RCB CULVERT REPLACEMENT - TWIN BOX
BRS-C024(85)--60-24
LETTING DATE 01/17/07
CRAWFORD COUNTY

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, LAYOUTS, SIGNING, AND PAVEMENT MARKINGS INSTALLED WITHIN THE LIMITS OF THIS PROJECT SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AS ADOPTED BY THE DEPARTMENT PER 761 OF THE IOWA ADMINISTRATIVE CODE (IAC) CHAPTER 130."

PERMITS

THIS PROJECT IS COVERED BY U.S. ARMY CORPS OF ENGINEERS' NATIONWIDE PERMIT NO. 14.

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 SYSTEM
CRAWFORD COUNTY

PROJECT NO. BRS-C024(85)--60-24
RCB CULVERT REPLACEMENT - TWIN BOX
ON COUNTY ROAD M55 NORTH OF U.S. 30 0.6 MILES
OVER KING CREEK

SCALES: AS NOTED

The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2001, plus the applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions, shall apply to construction work on this project.

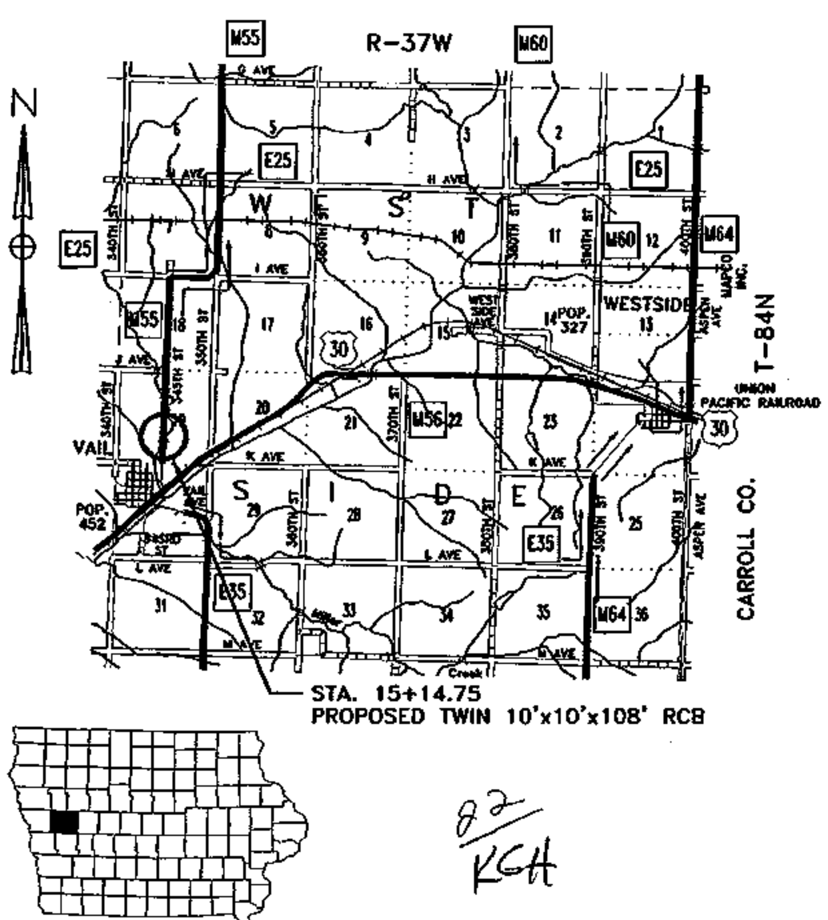
TOTAL SHEETS
15
PROJECT NUMBER
BRS-C024(85)--60-24
R.O.W. PROJECT NUMBER
PROJECT IDENTIFICATION NUMBER
FHWA STRUCTURE NO. 128590

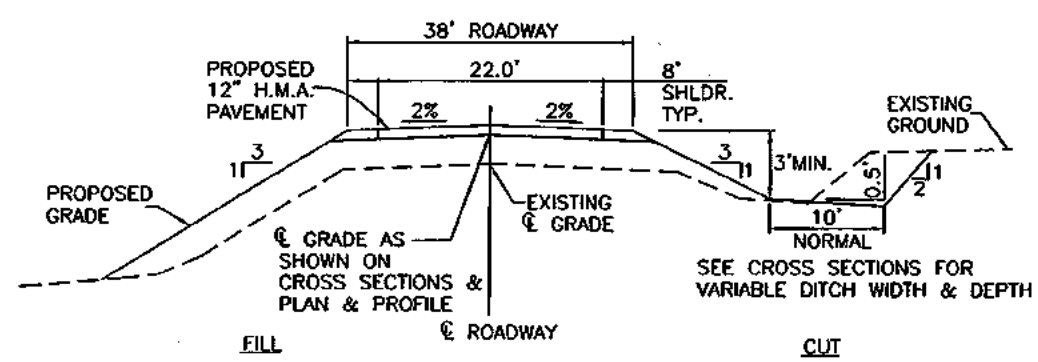
INDEX OF SHEETS

STANDARD BRIDGE PLANS

STANDARD	ISSUED	REVISED
TWRCB-G1-87	JULY, 1987	04-02
TWRCB 10-10-87	JULY, 1987	12-5-96
TWH 30-1-87	JULY, 1987	12-5-96
TWH 30-2-87	JULY, 1987	
TWH 30-3-87	JULY, 1987	1-1-98
TWH 30-4-87	JULY, 1987	
TWH 30-5-87	JULY, 1987	1-1-98
TWCBJ 2-87	JULY, 1987	04-02
TWCBJ 3-87	APRIL, 2002	

128590





TYPICAL CROSS SECTION
NOT TO SCALE

MILEAGE SUMMARY

LOCATION	LIN. FT.	MILES
BOP STA. 14+30.73 TO EOP STA. 15+96.10	165.37	0.031

STANDARD ROAD PLANS

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

NUMBER	DATE	NUMBER	DATE	NUMBER	DATE
RF-7	04-15-03	RJ-26D	10-02-01	TC-252	10-17-06
RF-30A	10-17-06	RL-4	09-21-99		
RF-32	04-18-06				

IOWA ONE CALL
Call Before You Dig! 1.800.292.8989 Call the toll-free number at least 48 hours prior to ALL excavations in Iowa.

04-30-02 101-4

DESIGN DATA RURAL

2004 AADT	340	V.P.D.
2026 AADT	510	V.P.D.
201X DHV	X	V.P.H.
TRUCKS	X	%
TOTAL DESIGN ESALs		

Approved
Robert Fohrmann
Mark Segebart
Steve Mann
David W. Muhlbauer
BOARD OF SUPERVISORS

Approved
10/17/06
CRAWFORD COUNTY ENGINEER DATE

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

TROY J. GROTH, P.E. #14450 10/11/06 DATE

LICENSED PROFESSIONAL ENGINEER TROY J. GROTH 14450 IOWA

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2007.
PAGES OR SHEETS COVERED BY THIS SEAL:
ALL SHEETS

82 KGH

LOCATION MAP SCALE
0 1 2 3
SCALE IN MILES

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

TABULATION OF SAFETY CLOSURES	108-13A 10-28-97		
Refer to Section 2518 of the St'd. Specifications			
STATION	CLOSURE TYPE Road Qty.	CLOSURE TYPE Hazard Qty.	REMARKS
13+00	1	–	SOUTH END
14+00	–	1	SOUTH END
16+00	–	1	NORTH END
17+00	1	–	NORTH END

PLACEMENT OF QUANTITIES TWIN 10'x10'x108' RCB CULVERT					
	CONCRETE C.Y.				STEEL
LOCATION	SLAB	FLOOR	WALLS	TOTAL	LBS.
BARREL (108')	70.4	90.8	96.0	257.2	37959
BELL JOINT (2)	7.8	9.5	5.6	22.9	3002
HEADWALL (2)	5.4	94.0	40.0	139.4	16944
TOTAL	83.6	194.3	141.6	419.5	57905

NOTE: FOR GENERAL INFORMATION, NOTES, SPECIFICATIONS & DESIGN STRESSES REFER TO IOWA D.O.T. BRIDGE STANDARD TWRCB-G1-87.

ESTIMATE REFERENCE INFORMATION

2102-0425070 SPECIAL BACKFILL
CRUSHED LIMESTONE OR CRUSHED CONCRETE SPECIAL BACKFILL MATERIAL SHALL MEET REQUIREMENTS FOR GRADATION NO. 30 OF THE AGGREGATE GRADATION TABLE REFERENCED IN SECTION 4109 OF THE I.D.O.T. STANDARD SPECIFICATIONS. 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.

MATERIAL SHALL BE PLACED IN LAYERS OF NOT MORE THAN EIGHT (8) INCHES IN THICKNESS, WITH EACH LAYER BEING COMPACTED TO A MINIMUM DENSITY OF 95% PERCENT OF THE DENSITY AS DETERMINED BY ASTM D698 VALUES. A MINIMUM OF TWO IN-PLACE DENSITY TESTS SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY RETAINED BY THE CONTRACTOR. COST OF DENSITY TESTING SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO PRICE BID FOR THIS ITEM. A CONVERSION FACTOR OF 140 PCF WAS USED TO DETERMINE THE TOTAL WEIGHT OF SPECIAL BACKFILL MATERIAL REQUIRED.

THE COST OF CONSTRUCTING THE COMPACTED EARTH CORE AT EACH END OF THE CULVERT SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.

2102-2710070 EXCAVATION, CLASS 10, ROADWAY AND BORROW
INCLUDES 133 C.Y. CUT, 4027 C.Y. FILL, 3894 C.Y. BORROW. TYPE "A" COMPACTION WILL BE REQUIRED. BORROW MAY BE OBTAINED FROM SUITABLE CLASS 10 CHANNEL AND CLASS 20 EXCAVATION. THE CONTRACTOR SHALL PROVIDE ADDITIONAL NECESSARY BORROW. NO PAYMENT FOR OVERHAUL WILL BE ALLOWED. PAYMENT FOR THIS ITEM SHALL BE AT PLAN QUANTITY. CROSS SECTIONS SHALL NOT BE TAKEN AFTER EXCAVATION FOR THE PURPOSE OF DETERMINING ACTUAL QUANTITIES. REFER TO PLAN SHEET C1 FOR QUANTITIES.

