CRAWFORD COUNTY PROJECT NO. DS-24(6)

Letting Date July 20, 1999

8-17 CHARTER OAK 8941-17N

ARCHAEOLOGICAL

IF ARCHAEOLOGICAL MATERIALS ARE ENCOUNTERED DURING THE CONSTRUCTION PHASE OF THIS PROJECT, THE ENGINEER MUST BE CONTACTED IMMEDIATELY SO THE PROPER AUTHORITIES CAN BE NOTIFIED ACCORDING TO THE EXISTING FEDERAL REGULATIONS AND STATE PROCEDURES, ADDITIONALLY, IT SHOULD BE NOTED THAT FINDINGS AND RECOMMENDATIONS FOR CLEARANCE FOR FURTHER TESTING CANNOT BE CONSIDERED FINAL UNTIL CONCURRENCE IS RECEIVED FROM THE OFFICE OF THE STATE HISTORIC PRESERVATION OFFICER.

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

PERMITS

THIS PROJECT IS COVERED BY THE CORPS OF ENGINEERS NATIONWIDE PERMIT NO.S ____ AND ____.
AND IOWA DEPARTMENT OF NATURAL RESOURCES FLOOD PLAIN DEVELOPMENT PERMIT NO. FP98-____.

IOWA
DEPARTMENT OF TRANSPORTATION

Project Development Division

PLANS OF PROPOSED IMPROVEMENT ON THE

SECONDARY ROAD SYSTEM
CRAWFORD COUNTY
STREAM CHANNEL STABILIZATION STRUCTURE
PROJECT NO. DS-24(6)

Proj. No. DS-24(6)

INDEX OF SHEETS

NO.	DESCRIPTION
A1	TITLE SHEET
B1	ESTIMATED PROJECT QUANTITIES AND GENERAL INFORMATION
C1	CONSTRUCTION SPECIFICATIONS
C2	TYPICAL SECTIONS
C3	TYPICAL SECTIONS AND REFERENCE TIES
D1	PLAN VIEW
U1-3	SPECIAL DETAILS
W1-9	CHANNEL CROSS SECTIONS
X1	ROAD DITCH CROSS SECTIONS

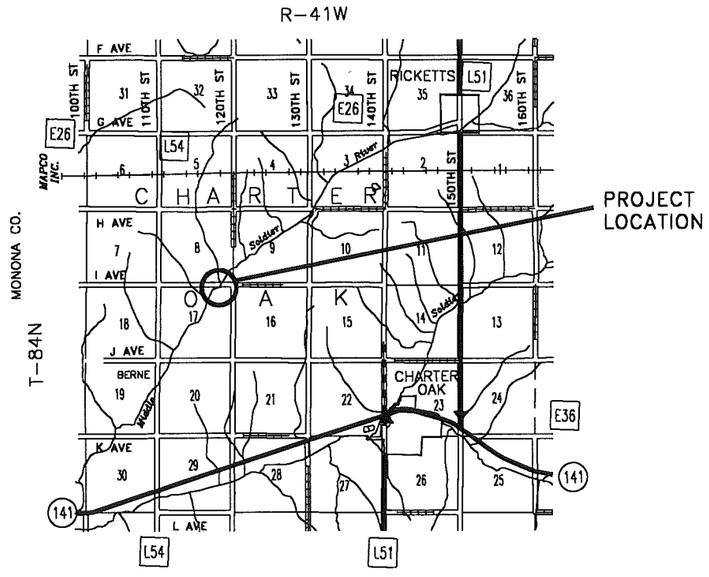
The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, series of 1997, plus current Supplemental Specifications and Special Provisions shall apply to construction work on this project.

Scales: As Noted

ROAD STANDARD PLANS

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

Identification	Date	Identification	Date	Identification	Date
RF-7	11-8-74	RF-30A	3-28-95	·	·
RS-2	4-30-96	RS-3	12-3-96	·	·



LOCATION MAP

0 1 2 3
SCALE IN MILES

1996 AADT 80 V.P.D.

Approved
A. Dean Hargens
Wayne J. Rockow
Robert A. Lohrmann
John P. Lawler
Mark Seger Barb
BOARD OF SUPERVISORS

Approved
H. Dale Wright 8-24-98
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.

LICENSED PROFESSIONAL ENGINEER PAUL J. ASSMAN 11982 IOWA

PAUL J. ASSMAN, P.E. #11982 — DATE 8/24/98

MY LICENSE RENEWAL DATE IS DECEMBER 31, 1998.

PAGES OR SHEETS COVERED BY THIS SEAL: ALL SHEETS

Iowa Department of Transportation
Accepted for Letting
SECONDARY ROADS ENGINEER Date

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.

202-1
THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT ARCHAEOLOGICAL REMAINS MAY BE UNCOVERED ON THIS PROJECT. REFER TO SECTION 2102.10 OF THE STANDARD SPECIFICATIONS. THE ENGINEER SHALL NOTIFY BOTH THE OFFICE OF THE STATE ARCHAEOLOGIST IN IOWA CITY AND THE OFFICE OF PROJECT PLANNING, IOWA DOT A MINIMUM OF ONE WEEK PRIOR TO THE EXPECTED DATE OF THE START OF CONSTRUCTION ACTIVITIES.

213-1
IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE WASTE AREAS OR DISPOSAL SITES FOR EXCESS MATERIAL (EXCAVATED MATERIAL, OPEN DUMP REFUSE 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.

ESTIMATE REFERENCE INFORMATION

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

1. CLEARING AND GRUBBING
INCLUDES REMOVAL AND DISPOSAL OF TREES, DOWN TIMBER, LOGS, DRIFTS, DEBRIS AND OTHER OBSTRUCTIONS LYING WITHIN THE PROPOSED WORK AREA.

2. EMBANKMENT-IN-PLACE
INCLUDES THE FOLLOWING QUANTITIES AS ESTIMATED FROM THE CROSS SECTIONS.

FILL + 35% SHRINKAGE = 1240 C.Y.

TYPE "A" COMPACTION WILL BE REQUIRED. BORROW FROM SUITABLE CLASS 10 CHANNEL EXCAVATION ALLOWED. ADDITIONAL NECESSARY BORROW SHALL BE PROVIDED BY THE CONTRACTOR. NO PAYMENT FOR OVERHAUL WILL BE ALLOWED. ALL AREAS TO RECEIVE NEW EMBANKMENT SHALL BE THOROUGHLY CLEAN OF ALL VEGETATION AND OTHER DEBRIS. EXISTING SURFACES SHALL BE PLOWED, STEPPED OR BENCHED PRIOR TO PLACEMENT OF NEW EMBANKMENT FILLS. SUCH WORK SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THIS ITEM. PAYMENT FOR THIS ITEM SHALL BE AT PLAN QUANTITY.

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.

SHAPING OF THE EXISTING CHANNEL BOTTOMS AND SIDESLOPES AND ROAD DITCHES AS DIRECTED BY THE ENGINEER TO TRANSITION INTO THE PROPOSED IMPROVEMENTS SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THE PRICE BID FOR EMBANKMENT-IN-PLACE.

3. EXCAVATION, CLASS 10, CHANNEL
SUITABLE CLASS 10 CHANNEL EXCAVATION MAY BE USED FOR EMBANKMENT-IN-PLACE. EXCESS MATERIALS 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 10 CHANNEL EXCAVATION.

PAYMENT SHALL BE BASED ON PLAN QUANTITY.

4. DIAPHRAGM, CORRUGATED METAL, TYPE A, 36 IN.
6. SUBDRAIN, CORRUGATED METAL PIPE, 36 IN. DIA.
7. INTAKE, SPECIAL, AS PER PLAN, 48 IN. DIA. CMP
ALL CORRUGATED METAL PIPE ON THIS PROJECT SHALL BE RIVETED PIPE. NO "SPIRAL" PIPE WILL BE ALLOWED. ALL BANDS SHALL BE 24" BANDS.

THE METAL SHEET THICKNESS USED TO FABRICATE CORRUGATED METAL PIPES SHALL BE AS SHOWN ON DRAWING SHEET U1. ALL CORRUGATED METAL PIPES SHALL BE FABRICATED WITH 3"X1" CORRUGATIONS.

TYPE A CORRUGATED METAL DIAPHRAGMS SHALL CONFORM WITH STANDARD ROAD PLAN RF-7.

5. PILING, STEEL SHEET
THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING THE SHEET PILING AS SHOWN ON THE DRAWINGS. THIS ITEM SHALL INCLUDE FIELD CUTTING THE SHEET PILING TO THE SPECIFIED 2:1 GRADE AS SHOWN ON THE DRAWINGS.

THE SHEET PILING AND APPURTENANT METALWORK SHALL MEET THE REQUIREMENTS OF ASTM A328, A572 OR A690. THE SHEET PILING SHALL BE INSTALLED STARTING FROM THE CENTERLINE OF THE WEIR SECTION AND PROGRESSING AWAY FROM THE CENTERLINE.

SHEET PILING SHALL MEET THE FOLLOWING REQUIREMENTS:

(a) MINIMUM SECTION MODULUS OF 19.25 CU. IN. PER FOOT OF LENGTH
(b) MINIMUM WALL THICKNESS OF 3/8 INCH.

7. INTAKE, SPECIAL, AS PER PLAN, 48 IN. DIA. CMP
ITEM INCLUDES FURNISHING AND INSTALLING THE VERTICAL INLET AS SHOWN; INCLUDING TEES, CONCRETE BASE WITH REINFORCING STEEL, SPECIAL BACKFILL, TRASH RACK, EXCAVATION AND REMOVAL OF EXCESS MATERIAL FROM THE PROJECT. ALL METAL FITTINGS AND HARDWARE SHALL BE GALVANIZED AFTER FABRICATION.

REFER TO SHEEET U1 FOR INTAKE DETAILS.

8. ENGINEERING FABRIC
SEE DRAWING SHEET C2 DETAILS OF PLACEMENT OF ENGINEERING FABRIC FOR INSTALLATION DETAILS. MATERIAL TO CONFORM TO IOWA DOT MATERIALS IM 496.01 APPENDIX A, EMBANKMENT EROSION CONTROL (SPECIFICATION 4196.01C).

ESTIMATED PROJECT QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	CLEARING AND GRUBBING	ACRE	1.9	
2	EMBANKMENT-IN-PLACE	CY	1240	
3	EXCAVATION, CLASS 10, CHANNEL	CY	4450	
4	DIAPHRAGM, CORRUGATED METAL, TYPE A, 36 IN.	EACH	1	
5	PILING, STEEL SHEET	SF	2720	
6	SUBDRAIN, CORRUGATED METAL PIPE, 36 IN. DIA.	LF	62	
7	INTAKE, SPECIAL, AS PER PLAN, 48 IN. DIA. CMP	EACH	1	
8	ENGINEERING FABRIC	SY	2540	
9	SPECIAL REVETMENT	TON	2729	
10	TRAFFIC CONTROL	LS	1	
11	MOBILIZATION	LS	1	
12	GROUT	CY	160	
13	REMOVAL OF WATER	LS	1	
14	MULCHING	ACRE	1.0	
15	SEEDING AND FERTILIZING (RURAL)	ACRE	1.0	
16	PILING, FURNISH & INSTALL STEEL, HP 10x42	LF	145	

9. SPECIAL REVETMENT
SPECIAL REVETMENT SHALL MEET THE REQUIREMENTS OF STANDARD SPECIFICATIONS SECTION 2507.03 CLASS B REVETMENT.

MATERIAL SHALL MEET THE REQUIREMENTS OF STANDARD SPECIFICATIONS SECTION 4130.03 CLASS B REVETMENT.

MATERIAL FOR SPECIAL REVETMENT WILL BE MEASURED IN TONS TO THE NEAREST 0.1 TONS.

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.

10. TRAFFIC CONTROL
INCLUDES BARRICADES AND WARNING SIGNS NECESSARY TO PROTECT THE CONTRACTORS WORK AND EQUIPMENT AND THE SAFETY OF THE TRAVELING PUBLIC. ALL SIGNS, BARRICADES AND OTHER TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH PART VI OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", REVISION 3, DATED SEPTEMBER 3, 1993.

