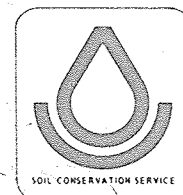


USDA-SCS-FORT WORTH, TEXAS



# SANDERSON CANYON CHANNEL WORK

## SANDERSON CANYON WATERSHED PROJECT

BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

SPONSORED BY  
RIO GRANDE-PECOS RIVER, BIG BEND AND TRANS-PECOS SOIL AND WATER CONSERVATION  
DISTRICTS  
TERRELL, PECOS AND BREWSTER COUNTY COMMISSIONERS COURTS

COOPERATING WITH  
SOIL CONSERVATION SERVICE  
OF THE  
U.S. DEPARTMENT OF AGRICULTURE  
1980

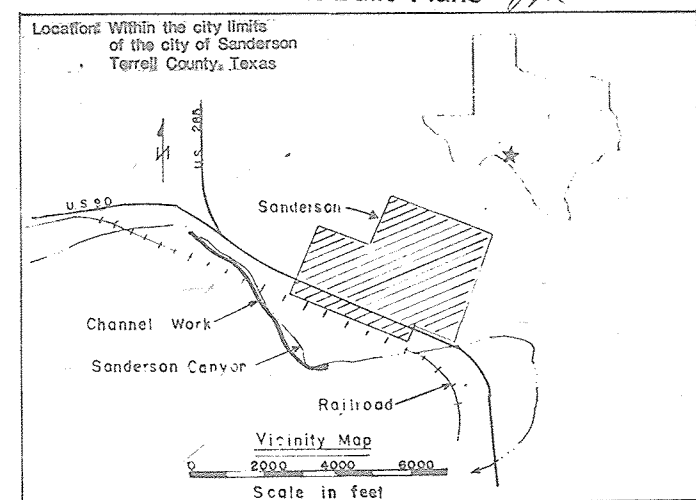
AS BUILT PLANS  
CONTRACT NO. 50-7442-1-1754  
CONTRACTOR J. D. Abrams, Inc.  
CONSTRUCTION COMMENCED 6-18-81  
GOV. REPRESENTATIVE Johnnie L. Bohuslav  
GOV. INSPECTOR Cyril W. Hamilton  
BID PRICE \$683,160.00  
FINAL PRICE \$710,351.89  
CONSTRUCTION COMPLETED 6-17-82

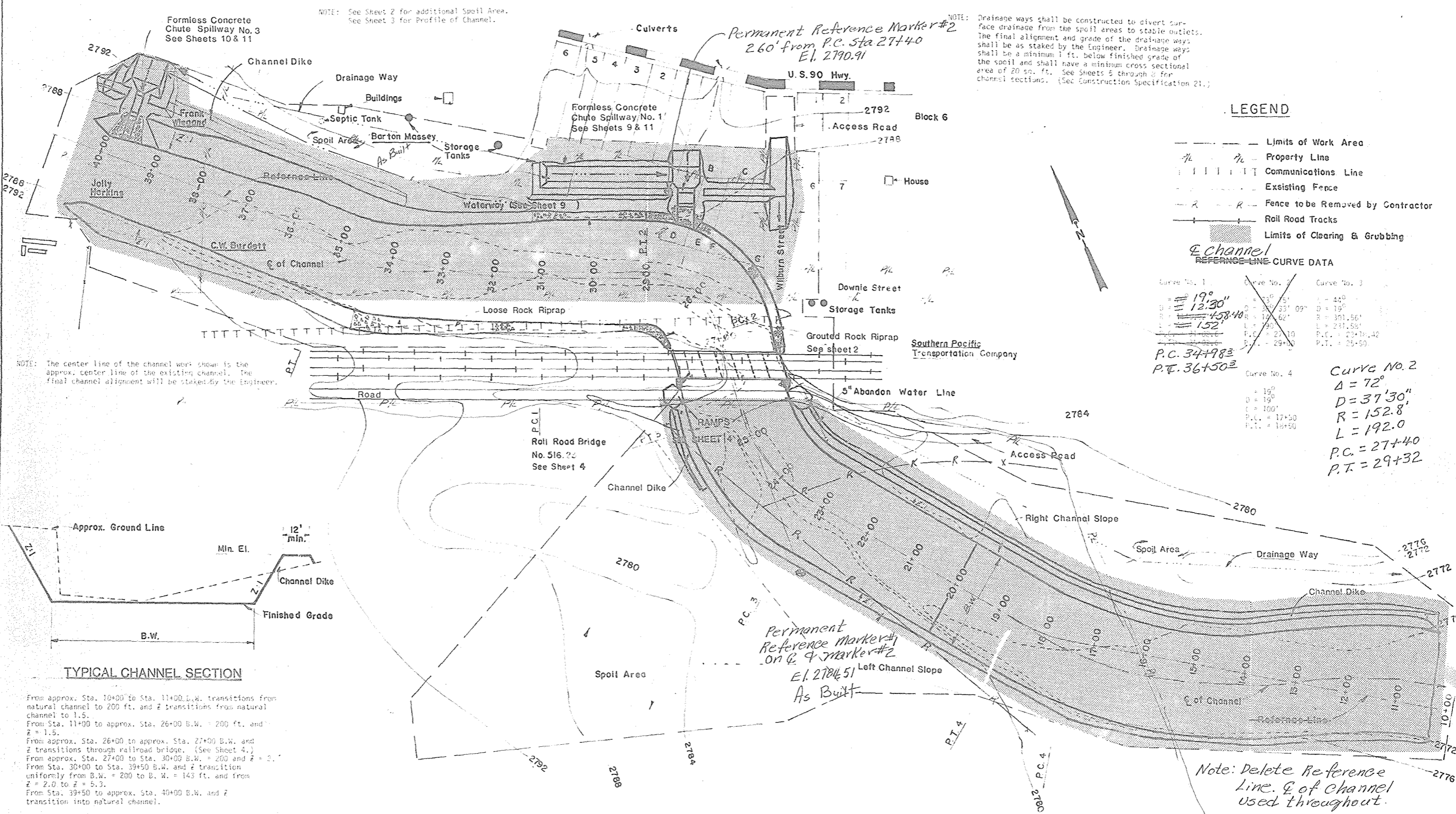
CONSTRUCTION DRAWINGS APPROVED

*Gene G. Villalpando* (MOK) 7-21-80  
STATE CONSERVATION ENGINEER'S OFFICE  
TEMPLE, TEXAS  
151 Robert A. Frank Jr. approved by letter 9/12/80  
STATE ENGINEER'S OFFICE  
EL PASO, TEXAS

6-17-82  
AS-Built Plans 912

INDEX OF DRAWINGS	
NO.	TITLE
100	GENERAL PLAN
101	CHANNEL PROFILE
102	CHANNEL SECTION
103	CHANNEL SECTIONS
104	FORMLESS CONCRETE GUTTER SPILLWAY NO. 1
105	FORMLESS CONCRETE GUTTER SPILLWAY NO. 2
106	FORMLESS CONCRETE GUTTER SPILLWAY STRUCTURE DETAILS





- LEGEND**
- Limits of Work Area
  - - - Property Line
  - Communications Line
  - - - Existing Fence
  - - - Fence to be Removed by Contractor
  - Rail Road Tracks
  - Limits of Clearing & Grubbing

**Channel 1**  
REFERENCE LINE CURVE DATA

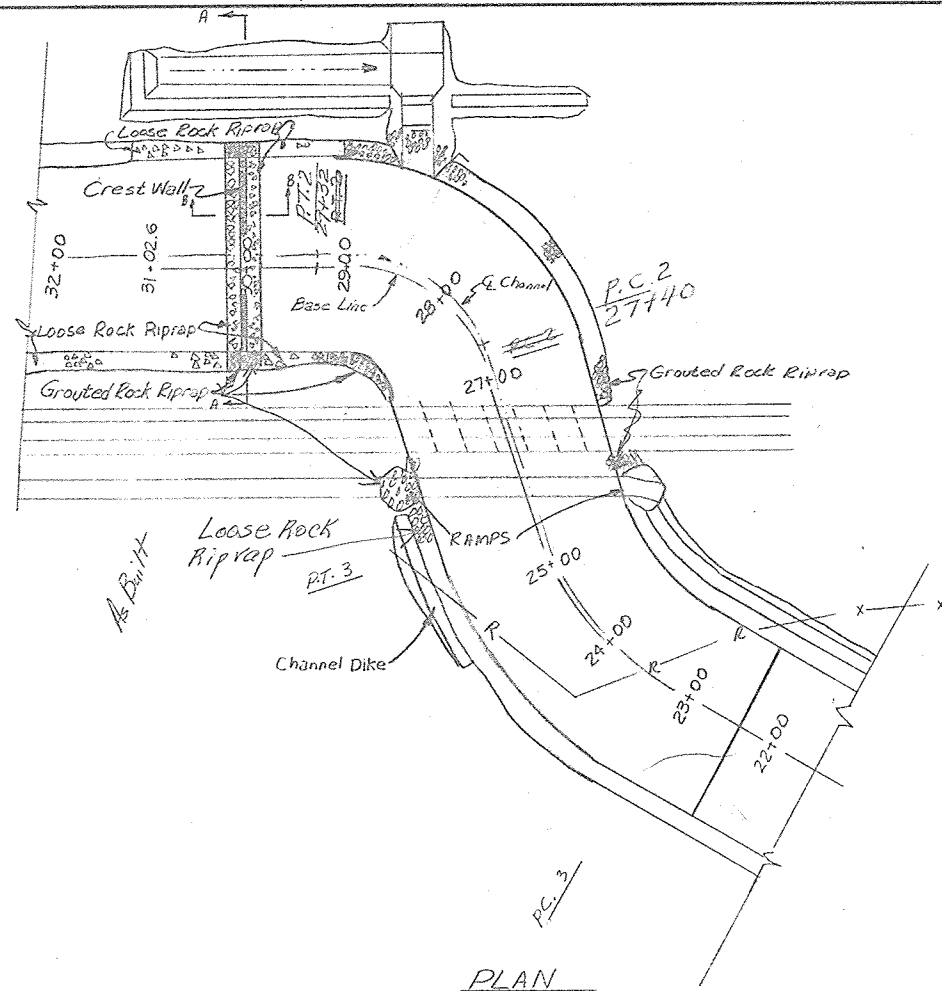
Curve No. 1	Curve No. 2	Curve No. 3	Curve No. 4
$\Delta = 19^\circ 30'$	$\Delta = 72^\circ$	$\Delta = 40^\circ$	$\Delta = 19^\circ$
$D = 12.30'$	$D = 37.30'$	$D = 301.56'$	$D = 19'$
$R = 152'$	$R = 152.8'$	$R = 241.55'$	$R = 100'$
$P.C. = 34+98.3$	$P.C. = 27+40$	$P.C. = 23+14.42$	$P.C. = 17+30$
$P.T. = 36+50.3$	$P.T. = 29+32$	$P.T. = 25+50$	$P.T. = 18+50$

