YR	462.76	462.44	0.32			360.97	93283.78	355.25	4351.01
Main	229.605	50 YR	465.43	464.98	0.46	0.00	0.01	679.47	122562.50	758.07	5874.59
Main	229.605	100 YR	466.67	466.16	0.51	0.00	0.01	849.89	134844.20	1305.95	5960.44
Main	229.605	500 YR	468.83	468.26	0.57	0.00	0.02	1178.31	154927.30	6894.37	6113.40
Main	229.60		Bridge								
Main	229.595	10 YR	462.01	461.70	0.31	0.01	0.00	364.23	93406.23	229.54	4416.65
Main	229.595	50 YR	465.38	464.95	0.43	0.02	0.01	743.72	122633.20	623.07	5794.04
Main	229.595	100 YR	466.61	466.13	0.48	0.02	0.01	920.17	134917.30	1162.58	5899.44
Main	229.595	500 YR	468.76	468.22	0.54	0.02	0.00	1258.39	155235.40	6506.21	6021.42
Main	229.56	10 YR	461.99	461.68	0.31	0.03	0.01	1228.11	91546.81	1225.07	2570.35

Main	229.56	50 YR	465.35	464.94	0.41	0.03	0.01	2260.68	118825.40	2913.89	4542.58
Main	229.56	100 YR	466.58	466.12	0.46	0.03	0.01	2732.91	130534.40	3732.71	5069.14
Main	229.56	500 YR	468.74	468.18	0.56	0.04	0.02	3707.18	153815.90	5476.91	5288.21
Main	229.38	10 YR	461.93	461.67	0.25	0.04	0.01	2321.01	90724.77	954.21	7741.58
Main	229.38	50 YR	465.27	464.94	0.33	0.05	0.01	4784.44	117069.40	2146.16	7798.42
Main	229.38	100 YR	466.49	466.12	0.37	0.05	0.01	5934.59	128350.70	2714.71	7819.05
Main	229.38	500 YR	468.63	468.19	0.44	0.06	0.02	8332.15	150753.60	3914.27	7855.08
Main	228.32	10 YR	461.65	461.55	0.10			575.87	72490.02	20934.11	7561.67
Main	228.32	50 YR	464.95	464.85	0.10			1248.00	86206.04	36545.96	7601.69
Main	228.32	100 YR	466.15	466.05	0.10			1552.00	92104.02	43343.99	7616.25
Main	228.32	500 YR	468.26	468.15	0.11			2173.37	103867.30	56959.29	7641.72


Illinois River - Proposed Conditions
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Elevation (ft)
520
500
480
460
440
420
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)
228.475*
228.65*
228.825*
229.*
229.175*
229.38
229.445*
229.56
229.59
229.65
229.745*
229.84
229.97*
230.1*
230.23