12. GROUT
SEE CONSTRUCTION SPECIFICATIONS ON SHEET C1 FOR MATERIAL AND INSTALLATION DETAILS.

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

DEWATERING OF SITE SHALL INCLUDE REMOVAL OF WATER FROM THE PROPOSED STILLING BASIN TO FACILITATE PLACEMENT OF ENGINEERING FABRIC, RIPRAP AND GROUT. PLACEMENT OF GROUT IN STANDING WATER SHALL NOT BE ALLOWED.

14. MULCHING
15. SEEDING AND FERTILIZING (RURAL)
INCLUDES RESTORING ALL DISTURBED AREAS IN ACCORDANCE WITH SECTION 2601 OF THE REFERENCE SPECIFICATIONS EXCEPT THAT THE FOLLOWING SPECIFIED 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, 1 1/2 BUSHELS PER ACRE OF OATS MAY BE SEEDED AS A NURSE CORP. THIS DECISION WILL BE BASED ON THE STEEPNESS OF THE SLOPES AND THE NEED FOR IMMEDIATE COVER. SECTION 1109.16 PARAGRAPH C OF THE REFERENCE SPECIFICATIONS DOES NOT APPLY.

16. PILING, FURNISH & INSTALL STEEL, HP 10x42
INCLUDES FURNISHING AND INSTALLING THE HP 10x42 WALER AS DETAILED ON DRAWING SHEET C3. BOLTS, NUTS AND WASHERS REQUIRED TO INSTALL WALER SHALL BE INCLUDED IN AND CONSIDERED INCIDENTAL TO THIS ITEM.

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: ESTIMATED PROJECT QUANTITIES & GENERAL INFORMATION PROJECT NO. DS-24(6)		SHEET B1

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.

POZZOLAN, UNLESS OTHERWISE SPECIFIED IN SECTION 10 OF THIS SPECIFICATION, POZZOLANS CONFORMING TO SPECIFICATION ASTM C-618 CLASS F 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.

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 1-1/2 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 PENETRATES 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.

COMPENSATION FOR ANY ITEM OF WORK DESCRIBED IN THE CONTRACT BUT NOT LISTED IN THE BID SCHEDULE WILL BE INCLUDED IN THE PAYMENT FOR THE ITEM OF WORK TO WHICH IT IS MADE SUBSIDIARY. SUCH ITEMS AND THE ITEMS TO WHICH THEY ARE MADE SUBSIDIARY ARE IDENTIFIED IN SECTION 10 OF THIS SPECIFICATION.

10. ITEMS OF WORK AND CONSTRUCTION DETAILS

ITEMS OF WORK TO BE PERFORMED IN CONFORMANCE WITH THIS SPECIFICATION AND THE CONSTRUCTION DETAILS THEREFOR ARE:

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

(2) THE GROUTING MIXTURE SHALL BE AS FOLLOWS:

- (A) CEMENT: TYPE IA, TYPE I OR TYPE II WITH AN AIR ENTRAINING ADMIXTURE, 10 SACKS OR 940 LBS/C.Y.
- (B) FINE CONCRETE AGGREGATE: 2,100 LBS/C.Y. (SURFACE DRY WEIGHT)
- (C) WATER: 45 GAL./C.Y., OR ENOUGH TO PROVIDE A THICK CREAMY CONSISTENCY.
- (D) 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.

(3) 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.

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

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

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

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

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.

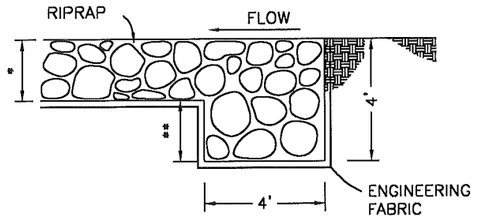
EXCEPT AS OTHERWISE SPECIFIED, PIPES AND CASINGS SHALL BE REMOVED FROM TEMPORARY WELLS AND THE WELLS SHALL BE FILLED TO GROUND LEVEL WITH GRAVEL OR OTHER MATERIAL APPROVED BY THE CONTRACTING OFFICER.

6. MEASUREMENT AND PAYMENT

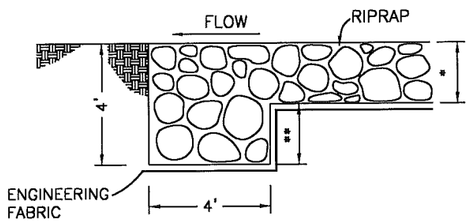
PAYMENT FOR THIS ITEM WILL BE MADE AT THE CONTRACT LUMP SUM PRICE AND WILL CONSTITUTE FULL COMPENSATION FOR COMPLETION OF THE WORK.

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: CONSTRUCTION SPECIFICATIONS PROJECT NO. DS-24(6)		SHEET C1



TYPICAL UPSTREAM



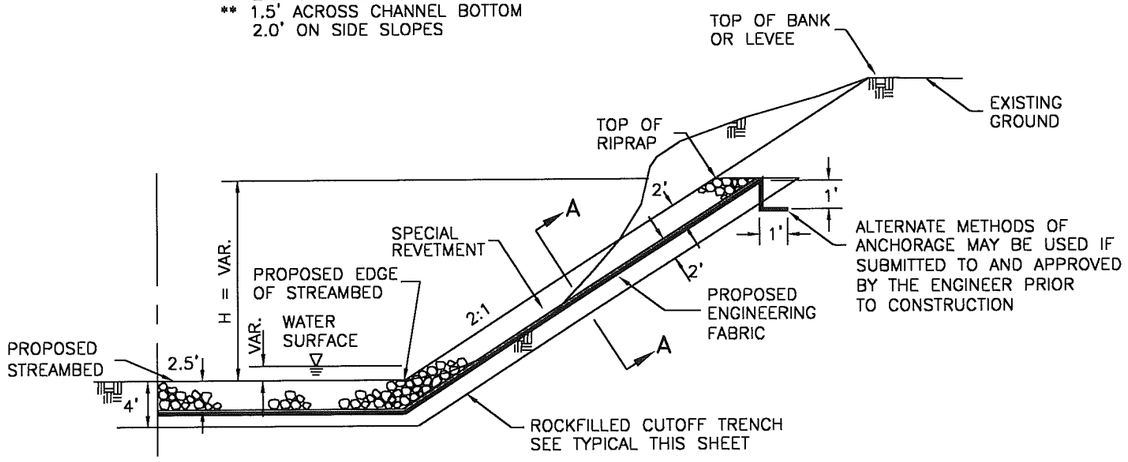
TYPICAL DOWNSTREAM

SECTION A-A

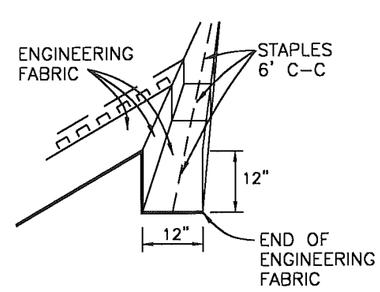
ROCK FILLED CUTOFF TRENCH DETAILS

CONTINUOUS ACROSS BOTTOM WIDTH AND SIDE SLOPES.

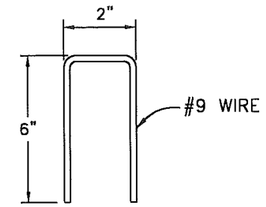
* 2.5' ACROSS CHANNEL BOTTOM
2.0' ON SIDE SLOPES
** 1.5' ACROSS CHANNEL BOTTOM
2.0' ON SIDE SLOPES



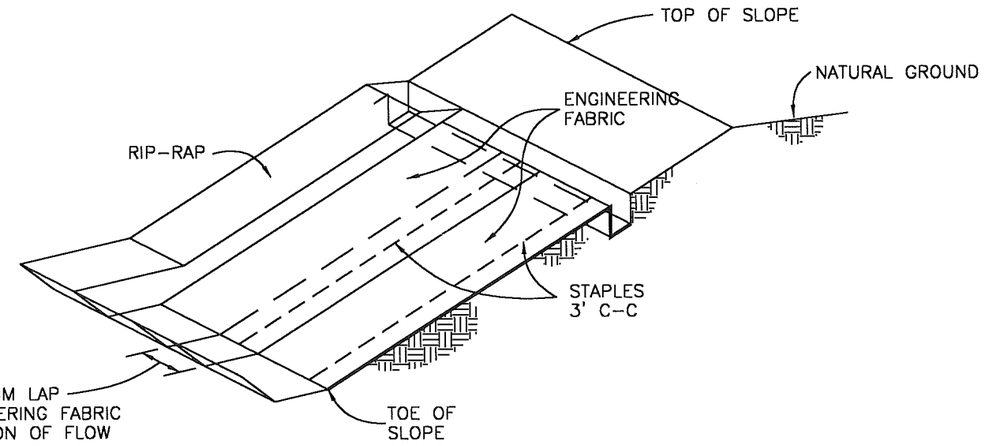
TYPICAL STILLING BASIN SECTION



DETAIL OF TRENCH



STAPLE

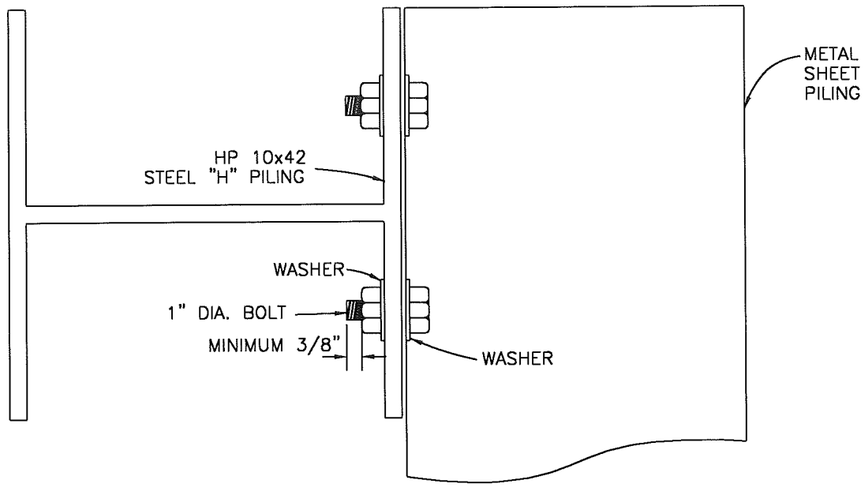


EXCAVATE 12"x12" TRENCH ALONG TOP OF RIPRAP. PLACE END OF ENGINEERING FABRIC STRIPS INTO TRENCH WITH STAPLES AS SHOWN. BACKFILL WITH THE EXCAVATED MATERIAL AND COMPACT. THE ENGINEER MAY PERMIT THE USE OF THE WHEELS OF PNEUMATIC-TIRED EQUIPMENT FOR CONSOLIDATING THE TRENCH BACKFILL MATERIAL.

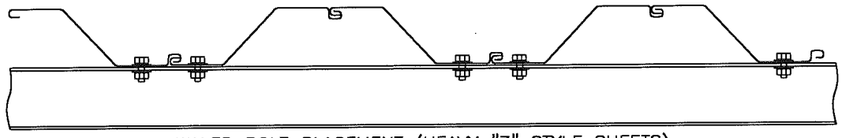
DETAILS OF PLACEMENT OF ENGINEERING FABRIC

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

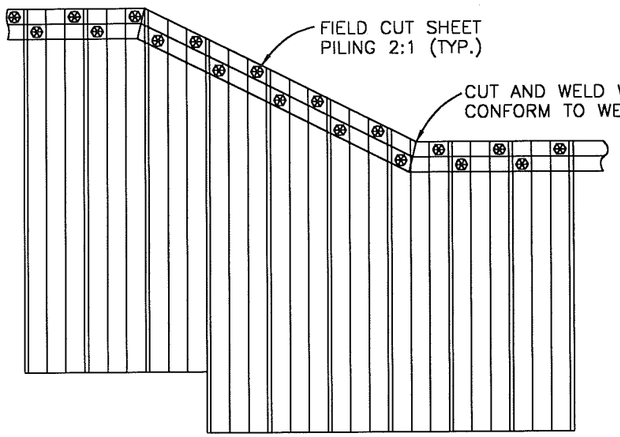
PROJECT NO.: 0667	DATE: 3/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA	
DESCRIPTION: TYPICAL SECTIONS PROJECT NO. DS-24(6)			SHEET C2



BOLT DETAIL

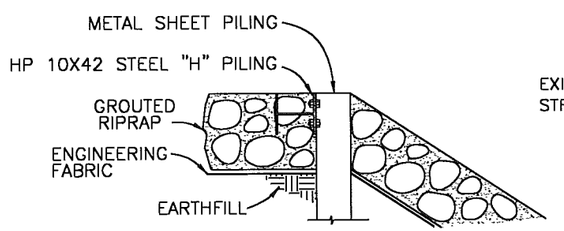


WALER BOLT PLACEMENT (HEAVY "Z" STYLE SHEETS)



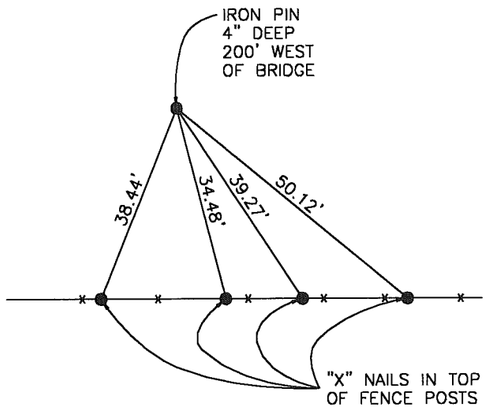
NOTES:
1. ALL BOLTS SHALL BE 1" DIA. W/2 WASHERS. BOLTS SHALL EXTEND AT MINIMUM 3/8" BEYOND NUT.
2. ALL HOLES SHALL BE FIELD CUT 1/16" DIA. LARGER THAN THE BOLTS.

