LETTING DATE 5-28-02

RCP FLUME OUTLET

LHC30-3N

CRAWFORD COUNTY

834-3N

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 VI OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REVISION 3, DATED SEPTEMBER 3, 1993.

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

SECONDARY ROAD SYSTEM
CRAWFORD COUNTY

PROJECT NO. LHC30-3N
RCP FLUME OUTLET
ON M AVENUE OVER
UNNAMED CREEK

IN COOPERATION WITH LOESS HILLS DEVELOPMENT AND CONSERVATION AUTHORITY - HUNGRY CANYONS ALLIANCE
SITE HC 01-21

SCALES: As Noted

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

	TOTAL SHEETS
	8
PROJECT NUMBER	
LHC30-3N	
R.O.W. PROJECT NUMBER	
PROJECT IDENTIFICATION NUMBER	

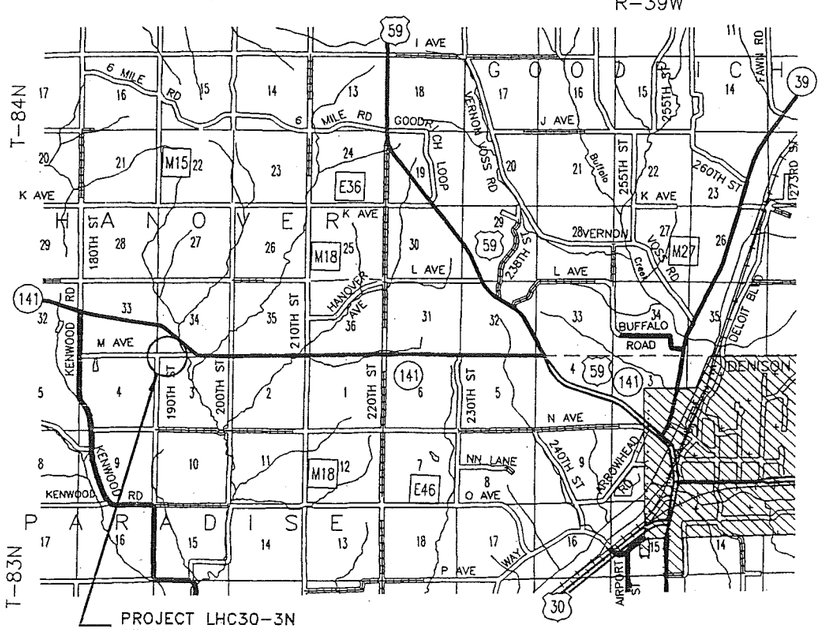
INDEX OF SHEETS

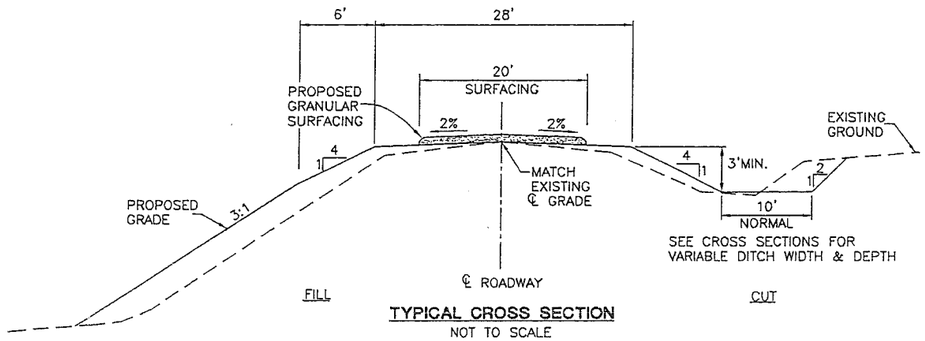
NO.	DESCRIPTION
A1	TITLE SHEET
B1-2	ESTIMATE PROJECT QUANTITIES AND GENERAL INFORMATION
U1-3	DETAIL SHEETS
V1	CULVERT SITUATION PLAN
W1	CROSS SECTIONS

STANDARD ROAD PLANS

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

Identification	Date	Identification	Date	Identification	Date
RF-1	04-03-01	RF-30A	03-28-95	RF-31	03-28-95
RF-14	04-25-00	RF-30B	04-30-02	RS-26A	10-28-97





TYPICAL CROSS SECTION
NOT TO SCALE

Approved

4/30/02

Crawford County Engineer — Date

Approved

BOARD OF SUPERVISORS

DESIGN DATA RURAL

2000 AADT LHC30-3N	70	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.

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.

LICENSED PROFESSIONAL ENGINEER — TROY J. GROTH 14450 — IOWA

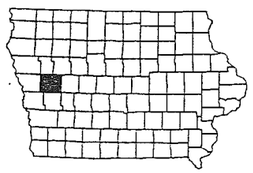
TROY J. GROTH, P.E. #14450 — 4/12/02 DATE

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2003.

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

LOCATION MAP SCALE
0 1 2 3
SCALE IN MILES



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 0 C.Y. CUT, 192 C.Y. FILL + 35%, 192 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.

5. 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.

6. REMOVAL OF EXISTING STRUCTURES
INCLUDES REMOVAL AND DISPOSAL OF EXISTING REINFORCED CONCRETE CULVERT HEADWALL AT STA. 100+98.

ESTIMATED PROJECT QUANTITIES

100-1A
07-15-97

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2101-0850001	CLEARING AND GRUBBING	ACRE	0.05	
2	2102-0425070	SPECIAL BACKFILL	TON	65	
3	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	CY	192	
4	2104-2710020	EXCAVATION, CLASS 10 CHANNEL	CY	76	
5	2107-0425020	COMPACTING BACKFILL ADJACENT TO BRIDGES, CULVERTS OR STRUCTURES	CY	43.3	
6	2401-6745650	REMOVAL OF EXISTING STRUCTURES	LS	1	
7	2402-2720000	EXCAVATION, CLASS 20	CY	142	
8	2402-2720100	EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERT	CY	160	
9	2403-0100000	STRUCTURAL CONCRETE (MISCELLANEOUS)	CY	35.06	
10	2404-7775000	REINFORCING STEEL	LB	4831.44	
11	2416-1180084	CULVERT, CONCRETE ROADWAY PIPE, 84 IN. DIA.	LF	6	
12	2416-1541136	REMOVE AND REINSTALL RIGID PIPE CULVERT GREATER THAN 36 IN.	LF	18	
13	2501-5775000	PILES, STEEL SHEET	SF	180	
14	2518-6910000	SAFETY CLOSURE	EACH	4	
15	2528-8445110	TRAFFIC CONTROL	LS	1	
16	2533-4980005	MOBILIZATION	LS	1	
17	2599-9999010	REMOVAL OF WATER	LS	1	
18	2601-2634100	MULCHING	ACRE	0.2	
19	2601-2636043	SEEDING AND FERTILIZING (RURAL)	ACRE	0.2	

7. EXCAVATION, CLASS 20
ITEM INCLUDES EXCAVATION NECESSARY FOR CONSTRUCTION OF THE REINFORCED CONCRETE FLUME. REFER TO TYPICAL SECTION ON PLAN SHEET B2.

CONSTRUCTION OF EMBANKMENT ADJACENT TO REINFORCED CONCRETE FLUME WILL NOT BE MEASURED FOR PAYMENT AND SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.

8. EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERT
CONSTRUCTION OF EMBANKMENT ADJACENT TO CONCRETE CULVERT PIPE WILL NOT BE MEASURED FOR PAYMENT AND SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.

9. 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. 100+98. 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.

10. REINFORCING STEEL
QUANTITY INCLUDES ALL REINFORCING STEEL NECESSARY TO CONSTRUCT HEADWALL AND FLUME AT STA. 100+98. REFER TO TABULATION ON SHEET U3 FOR STEEL PLACEMENT QUANTITIES.

11. CULVERT, CONCRETE ROADWAY PIPE, 84 IN. DIA.
CLASS OF CONCRETE CULVERT PIPE SHALL BE 2000D. PIPE SHALL BE FABRICATED IN CONFORMANCE WITH STANDARD ROAD PLAN RF-1, DETAILS ON SHEET B2 AND CURRENT STANDARD AND SUPPLEMENTAL SPECIFICATIONS.

PIPE SHALL BE PERMANENTLY MARKED, INSIDE AND OUTSIDE AT BOTH ENDS, TO INDICATE THE TOP. CONTRACTOR SHALL VERIFY WALL THICKNESS AND TONGUE END DIMENSIONS OF EXISTING RCP CULVERT SECTIONS TO ENSURE COMPATIBILITY WITH PROPOSED END SECTION.

ITEM INCLUDES INSTALLATION OF STANDARD ROAD PLAN RF-14 TYPE 3 CONNECTION AT JOINT BETWEEN REINSTALLED AND NEW CULVERT PIPE.

12. REMOVE AND REINSTALL RIGID PIPE CULVERT GREATER THAN 36 IN.
ITEM INCLUDES REMOVING AND REINSTALLING THREE SIX-FOOT SECTIONS OF 84 INCH DIAMETER CONCRETE CULVERT PIPE. THE BASE SHALL BE CLASS C BEDDING. EXCAVATION NECESSARY TO COMPLETE THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERT.

ITEM INCLUDES INSTALLATION OF THREE STANDARD ROAD PLAN RF-14 TYPE 3 CONNECTIONS AS SHOWN ON PLAN SHEET V1.

THE LENGTH OF PIPE CULVERT REMOVED AND REINSTALLED IN ACCORDANCE WITH THE PLANS WILL BE MEASURED TO THE NEAREST FOOT FOR PAYMENT. THE CONTRACTOR WILL BE PAID THE CONTRACT UNIT PRICE PER LINEAR FOOT OF PIPE CULVERT REMOVED AND REINSTALLED.

ESTIMATE REFERENCE INFORMATION (CONT.)

13. 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.

17. 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.

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

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.

GRANULAR SURFACING OF ROADWAY WILL BE ACCOMPLISHED BY THE CONTRACTING AUTHORITY.

THE BACKFILLING AND ASSOCIATED EMBANKMENT CONSTRUCTION SHALL BE COMPLETED WITHIN 14 WORKING DAYS AFTER THE CURING PERIOD HAS EXPIRED FOR CONCRETE STRUCTURES.

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.

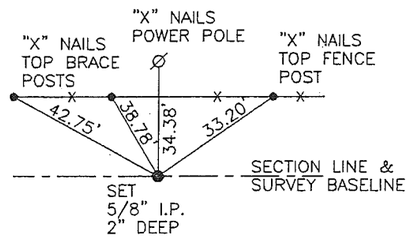
IF THE PERMANENT ACCESS CANNOT BE COMPLETED PRIOR TO REMOVAL OF THE EXISTING ACCESS, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AN ALTERNATE ACCESS. TEMPORARY GRANULAR SURFACING WILL BE PAID FOR AS A CONTRACT ITEM OR BY EXTRA WORK.

TABULATION OF SAFETY CLOSURES

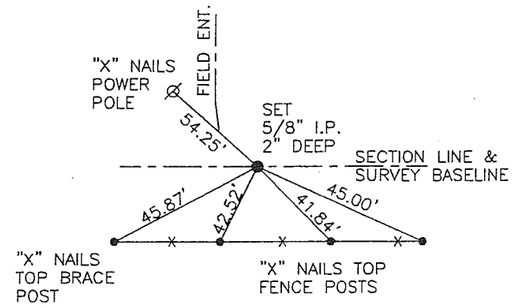
108-13A
10-28-97

Refer to Section 2518 of the St'd. Specifications

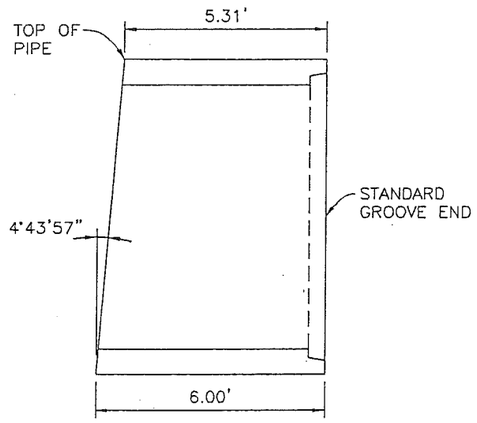
STATION	CLOSURE TYPE		REMARKS
	Road Qty.	Hazard Qty.	
99+00	1	–	WEST END
100+50	–	1	WEST END
102+00	–	1	EAST END
103+50	1	–	EAST END



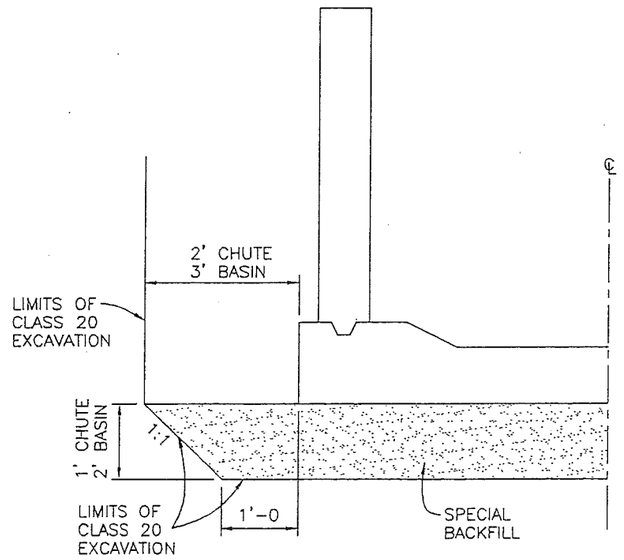
P.O.T STA. 100+00
DISTANCES SLOPE CHAINED



P.O.T STA. 102+00
DISTANCES SLOPE CHAINED



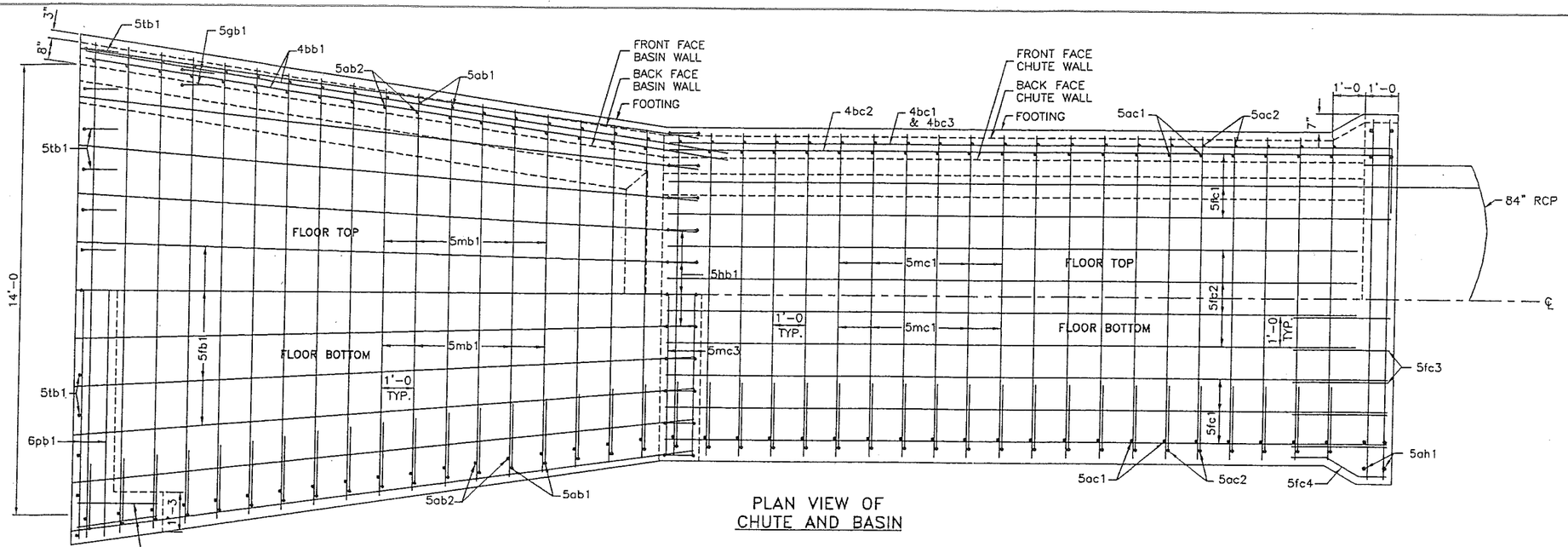
DETAILS OF RCP CULVERT END SECTION
NOT TO SCALE



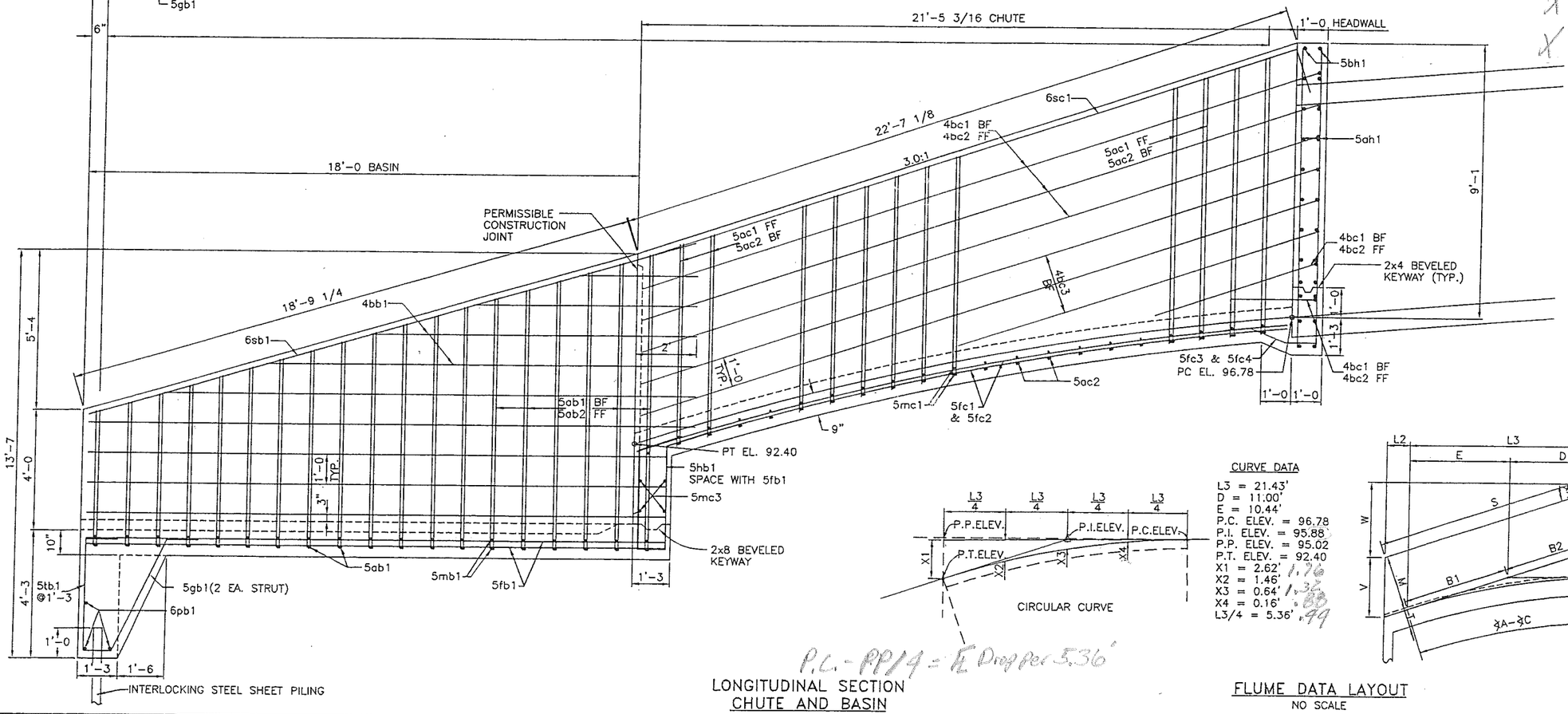
CLASS 20 EXCAVATION & SPECIAL BACKFILL PLACEMENT
NOT TO SCALE

Drop off flow line of Pipe
X1 = 9.38
X2 = 2.78
X3 = 1.52
X9 = 0.6

Elevation
X1 = 92.40
X2 = 99.00
X3 = 95.26
X9 = 96.18



PLAN VIEW OF
CHUTE AND BASIN



LONGITUDINAL SECTION
CHUTE AND BASIN

P.C. - PP/4 = E Drop Rec 5.36'

CURVE DATA

L3 = 21.43'
D = 11.00'
E = 10.44'
P.C. ELEV. = 96.78
P.I. ELEV. = 95.88
P.P. ELEV. = 95.02
P.T. ELEV. = 92.40
X1 = 2.62' 1.26
X2 = 1.46' 1.32
X3 = 0.64' .88
X4 = 0.16' .99
L3/4 = 5.36'

FLUME DATA

½A = 18°26'06" (18.4349°)
½C = 04°41'07" (4.6853°)
B1 = 11'
B2 = 11.59'
S = 22.59'
V = 6.32'
W = 7.14'
M = 6.0'
T = 9"
H = 84"
P = 2.06'
L2 = 0'

FLUME DATA LAYOUT
NO SCALE

0' 2' 4' 6'

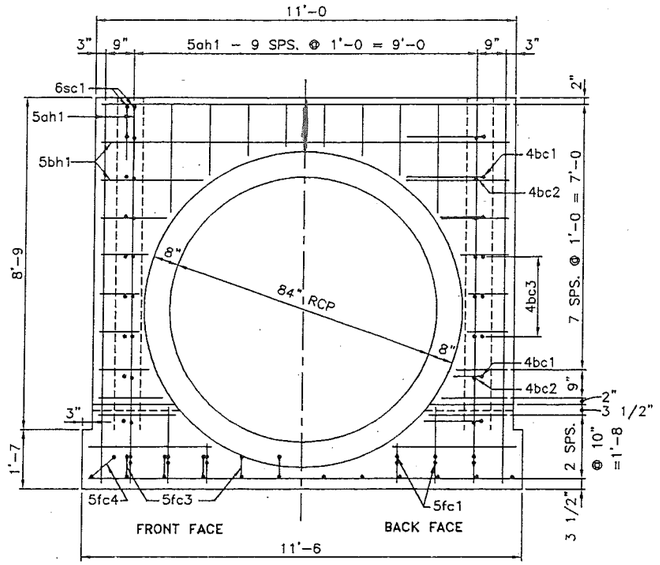
REV.:

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.: 05801 DATE: 12/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG

CLIENT: CRAWFORD COUNTY, IOWA DESCRIPTION: DETAIL SHEET

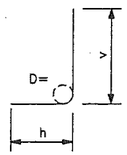
SHEET UI



SECTION THROUGH HEADWALL

BENT BAR DETAIL

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

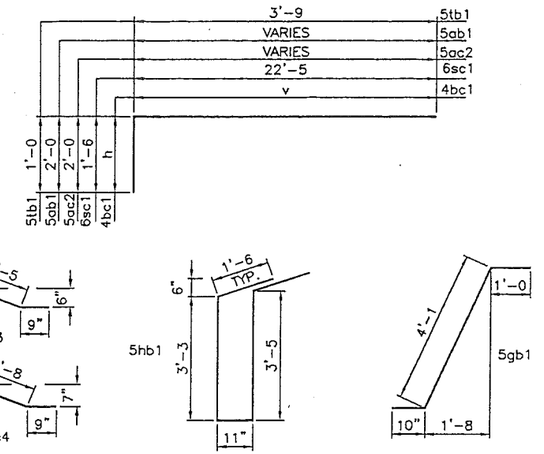


NOTE:
ALL DIMENSIONS ARE OUT TO OUT.
D = PIN DIAMETER IN INCHES.