RM 230.23 Illinois River - Proposed Conditions
.1
.04
.023
.1
.04
.023
.04
.1
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RM 229.84 Illinois River - Proposed Conditions
.1
.04
.023
.1
.04
.011
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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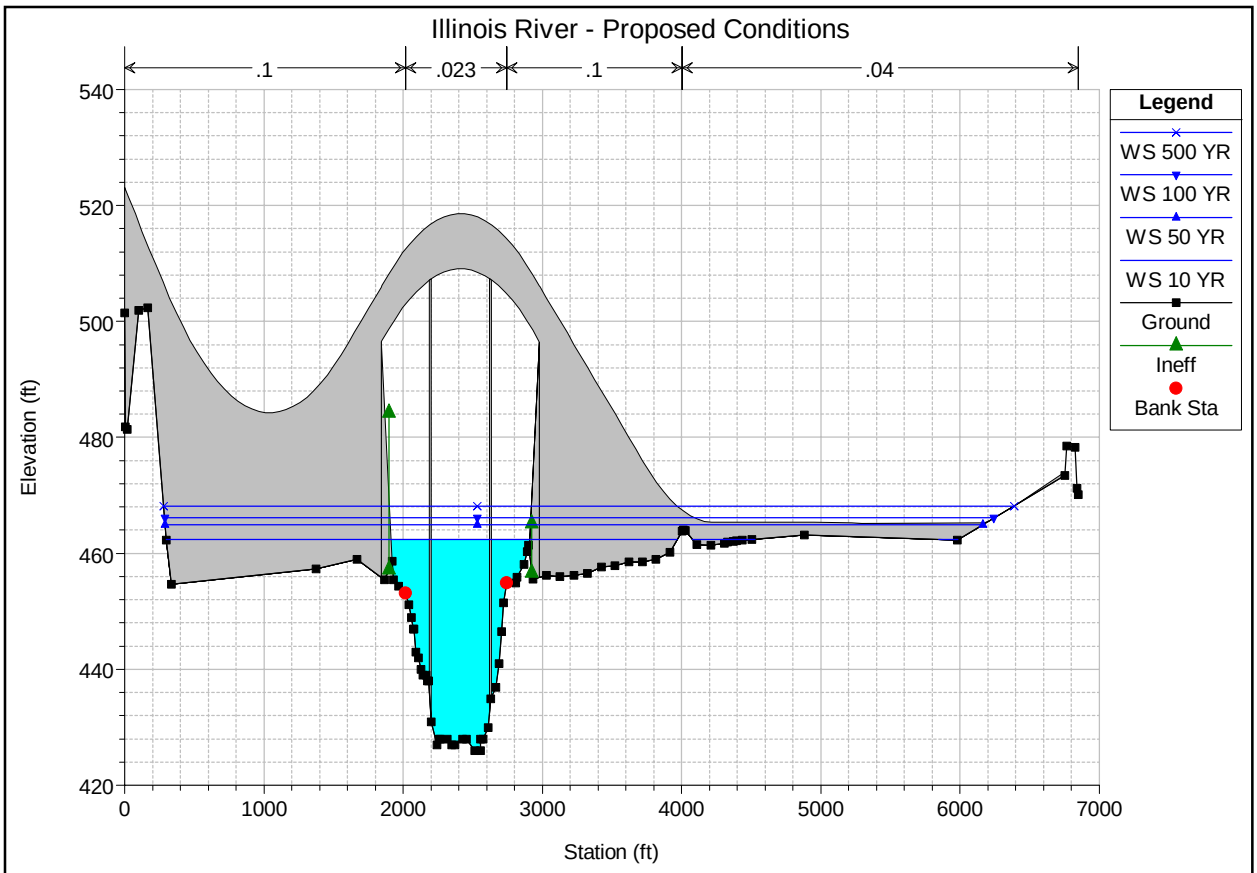
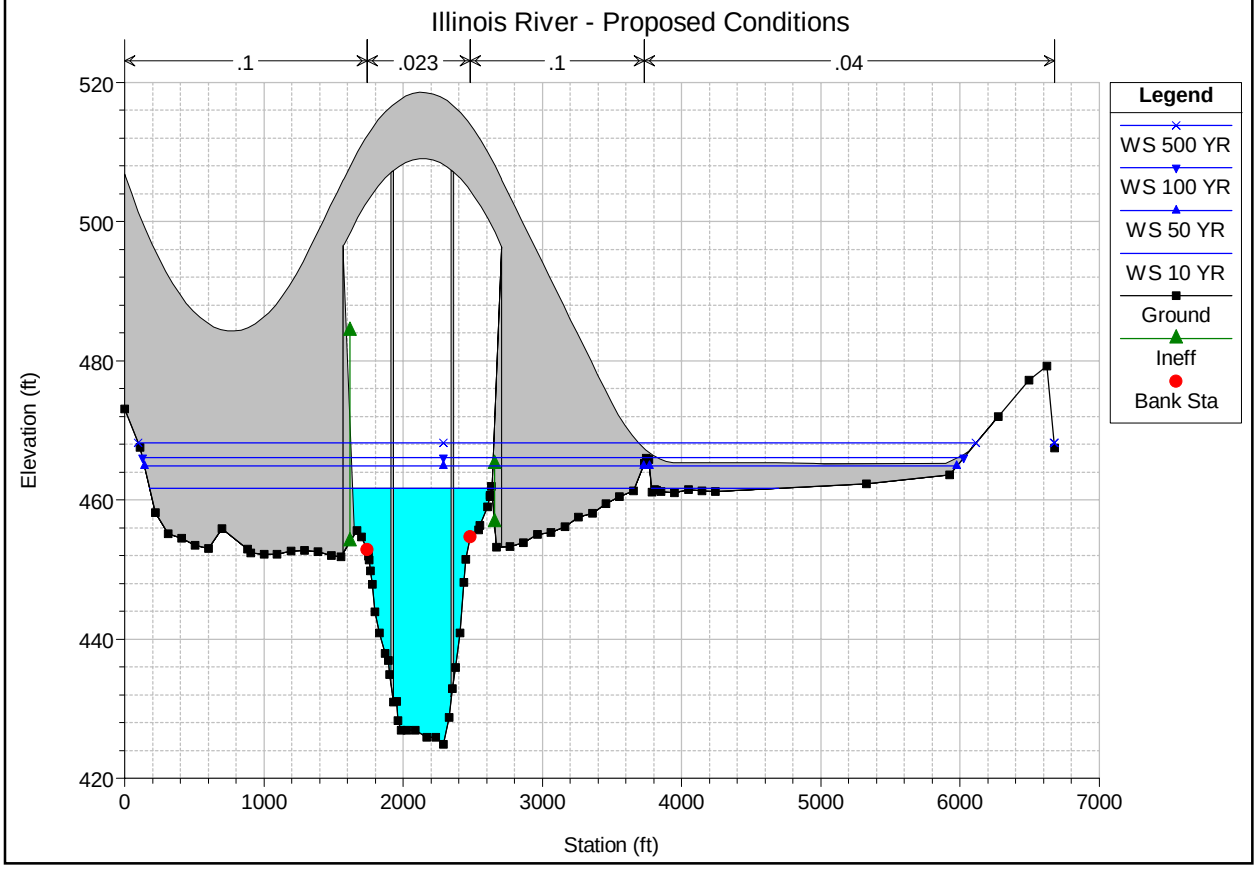
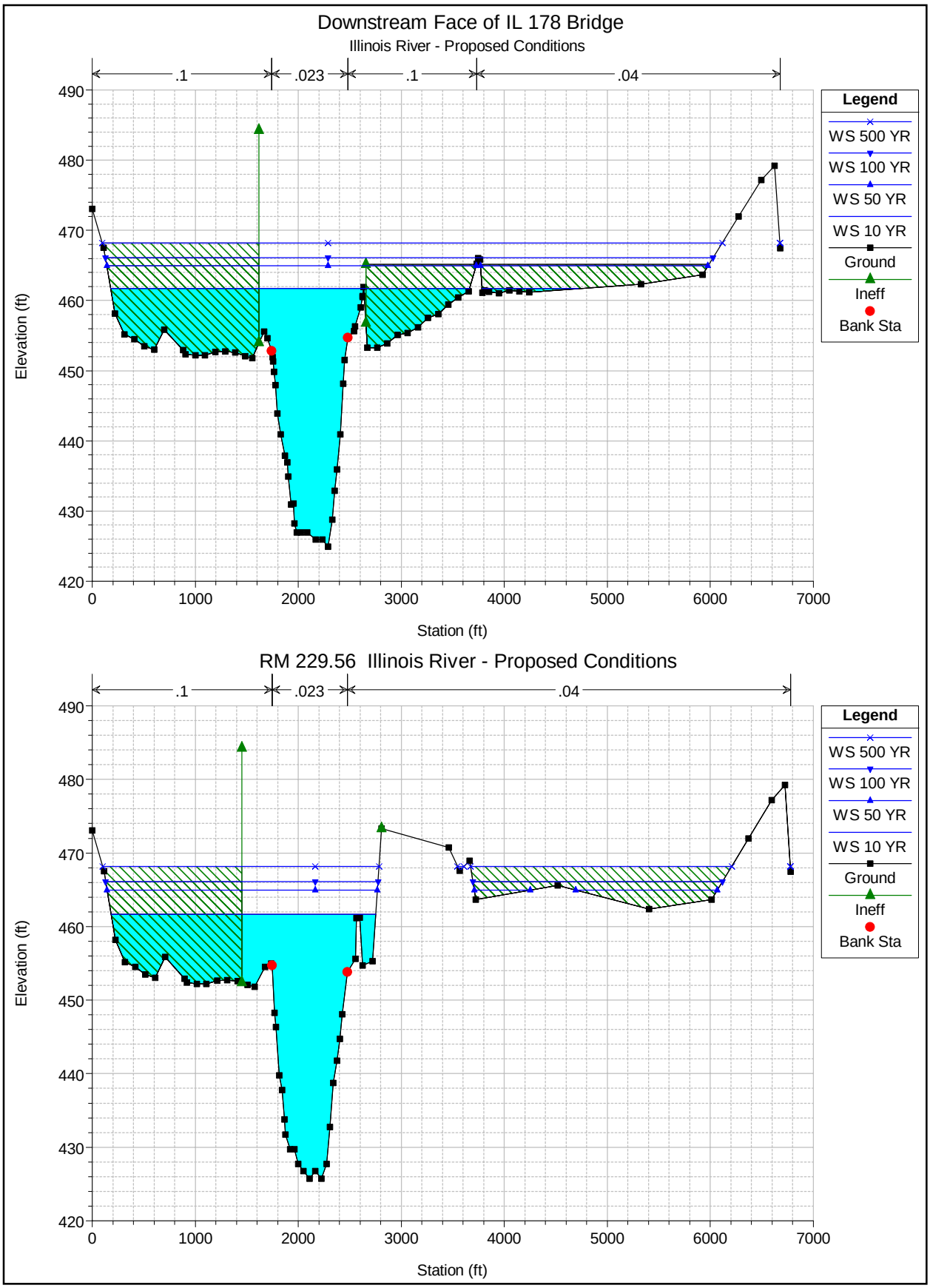
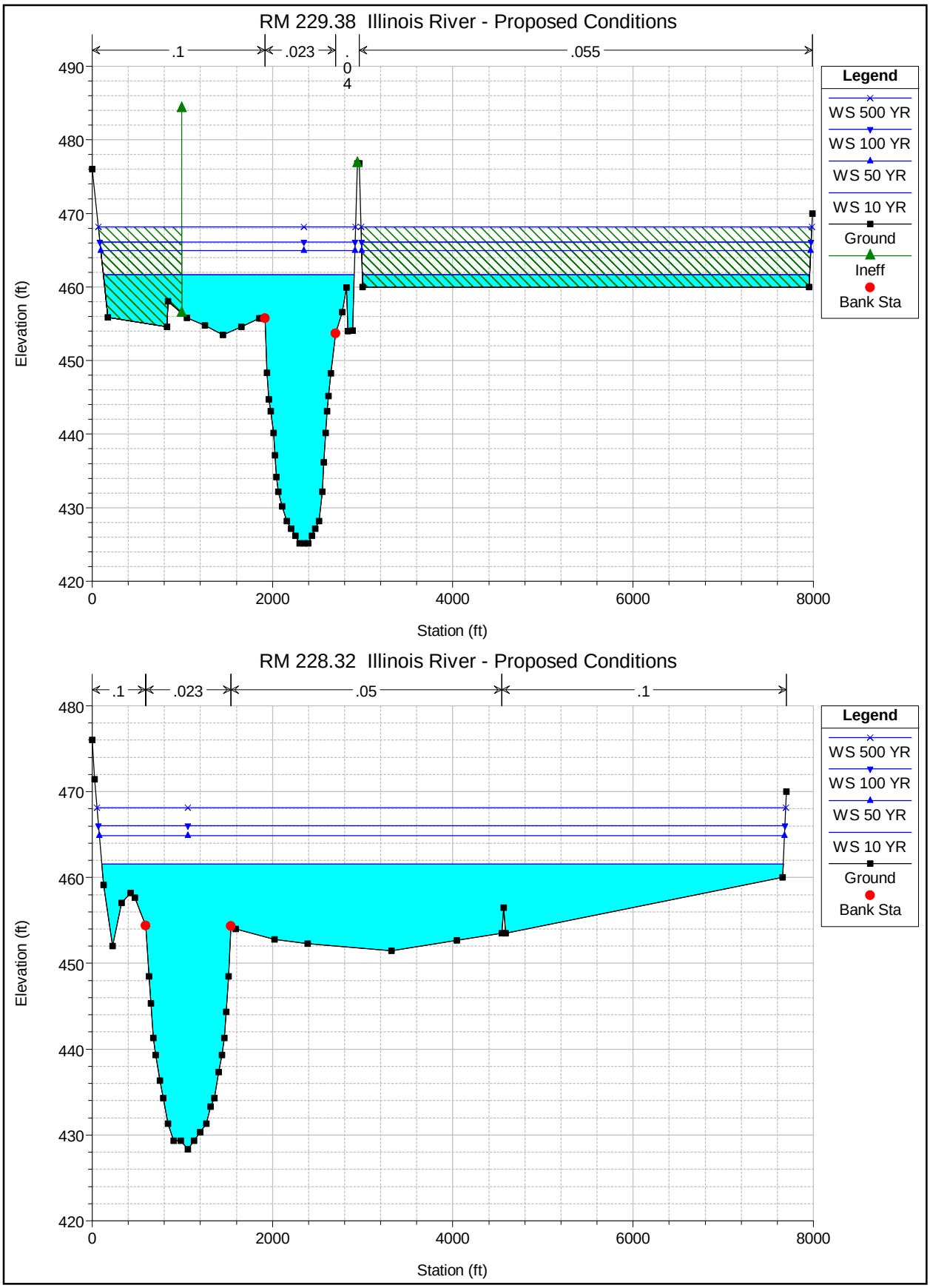
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000
Upstream Face of IL 178 Bridge
Illinois River - Proposed Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Illinois River - Proposed Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Illinois River - Proposed Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
520
500
480
460
440
420
0
1000
2000
3000
4000
5000
6000
7000


Downstream Face of IL 178 Bridge
Illinois River - Proposed Conditions
.1
.023
.1
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
490
480
470
460
450
440
430
420
0
1000
2000
3000
4000
5000
6000
7000
RM 229.56 Illinois River - Proposed Conditions
.1
.023
.04
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


RM 229.38 Illinois River - Proposed Conditions
.1
.023
.04
.055
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RM 228.32 Illinois River - Proposed Conditions
.1
.023
.05
.1
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

