

FLOODWATER RETARDING DAM NO. 10 SANDERSON CANYON WATERSHED PROJECT BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

DRAINAGE AREA 3036 ACRES
 TOTAL STORAGE 929 AC. FT.
 HEIGHT OF DAM 56 FEET
 VOLUME OF FILL -484,118 CU. YDS.
 440,561

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
 1979

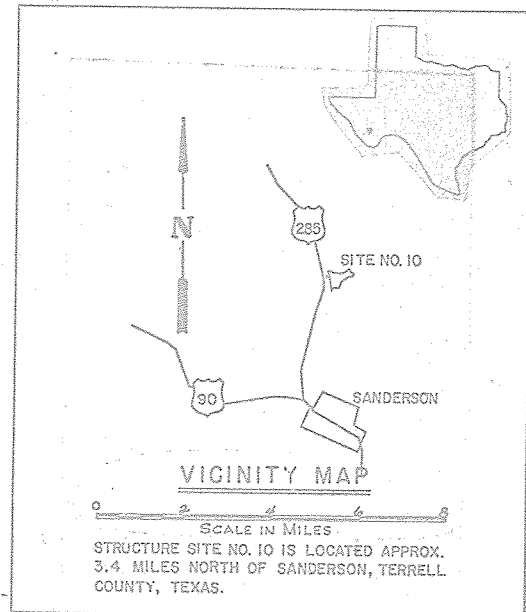
Contractor;
 J.D. Abrams Inc.
 Contract number and date;
 50-7442-9-674, 6-19-79
 Government representative;
 Johnnie J. Bohuslav
 Inspector;
 Cyril W. Hamilton
 Construction Commenced 7-21-79
 Bid Price \$1,680,795.06
 Final Price \$1,699,738.42
 Construction Completed 6-25-80

Approved by: [Signature]
 HEAD ENGINEERING STAFF SCS
 FT. WORTH, TEXAS
 DATE: 4-17-79

CONSULTATION DRAWINGS APPROVED
 [Signature]
 STATE CONSERVATION ENGINEER SCS
 TEMPLE, TEXAS
 DATE: 4-17-79

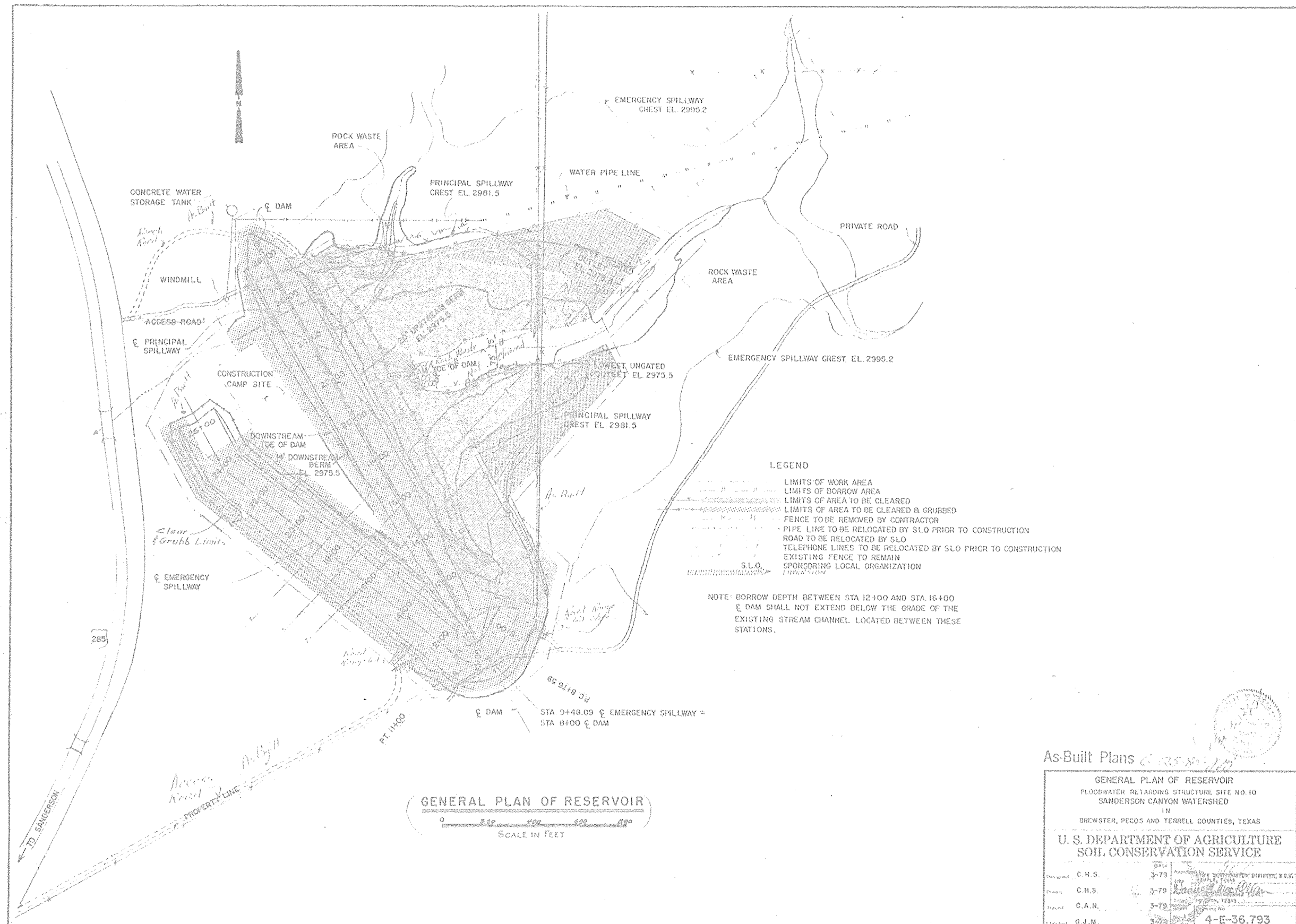
[Signature]
 BLOM ENGINEERING CORP.
 HOUSTON, TEXAS
 DATE: 4/12/79

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SHEET NO.	TITLE
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2	Plan of Embankment and Spillways
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16	Principal Spillway Inlet Scour Apron
17	Port Trash Rack
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BLOM ENGINEERING CORPORATION
 HOUSTON, TEXAS

4-E-36,793



EMERGENCY SPILLWAY CURVE DATA

Δ=100°
D=44.76'
R=128.00'
L=223.41'
PC=8+76.59
PT=11+00

PRIVATE ROAD TO
BE RELOCATED BY
S.L.O.

P.R.M. #2
EL. 3000.57
Destroyed

12' Bench
El. 3020.0

PERMANENT
REFERENCE
MARKER
Sta. 0+100
El. 3009.60
DAM

STA. 9+48.09 E
EMERGENCY
SPILLWAY
STA. 8+00
DAM

ELEVATION	SURFACE ACRES	CAPACITY ACRE FEET	INCHES
2956.0	0	0	0.00
2960.0	1	2	0.01
2964.0	2	9	0.04
2968.0	6	25	0.10
2972.0	10	57	0.23
2975.5	16	104	0.41
2976.7	18	119	0.47
2981.5	29	235	0.93
2982.4	31	261	1.03
2984.0	36	316	1.25
2988.0	48	484	1.97
2992.0	64	707	2.80
2995.2	76	929	3.67
2996.0	80	993	3.93
3000.0	99	1351	5.34
3004.0	117	1782	7.04
3008.0	135	2284	9.03
3009.0	140	2441	9.65

Drainage Area, Acres	3036
Top of Dam (effective) El.	3009.0
Emergency Spillway Crest El.	2995.2
Principal Spillway Crest El.	2981.5
Lowest Ungated Outlet El.	2975.5
Sediment Capacity, Acre Feet	261
Floodwater Capacity, Acre Feet	668
Maximum Emergency Spillway Capacity, cubic feet/second	24,300
Principal Spillway Capacity, 0 El. 2995.2, cubic feet/second	123

1/ 50 yr. Submerged Sediment
2/ 100 yr. Submerged Sediment

EMERGENCY SPILLWAY

PLAN OF EMBANKMENT AND SPILLWAYS

SCALE IN FEET

NOTE: SHOULD THE CONTRACTOR ELECT TO CONSTRUCT A
RAMP ON THE RIGHT ABUTMENT, THE SIDE SLOPES
SHALL HAVE A MINIMUM 1.0 FT. THICK ROCK BLANKET
AND GRAVEL SHALL BE PLACED ON THE CROWN, THE
RAMP SHALL REMAIN IN PLACE AFTER COMPLETION
OF THE CONTRACT.

LEGEND

- EXISTING FENCE TO REMAIN
- FENCE TO BE REMOVED BY CONTRACTOR
- ROAD TO BE RELOCATED BY S.L.O.
- TELEPHONE LINES TO BE RELOCATED BY S.L.O. PRIOR
TO CONSTRUCTION
- S.L.O. SPONSORING LOCAL ORGANIZATION.

As-Built Plans

6-25-80 925

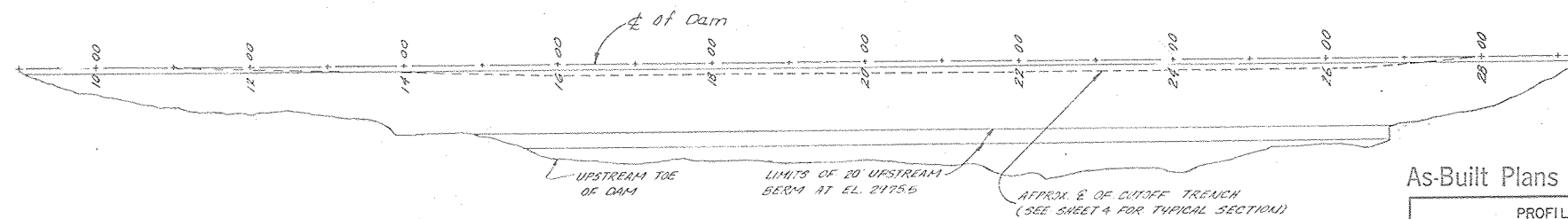
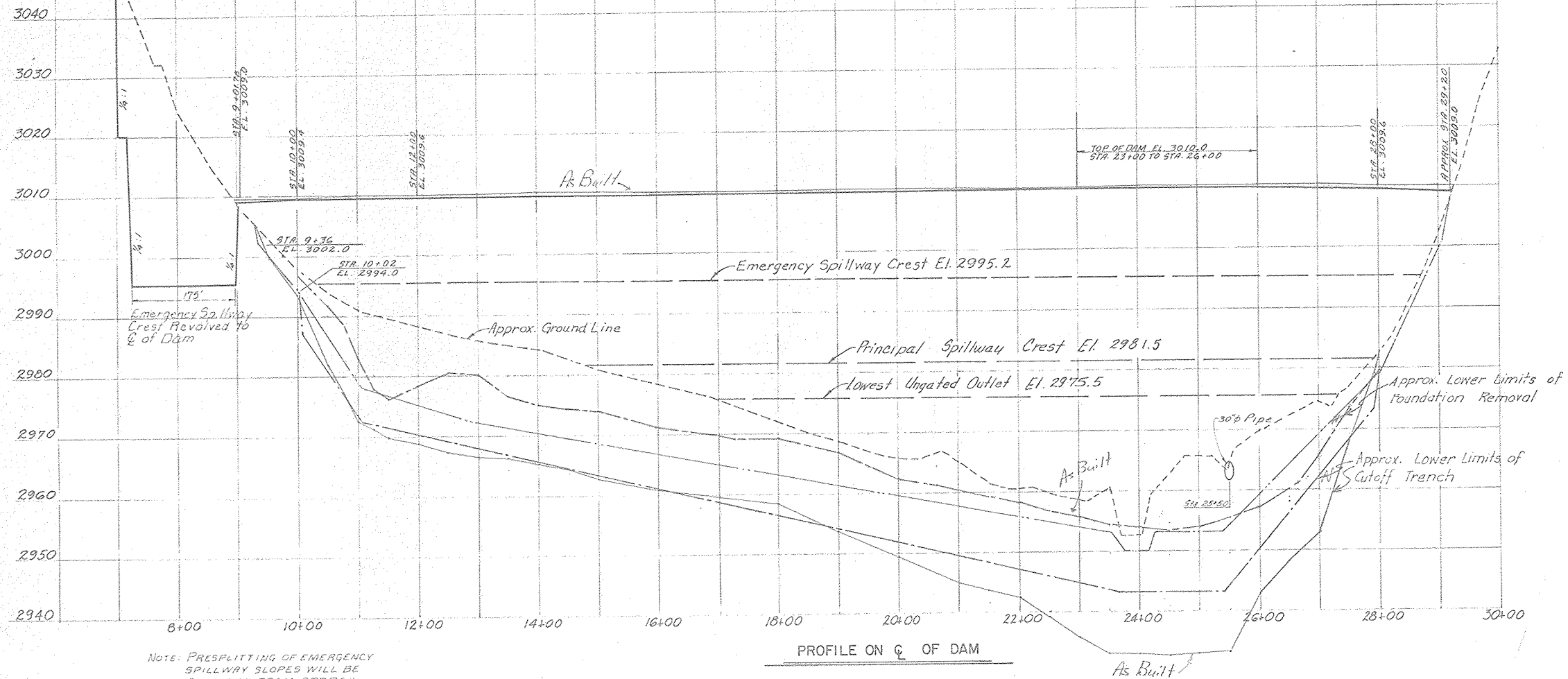
PLAN OF EMBANKMENT AND SPILLWAYS
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	C.H.S.	3-79	Approved by	CONSTRUCTION ENGINEER, DIST.	3-79
Drawn	C.H.S.	3-79	Checked	CONSTRUCTION ENGINEER, DIST.	3-79
Field	C.A.N.	3-79	Field	CONSTRUCTION ENGINEER, DIST.	3-79
Checked	G.J.M.	3-79	Checked	CONSTRUCTION ENGINEER, DIST.	3-79

