RCB CULVERT REPLACEMENT – PIPE CULVERT/DROP INLET/FLUME

LHC40–18N

CRAWFORD COUNTY

LETTING DATE

B90-18N

TRAFFIC CONTROL PLAN

THIS ROAD WILL BE CLOSED TO THROUGH TRAFFIC DURING CONSTRUCTION. LOCAL TRAFFIC TO ADJACENT PROPERTIES WILL BE MAINTAINED AS PROVIDED FOR IN ARTICLE 1107.08 OF THE CURRENT STANDARD SPECIFICATIONS. TRAFFIC CONTROL DEVICES, PROCEDURES AND LAYOUTS SHALL BE AS PER PART 6 OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) 2000 MILLENNIUM EDITION, DECEMBER 2000, INCLUDING ERRATA NO. 1 DATED JUNE 14, 2001.

PERMITS

THIS PROJECT IS COVERED BY THE FOLLOWING CORPS OF ENGINEERS (COE) AND IOWA DEPARTMENT OF NATURAL RESOURCES (IDNR) FLOOD PLAIN DEVELOPMENT PERMITS.
COE PERMIT:
IDNR PERMIT: N/A

DRAWING APPROVAL

ALL SHOP DRAWINGS THAT REQUIRE APPROVAL SHALL BE APPROVED BY
SUNDQUIST ENGINEERING, P.C.

ADDRESS: 120 SOUTH MAIN, P.O. BOX 220
DENISON, IOWA 51442-0220
TELEPHONE: (712)263-8118

THESE SHOP DRAWINGS SHALL NOT BE SENT TO IOWA D.O.T. OFFICE OF BRIDGE DESIGN.

Iowa Department of Transportation
Highway Division

PLANS OF PROPOSED IMPROVEMENTS ON THE

FARM TO MARKET ROAD SYSTEM
CRAWFORD COUNTY

PROJECT NO. LHC40–18N

RCB CULVERT REPLACEMENT – PIPE CULVERT/DROP INLET/FLUME OUTLET
ON I AVENUE OVER
TRIBUTARY TO SOLDIER RIVER

IN COOPERATION WITH LOESS HILLS DEVELOPMENT AND CONSERVATION AUTHORITY – HUNGRY CANYONS ALLIANCE
SITE HC69–6114–01–14

SCALES: As Noted

	TOTAL SHEETS
	14
PROJECT NUMBER	
LHC40–18N	
R.O.W. PROJECT NUMBER	
PROJECT IDENTIFICATION NUMBER	

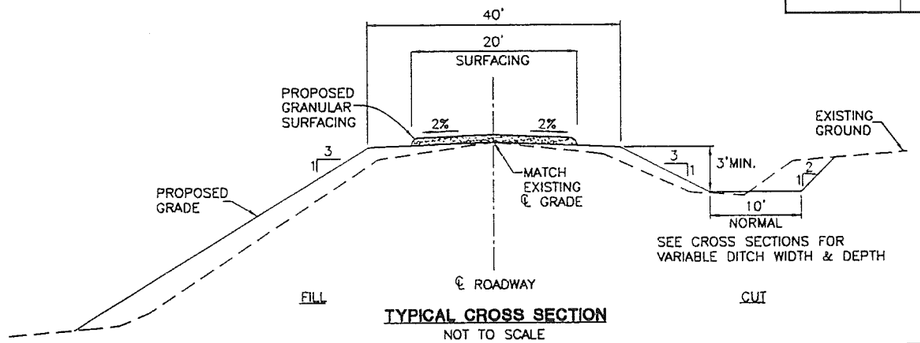
INDEX OF SHEETS

The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, series of 2001, plus current Supplemental Specifications and Special Provisions shall apply to construction work on this project.

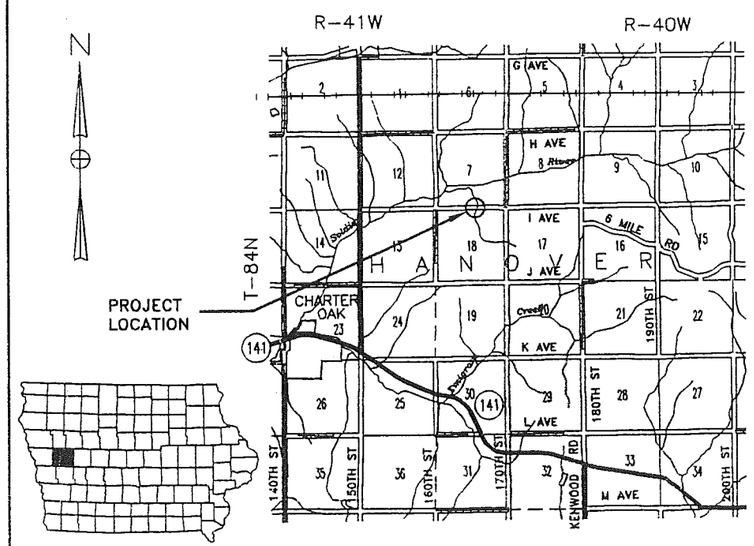
ROAD STANDARD PLANS

The following Standard Plans shall be considered applicable to construction work on this project.

IDENTIFICATION	DATE	IDENTIFICATION	DATE	IDENTIFICATION	DATE
RF–30A	03–28–95	RS–26A	10–28–97		
RF–30B	01–12–99				
RF–32	03–28–95				



TYPICAL CROSS SECTION
NOT TO SCALE



LOCATION MAP SCALE
0 1 2 3
SCALE IN MILES

DESIGN DATA RURAL		
1996 AADT	90	V.P.D.
2020 AADT	–	V.P.D.
201X DHV	X	V.P.H.
TRUCKS	X	%
ESALs per day	X	
DESIGN SPEED	40	M.P.H.

Approved

BOARD OF SUPERVISORS

Approved

Crawford County Engineer — Date 12/24/01

LICENSED PROFESSIONAL ENGINEER — TROY J. GROTH 14450 — IOWA

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

TROY J. GROTH, P.E. #14450 — DATE 12/11/01

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2001.

PAGES OR SHEETS COVERED BY THIS SEAL:
ALL SHEETS

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442-0220
PHONE: (712)263-8118 FAX: (712)263-2181

DESIGN TEAM: TJG/SAS/TKK	ENGLISH	SE PROJECT NO. : 02601	DATE: 12/01	CRAWFORD COUNTY	PROJECT NUMBER LHC40–18N	SHEET NUMBER A1

ESTIMATE REFERENCE INFORMATION

DATA LISTED BELOW IS FOR INFORMATIONAL PURPOSES ONLY AND SHALL NOT CONSTITUTE A BASIS FOR ANY EXTRA WORK ORDERS.

2. SPECIAL BACKFILL
SPECIAL BACKFILL MATERIAL SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL MEET THE REQUIREMENTS OF I.D.O.T. STANDARD SPECIFICATION 4132.02 CRUSHED STONE OR CRUSHED CONCRETE SPECIAL BACKFILL. REMOVAL OF UNSUITABLE OR UNSTABLE SOIL AND PLACEMENT OF SPECIAL BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH I.D.O.T. STANDARD SPECIFICATION 2402.04. NO ADJUSTMENT IN UNIT PRICE WILL BE ALLOWED FOR DEVIATION BETWEEN PLAN QUANTITY AND ACTUAL QUANTITY PLACED.

THE CRUSHED ROCK MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS OF NOT MORE THAN EIGHT (8) INCHES IN THICKNESS.

3. EXCAVATION, CLASS 10, ROADWAY & BORROW
INCLUDES 438 C.Y. CUT, 3427 C.Y. FILL + 35%, 2989 C.Y. BORROW. SUITABLE MATERIAL FROM CHANNEL EXCAVATION AND CLASS 20 EXCAVATION MAY BE USED FOR EMBANKMENT MATERIAL AS DIRECTED BY THE ENGINEER. ADDITIONAL NECESSARY BORROW SHALL BE PROVIDED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE CONTRACTOR SELECTED BORROW SITE AND MATERIAL SHALL BE APPROVED BY THE ENGINEER. OVERHAUL IS INCIDENTAL TO THE PRICE BID FOR THIS ITEM.

THE HAUL ROUTE DESIGNATION SHALL BE IN ACCORDANCE WITH SECTION 1105.13 OF THE SPECIFICATIONS EXCEPT THE CONTRACTOR SHALL SUBMIT THE HAUL ROAD REQUEST TO THE ENGINEER. CONTRACTOR SHALL BE RESPONSIBLE FOR INVESTIGATING WHICH POTENTIAL COUNTY HAUL ROADS ARE EMBARGOED AND WHEN THE EMBARGO IS IN EFFECT.

THE CONTRACTOR WILL BE REQUIRED TO OBTAIN ARCHAEOLOGICAL CLEARANCE FOR BORROW UPON WHICH NO PREVIOUS BORROW OPERATIONS HAVE OCCURRED. THE CONTRACTOR SHALL PROVIDE PROOF OF CLEARANCE TO THE ENGINEER PRIOR TO COMMENCING ANY BORROW OPERATIONS.

THE CONTRACTOR WILL NOT BE REQUIRED TO OBTAIN ARCHAEOLOGICAL CLEARANCE IF BORROW MATERIALS ARE OBTAINED FROM A SITE CURRENTLY IN OPERATION OR PREVIOUSLY USED FOR SUCH PURPOSES.

FILL MATERIALS SHALL CONTAIN NO SOD, BRUSH, ROOTS OR OTHER PERISHABLE MATERIALS. FILL SHALL NOT BE PLACED UPON A FROZEN SURFACE, NOR SHALL SNOW, ICE OR FROZEN MATERIAL BE INCORPORATED IN THE FILL.

FILL PLACEMENT SHALL TAKE PLACE ON NEAR HORIZONTAL SURFACES. THE EXISTING SURFACES SHALL BE BENCHED PRIOR TO PLACEMENT OF FILL UPON THEM. NEAR VERTICAL BENCHES AT 3 TO 5 FEET IN HEIGHT SHALL BE REQUIRED IN ORDER TO EFFECT A GOOD BOND BETWEEN THE FILL AND THE EXISTING SURFACES. NO SEPARATE PAYMENT WILL BE MADE FOR BENCHING OF THE EXISTING SURFACES. SUCH BENCHING SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.

TYPE A COMPACTION SHALL BE REQUIRED AND SHALL BE IN ACCORDANCE WITH SECTION 2107 OF THE REFERENCE SPECIFICATIONS.