WALER



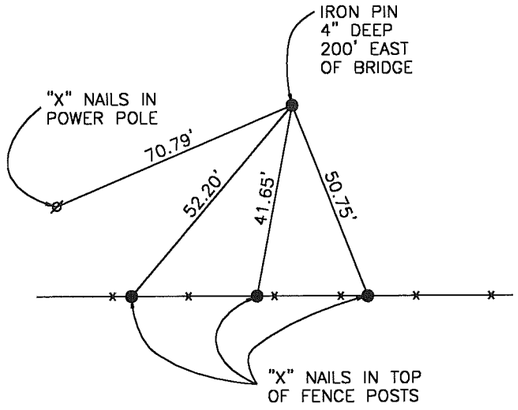
GROUTED RIP-RAP DETAIL

PT #2
STA. 108+11.75



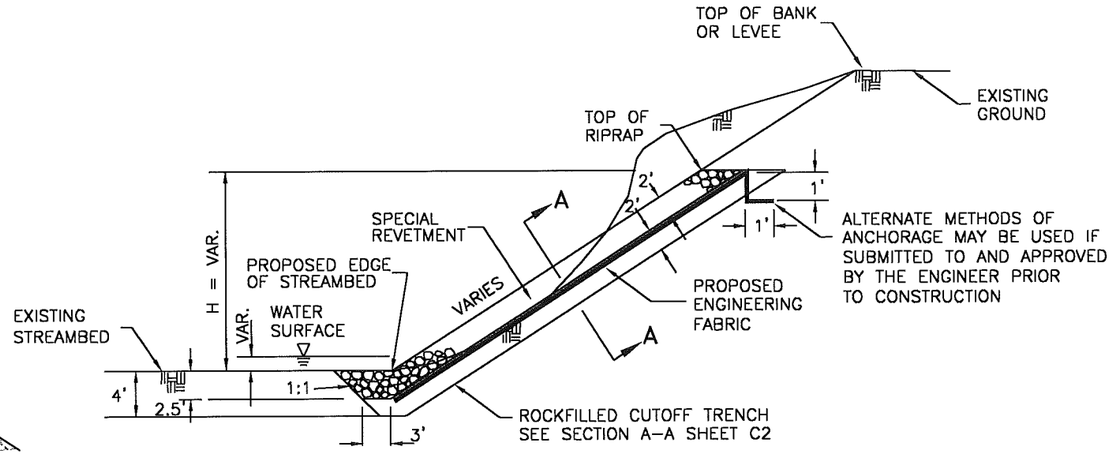
DISTANCES SLOPE CHAINED

PT #3
STA. 113+44.50



DISTANCES SLOPE CHAINED

REFERENCE TIES



CHANNEL CUT

NO SCALE

TYPICAL BANK STABILIZATION SECTION

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: TYPICAL SECTIONS & REFERENCE TIES PROJECT NO. DS-24(6)		SHEET C3

8-84-41

LOCATION
CRAWFORD COUNTY
T-84N R-41W
SEC. 17
CHARTER OAK TWP.
MIDDLE SOLDIER RIVER
DRAINAGE AREA = 18.0 S.M.

HOG SHED

HOG HOUSE

ROBERT E. STOLTZE
ELAINE M. STOLTZE

CHANNEL ℄ P.I.
STA. 11+35.31
Δ=56°58'45"
D=88°03'53"
T=35.31'
L=64.70'
E=8.96'
R=65.06'

FILL TO ELEV. 997.0

SHAPE DITCH TO DRAIN TO RIPRAP OUTLET AS DIRECTED BY THE ENGINEER

MIDDLE SOLDIER RIVER

OUTLET DITCH
STA. 11+00
36.0' LT.

℄ DIKE
STA. 10+53.1
67.7' RT.
ELEV. 1004.0

ROBERT E. STOLTZE
ELAINE M. STOLTZE

STA. 10+48.2
17.2' RT.

STA. 10+40.7
42.0' RT.

17°40'

STA. 10+17.9
11.0' RT.

HYDROLOGY AND HYDRAULICS
DRAINAGE AREA = 18.0 SM
CHANNEL SLOPE = 19.9 FT/MILE

STORM	RUNOFF CFS	VELOCITY FT/SEC	STAGE* ELEV.
Q2	1018	5.83	988.6
Q5	1971	6.97	990.9
Q10	2794	7.66	992.4
Q25	3910	8.35	994.1
Q50	4719	8.71	995.2
Q100	5691	9.18	996.3

*AS MEASURED FROM ELEV. 983.0

EX. 36" RCP U.A.C.

I.P. @ STA. 108+11.75
SEE SHT C3 FOR TIES

I AVENUE

PC = 11+00

℄ DITCH
STA. 11+41
52.0' LT.

STA. 10+66.26 =
STA. 110+66.26

I.P. @ STA. 113+44.50
SEE SHT C3 FOR TIES

BANK REPAIR NOTES:

FILL MATERIAL PLACED AROUND EXISTING PIER PILES IS TO REMAIN UNCOMPACTED FOR A MINIMUM 3' DIAMETER AROUND THE CENTER OF THE PIER PILING.

CLEAR AND GRUB ALL TREES AND DEBRIS FROM WITHIN CHANNEL FROM STA. 7+25 TO STA. 12+00.

ABANDONED TIMBER PILING SHALL BE REMOVED TO AN ELEVATION 1.0' BELOW THE PROPOSED RIPRAP SUBGRADE.

NO. LINE 17-84-41
& SURVEY BASELINE

CONTRACTOR TO CLEAN OUT ROAD DITCH TO DRAIN AS DIRECTED BY THE ENGINEER (130 CY ±)

℄ DITCH
STA. 9+68.6
103.1' LT.

BM #1A

STA. 9+68.6
66.0' LT.

PT = 10+34.56

POT = 10+10

BM #2A

CHANNEL ℄ P.I.
STA. 10+22.67
Δ=34°37'00"
D=140°55'00"
T=12.67'
L=24.57'
E=1.93'
R=40.66'

OUTLET DITCH
STA. 9+68.6
46.0' LT.
ELEV. 996.0

GROUTED SPECIAL RIPRAP

LOOSE SPECIAL RIPRAP

STA. 10+35.0, 86.0' RT.
CONTRACTOR TO FURNISH & PLACE 36" x 62" CMP SUBDRAIN W/1 - STD. RF-7 TYPE "A" DIAPHRAGM INCL. 48" x 10' CMP VERTICAL INLET W/ TRASH RACK. SEE SHTS U1 - U3 FOR DETAILS.

℄ DIKE
STA. 10+15.8
59.0' RT.
ELEV. 1004.0

PROPOSED WEIR

PROPOSED OUTLET
EL. 996.0, STA. 9+68.6
EL. 996.0, STA.11+00

PROPOSED TOP OF RIPRAP
EL. 999.0, STA. 9+68.6
EL. 997.0, STA. 11+00

PROPOSED ENGINEERING FABRIC

VIOLA MAAHS

EXISTING TOP OF BANK (TYP)

EDGE OF WATER (12-2-97)

SURVEY BASELINE

PC = 8+29.10

PROPOSED TOP OF ROCK (TYP.)

CONSTRUCT DIVERSION AT TOP OF SLOPE
T = 0, DEPTH = 1.5'
WIDTH = 0, SS = 3:1

4' x 4' ROCK FILLED CUTOFF (TYP.)

ROCK FILLED CUTOFF TRENCH (TYP.)

CHANNEL ℄ P.I.
STA. 8+59.91
Δ=21°25'00"
D=35°10'00"
T=30.81'
L=60.90'
E=2.89'
R=162.93'

BENCH MARK
#1A - R.R. SPK IN PWR POLE @
STA. 109+29, 33' RT.
EL. = 1000.00 (ASSUMED)

#2A - R.R. SPK IN PWR POLE @
STA. 112+82, 33' RT.
EL. = 1009.94

SHAPE INTO EXISTING CHANNEL SLOPES AS DIRECTED BY THE ENGINEER (TYPICAL).

TYPICAL DITCH SECTION

NOT TO SCALE

EL. 978.0 STA. 8+90 — FLOW — EL. 978.0 STA. 9+30 — 2.5' — EL. 978.0 STA. 9+80 — 4:1 — EL. 983.0 STA. 10+00 — 2.5' — EL. 983.0 STA. 10+20 — FLOW

ENGINEERING FABRIC

METAL SHEET PILING WEIR. SEE SHEET W6 FOR DETAILS.

GROUTED RIPRAP

LOOSE RIPRAP

LOOSE RIPRAP | GROUTED RIPRAP

SECTION A-A

NOT TO SCALE

17-84-41

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: PLAN VIEW PROJECT NO. DS-24(6)		SHEET D1

8-84-41

LOCATION
CRAWFORD COUNTY
T-84N R-41W
SEC. 17
CHARTER OAK TWP.
MIDDLE SOLDIER RIVER
DRAINAGE AREA = 18.0 S.M.

CHANNEL ℄ P.I.
STA. 11+35.31
Δ=56°58'45"
D=88°03'53"
T=35.31'
L=64.70'
E=8.96'
R=65.06'

HOG SHED
HOG HOUSE
ROBERT E. STOLTZE
ELAINE M. STOLTZE

FILL TO ELEV. 997.0
SHAPE DITCH TO DRAIN TO RIPRAP OUTLET AS DIRECTED BY THE ENGINEER

MIDDLE SOLDIER RIVER

OUTLET DITCH
STA. 11+00
36.0' LT.

℄ DIKE
STA. 10+53.1
67.7' RT.
ELEV. 1004.0

STA. 10+48.2
17.2' RT.
STA. 10+40.7
42.0' RT.
STA. 10+17.9
11.0' RT.

ROBERT E. STOLTZE
ELAINE M. STOLTZE

0' 50' 100' 150'

HYDROLOGY AND HYDRAULICS
DRAINAGE AREA = 18.0 SM
CHANNEL SLOPE = 19.9 FT/MILE

STORM	RUNOFF CFS	VELOCITY FT/SEC	STAGE* ELEV.
Q2	1018	5.83	988.6
Q5	1971	6.97	990.9
Q10	2794	7.66	992.4
Q25	3910	8.35	994.1
Q50	4719	8.71	995.2
Q100	5691	9.18	996.3

*AS MEASURED FROM ELEV. 983.0

EX. 36" RCP
U.A.C.

I.P. @ STA. 108+11.75
SEE SHT C3 FOR TIES

I AVENUE

I.P. @ STA. 113+44.50
SEE SHT C3 FOR TIES

PC = 11+00
PT = 10+34.56
STA. 10+66.26 = STA. 110+66.26

℄ DITCH
STA. 11+41
52.0' LT.

NO. LINE 17-84-41
& SURVEY BASELINE

CONTRACTOR TO CLEAN OUT ROAD DITCH TO DRAIN AS DIRECTED BY THE ENGINEER (130 CY ±)

℄ DITCH
STA. 9+68.6
103.1' LT.

BM #1A
STA. 9+68.6
66.0' LT.

