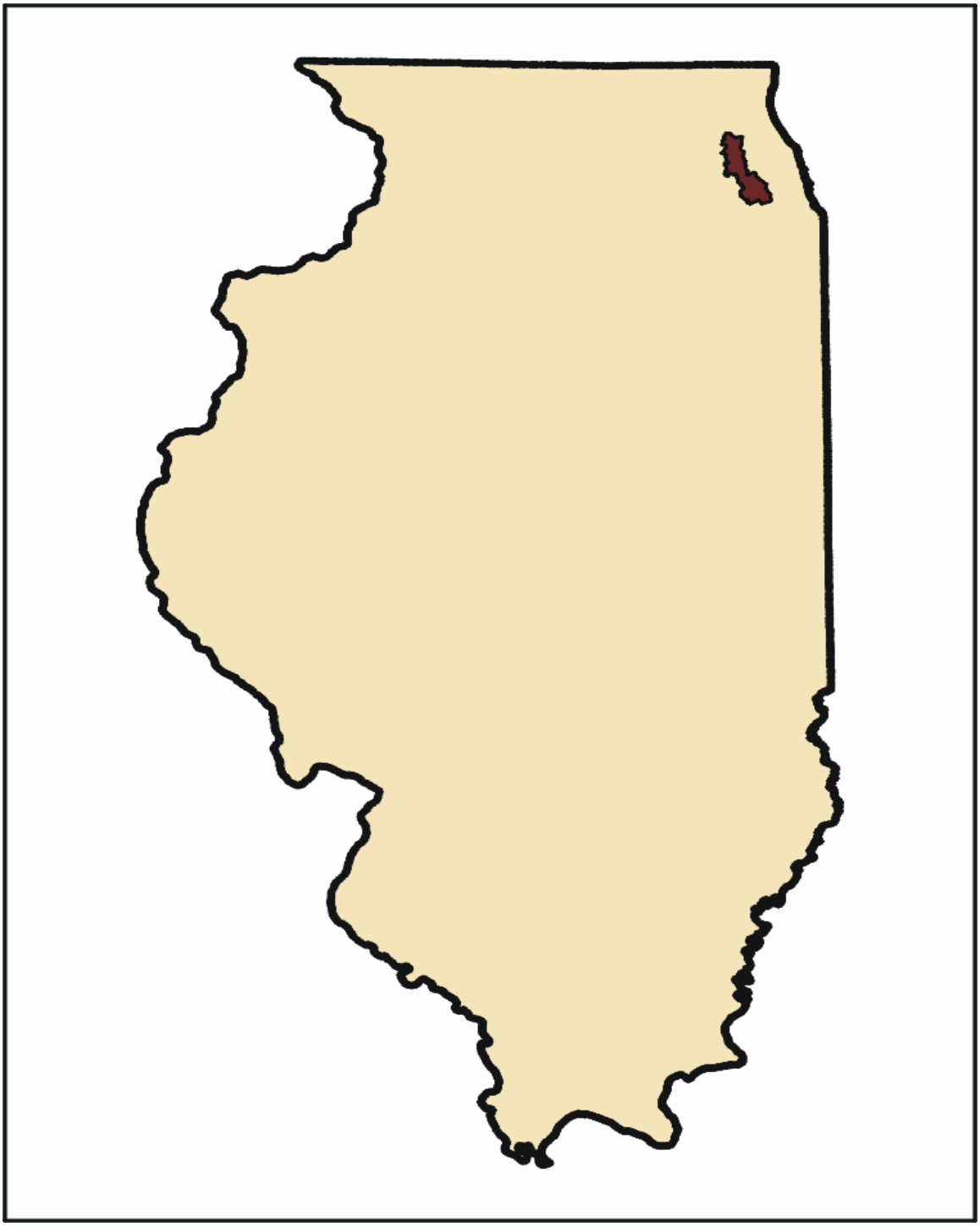


AERIAL ASSESSMENT REPORT FOR Salt Creek

Cook County and DuPage County

November 2005

Prepared by Wayne Kinney for IL. Dept. of Agriculture

The TMDL report for Salt Creek found four impaired segments. The segments GL 03 and GL 19 are impaired by dissolved oxygen (DO). GL 03, GL 09 and GL 10 are impaired by total dissolved solids (TDS). (See Fig. 1)This aerial assessment of the main stem of the East Branch of the DuPage will address potential contaminated sediment from streambank erosion and increased DO through reaeration of stream flow.

Assessment Procedure

Low level geo-referenced video was taken of Salt Creek in March, 2004. Video taping was completed by Fostaire Helicopters, Sauget, IL, using a camera mounted beneath a helicopter to record data from just above tree top level in DVD format for further evaluation and assessment. Video mapping began at the confluence of Salt Creek and the Des Plaines River and continued upstream to a point west of IL. Rte. 53 north of Interstate 90.

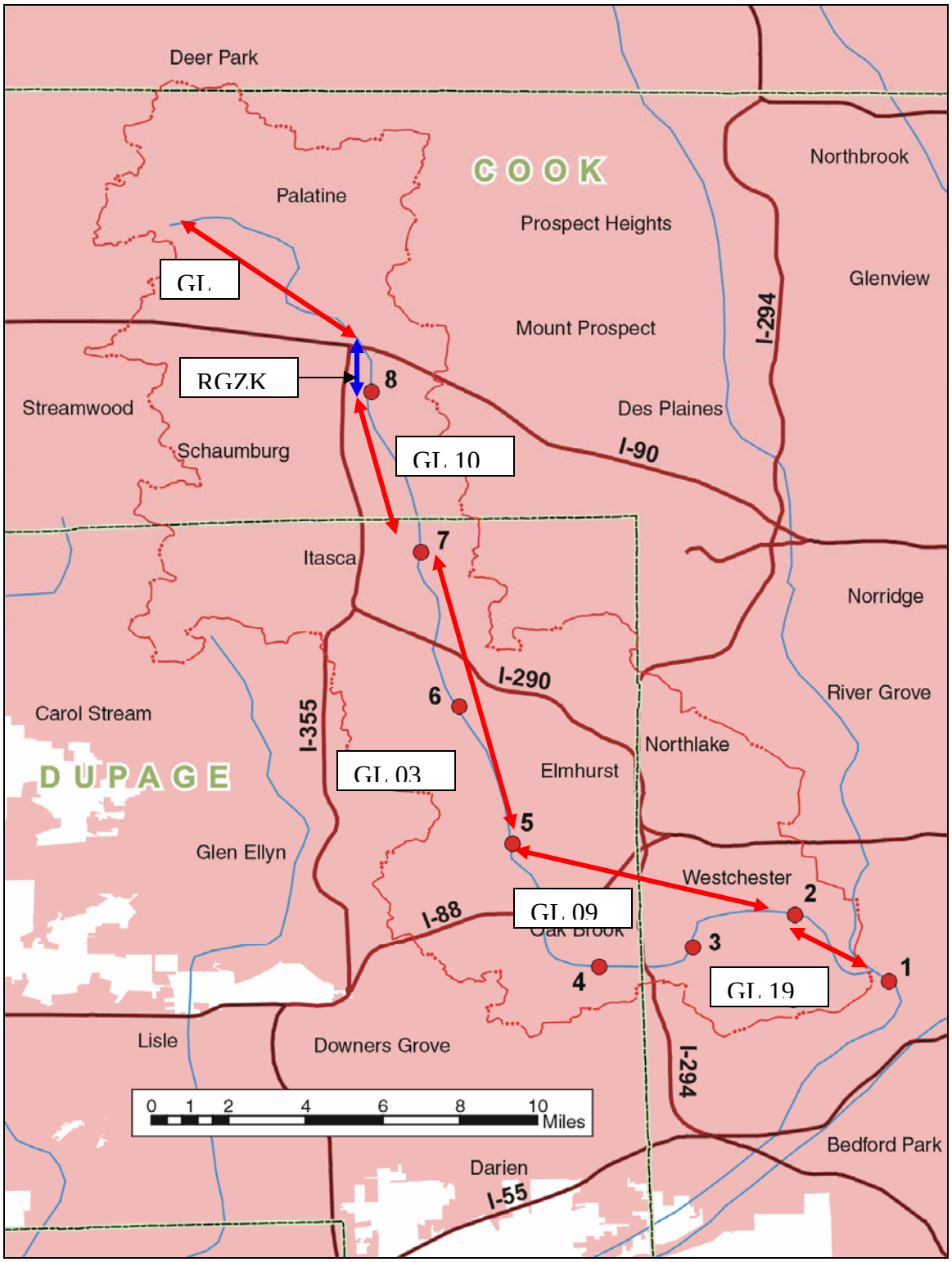


Fig. 1 Aerial Assessment Map of Salt Creek with DVD Chapters and Impaired Segments

After videotaping the stream, the DVD tapes were processed by USGS to produce a geo-referenced DVD showing flight data and location. Next, USGS identified features from the video and created shapefiles containing the GPS location, type of feature identified, and the time on the DVD to allow cross referencing. The shape-files along with the DVD were then used to identify and locate the points where ground investigations were needed to verify aerial assessment assumptions and gather additional data.

The ground investigations or "ground truthing" is intended to accomplish two primary functions. First, it provides those viewing videos the opportunity to verify the correct interpretation of the video. Second, the video allows the user to identify and gather field data at the most appropriate locations to more closely represent the entire study portion of the stream.

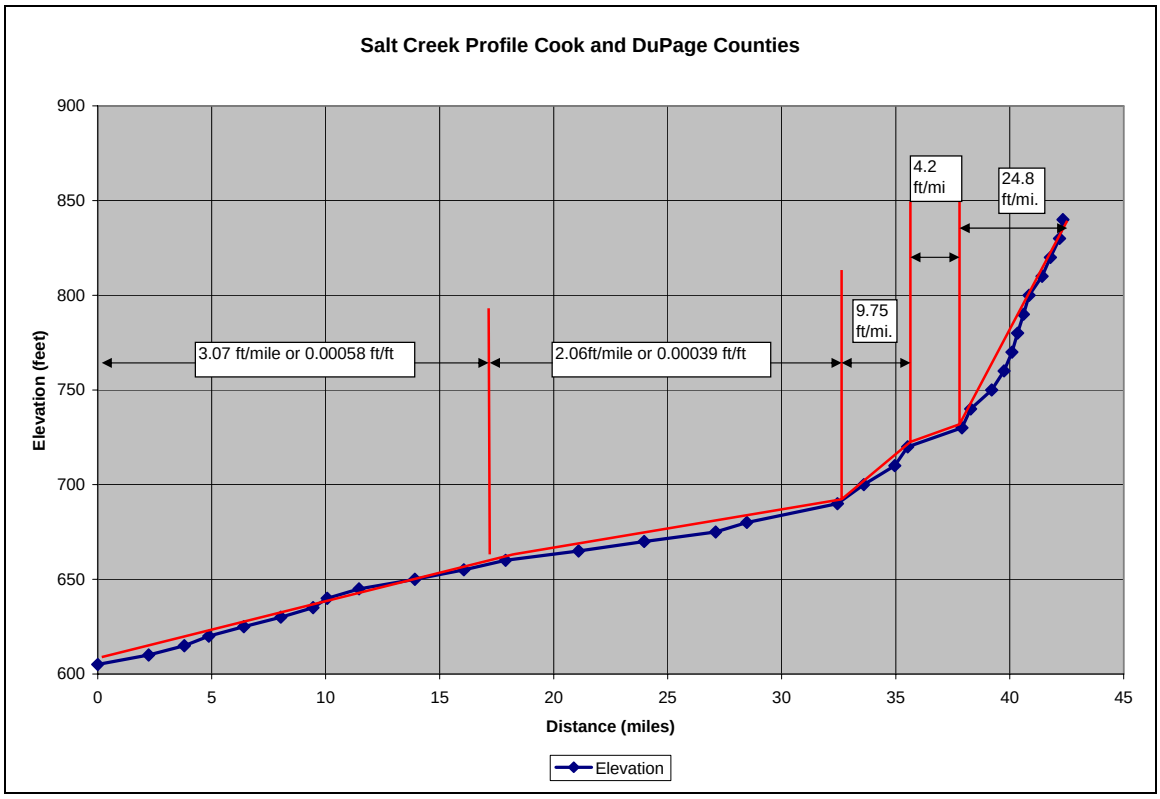


Fig. 2 Channel Profile of Salt Creek

Detailed elevation data is not available; therefore the channel slope is calculated from USGS topo maps by measuring the channel length between contour lines. The report refers to this as "valley profile" although a true valley profile would use a straight line distance down the floodplain rather than channel length. However, this method is used because it incorporates sinuosity into the calculation and allows the channel slope to be assume equal to "valley slope" in order to estimate channel capacity, velocity, etc., although there are short segments where the channel slope may differ significantly near roads, logjams, knickpoints, etc.