FILL ADJACENT TO STRUCTURES SHALL BE COMPACTED TO A DENSITY EQUIVALENT TO THAT OF THE SURROUNDING FILL BY MEANS OF HAND TAMPING OR MANUALLY DIRECTED POWER TAMPERS OR PLATE VIBRATORS. UNLESS OTHERWISE SPECIFIED, HEAVY EQUIPMENT INCLUDING BACKHOE MOUNTED POWERTAMPERS, OR VIBRATING COMPACTORS AND MANUALLY DIRECTED VIBRATING ROLLERS, SHALL NOT BE OPERATED WITHIN 2 FEET OF ANY STRUCTURE. TOWED OR SELF-PROPELLED VIBRATING ROLLERS SHALL NOT BE OPERATED WITHIN 5 FEET OF ANY STRUCTURE. COMPACTION BY MEANS OF DROP WEIGHTS OPERATING FROM A CRANE OR HOIST WILL NOT BE PERMITTED.

THE PASSAGE OF HEAVY EQUIPMENT WILL NOT BE ALLOWED OVER ANY TYPE OF CONDUIT UNTIL THE BACKFILL HAS BEEN PLACED ABOVE THE TOP SURFACE OF THE STRUCTURE TO A HEIGHT EQUAL TO ONE-HALF THE CLEAR SPAN WIDTH OF THE STRUCTURE OR PIPE OR 2 FEET, WHICHEVER IS GREATER.

HAND COMPACTED FILL, INCLUDING FILL COMPACTED BY MANUALLY DIRECTED POWER TAMPERS, SHALL BE PLACED IN LAYERS NOT MORE THAN 4 INCHES THICK BEFORE COMPACTION.

SHAPING OF CHANNEL AS SHOWN ON SHEET VI SHALL BE INCIDENTAL TO THIS ITEM. PAYMENT SHALL BE BASED ON PLAN QUANTITY.

4. COMPACTING BACKFILL ADJACENT TO BRIDGES, CULVERTS OR STRUCTURES
ITEM INCLUDES COMPACTION OF BACKFILL ADJACENT TO FLUME TO THE FULL HEIGHT OF THE CHUTE AND BASIN WALLS.

5. GRANULAR SURFACING ON ROAD, CLASS C GRAVEL
MATERIAL SHALL MEET THE REQUIREMENTS OF CLASS C GRAVEL IN ACCORDANCE WITH ARTICLE 4120, GRADATION NO. 10 AND SHALL INCLUDE THE COST OF SPREADING GRANULAR SURFACING ON ROADWAY SURFACE. RATE OF APPLICATION SHALL BE 1650 TONS PER MILE.

ESTIMATED PROJECT QUANTITIES

100-1A
07-15-97

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2101-0850002	CLEARING AND GRUBBING	UNIT	242.3	
2	2102-0425070	SPECIAL BACKFILL	TON	192	
3	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	CY	3427	
4	2107-0425020	COMPACTING BACKFILL ADJACENT TO BRIDGES, CULVERTS OR STRUCTURES	CY	40.5	
5	2312-8260201	GRANULAR SURFACING ON ROAD, CLASS C GRAVEL	TON	22	
6	2401-6745650	REMOVAL OF EXISTING STRUCTURES	LS	1	
7	2402-2720100	EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERT	CY	1374	
8	2403-0100000	STRUCTURAL CONCRETE (MISCELLANEOUS)	CY	29.08	
9	2404-7775000	REINFORCING STEEL	LB	3173.27	
10	2417-1060078	CULVERT, CORRUGATED METAL ROADWAY PIPE, 78 IN. DIA.	LF	104	
11	2501-5775000	PILES, STEEL SHEET	SF	150	
12	2503-4388014	INTAKE, SPECIAL, AS PER PLAN, 96 IN. DIA. CMP	EACH	1	
13	2507-3250005	ENGINEERING FABRIC	SY	186	
14	2507-6800060	REVETMENT, CLASS E, RIPRAP	TON	177	
15	2518-6910000	SAFETY CLOSURE	EACH	4	
16	2528-8445110	TRAFFIC CONTROL	LS	1	
17	2533-4980005	MOBILIZATION	LS	1	
18	2599-9999010	REMOVAL OF WATER	LS	1	
19	2601-2634100	MULCHING	ACRE	0.6	
20	2601-2636043	SEEDING AND FERTILIZING (RURAL)	ACRE	0.6	

6. REMOVAL OF EXISTING STRUCTURES
INCLUDES REMOVAL AND DISPOSAL OF EXISTING 7' X 7.5' X 57' RCB CULVERT AT STA. 15+75.

8. STRUCTURAL CONCRETE (MISCELLANEOUS)
MINIMUM 28 DAY COMPRESSIVE STRENGTH SHALL BE 4000 PSI. TO BE CLASS C STRUCTURAL CONCRETE. QUANTITY INCLUDES ALL CONCRETE NECESSARY TO CONSTRUCT HEADWALL AND FLUME AT STA. 15+81. COARSE AGGREGATE SHALL BE CLASS 2 DURABILITY. REFER TO TABULATION ON SHEET U3 FOR CONCRETE PLACEMENT QUANTITIES. CERTIFIED PLANT INSPECTION IS REQUIRED AND CONSIDERED INCIDENTAL TO STRUCTURAL CONCRETE ITEM.

9. REINFORCING STEEL
QUANTITY INCLUDES ALL REINFORCING STEEL NECESSARY TO CONSTRUCT HEADWALL AND FLUME AT STA. 15+81. REFER TO TABULATION ON SHEET U3 FOR STEEL PLACEMENT QUANTITIES.

PRICE BID PER POUND SHALL INCLUDE COST OF FURNISHING AND INSTALLING HOOK BOLTS IN HEADWALL.

10. CULVERT, CORRUGATED METAL ROADWAY PIPE, 78 IN. DIA.
ALL CORRUGATED METAL PIPE ON THIS PROJECT SHALL BE RIVETED PIPE. NO "SPIRAL" PIPE WILL BE ALLOWED. ALL BANDS SHALL BE 24 IN. BANDS.

78 IN. DIA. ROADWAY CULVERT SHALL BE FABRICATED FROM 12 GAGE (0.109) SHEET METAL WITH 3"X1" CORRUGATIONS.

11. PILES, STEEL SHEET
SHALL BE 8 GAGE STEEL SHEETING, MINIMUM SECTION MODULUS 2.6 CU. IN. PER FOOT OF LENGTH. STEEL SHEET PILING TO BE FIELD BURNED OR DRILLED TO ACCOMMODATE 5gb1 BARS IN CURTAIN WALL. THIS WORK TO BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR THIS ITEM.

12. INTAKE, SPECIAL, AS PER PLAN, 96 IN. DIA. CMP
ITEM INCLUDES FURNISHING AND INSTALLING THE VERTICAL INLET AS SHOWN; INCLUDING TEES, CONCRETE BASE WITH REINFORCING STEEL, TRASH RACK, EXCAVATION AND REMOVAL OF EXCESS MATERIAL FROM THE PROJECT. ALL METAL FITTINGS AND HARDWARE SHALL BE GALVANIZED AFTER FABRICATION.

REFER TO SHEETS U4 AND U5 FOR INTAKE AND TRASH RACK DETAILS.

96 IN. DIA. INTAKE SHALL BE RIVETED AND FABRICATED FROM 12 GAGE (0.109) SHEET METAL WITH 3"X1" CORRUGATIONS.

13. ENGINEERING FABRIC
SEE DRAWING SHEET U6 DETAILS OF PLACEMENT OF ENGINEER FABRIC FOR INSTALLATION DETAILS. MATERIAL TO CONFORM TO IOWA DOT MATERIALS IM 496.01 APPENDIX A, EMBANKMENT EROSION CONTROL (SPECIFICATION 4196.01C).

ESTIMATE REFERENCE INFORMATION
CONTINUED ON SHEET B2

GENERAL NOTES

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAKE ALL NECESSARY ARRANGEMENTS WITH ADJACENT PROPERTY OCCUPANTS FOR RESTRAINING LIVESTOCK FROM ENTERING THE RIGHT-OF-WAY.

CONTRACTOR IS TO USE DUE CAUTION IN WORKING OVER AND AROUND ALL TILE LINES. BREAKS IN THE TILE LINE DUE TO THE CONTRACTOR'S CARELESSNESS ARE TO BE REPLACED AT HIS EXPENSE WITHOUT COST TO THE COUNTY. ANY TILE LINES BROKEN OR DISTURBED BY CUT LINES WILL BE REPLACED AS DIRECTED BY THE ENGINEER IN CHARGE OF CONSTRUCTION AND AT THE COUNTY'S EXPENSE.

ALL BORROW AREAS, STOCKPILE AREAS, HAUL ROADS AND AREAS FOR MANEUVERING EQUIPMENT ON THIS PROJECT WILL REQUIRE SUBSOIL TILLAGE TO AN AVERAGE DEPTH OF 18 TO 24 INCHES. SUCH TILLAGE SHALL BE ACCOMPLISHED ON MAXIMUM OF THREE FOOT CENTERS. SUCH AREAS SHALL BE DESIGNATED BY THE COUNTY ENGINEER.

WHERE PUBLIC UTILITY FIXTURES ARE SHOWN AS EXISTING ON THE PLANS OR ENCOUNTERED WITHIN THE CONSTRUCTION AREA, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE OWNERS OF THOSE UTILITIES PRIOR TO THE BEGINNING OF ANY CONSTRUCTION. THE CONTRACTOR SHALL AFFORD ACCESS TO THESE FACILITIES FOR NECESSARY MODIFICATION OF SERVICES. UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORDS, AND THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. IT IS POSSIBLE THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY NOT KNOWN OR SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THEIR EXISTENCE AND EXACT LOCATION AND TO AVOID DAMAGE THERETO. NO CLAIMS FOR ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR ANY INTERFERENCE OR DELAY CAUSED BY SUCH WORK.

CONTRACTOR SHALL NOTIFY ONE-CALL (1-800-292-8989) FOR UTILITY LOCATES PRIOR TO COMMENCING WORK.

THE BACKFILLING AND ASSOCIATED EMBANKMENT CONSTRUCTION SHALL BE COMPLETED WITHIN 14 WORKING DAYS AFTER THE CURING PERIOD HAS EXPIRED FOR CONCRETE DROP INLET BASES, HEADWALLS AND FLUMES.

213-1
IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE WASTE AREAS OR DISPOSAL SITES FOR EXCESS MATERIAL (EXCAVATED MATERIAL OR BROKEN CONCRETE) WHICH IS NOT DESIRABLE TO BE INCORPORATED INTO THE WORK INVOLVED ON THIS PROJECT. THESE AREAS SHALL NOT IMPACT WETLANDS OR "WATERS OF THE U.S." NO PAYMENT FOR OVERHAUL WILL BE ALLOWED FOR MATERIAL HAULED TO THESE SITES. NO MATERIAL SHALL BE PLACED WITHIN THE RIGHT-OF-WAY, UNLESS SPECIFICALLY STATED IN THE PLANS OR APPROVED BY THE ENGINEER.

213-4
THE CONTRACTOR SHALL APPLY NECESSARY MOISTURE TO THE CONSTRUCTION AREA AND HAUL ROADS TO PREVENT THE SPREAD OF DUST. REFER TO ARTICLE 1107.07 OF THE CURRENT STANDARD SPECIFICATIONS FOR ADDITIONAL DETAILS.