10D – SUMMARY TABLE – EXISTING – PROPOSED – AND WORST CASE SCENARIO DURING CONSTRUCTION

HEC-RAS River: Illinois River Reach: Main

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	230.23	10 YR	Existing	94000.00	425.97	462.93	441.93	463.05	0.000035	3.54	56046.36	5958.44	0.12
Main	230.23	10 YR	Natural	94000.00	425.97	462.03	441.93	462.20	0.000044	3.91	37290.86	5192.98	0.13
Main	230.23	10 YR	Proposed-D	94000.00	425.97	462.79	441.93	462.94	0.000039	3.75	39493.93	5835.90	0.12
Main	230.23	10 YR	Prop-D WorstCase	94000.00	425.97	462.93	441.93	463.05	0.000035	3.54	56053.27	5959.40	0.12
Main	230.23	50 YR	Existing	124000.00	425.97	465.51	443.74	465.66	0.000039	3.99	72153.00	6345.71	0.13
Main	230.23	50 YR	Natural	124000.00	425.97	465.40	443.74	465.55	0.000040	4.02	71436.68	6338.47	0.13
Main	230.23	50 YR	Proposed-D	124000.00	425.97	465.50	443.74	465.65	0.000039	4.00	72079.98	6344.98	0.13
Main	230.23	50 YR	Prop-D WorstCase	124000.00	425.97	465.56	443.74	465.71	0.000039	3.98	72448.96	6348.70	0.13
Main	230.23	100 YR	Existing	137000.00	425.97	466.75	444.40	466.91	0.000040	4.11	80074.45	6425.28	0.13
Main	230.23	100 YR	Natural	137000.00	425.97	466.62	444.40	466.78	0.000040	4.14	79221.66	6416.76	0.13
Main	230.23	100 YR	Proposed-D	137000.00	425.97	466.74	444.40	466.90	0.000040	4.11	79996.22	6424.50	0.13
Main	230.23	100 YR	Prop-D WorstCase	137000.00	425.97	466.81	444.40	466.96	0.000039	4.09	80404.75	6428.58	0.13
Main	230.23	500 YR	Existing	163000.00	425.97	468.92	445.63	469.09	0.000041	4.35	94269.82	6726.72	0.13
Main	230.23	500 YR	Natural	163000.00	425.97	468.77	445.63	468.93	0.000042	4.39	93214.77	6699.33	0.13
Main	230.23	500 YR	Proposed-D	163000.00	425.97	468.91	445.63	469.07	0.000041	4.36	94175.20	6724.27	0.13
Main	230.23	500 YR	Prop-D WorstCase	163000.00	425.97	468.97	445.63	469.14	0.000041	4.34	94600.74	6735.29	0.13
Main	229.84	10 YR	Existing	94000.00	426.13	462.70	440.09	462.94	0.000051	4.19	35227.84	4769.11	0.14
Main	229.84	10 YR	Natural	94000.00	426.13	461.83		462.08	0.000054	4.23	40396.54	4721.16	0.14
Main	229.84	10 YR	Proposed-D	94000.00	426.13	462.57	440.09	462.83	0.000052	4.23	34183.23	4742.69	0.14
Main	229.84	10 YR	Prop-D WorstCase	94000.00	426.13	462.70	440.09	462.95	0.000051	4.21	34589.87	4767.73	0.14
Main	229.84	50 YR	Existing	124000.00	426.13	465.22	442.38	465.54	0.000060	4.84	44053.47	5836.66	0.16
Main	229.84	50 YR	Natural	124000.00	426.13	465.17		465.43	0.000053	4.54	58262.45	5834.57	0.15
Main	229.84	50 YR	Proposed-D	124000.00	426.13	465.20	442.38	465.53	0.000061	4.87	43100.83	5835.90	0.16
Main	229.84	50 YR	Prop-D WorstCase	124000.00	426.13	465.26	442.38	465.58	0.000060	4.85	43401.12	5838.60	0.16
Main	229.84	100 YR	Existing	137000.00	426.13	466.45	443.28	466.78	0.000061	5.00	50251.45	5891.65	0.16
Main	229.84	100 YR	Natural	137000.00	426.13	466.39		466.66	0.000053	4.65	65419.07	5889.07	0.15
Main	229.84	100 YR	Proposed-D	137000.00	426.13	466.43	443.28	466.77	0.000062	5.02	49231.79	5890.81	0.16
Main	229.84	100 YR	Prop-D WorstCase	137000.00	426.13	466.50	443.28	466.83	0.000061	5.00	49566.50	5893.80	0.16
Main	229.84	500 YR	Existing	163000.00	426.13	468.61	444.94	468.96	0.000062	5.27	61253.95	6002.42	0.16
Main	229.84	500 YR	Natural	163000.00	426.13	468.54		468.81	0.000053	4.87	78152.88	5999.03	0.15
Main	229.84	500 YR	Proposed-D	163000.00	426.13	468.59	444.95	468.94	0.000063	5.30	60119.13	6001.40	0.16
Main	229.84	500 YR	Prop-D WorstCase	163000.00	426.13	468.65	444.95	469.01	0.000062	5.28	60457.13	6004.59	0.16
Main	229.65	10 YR	Existing	94000.00	426.19	462.59	440.80	462.89	0.000058	4.39	24704.46	4726.31	0.15
Main	229.65	10 YR	Natural	94000.00	426.19	461.73		462.02	0.000062	4.42	31712.30	3938.16	0.15
Main	229.65	10 YR	Proposed-D	94000.00	426.19	462.47	440.80	462.77	0.000059	4.42	24203.54	4510.25	0.15
Main	229.65	10 YR	Prop-D WorstCase	94000.00	426.19	462.59	440.80	462.89	0.000059	4.40	24377.95	4726.09	0.15
Main	229.65	50 YR	Existing	124000.00	426.19	465.04	442.83	465.46	0.000075	5.26	28489.31	5879.56	0.17
Main	229.65	50 YR	Natural	124000.00	426.19	465.05		465.37	0.000063	4.84	49259.57	5879.73	0.16
Main	229.65	50 YR	Proposed-D	124000.00	426.19	465.03	442.82	465.45	0.000075	5.27	27910.57	5878.45	0.17
Main	229.65	50 YR	Prop-D WorstCase	124000.00	426.19	465.09	442.82	465.51	0.000074	5.26	27997.51	5882.81	0.17
Main	229.65	100 YR	Existing	137000.00	426.19	466.24	443.64	466.70	0.000078	5.53	33500.90	5966.59	0.18
Main	229.65	100 YR	Natural	137000.00	426.19	466.26		466.60	0.000063	4.96	56480.93	5968.35	0.16
Main	229.65	100 YR	Proposed-D	137000.00	426.19	466.22	443.64	466.69	0.000079	5.55	32801.18	5965.30	0.18
Main	229.65	100 YR	Prop-D WorstCase	137000.00	426.19	466.29	443.64	466.75	0.000078	5.53	33107.76	5970.23	0.18
Main	229.65	500 YR	Existing	163000.00	426.19	468.36	445.16	468.87	0.000082	5.92	43348.87	6121.00	0.18
Main	229.65	500 YR	Natural	163000.00	426.19	468.41		468.75	0.000063	5.19	69439.94	6124.16	0.16
Main	229.65	500 YR	Proposed-D	163000.00	426.19	468.34	445.19	468.86	0.000083	5.94	42530.06	6119.45	0.18
Main	229.65	500 YR	Prop-D WorstCase	163000.00	426.19	468.41	445.19	468.92	0.000082	5.92	42848.76	6124.41	0.18
Main	229.605	10 YR	Existing	94000.00	425.94	462.56	439.56	462.87	0.000057	4.50	22615.82	4572.46	0.15
Main	229.605	10 YR	Natural	94000.00	425.94	461.71		462.00	0.000058	4.45	34236.00	3854.70	0.15
Main	229.605	10 YR	Proposed-D	94000.00	425.94	462.44	439.57	462.76	0.000057	4.52	22495.74	4351.01	0.15
Main	229.605	10 YR	Prop-D WorstCase	94000.00	425.94	462.56	439.57	462.88	0.000057	4.50	22619.38	4579.00	0.15
Main	229.605	50 YR	Existing	124000.00	425.94	464.98	441.69	465.44	0.000074	5.45	25109.63	5875.24	0.17
Main	229.605	50 YR	Natural	124000.00	425.94	465.02		465.36	0.000060	4.90	51557.48	5878.17	0.16
Main	229.605	50 YR	Proposed-D	124000.00	425.94	464.98	441.70	465.43	0.000075	5.46	25100.41	5874.59	0.17
Main	229.605	50 YR	Prop-D WorstCase	124000.00	425.94	465.04	441.70	465.49	0.000074	5.45	25162.08	5878.95	0.17
Main	229.605	100 YR	Existing	137000.00	425.94	466.17	442.56	466.68	0.000079	5.78	29570.14	5961.20	0.18
Main	229.605	100 YR	Natural	137000.00	425.94	466.24		466.58	0.000060	5.04	58767.11	5966.67	0.16
Main	229.605	100 YR	Proposed-D	137000.00	425.94	466.16	442.56	466.67	0.000080	5.78	29524.46	5960.44	0.18
Main	229.605	100 YR	Prop-D WorstCase	137000.00	425.94	466.22	442.56	466.73	0.000079	5.77	29820.85	5965.39	0.18
Main	229.605	500 YR	Existing	163000.00	425.94	468.27	444.11	468.85	0.000085	6.23	38888.02	6114.29	0.19
Main	229.605	500 YR	Natural	163000.00	425.94	468.38		468.73	0.000061	5.29	71706.08	6122.29	0.16
Main	229.605	500 YR	Proposed-D	163000.00	425.94	468.26	444.11	468.83	0.000085	6.23	38832.71	6113.40	0.19
Main	229.605	500 YR	Prop-D WorstCase	163000.00	425.94	468.33	444.11	468.90	0.000084	6.21	39142.19	6118.40	0.19
Main	229.60			Bridge									
Main	229.595	10 YR	Existing	94000.00	424.92	461.69	438.69	462.01	0.000057	4.50	22404.25	4414.37	0.15
Main	229.595	10 YR	Natural	94000.00	424.92	461.74		461.99	0.000049	4.18	39584.81	4457.25	0.14
Main	229.595	10 YR	Proposed-D	94000.00	424.92	461.70	438.68	462.01	0.000057	4.50	22406.67	4416.65	0.15
Main	229.595	10 YR	Prop-D WorstCase	94000.00	424.92	461.69	438.68	462.01	0.000057	4.50	22403.90	4414.04	0.15
Main	229.595	50 YR	Existing	124000.00	424.92	464.94	440.93	465.37	0.000068	5.29	25768.25	5793.77	0.17
Main	229.595	50 YR	Natural	124000.00	424.92	465.06		465.34	0.000051	4.59	57556.31	5802.64	0.14
Main	229.595	50 YR	Proposed-D	124000.00	424.92	464.95	440.92	465.38	0.000068	5.29	25771.79	5794.04	0.17
Main	229.595	50 YR	Prop-D WorstCase	124000.00	424.92	464.94	440.92	465.37	0.000068	5.29	25768.47	5793.79	0.17
Main	229.595	100 YR	Existing	137000.00	424.92	466.12	441.78	466.61	0.000073	5.61	30127.02	5899.25	0.17
Main	229.595	100 YR	Natural	137000.00	424.92	466.27		466.56	0.000052	4.72	64682.20	5907.33	0.15
Main	229.595	100 YR	Proposed-D	137000.00	424.92	466.13	441.77	466.61	0.000073	5.61	30143.16	5899.44	0.17
Main	229.595	100 YR	Prop-D WorstCase	137000.00	424.92	466.12	441.77	466.61	0.000073	5.61	30128.09	5899.26	0.17
Main	229.595	500 YR	Existing	163000.00	424.92	468.22	443.37	468.76	0.000079	6.06	39455.16	6021.37	0.18
Main	229.595	500 YR	Natural	163000.00	424.92	468.41		468.72	0.000052	4.97	77451.70	6034.32	0.15
Main	229.595	500 YR	Proposed-D	163000.00	424.92	468.22	443.34	468.76	0.000079	6.06	39458.32	6021.42	0.18
Main	229.595	500 YR	Prop-D WorstCase	163000.00	424.92	468.22	443.34	468.76	0.000079	6.07	39440.20	6021.15	0.18