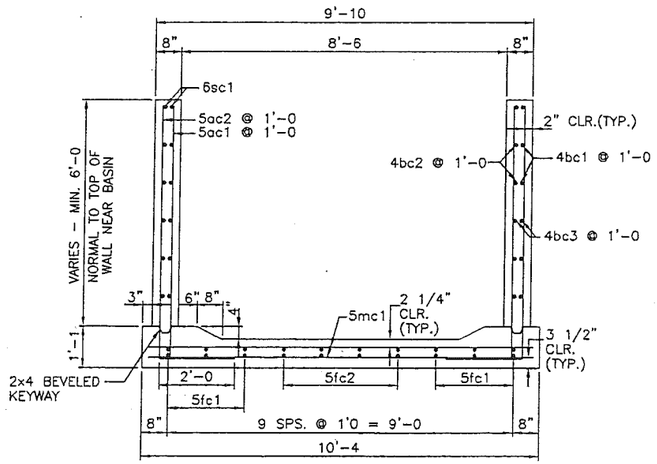
END CLEARANCES:
VERTICAL TOP = 2"
VERTICAL BOTTOM = 3"
TRANSVERSE = 2"

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

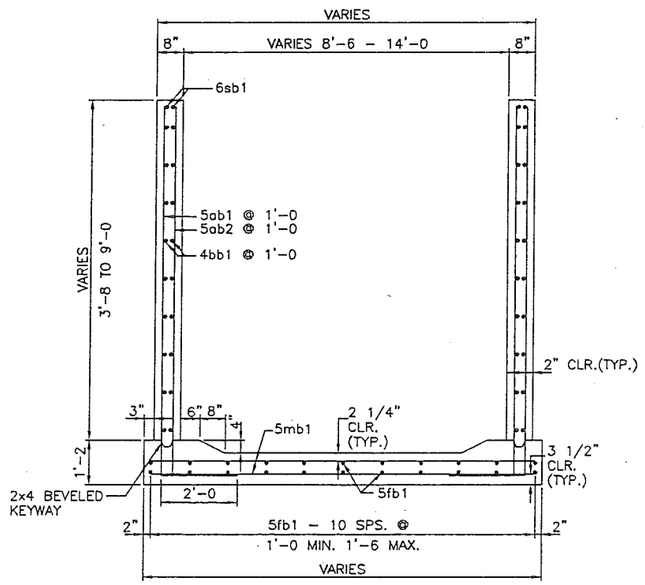
MARK	NO.	h	v	TOTAL
4bc1	4	2'-0	23'-2	25'-2
	2	1'-2	23'-2	24'-4
	2	9"	5'-6	6'-3
	2	1'-6	2'-9	4'-3



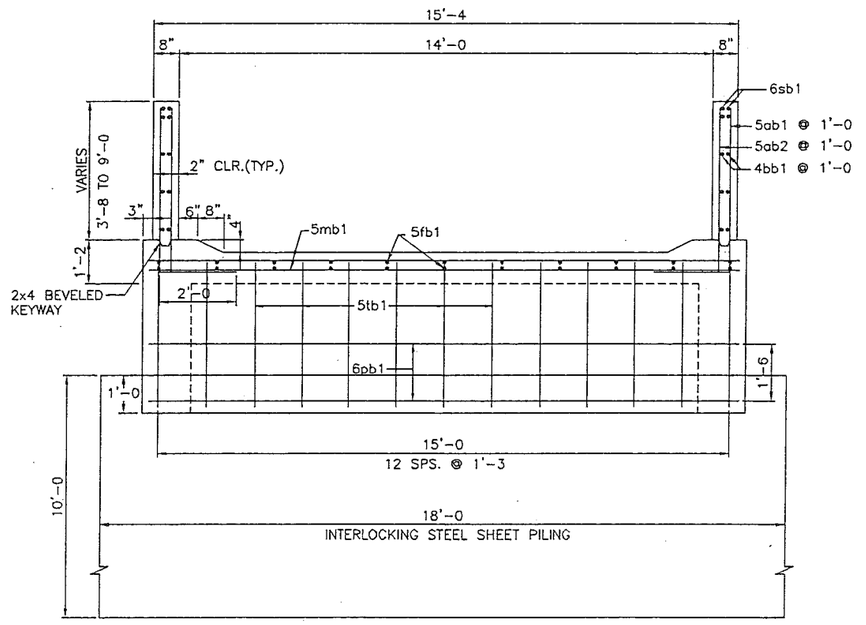
BENT BAR DETAILS
NO SCALE



SECTION THROUGH CHUTE



SECTION THROUGH BASIN



SECTION AT END OF BASIN

0' 2' 4' 6'

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.: 05801 DATE: 12/01 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	32	HEADWALL, F.F. & B.F., VERT.	3.73	124.46
5bh1	42	HEADWALL, F.F. & B.F., TRANS.	3.05	133.50
TOTAL WEIGHT (LBS)				257.96

MARK	NO.	LENGTH
5ah1	8	9'-11
	4	2'-10
	4	1'-10
	4	1'-4
	4	1'-1
	4	1'-11
	4	1'-0
AVERAGE LENGTH 3.73		

MARK	NO.	LENGTH
5bh1	4	10'-8
	4	2'-8
	4	1'-9
	8	1'-3
	8	1'-0
	4	1'-8
	4	2'-0
	4	3'-2
	2	11'-2
AVERAGE LENGTH 3.05		

FLUME CHUTE

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

BAR	NO.	LOCATION	LENGTH	WEIGHT
5ac1	40	WALLS, F.F., VERT.	7.57	315.86
5ac2	40	WALLS, B.F., VERT.	9.52	397.04
4bc1	10	WALLS, B.F., LONG.	17.03	113.78
4bc2	16	WALLS, F.F., LONG.	17.10	182.81
4bc3	6	WALLS, B.F., LONG.	19.61	78.60
6sc1	4	WALLS, TOP, SLOPED	23'-11	143.69
5fc1	12	FLOOR, TOP & BOTT., LONG.	23'-7	295.17
5fc2	8	FLOOR, TOP & BOTT., LONG.	22'-7	188.44
5fc3	10	FLOOR, LONG.	2'-11	30.42
5fc4	2	FLOOR, LONG.	3'-2	6.61
5mc1	42	FLOOR, TOP & BOTT., TRANS.	10'-0	438.06
5mc3	4	FLOOR, BACKWALL, TRANS.	10'-0	41.72
TOTAL WEIGHT (LBS.)				2232.20

MARK	NO.	LENGTH
5ac1	4	6'-8
	4	6'-9
	2	6'-10
	2	6'-11
	2	7'-0
	2	7'-1
	2	7'-2
	2	7'-4
	2	7'-5
	2	7'-7
	2	7'-9
	2	7'-11
	2	8'-1
	2	8'-3
	2	8'-6
	2	8'-8
	2	8'-11
	2	9'-2
AVERAGE LENGTH 7.57		

MARK	NO.	LENGTH
5ac2	6	8'-8
	4	8'-9
	2	8'-10
	2	8'-11
	2	9'-0
	2	9'-2
	2	9'-3
	2	9'-5
	2	9'-6
	2	9'-8
	2	9'-10
	2	10'-0
	2	10'-3
	2	10'-5
	2	10'-8
	2	10'-10
	2	11'-1
AVERAGE LENGTH 9.52		

MARK	NO.	LENGTH
4bc1	4	25'-2
	2	24'-4
	2	6'-3
	2	4'-3
AVERAGE LENGTH 17.03		

MARK	NO.	LENGTH
4bc2	10	23'-3
	2	12'-4
	2	5'-6
	2	2'-9
AVERAGE LENGTH 17.10		

MARK	NO.	LENGTH
4bc3	4	23'-3
	2	12'-4
AVERAGE LENGTH 19.61		

FLUME BASIN

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

BAR	NO.	LOCATION	LENGTH	WEIGHT
5ab1	38	WALLS, B.F., VERT.	9.14	362.27
5ab2	38	WALLS, F.F., VERT.	7.23	286.65
4bb1	36	WALLS, F.F. & B.F., LONG.	14.50	348.70
6sb1	4	WALLS, TOP, SLOPED	20'-9	124.67
5fb1	22	FLOOR, TOP & BOTT., LONG.	19.14	439.27
5mb1	38	FLOOR, TOP & BOTT., TRANS.	12.62	500.12
5hb1	11	FLOOR, BACKWALL, VERT.	10'-7	121.42
5tb1	13	CURTAIN, VERT.	4'-9	64.41
5qb1	4	CURTAIN, STRUTS	5'-11	24.68
6pb1	3	CURTAIN, TRANS.	15'-4	69.09
TOTAL WEIGHT (LBS.)				2341.28

MARK	NO.	LENGTH
5ab1	2	11'-10
	2	11'-6
	2	11'-3
	2	10'-11
	2	10'-8
	2	10'-4
	2	10'-0
	2	9'-9
	2	9'-5
	2	9'-2
	2	8'-10
	2	8'-6
	2	8'-3
	2	7'-11
	2	7'-8
	2	7'-4
	2	7'-1
	2	6'-9
	2	6'-6
AVERAGE LENGTH 9.14		

MARK	NO.	LENGTH
5ab2	2	9'-10
	2	9'-7
	2	9'-3
	2	9'-0
	2	8'-8
	2	8'-5
	2	8'-2
	2	7'-10
	2	7'-6
	2	7'-3
	2	6'-11
	2	6'-8
	2	6'-4
	2	6'-1
	2	5'-9
	2	5'-6
	2	5'-2
	2	4'-11
	2	4'-7
AVERAGE LENGTH 7.23		

MARK	NO.	LENGTH
4bb1	4	3'-11
	4	7'-3
	4	10'-8
	4	14'-0
	4	17'-5
	4	20'-0
	12	19'-1
AVERAGE LENGTH 14.50		

MARK	NO.	LENGTH
5fb1	10	19'-1
	8	19'-2
	4	19'-3
AVERAGE LENGTH 19.14		

MARK	NO.	LENGTH
5mb1	2	15'-4
	2	15'-1
	2	14'-9
	2	14'-5
	2	14'-2
	2	13'-10
	2	13'-6
	2	13'-3
	2	12'-11
	2	12'-8
	2	12'-4
	2	12'-0
	2	11'-8
	2	11'-4
	2	11'-1
	2	10'-9
	2	10'-6
	2	10'-2
	2	10'-0
AVERAGE LENGTH 12.62		

PLACEMENT OF QUANTITIES
FLUME OUTLET

LOCATION	CONCRETE C.Y. FLOOR	CONCRETE C.Y. WALLS	CONCRETE C.Y. TOTAL	STEEL LBS.
BASIN	11.37	5.73	17.10	2341.28
CHUTE	8.97	7.43	16.40	2232.20
HEADWALL	–	1.56	1.56	257.96
TOTAL	20.34	14.72	35.06	4831.44

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 5fc1 & 5fc2 BARS.

Deduct for unsatisfactory concrete

West Basin Wall = 2.86 CY

West Chute Wall = 3.72 CY

Headwall = .90 CY

REV.:

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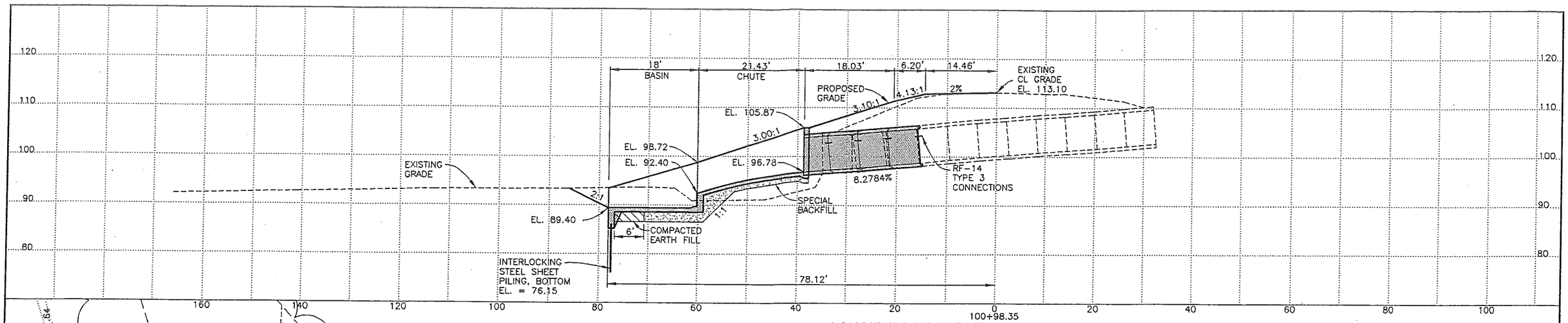
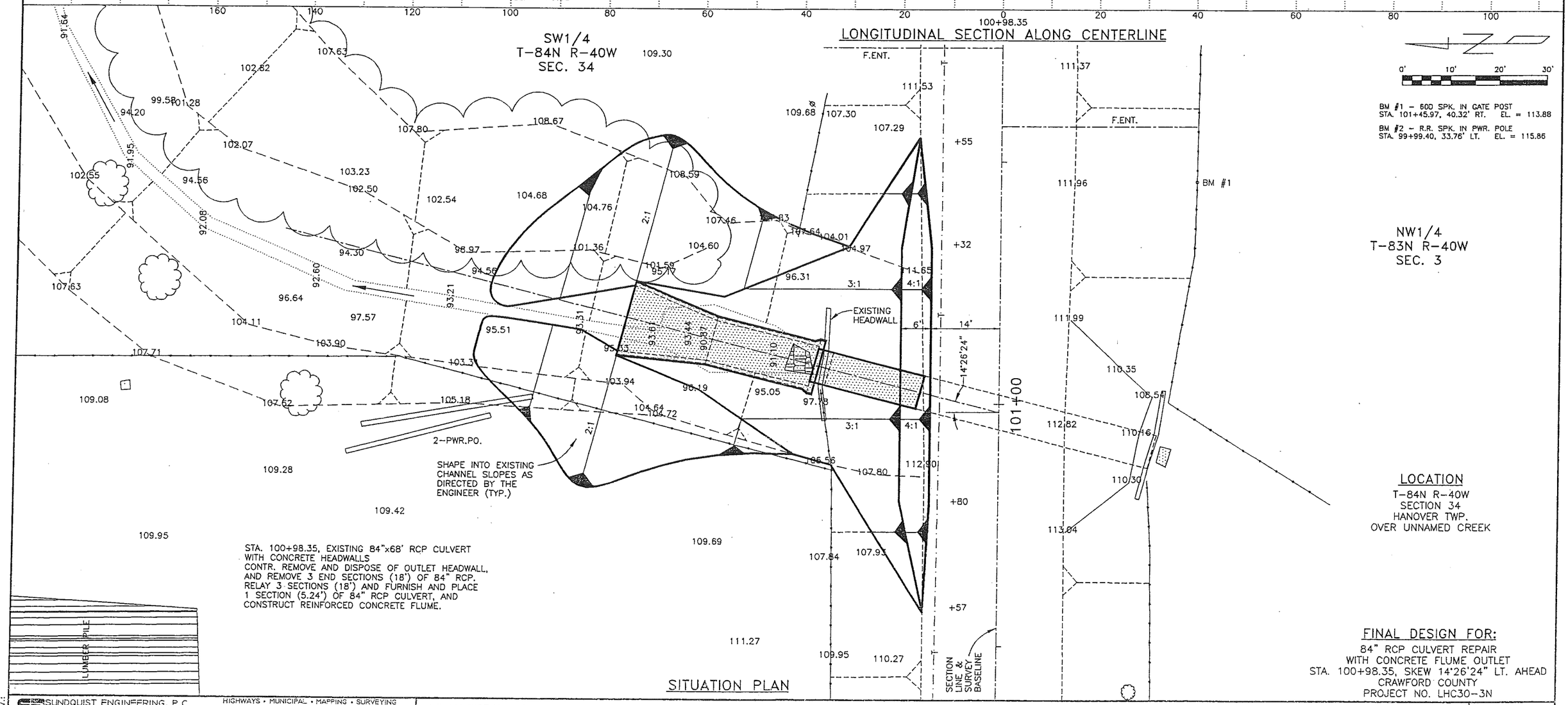


LONGITUDINAL SECTION ALONG CENTERLINE



BM #1 – 60D SPK. IN GATE POST
STA. 101+45.97, 40.32' RT. EL. = 113.88

BM #2 – R.R. SPK. IN PWR. POLE
STA. 99+99.40, 33.76' LT. EL. = 115.86

LOCATION

T-84N R-40W
SECTION 34
HANOVER TWP.
OVER UNNAMED CREEK

SITUATION PLAN

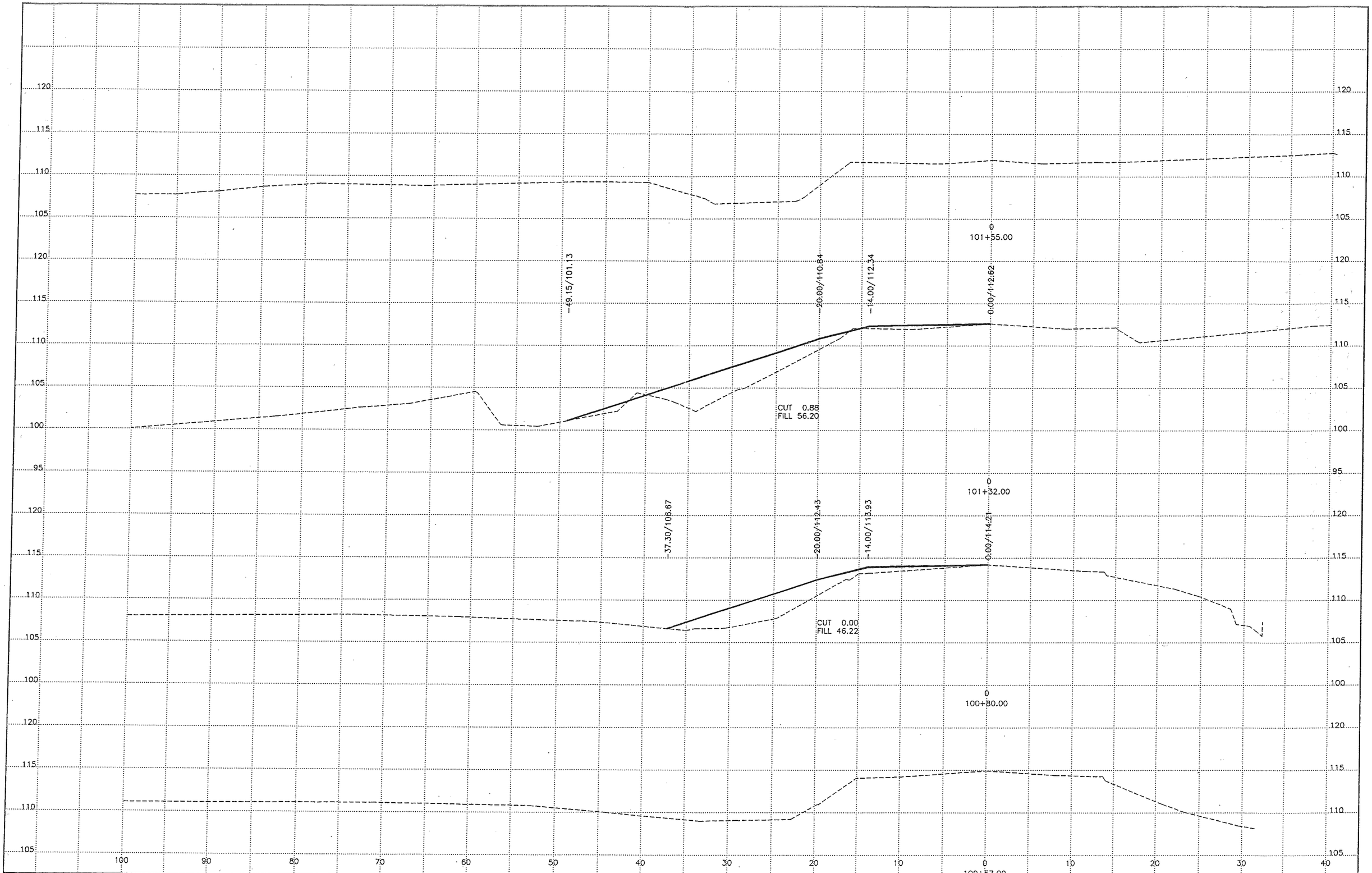
FINAL DESIGN FOR:

84" RCP CULVERT REPAIR
WITH CONCRETE FLUME OUTLET
STA. 100+98.35, SKEW 14°26'24" LT. AHEAD
CRAWFORD COUNTY
PROJECT NO. LHC30-3N

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. 05801 | DATE: 01/02 | DRAWN BY: TKK | REVIEWED BY: SAS | APPROVED BY: TJG | FILE NO. | CRAWFORD COUNTY | PROJECT NO. LHC30-3N | SHEET VI



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

SE PROJECT NO.: 05801 DATE: 11/01 DRAWN BY: TKK REVIEWED BY: SAS APPROVED BY: TJG DESIGN NO. . FILE NO. . CRAWFORD COUNTY PROJECT NO. LHC30-3N

SHEET W1

CRAWFORD COUNTY PROJECT NO. EWP-L95(1)

STREAMBANK AND STREAMBED STABILIZATION PROJECTS

Letting Date MARCH 14, 1995

PROJECT TRAFFIC CONTROL PLAN

THROUGH TRAFFIC WILL BE MAINTAINED AT ALL TIMES 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 THE CURRENT SUPPLEMENTAL SPECIFICATION FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS', AND THE APPROPRIATE STANDARD ROAD PLANS TABULATED.

THIS PROJECT IS BEING CONSTRUCTED UNDER CORPS OF ENGINEERS NATIONWIDE PERMIT NO. 13, NO. 26 AND NO. 37.