2104-2710020 EXCAVATION, CLASS 10, CHANNEL
DISPOSAL OF EXCESS MATERIAL AND UNSUITABLE MATERIAL SHALL BE AS DIRECTED BY THE ENGINEER. THE COST OF HAULING AND DISPOSING OF THIS MATERIAL SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR CLASS 10 CHANNEL EXCAVATION. PAYMENT FOR THIS ITEM SHALL BE AT PLAN QUANTITY. CROSS SECTIONS SHALL NOT BE TAKEN AFTER EXCAVATION FOR THE PURPOSE OF DETERMINING ACTUAL QUANTITIES.

2121-7425010 GRANULAR SHOULDERS, TYPE A
QUANTITY IS BASED ON 37.45 TONS/STA. SEE TABULATION SHEET C1 FOR LOCATIONS. GRAVEL/LIMESTONE MEETING THE REQUIREMENTS OF ARTICLE 4120.02 OF THE STANDARD SPECIFICATIONS IS ALLOWED.

2123-7450020 SHOULDER FINISHING, EARTH
SEE TABULATION ON SHEET C1 FOR LOCATIONS. QUANTITIES OF EXCAVATION AND FILL REQUIRED ARE INCLUDED IN PLAN QUANTITY FOR CLASS 10 ROADWAY AND BORROW EXCAVATION.

2303-0023500 HOT MIX ASPHALT MIXTURE (300,000 ESAL), INTERMEDIATE OR SURFACE COURSE, 1/2 IN. MIX, NO SPCL FRIC REQ
REFER TO INSTRUCTIONAL MEMORANDUM 510 APPENDIX A FOR ASPHALT MIX PARAMETERS.

NATURAL SUBGRADE SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 2109 EXCEPT THAT ALL RECOMPACTION SHALL MEET REQUIREMENTS OF ARTICLE 2107.05. NO PONDING OF WATER SHALL BE ALLOWED DUE TO THE PLACEMENT OF MATERIALS TRIMMED DURING CONSTRUCTION OF NATURAL SUBGRADE.

CLASS IB COMPACTION SHALL BE REQUIRED.

ESTIMATED QUANTITIES ARE BASED UPON FULL DEPTH (12") HMA PAVEMENT FROM STA. 14+51.43 TO STA. 15+88.56, 145 PCF ESTIMATED UNIT WEIGHT, AND 3% OVERRUN.

CRUSHED PARTICLES - ARTICLE 4127.05 SHALL BE SUPERSEDED BY THE FOLLOWING:

WHEN CRUSHED SAND OR GRAVEL IS USED IN THE MIX, IT SHALL BE PRODUCED AS A SEPARATE OPERATION BY CRUSHING A GRAVEL AGGREGATE WHICH IS RETAINED ON A SCREEN AT LEAST 1/4 INCH LARGER THAN THE AGGREGATE SIZE SPECIFIED.

NO CONSIDERATION SHALL BE GIVEN TO CRUSHED PARTICLES IN PIT RUN GRAVELS.

CRUSHED PARTICLES CALCULATIONS SHALL BE SUBMITTED WITH THE MIX DESIGN FOR APPROVAL BY THE ENGINEER.

VOIDS CONTENT SHALL BE CHECKED BY THE OWNER FROM THE FIRST DAY'S RUN AND ADJUSTMENTS, IF NEEDED, SHALL BE MADE PRIOR TO ANY FURTHER PRODUCTION.

ITEM INCLUDES CERTIFIED HMA PLANT INSPECTION IN ACCORDANCE WITH SECTION 2521.

SMOOTHNESS OF HMA PAVEMENT SHALL BE CHECKED WITH A SURFACE CHECKER BY THE ENGINEER AND SHALL NOT EXCEED 1/8 INCH IN 10 FEET IN ACCORDANCE WITH ARTICLE 2316.01, B, OF THE STANDARD SPECIFICATIONS.

2401-6745625 REMOVAL OF EXISTING BRIDGE
INCLUDES EXISTING PRESTRESSED CONCRETE CHANNEL BEAM BRIDGE WITH TIMBER HIGH ABUTMENTS AND TIMBER TRESTLE PILES AT STA. 15+08.

2402-2720000 EXCAVATION, CLASS 20
THE LIMITS OF EXCAVATION SHALL BE AS SHOWN ON PLAN SHEET U1. EXCESS MATERIAL AND UNSUITABLE MATERIAL SHALL BE HAULED FROM THE SITE AND DISPOSED OF BY THE CONTRACTOR. THE COST OF HAULING AND DISPOSING OF THIS MATERIAL SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR CLASS 20 EXCAVATION.

PRIOR TO CONSTRUCTION OF THE RCB CULVERT, BACKFILL OF THE CLASS 20 EXCAVATION WITH SPECIAL BACKFILL AND/OR COMPACTED EARTHFILL SHALL BE COMPLETED THROUGHOUT THE ENTIRE CROSS SECTION TO AN ELEVATION AT OR ABOVE THE BOTTOM OF THE FLOOR SLAB.

THIS ITEM SHALL INCLUDE ALL WORK IN CONJUNCTION WITH THE REMOVAL OF SURFACE WATER AND GROUND WATER AS NEEDED TO PERFORM THE REQUIRED CONSTRUCTION IN ACCORDANCE WITH THE SPECIFICATIONS. IT SHALL INCLUDE (1) BUILDING AND MAINTAINING ALL NECESSARY TEMPORARY IMPOUNDING WORKS, CHANNELS AND DIVERSIONS, (2) FURNISHING, INSTALLING AND OPERATING ALL NECESSARY PUMPS, PIPING AND OTHER FACILITIES AND EQUIPMENT, AND (3) REMOVING ALL SUCH TEMPORARY WORKS AND EQUIPMENT AFTER THEY HAVE SERVED THEIR PURPOSES.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE NATURE AND EXTENT OF DEWATERING REQUIRED TO COMPLETE THE PROPOSED WORK.

2403-0100020 STRUCTURAL CONCRETE (RCB CULVERT)
REFER TO TABULATION ON THIS SHEET FOR CONCRETE PLACEMENT QUANTITIES. ITEM INCLUDES CERTIFIED PLANT INSPECTION IN ACCORDANCE WITH ARTICLE 2521 OF THE CURRENT STANDARD SPECIFICATIONS.

2404-7775000 REINFORCING STEEL
REFER TO TABULATION ON THIS SHEET FOR STEEL PLACEMENT QUANTITIES IN THE RCB CULVERT.

2501-5775000 PILES, STEEL SHEET
SHALL BE 5 GAGE STEEL SHEETING WITH A MINIMUM SECTION MODULUS OF 3.3 CU. IN. PER FT. REFER TO DETAILS ON PLAN SHEET U1.

2502-8215124 SUBDRAIN, CORRUGATED METAL PIPE, 24 IN. DIA.
ALL METAL PIPE SHALL BE RIVETED PIPE WITH ANNULAR CORRUGATIONS. ALL BANDS SHALL HAVE ANNULAR CORRUGATIONS AND SHALL BE THE SAME THICKNESS AS THE PIPE. BANDWIDTHS SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 441 EXCEPT THAT NO BAND SHALL BE LESS THAN 24 INCHES IN WIDTH. SPIRAL PIPE SHALL NOT BE ALLOWED. DIAPHRAGMS ARE NOT A BID ITEM.

2505-4008100 REMOVAL OF GUARDRAIL
CONTRACTOR SHALL COMPLETELY DISASSEMBLE GUARDRAIL AND STACK NEATLY WITHIN THE RIGHT-OF-WAY FOR REMOVAL BY THE COUNTY. GUARDRAIL POSTS SHALL BE DISPOSED OF OFF-SITE BY THE CONTRACTOR. REFER TO TABULATION ON PLAN SHEET C1.

ESTIMATED PROJECT QUANTITIES

100-1A 07-15-97

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2102-0425070	SPECIAL BACKFILL	TON	270	
2	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	CY	4027	
3	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	CY	2086	
4	2107-0425020	COMPACTING BACKFILL ADJACENT TO BRIDGES, CULVERTS OR STRUCTURES	CY	160	
5	2121-7425010	GRANULAR SHOULDER, TYPE A	TON	84	
6	2123-7450020	SHOULDER FINISHING, EARTH	STA	2.22	
7	2303-0023500	HOT MIX ASPHALT MIXTURE (300,000 ESAL), INTERMEDIATE OR SURFACE COURSE, 1/2 IN. MIX, NO SPCL FRIC REQ	TON	226	
8	2303-0245828	ASPHALT BINDER, PG 58-28	TON	14	
9	2401-6745625	REMOVAL OF EXISTING BRIDGE	LS	1	
10	2402-2720000	EXCAVATION, CLASS 20	CY	2108	
11	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT)	CY	419.5	
12	2404-7775000	REINFORCING STEEL	LB	57905	
13	2501-5775000	PILES, STEEL SHEET	SF	575	
14	2502-8215124	SUBDRAIN, CORRUGATED METAL PIPE, 24 IN. DIA.	LF	68	
15	2505-4008100	REMOVAL OF GUARDRAIL	LF	380	
16	2507-3250005	ENGINEERING FABRIC	SY	1266	
17	2507-6850053	REVETMENT, SPECIAL	TON	361	
18	2510-6745850	REMOVAL OF PAVEMENT	SY	268	
19	2518-6910000	SAFETY CLOSURE	EACH	4	
20	2527-9263109	PAINTED PAVEMENT MARKING, WATERBORNE OR SOLVENT-BASED	STA	3.105	
21	2528-8445110	TRAFFIC CONTROL	LS	1	
22	2533-4980005	MOBILIZATION	LS	1	
23	2601-2634100	MULCHING	ACRE	0.6	
24	2601-2636043	SEEDING AND FERTILIZING (RURAL)	ACRE	0.6	
25	2602-0000030	SILT FENCE FOR DITCH CHECKS	LF	56	

2507-3250005 ENGINEERING FABRIC
ITEM INCLUDES 909 S.Y. OF ENGINEERING FABRIC PLACED ON THE TOP, BOTTOM, ENDS AND SIDES OF THE SPECIAL BACKFILL MATERIAL. ENGINEERING FABRIC FOR THIS PURPOSE SHALL BE MIRAFI 500X, SI GEOSOLUTIONS GEOTEX 200 ST, CONTECH C-200, OR APPROVED EQUAL. REFER TO DETAILS ON PLAN SHEET U1.