HEC-RAS River: Illinois River Reach: Main (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	229.56	10 YR	Existing	94000.00	425.75	461.68	439.24	461.99	0.000059	4.54	23894.67	2570.33	0.15
Main	229.56	10 YR	Natural	94000.00	425.75	461.71		461.98	0.000054	4.32	34206.63	2570.77	0.14
Main	229.56	10 YR	Proposed-D	94000.00	425.75	461.68	439.24	461.99	0.000059	4.53	24185.41	2570.35	0.15
Main	229.56	10 YR	Prop-D WorstCase	94000.00	425.75	461.68	439.24	461.99	0.000059	4.53	24185.41	2570.35	0.15
Main	229.56	50 YR	Existing	124000.00	425.75	464.94	441.48	465.35	0.000069	5.28	28061.22	4541.40	0.17
Main	229.56	50 YR	Natural	124000.00	425.75	464.99		465.32	0.000060	4.92	42723.01	4577.84	0.16
Main	229.56	50 YR	Proposed-D	124000.00	425.75	464.94	441.48	465.35	0.000069	5.26	28453.21	4542.58	0.17
Main	229.56	50 YR	Prop-D WorstCase	124000.00	425.75	464.94	441.48	465.35	0.000069	5.26	28453.21	4542.58	0.17
Main	229.56	100 YR	Existing	137000.00	425.75	466.12	442.35	466.58	0.000074	5.58	29584.89	5069.01	0.17
Main	229.56	100 YR	Natural	137000.00	425.75	466.18		466.54	0.000063	5.17	45862.33	5073.09	0.16
Main	229.56	100 YR	Proposed-D	137000.00	425.75	466.12	442.33	466.58	0.000073	5.57	30013.64	5069.14	0.17
Main	229.56	100 YR	Prop-D WorstCase	137000.00	425.75	466.12	442.33	466.58	0.000073	5.57	30013.64	5069.14	0.17
Main	229.56	500 YR	Existing	163000.00	425.75	468.18	443.96	468.74	0.000083	6.18	32258.88	5287.73	0.19
Main	229.56	500 YR	Natural	163000.00	425.75	468.26		468.69	0.000069	5.66	51409.92	5302.93	0.17
Main	229.56	500 YR	Proposed-D	163000.00	425.75	468.18	443.96	468.74	0.000083	6.17	32752.12	5288.21	0.19
Main	229.56	500 YR	Prop-D WorstCase	163000.00	425.75	468.18	443.96	468.74	0.000083	6.17	32752.12	5288.21	0.19
Main	229.38	10 YR	Existing	94000.00	425.15	461.67	437.79	461.93	0.000047	4.10	29516.04	7741.57	0.14
Main	229.38	10 YR	Natural	94000.00	425.15	461.68		461.92	0.000045	4.02	34786.75	7741.72	0.13
Main	229.38	10 YR	Proposed-D	94000.00	425.15	461.67	437.79	461.93	0.000047	4.09	29681.85	7741.58	0.14
Main	229.38	10 YR	Prop-D WorstCase	94000.00	425.15	461.67	437.79	461.93	0.000047	4.09	29681.85	7741.58	0.14
Main	229.38	50 YR	Existing	124000.00	425.15	464.94	439.84	465.27	0.000054	4.74	35677.82	7798.41	0.15
Main	229.38	50 YR	Natural	124000.00	425.15	464.96		465.26	0.000051	4.60	43954.08	7798.74	0.14
Main	229.38	50 YR	Proposed-D	124000.00	425.15	464.94	439.86	465.27	0.000054	4.74	35944.84	7798.42	0.15
Main	229.38	50 YR	Prop-D WorstCase	124000.00	425.15	464.94	439.86	465.27	0.000054	4.74	35944.84	7798.42	0.15
Main	229.38	100 YR	Existing	137000.00	425.15	466.12	440.71	466.49	0.000058	5.01	37920.59	7819.04	0.15
Main	229.38	100 YR	Natural	137000.00	425.15	466.15		466.48	0.000054	4.84	47314.24	7819.46	0.15
Main	229.38	100 YR	Proposed-D	137000.00	425.15	466.12	440.71	466.49	0.000058	5.01	38224.43	7819.05	0.15
Main	229.38	100 YR	Prop-D WorstCase	137000.00	425.15	466.12	440.71	466.49	0.000058	5.01	38224.43	7819.05	0.15
Main	229.38	500 YR	Existing	163000.00	425.15	468.19	442.32	468.63	0.000065	5.54	41844.41	7855.06	0.17
Main	229.38	500 YR	Natural	163000.00	425.15	468.23		468.62	0.000060	5.30	53225.90	7855.67	0.16
Main	229.38	500 YR	Proposed-D	163000.00	425.15	468.19	442.32	468.63	0.000065	5.53	42212.78	7855.08	0.17
Main	229.38	500 YR	Prop-D WorstCase	163000.00	425.15	468.19	442.32	468.63	0.000065	5.53	42212.78	7855.08	0.17
Main	228.32	10 YR	Existing	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	10 YR	Natural	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	10 YR	Proposed-D	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	10 YR	Prop-D WorstCase	94000.00	428.32	461.55	439.89	461.65	0.000025	2.88	70050.67	7561.67	0.10
Main	228.32	50 YR	Existing	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	50 YR	Natural	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	50 YR	Proposed-D	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	50 YR	Prop-D WorstCase	124000.00	428.32	464.85	441.62	464.95	0.000024	3.05	95070.36	7601.69	0.10
Main	228.32	100 YR	Existing	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	100 YR	Natural	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	100 YR	Proposed-D	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	100 YR	Prop-D WorstCase	137000.00	428.32	466.05	442.28	466.15	0.000024	3.13	104201.00	7616.25	0.10
Main	228.32	500 YR	Existing	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10
Main	228.32	500 YR	Natural	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10
Main	228.32	500 YR	Proposed-D	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10
Main	228.32	500 YR	Prop-D WorstCase	163000.00	428.32	468.15	443.53	468.26	0.000025	3.31	120221.90	7641.72	0.10

SECTION 11

SCOUR ANALYSIS

PARSONS BRINCKERHOFF Computation Sheet

page 1 of 1 | 16870A
made by PMK
date 2/3/2012
checked by SJV
date 2/24/2012

subject IL 178 OVER ILLINOIS RIVER
CONTRACTION SCOUR

- DETERMINE WHETHER TO APPLY LIVE-BED OR CLEAR-WATER CONTRACTION SCOUR

FOR SAND USE D_{50} = 0.6 mm, WHICH CORRESPONDS TO BASE n_b = 0.023 USED IN HEC-RAS, MAIN CHANNEL

COMPUTE CRITICAL VELOCITY, V_c (USE EQ 10-1, IDOT DRAINAGE MANUAL):

$$V_c = 11.17 y^{1/6} D^{1/3}$$

FOR y USE AVERAGE DEPTH OF FLOW UPSTREAM OF THE BRIDGE (USE APPROACH XS → RM 230.23)