IOWA DEPARTMENT OF TRANSPORTATION

Project Development Division

PLANS OF PROPOSED IMPROVEMENT ON THE

SECONDARY ROAD SYSTEM CRAWFORD COUNTY

PROJECT NO. EWP-L95(1)

STREAMBANK AND STREAMBED STABILIZATION PROJECT

1993 FLOOD DAMAGE

NRCS EMERGENCY WATERSHED PROTECTION PROGRAM

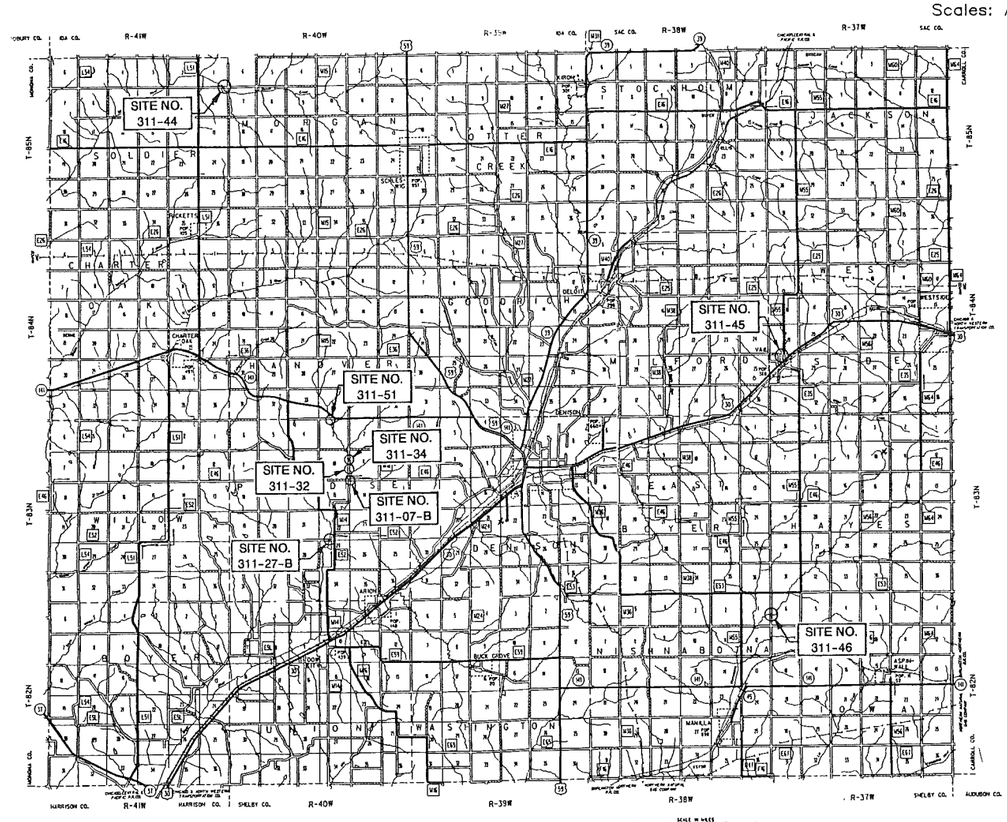
U.S.D.A. - NATURAL RESOURCES CONSERVATION SERVICE AND CRAWFORD COUNTY, IOWA

SCS EMERGENCY WATERSHED PROTECTION PROGRAM SITE NO. 311-27-B, 311-07-B, 311-32, 311-34, 311-51, 311-44, 311-45 AND 311-46

The Standard Specifications, Series of 1992 of the Iowa Department of Transportation Shall Apply to Construction Work on this Project

Plus Current Special Provisions and Supplemental Specifications

Scales: As Noted



LOCATION MAP

Proj. No. EWP-L95(1)

INDEX OF SHEETS

NO.	DESCRIPTION
A.01	TITLE SHEET
C.01	ESTIMATED QUANTITIES, ESTIMATE REFERENCE INFORMATION AND GENERAL NOTES
C.02	TYPICAL SECTIONS AND CONSTRUCTION SPECIFICATIONS
	PLAN VIEW, TYPICAL CROSS SECTIONS AND SPECIAL DETAILS
D.01-.04	SITE NO. 311-27-B
E.01-.03	SITE NO. 311-07-B
F.01-.02	SITE NO. 311-32
G.01-.02	SITE NO. 311-34
H.01-.02	SITE NO. 311-51
K.01-.02	SITE NO. 311-44
L.01	SITE NO. 311-45
M.01-.02	SITE NO. 311-46

MILEAGE SUMMARY

SITE NO.	LOCATION
311-27-B	Q AVE. AND PARADISE CREEK SEC. 27-83-40
311-07-B	O AVE. AND PARADISE CREEK SEC. 14-83-40
311-32	200TH ST. AND PARADISE CREEK SEC. 11-83-40
311-34	200TH ST. AND PARADISE CREEK SEC. 11-83-40
311-51	M AVE. AND PARADISE CREEK SEC. 3-83-40
311-44	160TH ST. AND BEAVER CREEK SEC. 12-85-41
311-45	MORRIS ST., VAIL AND KING CREEK SEC. 30-84-37
311-46	340TH ST. AND W. FORK NISHNABOTNA RIVER SEC. 6-82-37

1988 AADT

SITE NO.	VPD
311-27-B	30
311-07-B	35
311-32	40
311-34	40
311-51	70
311-44	35
311-45	Unknown
311-46	10

ROAD STANDARD PLANS

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

Identification	Date	Identification	Date	Identification	Date
RC-5	9-23-86	RF-7	11-8-74	RF-19F	3-28-95
RS-2	6-15-93	RS-3	2-23-93		

Approved

Robert D. Lohrmann

John P. Rawlen

Virgil E. Anderson

G. Dean Hargens

Michael L. Gordon

BOARD OF SUPERVISORS

Approved

H. Dale Wright 2-27-95

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 Registered Professional Engineer under the laws of the State of Iowa.

Stephen A. Sundquist P.E. #5707

Date 1-31-95

My registration expires December 31, 1996

Iowa Department of Transportation

Project Development Division

Authorized for Letting

Transportation Center Date

Local Systems Engineer

EWP-L95(1)

ESTIMATE REFERENCE INFORMATION

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

1. INCLUDES REMOVAL AND DISPOSAL OF TREES, DOWN TIMBER, LOGS, DRIFTS, DEBRIS AND OTHER OBSTRUCTIONS LYING WITHIN THE CONSTRUCTION LIMITS.

2. INCLUDES APPROXIMATELY 7636 CY OF CONTRACTOR PROVIDED BORROW TO BE USED AS FILL TO CONSTRUCT THE SLOPES OF THE STREAM BANKS AS SHOWN ON THE CROSS SECTIONS. SUITABLE CLASS 10 CHANNEL EXCAVATION MAY BE USED FOR EMBANKMENT MATERIAL AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SELECTED BORROW MATERIAL SHALL BE APPROVED BY THE ENGINEER. OVERHAUL IS INCIDENTAL TO THE PRICE BID FOR EMBANKMENT-IN-PLACE.

   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.

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

   PAYMENT WILL BE BASED ON PLAN QUANTITY.

3. QUANTITY INCLUDES STRIPPING OF EXISTING VEGETATIVE COVER TO A DEPTH OF 6". THE STRIPPINGS AND ANY REMAINING CLASS 10 CHANNEL EXCAVATION NOT INCORPORATED IN THE EMBANKMENT FILL SHALL BE DISPOSED OF.

   QUANTITY FOR SITE 311-32 WAS BASED ON AN ASSUMED AVERAGE DEPTH OF 2 FEET.

   PAYMENT WILL BE BASED ON PLAN QUANTITY.

4. SITE 311-07-B INCLUDES REMOVAL OF DEBRIS AT BRIDGE PIERS AND LODGED IN BRIDGE SUPERSTRUCTURE. SITE 311-34 INCLUDES REMOVAL OF DEBRIS BETWEEN SOUTH PIER AND ABUTMENT. SITE 311-45 INCLUDES REMOVAL OF CONCRETE SLAB, RIPRAP AND BROKEN CONCRETE WITHIN THE LIMTS OF THE PROPOSED IMPROVEMENTS. SITE 311-46 INCLUDES REMOVAL OF TIMBER, MISCELLANEOUS LUMBER AND BROKEN CONCRETE BETWEEN SOUTH PIER AND SOUTH ABUTMENT. SEE PLAN SHEETS FOR ADDITIONAL INFORMATION.

5. STRUCTURAL CONCRETE SHALL BE CLASS C CONCRETE. INCLUDES 6.2 C.Y. FOR NOMINAL 6" SLAB AND 7.5 C.Y. TO FILL VOIDS IN RIPRAP BASE.

6. SHALL BE ASTM A615, GRADE 60.

7, 8 & 16. SHALL BE 16 GAUGE RIVETED PIPE WITH ANNULAR CORRUGATIONS. ALL BANDS SHALL BE 24" WIDE. NO "SPIRAL" PIPE WILL BE ALLOWED.

13,14 & 15. REFER TO PIPE DETAILS ON SHEETS D.02 & G.01 FOR DEGREES OF ELBOWS.

18. MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 4196.01.C OF THE REFERENCE SPECIFICATIONS. REFER TO CONSTRUCTION SPECIFICATIONS FOR INSTALLATION DETAILS. PRIOR TO INSTALLATION, CONTRACTOR MAY SUBMIT ALTERNATE TYPE OF STAPLE TO ENGINEER FOR APPROVAL. ITEM INCLUDES ANY DEWATERING NECESSARY FOR INSTALLATION OF THE FABRIC.

19. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING REVETMENT STONE, COMPLETE IN PLACE FOR ROCK JETTIES, AS SHOWN ON THE DRAWINGS.

   INCLUDES FURNISHING AND PLACING OF CLASS D REVETMENT STONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MAXIMUM STONE SIZE SHALL BE 750 POUNDS AND THE MATERIAL SHALL MEET THE FOLLOWING SIZE LIMITATIONS:

STONE WT., POUNDS	MINIMUM % LARGER THAN
250	80
5	90

20. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING REVETMENT STONE, COMPLETE IN PLACE FOR BANK AND STREAMBED STABILIZATION, AS SHOWN ON THE DRAWINGS.

   INCLUDES FURNISHING AND PLACING OF CLASS D REVETMENT STONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MAXIMUM STONE SIZE SHALL BE 400 POUNDS AND A MINIMUM OF 50% OF THE MATERIAL SHALL BE GREATER THAN 150 POUNDS.

   REVETMENT STONE SHALL BE SCREENED PRIOR TO HAULING BY RUNNING THE STONE THROUGH A GRIZZLY OR PLATE SCREEN WITH A MINIMUM OPENING SIZE OF 8 INCHES. THIS OPERATION SHALL BE DONE AT THE QUARRY. THE PORTION OF THE STONE THAT IS REMOVED BY SCREENING WILL NOT BE ACCEPTABLE FOR USE AS REVETMENT STONE.

21. INCLUDES ALL ADVANCED WARNING SIGNS, TYPE 3 BARRICADES AND OTHER TRAFFIC CONTROL DEVICES FOR THIS PROJECT WHICH SHALL BE LOCATED AT THE BEGINNING AND THE END OF THE PROJECT AND WHERE THE ROAD FOR CONSTRUCTION INTERSECTS OTHER PUBLIC ROADS. ALSO SHALL INCLUDE ALL OTHER BARRICADES AND WARNING SIGNS NECESSARY TO PROTECT THE CONTRACTOR'S WORK AND EQUIPMENT AND THE SAFETY OF THE TRAVELING PUBLIC. ALL SIGNS, BARRICADES AND OTHER TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" 1988.

   INCLUDES FURNISHING, INSTALLING, MAINTAINING, REPAIRING AND RELOCATING ALL THE SIGNS AND BARRICADES AS SHOWN ON THE TRAFFIC CONTROL PLAN. FULL PAYMENT FOR THIS WORK SHALL BE THE LUMP SUM PRICE IN THE CONTRACT.

24. INCLUDES RESTORING ALL DISTURBED AREAS IN ACCORDANCE WITH SECTION 2601 OF THE REFERENCE SPECIFICATIONS EXCEPT THAT THE FOLLOWING SPECIES AND RATE OF SEED SHALL BE SOWN PER ACRE:

SWITCHGRASS (CAVE-IN-ROCK)	3 POUNDS (PLS)
SMOOTH BROMEGRASS (SOUTHERN TYPE)	15 POUNDS
TALL FESCUE (ENDOPHYTE FREE)	12 POUNDS
RED CLOVER (MEDIUM)	5 POUNDS
BIRDSFOOT TREFOIL (EMPIRE)	5 POUNDS
PERENNIAL RYEGRASS	10 POUNDS

   AT THE OPTION OF THE ENGINEER, 1½ BUSHELS PER ACRE OF OATS MAY BE SEEDED AS A NURSE CROP. THIS DECISION WILL BE BASED ON THE STEEPNESS OF THE SLOPES AND THE NEED FOR IMMEDIATE COVER.

   SECTION 1109.16 PARAGRAPH C.2 OF THE REFERENCE SPECIFICATIONS DOES NOT APPLY.

25. SHALL BE AMXCO HI-VELOCITY CURLEX BLANKET OR APPROVED EQUAL, AND SHALL BE INSTALLED IN STRICT COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS AND STANDARD ROAD PLAN RC-5. 1 SQ = 100 SQUARE FEET.

26. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING CONCRETE GROUT AS SHOWN ON THE DRAWINGS.

   THE GROUTING MIXTURE SHALL BE AS FOLLOWS:

   CEMENT: TYPE IA, TYPE I OR TYPE II WITH AN AIR ENTRAINING ADMIXTURE, 10 SACKS OR 940 LBS/C.Y.

   FINE CONCRETE AGGREGATE: 2,100 LBS/C.Y. (SURFACE DRY WEIGHT).

   WATER: 45 GAL./C.Y., OR ENOUGH TO PROVIDE A THICK CREAMY CONSISTENCY.

   AIR CONTENT: 6 TO 10 PERCENT.

   OTHER SIMILAR GROUT MIXES THAT INCORPORATE SMALL COARSE AGGREGATE MAY BE USED IF APPROVED IN ADVANCE BY THE ENGINEER.

   FLY ASH CONFORMING TO ASTM C 618 CLASS F OR CLASS C, IN AMOUNTS NOT TO EXCEED 20 PERCENT BASED ON ABSOLUTE VOLUME, MAY BE SUBSTITUTED FOR AN EQUIVALENT AMOUNT OF PORTLAND CEMENT IN THE GROUT MIXTURE.

   THE GROUT SHALL BE CONSOLIDATED INTO THE VOIDS WITH THE USE OF A CONCRETE VIBRATOR.

   THE VOIDED AREA BETWEEN THE ROCK RIPRAP AND SHEET PILING SHALL BE FILLED WITH WITH GROUT AND VIBRATED UNTIL TOTALLY FILLED WITH GROUT.

   GROUTING OPERATION SHALL NOT BE PERFORMED EXCEPT IN THE PRESENCE OF THE ENGINEER.

   A SMOOTH SURFACE IS NOT TO BE CREATED BY THE GROUTING OPERATIONS.

   THE AVERAGE RATE OF GROUT APPLICATION SHALL BE 5.4 CUBIC FEET OF GROUT PER SQUARE YARD OF LOOSE ROCK RIPRAP.

   INCLUDES 6.8 C.Y. TO BE PAID FOR BY CRAWFORD COUNTY AT SITE 311-51.

   SEE CONSTRUCTION SPECIFICATIONS FOR MATERIAL AND INSTALLATION DETAILS ON SHEET C.02.

27. THIS ITEM SHALL CONSIST OF DIVERTING SURFACE WATER AND DEWATERING THE SITE AS NEEDED FOR CONSTRUCTION. POLLUTION CONTROL SHALL BE INCLUDED IN AND CONSIDERTED INCIDENTAL TO THIS ITEM.

   REMOVAL OF WATER AT SITES 311-27-B, 311-07-B, 311-32, 311-34, 311-44 AND 311-46 SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO OTHER WORK AT THESE SITES.

28. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING REVETMENT STONE, COMPLETE IN PLACE FOR BANK AND STREAMBED STABILIZATION, AS SHOWN ON THE DRAWINGS.

   INCLUDES FURNISHING AND PLACING OF CLASS E REVETMENT STONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MAXIMUM STONE SIZE SHALL BE 400 POUNDS AND A MINIMUM OF 50% OF THE MATERIAL SHALL BE GREATER THAN 150 POUNDS.

   REVETMENT STONE SHALL BE SCREENED PRIOR TO HAULING BY RUNNING THE STONE THROUGH A GRIZZLY OR PLATE SCREEN WITH A MINIMUM OPENING SIZE OF 8 INCHES. THIS OPERATION SHALL BE DONE AT THE QUARRY. THE PORTION OF THE STONE THAT IS REMOVED BY SCREENING WILL NOT BE ACCEPTABLE FOR USE AS REVETMENT STONE.

ESTIMATED PROJECT QUANTITIES
PROJECT NO. EWP-L95(1)

ITEM #	ITEM CODE	ITEM	UNIT	SITE 311-27-B	311-07-B	311-32	311-34	311-51	311-44	311-45	311-46	TOTAL
1	2101-0550002	CLEARING AND GRUBBING	UNIT	562.4	60.7	106.1	9.4	–	–	116.1	–	854.7
2	2102-2625000	EMBANKMENT-IN-PLACE	CY	1246	108	4733	1205	144	1904	–	353	9693
3	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	CY	610	1383	447	310	1424	291	373	399	5237
4	2401-6750001	REMOVALS, AS PER PLAN	LS	–	–	0.04	–	0.09	–	–	0.83	0.04	1.0
*5	2403-0900000	STRUCTURAL CONCRETE	CY	–	–	–	–	13.7	–	–	–	–	13.7
*6	2404-7775000	REINFORCING STEEL	LB	–	–	–	–	317	–	–	–	–	317
*7	2417-1040018	CULVERT, CORRUGATED METAL ENTRANCE PIPE, 18 IN. DIA.	LF	34	–	–	–	–	–	–	–	–	34
*8	2417-1040024	CULVERT, CORRUGATED METAL ENTRANCE PIPE, 24 IN. DIA.	LF	20	–	–	–	–	–	–	–	–	20
*9	2417-1440018	CULVERT, REMOVE & REINSTALL CORRUGATED METAL ENTRANCE PIPE, 18 IN. DIA.	LF	40	–	–	–	–	–	–	–	–	40
*10	2417-1440024	CULVERT, REMOVE & REINSTALL CORRUGATED METAL ENTRANCE PIPE, 24 IN. DIA.	LF	70	–	–	–	–	–	–	–	–	70
*11	2417-2150018	DIAPHRAGM, CORRUGATED METAL, TYPE A, 18 IN.	EACH	1	–	–	–	–	–	–	–	–	1
*12	2417-2150024	DIAPHRAGM, CORRUGATED METAL, TYPE A, 24 IN.	EACH	1	–	–	–	–	–	–	–	–	1
*13	2417-2550018	ELBOWS, CORRUGATED METAL PIPE, 18 IN. DIA.	EACH	1	–	–	–	–	–	–	–	–	1
*14	2417-2550024	ELBOWS, CORRUGATED METAL PIPE, 24 IN. DIA.	EACH	1	–	–	–	–	–	–	–	–	1
*15	2417-2550036	ELBOWS, CORRUGATED METAL PIPE, 36 IN. DIA.	EACH	–	–	–	–	1	–	–	–	–	1
*16	2502-8215136	SUBDRAIN, CORRUGATED METAL PIPE, 36 IN. DIA.	LF	–	–	–	–	18	–	–	–	–	18
*17	2502-8220208	SUBDRAIN OUTLET, CORRUGATED METAL PIPE, 8 IN. DIA.	EACH	1	–	–	–	–	–	–	–	–	1
18	2507-3250005	FABRIC, ENGINEERING	SY	1073	960	–	646	819	–	450	360	4308
19	2507-6800040	REVETMENT, CLASS D, RIPRAP	TON	90	60	630	75	–	540	–	76	1470
20		REVETMENT, CLASS D, RIPRAP, SPECIAL	TON	804	838	–	501	–	–	–	329	2472
21	2528-8445110	TRAFFIC CONTROL	LS	0.10	0.10	0.20	0.10	0.10	0.20	0.10	0.10	1.0
22	2528-8445112	FLAGGERS	DAY	–	–	8	–	–	8	–	–	16
23	2533-4980005	MOBILIZATION	LS	0.17	0.12	0.18	0.10	0.17	0.10	0.11	0.05	1.0
24	2601-2636042	SEEDING, FERTILIZING AND MULCHING	ACRE	0.7	0.5	1.0	0.4	0.5	0.5	0.4	0.3	4.3
25	2601-2640350	SPECIAL DITCH CONTROL, WOOD EXCELSIOR MAT	SQ	–	3.1	–	–	–	–	–	–	3.1
26		GROUT	CY	–	–	–	1.8	91.2	–	51.5	–	144.5
27		REMOVAL OF WATER	LS	–	–	–	–	0.75	–	0.25	–	1.0
28		REVETMENT, CLASS E, RIPRAP, SPECIAL	TON	–	–	–	–	647	–	330	–	977.0

* Cost to be paid for by Crawford County

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.

ROAD 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.

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. 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.

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.

261-1
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.

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
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PROJECT NO.: 0464 | DATE: 1/95 | REV:
APPROVED BY: SAS | DRAWN BY: TKK
CLIENT: CRAWFORD COUNTY, IA
DESCRIPTION: ESTIMATED QUANTITIES, ESTIMATE REFERENCE INFORMATION & GENERAL NOTES PROJ. #EWP-L95(1)
SHEET C.01

CONSTRUCTION SPECIFICATIONS

CONCRETE GROUT

1. SCOPE

THE WORK SHALL CONSIST OF FURNISHING, TRANSPORTING, AND PLACING CONCRETE GROUT IN THE CONSTRUCTION OF GROUTED ROCK RIPRAP SECTIONS SHOWN ON THE DRAWINGS.

2. MATERIALS

PORTLAND CEMENT SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 85, TYPE 1.

AGGREGATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM SPECIFICATION C-33.

WATER SHALL BE CLEAN AND FREE FROM INJURIOUS AMOUNTS OF OILS, ACID, ALKALI, ORGANIC MATTER OR OTHER DELETERIOUS SUBSTANCES.

AIR-ENTRAINING ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 154.

CURING COMPOUND SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 148.

OTHER ADMIXTURES, WHEN REQUIRED, SHALL BE AS SPECIFIED IN THE CONSTRUCTION DETAILS.

3. DESIGN OF THE GROUT MIX

THE MIX PROPORTIONS FOR THE GROUT MIX SHALL BE AS SPECIFIED IN THE CONSTRUCTION DETAILS. DURING THE COURSE OF THE WORK THE ENGINEER WILL REQUIRE ADJUSTMENT OF THE MIX PROPORTIONS WHENEVER NECESSARY. AFTER THE MIX HAS BEEN DESIGNATED, IT SHALL NOT BE CHANGED WITHOUT THE APPROVAL OF THE ENGINEER.

4. HANDLING AND MEASUREMENT OF MATERIAL

MATERIALS SHALL BE STOCKPILED AND BATCHED BY METHODS THAT WILL PREVENT SEGREGATION OR CONTAMINATION OF AGGREGATES AND INSURE ACCURATE PROPORTIONING OF THE INGREDIENTS OF THE MIX.

EXCEPT AS OTHERWISE PROVIDED IN SECTION 8, CEMENT AND AGGREGATES SHALL BE MEASURED AS FOLLOWS:

CEMENT SHALL BE MEASURED BY WEIGHT OR IN BAGS OF 94 POUNDS EACH. WHEN CEMENT IS MEASURED IN BAGS, NO FRACTION OF A BAG SHALL BE USED UNLESS WEIGHED.

AGGREGATES SHALL BE MEASURED BY WEIGHT. MIX PROPORTIONS SHALL BE BASED ON SATURATED, SURFACE-DRY WEIGHTS. THE BATCH WEIGHT OF EACH AGGREGATE SHALL BE THE REQUIRED SATURATED, SURFACE-DRY WEIGHT PLUS THE WEIGHT OF SURFACE MOISTURE IT CONTAINS.

WATER SHALL BE MEASURED BY VOLUME OR BY WEIGHT, TO AN ACCURACY WITHIN ONE PERCENT OF THE TOTAL QUANTITY OF WATER REQUIRED FOR THE BATCH.

ADMIXTURES SHALL BE MEASURED WITHIN A LIMIT OF ACCURACY OF ±3 PERCENT.

5. MIXERS AND MIXING

THE MIXER, WHEN LOADED TO CAPACITY, SHALL BE CAPABLE OF COMBINING THE INGREDIENTS OF THE GROUT MIX INTO A THOROUGHLY MIXED AND UNIFORM MASS AND OF DISCHARGING IT WITH A SATISFACTORY DEGREE OF UNIFORMITY.

MIXER SHALL BE OPERATED WITHIN THE LIMITS OF THE MANUFACTURER'S GUARANTEED CAPACITY AND SPEED OF ROTATION.

THE TIME OF MIXING AFTER ALL CEMENT AND AGGREGATES ARE IN THE MIXER DRUM SHALL BE NOT LESS THAN ONE MINUTE FOR MIXERS HAVING A CAPACITY OF ONE CUBIC YARD OR LESS. FOR MIXERS OF LARGER CAPACITIES, THE MINIMUM TIME SHALL BE INCREASED FIFTEEN SECONDS FOR EACH CUBIC YARD OR FRACTION THEREOF OF ADDITIONAL CAPACITY. THE BATCH SHALL BE SO CHARGED INTO THE MIXER THAT SOME WATER WILL ENTER IN ADVANCE OF CEMENT AND AGGREGATE, AND ALL MIXING WATER SHALL BE INTRODUCED INTO THE DRUM BEFORE ONE-FOURTH OF THE MIXING TIME HAS ELAPSED.

WHEN READY-MIXED GROUT MIX IS FURNISHED, THE CONTRACTOR SHALL FURNISH TO THE ENGINEER A DELIVERY TICKET SHOWING THE TIME OF LOADING AND THE QUANTITIES OF MATERIALS USED FOR EACH LOAD OF GROUT MIX.

NO MIXING WATER IN EXCESS OF THE AMOUNT CALLED FOR BY THE JOB MIX SHALL BE ADDED TO THE GROUT MIX DURING MIXING OR HAULING OR AFTER ARRIVAL AT THE DELIVERY POINT.