BM #2A

CHANNEL ℄ P.I.
STA. 10+22.67
Δ=34°37'00"
D=140°55'00"
T=12.67'
L=24.57'
E=1.93'
R=40.66'

OUTLET DITCH
STA. 9+68.6
46.0' LT.
ELEV. 996.0

GROUTED SPECIAL RIPRAP

LOOSE SPECIAL RIPRAP

STA. 10+35.0, 86.0' RT.
CONTRACTOR TO FURNISH & PLACE 36" x 62' CMP SUBDRAIN W/1 - STD. RF-7 TYPE "A" DIAPHRAGM INCL. 48" x 10' CMP VERTICAL INLET W/ TRASH RACK. SEE SHTS U1 - U3 FOR DETAILS.

℄ DIKE
STA. 10+15.8
59.0' RT.
ELEV. 1004.0

PROPOSED WEIR

PROPOSED TOP OF ROCK (TYP.)

BANK REPAIR NOTES:

FILL MATERIAL PLACED AROUND EXISTING PIER PILES IS TO REMAIN UNCOMPACTED FOR A MINIMUM 3' DIAMETER AROUND THE CENTER OF THE PIER PILING.

CLEAR AND GRUB ALL TREES AND DEBRIS FROM WITHIN CHANNEL FROM STA. 7+25 TO STA. 12+00.

ABANDONED TIMBER PILING SHALL BE REMOVED TO AN ELEVATION 1.0' BELOW THE PROPOSED RIPRAP SUBGRADE.

PROPOSED OUTLET
EL. 996.0, STA. 9+68.6
EL. 996.0, STA.11+00

PROPOSED TOP OF RIPRAP
EL. 999.0, STA. 9+68.6
EL. 997.0, STA. 11+00

PROPOSED ENGINEERING FABRIC

VIOLA MAAHS

EXISTING TOP OF BANK (TYP)

EDGE OF WATER (12-2-97)

SURVEY BASELINE

BENCH MARK
#1A - R.R. SPK IN PWR POLE ©
STA. 109+29, 33' RT.
EL. = 1000.00 (ASSUMED)

#2A - R.R. SPK IN PWR POLE ©
STA. 112+82, 33' RT.
EL. = 1009.94

SHAPE INTO EXISTING CHANNEL SLOPES AS DIRECTED BY THE ENGINEER (TYPICAL).

4' x 4' ROCK FILLED CUTOFF (TYP.)

CONSTRUCT DIVERSION AT TOP OF SLOPE
T = 0, DEPTH = 1.5'
WIDTH = 0, SS = 3:1

ROCK FILLED CUTOFF TRENCH (TYP.)

CHANNEL ℄ P.I.
STA. 8+59.91
Δ=21°25'00"
D=35°10'00"
T=30.81'
L=60.90'
E=2.89'
R=162.93'

TYPICAL DITCH SECTION

NOT TO SCALE

EL. 978.0 STA. 8+90
FLOW
EL. 978.0 STA. 9+30
2.5'
EL. 978.0 STA. 9+80
4:1
EL. 983.0 STA. 10+00
2.5'
EL. 983.0 STA. 10+20
FLOW
ENGINEERING FABRIC
METAL SHEET PILING WEIR. SEE SHEET W6 FOR DETAILS.
GROUTED RIPRAP
LOOSE RIPRAP
LOOSE RIPRAP
GROUTED RIPRAP

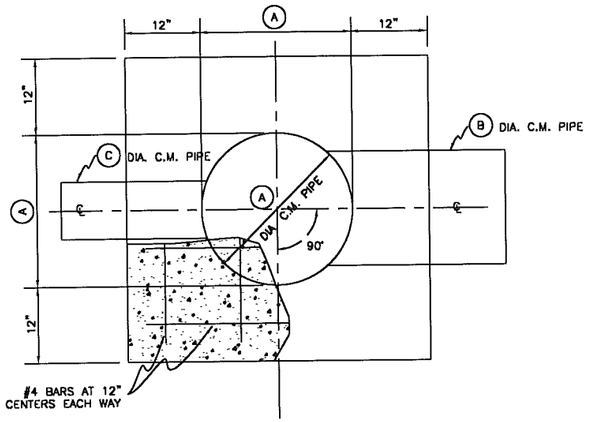
SECTION A-A

NOT TO SCALE

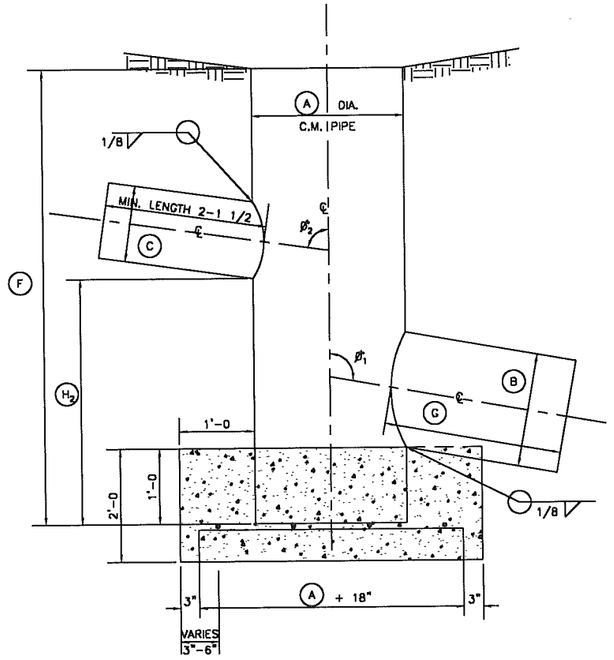
17-84-41

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA
DESCRIPTION: PLAN VIEW		SHEET D1
PROJECT NO. DS-24(6)		



TYPICAL PLAN VIEW



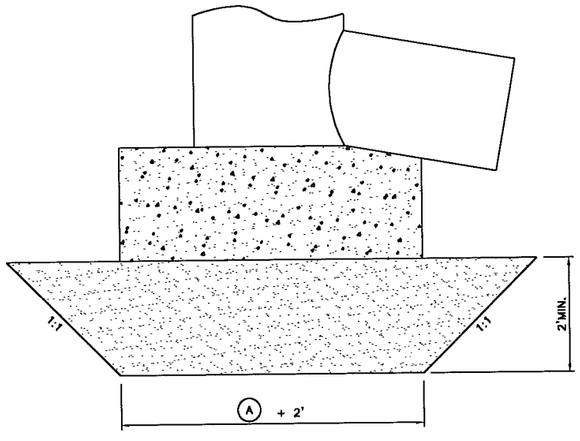
TYPICAL SECTION ON CENTERLINE

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

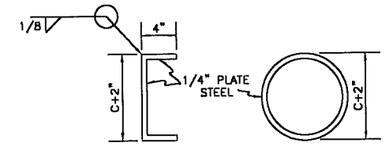
NOTE: PIPE "C" AND END CAP NOT REQUIRED ON THIS INTAKE.

TABLE – DIMENSIONS AND MATERIAL	
STATION	101+55
A	48"
B	36"
C	–
D	–
E	–
F	10'–0"
G	4'–0"
H_2	–
H_3	–
H_4	–
END CAPS REQUIRED	–
SHEET THICKNESS FOR A DIA.	0.079"
SHEET THICKNESS FOR B DIA.	0.079"
SHEET THICKNESS FOR C DIA.	–
SHEET THICKNESS FOR D DIA.	–
SHEET THICKNESS FOR E DIA.	–
ø DEGREES – ANGLE $ø_1$	95°14'
$ø_2$	–
$ø_3$	–
$ø_4$	–

VERTICAL INLET BASE QUANTITIES				
DIMENSION A	CONCRETE CU. YDS.	STEEL REINFORCEMENT #4 BAR		
		LENGTH EACH BAR	NUMBER OF BARS	TOTAL WEIGHT POUNDS
18"	0.91	3–0	8	16.0
24"	1.19	3–6	8	18.7
30"	1.50	4–0	10	26.7
36"	1.85	4–6	10	30.1
42"	2.24	5–0	12	40.1
48"	2.67	5–6	12	44.1
54"	3.13	6–0	14	56.1
60"	3.63	6–6	14	60.8
72"	4.74	7–6	16	80.2
78"	5.35	8–0	18	96.2
84"	6.0	8–6	18	102.2



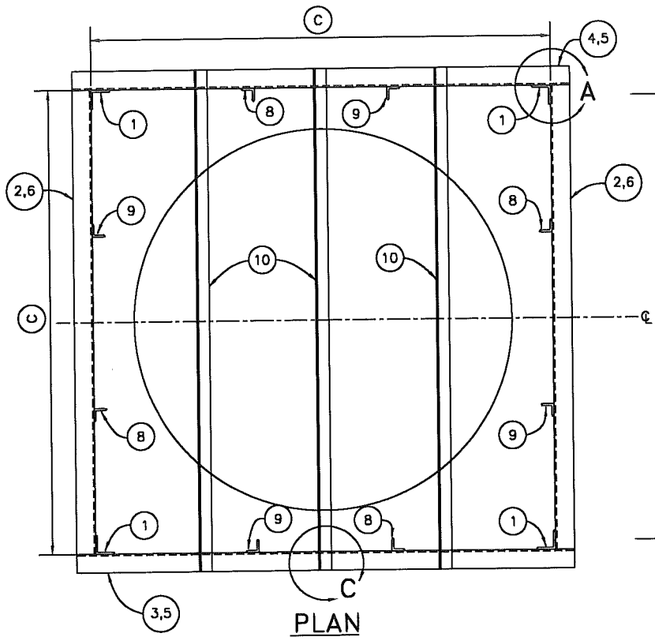
SPECIAL BACKFILL PLACEMENT

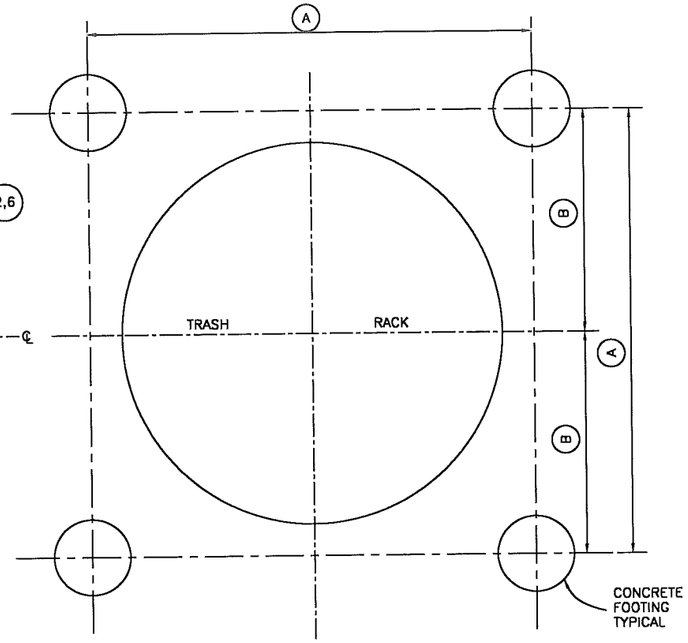


END CAP DETAIL

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

PROJECT NO.: 0667	DATE: 3/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: SPECIAL INTAKE PROJECT NO. DS-24(6)		SHEET U1

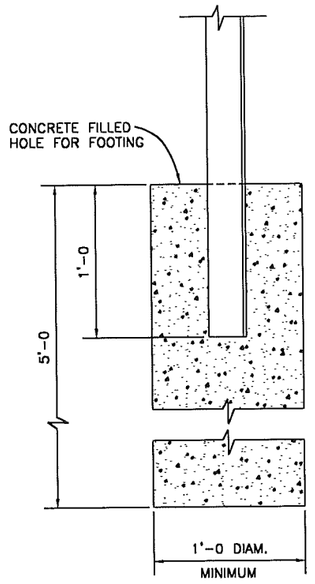




CONCRETE FOOTING LAYOUT

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

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



CONCRETE FOOTING DETAIL

BILL OF MATERIALS

MARK	QTY.	ITEM	LENGTH
1	4	L S 3" x 3" x 5/16"	4-11
2	2	"	5-1
3	1	"	5-7
4	1	"	5-7
5	2	L S 2" x 2" x 3/16"	5-5
6	2	"	5-1
7	0	"	-
8	4	"	3-11
9	4	"	3-11
10	3	"	5-7
	46	1/2" ø MACHINE BOLTS W/LOCK WASHERS & HEX NUTS	0-1 1/2
		CONCRETE 0.6 CY	

CONSTRUCTION NOTES:

STRUCTURE IS SYMMETRICAL ABOUT ℄.