As-Built Plans 6-17-82 JJB

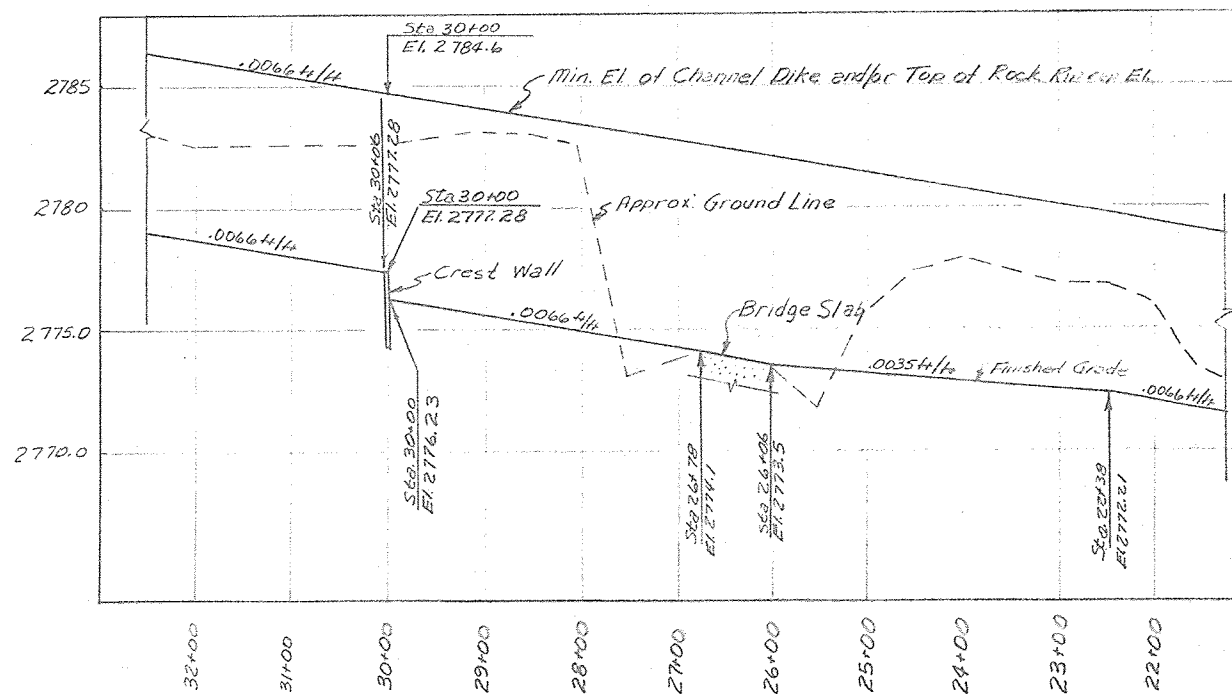
**GENERAL PLAN**  
SANDERSON CANYON CHANNEL WORK  
SANDERSON CANYON WATERSHED  
IN  
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS  
**U.S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

DESIGNED	L. D. M.	DATE	3-80	APPROVED BY	
DRAWN	L. D. M.	DATE	3-80	TITLE	STATE ENGINEER
TRACED	L. D. M.	DATE	3-80	SHEET	1
CHECKED	R. L. K.	DATE	5-80	DRAWING NO.	TX-EN-0029

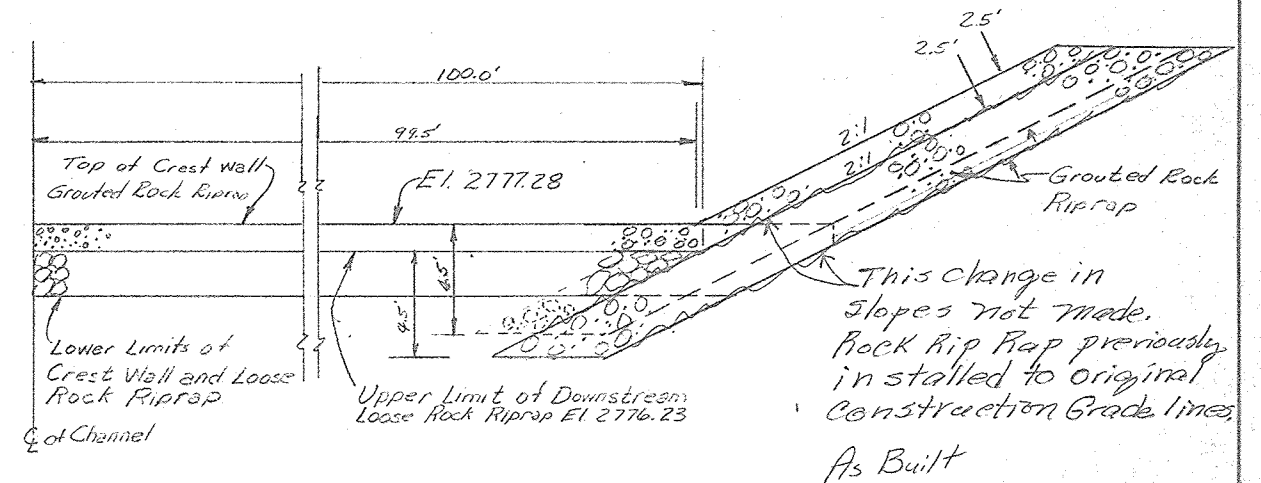
SCS-ENG-314 (Rev. 7-71)



PLAN



PROFILE

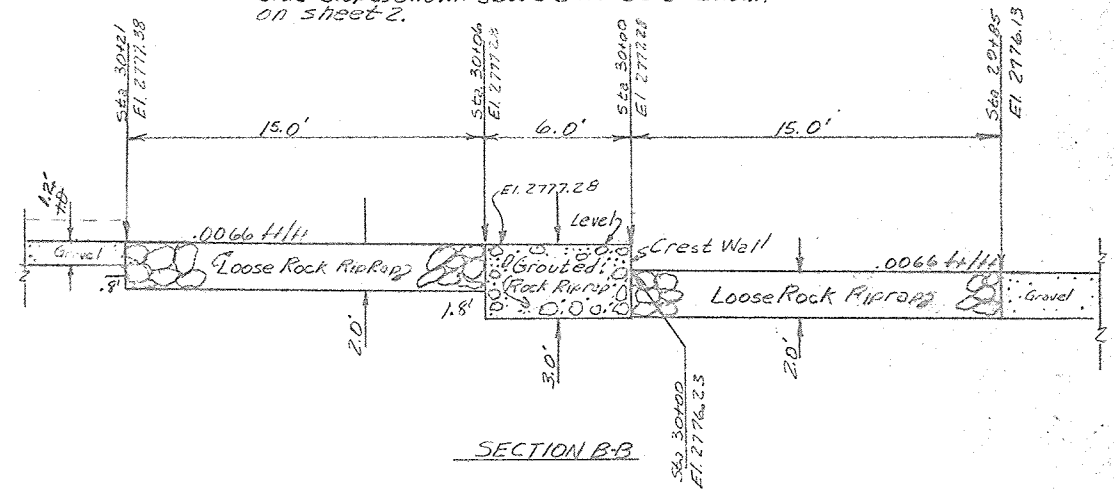


HALF SECTION A-A

Notes: The bottom width of the channel shall be as shown on sheet 1, except from Sta 30+00 to Sta 30+16.7 the bottom width shall be 199ft.

The Grouted Rock Riprap side slopes as shown above shall extend from Sta 29+85 to Sta 30+06. The remainder of the loose rockrap and Grouted Rock Riprap side slopes shall be as shown on sheets 1 and 2.

Gravel backing for the Grouted Rock Riprap side slopes shown above shall be as shown on sheet 2.

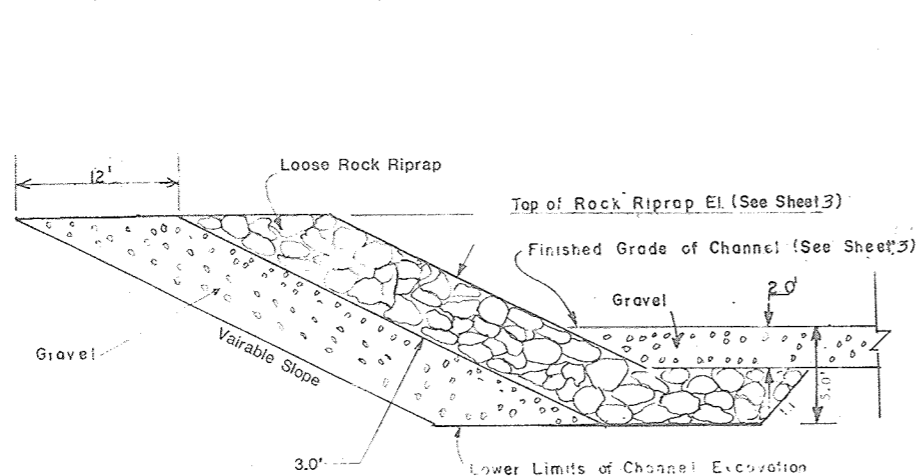
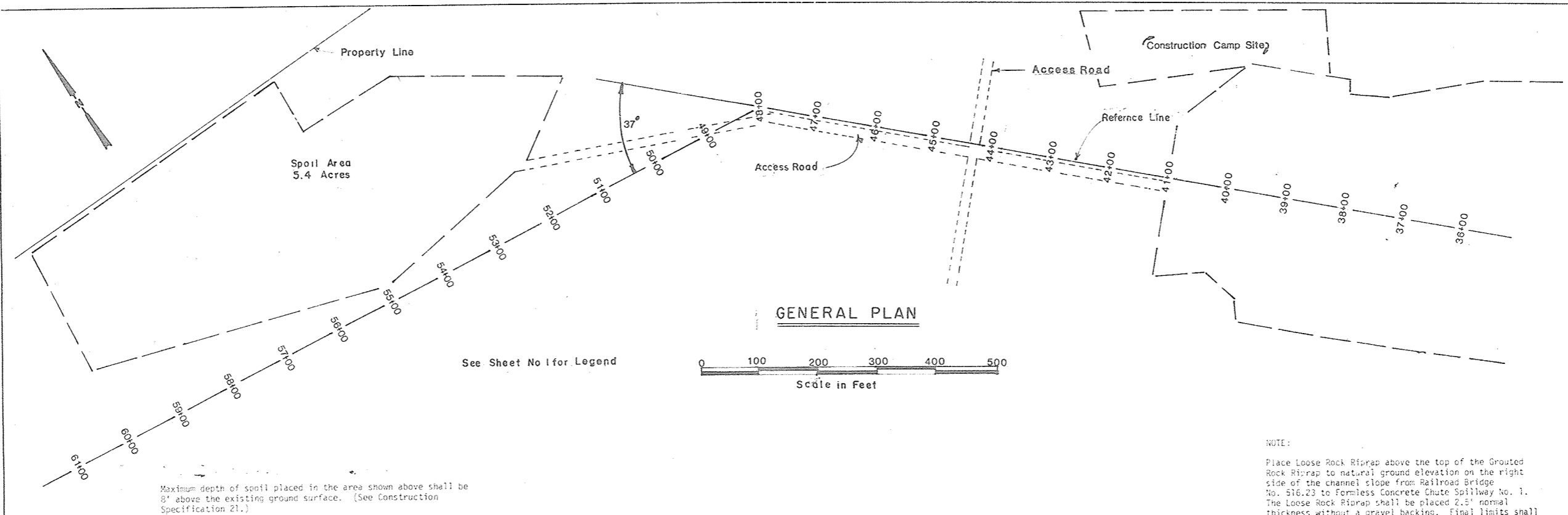


SECTION B-B

As-Built Plans 6-17-82 872

CREST WALL DETAILS  
SANDERSON CANYON CHANNEL WORK  
SANDERSON CANYON WATERSHED  
in  
Brewster, Pecos, and Terrell Counties, Tex.  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed	L.D.M.	Date	12-81	Approved by	
Drawn	L.D.M.	Date	12-81	Title	
Traced	L.D.M.	Date	12-81	Sheet	No. 19
Checked	W.P.F.	Date	12-81	of 11	TX-EN-0029



Loose rock riprap shall be placed as shown above on the left channel slope from Sta. 29+00 to Sta. 34+50 and on the right channel slope from Sta. 29+00 to Sta. 31+25. Gradation of the riprap shall be as shown at right. (See Construction Specification 61.)