6. CONVEYING AND PLACING

THE GROUT MIX SHALL BE DELIVERED TO THE SITE AND PLACED WITHIN 1-½ HOURS AFTER THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES. IN HOT WEATHER OR UNDER CONDITIONS CONTRIBUTING TO QUICK STIFFENING OF THE CONCRETE, THE TIME BETWEEN THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES AND DISCHARGE SHALL NOT EXCEED 45 MINUTES. THE ENGINEER MAY ALLOW A LONGER TIME, PROVIDED THE SETTING TIME OF THE CONCRETE IS INCREASED A CORRESPONDING AMOUNT BY THE ADDITION OF AN APPROVED SET-RETARDING MIXTURE. IN ANY CASE, CONCRETE SHALL BE CONVEYED FROM THE MIXER TO THE FINAL PLACEMENT AS RAPIDLY AS PRACTICABLE BY METHODS THAT WILL PREVENT SEGREGATION OF THE AGGREGATES OR LOSS OF MORTAR.

GROUT MIX SHALL NOT BE DROPPED MORE THAN 5 FEET VERTICALLY UNLESS SUITABLE EQUIPMENT IS USED TO PREVENT SEGREGATION.

THE GROUT MIX SHALL NOT BE PLACED UNTIL THE ROCK RIPRAP HAS BEEN INSPECTED AND APPROVED BY THE ENGINEER.

ROCK TO BE GROUTED SHALL BE KEPT WET FOR AT LEAST 2 HOURS IMMEDIATELY PRIOR TO GROUTING.

THE ROCK RIPRAP SHALL BE FLUSHED WITH WATER TO REMOVE THE FINES FROM THE ROCK PRIOR TO PLACING THE GROUT. THE ROCK SHALL BE KEPT MOIST JUST AHEAD OF THE ACTUAL PLACING, BUT THE GROUT SHALL NOT BE PLACED IN STANDING OR FLOWING WATER. GROUT PLACED ON INVERTS OR OTHER NEARLY LEVEL AREAS MAY BE PLACED IN ONE COURSE. ON SLOPES, THE GROUT SHALL BE PLACED IN TWO (2) COURSES IN SUCCESSIVE LATERAL STRIPS APPROXIMATELY TEN (10) FEET IN WIDTH STARTING AT THE TOE OF THE SLOPE AND PROGRESSING TO THE TOP. THE GROUT SHALL BE DELIVERED TO THE PLACE OF FINAL DEPOSIT BY APPROVED MEANS AND DISCHARGED DIRECTLY ON THE SURFACE OF THE ROCK, USING A SPLASH PLATE OF METAL OR WOOD TO PREVENT DISPLACEMENT OF THE ROCK DIRECTLY UNDER THE DISCHARGE. THE FLOW OF GROUT SHALL BE DIRECTED WITH BROOMS, SPADES OR BAFFLES TO PREVENT IT FROM FLOWING EXCESSIVELY ALONG THE SAME PATH AND TO ASSURE THAT ALL INTERMITTENT SPACES ARE FILLED. SUFFICIENT BARRING SHALL BE DONE TO LOOSEN TIGHT POCKETS OF ROCK AND OTHERWISE AID THE PENETRATION OF GROUT SO THAT ALL VOIDS SHALL BE FILLED AND THE GROUT FULLY PENETRATED THE ROCK BLANKET. ALL BROOMING ON SLOPES SHALL BE UPHILL AND AFTER THE GROUT HAS STIFFENED, THE ENTIRE SURFACE SHALL BE REBROOMED TO ELIMINATE RUNS AND TO FILL VOIDS CAUSED BY SLOUGHING.

AFTER COMPLETION OF ANY STRIP OR PANEL, NO WORKMAN OR OTHER LOAD SHALL BE PERMITTED ON THE GROUTED SURFACE FOR A PERIOD OF TWENTY FOUR (24) HOURS. THE GROUTED SURFACE SHALL BE PROTECTED FROM INJURIOUS ACTION BY THE SUN, RAIN, FLOWING WATER AND MECHANICAL INJURY.

7. CURING AND PROTECTION

THE SURFACE OF TREATMENT MATERIALS SHALL BE PREVENTED FROM DRYING FOR A CURING PERIOD OF AT LEAST 7 DAYS AFTER IT IS PLACED. EXPOSED SURFACES SHALL BE KEPT CONTINUOUSLY MOIST FOR THE ENTIRE PERIOD, OR UNTIL CURING COMPOUND IS APPLIED AS SPECIFIED BELOW. MOISTURE SHALL BE MAINTAINED BY SPRINKLING, FLOODING OR FOG SPRAYING OR BY COVERING WITH CONTINUOUSLY MOISTENED CANVAS, CLOTH MATS, STRAW, SAND OR OTHER APPROVED MATERIAL. WATER OR COVERING SHALL BE APPLIED IN SUCH A WAY THAT THE CONCRETE SURFACE IS NOT ERODED OR OTHERWISE DAMAGED.

THE GROUTED ROCK MAY BE COATED WITH AN APPROVED CURING COMPOUND IN LIEU OF CONTINUED APPLICATION OF MOISTURE. THE COMPOUND SHALL BE SPRAYED ON THE MOIST CONCRETE SURFACES AS SOON AS FREE WATER HAS DISAPPEARED, BUT SHALL NOT BE APPLIED TO ANY SURFACE UNTIL FINISHING OF THAT SURFACE IS COMPLETED. THE COMPOUND SHALL BE APPLIED AT A UNIFORM RATE OF NOT LESS THAN ONE GALLON PER 150 SQUARE FEET OF SURFACE AND SHALL FORM A CONTINUOUS ADHERENT MEMBRANE OVER THE ENTIRE SURFACE. CURING COMPOUND SHALL NOT BE APPLIED TO SURFACES REQUIRING BOND TO SUBSEQUENTLY PLACED CONCRETE. IF THE MEMBRANE IS DAMAGED DURING THE CURING PERIOD, THE DAMAGED AREA SHALL BE RESPRAYED AT THE RATE OF APPLICATION SPECIFIED ABOVE.

GROUT MIX SHALL NOT BE PLACED WHEN THE DAILY MINIMUM TEMPERATURE IS LESS THAN 40° F UNLESS FACILITIES ARE PROVIDED TO INSURE THAT THE TEMPERATURE OF THE MATERIALS IS MAINTAINED AT NOT LESS THAN 50° F NOR MORE THAN 90° F DURING PLACEMENT AND THE CURING PERIOD. GROUT MIX SHALL NOT BE PLACED ON FROZEN SURFACES. WHEN FREEZING CONDITIONS PREVAIL, ROCK TO BE GROUTED MUST BE COVERED AND HEATED TO A RANGE OF 50° F TO 90° F FOR AT LEAST 24 HOURS PRIOR TO PLACING TREATMENT MATERIALS.

8. INSPECTING AND TESTING FRESH GROUT

THE ENGINEER WILL INSPECT AND TEST GROUT DURING THE COURSE OF THE WORK. SAMPLING OF FRESH GROUT WILL BE DONE BY THE METHODS PRESCRIBED IN ASTM DESIGNATION C 172. THE VOLUME OF EACH BATCH WILL BE DETERMINED BY THE METHODS PRESCRIBED IN ASTM DESIGNATION C 138.

THE ENGINEER SHALL HAVE FREE ENTRY TO ALL PARTS OF THE CONTRACTOR'S PLANT AND EQUIPMENT WHICH CONCERN MIXING AND PLACING THE GROUT WHILE WORK ON THE CONTRACT IS BEING PERFORMED. PROPER FACILITIES SHALL BE PROVIDED FOR THE ENGINEER TO INSPECT MATERIALS AND PROCESSES USED IN MIXING AND PLACING THE GROUT AS WELL AS FOR SECURING SAMPLES OF THE GROUT MIX. ALL TESTS AND INSPECTIONS SHALL BE SO CONDUCTED AS NOT TO INTERFERE UNNECESSARILY WITH THE MIXING AND PLACING OF THE GROUT.

WHEN READY-MIXED GROUT IS FURNISHED, THE CONTRACTOR SHALL FURNISH TO THE ENGINEER A STATEMENT-OF-DELIVERY TICKET FOR EACH BATCH DELIVERED TO THE JOB SITE. THE TICKET SHALL SHOW THE TOTAL WEIGHTS IN POUNDS OF CEMENT, WATER, AND FINE AND COARSE AGGREGATES, AMOUNT OF AIR-ENTRAINING AGENT, TIME OF LOADING, AND THE REVOLUTION COUNTER READING AT THE TIME OF BATCHING.

9. MEASUREMENT AND PAYMENT

FOR ITEMS OF WORK FOR WHICH SPECIFIC UNIT PRICES ARE ESTABLISHED IN THE CONTRACT, THE QUANTITY OF CONCRETE GROUT PLACED WITHIN THE SPECIFIED LIMITS WILL BE COMPUTED TO THE NEAREST 0.1 CUBIC YARD BY VOLUME. THE VOLUME OF GROUT WILL BE DETERMINED FROM THE SUMMATION OF ALL STATEMENT-OF-DELIVERY TICKETS FOR CONCRETE GROUT DELIVERED TO THE SITE AND ACCEPTABLY PLACED IN THE WORK.

PAYMENT FOR THE CONCRETE GROUT WILL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH ITEM. SUCH PAYMENT WILL BE CONSIDERED FULL COMPENSATION FOR ALL LABOR, MATERIALS, EQUIPMENT, AND ALL OTHER ITEMS NECESSARY AND INCIDENTAL TO THE COMPLETION OF THE WORK.

ENGINEERING FABRIC

1. SCOPE

THIS WORK SHALL CONSIST OF FURNISHING ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY FOR THE INSTALLATION OF ENGINEERING FABRIC.

2. QUALITY

ENGINEERING FABRIC SHALL CONFORM TO THE REQUIREMENTS OF IDOT ENGINEERING FABRIC FOR EMBANKMENT EROSION CONTROL.

3. STORAGE

PRIOR TO USE, THE ENGINEERING FABRIC SHALL BE STORED IN A CLEAN DRY PLACE, OUT OF DIRECT SUNLIGHT, NOT SUBJECT TO EXTREMES OF EITHER HOT OR COLD, AND WITH THE MANUFACTURER'S PROTECTIVE COVER IN PLACE. RECEIVING, STORAGE, AND HANDLING AT THE JOB SITE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS IN ASTM D 4873.

4. SURFACE PREPARATION

THE SURFACE ON WHICH THE ENGINEERING FABRIC IS TO BE PLACED SHALL BE GRADED TO THE NEAT LINES AND GRADES AS SHOWN ON THE DRAWINGS. THE SURFACE SHALL BE REASONABLY SMOOTH AND FREE OF LOOSE ROCK AND CLODS, HOLES, DEPRESSIONS, PROJECTIONS, MUDDY CONDITIONS AND STANDING OR FLOWING WATER.

5. PLACEMENT

PRIOR TO PLACEMENT OF THE ENGINEERING FABRIC, THE SOIL SURFACE WILL BE INSPECTED FOR QUALITY ASSURANCE OF DESIGN AND CONSTRUCTION. THE ENGINEERING FABRIC SHALL BE PLACED ON THE APPROVED PREPARED SURFACE AT THE LOCATIONS AND IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS AND AS SPECIFIED. THE ENGINEERING FABRIC SHALL BE UNROLLED ALONG THE PLACEMENT AREA AND LOOSELY LAID (NOT STRETCHED) IN SUCH A MANNER THAT IT WILL CONFORM TO THE SURFACE IRREGULARITIES WHEN MATERIAL IS PLACED ON OR AGAINST IT. THE ENGINEERING FABRIC MAY BE FOLDED AND OVERLAPPED TO PERMIT PROPER PLACEMENT IN THE DESIGNATED AREA.

THE ENGINEERING FABRIC SHALL BE JOINED BY OVERLAPPING A MINIMUM OF 18 INCHES (UNLESS OTHERWISE SPECIFIED), AND SECURED AGAINST THE UNDERLYING FOUNDATION MATERIAL. SECURING PINS, APPROVED AND PROVIDED BY THE ENGINEERING FABRIC MANUFACTURER, SHALL BE PLACED ALONG THE EDGE OF THE PANEL OR ROLL MATERIAL TO ADEQUATELY HOLD IT IN PLACE DURING INSTALLATION. PINS SHALL BE STEEL OR FIBERGLASS FORMED AS A "U", "L", OR "T" SHAPE OR CONTAIN "EARS" TO PREVENT TOTAL PENETRATION. STEEL WASHERS SHALL BE PROVIDED ON ALL BUT THE "U" SHAPED PINS. THE UPSTREAM OR UP-SLOPE ENGINEERING FABRIC SHALL OVERLAP THE ABUTTING DOWN-SLOPE ENGINEERING FABRIC. AT VERTICAL LAPS, SECURING PINS SHALL BE INSERTED THROUGH BOTH LAYERS ALONG A LINE THROUGH APPROXIMATELY THE MIDPOINT OF THE OVERLAP. AT HORIZONTAL LAPS AND ACROSS SLOPE LAPS, SECURING PINS SHALL BE INSERTED THROUGH THE BOTTOM LAYER ONLY. SECURING PINS SHALL BE PLACED ALONG A LINE APPROXIMATELY 2 INCHES IN FROM THE EDGE OF THE PLACED ENGINEERING FABRIC AT INTERVALS NOT TO EXCEED 12 FEET UNLESS OTHERWISE SPECIFIED. ADDITIONAL PINS SHALL BE INSTALLED AS NECESSARY AND WHERE APPROPRIATE, TO PREVENT ANY UNDUE SLIPPAGE OR MOVEMENT OF THE ENGINEERING FABRIC. THE USE OF SECURING PINS WILL BE HELD TO THE MINIMUM NECESSARY. PINS ARE TO BE LEFT IN PLACE UNLESS OTHERWISE SPECIFIED.

SHOULD THE ENGINEERING FABRIC BE TORN OR PUNCTURED, OR THE OVERLAPS DISTURBED, AS EVIDENCED BY VISIBLE ENGINEERING FABRIC DAMAGE, SUBGRADE PUMPING, INTRUSION, OR GRADE DISTORTION, THE BACKFILL AROUND THE DAMAGED OR DISPLACED AREA SHALL BE REMOVED AND RESTORED TO THE ORIGINAL APPROVED CONDITION. THE REPAIR SHALL CONSIST OF A PATCH OF THE SAME TYPE OF ENGINEERING FABRIC BEING USED, OVERLAYING THE EXISTING ENGINEERING FABRIC. ENGINEERING FABRIC PANELS JOINED BY OVERLAP SHALL HAVE THE PATCH EXTEND A MINIMUM OF 2 FEET FROM THE EDGE OF ANY DAMAGED AREA.

THE ENGINEERING FABRIC SHALL NOT BE PLACED UNTIL IT CAN BE ANCHORED AND PROTECTED WITH THE SPECIFIED COVERING WITHIN 48 HOURS OR PROTECTED FROM EXPOSURE TO ULTRAVIOLET LIGHT. IN NO CASE SHALL MATERIAL BE DROPPED ON UNCOVERED ENGINEERING FABRIC FROM A HEIGHT GREATER THAN 3 FEET.

6. MEASUREMENT AND PAYMENT

FOR ITEMS OF WORK FOR WHICH SPECIFIC UNIT PRICES ARE ESTABLISHED IN THE CONTRACT, THE QUANTITY OF ENGINEERING FABRIC FOR EACH TYPE PLACED WITHIN THE SPECIFIED LIMITS WILL BE DETERMINED TO THE NEAREST SPECIFIED UNIT BY MEASUREMENTS MADE OF THE COVERED SURFACES ONLY, DISREGARDING THAT REQUIRED FOR ANCHORAGE, SEAMS, AND OVERLAPS. PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE. SUCH PAYMENT WILL CONSTITUTE FULL COMPENSATION FOR THE COMPLETION OF THE WORK.

REMOVAL OF WATER

1. SCOPE

THE WORK SHALL CONSIST OF 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.

2. DIVERTING SURFACE WATER

THE CONTRACTOR SHALL BUILD, MAINTAIN AND OPERATE ALL COFFERDAMS, CHANNELS, FLUMES, SUMPS, AND OTHER TEMPORARY DIVERSION AND PROTECTIVE WORKS NEEDED TO DIVERT STREAMFLOW AND OTHER SURFACE WATER THROUGH OR AROUND THE CONSTRUCTION SITE AND AWAY FROM THE CONSTRUCTION WORK WHILE CONSTRUCTION IS IN PROGRESS. UNLESS OTHERWISE SPECIFIED, A DIVERSION MUST DISCHARGE INTO THE SAME NATURAL DRAINAGEWAY IN WHICH ITS HEADWORKS ARE LOCATED.

UNLESS OTHERWISE SPECIFIED, THE CONTRACTOR SHALL FURNISH TO THE CONTRACTING OFFICER, IN WRITING, HIS PLAN FOR DIVERTING SURFACE WATER BEFORE BEGINNING THE CONSTRUCTION WORK FOR WHICH THE DIVERSION IS REQUIRED. ACCEPTANCE OF THIS PLAN WILL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR COMPLETING THE WORK AS SPECIFIED.

3. DEWATERING THE CONSTRUCTION SITE

FOUNDATIONS, CUTOFF TRENCHES AND OTHER PARTS OF THE CONSTRUCTION SITE SHALL BE DEWATERED AND KEPT FREE OF STANDING WATER OR EXCESSIVELY MUDDY CONDITIONS AS NEEDED FOR PROPER EXECUTION OF THE CONSTRUCTION WORK. THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE AND MAINTAIN ALL DRAINS, SUMPS, PUMPS, CASING, WELLPOINTS, AND OTHER EQUIPMENT NEEDED TO PERFORM THE DEWATERING AS SPECIFIED. DEWATERING METHODS THAT CAUSE A LOSS OF FINES FROM FOUNDATION AREAS WILL NOT BE PERMITTED.

UNLESS OTHERWISE SPECIFIED, THE CONTRACTOR SHALL FURNISH TO THE CONTRACTING OFFICER, IN WRITING, HIS PLAN FOR DEWATERING BEFORE BEGINNING THE CONSTRUCTION WORK FOR WHICH THE DEWATERING IS REQUIRED. ACCEPTANCE OF THIS PLAN WILL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR COMPLETING THE WORK AS SPECIFIED.

4. EROSION AND POLLUTION CONTROL

REMOVAL OF WATER FROM THE CONSTRUCTION SITE SHALL BE ACCOMPLISHED IN SUCH A MANNER THAT EROSION AND THE TRANSMISSION OF SEDIMENT AND OTHER POLLUTANTS ARE MINIMIZED.

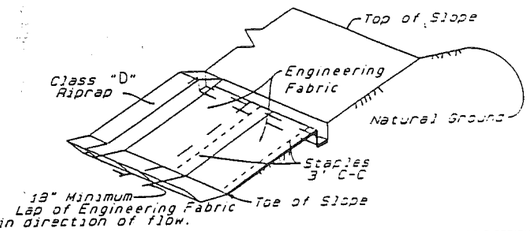
5. REMOVAL OF TEMPORARY WORKS

AFTER THE TEMPORARY WORKS HAVE SERVED THEIR PURPOSES, THE CONTRACTOR SHALL REMOVE THEM OR LEVEL AND GRADE THEM TO THE EXTENT REQUIRED TO PRESENT A SIGHTLY APPEARANCE AND TO PREVENT ANY OBSTRUCTION OF THE FLOW OF WATER OR ANY OTHER INTERFERENCE WITH THE OPERATION OF OR ACCESS TO THE PERMANENT WORKS.

EXCEPT AS OTHERWISE SPECIFIED, PIPES AND CASINGS SHALL BE REMOVED FROM TEMPORARY WELLS AND THE WELLS SHALL BE FILLED TO GROUND LEVEL WITH GRAVEL OR OTHER MATERIAL APPROVED BY THE CONTRACTING OFFICER.

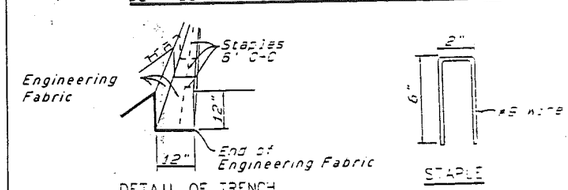
6. MEASUREMENT AND PAYMENT

PAYMENT FOR THIS ITEM WILL BE MADE AT THE CONTRACT LUMP SUM PRICE AND WILL CONSTITUTE FULL COMPENSATION FOR COMPLETION OF THE WORK.

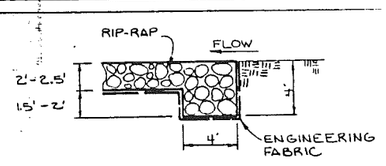


EXCAVATE 12"X12" TRENCH ALONG TOP OF RIPRAP. PLACE END OF ENGINEERING FABRIC STRIPS INTO TRENCH WITH STAPLES AS SHOWN. BACKFILL WITH THE EXCAVATED MATERIAL AND COMPACT THE ENGINEER MAY PERMIT THE USE OF THE WHEELS OF PNEUMATIC-TIRED EQUIPMENT FOR CONSOLIDATING THE TRENCH BACKFILL MATERIAL.

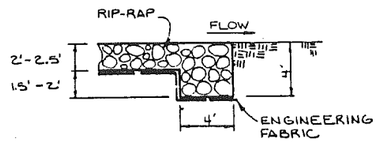
DETAILS OF PLACEMENT OF ENGINEERING FABRIC



DETAIL OF TRENCH



TYPICAL UPSTREAM

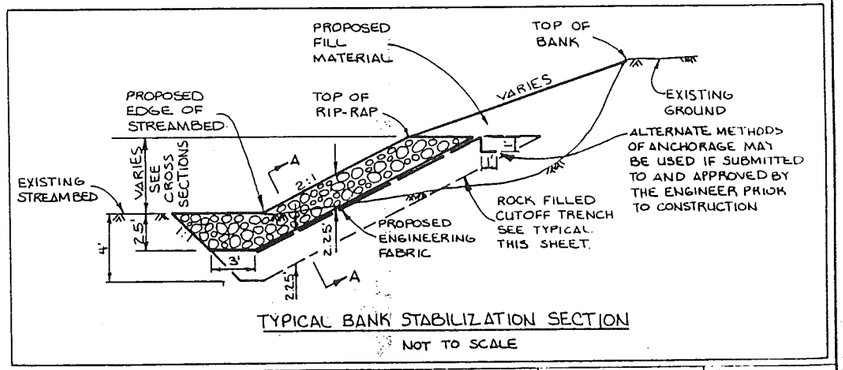


TYPICAL DOWNSTREAM

SECTION A-A

ROCK FILLED CUTOFF TRENCH
NOT TO SCALE

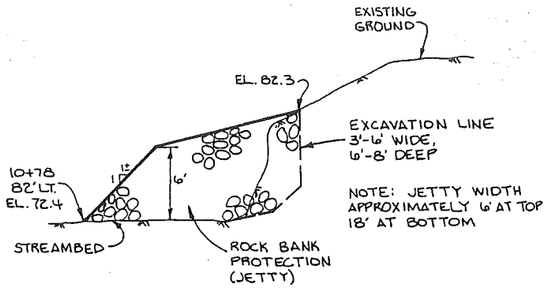
CONTINUOUS ACROSS BOTTOM WIDTH AND SIDE SLOPES.