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

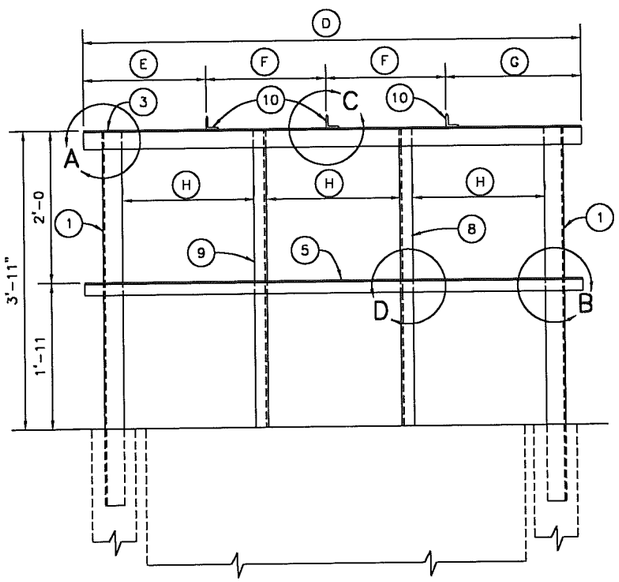
ALL CUTS SHALL BE SAW CUTS.

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

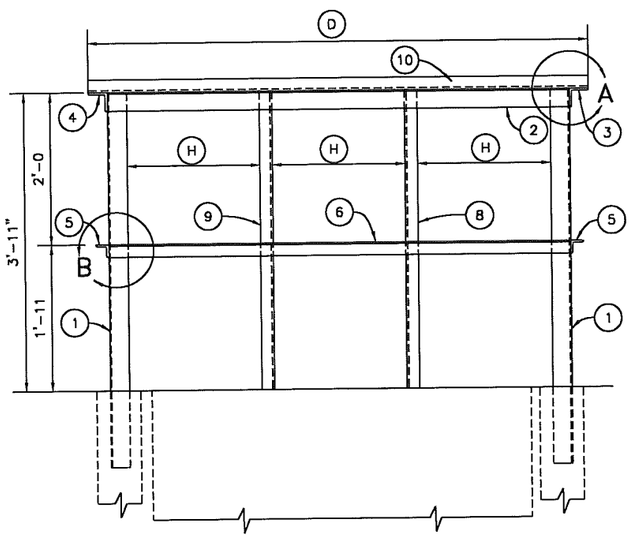
ALL ANGLES AND BOLTS SHALL BE GALVANIZED.

TABLE OF ASSEMBLY DIMENSIONS

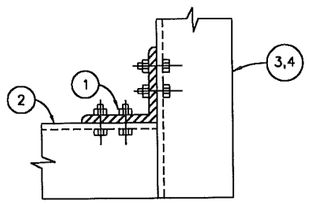
MARK	DIMENSIONS ACCORDING TO RISER DIAMETER
	48"
A	4'-10
B	2'-5
C	5'-1
D	5'-7
E	1'-4 1/2
F	1'-4
G	1'-6 1/2
H	1'-5



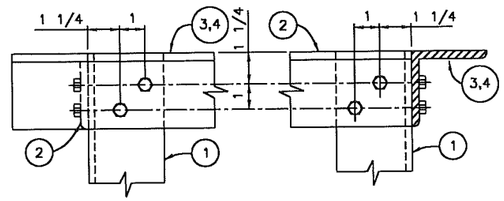
RIGHT SIDE ELEVATION



FRONT ELEVATION

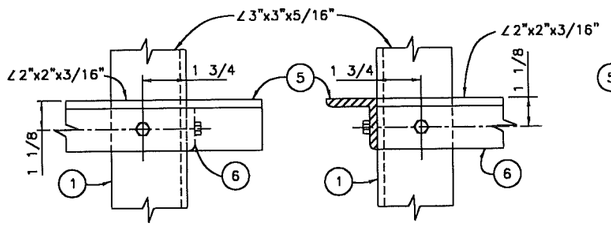


PLAN



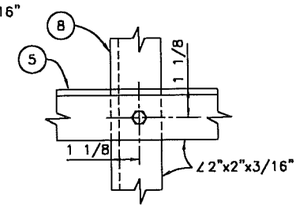
SIDE ELEV. FRONT ELEV.

VIEW "A"



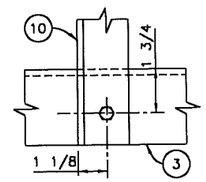
SIDE ELEV. FRONT ELEV.

VIEW "B"

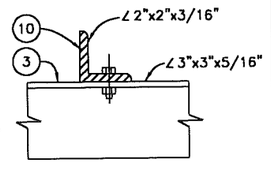


SIDE ELEV.

VIEW "D"



PLAN

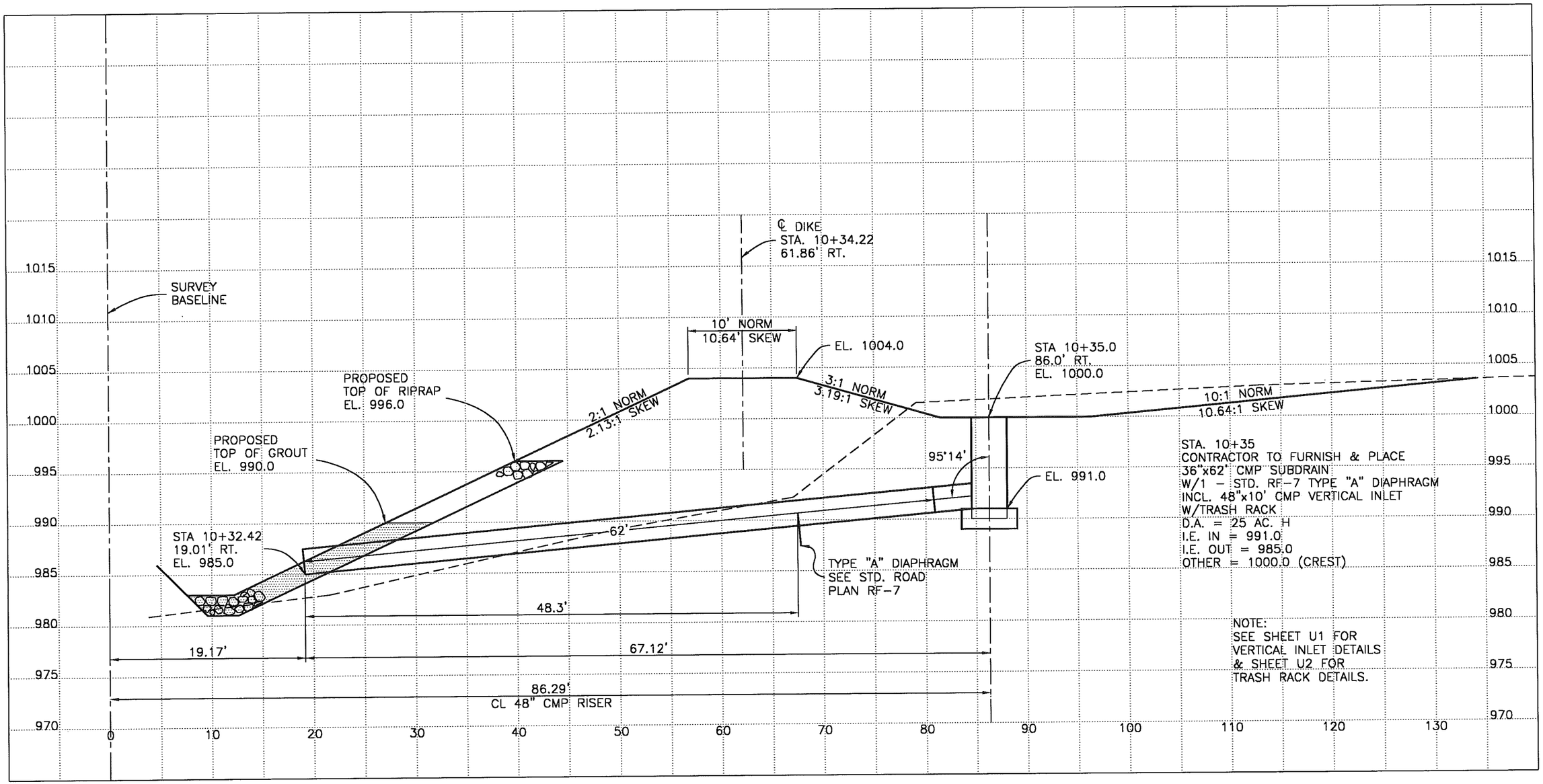


SIDE ELEV.

VIEW "C"

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

PROJECT NO.: 0667	DATE: 7/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TKK	REVIEWED BY: TJG	APPROVED BY: PJA
DESCRIPTION: SPECIAL DETAILS - TRASH RACK - 48" INTAKE PROJECT NO. DS-24(6)		SHEET U2



SECTION ALONG CENTERLINE SUBDRAIN
SKEW 20° R.A. TO DIKE

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

PROJECT NO.: 0667	DATE: 2/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: SUBDRAIN DETAILS PROJECT NO. DS-24(6)		SHEET U3

1035
1030
1025
1020
1015
1010
1005
1000
995
990
985
980
975

100 50 0 50 100 150

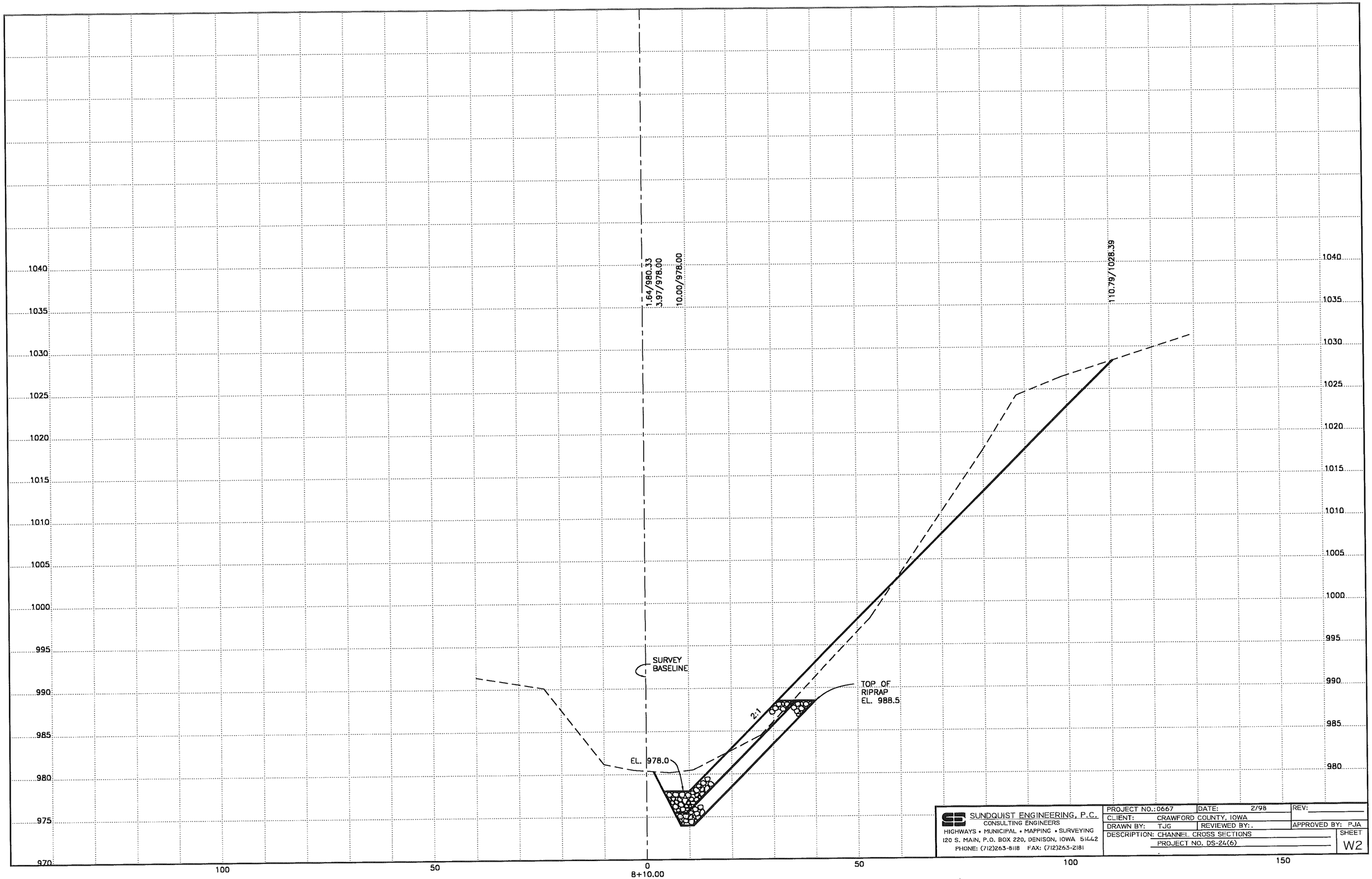
7+60.00

SURVEY BASELINE

VAR.

