STANDARD FORM NO. 64

Office Memorandum · UNITED STATES GOVERNMENT

TO : P. M. Price, State Conservation Engineer, SCS, Temple, Texas

DATE: September 29, 1961

FROM : Howard Matson, Head, E&WP Unit, SCS, Fort Worth, Texas

ENGINEERING FILE COPY

SUBJECT: OPERATIONS - Materials Testing Section Report, Texas, WP-08, Guadalupe River, Plum Creek, Site 21

Charlie M. Moore
Acting

ATTACHMENTS

1.	Form SCS-35, Plan and Profiles for Geologic Investigations	3 sheets
2.	Form SCS-352, Compaction Curves	5 sheets
3.	Form SCS-354, Soil Mechanics Laboratory Data	3 sheets
4.	Form SCS-372, Recommended Use of Excavated Materials	1 sheet

INTERPRETATION OF DATA & RECOMMENDATIONS

Foundation

The foundation materials consist of CL, ML, and CH soils. The CH material is predominant on the right side of the main stream channel and the CL material is predominant on the left side. The ML material exists between layers of shale in hole number 2, station 14 + 00. The CL, ML, and CH material is underlain by shale ranging in depths from 3' to 24' in the floodplain. The shale is at an undetermined depth in the abutments. Salt and dispersion have low to moderate values.

Based on the 20% size, the foundation materials should have very low permeabilities.

At station 28 + 00 settlement due to consolidation of the foundation should not exceed 2.4' of which 5% may occur during a construction period of four months.

Centerline Cutoff

The depths of excavation shown in the following tabulation should provide an effective cutoff in nearly impermeable materials.

RECOMMENDED CUTOFF DEPTHS

Station	Depth	Elevation	Bottom Materials
9 + 00	5.0	506.8	Clay
12 + 00	6.0	491.4	Sandy Clay
16 + 00	6.0	489.9	Silty Clay
20 + 50	10.0	480.2	Shale
22 + 00	8.0	491.0	Silty Clay
24 + 00	8.0	496.3	Silty Clay
29 + 40	11.0	488.7	Sandy Clay
32 + 00	5.0	508.3	Sandy Clay

Principal Spillway

Excavation for the foundation under the outlet structure should extend to a depth of approximately 11' at the intersection with the centerline of the dam.

At 11' depth, station 18 + 10 centerline of the dam, settlement under the conduit foundation should not exceed 0.5'. Settlement in 18' of materials surrounding the conduit foundation is estimated to be 1.5'.

At 11' depth, station 20 + 35 centerline of the dam, settlement under the conduit foundation should not exceed 0.1'. Settlement in 11' of material surrounding the conduit foundation is estimated to be 1.3'.

Borrow and Excavation

AASHO compaction tests were performed on two composite samples from the emergency spillway and three from the borrow area. Densities obtained are recorded on Form SCS-354. The samples tested classify as CL and CH soils with low dispersion. The CL materials represented by Curves 1, 2, 4 and 5 can be used any place in the embankment. The CH material represented by Curve 3 should be used in the center section of the embankment. Recommended placement densities and moisture contents are shown on Form SCS-372.

Embankment Design

A standard embankment design of 2-1/2:1 slope upstream should be stable. 2-1/2:1 slopes downstream with a 12' berm at approximately elevation 500' is recommended. This recommendation is based on a minimum safety factor of 1.5 using average or representative strength and density values and approximate stability analysis. Consideration has also been given to the possibility of delayed embankment slides as experienced in the same geologic formation (Kemp clay) in the Grays Creek Watershed.

Residual settlement within the embankment should not exceed 2% of the height of fill.

Considering foundation consolidation during construction, a total allowance of 2.8' should be added to the fill height for settlement of the foundation and embankment.

Drainage

No drainage measures are recommended.

cc: M. P. Frank, Fort Worth, Texas
Gene Vittetoe, Fort Worth, Texas
P. M. Browning, Temple, Texas
D. L. Bidwell, Seguin, Texas
Henry H. Swope, Waco, Texas
Rey S. Decker, Lincoln, Nebraska

FW-MTS-18
(Rev. 11-59)

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Invoice No. 79-62
Date 9-29-61
State Order No TX-A431-62
12X1067 TX-S(WP-08)2029
Lab Work Order No. 446

TO : H. N. Smith , State Conservationist, SCS
Temple, Texas

FROM : Howard Matson, Head, E&WP Unit, SCS
Fort Worth, Texas

SUBJECT: FISCAL - Reimbursement, Soil Analyses

The following reimbursements chargeable to Flood Prevention ( ); Watershed Protection (Pilot) ( ); Watershed Protection (PL 566) (x); Public 46 ( ); Great Plains ( ); Other ( ) are collections from:

Project and/or Site Plum Creek Site 21

Copies sent to P. M. Price Gene Vittetoe
Fiscal Office H. H. Swope

_____	Each Hydrometer Analysis	@ 3.75	_____
_____	Each Hydrometer Analysis with Total Salt	@ 5.00	_____
_____	Each Hydrometer Analysis with Dispersion	@ 5.25	_____
25	Each Hydrometer Analysis with Total Salt & Disp.	@ 6.25	156.25
4	Each Moisture-Density (Standard Compaction)	@ 22.50	90.00
1	Each Moisture-Density (Modified Compaction)	@ 24.50	24.50
_____	Each Dry Unit Weight	@ 1.50	_____
4	Each Specific Gravity	@ 3.05	12.20
2	Each Sand Sieve Analysis	@ 4.85	9.70
5	Each Gravel Sieve Analysis	@ 2.60	13.00
14	Each Atterberg Test	@ 13.50	189.00
_____	Each Sealing	@ 40.00	_____
_____	Each Freeze-Thaw & Wet-Dry	@ 15.00	_____
_____	Other		_____