### LOOSE ROCK RIPRAP TYPICAL SECTION

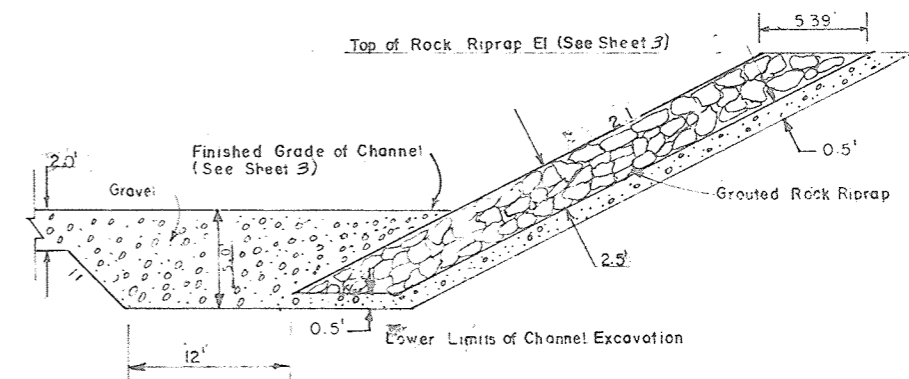
#### Gradation of Bed Materials for the As-Built Channel

Channel Sta.	Passing Sieve Size (Inches)				
	No. 4	3/8	3/4	1-1/2	3
12+00					
18+00					
24+00					
28+00					
33+00					
38+00					

The Engineer will conduct such tests as are necessary to verify that the materials at finished grade meet the gradation requirements for Gravel as shown above.

#### Gravel Gradation and Placement Requirements

Gravel shall have less than 35% by weight passing the 3/8" sieve. The maximum particle size for gravel shall be 9" and the maximum layer thickness before compaction shall be 15". The placement moisture shall be approved by the Engineer. Class C compaction shall be required for gravel and shall be accomplished by a minimum of at least 2 passes, over the entire gravel surface, of a steel-drum, vibrating roller weighing not less than 5 tons and exerting a vertical vibrating force of not less than 20,000 pounds at least 1200 times per minute, or by an equivalent method approved by the Engineer. (See Construction Specification 23A.)



Grouted rock riprap shall be placed as shown above on the right channel slope from Railroad Bridge No. 516.23 to Formless Concrete Chute Spillway No. 1 and from Formless Concrete Chute Spillway No. 1 to Sta. 29+00, and on the left channel slope from Railroad Bridge No. 516.23 to Sta. 29+00. Grouted rock riprap shall be required adjacent to the left downstream bridge wingwall as shown on Sheet 4, and downstream from Concrete Paved Side Inlets Nos. 1 and 3 as shown on Sheets 9, 10, and 11. Gradation of all grouted rock riprap shall be as shown at left. See Construction Specification 62.

#### Gradation of Rock Riprap

Size of Rock lbs.	Smaller by Weight
800	100
400	65-50
6	10-15

The least dimension of an individual rock fragment shall be not less than one-third of the greatest dimension of the fragment.

All loose Rock Riprap and Grouted Rock Riprap required in this contract shall comply with the gradation shown in the table above.

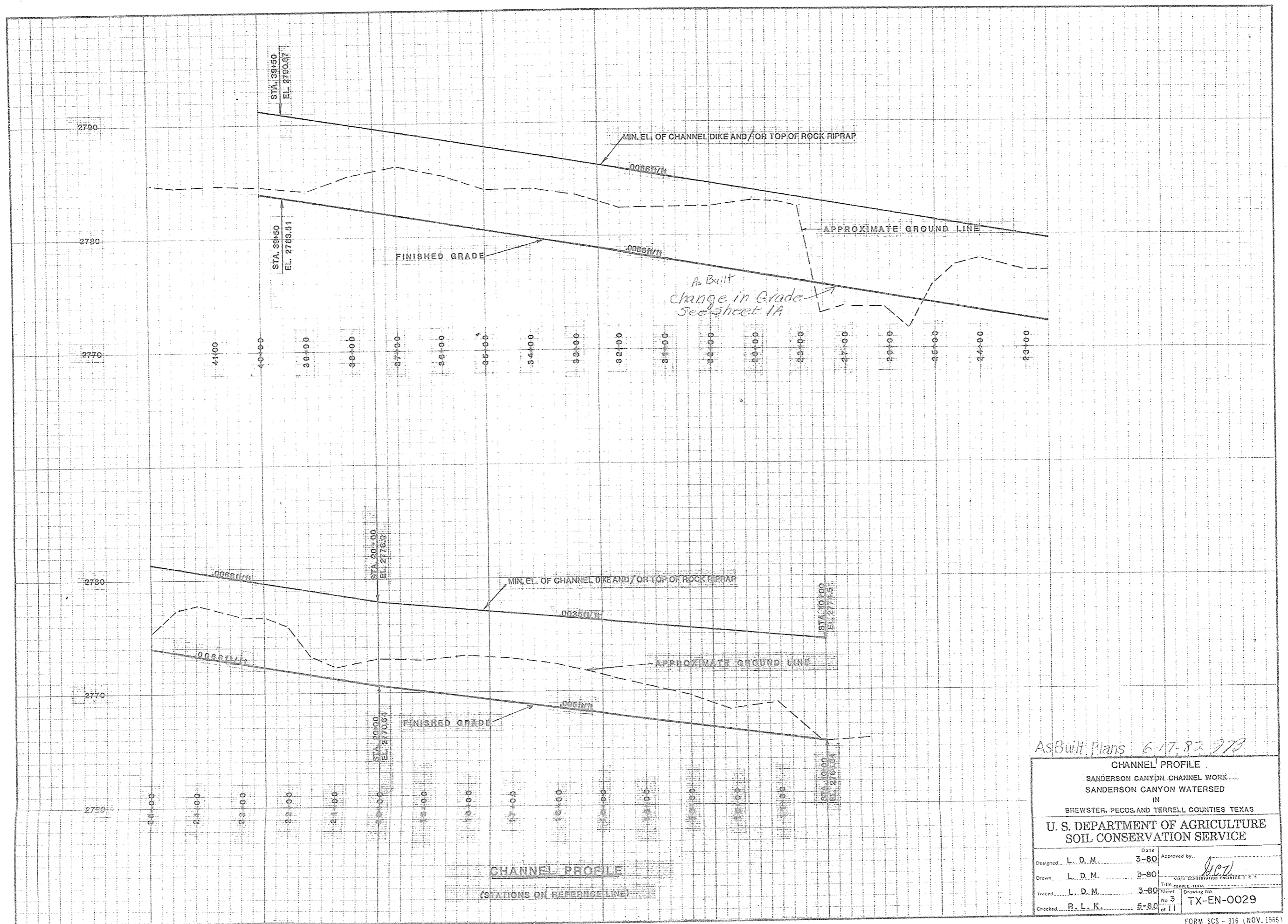
### GROUTED ROCK RIPRAP TYPICAL SECTION

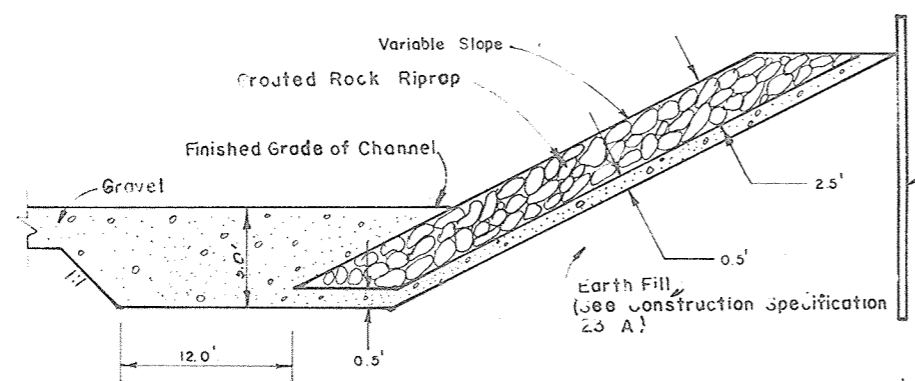
6-17-82 773

GENERAL PLAN  
SANDERSON CANYON CHANNEL WORK  
SANDERSON CANYON WATERSHED  
BREWSTER, DALLAS AND TARRANT COUNTIES TEXAS  
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

DESIGNED L. D. M. DATE 4-80  
DRAWN L. D. M. DATE 4-80  
TRACED W. H. D. DATE 4-80  
CHECKED R. L. K. DATE 5-80

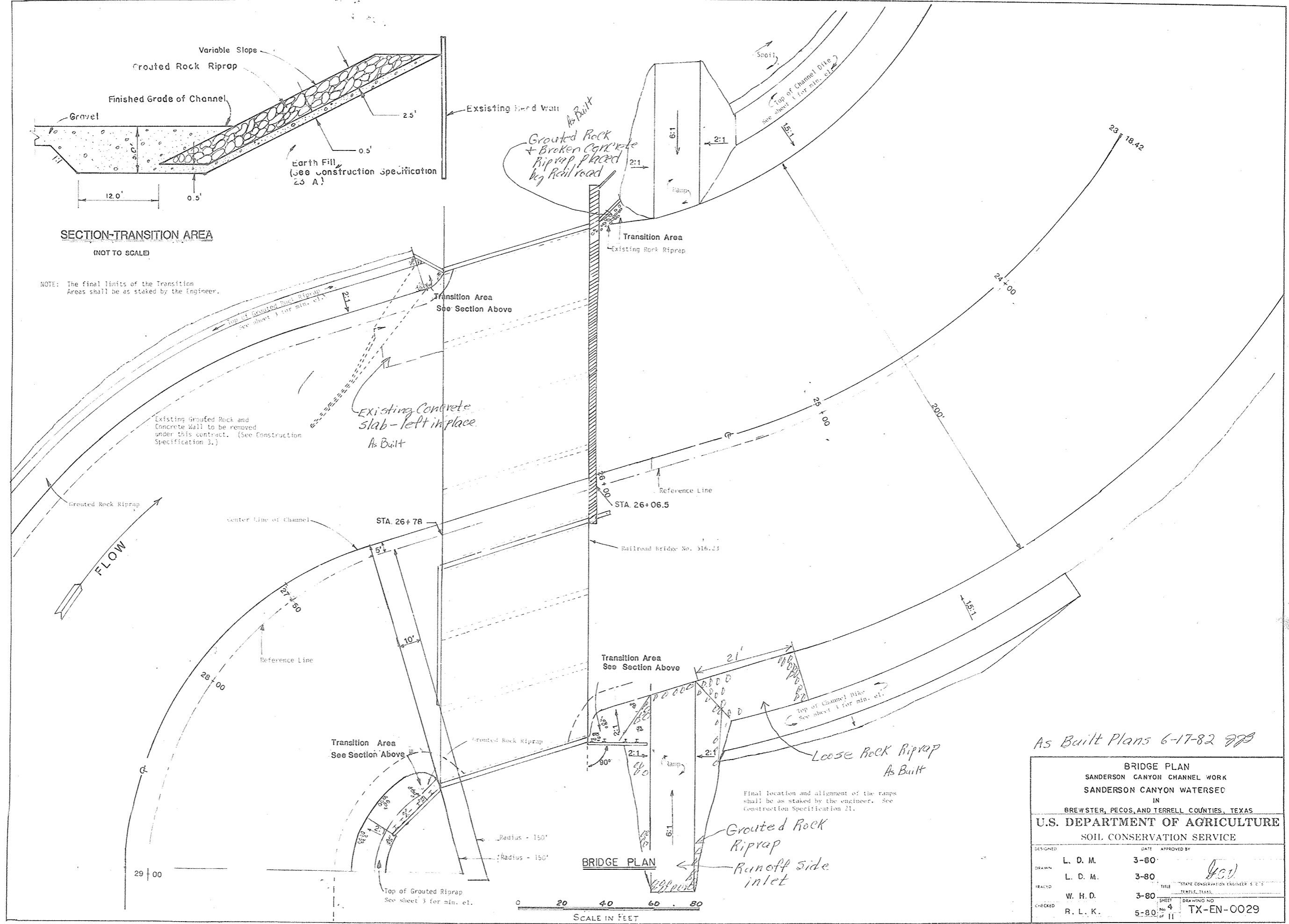
APPROVED BY [Signature]  
TITLE STATE CONSERVATION ENGINEER'S C. S.  
SHEET No. 2 of 11  
DRAWING NO. TX-EN-0029





**SECTION-TRANSITION AREA**  
(NOT TO SCALE)

NOTE: The final limits of the Transition Areas shall be as staked by the engineer.