CHAPTERS ON DVD AND ASSESSMENT REPORT Salt Creek				
DVD Disc	DVD chapter	Beginning Time	Report Chapter	Cross Sections
1	2	5:00	1	8
1	3	10:00	2	7
1	4	15:00:00	3	
1	5	20:00:00	4	6
1	6	25:00:00	5	5
1	7	30:00:00	6	4
1	8	35:00:00	7	3
1	9	40:00:00	8	1,2

Note: Flight path is from downstream to upstream

Table 1 DVD Chapters and Report Guide

The DVD has been divided into "chapters" of approximately five minutes of video (Table 1) to enhance the ability to navigate within the flight video and provide a simple way to identify and discuss different stream segments. Although the report will begin with a broader more general assessment of the entire study reach, it will also provide an assessment and treatment recommendations by chapter or group of chapters. The chapter divisions are clearly arbitrary and do not reflect "change points" in the stream characteristics or treatment recommendations. For clarity the conclusions and recommendations are presented for each stream "chapter".

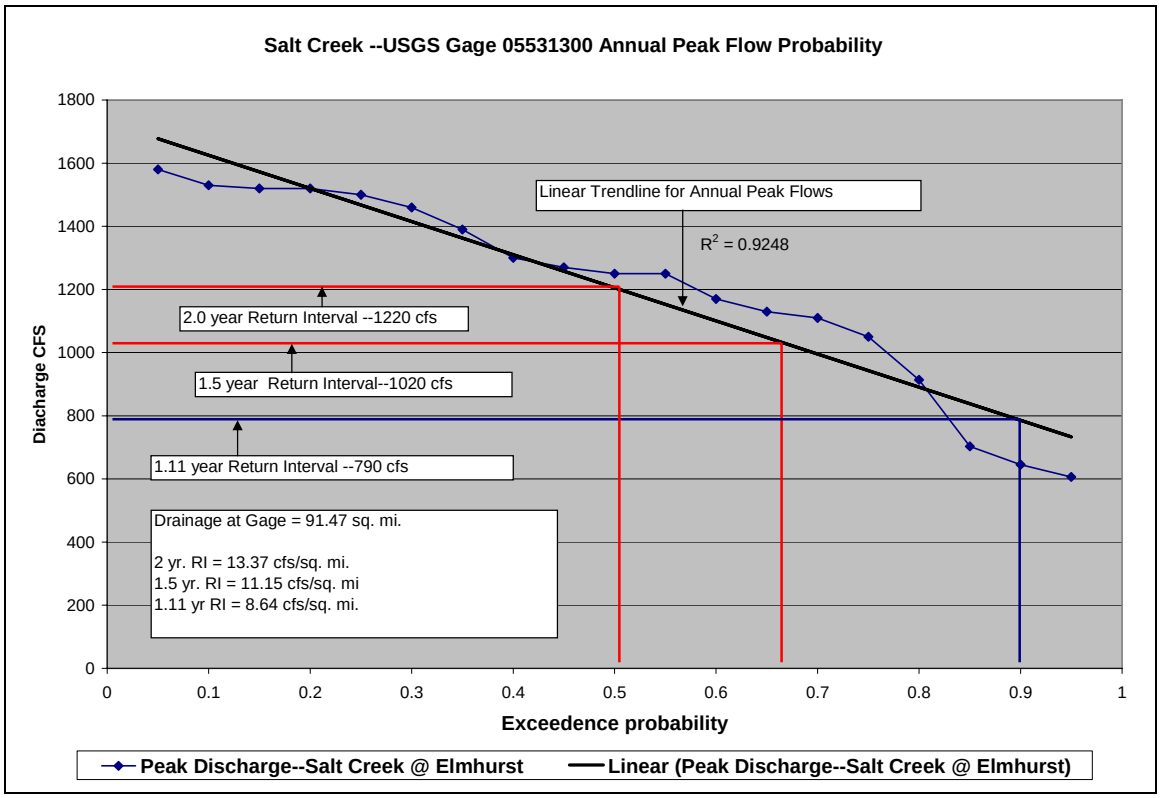


Fig. 3 Annual Peak Discharge Probability at USGS Gage 05531300 on Salt Creek near Elmhurst

FEATURES IDENTIFIED BY CHAPTER
Salt Creek

CHAPTER	BED STRUCTURE	LOGJAM	GEOTECH FAILURE	DEPOSITION	BED CONTROL	BANK CONTROL	BREAK POINT	EROSION	SEVERE EROSION	ROCK OUTCROP
1	2	2	1	1	0	4	2	10	0	1
2	0	1	4	1	1	1	3	14	1	0
3	0	2	2	2	1	3	3	9	0	0
4	0	0	0	0	1	13	0	4	0	0
5	0	1	0	2	0	7	4	7	0	0
6	0	0	0	2	2	14	0	8	0	0
7	0	0	0	0	0	11	0	3	0	0
8	0	0	0	2	0	8	0	1	0	0
TOTALS	2	6	7	10	5	61	12	56	1	0

Table 2 Features by Chapter Identified with Aerial Assessment

Eight cross sections were taken at selected locations on Salt Creek after viewing the DVD's. The cross sections are located at "riffle" locations to best represent the channel characteristics and to allow for comparison of width, depth, x-sec. area, etc. along the channel at similar geometric locations. The result of the hydraulic analysis at each site is presented in summary form in Table 3 and the approximate location of each cross section along the channel profile is found in Fig. 3A. Aerial views of cross sections locations are shown in Figs. 4 thru 11. Exact locations as Eastings and Northings and more detail can be found in Appendix A.

Cross Section Summary --Salt Creek												
X-Sec	Easting	Northing	ADA	Valley Slope ft/m	BKF CFS	Width	Depth	W/D Ratio	Vel. FPS	Bedload Dia.	CEM Stage	CFS per Sq. Mi.
1	414895	4657978	15.94	15.3	396	33	3.41	9.68	3.5	2	5	24.84
2	415888	4656952	26.88	13.8	377	44	4.44	9.91	1.9	2	4	14.03
3	417511	4649997	52.69	7.7	337	66	3.23	20.43	1.6	1	6	6.40
4	418088	4645273	75.2	5.2	419	75	3.4	22.06	1.6	1	5	5.57
5	420289	4637785	91.96	4.7	550	57	4.21	13.54	2.3	1	5	5.98
6	421218	4635170	97.8	3.9	616	72	3.89	18.51	2.2	1	5	6.30
7	426621	4632176	122.8	3.3	604	72	3.85	18.70	2.2	1	6	4.92
8	430022	4630892	152.4	3.3	675	67	4.31	15.55	2.3	1	6	4.43

Table 3 Cross Section Summary

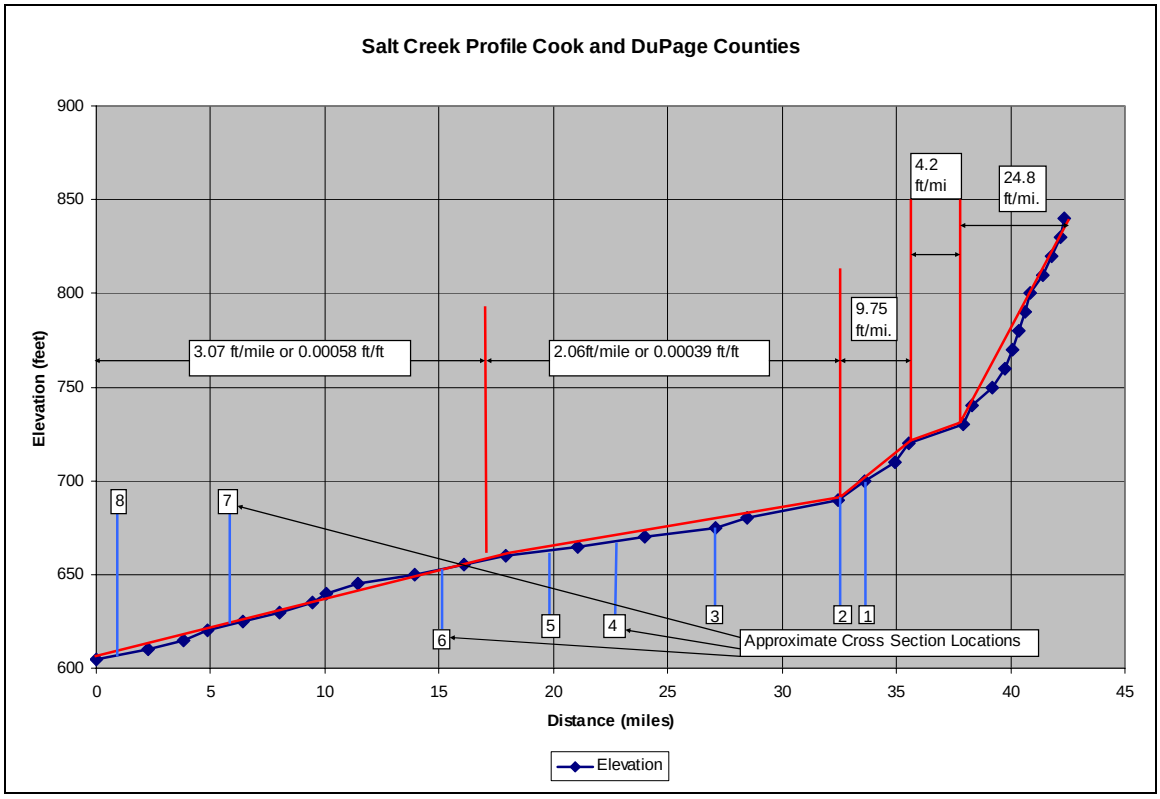


Fig. 3A. Approximate Cross Section Locations along Channel Profile

The geomorphic bankfull determined from the cross section data and field observations predict channel forming flow to be approximately 6 cfs/sq. mi. at cross sections 3 thru 8. Sections 1 and 2 are significantly higher due to there location in the watershed where the valley slope is much higher. The bankfull discharge of 6 cfs/sq. mi. is equal to less than a 1.1 yr Return Interval rate based on peakflow data from USGS Gage 05531300 (Fig. 3)