251-1
THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN ACCESS TO INDIVIDUAL PROPERTIES DURING CONSTRUCTION.

RELOCATED ACCESS SHALL BE COMPLETED TO INDIVIDUAL PROPERTIES PRIOR TO REMOVAL OF EXISTING ACCESS.

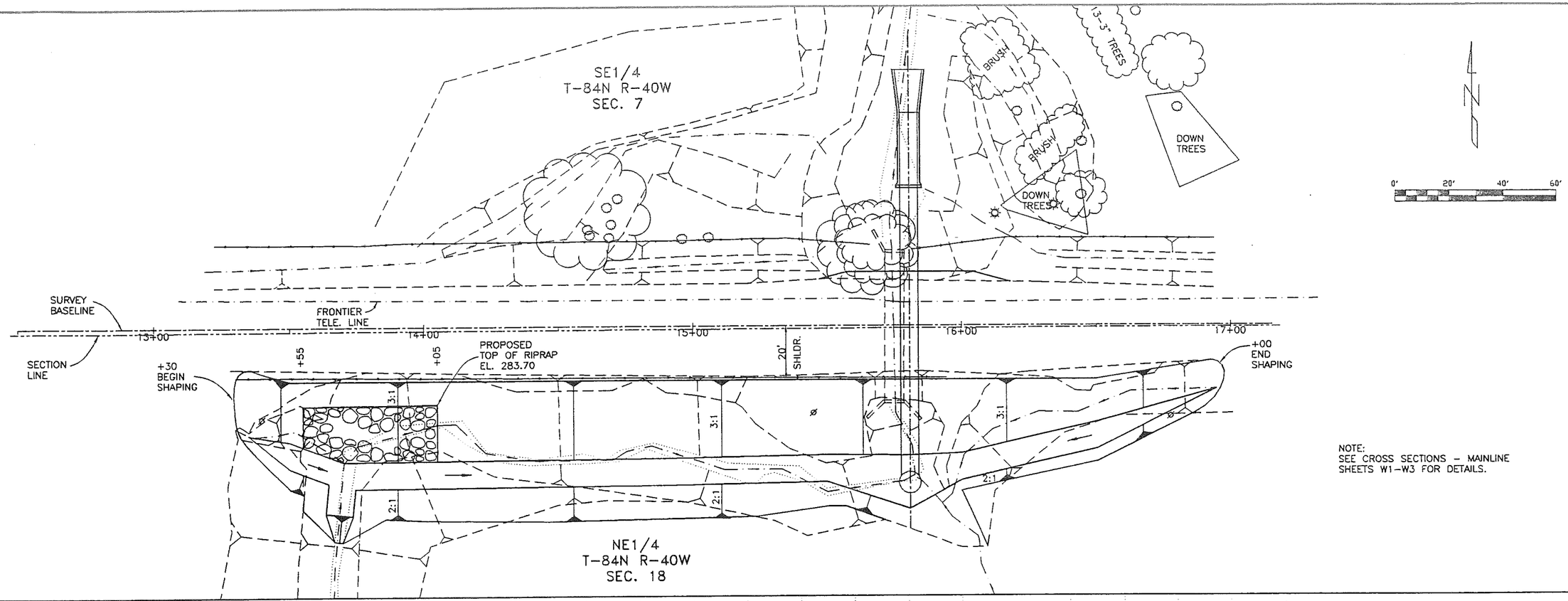
IF THE PERMANENT ACCESS CANNOT BE COMPLETED PRIOR TO REMOVAL OF THE EXISTING ACCESS, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AN ALTERNATE ACCESS. TEMPORARY GRANULAR SURFACING WILL BE PAID FOR AS A CONTRACT ITEM OR BY EXTRA WORK.

ESTIMATE REFERENCE INFORMATION (CONT.)

14. REVETMENT, CLASS E, RIPRAP
THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL OF ALL REMNANTS OF RIPRAP STOCKPILES FROM FARM FIELDS UTILIZED BY CONTRACTOR IN THE PROJECT AREA. THIS WORK WILL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR THIS ITEM.

18. REMOVAL OF WATER
THIS ITEM CONSISTS OF DIVERTING SURFACE WATER AND DEWATERING THE SITE AS NEEDED FOR CONSTRUCTION. POLLUTION CONTROL SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THIS ITEM.

19. MULCHING
20. SEEDING AND FERTILIZING (RURAL)
INCLUDES RESTORING ALL DISTURBED AREAS IN ACCORDANCE WITH SECTION 2601 OF THE REFERENCE SPECIFICATIONS FOR PERMANENT SEEDING OF RURAL AREAS.



REV:

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS

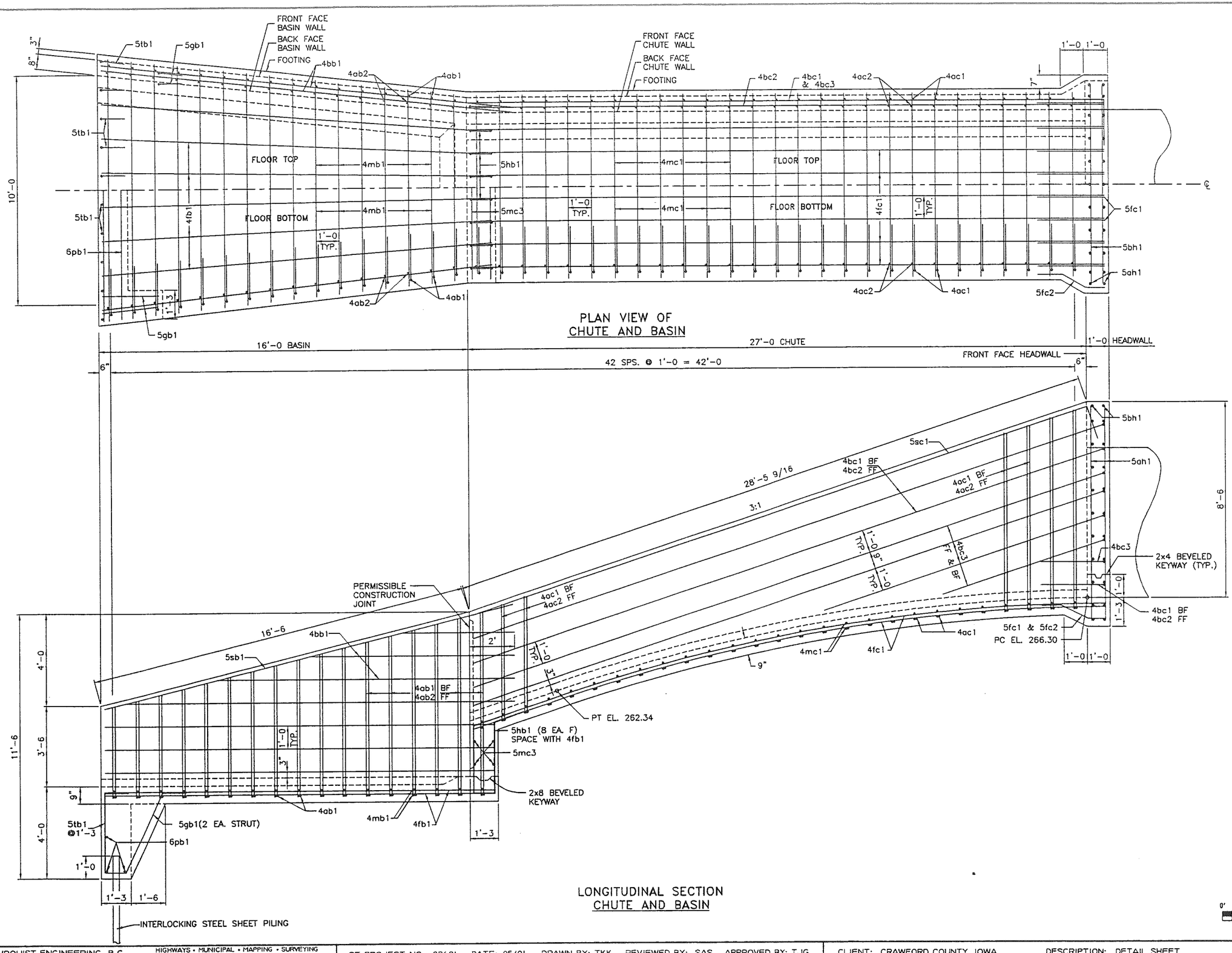
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

SE PROJECT NO.: 02601 DATE: 06/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA

DESCRIPTION: PLAN AND PROFILE - MAINLINE

SHEET D1



REV.:

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120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

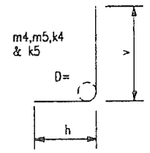
SE PROJECT NO.: 02601 DATE: 05/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: DETAIL SHEET

SHEET UI

BENT BAR DETAIL

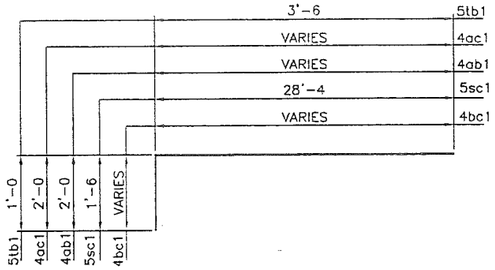
BARS	D
4	3
5	3 3/4
6	4 1/2
7	5 1/4

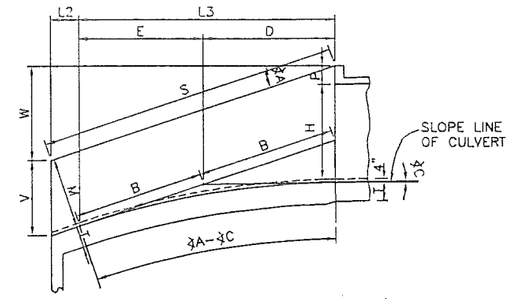


NOTE:
ALL DIMENSIONS ARE OUT TO OUT.
D = PIN DIAMETER IN INCHES.

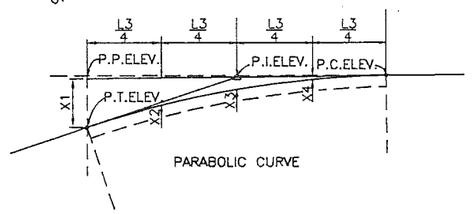
END CLEARANCES:
VERTICAL TOP = 2"
VERTICAL BOTTOM = 3"
TRANSVERSE = 2"

EDGE CLEARANCE = 2" EXCEPT:
TOP OF FLOOR = 2 1/4" TO NEAR REINFORCING BAR.
BOTTOM OF FLOOR = 3 1/2" TO NEAR REINFORCING BAR.