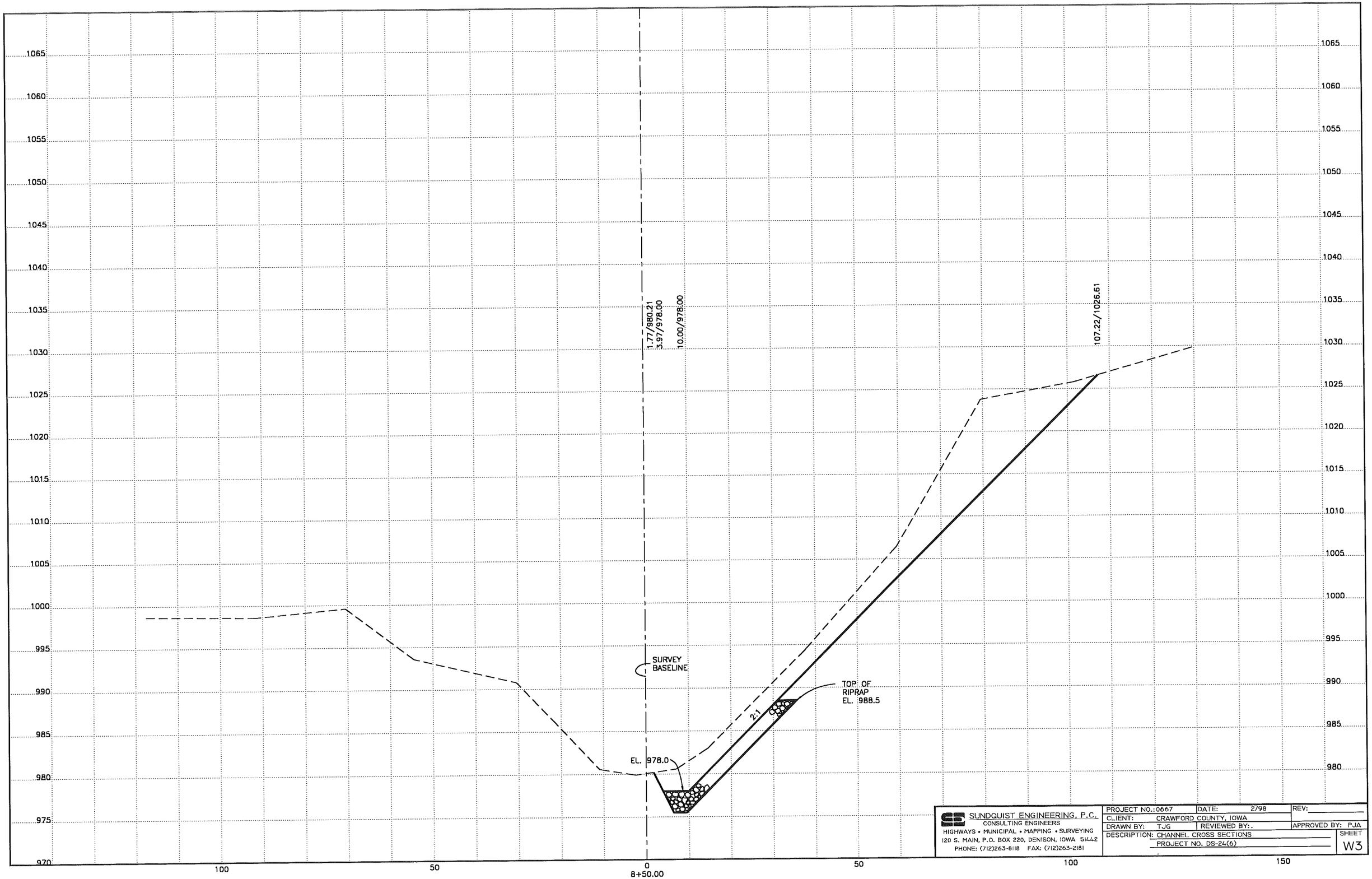
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

PROJECT NO.: 0667	DATE: 2/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA	
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET W1	



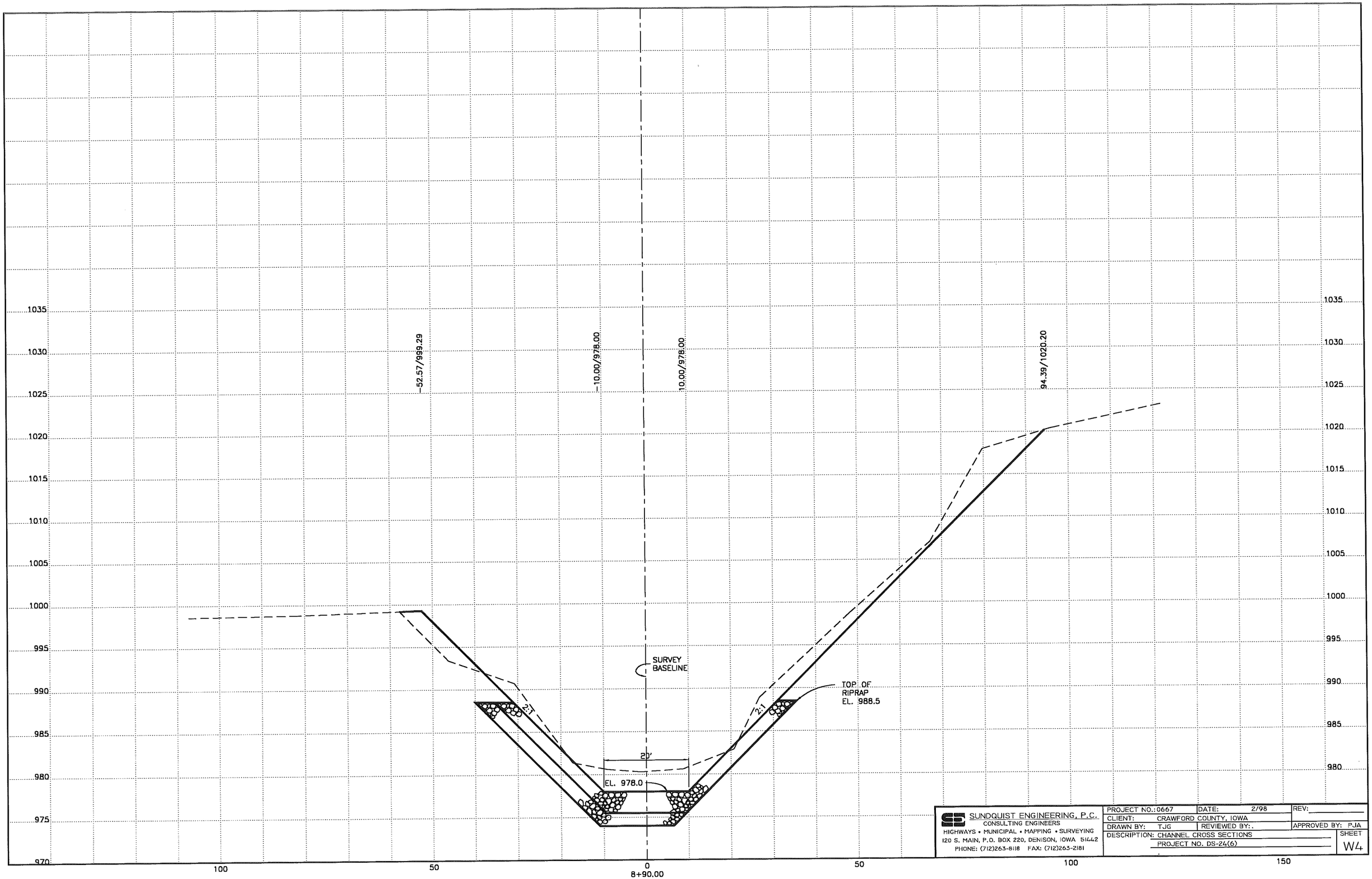
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

PROJECT NO.: 0667	DATE: 2/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA	
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)			SHEET W2

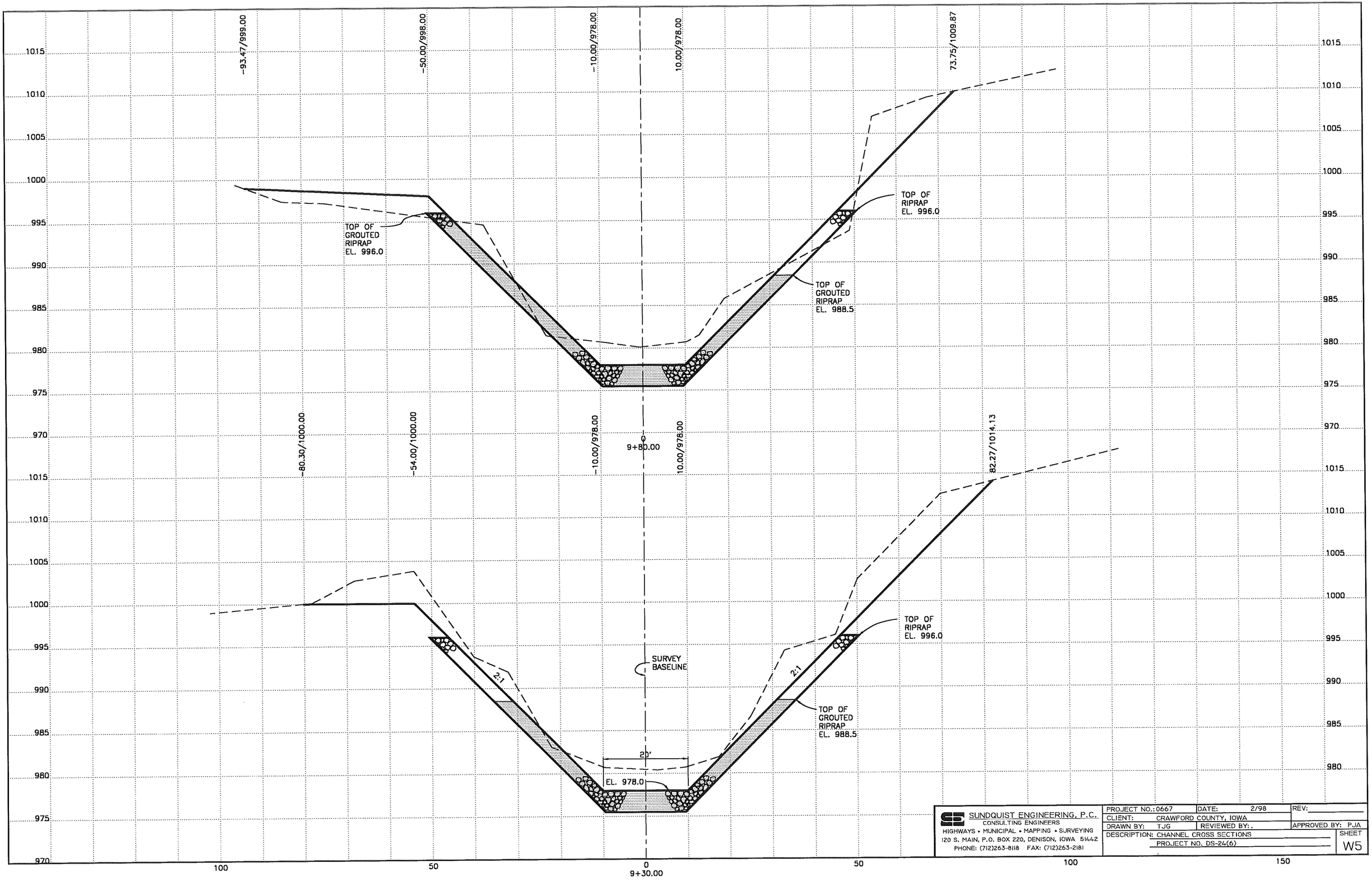


SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

PROJECT NO.:0667	DATE: 2/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA	
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)			SHEET W3