Fig. 4 Chapter Divisions and Cross Section Locations --- Chapter 1

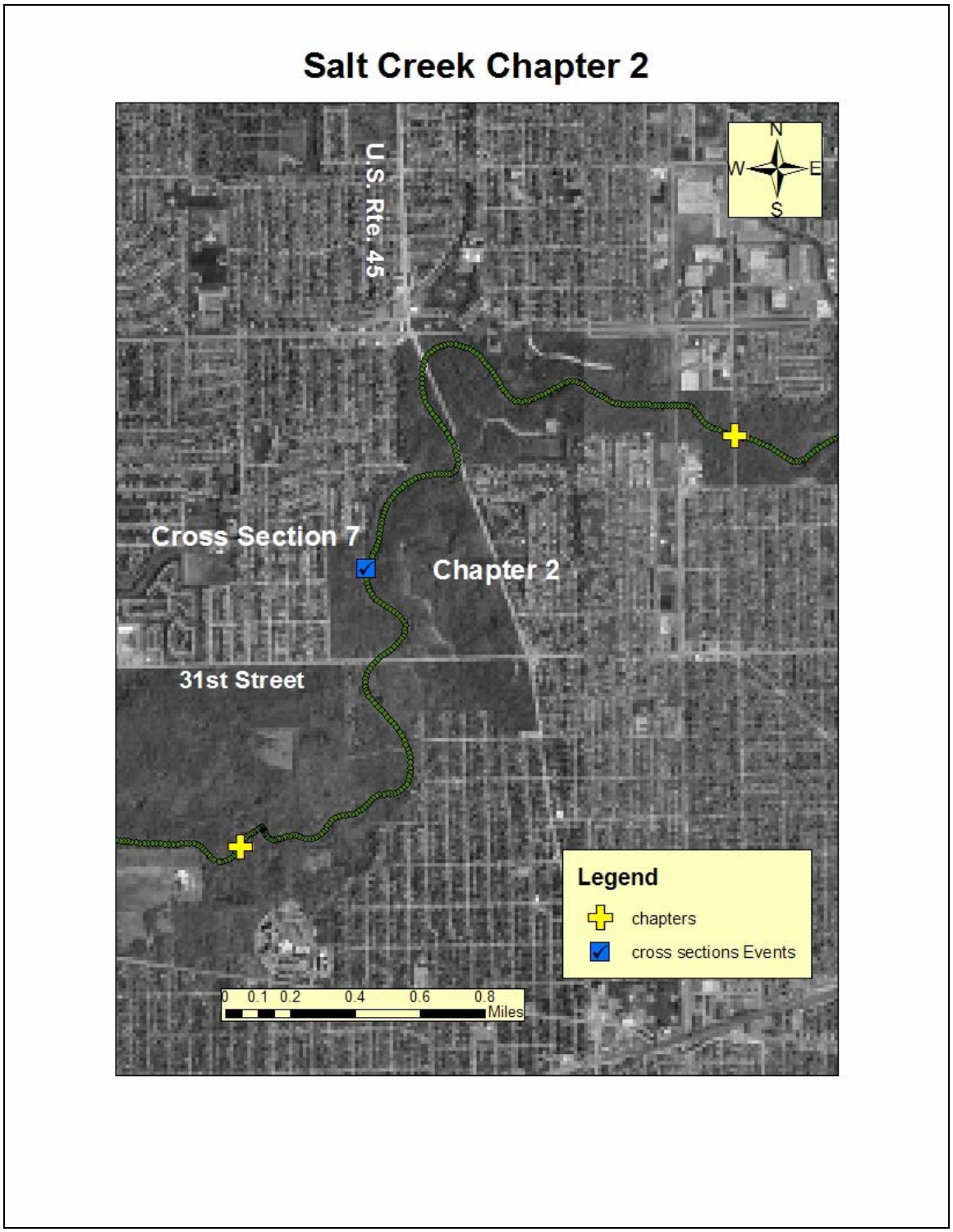


Fig. 5 Chapter Divisions and Cross Section Locations --- Chapter 2

Fig. 6 Chapter Divisions and Cross Section Locations --- Chapter 3

Fig. 7 Chapter 4

Fig. 8 Chapter 5

Fig. 9 Chapter 6

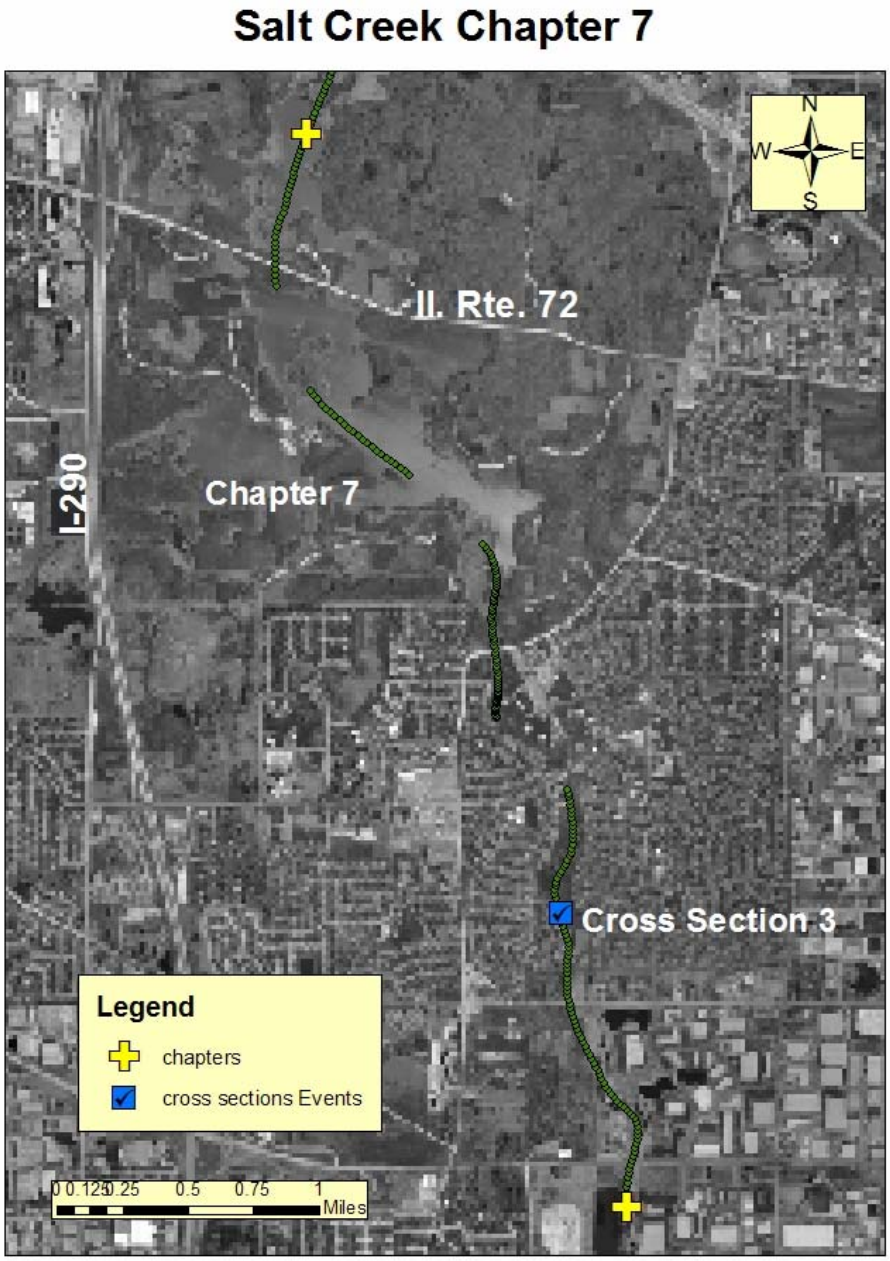


Fig. 10 Chapter 7

Fig. 11 Chapter 8

The major factors indicating channel conditions identified from the aerial assessment have been totaled by DVD chapter in Table 2 below. This tabulation allows a general comparison of the relative dominance of features found in each chapter and provides a means of comparing stream characteristic between chapters. A discussion of the major differences will follow later in this report.

General Observations

1. Salt Creek appears to be a CEM stage 5 and 6 channel. Only cross section 2 where the channel is incised preventing access to the floodplain and both bank are rip raped is the CEM found to be less stable.
2. With velocities near 2 ft. /sec. or lower Salt Creek does not transport material courser than 1 inch in diameter.
3. Salt Creek has a nearly uniform gradient of 3 ft per mile on the lower 17 miles and then flattens slightly to a gradient of 2 ft per mile for the next 16 miles. The gradient then increases to almost 10 ft. per mile and finally to almost 25 ft per mile nth every upper reaches.
4. To assist in improving the impairment parameters identified in Salt Creek work within the stream can concentrate on reaeration to improve DO and bank stabilization to reduce contamination from sediment (TDS).
5. A-Jacks have been installed for bank stabilization at numerous points and are quite effective. However they do not as effective in reaeration as measures that project into the stream.
6. Rock Riffle Grade controls are effective reaeration practices, however they are not recommended in Salt Creek at this time since there appears to be no need for bed stabilization. Instead reaeration will be improved by using Streambarbs with J-hooks to increase turbulence.
7. With width/depth ratios above 15 in 5 of the eight cross sections and mean flow depths of less than 5 ft. this stream is particularly well suited to the use of streambarbs.