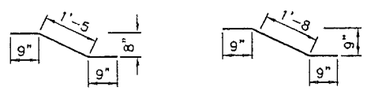


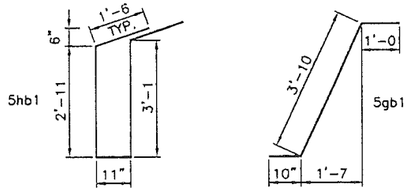
FLUME DATA
¾A = 18°26'06" (18.4349°)
¾C = 00°30'56" (0.5156°)
B = 12.19'
S = 28.46'
V = 4.74'
W = 9.0'
M = 4.5'
T = 9"
H = 66"
P = 3'



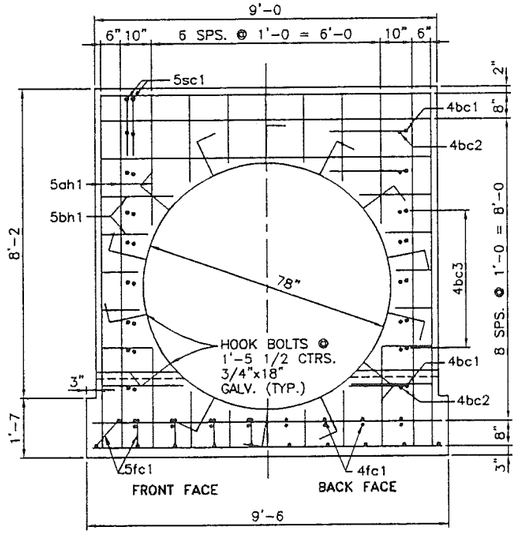
CURVE DATA
L3 = 23.16'
D = 11.60'
E = 11.56'
P.C. ELEV. = 266.30
P.I. ELEV. = 266.20
P.P. ELEV. = 266.09
P.T. ELEV. = 262.34
X1 = 3.75'
X2 = 2.11'
X3 = 0.94'
X4 = 0.23'
L3/4 = 5.79'

FLUME DATA LAYOUT

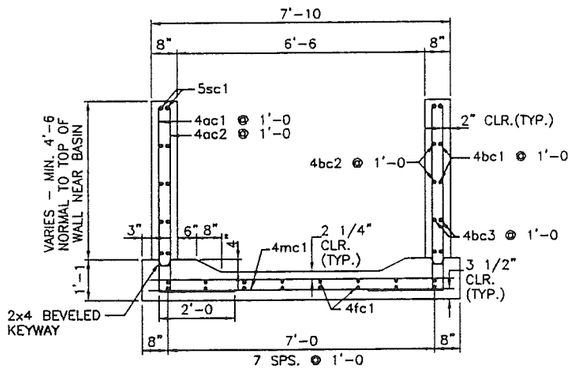




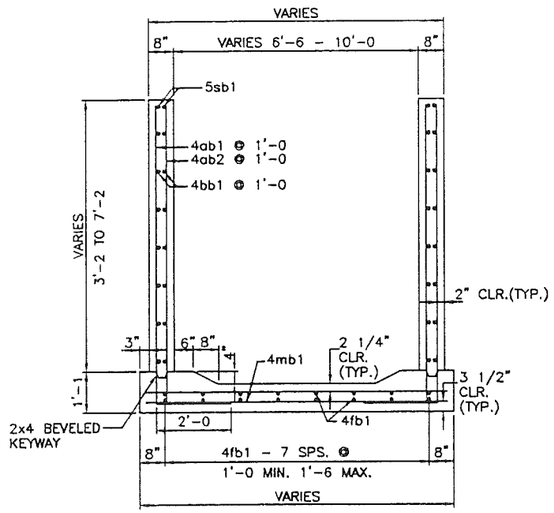
BENT BAR DETAILS
NO SCALE



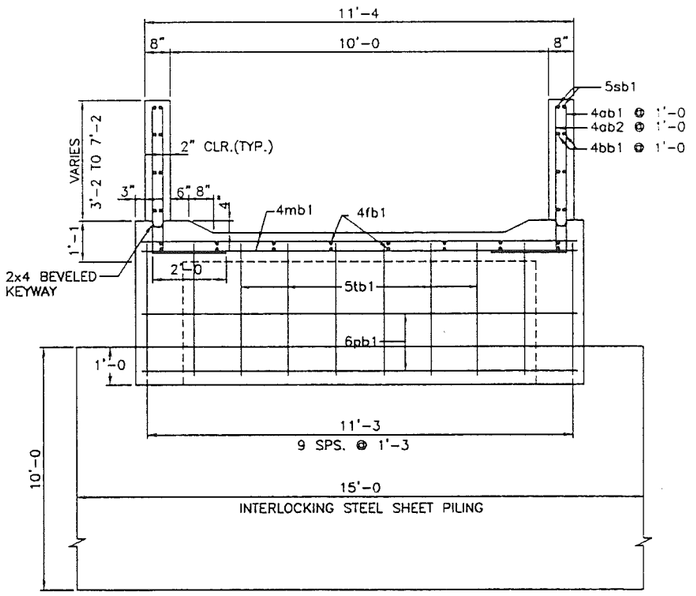
SECTION THROUGH HEADWALL



SECTION THROUGH CHUTE



SECTION THROUGH BASIN



SECTION AT END OF BASIN

0' 2' 4' 6'

REV.:

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120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

SE PROJECT NO.: 02601 DATE: 05/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: DETAIL SHEET

FLUME HEADWALL

Where length in decimal feet is shown, length is average length of a variable bar.

BAR	NO.	LOCATION	LENGTH	WEIGHT
5ah1	36	HEADWALL, F.F. & B.F., VERT.	3.61	135.55
5bh1	34	HEADWALL, F.F. & B.F., TRANS.	3.60	127.64
TOTAL WEIGHT (LBS)				263.19
14 HOOK BOLTS				

MARK	NO.	LENGTH
5ah1	8	9'-4
	4	3'-5
	4	2'-4
	4	1'-10
	2	1'-8
	4	2'-7
	4	1'-6
	4	0'-11
	2	0'-10
AVERAGE LENGTH 3.61		

MARK	NO.	LENGTH
5bh1	6	8'-8
	4	1'-10
	4	1'-2
	4	0'-11
	4	1'-0
	4	1'-4
	4	2'-2
	4	9'-2
AVERAGE LENGTH 3.60		

FLUME CHUTE

Where length in decimal feet is shown, length is average length of a variable bar.

BAR	NO.	LOCATION	LENGTH	WEIGHT
4ac1	52	WALLS, B.F., VERT.	8.08	280.79
4ac2	52	WALLS, F.F., VERT.	6.16	214.07
4bc1	6	WALLS, B.F., LONG.	22.14	88.72
4bc2	6	WALLS, F.F., LONG.	20.30	81.38
4bc3	20	WALLS, F.F. & B.F., LONG.	16.25	217.10
5sc1	4	WALLS, TOP, SLOPED	29'-10	124.45
5fc1	8	FLOOR, LONG.	2'-11	24.34
5fc2	2	FLOOR, LONG.	3'-2	6.61
4fc1	16	FLOOR, TOP & BOTT., LONG.	28'-3	301.94
4mc1	54	FLOOR, TOP & BOTT., TRANS.	8'-0	288.58
5mc3	4	FLOOR, BACKWALL, TRANS.	8'-0	33.38
TOTAL WEIGHT (LBS.)				1661.36

MARK	NO.	LENGTH
4ac1	2	10'-7
	2	10'-3
	2	10'-0
	2	9'-8
	2	9'-5
	2	9'-2
	2	8'-11
	2	8'-8
	2	8'-6
	2	8'-3
	2	8'-1
	2	7'-11
	2	7'-9
	2	7'-7
	2	7'-6
	2	7'-4
	2	7'-3
	2	7'-2
	4	7'-1
	12	7'-0
AVERAGE LENGTH 8.08		

MARK	NO.	LENGTH
4ac2	2	8'-8
	2	8'-4
	2	8'-0
	2	7'-9
	2	7'-6
	2	7'-3
	2	7'-0
	2	6'-9
	2	6'-7
	2	6'-4
	2	6'-2
	2	6'-0
	2	5'-10
	2	5'-8
	2	5'-7
	2	5'-5
	2	5'-4
	2	5'-3
	4	5'-2
	12	5'-1
AVERAGE LENGTH 6.16		

MARK	NO.	LENGTH
4bc1	4	31'-1
	2	4'-3
AVERAGE LENGTH 22.14		

MARK	NO.	LENGTH
4bc2	4	29'-1
	2	2'-9
AVERAGE LENGTH 20.30		

MARK	NO.	LENGTH
4bc3	8	29'-1
	4	12'-11
	4	7'-5
	4	2'-9
AVERAGE LENGTH 16.25		

FLUME BASIN

Where length in decimal feet is shown, length is average length of a variable bar.

BAR	NO.	LOCATION	LENGTH	WEIGHT
4ab1	34	WALLS, B.F., VERT.	7.85	178.20
4ab2	34	WALLS, F.F., VERT.	5.92	134.56
4bb1	28	WALLS, F.F. & B.F., LONG.	13.58	254.05
5sb1	4	WALLS, TOP, SLOPED	18'-5	76.85
4fb1	16	FLOOR, TOP & BOTT., LONG.	16.94	181.05
4mb1	34	FLOOR, TOP & BOTT., TRANS.	9.65	219.21
5hb1	8	FLOOR, BACKWALL, VERT.	9'-11	82.74
5tb1	10	CURTAIN, VERT.	4'-6	46.94
5qb1	4	CURTAIN, STRUTS	5'-8	23.66
6pb1	3	CURTAIN, TRANS.	11'-5	51.46
TOTAL WEIGHT (LBS.)				1248.72

MARK	NO.	LENGTH
4ab1	2	9'-11
	2	9'-7
	2	9'-5
	2	9'-1
	2	8'-11
	2	8'-7
	2	8'-4
	2	8'-1
	2	7'-10
	2	7'-7
	2	7'-4
	2	7'-1
	2	6'-10
	2	6'-7
	2	6'-4
	2	6'-1
	2	5'-10
AVERAGE LENGTH 7.85		

MARK	NO.	LENGTH
4ab2	2	8'-0
	2	7'-8
	2	7'-5
	2	7'-2
	2	6'-11
	2	6'-8
	2	6'-5
	2	6'-2
	2	5'-11
	2	5'-8
	2	5'-5
	2	5'-2
	2	4'-11
	2	4'-8
	2	4'-5
	2	4'-2
	2	3'-11
AVERAGE LENGTH 5.92		

MARK	NO.	LENGTH
4bb1	4	5'-0
	4	9'-0
	4	13'-0
	4	17'-1
	12	17'-0
AVERAGE LENGTH 13.58		

MARK	NO.	LENGTH
4fb1	4	17'-0
	12	16'-11
AVERAGE LENGTH 16.94		

MARK	NO.	LENGTH
4mb1	2	8'-0
	2	8'-1
	2	8'-4
	2	8'-7
	2	8'-9
	2	9'-0
	2	9'-3
	2	9'-5
	2	9'-8
	2	9'-8
	2	9'-10
	2	10'-1
	2	10'-4
	2	10'-6
	2	10'-9
	2	10'-11
	2	11'-2
	2	11'-5
AVERAGE LENGTH 9.65		

PLACEMENT OF QUANTITIES
FLUME OUTLET

LOCATION	CONCRETE C.Y. FLOOR	CONCRETE C.Y. WALLS	CONCRETE C.Y. TOTAL	STEEL LBS.
BASIN	7.13	4.15	11.28	1248.72
CHUTE	9.07	7.34	16.41	1661.36
HEADWALL	–	1.39	1.39	263.19
TOTAL	16.20	12.88	29.08	3173.27

NOTE:
ALL EXPOSED CORNERS 90° OR SHARPER TO BE FILLETED WITH A 3/4" DRESSED BEVELED STRIP.