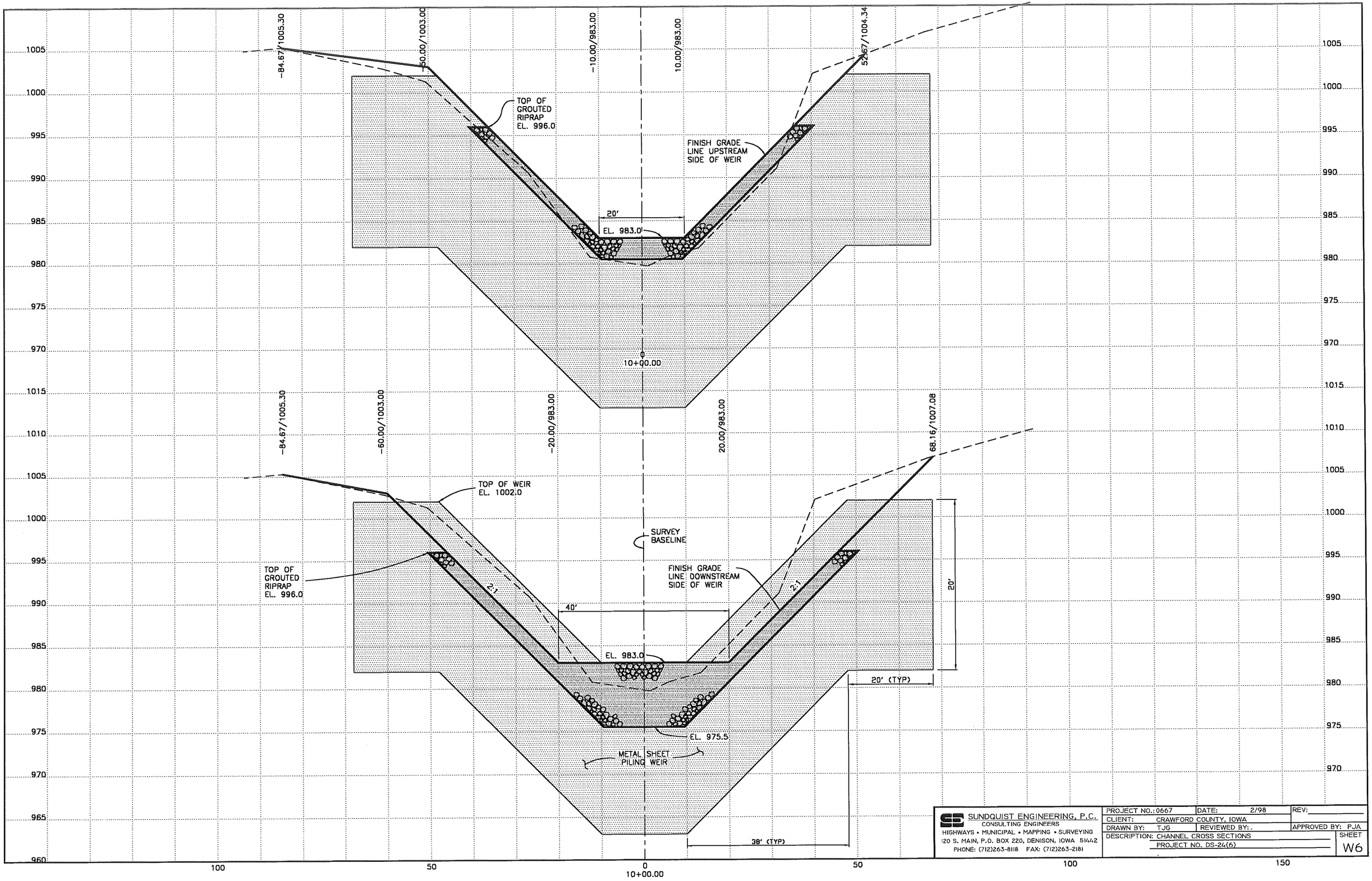


SUNDQUIST ENGINEERING, P.C. CONSULTING ENGINEERS HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING 120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442 PHONE: (712)263-8118 FAX: (712)263-2181	PROJECT NO.: 0667	DATE: 2/98	REV:
	CLIENT: CRAWFORD COUNTY, IOWA		
	DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
	DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET W4



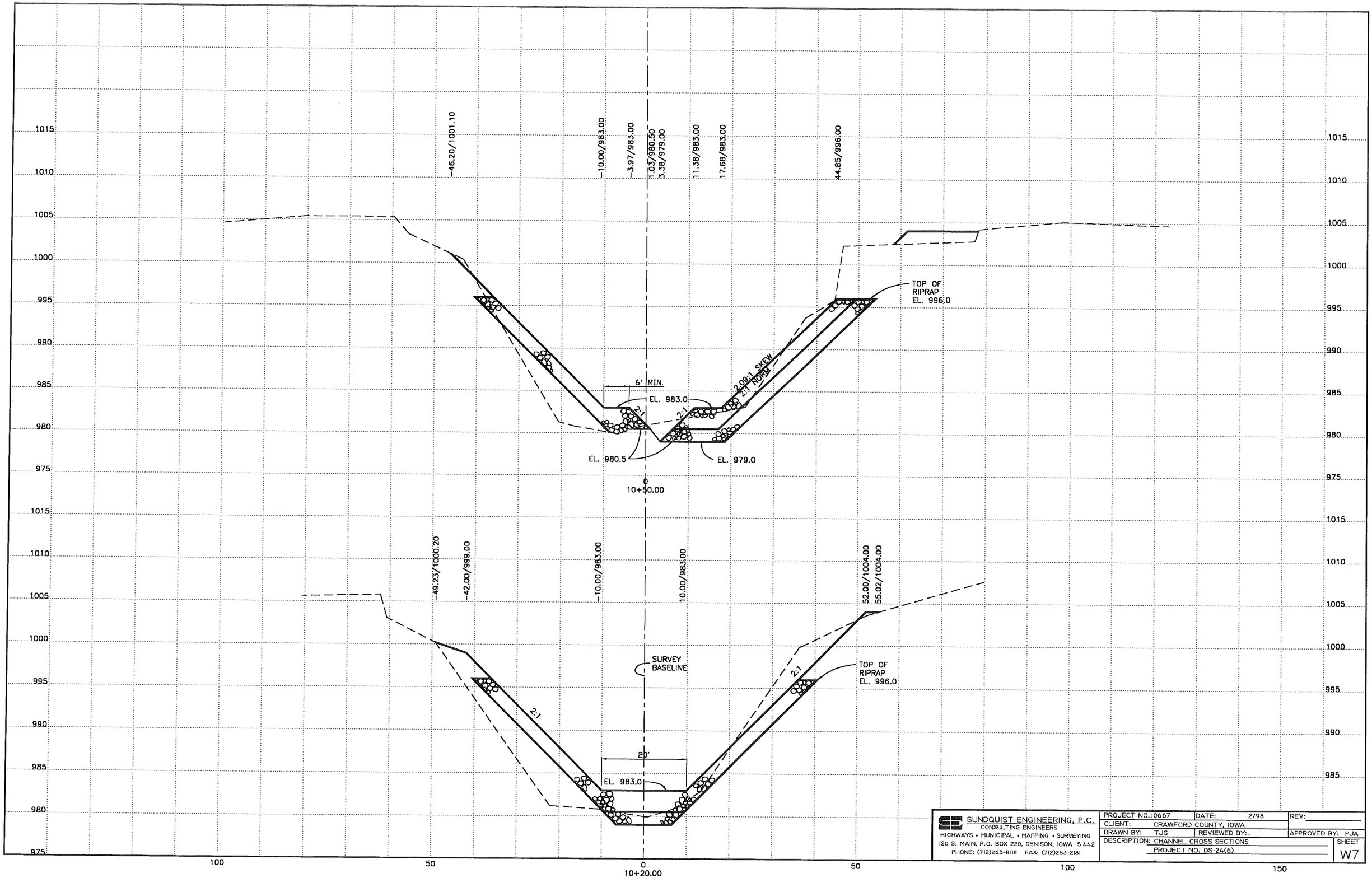
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

PROJECT NO.: 0667	DATE: 2/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET W5

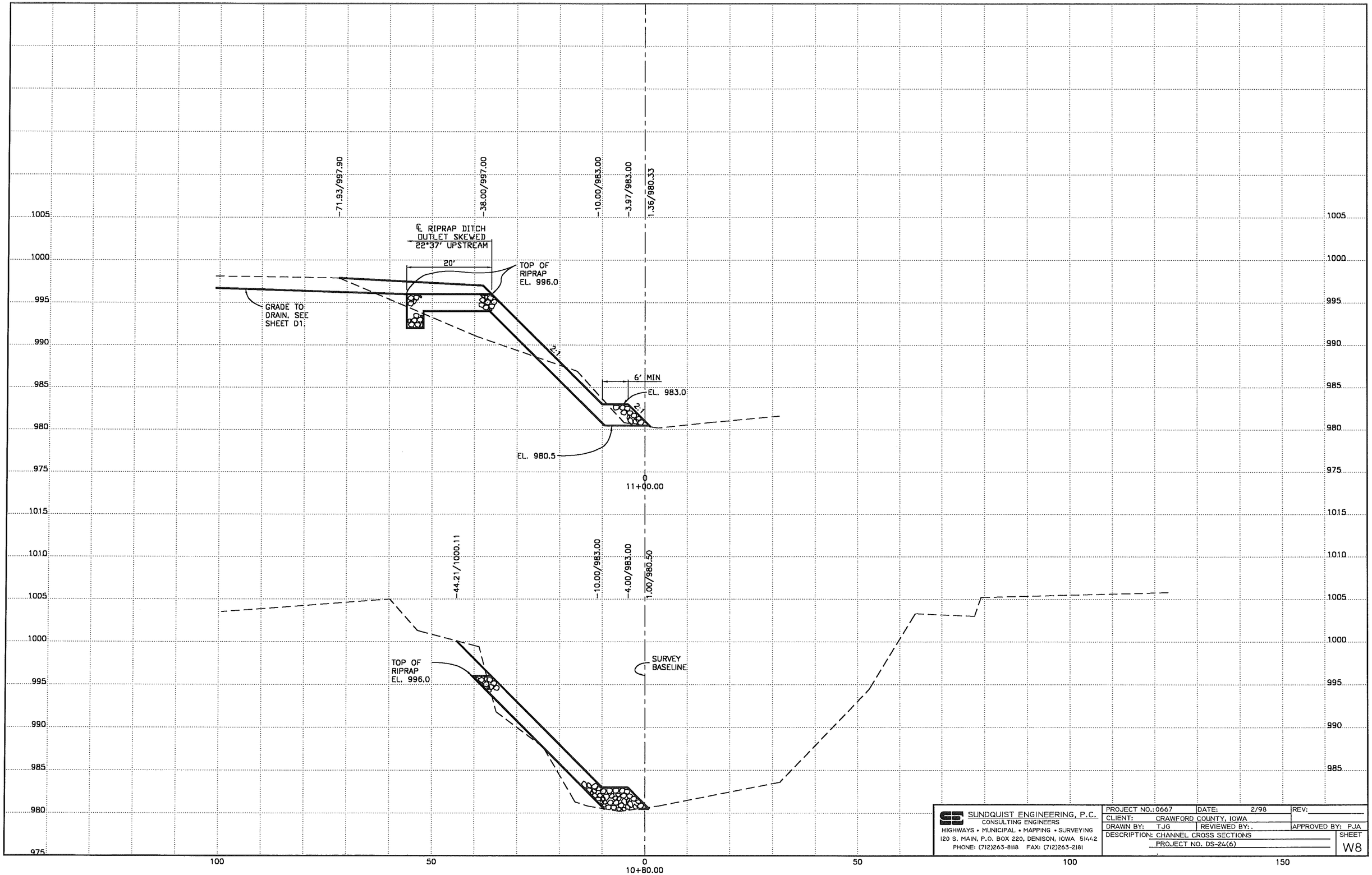


SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

PROJECT NO.: 0667	DATE: 2/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA	
DESCRIPTION: CHANNEL CROSS SECTIONS		SHEET	
PROJECT NO. DS-24(6)		W6	

