

AD-A135 578

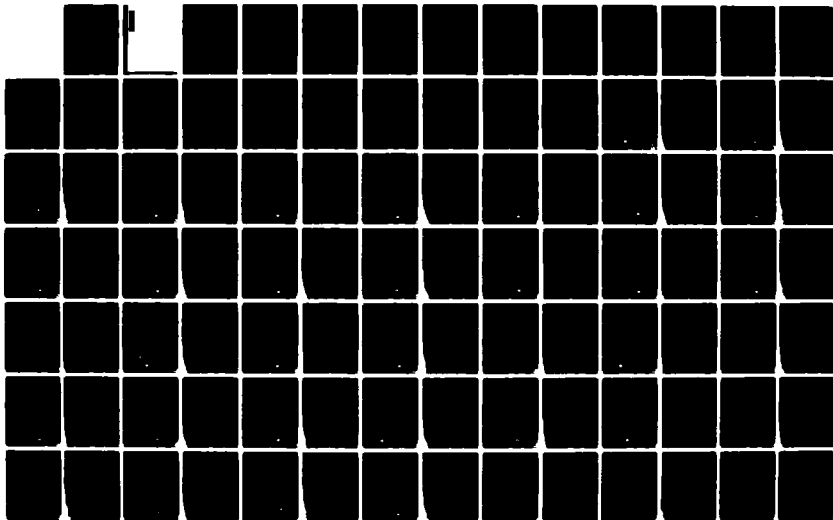
MULTIPLE-PURPOSE PROJECT OSAGE RIVER BASIN HUNDRED AND
TEN MILE CREEK KAN. (U) CORPS OF ENGINEERS KANSAS CITY
MO KANSAS CITY DISTRICT L C MYERS ET AL. OCT 83

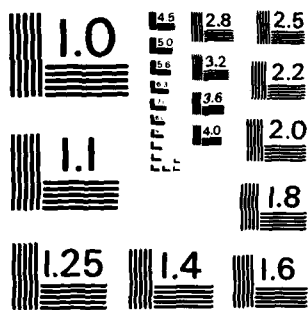
1/2

UNCLASSIFIED

F/G 13/2

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A135578

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Appendix VII to the Pomona Lake O&M Manual	2. GOVT ACCESSION NO. AD-A135578	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Multiple-Purpose Project, Osage River Basin, Hundred and Ten Mile Creek, Kansas, Pomona Lake, Operation and Maintenance Manual, Appendix VII, Construction Foundation Report		5. TYPE OF REPORT & PERIOD COVERED Construction Foundation Report, From Jul 59 to Oct 63
7. AUTHOR(s) Mr. Lynn C. Myers - Project Geologist Mr. Ralph Dennis - Resident Engineer Stage II Mr. Frederick Blanks - Resident Engineer Stage I Mr. Victor Anderson - Geologist		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Geology Section (MRKED-FG), Foundation & Materials Branch (MRKED-F), Kansas City District, Corps of Engineers, 601 E. 12th St., Kansas City, MO 64106		8. CONTRACT OR GRANT NUMBER(s) Cost Key: CB251 07 53100 000
11. CONTROLLING OFFICE NAME AND ADDRESS Estimates & Specifications Section (MRKED-DE), Design Branch (MRKED-D), Kansas City District, Corps of Engrs, 601 E. 12th, Kansas City, MO 64106		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS PB-2b and ER 1110-1-1801, change 2, dated 1 April 1983
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 1977 Revised October 1983
		13. NUMBER OF PAGES 78
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Distribution in accordance with ER 1110-1-1801, Change 2, Dated 1 April 1983		
This document has been approved for public release and sale; its distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this report is to present a complete record of the geology and foundation conditions encountered during construction of Pomona Dam. The report focuses primarily on the foundations of the outlet works, right abutment, and spillway area where the bulk of rock foundations are involved.		

DD FORM 1473

EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

OPERATION AND MAINTENANCE MANUAL

POMONA LAKE

HUNDRED AND TEN MILE CREEK, KANSAS
OSAGE RIVER BASIN

APPENDIX VII

CONSTRUCTION FOUNDATION REPORT

*Supersedes
Previous report*

1977
(Revised October 1983)

DDC
ELECT
DEC 7 1983
A

This document has been approved
for public release and sale; its
distribution is unlimited.

DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

OPERATION AND MAINTENANCE MANUAL

POMONA LAKE
HUNDRED AND TEN MILE CREEK, KANSAS
OSAGE RIVER BASIN

APPENDIX VII

CONSTRUCTION FOUNDATION REPORT

TABLE OF CONTENTS

<u>Paragraph No.</u>	<u>Title</u>	<u>Page No.</u>
CHAPTER 1		
INTRODUCTION		
1-01	Location and Description	VII-1-1
1-02	Construction Authority	VII-1-1
1-03	Purpose and Scope	VII-1-1
CHAPTER 2		
FOUNDATION INVESTIGATIONS		
2-01	Investigations Prior to Construction	VII-2-1
2-02	Investigations During Construction	VII-2-1
2-03	Geology and Physiography	VII-2-1
2-04	Bedrock Stratigraphy	VII-2-2
2-05	Bedrock Structure	VII-2-3
2-06	Weathering	VII-2-3
2-07	Strength of Rock	VII-2-3
CHAPTER 3		
FOUNDATION CONDITIONS AND TREATMENT		
3-01	Excavation	VII-3-1
3-02	Anchor Bars	VII-3-1
3-03	Foundation Preparation	VII-3-2
3-04	Character of Foundations	VII-3-2
3-05	Ground Water	VII-3-3
3-06	Curtain Grouting	VII-3-3
3-07	Closure	VII-3-4
3-08	Instrumentation	VII-3-4

TABLE OF CONTENTS

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page No.</u>
I	Grouting Summary - Pomona Dam	T-1
II	Laboratory Tests on Bedrock - Pomona Dam	T-2

LIST OF PLATES

<u>Plate No.</u>	<u>Title</u>	<u>File No.</u>
1	Location and Vicinity Map	0-3-471
2	Plan of Work Area Embankment Outlet Works and Spillway	0-3-304
3	Plan of Work Area Embankment	0-3-305
4	Division Channel Excavation	0-3-306
5	Embankment Plan of Stilling Basin Area	0-3-307
6	Embankment Sections	0-3-308
7	Embankment Sections	0-3-309
8	Embankment Interior Plans and Details	0-3-310
9	Embankment and Excavation Partial Plan and Details	0-3-311
10	Curtain Grouting Plan and Profile	0-3-312
11	Outlet Works Plan and Longitudinal Section	0-3-313
12	Outlet Works Excavation Plan of Area	0-3-314
13	Outlet Works Excavation Profile and Sections	0-3-315
14	Outlet Works Excavation Sections	0-3-316
15	Spillway Control Sill Concrete and Reinforcement	0-3-366
16	Spillway Excavation Plan, Profile and Sections	0-3-367
17	Plan of Underground Explorations	0-3-375
18	Logs of Underground Explorations Spillway and Outlet Works	0-3-376
19	Logs of Underground Explorations Axis of Dam and Outlet Works	0-3-377
20	Logs of Underground Explorations Quarry Site and Borrow Area "A"	0-3-378
21	General Plan	0-3-472
22	Plan of Embankment Station 24+00 to Station 59+00	0-3-473
23	Plan of Embankment Station 59+00 to Station 102+00	0-3-474
24	Embankment Sections Station 24+00 to Station 49+25±	0-3-475
25	Embankment Sections Station 49+25± to Station 102+00	0-3-476

TABLE OF CONTENTS -- con.

LIST OF PLATES

<u>Plate No.</u>	<u>Title</u>	<u>File No.</u>
26	Closure Area Section, Plan and Profile	0-3-477
27	Outlet Works Excavation Plans and Sections and Foundation Drain Profile	0-3-478
28	Spillway Excavation Plan, Profile and Sections and Description of Excavations	0-3-479
29	Curtain Grouting Plan and Profile	0-3-480
30	Piezometer and Settlement Gages, Plan and Details	0-3-481
31	Plan of Underground Explorations and Borrow Areas	0-3-494
32	Geologic Profiles Outlet Works and Spillway	0-3-495
33	Geologic Profile Dam Axis	0-3-496
34	Logs of Underground Explorations Borrow Areas and Quarry Site	0-3-497
35	Outlet Works Foundation Plan and Profile	0-3-993
36	Completion of Embankment Grouting Sta. 67+50 to Sta. 63+50	0-3-994
37	Diversion Channel Grouting Sta. 41+00 to Sta. 40+00	0-3-995
38	Curtain Grouting Sta. 31+00 to Sta. 27+90	0-3-996
39	Curtain Grouting Outlet Works Sta. 28+00 to Sta. 26+50	0-3-997
40	Curtain Grouting Sta. 26+50 to Sta. 25+50	0-3-998
41	Curtain Grouting Sta. 25+50 to Sta. 24+00	0-3-999

PHOTOGRAPHS

<u>Photo No.</u>	<u>Subject</u>	<u>Neg. No.</u>
1	POMONA LAKE, July 1960, Outlet Works. Foundation Preparation, Conduit Monoliths #11, 12, & 13.	R-145-8
2	POMONA LAKE, July 1960, Outlet Works. Foundation Preparation, Conduit Monoliths #14, 15, & 16.	R-145-10
3	POMONA LAKE, August 1960, Outlet Works. Foundation Preparation, Conduit Monolith #17	R-147-4
4	POMONA LAKE, August 1960, Outlet Works, Foundation Preparation, Conduit Monoliths 19, 20, 21, & 22.	R-147-13

TABLE OF CONTENTS -- con.

PHOTOGRAPHS

<u>Photo No.</u>	<u>Subject</u>	<u>Neg. No.</u>
5	POMONA LAKE, July 1960, Outlet Works. Foundation Preparation, Conduit Monolith #22 After Heavy Rain.	R-147-7
6	POMONA LAKE, June 1960, Outlet Works. Foundation Preparation, Conduit Monoliths #6, 7, 8, 9 & 10.	R-142-10
7	POMONA LAKE, July 1960, Outlet Works. Foundation Preparation, Tower Monolith #1.	R-142-15
8	POMONA LAKE, July 1960, Outlet Works. Foundation Preparation, Conduit Monolith #1.	R-142-16
9	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin Monolith #2.	R-149-6
10	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin Monolith #3	R-149-3
11	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin Monolith #3	R-149-4
12	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin Monolith #6	R-148-10
13	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin End Sill.	R-149-11
14	POMONA LAKE, September 1960, Outlet Works. Foundation Preparation, Stilling Basin End Sill.	R-149-12
15	POMONA LAKE, Special Cleanup Area. Foundation Cleanup Before Placing Impervious Fill.	R-168-12
16	POMONA LAKE, Foundation Cleanup. Placing Impervious Fill.	R-168-11
17	POMONA LAKE, Foundation Cleanup and Backfill.	R-168-13
18	POMONA LAKE, Watering Pervious Fill.	R-168-15
19	POMONA LAKE, Outlet Works. Rock Excavation in Approach Channel.	R-151-0
20	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #4	R-151-6
21	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #3, 4 & 5.	R-149-21

TABLE OF CONTENTS -- con.

PHOTOGRAPHS

<u>Photo No.</u>	<u>Subject</u>	<u>Neg. No.</u>
22	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #6 & 7.	R-149-20
23	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #7	R-151-8
24	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #8	R-151-9
25	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #9	R-151-14
26	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #20	R-149-19
27	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #21	R-149-18
28	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation Monolith #23	R-149-13
29	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation. Drilling Holes for Anchor Bars.	R-148-8
30	POMONA LAKE, September 1960, Spillway Sill. Foundation Preparation. Anchor Bars Installed. Left Slope.	R-149-2
31	POMONA LAKE, August 1960, Left Abutment Grout Trench. Foundation Cleanup.	R-171-6
32	POMONA LAKE, August 1960, Outlet Works. Stilling Basin Anchor Bars.	R-147-2
33	POMONA LAKE, August 1960, Outlet Works. Stilling Basin Anchor Bars.	R-147-16
34	POMONA LAKE, November 1961, Placing Class II Rockfill Sta. 46+00.	R-168-17
35	POMONA LAKE, November 1961, Riprap Type B, Test Load.	R-160-15
36	POMONA LAKE, November 1961, Riprap Type B, Stage I.	R-160-3
37	POMONA LAKE, May 1960, Grouting on Right Abutment	R-145-5

DEPARTMENT OF THE ARMY
Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

POMONA LAKE
HUNDRED AND TEN MILE CREEK, KANSAS
OSAGE RIVER BASIN

FOUNDATION REPORT

CHAPTER 1

INTRODUCTION

1-01. Location and Description.

a. Pomona Lake is located at mile 7.0 on One Hundred and Ten Mile Creek, a tributary of the Marais des Cygnes River in Osage County, Kansas (see plate No. 1). The project is designed for multipurpose use in flood control and water conservation. The flood control (full) pool at elevation 1003 covers 8,600 surface acres and stores 176,500 acre-feet of water. The conservation pool, at elevation 974 covers 4,000 surface acres and stores 70,000 acre-feet of water. The dam consists of a zoned earthfill embankment, about 7,750 feet long, 111 feet high, with a maximum base width of 900 feet (see plate No. 21). The top of dam elevation is 1031. The outlet works is located in the right abutment approximately at flood plain level (see plate No. 21) and consists of an approach channel, control tower, a 13.5 foot (ID) single horseshoe conduit, transition section, stilling basin and outlet channel. Invert elevations range from 925 at the intake tower to 914 in the stilling basin. Outlet works capacity is 9,200 c.f.s. The uncontrolled spillway is located in a natural saddle about 1,760 feet west of the right abutment (see plate No. 21) and consists of a 200 foot wide by 1,500 foot long channel with an anchored concrete sill.

1-02. Construction Authority. Pomona Lake was constructed under authorization of the Flood Control Act of 1954, approved 3 September 1954, (Public Law 780, Eighty-Third Congress, Second Session).

1-03. Purpose and Scope. The purpose of this report is to present a complete record of the geology and foundation conditions, excavation procedures and equipment for future use. This report will focus primarily on foundations for the outlet works, right abutment, and spillway area where the bulk of rock foundations are involved. Stage I Construction was awarded to List and Clark Construction Company, Kansas City, Missouri, by Contract Number DA-23-028-CIVENG-59-551. Work on this contract started in July 1959 and consisted of excavating and making initial diversion of the stream, placing a portion of the embankment between the right abutment and the diversion channel, excavating and constructing the outlet works, and the bulk of work in constructing the spillway and construction of some of the access and service roads. The Resident Engineer was Mr. Fredrick Blanks.

Completion of Embankment Contract was awarded to Cook Construction Company, Jackson, Mississippi, Contract Number DA-23-028-CIVENG-61-250. Work on this contract started in January 1961 and consisted primarily of completing the embankment and making closure and diversion. The Resident Engineer was Mr. Ralph Dennis. The Project Geologist for both Stages was Mr. Lynn C. Myers.

CHAPTER 2

FOUNDATION INVESTIGATIONS

2-01. Investigations Prior to Construction.

a. A total of 326 test borings were completed prior to construction, of which 152 were drive holes, 20 undisturbed sample holes, 71 bedrock core holes, and 33 auger holes. In addition, fifty 30-inch or 36-inch machine auger holes were drilled as test pits. Most of the drive holes were 3-inch diameter and the balance were 6-inch. The bedrock core borings were of 2-1/8-inch and 6-inch diameter. A total of 4,420 lineal feet of overburden drilling and 4,053 lineal feet of bedrock coring was completed prior to construction (see plate No. 31).

b. Pressure Testing. Eleven core holes were pressure tested before construction. Two of these were located on the left abutment, two in the flood plain, four in the outlet works area, and three in the spillway area. Expansion packers set at 5-foot intervals were used in conducting flow tests and pressure duration tests at each location immediately following completion of drilling. Tests indicate a relatively tight foundation. Water and water pressure losses were practically negligible except in the upper few feet of the borings, in the primary zone of weathering. Results of pressure tests during grouting are shown on plates Nos. 36 thru 41.

2-02. Investigations During Construction. Sixty-three drive holes totaling 762 lineal feet and 30 core holes totaling 531 lineal feet were completed by Government drill crews. Sixty-three hand auger holes were completed by project personnel in developing the borrow areas.

2-03. Geology and Physiography.

a. General. Pomona Lake lies within the physiographic region known as the Osage Plains Section of the Central Lowland Province. This section is characterized by a series of plains separated by eastward facing escarpments, formed by differential erosion of harder and softer, upper Pennsylvanian limestone and shale strata, which dip gently westward. Hundred and Ten Mile Creek rises in the northwestern corner of Osage County, a few miles north of the town of Burlingame. It is a moderately incised, meandering stream with a relatively low gradient flowing within a mature valley. Valley widths average about 3,000 feet along Hundred and Ten Mile Creek with slightly greater widths along Dragoon Creek, a major tributary.

b. Topography. Major topographic forms in the dam and reservoir area are the Hundred and Ten Mile Creek flood plain and bordering steeper slopes on the right and more gentle slopes on the left abutment. At the centerline of the dam, the flood plain is approximately 3,500 feet wide. Hundred and Ten Mile Creek flowed near the right valley wall at the elevation 920 feet, m.s.l., with flood plain elevations ranging from 935 to 950 feet, m.s.l. The right abutment rises steeply at the axis to an elevation of 1066 in 800 feet, while the left abutment rises gently to elevation 1085 in 4,600 feet from the left edge of the flood plain.

Along the left abutment slope, two levels of terrace remnants form rather pronounced benches; one at elevation 945± and another at elevation 990±. These terraces reflect the positions of two major limestone ledges underlying them. At the damsite, ancient stream action has scoured deeply at a point in the vicinity of the present stream channel producing, in effect, a "buried channel."

c. Overburden. Overburden soils are primarily alluvial in origin, with older alluvial terrace remnants covering a major portion of the valley slopes. Residual soils occur as thin layers immediately above bedrock over a considerable area and also comprise a major portion of the overburden in the upper abutment slopes in the vicinity of the dam. Soils vary from fat to lean clays with fat clays predominating in the valley slopes and lean clays in the flood plain. The older alluvial terrace soils contain varying amounts of chert gravel which locally range as high as 60 percent. The recent alluvium of the buried channel contains irregular lenses and layers of silty, clayey gravel below a depth of 22 feet and may persist over areas of considerable extent. The maximum amount of overburden exists in a buried channel that is located along and intersecting the upstream toe of the embankment. This ancient channel was exposed in the diversion at station 41+00, range 4+25 U.S. and indications are that it extends along a NE-SW line to station 30+00, range 0+00. Elsewhere, the overburden is generally 3 to 15 feet thick. The Plattsmouth limestone exhibits a subdued outcrop on the left abutment while more prominent outcrops of Kereford limestone Clay Creek limestone, and Spring Branch limestone occur on the right abutment. Consequently, no appreciable amount of excavation was required on the abutments to find competent foundation. The right abutment was brought to preliminary grade after clearing and grubbing operations by the Stage I Contractor.

d. A cutoff trench was excavated from station 25+00 on the right abutment to station 85+00 on the left abutment according to plans and specifications (see photo No. 31), except in the vicinity of station 26+50 to station 27+00 where the necessity for such a trench was eliminated by the removal of materials from slides which occurred along the excavated slope of the Heumader shale. The plane of weakness causing the slides was in the transition zone between the residual clay and the shale. This shale weathers to a fat clay and it is, therefore, extremely difficult to hold on slopes steeper than 1V on 2.5H. Another such slide occurred downstream of the stilling basin. This slide necessitated removal of some 18,000 cubic yards of overburden and the placement of rockfill.

2-04. Bedrock Stratigraphy. The bedrock strata of this area are classified as upper Pennsylvanian system; the Virgilian series, Shawnee group. The uppermost formation is the Lecompton limestone with the members named in descending order: Avoca limestone, King Hill shale, Beil limestone, Queen Hill shale, Big Springs limestone, Doniphan shale and the Spring Branch limestone. The spillway is founded on the Spring Branch limestone member. For convenience during excavation, it was divided into three zones: "A" zone - 7 feet of limestone, "B" zone - 6 feet of shale, and "C" zone - 6 feet of limestone. The middle formation is the Kanwaka shale with the members named in descending order: Stull shale, Clay Creek limestone and

Jackson Park shale. The abutment of the service bridge is founded on top of the Clay Creek limestone member. The lowest formation in the work area is the Oread limestone. Its members in descending order are as follows: Kereford limestone, Heumader shale, Plattsmouth limestone, Heebner shale, Leavenworth limestone, Snyderville shale and Toronto limestone which is present in the left abutment only. The bulk of foundation excavation was in the upper three members of this formation, and the Plattsmouth serves as foundation for the outlet works. The lower four members are below any excavation (see plate No. 32).

2-05. Bedrock Structure. The general bedrock structure of the area can be described as a gentle homocline dipping slightly NNW approximately one foot vertical for every 110 feet horizontal with minor variations in local areas of the foundation of the outlet works. There the strata dip downstream SSE. From range 2+25 U.S. to 0+50 D.S. The dip is one foot in 55 feet. From range 0+50 D.S. to 1+00 D.S. The dip is one foot in 8 feet. From range 1+00 D.S. to 1+60 D.S., the strata rises one foot in 30 feet. From range 1+60 D.S. to 4+99 D.S. the dip is one foot in 170 feet. Bedrock in the spillway is essentially horizontal, dipping due east approximately 1.5 feet in 200 feet.

2-06. Weathering.

a. Chemical weathering of the strata was noted in the foundations of monoliths 5 thru 10 of the conduit. The lower Plattsmouth limestone was stained red and some solution channels were noted. The upper 0.5 foot of the limestone in this area was somewhat leached. Shale partings were weathered to clay or were completely removed.

b. Mechanical weathering was noted in the limestone foundation of monoliths 5 thru 9 of the conduit. The left (or riverward) half of the foundation was generally 0.5 feet to 1.0 foot lower than the right half of the foundation, with some small potholes 1.5 feet lower than the general foundation surface.

2-07. Strength of Rock. Core samples from 17 drill holes have been tested for strength in vertical compression, dry weight, moisture content, and wet-dry tests. Results are included in table II. With the exception of the Heebner shale member, all shale samples broken down completely during the first cycle of wetting and drying. The Heebner shale ranged from 100 percent breakdown in one cycle to no change in 20 cycles. The upper Heebner was the more vulnerable to this type of test.

CHAPTER 3

FOUNDATION CONDITIONS AND TREATMENT

3-01. Excavation.

a. Common Excavation. Overburden excavation of the diversion channel began in July 1959. After stripping, all satisfactory material was placed in the impervious zone of the embankment. This was followed by overburden excavation of the outlet works and the spillway. The excavated materials were placed in either the impervious, berm, or in waste areas as determined by their character during excavation. The equipment used for overburden excavation was a dragline and Euclid belly dump trucks.

b. Rock Excavation. Rock, from required excavation, was utilized in the embankment. Amonium nitrate and 60 percent dynamite were used. No blasting records were kept. The powder factor averaged 0.75 pounds of explosives per cubic yard of rock. Rock from required excavation in the diversion channel and outlet works was used as class I rockfill, class II rockfill and bedding, (see photo No. 34). Rock excavated from the spillway was used as limestone and shale fill. Line drilling and shot hole drilling was accomplished with air-trac type equipment. The rock excavation lines were generally within the prescribed limits, (see photo No. 19). One notable exception occurred where the right training wall ties into the Plattsmouth limestone approach channel. This portion was somewhat overshot and 19 cubic yards of fill concrete were used by the Stage I Contractor to backfill the overbreak. Another overbreak occurred in the upstream key trench of the spillway where 15 cubic yards of structural concrete was used. Excavation of this trench and the downstream trench was difficult because of the interior rock slopes indicated in the plans. After trying several schemes involving variations of shot hole drilling and firing delays, the Contractor line drilled (on an angle) this slope. The resulting excavation line was excellent and this method was used for the remaining interior slopes, (see photos Nos. 20 thru 30, and plate No. 32). Rock excavation was accomplished with power shovels, draglines, Turnarockers, and Euclids.

3-02. Anchor Bars. Anchor bars were installed in the stilling basin and in the spillway. Holes were drilled with 6-inch diameter tricone roller bits using air to remove drill cuttings. The drill rig was mounted on a D-8 caterpillar dozer that also carried a compressor and dust exhausting system. All holes in the horizontal section of the spillway were drilled prior to excavating the sill to final grade. This allowed the drilling to be done from a level surface. The holes were then filled with sand and remained in that condition until the excavation was later brought to final grade. The holes were overdrilled 0.5 foot and then cleaned by use of air-water jetting. The holes were then pumped and swabbed just prior to placing the anchor bars. Drilling of the anchor bar holes on the 1V on 1.5H side slopes of the spillway was done by Stage I grouting subcontractor. This drilling was done by laying track up the slope along the line of holes and using a drill rig mounted on a self-leveling platform (see photos Nos. 29, 30, 32 and 33). Anchor bar holes that penetrated more than 3 feet into the Stull shale were "belled" at

the bottom according to specifications. This was done by using a special bit designed to ride on the bottom of the hole and, by rotating and applying pressure, the cutting edges were forced out and the required dimensions obtained. The excavation was later brought to final grade, the sand was jetted out and the holes pumped and swabbed. Grout was then placed in the hole, rodded, and the anchor bar, adjusted to proper elevation, was then spaced and suspended in the grout.

3-03. Foundation Preparation. The preparation of rock foundations was accomplished in two phases. Preliminary preparation consisted of a close visual examination, aided by air-water jets, and sounding the foundation for drummy rock. A rock drill was also employed to check for soft clay seams, to a depth of 4 feet below the excavation line. Any objectionable material was hand excavated and final foundation cleanup was done immediately prior to placing concrete. This was a final wash with air and water. The water was pumped or sponged as necessary and grout and concrete placed. All rock foundations were in limestone except for a 5-foot section of Doniphan shale at the top of the 1V on 1.5H side slopes in the spillway and the service bridge pier foundation in the Heumader shale. On the shale foundation, brooming and air jets were used to prepare the foundation. Foundation surfaces where soil fill was to be placed received the same foundation cleanup as those surfaces which received concrete except that the final wash was omitted. The soil foundation areas were prepared to receive fill by scarifying and rolling according to the plans and specifications.

3-04. Character of Foundations.

a. Outlet Works. The rock foundations of both the outlet works and the spillway were excavated along essentially horizontal bedding planes and are considered to be excellent. Although the foundation of the outlet works is jointed, the joints are tight and unstained except in the riverward half of monoliths 5 thru 9, as indicated previously (see photos Nos. 1 thru 14 and plate No. 35). To further substantiate the degree of competency of the foundation, 22 rock drill holes were drilled to check the subsurface for weak zones. Where soft zones or solution channels were found, the material was removed prior to final preparation. A shale bed, in the lower Plattsmouth limestone in the outlet works foundation between monoliths 5 and 12, was excavated because of its soft condition. At monolith 12 the shale's competence improved and the foundation excavation grade was raised 1.5 feet to the top of the shale.

b. Spillway. The foundation of the spillway slab was not mapped. It was in unweathered Spring Branch limestone, "C" zone, and was in excellent condition. The least competent foundations here underlined the top slabs of the sill on both slopes. These portions rest on comparatively weak Doniphan shale. However, very little support is needed as no appreciable load is carried. The abutment pier of the service bridge was founded on top of the Clay Creek limestone. The usual prominent jointing of this member was in evidence but the foundation appeared quite competent, as did the service bridge pier foundation which was in firm and unweathered Heumader shale (see photos Nos. 20 thru 28).

3-05. Ground Water. Control of ground water entering the foundations was not difficult but several extended wet periods proved troublesome because of surface runoff and activation of wet weather springs. Considerable pumping was required to keep the various areas dewatered. The wet periods proved especially bothersome during excavation and backfill of the 5-foot deep cutoff trench in an area near the toe of the left abutment. In this area water migrated along the top of bedrock through the valley alluvium and into the cutoff trench. The water was controlled by using centrifugal pumps and, after removal of objectionable material, normal backfilling and compaction was accomplished.

3-06. Curtain Grouting.

a. Stage I grout operations began in December 1959 and were completed in December 1960 (see plate No. 38). Grouting, using the stage grouting method, was started at Sta. 31+00, Range 0+60 U.S. and progressed to Sta. 28+60, Range 0+60, Range 0+60 U.S. Because of haul road traffic and outlet works excavation, grouting operations were then moved to the right abutment. Grouting operations began there at Sta. 26+30, Range 0+60 U.S. and progressed up slope to Sta. 24+67, Range 0+05 U.S. (see plates Nos. 40 and 41). After completing this section of the grout curtain the operations were moved to Sta. 27+55, Range 0+60 U.S. and progressed up slope to tie into the grout curtain at Sta. 26+30, Range 0+60 U.S. (see plate No. 39). The curtain was then completed between Sta. 28+60, Range 0+60 U.S. and Sta. 27+84.5, Range 0+60 U.S., except for five conduit grout holes which were completed under Modification No. 15 in July 1961. The grouting subcontractor was Air-Made Well Company, Edwardsville, Kansas (now known as the Judy Drilling Co.). The subcontractor laid railroad track on the right abutment, on the outlet works slopes and drilled grout holes with the drill mounted on the rails. This method simplified the operation of relocating over the drill holes as the succeeding zones were drilled (see photo No. 37). Excluding the five conduit holes, the Stage I Contract grouting subcontractor drilled a total of 7,212 lineal feet of grout hole, made 122 grout hole connections, and used a total of 2,386 cubic feet of cement. One thousand nine hundred and thirty-seven cubic feet of cement were injected and 354 cubic feet were used for backfill of grout holes. Under Modification No. 15 for the conduit grouting, 143 lineal feet of grout holes were drilled, four connections were made and 17 cubic feet of cement were used.

b. Embankment grouting began in June 1961 and was completed in August 1961. This contract covered the following areas: from Sta. 63+80, Range 0+60 U.S. to Sta. 67+50, Range 0+60 U.S.; and the diversion channel from Sta. 40+03, Range 0+60 U.S. to Sta. 40+98, Range 0+60 U.S. (see plates Nos. 36 and 37). Stage grouting techniques were used. The grouting subcontractor was Layne-Western Company, Kansas City, Missouri. The subcontractor drilled 1,042 lineal feet of grout hole, made 23 connections, injected 31 cubic feet of cement and used a total of 78 cubic feet of cement. A summary of grout "takes" is shown on table I.

3-07. Closure. Overburden in the diversion channel was excavated with scrapers when dry. Wet muck and organic clays were excavated with a dragline. The sides were sloped 1V on 2.5H. The excavation was continued down into Plattsmouth limestone to elevation 920 using jackhammers, and by picking and barring. The bottom width was 40 feet and the side slopes were cut 1V on 1H. After dewatering the foundation surfaces were cleaned with three separate washes using air-water jets. Rolled impervious clay was then placed. Compaction equipment traveled parallel to the rock side slopes until the fill reached the top of rock at which time the equipment resumed the normal direction of compaction parallel to the embankment (see photos Nos. 15 thru 18 and plate No. 26).

3-08. Instrumentation. Four types of observation devices were installed in the embankment and foundation. Of 22 piezometers, tips of 13 are in the foundation clays, gravel or limestone. The remaining nine have tips in the embankment. All are the open tube type. These devices were installed during construction and are shown on plate No. 30. In June 1964, six crest settlement monuments were installed at the top of the dam, 14 feet downstream of the centerline. Two are located in the buried channel reach at stations 30+50 and 33+00. The other four are located at 1,500-foot intervals, starting at station 40+00. In February 1972, twenty-five horizontal alignment monuments were installed. The monuments are on 200-foot centers on a line 100 feet downstream of the centerline and extend across the valley from station 26+00 to station 74+00. Instrument monuments are located at each end of the line.

1

TABLES

TABLES

TABLE I - GROUTING SUMMARY - POMONA DAM

STAGE I CONTRACT

<u>Grout Stage</u>	<u>Zone</u>	<u>Grout Hole Drilling Lineal Feet</u>	<u>Cubic Feet Cement Placed</u>
Primary	1	914.0	172
Secondary	1	975.0	65
Tertiary	1	<u>695.0</u>	<u>44</u>
Total	1	2,584.0	281
Primary	2	1,830.0	866
Secondary	2	1,474.0	134
Tertiary	2	<u>232.0</u>	<u>13</u>
Total	2	3,536.0	1,013
Primary	3	626.0	616
Secondary	3	609.0	27
Tertiary	3	<u>0.0</u>	<u>0</u>
Total	3	1,235.0	643
Total Primary		3,370.0	1,654
Total Secondary		3,058.0	226
Total Tertiary		<u>927.0</u>	<u>57</u>
Total (all zones)		7,355.0	1,937

COMPLETION OF EMBANKMENT CONTRACT

<u>Grout Stage</u>	<u>Zone</u>	<u>Lineal Footage Drilled</u>	<u>Cubic Feet Cement Placed</u>
Primary	1	254.0	25
Secondary	1	250.0	0
Tertiary	1	<u>29.0</u>	<u>0</u>
Total	1	533.0	25
Primary	2	268.0	4
Secondary	2	241.0	2
Tertiary	2	<u>0.0</u>	<u>0</u>
Total	2	509.0	6
Total Primary		522.0	29
Total Secondary		491.0	2
Total Tertiary		<u>29.0</u>	<u>0</u>
Total (all zones)		1,042.0	31

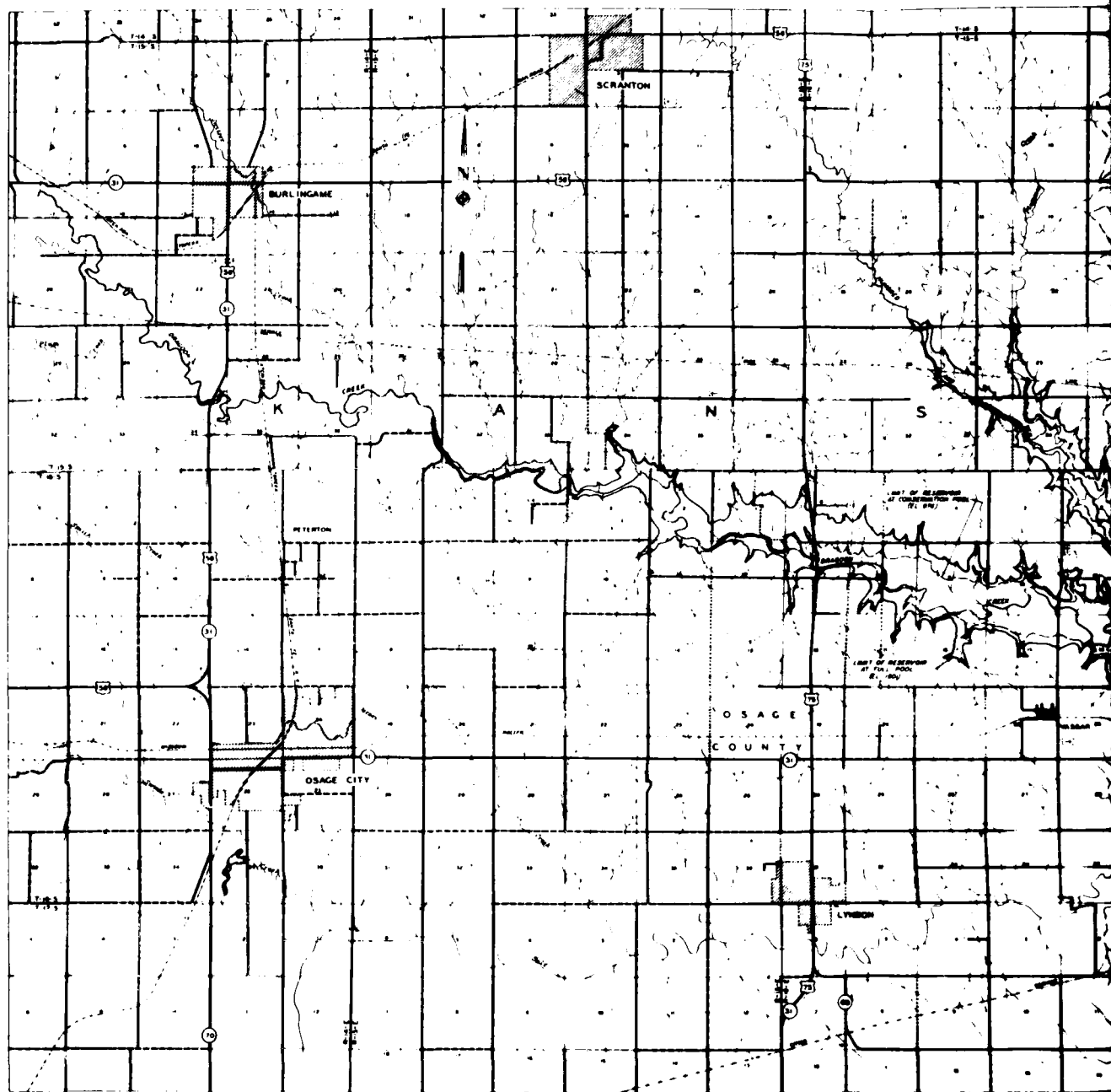
TABLE II - LABORATORY TESTS ON BEDROCK - POMONA DAM

Member	Vertical Compression		Ton/Ft. 2		Dry weight #/Ft. 3		Moisture Content % Dry Weight		MgSO ₄ (5 Cycles)	
	No of Tests	Avg.	Max.	Min.	No. of Tests	Avg.	No. of Tests	Avg. %	No. of Tests	Avg. % Less
Bell Limestone	1	324	-	-	1	160	1	2.0	-	-
Queen Hill Shale	1	154	-	-	1	117	1	8.0	-	-
Doniphan Shale	8	15	51	1.5	8	180	1	12.0	-	-
Spring Branch										
Zone A	2	257	423	100	2	151	2	4.5	-	-
Zone B	2	12	13.5	11	2	130	2	12.0	-	-
Zone C	1	632	-	-	1	165	1	0.5	1	0.40
Stull Shale	5	53	138	24	5	135	5	9.6	-	-
Clay Creek Limestone	1	603	-	-	1	166	2	3.6	-	-
Jackson Park Shale	9	98	338	31	9	140	9	7.4	-	-
Kereford Limestone	6	500	590	288	7	162	8	3.0	3	13.93
Heumader Shale	17	27.5	66	8	19	134	19	9.9	-	-
Plattsmouth Limestone	14	615	810	356	14	158	14	3.2	9	3.77
Heebner Shale	13	181	338	37	13	132	14	6.8	-	-
Leavenworth Limestone	3	250	370	91	3	158	3	1.6	-	-
Snyderville Shale	10	41	93	17	13	144	13	7.7	-	-
Lawrence Shale	5	36	56	22	5	136	5	7.7	-	-

T-2

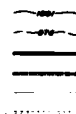
DRAWINGS

DRAWINGS



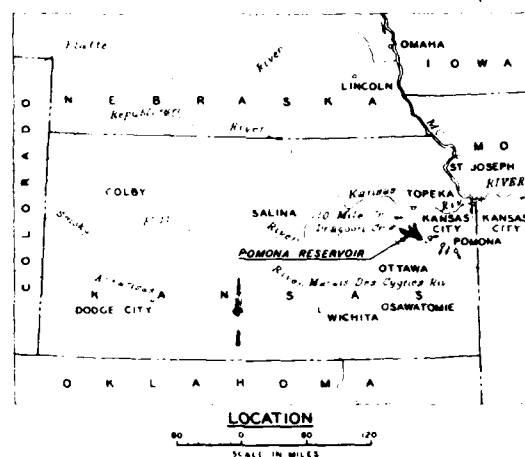
LEGEND

Full pool
 Conservation pool
 Concrete or bituminous pavement
 Improved road
 Graded road
 Trail



GENERAL

This map compiled from the
 Highway map, supplemented by
 Engineers photogrammetric survey
 reservoir area



This map compiled from the Kansas State General Highway map, supplemented by the U S Army Corps of Engineers photogrammetric surveys covering the reservoir area.

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA DAM
COMPLETION OF EMBANKMENT

In 29 sheets Sheet No. 1
U. S. ARMY ENGINEER DISTRICT
KANSAS CITY

Scale: as shown
KANSAS CITY, MO.
SEPTEMBER 1960

PLATE NO. 1



RECORD DRAWING

OCTOBER 1992

CONTRACT NO. 62-01-0000-00000000

MARCH 1962

CONTRACT NO. DA 23-028 CRYENG 59-551

SYN	Revised for Bull conditions	DATE	APPRO
DESCRIPTION			
REVISIONS			

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE I CONSTRUCTION

PLAN OF WORK AREA
EMBANKMENT, OUTLET WORKS & SPILLWAY

in 80 sheets
U S ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No 4

Scale as shown
KANSAS CITY, MO
APRIL 1959



Submitted
J. M. McLean
Chief, Earthquake Dist. Cos.
Drawn by Traced by
MOL QHR-GB

Recommended
George S. Paul
Chief, Engineering Division
Checked by
PEM

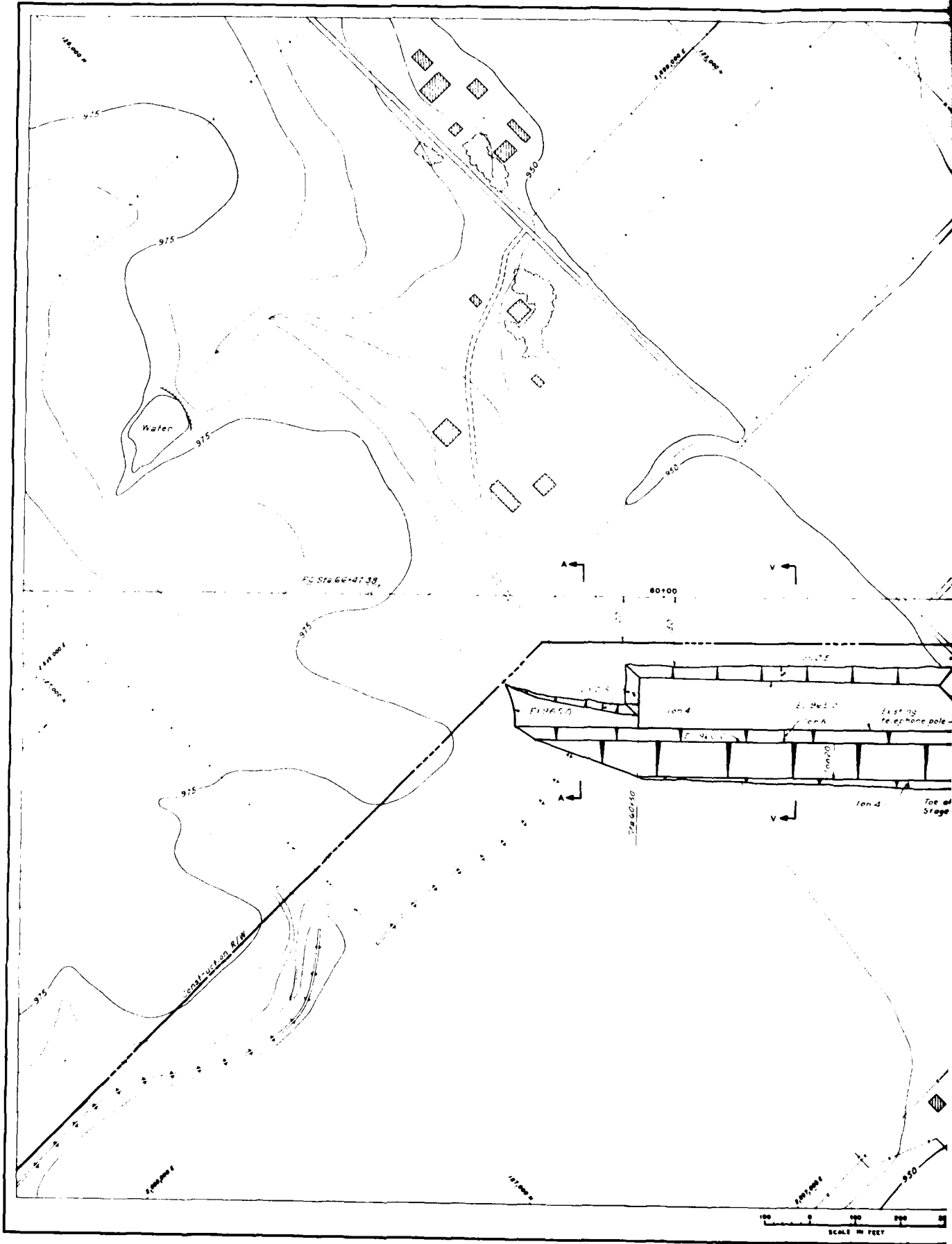
Approved
R. E. Larson
Ch. E. District Engineer
File No.
O - 3 - 304

