Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

September 11, 2012

SUBJECT: FAU 3860 (Miller Road)
Project HPP-1964(003)
Section 09-00372-00-PW
McHenry County
Contract No. 63633
Item 60
September 21, 2012
Addendum (A)

NOTICE TO PROSPECTIVE BIDDERS:

Due to clarify information necessary to revise the following:

1. **Pages 5 thru 20 of the Schedule of Prices.**
2. **Pages 1 & 3 of the Index for Special Provisions.**
3. **Page 9 of the Special Provisions.**
4. **Added pages 308 thru 396 to the Special Provisions.**
5. **Sheets 3, 4, 6, 7, 13, 14, 63, 64, 67, 69, 71, 72, 73, 96, 99, 100, 162, 188, 201, 202, 203, 204, 205 & 206 of the Plans.**

Prime contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

Scott Stitt, P.E.
Acting Engineer of Design and Environment

By: Ted B. Walschleger, P.E.
Engineer of Project Management

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
20201200	REM & DISP UNS MATL	CU YD	73,857.000	X			=		
20400800	FURNISHED EXCAVATION	CU YD	23,213.000	X			=		
20800150	TRENCH BACKFILL	CU YD	465.000	X			=		
21001000	GEOTECH FAB F/GR STAB	SQ YD	37,701.000	X			=		
21101615	TOPSOIL F & P 4	SQ YD	53,940.000	X			=		
21101685	TOPSOIL F & P 24	SQ YD	2,961.000	X			=		
25000210	SEEDING CL 2A	ACRE	7.500	X			=		
25000312	SEEDING CL 4A	ACRE	1.750	X			=		
25000314	SEEDING CL 4B	ACRE	2.000	X			=		
25000400	NITROGEN FERT NUTR	POUND	1,020.000	X			=		
25000500	PHOSPHORUS FERT NUTR	POUND	1,020.000	X			=		
25000600	POTASSIUM FERT NUTR	POUND	1,020.000	X			=		
25100635	HD EROS CONTR BLANKET	SQ YD	51,582.000	X			=		
25100900	TURF REINF MAT	SQ YD	292.000	X			=		
25200110	SODDING SALT TOLERANT	SQ YD	840.000	X			=		

Revised 9/11/12

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
25200200	SUPPLE WATERING	UNIT	42.000	X			=		
28000250	TEMP EROS CONTR SEED	POUND	1,070.000	X			=		
28000305	TEMP DITCH CHECKS	FOOT	150.000	X			=		
28000315	AGG DITCH CHECKS	TON	20.000	X			=		
28000400	PERIMETER EROS BAR	FOOT	12,560.000	X			=		
28000500	INLET & PIPE PROTECT	EACH	16.000	X			=		
28000510	INLET FILTERS	EACH	94.000	X			=		
28100105	STONE RIPRAP CL A3	SQ YD	289.000	X			=		
28100107	STONE RIPRAP CL A4	SQ YD	127.000	X			=		
28100707	STONE DUMP RIP CL A4	SQ YD	82.000	X			=		
28100709	STONE DUMP RIP CL A5	SQ YD	12.000	X			=		
28100805	STONE DUMP RIP CL A3	TON	3.000	X			=		
28200200	FILTER FABRIC	SQ YD	573.000	X			=		
30300001	AGG SUBGRADE IMPROVE	CU YD	12,975.000	X			=		
30300104	AGG SUBGRADE IMPR 4	SQ YD	2,380.000	X			=		

Revised 9/21/12

ILLINOIS DEPARTMENT OF TRANSPORTATION
SCHEDULE OF PRICES
CONTRACT NUMBER - 63633

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
30300112	AGG SUBGRADE IMPR 12	SQ YD	34,962.000			X =		
31101400	SUB GRAN MAT B 6	SQ YD	3,203.000			X =		
35501308	HMA BASE CSE 6	SQ YD	1,728.000			X =		
35600700	HMA BC WID 6	SQ YD	820.000			X =		
40600100	BIT MATLS PR CT	GALLON	3,943.000			X =		
40600300	AGG PR CT	TON	79.000			X =		
40600635	LEV BIND MM N70	TON	79.000			X =		
40600895	CONSTRUC TEST STRIP	EACH	2.000			X =		
40600982	HMA SURF REM BUTT JT	SQ YD	439.000			X =		
40603080	HMA BC IL-19.0 N50	TON	715.000			X =		
40603240	P HMA BC IL19.0 N90	TON	99.000			X =		
40603335	HMA SC "D" N50	TON	559.000			X =		
40603595	P HMA SC "F" N90	TON	472.000			X =		
40701961	HMA PAVT FD 14	SQ YD	34,026.000			X =		
42001430	BR APPR PVT CON (FLX)	SQ YD	125.000			X =		

Revised 9/11/12

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
42400300	PC CONC SIDEWALK 6	SQ FT	678.000	X			=		
42400800	DETECTABLE WARNINGS	SQ FT	58.000	X			=		
44000100	PAVEMENT REM	SQ YD	28,218.000	X			=		
44000200	DRIVE PAVEMENT REM	SQ YD	259.000	X			=		
44000500	COMB CURB GUTTER REM	FOOT	1,611.000	X			=		
44000600	SIDEWALK REM	SQ FT	156.000	X			=		
44004250	PAVED SHLD REMOVAL	SQ YD	3,240.000	X			=		
44201745	CL D PATCH T3 8	SQ YD	850.000	X			=		
48101500	AGGREGATE SHLDS B 6	SQ YD	1,093.000	X			=		
48203021	HMA SHOULDERS 6	SQ YD	550.000	X			=		
48203029	HMA SHOULDERS 8	SQ YD	205.000	X			=		
50102400	CONC REM	CU YD	8.700	X			=		
50200100	STRUCTURE EXCAVATION	CU YD	1,112.000	X			=		
50200300	COFFERDAM EXCAVATION	CU YD	424.000	X			=		
50201121	COFFERDAM TYP 2 LOC 1	EACH	1.000	X			=		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
50201122	COFFERDAM TYP 2 LOC 2	EACH	1.000	X			=		
50201123	COFFERDAM TYP 2 LOC 3	EACH	1.000	X			=		
50201124	COFFERDAM TYP 2 LOC 4	EACH	1.000	X			=		
50300225	CONC STRUCT	CU YD	653.000	X			=		
50300255	CONC SUP-STR	CU YD	777.200	X			=		
50300260	BR DECK GROOVING	SQ YD	2,075.000	X			=		
50300265	SEAL COAT CONC	CU YD	149.500	X			=		
50300280	CONCRETE ENCASEMENT	CU YD	7.700	X			=		
50300300	PROTECTIVE COAT	SQ YD	5,697.000	X			=		
50500105	F & E STRUCT STEEL	L SUM	1.000	X			=		
50500505	STUD SHEAR CONNECTORS	EACH	10,688.000	X			=		
50800105	REINFORCEMENT BARS	POUND	39,550.000	X			=		
50800205	REINF BARS, EPOXY CTD	POUND	251,310.000	X			=		
50800515	BAR SPLICERS	EACH	56.000	X			=		
51100300	SLOPE WALL 6	SQ YD	200.000	X			=		

Revised 9/11/12

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
51201400	FUR STL PILE HP10X42	FOOT	1,070.000	X			=		
51201600	FUR STL PILE HP12X53	FOOT	2,854.000	X			=		
51202305	DRIVING PILES	FOOT	3,924.000	X			=		
51203400	TEST PILE ST HP10X42	EACH	2.000	X			=		
51203600	TEST PILE ST HP12X53	EACH	4.000	X			=		
51204650	PILE SHOES	EACH	36.000	X			=		
51500100	NAME PLATES	EACH	1.000	X			=		
52000110	PREF JT STRIP SEAL	FOOT	30.000	X			=		
52000216	FINGER PLT EXP JT 5	FOOT	28.000	X			=		
52000340	NEOPRENE EXPAN JT 4	FOOT	44.000	X			=		
52000365	NEOPRENE EXP JT 6 1/2	FOOT	44.300	X			=		
52100020	ELAST BEARING ASSY T2	EACH	4.000	X			=		
52100030	ELAST BEARING ASSY T3	EACH	4.000	X			=		
52100520	ANCHOR BOLTS 1	EACH	64.000	X			=		
52100530	ANCHOR BOLTS 1 1/4	EACH	8.000	X			=		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
54002020	EXPAN BOLTS 3/4	EACH	16.000	X			=		
54003000	CONC BOX CUL	CU YD	14.000	X			=		
54213657	PRC FLAR END SEC 12	EACH	17.000	X			=		
54213660	PRC FLAR END SEC 15	EACH	1.000	X			=		
54213663	PRC FLAR END SEC 18	EACH	2.000	X			=		
54213669	PRC FLAR END SEC 24	EACH	5.000	X			=		
54213681	PRC FLAR END SEC 36	EACH	2.000	X			=		
550A0050	STORM SEW CL A 1 12	FOOT	1,603.000	X			=		
550A0070	STORM SEW CL A 1 15	FOOT	174.000	X			=		
550A0090	STORM SEW CL A 1 18	FOOT	99.000	X			=		
550A0120	STORM SEW CL A 1 24	FOOT	203.000	X			=		
550A0140	STORM SEW CL A 1 30	FOOT	171.000	X			=		
550A0160	STORM SEW CL A 1 36	FOOT	209.000	X			=		
550A0340	STORM SEW CL A 2 12	FOOT	1,627.000	X			=		
550A0380	STORM SEW CL A 2 18	FOOT	448.000	X			=		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
550A0410	STORM SEW CL A 2 24	FOOT	844.000	X			=		
550B0040	STORM SEW CL B 1 10	FOOT	284.000	X			=		
55100500	STORM SEWER REM 12	FOOT	490.000	X			=		
55100700	STORM SEWER REM 15	FOOT	728.000	X			=		
55100900	STORM SEWER REM 18	FOOT	55.000	X			=		
55101100	STORM SEWER REM 21	FOOT	110.000	X			=		
55101200	STORM SEWER REM 24	FOOT	73.000	X			=		
55101400	STORM SEWER REM 30	FOOT	105.000	X			=		
55101600	STORM SEWER REM 36	FOOT	76.000	X			=		
56400300	FIRE HYDNTS TO BE ADJ	EACH	1.000	X			=		
58700300	CONCRETE SEALER	SQ FT	784.400	X			=		
59100100	GEOCOMPOSITE WALL DR	SQ YD	208.000	X			=		
60200105	CB TA 4 DIA T1F OL	EACH	1.000	X			=		
60200805	CB TA 4 DIA T8G	EACH	2.000	X			=		
60201105	CB TA 4 DIA T11F&G	EACH	12.000	X			=		

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60201340	CB TA 4 DIA T24F&G	EACH	10.000	X			=		
60207605	CB TC T8G	EACH	7.000	X			=		
60207905	CB TC T11F&G	EACH	35.000	X			=		
60208240	CB TC T24F&G	EACH	8.000	X			=		
60218400	MAN TA 4 DIA T1F CL	EACH	17.000	X			=		
60221100	MAN TA 5 DIA T1F CL	EACH	3.000	X			=		
60236800	INLETS TA T11F&G	EACH	21.000	X			=		
60237470	INLETS TA T24F&G	EACH	11.000	X			=		
60250200	CB ADJUST	EACH	1.000	X			=		
60257900	MAN RECONST	EACH	1.000	X			=		
60260300	INLETS ADJ NEW T1F OL	EACH	1.000	X			=		
60500040	REMOV MANHOLES	EACH	3.000	X			=		
60500050	REMOV CATCH BAS	EACH	3.000	X			=		
60500060	REMOV INLETS	EACH	8.000	X			=		
60600095	CLASS SI CONC OUTLET	CU YD	1.000	X			=		

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ILLINOIS DEPARTMENT OF TRANSPORTATION
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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
60603800	COMB CC&G TB6.12	FOOT	8,616.000	X			=		
60605000	COMB CC&G TB6.24	FOOT	6,482.000	X			=		
60618300	CONC MEDIAN SURF 4	SQ FT	10,478.000	X			=		
60619600	CONC MED TSB6.12	SQ FT	8,319.000	X			=		
60624600	CORRUGATED MED	SQ FT	815.000	X			=		
63000001	SPBGR TY A 6FT POSTS	FOOT	987.500	X			=		
63000003	SPBGR TY A 9FT POSTS	FOOT	1,187.500	X			=		
63100045	TRAF BAR TERM T2	EACH	3.000	X			=		
63100070	TRAF BAR TERM T5	EACH	2.000	X			=		
63100085	TRAF BAR TERM T6	EACH	3.000	X			=		
63100167	TR BAR TRM T1 SPL TAN	EACH	6.000	X			=		
63200310	GUARDRAIL REMOV	FOOT	415.000	X			=		
66400305	CH LK FENCE 6	FOOT	20.000	X			=		
66401900	CH LK GATE 5X6 SINGL	EACH	2.000	X			=		
67000400	ENGR FIELD OFFICE A	CAL MO	18.000	X			=		

Revised 9/11/12

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
67100100	MOBILIZATION	L SUM	1.000	X			=		
70103815	TR CONT SURVEILLANCE	CAL DA	403.000	X			=		
70106800	CHANGEABLE MESSAGE SN	CAL MO	39.000	X			=		
70300100	SHORT TERM PAVT MKING	FOOT	4,662.000	X			=		
70300210	TEMP PVT MK LTR & SYM	SQ FT	370.000	X			=		
70300220	TEMP PVT MK LINE 4	FOOT	56,120.000	X			=		
70300240	TEMP PVT MK LINE 6	FOOT	1,065.000	X			=		
70300250	TEMP PVT MK LINE 8	FOOT	1,970.000	X			=		
70300260	TEMP PVT MK LINE 12	FOOT	445.000	X			=		
70300280	TEMP PVT MK LINE 24	FOOT	125.000	X			=		
70300520	PAVT MARK TAPE T3 4	FOOT	12,255.000	X			=		
70301000	WORK ZONE PAVT MK REM	SQ FT	3,060.000	X			=		
70400100	TEMP CONC BARRIER	FOOT	499.000	X			=		
70400200	REL TEMP CONC BARRIER	FOOT	137.000	X			=		
72000100	SIGN PANEL T1	SQ FT	551.000	X			=		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
72000200	SIGN PANEL T2	SQ FT	60.000	X			=		
73400200	DRILL SHAFT CONC FDN	CU YD	4.000	X			=		
78000100	THPL PVT MK LTR & SYM	SQ FT	185.000	X			=		
78000200	THPL PVT MK LINE 4	FOOT	21,395.000	X			=		
78000400	THPL PVT MK LINE 6	FOOT	485.000	X			=		
78000600	THPL PVT MK LINE 12	FOOT	230.000	X			=		
78000650	THPL PVT MK LINE 24	FOOT	60.000	X			=		
78008210	POLYUREA PM T1 LN 4	FOOT	3,190.000	X			=		
78008230	POLYUREA PM T1 LN 6	FOOT	100.000	X			=		
78100105	RAISED REF PVT MKR BR	EACH	36.000	X			=		
78200410	GUARDRAIL MKR TYPE A	EACH	32.000	X			=		
78201000	TERMINAL MARKER - DA	EACH	6.000	X			=		
78300100	PAVT MARKING REMOVAL	SQ FT	8,350.000	X			=		
78300200	RAISED REF PVT MK REM	EACH	20.000	X			=		
80400100	ELECT SERV INSTALL	EACH	1.000	X			=		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
80400200	ELECT UTIL SERV CONN	L SUM	1.000			X =		
80500020	SERV INSTALL POLE MT	EACH	1.000			X =		
81028200	UNDRGRD C GALVS 2	FOOT	391.000			X =		
81028210	UNDRGRD C GALVS 2 1/2	FOOT	172.000			X =		
81028220	UNDRGRD C GALVS 3	FOOT	21.000			X =		
81028240	UNDRGRD C GALVS 4	FOOT	464.000			X =		
81200210	CON EMB STR 1 PVC	FOOT	700.000			X =		
81200230	CON EMB STR 2 PVC	FOOT	620.000			X =		
81300830	JUN BX SS AS 18X18X8	EACH	4.000			X =		
81400100	HANDHOLE	EACH	3.000			X =		
81400300	DBL HANDHOLE	EACH	2.000			X =		
81603050	UD 3#6 #8G XLPUSE 1	FOOT	2,225.000			X =		
81702110	EC C XLP USE 1C 10	FOOT	1,400.000			X =		
81702120	EC C XLP USE 1C 8	FOOT	638.000			X =		
81702130	EC C XLP USE 1C 6	FOOT	1,914.000			X =		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
81702160	EC C XLP USE 1C 1/0	FOOT	150.000			X =		
82102310	LUM SV HOR MT 310W	EACH	18.000			X =		
82500350	LT CONT BASEM 240V100	EACH	1.000			X =		
83008200	LT P A 40MH 6MA	EACH	6.000			X =		
83008500	LT P A 40MH 12MA	EACH	10.000			X =		
83600355	LP F M 15BC 8" X 6'	EACH	7.000			X =		
83800205	BKWY DEV TR B 15BC	EACH	6.000			X =		
84200500	REM LT UNIT SALV	EACH	9.000			X =		
84200804	REM POLE FDN	EACH	6.000			X =		
87300925	ELCBL C TRACER 14 1C	FOOT	638.000			X =		
87301215	ELCBL C SIGNAL 14 2C	FOOT	835.000			X =		
87301225	ELCBL C SIGNAL 14 3C	FOOT	557.000			X =		
87301245	ELCBL C SIGNAL 14 5C	FOOT	1,639.000			X =		
87301255	ELCBL C SIGNAL 14 7C	FOOT	1,869.000			X =		
87301290	ELCBL C SIGNAL 18 3C	FOOT	729.000			X =		

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ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
87301805	ELCBL C SERV 6 2C	FOOT	126.000			X =		
87301900	ELCBL C EGRDC 6 1C	FOOT	726.000			X =		
87502440	TS POST GALVS 10	EACH	1.000			X =		
87502500	TS POST GALVS 16	EACH	3.000			X =		
87700180	S MAA & P 28	EACH	1.000			X =		
87700250	S MAA & P 42	EACH	1.000			X =		
87700280	S MAA & P 48	EACH	1.000			X =		
87800100	CONC FDN TY A	FOOT	16.000			X =		
87800150	CONC FDN TY C	FOOT	4.000			X =		
87800415	CONC FDN TY E 36D	FOOT	36.000			X =		
88030020	SH LED 1F 3S MAM	EACH	4.000			X =		
88030050	SH LED 1F 3S BM	EACH	3.000			X =		
88030070	SH LED 1F 4S BM	EACH	1.000			X =		
88030100	SH LED 1F 5S BM	EACH	2.000			X =		
88030110	SH LED 1F 5S MAM	EACH	1.000			X =		

Revised 9/11/12

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY		UNIT PRICE DOLLARS	UNIT PRICE CENTS		TOTAL PRICE DOLLARS	TOTAL PRICE CTS
88030250	SH LED 2F 1-4 1-5 BM	EACH	1.000	X			=		
88102717	PED SH LED 1F BM CDT	EACH	2.000	X			=		
88200110	TS BACKPLATE LOUVERED	EACH	5.000	X			=		
88700200	LIGHT DETECTOR	EACH	2.000	X			=		
88700300	LIGHT DETECTOR AMP	EACH	1.000	X			=		
88800100	PED PUSH-BUTTON	EACH	2.000	X			=		
89000100	TEMP TR SIG INSTALL	EACH	1.000	X			=		
89100400	ILLUM SIGN LED	EACH	3.000	X			=		
89502375	REMOV EX TS EQUIP	EACH	1.000	X			=		

TOTAL $

NOTE:

1. EACH PAY ITEM SHOULD HAVE A UNIT PRICE AND A TOTAL PRICE.
2. THE UNIT PRICE SHALL GOVERN IF NO TOTAL PRICE IS SHOWN OR IF THERE IS A DISCREPANCY BETWEEN THE PRODUCT OF THE UNIT PRICE MULTIPLIED BY THE QUANTITY.
3. IF A UNIT PRICE IS OMITTED, THE TOTAL PRICE WILL BE DIVIDED BY THE QUANTITY IN ORDER TO ESTABLISH A UNIT PRICE.
4. A BID MAY BE DECLARED UNACCEPTABLE IF NEITHER A UNIT PRICE NOR A TOTAL PRICE IS SHOWN.

Revised 9/11/12

INDEX OF SPECIAL PROVISIONS

1 **8.27.12**

Revised 9/11/12

AGGREGATE DITCH CHECKS

This work shall include all labor and materials required to construct Aggregate Ditch Checks at locations shown in the plans or, as directed by the Engineer. Aggregate Ditch Checks shall be constructed according to IDOT Standard 280001-06 and applicable portions of Section 280 of the Standard Specifications.

The quantity shown on the plans shall be used to establish a contract unit price for this pay item. The final quantity may vary from this dependent upon field conditions encountered. This work will be paid for at the contract unit price per TON for AGGREGATE DITCH CHECKS.

Revised 9/11/12

Hydraulic Report

City of McHenry
McHenry County, Illinois

HR GREEN JOB NO. MCHE-050761
August 15, 2008
REVISED: July 5, 2012

Prepared by:
Joel N. Krause, P.E., CFM

Reviewed by:
Ajay Jain, P.E., CFM

HRGreen

HR GREEN, INC.
420 North Front Street
McHenry, Illinois 60050
Phone: (815) 385-1778
Fax: (815) 385-1781

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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 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 056-3213 (Existing); SN N/A. (Proposed)
   Route/Stream: Un-named tributary to Fox River
   County McHenry

2. Prepared By: ☒ Consultant: SEC Group, Inc.
   ☐ District

3. Chapter 2 of the Drainage Manual adhered to: 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_____, downstream _____.
   d. ☐ Bridge
      ☒ Culvert
   e. ☐ New alignment
   f. Work planned below Q100 HWE: Yes ☐ No ☒

6. Hydrology: USGS _____; FIS __; Other HEC-1
   Gage data utilized? Yes ☐ No ☒

7. WIT: Attached copy of all completed WIT(s) Yes.

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

9. IDNR Permit: Drainage Area 0.63 s. mi.; Rural _____; Urbanizing X; Public Water or within Public Water boundaries Yes. Indicate Permit Type Required:
   a. Individual ☐
   b. Statewide #2 ☐
   c. Statewide #12 ☐
   d. Floodway ☐
   e. Other: _____.
   f. None: ☒

10. Sensitive flood receptors: Yes ☐ No ☒; give type, elevations and locations _____.
    History of flooding or overtopping problems: Yes ☐ No ☒
    Sources of observed highwater: N/A.

11. Scour/migration problems: None/minimal ☒ Significant ☐ Severe ☐
    Comments: _____.

    Ice/Debris concerns: None/minimal ☒ Significant ☐ Severe ☐
    Comments: None.

    Countermeasures proposed: riprap at the outlet.

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 Joel N. Krause Date 08-04-08

Signed (QA/QC) [signature] Date 8/15/08

RLD/bb25841(6/14)

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TABLE OF CONTENTS

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HYDRAULIC REPORT
Charles Miller Road Over Un-Named Fox River Tributary
McHenry, Illinois

I. NARRATIVE

A. General Project Description

This abbreviated Hydraulic Report summarizes a hydraulic analysis that was performed for Charles Miller Road over an un-named Tributary to the Fox River in the City of McHenry in McHenry County, Illinois. The project is located in the Southwest Quarter of the Northwest Quarter of Section 1, Township 44 N, Range 8E of 7.5 minute U.S.G.S (United States Geological Survey) Quadrangle Map of McHenry in Illinois.

As shown on the FEMA FIRM Map (Panel 17111C0209J) included in Appendix V, there is no regulatory floodway/floodplain at the location of the stream crossing, and therefore, there is no regulatory hydrologic and hydraulic modeling available from FEMA. Since there is no regulatory modeling available, HEC-1 was used to generate the discharges for the culvert, which was modeled in HY-8. Please refer to the section of the narrative entitled "Hydrologic and Hydraulic Analysis" for more information pertaining to the hydrologic and hydraulic modeling.

The existing structure consists of a single 6' x 3' precast concrete box culvert having a length of 83'-0" and a 27-degree skew with respect to the perpendicular of the Miller Road centerline. The culvert was originally designed in 1987 having a total length of 73'-0" (referred to as the pre-existing conditions). In 1997, the culvert was extended 10'-0" to be 83'-0" long as part of the Miller Road improvements (referred to as the existing conditions). The culvert is on a tangent horizontal alignment and a tangent vertical alignment with a +0.5% slope. The existing culvert has upstream and downstream inverts of 735.93, respectively, and is therefore considered to be an equalizer pipe. The stream is an un-named tributary to the Fox River and has a total tributary area of 0.63 square miles (404.3 acres) at the culvert crossing. The existing crossing is partially located in the zone AE floodplain of the Fox River as shown on the FEMA FIRM map included in Appendix V. The existing conditions models show that there is no overtopping of the road for a flood event up to the 100-year event as shown on the Waterway Information Table included in Appendix IV. There have been no reported flooding incidents at the existing structure. There are no sensitive flood receptors located within the existing conditions headwater elevation and the existing culvert is, therefore, not a source of flood damage. Please refer to the General Location Drainage Map included in Appendix III for the delineation of the watershed and Appendix VIII for the Culvert Details showing the original culvert design from 1987 and the culvert extension design from 1997. The existing condition models are included in Appendix VII.