4-E-36,793

SCS-ENG-313-C Rev. 12-72

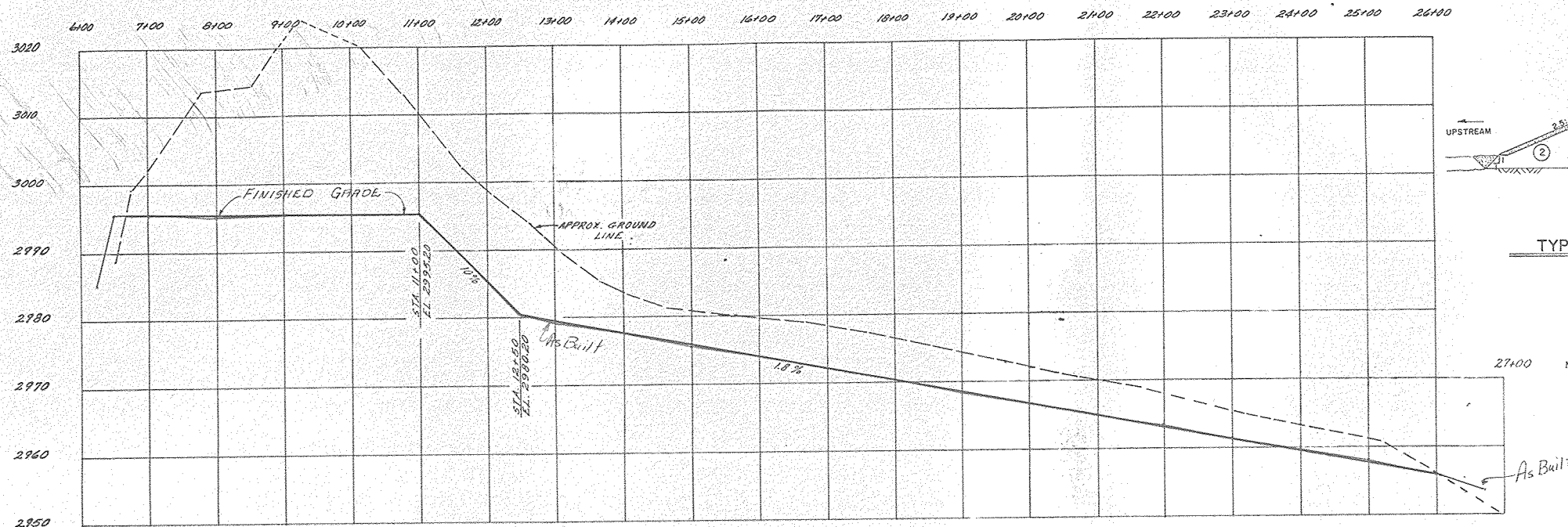


PLAN OF CUTOFF TRENCH

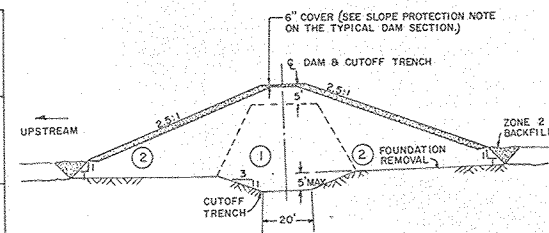
NOTE: THE LOCATION OF THE CUTOFF TRENCH MAY BE ALTERED BY THE ENGINEER IN THE FIELD

As-Built Plans 6-25-80 97B

PROFILE ON \bar{C} OF DAM			
FLOODWATER RETARDING STRUCTURE SITE NO. 10			
SANDERSON CANYON WATERSHED			
IN			
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	C.H.S.	Date	3-79
Drawn	C.H.S.	Approved by	State Engineer, Texas
Traced	C.A.N.	Checked by	State Engineer, Texas
Checked	G.J.M.	Sheet	No. 3 of 23
Drawing No.			4-E-36,793



PROFILE ON C OF EMERGENCY SPILLWAY
SEE SHT. 5 FOR TYP. CROSS SECTIONS OF SPILLWAY



TYPICAL ABUTMENT SECTION

NOTE: THE INITIAL LAYER OF CORE MATERIAL PLACED AGAINST ROCK ABUTMENTS SHALL BE PLACED AT $\pm 3\%$ WET OF OPTIMUM.

NOTE: TRANSITIONS IN CUTOFF TRENCH BOTTOM WIDTH SHALL BE STAKED BY ENGINEER.

ZONED EMBANKMENT DATA

- The zone boundaries shown in the typical section are approximate. They may be varied as permitted by the Engineer, to allow the use of all suitable and needed materials from the required excavations.
- Rock shall be reasonably well graded from a maximum particle size of 30" down to the 6" size with not less than 50% by weight larger than 12". Sizing of oversized rock materials from the required excavations to meet the specified gradation will be required.

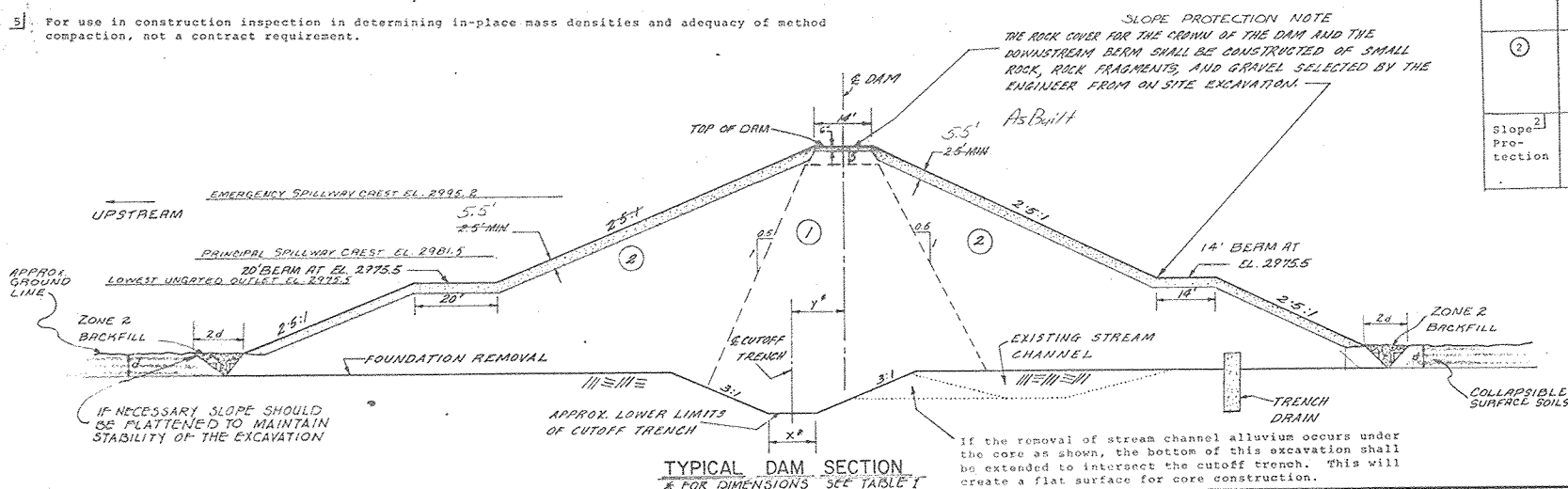
Durable rock and rock fragments (max. dimension 30 in.) from rock excavation and separated from other required excavations, shall be placed in riprap sections and in the plunge basin at the outfall of the principal spillway. No special compaction or moisture control will be required. The rock shall be spread in approximately horizontal layers not more than 3 ft. in thickness. The rock shall be placed so that the completed fill shall have the smaller rock fragments in the inner portion of the riprap sections and the larger rock fragments on the outer slopes. The rock and rock fragments shall be placed in a manner that will produce a stable fill that contains no large unfilled spaces caused by bridging of the larger fractions. (See Construction Specification 23A.)

- Class "C" compaction shall be accomplished by a minimum of 4 complete passes per layer of tamping roller weighing not less than 1200 pounds per foot of roller width at a towing or traveling speed of 2 mph or greater.
- Less gravelly materials shall be used in Zone 1 or Zone 2. Only more gravelly materials shall be used in Zone 2.
- For use in construction inspection in determining in-place mass densities and adequacy of method compaction, not a contract requirement.

TABLE 1

Station	Dam C to E Cutoff Trench		Cutoff Trench Width	
	Y	X	Y	X
9+50	0'	20'	0'	20'
11+00	0'	20'	0'	20'
16+00	13'	12'	13'	12'
27+50	13'	12'	13'	12'
28+00	0'	20'	0'	20'

NOTE: Trench widths and offsets vary uniformly between stations.



TYPICAL DAM SECTION
* FOR DIMENSIONS SEE TABLE 1

MATERIALS PLACEMENT DATA

Embankment Zone	Unified Classification and Type	ASTM Test		Max. Allowable Particle Size	Max. Uncompacted Layer Thickness	Specified Compaction Classification	Min. Dry Density Percent of Field Test	Moisture Limits Relative to Field Test Optimum	
		Number	Method					From	To
①	CL; clay, sandy clay, gravelly clay	D-698	C	6"	9"	A	95	Opt.	Up
②	SC; clayey sand, gravelly clayey sand	D-698	C	6"	9"	A	95	Opt.	Up
③	SC; clayey sand, gravelly clayey sand	D-698 Moisture Only	C	6"	9"	C ³	95	-1%	Up
④	GC; clayey gravel, sandy clayey gravel	D-698 Moisture Only	C	6"	9"	C ³	95	-1%	Up
Slope Protection	Limestone rock, cobbles, boulders	---	---	2'	2'	---	---	---	---

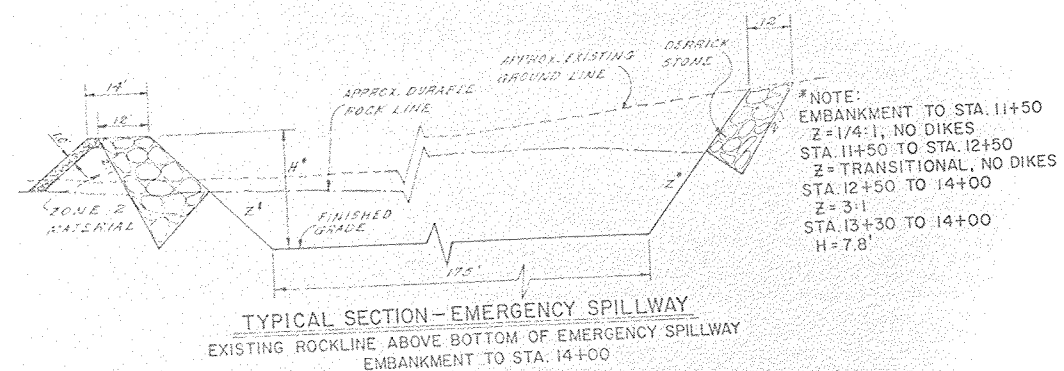
PROFILE AND SECTIONS
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

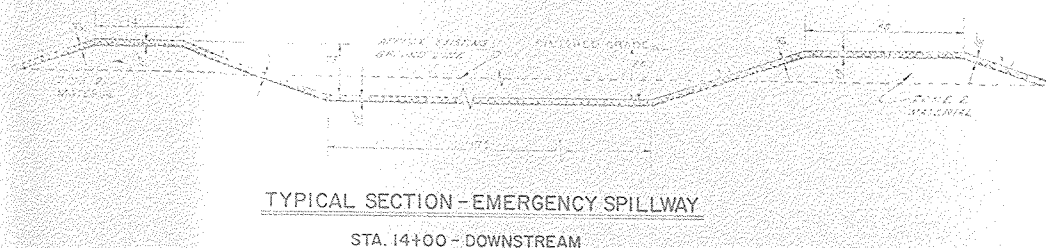
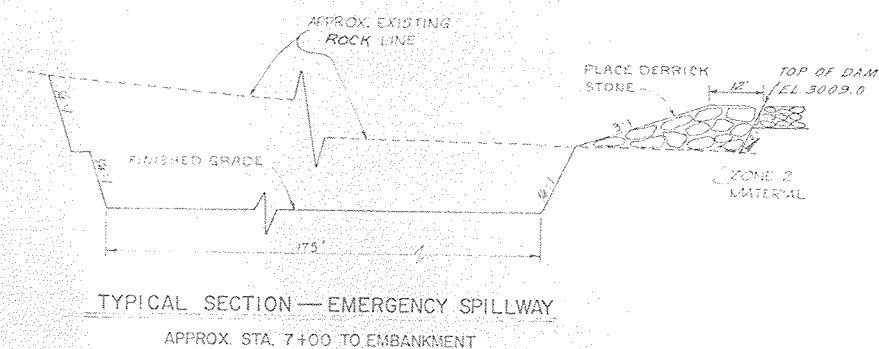
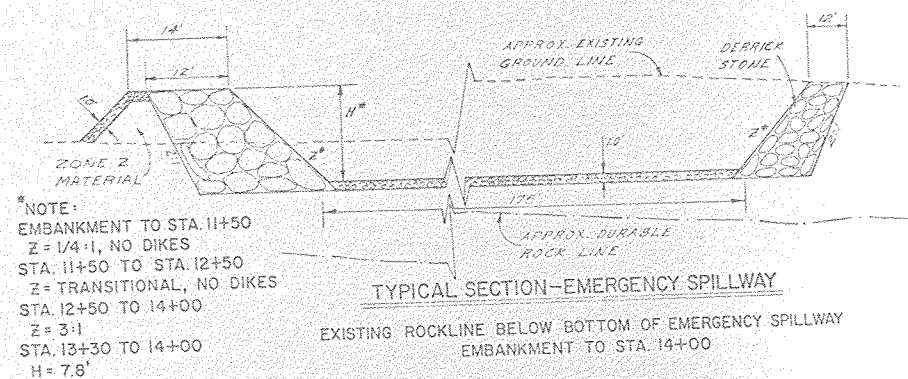
As-Built Plans
6-25-80 JTB

Designed... C.H.S. 3-79
Drawn... C.H.S. 3-79
Traced... C.A.N. 3-79
Checked... G.J.M. 3-79

Approved by... [Signature]
Title... [Signature]
Sheet No. 4
Drawing No. 4-E-36,793



DERRICK STONE SHALL ONLY BE PLACED WHERE EMERGENCY SPILLWAY EXCAVATION OCCURS IN SOIL.



- NOTES:**
1. The rock mass for the rock tunnel shall be harvested or produced in such a way that it will have (1) full stone weights ranging from 100 to 1,000 pounds; (2) no large voids; (3) no cracks or splits; (4) no excessive bedding planes; (5) no bedding planes with a maximum of voids. Bedding planes shall be placed and paid for as earth fills throughout. (See Construction Specification 23A).
 2. Material forming dikes and transition sections shall be placed and paid for as earth fill. Subsequent (See Construction Specification 23A).
 3. Where durable rock is not exposed at grade, the 1:1 foot secondary railway shall be overexcavated and backfilled with rock.
 4. For all the remaining rock section from maximum height of 12' down to 4' above water, not more than 5% by weight of the rock shall be made of concrete rock or a related equivalent material. The required vibration will be required. The material shall be placed and paid for as earth fill. Subsequent (See Construction Specification 23A).

