HESPERUS WASH DAM

STRUCTURE NO. 36

FOUNTAIN HILLS

GENERAL DATA

Section	Title
1.	Hydrology and Hydraulic Calculations
2.	Specifications
3.	Subsurface Investigation Data
4.	Density Determinations
5.	Tests on Concrete Cylinders
6.	License of Approval
7.	Computer Calculations for Hydrology & Hydraulic (formerly in a second volume)
8.	Photos
9.	As-Built Plans

HYDROLOGY AND HYDRAULIC

CALCULATIONS

TRICO INTERNATIONAL INC.
CIVIL ENGINEERING & LAND PLANNING
TEMPE, ARIZONA

	BY	DATE
CAL'D.		
CHK'D.		
JOB NO.		
SHEET	OF	

FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36 | REFERENCE

RETARDATION STRUCTURE NO 36

FOUNTAIN HILLS, ARIZONA

HYDROLOGY & HYDRALIC

CALCULATIONS

TRICO INTERNATIONAL INC.
CIVIL ENGINEERING & LAND PLANNING
TEMPE, ARIZONA

	BY	DATE
CAL'D.	HIGG	
CHK'D.		
JOB NO.		
SHEET 1 OF		

FOUNTAIN HILLS, ARIZONA

RETARDATION STRUCTURE NO 36

REFERENCE

METHOD OF ANALYSIS.

1. USE SOIL CONSERVATION SERVICE COMPUTER PROGRAM TR-20 "PROJECT FORMULATION" FOR STREAM FLOW ROUTING AND TO ESTABLISH INVERT OF EMERG. SPILLWAY, SIZE OF PRINCIPAL SPILLWAY PIPE, CAP. OF EMERGENCY SPILLWAY, TOP OF DAM ELEV. AND FREEBOARD

2. GENERAL CRITERIA - STORMS FOR CLASS "B" DAM

THE FOLLOWING STORMS ARE TO BE USED AS THE BASIS OF DESIGN OF THE DAM

STORM "A" - 100 YR / 24 HR PRECIP. = 4.2"

STORM "B" - 100 YR / 6 HR PRECIP = 3.2"

U.S. WEATHER BUREAU PRECIPITATION MAPS FOR ARIZONA DATED 1970 (ATTACHED)

STORM "C" - 100 YR/6 HR + 0.12 (PMP - 100 YR/6 HR)

@ PMP = 19"

- 3.2 + 0.12 (19.0 - 3.2) = 5.10"

PER SCS DESIGN CRITERIA FOR EARTHFILL DAMS (ATTACHED)

STORM "D" - 100 YR/6 HR + 0.4 (PMP - 100 YR/6 HR)

- 3.2 + 0.4 (19.0 - 3.2) = 9.52"

PMP PER U.S. WEATHER BUREAU

3. GENERAL CRITERIA - BASIS OF DESIGN

1. POOL BEHIND DAM MUST HAVE SUFFICIENT STORAGE TO CONTAIN RUNOFF FROM STORM "A" OR STORM "B" (WHICHEVER IS GREATER) WITH DISCHARGE FROM PRINCIPAL SPILLWAY BUT NO DISCHARGE FROM EMERG. SPILLWAY.

2. TOP OF DAM SET TO CONTAIN POOL GENERATED BY STORM "D" WITH BOTH PRINCIPAL & EMERG. SPILLWAYS WORKING.

3. FREEBOARD (POOL ELEV. TO TOP OF DAM) BASED UPON STORM "C" FREEBOARD TO BE AT LEAST 1.0 FT.

BASED UPON GENERAL CRITERIA OF SCS FOR EARTH DAMS (ATTACHED)

TRICO INTERNATIONAL INC.
CIVIL ENGINEERING & LAND PLANNING
TEMPE, ARIZONA

	BY	DATE
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CHK'D.		
JOB NO.		
SHEET 1 OF		

FOUNTAIN HILLS

STRUCTURE NO. 4

REFERENCE

See next sheet

METHOD OF ANALYSIS

1. USE SOIL CONSERVATION SERVICE COMPUTER PROGRAM TR-20 "PROJECT- FORMULATION" FOR STREAM FLOW ROUTING AND TO ESTABLISH INVERT OF EMERG. SPILLWAY, SIZE OF PRINCIPAL SPILLWAY PIPE, CAPACITY OF EMERG. SPILLWAY, TOP OF DAM AND FREEBOARD

2. GENERAL CRITERIA - STORMS FOR CLASS "C" DAMS

THE FOLLOWING STORMS ARE TO BE USED AS THE BASIS OF DESIGN OF THE DAM

→ STORM "A" - 100 YR / 24 HR PRECIP = 4.2" — U.S. WEATHER BUREAU PRECIPITATION MAPS FOR ARIZONA DATED 1970 (ATTACHED)

→ STORM "B" - 100 YR / 6 HR PRECIP = 3.2" — U.S. WEATHER BUREAU

STORM "C" - 100 YR 6HR + 0.26 (PMP - 100YR 6HR) — PER SCS DESIGN CRITERIA FOR EARTH DAMS (ATTACHED)

@ PMP = 19"

= 3.2 + 0.26 (19.0 - 3.2) = 3.2 + 4.1 = 7.3"

STORM "D" - PMP = 19.0" — U.S. WEATHER BUREAU & SOIL CONS. SER.

(PMP MEANS PROBABLE MAX. PRECIPITATION)

3. GENERAL CRITERIA - BASIS OF DESIGN — BASED UPON GENERAL CRITERIA OF S.C.S. FOR EARTHFILL DAMS (ATTACHED)

1. POOL BEHIND DAM MUST HAVE SUFFICIENT STORAGE TO CONTAIN RUNOFF FROM STORM "A" OR STORM "B" (WHICHEVER IS GREATER) WITH DISCHARGE FROM PRINCIPAL SPILLWAY BUT NO DISCHARGE FROM EMERGENCY SPILLWAY.

2. TOP OF DAM SET TO CONTAIN POOL GENERATED BY STORM "D" WITH BOTH PRINCIPAL & EMERGENCY SPILLWAYS OPERATING

3. FREEBOARD (POOL ELEV. TO TOP OF DAM) BASED UPON STORM "C". FREEBOARD TO BE AT LEAST 1.0 FT.

TRICO INTERNATIONAL INC.
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TEMPE. ARIZONA

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FOUNTAIN HILLS, ARIZONA

STRUCTURE NO 240

REFERENCE

VOLUME OF STORAGE POND

ELEV	ΔV (AC-FT)	ΣV (AC-FT)
1854.6	0.0	0.0
1860.6	0.239	0.239
1866.6	5.36	5.599
1870.6	15.10	20.699
1874.6	28.451	49.15
[illegible]	[illegible]	97.5
[illegible]	[illegible]	179.00
90	[illegible]	303.0
[illegible]	[illegible]	335.0
1882.6	32.0	367.0
1886.6	96.0	463.0
1886.00		

SPILLWAY DISCHARGE CHARACTERISTICS

ONE 48" ϕ PIPE (RCP)

to d pipe

$Q = 0.62 \times A \times \sqrt{2gH}$

$A = \frac{\pi D^2}{4} = \frac{\pi \times 4^2}{4} = 12.57$ FT²

$G = 32.2$

12.57
.62
25.14
75 42
779 34

ELEV	H	Q
1854.6	0.0	0.0
1860.6	4.0	125
1866.6	9.0	187
1870.6	12.0	234
1874.6	17.0	272
1880.6	24.0	306
1884.6	28.0	337
1886.6	31.0	363
1888.6	33.0	379
1890.6	35.0	394
1892.6	37.0	409
1894.6	39.0	424
1896.00	39.45	393

KING'S HANDBOOK OF HYDRAULICS
PG 3-5
(4TH EDITION)

TRICO INTERNATIONAL INC.
CIVIL ENGINEERING & LAND PLANNING
TEMPE, ARIZONA

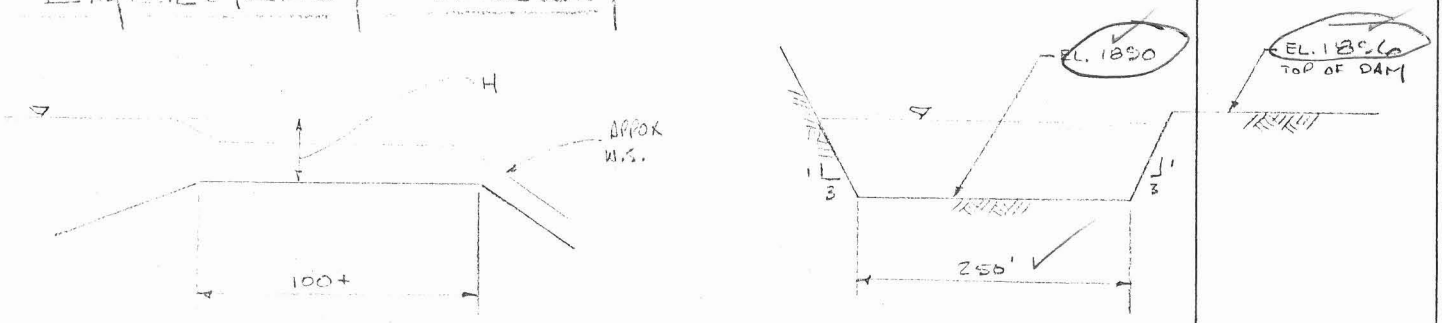
	BY	DATE
CAL'D.	HIGG	
CHK'D.		
JOB NO.		
SHEET 3 OF		

FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 260

REFERENCE

EMERGENCY SPILLWAY



$Q = C L H^{3/2}$ ✓

$C = 2.63$ ✓

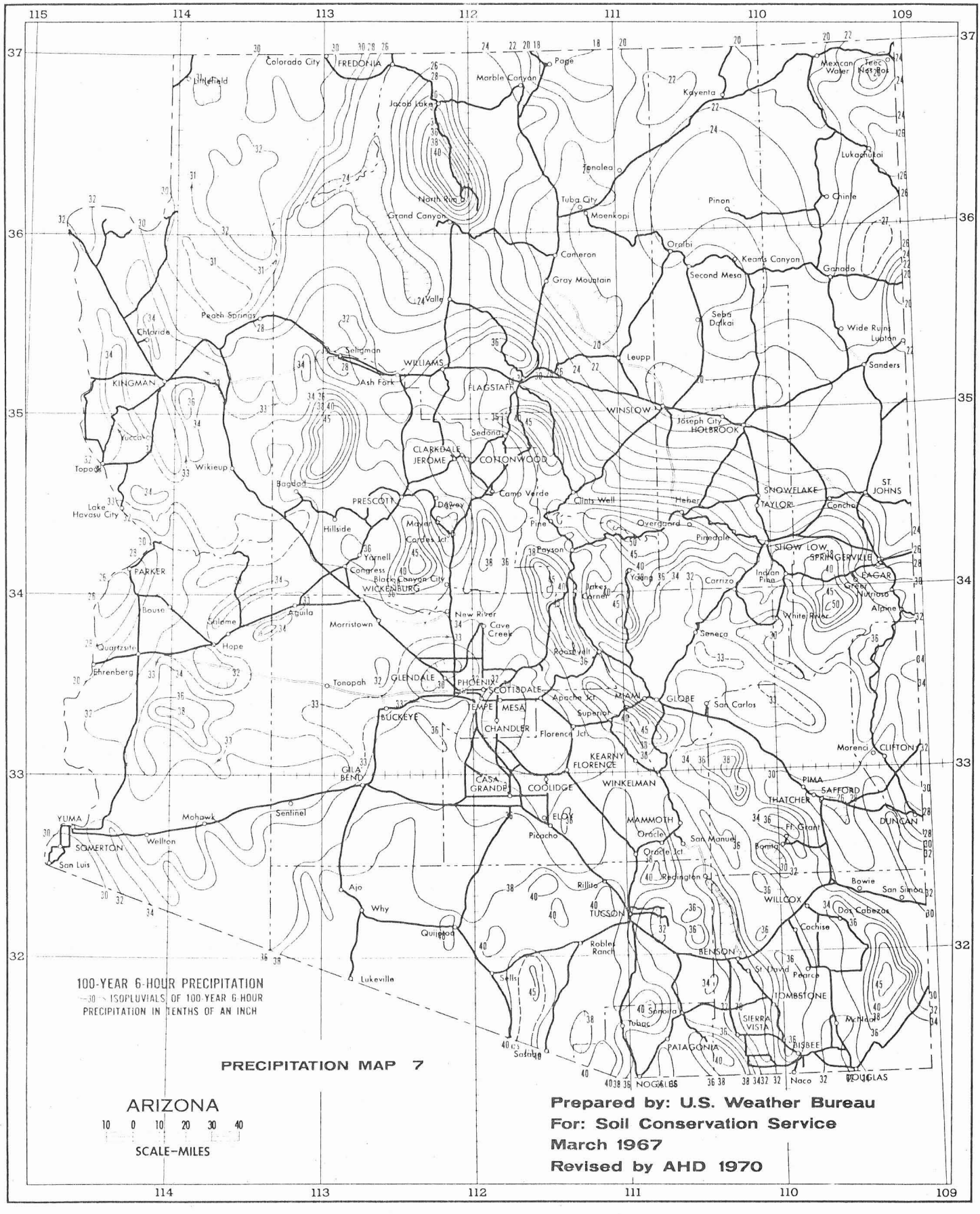
KING'S HANDBOOK OF HYDRAULICS
PG 5-4
5-12
(4TH EDITION)

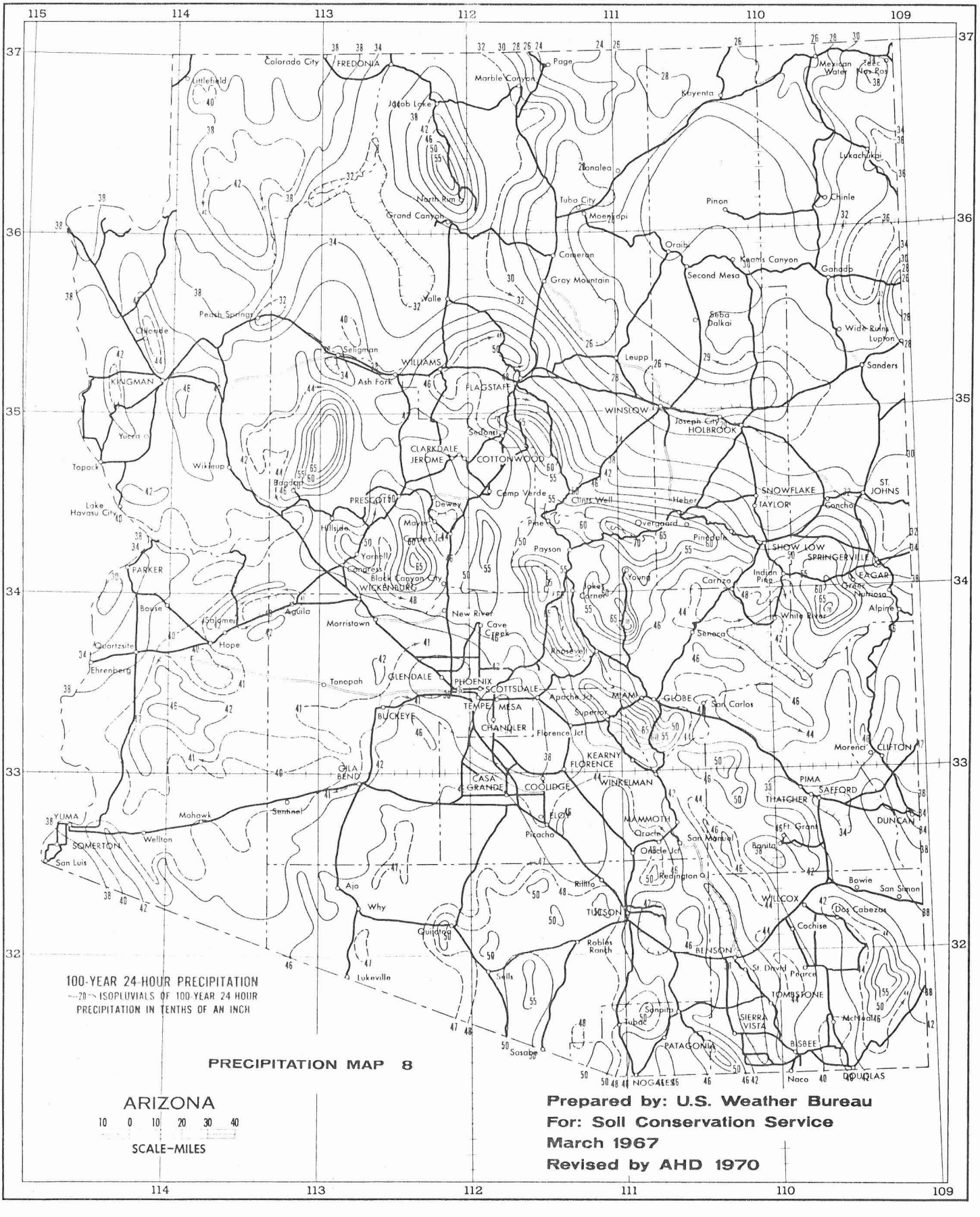
ELEV	H	L	Q_{EMERG}	Q_{PRIN}	Q_{TOTAL}	A.F./HR
1890	0.0	250 ✓	0.0	362	362	30.2
1890.6	0.6	252	247 ✓	362	712	59.3
1891.6	1.6	255	1421	370	1791	149.3
1892.6	2.6	258	2927	375	3302	
1893.6	3.6	261	4431 ✓	391	4822	
1896.00	6.00	268	10359 ✓	393	10,752	895.2
1897	7.00	269	13,108	400±	13,500	
1898	8.00	270	16,067	400±	16,500	

agree w/ printout

1896.5±

12,100


100-YEAR 6-HOUR PRECIPITATION
30 ISOPLUVIALS OF 100-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP 7
ARIZONA
10 0 10 20 30 40
SCALE-MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970



100-YEAR 24-HOUR PRECIPITATION

—20— ISOPLUVIALS OF 100-YEAR 24 HOUR PRECIPITATION IN TENTHS OF AN INCH

PRECIPITATION MAP 8

ARIZONA

10 0 10 20 30 40

SCALE-MILES

Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970

SPECIFICATIONS

McCULLOCH PROPERTIES, INC.

FOUNTAIN HILLS, ARIZONA

SPECIFICATIONS

FOR

RETARDATION STRUCTURE NO. 36

TRICO OF ARIZONA

Fountain Hills, Arizona

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SECTION I - CONSTRUCTION MATERIALS

1.01 PORTLAND CEMENT CONCRETE

1.01.1 General:

Concrete consisting of Portland Cement, concrete aggregate, sand and water will be designated by a symbol consisting of a number, a letter, and a number. The first number will be the number of sacks of cement per cubic yard, the letter the grading of the aggregate, and the last number the compressive strength at 28 days. A sack of cement shall be defined as 94 pounds.

1.01.1.1 Concrete Classes

Structural Concrete shall be 6.0-B-3000 and bedding concrete shall be 5.0-B-2000, concrete cemented riprap shall be 5.0-C-2000. Compressive strength test shall be performed in accordance with ASTM C-39.

1.01.2 Portland Cement:

All cement to be used or furnished shall be Type II, Portland Cement, conforming to ASTM C-150. The Contractor shall furnish a certificate of compliance signed by the manufacturer identifying the cement and stating that the cement delivered conforms with ASTM C-150. The cost of furnishing certified cement shall be considered as included in the Contract Bid Price.

Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling, and suitably protected against contamination or moisture. Should any cement delivered show evidence of contamination, or be otherwise unsuitable, the Engineer may require that it be removed from the site.

All Portland Cement used in concrete for any individual structure shall be of the same brand and type unless otherwise approved by the Engineer.

Low alkali cement shall conform to the requirements for Portland Cement as specified in ASTM C-150; and, in addition, shall contain not more than 0.60 percent by weight of total alkali calculated at sodium oxide, including all sodium oxide plus 0.658 of all potassium oxide.

1.01.3 Aggregates:

Aggregates shall be sand and concrete aggregates conforming to the requirements prescribed in Subsection 200-1 of Standard Specifications for Public Works Construction, 1970 Edition, and shall be approved by the Engineer prior to use. They shall meet the grading requirements of this subsection.

Methods of handling materials resulting in segregation, degradation or the combining of materials which results in any stockpile failing to meet specifications, shall not be permitted.

Aggregates which are found to have a silica-released to alkali-reduced ratio greater than one, when tested in accordance with ASTM C-289 may be used only with approval by the Engineer and provided low-alkali cement is used. No additional allowance will be made for the use of low-alkali cement.

1.01.4 Combined Aggregate Gradings:

The combined aggregates shall conform to the gradings specified in the following table:

COMBINED GRADINGS FOR PORTLAND CEMENT CONCRETE

PERCENTAGE PASSING SIEVES

Sieve Size	Grading A	Grading B	Grading C	Grading D	Grading E
2"	100	100			
1-1/2"	95-100	95-100	100		
1"	64- 80	80-100	95-100		
3/4"	55- 71	64- 80	75- 91	100	100
3/8"	37- 53	40- 52	48- 66	92-100	90-100
#4	32- 42	35- 45	39- 51	42- 60	60- 80
#8	25- 35	28- 38	31- 41	33- 47	50- 70
#16	18- 28	21- 31	22- 32	22- 38	33- 53
#30	10- 18	10- 20	12- 22	17- 25	19- 35
#50	3- 9	3- 9	3- 9	6- 12	5- 15
#100	0- 3	0- 3	0- 3	1- 5	2- 6
#200	0- 2	0- 2	0- 2	0- 2	0- 2

1.01.5 Water:

Water used for concrete shall be clear and free from oil, vegetable matter and other deleterious substance. Water shall not contain an amount of impurities that will cause a change in the time of setting of Portland Cement of more than 25% nor a reduction in the compressive strength of mortar at fourteen (14)

days of more than 5% compared to results obtained with distilled water.

In conventionally reinforced concrete work, water shall not contain more than 1,000 ppm of chloride calculated as Cl, nor more than 1,000 ppm of sulfates calculated as SO.

In non-reinforced concrete work, water shall not contain more than 2,000 ppm of chloride calculated as Cl, nor more than 1,500 ppm of sulfates calculated as SO_4.

1.01.6 Admixtures:

No admixture of any type shall be used unless authorized by the Engineer. When an admixture is permitted it shall be measured accurately into each batch or load in liquid form by a mechanical dispensing device and method approved by the Engineer.

When an air-entraining agent is used it will be limited to the extent that the amount of entrained air by volume shall not exceed 6%, and the mix shall be redesigned to adjust to yield.

1.01.6.1 Accelerator:

Use of $CaCl_2$ (Calcium Chloride) will not be permitted.

1.01.7 Mixing:

Machine mixing will be required in all cases other than in which it would obviously prove to be impractical, in which event hand mixing will be permitted.

Mixing shall be commenced as soon as possible after the cement is placed in contact with the aggregates, but in no event shall the intervening period exceed 30 minutes.

All concrete mixers shall be of such design and construction and so operated to provide a thoroughly and properly mixed concrete in which the ingredients are uniformly distributed.

1.01.8 Concrete Consistency:

The amount of water added at the mixer shall be regulated to take into account the free water in the aggregates. Free water is defined as the total water minus the water absorbed by the aggregate in a saturated surface-dry condition.

The amount of water used in the mixture shall not exceed the minimum amount necessary to permit practical placement and

consolidation of the concrete, and unless otherwise authorized by the Engineer shall be that required to produce concrete with a slump within the range shown as nominal in the following table:

Type of Work	NOMINAL SLUMP (inches)	MAXIMUM SLUMP (inches)
Non-reinforced Concrete	0-3	4
Reinforced Concrete Structures		
Heavy Sections	0-3	5
Thin Sections	0-4	6

The concrete used in the work shall not have a slump greater than that shown as maximum above, nor a free water content greater than 312 pounds per cubic yard of concrete.

When adverse or difficult conditions affect the placement of concrete, the Engineer may authorize a greater slump to be used, both the water and cement are increased.

Water shall be added at a ratio not to exceed 30 pounds per sack of added cement per cubic yard of concrete, and such additional water and cement shall be at the Contractor's expense.

The consistency of concrete shall be determined in accordance with ASTM C-143.

If slump tests of individual samples taken at approximately the 1/4 and 3/4 points of the discharge differ by more than two inches (2"), the mixer will not be acceptable for further use until the condition is corrected.

1.01.9 Transit Mixers:

The type, capacity, and manner of operation of the mixing and transporting equipment for ready-mix concrete shall conform to the current "Standards for Operation of Truck Mixers and Agitators of the National Ready-Mixed Concrete Association" and the "Truck Mixer and Agitators Standards of the Truck Mixer Manufacturers Bureau". Transit mix concrete trucks shall be equipped with an automatic device for recording the number of revolutions of the drum during the mixing period. Each mixer and agitator shall have attached thereto in a prominent place, a metal plate, or plates, installed by the manufacturer on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades.

Each mixer shall have an identification number painted on the

truck in such a location that it can be easily read from the batching platform.

The total volume of materials introduced into the mixer shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this subsection, the amount of materials charged into the mixer shall be reduced.

The drum of the mixer shall be completely emptied of any previously mixed load. The proper proportions of aggregate, cement, and water for each load of concrete shall be placed in the mixer and shall be mixed therein for not less than 70 nor mor than 100 revolutions of the drum or blades at the speed designated by the manufacturer of the equipment as mixing speed. Additional revolutions of the drum shall be at the speed designated by the manufacturer of the equipment as agitating speed. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum.

When concrete is being placed for concrete structures, all wash water shall be emptied from the mixer before any portion of the succeeding load is placed therein. For all other work, the mixer shall be empty or may carry 10 gallons of water in the drum. Adequate control of ready-mixed concrete will normally require the additional water to be added and mixed into the batch at the point of discharge. Water so added shall be mixed into the load for a minimum mixing time of three (3) minutes. Water shall not be added to the load during transit.

The total elapsed time between the addition of water at the batch plant and discharging the completed mix shall not exceed 90 minutes. Under conditions contributing to quick setting, the total elapse time permitted may be reduced by the Engineer.

The Engineer shall be provided with a legible certified weighmaster's certificate which shall contain the following information:

Name of Vendor
Name of Contractor
Number of Cubic Yards in the Load
Actual Weights of Cement and of each Size of Aggregate
Amount of Water Added at the Plant
Amount of Water in the Aggregate
Brand and Type of Cement
Brand and Amount of Admixture
Time and Date of Batching

Space shall be provided on the certificate so that amount of water added on the job may be indicated.

1.01.10 Hand Mixing:

Hand-mixing concrete shall be mixed on a water-tight platform, or in a mortar box in batches not to exceed 1/3 cubic yards each.

The aggregates shall first be spread in a uniform layer over which the required quantity of cement shall be evenly distributed. The entire batch shall be turned with shovels until the ingredients are thoroughly blended before adding the water. After adding the proper amount of water, the batch shall again be turned with shovels until a uniform consistency is obtained. Methods of hand mixing which allow the loss of mixing water shall not be permitted.

1.02 CURING COMPOUND (FOR Concrete)

1.02.1 General:

The curing compound shall meet the requirements of ASTM Designation C-309.

Unless otherwise specified the compound shall be Type 2.

1.03 STEEL REINFORCEMENT FOR CONCRETE

1.03.1 General:

Reinforcing steel shall be either Grade 40 or Grade 60 billet steel conforming to ASTM A-615. Varying grades shall not be used interchangingly in structures.

Steel bending processes shall conform to the requirement of ACI-318.

Bending or straightening shall be accomplished so that the steel will not be damaged. Kinked bars shall not be used.

1.03.2 Tie Wires:

The wires shall be cold-drawn black annealed wire and shall have a tensile strength of not less than 40,000 pounds per square inch.

1.04 CEMENT MORTAR SEAL FOR JOINTS IN CONCRETE PIPE

1.04.1 General:

Cement mortar shall be Class C mortar, 1 part cement to 2 parts sand. The quantity of water to be used in the preparation of mortar shall be required to produce a mixture sufficiently workable for the purpose intended.

Mortar shall be used as soon as possible after mixing and shall show no visible signs of setting prior to use. Retempering of mortar will not be permitted.

1.04.2 Cement:

Cement shall conform to the requirements of Subsection 3.01.2 of these specifications.

1.04.3 Sand:

Sand shall conform to the requirements of Subsection 3.01.3.

In proportioning the sand it shall be measured loose (without shaking or compacting) in measuring boxes or other suitable containers of known capacity.

1.04.4 Water:

Water shall conform to the requirements of Subsection 3.01.5 of these specifications.

1.04.5 Admixtures:

No admixture shall be used in mortar unless otherwise specified or approved by the Engineer.

1.05 REINFORCED CONCRETE PIPE

1.05.1 General:

The reinforced concrete pipe to be used for the principal spillway conduit shall be designed to withstand external loads due to the dam embankment and internal loads due to hydrostatic pressure of 25 pounds per square inch and shall conform to requirements of ASTM-C-361. The Contractor shall submit manufacturer's design calculations to the Engineer for approval.

1.05.2 Steel Reinforcement:

The steel reinforcement shall conform to the requirements of the specifications cited in Section 3.04 for the specified type of pipe.

1.05.3 Joints:

The pipe joints shall be of the bell and spigot type and shall incorporate a positive groove in the spigot to contain the gasket. The groove shall be so proportioned as to prevent the displacement of the gasket by the action of either internal or external pressures.

1.05.4 Gaskets:

The cross-sectional diameter of the gaskets shall conform to the pipe manufacturer's recommendation for the type and size of the pipe furnished.

1.05.5 Marking:

All pipe sections shall be marked by the manufacturer with the manufacturer's name and trademark, the date of manufacture, the nominal size, design head, and design external load.

1.06 ROCK FOR CEMENTED RIP-RAP CONSTRUCTION

1.06.1 General Requirements:

Native rock shall be used in the construction of permanent works. The rock size gradation shall be 18" maximum dimensions for the larger rocks and 1" minimum dimensions for the least gradation. Individual rock fragments shall be angular, sound, durable, hard, resistant to abrasion and free from laminations, weak cleavages, and undesirable weathering, leaching, exfoliation, and slaking tendencies. It shall be of such character that it will not disintegrate from the action of air, water, or the conditions to be met in handling and placing. All material shall be clean and free from delerious impurities, including alkali, earth, clay, refuse, and undesirable coatings.

SECTION II - CONSTRUCTION METHODS

2.01 CLEARING AND GRUBBING

2.01.1 General:

This work shall consist of removing all natural and artificial objectionable material from the construction area as delineated on the plans, material sites and areas through which channels are to be constructed. Clearing and grubbing shall be performed in advance of grading operations and in accordance with the requirements herein specified.

2.01.2 Marking:

The limits of the areas to be cleared and grubbed will be marked by means of stakes, flags, tree markings, or other suitable methods. Trees and cactus to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about six feet (6') above the ground surface.

2.01.3 Removal:

All trees and cactus not marked for preservation and all snags, logs, brush, stumps, shrubs, and rubbish shall be removed from the within limits of the marked areas. Unless otherwise specified, all stumps, roots, and root clusters having a diameter of one inch (1") or larger shall be grubbed out to a depth of at least two feet (2') below subgrade elevation for concrete structures and one foot (1') below the natural ground surface at embankment sites and other designated areas. Trees and plants that are not to be removed shall be fully protected from injury by the Contractor at his expense.

2.01.4 Disposal:

All material removed shall be disposed of outside of the construction area by burying or burning. The Contractor shall, at his expense, obtain all necessary county permits for burning and observe all county regulations pertaining to burning. Burning shall be done at such times and in such manner as to prevent the fire from spreading to areas adjoining the construction area. In case burning precedes construction operations, the piles may be placed in the most convenient location on the site. Otherwise, the piles shall be placed in the most convenient location at the side of the site and beyond slope lines where they may be burned without damage to

the surrounding area. No accumulation of flammable material shall remain on or adjacent to the construction site. The adjacent areas shall be left with a neat appearance.

2.02 EARTHWORK, EXCAVATION

2.02.1 General:

Earthwork for debris, dams, and basins shall include stripping, excavation, fill, backfill, grading, and disposal of excavated material.

2.02.2 Stripping:

The Contractor shall strip all top soil and unsuitable material to a minimum of two feet (2') in depth in (1) areas of embankments from toe of slope to toe of slope and, (2), in graded channel areas from top of slope to top of slope, as delineated on the plans.

The material obtained from stripping operations shall be disposed of away from the site unless tests conducted by a soils laboratory conclude the material is suitable for embankment fill. Suitable material shall be stockpiled at a location designated by the Engineer for use as future embankment.

Soil loosened below the stripping depth of two feet (2') shall be compacted. Soil removed below stripping depth, unless otherwise directed by the Engineer, shall be replaced and compacted to subgrade. All such filling and compacting shall be at the Contractor's expense unless otherwise directed by the Engineer.

2.02.3 Cut-Off Trench Excavation:

The Contractor shall excavate a minimum of two feet (2') in depth into cemented granular soils or to solid rock within the limits of the cut-off trench as delineated on the plans as Zone I of embankment. Cut-off trench depth shall be increased to 2'-6" minimum below bottom of principal spillway pipe within area of pipe trench.

The final depths and extent of the cut-off trench will be determined in the field by the Engineer.

2.02.4 Basin Excavation:

Materials obtained from the basin excavation shall be used for compacted embankment fills. The Engineer will designate the exact limits of basin excavation and the depths thereof in order to obtain material suitable for use in the compacted fills. Rocks over twelve inches (12") in greatest dimension will not be permitted in compacted fills and shall be stock-piled for use in grouted Rip-Rap.

2.03 EARTHWORK, FILL AND EMBANKMENT

2.03.1 General:

Earthwork - Fill and embankment shall include all earth fills necessary for construction of the project.

2.03.2 Project Control and Testing:

The Engineer shall act as the Owner's representative during construction, shall perform necessary observation and tests to verify compliance with specifications and shall approve all items specified. Test procedures shall be those outlined in the 1971 Book of Standards of the American Society of Testing and Materials.

2.03.2.1 Testable Embankment:

All embankment materials in Zone I (Core) and those materials in Zone II (Shell) for which accurate field density tests can

be performed shall be placed in horizontal lifts and compacted to a minimum of 95% of maximum density. A minimum of 5 field density tests shall be performed for each lift. Fifty percent of the field density tests shall be at or above 97% of maximum density.

For purposes of acceptance, the in-place density shall be defined as that determined in accordance with ASTM D1556, "Density of Soil in Place by Sand-Cone Method". Appropriate "Rock Correction" shall be made to account for the fraction of soil retained on the No. 4 sieve. During compaction the moisture content of the fill shall be maintained within 2% of the optimum moisture content as determined in accordance with ASTM D1557, Method D.

2.03.2.2 Non-Testable Embankment:

Compaction of coarse embankment materials in Zone II (Shell) which cannot be accurately tested by field density tests shall be controlled on a minimum rolling basis as follows:

A. Lifts shall be placed so their thickness, when compacted, does not exceed twelve inches (12").
B. Compaction shall be accomplished by a specified number of passes of equipment approved by the Soil Engineer. The following types of pneumatic rollers will be satisfactory:

Roller Type	Roller Rating	Wheel Load	Tire Inflation Pressure
A	45 Ton Min.	11 Ton Min.	140 PSI Min.
B	45 Ton Min.	5-1/2 Ton Min.	90 PSI Min.

Each lift shall be compacted with a minimum of three (3) passes of roller A or five (5) passes with Roller B. Other types of rollers can be evaluated as to suitability and required compactive effort established for those which are acceptable by the Engineer.

C. During compaction, the moisture content of the -3/4 fraction of the fill shall be maintained within 2% of the optimum moisture content as determined in accordance with ASTM D1557, Method D.

2.03.3 No fill or embankment shall be placed until the required excavation and preparation of the underlying foundation is completed, inspected, and accepted by the Engineer.

Before placing the materials for the compacted fills, the subgrade therefor shall be moistened, compacted and scarified in accordance with the requirements hereinafter set forth for subsequent layers of fill. Compaction Test shall be taken on the subgrade at the location designated by the Engineer. Areas not having a minimum density of 95% shall be removed to a depth specified by the Engineer and disposed of away from the construction area. The area shall then be rescarified, compacted, and tested.

2.03.4 Materials:

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing, and disposition of materials within the various fills shall be subject to approval by the Engineer.

Fill materials shall contain no sod, brush, roots, or other perishable materials. Rock particles larger than the maximum size specified for each type of fill shall be removed from the materials prior to compaction of the fill and stockpiled for use as Rip-Rap.