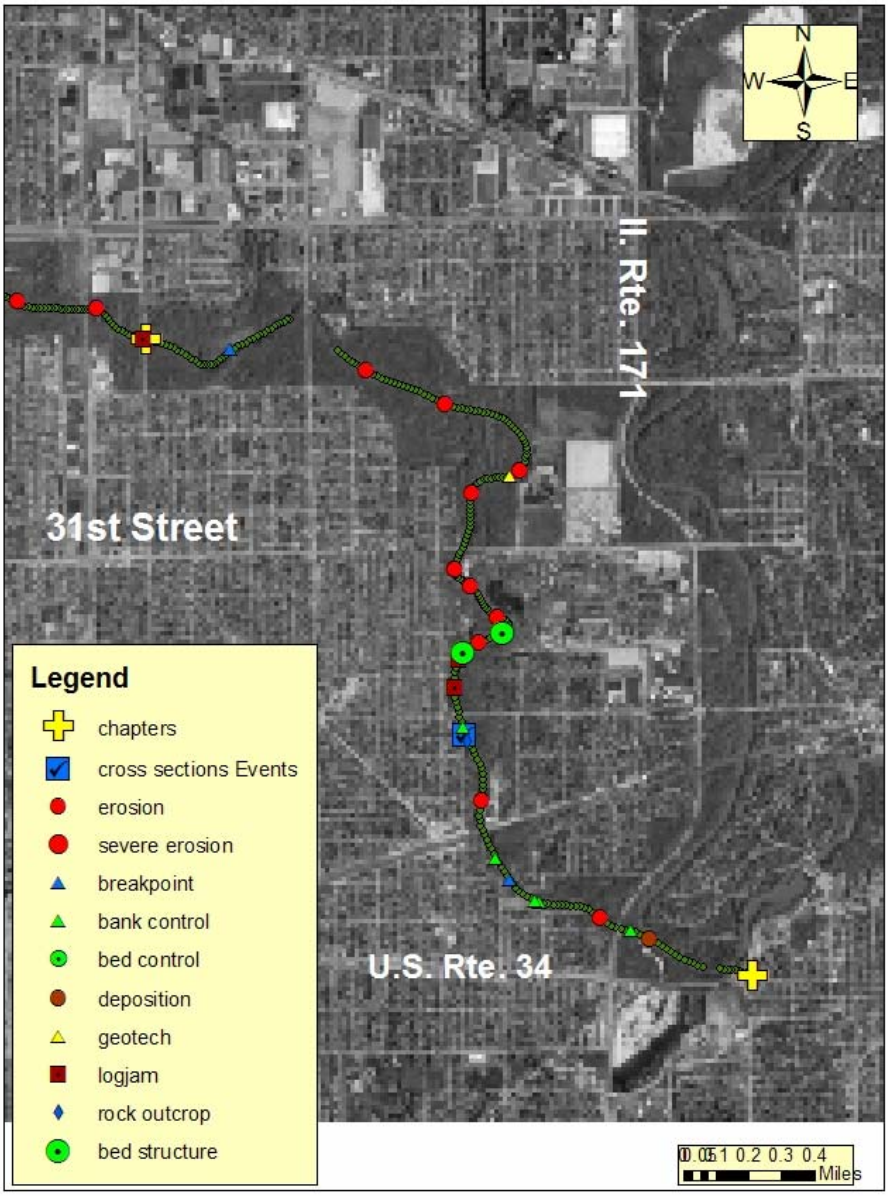
Recommendations Chapter 1 through 7

This reach extends from the confluence with the Des Plaines River up to Busse Lake in the Ned Brown Forest Preserve. The reach contains impaired TMDL segments GL 03, GL 09, GL 10 and GL 19. All cross sections analyzed in this reach are CEM stage 5 or 6 with no evidence of incision. The width/depth ratios are all above 13.5 with two sections with a W/D ratio over 20. Channels with a stable bed and wide width depth ratios are ideal locations to use Streambarbs to redirect flow toward the center of the channel. By adding a “j-hook” to each streambarb the turbulence will create significant turbulence during flow events that should help with the reaeration and also protect the eroding streambanks to reduce sediment loading.
The recommendation is to install streambarbs at all eroding locations in this reach to reduce W/D ratios, increase aeration and reduce sediment. Table 5 provides the quantities and cost estimates for each chapter.

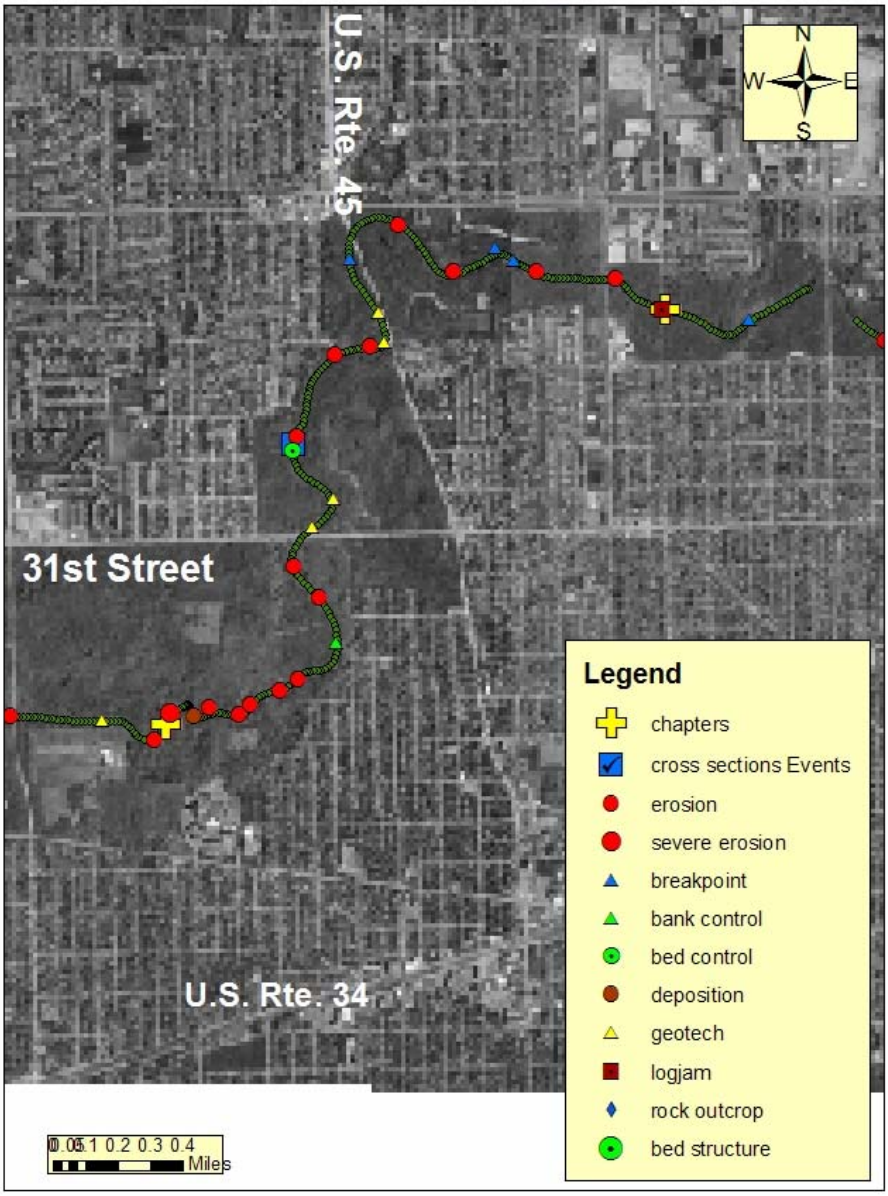
` TREATMENT --CHAPTERS 1 THRU 7 Lateral Bank Protection with Stream Barbs and "J-Hooks"					
Chapter	Erosion Sites	Average Length(ft)	Total Length	Average Cost/foot	Total Cost
1	10	350	3500	$75.00	$262,500.00
2	14	350	4900	$75.00	$367,500.00
3	9	350	3150	$75.00	$236,250.00
4	4	350	1400	$75.00	$105,000.00
5	7	350	2450	$75.00	$183,750.00
6	8	350	2800	$75.00	$210,000.00
7	3	350	1050	$75.00	$78,750.00
Total	55		19250		$1,443,750.00