TYPICAL BANK STABILIZATION SECTION
NOT TO SCALE

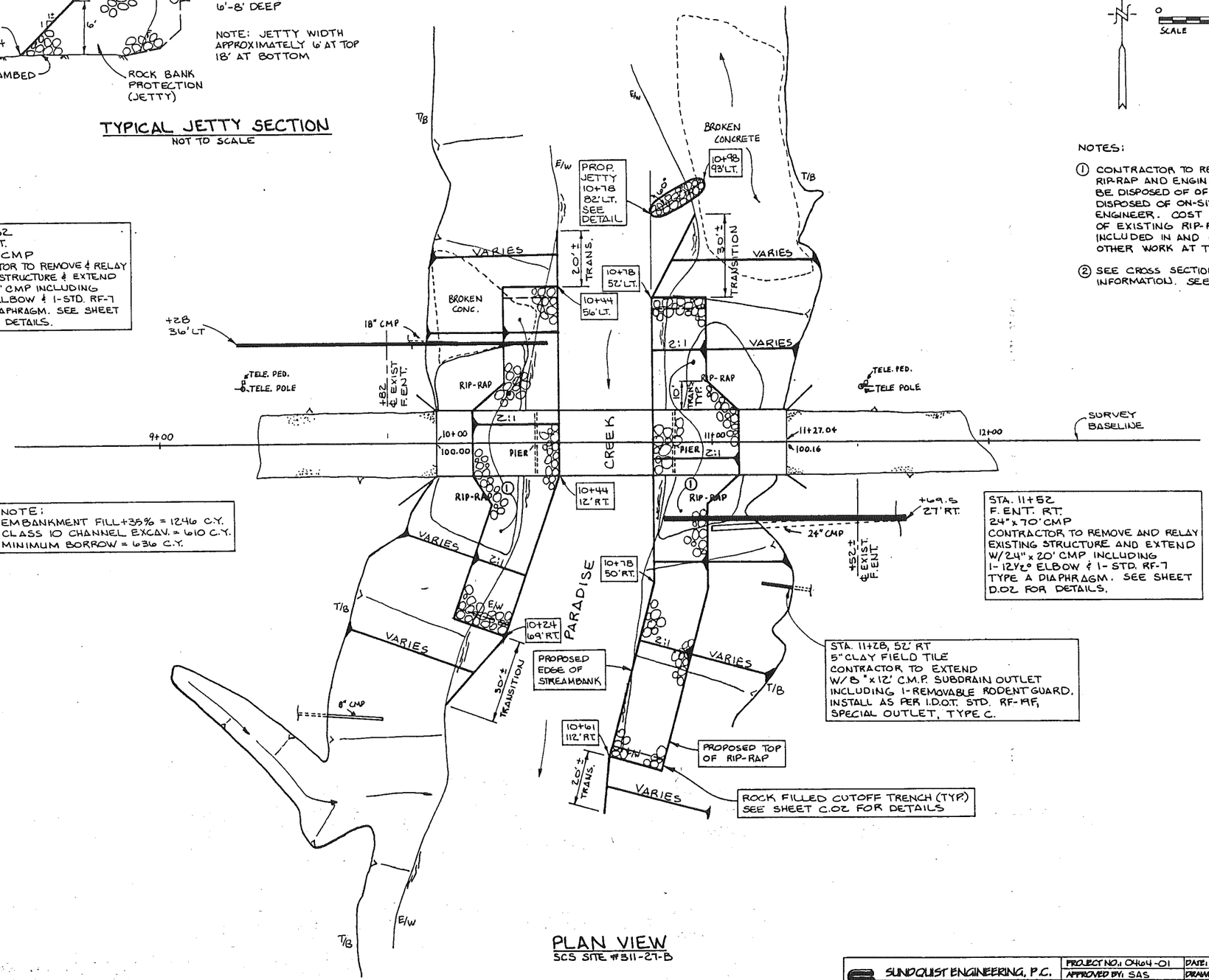
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-5118 FAX: (712) 263-2101

PROJECT NO.: 0464	DATE: 1/96	REV:
APPROVED BY: SAS	DRAWN BY: TKK	
CLIENT: CRAWFORD COUNTY, IOWA		
DESCRIPTION: TYPICAL SECTIONS FOR BANK STABILIZATION - CUTOFF TRENCH AND CONSTRUCTION SPECIFICATIONS PROJ #EWP-L95(1)		SHEET C.02



TYPICAL JETTY SECTION
NOT TO SCALE

STA. 9+82
F.ENT. LT.
18" x 40' CMP
CONTRACTOR TO REMOVE & RELAY EXISTING STRUCTURE & EXTEND W/18" x 34' CMP INCLUDING 1-12½° ELBOW & 1-STD. RF-7 TYPE A DIAPHRAGM. SEE SHEET D.02 FOR DETAILS.



NOTE:
EMBANKMENT FILL +35% = 1246 C.Y.
CLASS 10 CHANNEL EXCAV. = 610 C.Y.
MINIMUM BORROW = 636 C.Y.

STA. 11+52
F.ENT. RT.
24" x 70' CMP
CONTRACTOR TO REMOVE AND RELAY EXISTING STRUCTURE AND EXTEND W/24" x 20' CMP INCLUDING 1-12½° ELBOW & 1-STD. RF-7 TYPE A DIAPHRAGM. SEE SHEET D.02 FOR DETAILS.

STA. 11+28, 52' RT
5" CLAY FIELD TILE
CONTRACTOR TO EXTEND W/ 8" x 12' C.M.P. SUBDRAIN OUTLET INCLUDING 1-REMOVABLE RODENT GUARD. INSTALL AS PER I.D.O.T. STD. RF-19F, SPECIAL OUTLET, TYPE C.

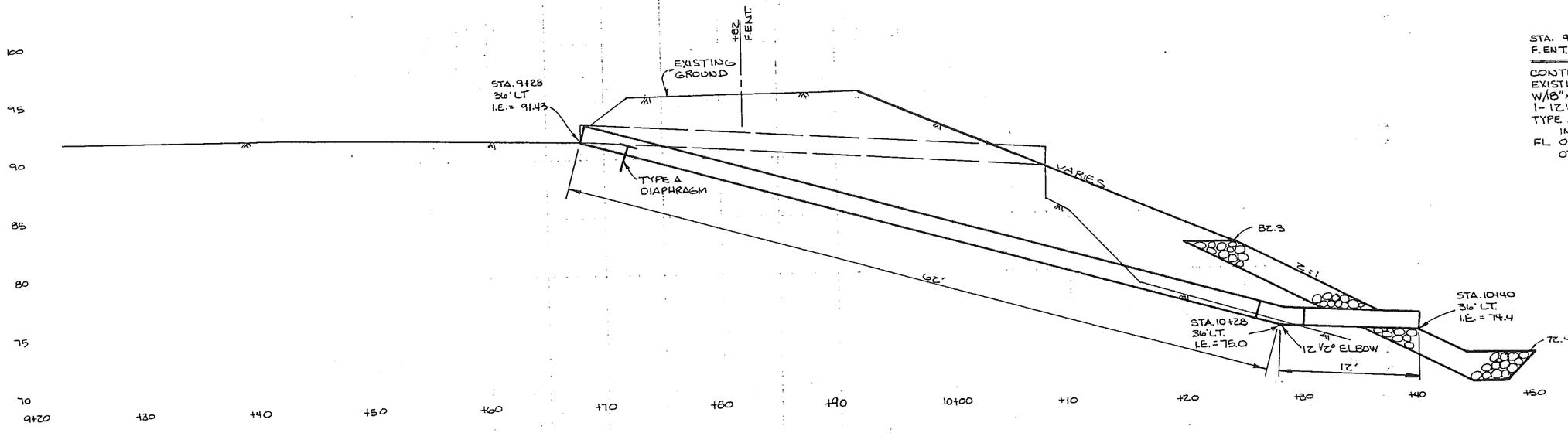
PLAN VIEW
SCS SITE #311-27-B

0 20' 40' 60' 80'
SCALE FEET

NOTES:

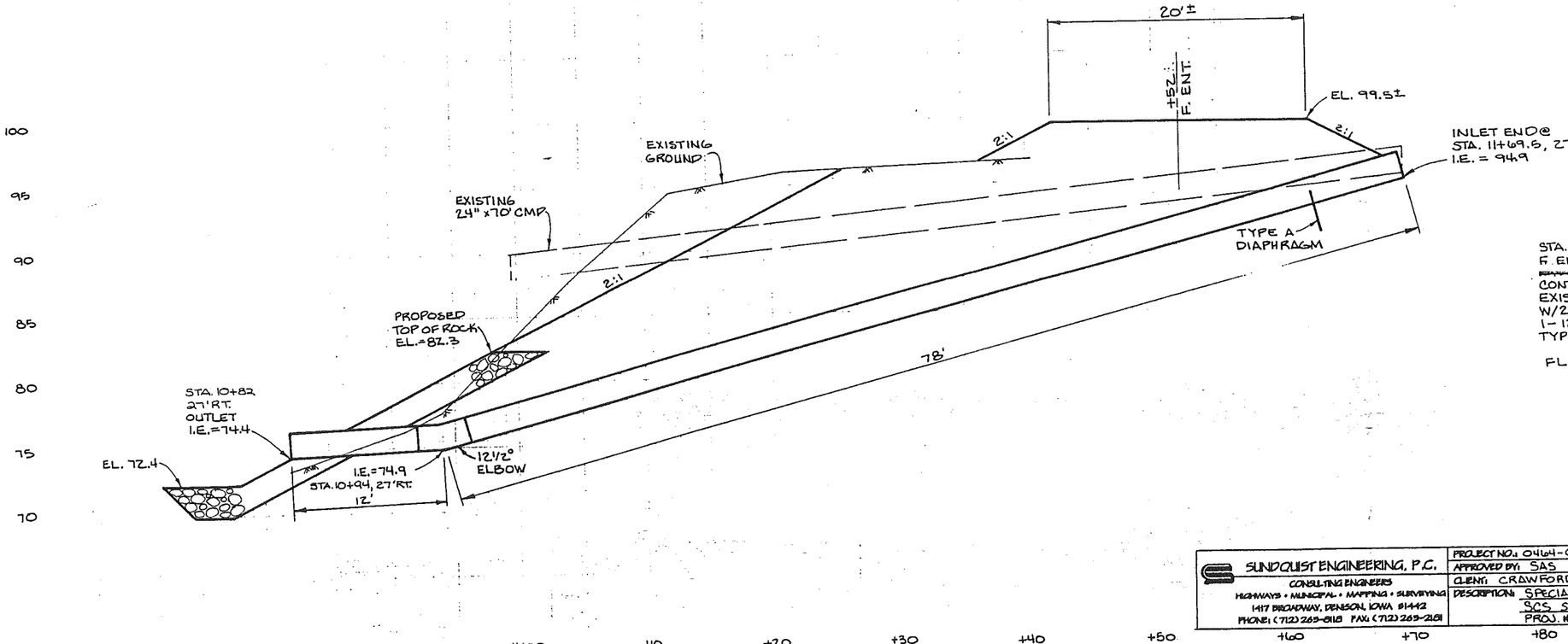
1. CONTRACTOR TO REMOVE AND DISPOSE OF EXISTING RIP-RAP AND ENGINEERING FABRIC. FABRIC SHALL BE DISPOSED OF OFF-SITE AND RIP-RAP SHALL BE DISPOSED OF ON-SITE AS DIRECTED BY THE ENGINEER. COST OF REMOVAL AND DISPOSAL OF EXISTING RIP-RAP AND FABRIC SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO OTHER WORK AT THIS SITE.
2. SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SEE SHEETS D.03 & D04

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-01	DATE: 7/15/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: PLAN VIEW		SHEET
PHONE: (712) 263-3113 FAX: (712) 263-2151	SCS SITE # 311-27-B		D.01
	PROJ. # EWP-L95(1)		



STA. 9+82
F. ENT. LT. 18" x 40' CMP

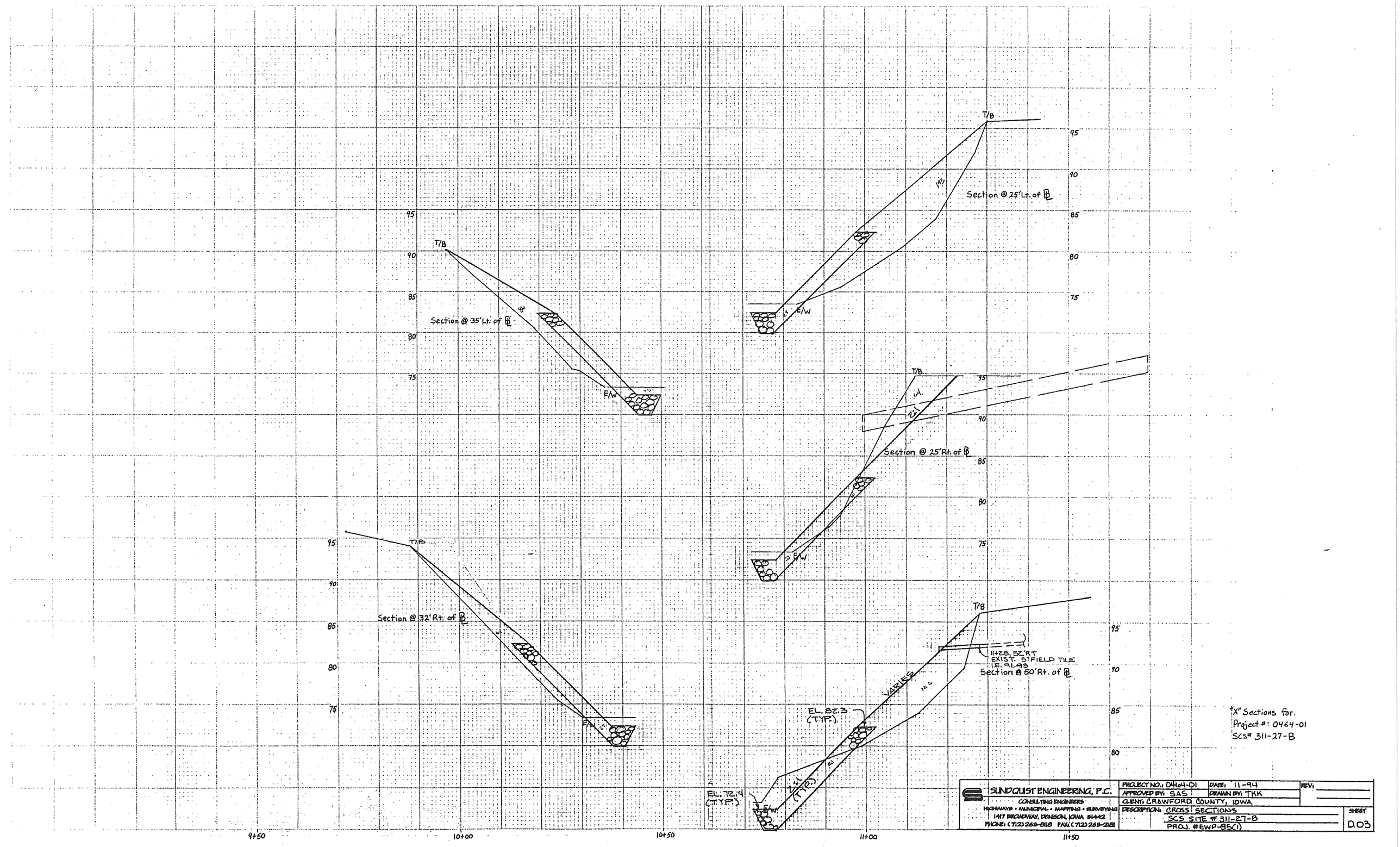
CONTR. TO REMOVE AND RELAY EXISTING STRUCTURE AND EXTEND W/18" x 34' CMP INCLUDING
1- 12 1/2° ELBOW & 1-STD. RF-7
TYPE A DIAPHRAGM
IN = 91.43
FL OUT = 74.4
OTHER = 75.0



STA. 11+52
F. ENT RT. 24" x 70' CMP

CONTR. TO REMOVE AND RELAY EXISTING STRUCTURE AND EXTEND W/24" x 20' CMP INCLUDING
1-12 1/2° ELBOW & 1 STD. RF-7
TYPE A DIAPHRAGM
IN = 94.9
FL OUT = 74.4
OTHER = 74.9

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-01	DATE: 12/94	REV:
	APPROVED BY: SAS	DRAWN BY: TKK	
CONSULTING ENGINEERS	CLIENT: CRAWFORD COUNTY, IOWA		
HIGHWAYS • MUNICIPAL • PLATTING • SURVEYING	DESCRIPTION: SPECIAL DETAILS		SHEET
1417 BROADWAY, DENISON, IOWA 51442	SCS SITE #311-27-B		D.02
PHONE: (712) 263-3118 FAX: (712) 263-2101	PROJ. # EWP-L95(1)		

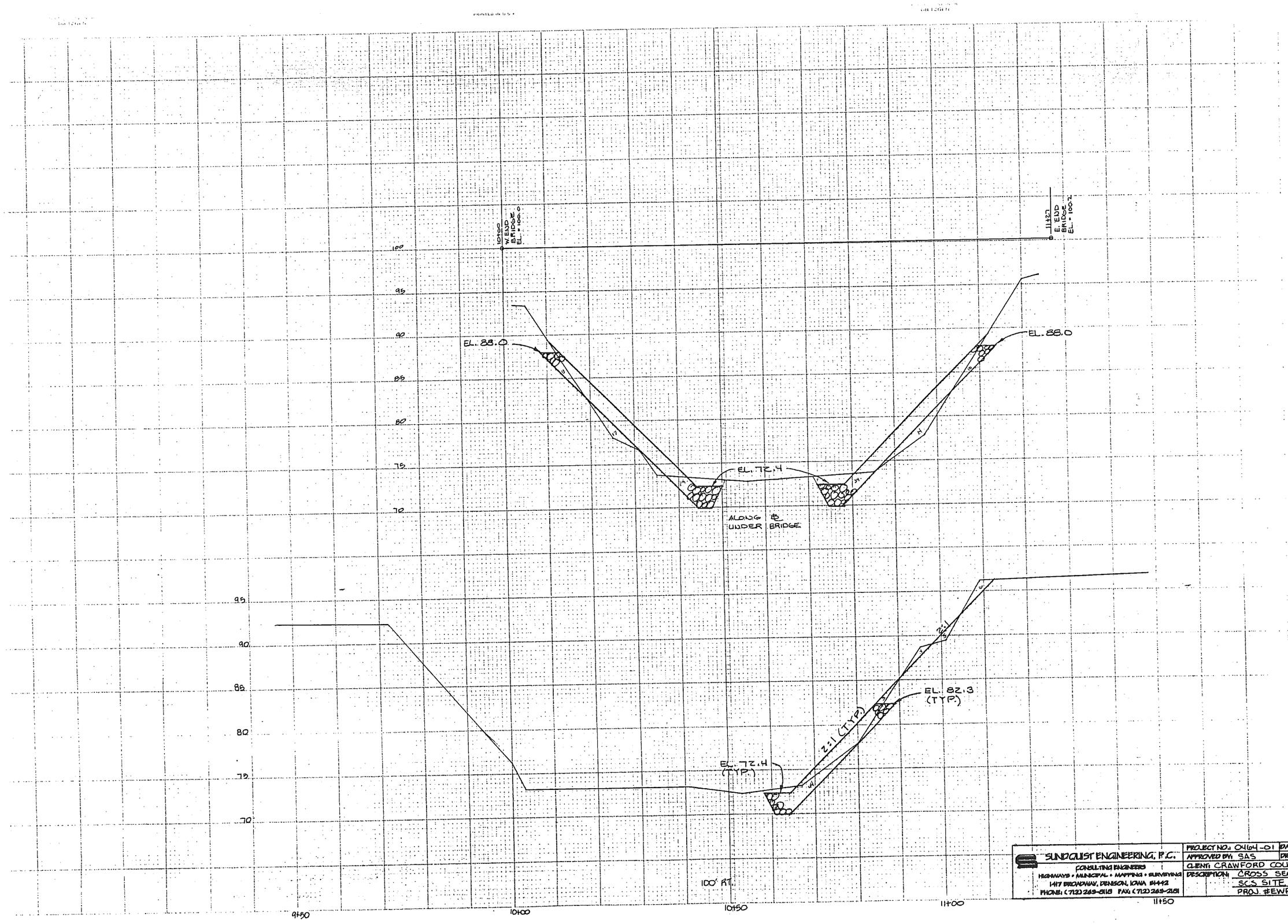


"X" Sections for.
Project #: 0464-01
SCS# 311-27-B

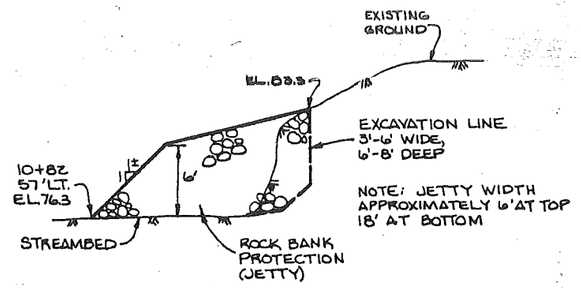
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-6118 FAX: (712) 263-2181

PROJECT NO.: 0464-01 | DATE: 11-94 | REV:
APPROVED BY: SAS | DRAWN BY: TKK
CLIENT: CRAWFORD COUNTY, IOWA
DESCRIPTION: CROSS SECTIONS
SCS SITE # 311-27-B
PROJ. #EWP-85(1)

SHEET D.03

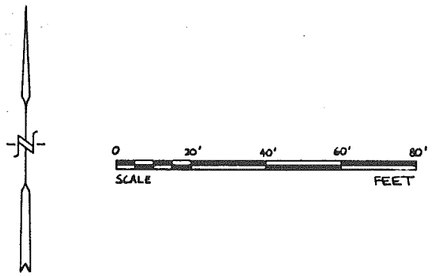


SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-01	DATE: 12/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: CROSS SECTIONS		SHEET
PHONE: (712) 263-5113 FAX: (712) 263-2151	SCS SITE #311-27-B		D.04
	PROJ. #EWP-L95(1)		



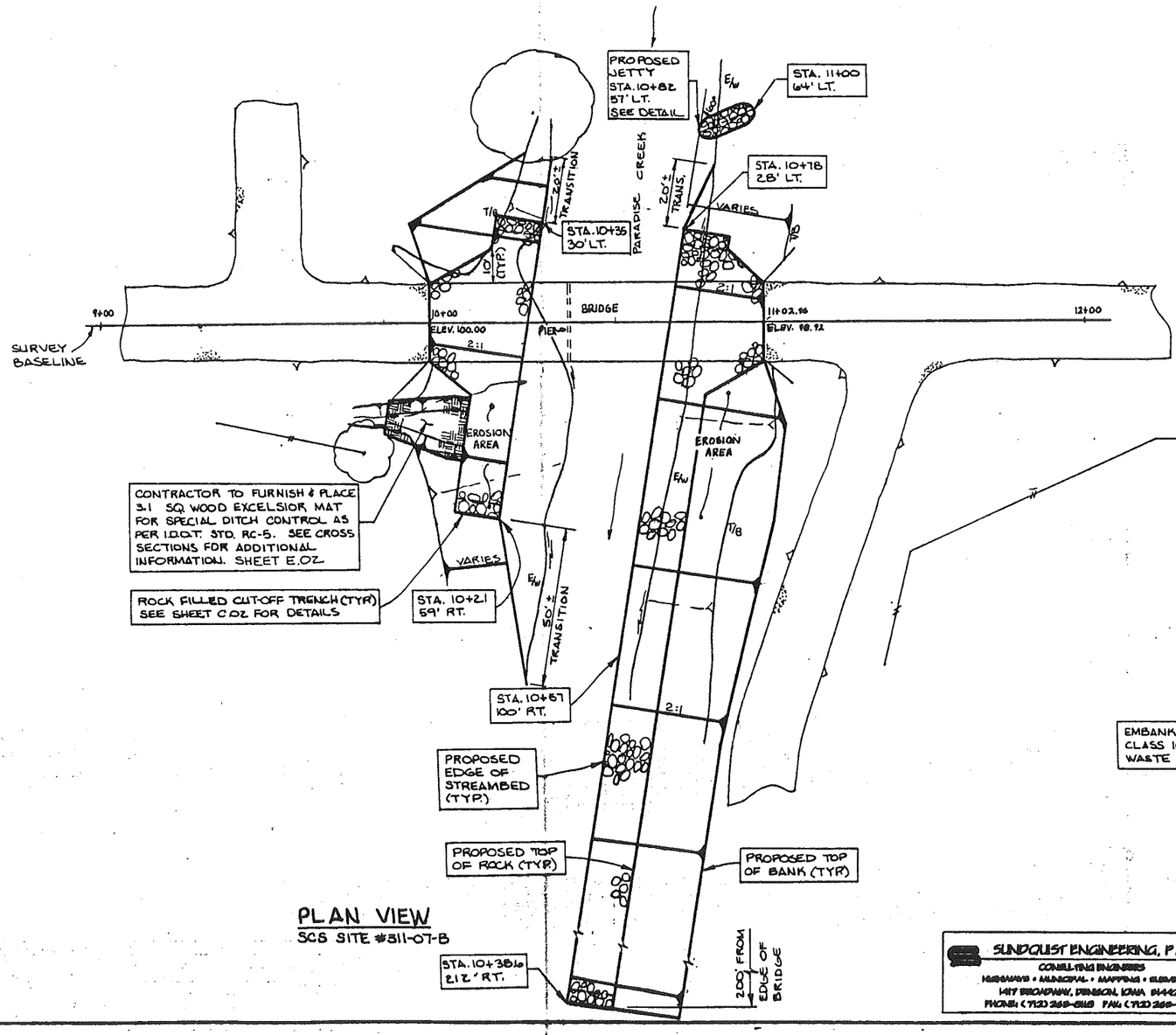
TYPICAL JETTY SECTION

NOT TO SCALE



NOTE:

SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SHEETS E.02 & E.03

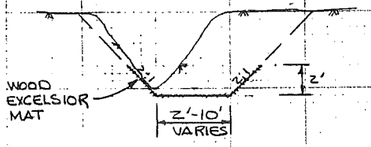


PLAN VIEW

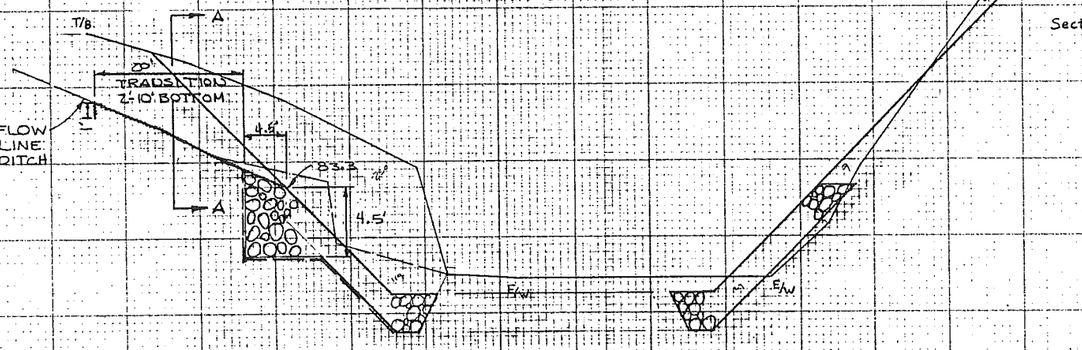
SCS SITE #311-07-B

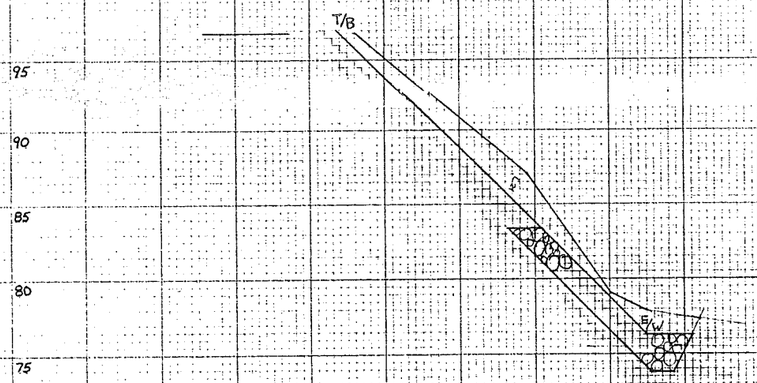
EMBANKMENT FILL + 35% = 108 C.Y.
CLASS 10 CHANNEL EXCAV. = 1383 C.Y.
WASTE = 1275 C.Y.

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-02	DATE: 7/12/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYS	CLIENT: CRAWFORD COUNTY, IOWA		
117 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: PLAN VIEW		SHEET
PHONE: (712) 263-6163 FAX: (712) 263-2163	SCS SITE #311-07-B		E.01
	PROJ. #EWP-95(1)		



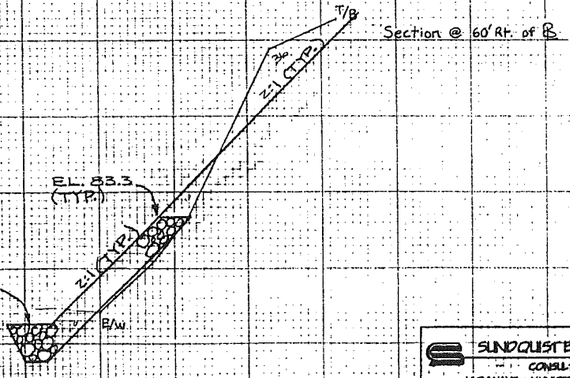
SECTION A-A





Section @ 30' Lt. of ℄

Section @ 30' Rt of ℄



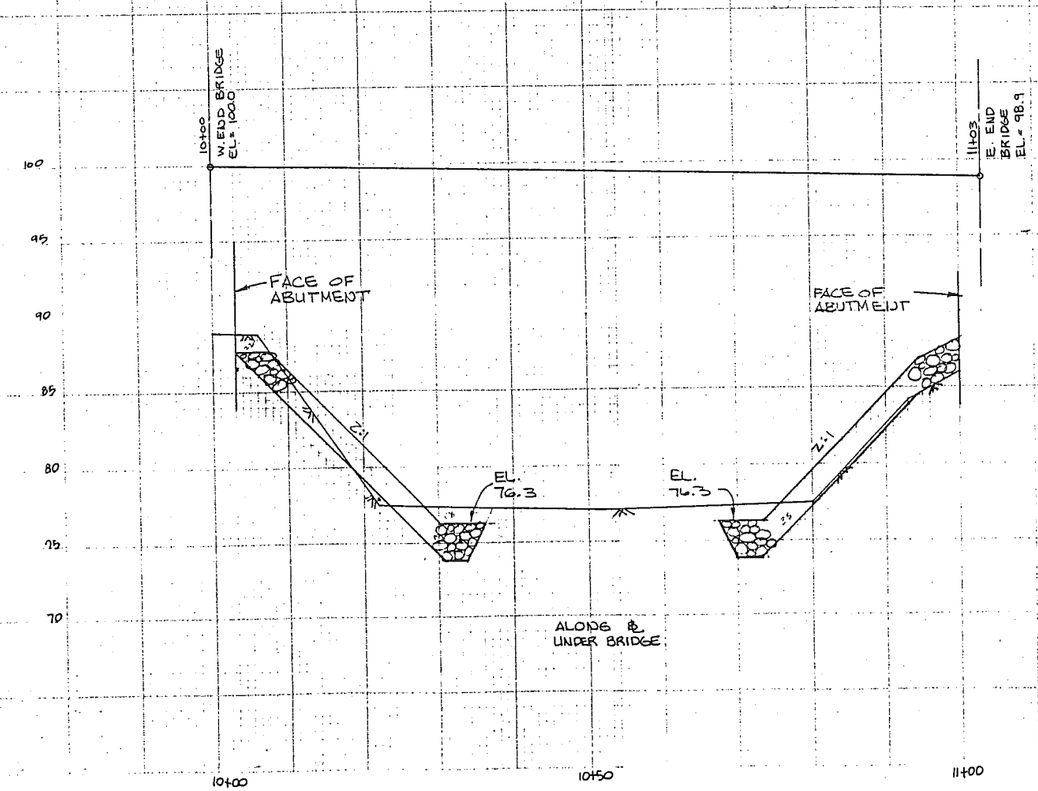
Section @ 60' Rt. of ℄

95
90
85
80
75

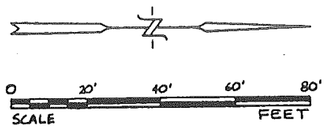
10+00
10+50
11+00

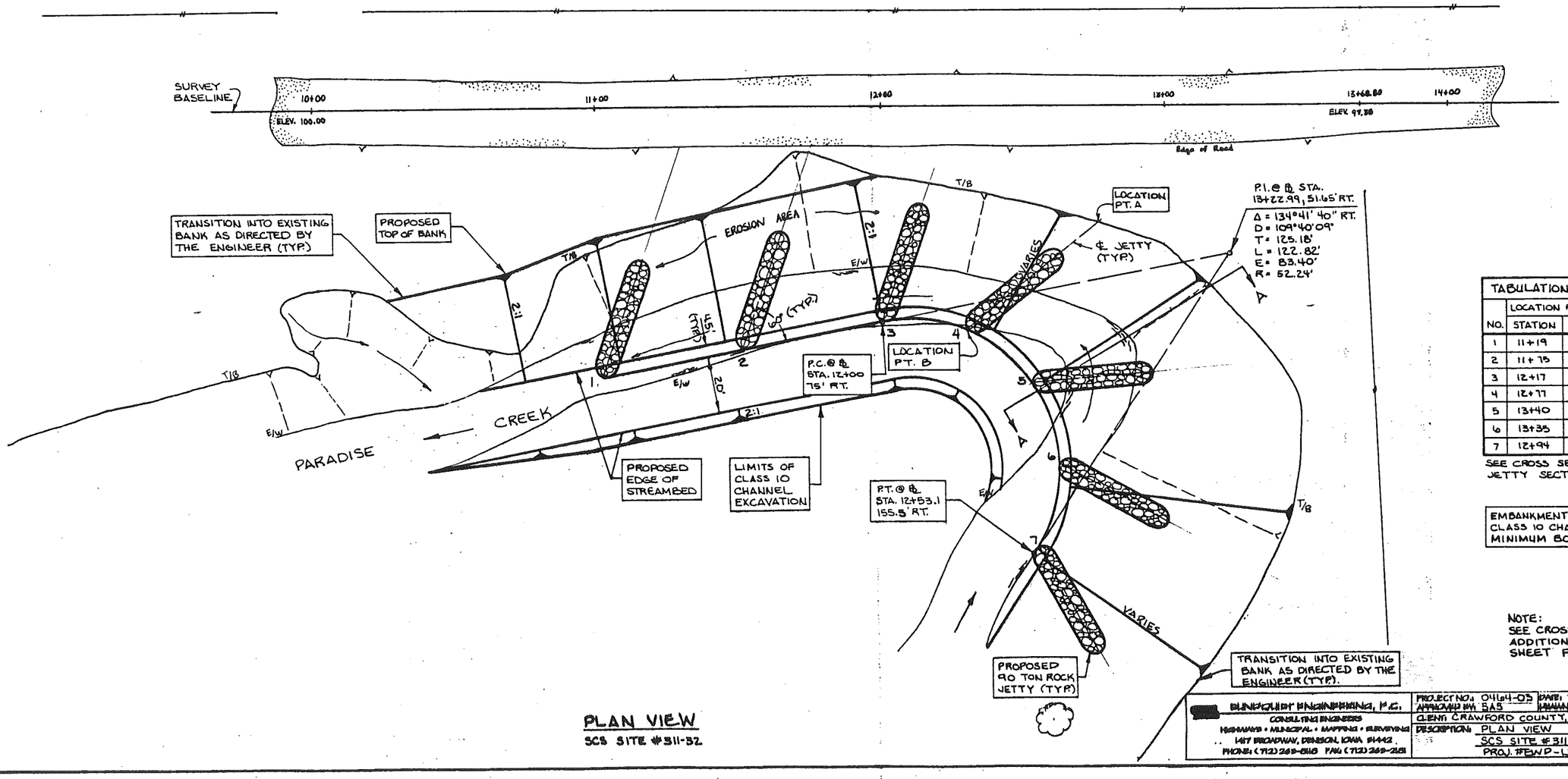
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-8118 FAX: (712) 263-2181

PROJECT NO.: 0464-02 | DATE: 11/94 | REV:
APPROVED BY: SAS | DRAWN BY: TKK
CLIENT: CRAWFORD COUNTY, IOWA
DESCRIPTION: CROSS SECTIONS
SCS BITE-# 311-07-05
PROJ. #EWP-L95(1)
SHEET E.02



SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-02	DATE: 1/95	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: CROSS SECTION		SHEET
PHONE: (712) 263-5118 FAX: (712) 263-2181	SCS SITE # 311-07-B		E.03
	PROJ. # EWP-L95(1)		





PLAN VIEW
SCS SITE #311-32

TABULATION OF ROCK JETTIES				
	LOCATION POINT A		LOCATION POINT B	
NO.	STATION	OFFSET	STATION	OFFSET
1	11+19	93'	11+02	43'
2	11+75	16'	11+51	84'
3	12+17	27'	12+00	75'
4	12+77	41'	12+30	78'
5	13+40	88'	12+55	96'
6	13+35	163'	12+62	124'
7	12+94	222'	12+55	153'

SEE CROSS SECTIONS FOR TYPICAL JETTY SECTION. (SHEET F.02)

EMBANKMENT FILL+35% = 4733 C.Y.
CLASS 10 CHANNEL EXCAV. = 447 C.Y.
MINIMUM BORROW = 4286 C.Y.

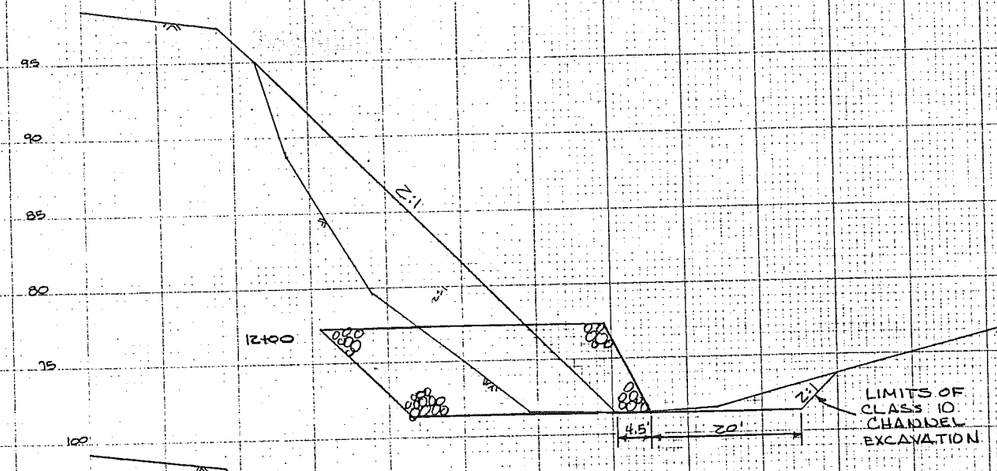
NOTE:
SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SHEET F.02

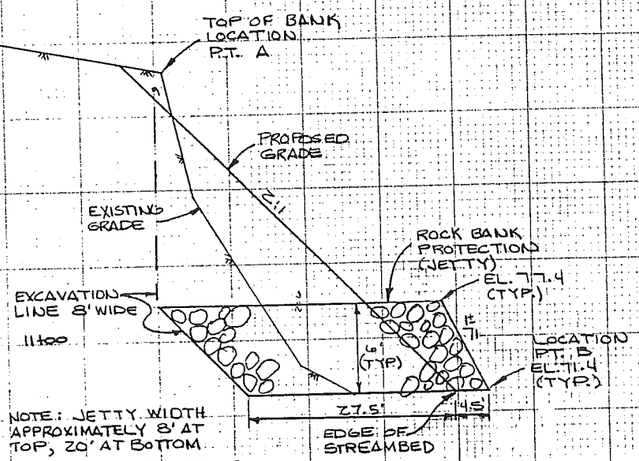
BUNGUARDT ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-5113 FAX: (712) 263-2101

PROJECT NO.: 0464-05 DATE: 7/14/94
APPROVED BY: BAB DRAWN BY: ALW TKH
CLIENT: CRAWFORD COUNTY, IOWA
DESCRIPTION: PLAN VIEW
SCS SITE #311-32
PROJ. #EWP-L95(1)

REV:

SHEET F.01

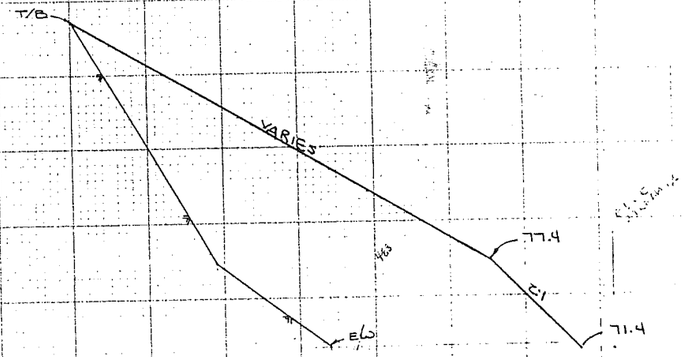




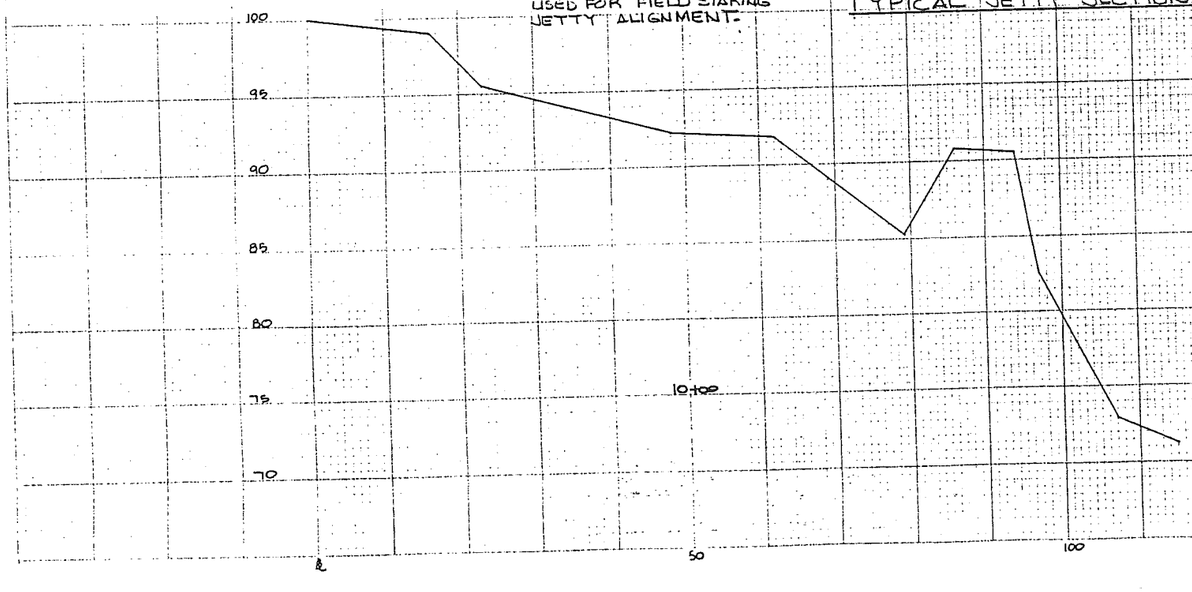
NOTE: JETTY WIDTH APPROXIMATELY 8' AT TOP, 20' AT BOTTOM

LOCATION POINTS TO BE USED FOR FIELD STAKING JETTY ALIGNMENT.

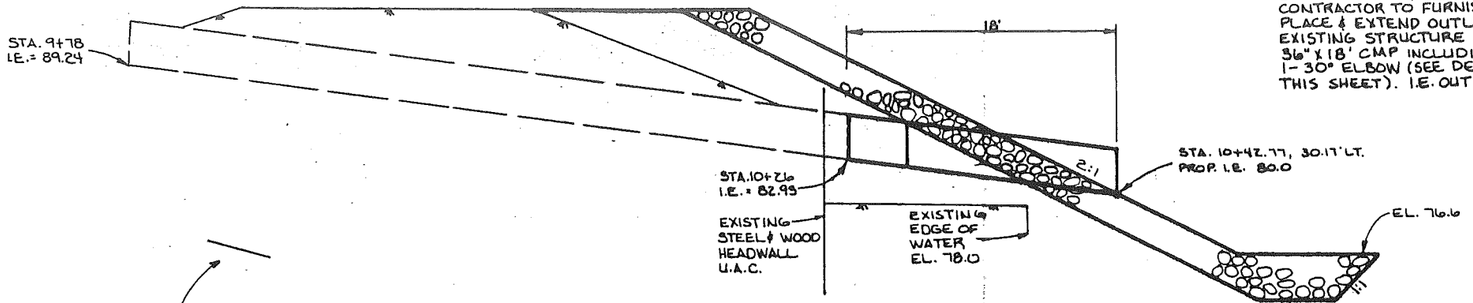
TYPICAL JETTY SECTION



SECTION A-A

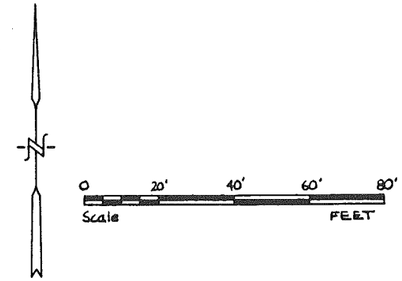


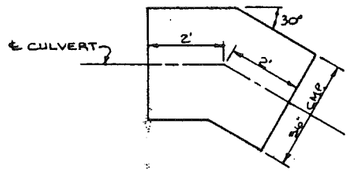
SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-03	DATE: 11/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: CROSS SECTIONS		SHEET
PHONE: (712) 263-5113 FAX: (712) 263-2151	SCS SITE #311-32		F.07
	PROJ. #EWP-L95(1)		



STA. 10+26
36" x 48' CMP W/ HEADWALL
CONTRACTOR TO FURNISH, PLACE & EXTEND OUTLET END EXISTING STRUCTURE WITH 36" x 18' CMP INCLUDING 1-30° ELBOW (SEE DETAIL THIS SHEET). I.E. OUT = 80.0

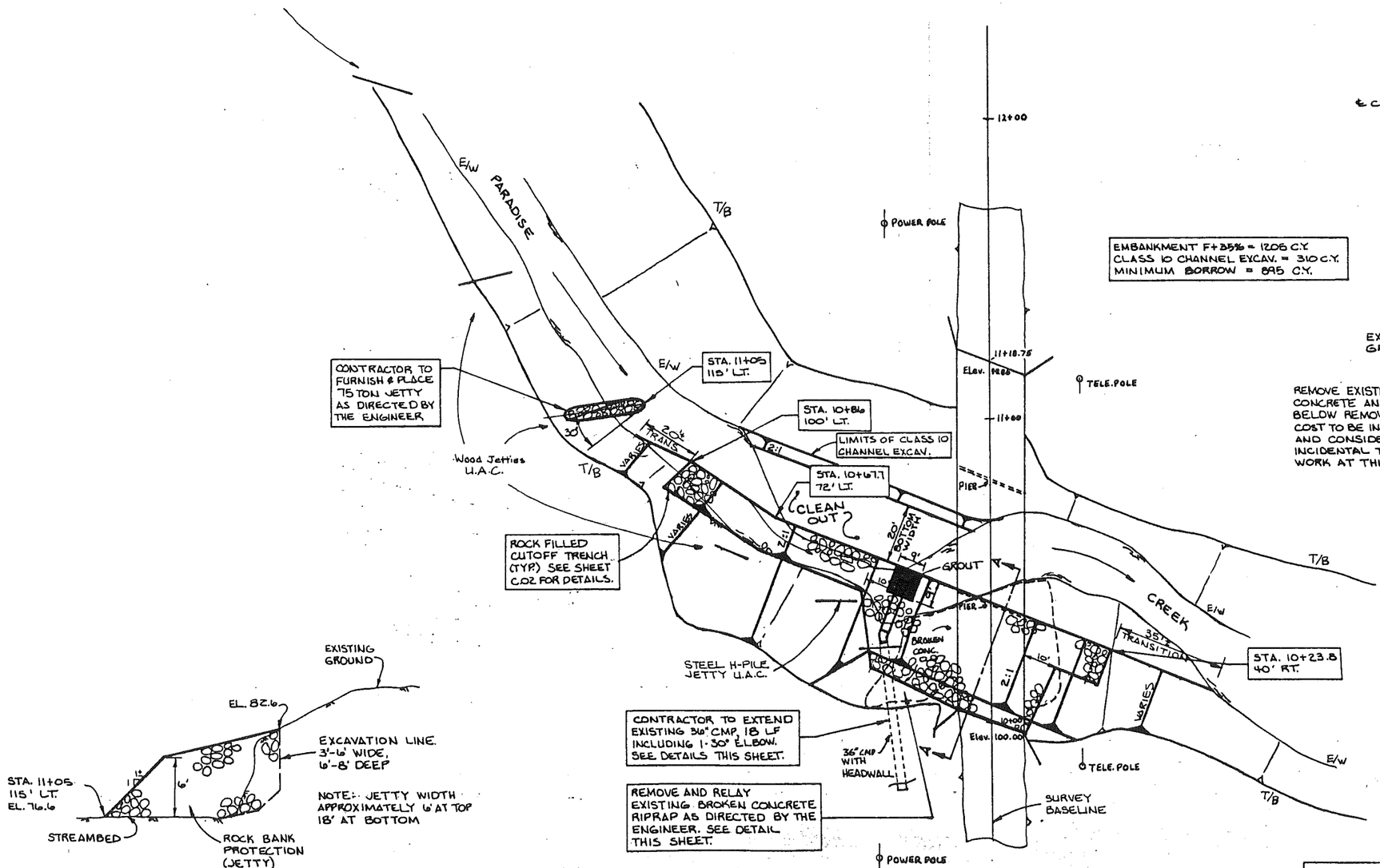
LONGITUDINAL SECTION ALONG ℄ OF LETDOWN STRUCTURE
SCALE: 1" = 5'





ELBOW DETAIL
SCALE: 1" = 2'

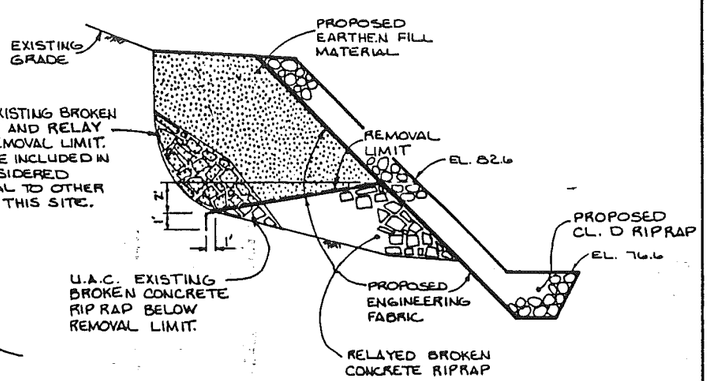
EMBANKMENT F+B5% = 1205 C.Y.
CLASS 10 CHANNEL EXCAV. = 310 C.Y.
MINIMUM BORROW = 895 C.Y.



