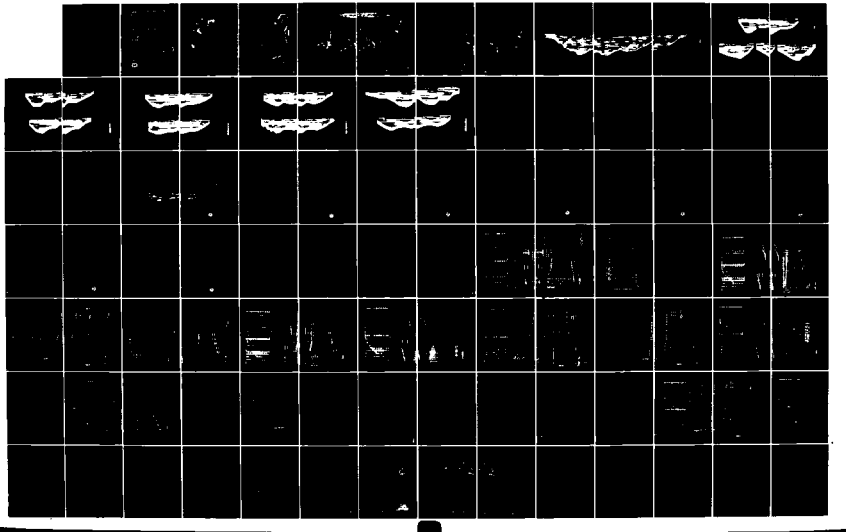
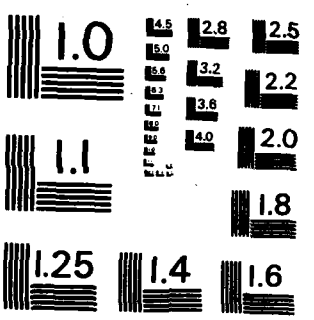
AD A134 914 CONSTRUCTION FOUNDATION REPORT MISSOURI RIVER FORT PECK 1/4
MONTANA VOLUME 2 DRAWINGS(U) ARMY ENGINEER DISTRICT
OMAHA NE JAN 83

UNCLASSIFIED F/G 13/13 NL





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

CONSTRUCTION FOUNDATION REPORT

(3)

A134914

MISSOURI RIVER
FORT PECK LAKE, MONTANA

VOLUME II
DRAWINGS

DTIC
ELECTE
NOV 17 1983
S D
A

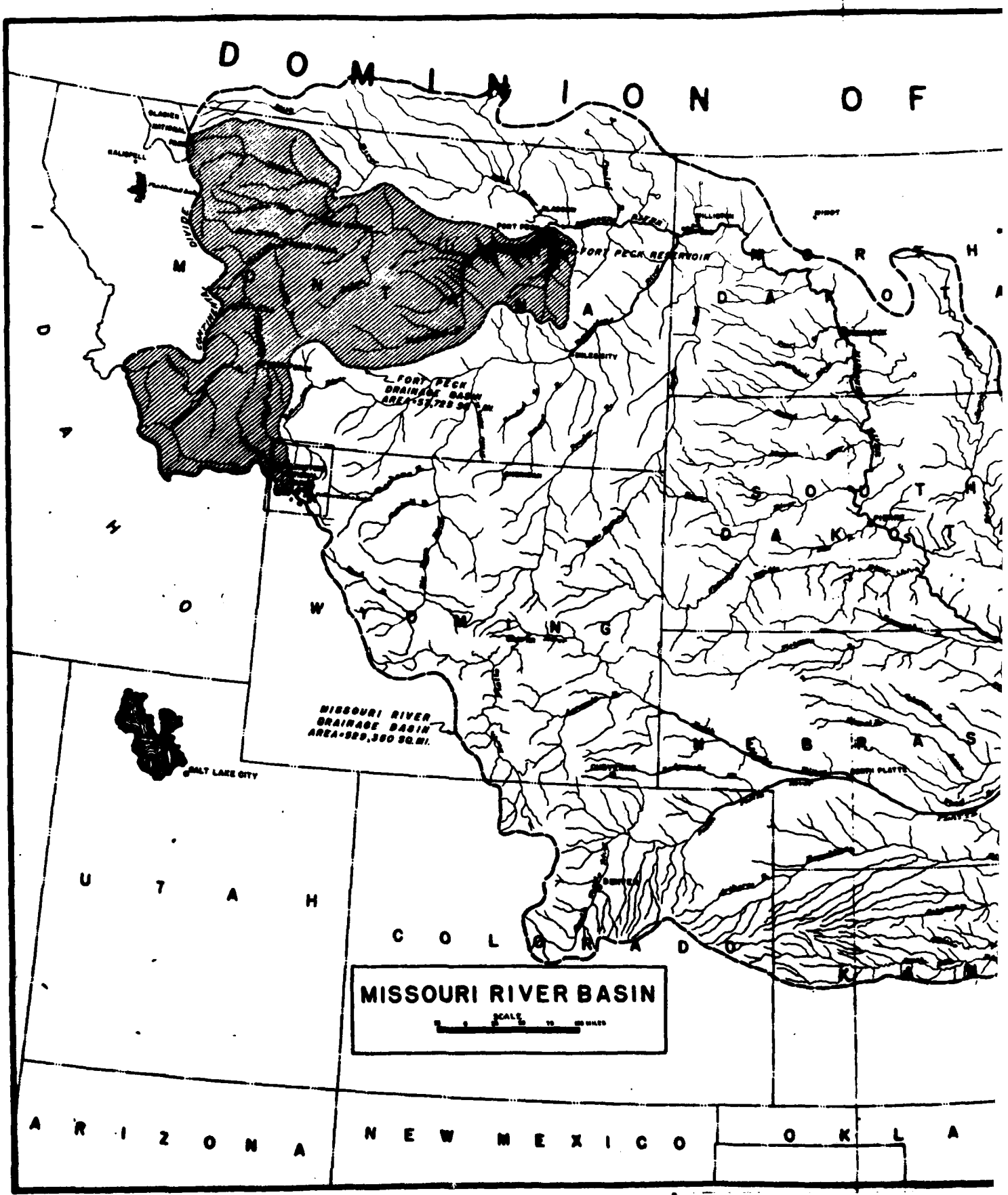
DTIC FILE COPY

JANUARY 1983

US Army Corps
of Engineers
Omaha District

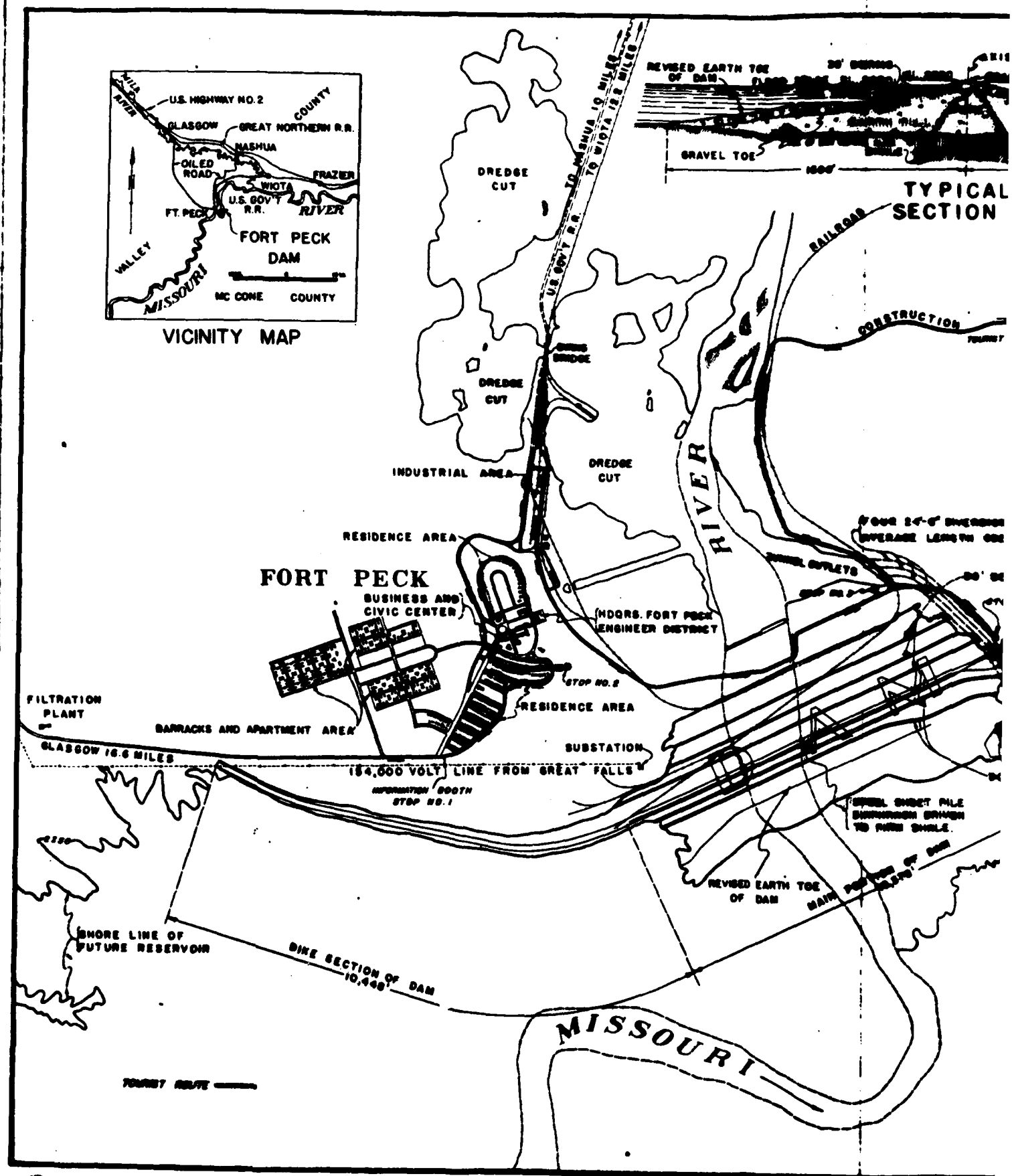
This document has been approved for public release and sale; its distribution is unlimited.

83 11 15 064

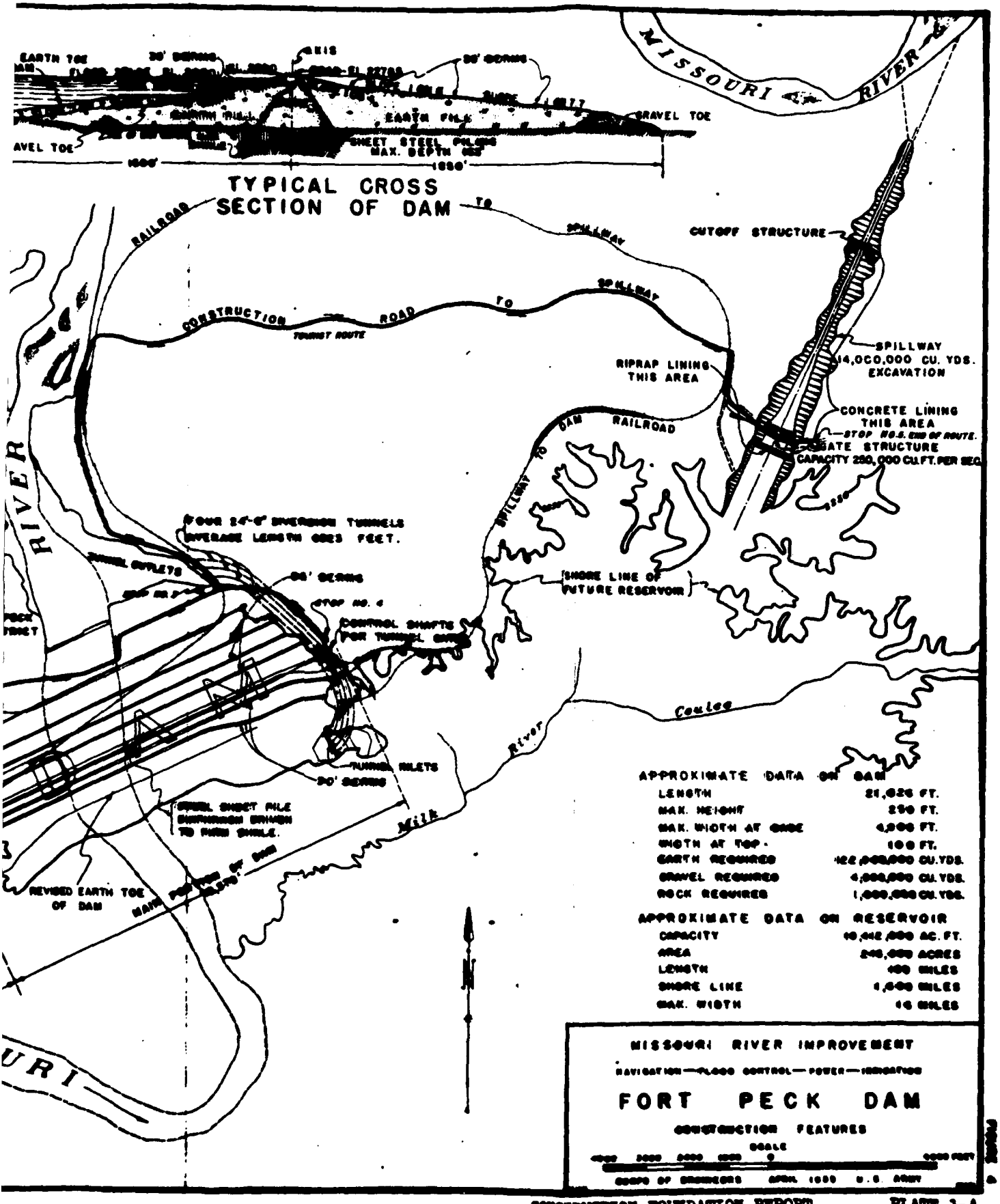


(Photo p. 34) No. 2


N O F C A N A D A
M I C H I G A N
W I S C O N S I N
M I N N E S O T A
O W A
N E B R A S K A
O K L A H O M A
MISSOURI RIVER
DRAINAGE BASIN
AREA-529,350 SQ.MI.
NOTE.
MISSOURI RIVER CHANNEL
FROM KANSAS CITY TO SIOUX
CITY IMPROVEMENT IN PROGRESS.
NOTE.
MISSOURI RIVER CHANNEL
FROM SIOUX CITY TO KANSAS CITY
IMPROVED.

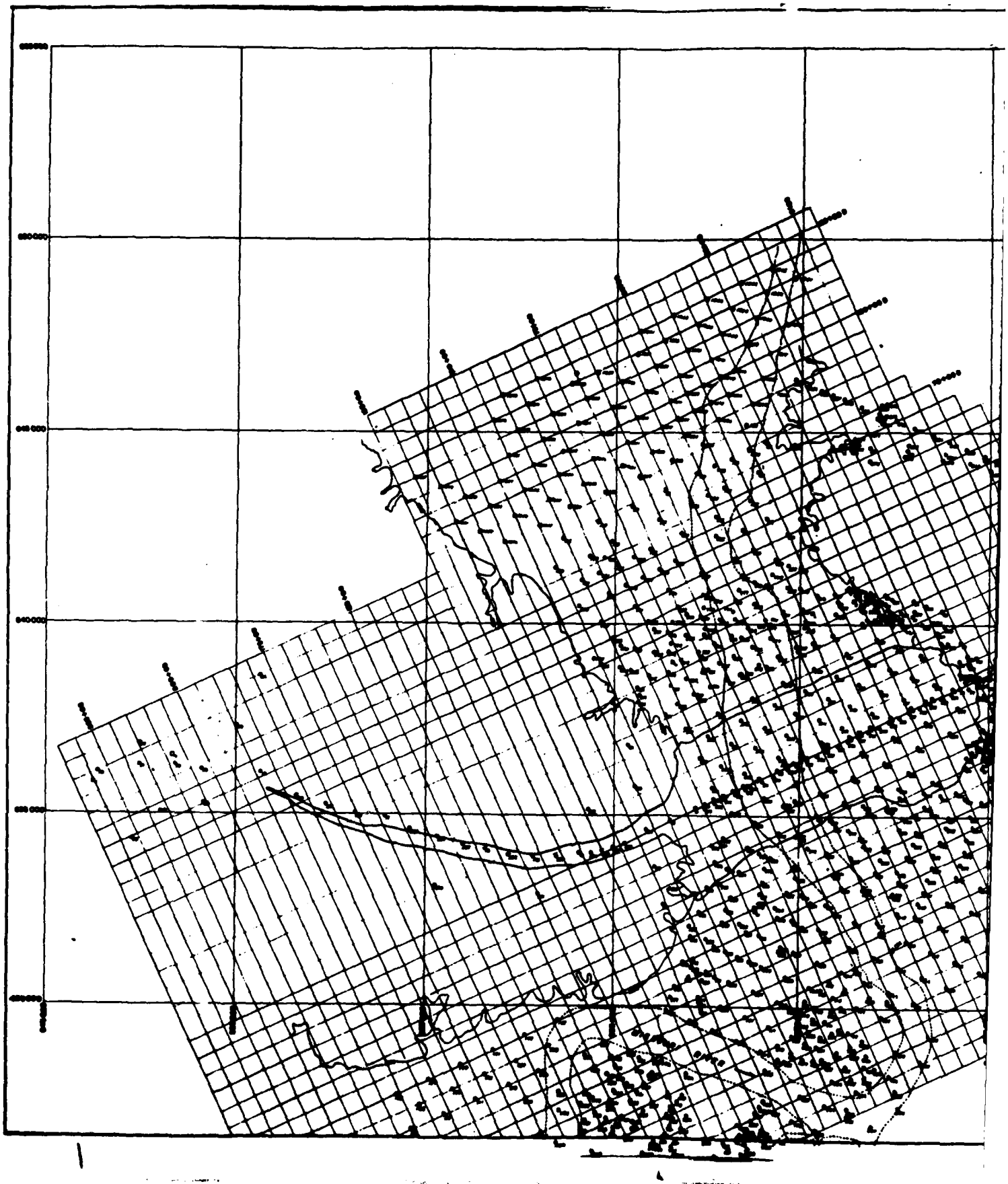


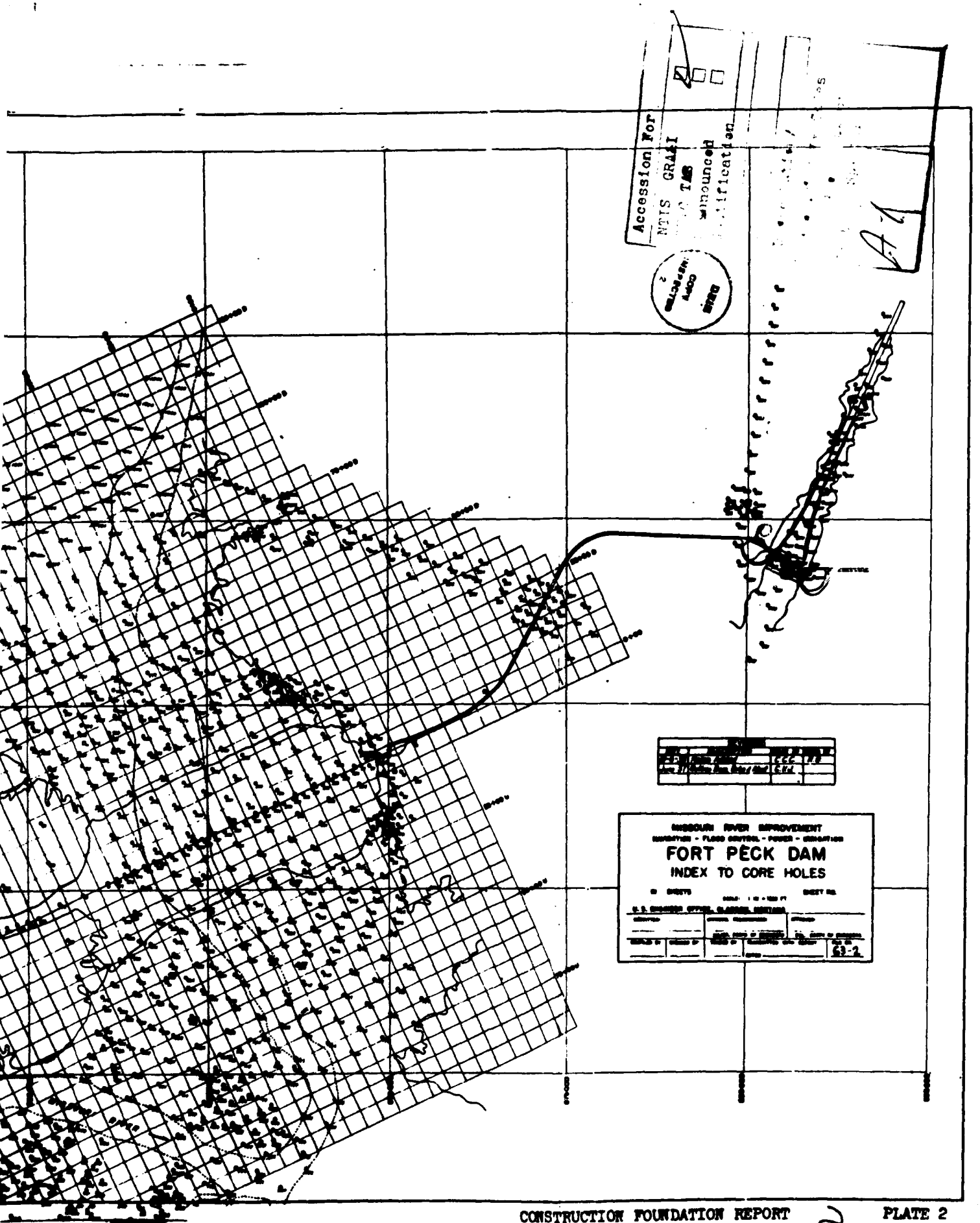
(Plate p. 24) No. 8

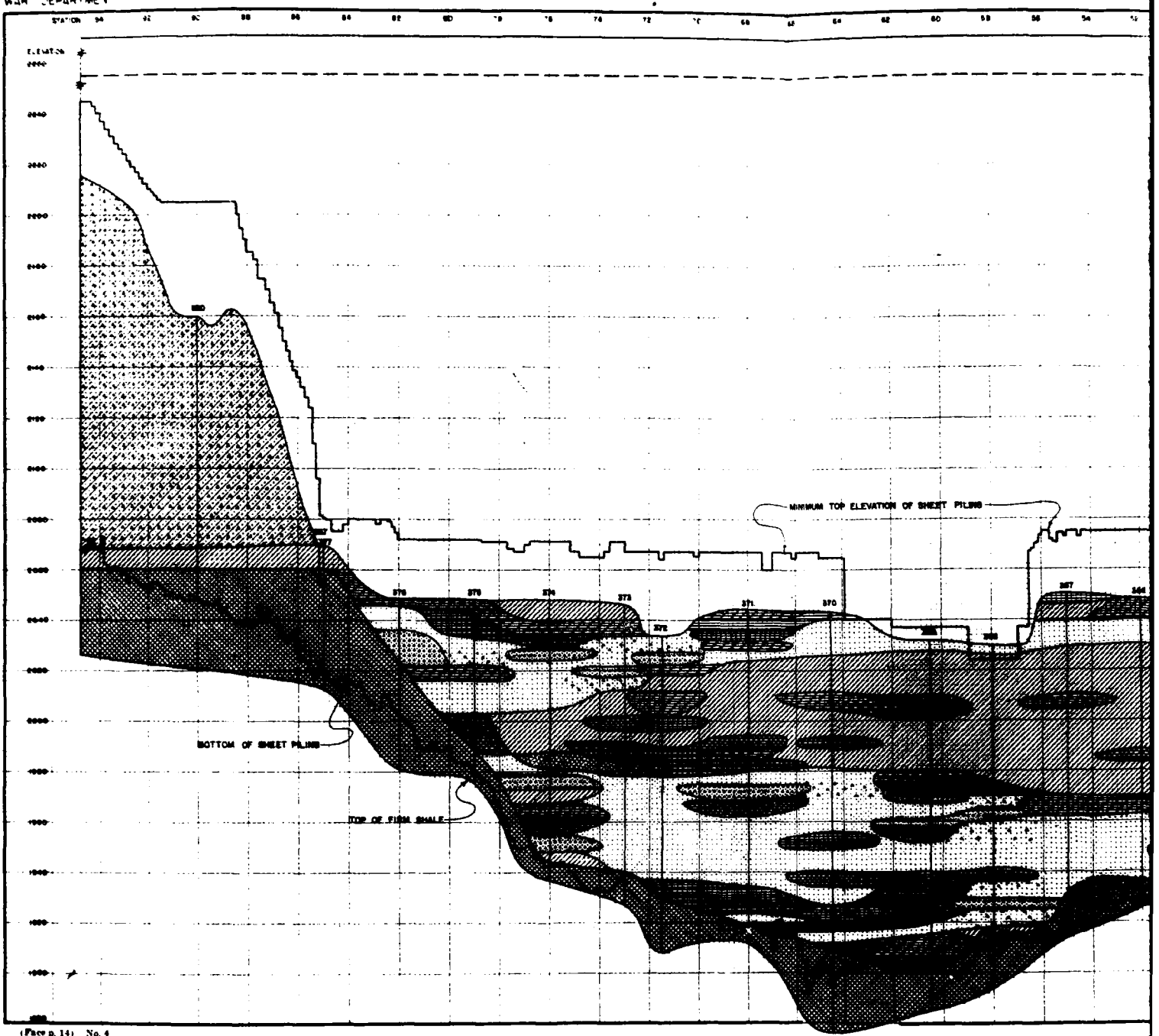


CONSTRUCTION FOUNDATION REPORT PLATE 1-A

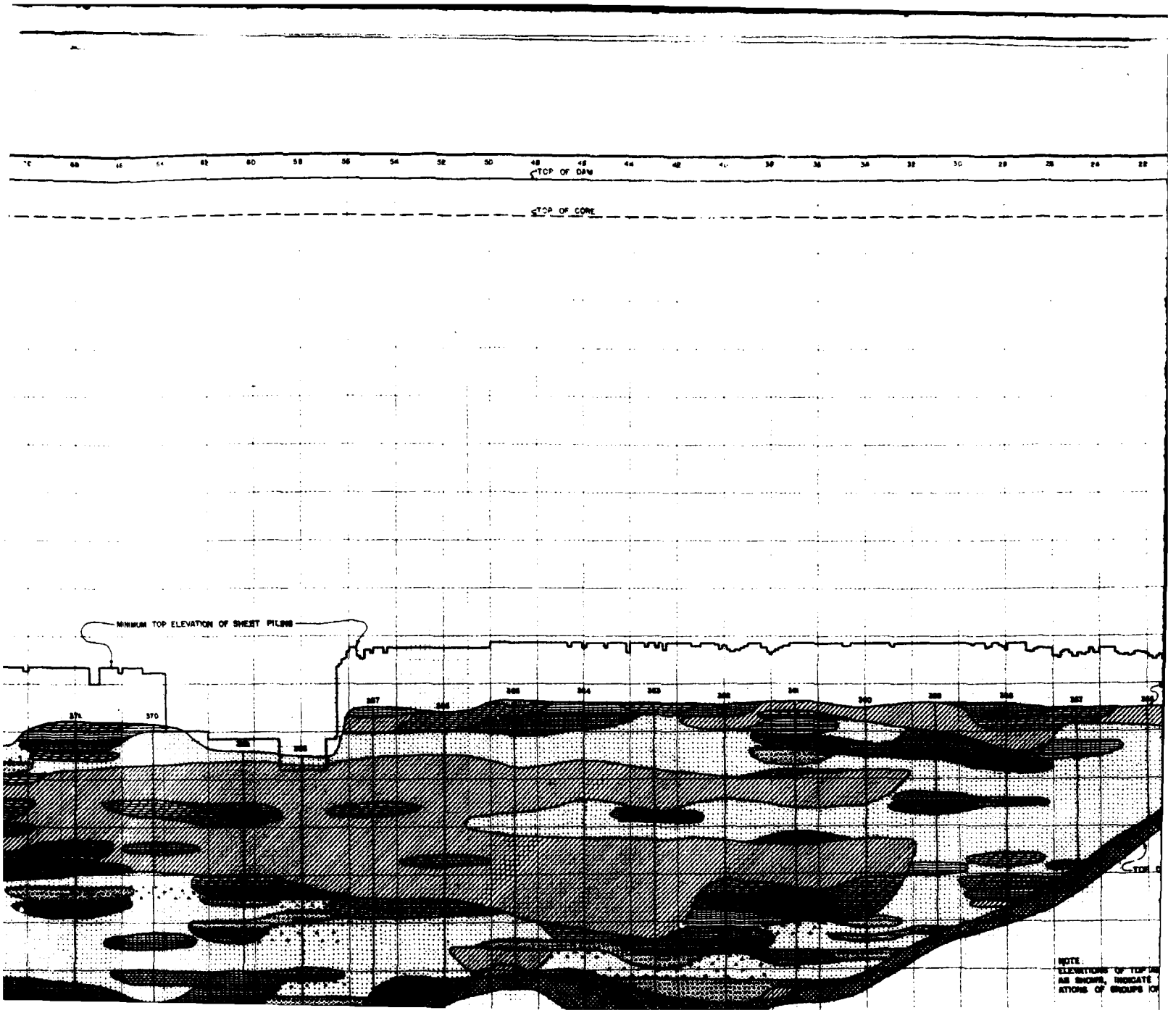
2

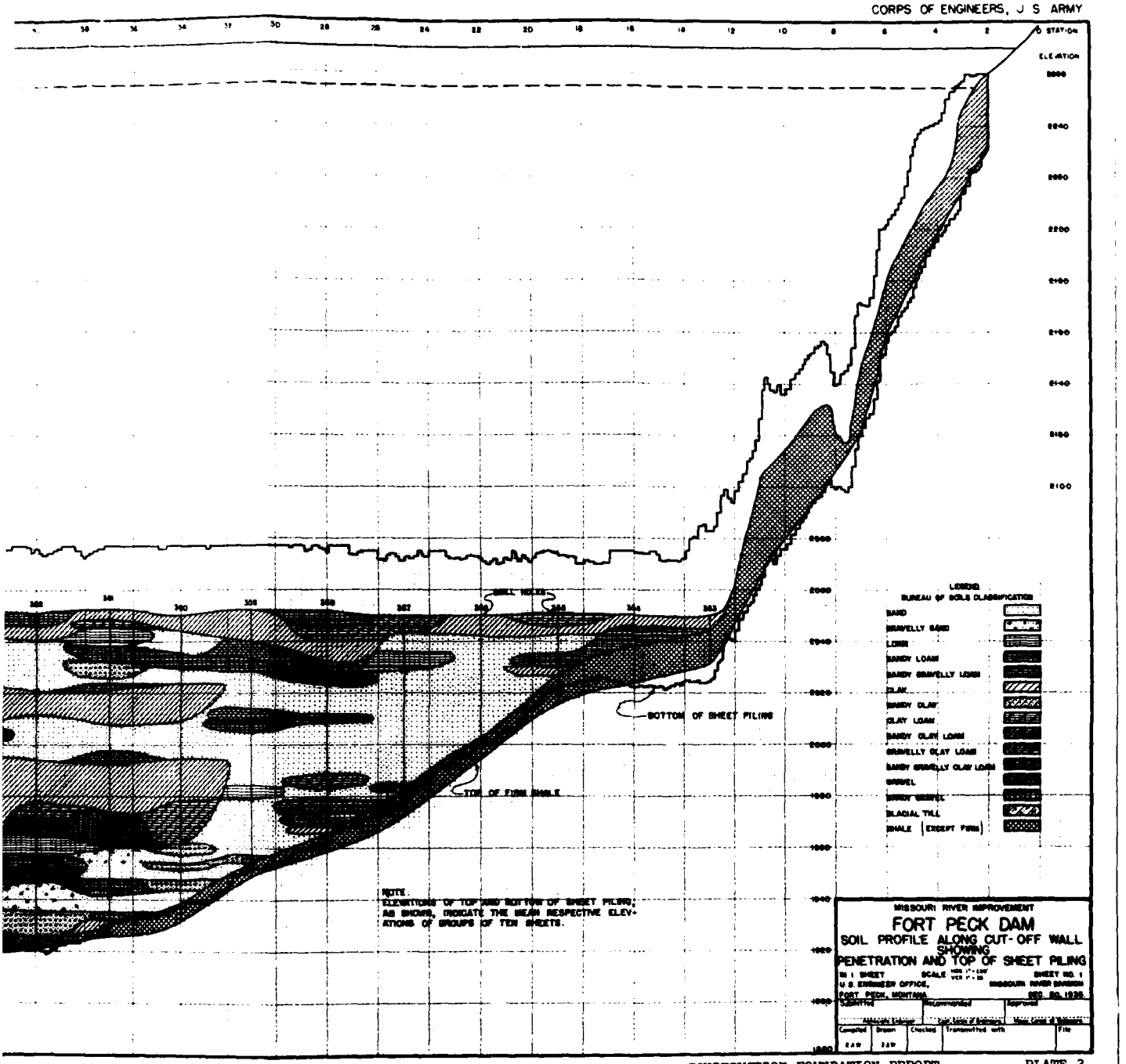



Accession For
NTIS GRA&I
DTIC TAB
Unannounced
Justification
MISSOURI RIVER IMPROVEMENT
NAVIGATION - FLOOD CONTROL - POWER - IRRIGATION
FORT PECK DAM
INDEX TO CORE HOLES
SHEET NO.
63-2


MINIMUM TOP ELEVATION OF SHEET PILING
BOTTOM OF SHEET PILING
TOP OF FISSILE SHALE

(Face p. 14) No. 4


TOP OF DAM
TOP OF CORE
Minimum TOP ELEVATION OF SHEET PILING
NOTE



NOTE:
ELEVATIONS OF TOP AND BOTTOM OF SHEET PILING AS SHOWN, INDICATE THE MEAN RESPECTIVE ELEVATIONS OF GROUPS OF TEN SHEETS.

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

SOIL PROFILE ALONG CUT-OFF WALL SHOWING PENETRATION AND TOP OF SHEET PILING

IN 1 SHEET SCALE HOR 1" = 100' VER 1" = 20 SHEET NO. 1

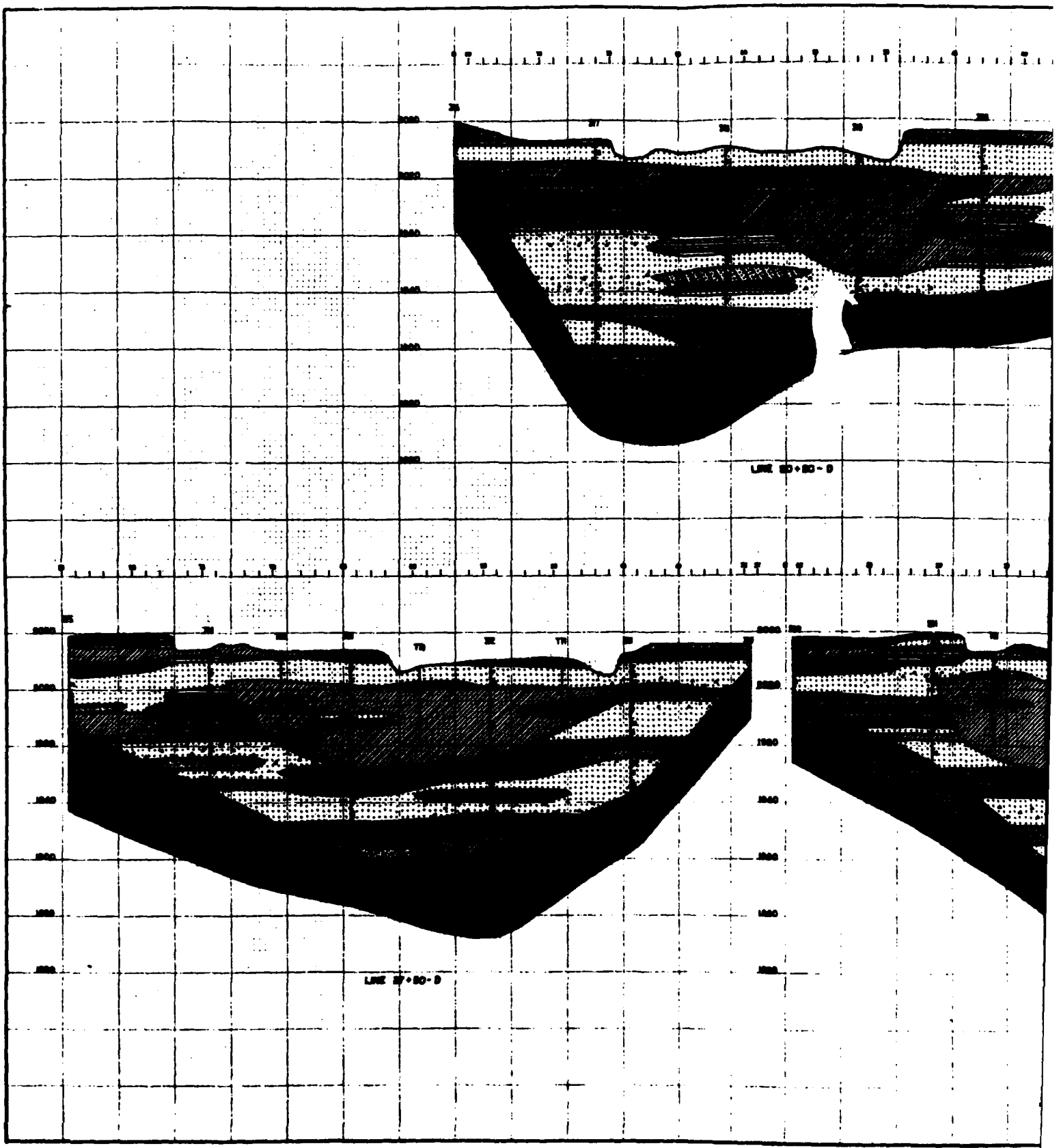
U.S. ENGINEER OFFICE, MISSOURI RIVER DIVISION

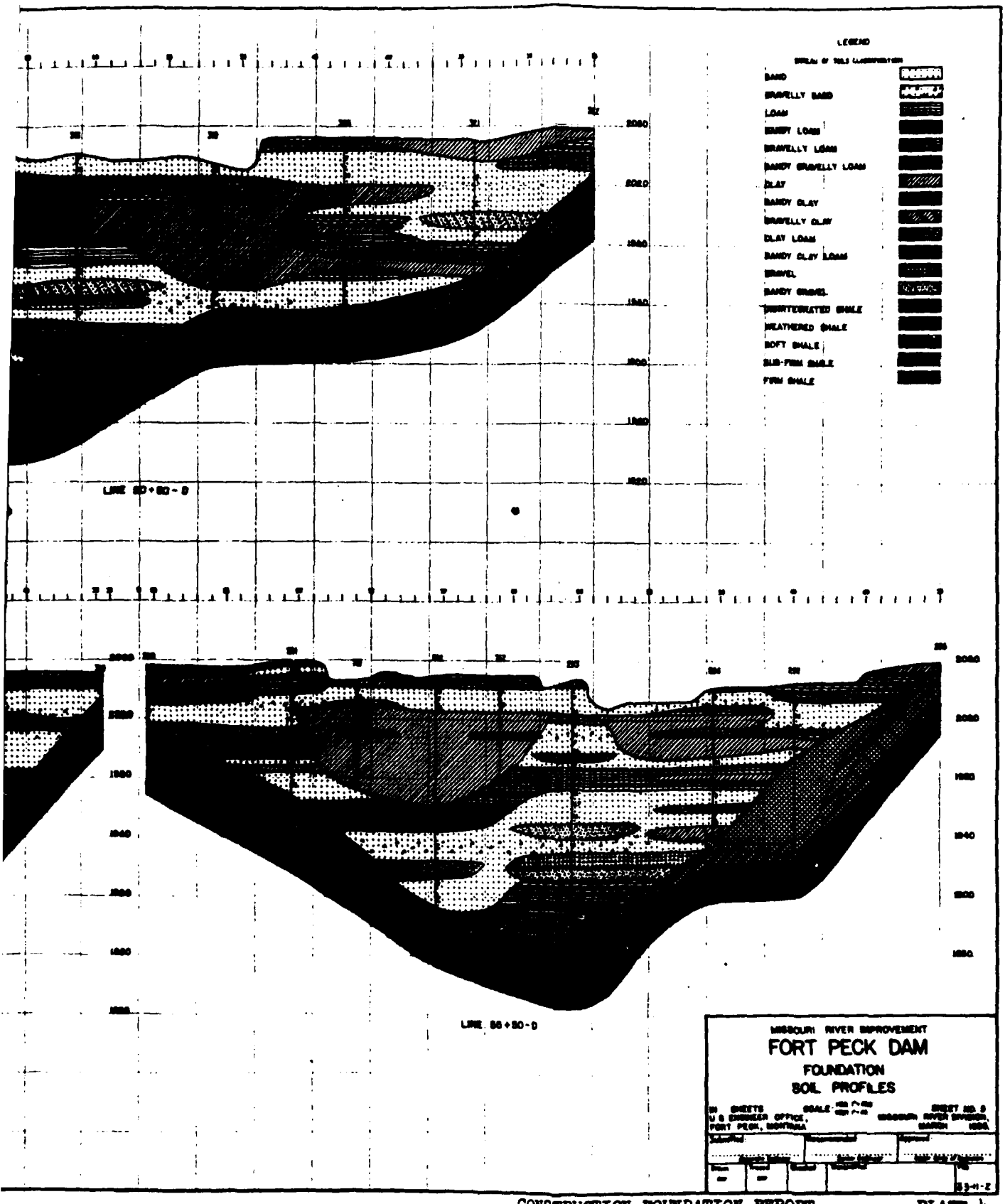
FORT PECK, MONTANA DEC. 30, 1938

Submitted	Recommended	Approved
Assistant Engineer	Asst. Chief of Engineers	Major General, U.S. Army

Compiled	Drawn	Checked	Transmitted with	File
A.A.W.	J.A.M.			

3





MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

FOUNDATION SOIL PROFILES

SHEETS SCALE SHEET NO. 8

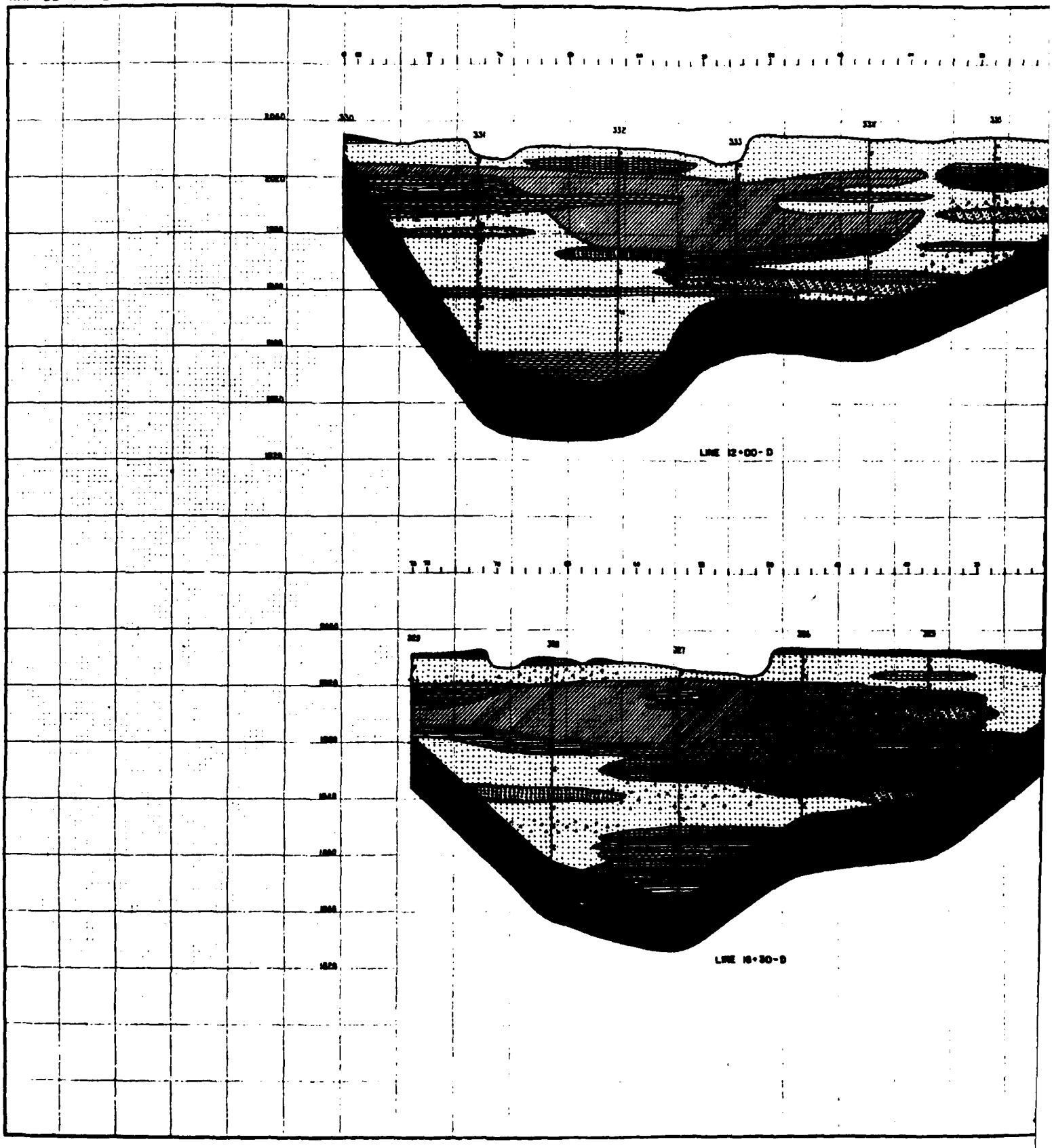
U.S. ENGINEER OFFICE, FORT PECK, MONTANA. MISSOURI RIVER DIVISION, MARCH 1934.

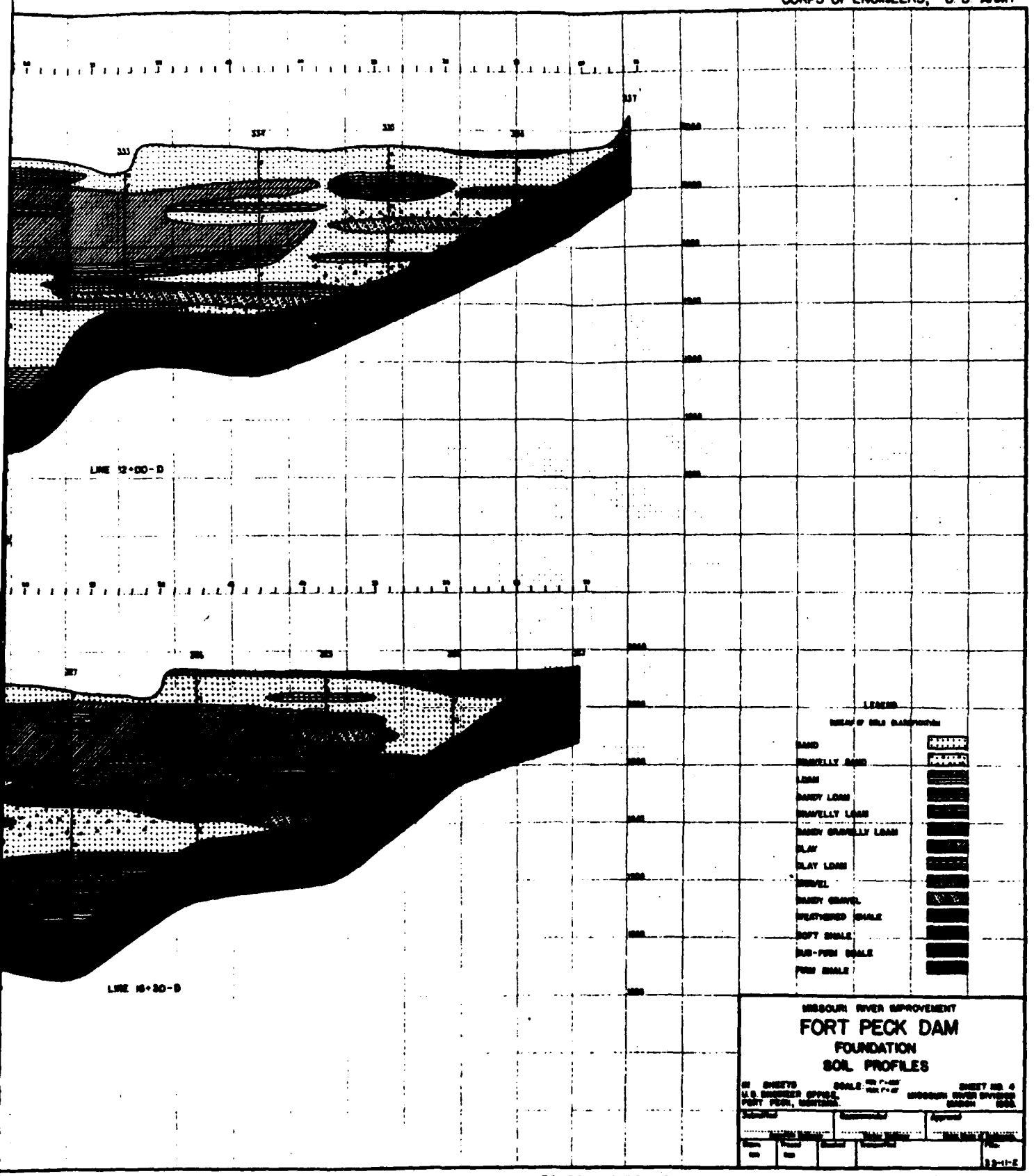
Submitted | Recommended | Approved

Drawn | Traced | Checked | Date

93-41-2

WAR DEPARTMENT





MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

FOUNDATION SOIL PROFILES

SHEET NO. 6

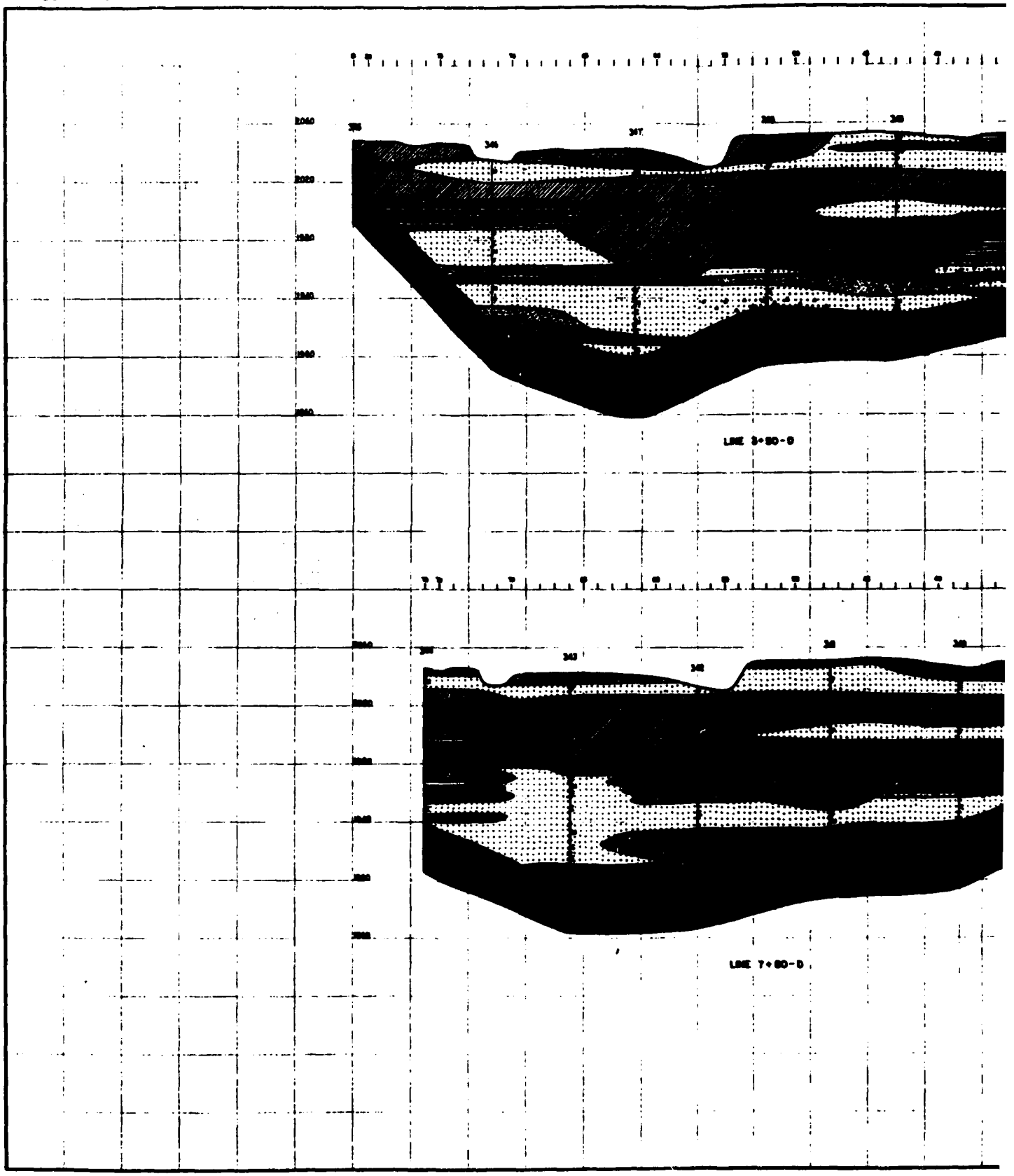
U.S. ENGINEER OFFICE, FORT PECK, MONTANA

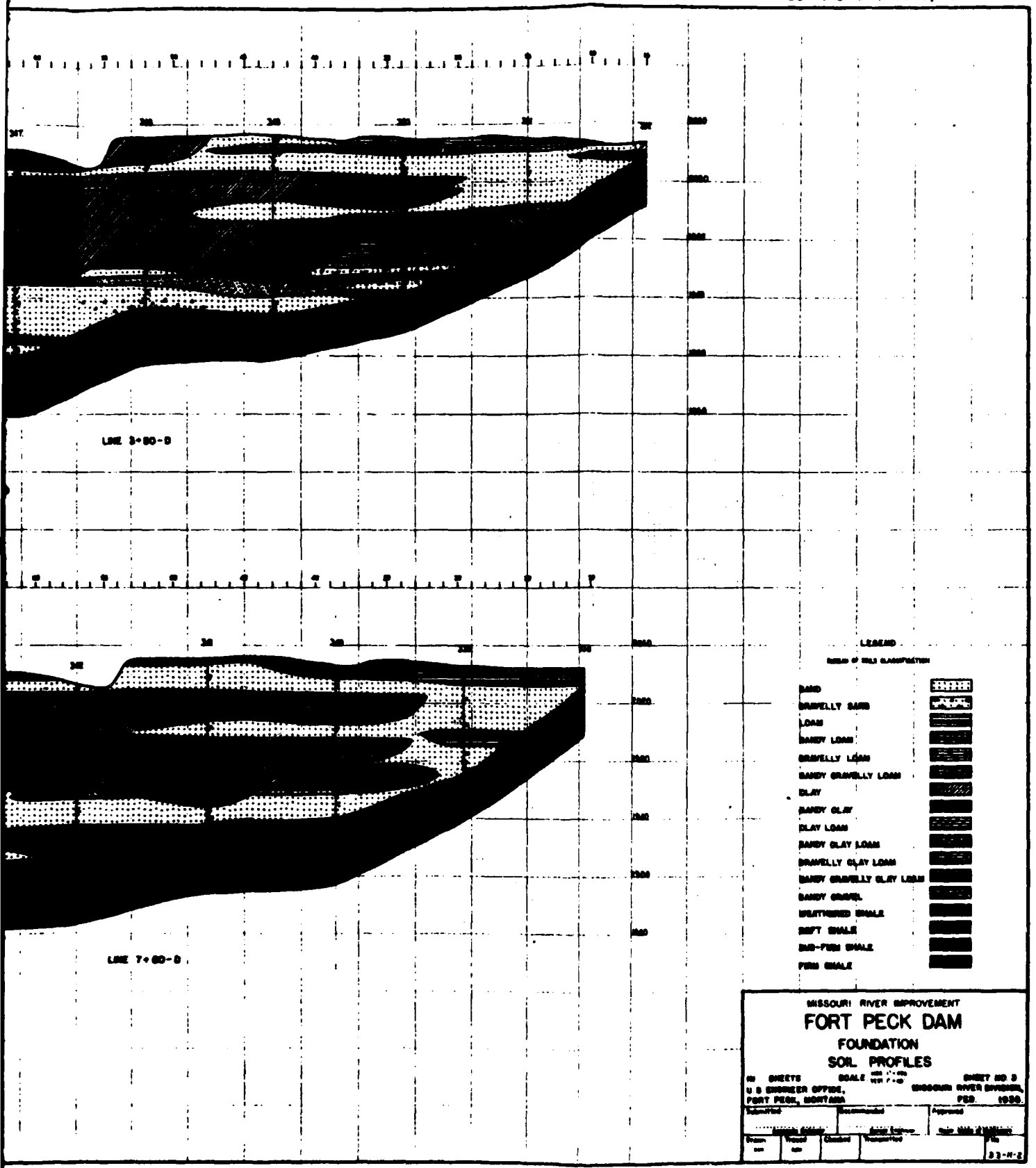
MISSOURI RIVER DIVISION

Submitted | Recommended | Approved

53-11-5

WAR DEPARTMENT





MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

FOUNDATION

SOIL PROFILES

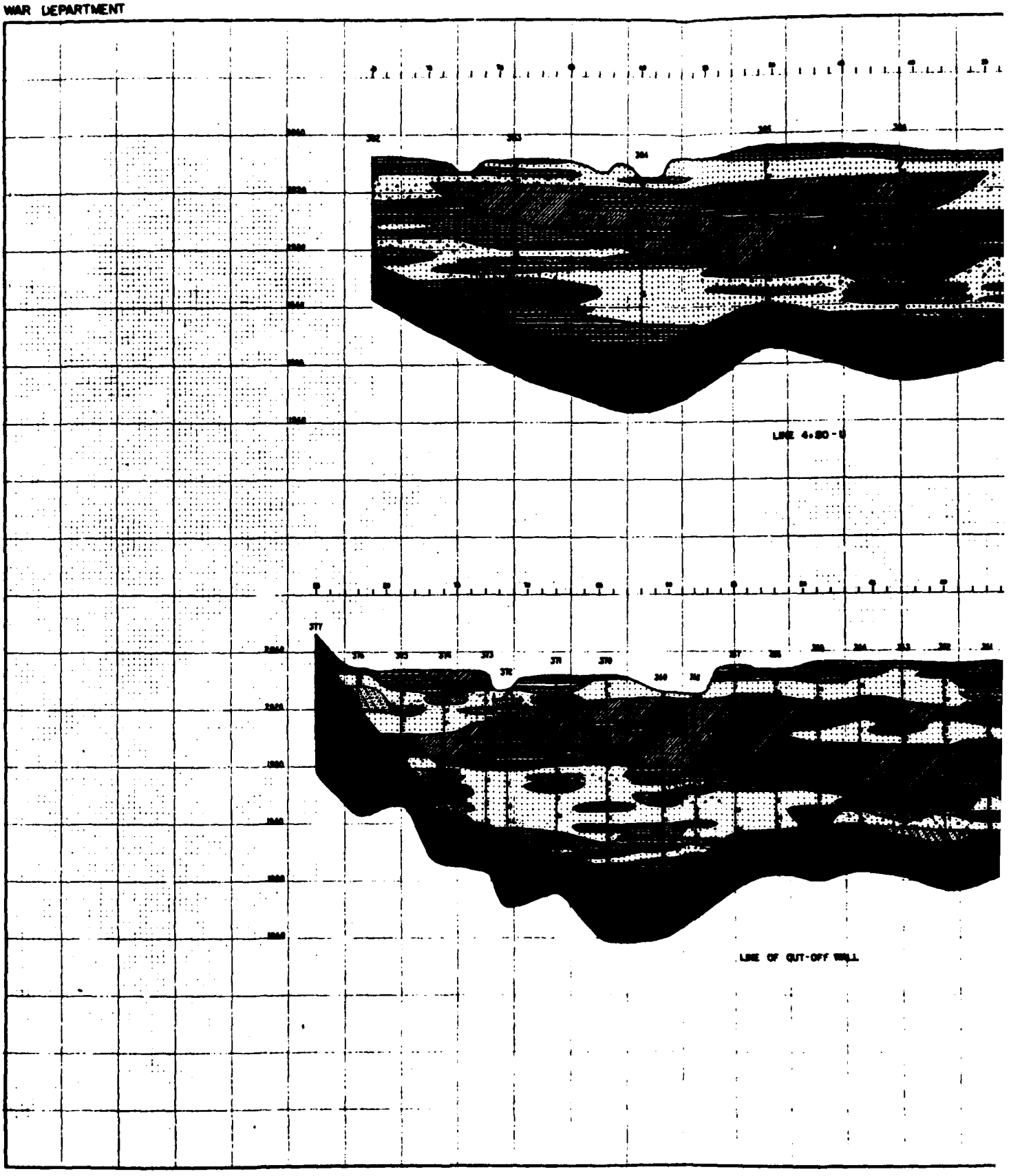
U S ENGINEER OFFICE, MISSOURI RIVER DIVISION,
FORT PECK, MONTANA FEB. 1938

Submitted | Recommended | Approved

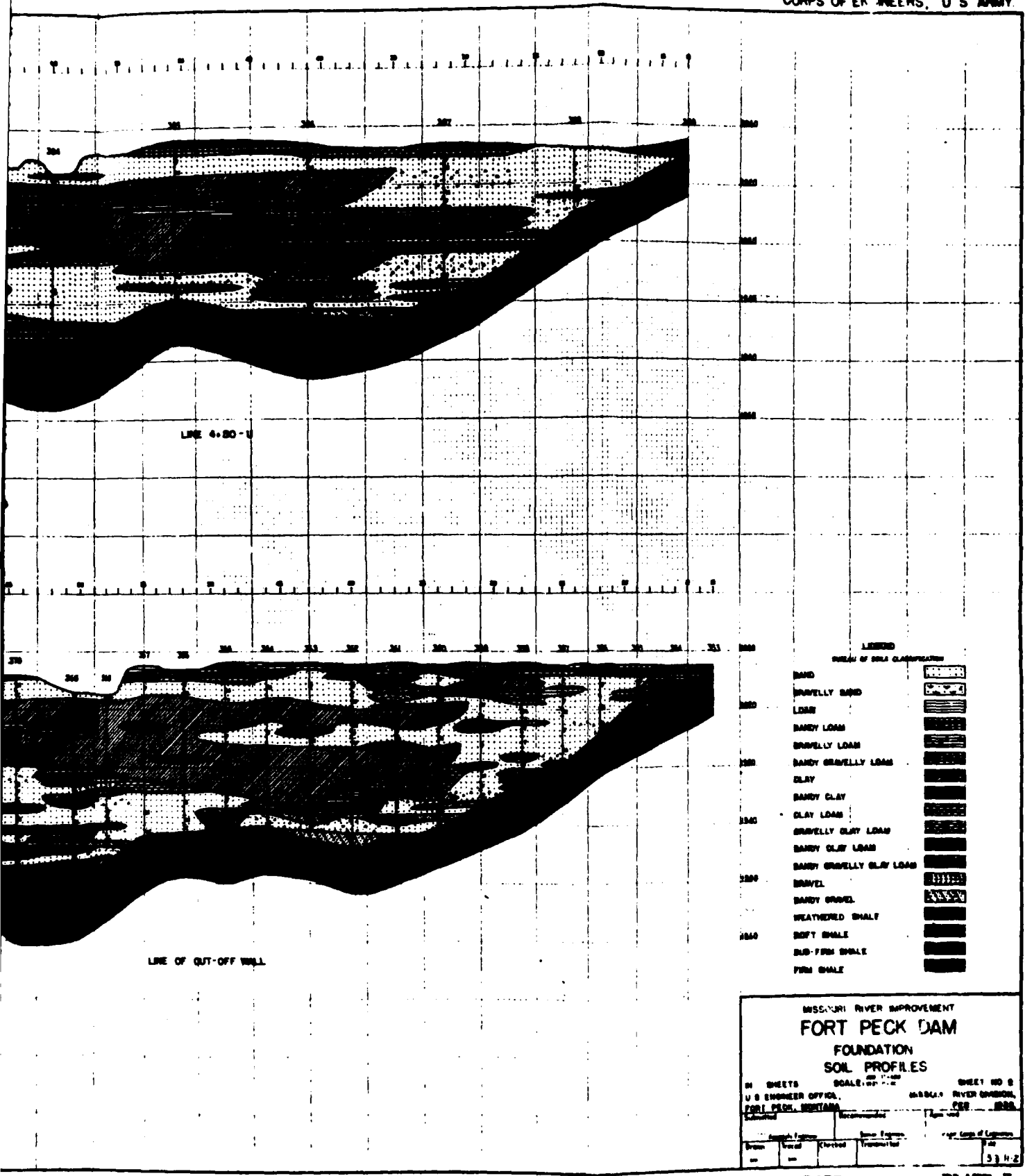
Drawn | Traced | Checked | Recommended | No. 33-M-2

CONSTRUCTION FOUNDATION REPORT 2 PLATE 6

WAR DEPARTMENT



CORPS OF ENGINEERS, U S ARMY



MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

FOUNDATION SOIL PROFILES

SHEETS SCALE SHEET NO 8

U S ENGINEER OFFICE, MISSOURI RIVER DIVISION, FORT PECK, MONTANA FEB 1938

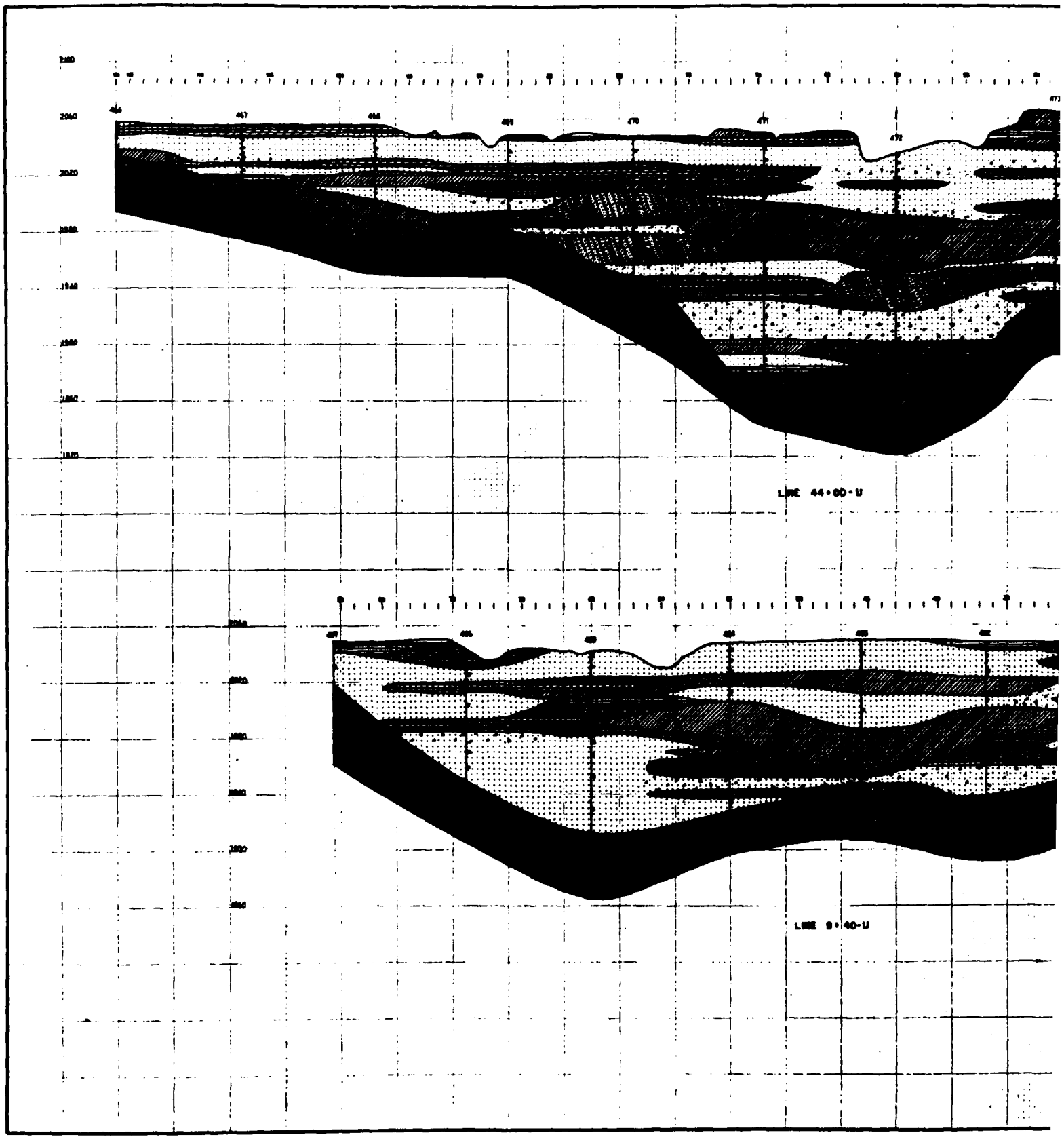
Submitted Recommended Approved

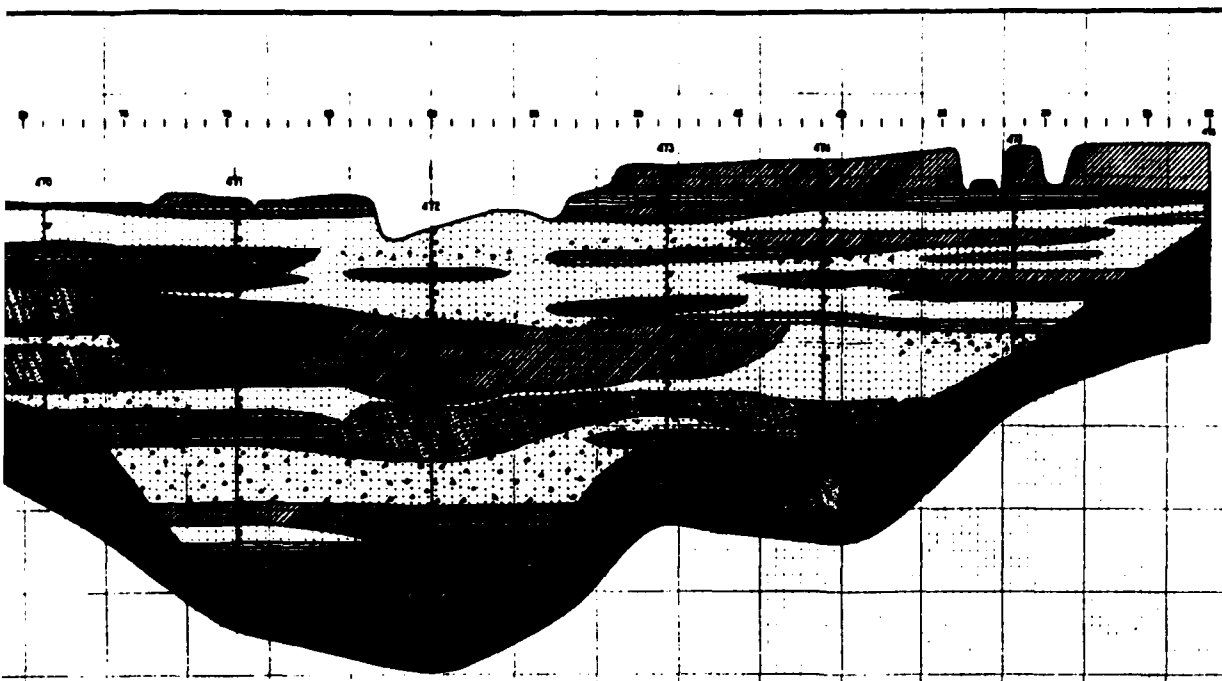
Drawn Traced Checked Tracings Checked 53 H-2

CONSTRUCTION FOUNDATION REPORT PLATE 7

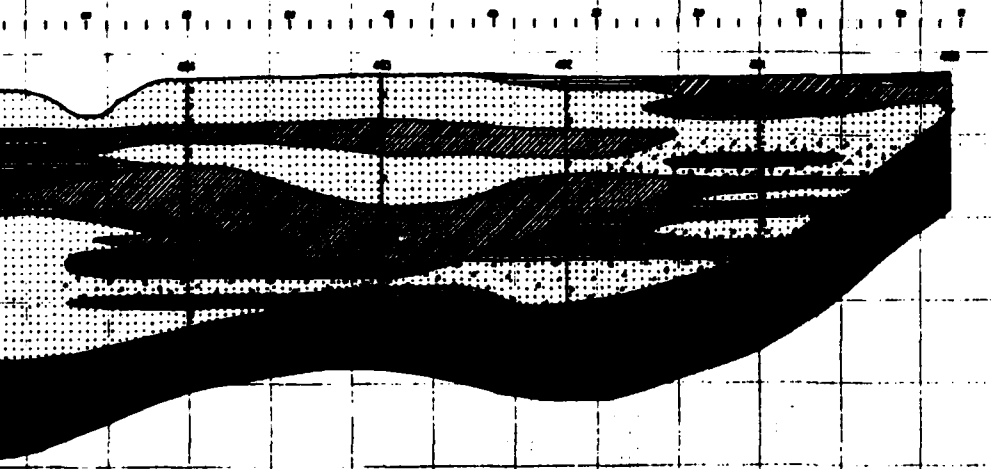
7

WAR DEPARTMENT





LINE 44+60-U



LINE 9+40-U

LEGEND
SHEET OF SOILS CLASSIFICATION

- SAND
- GRAVELLY SAND
- LOAM
- SANDY LOAM
- GRAVELLY LOAM
- SANDY GRAVELLY LOAM
- CLAY
- GRAVELLY CLAY
- CLAY LOAM
- SANDY CLAY LOAM
- GRAVELLY CLAY LOAM
- SANDY GRAVELLY CLAY LOAM
- GRAVEL
- SANDY GRAVEL
- SOFT SHALE
- SUB-FIRM SHALE
- FIRM SHALE

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

FOUNDATION SOIL PROFILES

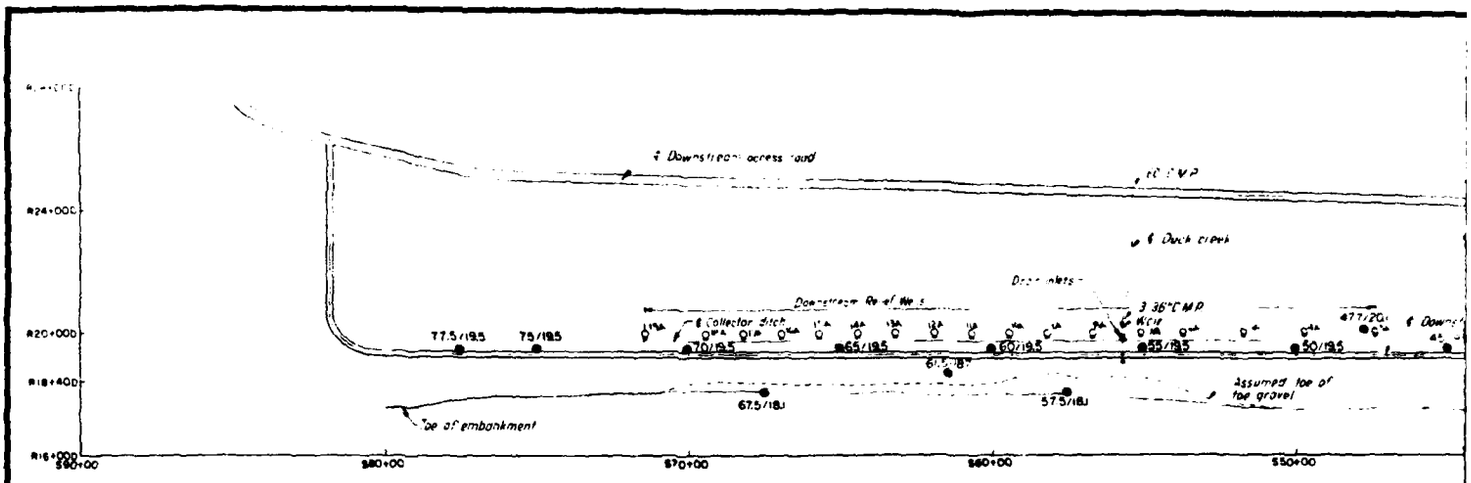
IN SHEETS SCALE: SHEET NO. 1
U.S. ENGINEER OFFICE MISSOURI RIVER DIVISION
FORT PECK, MONTANA FILE NO.

Submitted | Recommended | Approved

Drawn | Traced | Checked | Transmitted | File 3.3-11-1

CONSTRUCTION FOUNDATION REPORT PLATE 8

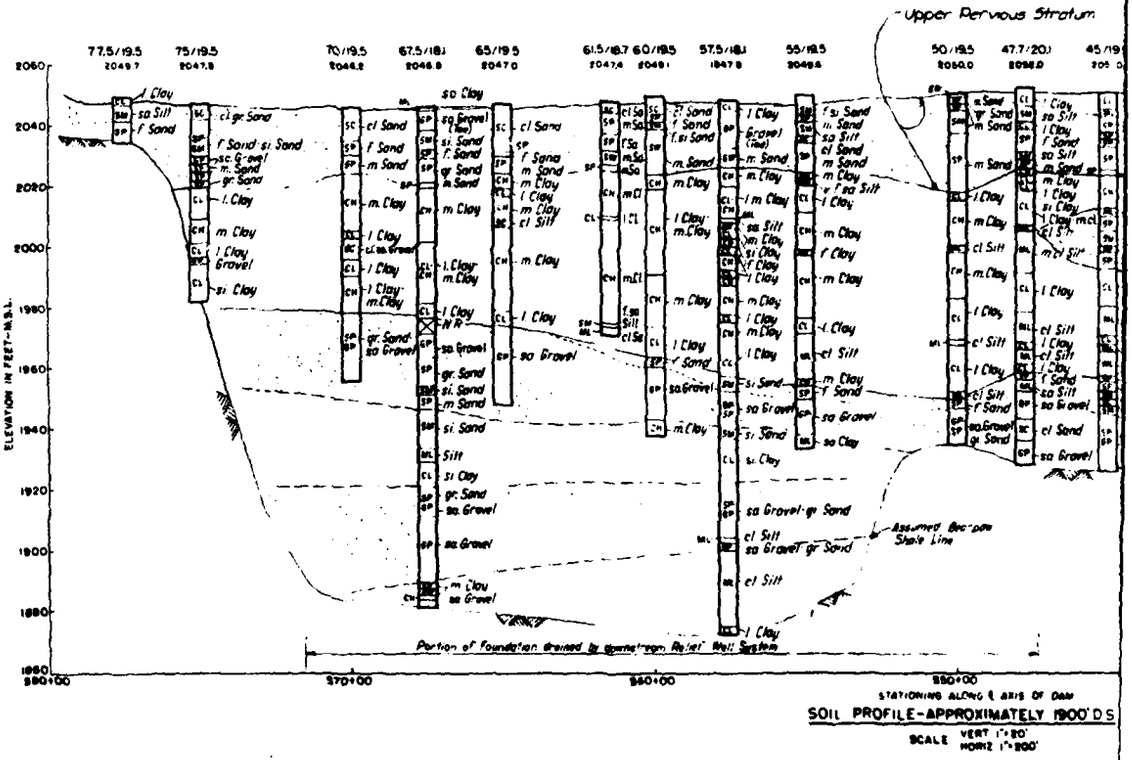
2



PLAN

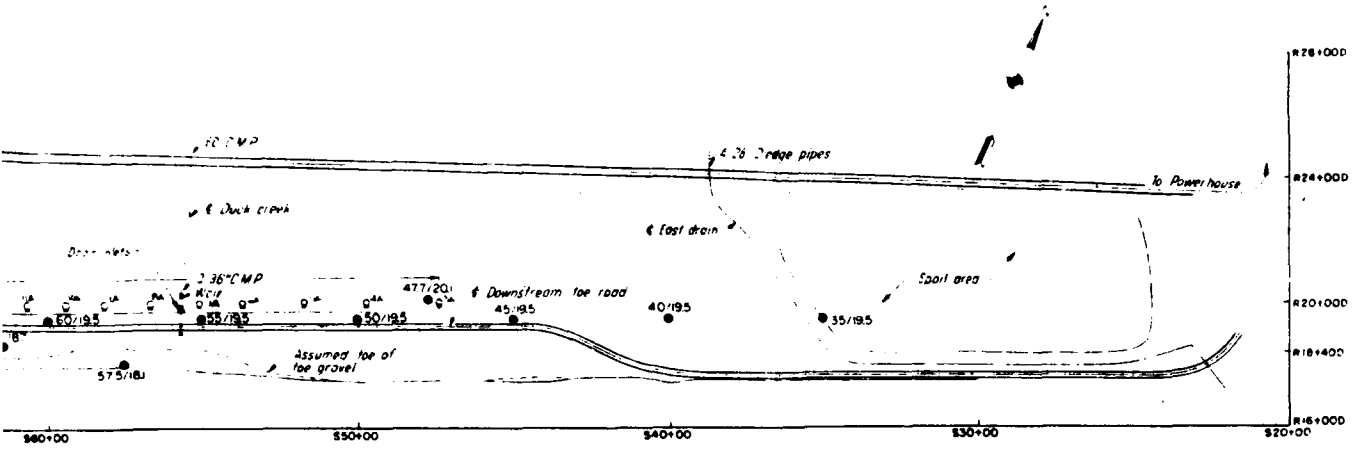
SCALE 1" = 200'

200 0 200 400



SOIL PROFILE-APPROXIMATELY 1800' D/S

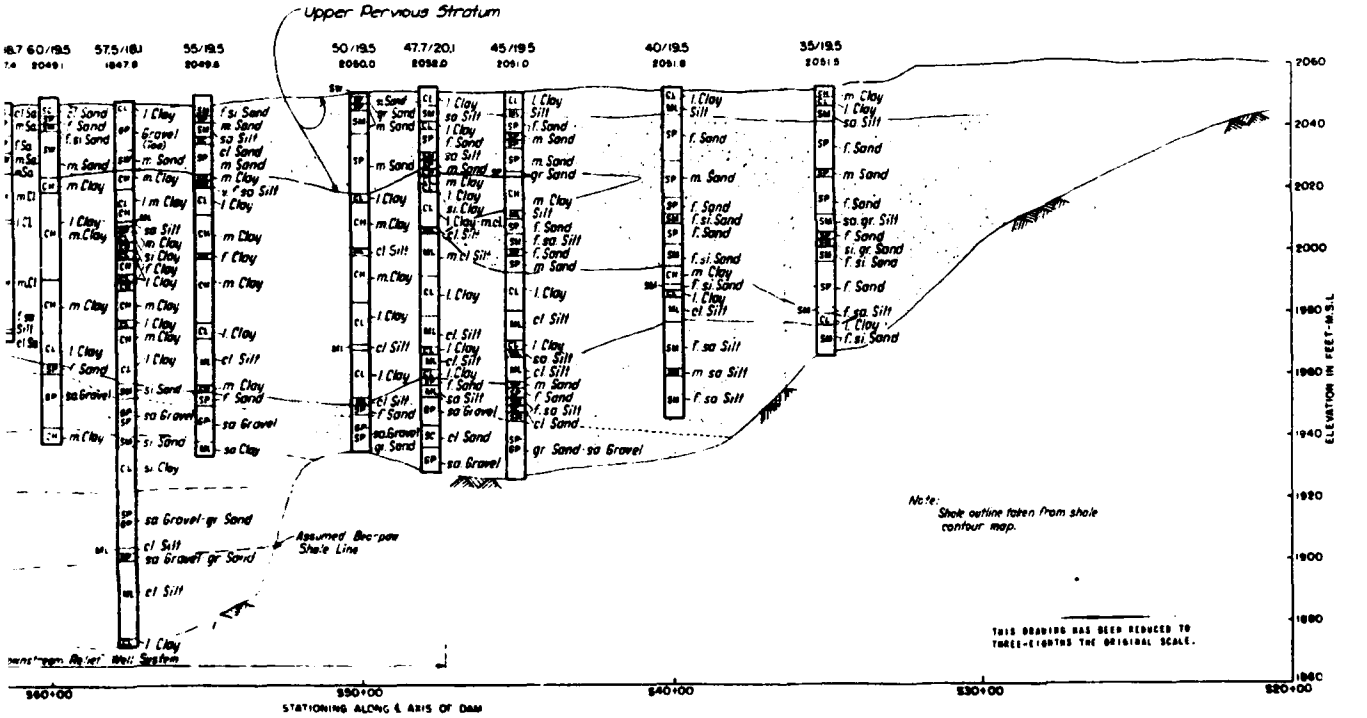
SCALE VERT 1"=20'
HORIZ 1"=200'



PLAN

SCALE 1" = 200'

200 0 200 400



STATIONING ALONG ℄ AXIS OF DAM

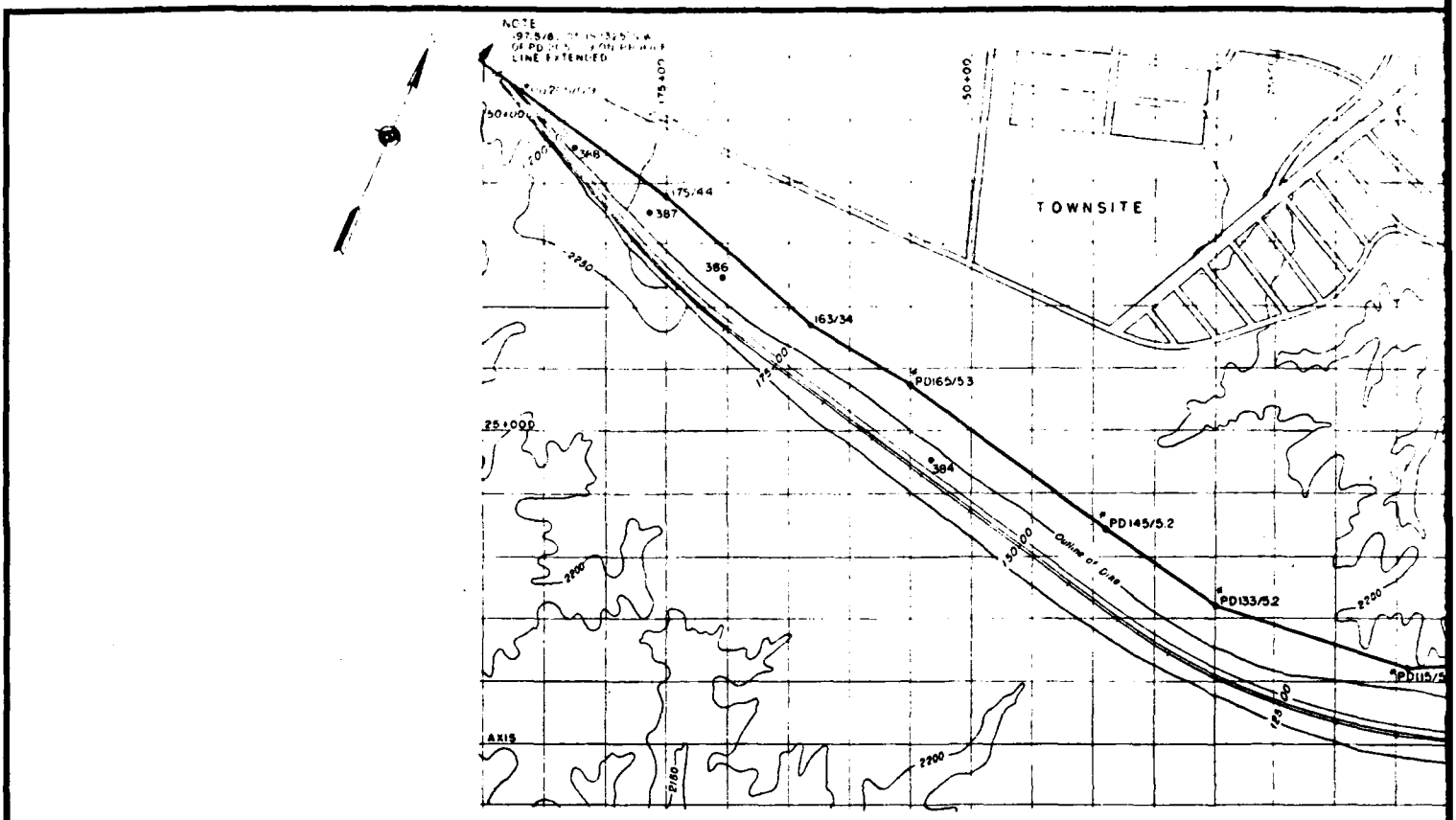
SOIL PROFILE-APPROXIMATELY 1900' D.S.