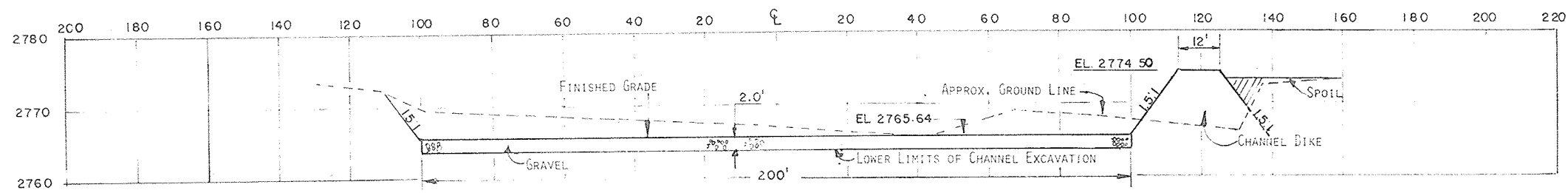


**BRIDGE PLAN**

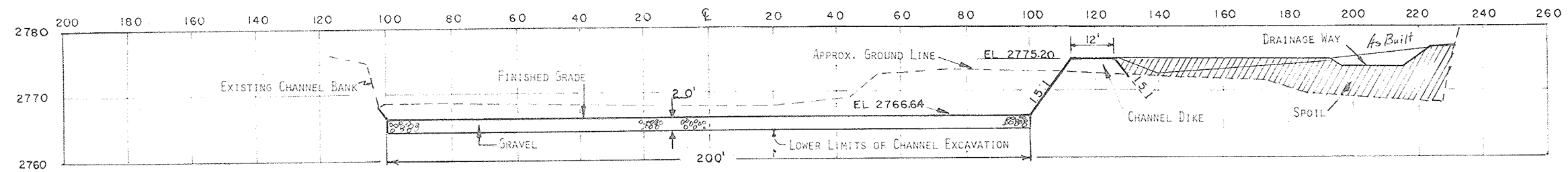
0 20 40 60 80  
SCALE IN FEET

*As Built Plans 6-17-82 JPB*

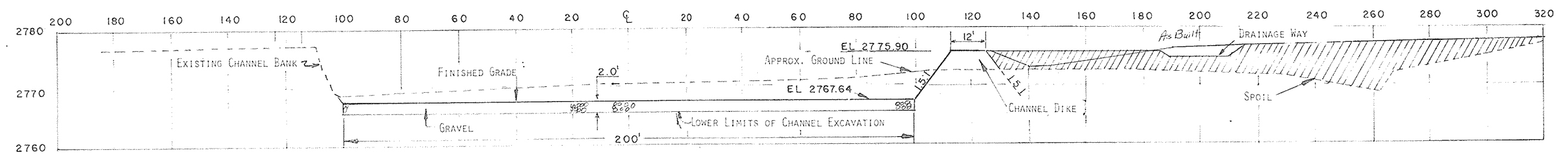
BRIDGE PLAN			
SANDERSON CANYON CHANNEL WORK			
SANDERSON CANYON WATERSEED			
IN			
BREWSTER, PECOS, AND TERRELL COUNTIES, TEXAS			
U.S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
DESIGNED	L. D. M.	3-80	DATE
DRAWN	L. D. M.	3-80	APPROVED BY
TRACED	W. H. D.	3-80	TITLE
CHECKED	R. L. K.	5-80	STATE CONSERVATION ENGINEER'S OFFICE
		SHEET 4	TX-EN-0029
		of 11	DRAWING NO.



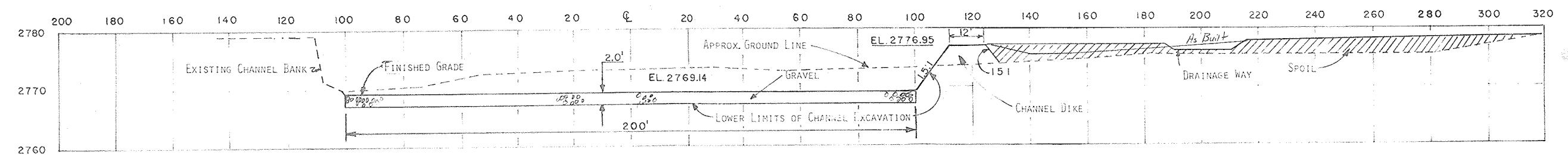
APPROX. STA. 11+00



APPROX. STA. 12+00



APPROX. STA. 14+00



APPROX. STA. 17+00

SECTIONS ARE SHOWN LOOKING UPSTREAM

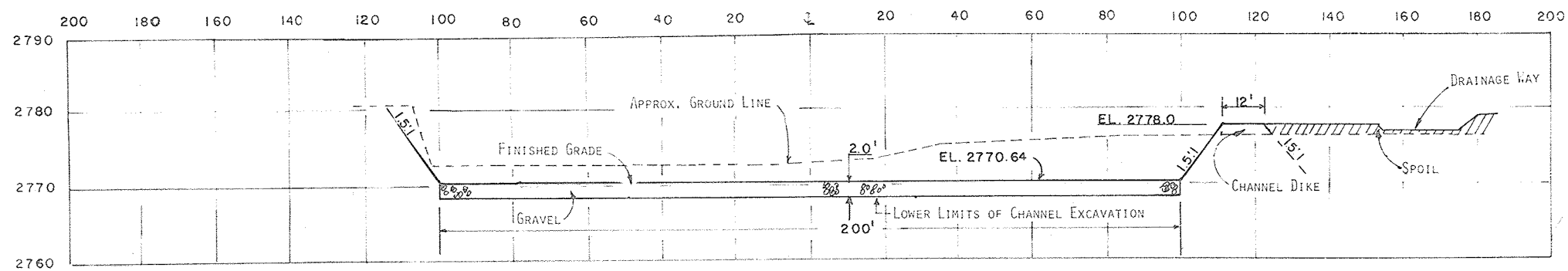
NOTE: SEE SHEET 2 FOR GRAVEL GRADATION AND PLACEMENT REQUIREMENTS.

NOTE:  
The existing left channel bank shall be left undisturbed from approx. Sta. 12+00 to approx. Sta. 17+00 as shown above. The final limits of channel bank to be left undisturbed shall be as staked by the Engineer.

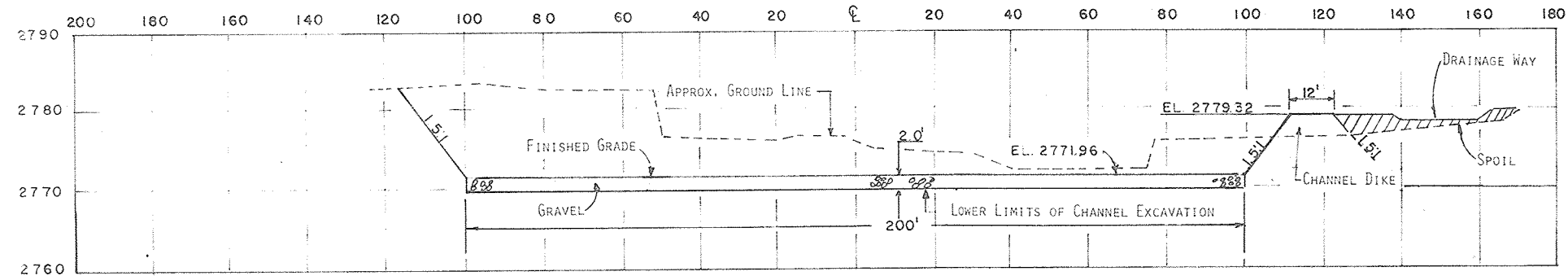
# CHANNEL SECTIONS

As Built Plans 6-77-82 278

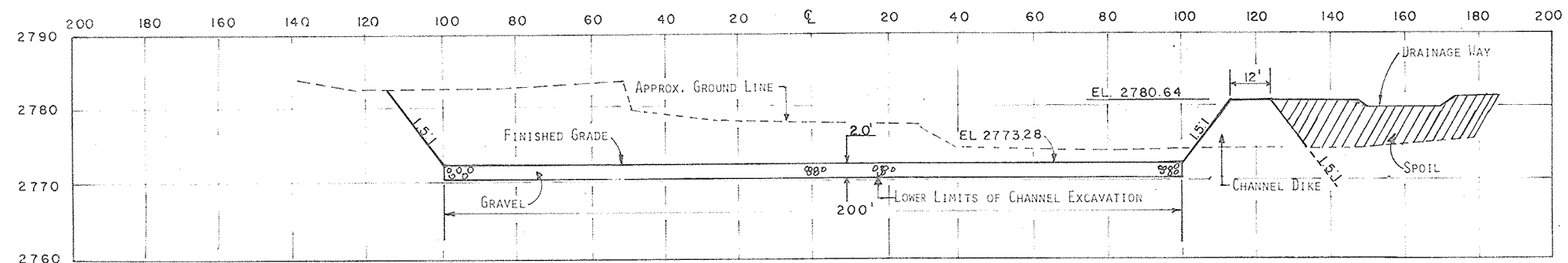
CHANNEL SECTIONS			
SANDERSON CANYON CHANNEL WORK			
SANDERSON CANYON WATERSHED			
IN			
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS			
U.S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
DESIGNED	L D M	DATE	4-80
DRAWN	L D M	DATE	4-80
TRACED	W H D.	DATE	4-80
CHECKED	R. L. K.	DATE	5-80
APPROVED BY		STATE CONSERVATION ENGINEER S. C. S.	
SHEET		DRAWING NO.	
NO. 5		TX-EN-0029	