PLAN VIEW
SCS SITE # 311-34

NOTE: JETTY WIDTH APPROXIMATELY 6' AT TOP 18' AT BOTTOM

TYPICAL JETTY SECTION
NOT TO SCALE

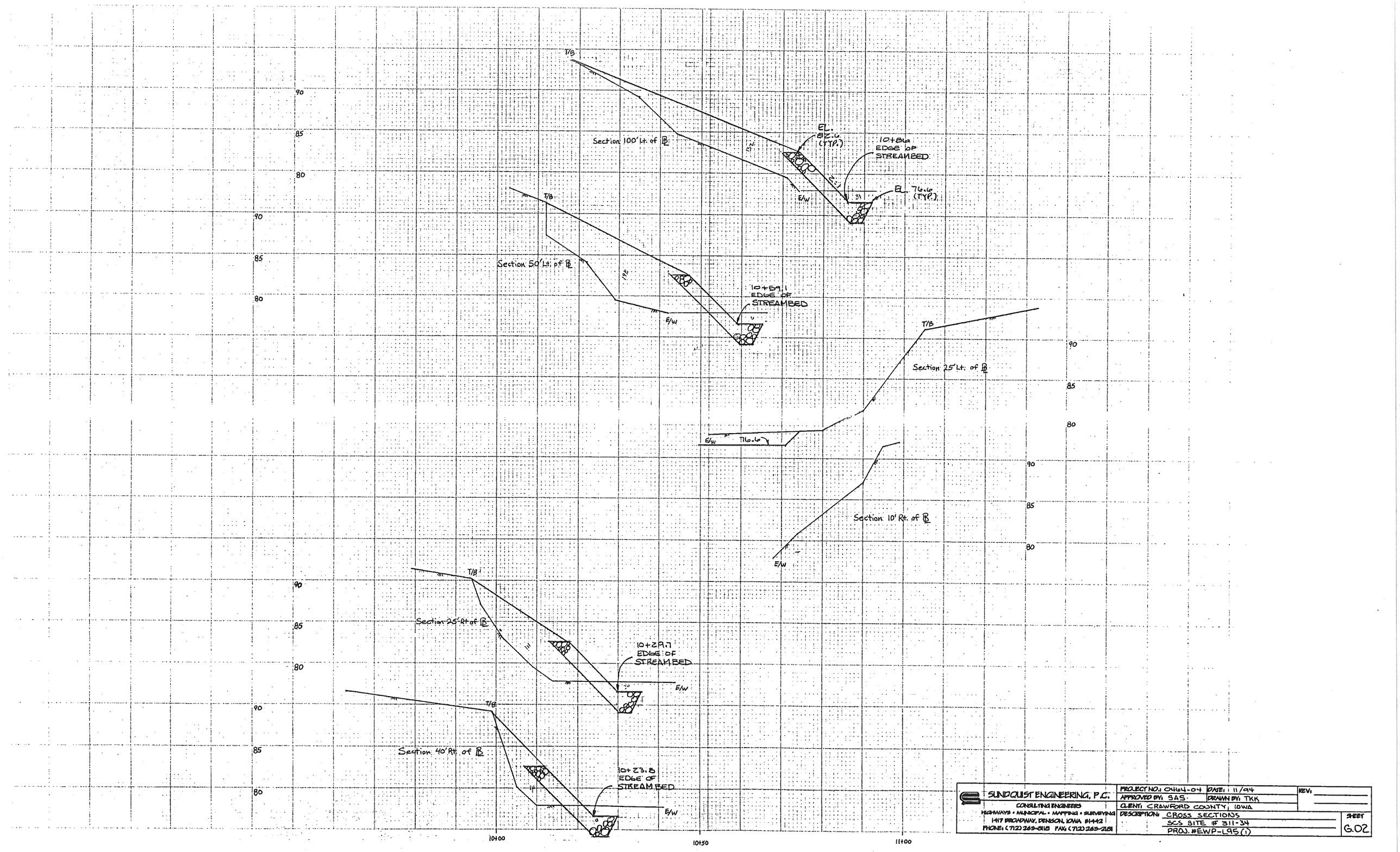


SECTION A-A
NOT TO SCALE

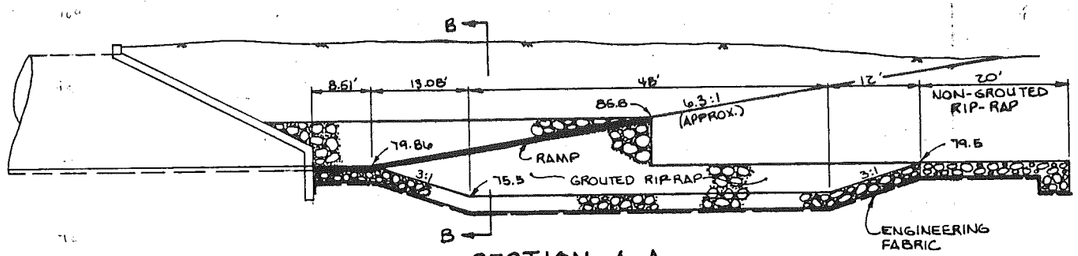
NOTE:
SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SHEET G.02

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
147 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-6168 FAX: (712) 263-2611

PROJECT NO.: 0464-04	DATE: 7/15/94
APPROVED BY: SAS	DRAWN BY: AON TKM
CLIENT: CRAWFORD COUNTY, IOWA	
DESCRIPTION: PLAN VIEW SCS SITE #311-34 PROJ. #EWP-L96(1)	SHEET G.01

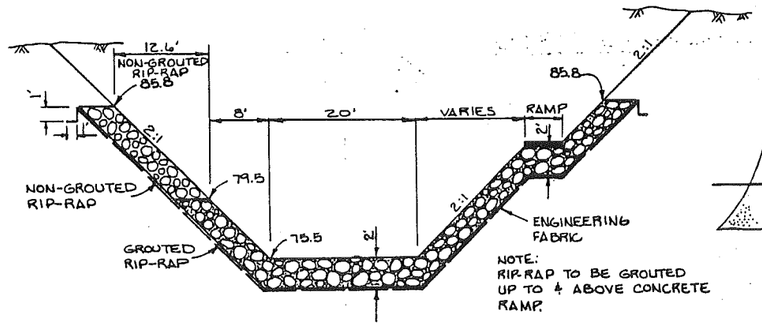


SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0404-04	DATE: 11/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: CROSS SECTIONS		SHEET
PHONE: (712) 263-5113 FAX: (712) 263-2151	SCS SITE # 311-34		G.02
	PROJ. #EWP-L95(1)		



SECTION A-A

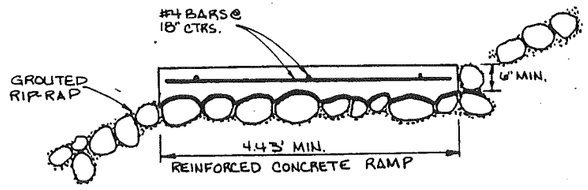
SCALE: 1" = 10'



NOTE:
RIP-RAP TO BE GROUTED UP TO ℄ ABOVE CONCRETE RAMP.

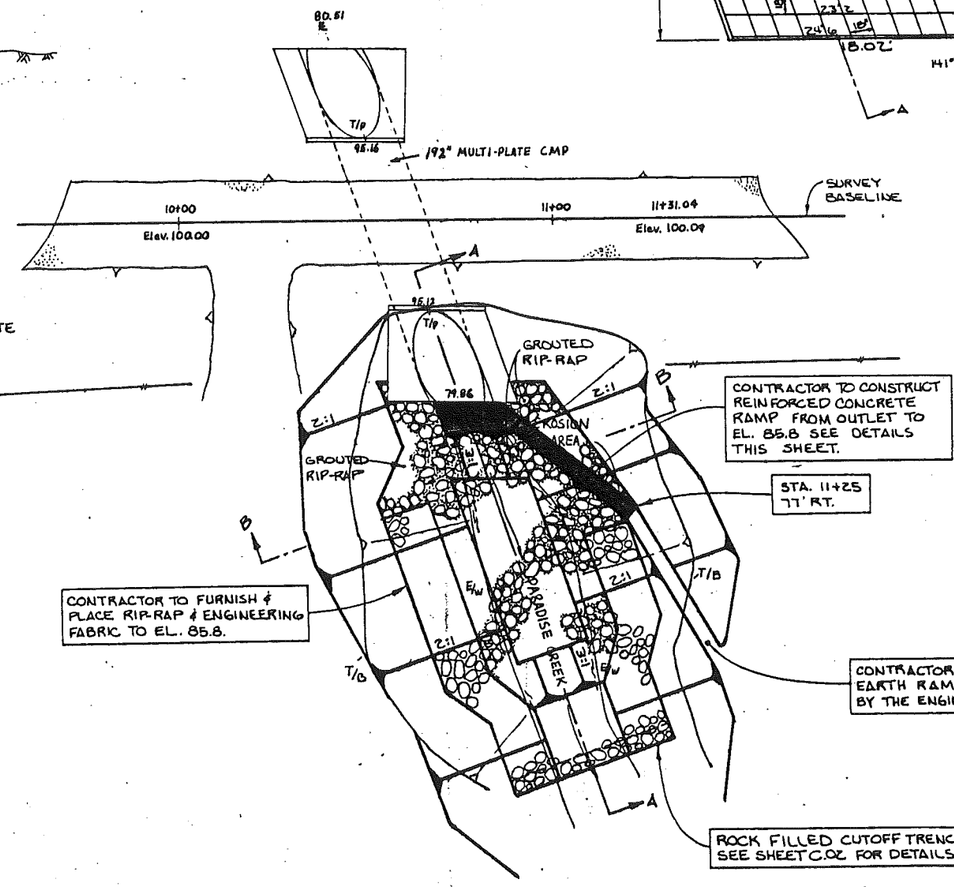
SECTION B-B

NOT TO SCALE.



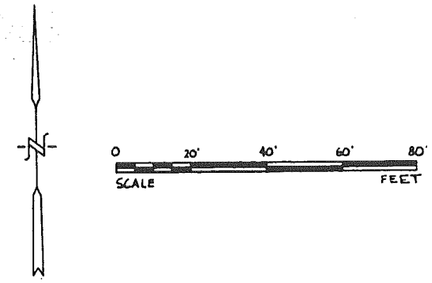
RAMP DETAIL

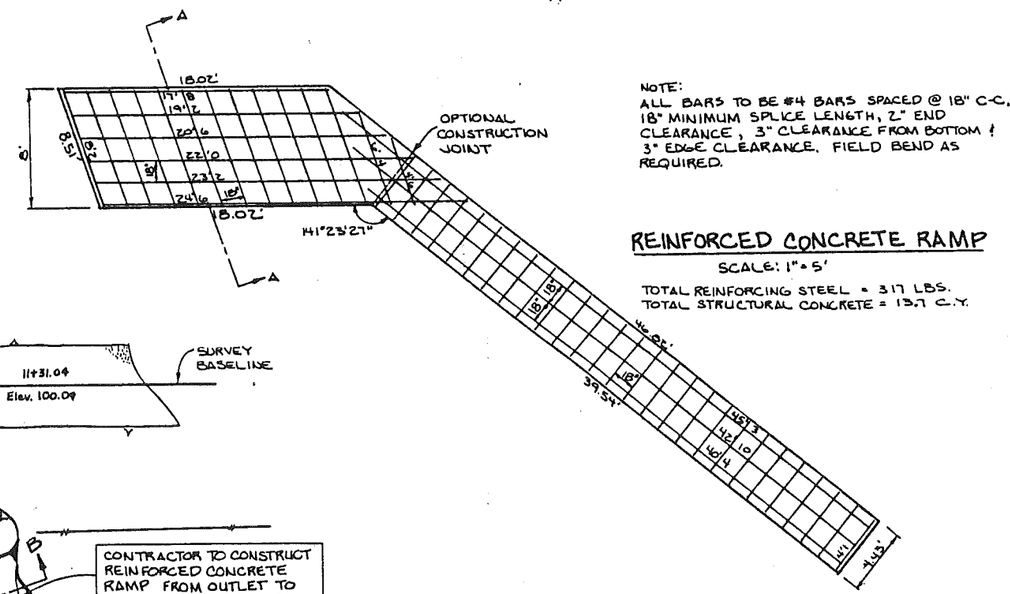
NOT TO SCALE



PLAN VIEW

SCS SITE # 311-51





NOTE:
ALL BARS TO BE #4 BARS SPACED @ 18" C-C, 18" MINIMUM SPLICE LENGTH, 2" END CLEARANCE, 3" CLEARANCE FROM BOTTOM & 3" EDGE CLEARANCE. FIELD BEND AS REQUIRED.

REINFORCED CONCRETE RAMP

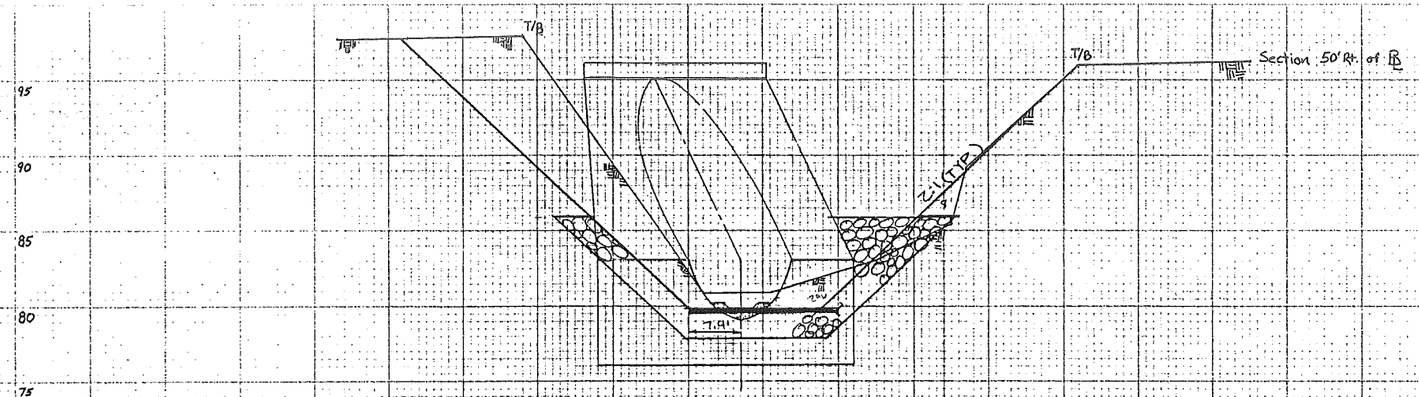
SCALE: 1" = 5'

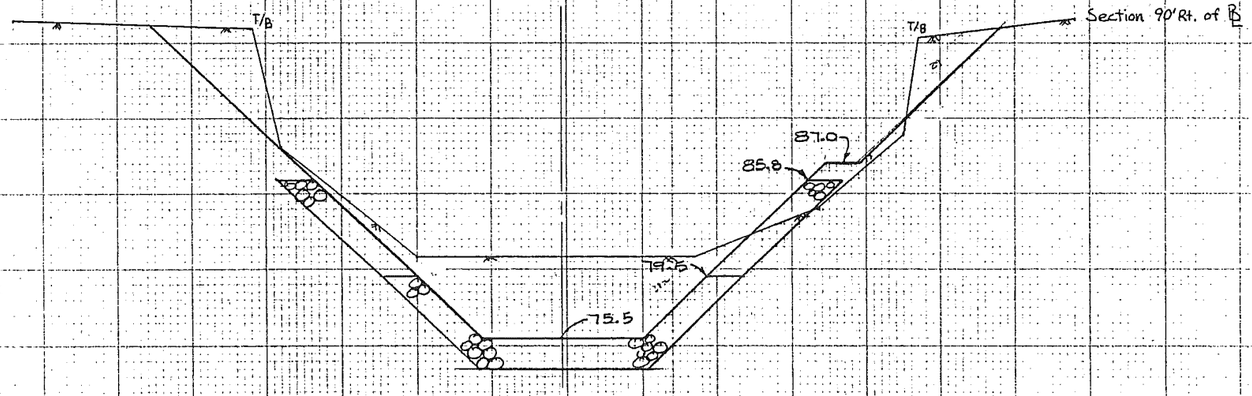
TOTAL REINFORCING STEEL = 317 LBS.
TOTAL STRUCTURAL CONCRETE = 13.7 C.Y.

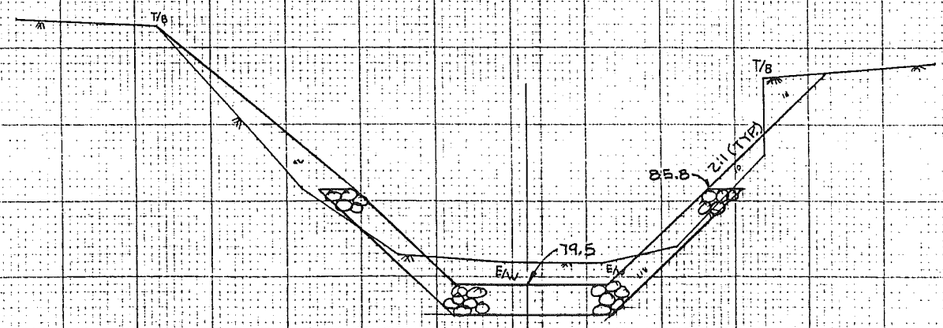
EMBANKMENT FILL + 35% = 144 C.Y.
CL. 10 CHANNEL EXCAV. = 1424 C.Y.
WASTE = 1280 C.Y.

NOTE:
SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SEE SHEET H.02.

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-05	DATE: 7/12/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKK	
HIGHWAYS • MUNICIPAL • PLANNING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: PLAN VIEW		SHEET
PHONE: (712) 263-5168 FAX: (712) 263-2101	SCS SITE #311-51		H.01
	PROJ. #BWP-L95(1)		







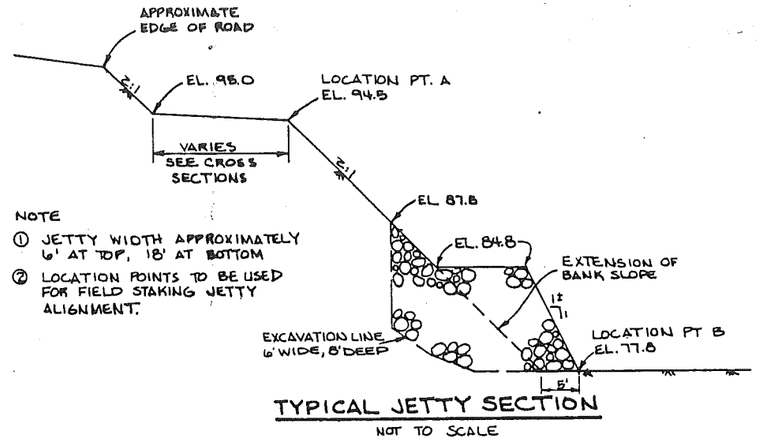
10+00 10+50 11+00 11+50 12+00

"X" Sections for.
Project # 0464-05
SCS # 311-51 Paradise Creek
Between 3 Paradise / 34 Hanover

SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-5118 FAX: (712) 263-2151

PROJECT NO.: 0464-05 | DATE: 1/96 | REV:
APPROVED BY: SAS | DRAWN BY: TKK
CLIENT: CRAWFORD COUNTY, IOWA
DESCRIPTION: CROSS SECTIONS
SCS SITE #311-51
PROJ. # EWP-L95(1)
SHEET H.02

TABULATION OF ROCK JETTIES				
	LOCATION PT. A		LOCATION PT B	
NO.	STATION	OFFSET	STATION	OFFSET
1	10+32	26'	10+59	60'
2	10+86	18'	11+12	53'
3	11+34	13'	11+57	51'
4	11+85	13'	12+03	53'
5	12+40	19'	12+53	61'
6	12+94	31'	13+02	74'



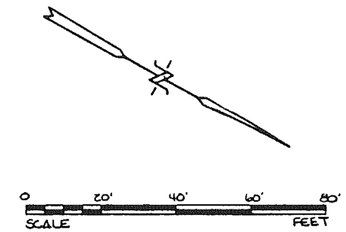
NOTE

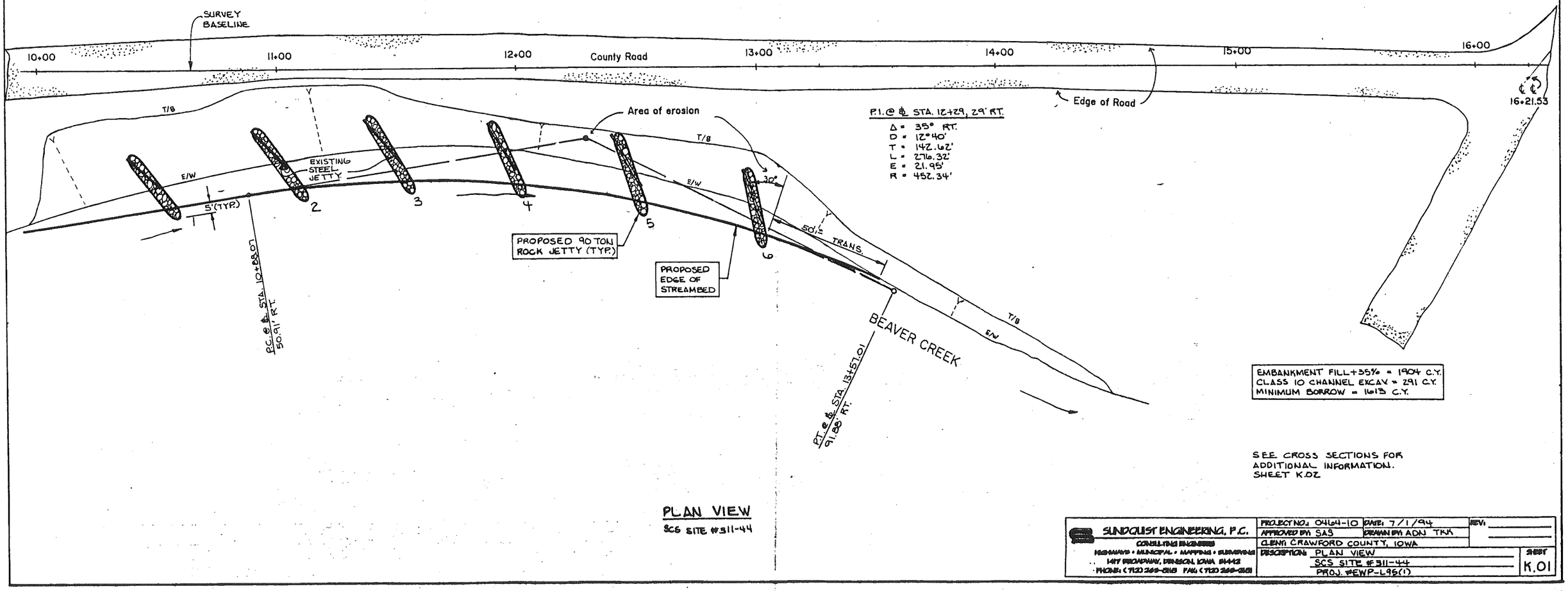
① JETTY WIDTH APPROXIMATELY 6' AT TOP, 18' AT BOTTOM

② LOCATION POINTS TO BE USED FOR FIELD STAKING JETTY ALIGNMENT.