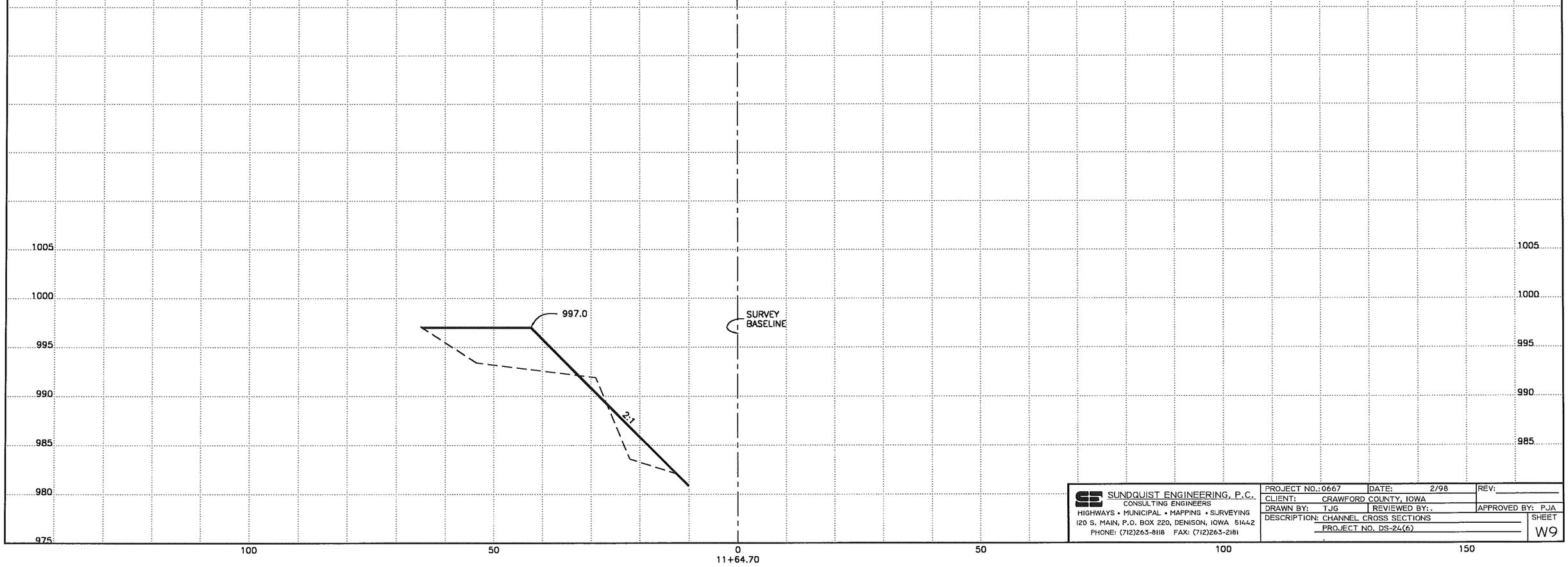


SUNDQUIST ENGINEERING, P.C. CONSULTING ENGINEERS HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING 120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442 PHONE: (712)263-8118 FAX: (712)263-2181	PROJECT NO.:0667	DATE: 2/98	REV:
	CLIENT: CRAWFORD COUNTY, IOWA		
	DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA
	DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET W7



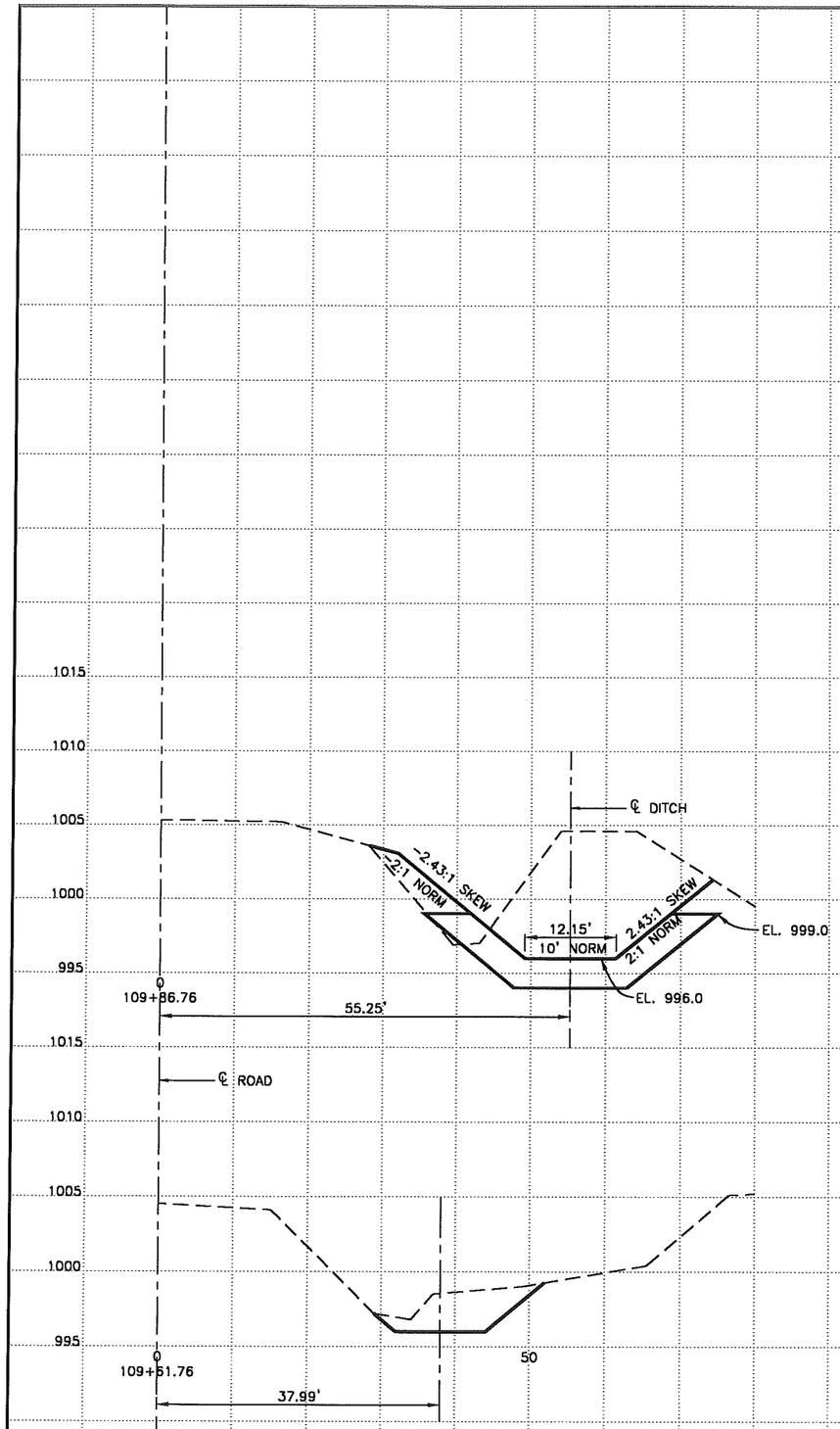
SUNDQUIST ENGINEERING, P.C.
CONSULTING ENGINEERS
HIGHWAYS • MUNICIPAL • MAPPING • SURVEYING
120 S. MAIN, P.O. BOX 220, DENISON, IOWA 51442
PHONE: (712)263-8118 FAX: (712)263-2181

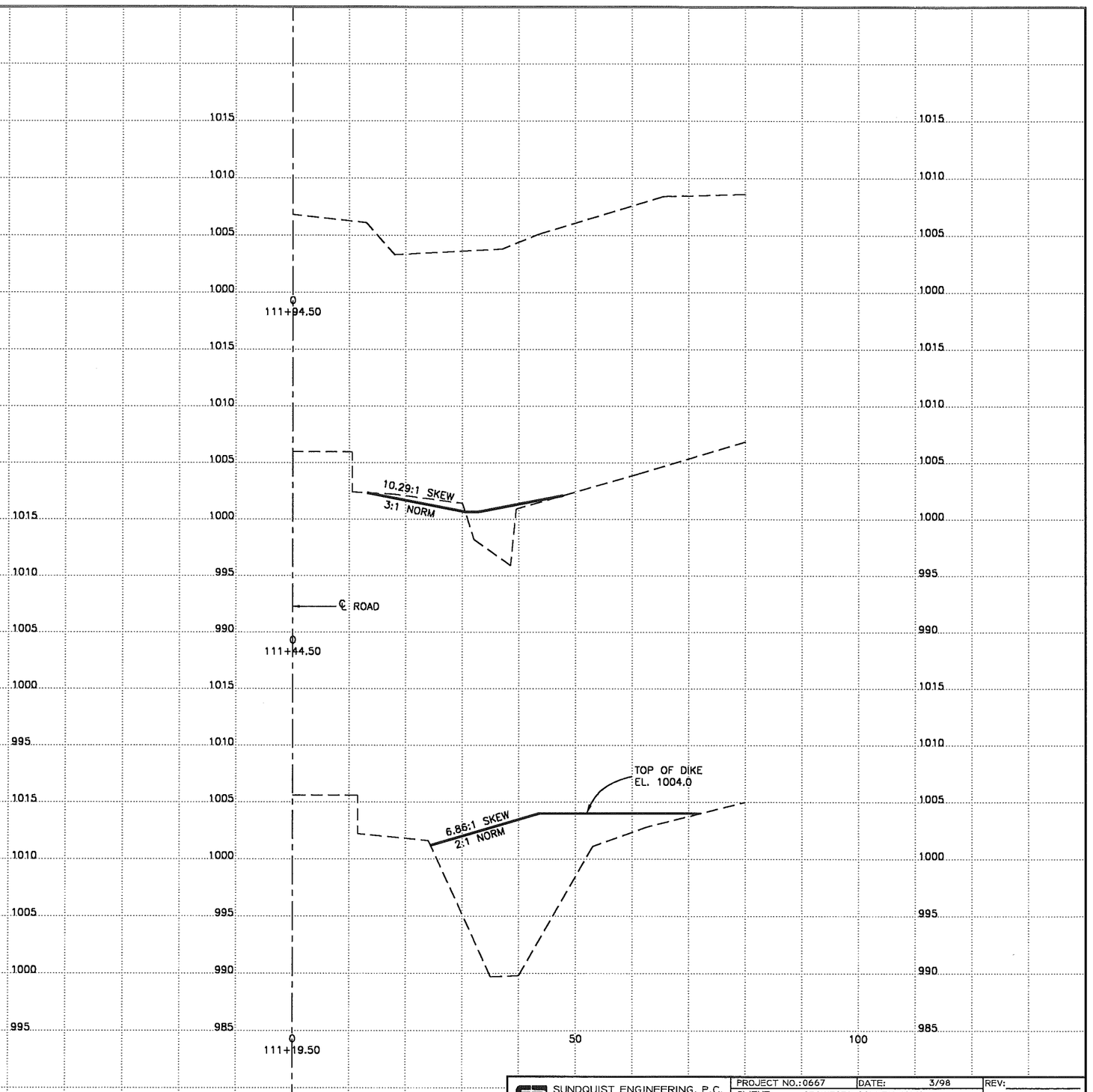
PROJECT NO.: 0667	DATE: 2/98	REV:
CLIENT: CRAWFORD COUNTY, IOWA		
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET W8



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

PROJECT NO.: 0667	DATE: 2/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY:.	APPROVED BY: PJA	
DESCRIPTION: CHANNEL CROSS SECTIONS PROJECT NO. DS-24(6)			SHEET W9





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

PROJECT NO.: 0667	DATE: 3/98	REV:	
CLIENT: CRAWFORD COUNTY, IOWA			
DRAWN BY: TJG	REVIEWED BY: .	APPROVED BY: PJA	
DESCRIPTION: ROAD DITCH CROSS SECTIONS PROJECT NO. DS-24(6)		SHEET X1	