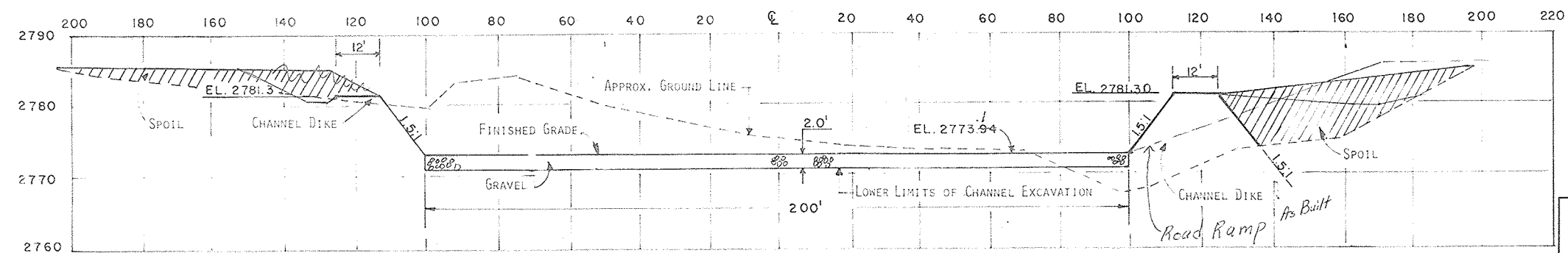
APPROX. STA. 20+00



APPROX. STA. 22+00



APPROX. STA. 24+00



APPROX. STA. 25+00

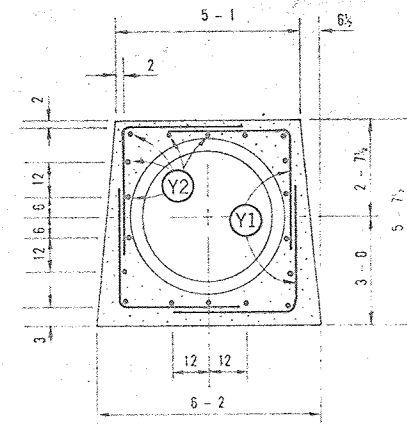
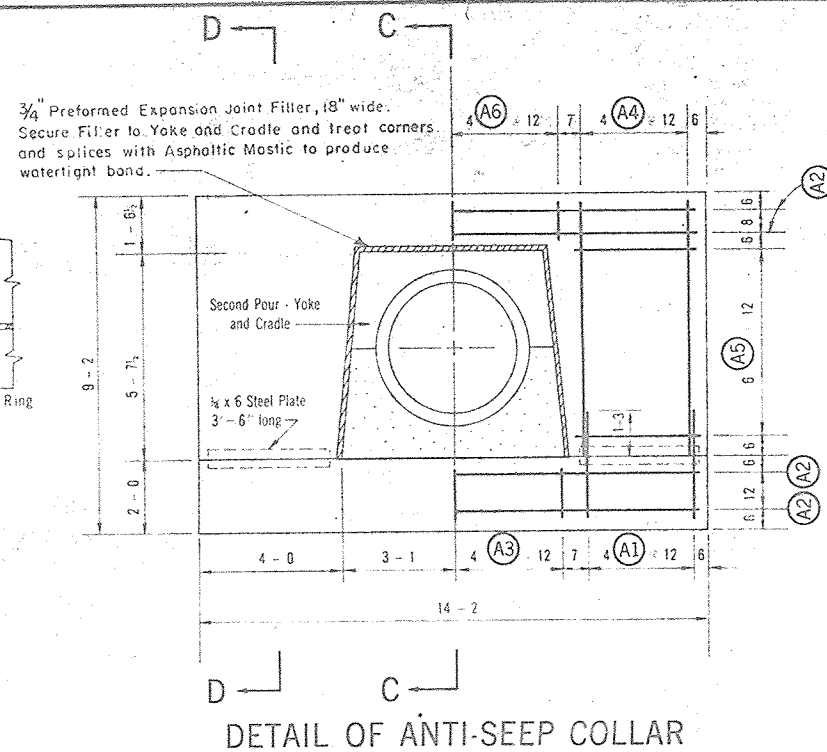
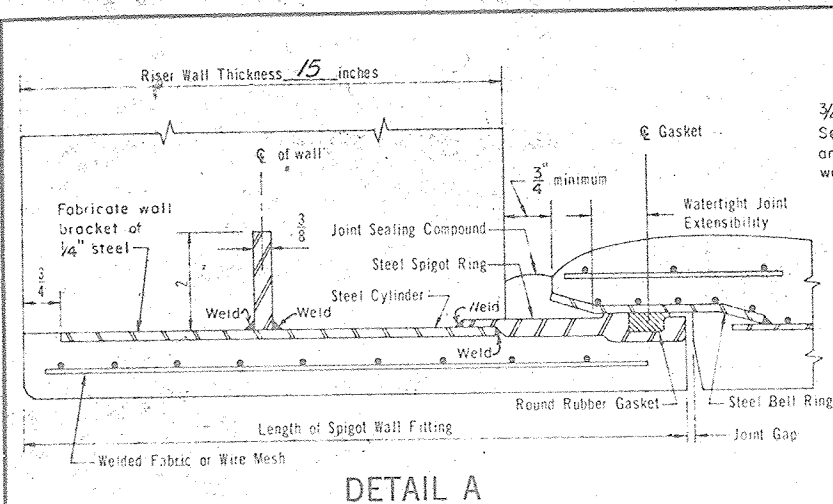
NOTE: SEE SHEET 2 FOR GRAVEL GRADATION AND PLACEMENT REQUIREMENTS.

# CHANNEL SECTIONS

SECTIONS ARE SHOWN LOOKING UPSTREAM

*As Built Plans 6-17-82 JJB*

CHANNEL SECTIONS			
SANDERSON CANYON CHANNEL WORK			
SANDERSON CANYON WATERSHED			
IN			
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS			
U.S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
DESIGNED	L. D. M.	DATE	4-80
DRAWN	L. D. M.	DATE	4-80
TRACED	W. H. D.	DATE	4-80
CHECKED	R. L. K.	DATE	5-80
TITLE		STATE CONSERVATION ENGINEER'S OFFICE	
SHEET		DRAWING NO.	
No 6		TX-EN-0029	



STEEL SCHEDULE						
Anti-seep Collar and Yoke, <i>12</i> Required.						
Mark	Size	Quantity per Collar	Length	Type	Total Quantity	Total Length
A1	4	8	3 - 0	1	<i>96</i>	<i>288' 0"</i>
A2	4	4	13 - 8	1	<i>48</i>	<i>656' 0"</i>
A3	4	7	1 - 6	1	<i>84</i>	<i>126' 0"</i>
A4	4	8	6 - 11	1	<i>96</i>	<i>664' 0"</i>
A5	4	12	3 - 6	1	<i>144</i>	<i>504' 0"</i>
A6	4	7	1 - 0	1	<i>84</i>	<i>84' 0"</i>
Y1	4	12	6 - 6	21	<i>144</i>	<i>936' 0"</i>
Y2	4	18	1 - 2	1	<i>216</i>	<i>252' 0"</i>
Total						<i>3510'</i>

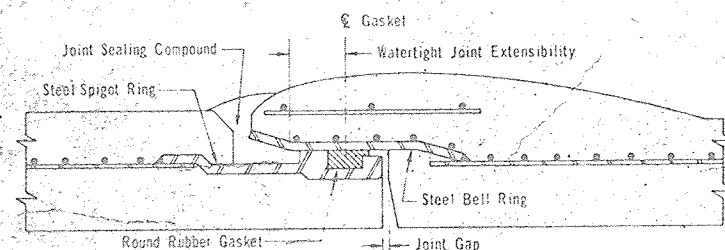
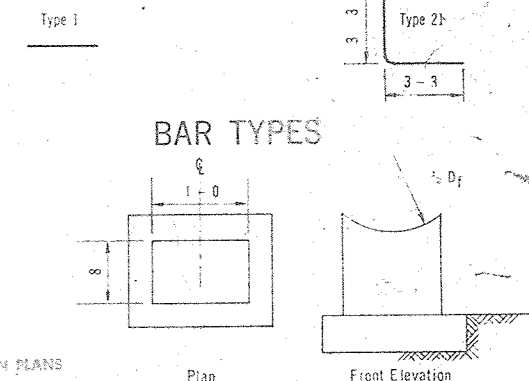
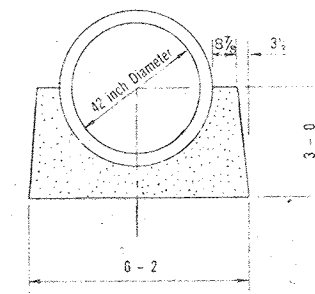
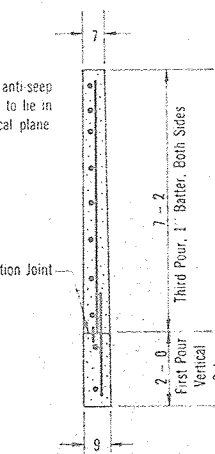
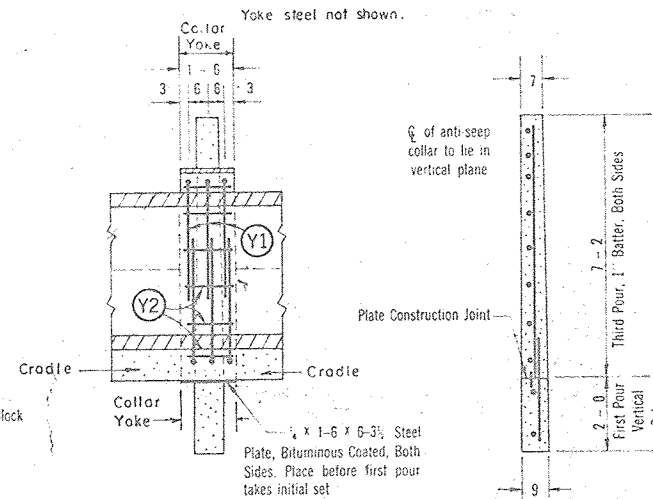
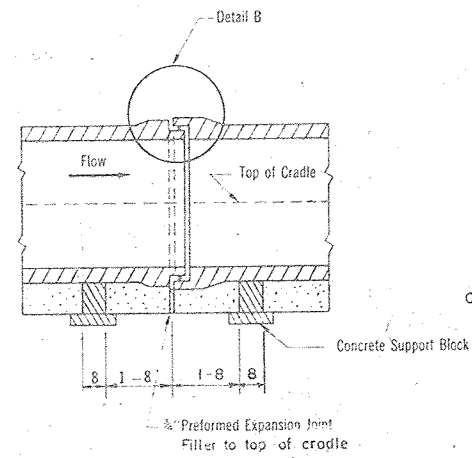
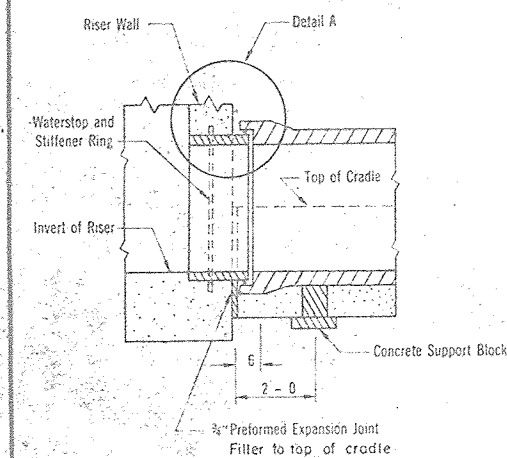
QUANTITIES		
Concrete		Cu. Yds.
Anti-seep Collar including Yoke		
* Each		<u>3.514</u>
Total <u>12</u> Collars		<u>42.168</u>
Cradle		
** Per Lineal Foot of Cradle		<u>0.4078</u>
Total <u>(384 lin. ft. less 18 lin. ft. in yokes)</u>		<u>159.2548</u>
Steel		Pounds
Anti-seep Collar including Yoke, 1 Collor		<u>195.39</u>
Total <u>12</u> Collors		<u>2344.08</u>

Concrete quantities are based on an outside diameter of pipe of 49 1/4 inches.  
Steel quantities do not change with outside diameter of pipe.

\* This quantity is given by  
 $4.249 - 0.003303(D_f)^2$  cu. yds.

\*\* This quantity is given by  
 $0.6528 - 0.000101(D_f)^2$  cu. yds.

$D_f$  = outside diameter of pipe furnished, inches.



JOINT REQUIREMENTS			
Length of Pipe Section	Minimum Joint Length	Minimum Joint Limiting Angle	
feet	inches	radians	degrees
16	2 1/2	0.0157	0° - 54°

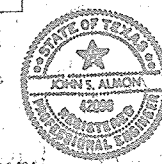
For pipe length other than shown, joint requirements will be determined by the Engineer.

Where pipes of different length are connected, adjoining pipes shall meet the requirements of the longer pipe.

Prior to delivery of pipe, the pipe joint detail proposed for use shall be submitted to the Engineer for approval.

STRENGTH REQUIREMENTS				
Inside Diameter of Pipe		Internal Load	External Load	
			Minimum 3-Edge Bearing Strength in Pounds per Lineal Foot of Pipe	
			Applicable Standard Specification	
			AWWA C-301	AWWA C-300
inches	feet	Head of Water	Load to produce 0.001 inch crack one foot long	Load to produce 0.01 inch crack one foot long
42	50		10,500	

The outside diameter of pipe assumed in design is 49 1/4 inches. Where the pipe furnished has an outside diameter greater than assumed in design, the three-edge bearing strength of the pipe furnished must not be less than the specified three-edge bearing strength multiplied by the ratio of the outside diameter of the pipe furnished to the outside diameter assumed in design.