As-Built Plans

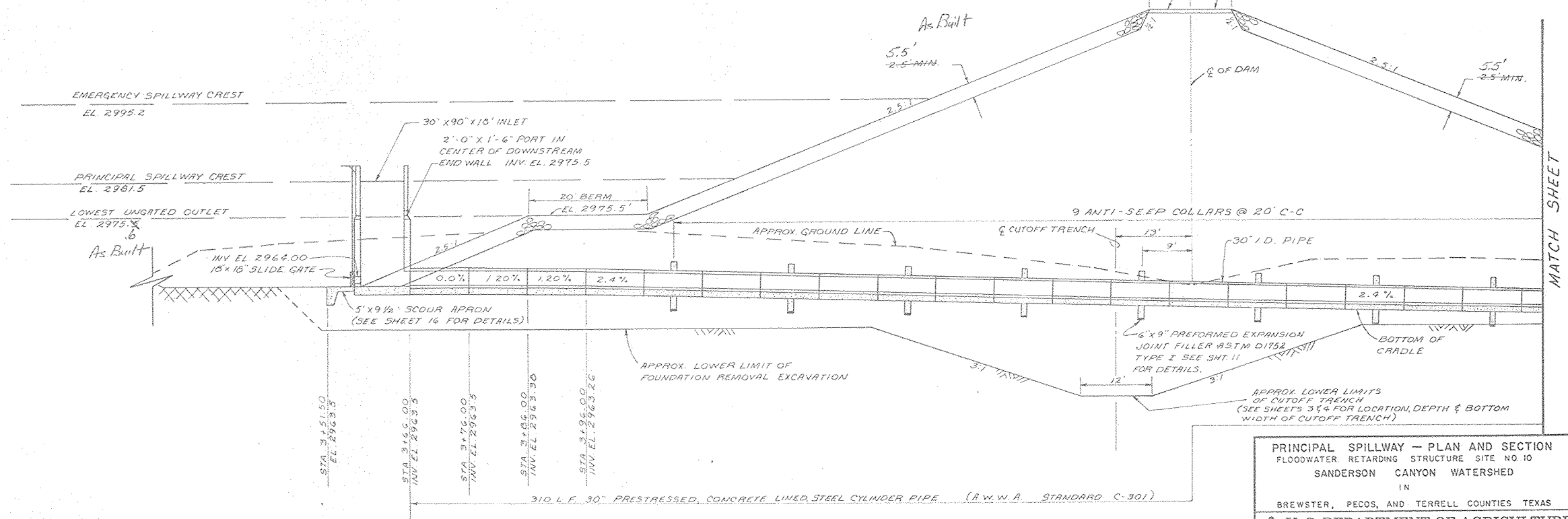
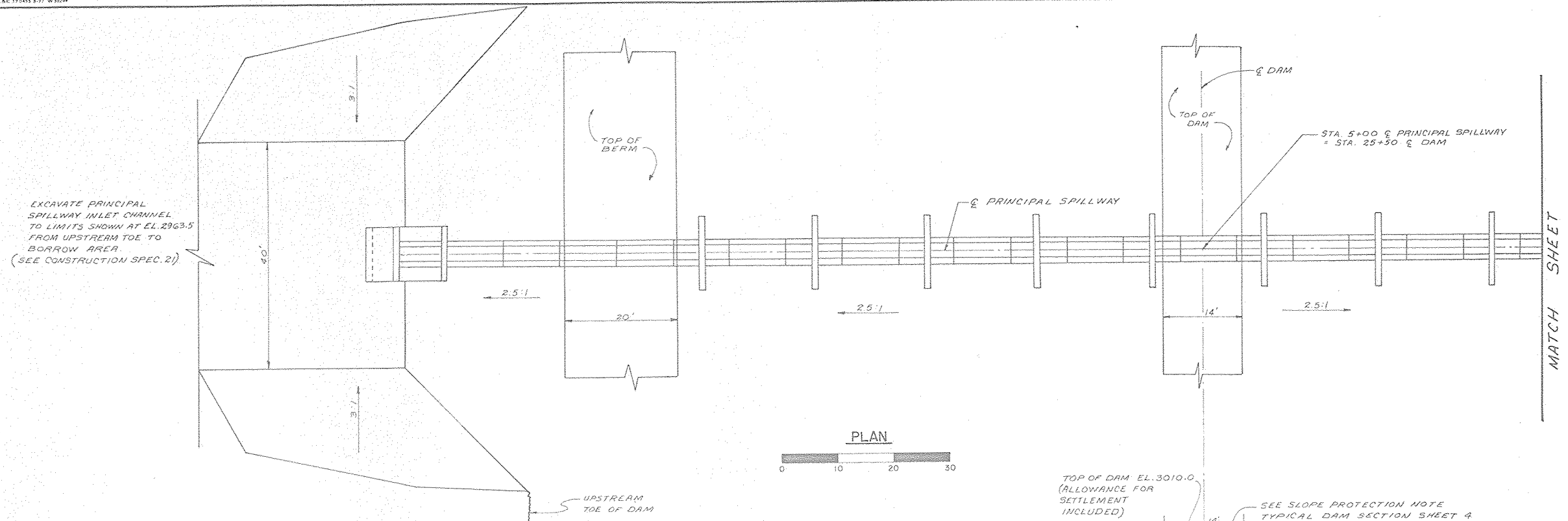
NO CHANGES IN CONSTRUCTION
6-25-80 922

PROFILE AND SECTIONS
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date	Approved by
Designed . . . C. H. S.	3-79	FOUNDATION ENGINEER, S.E.S.
		Title: <u>STRUCTURAL</u>
Drawn . . . C. H. S.	3-79	Project <u>5-11-172</u>
		Title: <u>STEEL CONCRETE COMB.</u>
Traced . . . C. A. N.	3-79	Title: <u>HOUSTON, TEXAS</u>
		Sheet: <u>Drawing No</u>
Checked . . . G. J. M.	3-79	No 5
		4-E-36,793

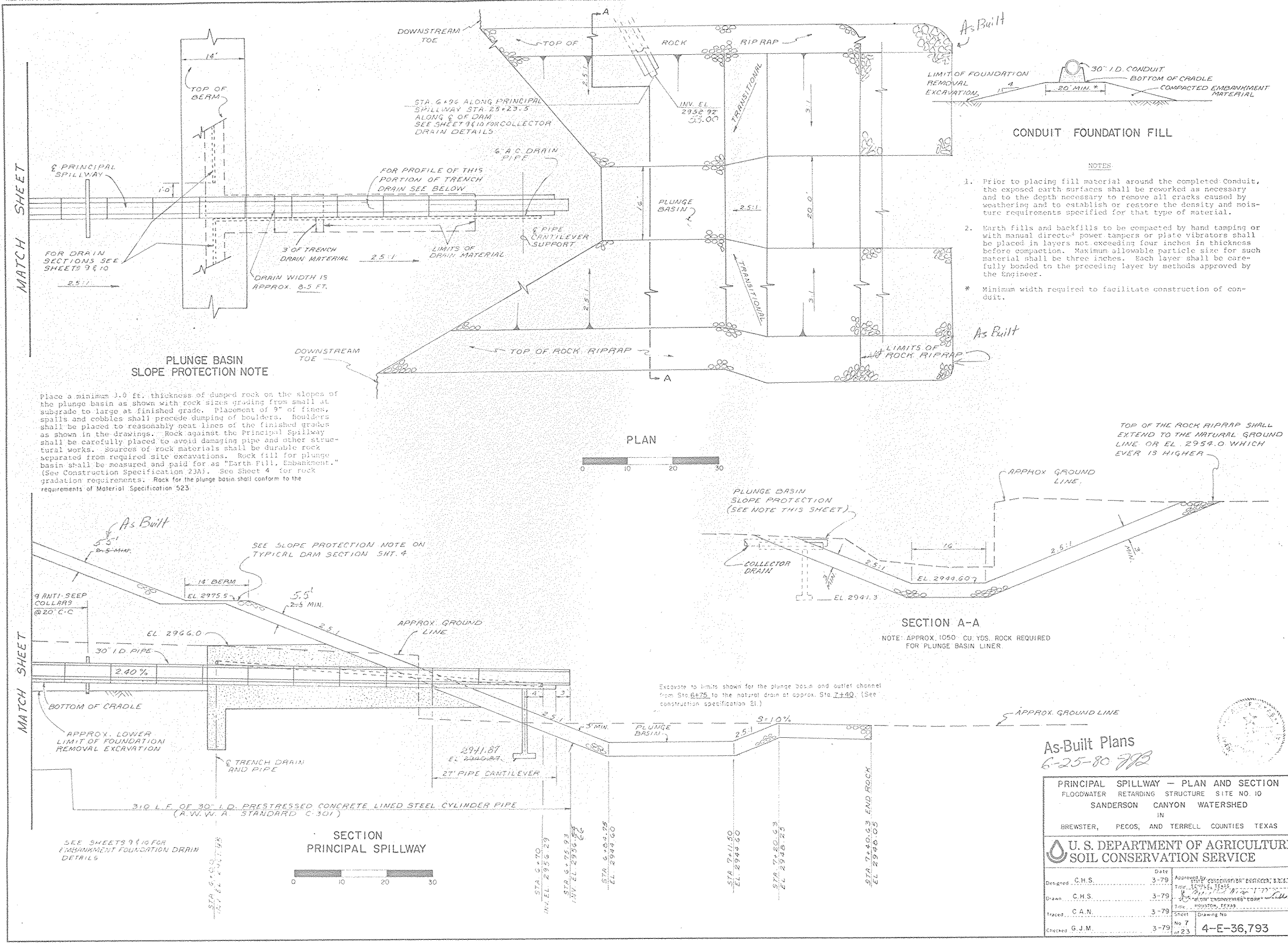


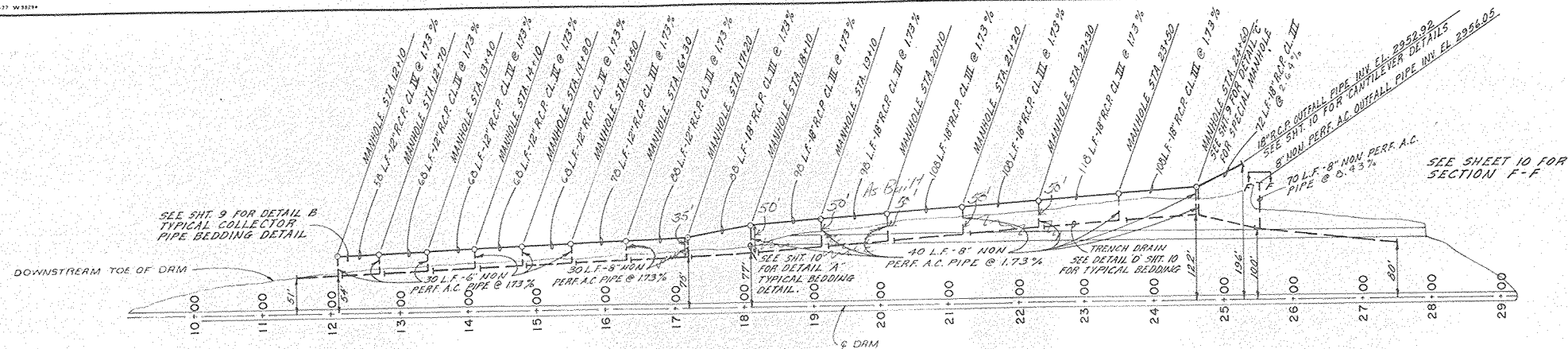
SECTION
PRINCIPAL SPILLWAY



As-Built Plans
6-25-80 JPB

PRINCIPAL SPILLWAY — PLAN AND SECTION FLOODWATER RETARDING STRUCTURE SITE NO. 10 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed... C.H.S.	Date... 3-79	Approved by... [Signature]	
Drawn... C.H.S.	Date... 3-79	Title... [Signature]	
Traced... J.E.G.	Date... 3-79	Title... [Signature]	
Checked... G.J.M.	Date... 3-79	Title... [Signature]	
Sheet No. 6 of 23		Drawing No. 4-E-36,793	



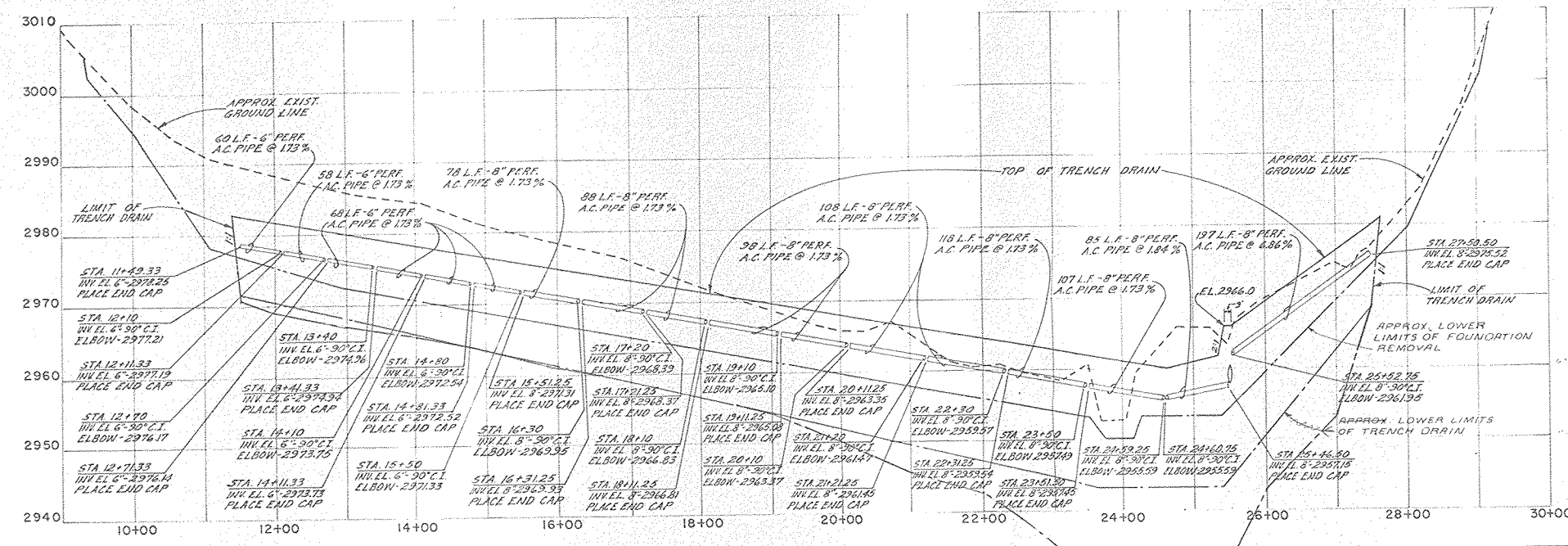


PLAN OF TRENCH DRAIN

PIPE QUANTITY TABLE

Type of Pipe	Size	Length, Ft.
Non-perforated	6"	440
Non-perforated	8"	450
Perforated	6"	1173
Perforated	8"	1173
R.C.P. CL III	12"	166
R.C.P. CL IV	12"	330
R.C.P. CL III	18"	798
R.C.P. Manholes	36"	1425

NOTE:
FOR INVERT ELEVATIONS
OF ALL MANHOLES AND
PIPES ENTERING
MANHOLES SEE TABLE 2
ON SHT. 9.