Table 5 Treatment Needs for Chapters 1 thru 7

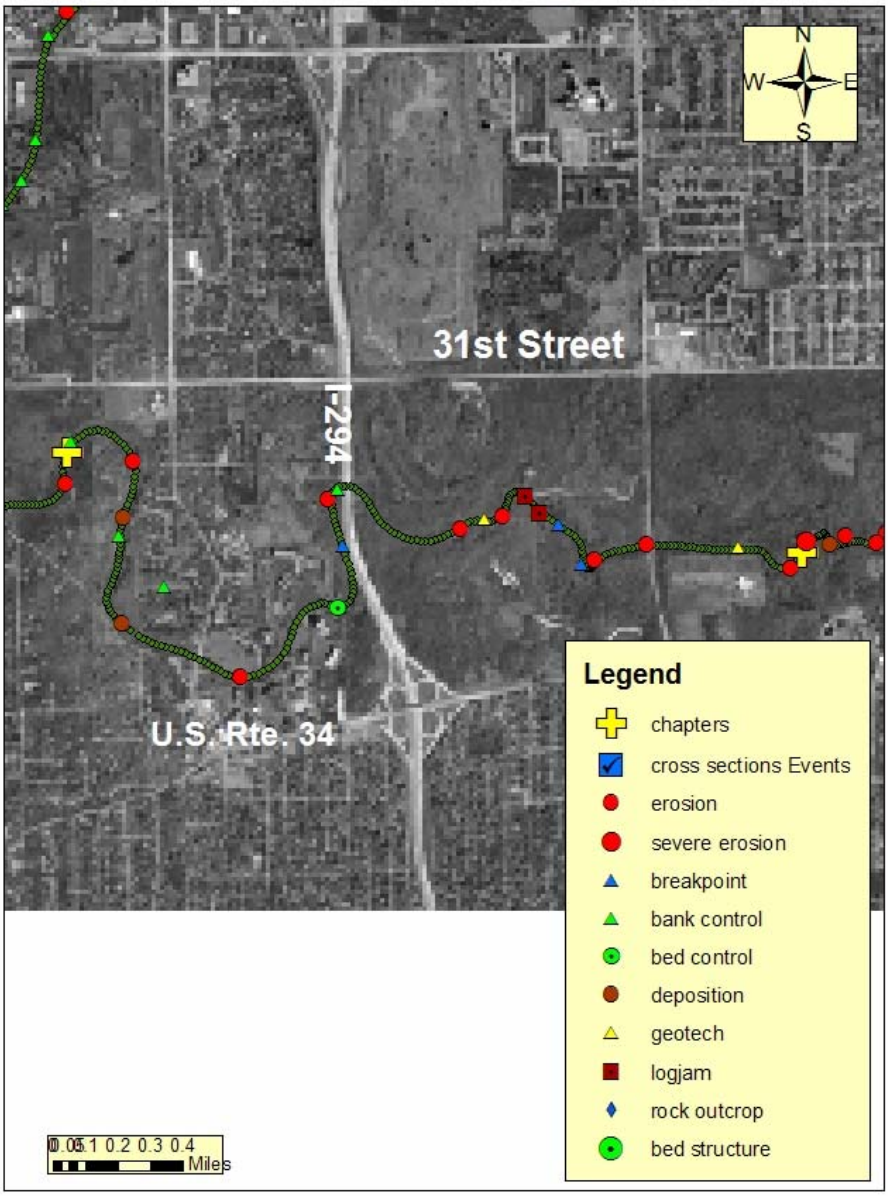
Salt Creek Chapter 1



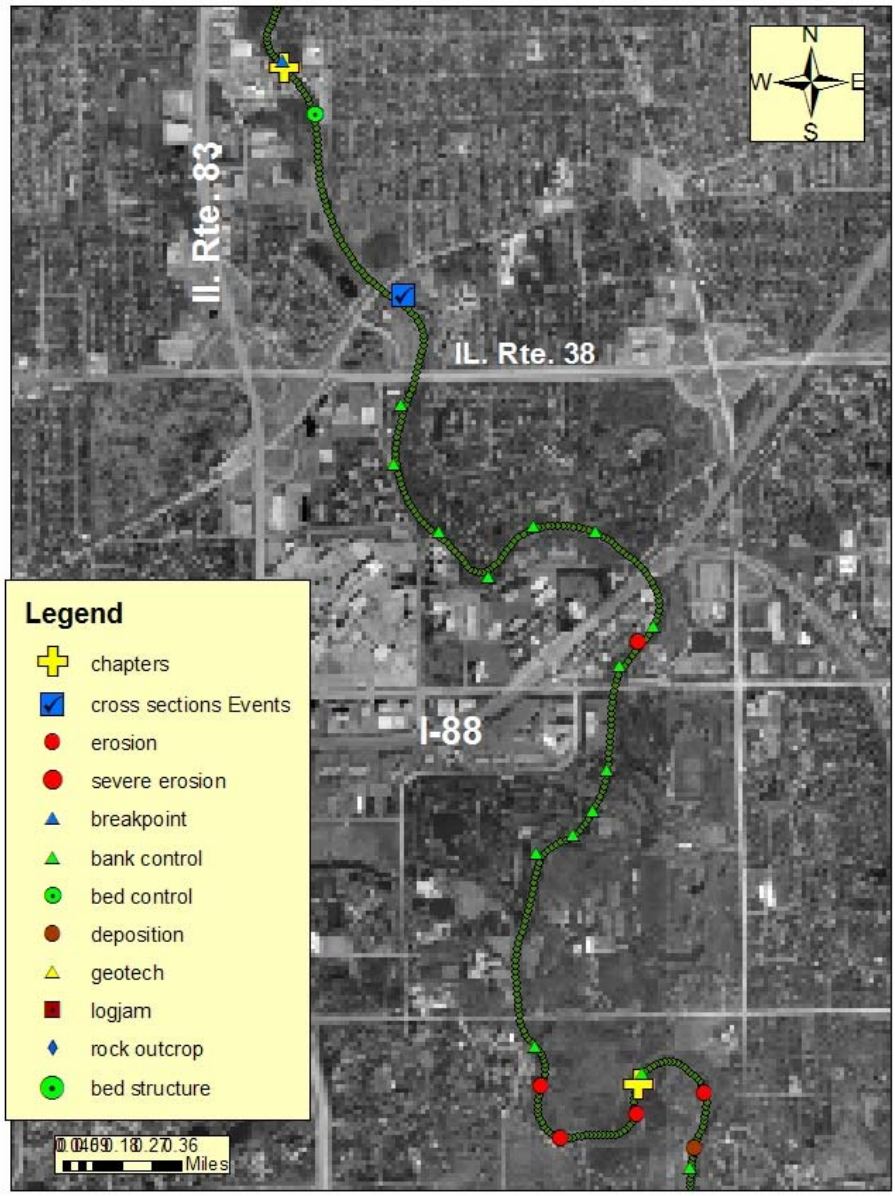
Salt Creek Chapter 2



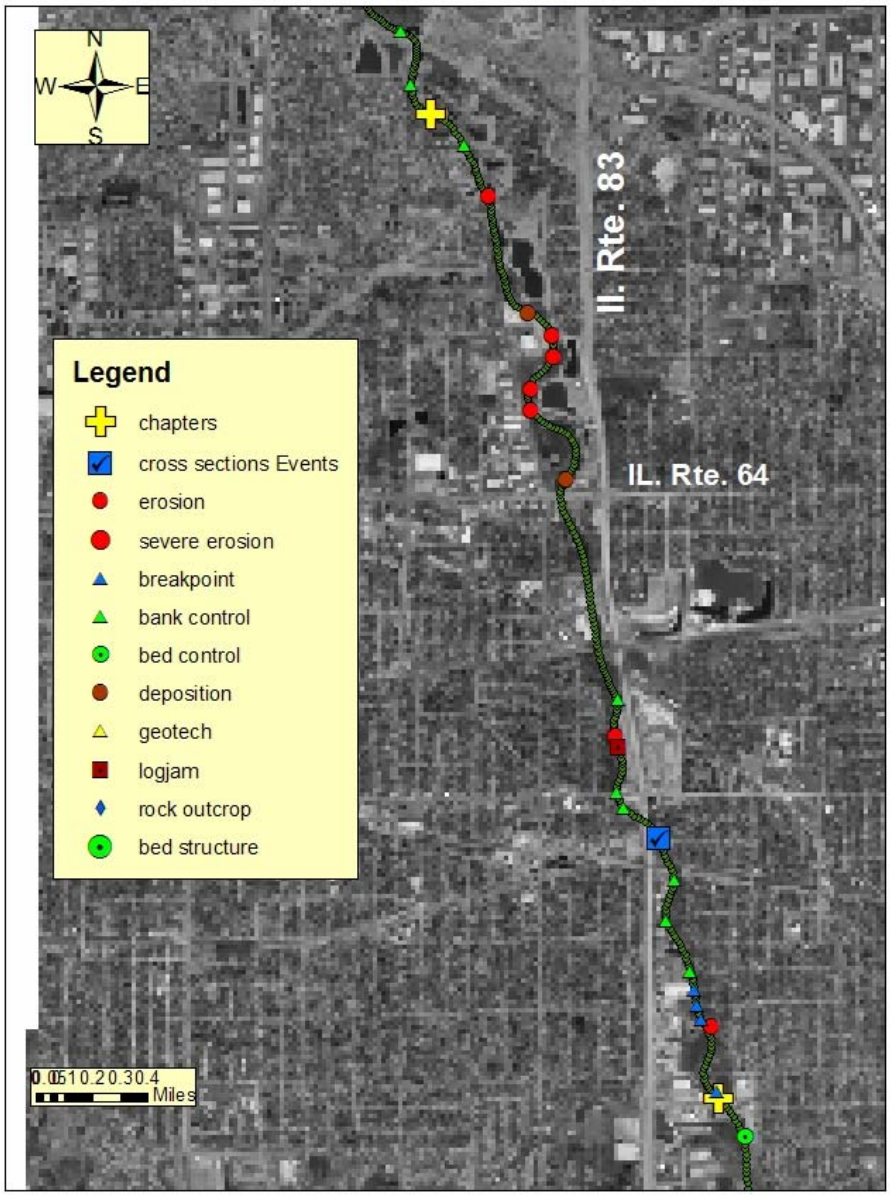
Salt Creek Chapter 3



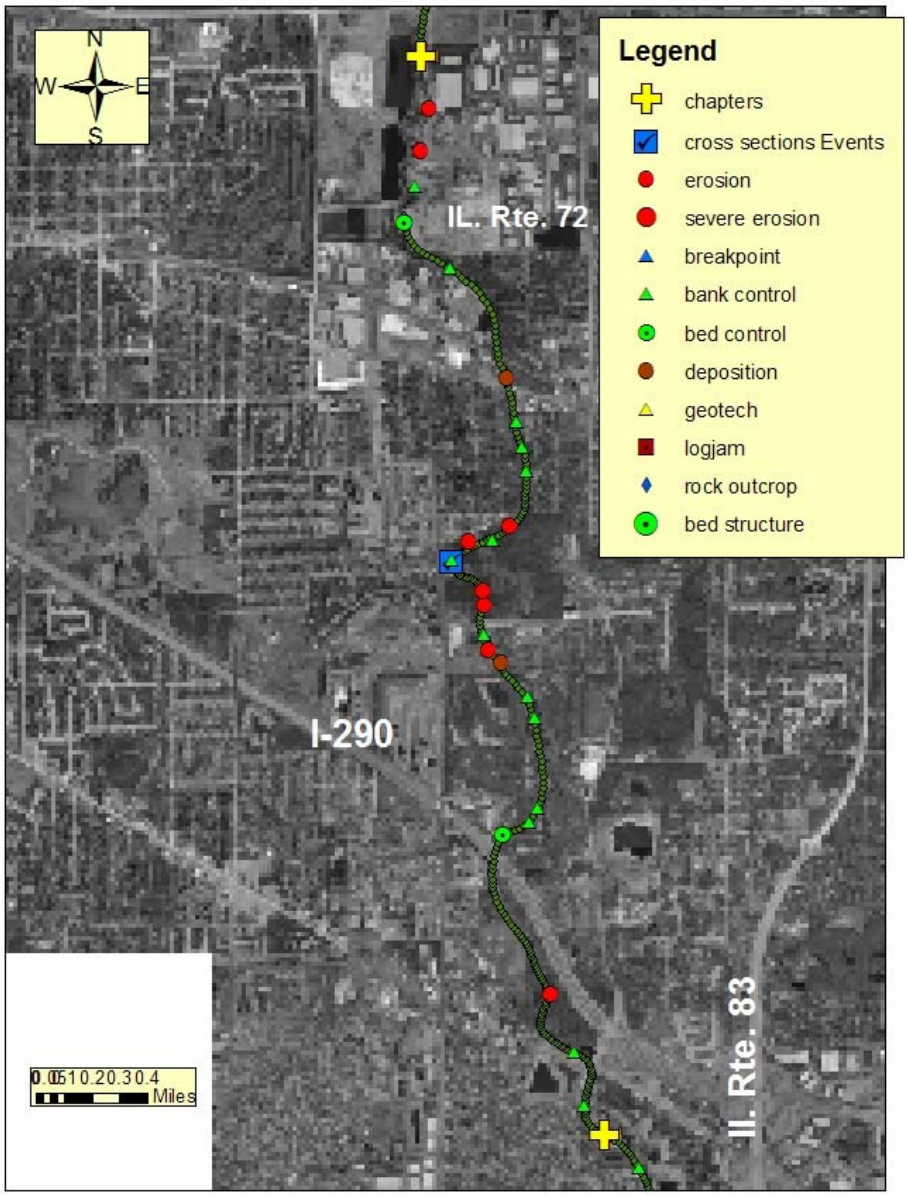
Salt Creek Chapter 4



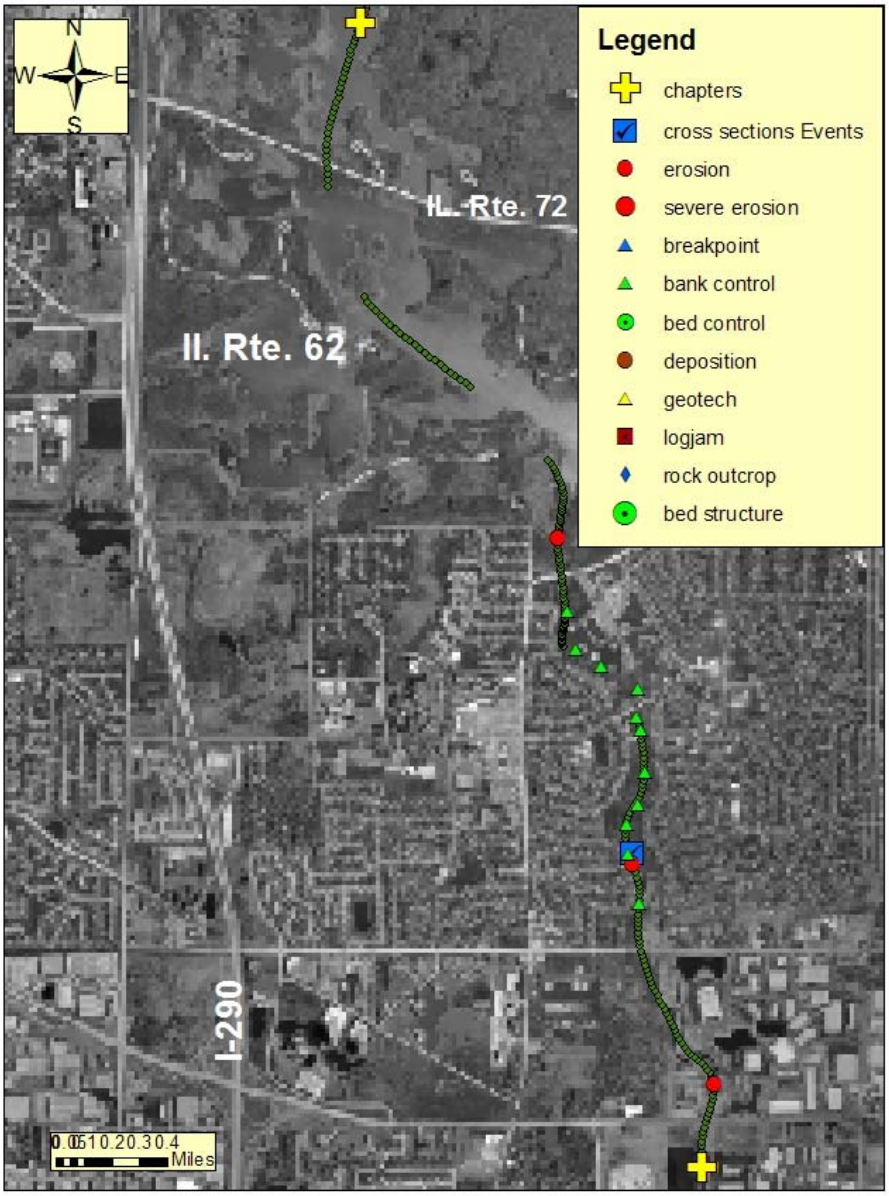
Salt Creek Chapter 5



Salt Creek Chapter 6



Salt Creek Chapter 7



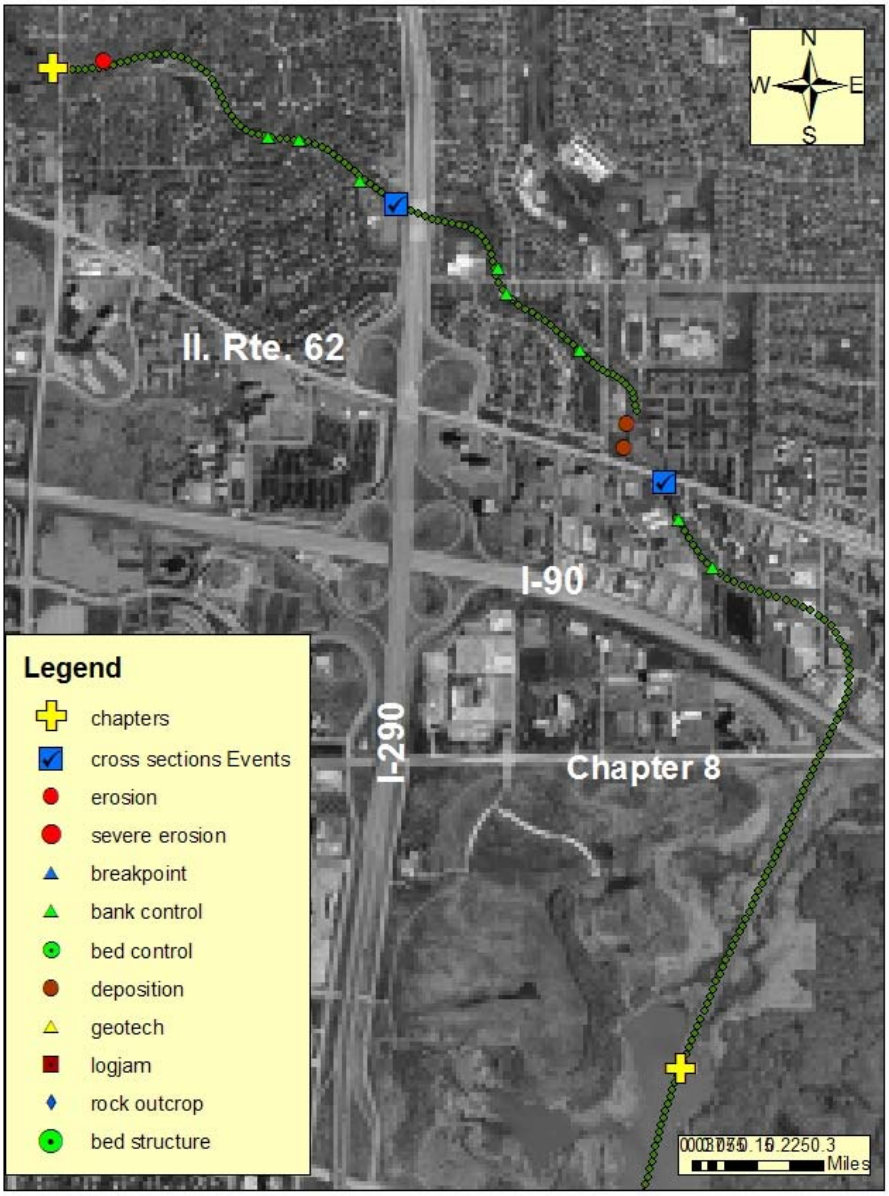
Recommendations Chapter 8

This chapter is at the very upper end of the assessment reach above Busse Lake in the Ned Brown Forest Preserve. This is identified as segment GL in the TMDL report which is not an impaired water. There is only one identified erosion site in this chapter and the recommended solution is to use 200 ft. of Stone Toe Protection. The width/depth ratio in this chapter is too narrow for effective use of Streambarbs. Table 4 provides an estimate of the quantities and cost for treatment.

TREATMENT --CHAPTER 8					
Lateral Bank Treatment					
Chapter	Erosion Sites	Average Length(ft)	Total Length	Average Cost/foot	Total Cost
8	1	200	200	$50.00	$10,000.00
Total	**1**		**200**		**$10,000.00**

Table 4 Treatment needs for Chapter 8

Salt Creek Chapter 8



APPENDIX A

CROSS SECTION DATA

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E414895 N4657978

Landowner Name Xsec1

Drainage Area 15.94 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	44 ft.	Cross Sectional Area	147 sq. ft.
	Depth	3.3 ft.		

Reference Stream Gage:

Salt Creek near Arlington Heights	Station No.	05531000	Gage Q_2 453 cfs
	Drainage Area	33 sq.mi	Regression (-
Cook County, IL		**REFERENCE STREAM DATA ONLY**	

USGS Flood-Peak Discharge Predictions:

Valley Slope:	15.3	*ft./mi. (user-entered)*			Regression Q_2	289 cfs
		ft/mi (from worksheet)	Rainfall	2.75 in *(2 yr, 24 hr)*	Adjusted Q_2	-
	0.0029	*ft./ft.*	Regional Factor	0.578	Typical Range for Bankfull Discharge:	
					110 to 240 cfs	

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

			Stream Length		*ft.*
Basic Field Data:			Valley Length		*ft.*
Bankfull Width	33	*ft.*	Contour Interval		feet
Mean Bankfull Depth	3.41	*ft.*	Estimated Sinuosity		
Width/Depth Ratio	9.68				
			Channel Slope:		Bankfull Q from:
Max. Bankfull Depth	4.2	*ft.*	Surveyed:	0.001847 *ft./ft.*	Cross-Section 384 *cfs*
Width at twice max. depth	400	*ft.*	Estimated:	*ft./ft.*	Basic field data 408 *cfs*
(8.4 ft.)					Selected Q 396 *cfs*
Entrenchment Ratio	12.12		Radius of Curvature (Rc)		ft.
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload:	D_{90}	2 *in.*	Velocity required to move D_{90}:	2.9	*ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	3.41	*ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	3.63	*ft./sec.*
velocities from different sources.			Velocity from selected Q:	3.5	*ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

24.84 cfs/sq. mi.

Natural Open Channel Flow

back to I&E form

Clear Cells

Project:	Xsec1	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.001847	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.2	*ft*