SCALE VERT 1"=20'
HORIZ 1"=200'

DATE	DESCRIPTION	CHKD	APPD
	REVISIONS		

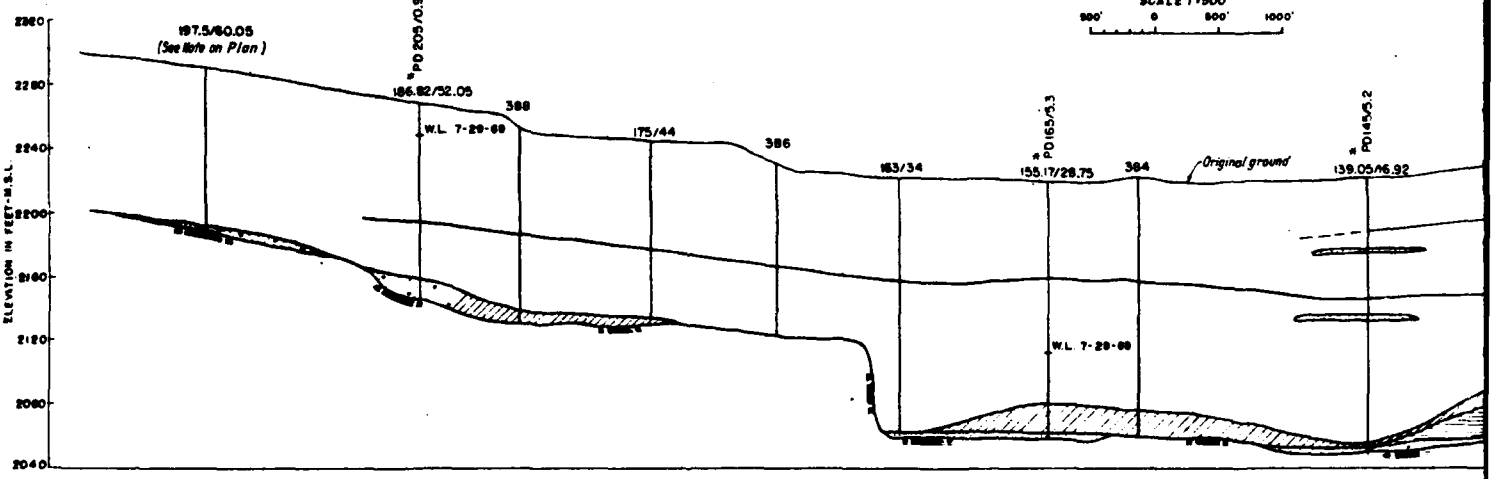
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
TOE DRAIN REPORT
SOIL PROFILE
R 19+00 D



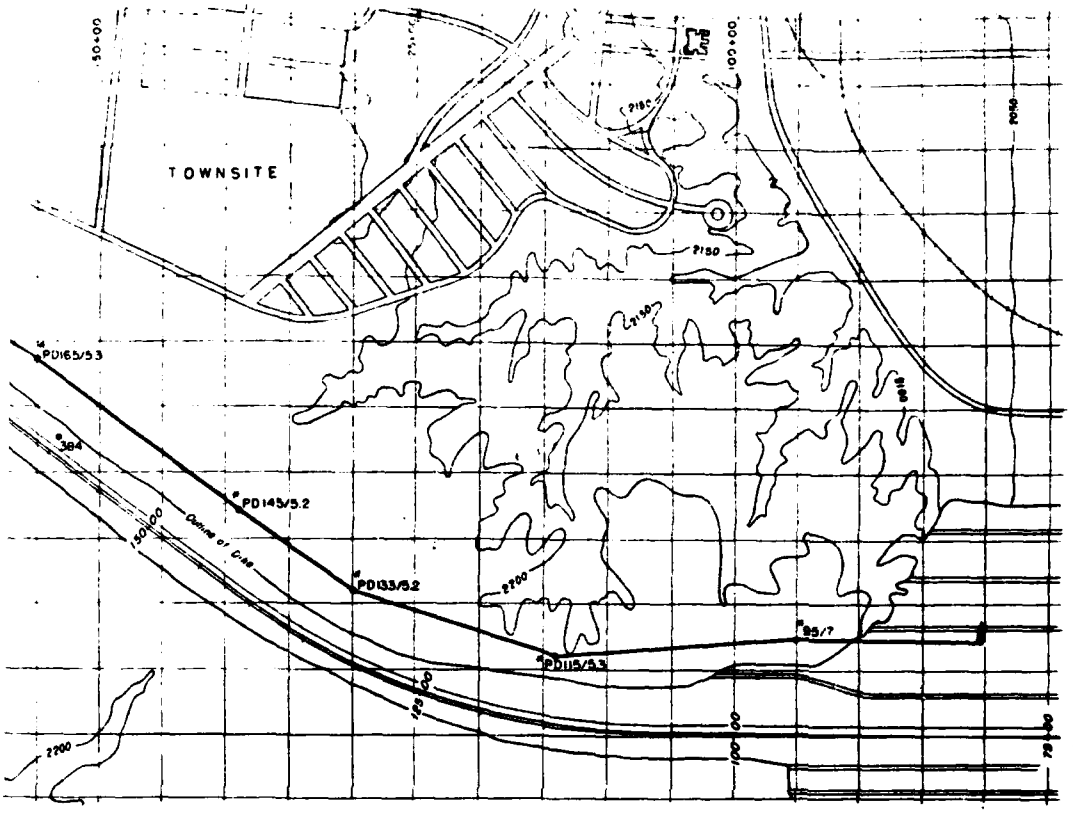
PLAN

SCALE 1"=500'

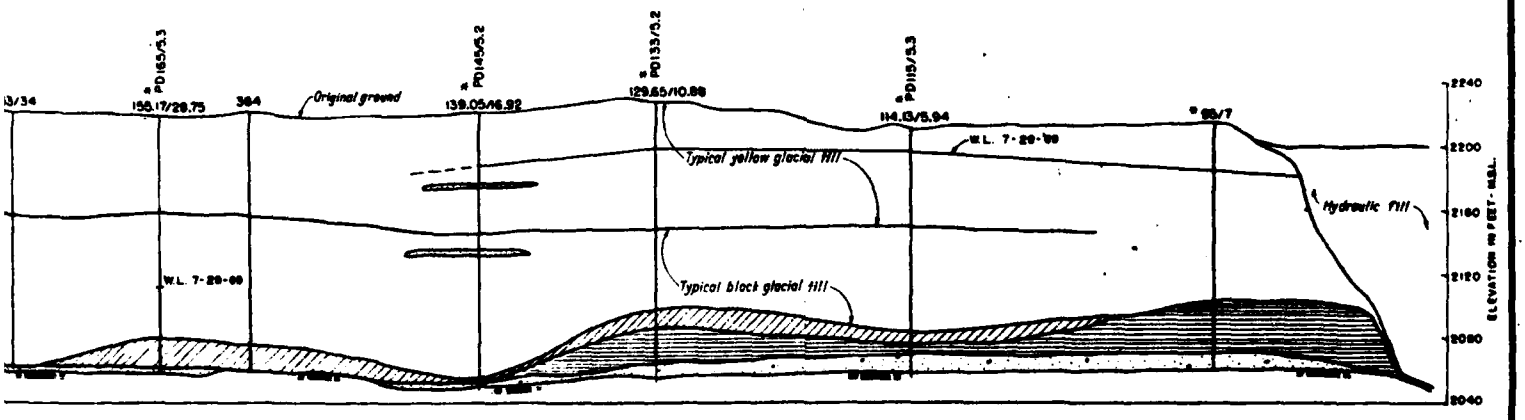


PROFILE

SCALE HOR. 1"=400'
VERT. 1"=40'



PLAN
SCALE 1"=500'
500' 0 500' 1000'

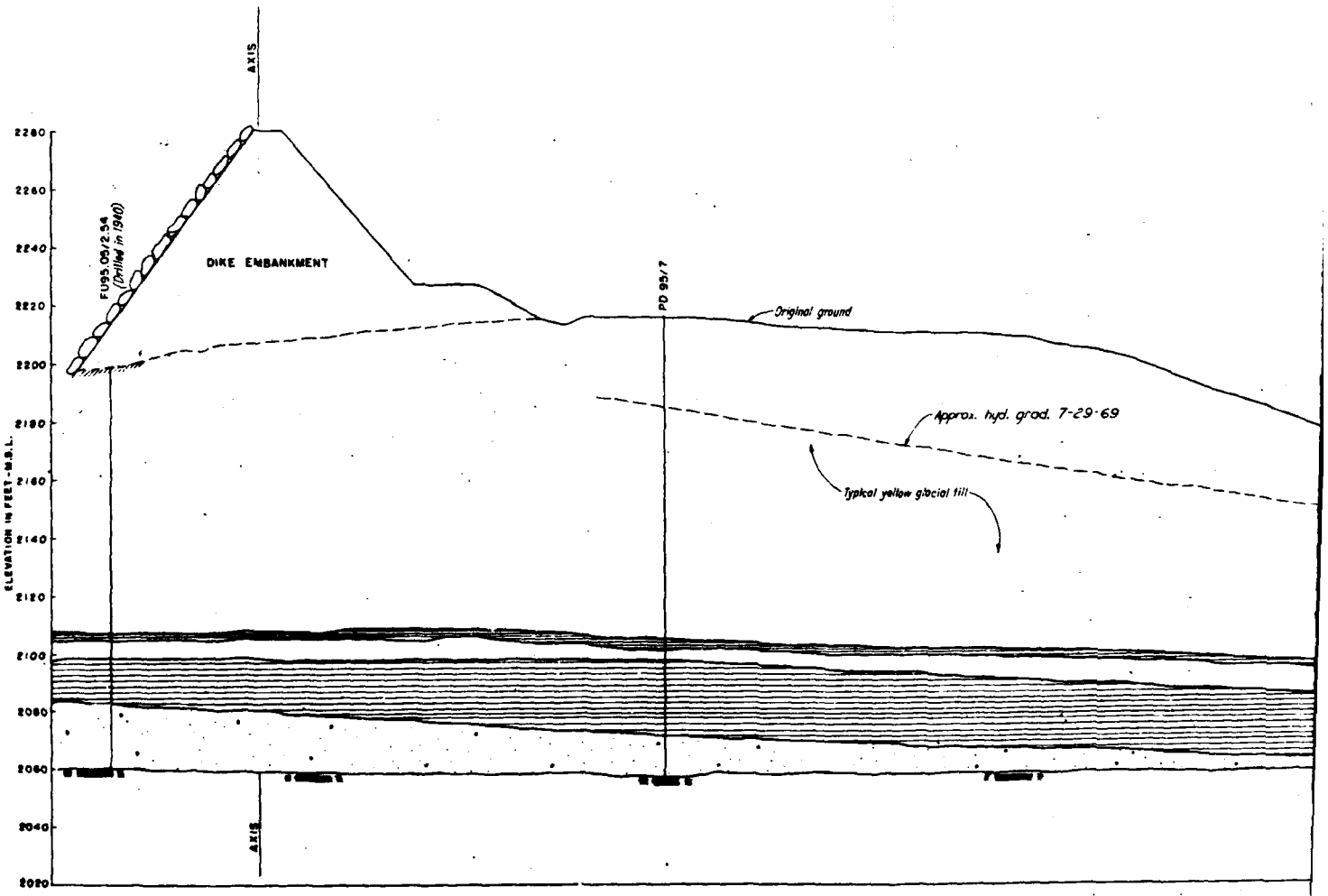


PROFILE
SCALE HOR. 1"=400'
VERT. 1"=40'

LEGEND
- Clay (Alluvial)
- Loam
- Pervious Sandy Material
- Bearpaw Shale
- * Piez. pipe locations refer to Dike Station and Range.

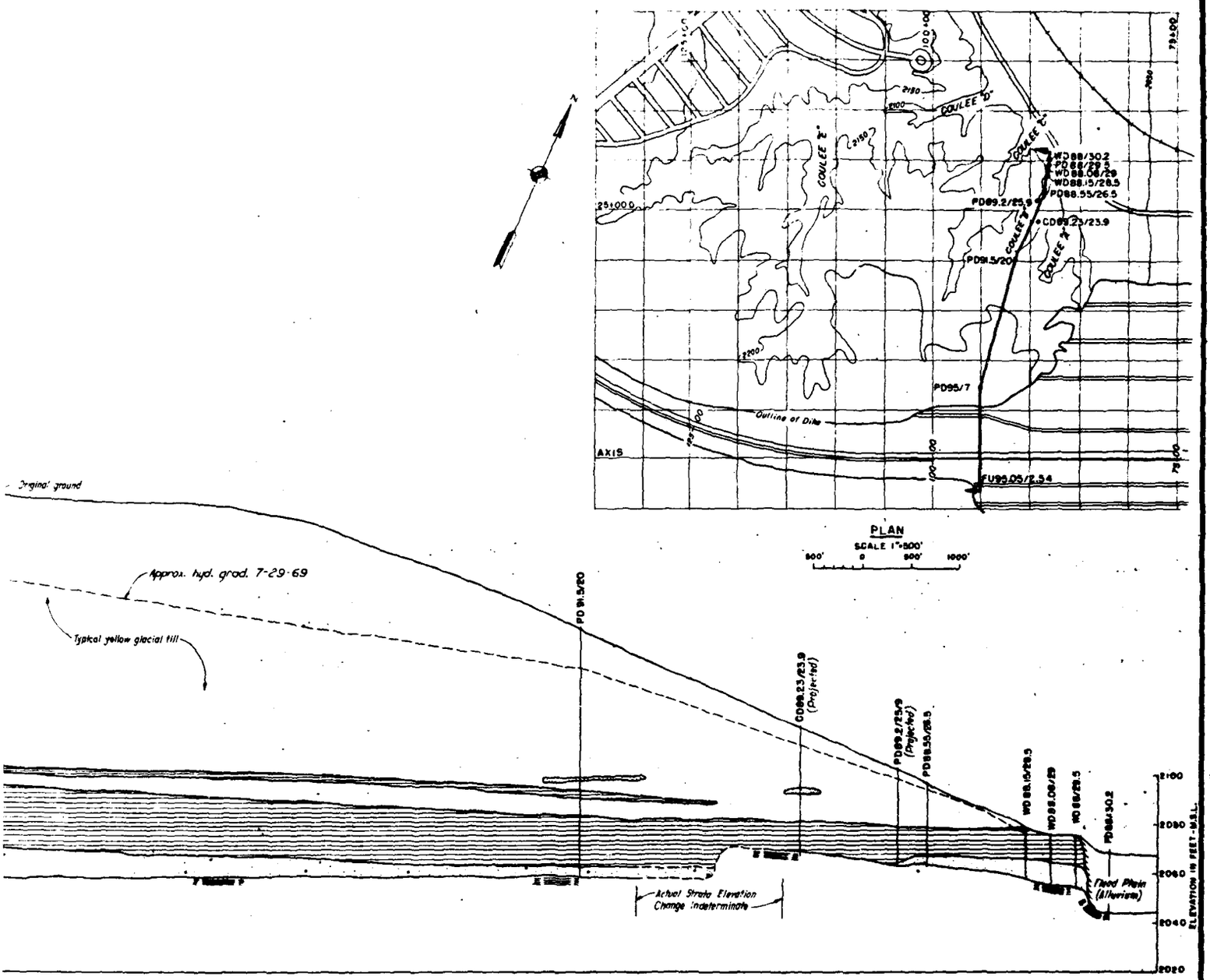
CORPS OF ENGINEERS, U.S. ARMY
MISSOURI RIVER
FORT PECK DAM
LEFT ABUTMENT SOIL PROFILE
DOWNSTREAM OF DIKE
JUNE 1957
6296.93C-26

CONSTRUCTION FOUNDATION REPORT 2 PLATE 10



PROFILE

SCALE HOR. 1" = 100'
VERT. 1" = 20'



PLAN
SCALE 1"=500'
500' 0 500' 1000'

PROFILE
SCALE HOR 1"=100'
VERT. 1"=20'

LEGEND:
- Loam
- Pervious sandy material
- Bearpaw shale

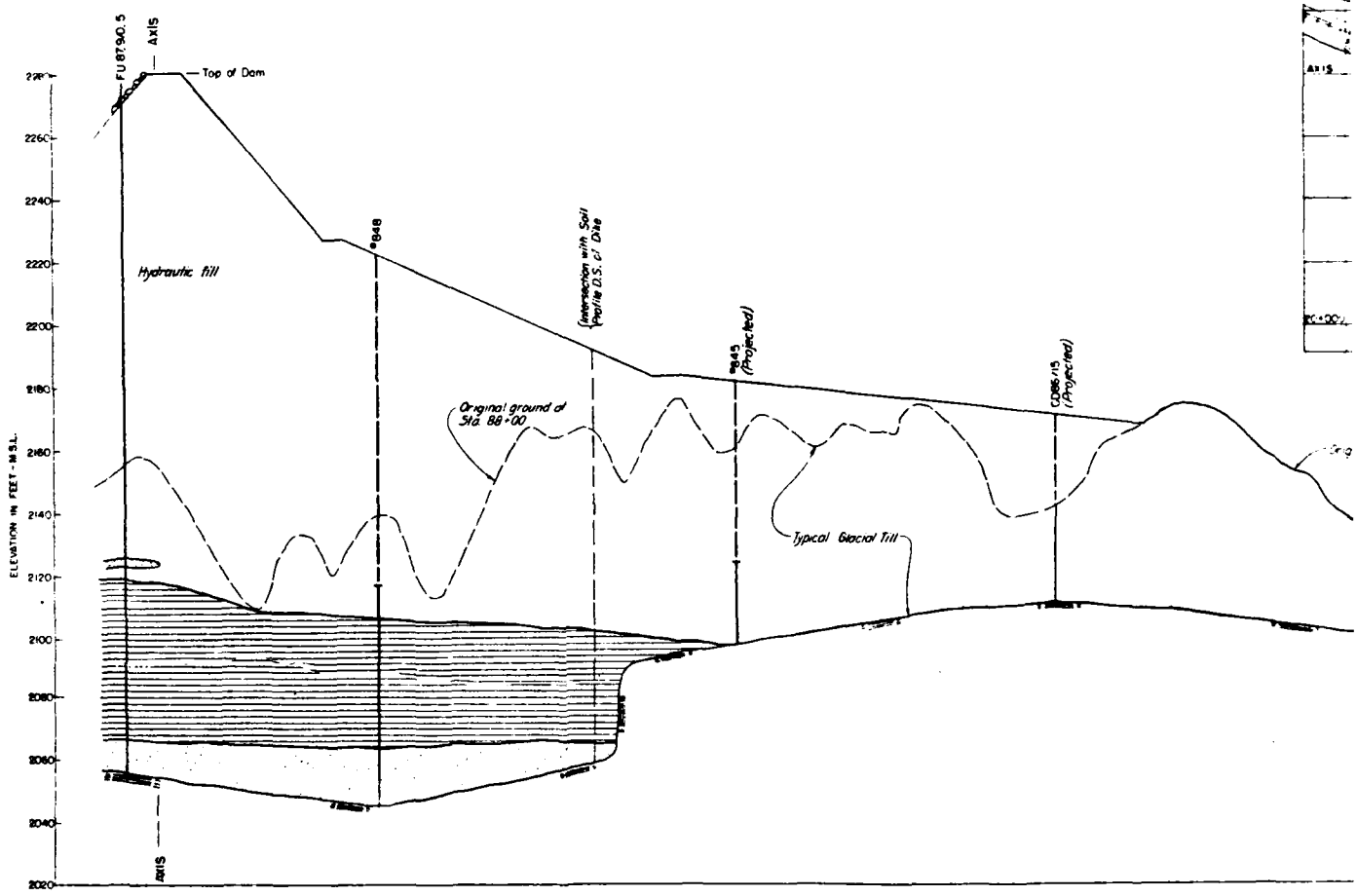
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GLASGOW, MONT.

MISSOURI RIVER
FORT PECK DAM

LEFT ABUTMENT SOIL PROFILE
COULEE "B"

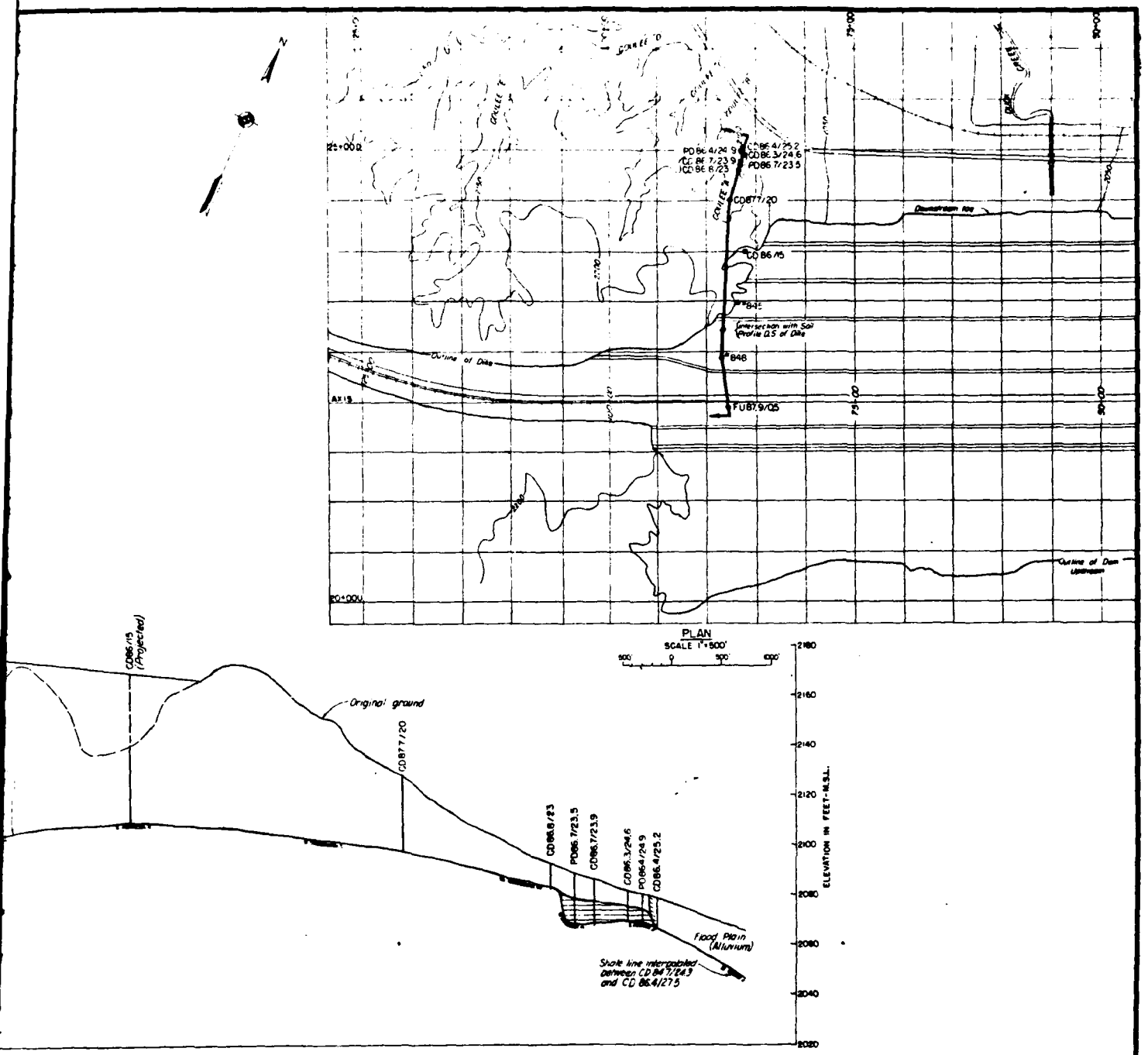
JUNE 1957

6296.93C-28



PROFILE

SCALE HOR. 1"=100
VERT. 1"=20



PROFILE
SCALE HOR. 1"=100
VERT. 1"=20

LEGEND
- Loam
- Pervious Sandy Material
- Bedrock Shale

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT
Bismarck, N. D.

MISSOURI RIVER
FORT PECK DAM

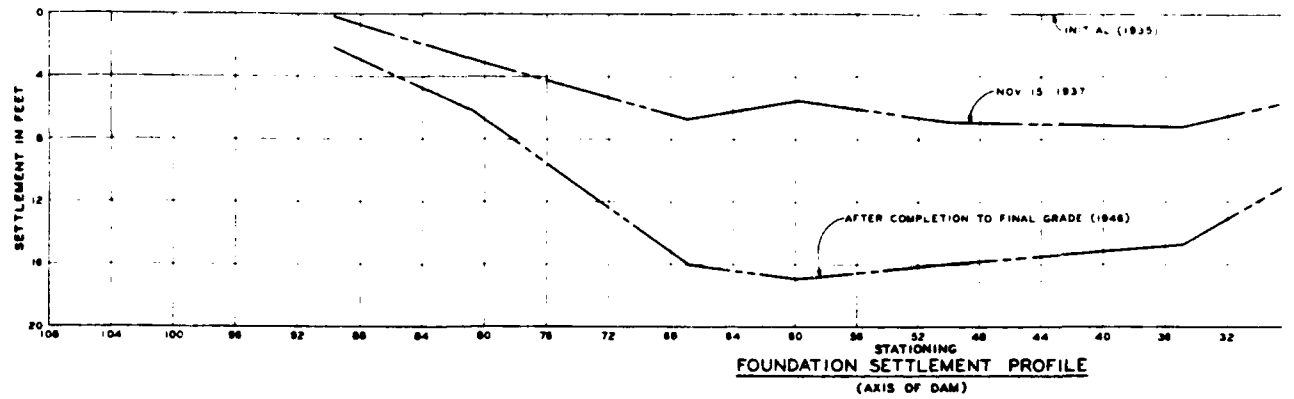
LEFT ABUTMENT SOIL PROFILE
COULEE "A"

JUNE 1957

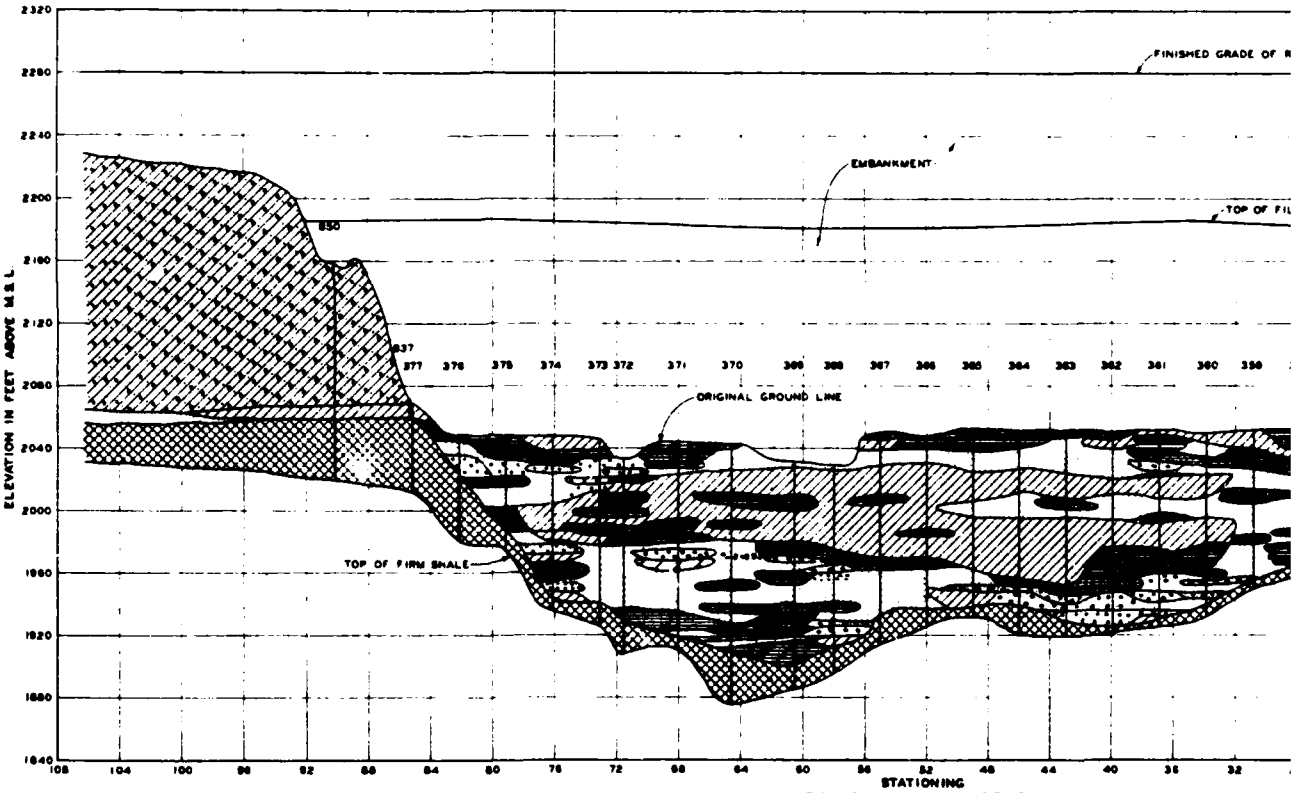
AS SHOWN

6296.93C-29

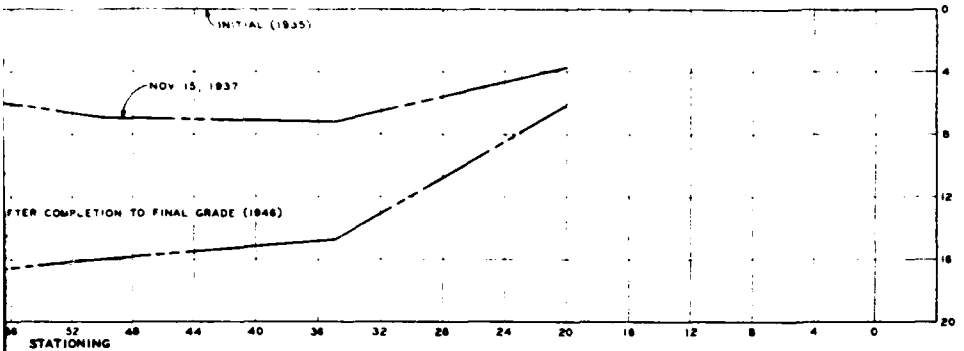
CONSTRUCTION FOUNDATION REPORT 2 PLATE 12



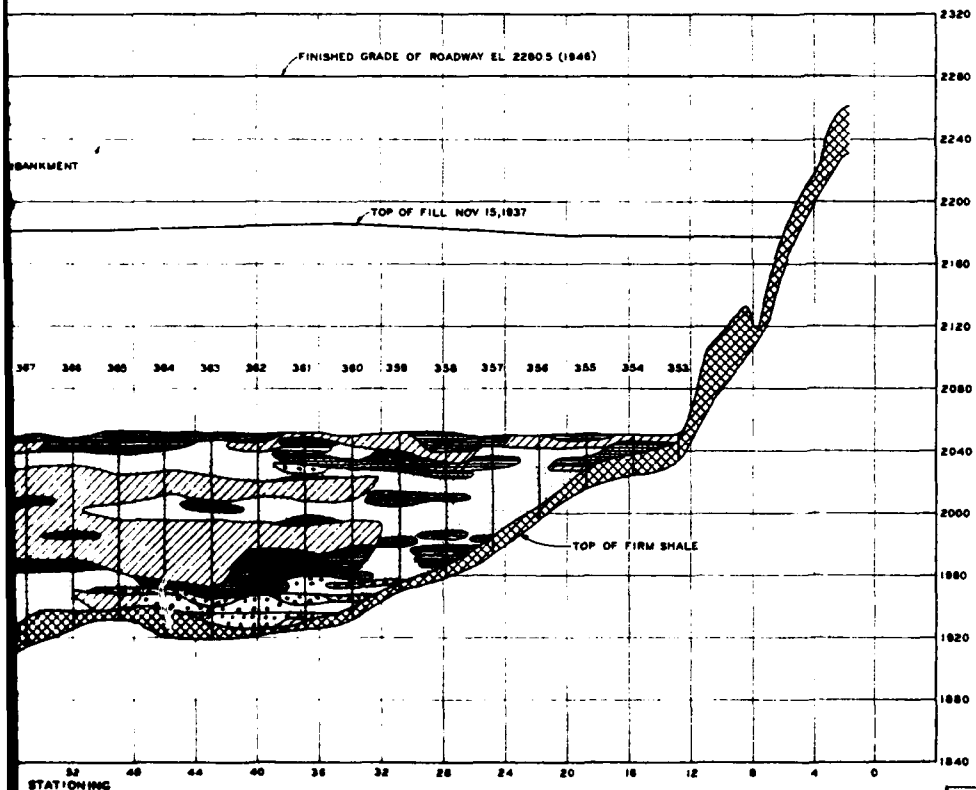
FOUNDATION SETTLEMENT PROFILE
(AXIS OF DAM)



SECTION ON AXIS OF DAM
(LOOKING DOWNSTREAM)



SETTLEMENT PROFILE
(AXIS OF DAM)



ON AXIS OF DAM
ING DOWNSTREAM)

LEGEND:

- SAND
- GRAVELLY SAND
- LOAM
- SANDY LOAM
- SANDY GRAVELLY LOAM
- CLAY
- SANDY CLAY
- CLAY LOAM
- SANDY CLAY LOAM
- GRAVELLY CLAY LOAM
- SANDY GRAVELLY CLAY LOAM
- GRAVEL
- SANDY GRAVEL
- GLACIAL TILL
- SHALE (EXCEPT FIRM)

BUREAU OF SOILS CLASSIFICATION

NOTE:

1. PROFILE DATA TAKEN FROM DWG NO 6286 81-1-10 (FEB 1944)
2. EACH SUBSIDENCE PIPE IS AN EXTENSION OF A 3"Ø PIPE WELDED TO AN 18"□ PLATE, IN TURN BOLTED TO A WOOD PLATFORM MEASURING 8' SQUARE. NO PROTECTIVE PIPE WAS PROVIDED; THEREFORE, STRAIN DUE TO SKIN FRICTION IS REALIZED.

DATE	DESCRIPTION	MADE	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SUMMARY OF FOUNDATION SETTLEMENT AND FOUNDATION PROFILE (SUBSIDENCE PIPES)

DESIGNED BY: O W A
DRAWN BY: L D S
TRACED BY: O W A
SUBMITTED BY:
CHIEF ENGINEERING DIVISION:
APPROVED:
CHIEF PLANNING BRANCH:
APPROVED:
CHIEF ENGINEERING BRANCH:
APPROVED:
CHIEF CONSTRUCTION BRANCH:
DATE:
CHIEF AD DIVISION:
CHIEF, U.S. SURVEY DIVISION:
SHEET:

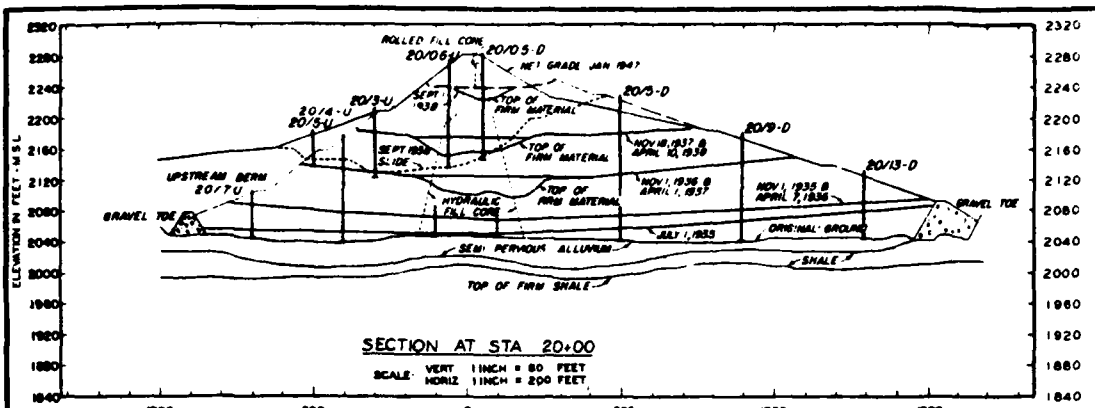
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

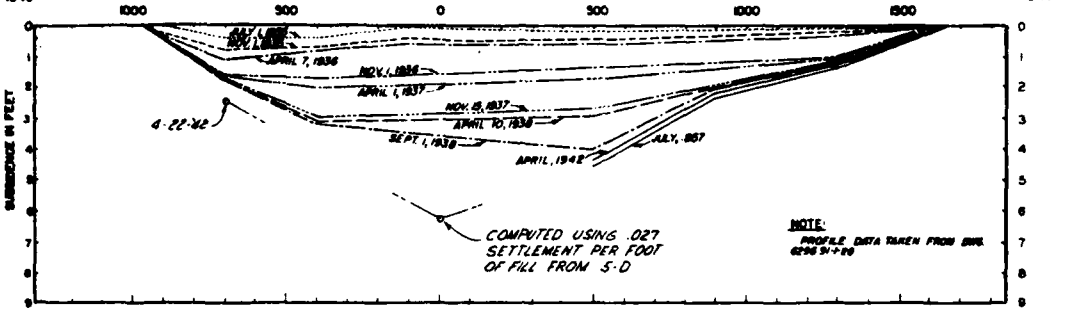
SAFETY PAYS

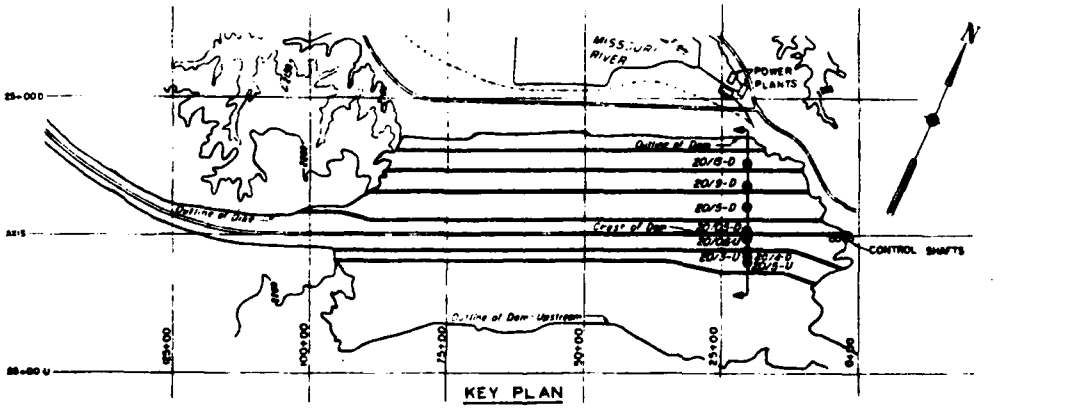
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 400 FEET

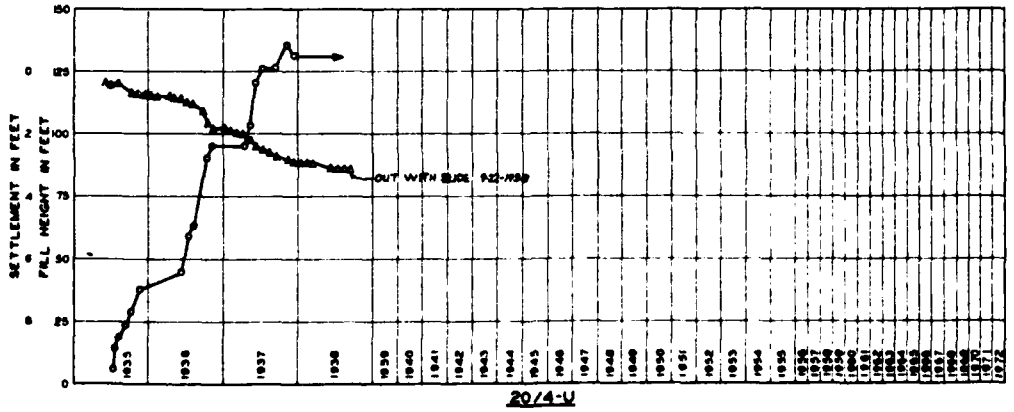
THIS PLAN ACCOMPANIES CONTRACT NO.
IDENTIFICATION NO.

2

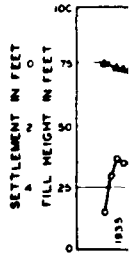

ROLLED FILL CORE
20/10-D
20/6-U
NET GRADE JAN 1947
20/5-D
20/3-U
SEPT. 1938
TOP OF FIRM MATERIAL
20/4-U
20/5-U
20/9-D
SEPT 1938 SLIDE
NOV 18, 1937 & APRIL 10, 1938
20/13-D
UPSTREAM BERM 20/7-U
NOV 1, 1936 & APRIL 7, 1937
NOV 1, 1935 & APRIL 7, 1936
GRAVEL TOE
HYDRAULIC FILL CORE
JULY 1, 1935
ORIGINAL GROUND
SEMI PERVIOUS ALLUVIUM
SHALE
TOP OF FIRM SHALE
ELEVATION IN FEET - M.S.L.
SECTION AT STA 20+00
SCALE: VERT. 1 INCH = 80 FEET
HORIZ. 1 INCH = 200 FEET
1000
500
0
500
1000
1500


SUBSIDENCE IN FEET
APRIL 7, 1936
NOV 1, 1936
APRIL 1, 1937
NOV 18, 1937
APRIL 10, 1938
SEPT 1, 1938
APRIL, 1942
JULY, 1957
4-22-32
COMPUTED USING .027 SETTLEMENT PER FOOT OF FILL FROM 5-0
NOTE:
PROFILE DATA TAKEN FROM DWG. 6296 91-2-18

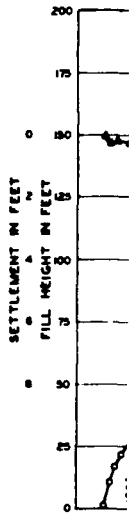

MISSOURI RIVER
POWER PLANTS
Outline of Dam
20/13-D
20/9-D
20/5-D
Crest of Dam
CONTROL SHAFTS
Outline of Dam-Upstream
N
KEY PLAN

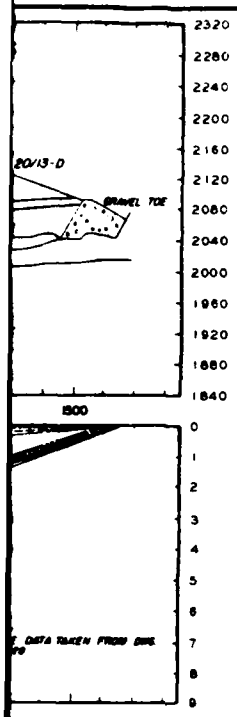

SETTLEMENT IN FEET
FILL HEIGHT IN FEET
OUT WITH SLIDE 9-22-1938
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
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1967
1968
1969
1970
1971
1972

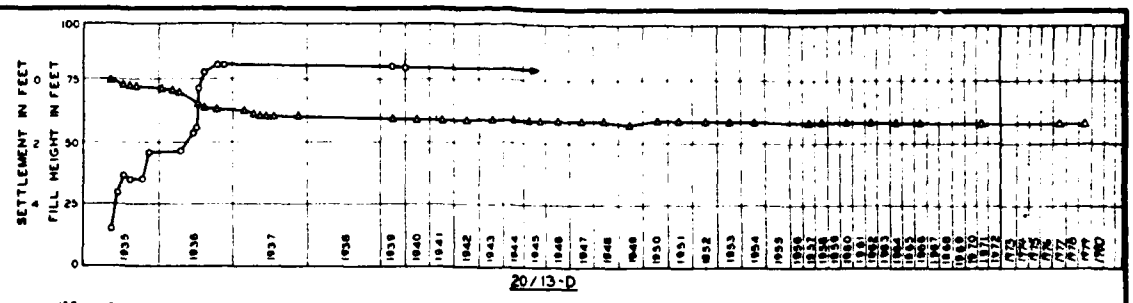
20/4-U


SETTLEMENT IN FEET
FILL HEIGHT IN FEET
1935

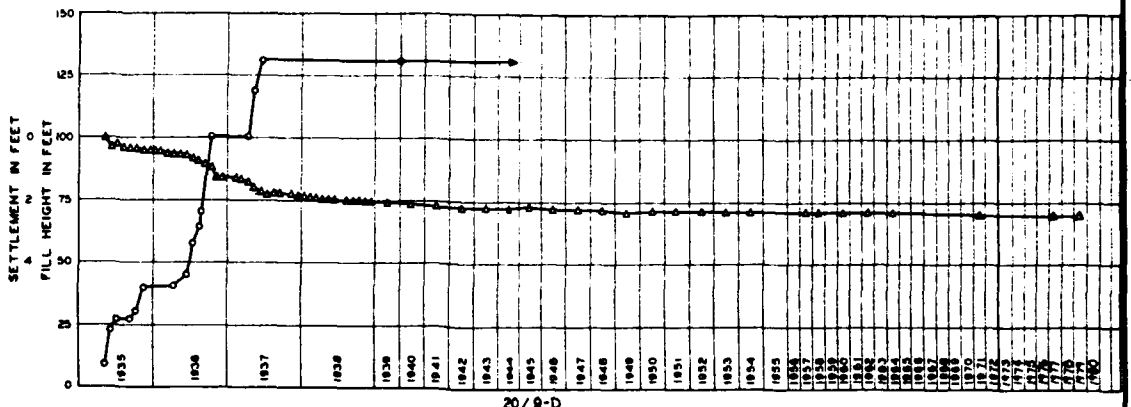

SETTLEMENT IN FEET
FILL HEIGHT IN FEET
1935


SETTLEMENT IN FEET
FILL HEIGHT IN FEET

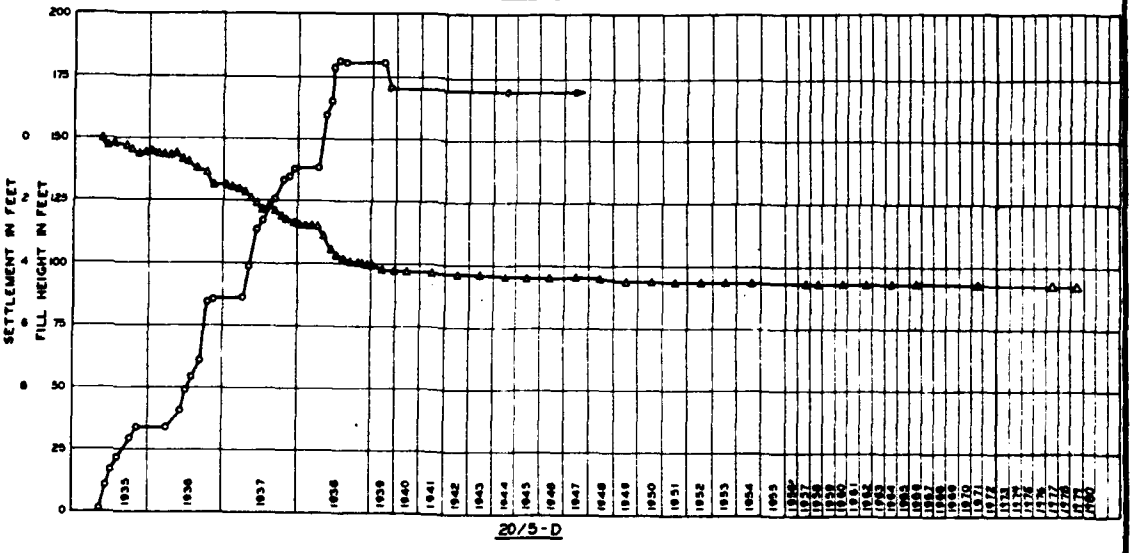




20/13-D



20/9-D



20/5-D

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

LEGEND

FILL HEIGHT IN FEET

SETTLEMENT IN FEET

DATE	DESCRIPTION	CHKD	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

SUMMARY OF FOUNDATION SETTLEMENT
STATION 20+00

DESIGNED BY: D.W.A.
DRAWN BY: R.A.B.
TRACED BY: D.W.A.
CHECKED BY:
QUAN. EARTH FILL & EXCAVATION:
APPROVED:

APPROVED: DIST. ENGINEER, OMAHA — DATE:

SAFETY PAYS

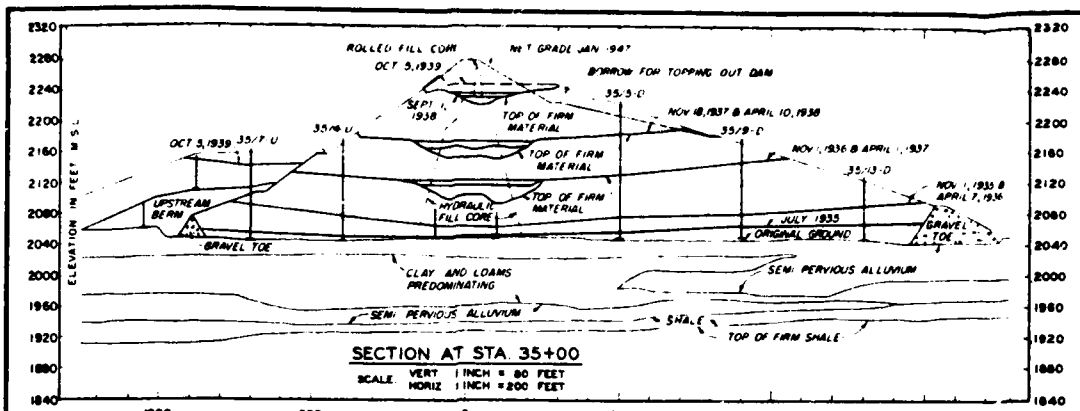
THIS PLAN ACCOMPANIES CONTRACT NO. MODIFICATION NO.

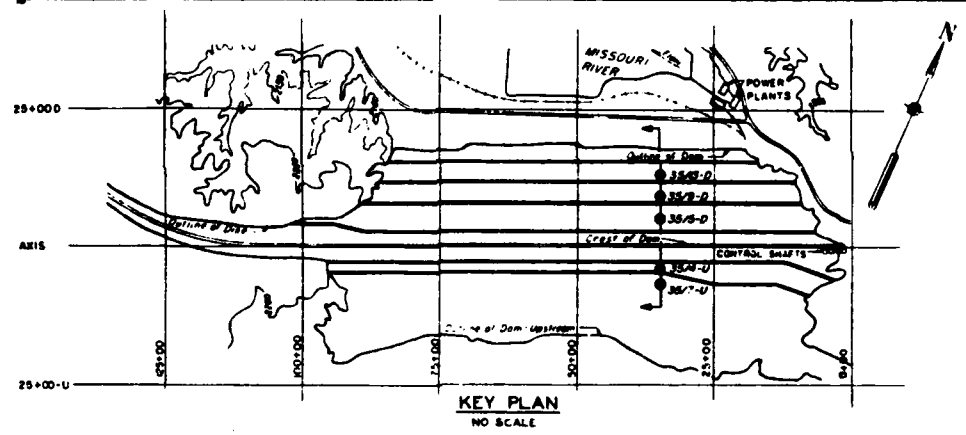
APPROVED: CH., E & E. BRANCH, DIVISION — DATE:

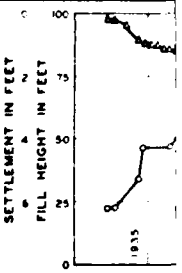
DRAWING NO. — SHEET NO.

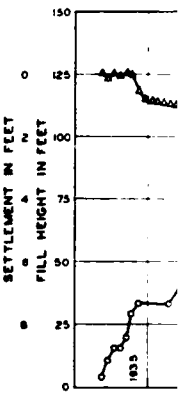
CONSTRUCTION FOUNDATION REPORT — PLATE 14

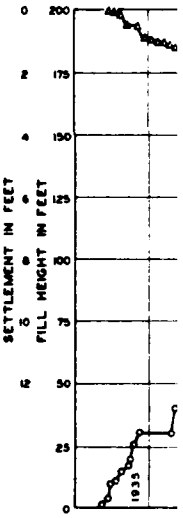
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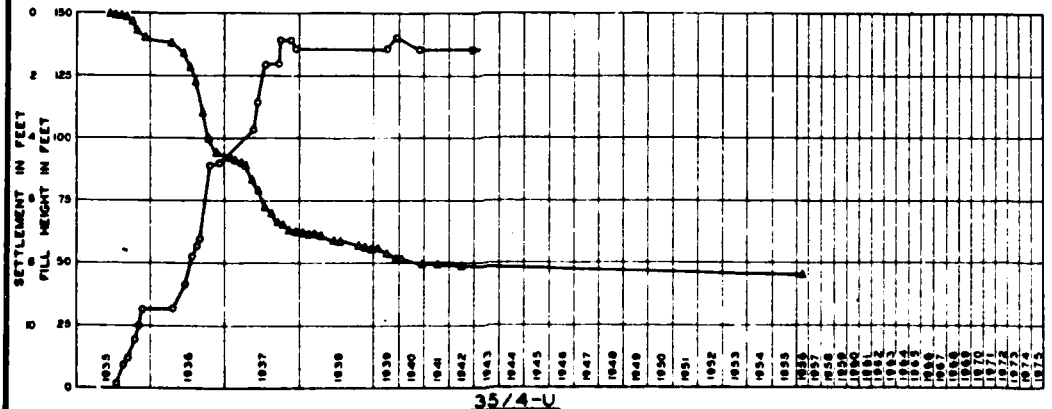




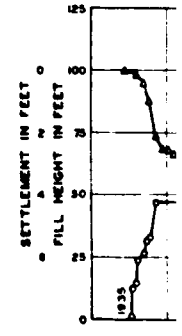
LEGEND

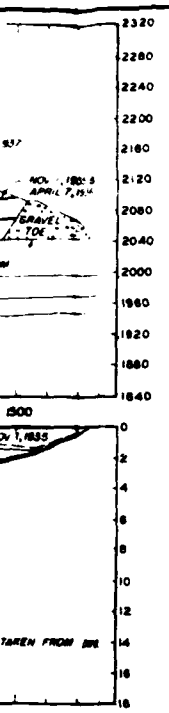
FILL HEIGHT IN FEET

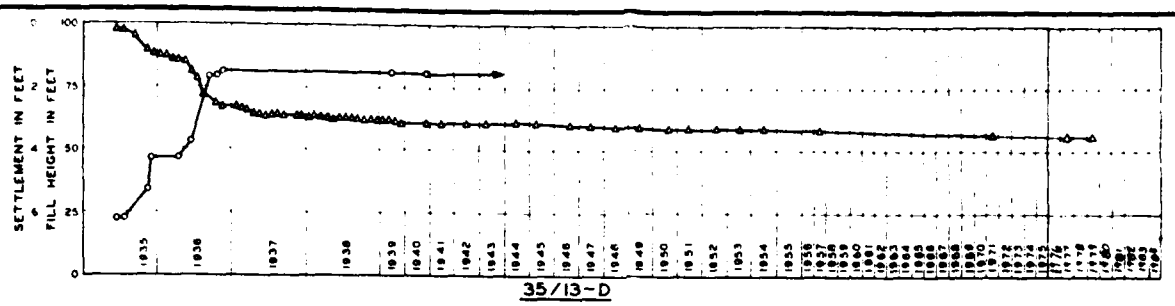
SETTLEMENT IN FEET



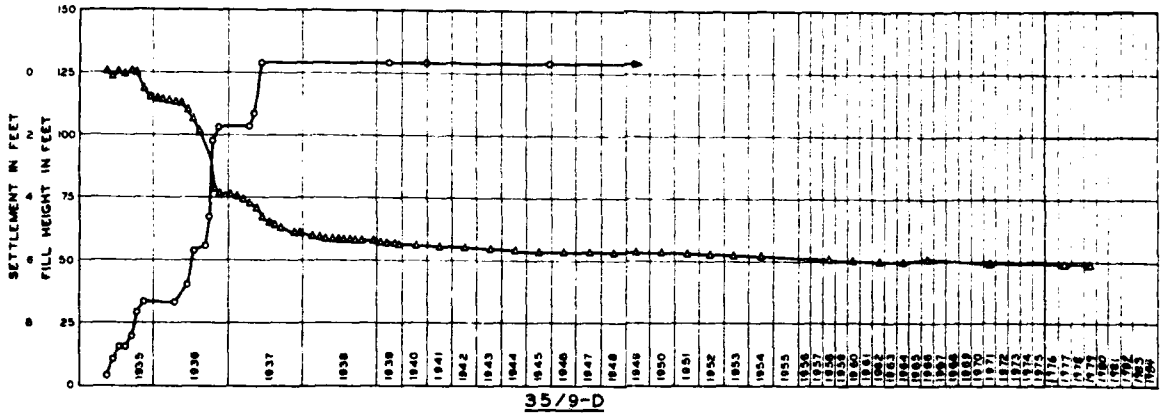
35/4-U



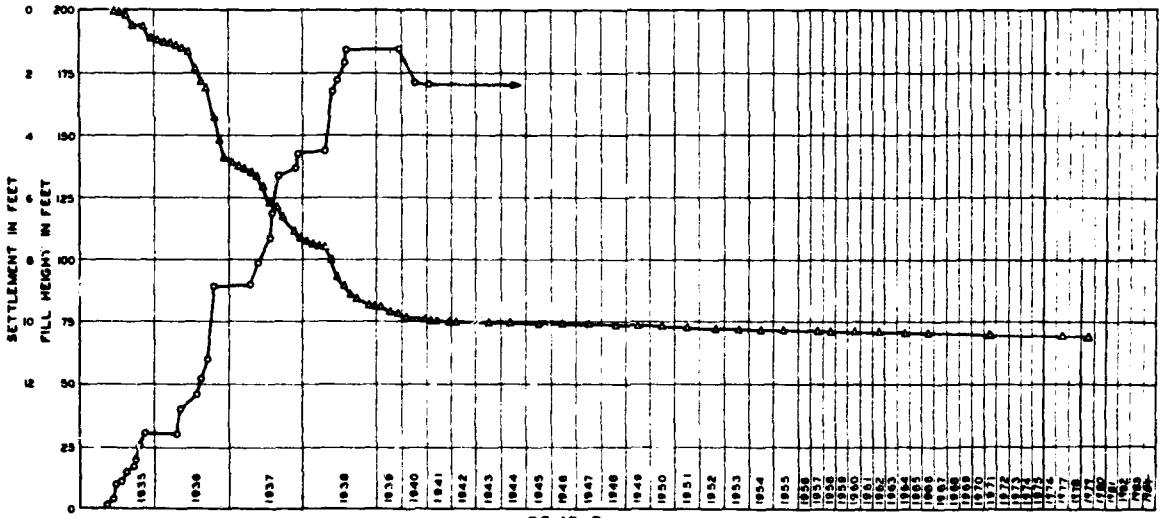




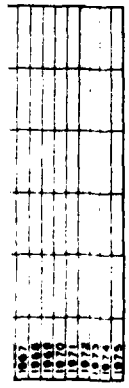
35/13-D

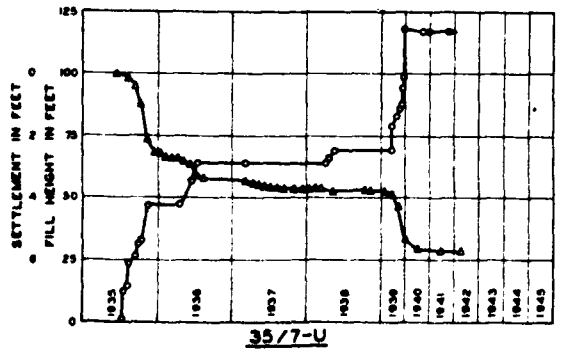


35/9-D



35/5-D





35/7-U

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPD'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

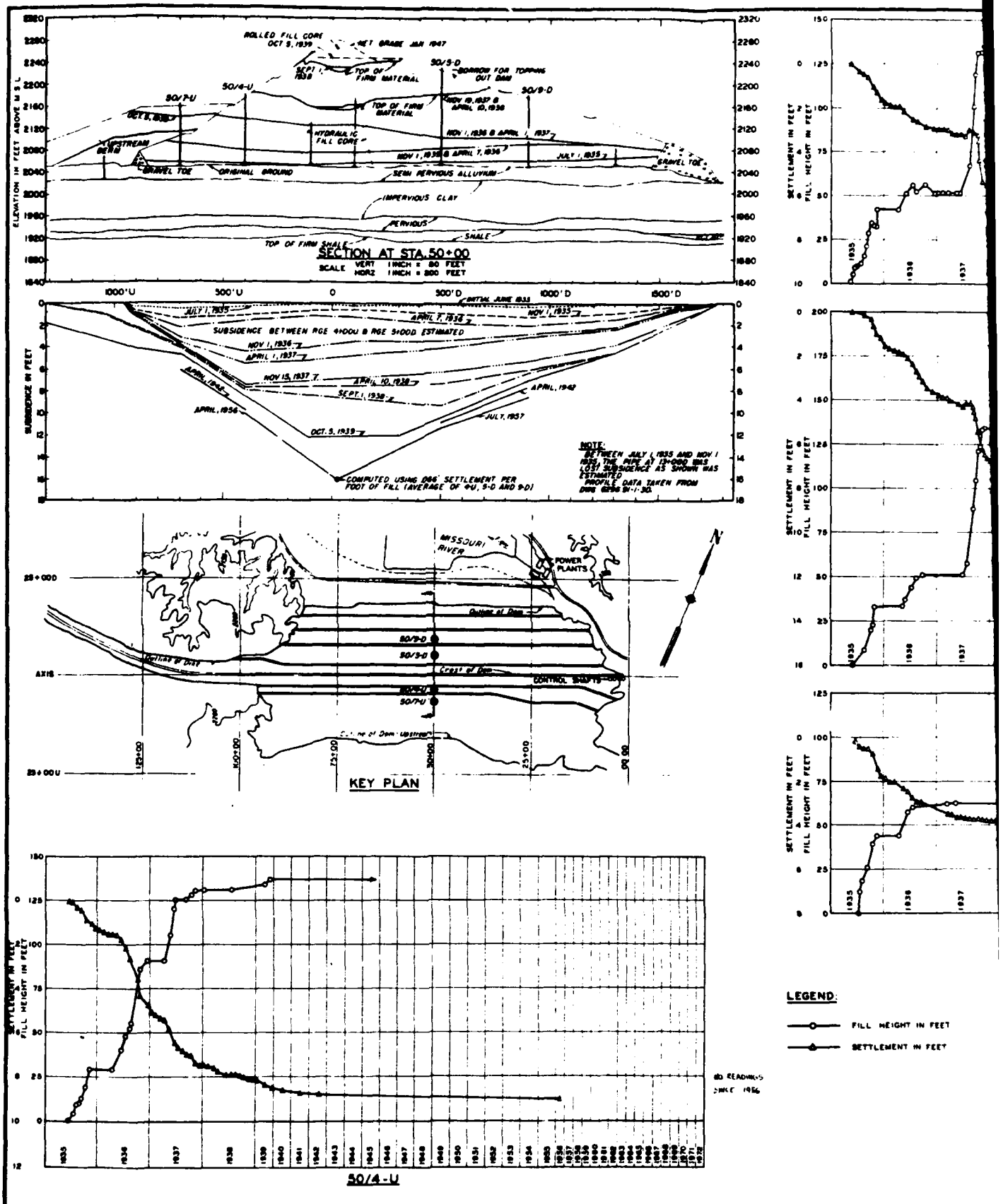
MISSOURI RIVER
FORT PECK LAKE, MONTANA

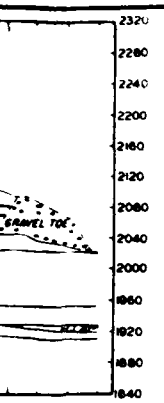
SUMMARY OF FOUNDATION SETTLEMENT
STATION 35+00

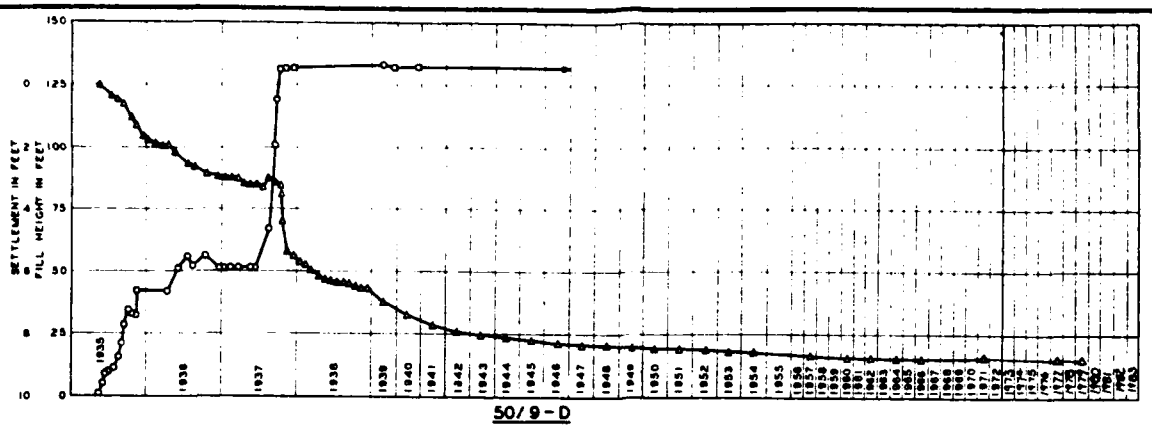
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

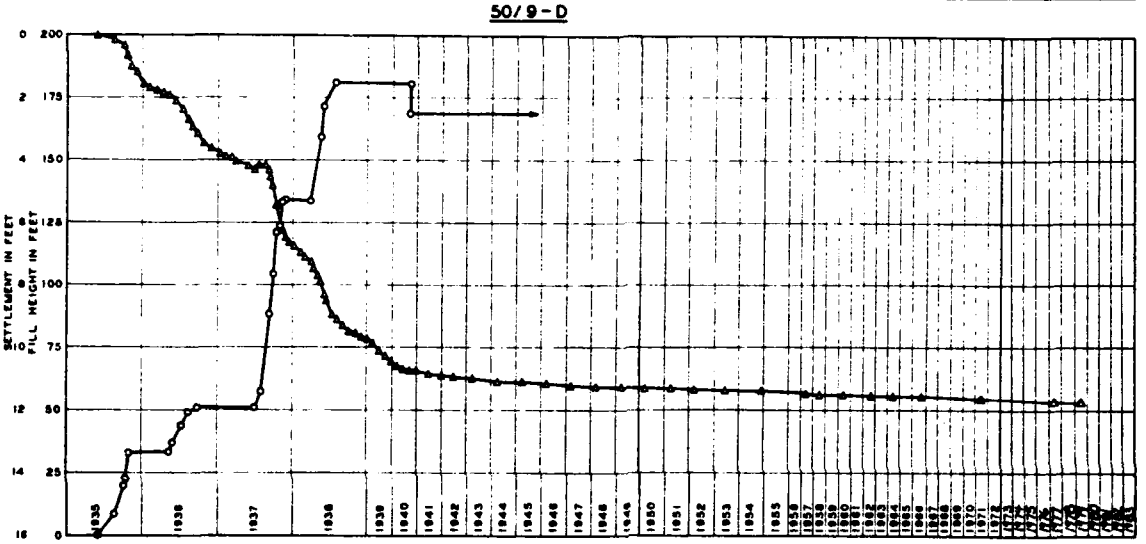
CONSTRUCTION FOUNDATION REPORT PLATE 15


ROLLED FILL CORE OCT 9, 1939
GRADE JAN 1947
SEPT 1, 1938
TOP OF FIRM MATERIAL
50/9-D
BORROW FOR TOPPING OUT DAM
50/7-U
50/4-U
50/9-D
NOV 19, 1937 & APRIL 10, 1938
OCT 8, 1935
HYDRAULIC FILL CORE
NOV 1, 1936 & APRIL 1, 1937
NOV 1, 1935 & APRIL 7, 1936
JULY 1, 1935
UPSTREAM BERM
GRAVEL TOE
ORIGINAL GROUND
SEMI PERVIOUS ALLUVIUM
GRAVEL TOE
IMPERVIOUS CLAY
PERVIOUS
SHALE
TOP OF FIRM SHALE
ELEVATION IN FEET ABOVE M S L
SECTION AT STA. 50+00
SCALE VERT 1 INCH = 80 FEET
HORZ 1 INCH = 800 FEET
1000'U
500'U
0
500'D
1000'D
1500'D
SUBSIDENCE IN FEET
JULY 1, 1935
APRIL 7, 1936
NOV 1, 1935
SUBSIDENCE BETWEEN RGE 4+00U & RGE 5+00D ESTIMATED
NOV 1, 1936
APRIL 1, 1937
APRIL, 1942
NOV 15, 1937
APRIL 10, 1938
SEPT 1, 1938
APRIL, 1942
APRIL, 1956
JULY, 1957
OCT. 9, 1939
COMPUTED USING .066' SETTLEMENT PER FOOT OF FILL (AVERAGE OF 4-U, 5-D AND 9-D)
NOTE:
BETWEEN JULY 1, 1935 AND NOV 1 1935, THE PIPE AT 13+00D WAS LOST. SUBSIDENCE AS SHOWN WAS ESTIMATED
PROFILE DATA TAKEN FROM DWG 6296 91-1-30.
SETTLEMENT IN FEET
FILL HEIGHT IN FEET
1935
1936
1937
MISSOURI RIVER
POWER PLANTS
N
Outline of Dam
50/9-D
50/5-D
Crest of Dam
CONTROL SHAFTS
50/7-U
Outline of Dam Upstream
AXIS
25+00D
25+00U
12+00
37+00
50+00
25+00
00+00
KEY PLAN
SETTLEMENT IN FEET
FILL HEIGHT IN FEET
80 READINGS SINCE 1956
50/4-U
LEGEND:
FILL HEIGHT IN FEET
SETTLEMENT IN FEET

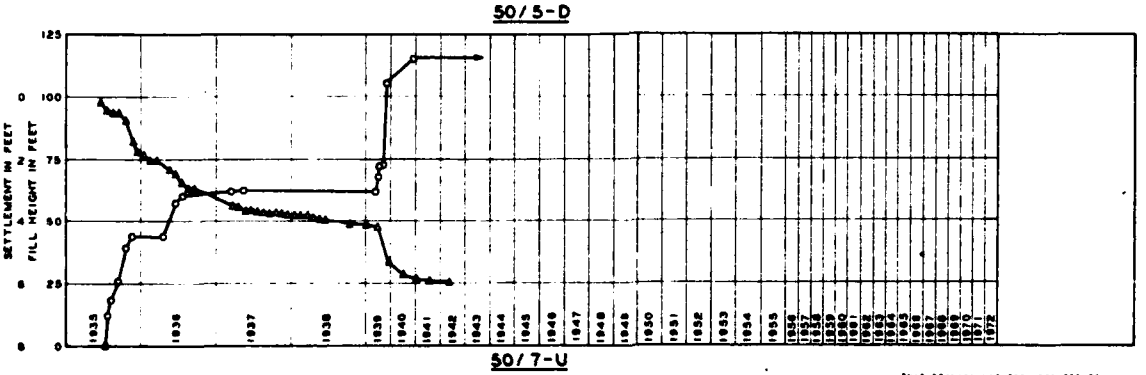




50/9-D



50/5-D



50/7-U

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

LEGEND

FILL HEIGHT IN FEET

SETTLEMENT IN FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

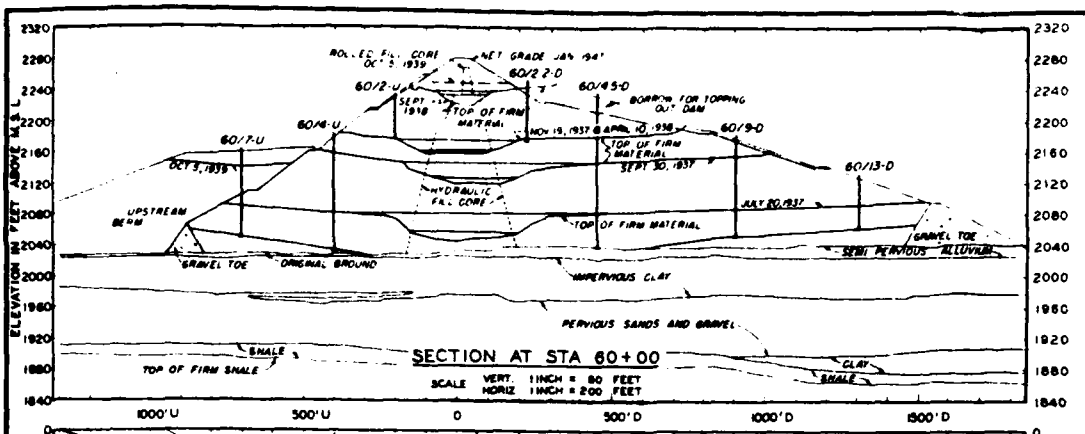
SUMMARY OF FOUNDATION SETTLEMENT
STATION 50+00

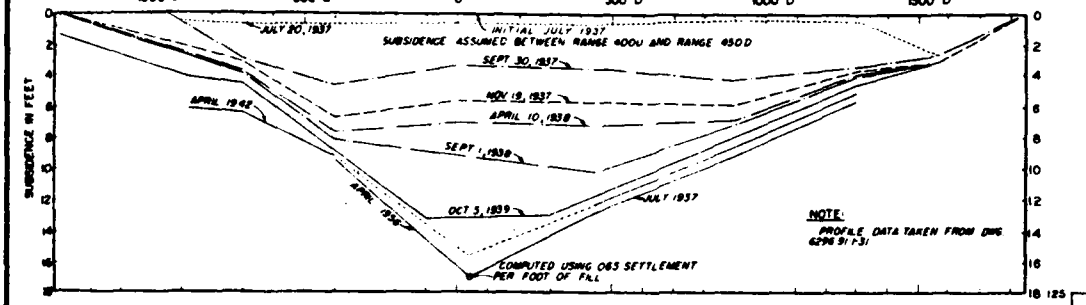
SAFETY PAYS

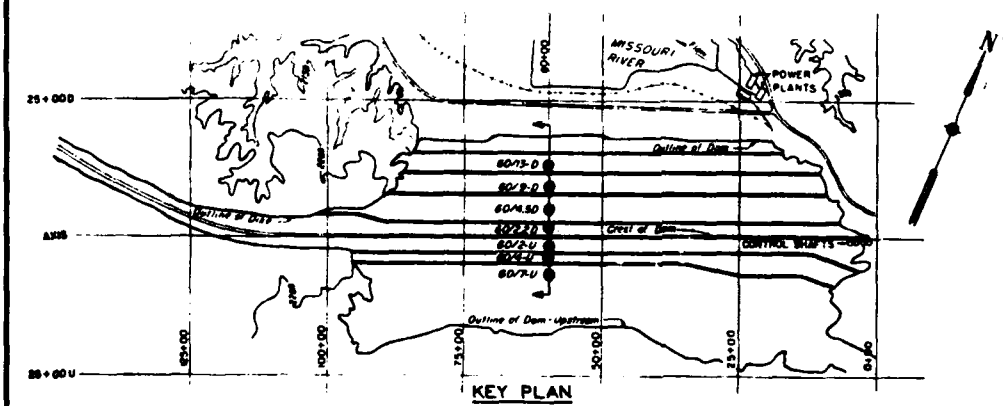
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

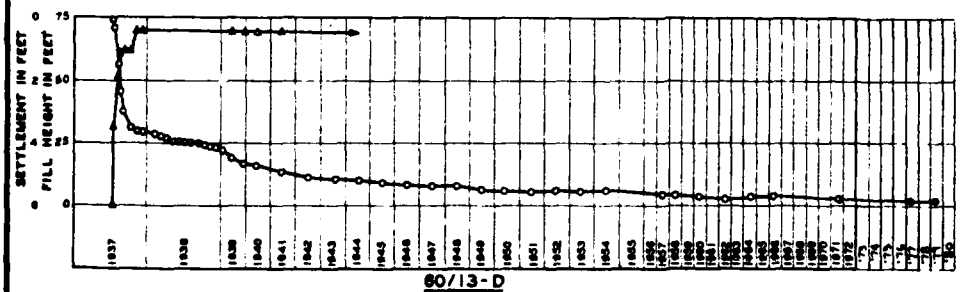
CONSTRUCTION FOUNDATION REPORT

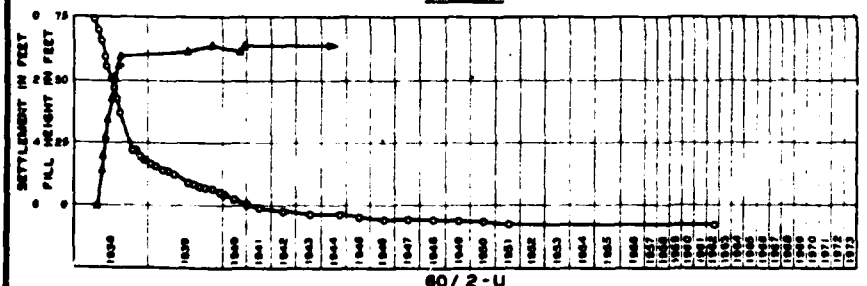
PLATE 16

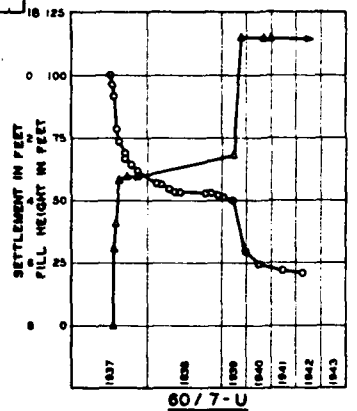






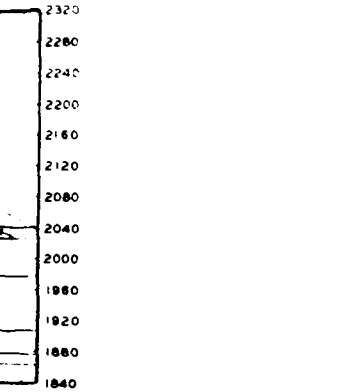








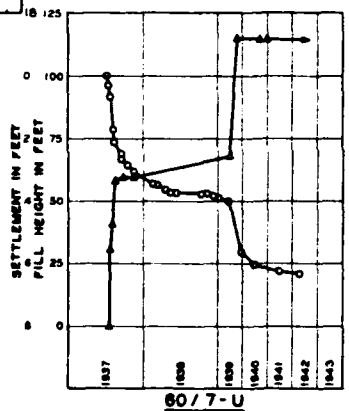
LEGEND:
FILL HEIGHT IN FEET
SETTLEMENT IN FEET



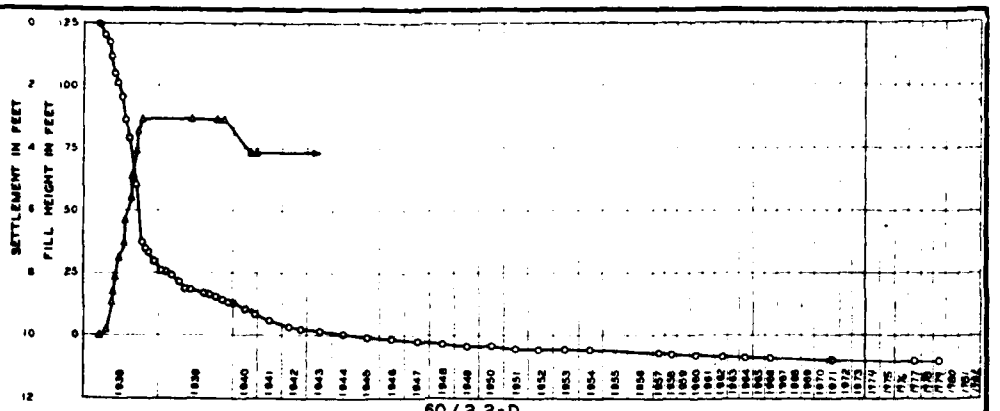
LEGEND.

FILL HEIGHT IN FEET

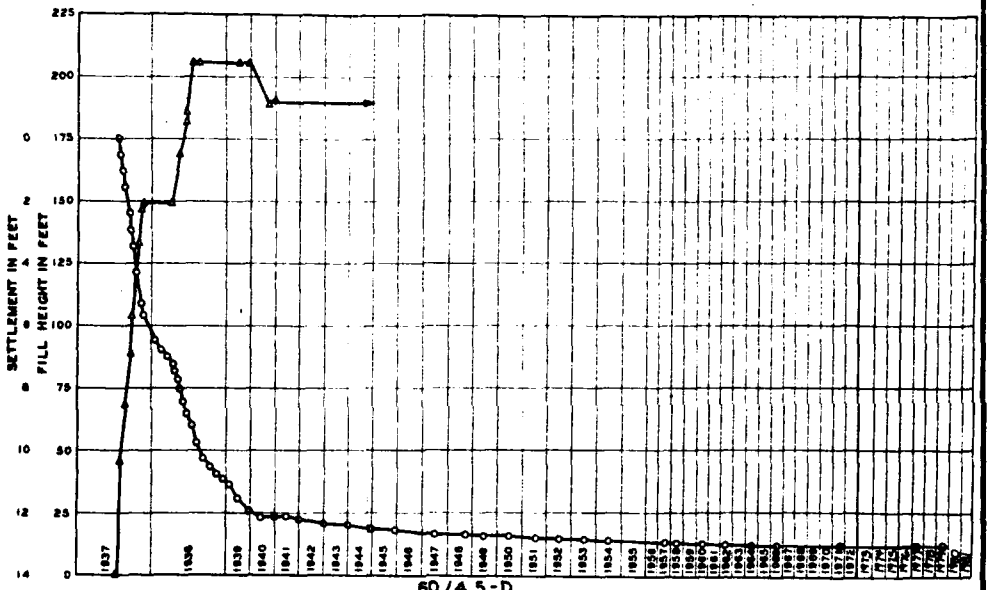
SETTLEMENT IN FEET



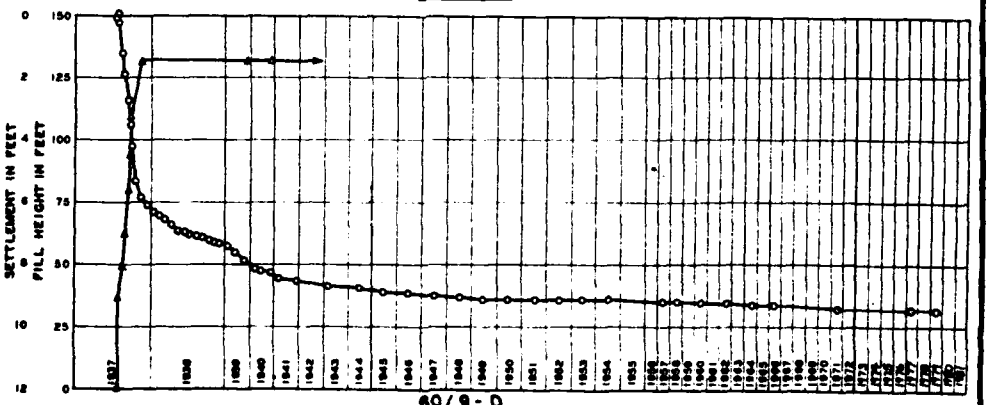
60/7-U



60/2.2-D



60/4.5-D



60/9-D

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

SUMMARY OF FOUNDATION SETTLEMENT
STATION 60+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE

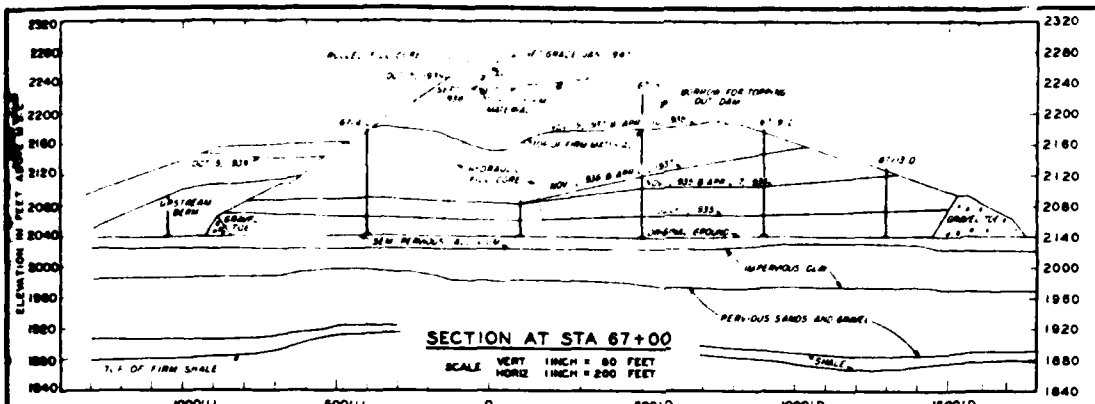
SAFETY PAYS

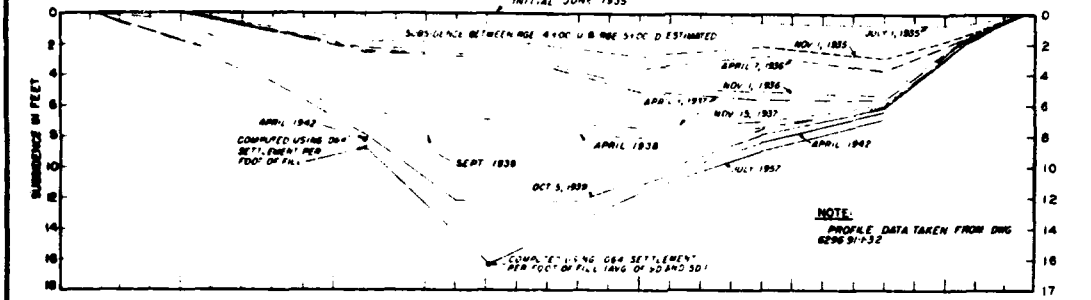
THIS PLAN ACCOMPANIES CONTRACT NO. _____
MODIFICATION NO _____

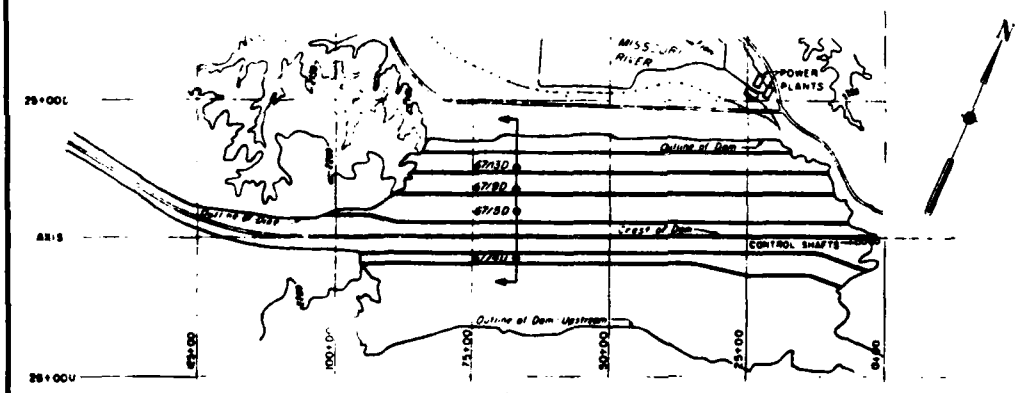
CONSTRUCTION FOUNDATION REPORT

PLATE 17

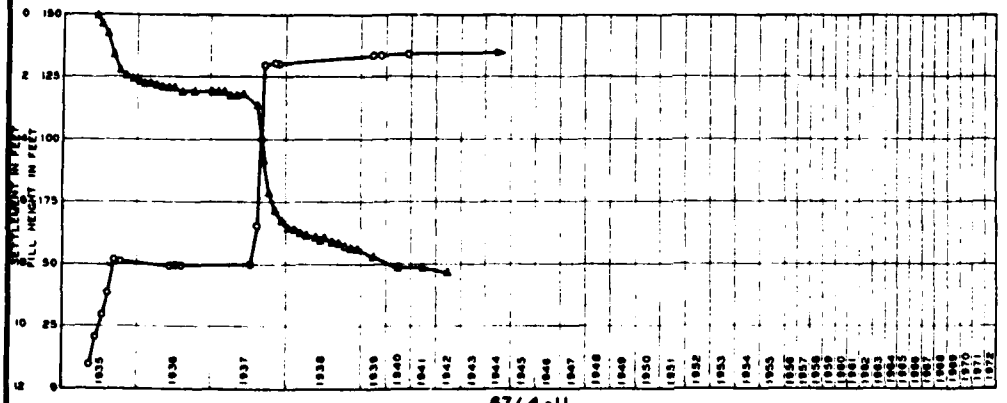
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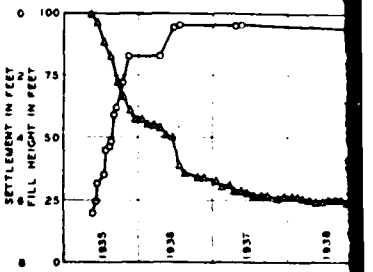


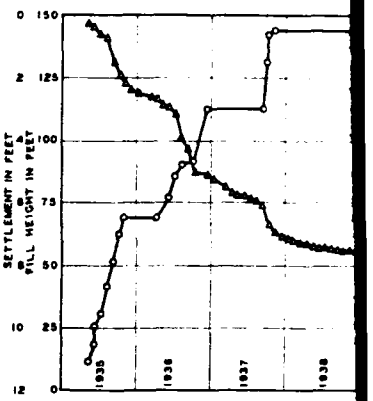


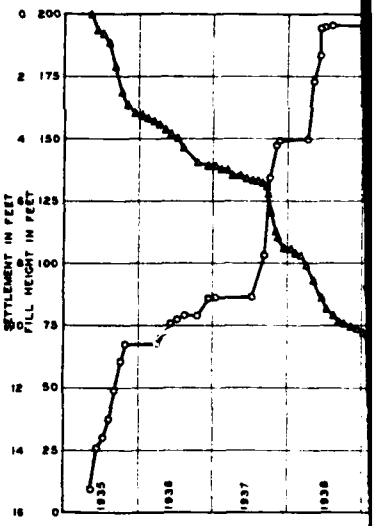
KEY PLAN



67/4-U



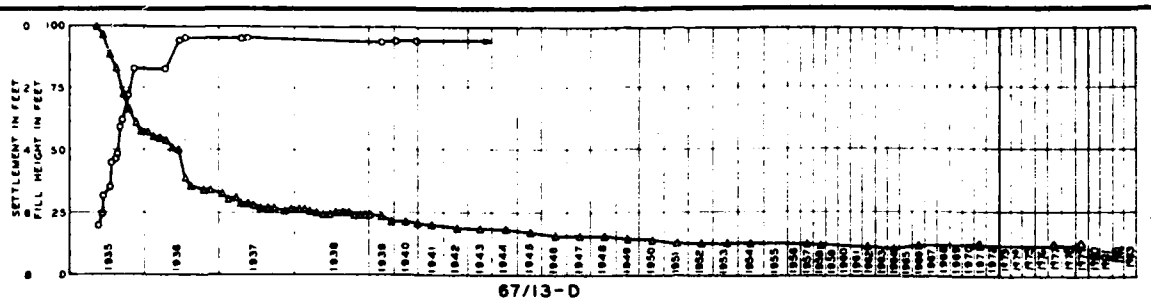




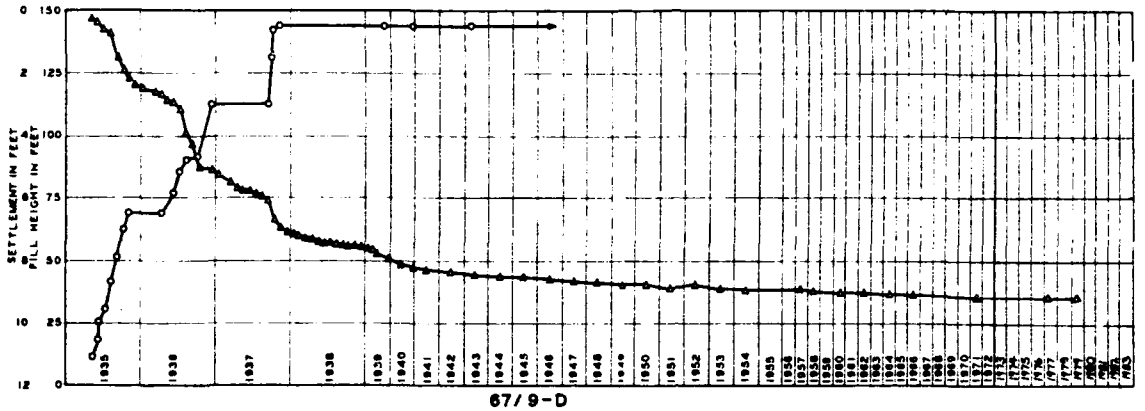
LEGEND:

FILL HEIGHT IN FEET

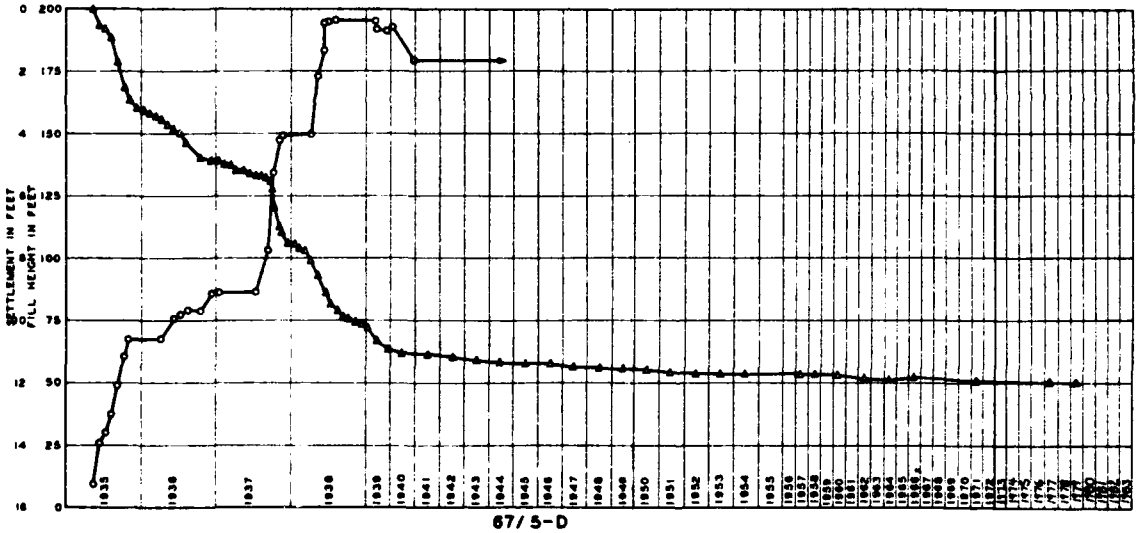
SETTLEMENT IN FEET



67/13-D



67/9-D



67/5-D

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

LEGEND:

FILL HEIGHT IN FEET

SETTLEMENT IN FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

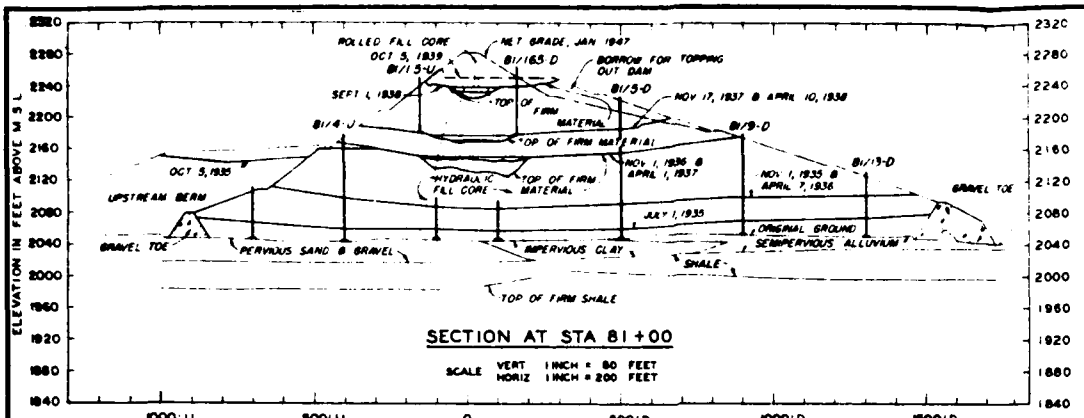
MISSOURI RIVER
FORT PECK LAKE, MONTANA

SUMMARY OF FOUNDATION SETTLEMENT
STATION 67+00

SAFETY PAYS

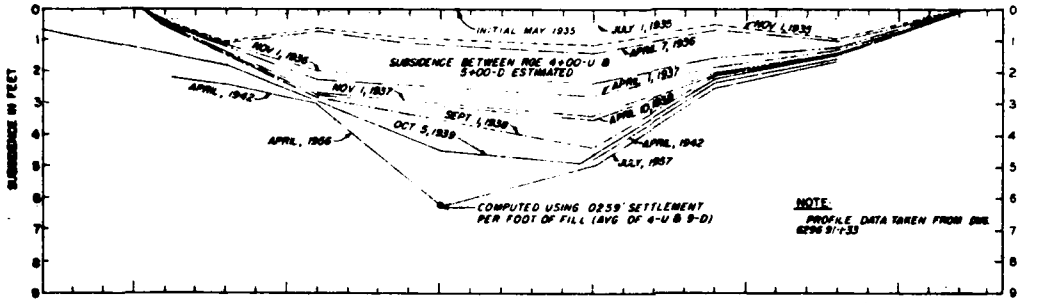
THIS PLAN ADDRESSES CONTRACT NO.
MODIFICATION NO.