As stated previously in the report, since there was no regulatory hydrologic and hydraulic modeling from FEMA, HEC-1 was used to generate the design discharges for the culvert. The Clark Unit Hydrograph was used to develop the rainfall

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hydrograph for the watershed. Please refer to Appendix VI for the calculation of the Clark Unit Hydrograph parameters. Please also refer to Appendix VI for the calculation of the weighted runoff coefficient. Various land uses such as row crops, paved impervious areas, ¼-acre residential lots, open space, and woods were used to calculate the weighted runoff coefficient. As shown in the HEC-1 output, included in Appendix VI, the 2, 10, 50, and 100-year discharges were calculated to be 55, 110, 258, and 356 cfs, respectively.

HY-8 was used for the hydraulic modeling of the culvert. Two (2) separate models with varying tailwaters were prepared for both the existing and proposed conditions; the first model used a starting tailwater of 737.00, which was based upon the approximate ground elevation immediately downstream of the culvert. The existing condition analysis with this tailwater shows that the 100-year headwater elevation for the culvert is 740.90, which is below the existing low grade elevation (EOP) of 741.0 at Station 583+00. On the upstream side of the culvert and further to the east, there is a high point elevation of 739.45 (which is below the roadway edge of pavement elevation) at Station 587+00. This high point in the ground causes a split flow to occur such that a portion of the flow above this overflow elevation splits and flows easterly to a second culvert (24" culvert) under Miller Road located at Station 589+50. The flow from this culvert also drains into the same channel (south of Miller Road) as the box culvert and eventually discharges into the Fox River. In order to model the split flow, the weir section was taken along the roadway edge of pavement up to station 587+00 and then across the overflow point. The same split flow was maintained in the proposed conditions to maintain the existing drainage patterns. The second existing conditions model that was prepared utilized a starting tailwater elevation of 738.34, which is the 10-year water surface elevation of the Fox River at Miller Road (per the FIS Study, and is in NAVD88). The analysis shows that the 100-year headwater elevation for this tailwater remained the same at 740.90.

It is important to note that the water surface elevations from the FIS profile are in NGVD29 datum, and have been converted to NAVD88 datum for modeling purposes ($Elev_{NAVD88} = Elev_{NGVD29} - 0.16$ ft). Please see Appendix IX for the vertical datum conversion from NGVD29 to NAVD88. A copy of the FIS profile showing the water surface elevations at Miller Road is also included in Appendix IX.

Once the existing analysis was completed, the proposed condition analysis was completed for the proposed improvements, which involve a culvert extension. The proposed horizontal geometry of Charles Miller Road will be improved from two (2) lanes of traffic to four (4) lanes of traffic (2 lanes in each direction) at this location. The widening of Charles Miller Road will typically be a total of 18' (out-to-out distance being increased from 44'-0" to 62'-0") along the roadway improvements. In order to accommodate the proposed widening of Miller Road, the existing culvert will need to be extended 29'-4" to the north (in the upstream direction). Similar to the existing conditions, two (2) separate models with varying tailwaters were used to analyze the culvert in the proposed conditions. The starting tailwater elevations were the same as those in the existing conditions. The first model, which used a starting tailwater of 737.00, shows that the 100-year headwater elevation is 740.91, which is below the overtopping elevation of the roadway top of curb elevation of 741.26 at Station 583+00. To maintain the existing drainage patterns, the split flow elevation on the upstream side of the culvert further to the east at approximate Station 587+00 is

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generally being maintained. This split flow overflow will maintain the existing conditions split flow and ensure that the stream flows to the northeast along its path of natural drainage to the river. The second model, which used a starting tailwater elevation of 738.34, shows that the 100-year headwater elevation is also 740.91. The proposed modeling shows that there is no overtopping (no encroachment on the pavement) for all profiles up to and including the 100-year storm. The water surface elevations are being maintained in the proposed conditions similar to the existing conditions. Please see Appendix IV for the Waterway Information Table (WIT) and Appendix VII for the proposed HY-8 modeling.

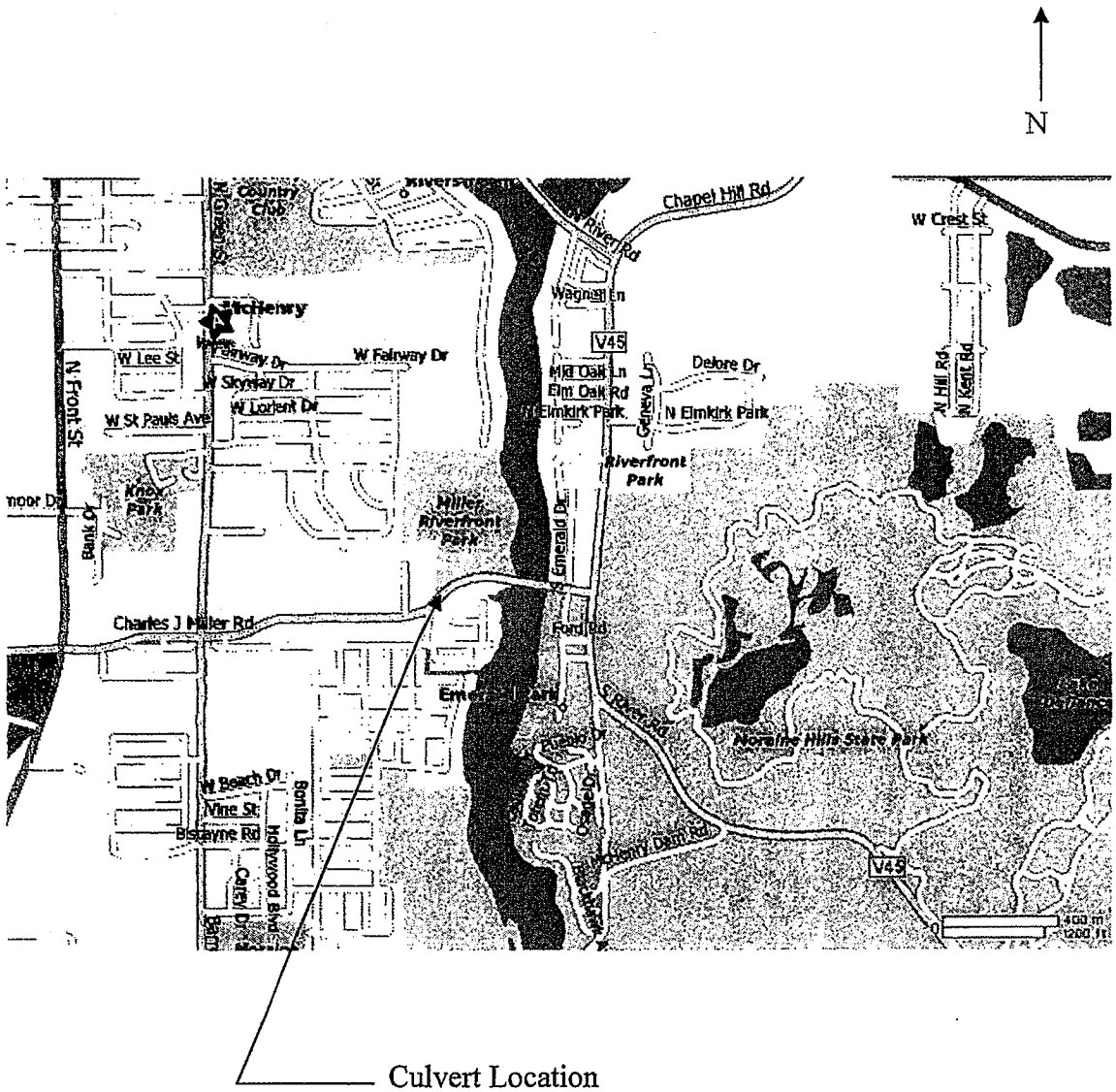
Since the waterway crossing is classified as an urban crossing, with a tributary area less than 1 square mile, the stream is not under the jurisdiction of IDNR-OWR. Therefore, an IDNR-OWR permit is not applicable for this project.

The design criteria utilized for sizing the culvert was ensuring that all profiles up to and including the 100-year do not encroach on to the edge of pavement. For the proposed conditions, there is more than 0.5' of freeboard for the 50-year storm and the 100-year storm is not overtopping the road. The proposed improvements associated with the culvert extension are therefore in compliance with the McHenry County Stormwater Ordinance and the IDOT Drainage Manual.

P:\2005\050761 MCHE Miller_Rd_PI-31to120\Engineering\reports\Hydraulic\6 x 3 Box Culvert\Miller Road Hydraulic Report Narrative-Revised.doc

Added 9/11/12

Location Map



Added 9/11/12

WATERWAY INFORMATION TABLE

Route:	Charles Miller Road (FAU 3860)	**S.N.:**	N/A.	**Existing**	**Computed:**	JNK	**Date:** 07/05/12
Section:		**S.N.:**	N/A.	**Proposed**	**Checked:**	AJ	**Date:** 07/05/12
County:	McHenry	**Waterway:**	Un-Named Tributary to Fox River				

Existing Low Grade Elevation (edge of pavement at local sag) = 741.0 **at Sta.** 583+00

Drainage Area = 0.63 sq. mi. **Proposed Low Grade Elevation (top of curb at local sag) =** 741.3 **at Sta.** 583+00

Flood	Frequency Year	Discharge (cfs)	Waterway Opening (sq. ft.)		Natural H.W.E	Head (ft.)		Headwater Elev.	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	110	14	14	738.3	1.3	1.0	739.6	739.3
DESIGN	50	258	18	18	739.1	1.4	1.4	740.5	740.5
BASE/MAX CALC	100	356	18	18	739.6	1.3	1.3	740.9	740.9
OVERTOPPING	> 100								

10 Year Velocity Through Existing Culvert = 7.39 fps

10 Year Velocity Through Proposed Culvert = 6.56 fps

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DATUM: NAVD88 (Highway Datum), which is 0.16 ft lower than the NGVD29 datum.

ALL-TIME H.W.E. & DATE: N/A.

EXISTING STRUCTURE:

TYPE:	Precast Concrete Box
SIZE/LENGTH:	6'W x 3'H Box Culvert / 83'-0" long
SPANS:	N/A.
LOW BEAM:	N/A.
SKEW:	27-degrees
UPSTREAM INV.	735.93
DOWNSTREAM INV.	735.93

PROPOSED STRUCTURE:

TYPE:	Precast Concrete Box
SIZE/LENGTH:	6'W x 3'H Box Culvert / 112'-4" long
SPANS:	N/A.
LOW BEAM:	N/A.
SKEW:	27-degrees
UPSTREAM INV.	735.93
DOWNSTREAM INV.	735.93

COMMENTS: Waterway openings are based on the natural H.W.E.
The natural H.W.E was taken at the upstream face cross-section (cross-section 0.494).
The existing head is the difference in water surface elevation, between the existing and natural conditions.
The proposed head is the difference in water surface elevation, between the existing and natural conditions.
The headwater elevations are the sum of the natural H.W.E and the created head.
The freeboard was measured at Sta. 583+00, which is located approximately 202 feet west of the culvert centerline. The culvert is located at Sta. 585+02.

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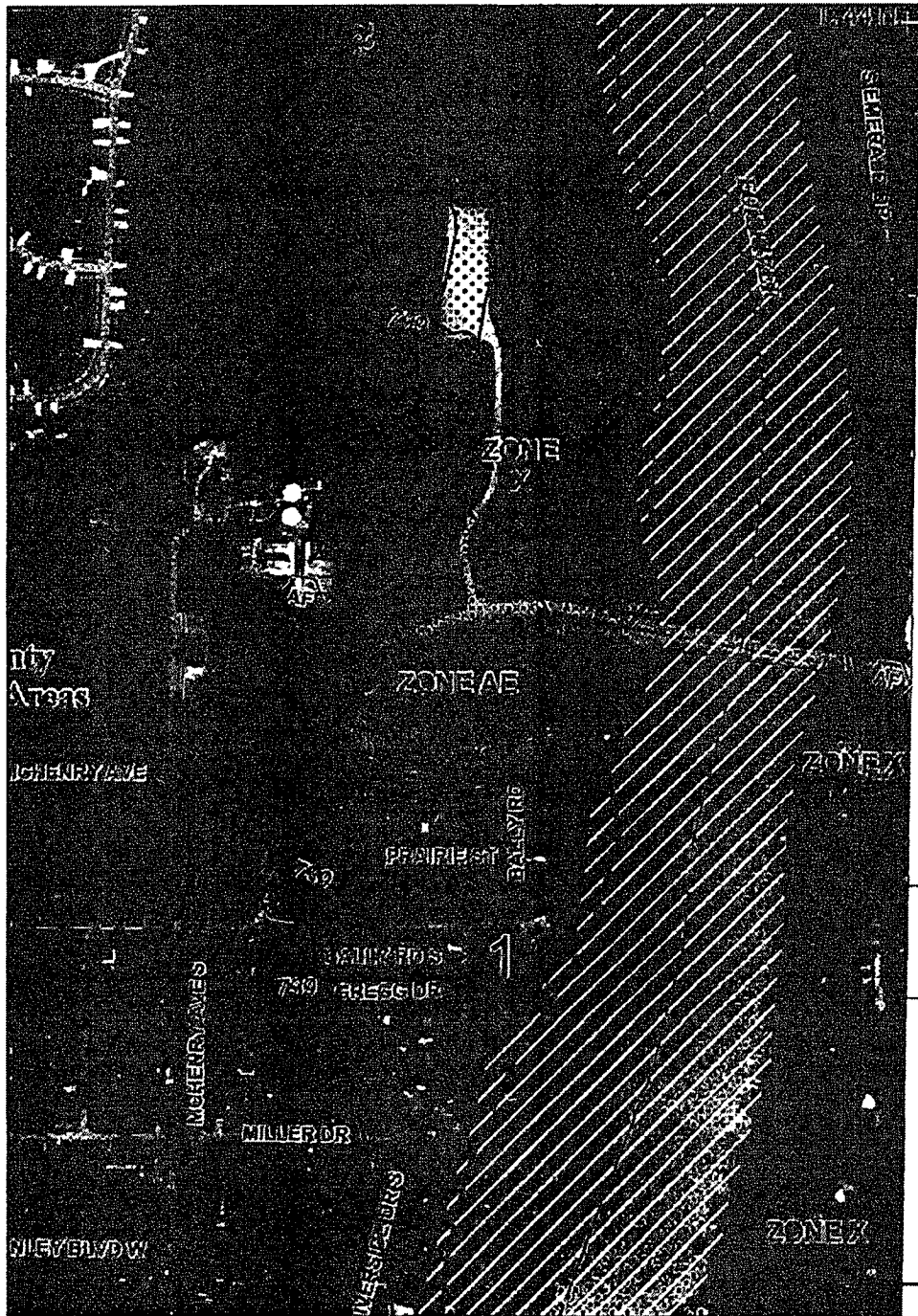

MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 150 300 METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0209J

FIRM

FLOOD INSURANCE RATE MAP

McHENRY COUNTY, ILLINOIS AND INCORPORATED AREAS

PANEL 209 OF 365

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MCHENRY COUNTY	170732	0209	J
MCHENRY, CITY OF	170483	0209	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17111C0209J

EFFECTIVE DATE
NOVEMBER 16, 2006

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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Culvert Location

Added 9/11/12

Calculation of Parameters for Clark Unit Hydrograph (per USGS WRI 82-22)

(shaded columns indicate input values)

Sub- Area	R/(TC+R)	Length (ft)	Dist. from divide	Elev	Dist. from outfall	Elev	Slope Length	Slope (ft/mi)	(TC+R)	Tc (hr)	R (hr)
6' x 3' box	0.6	6991.0	1048.6	830.0	699.1	739.9	5243.2	90.73	1.17	0.47	0.70

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Project: Miller Road @ IL 31
Job No.: MCHE-050761

Calculation of Weighted Runoff Curve Number

	Row Crop (78)	Paved (98)	1/4-ac. Residential (75)	Open Space (61)	Woods (55)	Total Area (ac)	**Composite RCN**
Area (ac)	14.4	40.8	175.8	126.4	46.8	**404.3**	**70.7**

Added 9/11/12

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   01AUG08  TIME  09:05:54   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID   Miller Road Clark Hydrology 050761
    2         ID   only used for drainage area > 200 ac.
    3         ID   filename - C050761.dat
    4         ID   Prepared August 2006 by Anitha
    5         ID   Revised July 2008 by JNK
    6         ID   Rainfall data based on ISWS Bulletin #70 Sectional Values
    7         ID   Storm Frequencies 2, 10, 50, 100 Year
    8         ID   Storm Durations 20min, 40min, 1, 2, 3, 6, 12, 24 hour
    9         IT       2 31DEC99    0000     750
   10         JR       4    .455    .590    .852     1.0
   11         IO       5
   12         JP       8
   13         IN       1
   14         PG  DUR20M    2.30
   15         PC       0      16      33      43      52      60      66      71      75      79
   16         PC      82      84      86      88      90      92      94      96      97      98
   17         PC     100
   18         IN       2
   19         PG  DUR40M    3.05
   20         PC       0      16      33      43      52      60      66      71      75      79
   21         PC      82      84      86      88      90      92      94      96      97      98
   22         PC     100
   23         IN       3
   24         PG    DUR1    3.56
   25         PC       0      16      33      43      52      60      66      71      75      79
   26         PC      82      84      86      88      90      92      94      96      97      98
   27         PC     100
   28         IN       6
   29         PG    DUR2    4.47
   30         PC       0      16      33      43      52      60      66      71      75      79
   31         PC      82      84      86      88      90      92      94      96      97      98
   32         PC     100
   33         IN       9
   34         PG    DUR3    4.85
   35         PC       0      16      33      43      52      60      66      71      75      79
   36         PC      82      84      86      88      90      92      94      96      97      98
   37         PC     100
   38         IN      18
   39         PG    DUR6    5.68
   40         PC       0      16      33      43      52      60      66      71      75      79
   41         PC      82      84      86      88      90      92      94      96      97      98
   42         PC     100
   43         IN      36
   44         PG   DUR12    6.59
   45         PC       0       3       8      12      16      22      29      39      51      62
   46         PC      70      76      81      85      88      91      93      95      97      98
   47         PC     100
   48         IN      72
   49         PG   DUR24    7.58
   50         PC       0       3       6       9      12      15      19      23      27      32
   51         PC      38      45      57      70      79      85      89      92      95      97
   52         PC     100
   53         IN     144
   54         PG   DUR48    8.16
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```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  55          PC       0       2       5       8      10      13      16      19      22      25
  56          PC      28      32      35      39      45      51      59      72      84      92
  57          PC     100
  58          IN     216
  59          PG   DUR72    8.78
  60          PC       0       2       5       8      10      13      16      19      22      25
  61          PC      28      32      35      39      45      51      59      72      84      92
  62          PC     100
  63          IN     360
  64          PG    DUR5    9.96
  65          PC       0       2       5       8      10      13      16      19      22      25
  66          PC      28      32      35      39      45      51      59      72      84      92
  67          PC     100
  68          IN     720
  69          PG   DUR10   11.14
  70          PC       0       2       5       8      10      13      16      19      22      25
  71          PC      28      32      35      39      45      51      59      72      84      92
  72          PC     100

  73          KK  AREA
  74          KM       1
  75          BA  0.6317
  76          PT  DUR20M
  77          PW       1
  78          PR  DUR20M
  79          PW       1
  80          LS       0    70.7
  81          UC    0.47    0.70
  82          KP       2
  83          PT  DUR40M
  84          PW       1
  85          PR  DUR40M
  86          PW       1
  87          KP       3
  88          PT    DUR1
  89          PW       1
  90          PR    DUR1
  91          PW       1
  92          KP       4
  93          PT    DUR2
  94          PW       1
  95          PR    DUR2
  96          PW       1
  97          KP       5
  98          PT    DUR3
  99          PW       1
 100          PR    DUR3
 101          PW       1
 102          KP       6
 103          PT    DUR6
 104          PW       1
 105          PR    DUR6
 106          PW       1
 107          KP       7
 108          PT   DUR12
```



```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 109          PW       1
 110          PR   DUR12
 111          PW       1
 112          KP       8
 113          PT   DUR24
 114          PW       1
 115          PR   DUR24
 116          PW       1
 117          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

    73      AREA

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   01AUG08  TIME  09:05:54   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```


Added 9/11/12

```
                    only used for drainage area > 200 ac.
                    filename - C050761.dat
                    Prepared August 2006 by Anitha
                    Revised July 2008 by JNK
                    Rainfall data based on ISWS Bulletin #70 Sectional Values
                    Storm Frequencies 2, 10, 50, 100 Year
                    Storm Durations 20min, 40min, 1, 2, 3, 6, 12, 24 hour

  11 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                      NMIN           2  MINUTES IN COMPUTATION INTERVAL
                     IDATE     31DEC99  STARTING DATE
                     ITIME        0000  STARTING TIME
                        NQ         750  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1JAN 0  ENDING DATE
                    NDTIME        0058  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL      .03 HOURS
                      TOTAL TIME BASE   24.97 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT

     JP          MULTI-PLAN OPTION
                      NPLAN          8  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                    .46       .59       .85      1.00
1

               PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                   FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS


                                                                    RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN                 RATIO 1  RATIO 2  RATIO 3  RATIO 4
                                                              .46      .59      .85     1.00

 HYDROGRAPH AT
+                AREA          .63     1   FLOW              4.      24.      96.     152.
                                           TIME             .70      .67      .63      .60
                                       2   FLOW             24.      65.     181.     263.
                                           TIME             .93      .87      .83      .80
                                       3   FLOW             40.      89.     221.     311.
                                           TIME            1.17     1.13     1.07     1.00
                                       4   FLOW             [illegible]
                                           TIME            1.83     1.30     1.20     1.17
                                       5   FLOW             54.     109.     245.     334.
                                           TIME            1.73     1.63     1.53     1.47
                                       6   FLOW             52.      99.     214.     290.
                                           TIME            2.83     2.27     2.03     1.93
                                       7   FLOW             60.     106.     215.     282.
                                           TIME            6.20     6.10     5.70     5.67
                                       8   FLOW             62.     102.     186.     235.
                                           TIME           15.83    15.80    15.77    15.77


 *** NORMAL END OF HEC-1 ***
```


Added 9/11/12

Existing 6'x3'

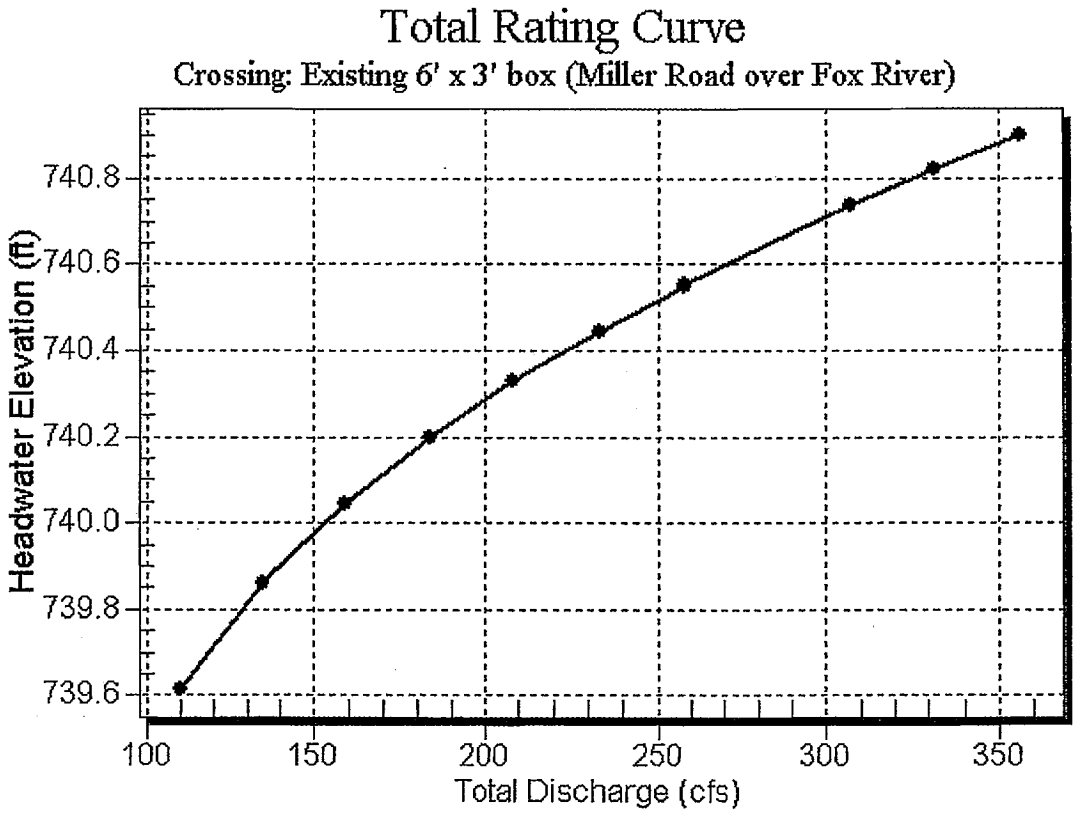
Table 1 - Summary of Culvert Flows at Crossing: Existing 6' x 3' box (Miller Road over Fox River)

	Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
10-yr	739.62	110.00	108.26	1.68	10
	739.86	134.60	119.49	14.97	6
	740.04	159.20	126.89	32.14	6
	740.20	183.80	132.09	51.58	6
	740.33	208.40	136.47	71.83	6
	740.45	233.00	140.29	92.47	5
	740.55	257.60	143.79	113.66	5
50-yr	740.55	258.00	143.83	113.91	2
	740.74	306.80	149.93	156.77	5
	740.82	331.40	152.68	178.58	4
100-yr.	740.90	356.00	155.28	200.65	4

Tailwater = 737.00

Added 9/11/12

Rating Curve Plot for Crossing: Existing 6' x 3' box (Miller Road over Fox River)



Added 9/11/12

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
110.00	108.26	739.62	3.443	3.685	2-M2c	3.000	2.167	2.167	1.070	8.326	0.000
134.60	119.49	739.86	3.746	3.929	2-M2c	3.000	2.314	2.314	1.070	8.605	0.000
159.20	126.89	740.04	3.956	4.113	7-M2c	3.000	2.409	2.409	1.070	8.779	0.000
183.80	132.09	740.20	4.111	4.268	7-M2c	3.000	2.474	2.474	1.070	8.897	0.000
208.40	136.47	740.33	4.245	4.400	7-M2c	3.000	2.529	2.529	1.070	8.995	0.000
233.00	140.29	740.45	4.365	4.515	7-M2c	3.000	2.576	2.576	1.070	9.078	0.000
257.60	143.79	740.55	4.478	4.621	7-M2c	3.000	2.618	2.618	1.070	9.153	0.000
258.00	143.83	740.55	4.479	4.622	7-M2c	3.000	2.619	2.619	1.070	9.153	0.000
306.80	149.93	740.74	4.683	4.807	7-M2c	3.000	2.692	2.692	1.070	9.281	0.000
331.40	152.68	740.82	4.778	4.891	7-M2c	3.000	2.725	2.725	1.070	9.338	0.000
356.00	155.28	740.90	4.869	4.969	7-M2c	3.000	2.756	2.756	1.070	9.390	0.000

****

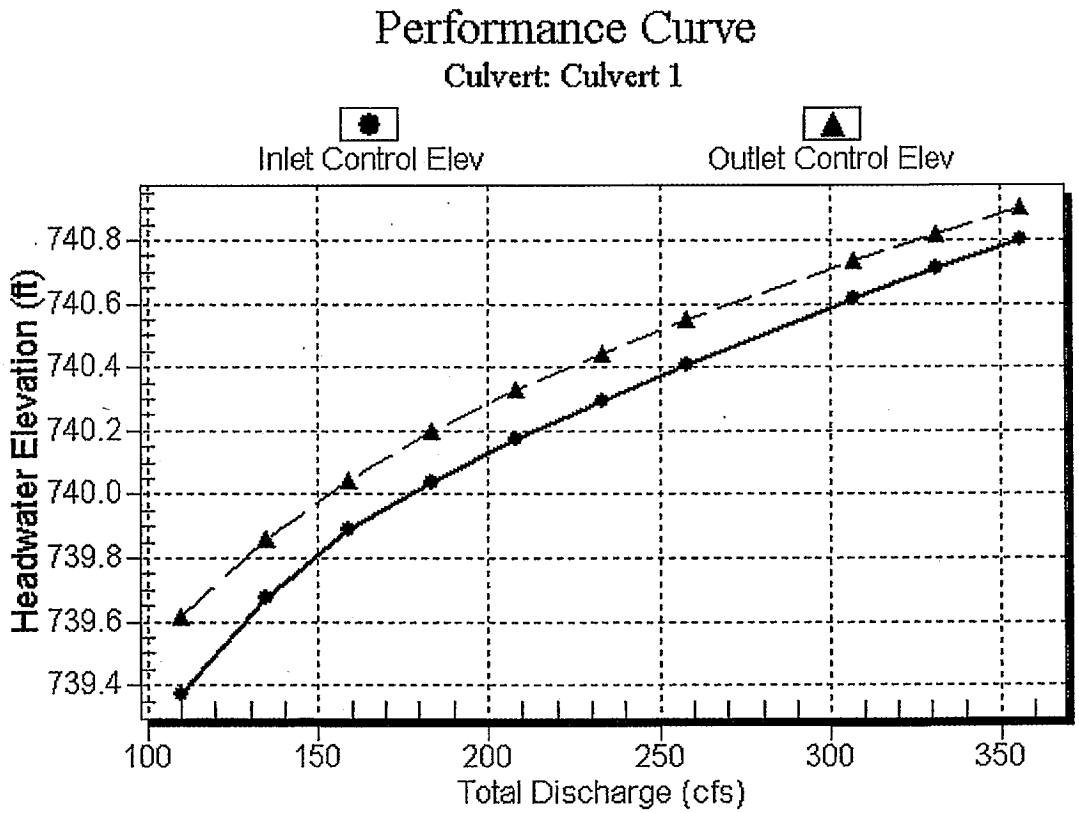
Inlet Elevation (invert): 735.93 ft, Outlet Elevation (invert): 735.93 ft

Culvert Length: 83.00 ft, Culvert Slope: 0.0000

****

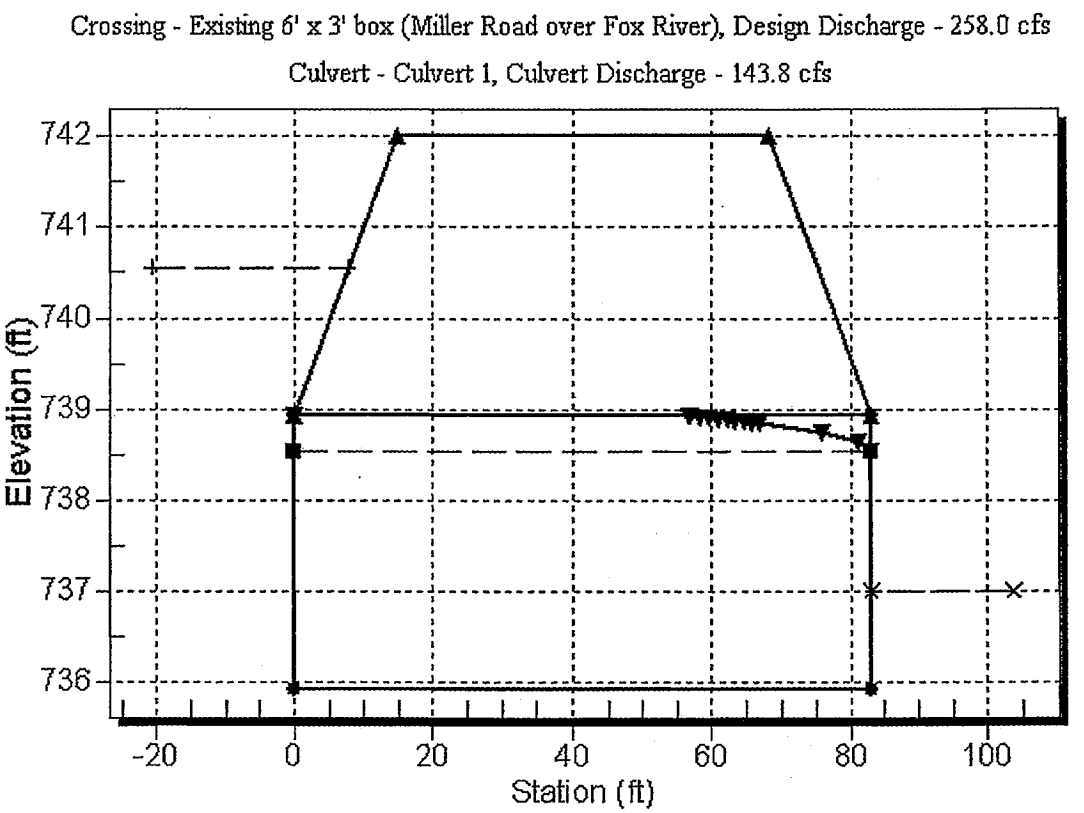
Added 9/11/12

Culvert Performance Curve Plot: Culvert 1



Added 9/4/12

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 735.93 ft

Outlet Station: 83.00 ft

Outlet Elevation: 735.93 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (30-75° flare) Wingwall

Inlet Depression: None

Added 9/11/12

Table 3 - Downstream Channel Rating Curve (Crossing: Existing 6' x 3' box (Miller Road over Fox River))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
110.00	737.00	1.07
134.60	737.00	1.07
159.20	737.00	1.07
183.80	737.00	1.07
208.40	737.00	1.07
233.00	737.00	1.07
257.60	737.00	1.07
258.00	737.00	1.07
306.80	737.00	1.07
331.40	737.00	1.07
356.00	737.00	1.07

Tailwater Channel Data - Existing 6' x 3' box (Miller Road over Fox River)

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 737.00 ft

Roadway Data for Crossing: Existing 6' x 3' box (Miller Road over Fox River)

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	742.00
2	21.14	742.00
3	103.62	739.45
4	128.03	739.63
5	144.34	742.72
6	145.88	742.87
7	151.93	743.25

Roadway Surface: Gravel

Roadway Top Width: 53.50 ft

Added 9/11/12

Existing 6'x3'

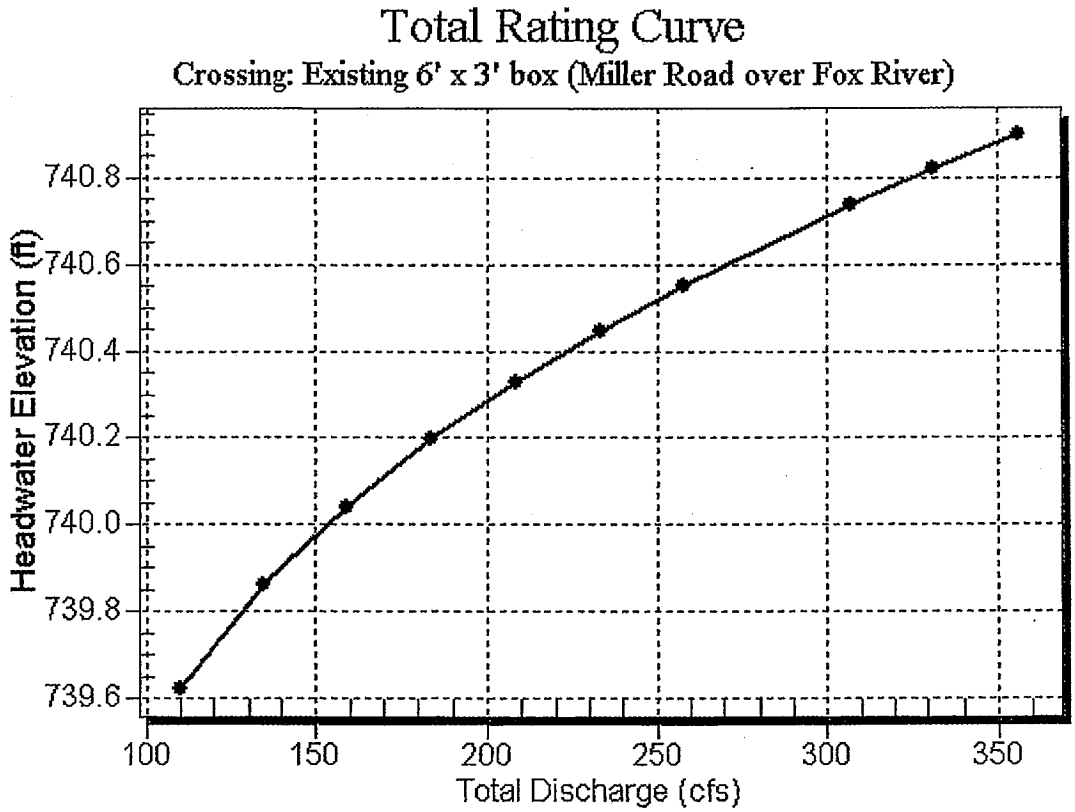
Table 1 - Summary of Culvert Flows at Crossing: Existing 6' x 3' box (Miller Road over Fox River)

	Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
10-yr.	739.62	110.00	108.03	1.89	9
	739.86	134.60	119.47	15.10	6
	740.04	159.20	126.88	32.16	6
	740.20	183.80	132.09	51.58	6
	740.33	208.40	136.47	71.83	6
	740.45	233.00	140.29	92.47	5
	740.55	257.60	143.79	113.66	5
50-yr.	740.55	258.00	143.83	113.91	2
	740.74	306.80	149.93	156.77	5
	740.82	331.40	152.68	178.58	4
100-yr.	740.90	356.00	155.28	200.65	4

Tailwater = 738.34 (10-yr. Fox River WSE)

Added 9/11/12

Rating Curve Plot for Crossing: Existing 6' x 3' box (Miller Road over Fox River)



Added 9/11/12

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
110.00	108.03	739.62	3.437	3.692	3-M2t	3.000	2.164	2.411	2.410	7.468	0.000
134.60	119.47	739.86	3.745	3.931	3-M2t	3.000	2.314	2.411	2.410	8.259	0.000
159.20	126.88	740.04	3.956	4.112	7-M2t	3.000	2.409	2.411	2.410	8.771	0.000
183.80	132.09	740.20	4.111	4.268	7-M2c	3.000	2.474	2.474	2.410	8.897	0.000
208.40	136.47	740.33	4.245	4.400	7-M2c	3.000	2.529	2.529	2.410	8.995	0.000
233.00	140.29	740.45	4.365	4.515	7-M2c	3.000	2.576	2.576	2.410	9.078	0.000
257.60	143.79	740.55	4.478	4.621	7-M2c	3.000	2.618	2.618	2.410	9.153	0.000
258.00	143.83	740.55	4.479	4.622	7-M2c	3.000	2.619	2.619	2.410	9.153	0.000
306.80	149.93	740.74	4.683	4.807	7-M2c	3.000	2.692	2.692	2.410	9.281	0.000
331.40	152.68	740.82	4.778	4.891	7-M2c	3.000	2.725	2.725	2.410	9.338	0.000
356.00	155.28	740.90	4.869	4.969	7-M2c	3.000	2.756	2.756	2.410	9.390	0.000

****

Inlet Elevation (invert): 735.93 ft, Outlet Elevation (invert): 735.93 ft

Culvert Length: 83.00 ft, Culvert Slope: 0.0000

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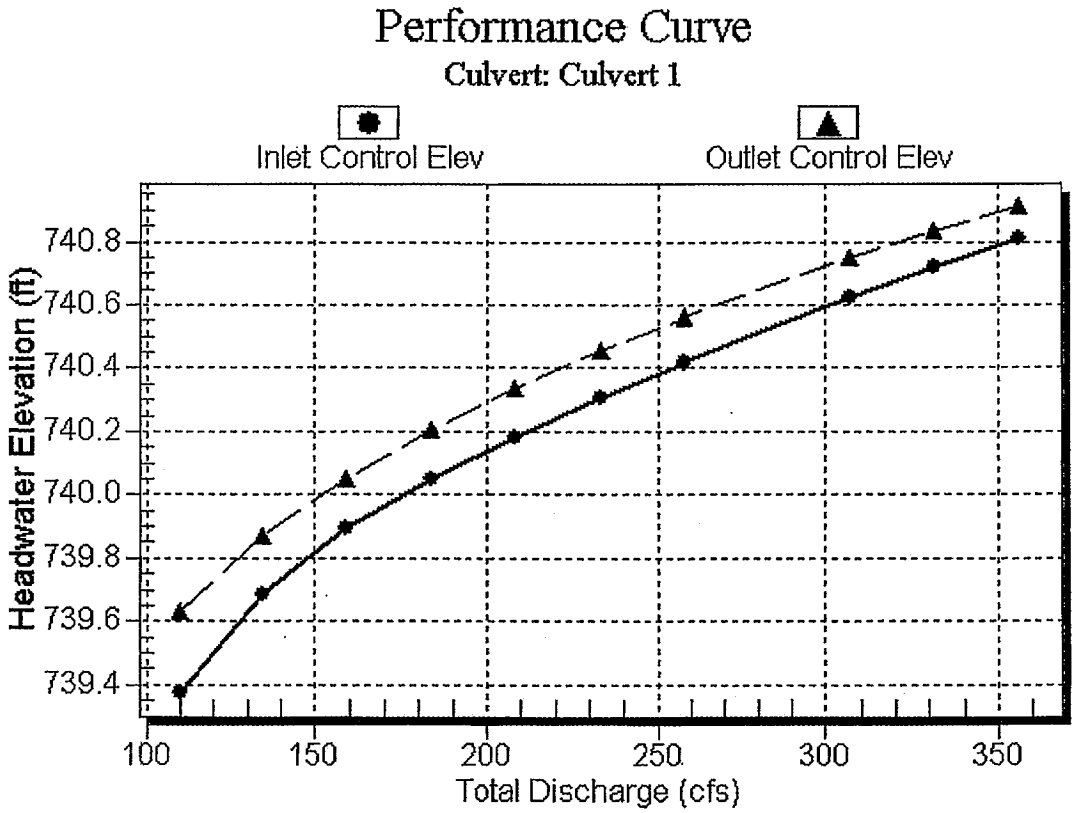
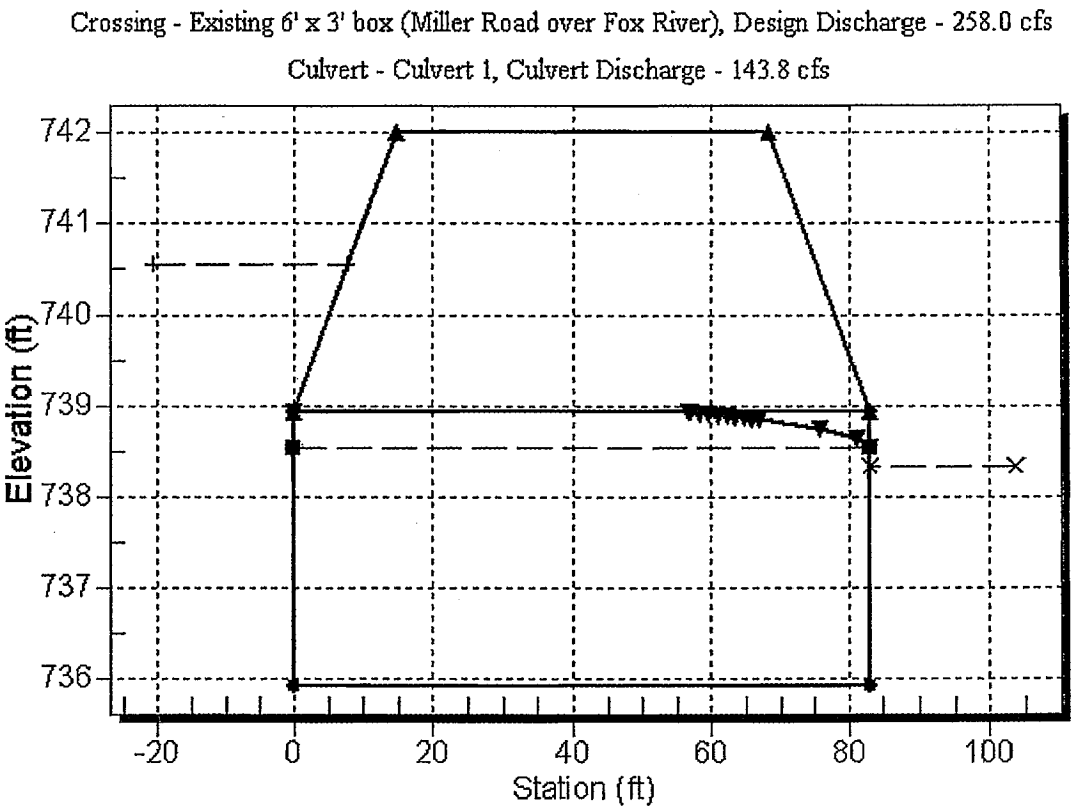
Added 9/11/12

Culvert Performance Curve Plot: Culvert 1



Added 9/11/12

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 735.93 ft

Outlet Station: 83.00 ft

Outlet Elevation: 735.93 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (30-75° flare) Wingwall

Inlet Depression: None

Added 9/11/12

Table 3 - Downstream Channel Rating Curve (Crossing: Existing 6' x 3' box (Miller Road over Fox River))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
110.00	738.34	2.41
134.60	738.34	2.41
159.20	738.34	2.41
183.80	738.34	2.41
208.40	738.34	2.41
233.00	738.34	2.41
257.60	738.34	2.41
258.00	738.34	2.41
306.80	738.34	2.41
331.40	738.34	2.41
356.00	738.34	2.41

Tailwater Channel Data - Existing 6' x 3' box (Miller Road over Fox River)

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 738.34 ft

Roadway Data for Crossing: Existing 6' x 3' box (Miller Road over Fox River)

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	742.00
2	21.14	742.00
3	103.62	739.45
4	128.03	739.63
5	144.34	742.72
6	145.88	742.87
7	151.93	743.25

Roadway Surface: Gravel

Roadway Top Width: 53.50 ft

Added 9/11/12

Proposed 6'x3'

Table 1 - Summary of Culvert Flows at Crossing: Proposed 6' x 3' Box

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
739.37	110.00	96.25	13.69	7
739.64	134.60	107.80	26.69	5
739.84	159.20	118.38	41.22	7
740.05	183.80	123.96	59.78	6
740.21	208.40	129.28	78.93	5
740.36	233.00	133.92	98.91	5
740.49	257.60	138.02	119.43	5
740.49	258.00	138.06	119.67	2
740.72	306.80	145.16	161.52	5
740.82	331.40	148.30	182.93	4
740.91	356.00	151.24	204.66	4

50-yr

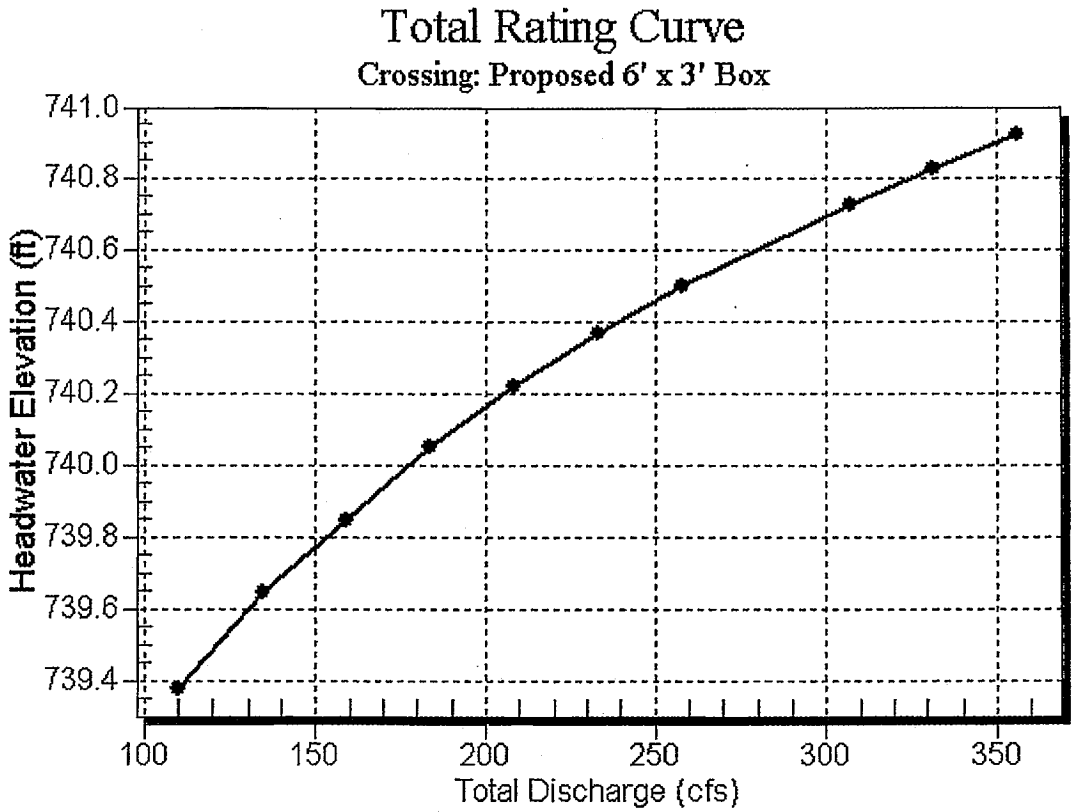
100-yr

Tailwater = 737.00

Ditch at 738.81

Added 9/11/12

Rating Curve Plot for Crossing: Proposed 6' x 3' Box



Added 9/11/12

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
110.00	96.25	739.37	3.138	3.440	2-M2c	3.000	2.004	2.004	1.070	8.006	0.000
134.60	107.80	739.64	3.431	3.707	2-M2c	3.000	2.161	2.161	1.070	8.315	0.000
159.20	118.38	739.84	3.715	3.906	2-M2c	3.000	2.300	2.300	1.070	8.578	0.000
183.80	123.96	740.05	3.872	4.116	7-M2c	3.000	2.372	2.372	1.070	8.711	0.000
208.40	129.28	740.21	4.027	4.282	7-M2c	3.000	2.439	2.439	1.070	8.834	0.000
233.00	133.92	740.36	4.166	4.429	7-M2c	3.000	2.497	2.497	1.070	8.938	0.000
257.60	138.02	740.49	4.293	4.558	7-M2c	3.000	2.548	2.548	1.070	9.029	0.000
258.00	138.06	740.49	4.295	4.560	7-M2c	3.000	2.548	2.548	1.070	9.030	0.000
306.80	145.16	740.72	4.523	4.786	7-M2c	3.000	2.635	2.635	1.070	9.182	0.000
331.40	148.30	740.82	4.628	4.887	7-M2c	3.000	2.673	2.673	1.070	9.247	0.000
356.00	151.24	740.91	4.728	4.981	7-M2c	3.000	2.708	2.708	1.070	9.308	0.000