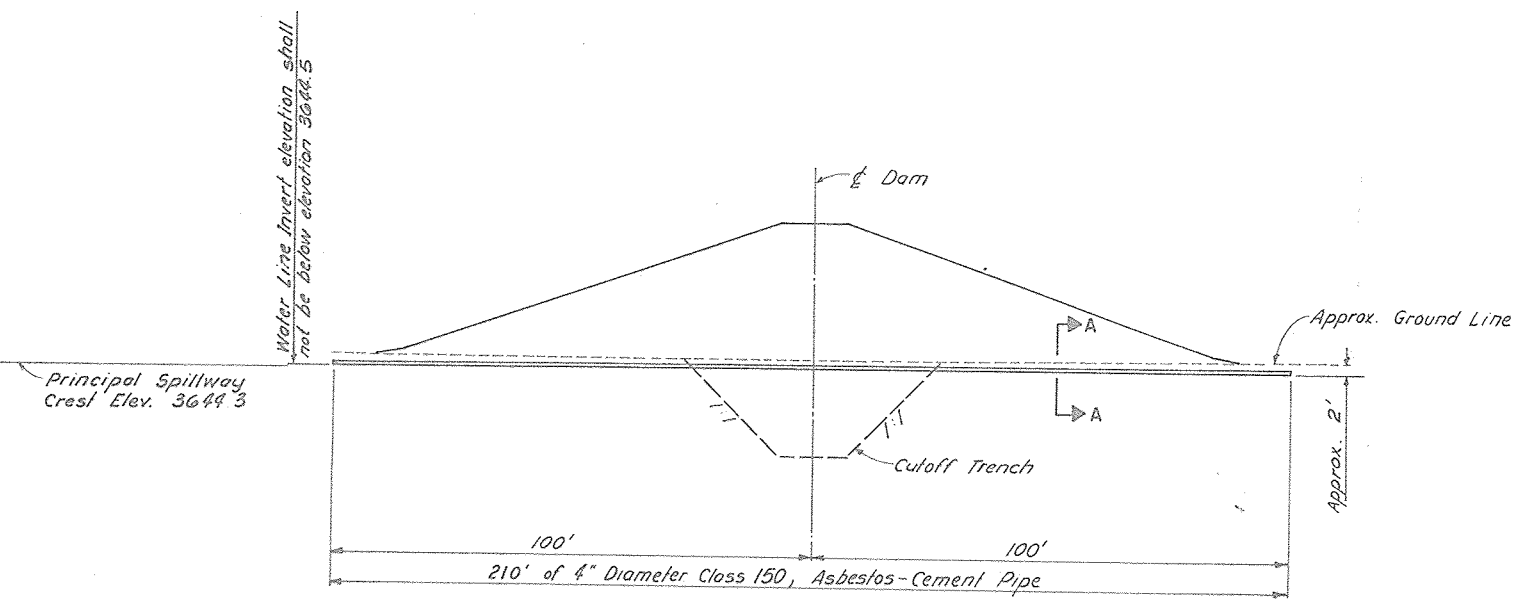


REPRINTED W/MINOR REVISIONS. BY SC5 - 6/84

## SUGGESTED SUPPORT BLOCKS

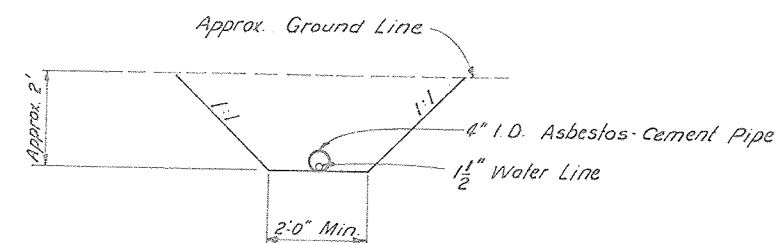
Sufficient blocks shall be provided to support the pipe to the required line and grade. The Contractor shall determine the number and size of blocks required. Wedges may be used as an alternate. (See Construction Spec. 41)

PIPE DETAILS FLOODWATER RETARDING STRUCTURE SITE NO. 1 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	
J. S. Almon	10/79	<i>J.S.A.</i> STATE CONSERVATION ENGINEER'S TENURE SEAL	
Drawn			
G. Ovalle	10/79	<i>John S. Almon, P.E.</i> Benham-Blair & Associates, Inc.	
Traced			
Checked			
J. S. Almon	10/79	Sheet	Drawing No.
		No. 8	
		of 2	4-E-36-850



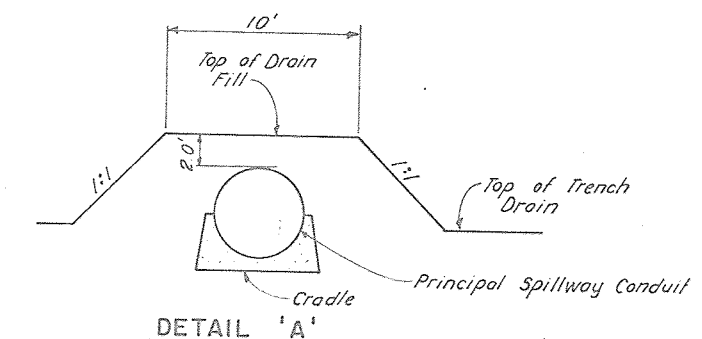
Note:  
The existing 1" waterline shall be removed and replaced with a 1 1/2" waterline through the 4" Asbestos-Cement pipe.  
The upstream and downstream ends of the Asbestos-Cement pipe shall be sealed with packing glands at the upstream & downstream ends.

**SECTION**  
**ENCASEMENT PIPE FOR WATERLINE**  
(APPROX. STA. 14+00 @ DAM)



Note:  
All Asbestos-Cement Pipe and Couplings shall be Class 150, Pressure Pipe and shall conform to the requirements of Materials Specification 545.  
The installation of the pipe shall be with ordinary bedding that provides uniform and continuous bedding contact throughout the entire line. Joining shall be in accordance with the manufacturers recommendations. Backfill and compaction shall be as specified in Construction Specification 23A.

**SECTION A - A**



Note:  
Drain fill shall not be dropped more than 5 feet vertically unless a tremie or other equivalent means is used to prevent segregation.

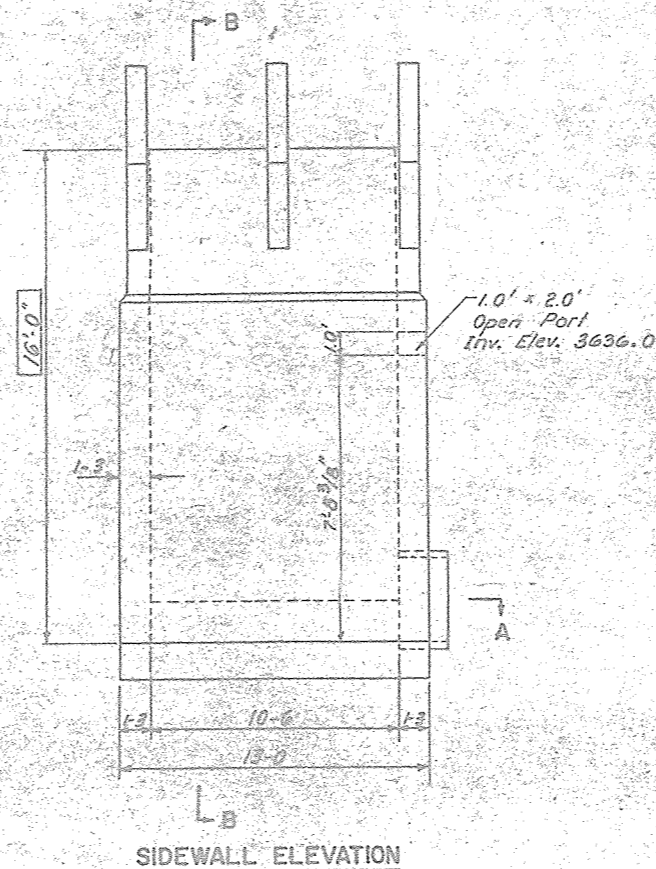
NO CHANGE IN PLANS

AS-BUILT PLANS  
CONSTRUCTION  
COMPLETED 10/3/86  
124



REPRINTED W/MINOR REVISIONS BY SCS - 6/84

WATER LINE ENCASEMENT AND TRENCH DRAIN DETAILS FLOODWATER RETARDING STRUCTURE SITE NO. 1 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
DESIGNED BY J. S. Almon	DATE 10/79	APPROVED BY <i>[Signature]</i>	TITLE STATE CONSULTATION ENGINEER'S 'E' & 'C' - TERRELL, TEXAS
DRAWN BY G. Ovalle	DATE 10/79	TITLE Benham-Blair & Associates, Inc.	
CHECKED BY J. S. Almon	DATE 10/79	SHEET No. 9 of 21	DRAWING NO. 4-E-36,850



R1	G	20	7:11"	1	-	-	158:4°
R2	G	8	7:11"	1	-	-	63:4"
R3	G	26	5:6"	1	-	-	143:0"
R4	G	12	5:6"	1	-	-	66:0°
R5	S	4	11:6	1	-	-	46:0°
R6	G	2	4:6	1	-	-	9:0°
R7	S	8	10:10	2	3-8	7-2	86:8"
R8	S	16	11:2	1	-	-	178-8"
R9	G	10	4:6	1	-	-	45-0
R10	S	28	10:10	2	3-8	7-2	303-4
R11	G	26	4-4	1	-	-	112-8
R12	G	8	4-4	1	-	-	34-8
R13	S	4	10-4	2	3-5	6-1	41-4

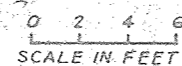
STEEL

#5 BARS	2153' 8"	2240.3	LBS
#6 BARS	2042' 4"	3067.6	LBS
#8 BARS	552-0	1474	LBS
		6787.9	LBS

$$\text{CONCRETE} = 32.76 + 1.53 V = \boxed{34.29} \text{ CU.YDS.}$$

LENGTH OF #5 BARS = (2021 - 0.) + (LENGTH OF BARS R5 & R7)  
LENGTH OF #6 BARS = (1602 - 8) + (LENGTH OF BARS R1 THROUGH R4 & R6)

STANDARD OPEN RISER	
STANDARD DWG. NO. ES-3142-2020 R	
DATE 4-67	SHEET 1 OF 4
ADAPTED FROM	
STANDARD COVERED RISER	
DESIGN CONSTANTS $f_c = 4000 \text{ psi}$ $f_c = 1600 \text{ psi}$ $n = 8$ $f_s = 20,000 \text{ psi}$	
STANDARD DWG. NO. ES-3042-2520 R	
DATE 8-66	SHEET 1 OF 4