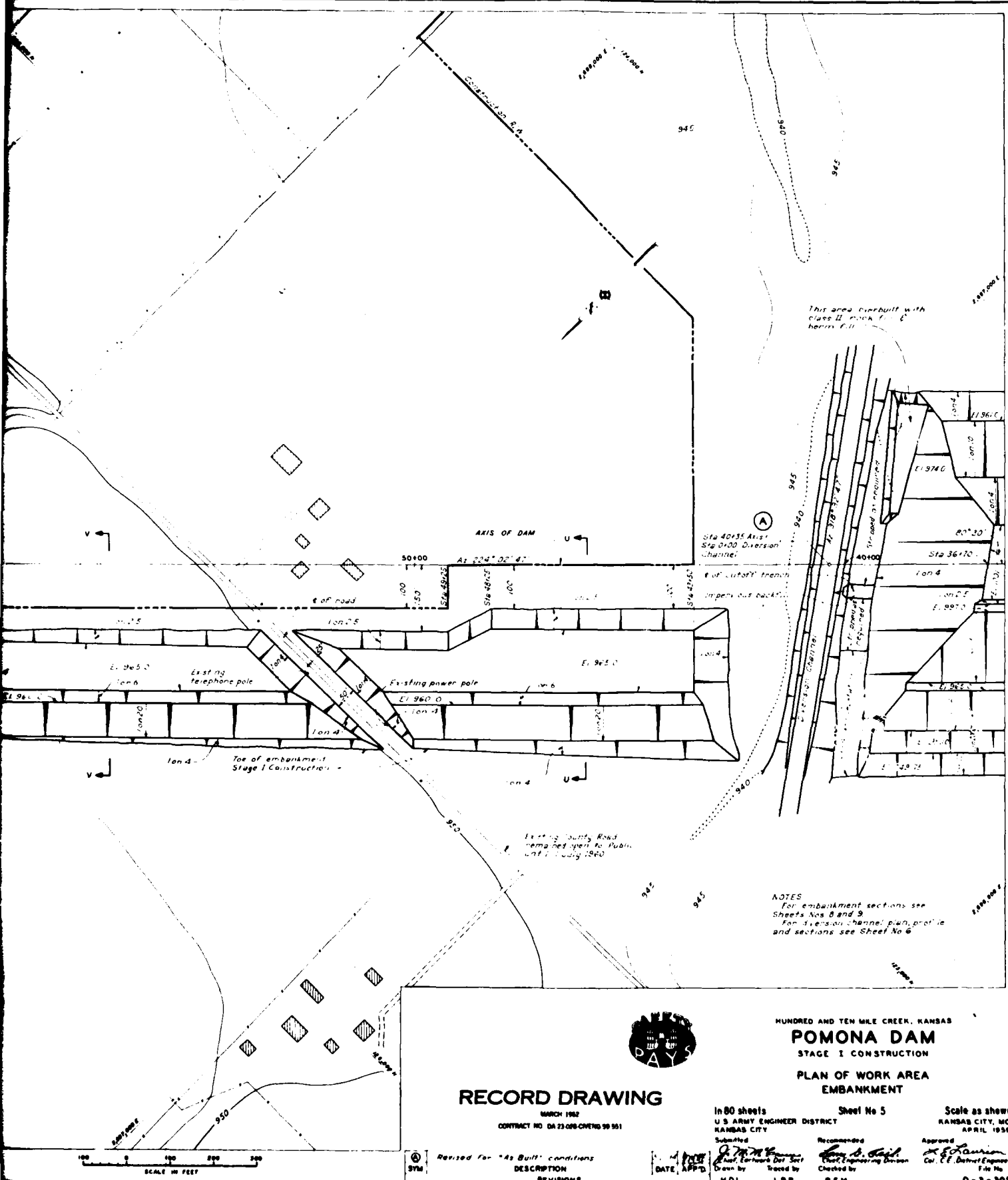
MDL QHR-GB

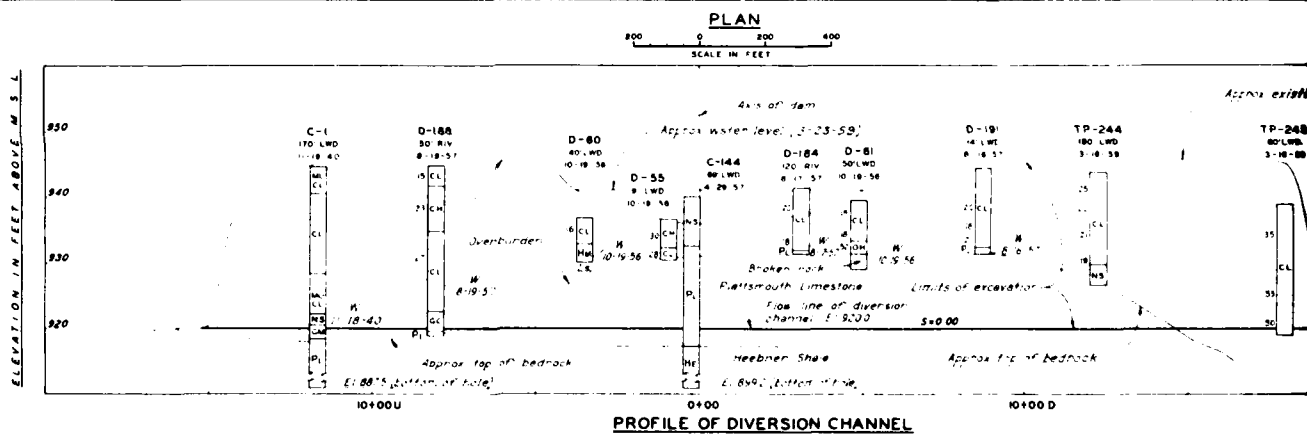
PEM

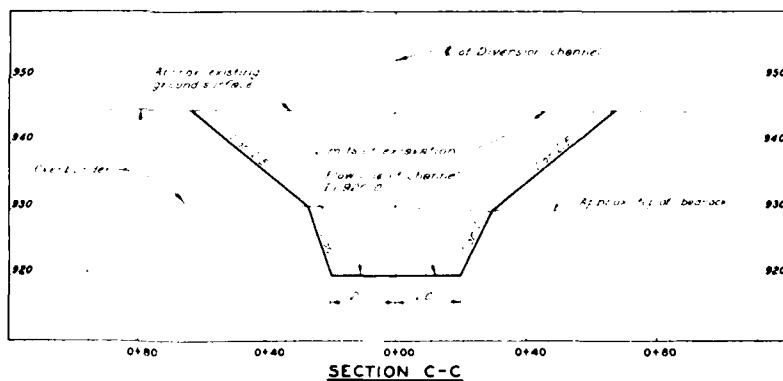
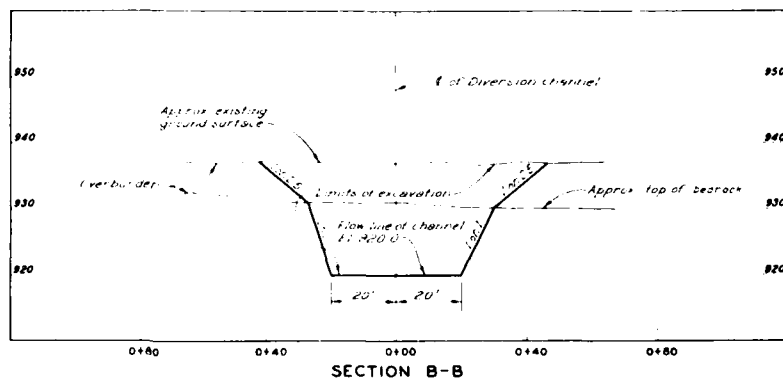
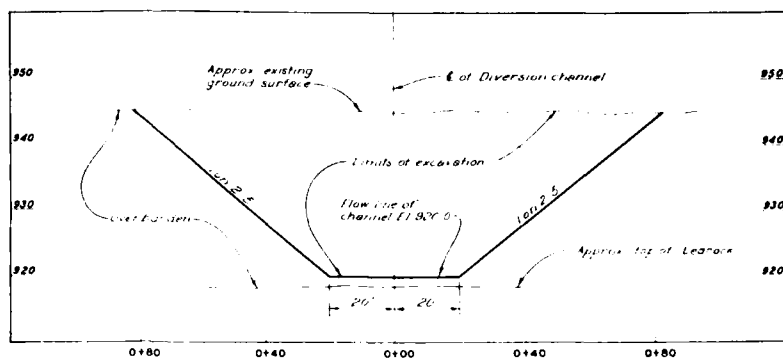
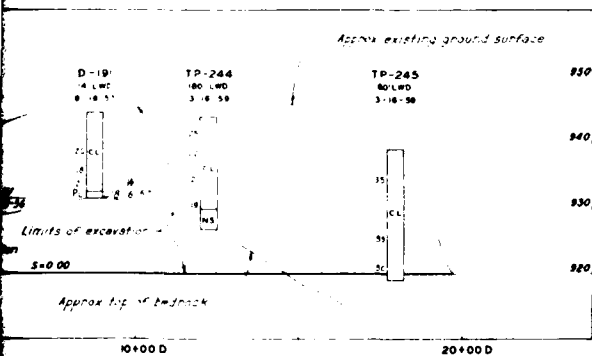
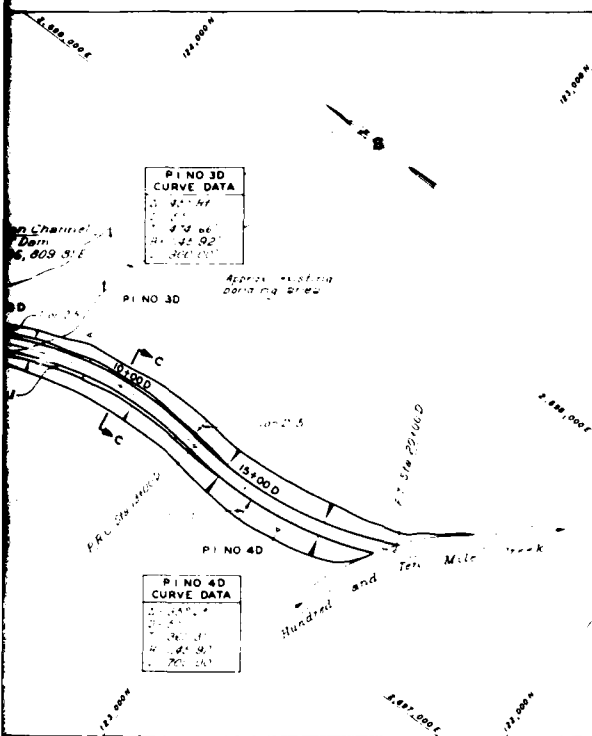
O - 3 - 304

PLATE NO. 2









NOTES
For legend of logs see Sheet No. 16
For other logs or underground
explorations see Sheets Nos. 5, 16 & 17
For location of borings see Sheet No. 15

RECORD DRAWING

MARCH 1962
CONTRACT NO. DA 23-028 CRENG 59 551

SYMBOL	DESCRIPTION	DATE	APP'D
Revised for "As Built" conditions			

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA DAM
STAGE I CONSTRUCTION
DIVERSION CHANNEL
EXCAVATION

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 6

Scale as shown
KANSAS CITY, MO
APRIL 1959

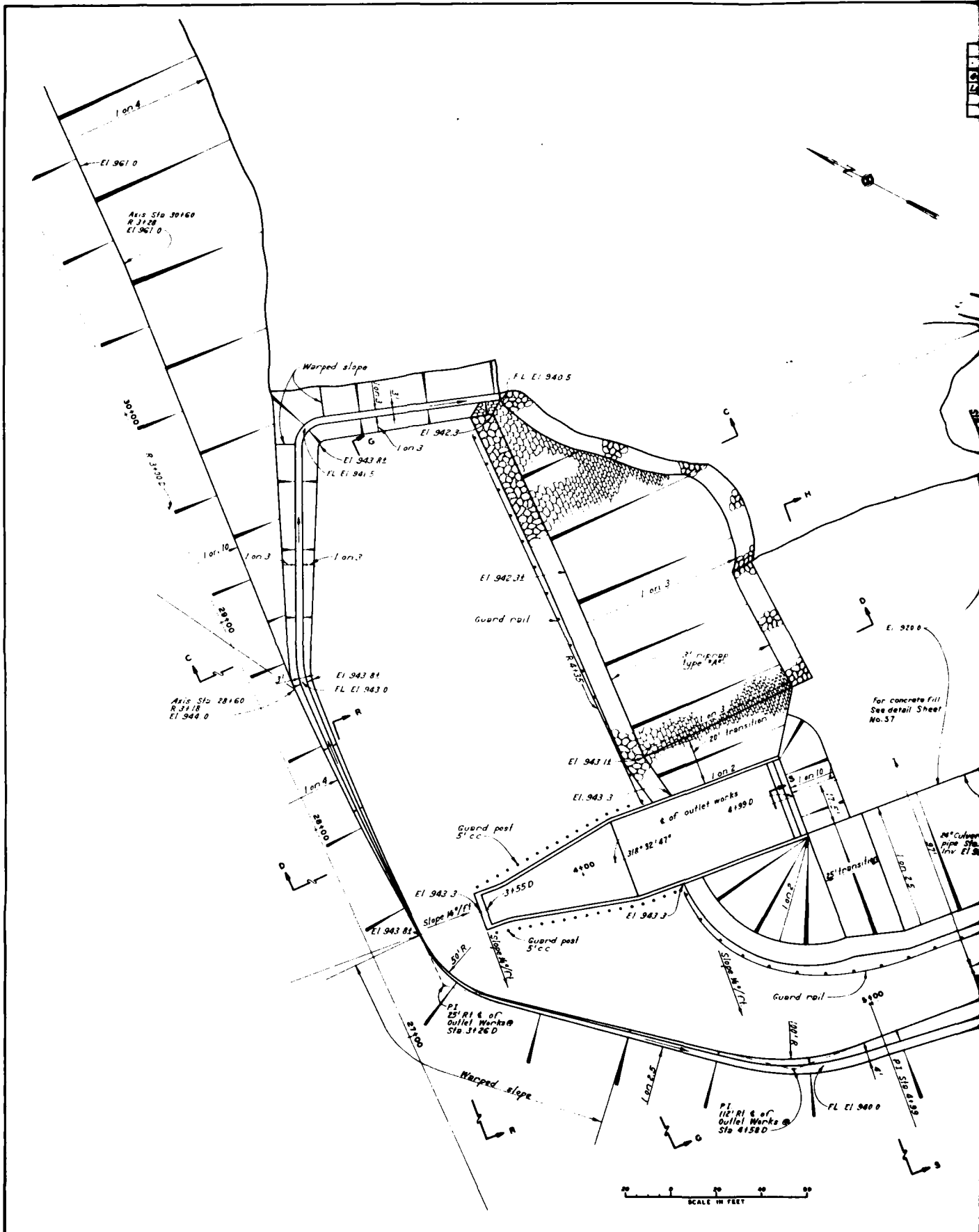


Submitted
Checked by
Drawn by
HDL
FEG
P.E.M.

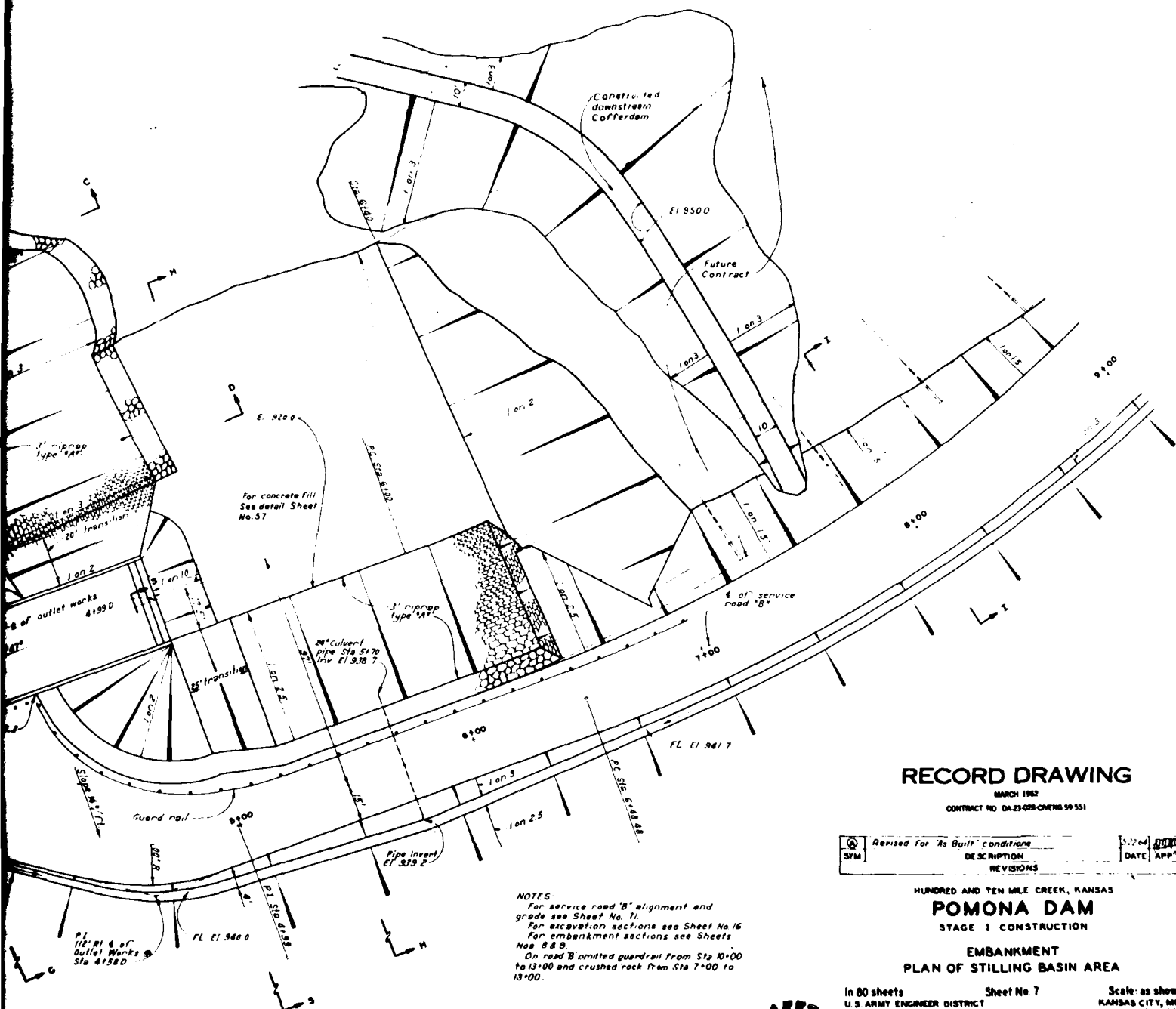
Recommended
Checked by
P.E.M.

Approved
C.E. District Engineer
File No.
O-3-308

PLATE NO. 4



SCHEDULE OF GUARD POSTS			
LOCATION	NO	SPACING	SIDE
Stillage basin	33	5'cc	1 & Rt



MARCH 1962

CONTRACT NO. DA-23-028-CNENG 99 551

 SYM	Revised for "As Built" conditions	DATE	APP'D
	DESCRIPTION		
	REVISIONS		

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE 1 CONSTRUCTION

STAGE 1 CONSTRUCTION

EMBANKMENT
PLAN OF STILLING BASIN AREA

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 7

Scale: as shown
KANSAS CITY, MO.
APRIL 1938

Submitted

Recommended

Approved

J. M. M. L.
Prof. Earthward Del Soc!
Drawn by Traced by

Chief Engineering Division
Checked by

CE Laurion
Col. C.E. District Engineer
File No

NR

9.5.1

PE. M

0-3-307

PLATE NO. 8

1080
UPSTREAM

1040

1000

960

920

Future construction

E. 949.75
R=4+28.5

E. 940.0
R=4+38.5

E. 950.0
R=3+78.5

E. 965.0
R=2+70

E. 965.0
R=2+68.5

E. 953.0
R=2+68.5

Minimum required waste area

Rock fill Class I

Riprap Type B

Shale and limestone fill

Berm fill (impervious)

Berm fill

Flatten river bed (See plan)

Approx top of bedrock

Rain overdrains

Approx flow line of river

7+00 6+00 5+00 4+00 3+00 2+00

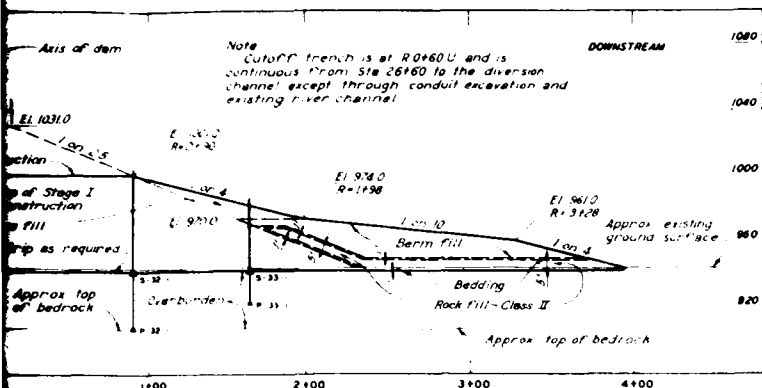
The diagram illustrates a cross-section of a dam structure, labeled 'SECTION C-C STA. 28+1'. The horizontal axis represents the 'RANGE' from 5+00 to 10+00, and the vertical axis shows elevation from 920 to 1080. Key features include:

- UPSTREAM**: Indicated at the top left.
- Axis of dam**: A vertical line on the right side.
- Future construction**: A dashed line showing the planned profile.
- Top of Stage I construction**: A solid line showing the current stage.
- Impervious fill**: A horizontal line across the middle of the dam.
- Stripped as required**: A dashed line below the impervious fill.
- Approx. top of bedrock**: A dashed line at the bottom.
- Berm fill begins at Sta. +9+00**: A label pointing to a specific location.
- Riprap Type B**: A label pointing to a specific location.
- Approx. existing ground surface**: A label pointing to a specific location.
- 6' of cutoff trench**: A label pointing to a specific location.
- EL 1001.0 R=0+90**: A label pointing to a specific location.
- EL 960.0 R=3+32**: A label pointing to a specific location.
- EL 955.0 R=0+60**: A label pointing to a specific location.
- 1 on 2.5**: A slope ratio label.
- 1 on 5**: A slope ratio label.
- 1 on 3**: A slope ratio label.
- 1 on 1.5**: A slope ratio label.
- 1 on 1.5**: A slope ratio label.
- 10'**: A vertical dimension label.
- 30'**: A vertical dimension label.
- 60'**: A vertical dimension label.
- 5'**: A vertical dimension label.
- 10'**: A vertical dimension label.

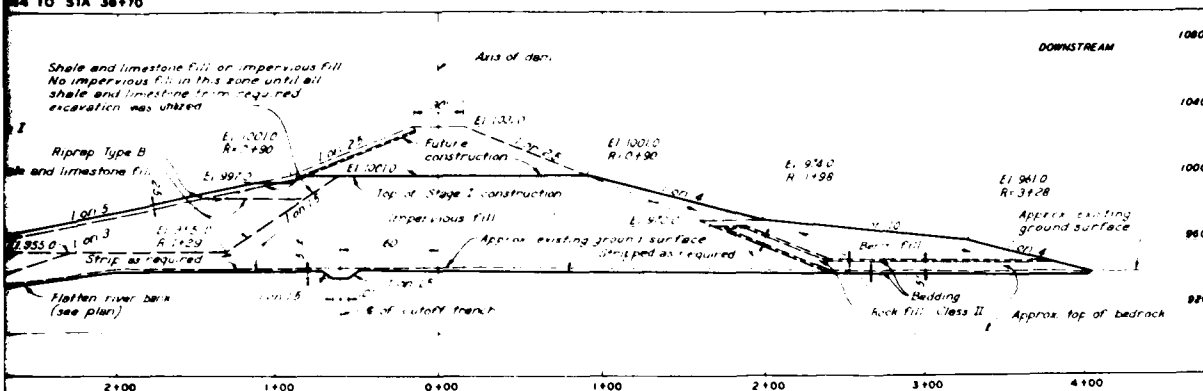
This longitudinal section shows the dam structure and the approach roadway. The vertical axis represents elevation in feet, ranging from 880 to 1080. The horizontal axis represents stationing, ranging from 3+00 (UPSTREAM) to 2+00 (DOWNSTREAM). Key features include:

- Dam Structure:** The dam crest is at elevation 1031.45. The downstream face of the control tower is at station 3+00, elevation 982.0. The top of Stage 1 construction is at elevation 980.0. The future construction line is shown with a 1 on 2 slope. The axis of the dam is indicated.
- Approach Roadway:** The existing ground surface is shown with a 1 on 2 slope. The proposed roadway is shown with a 1 on 2 slope. The limit of excavation is indicated.
- Conduit:** A conduit is shown at the base of the dam, with an approximate top of bedrock indicated.
- Other Labels:** "Imperious fill 1 on 2", "Pervious fill around conduit see Sheet No 10", and "Approx existing ground surface".

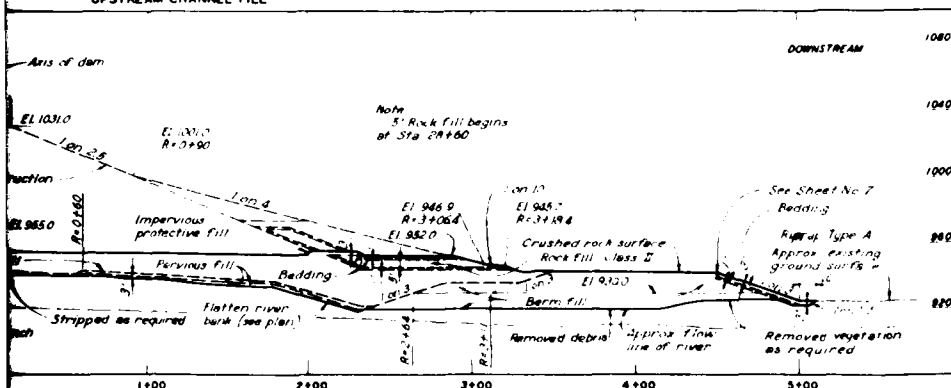
SECTION D-D STA. 27+80



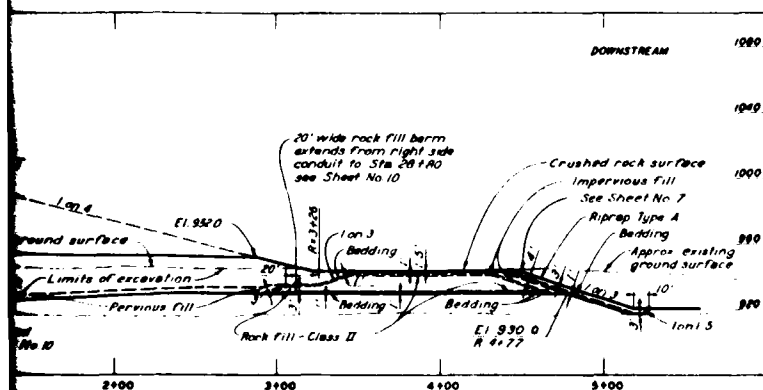
34+00
34 TO STA 36+70



SECTION B-B STA 32+30
UPSTREAM CHANNEL FILL



RANGE
C-C STA 28+00



NOTES
For plan of embankment see Sheets Nos 4 & 5.
For plans of interior embankment outlet works downstream see Sheet No 6.

RECORD DRAWING

MARCH 1962

CONTRACT NO. DA 22-026 CIVENG 98 551

SYMBOL	DESCRIPTION	DATE	APPROVED
	Revised for "As Built" conditions		
	REVISIONS		

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA DAM
STAGE I CONSTRUCTION

EMBANKMENT
SECTIONS

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No 8

Scale as shown
KANSAS CITY, MO
APRIL 1959



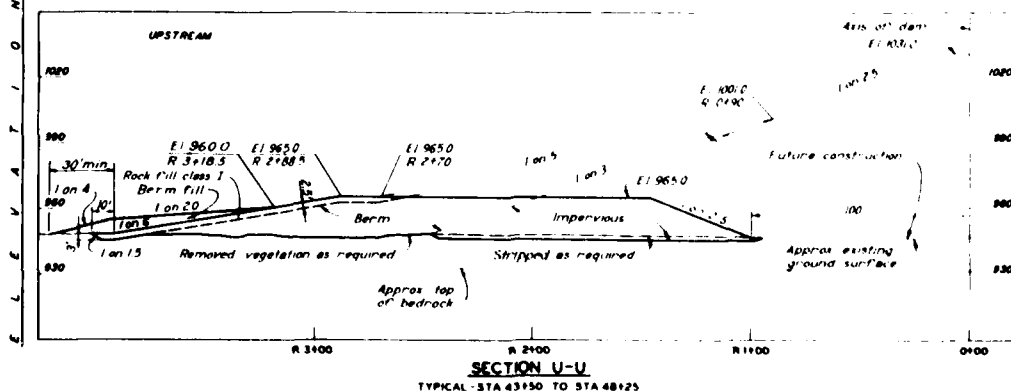
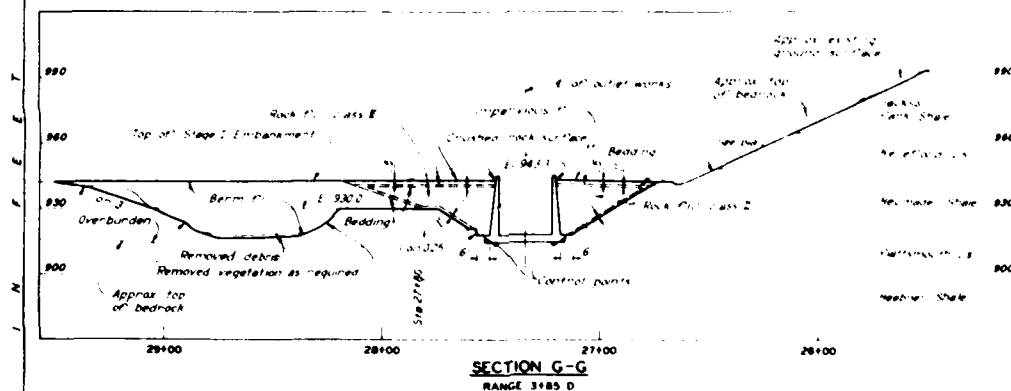
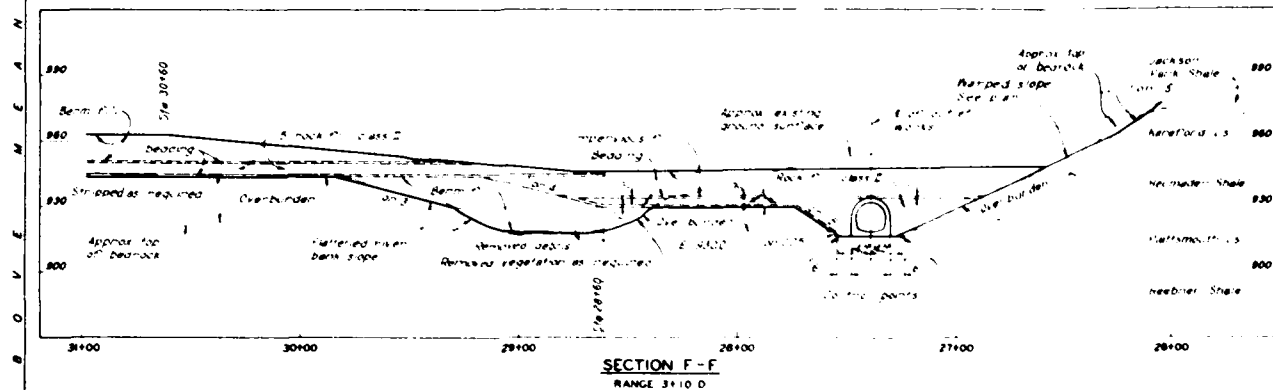
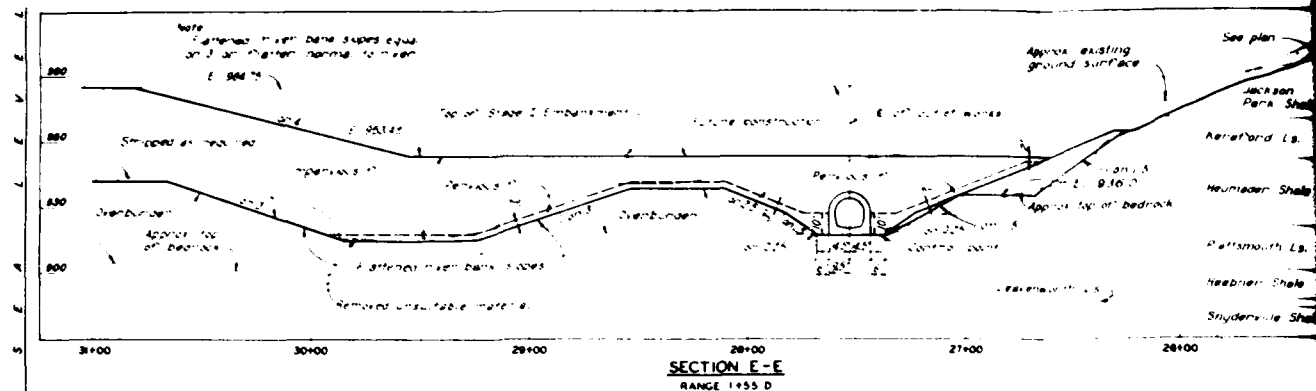
Submitted
Chief, Earthwork Dist. Serv.
Drawn by
HOL

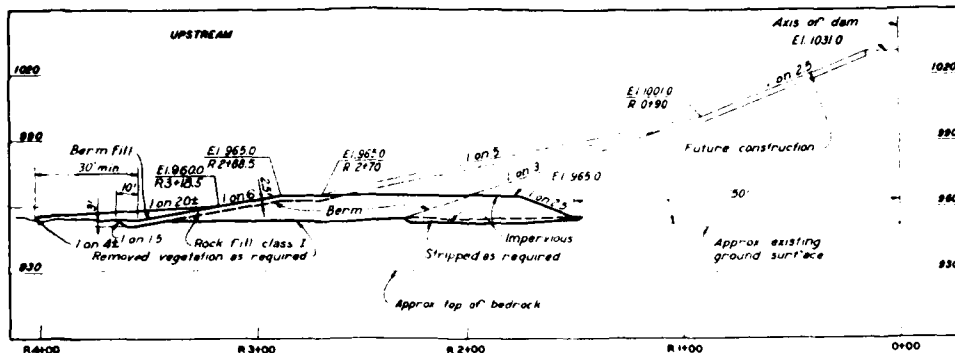
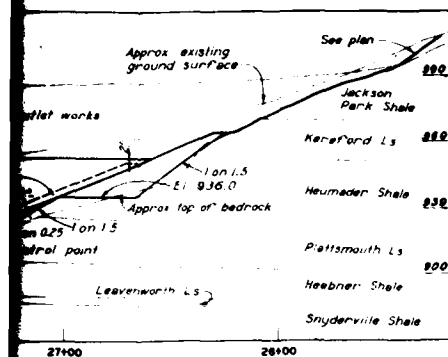
Recommended
Chief, Engineering Division
Checked by
REC

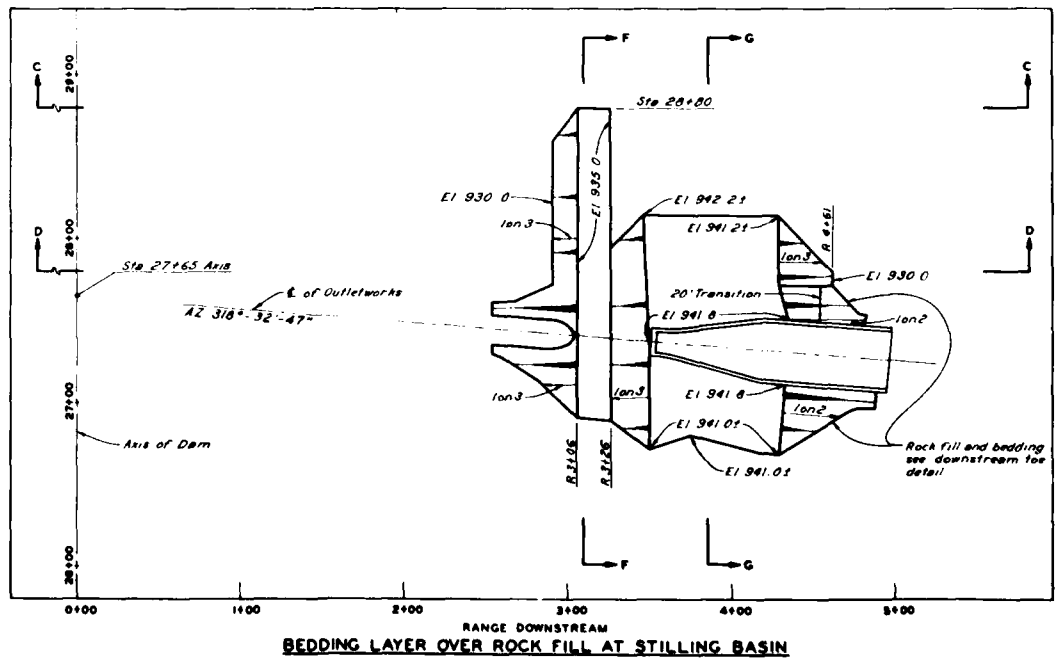
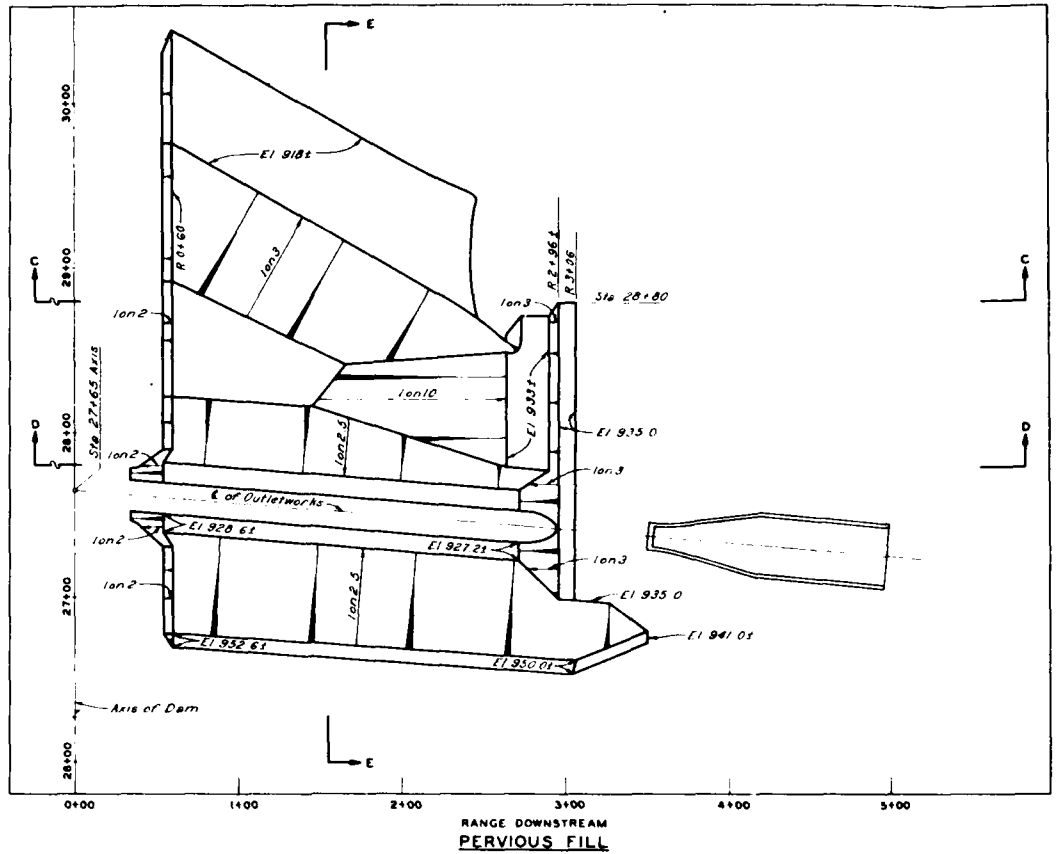
Approved
Chief, District Engineer
File No.
PEM

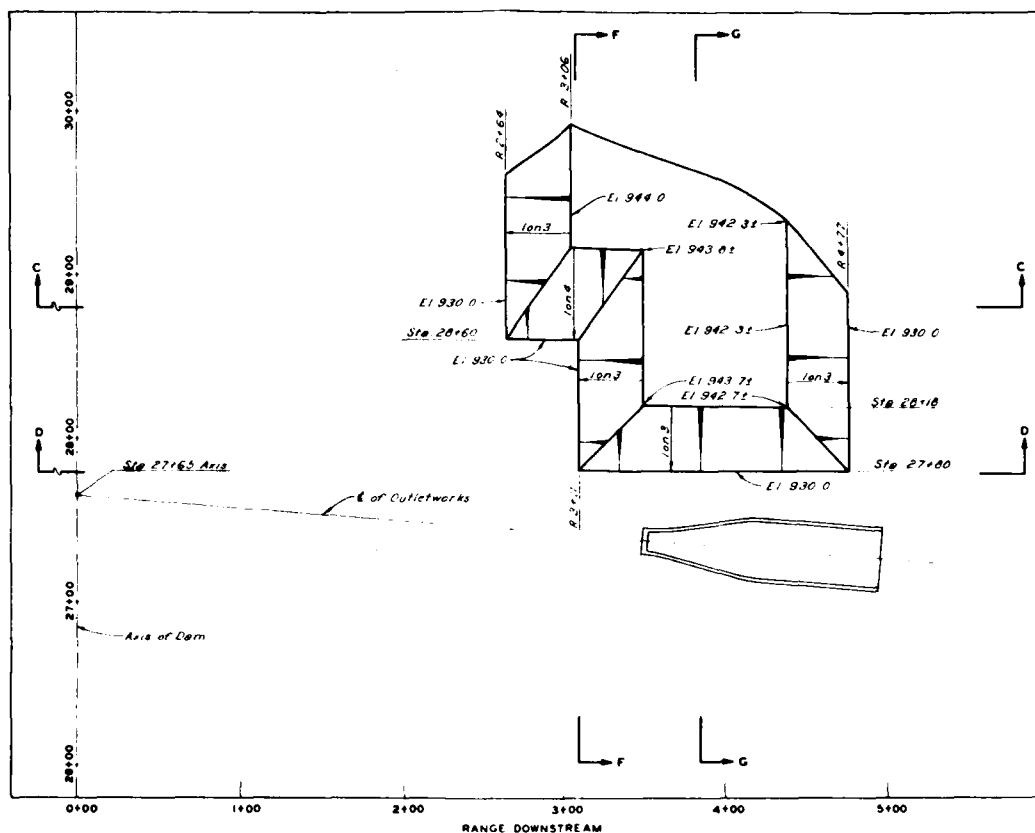
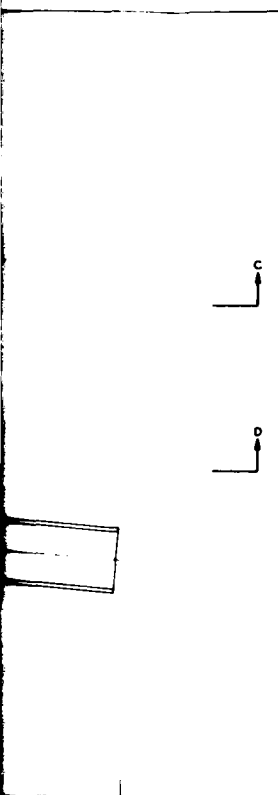
0-3-308

PLATE NO. 6

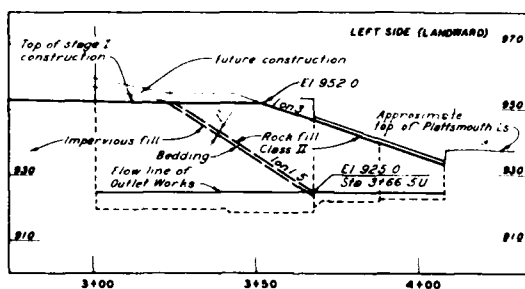
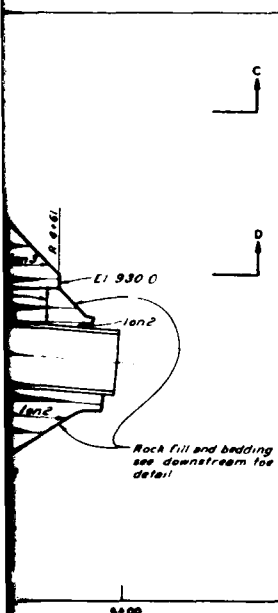




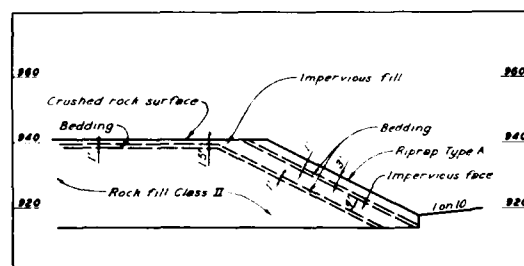




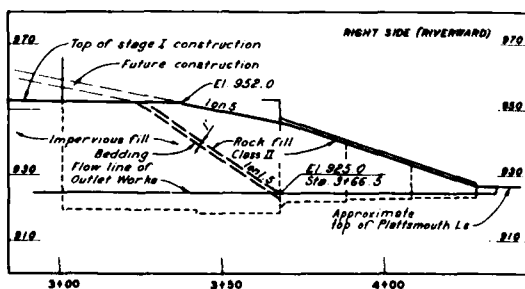
BERM FILL PRIOR TO ROCK FILL AT STILLING BASIN



DETAILS OF FILL WEST SIDE CONTROL TOWER



TOE DETAIL ADJACENT TO STILLING BASIN



DETAILS OF FILL EAST SIDE CONTROL TOWER

NOTES
For plan at control tower see Sheet No 4
For plan at stilling basin see Sheets Nos 4C7

SYN	DESCRIPTION	DATE	APPRO
6	Revised for "As Built" conditions	5/27/64	JMB

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA DAM
STAGE I CONSTRUCTION

EMBANKMENT
INTERIOR PLANS AND DETAILS



In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY
Submitted by: [Signature]
Checked by: [Signature]
H.D.L. F.E.G. P.E.M.

Sheet No 10
Scale as shown
KANSAS CITY, MO
APRIL 1959

Approved: [Signature]
Col. C. F. Blair, Jr., Engineer
9th Div.

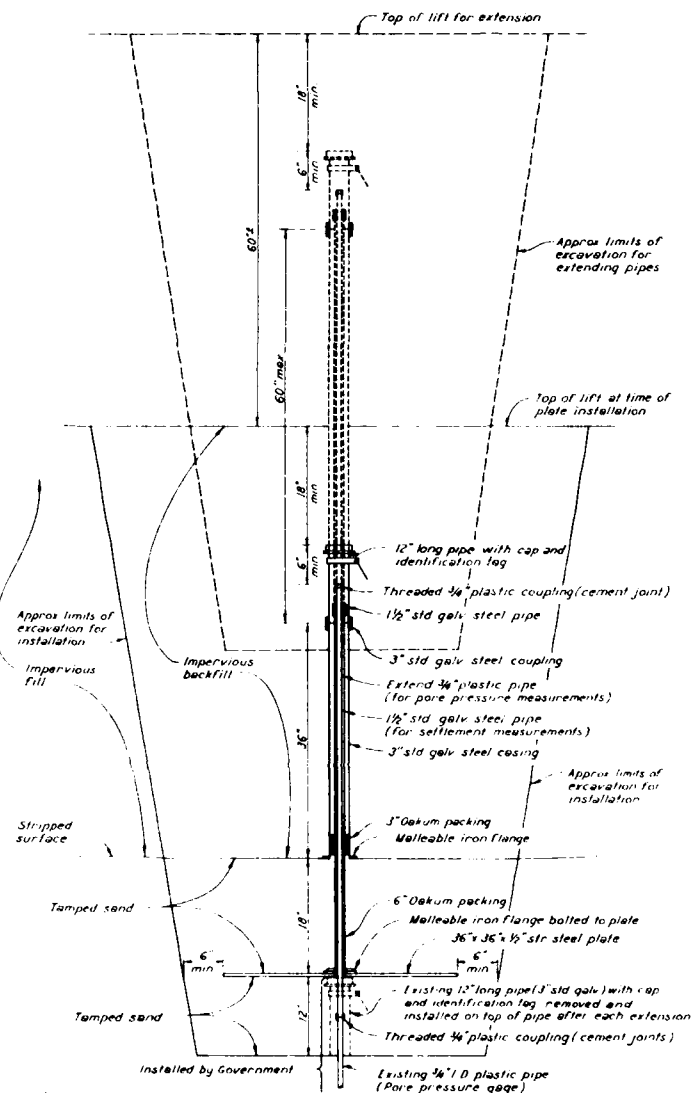
RECORD DRAWING

MARCH 1960
CONTRACT NO. DA-23-082-CHENG-82-001

PLATE NO. 8

Note

Pipes extend 36" minimum above the finished embankment grade. The 3" outer casing painted alternating black and chrome 6" bands and provided with a 3" brass plug with 1/8" hole.



