Form SCS-376A
Sheet 1 of _____

10-59

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ENGINEERING
FILE COPY

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

GENERAL

State Texas County Caldwell ; ___ ¼, ___ ¼, Sec. ___, T ___ R ___ ; Watershed Guadalupe

Subwatershed Lower Plum Fund class 2035 (FP-2, WP-1, etc.) Site number 28 Site group 1 Structure class B

Investigated by Henry H. Sveum + Geol (signature and title), Equipment used Failing 1500 Acker (Type, size, make, model, etc.), Date 1-19-62

Dale L. Bidwell, P.E.

SITE DATA

Drainage area size 7.33 sq. mi., 4691 acres. Type of structure Compacted earth Purpose floodwater retarding

Direction of valley trend (downstream) SE Maximum height of fill 34 feet. Length of fill 3535 feet.

Estimated volume of compacted fill required 282,800 yards

STORAGE ALLOCATION

	Volume (ac. ft.)	Surface Area (acres)	Depth at Dam (feet)
Sediment	* 266	208	15.5
Floodwater	2832	365	34.5
_____	_____	_____	_____

*Includes sediment reserve

SURFACE GEOLOGY AND PHYSIOGRAPHY

Physiographic description Forested Coastal Topography rolling hills Attitude of beds: Dip 21 SE Strike NE-SW

Steepness of abutments: Left 4 percent; Right 5 percent. Width of floodplain at centerline of dam 1400 feet

General geology of site: Site 28 is located on an outcrop of the Wilcox group.

Form SCS-376B
Sheet ___ of.___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Centerline Dam
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Failing 1500	13	4	13 Denison		12
Acker	4				
Total	17				

SUMMARY OF FINDINGS
(include only factual data)

The following foundation conditions prevail at this site:
The near surface horizon is composed of CL-CH soils in the abutments generally, and very sandy CL soil in the valley floor segment.
The next horizon downward is composed of poorly correlative laminated CL and CH soils.
Water level is positioned on or in the horizons outlined above across the valley floor.
The next horizon is composed of poorly correlative materials consisting of CL-SC, lignite(poor quality coal).
The next horizon is composed of SM-SM, SM-SC, and SM soils. Lignite and water are also found in this horizon.
The next horizon, along with the one just above is considered parent material and is composed of lignite, laminated shale and sand, and SM materials.
Small quantities of bentonitic materials were found at great depths.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Centerline Principal Spillway
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Failing 1500	3	2	12 Denison		7
Total					

SUMMARY OF FINDINGS
(include only factual data)

Foundation conditions are the same as outlined for the valley floor segment of the centerline of the dam.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Left Abutment Emergency Spillway

(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Acker Auger	10	7		4	
Total					

SUMMARY OF FINDINGS

(include only factual data)

Four major material types were found in the left abutment spillway.
The upper horizon in the forebay and crest section was a coarse grained, very sandy CL material.
A sandy CH material was found in the top horizon of the upper part of the exit channel.
A coarse grained SC material was found to occur erratically in the second horizon.
The lower horizon throughout the forebay and upper part of the exit channel was a slightly sandy CH or CL-CH material.
Representative samples were taken of each of the major material types present.
Materials in the lower exit channel were similar to those found in the borrow area.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE: On the Abutment of Emergency Spillway
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Auger Auger	9	3		3	
Failing 1500	3	3			
D-7 Dozer	3	1			
Total	17	7			

SUMMARY OF FINDINGS
(include only factual data)

Three major soil horizons were found in the right abutment emergency spillway.
The top horizon is a sandy CL-CH material.
The second horizon is an SM material. This horizon contains a few small boulders in places and the horizon is not continuous throughout the spillway.
The lower horizon is a sandy to very sandy, laminated, CL material.
Representative composite samples were taken of each of the three horizons found.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Stream Channel
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Hand Auger	3				
Total					

SUMMARY OF FINDINGS
(include only factual data)

Loose SP-SM sands were found above sandy, laminated CL materials in the stream channel.
A water table was found at shallow depths in these sands.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Vertical Drains (relief wells) and Drain Line
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Failing 1500	6	6			36
Acker	4	4			20
Total	10	10			56

SUMMARY OF FINDINGS
(include only factual data)

Ten vertical drain (relief well) locations were tested and sampled. In addition the downstream principal spillway hole was sampled in lieu of a relief well test hole.

The sampling of the centerline of the dam along with the sampling of the relief wells was accomplished in such a manner that drain line filter gradation can be determined, if necessary.

Form SCS-376B
Sheet ___ of ___

USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

FEATURE Borrow
(Centerline of Dam, Principal Spillway, Emergency Spillway, the Stream Channel, Investigations for Drainage of Structure, Borrow Area, Reservoir Basin, etc.)

DRILLING PROGRAM

Equipment Used	Number of Holes		Number of Samples Taken		
	Exploration	Sampling	Undisturbed (state type)	Disturbed Large	Disturbed Small
Acker Auger	23	13		8	
Total					

SUMMARY OF FINDINGS
(include only factual data)

The borrow area was divided into two areal zones, according to the material types present, as shown on the grid sheets.
Two major horizons were found in zone A.
The upper horizon materials consist of very sandy CL's near the stream channel, sandy CL's in the central portion of the zone, and sandy CL-CH's near the hillside slopes.
The lower horizon contains mainly a sandy, laminated CL material.
An SC-SM material was found at one location in the lower horizon, near the stream channel.
Three major horizons were found in areal zone B.
A very sandy CH material was generally found in the upper horizon.
An SC-CL or very clayey SC material was generally found in the second horizon.
A sandy, laminated CL-CH material was found in the lower horizon.
An SC-SM material was found in the second horizon at one location near the stream channel.
Representative composite samples were taken of the three material types found in the upper horizon of zone A and of the lower horizon CL material of zone A.
Representative composite samples were taken of the three major horizons in zone B and a single sample was taken of the SC-SM material found in the zone.
A relatively high water table was found throughout most of the lower sections of the borrow as shown on the grid sheets.

Form SCS-376C
Sheet ___ of ___
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USDA-SCS

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

State Texas County Caldwell Watershed Guadalupe Subwatershed Lower Plum Creek

Site number 28 Site group I Structure class B Investigated by Henry H. Swope (signature and title) Date 1-19-62

INTERPRETATIONS AND CONCLUSIONS

Site 28 foundation is complex and contains many conditions that can be evaluated accurately only after testing, such as the bearing strength of the coal and the permeability of the laminated soils.

It was apparent in the field, however, that a drainage system should be installed since a positive cutoff cannot be achieved, and since some cross bedding exists. It is suggested that the drainage system consist of a drainage line which, in turn contains blind vertical drains(wells). This would relieve both water horizons.

If vertical drains containing pipe and screens(relief wells) are installed in deference to the above suggestions then care should be taken to re-investigate any relief well locations elected in lieu of one reported here, prior to awarding of the construction contract.

Materials from the keyway in the valley floor segment should be used as outlined for similar soils from the borrow area. Materials from the abutments should be used as outlined for the materials in spillway area.

It was planned to take Denison samples from test hole #10 but weather prevented doing so. A conference determined that disturbed samples would be taken in lieu of Denisons but Denisons could be taken later if the laboratory thought it absolutely necessary.

Principal Spillway: Recommendations outlined for the centerline of the dam also apply to the principal spillway. Materials used as backfill for the conduit foundation trench should be as similar as possible to those used in adjacent segments of the keyway or cutoff trench.

Borrow: Borrow materials are crossbedded and highly laminated, and a marked increase in the sand content in the materials is evidenced near the stream channel. Samples of materials from the borrow may be referred to similar materials throughout the borrow. This may be especially desirable for the very sandy CL and SC-SM materials found near the stream channel.

Depth of the borrow may necessarily be limited, due to the high water table present throughout most of the borrow.

The more plastic materials should be placed in the cutoff trench and center section of the dam; the less plastic materials should be used in the downstream section, or shell of the dam.

Left Abutment Emergency Spillway: CL and CH materials found in the left abutment spillway may be used anywhere in the dam, and the SC materials should be placed in the downstream section of the dam.

Materials in the lower exit channel section may be referred to similar materials found in the borrow.

A vegetative cover should be placed on the spillway soon after construction to help reduce the effects of erosion.

Right Abutment Emergency Spillway: The CL-CH and CL materials found in this spillway may be used anywhere in the dam.
The SM materials should be used in the downstream section of the dam.
Small boulders which may be found in the SM horizon may be placed under a berm.
A vegetative cover should be placed on the spillway soon after construction to help reduce the effects of erosion.

Stream Channel: Removal of the SP-SM materials through ordinary stream channel preparation may be desirable.

Trial Form

REPORT TO ACCOMPANY
DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

SAMPLES OF FOUNDATION MATERIALS FOR LABORATORY TESTS

Watershed [illegible] Site No. [illegible]

Hole No.	Sample Type	Field Class.	Depth From	Depth To	Type of Test: M.A.	Shear	Cons.	Perm.	Salt	Disp.
303	Core	CH	43.0	45.0	Observation					
[illegible]	[illegible]	CL	0.0	6.0	X				X	X
302	"	CL	6.0	10.0	X				X	X
[illegible]	"	CH	10.0	16.0	X				X	X
302	"	CH	16.0	20.0	X				X	X
[illegible]	"	CH	20.0	26.0	X				X	X
302	"	Lignite	26.0	31.0	X				X	X
[illegible]	"	CH	31.0	36.0	X				X	X
1	"	CL-CH	1.0	6.0	X				X	X
1	"	CL-CH	6.0	10.0	X				X	X
1	"	CH-SC	10.0	12.0	X				X	X
1	"	CH	12.0	18.0	X				X	X
1	"	CH	18.0	32.0	X				X	X
1	"	Lignite	32.0	34.0	X				X	X
1	"	CH	34.0	36.0	X				X	X
7	Core	CL	2.0	6.0	X			X	X	X
7	"	CH	10.0	12.0	X	X	X	X	X	X
7	"	CH	32.0	34.0	Observation					
303	"	CL	2.0	4.0	X	X	X	X	X	X
[illegible]	"	CL	6.0	8.0	X					
303	"	CL	8.0	12.0	Observation					
[illegible]	"	CH	10.0	12.0	X	X	X	X	X	X
303	"	CH	12.0	14.0	X	X	X	X	X	X
[illegible]	"	CH	14.0	16.0	Observation					
303	"	SH	18.0	20.0	X			X	X	X
[illegible]	"	Lignite	26.0	28.0	X	X	X	X	X	X
303	"	"	27.0	29.0	Observation					

Comments: _____

Sheet 1 of 3

Trial Form

REPORT TO ACCOMPANY
DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

SAMPLES OF FOUNDATION MATERIALS FOR LABORATORY TESTS

Watershed Lower Flint Creek Site No. 28

Hole No.	Sample Type	Field Class.	Depth From	Depth To	Type of Test M.A.	Shear	Cons.	Perm.	Salt	Disp.
1A3	Disc	CH	11.0	13.0	X				X	X
2A3	"	CH	13.0	15.0	X			X	X	X
1A	Plat	CL	8.0	10.0	X				X	X
1A	"	CL	10.0	14.0	X				X	X
1A	"	CL-CH	14.0	18.0	X				X	X
1A	"	CL	18.0	24.0	X				X	X
1A	"	CH-CL	24.0	32.0	X				X	X

Comments: _____

Sheet 1 of 3

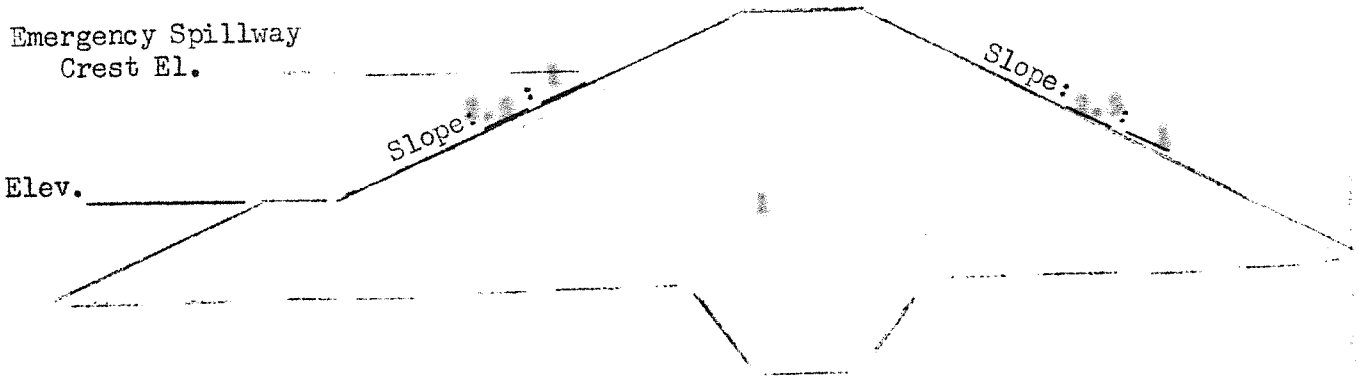
Trial Form

REPORT TO ACCOMPANY
DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

COMPOSITE SAMPLES FOR MOISTURE DENSITY DETERMINATION

Watershed [illegible] Site No. [illegible]

SUGGESTED EMBANKMENT SECTION(S)



SUGGESTED USE OF MATERIALS

Comp. No.	Material Source	Hole Nos.	Field Class.	Depth From	Depth To	Emb. Sec.	Quan. Avail. (Est.) Cu. Yds.
1	Borrow	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Comments: [illegible]

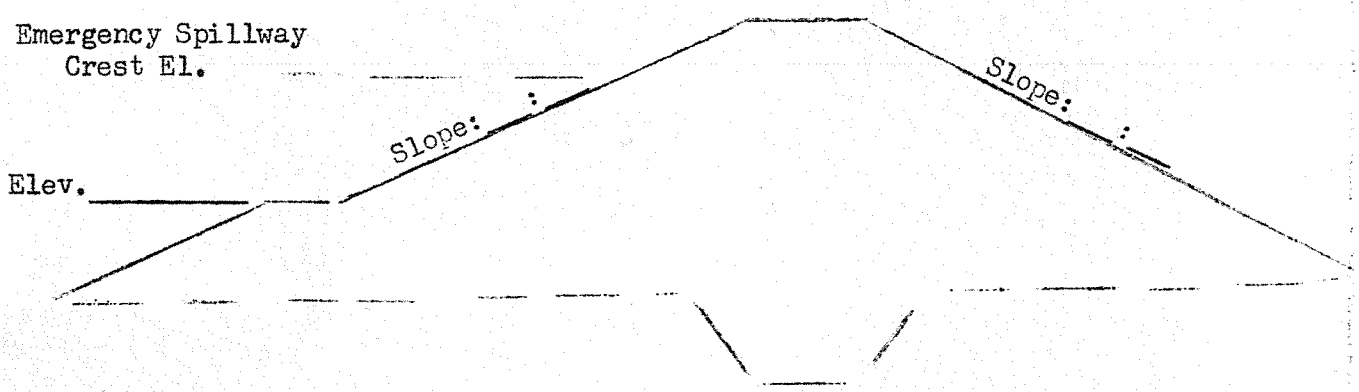
Trial Form

REPORT TO ACCOMPANY
DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

COMPOSITE SAMPLES FOR MOISTURE DENSITY DETERMINATION

Watershed _____ Site No. _____

SUGGESTED EMBANKMENT SECTION(S)



SUGGESTED USE OF MATERIALS

Comp. No.	Material Source	Hole Nos.	Field Class.	Depth From	Depth To	Emb. Sec.	Quan. Avail. (Est.) Cu. Yds.
9	Emer. Spwy	238	CH	1.0	4.0	1	3,000
10	Emer. Spwy	267,2200,204	CL-CH	1.0	4.0	1	45,000
11	" "	261,268,236	CH	4.0	8.0	1	15,000
12	" "	203,267	CL	4.0	Grade	1	90,000

Comments: _____