2.03.4.1 Zone I (Core of Dam):

Embankment shall be selected excavated or borrow material with gradations as follows:

Passing 6 inch square opening -	100%
Passing No. 4 Sieve -	60-100%
Passing No. 200 Sieve -	15-35%
Plasticity Index -	5-25%

2.03.4.2 Zone II (Shell of Dam):

Embankment shall be selected excavated or borrow material with gradations as follows:

Passing 12 inch square opening -	100%
Passing 1/4 inch Sieve -	25-75%
Passing No. 200 Sieve -	0-12%
Plasticity Indes -	5% Maximum

2.03.5 Placement of Embankment:

The Engineer may determine the locations at which each load of fill shall be placed in order to obtain the best possible blending of materials, fill shall be so constructed that the distribution of materials throughout each specified zone will be essentially homogeneous and free from lenses, pockets, streaks, or layers of material differing substantially in

texture or gradation from the surrounding material in the zone and shall be placed in approximately horizontal layers extending the entire length and width of the embankment. Unless otherwise specified, the elevation of the embankment surface shall be increased at approximately the same rate at all points regardless of the number of zones or types of material being placed. Each layer shall be sufficiently scarified after compaction to provide a bond with the succeeding layer. The top surface of each layer shall have sufficient crown to provide adequate drainage for water at all times during the construction period.

Before rolling or tamping, sufficient water shall be evenly applied to each layer of loose material so as to provide proper moisture content for satisfactory compaction to the specified relative density. The material shall be disc harrowed, or otherwise similarly worked, as the water is applied. The moisture content at the time of compaction shall be subject to the approval of the Engineer. In case any layer of the fill shall prove to be too wet to permit the attainment of the specified relative compaction the compacting work shall be delayed until the material has dried sufficiently to permit the attainment of said relative compaction.

After each layer has been spread, worked, and properly moistened, it shall be compacted by approved tamping, sheepsfoot rollers, pneumatic tire roller, mechanically operated hand tampers, or other mechanical means acceptable to the Engineer, to such extent as will produce the specified relative compaction.

Zone I (Core) of the embankement shall be placed in lifts not exceeding six inches (6") and Zone II (Shell) shall be placed in layers not exceeding twelve inches (12"). With authorization from the Engineer, where the Contractor clearly demonstrates that he can attain the required relative density with the type of equipment being used, a greater lift may be permitted.

2.03.5.1 Structure Fill:

Materials placed on the fill by dumping in piles or wind-rows shall be spread uniformly to not more than the specified thickness prior to compaction. Adjacent to structures fill shall be placed in a manner adequate to prevent damage to the structure and to allow the structure to gradually and uniformly assume the backfill loads. Backfill shall be placed in layers not thicker than four inches (4") and shall be

compacted by means of hand tamping, manually directed power tampers, or plate vibrators. Heavy equipment, except Vibrating Rollers, shall not be operated within two feet (2') of any structure. Vibrating Rollers shall not be operated within five feet (5') of any structure. The height of the backfill shall be increased at approximately the same rate on all sides of the structure during placement. No structural backfill shall be placed prior to inspection and approval of the structure by the Engineer.

Compacted fill which is to become subgrade for concrete cradles, spillways, or other hydraulic structures, shall be overfilled, sufficiently as to permit the trimming thereof to an even and firm subgrade for the concrete to be placed thereon. No direct payment will be made for such overfill. Any costs involved therefor shall be included in the price bid for the compacted fill.

On hillsides the existing ground shall be benched as the fill is brought up in layers and the material cut shall be incorporated into the fill. Areas which are inaccessible to heavy equipment shall be compacted manually.

The passage of heavy equipment will not be allowed over cradled precast conduits prior to seven (7) days after placement of the concrete cradle and until the backfill has been placed above the top surface of the pipe to a height of two feet (2').

Compaction of fill adjacent to structures may begin ten (10) days after placement of concrete.

203.5.2 Removal and Replacement of Defective Fill:

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements, or removed and replaced with acceptable fill.

203.6 Fill and Backfill of Channels:

Material for fill and backfill of channels shall be the same as embankment fill for Zone I described in Section 202.4.1 of these specifications and shall be placed in lifts not exceeding eight inches (8") in depth. Each lift shall be compacted in the aforedescribed manner to a minimum of 95% relative density.

Grading of unlined channels shall conform to the following tolerances:

A vertical tolerance of zero above and three inches (3") below the specified grade will be allowed for grading the channel bottom and the channel side slopes in both cut and fill.

Regardless of the construction tolerances specified, the excavation and grading shall be performed so that the finished surfaces are in uniform planes with no abrupt breaks in the surface.

The construction tolerances specified herein for grading are solely for purposes of field control.

203.7 Slope Treatment:

After completion of embankment the side slopes of the dam shall be graded and compacted to a uniform surface. Should the Contractor maintain uniform surfaces during the embankment process and with the approval of the Engineer additional grading and compaction may not be required.

2.04 CEMENTED RIP-RAP:

2.04.1 General:

Cemented Rip-Rap for bank protection shall consist of native rock rip-rap covered with Class 5.-C-2000 concrete constructed in accordance with these specifications and drawings at the designated locations and at other locations as may be directed by the Engineer. Sub-grade and forming shall be inspected and approved prior to any placement of cemented rip-rap.

2.04.2 Materials:

2.04.2.1 Rock for Cemented Rip-Rap:

The rock used in the construction of rip-rap shall conform to the requirements of Material Specifications 1.07 of these specifications. The Contractor shall provide the Engineer free access to the rock source for the purpose of obtaining samples of rock for testing and approving.

2.04.2.2 Concrete for Cemented Rip-Rap:

The concrete used in cemented rip-rap shall conform to the requirements of Material Specifications 1.01 of these specifications.

204.3 Placement of Rip-Rap Rock:

The rock shall be placed by equipment on the surfaces and to the depths specified. The rip-rap shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock shall be delivered and placed in a manner that will insure that the rip-rap in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. The smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge.

Rip-Rap shall be placed in a manner to prevent damage to structures. Hand placing will be required to the extent necessary to prevent damage to the permanent work.

2.04.4 Placement of Rip-Rap Concrete:

2.04.4.1 Placement of Concrete:

Concrete for rip-rap shall be conveyed, deposited, and consolidated by any method which will preclude the segregation or loss of ingredients. Chutes used in conveying concrete shall be sloped to permit concrete of the consistency required to flow without segregation. Where necessary to prevent segregation, chutes shall be provided with baffle boards or a reversed section at the outlet. The Contractor shall obtain the Engineer's approval for the method of concrete placement prior to start of work.

2.04.4.2 Preparation of Cemented Rip-Rap Base:

Earth surfaces to which cemented rip-rap is to be applied shall be neatly trimmed to line and grade and shall be free of all loose material.

No high subgrade will be permitted. Excavation made below subgrade shall be backfilled with compacted fill or, at the Contractor's opinion, with cemented rip-rap.

Rock surfaces shall be examined and all loose material removed therefrom. The surfaces shall be thoroughly cleaned of all dust, dirt, mortar, grease, or other deleterious substances and then washed with water.

All surfaces shall be wetted with water before application of concrete. Concrete shall not be applied to surfaces on which free water exists.

2.04.3 Curing:

The cemented rip-rap shall be cured by a pigmented sealing compound method.

Curing shall commence as soon as free water leaves the surface face of the concrete but not later than 3 hours following the depositing of the concrete upon the rock. The entire surface shall be covered with Type 2 pigmented curing compound conforming to the requirements of Subsection 1.03 of these specifications.

The curing compound shall be delivered to the work ready-mixed. At the time of use the curing compound shall be thoroughly mixed with the pigment uniformly dispersed throughout the mixture.

The curing compound shall be applied to the entire cemented rip-rap surface by spraying at the rate of one (1) gallon per 200 square feet of pavement surface.

Spraying equipment shall be of the fully atomizing type, equipment with a tank agitator of an approved type which provides for continual agitation of the compound during application. The use of non-agitating type hand pumped garden sprayers will not be permitted except for small and inaccessible areas as may be permitted by the Engineer.

Care shall be taken to provide adequate coverage with the compound at edges, corners, and rough concrete surfaces, and to protect the seal against damage during the curing period. Should the seal be broken or damaged from any cause within 72 hours after application those portions shall be immediately repaired with additional curing compound.

2.05 Concrete Construction:

2.05.1 General:

Concrete structures shall be constructed in conformity with the plans and Special Provisions. Concrete for use in work constructed under this Section shall conform to the requirements of Subsection 1.01 hereof.

Safe and suitable ladders shall be provided to permit access to all portions of the work.

2.05.2 Subgrade for Concrete Structures:

Earth subgrade upon which concrete is placed shall be firm and

free from water. Ground water shall be kept below subgrade until the concrete has set. When the subgrade is in dry earth, it shall be thoroughly dampened with water to insure that no moisture will be absorbed from the fresh concrete.

When the concrete is to be deposited on rock, the rock shall be fully uncovered, cleaned, and its surface shall be removed to a depth sufficient to expose sound rock. Bedrock shall be roughly leveled-off or cut to approximately horizontal and vertical steps. Seams in the rock shall be grouted under pressure or otherwise treated as the Engineer may direct.

2.05.3 Forms:

Forms shall be of suitable material and of a type, size, shape, quality, and strength to insure construction as desired. The forms shall be true to line and grade, mortar tight, and sufficiently rigid to resist deflection during placing of the concrete. The responsibility for their adequacy shall rest with the Contractor. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes that would deface the finished surface. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being re-used. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly treated with an approved releasing agent which will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete.

Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber or material which will provide a surface at least equal to surfaced lumber or plywood. Any lumber or material which becomes badly checked or warped, prior to placing concrete, shall not be used.

Form clamps or bolts, approved by the Engineer, shall be used to fasten forms. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used. Clamps or bolts shall be of sufficient strength and number to prevent spreading of the forms. They shall be of such type that they can be entirely removed or cut back one inch (1") below the finished surface of the concrete.

2.05.4 Removal of Forms:

The periods of time for form removal set forth herein are permissive only and subject to the Contractor assuming all risks that may be involved. The time periods are minimum with no allowance therein for external loads. At time of low temperatures, or other adverse conditions, the Engineer may require the forms to be kept in place for longer periods of time.

The time period is predicated on the use of concrete to which no admixtures have been added for the purpose of obtaining a high early strength, and upon the use of the same type of cement throughout the structure.

Outside forms and inside wall forms may be removed after a period of sixteen (16) hours.

2.05.5 Placing Reinforcement:

Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in position in accordance with Concrete Reinforcing Steel Institute "Recommended Practice for Placing Reinforcing Bars", and by using concrete or metal chairs, spacers, metal hangers, supporting wires and other approved devices of sufficient strength to resist crushing under full load. Metal chairs which extend to the surface of the concrete shall not be used.

Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted. Before placing in the forms, all reinforcing steel shall be cleaned thoroughly of mortar, oil, dirt, loose mill scale, loose or thick rust, and coatings of any character that would destroy or reduce the bond. No concrete shall be deposited until the placing of the reinforcing steel has been inspected and approved by the Engineer.

2.05.5.1 Splicing Reinforcement:

Splices of bars shall be made only where shown on the plans or as approved by the Engineer. Where bars are spliced, they shall be lapped at least thirty (30) diameters, unless otherwise shown on the plans.

Splicing shall be accomplished by placing the bars in contact with each other and wiring them together.

Welding of reinforcing steel will not be permitted unless specifically authorized by the Engineer.

2.05.5.2 Bending Reinforcement:

Bends and hooks in bars shall be made in the manner prescribed in the "Manual of Standard Practice" of the American Concrete Institute.

Bars shall not be bent or straightened in a manner which will injure the material. Bars with kinks or unspecified bends shall not be used.

2.05.6 Placing Concrete (General):

Concrete shall be conveyed, deposited and consolidated by any method which will preclude the segregation or loss of ingredients.

Chutes used in conveying concrete shall be sloped to permit concrete of the consistency required to flow without segregation.

2.05.6.1 Depositing:

To avoid segregation, concrete shall be deposited as near to its final position as is practicable. The use of vibrators for extensive shifting of the mass of concrete will not be permitted. Concrete that has partially hardened, has been retempered, or is contaminated by foreign materials shall not be deposited in the structure.

Concrete shall be placed in horizontal layers insofar as practical. Placing shall start at the low point and proceed upgrade unless otherwise permitted by the Engineer. Concrete shall be placed in a continuous operation between construction joints and shall be terminated with square ends and level tops.

2.05.6.2 Consolidating:

Concrete shall be thoroughly consolidated in a manner that will encase the reinforcement and inserts, fill the forms, and produce a surface or even texture free of rock pockets and excessive voids.

Concrete shall be consolidated by means of high frequency internal vibrators of a type, size and number approved by the Engineer. The location, manner, and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without separation of the mortar

and coarse aggregate, and without causing water or cement paste to flush to the surface. Internal vibrators shall not be held against the forms or reinforcing steel.

The number of vibrators employed shall be sufficient to consolidate the concrete within fifteen (15) minutes after it has been deposited in the forms. At least two (2) vibrators in good operating condition shall be available at the site of the structure in which more than twenty-five (25) cubic yards of concrete is to be placed.

2.05.6.3 Placing Concrete Under Adverse Weather Conditions:

Concrete for structures or slabs shall not be placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below 35 degrees F., unless adequate means are employed to heat the aggregate and water, satisfactory provisions have been made for protecting the work, and with the written permission of the Engineer and only after such precautionary measures have been taken as he may direct.

Concrete shall be effectively protected from freezing or frost for a period of five (5) days after placing.

Concrete for structures shall not be mixed or placed while the atmospheric temperature is above 115 degrees F., unless adequate means are employed to cool the aggregate and water and satisfactory provisions have been made for protecting the work. In any case, the temperature of the concrete as placed shall not exceed 90 degrees F.

Concrete placement shall be stopped when rainfall is sufficient to cause damage to the work.

2.05.7 Surface Finishes:

The classes of surface finish described herein shall be applied to various parts of concrete structures as specified.

2.05.7.1 Ordinary Surface Finish:

Immediately after the forms have been removed, all exterior form bolts shall be removed to a depth of at least one inch (1") below the surface of the concrete and the resulting holes or depressions cleaned and filled with mortar. Mortar shall consist of one (1) part by volume of cement to two (2) parts of sand. Mortar shall be mixed approximately 45 minutes in advance of use. Care shall be exercised to obtain a perfect bond with the concrete. All fins caused by form joints and other projections shall be removed and all pockets cleaned and filled. Mortar for filling pockets shall be treated as specified for bolt holes.

On surfaces which are to be buried underground the removal of

fins and form marks will not be required. Ordinary surface finish shall be considered as a final finish for exposed surfaces.

2.05.8 Curing:

As soon after the completion of the specified finishing operation as the condition of the concrete will permit without danger of consequent damage thereto, all exposed surface shall either be sprinkled with water, covered with plastic sheet, or covered with earth, sand, or burlap, sprayed with Type 1 curing compound conforming with subsection 1.01.1.

Concrete that is water cured must be kept continuously wet for at least ten (10) days after being placed. The method of water curing shall be subject to approval by the Engineer.

When an impervious membrane (curing compound) is used it shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely cover and seal all exposed surfaces of the concrete with a uniform film. The membrane shall not be applied to any surface until all of the finishing operations have been completed, such surfaces being kept damp until the membrane is applied. All surfaces on which a bond is required, such as construction joints, reinforcing steel, and the like, shall be adequately covered and protected before starting the application of the curing compound in order to prevent any of the compound from being deposited thereon, and any such surface with which the compound may have come in contact shall immediately thereafter be cleaned. Care shall be exercised to prevent any damage to the membrane seal during the curing period. Should the seal be damaged before the expiration of ten (10) days after the placing of the concrete additional impervious membrane shall be immediately applied over the damaged area.

Should any forms be removed sooner than ten (10) days after the placing of the concrete, the surface so exposed shall either be immediately sprayed with a coating of the curing compound or kept continuously wet by the use of burlap or other suitable means until such conrete has cured for at least ten (10) days.

When tops of walls are cured by the curing compound method the side forms, except for metal forms, must be kept continuously wet for at least ten (10) days following the placing of the concrete.

2.06 INSTALLATION OF REINFORCED CONCRETE PIPE (Principal Spillway)

2.06.1 Trench Excavation:

2.06.1. General:

Excavation shall include the removal of all water and materials of any nature which interfere with the construction work.

Excavation for conduits shall be by open trench. Contractor shall not commence trenching operations until embankment fill is placed to minimum height of one foot (1') above the design grade of the top of the conduit.

Excavation for appurtenant structures such as seepage structures shall be deemed to be in the category of trench excavation.

2.06.1.2 Maximum and Minimum Width of Trench:

The minimum and maximum width of trench permitted shall be as indicated on the Plans The side slopes necessary to maintain the stability of excavated surfaces may not necessarily coincide with the limits specified on the Plans for trench excavation. Such work shall be wxcavated, in a manner as to safeguard the work and workmen and to provide the ground adjacent to the excavation will not slide or settle.

2.06.1.3 Over Excavation of Trench:

Excavation in earth below the design grade of the trench due to Contractor's error shall be backfilled with select material as designated by the Engineer and mechanically compacted to 95% optimum density prior to installation of the conduit.

Excavation in rock below design grade of trench due to rock excavation shall be backfilled with concrete bedding after installation of conduit.

2.06.1.4 Access to Trenches:

Safe and suitable ladders which project two feet (2') above the top of the trench shall be provided. One (1) ladder shall be provided for each one hundred fee (100') of open trench, or fraction thereof; and be so located that workmen in the trench need not move more than fifty feet (50') to a ladder.

2.06.2 Backfill:

Backfill shall be considered as starting at the top of concrete bedding. All material below this point shall be considered as bedding.

The Contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised so that the conduit will not be damaged or displaced. The backfill above the concrete bedding shall not be placed until at least forty (40) hours after the placement of concrete bedding.

Rocks larger than six inches (6") in any dimension will not be permitted in backfill of the pipe. Where rocks are included in the backfill they shall be mixed with suitable excavated materials so as to eliminate voids.

After the placing of backfill has been started the Contractor shall proceed as soon as practicable with densification.

2.06.2.1 Densification Methods:

Backfill shall be mechanically compacted by means of tamping with manually directed mechanical equipment. The equipment shall be of a size and type approved by the Engineer. Impact-type pavement breakers (stompers) will not be permitted.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, or improvements installed under the Contract. The Contractor shall make his own determination in this regard.

Material for mechanical compacted backfill shall be placed in lift which, prior to compaction, shall not exceed the depth of four inches (4").

Mechanically compacted backfill shall be placed in horizontal layers of such depths (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped until the specified 95% relative compaction has been attained.

Water densification of backfill will not be permitted.

2.06.3 Laying Reinforced Concrete Pipe:

2.06.3.1 Bedding Material:

Bedding shall be Class 5.0-B-2000 concrete, the top of the concrete as shown on the Plans shall be considered as the top of the bedding.

If soft, spongy, unstable, or similar other material is encountered upon which the bedding material is to be placed, this unsuitable material shall be removed to a depth ordered by the Engineer and replaced with bedding material.

2.06.3.1.1 Placing Bedding Material:

Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of 0.4 of the outside diameter of the barrel. Then the remainder of the bedding shall be placed in accordance with Section 2.05.6 of these Specifications.

2.06.3.2 Pipe Laying:

Pipe shall be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Engineer.

2.06.3.3 Field Jointing of Gasket Type Joints for Reinforced Concrete Pipe:

(1) The ends of the pipe shall be so formed that when the pipes are laid together and joined they shall make a continuous and uniform line of pipe with a smooth and regular surface.

(2) The work shall be scheduled so that the bell end of the pipe faces in the direction of laying. Prior to placing the spigot into the bell of the pipe previously laid, the spigot groove, the gasket and the bell shall be thoroughly cleaned. Then the spigot groove, the gasket and the first two inches (2") of the bell shall be lubricated with a soft vegetable soap compound. The gasket, after lubrication, shall be uniformly stretched when placing it in the spigot groove so that the gasket is distributed evenly around the circumference. After the joint is assembled a

thin metal feeler gauge shall be inserted between the bell and the spigot and the position of the gasket checked around the complete circumference of the pipe. If the gasket is not in the proper position the pipe shall be withdrawn, the gasket checked to see that it is not cut or damaged, the pipe relaid, and the gasket again checked.

(3) Before placement of the bedding the exterior annular space between the ends of the pipe sections shall be cleaned and filled with Class "C" Mortar.

2.06.4 Pressure Testing:

Pressure testing of the completed conduit will not be required.

2.07 DEBRIS BARRIER:

2.07.1 General:

The Contractor shall install wooden poles for the purpose of debris barriers at locations delineated on the Plans.

2.07.2 Wood Poles:

Poles shall be hard, dense timber of sufficient length to allow for a minimum of four foot (4') bury and maintain the required height above ground as shown on the Plans. All poles shall be a minimum of eight inches (8") in diameter and shall be treated with creosote. The minimum amount of preservative to be retained in the wood shall be 12 lbs. per cubic foot to minimum depth of 3/4 inch.

Sawed surfaces shall be painted with creosote as directed by the Engineer.

With approval of the Engineer the Contractor may use surplus utility poles as debris barriers.

2.07.3 Installing Wood Poles:

Poles shall be set in pre-drilled holes at as near vertical positions as possible and backfilled with a cement grout. Poles shall be held in a vertical position for a period of twenty-four (24) hours to allow grout to set up.

2.07.4 Damaged Poles:

Poles moved or otherwise damaged by construction operations after installation shall be removed and replaced at the Contractor's expense.

2.08 CLEANUP AND RESTORATION:

2.08.1 General:

Throughout all phases of construction including suspension of work and until final acceptance of the project the Contractor shall keep the worksite clean and free from rubbish and debris. Prior to the acceptance of the work, the Contractor shall remove all excess construction materials and appurtenances and perform general grading operations as directed by the Engineer to restore the construction site to an aesthetically pleasing condition.

SUBSURFACE

INVESTIGATION

DATA

FOUNDATION AND MATERIALS INVESTIGATION REPORT

STRUCTURE No. 36

PROPOSED RETENTION BASIN PROGRAM FOR 1971

FOUNTAIN HILLS, ARIZONA

JOB No. E71-141

SERGENT, HAUSKINS & BECKWITH

CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • FLAGSTAFF • EL PASO

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

B. DWAINE SERGENT, P.E. • JOHN B. HAUSKINS, P.E. • GEORGE H. BECKWITH, P.E. • DALE V. BEDENKOP, P.E.

JULY 19, 1971

TRICO INTERNATIONAL INC.
8718 EAST McDOWELL ROAD
SCOTTSDALE, ARIZONA 85257

JOB NO. E71-141

ATTENTION: MR. JOE CHOPRA

RE: STRUCTURE NO. 36
PROPOSED RETENTION BASIN
PROGRAM FOR 1971
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

OUR FOUNDATION AND MATERIALS INVESTIGATION REPORT FOR THE REFERENCED PROJECT IS HEREWITH SUBMITTED. THE REPORT INCLUDES THE RESULTS OF TEST DRILLING AND LABORATORY ANALYSIS ALONG WITH OUR CONCLUSIONS AND RECOMMENDATIONS.

SHOULD ANY QUESTIONS ARISE CONCERNING THIS REPORT, WE WOULD BE PLEASED TO DISCUSS THEM WITH YOU.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY Robert D. Booth
ROBERT D. BOOTH, P.E.

REVIEWED BY George H. Beckwith
GEORGE H. BECKWITH, P.E.

Registered Professional Engineer (Civil) CERTIFICATE NO. 5633 GEORGE HENRY BECKWITH Date Signed 7-19-71 ARIZONA, U.S.A.

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FOUNTAIN HILLS, ARIZONA
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INTRODUCTION

THIS REPORT PRESENTS THE RESULTS OF A FOUNDATION AND MATERIALS INVESTIGATION MADE BY THIS FIRM FOR THE PROPOSED FLOOD CONTROL DAM, STRUCTURE No. 36, RETENTION BASIN PROGRAM FOR 1971, FOUNTAIN HILLS, ARIZONA. THE OBJECT OF THE INVESTIGATION WAS TO DETERMINE THE PHYSICAL PROPERTIES OF THE SOILS UNDERLYING THE SITE TO PROVIDE RECOMMENDATIONS FOR DESIGN OF THE DAM EMBANKMENT AND SPILLWAY.

PROPOSED CONSTRUCTION

THE PROPOSED DAM WILL BE APPROXIMATELY (1150) 1040 FEET IN LENGTH WITH A MAXIMUM HEIGHT OF (50) 41.5 FEET. THE WIDTH AT THE TOP OF THE DAM WILL BE (10) 12' FEET AND APPROXIMATELY 60,000 CUBIC YARDS OF EMBANKMENT WILL BE INVOLVED. THE SPILLWAY ELEVATION WILL BE (1900) 1890.0 OR 6.0 FEET BELOW THE TOP OF THE PROPOSED EMBANKMENT. THE PROPOSED STRUCTURE WILL BE USED FOR FLOOD CONTROL PURPOSES ONLY. THE DESIGN IS BASED UPON THE TOTAL TIME REQUIRED FOR FILLING AND DRAINING BEING LESS THAN 2 DAYS.

INVESTIGATION

EIGHT EXPLORATORY BORINGS WERE DRILLED TO DEPTHS OF BETWEEN 6 AND 30 FEET BELOW EXISTING GRADE. STANDARD PENETRATION TESTING AND UNDISTURBED SAMPLING WERE PERFORMED AT SELECTED INTERVALS IN SOME OF THE BORINGS. GENERALLY, 6½ INCH HOLLOW STEM AUGER WAS USED TO ADVANCE THE BORINGS TO THEIR FULL DEPTH OR TO A DEPTH IN WHICH REFUSAL ON STRONGLY LIME CEMENTED SOILS CONTAINING LARGE COBBLES WAS ENCOUNTERED. TRICONE GEAR BITS OR NX DIAMOND CORING WERE UTILIZED IN ADVANCING SOME OF THE BORINGS BEYOND THESE DEPTHS. INFORMATION ON THE PERMEABILITY OF

THE SOILS AND ROCK INVOLVED WAS OBTAINED BY FILLING THE BOREHOLES WITH WATER AND TAKING PERIODIC OBSERVATIONS OF WATER SURFACE ELEVATION. THE RESULTS OF THE EXPLORATORY DRILLING ARE PRESENTED IN APPENDIX A WHICH INCLUDES A BRIEF DESCRIPTION OF DRILLING AND SAMPLING EQUIPMENT AND PROCEDURES, A SITE PLAN SHOWING BORING LOCATIONS AND LOGS OF THE TEST BORINGS.

IN ADDITION TO THE 8 EXPLORATORY BORINGS, 12 TEST PITS WERE EXCAVATED WITH A WARNER & SWASEY HOPTO SERIES 200 TRUCK MOUNTED BACKHOE IN THE RESERVOIR AREA TO LOCATE BORROW FOR THE DAM EMBANKMENT. EACH TEST PIT WAS CAREFULLY EXAMINED, VISUALLY CLASSIFIED AND LOGGED. WHEREVER APPLICABLE, LARGE BULK SAMPLES WERE OBTAINED FOR LABORATORY ANALYSIS. THE LOGS OF THE TEST PITS ALSO ARE PRESENTED IN APPENDIX A. THEIR LOCATIONS ARE NOTED ON THE SITE PLAN.

GRAIN-SIZE ANALYSIS, ATTERBERG LIMITS, PERMEABILITY AND MOISTURE-DENSITY RELATIONSHIP TESTS WERE PERFORMED ON SELECTED SAMPLES OF THE BORROW AND EMBANKMENT FOUNDATION SOILS. THE RESULTS OF THESE TESTS ARE PRESENTED IN APPENDIX B.

SITE CONDITIONS & SOIL PROFILE

THE SITE IS COVERED BY A MODERATE GROWTH OF BRUSH, CACTI AND SMALL TREES. THE AXIS OF THE PROPOSED STRUCTURE IS LOCATED IN A RELATIVELY WIDE DRAINAGE WITH RELATIVELY STEEP SLOPES ON EITHER SIDE. NEAR VERTICAL SLOPES ARE PRESENT ON EITHER SIDE OF THE MAIN DRAINAGE. THE SPILLWAY WILL BE LOCATED NEAR THE SOUTH ABUTMENT WHICH WILL UTILIZE A SMALL SIDE DRAINAGE TO KEEP FLOOD WATERS AWAY FROM THE DOWNSTREAM SLOPE OF THE DAM.

AS INDICATED BY OUR EXPLORATORY BORINGS, THE SOIL PROFILE ACROSS THE DAM AXIS CAN BE GENERALIZED AS FOLLOWS:

1. UNCEMENTED SILTY AND CLAYEY SANDS WITH VARYING AMOUNTS OF GRAVEL AND COBBLES WERE ENCOUNTERED AT THE SURFACE AND EXTENDED TO DEPTHS UP TO 6 FEET BELOW EXISTING GRADE. THESE SOILS ARE GENERALLY MEDIUM DENSE TO DENSE.

2. SAND AND GRAVEL WITH VARYING AMOUNTS OF COBBLES WERE ENCOUNTERED UNDERLYING THE SURFACE STRATUM IN 6 OF THE BORINGS AND EXTENDED TO DEPTHS UP TO 30 FEET. THESE SOILS ARE MODERATELY TO VERY STRONGLY LIME CEMENTED AND VERY FIRM TO HARD WITH DEPTH.

3. MODERATELY TO STRONGLY LIME CEMENTED SANDY CLAYS AND SILTS WERE THEN ENCOUNTERED IN 5 OF THE BORINGS AND EXTENDED TO DEPTHS UP TO 30 FEET. THESE SOILS WERE ENCOUNTERED AT ELEVATIONS VARYING BETWEEN 1849.5 FEET AND 1860.0 FEET. IT APPEARS THAT THESE SOILS ARE AN OLD LAKE BED DEPOSIT AND PROBABLY UNDERLIE THE ENTIRE SITE. THEY ARE GENERALLY HARD IN RELATIVE FIRMNESS AT THE PRESENT MOISTURE CONTENTS.

THE GEOLOGIC PROFILE ALONG THE DAM AXIS IS PRESENTED IN APPENDIX C.

NO FREE GROUND WATER WAS ENCOUNTERED IN THE TEST BORINGS AND SOIL MOISTURE CONTENTS WERE GENERALLY VERY LOW.

DISCUSSION & RECOMMENDATIONS

GENERAL

BECAUSE THE PROPOSED DAM IS FOR FLOOD CONTROL PURPOSES AND

WILL NOT RETAIN WATER FOR EXTENDED PERIODS OF TIME, NORMAL SEEPAGE CONSIDERATIONS WILL NOT BE APPLICABLE TO THE PROJECT. EXTENSION OF THE CORE TRENCH TO SLIGHTLY PENETRATE VERY FIRM CEMENTED SOILS IS RECOMMENDED. WITH THIS TREATMENT, EMBANKMENT SETTLEMENTS WILL BE VERY SLIGHT. THIS WILL PREVENT THE POSSIBILITY OF EMBANKMENT CRACKING AND SUBSEQUENT PIPING DURING ISOLATED WATER RETENTION PERIODS DUE TO EXCESSIVE MOVEMENTS OF THE FILL.

WATER LOSS IN THE BOREHOLES INDICATES THAT THE STRONGLY CEMENTED SOILS ARE LOW IN PERMEABILITY. DUE TO THE STRONG CEMENTATION AND LOW PERMEABILITY, THE EMBANKMENT FOUNDATION SOILS HAVE A COMPARATIVELY HIGH RESISTANCE TO PIPING. THE USE OF SOILS WITH RELATIVELY HIGH RESISTANCE TO PIPING AND LOW PERMEABILITY IS RECOMMENDED FOR THE CENTER PORTION OF THE EMBANKMENT. ALSO, SINCE THE EMBANKMENT SOILS WILL BE SUBJECT TO PERIODIC WETTING AND DRYING, THE USE OF CLEAN GRANULAR SOILS IN THE SHELL TO PREVENT SHRINKAGE CRACKING IS RECOMMENDED. THE RECOMMENDED DETAILS WILL PRECLUDE PIPING THROUGH THE DAM FOUNDATION AND EMBANKMENT AND ENABLE ECONOMICAL CONSTRUCTION WITH MATERIALS AVAILABLE IN THE IMMEDIATE VICINITY OF THE DAM.

EMBANKMENT DETAILS

A ZONED EMBANKMENT IS RECOMMENDED. EMBANKMENT DETAILS SHOULD BE THE SAME AS RECOMMENDED FOR STRUCTURE NO. 7 (JOB NO. E70-180, FEBRUARY 8, 1971). BOTH UPSTREAM AND DOWNSTREAM SLOPES SHOULD BE 2 HORIZONTAL TO 1 VERTICAL. THE STABILITY ANALYSIS OUTLINED IN ADDENDUM NO. 1 OF THE REPORT FOR STRUCTURE NO. 7 DATED JULY 13, 1971 WILL APPLY TO THIS STRUCTURE.

THE REVISED "GUIDE SPECIFICATIONS FOR EARTHWORK" PRESENTED IN THAT ADDENDUM ALSO WILL APPLY TO THIS PROJECT.

THE CORE TRENCH SHOULD BE A MINIMUM OF (10) 12 FEET IN WIDTH AT THE BOTTOM AND PENETRATE THE CEMENTED SOILS AT LEAST 2 FEET. IT APPEARS THAT ONLY LIGHT RIPPING WILL BE NECESSARY.

EMBANKMENT MATERIALS & CONSTRUCTION

REQUIREMENTS FOR ZONE II ARE DESIGNED TO ELIMINATE MATERIALS HIGHLY SENSITIVE TO PIPING, CRACKING OR THE DEVELOPMENT OF HIGH SEEPAGE FORCES DURING DRAWDOWN. IN PRACTICE, VIRTUALLY ALL SOILS FROM THE RESERVOIR AND MANY FROM THE CORE TRENCH EXCAVATION WILL MEET THESE REQUIREMENTS. APPROXIMATELY 100,000 CUBIC YARDS OF ZONE II MATERIAL (IN TERMS OF VOLUME IN PLACE) IS AVAILABLE WITHIN THE RESERVOIR WITHOUT RIPPING.

IN ORDER TO ACHIEVE PROPER PERMEABILITY CHARACTERISTICS, REQUIREMENTS FOR ZONE I MATERIAL ARE SOMEWHAT MORE STRINGENT. A LIMITED AMOUNT OF MATERIALS MEETING THESE REQUIREMENTS ARE AVAILABLE WITHIN THE RESERVOIR. THUS, IT WILL BE NECESSARY TO BORROW ZONE I MATERIAL FROM CLAYEY SAND DEPOSITS ON THE ADJACENT SLOPES OR RIDGES.

OUTLET PIPE

IT IS UNDERSTOOD THAT A REINFORCED CONCRETE OUTLET PIPE IS BEING CONSIDERED. CONCRETE CRADLE-TYPE BEDDING BEARING ON THE CEMENTED SOILS IS RECOMMENDED. IN ORDER TO MINIMIZE THE THICKNESS OF THE CRADLE, IT IS RECOMMENDED THAT ITS BASE BE BENCHED INTO THE NORTH SLOPE IN THE MANNER SHOWN ON THE GEOLOGIC PROFILE IN APPENDIX C. THE BASE OF THE CRADLE SHOULD

EXTEND TO AT LEAST 2 FEET BELOW THE CONTACT OF THE NATIVE SOILS.

WITH THE BEDDING RECOMMENDED ABOVE, SETTLEMENT OF $\frac{1}{2}$ INCH AT THE CENTER OF THE PIPE IS RECOMMENDED FOR STRUCTURAL ANALYSIS BY SOIL CONSERVATION SERVICE PROCEDURES. BY EXCAVATING TO THE CEMENTED SOILS FOR 5 FEET ON EACH SIDE OF THE PIPE THROUGHOUT ITS LENGTH AND RECOMPACTION, IT CAN BE ASSURED THAT EXTERNAL PRESSURES ON THE PIPE WILL NOT BE SIGNIFICANTLY HIGHER THAN THE WEIGHT OF THE OVERBURDEN.

SEEPAGE COLLARS SHOULD BE PROVIDED.

SPILLWAY

BORING 1 INDICATED THAT VERY STRONGLY LIME CEMENTED CLAYEY SAND AND GRAVEL WITH A FEW COBBLES IS PRESENT AT THE PROPOSED SPILLWAY LOCATION. IT IS ESTIMATED THAT THESE MATERIAL WILL RESIST VELOCITIES UP TO ABOUT 8 FEET PER SECOND WITHOUT SIGNIFICANT EROSION. HEAVY RIPPING WILL BE NECESSARY FOR THE SPILLWAY EXCAVATION. BLASTING MIGHT BE NECESSARY IN ISOLATED AREAS. CUT SLOPES OF $\frac{1}{2}$:1 ARE RECOMMENDED.