Received 10/3/61

Asst. State Conservation Engineer

TOTAL $ 494.65

TX-254 (Rev. 1-60)
Temple, Texas

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FIELD COST OF WATERSHED WORK OF IMPROVEMENT
(PARTIAL, EXCEPTING VEGETATION)

Site No. 21 Date Construction Contract Completed 7-13-62

Subwatershed Plum Creek River Watershed Guadalupe

1. DETAIL SURVEYS FOR DESIGN

A. Personnel Cost	$ 2,677.05		
B. Per Diem Cost	$ 0		
C. Transportation Operations Cost	$ 191.64		
D. Miscellaneous Costs	$ 54.70		
Total Detail Survey Costs		$ 2,923.39	
Percent of Total Construction Cost (Item 8)			3.44 %

2. SOIL AND FOUNDATION INVESTIGATION

A. Personnel Cost	$ 1,020.43		
B. Per Diem Cost	$ 636.75		
C. Drilling Equipment Operations Cost	$ 221.24		
D. Transportation Operations Cost	$ 92.59		
E. Miscellaneous Costs	$ 10.65		
F. Clearing and/or Dozer Cost	$ 115.00		
Total Soil and Foundation Investigation Costs		$ 2,096.66	
Percent of Total Construction Cost (Item 8)			2.47 %

3. SOIL MECHANICS LABORATORY $ 494.65
Percent of Total Construction Cost (Item 8) 0.58 %

4. DESIGN AND CARTOGRAPHIC

A. Engineering Design Cost	$ 937.44		
B. Cartographic Cost	$ 427.93		
C. Other Costs	$ 0		
Total Design and Cartographic Costs		$ 1,365.37	
Percent of Total Construction Cost (Item 8)			1.61 %

5. CONSTRUCTION LAYOUT AND SUPERVISION

A. Personnel Cost	$ 5,519.82		
B. Per Diem Cost	$ 191.00		
C. Transportation Operations Cost	$ 825.08		
D. Miscellaneous Costs	$ 179.25		
Total Construction Layout and Supervision Costs		$ 6,715.15	
Percent of Total Construction Cost (Item 8)			7.90 %

6. FIELD OFFICE

A. Clerical Personnel	$ 408.54		
B. Rent, Storage, Utilities	$ 47.77		
C. Miscellaneous Costs	$ 0		
Total Field Office Costs		$ 456.31	
Percent of Total Construction Cost (Item 8)			0.54 %

(over)

7. TOTAL SURVEY, INVESTIGATION, LABORATORY, DESIGN & SUPERVISION COSTS (Sum of Items 1 through 6) $ 14,051.53
Percent of Total Construction Cost (Item 8) 16.54 %

8. FINAL CONSTRUCTION

A. Construction Contract
(1) Contract Cost $ 84,989.72
(2) Materials Furnished by Government $ 0
(see attached listing)
Total Construction Contract Cost $ 84,989.72

B. Relief Wells (Government Installed)
(1) Labor, Equipment & Transportation $ _____
(2) Materials Furnished by Government $ _____
Total Relief Well Costs $ 0

Total Construction Cost (Item 8) $ 84,989.72

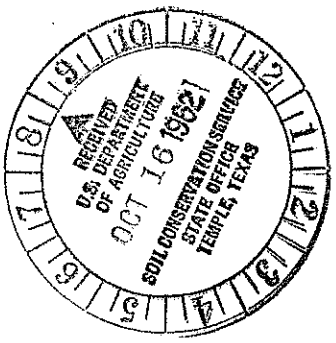
9. SUB-TOTAL FIELD COST OF SITE THROUGH COMPLETION OF CONSTRUCTION CONTRACT (Sum of Items 7 and 8) $ 99,041.25

Submitted by Dale L. Bidwell Dale L. Bidwell Government Representative Date 10-9-62

10. VEGETATION COST

A. Personnel Cost $ _____
B. Per Diem Cost $ _____
C. Transportation Cost $ _____
D. Miscellaneous Costs $ _____
E. Equipment Cost $ _____
F. Contract Cost $ _____
Total Cost to Establish Vegetation $ _____
Percent of Total Construction Cost (Item 8) _____ %