****

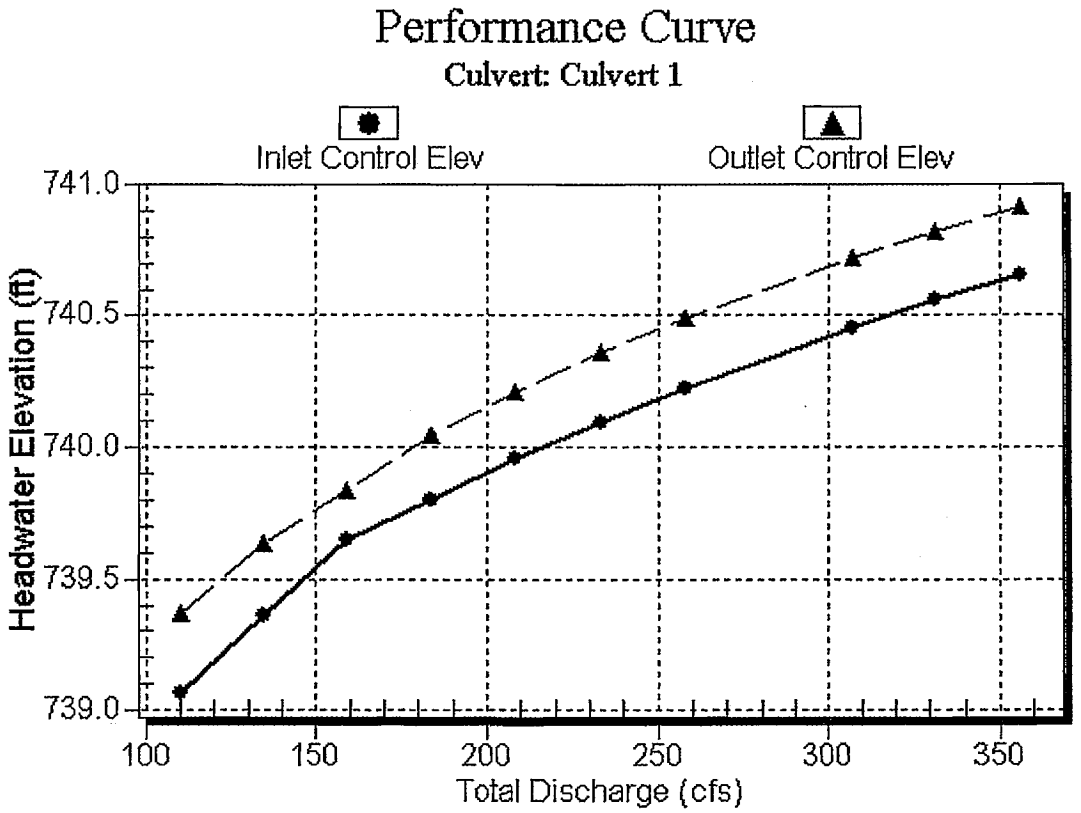
Inlet Elevation (invert): 735.93 ft, Outlet Elevation (invert): 735.93 ft

Culvert Length: 112.30 ft, Culvert Slope: 0.0000

****

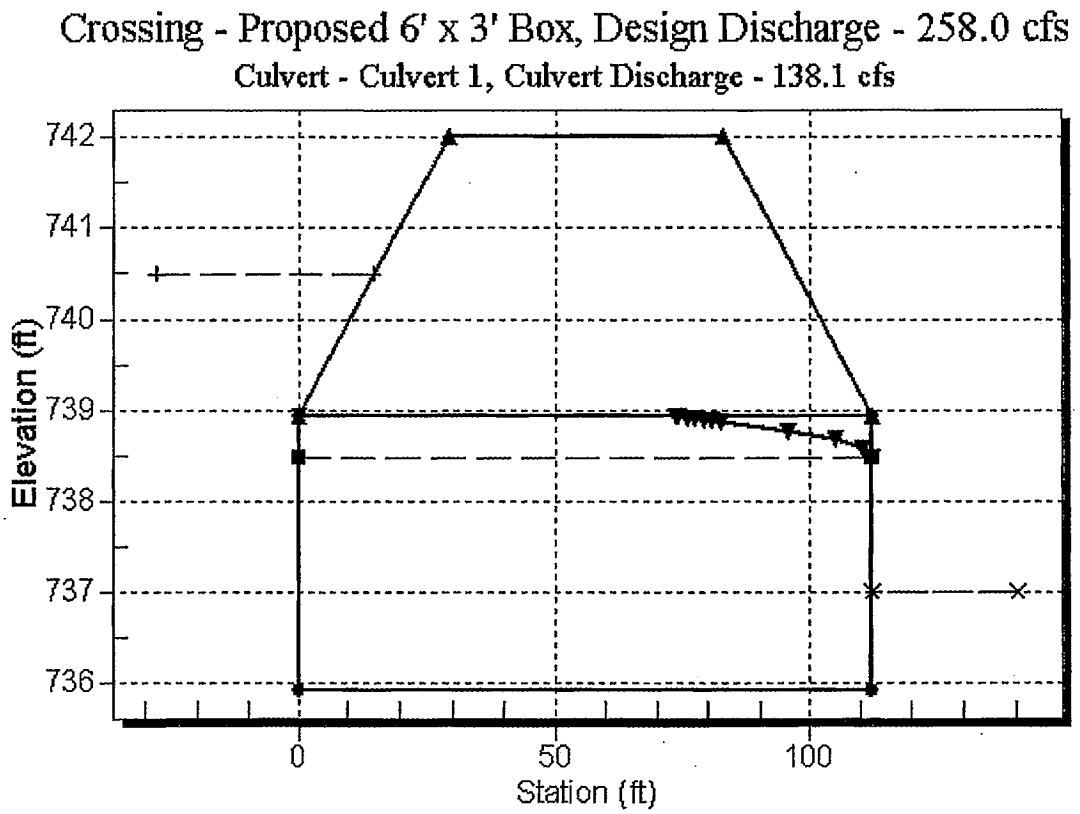
Added 9/11/12

Culvert Performance Curve Plot: Culvert 1



Added 9/11/12

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 735.93 ft

Outlet Station: 112.30 ft

Outlet Elevation: 735.93 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (30-75° flare) Wingwall

Inlet Depression: None

Added 9/11/12

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed 6' x 3' Box)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
110.00	737.00	1.07
134.60	737.00	1.07
159.20	737.00	1.07
183.80	737.00	1.07
208.40	737.00	1.07
233.00	737.00	1.07
257.60	737.00	1.07
258.00	737.00	1.07
306.80	737.00	1.07
331.40	737.00	1.07
356.00	737.00	1.07

Tailwater Channel Data - Proposed 6' x 3' Box

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 737.00 ft

Roadway Data for Crossing: Proposed 6' x 3' Box

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	742.00
2	21.14	742.00
3	97.39	739.44
4	99.29	738.81
5	110.29	738.81
6	116.60	742.00

Roadway Surface: Gravel

Roadway Top Width: 53.50 ft

Added 9/11/12

Proposed 6'x3' Box

Table 1 - Summary of Culvert Flows at Crossing: Proposed 6' x 3' Box

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
739.40	110.00	95.19	14.77	6
739.64	134.60	107.37	27.13	5
739.85	159.20	117.34	41.76	5
740.05	183.80	123.94	59.80	6
740.21	208.40	129.28	78.93	5
740.36	233.00	133.92	98.91	5
740.49	257.60	138.02	119.43	5
740.49	258.00	138.06	119.67	2
740.72	306.80	145.16	161.52	5
740.82	331.40	148.30	182.93	4
740.91	356.00	151.24	204.66	4

50 yr.

100 yr.

Tailwater = 738.34 (10 yr. Fox River WSE)
Ditch @ 738.81

Added 9/11/12

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
110.00	95.19	739.40	3.112	3.467	3-M2t	3.000	1.989	2.411	2.410	6.580	0.000
134.60	107.37	739.64	3.420	3.714	3-M2t	3.000	2.155	2.411	2.410	7.422	0.000
159.20	117.34	739.85	3.686	3.921	3-M2t	3.000	2.287	2.411	2.410	8.112	0.000
183.80	123.94	740.05	3.871	4.116	7-M2t	3.000	2.371	2.411	2.410	8.568	0.000
208.40	129.28	740.21	4.027	4.282	7-M2c	3.000	2.439	2.439	2.410	8.834	0.000
233.00	133.92	740.36	4.166	4.429	7-M2c	3.000	2.497	2.497	2.410	8.938	0.000
257.60	138.02	740.49	4.293	4.558	7-M2c	3.000	2.548	2.548	2.410	9.029	0.000
258.00	138.06	740.49	4.295	4.560	7-M2c	3.000	2.548	2.548	2.410	9.030	0.000
306.80	145.16	740.72	4.523	4.786	7-M2c	3.000	2.635	2.635	2.410	9.182	0.000
331.40	148.30	740.82	4.628	4.887	7-M2c	3.000	2.673	2.673	2.410	9.247	0.000
356.00	151.24	740.91	4.728	4.981	7-M2c	3.000	2.708	2.708	2.410	9.308	0.000

****

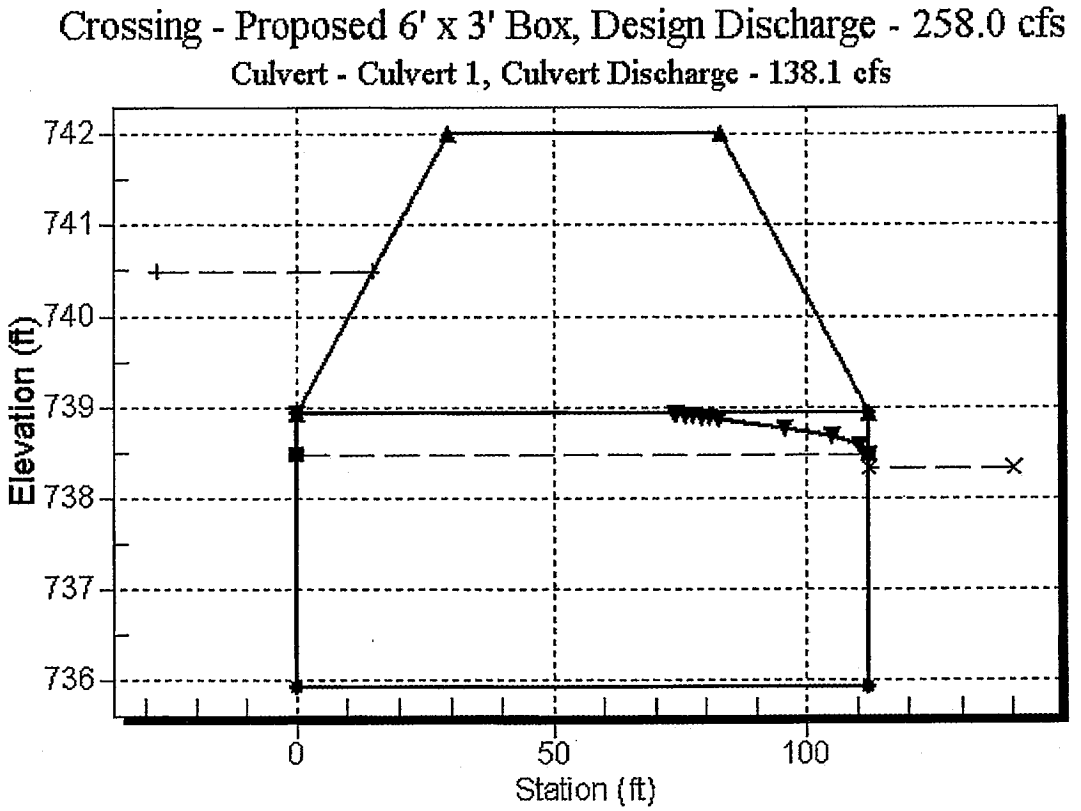
Inlet Elevation (invert): 735.93 ft, Outlet Elevation (invert): 735.93 ft

Culvert Length: 112.30 ft, Culvert Slope: 0.0000

****

Added 9/11/12

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 735.93 ft

Outlet Station: 112.30 ft

Outlet Elevation: 735.93 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (30-75° flare) Wingwall

Inlet Depression: None

Added 9/11/12

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed 6' x 3' Box)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
110.00	738.34	2.41
134.60	738.34	2.41
159.20	738.34	2.41
183.80	738.34	2.41
208.40	738.34	2.41
233.00	738.34	2.41
257.60	738.34	2.41
258.00	738.34	2.41
306.80	738.34	2.41
331.40	738.34	2.41
356.00	738.34	2.41

Tailwater Channel Data - Proposed 6' x 3' Box

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 738.34 ft

Roadway Data for Crossing: Proposed 6' x 3' Box

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	742.00
2	21.14	742.00
3	97.39	739.44
4	99.29	738.81
5	110.29	738.81
6	116.60	742.00

Roadway Surface: Gravel

Roadway Top Width: 53.50 ft

Added 9/11/12

Input
  Horizontal: NAD 83 Geographic
  Vertical: NGVD 29, U.S. Survey Feet
Output
  Horizontal: NAD 83 Geographic
  Vertical: NAVD 88, U.S. Survey Feet

Name	Input	Output
a	42 20 16.00000 N	42 20 16.00000 N
	88 15 14.00000 W	88 15 14.00000 W
Elevation	739.80000	739.64

$Elev._{NAVD88} = Elev._{NGVD29} - 0.16\ ft$

Added 9/11/12

Added 9/11/12

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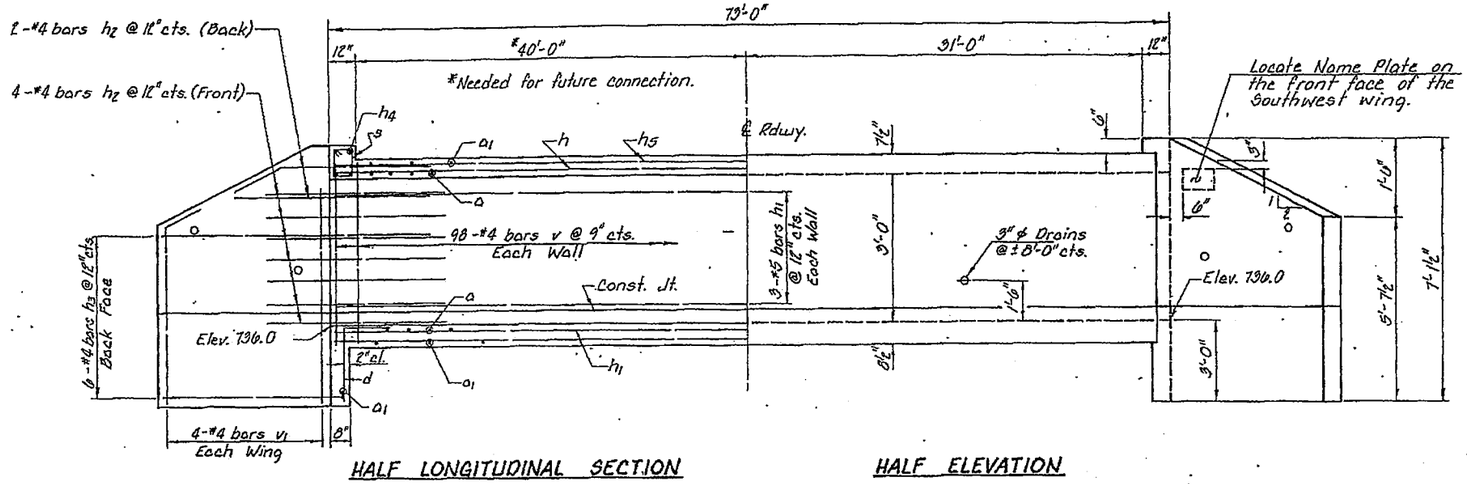
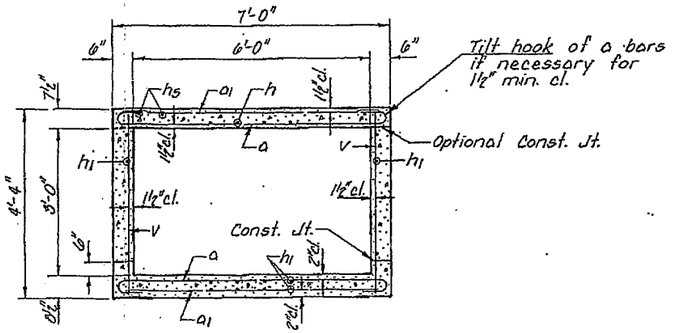
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
C.H. 51	BRIDGE PROJ. 279	McHENRY	55	42
FED. ROAD DIST. NO. 7	ILLINOIS	PROJECT		



HALF LONGITUDINAL SECTION

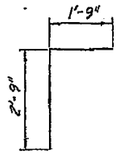


SECTION THRU BARREL

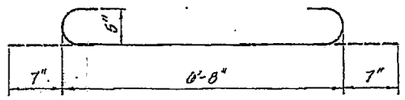
STR. NO. 056-3213
BUILT 198_ BY
McHENRY COUNTY
BRIDGE PROJECT 279
C.H. 51 STA. 137+60
LOADING H520

LETTERING FOR NAME PLATE
See Std. 2113

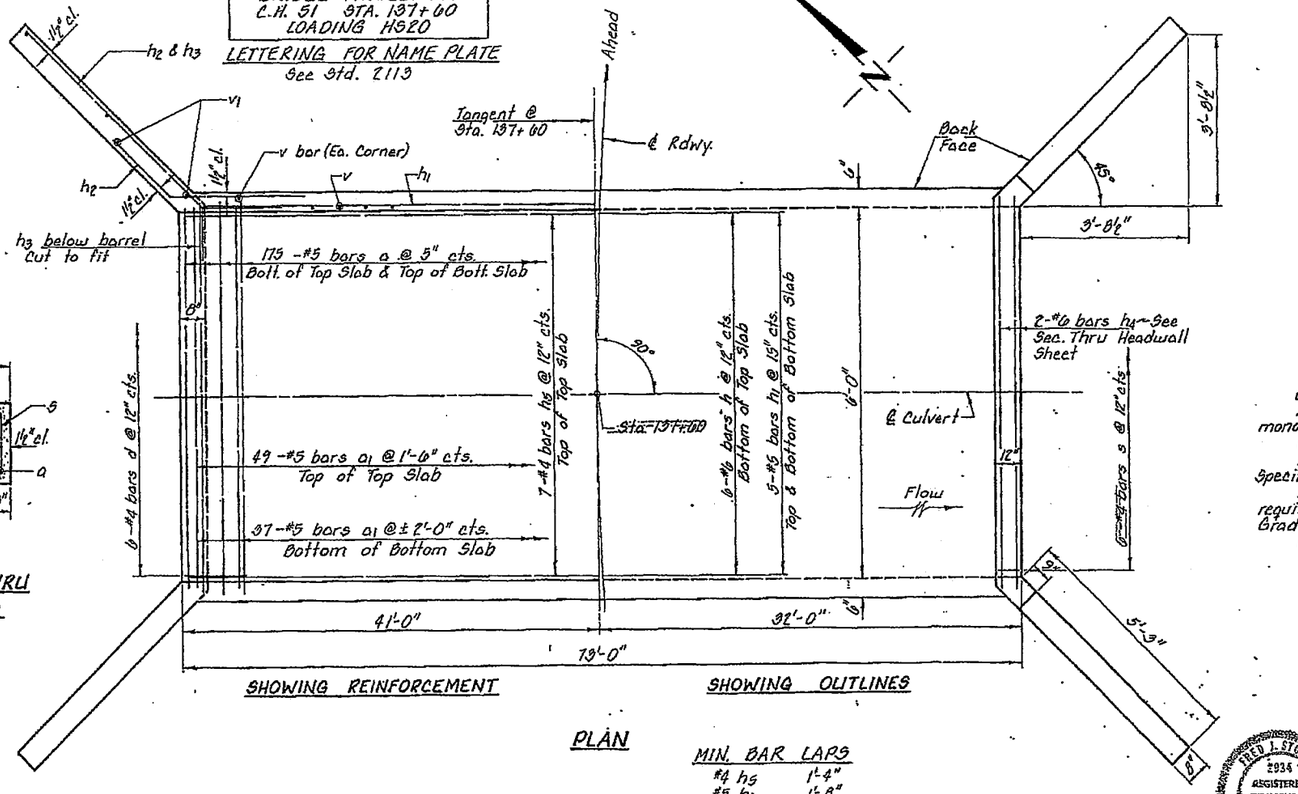
HALF ELEVATION

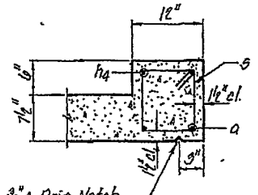


BAR d



BAR a





SECTION THRU HEADWALLS

SHOWING REINFORCEMENT

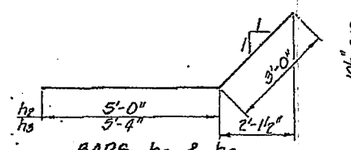
SHOWING OUTLINES

PLAN

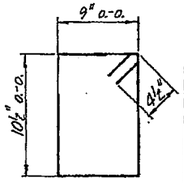
MIN. BAR LAPS

#4 h5	1'-4"
#5 h1	1'-8"
#6 h	2'-0"

h, h1, & h5 bars are composed of 3 lengths & 2 laps.



BARS h2 & h3



BAR s

BILL OF MATERIAL

BAR	No. Req'd.	SIZE	LENGTH	SHAPE
a	350	#5	7'-10"	
a1	88	#5	6'-3"	
d	12	#4	4'-0"	
h	18	#6	25'-7"	
h1	48	#5	25'-4"	
h2	24	#2	8'-0"	
h3	24	#4	8'-4"	
h4	4	#6	6'-0"	
h5	21	#4	25'-2"	
s	12	#2	4'-0"	
v	200	#4	4'-0"	
v1	16	#4	6'-1"	
Class X Concrete Box Culverts		Cu. Yds.	37.6	
Reinforcement Bars		Lbs.	6,710	
Name Plates		Each	1	

GENERAL NOTES

Class X Concrete shall be used throughout.
At least six feet of barrel shall be poured monolithically with wingwalls.
Exposed edges shall be beveled ¾".
For backfilling and embankment, see Standard Specifications.
Reinforcement Bars shall conform to the requirements of AASHTO M-31, M-42 or M-53, Grade 60.
No waterproofing required.