ITEM INCLUDES 357 S.Y. OF ENGINEERING FABRIC PLACED UNDER THE SPECIAL REVETMENT. SEE DRAWING SHEET U2 - DETAILS OF PLACEMENT OF ENGINEERING FABRIC FOR INSTALLATION DETAILS. MATERIAL SHALL CONFORM TO IOWA DOT MATERIALS IM 496.01 APPENDIX A, EMBANKMENT EROSION CONTROL (SPECIFICATION 4196.01C).

2507-6800053 REVETMENT, SPECIAL
THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING REVETMENT STONE, COMPLETE IN PLACE AS SHOWN ON THE DRAWINGS. REFER TO DETAILS ON PLAN SHEET U2 AND V1.

SPECIAL REVETMENT PLACED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS WILL BE MEASURED IN TONS TO THE NEAREST 0.1 TON. FOR THE QUANTITY OF SPECIAL REVETMENT FURNISHED AND PLACED, THE CONTRACTOR WILL BE PAID THE CONTRACT UNIT PRICE PER TON.

MATERIAL SHALL MEET THE REQUIREMENTS OF SECTION 4130 OF THE CURRENT STANDARD SPECIFICATIONS FOR CLASS B REVETMENT ON PRIMARY PROJECTS.

DEWATERING REQUIRED TO INSTALL REVETMENT SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR THIS ITEM.

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.

2510-6745850 REMOVAL OF PAVEMENT
EXISTING HMA PAVEMENT VARIES IN THICKNESS FROM 12 INCHES TO 15 INCHES. FULL DEPTH SAW CUTS SHALL BE REQUIRED AT ALL BREAKOUT LINES. ACTUAL LOCATION OF BREAKOUT LINES SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.

2518-6910000 SAFETY CLOSURE
REFER TO TABULATION ON THIS SHEET.

2527-9263109 PAINTED PAVEMENT MARKING, WATERBORNE OR SOLVENT-BASED
REFER TO TABULATION AND DETAILS ON PLAN SHEET C1.

2602-0000030 SILT FENCE FOR DITCH CHECKS
DITCH CHECKS SHALL BE AS PER STANDARD ROAD PLAN RC-17. QUANTITY INCLUDES SILT FENCE AT ROADWAY CULVERT INLETS AS DETAILED ON PLAN SHEET C1. MAXIMUM SPACING OF STEEL POSTS SHALL BE 5 FEET. REFER TO TABULATION ON PLAN SHEET C1.

ESTIMATED PROJECT QUANTITIES AND GENERAL INFORMATION

REV.:

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 229, DENISON, IOWA 51442
PHONE: (712)263-0118 FAX: (712)263-2181

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 CONTRACTOR'S EXPENSE WITHOUT COST TO THE CONTRACTING AUTHORITY. ANY TILE LINES BROKEN OR DISTURBED BY CUT LINES WILL BE REPLACED AS DIRECTED BY THE ENGINEER IN CHARGE OF CONSTRUCTION AND AT THE CONTRACTING AUTHORITY'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 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.

CONSTRUCTION STAKING SHALL BE PROVIDED BY THE OWNER IN ACCORDANCE WITH ARTICLE 1105.06 OF THE CURRENT STANDARD SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING AN INDEPENDENT CHECK OF ALL CONSTRUCTION STAKES PLACED FOR THE PROJECT. THIS INDEPENDENT CHECK SHALL BE SUFFICIENT TO UNDERSTAND THE PLACEMENT AND INTENT OF THE STAKES.

THE CONTRACTOR IS ENCOURAGED TO CONDUCT CONSTRUCTION ACTIVITIES DURING A PERIOD OF LOW FLOW. ANY TEMPORARY CROSSINGS SHALL INCLUDE ENOUGH CULVERTS TO ACCOMMODATE LOW FLOWS AND MUST BE REMOVED AFTER COMPLETION OF WORK ON THIS PROJECT. THE CONTRACTOR IS REQUIRED TO REMOVE ALL FILL MATERIAL USED AS A TEMPORARY CROSSING TO AN UPLAND, NON-WETLAND SITE AND TO IMPLEMENT APPROPRIATE MEASURES TO INSURE SEDIMENTS ARE NOT INTRODUCED INTO WATERS OF THE UNITED STATES DURING CONSTRUCTION OF THIS PROJECT. THE COST OF INSTALLATION, MAINTENANCE AND REMOVAL OF TEMPORARY CROSSINGS, INCLUDING CULVERTS, SHALL BE INCIDENTAL TO THE PROJECT.

01-20-84 212-1
SOUNDING AND TEST BORING DATA SHOWN ON PLANS WERE ACCUMULATED FOR DESIGNING AND ESTIMATING PURPOSES. THEIR APPEARANCE ON THE PLAN DOES NOT CONSTITUTE A GUARANTEE THAT CONDITIONS OTHER THAN THOSE INDICATED WILL NOT BE ENCOUNTERED.

10-29-02 213-1
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.

10-27-98 213-4
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.

04-30-02 213-7
UNLESS OTHERWISE DIRECTED OR AUTHORIZED, ALL HOT MIX ASPHALT AND OTHER BITUMINOUS MATERIALS WHICH ARE NOT SPECIFICALLY ADDRESSED OR DESCRIBED IN THE CONTRACT DOCUMENTS SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

THE CONTRACTOR, IN ACCORDANCE WITH CURRENT RULES AND REGULATIONS OF THE IOWA DEPARTMENT OF NATURAL RESOURCES, MAY:

1. WITH THE APPROVAL OF THE ENGINEER, BLEND OR OTHERWISE PROCESS THE MATERIAL FOR USE WITH SHOULDER OR SPECIAL BACKFILL AGGREGATE, FOR USE ON THE PROJECT.
2. WITH THE APPROVAL OF THE ENGINEER, PLACE WITH MATERIAL IN AREAS DESIGNATED BY THE ENGINEER AS SOIL AGGREGATE SUBBASE WITHOUT EXTRA CHARGE.
3. REMOVE THE MATERIAL FROM THE PROJECT AND STOCKPILE FOR THE CONTRACTOR'S FUTURE USE.

01-19-88 251-1
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.

ESTIMATED PROJECT QUANTITIES
AND GENERAL INFORMATION

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)263-2191

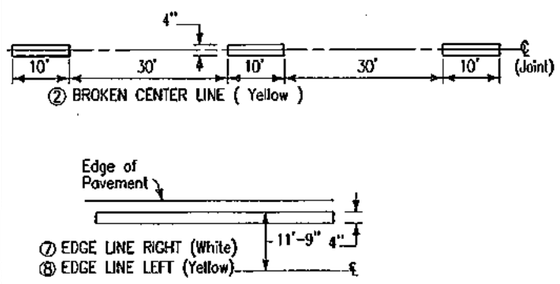
DRAINAGE STRUCTURES

104-3 MODIFIED

* Not a bid item

DRAINAGE AREA (Acres)	LOCATION	TYPE	SIZE Inches	KIND OF PIPE	LENGTH NEW CONST. Lin. Ft.	BEDDING CLASS	DESIGN COVER (H)	CAMBER Ft.	APRON NO. Inlet	APRON NO. Outlet	ELBOW* RF-13 No.	DIAPHRAGM* RF-7 No.	TEE SECTION* RF-21 No.	ADAPTORS* RF-2 Type	ADAPTORS* RF-2 No.	CONNECTED PIPE JOINT* RF-14 Type	FLOW LINE ELEVATIONS Lt.	FLOW LINE ELEVATIONS Rt.	FLOW LINE ELEVATIONS Other	FLOW LINE ELEVATIONS Other	DIMENSIONS Lin. Ft. Total Lt.	DIMENSIONS Lin. Ft. Total Rt.	SKEW AHEAD Degrees Lt.	SKEW AHEAD Degrees Rt.	DIKE Rt. Lt.	DIKE Location Station	DIKE Top Elevation	DIKE Type	Class 20 Cu. Yds.	Granular Backfill Tons	REMARKS
1	15+05.53	SEE U3	24	CMP	34	C	3.5					1							492.83	486.50	33.41				RT.	15+14	495.83	F	–		SUBDRAIN
5	15+20.35	SEE U3	24	CMP	34	C	3.5					1							485.00	491.33		33.41			LT.	15+12	494.33	F	–		SUBDRAIN

9001 MODIFIED



STANDARD TYPES OF PAVEMENT MARKINGS

TABULATION OF PAVEMENT MARKINGS

108-22 MODIFIED

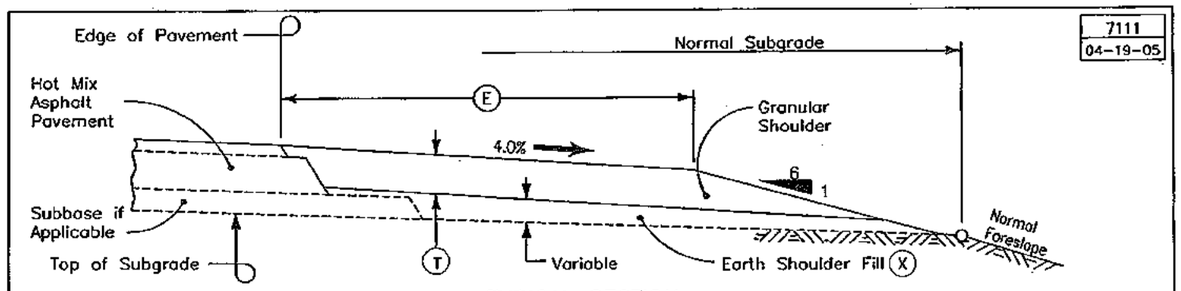
② Broken Center Line (Yellow) ③ Double Center Line (Yellow) ⑤ No-Passing Zone Line (Yellow) ⑦ EDGE LINE RIGHT (White)

ROAD IDENTIFICATION	LOCATION STATION TO STATION	SIDE L	SIDE R	LENGTH (In Stations) ②	③	⑤	⑦	REMARKS
	14+51 – 15+89	X	X	1.380			2.760	
	LENGTH SUBTOTALS			1.380			2.760	
	QUANTITY FACTORS			.25	2	1	1	
	TOTALS			0.345			2.760	TOTAL = 3.105 STA.