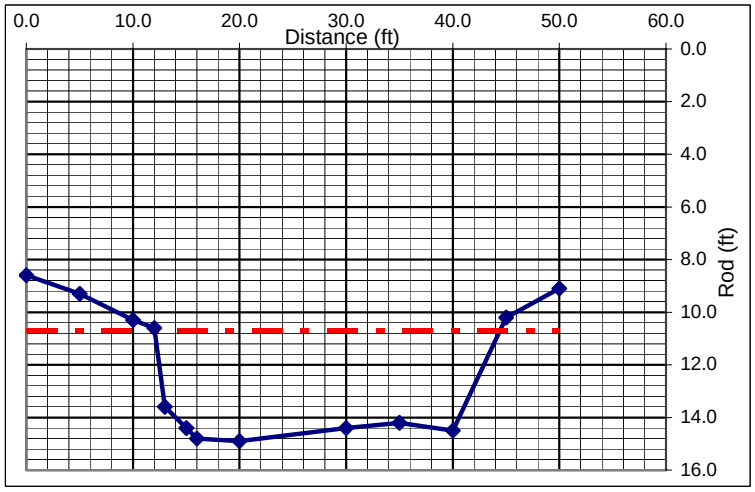
$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.2 *ft*	5.8	
Channel Flow (***Q***):	383.7 *cfs*	634.5	
Channel Velocity:	3.4 *ft/sec*	3.6	
Cross-Sectional Area (***A***):	112.6 *sq.ft.*	174.4	
Hydraulic Radius (***R***):	3.1 *ft*	3.4	

Survey Data:

Rod *(ft)*	Distance *(ft)*
8.6	0.0
9.3	5.0
10.3	10.0
10.6	12.0
13.6	13.0
14.4	15.0
14.8	16.0
14.9	20.0
14.4	30.0
14.20	35
14.50	40
10.20	45
9.10	50



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E415888 N4656952

Landowner Name Xsec2

Drainage Area 26.88 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	54 ft.	Cross Sectional Area	210 sq. ft.
	Depth	3.9 ft.		

Reference Stream Gage:

Salt Creek near Arlington Heights	Station No.	05531000	Gage Q_2	453 cfs
	Drainage Area	33 sq.mi	Regression (	-
Cook County, IL		**REFERENCE STREAM DATA ONLY**		

USGS Flood-Peak Discharge Predictions:

Valley Slope:	13.8	*ft./mi. (user-entered)*			Regression Q_2	416 cfs
		ft/mi (from worksheet)	Rainfall	2.75 in *(2 yr, 24 hr)*	Adjusted Q_2	-
	0.0026	*ft./ft.*	Regional Factor	0.578	Typical Range for Bankfull Discharge:	
					160	to 340 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:					
			Stream Length		*ft.*
			Valley Length		*ft.*
Bankfull Width	44	*ft.*	Contour Interval		feet
Mean Bankfull Depth	4.44	*ft.*	Estimated Sinuosity		
Width/Depth Ratio	9.91				
			Channel Slope:		Bankfull Q from:
Max. Bankfull Depth	7.5	*ft.*	Surveyed:	0.00039 *ft./ft.*	Cross-Section 366 *cfs*
Width at twice max. depth	500	*ft.*	Estimated:	*ft./ft.*	Basic field data 388 *cfs*
(15.0 ft.)					Selected Q 377 *cfs*
Entrenchment Ratio	11.36		Radius of Curvature (Rc)	ft.	
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload:	D_{90}	2 *in.*	Velocity required to move D_{90}:	2.9 *ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	1.87 *ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	1.99 *ft./sec.*
velocities from different sources.			Velocity from selected Q:	1.9 *ft./sec.*

Channel Evolution Stage IV Stream Type (Rosgen)

Notes

14.02 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec2	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000390	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	7.5	*ft*

$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

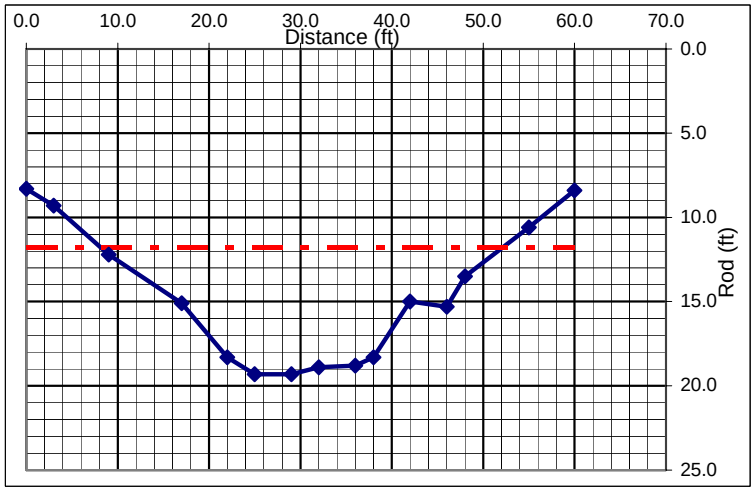
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	7.5 *ft*		
Channel Flow (***Q***):	366.2 *cfs*		
Channel Velocity:	1.9 *ft/sec*		
Cross-Sectional Area (***A***):	195.6 *sq.ft.*		
Hydraulic Radius (***R***):	4.1 *ft*		

Survey Data:

Rod *(ft)*	Distance *(ft)*
8.3	0.0
9.3	3.0
12.2	9.0
15.1	17.0
18.3	22.0
19.3	25.0
19.3	29.0
18.9	32.0
18.8	36.0
18.30	38
15.00	42
15.30	46
13.50	48
10.60	55
8.40	60



COMMENTS:

Riprap lined channel

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E417511 N4649997
Landowner Name Xsec3

Drainage Area 52.69 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	70 ft.	Cross Sectional Area	331 sq. ft.
	Depth	4.7 ft.		