DESIGN STRESSES

f_y = 60,000 p.s.i. (Reinforcement)
f'_c = 3,500 p.s.i. (Concrete)
n = 9

LOADING H520-44

FRED J. STONE JR. 2934 REGISTERED STRUCTURAL ENGINEER OF ILLINOIS

Fred J. Stone Jr.
Illinois Structural No. 2934

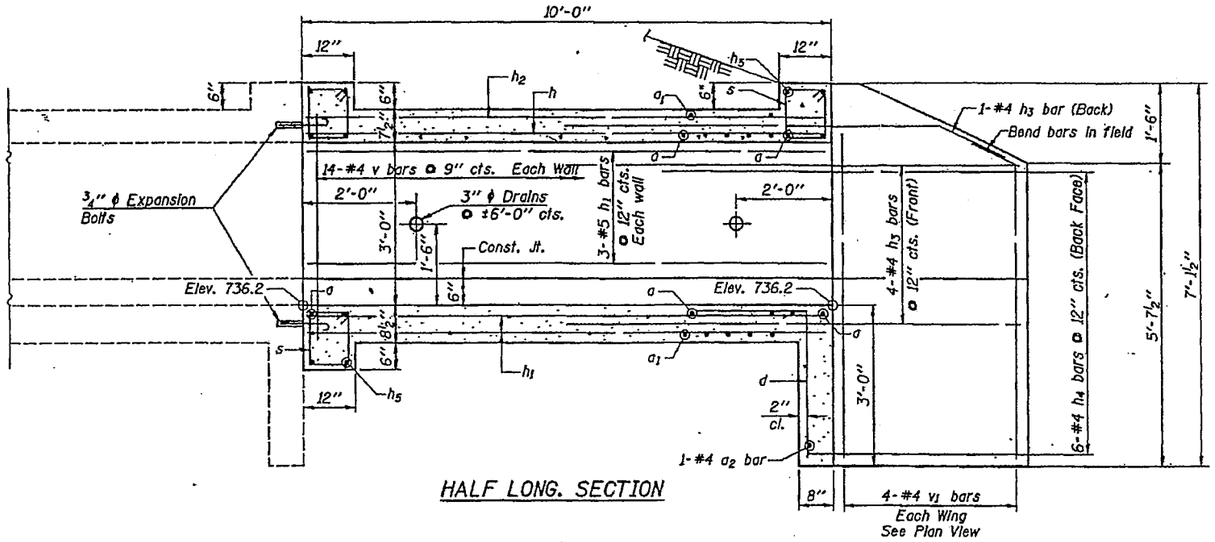
CULVERT DETAILS
BULL VALLEY ROAD
BRIDGE PROJECT 279
McHENRY COUNTY
STATION 137+60

COLLINS AND RICE
CONSULTING ENGINEERS

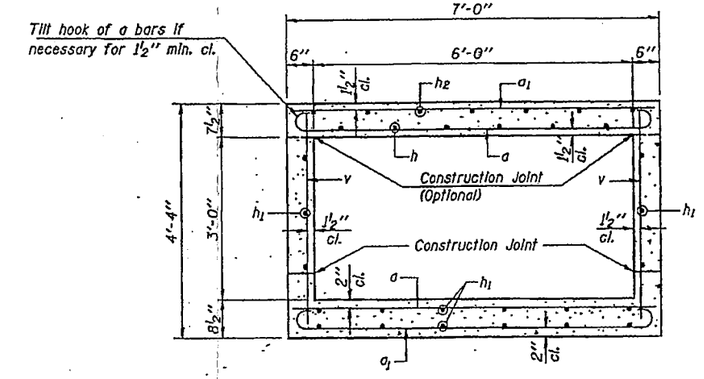
DESIGNED F.S. CHECKED A.R.K.
DRAWN M.B. DATE 8-3-87 NO. 2168

2168

Added 9/11/12 347

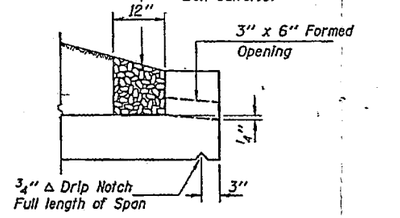


HALF LONG. SECTION

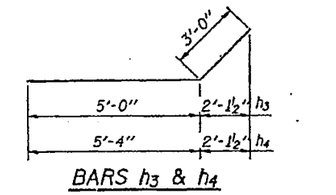


SECTION THRU BARREL

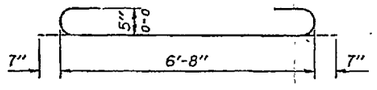
Coarse aggregate full length of both headwalls. To be placed by Grading Contractor. Cost included with Concrete Box Culverts.



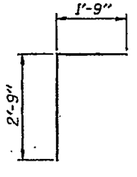
DRAIN DETAIL



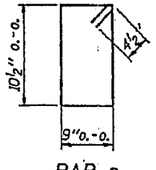
BARS h3 & h4



BAR a



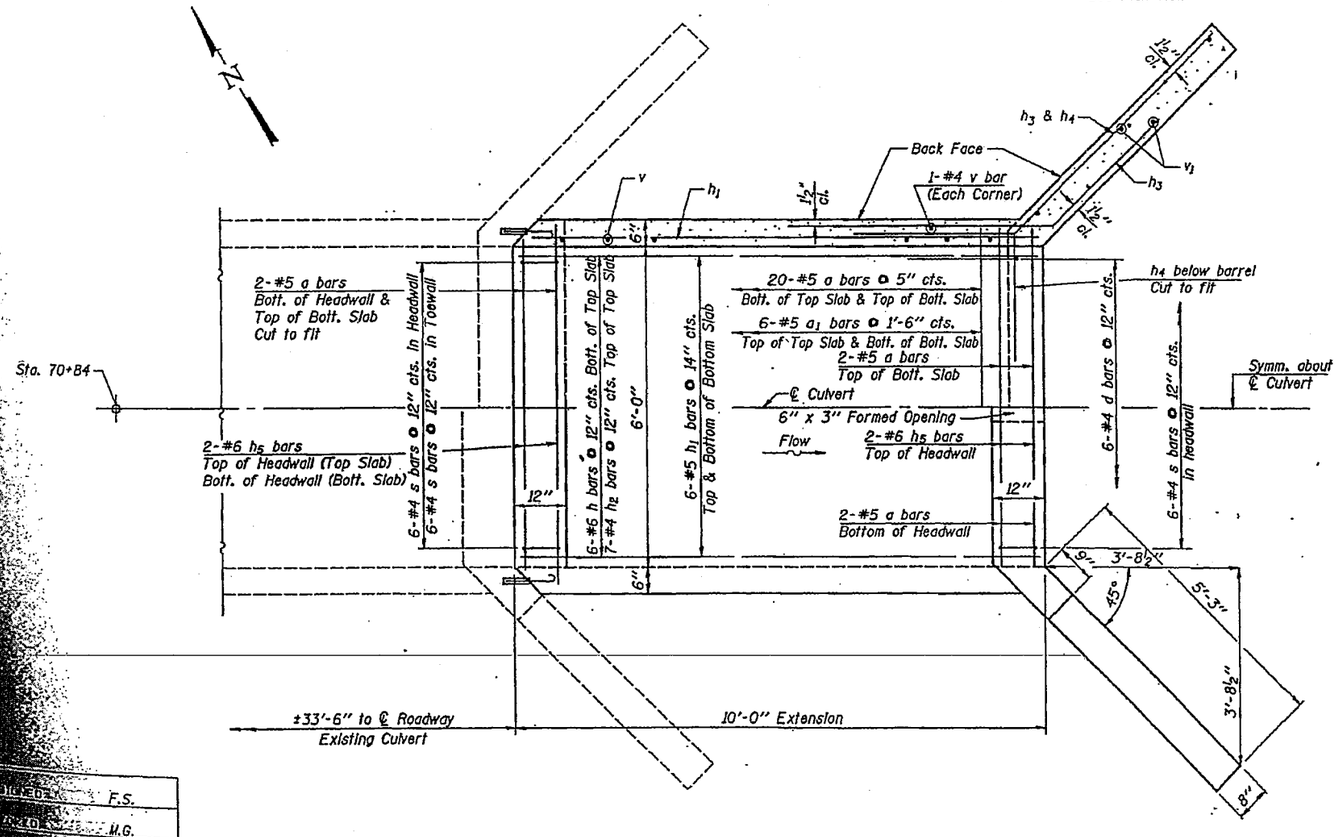
BAR d



BAR s

BILL OF MATERIAL

Bar	No.	Size	Length	Shape
a	48	#5	7'-10"	
a1	12	#5	6'-6"	
a2	1	#4	6'-3"	
d	6	#4	4'-6"	
h	6	#6	9'-9"	
h1	18	#5	9'-9"	
h2	7	#4	9'-9"	
h3	10	#4	8'-0"	
h4	12	#4	8'-4"	
h5	6	#6	6'-6"	
s	18	#4	4'-0"	
v	30	#4	4'-0"	
v1	8	#4	6'-1"	
Concrete Box Culverts			Cu. Yd.	6.9
Reinforcement Bars			Pound	1150
Expansion Bolts ¾" x 12"			Each	14



PLAN

SCALE: ¾ Inch = 1 Foot

DESIGN STRESSES

(New Construction Only)

f'_c = 3,500 p.s.i.

f_y = 60,000 p.s.i. (Grade 60)

LOADING HS20-44 & ALT.

DESIGNED	F.S.
DRAWN	M.G.
TRACED	M.G.
CHECKED	F.S.

CULVERT EXTENSION DETAILS

BULL VALLEY ROAD

McHENRY COUNTY

STATION 70+84

511 WEST CAPITOL
SPRINGFIELD, IL 62704
(217) 528-2958

Ozyurt and Stone, Inc.
CONSULTING ENGINEERS

FILE NO. 96-19

DATE: 7-30-97

Added 9/11/12 348

REACH 4
ZONE A3

McHENRY DAM

Miller Rd.

ELEVATION (FEET NGVD)

739.8
740
738.5

745
735
730
725
720
715

522,000 523,000 524,000 525,000 526,000 527,000 528,000 529,000 530,000 531,000 532,000 533,000 534,000

STREAM DISTANCE IN FEET ABOVE MOUTH

V W X Y

LEGEND
- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

FOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

McHENRY COUNTY, IL
(UNINCORPORATED AREAS)

08P

STRUCTURE GETECHNICAL REPORT

For

FAU ROUTE 3860, C. J. Miller Road over Fox River - McHenry County, Illinois

IDOT Proposed Structure No. 056-3190

Section No. 06-00068-00-PV

Report Prepared For:

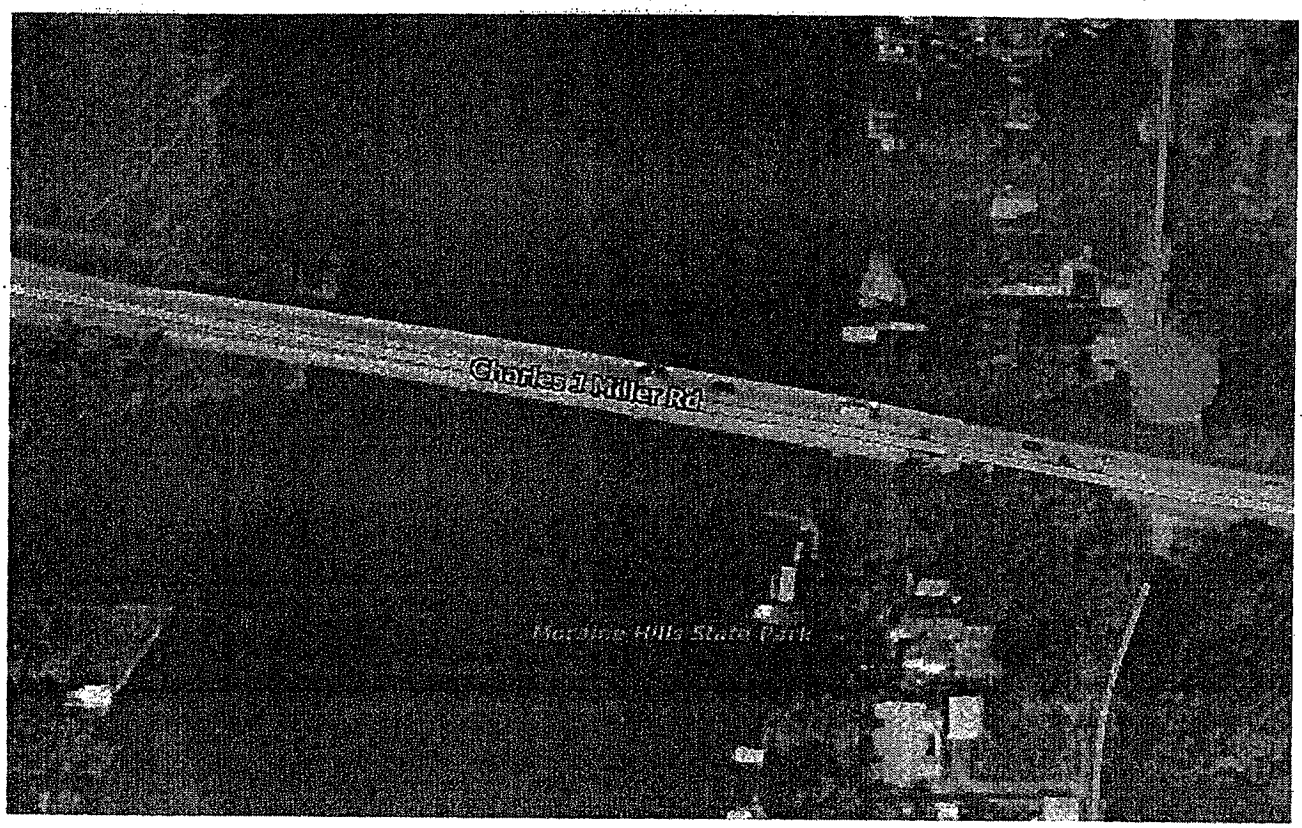
CONSULTANT

Smith Engineering Consultants, Inc.

420 North Front Street, McHenry, IL 60050

Structural Engineer: Robert G. Davies, S.E., P.E.

(815) 385-1778



Report Prepared By:

GEOTECHNICAL SUBCONSULTANT

SAM Consultants, Inc.

407 Eisenhower Lane South, Lombard, IL 60148

Report Author: Altaf U. Rahman, Ph.D., P.E.

(630) 424-1200

Report Date:

March 16, 2009

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Added 9/11/12

STRUCTURE GEOTECHNICAL REPORT

WIDENING OF C.J. MILLER ROAD BRIDGE OVER FOX RIVER
PROPOSED STRUCTURE NO. 056-3190
PHASE ONE ENGINEERING – SECTION 06-00068-00-PV
CITY OF MCHENRY, MCHENRY COUNTY, IL.

SAM Job No.08051B-GT – March 16, 2009

1.0 INTRODUCTION

S.A.M. Consultants, Inc., (SAM) were contracted by Smith Engineering Consultants, Inc., (SEC), to perform a geotechnical investigation for the Phase I Engineering for a new bridge to be constructed on the north side of the existing bridge that takes C.J. Miller Road across Fox River in McHenry County, Illinois. The City of McHenry (City) working with McHenry County Division of Transportation, (MCDOT), are intending to construct this new independently supported bridge for the west bound traffic of CJ Miller Road, with the existing bridge dedicated for the east bound traffic. The soil investigation was performed in accordance with a subcontract agreement dated October 16, 2007 between SEC, and SAM.

2.0 LOCATION OF PROJECT AND PROPOSED IMPROVEMENTS

The project is located at C.J. Miller Road over Fox River which is west of the intersection of South River Road and C.J. Miller Road and approximately 1.2 miles east of Illinois Route 31 in McHenry County, Illinois. The site location is defined as T-44-N, R-8-E, in Section 1 in Nunda Township in McHenry County. The bridge project investigation covers C.J. Miller Road alignment across the Fox River, between Station 594+27.35 at the west abutment to Station 601+15.89 at the east abutment. No bridge existed prior to 1989.

Existing Structure

The existing bridge (Structure Number 056-3149) was built in 1987/88. The structure is a five-span concrete deck with steel girders. The structure measures 658'-6 1/2" back-to-back of abutments and 44'-2" out-to-out of deck with a clear width of 32'-0" roadway and 8'-0" of multi purpose pathway. There is no skew. The abutments and four piers are supported on driven HP 10x42 piles. The abutments have two rows of piles, one vertical and another battered at 2" per foot. The piers have three rows of piles, vertical in the center and outside rows battered at 2" per foot. The pile driving records are not available; therefore actual pile driven lengths are not available. Table 1 shows the pile data shown on the 1987 design drawings.

Added 9/11/12

Table 1 - Existing Bridge Pile Design Data

Sub-Structure	Boring Number	Bottom of Pile Cap Elevation	No. of Piles	Capacity/pile (tons)	Estimated Pile Length (feet)
West Abutment	B-1 (Approx. 10 ft east of West Abt.)	742.01	13	65	34
Pier 1	B-2 (At the center of Pier 1)	728.89	24	60	26
Pier 2	--	720.81	24	60	26
Pier-3	--	721.05	33	68	18
Pier-4	B-3 (Approx. 40 ft east of Pier 4)	724.08	24	60	16
East Abutment	B-4 (Approx. 10 ft east of East Abt.)	742.05	13	45	23

Reference Drawings: Bull Valley Road Bridge Project 279, County Highway 51, McHenry County, Date: 8-3-87, Structure. No. 056-3149.

Proposed Structure

The new proposed bridge will be constructed parallel to and on the north, (plan north), side of the existing bridge across the Fox River for C.J. Miller Road. The new structure will also be a five span structure with a clear distance of 9'-10" between the existing and the proposed structures. There will be no skew. The new bridge will carry two lanes of westbound traffic and the existing will carry eastbound traffic. The proposed structure will have concrete deck with steel girders. The structure will be 658'-6 1/2" back-to-back of abutments and 31'-2" out-to-out of deck with a clear width of 28'-0" for the roadway.

3.0 SITE GEOLOGY & PEDOLOGY

The soil survey map published by United States Department of Agriculture for McHenry County, Illinois, shows that the majority of the roadway alignment has surface slopes varying between 0 to 2 percent to 2 to 6 percent. A photocopy of the area soil survey map is included in the Appendix to this report. The soil survey map does not identify any peat, bog, organic or such unsuitable soils within the proposed roadway right-of-way.

Added 9/11/12

According to the Illinois State Geological Survey Map (1979), the project lies within the surficial soil deposits of the following: Haeger Till Member of the Wedron Formation, (Wh), Dolton Member of the Equality Formation, (ed), and Batavia Member of the Henry Formation, (hb). All these lie within the Woodfordian sub-stage of the Wisconsin stage of Glaciation. These soils are mostly sands and gravelly sands, except for the Henry Formation which exists close to the river and is a sedimentary deposit also sandy and gravelly, yet possibly associated with the Fox River deposition.

Pedological Settings

A copy of the pedological map of the project area prepared by USDA National Resources Conservation Services (NRCS) is included in the Appendix. This map shows that the surface soils are loams, silt loams and silty clay loams. The following are the specific surface soils of the areas on either sides of the bridge.

- Map Unit 1082A Millington Silt Loam – 2 to 5 percent slope
- Map Unit 1153A Pella Silty Clay Loam – 4.5 percent slope

The surrounding land use consists of commercial, residential as well as agriculture land along the roadway alignments.

4.0 SCOPE OF FIELD INVESTIGATION & LABORATORY TESTING

In accordance with the scope of services approved by SEC, we performed drilling, sampling and testing services within the extent of the bridge project and locations noted in the tables and sections of the report that follows.

4.1 Field Investigation

The field investigation consisted of performing six structure borings during the period September 25, 2008 through November 18, 2008. Of these, two (2) borings were made in the Fox River bed with the drill rig on top of a barge, and the remaining four (4) borings were made by a truck mounted drill rig on the banks of the river. The locations of borings, labeled S-1 through S-6 were selected by SEC. Table 2 lists the locations where these borings were made. The six borings were drilled to varying depths to obtain data for proper foundation design of the new bridge structure.

Added 9/11/12

Table 2 – Bridge Structure Boring Locations

Boring Number	*Station*	*Distance from C/L*	*Depth of Boring (feet)*	*Surface Elevation*
S-1	594+40	35' N	70.0	751.00
S-2	595+70	10' S	70.0	740.60
S-3	597+15	35' N	62.5*	735.5**
S-4	598+58	25' N	62.5*	736.0**
S-5	600+02	35' N	71.5	737.5
S-6	601+20	20' N	55.0	740.0

* Below Fox River water surface, ** Fox River water elevation at the time of borings

Narrative clarifies that S-5 was moved to 600+42 in the field

The borings were advanced using hollow stem auger drilling methods and soil samples were obtained at every 2.5 feet intervals to a depth of 30 feet and at 5-foot interval thereafter. Representative samples of soils were obtained using the split barrel sampling techniques, (ASTM procedure D-1556) which also provided the standard penetration resistance "N" (blows/foot) value of the soil at each sample depth. Photographs included in the appendix of this report provide a picture of the drilling operations.

Water level readings were taken during and following completion of drilling operations. These are recorded on the logs of borings included in the Appendix as well as in sections of the report that follow.

Reference is made to the boring logs (gINT program generated) included in the Appendix which indicates subsurface stratigraphy and soil descriptions as well as other physical characteristics of the soils. Definitions of descriptive terminology are also included. While strata changes are shown as a definite line on the boring logs, the actual transition between soil layers will probably be more gradual.

4.2 Laboratory Testing

Soil samples were examined in the laboratory to verify field descriptions and to classify them in accordance with the AASHTO Soil Classification System. Laboratory testing included moisture content determinations for all soil samples and grain size including sieve and hydrometer analyses and Atterberg Limits for selected samples, as applicable.

Added 9/11/12

5.0 PRECIPITATION SUMMARY

The borings were drilled in the period September through November 2008. Observations made of precipitation data for the two months immediately prior to our field work and during the months of our investigation, are summarized in the Table 3. The precipitation data was obtained from the National Weather Service. The normal value is for a 30-year monthly average period (1971 to 2007).

Table No. 3 - Precipitation Data (In inches)

Month	Total	Normal	Departure From Normal
July 2008	4.76	3.51	1.25
August 2008	3.73	4.62	-0.89
September 2008	13.63	3.27	10.36
October 2008	5.35	4.25	1.1
November 2008	3.85	3.44	0.41

Based on the above data it is noted that the precipitation was mostly on the wet side of the normal for the period July through November 2008. Therefore, the groundwater level may have been at higher level than the normal level and also the soil moisture content on the wet side than the normal condition.

6.0 GENERALIZED SUBSURFACE CONDITIONS

6.1 Subsurface Soil Conditions

The following is a brief description of the subsoil encountered in the six bridge borings. Detailed descriptions and physical properties of the soils encountered in each boring are provided in the Boring Logs included in the Appendix.

West End of the Bridge:

Borings S-1 and S-2 were drilled on the west side of the Fox River, at the proposed west abutment and the proposed Pier 1 (first pier from the west end of the bridge) respectively. The ground surface at the Boring S-2 location was 10.4 feet lower than at the Boring S-1 location. A layer of 12-inch thick black topsoil was encountered at Boring S-2 with a 18-inch thick layer of clay loam below topsoil. From below the ground surface at Boring S-1 and below clay loam at Boring S-2, both the borings encountered very soft to medium stiff sandy loam to depths of 2 feet and 7.5 feet below grade. From a depth of 2 feet at Boring S-1 and 7.5 feet at Boring S-2, the soils are granular in nature consisting of brown and gray, loose to dense sands with

Added 9/11/12

varying amount of gravel to a depth of 50 feet in Boring S-1 and 70 feet in Boring S-2. Below a depth of 50 feet in Boring S-1, the soil was brown, dense sandy loam to the boring termination depth of 70 feet.

Fox River Channel

Borings S-3 and S-4 were drilled from a barge at or near the proposed Pier 2 and Pier 3 (second and third pier from the west end of the proposed bridge) locations respectively. The river depth was 6.5 feet (Elevation 729.0) at Boring S-3 location drilled on October 13, 2008 and it was 7.5 feet (Elevation 728.5) at Boring S-4 location drilled on October 9, 2008. A 2.5-foot thick loose to medium dense gray and black sand layer was encountered at the river bed. Below the river bed soils, the borings revealed medium dense, sand and gravel to a depth of 20.5 feet and 18 feet below river bed (elevations 708.5 and 710.5) at Borings S-3 and S-4 respectively. Below medium dense granular soils, the borings encountered dense to very dense sand and gravel to the boring termination depth of 55 feet below river bed (approximate elevation 674). The standard penetration test blow counts (N value) in this layer ranged from 31 to 121 blows per foot.

East End of the Bridge

Boring S-5 was originally scheduled to be drilled from a barge, near the proposed Pier 4 (first pier from the east end) location. However, while attempting to set up at this location, the barge got turned over by the Fox River flow currents, causing the skid-mounted drill rig to break and had to be salvaged by a wrecker boat. In consultation with SEC's structural engineer, S-5 location was moved over eastwards to be barely out of the river and on its east bank, 40 feet east of its originally designated location. Boring S-6 was drilled close to its designated location, at the proposed new east abutment. The ground surface at the Boring S-5 location was 2.5 feet lower than at the Boring S-6 location. At the surface a layer of black topsoil varying in thickness from 6 to 12 inches exists. Below topsoil, black, soft sand loam to gray, loose sand was encountered to a depth of 7.5 to 5.5 feet below grade. From a depth of 5.5 to 7.5 feet, both he borings encountered medium dense to dense sand with varying amount of gravel to the depths of 33.5 feet and 25.5 feet in Borings S-5 and S-6 respectively. Below this layer, the borings encountered dense to very dense gravelly sand to the boring termination depths of 71.5 in Boring S-5 and 55 feet in Boring S-6. The standard penetration test blow counts (N value) in this layer ranged from 37 to 80 blows per foot.