11. OTHER COSTS



A. Force Account Cost $ _____
B. Contract Cost $ _____
Total Other Costs $ _____

12. TOTAL FIELD COST OF SITE (Sum of Items 9 through 11) $ _____

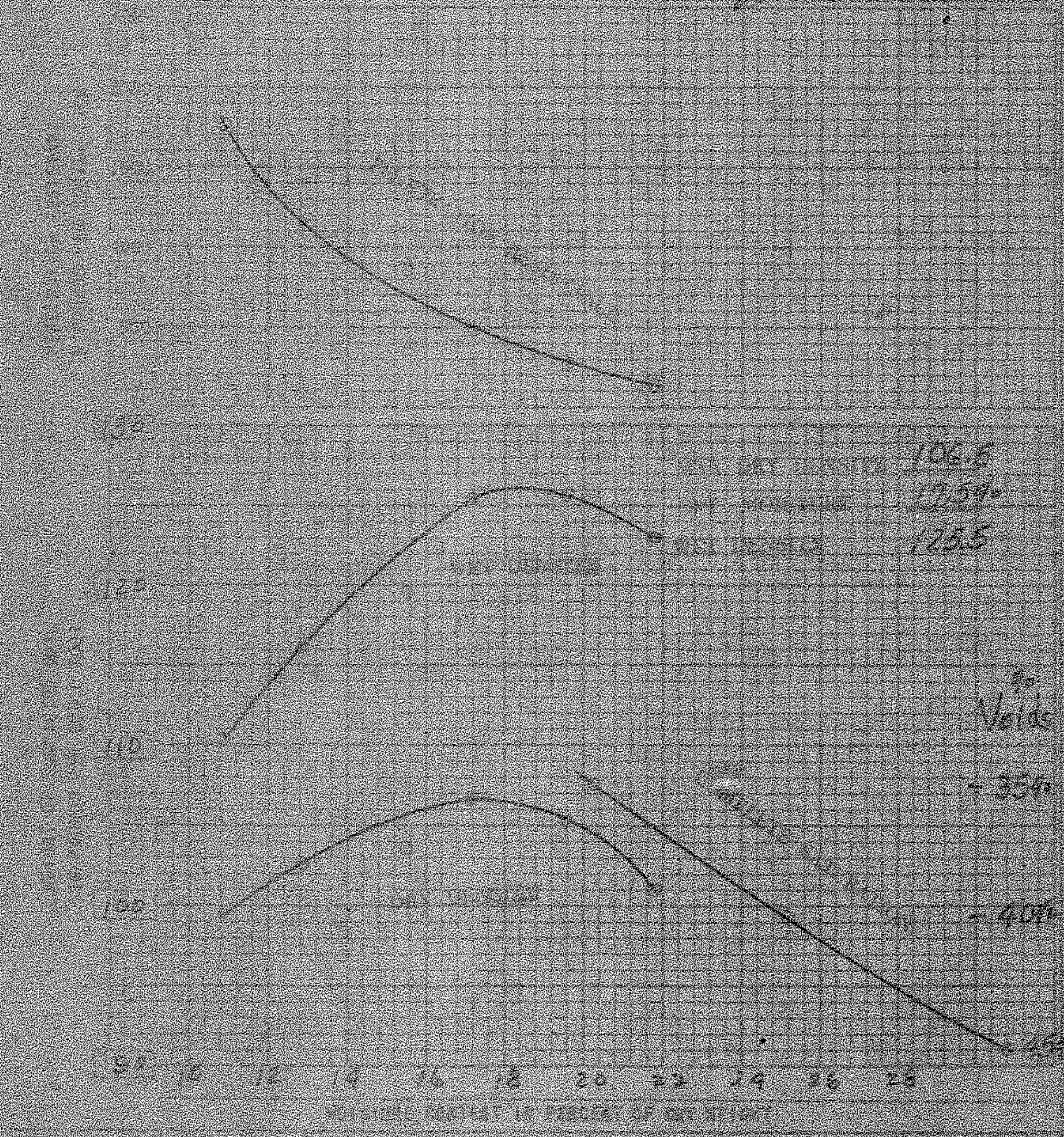
Submitted by _____ _____ Date _____
Title