APPENDIX A

TEST DRILLING EQUIPMENT & PROCEDURES

DRILLING EQUIPMENT TRUCK MOUNTED CME-55 DRILL RIGS POWERED WITH 4 OR 6 CYLINDER FORD INDUSTRIAL ENGINES ARE USED IN ADVANCING TEST BORINGS. THE 4 CYLINDER AND 6 CYLINDER ENGINES ARE CAPABLE OF DELIVERING ABOUT 4350 AND 6500 FT. LBS. TORQUE TO THE DRILL SPINDLE, RESPECTIVELY. THE SPINDLE IS ADVANCED WITH TWIN HYDRAULIC RAMS CAPABLE OF EXERTING 12,000 POUNDS DOWNWARD FORCE. DRILLING THROUGH SOIL OR SOFTER ROCK IS PERFORMED WITH $6\frac{1}{2}$" O.D. $3\frac{1}{4}$" I.D. HOLLOW STEM AUGER OR $4\frac{1}{2}$" CONTINUOUS FLIGHT AUGER. CARBIDE INSERT TEETH ARE NORMALLY USED ON THE AUGER BITS SO THEY CAN OFTEN PENETRATE ROCK OR VERY STRONGLY CEMENTED SOILS WHICH REQUIRE BLASTING OR VERY HEAVY EQUIPMENT FOR EXCAVATION. WHERE REFUSAL IS EXPERIENCED IN AUGER DRILLING, THE HOLES ARE SOMETIMES ADVANCED WITH TRICONE GEAR BITS AND NW RODS USING WATER OR AIR AS A DRILLING FLUID.

SAMPLING PROCEDURES DYNAMICALLY DRIVEN TUBE SAMPLES ARE USUALLY OBTAINED AT SELECTED INTERVALS IN THE BORINGS BY THE ASTM D1586 PROCEDURE. TWO INCH O.D. 1-3/8" I.D. SAMPLERS ARE USED IN MANY CASES TO OBTAIN THE STANDARD PENETRATION RESISTANCE. "UNDISTURBED" SAMPLES OF FIRMER SOILS ARE OFTEN OBTAINED WITH 3" O.D. SAMPLERS LINED WITH 2.42" I.D. BRASS RINGS. DRIVING ENERGY IS GENERALLY RECORDED AS THE NUMBER OF BLOWS OF A 140 POUND 30 INCH FREE FALL DROP HAMMER REQUIRED TO ADVANCE THE SAMPLERS IN 6 INCH INCREMENTS. HOWEVER, IN STRATIFIED SOILS DRIVING RESISTANCE SOMETIMES IS RECORDED IN 2 OR 3 INCH INCREMENTS SO THAT SOIL CHANGES AND THE PRESENCE OF SCATTERED GRAVEL OR CEMENTED LAYERS CAN BE READILY DETECTED AND REALISTIC PENETRATION VALUES OBTAINED FOR CONSIDERATION IN DESIGN. THESE VALUES ARE EXPRESSED IN BLOWS PER FOOT ON THE LOGS. "UNDISTURBED" SAMPLING OF SOFTER SOILS IS SOMETIMES PERFORMED WITH THIN WALLED SHELBY TUBES (ASTM D1587). WHERE SAMPLES OF ROCK ARE REQUIRED, THEY ARE OBTAINED BY NX DIAMOND CORE DRILLING (ASTM D2113). THE TUBE SAMPLES ARE LABELED AND PLACED IN WATERTIGHT CONTAINERS TO MAINTAIN FIELD MOISTURE CONTENTS FOR TESTING. WHEN NECESSARY FOR TESTING, LARGER BULK SAMPLES ARE TAKEN FROM AUGER CUTTINGS.

CONTINUOUS PENETRATION TESTS CONTINUOUS PENETRATION TESTS ARE PERFORMED BY DRIVING A 2" O.D. BLUNT NOSED PENETROMETER ADJACENT TO OR IN THE BOTTOM OF BORINGS. THE PENETROMETER IS ATTACHED TO 1-5/8" O.D. DRILL RODS TO PROVIDE CLEARANCE AND MINIMIZE SIDE FRICTION SO THAT PENETRATION VALUES ARE AS NEARLY AS POSSIBLE A MEASURE OF END RESISTANCE. PENETRATION VALUES ARE RECORDED AS THE NUMBER OF BLOWS OF A 140 POUND 30 INCH FREE FALL DROP HAMMER REQUIRED TO ADVANCE THE PENETROMETER IN ONE FOOT INCREMENTS OR LESS.

BORING RECORDS DRILLING OPERATIONS ARE DIRECTED BY OUR FIELD ENGINEER OR GEOLOGIST WHO EXAMINES SOIL RECOVERY AND PREPARES BORING LOGS. SOILS ARE VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487) WITH APPROPRIATE GROUP SYMBOLS BEING SHOWN ON THE LOGS.

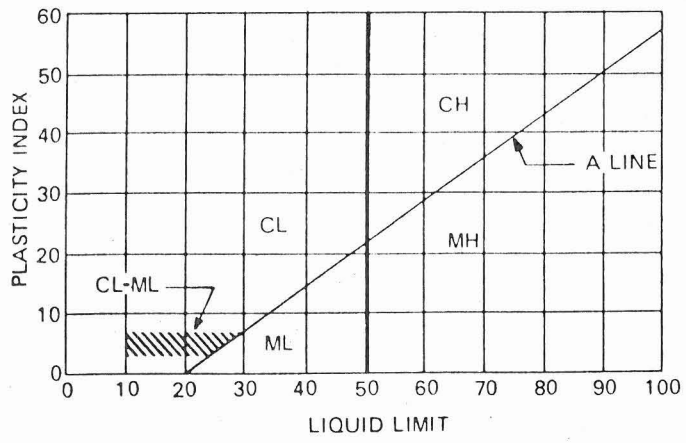
UNIFIED SOIL CLASSIFICATION SYSTEM

Soils are visually classified by the Unified Soil Classification system on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" Corp of Engineers, US Army Technical Memorandum No. 3-357 (Revised April 1960) or ASTM Designation: D2487-66T.

MAJOR DIVISIONS				GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
					GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 seive)			SW	Well graded sands, gravelly sands.
					SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS (Limits plot below "A" line & hatched zone on plasticity chart)	SILTS OF LOW PLASTICITY (Liquid Limit Less Than 50)			ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)			MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts.
	CLAYS (Limits plot above "A" line & hatched zone on plasticity chart)	CLAYS OF LOW PLASTICITY (Liquid Limit Less Than 50)			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)			CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity.

NOTE: Coarse grained soils with between 5% & 12% passing the No. 200 sieve and fine grained soils with limits plotting in the hatched zone on the plasticity chart to have double symbol.

PLASTICITY CHART



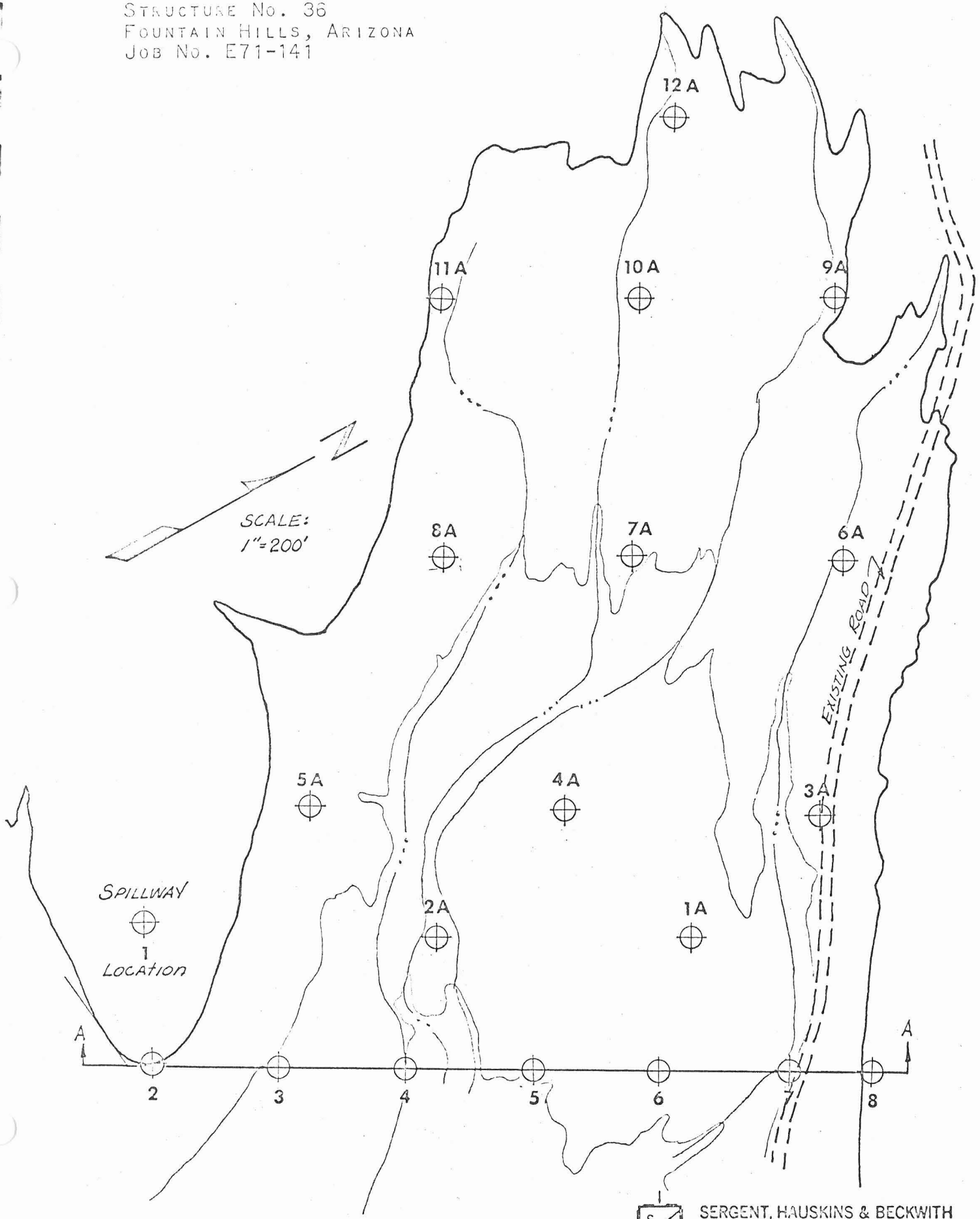
DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Cobbles	Above 3 in.
Gravel	3 in. to No. 4 sieve
Coarse gravel	3 in. to ¾ in.
Fine gravel	¾ in. to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

SITE PLAN

SHOWING LOCATIONS OF TEST BORINGS

STRUCTURE No. 36
FOUNTAIN HILLS, ARIZONA
JOB No. E71-141



SERGENT, HAUSKINS & BECKWITH

CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • FLAGSTAFF • EL PASO

PROJECT FOUNTAIN HILLS-STRUCTURE No. 36 **LOG OF TEST BORING NO. 1**

JOB NO. E71-141 DATE 6-14-71

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER, 4½" FLIGHT AUGER & TRICONE GEAR BIT

SURFACE ELEV. 1920'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			S		102		1	SC	DENSE	CLAYEY SAND, MEDIUM PLASTICITY, BROWN
			S		50/2½"		1		HARD	CLAYEY SAND, SOME GRAVEL, FEW COBBLES, MODERATELY LIME CEMENTED, MEDIUM PLASTICITY, WHITE
5			S		50/5½"		1			
								SC		
10			S		50/1" (NO RECOVERY)					
15			S		50/1"				HARD 100% WATER RETURN	CLAYEY SAND & GRAVEL, SOME COBBLES TO 6", VERY STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, WHITE TO GRAY
20			S		50/0" (NO RECOVERY)					
								GC		
25			S		50/0" (NO RECOVERY)					
30			S		50/0" (NO RECOVERY)					STOPPED GEAR BIT AT 30' SAMPLER REFUSED AT 30' NOTE: HOLLOW STEM AUGER REFUSED AT 9½', FLIGHT AUGER REFUSED AT 14'

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
H – 3" O.D. 2.42" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

JOB NO. E71-141 DATE 6-14-71

LOG OF TEST BORING NO. 2

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER

SURFACE ELEV. 1898'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	100		2		HARD	CLAYEY SAND & GRAVEL, SOME COBBLES, STRONGLY LIME CEMENTED BELOW 1', LOW PLASTICITY, LIGHT BROWN
				S	72		2	GC		
5				S	50/2" (NO RECOVERY)					
				S	50/0" (NO RECOVERY)					AUGER REFUSED AT 6' SAMPLER REFUSED AT 6'
10										

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

JOB NO. E71-141 DATE 6-15-71

LOG OF TEST BORING NO. 3

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER, NX

SURFACE ELEV. 1878'± DIAMOND CORE &

DATUM TOPO TRICONE GEAR BIT

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			S	S	23		4		FIRM AT SURFACE BECOMING VERY HARD WITH DEPTH	CLAYEY SAND & GRAVEL, SOME COBBLES TO 6"±, MODERATELY TO VERY STRONGLY LIME CEMENTED BELOW 2½', MEDIUM PLASTICITY, WHITE TO GRAY
			S	S	50/0" (NO RECOVERY)					
5			S	S	50/5½"		1		10% CORE RECOVERY 100% WATER RETURN	
			NX							
10			NX						10% CORE RECOVERY 100% WATER RETURN	
15			S	S	50/5"			GC		
20			S	S	50/2"					
25			S	S	50/0" (NO RECOVERY)				HARD	SANDY SILT, SAND PREDOMINANTLY FINE, LOW TO MEDIUM PLASTICITY, BROWN
30			S	S	50/4"			CL		

STOPPED GEAR BIT AT 29½'
SAMPLER REFUSED AT 29'10"

NOTE: HOLLOW STEM AUGER REFUSED AT 5', NX DIAMOND CORED TO 14½', HOLLOW STEM AUGERED TO 25' AND REFUSED, TRICONE GEAR BIT TO 29½'

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

LOG OF TEST BORING NO. 4

JOB NO. E71-141 DATE 6-3-71

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER

SURFACE ELEV. 1859'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	17		1	SM	MEDIUM DENSE	SILTY SAND, GRAVEL & COBBLES, GENERALLY WELL GRADED, NONPLASTIC, BROWN
				S	29		1	SC		
5				S	58		8	ML	FIRM	CLAYEY SAND, GRAVEL & COBBLES, STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, TAN
				S	80		11			
10				S	89		10		HARD	SANDY SILT, OCCASIONAL GRAVEL, SLIGHTLY TO STRONGLY LIME CEMENTED, LOW PLASTICITY TO NON-PLASTIC, TAN
								CL		
15				S	94		7		HARD	CLAY, SMALL AMOUNT OF SAND, MODERATELY TO STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, TAN
				S	117		13			
20										
										STOPPED AUGER AT 19½' SAMPLER REFUSED AT 20'3½"
25										

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

LOG OF TEST BORING NO. 5

JOB NO. E71-141 DATE 6-4-71

RIG TYPE CME-55
BORING TYPE 6½" HOLLOW STEM AUGER
SURFACE ELEV. 1861'±
DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	16		1	SM	MEDIUM DENSE	SILTY SAND, GRAVEL & COBBLES, WELL GRADED, NONPLASTIC, BROWN
				S	50		1	SC		
									HARD	CLAYEY SAND & GRAVEL, OCCASIONAL COBBLES, LOW TO MEDIUM PLASTICITY, TAN
5				S	64		6			
				S	99		10		HARD	SANDY CLAY, MODERATELY TO STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, TAN
10				S	78		10			
								CL		
15				S	74		8			
20				S	81		7			
										STOPPED AUGER AT 19½' SAMPLER REFUSED AT 20'5"
25										

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

JOB NO. E71-141 DATE 6-4-71

LOG OF TEST BORING NO. 6

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER

SURFACE ELEV. 1864'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	23		1	SC-SM	MEDIUM DENSE	CLAYEY SAND, GRAVEL & COBBLES, WELL GRADED, LOW PLASTICITY, TAN
				S	26		2			
5				S	85		5		HARD	SANDY CLAY, MODERATELY TO STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, TAN
				S	50/6"		4			
10				S	90		7			
15				S	72		8	CL		
20				S	50/6"		8			
25				S			8			
										STOPPED AUGER AT 24½' SAMPLER REFUSED AT 25'4"
30										

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING SOIL AND FOUNDATION ENGINEERS

PHOENIX • FLAGSTAFF • EL PASO

PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

JOB NO. E71-141 DATE 6-10-71

LOG OF TEST BORING NO. 7

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER

SURFACE ELEV. 1877'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	32		5		MEDIUM DENSE TO VERY DENSE	SILTY SAND & GRAVEL, SOME COBBLES, MEDIUM TO LOW PLASTICITY, TAN
				S	117		1	GM		
5				S	50/4"		4			
				S	50/0" (NO RECOVERY)					
				S	50/¾"		1		HARD	CLAYEY SAND, SOME GRAVEL & COBBLES, FAIRLY WELL GRADED, STRONGLY LIME CEMENTED, LOW TO MEDIUM PLASTICITY, GRAY
10								SC		
15										
20				S	50/4½"		7	CH	HARD	CLAY, CONSIDERABLE GRAVEL, STRONGLY LIME CEMENTED, HIGH PLASTICITY, WHITE
25				S	50/5"		9	ML	HARD	CLAYEY SILT, SOME SAND & GRAVEL, STRATIFIED, MODERATELY LIME CEMENTED, LOW TO MEDIUM PLASTICITY, LIGHT BROWN
				U	100/10'					
30										STOPPED AUGER AT 29½' SAMPLER REFUSED AT 30'4"
35										

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

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PROJECT FOUNTAIN HILLS-STRUCTURE No. 36

JOB NO. E71-141 DATE 6-4-71

LOG OF TEST BORING NO. 8

RIG TYPE CME-55

BORING TYPE 6½" HOLLOW STEM AUGER

SURFACE ELEV. 1904'+

DATUM TOPO

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt. %	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	40		4	SC	DENSE	CLAYEY SAND & GRAVEL, SOME COBBLES, GENERALLY WELL GRADED, LOW TO MEDIUM PLASTICITY, TAN
				S	50/5"		3			
5				S	85		3	SC	HARD	CLAYEY SAND, SOME GRAVEL & COBBLES, STRONGLY LIME CEMENTED, MEDIUM PLASTICITY, WHITE
				S	50/1" (NO RECOVERY)					
10				S	50/4"		2			
15										AUGER REFUSED AT 11'

GROUND WATER

DEPTH	HOUR	DATE
	NONE	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA
JOB NO. E71-141

LOGS OF TEST PITS

HOLE NO.	DEPTH	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	
1A	0-1'	GC	CLAYEY SAND, GRAVEL & COBBLES, SLIGHTLY LIME CEMENTED, MEDIUM TO LOW PLASTICITY, BROWN	S
	1'-4'	GW-GM	SAND, GRAVEL & COBBLES, MODERATELY LIME CEMENTED, NONPLASTIC, GRAY	S
	4'-9'	ML	SANDY SILT, LOW PLASTICITY, GRAYISH-BROWN (DUG WITH BACKHOE)	S
2A	0-4½'	GW	SAND, GRAVEL & COBBLES, FAIRLY WELL GRADED, SLIGHTLY LIME CEMENTED, NONPLASTIC, TAN	S
	4½'-10'	ML	SANDY SILT, MODERATELY LIME CEMENTED, LOW PLASTICITY, BROWN WITH SOME LIGHT GRAY MOTTLING (DUG WITH BACKHOE)	S
3A	0-2'	CL	SANDY CLAY, SOME GRAVEL, SLIGHTLY LIME CEMENTED, MEDIUM PLASTICITY, BROWN	NS
	2'-6½'	GC	CLAYEY GRAVEL & COBBLES, SOME SAND, MODERATELY LIME CEMENTED, MEDIUM PLASTICITY, TAN (DUG WITH BACKHOE)	S
4A	0-3½'	SW-SM	SAND & GRAVEL, SOME COBBLES, FAIRLY WELL GRADED, SLIGHTLY LIME CEMENTED, BROWN	S

STRUCTURE No. 36
FOUNTAIN HILLS, ARIZONA
JOB No. E71-141

LOGS OF TEST PITS

HOLE No.	DEPTH	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	
4A	$3\frac{1}{2}$'-$9\frac{1}{2}$'	ML	SANDY SILT, SOME GRAVEL, LOW PLASTICITY, TAN WITH SOME LIGHT GRAY MOTTLING (DUG WITH BACKHOE)	S
5A	0-$3\frac{1}{2}$'	SC	CLAYEY SAND & GRAVEL, MODERATELY LIME CEMENTED, MEDIUM PLASTICITY, BROWN	S
	$3\frac{1}{2}$'-10'	SM	SILTY SAND, STRONGLY CEMENTED, NONPLASTIC, WHITE (DUG WITH BACKHOE)	S
6A	0-6'	SC-SM	SILTY SAND, SOME GRAVEL & COBBLES, LOW PLASTICITY, TAN (DUG WITH BACKHOE)	S
7A	0-5'	GW-GM	SAND & GRAVEL, SOME COBBLES, SOME SILT, FAIRLY WELL GRADED, SLIGHTLY LIME CEMENTED, NONPLASTIC TO LOW PLASTICITY, BROWN	S
	5'-10'	CL-ML	SILTY CLAY, SOME SAND, LOW TO MEDIUM PLASTICITY, BROWN (DUG WITH BACKHOE)	S
8A	0-6"	CL & SM	SILTY CLAY, LOW PLASTICITY, BROWN, INTERCOLLATED WITH SILTY SAND, STRONGLY LIME CEMENTED, NONPLASTIC, WHITE	S
	6"-$2\frac{1}{2}$'	GM	SILTY SAND & GRAVEL, STRONGLY LIME CEMENTED, NONPLASTIC, WHITE (DUG WITH BACKHOE)	S

STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA
JOB NO. E71-141

LOGS OF TEST PITS

HOLE NO.	DEPTH	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	
9A	0-1½'	CL	SANDY CLAY, SOME GRAVEL & COBBLES, MEDIUM PLASTICITY, TAN	S
	1½'-2½'	CL	SANDY CLAY, SOME GRAVEL & COBBLES, WELL GRADED, SLIGHTLY LIME CEMENTED, LOW PLASTICITY, TAN	S
	2½'-3½'	GM	SAND, GRAVEL & COBBLES, WELL GRADED, STRONGLY LIME CEMENTED, LOW PLASTICITY, WHITE (DUG WITH BACKHOE)	S
10A	0-6½'	GW-GM	SANDY GRAVEL, SOME COBBLES, SOME SILTY CLAY, WELL GRADED, MODERATELY LIME CEMENTED, LOW PLASTICITY TO NONPLASTIC, BROWN	S
	6½'-9½'	CL-ML	SILTY CLAY, SOME SAND, MEDIUM PLASTICITY, BROWN WITH SOME GRAY MOTTLING (DUG WITH BACKHOE)	S
11A	0-2'	CL	SANDY CLAY, SOME GRAVEL & COBBLES, SLIGHTLY LIME CEMENTED, MEDIUM PLASTICITY, BROWN	S
	2'-6½'	SM	SAND, GRAVEL & COBBLES, FAIRLY WELL GRADED, SLIGHTLY LIME CEMENTED, NONPLASTIC, BROWN	S
	6½'-11'	CL-ML	SILTY CLAY, SOME SAND, MEDIUM PLASTICITY, BROWN (DUG WITH BACKHOE)	S

STRUCTURE No. 36
FOUNTAIN HILLS, ARIZONA
JOB No. E71-141

LOGS OF TEST PITS

HOLE No.	DEPTH	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	
12A	0-2'	GW-GM	SAND, GRAVEL & COBBLES, WELL GRADED, NONPLASTIC, GRAY	S
	2'-5'	GW-GM	SAND, GRAVEL & COBBLES, TRACE OF SILT, WELL GRADED, MODERATELY LIME CEMENTED, NONPLASTIC, BROWN	S
	5'-11'	ML	CLAYEY SILT, SOME SAND, LOW PLASTICITY, BROWN	S
			(DUG WITH BACKHOE)	

APPENDIX B

SERGENT, HAUSKINS & BECKWITH
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SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT ON LABORATORY TESTS

DATE 7-1-71

PROJECT Structure No. 36 JOB NO. E71-141

LOCATION Fountain Hills, Arizona LAB NO.

CLIENT ADDRESS

SOURCE OF SAMPLE

MATERIAL SAMPLED BY

SUBMITTED BY REQUESTED BY

TESTED ASTM D2434 DATE RECEIVED

TEST RESULTS

Boring No.	Depth	Dry Density lbs/pcf	Percent Compaction	Permeability Rate	Lab No.
4A	0-3½'	125.0	96.2	10,420 ft/yr	141-49
11A	2'-6½'	129.5	97.1	693.7 ft/yr	141-64

PHOENIX, ARIZONA
3944 WEST CLARENDON
(602) 264-4377

FLAGSTAFF, ARIZONA
2029 NORTH 4TH STREET
(602) 774-4433

EL PASO, TEXAS
201 NORTH CLARK ROAD
(915) 772-3088

TABULATION OF TEST RESULTS

Job No. E71-141 Date

Client:

Project STRUCTURE No. 36

FOUNTAIN HILLS, ARIZONA

Material

Source

HOLE NO.	LOCATION	DEPTH	UNIFIED CLASS.	LL	PI	SIEVE ANALYSIS -- ACCUM. % PASSING												LAB. NO.
						200	100	40	16	10	4	1/4	3/8	3/4	1	1 1/2	2	
4	SEE SITE PLAN	8'	CL	36	14	83	92	98	99	99	100							141-7
6	SEE SITE PLAN	3'	SM-SC	25	6	28	33	41	50	57	67	70	75	87	100			141-19
6	SEE SITE PLAN	5'	CL	31	10	60	65	70	74	76	85	89	91	100				141-20
7	SEE SITE PLAN	1'	GM	42	14	34	36	40	47	52	65	70	73	82	88	100		141-26
7	SEE SITE PLAN	3'	GM	21	1	30	34	40	51	52	64	72	73	88	100			141-27
7	SEE SITE PLAN	30'	ML	36	10	94	99	99	100									141-77
1A	SEE SITE PLAN	1'-4'	GW-GM	23	3	8	9	12	18	22	33	36	41	56	63	75	85	141-43
1A	SEE SITE PLAN	4'-9'	ML	35	8	75	85	89	94	96	100							141-44
2A	SEE SITE PLAN	0-4 1/2'	GW		NP	4	6	12	22	28	38	42	47	60	68	77	85	141-45
2A	SEE SITE PLAN	4 1/2'-10'	ML	34	8	53	75	90	95	96	100							141-46
3A	SEE SITE PLAN	2'-6 1/2'	GC	36	18	13	14	17	23	27	36	41	47	61	70	78	87	141-48
4A	SEE SITE PLAN	0-3 1/2'	SW-SM		NP	10	12	18	32	41	59	64	71	80	84	89	92	141-49
4A	SEE SITE PLAN	3 1/2'-9 1/2'	ML	37	6	57	71	86	93	95	96	96	97	100				141-50
5A	SEE SITE PLAN	0-3 1/2'	GC	37	20	45	49	53	57	60	67	69	75	86	90	96	97	141-51
5A	SEE SITE PLAN	3 1/2'-10'	GM		NP	21	24	30	35	36	38	41	44	54	63	75	90	141-52

FOUNDATION TEST RESULTS

Job No. E71-141 Date

Client:

Project STRUCTURE No. 36

FOUNTAIN HILLS, ARIZONA

Material

Source

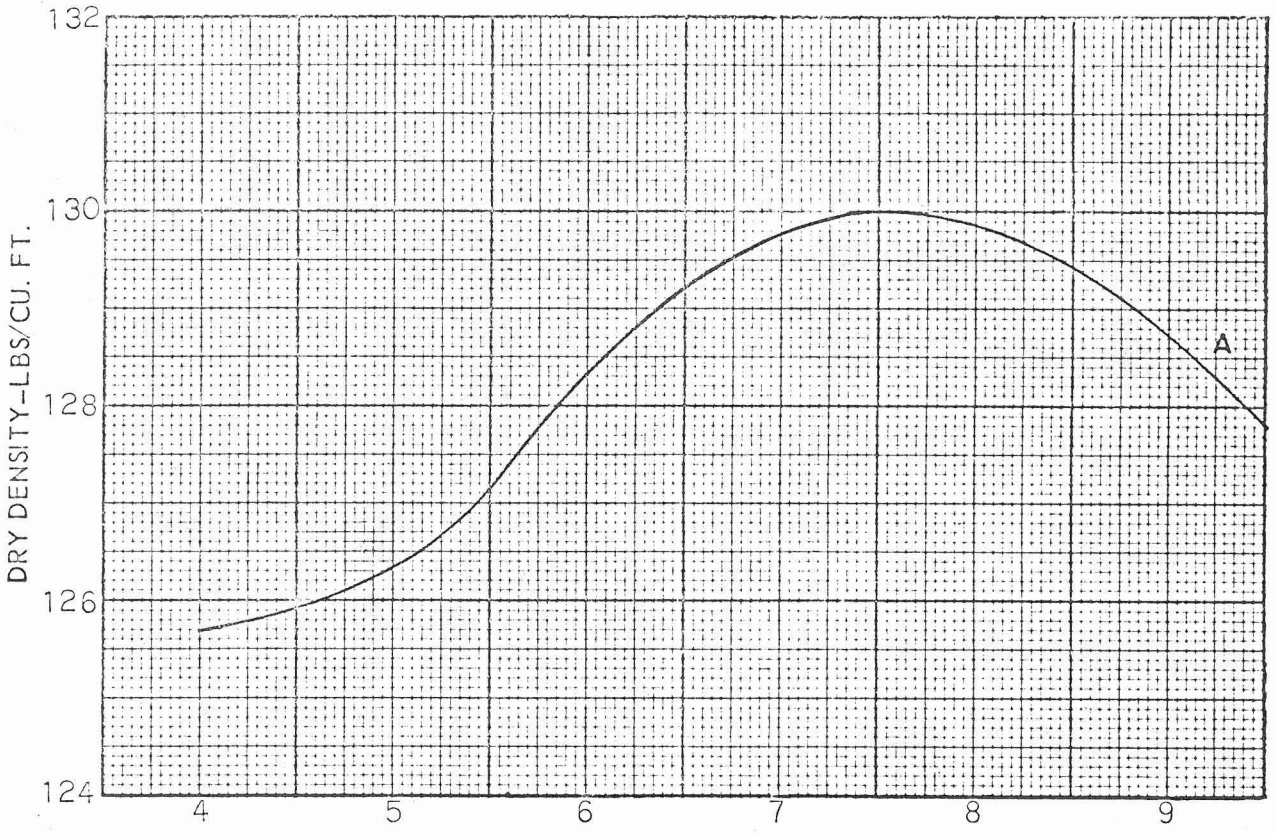
HOLE NO.	LOCATION	DEPTH	UNIFIED CLASS.	LL	PI	SIEVE ANALYSIS — ACCUM. % PASSING												LAB. NO.
						200	100	40	16	10	4	¼	⅜	¾	1	1½	2	
6A	SEE SITE PLAN	0-6'	SC-SM	22	4	31	38	47	52	62	71	75	80	87	90	92	94	141-53
7A	SEE SITE PLAN	0-5'	GW-GM		NP	8	11	18	28	35	48	52	58	63	75	81	89	141-54
7A	SEE SITE PLAN	5'-10'	CL-ML	30	8	77	92	98	99	99	99	99	100					141-55
8A	SEE SITE PLAN	6"-2½'	GM		NP	36	38	42	43	43	44	46	49	61	67	76	94	141-57
9A	SEE SITE PLAN	2½'-3½'	GM		NP	34	37	43	51	56	65	71	78	91	95	100		141-60
10A	SEE SITE PLAN	0-6½'	GW-GM		NP	9	12	17	25	29	40	45	51	69	80	90	95	141-61
10A	SEE SITE PLAN	6½'-9½'	CL-ML	34	10	78	90	95	97	98	100							141-62
11A	SEE SITE PLAN	2'-6½'	SM		NP	13	16	25	40	47	58	62	67	78	83	91	97	141-64
11A	SEE SITE PLAN	6½'-11'	CL	29	8	75	90	95	96	97	98	98	100					141-65
12A	SEE SITE PLAN	2'-5'	GW-GM		NP	7	9	13	22	27	39	45	54	73	82	91	97	141-67
12A	SEE SITE PLAN	5'-11'	ML	33	6	76	87	91	93	94	95	95	96	100				141-68

B-3

SERGENT, HAUSKINS & BECKWITH

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 - FOUNTAIN HILLS JOB NO. E71-141



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
A	GRAB #4A @ 0-3½'	7.6	130.0	ASTM D698-66T	D	141-49

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

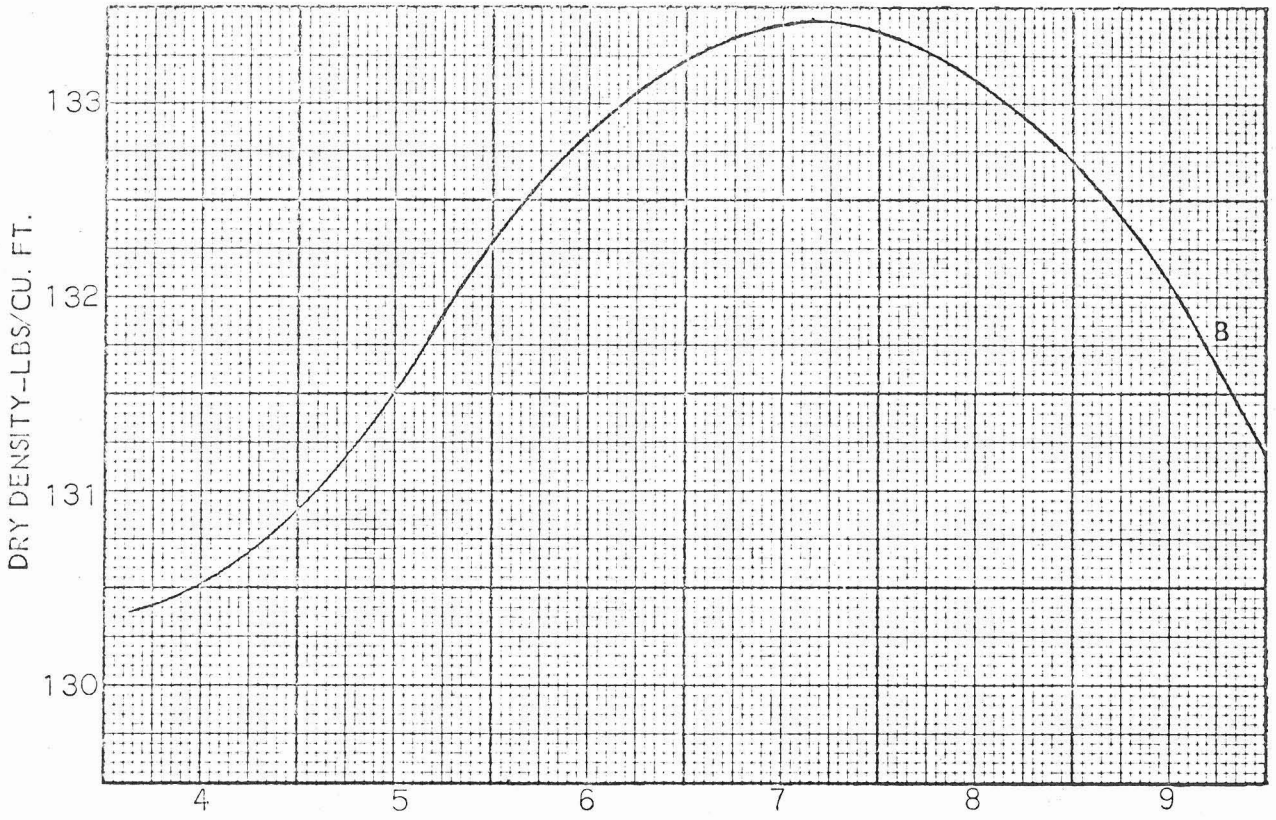
METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 - FOUNTAIN HILLS JOB NO. E71-141



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
B	GRAB #11A @ 2'-6½'	7.1	133.4	ASTM D698-66T	D	141-64

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

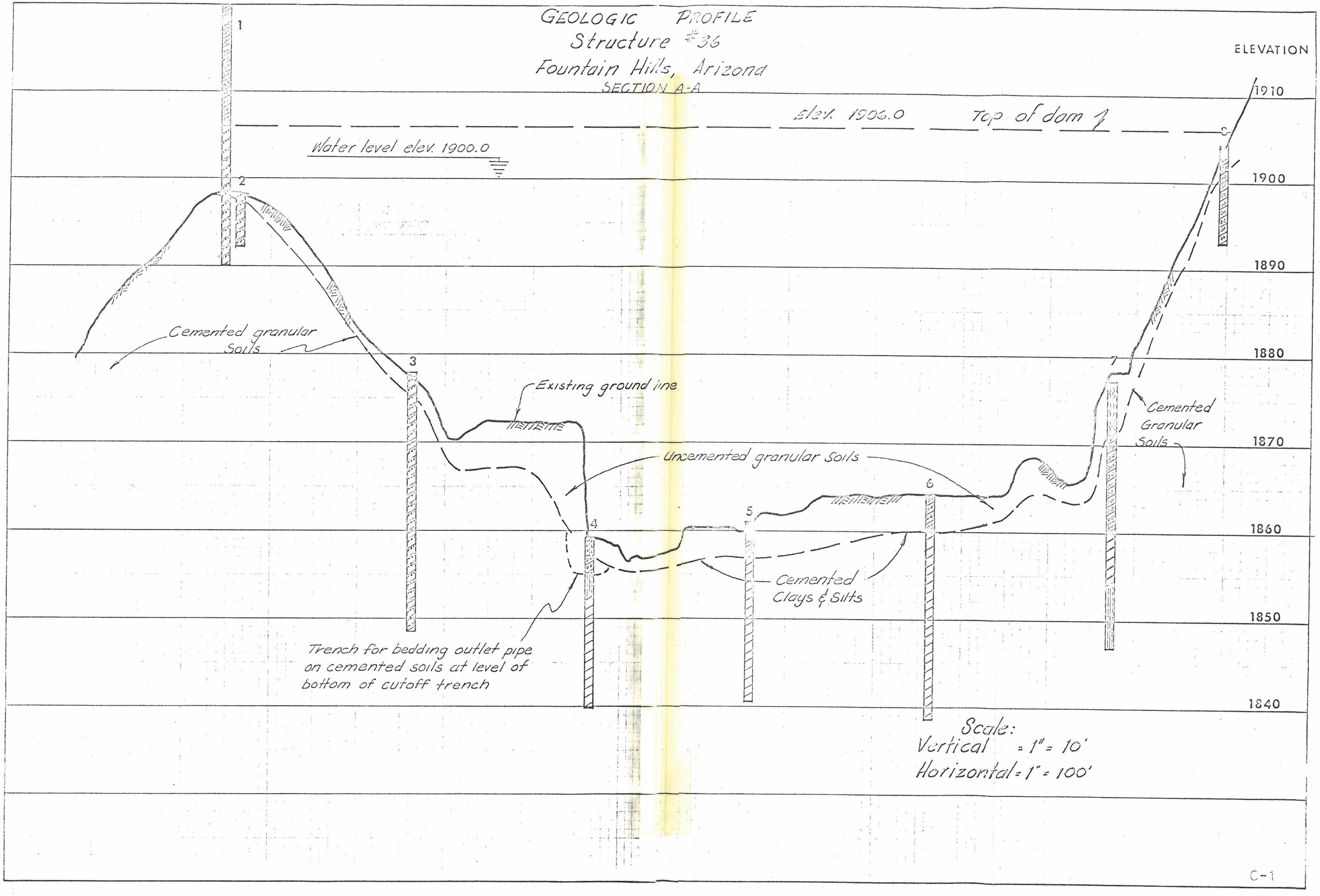
METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

APPENDIX C

GEOLOGIC PROFILE
Structure #36
Fountain Hills, Arizona
SECTION A-A



C-1

DENSITY

DETERMINATIONS

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

MAY 3, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH ARE THE RESULTS OF FIELD DENSITY TESTS PERFORMED AT THE ABOVE REFERENCED PROJECT ON MARCH 26, 1973, THROUGH APRIL 17, 1973.

SHOULD ANY QUESTIONS ARISE CONCERNING THESE TESTS, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)
ARIZONA WATER COMMISSION
ATTN: JOSEPH D. WALTERS, P. E.
SUPERVISOR OF DAM SAFETY (1)

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 5-3-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Borrow

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-26-73	75	21' -	25' L of ℄ - Station 1+50	4.0	145.0	106.0	H
		21½'					
3-26-73	76	18' -	20' W of ℄ - Station 1+50	5.1	142.0	103.9	H
		18½'					
3-26-73	77	21' -	℄ of Core - Station 4+00	14.6	111.0	99.5	A
		21½'					
3-26-73	78	18' -	℄ of Core - Station 1+50	16.2	106.9	96.0	A
		18½'					
3-27-73	79	14' -	3' W of ℄ - Station 6+50	16.0	109.1	98.0	A
		14½'					
3-27-73	80	18' -	3' E of ℄ - Station 4+50	14.1	109.0	98.0	A
		18½'					
3-27-73	81	18' -	℄ of Core - Station 1+50	14.8	107.3	96.4	A
		18½'					
4-2-73	82	13½' -	4' W of ℄ - Station 2+00	14.1	109.8	98.4	A
		14'					
4-2-73	83	13' -	4' E of ℄ - Station 5+00	14.9	106.0	95.2	A
		13½'					
4-2-73	84	11½' -	℄ of Core - Station 7+00	16.0	106.9	96.0	A
		12'					

6/10

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 5-3-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Borrow

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
4-3-73	85	9½' - 10'	4' W of ℄ - Station 10+00	15.8	111.3	99.8	A
4-3-73	86	11' - 11½'	4' E of ℄ - Station 8+00	14.8	110.3	99.0	A
4-3-73	87	10' - 10½'	℄ of Core - Station 5+00	15.0	108.3	97.2	A
4-3-73	88	10' - 10½'	℄ of Core - Station 2+00	15.9	108.0	97.0	A
4-4-73	89	8' - 8½'	℄ of Core - Station 3+00	13.9	108.0	97.0	A
4-4-73	90	8' - 8½'	3' W of ℄ - Station 6+00	16.1	107.5	96.5	A
4-4-73	91	7½' - 8'	4' W of ℄ - Station 9+00	16.3	108.3	97.2	A
4-5-73	92	7' - 7½'	℄ of Core - Station 3+00	17.2	107.9	96.9	A
4-5-73	93	7' - 7½'	℄ of Core - Station 6+00	14.5	107.5	96.5	A
4-6-73	94	6½' - 7'	3' W of ℄ - Station 9+00	14.0	106.8	95.8	A

6/10

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CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 5-3-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Borrow

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS./CU.FT.	% MAX DRY DENSITY	CURVE NO.
4-6-73	95	6½' -	4' E of ℄ - Station 5+00	16.0	109.2	98.0	A
		7'					
4-9-73	96	0-6"	5' in Front of Inlet Pipe	7.0	131.5	99.9	E
4-9-73	97	5' -	℄ of Core - Station 5+00	17.0	108.0	97.0	A
		5½'					
4-9-73	98	5' -	℄ of Core - Station 8+00	14.2	107.0	96.2	A
		5½'					
4-10-73	99	4' -	5' W of ℄ - Station 3+00	15.0	107.5	96.5	A
		4½'					
4-10-73	100	4' -	4' E of ℄ - Station 6+00	14.0	109.8	98.5	A
		4½'					
4-13-73	101	3' -	5' W of ℄ - Station 2+00	6.6	135.0	98.8	H
		3½'					
4-16-73	102	1' -	3' E of ℄ - Station 6+00	5.0	135.7	99.3	H
		1½'					
4-17-73	103	0-6"	2' W of ℄ - Station 8+00	5.9	137.7	100.6	H

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

MARCH 28, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH ARE THE RESULTS OF FIELD DENSITY TESTS PERFORMED AT THE ABOVE REFERENCED PROJECT ON MARCH 5, 1973, THROUGH MARCH 22, 1973.

SHOULD ANY QUESTIONS ARISE CONCERNING THESE TESTS, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)
ARIZONA WATER COMMISSION (1)

REPLY TO: 3940 W. CLARENDON, PHOENIX, ARIZONA 85019

PHOENIX (602) 272-6848 FLAGSTAFF (602) 774-4433 EL PASO (915) 772-3088 ALBUQUERQUE (505) 344-9940

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-27-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS./CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-5-73	43	21' -	30' W of ℄ - Station 5+50	4.0	143.0	98.6	D
		21½'					
3-5-73	44	24½' -	20' E of ℄ - Station 7+00	9.3	139.2	102.2	H
		25'					
3-6-73	45	20½' -	℄ of Core - Station 9+00	13.0	105.6	95.0	A
		21'					
3-6-73	46	20½' -	20' W of ℄ - Station 9+00	9.0	136.5	99.8	H
		21'					
3-6-73	47	23½' -	4' W of ℄ - Station 6+50	16.5	108.8	97.6	A
		24'					
3-6-73	48	23½' -	25' E of ℄ - Station 6+50	9.0	141.5	103.5	H
		24'					
3-6-73	49	17' -	24' E of ℄ - Station 9+50	8.6	140.0	102.6	H
		17½'					
3-7-73	50	16' -	3' W of ℄ - Station 9+50	15.8	106.6	95.8	A
		16½'					
3-7-73	51	16' -	20' W of ℄ - Station 9+50	8.7	141.9	103.8	H
		16½'					
3-7-73	52	22½' -	30' E of ℄ - Station 7+00	9.6	144.0	105.3	H
		23'					

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SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-27-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive, Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER _____ CONTRACTOR _____

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS./CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-7-73	53	21½' -	4' E of ℄ - Station 7+00	16.6	107.8	96.6	A
		22'					
3-7-73	54	22½' -	30' W of ℄ - Station 7+00	9.0	141.0	103.1	H
		23'					
3-15-73	55	31' -	35' W of ℄ - 1' over outlet				
		31½'	pipe	10.0	134.6	98.5	H
3-15-73	56	31' -	20' E of ℄ - 2' over outlet				
		31½'	pipe	8.0	141.5	103.5	H
3-15-73	57	25½' -	25' E of ℄ - Station 5+50	7.0	141.0	103.1	H
		26'					
3-15-73	58	25' -	℄ of Core - Station 5+50	15.0	108.9	97.8	A
		25½'					
3-15-73	59	25' -	15' W of ℄ - Station 5+50	6.8	142.6	104.2	H
		25½'					
3-16-73	60	16½' -	30' W of ℄ - Station 8+50	6.2	138.0	100.2	H
		17'					
3-16-73	61	16½' -	3' E of ℄ - Station 8+50	16.2	108.0	97.0	A
		17'					
3-16-73	62	17' -	25' W of ℄ - Station 8+50	16.4	133.6	98.0	H
		17½'					

1/10

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-27-73

PROJECT STRUCTURE No. 36 JOB NO. E73-14

LOCATION FOUNTAIN HILLS, ARIZONA

CLIENT TRICO OF ARIZONA, INC. ADDRESS 12031 NORTH COLONY DRIVE FOUNTAIN HILLS, ARIZONA 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY ROGER TULK PERFORMED BY SHB/GDS

MATERIAL NATIVE SOIL

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-19-73	63	34' -	℄ OF CORE - STATION 3+50	16.9	109.0	97.8	A
		34½'					
3-19-73	64	33' -	40' E OF ℄ - STATION 3+50	5.0	138.0	101.8	H
		33½'					
3-19-73	65	31' -	40' W OF ℄ - STATION 3+50	6.2	145.0	106.0	H
		31½'					
3-20-73	66	30' -	℄ OF CORE - STATION 4+00	14.2	114.8	103.0	A
		30½'					
3-20-73	67	29' -	20' W OF ℄ - STATION 3+50	6.5	144.8	105.8	H
		29½'					
3-20-73	68	28' -	28' E OF ℄ - STATION 3+75	4.8	142.2	104.0	H
		28½'					
3-21-73	69	27' -	15' W OF ℄ - STATION 3+50	3.1	143.0	104.5	H
		27½'					
3-21-73	70	26' -	3' W OF ℄ - STATION 3+00	17.0	110.0	98.6	A
		26½'					
3-21-73	71	25' -	16' E OF ℄ - STATION 4+00	4.0	136.5	100.0	H
		25½'					
3-22-73	72	21' -	30' E OF ℄ - STATION 5+50	6.2	141.9	103.8	H
		21½'					

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-27-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-22-73	73	21½' - 22'	20' W of ℄ - Station 2+50	7.0	142.8	104.5	H
3-22-73	74	19' - 19½'	℄ of Core - Station 1+50	16.4	115.2	103.3	A

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

MARCH 13, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH IS THE CORRECTED PLASTICITY INDEX WHICH WAS INCORRECTLY REPORTED TO YOU ON MARCH 6, 1973.

SHOULD ANY QUESTIONS ARISE CONCERNING THIS TEST, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)
ARIZONA WATER COMMISSION (1)

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 3-13-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Colony Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 3-1-73

SOURCE Spillway Cut

MATERIAL Native Soil

LAB NO. 3-14-21

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4''			
3''		100	
2''		98	
1-1/2''		95	
1''		89	
3/4''		83	
1/2''		75	
3/8''		68	
1/4''		58	
# 4		52	
# 8		44	
# 10		43	
# 16		38	
# 30			
# 40		31	
# 50			
# 100		26	
# 200		24	

LIQUID LIMIT 29 PLASTIC LIMIT 26

PLASTICITY INDEX 4

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

SOURCE

MATERIAL

LAB NO.

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4''			
3''			
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4			
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200			

LIQUID LIMIT PLASTIC LIMIT

PLASTICITY INDEX

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

PHOENIX, ARIZONA
3940 WEST CLARENDON
(602) 272-6848

FLAGSTAFF, ARIZONA
2029 NORTH 4TH STREET
(602) 774-4433

EL PASO, TEXAS
201 NORTH CLARK ROAD
(915) 772-3088

ALBUQUERQUE, NEW MEXICO
2501 CANDELARIA N.E.
(505) 344-9940

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

MARCH 6, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONEY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH ARE THE RESULTS OF FIELD DENSITY TESTS PERFORMED AT THE ABOVE REFERENCED PROJECT ON FEBRUARY 14, 1973, THROUGH MARCH 6, 1973.

ALSO SUBMITTED ARE THE RESULTS OF SIEVE ANALYSIS, PLASTICITY INDEX AND MOISTURE-DENSITY RELATIONSHIP TESTS PERFORMED IN OUR LABORATORY.

SHOULD ANY QUESTIONS ARISE CONCERNING THESE TESTS, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)
ARIZONA WATER COMMISSION (1)

REPLY TO: 3940 W. CLARENDON, PHOENIX, ARIZONA 85019

PHOENIX (602) 272-9848 FLAGSTAFF (602) 774-4433 EL PASO (915) 772-3088 ALBUQUERQUE (505) 344-9940

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
2-14-73	1	45'-	℄ of Core Station 4+50	15.0	108.8	97.5	A
		45½'					
2-14-73	2	41'-	℄ of Core Station 6+50	15.8	106.8	96.0	A
		41½'					
2-14-73	3	38'-	℄ of Core Station 8+00	16.0	113.5	101.8	A
		38½'					
2-15-73	4	44'-	3' W of ℄ Station 4+00	9.0	127.7	95.2	F
		44½'					
2-15-73	5	38'-	3' E of ℄ Station 7+50	6.1	129.0	96.2	F
		38½'					
2-15-73	6	41'-	℄ of Core Station 5+50	7.7	130.0	97.0	F
		41½'					
2-15-73	7	37'-	℄ of Core Station 7+50	8.4	128.0	95.7	F
		37½'					
2-16-73	8	35'-	℄ of Station 7+00	16.8	110.0	98.6	A
		35½'					
2-16-73	9	38'-	4' W of ℄ Station 5+00	16.0	108.0	97.8	A
		38½'					
2-16-73	10	38'-	25' E of ℄ Station 6+00	4.0	146.0	104.1	E
		38½'					

4/10

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
2-21-73	11	40'-	4' E of ℄ Station 4+00	14.0	109.8	97.4	A
		40½'					
2-21-73	12	35'-	4' W of ℄ Station 5+50	14.2	109.8	97.4	A
		35½'					
2-21-73	13	32'-	℄ of Core Station 8+50	13.8	110.0	98.8	A
		32½'					
2-21-73	14	35'-	30' E of ℄ Station 8+00	3.5	139.0	99.4	E
		35½'					
2-21-73	15	33½'-	35' W of ℄ Station 6+00	5.0	139.1	99.5	E
		34'					
2-21-73	16	40'-	20' E of ℄ Station 4+50	5.4	143.8	102.7	E
		40½'					
2-21-73	17	38'-	30' E of ℄ Station 5+00	6.0	145.0	103.5	E
		38½'					
2-23-73	18	27½'-	35' W of ℄ Station 8+50	5.8	148.1	105.8	E
		28'					
2-23-73	19	34½'-	20' E of ℄ Station 6+50	6.0	144.2	103.1	E
		35'					
2-23-73	20	32½'-	25' W of ℄ Station 5+50	5.4	149.2	106.8	E
		33'					

0/10

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
2-23-73	21	34'-	22' E of ℄ Station 7+50	4.3	146.0	104.3	E
		34½'					
2-26-73	22	28'-	℄ of Core Station 8+50	17.5	106.0	95.0	A
		28½'					
2-26-73	23	35'-	℄ of Core Station 4+50	16.0	117.0	105.0	A
		35½'					
2-27-73	24	35'-	℄ of Core Station 4+00	17.2	109.0	97.9	A
		35½'					
2-27-73	25	29½'-	3' E of ℄ Station 6+50	16.6	107.2	96.2	A
		30'					
2-28-73	26	34'-	48' E of ℄ Station 5+00	9.0	129.0	96.0	F
		34½'					
2-28-73	27	30'-	℄ of Core Station 5+50	16.4	110.8	99.3	A
		30½'					
2-28-73	28	29'-	℄ of Core Station 6+50	15.5	110.0	98.7	A
		29½'					
2-28-73	29	26'-	℄ of Core Station 8+50	16.9	109.9	97.6	A
		26½'					
3-1-73	30	30'-	3' W of ℄ Station 5+00	15.5	107.5	96.5	A
		30½'					

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-1-73	31	27½'-	3' E of ℄ Station 6+50	12.0	107.0	96.0	A
		28'					
3-1-73	32	23'-	℄ of Core Station 9+00	14.1	108.0	96.8	A
		23½'					
3-1-73	33	25'-	45' W of ℄ Station 7+50	3.6	159.0	108.5	D
		25½'					
3-1-73	34	31'-	40' E of ℄ Station 5+50	3.5	147.0	101.0	D
		31½'					
3-1-73	35	27'-	℄ of Core Station 7+50	15.8	110.3	99.1	A
		27½'					
3-3-73	36	27½'-	℄ of Core Station 5+50	13.0	107.0	96.0	A
		28'					
3-3-73	37	27½'-	24' W of ℄ Station 5+50	4.0	147.0	101.2	D
		28'					
3-3-73	38	23½'-	℄ of Core Station 7+50	13.0	108.2	97.1	A
		24'					
3-3-73	39	23½'-	20' E of ℄ Station 7+50	3.8	149.5	103.1	D
		24'					
3-6-73	40	20'-	℄ of Core Station 8+50	14.0	106.5	95.6	A
		20½'					

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SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

FIELD DENSITY TEST DATA

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

ARCHITECT/ENGINEER CONTRACTOR

REQUESTED BY Roger Tulk PERFORMED BY SHB/GDS

MATERIAL Native Soil

DATE OF TEST	TEST NO.	DEPTH OF TEST	LOCATION	MOISTURE CONTENT % DRY WT.	DRY DENSITY LBS/CU.FT.	% MAX DRY DENSITY	CURVE NO.
3-6-73	41	21½'- 22'	3' W of ℄ Station 7+00	14.5	110.0	98.8	A
3-6-73	42	28'- 28½'	3' E of ℄ Station 5+00	15.2	109.5	98.1	A

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 3-6-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 3-1-73

SOURCE Spillway Cut
MATERIAL Native Soil
LAB NO. 3-14-21

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4''			
3''		100	
2''		98	
1-1/2''		95	
1''		89	
3/4''		83	
1/2''		75	
3/8''		68	
1/4''		58	
# 4		52	
# 8		44	
# 10		43	
# 16		38	
# 30			
# 40		31	
# 50			
# 100		26	
# 200		24	

LIQUID LIMIT _____ PLASTIC LIMIT _____
PLASTICITY INDEX NP
SOIL CLASSIFICATION: AASHO _____
UNIFIED _____
OTHER _____

SOURCE _____
MATERIAL _____
LAB NO. _____

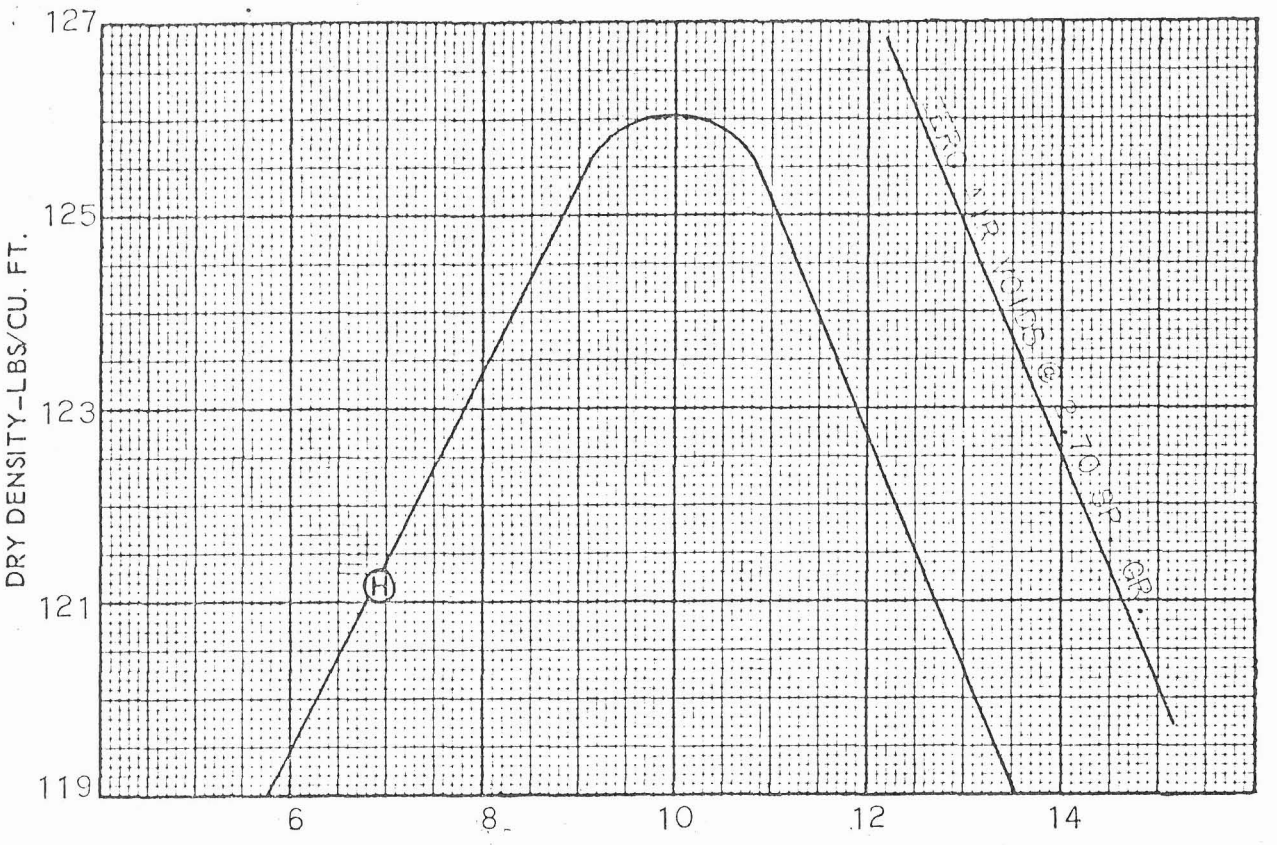
MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4''			
3''			
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4			
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200			

LIQUID LIMIT _____ PLASTIC LIMIT _____
PLASTICITY INDEX _____
SOIL CLASSIFICATION: AASHO _____
UNIFIED _____
OTHER _____

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



MOISTURE CONTENT – % DRY WEIGHT

CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
H	NATIVE SOIL - SPILLWAY CUT	10.0	126.0	ASTM D1557-70T	A	3-14-21
	WITH ROCK CORRECTION	5.2	136.7		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

FEBRUARY 16, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONEY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE NO. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH ARE THE RESULTS OF SIEVE ANALYSIS AND PLASTICITY INDEX TESTS PERFORMED AT YOUR REQUEST FOR THE ABOVE REFERENCED PROJECT. ALSO SUBMITTED ARE THE RESULTS OF MOISTURE-DENSITY RELATIONSHIP TESTS PERFORMED IN OUR LABORATORY.

SHOULD ANY QUESTIONS ARISE CONCERNING THESE TESTS, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF AGGREGATE TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona LAB NO. 3-14-9

CLIENT Trico of Arizona, Inc. ADDRESS 12301 North Coloney Drive Fountain Hills, Arizona 85268

SOURCE OF SAMPLE "C" 0-3'

MATERIAL Native

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY Roger Tulk DATE RECEIVED 2-2-73

MECHANICAL ANALYSIS

Sieve Size	% Retained (Indiv.)	% Passing (Cumul.)	
6"			
4"			
3"		100	
2"		97	
1½"		92	
1"		85	
3/4"		79	
1/2"		73	
3/8"		68	
1/4"		61	
#4		55	
#8		41	
#10		39	
#16		27	
#30			
#40		10	
#50			
#100		4	
#200		3	

Liquid Limit ____ %
Plastic Limit ____ %
Plasticity Index NP %
Decantation ____ %
Fineness Modulus ____
Specific Gravity ____
Unit Weight; Lbs./Cu. Ft.
Loose ____
Rodded ____
Voids in Aggregate ____ %
Absorption ____ %
Moisture ____ %
Organic Impurities ____
L.A. Abrasion;
Loss after ____ rev. ____ %
Soundness, Sodium Sulfate:
Loss after 5 cycles ____ %
% Fractured Face
By Weight ____ %
By Count ____ %
% Asphalt req'd. ____ Type ____
Swell ____
Bit. Content (% of Dry Agg.) ____
(% of Total Sample) ____

RESPECTFULLY SUBMITTED,

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF AGGREGATE TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona LAB NO. 3-14-11

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SOURCE OF SAMPLE "D" 0-5'

MATERIAL Native

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY Roger Tulk DATE RECEIVED 2-2-73

MECHANICAL ANALYSIS

Sieve Size	% Retained (Indiv.)	% Passing (Cumul.)	
6"			
4"			
3"		100	
2"		96	
1½"		90	
1"		78	
3/4"		70	
1/2"		61	
3/8"		55	
1/4"		49	
#4		45	
#8		35	
#10		31	
#16		22	
#30			
#40		13	
#50			
#100		7	
#200		6	

Liquid Limit 22 %
Plastic Limit 18 %
Plasticity Index 4 %
Decantation ____ %
Fineness Modulus ____
Specific Gravity ____
Unit Weight; Lbs./Cu. Ft.
Loose ____
Rodded ____
Voids in Aggregate ____ %
Absorption ____ %
Moisture ____ %
Organic Impurities ____
L.A. Abrasion;
Loss after ____ rev. ____ %
Soundness, Sodium Sulfate:
Loss after 5 cycles ____ %
% Fractured Face
By Weight ____ %
By Count ____ %
% Asphalt req'd. ____ Type ____
Swell ____
Bit. Content (% of Dry Agg.) ____
(% of Total Sample) ____

RESPECTFULLY SUBMITTED,

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CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF AGGREGATE TESTS

DATE 2-19-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona LAB NO. 3-14-17

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SOURCE OF SAMPLE "G" 0-3'

MATERIAL Native

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY Roger Tulk DATE RECEIVED 2-2-73

MECHANICAL ANALYSIS

Sieve Size	% Retained (Indiv.)	% Passing (Cumul.)	
6"			
4"			
3"			
2"		100	
1½"		92	
1"		82	
3/4"		75	
1/2"		68	
3/8"		62	
1/4"		55	
#4		50	
#8		35	
#10		33	
#16		25	
#30			
#40		13	
#50			
#100		7	
#200		6	

Liquid Limit ____ %
Plastic Limit ____ %
Plasticity Index NP %
Decantation ____ %
Fineness Modulus ____
Specific Gravity ____
Unit Weight; Lbs./Cu. Ft.
Loose ____
Rodded ____
Voids in Aggregate ____ %
Absorption ____ %
Moisture ____ %
Organic Impurities ____
L.A. Abrasion;
Loss after ____ rev. ____ %
Soundness, Sodium Sulfate:
Loss after 5 cycles ____ %
% Fractured Face
By Weight ____ %
By Count ____ %
% Asphalt req'd. ____ Type ____
Swell ____
Bit. Content (% of Dry Agg.) ____
(% of Total Sample) ____

RESPECTFULLY SUBMITTED,

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF AGGREGATE TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona LAB NO. 3-14-19

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SOURCE OF SAMPLE "H" 0-8'

MATERIAL Native

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY Roger Tulk DATE RECEIVED 2-2-73

MECHANICAL ANALYSIS

Sieve Size	% Retained (Indiv.)	% Passing (Cumul.)	
6"			
4"			
3"		100	
2"		94	
1½"		90	
1"		81	
3/4"		74	
1/2"		66	
3/8"		60	
1/4"		53	
#4		47	
#8		35	
#10		32	
#16		26	
#30			
#40		16	
#50			
#100		11	
#200		10	

Liquid Limit 26 %
Plastic Limit 22 %
Plasticity Index 4 %
Decantation ____ %
Fineness Modulus ____
Specific Gravity ____
Unit Weight; Lbs./Cu. Ft.
Loose ____
Rodded ____
Voids in Aggregate ____ %
Absorption ____ %
Moisture ____ %
Organic Impurities ____
L.A. Abrasion;
Loss after ____ rev. ____ %
Soundness, Sodium Sulfate:
Loss after 5 cycles ____ %
% Fractured Face
By Weight ____ %
By Count ____ %
% Asphalt req'd. ____ Type ____
Swell ____
Bit. Content (% of Dry Agg.) ____
(% of Total Sample) ____

RESPECTFULLY SUBMITTED,

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CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

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REPORT OF AGGREGATE TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona LAB NO. 3-14-20

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive, Fountain Hills, Arizona 85268

SOURCE OF SAMPLE Cut from Spillway

MATERIAL Native

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY Roger Tulk DATE RECEIVED 2-14-73

MECHANICAL ANALYSIS

Sieve Size	% Retained (Indiv.)	% Passing (Cumul.)	
6"			
4"			
3"		100	
2"		96	
1½"		92	
1"		87	
3/4"		81	
1/2"		74	
3/8"		69	
1/4"		64	
#4		60	
#8		54	
#10		53	
#16		50	
#30			
#40		40	
#50			
#100		41	
#200		38	

Liquid Limit 44 %
Plastic Limit 20 %
Plasticity Index 24 %
Decantation ____ %
Fineness Modulus ____
Specific Gravity ____
Unit Weight; Lbs./Cu. Ft.
Loose ____
Rodded ____
Voids in Aggregate ____ %
Absorption ____ %
Moisture ____ %
Organic Impurities ____
L.A. Abrasion;
Loss after ____ rev. ____ %
Soundness, Sodium Sulfate:
Loss after 5 cycles ____ %
% Fractured Face
By Weight ____ %
By Count ____ %
% Asphalt req'd. ____ Type ____
Swell ____
Bit. Content (% of Dry Agg.) ____
(% of Total Sample) ____

RESPECTFULLY SUBMITTED,

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MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12301 North Coloney Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 2-2-73

SOURCE "A" 3'-6'
MATERIAL Native
LAB NO. 3-14-8

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
#4		100	
#8			
#10			
#16			
#30			
#40			
#50			
#100			
#200		57	

LIQUID LIMIT 34 PLASTIC LIMIT 28

PLASTICITY INDEX 6

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

SOURCE "C" 3'-6'
MATERIAL Native
LAB NO. 3-14-10

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
#4		100	
#8			
#10			
#16			
#30			
#40			
#50			
#100			
#200		57	

LIQUID LIMIT 33 PLASTIC LIMIT 23

PLASTICITY INDEX 10

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

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MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-16-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 2-2-73

SOURCE "D" 5'-8'
MATERIAL Native
LAB NO. 3-14-12

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
# 4		100	
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		84	

LIQUID LIMIT 38 PLASTIC LIMIT 24

PLASTICITY INDEX 14

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

SOURCE "E" 0-3'
MATERIAL Native
LAB NO. 3-14-13

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"		100	
3"		97	
2"		97	
1-1/2"		86	
1"		80	
3/4"		73	
1/2"		65	
3/8"		60	
1/4"		54	
# 4		50	
# 8		41	
# 10		39	
# 16		31	
# 30			
# 40		13	
# 50			
# 100		6	
# 200		4	

LIQUID LIMIT PLASTIC LIMIT

PLASTICITY INDEX NP

SOIL CLASSIFICATION: AASHO

UNIFIED

OTHER

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MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-16-73

PROJECT STRUCTURE No. 36 JOB NO. E73-14

LOCATION FOUNTAIN HILLS, ARIZONA

CLIENT TRICO OF ARIZONA, INC. ADDRESS 12031 NORTH COLONEY DRIVE FOUNTAIN HILLS, ARIZONA 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: ROGER TULK DATE RECEIVED 2-2-73

SOURCE "E" 3'-8'
MATERIAL NATIVE
LAB NO. 3-14-14

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
#4		100	
#8			
#10			
#16			
#30			
#40			
#50			
#100			
#200		69	

LIQUID LIMIT 34 PLASTIC LIMIT 26
PLASTICITY INDEX 8
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER

SOURCE "F" 0-6'
MATERIAL NATIVE
LAB NO. 3-14-15

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"		100	
3"		97	
2"		89	
1-1/2"		87	
1"		80	
3/4"		72	
1/2"		66	
3/8"		61	
1/4"		54	
#4		50	
#8		40	
#10		39	
#16		32	
#30			
#40		18	
#50			
#100		12	
#200		10	

LIQUID LIMIT PLASTIC LIMIT
PLASTICITY INDEX NP
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-19-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12031 North Coloney Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 2-2-73

SOURCE "G" 3'-8'
MATERIAL Native
LAB NO. 3-14-18

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
# 4		100	
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		80	

LIQUID LIMIT 34 PLASTIC LIMIT 25
PLASTICITY INDEX 9
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER

SOURCE "F" 6'-8'
MATERIAL Native
LAB NO. 3-14-16

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
# 4		100	
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		71	

LIQUID LIMIT 33 PLASTIC LIMIT 26
PLASTICITY INDEX 7
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14

CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
A	NATIVE SOIL-A @ 3'-6'	15.5	111.5	ASTM 1557-70T	A	3-14-8

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

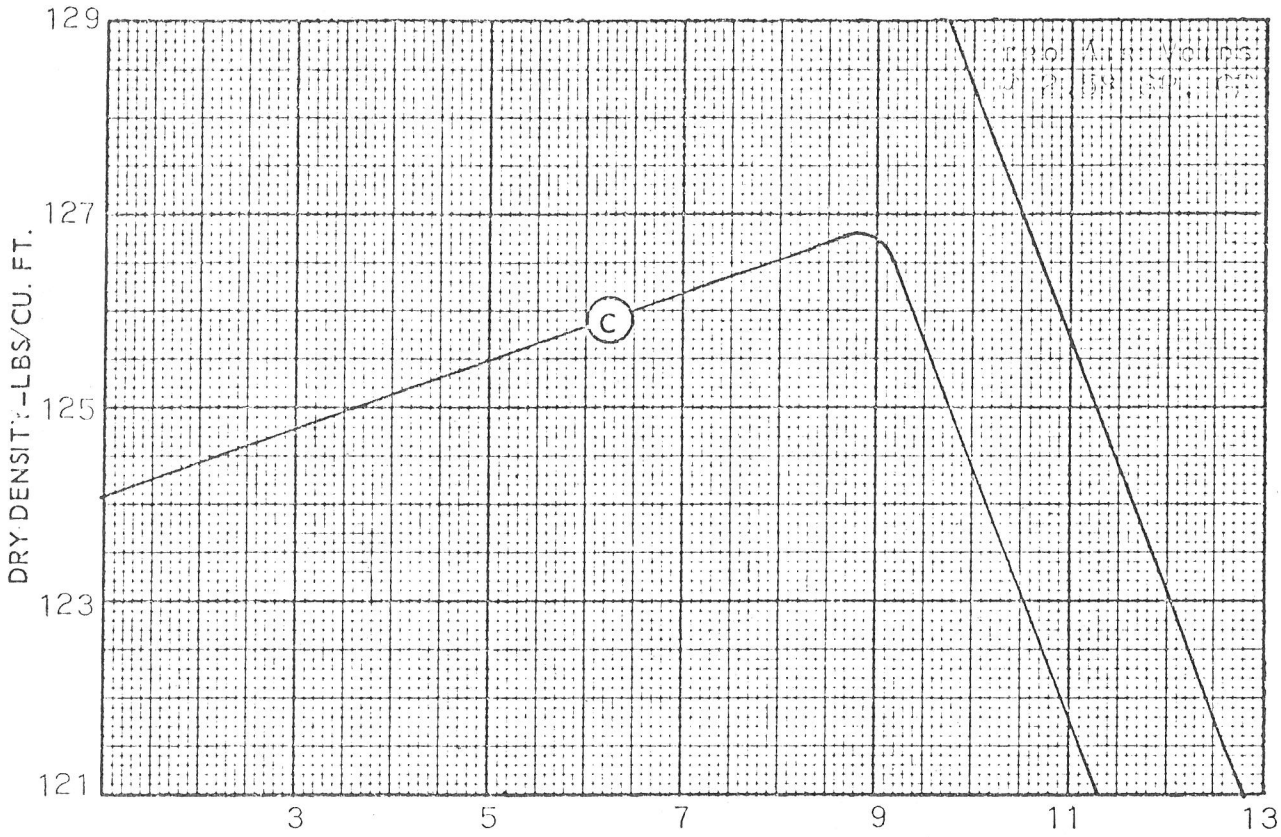
AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • FLAGSTAFF • ALBUQUERQUE • EL PASO

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
C	NATIVE SOIL-C @ 0-3'	8.9	126.8	ASTM 1557-70T	A	3-14-9
	WITH ROCK CORRECTION	4.9	136.8		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

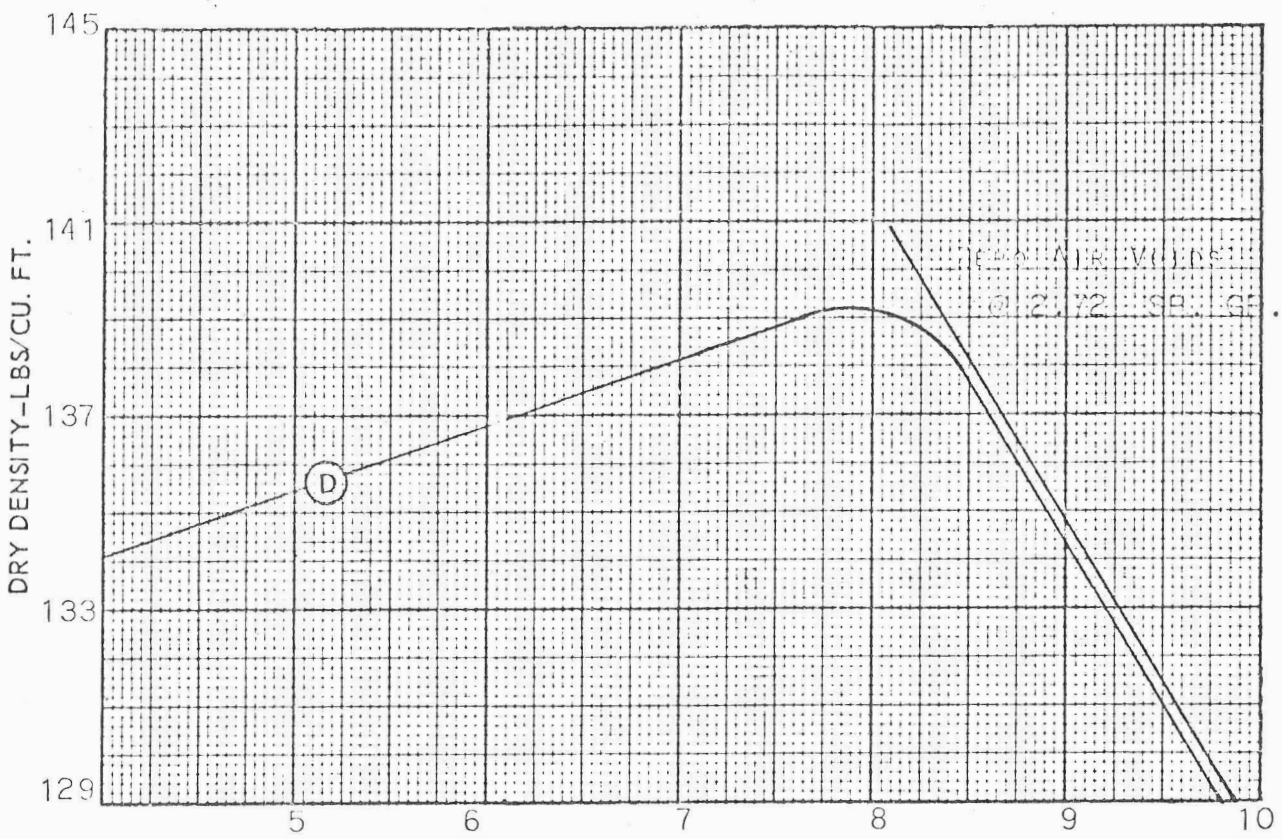
METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.59"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.59"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



MOISTURE CONTENT – % DRY WEIGHT

CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
D	NATIVE SOIL-D @ 0-5'	7.9	139.1	ASTM 1557-70T	A	3-14-11
	WITH ROCK CORRECTION	4.3	145.4		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

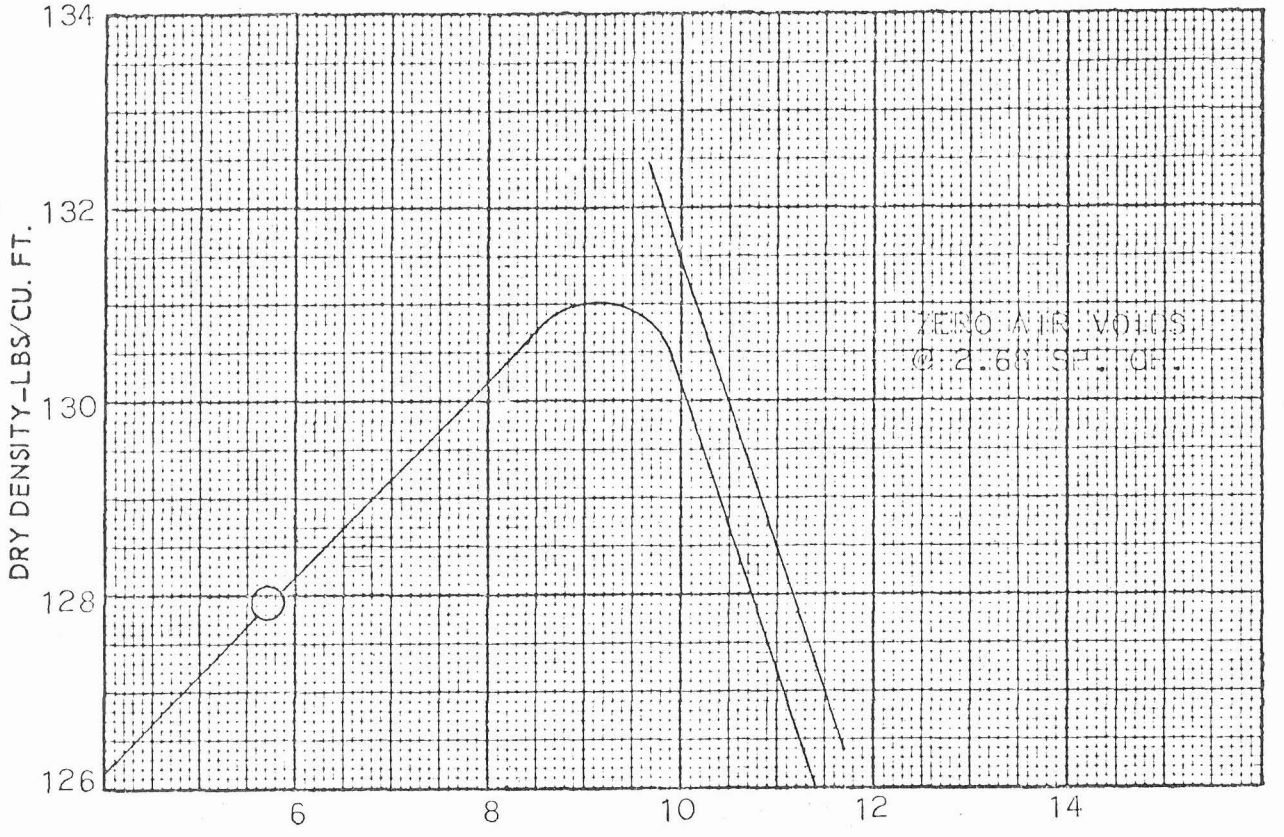
METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
G	NATIVE SOIL-E @ 0-3'	9.2	131.0	ASTM 1557-70T	A	3-14-13
	WITH ROCK CORRECTION	4.6	140.0		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

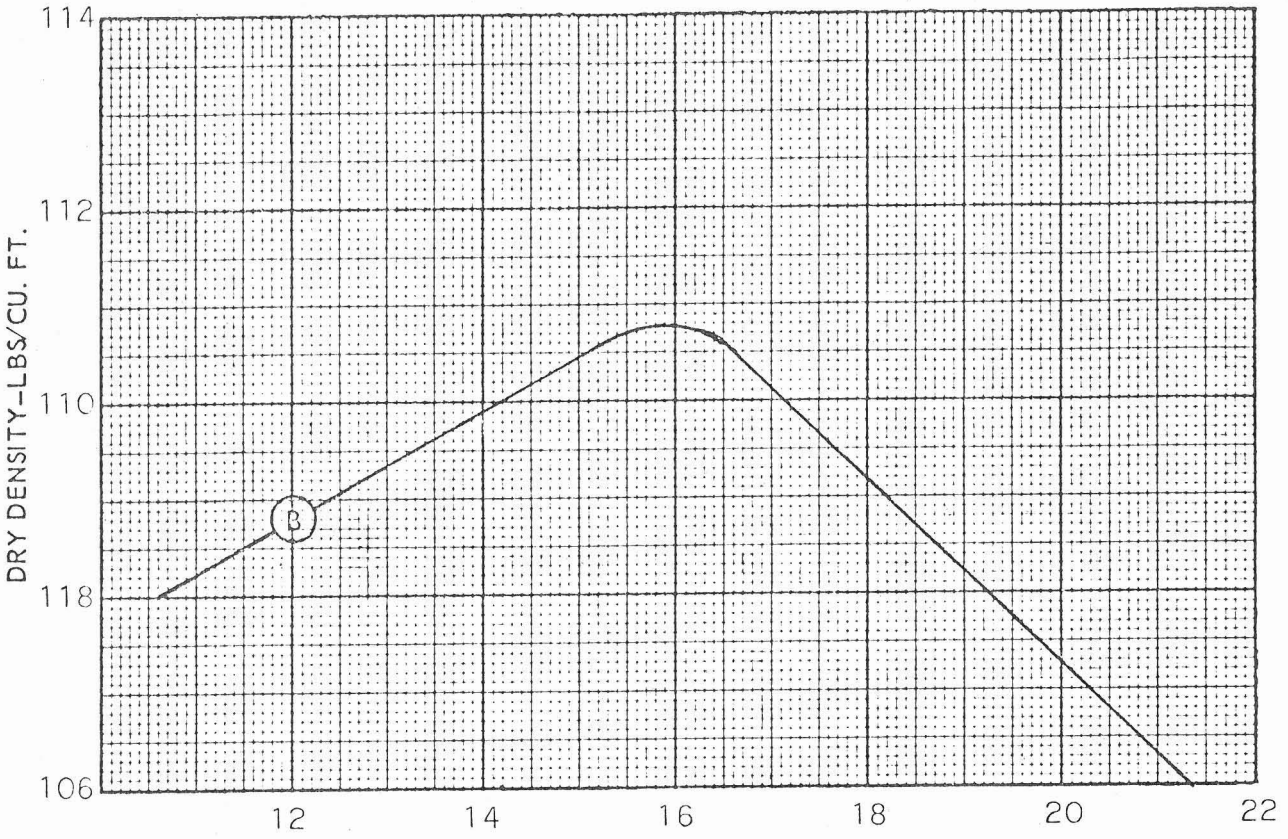
METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
B	NATIVE SOIL-G @ 3'-8'	16.0	110.8	ASTM 1557-70T	A	3-14-18

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

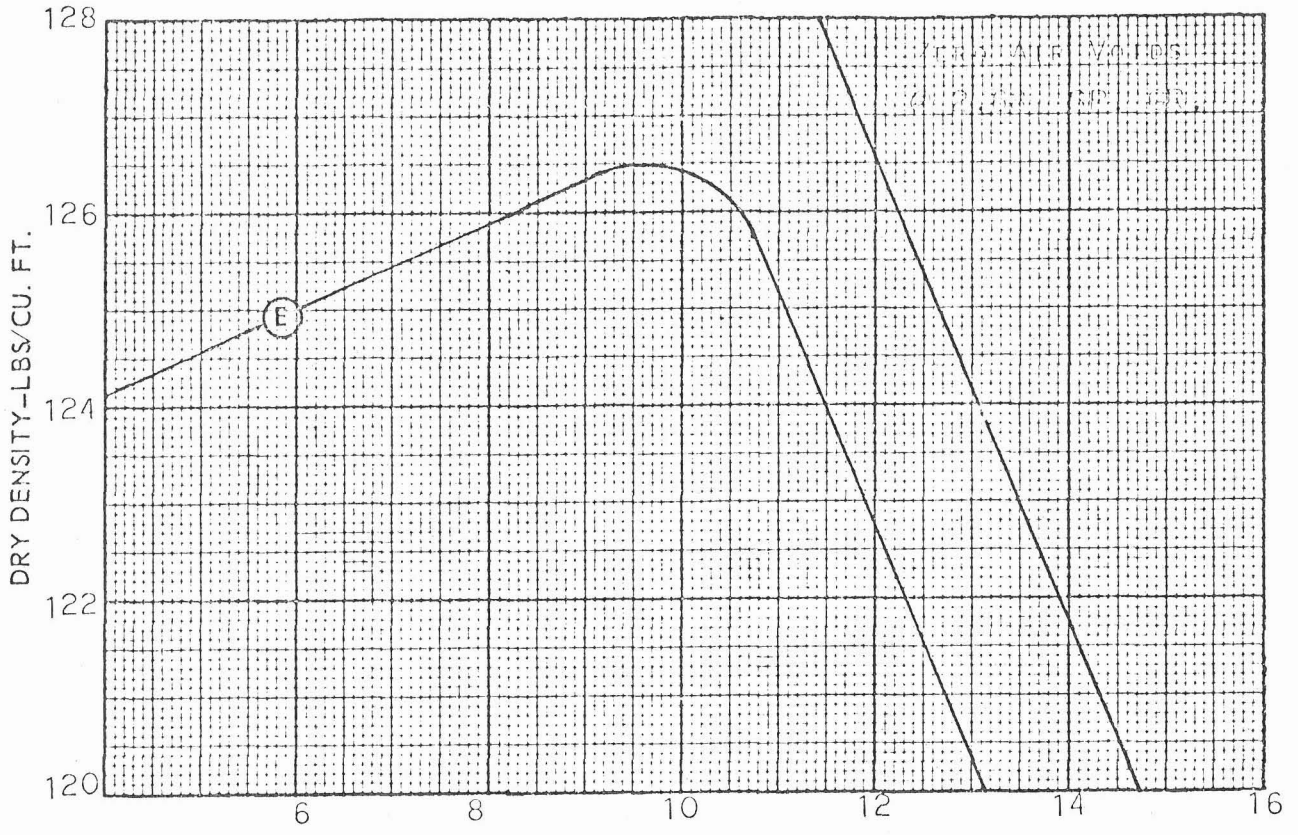
METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
E	NATIVE SOIL - H. 0-8'	9.7	126.5	ASTM 1557-70T	A	3-14-19
	WITH ROCK CORRECTION	5.1	138.0		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

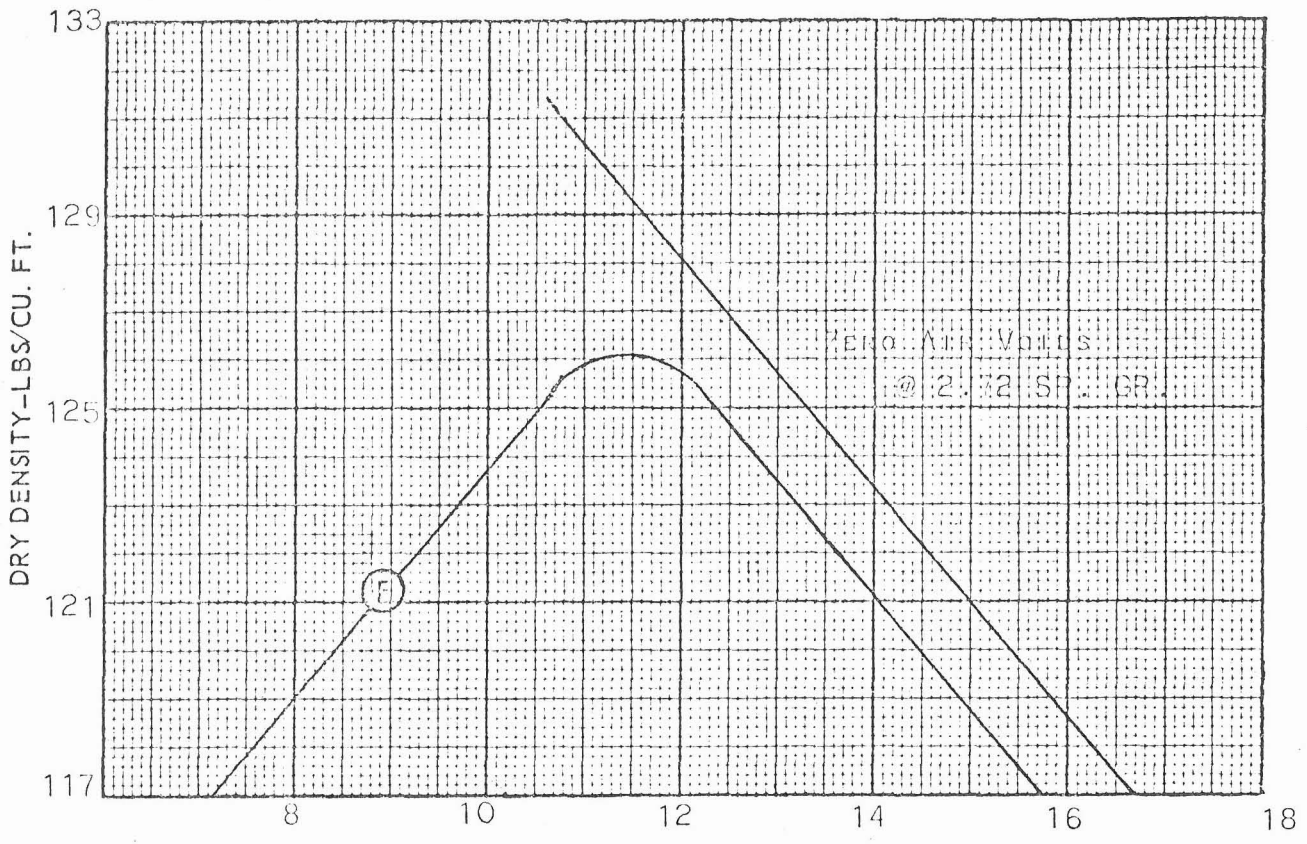
METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT STRUCTURE No. 36 FOUNTAIN HILLS, ARIZONA JOB NO. E73-14



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
F	NATIVE SOIL CUT FROM SPILLWAY	11.5	126.1	ASTM 1557-70T	A	3-14-20
	WITH ROCK CORRECTION	6.9	134.5		C	

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHO T99-61 and ASTM D 698-66T (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHO T180-61 and ASTM 1557-66T (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

B. DWAINE SERGENT, P.E. JOHN B. HAUSKINS, P.E. GEORGE H. BECKWITH, P.E.

DALE V. BEDENKOP, P.E. ROBERT D. BOOTH, P.E. BRUCE J. LEISER, P.E.

FEBRUARY 2, 1973

TRICO OF ARIZONA, INC.
12031 NORTH COLONEY DRIVE
FOUNTAIN HILLS, ARIZONA 85268

JOB NO. E73-14

ATTENTION: MR. ROGER TULK

RE: STRUCTURE No. 36
FOUNTAIN HILLS, ARIZONA

GENTLEMEN,

SUBMITTED HEREWITH ARE THE RESULTS OF SIEVE ANALYSIS AND PLASTICITY INDEX TESTS PERFORMED AT YOUR REQUEST FOR THE ABOVE REFERENCED PROJECT.

SHOULD ANY QUESTIONS ARISE CONCERNING THESE TESTS, PLEASE DO NOT HESITATE TO CALL.

RESPECTFULLY SUBMITTED,
SERGENT, HAUSKINS & BECKWITH ENGINEERS

BY _____
DALE S. PARKER

COPIES: ADDRESSEE (4)

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-2-73

PROJECT STRUCTURE No. 36 JOB NO. E73-14

LOCATION FOUNTAIN HILLS, ARIZONA

CLIENT TRICO OF ARIZONA, INC. ADDRESS 12301 NORTH COLONEY DRIVE FOUNTAIN HILLS, ARIZONA 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: ROGER TULK DATE RECEIVED 1-24-73

SOURCE BORROW AREA No.1 0-3'6"

MATERIAL NATIVE

LAB NO. 3-14-1

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4''			
3''		100	100
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4		69	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		15	15-35

LIQUID LIMIT _____ PLASTIC LIMIT _____

PLASTICITY INDEX NP

SOIL CLASSIFICATION: AASHO _____

UNIFIED _____

OTHER MOISTURE 5.6%

SOURCE BORROW AREA No.2 0-3'6"

MATERIAL NATIVE

LAB NO. 3-14-2

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4''			
3''		100	100
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4		75	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		12	15-35

LIQUID LIMIT _____ PLASTIC LIMIT _____

PLASTICITY INDEX NP

SOIL CLASSIFICATION: AASHO _____

UNIFIED _____

OTHER MOISTURE 5.6%

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MATERIALS TESTING ENGINEERS

ENGINEERING ANALYSIS • PHYSICAL TESTING • QUALITY CONTROL • FIELD EXPLORATION

REPORT OF SOIL TESTS

DATE 2-2-73

PROJECT STRUCTURE No. 36 JOB NO. E73-14

LOCATION FOUNTAIN HILLS, ARIZONA

CLIENT TRICO OF ARIZONA, INC. ADDRESS 12301 NORTH COLONEY DRIVE FOUNTAIN HILLS, ARIZONA 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: ROGER TULK DATE RECEIVED 1-24-73

SOURCE BORROW AREA No.3 0-4'6"
MATERIAL NATIVE
LAB NO. 3-14-3

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4''			
3''		100	100
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4		67	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		16	15-35

LIQUID LIMIT 22 PLASTIC LIMIT 18
PLASTICITY INDEX 4
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER MOISTURE 7.1%

SOURCE BORROW AREA No.4 0-2'0"
MATERIAL NATIVE
LAB NO. 3-14-4

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4''			
3''		100	100
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4		82	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		18	15-35

LIQUID LIMIT 22 PLASTIC LIMIT 19
PLASTICITY INDEX 3
SOIL CLASSIFICATION: AASHO
UNIFIED
OTHER MOISTURE 5.3%

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REPORT OF SOIL TESTS

DATE 2-2-73

PROJECT STRUCTURE No. 36 JOB NO. E73-14

LOCATION FOUNTAIN HILLS, ARIZONA

CLIENT TRICO OF ARIZONA, INC. ADDRESS 12301 NORTH COLONEY DRIVE FOUNTAIN HILLS, ARIZONA 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: ROGER TULK DATE RECEIVED 1-24-73

SOURCE BORROW AREA No.4 2'0"-4'0"

MATERIAL NATIVE

LAB NO. 3-14-5

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4"			
3"		100	100
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
# 4		91	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		42	15-35

LIQUID LIMIT ____ PLASTIC LIMIT ____

PLASTICITY INDEX NP

SOIL CLASSIFICATION: AASHO ____

UNIFIED ____

OTHER MOISTURE 13.6%

SOURCE BORROW AREA No.5 0-3'0"

MATERIAL NATIVE

LAB NO. 3-14-6

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4"			
3"		100	100
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
# 4		76	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		17	15-35

LIQUID LIMIT 23 PLASTIC LIMIT 19

PLASTICITY INDEX 4

SOIL CLASSIFICATION: AASHO ____

UNIFIED ____

OTHER MOISTURE 6.4%

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REPORT OF SOIL TESTS

DATE 2-2-73

PROJECT Structure No. 36 JOB NO. E73-14

LOCATION Fountain Hills, Arizona

CLIENT Trico of Arizona, Inc. ADDRESS 12301 North Coloney Drive Fountain Hills, Arizona 85268

SAMPLED BY SHB/GDS SUBMITTED BY SHB/GDS

REQUESTED BY: Roger Tulk DATE RECEIVED 1-24-73

SOURCE Borrow Area No.6 0-4'0"

MATERIAL Native

LAB NO. 3-14-7

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	SPECS.
4''			
3''		100	100
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4		82	60-100
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200		26	15-35

LIQUID LIMIT _____ PLASTIC LIMIT _____

PLASTICITY INDEX NP

SOIL CLASSIFICATION: AASHO _____

UNIFIED _____

OTHER Moisture 2.7%

SOURCE _____

MATERIAL _____

LAB NO. _____

MECHANICAL ANALYSIS

SIEVE SIZE	% RETAINED (INDIV.)	% PASSING (CUMUL)	
4''			
3''			
2''			
1-1/2''			
1''			
3/4''			
1/2''			
3/8''			
1/4''			
# 4			
# 8			
# 10			
# 16			
# 30			
# 40			
# 50			
# 100			
# 200			

LIQUID LIMIT _____ PLASTIC LIMIT _____

PLASTICITY INDEX _____

SOIL CLASSIFICATION: AASHO _____

UNIFIED _____

OTHER _____

PHOENIX, ARIZONA
3940 WEST CLARENDON
(602) 272-6848

FLAGSTAFF, ARIZONA
2029 NORTH 4TH STREET
(602) 774-4433

EL PASO, TEXAS
201 NORTH CLARK ROAD
(915) 772-3098

ALBUQUERQUE, NEW MEXICO
2501 CANDELARIA N.E.
(505) 344-9940

TESTS

ON

CONCRETE CYLINDERS

ATL Testing Laboratories
A Division of R & D Engineering Associates, Inc.
817 West Madison • Phoenix, Arizona 85007 • Telephone 254-6181

April 27, 1973

For: Sergent, Hauskins & Beckwith
3940 West Clarendon
Phoenix, Arizona 85019

Date: April 6, 1973

Received: 4-2-73 Project: Structure No. 36

Submitted by: C. D. Swindle Address of Project: ---

Contractor: C. D. Swindle Source of Sample: Outlet Pin Wing Walls

Arch./Engr.: Trico Mix: 3000#

Concrete Co.: Union Rock Admix: lo lbs cal. cho.

Truck No.: 4405 Batch Size: 6 cu yds

Ticket No.: 02-17538 Water Added: ---

Time in Mixer: --- Time Sampled: ---

REPORT OF CONCRETE CYLINDER TESTS

Lab. No.	Ident. No	Slump (in.)	Date Made	Date Tested	Age (Days)	lbs./sq. in.
6431	Set #23	4	3-30-73	4-6-73	7 Std	2030
6432	Set #23	4	3-20-73	4-27-73	28 Std	3530
6433					Hold 28	discarded

Billed 5/3/73
Invoice #5849
Betty

Respectfully submitted,

ATL TESTING LABORATORIES

Richard H Nelson

LICENSE OF APPROVAL

State of Arizona
DEPARTMENT OF WATER RESOURCES
Division of Safety of Dams

LICENSE OF APPROVAL

Pursuant to Chapter 3, Title 45-Waters, of the Arizona Revised Statutes, the DIRECTOR, Department of Water Resources authorizes the use of: FOUNTAIN HILLS FRS #36 *Dam and Reservoir, Application Number* 07.38 *Located in Sec.* 4 *, Tp.* 3N *, R.* 6E *, G. & S.R.B. & M.* Maricopa *County, State of Arizona to impound water in accordance with and subject to the following terms and conditions:*

(1) Use shall be only as a flood retarding structure, limited to temporary storage during periods of flood and for such additional time as may be required to completely evacuate the flood waters through the outlet conduit, (2) The owner shall take reasonable actions toward removal of the deficiencies present at the dam in a timely manner.

This license of approval supersedes every previous consent for use issued by the State of Arizona relative to said dam and reservoir.

Witness my hand and seal of the Arizona Department of Water Resources

6th *day of* December *, 19* 84 *.*

Wesley E. Steiner

WESLEY E. STEINER
DIRECTOR

State of Arizona
OFFICE OF THE STATE WATER ENGINEER
Supervision of Safety of Dams

License of Approval

Pursuant to Chapter 3, Title 45 (Waters), of the Arizona Revised Statutes, the STATE WATER ENGINEER has found that the FOUNTAIN HILLS DAM #36 *Dam and Reservoir, State Application Number* 7-38, *located in Sec.* 4, *Tp.* 3N, *R.* 6E, *G. & S. R. B & M,* Maricopa *County, State of Arizona, are safe to impound water; and the use of said dam and reservoir to impound water in accordance with and subject to the following terms and conditions is hereby authorized:* Use shall be only as a flood retarding structure, limited to temporary storage during periods of flood and for such additional time as may be required to completely evacuate the flood waters through the outlet conduit.

This license of approval supersedes every previous consent for use issued by the State of Arizona relative to said dam and reservoir.

Witness my hand and the seal of the Arizona Water Commission of the State of Arizona this 13th *day of* December, 1973.

STATE WATER ENGINEER

Benson G. Scott

By Chief, Supervision of Safety of Dams

VOLUME II

COMPUTER CALCULATIONS

FOR

HYDROLOGY & HYDRAULIC

STRUCTURE NO. 36

FOUNTAIN HILLS STRUCTURE NUMBER 36
THE NUMBER OF POINTS DESCRIBING HYDROGRAPHS IS 300

TR-20 ROUTING.

EXECUTIVE CONTROL CARD OPERATION LIST

FOUNTAIN HILLS STRUCTURE NUMBER 36

C TABLE VELOCITY INCREMENT = 0.200

8	0.0000	0.0800	0.1800	0.2500	0.3200
8	0.3700	0.4100	0.4500	0.4900	0.5100
8	0.5400	0.5700	0.5900	0.6100	0.6300
8	0.6500	0.6600	0.6700	0.6900	0.7000
8	0.7100	0.7200	0.7300	0.7400	0.7500
8	0.7600	0.7700	0.7700	0.7800	0.7900
8	0.7900	0.8000	0.8100	0.8100	0.8200
8	0.8200	0.8300	0.8300	0.8400	0.8400
8	0.8400	0.8500	0.8500	0.8600	0.8600
8	0.8600	0.8600	0.8700	0.8700	0.8700
8	0.8800	0.8800	0.8800	0.8900	0.8900
8	0.8900	0.8900	0.8900	0.8900	0.9000
8	0.9000	0.9000	0.9000	0.9000	0.9100
8	0.9100	0.9100	0.9100	0.9100	0.9100
8	0.9200	0.9200	0.9200	0.9200	0.9200
8	0.9200	0.9200	0.9200	0.9300	0.9300
9 ENDTBL					

CROSS SECTION NO. 1 DRAINAGE AREA = 1.00

	ELEVATION	DISCHARGE	END AREA
8	2400.0004	0.1000	0.0000
8	2402.0004	674.0001	60.0000
8	2404.0004	4278.0009	200.0000
8	2408.0004	17918.0039	516.0001
9 ENDTBL			

CROSS SECTION NO. 2 DRAINAGE AREA = 1.00

	ELEVATION	DISCHARGE	END AREA
8	2400.0004	0.1000	0.0000
8	2402.0004	674.0001	60.0000
8	2404.0004	4278.0009	200.0000

000001

8	2408.0004	17918.0039	516.0001
9 ENDTBL			

CROSS SECTION NO. 3 DRAINAGE AREA = 1.00

	ELEVATION	DISCHARGE	END AREA
8	2400.0004	0.1000	0.0000
8	2402.0004	674.0001	60.0000
8	2404.0004	4278.0009	200.0000
8	2408.0004	17918.0039	516.0001
9 ENDTBL			

CROSS SECTION NO. 4 DRAINAGE AREA = 1.00

	ELEVATION	DISCHARGE	END AREA
8	2125.0004	0.3000	0.0000
8	2127.0004	172.0000	30.0000
8	2129.0004	1253.0002	130.0000
8	2123.0004	9256.0019	638.0001
9 ENDTBL			

CROSS SECTION NO. 5 DRAINAGE AREA = 1.00

	ELEVATION	DISCHARGE	END AREA
8	1858.0002	0.0000	0.0000
8	1860.0002	172.0000	30.0000
8	1862.0002	1253.0002	130.0000
8	1866.0002	9256.0019	638.0001
9 ENDTBL			

STRUCTURE NO. 36

	ELEVATION	DISCHARGE	STORAGE
8	1854.6501	0.0000	0.0000
8	1860.6501	125.0000	0.2399
8	1865.6501	187.0000	5.5999
8	1870.6501	234.0000	20.6999
8	1875.6501	272.0000	49.1999
8	1880.6501	306.0000	97.5000
8	1885.6501	337.0000	179.0000
8	1890.6501	712.0001	303.0000
8	1891.6501	1791.0002	335.0000
8	1892.6501	3302.0004	367.0000
8	1895.6501	9822.0019	463.0000

000002

```
 8                    1896.6501  10752.0019    463.0000
 9 ENDTBL
```

DIMENSIONLESS HYDROGRAPH - DELTA T = 0.02

```
 8          0.0000     0.0150     0.0750     0.1600     0.2800
 8          0.4300     0.6000     0.7700     0.8900     0.9700
 8          1.0000     0.9800     0.9200     0.8400     0.7500
 8          0.6600     0.5650     0.4900     0.4200     0.3650
 8          0.3200     0.2790     0.2400     0.2100     0.1800
 8          0.1550     0.1300     0.1130     0.0980     0.0860
 8          0.0750     0.0650     0.0560     0.0470     0.0410
 8          0.0350     0.0300     0.0260     0.0220     0.0190
 8          0.0170     0.0150     0.0130     0.0110     0.0090
 8          0.0070     0.0050     0.0030     0.0020     0.0010
 8          0.0000     0.0000     0.0000     0.0000     0.0000
 9 ENDTBL
```

RAINFALL TABLE NO. 1 TIME INCREMENT = 0.50

```
 8          0.0000     0.0050     0.0110     0.0160     0.0220
 8          0.0280     0.0350     0.0410     0.0480     0.0560
 8          0.0630     0.0710     0.0800     0.0890     0.0980
 8          0.1090     0.1200     0.1330     0.1470     0.1630
 8          0.1810     0.2040     0.2350     0.2830     0.6630
 8          0.7350     0.7720     0.7990     0.8200     0.8380
 8          0.8540     0.8680     0.8800     0.8910     0.9020
 8          0.9120     0.9210     0.9290     0.9370     0.9450
 8          0.9520     0.9590     0.9650     0.9720     0.9780
 8          0.9840     0.9890     0.9950     1.0000     1.0000
 9 ENDTBL
```

RAINFALL TABLE NO. 2 TIME INCREMENT = 0.02

```
 8          0.0000     0.0100     0.0200     0.0200     0.0300
 8          0.0400     0.0500     0.0600     0.0700     0.0800
 8          0.1000     0.1100     0.1300     0.1400     0.1700
 8          0.1900     0.2200     0.2300     0.3800     0.4400
 8          0.5200     0.6000     0.6300     0.6600     0.6800
 8          0.7000     0.7200     0.7400     0.7600     0.7700
 8          0.7900     0.8000     0.8200     0.8300     0.8400
 8          0.8500     0.8700     0.8800     0.8900     0.9000
 8          0.9100     0.9200     0.9300     0.9400     0.9500
 8          0.9567     0.9633     0.9700     0.9800     0.9900
```



```
 8          1.0000     1.0000     1.0000     1.0000     1.0000
 9 ENDTBL
```

STANDARD CONTROL INSTRUCTIONS

SUBRTN	XSECTN	STRCT	HYDROGRAPHS IN1	IN2	OUT	DATA NO. 1	DATA NO. 2	DATA NO. 3	OUTPUT OPTIONS PK	H	E	V	PH	SM
RUNOFF	1	0	0	0	6	0.700	90.000	0.300	1	0	0	0	0	1
RUNOFF	2	0	0	0	5	0.500	90.000	0.220	1	0	0	0	0	0
ADDHYD	3	0	5	6	7	0.000	0.000	0.000	1	0	0	1	0	1
REACH	4	0	7	0	5	6500.000	0.000	0.000	0	0	0	0	0	0
RUNOFF	4	0	0	0	6	0.740	90.000	0.400	1	0	0	0	0	0
ADDHYD	4	0	5	6	7	0.000	0.000	0.000	1	0	0	1	0	1
REACH	5	0	7	0	5	10700.001	0.000	0.000	0	0	0	0	0	0
RUNOFF	5	0	0	0	6	0.900	90.000	0.720	1	0	0	0	0	0
ADDHYD	5	0	5	6	7	0.000	0.000	0.000	1	0	0	1	0	1
RESVOR	0	36	7	0	6	1854.650	0.000	0.000	1	1	1	1	0	1

ENDATA

END OF LISTING

EXECUTIVE CONTROL CARD OPERATION INCREM, MAIN TIME INCREMENT= 0.15
EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 1/ 0 TO XSECTN/STRUCT 0/ 36
STARTING TIME= 0.00 RAIN DEPTH= 3.20 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2
ALTERNATE NO.= 1 STORM NO.= 1

SUBROUTINE RUNOFF CROSS SECTION 1
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.70 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.30
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.52	725.671	(RUNOFF)
4.47	152.659	(RUNOFF)
5.97	106.339	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.1734 CFS-HRS= 981.86 ACRE-FT= 81.14

SUBROUTINE RUNOFF CROSS SECTION 2
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 5
AREA= 0.50 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.22
COMPUTED CURVE NO. = 90.0

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.31	558.427	(RUNOFF)
2.50	549.877	(RUNOFF)
3.87	126.687	(RUNOFF)
4.38	113.799	(RUNOFF)
5.17	80.681	(RUNOFF)
5.94	80.577	(RUNOFF)

HYDROGRAPH, TZERO= 1.04 DELTA T= 0.15 DRAINAGE AREA= 0.50

TIME											
1.04	DISCHG	0.00	5.94	15.06	29.08	38.01	72.35	94.82	121.48	518.44	490.30
2.55	DISCHG	541.53	367.81	243.91	174.54	156.09	153.46	141.48	117.91	112.92	125.94
4.05	DISCHG	97.25	82.80	112.54	102.73	84.58	80.53	79.63	79.65	79.80	72.35
5.55	DISCHG	57.89	56.16	71.86	78.31	45.07	10.41	2.11	0.27	0.00	

SUBROUTINE ADDHYD CROSS SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.51	1274.633	2402.33
3.85	295.476	2400.87
4.43	259.534	2400.77
5.96	186.581	2400.55

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.1636 CFS-HRS= 1675.59 ACRE-FT= 138.47

SUBROUTINE REACH CROSS SECTION 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 6500.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 9.352 AVERAGE ROUTING COEFF= 0.8461 NUMBER OF ROUTINGS= 1.08

SUBROUTINE RUNOFF CROSS SECTION 4
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.74 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.40
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.59	709.596	(RUNOFF)
4.49	158.230	(RUNOFF)
6.01	106.142	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 4
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.66	1930.771	2128.49
4.55	405.417	2127.43
6.09	283.192	2127.20

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.2022 CFS-HRS= 2757.23 ACRE-FT= 227.85

SUBROUTINE REACH CROSS SECTION 5
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 10700.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 10.425 AVERAGE ROUTING COEFF= 0.8597 NUMBER OF ROUTINGS= 1.63

SUBROUTINE RUNOFF CROSS SECTION 5
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.90 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.72
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.79	702.833	(RUNOFF)
6.08	123.886	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 5
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.90	2493.230	1862.62
4.75	575.401	1860.74
6.24	377.267	1860.37

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.1929 CFS-HRS= 4019.40 ACRE-FT= 332.16

SUBROUTINE RESVOR STRUCTURE 36
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6
SURFACE ELEVATION= 1854.65

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
5.84	400.430	1886.49
15.47	15.930	1855.41
15.77	4.415	1854.86
16.07	1.222	1854.70
16.37	0.343	1854.66
16.67	0.095	1854.65
16.97	0.026	1854.65
17.27	0.007	1854.65

TIME HYDROGRAPH, TZERO= 1.04 DELTA T= 0.15 DRAINAGE AREA= 2.83

1.04	DISCHG	0.00	0.80	4.62	17.69	47.24	95.83	128.38	141.56	172.23	199.97
1.04	ELEV	1854.65	1854.68	1854.87	1855.49	1856.91	1859.25	1860.92	1861.98	1864.45	1867.03
2.55	DISCHG	233.93	259.27	283.07	301.81	312.66	319.49	324.43	328.13	331.10	333.57
2.55	ELEV	1870.64	1873.97	1877.27	1880.03	1881.72	1882.82	1883.62	1884.21	1884.69	1885.09
4.05	DISCHG	335.64	340.23	352.28	362.09	370.09	377.49	384.24	389.49	393.24	396.07
4.05	ELEV	1885.43	1885.69	1885.85	1885.98	1886.09	1886.18	1886.28	1886.34	1886.39	1886.43
5.55	DISCHG	398.32	399.90	400.42	399.77	398.61	397.59	395.99	391.82	383.94	373.20
5.55	ELEV	1886.46	1886.48	1886.49	1886.48	1886.47	1886.45	1886.43	1886.38	1886.27	1886.13
7.05	DISCHG	361.07	348.55	336.88	335.32	333.75	332.19	330.63	329.08	327.53	325.99
7.05	ELEV	1885.97	1885.80	1885.63	1885.37	1885.12	1884.87	1884.62	1884.37	1884.12	1883.87
8.55	DISCHG	324.46	322.93	321.41	319.90	318.39	316.90	315.41	313.92	312.45	310.98
8.55	ELEV	1883.62	1883.38	1883.13	1882.89	1882.64	1882.40	1882.16	1881.92	1881.69	1881.45
10.05	DISCHG	309.51	308.06	306.61	304.46	301.82	299.19	296.59	294.02	291.46	288.93
10.05	ELEV	1881.21	1880.98	1880.74	1880.42	1880.03	1879.64	1879.26	1878.88	1878.51	1878.14
11.55	DISCHG	286.42	283.93	281.46	279.02	276.59	274.19	271.64	267.19	262.81	258.50
11.55	ELEV	1877.77	1877.40	1877.04	1876.68	1876.32	1875.97	1875.60	1875.01	1874.44	1873.87
13.05	DISCHG	254.26	250.10	246.00	241.96	238.00	234.09	225.36	216.83	208.62	200.73
13.05	ELEV	1873.31	1872.76	1872.22	1871.69	1871.17	1870.66	1869.73	1868.82	1867.95	1867.11
14.55	DISCHG	193.13	182.83	158.37	137.18	54.53	-28.74	15.14	-7.98	4.20	-2.21
14.55	ELEV	1866.30	1865.31	1863.34	1861.63	1857.26	1853.27	1855.37	1854.26	1854.85	1854.54
16.05	DISCHG	1.16	-0.61	0.32	-0.17	0.09	-0.04	0.02	-0.01	0.00	-0.00
16.05	ELEV	1854.70	1854.62	1854.66	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64
17.55	DISCHG	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00			
17.55	ELEV	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65			

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 2.1901 CFS-HRS= 4014.30 ACRE-FT= 331.74

ENDCMP 1

000009

EXECUTIVE CONTROL CARD OPERATION INCREM, MAIN TIME INCREMENT= 0.25
EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 1/ 0 TO XSECTN/STRUCT 0/ 36
STARTING TIME= 0.00 RAIN DEPTH= 4.20 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2
ALTERNATE NO.= 1 STORM NO.= 2

SUBROUTINE RUNOFF CROSS SECTION 1
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.70 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.30
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.99	1169.801	(RUNOFF)
19.37	29.291	(RUNOFF)
21.47	25.283	(RUNOFF)
23.47	21.656	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1498 CFS-HRS= 1422.95 ACRE-FT= 117.59

SUBROUTINE RUNOFF CROSS SECTION 2
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 5
AREA= 0.50 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.22
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.94	907.589	(RUNOFF)
16.87	28.657	(RUNOFF)
19.37	21.008	(RUNOFF)
20.37	18.440	(RUNOFF)
21.42	18.285	(RUNOFF)
22.37	15.881	(RUNOFF)
23.42	15.715	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
11.97	2070.430	2402.77
16.87	68.718	2400.20
19.37	50.338	2400.14
21.45	43.473	2400.12

000010

23.45 37.346 2400.11

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1539 CFS-HRS= 2442.57 ACRE-FT= 201.85

SUBROUTINE REACH CROSS SECTION 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 6500.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 10.677 AVERAGE ROUTING COEFF= 0.8626 NUMBER OF ROUTINGS= 0.58

SUBROUTINE RUNOFF CROSS SECTION 4
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.74 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.40
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.05	1117.179	(RUNOFF)
19.37	30.890	(RUNOFF)
21.53	26.341	(RUNOFF)
23.53	22.528	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 4
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.09	2831.492	2127.81
19.37	80.827	2125.93
21.56	68.774	2125.79
23.56	58.790	2125.68

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1400 CFS-HRS= 3931.38 ACRE-FT= 324.88

SUBROUTINE REACH CROSS SECTION 5
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 10700.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 12.070 AVERAGE ROUTING COEFF= 0.8765 NUMBER OF ROUTINGS= 0.86

SUBROUTINE RUNOFF CROSS SECTION 5

INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.90 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.72
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.27	1071.019	(RUNOFF)
21.70	31.327	(RUNOFF)
23.70	26.682	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 5
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
12.32	3695.297	1863.22
21.78	99.329	1859.15
23.78	84.532	1858.98

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1404 CFS-HRS= 5755.98 ACRE-FT= 475.67

SUBROUTINE RESVOR STRUCTURE 36
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6
SURFACE ELEVATION= 1854.65

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
13.60	505.883	1887.90
28.02	37.207	1856.43
28.52	17.346	1855.48
29.02	8.251	1855.04
29.52	3.906	1854.83
30.02	1.835	1854.73
30.52	0.854	1854.69
31.02	0.407	1854.66
31.52	0.190	1854.65
32.02	0.091	1854.65

HYDROGRAPH, TZERO= 4.75 DELTA T= 0.25 DRAINAGE AREA= 2.83

TIME											
4.75	DISCHG	0.00	0.21	3.17	7.04	10.42	14.53	18.71	22.75	26.33	29.80
4.75	ELEV	1854.65	1854.66	1854.80	1854.98	1855.15	1855.34	1855.54	1855.74	1855.91	1856.08
7.25	DISCHG	33.49	39.22	46.23	51.84	56.80	64.18	73.33	81.99	90.64	101.10
7.25	ELEV	1856.25	1856.53	1856.86	1857.13	1857.37	1857.73	1858.17	1858.58	1859.00	1859.50

9.75	DISCHG	113.17	125.14	127.26	133.01	143.11	158.46	180.40	194.37	215.81	257.94
9.75	ELEV	1860.08	1860.66	1860.83	1861.29	1862.11	1863.34	1865.11	1866.43	1868.71	1873.80
12.25	DISCHG	301.83	328.09	402.57	468.90	496.29	504.85	504.29	498.61	489.77	479.04
12.25	ELEV	1880.03	1884.21	1886.52	1887.40	1887.77	1887.88	1887.88	1887.80	1887.68	1887.54
14.75	DISCHG	467.28	454.98	442.42	429.70	416.87	403.94	390.94	378.02	365.36	353.16
14.75	ELEV	1887.38	1887.22	1887.05	1886.88	1886.71	1886.54	1886.36	1886.19	1886.02	1885.86
17.25	DISCHG	341.56	336.15	334.72	333.24	331.72	330.15	328.55	326.92	325.29	323.66
17.25	ELEV	1885.71	1885.51	1885.28	1885.04	1884.79	1884.54	1884.28	1884.02	1883.76	1883.50
19.75	DISCHG	322.05	320.43	318.78	317.11	315.44	313.75	312.04	310.34	308.67	307.02
19.75	ELEV	1883.23	1882.97	1882.71	1882.44	1882.17	1881.90	1881.62	1881.35	1881.08	1880.81
22.25	DISCHG	304.82	301.73	298.66	295.59	292.49	289.41	286.43	283.50	280.53	277.34
22.25	ELEV	1880.47	1880.02	1879.57	1879.11	1878.66	1878.21	1877.77	1877.34	1876.90	1876.43
24.75	DISCHG	273.81	268.30	261.11	254.05	247.16	240.45	233.81	219.24	205.58	192.77
24.75	ELEV	1875.91	1875.16	1874.21	1873.28	1872.38	1871.49	1870.62	1869.08	1867.62	1866.26
27.25	DISCHG	165.63	130.27	-53.05	36.42	-25.00	17.16	-11.78	8.09	-5.55	3.81
27.25	ELEV	1863.92	1861.07	1852.10	1856.39	1853.44	1855.47	1854.08	1855.03	1854.38	1854.83
29.75	DISCHG	-2.61	1.79	-1.23	0.84	-0.58	0.39	-0.27	0.18	-0.12	0.08
29.75	ELEV	1854.52	1854.73	1854.59	1854.69	1854.62	1854.66	1854.63	1854.65	1854.64	1854.65
32.25	DISCHG	-0.06	0.04	-0.02	0.01	-0.01	0.00	-0.00	0.00	-0.00	0.00
32.25	ELEV	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65
34.75	DISCHG	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00
34.75	ELEV	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.1506 CFS-HRS= 5774.65 ACRE-FT= 477.21

ENDCMP 1

000013

EXECUTIVE CONTROL CARD OPERATION INCREM, MAIN TIME INCREMENT= 0.15
EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 1/ 0 TO XSECTN/STRUCT 0/ 36
STARTING TIME= 0.00 RAIN DEPTH= 5.10 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2
ALTERNATE NO.= 1 STORM NO.= 3

SUBROUTINE RUNOFF CROSS SECTION 1
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.70 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.30
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.50	1327.578	(RUNOFF)
4.47	256.446	(RUNOFF)
5.97	176.999	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.9800 CFS-HRS= 1798.00 ACRE-FT= 148.58

SUBROUTINE RUNOFF CROSS SECTION 2
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 5
AREA= 0.50 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.22
COMPUTED CURVE NO. = 90.0

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.30	1076.729	(RUNOFF)
2.49	992.440	(RUNOFF)
3.87	214.012	(RUNOFF)
4.38	191.209	(RUNOFF)
5.17	134.750	(RUNOFF)
5.94	134.071	(RUNOFF)

HYDROGRAPH, TZERO= 0.75 DELTA T= 0.15 DRAINAGE AREA= 0.50

TIME											
0.75	DISCHG	0.00	8.93	20.76	44.68	64.79	93.81	106.18	180.25	217.91	260.48
2.25	DISCHG	1014.71	912.39	969.11	646.35	423.14	300.52	267.33	261.83	240.64	200.04
3.75	DISCHG	191.16	212.70	163.99	139.42	189.16	172.45	141.80	134.84	133.20	133.10
5.25	DISCHG	133.22	120.69	96.49	93.55	119.62	130.24	74.93	17.30	3.51	0.45
6.75	DISCHG	0.00									

SUBROUTINE ADDHYD CROSS SECTION 3

000014

INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.50	2319.552	2402.91
3.85	499.699	2401.48
4.42	436.161	2401.29
5.96	310.341	2400.92

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 3.9615 CFS-HRS= 3068.00 ACRE-FT= 253.54

SUBROUTINE REACH CROSS SECTION 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 6500.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 10.985 AVERAGE ROUTING COEFF= 0.8659 NUMBER OF ROUTINGS= 0.94

SUBROUTINE RUNOFF CROSS SECTION 4
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.74 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.40
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.56	1306.117	(RUNOFF)
4.49	265.987	(RUNOFF)
6.01	176.691	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 4
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.63	3559.323	2127.27
4.54	687.824	2127.95
6.08	474.908	2127.56

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 4.0378 CFS-HRS= 5055.41 ACRE-FT= 417.77

SUBROUTINE REACH CROSS SECTION 5
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 10700.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 12.277 AVERAGE ROUTING COEFF= 0.8783 NUMBER OF ROUTINGS= 1.41

000015

SUBROUTINE RUNOFF CROSS SECTION 5
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.90 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.72
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.76	1313.632	(RUNOFF)
6.08	206.408	(RUNOFF)

SUBROUTINE ADDHYD CROSS SECTION 5
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.82	4710.196	1863.72
4.73	975.302	1861.48
6.23	643.346	1860.87

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 4.0131 CFS-HRS= 7355.52 ACRE-FT= 607.86

SUBROUTINE RESVOR STRUCTURE 36
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6
SURFACE ELEVATION= 1854.65

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
3.95	1316.123	1891.20
17.72	8.708	1855.06
18.02	2.421	1854.76
18.32	0.668	1854.68
18.62	0.185	1854.65
18.92	0.051	1854.65
19.22	0.014	1854.65
19.52	0.004	1854.65

TIME HYDROGRAPH, TZERO= 0.75 DELTA T= 0.15 DRAINAGE AREA= 2.83

000016

0.75	DISCHG	0.00	1.35	8.05	32.16	83.42	128.69	143.47	172.25	195.15	213.84
0.75	ELEV	1854.65	1854.71	1855.03	1856.19	1858.65	1860.94	1862.13	1864.46	1866.51	1868.50
2.25	DISCHG	237.88	258.80	285.26	311.69	331.74	447.41	568.31	652.58	709.59	1073.18
2.25	ELEV	1871.16	1873.91	1877.60	1881.56	1884.80	1887.12	1888.73	1889.85	1890.61	1890.98
3.75	DISCHG	1254.11	1312.06	1301.01	1262.87	1210.76	1143.53	1082.28	1042.21	1004.60	955.67
3.75	ELEV	1891.15	1891.20	1891.19	1891.16	1891.11	1891.05	1890.99	1890.95	1890.92	1890.87
5.25	DISCHG	904.61	861.39	826.61	793.12	751.95	711.43	707.81	704.87	700.20	689.97
5.25	ELEV	1890.82	1890.78	1890.75	1890.72	1890.68	1890.64	1890.59	1890.55	1890.49	1890.35
6.75	DISCHG	673.43	652.97	631.01	608.82	586.94	565.63	544.97	525.01	505.74	487.15
6.75	ELEV	1890.13	1889.86	1889.57	1889.27	1888.98	1888.69	1888.42	1888.15	1887.89	1887.65
8.25	DISCHG	469.23	451.96	435.33	419.31	403.88	389.01	374.70	360.91	347.63	336.72
8.25	ELEV	1887.41	1887.18	1886.96	1886.74	1886.54	1886.34	1886.15	1885.96	1885.79	1885.60
9.75	DISCHG	335.13	333.56	331.99	330.43	328.87	327.33	325.79	324.25	322.73	321.21
9.75	ELEV	1885.34	1885.09	1884.84	1884.59	1884.34	1884.09	1883.84	1883.59	1883.34	1883.10
11.25	DISCHG	319.70	318.19	316.70	315.21	313.73	312.25	310.78	309.32	307.86	306.41
11.25	ELEV	1882.86	1882.61	1882.37	1882.13	1881.89	1881.65	1881.42	1881.18	1880.95	1880.71
12.75	DISCHG	304.11	301.47	298.85	296.25	293.68	291.12	288.59	286.09	283.60	281.14
12.75	ELEV	1880.37	1879.98	1879.59	1879.21	1878.83	1878.46	1878.09	1877.72	1877.35	1876.99
14.25	DISCHG	278.69	276.27	273.87	271.05	266.60	262.23	257.94	253.71	249.55	245.46
14.25	ELEV	1876.63	1876.27	1875.92	1875.52	1874.94	1874.36	1873.80	1873.24	1872.69	1872.15
15.75	DISCHG	241.43	237.47	233.04	224.22	215.73	207.56	199.71	192.15	179.49	155.47
15.75	ELEV	1871.62	1871.10	1870.54	1869.60	1868.70	1867.83	1867.00	1866.19	1865.04	1863.10
17.25	DISCHG	134.67	29.75	-15.68	8.26	-4.35	2.29	-1.20	0.63	-0.33	0.17
17.25	ELEV	1861.43	1856.07	1853.89	1855.04	1854.44	1854.76	1854.59	1854.68	1854.63	1854.65
18.75	DISCHG	-0.09	0.04	-0.02	0.01	-0.00	0.00	-0.00	0.00	-0.00	0.00
18.75	ELEV	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65
20.25	DISCHG	-0.00	0.00	0.00							
20.25	ELEV	1854.64	1854.65	1854.65							

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 4.0181 CFS-HRS= 7364.64 ACRE-FT= 608.61

ENDCMP 1

XECUTIVE CONTROL CARD OPERATION COMPUT. FROM XSECTN/STRUCT 1/ 0 TO XSECTN/STRUCT 0/ 36
STARTING TIME= 0.00 RAIN DEPTH= 9.52 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2
ALTERNATE NO.= 1 STORM NO.= 4

SUBROUTINE RUNOFF CROSS SECTION 1
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.70 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.30
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.48	2724.900	(RUNOFF)
4.47	493.554	(RUNOFF)
5.97	338.414	(RUNOFF)

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.3190 CFS-HRS= 3758.18 ACRE-FT= 310.57

SUBROUTINE RUNOFF CROSS SECTION 2
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 5
AREA= 0.50 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.22
COMPUTED CURVE NO. = 90.0

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.30	2293.517	(RUNOFF)
2.48	2012.006	(RUNOFF)
3.87	413.368	(RUNOFF)
4.38	368.000	(RUNOFF)
5.17	258.338	(RUNOFF)
5.94	256.365	(RUNOFF)

HYDROGRAPH, TZERO= 0.44 DELTA T= 0.15 DRAINAGE AREA= 0.50

TIME											
0.44	DISCHG	0.00	16.44	51.47	84.52	111.39	176.75	219.13	280.90	293.89	463.63
1.95	DISCHG	529.33	600.91	2182.95	1889.03	1948.65	1282.57	831.95	587.80	521.00	508.96
3.45	DISCHG	466.83	387.42	369.70	410.75	316.36	268.70	364.15	331.70	272.53	258.97
4.95	DISCHG	255.65	255.28	255.36	231.21	184.78	179.06	228.86	249.07	143.25	33.08
6.45	DISCHG	6.72	0.87	0.00							

SUBROUTINE ADDHYD CROSS SECTION 3
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

000019

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.48	4736.869	2404.13
3.85	965.530	2402.16
4.42	839.237	2402.09
5.96	593.506	2401.76

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.2809 CFS-HRS= 6413.13 ACRE-FT= 529.98

SUBROUTINE REACH CROSS SECTION 4
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 6500.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 13.257 AVERAGE ROUTING COEFF= 0.8863 NUMBER OF ROUTINGS= 0.80

SUBROUTINE RUNOFF CROSS SECTION 4
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.74 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.40
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.53	2697.906	(RUNOFF)
4.49	512.103	(RUNOFF)
6.01	337.888	(RUNOFF)

UBROUTINE ADDHYD CROSS SECTION 4
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.55	7213.202	2124.53
4.52	1327.012	2128.94
6.06	880.555	2128.31

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.4287 CFS-HRS= 10552.98 ACRE-FT= 872.09

UBROUTINE REACH CROSS SECTION 5
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH= 10700.00 INPUT COEFFICIENT= 0.0000 INPUT ROUTINGS= 0.00

AVERAGE WATER VELOCITY= 13.803 AVERAGE ROUTING COEFF= 0.8903 NUMBER OF ROUTINGS= 1.27

000020

UBROUTINE RUNOFF CROSS SECTION 5
INPUT HYDROGRAPH= 0 OUTPUT HYDROGRAPH= 6
AREA= 0.90 INPUT RUNOFF CURVE= 90.0 TIME OF CONCENTRATION= 0.72
COMPUTED CURVE NO. = 90.0

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.74	2733.237	(RUNOFF)
6.07	395.092	(RUNOFF)

UBROUTINE ADDHYD CROSS SECTION 5
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
2.77	9852.533	1866.29
4.65	1884.278	1862.31
6.20	1224.109	1861.94

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.3853 CFS-HRS= 15369.05 ACRE-FT= 1270.09

UBROUTINE RESVOR STRUCTURE 36
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6
SURFACE ELEVATION= 1854.65

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

********** WARNING MAIN TIME INCREMENT CHECK **********

PEAK TIMES	PEAK DISCHARGES	PEAK ELEVATIONS
3.06	7608.338	1894.63
18.02	5.927	1854.93
18.32	1.651	1854.72
18.62	0.452	1854.67
18.92	0.126	1854.65
19.22	0.035	1854.65
19.52	0.009	1854.65

TIME		HYDROGRAPH, TZERO= 0.44				DELTA T= 0.15			DRAINAGE AREA= 2.83		
0.44	DISCHG	0.00	2.16	18.22	79.70	131.89	155.67	190.69	210.47	236.43	253.07
0.44	ELEV	1854.65	1854.75	1855.52	1858.47	1861.20	1863.12	1866.04	1868.14	1870.97	1873.15

1.95	DISCHG	273.25	288.10	307.17	323.84	456.64	1207.00	5319.84	7411.96	7215.70	6090.30
1.95	ELEV	1875.83	1878.01	1880.84	1883.52	1887.24	1891.10	1893.57	1894.54	1894.45	1893.93
3.45	DISCHG	4925.43	4060.08	3463.88	3082.50	2793.59	2564.49	2361.52	2163.15	2027.22	1955.05
3.45	ELEV	1893.39	1892.99	1892.72	1892.50	1892.31	1892.16	1892.02	1891.89	1891.80	1891.75
4.95	DISCHG	1872.03	1768.74	1688.08	1619.54	1562.52	1500.72	1418.57	1333.01	1281.41	1257.90
4.95	ELEV	1891.70	1891.62	1891.55	1891.49	1891.43	1891.38	1891.30	1891.22	1891.17	1891.15
6.45	DISCHG	1191.94	1030.78	809.19	699.51	677.19	654.03	630.91	608.22	586.14	564.75
6.45	ELEV	1891.09	1890.94	1890.73	1890.48	1890.18	1889.87	1889.56	1889.26	1888.97	1888.68
7.95	DISCHG	544.06	524.08	504.80	486.23	468.34	451.10	434.50	418.51	403.11	388.27
7.95	ELEV	1888.41	1888.14	1887.88	1887.63	1887.40	1887.17	1886.95	1886.73	1886.53	1886.33
9.45	DISCHG	373.99	360.22	346.97	336.64	335.05	333.48	331.91	330.35	328.79	327.25
9.45	ELEV	1886.14	1885.95	1885.78	1885.59	1885.33	1885.08	1884.82	1884.57	1884.32	1884.07
10.95	DISCHG	325.71	324.17	322.65	321.13	319.62	318.12	316.62	315.13	313.65	312.17
10.95	ELEV	1883.82	1883.58	1883.33	1883.09	1882.84	1882.60	1882.36	1882.12	1881.88	1881.64
12.45	DISCHG	310.71	309.24	307.79	306.34	303.97	301.33	298.71	296.12	293.54	290.99
12.45	ELEV	1881.40	1881.17	1880.93	1880.70	1880.35	1879.96	1879.57	1879.19	1878.81	1878.44
13.95	DISCHG	288.47	285.96	283.47	281.01	278.57	276.15	273.75	270.82	266.38	262.01
13.95	ELEV	1878.07	1877.70	1877.33	1876.97	1876.61	1876.26	1875.90	1875.49	1874.91	1874.33
15.45	DISCHG	257.72	253.49	249.34	245.25	241.23	237.27	232.58	223.78	215.31	207.16
15.45	ELEV	1873.77	1873.21	1872.66	1872.13	1871.60	1871.08	1870.49	1869.56	1868.66	1867.79
16.95	DISCHG	199.31	191.77	178.21	154.36	133.71	20.25	-10.67	5.62	-2.96	1.56
16.95	ELEV	1866.96	1866.15	1864.94	1863.01	1861.35	1855.62	1854.13	1854.91	1854.50	1854.72
18.45	DISCHG	-0.82	0.43	-0.22	0.12	-0.06	0.03	-0.01	0.00	-0.00	0.00
18.45	ELEV	1854.61	1854.67	1854.63	1854.65	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65
19.95	DISCHG	-0.00	0.00	-0.00	0.00	-0.00	0.00	0.00			
19.95	ELEV	1854.64	1854.65	1854.64	1854.65	1854.64	1854.65	1854.65			

TOTAL WATER, IN INCHES ON DRAINAGE AREA= 8.3701 CFS-HRS= 15341.27 ACRE-FT= 1267.80

VOCMP 1

JMMARY TABLE 1

ALT	STORM	ID	DA SQ-MI.	RAIN TBLE	AMC	DELTA-T HRS.	TZERO HRS.	PRECIP IN.	PRECIP DURATION	PEAK-Q CFS	PEAK-TIME	PEAK-ELEV	RUNOFF IN.	CSM
1	1	1X	0.70	2	2	0.15	0.00	3.20	6.00	725.67	2.52	0.00	2.17	1036.67
1	1	3X	1.20	2	2	0.15	0.00	3.20	6.00	1274.63	2.51	2402.33	2.16	1062.19
1	1	4X	1.93	2	2	0.15	0.00	3.20	6.00	1930.77	2.66	2128.49	2.20	995.24
1	1	5X	2.83	2	2	0.15	0.00	3.20	6.00	2493.23	2.90	1862.62	2.19	877.89
1	1	36S	2.83	2	2	0.15	0.00	3.20	6.00	400.43	5.84	1886.49	2.19	140.99
1	2	1X	0.70	1	2	0.25	0.00	4.20	24.50	1169.80	11.99	0.00	3.14	1671.14
1	2	3X	1.20	1	2	0.25	0.00	4.20	24.50	2070.43	11.97	2402.77	3.15	1725.35
1	2	4X	1.93	1	2	0.25	0.00	4.20	24.50	2831.49	12.09	2127.81	3.14	1459.53
1	2	5X	2.83	1	2	0.25	0.00	4.20	24.50	3695.29	12.32	1863.22	3.14	1301.16
1	2	36S	2.83	1	2	0.25	0.00	4.20	24.50	505.88	13.60	1887.90	3.15	178.12
1	3	1X	0.70	2	2	0.15	0.00	5.10	6.00	1327.57	2.50	0.00	3.98	1896.54
1	3	3X	1.20	2	2	0.15	0.00	5.10	6.00	2319.55	2.50	2402.91	3.96	1932.96
1	3	4X	1.93	2	2	0.15	0.00	5.10	6.00	3559.32	2.63	2127.27	4.03	1834.70
1	3	5X	2.83	2	2	0.15	0.00	5.10	6.00	4710.19	2.82	1863.72	4.01	1658.52
1	3	36S	2.83	2	2	0.15	0.00	5.10	6.00	1316.12	3.95	1891.20	4.01	463.42
1	4	1X	0.70	2	2	0.15	0.00	9.52	6.00	2724.90	2.48	0.00	8.31	3892.71
1	4	3X	1.20	2	2	0.15	0.00	9.52	6.00	4736.86	2.48	2404.13	8.28	3947.39
1	4	4X	1.93	2	2	0.15	0.00	9.52	6.00	7213.20	2.55	2124.53	8.42	3718.14
1	4	5X	2.83	2	2	0.15	0.00	9.52	6.00	9852.53	2.77	1866.29	8.38	3469.20
1	4	36S	2.83	2	2	0.15	0.00	9.52	6.00	7608.33	3.06	1894.63	8.37	2678.99

'X' OR 'S' FOLLOWING THE ID REPRESENTS CROSS-SECTION OR STRUCTURE, RESPECTIVELY.

IF A SPACE OCCURS BETWEEN LINES THEN

* MORE THAN ONE PEAK-Q HAS BEEN COMPUTED FOR THE SAME ALTERNATE-STORM-XSEC/STRUC COMBINATION FOR THE EVALUATION SERIES. THE LARGEST PEAK-Q IS SAVED.

JMMARY TABLE 2 DATA PUNCHED IN SAME FORMAT FOR INSERTION INTO SCS ECONOMICS PROGRAM VERSION 1

DISCHARGE,CFS

XSEC NO.							
ALTERNATE NO. 1							
-36	400.4	505.8	1316.1	7608.3	0.0	0.0	AL 1 1
1	725.6	1169.8	1327.5	2724.9	0.0	0.0	AL 1 2
3	1274.6	2070.4	2319.5	4736.8	0.0	0.0	AL 1 3
4	1930.7	2831.4	3559.3	7213.2	0.0	0.0	AL 1 4
5	2493.2	3695.2	4710.1	9852.5	0.0	0.0	AL 1 5

JMMARY TABLE 3

	DISCHARGE,CFS									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
FRUCTURE NO. 36										
.TERNATE 1	400.43	505.88	1316.12	7608.33	0.00	0.00	0.00	0.00	0.00	0.00
•SECTION NO. 1										
.TERNATE 1	725.67	1169.80	1327.57	2724.90	0.00	0.00	0.00	0.00	0.00	0.00
•SECTION NO. 3										
.TERNATE 1	1274.63	2070.43	2319.55	4736.86	0.00	0.00	0.00	0.00	0.00	0.00
•SECTION NO. 4										
.TERNATE 1	1930.77	2831.49	3559.32	7213.20	0.00	0.00	0.00	0.00	0.00	0.00
•SECTION NO. 5										
.TERNATE 1	2493.23	3695.29	4710.19	9852.53	0.00	0.00	0.00	0.00	0.00	0.00

FOUNTAIN HILLS 4/10/75
DAM #36

DEPTH TO HARD MATERIAL IN EMERGENCY.

PICK IS STUCK IN CEMENTED MATERIAL

946

FOUNTAIN HILLS 4/10/75
DAM #36

GENERAL VIEW OF EMERGENCY SPILLWAY

946

FOUNTAIN HILLS 4/10/75
DAM #36

CREST OF EMERGENCY SPILLWAY, VIEWED FROM RIGHT ABUTMENT

946

FOUNTAIN HILLS 4/10/75
DAM #36

LOOKING DOWNSTREAM FROM CREST OF EMERGENCY SPILLWAY

946

FOUNTAIN HILLS 4/10/75
DAM #36

CREST OF EMERGENCY SPILLWAY
VIEWED FROM RIGHT ABUTMENT

946

FOUNTAIN HILLS 4/10/75

DAM #36

DEPTH TO HARD MATERIAL IN EMERGENCY SPILLWAY. PICK IS STUCK IN CEMENTED MATERIAL

946

FOUNTAIN HILLS 4/10/75

DAM #36

LOOKING DOWNSTREAM FROM CREST OF EMERG. SPILLWAY

36

946

FOUNTAIN HILLS 4/10/75

DAM #36

CREST OF EMERG. SPILLWAY, VIEWED FROM RIGHT ABUTMENT

36

946

FOUNTAIN HILLS 4/10/75

DAM #36

CREST OF EMERG. SPILLWAY VIEWED FROM RIGHT ABUTMENT

36

946

36

Frame 13

36

Frame 14

AN ORIGINAL POLAROID® LAND PHOTOGRAPH

SUBJECT FOUNTAIN HILLS DATE 3/13/75

NAME DAM #36

ADDRESS OUTLET OF PRINCIPAL

SPILLWAY — WASH IS 2'± LOWER THAN CONC. FROM TOP OF DAM

For your convenience when ordering copies, indicate the number of copies desired in the appropriate box for the size(s) you select. You can get quality work by Polaroid Copy Service through your dealer or by mail.

REGULAR SIZE COPIES	
WALLET SIZE COPIES	
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8 x 10 ENLARGEMENTS	
35mm SLIDES	

P558B-1 4/72 Printed in U.S.A.

FOUNTAIN HILLS 4/10/75

DAM # 36

GENERAL VIEW OF

EMERG. SPILLWAY

36

946

Structure No. 36

Spillway on right abutment looking into reservoir. Rock and grout sill. Spillway slopes to right side (about 3'). No protection on right slope — could erode and create a channel around end of spillway.

Structure No. 36

Trash Rack & intake. Note that rack is effective at low flows only. Drainage good.

AN ORIGINAL POLAROID® LAND PHOTOGRAPH

SUBJECT FOUNTAIN HILLS DATE 3/13/75

NAME DAM #36

ADDRESS EMERGENCY SPILLWAY AND DAM FROM S. ABUT.

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35mm SLIDES	

P558B-1 4/72 Printed in U.S.A.

AN ORIGINAL POLAROID® LAND PHOTOGRAPH

SUBJECT FOUNTAIN HILLS DATE 3/13/75

NAME DAM #36 — TRASH STRUCTURE

ADDRESS FROM TOP OF DAM

For your convenience when ordering copies, indicate the number of copies desired in the appropriate box for the size(s) you select. You can get quality work by Polaroid Copy Service through your dealer or by mail.

REGULAR SIZE COPIES	
WALLET SIZE COPIES	
5 x 7 ENLARGEMENTS	
8 x 10 ENLARGEMENTS	
35mm SLIDES	

P558B-1 4/72 Printed in U.S.A.

MADE IN U.S.A.

Structure #36

Spillway
Note: Manhole Cover

4/75

MADE IN U.S.A.

Structure #36

Spillway

4/75

MADE IN U.S.A.

Structure #36

Spillway

4/75

MADE IN U.S.A.

Structure #36

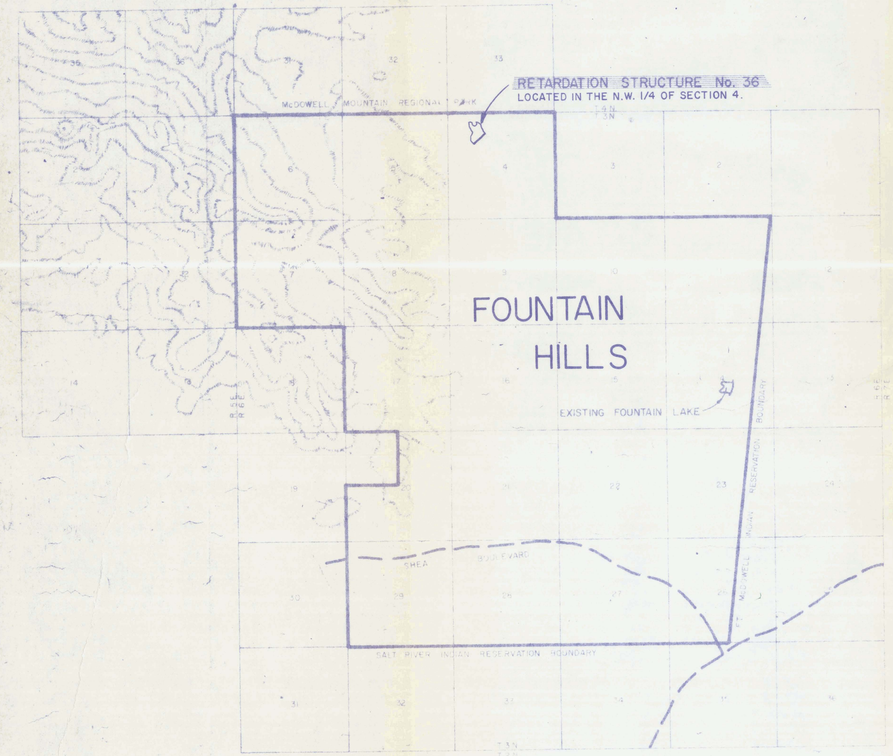
Trashrack
& Inlet

4/75

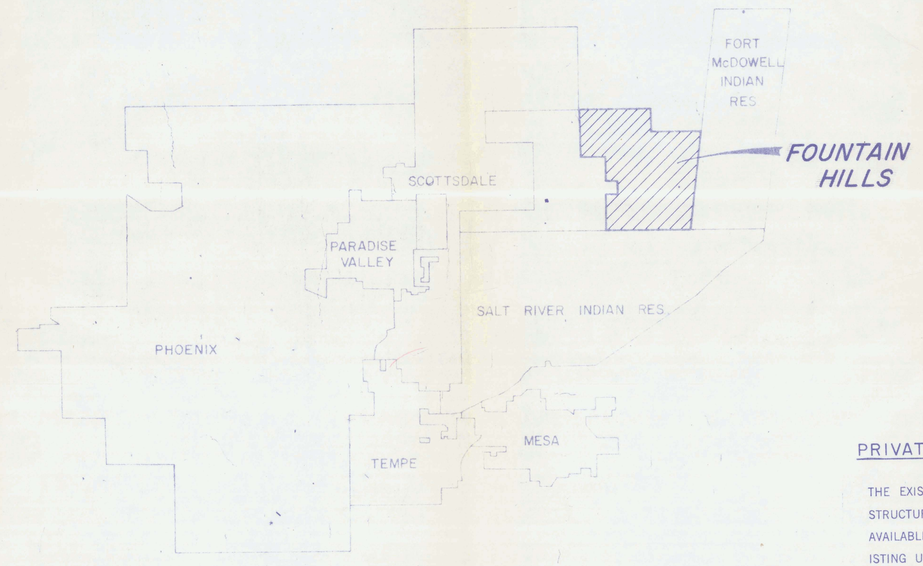
FOUNTAIN HILLS

MARICOPA COUNTY, ARIZONA

STORM WATER RETARDATION BASIN NO. 36



VICINITY MAP
NO SCALE



PHOENIX - SCOTTSDALE AREA
NO SCALE

SHEET INDEX	
SHEET	DESCRIPTION
1	TITLE SHEET
2	DRAINAGE MAP
3	PLOT PLAN & GRADING PLAN
4	PLAN & SECTION OF DAM
5	CROSS-SEC. & EMERGENCY SPILLWAY PROF.
6	INLET STRUCTURE
7 & 8	EMERGENCY SPILLWAY CROSS-SECTIONS
9	OUTLET STRUCTURE
10	DAM CORE BORINGS

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS.
THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN, AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

GORDON F. FREUDIG, REGISTERED CIVIL ENGINEER NO. 5478

GENERAL NOTES

1. THE DAM CONSTRUCTION WILL BE FIELD INSPECTED BY CONSULTING SOIL AND FOUNDATION ENGINEERS
2. THE DAM CONSTRUCTION TO BE IN ACCORDANCE WITH THE FOUNDATION AND MATERIALS INVESTIGATION REPORT (STRUCTURE NO 36) BY SERGENT, HAUSKINS, AND BECKWITH

DESIGN CRITERIA

1. CREST ELEVATION IS BASED ON 100 YEAR STORM.
2. EMERGENCY & FREEBOARD DESIGN BASED ON 6 HOUR P.M.P.
3. PRINCIPAL SPILLWAY DESIGN BASED ON A 10 DAY DRAW DOWN PERIOD.
4. FLOOD WATER DAMS: FUNCTION IS TO RETARD RUNOFF.

AS BUILT ADWR # 7-38

SEC - 4 T 3 N R 5 E			
NONE			
8-25-72			
TEMPE P-12-1956	2	7-1-74	AS BUILT

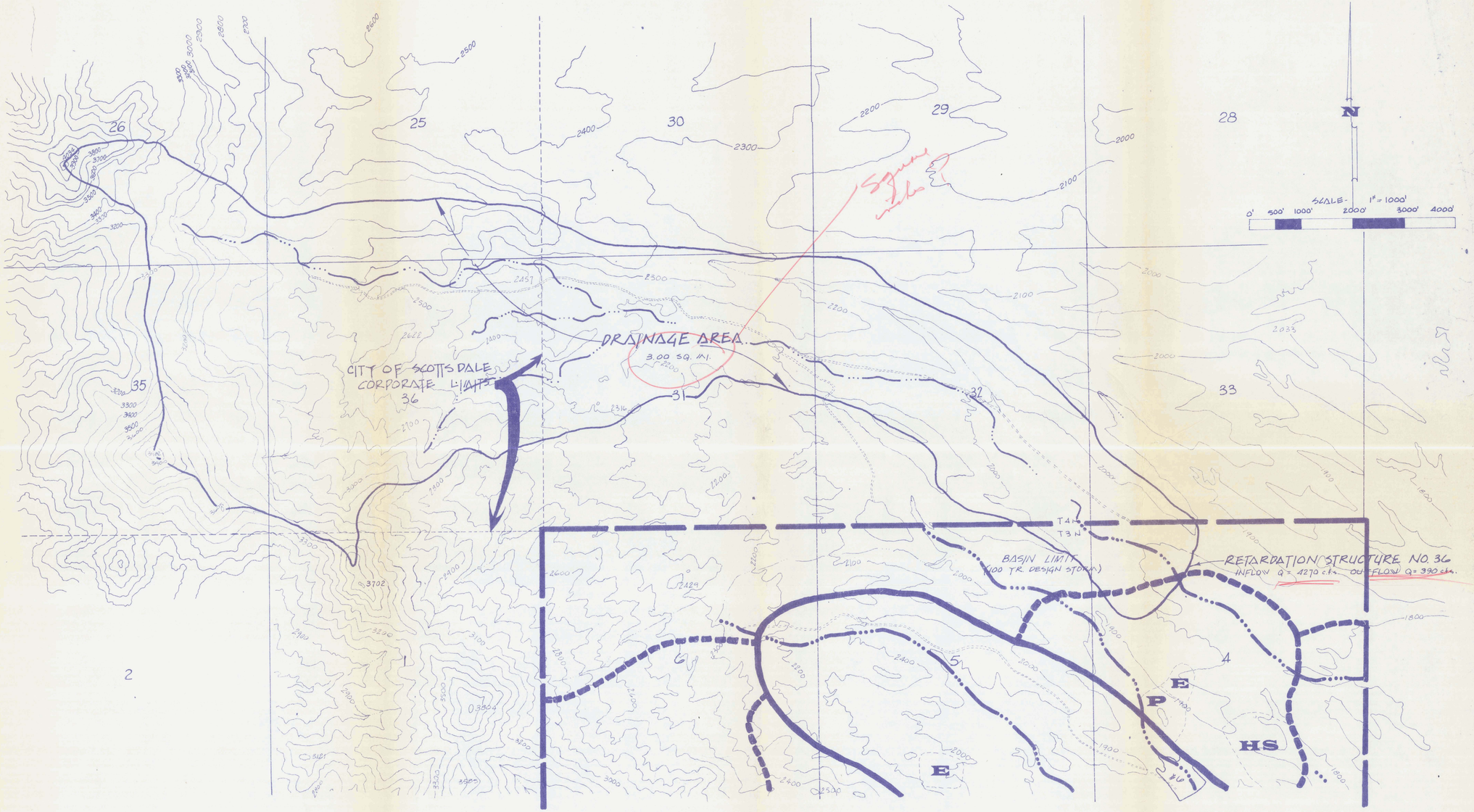
TRICO ENGINEERING

TEMPE, ARIZONA

McCULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36
TITLE SHEET

SHEET 1 OF 10 SHEETS



POOR ORIGINAL
MICROFILM IMAGE CANNOT BE IMPROVED

DRAWN BY S.L.G.	TRICO INTERNATIONAL INC.	TEMPE, ARIZONA CIVIL ENGINEERING	Mc CULLOCH PROPERTIES, INC. FOUNTAIN HILLS, ARIZONA	STRUCTURE NO. 36 DRAINAGE MAP	SHEET 2 OF 10 SHEETS
SCALE 1" = 1000'					
DATE 8-23-72					
CHECKED BY					
DRAWING NUMBER 72MPIF-P.12-79G					

NO	DATE	BY	REVISIONS & REMARKS
1	4 OCT 72	GB	STATE EXHIBITS
2	7-1-74	GB	AS BUILT

BRUNING 40-105

● — DENOTES TEST BORING

Ⓐ — DENOTES REFERENCE POINT

(2) — DENOTES CURVE NO.

NOTE:

ALL INDICATED COORDINATES REFER TO AN ASSUMED COORDINATE SYSTEM WITH AN ORIGIN OF 20,000 N. AND 20,000 E., STATION NO. 123+83.38 OF THE CENTERLINE RIGHT-OF-WAY OF SHEA BOULEVARD AS ESTABLISHED BY THE MARICOPA COUNTY HIGHWAY DEPT.

COORDINATES

REF. PT.	NORTH	EAST	REF. PT.	NORTH	EAST
A	40,439.76	21,558.22	L RADIUS	40,036.20	21,849.60
B AXIS	40,270.85	21,972.83	M AXIS	41,032.20	22,372.68
C B.C.	40,164.57	22,233.68	N RADIUS	40,160.45	21,989.40
D E.C.	39,836.21	22,682.88			
E	39,683.95	22,809.88			
F	39,375.312	23,067.337			
G B.C.	40,025.20	21,574.82			
H E.C.	39,792.74	21,721.73			
I B.C.	39,762.05	21,780.16			
J E.C.	39,710.68	21,975.00			
K AXIS	39,615.67	21,628.74			

CURVE DATA

NO.	Δ	R.	T	L	C
①	60° 00' 00"	275.00'	158.77	287.98	275.00'
②	25° 52' 29"	450.00'	103.37	203.22	201.50
③	28° 00' 00"	1,150.00'	286.73	562.00	556.42

AS BUILT

DRAWN BY: A.G.
SCALE: 1" = 100'
DATE: 10-6-72
CHECKED BY:
DRAWING NUMBER: 72-MPIF-P12-7P6

NO	DATE	BY	REVISIONS & REMARKS
* 1	1-4-73	K/G	REV. STATIONS
2	7-1-74	GB	AS BUILT

TRICO INTERNATIONAL INC.

TEMPE, ARIZONA
CIVIL ENGINEERING

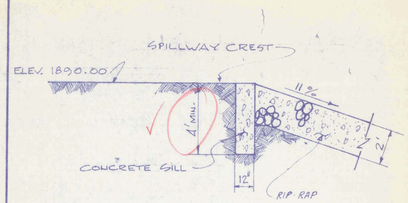
McCULLOCH PROPERTIES INC.

FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36

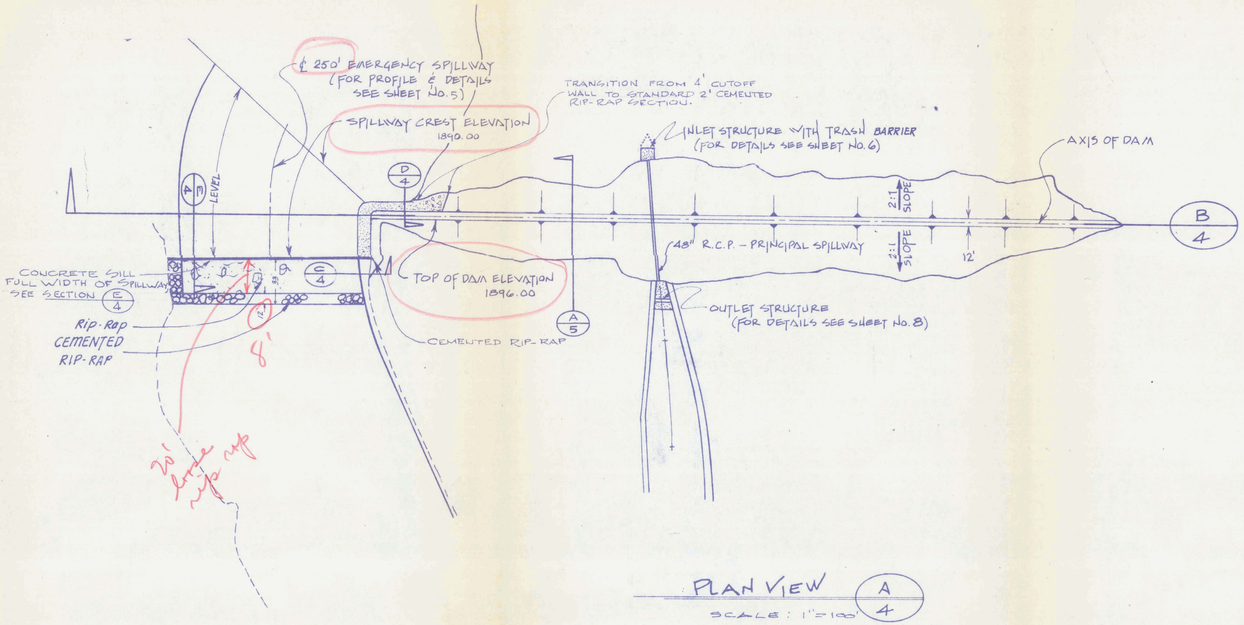
PLOT PLAN & GRADING PLAN

SHEET 3 OF 10 SHEETS



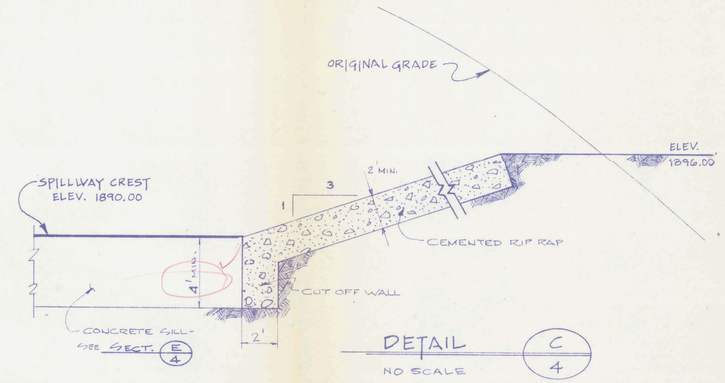
SECTION E/4

NO SCALE



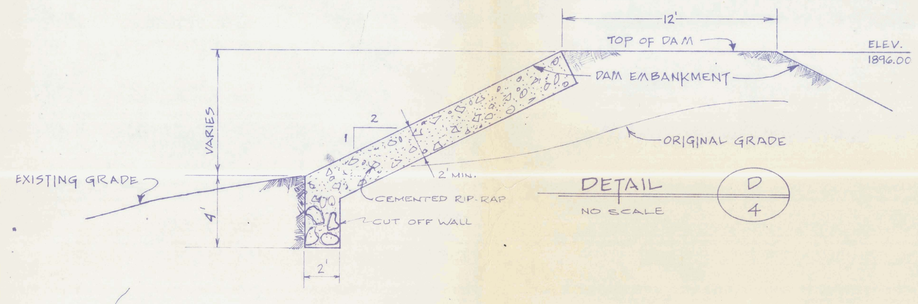
PLAN VIEW A/4

SCALE: 1"=100'



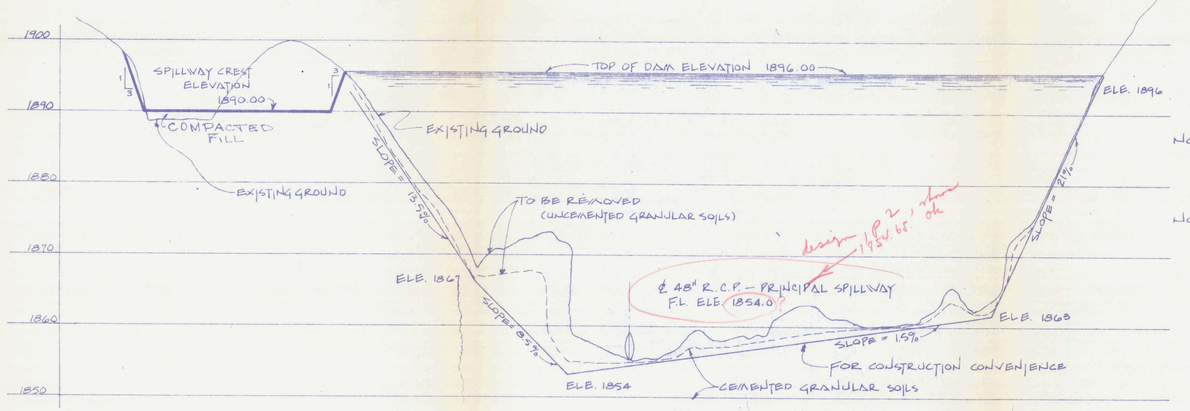
DETAIL C/4

NO SCALE



DETAIL D/4

NO SCALE



SECTION B/4

SCALE:
HORIZ. 1" = 100'
VERT. 1" = 10'

NOTE: EXTEND CUTOFF TRENCH MIN. 2' INTO CEMENTED GRANULAR SOILS OR TO SOLID ROCK.

NOTE: SHADED AREA REPRESENTS EARTH REMOVAL IN THE CUTOFF TRENCH ONLY. A GENERAL CLEARING AND GRUBBING OVER THE BASE OF THE DAM OF 1½ TO 2 FEET SHALL BE REQUIRED. (INCLUDING REMOVAL OF ALL SOFT MATERIAL)

AS BUILT

DRAWN BY	G.L.G.
SCALE	NOTED
DATE	8-29-72
CHECKED BY	
DRAWING NUMBER	DEMME BID-796

NO	DATE	BY	REVISIONS & REMARKS
	4 OCT 72	GB	STATE COMMENTS
2	12 DEC 72	GB	NOTE ON SPILLWAY WIDTH
3	7-1-74	GB	AS BUILT

TRICO INTERNATIONAL INC.

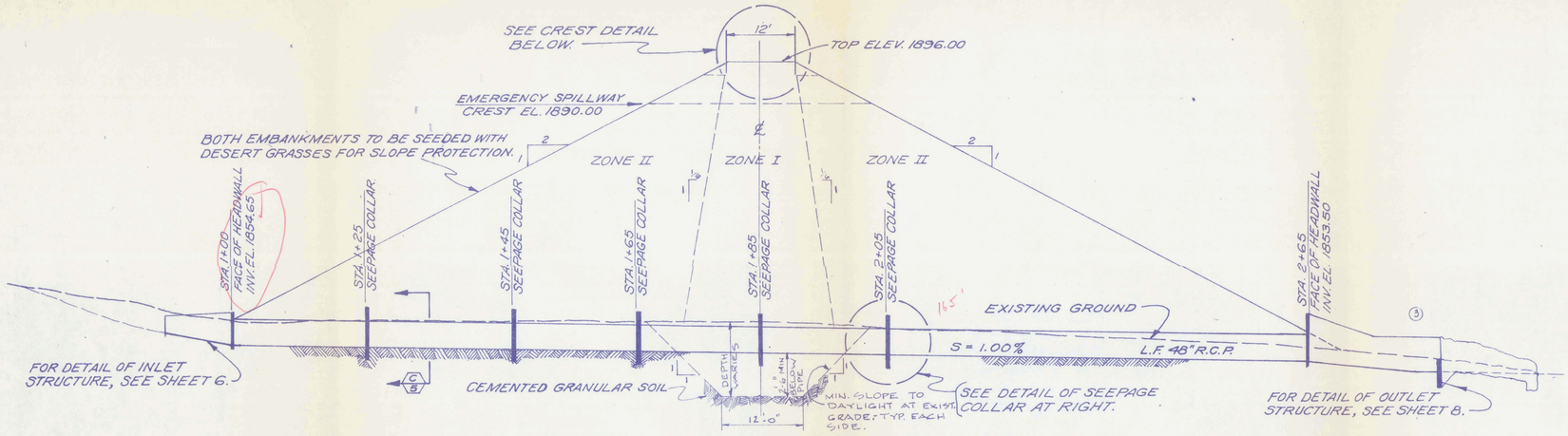
TEMPE, ARIZONA
CIVIL ENGINEERING

Mc CULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

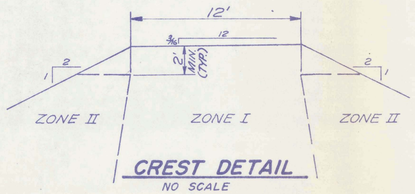
STRUCTURE NO. 36
PLAN & SECTION OF DAM

SHEET 4 OF 10 SHEETS

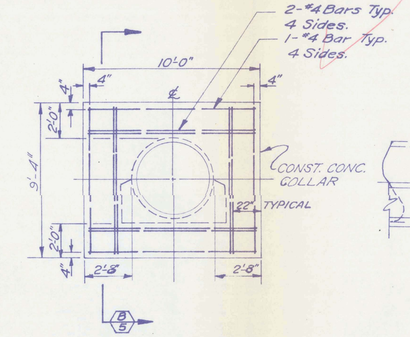
BRUNING 40-105

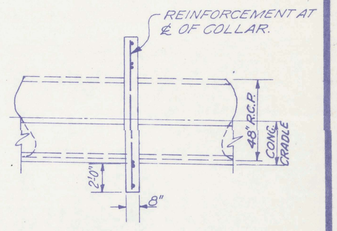


SECTION A/5
SCALE: 1" = 10'



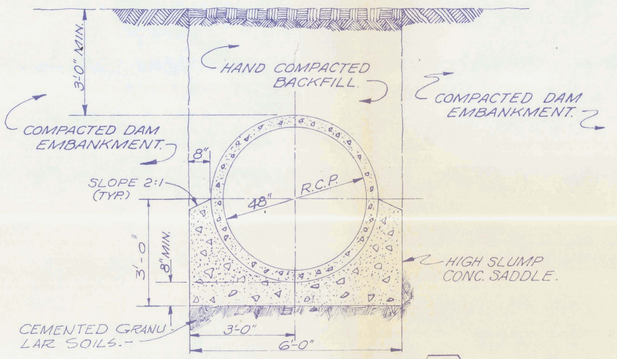
CREST DETAIL
NO SCALE



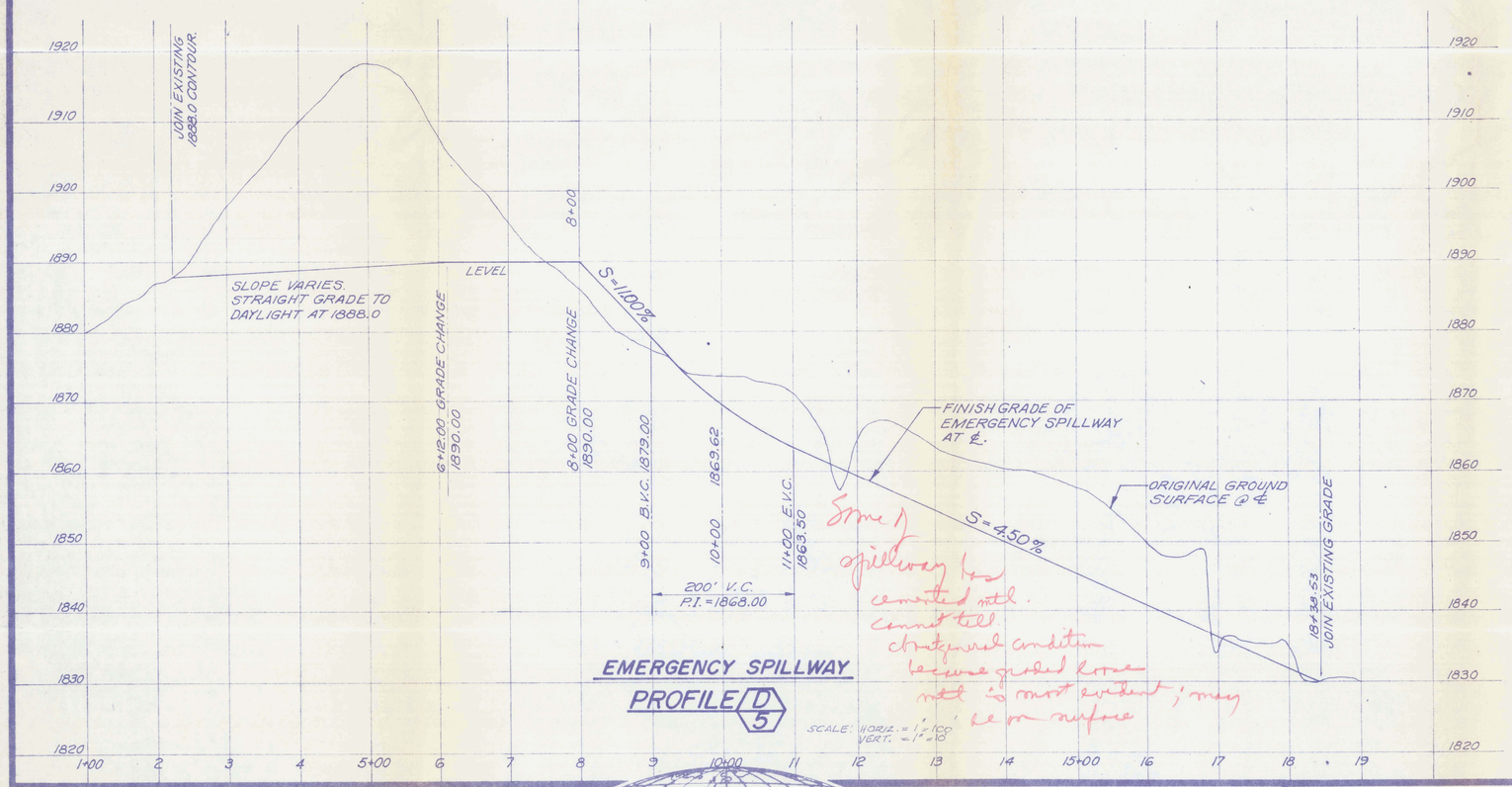


DETAIL OF SEEPAGE COLLAR
SCALE: 1/4" = 1'-0"

SECTION B/5



TYPICAL SECTION C/5
SCALE: 1/2" = 1'-0"



EMERGENCY SPILLWAY PROFILE D/5
SCALE: HORIZ. = 1" = 100'
VERT. = 1" = 10'

Some 1 spillway has cemented until. Construction condition because graded route until is most evident; may be on surface

GENERAL NOTES

1. **ZONE I**: Soil with high resistance to Piping and low permeability as approved by the Consulting Soil and Foundation Engineer.
2. **ZONE II**: Granular soil.
3. Pipe shall be Reinforced Concrete Pressure pipe as shown in the Specifications.
4. Over-excavation beyond min. shown for Cradle section shall be filled with backfill concrete.
5. 48" R.C.P. shall be supported to true line & grade by use of concrete block or Wedges prior to placement of concrete cradle.
6. R.C.P. shall conform to ASTM C-361 with rubber gasket joints. Contractor shall submit design of pipe to be used to Engineer for approval before installation.

AS BUILT

DRAWN BY	H.E.J.
SCALE	As Noted.
DATE	
CHECKED BY	
DRAWING NUMBER	72-MCP-736

NO.	DATE	BY	REVISIONS & REMARKS
1	4 OCT 72	RH	STATE COMMENTS
2	12 DEC 72	RH	SLOPES FOR ZONE I MATERIAL
3	3-28-73	LRB	AS BUILTS
4	7-1-74	RB	AS BUILT

TRICO INTERNATIONAL INC.

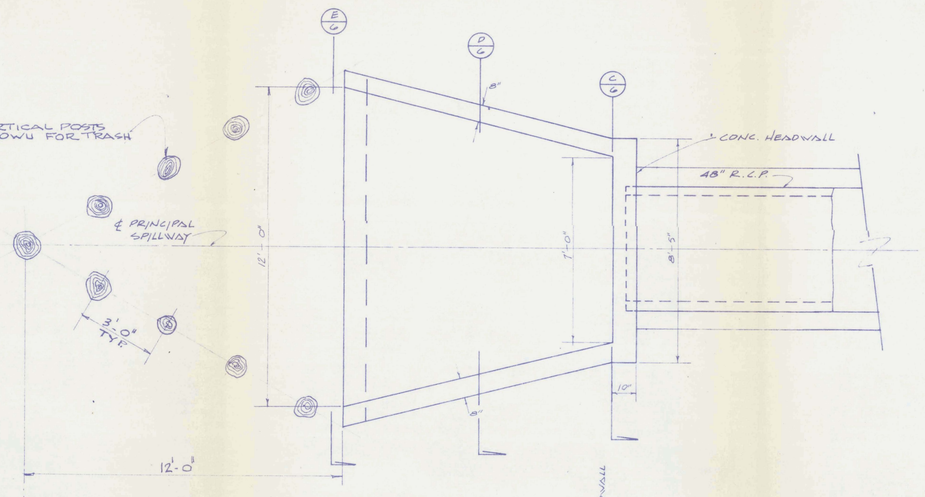
TEMPE, ARIZONA
CIVIL ENGINEERING

McCULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

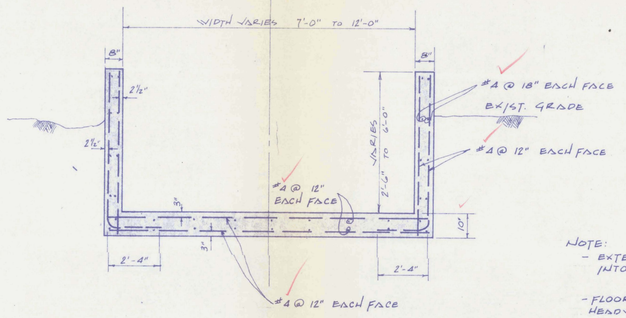
STRUCTURE NO. 36
CROSS-SECT. & EMERGENCY SPILLWAY PROF.

SHEET 5 OF 10 SHEETS

LOCATE NINE VERTICAL POSTS PER PATTERN SHOWN FOR TRASH BARRIER.

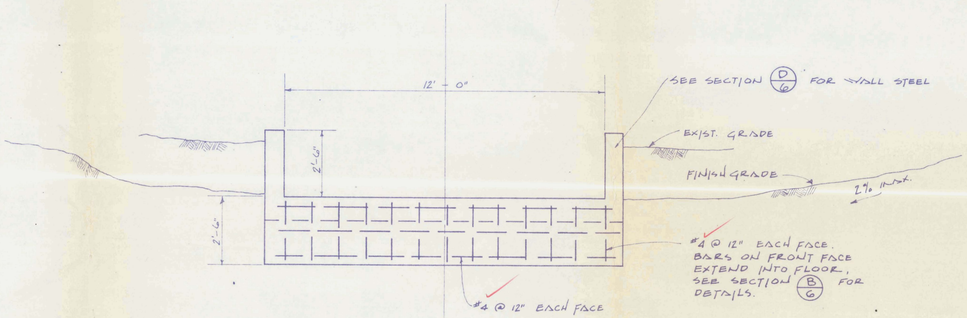


PLAN (A/G) SCALE 3/8"=1'



SECTION (D/G) SCALE 3/8"=1'

NOTE:
- EXTEND SIDE WALL LONG. BARS INTO HEADWALL
- FLOOR STEEL CONTINUES INTO HEADWALL AND CUT-OFF WALL, SEE SECTION (B/G) FOR DETAILS

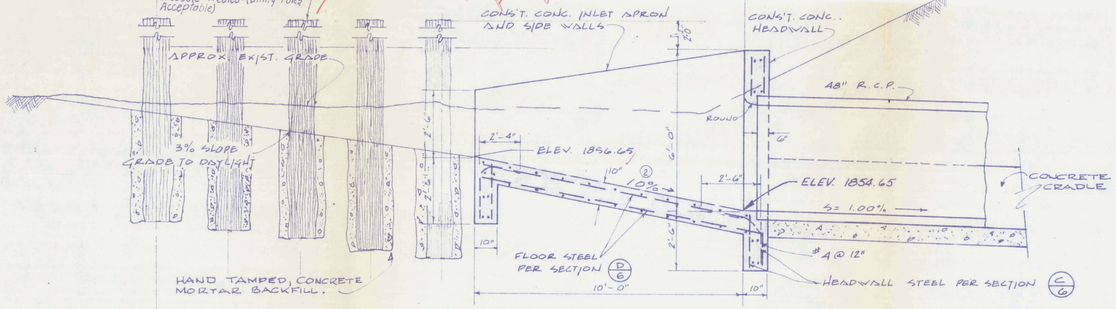


DETAIL (E/G) SCALE 3/8"=1'

STRUCTURAL NOTES:
30 DIA.^{s} MIN. LAP FOR BAR SPLICING.-
CLEARANCES TO REINFORCING STEEL ARE MEASURED TO ℄ OF BAR.
MIN. 2½' CLEARANCE BETWEEN STEEL & FACE OF CONCRETE, EXCEPT AS NOTED.
10 DIA.^{s} MIN. BEND RADII OF BARS.

Poste to be hard, dense timber. Creosote treated-(utility Poles Acceptable)

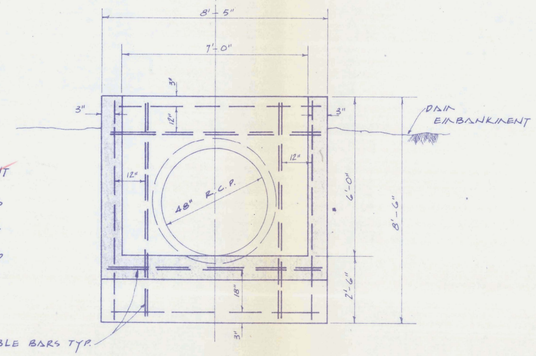
STA. 1100 FACE OF HEADWALL
INVERT ELEV 1854.65



SECTION (B/G) SCALE - 3/8"=1'

1854.65
1862.65

NOTE:
- ALL REINFORCEMENT IS #4 BARS
- ARRANGE REINF. AS SHOWN FOR EACH FACE OF HEADWALL
- SEE SECTION D/G FOR SIDEWALL AND APRON.



SECTION (C/G) SCALE - 3/8"=1'

POOR ORIGINAL
MICROFILM IMAGE CANNOT BE IMPROVED

AS BUILT

DRAWN BY	S.L.G.			
SCALE	NOTED			
DATE	AUG. 23, 72			
CHECKED BY				
DRAWING NUMBER	71MPIF-P.12-7.96			

NO	DATE	BY	REVISIONS & REMARKS
1	4-OCT-72	WH	STATE COMMENTS
2	3-28-73	LEE	AS BUILTS
3	7-1-74	GB	AS BUILTS

TRICO INTERNATIONAL INC.