6.2 Groundwater Conditions

The groundwater level during drilling was observed at a depth of 10.5 feet and 1 foot in Borings S-1 and S-2 respectively. Upon completion of drilling, the groundwater level was observed at a depth of 11 feet and 2 feet in Boring S-1 and S-2 respectively. The groundwater level during drilling was observed at a depth of 3 feet and 5.5 feet in Borings S-5 and S-6 respectively. Upon completion of drilling, the groundwater level was observed at a depth of 4 feet and 6 feet in Boring S-5 and S-6 respectively. Borings S-3 and S-4 were drilled in the river.

Added 9/11/12

The groundwater level observations provide an approximate indication of the groundwater at the time the borings were drilled. Fluctuations in the groundwater level should be anticipated throughout the year depending on regional variations in the climate and other factors not apparent at the time the borings were performed. Additionally, discontinuous zones of perched water may exist within the soils. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. We recommend the contractor determine the actual groundwater levels at the site at the time of the construction activities.

7.0 GEOTECHNICAL EVALUATIONS

Not a recommendation by Geotech but an assumption based on existing bridge pile cap elevations.

7.1 Scour Evaluations

As per hydraulic report information including scour analysis and preliminary plans provided by SEC for the existing bridge, there could be a 4.5 feet of local scour at the proposed piers for the 50 and 100 year flood events. The analysis found no scour at the abutments which are at significantly higher elevations and outside of the normal river flow. The proposed river Piers 2 through 4 will be supported on driven piles with bottom of the pile cap at approximate depths of 5 to 9 feet below river bed. The Pier 1 (land pier) will also be supported on driven piles with bottom of the pile cap at approximate depths of 11.5 feet below existing grade. Therefore, there is no need for any reduction in the pile capacities for the foundation design due to scouring. The grain size analysis on some selected samples was performed and the results are included in the Appendix. The scour analysis can be revised considering soil parameters from these grain size analyses results.

Table 4 shows the waterway information as per the hydraulic report. The normal water level elevation is 737.0 feet and all time high water elevation is 739.4 recorded in April 1960.

Table 4 – Waterway Information

Flood	Frequency Year	Headwater Elevation Existing	Headwater Elevation Proposed
	10	738.3	738.3
Design	50	739.0	739.0
Base	100	739.5	739.5
Max. Calc.	500	740.3	740.3

Added 9/11/12

7.2 Seismic Considerations

We calculated factor of safety for the liquefaction at each boring using a procedure developed by Seed and Idriss (1982 and 1992) considering earthquake with a magnitude of 7.5 with the groundwater level encountered during drilling. The minimum factor of safety ranged from 1.5 at a depth of 59 feet in Boring S-2 to 4.0 at a depth of 19 feet in Boring S-6. The IDOT requires minimum factor of safety to be 1.0. Therefore, no liquefaction of the foundation soils is expected during the earthquake.

It is recommended to consider the following seismic data for the design of the structure based on the 2008 IDOT Bridge Manual Design Guide and 2008 Interim Revisions of the AASHTO LRFD Bridge Design Specifications. These values are based at the center of the bridge at latitude of 42.32 degrees and longitude of -88.25 degrees.

Seismic Performance Zone (SPZ): 1
Site Class: D
S_{DS} - Design Spectral Acceleration at 0.2 sec.: 0.132
S_{D1} - Design Spectral Acceleration at 1.0 sec.: 0.078

7.3 Embankment settlement

The existing embankments will be widened as much as 50 feet near the abutments requiring up to 14 feet of new fill at the west abutment and 10 feet at the east abutment. The approach embankments will have 1V:2H end slopes. The side slopes are at 1V:2H at the west abutment and 1V:3H at the east abutment. There will be settlement of the foundation soils from the new fill loading and settlement within the new embankment fill. A preliminary settlement analysis indicates that the settlement of the foundation soils would be on the order of 1.25 inches at the west abutment and 0.75 inches at the east abutment. Since the foundation soils are granular soils, most of the foundation soils settlement is expected to be occurring at the same rate as construction. The settlement within the new embankment could be on the order of 0.75 to one inches. We recommend that the embankments should be constructed as early as possible and the approach pavement construction should be delayed as much as possible. The piles for the abutments should be installed in precored holes as discussed in the foundation design recommendation section of the report.

7.4 Embankment Slope Stability

The widened portions of the new embankments were analyzed for the global slope stability near the abutments. The minimum factor of safety required by the IDOT is 1.5. We performed a preliminary analysis based on the borings drilled near the abutments (Borings S-1 and S-6). Our preliminary analyses indicate the factor of safety (FOS) to be 2.1 for the embankment end and side slopes of 1V:2H at the west abutment and FOS of 3.1 for the side slope of 1V:3H and FOS of 2.8 for 1V:2H end slope at the east abutment.

Added 9/11/12

7.5 Mining Activity

There was no coal mining activity in the McHenry County as per Illinois State Geological Survey.

8.0 FOUNDATION RECOMMENDATIONS

8.1 Design Recommendations for the New Bridge Foundations

Considering the soil conditions encountered in the Borings S-1 through S-6 and borings data for the existing bridge structure, shallow foundation consisting of spread footings and deep foundation consisting of drilled shafts would not be appropriate. We recommend supporting the structure on driven piles. The piles driven to the refusal to top of the bedrock as an end bearing piles would be not economical. Therefore, we recommend driven piles designed as friction piles. We evaluated H-piles and metal shell cast-in-place concrete piles (metal shell piles). Tables 5 through 12 summarizes the estimated pile lengths for different pile types and sizes. We will provide estimated pile lengths for other pile sizes and/or capacities if desired during the design phase.

It can be seen that the metal shell piles achieve very high capacities with short lengths. The maximum Nominal Required Bearing (NRB) for the metal shell piles at some substructure locations is achieved for a penetration of equal to or less than 10 feet. The minimum pile length in the natural soils should be 10 feet. Some borings encountered very dense sand and gravel soils with high gravel content. As an example, the grain size analysis for the sample at a depth of 23.5 feet in Borings S-4 shows 83 percent gravel and 16 percent sand. Driving through very dense granular soils will not be easy with the possibility of pile toe damage. The shorter Metal Shell piles also may not provide the fixity needed. Therefore, it is our opinion that the metal shell piles would not be appropriate.

The Factored Resistance Available (FRA) for the piles should be taken equal to 0.5 times Nominal Required Bearing (NRB) as per 2008 IDOT Bridge Manual.

Added 9/11/12

Table 5 - Pile Design Data for HP 10x42

Maximum NRB for HP 10x42 pile: 335 kips

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips			
				240	270	300	335
				Estimated Pile Length, ft			
West Abutment	S-1	751.0 ✓	742.0	55	61	64	69
Pier 1	S-2	740.6 ✓	729.0	35	40	50	60
Pier 2	S-3	735.5 ? 729.00	720.0	28	31	33	37
Pier-3	S-4	736.0 ? 728.50	721.0	30	31	32	34
Pier-4	S-5	737.5 733.00	724.0	46	47	52	57
East Abutment	S-6	740.0 ✓	742.0	40	44	46	49

Don't match Borings

S-5 not at pier 4 after Barge tipped over.

Added 9/11/12

Table 6 - Pile Design Data for HP 12x53

Maximum NRB for HP 12x53 pile: 419 kips.

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				300	330	360	390	419
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	56	61	64	67	72
				686.0	681.0	678.0	675.0	670.0
Pier 1	S-2	740.6	729.0	35	41	47	58	65
				694.0	688.0	682.0	671.0	664.0
Pier 2	S-3	735.5	720.0	28	31	33	35	38
				692	689	687	685	682
Pier-3	S-4	736.0	721.0	30	31	32	33	34
				691	690	689	688	687
Pier-4	S-5	737.5	724.0	47	49	52	55	57
				677	675	672	669	667
East Abutment	S-6	740.0	742.0	40	44	46	48	49

TIP ELEV

Don't match Borings S-5 - doesn't match Pier 4 location

360

Added 9/11/12

Table 7 - Pile Design Data for HP 12x63

Maximum NRB for HP 12x63 pile: 497 kips

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				360	390	420	450	497
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	63	66	69	72	76
Pier 1	S-2	740.6	729.0	47	55	60	66	76
Pier 2	S-3	735.5	720.0	33	35	36	39	41
Pier-3	S-4	736.0	721.0	31	32	34	35	37
Pier-4	S-5	737.5	724.0	52	55	56	57	59
East Abutment	S-6	740.0	742.0	43	45	46	48	51

don't match borings

S-5 doesn't match Pier 4 location

Added 9/11/12

Table 8 - Pile Design Data for HP 14x73
Maximum NRB for HP 14x73 pile: 578 kips.

→ all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				450	480	510	450	578
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	65	68	71	75	80
Pier 1	S-2	740.6	729.0	52	57	62	70	77
Pier 2	S-3	735.5	720.0	35	37	38	40	41
Pier-3	S-4	736.0	721.0	33	34	35	36	37
Pier-4	S-5	737.5	724.0	53	56	57	57	58
East Abutment	S-6	740.0	742.0	45	46	48	49	50

→ don't match Borings

S-5 Doesn't match Pier 4 location

362

Added 9/11/12

Table 9 - Pile Design Data for Metal Shell 12" Dia, 0.179" wall
Maximum NRB for Metal Shell 12" Dia 0.179" wall pile: 254 kips.

All base on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				150	180	210	240	254
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	11	16	21	28	31
Pier 1	S-2	740.6	729.0	6	8	12	14	18
Pier 2	S-3	735.5	720.0	7	8	11	13	14
Pier-3	S-4	736.0	721.0	6	6	8	9	9
Pier-4	S-5	737.5	724.0	7	7	8	9	9
East Abutment	S-6	740.0	742.0	9	10	11	12	12

Don't match borings

Doesn't match Pier 4 location

Added 9/11/12

Table 10 - Pile Design Data for Metal Shell 12" Dia, 0.25" wall
Maximum NRB for Metal Shell 12" Dia, 0.25" wall pile: 353 kips.

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				240	270	300	330	353
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	26	32	36	40	42
Pier 1	S-2	740.6	729.0	16	19	26	35	38
Pier 2	S-3	735.5	720.0	13	15	16	17	18
Pier-3	S-4	736.0	721.0	8	9	10	11	12
Pier-4	S-5	737.5	724.0	9	10	11	11	12
East Abutment	S-6	740.0	742.0	12	12	13	15	16

Don't match Borings

S-5 doesn't match Pier 4 location

Added 9/11/12

Table 11 - Pile Design Data for Metal Shell 14" Dia, 0.25" wall

Maximum NRB for Metal Shell 14" Dia, 0.25" wall pile: 413 kips.

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				300	330	360	390	413
				Estimated Pile Length, ft.				
West Abutment	S-1	751.0	742.0	25	32	36	40	41
Pier 1	S-2	740.6	729.0	16	19	26	36	41
Pier 2	S-3	735.5 ? 729.00	720.0	12	14	15	16	17
Pier-3	S-4	736.0 ? 728.50	721.0	9	9	10	10	11
Pier-4	S-5	737.5 733.00	724.0 ? 725.50	9	9	10	10	11
East Abutment	S-6	740.0	742.0	11	12	12	13	14

→ NOT AT PIER 4
→ Report Narrative clarifies that due to barge tip-over S-5 was shifted to behind East sheet pile wall.

Added 9/11/12

Table 12 - Pile Design Data for Metal Shell 14" Dia, 0.312" wall
Maximum NRB for Metal Shell 14" Dia, 0.312" wall pile: 513 kips.

all based on exist. bridge

Sub-Structure	Boring Number	Grade Elevation At Boring	Bottom of Pile Cap Elevation	Nominal Required Bearing, kips				
				390	420	450	480	513
				Estimated Pile Length, ft				
West Abutment	S-1	751.0	742.0	40	41	45	46	47
Pier 1	S-2	740.6	729.0	36	38	39	42	45
Pier 2	S-3	735.5	720.0	16	17	17	18	19
Pier-3	S-4	736.0	721.0	10	10	11	12	13
Pier-4	S-5	737.5	724.0	10	10	11	12	14
East Abutment	S-6	740.0	742.0	13	16	19	21	26

S-5 doesn't match pier location

don't match borings

The above pile length estimates are based on the "N" values from the standard penetration resistance test results performed in the field during drilling. It should further be understood that these numbers are estimates and are based on assumed pile cap elevations. Any modifications to the elevations of the pile cap elevations will require appropriate modifications to the estimated pile lengths.

We recommend including one test pile at each substructure. It is our recommendation that pile shoes will generally be not be needed at this bridge site. Some exceptions to this are zones of gravel in S-3 at 42.5 feet depth and in S-4 at 23.5 feet depth. Based on the results of the test piles driven at the structural elements at

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the pier locations within the river channel, to facilitate driving of piles, pile shoe may become necessary at these locations.

It is also recommended that holes should be precored for piles which are to be driven through new approach embankment at the abutments. The bottom of the holes to be precored should be 12 inches below the existing grade at the abutments locations considering removal of topsoil. There should be negligible settlement of the abutments and the piers supported on the driven piles.

8.2 Lateral Pressure and Resistance

We recommend considering an active earth pressure of 40 pounds per square foot per foot depth (pcf) for designing the abutments and the wing walls for the horizontal embankment slopes. The lateral earth pressure should be 70 pcf for the embankment behind the wing walls at a slope of 1V:2H. These pressures are assuming the drainable backfill behind the abutments and wing walls. The surcharge and backfill behind the abutments and wing walls should be as per IDOT Bridge Manual.

The lateral load can be resisted by battering some of the piles. The remaining lateral load after battering can be resisted by considering factored (LRFD) lateral resistance of 3 kips per pile as per 2008 IDOT Bridge Manual (page 3-356). If necessary, laterally loaded piles can be further analyzed using computer programs such as L-piles or COM624P when the factored lateral loading per pile exceeds 3 kips for LRFD. The soil properties to be used for a detailed soil structure interaction analysis are shown in Table 13. This analysis will also provide minimum pile embedment required to develop the fixity and resist the applied lateral loads.

Table 13 – Soil Properties for Laterally Loaded Pile Analysis

Above Water Level				
Soil Property	Loose Granular Soils	Medium Dense Granular Soils	Dense Granular Soils	Very Dense Granular Soils
SPT Value (N, blows per foot)	4 to 10	11 to 30	31 to 50	Over 50
Total Unit Weight, pounds per cubic inch	0.067	0.068	0.075	0.078
Angle of Internal Friction, degree	30	34	38	42
Modulus of Subgrade Reaction, pounds per cubic inch (k)	25	90	220	270

Added 9/11/12

Below Water Level				
Soil Property	Loose Granular Soils	Medium Dense Granular Soils	Dense Granular Soils	Very Dense Granular Soils
SPT Value (N, blows per foot)	4 to 10	11 to 30	31 to 50	Over 50
Submerged Unit Weight, pounds per cubic inch	0.029	0.032	0.039	0.042
Angle of Internal Friction, degree	30	34	38	42
Modulus of Subgrade Reaction, pounds per cubic inch (k)	20	60	120	150

Boring logs show Standard Penetration Test (SPT) values in "**BLOWS (/6")**" column. N value is the total of second and the third numbers.

9.0 CONSTRUCTION CONSIDERATIONS

9.1 Foundation Construction

Excavations for the foundations should be performed in accordance with OSHA requirements. The pile installation should be as per IDOT Standard Specifications Section 512-PILING. We recommend driving one test pile at each substructure as per IDOT Standard Specifications Article 512.15.

9.2 Cofferdams

assumes prop. cap elev. has to match exist. cap elev.

Cofferdam will be required for all the piers foundation construction. Cofferdam can be constructed using steel sheet piling. Based on the existing grade at the boring locations and the proposed bottom of the pile footings, it appears that approximately 5 to 9 feet of excavation from the river bed to the bottom of the pile footings would be required at the river piers. The concrete seal coat will be required for the river piers constructed in the water. A preliminary thickness of the cofferdam seal coat can be determined as per IDOT Design Guide included in 2008 IDOT Bridge Manual. We recommend showing a concrete seal coat below the bottom of the pile footings on the contract plans. Approximately 11.5 feet of excavation from the existing

Added 9/11/12

grade to the bottom of the pile footing would be required at Pier 1. Pier 1 constructed outside the river water edge but very close to the river will also require a concrete seal coat due to groundwater at a very shallow depth and granular soils conditions. The minimum thickness of the seal coat as per IDOT requirement is 3 feet for the piers constructed in the water. The top of cofferdam elevation should be 3 feet above Estimated Water Surface Elevation (EWSE) as per IDOT Bridge Manual. Steel sheet piling can be installed using vibratory hammer. The care should be taken to minimize the disturbance to the foundation soils during removal of the sheet piling. As per IDOT requirements, the design of the cofferdam including the final thickness of the seal coat should be performed by an Illinois Licensed Structural Engineer.

9.3 Approach Embankments

After removing the surficial topsoil and vegetation the exposed subgrade should be proofrolled before placement of fill. Any soft or loose subgrade observed during the proofrolling should be reworked or replaced with an approved backfill. The required embankments should be constructed as per IDOT Standard Specifications Section 205.

9.4 Construction Monitoring

It is recommended that all excavations and driving of piles for the bridge substructures, shall be observed and documented by the geotechnical engineer during construction. It is recommended that all undercuts, subgrade examinations and proof-rolling etc. shall be observed and documented by the geotechnical engineer during construction. Any and all soil fill, including replacement fill and embankment fill, should be tested for conformance with the density requirements.

10.0 REPORT LIMITATIONS

The information, analyses and recommendations presented in this report are based on the project related information supplied to S. A. M. Consultants Inc., by Smith Engineering Consultants, Inc., the results of our field drilling, sampling and testing and the ensuing analyses performed by us. If any of the project related information is different from our current understanding as presented in this report, or if any of the same changes, please inform us so that we can modify our recommendations if necessary. If we are not informed of any changes in the construction related aspects of the project, our firm will not be responsible for any consequences resulting from such change of construction.

The analyses and recommendations presented in this report conform to the current standards of the industry for similar construction. Beyond this, no warranty is provided or implied. We request that after the pre-final plans are completed, SAM Consultants should be provided with a set of plans and specifications so that we can confirm that the intent of recommendations provided in this report have been followed and will be implemented.

Added 9/11/12

The recommendations provided in this report are for the exclusive use of the City of McHenry and their consultants Smith Engineering Consultants, Inc. for the specific use in the design and construction of the bridge over Fox River, McHenry, Illinois. Our firm will be pleased to provide the inspection and related testing services during the construction phase of the project.

Submitted by:
S. A. M. Consultants, Inc.

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Principal

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Added 9/11/12

APPENDIX

SITE VICINITY MAP (1 page)

BORINGS LOCATION PLAN (1 page)

SOIL TEXTURAL CLASSIFICATION SYSTEM (1 page)

AASHTO SOIL CLASSIFICATION SYSTEM (1 page)

GENERAL NOTES & SOIL CLASSIFICATION CHARTS (2 pages)

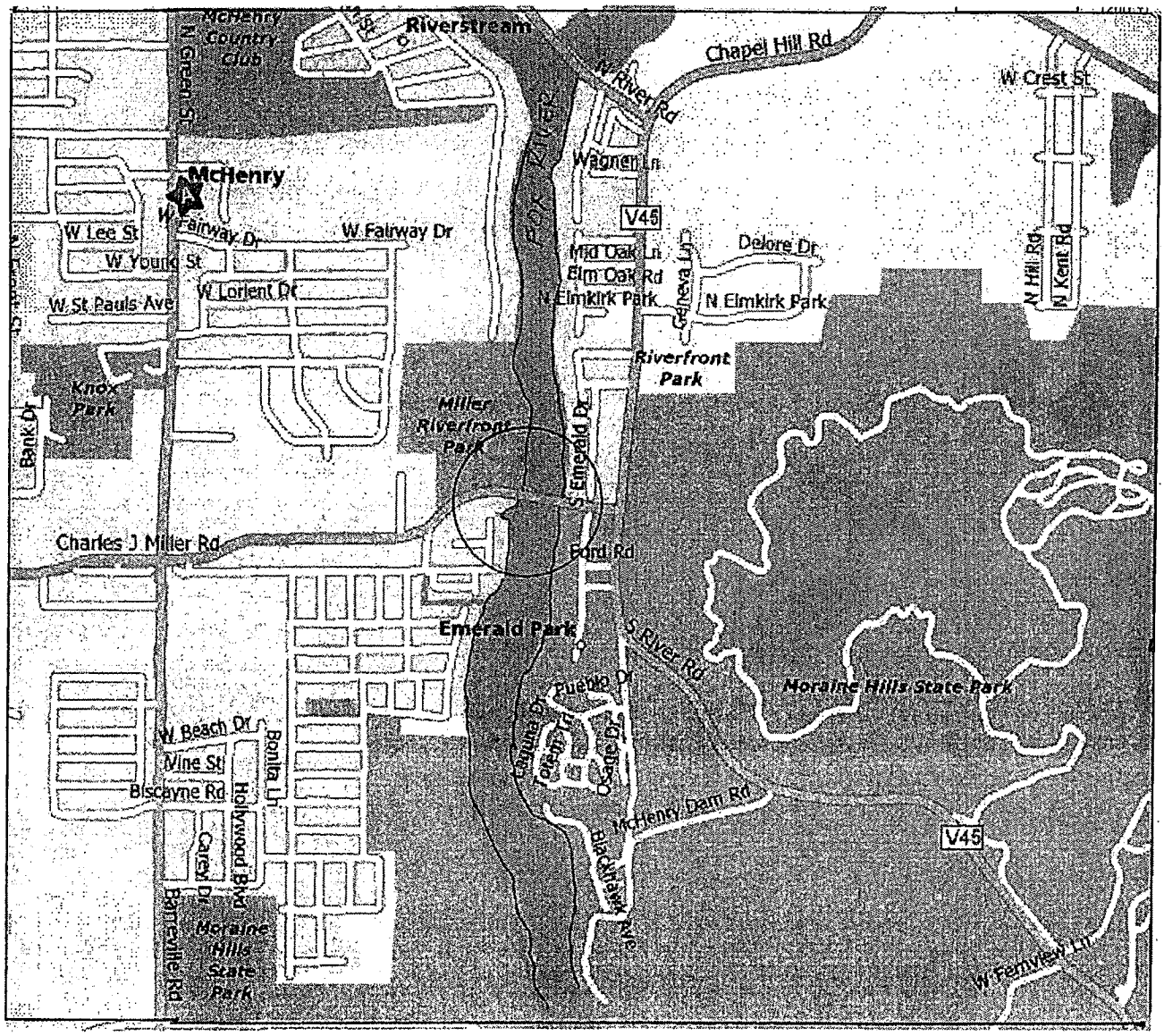
STRUCTURE BORING LOGS S-1 through S-6 (12 pages)

LABORATORY TEST RESULTS (5-pages)

PEDOLOGICAL MAP & SOIL TYPES OF THE AREA – (1 page)

Added 9/11/12

SITE VICINITY MAP



Added 9/11/12

Added 9/11/12 373

ATION
PE B-6.12

245' TAPER (22.2:1)

150' (50:1) BRIDGE APPROACH TAPER

PR ROW

N

GRAPHIC SCALE

METERS

20 0 20 40 60 80 100

50 0 50 100 150 200 250

FEET

BORINGS LOCATION PLAN

Fox River Bridge Additions Project - Phase I Engineering
C.J. Miller Road, McHenry County, Illinois

SAM Job No.08051B-GT

PROPOSED MILLER ROAD ℄

FOX RIVER

S-1

S-2

S-3

S-4

S-5

S-6

PROPOSED STRUCTURE

MILLER ROAD

L995.100

PROPOSED BRIDGE ABUTMENT
STA 594+57.35

PROPOSED APPROACH SLAB
STA 594+27.35

EXISTING STRUCTURE
NUMBER 056-3149
TO REMAIN IN PLACE

EXISTING 8' SHARED USE PATH

EX ROW

N 764.57'

PROPOSED BRIDGE ABUTMENT
STA 601+15.89

PROPOSED APPROACH SLAB
STA 601+45.89

PROPOSED COMBINATION CONCRETE C&G TYPE B-6.24 (TYP OUTSIDE EDGE)

PROPOSED COMBINATION CONCRETE C&G TYPE B-6.12 (TYP MEDIAN)

PROPOSED ROADWAY RECONSTRUCTION (SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION)

220' TAPER (20:1)