TABULATION OF EARTHWORK QUANTITES

STA.	CUT	ADD. CUT	FILL +35%	ADD. FILL	TOTAL CUT	TOTAL FILL+35%	BALANCE
14+30.73							
14+42.55	0		10		0	10	
14+92.55	26		1144	300	26	1444	
15+23.05	30		1411	260	30	1671	
15+42.55	28		593		28	593	
15+92.55	49		309		49	309	
15+96.10	0		0		0	0	
TOTAL					133	4027	

7111 04-19-05



TYPICAL SECTION
TYPE 'A' OR 'B' GRANULAR SHOULDER
Adjacent to HMA Pavement

ROAD IDENTIFICATION	LOCATION STATION TO STATION		E Feet	T Inches	SIDE	X Cu.Yds.
M55	14+30.73	15+41.80	8	6	LT	32.5
M55	14+85.04	15+96.10	8	6	RT	32.5

Notes:
See Standard Road Plan RJ-26D.
Earth Shoulder fill requires approximately X cubic yards of excavation, including 35% for shrinkage, per shoulder per station.

REMOVAL OF PAVEMENT

*Not a bid item.

110-1 MODIFIED

STATION TO STATION		PAVEMENT TYPE	AREA (Sq. Yds.)	SAW CUT* (Lin. Ft.)	REMARKS
14+51.43	14+92.41	HMA	103.6	22.6	
15+23.37	15+88.56	HMA	164.4	22.6	
TOTAL			268.0		

REMOVE or REMOVE & REINSTALL BEAM GUARDRAIL

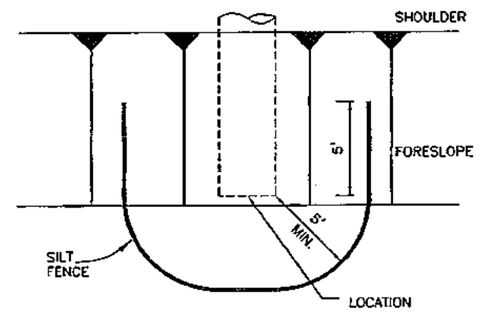
110-7A 04-19-05

No.	LOCATION Direction of Traffic	LOCATION Station	Side	STEEL BEAM GUARDRAIL Remove (Lin. Ft.)	STEEL BEAM GUARDRAIL Remove & Reinstall (Lin. Ft.)	POST Remove (No.)	POST Remove & Reinstall (No.)	END ANCHORAGE Remove (No.)	END ANCHORAGE Remove & Reinstall (No.)	END ANCHORAGE Type	Remarks
	NB	15+07.86	--	190	--	39	--	2	--	RE-33A	SALVAGE BEAMS
	SB	15+07.86	--	190	--	39	--	2	--	RE-33A	SALVAGE BEAMS

TABULATION OF SILT FENCES

100-17 11-10-83

STATION TO STATION		SIDE	LIN. FT.	REMARKS
15+05	–	RT.	28	CULVERT INLET
15+20	–	LT.	28	CULVERT INLET
TOTAL			56	



DETAILS OF SILT FENCE AT CULVERT INLETS
NO SCALE

TABULATIONS, TYPICALS

PARCEL NUMBER PROPERTY OWNER

1. ROSENER FARMS INC
2. VETTER FARMS LTD

WESTSIDE TWP.
T-84N R-37W

'X' NAILS IN TOP OF WOOD FENCE POSTS

EDGE OF PAVEMENT
PK NAIL FLUSH
EDGE OF PAVEMENT

'X' NAILS IN TOP OF WOOD FENCE POSTS

STA. 11+92.55, 0.43' LT.
CONTROL POINT #5
ALL DIST. PLUMBED CHAINED

SE1/4 SW1/4
19-84-37
①

EDGE OF PAVEMENT
PK NAIL FLUSH
EDGE OF PAVEMENT

'X' NAILS IN TOP OF WOOD FENCE POSTS

STA. 18+22.97, 0.32' LT.
CONTROL POINT #6
ALL DIST. PLUMBED CHAINED

NE1/4 SW1/4
19-84-37
①

0' 50' 100' 150'

BM#1 – 60D SPIKE IN 1.0' DIA. GATE POST
@ STA. 12+82.13, 49.39' RT. EL. = 500.00

BM#2 – 60D SPIKE IN WOOD FENCE POST
@ STA. 18+19.07, 48.97' RT. EL. = 496.68

STA. 0+00
S1/4 CORNER
SEC. 19-84-37

SW1/4 SE1/4
19-84-37
②

EXISTING R-O-W

STA. 14+30.73
BEGIN PROJECT

STA. 15+14.75 MAINLINE =
STA. 115+14.75 CHANNEL

DITCH TO DRAIN

STA. 15+96.10
END PROJECT

SECTION LINE AND SURVEY BASELINE

STA. 26+18.79
CENTER
SEC. 19-84-37

CP#5

CP#6

BM#1

+97 F. ENT.

STA. 14+51.43
BEGIN REMOVAL OF PAVEMENT

DITCH TO DRAIN

STA. 15+88.56
END REMOVAL OF PAVEMENT

BM#2

EXISTING R-O-W

NW1/4 SE1/4
19-84-37
②

NEEDLINE

STA. 12+97, F. ENT. RT.
24"x61" CMP
U.A.C.

STA. 15+07.86, EXISTING 30' x 27'-3
PRESTRESSED CONCRETE CHANNEL BEAM BRIDGE
WITH TIMBER HIGH ABUTMENTS AND TIMBER TRESTLE PILE,
TO BE REMOVED FROM THE PROJECT RIGHT-OF-WAY.
CONTRACTOR SHALL CONSTRUCT TWIN 10'x10'x108' RCB
W/FLARED WING HEADWALLS @ STA. 15+14.75,
SKEW 30° RT. AHEAD. DESIGN FILL = 9.8'
D.A. = 3.85 S.M.

STA. 15+05, 62' RT.
CONTRACTOR TO FURNISH AND PLACE
24"x34" CMP SUBDRAIN
INCL. 1 TYPE 'A' DIAPHRAGM
I.E. IN = 492.83
I.E. OUT = 486.50

STA. 15+20, 64' LT.
CONTRACTOR TO FURNISH AND PLACE
24"x34" CMP SUBDRAIN
INCL. 1 TYPE 'A' DIAPHRAGM
I.E. IN = 491.33
I.E. OUT = 485.0

510
505
500

EXISTING GRADE

PROPOSED GRADE
0.45%

EXISTING BRIDGE

0' 5' 10' 15'
VERTICAL SCALE

PROPOSED CL GRADE

14+51.43
503.26

503.48

503.71

15+88.56
503.88

9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00

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. 05106 DATE: 07/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(65)--60-24

SHEET 01

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: G1759
Project: Crawford County Bridge FHWA 128590
Date Started: 6/20/06
Date Completed: 6/20/06
Boring No.: B-1
Boring Location: North Abutment
Drill Type: Hollow Stem
Ground Elev.: 99.8

Shelby Tube | Standard Split Spoon | Water Level ATD
Modified California | Grab Sample | Water Level After 7 Days

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (TSF)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Other Tests
			12-INCH ASPHALT LAYER											
			FILL, Lean Clay with Sand and Gravel, Gray Brown, Moist to Wet		7-6-4 N= 10	20								
5					1-1-3 N= 4	20								
					2-2-3 N= 5	15								
10						17	106	83	1.50					
15					1-3-3 N= 6	22								
20						24	98	94	1.00					
			(Concrete Rubble)											
25			WELL GRADED SAND WITH GRAVEL, Medium Brown, Wet, Loose to Medium Dense, Alluvium	SW	4-4-5 N= 9									
30					7-12-15 N= 27									
			FAT CLAY WITH SAND AND GRAVEL, Yellowish Gray Brown, Moist, Stiff, Glacial Till	CH	5-4-6 N= 10	18								
35			END OF BORING AT 35 FEET FREE GROUNDWATER WAS ENCOUNTERED AT 21 FEET AT THE TIME OF DRILLING											

LOG OF BORING G1759.GPJ CERTIFIED TESTING.GDT 8/14/06

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: G1759
Project: Crawford County Bridge FHWA 128590
Date Started: 6/20/06
Date Completed: 6/20/06
Boring No.: B-2
Boring Location: South Abutment
Drill Type: Hollow Stem
Ground Elev.: 99.4

Shelby Tube | Standard Split Spoon | Water Level ATD
Modified California | Grab Sample | Water Level After 7 Days

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (TSF)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Other Tests
			15-INCH ASPHALT LAYER											
			FILL, Lean Clay with Sand and Gravel, Gray Brown, Dry to Moist		2-2-3 N= 5	9								
5					10-3-3 N= 6	19								
						26	94	92	1.00					
10					1-1-4 N= 5	23								
15						23	97	88	1.00					
20			LEAN CLAY, Dark Gray Brown, Wet, Soft, Alluvium	CL	1-1-2 N= 3	27								
25			SILTY SAND WITH CLAY LENSES, Medium Gray Brown, Wet, Alluvium	SM										
30			FAT CLAY WITH SAND AND GRAVEL, Yellowish Gray Brown, Moist, Stiff, Glacial Till	CH	2-2-3 N= 5	18								
					3-5-6 N= 11	17								
35			END OF BORING AT 35 FEET FREE GROUNDWATER WAS ENCOUNTERED AT 20 FEET AT THE TIME OF DRILLING											

LOG OF BORING G1759.GPJ CORRECTED TESTING.GDT 8/14/06

GEOTECHNICAL INFORMATION PROVIDED HEREWITH IS THE SOLE RESPONSIBILITY OF CERTIFIED TESTING SERVICES, INC., WHOSE GEOTECHNICAL REPORT DATED JUNE 28, 2006, COMPLETE WITH THE LICENSED ENGINEER'S SEAL AND CERTIFICATION, IS AVAILABLE FOR VIEWING.