Note
Pipes centered to maintain clearance
The space between the 3\"/>

SETTLEMENT PLATE INSTALLATION AND PORE PRESSURE GAGE EXTENSION DETAIL

SETTLEMENT PLATE DATA				
NUMBER	STATION	RANGE	PLATE APPROX. ELEV.	EXTENSION APPROX. LENGTH
S-32-1	31+70	0+900	940.0	66'
S-32-2	32+30	1+120	944.0	36'
S-31-1	33+00	1+650	943.0	40'
S-34-1	34+50	1+120	943.5	57'
P-32-1A	31+76.02	0+900.00	No Plate	
P-148-1	34+80	1+450		
P-348-2	34+80	0+200		
P-348-3	34+80	0+320		

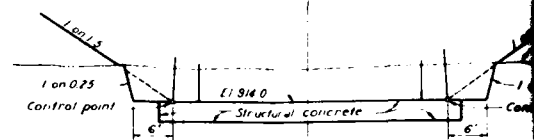
Gages plotted on plan, Sheet No. 4

* Installed by Government, extended by Contractor

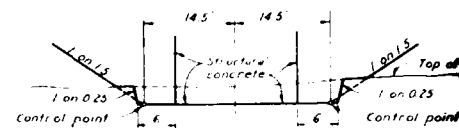
NOTE

* 1/4\"/>

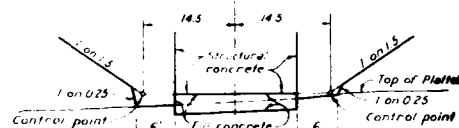
LEFT (EAST)



STILL BASIN

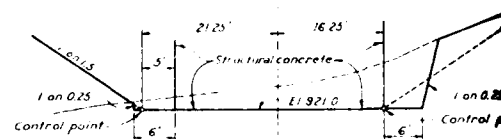


CONDUIT



CONDUIT

LEFT (EAST)



TOWER

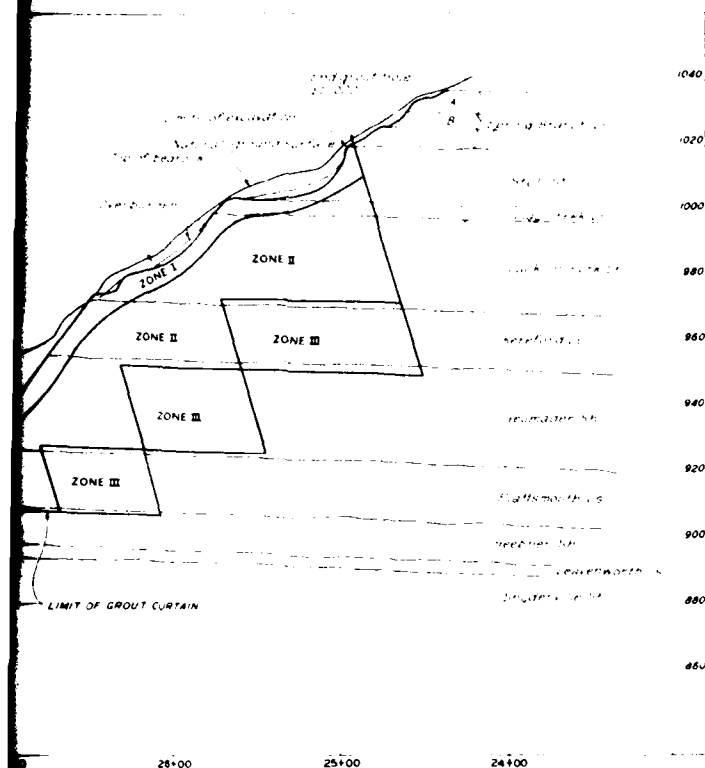
OUTLET WORKS EXCAVATION CONTROL DETAILS

OUTLET WORKS TABLE OF CONTROL POINTS FOR EXCAVATION LEFT SIDE OF CENTERLINE LOOKING DOWNSTREAM				
STATION	ELEVATION	DIST. FROM CENTERLINE	BACKSLOPE	
7+50 U to 5+00 U	925.0	5'	1 on 2.5	
5+00 U to 4+32 U	925.0	Varies	1 on 2.5	
4+32 U	925.0	17.5	1 on 2.5	
4+32 U to 4+26.5 U	925.0	Varies	1 on 2.5	
4+26.5 U to 3+70.5 U	925.0	Outside face stem	1 on 1.5	
3+70.5 U to 3+66.5 U	Varies	Varies	1 on 1.5	
3+66.5 U to 3+01 U	921.0	21.25	1 on 1.5	
3+01 U to 2+59 U	Bottom of struct. conc.	Varies	1 on 1.5	
2+59 U to 3+55 D	Bottom of struct. conc.	14.5	1 on 1.5	
3+55 D to 4+19 D	Varies	Varies	1 on 1.5	
4+19 D to 4+99 D	914.0	21.5	1 on 1.5	
RIGHT SIDE OF CENTERLINE LOOKING DOWNSTREAM				
7+50 U to 4+06.5 U	925.0	5'	1 on 2.5	
4+06.5 U to 3+70.5 U	925.0	Varies	Transition	
3+70.5 U	925.0	Outside face stem	1 on 1.5	
3+70.5 U to 3+66.5 U	Varies	Varies	1 on 1.5	
3+66.5 U to 3+01 U	921.0	16.25	1 on 1.5	
3+01 U to 2+59 U	Bottom of struct. conc.	Varies	1 on 1.5	
2+59 U to 3+55 D	Bottom of struct. conc.	14.5	1 on 1.5	
3+55 D to 4+19 D	Varies	Varies	1 on 1.5	
4+19 D to 4+70 D	914.0	21.5	1 on 1.5	
4+70 D to 5+24 D	Varies	Varies	Transition	
5+24 D to 6+00 D	920.0	25.6	1 on 2.5	

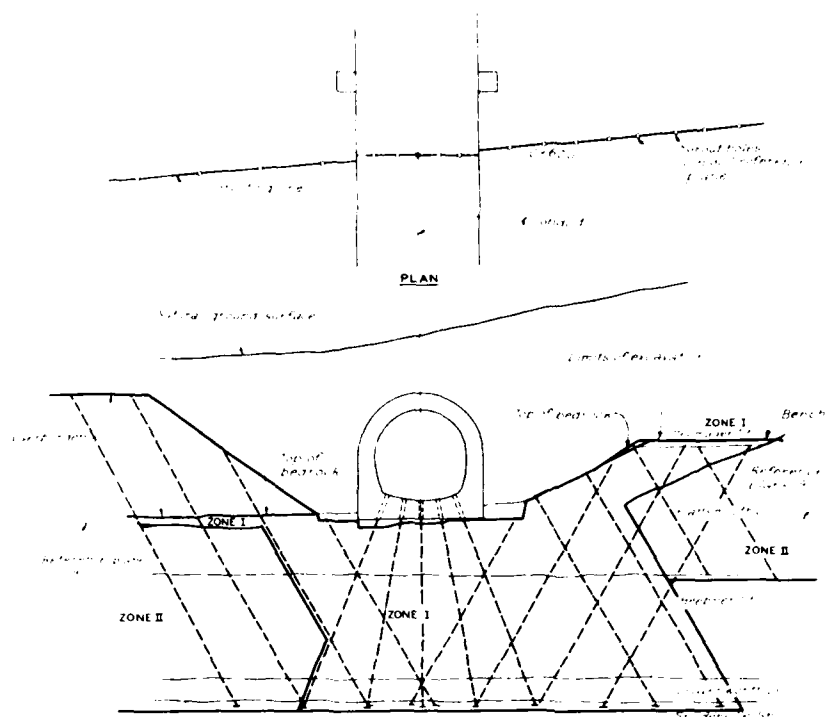
* Backslope from Sta. 4+75 D to Sta. 4+99 D Left Side is warped. See plan, Sheet No.



FOUNDATION GROUTING-RIGHT ABUTMENT
Scale 1"=40'

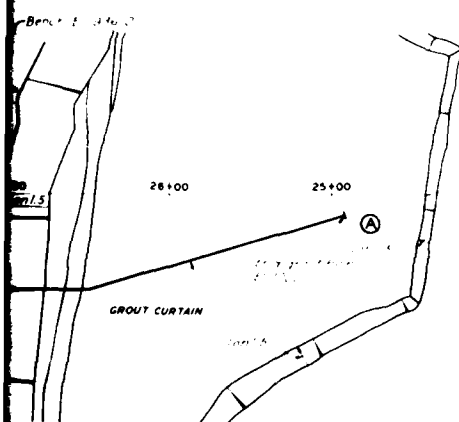


1040
1020
1000
980
960
940
920
900
880
860



SECTION
A CONDUIT GROUTING
Scale 1" = 10'

Notes:
1. For location of pipe, refer to sheet No. 56.
2. The grout curtain was installed on a foundation of sandstone.
3. The grout curtain was installed in three zones. Zone I was the central excavation area, Zone II was the area immediately adjacent to Zone I, and Zone III was the outermost area.
4. The grout curtain was installed in three zones. Zone I was the central excavation area, Zone II was the area immediately adjacent to Zone I, and Zone III was the outermost area.
5. The grout curtain was installed in three zones. Zone I was the central excavation area, Zone II was the area immediately adjacent to Zone I, and Zone III was the outermost area.



RECORD DRAWING

MARCH 1962
CONTRACT NO. DA 23-029 CIVING 99 551

SYMBOL	DESCRIPTION	DATE	APP'D
A	Revised for "As Built" conditions	12/62	LCM
SYM	Revised for limits of excavation (Zone I)		

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE 1 CONSTRUCTION

CURTAIN GROUTING
PLAN AND PROFILE

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 12

Scale as shown
KANSAS CITY, MO
APRIL 1959



Submitted by
Checked by
HRL

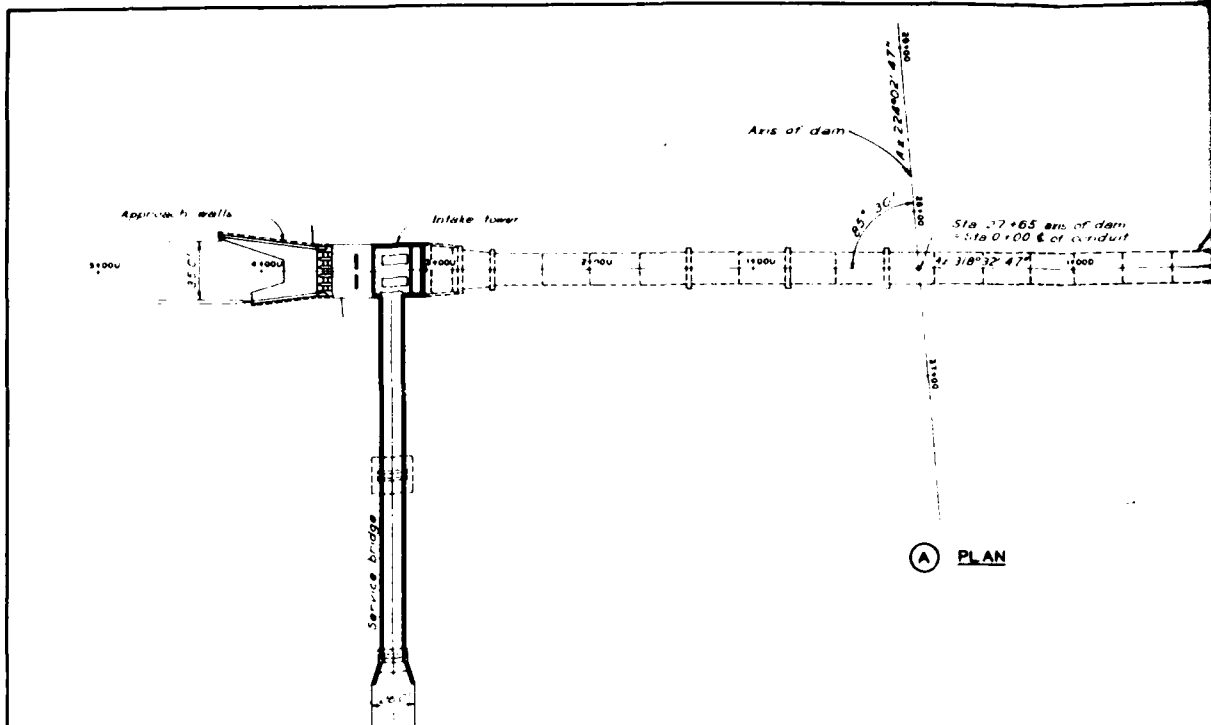
Recommended by
Checked by
CHL

Approved by
Checked by
CRG

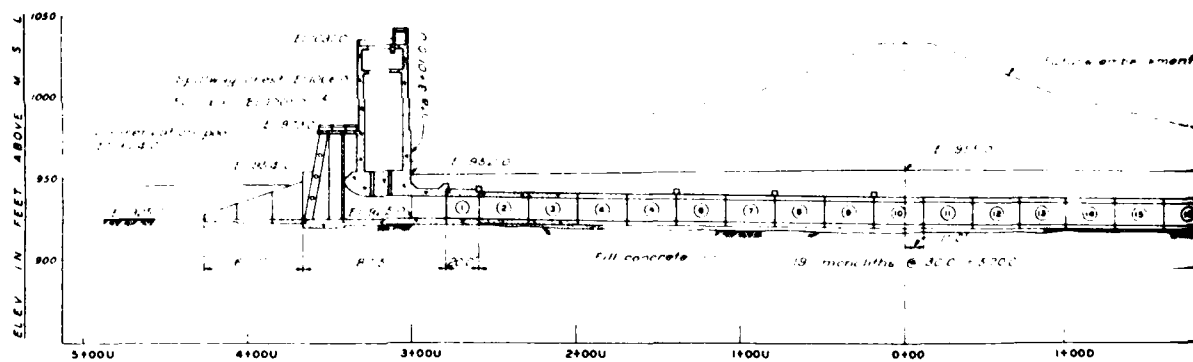
O-3-312

PLATE NO. 10

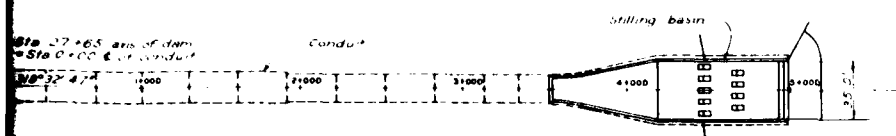
U. S. ARMY



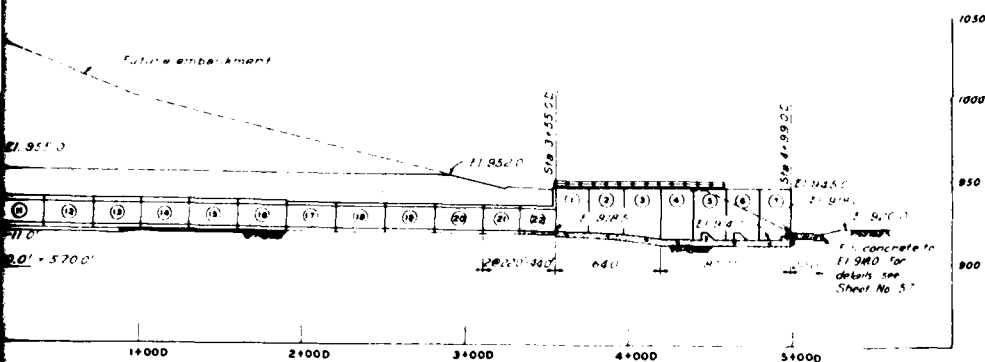
(A) PLAN



(A) LONGITUDINAL SECTION



PLAN



DINAL SECTION

RECORD DRAWING

MARCH 1962

CONTRACT NO DA 23-028 OVENG 59 961

A
 Revised for "As Built" conditions

 DATE 11/11/83 APP'D ASB

HUNDRED AND TEN MILE CREEK KANSAS

POMONA DAM

STAGE I CONSTRUCTION

OUTLET WORKS

PLAN AND LONGITUDINAL SECTION

In 80 sheets
U S ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No 13

Scale 1"=40'
KANSAS CITY, MO
APRIL 1939

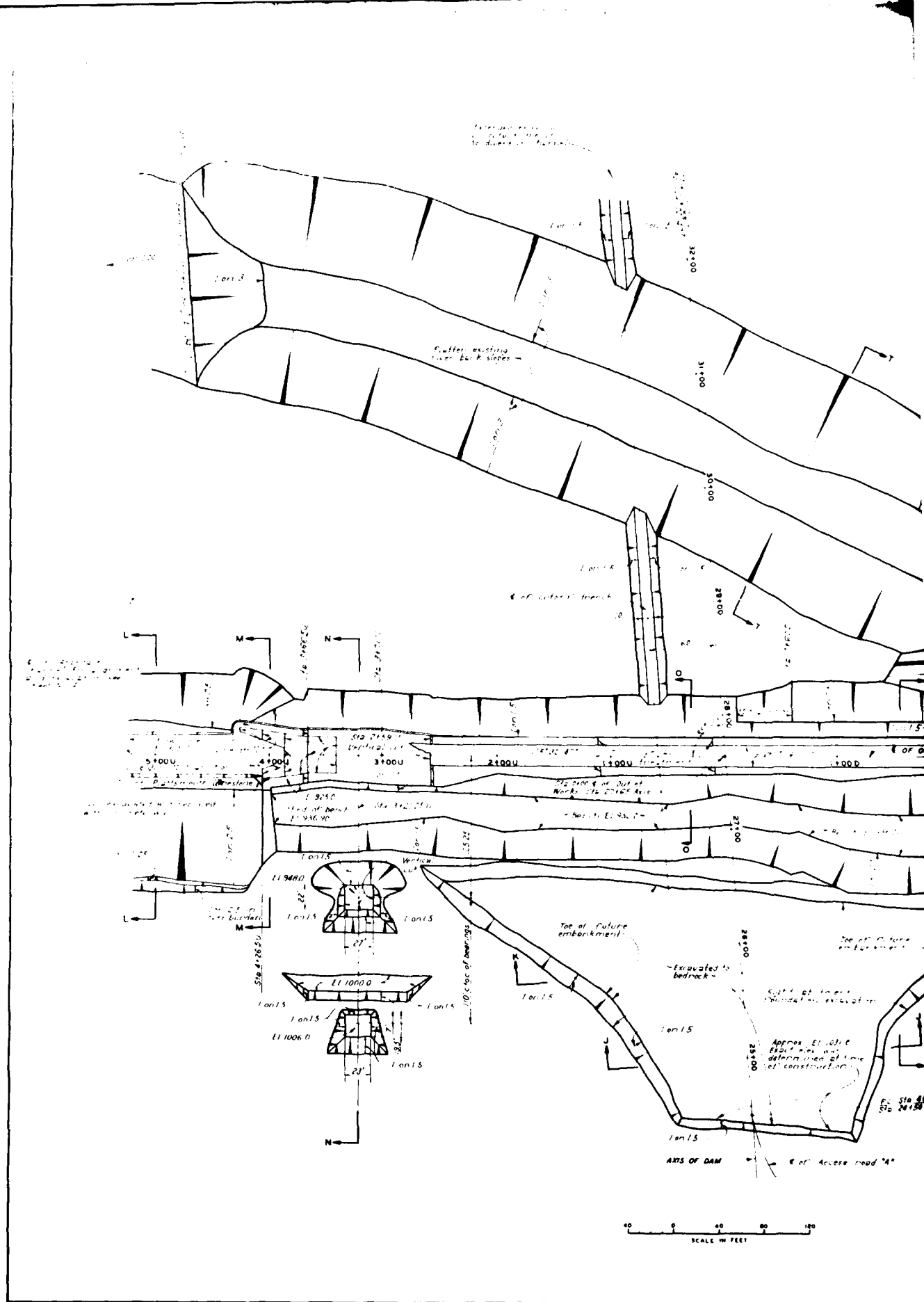
KANSAS CITY
Submitted *R. L. Johnson*
Chief, Streets Design
Drawn by Traced by
J. L. N. J. A. R.

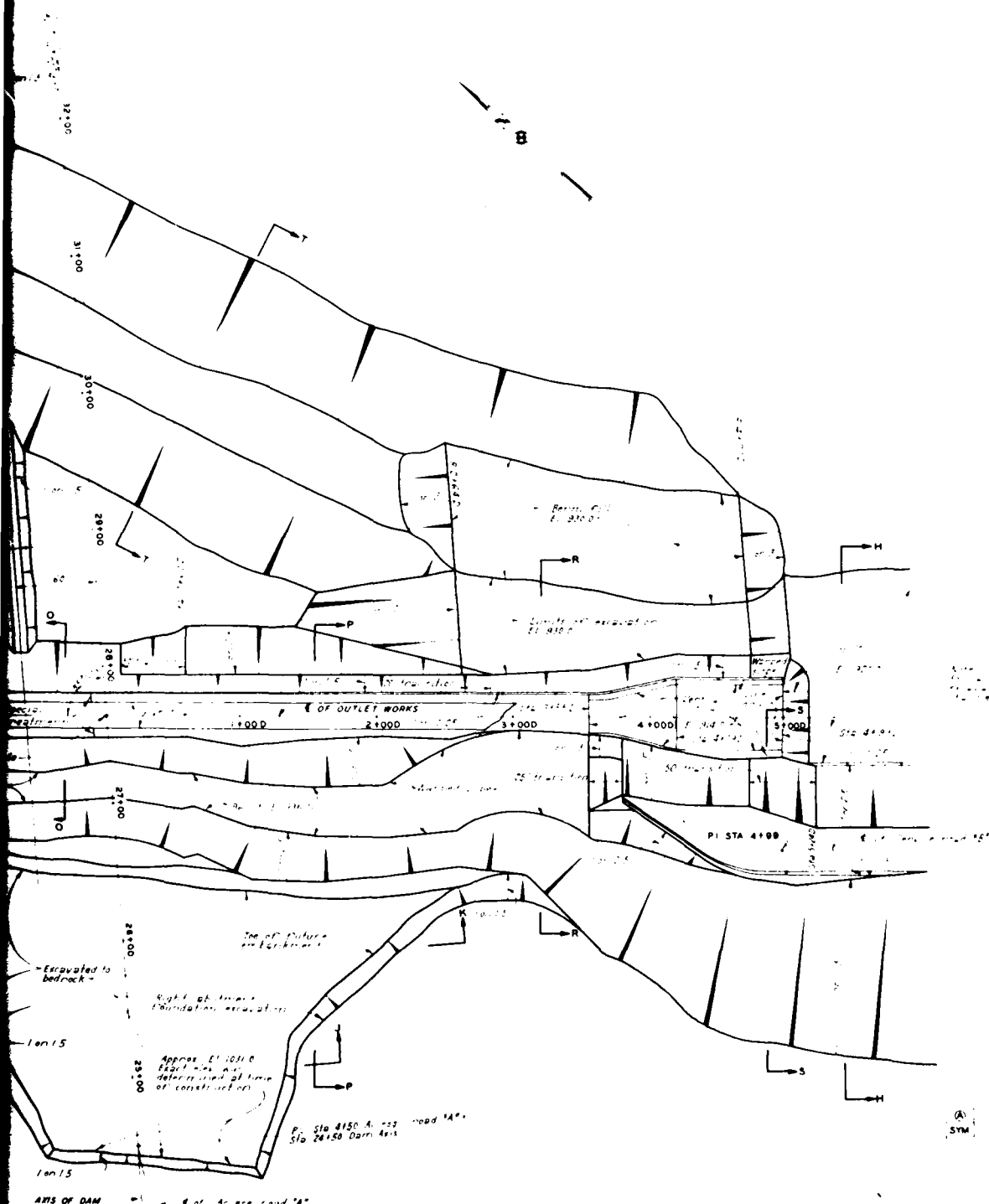
Recommended
John A. Reed
 Chief, Engineering Division
 Checked by
 EBC

APRIL 1959
Approved
T. E. Harrison
Cal. C.E. District Engineer
File No
9-3-313

0-3-313

PLATE NO. 11





RECORD DRAWING

MARCH 1952
CONTRACT NO. DA 23 028 CYENG 59 551

Revised For: A. B. 1011 Conditions
SYM DESCRIPTION REVISIONS DATE APP'D

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE I CONSTRUCTION

OUTLET WORKS
EXCAVATION
PLAN OF AREA

NOTES
For excavations see sheets Nos. 15 & 16
For profile of outlet works see Sheet No. 15

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY
Sheet No 14
Scale as shown
KANSAS CITY, MO
APRIL 1950
Submitted
Chief Engineer Dist Sect
Drawn by
HDL
Recommended
Chief Engineering Division
Checked by
PEM
Approved
Col. C.E. District Engineer
File No.
O-3-314



PLATE NO. 12

2

UPSTREAM

DOWNSTREAM

See plan Sheet No. 14

Approx. existing ground surface

See plan Sheet No. 14

100 ft

Future embankment

Proposed road

Limits of excavation

Approx. toe of beach

Toe of future embankment

Toe of future embankment

R+00

R+20

R+60

0+00

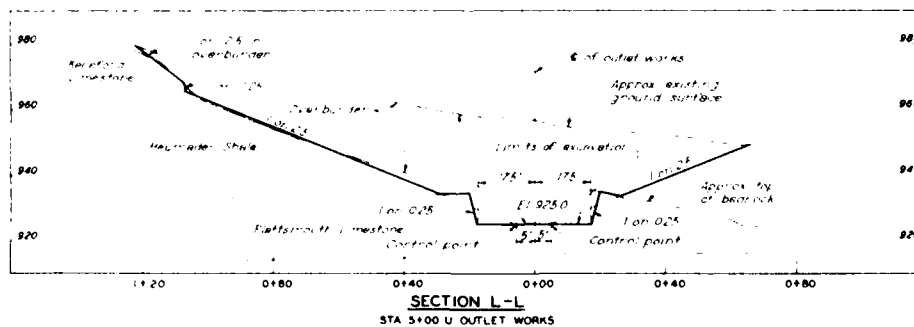
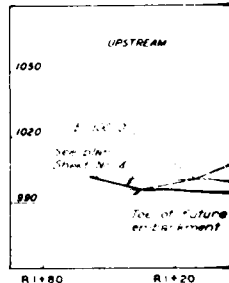
R+60

R+20

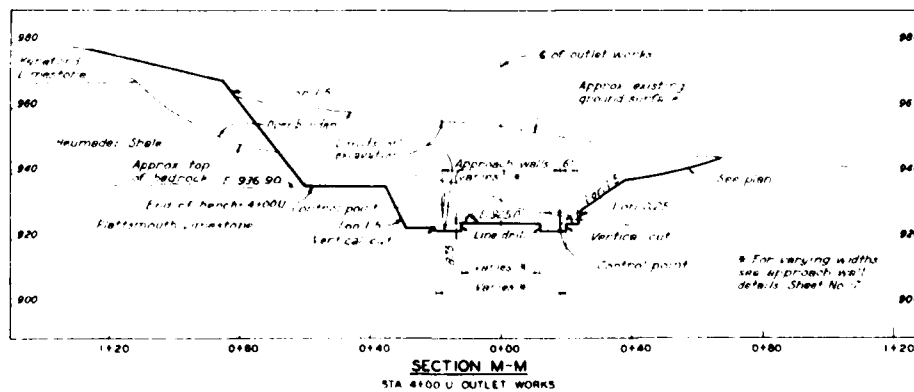
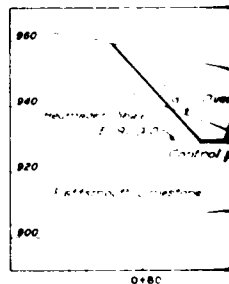
R+80

SECTION J-J

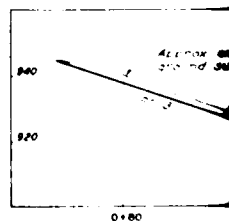
STA 25+00

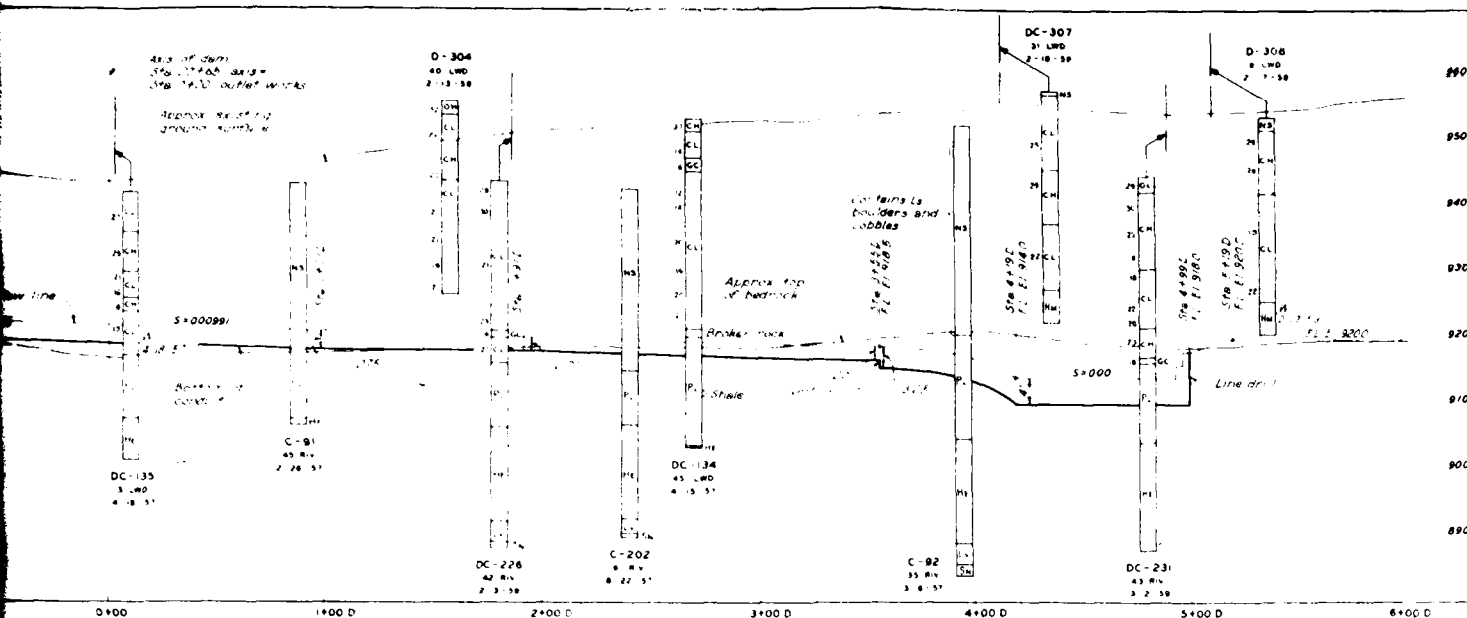


SECTION L-L
STA 5+00 U OUTLET WORKS

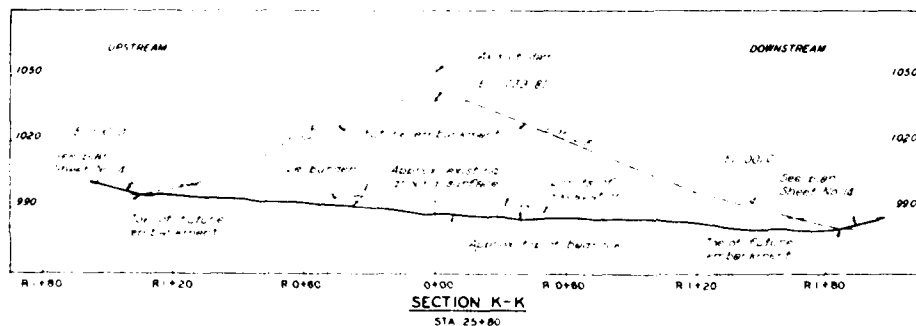


SECTION M-M
STA 4+00 U OUTLET WORKS

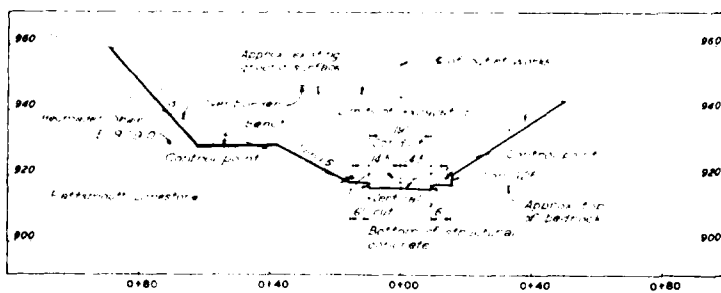




6. PROFILE OF OUTLET WORKS

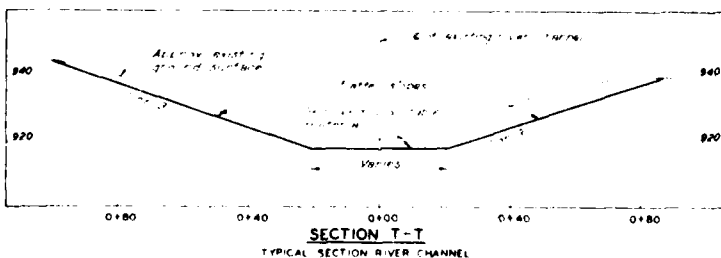


SECTION K-K
STA 25+80



SECTION 0-0
STA 0+30 U OUTLET WORKS

NOTES
For control point details
see Sheet No. 1.
For plan of right abutment and
outlet works excavation see Sheet No. 4.
For legend of underground
explorations see Sheet No. 76.



SECTION T-T
TYPICAL SECTION RIVER CHANNEL

RECORD DRAWING

MARCH 1967

CONTRACT NO DA 23 028 CIVENG 59 551

SYM

DESCRIPTION	REVISIONS
Approved for Release by NSA on 09-11-2013 pursuant to E.O. 13526	

DATE 'AP'D

HUNDRED AND TEN MILE CREEK KANSAS

POMONA DAM

OUTLET WORKS

EXCAVATION PROFILE AND SECTIONS

In 80 sheets
U S ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No 15

Scale as shown
KANSAS CITY MO
APRIL 1939

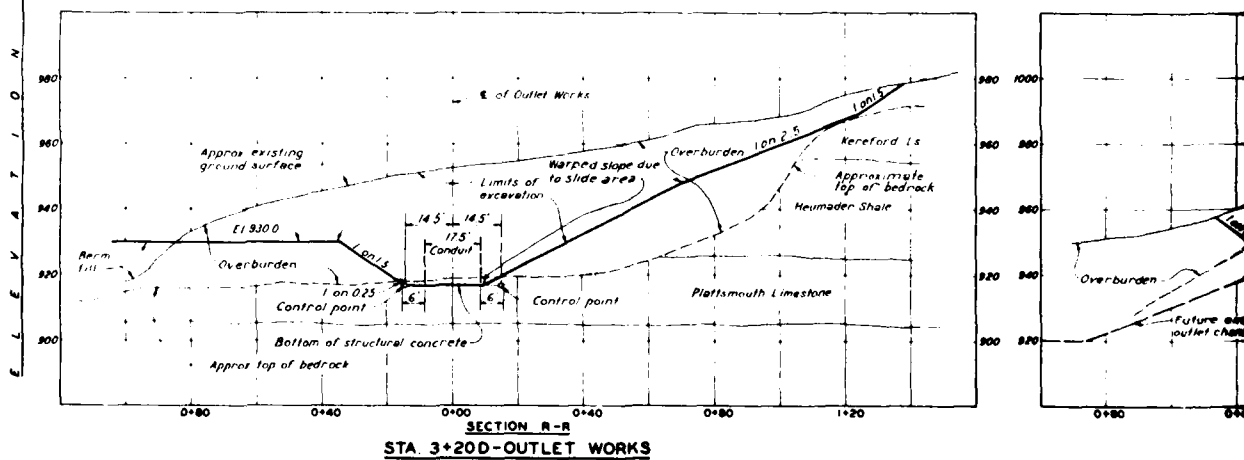
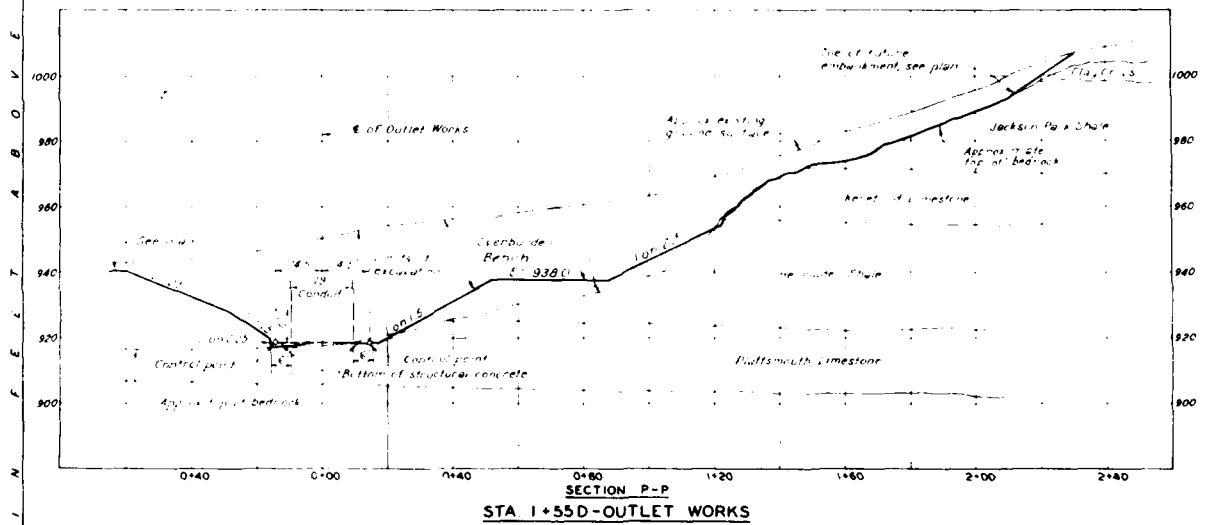
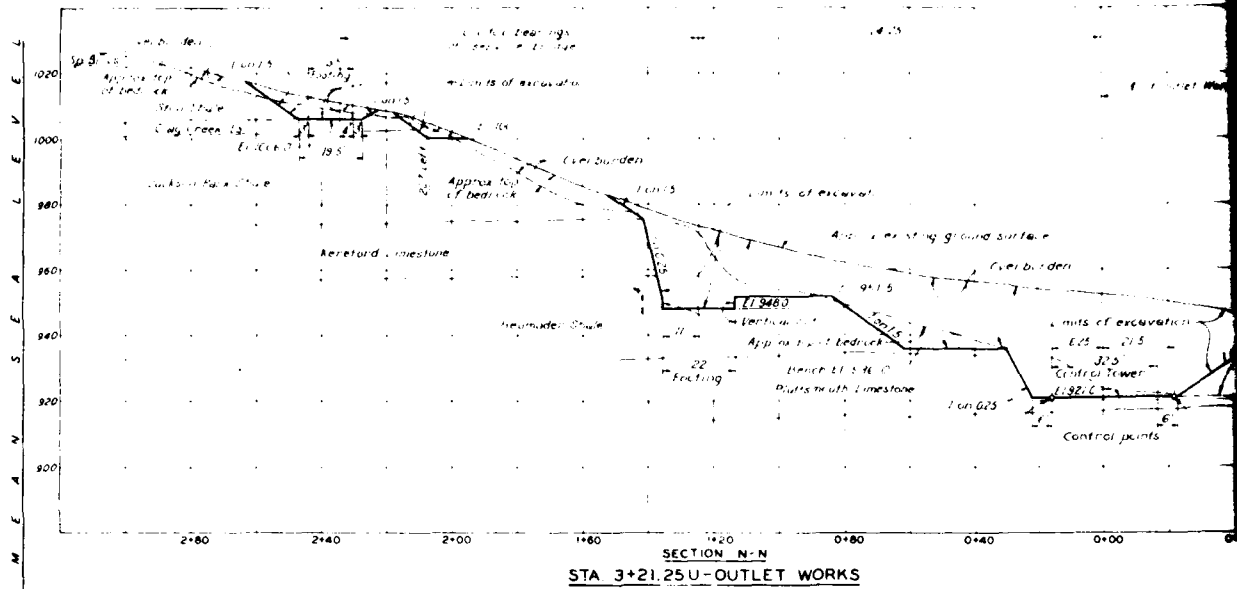
Submitted
J. M. McCarroll
Chief, Earthquake Dist. Sec.
Drawn by Traced by
HDL REC

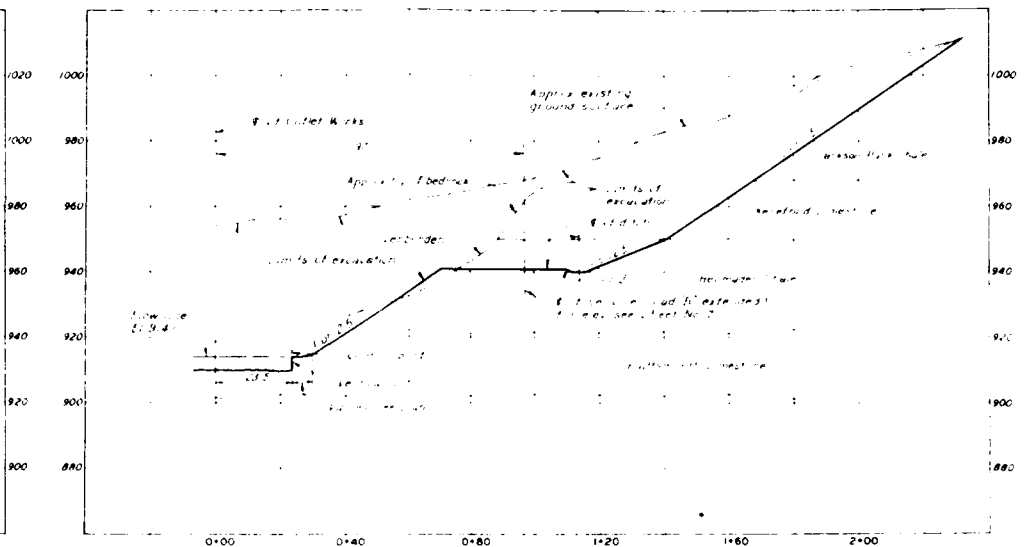
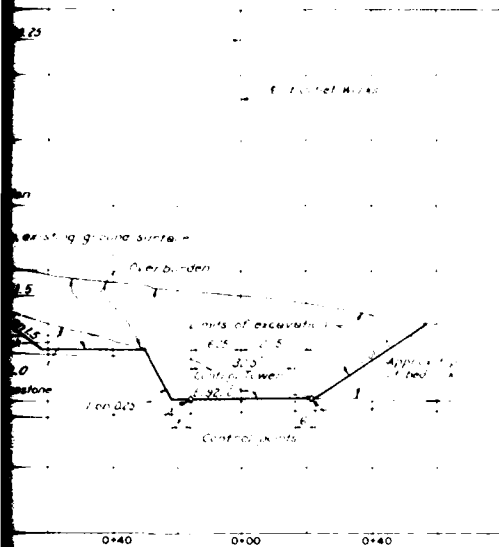
Recommended
James B. Gail
Chief, Engineering Division
Checked by
P.E.M.

Approved
X-6 *Trachman*
 Col. C. E. District Engineer
 File No
 0-3-319

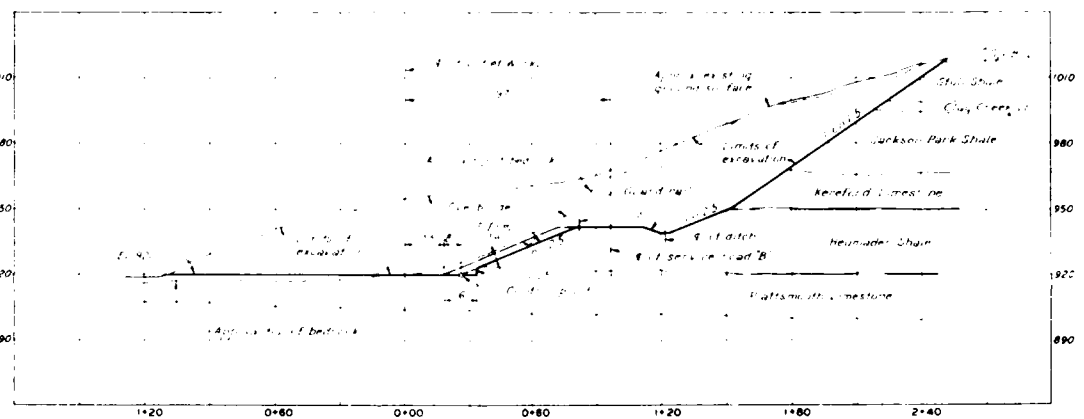
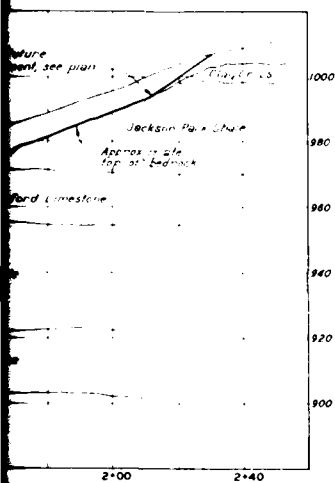
0 - 3 - 319

PLATE NO. 13

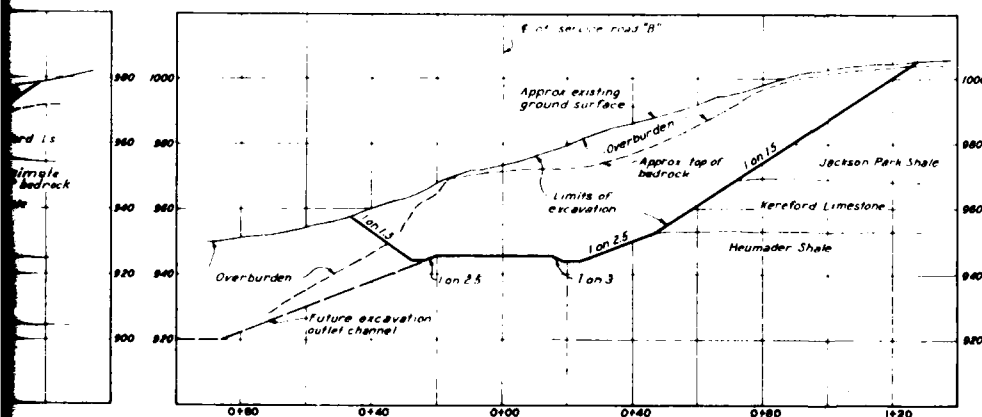




SECTION 5-S
STA 4+90D-OUTLET WORKS



SECTION H-H
STA 5+40D-OUTLET WORKS



SECTION I-I
STA 0+00-SERVICE ROAD "B"

NOTE:
For service road "B" alignment and grade see Sheet No. 1.
For control point details see Sheet No. 1.
For plan of outlet works excavation see Sheet No. 14.

RECORD DRAWING

MARCH 1952
CONTRACT NO. DA 23-028-ORVNS 59 551

SYMBOL	DESCRIPTION	DATE	APPROVED
①	Revised for "As Built" conditions		
	REVISIONS		

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE I CONSTRUCTION

OUTLET WORKS

EXCAVATION

SECTIONS

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 18

Scale as shown
KANSAS CITY, MO
APRIL 1950

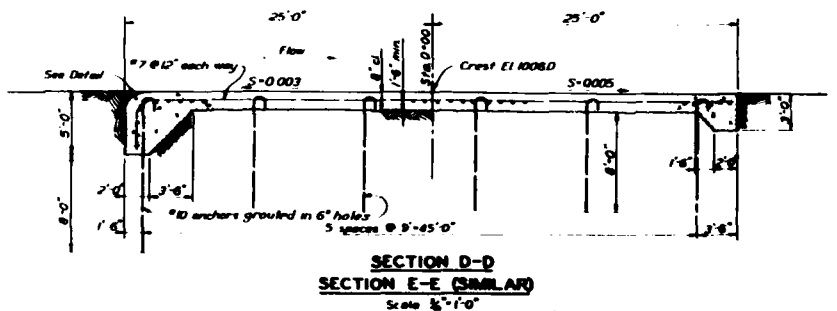
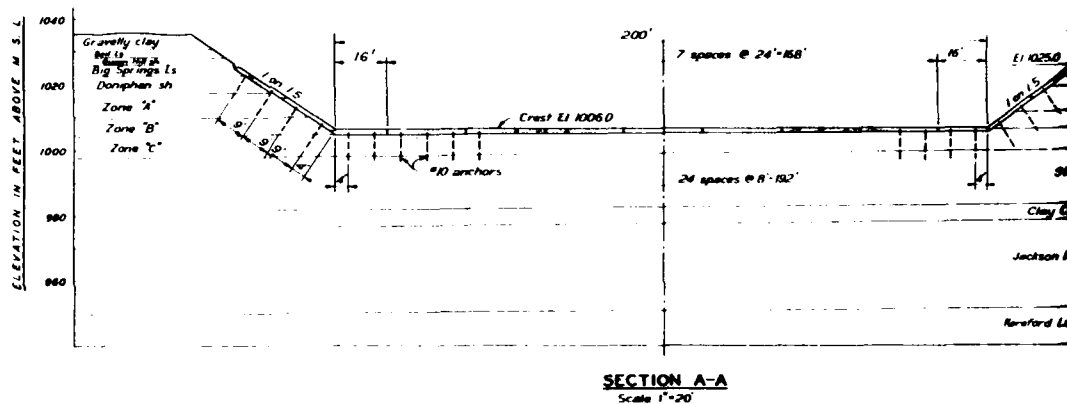
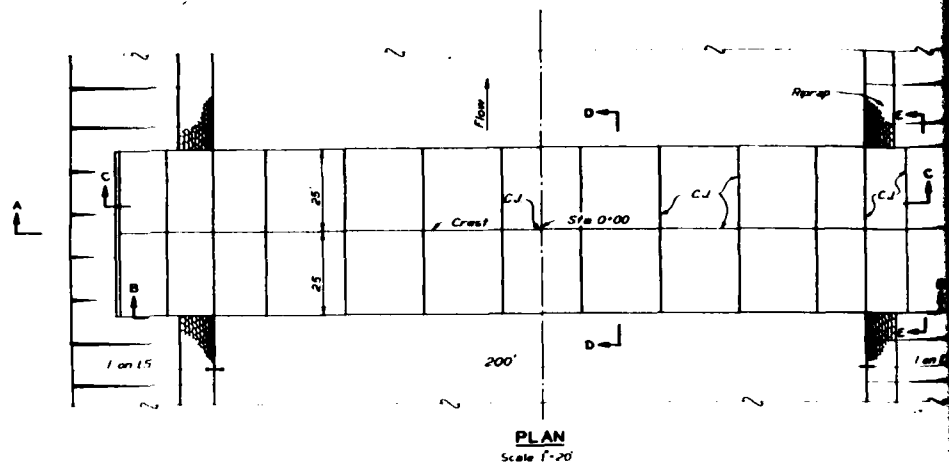


Submitted
J. M. M. Lamm
Chief, Earthwork Dist. Sect.
Drawn by
H. D. L.
H. E. S.