TYPICAL JETTY SECTION

NOT TO SCALE





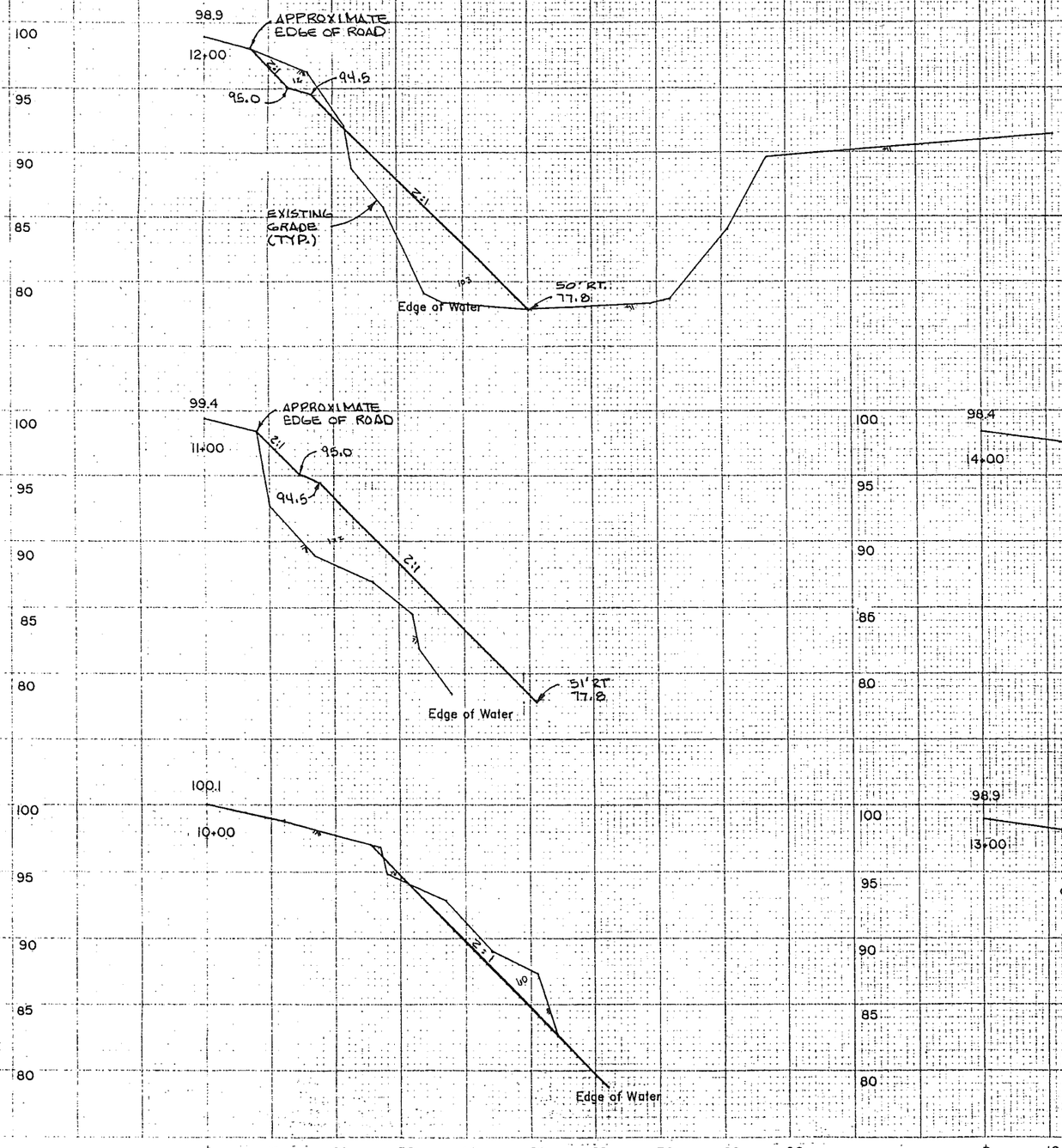
EMBANKMENT FILL + 35% = 1904 C.Y.
CLASS 10 CHANNEL EXCAV = 291 C.Y.
MINIMUM BORROW = 1613 C.Y.

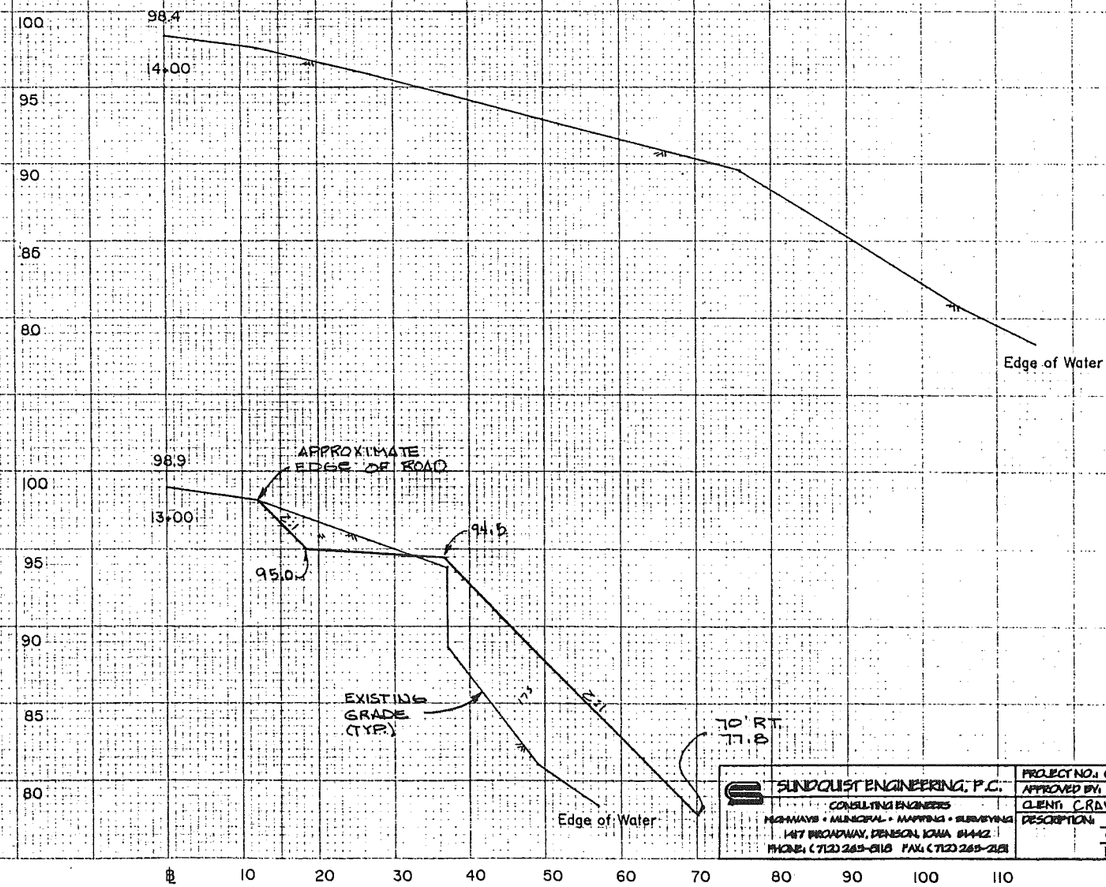
SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION. SHEET K.02

PLAN VIEW

SCS SITE #311-44

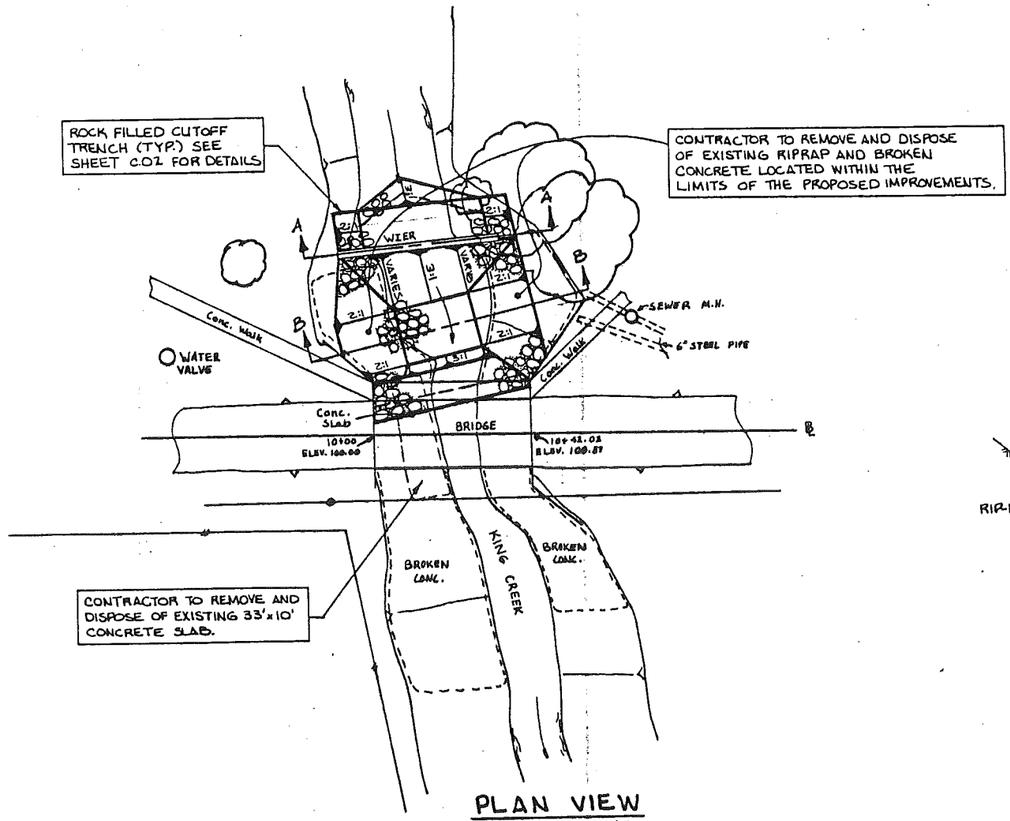
SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-10	DATE: 7/1/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKK	
HIGHWAY • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: PLAN VIEW		SHEET
PHONE: (712) 263-3313 FAX: (712) 263-3131	SCS SITE #311-44		K.01
	PROJ. #EWP-L95(1)		



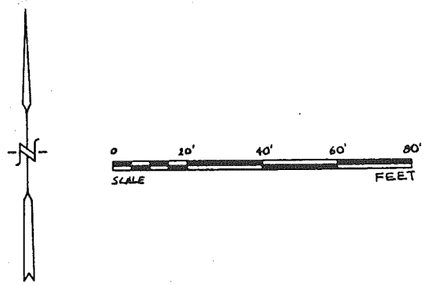


SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
1417 BROADWAY, DENISON, IOWA 51442
PHONE: (712) 263-5113 FAX: (712) 263-2191

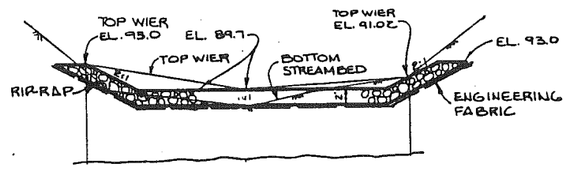
PROJECT NO.: 0404-10	DATE: 11/94	REV:	
APPROVED BY: SAS	DRAWN BY: TKK		
CLIENT: CRAWFORD COUNTY, IOWA			
DESCRIPTION: CROSS SECTION		SHEET	
SCS SITE #311-44		K.02	
PROJ. #EWP-L95(1)			



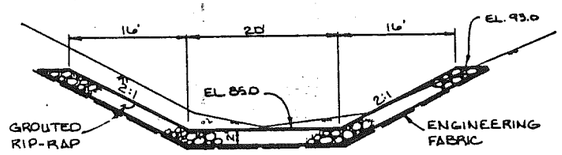
PLAN VIEW
SCS SITE #311-45



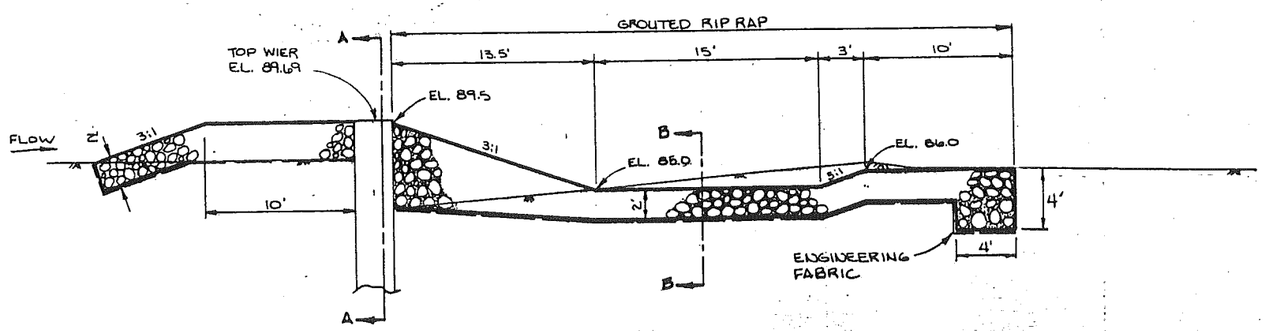
CLASS 10 CHANNEL EXCAV. = 373 C.Y.



SECTION A-A
SCALE: 1" = 10'

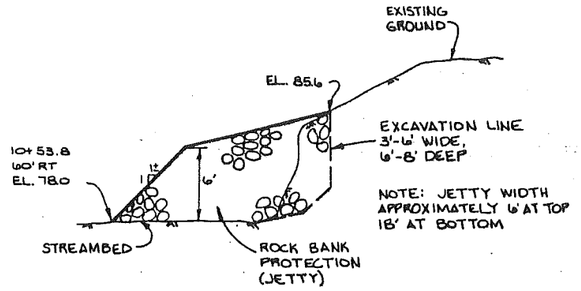


SECTION B-B
SCALE: 1" = 10'



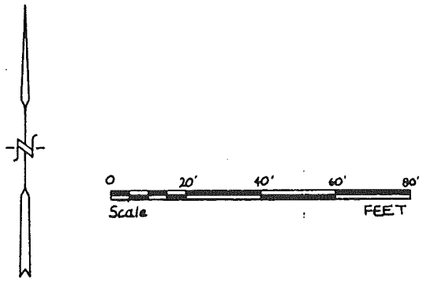
LONGITUDINAL SECTION ALONG ℄ DITCH
SCALE: 1" = 5'

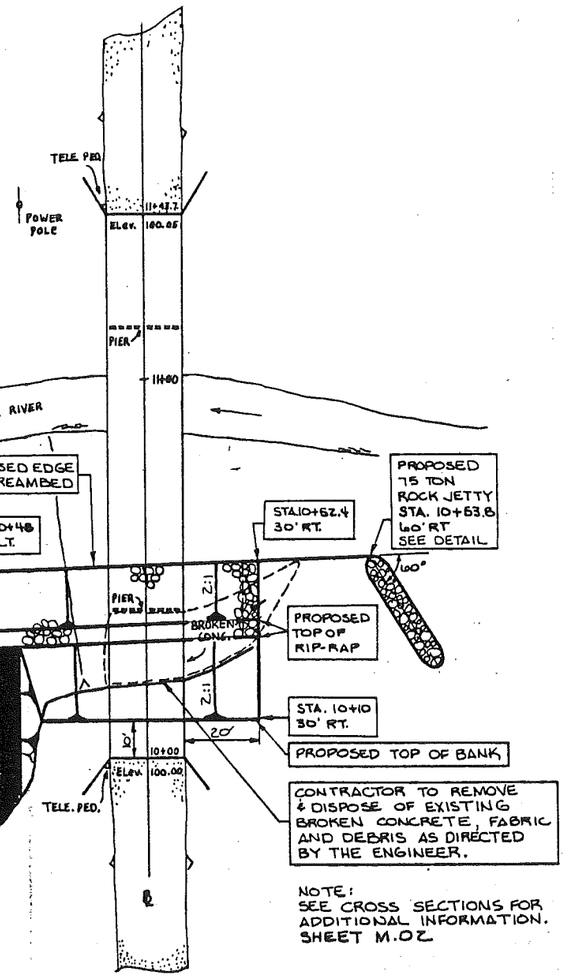
SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-12	DATE: 8/11/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKK	
HIGHWAY • MUNICIPAL • MAPPING • ELEVATIONS	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: PLAN VIEW		SHEET
PHONE: (712) 263-5113 FAX: (712) 263-2101	SCS SITE #311-45		L.01
	PROJ. # EWP-L95(1)		



TYPICAL JETTY SECTION

NOT TO SCALE



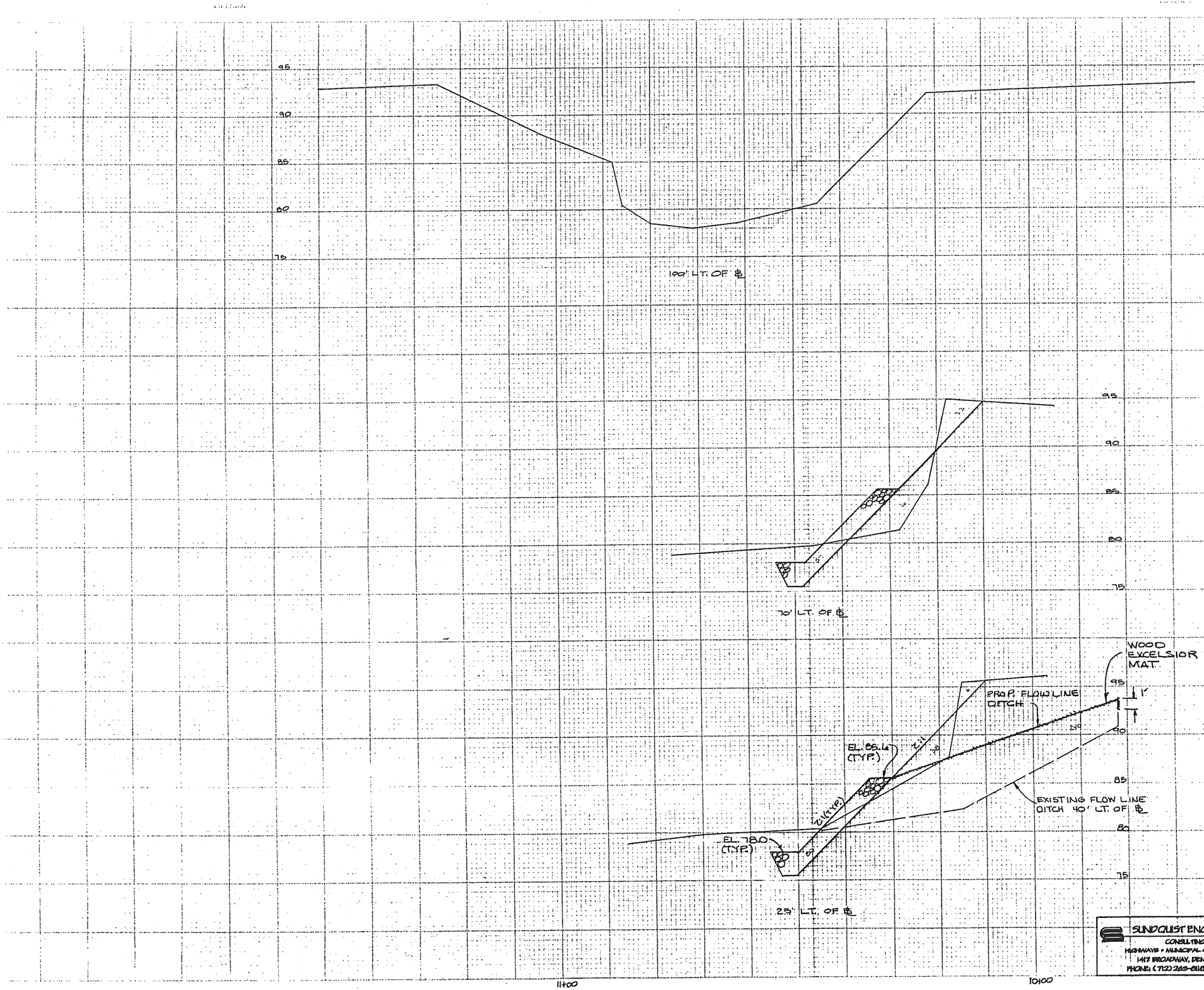


PLAN VIEW

SCS SITE #511-46

EMBANKMENT FILL+35% = 353 C.Y.
CLASS 10 CHANNEL EXCAV. = 399 C.Y.
MINIMUM BORROW = 46 C.Y.

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0464-15	DATE: 7/19/94	REV.
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: ADN TKM	
HIGHWAY • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442 PHONE: (712) 263-5613 FAX: (712) 263-2151	DESCRIPTION: PLAN VIEW SCS SITE #511-46 PROJ. #EWP-L95(1)		SHEET M.01



	C	F	C	F
			49	5
39'			46	23
			82	48
10'			55	31
			82	46
12'			26	64
			80	49
12'			37	62
			86	53
52'			126	62
AHEAD			86	
BACK			40	32
				5
32'			0	0
TOTAL			384	296

SUNDQUIST ENGINEERING, P.C.	PROJECT NO.: 0404-13	DATE: 10/7/94	REV:
CONSULTING ENGINEERS	APPROVED BY: SAS	DRAWN BY: TKK	
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING	CLIENT: CRAWFORD COUNTY, IOWA		
1417 BROADWAY, DENISON, IOWA 51442	DESCRIPTION: CROSS SECTIONS		SHEET
PHONE: (712) 263-5118 FAX: (712) 263-2181	SITE #311-46		M.02
	PROJ #EWP-L95(1)		