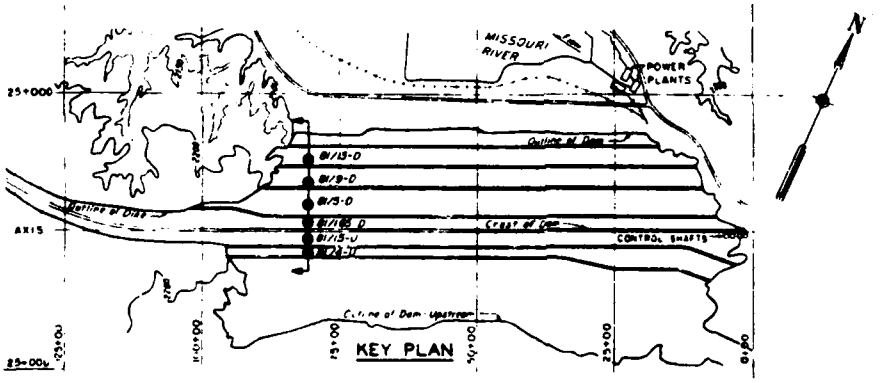
CONSTRUCTION FOUNDATION REPORT 2 PLATE 18



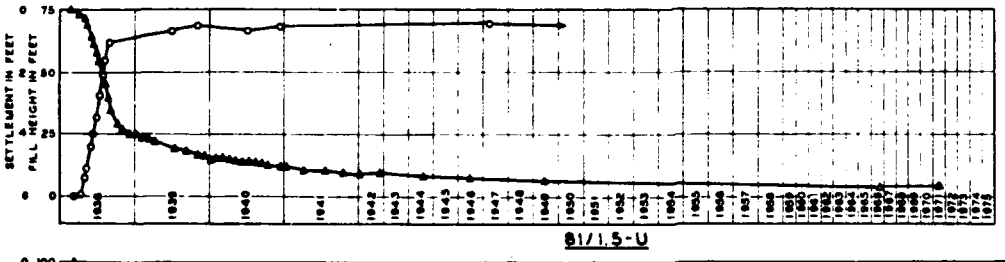
SECTION AT STA 81+00

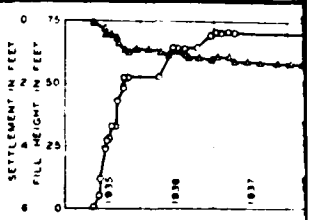
SCALE VERT 1 INCH = 80 FEET
HORIZ 1 INCH = 200 FEET

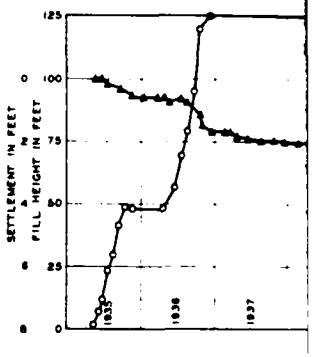


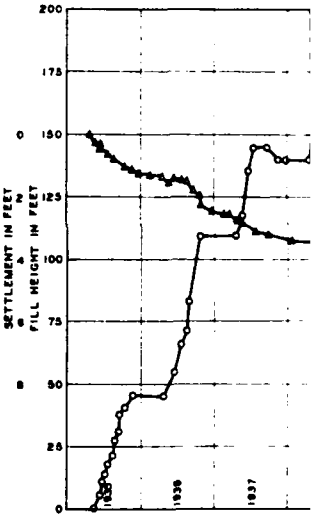


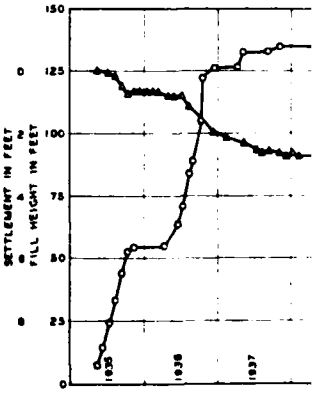
KEY PLAN





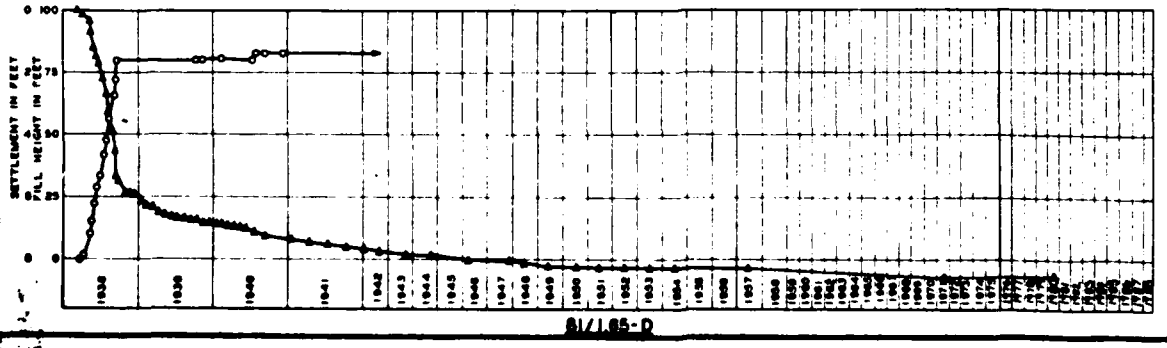






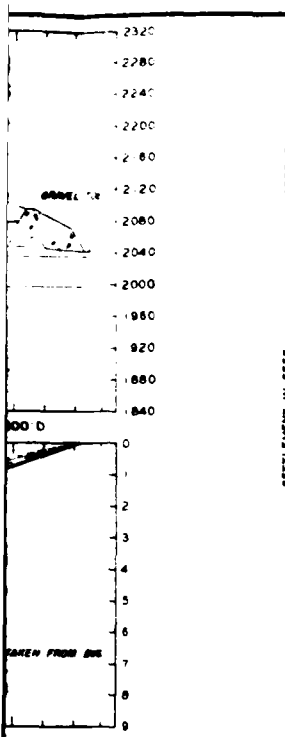
No Readings Since 1971

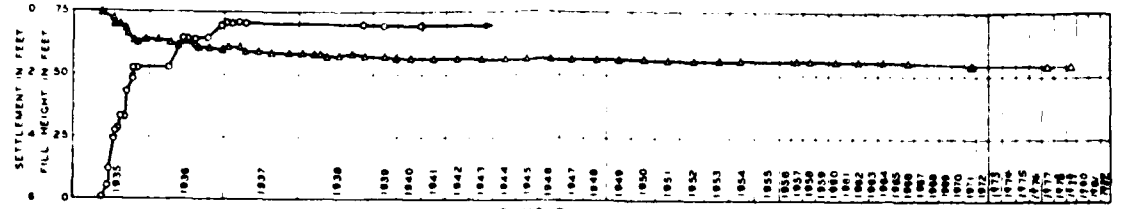
BI/1.5-U



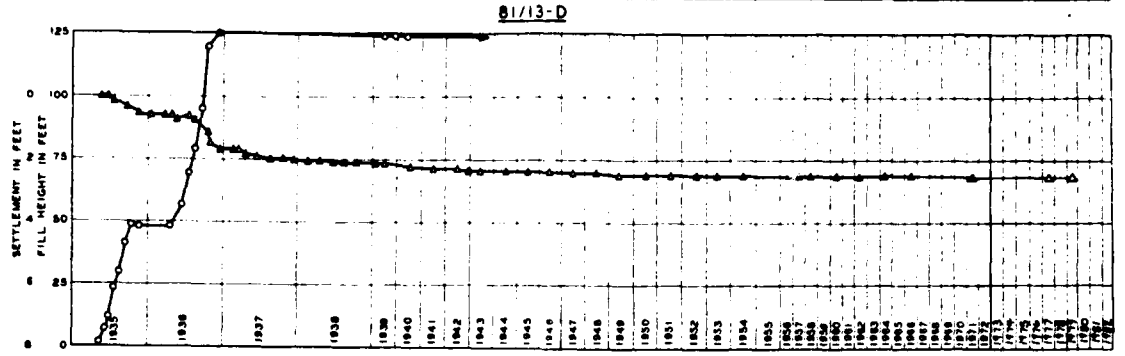
BI/1.65-D

LEGEND:
FILL HEIGHT IN FEET
SETTLEMENT IN FEET

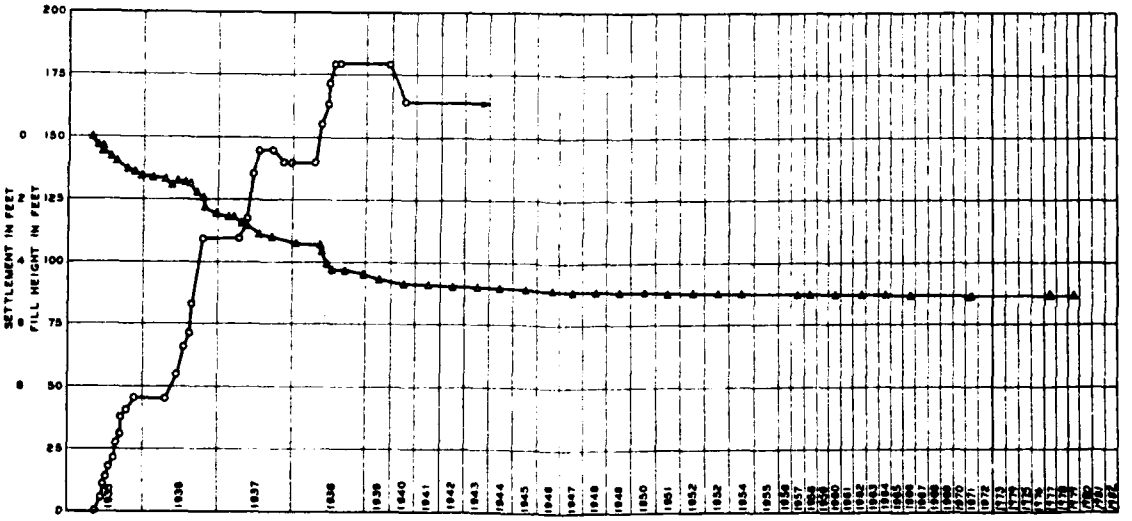




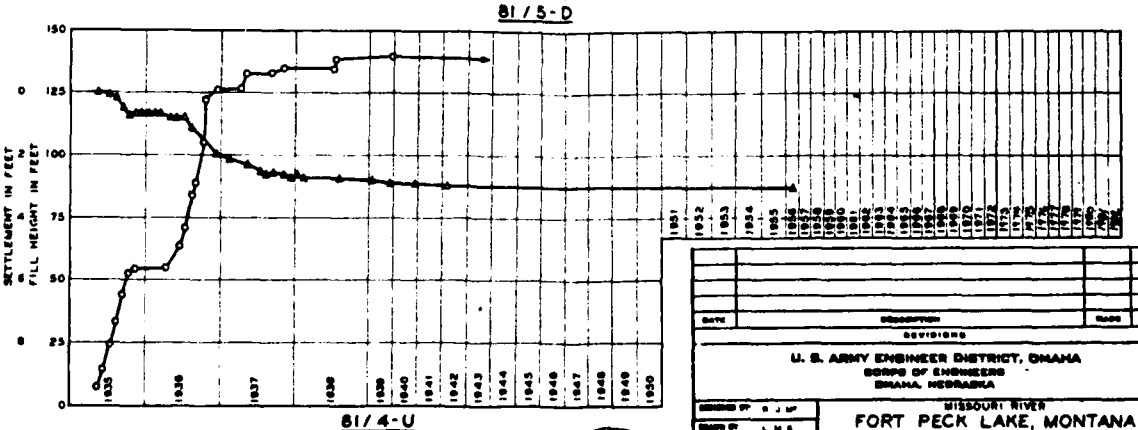
81/13-D



81/9-D



81/5-D



81/4-U

LEGEND:

FILL HEIGHT IN FEET

SETTLEMENT IN FEET

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

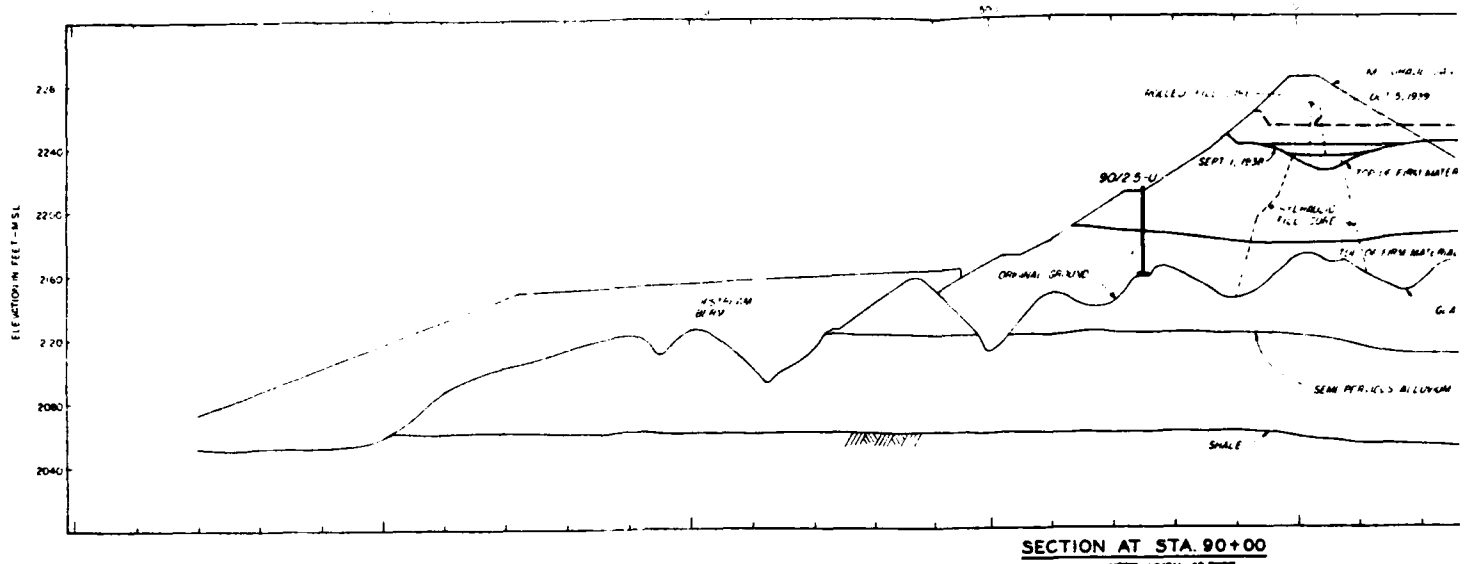
MISSOURI RIVER
FORT PECK LAKE, MONTANA

SUMMARY OF FOUNDATION SETTLEMENT
STATION 81+00

CONSTRUCTION FOUNDATION REPORT

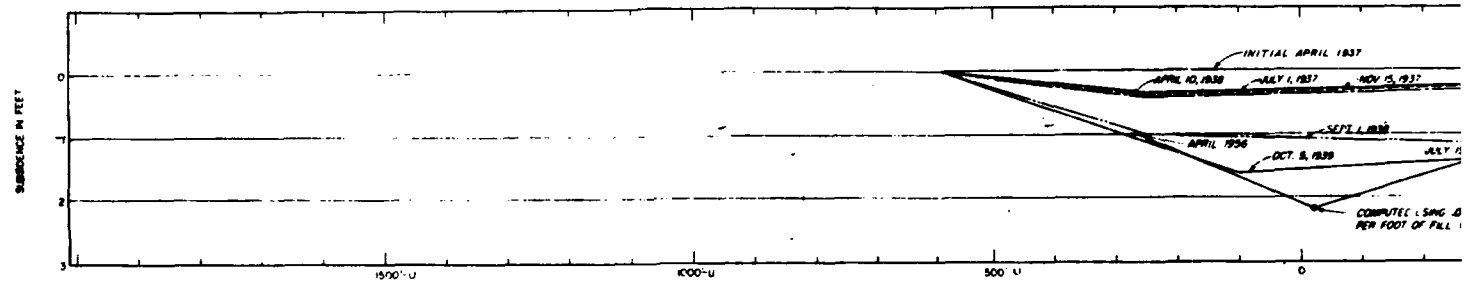
PLATE 19

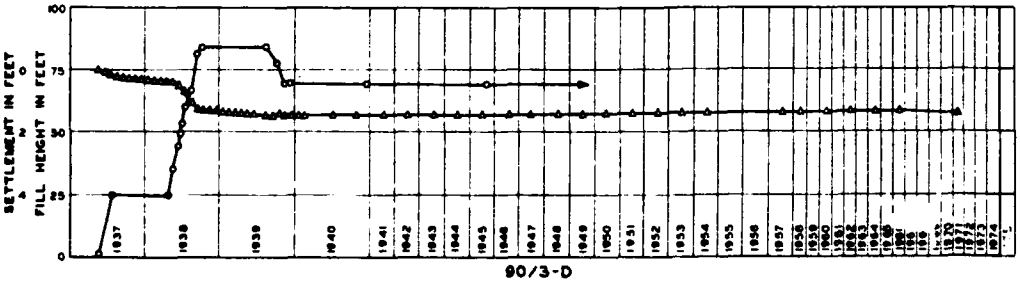
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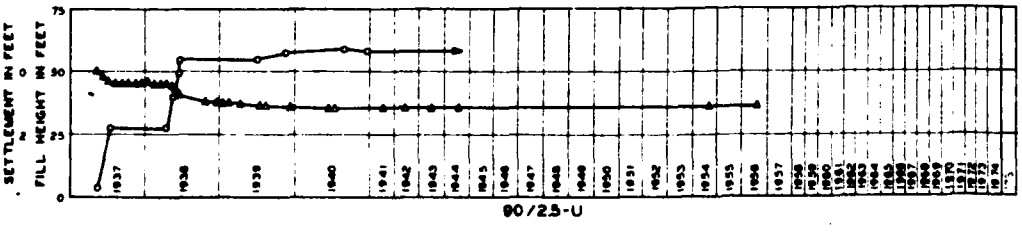


SECTION AT STA. 90+00

SCALE: VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 100 FEET



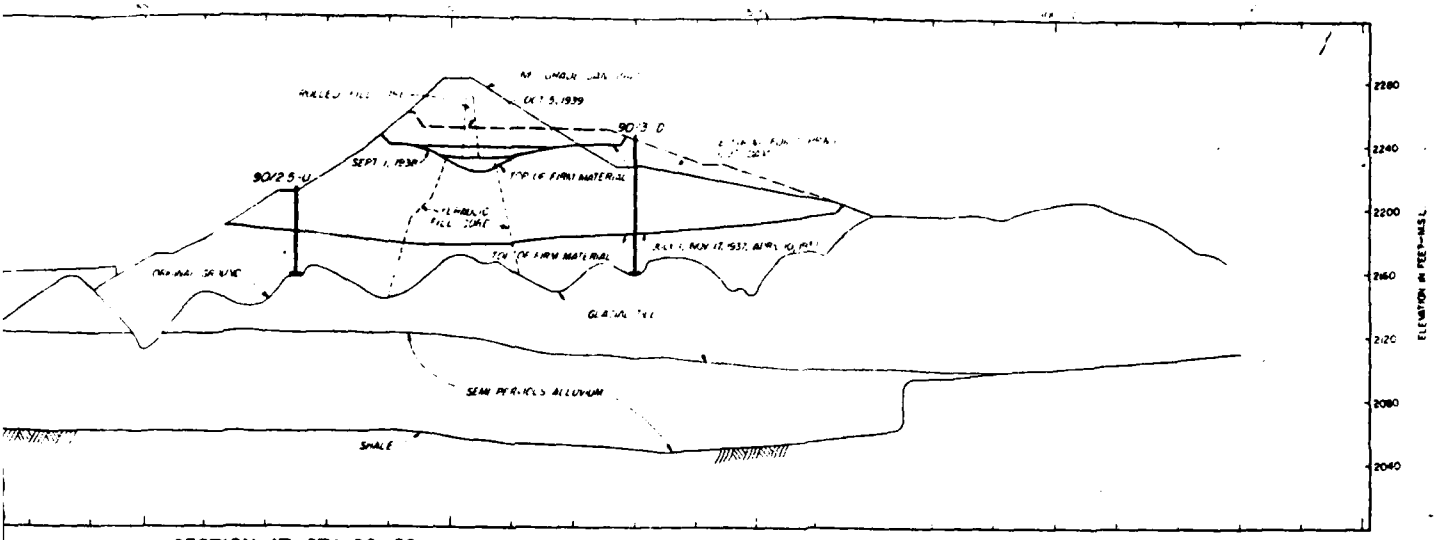




LEGEND

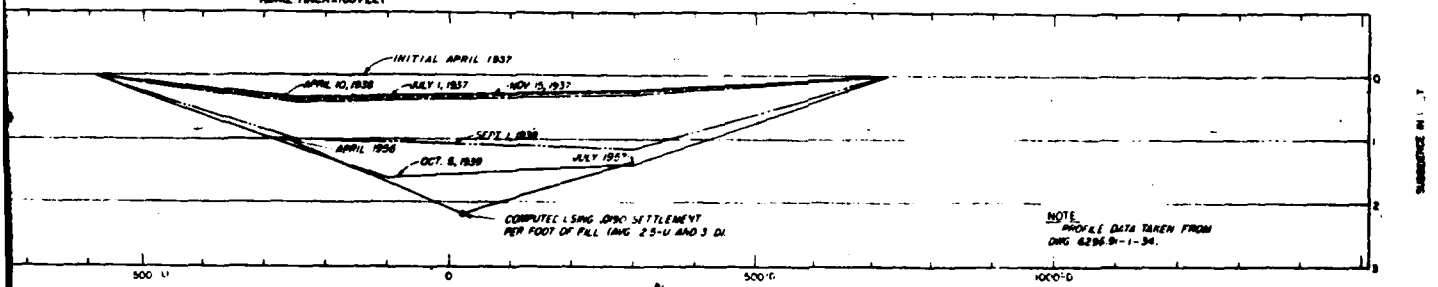
SETTLEMENT IN FEET

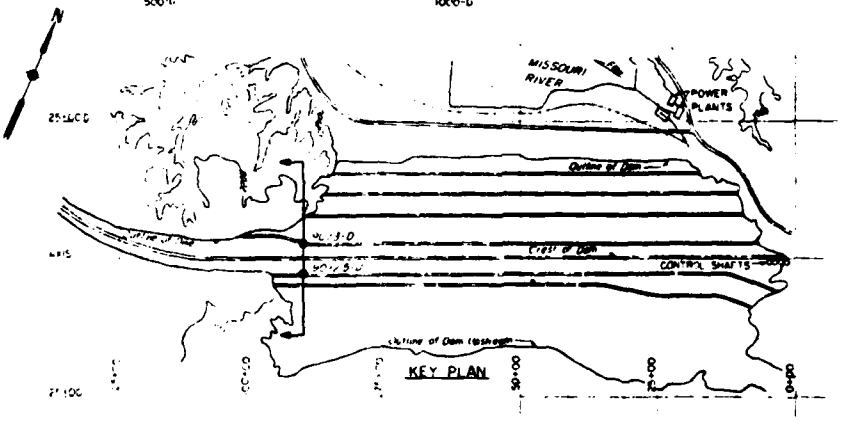
FILL HEIGHT IN FEET

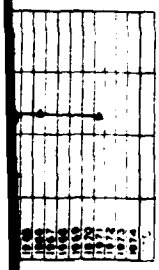


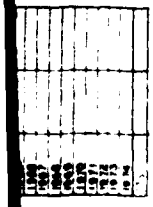
SECTION AT STA. 90+00

SCALE: VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 100 FEET









LEGEND

SETTLEMENT IN FEET
FILL HEIGHT IN FEET

This drawing has been reduced to three-eighths of original scale.

SAFETY PAYS

DATE	DESCRIPTION	MADE	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

SUMMARY OF FOUNDATION SETTLEMENT
STATION 90+00

APPROVED | DATE

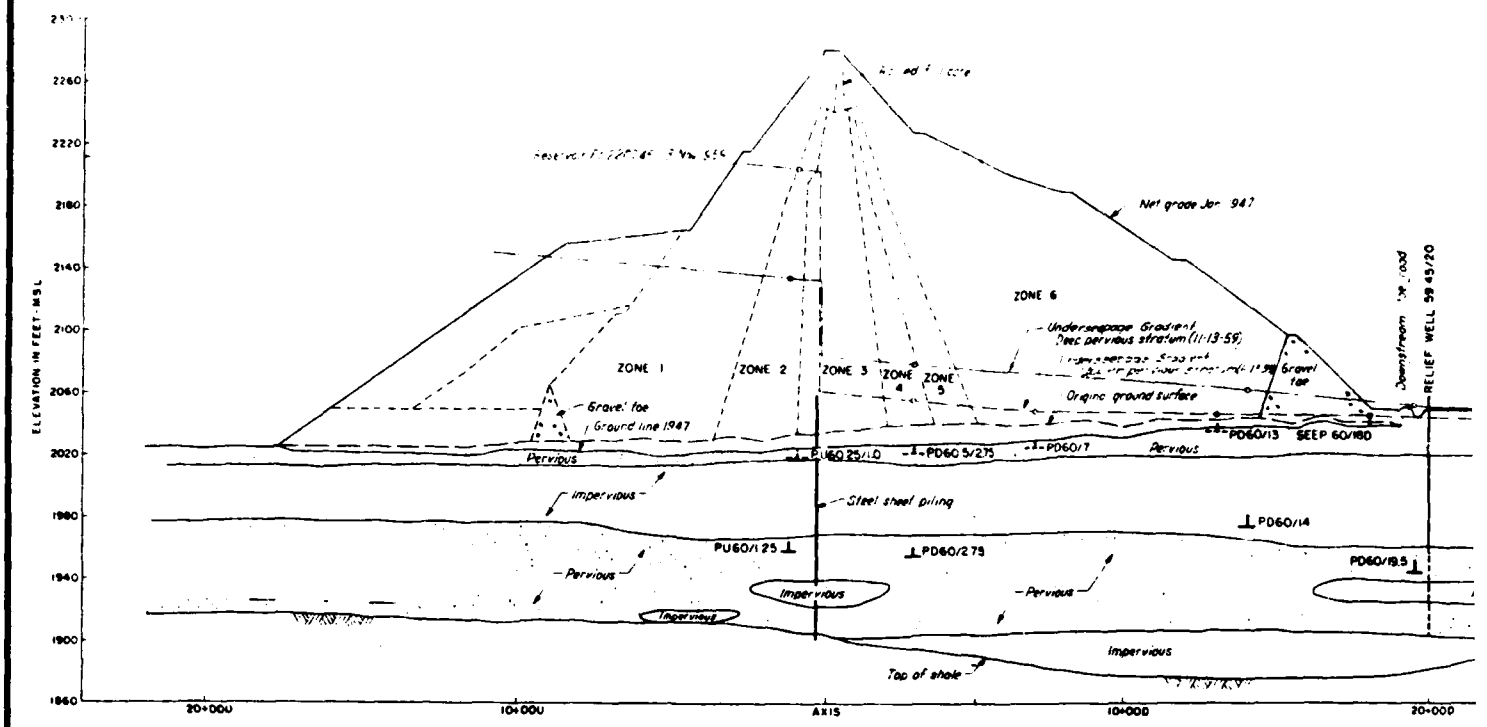
APPROVED | SCALE AS SHOWN | DWG NO.

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

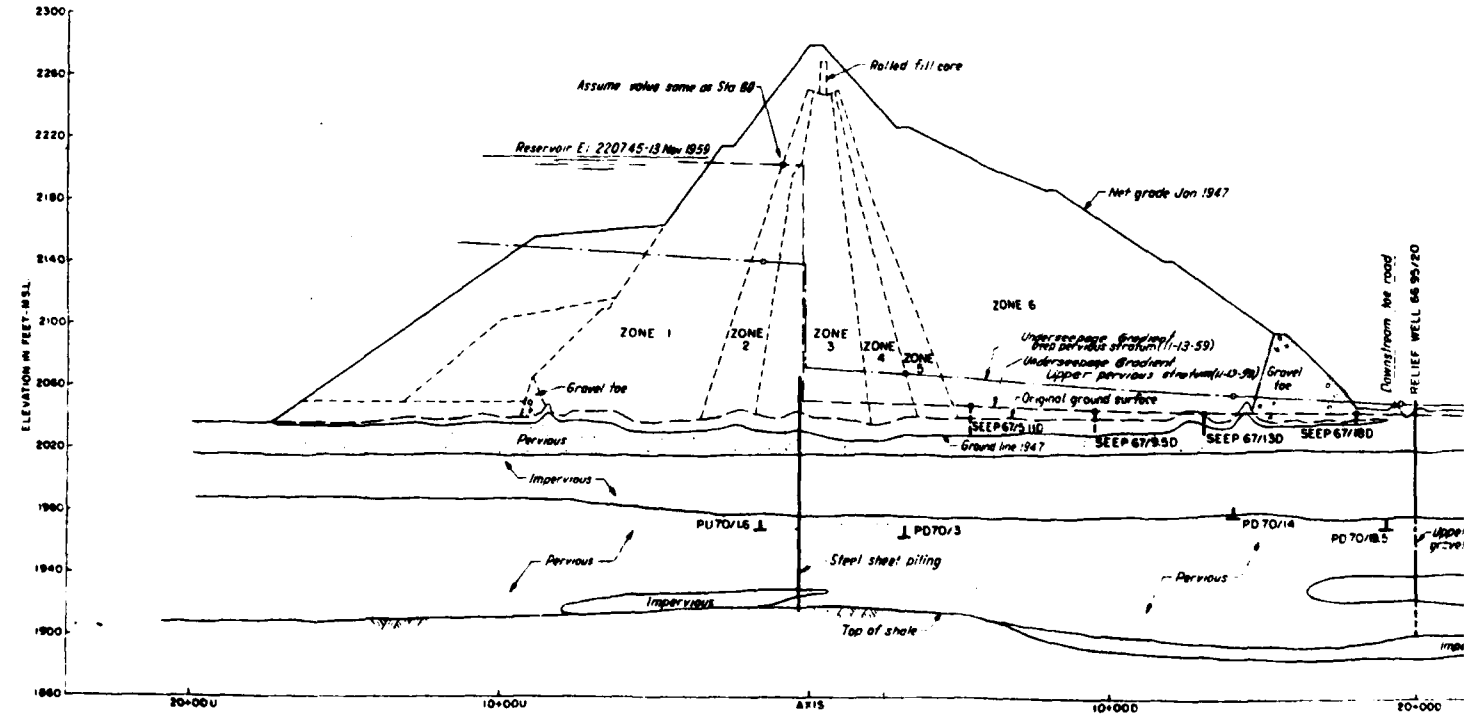
PLATE 20

2



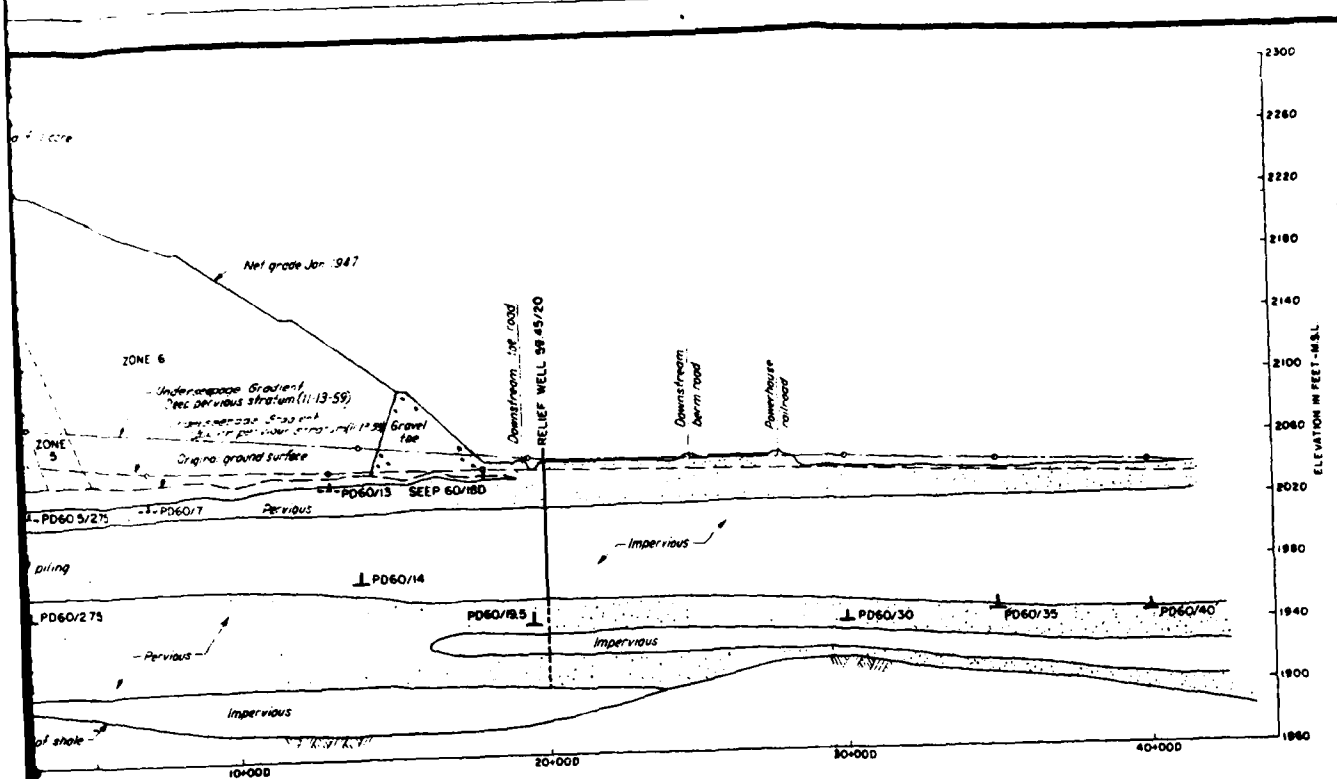
SECTION-STA. 60+00

SCALE HOR 1"=200' VERT 1"=40'



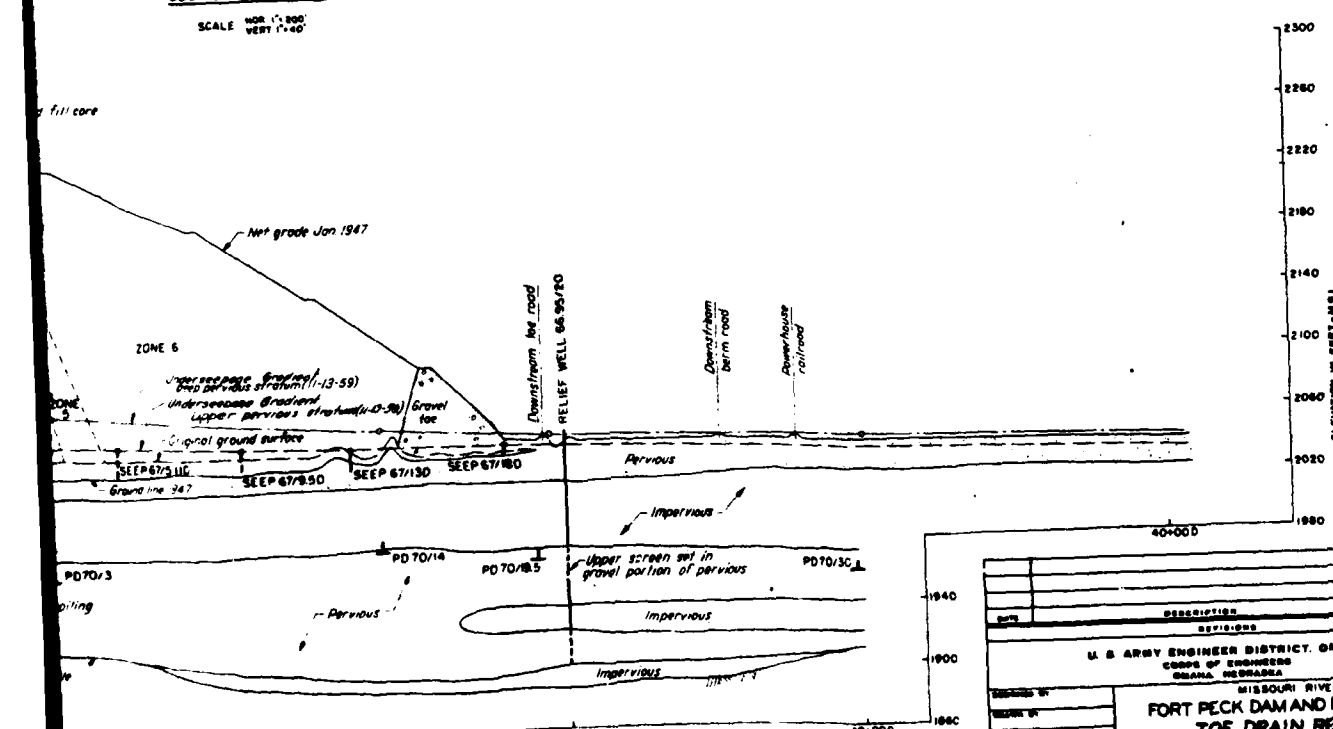
SECTION-STA. 67+00

SCALE HOR 1"=200' VERT 1"=40'



SECTION-STA. 60+00

SCALE HOR 1" = 200' VERT 1" = 40'



SECTION-STA 67+00

SCALE HOR 1" = 200' VERT 1" = 40'

LEGEND

⊥ Bottom of Deep Piezometers

⊥ Bottom of Shallow Piezometers

PD70/3 - Piezometer at Sta 70+00, Range 3+00 Downstream

SEEP 67/130 - Seepage Pipe at Sta 67+00, Range 13+00 Downstream

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

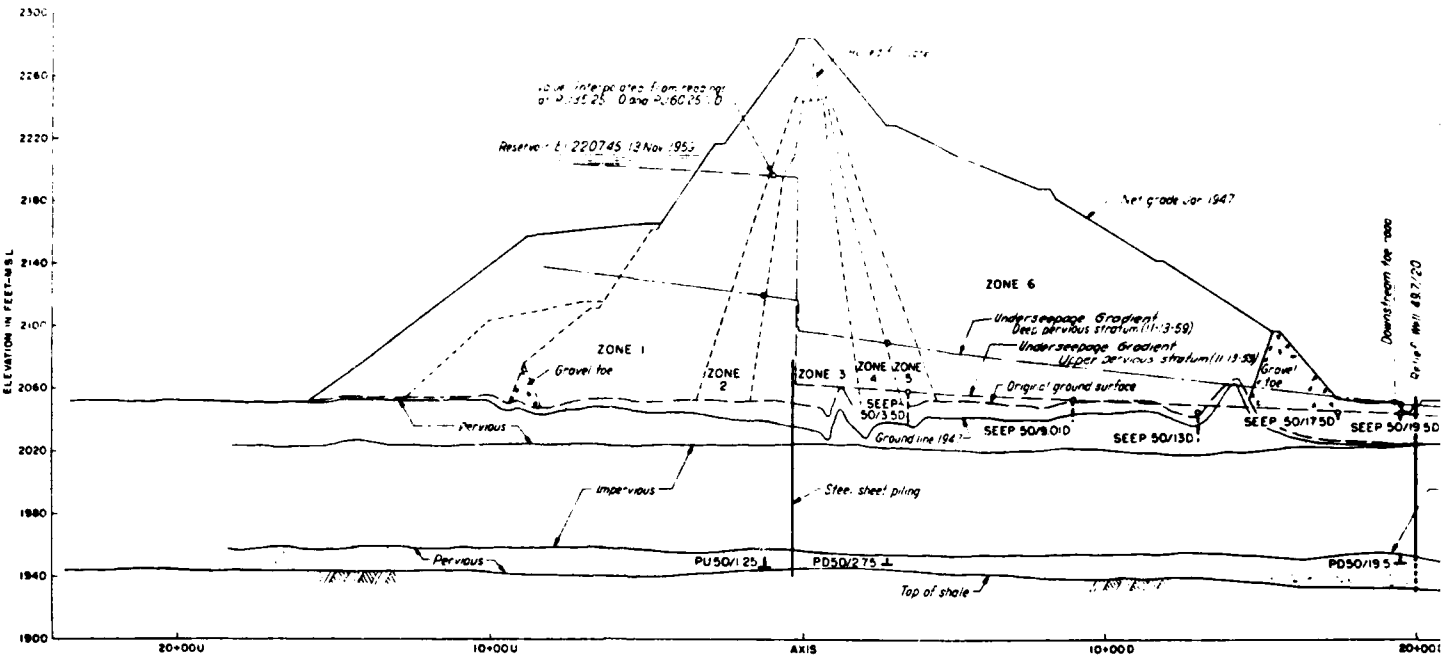
DATE	DESCRIPTION	MADE	CHKD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

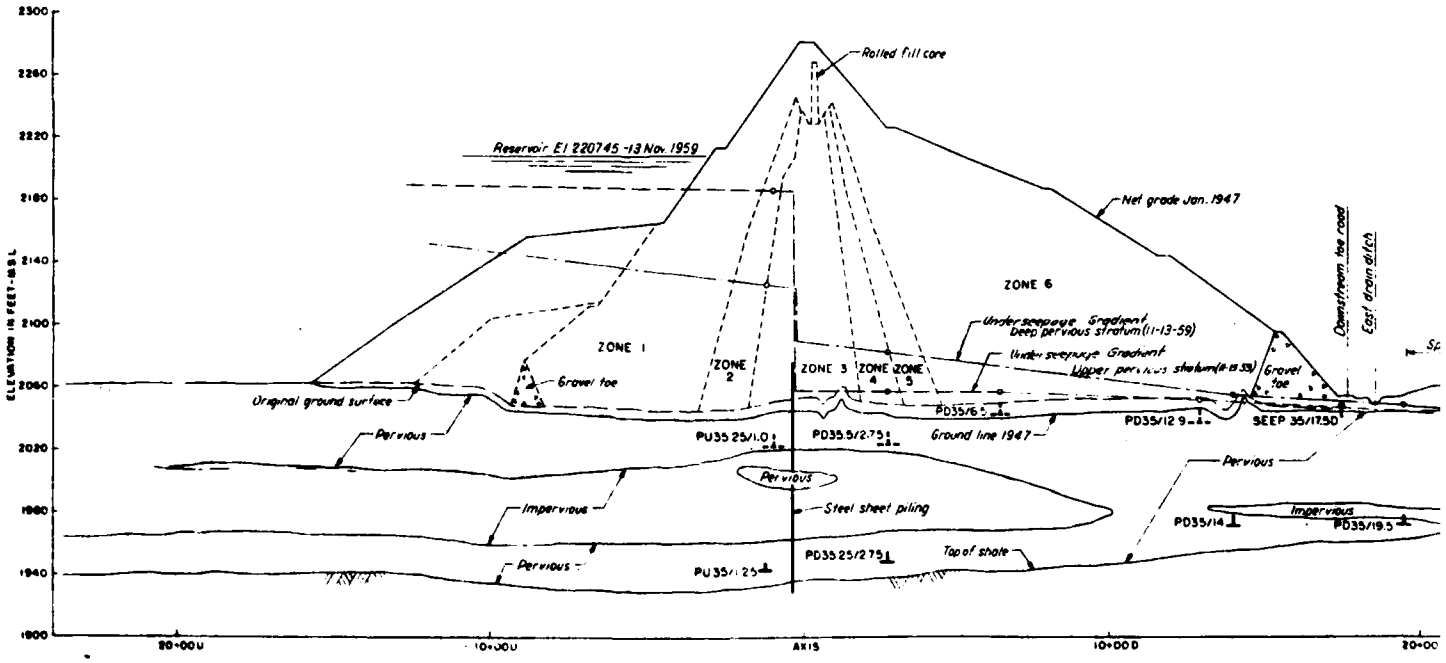
FORT PECK DAM AND RESERVOIR
TOE DRAIN REPORT
SECTIONS AT STA 60+00 AND STA 67+00 SOIL PROFILE AND UNDERSEEPAGE GRADIENTS

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
QUANTITIES BY
SUBMITTED BY
CHIEF, ENGINEERING DIVISION
CHIEF, PLANNING & CONTROL BRANCH
CHIEF, ENGINEERING BRANCH
CHIEF, CONSTRUCTION BRANCH
CHIEF, REAL ESTATE DIVISION
APPROVED
DATE
FILE NO
SCALE AS SHOWN
DRAWING NO



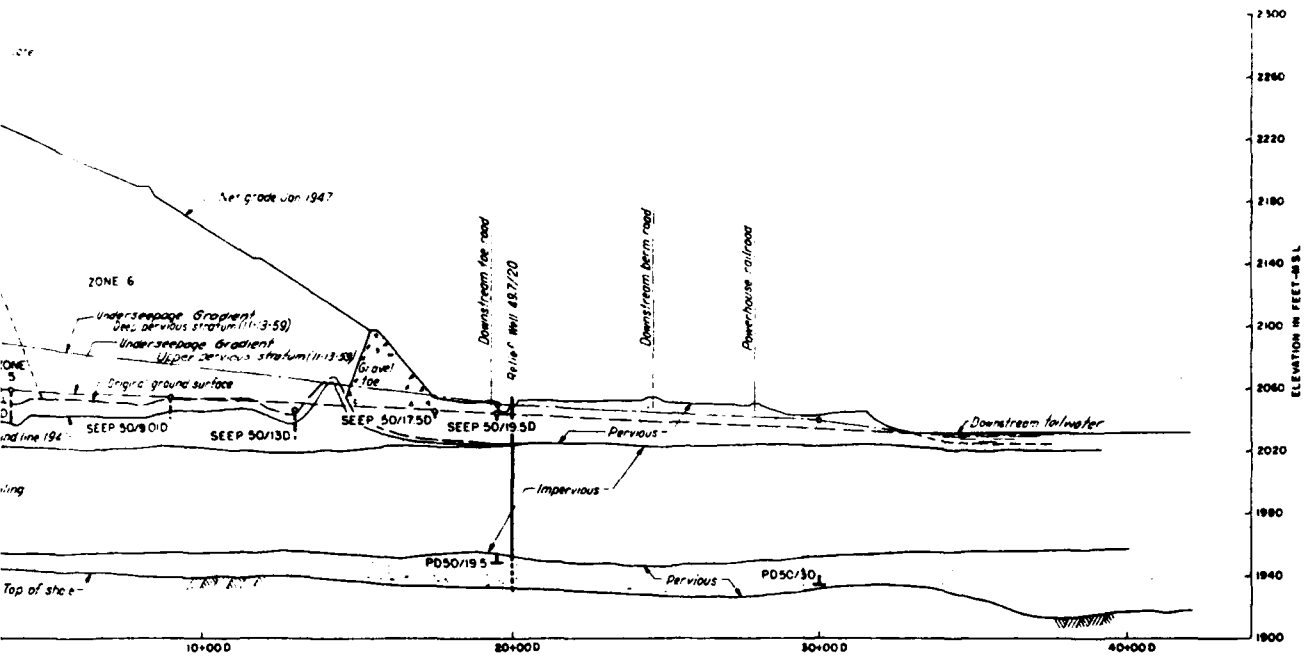
SECTION-STA. 50+00

SCALE HOR 1"=200' VERT 1"=40'



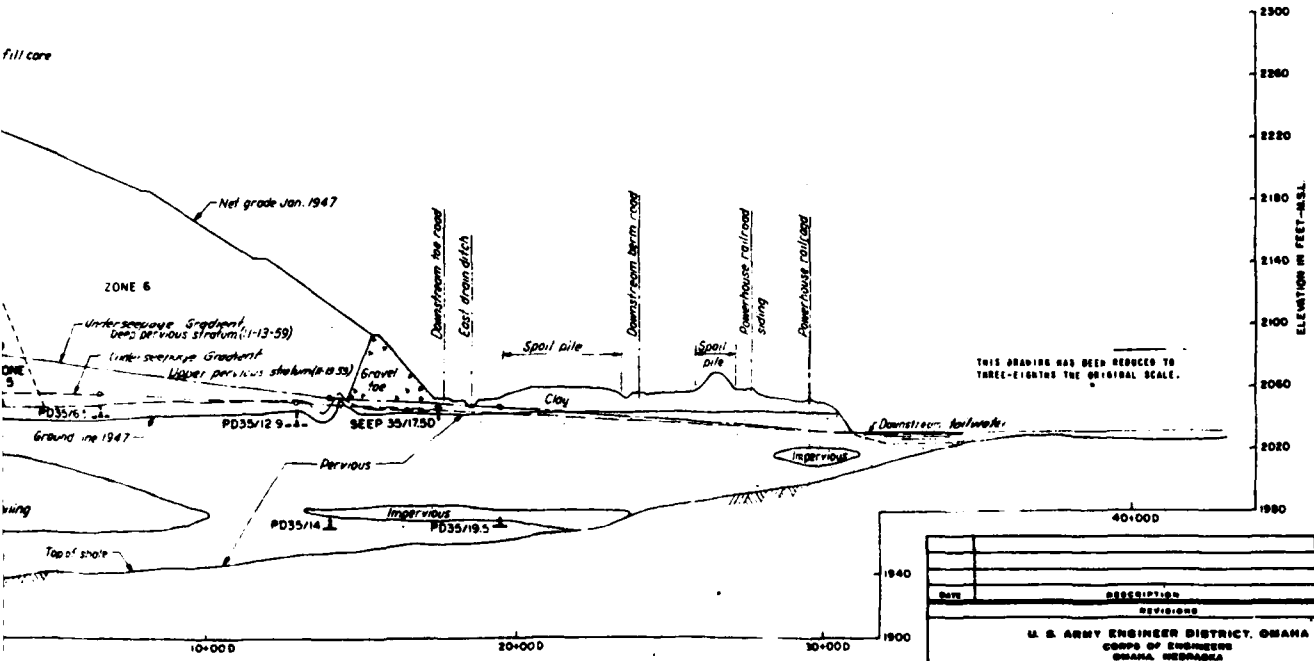
SECTION-STA. 35+00

SCALE HOR 1"=200' VERT 1"=40'



SECTION-STA 50+00

SCALE HOR 1" = 200'
VERT 1" = 40'



SECTION-STA 35+00

SCALE HOR 1" 200'
VERT 1" 40'

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

LEGEND

Bottom of Deep Piezometers

Bottom of Shallow Piezometers

PD 35/6.5 - Piezometer at Sta 35+00, Range 6.50 Downstream.

SEEP 35/17.50 - Seepage Pipe at Sta 35+00, Range 17.50 Downstream

DATE	DESCRIPTION	CHKD	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

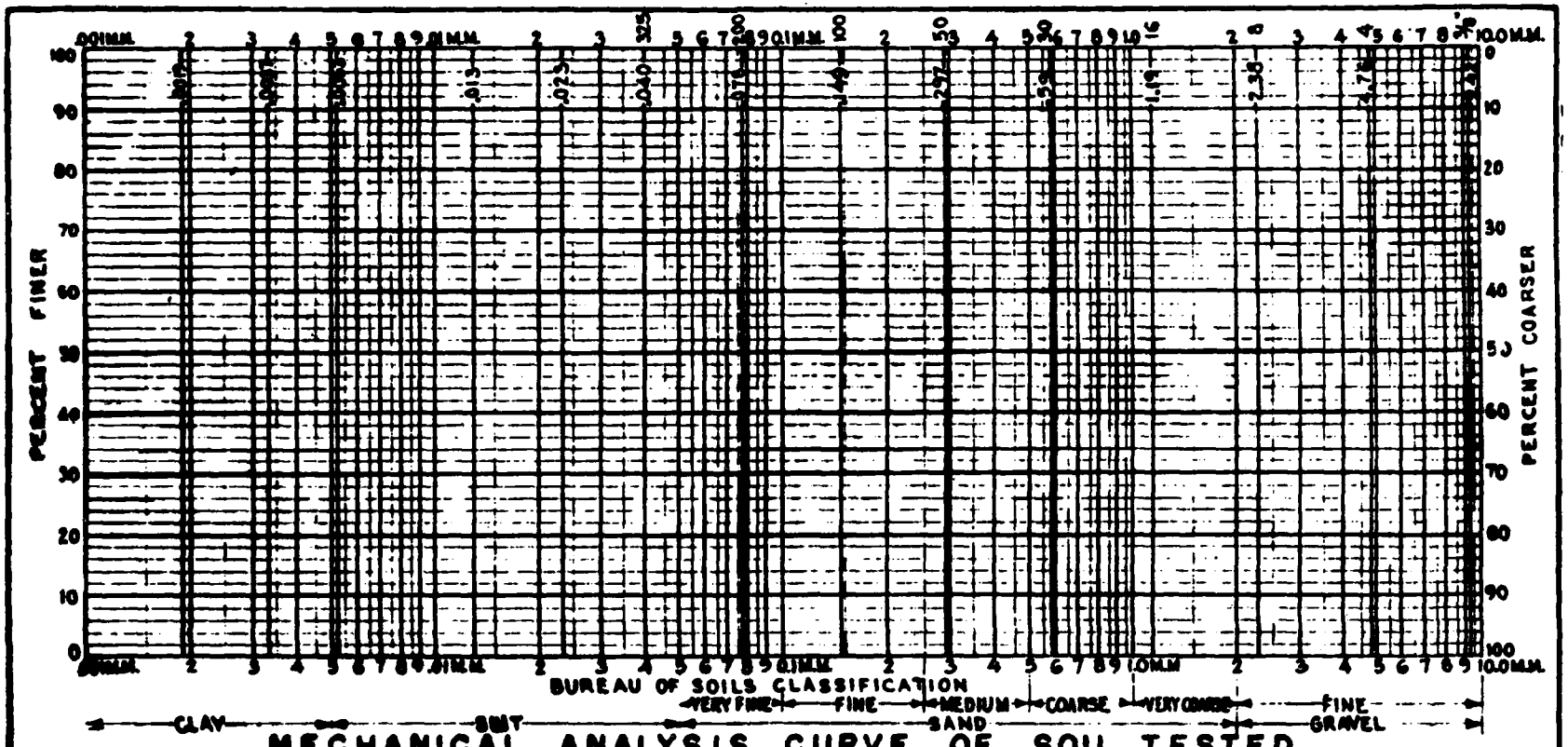
FORT PECK DAM AND RESERVOIR
TOE DRAIN REPORT
SECTIONS AT STA. 35+00 AND STA. 50+00
SOIL PROFILE AND
UNDERSEEPAGE GRADIENTS

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
QUANTITIES BY
SUBMITTED BY
RECOMMENDED FOR APPROVAL
APPROVED FOR THE DIVISION ENGINEER

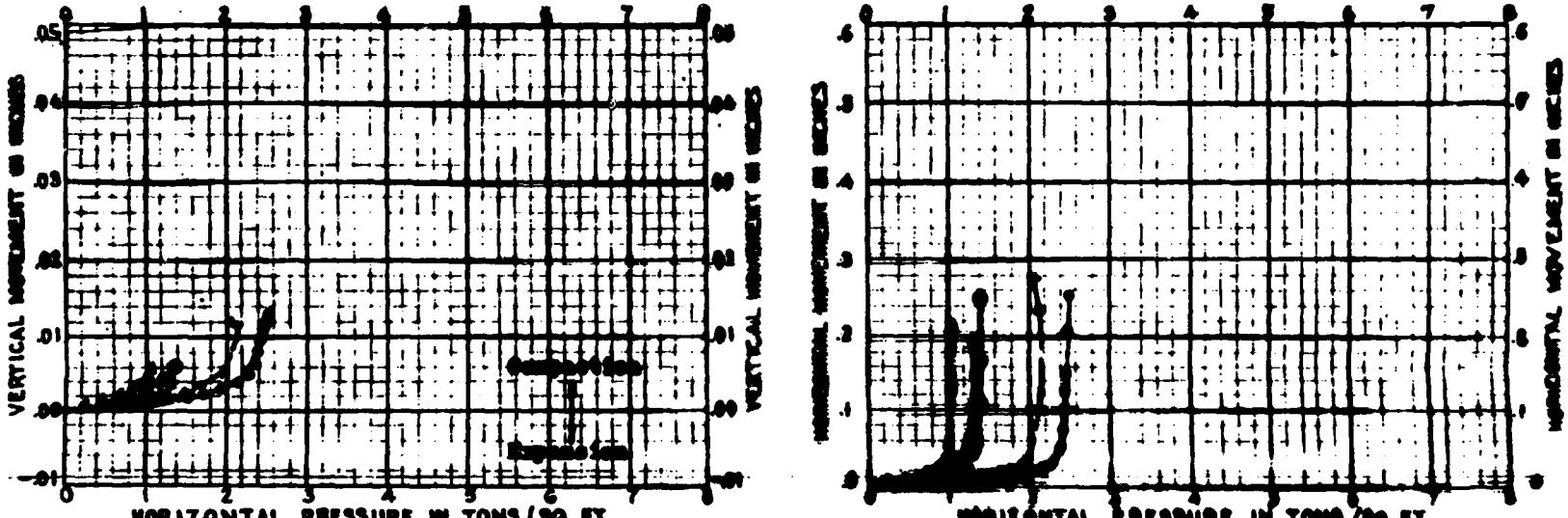
DRAWING NO.

CONSTRUCTION FOUNDATION REPORT PLATE 22

2

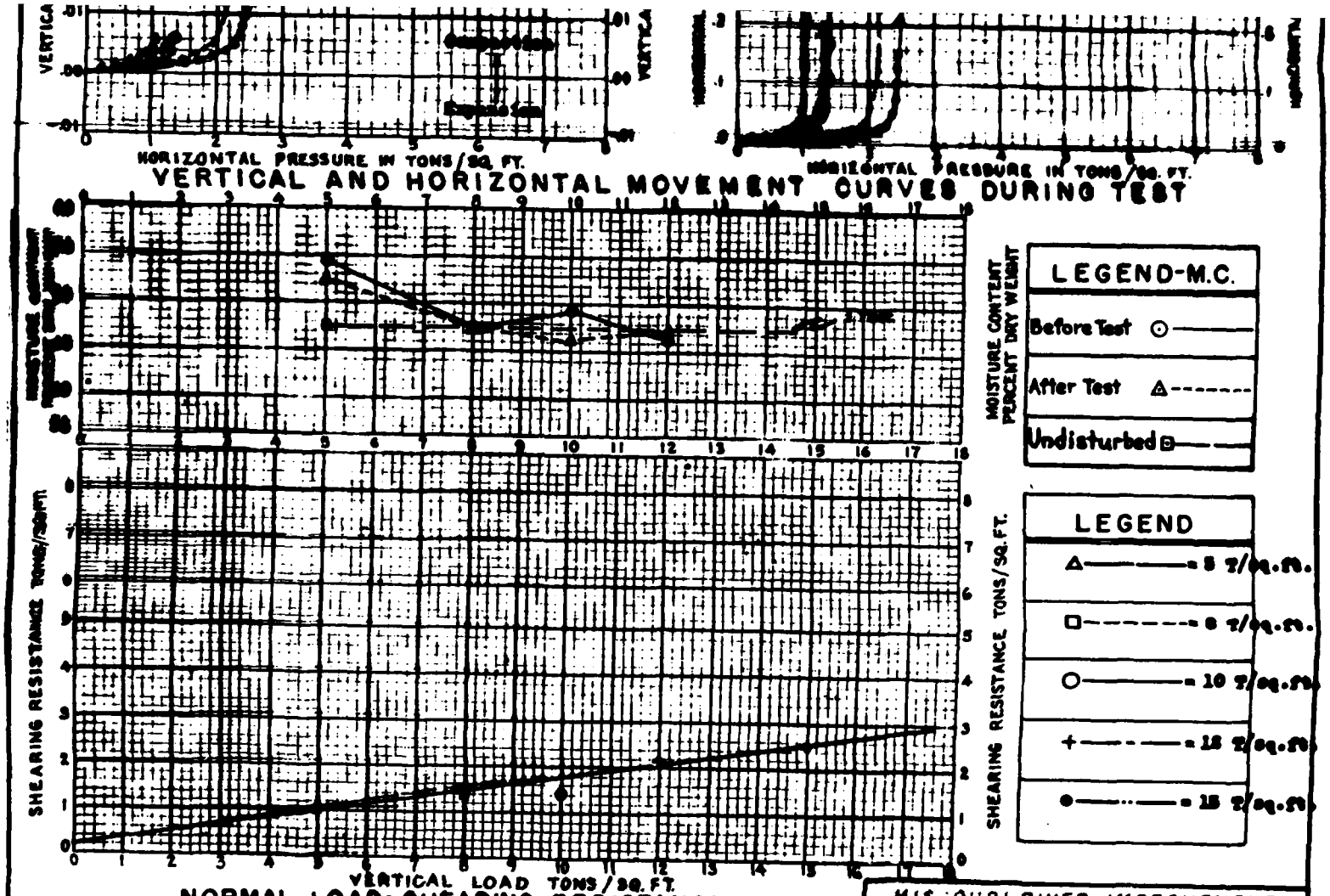


MECHANICAL ANALYSIS CURVE OF SOIL TESTED



VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





$\tan\phi = \frac{\text{Shearing Resistance} - \text{Cohesion (tons/sq.ft.)}}{\text{Vertical Load (tons/sq.ft.)}}$

$= 0.156$

$\phi = 8^{\circ}\ 50'$

c = Cohesion = 0.80 T/sq.ft.

Notes:

Undisturbed Sample
Consolidated Shear Tests
Increment Loading
Cross Sectional Area 16.00 sq. in.
Initial Thickness 0.75 inch.
Sample Immersed in Water during Test.

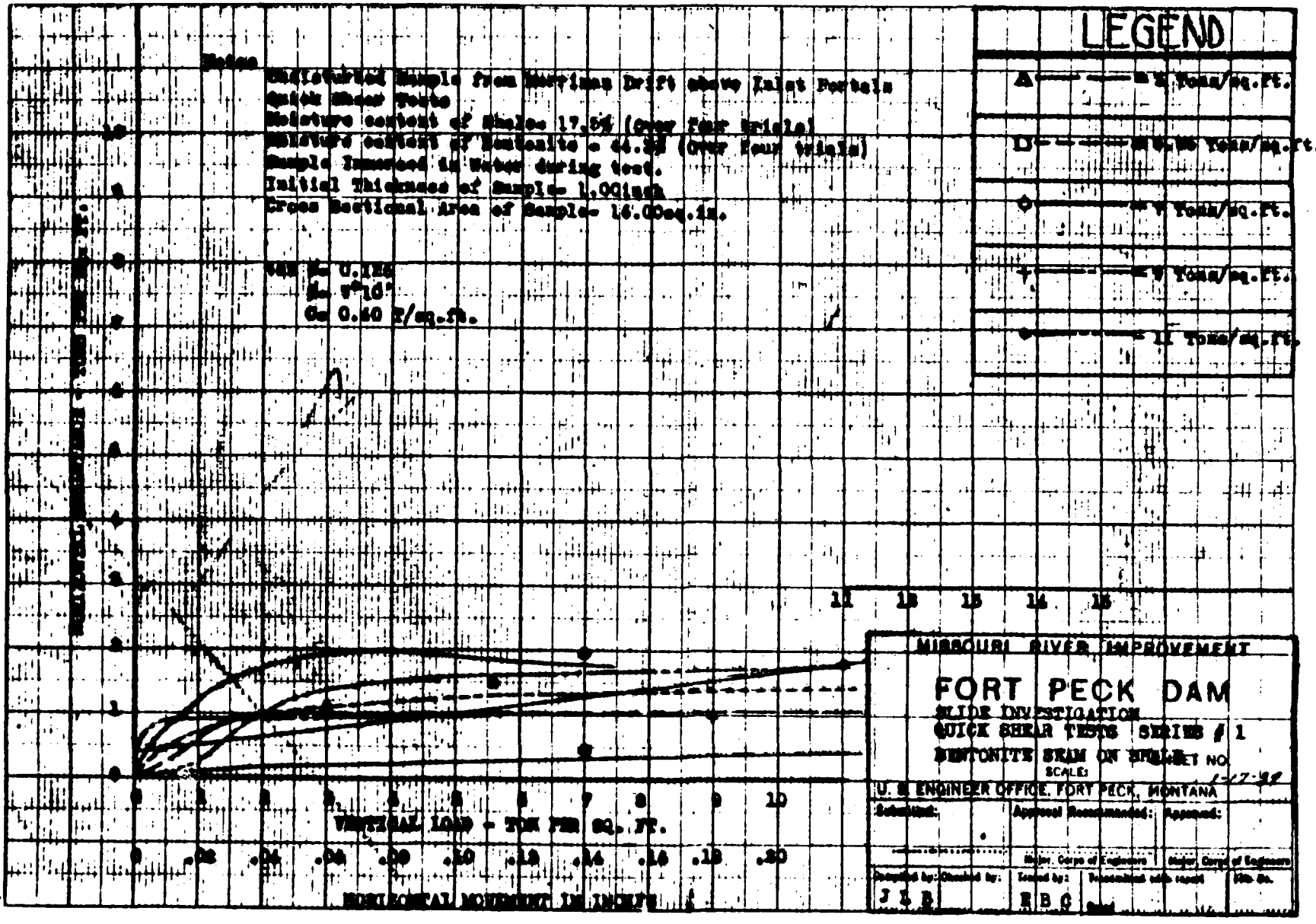
MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATED SHEAR TESTS - SERIES #1
BENTONITE FROM CROSBY DRIFT
ENGINEER'S REPORT 1-27-39
Approved
JLB | EBC

CONSTRUCTION FOUNDATION REPORT PLATE 23

2

(Face p. 32) No. 1

SHEET 32



CONSTRUCTION FOUNDATION REPORT

PLATE 24

Results of tests on undisturbed samples of shale taken in the Fort Peck Dam Foundation, downstream, with 6-inch sampler

1	2	3	4	5	6	7	8	9
Sample No.	Sand over-burden	Depth into shale	Equivalent load in tons/sq. ft.	Moisture content, percent dry weight	Shearing strength in tons/sq. ft.	Computed shearing strength tons/sq ft. with Tanϕ = .18, C = .20	Ratio $\frac{6}{7}$	Type test
HOLE C-12 STATION 16+75, RANGE 8+00 D								
6	14.6	1.4	0.63	21.3	0.65	0.35	1.85	Quick.
7	14.6	3.4	.97	22.8	.86	.37	2.32	Consol.
8	14.6	5.4	1.69	25.3	.89	.40	2.2	Quick.
9	14.6	7.4	1.21	28.6	.81	.43	1.98	Quick.
HOLE C-13 STATION 13+00, RANGE 8+00 D								
2	26.5	0.0	1.20	28.6	1.20	0.62	2.9	Quick.
3	26.5	0.0	1.20	27.7	1.08	.43	2.5	Consol.
5	26.5	2.0	1.44	48.5	.96	.45	2.1	Quick.
6	26.5	4.0	1.53	28.0	2.06	.48	4.3	Quick.
6	26.5	6.0	1.68	25.5	1.15	.39	2.3	Quick.
8	26.5	8.0	1.65	28.0	1.35	.39	3.1	Consol.
7	26.5	10.4	1.90	25.0	1.28	.54	2.3	Quick.
8	26.5	12.0	2.01	[1] 26.0	1.28	.36	2.3	Quick.
HOLE C-14 STATION 12+00, RANGE 8+00 D								
2	46.3	1.7	2.44	29.0	2.25	0.66	3.5	Quick.
3	46.3	3.7	2.60	24.6	1.30	.67	1.9	Consol.
4	46.3	5.7	2.72	21.2	2.4	.69	3.5	Quick.
5	46.3	7.7	2.84	20.2	1.98	.71	2.7	Quick.
6	46.3	16.3	3.18	23.5	1.50	.77	1.95	Quick.
HOLE C-15 STATION 13+25, RANGE 8+00 D								
2	71.5	2.0	3.67	25.5	1.30	0.99	1.35	Quick.
3	71.5	3.5	3.98	[1] 28.7	1.51	.92	1.64	Consol.
5	71.5	7.75	4.21	25.5	2.50	.95	2.7	Quick.
7	71.5	11.75	4.46	26.0	2.05	1.05	1.98	Quick.
HOLE C-16, STATION 14+00, RANGE 8+00 D								
2	100	1.0	3.78	27.7	2.26	1.25	2.01	Quick.
3	100	3.0	3.99	27.1	3.02	1.26	2.40	Consol.
4	100	7.0	4.36	28.6	1.99	1.30	1.46	Quick.
TEST SHAFT, STATION 12+00, RANGE 8+00 D								
0	26.5	1.5	1.26	28.1	0.73	0.46	1.96	Quick.
1	26.5	1.3	1.26	31.1	.96	.44	2.13	Quick.
2	26.5	5.5	1.75	[1] 28.2	1.44	.52	2.77	Quick.
GLACIAL TILL FROM HOLE AT STATION 165+00, RANGE 6+00 D								
3	48.5	2.5	2.34	18.7	1.26	0.62	1.64	Quick.
4	48.5	5.5	2.46	19.6	1.56	.35	1.62	Quick.
5	48.5	7.5	2.55	20.4	1.46	.59	1.57	Consol.
6	48.5	9.5	2.70	27.9	1.44	.32	1.57	Quick.

[1] After test.

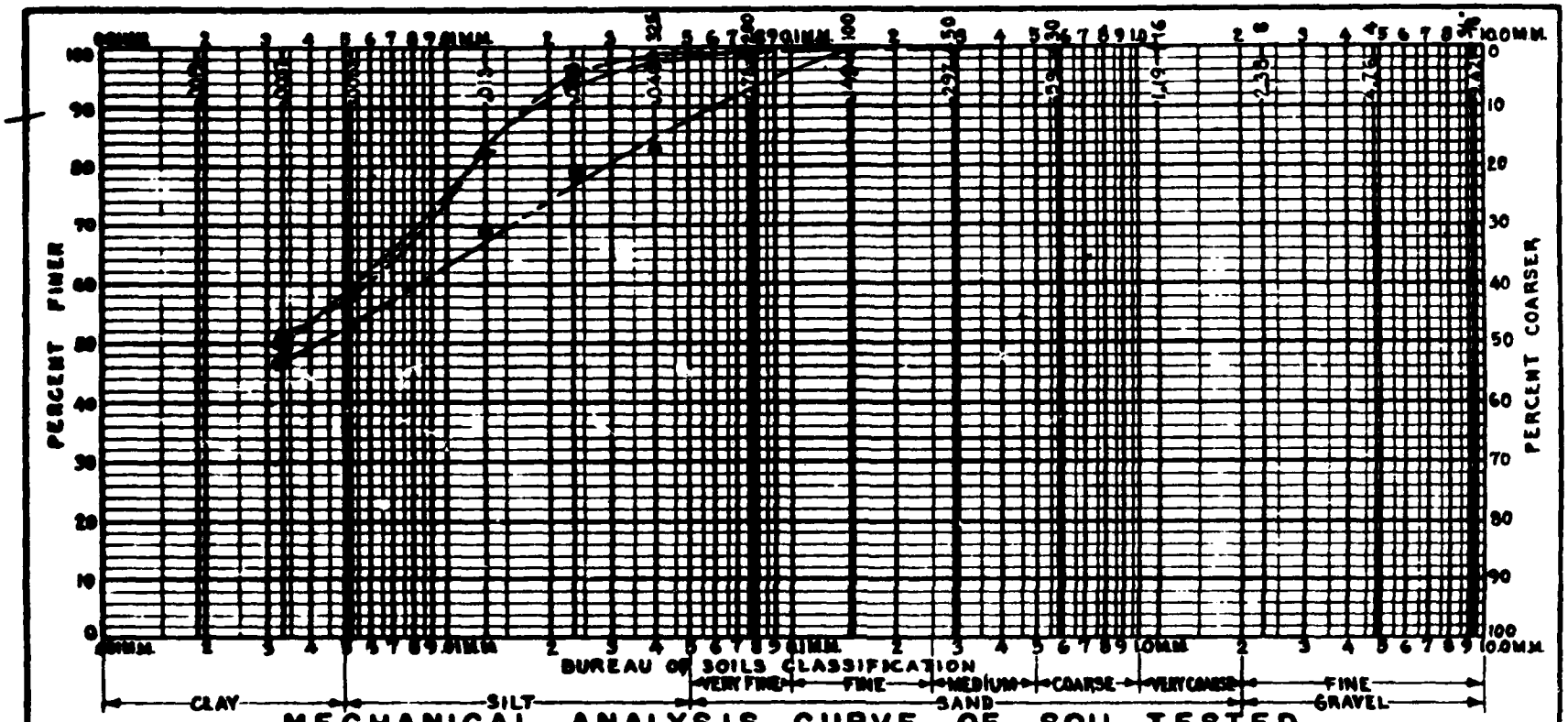
NOTES.—Except for samples 1 and 2 from the test shaft all samples were 6" drive samples.

Duration of test for Quick shear varied from 1.5 to 3 minutes.

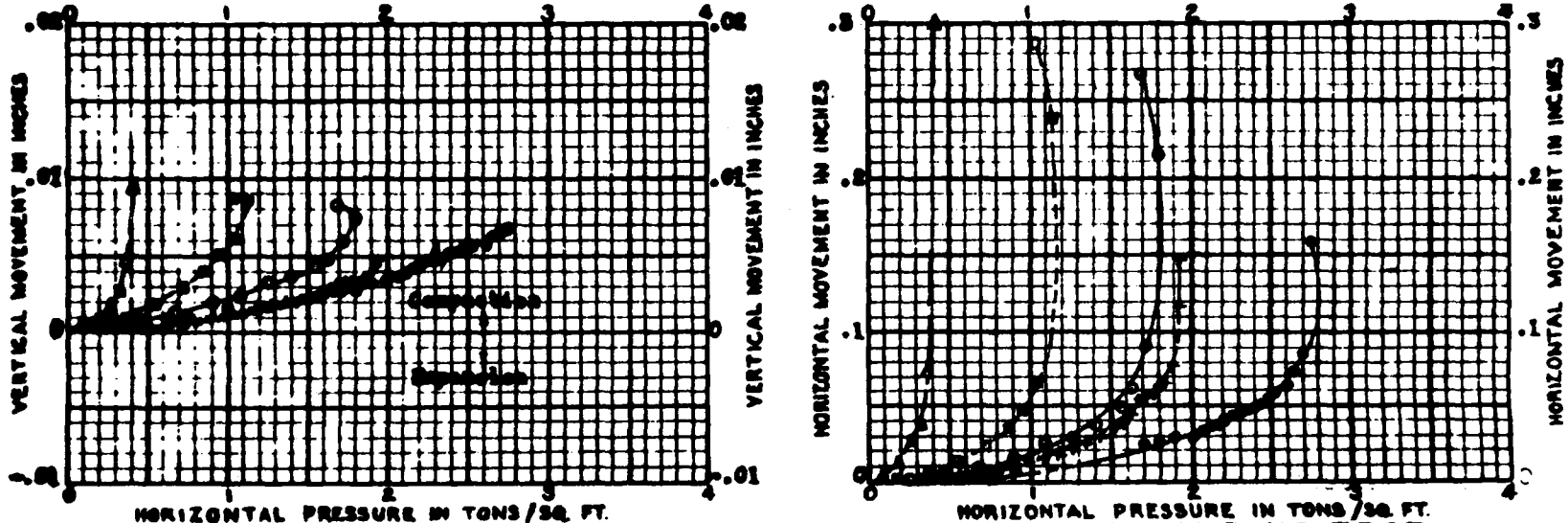
The vertical load for the duration of the test was as indicated in Column 4.

Tan ϕ=0.18, C=0.20 were coefficients used in the design of the reconstruction in the slide area.

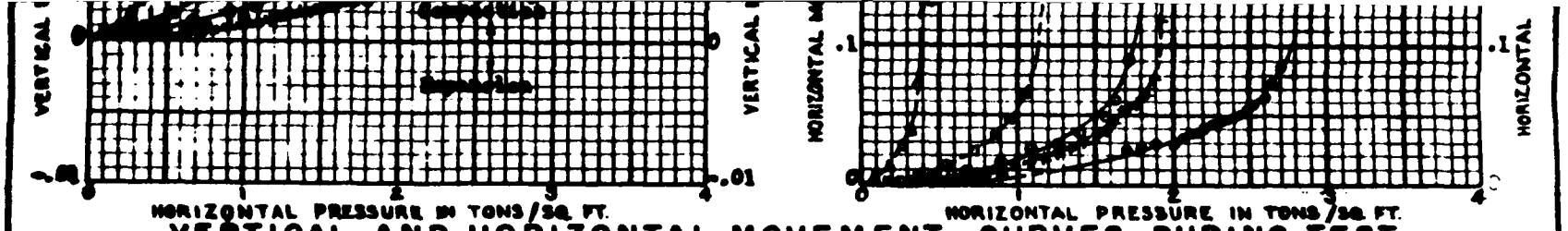
For computed shearing strength for Glacial Till from Hole S. D. 165/0.00 coefficients used were Tan. ϕ=.26, C=.32.



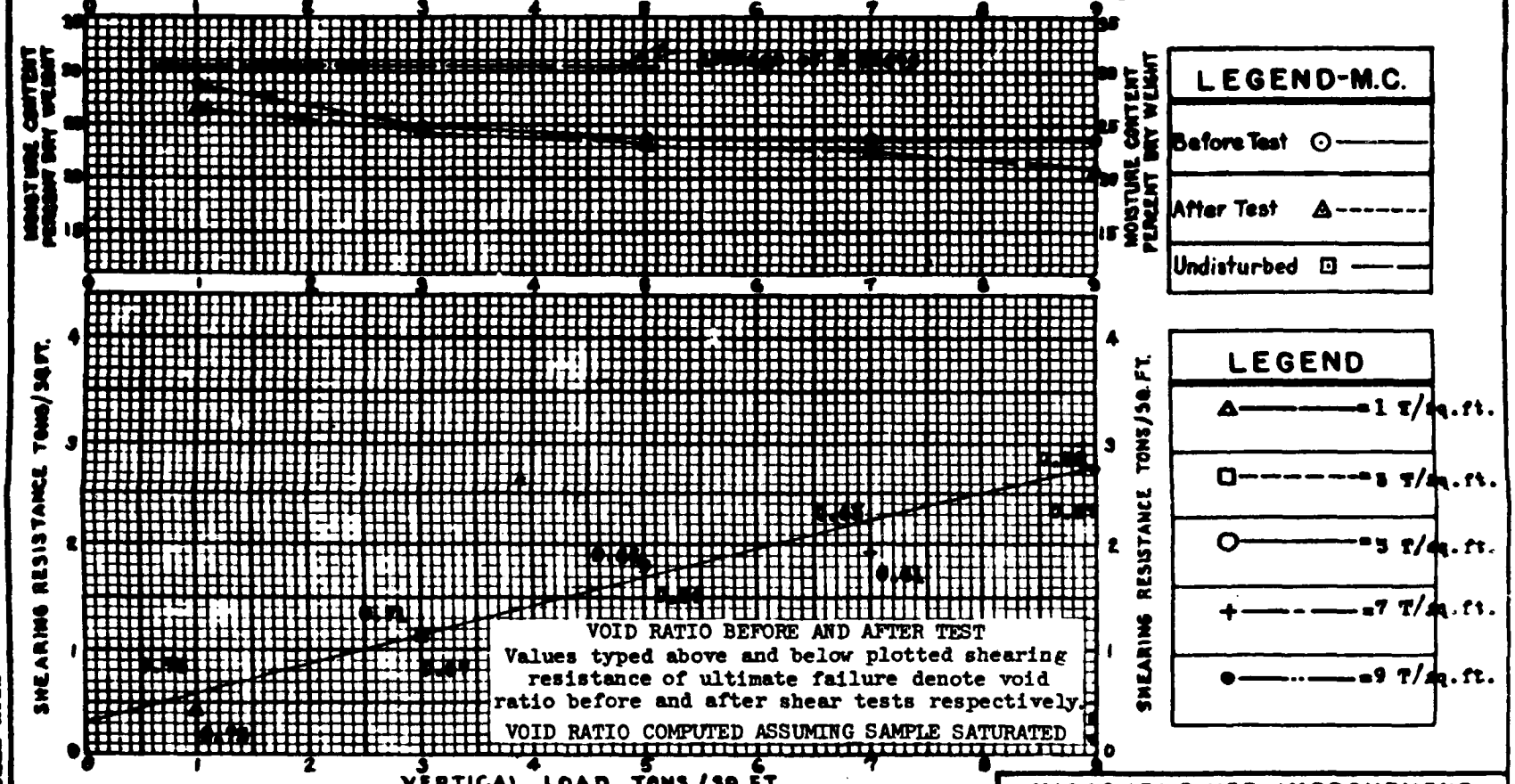
MECHANICAL ANALYSIS CURVE OF SOIL TESTED



VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



NORMAL LOAD-SHEARING RESISTANCE CURVE

$\tan\phi = \frac{\text{Shearing Resistance} - \text{Cohesion (Tons/Sq.Ft.)}}{\text{Vertical Load (Tons/Sq.Ft.)}} = 0.278$

$\phi = 15° 25'$

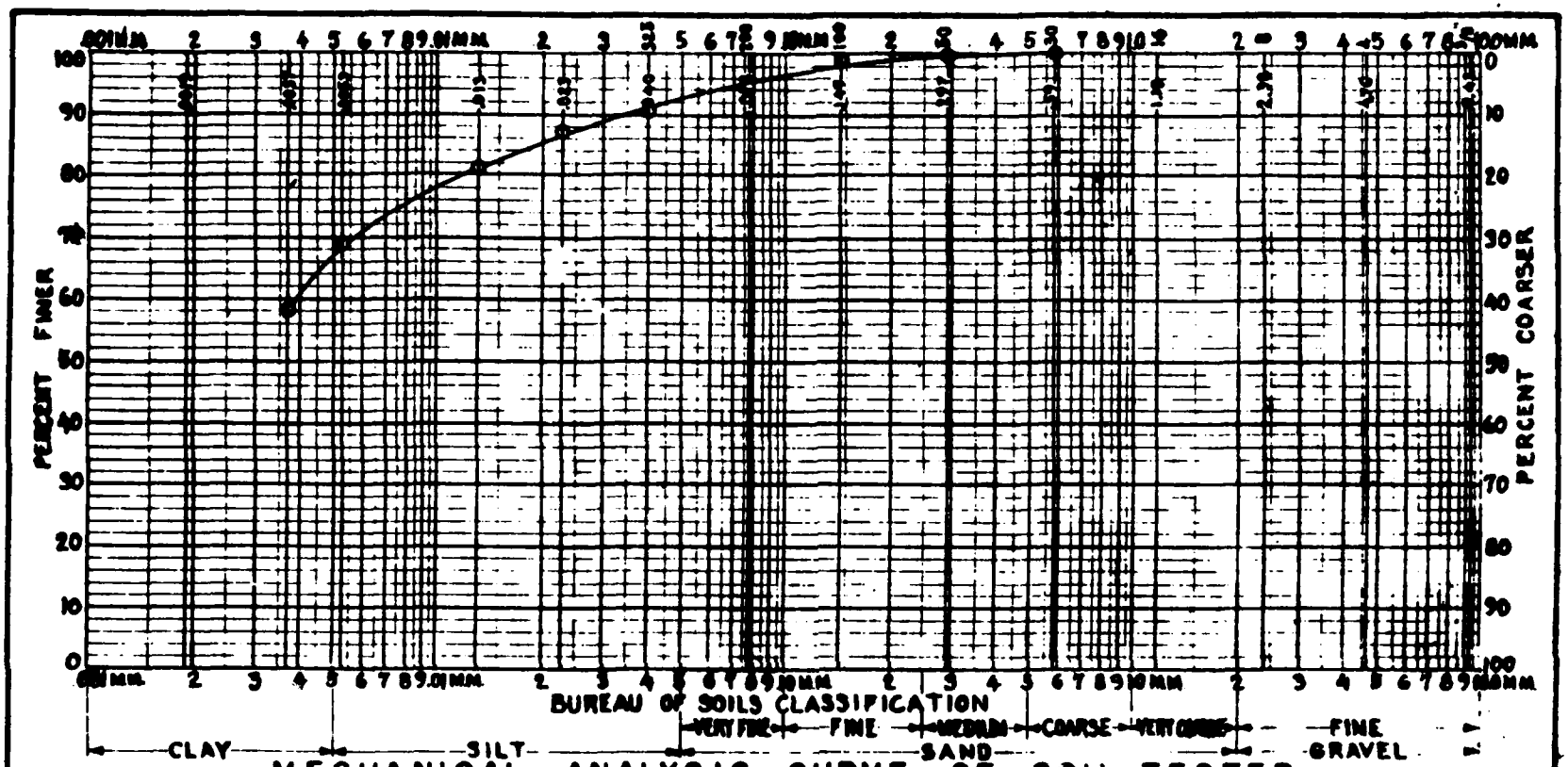
$c = \text{Cohesion} = 0.80$ T/sq.ft.