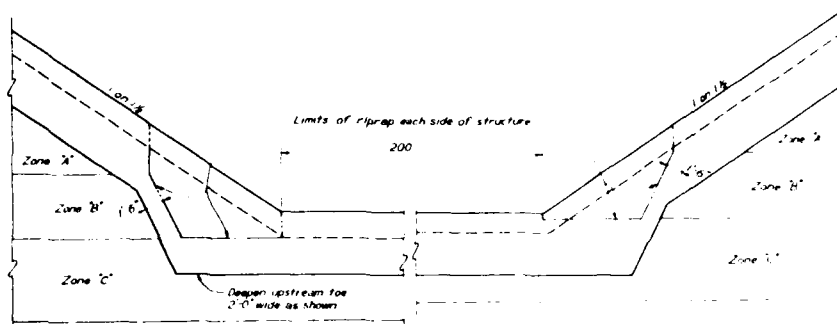
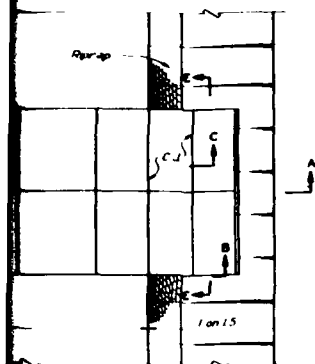
Recommended
R. A. B. Ford
Chief, Engineering Division
Checked by
P. E. M.

Approved
J. E. Lamm
Col., C. E. District Engineer
File No.
O-3-518

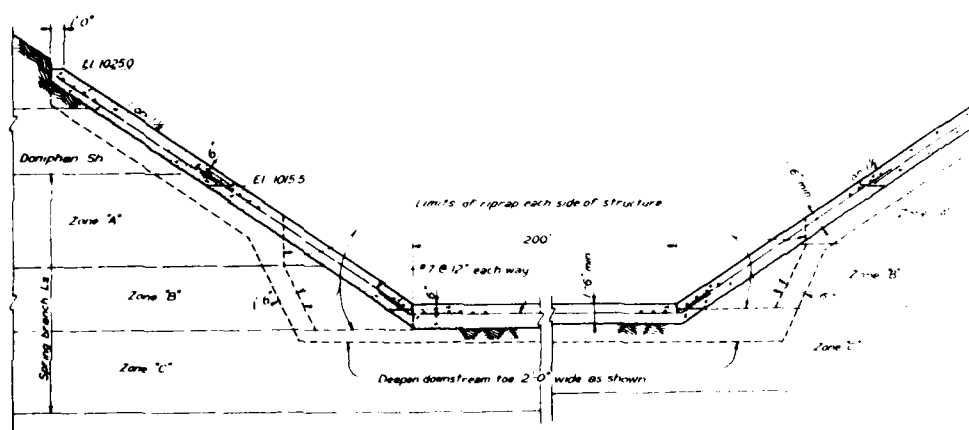
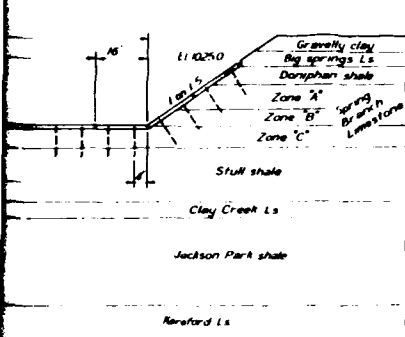
PLATE NO. 14



(A) Note:
The thickened section at the upstream and downstream edge of the horizontal portion of the sill designed beyond the dimensions shown, as necessary to provide a minimum embedment below the top of the "C" zone of the Spring Branch Limestone of 3 feet 6 inches upstream and 1 foot 6 inches downstream.



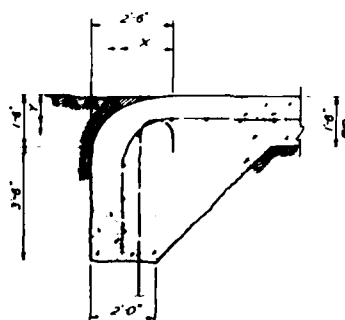
SECTION B-B

Scale $\frac{1}{4}$ " = 1'-0"

SECTION C-C

Scale $\frac{1}{4}$ " = 1'-0"

NOTE
C.J. indicates construction joints with
steel reinforcement continuous through
joints



(A) DETAIL OF UPSTREAM TOE

Scale $\frac{1}{4}$ " = 1'-0"

Note
Coat elliptic surface with concrete
curing compound to eliminate bond

ORDINATES OF ELLIPTIC QUADRANT	
X	Y
1'-0"	1'-6"
1'-6"	3'-6"
2'-0"	7'-6"
2'-6"	1'-6"

RECORD DRAWING

MARCH 1952
CONTRACT NO. DA-23-028-ORNG 99 551

Revised for "As Built" conditions
SYN DESCRIPTION REVISIONS

DATE APP'D

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE 1 CONSTRUCTION

SPILLWAY

CONTROL SILL

CONCRETE AND REINFORCEMENT

In 80 sheets Sheet No 66
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

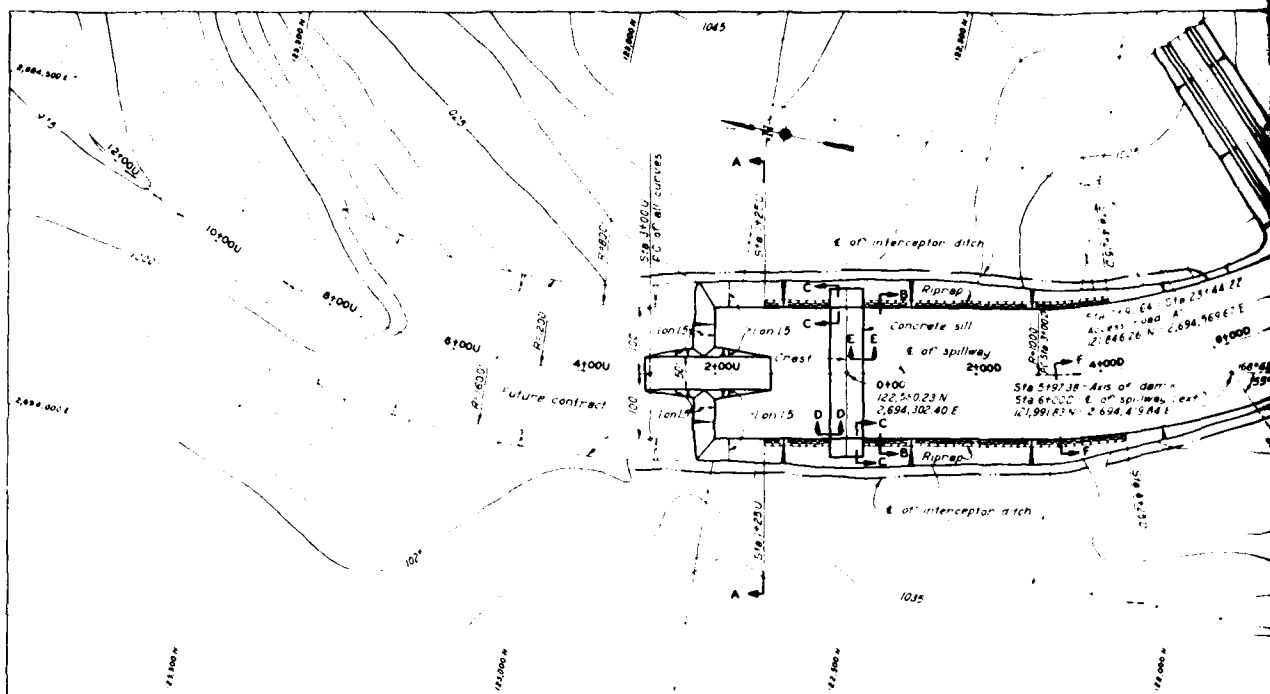
Scale as shown
KANSAS CITY, MO.
APRIL 1950

Submitted
Chief, District Design
Drawn by
P.T.L.

Recommended
Chief, Engineering Division
Checked by
E.B.C.

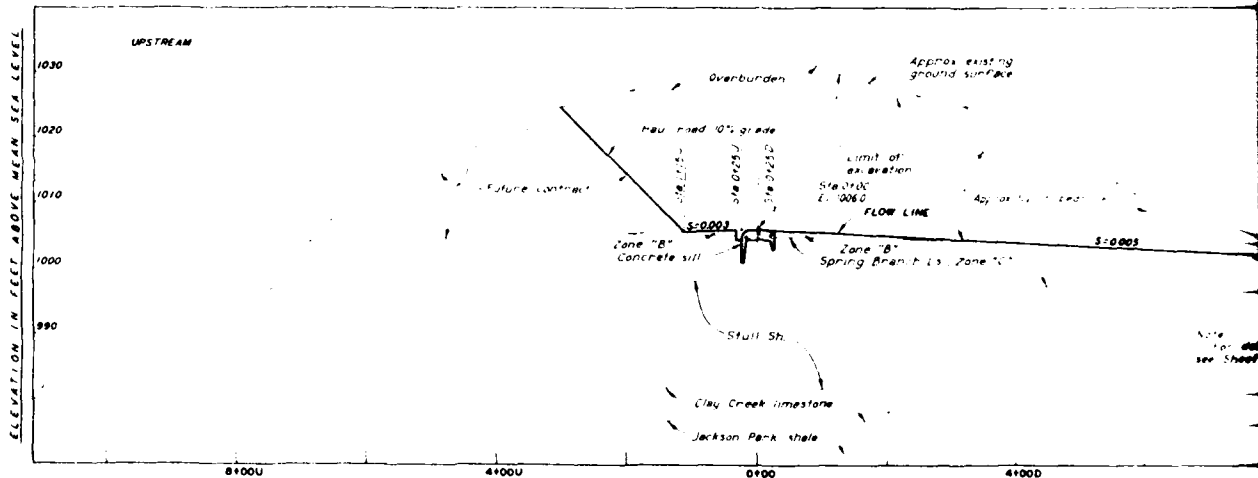
Approved
Chief, District Engineer
File No.

PLATE NO. 15

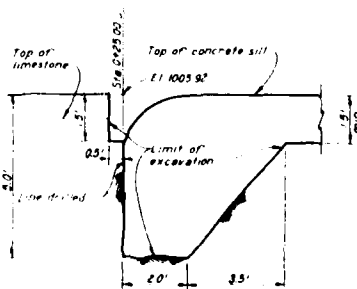


PLAN

SCALE IN FEET

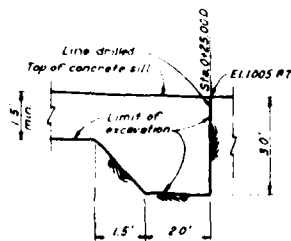


PROFILE ON CENTERLINE OF SPILLWAY



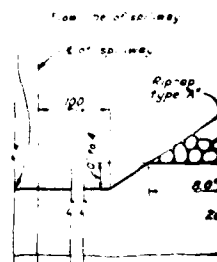
SECTION D-D

Not to scale



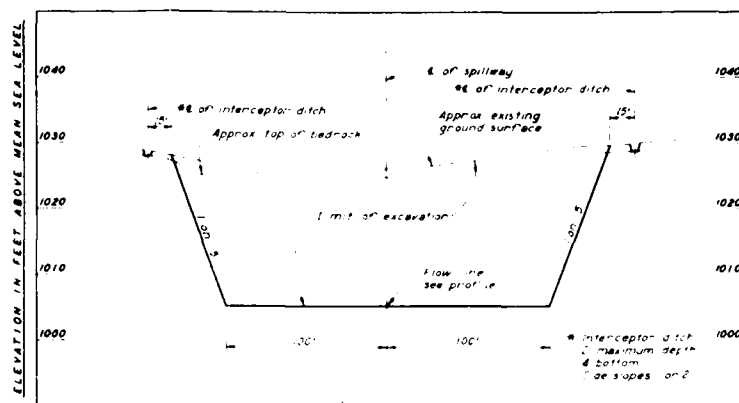
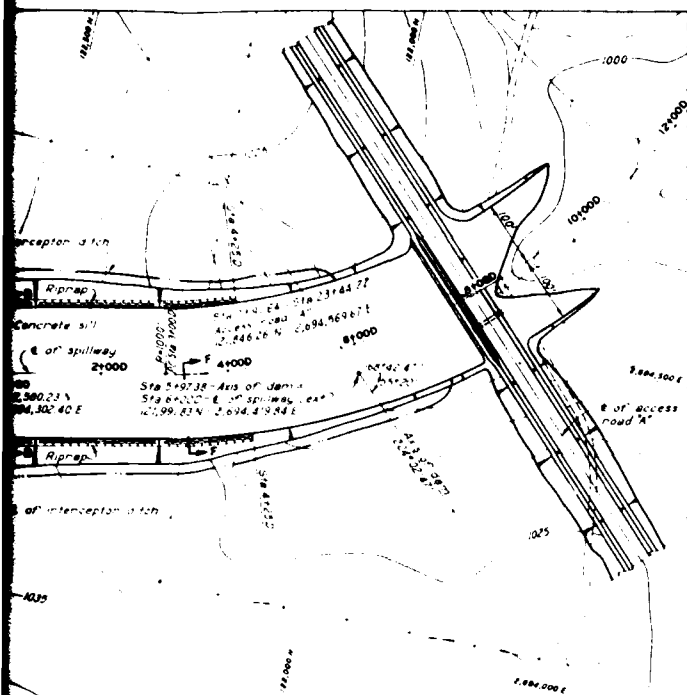
SECTION E-E

Not to scale

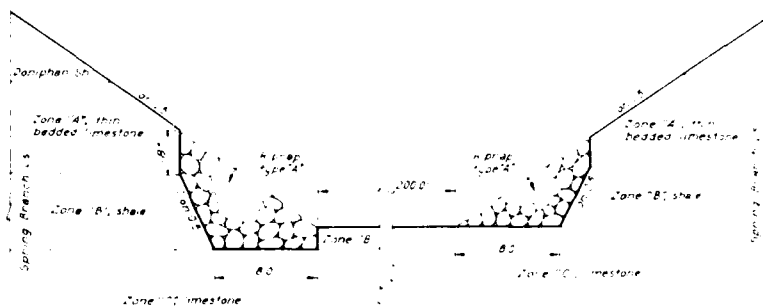


SECTION F-F

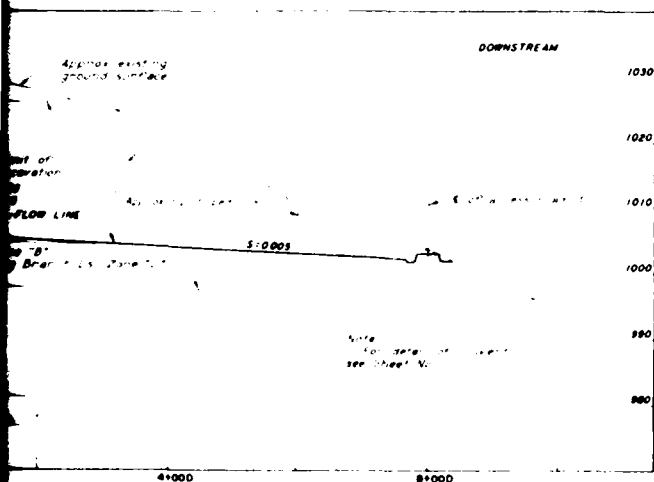
Not to scale



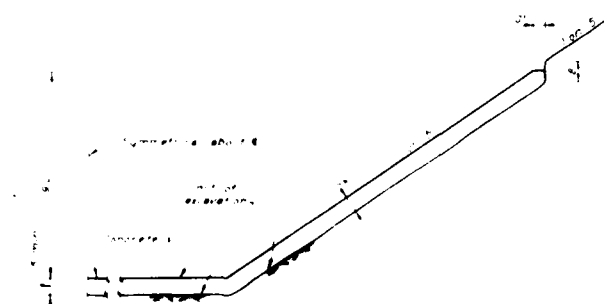
SECTION A-A



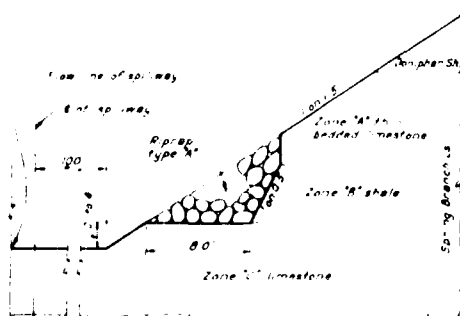
SECTION B-B



SPILLWAY



SECTION C-C



SECTION F-F

NOTES
 For excavation data adjacent to concrete structure, see Sheet No. 66.
 For access road alignment and grade, see Sheet No. 66.
 The 5 foot vertical surface upstream and the 3 foot vertical surface downstream were fine filled.

RECORD DRAWING

MARCH 1967
 CONTRACT NO. DA 23-029-CIVENG 59 951

Revised for As-Built Conditions
 DESCRIPTION
 REVISIONS
 DATE APP'D

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

STAGE I CONSTRUCTION

SPILLWAY

EXCAVATION

PLAN, PROFILE AND SECTIONS

In 80 sheets
 U.S. ARMY ENGINEER DISTRICT
 KANSAS CITY

Sheet No. 67

Scale as shown
 KANSAS CITY, MO
 APRIL 1959



Submitted
 Chief, Earthwork Dist Sect
 Drawn by
 HDL

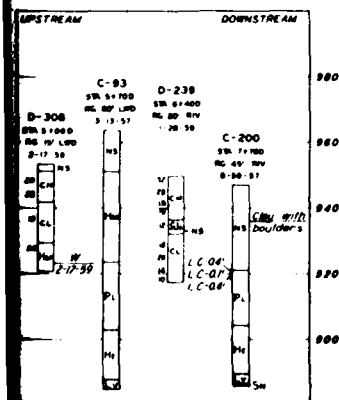
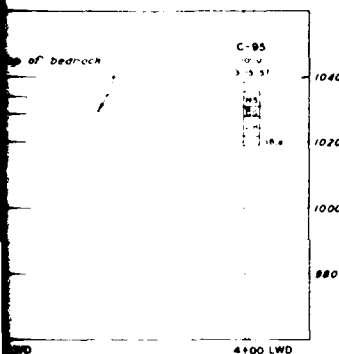
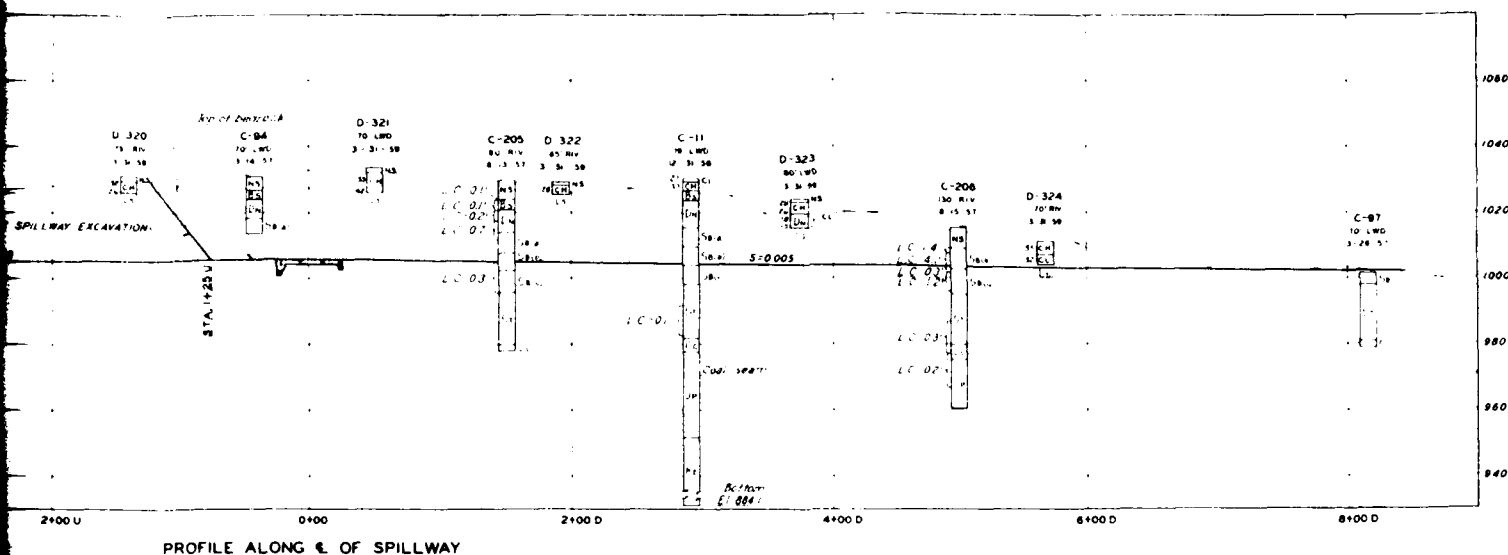
Recommended
 Chief, Engineering Division
 Checked by
 GBW

Approved
 Col. C.E. Bicknell, Engineer
 File No.
 O-3-387



[illegible]

OUTLET CHANNEL-OUTLET WORKS



THICKNESS IN FEET	MEMBER SYMBOL	LEGEND	BEDROCK (RIGHT ABUTMENT) MEMBER NAME AND DESCRIPTION
10E	Av		AVOCA LIMESTONE moderately hard, medium bedded, argillaceous upper 1 foot slightly harder than below, irregular jointing, gray, weathered
15E	Hh		KING HILL SHALE soft, laminated, contains thin limestone layers, greenish gray, weathered
6E	BL		BEIL LIMESTONE medium hard, medium bedded, generally uniform from top to base, contains irregular shaly bands, gray, weathered
20E	QH		QUEEN HILL SHALE soft, sub-fine, carbonaceous, silty gray to black, appearance similar to lower Heebner shale, weathered
30E	BS		BIG SPRINGS LIMESTONE hard, medium bedded, coarsely crystalline, indistinct banding including dark, abundantly fossiliferous zones, prominent jointing, mottled gray, weathered
6.8E	Dn		DOONAN SHALE soft to very soft, laminated, numerous slicken sides, becomes more limy toward base, dark gray, becoming lighter in color at base, weathered
6.8E	SW		SPRING BRANCH LIMESTONE (ZONE A) hard, thin bedded, numerous shale seams, argillaceous, medium to light gray
5.8E	SW		SPRING BRANCH LIMESTONE (ZONE B) this is a shale zone, moderately soft to soft, indistinctly laminated, smooth bedding planes, upper 2-3 feet is limy, medium to light gray becoming darker toward base
5.6E	SW		SPRING BRANCH LIMESTONE (ZONE C) hard, finely crystalline, medium bedded, stained, vertical jointing, contains dark colored, irregular fossiliferous bands, gray
16.6E	St		STILL SHALE moderately soft, sub-fine, micaceous, slightly micaceous, lower contact transitional, dark gray
4.7E	C		CLAY CREEK LIMESTONE hard, upper 1 foot blocky, very fossiliferous, distinct vertical jointing, brownish gray
28.4E	JP		JACKSON PARK SHALE moderately soft, very sandy and silty, thin bedded, finely laminated, contains numerous beds and lenses of silty sandstone, gray becoming darker toward base
16.6E	Ht		HEREFORD LIMESTONE hard, dense, finely crystalline, contains numerous, thin bedded, irregular, dark gray shale bands, gray
32.0E	Hw		HEUMADER SHALE soft, sub-fine, contains numerous limonite concretions, lower 1/2 more massive than above, medium to dark gray
20.5E	PL		PLATTSBURGH LIMESTONE hard, dense, fine-grained, medium bedded, abundant vertical jointing or fracturing, irregular dark gray shale seams, becomes more massive toward base, gray (commonly a thin, very argillaceous or shaly zone 6 to 7 feet from the base)
16.2E	Ht		HEEBNER SHALE moderately soft, laminated, fissile, brittle, carbonaceous, black
3.0E	LV		LEAVENWORTH LIMESTONE hard, becomes softer toward base, massive, coarsely crystalline, lower 1/2 argillaceous grading into shale below, medium gray to dark gray
35.0E	Sn		SNYDERVILLE SHALE soft to moderately soft, very silty, micaceous, contains beds of siltstone and fine sandstone, light bluish gray
35.0E	LA		LAWRENCE SHALE FORMATION Borings have penetrated at least the upper 35 feet of this formation which consists of sandy shale and soft sandstone similar to the Snyderville member. Total formation thickness may range up to 125 feet.

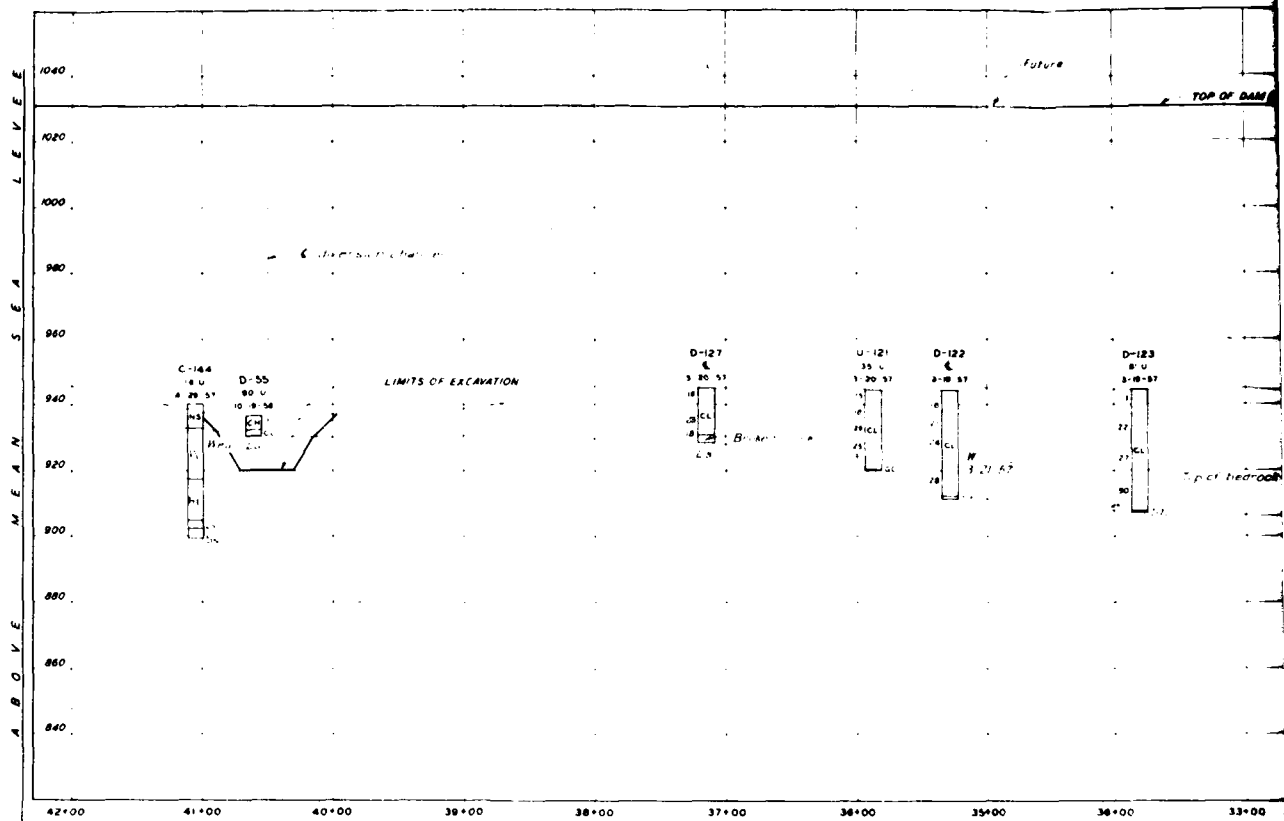
Notes:
1. This is a shale zone within a limestone member.
2. Column is not shown to scale.
3. L.C. denotes core loss.

LEGEND FOR UNDERGROUND EXPLORATIONS

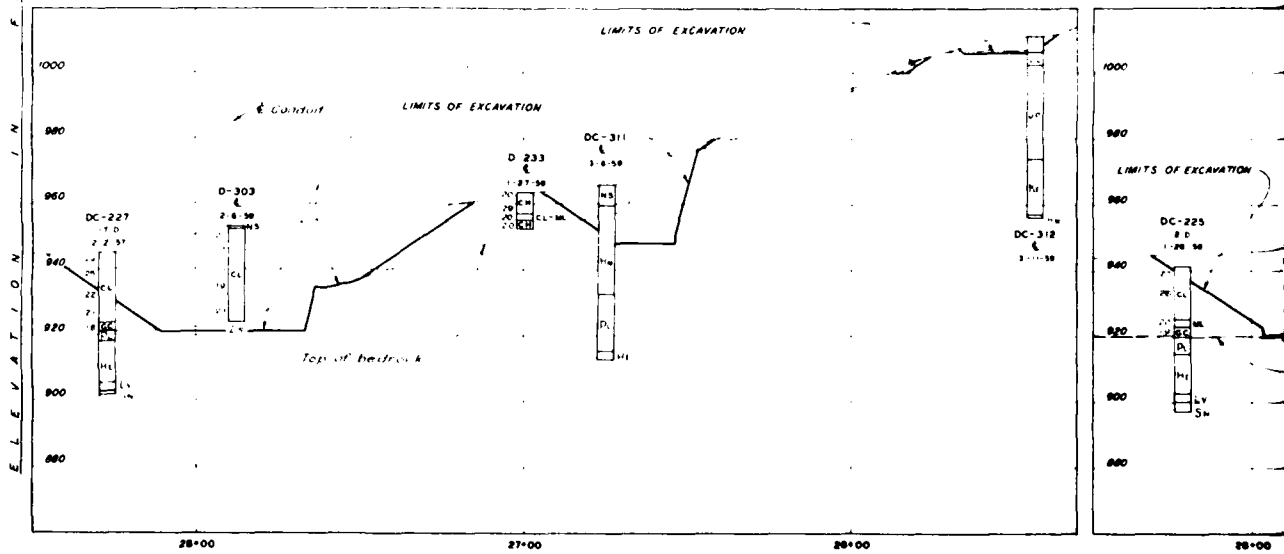
SYMBOL	DESCRIPTION
6E	Gravel or Sandy Gravel, well graded
6E	Gravel or Sandy Gravel, poorly graded
6E	Silty Gravel or Silty Sandy Gravel
6E	Clayey Gravel or Clayey Sandy Gravel
6E	Sand or Gravelly Sand, well graded
6E	Sand or Gravelly Sand, poorly graded
6E	Silty Sand or Silty Gravelly Sand
6E	Clayey Sand or Clayey Gravelly Sand
6E	Sandy Silty or Gravelly Silty or Sandstone Silty or Sandstone Silty
6E	Low Clayey Sand (Type of Gravelly Clay)
6E	Organic Silty or Low Organic Clay
6E	Micaceous Silty Sandstone Silty or Silty Sandstone
6E	For Clay
6E	For Organic Clay
6E	For Silty and other Organic Soils
6E	Overburden Unconsolidated or Very Soft or Very Hard
6E	No Recovery
6E	Not Compacted
6E	Not Shipped or Shipped

Standard 10 ft length
Notes on hole or data sheet
Not determined where these data are absent
[This hole is 10 ft long, maximum diameter of the smallest 10 ft length]
Note designation and number
Notes
Notes completed

NOTE: Holes may be open or closed, or
Standard or non-standard (10 ft or 15 ft or
right or left or 10 ft or 15 ft or 20 ft or 25 ft or 30 ft or 35 ft or 40 ft or 45 ft or 50 ft or 55 ft or 60 ft or 65 ft or 70 ft or 75 ft or 80 ft or 85 ft or 90 ft or 95 ft or 100 ft or 105 ft or 110 ft or 115 ft or 120 ft or 125 ft or 130 ft or 135 ft or 140 ft or 145 ft or 150 ft or 155 ft or 160 ft or 165 ft or 170 ft or 175 ft or 180 ft or 185 ft or 190 ft or 195 ft or 200 ft or 205 ft or 210 ft or 215 ft or 220 ft or 225 ft or 230 ft or 235 ft or 240 ft or 245 ft or 250 ft or 255 ft or 260 ft or 265 ft or 270 ft or 275 ft or 280 ft or 285 ft or 290 ft or 295 ft or 300 ft or 305 ft or 310 ft or 315 ft or 320 ft or 325 ft or 330 ft or 335 ft or 340 ft or 345 ft or 350 ft or 355 ft or 360 ft or 365 ft or 370 ft or 375 ft or 380 ft or 385 ft or 390 ft or 395 ft or 400 ft or 405 ft or 410 ft or 415 ft or 420 ft or 425 ft or 430 ft or 435 ft or 440 ft or 445 ft or 450 ft or 455 ft or 460 ft or 465 ft or 470 ft or 475 ft or 480 ft or 485 ft or 490 ft or 495 ft or 500 ft or 505 ft or 510 ft or 515 ft or 520 ft or 525 ft or 530 ft or 535 ft or 540 ft or 545 ft or 550 ft or 555 ft or 560 ft or 565 ft or 570 ft or 575 ft or 580 ft or 585 ft or 590 ft or 595 ft or 600 ft or 605 ft or 610 ft or 615 ft or 620 ft or 625 ft or 630 ft or 635 ft or 640 ft or 645 ft or 650 ft or 655 ft or 660 ft or 665 ft or 670 ft or 675 ft or 680 ft or 685 ft or 690 ft or 695 ft or 700 ft or 705 ft or 710 ft or 715 ft or 720 ft or 725 ft or 730 ft or 735 ft or 740 ft or 745 ft or 750 ft or 755 ft or 760 ft or 765 ft or 770 ft or 775 ft or 780 ft or 785 ft or 790 ft or 795 ft or 800 ft or 805 ft or 810 ft or 815 ft or 820 ft or 825 ft or 830 ft or 835 ft or 840 ft or 845 ft or 850 ft or 855 ft or 860 ft or 865 ft or 870 ft or 875 ft or 880 ft or 885 ft or 890 ft or 895 ft or 900 ft or 905 ft or 910 ft or 915 ft or 920 ft or 925 ft or 930 ft or 935 ft or 940 ft or 945 ft or 950 ft or 955 ft or 960 ft or 965 ft or 970 ft or 975 ft or 980 ft or 985 ft or 990 ft or 995 ft or 1000 ft or 1005 ft or 1010 ft or 1015 ft or 1020 ft or 1025 ft or 1030 ft or 1035 ft or 1040 ft or 1045 ft or 1050 ft or 1055 ft or 1060 ft or 1065 ft or 1070 ft or 1075 ft or 1080 ft or 1085 ft or 1090 ft or 1095 ft or 1100 ft or 1105 ft or 1110 ft or 1115 ft or 1120 ft or 1125 ft or 1130 ft or 1135 ft or 1140 ft or 1145 ft or 1150 ft or 1155 ft or 1160 ft or 1165 ft or 1170 ft or 1175 ft or 1180 ft or 1185 ft or 1190 ft or 1195 ft or 1200 ft or 1205 ft or 1210 ft or 1215 ft or 1220 ft or 1225 ft or 1230 ft or 1235 ft or 1240 ft or 1245 ft or 1250 ft or 1255 ft or 1260 ft or 1265 ft or 1270 ft or 1275 ft or 1280 ft or 1285 ft or 1290 ft or 1295 ft or 1300 ft or 1305 ft or 1310 ft or 1315 ft or 1320 ft or 1325 ft or 1330 ft or 1335 ft or 1340 ft or 1345 ft or 1350 ft or 1355 ft or 1360 ft or 1365 ft or 1370 ft or 1375 ft or 1380 ft or 1385 ft or 1390 ft or 1395 ft or 1400 ft or 1405 ft or 1410 ft or 1415 ft or 1420 ft or 1425 ft or 1430 ft or 1435 ft or 1440 ft or 1445 ft or 1450 ft or 1455 ft or 1460 ft or 1465 ft or 1470 ft or 1475 ft or 1480 ft or 1485 ft or 1490 ft or 1495 ft or 1500 ft or 1505 ft or 1510 ft or 1515 ft or 1520 ft or 1525 ft or 1530 ft or 1535 ft or 1540 ft or 1545 ft or 1550 ft or 1555 ft or 1560 ft or 1565 ft or 1570 ft or 1575 ft or 1580 ft or 1585 ft or 1590 ft or 1595 ft or 1600 ft or 1605 ft or 1610 ft or 1615 ft or 1620 ft or 1625 ft or 1630 ft or 1635 ft or 1640 ft or 1645 ft or 1650 ft or 1655 ft or 1660 ft or 1665 ft or 1670 ft or 1675 ft or 1680 ft or 1685 ft or 1690 ft or 1695 ft or 1700 ft or 1705 ft or 1710 ft or 1715 ft or 1720 ft or 1725 ft or 1730 ft or 1735 ft or 1740 ft or 1745 ft or 1750 ft or 1755 ft or 1760 ft or 1765 ft or 1770 ft or 1775 ft or 1780 ft or 1785 ft or 1790 ft or 1795 ft or 1800 ft or 1805 ft or 1810 ft or 1815 ft or 1820 ft or 1825 ft or 1830 ft or 1835 ft or 1840 ft or 1845 ft or 1850 ft or 1855 ft or 1860 ft or 1865 ft or 1870 ft or 1875 ft or 1880 ft or 1885 ft or 1890 ft or 1895 ft or 1900 ft or 1905 ft or 1910 ft or 1915 ft or 1920 ft or 1925 ft or 1930 ft or 1935 ft or 1940 ft or 1945 ft or 1950 ft or 1955 ft or 1960 ft or 1965 ft or 1970 ft or 1975 ft or 1980 ft or 1985 ft or 1990 ft or 1995 ft or 2000 ft or 2005 ft or 2010 ft or 2015 ft or 2020 ft or 2025 ft or 2030 ft or 2035 ft or 2040 ft or 2045 ft or 2050 ft or 2055 ft or 2060 ft or 2065 ft or 2070 ft or 2075 ft or 2080 ft or 2085 ft or 2090 ft or 2095 ft or 2100 ft or 2105 ft or 2110 ft or 2115 ft or 2120 ft or 2125 ft or 2130 ft or 2135 ft or 2140 ft or 2145 ft or 2150 ft or 2155 ft or 2160 ft or 2165 ft or 2170 ft or 2175 ft or 2180 ft or 2185 ft or 2190 ft or 2195 ft or 2200 ft or 2205 ft or 2210 ft or 2215 ft or 2220 ft or 2225 ft or 2230 ft or 2235 ft or 2240 ft or 2245 ft or 2250 ft or 2255 ft or 2260 ft or 2265 ft or 2270 ft or 2275 ft or 2280 ft or 2285 ft or 2290 ft or 2295 ft or 2300 ft or 2305 ft or 2310 ft or 2315 ft or 2320 ft or 2325 ft or 2330 ft or 2335 ft or 2340 ft or 2345 ft or 2350 ft or 2355 ft or 2360 ft or 2365 ft or 2370 ft or 2375 ft or 2380 ft or 2385 ft or 2390 ft or 2395 ft or 2400 ft or 2405 ft or 2410 ft or 2415 ft or 2420 ft or 2425 ft or 2430 ft or 2435 ft or 2440 ft or 2445 ft or 2450 ft or 2455 ft or 2460 ft or 2465 ft or 2470 ft or 2475 ft or 2480 ft or 2485 ft or 2490 ft or 2495 ft or 2500 ft or 2505 ft or 2510 ft or 2515 ft or 2520 ft or 2525 ft or 2530 ft or 2535 ft or 2540 ft or 2545 ft or 2550 ft or 2555 ft or 2560 ft or 2565 ft or 2570 ft or 2575 ft or 2580 ft or 2585 ft or 2590 ft or 2595 ft or 2600 ft or 2605 ft or 2610 ft or 2615 ft or 2620 ft or 2625 ft or 2630 ft or 2635 ft or 2640 ft or 2645 ft or 2650 ft or 2655 ft or 2660 ft or 2665 ft or 2670 ft or 2675 ft or 2680 ft or 2685 ft or 2690 ft or 2695 ft or 2700 ft or 2705 ft or 2710 ft or 2715 ft or 2720 ft or 2725 ft or 2730 ft or 2735 ft or 2740 ft or 2745 ft or 2750 ft or 2755 ft or 2760 ft or 2765 ft or 2770 ft or 2775 ft or 2780 ft or 2785 ft or 2790 ft or 2795 ft or 2800 ft or 2805 ft or 2810 ft or 2815 ft or 2820 ft or 2825 ft or 2830 ft or 2835 ft or 2840 ft or 2845 ft or 2850 ft or 2855 ft or 2860 ft or 2865 ft or 2870 ft or 2875 ft or 2880 ft or 2885 ft or 2890 ft or 2895 ft or 2900 ft or 2905 ft or 2910 ft or 2915 ft or 2920 ft or 2925 ft or 2930 ft or 2935 ft or 2940 ft or 2945 ft or 2950 ft or 2955 ft or 2960 ft or 2965 ft or 2970 ft or 2975 ft or 2980 ft or 2985 ft or 2990 ft or 2995 ft or 3000 ft or 3005 ft or 3010 ft or 3015 ft or 3020 ft or 3025 ft or 3030 ft or 3035 ft or 3040 ft or 3045 ft or 3050 ft or 3055 ft or 3060 ft or 3065 ft or 3070 ft or 3075 ft or 3080 ft or 3085 ft or 3090 ft or 3095 ft or 3100 ft or 3105 ft or 3110 ft or 3115 ft or 3120 ft or 3125 ft or 3130 ft or 3135 ft or 3140 ft or 3145 ft or 3150 ft or 3155 ft or 3160 ft or 3165 ft or 3170 ft or 3175 ft or 3180 ft or 3185 ft or 3190 ft or 3195 ft or 3200 ft or 3205 ft or 3210 ft or 3215 ft or 3220 ft or 3225 ft or 3230 ft or 3235 ft or 3240 ft or 3245 ft or 3250 ft or 3255 ft or 3260 ft or 3265 ft or 3270 ft or 3275 ft or 3280 ft or 3285 ft or 3290 ft or 3295 ft or 3300 ft or 3305 ft or 3310 ft or 3315 ft or 3320 ft or 3325 ft or 3330 ft or 3335 ft or 3340 ft or 3345 ft or 3350 ft or 3355 ft or 3360 ft or 3365 ft or 3370 ft or 3375 ft or 3380 ft or 3385 ft or 3390 ft or 3395 ft or 3400 ft or 3405 ft or 3410 ft or 3415 ft or 3420 ft or 3425 ft or 3430 ft or 3435 ft or 3440 ft or 3445 ft or 3450 ft or 3455 ft or 3460 ft or 3465 ft or 3470 ft or 3475 ft or 3480 ft or 3485 ft or 3490 ft or 3495 ft or 3500 ft or 3505 ft or 3510 ft or 3515 ft or 3520 ft or 3525 ft or 3530 ft or 3535 ft or 3540 ft or 3545 ft or 3550 ft or 3555 ft or 3560 ft or 3565 ft or 3570 ft or 3575 ft or 3580 ft or 3585 ft or 3590 ft or 3595 ft or 3600 ft or 3605 ft or 3610 ft or 3615 ft or 3620 ft or 3625 ft or 3630 ft or 3635 ft or 3640 ft or 3645 ft or 3650 ft or 3655 ft or 3660 ft or 3665 ft or 3670 ft or 3675 ft or 3680 ft or 3685 ft or 3690 ft or 3695 ft or 3700 ft or 3705 ft or 3710 ft or 3715 ft or 3720 ft or 3725 ft or 3730 ft or 3735 ft or 3740 ft or 3745 ft or 3750 ft or 3755 ft or 3760 ft or 3765 ft or 3770 ft or 3775 ft or 3780 ft or 3785 ft or 3790 ft or 3795 ft or 3800 ft or 3805 ft or 3810 ft or 3815 ft or 3820 ft or 3825 ft or 3830 ft or 3835 ft or 3840 ft or 3845 ft or 3850 ft or 3855 ft or 3860 ft or 3865 ft or 3870 ft or 3875 ft or 3880 ft or 3885 ft or 3890 ft or 3895 ft or 3900 ft or 3905 ft or 3910 ft or 3915 ft or 3920 ft or 3925 ft or 3930 ft or 3935 ft or 3940 ft or 3945 ft or 3950 ft or 3955 ft or 3960 ft or 3965 ft or 3970 ft or 3975 ft or 3980 ft or 3985 ft or 3990 ft or 3995 ft or 4000 ft or 4005 ft or 4010 ft or 4015 ft or 4020 ft or 4025 ft or 4030 ft or 4035 ft or 4040 ft or 4045 ft or 4050 ft or 4055 ft or 4060 ft or 4065 ft or 4070 ft or 4075 ft or 4080 ft or 4085 ft or 4090 ft or 4095 ft or 4100 ft or 4105 ft or 4110 ft or 4115 ft or 4120 ft or 4125 ft or 4130 ft or 4135 ft or 4140 ft or 4145 ft or 4150 ft or 4155 ft or 4160 ft or 4165 ft or 4170 ft or 4175 ft or 4180 ft or 4185 ft or 4190 ft or 4195 ft or 4200 ft or 4205 ft or 4210 ft or 4215 ft or 4220 ft or 4225 ft or 4230 ft or 4235 ft or 4240 ft or 4245 ft or 4250 ft or 4255 ft or 4260 ft or 4265 ft or 4270 ft or 4275 ft or 4280 ft or 4285 ft or 4290 ft or 4295 ft or 4300 ft or 4305 ft or 4310 ft or 4315 ft or 4320 ft or 4325 ft or 4330 ft or 4335 ft or 4340 ft or 4345 ft or 4350 ft or 4355 ft or 4360 ft or 4365 ft or 4370 ft or 4375 ft or 4380 ft or 4385 ft or 4390 ft or 4395 ft or 4400 ft or 4405 ft or 4410 ft or 4415 ft or 4420 ft or 4425 ft or 4430 ft or 4435 ft or 4440 ft or 4445 ft or 4450 ft or 4455 ft or 4460 ft or 4465 ft or 4470 ft or 4475 ft or 4480 ft or 4485 ft or 4490 ft or 4495 ft or 4500 ft or 4505 ft or 4510 ft or 4515 ft or 4520 ft or 4525 ft or 4530 ft or 4535 ft or 4540 ft or 4545 ft or 4550 ft or 4555 ft or 4560 ft or 4565 ft or 4570 ft or 4575 ft or 4580 ft or 4585 ft or 4590 ft or 4595 ft or 4600 ft or 4605 ft or 4610 ft or 4615 ft or 4620 ft or 4625 ft or 4630 ft or 4635 ft or 4640 ft or 4645 ft or 4650 ft or 4655 ft or 4660 ft or 4665 ft or 4670 ft or 4675 ft or 4680 ft or 4685 ft or 4690 ft or 4695 ft or 4700 ft or 4705 ft or 4710 ft or 4715 ft or 4720 ft or 4725 ft or 4730 ft or 4735 ft or 4740 ft or 4745 ft or 4750 ft or 4755 ft or 4760 ft or 4765 ft or 4770 ft or 4775 ft or 4780 ft or 4785 ft or 4790 ft or 4795 ft or 4800 ft or 4805 ft or 4810 ft or 4815 ft or 4820 ft or 4825 ft or 4830 ft or 4835 ft or 4840 ft or 4845 ft or 4850 ft or 4855 ft or 4860 ft or 4865 ft or 4870 ft or 4875 ft or 4880 ft or 4885 ft or 4890 ft or 4895 ft or 4900 ft or 4905 ft or 4910 ft or 4915 ft or 4920 ft or 4925 ft or 4930 ft or 4935 ft or 4940 ft or 4945 ft or 4950 ft or 4955 ft or 4960 ft or 4965 ft or 4970 ft or 4975 ft or 4980 ft or 4985 ft or 4990 ft or 4995 ft or 5000 ft or 5005 ft or 5010 ft or 5015 ft or 5020 ft or 5025 ft or 5030 ft or 5035 ft or 5040 ft or 5045 ft or 5050 ft or 5055 ft or 5060 ft or 5065 ft or 5070 ft or 5075 ft or 5080 ft or 5085 ft or 5090 ft or 5095 ft or 5100 ft or 5105 ft or 5110 ft or 5115 ft or 5120 ft or 5125 ft or 5130 ft or 5135 ft or 5140 ft or 5145 ft or 5150 ft or 5155 ft or 5160 ft or 5165 ft or 5170 ft or 5175 ft or 5180 ft or 5185 ft or 5190 ft or 5195 ft or 5200 ft or 5205 ft or 5210 ft or 5215 ft or 5220 ft or 5225 ft or 5230 ft or 5235 ft or 5240 ft or 5245 ft or 5250 ft or 5255 ft or 5260 ft or 5265 ft or 5270 ft or 5275 ft or 5280 ft or 5285 ft or 5290 ft or 5295 ft or 5300 ft or 5305 ft or 5310 ft or 5315 ft or 5320 ft or 5325 ft or 5330 ft or 5335 ft or 5340 ft or 5345 ft or 5350 ft or 5355 ft or 5360 ft or 5365 ft or 5370 ft or 5375 ft or 5380 ft or 5385 ft or 5390 ft or 5395 ft or 5400 ft or 5405 ft or 5410 ft or 5415 ft or 5420 ft or 5425 ft or 5430 ft or 5435 ft or 5440 ft or 5445 ft or 5450 ft or 5455 ft or 5460 ft or 5465 ft or 5470 ft or 5475 ft or 5480 ft or 5485 ft or 5490 ft or 5495 ft or 5500 ft or 5505 ft or 5510 ft or 5515 ft or 5520 ft or 5525 ft or 5530 ft or 5535 ft or 5540 ft or 5545 ft or 5550 ft or 5555 ft or 5560 ft or 5565 ft or 5570 ft or 5575 ft or 5580 ft or 5585 ft or 5590 ft or 5595 ft or 5600 ft or 5605 ft or 5610 ft or 5615 ft or 5620 ft or 5625 ft or 5630 ft or 5635 ft or 5640 ft or 5645 ft or 5650 ft or 5655 ft or 5660 ft or 5665 ft or 5670 ft or 5675 ft or 5680 ft or 5685 ft or 5690 ft or 5695 ft or 5700 ft or 5705 ft or 5710 ft or 5715 ft or 5720 ft or 5725 ft or 5730 ft or 5735 ft or 5740 ft or 5745 ft or 5750 ft or 5755 ft or 5760 ft or 5765 ft or 5770 ft or 5775 ft or 5780 ft or 5785 ft or 5790 ft or 5795 ft or 5800 ft or 5805 ft or 5810 ft or 5815 ft or 5820 ft or 5825 ft or 5830 ft or 5835 ft or 5840 ft or 5845 ft or 5850 ft or 5855 ft or 5860 ft or 5865 ft or 5870 ft or 5875 ft or 5880 ft or 5885 ft or 5890 ft or 5895 ft or 5900 ft or 5905 ft or 5910 ft or 5915 ft or 5920 ft or 5925 ft or 5930 ft or 5935 ft or 5940 ft or 5945 ft or 5950 ft or 5955 ft or 5960 ft or 5965 ft or 5970 ft or 5975 ft or 5980 ft or 5985 ft or 5990 ft or 5995 ft or 6000 ft or 6005 ft or 6010 ft or 6015 ft or 6020 ft or 6025 ft or 6030 ft or 6035 ft or 6040 ft or 6045 ft or 6050 ft or 6055 ft or 6060 ft or 6065 ft or 6070 ft or 6075 ft or 6080 ft or 6085 ft or 6090 ft or 6095 ft or 6100 ft or 6105 ft or 6110 ft or 6115 ft or 6120 ft or 6125 ft or 6130 ft or 6135 ft or 6140 ft or 6145 ft or 6150 ft or 6155 ft or 6160 ft or 6165 ft or 6170 ft or 6175 ft or 6180 ft or 6185 ft or 6190 ft or 6195 ft or 6200 ft or 6205 ft or 6210 ft or 6215 ft or 6220 ft or 6225 ft or 6230 ft or 6235 ft or 6240 ft or 6245 ft or 6250 ft or 6255 ft or 6260 ft or 6265 ft or 6270 ft or 6275 ft or 6280 ft or 6285 ft or 6290 ft or 6295 ft or 6300 ft or 6305 ft or 6310 ft or 6315 ft or 6320 ft or 6325 ft or 6330 ft or 6335 ft or 6340 ft or 6345 ft or 6350 ft or 6355 ft or 6360 ft or 6365 ft or 6370 ft or 6375 ft or 6380 ft or 6385 ft or 6390 ft or 6395 ft or 6400 ft or 6405 ft or 6410 ft or 6415 ft or 6420 ft or 6425 ft or 6430 ft or 6435 ft or 6440 ft or 6445 ft or 6450 ft or 6455 ft or 6460 ft or 6465 ft or 6470 ft or 6475 ft or 6480 ft or 6485 ft or 6490 ft or 6495 ft or 6500 ft or 6505 ft or 6510 ft or 6515 ft or 6520 ft or 6525 ft or 6530 ft or 6535 ft or 6540 ft or 6545 ft or 6550 ft or 6555 ft or 6560 ft or 6565 ft or 6570 ft or 6575 ft or 6580 ft or 6585 ft or 6590 ft or 6595 ft or 6600 ft or 6605 ft or 6610 ft or 6615 ft or 6620 ft or 6625 ft or 6630 ft or 6635 ft or 6640 ft or 6645 ft or 6650 ft or 6655 ft or 6660 ft or 6665 ft or 6670 ft or 6675 ft or 6680 ft or 6685 ft or 6690 ft or 6695 ft or 6700 ft or 6705 ft or 6710 ft or 6715 ft or 6720 ft or 6725 ft or 6730 ft or 6735 ft or 6740 ft or 6745 ft or 6750 ft or 6755 ft or 6760 ft or 6765 ft or 6770 ft or 6775 ft or 6780 ft or 6785 ft or 6790 ft or 6795 ft or 6800 ft or 6805 ft or 6810 ft or 6815 ft or 6820 ft or 6825 ft or 6830 ft or 6835 ft or 6840 ft or 6845 ft or 6850 ft or 6855 ft or 6860 ft or 6865 ft or 6870 ft or 6875 ft or 6880 ft or 6885 ft or 6890 ft or 6895 ft or 6900 ft or 6905 ft or 6910 ft or 6915 ft or 6920 ft or 6925 ft or 6930 ft or 6935 ft or 6940 ft or 6945 ft or 6950 ft or 6955 ft or 6960 ft or 6965 ft or 6970 ft or 6975 ft or 6980 ft or 6985 ft or 6990 ft or 6995 ft or 7000 ft or 7005 ft or 7010 ft or 7015 ft or 7020 ft or 7025 ft or 7030 ft or 7035 ft or 7040 ft or 7045 ft or 7050 ft or 7055 ft or 7060 ft or 7065 ft or 7070 ft or 7075 ft or 7080 ft or 7085 ft or 7090 ft or 7095 ft or 7100 ft or 7105 ft or 7110 ft or 7115 ft or 7120 ft or 7125 ft or 7130 ft or 7135 ft or 7140 ft or 7145 ft or 715