Reference Stream Gage:

Salt Creek at Addison	Station No.	05531200	Gage Q_2 838 cfs
	Drainage Area	-	Regression (-
DuPage County, IL	**REFERENCE STREAM DATA ONLY**		

USGS Flood-Peak Discharge Predictions:

Valley Slope:	7.7	*ft./mi. (user-entered)*			Regression Q_2	534 cfs
		ft/mi (from worksheet)	Rainfall	2.75 in *(2 yr, 24 hr)*	Adjusted Q_2	-
	0.0015	*ft./ft.*	Regional Factor	0.578	Typical Range for Bankfull Discharge:	
					210 to 430 cfs	

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

			Stream Length		*ft.*
Basic Field Data:			Valley Length		*ft.*
Bankfull Width	66	*ft.*	Contour Interval		feet
Mean Bankfull Depth	3.23	*ft.*	Estimated Sinuosity		
Width/Depth Ratio	20.43				
			Channel Slope:		Bankfull Q from:
Max. Bankfull Depth		*ft.*	Surveyed:	0.00039 *ft./ft.*	Cross-Section 330 *cfs*
Width at twice max. depth		*ft.*	Estimated:	*ft./ft.*	Basic field data 343 *cfs*
					Selected Q 337 *cfs*
Entrenchment Ratio	0.00		Radius of Curvature (Rc)		ft.
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload:	D_{90}	1 *in.*	Velocity required to move D_{90}:	2.1	*ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	1.55	*ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	1.61	*ft./sec.*
velocities from different sources.			Velocity from selected Q:	1.6	*ft./sec.*

Channel Evolution Stage VI Stream Type (Rosgen)

Notes

6.40 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec3	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000390	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.4	*ft*

$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

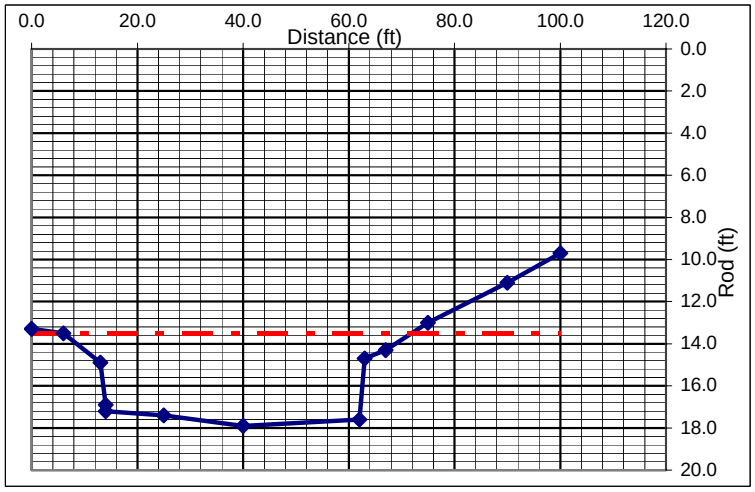
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.4 *ft*	4.6	
Channel Flow (***Q***):	330.1 *cfs*	343.3	
Channel Velocity:	1.5 *ft/sec*	1.5	
Cross-Sectional Area (***A***):	213.5 *sq.ft.*	227.4	
Hydraulic Radius (***R***):	3.1 *ft*	3.0	

Survey Data:

Rod *(ft)*	Distance *(ft)*
13.3	0.0
13.5	6.0
14.9	13.0
16.9	14.0
17.2	14.0
17.4	25.0
17.9	40.0
17.6	62.0
14.7	63.0
14.30	67
13.00	75
11.10	90
9.70	100



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E418088 N4645273

Landowner Name Xsec4

Drainage Area 75.2 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	80 ft.	Cross Sectional Area	421 sq. ft.
	Depth	5.2 ft.		

Reference Stream Gage:

Salt Creek at Addison — Station No. 05531200 — Gage Q_2 838 cfs

Drainage Area - — Regression (-

DuPage County, IL — **REFERENCE STREAM DATA ONLY**

USGS Flood-Peak Discharge Predictions:

Valley Slope: 5.2 *ft./mi. (user-entered)* — Regression Q_2 586 cfs

ft/mi (from worksheet) — Rainfall 2.75 in *(2 yr, 24 hr)* — Adjusted Q_2 -

0.0010 *ft./ft.* — Regional Factor 0.578 — Typical Range for Bankfull Discharge: 230 to 470 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 75 *ft.*

Mean Bankfull Depth 3.4 *ft.*

Width/Depth Ratio 22.06

Max. Bankfull Depth 4.6 *ft.*

Width at twice max. depth 600 *ft.*

(9.2 ft.)

Entrenchment Ratio 8.00

Stream Length *ft.*

Valley Length *ft.*

Contour Interval feet

Estimated Sinuosity

Channel Slope:

Surveyed: 0.00039 *ft./ft.*

Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.

Rc/Bankfull width: 0.00

Bankfull Q from:

Cross-Section 414 *cfs*

Basic field data 424 *cfs*

Selected Q 419 *cfs*

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D_{90} 1 *in.* — Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* — Velocity from Cross-Section data: 1.62 *ft./sec.*

GOAL: Develop confidence by matching velocities from different sources.

Velocity from basic field data: 1.66 *ft./sec.*

Velocity from selected Q: 1.6 *ft./sec.*

Channel Evolution Stage V — Stream Type (Rosgen)

Notes

5.57 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec4	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000390	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.6	*ft*

$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

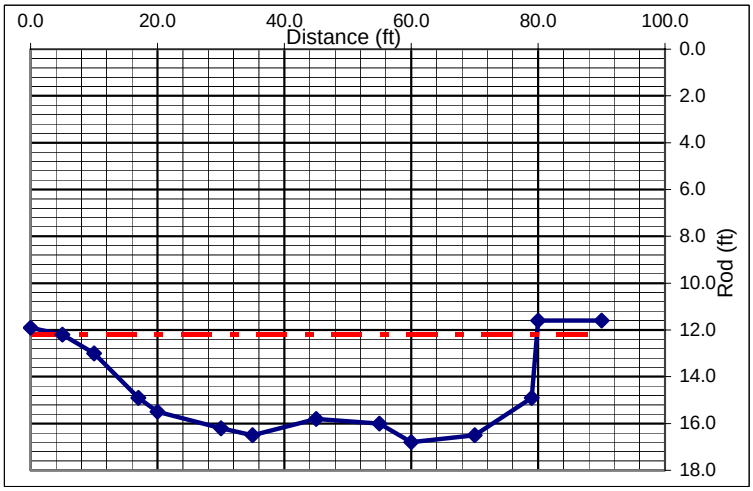
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.6 *ft*	4.9	
Channel Flow (***Q***):	414.3 *cfs*	458.2	
Channel Velocity:	1.6 *ft/sec*	1.6	
Cross-Sectional Area (***A***):	255.1 *sq.ft.*	278.3	
Hydraulic Radius (***R***):	3.3 *ft*	3.4	

Survey Data:

Rod *(ft)*	Distance *(ft)*
11.9	0.0
12.2	5.0
13.0	10.0
14.9	17.0
15.5	20.0
16.2	30.0
16.5	35.0
15.8	45.0
16.0	55.0
16.80	60
16.50	70
14.90	79
11.60	80
11.60	90



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E420289 N4637785

Landowner Name Xsec5

Drainage Area 91.96 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	87 ft.	Cross Sectional Area	482 sq. ft.
	Depth	5.6 ft.		

Reference Stream Gage:

Salt Creek at Oak Brook

DuPage County, IL

Station No. 05531380 Gage Q_2 1030 cfs

Drainage Area - Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 4.7 *ft./mi. (user-entered)* Regression Q_2 654 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0009 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

260 to 530 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 57 *ft.*

Mean Bankfull Depth 4.21 *ft.*

Width/Depth Ratio 13.54

Max. Bankfull Depth 5.1 *ft.*

Width at twice max. depth 800 *ft.*

(10.2 ft.)

Entrenchment Ratio 14.04

Stream Length *ft.*

Valley Length *ft.*

Contour Interval feet

Estimated Sinuosity

Channel Slope:

Surveyed: 0.00058 *ft./ft.*

Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.

Rc/Bankfull width: 0.00

Bankfull Q from:

Cross-Section 538 *cfs*

Basic field data 562 *cfs*

Selected Q 550 *cfs*

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 2.24 *ft./sec.*

GOAL: Develop confidence by matching velocities from different sources.

Velocity from basic field data: 2.34 *ft./sec.*

Velocity from selected Q: 2.3 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

5.98 cfs/sq.mi.

Natural Open Channel Flow

back to I&E form

Clear Cells

Project:	Xsec5	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000580	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	5.1	*ft*

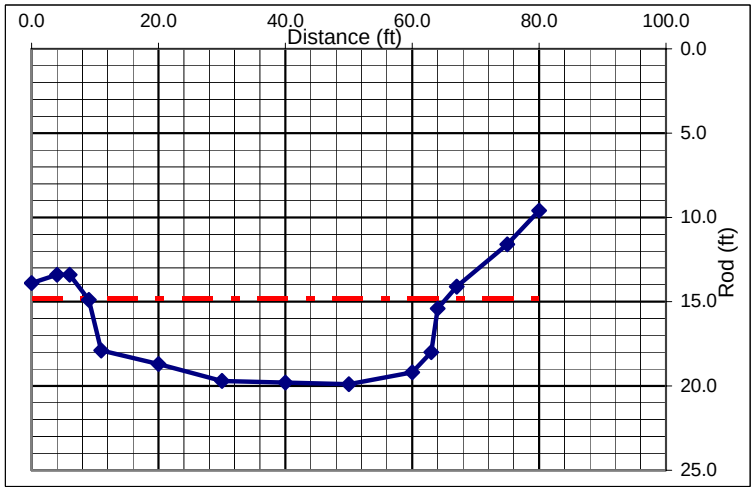
$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	5.1 *ft*	6.5	
Channel Flow (***Q***):	538.0 *cfs*	780.0	
Channel Velocity:	2.2 *ft/sec*	2.4	
Cross-Sectional Area (***A***):	239.9 *sq.ft.*	324.6	
Hydraulic Radius (***R***):	4.0 *ft*	4.4	

Survey Data:

Rod *(ft)*	Distance *(ft)*
13.9	0.0
13.4	4.0
13.4	6.0
14.9	9.0
17.9	11.0
18.7	20.0
19.7	30.0
19.8	40.0
19.9	50.0
19.20	60
18.00	63
15.40	64
14.10	67
11.60	75
9.60	80



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E421218 N4635170

Landowner Name Xsec6

Drainage Area 97.8 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	89 ft.	Cross Sectional Area	503 sq. ft.
	Depth	5.7 ft.		