PROFILE ON C OF TRENCH DRAIN

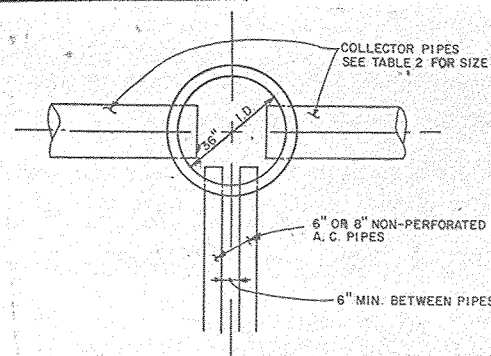
As-Built Plans
6-25-80 222



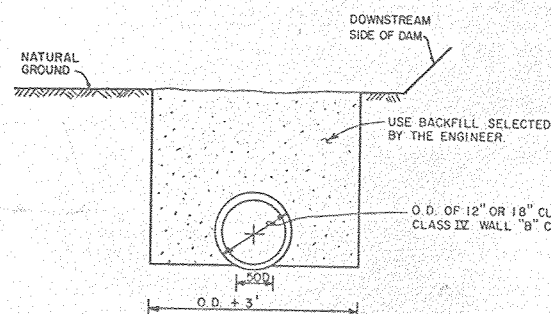
EMBANKMENT FOUNDATION DRAIN
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	C. H. S.	Date	3-79	Approved	Conservation Engineer, S.C.S.
Drawn	C. H. S.	Date	3-79	Checked	Conservation Engineer, S.C.S.
Traced	C. A. N.	Date	3-79	Sheet	No. 8 of 23
Checked	G. J. M.	Date	3-79	Drawing No.	4-E-36,793



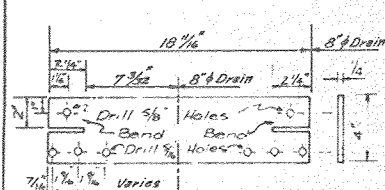
DETAIL C



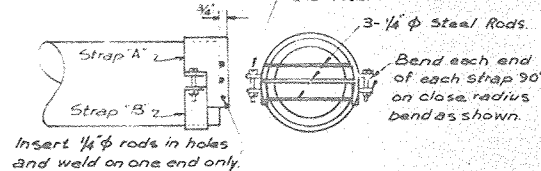
TYPICAL COLLECTOR PIPE BEDDING DETAIL

DETAIL B

Back filling of the collector drain trench and around each manhole shall be accomplished in a manner to produce densities of each layer equivalent to the densities of the foundation materials prior to excavation of the collector drain trench. The maximum uncompacted layer thickness shall not exceed 12 inches. Backfill shall be placed in a moist condition, and shall contain no particle size greater than 6 inches.



DETAILS OF STRAP "A"
(Before Bending)



DETAILS OF STRAP "B"
(Before Bending)

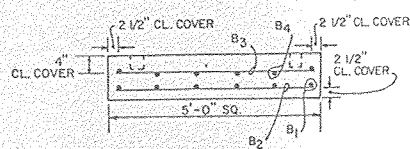
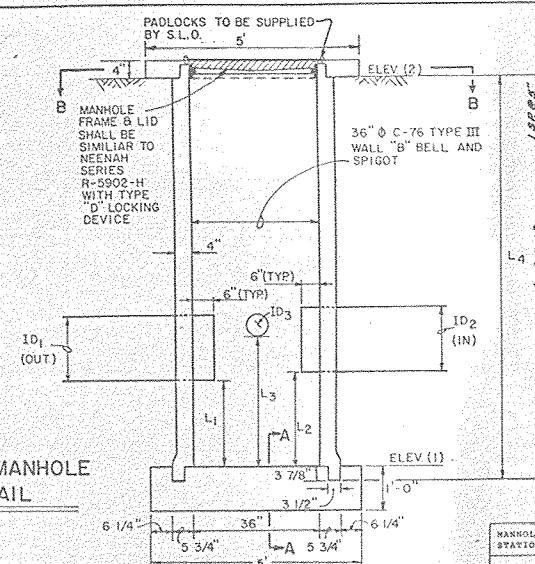
SIDE ELEVATION

END ELEVATION

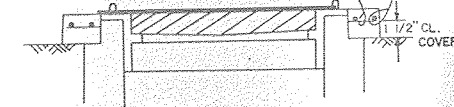
Note: Bend Straps A and B on a radius 1/4 inch larger than the outside diameter of the asbestos-cement pipe. Cut off tapered end of the asbestos-cement pipe and install the rodent guard so that the asbestos-cement pipe has full wall thickness at point of installation. Install with rods horizontal. All materials (except brass) shall be galvanized after fabrication.

RODENT GUARD DETAILS

TYPICAL MANHOLE
DETAIL

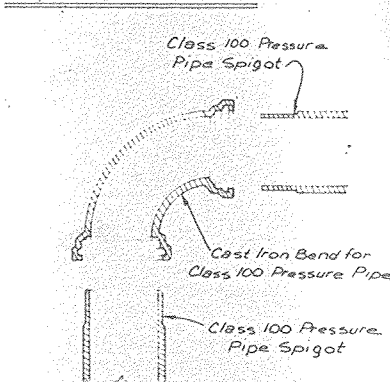


SECTION A-A



SECTION C-C

RODENT GUARD DETAIL



PERFORATED PIPE

TABLE 2

MANHOLE STATION	ELEV. (1)	ELEV. (2)	L1 FT.	L2 FT.	L3 FT.	L4 FT.	IP1 IN.	IP2 IN.	IP3 IN.
12+10	2974.82	2985.5	1.62	---	1.07	12	12	6	6
12+70	2971.32	2985.0	2.08	2.08	2.33	12	12	12	6
13+40	2972.12	2983.8	2.07	2.07	2.32	12	12	12	6
14+10	2971.32	2983.0	1.66	1.66	1.91	12	12	12	6
14+80	2969.82	2981.0	1.93	1.93	2.20	11.5	12	12	6
15+50	2969.32	2979.0	1.24	1.24	1.49	10	12	12	6
16+30	2967.92	2977.6	1.25	1.25	1.51	10	12	12	8
17+20	2966.32	2976.0	1.30	1.30	1.55	10	10	12	8
18+10	2964.82	2974.5	1.24	1.24	1.32	10	10	10	8
19+10	2962.32	2972.0	2.01	2.01	2.09	10	10	10	8
20+10	2960.82	2968.0	1.78	1.78	1.86	7.5	10	10	8
21+20	2957.32	2964.5	3.38	3.38	3.46	7.5	10	10	8
22+30	2956.67	2962.35	2.13	2.13	2.21	6	10	10	6
23+50	2954.59	2960.27	2.13	2.13	2.21	6	10	10	8
24+60	2952.69	2958.37	2.13	2.13	2.21	6	10	10	8

MANHOLE SLAB QUANTITIES

BAR NO.	SIZE	QUANTITY	LENGTH	TYPE	TOTAL LENGTH
T1	4	8	4'-7"	1	36'-6"
T2	4	20	0'-6"	1	16'-0"
B1	4	7	4'-7"	1	32'-1"
B2	4	7	4'-7"	1	32'-1"
B3	4	7	4'-7"	1	32'-1"
B4	4	7	4'-7"	1	32'-1"
Total steel size No. 4 in lin. ft.					170'-10"
Total steel weight per manhole in lb.					220.8
Total steel for 15 manholes in lb.					3311.85
Total concrete top slab in cu. yd.					25 c.y.
Total concrete bottom slab in cu. yd.					.93 c.y.
Total concrete per manhole in cu. yd.					1.18 c.y.
Total concrete for 15 manholes in cu. yd.					17.7 c.y.

Note: Bends shall be 90°, 45°, 22 1/2°, or 11 1/4° as designated on the Plan and shall comply with the requirements of Material Specification 545.

For changes in horizontal or vertical alignment which are less than 10° or which differ from the standard bends mentioned above, the alignment change not taken up by the standard bend, shall be made by deflection of an equal number of pipe sections on either side of the point of intersection of the alignment shown. No angle of deflection for a single pipe joint shall exceed 4° or 7 1/2°.

Tees, Crosses, Wyes, and Reducers, if required, shall be the same as specified for Bends. Deflection of pipe sections, if required to complete alignment changes, shall be the same as specified for Bends.

DETAILS-PIPE FITTINGS

(Other than straight couplings)

NOTES:

- All non-perforated A.C. pipe to collector drain manholes shall be encased in filter material for that portion under the dam embankment.
- The quality of materials and construction for drain fill shall comply with the requirements of Construction Specification 24 and Material Specification 521.
- Rodent guards shall be installed on each A.C. pipe and concrete culvert pipe outletting from the trench drain or collector drain.
- All Asbestos Cement Pipe and couplings shall be Class 100 pressure pipe and shall conform to the requirements of Material Specification 545.
- All Reinforced Concrete Culvert Pipe shall be Class III, Type C-76, bell and spigot with Wall 8 unless otherwise noted. This includes those used for manholes.
- An access trench shall be required in the construction of the trench drain. This access trench shall have a 1:1 side slope with a minimum bottom width of 25 feet. (See Construction Specification 21)
- The trench drain shall be excavated as shown on the typical section and shall have vertical sides and a 4.0 foot bottom width. (See Construction Specification 24)
- Backfill of the access trench and fill adjacent to or above the top of the trench drain shall be relatively pervious on-site material, as selected by the Engineer. The Engineer may require stockpiling of these materials. The fill shall be placed and paid for as, "Earth Fill, Embankment."
- The drain filter material shall comply with the gradation requirements for one of the following:
 - ASTM, C-33, coarse concrete aggregate Size No. 7.
 - ASTM, C-33, coarse concrete aggregate Size No. 57.
 - ASTM, C-33, coarse concrete aggregate Size No. 67.
 Or any other aggregate that will grade within the limits shown in Table 1.
- Drain filter material shall not be dropped more than 5 feet vertically unless a tremie or other equivalent means is used to prevent segregation.

TABLE 1

Sieve Size	Percent Finer
1-1/2"	100
1"	95 - 100
3/4"	25 - 100
3/8"	20 - 75
4	0 - 25
8	0 - 10
16	0 - 5
200	0 - 5

The manholes shall be factory fabricated with pipe holes set to the elevation shown in Table 2. The total length of each manhole shall equal the length shown in Table 2. Once the collector pipes and trench drain pipe have been set to the prescribed elevation the void between the manhole side-wall and the O.D. of pipe shall be mortared.

The bedding of perforated pipe installed in filter material shall be ordinary bedding providing uniform and continuous bedding contact throughout the entire line. Joining shall be in accordance with the manufacturer's recommendations. Tamping of the filter material under and on the sides and top of the pipe will be required only to the extent necessary to eliminate voids or empty pockets. The installation of the non-perforated pipe shall be with ordinary bedding that provides uniform and continuous bedding contact throughout the entire line. Joining shall be in accordance with the manufacturer's recommendations. Backfill and compaction shall be as specified in Construction Specification 23.

STRAIGHT TYPE I

BAR TYPE

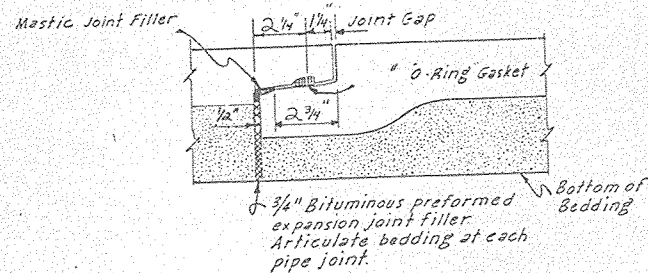
As-Built Plans 6-25-87

EMBANKMENT FOUNDATION DRAIN
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

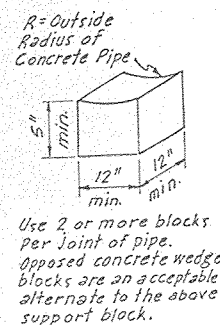
C.H.S.	3-79	STATE CONSERVATION ENGINEER, S.C.S.
C.H.S.	3-79	REGISTERED PROFESSIONAL ENGINEER
C.A.N.	3-79	REGISTERED PROFESSIONAL ENGINEER
G.J.M.	3-79	REGISTERED PROFESSIONAL ENGINEER

4-E-36,793

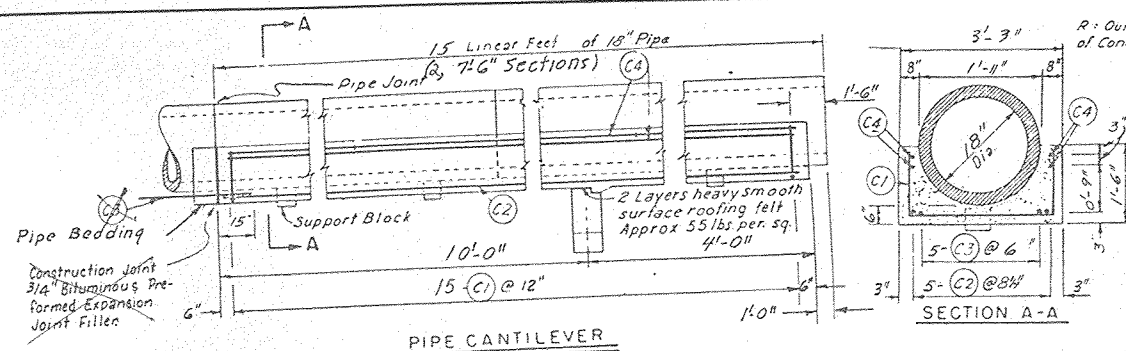


PIPE JOINT
PIPE JOINT DETAILS

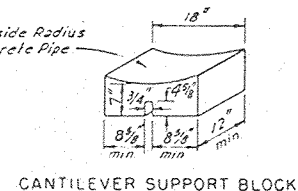
The pipe shall be drawn together so that the maximum joint gap does not exceed $\frac{3}{8}$ " for pipe laid on a straight line. For cambered pipe or pipe laid on a curved line, the joint gap at the closest point shall not exceed $\frac{3}{8}$ ".



SUPPORT BLOCK

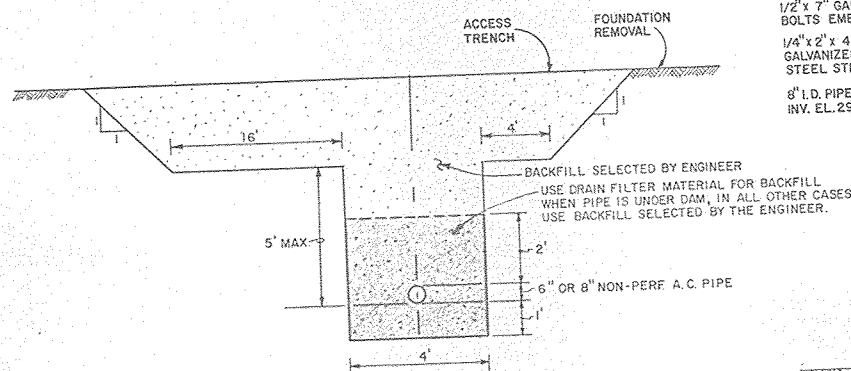


PIPE CANTILEVER

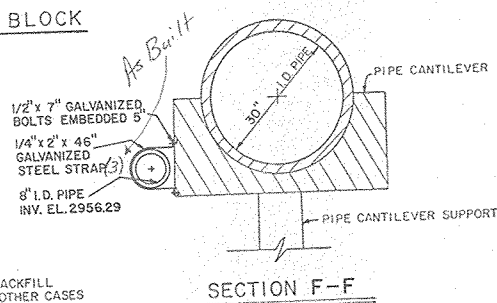


CANTILEVER SUPPORT BLOCK

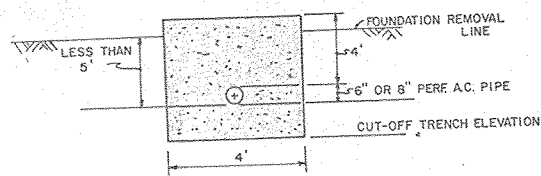
Note: Sides of Pipe Cantilever
to be formed with lumber or
metal.