Compaction F42-163

Plum 21 Texas

Borrow 11-61

JAH

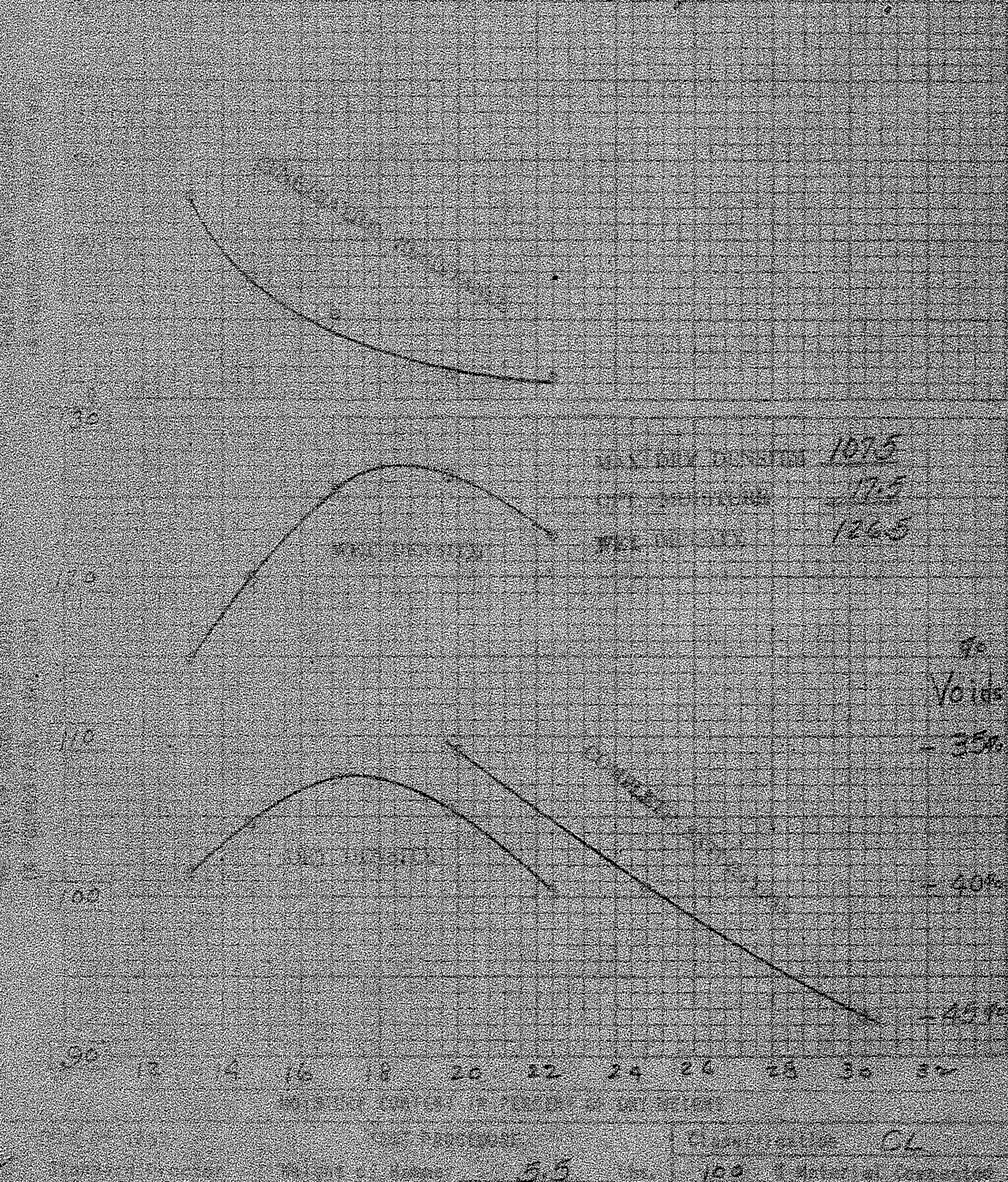


✓	55	CL
	12	100
	3	#4
	1/50	2.65
		1.6

Comp #2 F62-164

Plum 21 Texas

Borrow 2'-13'



MAX DRY DENSITY 107.5

OPT MOISTURE 17.5

WET DENSITY 126.5

Weight of Rammer 5.5 lbs.

Drop 12 inches

Layers 3

1/30

Classification CL

100 % Material Passing #4 Sieve

2.69

Page 2 of 5

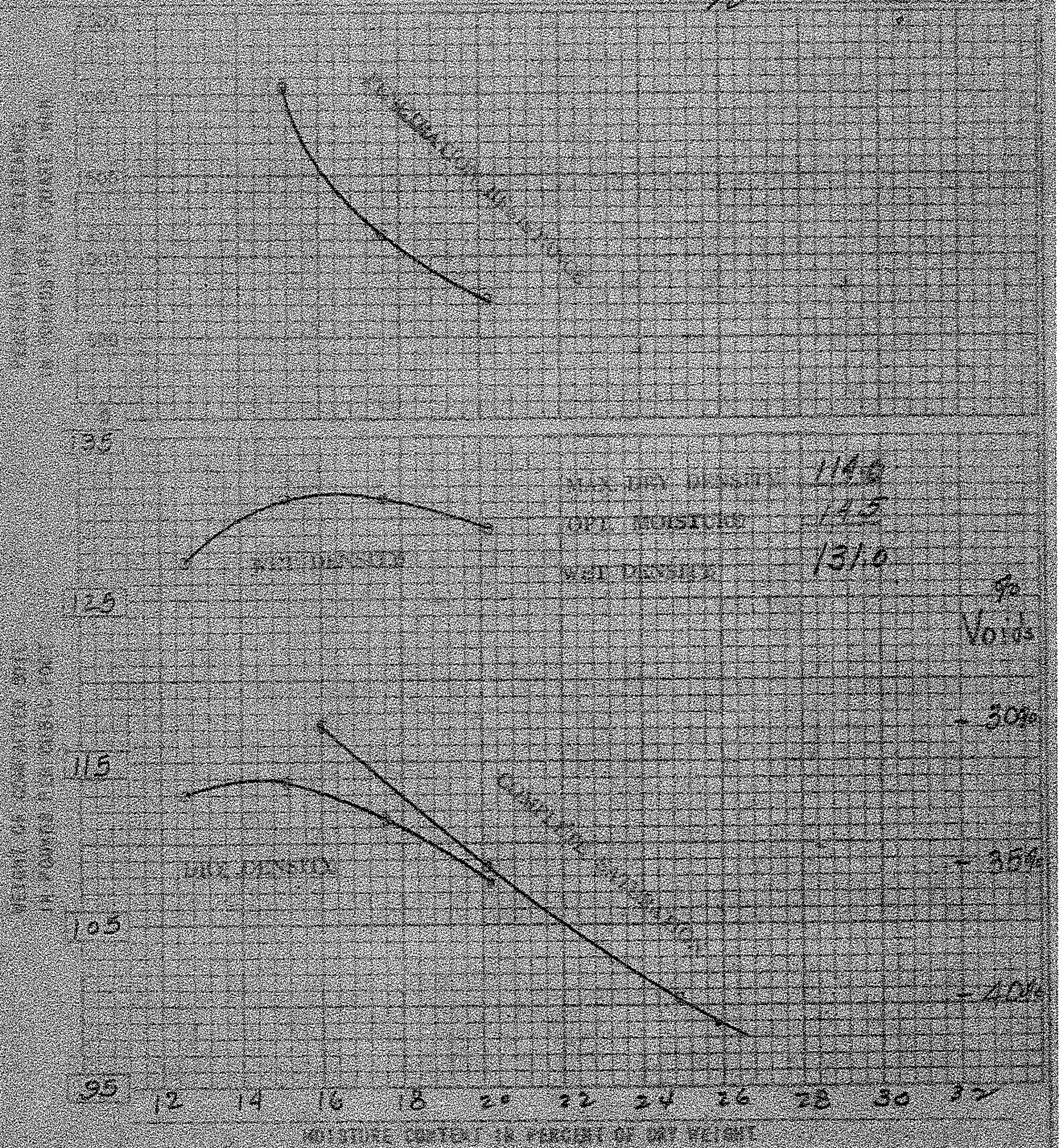
COMPACTION AND PENETRATION RESISTANCE REPORT