NO CHANGE IN PLANS

AC-BUILT PLANS  
CONSTRUCTION  
COMPLETED 10/1



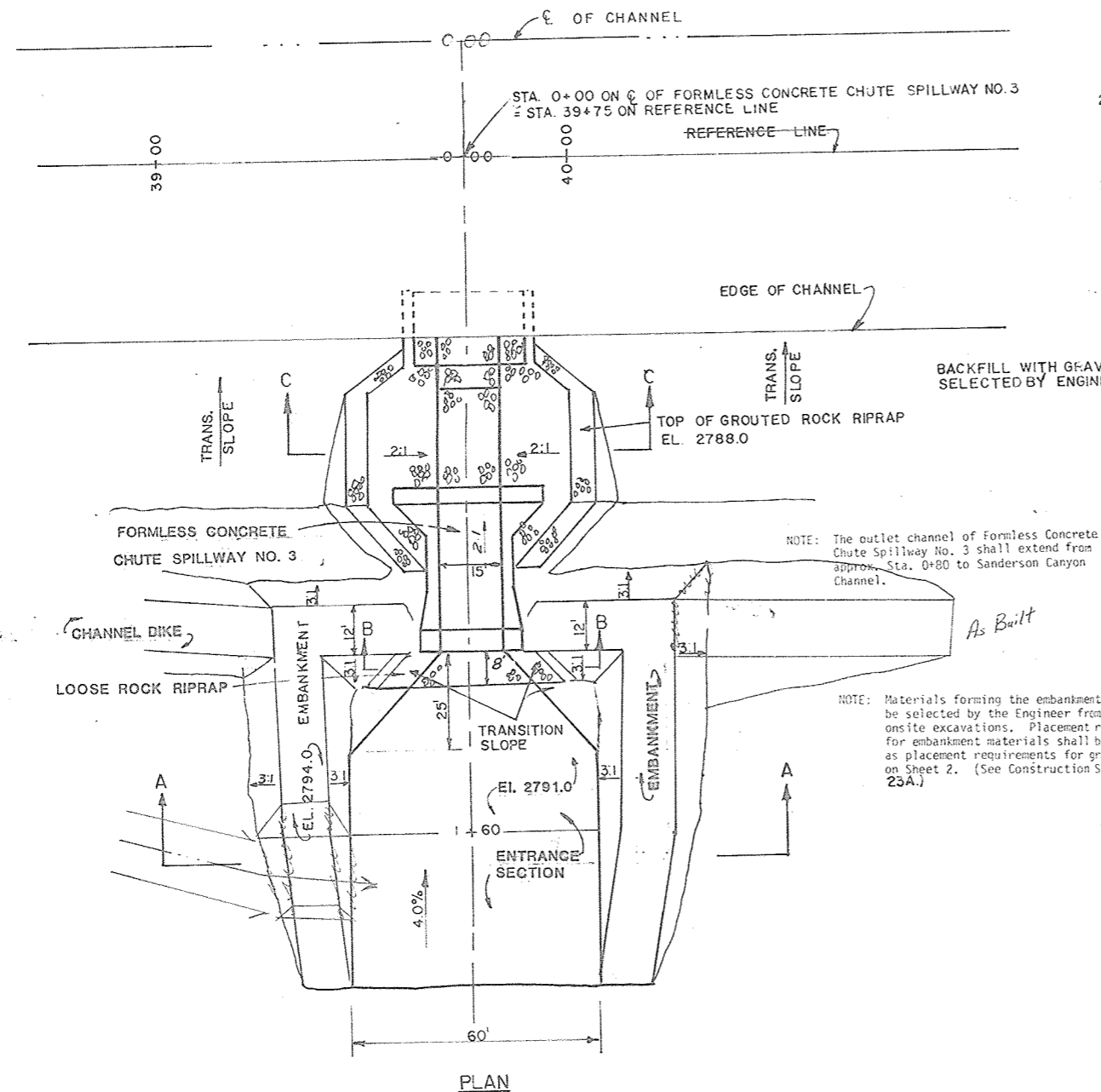
REPRINTED W/MINOR REVISIONS BY SCS - 6/84

PRINCIPAL SPILLWAY INLET  
FLOODWATER RETARDING STRUCTURE SITE NO. 1  
SANDERSON CANYON WATERSHED

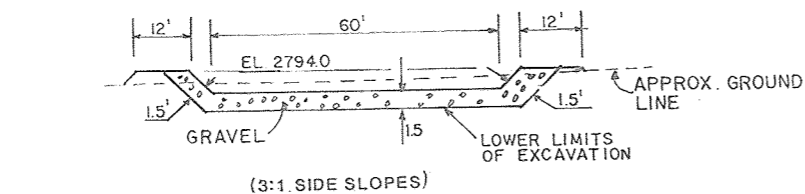
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

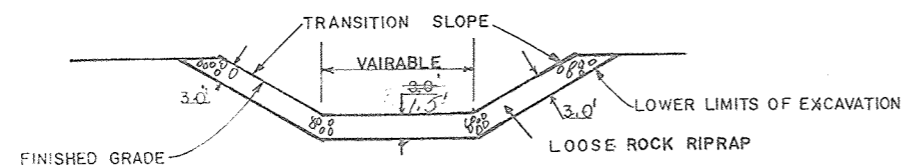
	Date	Approved by
Designed	J. S. Almon 10/79	<i>[Signature]</i> SPECIAL AGENT IN CHARGE
		Title: 750525-121
Drawn	G. Ovalle 10/79	<i>[Signature]</i> SPECIAL AGENT IN CHARGE
		Title: Benham-Blair & Affiliates, Inc.
Traced		
		Sheet _____ Drawing No _____
		No 10 _____
Created	J. S. Almon 10/79	4-E-36,850



FORMLESS CONCRETE CHUTE SPILLWAY NO. 3



SECTION A-A

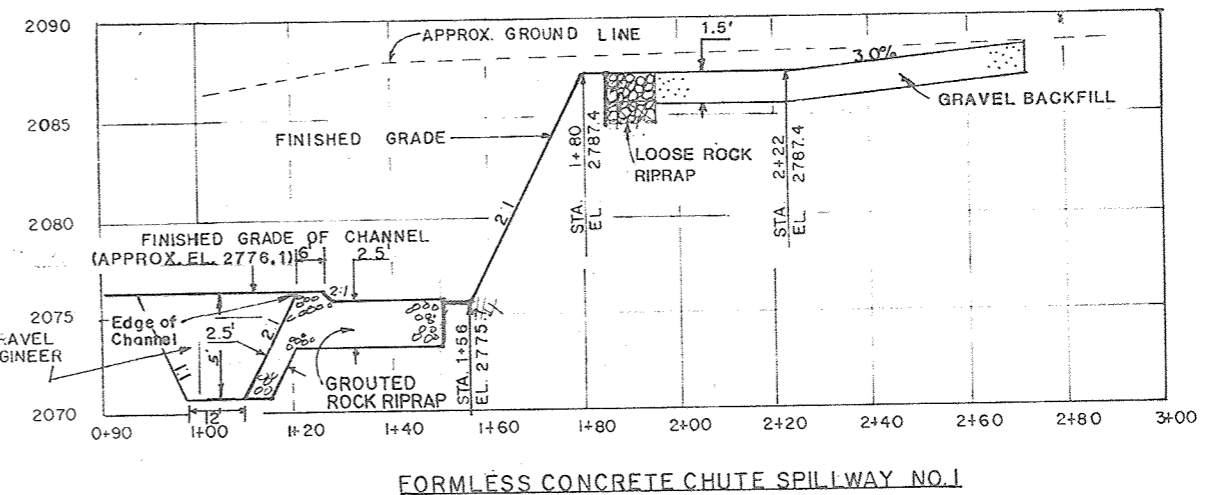


SECTION B-B

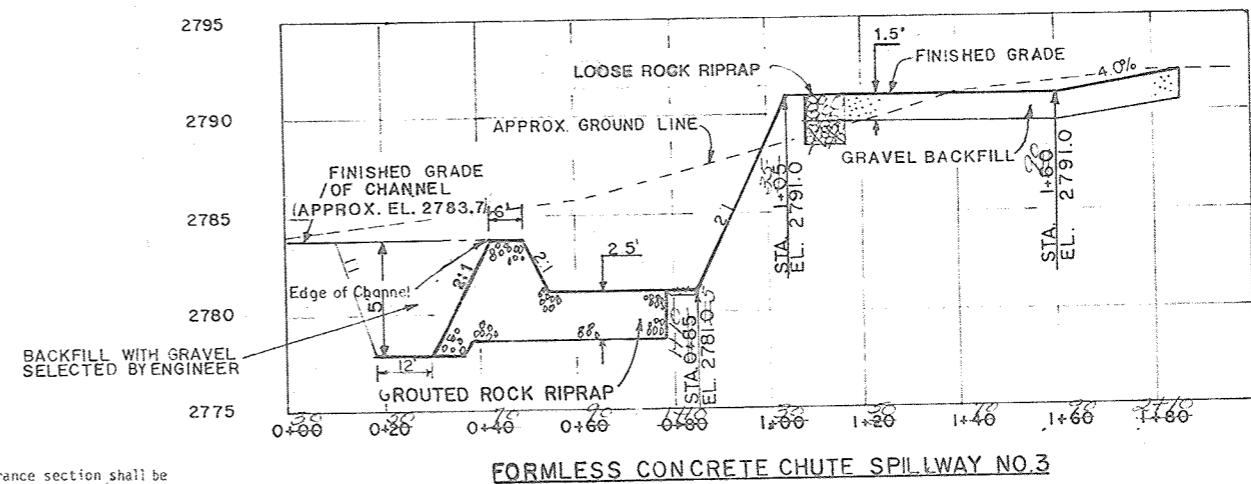
(APPLIES TO FORMLESS CONCRETE CHUTE SPILLWAYS NO. 1 AND NO. 2)

NOTE: Materials forming the embankment shall be selected by the Engineer from required onsite excavations. Placement requirements for embankment materials shall be the same as placement requirements for gravel as shown on Sheet 2. (See Construction Specification 23A.)

NOTE: The entrance section shall be overexcavated 1.5 ft. and backfilled with gravel as shown to the left. See Sheet 2 for gravel gradation and placement requirements. (See Construction Specification 23A.)

