

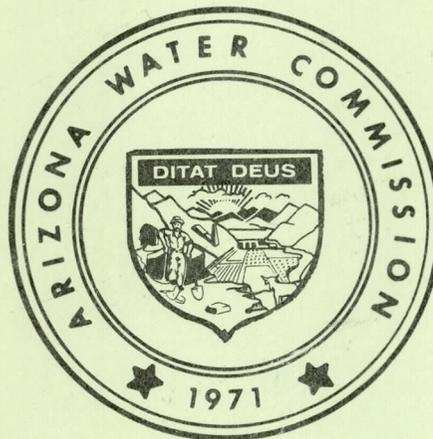
LIBRARY

LIBRARY

Name of Dam: Guadalupe Flood Retarding-Az. Dam No.(7-43)  
County and State: Maricopa, Arizona  
Inventory Number:

# PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

STATE OF ARIZONA



OFFICE OF THE STATE WATER ENGINEER

Prepared by: Arizona Water Commission  
Supervision of Dam Safety  
Phoenix, Arizona

For: Los Angeles District Corps of Engineers  
Date: January 1979

A205.906

LIBRARY

LIBRARY

PHASE I REPORT

National Dam Safety Program

Name of Dam: Guadalupe Dam (7-43)

State Located: Arizona

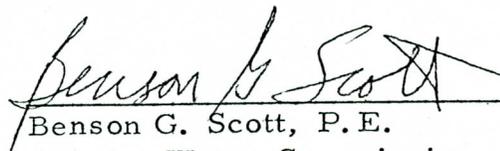
County Located: Maricopa

Stream: Unnamed Wash

Date of Inspection: June 6, 1978

This small flood retarding dam is in excellent condition. It is conservatively designed, adequately maintained and under jurisdiction of the State's Division of Safety of Dams. There is no need for further investigation, but the Commission should obtain missing quality control records and design data not presently in their files. The aspect of downstream damage from spillway operation should be investigated.

Submitted by,



Benson G. Scott, P.E.  
Arizona Water Commission  
Chief, Supervision of Dam Safety  
Arizona Registration No. 8169

LIBRARY

## Guadalupe Dam (7-43)

### Phase I Inspection

Introduction: The purpose of this report is to evaluate the safety of a nonfederal dam in accordance with the National Dam Inspection Act, Public Law 92-367.

Since 1971, all nonfederal dams in Arizona 25 feet or more in height or storing more than 50 acre-feet of water have been under jurisdiction of the State Water Engineer for the protection of life and property from the consequences of a failure or malfunction of a dam. Experienced professional engineers of the Arizona Water Commission carry out the program for safety of dams by review and approval of designs for new dams or major repair to existing dams, supervision of construction for all new dams and for repair to existing dams, and surveillance of existing dams by periodic inspection and evaluation.

Guadalupe Dam was designed and constructed and has been operated under the regulatory control of the Commission as documented in this report. Attached as part of the report are photographs, drawings and data sheets.

1 & 2. Location and Description. Guadalupe Dam and Reservoir are located in Sections 5 and 8, Township 1S, Range 4E, G & SR B&M. The dam is across several unnamed, small washes, tributary to the Salt River and separated from the community of Guadalupe only by a section of Interstate Freeway Route 10. The earthfill dam has a crest length of 6,070 feet, a crest width of 14 feet, upstream and downstream slopes of 3:1 and has a maximum height of  $34\frac{1}{2}$  feet. The dam is composed of four major sections or dikes, three of which make up the reservoir storage area. The North Dam #1 closes off the reservoir basin on the west side. The North Dam #2 closes off the reservoir on a north-westerly trending leg while the East Dam runs parallel to Interstate 10 in a north-south direction to terminate at the Guadalupe Road overcrossing. In addition, there is a training dike to divert additional runoff into the reservoir just south of the Guadalupe Road overcrossing. The unlined spillway is excavated through a granite knob between the North Dam #1 and the North Dam #2. The outlet consists of a complex drop inlet structure with a louvered trashrack conveying discharge into a 30-inch reinforced concrete pipe through North Dam #2 to a stilling basin at its downstream toe. The dam is a flood retarding structure to protect the community of Guadalupe and also an area lying north of the dam. It will never have a permanent storage pool.

3. Hazard Potential. With its capacity of 298 acre-feet and height to spillway crest of 27 feet the structure qualifies as a small-to-intermediate sized dam. Its location immediately adjacent to an interstate freeway, the town of Guadalupe and a semi-agricultural area that is rapidly changing to an urban area, calls for

a hazard potential of high. Any discharge from the spillway would cause severe property damage. Failure of any of the three segment of dam embankments would cause severe property damage and heavy loss of life.

4. Project Documentation. An application to construct the Guadalupe Flood Control Dam was filed on June 11, 1974 by the Maricopa County Flood Control District, owner of the dam. The United States Soil Conservation Service, under the authority of Public Law 566, acted as engineer for the owner and prepared plans and specifications. They also supervised construction. Submitted with the application were the necessary support documents to permit the independent review by the Commission staff, including plans, specifications, and design reports.

5. Geology. After site inspection an evaluation by an engineering geologist from the Commission staff concurred with the owner's engineer in site suitability. The site is located at the eastern edge of South Mountain, a fault-block mountain within the Basin and Range Physiographic Province. South Mountain is composed of very old granite gneiss and schist that have been intruded by younger granitic rocks, and is flanked by alluvial fans. Faults presumably border the mountain but there are no known faults at or near the damsite. During the site investigation foundation conditions in the dams and spillway and outlet, as well as potential borrow sources, were examined by both test pits and test holes.

6. Seismicity. Earthquakes have not been common in the Phoenix region during the 120 years or so of recorded seismic history in Arizona, and no active faults have been identified in the region. The most severe shocks felt in the Phoenix area originated outside the state and registered V-VI on the Modified Mercalli Scale. Earthquakes that originated in the Phoenix region ranged in intensity from II-V. Based on the geology and seismic history of the area, the site could experience an expected maximum probable intensity of VI-VII on the Modified Mercalli Scale.

7. Foundation Conditions. The three dams are underlain by both bedrock of South Mountain and alluvial material derived from it. Both abutments of North Dam #1 are composed of highly fractured granite gneiss. The central portion of the foundation is silty sand and gravel interbedded with caliche layers. Maximum depth to bedrock is 13 feet. North Dam #2 has the same type of foundation as #1 except the maximum depth to bedrock is 24 feet. The foundation for East Dam is predominantly silty sand, silty sandy gravel and silt interbedded with caliche cemented layers. The north abutment is highly fractured granite gneiss. Surficial soils for all dams have potential for consolidation.

8. Foundation Treatment. The foundations for all three dams were stripped of material with consolidation potential (one to five feet) after the area had been prewet. The cutoff for the East Dam was carried to firm calcareous, cemented sand gravel mixture at depths of 5 to 10 feet below original ground. At the two north damsites the cutoff trench was carried to bedrock with depths

to 20 feet and surface fractures in the rock sealed with slush grout. The spillway is a 200' wide unlined section located in a ridge between the two north dams in a highly fractured granite gneiss or possibly schist. The outlet structure was also located in this same bedrock beneath the North #2 Dam.

9. Embankment Design. The dam is a homogeneous earthfill dam constructed of silty sand with fines ranging from 20 to 40 percent. Laboratory moisture density tests ranged from 105 to 125 pounds per cubic ft. with optimum moisture from 9 to 17.3 percent. Direct shear showed a phi angle of  $27\frac{1}{2}$  degrees. The design called for a 14 foot crest width and 3:1 upstream and downstream slopes with finer material placed in the central portions of the dam. All embankment borrow material came from the reservoir. Minimum density was 95 percent of Standard AASHTO at optimum moisture. Based upon material characteristics, dam height and anticipated loading conditions the embankment design was adequate.

10. Outlet. The 30-inch reinforced concrete pipe conduit is founded on weathered granite through the center of North Dam #2. It is bedded in a concrete cradle to the springing line for its entire length. There are 8 anti-seep collars spaced at 16 feet on centers through the central portion of the dam to prevent seepage from moving along the conduit. The reinforced concrete intake tower is designed to evacuate reservoir storage from the 100-year storm at a maximum rate of 32 cfs by virtue of a 24-inch controlled gate on the inlet structure. The rather complex intake structure is designed to prevent the entrance of a heavy silt load into the discharge system. A stilling basin is located at the downstream toe of the dam from whence flow is conveyed via an open channel into a 24-inch pipeline. The terminal point of the pipeline is some one mile distant to an irrigation canal. The reinforced concrete pipe is adequate to resist the design load for the nonyielding foundation.

11. Spillway. The spillway is 200 feet wide with a total freeboard of 7.5 ft., excavated through granite rock at the left abutment of Dam #2. The rock of the unlined spillway is adequate to resist erosion from the infrequent flows that will occur.

According to Corps of Engineers classification criteria, Guadalupe Dam is a small structure with a high downstream hazard. The recommended spillway design flood for this classification ranges from  $\frac{1}{2}$  the Probable Maximum Flood (PMF) to the PMF.

A local six hour Probable Maximum Storm was developed for the watershed using procedures outlined in HMR-49, "Probable Maximum Precipitation Estimates, Colorado River and Great Basin Drainages", dated September 1977, prepared by the National Oceanic and Atmospheric Administration. This storm was routed through the structure using the Soil Conservation Service watershed modeling program "TR-20". The routing was performed with an initial water surface at spillway crest elevation. The spillway is capable of passing 100 percent of the PMF with no residual freeboard.

The spillway design is adequate. However, in future years as the area downstream of the spillway develops, changing from primarily agricultural to urban, any discharge will cause severe damage.

12. Specifications. The specifications governing construction of the dam were developed from standard Soil Conservation Service specifications with the addition of the special sections to cover those features pertinent to this dam. Commission review concerned itself with foundation preparation, embankment placement, embankment moisture condition, embankment density, control of drain fill, installation of filter drain pipe, structural backfill, and control over concrete. With the exception of a few minor points the construction specifications were satisfactory to the Commission.

13. Construction. The application for construction was approved by the State Engineer on July 29, 1974 and construction was underway by early fall of that year. The first foundation inspection by Water Commission engineers was on November 7, 1974 at which time foundation preparation was well along. All construction supervision and quality control was done by the Soil Conservation Service staff. Embankment quality control was in accordance with specifications and records of tests are available in Commission files. There were no unusual problems associated with construction and all work was completed and accepted on April 3, 1975. A license to operate was issued on July 22, 1975.

14. Data on File. The following data is on file with the Commission:

(Items 1 through 4 are also in the permanent records of the Soil Conservation Service)

1. As-built plans
2. Construction specifications
3. Preliminary design report
4. Geologic investigation report
5. Inspection reports with photographs by Commission engineers covering construction of the project. Inspection reports with photographs by Commission engineers since completion of the project.

15. Instrumentation. There is no instrumentation on this project.

16. Operational Surveillance.

A. Inspections: The dam is inspected annually by Commission engineers. The dam was inspected in March 1976, April 1977 and April and June 1978. At the time of the most recent inspection an engineer from the Commission inspected the dam with representatives of the Maricopa County Flood Control District, Owner of the dam. The reservoir was totally dry at the time of inspection although there had been about 4 feet of impoundment in the vicinity of the intake structure during recent floods of March 1978. The embankment was generally in good condition except for some small erosion gullies on the

slopes of the embankment. The crest was well graded with no settlement, cracking or evidence of rodents. The exterior of the intake structure was in good condition. The interior was not inspected but on the next regular inspection arrangements will be made to enter and examine the interior. The spillway is unchanged from construction as it has not operated yet. The overall condition of the dam is good. The potential for damage downstream in the event of failure is high. A study of direction and wave height of spillway discharge should be made.

B. Future Activity: The Commission will continue to inspect this structure at yearly intervals and also after periods of heavy inflow. As mentioned earlier, any spillway discharge would impinge upon an area presently undeveloped but with future potential for urban development. A study of the effect of spillway discharge on this area will be made by the Commission. It may be necessary after a number of years to remove silt buildup from around the low level intake and to repair erosion gullies as they become more prominent. The design did provide for storing a significant amount of silt below the level of the intake structure.

#### 17. Appraisal of the Project.

A. Conclusions: The proposed project is in satisfactory condition with no problems other than some routine maintenance of erosion of the embankment surface to be accomplished. There is no evidence of any problem that will affect the safety of the dam. The structure has been designed and constructed in accordance with practices acceptable within the profession. The dam is capable of operating under the most severe condition up to and including a flood from the probable maximum precipitation. Operation and maintenance is above normal. There is no need for any further investigation beyond this Phase I report.

B. Recommendations: Construction quality control records and the design report presently not in Commission files should be acquired for completion of the record. Because the dam is unattended and because discharge from the emergency spillway could cause damage downstream, it might be well for the Flood Control District to consider installation of a warning system to alert local emergency services people in time of extreme floods.

STATE OF ARIZONA  
ARIZONA WATER COMMISSION  
Supervision of Dam Safety

DATE: 4/13/78

- - Informational Summary Sheet - -

Name of Dam Guadalupe Flood Retarding Dam No. 7-43

Type of Dam Earthfill Use Flood Control Located in Maricopa County

Located on Unnamed Wash (stream), A Tributary to Salt River

Sec. 5 & 8 Twp. 1S Range 4E, G & SR B&M

The attached location map is a portion of the Guadalupe USGS

(7½) or ) Quadrangle.

The following additional maps may be helpful \_\_\_\_\_

Special access problems? Yes X No \_\_\_ If Yes see comments on attached map.

DAM:

Height 27 ft. U/S Slope 3:1 D/S Slope 3:1

Crest Elev. 1281.5 Crest Width 14 ft. Crest Length 6,070 ft.

SPILLWAY:

Crest Elev. 1274.0 Type Broad crested, un- Capacity 12,000 CFS  
controlled

Freeboard 7.5 ft. Width 200 ft. Side Slopes 1½:1

Flashboards? No If yes, Height \_\_\_\_\_

Controlled? No If yes, Describe \_\_\_\_\_

Spillway will operate at inflow floods greater than 100-year frequency flood.

OUTLET:

Type Conduit thru dam Dim. 30" R/C Cylinder Pipe Capacity 32 CFS

Controls 12" diameter orifice for low flows. Two 24" slide gates for total evacuation.

Emergency Operation Reservoir will drain naturally to El 1259 (top of sediment

pool). Both 24" gates are normally closed and outflow is limited by the 12" orifice.

Sediment pool is drained after settlement of sediment has occurred by opening 24" gate controlled from dam crest.

(over)

STATE OF ARIZONA  
ARIZONA WATER COMMISSION  
Supervision of Dam Safety

DATE: 4/13/78

- - Informational Summary Sheet - -

Name of Dam Guadalupe Flood Retarding Dam No. 7-43

Located 1/4 Sec. 5 & 8 Twp. 1S Range 4E, G & SR B&M

OWNER ENGINEER

Name Maricopa Co. Flood Control Dist. Name Herbert P. Donald, Chief Engineer

Address 3325 W. Durango Street Address Same

Phoenix, AZ 85009

Phone 262-1501 Phone Same (Home 959-8692)

Emergency 273-1411

OTHER IN EMERGENCY CONTACT:

Name Jack Leavitt, Operations Chief, Maricopa Co. Flood Control District

Address 3325 W. Durango Street Nearest Communication to Dam

Phoenix, AZ 85009

Phone 262-1501

Emergency 273-1411

LAW ENFORCEMENT

Maricopa County Sheriff Local Police

Address 102 W. Madison Avenue Address

Phoenix

Phone 258-6941 Phone

STATE OF ARIZONA  
ARIZONA WATER COMMISSION  
SUPERVISION OF DAM SAFETY

FLOOD ESTIMATE AND SPILLWAY ANALYSIS

Name of Dam Guadalupe Type of Dam Earthfill Dam No. 7-43  
County Maricopa Hydrologic Class Size = Small\*/Hazard = High  
Located on Unnamed Wash Tributary to \_\_\_\_\_  
NE 1/4 Sec. 5 Twp. 1 S Range 4E G & SR B & M  
USGS Quadrangle Guadalupe, AZ (7 1/2), 15' (Circle One)

I. DRAINAGE BASIN

1. Drainage Area - Sq. Mi. 1.87
2. Channel Reach Length, Ft. \_\_\_\_\_
3. Maximum Elevation 2550
4. Minimum Elevation 1280
5. Avrg. Watershed slope, % \_\_\_\_\_
6. Cover Density, % \_\_\_\_\_
7. Cover Type, \_\_\_\_\_
8. Soil Group D
9. Runoff Curve Number 93
10. Impaired? no

II. DAM AND RESERVOIR

1. Reservoir Area @S/W. Ac. 27
2. Res. Cap. to S/W A.F. 298
3. Surcharge Storage-A.F. 225
4. S/W Crest Elev. 1274.0
5. Dam Crest Elev. 1281.5
6. Total Freeboard Ft. 7.5
7. Max. Storage Level \_\_\_\_\_
8. Gated or Ungated Ungated
9. Max. S/W Q, -cfs 12220

\*According to Corps of Engineers criteria.

Sketch of Spillway Attached, as per SCS As-Built Drawings Date \_\_\_\_\_

Remarks, Special Conditions, Etc. \_\_\_\_\_

Calculated by W. C. Jenkins Date 12-78

Checked by \_\_\_\_\_ Date \_\_\_\_\_

## FLOOD HYDROLOGY

Name of Dam Guadalupe

No. 7-43

	PMF*	PMF**		
1. Flood Type				
2. Storm Precip-In.	15.1	15.1		
3. Precip, Dur. - Hr.	6	6		
4. Peak Intensity - In/Hr.		11.2		
5. Time of Concentration - Hr.	0.9	0.9		
6. Peak Inflow - cfs	8469	13385		
7. Peak Inflow - csm	4529	7158		
8. Runoff - A.F.	1419	1391		
9. Runoff - In.	14.2	13.9		
10. Runoff Coeff.	93	93		
11. Routed?	Yes	Yes		
12. Peak Outflow - cfs	7822	12221		
13. Peak Outflow - csm	4183	6535		
14. Max. Water Surface Elev.	1279.5	1281.5		
15. Residual Freeboard	2.0	0.02		
16. Diverted Inflow, cfs	-	-		
17. Check Adopted Flood				

Remarks:

Initial reservoir water surface at spillway crest, outlet presumed plugged.

\* Precipitation time distribution per SCS 6-hour storm.

\*\*Precipitation time distribution per HMR-49 thunderstorm criteria.

Guadalupe Dam



Photo 1 (January 9, 1979) - East Dam and North Dam #2. Outlet intake structure.

Guadalupe Dam



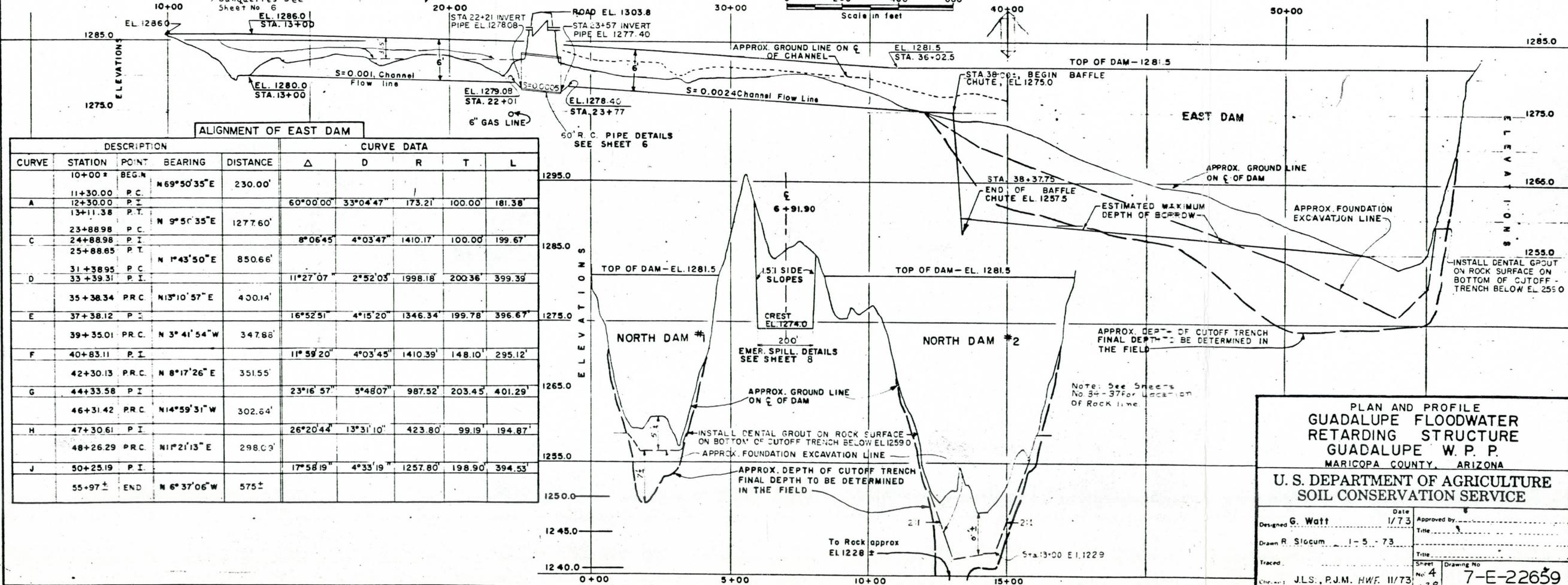
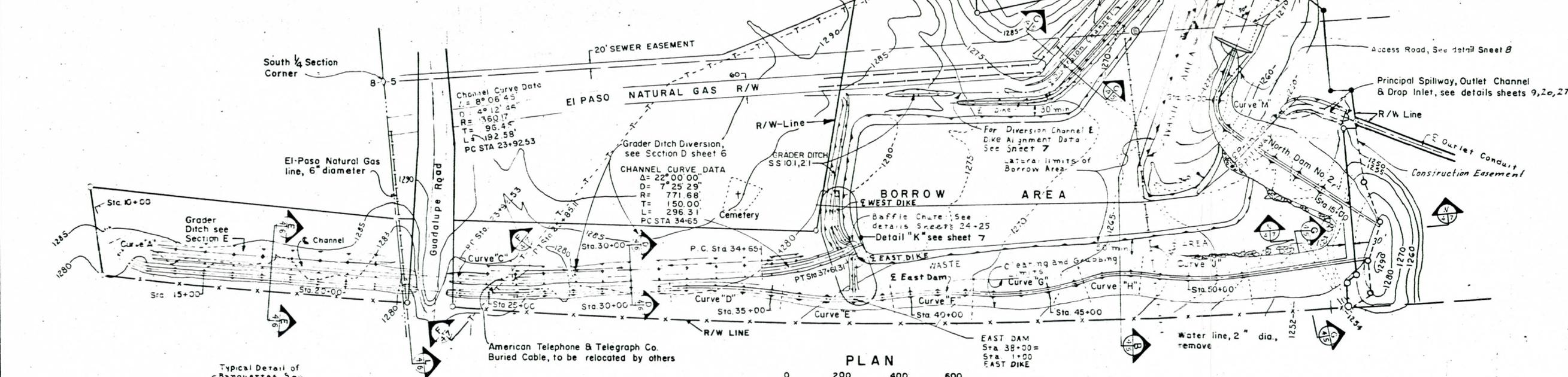
Photo 2 (January 9, 1979) - Upstream face of North Dam #2 and outlet intake structure.



Photo 3 (January 9, 1979) - Looking across North Dam #1 and down emergency spillway channel.

STATE OF ARIZONA  
OFFICE OF STATE WATER ENGINEER  
SUPERVISION OF DAMS  
APPLICATION NO. 7-43, INCLUDING  
THIS DRAWING, WAS APPROVED ON  
JUL 29 1974  
WESLEY E. STEINER  
STATE WATER ENGINEER  
*Benson G. Scott*  
BY: BENSON G. SCOTT  
CHIEF, SUPERVISION OF DAM SAFETY

ALIGNMENT OF NORTH DAMS									
DESCRIPTION					CURVE DATA				
CURVE	STATION	POINT	BEARING	DISTANCE	Δ	D	R	T	L
	0+00*	BEGIN	N 23° 25' 17" E	544.80'					
	5+44.80	P.I.			93° 09' 28"				
	9+60.50	P.C.	S 63° 25' 15" E	515.70'					
M	10+60.50	P.I.			80° 04' 06"	48° 08' 06"	119.03'	100.00'	166.34'
	11+26.84	P.T.							
	17+36.44†	END	N 36° 30' 39" E	709.60'					

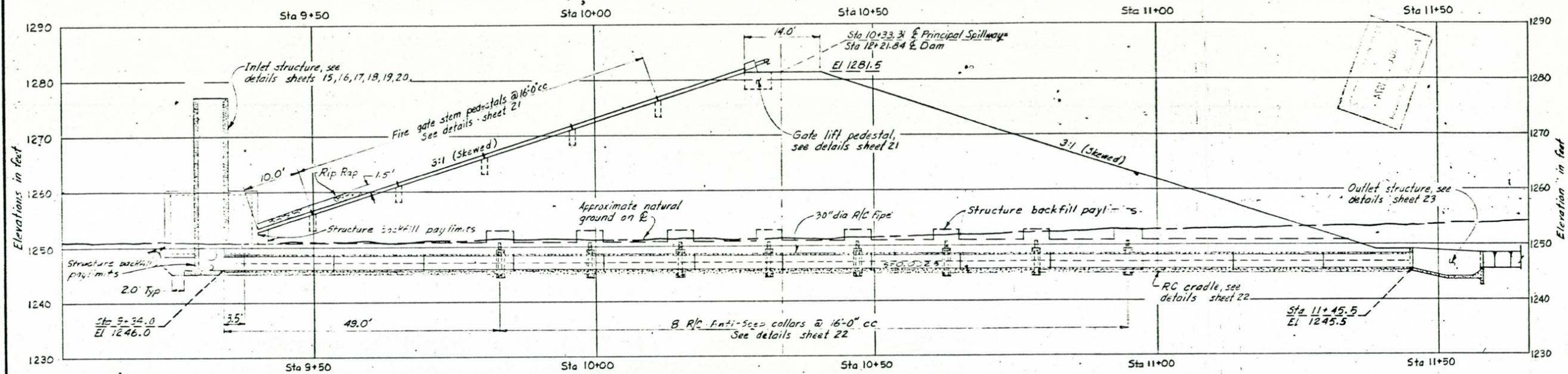


ALIGNMENT OF EAST DAM									
DESCRIPTION					CURVE DATA				
CURVE	STATION	POINT	BEARING	DISTANCE	Δ	D	R	T	L
	10+00*	BEGIN	N 69° 50' 35" E	230.00'					
A	11+30.00	P.C.			60° 00' 00"	33° 04' 47"	173.21'	100.00'	181.38'
	12+30.00	P.T.							
	13+11.38	P.T.	N 9° 50' 35" E	127.760'					
C	23+88.98	P.C.			8° 06' 45"	4° 03' 47"	1410.17'	100.00'	199.67'
	24+88.98	P.I.							
	25+88.65	P.T.	N 1° 43' 50" E	850.66'					
D	31+38.95	P.C.			11° 27' 07"	2° 52' 03"	1998.18'	200.36'	399.39'
	33+39.31	P.I.							
E	35+38.34	P.R.C.	N 13° 10' 57" E	400.14'					
	37+38.12	P.I.			16° 52' 51"	4° 15' 20"	1346.34'	199.78'	396.67'
	39+35.01	P.R.C.	N 3° 41' 54" W	347.86'					
F	40+83.11	P.I.			11° 59' 20"	4° 03' 45"	1410.39'	148.10'	295.12'
	42+30.13	P.R.C.	N 8° 17' 26" E	351.55'					
G	44+33.58	P.I.			23° 16' 57"	5° 48' 07"	987.52'	203.45'	401.29'
	46+31.42	P.R.C.	N 14° 59' 31" W	302.64'					
H	47+30.61	P.I.			26° 20' 44"	13° 31' 10"	423.80'	99.19'	194.87'
	48+26.29	P.R.C.	N 1° 21' 13" E	298.03'					
J	50+25.19	P.I.			17° 58' 19"	4° 33' 19"	1257.80'	198.90'	394.53'
	55+97±	END	N 6° 37' 06" W	575±'					

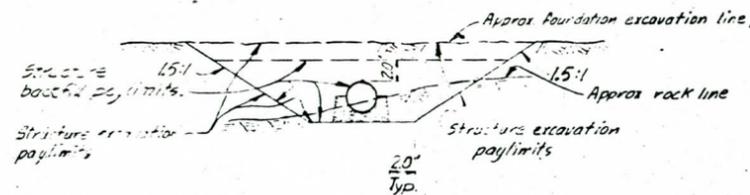
PLAN AND PROFILE  
GUADALUPE FLOODWATER  
RETARDING STRUCTURE  
GUADALUPE W. P. P.  
MARICOPA COUNTY, ARIZONA  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed G. Watt Date 1/73  
Drawn R. Slacum 1-5-73  
Traced JLS., P.J.M., H.W.F. 11/73

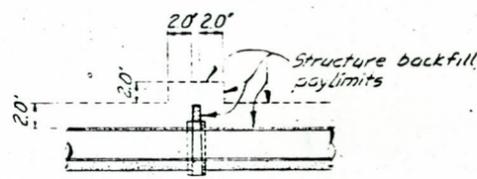
Approved by \_\_\_\_\_  
Title \_\_\_\_\_  
Sheet No. 4  
Drawing No. 7-E-22659



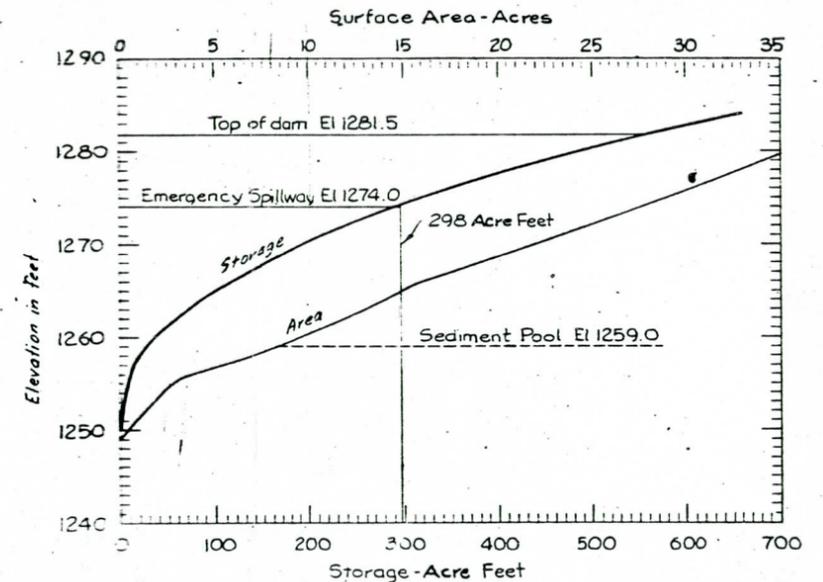
PROFILE ON E PRINCIPAL SPILLWAY



TYPICAL CRADLE

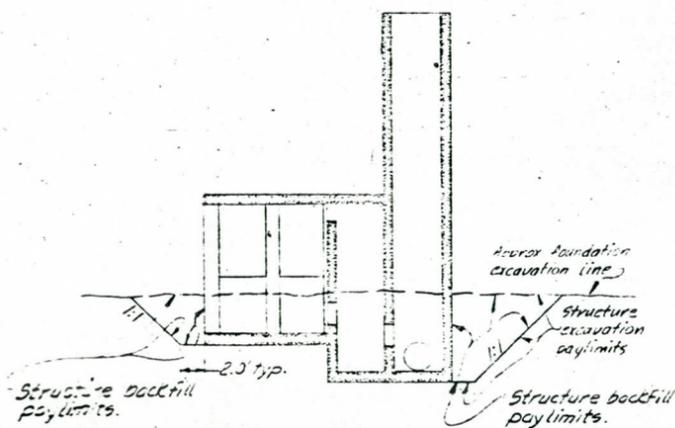


PROFILE CUTOFF COLLAR

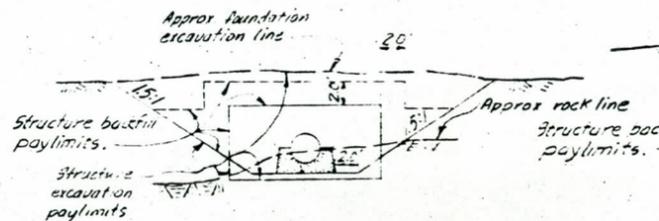


ADJUSTED SURFACE AREA & STORAGE CURVES

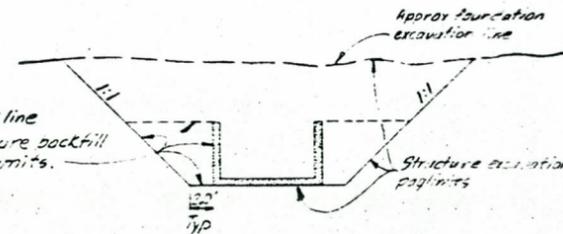
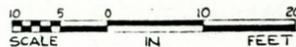
STATE OF ARIZONA  
 OFFICE OF STATE WATER ENGR.  
 SUPERVISION OF DAMS  
 APPLICATION NO. 7-45, INCLUDING  
 THIS DRAWING, WAS APPROVED ON  
 JUL 29 1974  
 WESLEY E. STEINER  
 STATE WATER ENGINEER  
 BY: *Benson G. Scott*  
 BENSON G. SCOTT  
 CHIEF, SUPERVISION OF DAM SAFETY



INLET STRUCTURE



CROSS SECTION CUTOFF COLLAR  
 EXCAVATION AND STRUCTURE BACKFILL PAYLIMITS



PRINCIPAL SPILLWAY OUTLET STRUCTURE

PROFILE ON E PRINCIPAL SPILLWAY AND PAYLIMITS			
GUADALUPE FLOODWATER RETARDING STRUCTURE			
GUADALUPE W.P.P.			
MARICOPA COUNTY, ARIZONA			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed W.H. ERION	Date 2-73	Approved by	
Drawn J.D. LAND	10-73	Title	
Traced		Sheet	
Checked H.W.F.	5-74	Drawing No.	7-E-22659