Date: 9-20-61 Sample No.: Field Comp #3 Lab F62-165

Project: Plum 21 Location: Texas

Sample Location and Depth: Borrow 8'-13'

Signature: [illegible]



TYPE OF TEST	TEST PROCEDURE		Classification CH
☐ Standard Proctor	Weight of Hammer	10.0 lbs.	100 % Material Compacted
☑ Modified AASHO	Drop	18 inches	Passed #4 Sieve
☐ Other	Layers	5	(Sp. Gr.) Gs = 2.68 gr/cc
	Vol. of Cylinder	1/30 cu.ft.	Curve 3 of 5

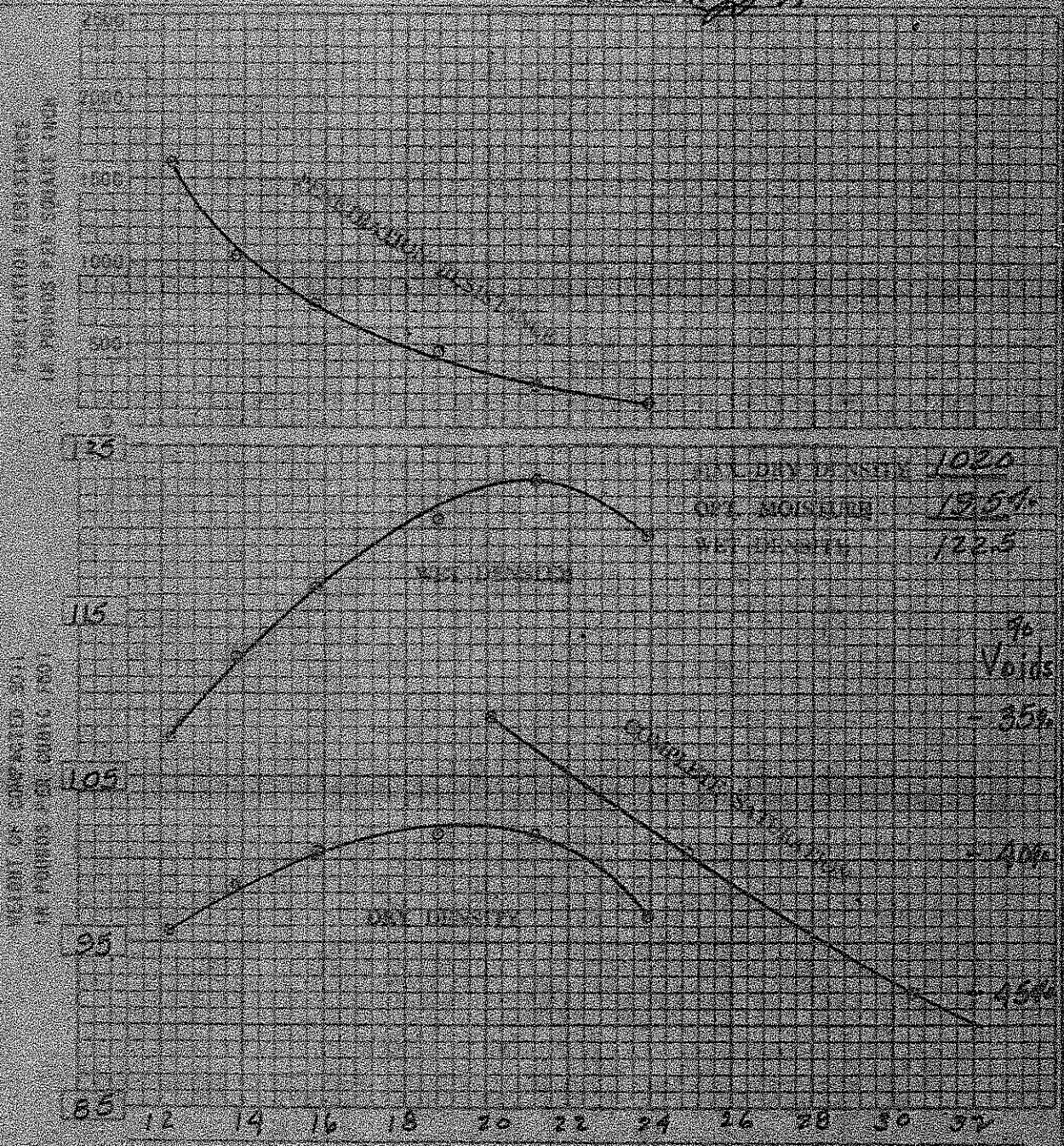
COMPACTION AND PENETRATION RESISTANCE REPORT

Date 9-20-61 Sample No.: Field Comp.#1 Lab F62-166

Project Plum 21 Location Texas

Sample Location and Depth ℄ Spillway 1'-4'

Signature: Roy



Type of Test	Test Procedure		Classification CL
☑ Standard Proctor	Weight of Hammer 5.5 Lbs.		100 % Material Compacted
☐ Modified AASHO	Drop 12 Inches		Passed # 4 Sieve
☐ Other	Mold 3		(Sp.Gr.) Gs 2.68 Assumed Estimated
	½ of Cylinder 1/30 Cu.Ft.		Curve 4 of 5

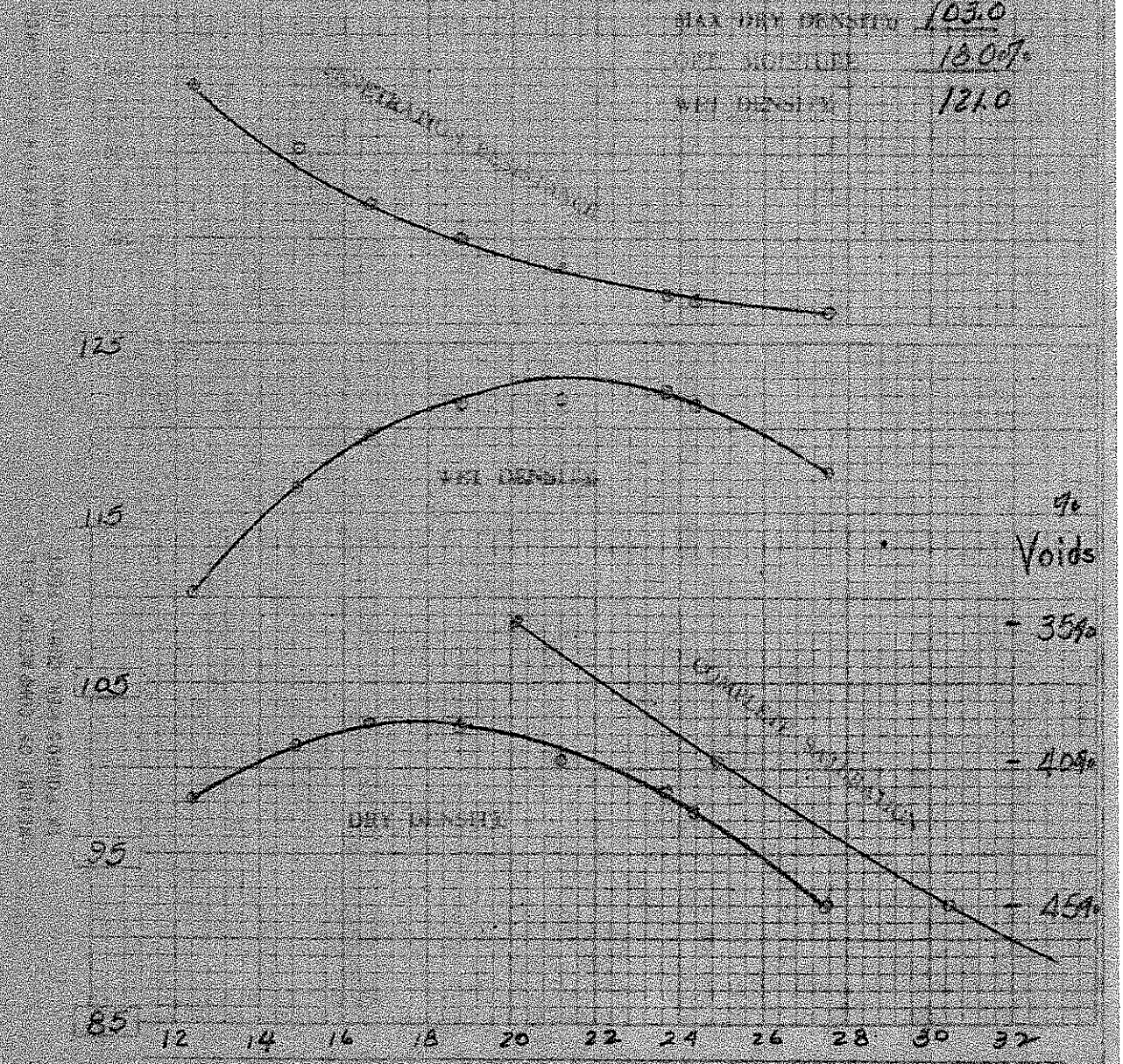
SM-1120

9-20-61 Comp #5 F62-167

Plum. 21 Texas

℄ Spillway 2'-20'

Dry



Laboratory Proctor	Test Procedure		Classification CL
Modified AASHO	Weight of Hammer	5.5 lbs.	100 % Material Corrected
	Drop	12 inches	Passed #4 Sieve
	Layers	3	(Sp.Gr.) Gs = 2.68 assd
	No. of Cylinder	1/30 Cu.Ft.	Curve 5 of 5

56-A10

SCS-378
(3/58)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RECOMMENDED USE OF EXCAVATED MATERIAL

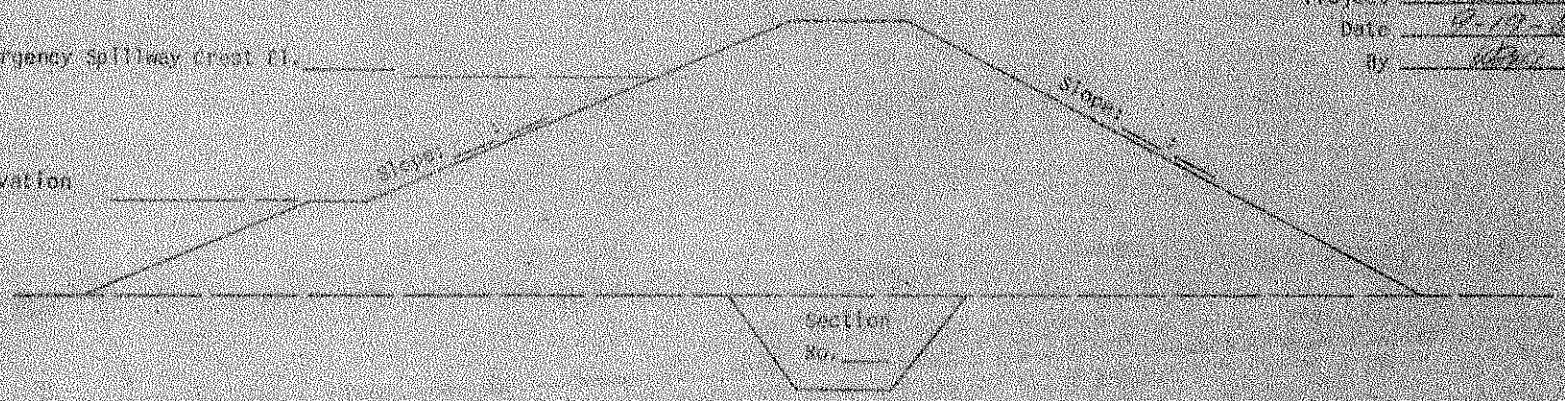
☐ Formal Zoning Plan ☒ Selective Placement Plan

State _____

Project _____

Date _____

By _____



TYPICAL EMBANKMENT SECTION

Embankment Section		Source of Fill Material			Lab. Sample No.	Lab Test		Curve No.	Compaction Requirements Class of Fill		
			Ave. Depth						Minimum Density	Moisture Range	
Sec. No.	Description	Location	From	To		Max. Den.	Optim. Moist.		Lbs. per Cu.Ft.	Percent From	To

Form SCS- 354
Rev. 3/59

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TEXAS GUADALUPE RIVER WP2-2 PLUM CREEK SITE 21

LABORATORY SAMPLE NUMBER	FIELD NUMBER	LOCATION AND DESCRIPTION	DEPTH	FIELD CLASSIFICATION	MECHANICAL ANALYSIS — GRAIN SIZE DISTRIBUTION EXPRESSED AS PERCENT FINER BY DRY WEIGHT — FINES 0.002 mm	0.005	0.02	0.05	#200 0.074	SANDS #140 0.105	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	GRAVEL 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	ATTERBERG LIMITS L.L.	P.I.	UNIFIED CLASSIFICATION	SOLUBLE SALTS %	DISPERSION %	MOISTURE-DENSITY RELATIONSHIPS (☒ STANDARD ☒ MODIFIED) CURVE NO.	DRY DENSITY γ IN LBS/FT³	OPTIMUM H₂O w IN %	UNDISTURBED SAMPLE DATA DRY UNIT WEIGHT g/cc	H₂O w IN %	Gs
F62.?																																
	153.1	BORROW A16+00	1.0–3.0	CH																												
	154.1	" A18+00	1.0–4.0	CH																												
163	155.1	" A20+00 Comp #1	1.0–6.0	CH	30	36	48	60	68					100								39	18	CL	1.02	6	1 Std	106.5	17.5			2.65
	157.1	" B19+00	1.0–4.0	CH																												
	158.1	" B17+00	1.0–2.0	CH																												
	159.1	" B15+00	1.0–3.0	CH																												
	153.2	BORROW A16+00	3.0–13.0	CH																												
	154.2	" A18+00	4.0–10.0	CH																												
164	155.2	" A20+00 Comp #2	6.0–13.0	CH	36	44	55	66	72					100								45	27	CL	2.17	5	2 Std	107.3	17.5			[illegible]
	157.2	" B19+00	4.0–[illegible]	CH																												
	158.2	" B17+00	2.0–[illegible]	CH																												
	159.2	" B15+00	3.0–[illegible]	CH																												
	153.3	BORROW A16+00	13.0–[illegible]	CH																												
	[illegible]	" A18+00	10.0–15.0	CH																												
[illegible]	[illegible]	" B19+00 Comp #3	[illegible]	CH	41	[illegible]	75	[illegible]	72					100								65	35	CH	0.61	4	3 Mod	114.0	14.5			[illegible]
	[illegible]	" B17+00	[illegible]	CH																												
	[illegible]	B15+00	[illegible]	CH																												

Form SCS-354
Rev. 3/59

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TEXAS GUADALUPE RIVER WP-2-2 PLUM CREEK SITE 21

Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	0.002 mm	0.005	0.02	0.05	#200 0.074	#140 0.105	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion %	Curve No.	Dry Density lbs/ft³	Optimum H₂O w in %	Dry Unit Weight g/cc	H₂O w in %	Gs
F62																																	
	251.1	150' Rt. 13+00 ℄ Spw.		1.0 4.0	CH																												
	252.1	145' Rt. 10+00 ℄ Spw.		1.0 4.0	CH																												
	253.1	℄ Spw. 13+70		1.0 3.0	CH																												
166	256.1	150' Lt. 13+70 ℄ Spw.	Comp. #4	1.0 3.0	CH	37	44	56	69	84					100								48	23	CL	<0.5	7	4 STD	102.0	19.5			
	201.1	145' Lt. 12+00 ℄ Spw.		1.0 3.0	CH																												
	257.1	145' Lt. 10+00 ℄ Spw.		1.0 2.0	CH																												
	261.1	℄ Spw. 10+00		1.0 2.0	CH																												
	262.1	℄ Spw. 12+00		1.0 2.0	CH																												
	252.2	145' Rt. 10+00 ℄ Spw.		4.0 6.0	SC-CH																												
	253.2	℄ Spw. 13+70		3.0 10.0	SC-CH																												
	256.2	150' Lt. 13+70		3.0 12.0	SC-CH																												
[illegible]	201.2	145' Lt. 12+00 ℄ Spw.	Comp. #5	3.0 20.0	SC-CH	25	34	53	77	94					100								44	18	CL	<0.5	15	5 STD	103.0	18.0			2.68
	[illegible]	145' Lt. 10+00 ℄ Spw.		2.0 13.0	SC-CH																												
	[illegible]	℄ Spw. 10+00		2.0 10.0	SC-CH																												
	[illegible]	℄ Spw. 12+00		2.0 13.0	SC-CH																												
[illegible]	[illegible]	[illegible]		1.0 8.0	SC-CH	24	29	40	52	64					100								34	12	CL	<0.5	14						
[illegible]	[illegible]	" [illegible]		[illegible]	SC-CH	13	14	17	29	33	24	27	37	39	32	36	43	48	55	66	83	100	58	28	GC	<0.5	7						
[illegible]	[illegible]	" [illegible]		[illegible]	CH	71	61	68	81	85					96	97	98	[illegible]	98	98	100		66	39	CH	0.78	6						
[illegible]	[illegible]	[illegible]		[illegible]	CH	33	39	51	62	79					100								43	24	CL	1.72	10						
	[illegible]	"		[illegible]	[illegible]	32	42	55	73	[illegible]					100											<0.5	14						
	[illegible]	"		[illegible]	CH-CL	[illegible]	47	66	85	92					100											<0.5	13						
[illegible]	[illegible]	"		[illegible]	CH	38	47	65	79	[illegible]					100											0.33	57						
[illegible]	[illegible]	"		20.0 24.0	CH	35	48	70	70	85					100											0.56	4						

Form SCS-354
Rev. 3/59

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TEXAS GUADALUPE RIVER
WP-2-2
PLUM CREEK SITE 21
FC2

LABORATORY SAMPLE NUMBER	FIELD NUMBER	LOCATION AND DESCRIPTION	DEPTH	FIELD CLASSIFICATION	FINES 0.002 mm	0.005	0.02	0.05	#200 0.074	SANDS #140 0.105	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	GRAVEL 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	ATTERBERG LIMITS L.L.	P.I.	UNIFIED CLASSIFICATION	SOLUBLE SALTS %	DISPERSION %	MOISTURE-DENSITY RELATIONSHIPS (☐ STANDARD ☐ MODIFIED) CURVE NO.	DRY DENSITY γ IN LBS/FT.³	OPTIMUM H₂O w IN %	UNDISTURBED SAMPLE DATA γ DRY UNIT WEIGHT g/cc	H₂O w IN %	Gs	
176	302.6	2+50 ℄ Sta. ≅ 18+10 ℄ Dam	24.5 29.0	CH	34	47	70	90	95					100								56	29	CH	0.55	6							
177	2.1	℄ Dam 14+00	0.0 6.0	CH	26	30	37	47	56					96	98	99	100								<0.5	16							
178	2.2	" "	6.0 16.0	SC-CL	24	32	43	63	70					97	98	100						39	16	CL	<0.5	18							
179	2.3	" "	16.0 20.0	CH	36	49	71	89	93					100											0.47	14							
180	2.4	" "	20.0 24.0	SC	20	26	38	63	87					100								37	10	ML	<0.5	23							
181	2.5	" "	24.0 28.0	CH	28	38	53	83	97					100											0.58	16							
182	3.1	" 16+00	8.0 12.0	SC	26	35	48	70	88					100											0.43	17							
183	1.1	" 12+00 (Core)	5.0 7.0	SC-CH																													
184	4.1	℄ Dam 22+00	2.0 8.0	GC-CH	27	31	39	46	51	52	54	56	59	65	70	77	79	84	87	96	100	55	30	CH	<0.5	9							
185	4.2	" "	8.0 16.0	CH	41	61	79	90	95					100								76	46	CH	<0.5	11							
186	4.3	" "	16.0 22.0	CH	45	60	81	92	95					100											1.40	8							
187	4.4	" "	22.0 26.0	CH	44	58	81	92	95					100											1.21	10							
188	4.5	" "	26.0 30.0	CH	41	56	80	93	95					100											<0.5	18							