TYPICAL BEDDING DETAIL
DETAIL A



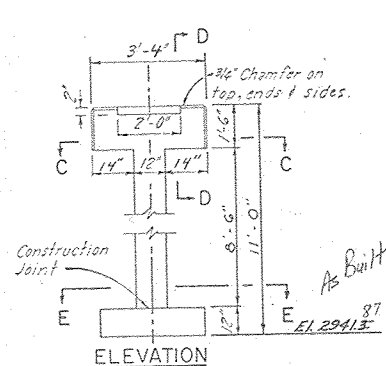
SECTION F-F



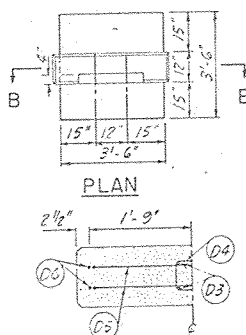
TRENCH DRAIN DETAIL

(DISTANCE FROM FOUNDATION REMOVAL
LINE TO INVERT OF DRAIN PIPE LESS
THAN 5')

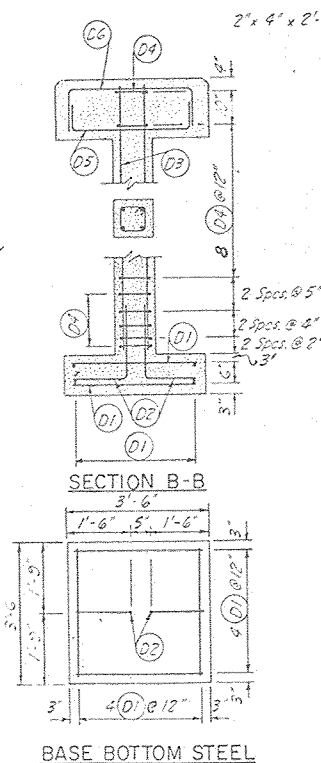
ALT. DETAIL D



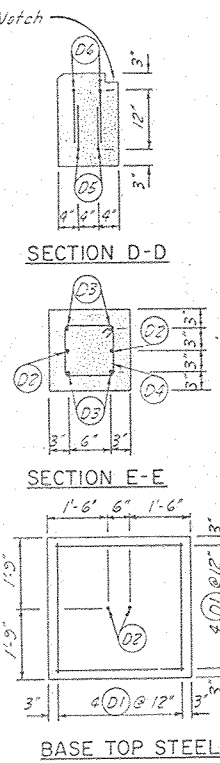
ELEVATION



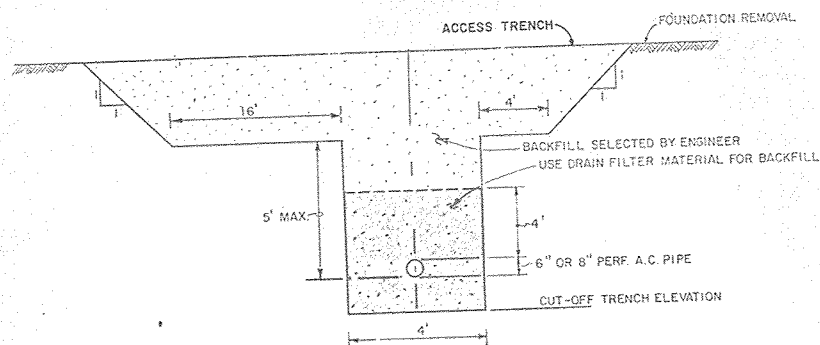
SECTION C-C



BASE BOTTOM STEEL



BASE TOP STEEL



TYPICAL TRENCH DRAIN DETAIL
DETAIL D

[illegible]

Note: Pipe supplied will be manufactured in accordance with the standard for ASTM C-76 Class III, or Class IV, Wall B, having a D-load capacity of not less than 2000 lbs. at the .01" crack. For Class III, and not less than 3000 lbs for Class IV. Elliptical reinforcement will not be permitted.

Pipe supplied with joint dimensions different from those shown, shall be approved by the Engineer.

As-Built Plans 6-25-80 972



EMBANKMENT FOUNDATION DRAIN
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED

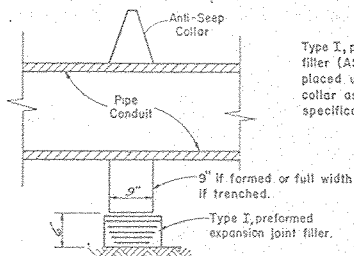
BREWSTER, PECOS, AND TERRELL, COUNTIES TEXAS



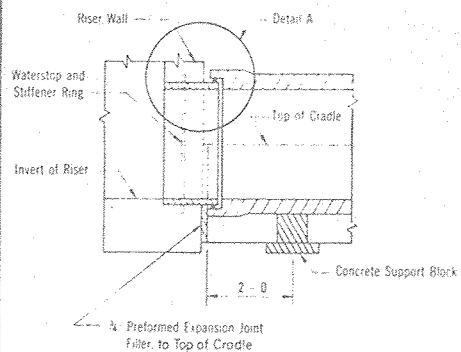
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	Approved by
Designed	G.J.M.	3-79	STATE SUPERVISOR TUSTON, S.B.
			TOLSON, J. Edgar
Drawn	G.J.M.	3-79	DAVID L. McPHERSON
			CHARLOTTE, N.C.
Traced	J.E.G.	3-79	Title HOUSTON, TEXAS
			Sheet
Checked	C.H.S.	3-79	Drawing No
			No 10
			of 23
			4-E-36,793

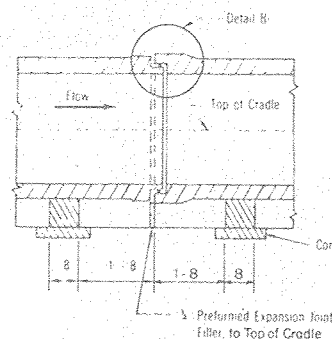
DETAIL A



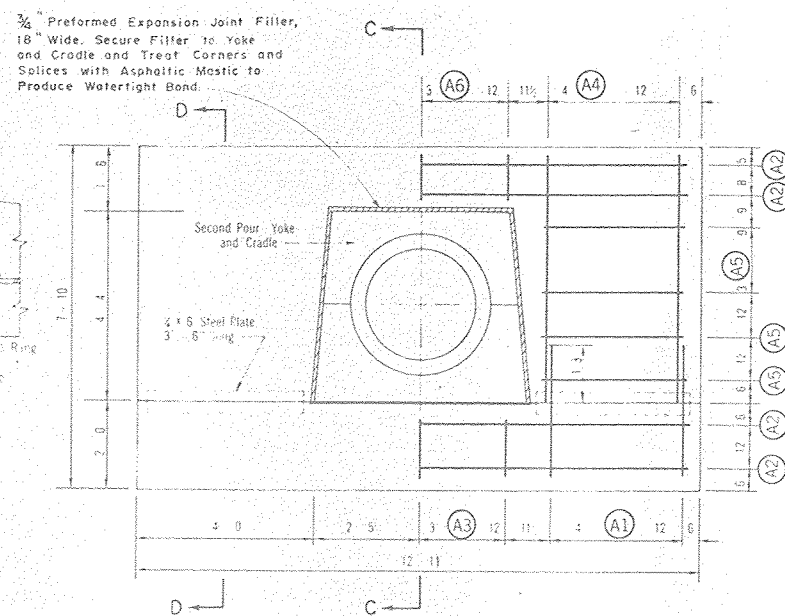
PREFORMED EXPANSION JOINT
FILLER DETAIL



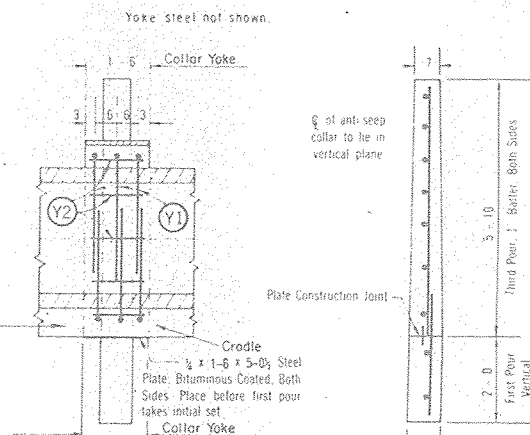
DETAIL OF SPIGOT WALL FITTING



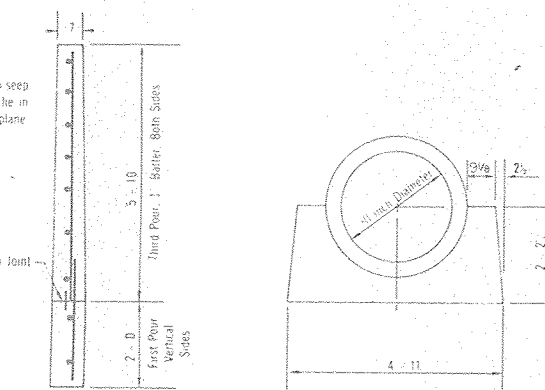
DETAIL OF PIPE JOINT



DETAIL OF ANTI-SEEP COLLAR



SECTION C-C



DETAIL OF CRADLE

[illegible]

QUANTITIES		
Concrete		Cu. Yds.
Amfr. seep collar including yoke		
* Each		2.777
Total	9 Colors	24.99
Ladle		
** Per linear foot of handle		0.2560
Total	280 in ft. less 135 in ft. in yokes	69.22
Steel		Pounds
Amfr. seep collar including yoke, 1 collar		154.562
Total	9 Colors	1,481.98

Quantities listed are based on an outside diameter of pipe of 35 3/4 inches.
Steel quantities do not change with outside diameter of pipe.

* This quantity is given by

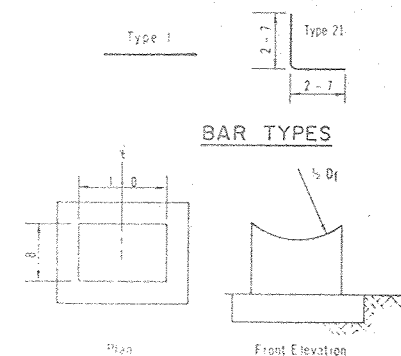
$$3.64 - 0.000303 \cdot (D_f)^2 \text{ cu yds}$$

This quantity is given by

$$0.385 - 0.00013 (\text{Dn})^2 \text{ cu yds}$$

D_1 = outside diameter of pipe furnished, inches.

D_1 = outside diameter of pipe furnished, inches.



BAR TYPES

STRENGTH REQUIREMENTS			
	Internal Load	External Load	
Inside Diameter of Pipe	Hydrostatic Pressure	Minimum 3-Edge Bearing Strength in Pounds per Linear Foot of Pipe Applicable Standard Specification AASHTO C-301	
	Head of Water	Load to produce 0.001 inch crack one foot long.	
inches	feet	7,500	NO CHANGES
30"	50'		



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.

PIPE DETAILS		
FLOODWATER RETARDING STRUCTURE SITE NO. 10 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS, AND TERRELL COUNTIES, TEXAS		
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE		
Designed	Date	Approved by
C.H.S.	1-79	State Conservation Engineer, W. TERRELL, TEXAS
Drawn		TITLE
S.C.S.	1-79	WATER CONSERVATION CORP.
fraced		TITLE
S.C.S.	1-79	HOUSTON, TEXAS
Checked		Sheet
G.J.M.	1-79	No. 11
		of 23
		4-E-36,793

DETAIL 8

Joint length equals watertight joint extensibility plus joint gap.

The pipe shall be drawn together so that the maximum joint gap does not exceed $\frac{3}{16}$ inch for pipe laid on a straight line. For cumbered pipe or pipe laid on a curved line, the joint gap at the closest point shall not exceed $\frac{3}{16}$ inch.

JOINT REQUIREMENTS

Length of Pipe Section feet	Minimum Joint Length inches	Minimum Joint Limiting Angle radians	degrees
10	2.875	.018	1.03
20	2.875	.018	1.03

For Outfall Section Only

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

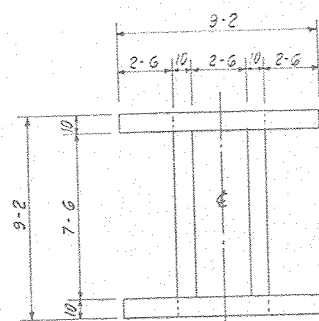
Where pipes of different length are connected, adjoining pipes shall meet the requirements of the longer pipe.

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

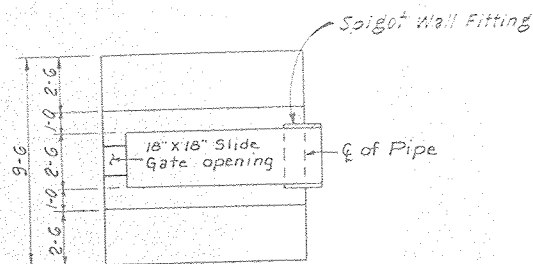
The outside diameter of pipe assumed in design is 35.34 inches. Where the pipe furnished has an outside diameter greater than assumed in design, the three-edge bearing strength of the pipe furnished must not be less than the specified three-edge bearing strength multiplied by the ratio of the outside diameter of the pipe furnished to the outside diameter assumed in design.