SOUNDING DATA

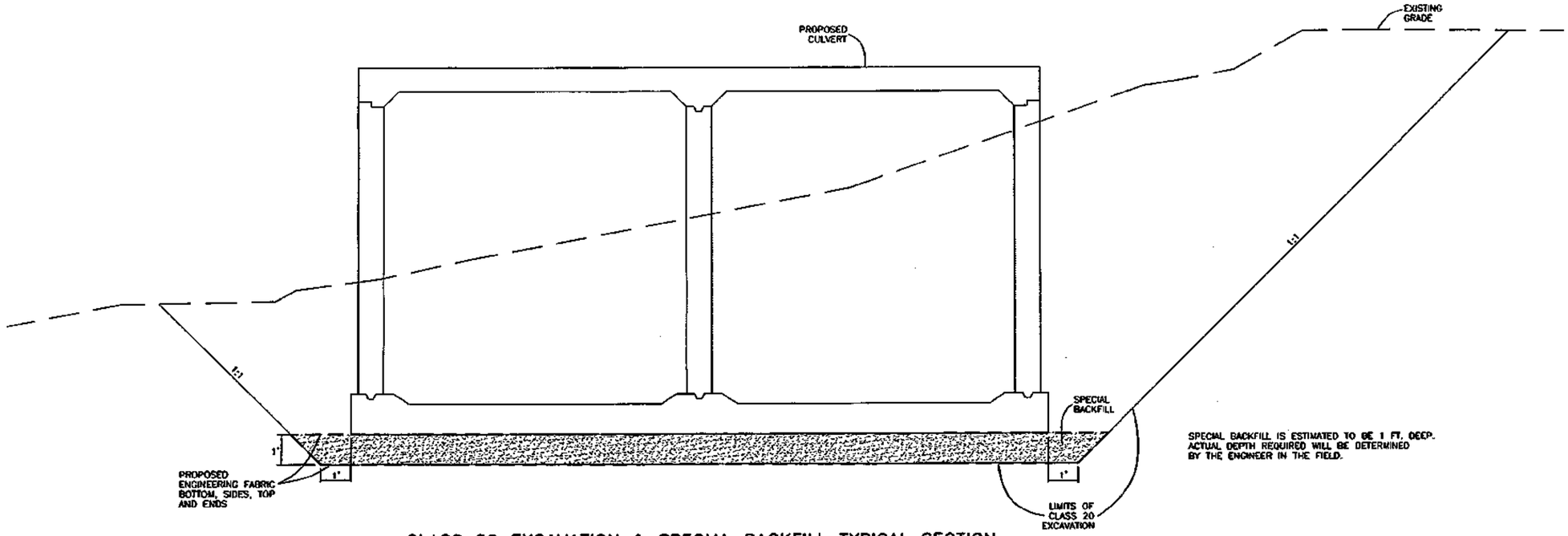
NOTE: THESE SOUNDINGS WERE MADE FOR DESIGN PURPOSES AND ARE NOT GUARANTEED FOR CONSTRUCTION.

SOUNDINGS WERE TAKEN ON JUNE 20, 2006.

SEE SHEET V1 FOR BORING LOCATIONS.

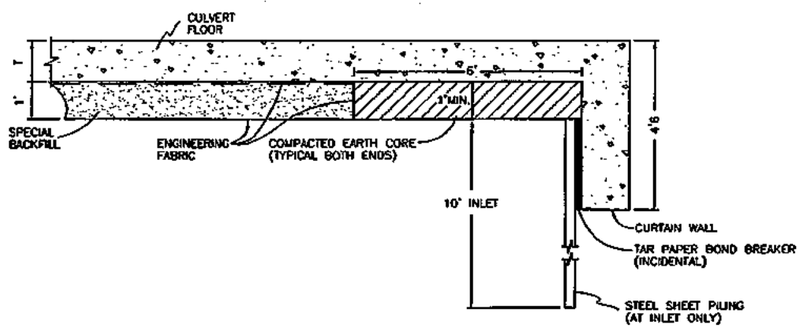
REV.:

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



CLASS 20 EXCAVATION & SPECIAL BACKFILL TYPICAL SECTION

NOT TO SCALE



SECTION AT HEADWALL CURTAIN WALL

NOT TO SCALE

TABULATIONS, TYPICALS

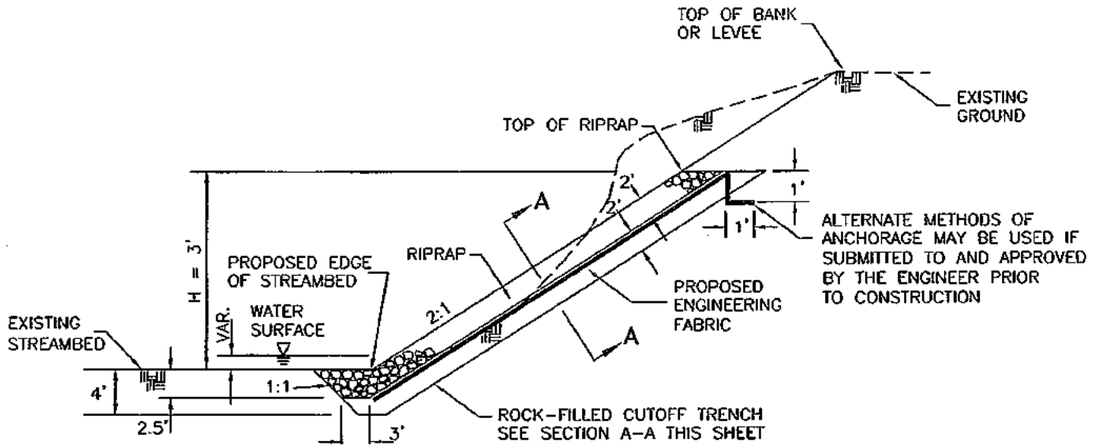
REV.:

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)263-2161

SE PROJECT NO. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

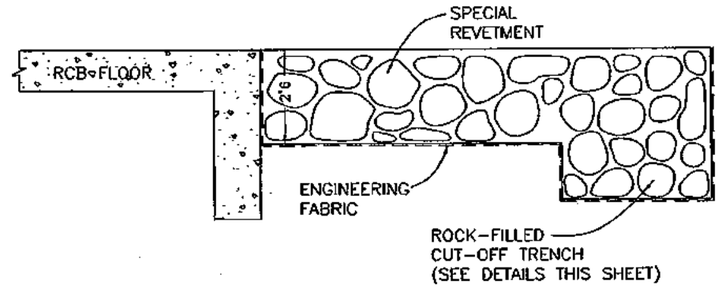
CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24

SHEET U1



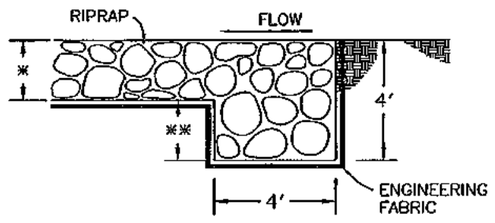
TYPICAL HALF-CHANNEL BANK STABILIZATION SECTION

NOT TO SCALE

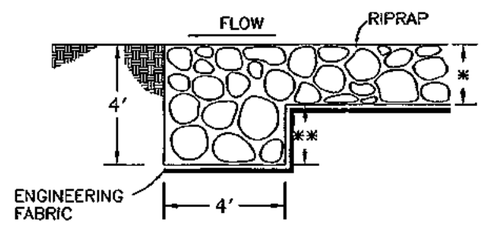


CULVERT HEADWALL ARMORING

NOT TO SCALE



TYPICAL UPSTREAM



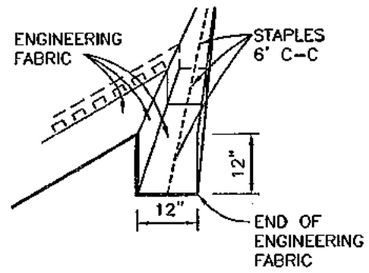
TYPICAL DOWNSTREAM

SECTION A-A

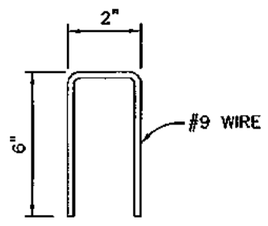
ROCK-FILLED CUTOFF TRENCH DETAILS

NOT TO SCALE

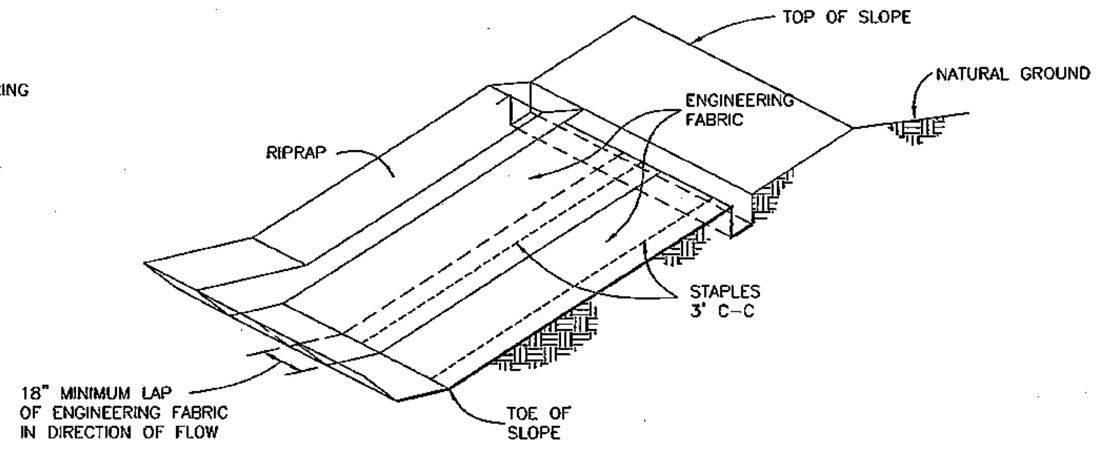
* 2.5' ON CHANNEL BOTTOM
2.0' ON SIDE SLOPES
** 1.5' ON CHANNEL BOTTOM
2.0' ON SIDE SLOPES