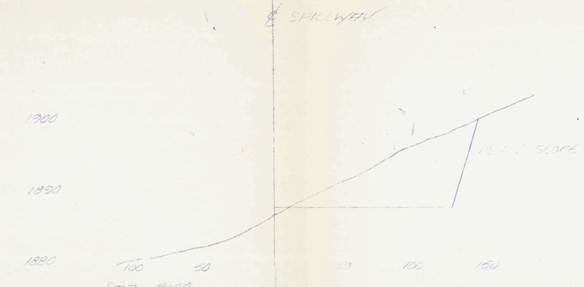
TEMPE, ARIZONA
CIVIL ENGINEERING

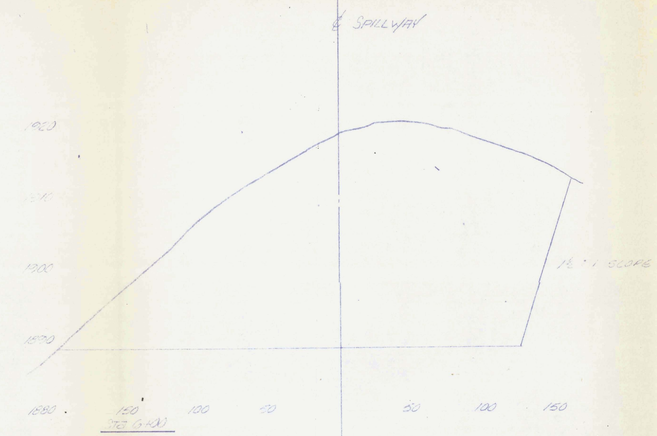
Mc CULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

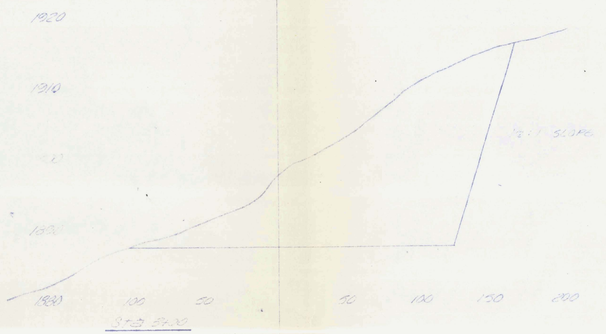
STRUCTURE NO. 36
INLET STRUCTURE

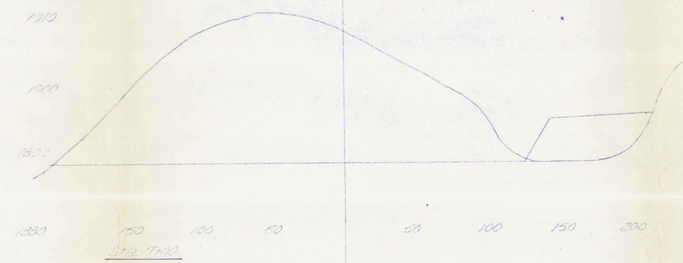
SHEET 6 OF 10 SHEETS

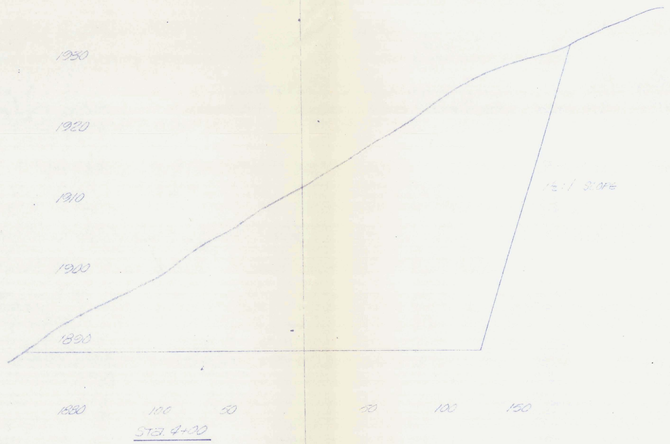
BRUNING 40-105

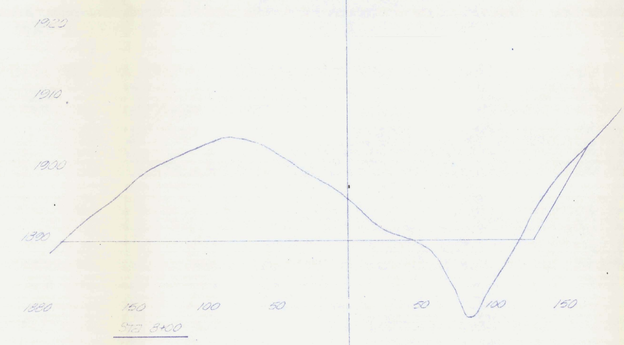












FOUNTAIN HILLS ARIZONA

BASIN Nº 36

POOR ORIGINAL
MICROFILM IMAGE CANNOT BE IMPROVED

AS BUILT

DRAWN BY	NO	DATE	BY	REVISIONS & REMARKS
SCALE	1	4 OCT 72	PH	STATE SUBMITTAL
DATE	2	7-1-74	GB	AS BUILT
CHECKED BY				
DRAWING NUMBER 72MPIF-P12-796				

TRICO INTERNATIONAL INC.

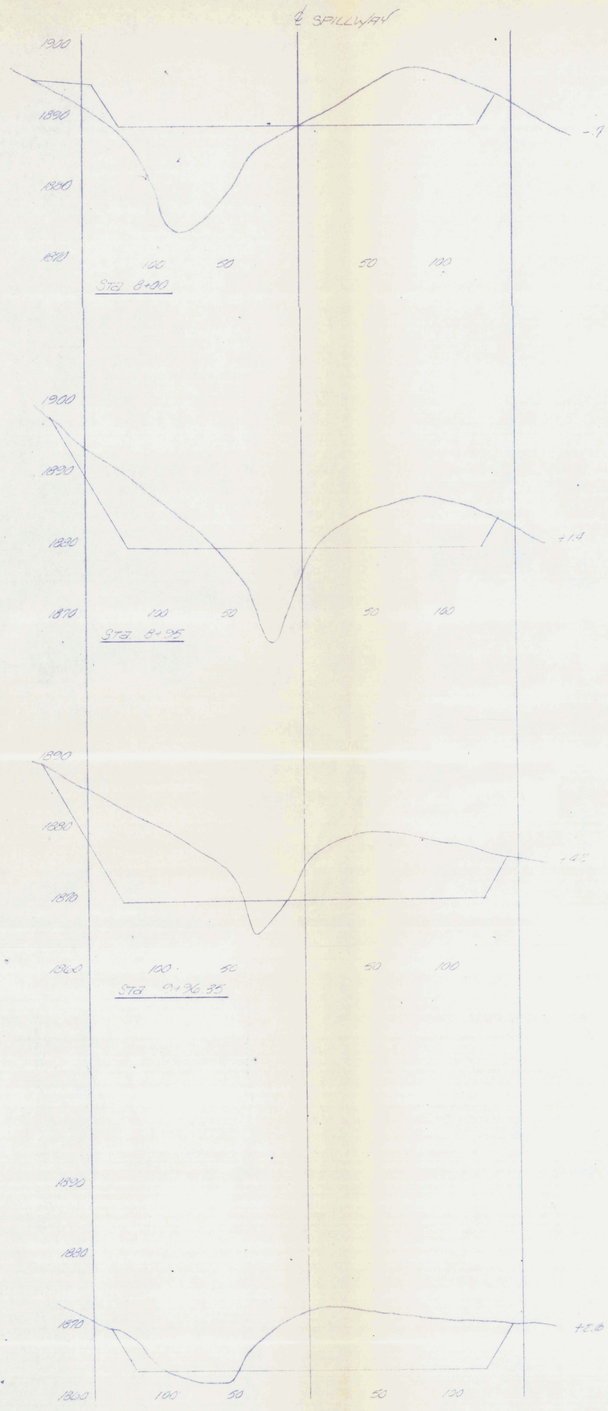
TEMPE, ARIZONA
CIVIL ENGINEERING

Mc CULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36
EMERGENCY SPILLWAY CROSS-SECTIONS.-

SHEET 7 OF 10 SHEETS

BRUNING 40-105



POOR ORIGINAL
MICROFILM IMAGE CANNOT BE IMPROVED

AS BUILT

DRAWN BY	NO	DATE	BY	REVISIONS & REMARKS
SCALE	1	4 OCT 74	CO	STATE COMMENTS
DATE	2	7-1-74	CO	AS BUILT
CHECKED BY				
DRAWING NUMBER 74MPIF-P-12-75G				

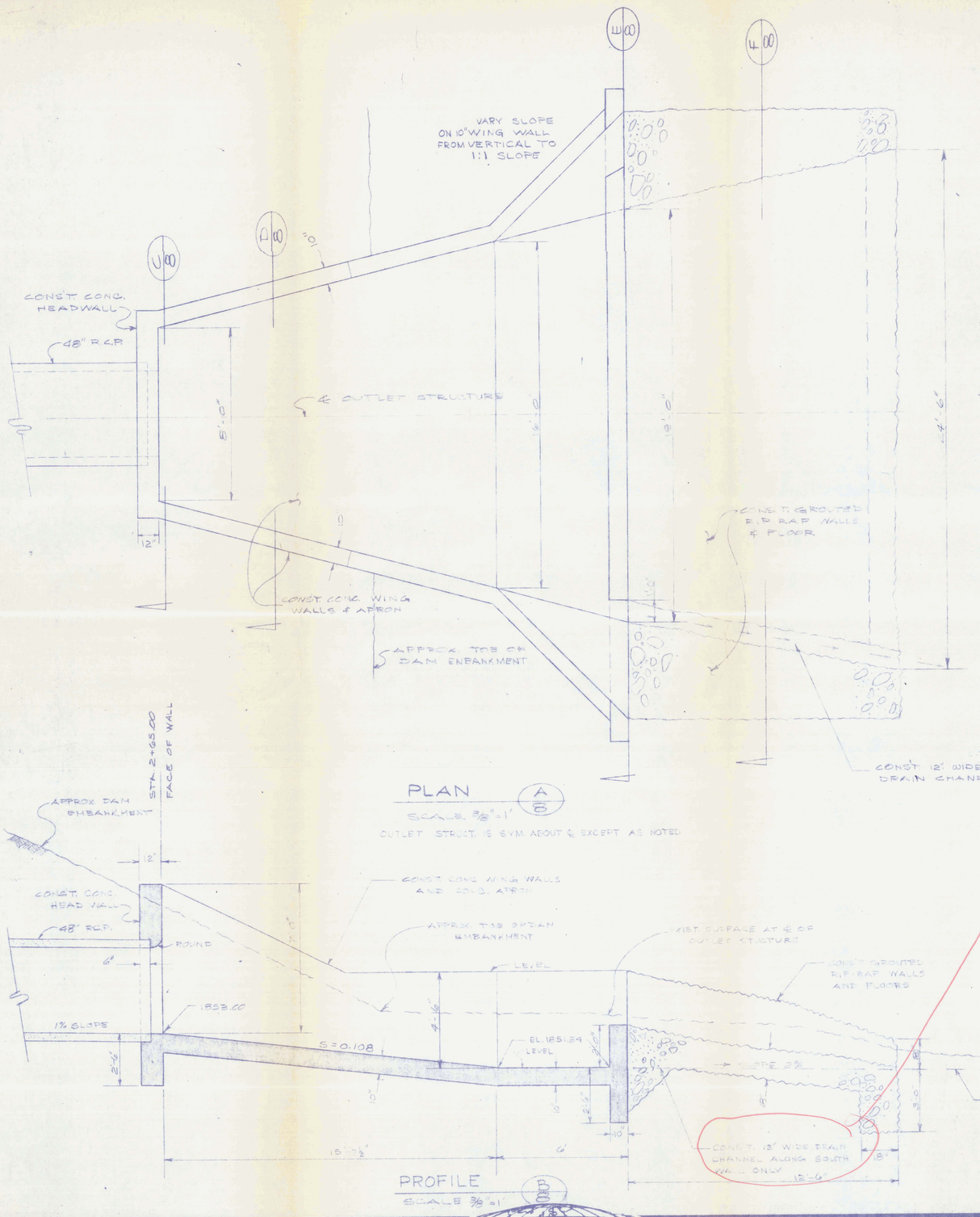
TRICO INTERNATIONAL INC.

TEMPE, ARIZONA
CIVIL ENGINEERING

Mc CULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

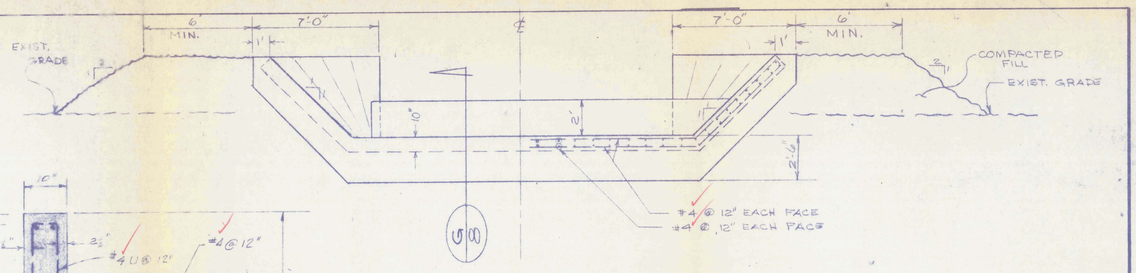
STRUCTURE NO. 36
EMERGENCY SPILLWAY CROSS-SECTIONS

SHEET 8 OF 10 SHEETS

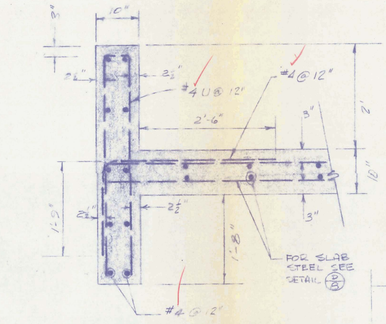


PLAN (A/8)
SCALE 3/8"=1'
OUTLET STRUCT. IS SYM. ABOUT ℄ EXCEPT AS NOTED

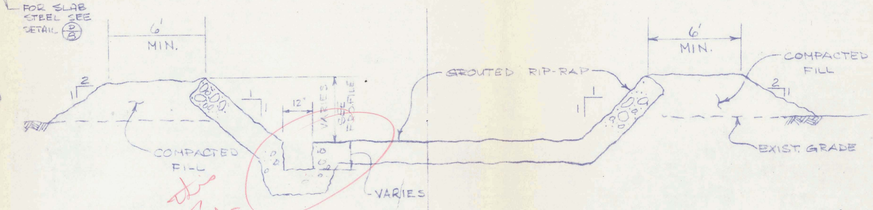
PROFILE (B/8)
SCALE 3/8"=1'



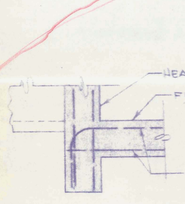
SECTION (E/8)
SCALE 1/4"=1'



DETAIL (G/8)
SCALE: 3/4"=1'

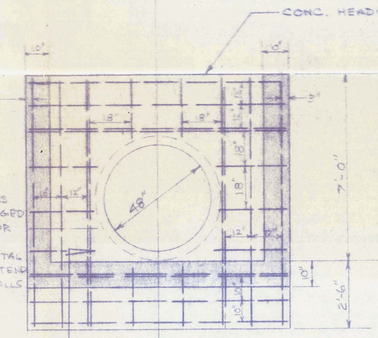


SECTION (F/8)
NO SCALE

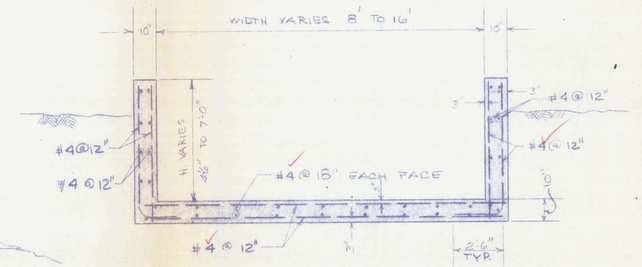


DETAIL (H/8)
NO SCALE

NOTE:
ALL REINF BARS ARE #4 ARRANGED AS SHOWN FOR EACH FACE. BEND HORIZONTAL BARS AND EXTEND THEM INTO WALLS FOR 16".



SECTION (C/8)
NO SCALE



SECTION (D/8)
NO SCALE

POOR ORIGINAL
MICROFILM IMAGE CANNOT BE IMPROVED

DRAWN BY K.G.	NO	DATE	BY	REVISIONS & REMARKS
SCALE AS NOTED	1	Aug '72		STATE COMMENTS
DATE 8-24-72				
CHECKED BY				
DRAWING NUMBER 72-MPIF-P127.96				

TRICO INTERNATIONAL INC.

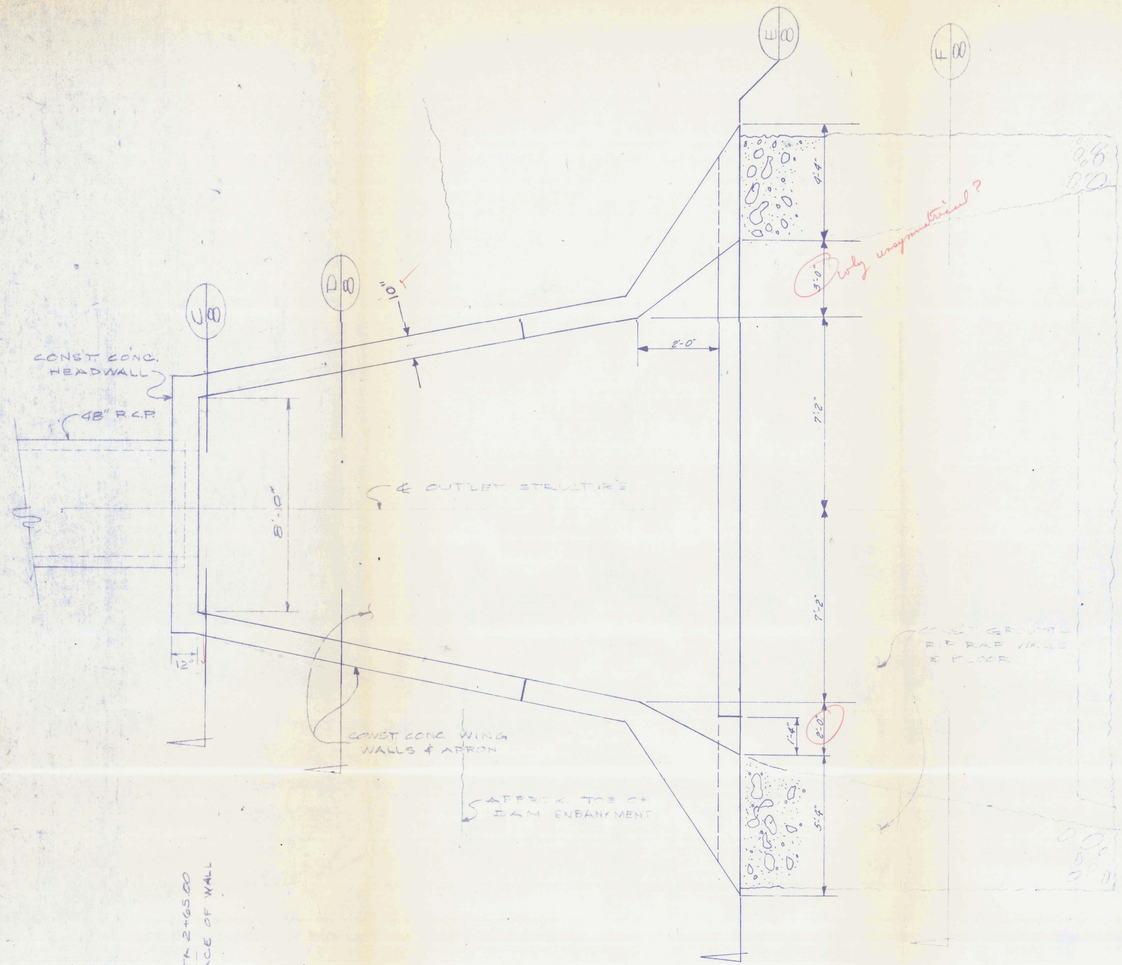
TEMPE, ARIZONA
CIVIL ENGINEERING

McCULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36
OUTLET STRUCTURE

SHEET 9 OF 10 SHEETS

BRUNING 40-105



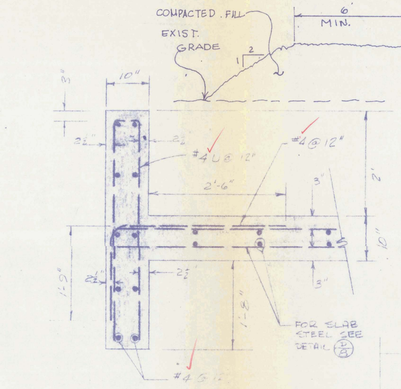
PLAN (A/8)

SCALE 3/16" = 1'

OUTLET STRUCT. SYM. ABOUT ℄ EXCEPT AS NOTED

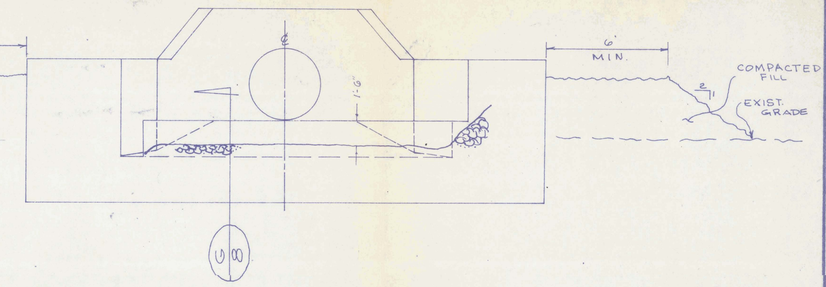
PROFILE (B/8)

SCALE 3/8" = 1'



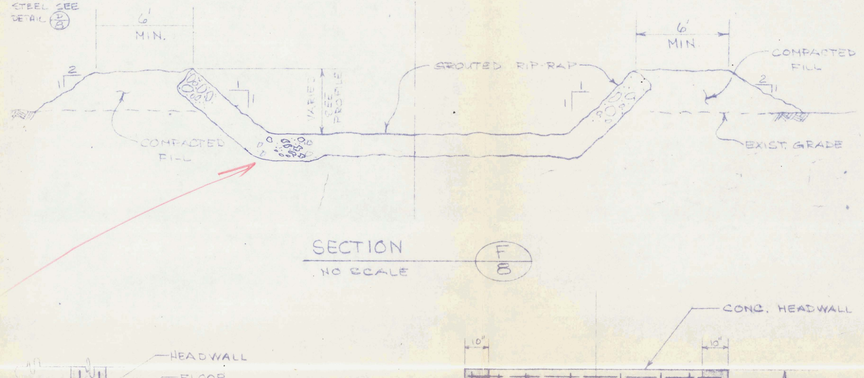
DETAIL (G/8)

SCALE: 3/4" = 1'



SECTION (E/8)

SCALE 1/4" = 1'



SECTION (F/8)

NO SCALE

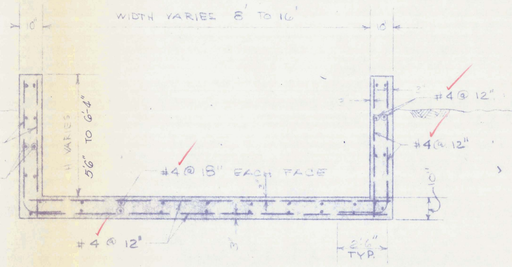
DETAIL (H/8)

NO SCALE

NOTE:
ALL REINF. BARS ARE #4 ARRANGED AS SHOWN FOR EACH FACE.
BEND HORIZONTAL BARS AND EXTEND THEM INTO WALLS FOR 16"

SECTION (C/8)

NO SCALE



SECTION (D/8)

NO SCALE

AS BUILT

DRAWN BY	NO	DATE	BY	REVISIONS & REMARKS
K. G.	1	Aug '72	'73	STATE COMMENTS
SCALE AS NOTED	2	9/29/73	LRE	AS BUILTS
DATE 8-24-72				
CHECKED BY				
DRAWING NUMBER 72-MPIF-PI2796				

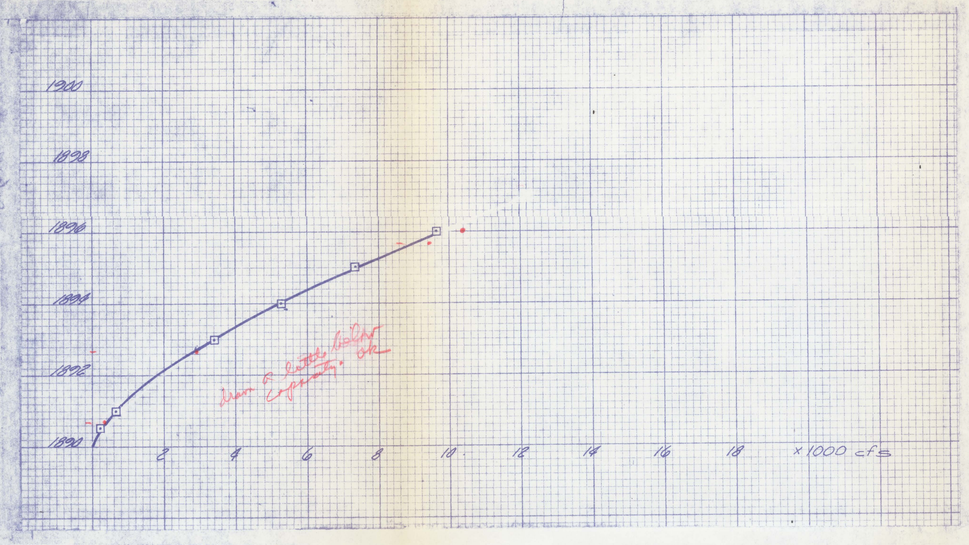
TRICO INTERNATIONAL INC.

TEMPE, ARIZONA
CIVIL ENGINEERING

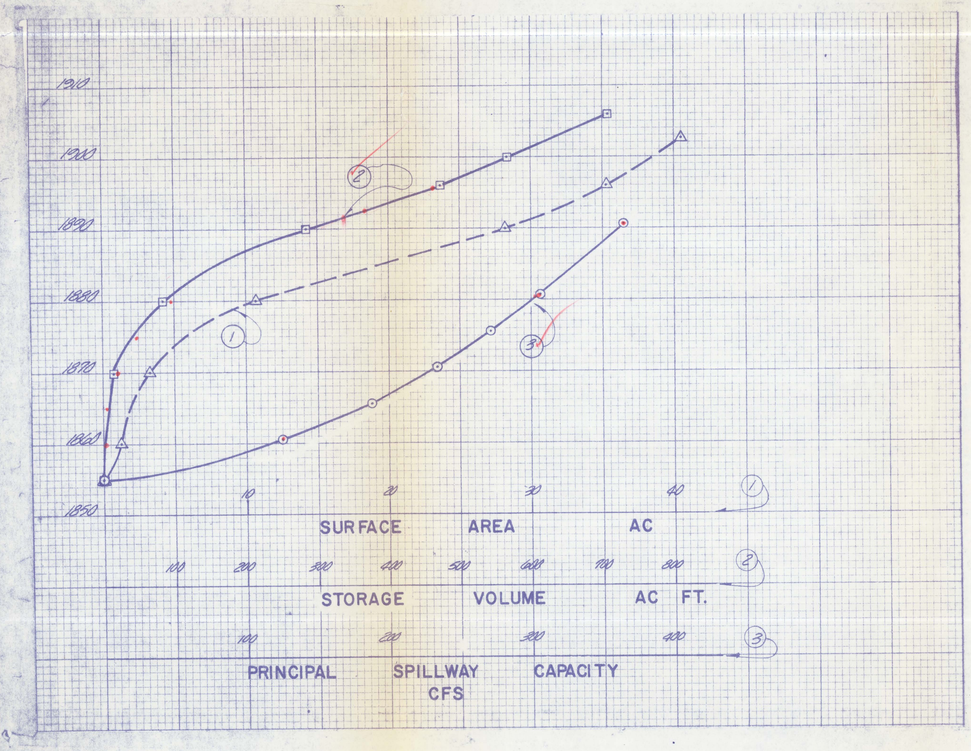
McCULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36
OUTLET STRUCTURE

SHEET 9 OF 10 SHEETS



EMERGENCY SPILLWAY · CAPACITY
1000 CFS



NOTE
FOR MORE COMPLETE DETAILS OF TEST BORINGS SEE FOUNDATION AND MATERIRL INVESTIGTION REPORT BY SERGENT, HAUSKINS, & BECKWITH

BORING NO. 1

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	102			1	SC
		S	50/2½"			1	
5		S	50/5½"			1	
							SC
10		S	50/1" (NO RECOVERY)				
15		S	50/1"				
20		S	50/0" (NO RECOVERY)				GC
25		S	50/0" (NO RECOVERY)				
30		S	50/0" (NO RECOVERY)				

BORING NO. 2

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	100			2	
		S	72			2	GC
5		S	50/2" (NO RECOVERY)				
		S	50/0" (NO RECOVERY)				

BORING NO. 3

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	23			4	
		S	50/0" (NO RECOVERY)				
5		S	50/5½"			1	
10			NX				
15			NX				
		S	50/5"				GC
20		S	50/2"				
25		S	50/0" (NO-RECOVERY)				
30		S	50/4"				CL

BORING NO. 4

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	17			1	SM
		S	29			1	SC
5		S	58			8	ML
		S	80			11	
10		S	89			10	
							CL
15		S	94			7	
20		S	117			13	

BORING NO. 5

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	16			1	SM
		S	50			1	SC
5		S	64			6	
		S	99			10	
10		S	78			10	
							CL
15		S	74			8	
20		S	81			7	

BORING NO. 6

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	23			1	SC
		S	26			2	SM
5		S	85			5	
		S	50/6"			4	
10		S	90			7	
							CL
15		S	72			8	
20		S	50/6"			8	
25		S					

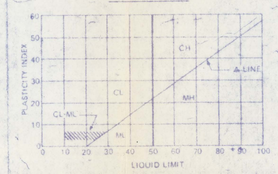
UNIFIED SOIL CLASSIFICATION SYSTEM

Soils are visually classified by the Unified Soil Classification system on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" Corp of Engineers, US Army Technical Memorandum No. 3-357 (Revised April 1960) or ASTM Designation: D2487-66T.

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (More than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
				GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well graded sands, gravelly sands.
				SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
		SANDS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)	SILTS OF LOW PLASTICITY (Liquid Limit Less Than 50)		ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts.
		CLAYS OF LOW PLASTICITY (Liquid Limit Less Than 50)		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)		CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity.

NOTE: Coarse grained soils with between 5% & 12% passing the No. 200 sieve and fine grained soils with limits plotting in the hatched zone on the plasticity chart to have double symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Cobbles	Above 3 in.
Gravel	3 in. to No. 4 sieve
Coarser gravel	3 in. to ¾ in.
Fine gravel	¾ in. to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

BORING NO. 7

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	32			5	
		S	117			1	GM
5		S	50/4"			4	
		S	50/0" (NO RECOVERY)				
10		S	50/2"			1	SC
15							
20		S	50/4½"			7	CH
25		S	50/5"			9	ML
30		U	100/0"				

BORING NO. 8

Depth in Feet	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification
0		S	40			4	SC
		S	50/5"			3	
5		S	85			3	SC
		S	50/1" (NO RECOVERY)				
10		S	50/4"			2	

AS BUILT

DRAWN BY	NO.	DATE	BY	REVISIONS & REMARKS
JIM N.	1	4 OCT 72	PH	STATE COMMENTS
SCALE NONE	2	7-1-74	GS	AS BUILT
DATE 6-21-71				
CHECKED BY				
DRAWING NUMBER				

TRICO INTERNATIONAL, INC.
TEMPE, ARIZONA
CIVIL ENGINEERING

McCULLOCH PROPERTIES, INC.
FOUNTAIN HILLS, ARIZONA

STRUCTURE NO. 36
DAM CORE BORINGS

SHEET 10 OF 10 SHEETS

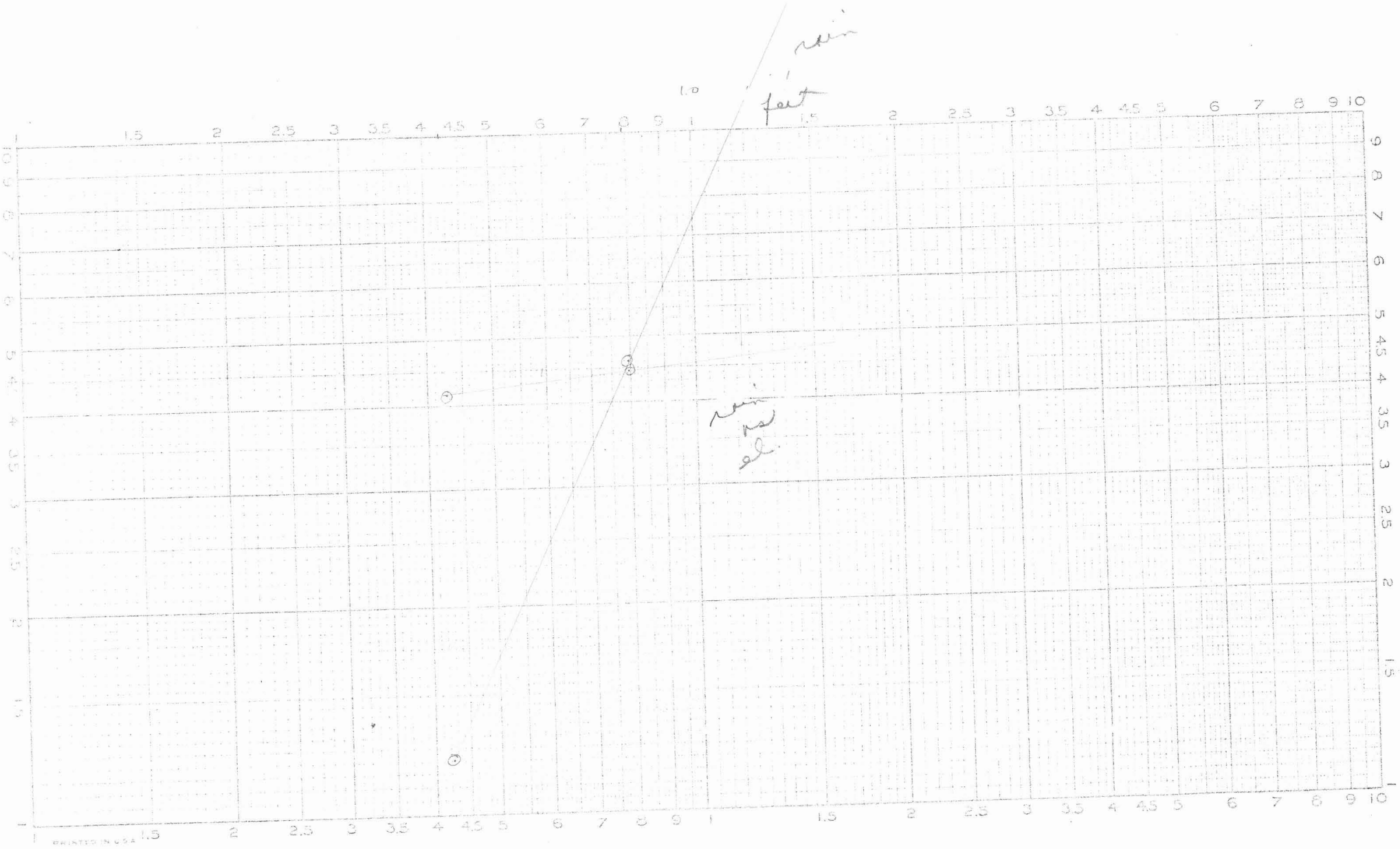


Fig #36

Prom #36

Rainfall Q'	Q_p	C.	C_Q.
3.2"	400		1886.5
4.2	506		1887.9
5.1 .425	1316		1891.2
9.52 .793	7608		1894.6

Log plot of vs rain

1411 (1.167) = 1896.2 ±

Sheet 3

Dam #36 plans

Does el 1898.0 indicate W.S.?

6. Posts for trash barrier. Tops are at 1862.65, which is approx. 27' below ~~top of~~ emergency spillway elev.
Any storage w.s. above that el (say 1865) will allow the trash into the inlet structure, with potential clogging of the 48" pipe. I discussed this with AWC people who stated that the emergency spillway is considered to be adequate to pass an increased flow, even with the principal spillway blocked, without endangering the dam.
Check the depth over the emergency spillway in a PMP storm, with principal spillway closed, to determine the freeboard for the dam.

Resit - Min rip is #4 which is ok.

9 (outlet) Outlet structure is unsymmetrical. Any reason why? No problem, as long as it meets the channel downstream.

9 (rip). Set F/8 shows small gutter in outlet channel. It is not in as built. Check to see if it was actually built.

10 Curves on topsheet check fairly close to computed data on sheets 2 and 3 of design info.

Dam #36 Design data

Spec- Embank. density req'd: Min. 95%
50% at or above 97%

Design Check ok. Printout data agrees
~~No data on hydrology, etc~~ with calcs.

Mtls investigation, etc.
Check data given on page 1 and page 5
See Opp. C. Sheet 4 of dwgs shows Emerg. Spillway el
as 1890, which agrees w/ curve.

Opp. C.
Profile shows top dam at 1906.0; mtls
investigation page 1, shows top will be 1896.0.
which is correct? Sheet 4 dwgs shows 1906.0

Field Tests Rel. density looks ok. 23% were under 97% density
Conc. looks ok 3530#
→ all were 95% or better.

Dam #36 Design Data

Hydrographs

4.2" storm (A)

	Printout	Calc. Sht 2	Calc Sht 2
Peak Q_o	505.8		
Peak El	1887.90	Theoretical would be 1890.3 ±	Spillway Curve 1890.0

9.5" storm (Modified D)

	Printout	Calc Sht 2	Calc Sht 2
Peak Q_o	7608		
Peak El	1894.63	agrees	top dam = 1896

Assuming D storm would be 19". No hydrograph was derived, but based on approximation of relationship of 100 yr storm on Dam #7, the 19" storm here would be 12,000 – 17,000 = Q_o. Use the lowest value (to being more comparable to Dam #7), then the peak el. for 19" would be 1896.5 ±. As in the case of Dam #7, a 19" storm would overtop the dam.

See Dam #36 General comment.

Dam # 36 General

The D (19") storm for this dam is not the PMP which was used for 3 of the other dams. Instead, a modified storm was used, with 9.52" of rain.

The dam crest is 1.4' higher than the modified storm, but 0.5' lower than the PMP storm. I can't understand why the modified storm was used, ~~except~~ except there may be a possibility that after the dam crest elevation had been selected and construction started, it was found that the PMP storm W.S. elevation was higher, and a lesser storm was chosen.

The criteria upon which they based design states that a class (c) structure is required where failure may cause loss of life, serious damage to home, etc. The selected hydrograph for a class (c) structure is to be based on a 6 hr PMP storm. The modified storm they used [6 hr P_{100} + .40(PMP − P_{100})] applies to a class (b) structure "located in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, etc.

SCS

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Any loss life hazard = PMP storm

4/10

Spillway checked with picks. Granular mtl. Fine to about 6" down, then hardpan.