Notes: Undisturbed Sample
Consolidated Shear Tests
Increment Loading
Elevation 2115.0 - 2114.0
Depth 0.0 - 1.0
Cross Sectional Area of Sample 16.00 Sq. In.
Initial Thickness 0.75 inch
Sample immersed in water during test
Station 13 + 5 Range 14 + 5U

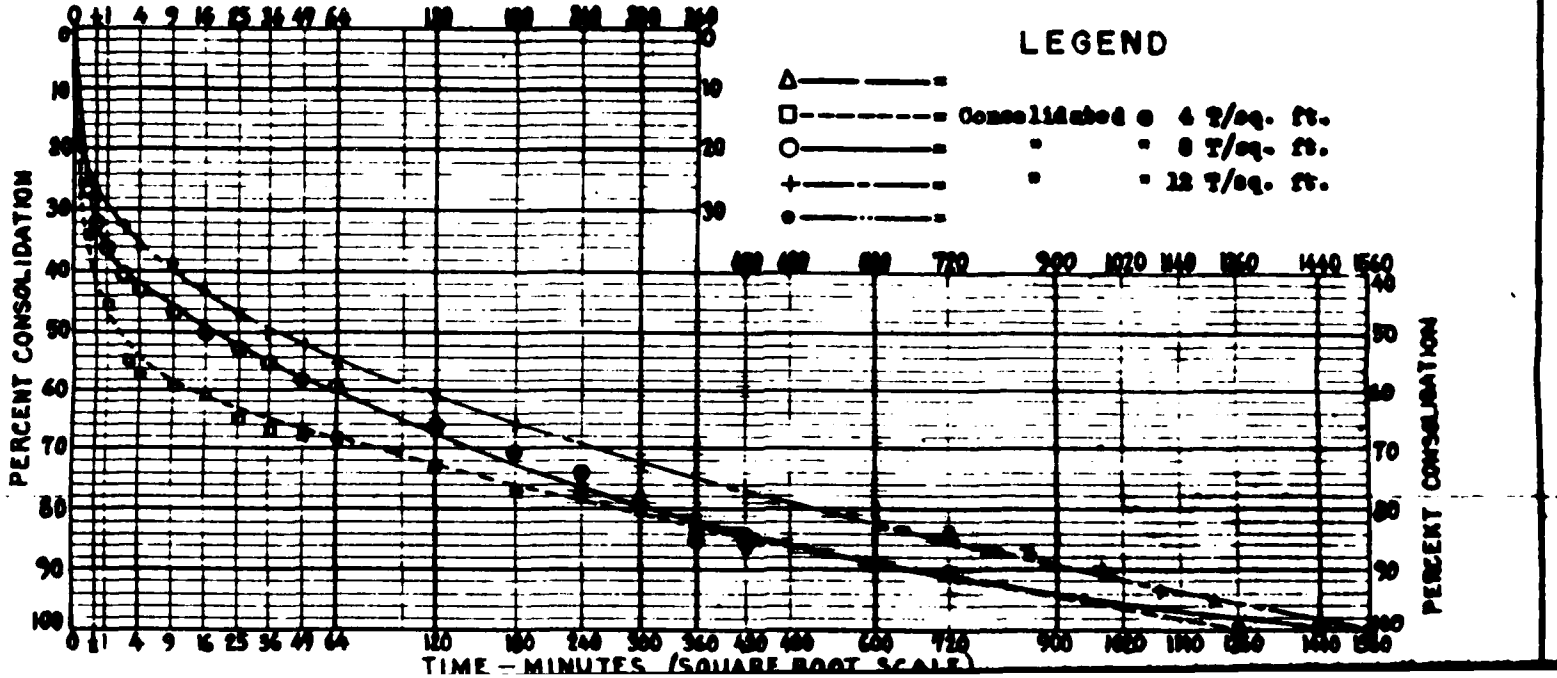
MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
SHEAR TESTS ON UNDISTURBED SAMPLES OF DISTURBED WEATHERED SHALE
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-4-39

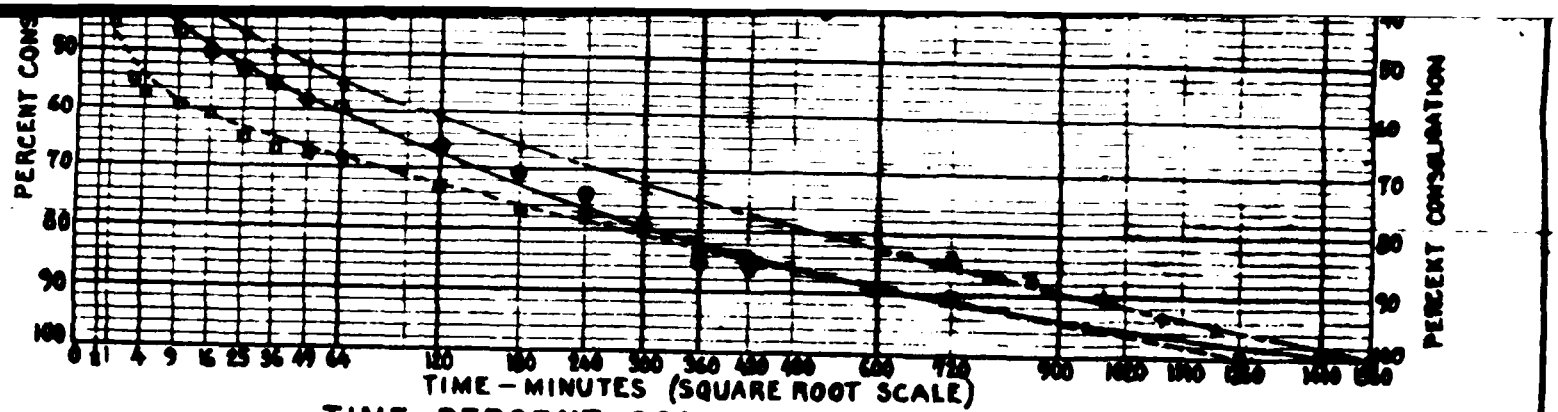
Submitted	Approval Recommended: Mississippi River Commission	Approved: Chief of Engineers
Drawn by: JLB	Traced by: EBC	Checked by: EBC
Transmitted with report dated	File No.	

CONSTRUCTION FOUNDATION REPORT
PLATE 26

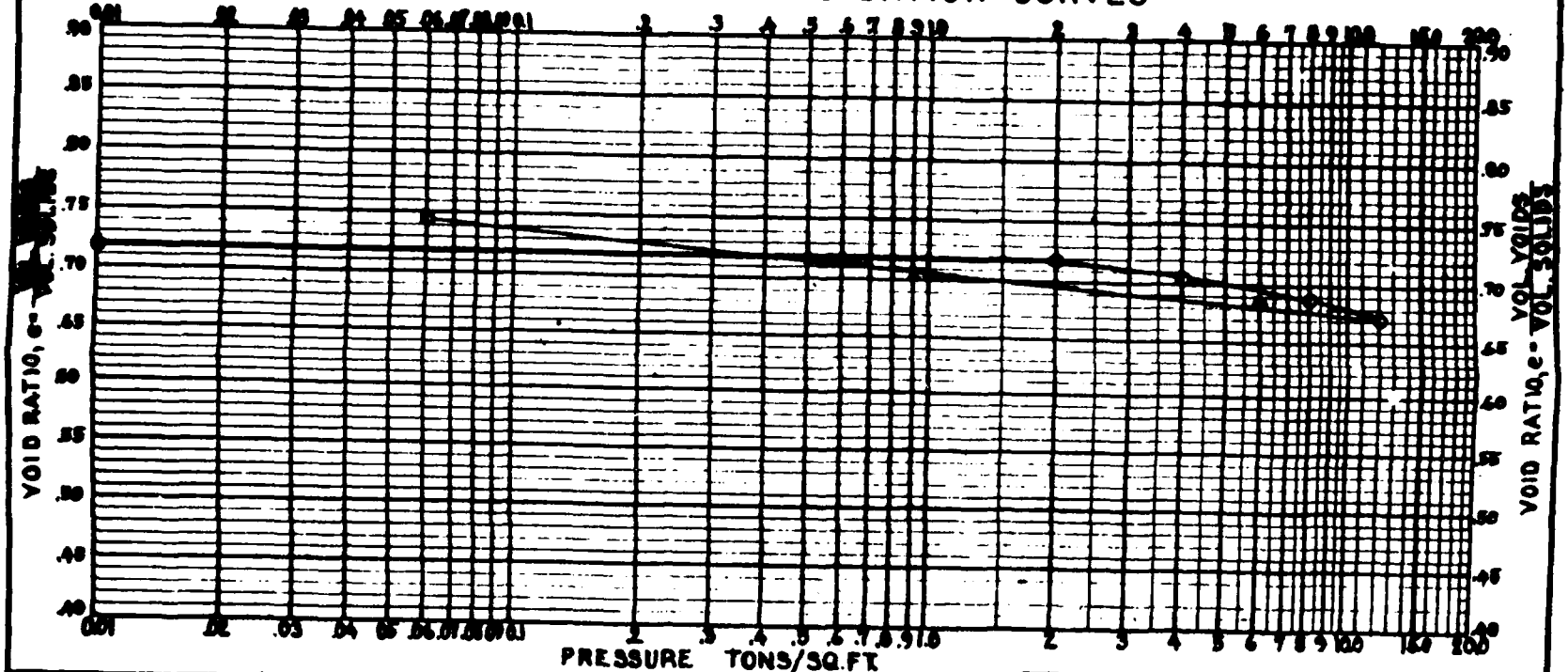


MECHANICAL ANALYSIS CURVE OF SOIL TESTED





TIME–PERCENT CONSOLIDATION CURVES



VERTICAL LOAD TONS/SQ.FT.	COMPACTION PERCENT*
0.00	0.00
2.00	0.09
4.00	0.80
8.00	1.82
12.00	2.04
6.00	2.24
0.07	- 1.26

* Total compaction in percent of original height of sample.

PRESSURE–VOID RATIO CURVE

Estimated Previous Consolidation = ... Tons/Sq.Ft.

Undisturbed sample of Weathered shale from Merriman Drift above Inlet Portals.
Immersed in Water during Test.
Initial Thickness 1.25 inches.
Cross Sectional Area 24.80 sq. in.

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION

FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATION TEST [illegible] SHALE
MERRIMAN DRIFT; SAMPLE #1

U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-29-36

Submitted	Approval Recommended	Approved
.....	[illegible] Corps of Engineers	[illegible] Corps of Engineers

Drawn by:	Traced by:	Checked by:	Transmitted with report dated	File No.
DWS	RBC			

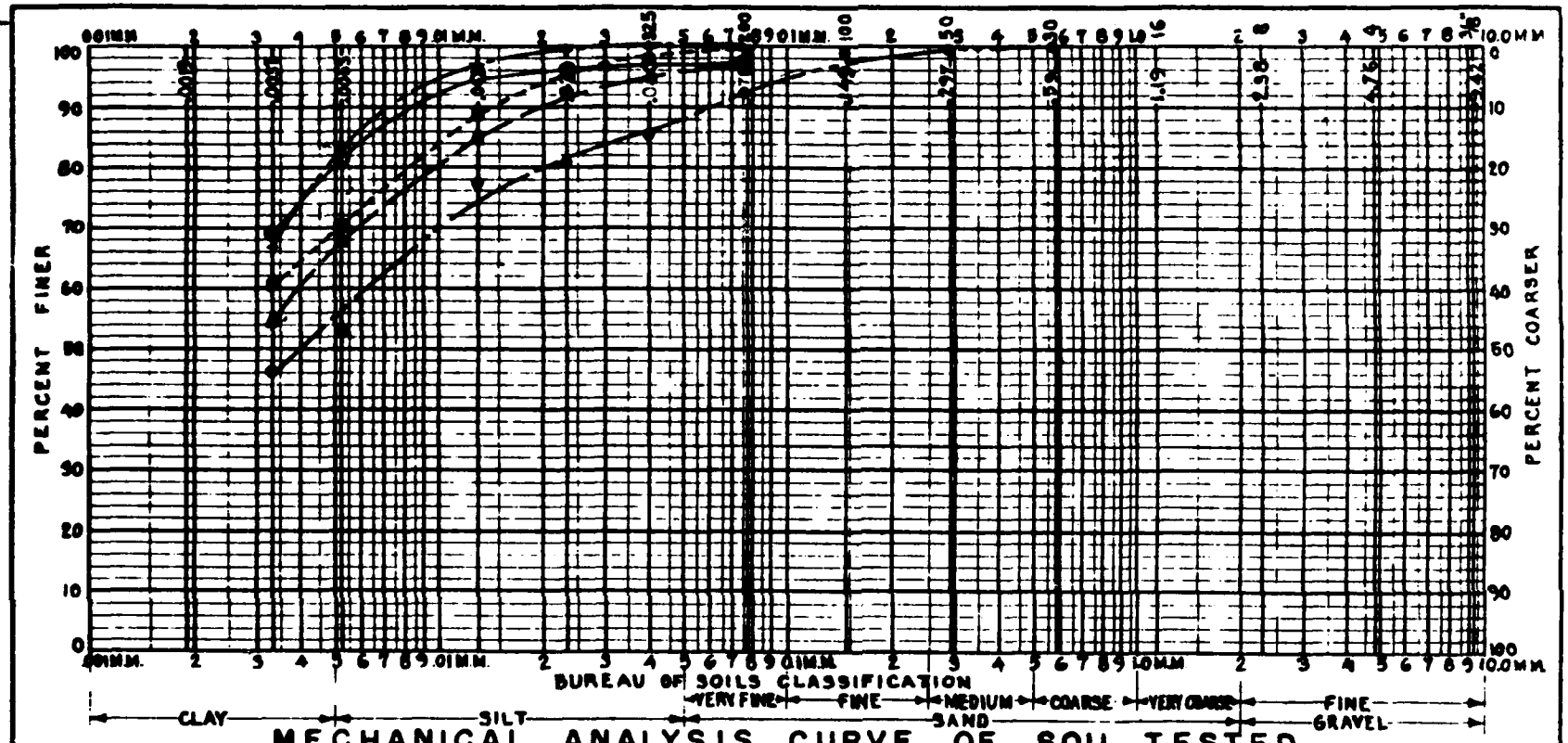
CONSTRUCTION FOUNDATION REPORT

PLATE 27

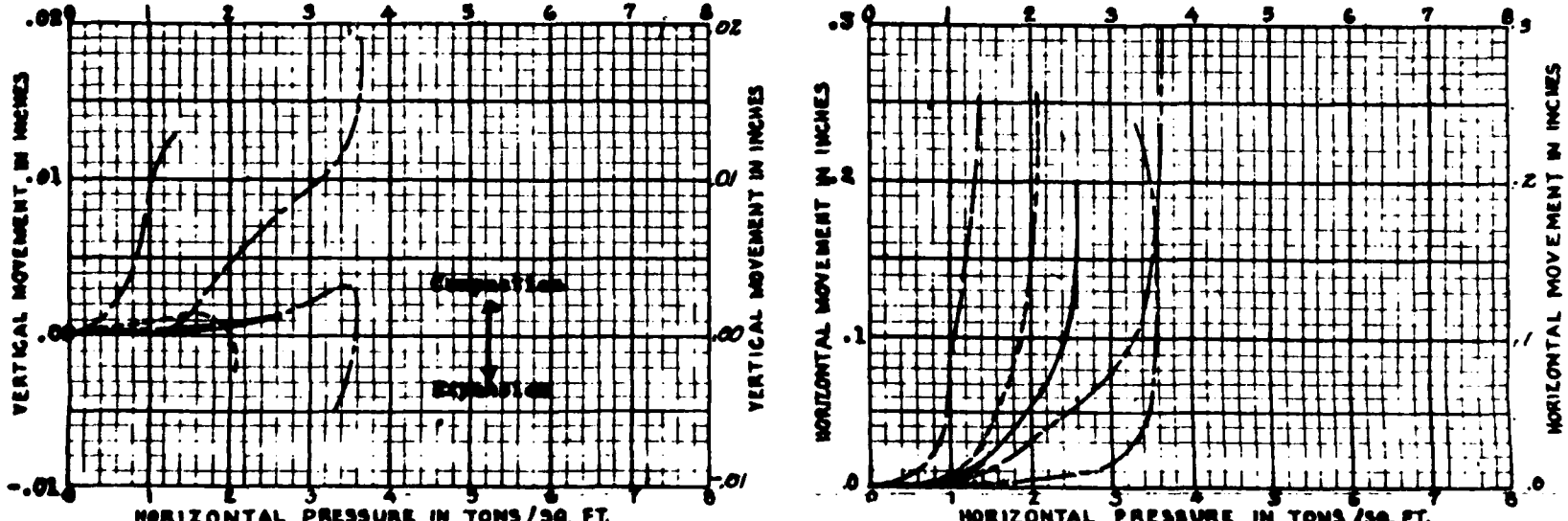
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(Face p. 30) No 13

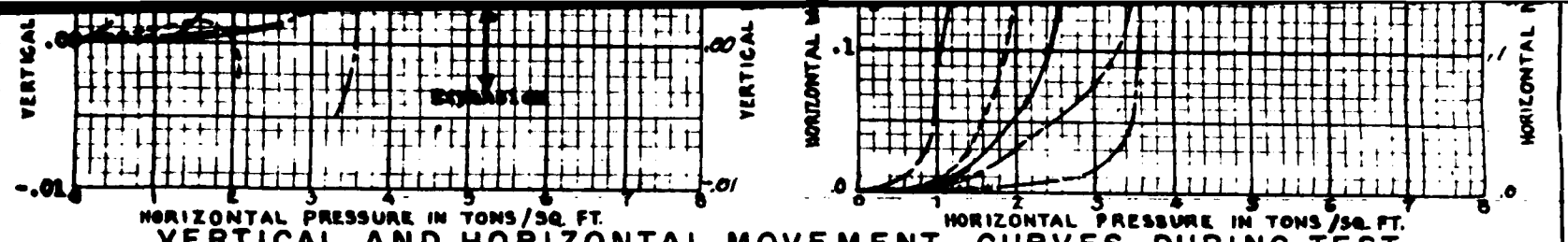
SHEET 28



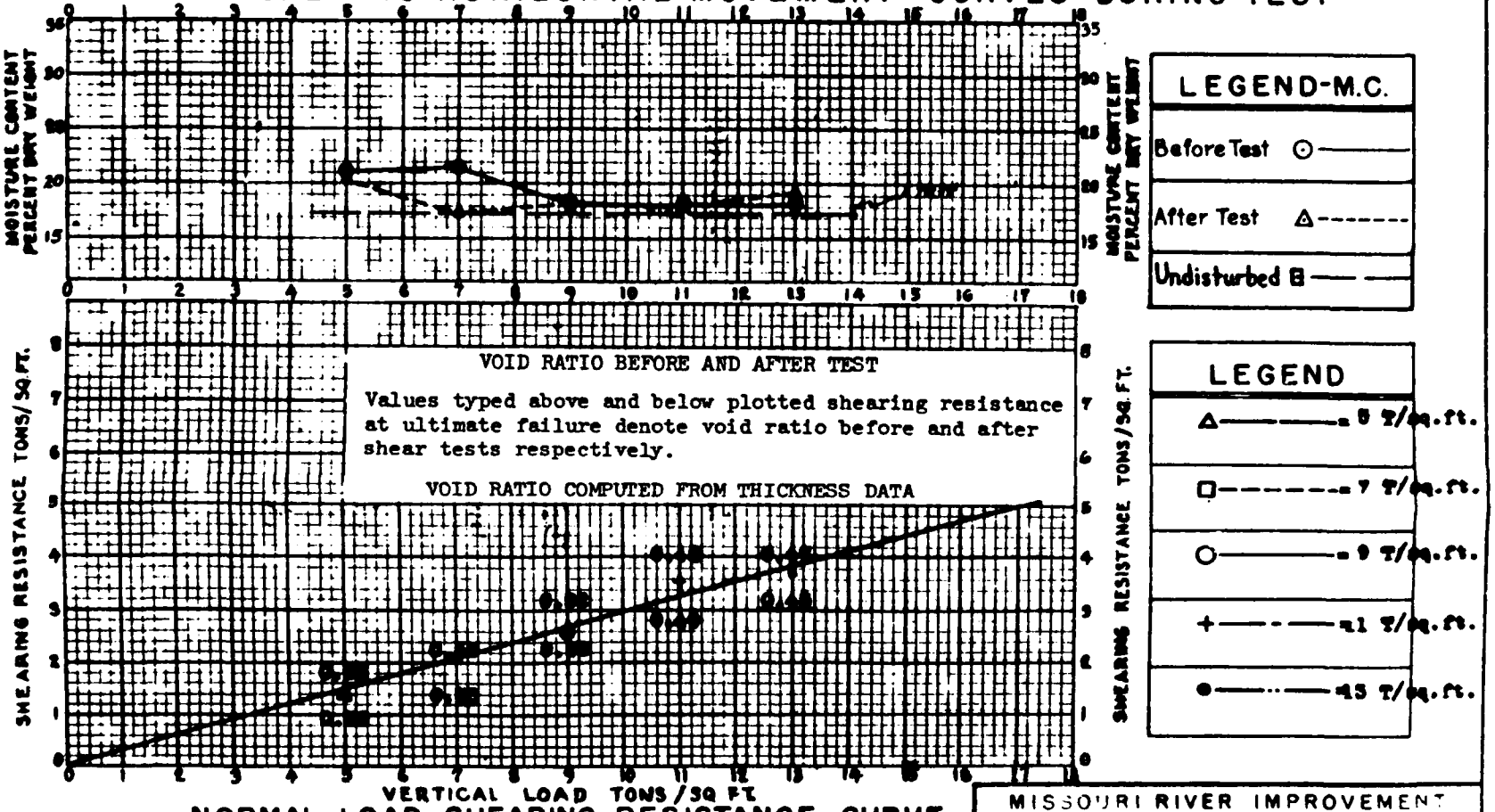
MECHANICAL ANALYSIS CURVE OF SOIL TESTED



VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



NORMAL LOAD-SHEARING RESISTANCE CURVE

$\tan \varphi = \frac{\text{Shearing Resistance} - \text{Cohesion (Tons/Sq.Ft.)}}{\text{Vertical Load (Tons/Sq.Ft.)}}$

$= 0.294$

$\varphi = 16°23'$

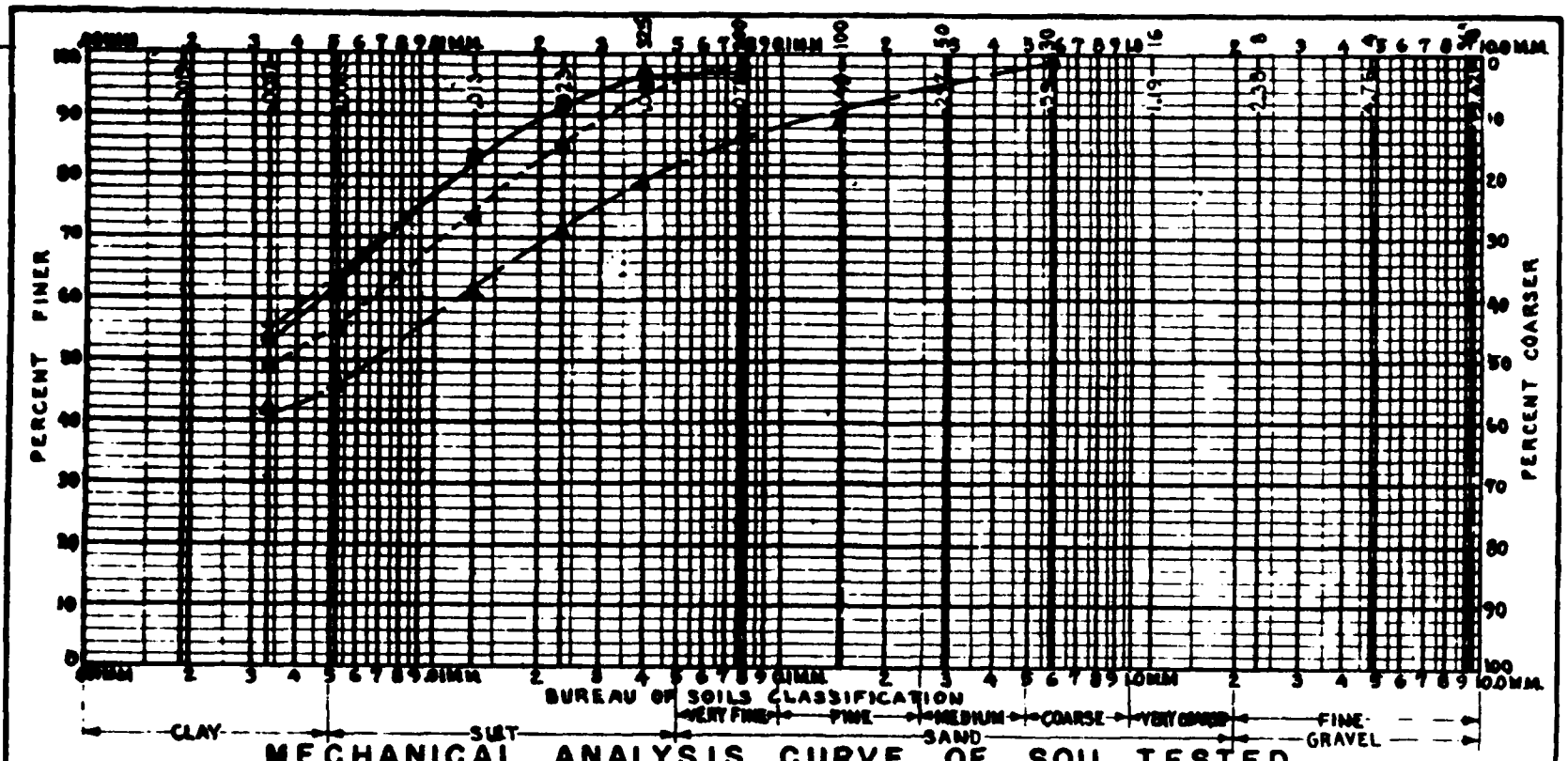
$c = \text{Cohesion} = 0.0\text{T/sq.ft.}$

Notes
Undisturbed Sample
Consolidated shear tests
Delta Loading
Cross Sectional Area of Sample 16.00 sq. in
Initial Thickness 0.75 inch
Sample Immersed in Water During Test
Note: Sample taken from block of soft shale in weathered zone in drift above inlet portals.

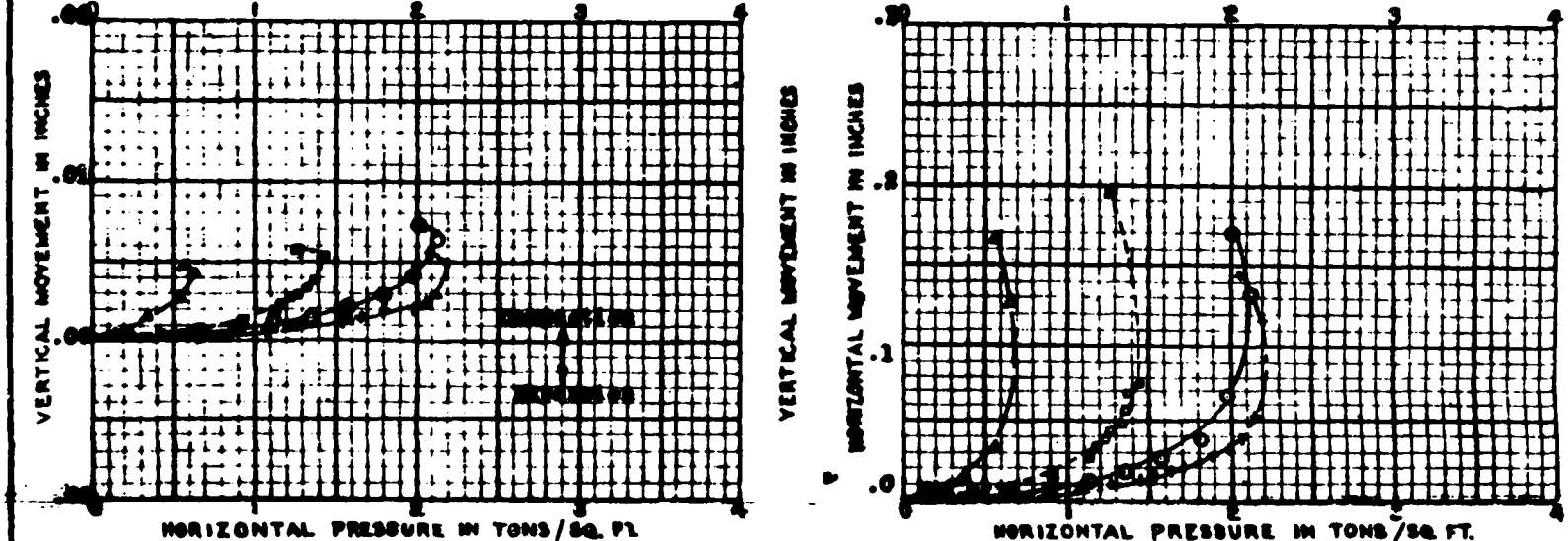
MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATED SHEAR TESTS SERIES # 1*
UND. WEATHERED SHALE--INLET PORTALS.
MERIDIAN DRIFT
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-20-39

Submitted	Special Recommendation	Approved
	Mo. River Div. Engineers	
Drawn J.I.	Traced by B.B.C.	Checked by D.R.D.	Transmitted with report dated	

CONSTRUCTION FOUNDATION REPORT
PLATE 28

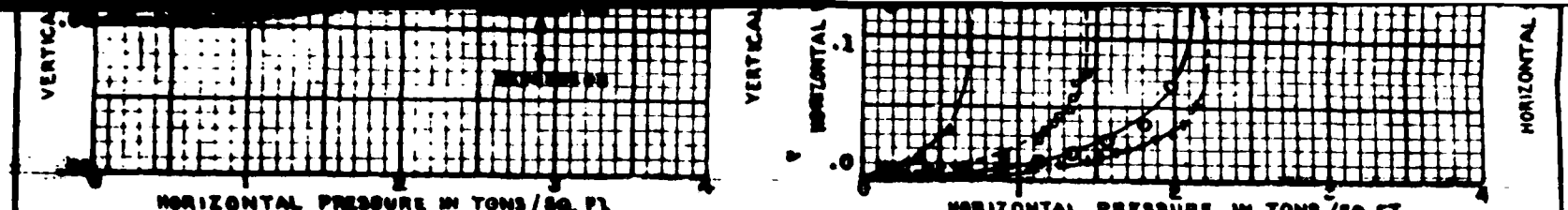


MECHANICAL ANALYSIS CURVE OF SOIL TESTED

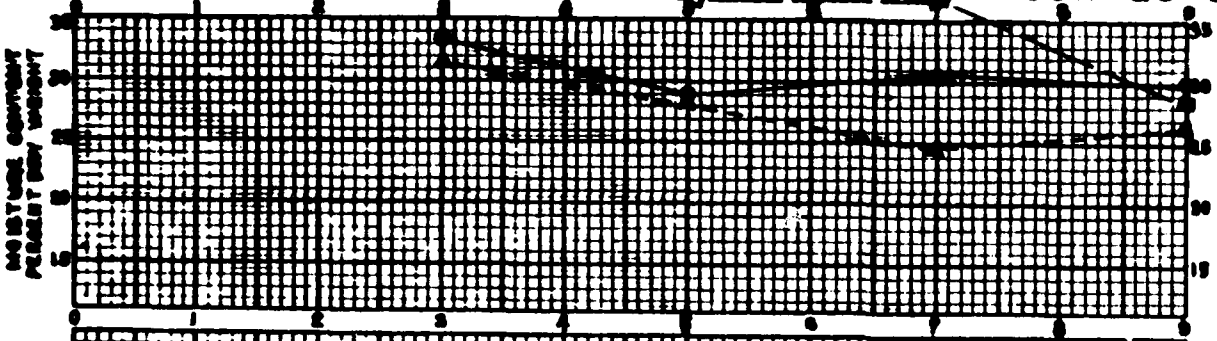


VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST

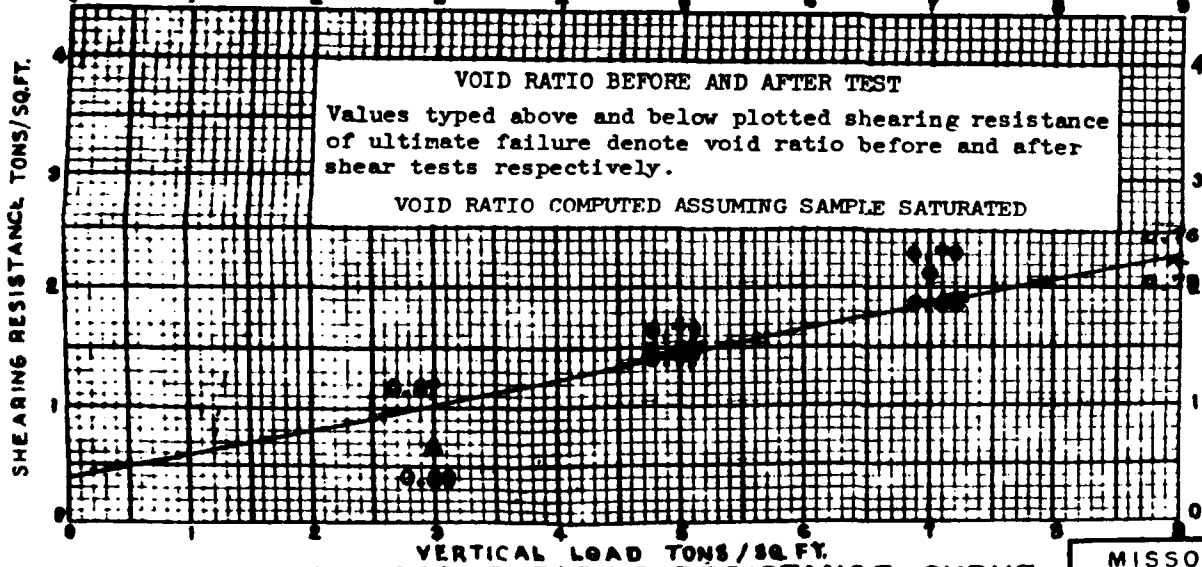


LEGEND-M.C.
Before Test ⊙———
After Test △-------
Undisturbed ■—·—·

VOID RATIO BEFORE AND AFTER TEST

Values typed above and below plotted shearing resistance of ultimate failure denote void ratio before and after shear tests respectively.

VOID RATIO COMPUTED ASSUMING SAMPLE SATURATED



LEGEND	
△————	= 3 T/ Sq.Ft.
□————	= 5 T/ Sq.Ft.
○————	= 7 T/ Sq.Ft.
+————	= 9 T Sq.Ft.
●————	=

VERTICAL LOAD TONS/SQ.FT.

NORMAL LOAD-SHEARING RESISTANCE CURVE

tan ϕ = Shearing Resistance − Cohesion (Tons/Sq.Ft.) / Vertical Load (Tons/Sq.Ft.) = 0.210
ϕ = 11°50'
c = Cohesion = 0.00 T/sq.ft.

Note: Undisturbed Samples
Consolidated Shearing Tests
Delta Loading
Elevation 2053.0-2050.8
Depth 46.3-47.5
Cross Sectional Area of Sample -16.00 sq. in..
Initial Thickness 0.75 inch
Sample Immersed in Water During Test
Station SU 27/16 Range 22/25

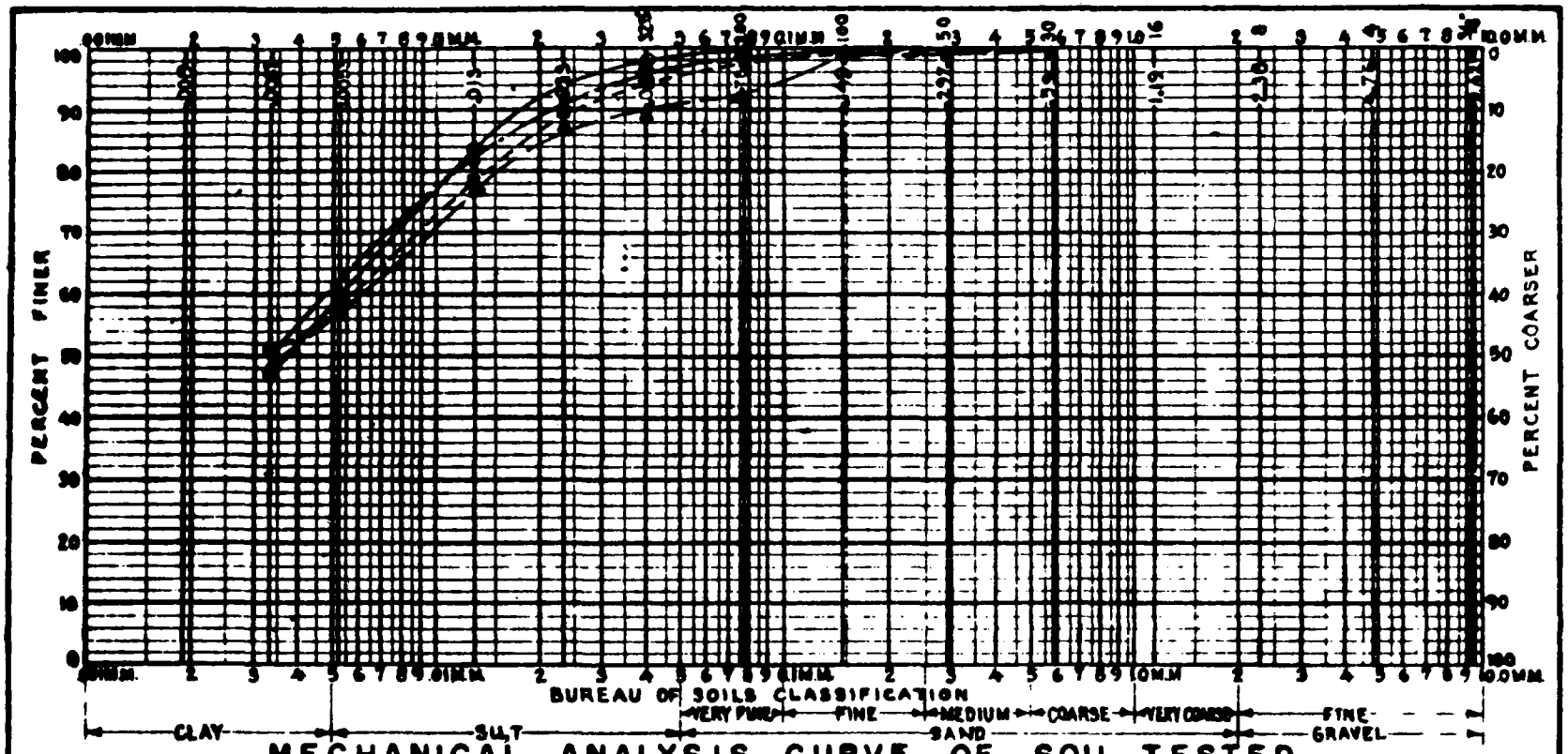
MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
SHEAR TESTS SURFACE CLAY
HOLE C-11 SAMPLE # 3'
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-11-39

Submitted	Approval Recommended	Approved

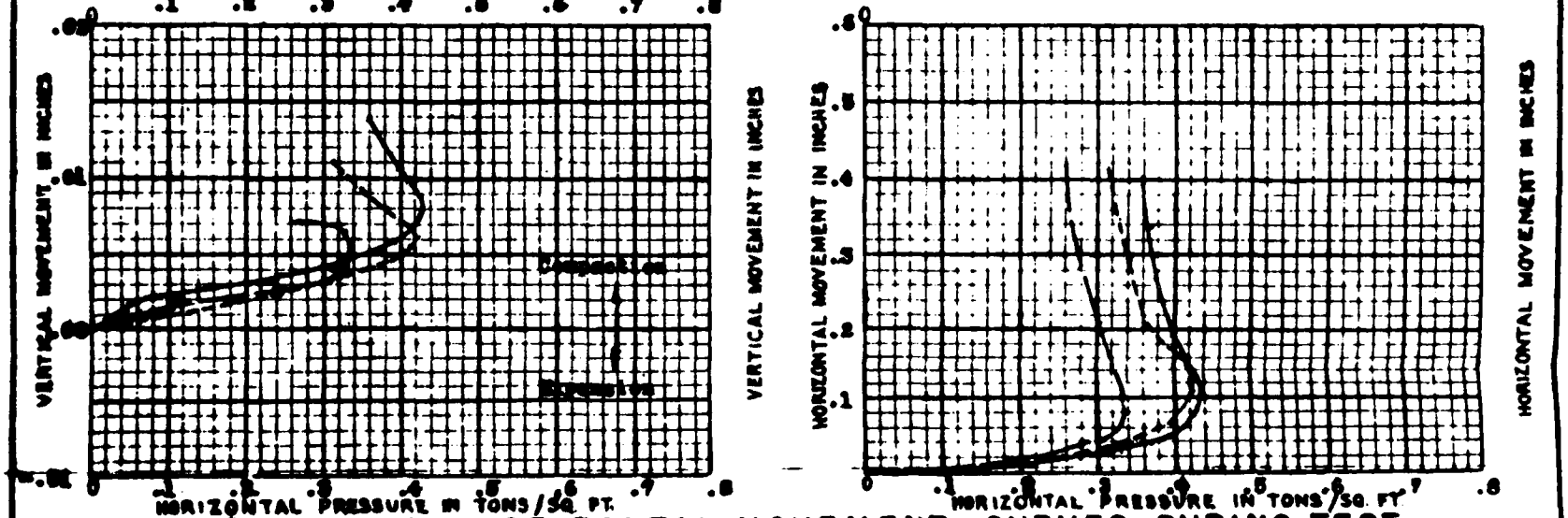
Drawn by	Traced by	Checked by	Transmitted with report dated	File No
J L S	B B C	D B D		

CONSTRUCTION FOUNDATION REPORT

PLATE 29

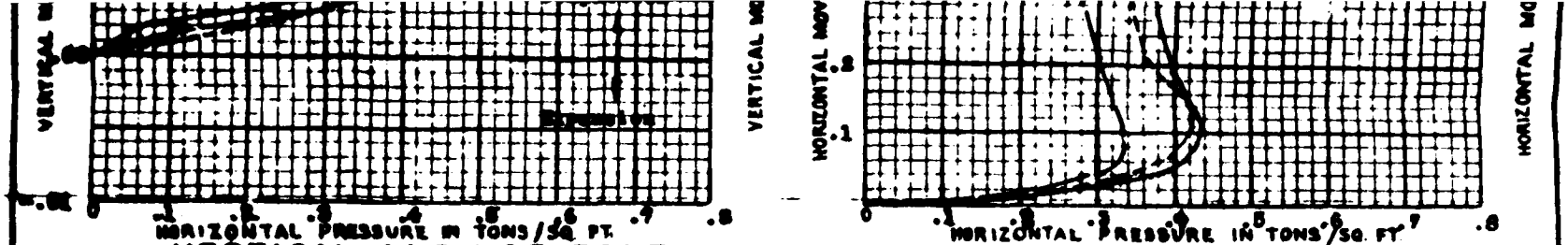


MECHANICAL ANALYSIS CURVE OF SOIL TESTED

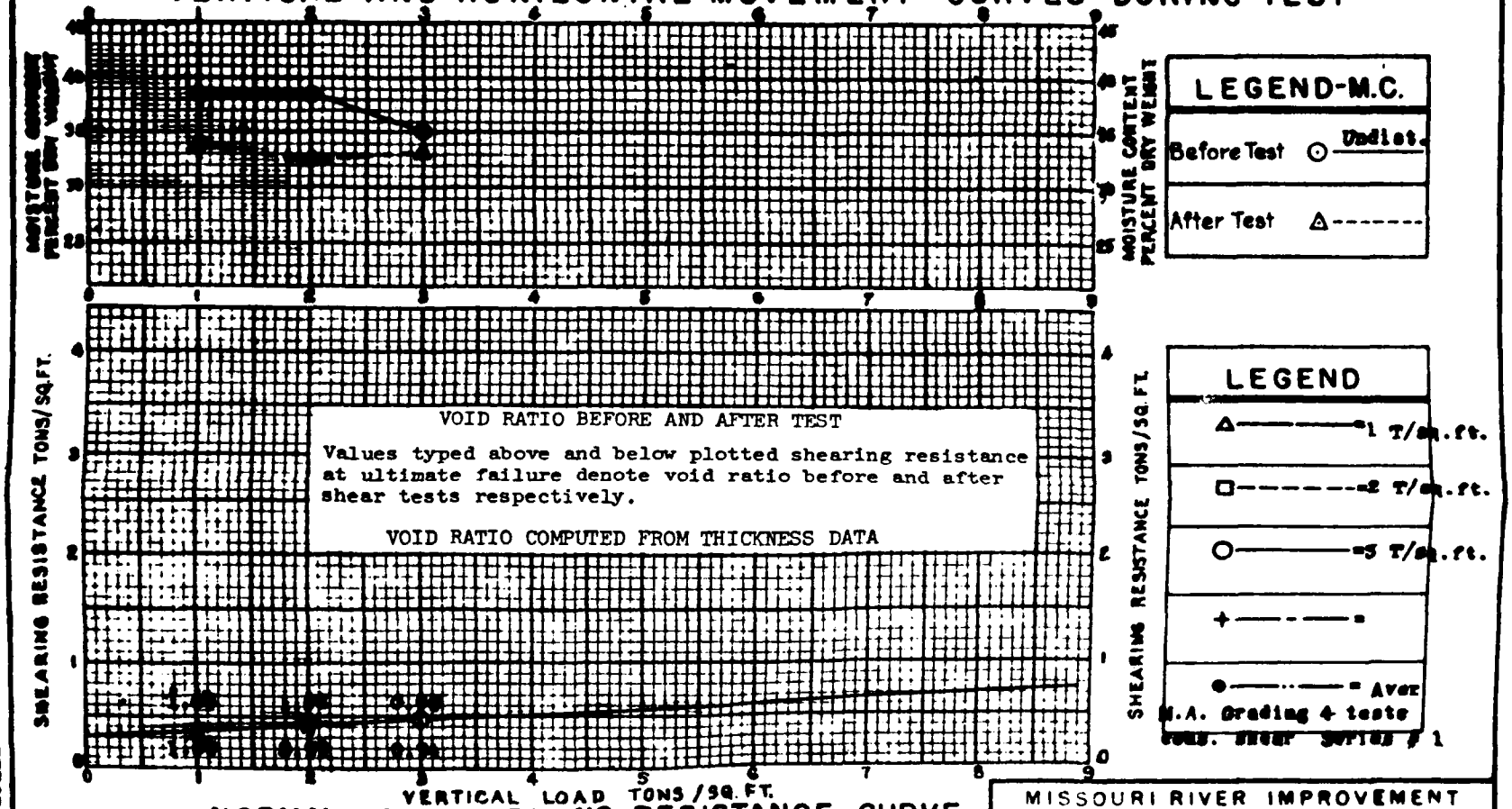


VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



NORMAL LOAD-SHEARING RESISTANCE CURVE

Shearing Resistance = Cohesion (Tons/Sq.Ft.) + Vertical Load (Tons/Sq.Ft.) tan φ

tan φ = 0.051

φ = 2°55'

c = Cohesion = 0.30 T/sq.ft.

Notes: Undisturbed Sample
Quick Shear Tests
Constant Strain Loading
Elevation 2053.1-2052.6
Depth- 45.2-45.6
Cross Sectional Area of Sample 16.00 sq. in.
Initial Thickness = 0.75 inch
Sample Immersed in Water During Test
Station 27+16 Range 22+2

Maximum rate of horizontal movement 0.021" /min.

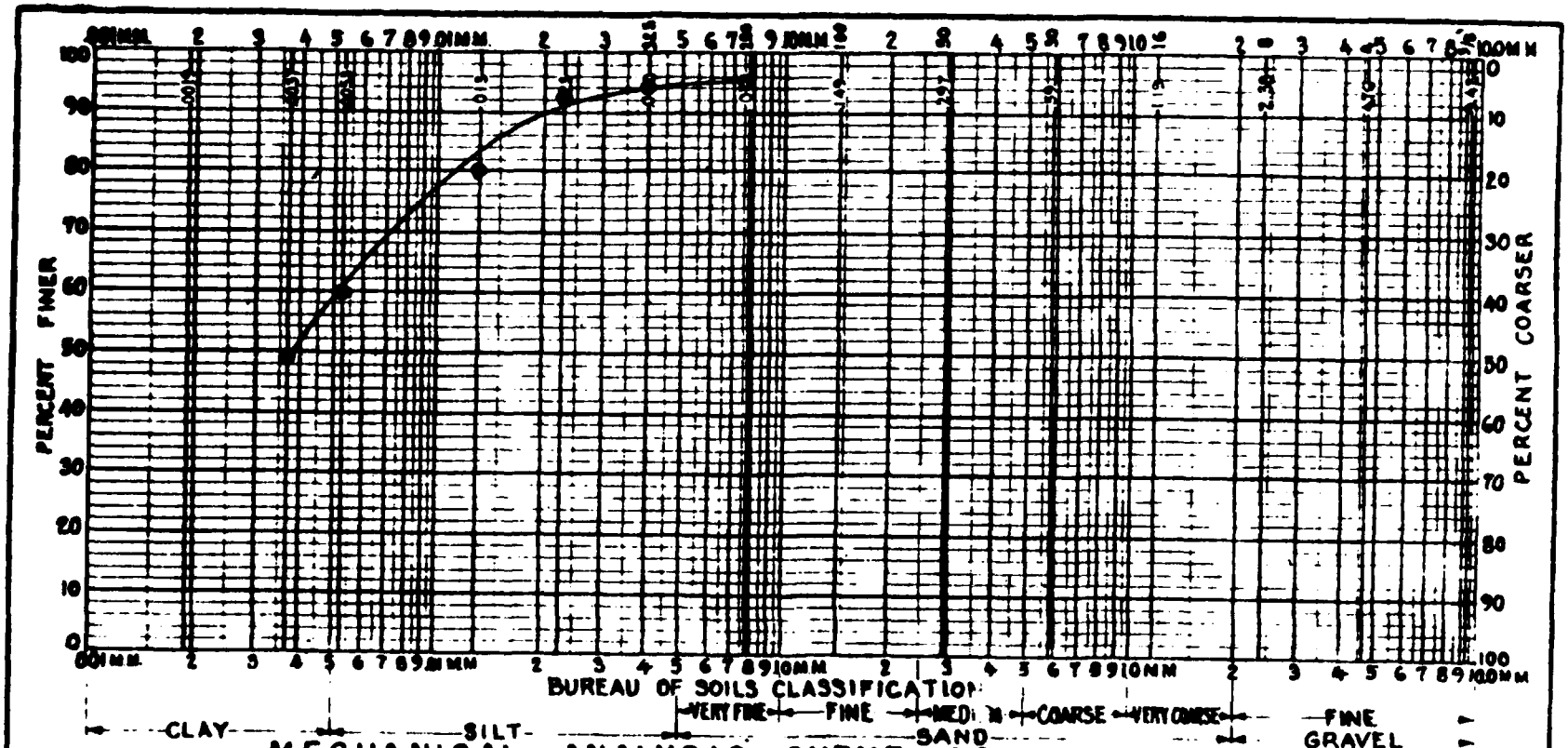
MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
Quick Shear Tests-Series # 3
SURFACE CLAY-HOLE-11 Sample # 2
U.S. ENG. DIST. OFFICE, FORT PECK, MONT. 2-4-39

Engineer	Approval Recommended	Approved
	Major, Corps of Engineers	Lieut. Colonel, Corps of Engineers

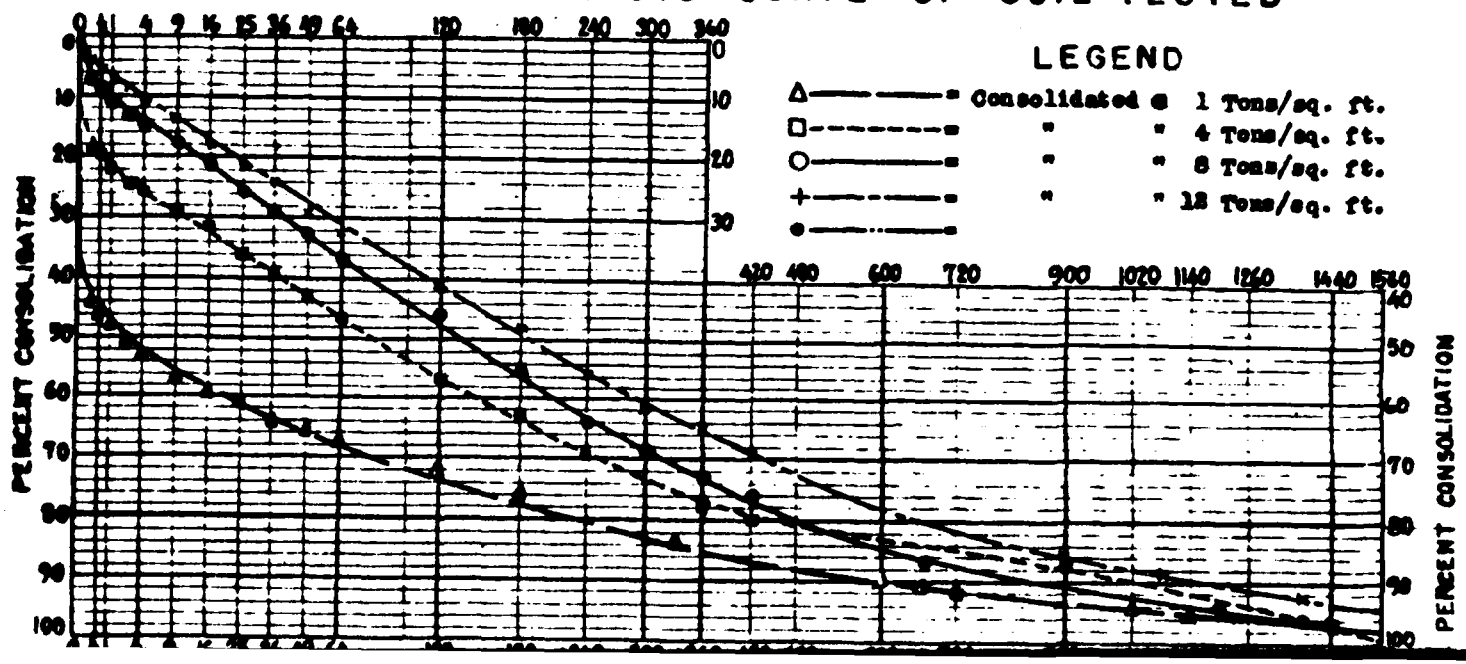
Drawn by	Traced by	Checked by	Transmitted with report dated	File No.
J L B	W B C	J L P		

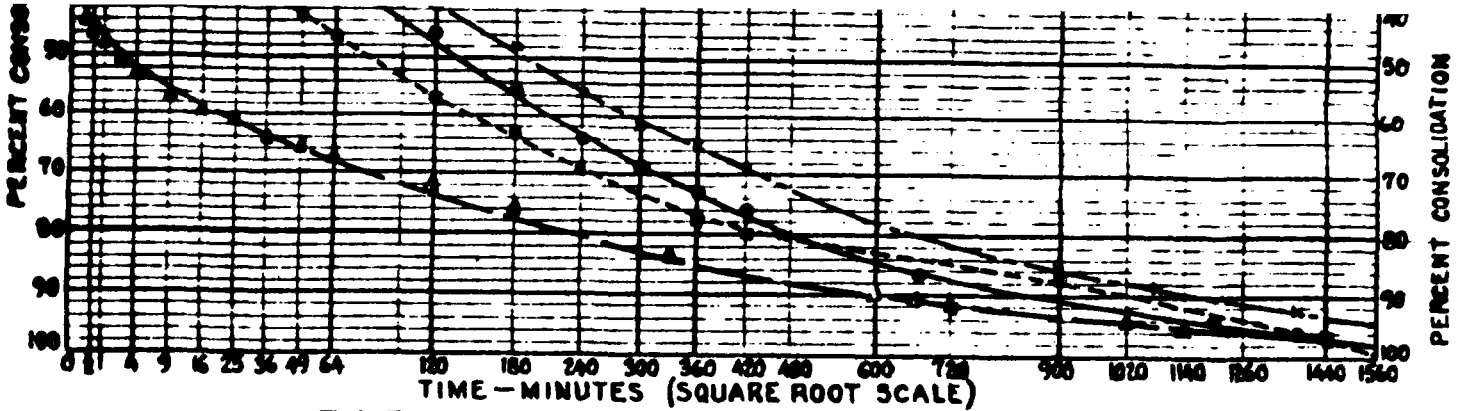
CONSTRUCTION FOUNDATION REPORT

PLATE 30

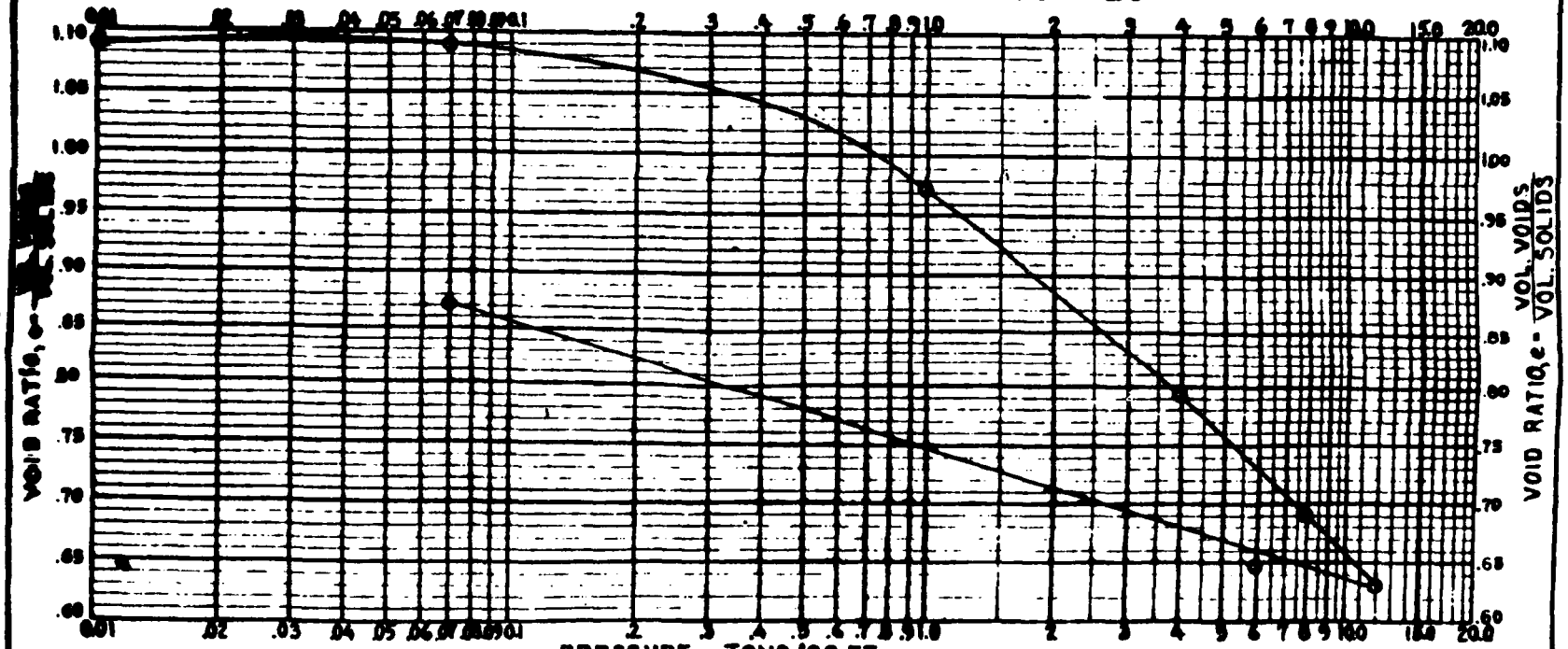


MECHANICAL ANALYSIS CURVE OF SOIL TESTED





TIME—PERCENT CONSOLIDATION CURVES



PRESSURE-VOID RATIO CURVE

Estimated Previous Consolidation - ..... Tons/Sq.Ft.

VERTICAL LOAD TONS/SQ.FT.	COMPACTION PERCENT e
0.00	0.00
0.07	0.00
1.00	5.55
4.00	14.10
8.00	19.11
16.00	21.75
4.00	21.00
0.07	10.17

e Total compaction in percent of original height of sample.

Undisturbed Sample Immersed in Water during test
Station 27 + 16, Range 22 + 22-U
Initial Thickness 1.00 inch
Cross Sectional Area 24.80 sq. in.
Elevation - 2051.8 - Depth 46.5'

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATION TEST SURFACE CLAY
HOLE C-11, SAMPLE NO. 3
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-13-39

Submitted	Approval Recommended	Approved
.....		

Drawn by	Traced by	Checked by	Transmitted with report dated	File No.
DWS	EBC	WA		

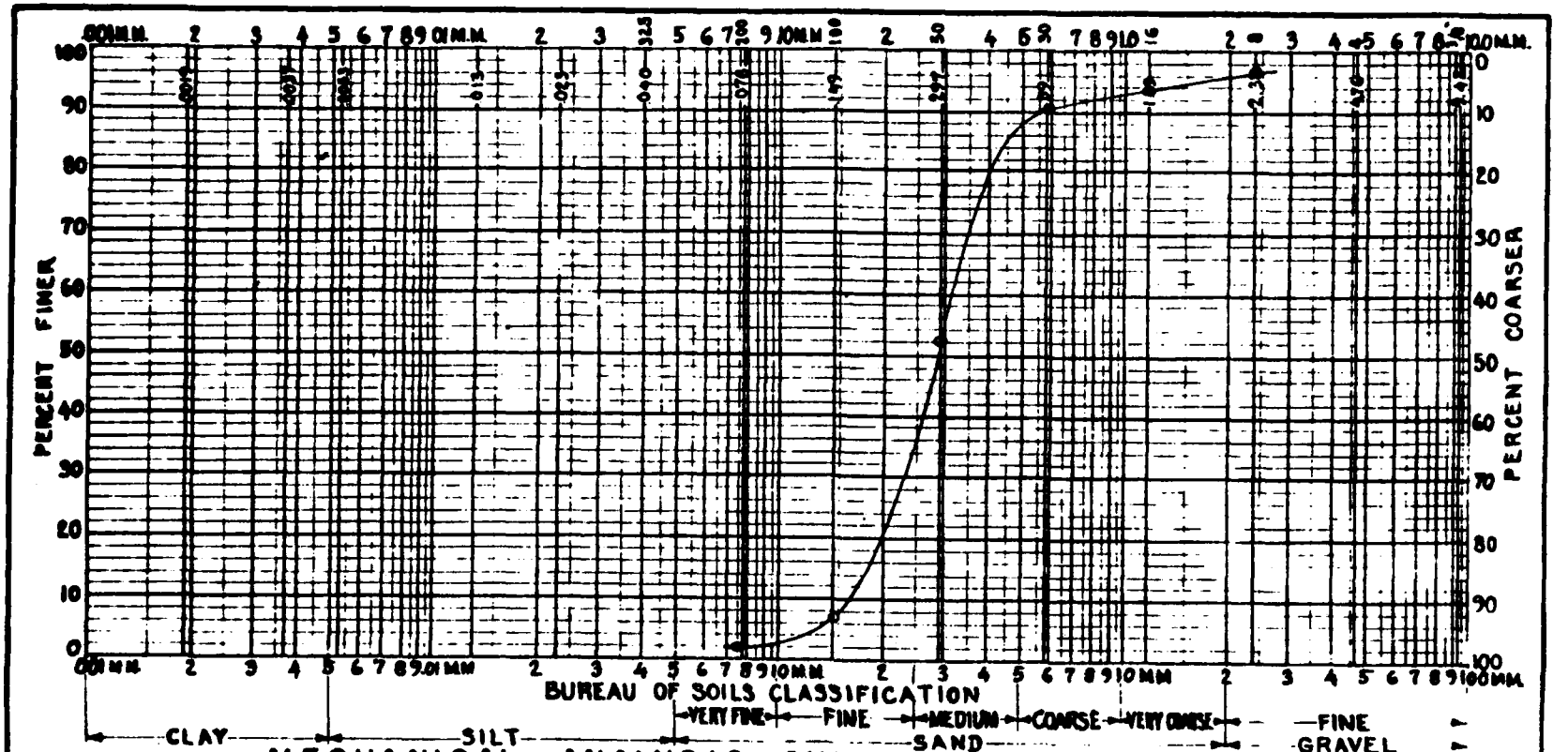
CONSTRUCTION FOUNDATION REPORT

PLATE 31

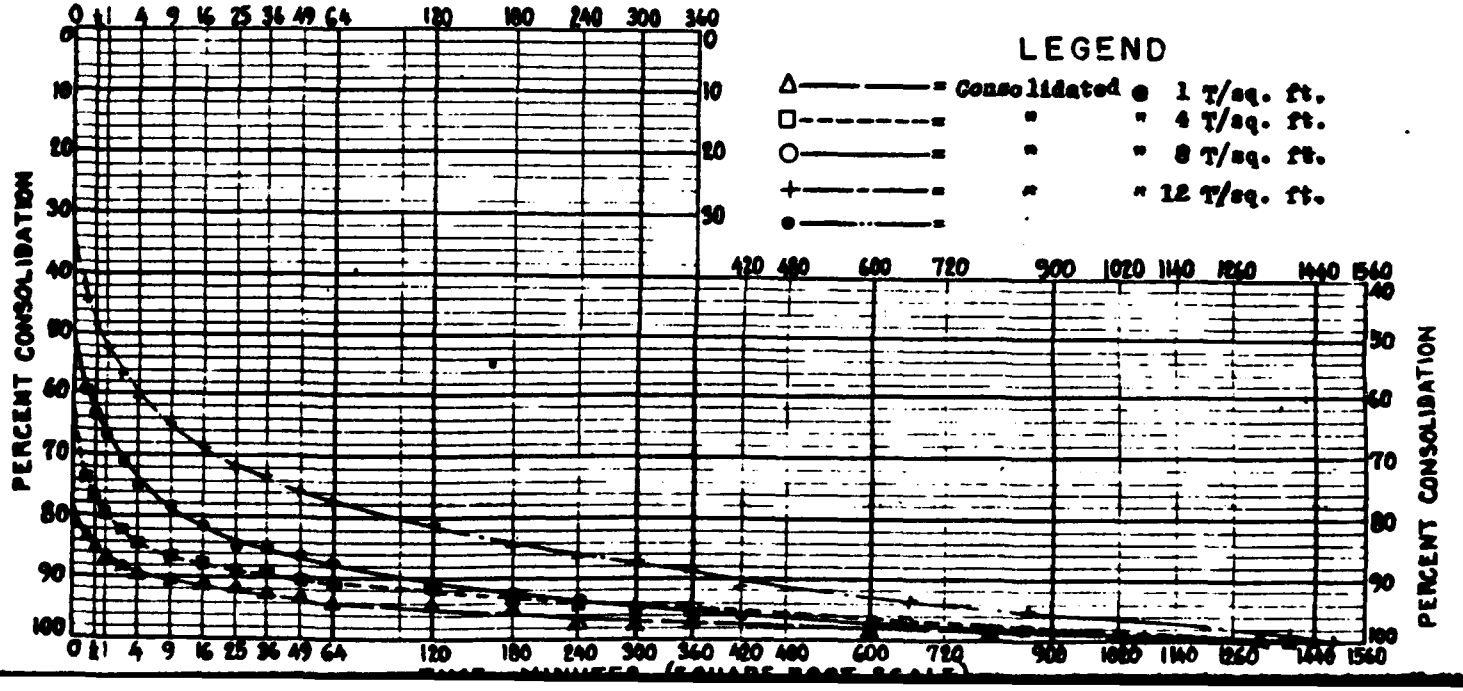
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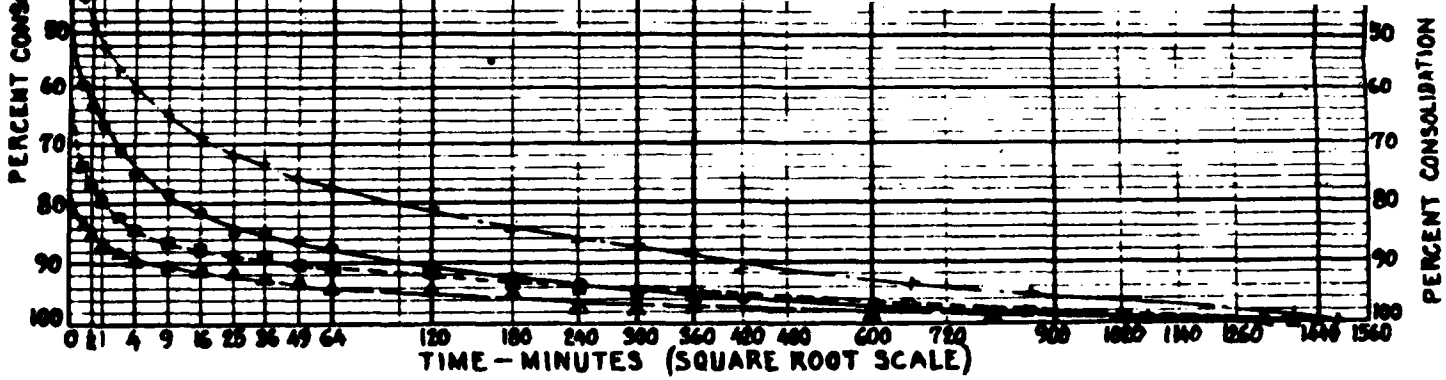
(Face p. 30) No. 7

SHEET 22

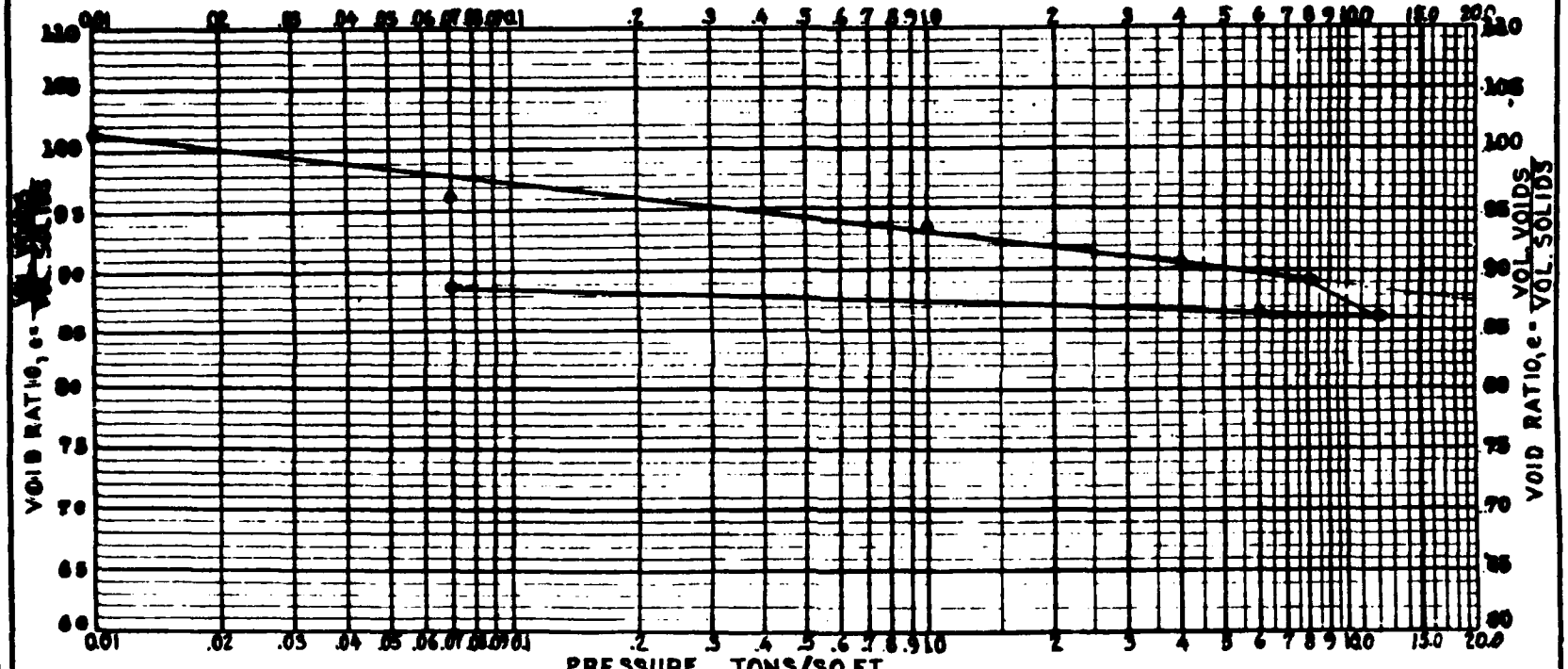


MECHANICAL ANALYSIS CURVE OF SOIL TESTED





TIME–PERCENT CONSOLIDATION CURVES



VERTICAL LOAD TONS/SQ.FT.	COMPACTION PERCENT*
0.00	0.00
0.07	1.76
1.00	3.07
4.00	4.68
8.00	5.82
12.00	6.80
8.00	6.87
0.07	5.45

* Total compaction in percent of original height of sample.

PRESSURE–VOID RATIO CURVE

Estimated Previous Consolidation = ... Tons/Sq.Ft.

Undisturbed Sample Immersed in Water during test
Station 41 + 00; Range 0 + 26-U
Initial Thickness 2.50 inch
Cross Sectional Area 24.80 sq. in.
Elevation 47.2; Depth 8'

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION

FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATION TEST, TRANSITION MATERIAL
TEST PIT NO. 5; SERIES #1

U.S. ENGINEER OFFICE, FORT PECK, MONT.

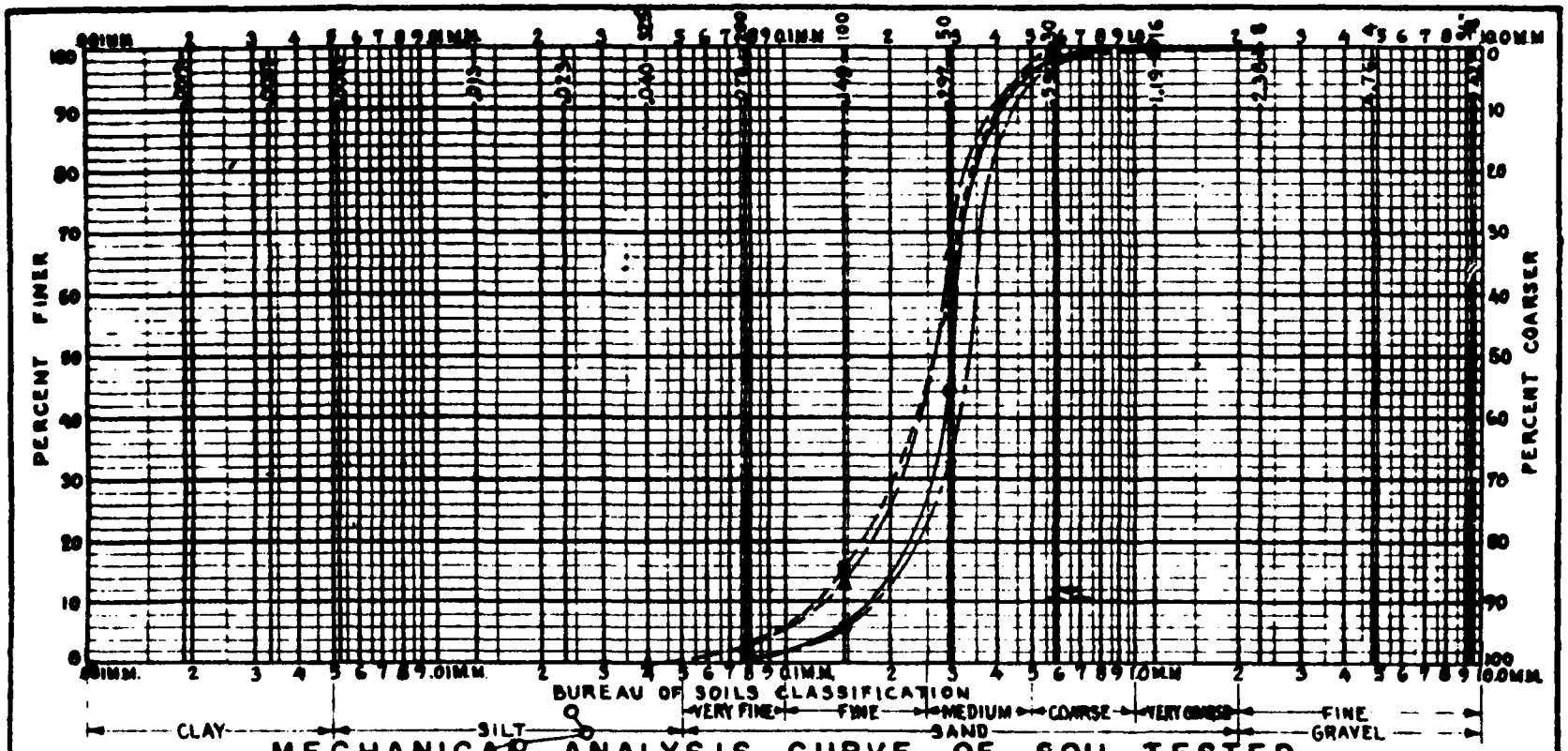
Submitted	Approval Recommended	Approved
.....	Major, Corps of Engineers	Lt. Col., Corps of Engineers

Drawn by	Traced by	Checked by	Transmitted with report dated	File No.
DHS	EBC			

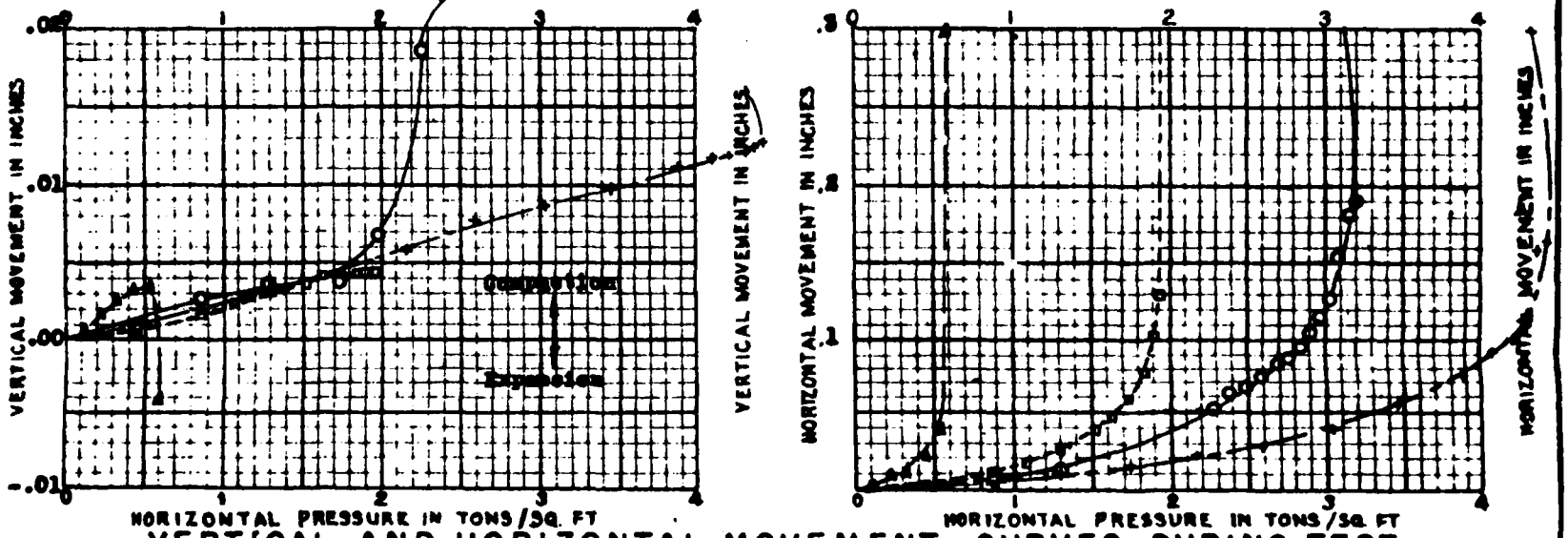
CONSTRUCTION FOUNDATION REPORT

PLATE 32

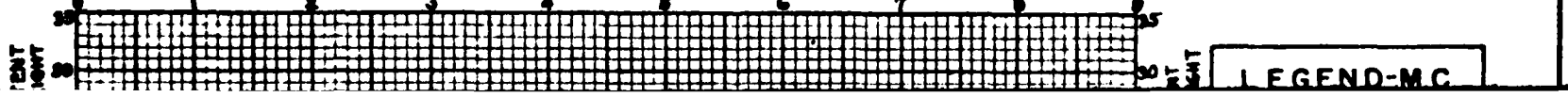
SHEET 5

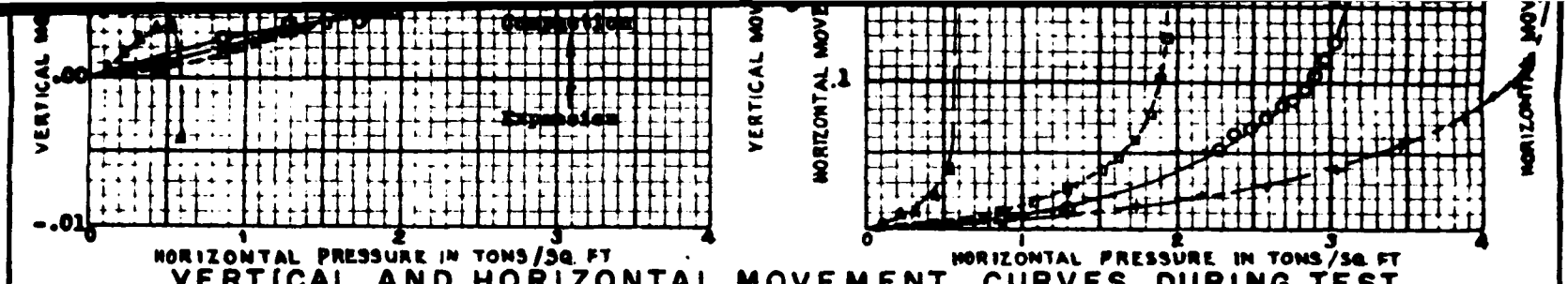


MECHANICAL ANALYSIS CURVE OF SOIL TESTED

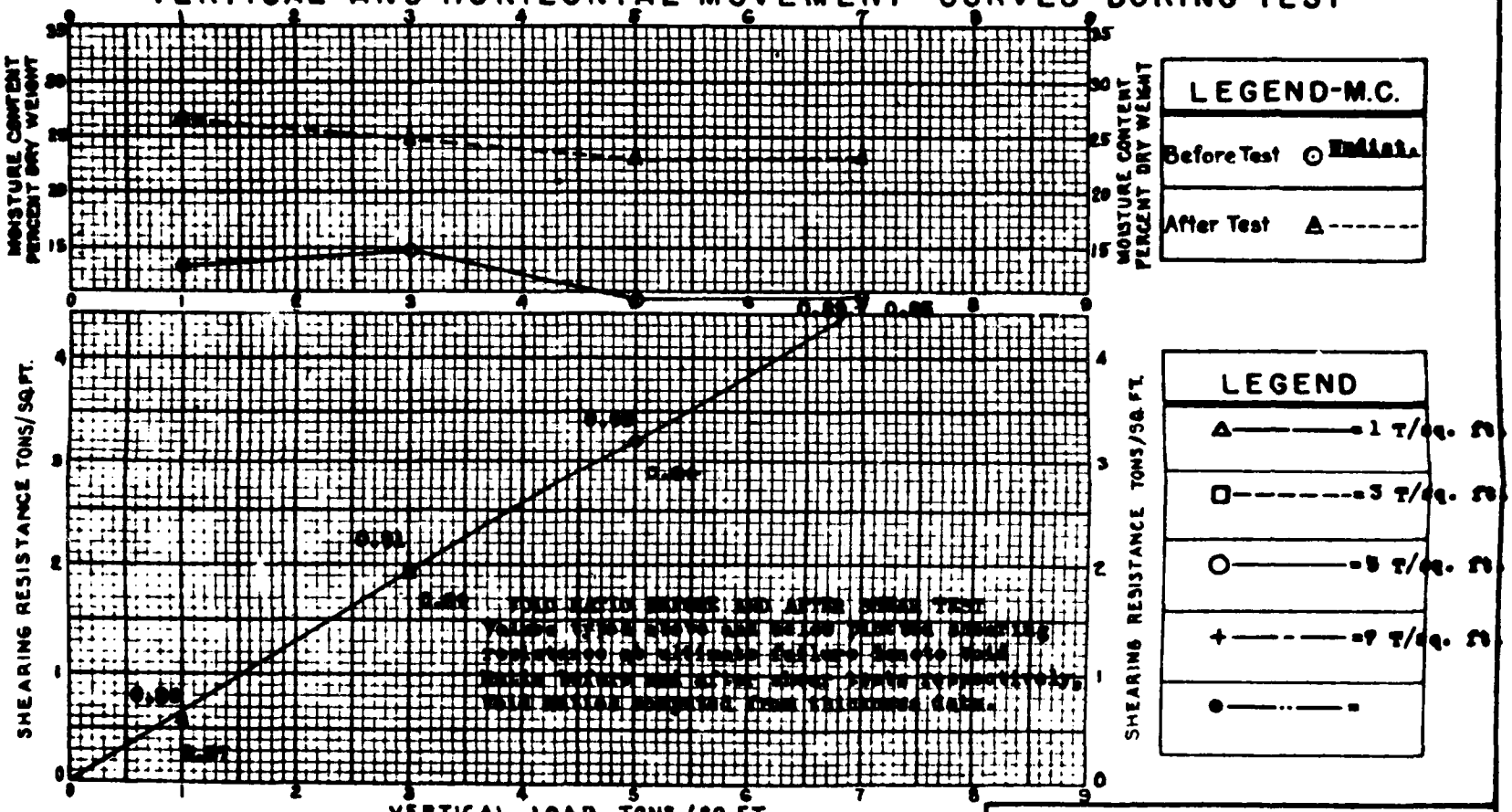


VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST



NORMAL LOAD-SHEARING RESISTANCE CURVE

tan ϕ = Shearing Resistance − Cohesion (tons/sq ft) / Vertical Load (tons/sq ft) = 0.640	
ϕ = 32° 30'	
c = Cohesion = 0.07 t/sq. ft.	