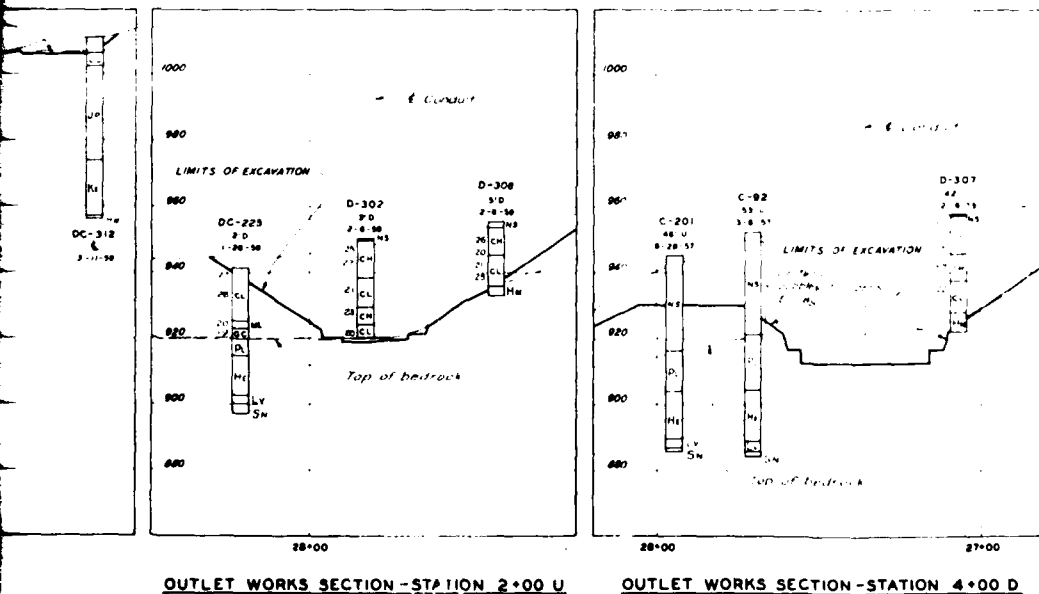
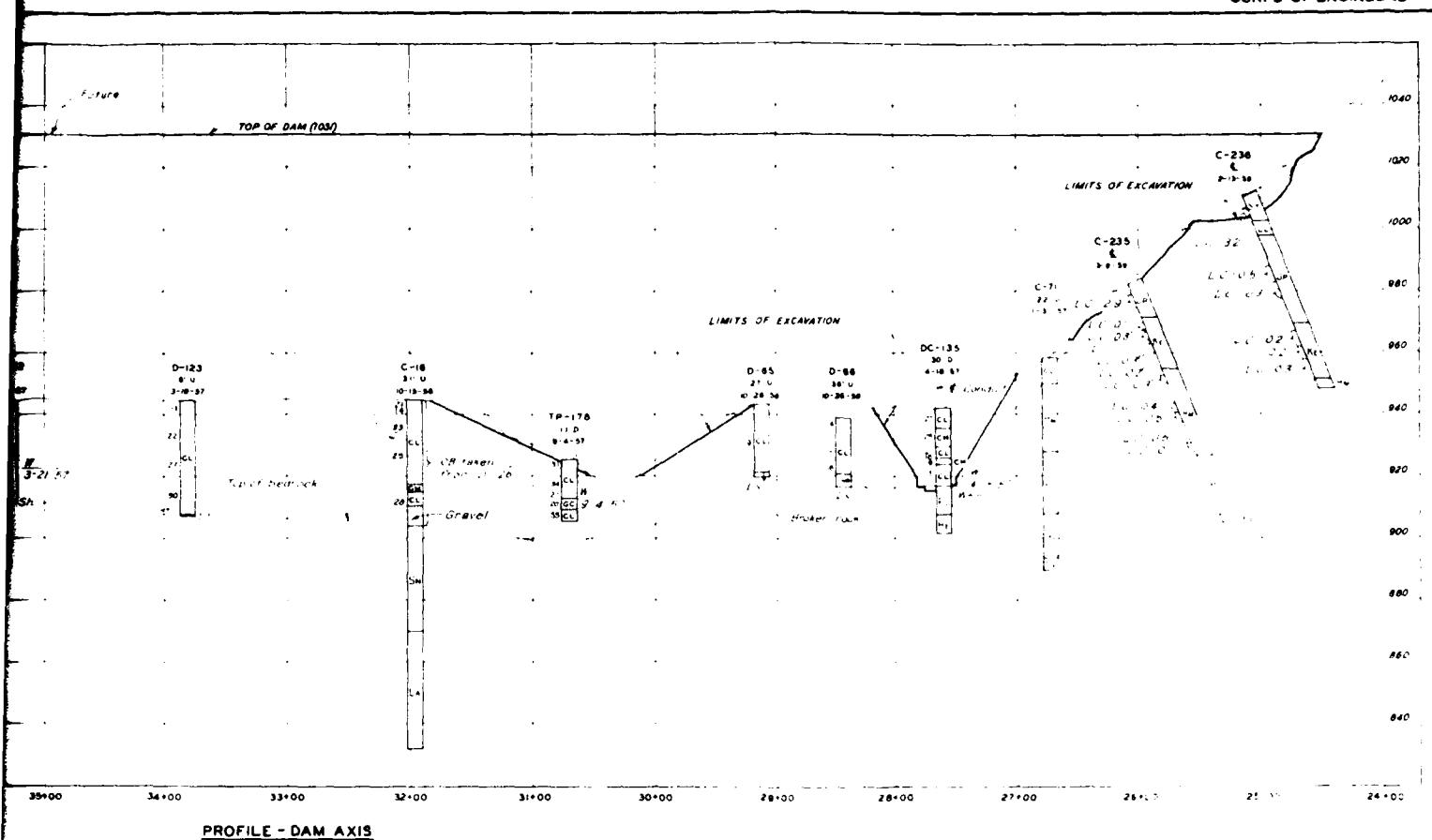


PROFILE - DAM



OUTLET WORKS SECTION - STATION 3+21.25 U

OUTLET WORKS SECTION



NOTES
1. See Notes 1 through 4
2. See Notes 1 through 4
3. See Notes 1 through 4
4. See Notes 1 through 4

RECORD DRAWING

MARCH 1960
CONTRACT NO. DA 23-028 (CHENG 58-1)

Revised for As Built conditions
DESCRIPTION
REVISIONS

DATE APP'D

HUNDRED AND TEN MILE CREEK, KAN.

POMONA DAM
STAGE 1 CONSTRUCTION

LOGS OF UNDERGROUND EXPLORATION
AXIS OF DAM AND OUTLET WORKS

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 77

Scale as shown
KANSAS CITY, MO.
APRIL 1959

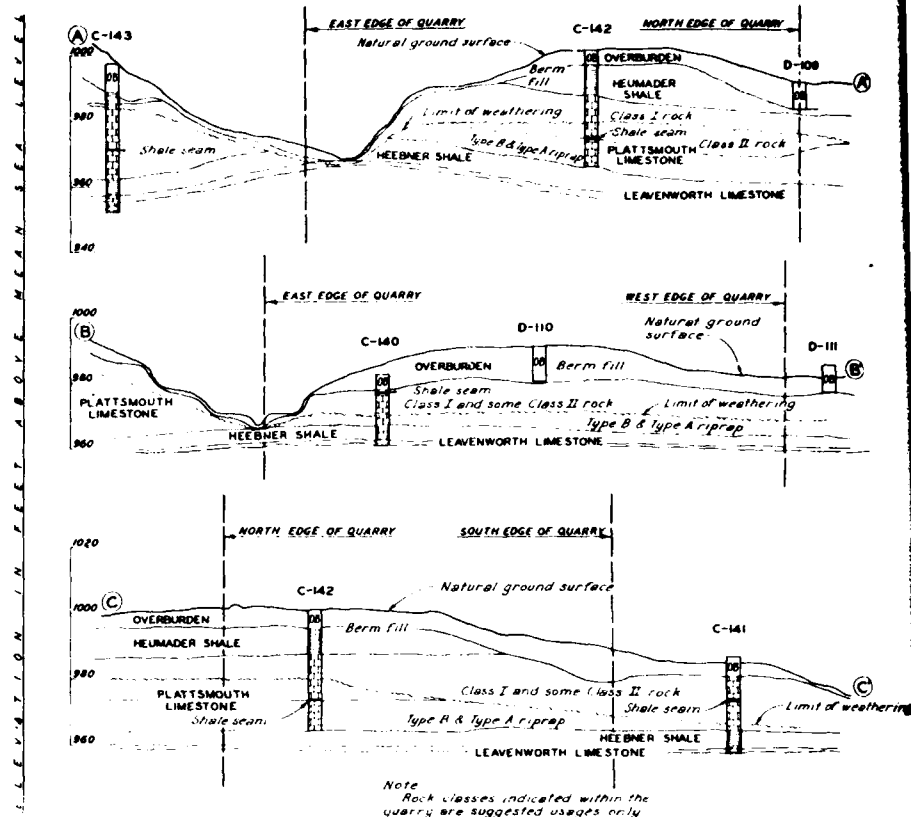
Submitted by
Checked by
Drawn by
NRL

Checked by
Drawn by
DES

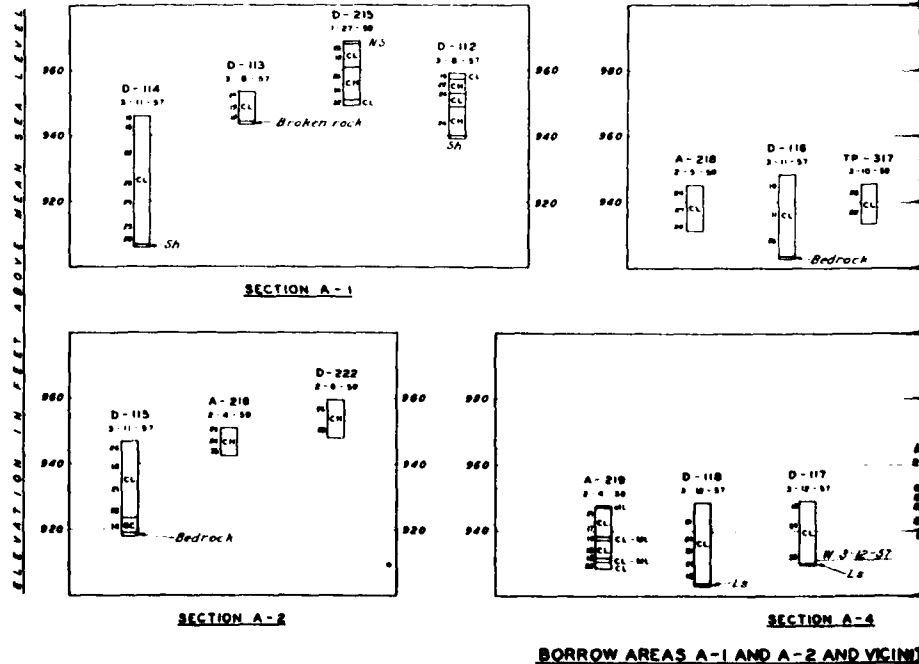
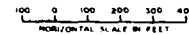
Recommended by
Checked by
CRG

Approved by
Checked by
0-3-377

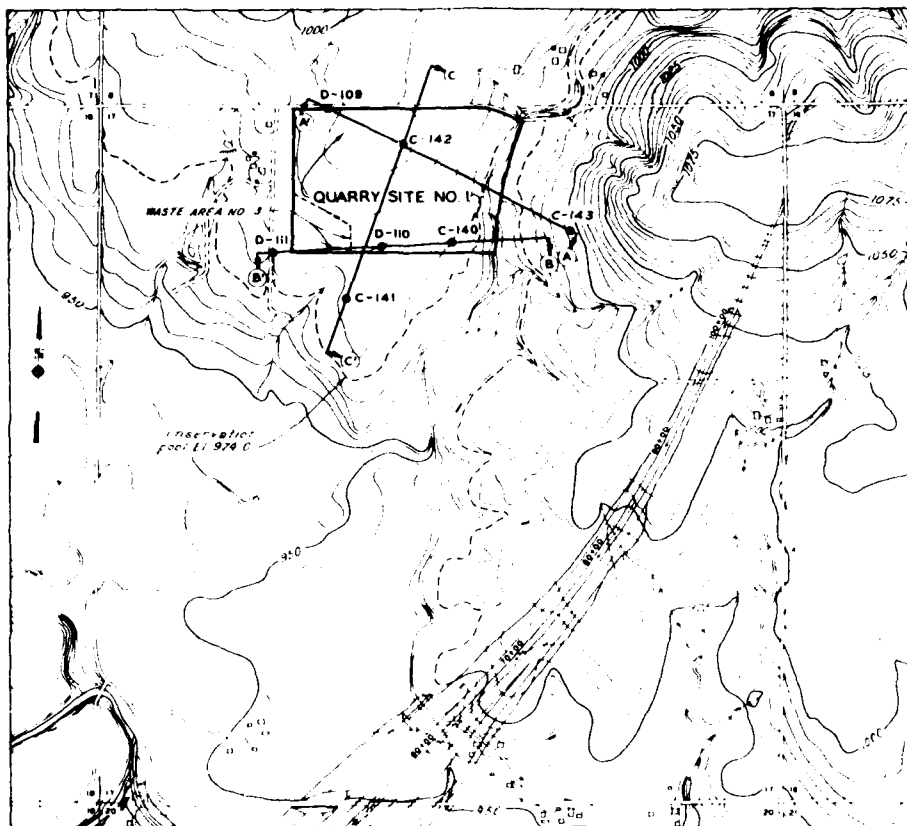
PLATE NO. 19



UNDERGROUND EXPLORATIONS

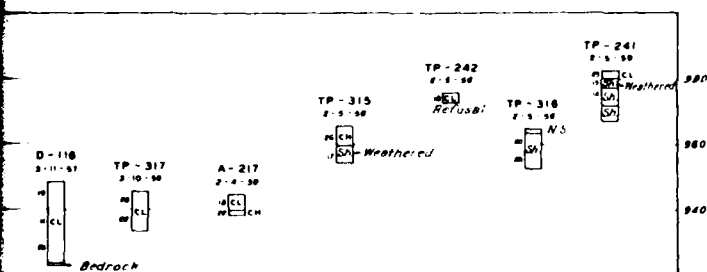


BORROW AREAS A-1 AND A-2 AND VICINITY

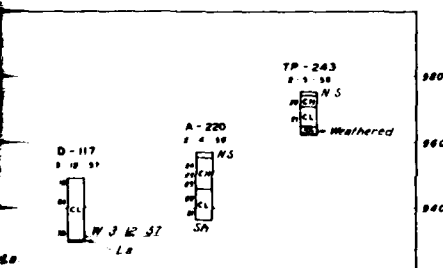


PLAN
500 0 500 1000 1500
SCALE IN FEET

QUARRY SITE NO. 1



SECTION A-3



SECTION A-4

AND A-2 AND VICINITY

RECORD DRAWING

MARCH 1962
CONTRACT NO. DA 23-028-GENVIG 59 551



Revised for "As Built" conditions
DESCRIPTION
REVISIONS

DATE APPD
1/2/63

HUNDRED AND TEN MILE CREEK KANSAS

POMONA DAM

STAGE I CONSTRUCTION

LOGS OF UNDERGROUND EXPLORATIONS
QUARRY SITE AND BORROW AREA "X"

In 80 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 78

Scale as shown
KANSAS CITY MO.
APRIL 1966

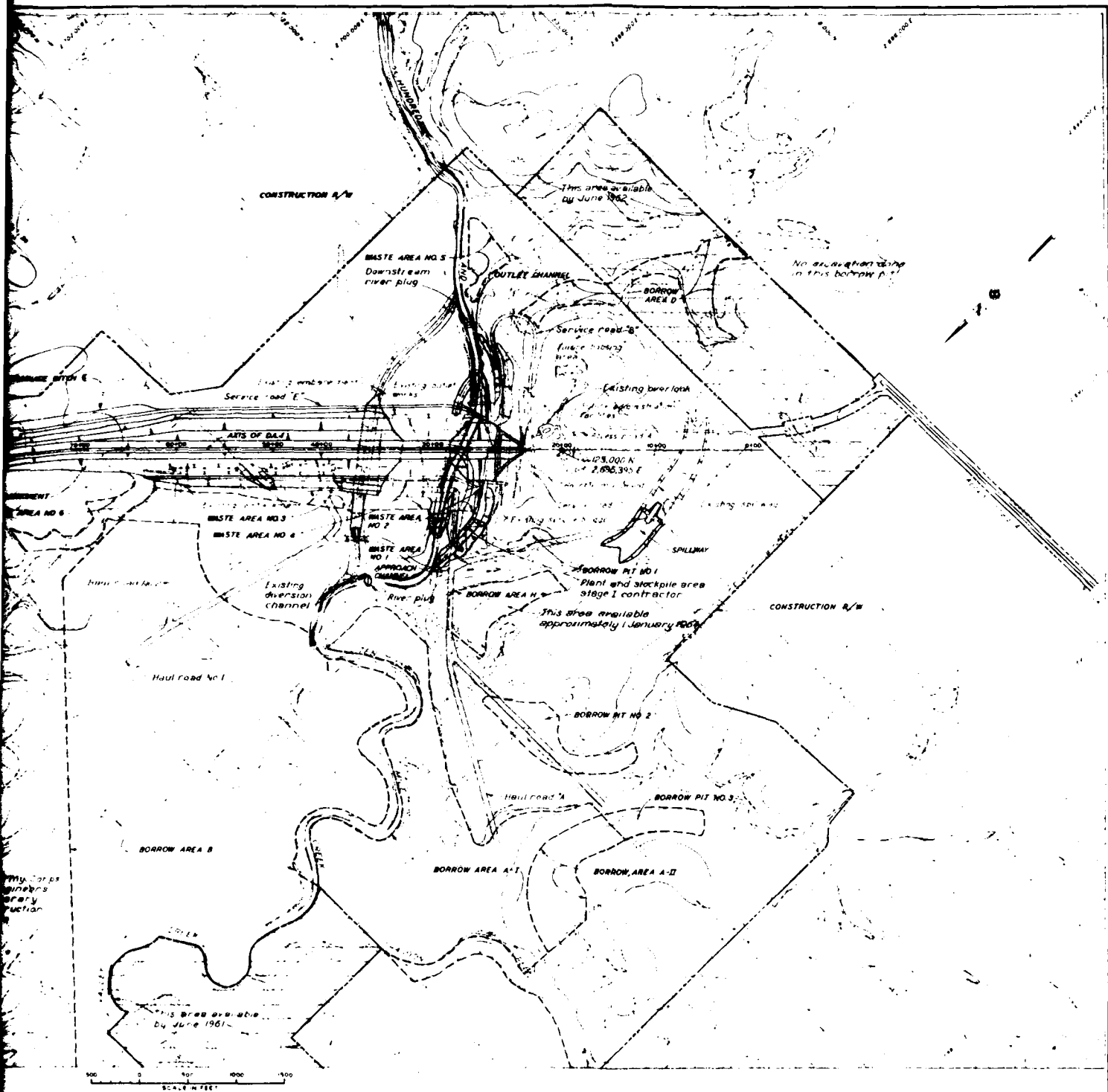
Submitted
Chief, Geology Section
Drawn by
V.L.A.

Recommended
Chief Engineering Division
Checked by
F.E.G.

Approved
Chief, Construction Division
Checked by
C.R.G.



PLATE NO. 20



HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

COMPLETION OF EMBANKMENT

GENERAL PLAN**RECORD DRAWING**

OCTOBER 1963

CONTRACT NO. DA-23-028-CIV-ENG-41 250

In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 2

Scale: as shown
KANSAS CITY, MO.
SEPTEMBER 1960

SYMBOLS
As Built conditions
DESCRIPTION
REVISIONS

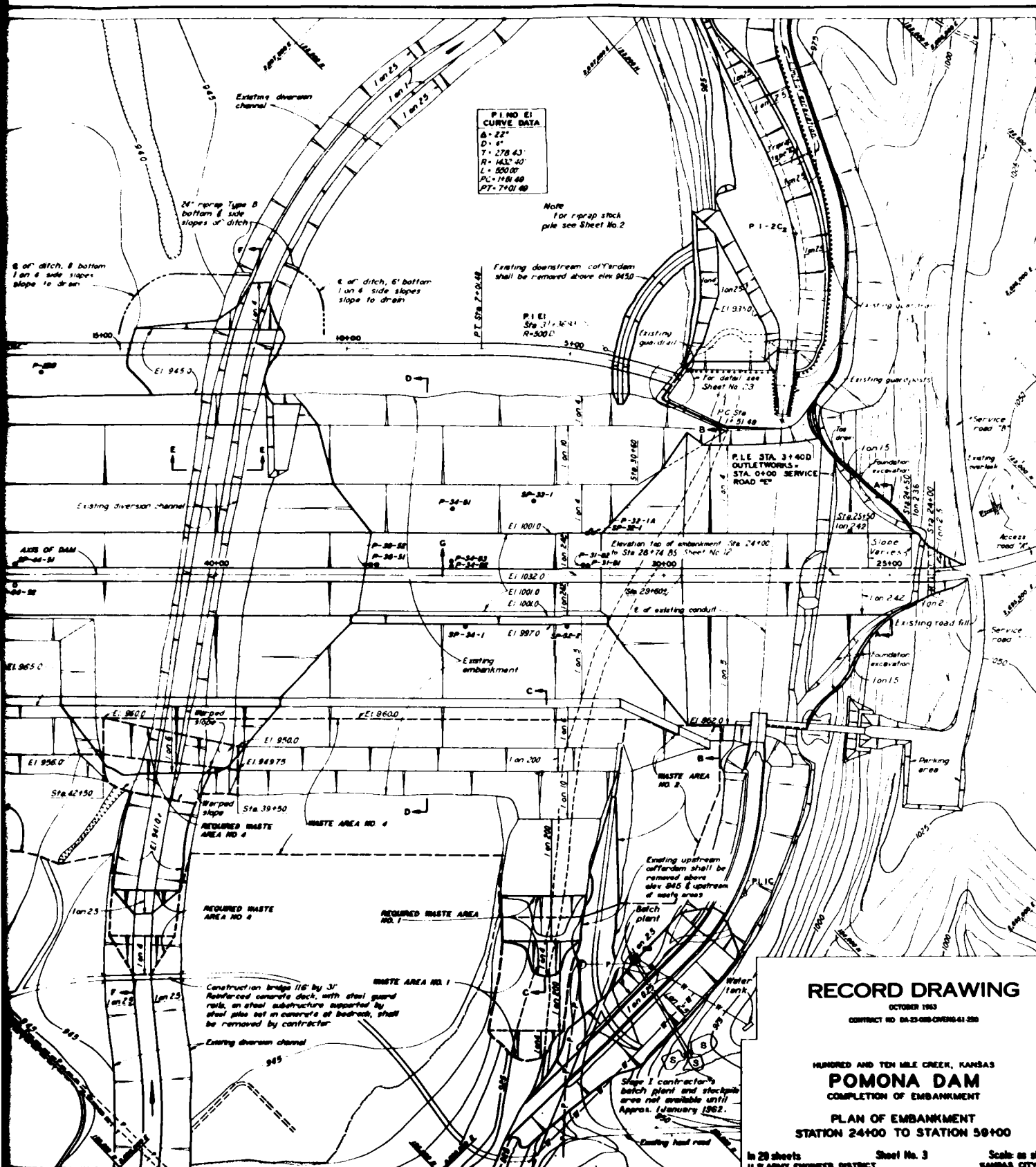
DATE, APP'D
N.F.P.

Submitted
Chief, Plans & Policy Sec.
Drawn by
J.A.W.

Recommended
Chief, Engineering Division
Checked by
R.G.F.

Approved
Col. C.E. Duffield, Engineer
File No.
O-3 9478

PLATE NO. 21



RECORD DRAWING

OCTOBER 1963
CONTRACT NO DA-23-000-ORD-61-220

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

COMPLETION OF EMBANKMENT

PLAN OF EMBANKMENT
STATION 24+00 TO STATION 59+00

In 20 sheets
U. S. ARMY ENGINEER DISTRICT
SACRAMENTO CITY

Sheet No. 3

Scale: as shown
KANSAS CITY, MO.
SEPTEMBER 1990

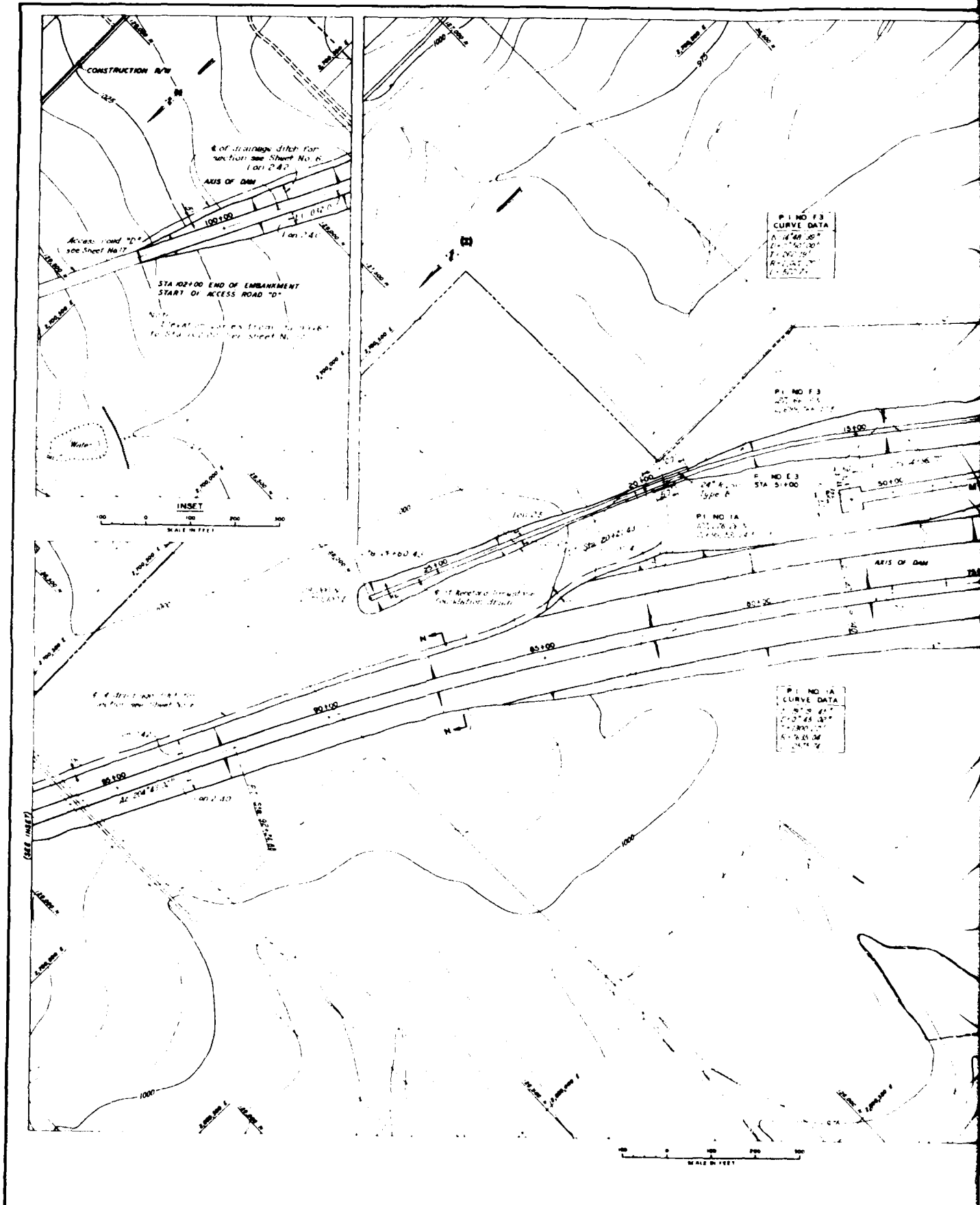
Submitted: E. J. [Signature]
 Chief, Bureau of Police, State
 Drawn by: H. F. R. Traced by: G. B. W.

Recommended

 Chief, Engineering Section
 Checked by:
 A.C.F.

Approved
[Signature]
 Col. C.E. Star of Superior
 File No.
 0-3-473

PLATE NO. 22



OCTOBER 1965

CONTRACT NO. DA 23-028 CIVE NG 61 240

A	Revised for "As Built" conditions
SYM	DESCRIPTION REVISIONS

HUNDRED AND TEN MILE CREEK, KANSAS.

POMONA DAM

COMPLETION OF EMBANKMENT

PLAN OF EMBANKMENT
STATION 59+00 TO STATION 102+00

In 29 sheets
U.S. ARMY EN
KANSAS CITY

Sheet No 4

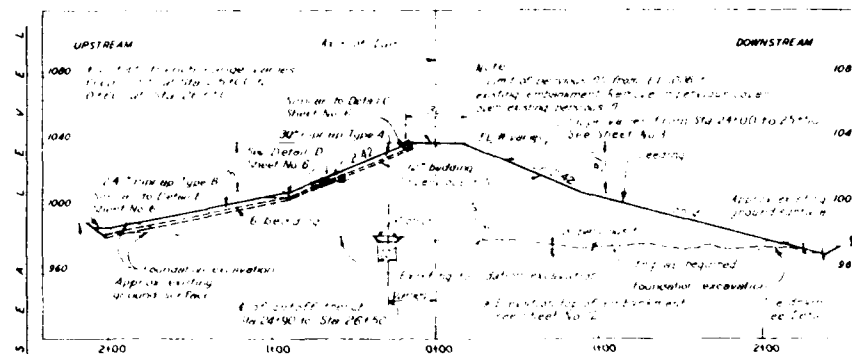
Scale as shown
KANSAS CITY, MO
SEPTEMBER 1960

Submitted
E. J. [Signature]
Chief, News & Film Sec.
Drawn by Traced by
NFP REC

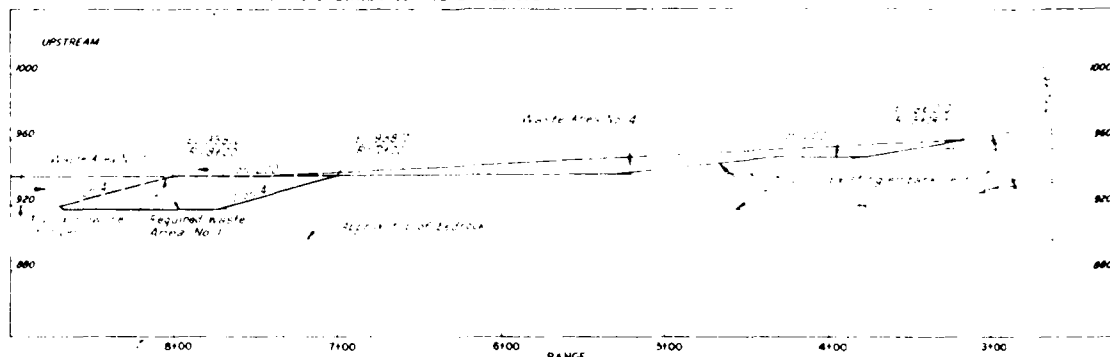
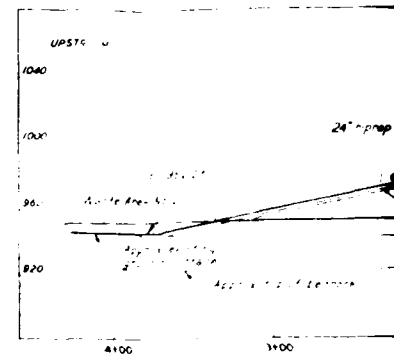
Rare compound,
See...
Chief, Engineering Division
(checked by)
R.G.F.

Approved
[Signature]
 Col. C. E. District Engineer
 File No.
 O-3-474

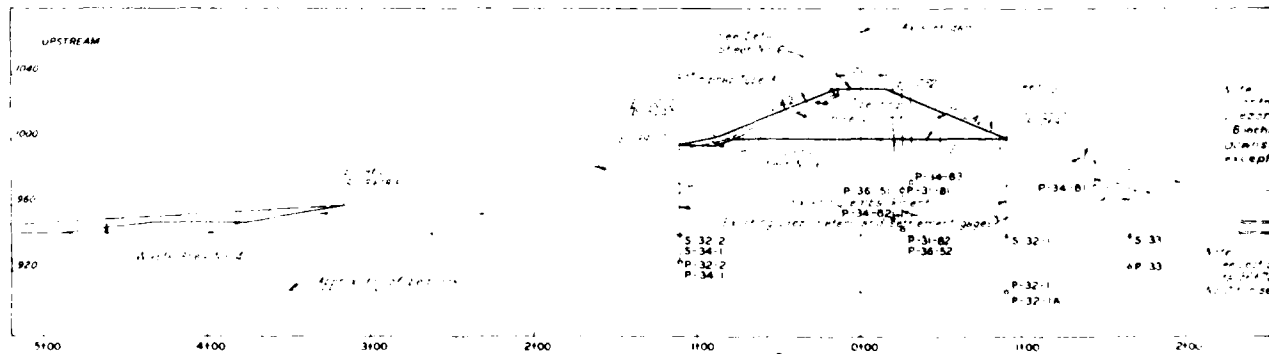
0-3-474



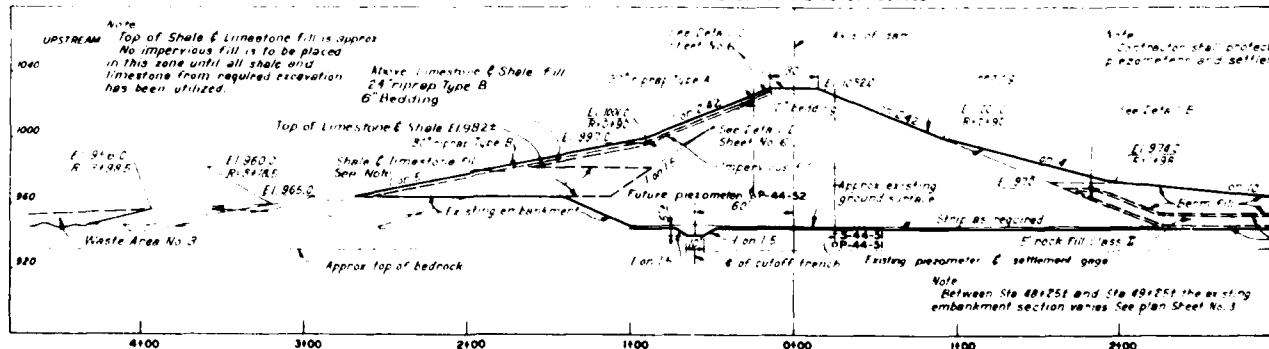
SECTION A-A
TYPICAL STA. 24+00 TO STA. 26+00



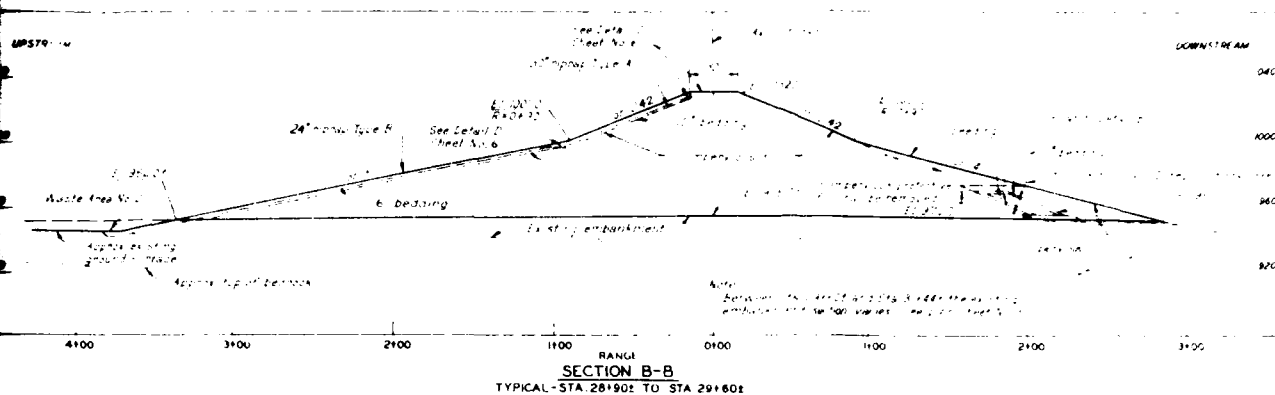
SECTION C-C
STA. 32+30 UPSTREAM CHANNEL FILL



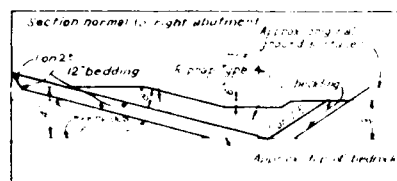
SECTION D-D
TYPICAL - STA. 31+442 TO STA. 38+702



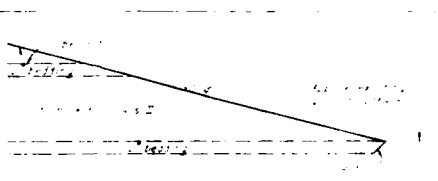
SECTION H-H
TYPICAL - STA. 43+502 TO STA. 48+252



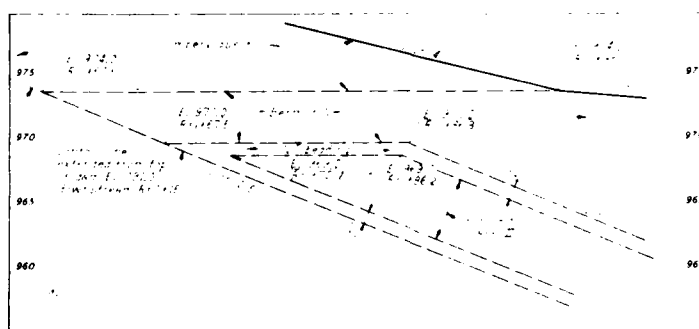
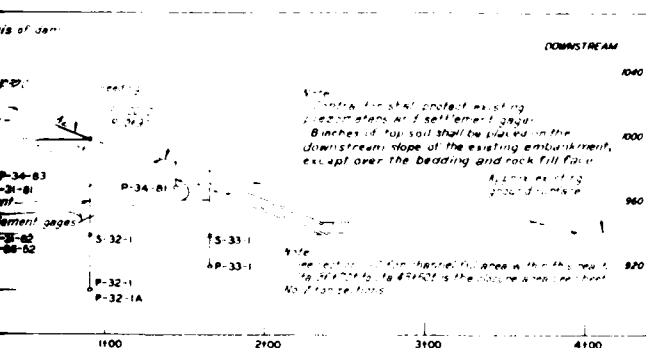
SECTION B-8
TYPICAL - STA. 28+90± TO STA 29+60±