As-Built Plans

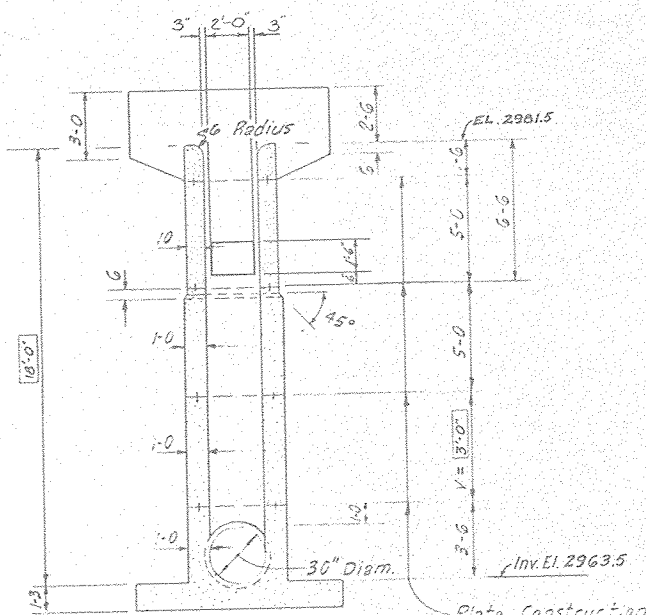
AP 6-25-8



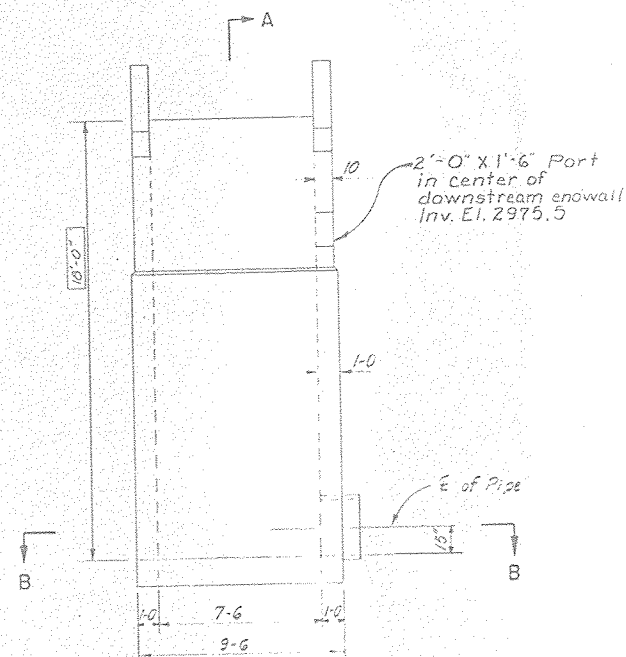
PLAN - TOP



SECTION B-B



SECTION A-A



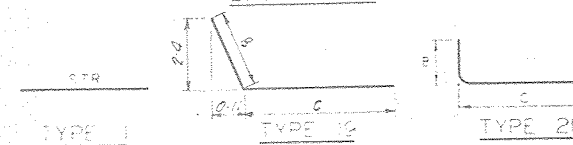
SIDE ELEVATION

STEEL SCHEDULE

Mark	Size	Quantity	Length	Type	B	C	Total Length	Mark	Size	Quantity	Length	Type	B	C	Total Length
B 1	# 6	10	9'-0	1			90'-0	T 1	# 5	14	6'-2	1			86'-4
B 2	# 6	10	9'-0	1			90'-0	T 2	# 5	14	6'-4	1			88'-8
B 3	# 7	34	9'-3	21	3'-3	6'-0	314'-6	T 3	# 5	8	3'-3	1			26'-0
B 4	# 6	10	9'-0	1			90'-0	T 4	# 5	12	8'-9	1			105'-0
B 5	# 6	10	9'-0	1			90'-0	T 5	# 5	36	8'-0	21	2'-9	5'-3	288'-0
B 6	# 6	2	3'-9	1			7'-6	T 6	# 5	14	8'-3	1			115'-6
B 7	# 5	6	7'-0	21	1'-0	6'-0	42'-0	T 7	# 5	4	6'-8	1			26'-8
B 8	# 6	3	7'-0	21	1'-0	6'-0	21'-0	T 8	# 5	12	8'-10	1			106'-0
B 9	# 5	16	7'-0	21	1'-0	6'-0	112'-0	T 9	# 5	8	5'-3	19	2'-6	2'-9	42'-0
B 10	# 6	10	8'-6	1			85'-0	T 10	# 5	8	3'-2	1			25'-4
B 11	# 5	5	3'-6	1			17'-6	T 11	# 5	8	3'-7	1			28'-8
B 12	# 6	3	2'-3	1			6'-9								
B 13	# 5	2	2'-3	1			4'-6								
B 14	# 6	10	6'-3	21	0'-8	5'-7	62'-6								
B 15	# 6	18	8'-9	21	3'-1	5'-8	157'-6								

R 1	# 5	22	9'-7	1			210'-10
R 2	# 6	10	8'-6	1			85'-0
R 3	# 5	6	3'-6	1			21'-0
R 4	# 5	26	7'-6	1			195'-0
R 5	# 5	24	8'-3	21	2'-10	5'-4	198'-0
R 6	# 5	14	8'-3	1			115'-6
R 7	# 5	10	3'-6	1			35'-0
R 8	# 5	20	3'-8	1			73'-4
R 9	# 4	36	8'-0	21	2'-9	5'-3	288'-0
R 10	# 4	4	7'-9	21	2'-7	5'-2	31'-0

BAR TYPES



- Notes:
1. All dimensions are out to out of bar
 2. Radius of bends equals 3 bar diameters for sizes equal to or less than # 7.
 3. The 2' and 3' dimensions from face of concrete to steel are clear distances.

0 2 4 6
Scale in feet

- Notes:
1. For Spigot Wall Fitting, See Detail Sheet 11.
 2. For Trash Rack, Grating, Sleeves and Bolts, See Detail Sheets 17 & 18.
 3. For Construction Joints, See Detail Sheet 18.

As-Built Plans

NO CHANGES IN CONSTRUCTION

6-25-80 77B

PRINCIPAL SPILLWAY INLET
FLOODWATER RETARDING STRUCTURE SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date: 1-79
Drawn: C.H.S. 1-79
Traced: C.A.N. 1-79
Checked: G.J.M. 1-79

STATE CONSTRUCTION ENGINEER, TEXAS
Title: HOUSTON, TEXAS
Sheet: Drawing No. 12
of 25 4-E-36,793

STANDARD OPEN RISER
STANDARD DWG NO. ES-3130-2020R
DATE 3-57 SHEET 1 OF 4

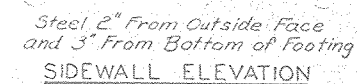
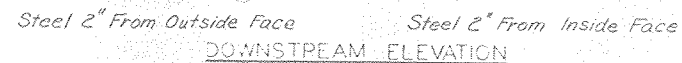
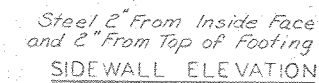
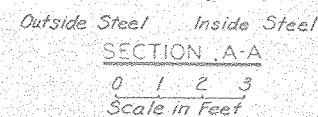
ADAPTED FROM
STANDARD COVERED RISER

DESIGN CONSTANTS
 $f_c = 4000 \text{ psi}$ $f_s = 1600 \text{ psi}$
 $n = 8$ $f_s = 20,000 \text{ psi}$

STANDARD DWG NO. ES-3030-2520R
DATE 5-65 SHEET 1 OF 4

QUANTITIES

Steel:					
# 4 Bars	319'-0	Lin. Ft.		213	Lbs.
# 5 Bars	1962'-10	Lin. Ft.		20473	Lbs.
# 6 Bars	185'-3	Lin. Ft.		1179.45	Lbs.
# 7 Bars	314'-6	Lin. Ft.		643	Lbs.
Total				4082.15	Lbs.
Length of # 5 Bars	$= 1338'-0 + (\text{Length of Bars R1, R3, R4, and R5})$				
Length of # 6 Bars	$= (750'-3) + (\text{Length of Bars R2})$				
Total Concrete	$= (18.03) \times (0.82 \text{ CV}) =$				
				20.70	Cu. Yds.



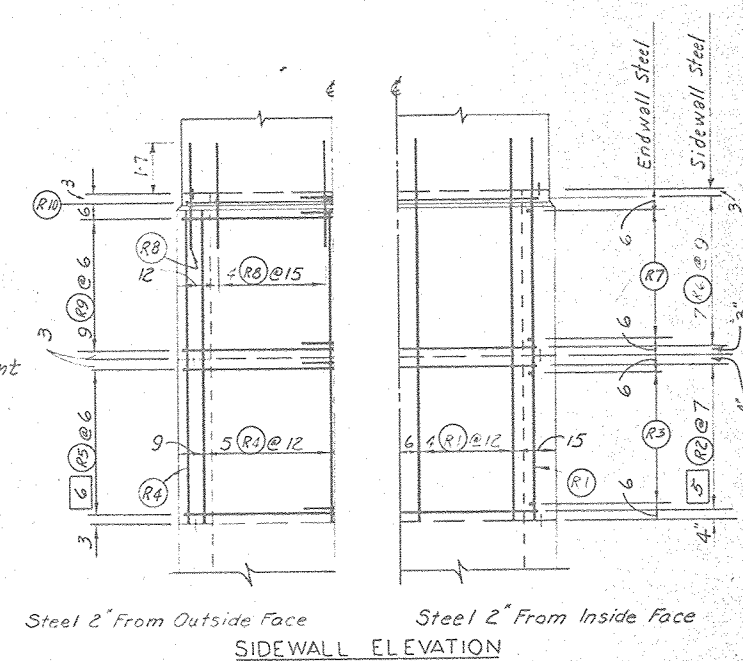
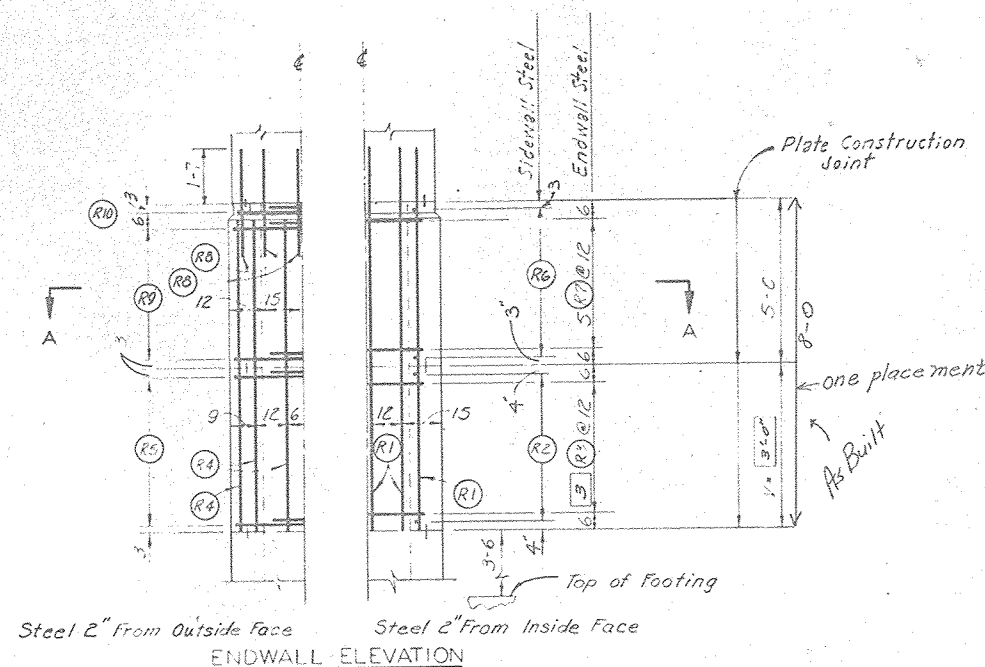
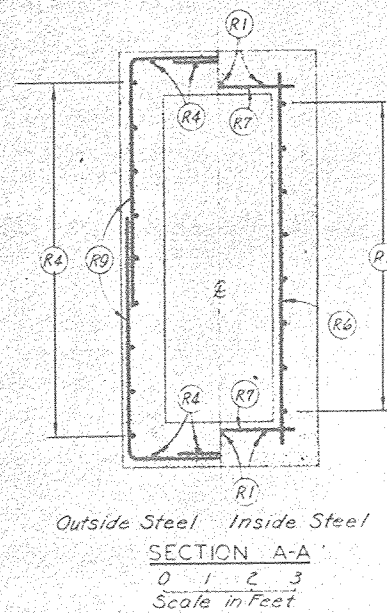
NOTE: CUT OR SHIFT STEEL
AS NECESSARY TO CLEAR
SLIDE GATE OPENING, 2"

As-Built Plans

NO CHANGES IN CONSTRUCTION

6-25-80 JJB

Form SCS 313 (November 1955)



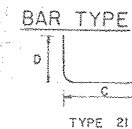
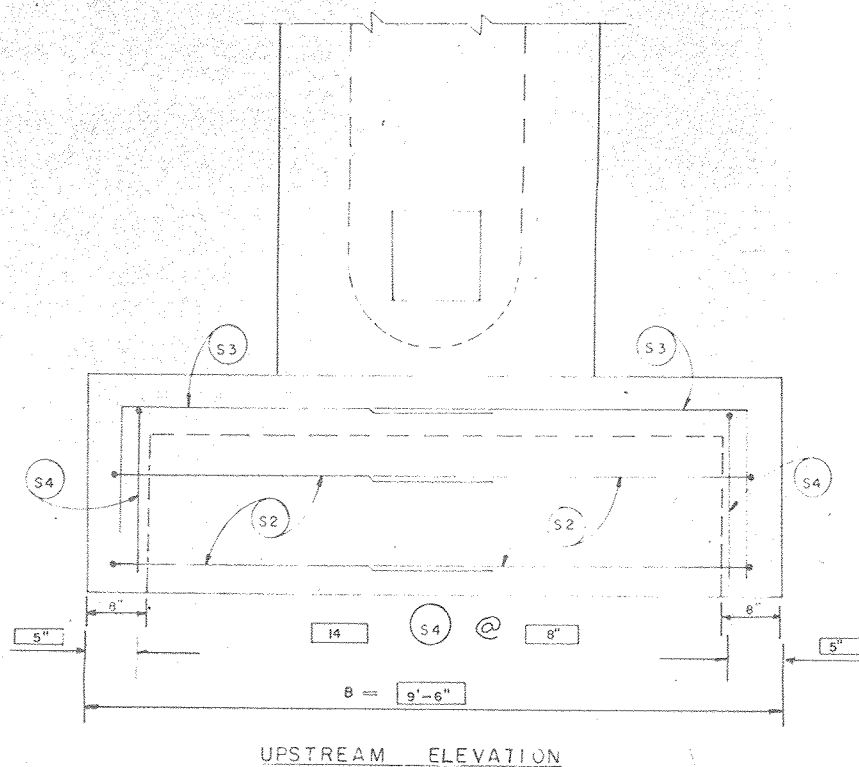
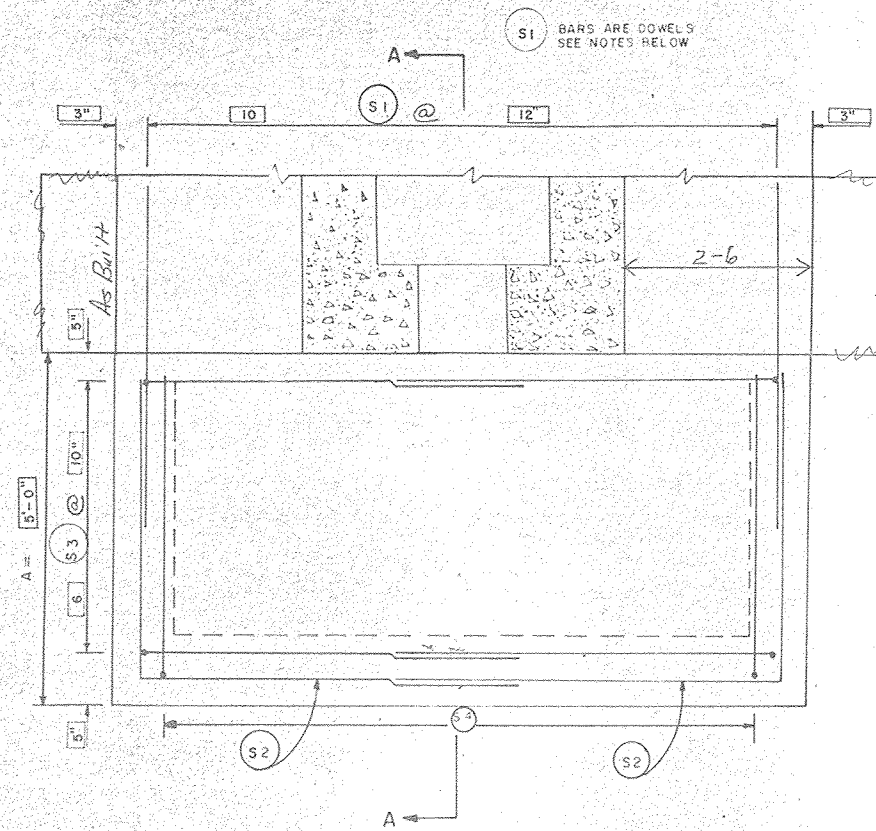
Cut or shift steel where necessary to clear the port by 2"

0 2 4
Scale in Feet
Unless Otherwise Shown

As-Built Plans
6-25-80
978

STANDARD OPEN RISER	
STANDARD DWG. NO. ES-3130-2020 R	
DATE 3-67	SHEET 3 OF 4
ADAPTED FROM	
STANDARD COVERED RISER	
DESIGN CONSTANTS $f'_c = 4000 \text{ psi}$ $f'_s = 1600 \text{ psi}$ $n = 8$ $f_s = 20,000 \text{ psi}$	
STANDARD DWG. NO. ES-3030-2520 R	
DATE 5-65	SHEET 3 OF 4

STEEL PLACEMENT—PRINCIPAL SPILLWAY INLET FLOODWATER RETARDING STRUCTURE SITE NO. 10 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS, AND TERRELL COUNTIES TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Drawn by S.C.S.	Date J-79	Checked by S.C.S.	State Engineer, TEXAS
Drawn by S.C.S.	Date I-79	Checked by S.C.S.	State Engineer, TEXAS
Drawn by S.C.S.	Date I-79	Checked by S.C.S.	State Engineer, TEXAS
Drawn by G.J.M.	Date I-79	Checked by S.C.S.	State Engineer, TEXAS
Sheet No. 14 of 23		4-E-36,793	



MARK	SIZE	QUAN-	LENGTH	TYPE	D	C	TOTAL	BAR NO	C. LENGTH	A. LENGTH
S2	4	4	9'-8"	21	4'-6"	5'-2"	38'-8"	S2	9'-5"	A'-6"
S3	4	12	7'-0"	21	4'-11"	5'-1"	24'-0"	S3	8'-4"	
S4	4	14	6'-5"	21	4'-11"	4'-6"	29'-10"	S4	A'-6"	
S1	6	10	4'-0"	-	-	-	40'-0"			

TOTAL STEEL (SIZE 4) 212'-6" = 141.95 lbs.