Notes:

Undisturbed Sample Test Pit #5
Consolidated Shear Tests
Increment Loading
Elevation 2242.7
Depth - 8'
Cross Sectional Area of Sample 16.00 sq. in.
Initial Thickness 0.75 inch.
Sample Immersed in Water During Test
Station 41 + 00, Range 0 + 86-0

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATED SHEAR TESTS SERIES #2
TRANSITION ZONE MATERIAL
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-27-39

Approval Recommended	Approved
Major, Corps of Engineers	Lt. Col., Corps of Engineers

Drawn by	Traced by	Checked by	Transmitted in the report dated	File No.
JLB	KBC	DHD		

CONSTRUCTION FOUNDATION REPORT
PLATE 33

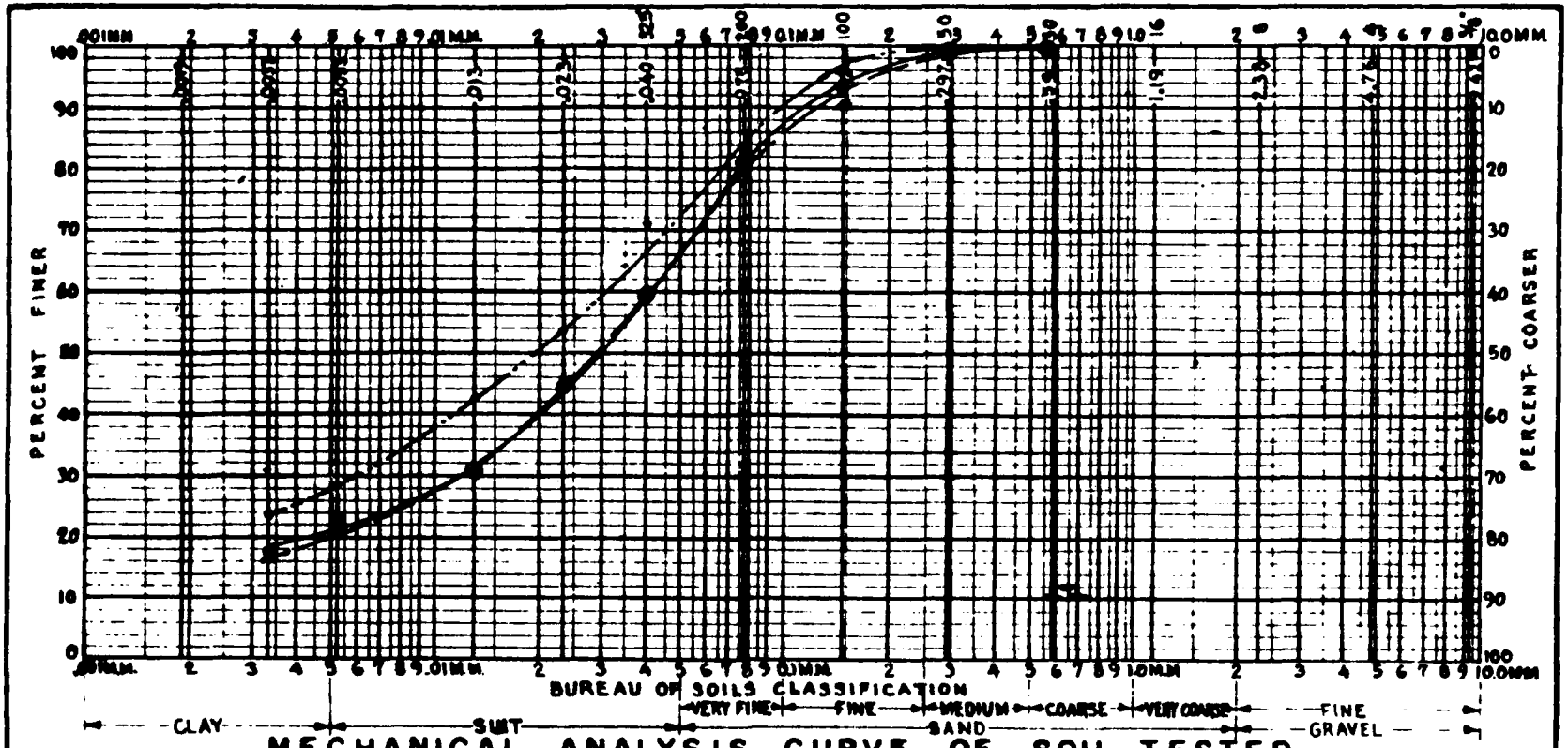
SHEET 4

CALYX HOLE NO. 4—STATION 14+79, RANGE 0+87-U

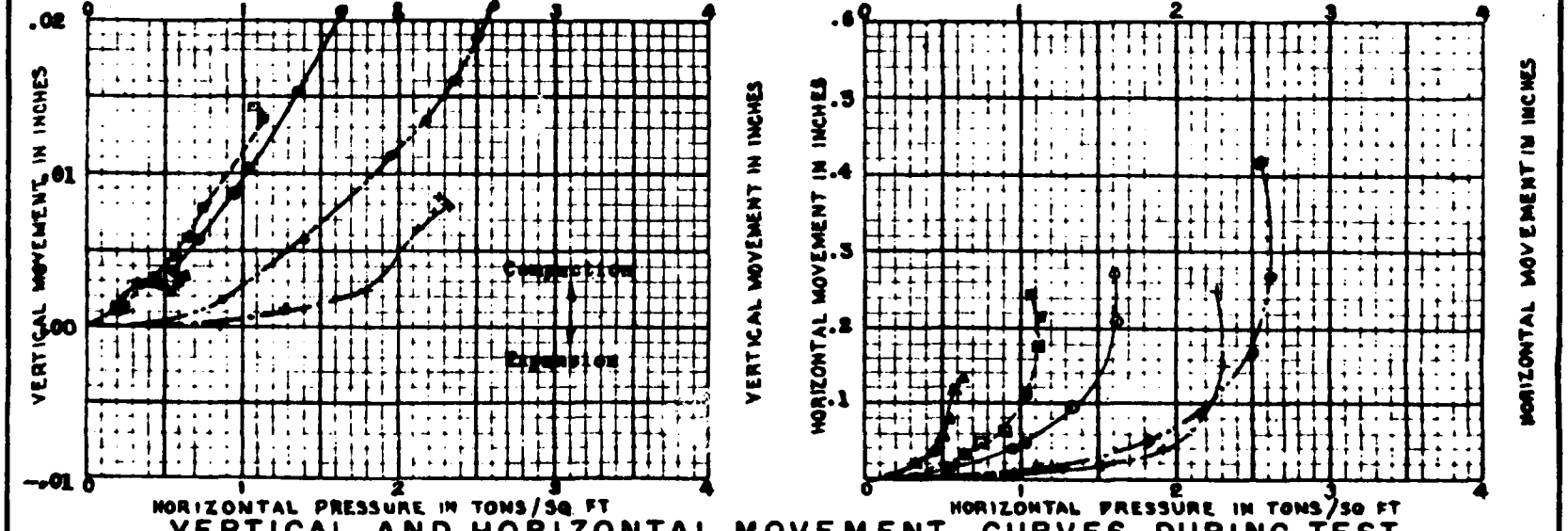
(Original sheets 2 and 3)

Core No.	Elevation top of core	Specific gravity	Moisture content, percent	Void ratio "E"	Percent of voids
1	2,124.30	2.697	25.7	0.783	43.9
2	2,122.00	2.693	20.7	.627	38.5
3	2,119.70	2.701	21.5	.676	40.3
4	2,118.30	2.689	21.5	.635	38.8
5	2,116.50	2.693	19.3	.564	36.1
6	2,114.30	2.704	20.2	.603	37.6
7	2,112.90	2.684	21.1	.624	38.4
8	2,110.72	2.691	20.6	.601	37.5
9	2,108.90	2.690	17.6	.512	33.8
10	2,107.20	2.692	18.7	.542	35.1
11	2,105.50	2.712	17.1	.509	33.7
12	2,103.88	2.682	20.7	.604	37.7
13	2,101.39	2.677	23.9	.731	42.2
14	2,099.29	2.680	22.2	.696	41.0
15	2,097.36	2.675	21.5	.665	40.0
16 [1]	2,095.20				
17	2,092.70	2.676	22.6	.670	40.1
18	2,090.60	2.678	21.6	.645	39.2
19	2,088.57	2.664	22.0	.637	38.9
20	2,086.71	2.688	22.1	.654	39.5
21	2,085.20	2.690	20.7	.619	38.2
22	2,082.70	2.665	21.2	.607	37.8
23	2,080.74	2.675	23.8	.723	42.0
24	2,078.81	2.714	19.3	.708	41.5
25	2,077.25	2.694	21.0	.644	39.2
26	2,074.94	2.669	21.6	.650	39.4
27A	2,072.90	2.685	21.6	.674	40.3
B		2.691	21.7	.685	40.6
28	2,071.43	2.680	22.4	.673	40.2
29	2,069 20.	2.703	19.2	.570	36.3
30	2,067.50	2.690	21.4	.639	39.0
31	2,064.90	2.692	21.4	.643	39.1
32	2,062.70	2.691	21.8	.648	39.3
33	2,061.00	2.697	21.7	.635	38.9
34	2,058.60	2.677	22.7	.666	39.9
35	2,056.10	2.692	21.4	.619	38.2
36	2,054.46	2.689	19.6	.568	36.2
37	2,052.20	2.688	19.1	.566	36.1
38	2,050.00	2.680	19.3	.551	35.5
39	2,048.90	2.743	26.6	.824	45.2
40	2,046.30	2.752	29.5	.680	40.5
41	2,043.60	2.697	28.3	.867	46.4
42	2,041.10	2.701	24.1	.750	42.8
43	2,039.70	2.727	22.7	.711	41.6

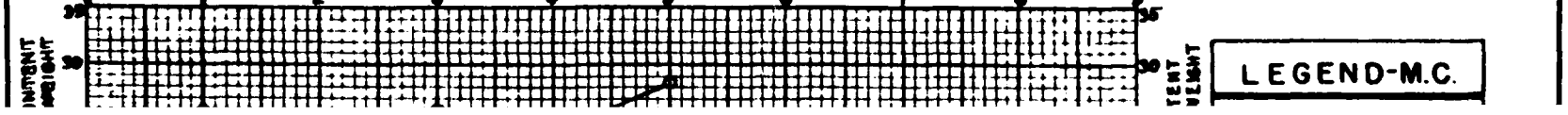
[1] First half destroyed, no sample obtained from other half of core.

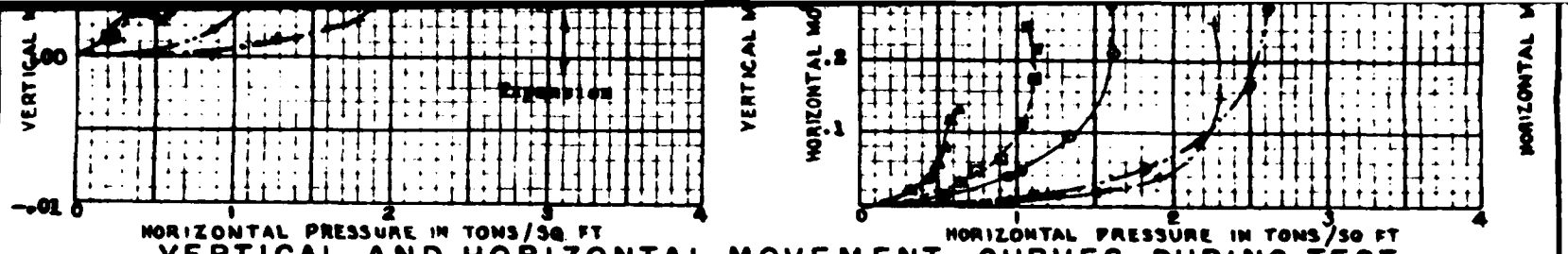


MECHANICAL ANALYSIS CURVE OF SOIL TESTED

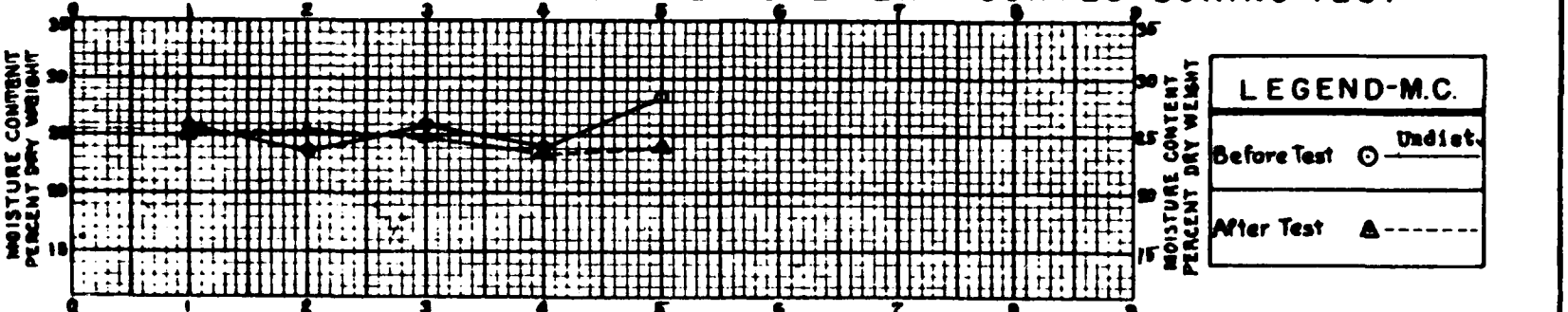


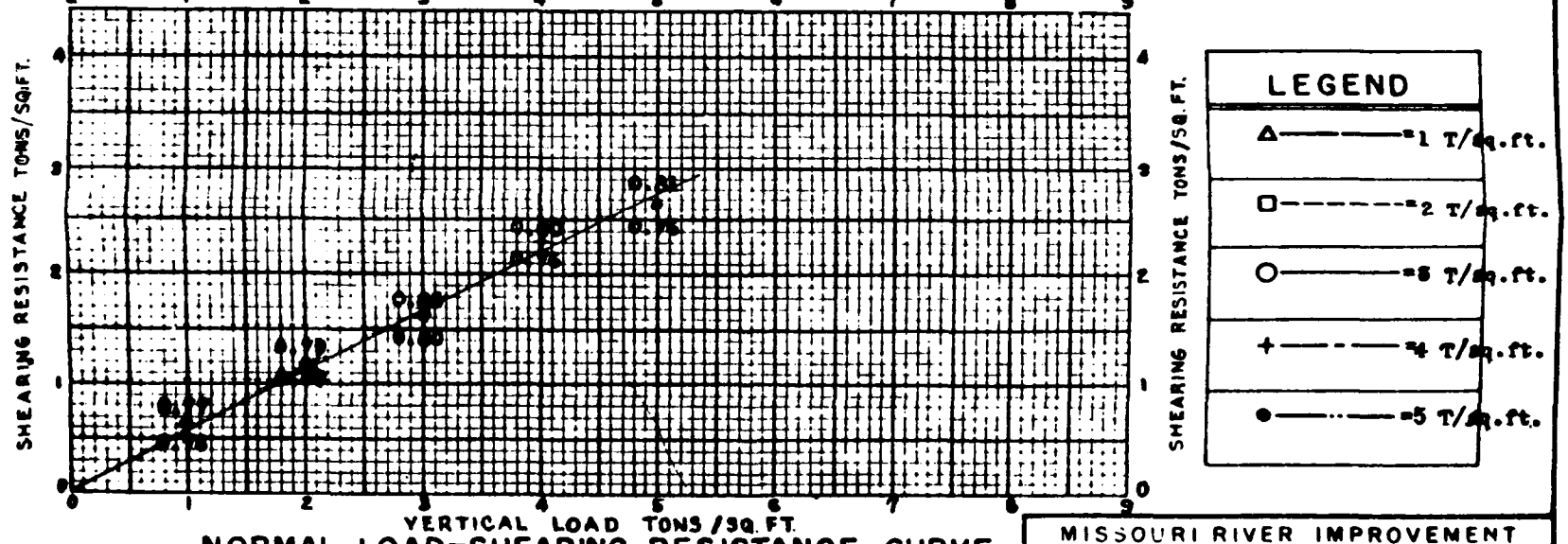
VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





NORMAL LOAD-SHEARING RESISTANCE CURVE

$\tan\phi = \frac{\text{Shearing Resistance} - \text{Cohesion (Tons/Sq Ft)}}{\text{Vertical Load (Tons/Sq Ft)}}$

$= 0.532$

$\phi = 28°54'$

$c = \text{Cohesion} = 0.02$ T/sq.ft.

Notes: Undisturbed Sample
Consolidated Shear Tests
Increment Loading
Elevation 2047.0-2046.6
Cross Sectional Area of Sample 16.00 sq. in.
Initial Thickness = 1.00 inch
Sample Immersed in Water During Test.
Station 14/79.0 Range 0/87U
Section # 39

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATED SHEAR TESTS SERIES # 1*
MIXED MATERIAL from CALYX HOLE # 4
SECTION 39
U.S. ENG. OFFICE, VICKSBURG, MISS. 2-7-39

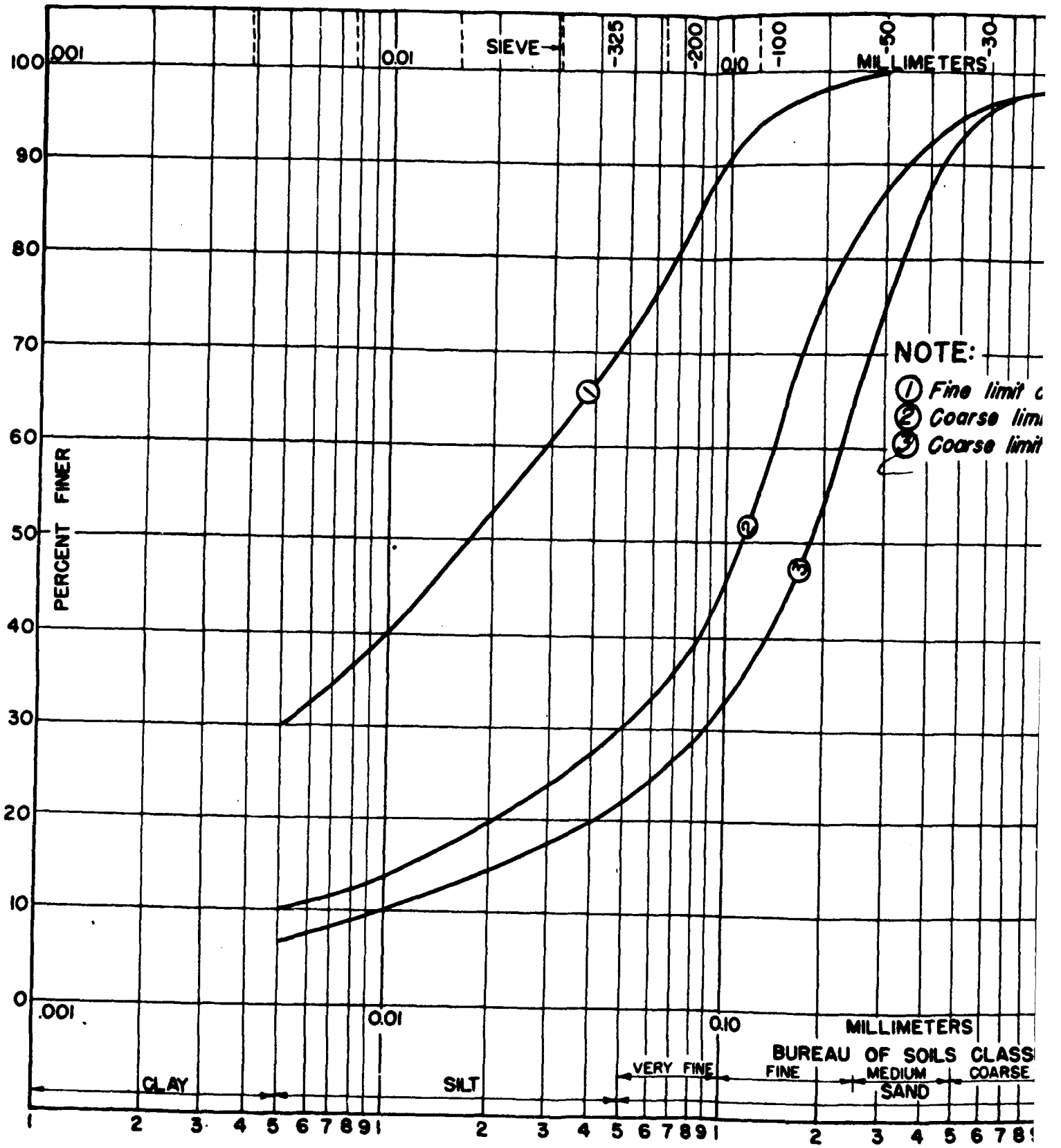
Submitted	Approved Recommended	Approved

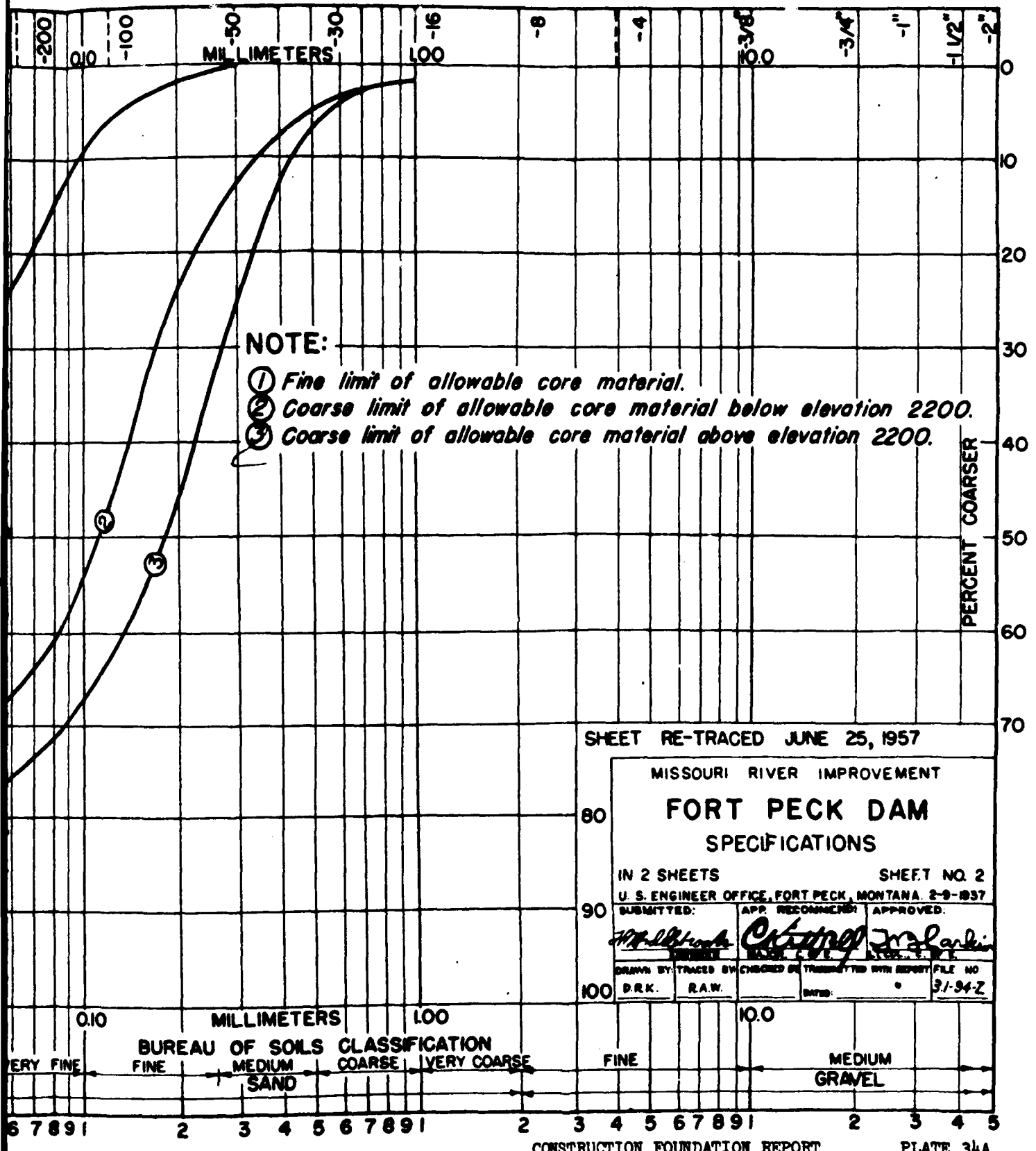
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CONSTRUCTION FOUNDATION REPORT

PLATE 34

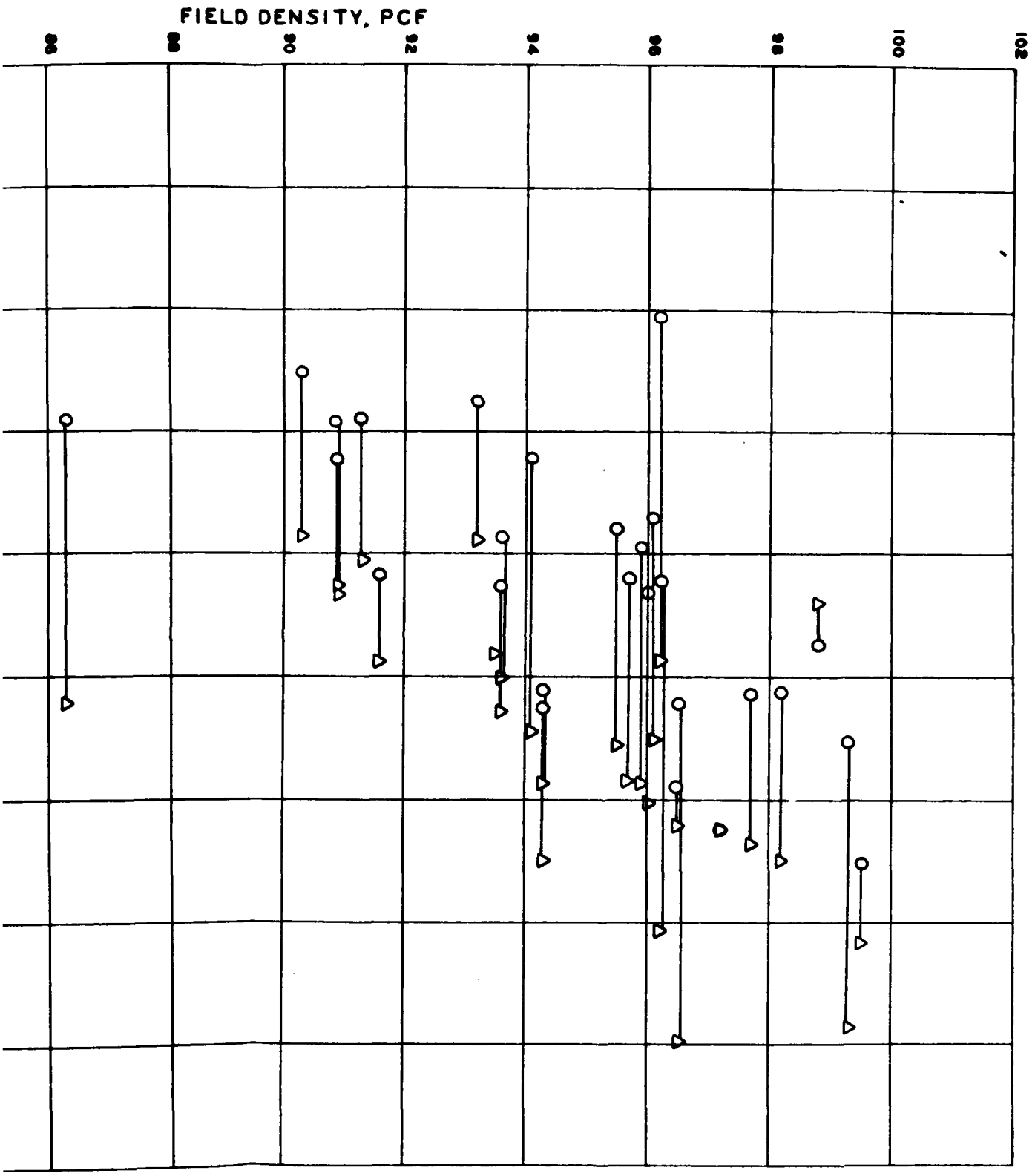
SHEET 1

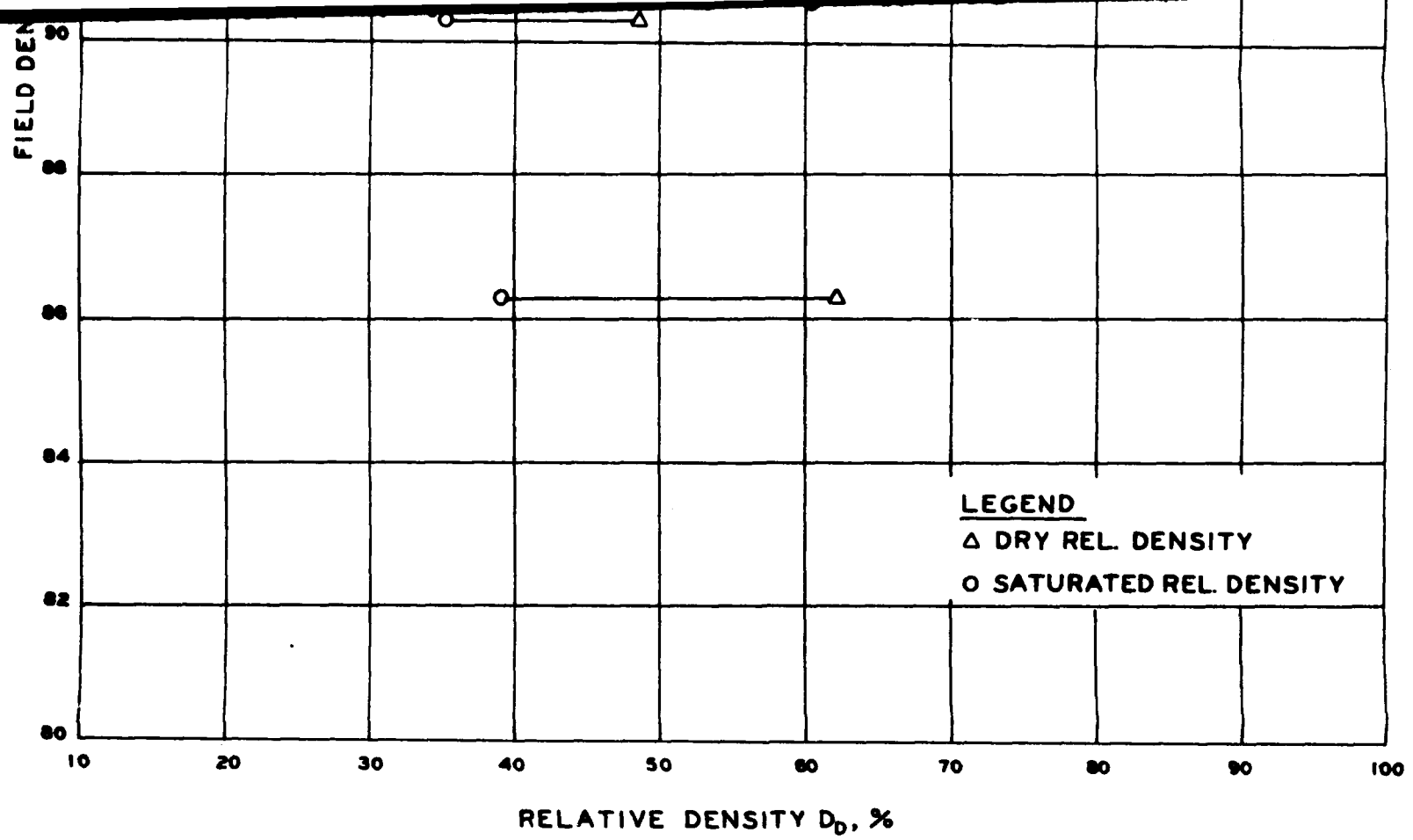

SIEVE
-325
-200
-100
-50
-30
MILLIMETERS
.001
0.01
0.10
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
NOTE:
① Fine limit
② Coarse limit
③ Coarse limit
CLAY
SILT
VERY FINE
FINE
MEDIUM
COARSE
SAND
BUREAU OF SOILS CLASS
1 2 3 4 5 6 7 8 9 1 2 3 4 5 6 7 8 9 1 2 3 4 5 6 7 8



CONSTRUCTION FOUNDATION REPORT PLATE 34A

2

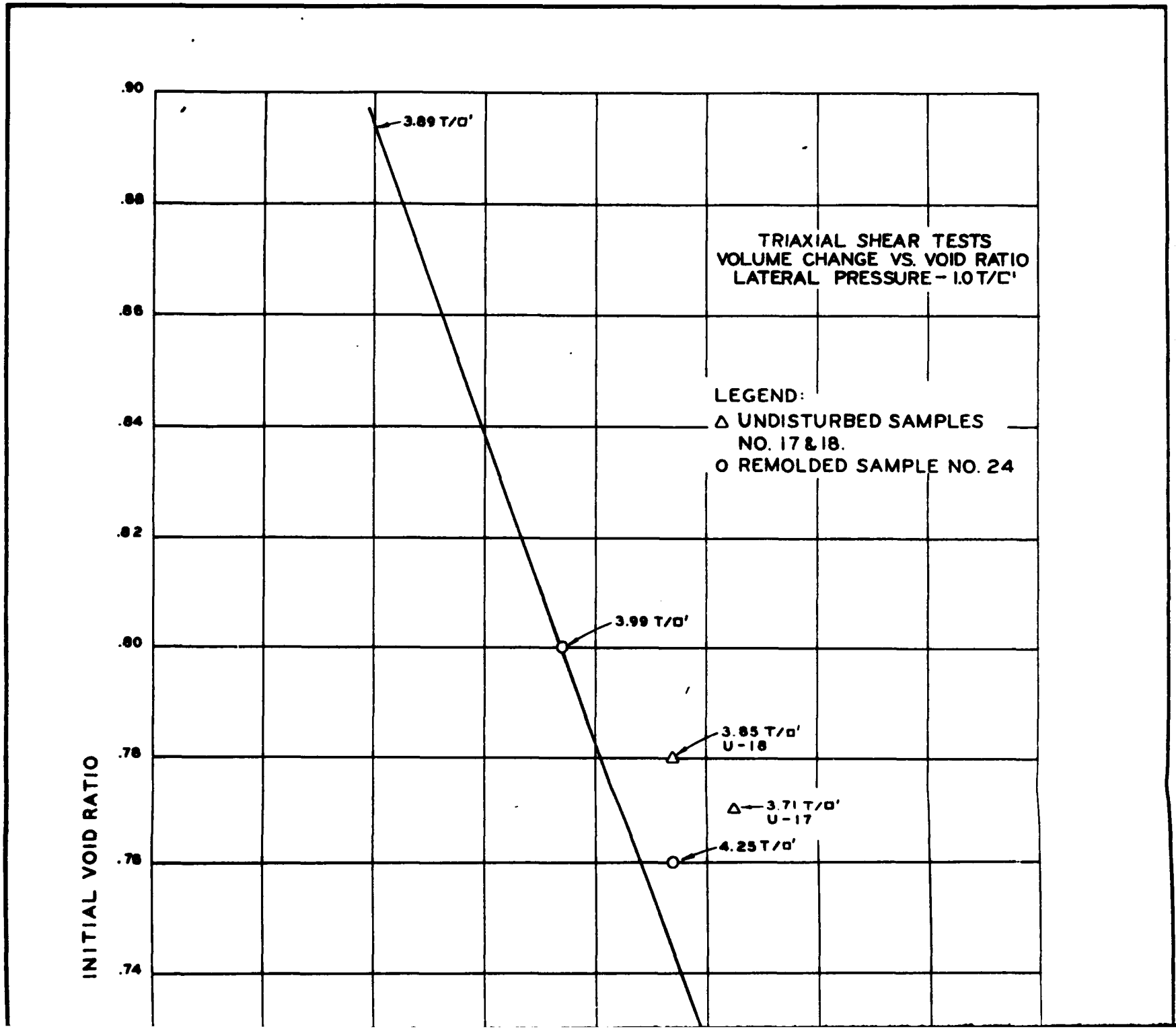

FIELD DENSITY, PCF
80
85
90
95
100
105

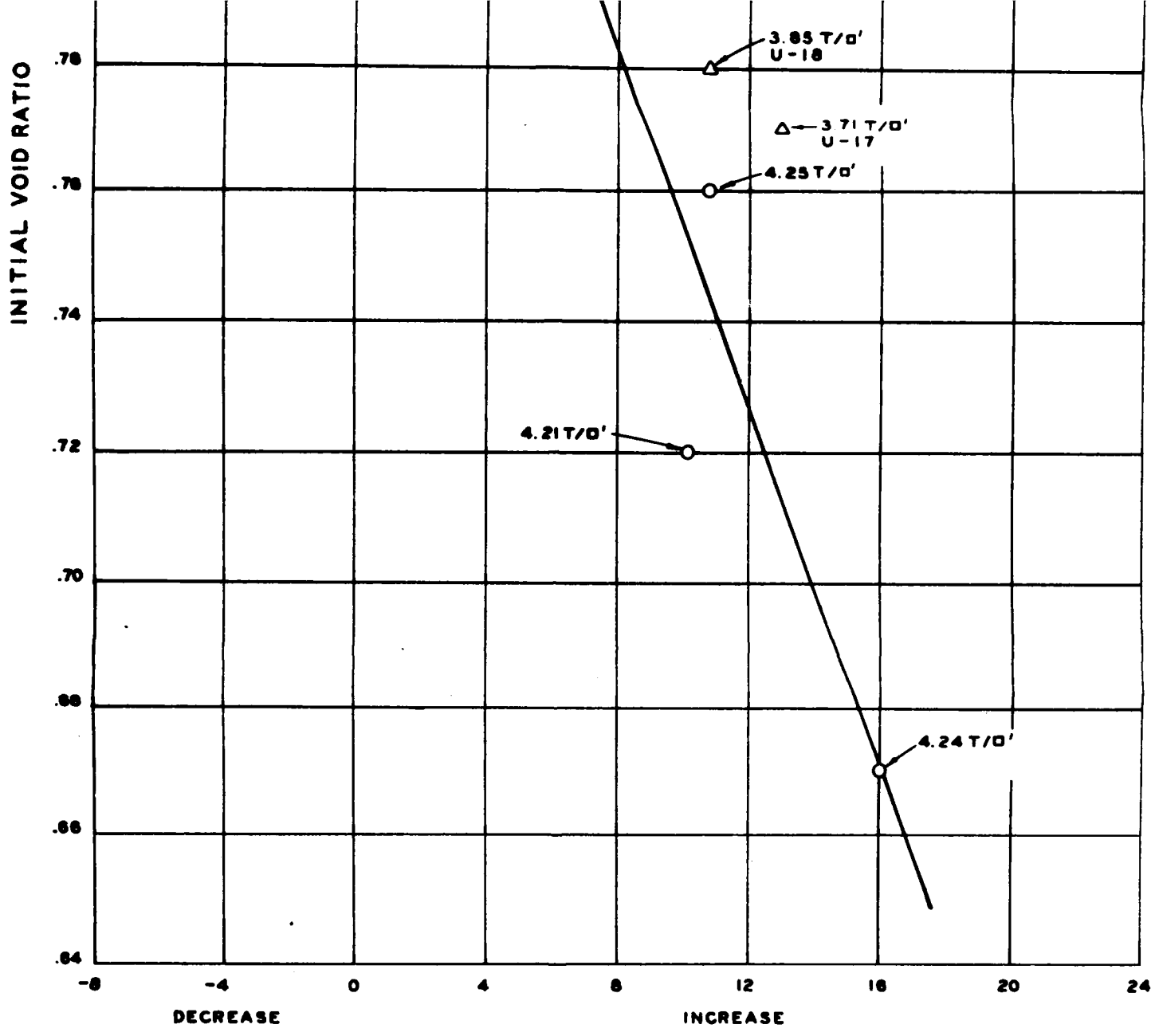


ITEM	RANGE OF VALUES
SPECIFIC GRAVITY	2.68 - 2.73
EFFECTIVE SIZE	0.11 - 0.21

FORT PECK DAM
RELATIVE DENSITY TESTS
SHELL MATERIAL
TEST PIT 1

CONSTRUCTION FOUNDATION REPORT PLATE 34B

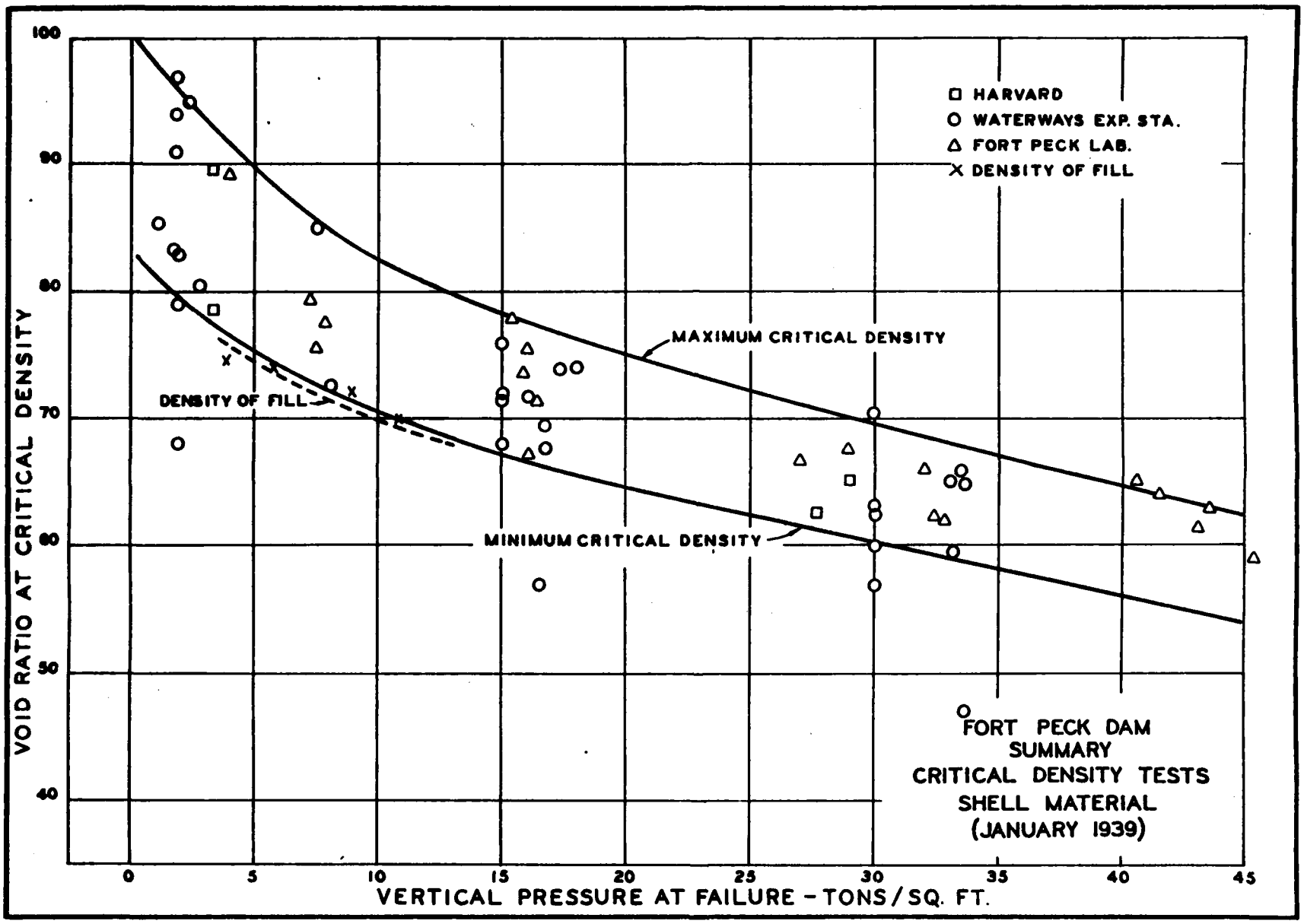

TRIAXIAL SHEAR TESTS
VOLUME CHANGE VS. VOID RATIO
LATERAL PRESSURE - 1.0 T/□'
LEGEND:
△ UNDISTURBED SAMPLES NO. 17 & 18.
○ REMOLDED SAMPLE NO. 24
INITIAL VOID RATIO
.90
.88
.86
.84
.82
.80
.78
.76
.74
3.89 T/□'
3.99 T/□'
3.85 T/□' U-18
3.71 T/□' U-17
4.25 T/□'



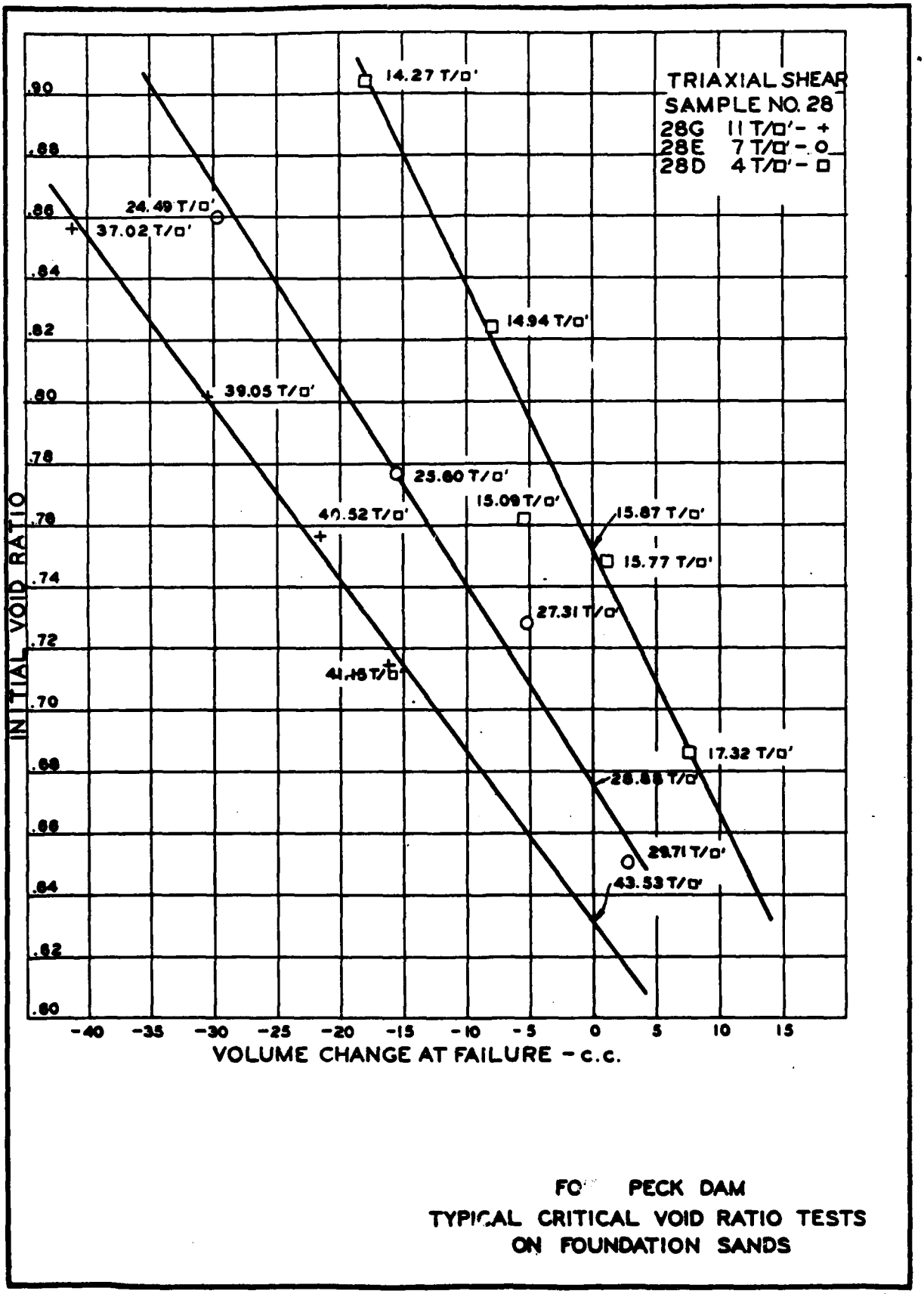
FORT PECK DAM
TYPICAL VOID RATIO CURVES FOR
UNDISTURBED AND REMOLDED SAMPLES
SHELL MATERIAL
TEST PIT 3

CONSTRUCTION FOUNDATION REPORT PLATE 34C

☆ U.S. GOVERNMENT PRINTING OFFICE 1941-16

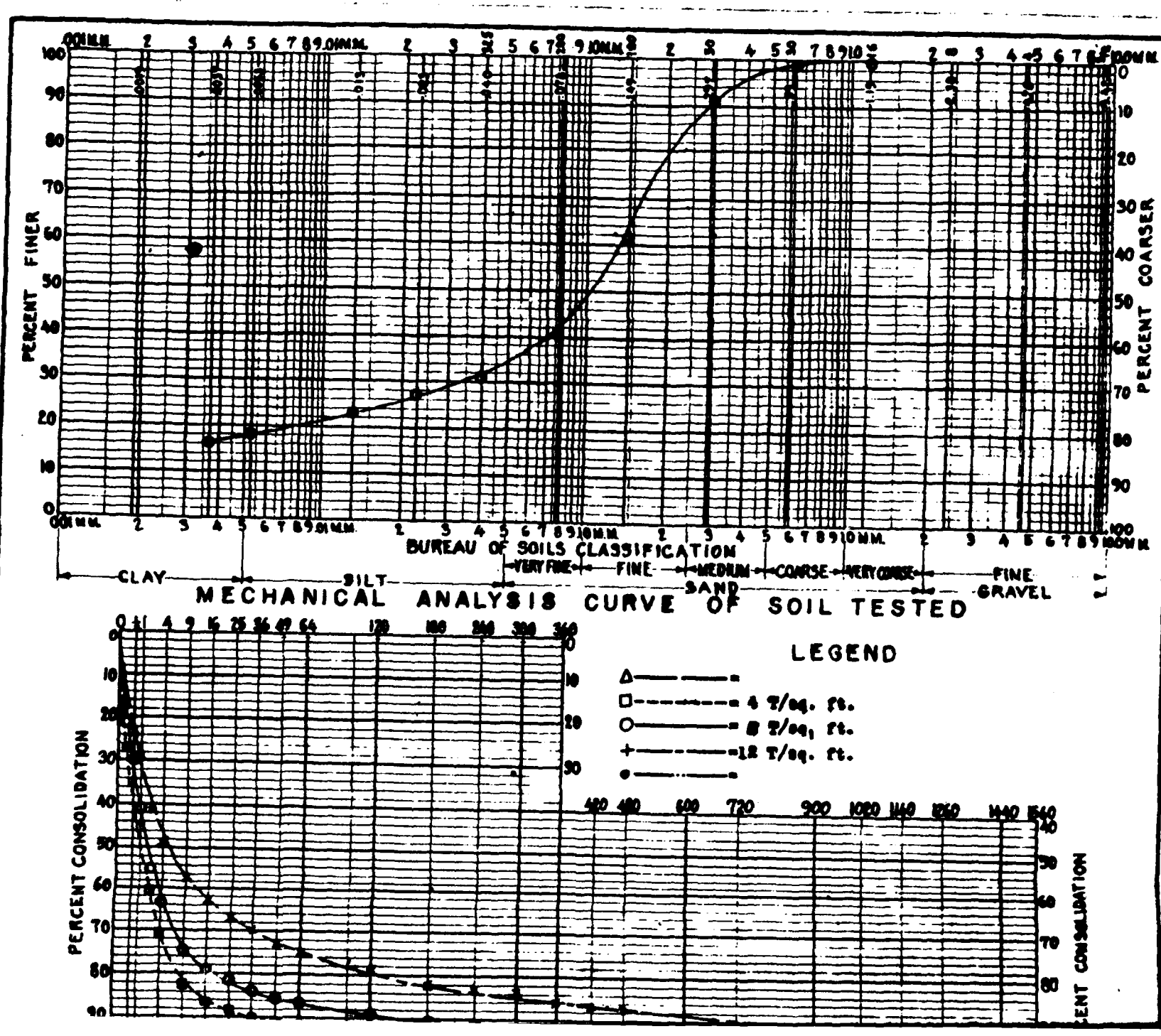


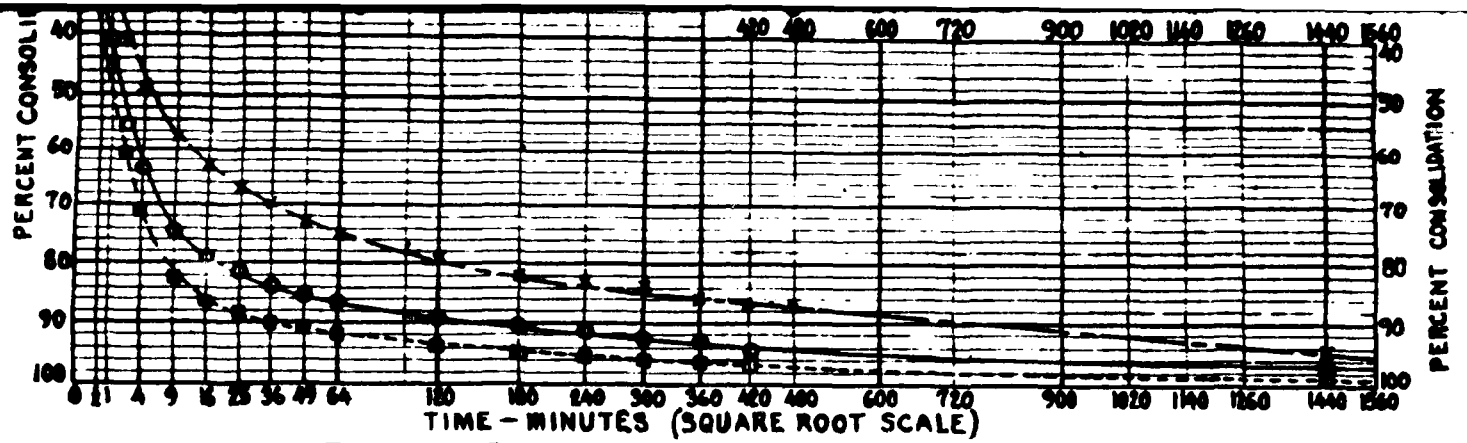
CONSTRUCTION FOUNDATION REPORT PLATE 34-D



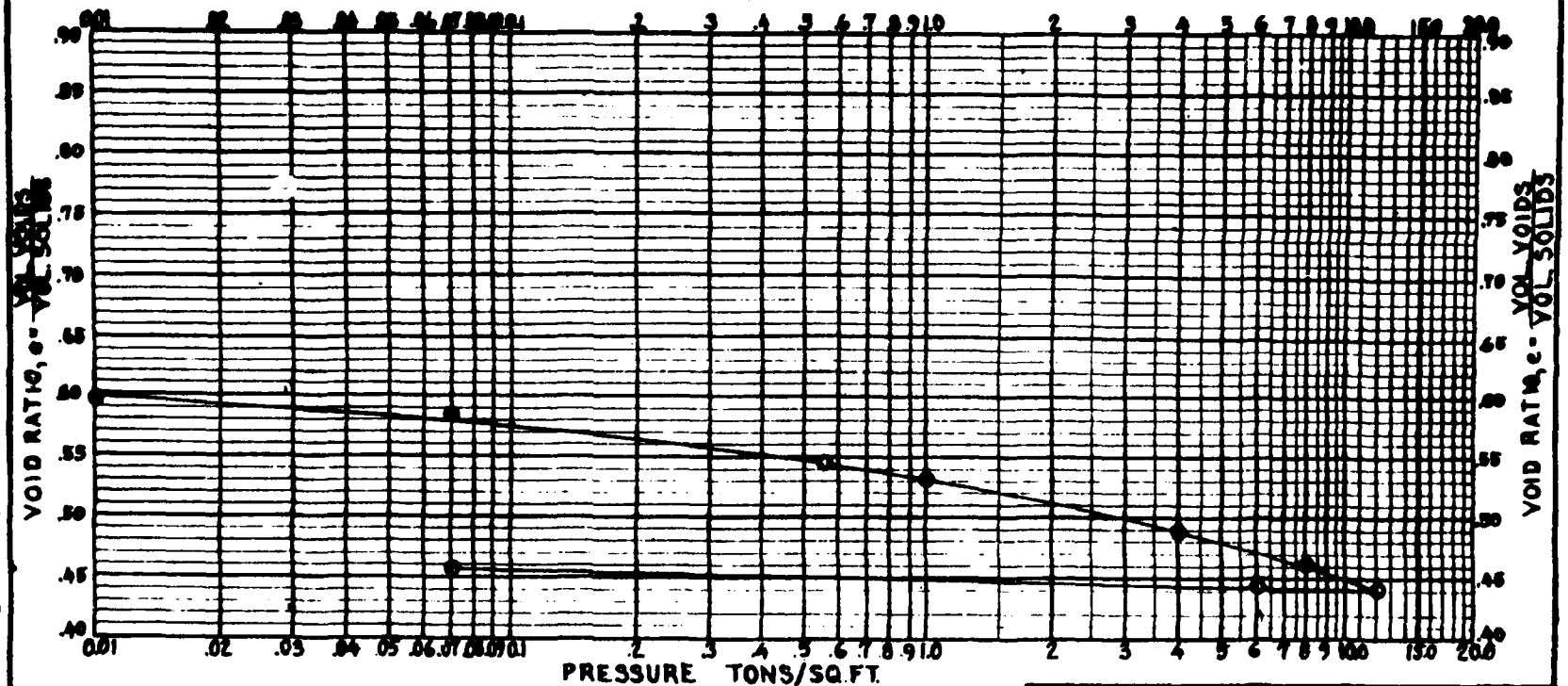
FOR PECK DAM

TYPICAL CRITICAL VOID RATIO TESTS
ON FOUNDATION SANDS


PERCENT FINER
PERCENT COARSER
BUREAU OF SOILS CLASSIFICATION
CLAY
SILT
VERY FINE
FINE
MEDIUM
COARSE
VERY COARSE
SAND
FINE
GRAVEL
MECHANICAL ANALYSIS CURVE OF SOIL TESTED
PERCENT CONSOLIDATION
LEGEND
4 T/sq. ft.
8 T/sq. ft.
12 T/sq. ft.



TIME—PERCENT CONSOLIDATION CURVES.



PRESSURE-VOID RATIO CURVE

Estimated Previous Consolidation = ... Tons/Sq.Ft.

VERTICAL LOAD TONS/SQ.FT.	COMPACTION PERCENT *
0.	0.
0.07	.58
0.56	3.34
1.00	4.00
4.00	6.71
8.00	8.88
12.00	9.70
6.00	9.60
0.07	8.65

Undisturbed sample
Immersed in water during test
Station 60 + 00 Range 0 + 35D
Depth 13.5 Elev. 2234.2
Initial Thickness 2.50"
Cross Sectional Area of sample 24.8 sq. in.
Natural Moisture Content 23.0%

* Total compaction in percent of original height of sample.

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
CONSOLIDATION TESTS ON CORE MATERIAL
HOLE C-7 - SAMPLE #2
U.S. ENGINEER OFFICE, FORT PECK, MONT. 12-18-38

Submitted	Approval Recommended	Approved
	Water Cons. of Engineers	Chief Cons. of Engineers

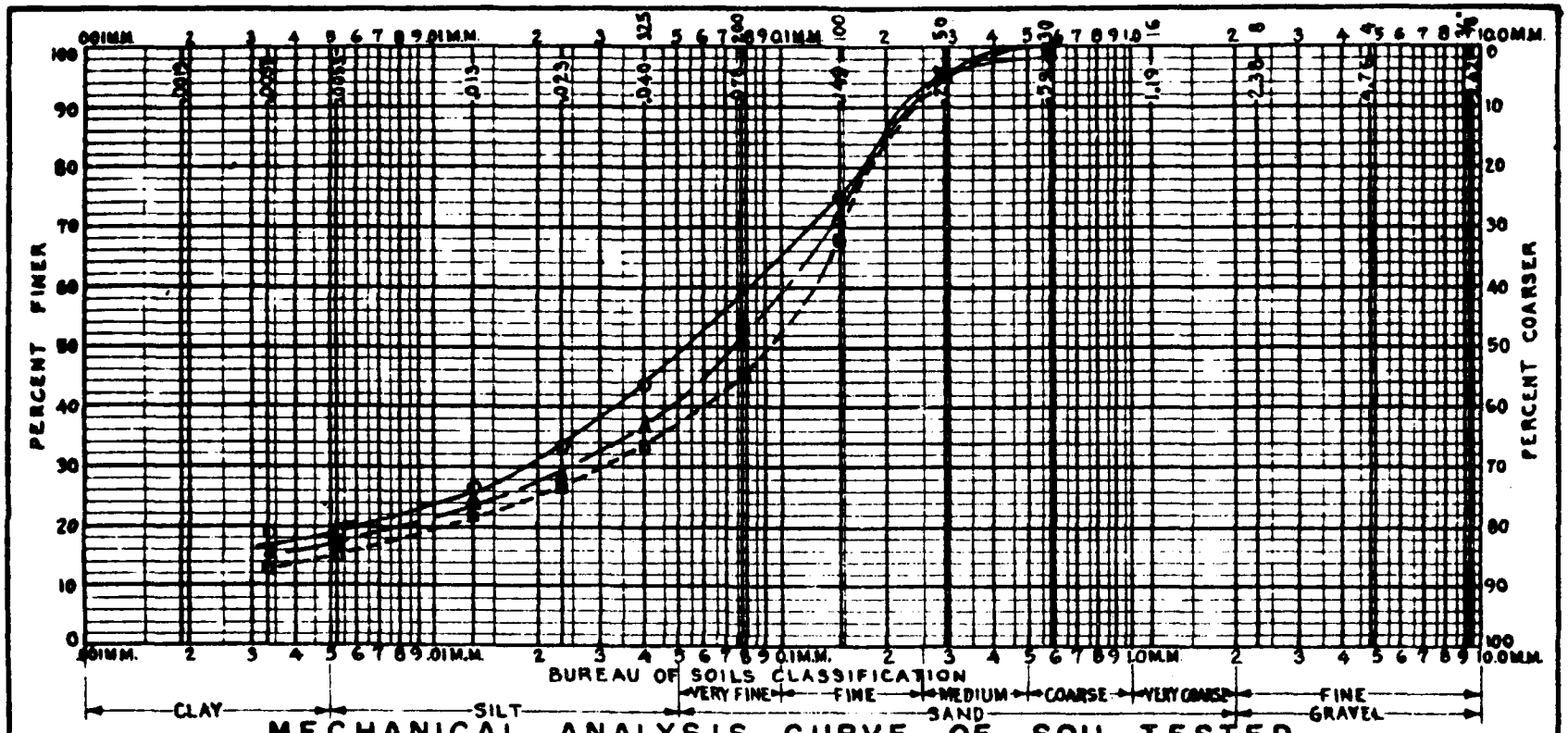
Drawn by	Traced by	Checked by	Transmitted with report dated	File No
DMS	HC	OA		

CONSTRUCTION FOUNDATION REPORT

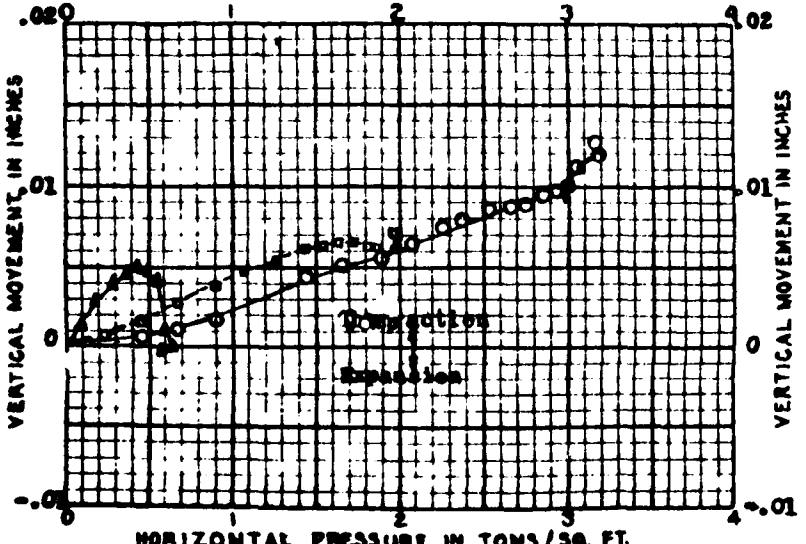
PLATE 34F

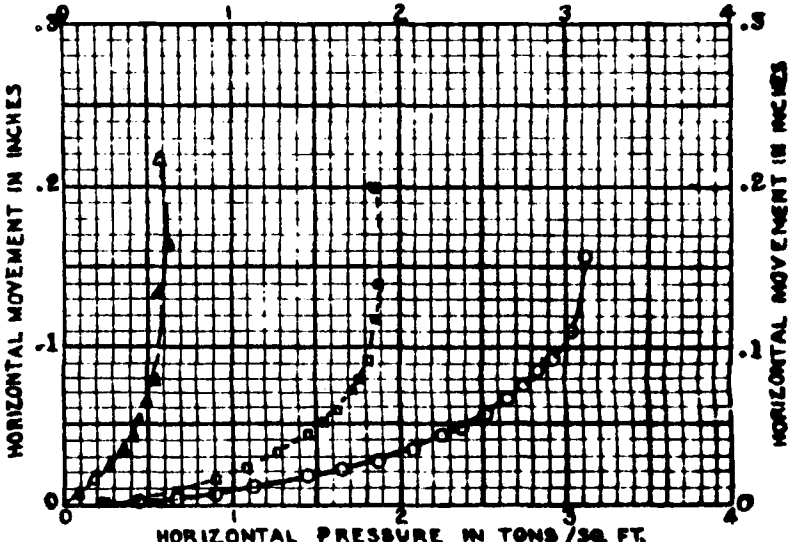
(Form 30) No 11

SHEET 26

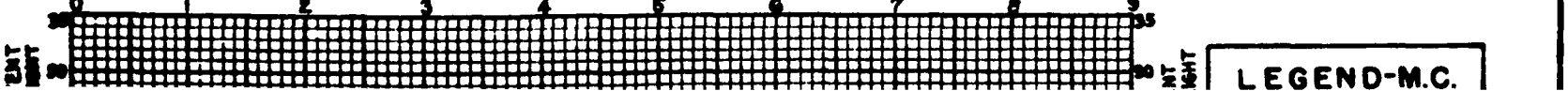


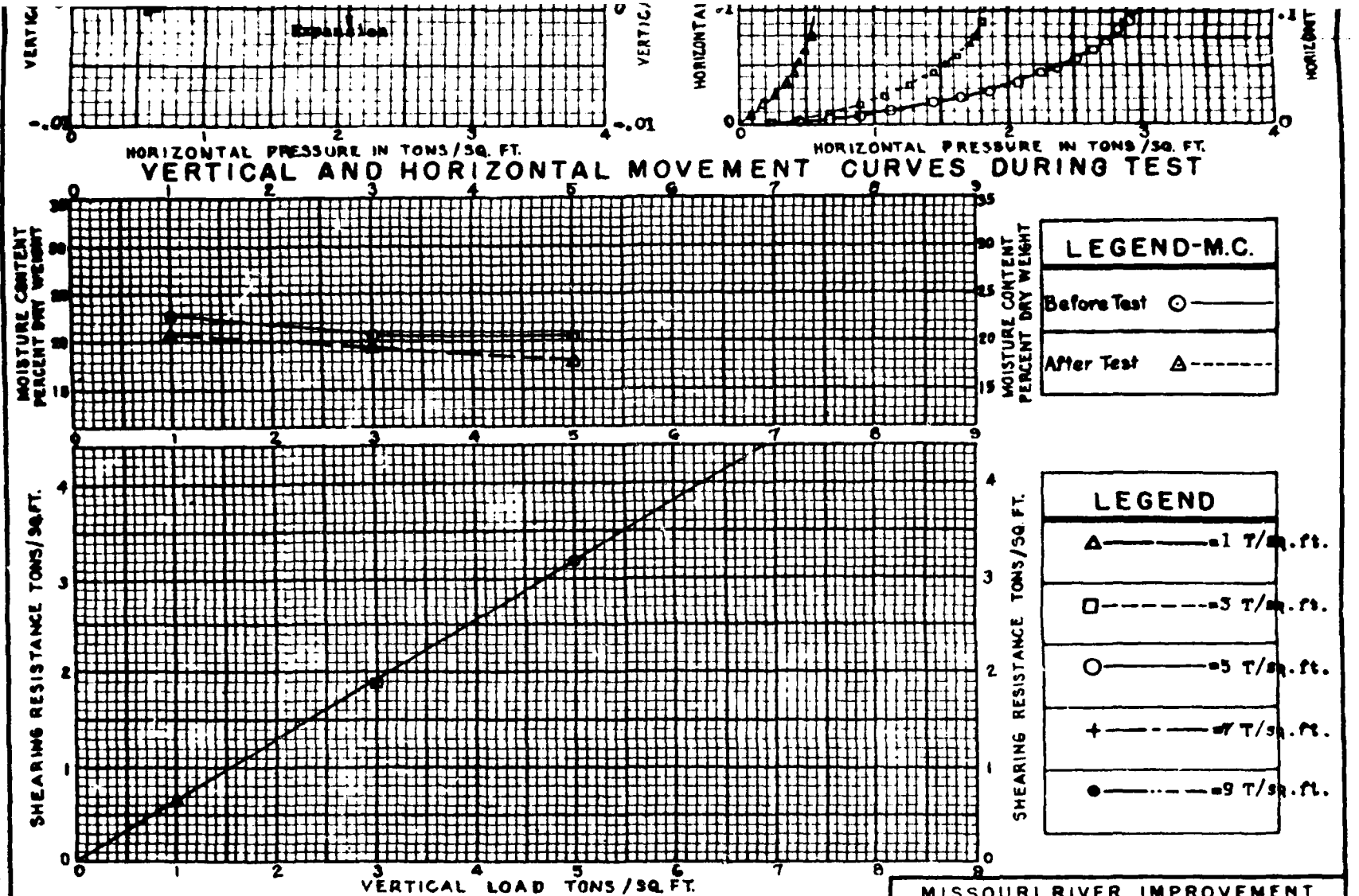
MECHANICAL ANALYSIS CURVE OF SOIL TESTED





VERTICAL AND HORIZONTAL MOVEMENT CURVES DURING TEST





$\tan\phi = \frac{\text{Shearing Resistance (Cohesion) Tons/Sq.Ft.}}{\text{Vertical Load (Tons/Sq.Ft.)}} = 0.633$

$\phi = 32° 20'$

$c = \text{Cohesion} = 0.0$ T/sq.ft.

Notes: Undisturbed Sample
Consolidated Shear Tests
Increment Loading
Elevation 2233.1 - 2233.0
Depth 14.6 - 14.7
Cross Sectional Area of Sample 16.00 sq. in.
Initial Thickness 0.75 inch
Sample immersed in water during test
Station 60 + 00 Range 0 + 35D

MISSOURI RIVER IMPROVEMENT
NAVIGATION, FLOOD CONTROL, POWER, IRRIGATION
FORT PECK DAM
SLIDE INVESTIGATION
SHEAR TESTS ON CORE MATERIAL
HOLE C-7 - SAMPLE #3
U.S. ENGINEER OFFICE, FORT PECK, MONT. 1-3-39

Submitted	Approval Recommended	Approved
	Major, Corps of Engineers	Lieut. Colonel, Corps of Engineers

Drawn by	Traced by	Checked by	Transmitted with report dated	File No.
JLB	BSC	JC		

CONSTRUCTION FOUNDATION REPORT

PLATE 34G

SHEET 24

A. GENERAL.

A comprehensive program of laboratory and field tests was made to determine the structural properties of the different types of materials in the damaged area, as well as in unaffected portions of the dam. These tests are grouped as follows:

Tests on overburden materials in the damaged area.

Tests on shell and transition zone material in unaffected portions of the dam.

Tests on typical foundation sands and clays.

Tests on core materials.

Tests on shale and bentonite.

These investigations are each discussed briefly.

1. Overburden materials in damaged area. The overburden in the damaged area included both shell and foundation sands, as well as alluvial clays and masses of core material that became intermixed during the movement.

Mechanical analyses for classification purposes were performed on overburden samples from the churn-drill holes. Overburden cores from the Calyx holes were split and photographed, and then samples for laboratory tests were cut from one of the halves. These samples, consisting of 4-inch (102 mm) cubes, were carefully selected and cut to represent typical material from each core. Tests on these included mechanical analyses, specific gravity, moisture content, and determination of the natural voids in the material. The samples were prepared in a cold-storage room, packed with dry ice to keep them frozen, and transported to the laboratory for testing.

Two series of shear tests were made on samples of overburden from Calyx hole No. 4. Plates 5-4 and 5-5 give typical results of tests on overburden materials.

2. Shell and transition-zone materials in unaffected portions of dam. Samples of typical shell materials were secured from undisturbed portions of the shell immediately west of the damaged area and from three test pits, located along the 2212 upstream berm, driven down to the saturation line.

A continuous photographic record was kept of the stratification of the material in the deepest test pit. On all samples, the tests included mechanical analyses, specific gravity, relative density (both wet and dry), and determination of natural voids. In addition, triaxial tests were made on disturbed and on several undisturbed samples of typical shell material from one of the test pits.

In order to check the results of critical-density tests performed on the triaxial shear machines, several series of direct-shear tests were also performed and critical density determined by the Taylor method.

Undisturbed samples of material from the tion zone between the core and the upstr were secured from a shaft near the east en undamaged section. On these samples, me analyses, critical-density tests, determina natural voids, relative density tests, cons tests, and shear tests were performed. In to the physical tests, a complete mineralogi ination was made of a typical sample of she rial. Plates 5-6 through 5-13 give results on these materials.

An experimental section of hydraulic fill structed to investigate the feasibility of ing this type of material by means of cate tractors. This fill was placed in 6-inch (1 12-inch (305 mm), 18-inch (457 mm), and (610 mm) layers to a depth of from 6 feet (1. 8 feet (2.4 m). Each layer was compacte three, six, or nine passes of a 95-horsepowe tor operating at half and full speed.

Continuous undisturbed samples were take test pits in each sampling area, and mechanic ysis, specific gravity, void determinations, a ative-density tests were made on each sample results on these samples are shown on Plates 5-17.

3. Foundation sands and clays. A test p driven into the flood plane downstream from t in order to secure undisturbed samples of a materials similar to the foundation materials the section of the dam affected by the earth ment. A continuous photographic record was k the natural strata in this pit, and mechanical ses, specific gravity, void determinations, re density and critical-density tests were perfor this material.

Undisturbed samples of the surface clays we cured at the upstream edge of the damaged are mechanical analyses, consolidation tests, and c idated-shear tests were performed on these sa Plates 5-18 to 5-21 show the results of te foundation sands and clays.

4. Core materials. At a selected location closure section, the undamaged core on the bank, and in the center of the slide area, (152 mm) drive samples were taken down to th of the core. Mechanical analyses, natural mo content, consolidation tests, and consolidated tests were performed on samples from 10-foot (intervals in elevation. In addition, triaxial tests, consolidation tests, and Atterberg tests were made on samples from elevations 2 2080. The results of typical tests on core ma are given on Plates 5-22 to 5-24.

5. Shale and bentonite. Samples of we

TESTS OF MATERIALS

Undisturbed samples of material from the transition zone between the core and the upstream shell were secured from a shaft near the east end of the undamaged section. On these samples, mechanical analyses, critical-density tests, determination of natural voids, relative density tests, consolidation tests, and shear tests were performed. In addition to the physical tests, a complete mineralogical examination was made of a typical sample of shell material. Plates 5-6 through 5-13 give results of tests on these materials.

An experimental section of hydraulic fill was constructed to investigate the feasibility of compacting this type of material by means of caterpillar tractors. This fill was placed in 6-inch (152 mm), 12-inch (305 mm), 18-inch (457 mm), and 24-inch (610 mm) layers to a depth of from 6 feet (1.8 m) to 8 feet (2.4 m). Each layer was compacted with three, six, or nine passes of a 95-horsepower tractor operating at half and full speed.

Continuous undisturbed samples were taken from test pits in each sampling area, and mechanical analysis, specific gravity, void determinations, and relative-density tests were made on each sample. Test results on these samples are shown on Plates 5-14 to 5-17.

3. **Foundation sands and clays.** A test pit was driven into the flood plane downstream from the dam, in order to secure undisturbed samples of alluvial materials similar to the foundation materials under the section of the dam affected by the earth movement. A continuous photographic record was kept of the natural strata in this pit, and mechanical analyses, specific gravity, void determinations, relative-density and critical-density tests were performed on this material.

Undisturbed samples of the surface clays were secured at the upstream edge of the damaged area, and mechanical analyses, consolidation tests, and consolidated-shear tests were performed on these samples. Plates 5-18 to 5-21 show the results of tests on foundation sands and clays.

4. **Core materials.** At a selected location in the closure section, in undamaged core on the right bank, and in the center of the slide area, 6-inch (152 mm) drive samples were taken down to the base of the core. Mechanical analyses, natural moisture content, consolidation tests, and consolidated-shear tests were performed on samples from 10-foot (3.0 m) intervals in elevation. In addition, triaxial-shear tests, consolidation tests, and Atterberg limit tests were made on samples from elevations 2170 to 2080. The results of typical tests on core material are given on Plates 5-22 to 5-24.

5. **Shale and bentonite.** Samples of weathered shale were taken from the Calyx holes, from the Merriman drift above the inlet portals, and from several points in the damaged area, as well as from five holes and a test pit driven into the weathered shale downstream from the damaged section. Samples of fault-zone material were also secured from the Crosby drift near the shafts. Mechanical analyses, consolidation tests, and both consolidated and quick-shear tests were performed on these samples.

Samples of bentonite were secured from Calyx holes, the Merriman drift, the Crosby drift, and from exposed seams at other points on the right abutment. Both quick and consolidated-shear tests were performed on these samples. The coefficient of friction of bentonite on shale was also determined for some samples. The results of these tests are given on Plates 5-25 to 5-30.

In addition to the laboratory tests on the bentonite, a series of shear tests was made in the field on the two bentonite seams in the Merriman drift. These seams were lying approximately horizontal and were separated by 8 inches (203 mm) of shale. Both the normal loads and shearing loads were applied by means of hydraulic jacks. The center section of shale was confined by a steel jacket, to prevent its being crushed by the vertical load and to properly distribute the shearing forces.

B. EQUIPMENT AND PROCEDURE FOR LABORATORY TESTS.

1. **Mechanical analyses.** All mechanical analyses were made by the sieve and hydrometer method and were usually run wet. Samples composed of distinctly different types of material, such as sand with quantities of shale fragments or clay balls and clay samples mixed with gravel, were segregated and the percentage of each kind of material determined separately. These samples were run dry.

2. **Specific-gravity determinations.** Specific-gravity determinations were made on material from every sample, so that void determinations could be made more accurately. Specific-gravity determinations were made by the vacuum method on 200-gram samples.

3. **Void determinations.** For the purpose of determining the natural void ratio in undisturbed samples of materials from the shells, transition zones, foundation sands, and the experimental rolled hydraulic fill, 6-inch-diameter (152 mm) samples were taken in accurately calibrated cylinders 6 inches (152 mm) in length.

Void determinations of material from the frozen Calyx cores were made on the 4-inch (102 mm) cubes. The volume of the cubes was accurately determined by submerging them in a pan filled to the overflow with mercury and weighing the mercury displaced.

4. **Relative-density tests.** Relative-density tests were performed on all undist material, transition-zone mat rial from the test pit in the dam, as well as on all samples rolled hydraulic fill. The la density tests made it necessa cial device for compacting t density. This apparatus consi tals, on which the tubes conta placed, the pedestals and sa and down by cams on a motor-dri mining the lowest possible deg materials were carefully depo ders through specially designe density tests were made on ea and saturated condition.

5. **Critical-density tests.** on shell materials were perfor oratory of the Graduate Scho Harvard University, at the Wat tion, Vicksburg, Miss., and a trict laboratory. Tests on u cohesionless materials were m laboratory.

6. **Consolidation tests.** Al were made according to stand Fort Peck type of consolidati were all 5-5/8 inches (143 mm) of transition-zone material a samples of core material were in thickness, while samples of rials, such as clays and w 1.0 inch (25 mm) or 1-1/4 inche

Consolidation of core and samples prior to making shear in consolidation devices, alth tonite and weather-shale sam dated directly in the shear box

7. **Shear tests.** Consolid transition-zone material, w bentonite were made in the while the direct-shear tests tests on core material were m type shear machine. All quick in the Zanesville-type shear test samples were 4 inches 3/4-inch (10 mm) thick.

Consolidated shear tests were idating the sample to the desi ing the shearing loads in incr til movement ceased before a increments. Quick-shear tests stant strain loading, the load uously, so that failure oc minutes after start of the test

…taken from the Calyx holes, from the Mer-…ove the inlet portals, and from sever-…n the damaged area, as well as from five …e test pit driven into the weathered …ream from the damaged section. Samples …e material were also secured from the …r near the shafts. Mechanical analyses, …n tests, and both consolidated and … tests were performed on these samples. …of bentonite were secured from Calyx … Merriman drift, the Crosby drift, and …ed seams at other points on the right … Both quick and consolidated-shear tests …med on these samples. The coefficient … of bentonite on shale was also deter-…ome samples. The results of these tests …n Plates 5-25 to 5-30.

…on to the laboratory tests on the benton-…es of shear tests was made in the field … bentonite seams in the Merriman drift. … were lying approximately horizontal and …ted by 3 inches (203 mm) of shale. Both …loads and shearing loads were applied by …ydraulic jacks. The center section of … confined by a steel jacket, to prevent …crushed by the vertical load and to prop-…bute the shearing forces.

…NT AND PROCEDURE FOR LABORATORY TESTS.

…ical analyses. All mechanical analyses …by the sieve and hydrometer method and …y run wet. Samples composed of distinct-…nt types of material, such as sand with … of shale fragments or clay balls and …s mixed with gravel, were segregated and …tage of each kind of material determined … These samples were run dry.

…ic-gravity determinations. Specific-…terminations were made on material from …e, so that void determinations could be … accurately. Specific-gravity determina-… made by the vacuum method on 200-gram …

…eterminations. For the purpose of deter-… natural void ratio in undisturbed sam-…materials from the shells, transition …undation sands, and the experimental …draulic fill, 6-inch-diameter (152 mm) …re taken in accurately calibrated cylin-…es (152 mm) in length.

…erminations of material from the frozen …s were made on the 4-inch (102 mm) cubes. … of the cubes was accurately determined …ing them in a pan filled to the overflow …ry and weighing the mercury displaced.

…ve-density tests. Relative-density tests were performed on all undisturbed samples of shell material, transition-zone material, and sandy material from the test pit in the flood plane below the dam, as well as on all samples from the experimental rolled hydraulic fill. The large number of relative-density tests made it necessary to construct a special device for compacting the samples to maximum density. This apparatus consisted of several pedestals, on which the tubes containing the samples were placed, the pedestals and samples being jarred up and down by cams on a motor-driven shaft. For determining the lowest possible degree of compaction, the materials were carefully deposited in glass cylinders through specially designed funnels. Relative-density tests were made on each sample in both dry and saturated condition.

5. **Critical-density tests.** Critical-density tests on shell materials were performed in the soils laboratory of the Graduate School of Engineering of Harvard University, at the Waterways Experiment Station, Vicksburg, Miss., and at the Fort Peck District laboratory. Tests on undisturbed samples of cohesionless materials were made at the Fort Peck laboratory.

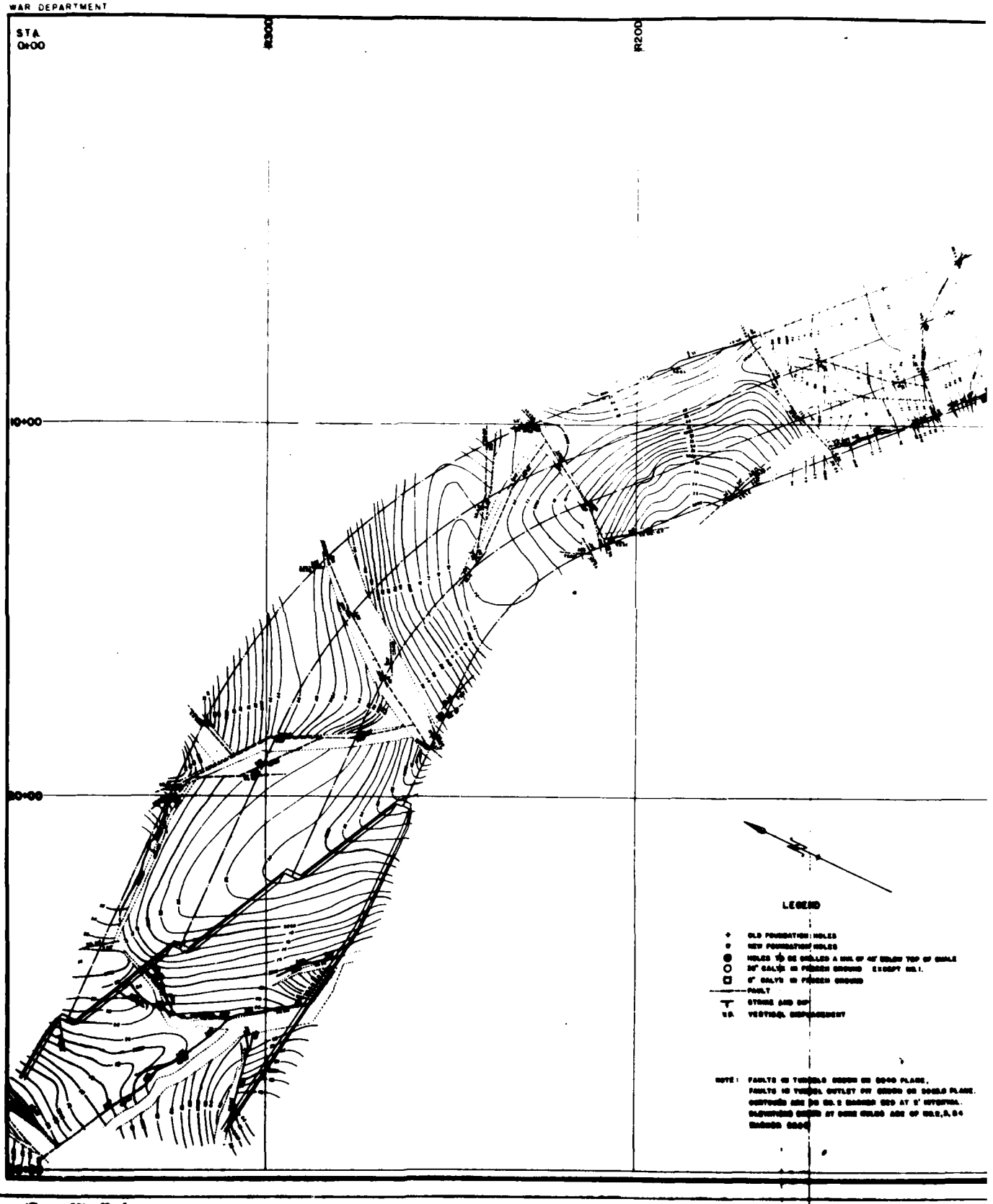
6. **Consolidation tests.** All consolidation tests were made according to standard procedure in the Fort Peck type of consolidation equipment. Samples were all 5-5/8 inches (143 mm) in diameter. Samples of transition-zone material and the more pervious samples of core material were 2-1/2 inches (64 mm) in thickness, while samples of very impervious materials, such as clays and weathered shale, were 1.0 inch (25 mm) or 1-1/4 inches (32 mm) thick.

Consolidation of core and a few weathered-shale samples prior to making shear tests was accomplished in consolidation devices, although most of the bentonite and weather-shale samples were preconsolidated directly in the shear boxes.

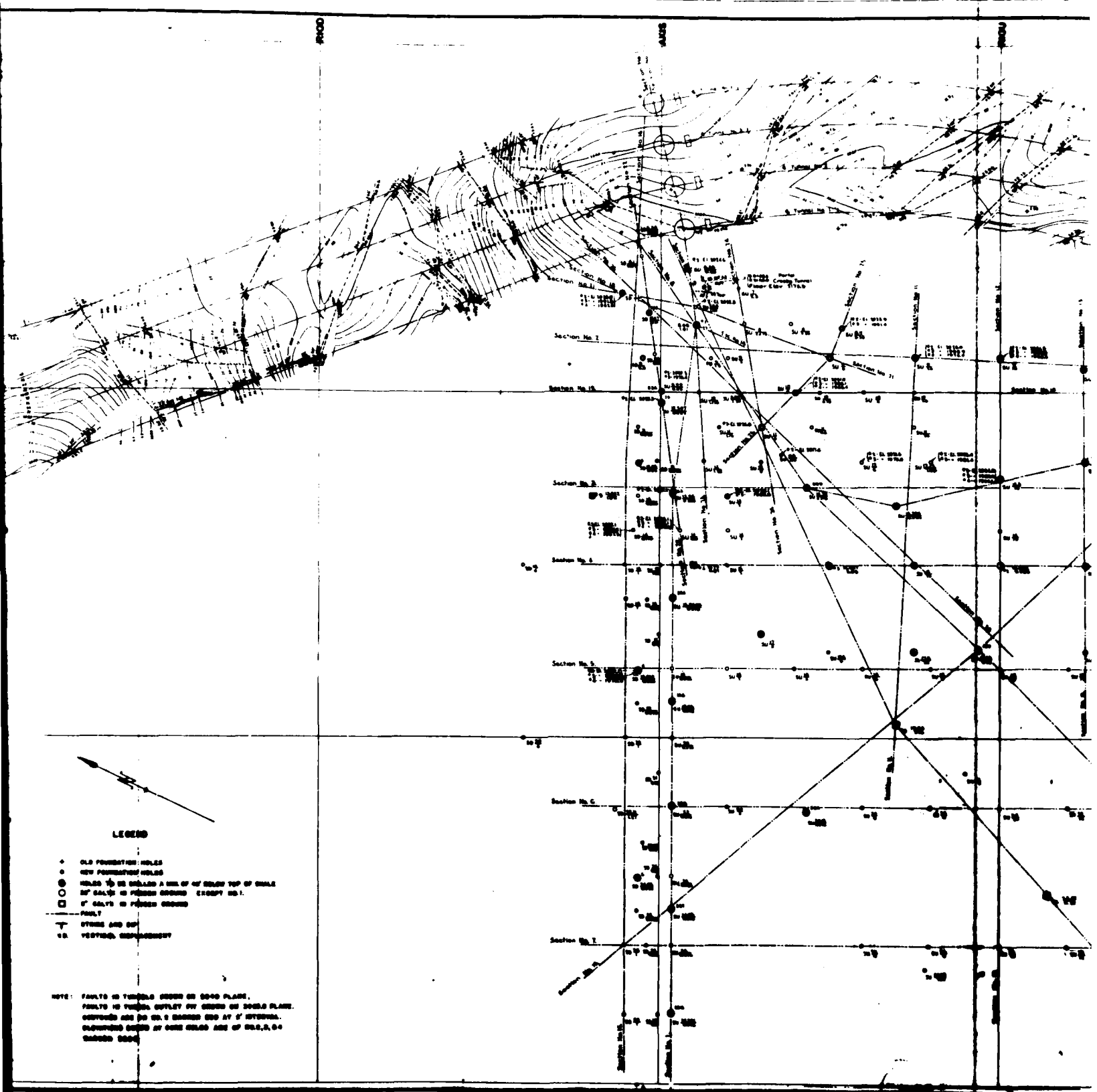
7. **Shear tests.** Consolidated-shear tests on transition-zone material, weathered shale and bentonite were made in the M.I.T. shear machine, while the direct-shear tests on shell material and tests on core material were made in the Zanesville-type shear machine. All quick-shear tests were made in the Zanesville-type shear machine. The shear test samples were 4 inches (102 mm) square and 3/4-inch (10 mm) thick.