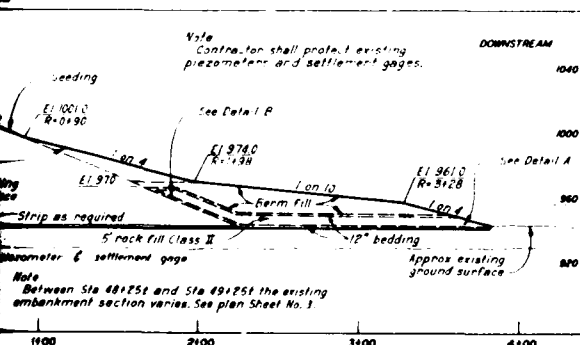
DETAIL OF TOE DRAIN



DETAIL A



DETAIL B



NOTE
The complete Townsendian is pe sta. to seeded
with the exception of the bedding and rock in
Class II face

RECORD DRAWING

OCTOBER 1963
CONTRACT NO. DA 23-028 CIVENG 61 250

②	Revised for As Built conditions	5764	EW
SYM	DESCRIPTION	DATE	APP'D
	REVISIONS		

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

COMPLETION OF EMBARKMENT

EMBANKMENT SECTIONS
STATION 24+00 TO STATION 49+25±

in 29 sheets
U S ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 5

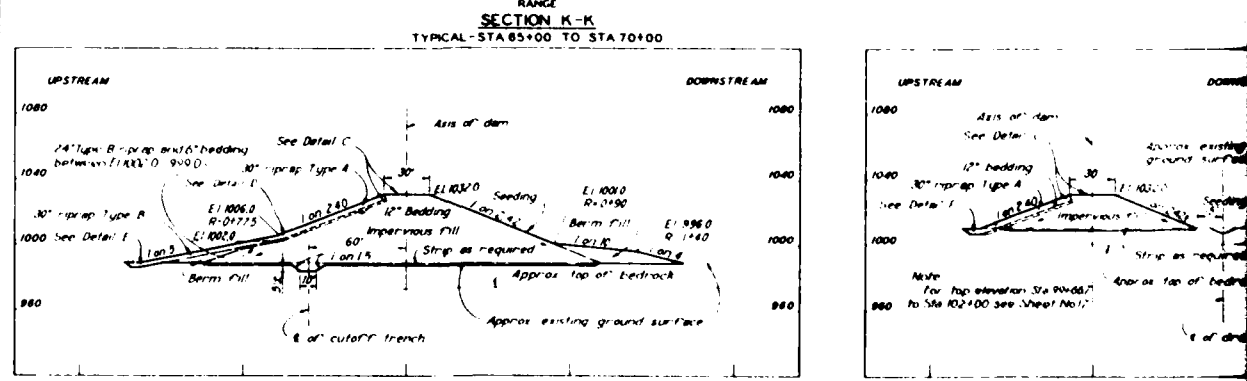
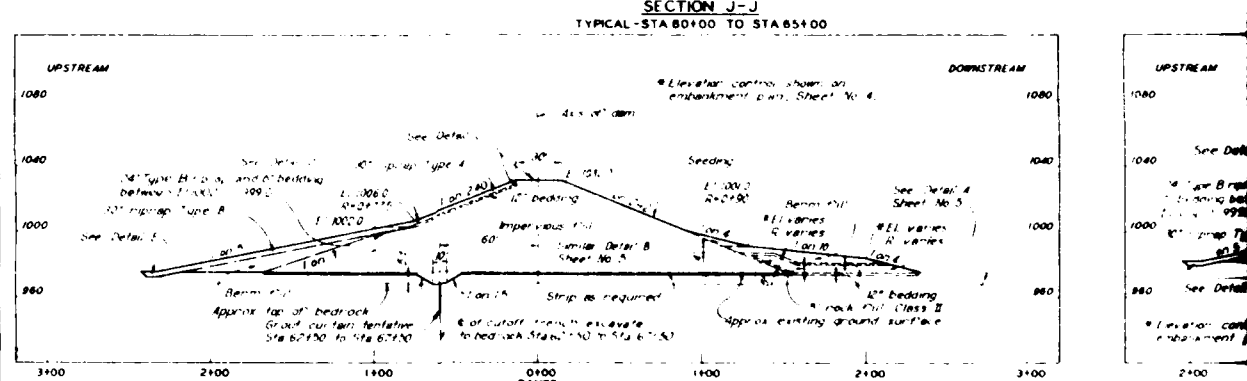
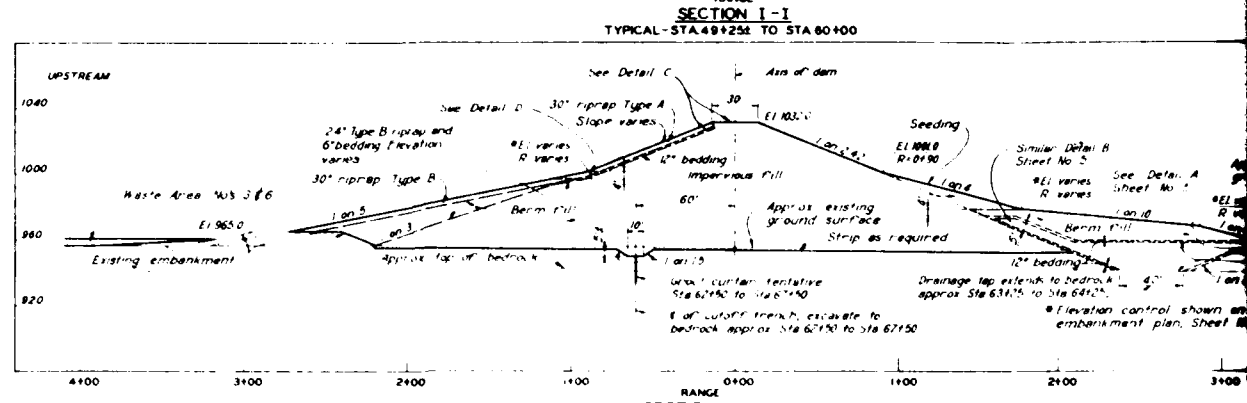
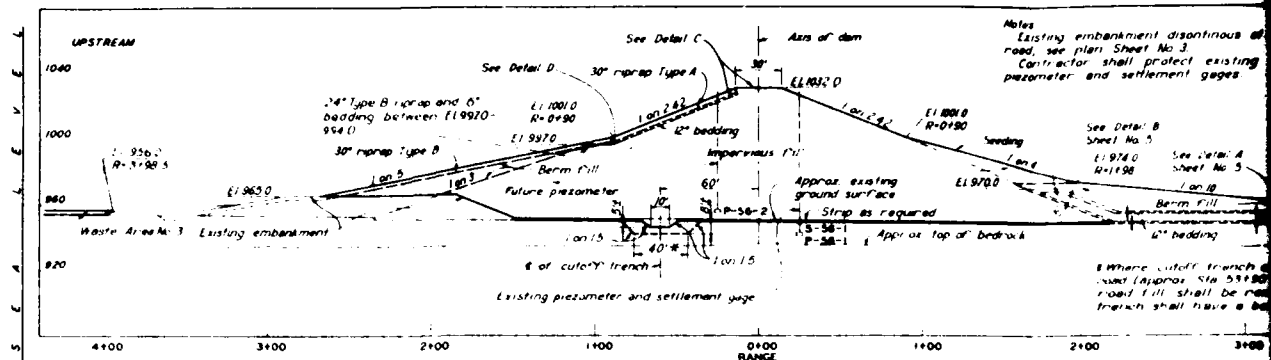
Scale as shown
KANSAS CITY, MO
SEPTEMBER 1960

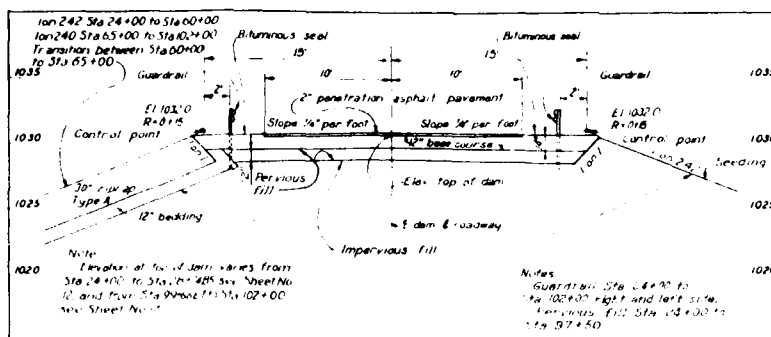
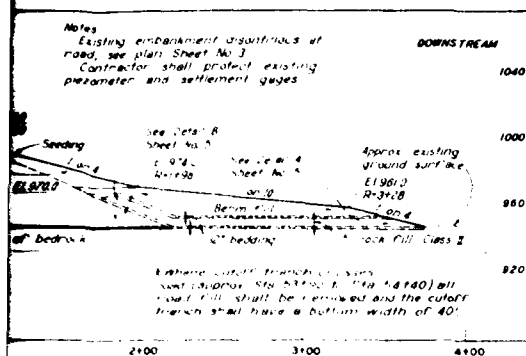
Submitted: E. J. Mohr
 Chief, Data & Film Sec.
 Drawn by: _____ Traced by: _____
 H.F.P. B.R.B.

Recommended
[Signature]
 Chief, Engineering Division
 Checked by
 R.G.F.

Approved
R E Pearson
Col. C. E. District Engineer
File No
0-3-47

9-3-67

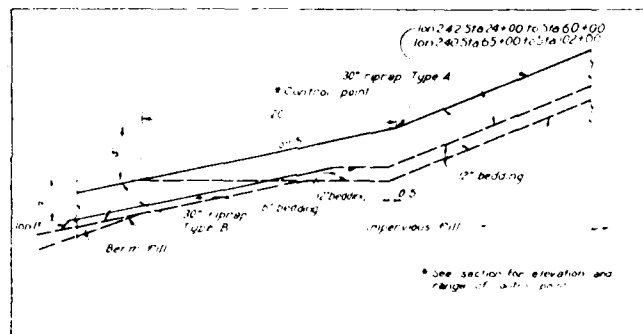
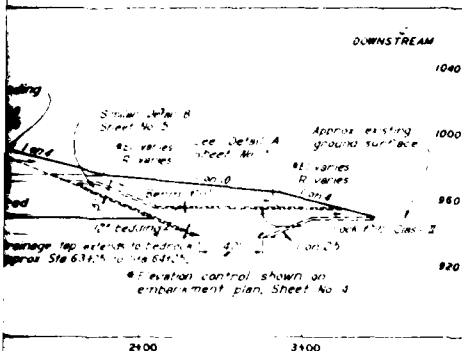




DETAIL C-TYPICAL SURFACING-TOP OF DAM

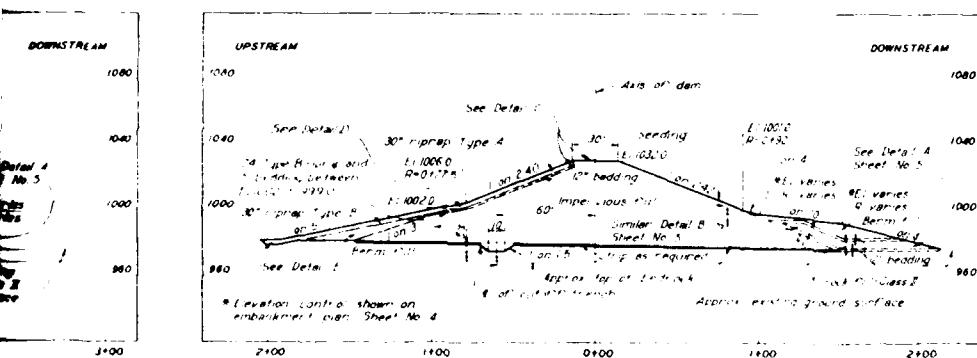
STA 24+00 TO STA 102+00

Scale 1"=5'



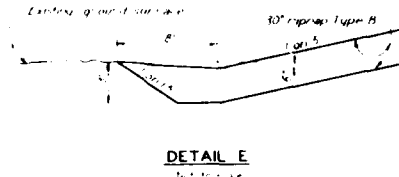
DETAIL D

Scale 1"=5'



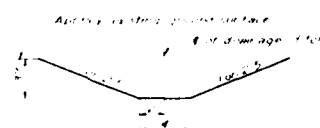
SECTION L-L

TYPICAL-STA 70+00 TO STA 74+00



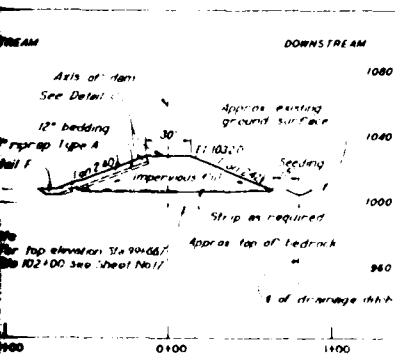
DETAIL E

Scale 1"=5'



SECTION-DRAINAGE DITCH

Scale 1"=5'



SECTION N-N

TYPICAL-STA 85+00 TO STA 102+00

NOTE:
The complete downstream slope shall be graded with the exception of the bedding and rock fill Class II face.

DETAIL F

Not to scale

RECORD DRAWING

OCTOBER 1963

CONTRACT NO. DA 21-028 COVER 41-250

Revised for 1st B.L. conditions
DESCRIPTION
REVISIONS

DATE
APP'D.

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM

COMPLETION OF EMBANKMENT

EMBANKMENT SECTIONS

STATION 49+25± TO STATION 102+00

In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 6

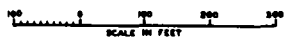
Scale as shown
KANSAS CITY, MO
SEPTEMBER 1960



Submitted
Chief, Dam & Tide Sect.
Drawn by
N.F.P.

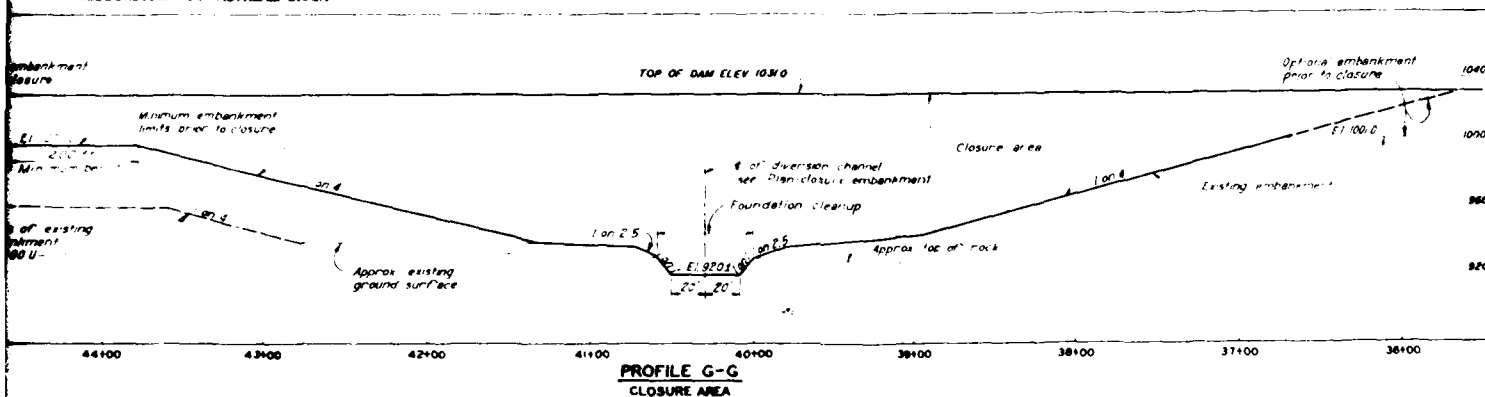
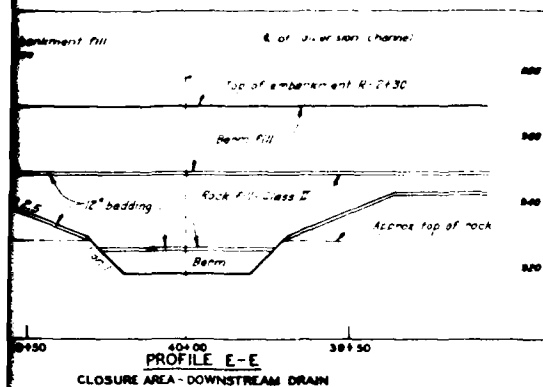
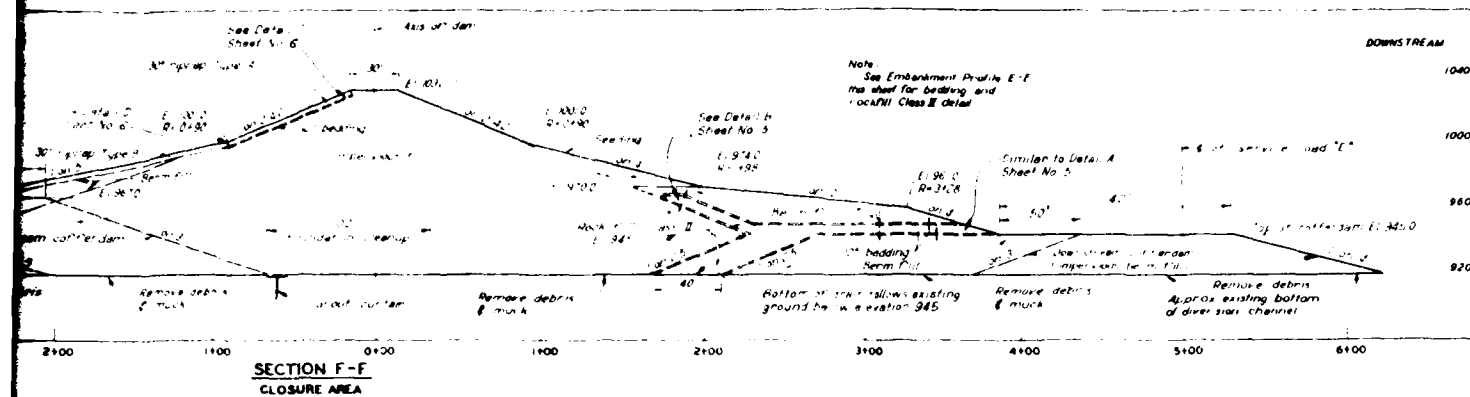
Recommended
Chief Engineering Division
Checked by
G.W.

Approved
Col. C.E. District Engineer
File No.
0-3-470



PLAN-CLOSURE EMBANKMENT





NOTE
Profile and section slopes and ranges
are given perpendicular to axis of dam.

RECORD DRAWING

OCTOBER 1983
CONTRACT NO. DA23-08-CRONG-41-250

SYMBOL	DESCRIPTION	DATE	APPROVED
(A)	Revised for 'As Built' conditions	5/26/84	
	REVISIONS		

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA DAM
COMPLETION OF EMBANKMENT

CLOSURE AREA
SECTION, PLAN AND PROFILES

In 28 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 7

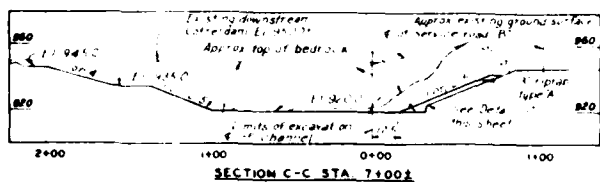
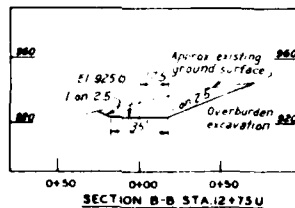
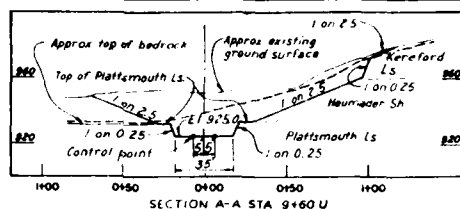
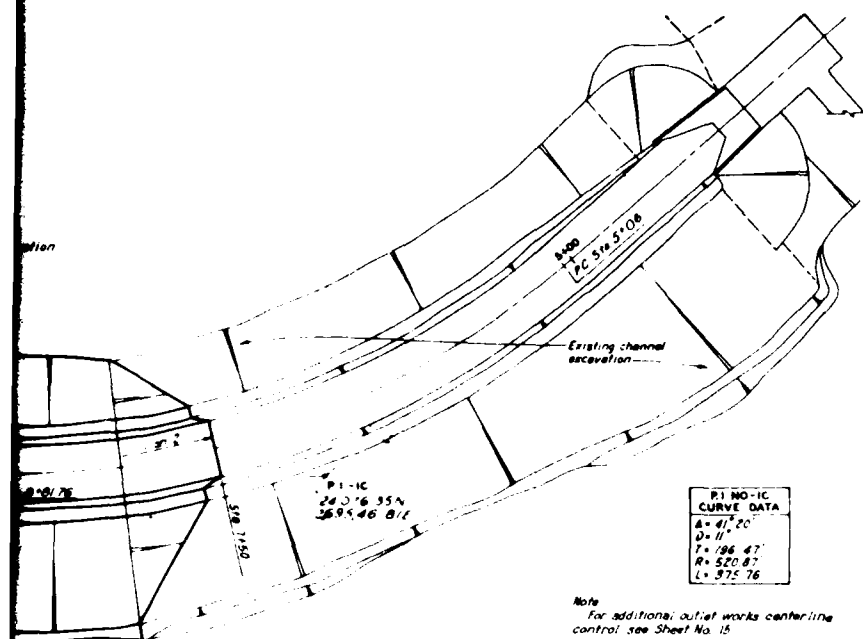
Scale as shown
KANSAS CITY, MO.
SEPTEMBER 1980

Submitted
Chief, Plans & Files Sect.
Drawn by
R.P.P.

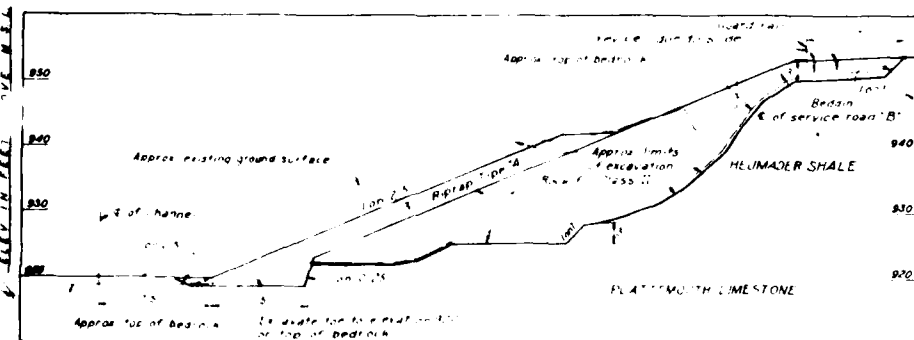
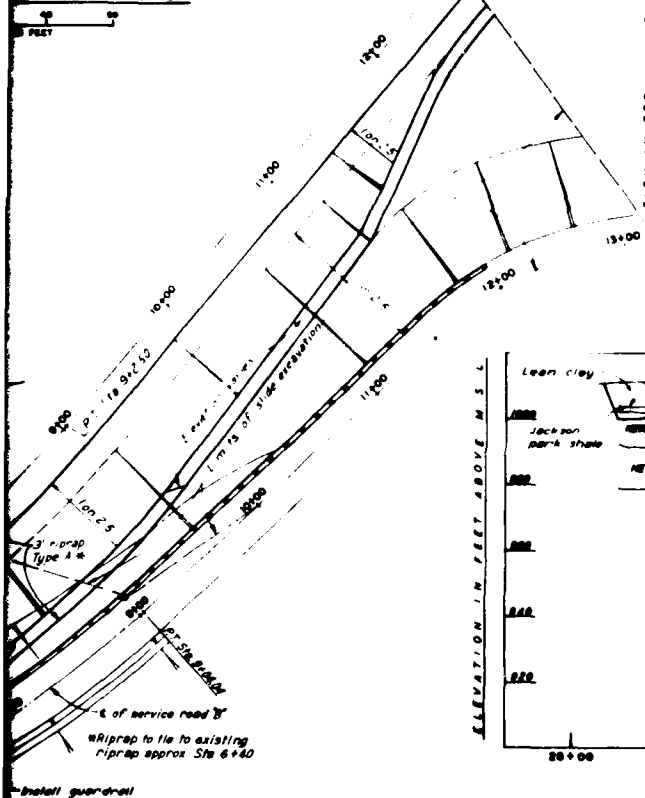
Recommended
Chief, Engineering Division
Checked by
G.W.W.

Approved
Col. C.E. Buehler
File No.
9-3-87

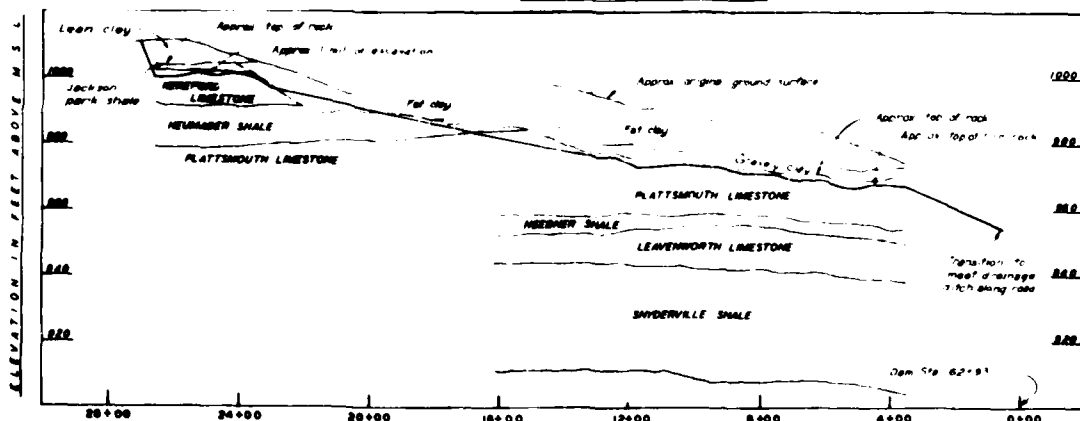
PLATE NO. 26



CHANNEL EXCAVATION



OUTLET CHANNEL SECTION



KEREFOORD AND PLATTSMOUTH LIMESTONE FOUNDATION DRAIN PROFILE

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM
COMPLETION OF EMBANKMENTOUTLETWORKS EXCAVATION
PLANS AND SECTIONS AND
FOUNDATION DRAIN PROFILE

RECORD DRAWING

OCTOBER 1959

CONTRACT NO. DA-23-088-0000-01-200

In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

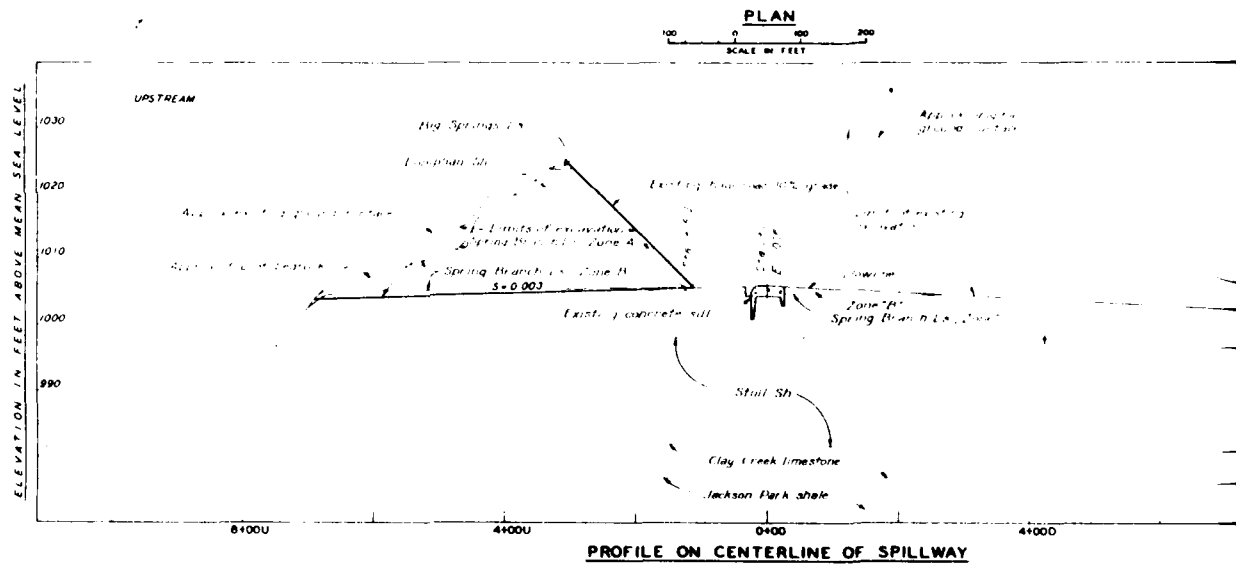
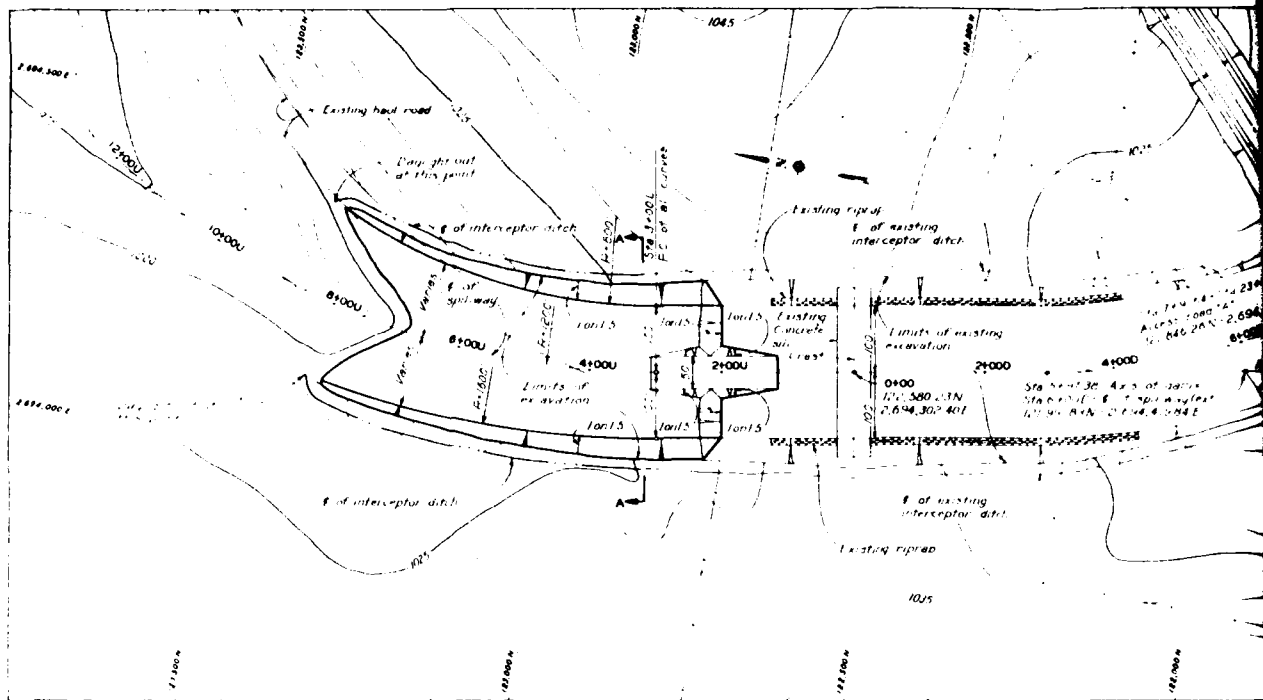
Sheet No. 8

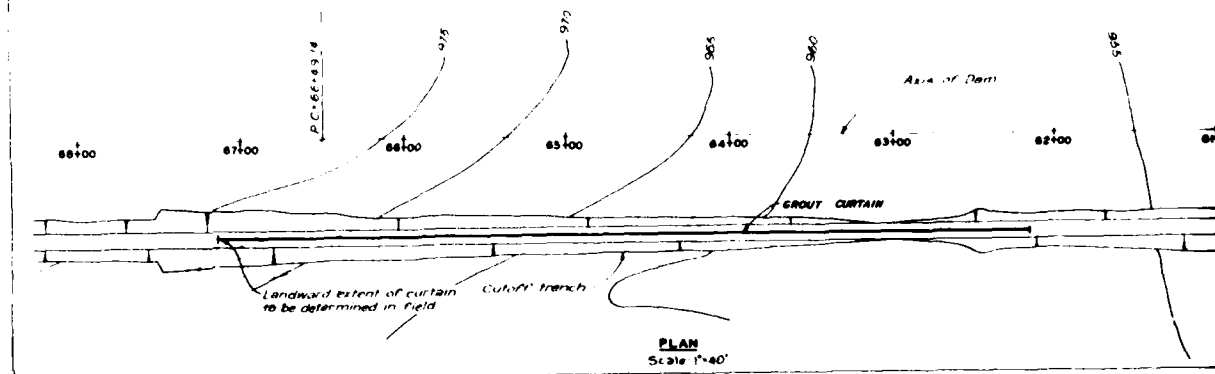
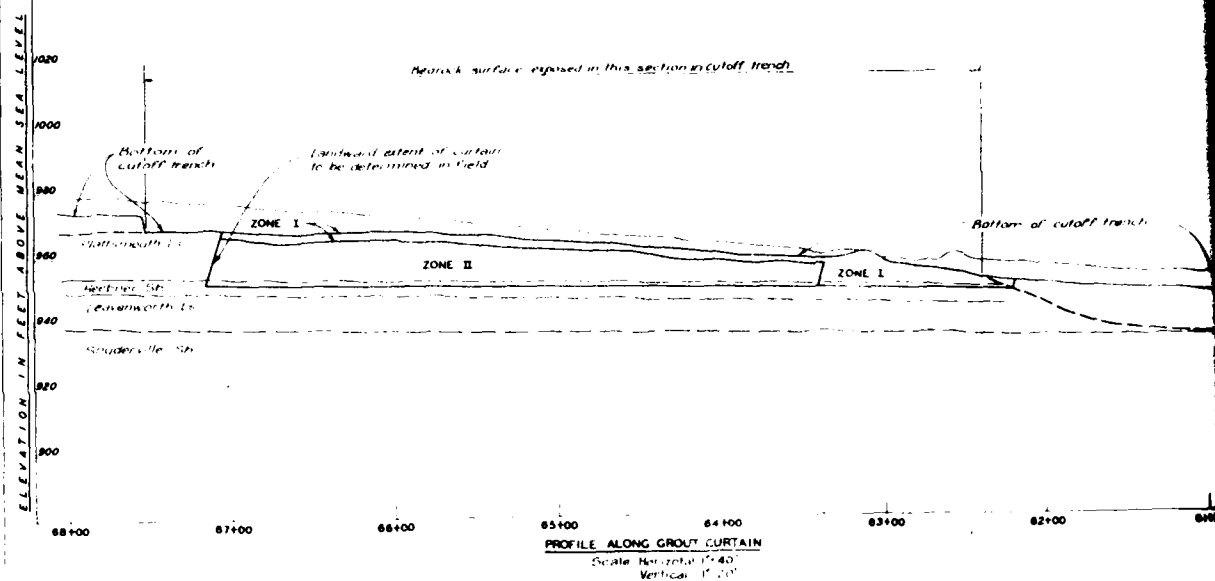
Scale: as shown
KANSAS CITY, MO.
SEPTEMBER 1959

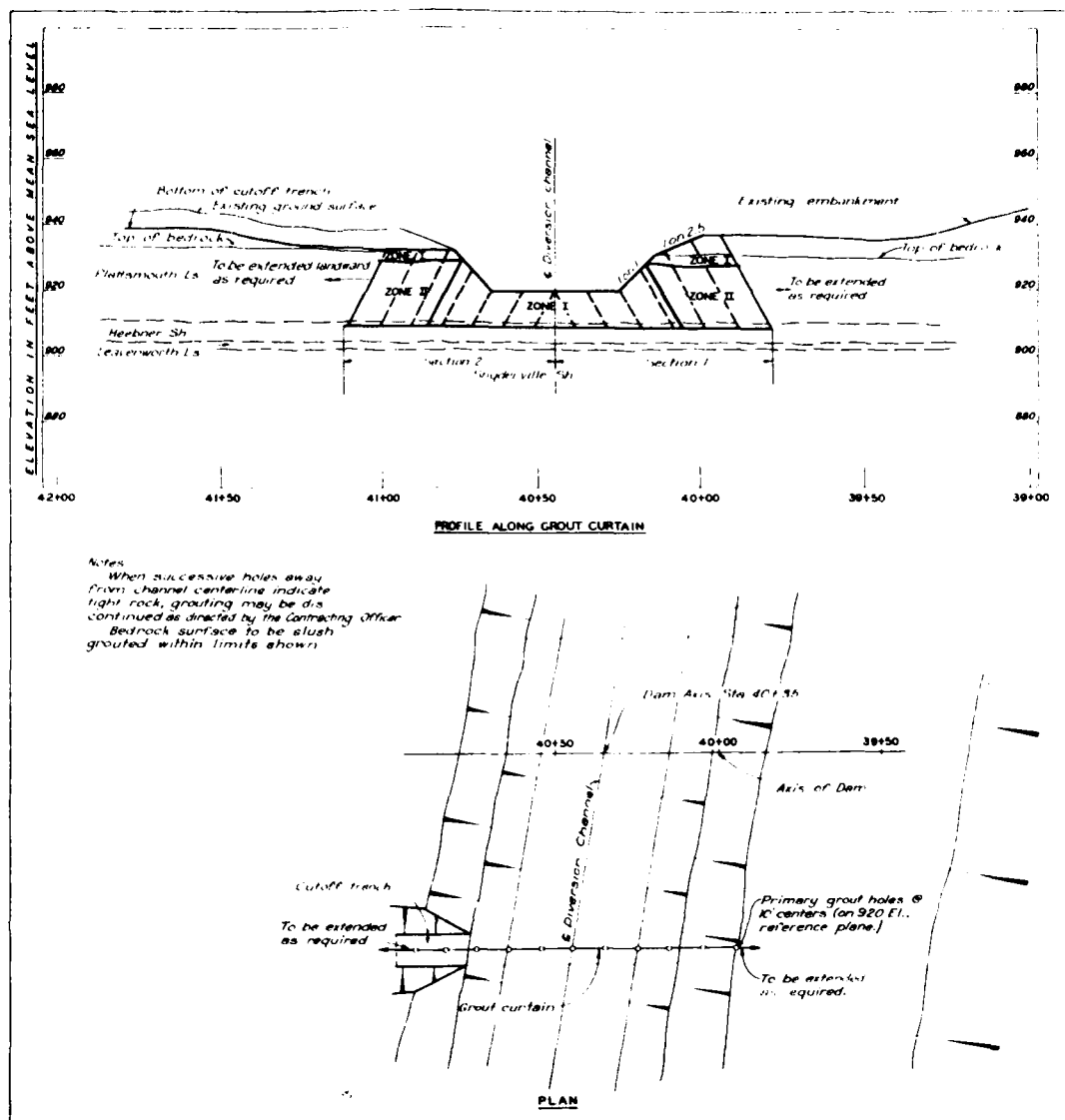
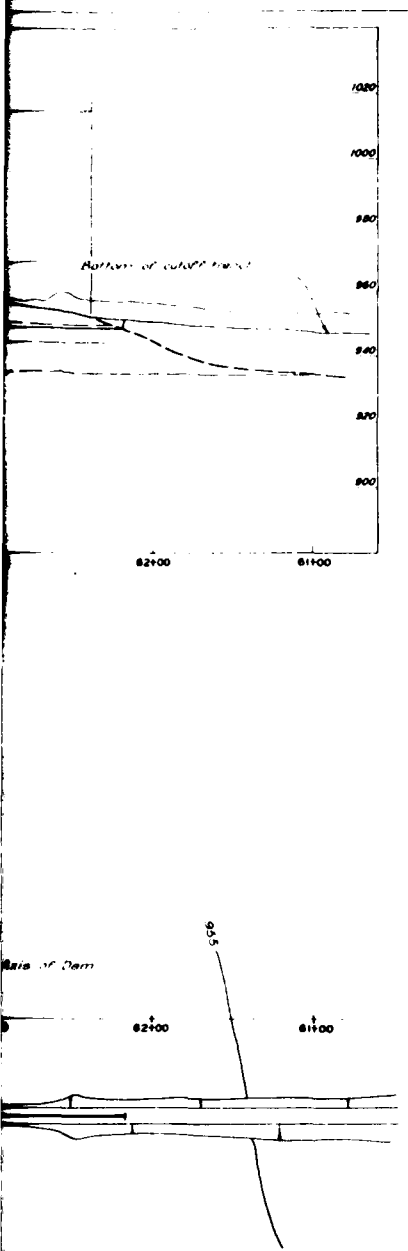
REVISIONS	DESCRIPTION	DATE	APP'D
1	Revised for "As Built" conditions	5-7-64	J.F.R.

Submitted by: *J.F.R.*
 Checked by: *J.F.R.*
 Recommended by: *R.G.F.*
 Approved by: *C.E.F.*
 Chief Engineer

PLATE NO. 27







NOTES:

Temporary casing is to be set thru overburden and into bedrock for zone I.

Zone I is the weathered zone near the top of bedrock.

Holes shall be grouted by the stage method.

Primary holes are on 10' spacing. The number of intermediate holes will be determined by the split spacing method.

For slush grouting on right abutment see Sheet No. 26.

REVISIONS	DATE	APP'D.
① Revised for "As Built" conditions	5-7-64	CLW

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM COMPLETION OF EMBANKMENT

CURTAIN GROUTING PLAN AND PROFILE

In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 10

Scale as shown
KANSAS CITY, MO.
SEPTEMBER 1960

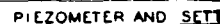


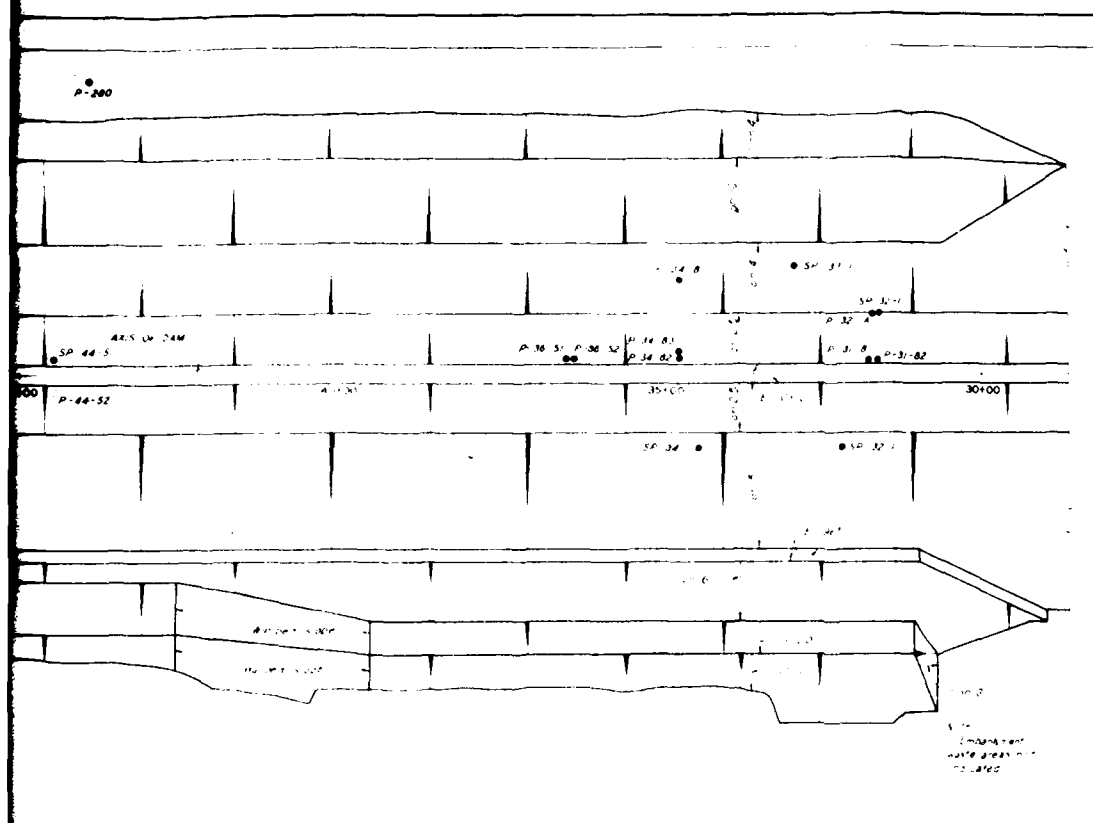
RECORD DRAWING

DESIGNED BY
ENGINEER NO. 54-22-01-01-01-01

Submitted by: *[Signature]* Recommended by: *[Signature]* Approved by: *[Signature]*
Checked by: *[Signature]* Checked by: *[Signature]* Checked by: *[Signature]*
K.L.L. E.L.K. C.R.G.

PLATE NO. 29





GAGE DATA			
NUMBER	STATION	RANGE	APPROX LENGTH OF EXTENSION
P-31-81	31+79.52	3120.000	18
P-31-82	31+81	3120.000	28
SP-32-1	31+72	3120.0	Extension completed
SP-32-2	31+76.02	3120.0	Extension completed
SP-32-3	31+80	3120.0	Extension completed
SP-32-4	31+83	3120.0	Extension completed
SP-32-5	31+86	3120.0	Extension completed
SP-32-6	31+89	3120.0	Extension completed
P-34-81	34+79.52	3420.000	18
P-34-82	34+81	3420.000	28
SP-35-1	34+72	3420.0	Extension completed
SP-35-2	34+76.02	3420.0	Extension completed
SP-35-3	34+80	3420.0	Extension completed
SP-35-4	34+83	3420.0	Extension completed
SP-35-5	34+86	3420.0	Extension completed
SP-35-6	34+89	3420.0	Extension completed
P-44-51	44+50	4450.0	Extension completed
P-44-52	44+52	4450.0	Extension completed
SP-45-1	44+50	4450.0	Extension completed
SP-45-2	44+52	4450.0	Extension completed
SP-45-3	44+54	4450.0	Extension completed
SP-45-4	44+56	4450.0	Extension completed
SP-45-5	44+58	4450.0	Extension completed
SP-45-6	44+60	4450.0	Extension completed
SP-45-7	44+62	4450.0	Extension completed
SP-45-8	44+64	4450.0	Extension completed
SP-45-9	44+66	4450.0	Extension completed
SP-45-10	44+68	4450.0	Extension completed
SP-45-11	44+70	4450.0	Extension completed
SP-45-12	44+72	4450.0	Extension completed
SP-45-13	44+74	4450.0	Extension completed
SP-45-14	44+76	4450.0	Extension completed
SP-45-15	44+78	4450.0	Extension completed
SP-45-16	44+80	4450.0	Extension completed
SP-45-17	44+82	4450.0	Extension completed
SP-45-18	44+84	4450.0	Extension completed
SP-45-19	44+86	4450.0	Extension completed
SP-45-20	44+88	4450.0	Extension completed
SP-45-21	44+90	4450.0	Extension completed
SP-45-22	44+92	4450.0	Extension completed
SP-45-23	44+94	4450.0	Extension completed
SP-45-24	44+96	4450.0	Extension completed
SP-45-25	44+98	4450.0	Extension completed
SP-45-26	45+00	4450.0	Extension completed

Note: Pressure on Piezometer gage
 1. Distribution Settlement plate of
 2. Force pressure on Piezometer gage
 3. Observation instruments will be
 4. Protected against construction hazards
 5. 1-44-52 and 1-44-54 gages are located
 6. after beginning of construction
 7. Location information is approximate

Note:
 For location of settlement monuments
 along top of dam see table 1-0-8 M
 Manual

PIEZOMETER AND SETTLEMENT GAGES

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

TOP OF GAGE DETAIL

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

EMBANKMENT DETAIL AT GAGES

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

1-0-8 M
 Manual

RECORD DRAWING

OCTOBER 1963
 CONTRACT NO. DA-21-028 (ENGR 61-250)

1-0-8 M
 Manual

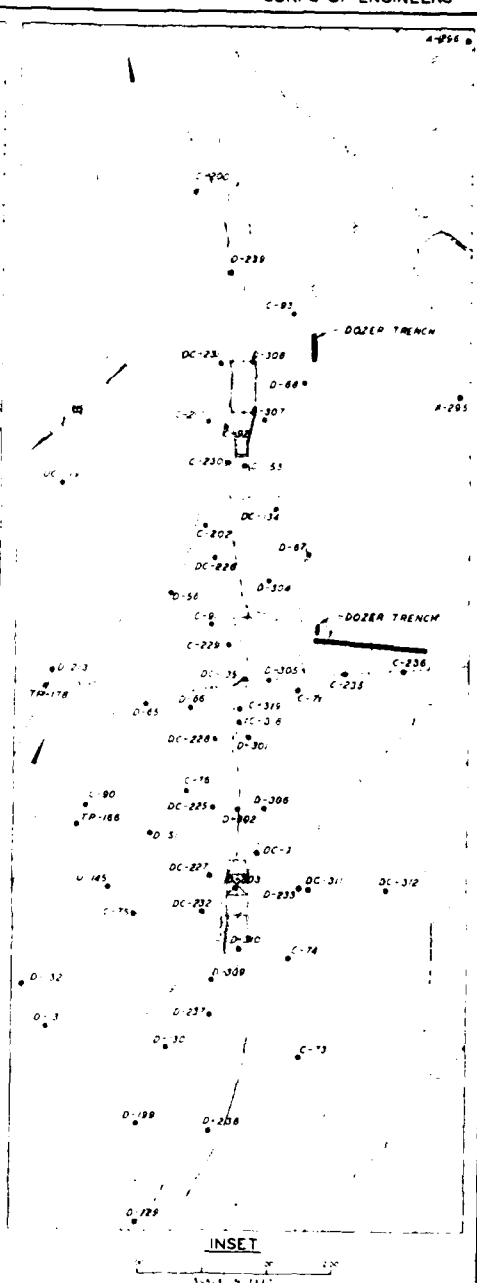
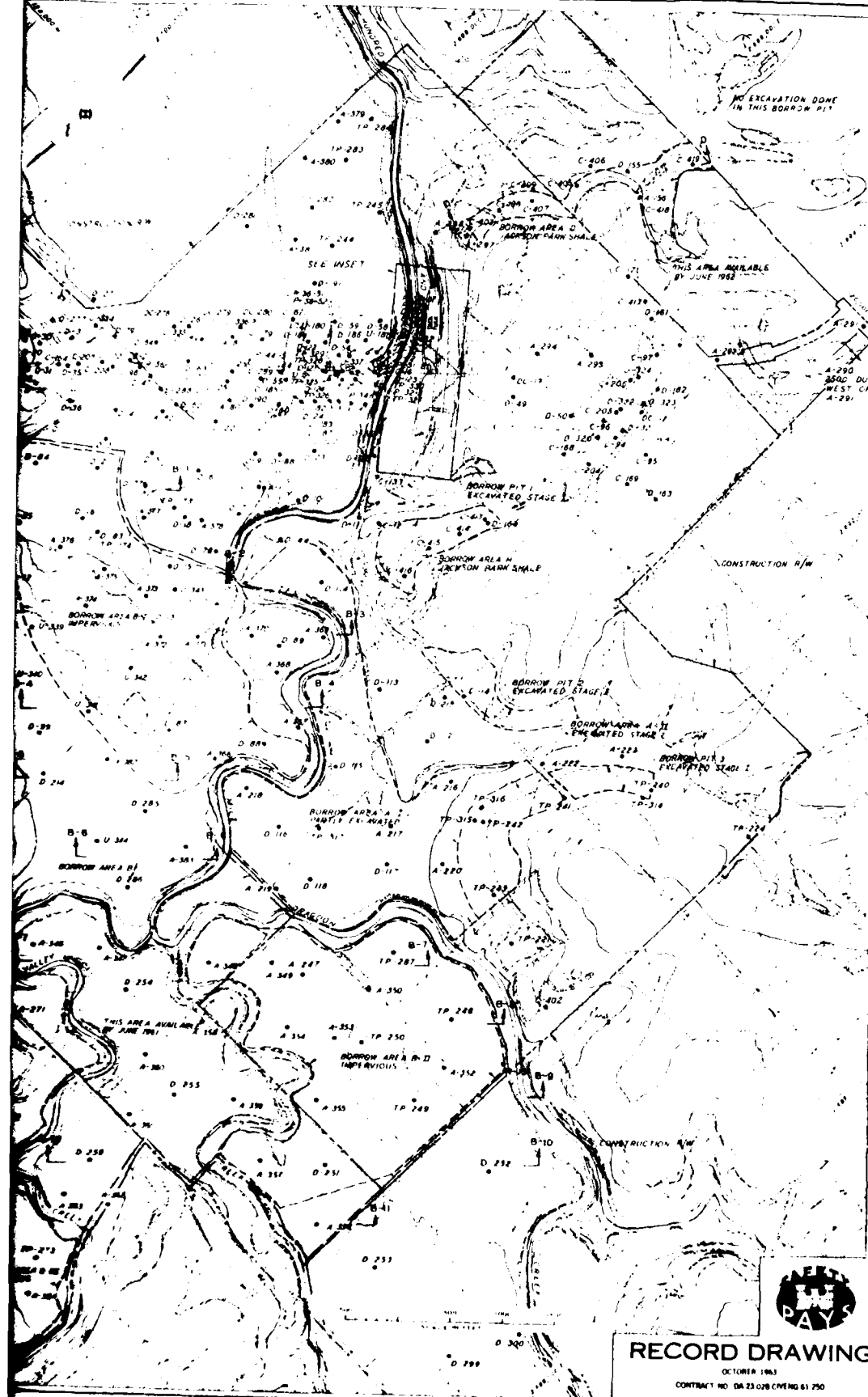
HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM
COMPLETION OF EMBANKMENTPIEZOMETER AND SETTLEMENT GAGES
PLAN AND DETAILS

In 29 sheets Sheet No 11
 U.S. ARMY ENGINEER DISTRICT
 KANSAS CITY
 Submitted
 Chief, Plans & Maps Sect
 Drawn by
 M.F.P.
 Recommended
 Chief, Engineering Division
 Checked by
 R.G.F.
 Approved
 Chief, District Engineer
 File No.
 O-3-48

Scale as shown
 KANSAS CITY, MO
 SEPTEMBER 1960

PLATE NO 30



NOTES:
1. All work shall be in accordance with the Plans and Specifications.
2. The Engineer shall be notified immediately of any change in the work.
3. The Contractor shall be responsible for the quality of the work.
4. The Contractor shall be responsible for the safety of the work.

SYMBOLS: A = Approved, B = Began, C = Completed, D = Drawn, E = Estimated, F = Finished, G = General, H = Heavy, I = Intermediate, J = Joint, K = Key, L = Light, M = Medium, N = Normal, O = Other, P = Plan, Q = Quantity, R = Right, S = Section, T = Trench, U = Under, V = Vertical, W = Width, X = X-section, Y = Year, Z = Zone.

HUNDRED AND TEN MILE CREEK KANSAS

POMONA DAM

COMPLETION OF EMBANKMENT

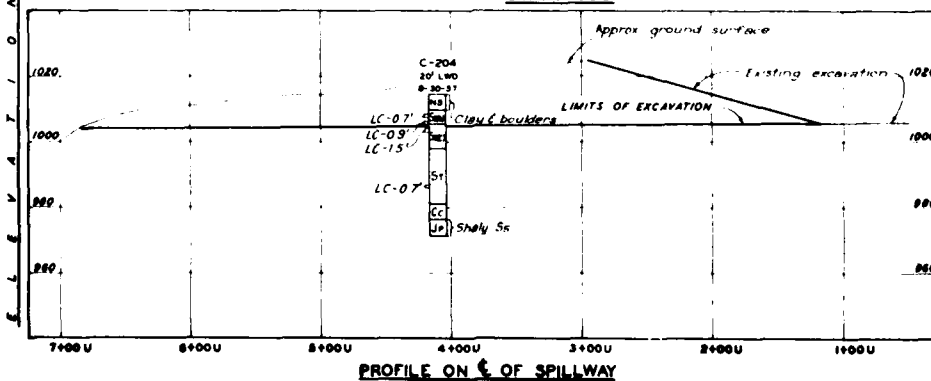
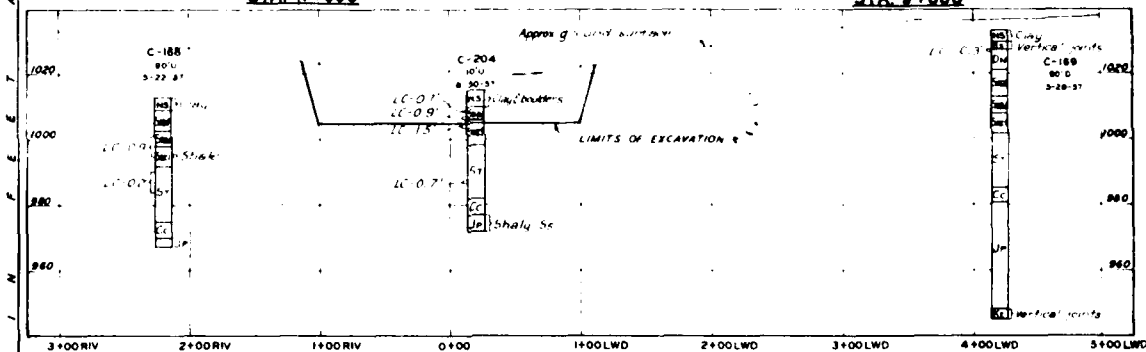
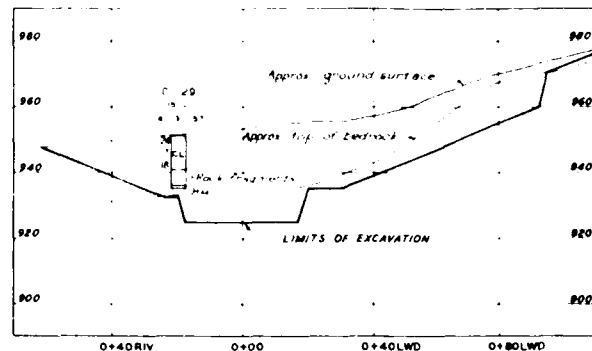
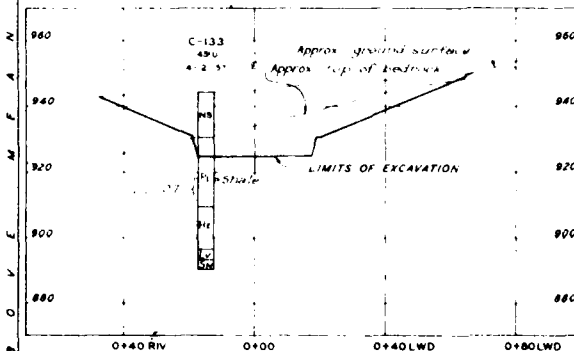
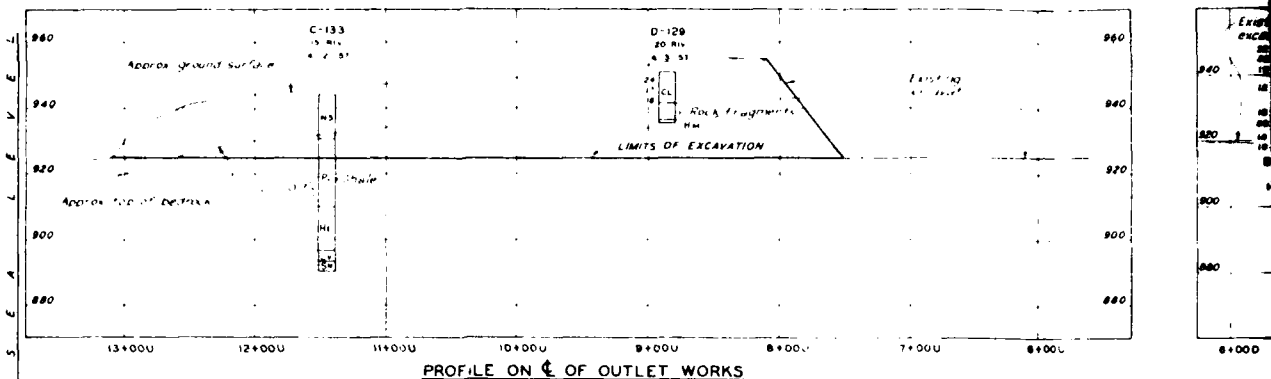
PLAN OF UNDERGROUND EXPLORATIONS AND BORROW AREAS

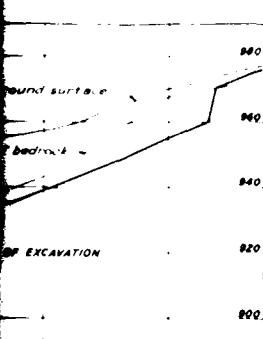
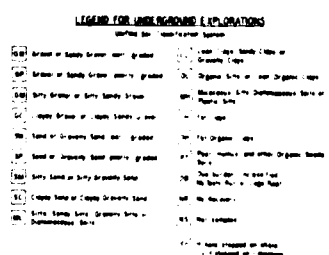
In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY
Sheet No. 24
Scale as shown
KANSAS CITY, MO
SEPTEMBER 1980
Approved: [Signature]
Checked: [Signature]
Drawn: [Signature]
H.R.L. C.H.L. C.R.C.

RECORD DRAWING

OCTOBER 1983
CONTRACT NO. DA 23 028 CMEN 61 250

PLATE NO. 31



[illegible][illegible]

NOTES

1. This is a shale zone with a limestone member
2. Column is not shown to scale

For locations of borings see Sheet No. 24.
Station and range of outlet works and spillway sections and profiles are referred to centerline of the respective structures.
For other logs of underground excavations see Sheets Nos. 26 and 27.

(A)	Revised for "As Built" conditions	5764	6
SYM	DESCRIPTION	DATE	APP'D
	REVISIONS		

In 20 sheets **Sheet No. 25** **Scale as shown**

U.S. ARMY ENGINEER DISTRICT **KANSAS CITY, MO.**

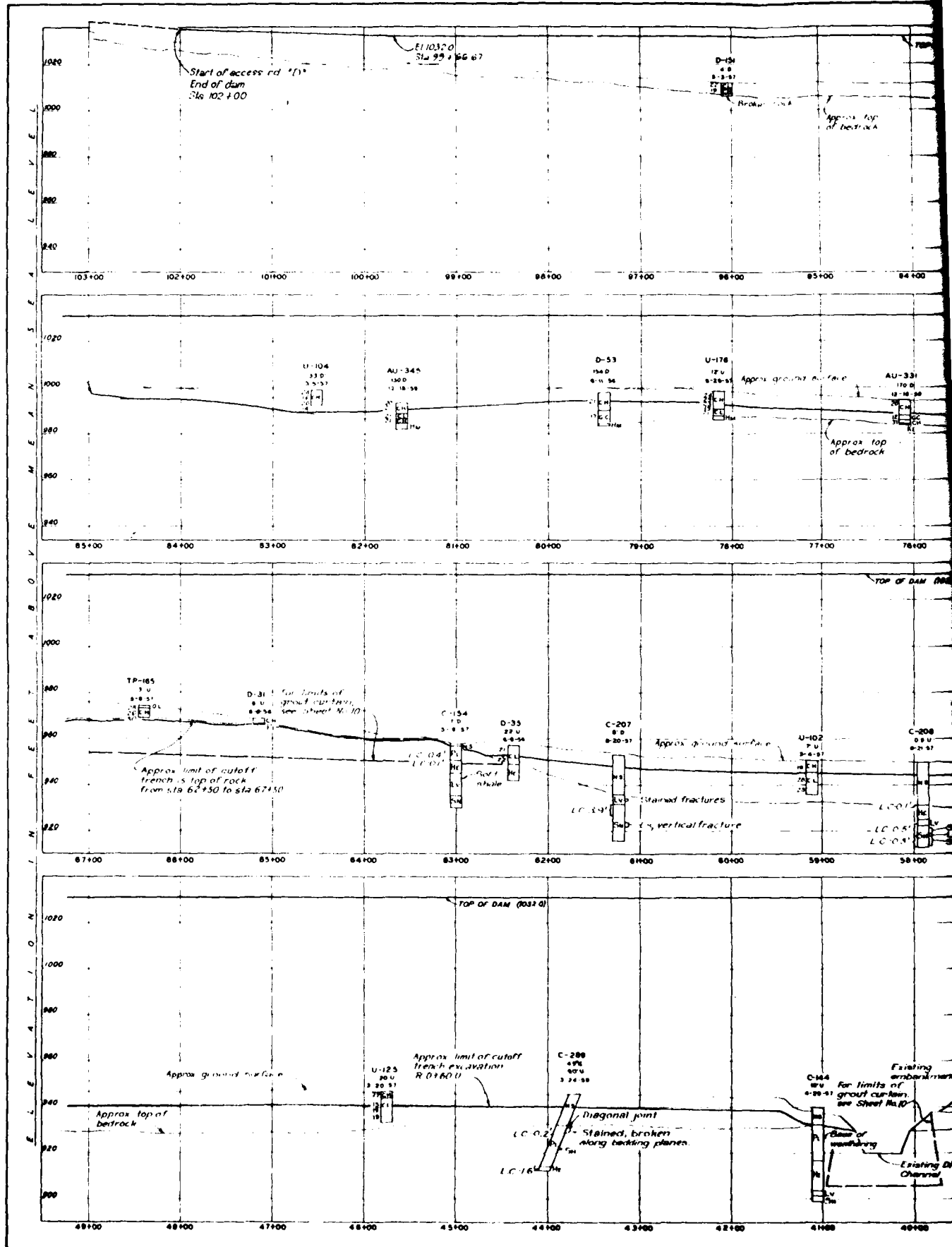
KANSAS CITY **SEPTEMBER 1960**

Submitted by: *[Signature]* **Recommended by:** *[Signature]* **Approved:** *[Signature]*

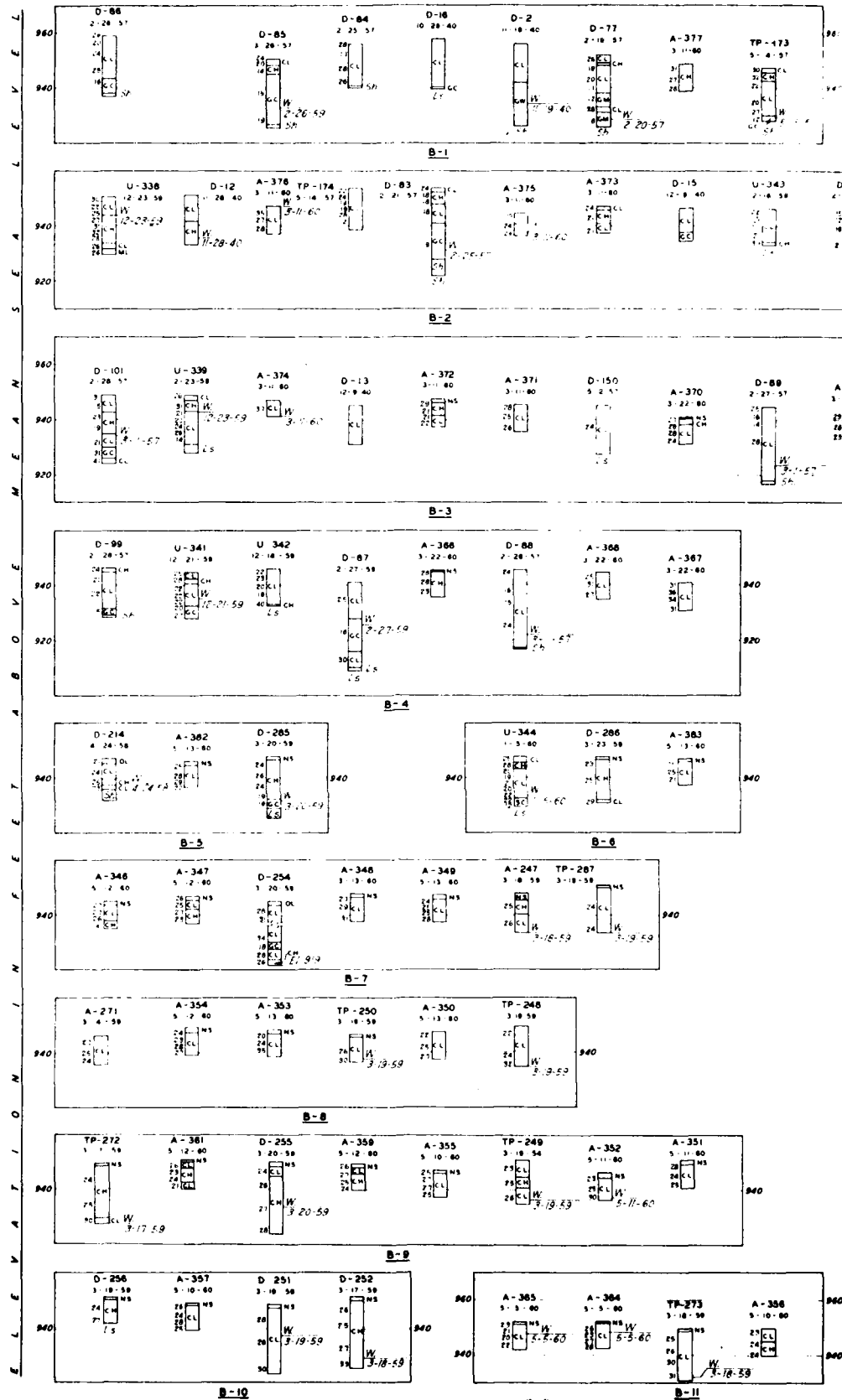
Chief, Geology Section **Chief, Engineering Division** **Cdr., C.E. Dist. of Engineer-**

Drawn by: **Checked by:** **File No.**

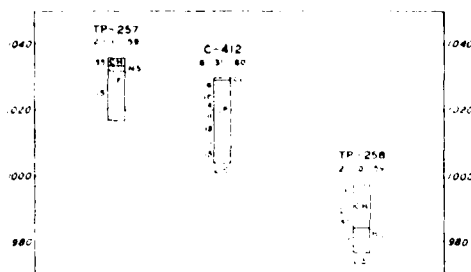
H.R.L. J.A.R. C.R.G. O-3-008



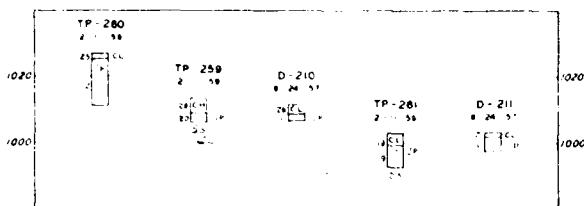




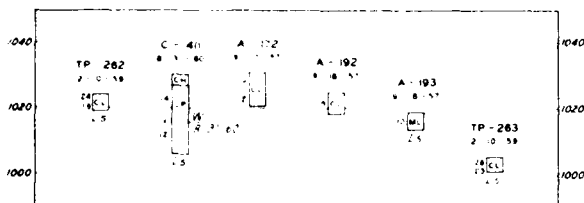
PROFILES - BORROW AREA "B"



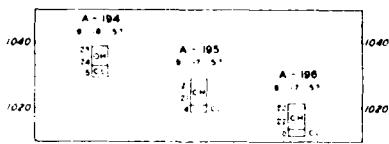
F-1



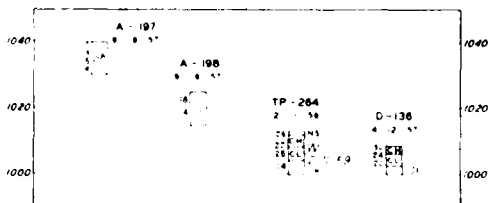
F-2



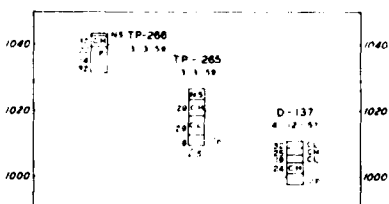
F-3



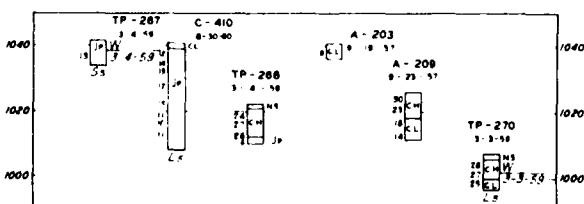
F-4



F-5

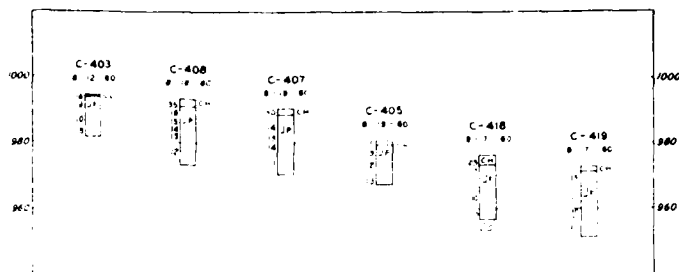


F-6

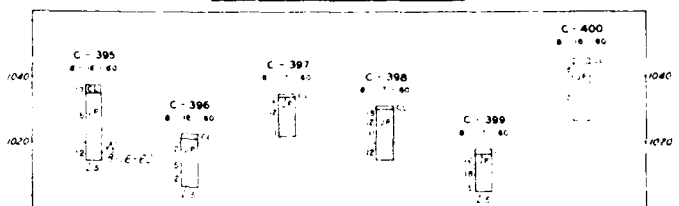


F-7

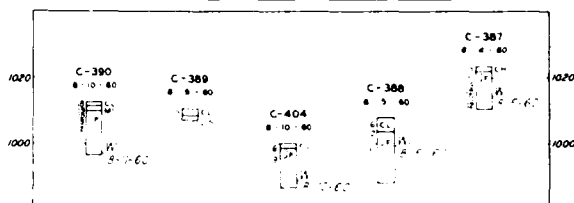
PROFILES - BORROW AREA "F"



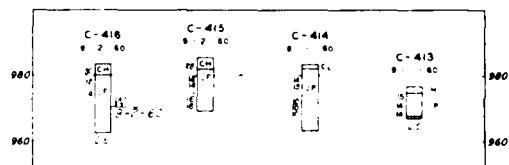
PROFILE - BORROW AREA "D"



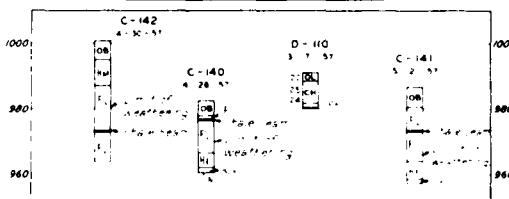
PROFILE - BORROW AREA "E"



PROFILE - BORROW AREA "G"



PROFILE - BORROW AREA "H"



PROFILE - QUARRY SITE NO. 1

Note:
For legend of Underground
Explorations see Sheet No. 25

RECORD DRAWING

OCTOBER 1963

CONTRACT NO. DA-23 028 CIVE NG 61 250

As Revised for As Built Conditions
SYMBOL DESCRIPTION REVISIONS

DATE APP'D

HUNDRED AND TEN MILE CREEK, KANSAS

POMONA DAM
COMPLETION OF EMBANKMENT

LOGS OF UNDERGROUND EXPLORATIONS
BORROW AREAS AND QUARRY SITE

In 29 sheets
U.S. ARMY ENGINEER DISTRICT
KANSAS CITY

Sheet No. 27

Scale: as shown
KANSAS CITY, MO
SEPTEMBER 1960



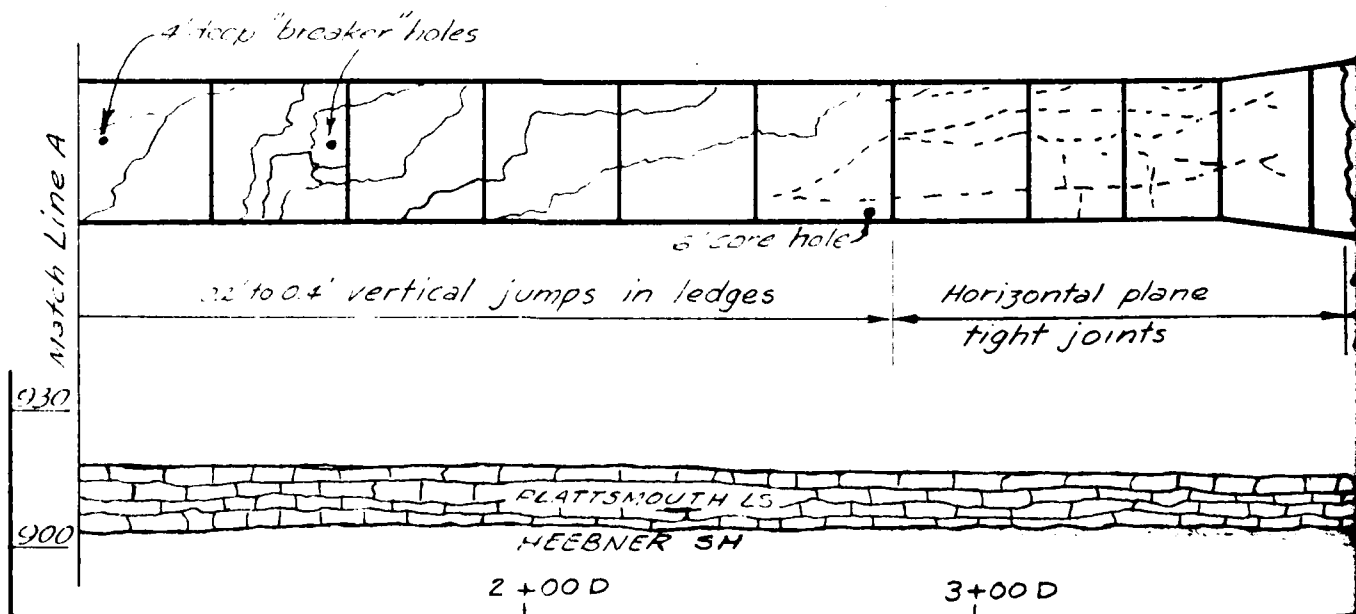
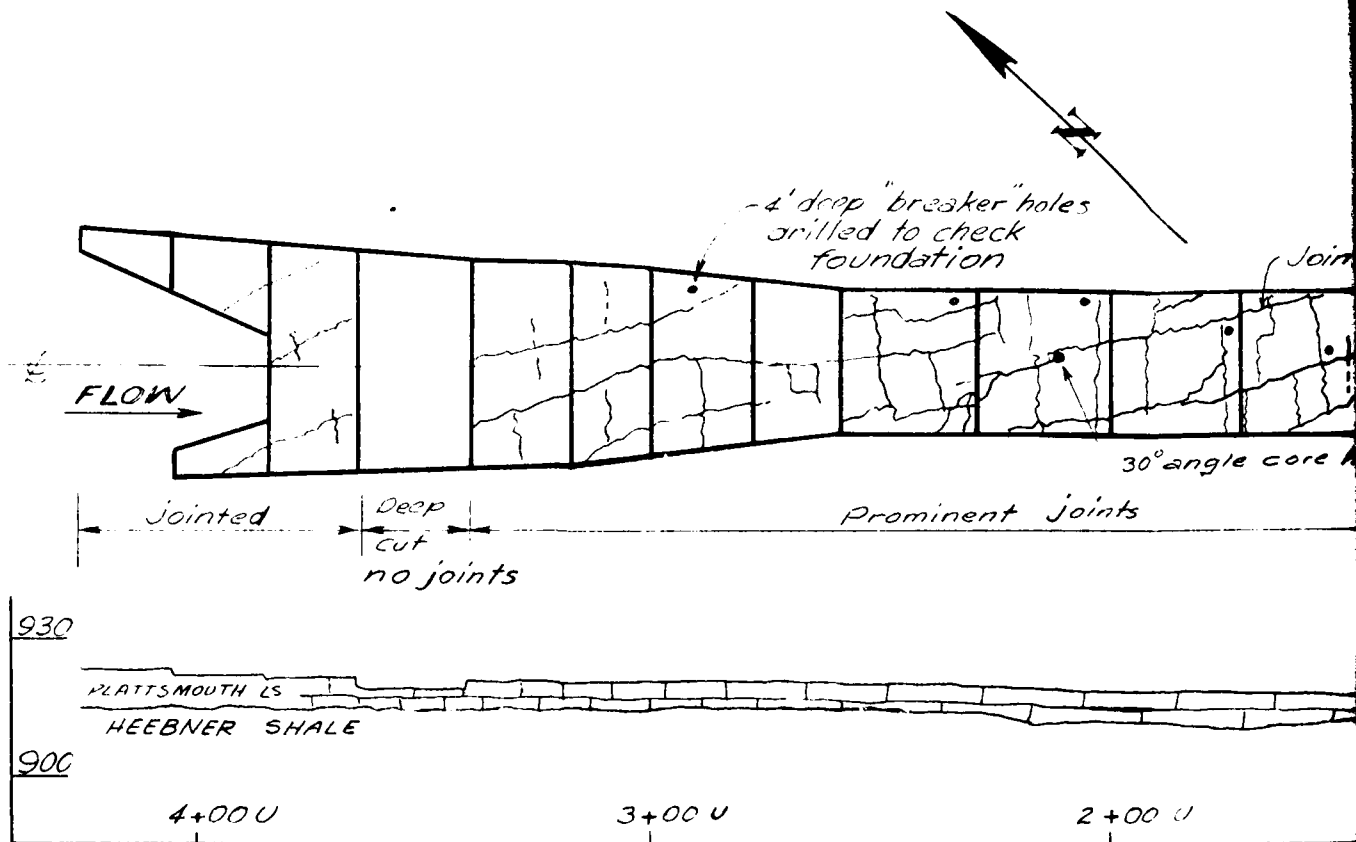
Submitted by
Chief, Dams & Tolls Sect.
Checked by
N.F.P.

Recommended by
Chief, Engineering Division
Checked by
B.R.N.

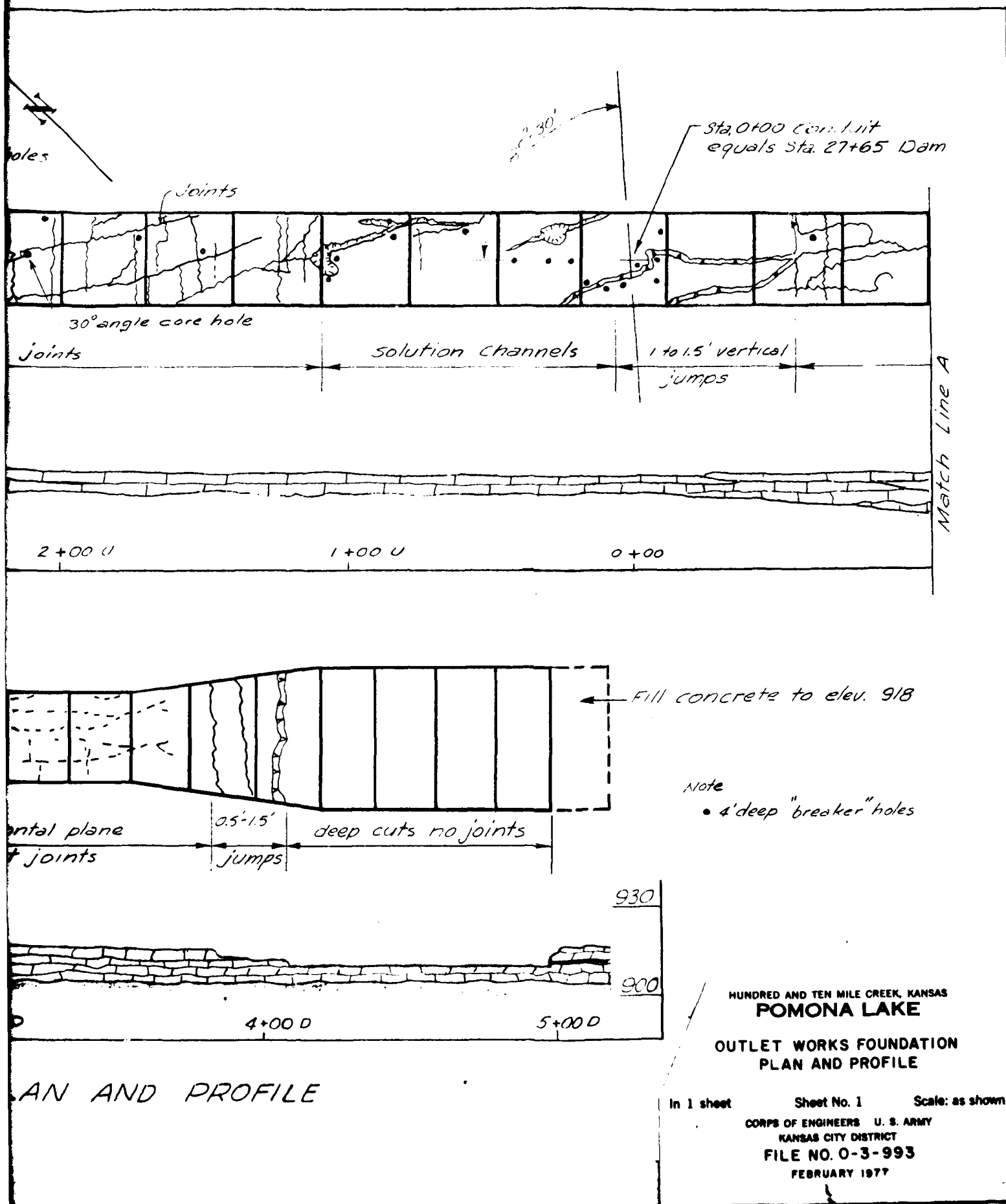
Approved by
Col. C.E. District Engineer
Checked by
R.G.F.

Q-3-497

PLATE NO. 34

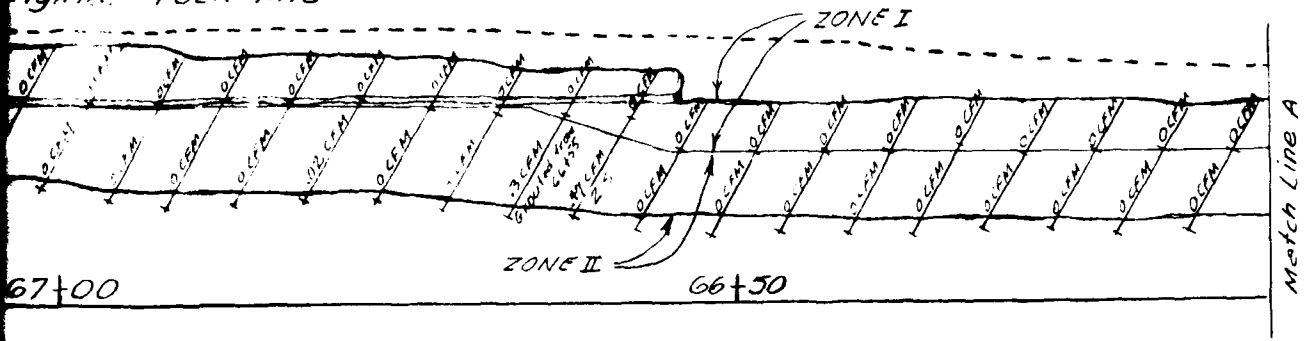


OUTLET WORKS FOUNDATION PLAN AND P
scale as shown

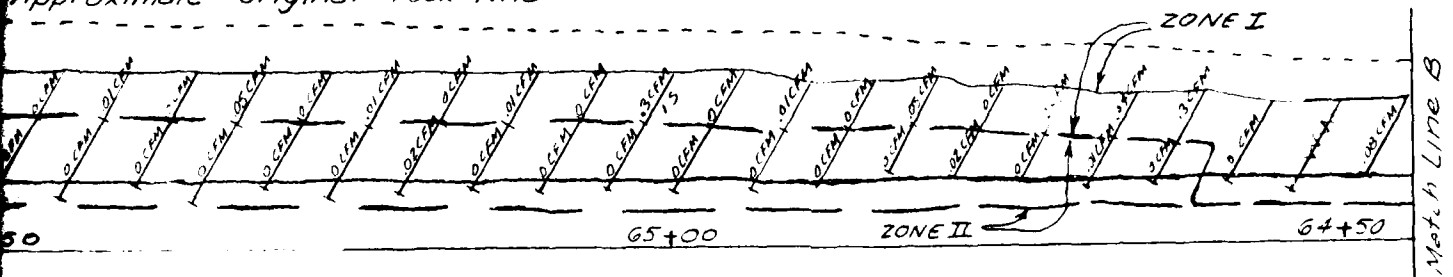


SCALE AS SHOWN

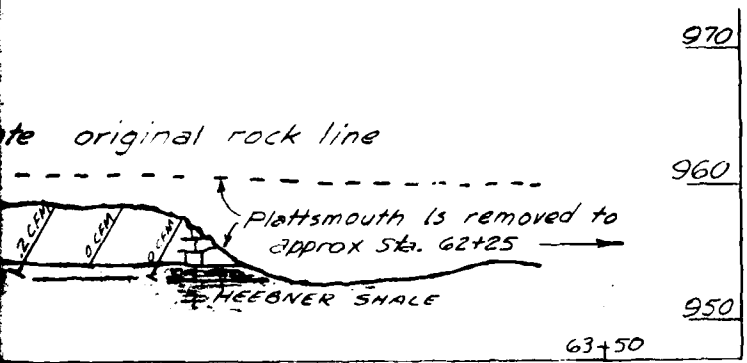
original rock line



Approximate original rock line



original rock line



ROUTING STA. 67+50 TO STA. 63+50

SHOWN

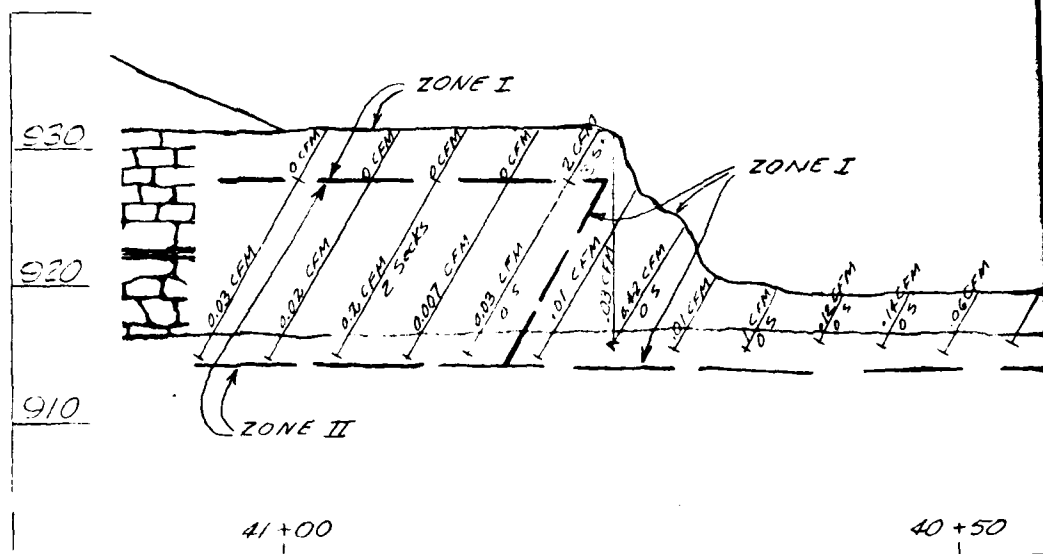
For notes and legend see plate No. 37.

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

COMPLETION OF EMBANKMENT GROUTING
STA 67+50 TO STA. 63+50

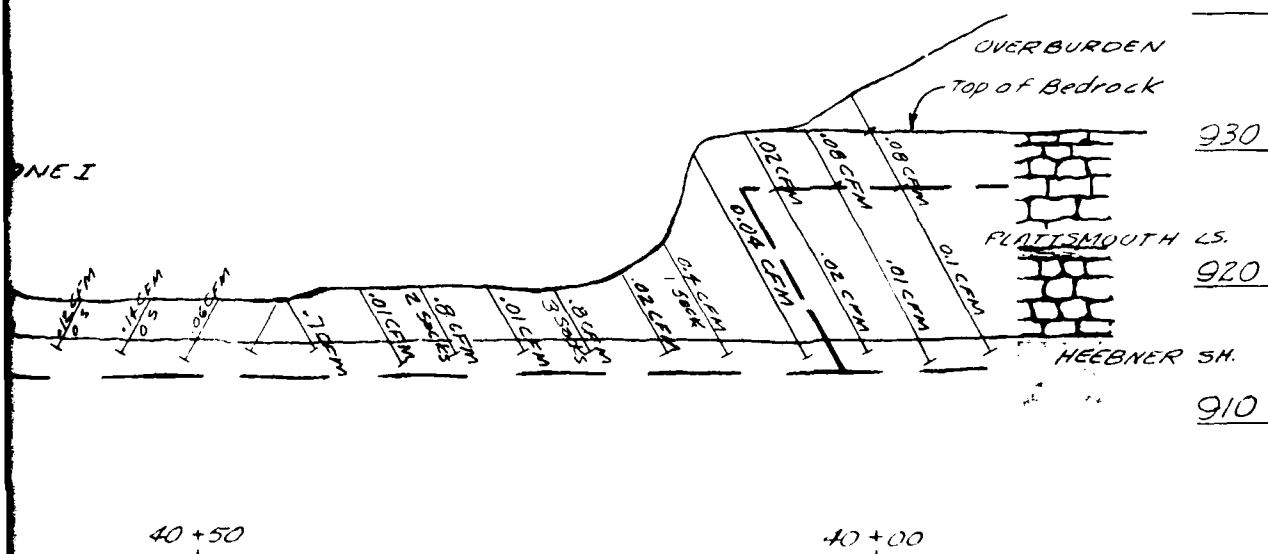
In 1 sheet Sheet No. 1 Scale: as shown
CORPS OF ENGINEERS U. S. ARMY
KANSAS CITY DISTRICT
FILE NO. 0-3-994
FEBRUARY 1977

PLATE NO. 36



DIVERSION CHANNEL GROUTING
SCALE AS SHOWN

0.5 CFM
2.5' to 5'



GROUTING STA 41+00 TO STA 40+00

Legend

Primary hole

secondary hole

tertiary hole

Packer set depth

Pressure Test Gallons per minute water take

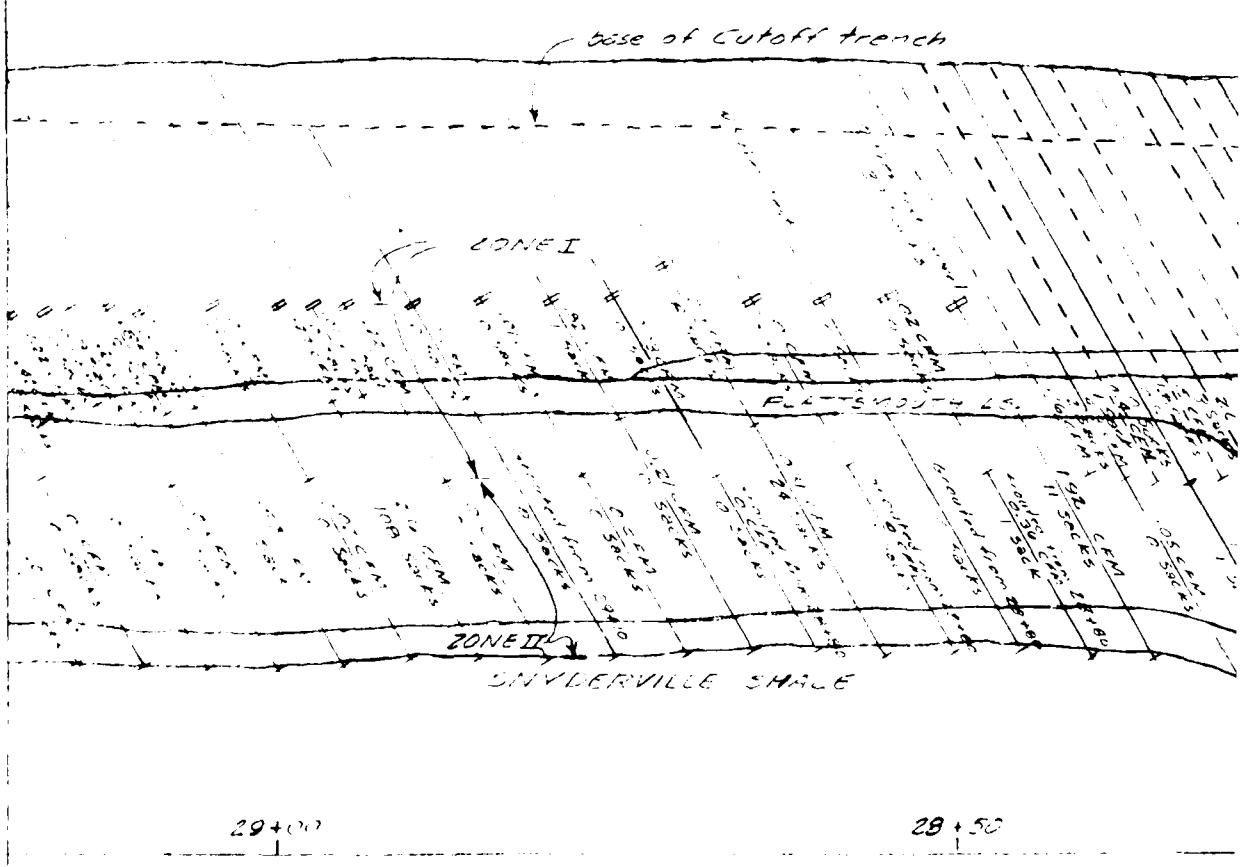
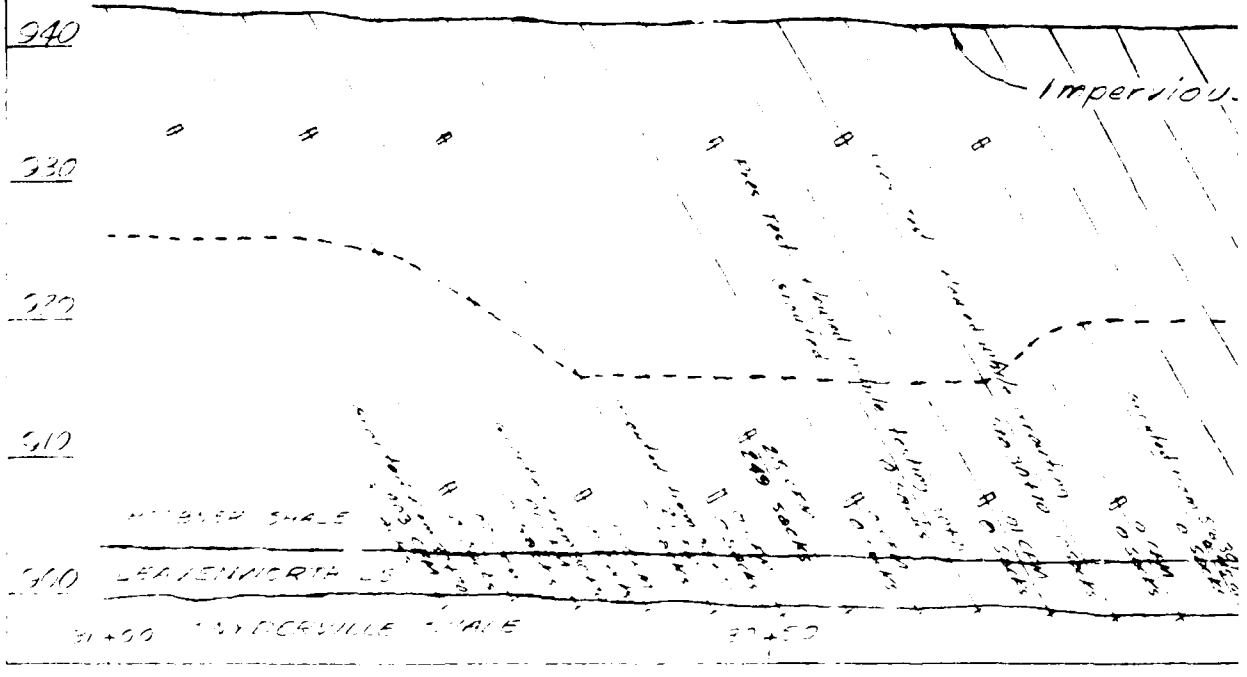
Grout take in sacks of cement

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

DIVERSION CHANNEL GROUTING
STA 41+00 TO STA. 40+00

In 1 sheet Sheet No. 1 Scale: as shown
CORPS OF ENGINEERS U. S. ARMY
KANSAS CITY DISTRICT
FILE NO. 0-3-995
FEBRUARY 1977

2
PLATE NO. 37



CURTAIN GROUTING STA 31+00 TO STA 27+50
SCALE AS SHOWN

AD-A135 578

MULTIPLE-PURPOSE PROJECT OSAGE RIVER BASIN HUNDRED AND
TEN MILE CREEK KAN. (U) CORPS OF ENGINEERS KANSAS CITY
MO KANSAS CITY DISTRICT L C MYERS ET AL. OCT 83

22

UNCLASSIFIED

F/G 13/2

NL



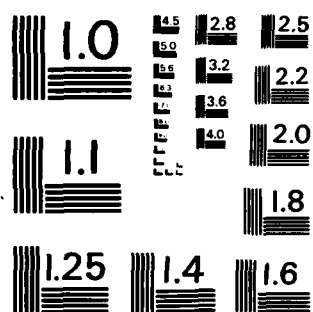
END

DATE

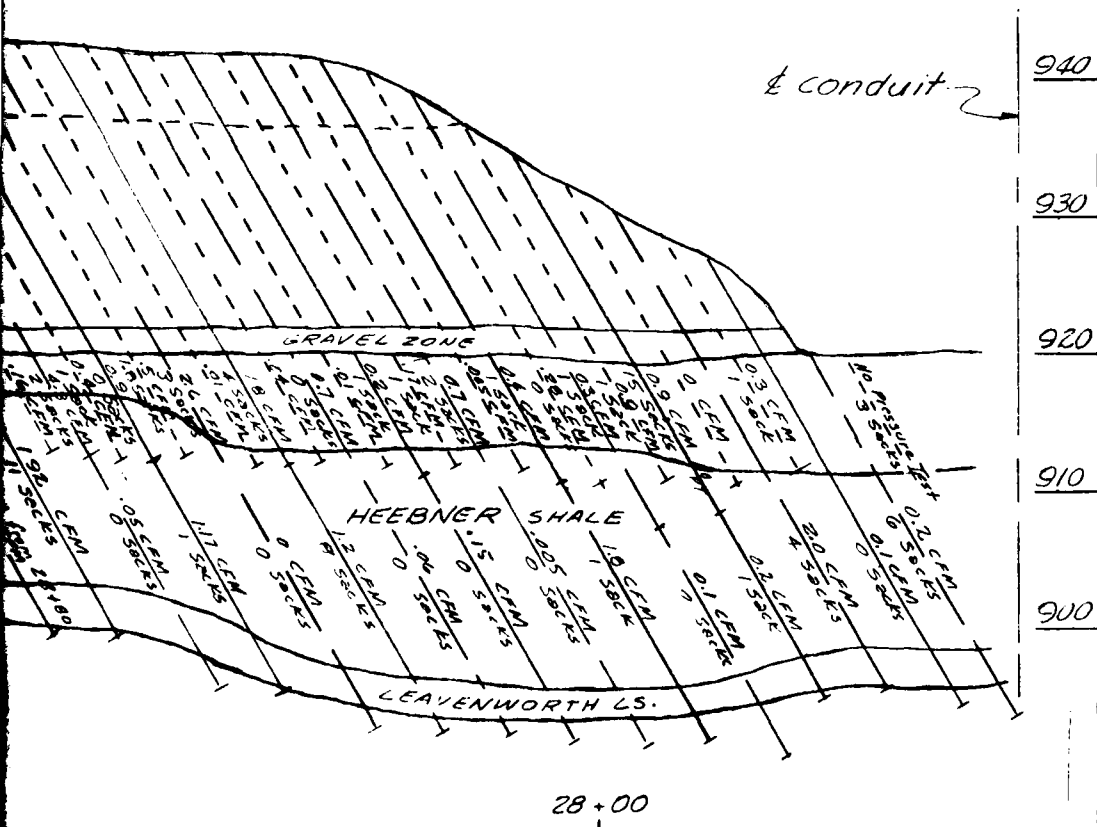
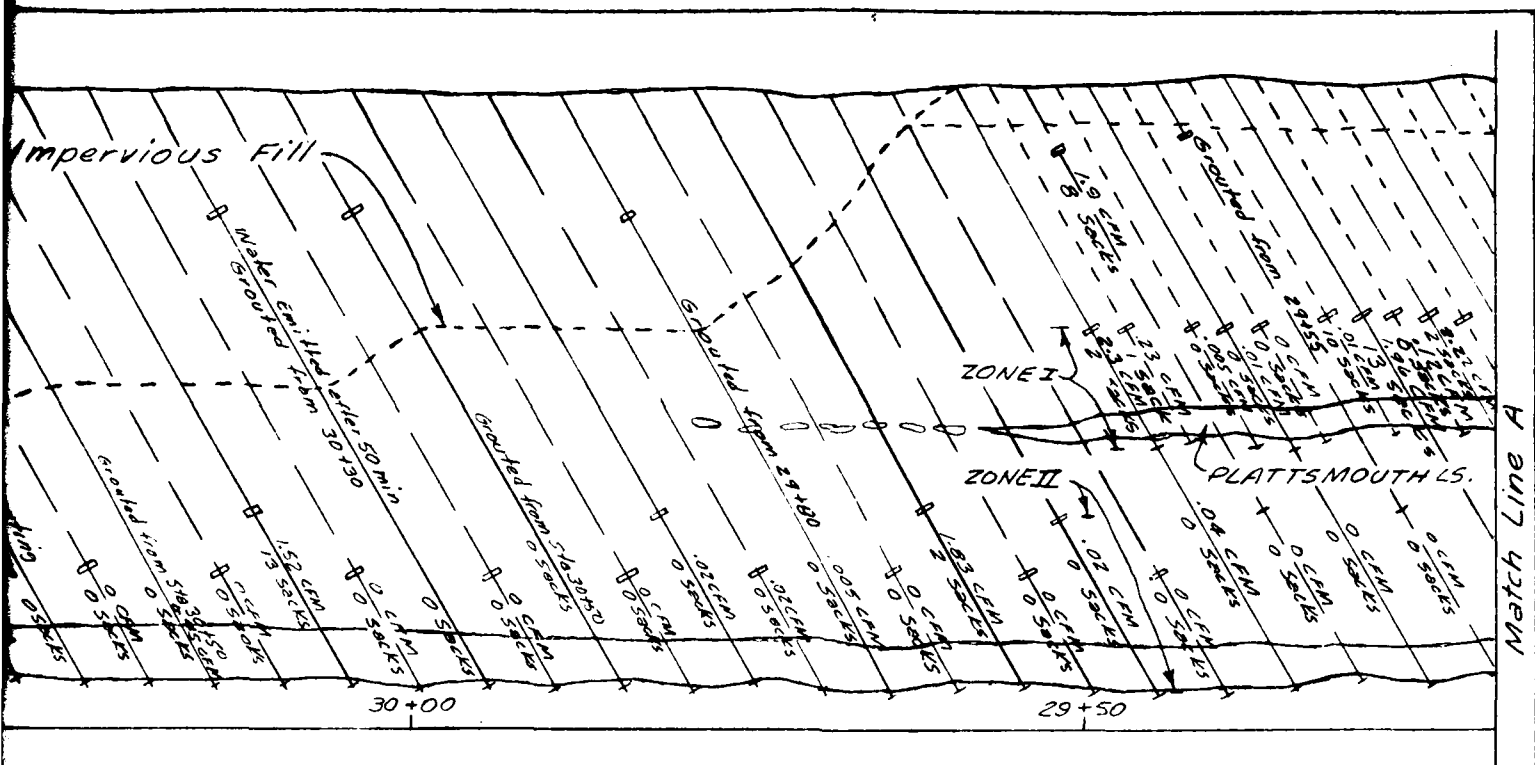
FORMED

1-84

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A



HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

CURTAIN GROUTING
 STA 31+00 TO STA. 27+90

In 1 sheet

Sheet No. 1

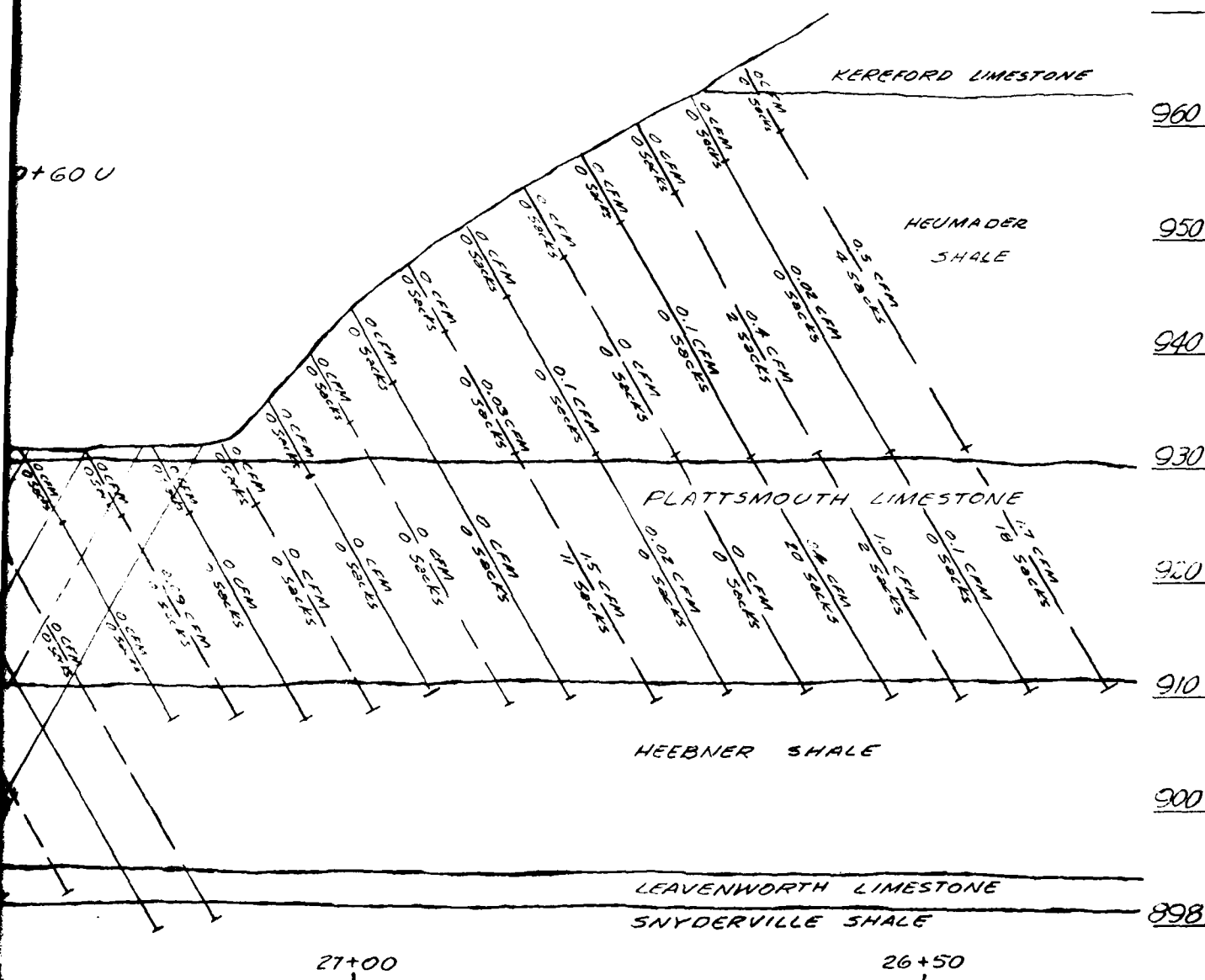
Scale: as shown

CORPS OF ENGINEERS U. S. ARMY
 KANSAS CITY DISTRICT

FILE NO. 0-3-996

FEBRUARY 1977

For notes and legend
 see plate No. 37.



WORKS STA. 28+00 TO STA. 26+50
AS SHOWN

For notes and legend
see plate No. 37.

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

**CURTAIN GROUTING OUTLET WORKS
STA. 28+00 TO STA. 26+50**

In 1 sheet

Sheet No. 1

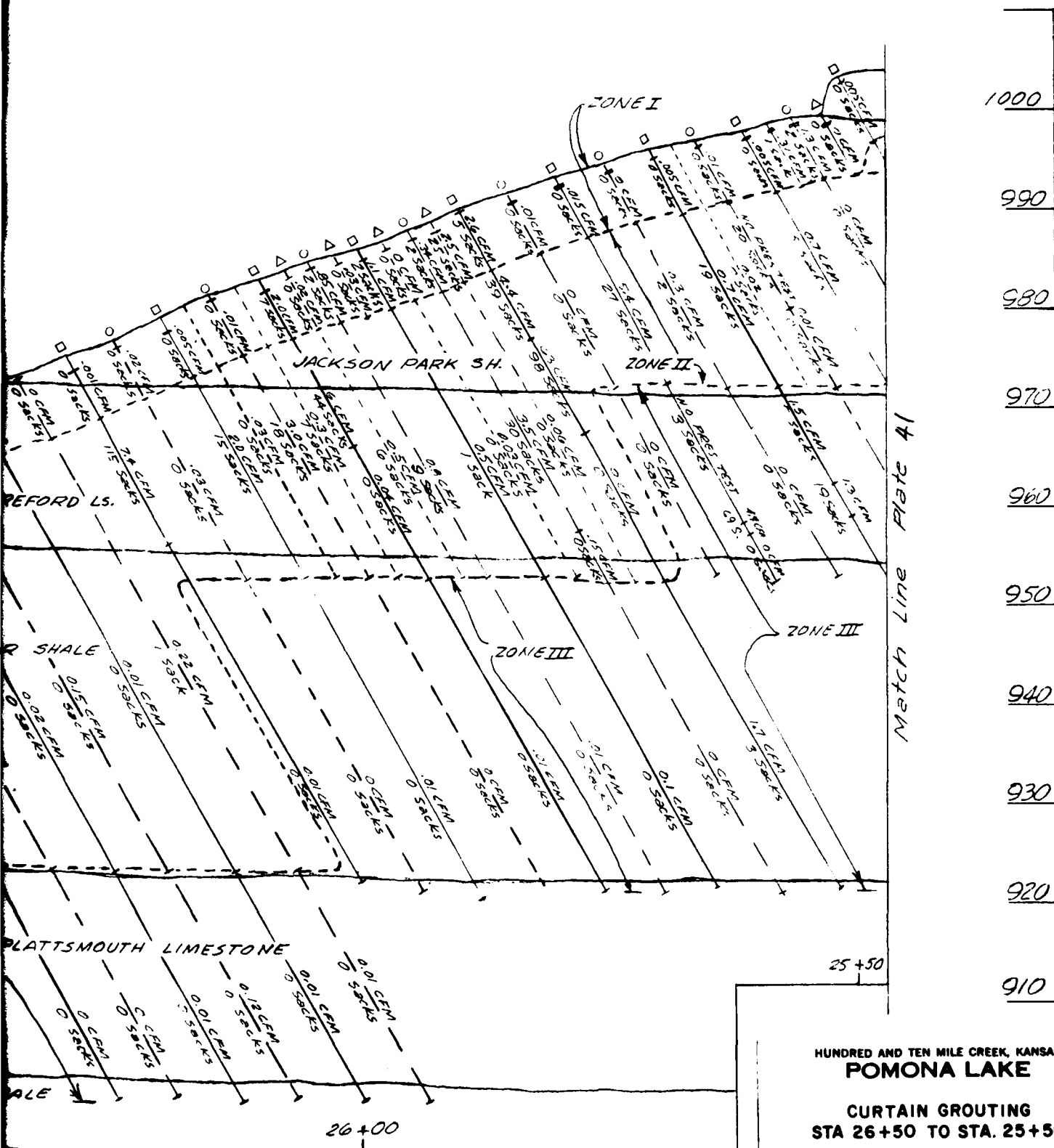
Scale: as shown

CORPS OF ENGINEERS U. S. ARMY
KANSAS CITY DISTRICT

FILE NO. 0-3-997

FEBRUARY 1977

PLATE NO. 39



HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

CURTAIN GROUTING
 STA 26+50 TO STA. 25+50

In 1 sheet

Sheet No. 1

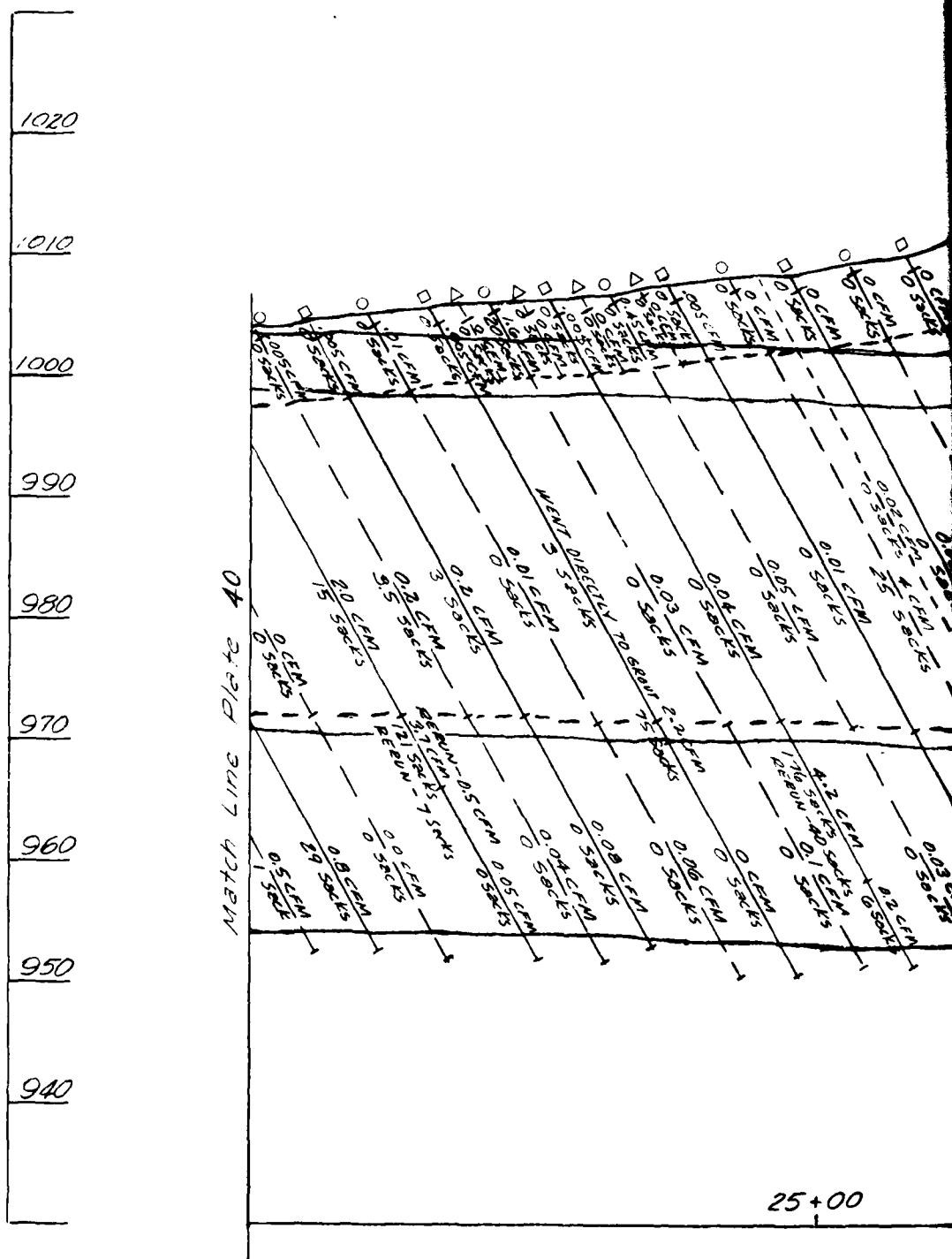
Scale: as shown

CORPS OF ENGINEERS U. S. ARMY
 KANSAS CITY DISTRICT

FILE NO. 0-3-998

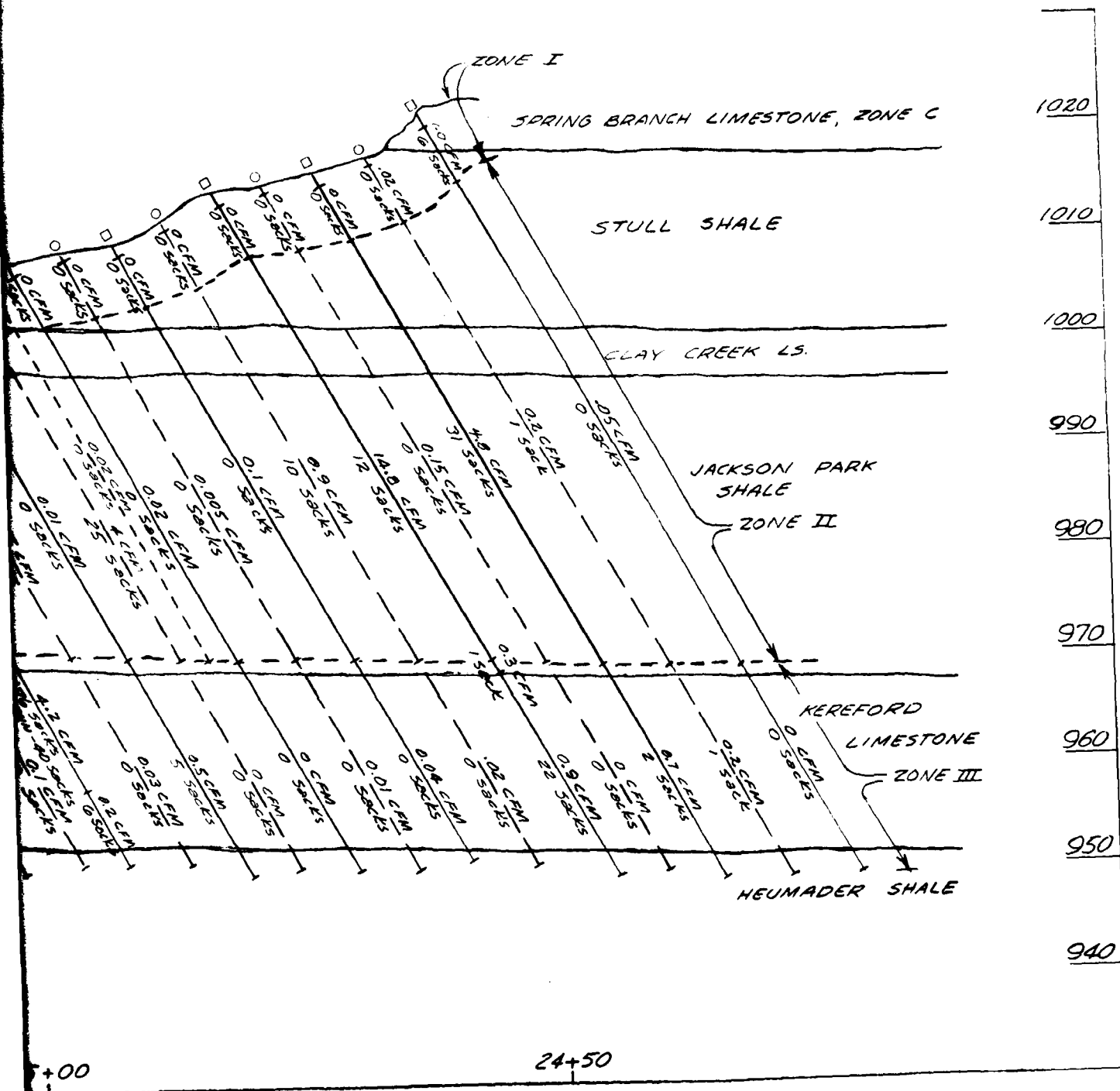
FEBRUARY 1977

PLATE NO. 40



CURTAIN GROUTING ST

SCALE AS SHOWN



NG STA. 25+50 TO STA. 24+00
 LE AS SHOWN

For Legend see Plate No. 37.

HUNDRED AND TEN MILE CREEK, KANSAS
POMONA LAKE

CURTAIN GROUTING
 STA. 25+50 TO STA. 24+00

In 1 sheet

Sheet No. 1

Scale: as shown

CORPS OF ENGINEERS U. S. ARMY
 KANSAS CITY DISTRICT
FILE NO. 0-3-999
 FEBRUARY 1977

PLATE NO. 4

PHOTOGRAPHS

PHOTOGRAPHS



1. Pomona Lake, Jul 60, Neg. No. R-145-8. Outlet Works. Foundation Preparation, Conduit Monoliths #11 thru 13.



2. Pomona Lake, Jul 60, Neg. No. R-145-10. Outlet Works. Foundation Preparation, Conduit Monoliths #14 thru 16.



3. Pomona Lake, Aug 60, Neg. No. R-147-4. Outlet Works, Foundation Preparation, Conduit Monolith #17.



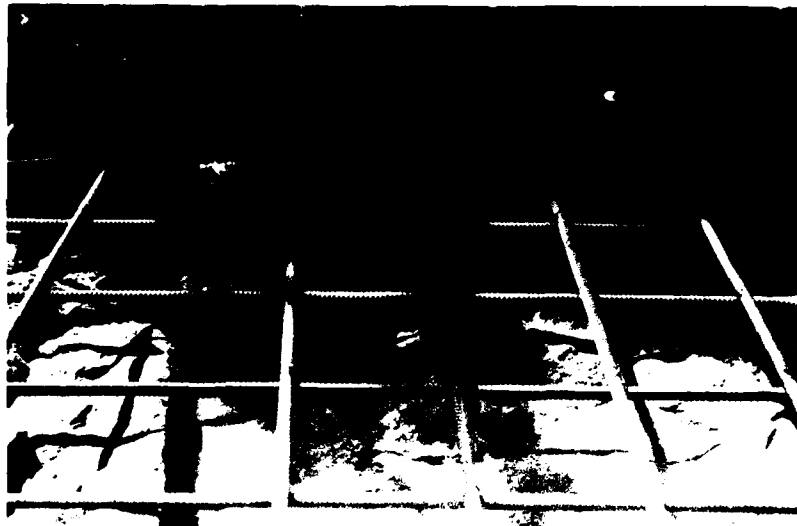
4. Pomona Lake, Aug 60, Neg. No. R-147-13. Outlet Works. Foundation Preparation, Conduit Monoliths #19 to #22.



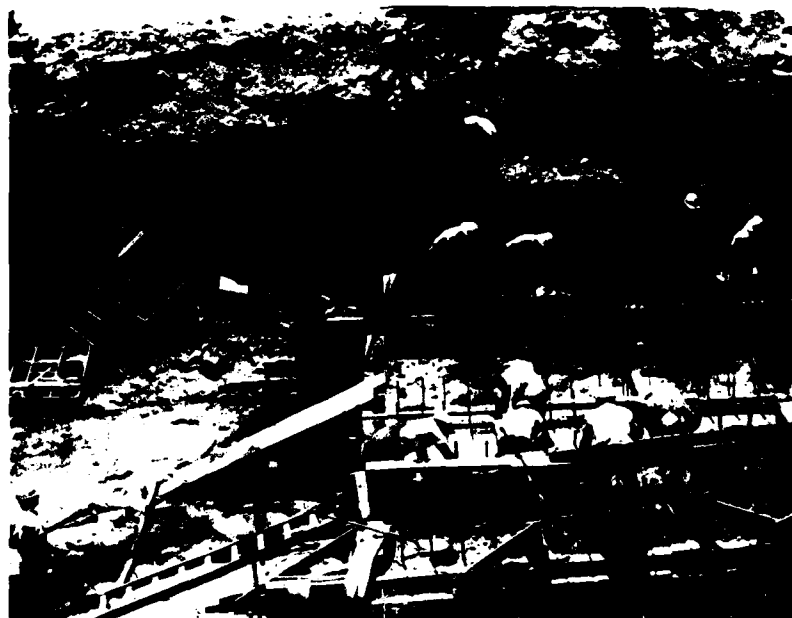
5. Pomona Lake, Aug 60, Neg. No. R-147-7. Outlet Works. Foundation Preparation, Conduit Monolith #22 After Heavy Rain.



6. Pomona Lake, Jun 60, Neg. No. R-142-10. Outlet Works Foundation Preparation, Conduit Monoliths #6 thru 10.



7. Pomona Lake, Jul 60, Neg. No. R-142-15. Outlet Works Foundation Preparation, Tower Monolith #1.



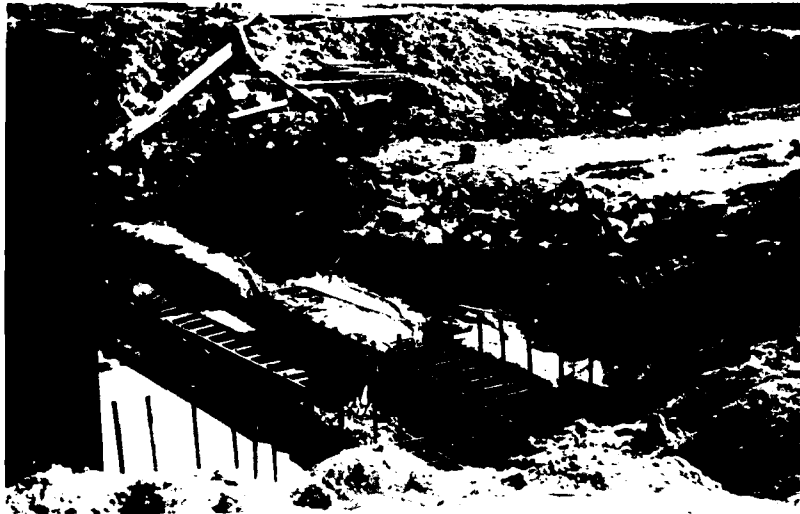
8. Pomona Lake, Jul 60, Neg. No. R-142-16. Outlet Works Foundation Preparation, Conduit Monolith #1.



9. Pomona Lake, Sep 60, Neg. No. R-149-6. Outlet Works. Foundation Preparation, Stilling Basin Monolith #2.



10. Pomona Lake, Sep 60, Neg. No. R-149-3. Outlet Works. Foundation Preparation, Stilling Basin Monolith #3.



13. Pomona Lake, Sep 60, Neg. No. R-149-11. Outlet Works. Foundation Preparation, Stilling Basin End Sill.



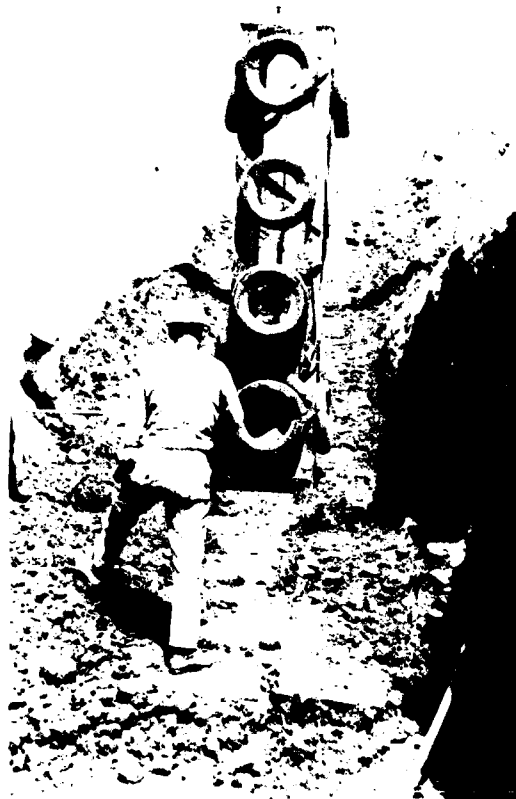
14. Pomona Lake, Sep 60, Neg. No. R-149-12. Outlet Works. Foundation Preparation, Stilling Basin End Sill.



15. Pomona Lake, Neg. No. R-168-12. Special Cleanup Area. Foundation Cleanup Before Placing Impervious Fill.



16. Pomona Lake, Neg. No. R-168-11. Foundation Cleanup. Placing Impervious Fill.



17. Pomona Lake,
Neg. No. R-168-13.
Foundation Cleanup
and Backfill.



18. Pomona Lake, Neg. No. R-168-16. Watering
Pervious Fill.



19. Pomona Lake, Neg. No. R-151-0. Outlet Works. Rock Excavation in Approach Channel.



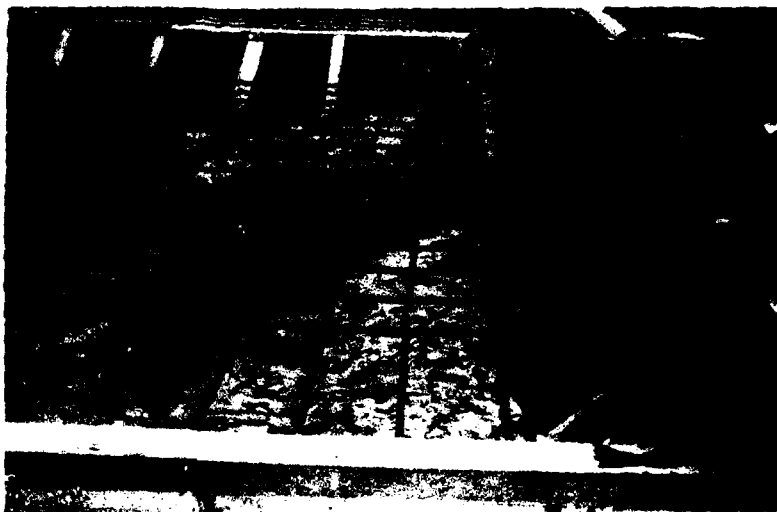
20. Pomona Lake, Sep 60, Neg. No. R-151-6. Spillway Sill. Foundation Preparation Monolith #4.



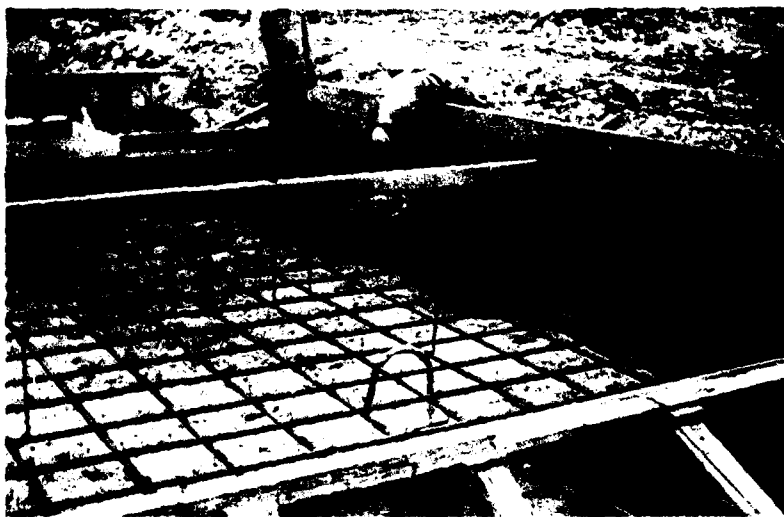
21. Pomona Lake, Sep 60, Neg. No. R-149-21. Spillway Sill.
Foundation Preparation Monolith #3 thru 5.



22. Pomona Lake, Sep 60, Neg. No. R-149-20. Spillway
Sill. Foundation Preparation Monoliths #6 & 7.



23. Pomona Lake, Sep 60, Neg. No. R-151-8. Spillway Sill. Foundation Preparation Monolith #7.



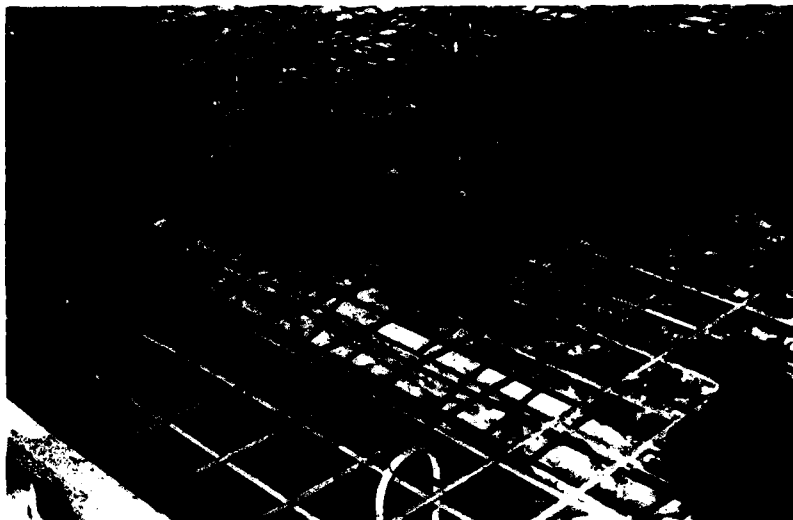
24. Pomona Lake, Sep 60, Neg. No. R-151-9. Spillway Sill. Foundation Preparation Monolith #8.



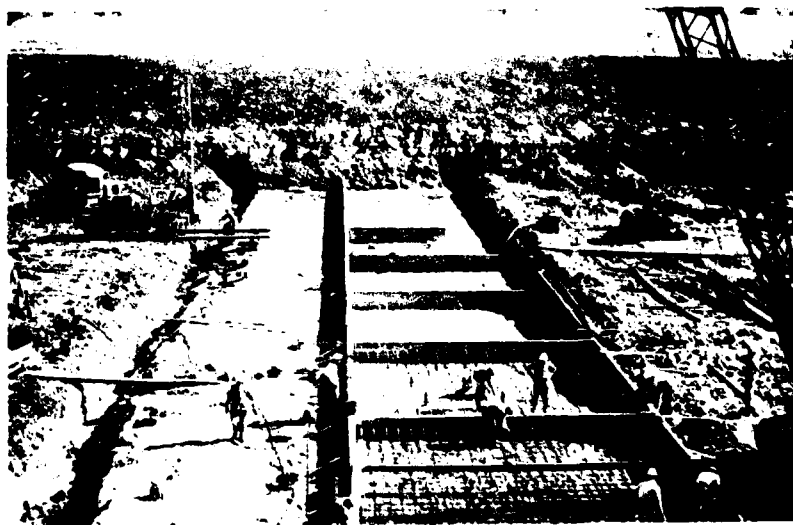
25. Pomona Lake, Sep 60, Neg. No. R-151-14. Spillway Sill. Foundation Preparation Monolith #9.



26. Pomona Lake, Sep 60, Neg. No. R-149-19. Spillway Sill. Foundation Preparation Monolith #20.



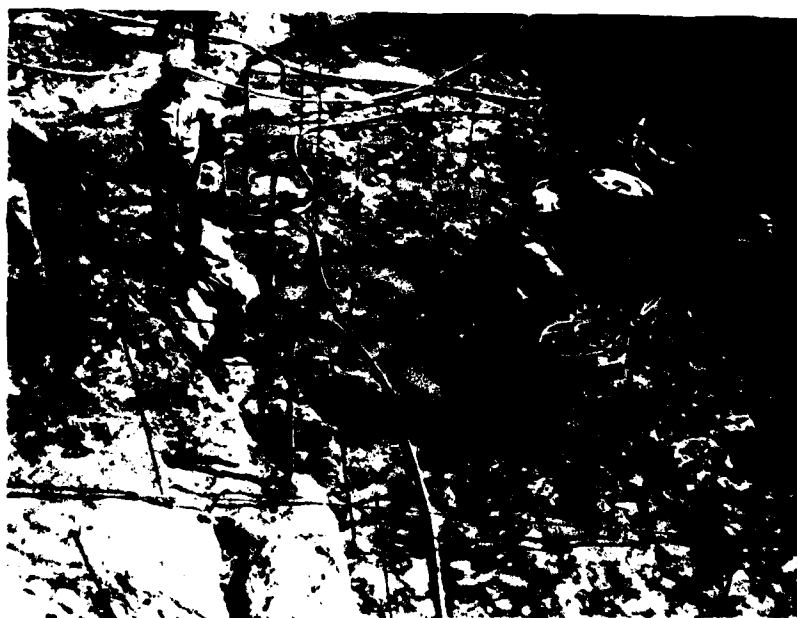
27. Pomona Lake, Sep 60, Neg. No. R-149-18. Spillway
Sill. Foundation Preparation Monolith #21.



28. Pomona Lake, Sep 60, Neg. No. R-149-13. Spillway
Sill. Foundation Preparation Monolith #23.



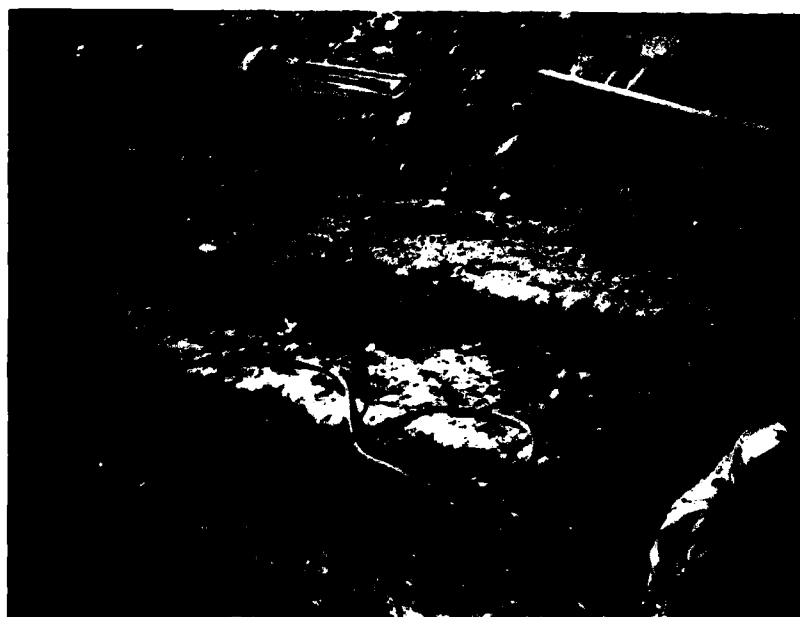
29. Pomona Lake, Sep 60, Neg. No. R-148-8. Spillway Sill. Foundation Preparation. Drilling Holes for Anchor Bars.



30. Pomona Lake, Sep 60, Neg. No. R-149-2. Spillway Sill. Foundation Preparation. Anchor Bars Installed. Left Slope.



31. Pomona Lake, Aug 60, Neg. No. R-171-6. Left Abutment Grout Trench. Foundation Cleanup.



32. Pomona Lake, Aug 60, Neg. No. R-147-2. Outlet Works. Stilling Basin Anchor Bars.



33. Pomona Lake, Aug 60, Neg. No. R-147-16. Outlet Works. Stilling Basin Anchor Bars.



34. Pomona Lake, Nov 61, Neg. No. R-168-17. Placing Class II Rockfill Sta. 46+00.



35. Pomona Lake, Nov 61, Neg. No. R-160-15. Riprap Type B, Test Load.



36. Pomona Lake, Nov 61, Neg. No. R-160-3. Riprap Type B, Stage I.



37. Pomona Lake, May 60, Neg. No. R-145-5. Grouting on Right Abutment.