FROM HEC-RAS FOR Q_{100} HYDRAULIC DEPTH IN CHANNEL = 32.63', V_{ave} = 4.09 FT/S

$$V_c = 11.17 (32.63)^{1/6} \left(0.6\ mm \times \frac{m}{1000\ mm} \times \frac{3.28'}{1\ m}\right)^{1/3}$$

$$= 2.5\ FT/S$$

$V_{ave} > V_c$ THEREFORE APPLY LIVE-BED CONTRACTION SCOUR

11A – PROPOSED CONDITIONS

10-yr Proposed

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	10.10	28.72	6.56
	Approach Velocity (ft/s):	1.50	3.75	0.77
	Br Average Depth (ft):	7.30	28.34	5.54
	BR Opening Flow (cfs):	374.89	93245.67	379.44
	BR Top WD (ft):	105.49	694.12	168.39
	Grain Size D50 (mm):	0.60	0.60	0.60
	Approach Flow (cfs):	35738.29	58100.36	161.35
	Approach Top WD (ft):	2356.45	538.94	31.82
	K1 Coefficient:	0.590	0.640	0.590
Results				
	Scour Depth Ys (ft):	0.00	8.30	0.00
	Critical Velocity (ft/s):			
	Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data

	Pier Shape:	Square nose
	Pier Width (ft):	10.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	36.50
	Velocity Upstream (ft/s):	5.12
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	49.83
	K2 Angle Coef:	1.49
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	

Results

	Scour Depth Ys (ft):	22.76
	Froude #:	0.15
	Equation:	CSU equation

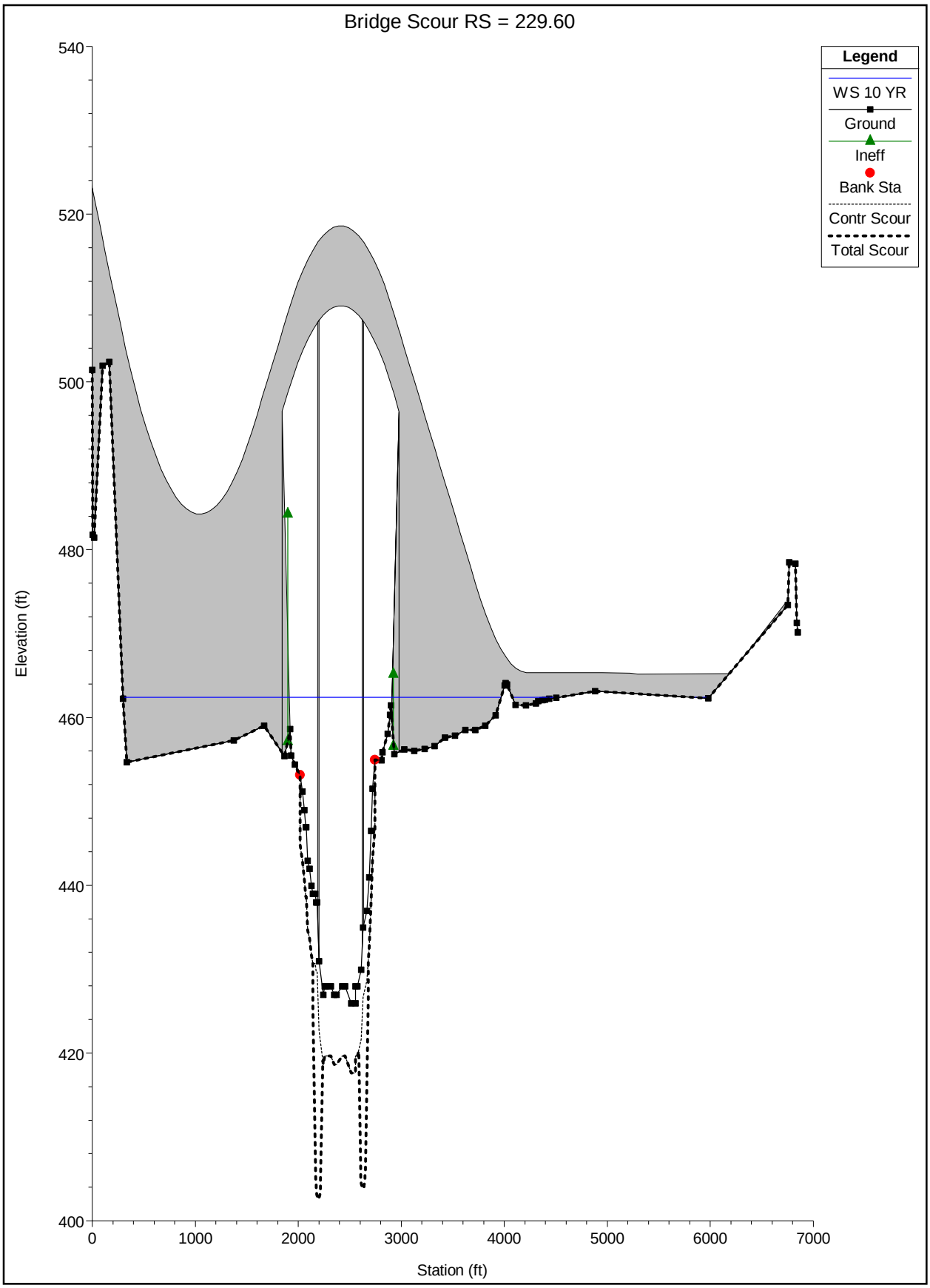
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	1918.95	2906.74
	Toe Sta at appr (ft):	1969.55	3024.71
	Abutment Length (ft):	1824.52	3088.16
	Depth at Toe (ft):	4.03	2.29
	K1 Shape Coef:	1.00 - Vertical abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	1824.52	3088.16
	Avg Depth Obstructed Ya (ft):	10.81	6.36
	Flow Obstructed Qe (cfs):	31118.71	12483.01
	Area Obstructed Ae (sq ft):	19715.35	19640.35
Results			
	Scour Depth Ys (ft):	0.00	0.00

Froude #:	0.00	0.00
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):		
	Channel:	31.06
Left abutment scour + contraction scour (ft):	0.00	
Right abutment scour + contraction scour (ft):	0.00	


Bridge Scour RS = 229.60
Legend
WS 10 YR
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
400
0
1000
2000
3000
4000
5000
6000
7000

50-yr Proposed

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	12.30	31.33	7.43
	Approach Velocity (ft/s):	1.54	4.00	0.39
	Br Average Depth (ft):	9.44	30.86	7.86
	BR Opening Flow (cfs):	689.81	122506.00	804.16
	BR Top WD (ft):	110.54	694.12	173.44
	Grain Size D50 (mm):	0.60	0.60	0.60
	Approach Flow (cfs):	46653.34	67700.42	9646.24
	Approach Top WD (ft):	2466.38	540.95	3337.64
	K1 Coefficient:	0.590	0.640	0.590
Results				
	Scour Depth Ys (ft):	0.00	13.54	0.00
	Critical Velocity (ft/s):			
	Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	10.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	39.03
	Velocity Upstream (ft/s):	6.15
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	49.83
	K2 Angle Coef:	1.49
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	24.85
	Froude #:	0.17
	Equation:	CSU equation