DETAIL OF TRENCH



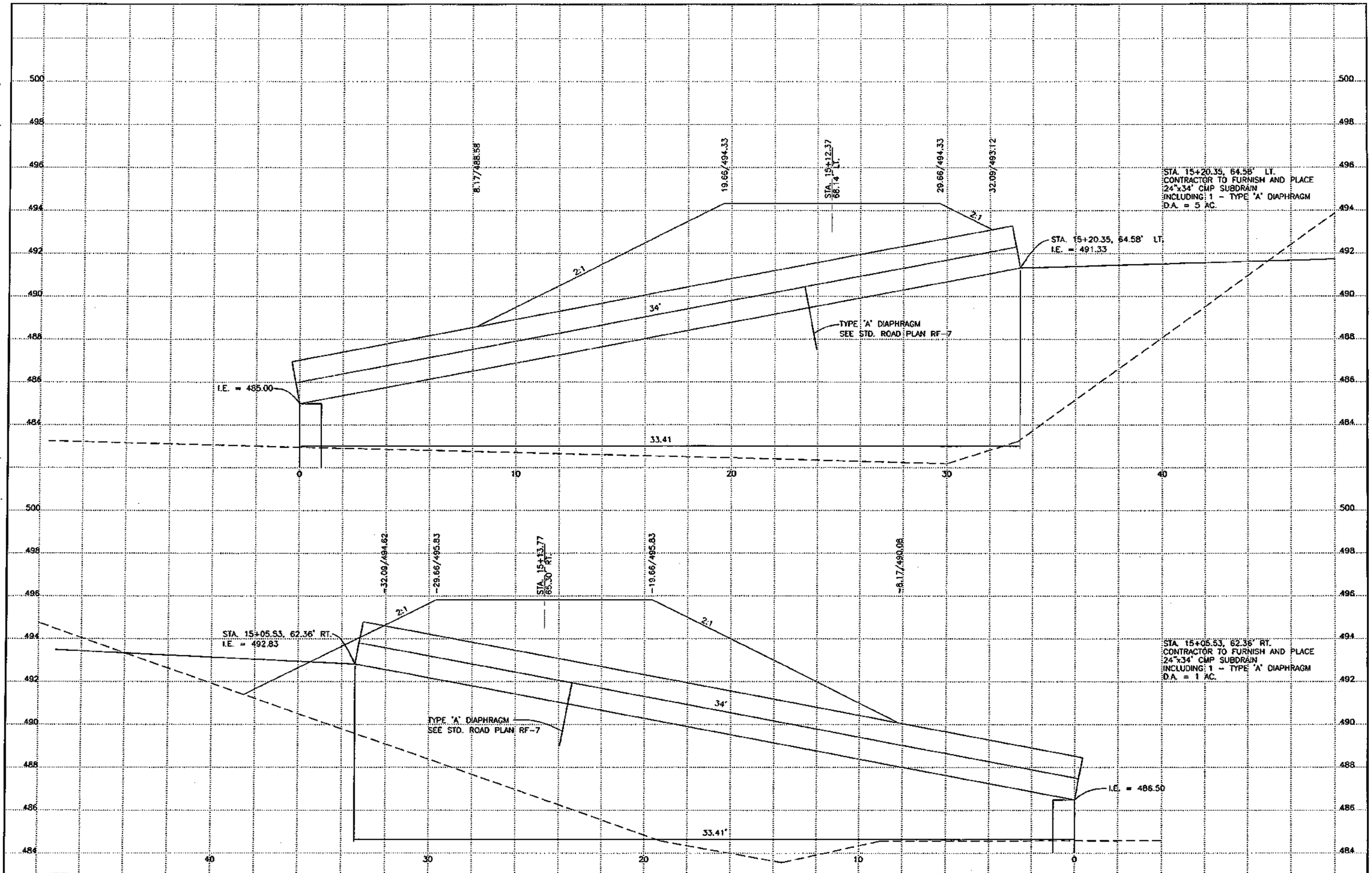
STAPLE



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

NOT TO SCALE



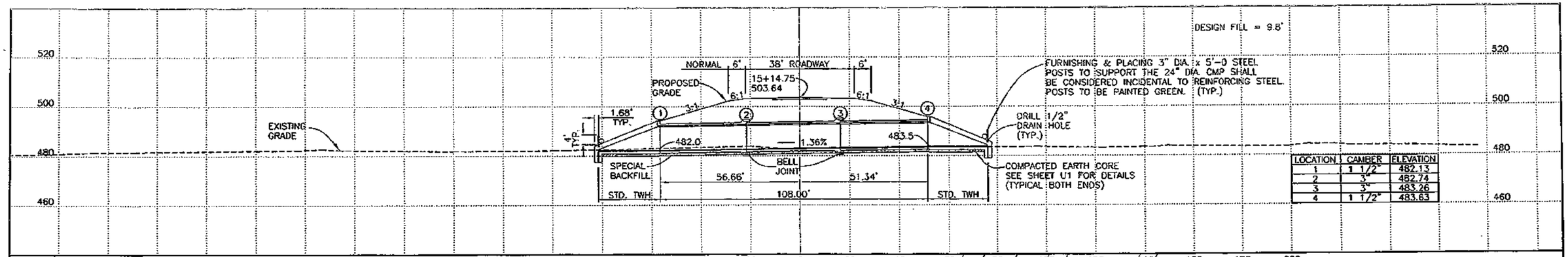
REV:

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • PLATTING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-6186 FAX: (712)263-2161

SE PROJECT NO. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24

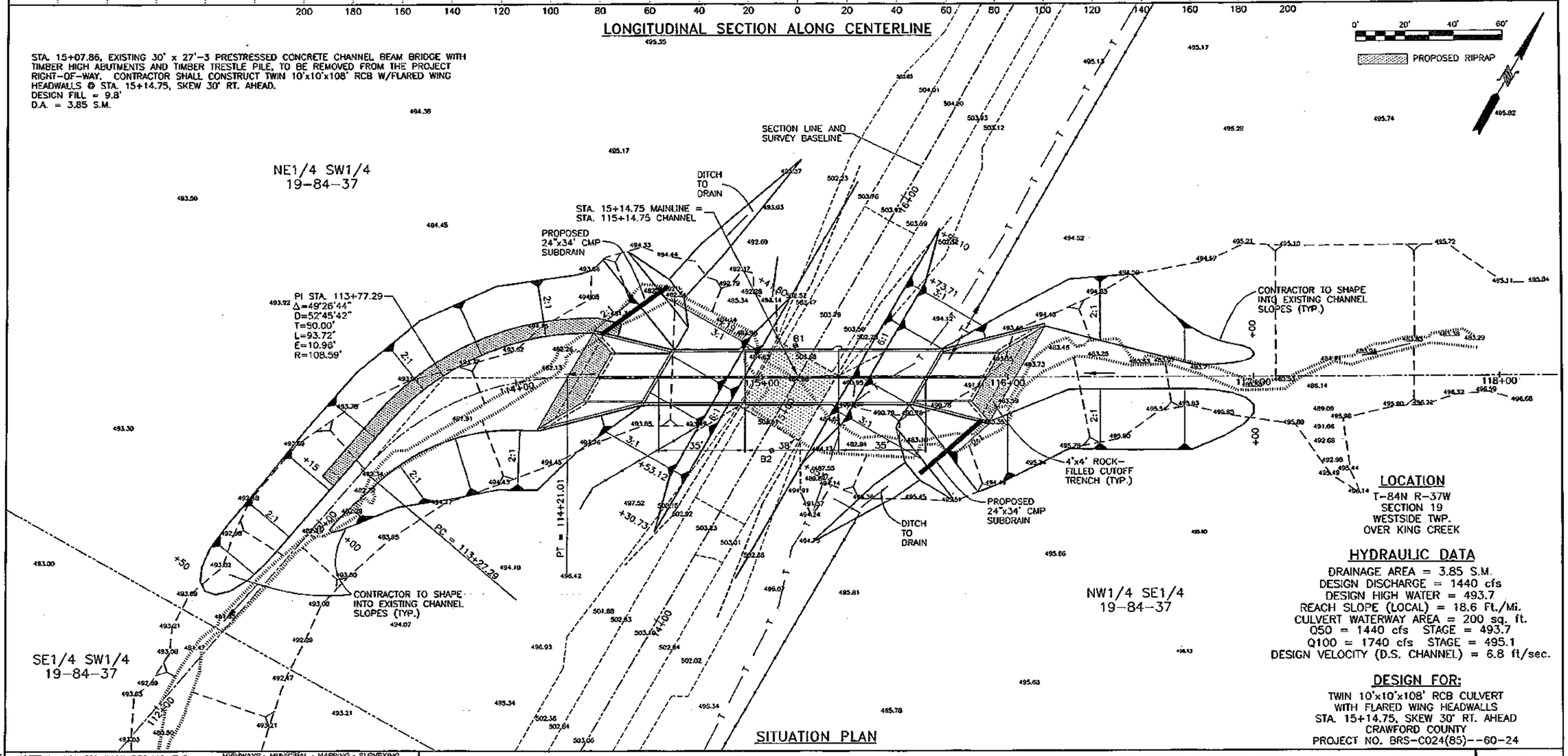
SHEET U3



LOCATION	CAMBER	ELEVATION
1	1 1/2"	482.13
2	3"	482.74
3	3"	483.26
4	1 1/2"	483.63

LONGITUDINAL SECTION ALONG CENTERLINE

STA. 15+07.86, EXISTING 30' x 27'-3 PRESTRESSED CONCRETE CHANNEL BEAM BRIDGE WITH TIMBER HIGH ABUTMENTS AND TIMBER TRESTLE PILE, TO BE REMOVED FROM THE PROJECT RIGHT-OF-WAY. CONTRACTOR SHALL CONSTRUCT TWIN 10'x10'x108' RCB W/FLARED WING HEADWALLS @ STA. 15+14.75, SKEW 30° RT. AHEAD.
DESIGN FILL = 9.8'
D.A. = 3.85 S.M.



SITUATION PLAN

LOCATION

T-84N R-37W
SECTION 19
WESTSIDE TWP.
OVER KING CREEK

HYDRAULIC DATA

DRAINAGE AREA = 3.85 S.M.
DESIGN DISCHARGE = 1440 cfs
DESIGN HIGH WATER = 493.7
REACH SLOPE (LOCAL) = 18.6 Ft./Mi.
CULVERT WATERWAY AREA = 200 sq. ft.
Q50 = 1440 cfs STAGE = 493.7
Q100 = 1740 cfs STAGE = 495.1
DESIGN VELOCITY (D.S. CHANNEL) = 6.8 ft/sec.