ALL VARIABLE LENGTH BARS TO BE FIELD CUT.

FIELD BEND 4fc1 BARS.

HOOK BOLTS TO INCLUDE 2 NUTS AND 2 WASHERS EACH.

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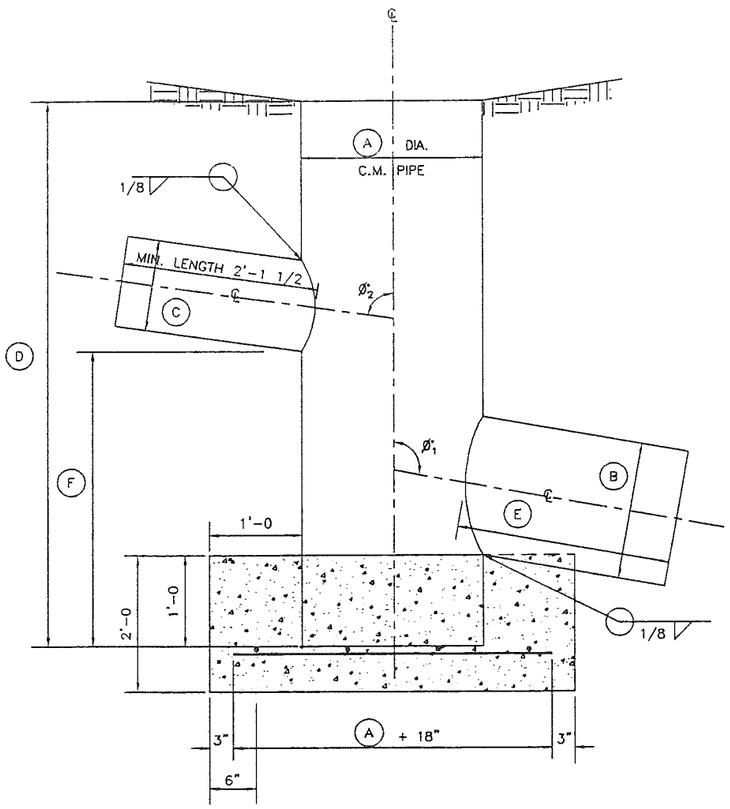
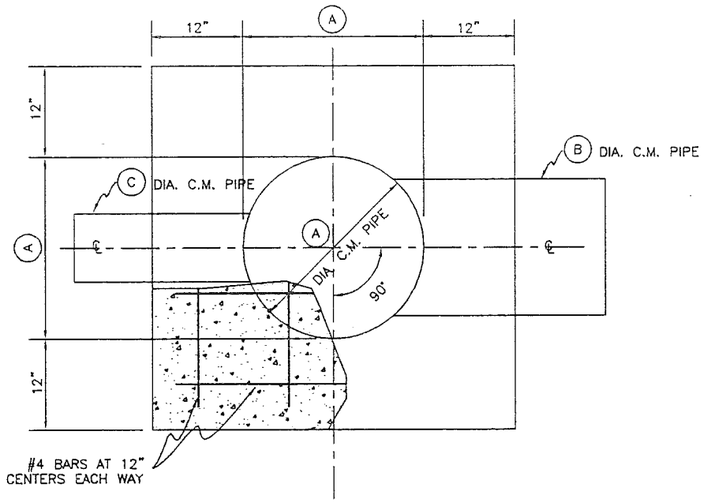


TYPICAL SECTION ON CENTERLINE

NOT TO SCALE

VERTICAL INLET TO BE SHOP FABRICATED. MATERIALS AND METHODS USED IN THE FABRICATION SHALL CONFORM TO CURRENT IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CORRUGATED METAL PIPE CULVERTS. ALL METAL PARTS AND HARDWARE SHALL BE GALVANIZED AS PER CURRENT IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. ANY DAMAGE TO PROTECTIVE COATING SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER.



TYPICAL PLAN VIEW

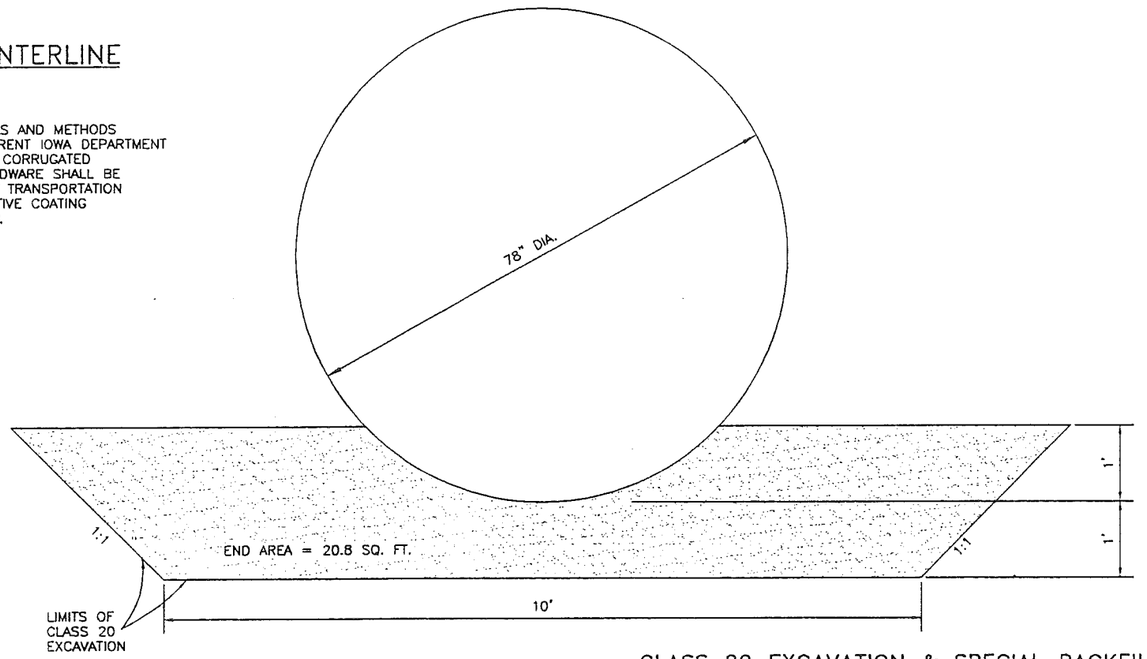
NOT TO SCALE

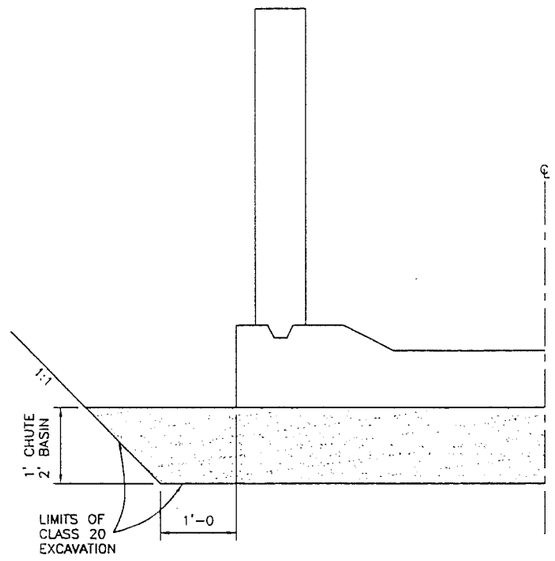
VERTICAL INLET BASE QUANTITIES

DIMENSION (A)	CONCRETE CU. YDS.	STEEL REINFORCEMENT #4 BAR		
		LENGTH EACH BAR	NUMBER OF BARS	TOTAL WEIGHT POUNDS
96"	7.4	9'-6	20	127

TABLE – DIMENSIONS AND MATERIAL

(A)	96"
(B)	78"
(C)	12"
(D)	9'-0
(E)	4'-0
(F)	2'-0
END CAPS REQUIRED	1
SHEET THICKNESS FOR (A) DIA.	0.109"
SHEET THICKNESS FOR (B) DIA.	0.109"
SHEET THICKNESS FOR (C) DIA.	0.064"
Ø DEGREES – ANGLE $Ø_1$	90°30'33"
$Ø_2$	90°00'





CLASS 20 EXCAVATION & SPECIAL BACKFILL PLACEMENT

NOT TO SCALE

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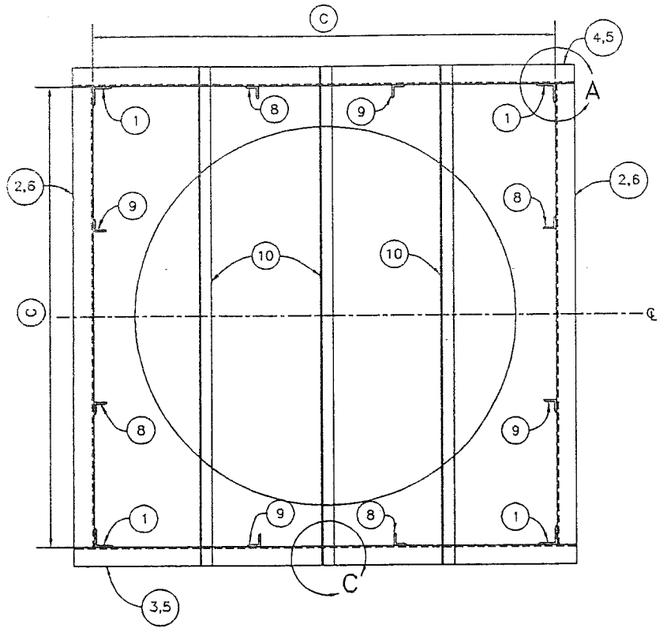
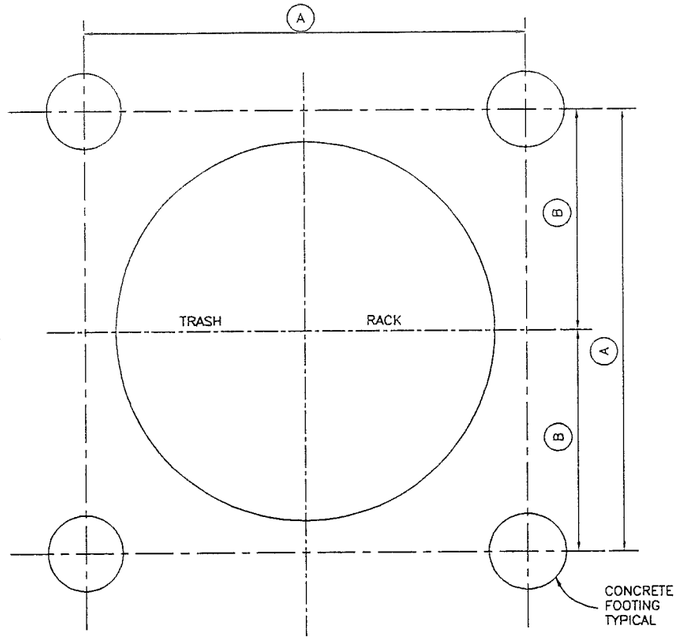
PHONE: (712)263-8118 FAX: (712)263-2181

SE PROJECT NO.: 02601 DATE: 05/01 DRAWN BY: TKK REVIEWED BY: . APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: SPECIAL DETAILS



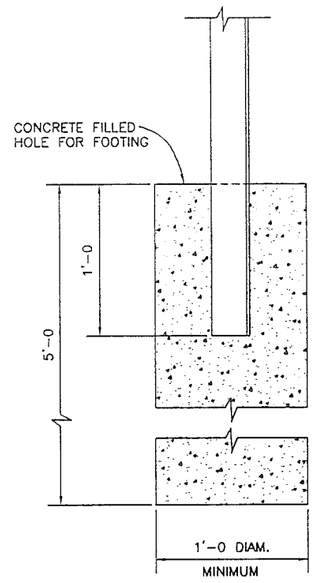
PLAN



CONCRETE FOOTING LAYOUT

A VOID SHALL BE FORMED IN THE CONCRETE FOOTINGS TO RECEIVE THE MARK 1 POSTS. THE VOID SHALL BE ONE FOOT DEEP. THE CROSS SECTION OF THE VOID MAY BE TRIANGULAR, RECTANGULAR OR CIRCULAR WITH 1/4" CLEARANCE BETWEEN THE CONCRETE AND THE MARK 1 POST

AFTER THE POSTS ARE INSTALLED, THE REMAINING VOIDS SHALL BE FILLED WITH ASPHALT.



CONCRETE FOOTING DETAIL

TRASH RACK BILL OF MATERIALS

MARK	*QUANTITY	ITEM	LENGTHS 96" DIAM.
1	4	L S 3"x3"x5/16"	4'-11
2	2	"	9'-1
3	1	"	9'-7
4	1	"	9'-7
5	2	L S 2"x2"x3/16"	9'-5
6	2	"	9'-1
7	0	"	-
8	4	"	3'-11
9	4	"	3'-11
10	3	"	9'-7
	46	1/2" ø MACHINE BOLTS W/LOCK WASHERS & HEX NUTS	
	0.6 CY	CONCRETE	

*QUANTITY FOR EACH TRASH RACK ASSEMBLY

CONSTRUCTION NOTES:

STRUCTURE IS SYMMETRICAL ABOUT ℄.

TRASH RACK TO BE FABRICATED OF STEEL ANGLES BOLTED TOGETHER WITH 1/2" ø MACHINE BOLTS.

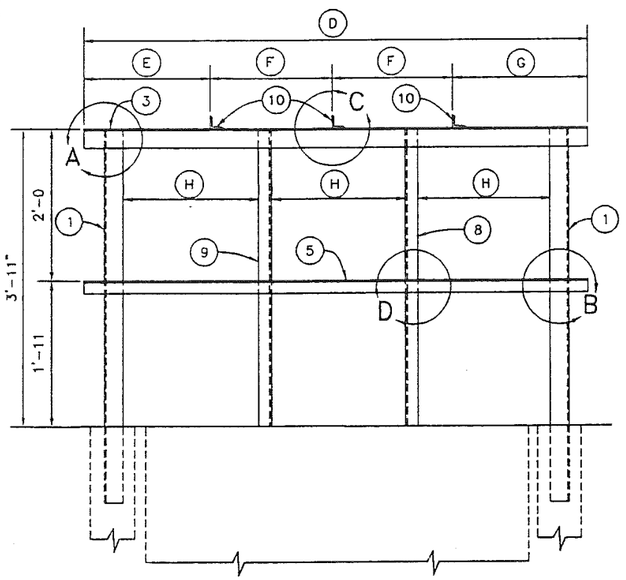
ALL CUTS SHALL BE SAW CUTS.

ALL HOLES FOR BOLTS SHALL BE 1/16" ø LARGER THAN BOLT DIAM.

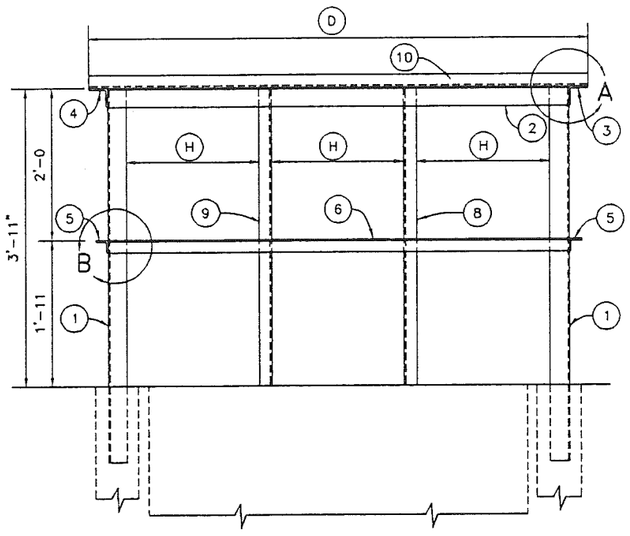
ALL ANGLES AND BOLTS SHALL BE GALVANIZED.

TRASH RACK DIMENSIONS

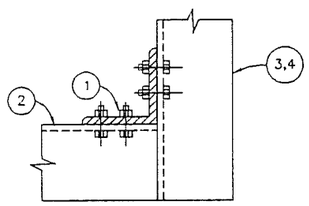
MARK	96" DIAM.
A	8'-10
B	4'-5
C	9'-1
D	9'-7
E	2'-4 3/4
F	2'-3 3/4
G	2'-6 3/4
H	2'-9



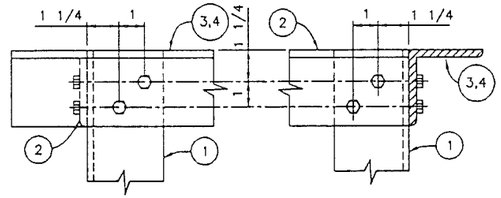
RIGHT SIDE ELEVATION



FRONT ELEVATION

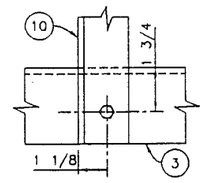


PLAN

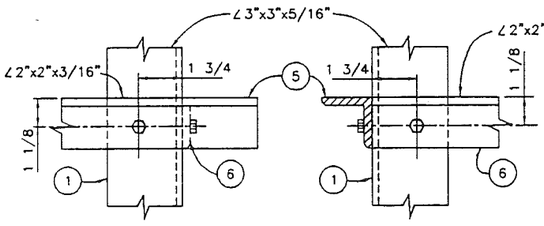


SIDE ELEV. FRONT ELEV.

VIEW "A"

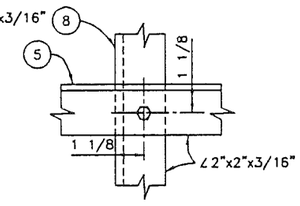


PLAN



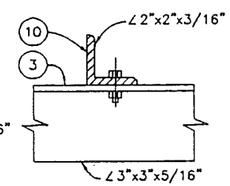
SIDE ELEV. FRONT ELEV.

VIEW "B"



SIDE ELEV.

VIEW "D"



SIDE ELEV.

VIEW "C"

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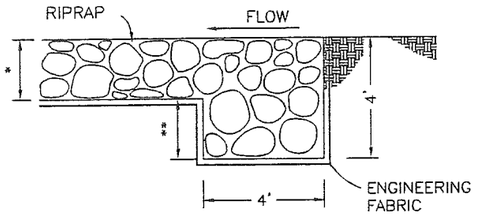
PHONE: (712)263-8118 FAX: (712)263-2181

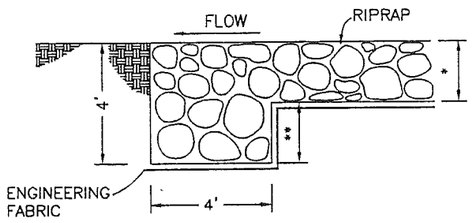
SE PROJECT NO.: 02601 DATE: 05/01 DRAWN BY: TKK REVIEWED BY: . APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: TRASH RACK DETAILS

SHEET U5



TYPICAL UPSTREAM



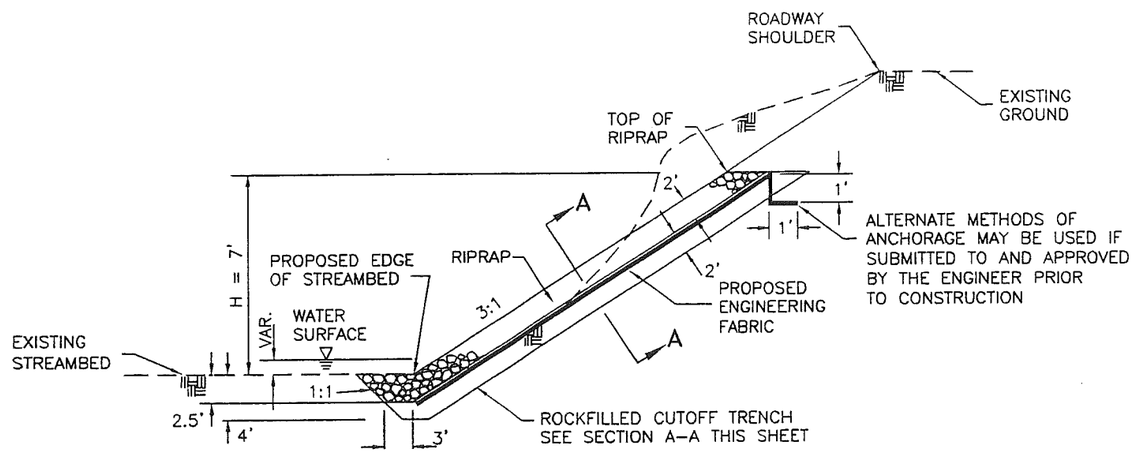
TYPICAL DOWNSTREAM

SECTION A-A

ROCK FILLED CUTOFF TRENCH DETAILS

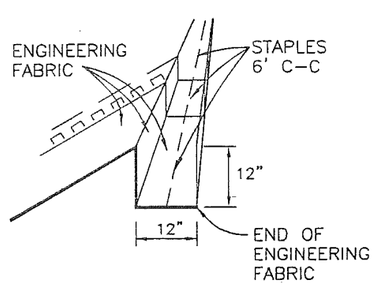
NO SCALE

* 2.5' ACROSS CHANNEL BOTTOM
2.0' ON SIDE SLOPES
** 1.5' ACROSS CHANNEL BOTTOM
2.0' ON SIDE SLOPES

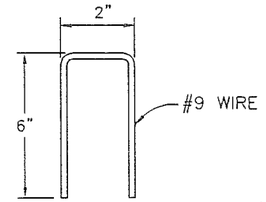


TYPICAL BANK STABILIZATION SECTION

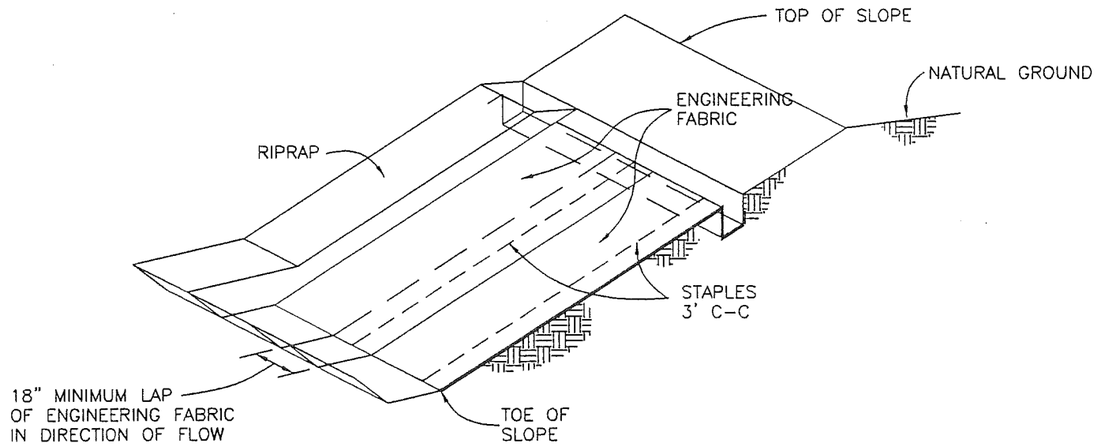
(REFER TO SHEET D1 FOR LOCATION)
NO SCALE



DETAIL OF TRENCH



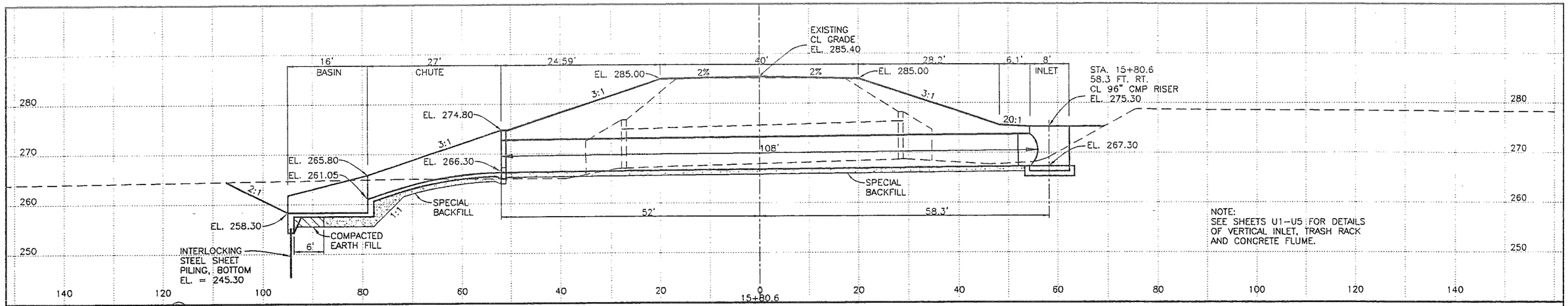
STAPLE



EXCAVATE 12"x12" TRENCH ALONG TOP OF RIPRAP. PLACE END OF ENGINEERING FABRIC STRIPS INTO TRENCH WITH STAPLES AS SHOWN. BACKFILL WITH THE EXCAVATED MATERIAL AND COMPACT. THE ENGINEER MAY PERMIT THE USE OF THE WHEELS OF PNEUMATIC-TIRED EQUIPMENT FOR CONSOLIDATING THE TRENCH BACKFILL MATERIAL.

DETAILS OF PLACEMENT OF ENGINEERING FABRIC

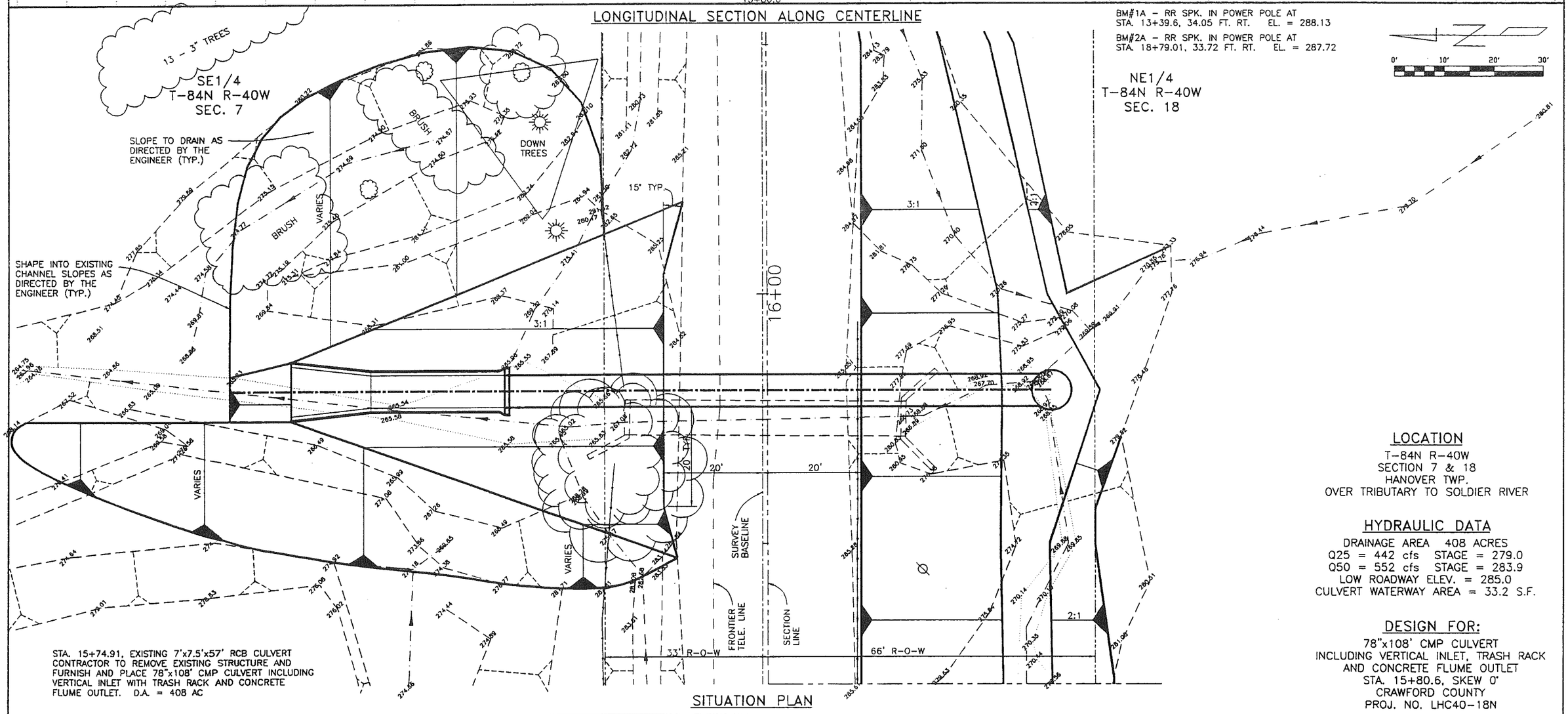
NO SCALE



LONGITUDINAL SECTION ALONG CENTERLINE

BM#1A - RR SPK. IN POWER POLE AT STA. 13+39.6, 34.05 FT. RT. EL. = 288.13

BM#2A - RR SPK. IN POWER POLE AT STA. 18+79.01, 33.72 FT. RT. EL. = 287.72



STA. 15+74.91, EXISTING 7'x7.5'x57' RCB CULVERT CONTRACTOR TO REMOVE EXISTING STRUCTURE AND FURNISH AND PLACE 78"x108' CMP CULVERT INCLUDING VERTICAL INLET WITH TRASH RACK AND CONCRETE FLUME OUTLET. D.A. = 408 AC

SITUATION PLAN

LOCATION

T-84N R-40W
SECTION 7 & 18
HANOVER TWP.
OVER TRIBUTARY TO SOLDIER RIVER

HYDRAULIC DATA

DRAINAGE AREA 408 ACRES
Q25 = 442 cfs STAGE = 279.0
Q50 = 552 cfs STAGE = 283.9
LOW ROADWAY ELEV. = 285.0
CULVERT WATERWAY AREA = 33.2 S.F.

DESIGN FOR:

78"x108' CMP CULVERT
INCLUDING VERTICAL INLET, TRASH RACK AND CONCRETE FLUME OUTLET
STA. 15+80.6, SKEW 0°
CRAWFORD COUNTY
PROJ. NO. LHC40-18N

REV.:

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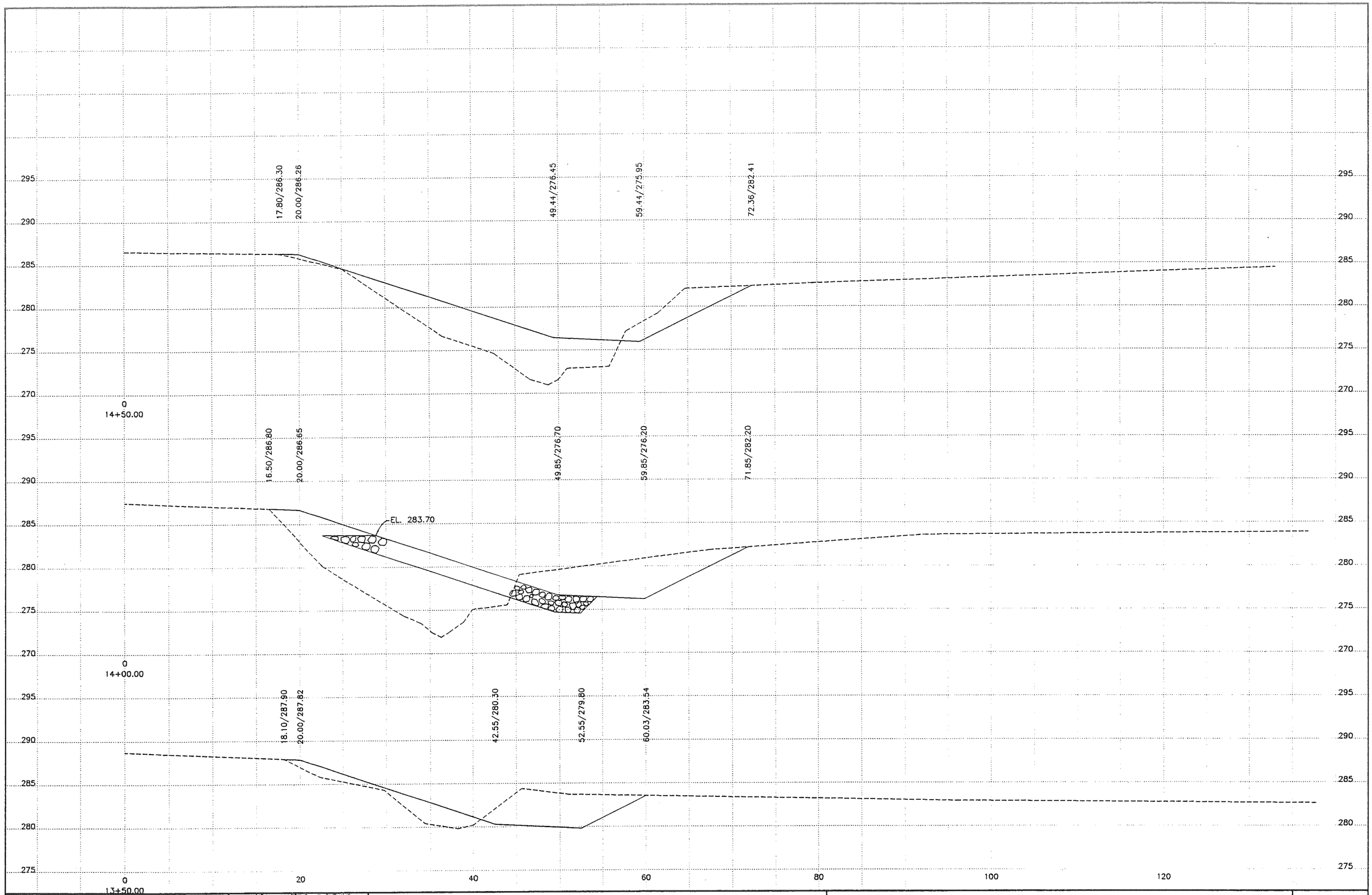
PHONE: (712)263-8118 FAX: (712)263-2181

SE PROJECT NO.: 02601 DATE: 06/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: CULVERT SITUATION PLAN



REV:

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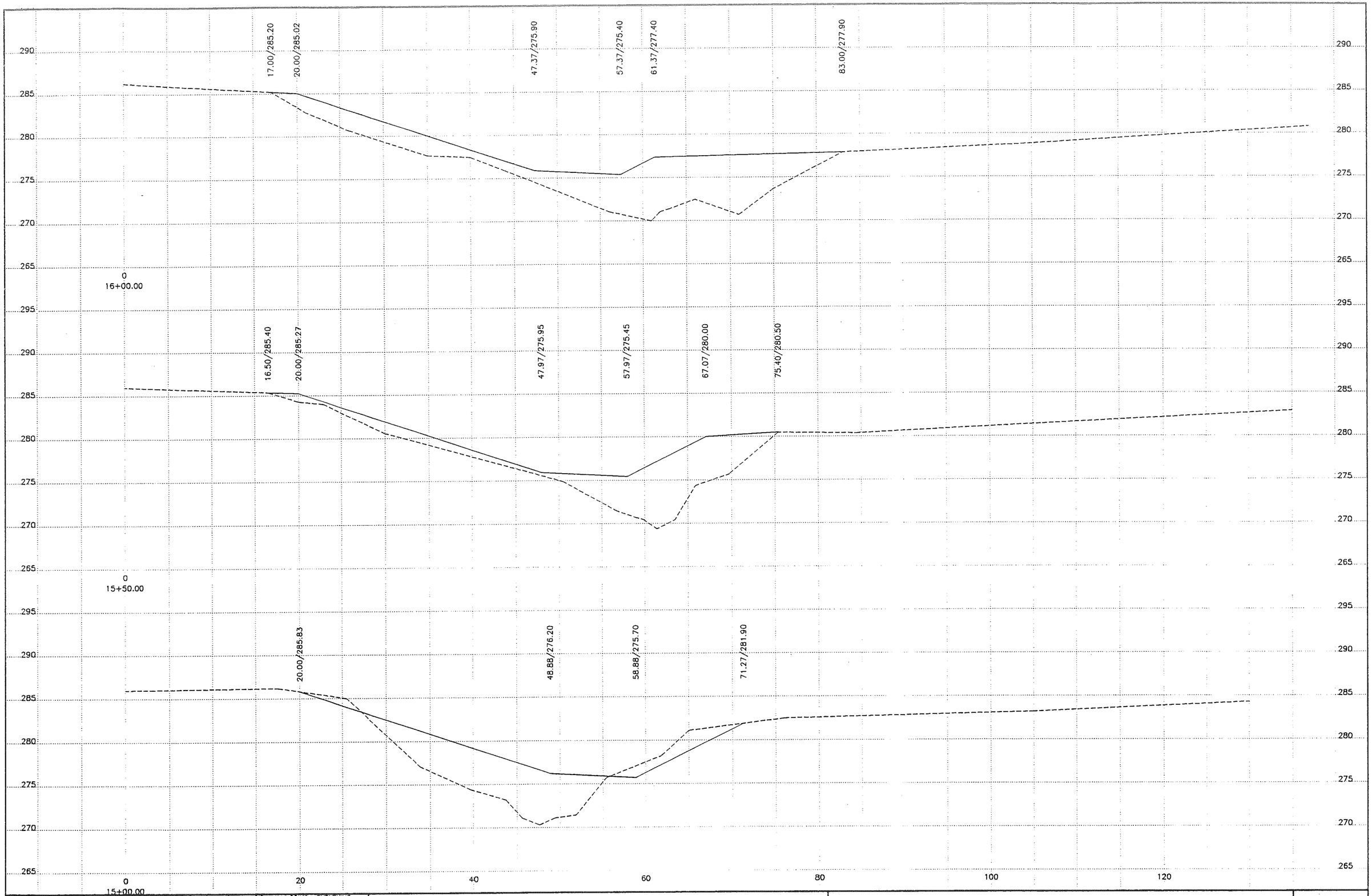
SE PROJECT NO.: 02601 DATE: 06/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA

DESCRIPTION: CROSS SECTIONS - MAINLINE

SHEET WI



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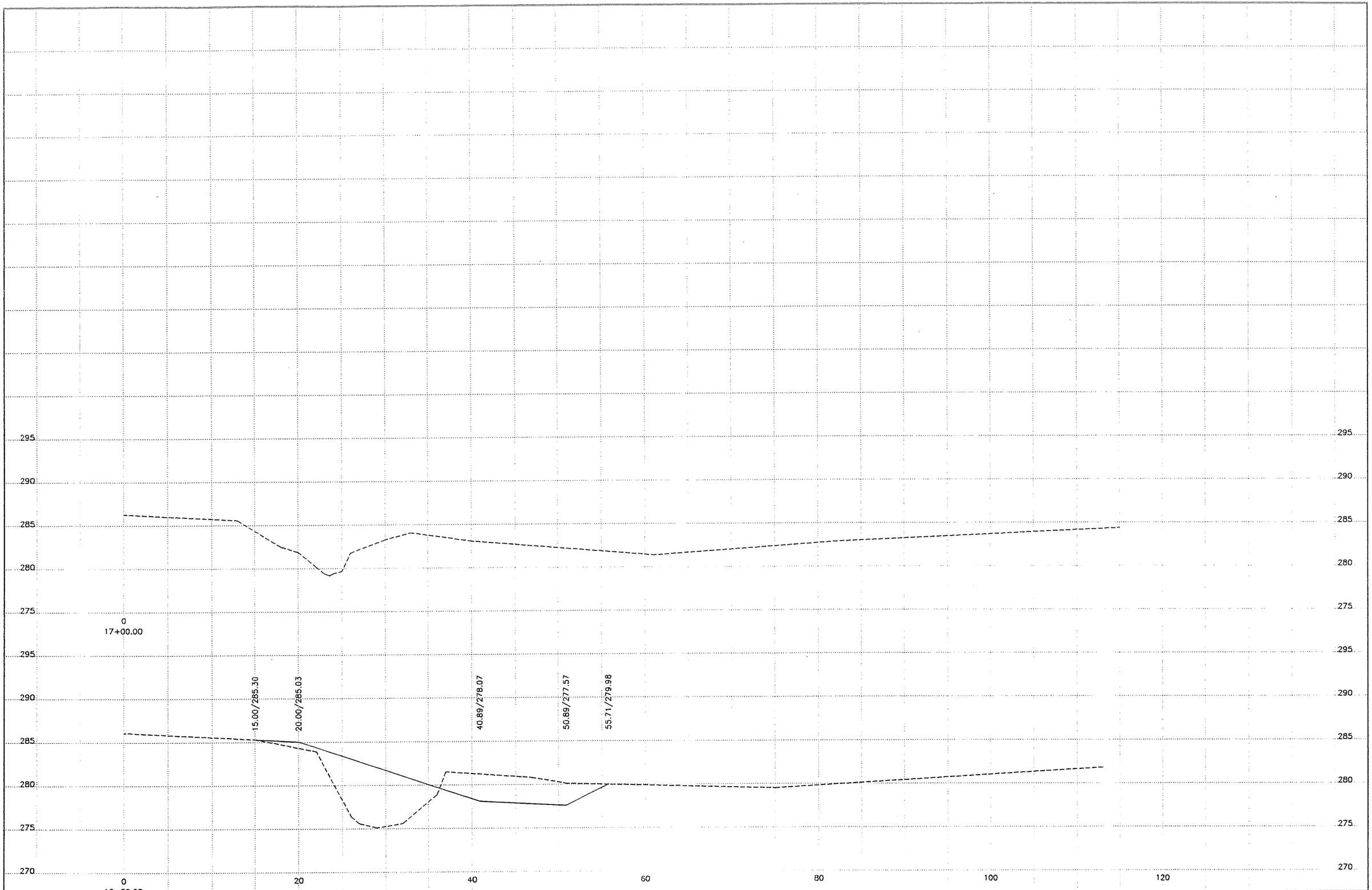
SE PROJECT NO.: 02601 DATE: 06/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA

DESCRIPTION: CROSS SECTIONS - MAINLINE

SHEET W2



REV:

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SE PROJECT NO.: 02601 DATE: 06/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA

DESCRIPTION: CROSS SECTIONS - MAINLINE

SHEET W3