TOTAL STEEL 252'-6" = 202.03 lbs.

TOTAL REINFORCED CONCRETE 2.0 Cu.Yds.

CU YDS. CONCRETE = 8 (A) (B) + 17 (H) + 352 (A) = 2816

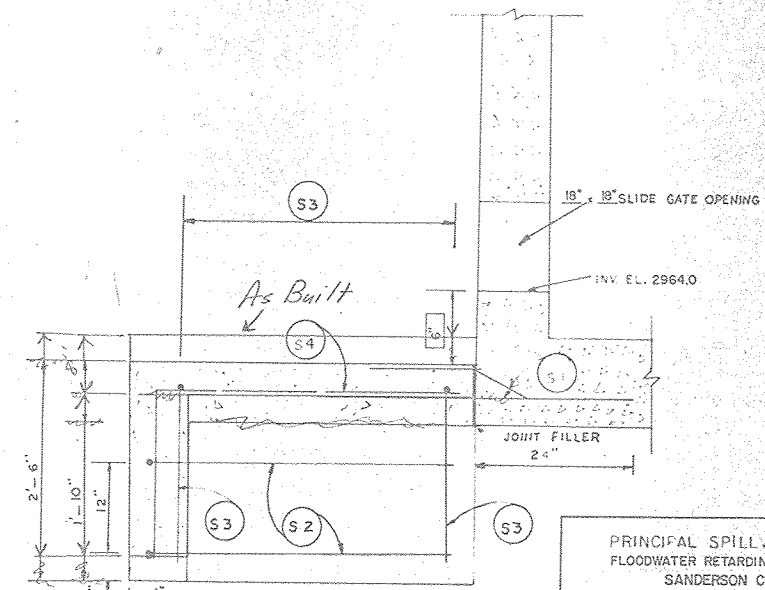
A=INCHES
B=INCHES

NOTES: MAXIMUM CENTER SPACING OF NO.4 BARS SHALL NOT EXCEED 12"

THE SCOUR APRON SHALL BE FASTENED TO THE INLET BASE WITH DOWELS OF NO.6 DEFORMED REINFORCING STEEL 4 FEET LONG, 10" MAX. REQUIRED CENTER SPACING OF NO.6 BARS SHALL BE 15" OR LESS.

ALL CONCRETE SHALL EQUAL OR EXCEED CLASS 4000

MINIMUM STEEL CLEARANCE AGAINST EARTH SHALL BE 3" EXCEPT S1 DOWELS AND S4 BARS SHALL BE CENTERED IN THE TOP SLAB



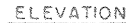
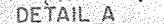
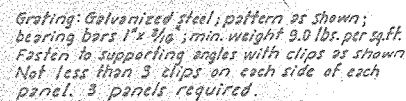
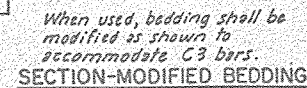
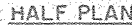
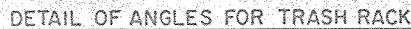
SECTION A-A

As-Built Plans
6-25-80 JTB



PRINCIPAL SPILLWAY INLET SCOUR APRON FLOODWATER RETARDING STRUCTURE SITE NO. 10 SANDERSON CANYON WATERSHED IN BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
DESIGNED	C.H.S.	DATE	1-79
DRAWN	S.C.S.	APPROVED BY	STATE CONSERVATION ENGINEER, T.C.S.
TRACED	S.C.S.	TITLE	SPILLWAY RETARDING STRUCTURE
CHECKED	G.J.M.	SHEET	1-79
		NO. 16	4-E-36,793
		OF 23	

All parts of the trash rack shall be galvanized. See Construction Specification 81 and Material Specification 502.

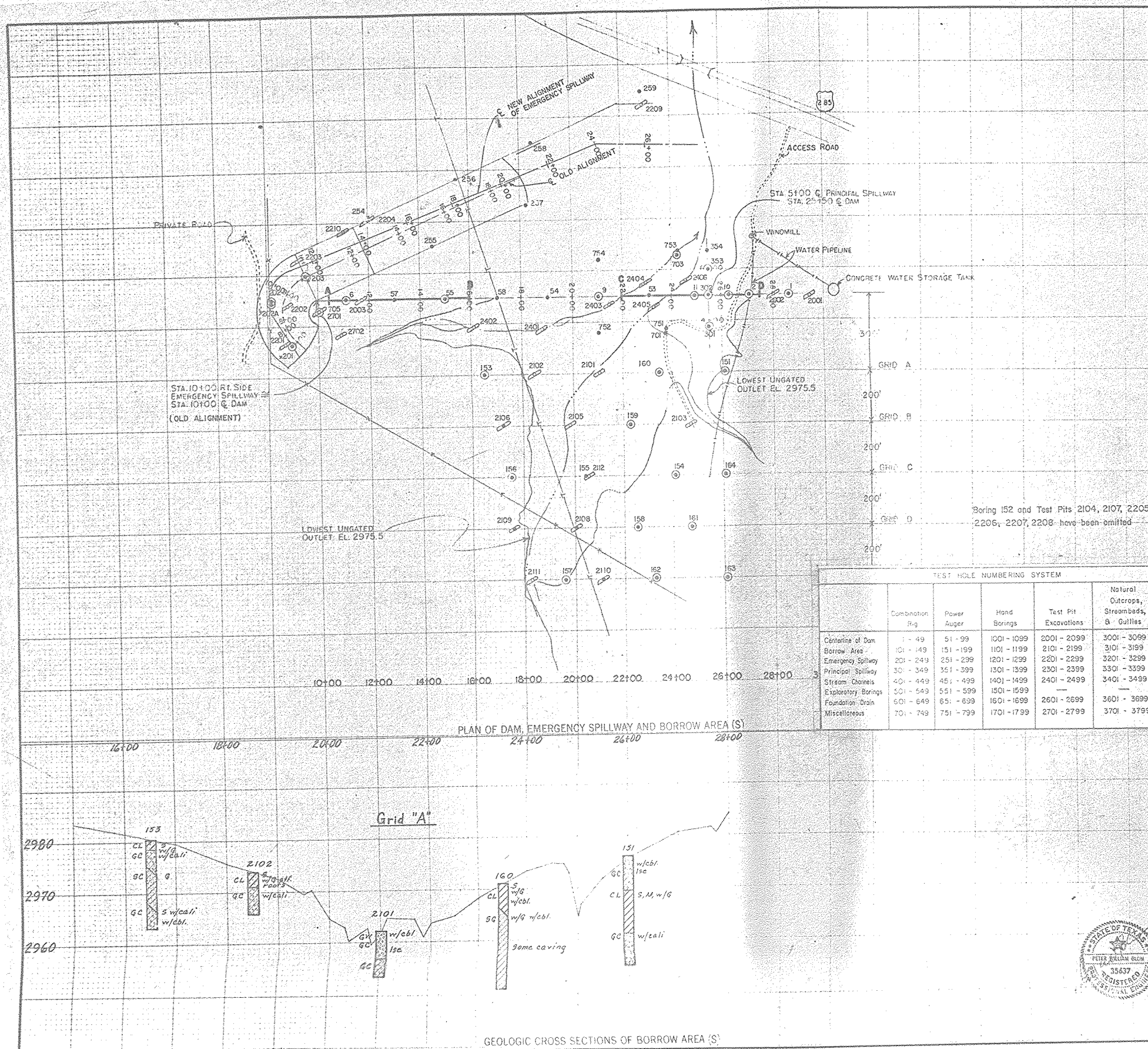


Note: All concrete shall equal or exceed class 4000

As-Built Plans 6-25-80 JZ

TRASH RACK, SLIDE GATE, AND
PIPE CANTILEVER SUPPORT DETAILS
FLOODWATER RETARDING STRUCTURE SITE NO.10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	C.H.S.	1-79	Approved by	RAYMOND E. HARRIS, JR.
Drawn	S.C.S.	1-79	Title	NO. 18 SLOW ENGINEERING CORP.
Traced	S.C.S.	1-79	Title	NO. 18 HARRIS, JR.
Checked	G.J.M.	1-79	Sheet	No. 18 of 23
			Drawing No.	4-E-36,793



LEGEND

SYMBOLS

UNCONSOLIDATED MATERIAL

gravel	sand	silt	clay	cobbles, boulders
gravel, sandy	sand, gravelly	silt, gravelly	clay, gravelly	peat or muck
gravel, silty	sand, silty	silt, silty	clay, silty	caliche
gravel, clayey	sand, clayey	silt, clayey	clay, clayey	

CONSOLIDATED MATERIAL

Sedimentary Rocks

Conglomerate	shale	limestone	coal
breccia	siltstone	dolomite	gypsum
sandstone	marl	chalk	chert

Metamorphic Rocks

gneiss	schist	intrusive	extrusive
quartzite	slate	pyroclastic	
marble	soapstone	undifferentiated	

Igneous Rocks

intrusive	extrusive
pyroclastic	

Other Symbols

hole logged only	strike and dip
hole sampled	pit or trench
	pit logged only

ABBREVIATIONS

ang. angular boulders (> 12")	lam. laminated	G gravel, gravelly
bid. boulders (> 12")	lsc. loose	S sand, sandy
calc. calcareous	mas. massive	M silt, silty
cali. caliche	med. medium	C clay, clayey
cav. cavities	mic. micaceous	O organic
cmt. cemented	mod. moderately	W well graded
coar. coarse	no recovery	P poorly graded
cbl. cobbles (3" - 12")	per. permeable	
cpt. compact	po. poorly	
con. concretions	rd. rounded	
cr. crystalline	sl. slightly	
ds. dense	sft. soft	
dip. dipping	st. some	
d.s. downstream	slb. slowly	
fin. fine	stf. stiff	
frm. firm	l.b. thin-bedded	
fract. fractured	tu. tuffaceous	
frag. fragments	u.s. upstream	
fr. friable	var. variable	
gr. grain	v. very	
gyp. gypsaceous	w. with	
hd. hard	wea. weathered	
h. highly	w.l. (data) static water level	
UAD unable to auger deeper		
UED unable to excavate deeper		

TEST HOLE NUMBERING SYSTEM

	Combination Rig	Power Auger	Hand Borings	Test Pit Excavations	Natural Outcrops, Streambeds, & Gullies
Centerline of Dam	1 - 49	51 - 99	1001 - 1099	2001 - 2099	3001 - 3099
Borrow Area	101 - 149	151 - 199	1101 - 1199	2101 - 2199	3101 - 3199
Emergency Spillway	201 - 249	251 - 299	1201 - 1299	2201 - 2299	3201 - 3299
Principal Spillway	301 - 349	351 - 399	1301 - 1399	2301 - 2399	3301 - 3399
Stream Channels	401 - 449	451 - 499	1401 - 1499	2401 - 2499	3401 - 3499
Exploratory Borings	501 - 549	551 - 599	1501 - 1599		
Foundation Drains	601 - 649	651 - 699	1601 - 1699		
Miscellaneous	701 - 749	751 - 799	1701 - 1799		

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SH	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts with liquid limit of 50 or less
MH	Silts with liquid limit above 50
CL	Clays with liquid limit of 50 or less
CH	Clays with liquid limit above 50
OL	Organic silts and clays with liquid limit of 50 or less
OH	Organic silts and clays with liquid limit above 50

Revised February 1963

As-Built Plans 6-25-80

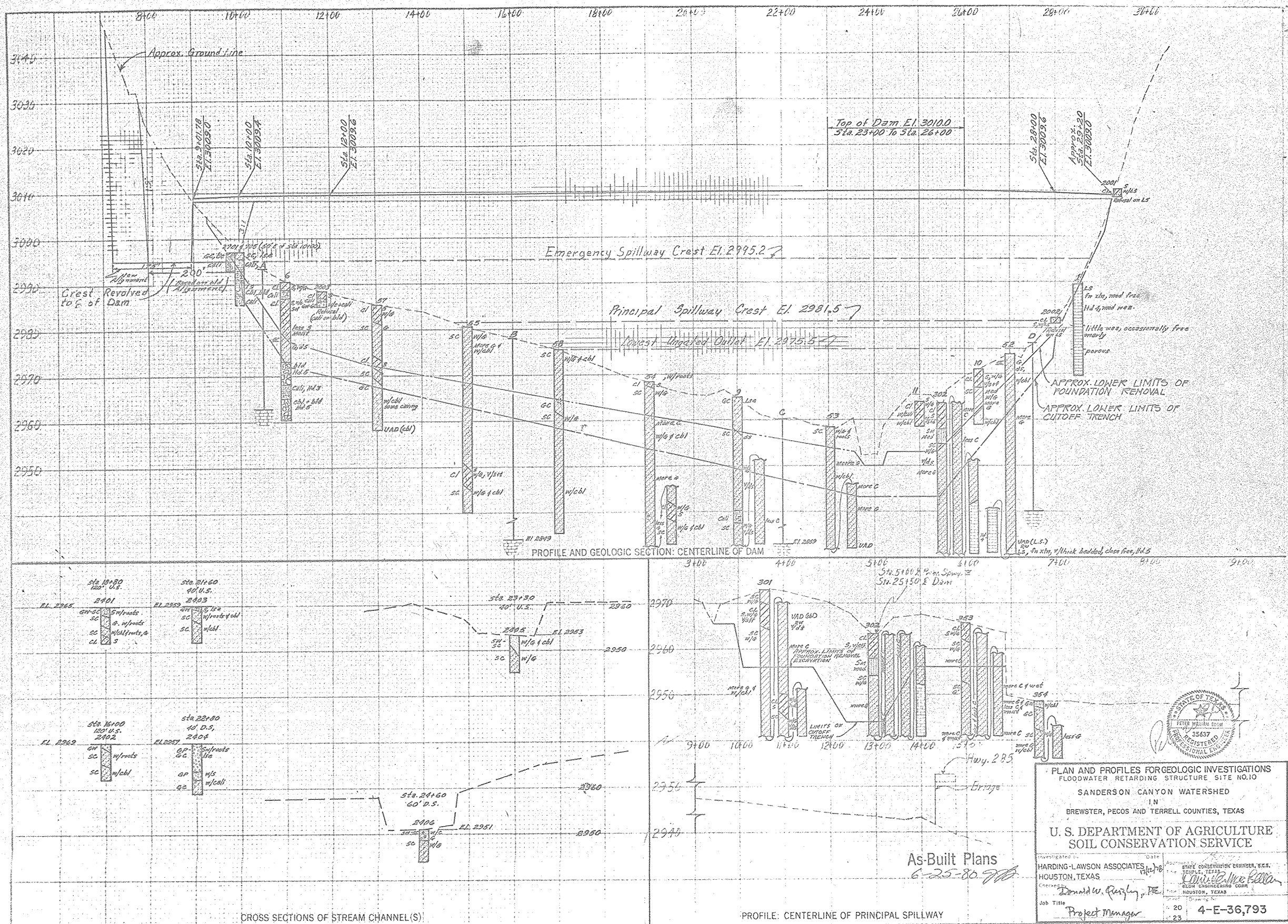
PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS

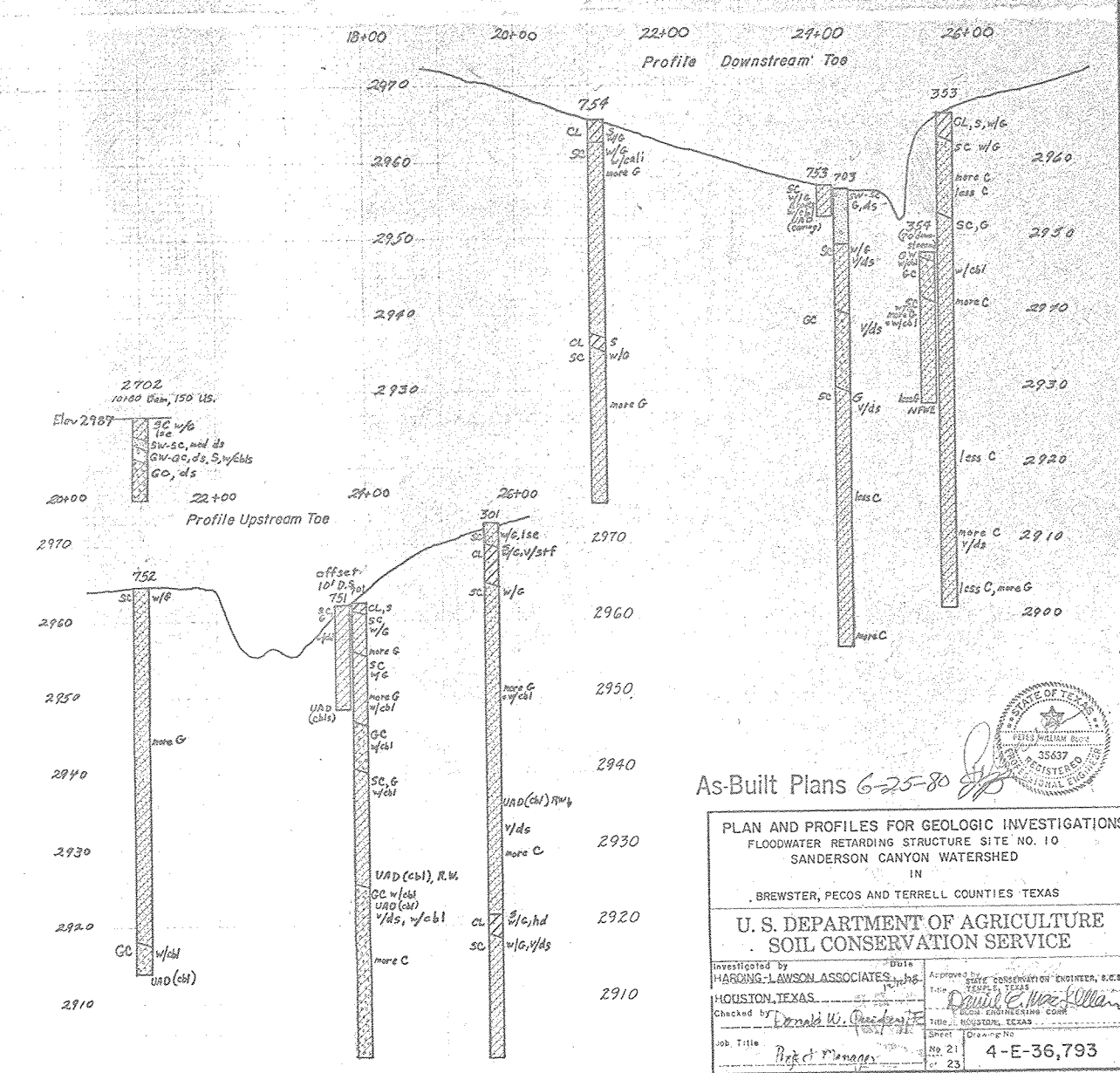
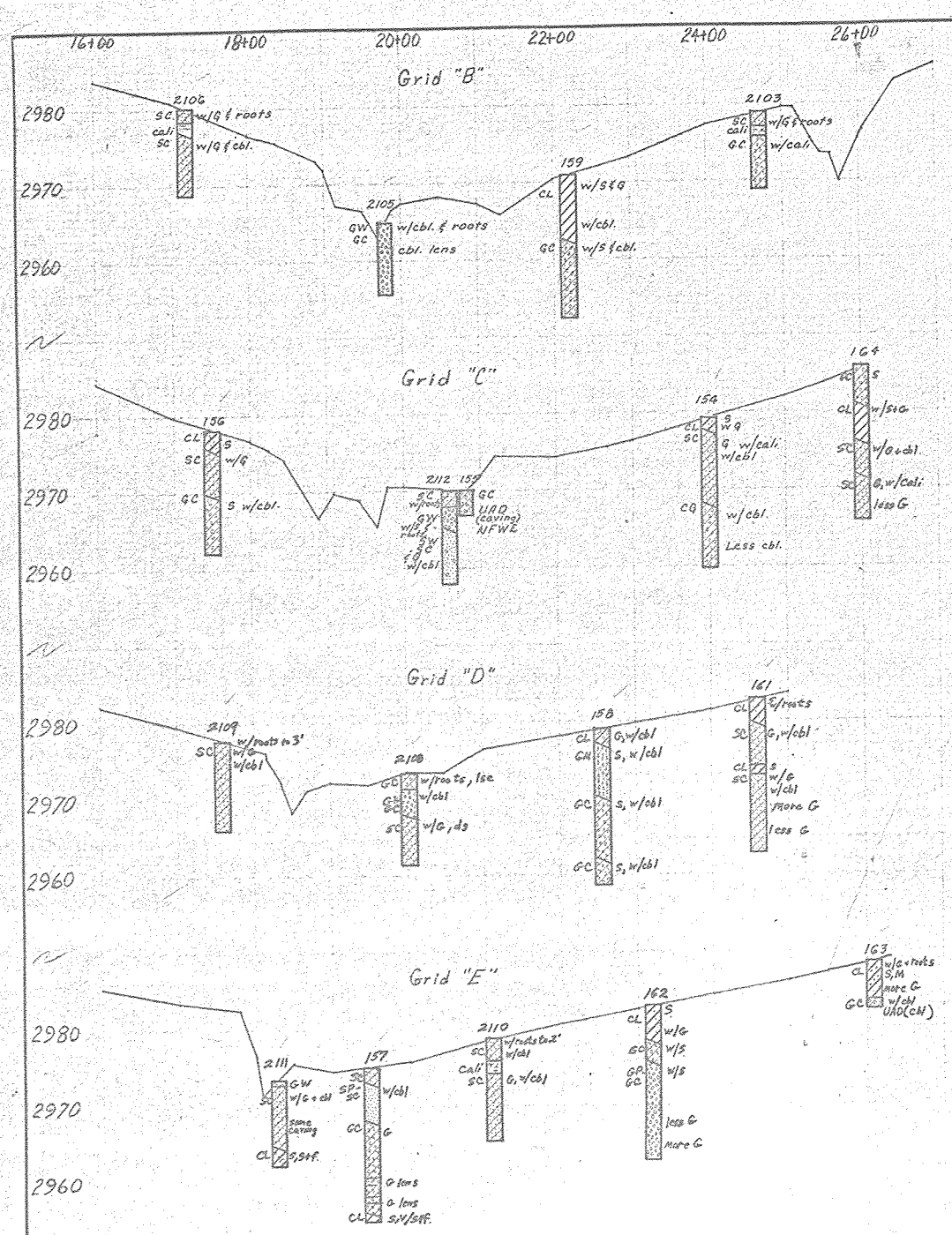
FLOODWATER RETARDING STRUCTURE, SITE NO. 10
SANDERSON CANYON WATERSHED
IN
BREWSTER, PECOS AND TERRELL COUNTIES, TEXAS

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Investigated by HARDING-LANSON ASSOCIATES, INC. HOUSTON, TEXAS	Date 10/15/80	Approved by State Conservation Engineer, SCS T. J. [Signature] HOUSTON, TEXAS	Drawn by D. W. [Signature] HOUSTON, TEXAS
Checked by [Signature]	Scale 1" = 40'	Sheet No. 19 of 23	Drawing No. 4-E-36,793

Project Manager



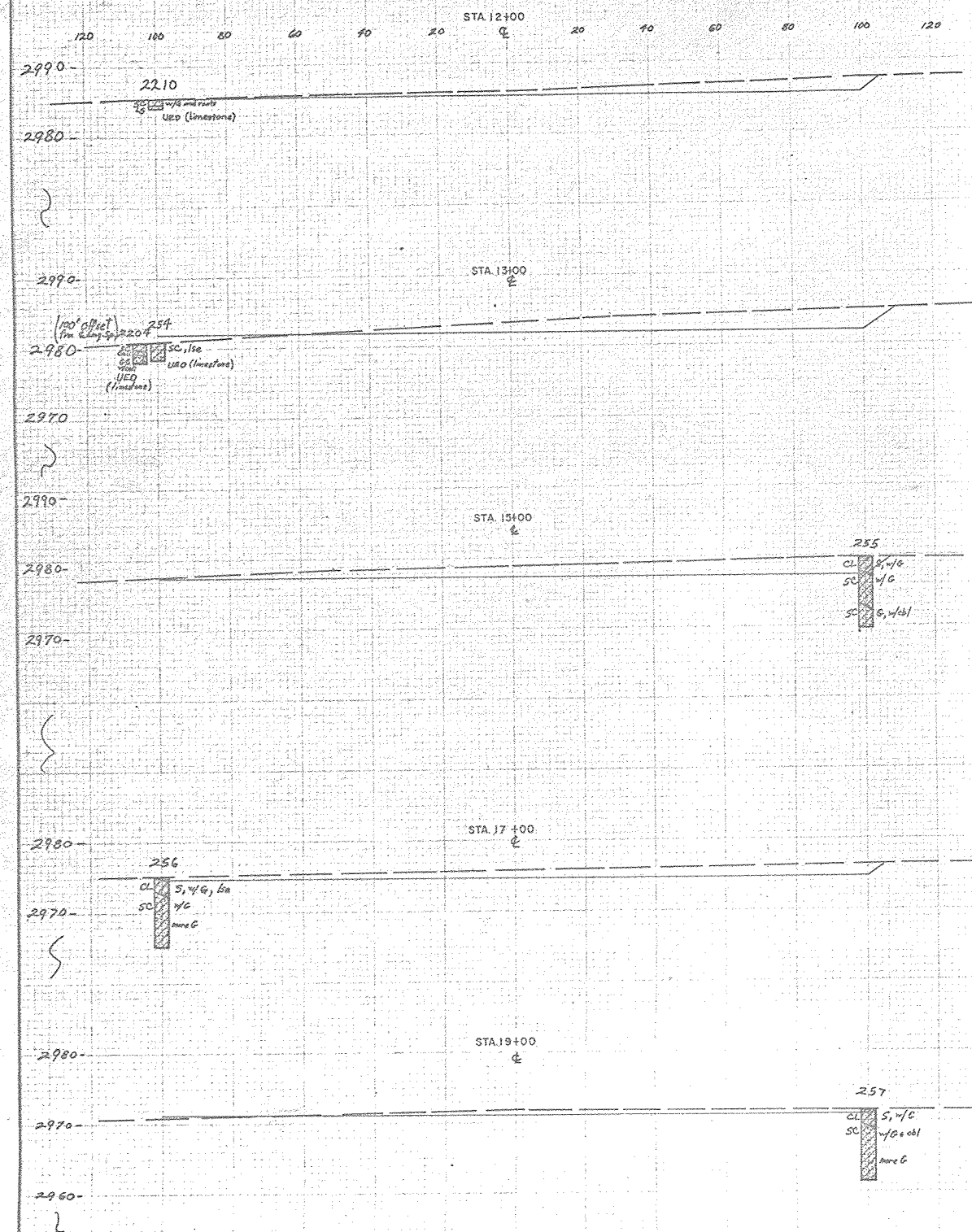


As-Built Plans 6-25-80

PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS
FLOODWATER RETARDING STRUCTURE SITE NO. 10
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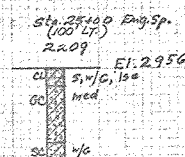
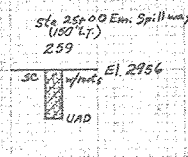
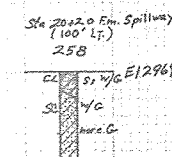
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Investigated by HARDING-LAWSON ASSOCIATES HOUSTON, TEXAS	Date 1/18/81	Approved by STATE CONSERVATION ENGINEER, S.C.S. DAVID E. WILSON LOCAL ENGINEERING CODE
Checked by Donald W. [Signature]	Title HOUSTON, TEXAS	Sheet No. 21 of 23
Job Title Project Manager	Drawing No. 4-E-36,793	



GEOLOGIC CROSS-SECTIONS OF EMERGENCY SPILLWAY (BASED ON OLD ALIGNMENT)

NOTE: SPA DETERMINED OFF OF OLD EMERGENCY SPILLWAY.



As-Built Plans 6-25-89

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Investigated by HARDING-LAWSON ASSOCIATES HOUSTON, TEXAS	Approved by STATE ENGINEERING BOARD, A.C.E.C. DAVID E. McCallum HOUSTON, TEXAS
Checked by DAVID E. McCallum	Sheet No. 23 of 23
Drawing No. 4-E-36,793	