Reference Stream Gage:

Salt Creek at Oak Brook

DuPage County, IL

Station No. 05531380 Gage Q_2 1030 cfs

Drainage Area - Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.9 *ft./mi. (user-entered)* Regression Q_2 628 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

250 to 510 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:

Bankfull Width	72	*ft.*	Stream Length		*ft.*
Mean Bankfull Depth	3.89	*ft.*	Valley Length		*ft.*
Width/Depth Ratio	18.51		Contour Interval		feet
			Estimated Sinuosity		
Max. Bankfull Depth	5	*ft.*	*Channel Slope:* Surveyed:	0.00058 *ft./ft.*	Bankfull Q from: Cross-Section 609 *cfs*
Width at twice max. depth (10.0 ft.)	100	*ft.*	Estimated:	*ft./ft.*	Basic field data 622 *cfs*
					Selected Q 616 *cfs*
Entrenchment Ratio	1.39		Radius of Curvature (Rc)		ft.
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)

Bedload:	D_{90}	1 *in.*	Velocity required to move D_{90}:	2.1 *ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	2.18 *ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	2.22 *ft./sec.*
velocities from different sources.			Velocity from selected Q:	2.2 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

6.30 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec6	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000580	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	5.0	*ft*

$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

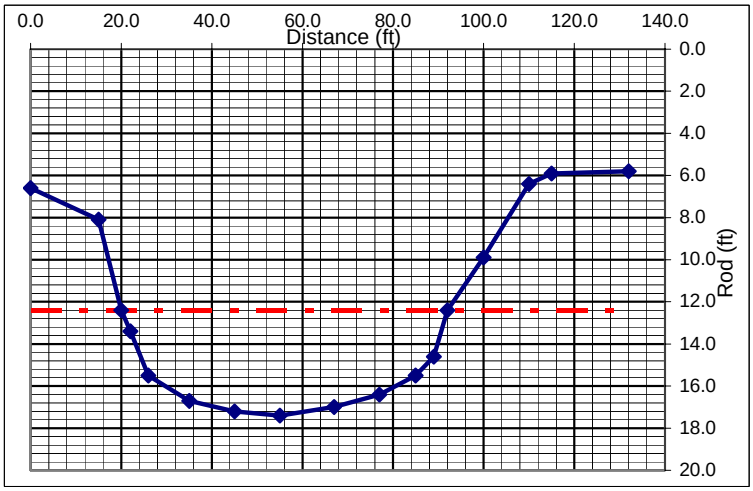
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	5.0 *ft*	10.8	
Channel Flow (***Q***):	609.3 *cfs*	2,512.7	
Channel Velocity:	2.2 *ft/sec*	3.2	
Cross-Sectional Area (***A***):	279.9 *sq.ft.*	779.0	
Hydraulic Radius (***R***):	3.8 *ft*	6.8	

Survey Data:

Rod *(ft)*	Distance *(ft)*
6.6	0.0
8.1	15.0
12.4	20.0
13.4	22.0
15.5	26.0
16.7	35.0
17.2	45.0
17.4	55.0
17.0	67.0
16.40	77
15.50	85
14.60	89
12.40	92
9.90	100
6.40	110
5.9	115
5.8	132



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E426621 N4632176

Landowner Name Xsec7

Drainage Area 122.76 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	97 ft.	Cross Sectional Area	587 sq. ft.
	Depth	6.0 ft.		

Reference Stream Gage:

Salt Creek at Western Springs — Station No. 05531500 — Gage Q_2 1160 cfs

Drainage Area 115 sq.mi — Regression (-

Cook County, IL **REFERENCE STREAM DATA ONLY**

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.3 *ft./mi. (user-entered)* — Regression Q_2 693 cfs

ft/mi (from worksheet) — Rainfall 2.75 in *(2 yr, 24 hr)* — Adjusted Q_2 -

0.0006 *ft./ft.* — Regional Factor 0.578 — Typical Range for Bankfull Discharge: 270 to 560 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:

Bankfull Width	72	*ft.*	Stream Length		*ft.*
Mean Bankfull Depth	3.85	*ft.*	Valley Length		*ft.*
Width/Depth Ratio	18.70		Contour Interval		feet
			Estimated Sinuosity		
Max. Bankfull Depth	4.8	*ft.*	*Channel Slope:* Surveyed:	0.00058 *ft./ft.*	Bankfull Q from: Cross-Section 597 *cfs*
Width at twice max. depth	800	*ft.*	Estimated:	*ft./ft.*	Basic field data 611 *cfs*
(9.6 ft.)					Selected Q 604 *cfs*
Entrenchment Ratio	11.11		Radius of Curvature (Rc)		ft.
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload:	D_{90}	1 *in.*	Velocity required to move D_{90}:	2.1 *ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	2.15 *ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	2.20 *ft./sec.*
velocities from different sources.			Velocity from selected Q:	2.2 *ft./sec.*

Channel Evolution Stage VI — Stream Type (Rosgen)

Notes

4.92 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec7	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000580	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.8	*ft*

$$Q \circ \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

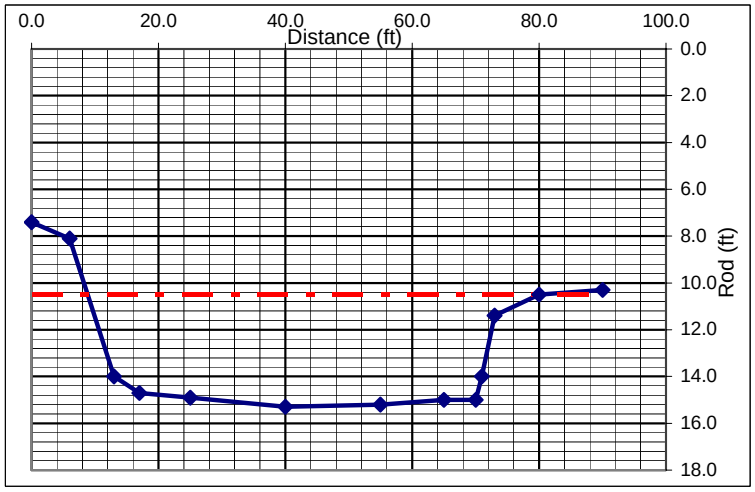
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.8 *ft*	5.0	
Channel Flow (***Q***):	597.4 *cfs*	598.9	
Channel Velocity:	2.2 *ft/sec*	2.0	
Cross-Sectional Area (***A***):	277.4 *sq.ft.*	292.6	
Hydraulic Radius (***R***):	3.7 *ft*	3.5	

Survey Data:

Rod *(ft)*	Distance *(ft)*
7.4	0.0
8.1	6.0
14.0	13.0
14.7	17.0
14.9	25.0
15.3	40.0
15.2	55.0
15.0	65.0
15.0	70.0
14.00	71
11.40	73
10.50	80
10.30	90



COMMENTS:

Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County DuPage T. R. Sec.

Date 11/23/2005 By Wayne Kinney

Stream Name Salt Creek UTM Coord. E430022 N4630892

Landowner Name Xsec8

Drainage Area 152.35 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	106 ft.	Cross Sectional Area	679 sq. ft.
	Depth	6.4 ft.		

Reference Stream Gage:

Salt Creek at Western Springs	Station No.	05531500	Gage Q_2 1160 cfs
	Drainage Area	115 sq.mi	Regression (-
Cook County, IL		**REFERENCE STREAM DATA ONLY**	

USGS Flood-Peak Discharge Predictions:

Valley Slope:	3.3	*ft./mi. (user-entered)*			Regression Q_2	822 cfs
		ft/mi (from worksheet)	Rainfall	2.75 in *(2 yr, 24 hr)*	Adjusted Q_2	-
	0.0006	*ft./ft.*	Regional Factor	0.578	Typical Range for Bankfull Discharge:	
					320	to 660 cfs

Local Stream Morphology:

Channel Description: (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

Basic Field Data:					
			Stream Length		*ft.*
			Valley Length		*ft.*
Bankfull Width	67	*ft.*	Contour Interval		feet
Mean Bankfull Depth	4.31	*ft.*	Estimated Sinuosity		
Width/Depth Ratio	15.55				
			Channel Slope:		Bankfull Q from:
Max. Bankfull Depth	5.4	*ft.*	Surveyed:	0.00058 *ft./ft.*	Cross-Section 664 *cfs*
Width at twice max. depth	800	*ft.*	Estimated:	*ft./ft.*	Basic field data 686 *cfs*
(10.8 ft.)					Selected Q 675 *cfs*
Entrenchment Ratio	11.94		Radius of Curvature (Rc)		ft.
			Rc/Bankfull width:	0.00	

Bankfull Velocity Check: *(typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload:	D_{90}	1 *in.*	Velocity required to move D_{90}:	2.1	*ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	2.30	*ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	2.38	*ft./sec.*
velocities from different sources.			Velocity from selected Q:	2.3	*ft./sec.*

Channel Evolution Stage VI Stream Type (Rosgen)

Notes

4.43 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec8	
Assisted by:	Wayne Kinney	
Date:	11/23/2005	
Channel Slope (***S***):	0.000580	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	5.4	*ft*

$$Q = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

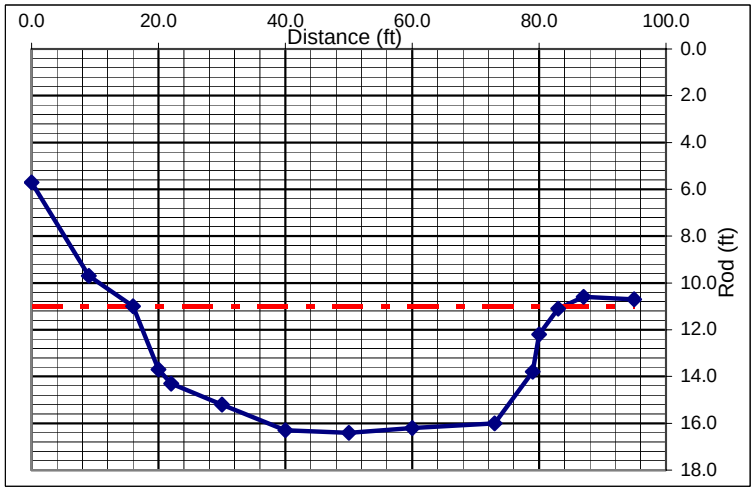
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	5.4 *ft*	5.8	
Channel Flow (***Q***):	663.8 *cfs*	686.7	
Channel Velocity:	2.3 *ft/sec*	2.2	
Cross-Sectional Area (***A***):	289.1 *sq.ft.*	317.7	
Hydraulic Radius (***R***):	4.1 *ft*	3.8	

Survey Data:

Rod *(ft)*	Distance *(ft)*
5.7	0.0
9.7	9.0
11.0	16.0
13.7	20.0
14.3	22.0
15.2	30.0
16.3	40.0
16.4	50.0
16.2	60.0
16.00	73
13.80	79
12.20	80
11.10	83
10.60	87
10.70	95



COMMENTS: