LIBRARY

DREAMY DRAW DAM

GILA RIVER BASIN, ARIZONA

DREAMY DRAW

DAM, OUTLET WORKS AND SPILLWAY

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

PERIODIC INSPECTION

REPORT NO. 2

NOVEMBER 1974

PIR-2

U.S. ARMY ENGINEERS DISTRICT, LOS ANGELES

CORPS OF ENGINEERS

A203.905

SPDED-G (28 Mar 75) 1st Ind
SUBJECT: Periodic Inspection Report No. 2 - Dreamy Draw Dam

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216, San Francisco, California 94111 15 April 1975

TO: District Engineer, Los Angeles, ATTN: SPLED-DD

Approved subject to the following: Last sentence of paragraph 4d(4) should be terminated after the word "gate". The extent of silt into the pipe was not measured.

FOR THE DIVISION ENGINEER:

R. L. O'Neill
for A. E. WANKET
Chief, Engineering Division

Incl wd

CF: HQDA (DAEN-CWE-B)

TEAM INSPECTION OF DREAMY DRAW DAM

Periodic Inspection Report No. 2
dated November 1974

CONTENTS

	Page
Inspection team	1
Project conditions	1
Maximum water surface elevation	1
Inspection results	1
Conclusions	3
Required action	3
Future inspection	3
Instrument observation program chart	4

Photos 1 through 12

Appendix I

SPD Trip Report I-1

Appendix II

General Project Description II-1

Appendix III

Agenda for Inspection III-1

TEAM INSPECTION OF DREAMY DRAW DAM

1. INSPECTION TEAM. In accordance with EC 1110-2-136, National Program for Inspection of Dams, and ER 1110-2-100, Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures, a team inspection of Dreamy Draw Dam was conducted on 13 November 1974. The team consisted of the following personnel.

Maricopa County Flood Control District

B. Pendergast

South Pacific Division

T. Albrecht
R. Catanach
B. Godwin

Los Angeles District

M. Carlassare
T. Hembree
A. Honda
A. Madinger
F. Turner

2. PROJECT CONDITIONS.

a. The weather was clear with bright sunshine and a high temperature of about 75 degrees.

b. The reservoir was dry and there was no flow through the outlet works. There were a few small trees and a sparse growth of brush in the reservoir.

c. Work was in progress on landscaping of the project. Approximately 18 inches of topsoil had been placed on the downstream slopes of the embankment and saddle dike, and cacti were being planted on the slopes.

d. The items of vandalism that were listed under "Required Action" in Periodic Inspection Report No. 1 had all been satisfactorily repaired and the project was in good condition.

3. MAXIMUM WATER SURFACE ELEVATION. Recorded water surface measurements were not available until a recorder was placed in service on 24 April 1974. However, based on observations of a debris line the water surface apparently reached elevation 1,377 ft m.s.l. (a maximum depth of 7 feet) prior to activation of the recorder. Since the recorder was placed in service the maximum depth recorded has been less than 2 feet. The invert elevation of the ungated conduit at the intake end is 1,369.71 ft m.s.l. and the crest elevation of the spillway is 1,405.00 ft m.s.l.

4. INSPECTION RESULTS.

a. Embankment.

(1) Crest - The crest was free of erosion, weeds and brush, but was covered with a thin layer of dust as a result of the landscaping

(2) Intake structure - Concrete in the structure was in good condition with no evidence of reactive aggregate. There was no debris accumulation in the vicinity of the structure.

(3) Conduit - Concrete in the conduit was sound with no signs of structural inadequacy or distress.

(4) Outlet structure - Concrete was in good condition with no popouts or other evidence of reactive aggregate or structural distress. Two 6-inch drains under the downstream toe of the embankment terminate at the upstream wall of the stilling basin where they are closed by automatic flap gates. Both gates appeared to be in good operating condition. The right drain had a small amount of silt in the bottom of the pipe. The pipe is sloped for drainage and the silt was about 1/4-inch deep next to the flap gate, tapering to zero depth about 6 inches back into the pipe.

(5) Outlet channel - The channel was free of debris and unobstructed. A few small trees and some brush were growing on the side slopes.

e. Instrumentation.

(1) Settlement monuments - Settlements and horizontal movements measured as of November 1974 have been insignificant (less than 0.01 feet).

5. CONCLUSIONS.

a. The minor erosion of the left side slope of the spillway outlet channel at the gulley drains is not significant and requires no action.

b. The source of the silt in the right toe drain pipe is unknown. Runoff on the downstream slope could have drained through the random material of the slope carrying some silt through the gravel filter then into the perforated drain pipe. Or seepage through the embankment could have carried some silt into the drain pipe. Material coming into the drain pipes in large quantities from either of these sources could indicate a problem if it continued to occur. It is also possible the silt could have been deposited in the pipe during construction, since the left pipe contained no silt. The amount of silt in the pipe was insignificant and is not indicative of a problem at this time.

6. REQUIRED ACTION. The toe drain pipes shall be inspected after periods of impoundment of water behind the dam to determine if more silt is accumulating in the drains. If any further accumulation of silt in the drains is found, the Los Angeles District shall be notified.

Note: When this report is transmitted to the Maricopa County Flood Control District, the transmittal letter will state the required action.

7. FUTURE INSPECTION. The next team inspection for Dreamy Draw Dam is planned for October 1975.

INSTRUMENT OBSERVATION PROGRAM

DREAMY DRAW DAM

7 Feb. 1975

INSTRUMENT	LOCATION	FREQUENCY OF READING	LAST READING DATE / ANALYZED BY F and M DATE									
Settlement Monument #3	Crest (Upstream) Sta. 21+50	Yearly Thru 1977, Biennial Thru 1981, Then Every 5 Years	1/74	4/74	11/74							
					11/74							
#4	Crest (Upstream) Sta. 22+00		1/74	4/74	11/74							
					11/74							
#5	Crest (Upstream) Sta. 22+50		1/74	4/74	11/74							
					11/74							
#6	Crest (Upstream) Sta. 23+50		1/74	4/74	11/74							
					11/74							
#7	Crest (Upstream) Sta. 24+10		1/74	4/74	11/74							
					11/74							

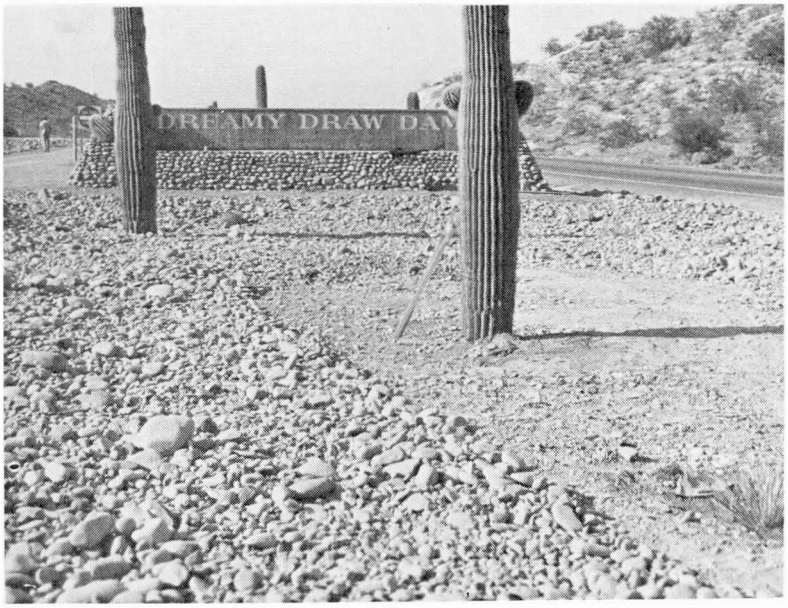


Photo 1 - Entrance to project showing project sign.

Photo 2 - Upstream slope of dam from saddle dike.
Cloud of dust on crest is from landscaping work.

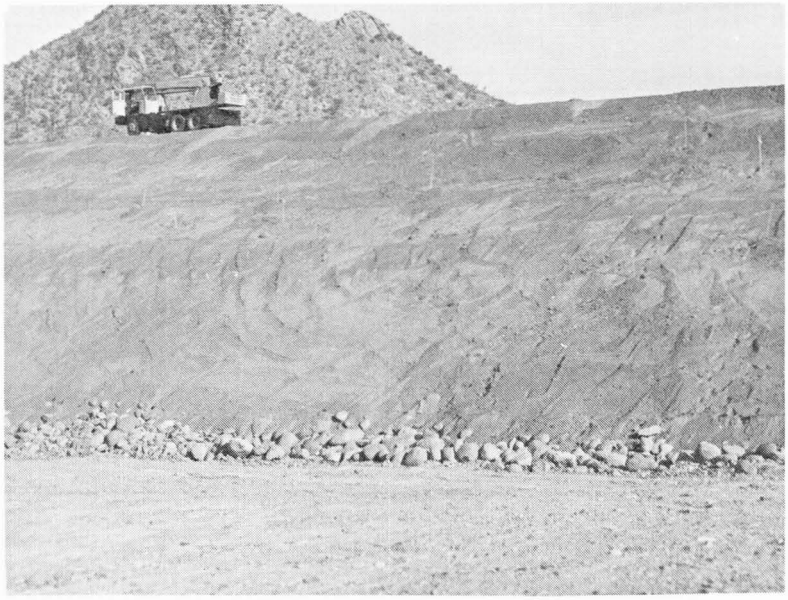


Photo 3 - Downstream slope of dam showing layer of topsoil placed for landscaping purposes.

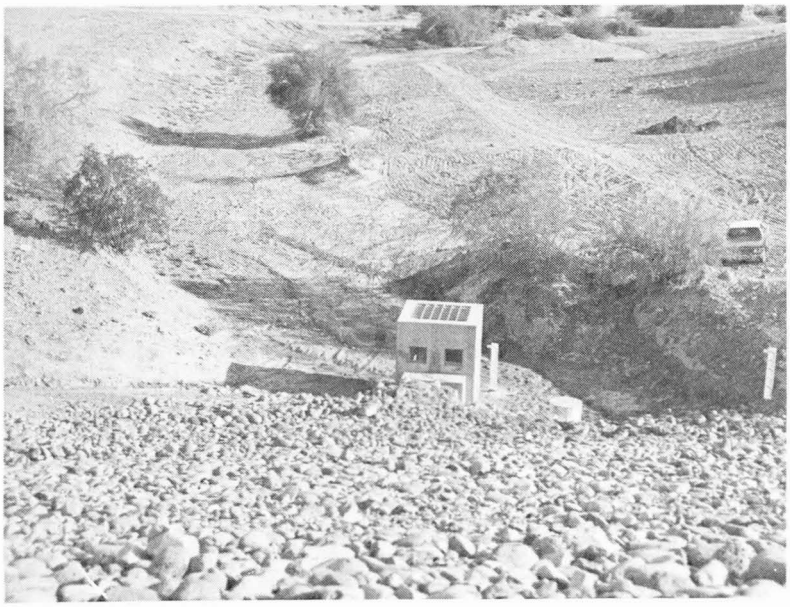


Photo 4 - Reservoir, intake structure and upstream slope of dam from crest.

Photo 5 - Intake structure and upstream slope of dam.

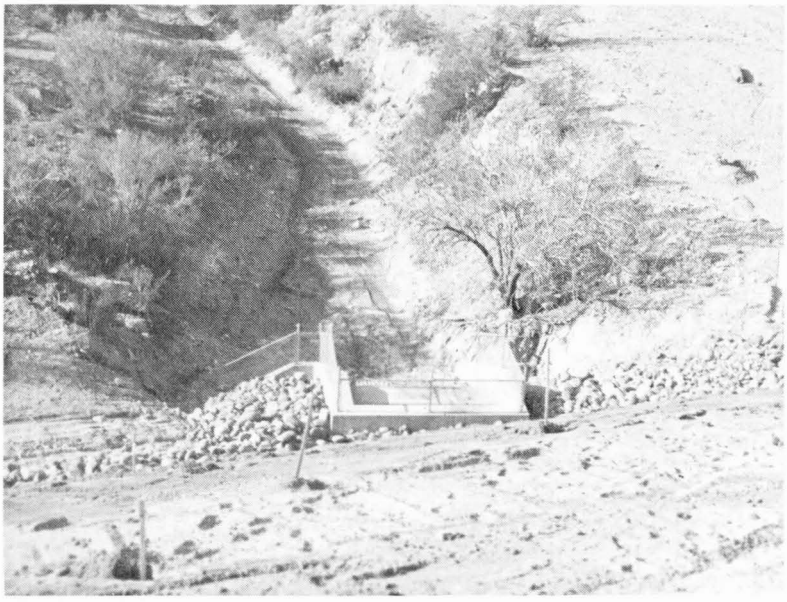


Photo 6 - Outlet works outlet channel, outlet structure and downstream slope of dam from crest.

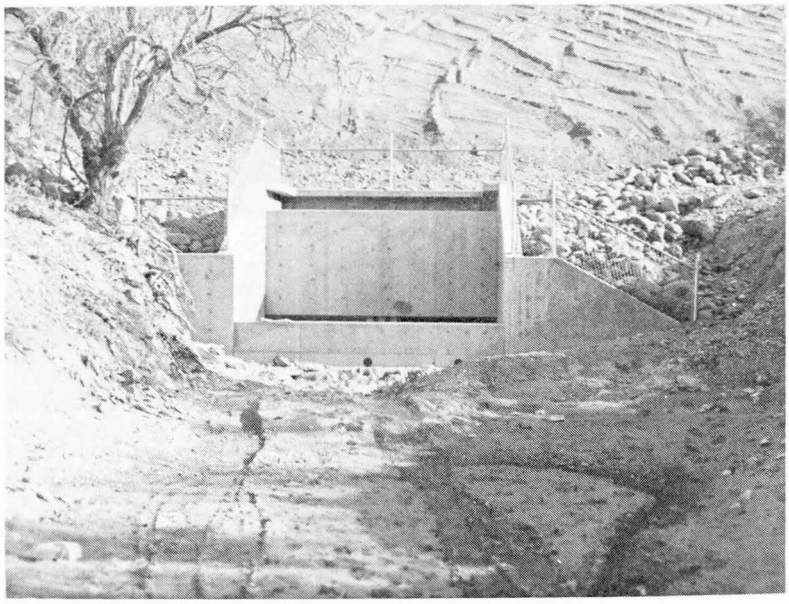


Photo 7 - Outlet structure and downstream slope of dam.

Photo 8 - Upstream slope of saddle dike from right abutment of dike.

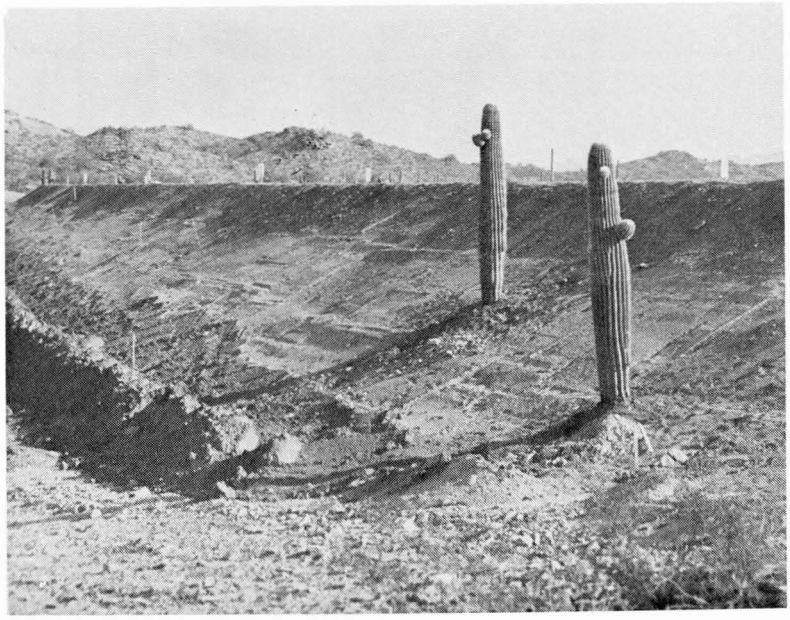


Photo 9 - Downstream slope of saddle dike from left abutment showing layer of topsoil placed for landscaping purposes.

Photo 10 - Spillway approach channel looking upstream from sill.

Photo 11 - Spillway sill looking west.

Photo 12 - Spillway outlet channel looking downstream from sill.

APPENDIX I

SPDED-G 9 January 1975

MEMORANDUM FOR RECORD

SUBJECT: Periodic Inspection - Dreamy Draw Dam

1. On 13 November 1974, the following personnel performed the periodic inspection of Dreamy Draw Dam:

R. Catqnach	SPD
T. Albrecht	SPD
B. Godwin	SPD
M. Carlassare	SPL
T. Hembree	SPL
A. Honda	SPL
F. Turner	SPL
A. Madinger	Project Engineer (Const)
B. Pendergast	Maricopa County Flood Control District

2. This was the second annual inspection since the completion of the project in 1973; the next inspection will be held in one year.

3. The project is in good condition and there are no questions regarding the structure stability, safety or operational adequacy of the project. A number of items were noted during the inspection and deserve comment and, where appropriate, action prior to the next inspection.

a. Landscaping of the downstream slope was in progress during the inspection. The inspection report should be updated to show the added features. Concern for the selected landscaping was expressed by several members of the group. The use of a thin layer of topsoil on the downstream slope could result in the soil washing off the slope during the brief, but intense rainfall in the area and creating a problem in the outlet channel.

b. Vandalism continues to be a problem; however, the measures taken appear to be working in controlling damage.

c. Results of instrumentation were not available for the inspection. Surveys should be completed prior to inspection so results can be reviewed at the site.

d. Two drains under the downstream toe of the embankment terminate at the upstream wall of the impact stilling basin where they are closed by automatic flap gates. Both gates appeared to be in excellent operating condition, but the right hand drain had about 1/4-inch of silt in the pipe. The source of this silt is unknown, and it is recommended that this drain be closely watched that material is not being piped out from under the toe of the embankment.

e. Excavation of the spillway channel intersected two natural drains that are now eroding the left side slope of the spillway channel downstream of the crest. Some small rocks should be placed on the slope below the mouths of these drains and a short distance upstream in each of the drains to stop this erosion and eliminate the unsightliness.

R. Catanach Geology, Soils & Materials Br.	T. Albrecht Hydrologic Engineering	B. Goswin Construction-Operations

APPENDIX II
GENERAL PROJECT DESCRIPTION
APPENDIX TO INSPECTION REPORT

CONTENTS

	PAGE
PURPOSE AND SCOPE	II-1
GENERAL	II-1
GEOLOGY	II-2
EMBANKMENT	II-3
FOUNDATION CONDITIONS	II-5
FOUNDATION TREATMENT	II-5
OUTLET WORKS	II-6
SPILLWAY	II-6
SADDLE DIKE	II-7
CONSTRUCTION HISTORY	II-7
ENGINEERING DATA	II-7
CHECK LIST	II-7
INSTRUMENTATION	II-8
PERTINENT DATA	II-9
PLATES	II-10

1. PURPOSE AND SCOPE. This report is prepared in accordance with ER 1110-2-100, which defines objectives, assigns functions, and establishes procedures by which the Corps of Engineers carries out its responsibilities for assuring the continuing structural integrity and operational adequacy of its major civil works structures in service. Periodic evaluation of constructed structures is accomplished by periodic inspection for the purpose of detecting conditions of significant structural distress and to provide a basis for timely initiation of corrective measures to be taken where necessary.

2. GENERAL. The Dreamy Draw Dam is located within the city limits of Phoenix, Arizona. The Maricopa County Flood Control District is responsible for the operation and maintenance of the project. The project area is located in the southeastern part of the Phoenix Mountains. Dreamy Draw rises in the Phoenix Mountains and flows generally southwestward from the damsite to its confluence with Cave Creek in Phoenix. The lands are typically Arizona desert. Vegetation is sparsely scattered throughout the area, with cacti, creosote bush, sagebrush and paloverde as the dominate desert plants. Animal life in the project area is also sparse because of the lack of water, limited vegetation cover, disturbance by man, and poor soil conditions for burrowing animals. The sparse wildlife includes small mammals, reptiles and birds. An archeological survey of the basin and spillway area uncovered no evidence of prehistoric occupation or use. Use of the basin area appeared to have been limited primarily to occasional horseback riding and hiking.

The principal features of the project (shown in pl. 1) include an earthfilled dam, a saddle dike, an outlet works, and a spillway.

a. The embankment, which is a zoned, compacted-earthfilled structure with crest elevation at 1,418 feet has a maximum height of 50 feet above streambed, a crest length of 450 feet, and a crest width of 20 feet. The upstream slope of the embankment is 1V on 2.75H, and the downstream slope is 1V on 2H. The upstream slope protection consists of 18 inches of facing stone, and extends from the top of dam to bedrock at the toe of the embankment. The top of the embankment is surfaced with 4 inches of base-course material and 2 inches of asphalt concrete. See plate 4.

b. The saddle dike is a zoned, compacted-earthfill structure with a crest length of 1,060 feet, a crest width of 20 feet, and a maximum height of 20 feet above existing streambed. The upstream slope of the embankment is 1V on 2.75H and the downstream slope is 1V on 2H. The upstream slope protection consists of 18 inches of facing stone and extends from the top of the dam to bedrock at the toe of the embankment. The top of the embankment is surfaced with 4 inches of base-course material and 2 inches of asphalt concrete. The slope of both the upstream and downstream side of the core is vertical.

c. Topsoil. Eighteen inches of topsoil was placed on top of the downstream slope of the dam embankment and the saddle dike for landscaping purposes. The material consists of natural, friable sandy loam that produces heavy vegetational growth.

d. The intake structure is a rectangular reinforced-concrete structure located at the upstream toe of the embankment. The top of the structure is at elevation 1,382 feet, 12 feet above the invert elevation of the structure and 23 feet below the spillway crest elevation. The structure is 6-feet wide and 6-feet long (inside dimensions) with 2-foot square openings regularly spaced horizontally and vertically. Grated openings are provided at the base and top of the structure for cleaning purposes.

e. A detached broadcrested spillway with a crest elevation of 1,405 feet and a crest length of 100 feet is located about 400 feet east of the left abutment. The spillway is of trapezoidal cross section excavated in rock, unlined, except for a concrete control sill. Excavated side slopes are 1V on 2H. The spillway channel is about 1,270 feet long.

f. The conduit consists of a concrete-encased reinforced concrete pipe about 264 feet long with an inside diameter of 36 inches. A concrete stilling basin structure, 15 feet wide and 20 feet 8 inches long, is provided at the downstream end of the conduit.

g. The service road providing access for maintenance and inspection of the dam and appurtenances extends from Northern Avenue, over the saddle dike and dam, to the east abutment of the dam. A turnaround is provided at the east end of the embankment.

h. Safety provisions include guard rails provided at the turnaround and along the sharp curve of the access road between the saddle dike and dam. A 4-foot chain-link fence is constructed on top of the outlet channel walls. Guide posts are provided along the top of the dam and saddle dike.

3. GEOLOGY. The Dreamy Draw Dam is located in the southeastern part of the Phoenix Mountains and lies in a canyon between North Mountain Park (elevation 2,104 feet) and Squaw Peak (elevation 2,608 feet). The canyon floor at the site is about 700-feet wide and is traversed by Northern Avenue on the west. The streambed elevation of the dam is about 1,370 feet. The rock formations in the vicinity of and at the damsite consist chiefly of precambrian metamorphic rock. Schist is the predominant rock type, but quartzite, marble and slate are present locally. The schist is steel gray to brownish gray, soft to hard, fissile and platy, and slightly weathered near the surface. Older alluvium, which lies along the side slopes of the valley is of Quaternary age, and consists of

consolidated gravelly silty sand. There are minor deposits of Recent alluvium in the streambed consisting of uncemented silt, sand, gravel and boulders. There is evidence of ancient folding and some faulting in the rock formations in the vicinity of the dam. See plate 5.

4. EMBANKMENT.

a. The embankment is a rolled-earthfill section consisting of three zones, a core, an upstream select random and a random zone, with a gravel drain at the downstream toe of the main embankment.

(1) The core zone is located on bedrock. The material for the core zone consists of clayey-gravelly sands and silty-gravelly sands obtained from designated core borrow areas (pl. 1). The top of the core is 5 feet below the crest elevation of the embankment. It has a top width of 10 feet and side slopes of 2.5V on 1H on the upstream side and vertical on the downstream side. The core zone permits possible future recreation pool storage and at the same time protects against through seepage from coarse material layering of exterior upstream zones.

(2) The select random zone, beginning from the right abutment, is located on bedrock for about 300 feet. The remaining 150 feet is located on older alluvium. The material for the select random zone consists of unweathered rock obtained from the spillway excavation. The top of the select random zone is 5 feet below the crest of the embankment and is 10-feet wide to accommodate placement by equipment. The zone serves as a transition and filter zone between the stone protection and the random zone. The select random zone allows faster drainage of the upstream main embankment slope under anticipated drawdown conditions.

(3) The random zone beginning from the right abutment, is located on bedrock for the first 300 feet. The remaining 150 feet is located on older alluvium. The material for the random zone consists of material obtained from required excavation and designated borrow areas (pl. 1). The material contains no stone larger than 3/4 of the layer thickness. Plan and profile of the embankment are shown on plate 2. Cross sections of the embankment are shown on plate 4.

b. A subdrainage system is provided to prevent concentrated flow of infiltrated water at the downstream toe, and to direct any flow to a controlled outlet. The drain extends about 50 feet upstream from the toe and terminates at elevation 1,380 feet on each abutment.

c. Stone erosion control gutters are provided at the abutment contacts, both upstream and downstream. See plate 2.

d. The stability of the embankment slopes was analyzed for end of construction conditions, sudden drawdown and drained condition during earthquakes.

(1) For the end of construction condition the infinite slope method of analysis was found to be most critical. In that the embankment was constructed under arid conditions, "S" strengths were used in slope stability computations. Results of analyses indicated safety factors of 1.4 for the downstream slope and 1.9 for the upstream slope.

(2) For sudden drawdown, the effect of routing the standard project flood is applicable. The routing curve shows the reservoir would fill to the spillway crest about 3 hours and would drawdown in about 19 hours (basin empty). The duration of drawdown corresponds to an average of 55 feet per day with a rate exceeding 3 feet per hour during the final 15 feet of drawdown. For application to stability, sudden drawdown was applied with the assumption that the upstream random zone become completely saturated during the filling of the reservoir. The results proved to be less critical for deep failure planes analyzed within the central portion of the embankment than for those planes near or parallel to the slope. A block and wedge analysis was used in analyzing stability for drawdown. "Bishop's Modified Method" was employed and thus resulted in a critical plane that nearly parallels the dam face. For emptying the reservoir the resulting minimum safety factors for drawdown from maximum pool and from spillway crest are 1.07 and 1.23, respectively.

(3) The damsite is located in seismic zone 2. Analyses of stability utilizing the corresponding seismic coefficient of 0.10 proved the infinite slope analysis to be most critical. Respective safety factors for the upstream and downstream slopes are 1.45 and 1.1.

e. The upstream slope protection for the embankment and the dike consists of 18 inches of facing stone, and extends from the top of the slope to bedrock at the toe of the embankment. The gradation of the processed material follows:

Weight of pieces (in pounds)	Percent smaller by weight
150	100
100	50-100
50	30-70
25	15-50
5	0-15
1	0-5

A graded filter was not required beneath the riprap.

f. The downstream slope protection of the embankment and the dike consists of 8 inches of excavated bedrock (gray schist) from the spillway, having a maximum dimension of 6 inches. An 18-inch layer of topsoil (see paragraph 2c) was placed on top of the slope protection. This material will accommodate planting and a natural effect on vegetal growth.

g. Seepage studies, utilizing transient flow nets, have proven that complete saturation of the upstream random zone would not occur during normal operations. The use of the core permits effective control of through seepage in the event that prolonged pool retention occurs. In order to control concentration of flow due to through seepage and infiltration of runoff water at the abutments, the downstream gravel drain has been provided.

5. FOUNDATION CONDITIONS.

a. The project site consists of moderate slopes of metamorphic rock overlain by alluvium. Schist is the predominant rock type and the alluvium consists of clayey-gravelly sand and silty-gravelly sand. At the main embankment site, a veneer of alluvium covers the right abutment and alluvium covers the left abutment to a depth of about 18 feet. Major portions of the streambed channel are exposed rock with minor depressions filled with gravelly sand.

b. The spillway was excavated in older alluvium consisting of gravelly sand, silty-gravelly sand and clayey-gravelly sand overlying bedrock. The thickness of the alluvium varies from 8 feet at the approach channel to about 1 foot at the spillway crest. The bedrock is steel-gray to brownish-gray schist, soft to hard, fissile and platy and slightly weathered near the surface. There are numerous thin intersecting quartz and calcite veins, and occasional seams of clay in the schist.

c. The saddle dike is located where older alluvium with an average thickness of 1.5 feet is underlain by bedrock.

6. FOUNDATION TREATMENT.

a. Embankment stripping was extended a minimum of 2 feet or to bedrock whichever was less. The estimated average depths of stripping were 2 feet for the left abutment, 1 foot for the right abutment, and 1.5 feet for the streambed. Slopes resulting from the stripping operation were no steeper than 2V on 1H. A cutoff trench, about 150 feet long, was excavated in the left abutment for the core zone. The depth of the trench varied from 2 feet to 21 feet. The average width of the trench is 28 feet. The cutoff trench was air blasted to remove all loose rocks. A continuous grout curtain was provided along the core contact. A total of 31 holes drilled at a spacing of 1.3 feet to 32 feet, according to the grout take, were required to fill the numerous small caves resulting from the dissolving of limestone lenses in the schist formation. See plate 5. Upon completion of

foundation grouting, slush grout was used to fill exposed cracks, joints and depressions where core material could not be satisfactorily placed. The soil was scarified to a depth of 6 inches, wetted, and rolled with eight passes of a 50-ton rubber-tired roller.

b. The spillway was excavated in older alluvium and highly fractured platy schist bedrock. Side slopes were cut on a 1V and 2H slope. A horizontal control sill was constructed at the crest of the spillway (Station 7+15). The concrete sill is embedded approximately 5 feet into hard resistant schist bedrock.

c. Foundation treatment of the dike consisted of stripping an average depth of 1 foot to bedrock.

7. OUTLET WORKS. Principal features of the outlet works include the intake, the conduit, and the stilling basin.

a. The intake structure is located on schist bedrock. It is a reinforced-concrete intake structure 12 feet high, 9 feet wide and 9 feet in length. The structure has 10 openings, 2 feet square, a 6- by 6-foot grated opening in the roof, and a 3 foot 6 inch by 4 foot 8 inch grated opening in the upstream face at invert level. The intake structure was checked for two conditions of loading: Condition I, when the reservoir is empty with earthquake loading and Condition II, when the reservoir is full to spillway crest elevation with no earthquake loading. It was determined that Condition II would be the critical design. Earthquake loading was not included because the possibility of an earthquake occurring simultaneously with Condition II is remote.

b. The conduit is a 36-inch concrete-encased reinforced-concrete pipe about 264 feet long. It is founded upon bedrock throughout its length. The pipe is designed to discharge a flow of 224 cubic feet per second when the water surface is at spillway crest. The conduit was designed for a loading condition wherein the vertical earth pressure equalled 1.5 times the weight of the fill directly above the conduit, and the horizontal pressure equalled 0.5 times the vertical earth pressure.

c. The concrete stilling basin is 15 feet wide and 20 feet 8 inches long. It was designed to reduce the discharge velocity from 28 feet per second to 8 feet per second. The energy dissipating wall located at mid-length and extending across the basin was designed to withstand a water force of 10.5 kips acting 2 feet 9 inches above the invert. The side walls were designed for a loading condition when the channel was empty. Backfill behind the side walls consists of sand, gravelly sand, silty sand, sandy silts, clayey sands and sandy clays.

8. SPILLWAY. The spillway is an unlined-trapezoidal channel excavated in bedrock. It has a base width of 100 feet and a length of 1,270 feet. The side slopes are 1V on 2H. The invert of the spillway is steel gray,

moderately hard to hard, fissile, and platy-schist bedrock. The side slopes are older alluvium consisting of silty sand with gravel and occasional cobbles. A concrete sill at the spillway crest protects it from erosion. The spillway is designed to pass a maximum discharge of 7,000 cubic feet per second at the maximum water surface elevation of 1,413 feet. For this discharge, the critical depth would be 5 feet and the velocity would be 12 feet per second.

9. SADDLE DIKE. The saddle dike is a zoned compacted-earthfill embankment located on schist bedrock and has a crest width of 20 feet and a length of 1,060 feet. The upstream slope is 1V on 2.75H and is protected by 18 inches of facing stone. The downstream slope is 1V on 2H and is protected by 8 inches of excavated bedrock. The dike consists of a core zone, a 10-foot select random on the upstream face and a random zone. The materials for each zone are similar to the material in the main embankment. Erosion control gutters are provided at the downstream end of the abutment contacts. A 24-inch C.M.P. culvert is located at Station 8+60 to connect with the existing 24-inch C.M.P. culvert under Northern Avenue for drainage.

10. CONSTRUCTION HISTORY. Construction of Dreamy Draw Dam project was completed in September 1973 under one contract awarded 21 September 1972 to:

Ducon, Inc.
Harn and Sloan
A Joint Venture
13165 E. Garvey Ave.
Baldwin Park, Calif. 91706

The project (Contract No. DACW 09-73-C-0019 and Specification No. DACW 09-73-B-0001) was accepted by the Corps of Engineers and transferred to the Maricopa County Flood Control District for operation and maintenance on 17 January 1975.

11. ENGINEERING DATA. Engineering data for the project are stored in the office of the Flood Control District of Maricopa County, 3325 West Durango Street, Phoenix, Arizona 85009. The following items are included:

a. Design Memorandum No. 1 - January 1972
b. As constructed drawings
c. Operation and Maintenance Manual
d. Latest Periodic Inspection and Continuing Evaluation Report

12. CHECK LIST. The following elements of the major features of the project are listed as guidance for periodic inspections and continuing evaluation:

a. Embankment

(1) Crest
(2) Upstream and downstream slopes
(3) Upstream and downstream toes
(4) Abutment contacts

b. Outlet Works

(1) Intake structure
(2) Conduit
(3) Stilling basin

c. Spillway

(1) Approach channel
(2) Concrete sill

d. Saddle Dike

(1) Crest
(2) Upstream and downstream slopes
(3) Upstream and downstream toes
(4) Abutment contacts

13. INSTRUMENTATION.

A. Hydrologic Facilities. The hydrologic facilities will provide water surface and precipitation records that are presently unavailable at the site. The facilities include a reservoir water surface recorder system, reservoir staff gages and a precipitation station. The water surface recorder system consists of a 50-inch battery operated hydro-gage, a water surface recorder and an intake sump interconnected by a 2-inch conduit. An instrument house is provided to house the hydro-gage and the water surface recorder. Nine adjustable staff gages between elevations 1,370 and 1,415 feet were installed on the left abutment. A precipitation station consisting of a weekly recording rain gage will be installed near the dam.

b. Monument. Five settlement monuments are located about 8.5 feet upstream from the centerline of the dam between Stations 21+50 and 24+10. The settlement surveys will provide information on settlement due to compression of the embankment. Two reference monuments are located on the access road on the right abutment. Monument details are shown on plate 3.

14. PERTINENT DATA

Drainage area	sq. mile	1.3
Dam (rolled earthfill)		
Crest elevation	ft. (m.s.l.)	1,418
Max. height above streambed	ft.	50
Crest length	ft.	450
Freeboard	ft.	5
Spillway (detached, broadcrested)		
Crest elevation	ft. (m.s.l.)	1,405
Crest length	ft.	100
Elevation of max. water surface	ft. (m.s.l.)	1,413
Outlet works (ungated conduit)		
Length	ft.	264
Intake elevation	ft.	1,370
Outlet elevation	ft. (m.s.l.)	1,365
Saddle dike		
Crest elevation	ft. (m.s.l.)	1,418
Crest length	ft.	1,060
Max. height above existing ground	ft.	20
Reservoir		
Area at--		
Spillway crest	acre	27
Max. water surface	acre	39
Dam crest	acre	48
Capacity (gross) at--		
Spillway crest	acre-feet	317
Max. water surface	acre-feet	577
Dam crest	acre-feet	793
Storage allocation below spillway crest		
Flood control	acre-feet	281
Sedimentation	acre-feet	36
Standard project flood		
Total volume (6 hours)	acre-feet	320
Peak inflow	cfs	3,600
Peak outflow	cfs	224
Drawdown time	hours	16.8
Maximum probable flood		
Total volume (10 hours)	acre-feet	770
Peak inflow	cfs	11,000
Peak outflow	cfs	7,000
Drawdown time (to spillway crest)	hours	7.5

15. PLATES

Title

1. General plan.
2. Embankment - plan and profile.
3. Subdrainage system, monument and miscellaneous details.
4. Embankment - cross sections.
5. Foundation grouting.
6. Saddle Dike and Access Road - plan, profile and sections.

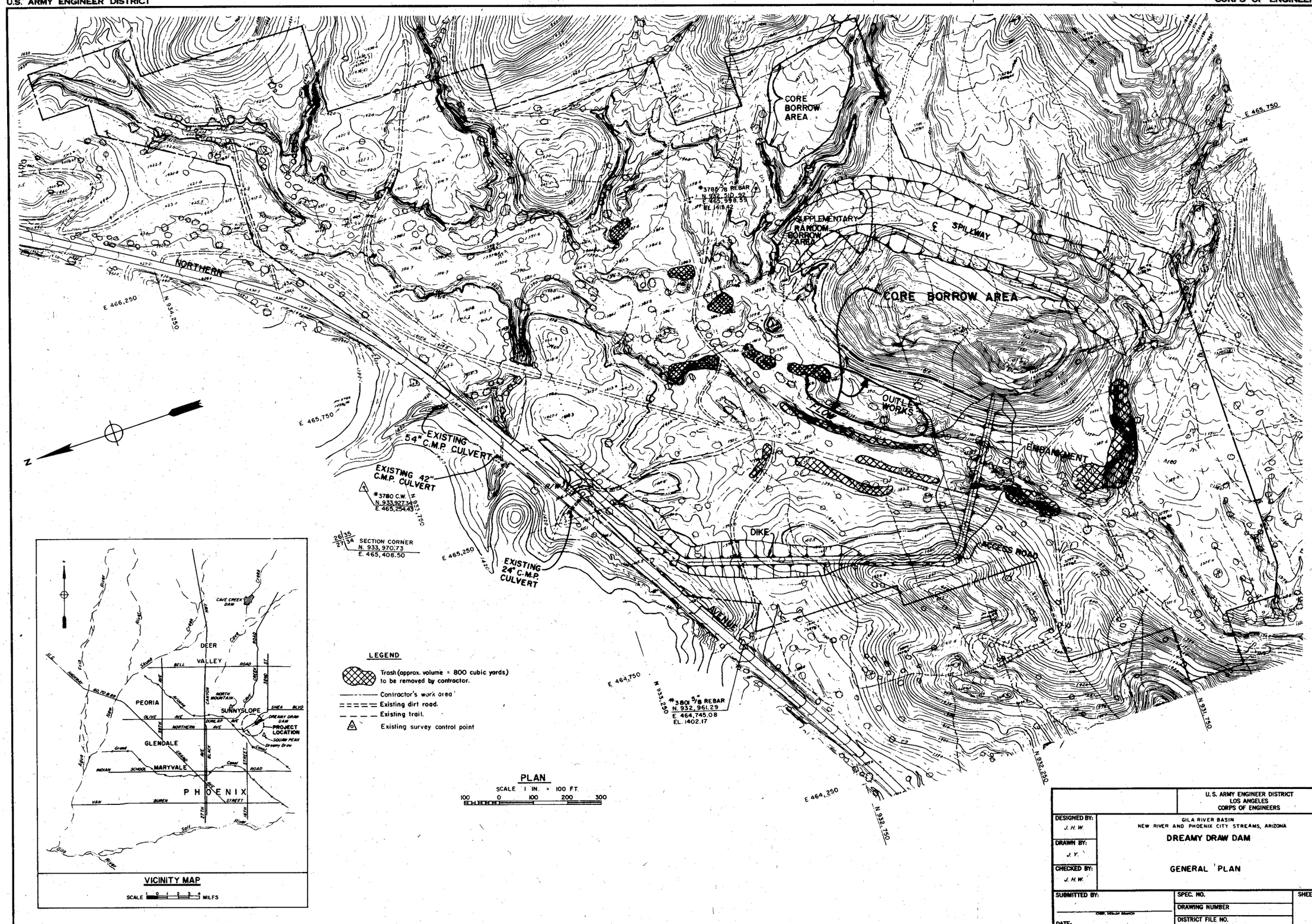
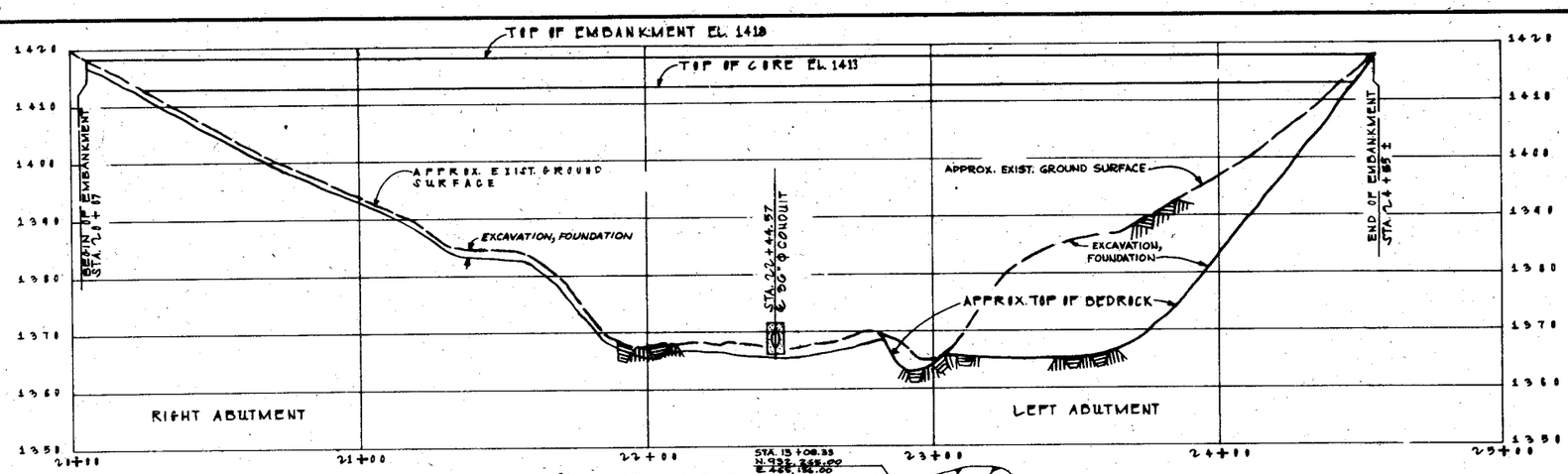
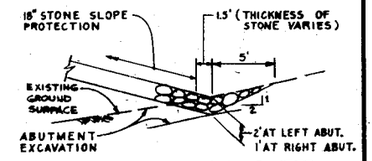

CORE BORROW AREA
SUPPLEMENTARY RANDOM BORROW AREA
℄ SPILLWAY
CORE BORROW AREA
OUTLET WORKS
FLOW
EMBANKMENT
ACCESS ROAD
DIKE
AVENUE
NORTHERN
EXISTING 54" C.M.P. CULVERT
EXISTING 42" C.M.P. CULVERT
EXISTING 24" C.M.P. CULVERT
#3780 C.W. N. 933,927.34 E. 465,254.43
SECTION CORNER N. 933,970.73 E. 465,408.50
#3801 5/8" REBAR N. 932,961.29 E. 464,745.08 EL. 1402.17
E 465,750
E 466,250
N 934,250
E 465,750
E 465,250
E 464,750
E 464,250
N 933,250
N 932,750
N 932,250
N 931,750
LEGEND
Trash (approx. volume = 800 cubic yards) to be removed by contractor.
Contractor's work area
Existing dirt road.
Existing trail.
Existing survey control point
PLAN
SCALE 1 IN. = 100 FT.
100 0 100 200 300
VICINITY MAP
SCALE 1 0 1 2 3 4 MILES
DEER VALLEY
PEORIA
SUNNYSLOPE
GLENDALE
MARYVALE
PHOENIX
CAVE CREEK DAM
DREAMY DRAW DAM
PROJECT LOCATION
SOUTH PEAK
Dreamy Draw
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS
DESIGNED BY: J. H. W.
DRAWN BY: J. Y.
CHECKED BY: J. H. W.
GILA RIVER BASIN
NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA
DREAMY DRAW DAM
GENERAL PLAN
SUBMITTED BY:
DATE:
SPEC. NO.
DRAWING NUMBER
DISTRICT FILE NO.
SHEET

PLATE I



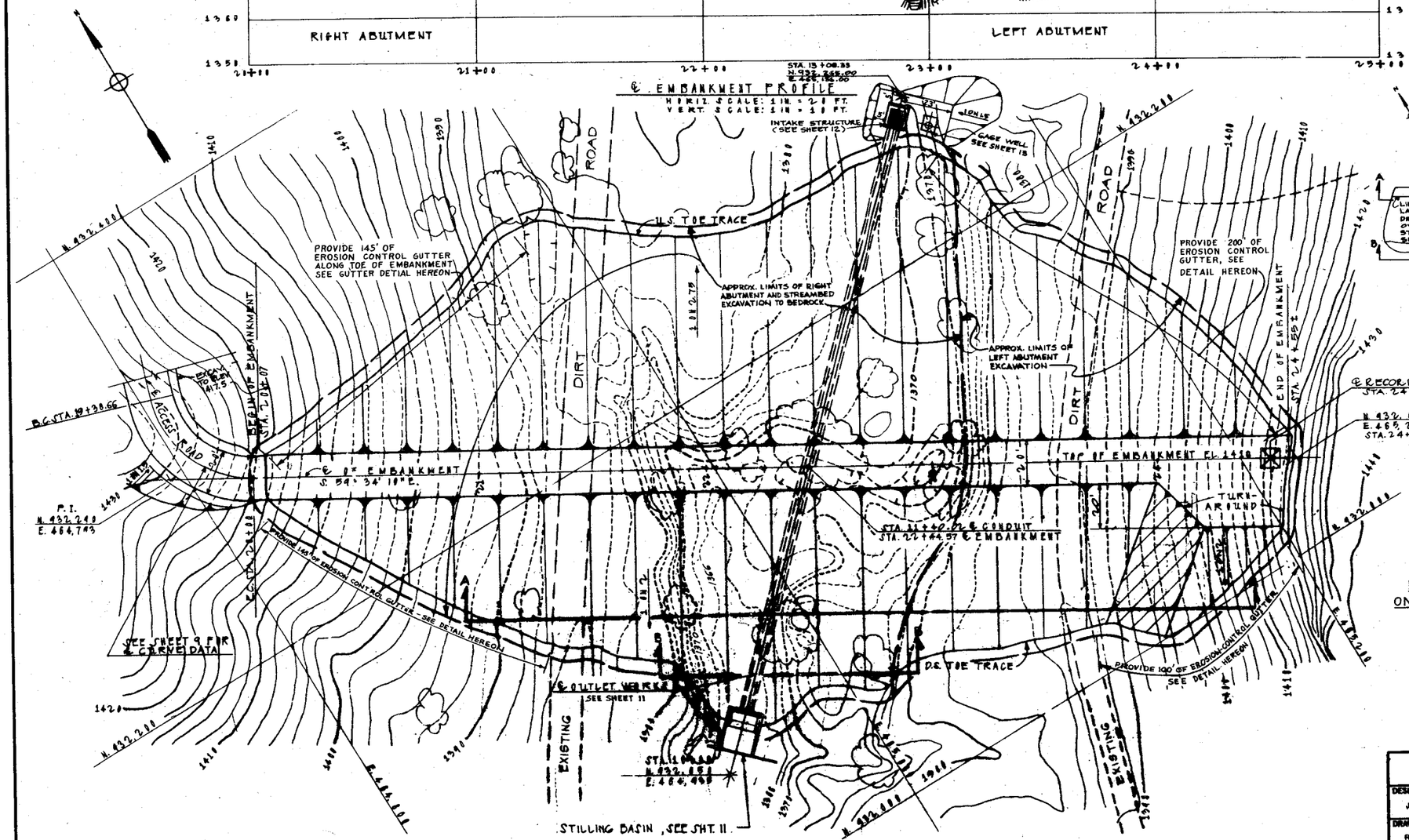
℄ EMBANKMENT PROFILE

HORIZ. SCALE: 1 IN. = 20 FT.
VERT. SCALE: 1 IN. = 10 FT.



DETAIL OF EROSION-CONTROL GUTTER ON UPSTREAM SLOPE OF EMBANKMENT

NOT TO SCALE

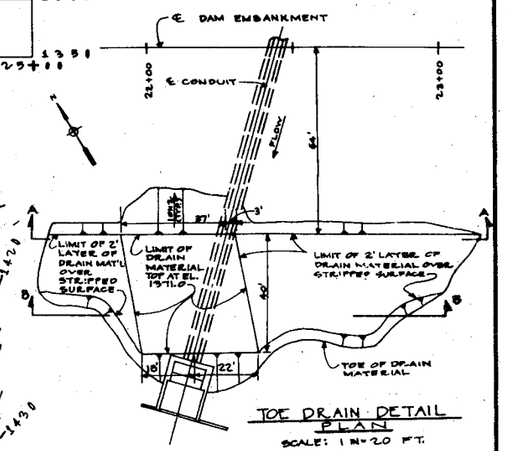


PLAN

SCALE: 1 IN. = 20 FT.

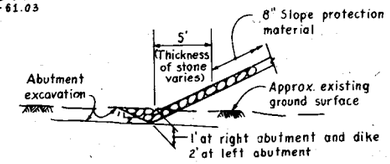
10 0 10 20 30 40 50

NOTE:
FOR SECTIONS A-A AND B-B SEE SHT. 8



TOE DRAIN DETAIL PLAN

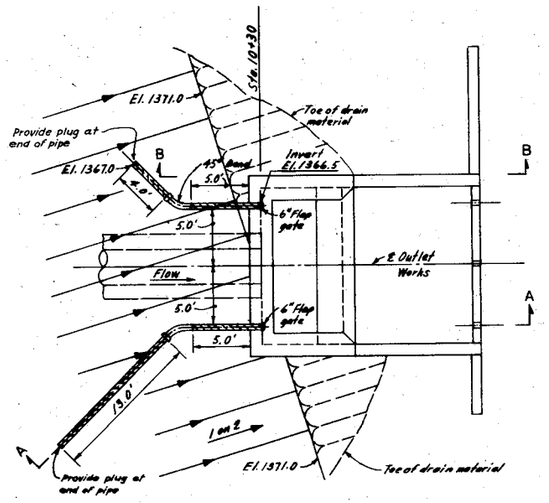
SCALE: 1 IN = 20 FT.



DETAIL OF EROSION CONTROL GUTTER ON DOWNSTREAM SLOPE OF EMBANKMENT

NOT TO SCALE

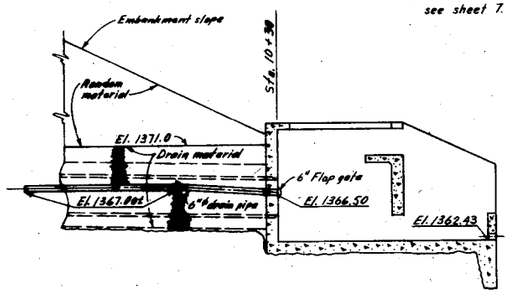
	U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS
DESIGNED BY: J.H.W.	GILA RIVER BASIN NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA
DRAWN BY: R.L.A.	DREAMY DRAW DAM
CHECKED BY: R.R.K. J.A.	EMBANKMENT - PLAN AND PROFILE
SUBMITTED BY: CHIEF DESIGN BRANCH	SPEC. NO. / DRAWING NUMBER / DISTRICT FILE NO. / SHEET
DATE:	



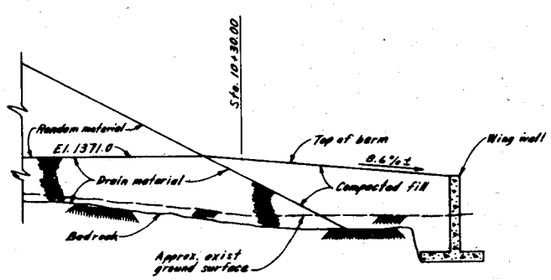
PLAN

Notes:

1. 6" Collector pipe shall be perforated.
2. Flap gates shall be automatic drainage, Armco Model 10C or equal.
3. For extent of drain material, see sheet 7.



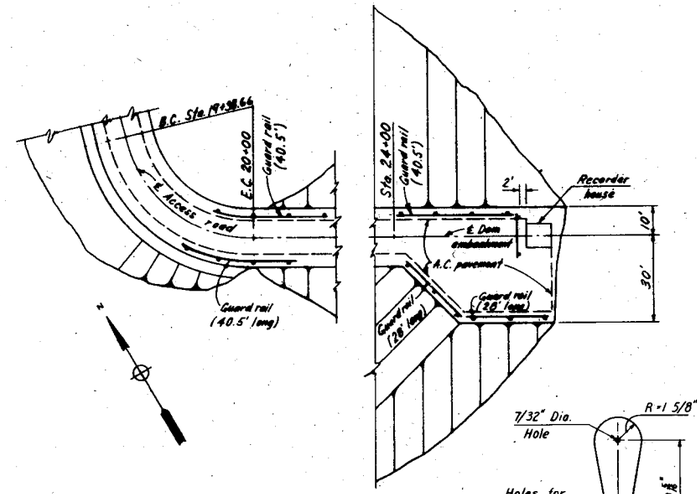
SECTION A-A



SECTION B-B

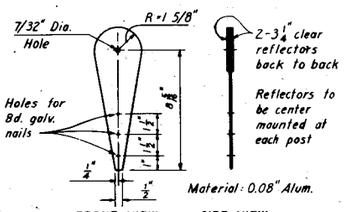
SUBDRAINAGE SYSTEM DETAILS

NOT TO SCALE



PLAN

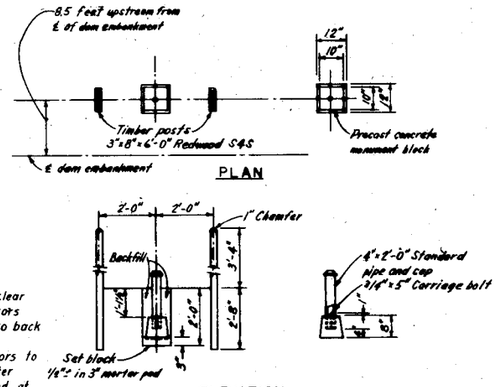
SCALE: 1" = 20'



FRONT VIEW SIDE VIEW

REFLECTOR ASSEMBLY

SCALE: 1/4 IN. = 1 IN.



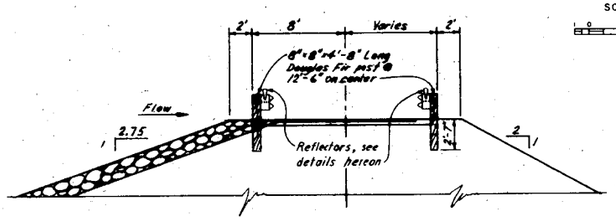
MONUMENT INSTALLATION MONUMENT DETAILS

SETTLEMENT AND REFERENCE MONUMENTS

NOT TO SCALE

Notes:

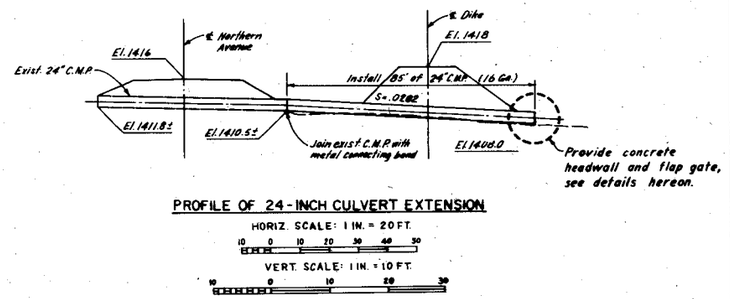
1. Five settlement monuments shall be installed 8.5 feet U/S from ℄ of dam embankment at stations 21+50, 22+00, 22+50, 23+50 and 24+10.
2. Two reference monuments are located, on the access road on the right abutment
3. Monuments shall be installed after the recorder house and traffic control facilities are completed.



TYPICAL SECTION

GUARD RAIL DETAILS

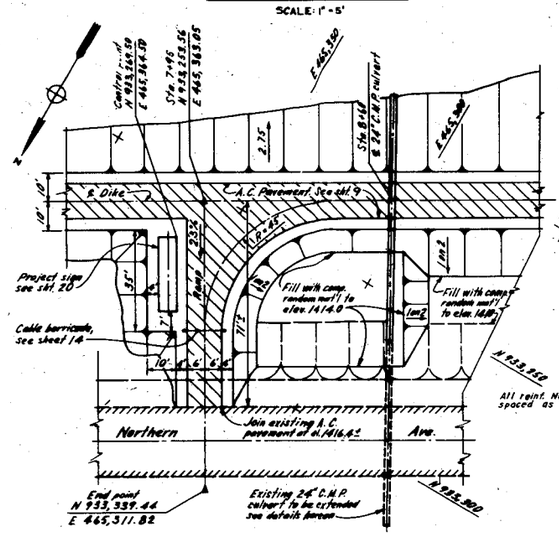
SCALE: 1" = 5'



PROFILE OF 24-INCH CULVERT EXTENSION

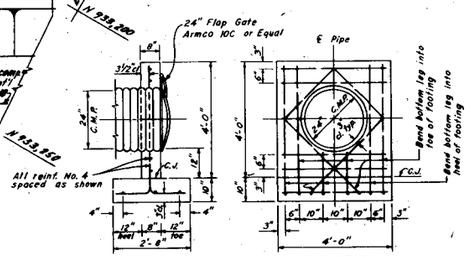
HORIZ. SCALE: 1 IN. = 20 FT.

VERT. SCALE: 1 IN. = 10 FT.



RAMP DETAIL

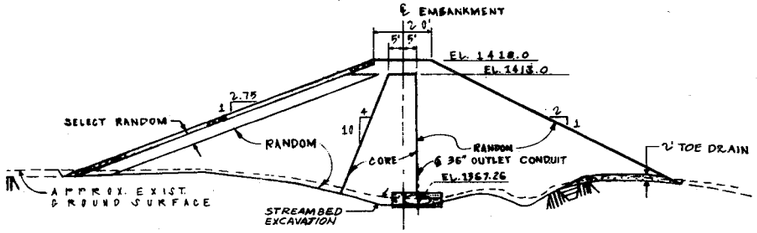
SCALE: 1" = 20'



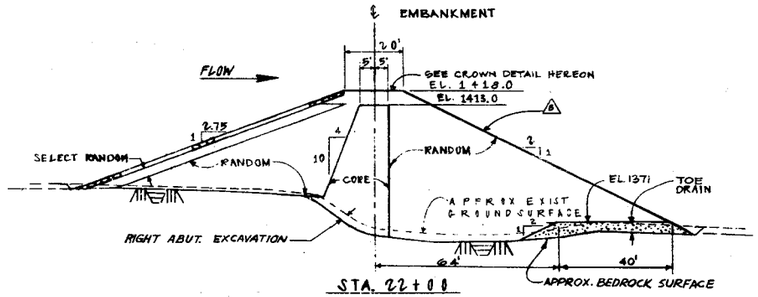
HEADWALL DETAILS

SCALE: 1/2 IN = 1 FT.

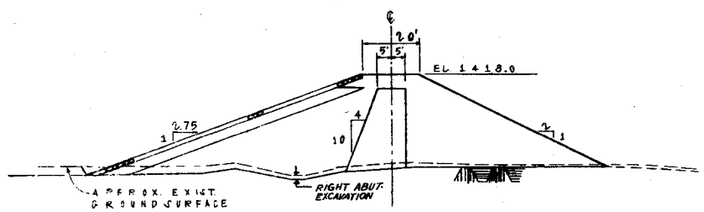
	U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS
DESIGNED BY: J.H.W.	GILA RIVER BASIN NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA
DRAWN BY: J. Y.	DREAMY DRAW DAM
CHECKED BY: J. A.	SUBDRAINAGE SYSTEM, MONUMENT AND MISCELLANEOUS DETAILS
SUBMITTED BY: CHIEF, DESIGN BRANCH	SPEC. NO. / DRAWING NUMBER / DISTRICT FILE NO. / SHEET
DATE:	



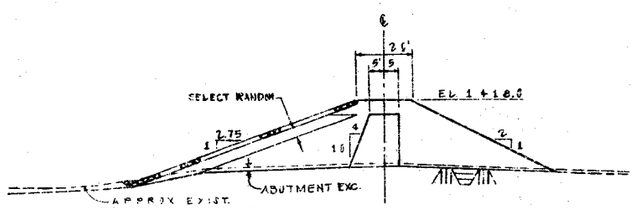
STA. 22 + 50 (A)



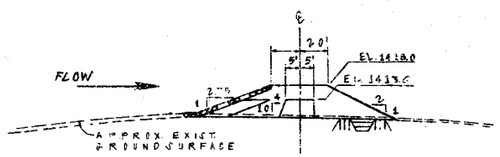
STA. 22 + 00



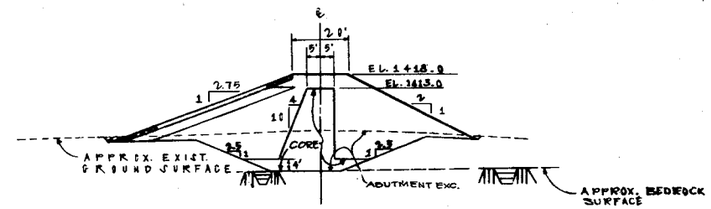
STA. 21 + 50 (A)



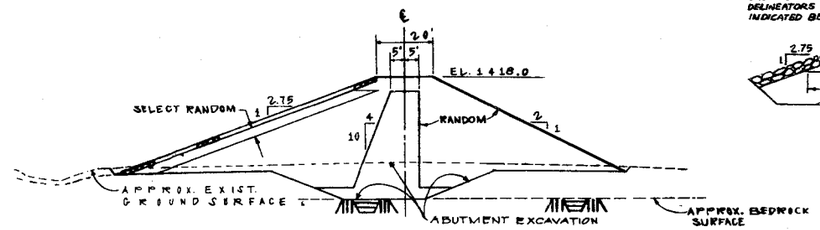
STA. 21 + 00 (A)



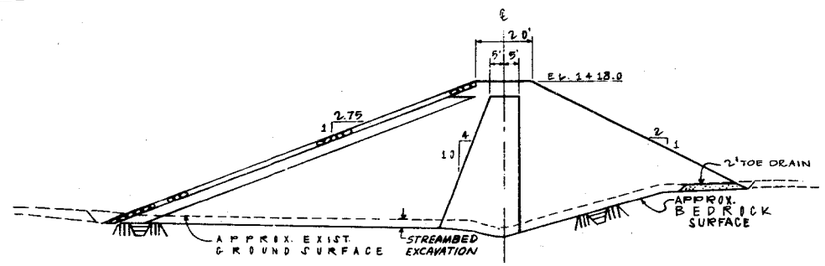
STA. 20 + 50 (A)



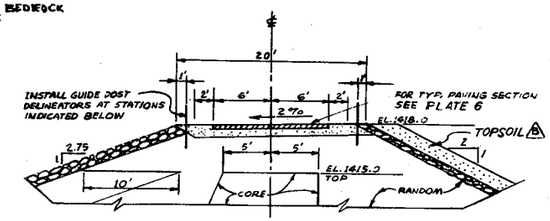
STA. 24 + 00



STA. 23 + 50 (A)



STA. 23 + 00



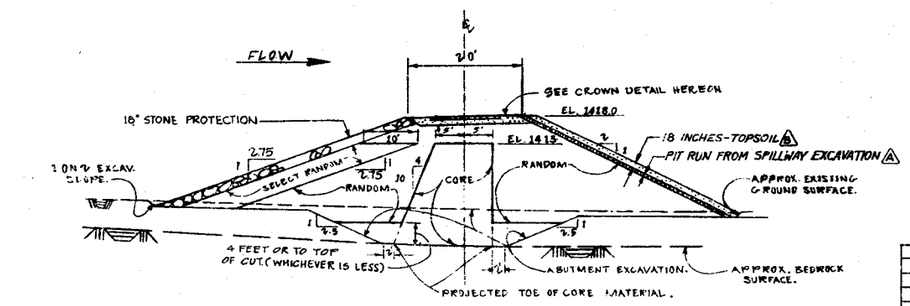
CROWN DETAIL

1" = 6 FT.

LOCATION OF GUIDE POSTS	
24 + 00	BOTH SIDES OF EMBANKMENT
23 + 00	
22 + 00	
21 + 00	
20 + 30	NORTH SIDE
20 + 20	SOUTH SIDE
19 + 70	WEST SIDE
19 + 50	EAST SIDE

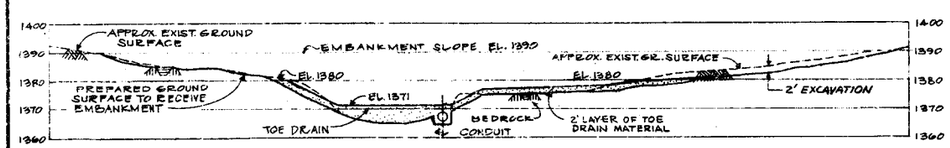
GENERAL NOTES

1. LIMITS OF ABUTMENT AND STREAMBED EXCAVATIONS ARE SHOWN ON PLATE 2.
2. UNLESS OTHERWISE INDICATED, SLOPES RESULTING FROM EXCAVATION OPERATIONS, SHALL BE NO STEEPER THAN 1 VERTICAL ON 2 HORIZONTAL.
3. LOCATIONS OF SECTIONS A-A AND B-B ARE SHOWN ON PLATE 2.
4. ALL CROSS SECTIONS ARE DRAWN TO SCALE OF 1 INCH = 20 FEET EXCEPT AS INDICATED



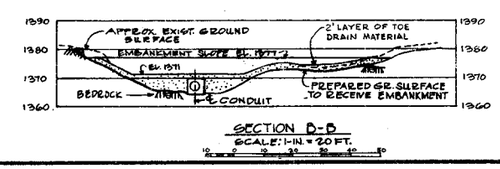
(A) TYPICAL EMBANKMENT SECTION WITH CUTOFF TRENCH

(NOT TO SCALE)



SECTION A-A

SCALE: 1-IN. = 20 FT.



SECTION B-B

SCALE: 1-IN. = 20 FT.

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
	CAVATION. "AS CONSTRUCTED"	12 Mar 75	
	And CROWN DETAIL. Removed, PIT RUN FROM SPILLWAY EX-		
	-TOPSOIL; TYPICAL EMBANKMENT SECTION WITH CUTOFF TRENCH		
	EMBANKMENT SECTION WITH CUTOFF TRENCH. Added 18 INCHES		
(B)	TYPICAL EMBANKMENT SECTION WITH CUTOFF TRENCH(WAS)		
	PIT RUN FROM SPILLWAY EXCAVATION "AS CONSTRUCTED"	16 Jul 74	
	& EMBANKMENT SECTION WITH CUTOFF TRENCH And Added		
	22+50, Remove '8' SLOPE PROTECTION MATERIAL' Sta. 22+00, 23+50		
(A)	Remove 'APPROX. BEDROCK SURFACE' Sta. 20+50, 21+00, 21+50,		

REVISIONS

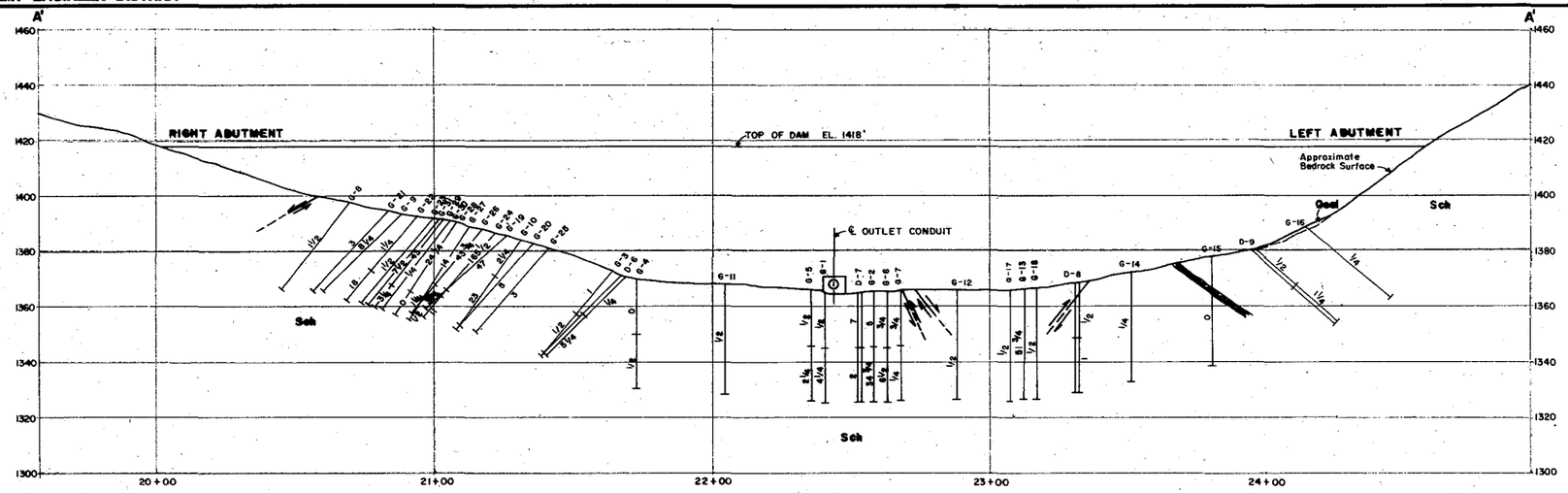
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

GILA RIVER BASIN
NEW RIVER & PHOENIX CITY STREAMS, ARIZONA

DREAMY DRAW DAM

EMBANKMENT- CROSS SECTIONS

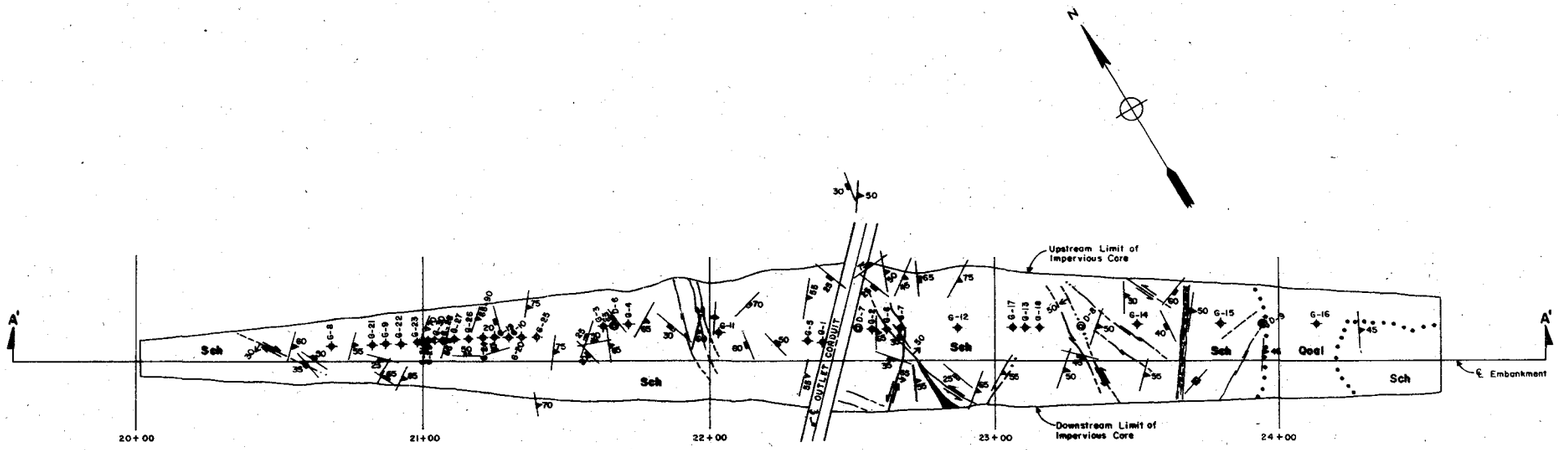
DESIGNED BY: J. H. W.
DRAWN BY: R. L. A. A. D. P.
CHECKED BY: J. A. R. R. K.
SUBMITTED BY:
DATE:
CHIEF, DESIGN BRANCH
SPEC. NO.
DRAWING NUMBER
DISTRICT FILE NO.
SHEET



SECTION A'-A'

GEOLOGY ALONG ℄ EMBANKMENT (AFTER EXCAVATION) SHOWING GROUT AND EXPLORATORY GROUT HOLE LOCATIONS

VERT. SCALE: 1 IN. = 20 FT.
HORIZ. SCALE: 1 IN. = 20 FT.



PLAN

SCALE: 1 IN. = 20 FT.

LEGEND

Qeol — **OLDER ALLUVIUM:** Terrace deposits, talus debris, and slope-wash; indurated.

Sch — **SCHIST:** Steel gray to brownish gray; soft to hard; platy; numerous quartz and occasional calcite veins and lenses; occasional seams of clay; foliation dips 45° to 90° to the east and strikes N30-50°E.

Exploratory grout holes (NX), showing the two stages; number of sacks of grout take for each stage indicated beside hole.

Grout hole (EX), showing holes without stages and holes with two stages; number of sacks of grout take for each stage indicated beside hole.

Contact between formations (i.e. between bedrock and alluvium) - dashed where approximate.

Strike and dip of inclined foliation.

Strike of vertical foliation.

Strike and dip of inclined joint.

Strike of vertical joint.

Fault - dashed where approximately located, dotted where hidden or buried; dip shown by short arrow; long arrows show direction of relative movement.

Vein material - mostly talc and quartz, with occasional iron oxide and limy veins and lenses.

Approximate interval of core loss.

DEPTH - Number of feet below top of hole.

PSI - Pounds per square inch water pressure.

GPM - Gallons per minute, water loss.

NO LOSS - No water loss at a certain pressure.

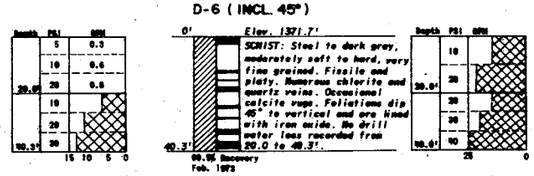
GENERAL NOTES

1. Bearing, inclination, spacing, and number of exploratory grout holes and grout holes were determined in the field according to number of sacks of grout which the preceding and adjacent holes took and also upon the bedrock conditions of the abutments.
2. See sheet 3 for plan of exploration and additional legend.
3. In area between G-8 and G-25 there are numerous limy veins and lenses exposed on ground surface.
4. Exploratory grout hole and grout hole inclinations are measured from horizontal.
5. Exploratory grout holes and grout holes are 40' deep, except D-6, which is 40.3'. Holes were drilled in stages as follows;

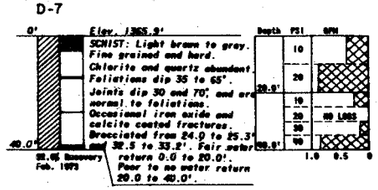
HOLE NO.	1ST STAGE	2ND STAGE
G-10	0 to 16'	16' to 40'
D-6 thru D-9 and G-1 thru G-7	0 to 20'	20' to Bottom
G-22 and G-26	0 to 26'	26' to 40'
G-19, 24, 27, 28, and 29.	0 to 30'	30' to 40'
G-8, 9, 11 thru 18, 20, 21, 23, 25, 30, and 31.	0 to 40'	-----

6. Soil classifications shown on this sheet are visual.
7. Section A'-A' is profile along embankment after excavation of core trench; it shows geology and location of grout and exploratory grout holes, as projected onto profile.

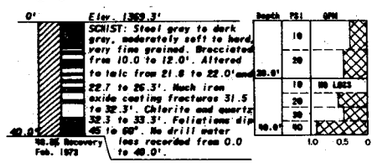
D-6 (INCL. 45°)



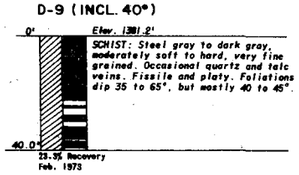
D-7



D-8



D-9 (INCL. 40°)



VERT. SCALE: 1 IN. = 20 FT.

DATUM IS MEAN SEA LEVEL

SYMBOL	DESCRIPTIONS	DATE	APPROVAL

REVISIONS

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: R.M.H.
DRAWN BY: R.L.A.
CHECKED BY: F.T.

GILA RIVER BASIN
NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA

DREAMY DRAW DAM

GEOLOGY AND FOUNDATION EXPLORATION
FOUNDATION GROUTING

SUBMITTED BY: DATE / CHIEF, ENGINEERING DIVISION

APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION

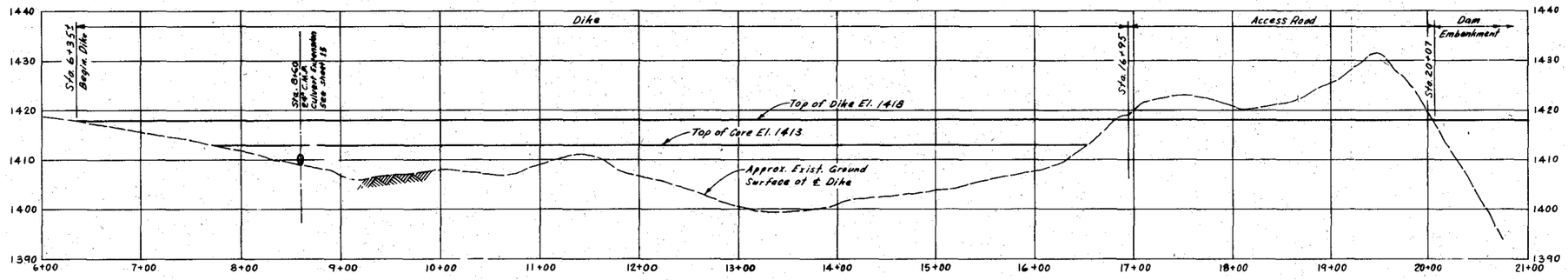
APPROVED: "ORIGINAL" C.E. DISTRICT ENGINEER

SPEC. NO. DACW09- ____ -B-____

DISTRICT FILE NO.

SHEET OF SHEETS

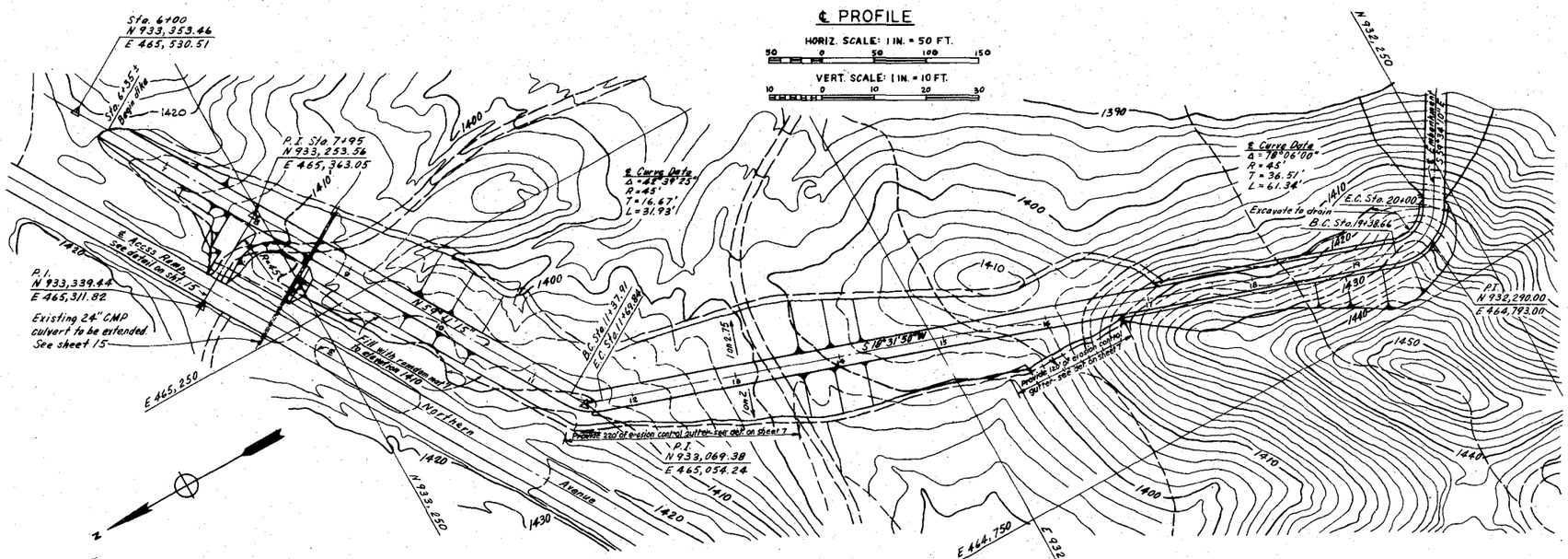
PLATE 5



℄ PROFILE

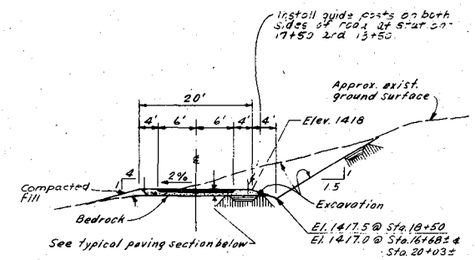
HORIZ. SCALE: 1 IN. = 50 FT.

VERT. SCALE: 1 IN. = 10 FT.



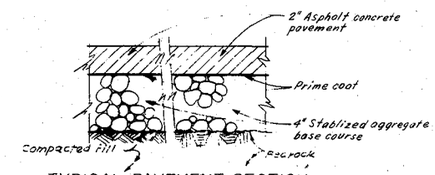
PLAN

SCALE: 1 IN. = 50 FT.



TYPICAL ACCESS ROAD SECTION

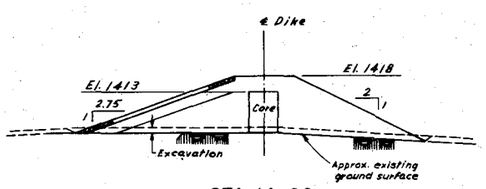
NOT TO SCALE



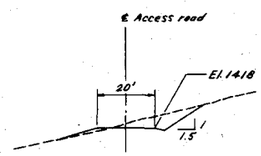
TYPICAL PAVEMENT SECTION

NOT TO SCALE

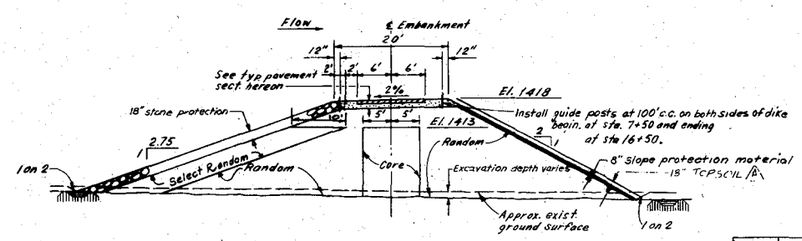
Note: 1. Pave access ramp to join Northern Ave.



STA. 14+00

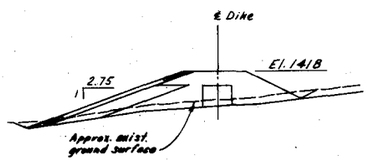


STA. 18+00

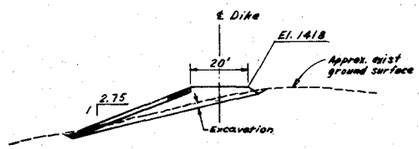


TYPICAL DIKE SECTION

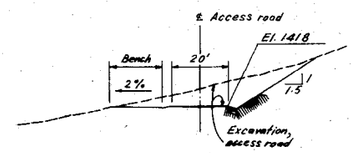
NOT TO SCALE



STA. 9+00



STA. 16+75



STA. 19+00

Note: All cross sections are shown looking toward south at a scale of 1 inch = 20 feet unless otherwise indicated.

SCALE: 1 IN. = 20 FT.

DATUM IS MEAN SEA LEVEL

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
A	18" TOPSOIL, Added. "AS CONSTRUCTED"	12 Mar 75	

REVISIONS

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: J. H. W.
DRAWN BY: J. Y.
CHECKED BY: J. J. K. J. A.

GILA RIVER BASIN
NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA

DREAMY DRAW DAM

SADDLE DIKE AND ACCESS ROAD

PLAN, PROFILE AND SECTIONS

SUBMITTED BY:
CHIEF, DESIGN BRANCH
DATE:

SPEC. NO.
DRAWING NUMBER
DISTRICT FILE NO.
SHEET

APPENDIX III
AGENDA FOR INSPECTION OF
TAT MOMOLIKOT (SANTA ROSA)
DREAMY DRAW AND ALAMO LAKE DAMS

Monday, 11 Nov 1974 - Members will arrive at Phoenix, Arizona by plane. Arrangements for cars will be made by LAD. Single room reservations will be made for all members for 11 November 1974. The name and address of the motel is:

Los Olivas Hotel
202 East McDowell Road
Phoenix, Arizona
Telephone Number: (602) 258-6911
Cost per room: $12.60 including tax

Tuesday, 12 Nov 1974

0800	Depart from motel for Tat Momolikot Dam
0930	Inspection of dam
1130	Lunch - Members will bring own lunch
1230	Inspection of dam
1430	Assemble for discussion of inspection
1500	Depart for Phoenix, Arizona

Single room reservations will be made for all members for 12 November 1974 at the Los Olivas Hotel in Phoenix.

Wednesday, 13 Nov 1974

0800	Depart from motel for Dreamy Draw Dam
0830	Inspection of dam
1130	Assemble for discussion of inspection
1200	Lunch
1300	Depart for Wickenberg, Arizona

Single room reservations will be made for all members for 13 November 1974.
The name of the motel is:

La Siesta Motel
Wickenberg, Arizona
Telephone Number: (602) 684-2193
Cost per room: $12.08 including tax

Thursday, 14 Nov 1974

0800	Depart from motel for Alamo Lake Dam
1000	Inspection of dam
1200	Lunch - Members will bring own lunch
1300	Inspection of dam
1530	Assemble for discussion of inspection
1600	Depart for Phoenix, Arizona

Single room reservations will be made for all members for 14 November 1974.

The name and address of the motel is:

Casa Bell Motel
17211 N. Black Canyon Hwy.
Phoenix, Arizona 85023
Telephone Number: (602) 993-8300
Cost per room: $14.70 including tax

Friday, 15 Nov 1974 - Members will return to duty station.