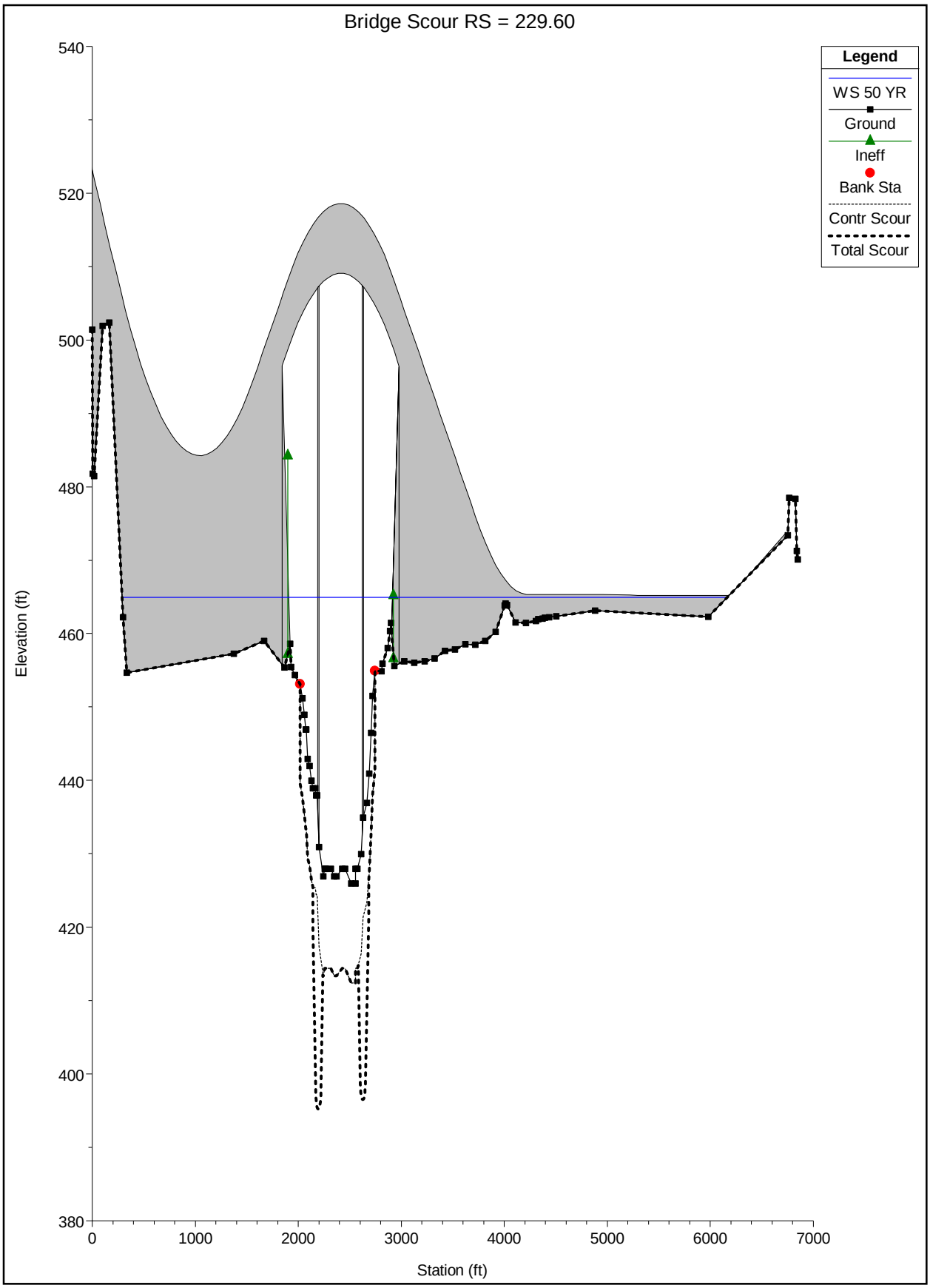
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	1918.95	2906.74
	Toe Sta at appr (ft):	1969.55	3024.71
	Abutment Length (ft):	1905.78	3485.30
	Depth at Toe (ft):	6.57	4.82
	K1 Shape Coef:	1.00 - Vertical abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	1905.78	3485.30
	Avg Depth Obstructed Ya (ft):	12.99	8.29
	Flow Obstructed Qe (cfs):	40025.90	24352.25
	Area Obstructed Ae (sq ft):	24759.05	28888.48
Results			
	Scour Depth Ys (ft):	0.00	0.00

Froude #:	0.00	0.00
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):		
	Channel:	38.39
Left abutment scour + contraction scour (ft):	0.00	
Right abutment scour + contraction scour (ft):	0.00	


Bridge Scour RS = 229.60
Legend
WS 50 YR
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
400
380
0
1000
2000
3000
4000
5000
6000
7000

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	13.40	32.57	8.55
	Approach Velocity (ft/s):	1.56	4.11	0.43
	Br Average Depth (ft):	10.40	32.04	1.42
	BR Opening Flow (cfs):	857.48	134522.90	1619.64
	BR Top WD (ft):	112.89	694.12	2324.30
	Grain Size D50 (mm):	0.60	0.60	0.60
	Approach Flow (cfs):	52258.21	72395.48	12346.31
	Approach Top WD (ft):	2493.05	540.95	3390.50
	K1 Coefficient:	0.590	0.640	0.590
Results				
	Scour Depth Ys (ft):	0.00	15.18	0.45
	Critical Velocity (ft/s):			
	Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	10.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	40.21
	Velocity Upstream (ft/s):	6.50
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	49.83
	K2 Angle Coef:	1.49
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	25.56
	Froude #:	0.18
	Equation:	CSU equation

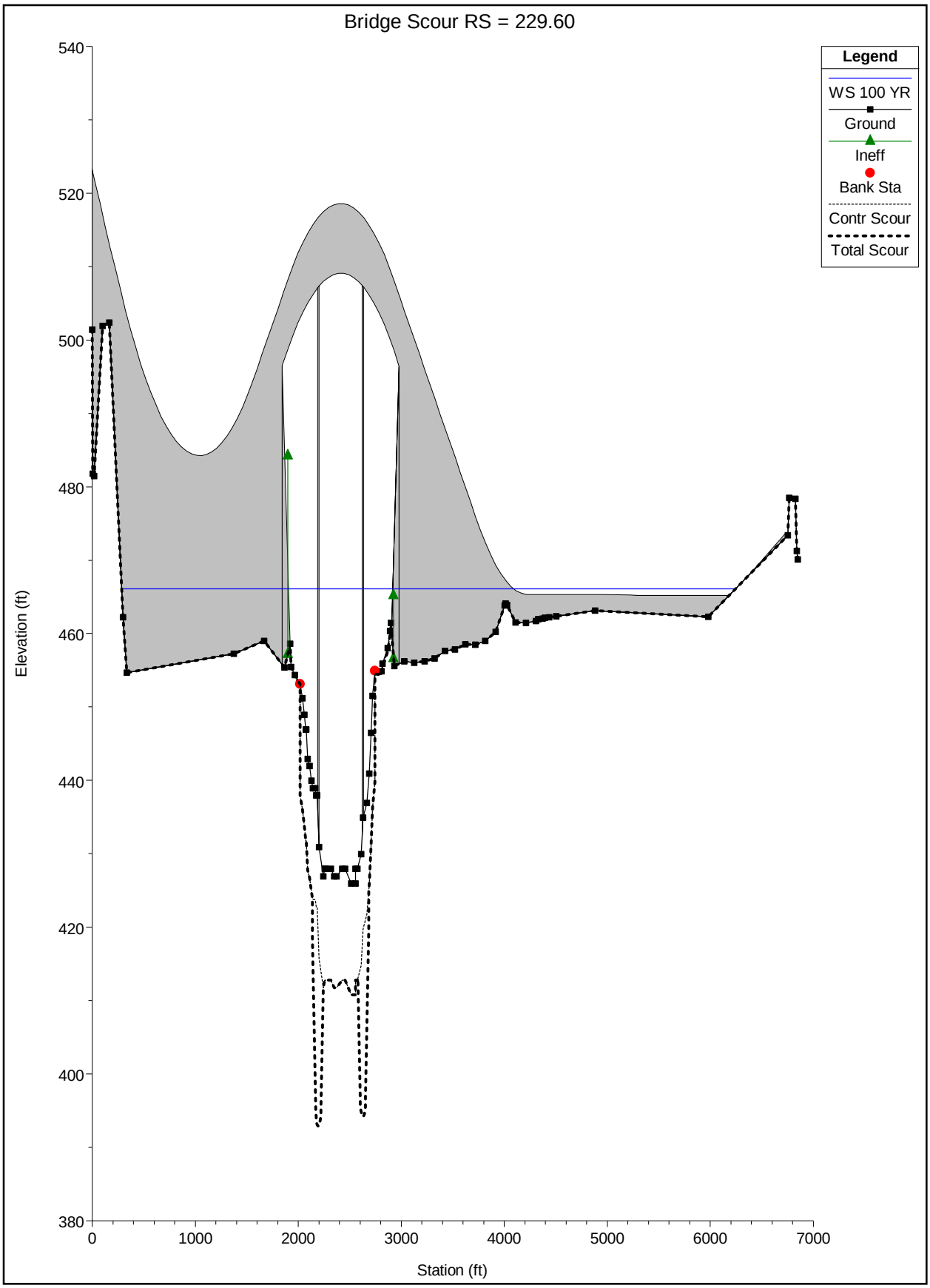
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	1918.95	2906.74
	Toe Sta at appr (ft):	1969.55	3024.71
	Abutment Length (ft):	1925.89	3538.15
	Depth at Toe (ft):	7.75	6.00
	K1 Shape Coef:	1.00 - Vertical abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	1925.89	3538.15
	Avg Depth Obstructed Ya (ft):	14.09	9.40
	Flow Obstructed Qe (cfs):	44562.68	28222.25
	Area Obstructed Ae (sq ft):	27134.43	33242.55
Results			
	Scour Depth Ys (ft):	0.00	0.00

Froude #:	0.00	0.00
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):		
	Channel:	40.74
Left abutment scour + contraction scour (ft):	0.00	
Right abutment scour + contraction scour (ft):	0.45	


Bridge Scour RS = 229.60
Legend
WS 100 YR
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
400
380
0
1000
2000
3000
4000
5000
6000
7000

500-yr Proposed

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	15.32	34.73	10.02
	Approach Velocity (ft/s):	1.64	4.36	0.48
	Br Average Depth (ft):	12.08	34.13	3.25
	BR Opening Flow (cfs):	1189.70	155148.70	6661.56
	BR Top WD (ft):	117.06	694.12	2602.00
	Grain Size D50 (mm):	0.60	0.60	0.60
	Approach Flow (cfs):	63589.92	81874.99	17535.08
	Approach Top WD (ft):	2536.32	540.95	3647.00
	K1 Coefficient:	0.590	0.640	0.590
Results				
	Scour Depth Ys (ft):	0.00	17.07	2.09
	Critical Velocity (ft/s):			
	Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	10.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	42.32
	Velocity Upstream (ft/s):	6.98
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	49.83
	K2 Angle Coef:	1.49
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	26.54
	Froude #:	0.19
	Equation:	CSU equation