RB-32

MILLER ROAD

225' STORAGE
445' LANE
475' LANE

L605.100

EXISTING 10' SHARED USE PATH

PR ROW

@115.5' R

90.0' R

EX ROW

RB-33

30+00 POT Sta 600+00

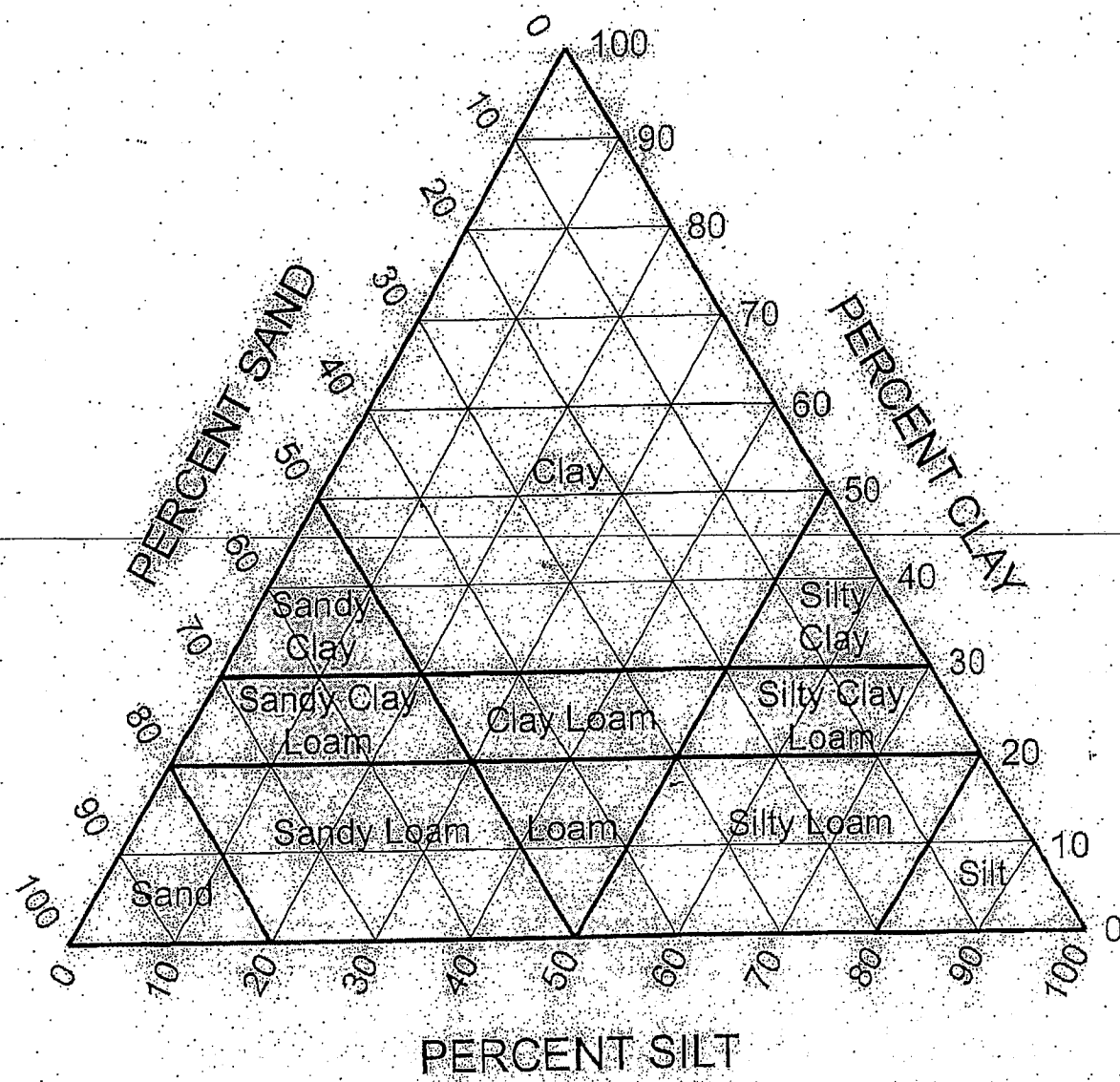
SOUTH RIVER ROAD

EX ROW

EX ROW

33.1'

PROPOSED 2-CENTERED CURVE
75'-450' @ 12' OFFSET



SIZE LIMITS

SAND: 2.0 to 0.074 mm SILT: 0.074 to 0.002 mm CLAY: Below 0.002 m

IDH Textural Classification Chart

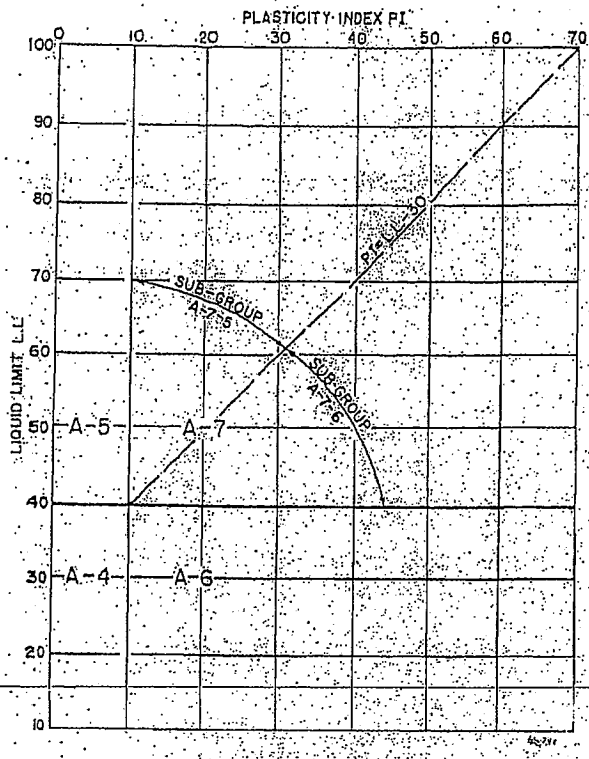
Added 9/11/12

AASHTO CLASSIFICATION CHART

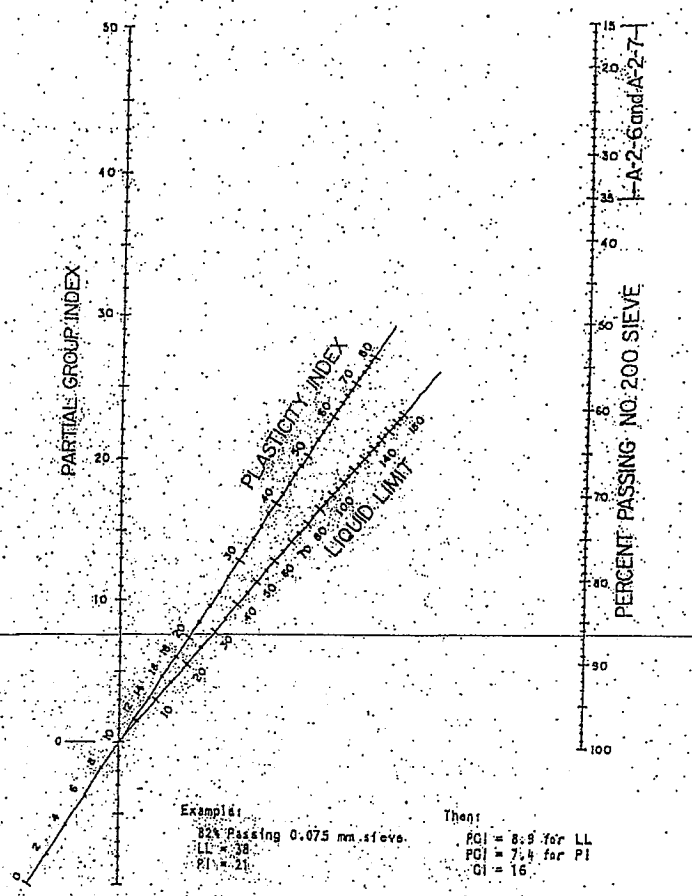
Group Index (GI) = (F-35)[0.2+0.005 (LL-40)]+0.01(F-15)(PI-10)
where F = % Passing 0.075 mm sieve, LL = Liquid Limit,
and PI = Plasticity Index

When working with A-2-6 and A-2-7 subgroups the Partial Group Index (PGI) is determined from the PI only.

When the combined Partial Group Indices are negative, the Group Index should be reported as zero.



Liquid Limit and Plasticity Index Ranges for the A-4, A-5, A-6 and A-7 Subgrade Groups



AASHTO SOIL CLASSIFICATION SYSTEM

General Classification	*Granular Materials (35% or less passing No. 200)*							*Silt-Clay Materials (more than 35% passing No. 200)*			
	A-1			*A-2*							*A-7*
Group Classification	*A-1-a*	*A-1-b*	*A-3*	*A-2-4*	*A-2-5*	*A-2-6*	*A-2-7*	*A-4*	*A-5*	*A-6*	*A-7-5, A-7-6*
Sieve analysis, % passing:											
No. 10	50 max	.....	.....	.....	.....	.....	.....	.....	.....	.....	
No. 40	30 max	50 max	51 min	.....	.....	.....	.....	.....	.....	.....	
No. 200	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing No. 40:											
Liquid limit	.....		.....	40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min†
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to good							Fair to poor			

† Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.

Added 9/11/12

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon – 1 3/8" I.D., 2" O.D., unless otherwise noted
ST: Thin-Walled Tube – 3" O.D., Unless otherwise noted
PA: Power Auger
HA: Hand Auger
DB: Diamond Bit – 4", N, B
AU: Auger Sample
HS: Hollow Stem Auger
PS: Piston Sample
WS: Wash Sample
FT: Fish Tail Bit
RB: Rock Bit
BS: Bulk Sample
PM: Pressuremeter
DC: Dutch Cone
WB: Wash Bore

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon, except when noted.

WATER LEVEL MEASUREMENT SYMBOLS:

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short term observations.

DESCRIPTIVE SOIL CLASSIFICATIONS:

Soil Classification is based on the Unified Soil Classification System and ASTM Designations D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles; gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve: they are described as: clays, if they are plastic and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in place density and the fine grained soils on the basis of their consistency. Example: Lean Clay with sand, trace of gravel, stiff (CL); Silty sand, trace of gravel, medium dense (SM).

CONSISTENCY OF FINE GRAINED SOILS:

Unconfined Compressive Strength, Qu, tsf	N-Blows/ft	Consistency
< 0.25	Below 2	Very soft
0.25 - 0.50	2 – 4	Soft
0.50 - 1.0	4 – 8	Medium Stiff
1.0 - 2.0	8 - 15	Stiff
2.0 - 4.0	15 - 30	Very Stiff
4.0 - 8.0	30 – 50	Hard
> 8.0	> 50	Very Hard

RELATIVE DENSITY OF COARSE GRAINED SOILS

N-Blows/ft.	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 - 29	Medium Dense
30 – 49	Dense
50 – 60	Very Dense
80+	Extremely Dense

RELATIVE PROPORTIONS OF SAND & GRAVEL

Descriptive Term(s) (of Components Also Present in Sample)	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component Of Sample	Size Range
Cobbles	12 in. to 3 in. (300 mm to 75 mm)
Gravel	3 in. to #4 sieve (75 mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75 mm to 0.75 mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) (of Components Also Present in Sample)	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

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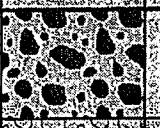
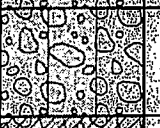
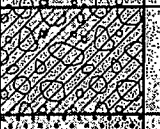
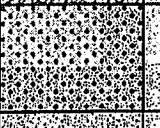
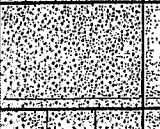
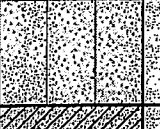
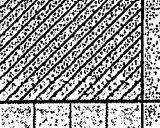
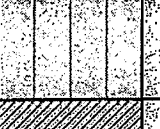
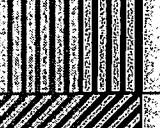
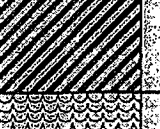
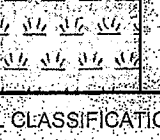
Added 9/11/12

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/25/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On West approach to Fox River Bridge LOGGED BY DM

SECTION 06-00068-00-PV LOCATION CJ Miller Road - West approach to Fox River Bridge

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. _____
Station _____

BORING NO. S-1
Station 594+40
Offset 35.00ft Left (N)
Ground Surface Elev. 751.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 740.5 ft ▼
Upon Completion 740.0 ft ▽
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
	6			Medium stiff brown SANDY LOAM; damp; - A-2-6(1)
749.00	8 9		4.4	
	3			Loose to medium dense dark brown SAND, medium grained; damp to moist; -A-1-a(0)
	6 14		8.1	
	3			
	4 6		11.8	
743.50				
	6			Medium dense gray brown SAND with gravel and stone chips; moist to wet; A-1-a (0)
	10 8		12.0	
▼ ▽	4			
	9 11		4.4	
	5			
	10 10		5.5	
736.00				
	3			Medium dense to dense brown SAND; saturated; A-1-b(0)2-4
	6 8		20.8	
	3			
	5 8		13.3	
711.00				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
	5			Medium dense to dense brown SAND; saturated; A-1-b(0)2-4 *(continued)*
	12 12		13.0	
	3			
	3 3		18.7	
726.00				
	25			Dense to medium dense brown Gravelly SAND with stones; wet ; A-1-b(0)
	16 10		8.8	
	3			
	4 8		18.5	
	4			
	6 8		11.7	

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/25/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On West approach to Fox River Bridge LOGGED BY DM

SECTION 06-00068-00-PV LOCATION CJ Miller Road - West approach to Fox River Bridge

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. _____
Station _____

BORING NO. S-1
Station 594+40
Offset 35.00ft Left (N)
Ground Surface Elev. 751.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 740.5 ft ▼
Upon Completion 740.0 ft ▽
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dense gray SAND with gravel; saturated; A-3			
	8		
	10		12.3
	12		
-45			
	7		
	9		11.5
	13		
701.00 -50			
Dense brown SANDY LOAM; saturated; A-1-b			
	12		
	12		11.8
	14		
-55			
	12		
	16		13.0
-60	20		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dense brown SANDY LOAM; saturated; A-1-b *(continued)*			
-65			
	20		
	28		18.8
681.00 -70	36		
-75			
-80			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Added 9/11/12

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/26/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On West Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION On West bank of Fox River

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-2
Station 595+70
Offset 10.00ft Right (S)
Ground Surface Elev. 740.60 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 739.6 ft ▼
Upon Completion 738.6 ft ▽
After Hrs ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Black TOPSOIL
739.60				
	2			Soft Gray CLAY LOAM; some organics present; very moist; A-4 (0)
▽	2		18.9	
738.10	3			Hit water at 1 foot
				Very soft, black SANDY LOAM; very moist to wet; A-2-4 (0)
	1			
	1		33.0	
-5	1			
	4			
	9		24.7	
733.10	11			
				Medium dense to dense brown SAND; traces of gravel; saturated; A-1-a(0)
	6			
	8		9.9	
-10	13			
	9			
	14		7.9	
	16			
	7			
	9		10.3	
-15	15			
	9			
	11		10.2	
	14			
	10			
	11		25.8	
-20	16			
				Medium dense to dense brown SAND; traces of gravel; saturated; A-1-a(0) *(continued)*
	7			
	12		16.5	
	12			
	5			
	7		18.9	
-25	10			
	6			
	9		16.2	
	11			
-30				
	5			
	11		8.6	
	13			
-35				
	8			
	10		17.5	
	13			
700.60 -40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

380
Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/26/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On West Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION On West bank of Fox River

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. _____
Station _____

BORING NO. S-2
Station 595+70
Offset 10.00ft Right (S)
Ground Surface Elev. 740.60 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 739.6 ft ▼
Upon Completion 738.6 ft ▽
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	8			Dense to medium dense brown Gravelly SAND with stones; wet ; A-1-a(0)
	9 12		6.8	
-45	4			
	5 6		19.5	
690.60 -50				
	14			Dense to medium densee gray SAND with gravel; saturated; A-1-b(0)
	16 21		16.6	
-55				
	4			
	5 6		19.1	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	6			Dense to medium densee gray SAND with gravel; saturated; A-1-b(0) *(continued)*
	9 12			
-65				
	4			
	5 6		13.7	
670.60 -70				
-75				
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 10/13/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION From barge in Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION In River channel - near 2nd Pier from the west Pier #2

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-3
Station 597+15
Offset 35.00ft Left (N)
Ground Surface Elev. 735.50 ft

Surface Water Elev. 735.50 ft
Stream Bed Elev. 729.00 ft

Groundwater Elev.:
First Encounter 735.5 ft ▼
Upon Completion 735.5 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				WATER - Fox River Flow
	5			
-5	5		25.0	
	6			
729.00				
				Loose to medium dense gray SAND; very moist; -A-2-4
726.50				
				Medium dense to dense SAND & Gravel; saturated ; A-1-a)
-10	5			
	5		4.2	
	8			
	10			
	20		6.0	
	7			
-15	7			
	7		16.5	
719.00	9			
				Medium dense brown SAND; saturated; - A-1-a(0)
	10			
	10		6.5	
	11			
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	8			Medium dense brown SAND; saturated; - A-1-a(0) *(continued)*
	9		17.3	
	8			
714.00				
				Medium dense to dense gray brown SAND & GRAVEL; saturated; - A-2-4(0)
	7			
	10		15.4	
	15			
-25				
	12			
	10		20.8	
	13			
	18			
	16		28.3	
	15			
-30				
	18			
	18		18.1	
704.00	20			
				Dense to very dense brown SAND with GRAVEL; staurated; A-1-a(0)
	19			
	22		5.2	
	49			
-35				
	21			
	26		4.5	
	29			
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

Added 382 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 10/13/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION From barge in Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION In River channel - near 2nd Pier from the west Pier #2

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-3
Station 597+15
Offset 35.00ft Left (N)
Ground Surface Elev. 735.50 ft

Surface Water Elev. 735.50 ft
Stream Bed Elev. 729.00 ft

Groundwater Elev.:
First Encounter 735.5 ft ▼
Upon Completion 735.5 ft ▽
After ____ Hrs. ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Dense to very dense brown SAND with GRAVEL: staurated; A-1-a(0) *(continued)*
	18			
	24		17.6	
	31			
45				
	40			
	32		3.3	
	24			
50				
	28			
	35		14.0	
	50			
55				
	31			
	42		6.4	
	56			
60				
				Dense to very dense brown SAND with GRAVEL: staurated; A-1-a(0) *(continued)*
				674.00
65				
70				
75				
80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

383
Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 10/9/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION From Barge in Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION In River Channel - near 3rd Pier from the west

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-4
Station 598+58
Offset 25.00ft Left (N)
Ground Surface Elev. 736.00 ft

Surface Water Elev. 736.00 ft
Stream Bed Elev. 728.50 ft

Groundwater Elev.:
First Encounter 736.0 ft ▼
Upon Completion 736.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				WATER - Fox River Flow
728.50				
	5			Loose to medium dense black SAND; very moist; -A-2-4
	7		7.7	
726.00 -10	8			
	3			Medium dense to loose SAND & Gravel; saturated ; A-1-a(0)
	4		15.3	
723.50	7			
	7			Medium dense blackSAND; saturated; - A-1-b(0)
	9		16.8	
721.00 -15	9			
	9			Medium dense to dense gray brown SAND & GRAVEL; saturated; - A-1-b(0)
	14		12.4	
	15			
	11			
	16		9.3	
-20	20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
	8			Medium dense to dense gray brown SAND & GRAVEL; saturated; - A-1-b(0) *(continued)*
	13		3.7	
	15			
	7			
	13		2.0	
-25	16			
	19			
	24		1.7	
	32			
	16			
	22		5.4	
706.00 -30	22			
	12			Alternating layers of SAND and Gravel; dense to very dense; brown ; staurated; A-1-b(0)
	15		5.6	
	21			
	16			
	20		8.8	
	25			
-35				
	8			
	10		8.8	
-40	12			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

384
Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 10/9/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION From Barge in Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION In River Channel - near 3rd Pier from the west

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-4
Station 598+58
Offset 25.00ft Left (N)
Ground Surface Elev. 736.00 ft

Surface Water Elev. 736.00 ft
Stream Bed Elev. 728.50 ft

Groundwater Elev.:
First Encounter 736.0 ft ▼
Upon Completion 736.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Alternating layers of SAND and Gravel: dense to very dense; brown ; staurated; A-1-b(0) *(continued)*
	37			
	41		16.5	
45	52			
	28			
	37		18.2	
50	43			
	30			
	56		16.6	
55	65			
	28			
	39		18.2	
60	50			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Alternating layers of SAND and Gravel: dense to very dense; brown ; staurated; A-1-b(0) *(continued)*
673.50				
65				
70				
75				
80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

385
Added 9/11/12

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 11/19/08

Bull Valley Road - Miller

ROUTE Road- River Road DESCRIPTION On East Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION On East bank of River

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-5
Station 600+42
Offset 35.00ft Left (N)
Ground Surface Elev. 737.50 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 734.5 ft ▼
Upon Completion 733.5 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Black TOPSOIL 736.90
	5			Loose SAND & Gravel, some organics present; very moist; A-4 (0)
	7		5.6	
	9			735.00
▼				Soft; black SANDY LOAM; very moist to wet; A-2-4 (0)
▽	3			
	3		20.3	
-5	3			732.50
				Medium dense gray SAND with gravel; wet; A-1b
	3			
	5		12.2	
	12			730.00
				Medium dense to dense brown SAND; traces of gravel; saturated; A-1-a(0)
	3			
	5		18.4	
-10	7			
	5			
	5		8.6	
	7			
	9			
	9		16.1	
-15	15			
	5			
	2		18.1	
	3			
	8			
	12		5.7	
-20	14			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Medium dense to dense brown SAND; traces of gravel; saturated; A-1-a(0) *(continued)*
	8			
	15		7.8	
	16			
	16			
	20		4.8	
-25	26			
	6			
	13		16.5	
	16			
-30				
	6			
	9		20.9	
	11			
-35				
	16			
	17		11.4	
	20			
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

386
Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 11/19/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On East Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION On East bank of River

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-5
Station 600+42
Offset 35.00ft Left (N)
Ground Surface Elev. 737.50 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 734.5 ft ▼
Upon Completion 733.5 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	13		
	16		18.3
	19		
-45			
	12		
	17		6.5
	19		
-50			
	13		
	17		20.9
	21		
-55			
	16		
	17		13.2
-60	21		

Medium dense to dense brown SAND, traces of gravel; saturated; A-1-a(0) *(continued)*

692.50

Dense to very dense Gravelly SAND with stones; saturated ; A-2-4-(0)

Dense to very dense Gravelly SAND with stones; saturated ; A-2-4-(0) *(continued)*

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	29		
	30		
	42		
-65			
	24		
	31		9.3
-70	28		
666.00	50/5"		
-75			
-80			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

387
Added 9/11/12

Illinois Department of Transportation

Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/20/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On East Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION Between East abutment and Easr bank of river

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-6
Station 601+20
Offset 20.00ft Left (N)
Ground Surface Elev. 740.00 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 734.5 ft ▼
Upon Completion 734.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Black TOPSOIL
738.90				
	4			Loose SAND & Gravel; very moist; A-4 (0)
	5		7.9	
737.50	6			
				Loose gray SAND with Gravel; very moist to wet; A-1-a (0)
	2			
	3		11.6	
-5	4			
▼				
▽	11			
	15		15.8	
	15			
	9			
	15		9.0	
730.00 -10	20			
				Medium dense yellow SAND; wet; A-1-b(0)
	9			
	15		16.4	
	16			
	6			
	6		21.7	
-15	8			
	11			
	15		12.5	
	16			
	6			
	6		15.9	
720.00 -20	7			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				Medium dense to dense brown SAND; traces of Loam; saturated; A-1-a(0)
	5			
	7		18.9	
	10			
	11			
	12		13.5	
-25	15			
	17			
	31		13.9	
	35			
-30				
	10			
	13		5.9	
	21			
-35				
	11			
	15		14.7	
	22			
700.00 -40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Added 388 9/11/12

Illinois Department of Transportation
Division of Highways
S.A.M. Consultants, Inc.