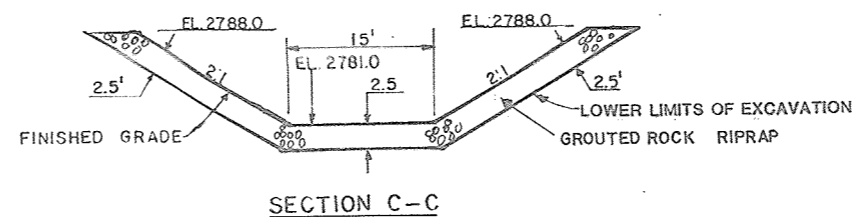


FORMLESS CONCRETE CHUTE SPILLWAY NO. 1



FORMLESS CONCRETE CHUTE SPILLWAY NO. 3

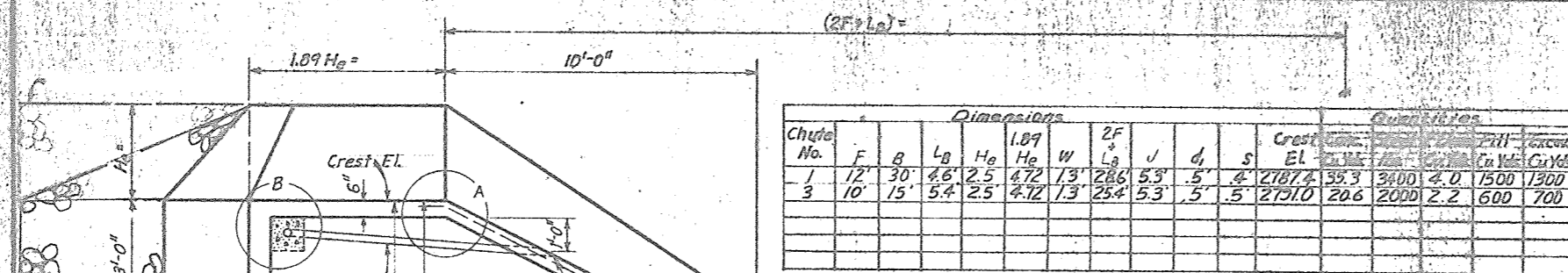
# PROFILES



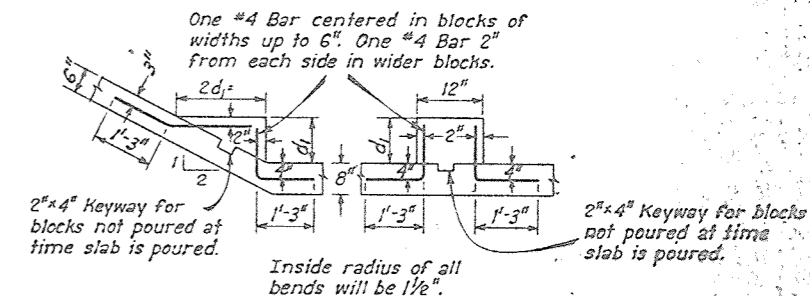
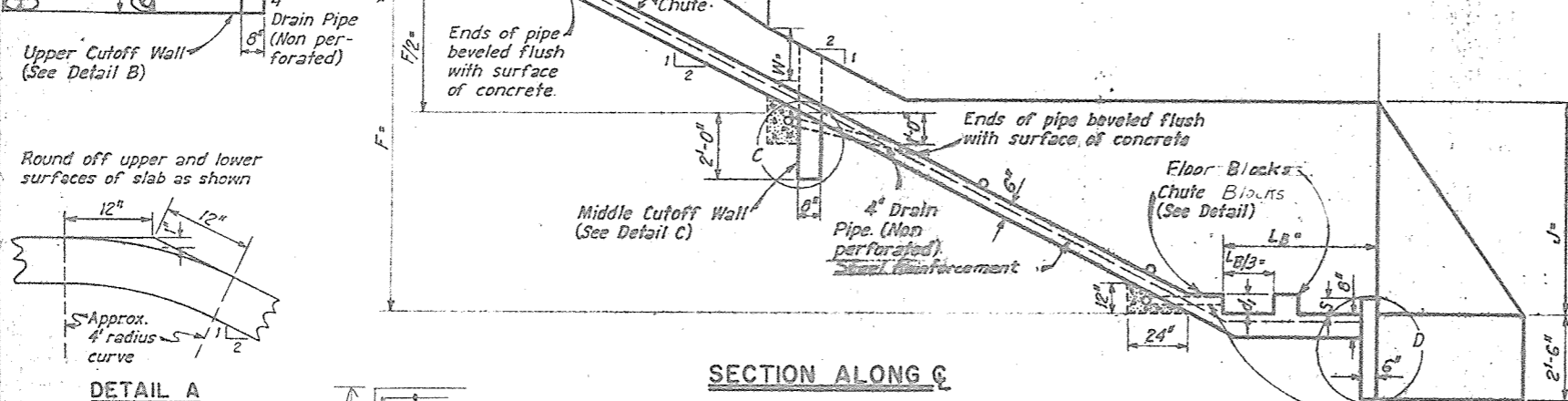
SECTION C-C

*As Built Plans 6-17-82 772*

FORMLESS CONCRETE CHUTE SPILLWAY NO. 3			
SANDERSON CANYON CHANNEL WORK			
SANDERSON CANYON WATERSHED			
IN			
BREWSTER, PECOS, AND TERRELL COUNTIES-TEXAS			
U.S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
DESIGNED	L. D. M.	DATE	4-80
DRAWN	L. D. M.	DATE	4-80
TRACED	W. H. D.	DATE	4-80
CHECKED	R. L. K.	DATE	5-80
SHEET			10
DRAWING NO.			TX-EN-0029

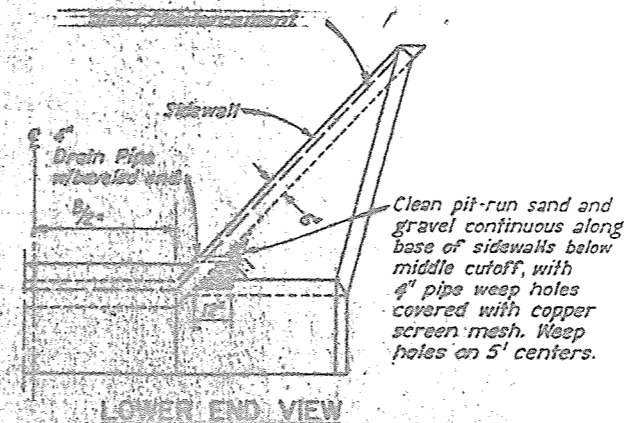
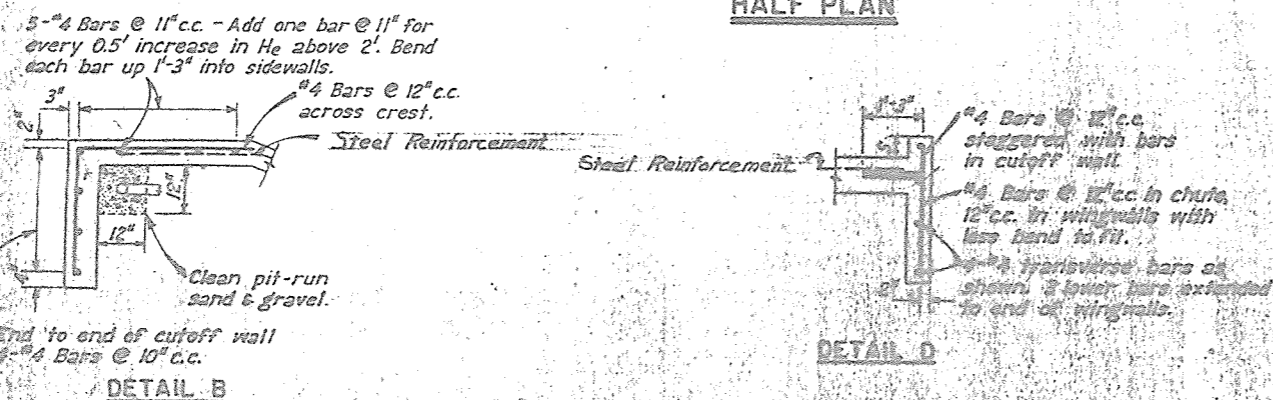
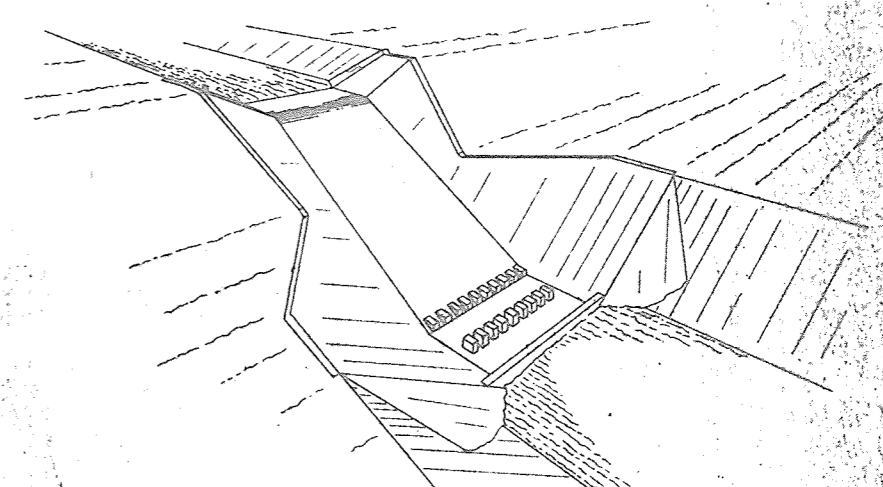
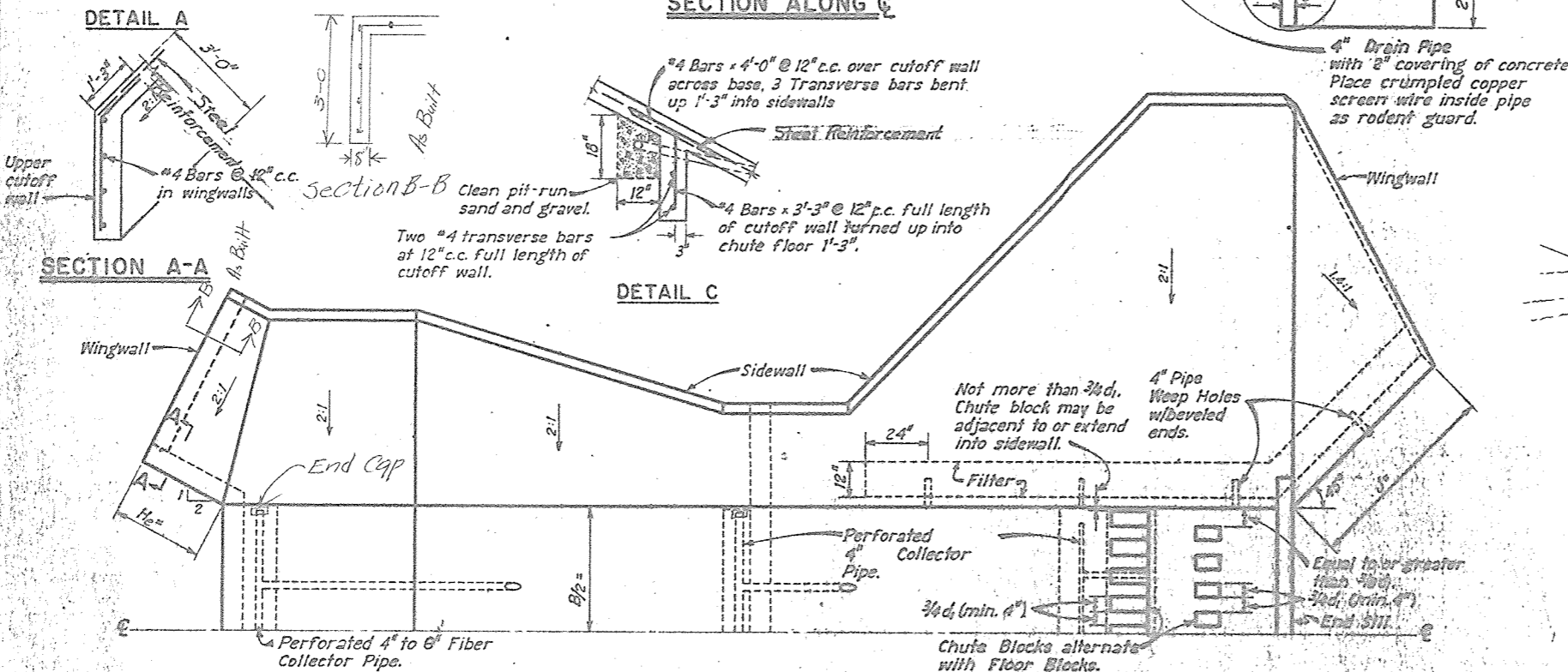


- NOTES
- Concrete for the Formless Concrete Chute Spillway(s) shall have a wood float or striking board finish. All concrete shall equal or exceed Class 4000.
  - Unless otherwise shown on the drawings, steel reinforcement for the entire chute shall be No. 4 bars at 12" c.c. each way, placed 3" from the bottom of the concrete.
  - Cutting and bending of the steel reinforcement may be done on the site as steel reinforcement is placed.
  - No premod joints are required. Construction joints as may be required during the placement of the chute shall be "cold" unkeyed joints.



### CHUTE BLOCK DETAIL FLOOR BLOCK DETAIL

- NOTES
- Floor and chute blocks should be poured at time slab is poured.
  - Floor blocks must occupy from 40% to 55% of the stilling basin width at the location of the floor blocks.
  - An ALTERNATE procedure may be used as follows:
    - Blocks to be formed and poured after the slab is poured.
    - Steel from the slab to be turned up for use in the floor and chute blocks prior to forming for the blocks.



As Built Plans 6-17-82 99B

### FORMLESS CONCRETE CHUTE SPILLWAY STRUCTURE DETAILS

SANDERSON CANYON CHANNEL WORK  
SANDERSON CANYON WATERSHED

IN BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS

### U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Designed: L. D. M.	Date: 4-80	
Drawn: L. D. M.	Date: 4-80	
Traced: W. H. D.	Date: 4-80	
Checked: B. L. K.	Date: 5-80	
Sheet 11		Drawing No. TX-EN-0029