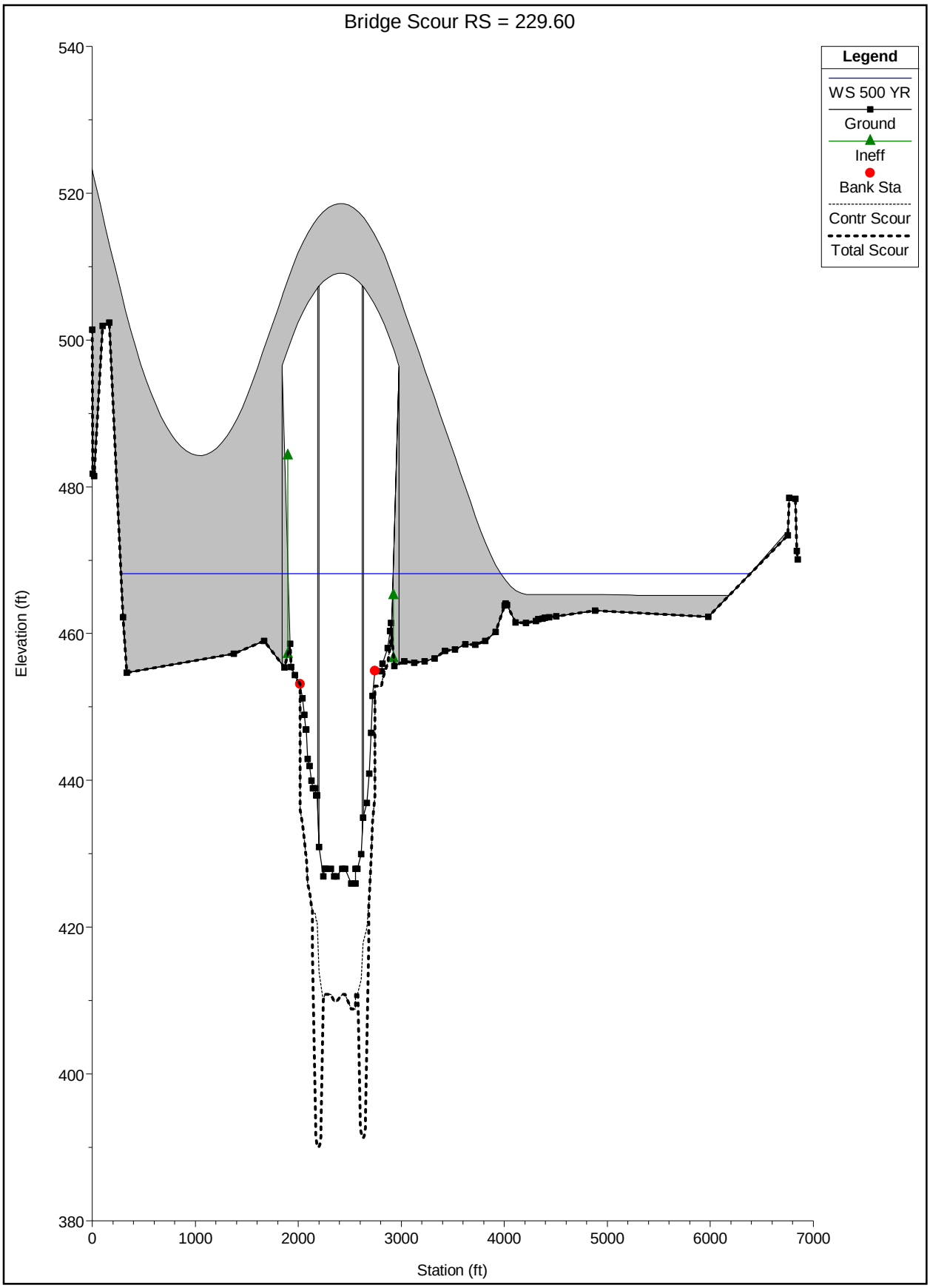
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	1918.95	2906.74
	Toe Sta at appr (ft):	1969.55	3024.71
	Abutment Length (ft):	1957.70	3656.94
	Depth at Toe (ft):	9.85	8.11
	K1 Shape Coef:	1.00 - Vertical abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	1957.70	3656.94
	Avg Depth Obstructed Ya (ft):	16.01	11.23
	Flow Obstructed Qe (cfs):	53718.95	35755.66
	Area Obstructed Ae (sq ft):	31343.80	41060.90
Results			
	Scour Depth Ys (ft):	0.00	0.00

Froude #:	0.00	0.00
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):		
	Channel:	43.62
Left abutment scour + contraction scour (ft):	0.00	
Right abutment scour + contraction scour (ft):	2.09	


Bridge Scour RS = 229.60
Legend
WS 500 YR
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
400
380
0
1000
2000
3000
4000
5000
6000
7000

11B – WORST CASE SCENARIO DURING CONSTRUCTION

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	10.23	28.84	5.35
	Approach Velocity (ft/s):	1.41	3.54	0.30
	Br Average Depth (ft):	7.44	28.24	5.83
	BR Opening Flow (cfs):	311.30	93298.37	390.33
	BR Top WD (ft):	78.06	658.14	137.22
	Grain Size D50 (mm):	0.60	0.60	0.60
	Approach Flow (cfs):	34100.51	55060.71	4838.79
	Approach Top WD (ft):	2359.99	539.29	3060.11
	K1 Coefficient:	0.590	0.640	0.590
Results				
	Scour Depth Ys (ft):	0.00	11.66	0.00
	Critical Velocity (ft/s):			
	Equation:	Live	Live	Live

Pier Scour

Pier: #1 (CL = 1926.481)

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	9.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	36.62
	Velocity Upstream (ft/s):	5.09
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	36.00
	K2 Angle Coef:	1.40
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	19.94
	Froude #:	0.15
	Equation:	CSU equation

Pier: #2 (CL = 2012.159)

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	10.00
	Grain Size D50 (mm):	0.60000
	Depth Upstream (ft):	36.62
	Velocity Upstream (ft/s):	5.09
	K1 Nose Shape:	1.00
	Pier Angle:	10.00
	Pier Length (ft):	36.00
	K2 Angle Coef:	1.36
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	20.74

Froude #:	0.15
Equation:	CSU equation

Pier: #3 (CL = 2194.349)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	10.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	49.83
K2 Angle Coef:	1.49
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	22.73
Froude #:	0.15
Equation:	CSU equation

Pier: #4 (CL = 2224.878)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	10.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	36.00
K2 Angle Coef:	1.36
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	20.74
Froude #:	0.15
Equation:	CSU equation

Pier: #5 (CL = 2597.135)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	10.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	36.00
K2 Angle Coef:	1.36
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees	
Results	
Scour Depth Ys (ft):	20.74
Froude #:	0.15
Equation:	CSU equation

Pier: #6 (CL = 2627.664)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	10.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	49.83
K2 Angle Coef:	1.49
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	
Results	
Scour Depth Ys (ft):	22.73
Froude #:	0.15
Equation:	CSU equation

Pier: #7 (CL = 2809.853)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	10.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	36.00
K2 Angle Coef:	1.36
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	
Results	
Scour Depth Ys (ft):	20.74
Froude #:	0.15
Equation:	CSU equation

Pier: #8 (CL = 2895.532)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	9.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	36.62
Velocity Upstream (ft/s):	5.09
K1 Nose Shape:	1.00
Pier Angle:	10.00
Pier Length (ft):	36.00
K2 Angle Coef:	1.40

K3 Bed Cond Coef:	1.10	
Grain Size D90 (mm):		
K4 Armouring Coef:	1.00	
Set K1 value to 1.0 because angle > 5 degrees		

Results

Scour Depth Ys (ft):	19.94	
Froude #:	0.15	
Equation:	CSU equation	

Abutment Scour

	Left	Right

Input Data

Station at Toe (ft):	1918.95	2906.74
Toe Sta at appr (ft):	1969.55	3024.71
Abutment Length (ft):	1827.66	3207.77
Depth at Toe (ft):	4.15	2.41
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	1827.66	3207.77
Avg Depth Obstructed Ya (ft):	10.93	6.26
Flow Obstructed Qe (cfs):	29667.79	16531.56
Area Obstructed Ae (sq ft):	19967.35	20074.80

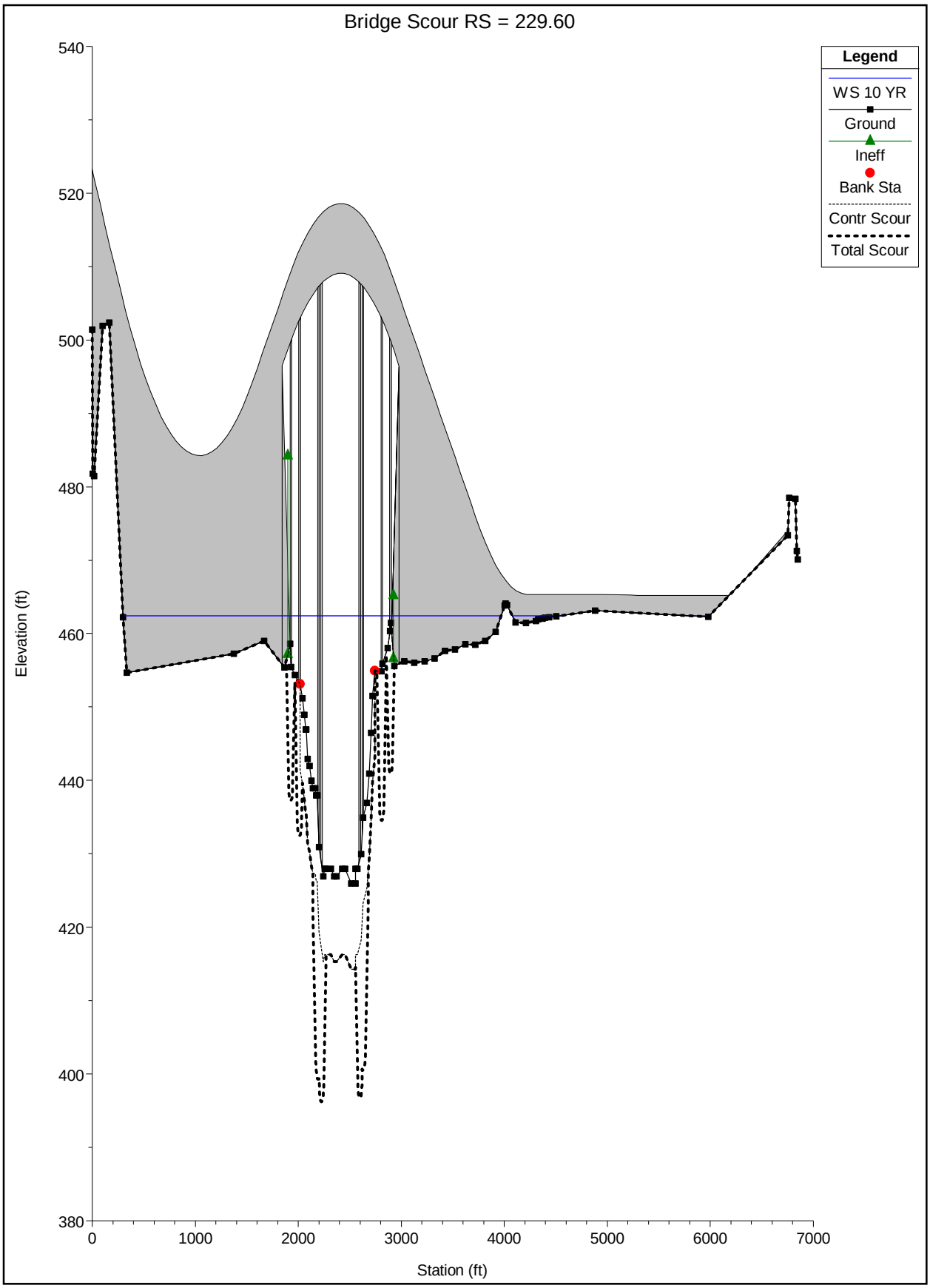
Results

Scour Depth Ys (ft):	0.00	0.00
Froude #:	0.00	0.00
Equation:	HIRE	HIRE

Combined Scour Depths

Pier : #1 (CL = 1926.481) (Contr + Pier) (ft):	19.94
Pier : #2 (CL = 2012.159) (Contr + Pier) (ft):	20.74
Pier : #3 (CL = 2194.349) (Contr + Pier) (ft):	34.38
Pier : #4 (CL = 2224.878) (Contr + Pier) (ft):	32.40
Pier : #5 (CL = 2597.135) (Contr + Pier) (ft):	32.40
Pier : #6 (CL = 2627.664) (Contr + Pier) (ft):	34.38
Pier : #7 (CL = 2809.853) (Contr + Pier) (ft):	20.74
Pier : #8 (CL = 2895.532) (Contr + Pier) (ft):	19.94

Left abutment scour + contraction scour (ft):	0.00
Right abutment scour + contraction scour (ft):	0.00


Bridge Scour RS = 229.60
Legend
WS 10 YR
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
540
520
500
480
460
440
420
400
380
0
1000
2000
3000
4000
5000
6000
7000

SECTION 12

CORRESPONDENCE

Kanellopoulos, Paul

From: Kanellopoulos, Paul
Sent: Tuesday, May 10, 2011 11:08 AM
To: Hammad, Ahmad; Powell, William (Rick); Hanks, Ryan
Cc: peter.j.sambor@uscg.mil
Subject: IL 178 over Illinois River - US Coast Guard Vertical Clearance Requirements

Ahmad –

I spoke yesterday to Peter Sambor, reviewer of permit applications, 8th Coast Guard District, St. Louis, MO.
His contact information is peter.j.sambor@uscg.mil (314)269-2380.

Following is a summary of our discussion:

1. The 2% flow line does not correspond to the FEMA 50-year water surface elevation due to changes in the waterway over time, such as scour.
2. The "normal pool" elevation is an average in the navigation channel over the course of the year.
3. For items "1" and "2" above there are no references or published values.
4. The vertical clearances in the USACE Navigation charts are not necessarily the same as those listed by the USCG, but the USACE is working towards matching those listed by the CG.
5. We need to send an official request to obtain the 2% flow line and normal pool. The CG typically references elevations to the 1929 datum. Typically the applicant will provide a surveyed elevation of the low steel elevation (and datum, i.e. NAVD88) and state something to the effect of what the proposed low steel elevation needs to be based on the beam/girder type. The CG will then provide the vertical clearance allowed, after consulting with the marine industry. If the proposed low steel matches the existing then it is okay.
   The CG typically responds to this request within 2 weeks. Requests should be sent to:
   Eric Washburn
   Commander (DWB)
   8th Coast Guard District
   Bridge Administration Office
   1222 Spruce Street
   Room 2.107F
   St. Louis, MO 63103
6. A comparison of nearby bridges may also indicate how far we can lower the low steel elevation (but this is not a final decision).
   Mile 229.6 – IL 178 – 65.91 ft above normal pool
   Mile 225.7 – Interstate 39 – 66.0 ft above normal pool
   Mile 225.5 – IL Central RR - 62.2 ft above normal pool
   Mile 224.7 La Salle Highway Bridge – 64.0 ft above normal pool
   It is safe to say we can go down to 62.2 ft, but again, this is not a final decision.
7. Horizontal clearances may not be reduced because when the bridge was built, boats and barges were smaller. The required clearance is site specific depending on bends, currents, shoals, and number of barges being towed.

Thanks,

Paul M. Kanellopoulos, P.E.

Lead Engineer

Kanellopoulos, Paul

From: Powell, William (Rick)
Sent: Wednesday, September 21, 2011 4:27 PM
To: Powell, William (Rick); Kanellopoulos, Paul
Cc: Bischel, Kevin
Subject: RE: 16870 IL 178 over Illinois River - STATUS UPDATE

Paul,

Please include this information in the Hydraulic Report:

Rick Powell of PB had a telephone conversation on 9/21/11 with Kathy Higdon of the USACE Illinois Waterway Center at Starved Rock Lock and Dam. Ms. Higdon noted the following observations:

- There have been 10 floods since the Waterway Center was established 33 years ago. The last one was in 2008.
- There are no ice jams on the Illinois River in recent history. Most of the ice jam problems occur upstream toward Chicago.
- Ms. Higdon suggested the State Park and Village of North Utica would be good sources of information. The State Park floods more often than the Waterway Center. There is a low spot on IL 178 between the bridge and the village that flooded in 2008.

Thanks,

Rick Powell
Senior Engineering Manager
PB Americas, Inc.
230 West Monroe Street
Suite 900
Chicago, IL 60606
Blackberry: 312-330-7477
Chicago office: 312-294-5660
Email (PB): powellw@pbworld.com

From: Powell, William (Rick)
Sent: Wednesday, September 21, 2011 1:42 PM
To: Kanellopoulos, Paul
Cc: Bischel, Kevin
Subject: RE: 16870 IL 178 over Illinois River - STATUS UPDATE

I have a call in to the Starved Rock Lock & Dam to see if they have any local information on flooding and ice jams.

Thanks,

Rick Powell
Senior Engineering Manager
PB Americas, Inc.
230 West Monroe Street
Suite 900
Chicago, IL 60606
Blackberry: 312-330-7477
Chicago office: 312-294-5660
Email (PB): powellw@pbworld.com

Kanellopoulos, Paul

From: Powell, William (Rick)
Sent: Tuesday, September 27, 2011 2:24 PM
To: Kanellopoulos, Paul
Subject: FW: Flooding at Illinois 178 over the Illinois River

Please see the attached message from Dave Alexander of IDOT re: flooding.

Rick Powell
Senior Engineering Manager
PB Americas, Inc.
230 West Monroe Street
Suite 900
Chicago, IL 60606
Blackberry: 312-330-7477
Chicago office: 312-294-5660
Email (PB): powellw@pbworld.com

From: Alexander, David S [mailto:David.S.Alexander@illinois.gov]
Sent: Tuesday, September 27, 2011 11:21 AM
To: Powell, William (Rick)
Subject: Flooding at Illinois 178 over the Illinois River

Rick,

Operations is not aware of any flooding problems around the river bridge.

Thanks,
Dave

David S. Alexander P.E.
Phase I Unit Chief
IDOT District 3
700 East Norris Drive
Ottawa, IL 61350
Phone:815-434-8468

SECTION 13

CD WITH PROJECT FILES