Consolidated shear tests were made by first consolidating the sample to the desired load and then adding the shearing loads in increments and waiting until movement ceased before adding additional load increments. Quick-shear tests were made with constant strain loading, the load being applied continuously, so that failure occurred within a few minutes after start of the test.

WAR DEPARTMENT



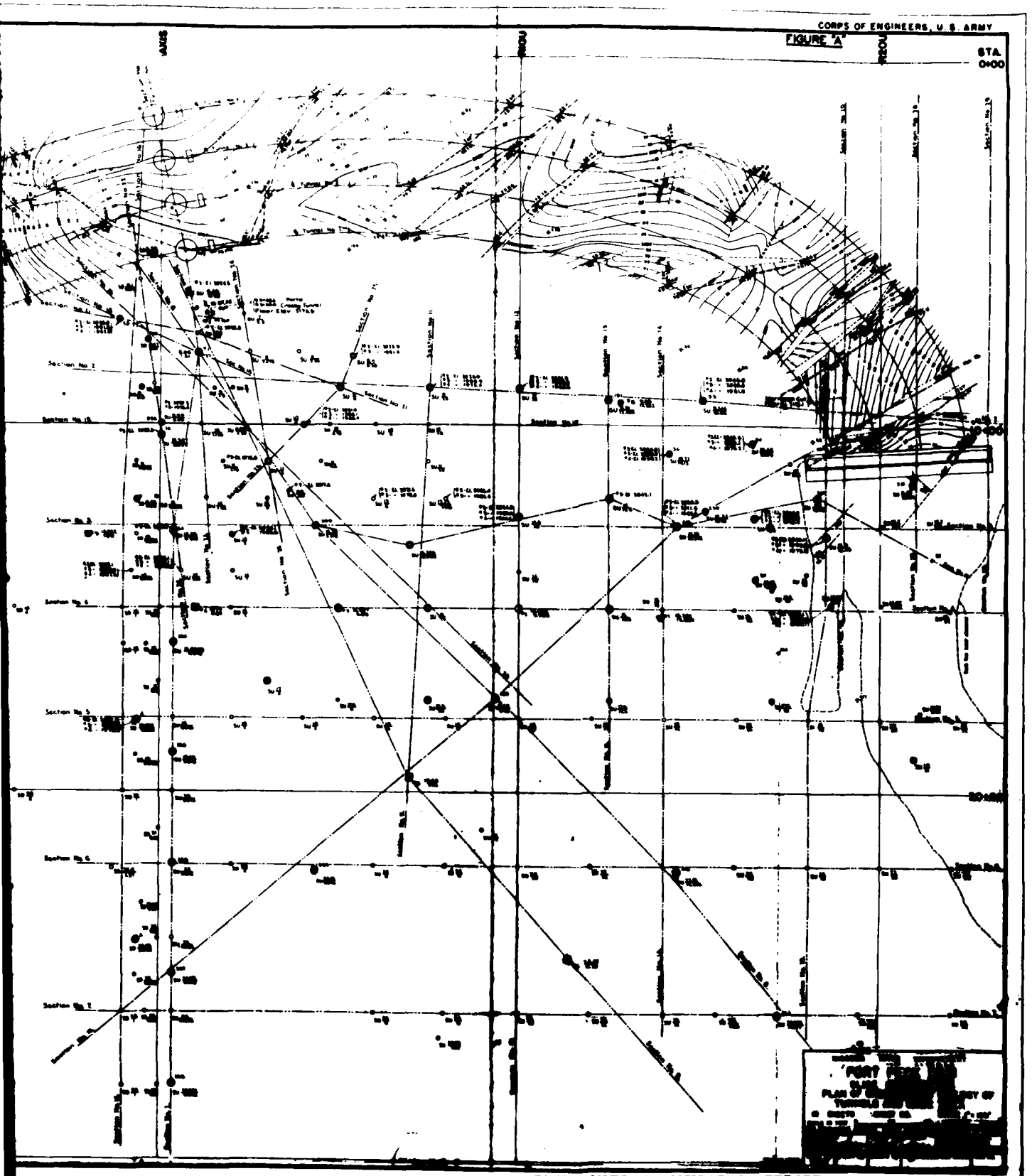
(Plate p. 88) No. 1



NOTE: FAULTS IN TUNNELS SHOWN ON SCALE PLANS.
FAULTS IN TUNNEL OUTLET PIT SHOWN ON SCALE PLANS.
CONTOURS ARE ON EL. 5 RAISED END AT 5' INTERVALS.
OVERBURDEN SHOWN BY CONTOURS AND BY EL. 0.0 ON RAISED END.

CONSTRUCT

2



CONSTRUCTION FOUNDATION REPORT PLATE 36

3

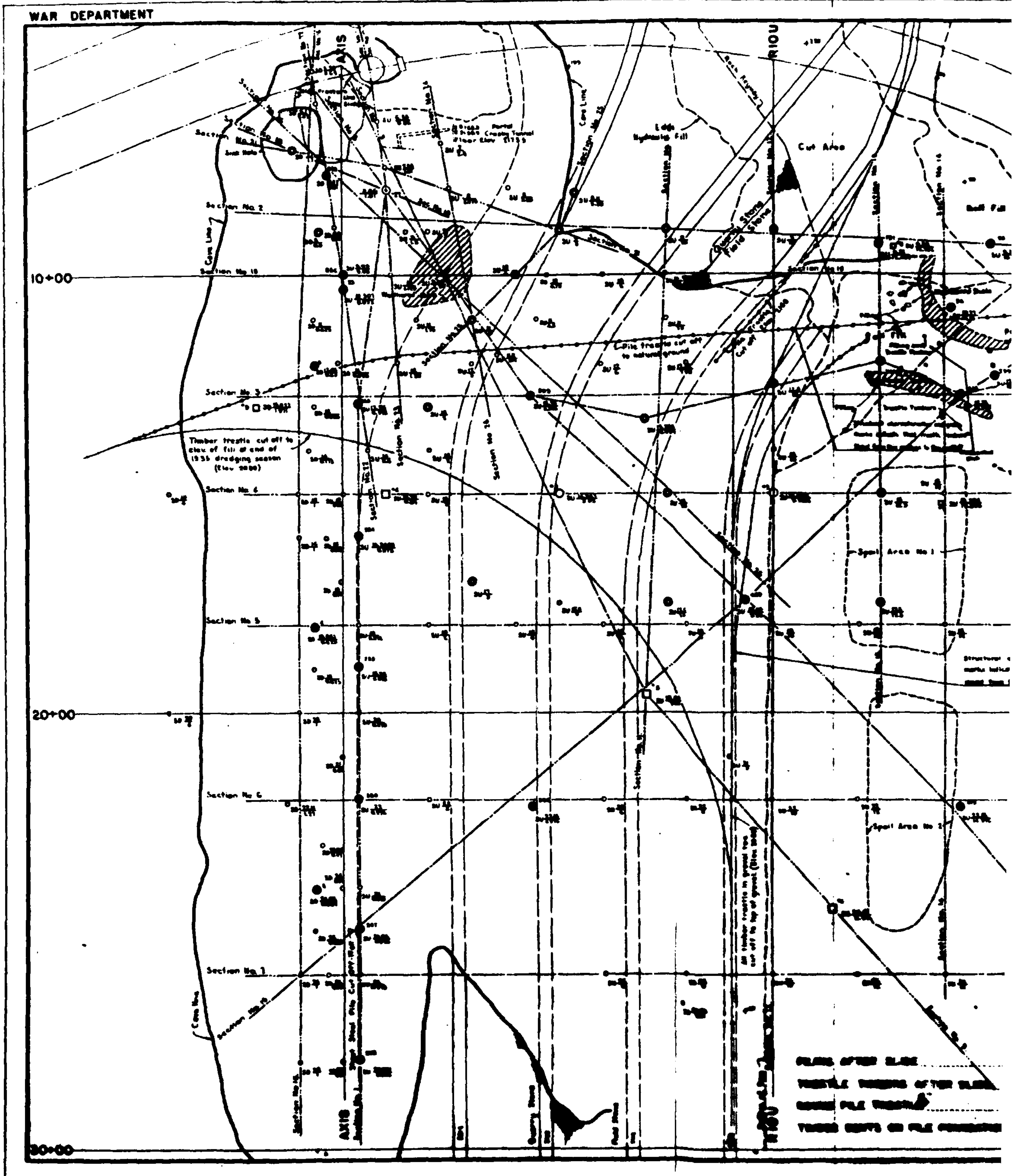
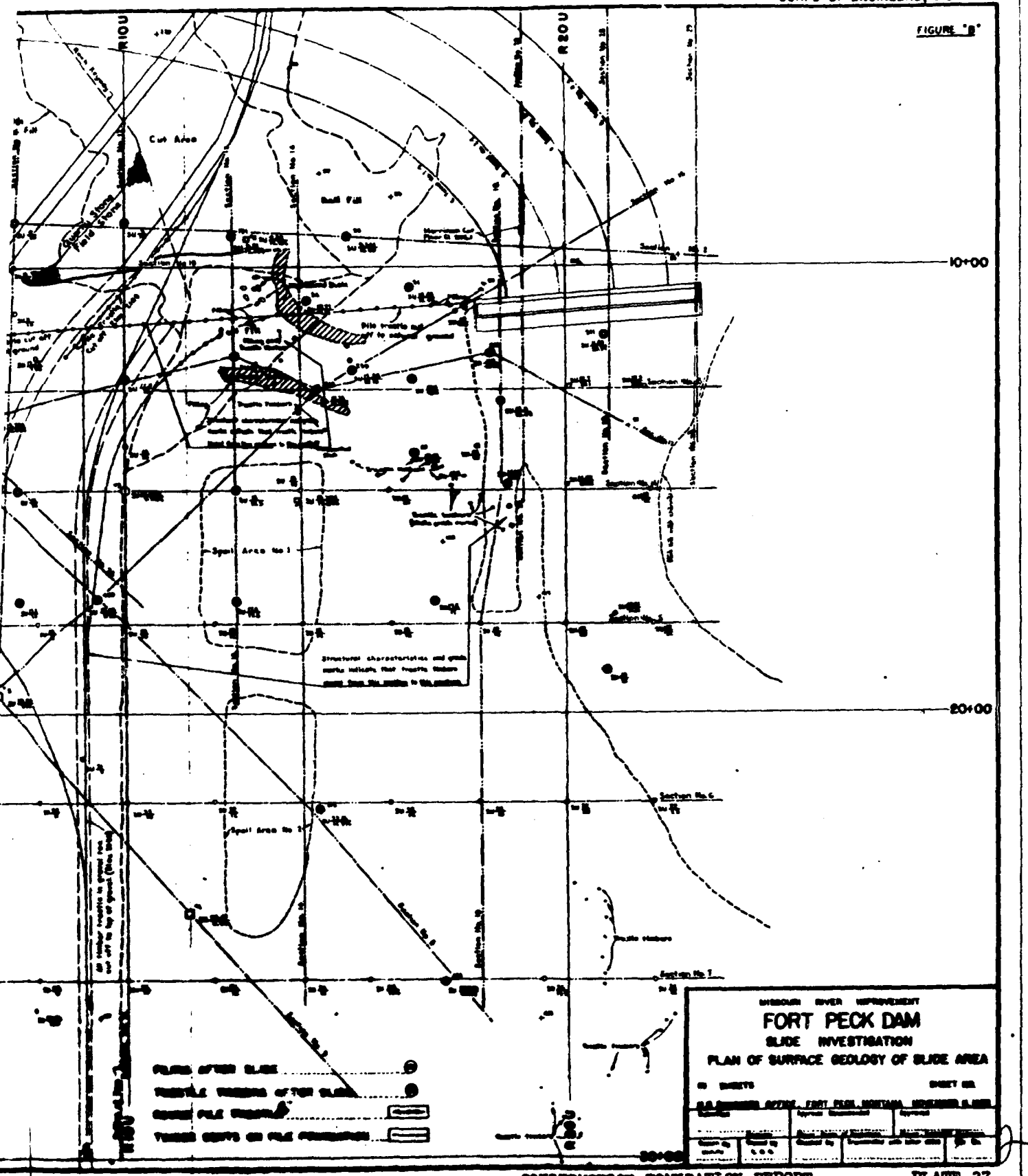

WAR DEPARTMENT
AXIS
RIOU
Cut Area
Edge Hydraulic Fill
Rock Boundary
Cave Line
Section No. 2
Section No. 3
Section No. 5
Section No. 6
Section No. 1
10+00
20+00
30+00
Timber trestle cut off to elev of fill at end of 1936 dredging season
L-Pile trestle cut off to natural ground
Spoil Area No 1
Spoil Area No 2

FIGURE "B"

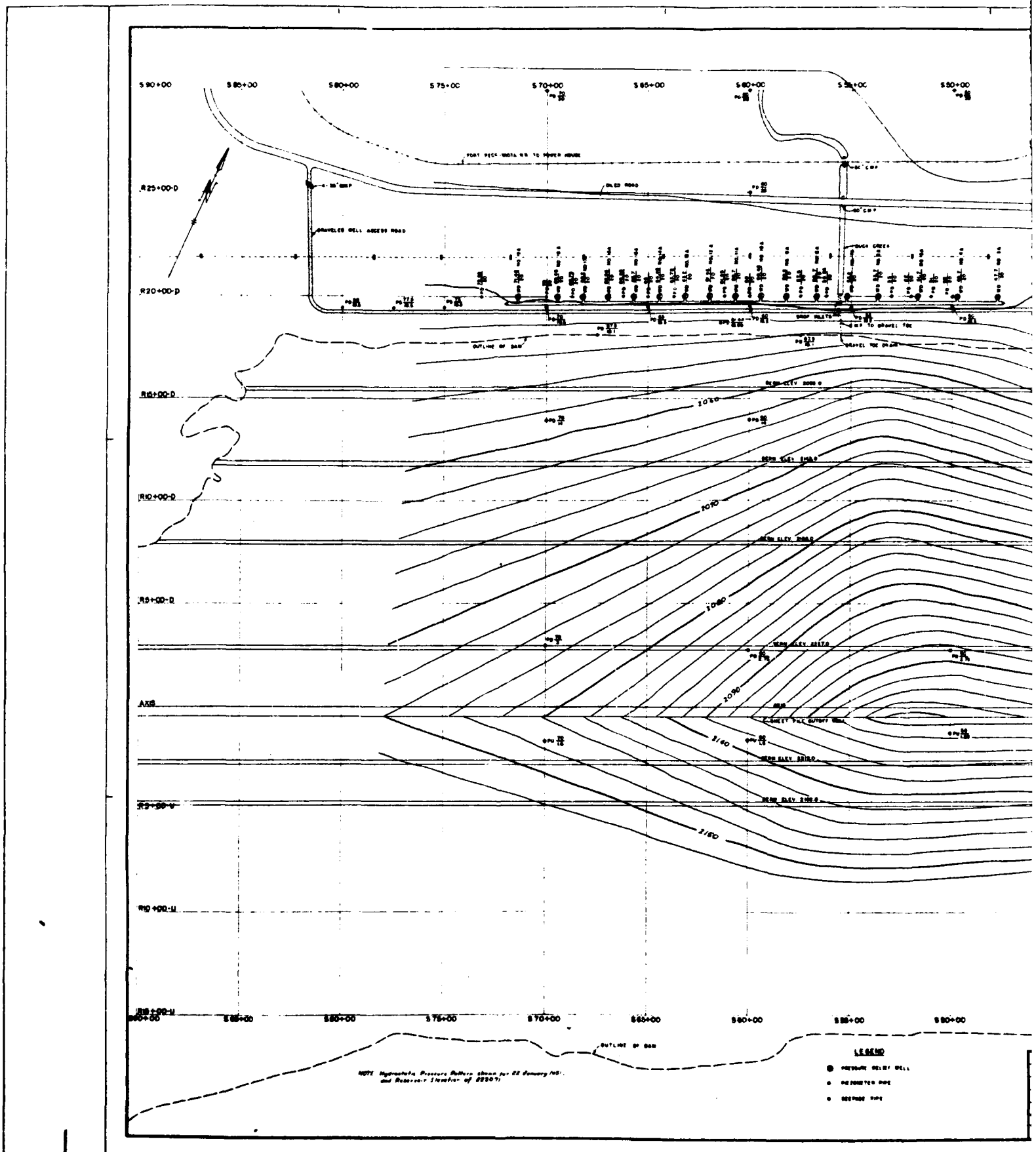


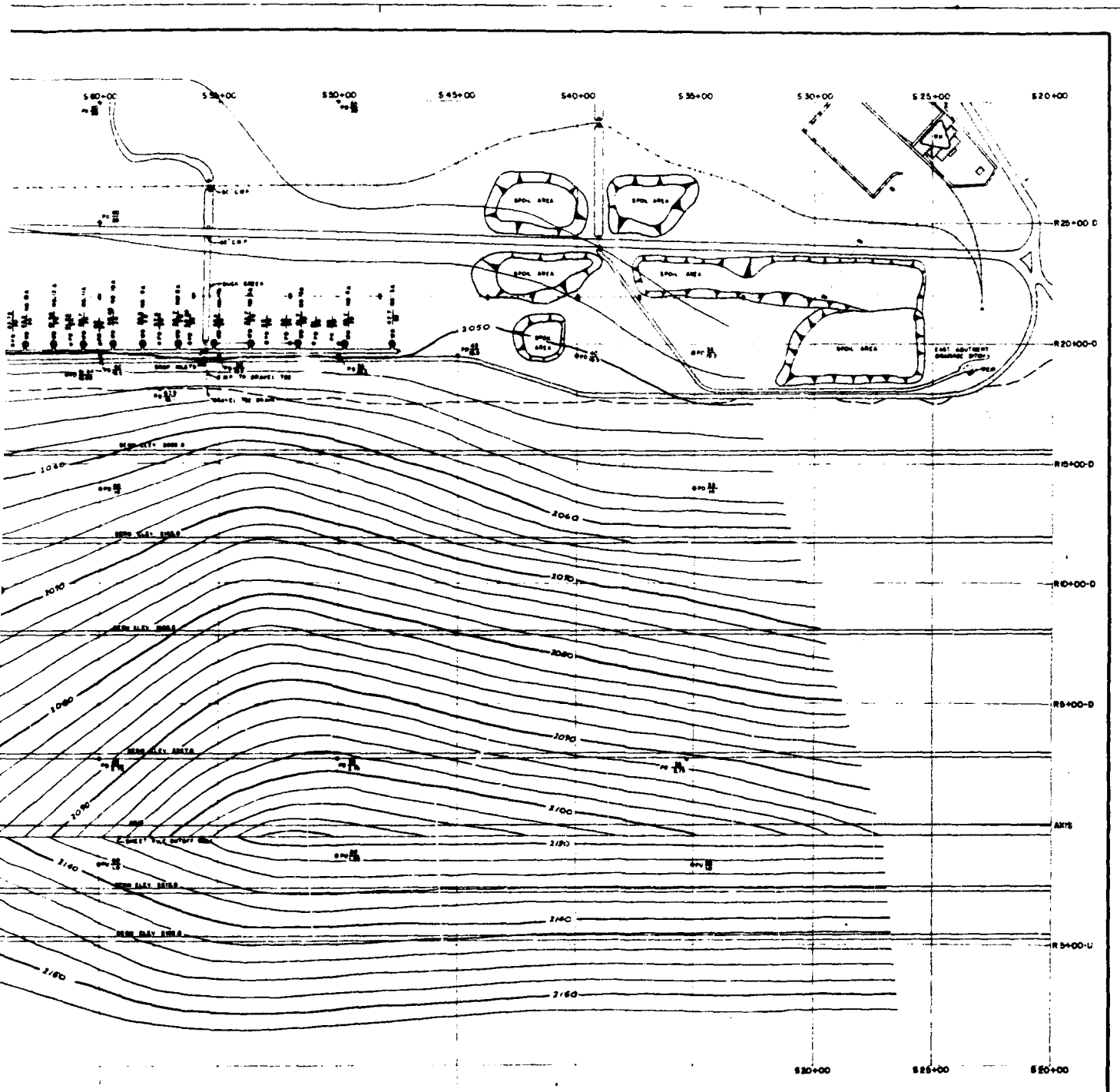
MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

SLIDE INVESTIGATION

PLAN OF SURFACE GEOLOGY OF SLIDE AREA


S 90+00
S 85+00
S 80+00
S 75+00
S 70+00
S 65+00
S 60+00
S 55+00
S 50+00
R 25+00-D
R 20+00-D
R 15+00-D
R 10+00-D
R 5+00-D
AXIS
R 5+00-U
R 10+00-U
R 15+00-U
FORT PECK-MOSBY 69 TO POWER HOUSE
GRAVELED WELL ACCESS ROAD
OUTLINE OF DAM
DRAIN CREEK
2050
2040
2030
2020
2010
2000
1990
1980
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150
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120
110
100
90
80
70
60
50
40
30
20
10
0
S 90+00
S 85+00
S 80+00
S 75+00
S 70+00
S 65+00
S 60+00
S 55+00
S 50+00
OUTLINE OF DAM
NOTE Hydrostatic Pressure Pattern shown for 22 January 1951 and Reservoir Elevation of 2230 ft
LEGEND



This drawing has been reduced to three-fourths the original scale.

LEGEND

- PRESSURE RELIEF WELL
- PIEZOMETER PIPE
- OBSERVATION PIPE

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

HYDROSTATIC PRESSURE PATTERN IN GRAVEL STRATA BENEATH CLAY STRATUM

1-22-51

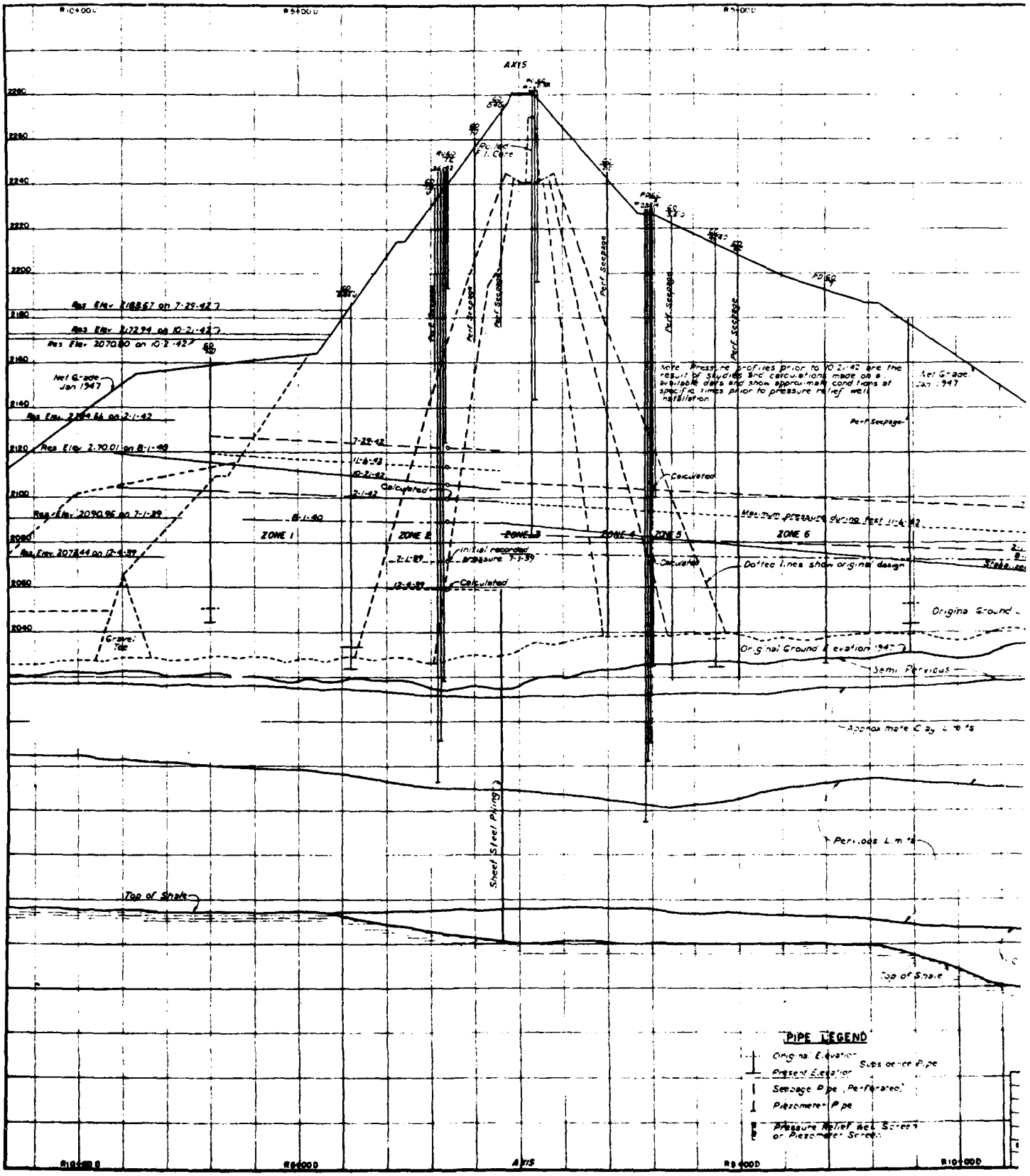
IN SHEETS SHEET NO.

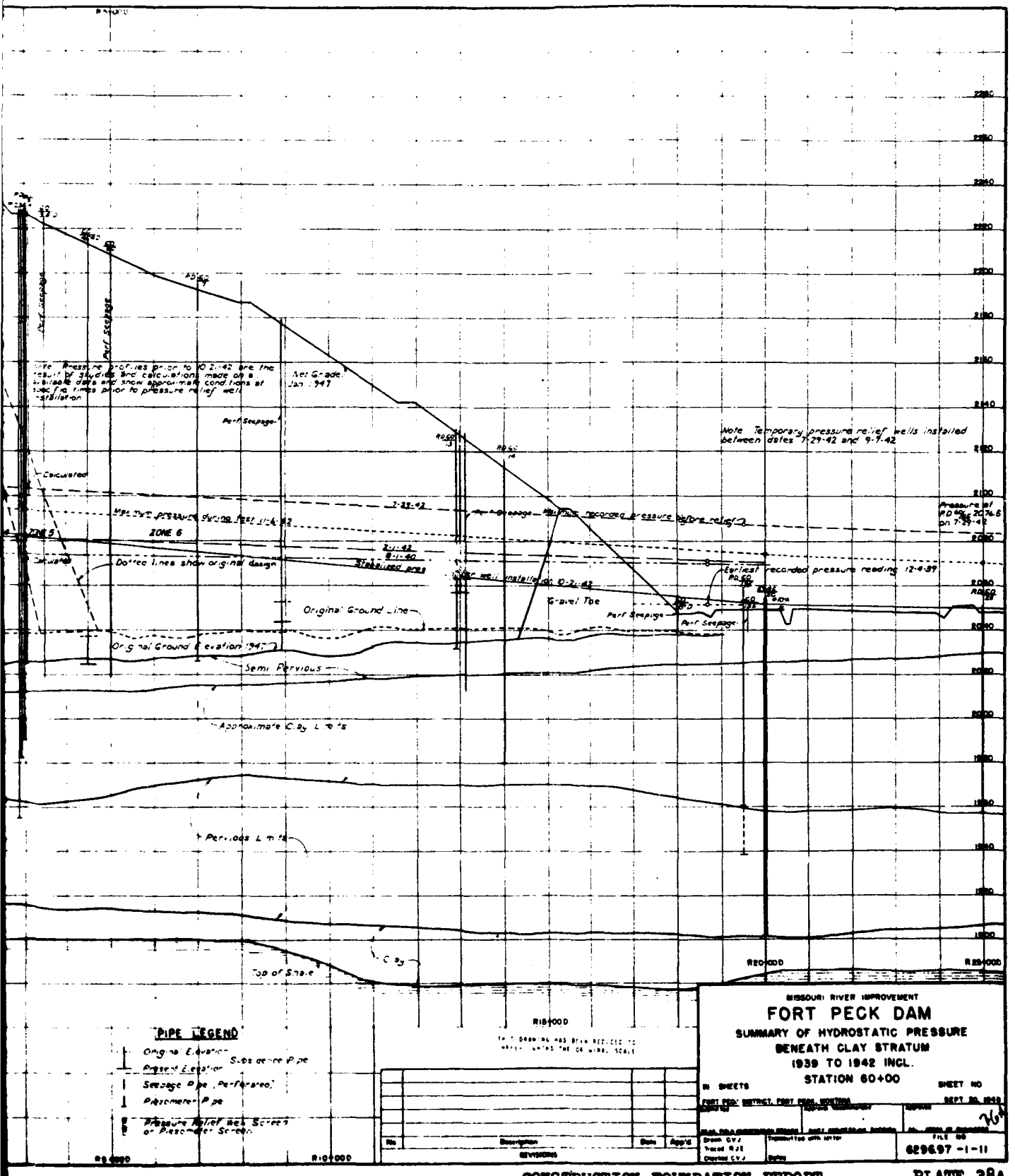
FORT PECK DISTRICT, FORT PECK, MONTANA

DESIGNED | DRAWN APR | TRACED JEH | CHECKED CJ | QUANTITIES CHECKED | APPROVED | CHIEF, ENGINEERING DIVISION | CHIEF, DIVISION OF ENGINEERING

FILE NO. 6296.97-1-55

NO	DESCRIPTION	DATE	APP'D
	REVISIONS		


AXIS
Perf Seepage
Res Elev 2168.67 on 7-29-42
Res Elev 2172.94 on 10-2-42
Res Elev 2070.80 on 10-2-42
Net Grade Jan 1947
Res Elev 2164.66 on 2-1-42
Res Elev 2100.1 on 8-1-40
Res Elev 2090.96 on 7-1-39
Res Elev 2078.44 on 12-6-39
7-29-42
12-6-42
10-2-42
2-1-42
Calculated
8-1-40
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 6
initial recorded pressure 7-1-39
12-6-39
Gravel Tide
Maximum pressure during test 1-6-42
Dotted lines show original design
Original Ground
Original Ground Elevation 1947
Semi Pervious
Approximate Clay Limits
Pervious Limits
Sheet Steel Piling
Top of Shale
Note Pressure profiles prior to 10-2-42 are the results of studies and calculations made on available data and show approximate conditions at specific times prior to pressure relief well installation.
PIPE LEGEND
Original Elevation Subsurface Pipe
Present Elevation
Seepage Pipe (Perforated)
Piezometer Pipe
Pressure Relief Well Screen or Piezometer Screen



PIPE LEGEND

- Original Elevation
- Present Elevation
- Seepage Pipe (Perforated)
- Piezometer Pipe
- Pressure Relief Well Screen or Piezometer Screen
- Subsurface Pipe

R15+000

This drawing has been reduced to conform with the original scale

No.	Description	Date	App'd

REVISIONS

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

SUMMARY OF HYDROSTATIC PRESSURE BENEATH CLAY STRATUM 1939 TO 1942 INCL. STATION 60+00

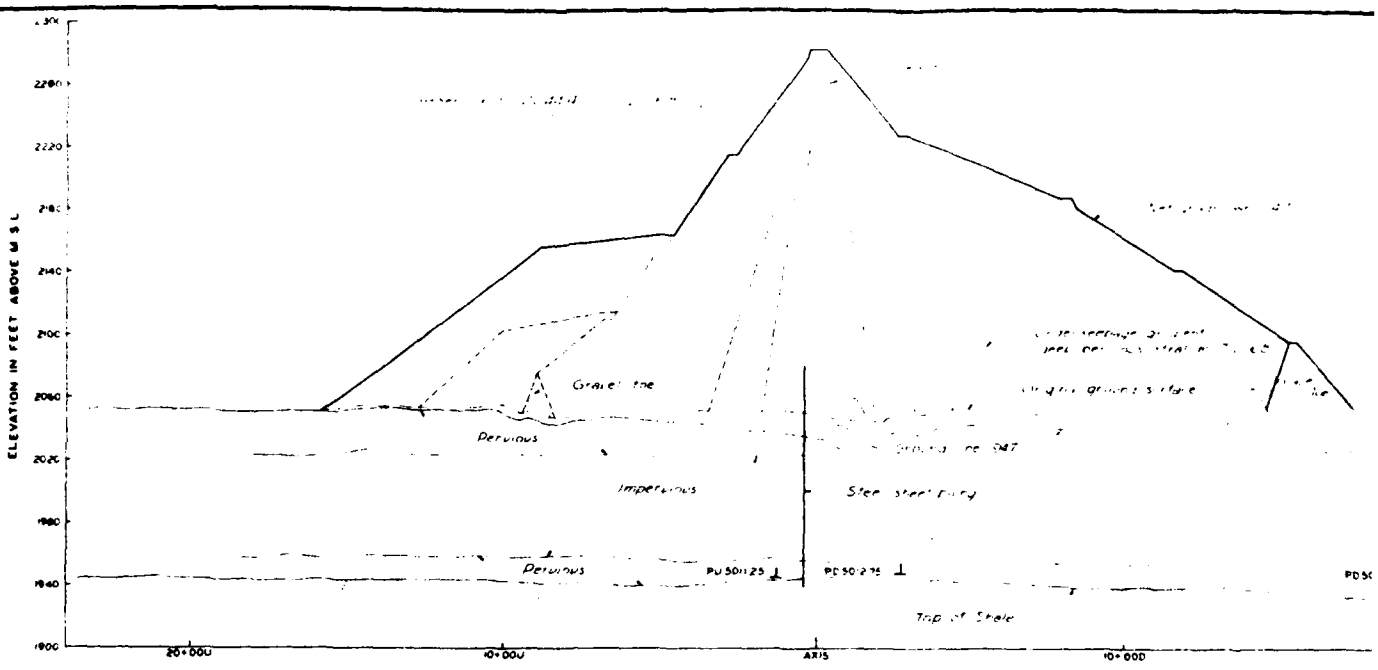
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FORT PECK DISTRICT, FORT PECK, MONTANA SEPT 30, 1942

Drawn C.V.J. Traced R.J.E. Checked C.V.J. Date

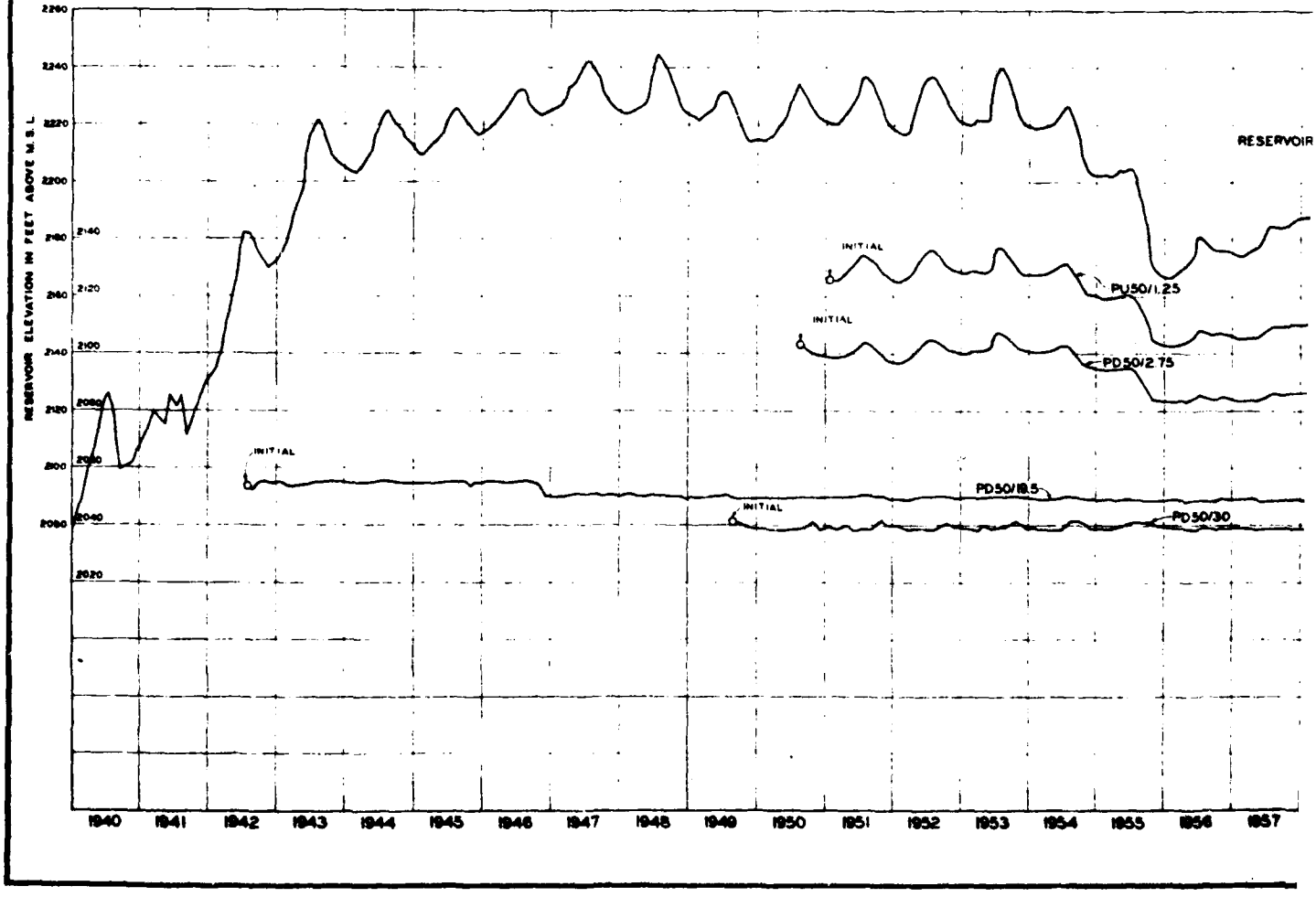
FILE NO 629697-1-11

CONSTRUCTION FOUNDATION REPORT PLATE 38A



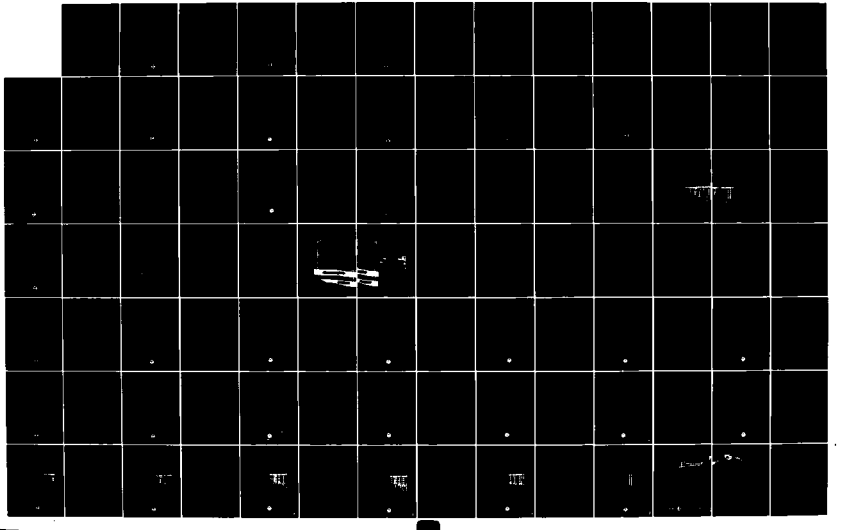
SECTION STA 50+00

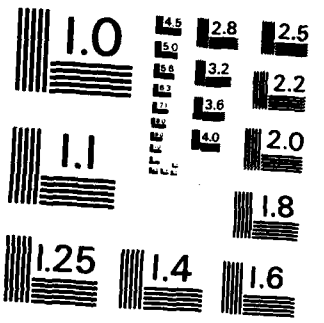
SCALE VERT 1INCH= 40FEET
HORIZ 1INCH=200FEET



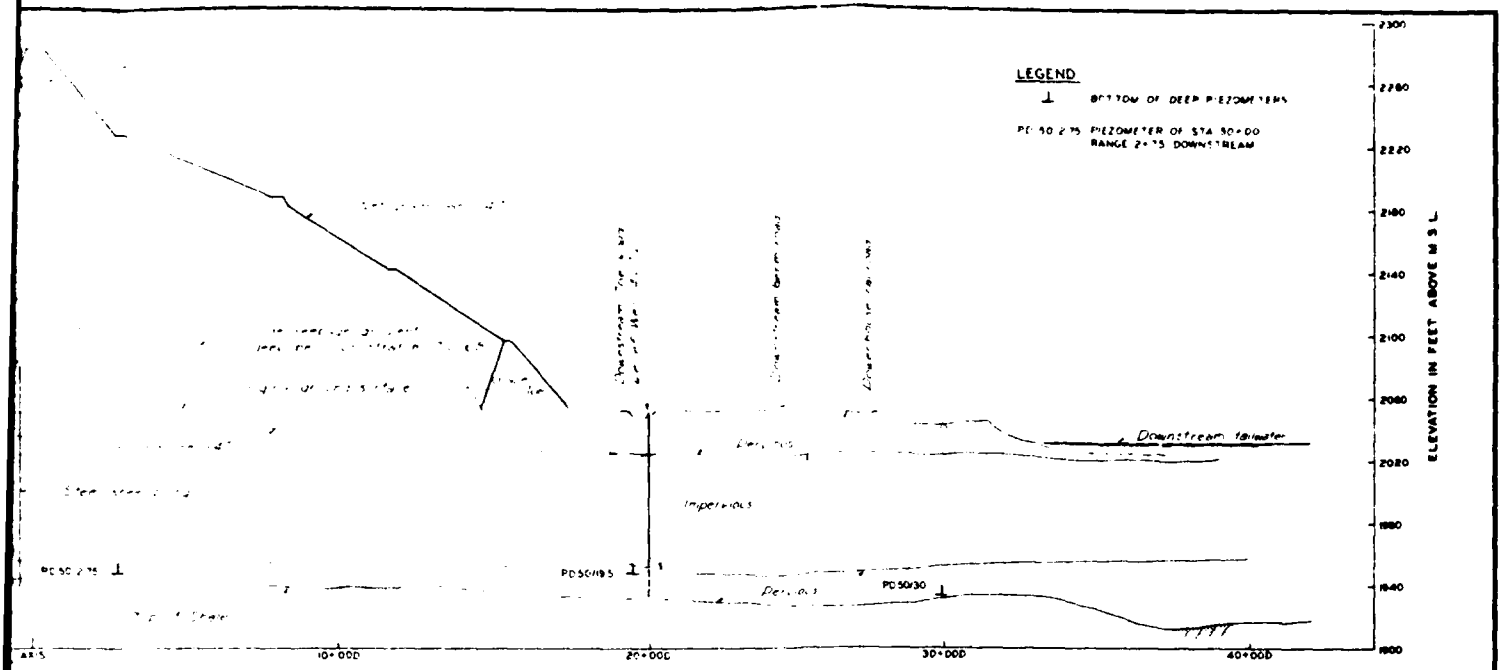
AD A134 914 CONSTRUCTION FOUNDATION REPORT MISSOURI RIVER FORT PECK MONTANA VOLUME 2 DRAWINGS(U) ARMY ENGINEER DISTRICT OMAHA NE JAN 83 2/4

UNCLASSIFIED F/G 13/13 NL



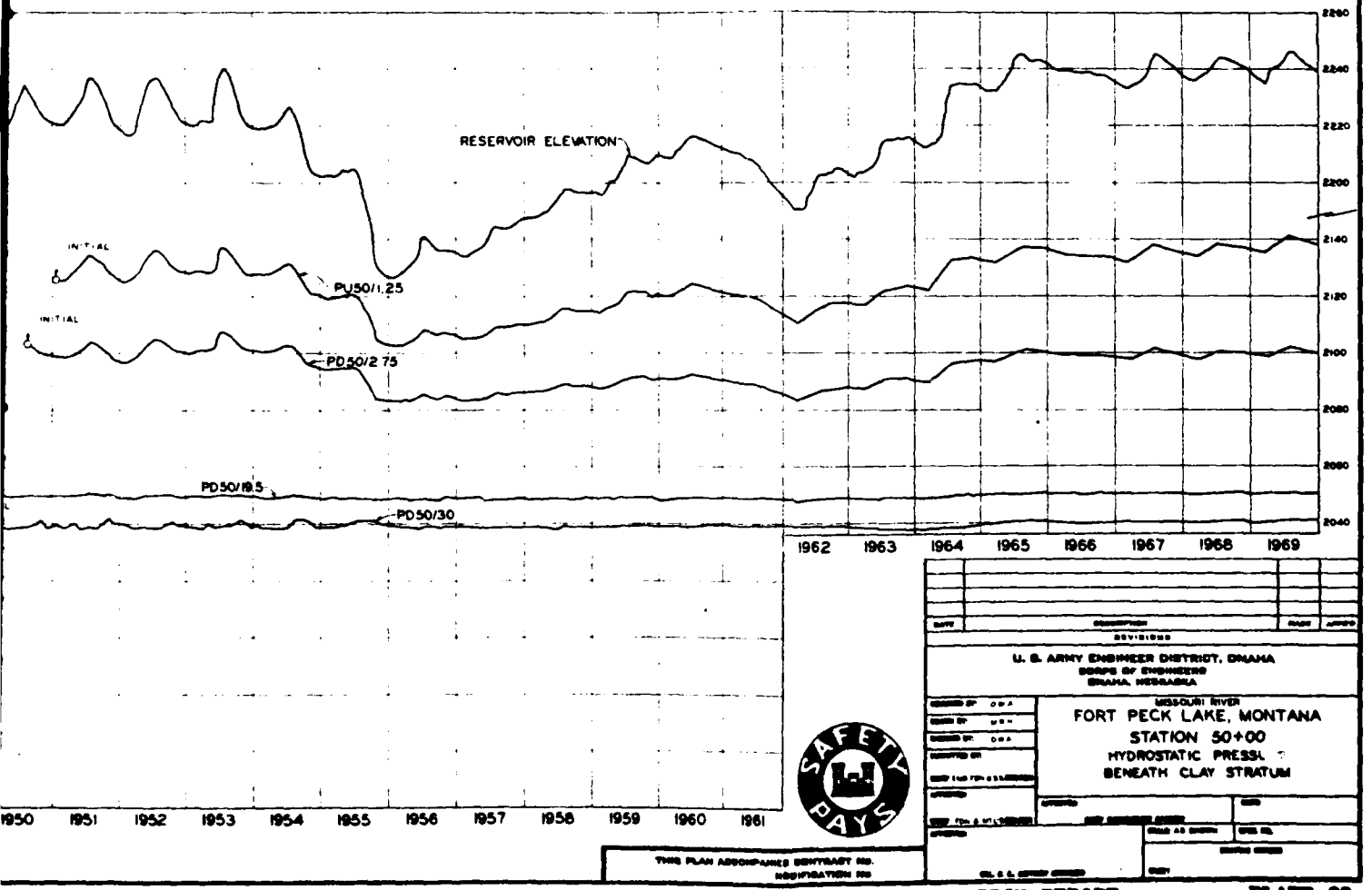


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A



SECTION STA 50+00

SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET



SAFETY DAYS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

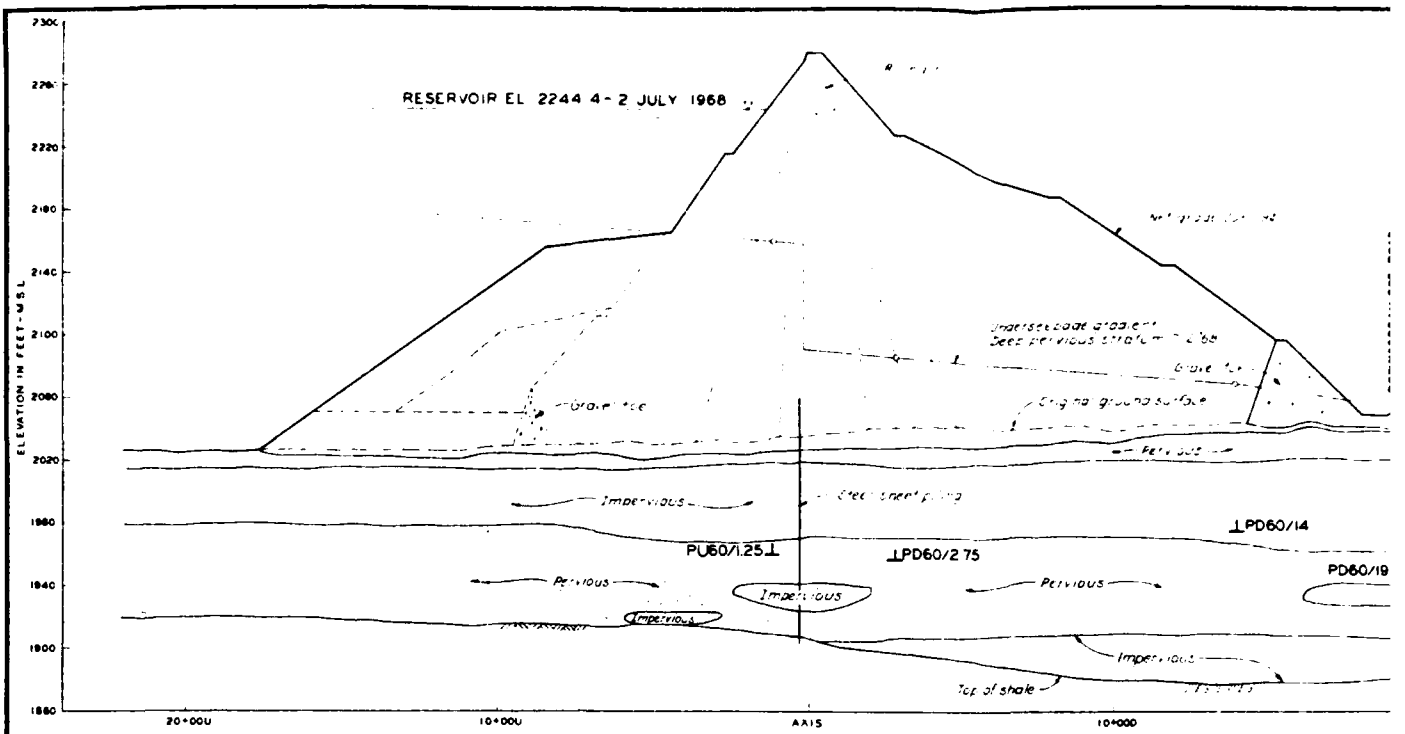
MISSOURI RIVER
FORT PECK LAKE, MONTANA
STATION 50+00
HYDROSTATIC PRESSURE
BENEATH CLAY STRATUM

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

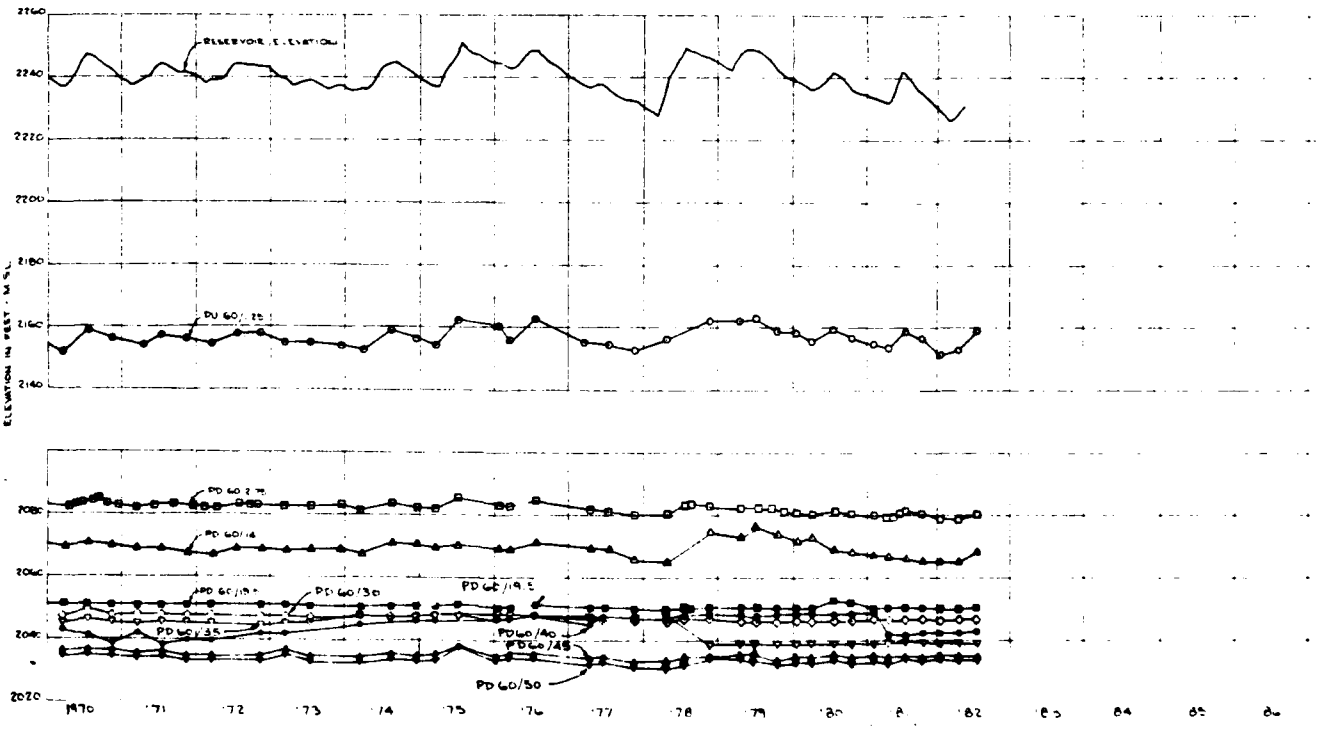
PLATE 39

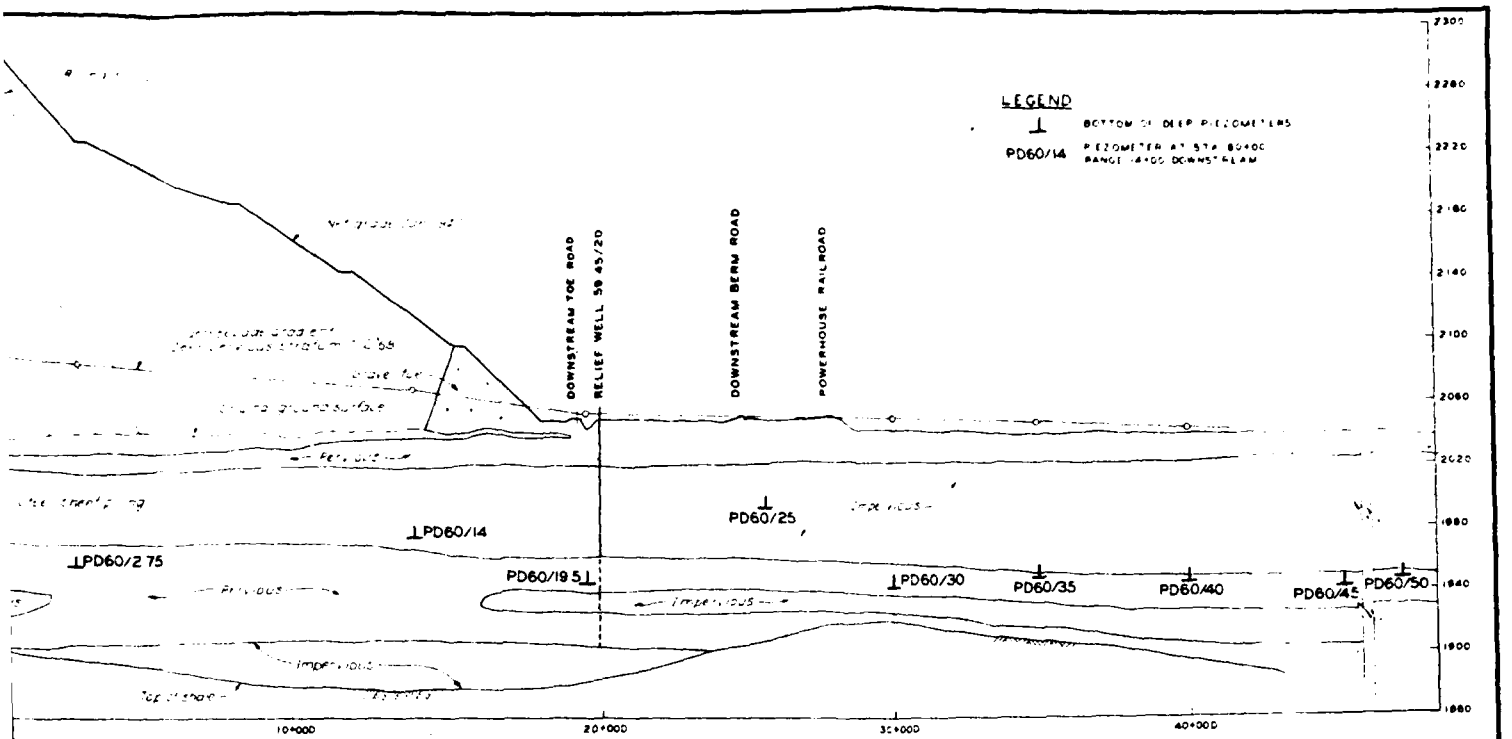
2



SECTION - STA 60+00

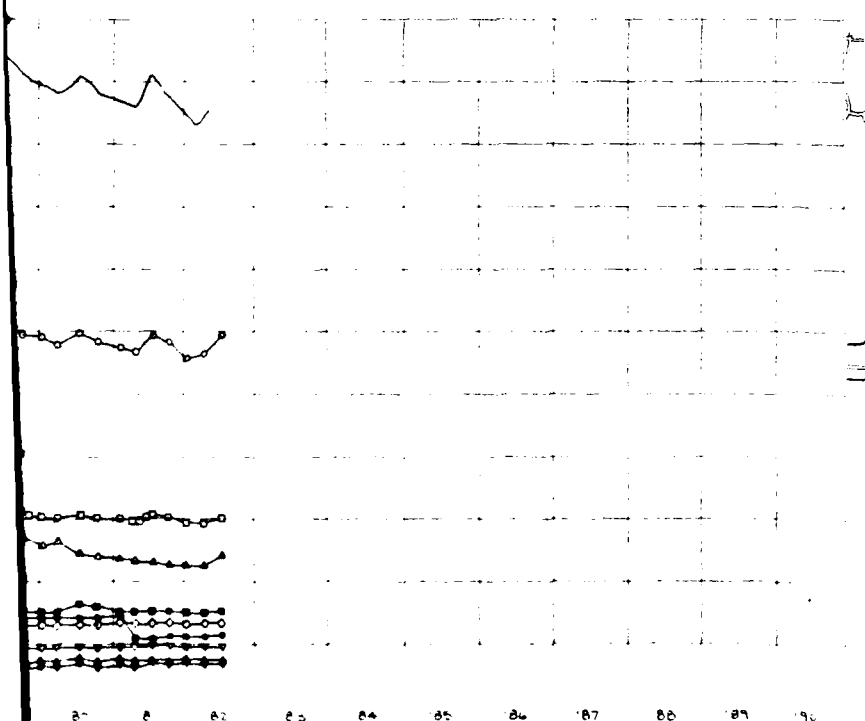
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET

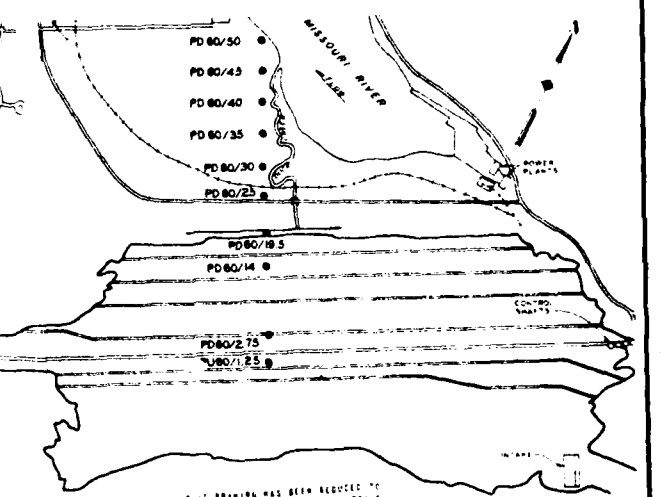




SECTION-STA 60+00

SCALE VERT 1 INCH= 40 FEET
HORIZ 1 INCH=200 FEET





KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE

DATE	DESCRIPTION	MADE	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

STATION 60 + 00
HYDROSTATIC PRESSURE
BENEATH CLAY STRATUM

DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
CHIEF
APPROVED
CHIEF
APPROVED
CHIEF
APPROVED
CHIEF, DESIGN BRANCH
DATE
SCALE AS SHOWN
SHEET NO.
CHIEF, ENGINEERING DIVISION
SHEET
U. S. ARMY ENGINEER DIVISION

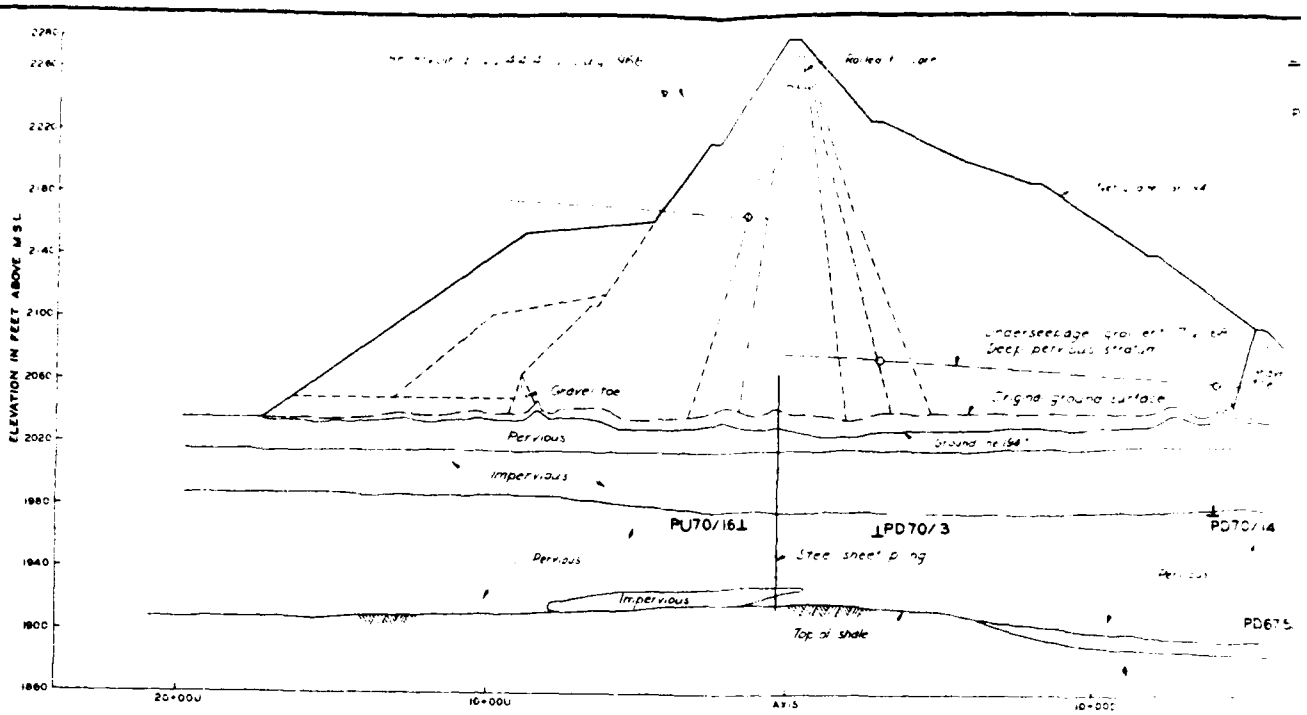
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

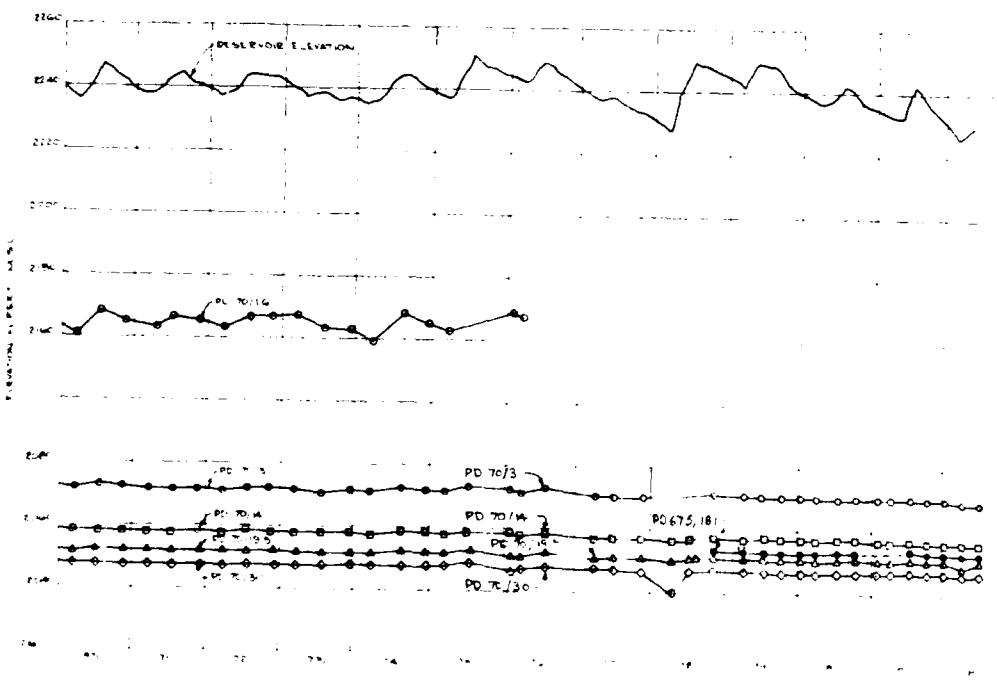
PLATE 40

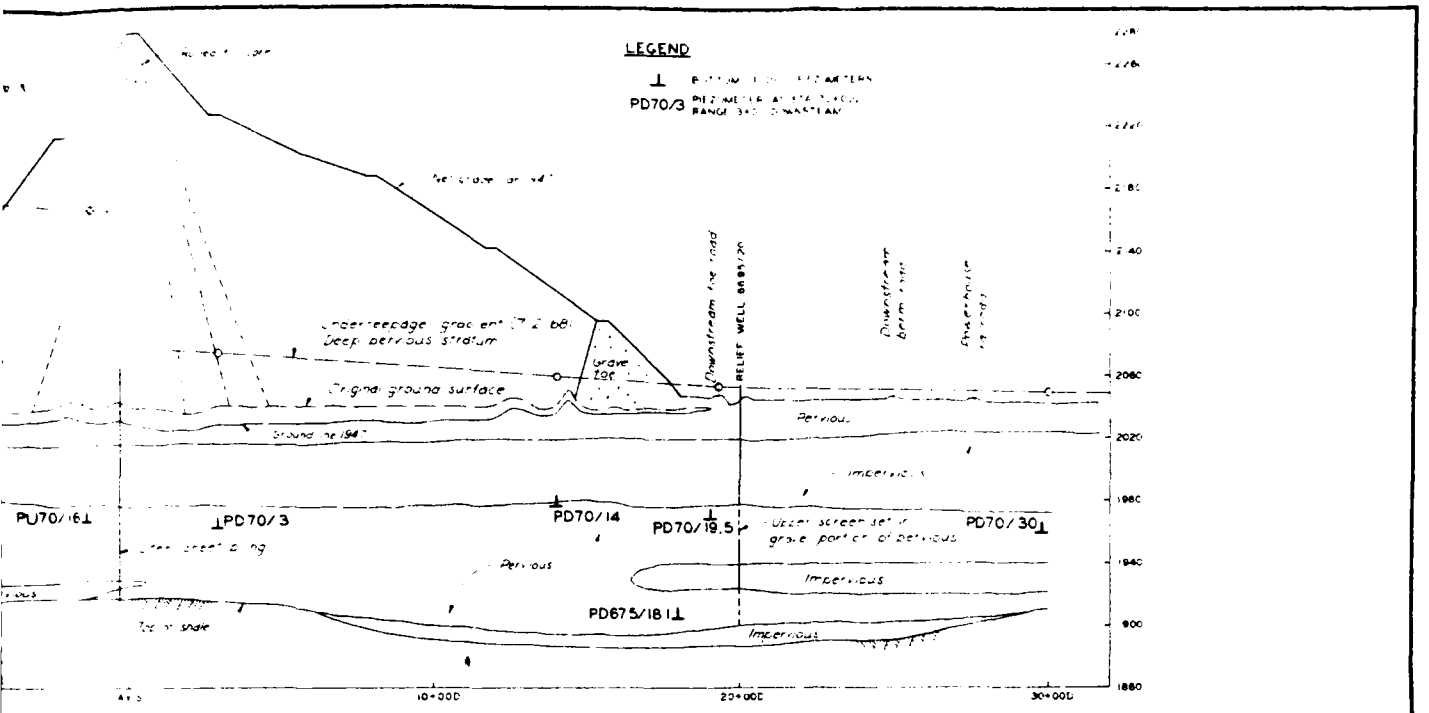
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SECTION STA 70+00

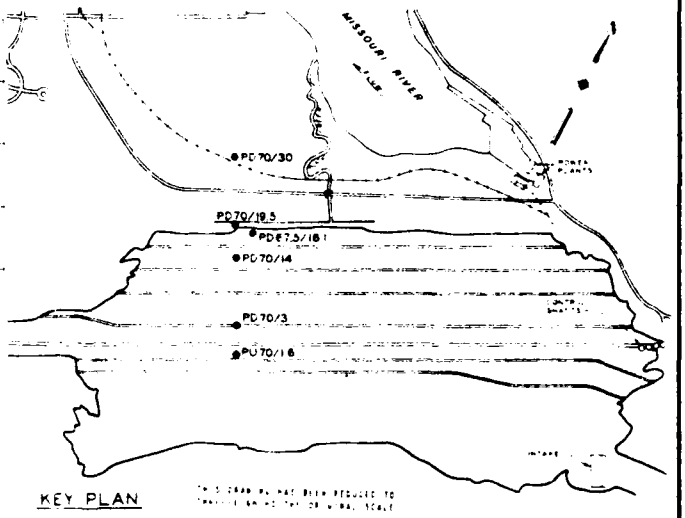
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET





SECTION STA 70+00

SCALE VERT. 1 INCH= 40 FEET
HOR. 1 INCH= 200 FEET



KEY PLAN

REVISIONS			
DATE	DESCRIPTION	CHKD	APPR'D

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

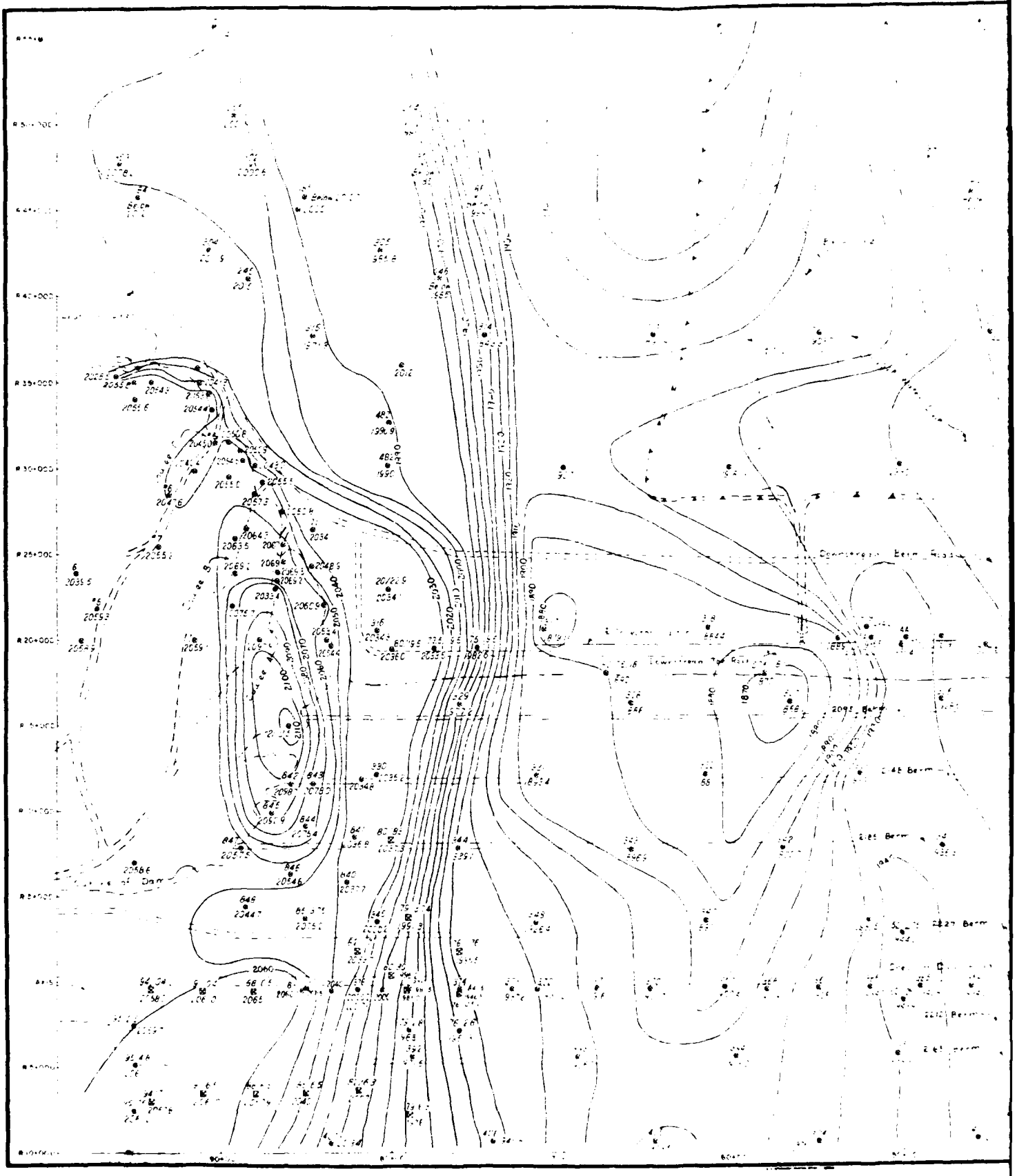
MISSOURI RIVER
FORT PECK LAKE MONTANA
STATION 70+00
HYDROSTATIC PRESSURE
BENEATH CLAY STRATUM

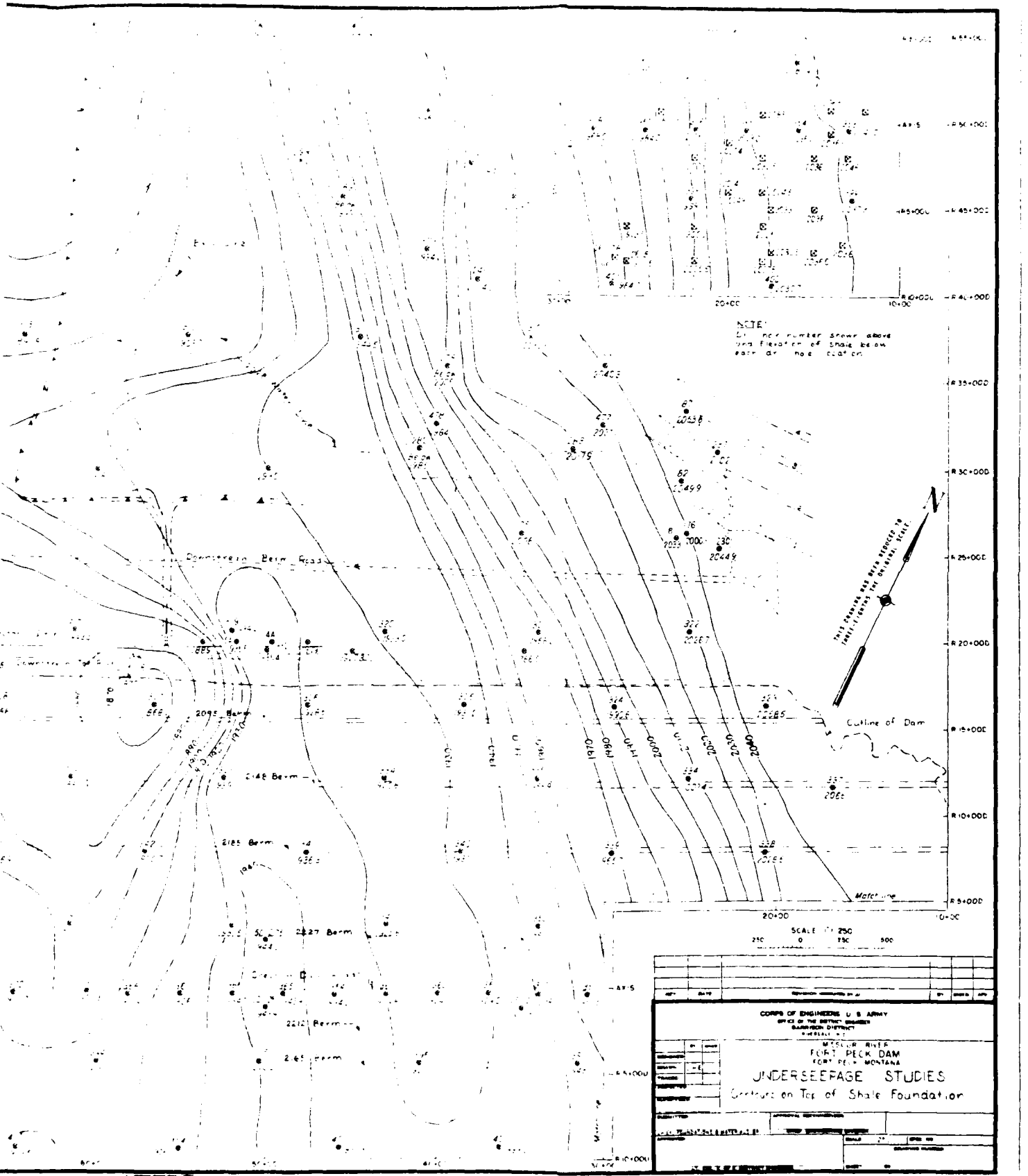
SAFETY PAYS

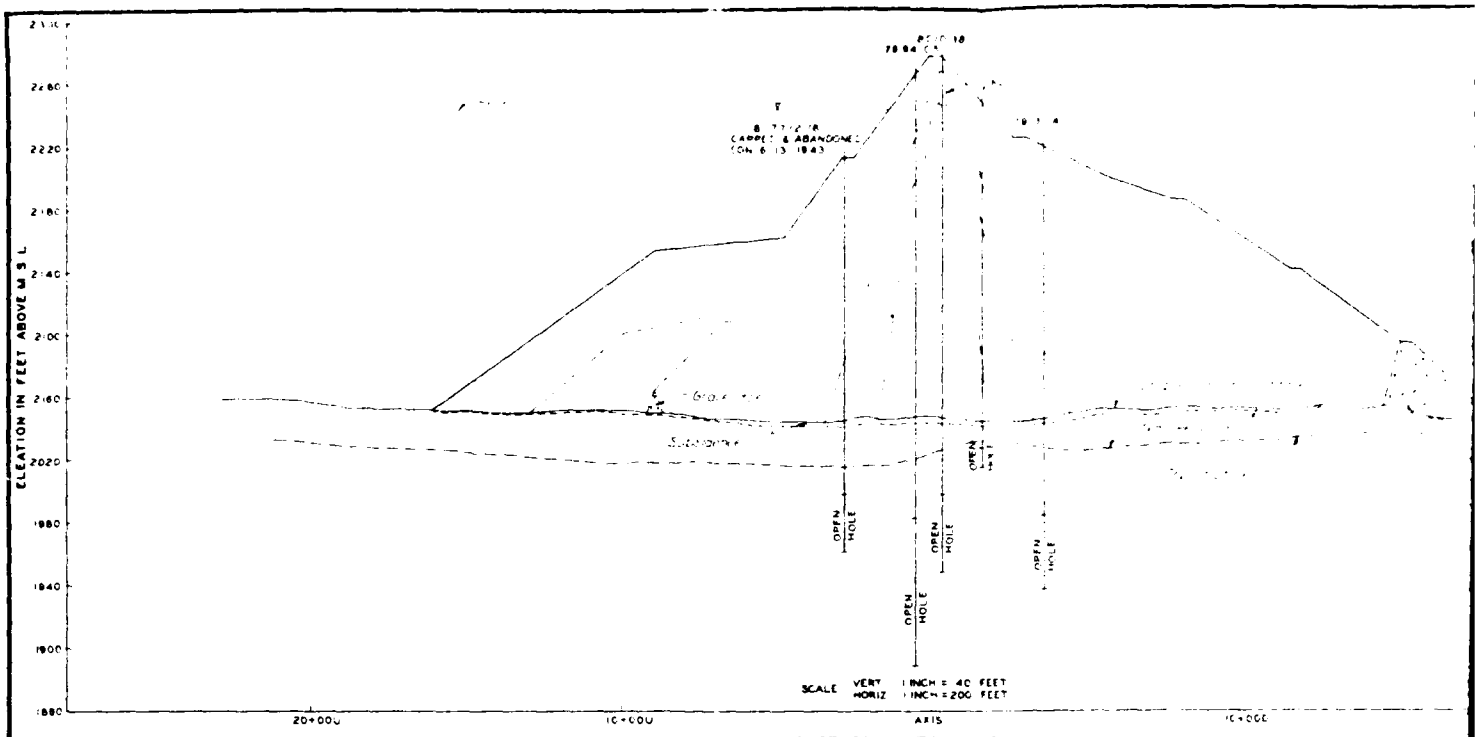
THIS PLAN ACCOMPANIES CONTRACT NO
MODIFICATION NO

CONSTRUCTION FOUNDATION REPORT

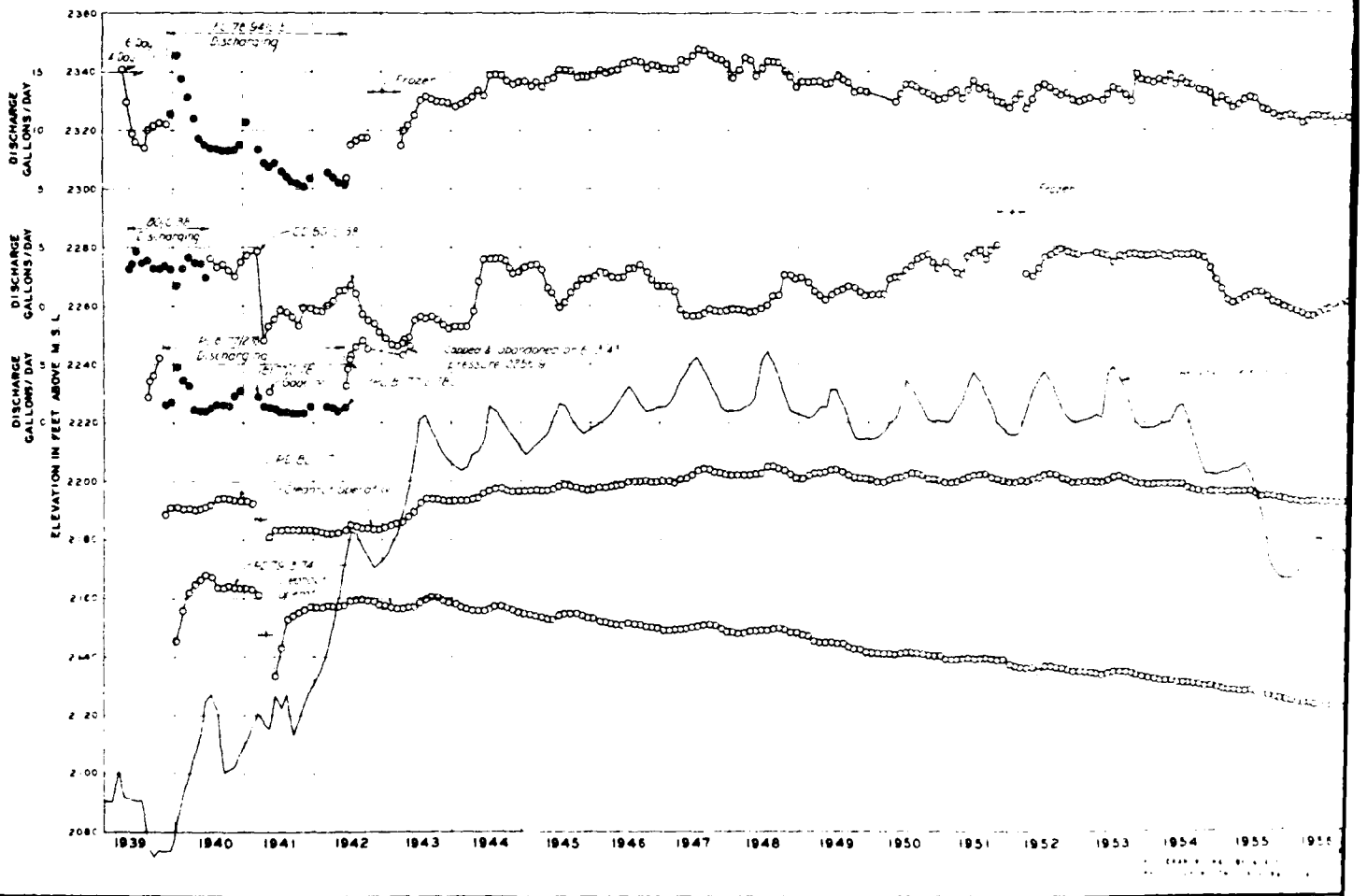
PLATE 41

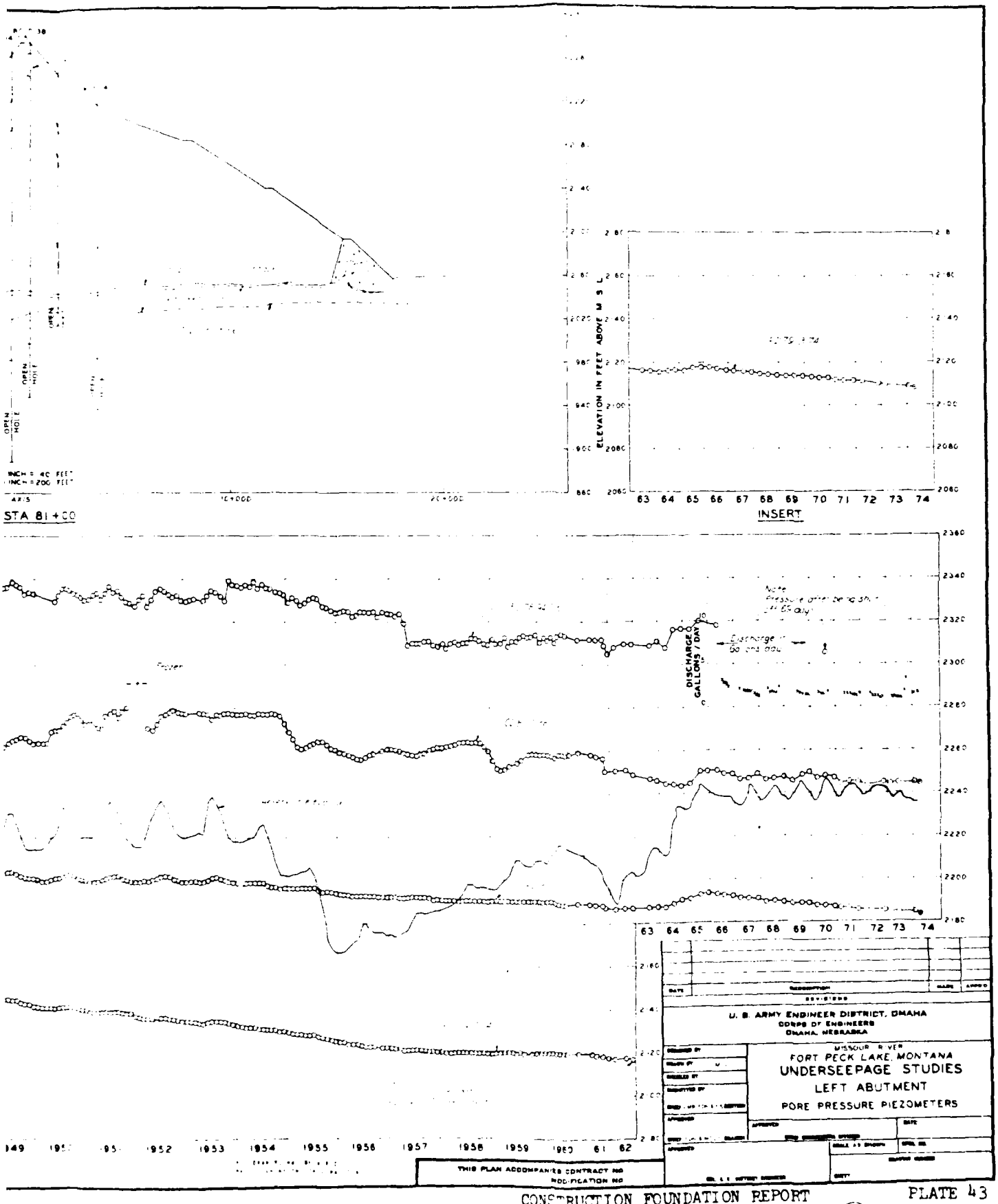



NOTE:
Dot and number shown above are elevation of shale below each drill hole location.
Downstream Berm Road
2095 Berm
2148 Berm
2185 Berm
2227 Berm
2212 Berm
2165 Berm
Cutline of Dam
Match line
20+00
10+00
R 30+000
R 25+000
R 20+000
R 15+000
R 10+000
R 5+000
SCALE 1" = 250'
250 0 250 500
CORPS OF ENGINEERS U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT
MISSOURI RIVER
FORT PECK DAM
FORT PECK, MONTANA
UNDERSEEPAGE STUDIES
Contours on Top of Shale Foundation