DESIGN FOR:

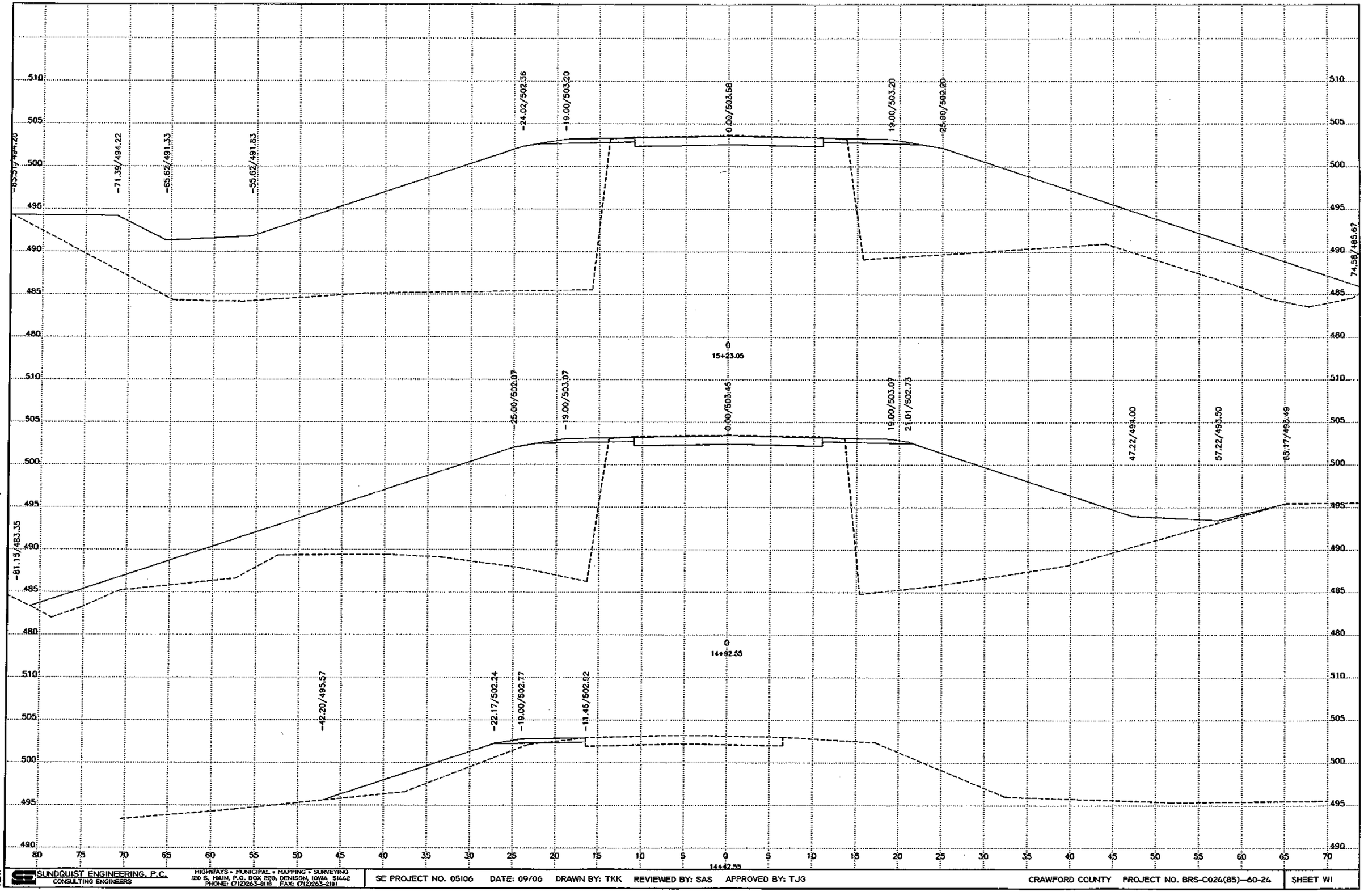
TWIN 10'x10'x108' RCB CULVERT
WITH FLARED WING HEADWALLS
STA. 15+14.75, SKEW 30° RT. AHEAD
CRAWFORD COUNTY
PROJECT NO. BRS-C024(85)--60-24

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. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)-60-24



REV:

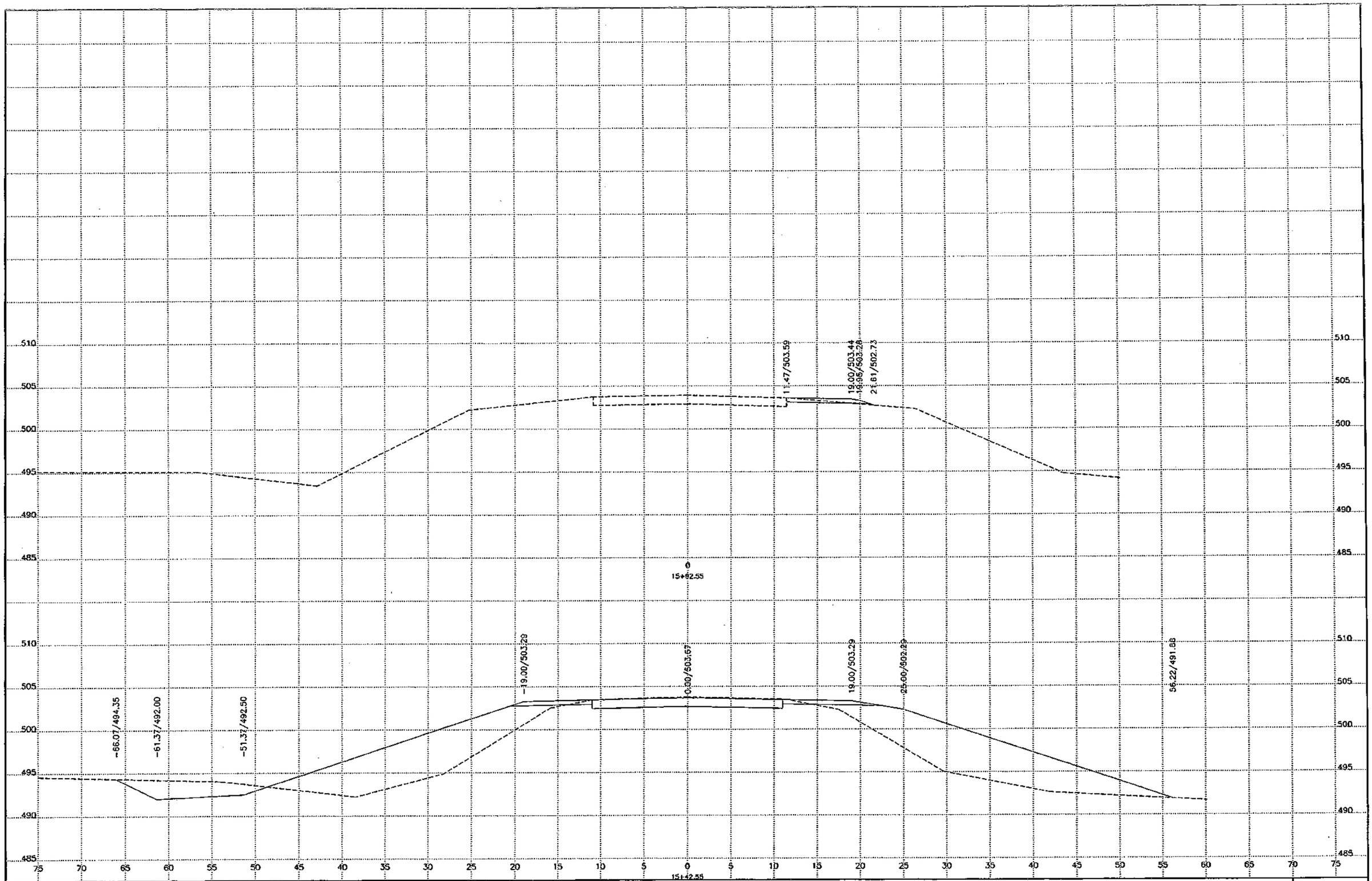
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS

HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2161

SE PROJECT NO. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24

SHEET WI



REV:

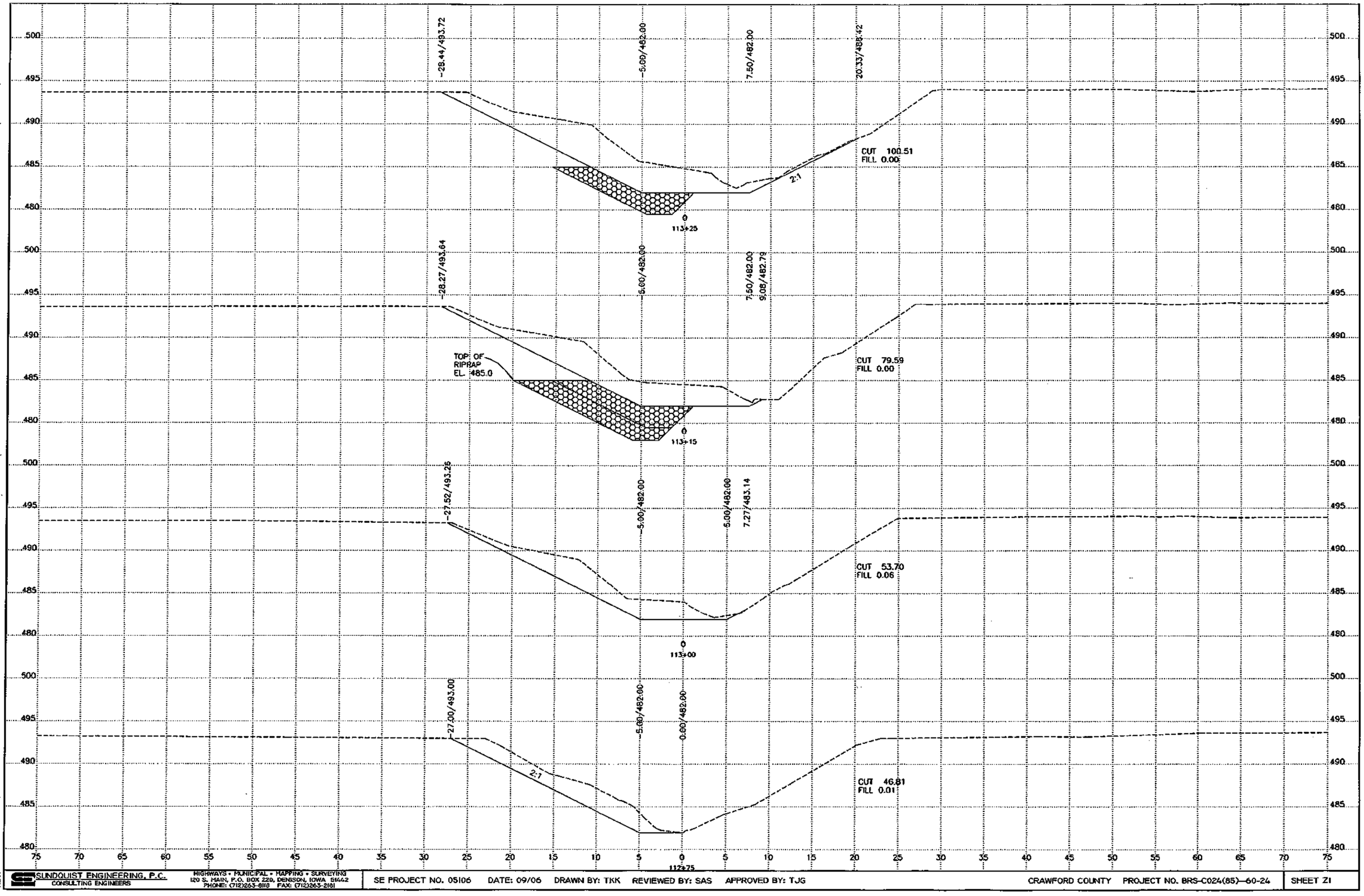
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS

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. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24

SHEET W2



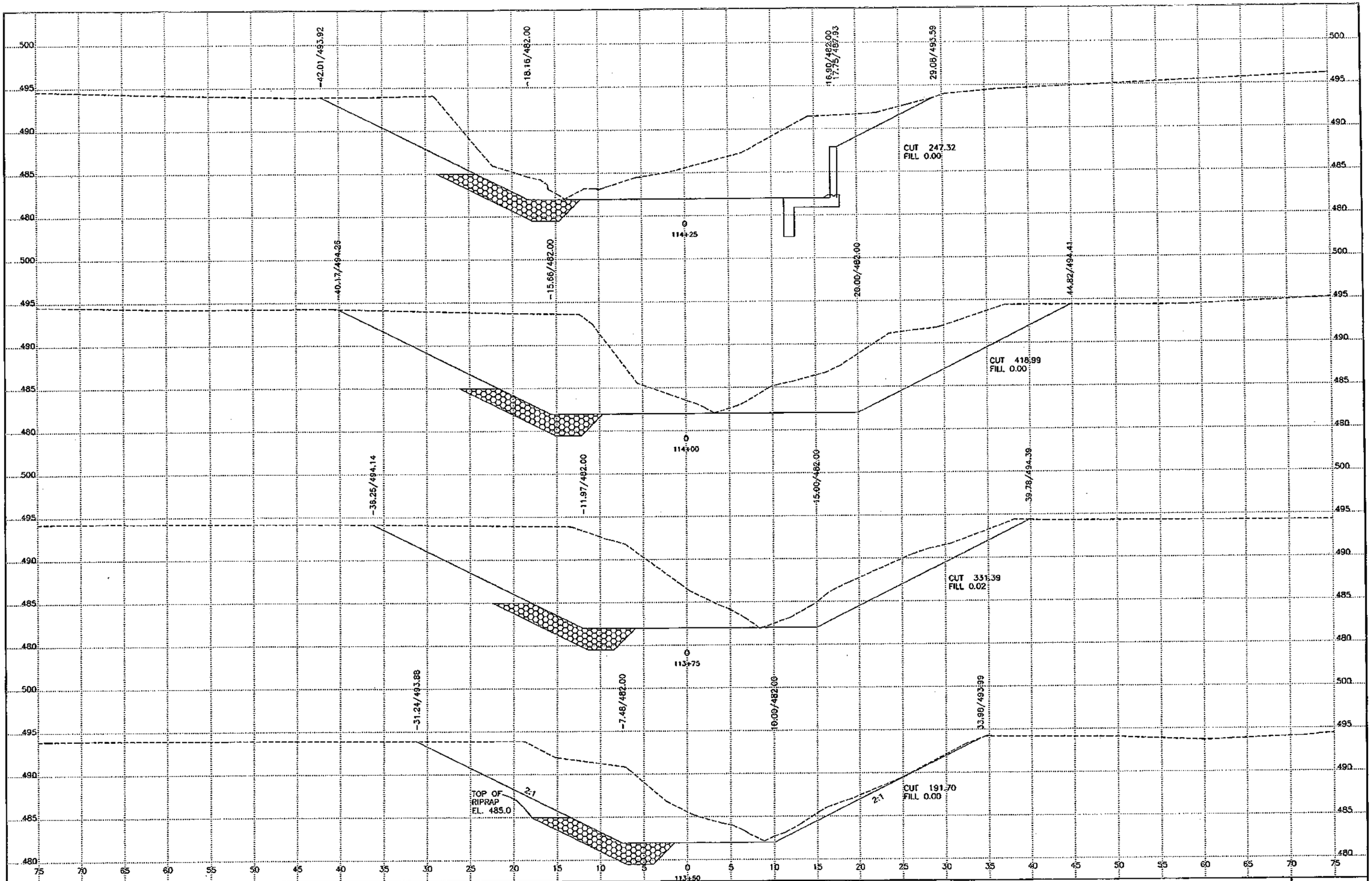
REV:

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)263-2161

SE PROJECT NO. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)—60-24

SHEET 21



REV:

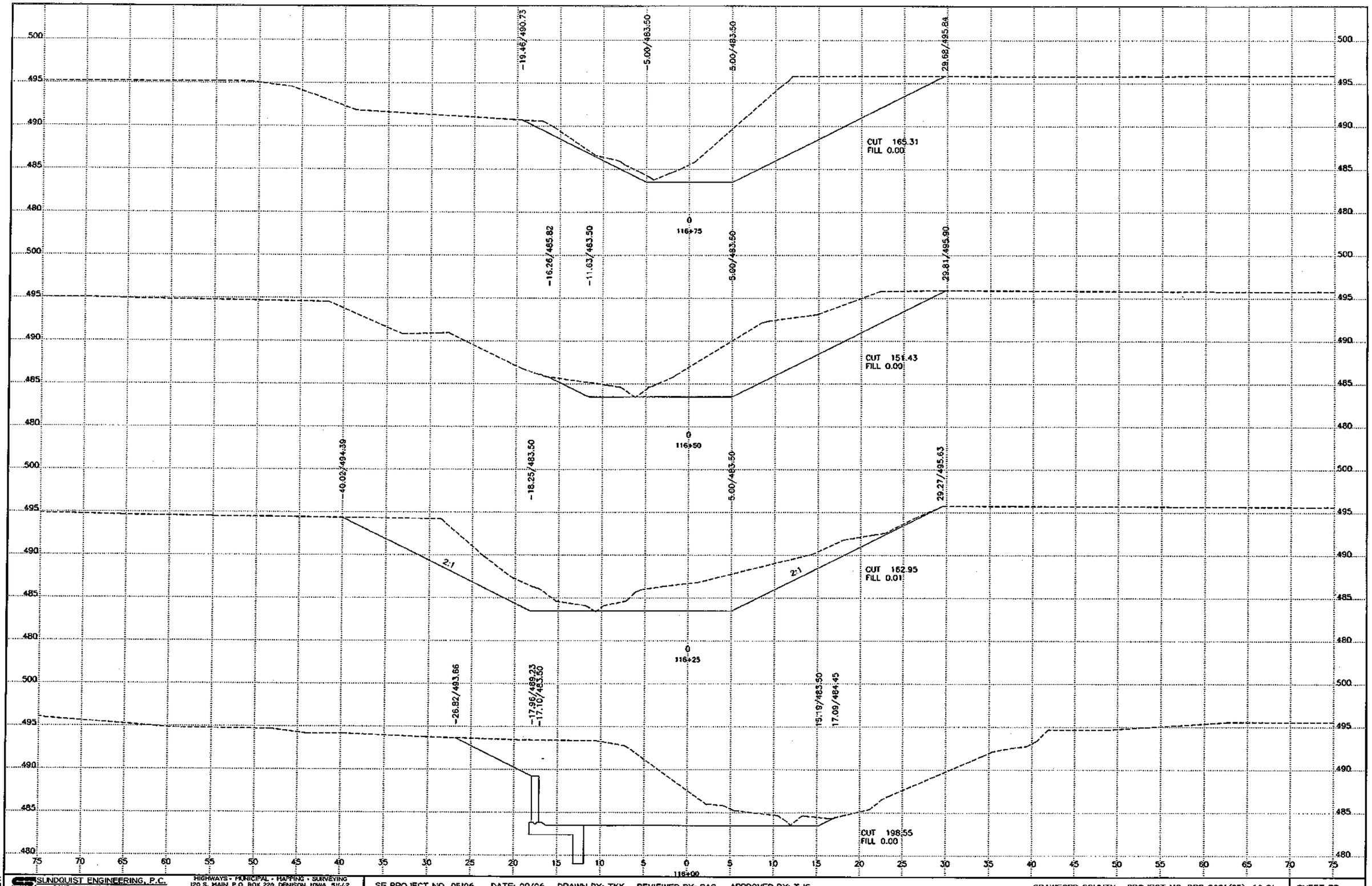
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS

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. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24

SHEET 22



REV:

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 229, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

SE PROJECT NO. 05106 DATE: 09/06 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CRAWFORD COUNTY PROJECT NO. BRS-C024(85)--60-24