SOIL BORING LOG

Date 9/20/08

ROUTE Bull Valley Road - Miller Road- River Road DESCRIPTION On East Bank of Fox River LOGGED BY DM

SECTION 06-00068-00-PV LOCATION Between East abutment and Easr bank of river

COUNTY McHenry County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.
Station

BORING NO. S-6
Station 601+20
Offset 20.00ft Left (N)
Ground Surface Elev. 740.00 ft

Surface Water Elev. ft
Stream Bed Elev. ft

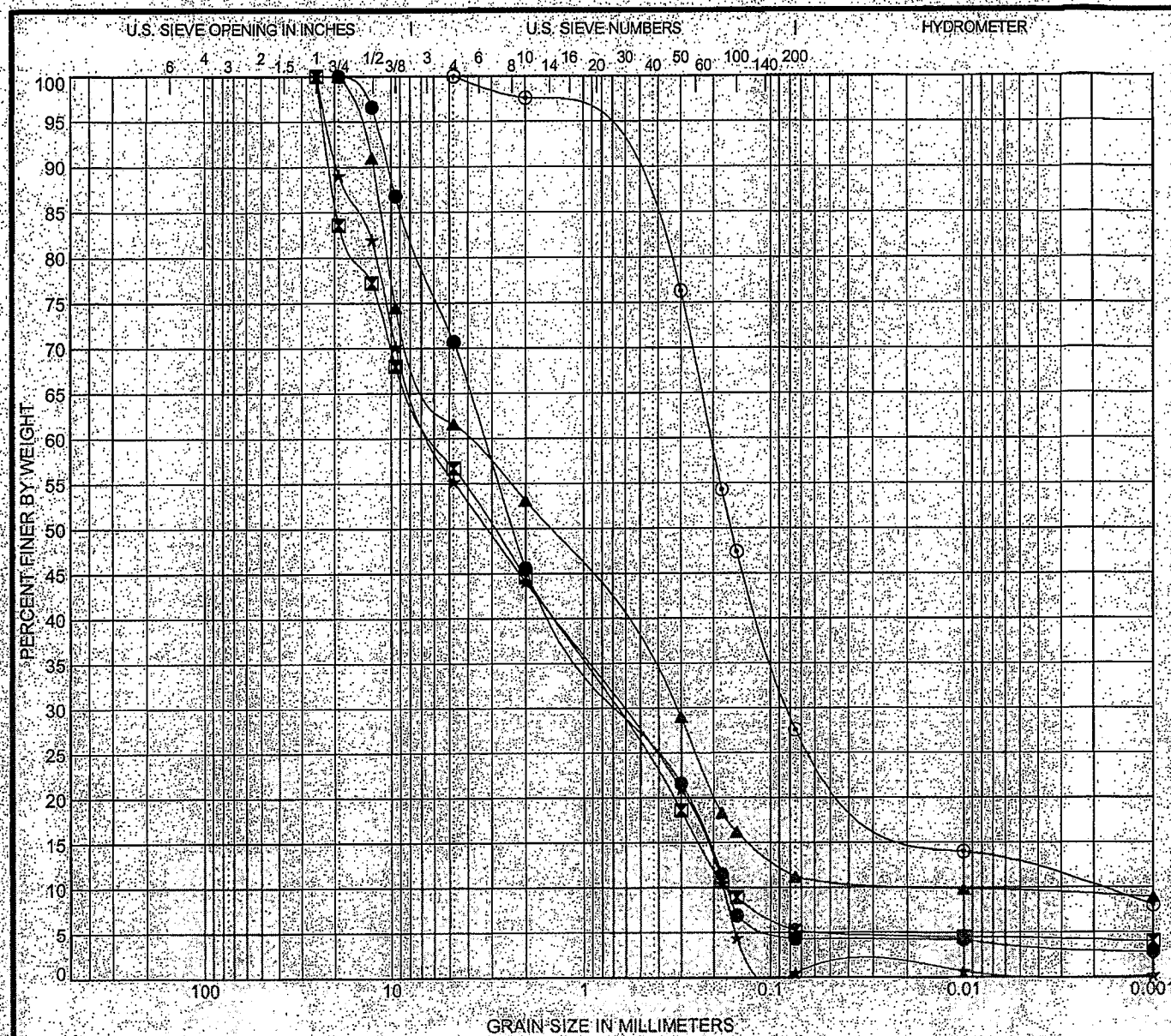
Groundwater Elev.:
First Encounter 734.5 ft ▼
Upon Completion 734.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
	20			Dense to very dense Gravelly SAND with pockets of Loam, saturated ; A-1-b(0)
	33		10.6	
	45			
45				
	23			
	34		11.4	
	46			
50				
	14			
	16		9.7	
	21			
	33			
685.00 55	50/4"			
60				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Added 9/11/12

BBS, from 137 (Rev. 8-99)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	S-1	6.00	A-1-a (0) SAND	NP	NP	NP	0.61	19.37
⊠	S-1	13.50	A-1-a (0) SAND	NP	NP	NP	0.48	34.46
▲	S-1	21.00	A-1-b (0) SAND	NP	NP	NP	1.96	302.67
★	S-1	41.00	A-1-a (0) SAND	NP	NP	NP	0.38	33.44
⊙	S-2	3.50	A-2-4 (0) SANDY LOAM	26.0	16.0	10.0	15.03	95.37

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	S-1	6.00	19	3.285	0.583	0.17	29.3	66.4	1.1	3.2
⊠	S-1	13.50	25	5.816	0.689	0.169	43.3	51.5	1.0	4.2
▲	S-1	21.00	19	4.036	0.325	0.013	38.4	50.4	2.0	9.2
★	S-1	41.00	25	5.93	0.628	0.177	44.8	54.7	0.1	0.4
⊙	S-2	3.50	4.75	0.205	0.082	0.002	0.0	72.4	17.8	9.8

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Division of Highways
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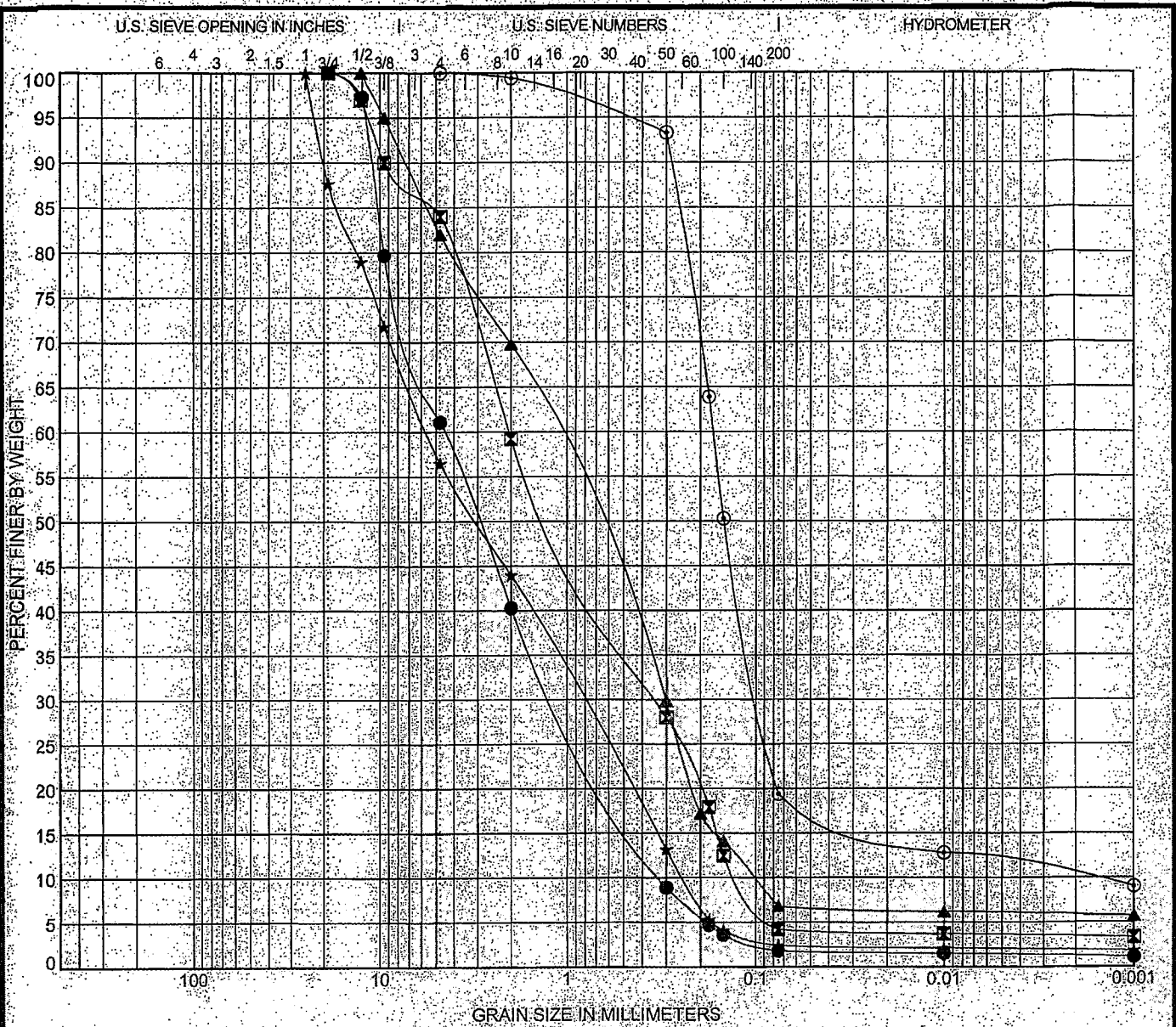
GRAIN SIZE DISTRIBUTION

Route: Bull Valley Road - Miller Road- River Road
Section: 06-00068-00-PV
County: McHenry County

Added 9/11/12
390

GRAIN_SIZE 8051GT-MILLER ROAD - FOX RIVER.GPJ IL_DOT.GDT 02/07/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	S-2	16.00	A-1-a (0) SAND	NP	NP	NP	0.79	14.15
⊠	S-2	26.00	A-1-b (0) SAND	NP	NP	NP	0.46	16.89
▲	S-2	51.00	A-1-b (0) SAND	NP	NP	NP	0.72	12.36
★	S-3	20.00	A-1-a (0) SAND	NP	NP	NP	0.53	22.82
⊙	S-3	27.50	A-2-4 (0) SAND	NP	NP	NP	28.90	93.20

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	S-2	16.00	19	4.538	1.073	0.321	38.9	59.3	0.6	1.2
⊠	S-2	26.00	19	2.057	0.339	0.122	16.0	79.8	0.8	3.4
▲	S-2	51.00	12.7	1.257	0.303	0.102	18.0	75.2	0.9	5.9
★	S-3	20.00	25	5.566	0.844	0.244	43.5	54.1	0.5	1.9
⊙	S-3	27.50	4.75	0.171	0.095	0.002	0.0	80.6	9.3	10.1

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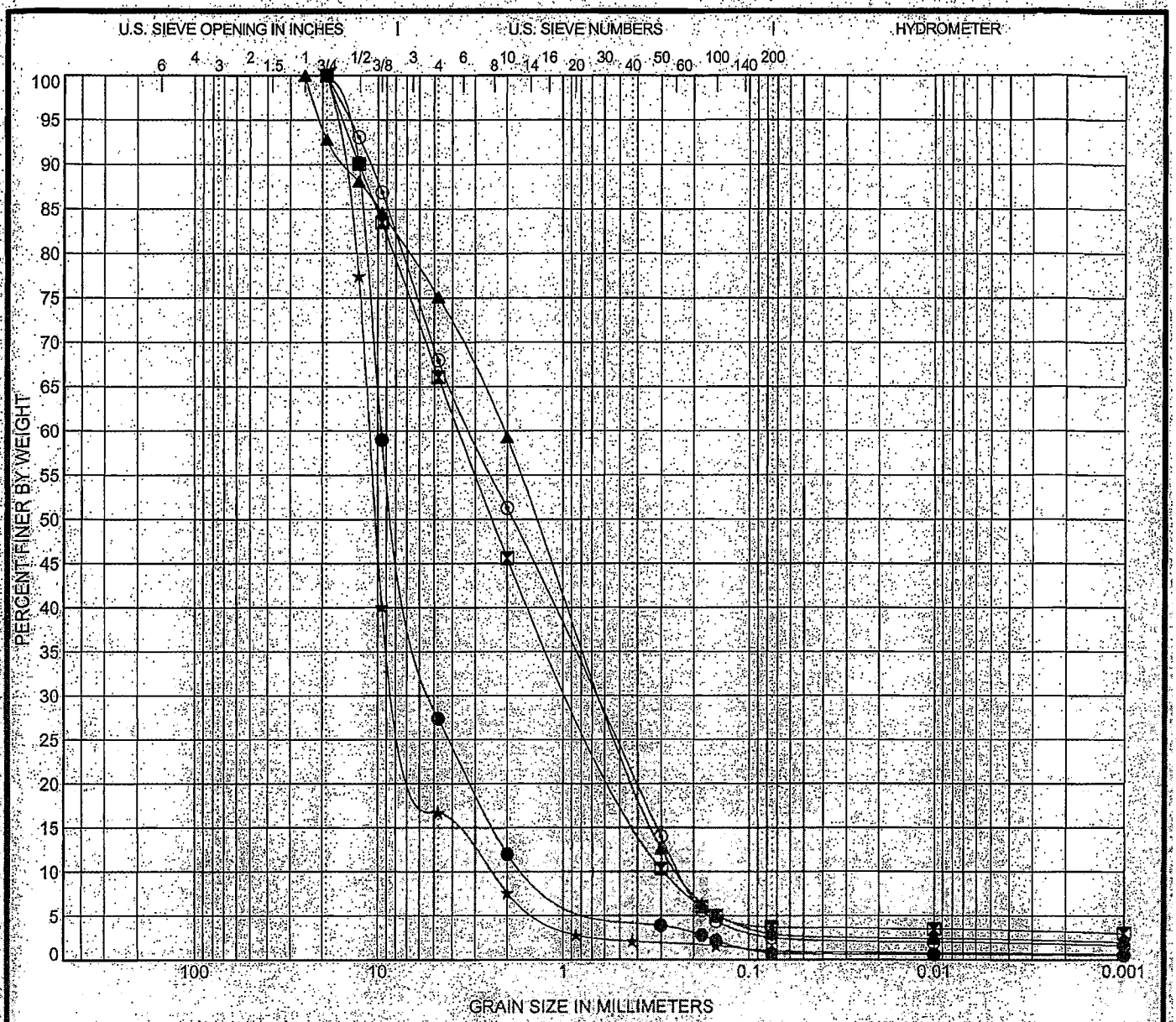
GRAIN SIZE DISTRIBUTION

Route: Bull Valley Road - Miller Road- River Road
Section: 06-00068-00-PV
County: McHenry County

Added 9/11/12
391

GRAIN_SIZE 8051GT_MILLER ROAD - FOX RIVER.GPJ IL DOTGDT 02/07/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	S-3	42.50	A-1-a (0) SAND	NP	NP	NP	2.11	7.66
⊠	S-4	11.00	A-1-a (0) SAND	NP	NP	NP	0.70	12.68
▲	S-4	18.50	A-1-b (0) SAND	NP	NP	NP	0.74	8.58
★	S-4	23.50	A-1-a (0) SAND	NP	NP	NP	1.78	4.41
⊙	S-4	32.50	A-1-b (0) SAND	NP	NP	NP	0.62	13.34

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	S-3	42.50	19	9.589	5.029	1.252	72.6	26.7	0.2	0.5
⊠	S-4	11.00	19	3.672	0.865	0.289	33.9	62.4	0.5	3.2
▲	S-4	18.50	25	2.078	0.608	0.242	24.9	72.2	0.8	2.1
★	S-4	23.50	19	11.087	7.044	2.513	83.3	15.7	0.3	0.7
⊙	S-4	32.50	19	3.139	0.677	0.235	32.0	65.5	0.8	1.7

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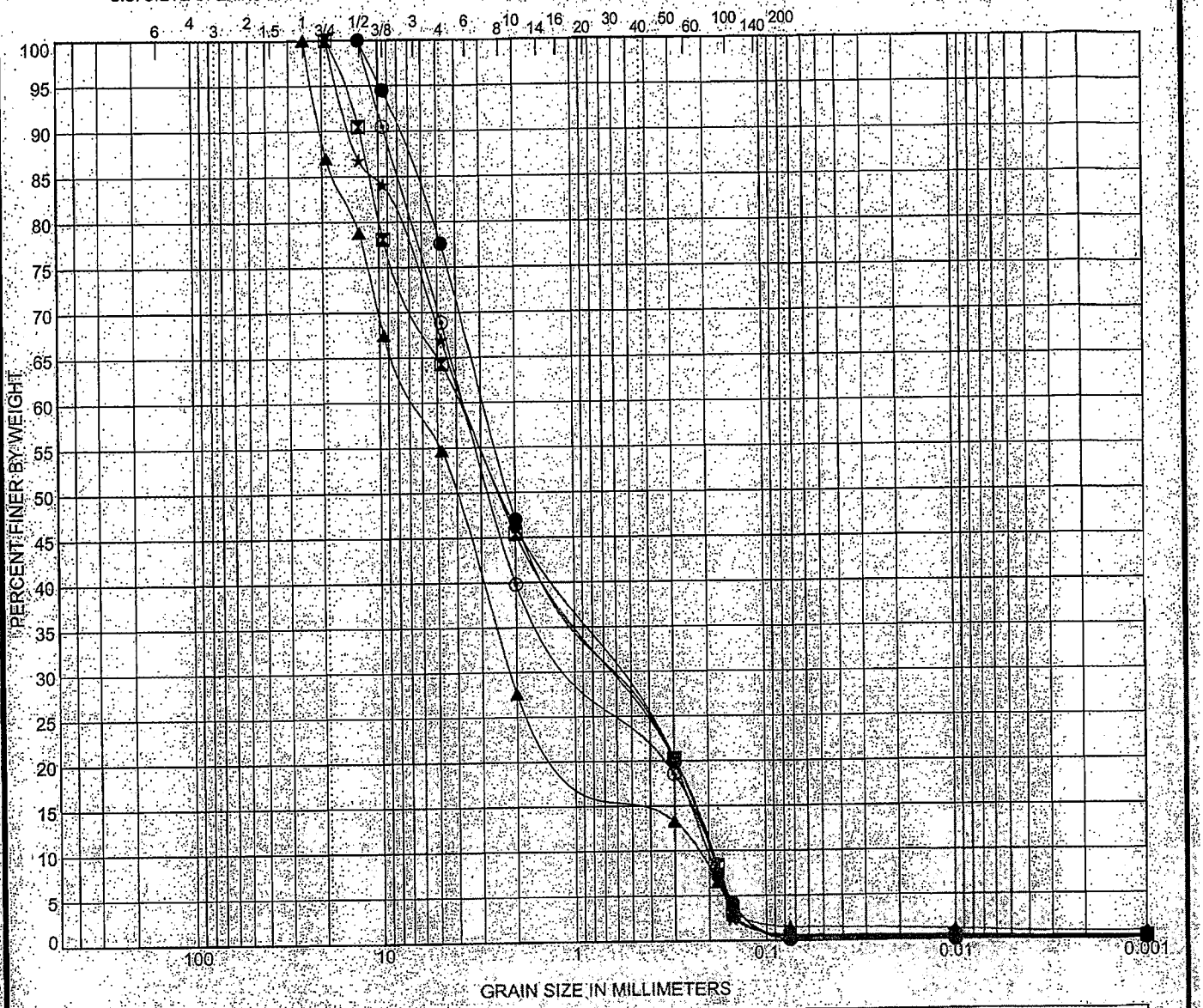
GRAIN SIZE DISTRIBUTION

Route: Bull Valley Road - Miller Road- River Road
Section: 06-00068-00-PV
County: McHenry County

Added 9/11/12
392

GRAIN_SIZE_8051GT_MILLER ROAD_FOX RIVER.GPJ IL_DOT.GDT 02/07/08



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	S-5	13.50	A-1-a (0) SAND	NP	NP	NP	0.64	14.38
⊠	S-5	21.00	A-1-a (0) SAND	NP	NP	NP	0.52	20.24
▲	S-5	23.50	A-1-a (0) SAND	NP	NP	NP	3.15	27.03
★	S-5	41.00	A-1-a (0) SAND	NP	NP	NP	0.52	17.99
⊙	S-6	6.00	A-1-a (0) SAND	NP	NP	NP	0.98	18.77

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	S-5	13.50	12.7	2.888	0.608	0.201	22.4	77.5	0.1	0.0
⊠	S-5	21.00	19	3.901	0.624	0.193	35.7	63.8	0.3	0.2
▲	S-5	23.50	25	6.329	2.159	0.234	45.3	53.2	0.6	0.9
★	S-5	41.00	19	3.55	0.605	0.197	33.0	66.4	0.2	0.4
⊙	S-6	6.00	12.7	3.646	0.832	0.194	31.1	68.6	0.2	0.1

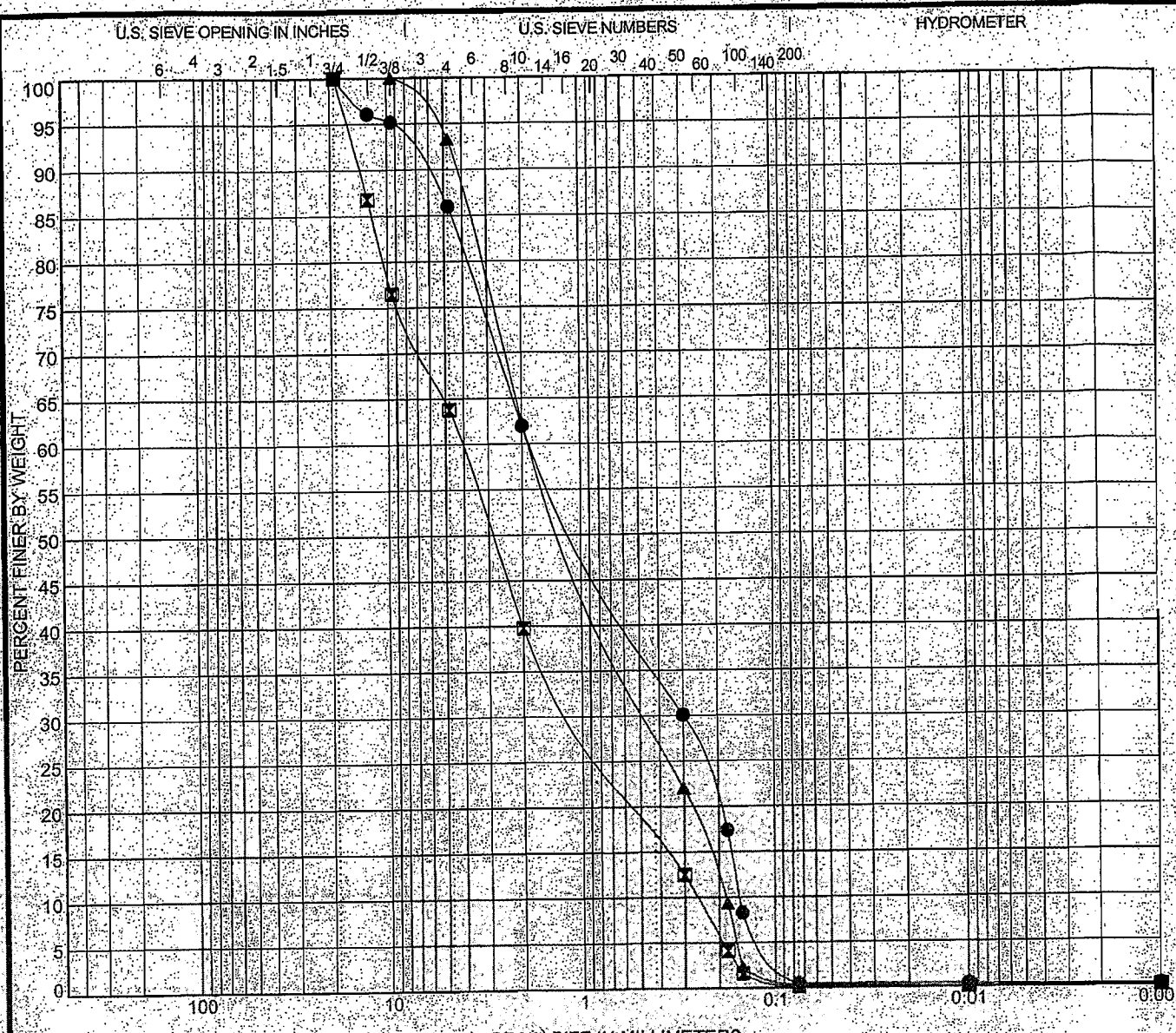
Illinois Department of Transportation
Division of Highways
S.A.M. Consultants, Inc.

GRAIN SIZE DISTRIBUTION

Route: Bull Valley Road - Miller Road- River Road
Section: 06-00068-00-PV
County: McHenry County

Added 9/11/12
393

GRAIN SIZE 8051GT- MILLER ROAD - FOX RIVER.GPJ - IL DOT.GDT - 02/07/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	S-6	13.50	A-1-b (0) SAND	NP	NP	NP	0.32	11.44
⊠	S-6	36.00	A-1-a (0) SAND	NP	NP	NP	0.96	16.07
▲	S-6	51.00	A-1-b (0) SAND	NP	NP	NP	0.58	9.65

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	S-6	13.50	19	1.776	0.299	0.155	14.0	85.5	0.2	0.3
⊠	S-6	36.00	19	4.142	1.012	0.258	36.2	63.7	0.1	0.0
▲	S-6	51.00	9.5	1.787	0.437	0.185	6.7	93.0	0.2	0.1

GRAIN SIZE - 8051.GT - MILLER ROAD - FOX RIVER.GPJ IL DOT.GDT 02/07/09

Illinois Department of Transportation
Division of Highways
S.A.M. Consultants, Inc.

GRAIN SIZE DISTRIBUTION

Route: Bull Valley Road - Miller Road - River Road
Section: 06-00068-00-PV
County: McHenry County

Added 9/11/12
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MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:12,700 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: McHenry County, Illinois
Survey Area Data: Version 6, Dec 29, 2006

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

395

Added 9/11/12

Added 9/11/12

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Soil Map—McHenry County, Illinois

Map Scale: 1:3,660 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1,200