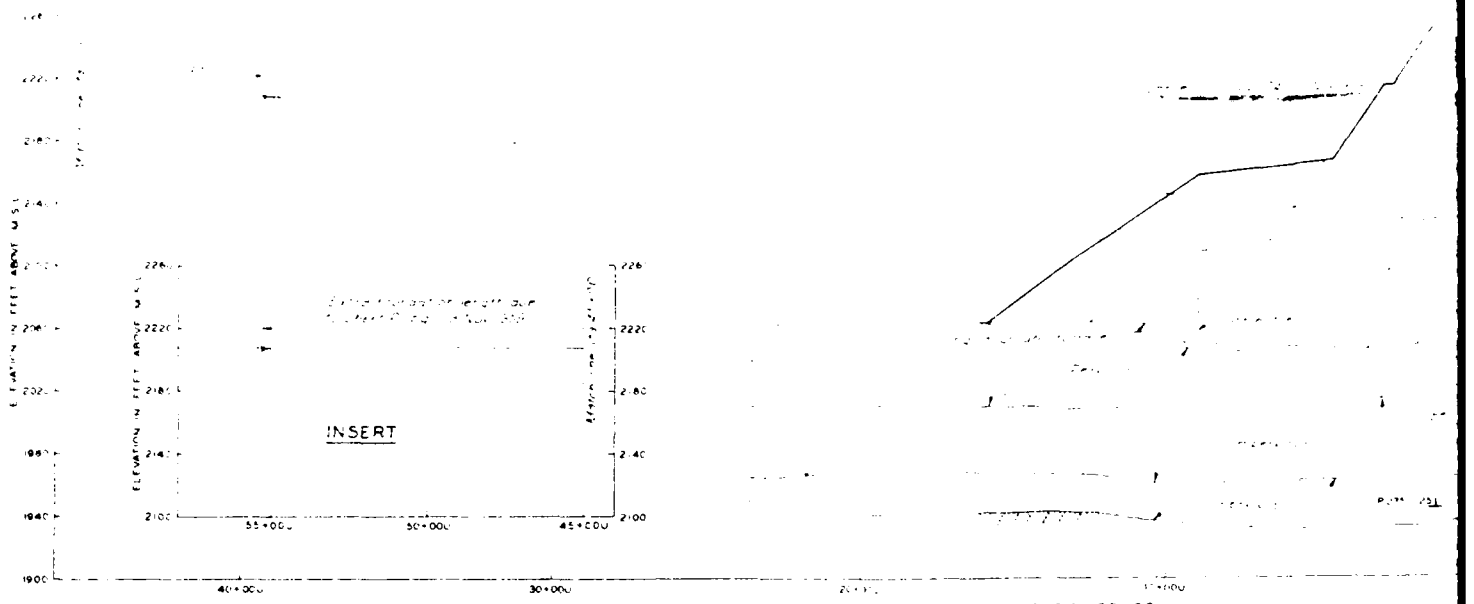
SECTION - STA 81+00

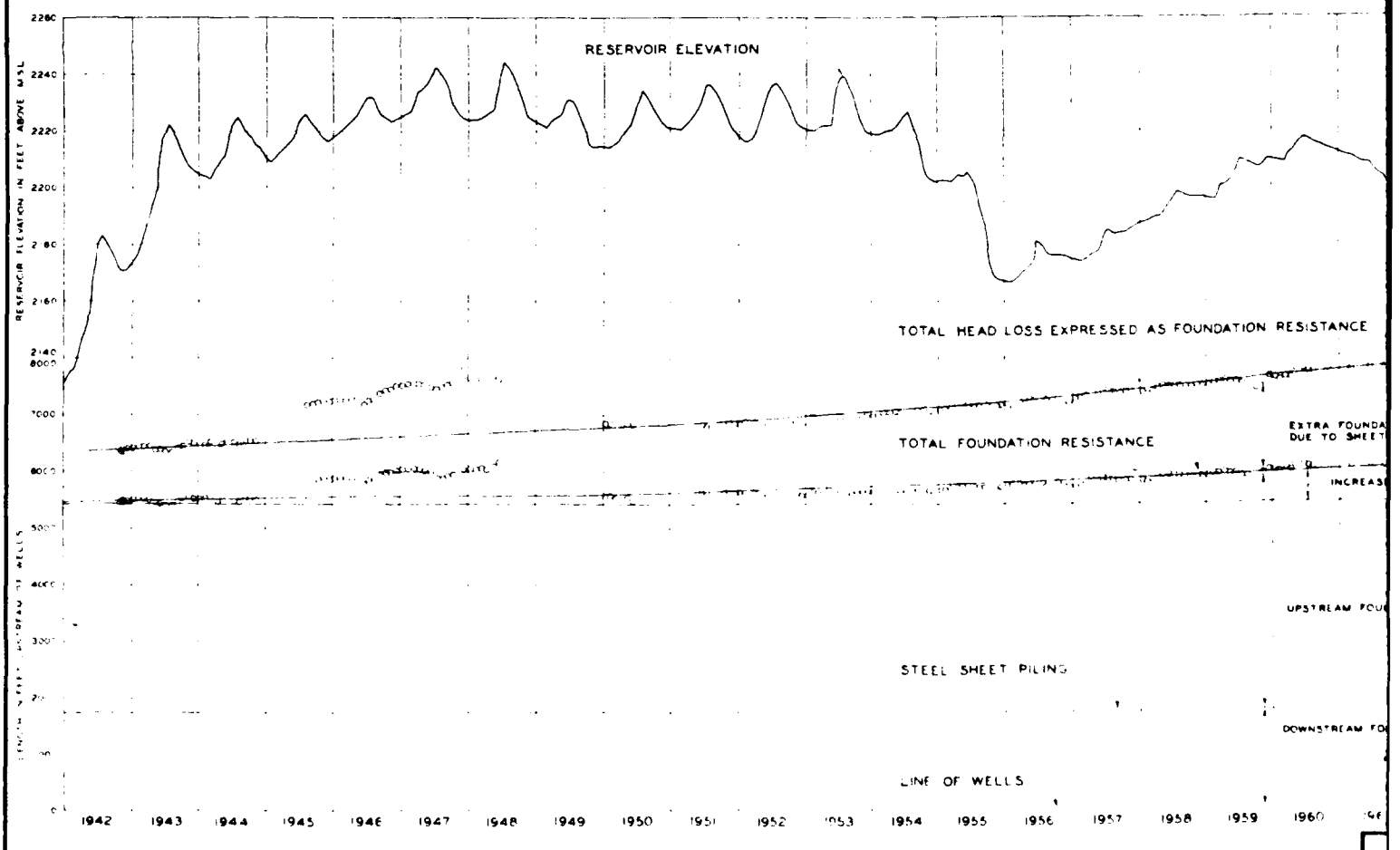


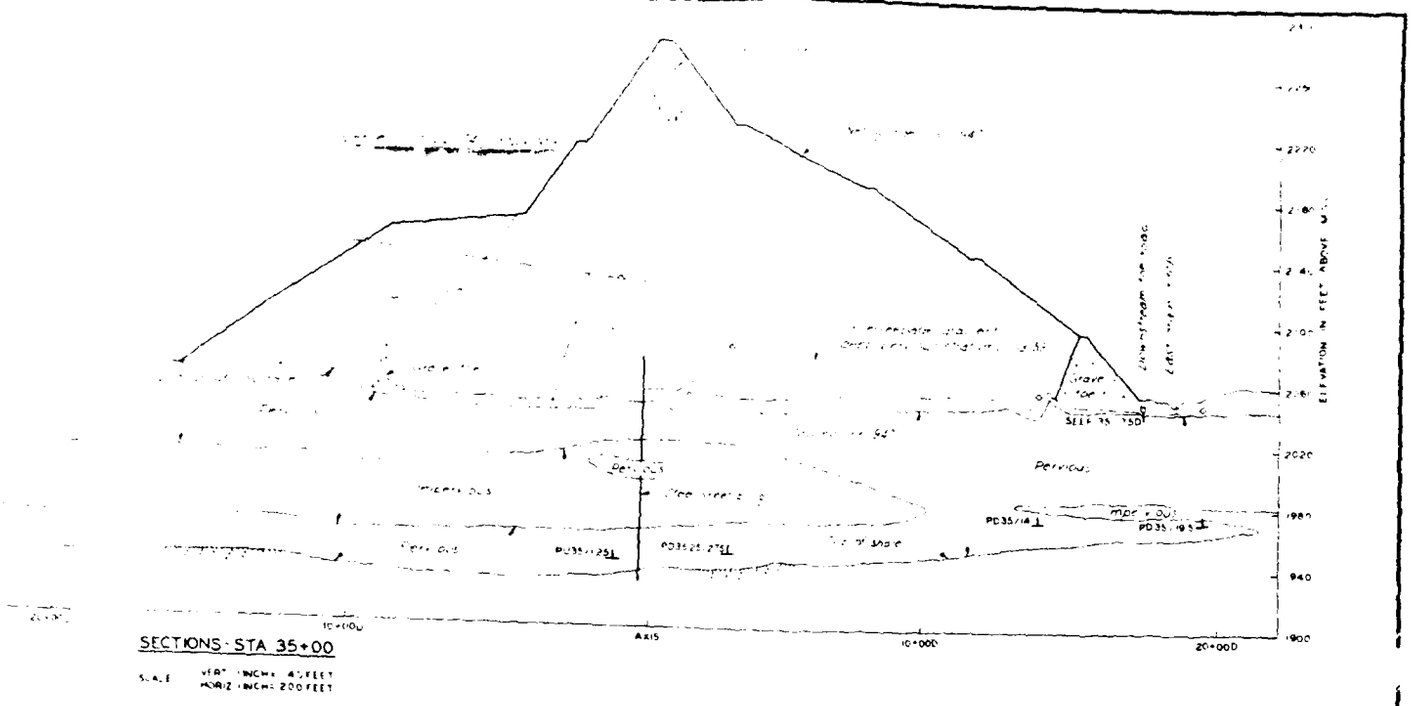


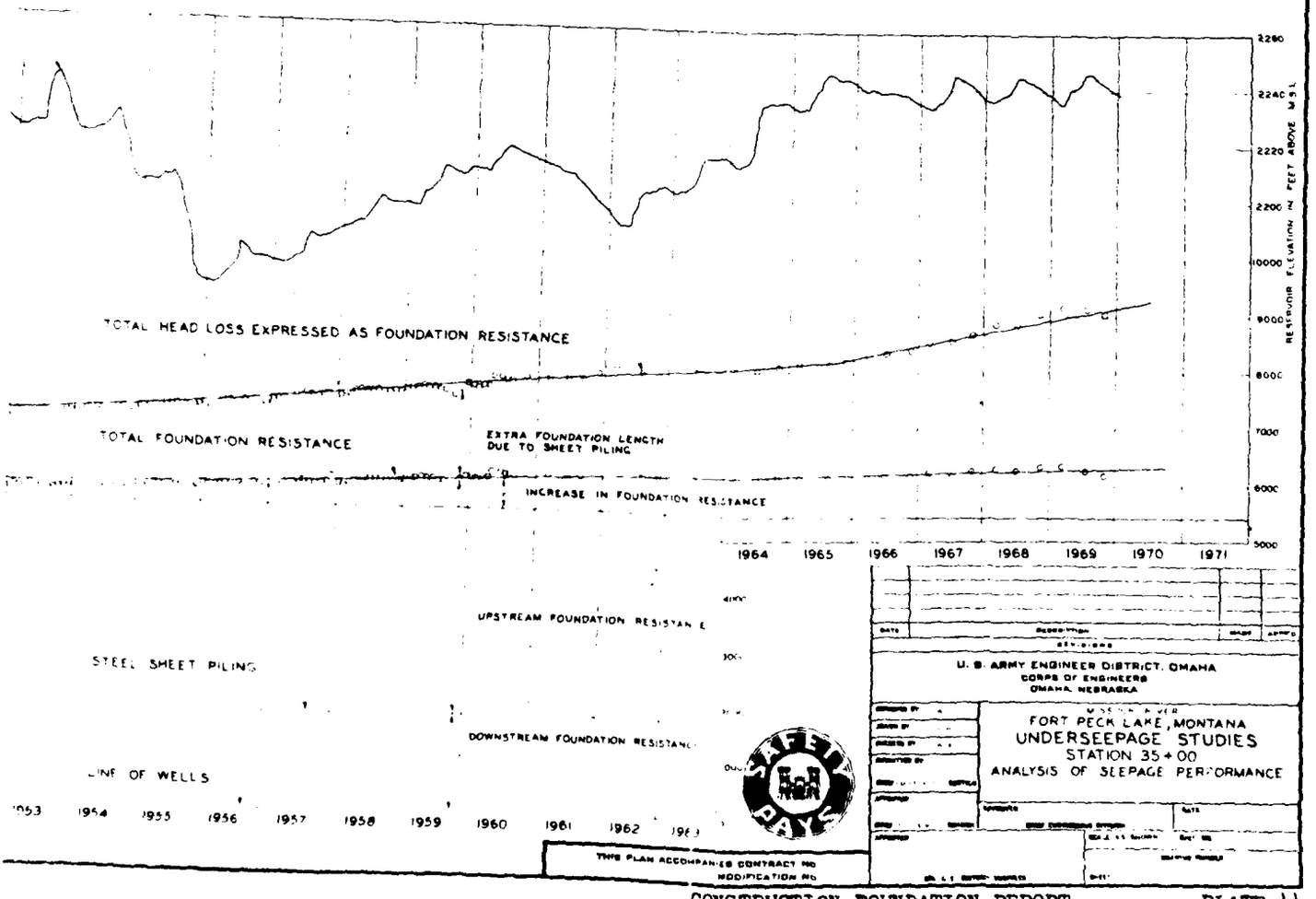
CONSTRUCTION FOUNDATION REPORT

PLATE 43


INSERT
SECTIONS - STA 35+00
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET


RESERVOIR ELEVATION
TOTAL HEAD LOSS EXPRESSED AS FOUNDATION RESISTANCE
TOTAL FOUNDATION RESISTANCE
STEEL SHEET PILING
LINE OF WELLS
RESERVOIR ELEVATION IN FEET ABOVE M.S.L.
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960



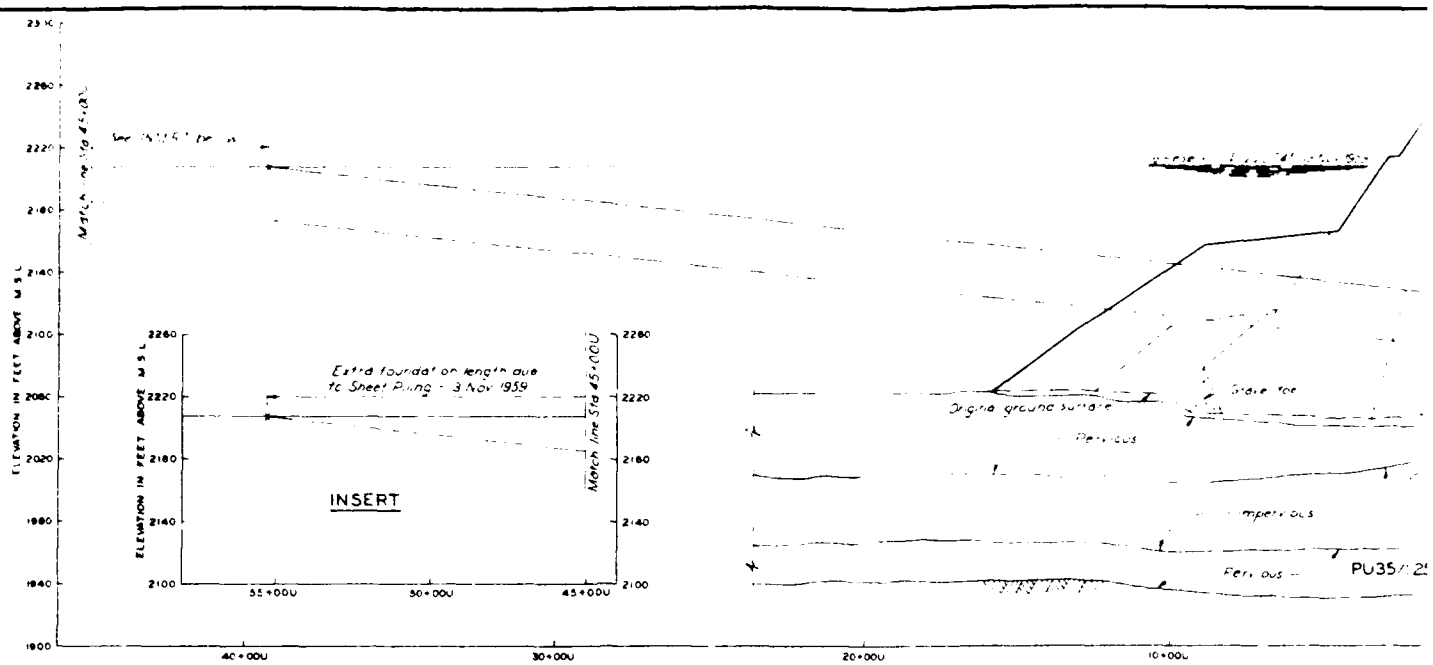


U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 35+00
ANALYSIS OF SEEPAGE PERFORMANCE

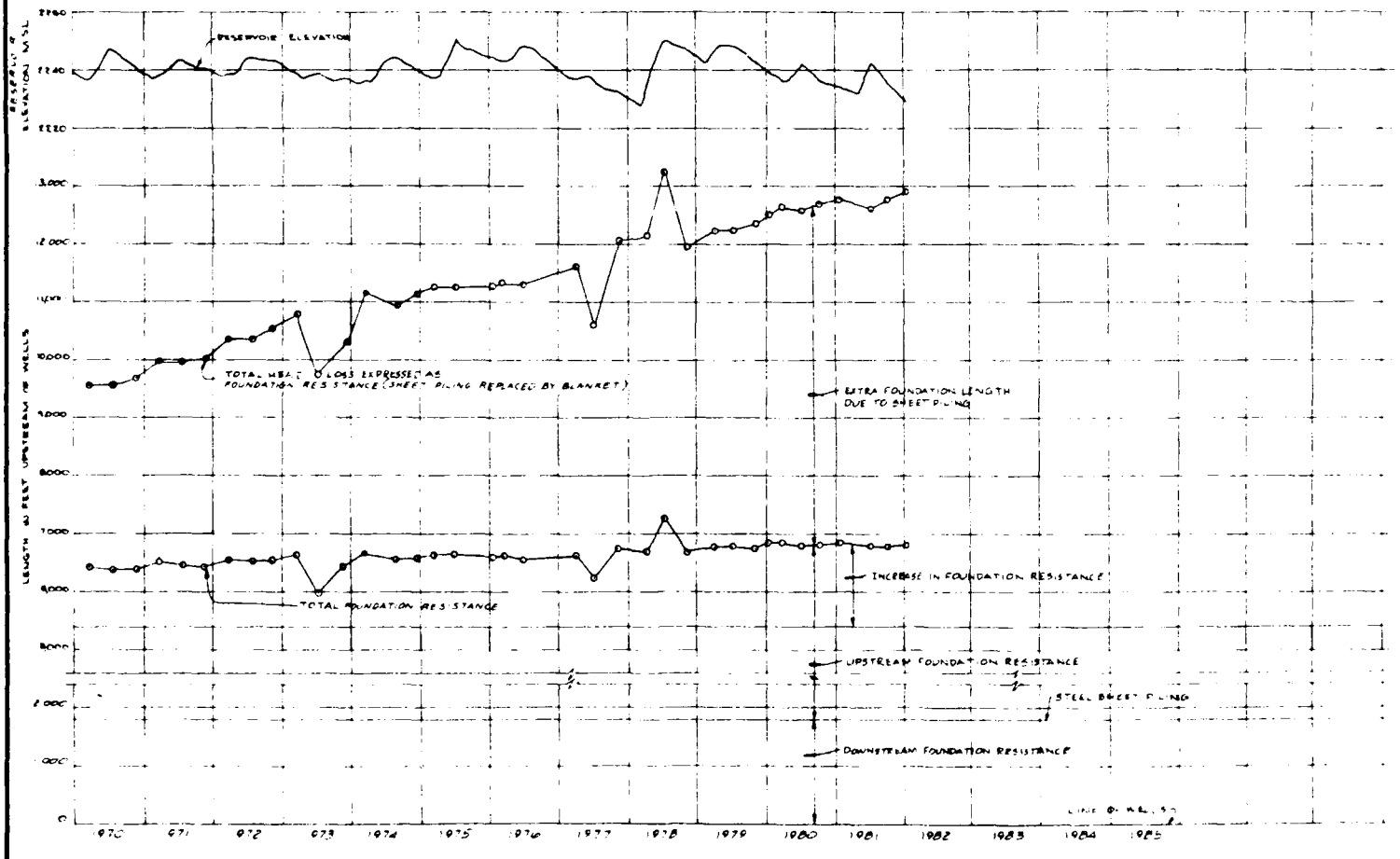
THIS PLAN ACCOMPANIES CONTRACT NO
MODIFICATION NO

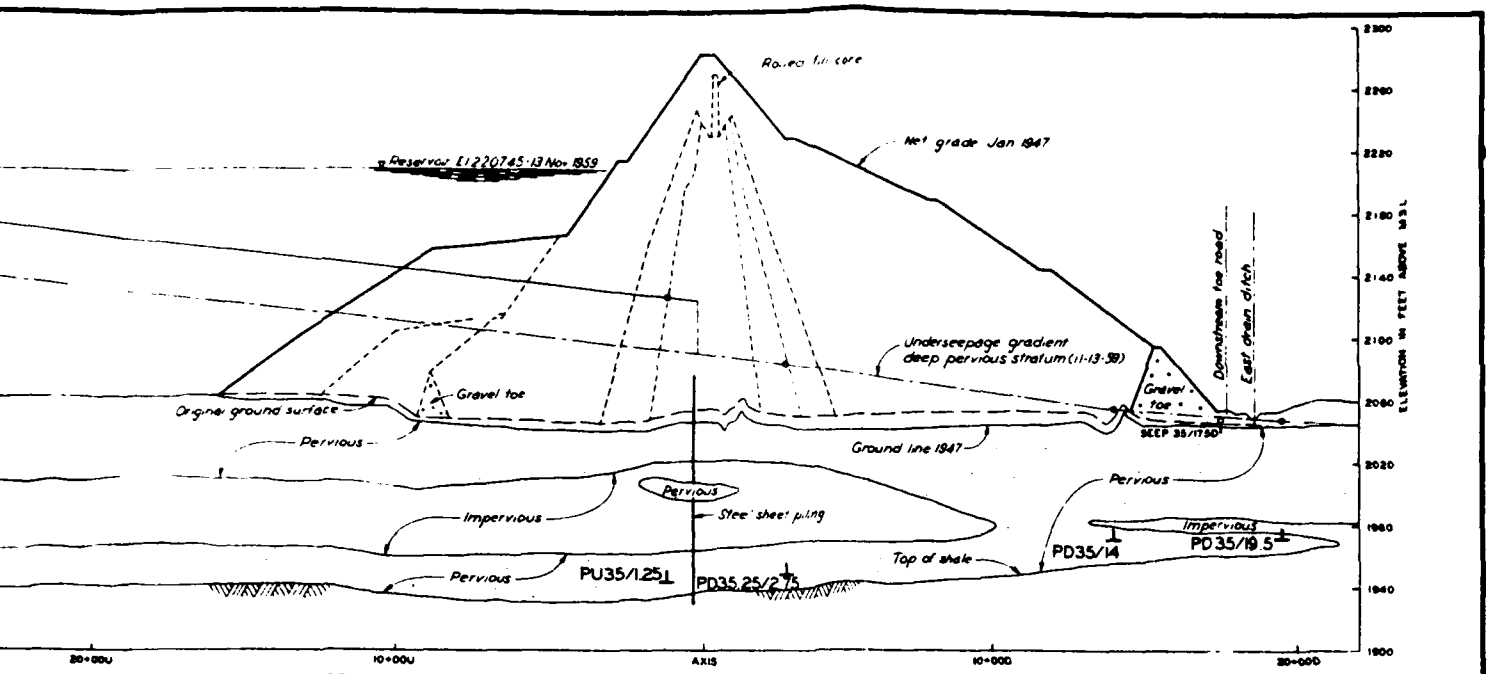
CONSTRUCTION FOUNDATION REPORT PLATE 44



SECTIONS - STA 35+00

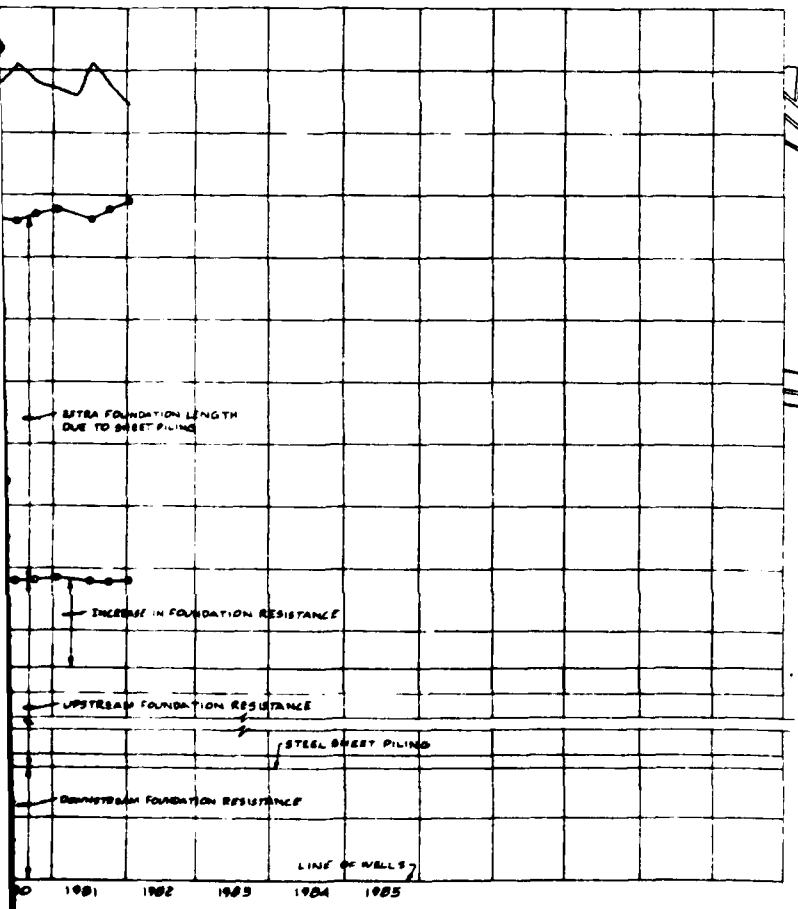
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET

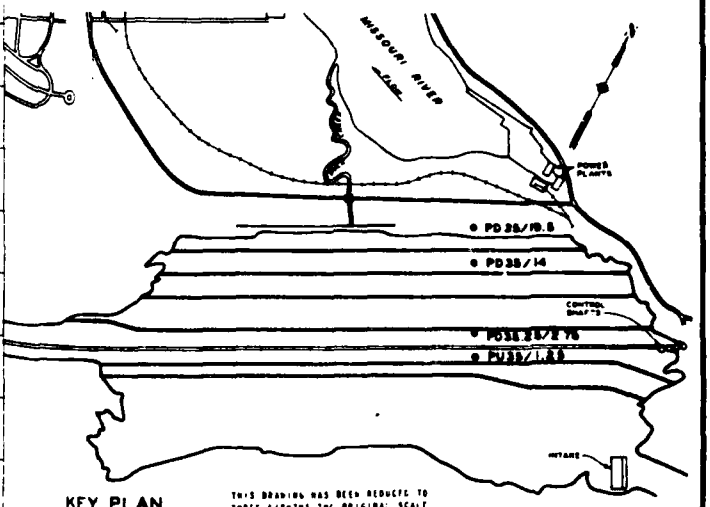




SECTIONS - STA. 35+00

SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET





KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

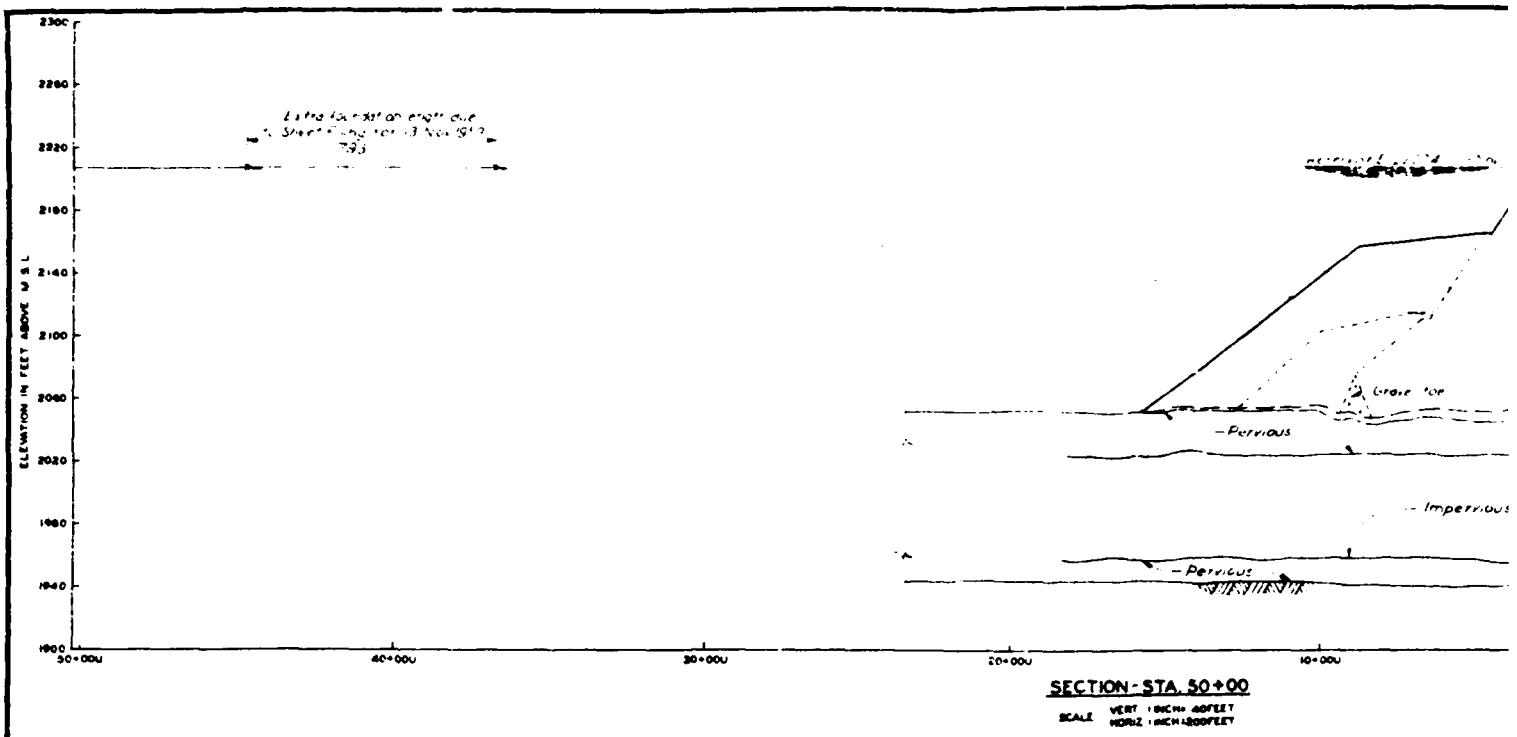
MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 35+00
ANALYSIS OF SEEPAGE PERFORMANCE
BENEATH CLAY STRATUM

SAFETY DAYS

THIS PLAN ACCOMPANIES CONTRACT NO. ____ SPECIFICATION NO. ____

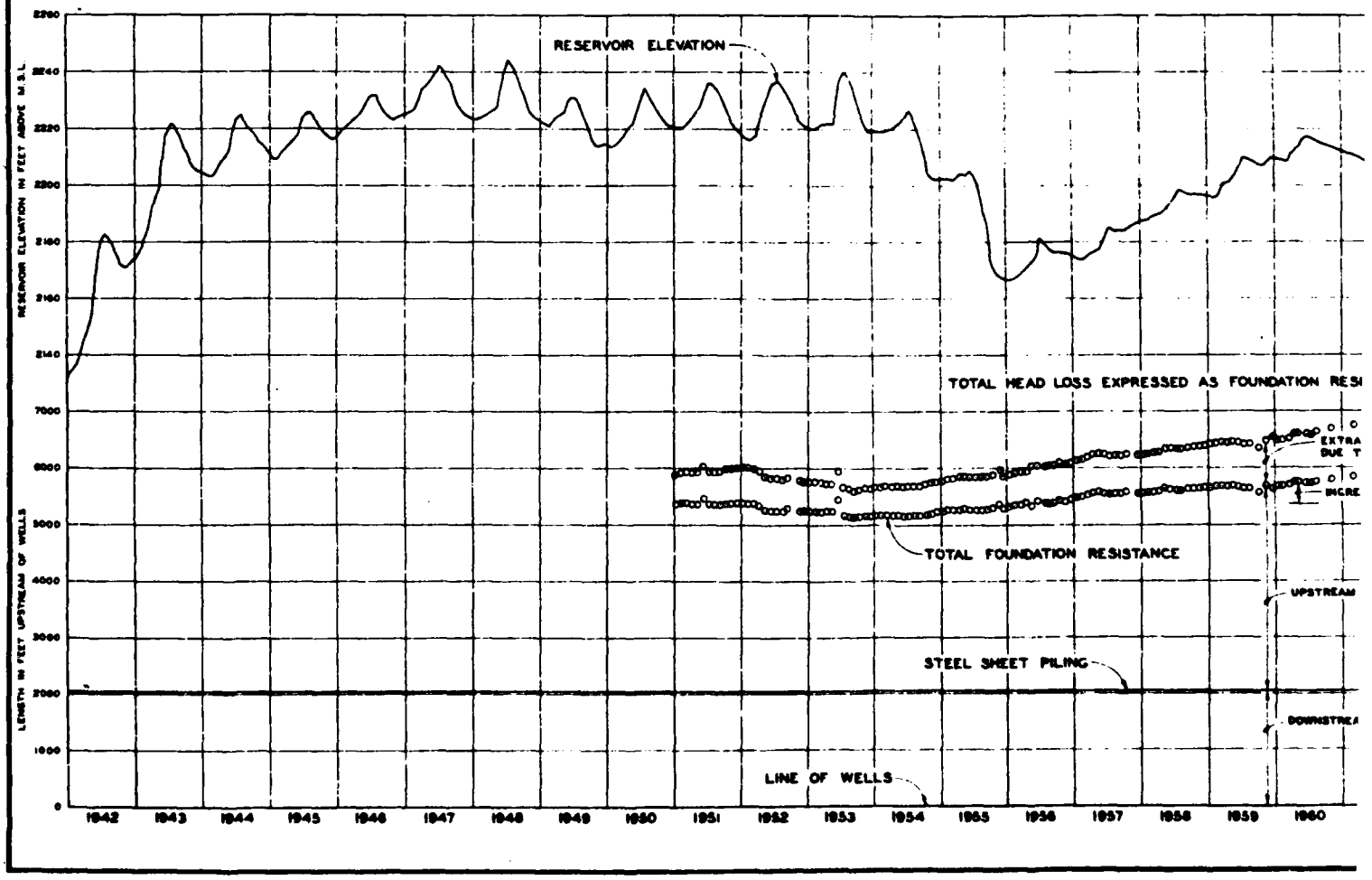
CONSTRUCTION FOUNDATION REPORT

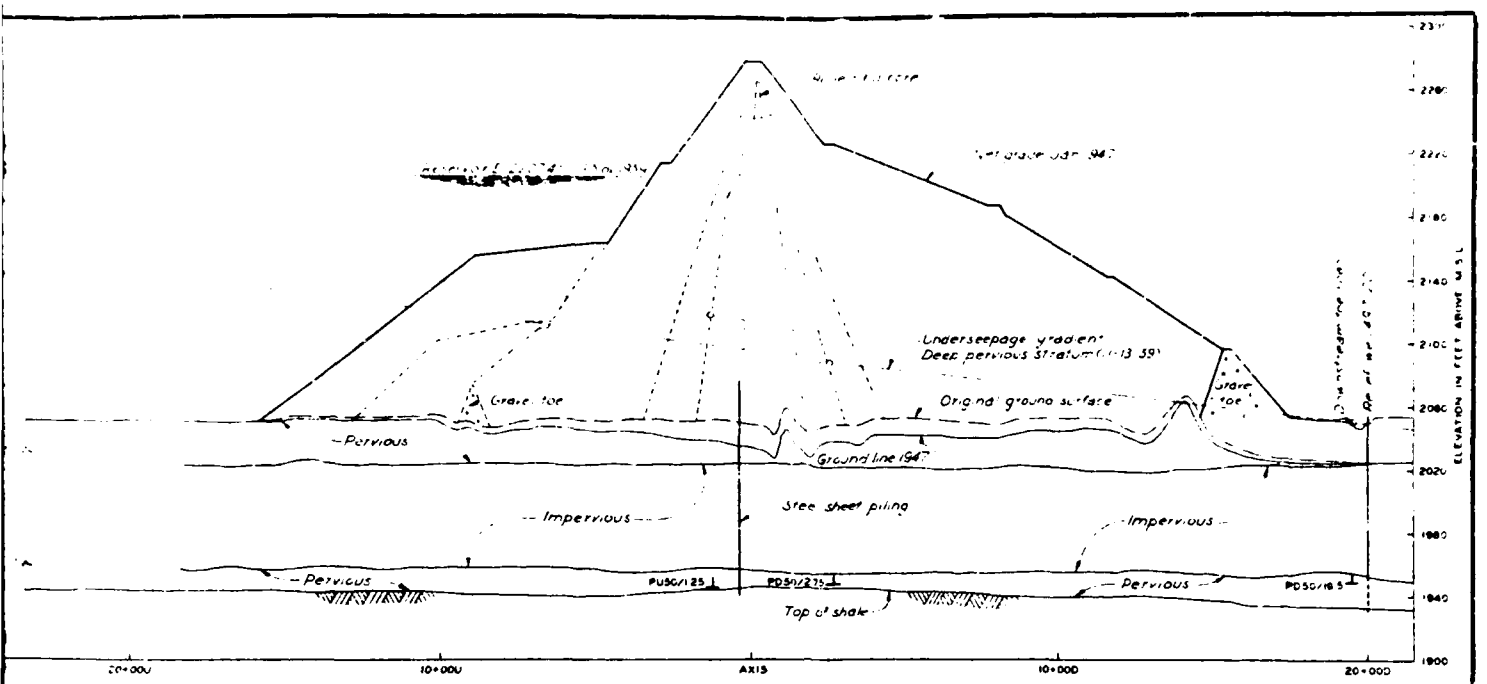
PLATE 45



SECTION - STA. 50+00

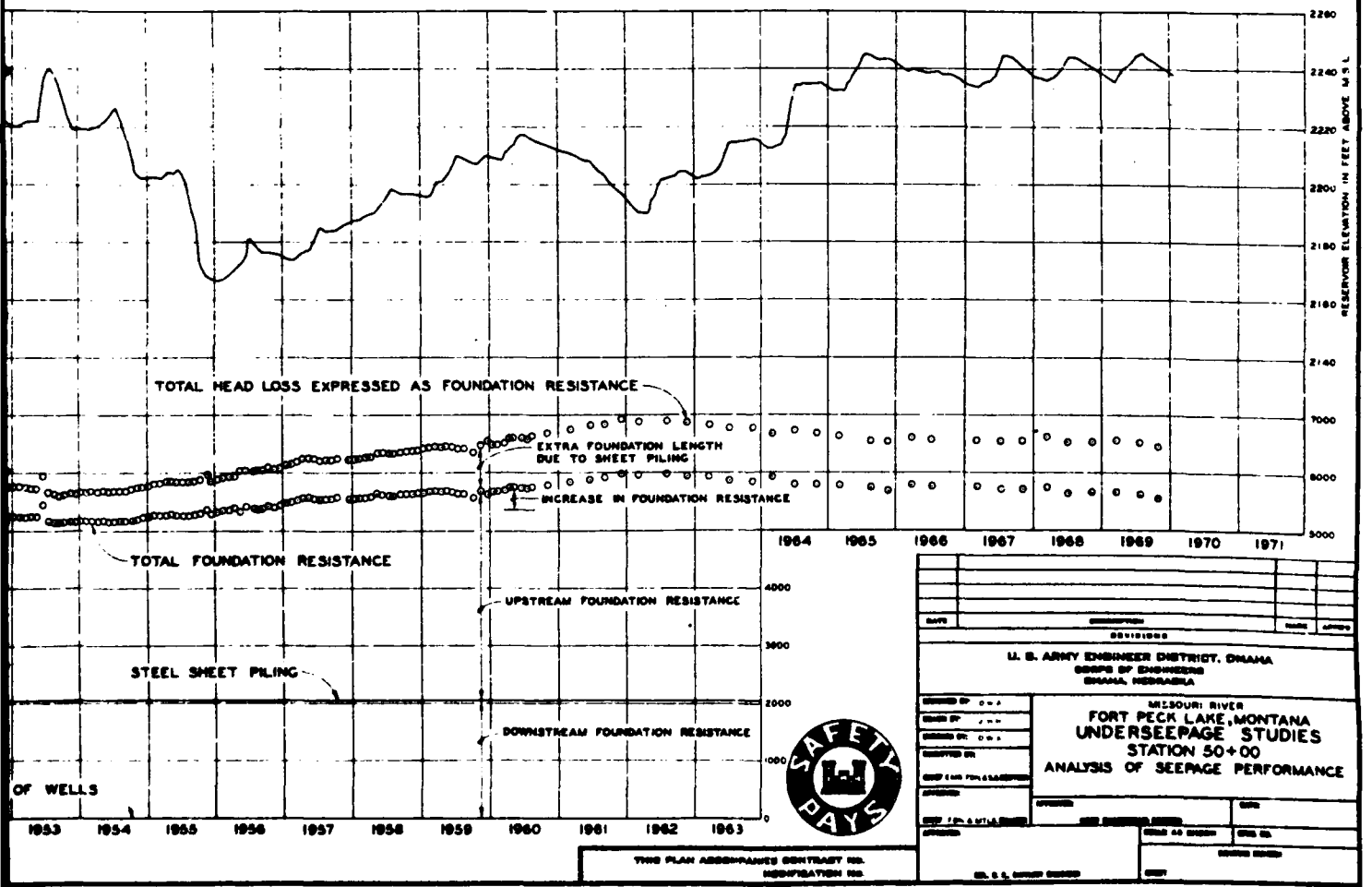
SCALE VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 800 FEET





SECTION - STA. 50+00

SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET



SAFETY PAYS

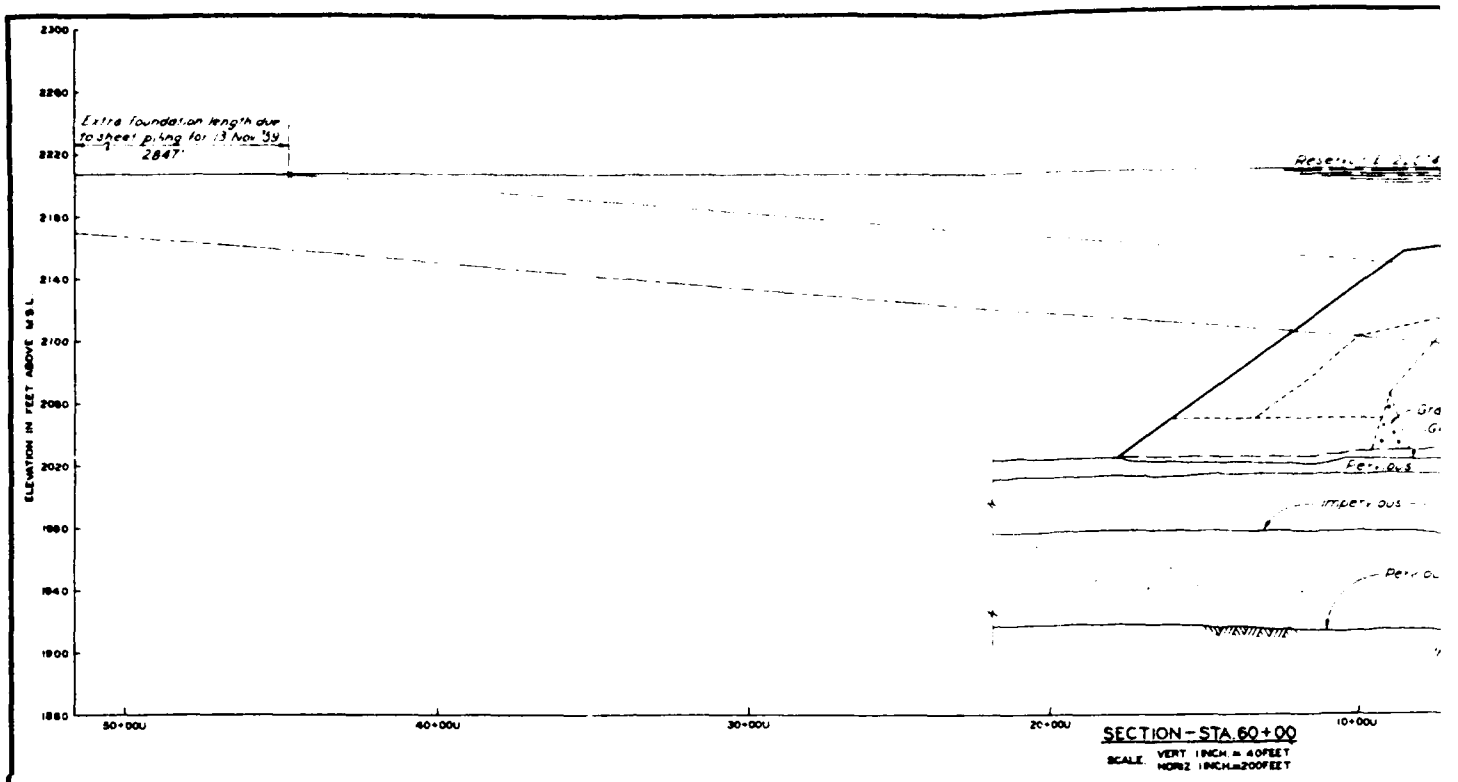
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 50+00
ANALYSIS OF SEEPAGE PERFORMANCE

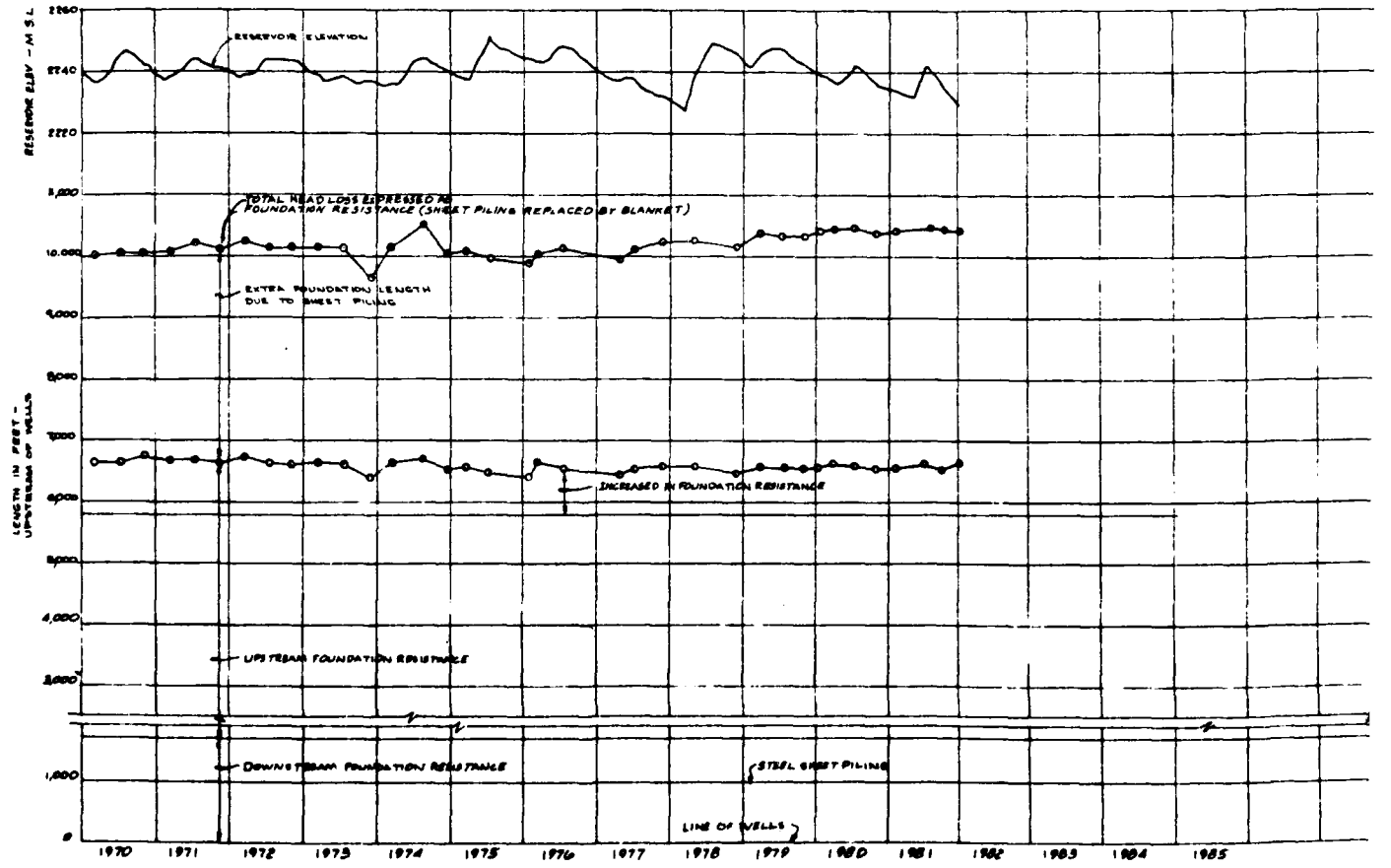
CONSTRUCTION FOUNDATION REPORT PLATE 46

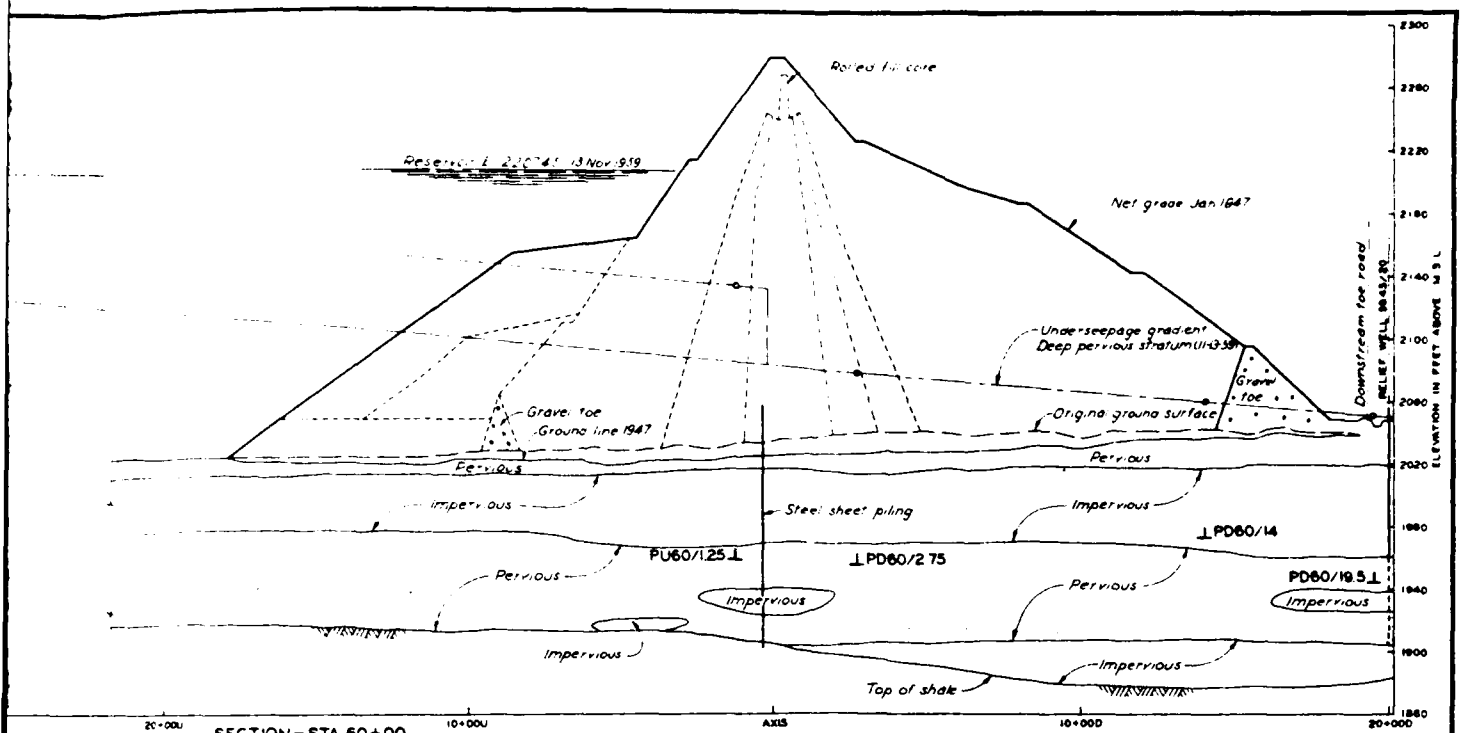
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SECTION – STA. 60+00

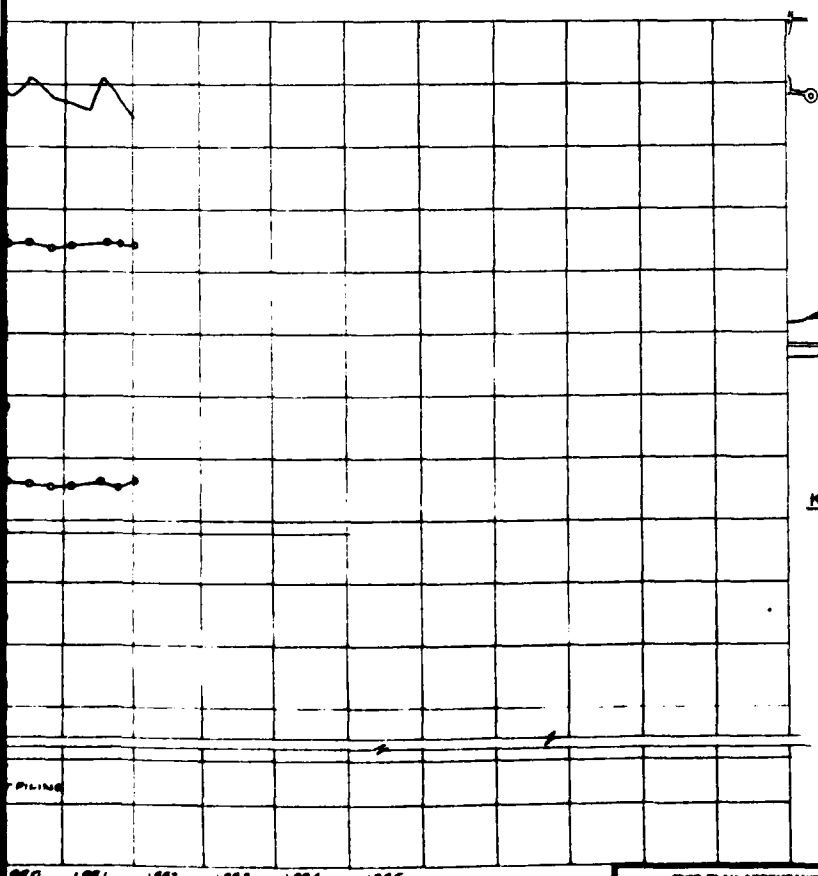
SCALE. VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 200 FEET

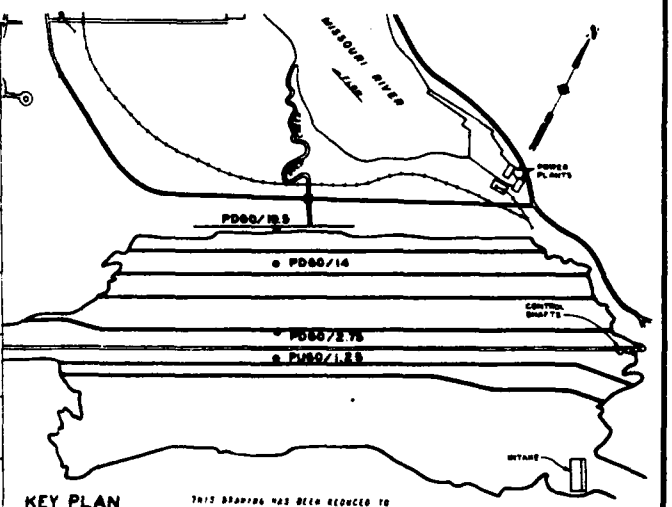




SECTION - STA. 60+00

SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET





KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPROVED
	REVISIONS		

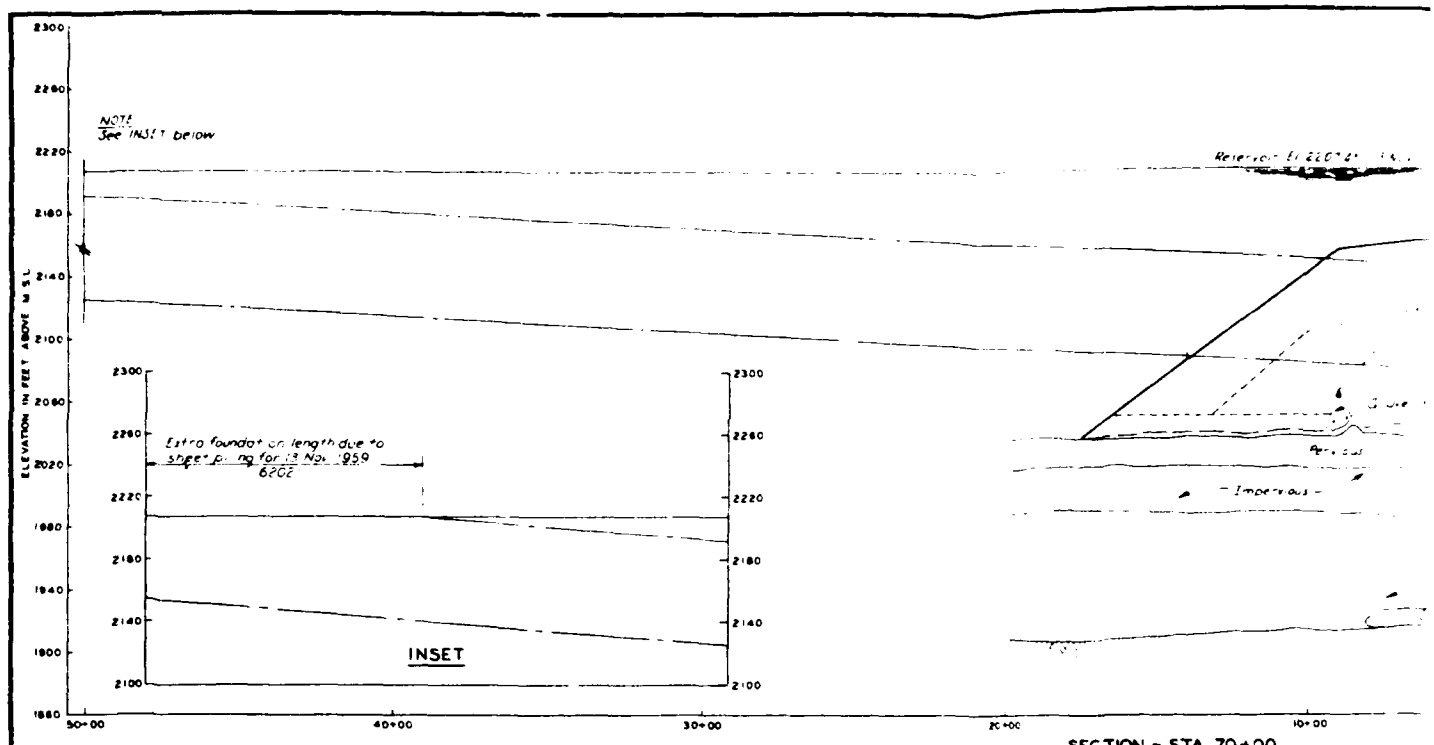
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 60+00
ANALYSIS OF SEEPAGE PERFORMANCE
BENEATH CLAY STRATUM

SAFETY PAYS

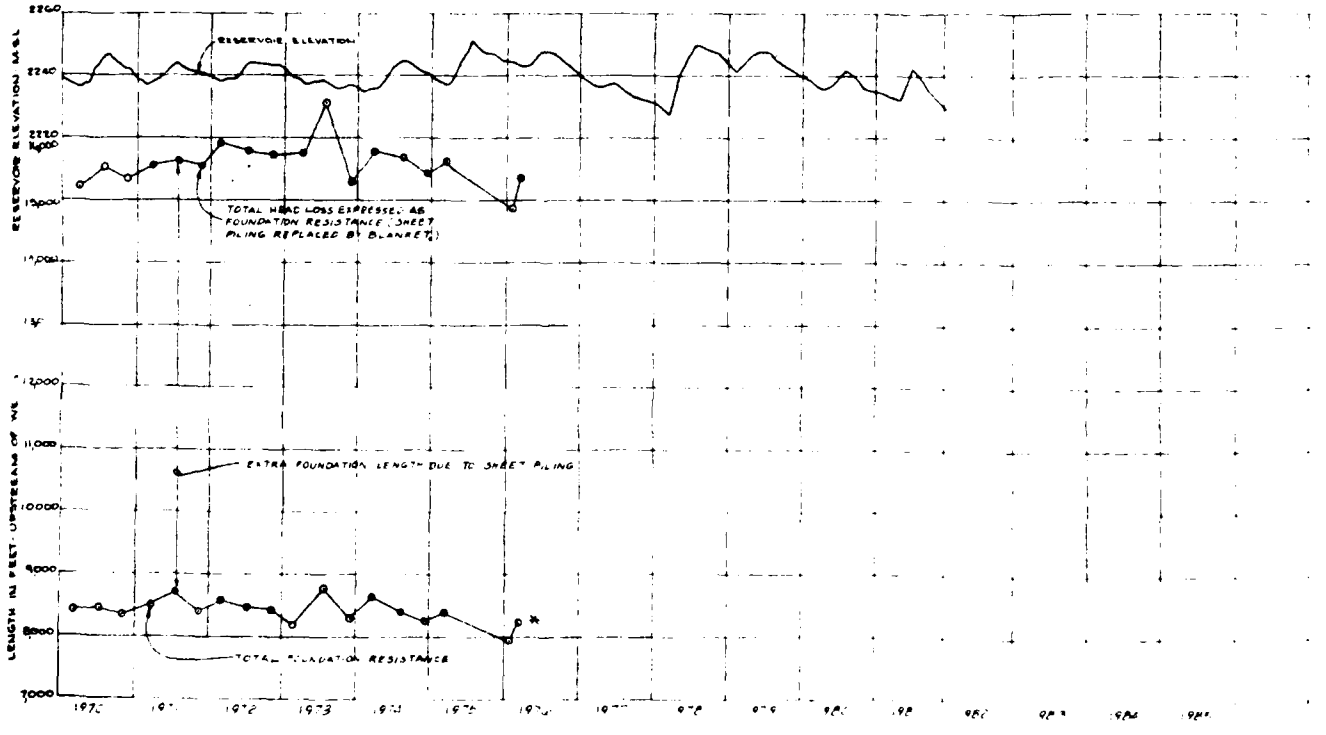
THIS PLAN ACCOMPANIES CONTRACT NO.
IDENTIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 47

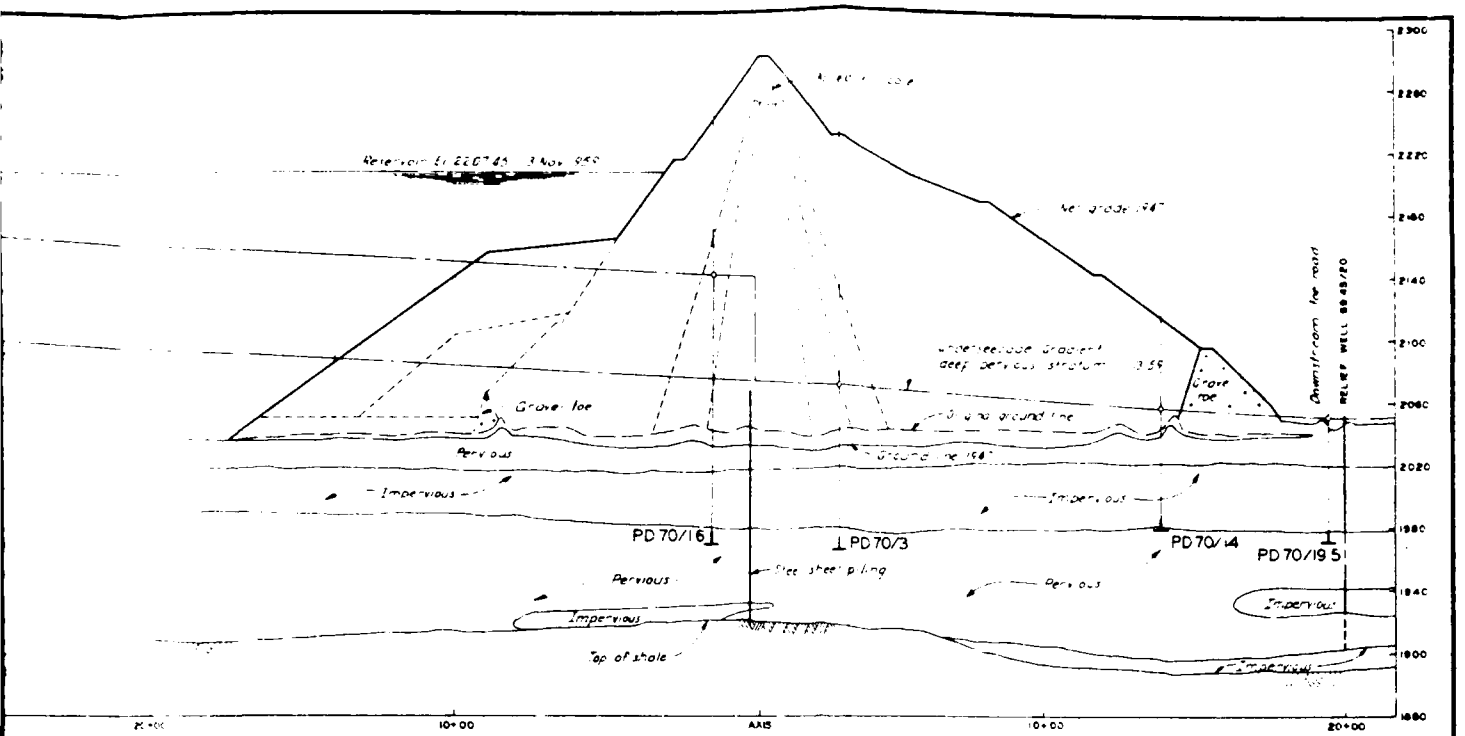


SECTION - STA. 70+00

SCALE VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 200 FEET

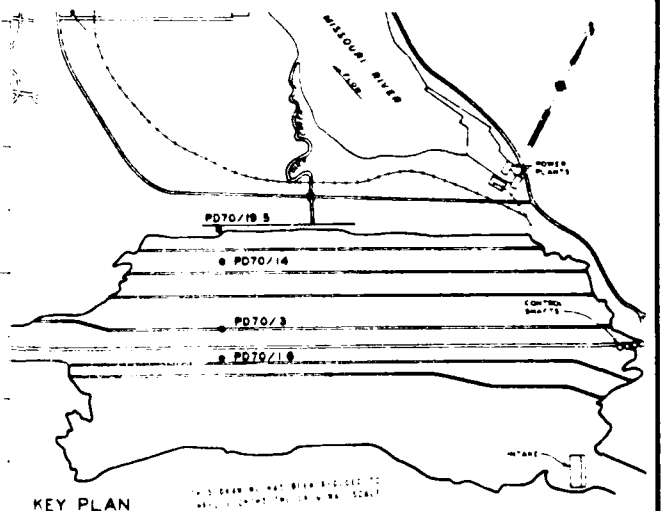


Pit 70/16 under water since 1976



SECTION - STA. 70+00

SCALE VERT 1 INCH = 60 FEET
HORIZ 1 INCH = 200 FEET



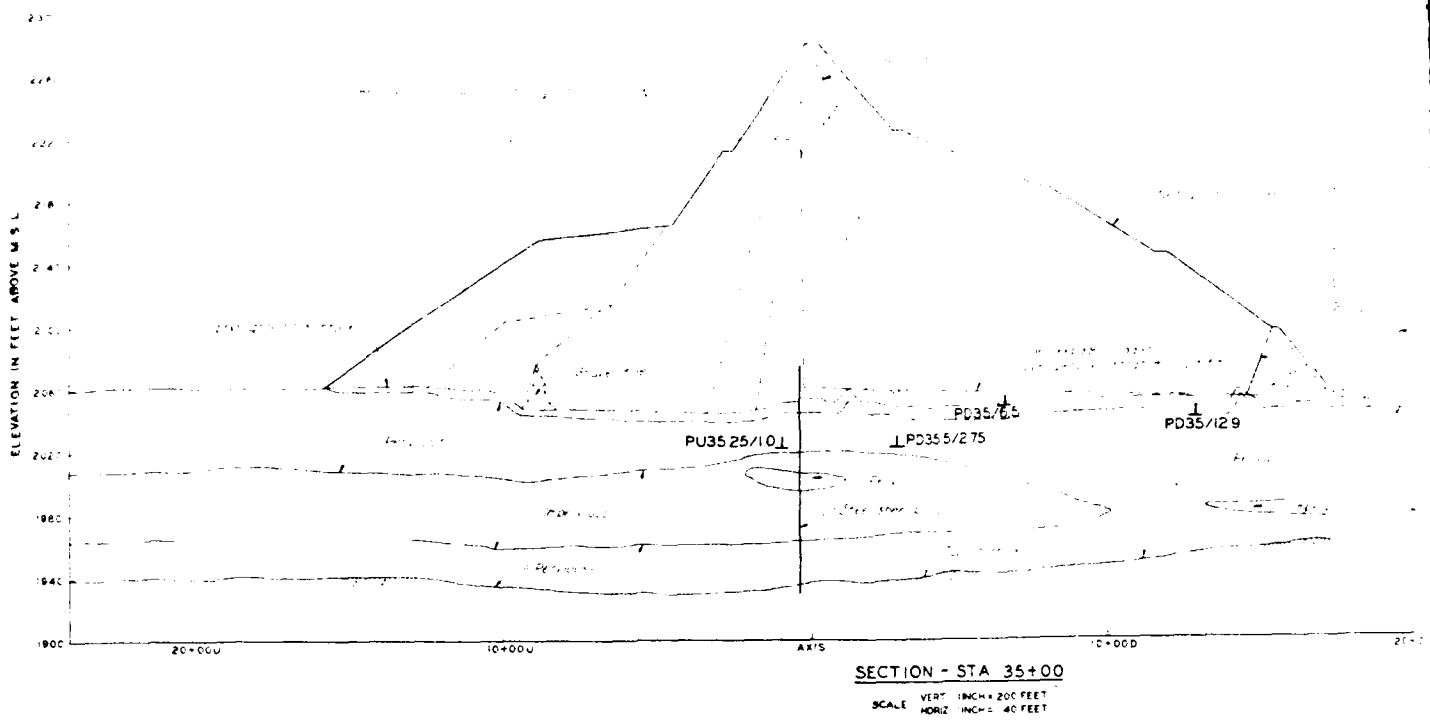
KEY PLAN

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA NEBRASKA

MISSOURI RIVER
FORT PECK LAKE MONTANA
UNDERSEEPAGE STUDIES
STATION 70+00
ANALYSIS OF SEEPAGE PERFORMANCE
BENEATH CLAY STRATUM

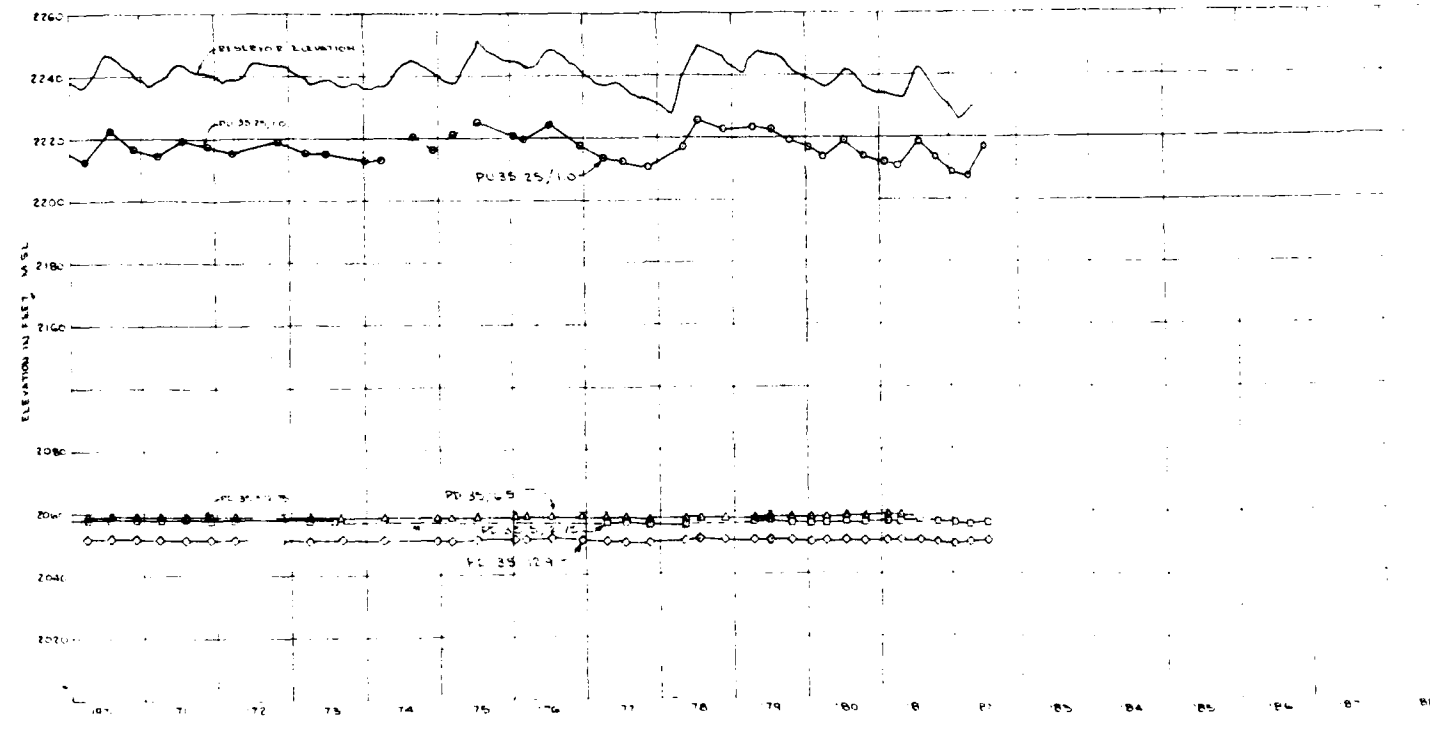
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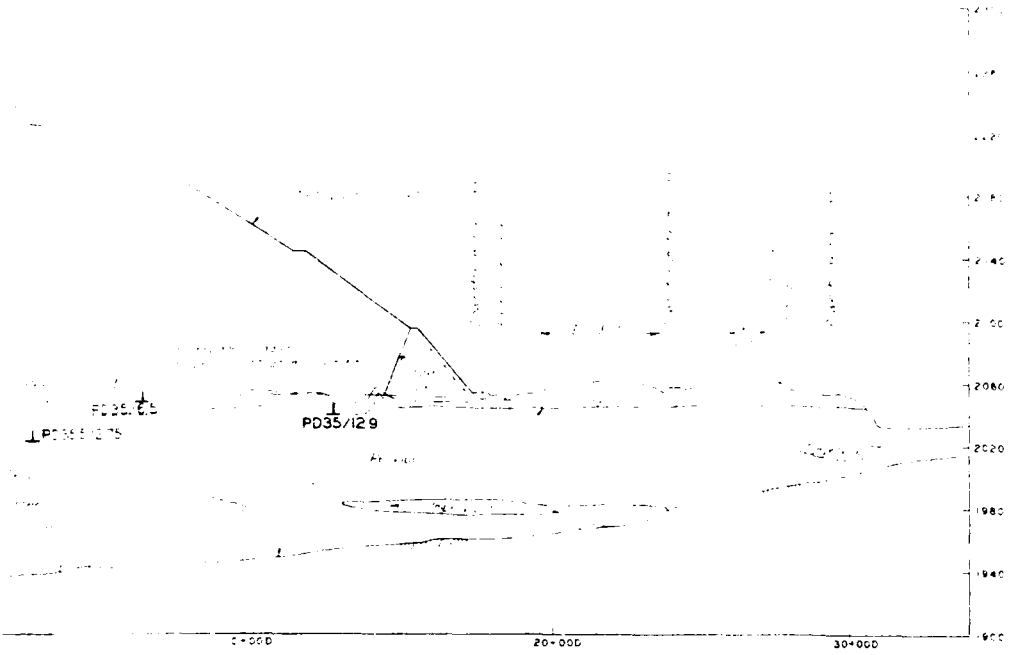
THIS PLAN ACCOMPANIES CONTRACT NO



SECTION - STA 35+00

SCALE VERT 1 INCH = 200 FEET
HORIZ 1 INCH = 40 FEET





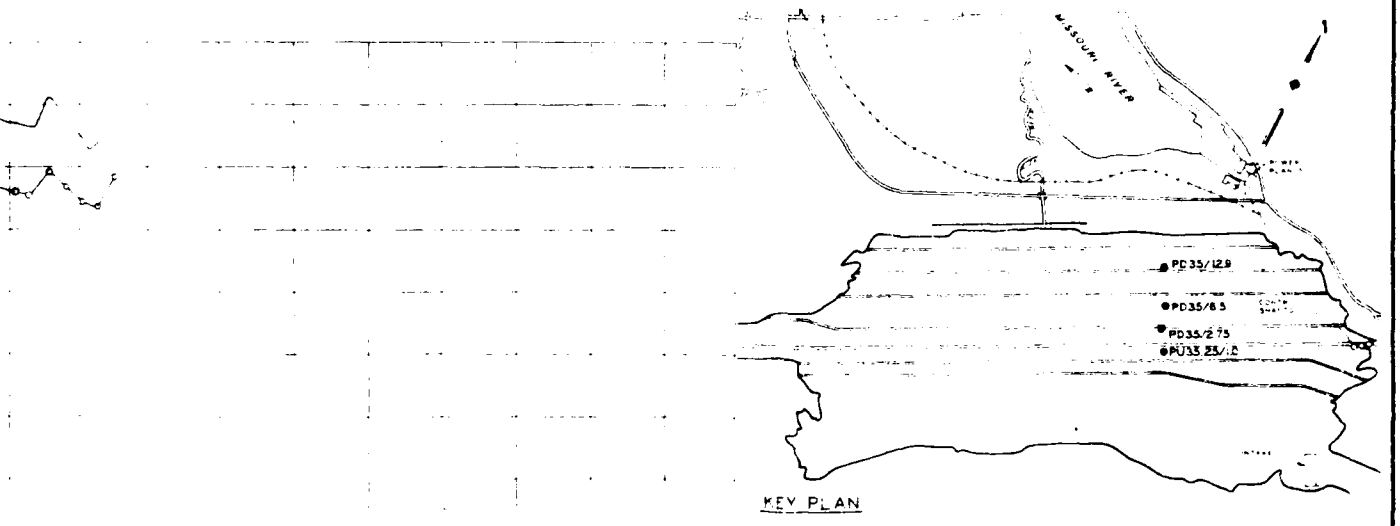
LEGEND

⊥ BOTTOM OF SHALLOW PIEZOMETERS

PD35/65 PIEZOMETER AT STA 35+00 RANGE 6+50 DOWNSTREAM

ECTION - STA 35+00

SCALE VERT. IN. = 200 FEET
HORIZ. INCH = 40 FEET



KEY PLAN

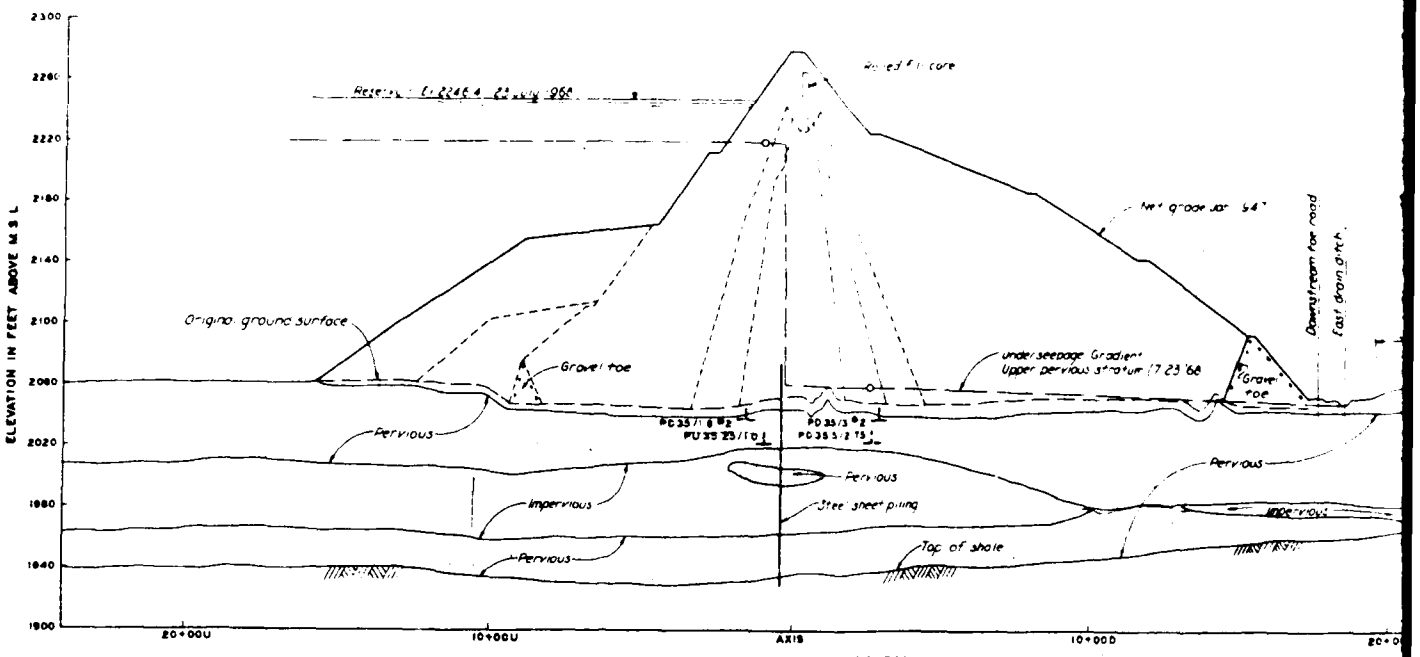
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE MONTANA
UNDERSEEPAGE STUDIES
STATION 35+00
STUDY OF HEAD LOSS THROUGH
SHEET PILING ABOVE CLAY STRATUM

SAFETY PAYS

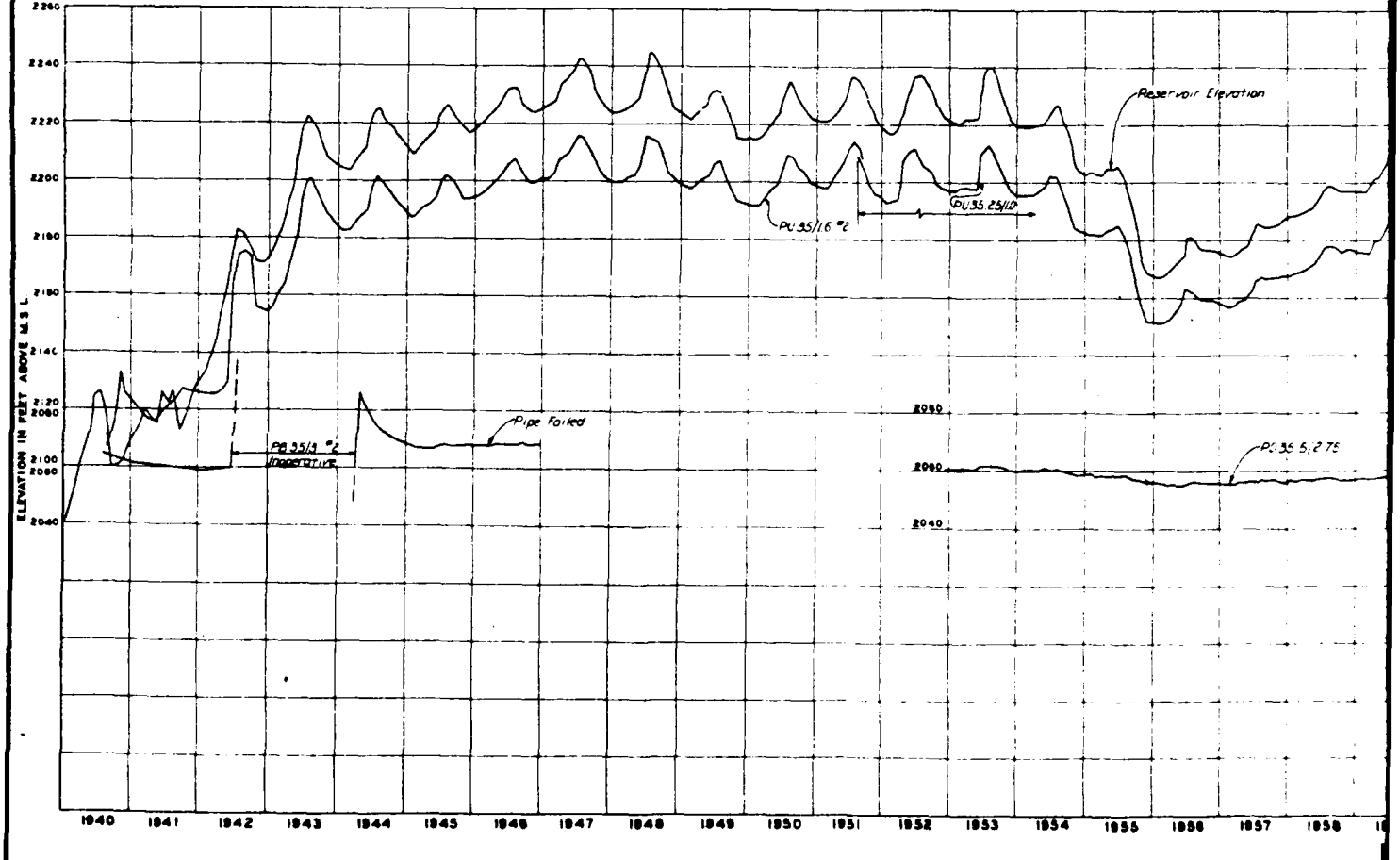
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

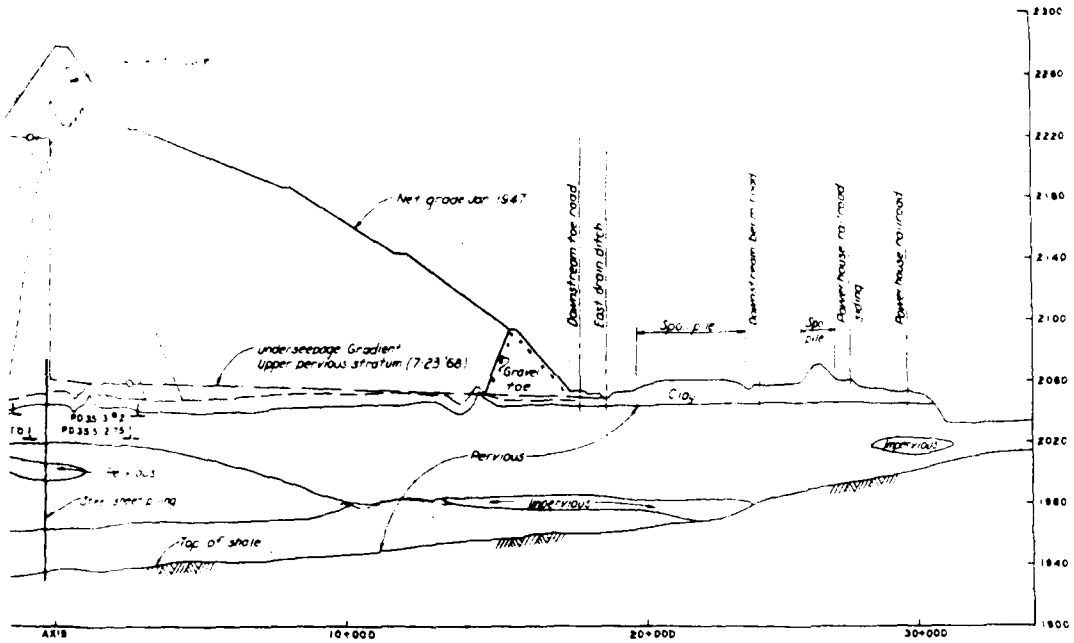
CONSTRUCTION FOUNDATION REPORT PLATE 49



SECTION - STA. 35+00

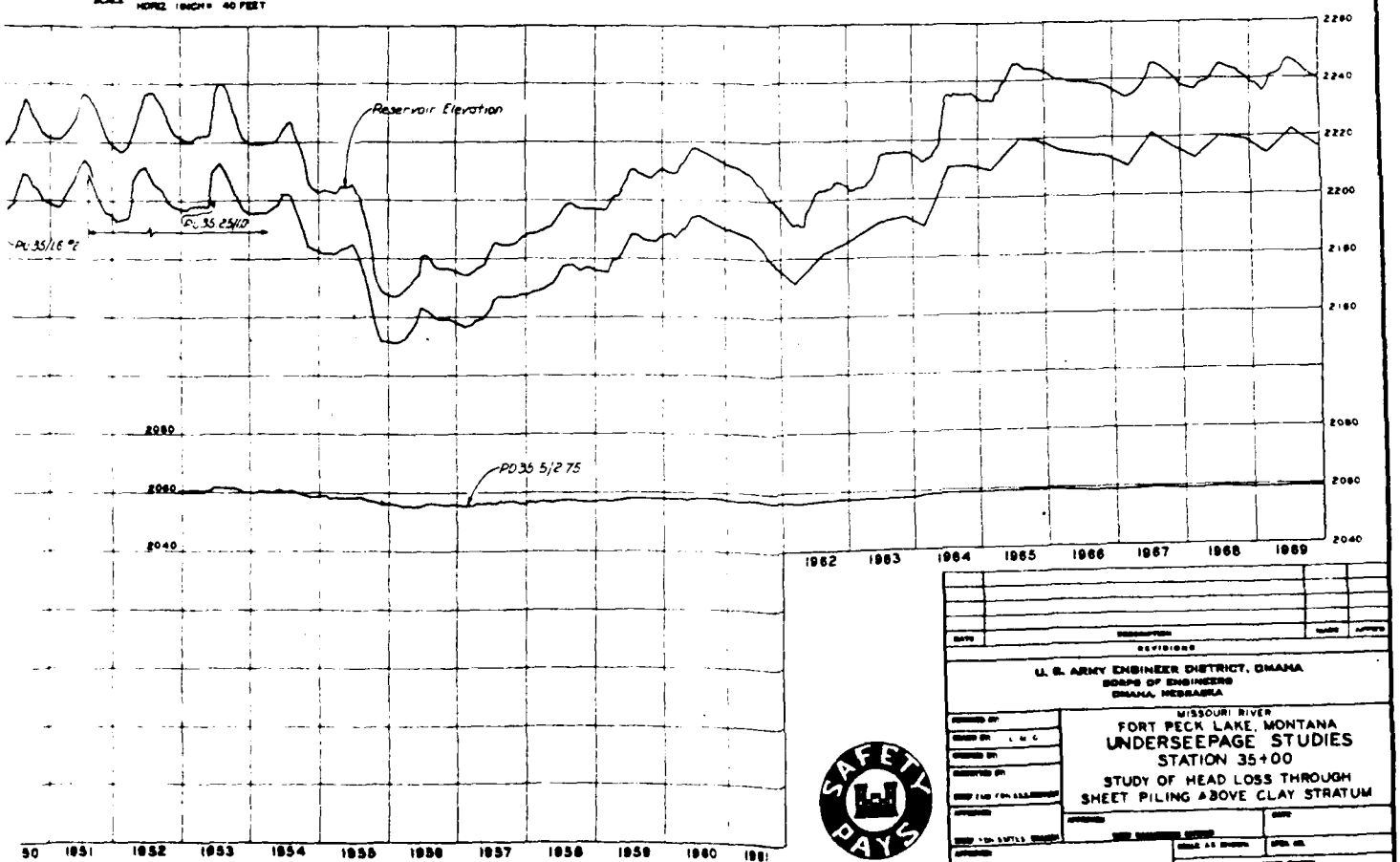
SCALE VERT. 1 INCH = 200 FEET
HORIZ. 1 INCH = 40 FEET





SECTION - STA 35+00

SCALE VERT 1 INCH = 200 FEET
HORIZ 1 INCH = 40 FEET



DATE	DESCRIPTION	DESIGNED	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 35+00
STUDY OF HEAD LOSS THROUGH SHEET PILING ABOVE CLAY STRATUM

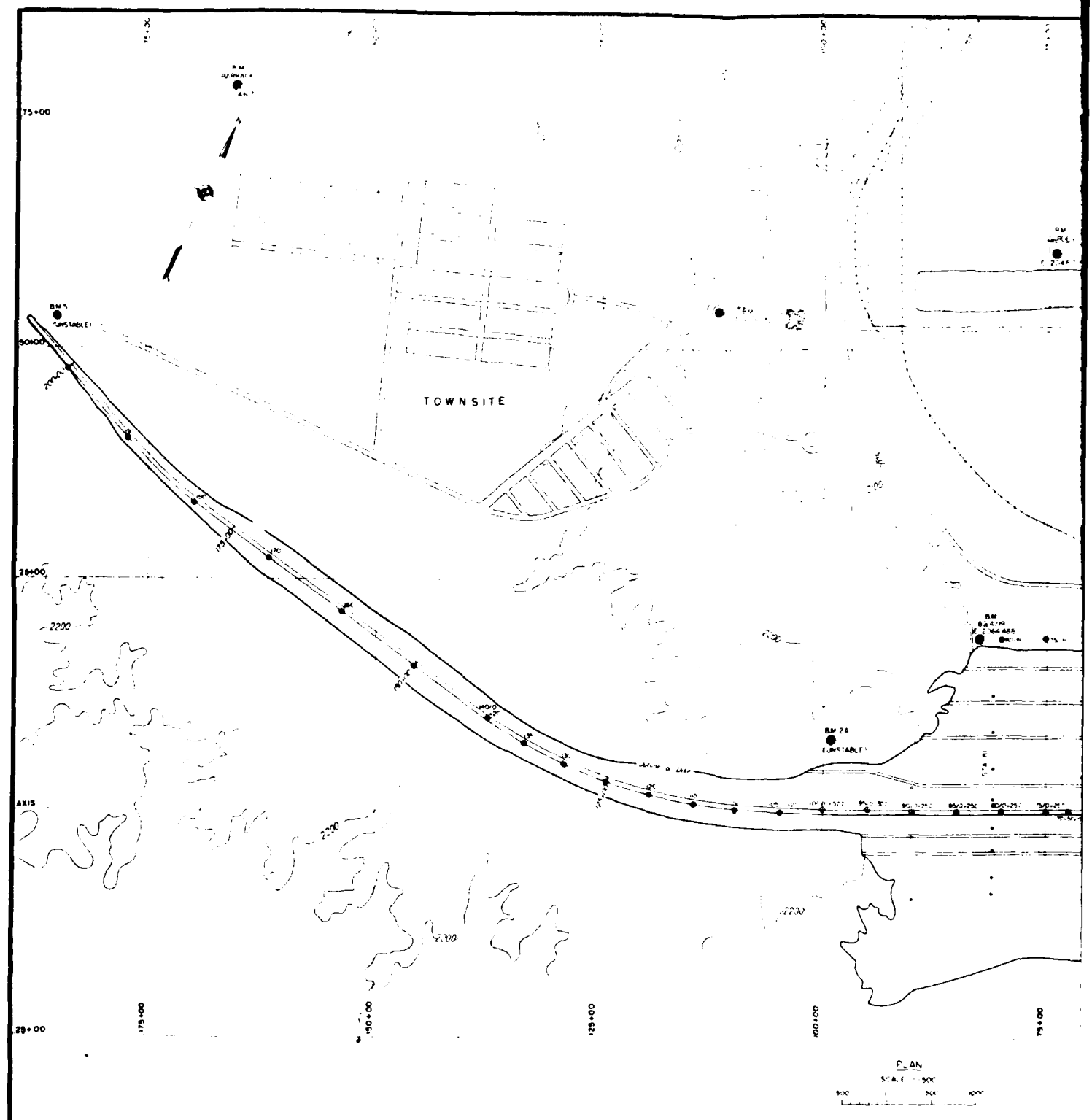
SAFETY PAYS

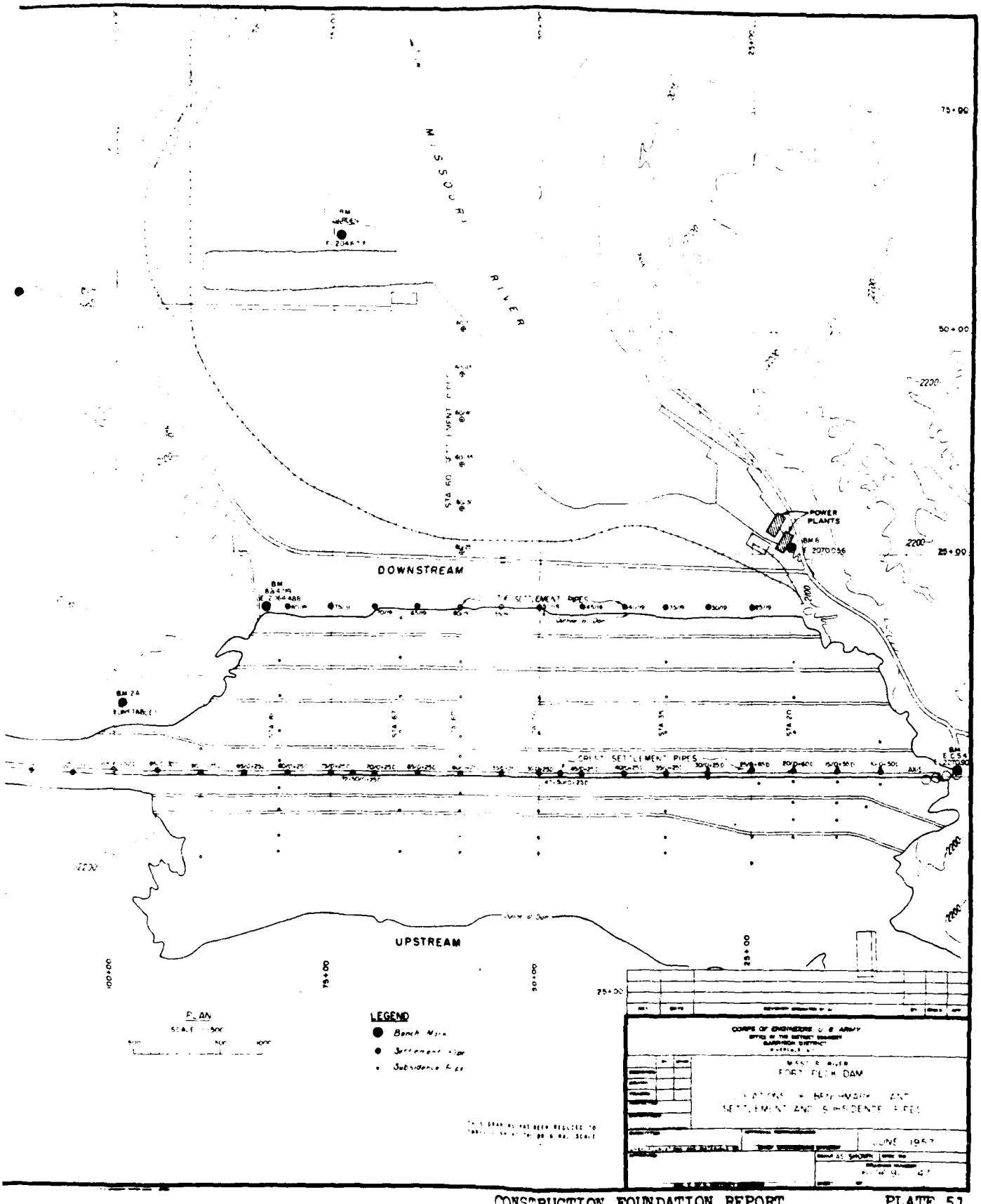
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

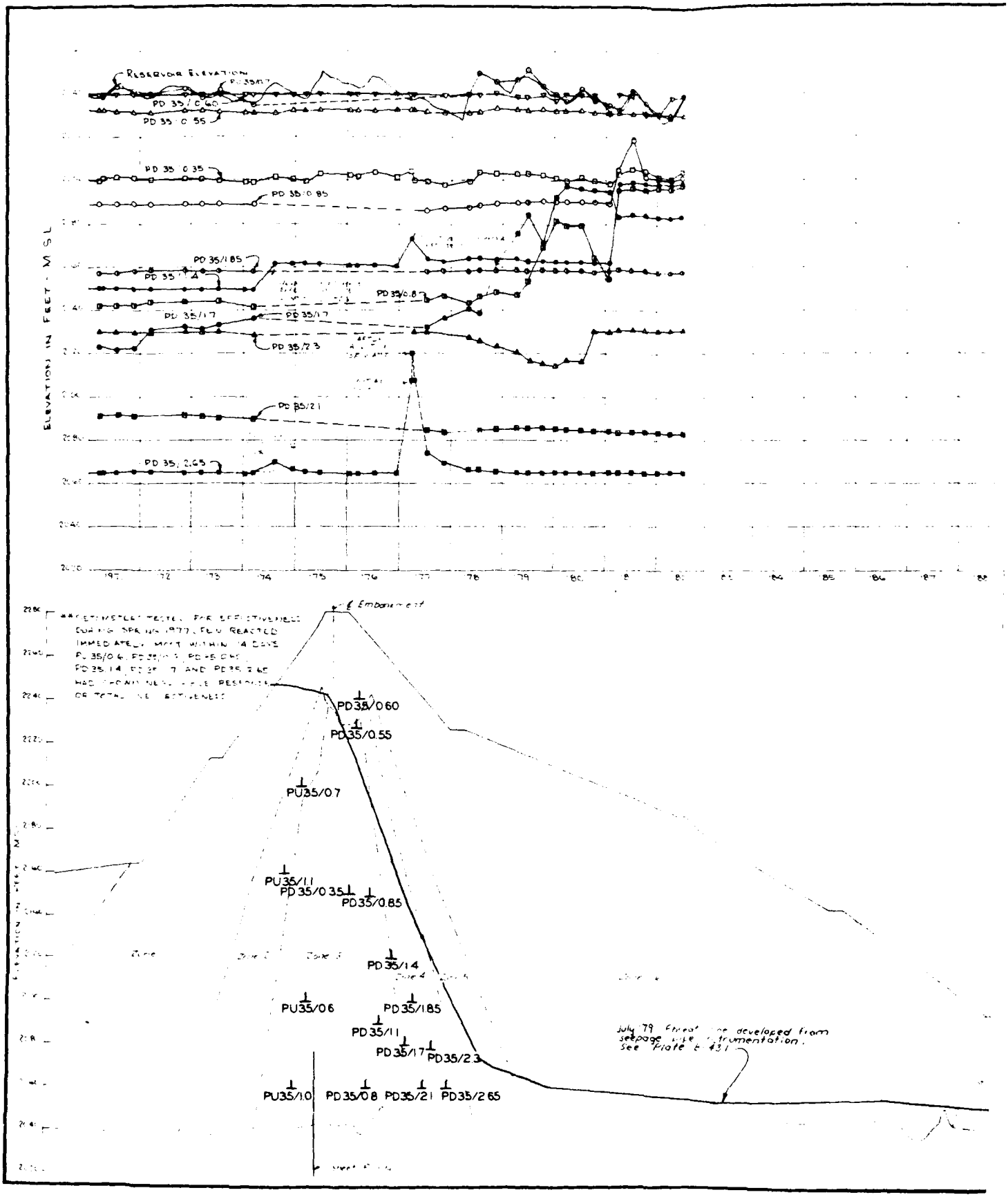
PLATE 50

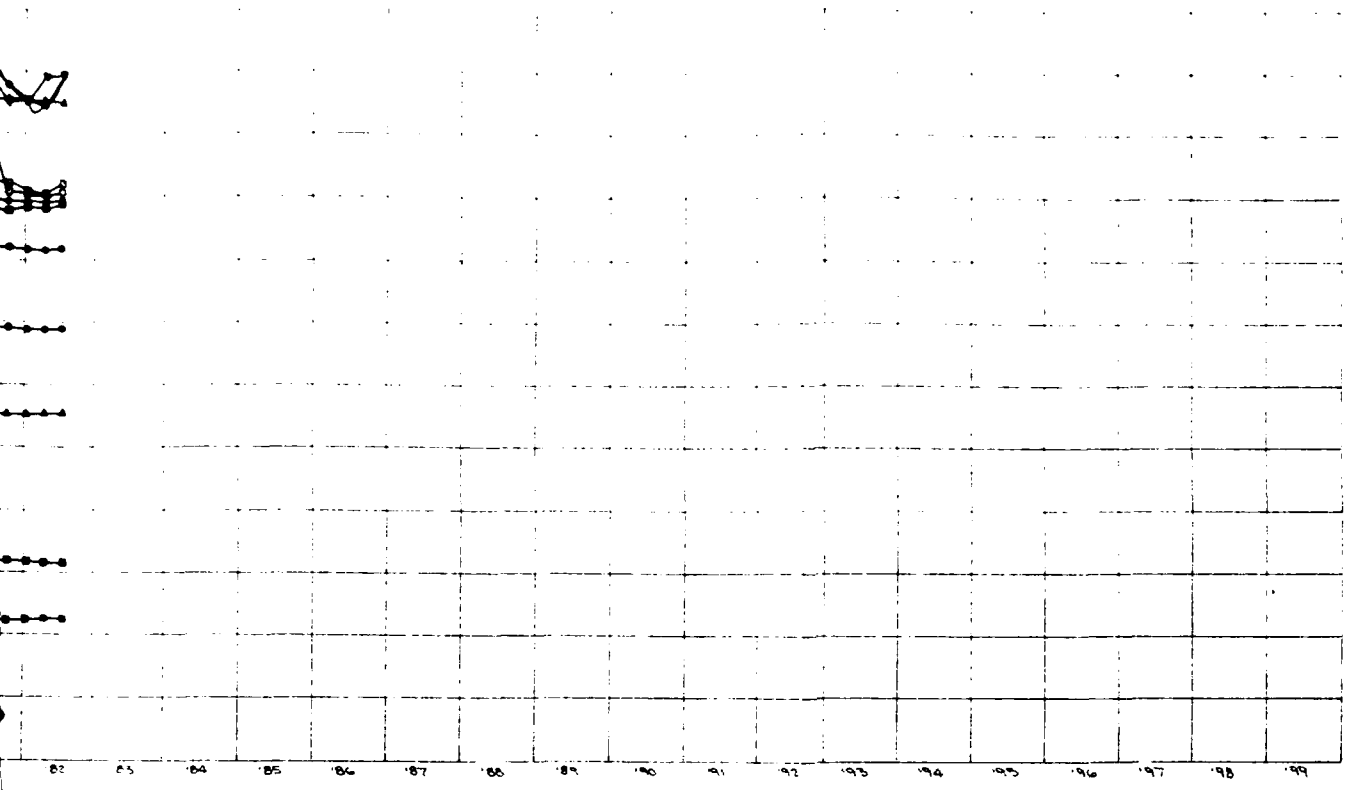
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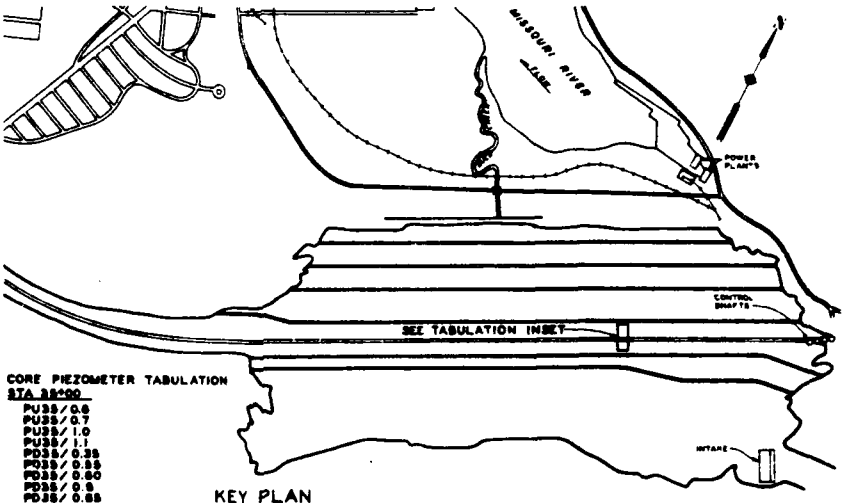

TOWNSITE
BM 5
(UNSTABLE)
BM 24
(UNSTABLE)
75+00
50+00
25+00
AXIS
175+00
150+00
125+00
100+00
75+00
PLAN



CONSTRUCTION FOUNDATION REPORT PLATE 51


RESERVOIR ELEVATION
PD 35/0.60
PD 35/0.55
PD 35/0.35
PD 35/0.85
PD 35/1.85
PD 35/1.4
PD 35/0.8
PD 35/1.7
PD 35/2.3
PD 35/2.1
PD 35/2.65
ELEVATION IN FEET - M.S.L.
PD35/0.60
PD35/0.55
PU35/07
PU35/11
PD35/0.35
PD35/0.85
PD35/14
PU35/06
PD35/1.85
PD35/11
PD35/17
PD35/2.3
PU35/10
PD35/08
PD35/21
PD35/2.65
July 79 Phreat... are developed from seepage ... instrumentation. See Plate E 431





KEY PLAN

CORE PIEZOMETER TABULATION

STA 35+00

PU35/ 0.6
PU35/ 0.7
PU35/ 1.0
PU35/ 1.1
PD35/ 0.35
PD35/ 0.55
PD35/ 0.80
PD35/ 0.9
PD35/ 0.85
PD35/ 1.1
PD35/ 1.4
PD35/ 1.7
PD35/ 1.85
PD35/ 2.1
PD35/ 2.3
PD35/ 2.65

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE

Phreatic line developed from pore pressure instrumentation. Plate 6-431

Grave Tee

SAFETY PAYS

DATE	DESCRIPTION	ISSUED	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA

EMBANKMENT PIEZOMETERS
STATION 35+00

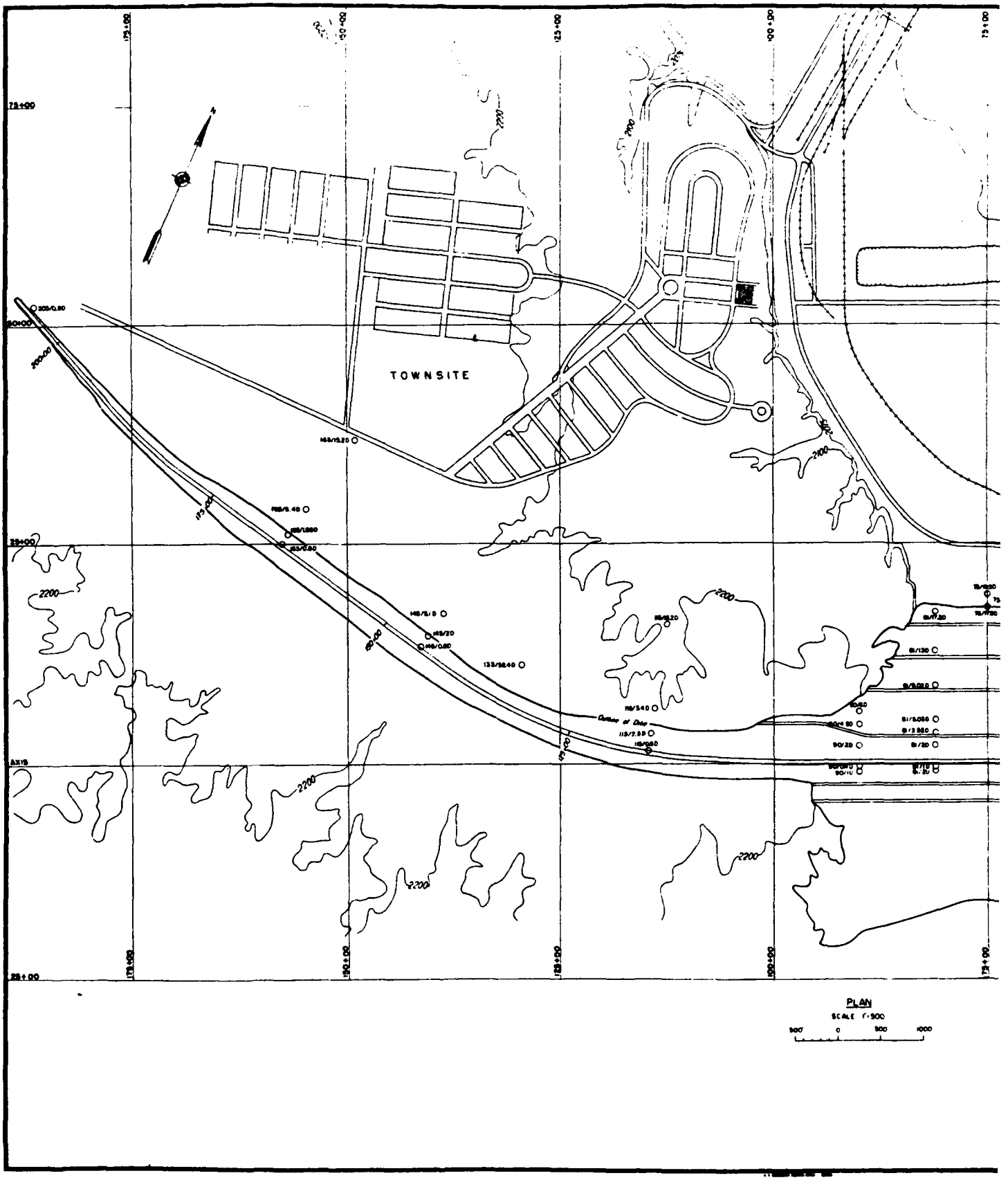
DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
QUAN. CONTROL
ESTIMATED
CHIEF
APPROVED
CHIEF DESIGNING SECTION
DATE
SCALE AS SHOWN
SPEC. NO.
DRAWING NUMBER
SHEET
Lt. U.S. ARMY ENGINEER

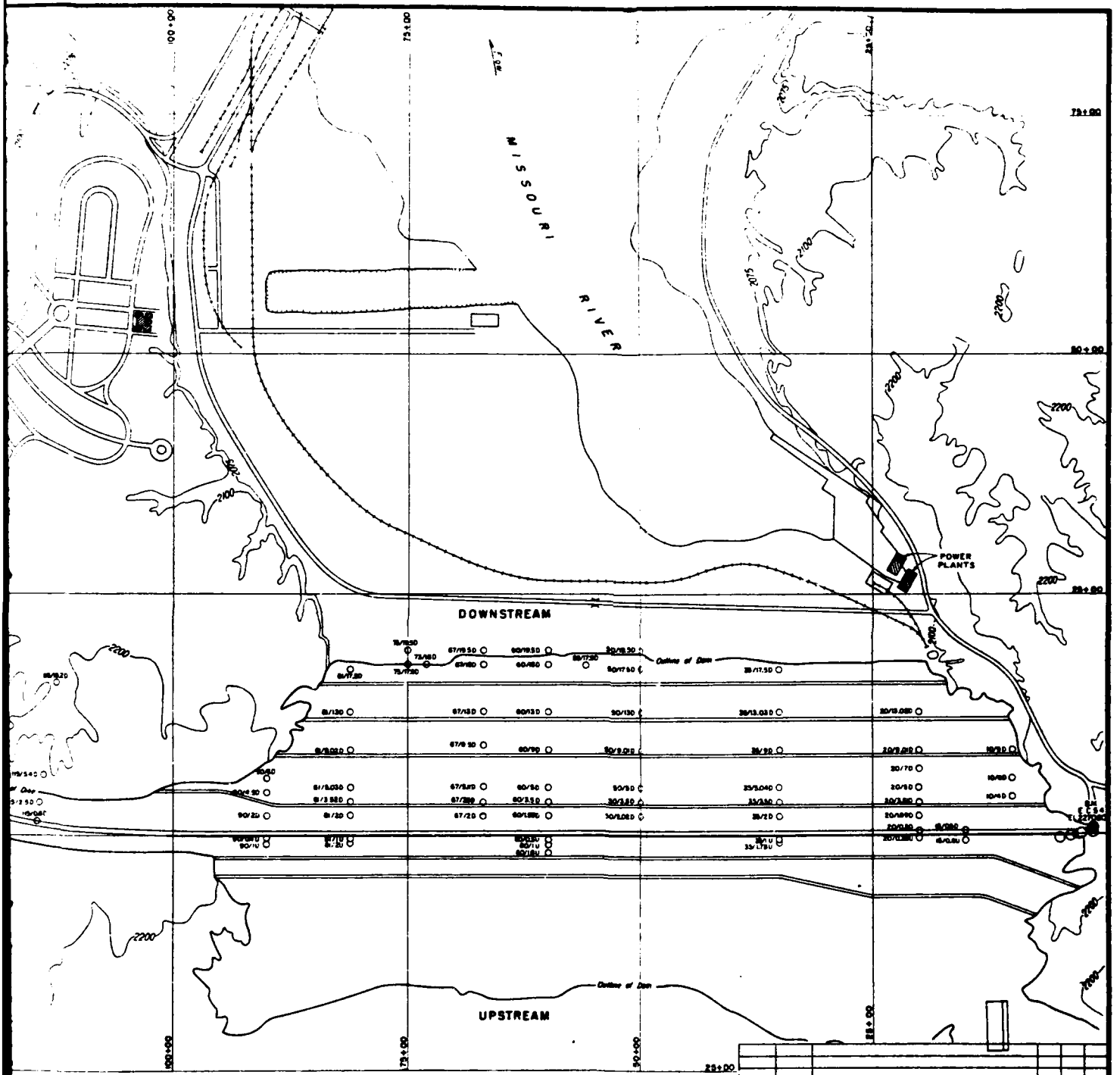
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

PLATE 52

2


TOWNSITE
PLAN
SCALE 1:500
AXIS



PLAN

SCALE 1"=500

900 0 900 1000

This drawing has been reduced to three-eighths the original scale.

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT

MISSOURI RIVER
FORT PECK DAM

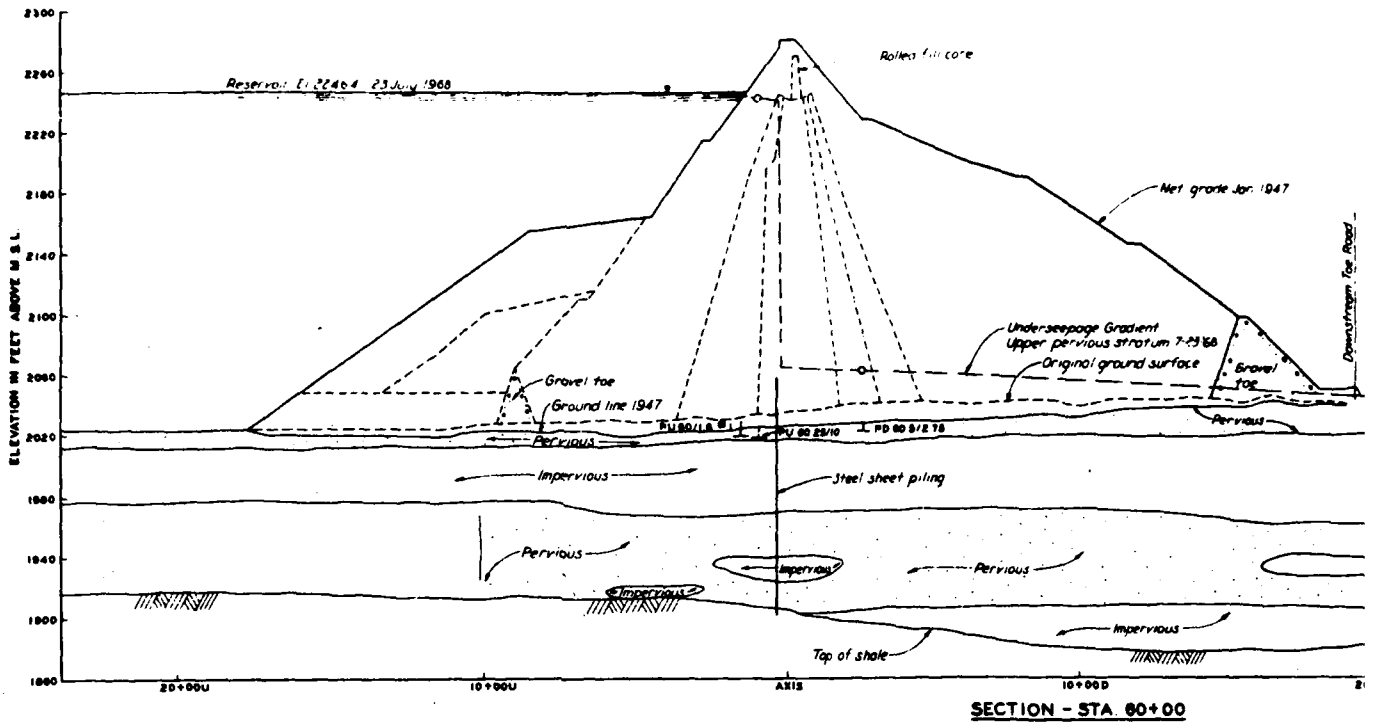
LOCATION OF SEEPAGE PIPES

AUGUST 1957

AS BUILT

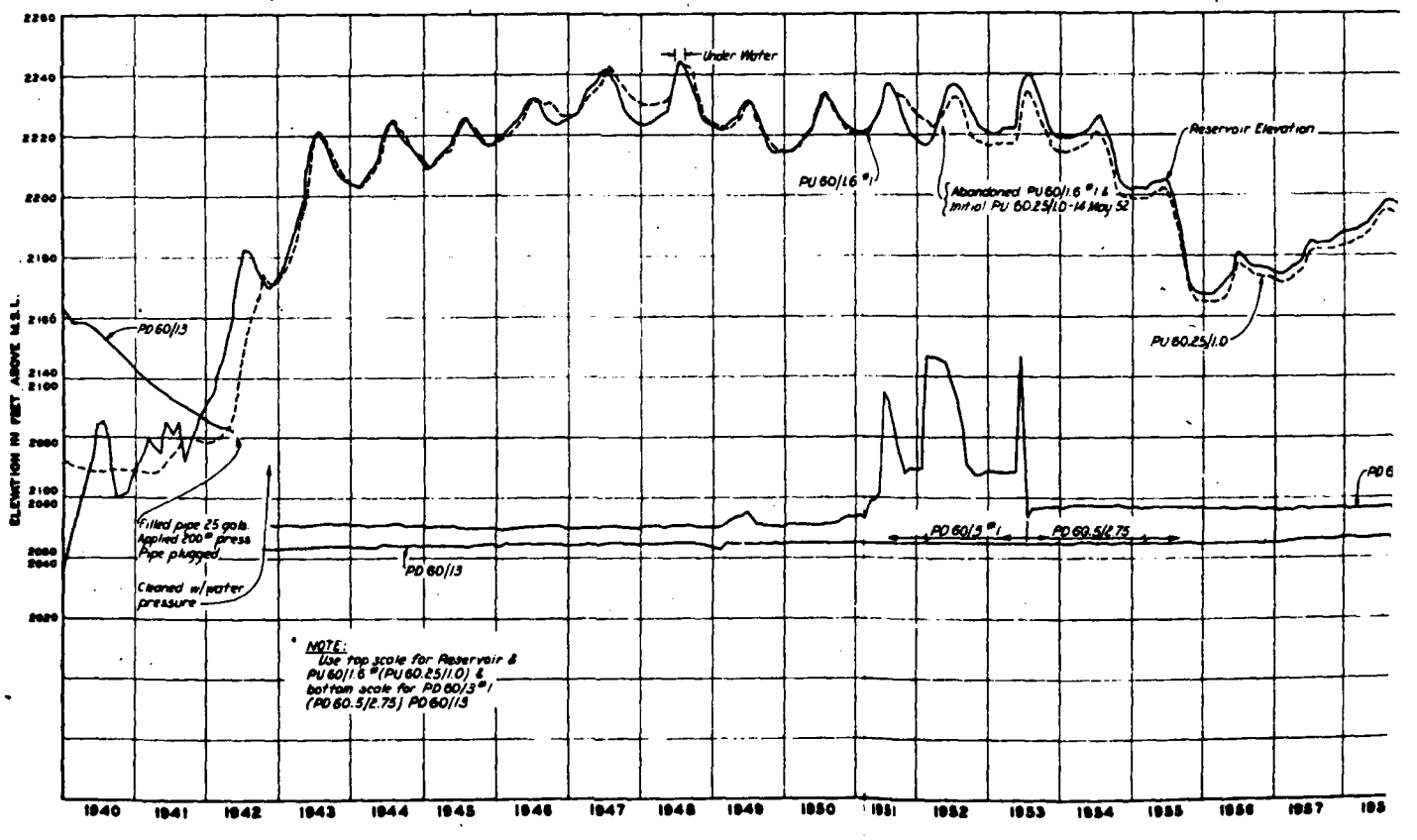
SEE SHEET TO

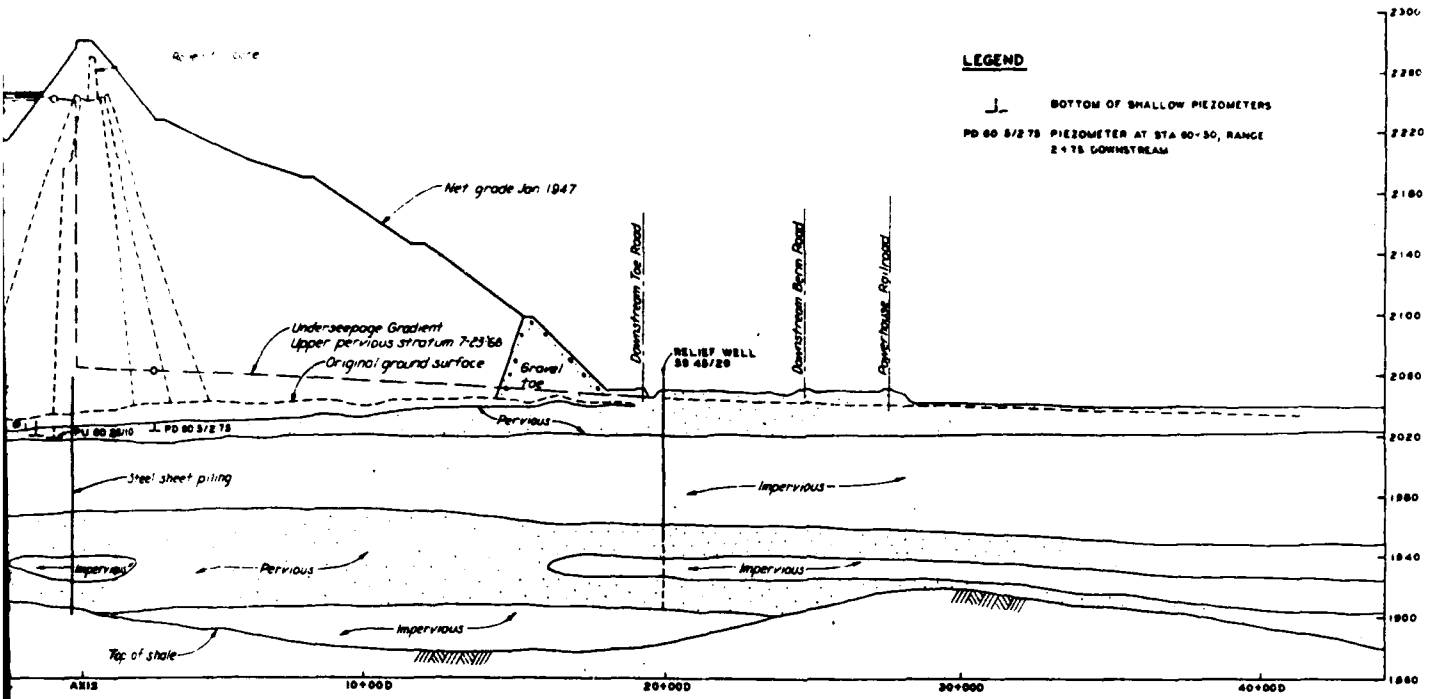
CONSTRUCTION FOUNDATION REPORT PLATE 53



SECTION - STA 60+00

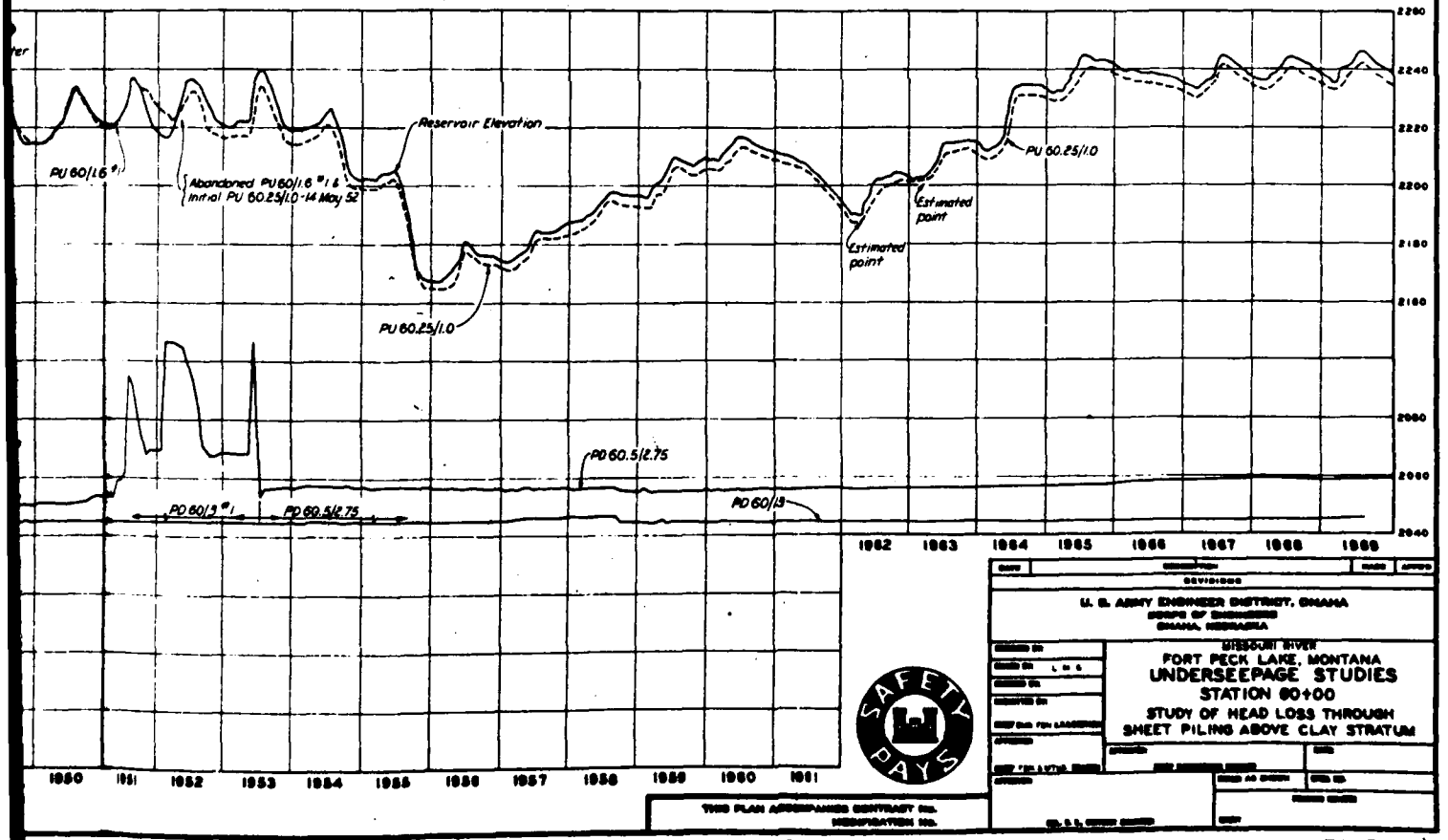
SCALE VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 200 FEET





SECTION - STA. 60+00

SCALE VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 200 FEET



SAFETY PAYS

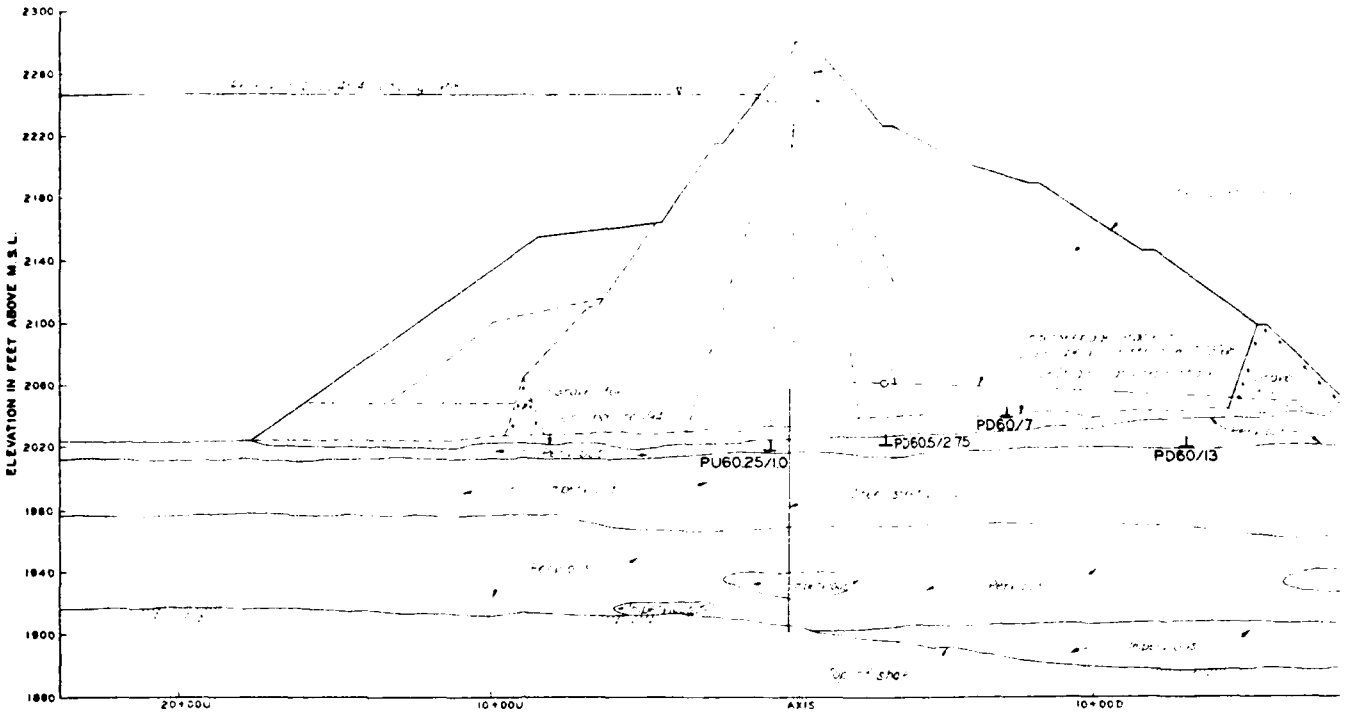
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
STATION 60+00
STUDY OF HEAD LOSS THROUGH SHEET PILING ABOVE CLAY STRATUM

THIS PLAN ACCOMPANIES CONTRACT NO. _____ MEMORANDUM NO. _____

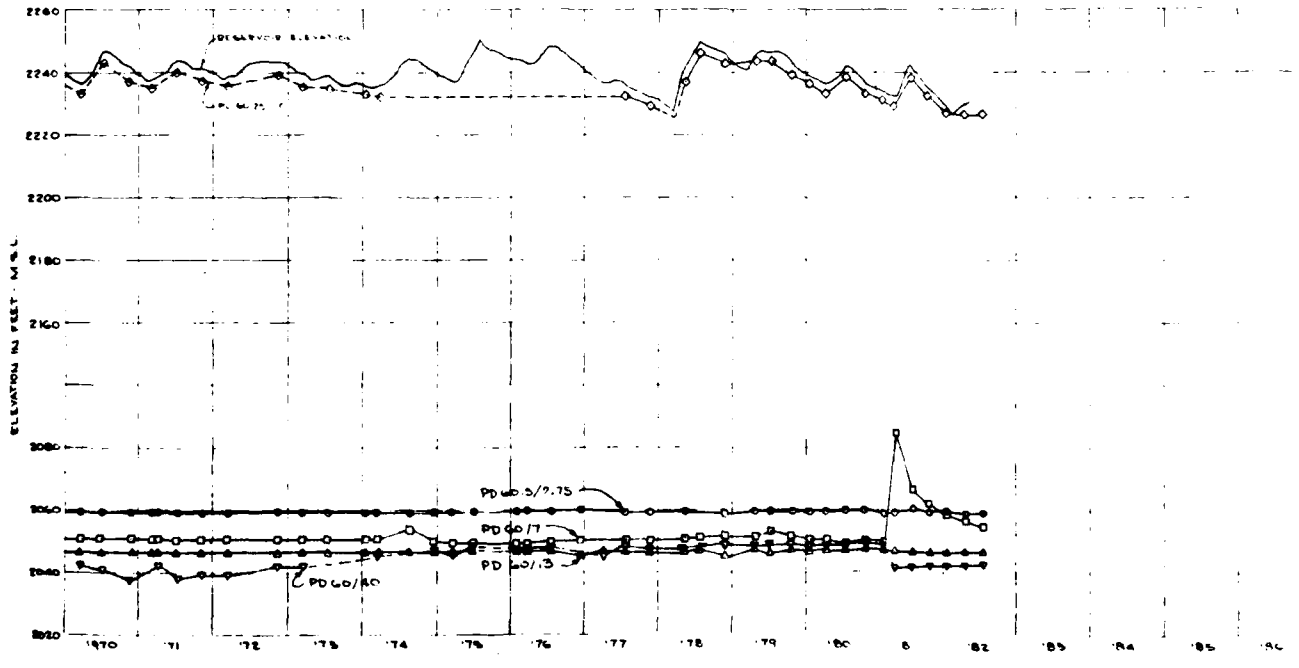
CONSTRUCTION FOUNDATION REPORT PLATE 54

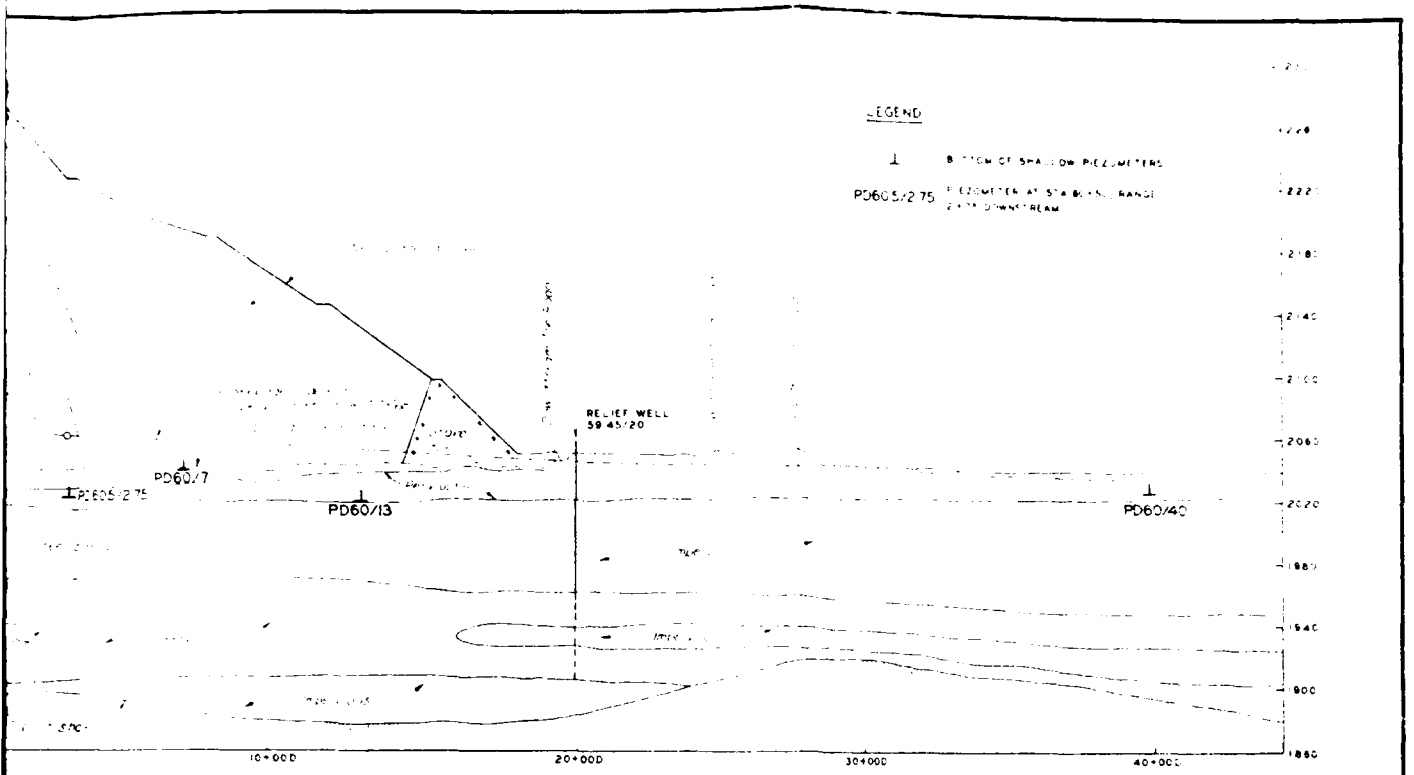
2



SECTION - STA 60+00

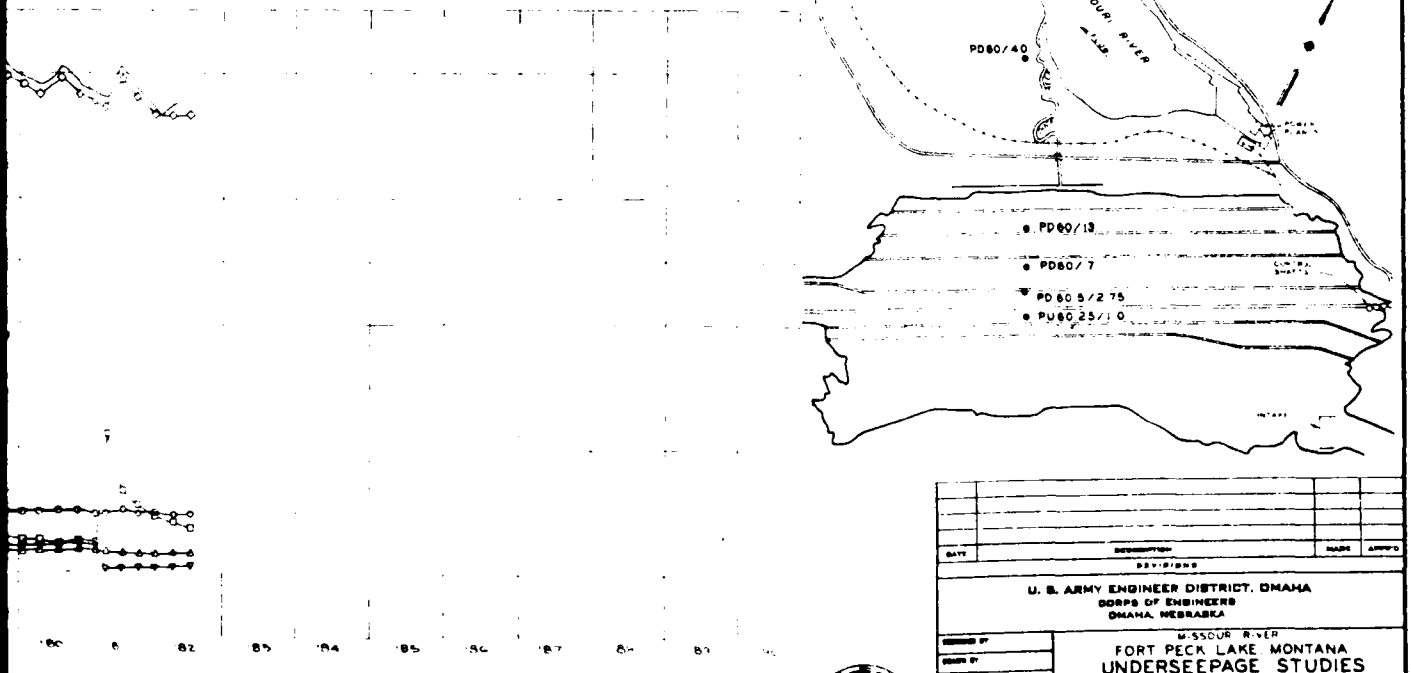
SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET





SECTION - STA 60+00

SCALE VERT 1 INCH = 40 FEET
HORIZ 1 INCH = 200 FEET



DATE	DESCRIPTION	MADE	APPD

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY
DRAWN BY
TRACED BY
SUBMITTED BY
DATE
SECTION
APPROVED
DATE
CHIEF, ENGINEERING DIVISION
DRAWING NO.
CHIEF, ENGINEERING DIVISION
DATE

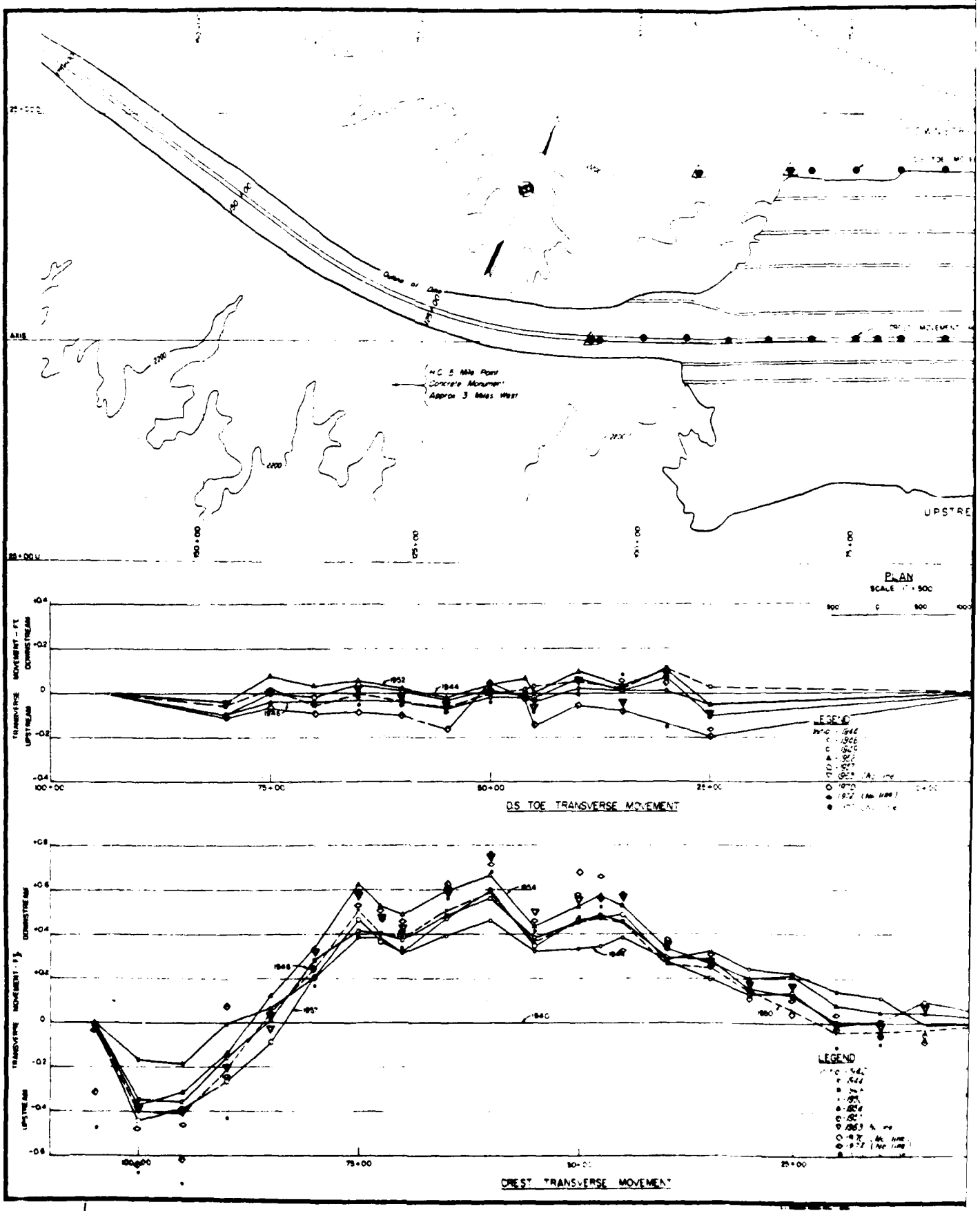
MISSOURI RIVER
FORT PECK LAKE MONTANA
UNDERSEEPAGE STUDIES
STATION 60+00
STUDY OF HEAD LOSS THROUGH
SHEET PILING ABOVE CLAY STRATUM

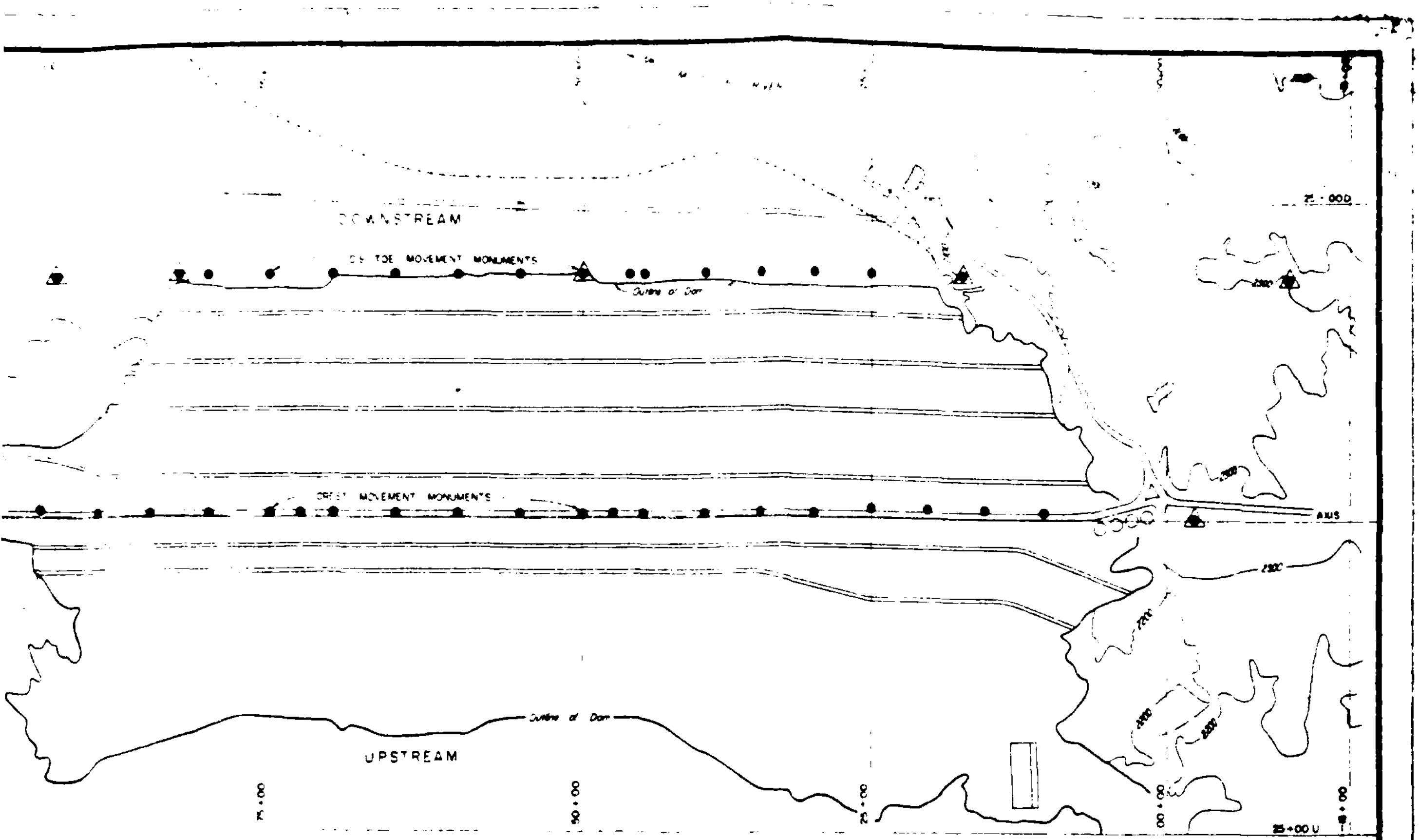
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO
MODIFICATION NO

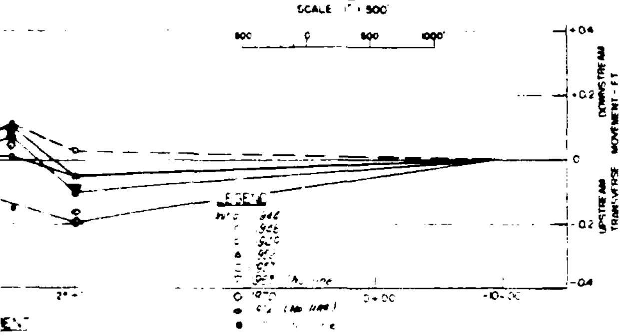
CONSTRUCTION FOUNDATION REPORT

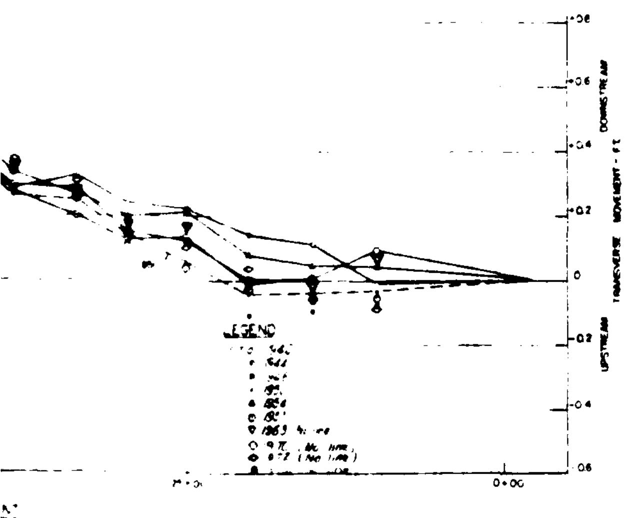
PLATE 55


PLAN
SCALE 1" = 500
H.C. 5 Mile Point
Concrete Monument
Approx 3 Miles West
UPSTRE
DS TOE TRANSVERSE MOVEMENT
TRANSVERSE MOVEMENT - FT
DOWNSTREAM
UPSTREAM
+0.4
+0.2
0
-0.2
-0.4
100+00
75+00
50+00
25+00
1952
1944
1946
LEGEND
CREST TRANSVERSE MOVEMENT
+0.8
+0.6
+0.4
+0.2
-0.2
-0.4
-0.6
1954
1948
1946
1950
1940
1960



PLAN
SCALE 1" = 500'





TABULATED LOCATIONS OF DS TOE MOVEMENT MONUMENTS			TABULATED LOCATIONS OF CREST MOVEMENT MONUMENTS		
NO	STATION	RANGE	NO	STATION	RANGE
HC-99/19D	-9+92.984	19+00.000	-2+90 Axis	-2+90	0+00
HC 6.9/19D	6+92.832	19+00.000	10/C 50D	9+95.642	0+38.090
25/19D	25+13.244	19+03.200	15/C 50D	14+99.515	0+55.180
30/19D	29+99.52	19+02.850	20/C 60D	19+95.761	0+60.200
35/19D	35+00.000	19+00.140	25/C 60D	24+99.485	0+63.330
40/19D	39+99.785	19+00.130	30/C 25D	30+00.00	0+25.480
45/19D	45+00.000	19+00.020	35/C 25D	34+99.750	0+25.930
46/19D	45+96.883	19+00.110	40/C 25D	39+95.870	0+25.520
50/19D	50+00.000	19+00.030	45/C 25D	44+95.470	0+25.800
HC 50/19D	50+08.703	19+00.020	47.5/C 25D	47+49.369	0+25.700
55/19D	55+00.000	19+00.040	50/C 25D	49+99.832	0+25.650
60/19D	60+00.000	19+00.054	55/C 25D	54+95.546	0+25.740
65/19D	65+00.000	19+00.070	60/C 25D	59+99.073	0+26.260
70/19D	70+00.000	19+00.020	65/C 25D	64+98.106	0+25.760
75/19D	75+00.030	19+00.046	70/C 25D	69+98.796	0+25.690
80/19D	80+00.000	19+00.080	72.5/C 25D	72+50.160	0+25.910
85/19D	84+99.873	19+00.050	75/C 25D	74+99.512	0+25.700
HC 82.4/19D	82+35.279	19+00.036	80/C 25D	79+99.390	0+25.530
85.6/19D	85+63.139	19+00.046	85/C 25D	84+95.891	0+24.970
84.5/19D	84+54.695	19+02.080	90/C 25D	89+99.210	0+24.890
HC 93.7/19D	93+74.126	19+00.000	95/C 52D	94+96.33	0+51.980
			100/C 52D	99+95.200	0+51.260
			105/C 24D	104+96.663	0+23.700
			HC 108/C 25D	108+54.95	0+25.800

Note locations as of May 1967

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE

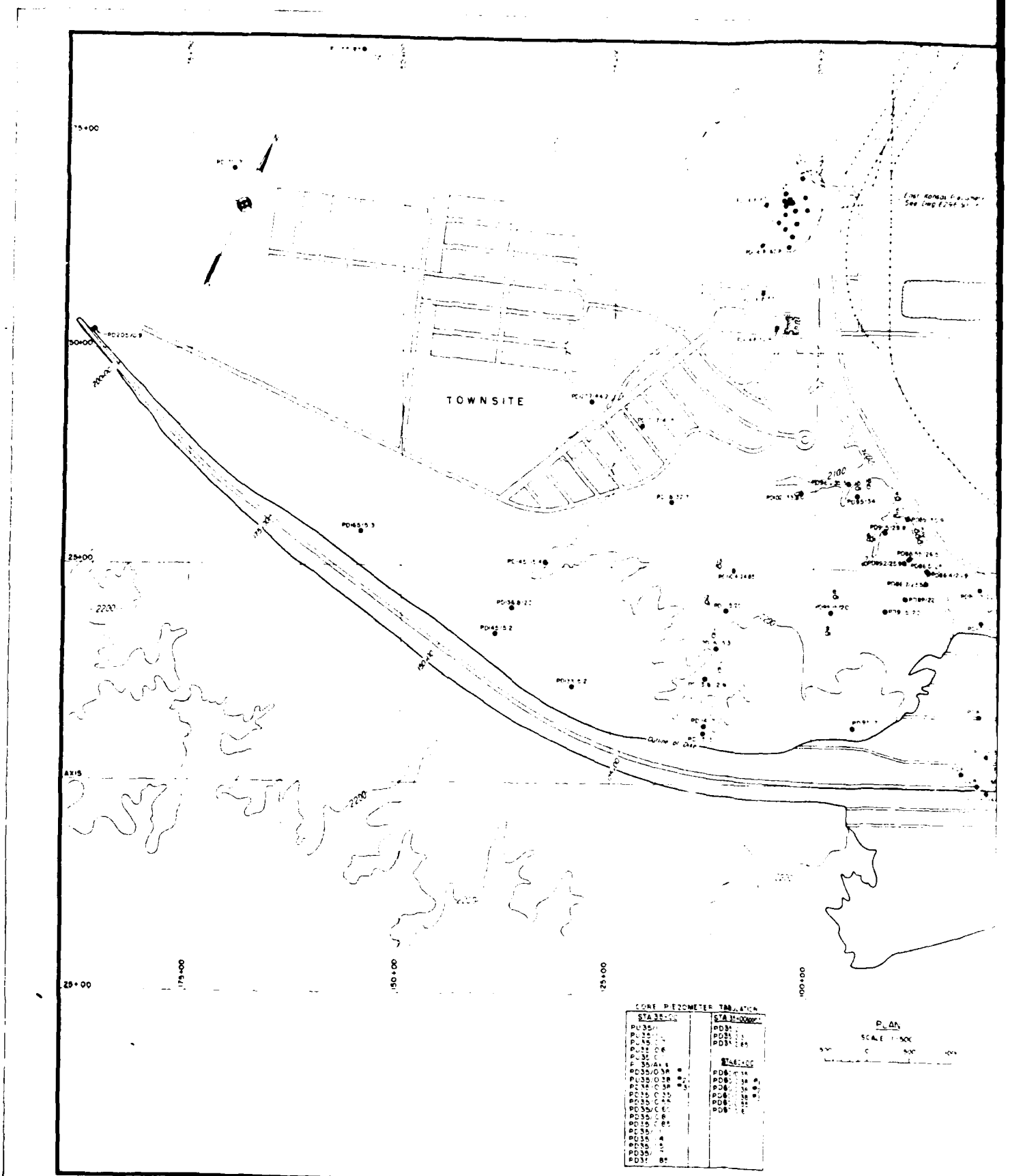
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT
RIVERDALE, N.D.

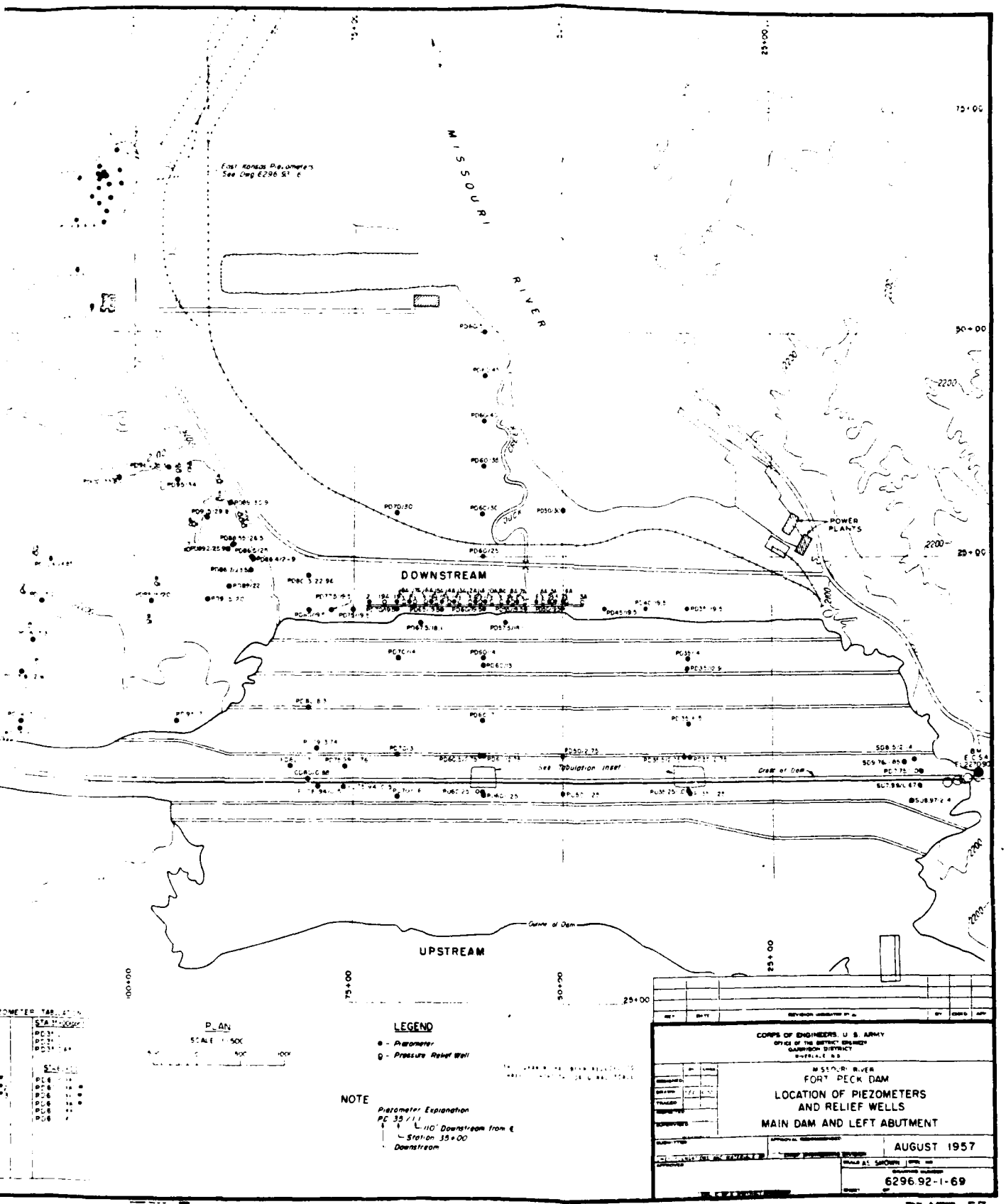
MISSOURI RIVER
FORT PECK DAM

HORIZONTAL MOVEMENT CONTROL
PLAN - GRAPHS - TABULATION

JUNE 1967

6266.95C-33


TOWNSITE
AXIS
2100
2200
2300
Outline of Dam
CORE PIEZOMETER TABULATION
PLAN
SCALE 1"=500'



PLAN

SCALE 1" = 500'

LEGEND

- ⊕ - Piezometer
- ⊡ - Pressure Relief Well

NOTE

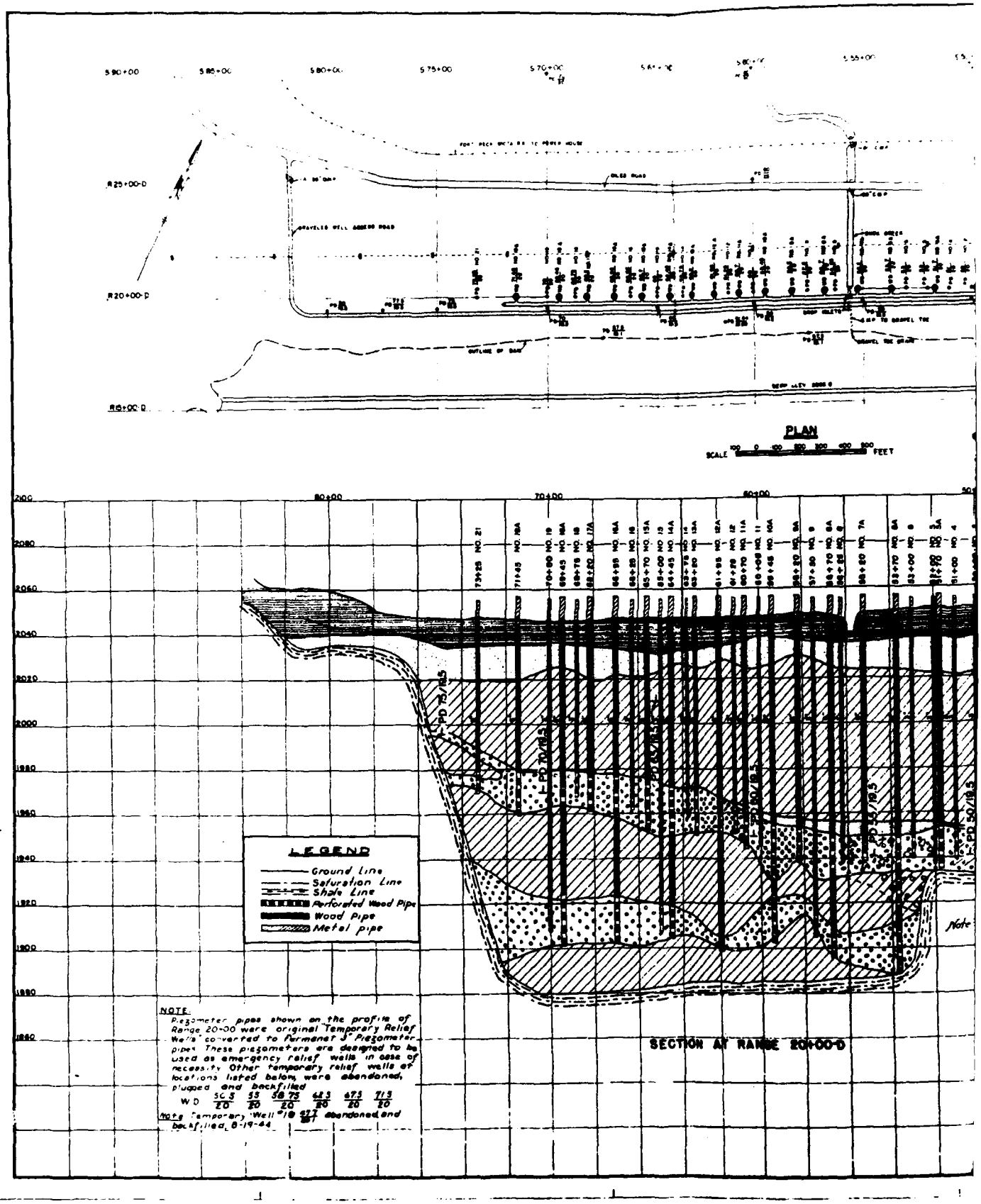
Piezometer Explanation
PC 35 / 11
110' Downstream from ℄
Station 35+00
Downstream

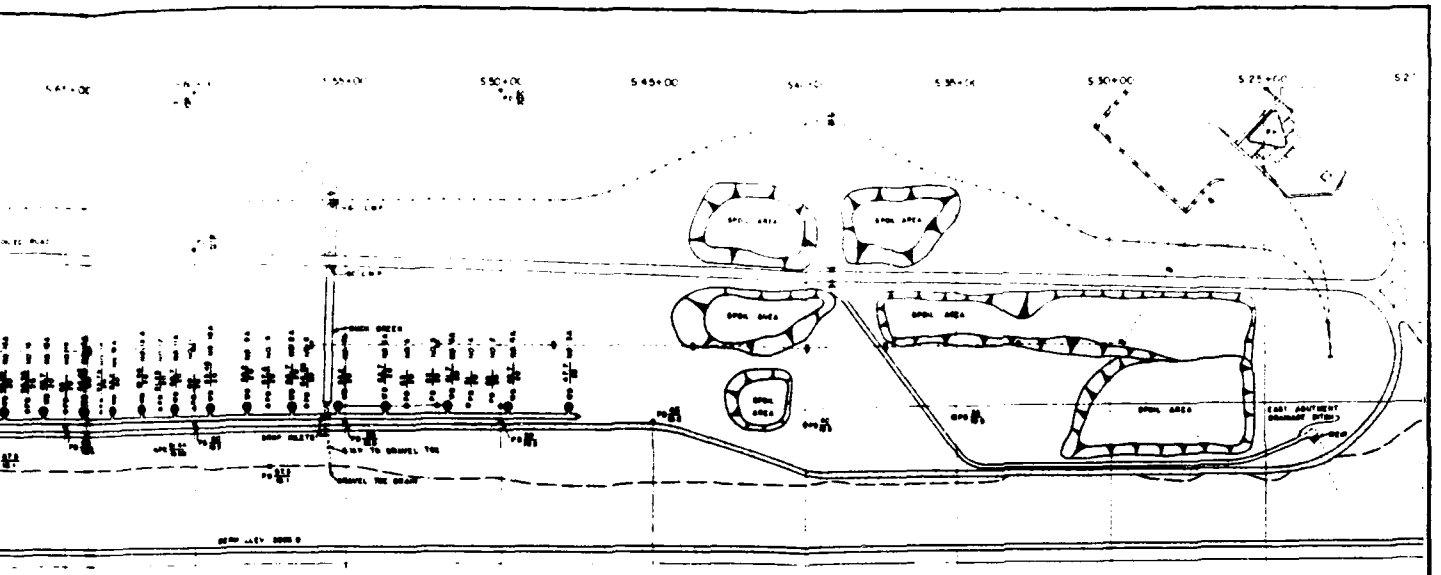
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT
OMAHA, NEB

MISSOURI RIVER
FORT PECK DAM
LOCATION OF PIEZOMETERS
AND RELIEF WELLS
MAIN DAM AND LEFT ABUTMENT

AUGUST 1957

6296-92-1-69


PLAN
SCALE 100 0 100 200 300 400 500 FEET
SECTION AT RANGE 20+00-D
LEGEND
Ground Line
Saturation Line
Shale Line
Perforated Wood Pipe
Wood Pipe
Metal pipe
NOTE
Piezometer pipes shown on the profile of Range 20+00 were original Temporary Relief Wells converted to Permanent 3" Piezometer pipes. These piezometers are designed to be used as emergency relief wells in case of necessity. Other temporary relief wells at locations listed below, were abandoned, plugged and backfilled
WD 55 20 58 75 20 64 3 20 67 5 20 71 3 20
Note Temporary Well #18 @ 67+1 abandoned and backfilled 8-19-44



PLAN

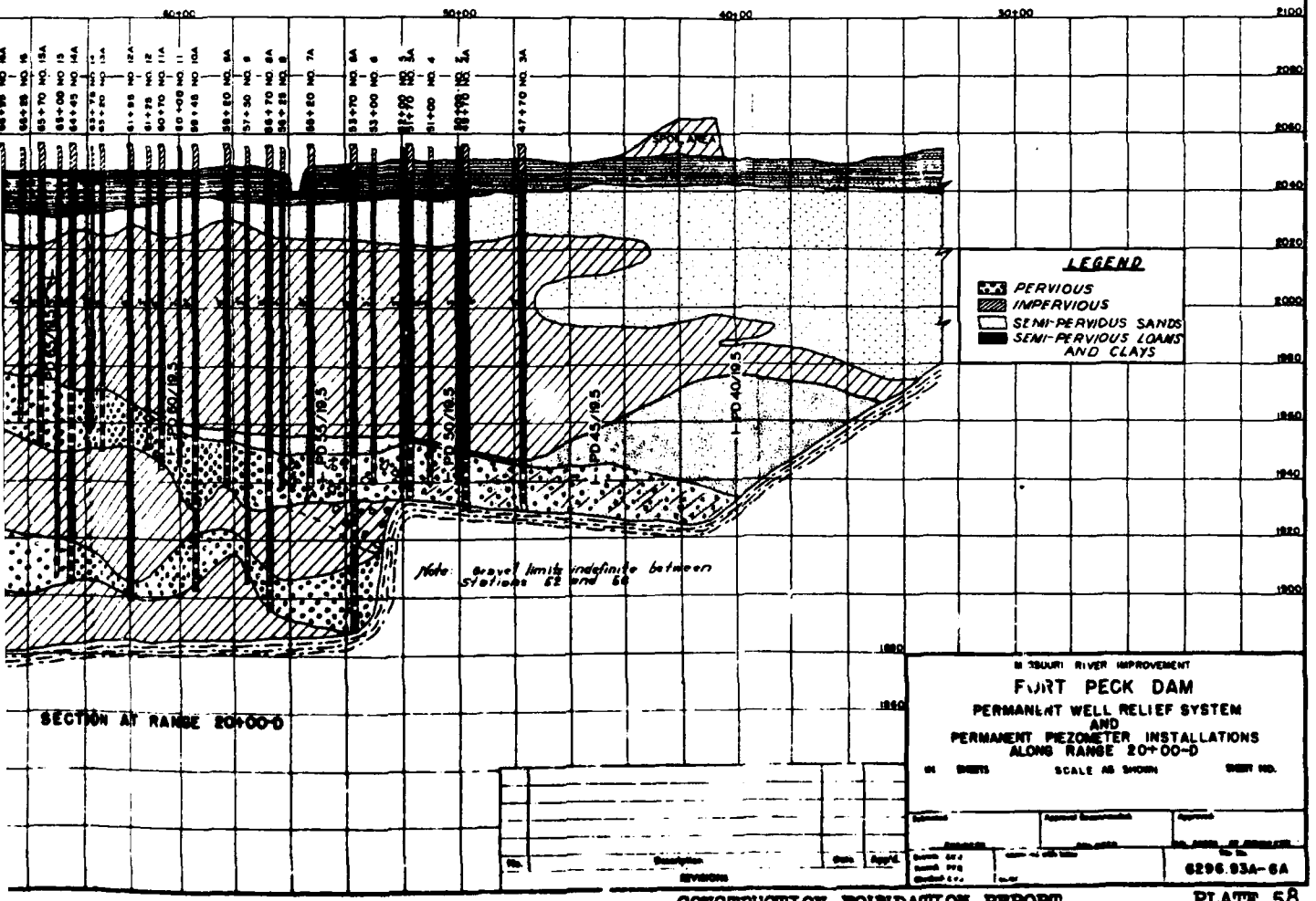
SCALE 100 0 400 800 1200 1600 FEET

LEGEND

● Permanent Pressure Relief Wells

• Piezometer Pipe (Existing)

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



SECTION AT RANGE 20+00-D

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

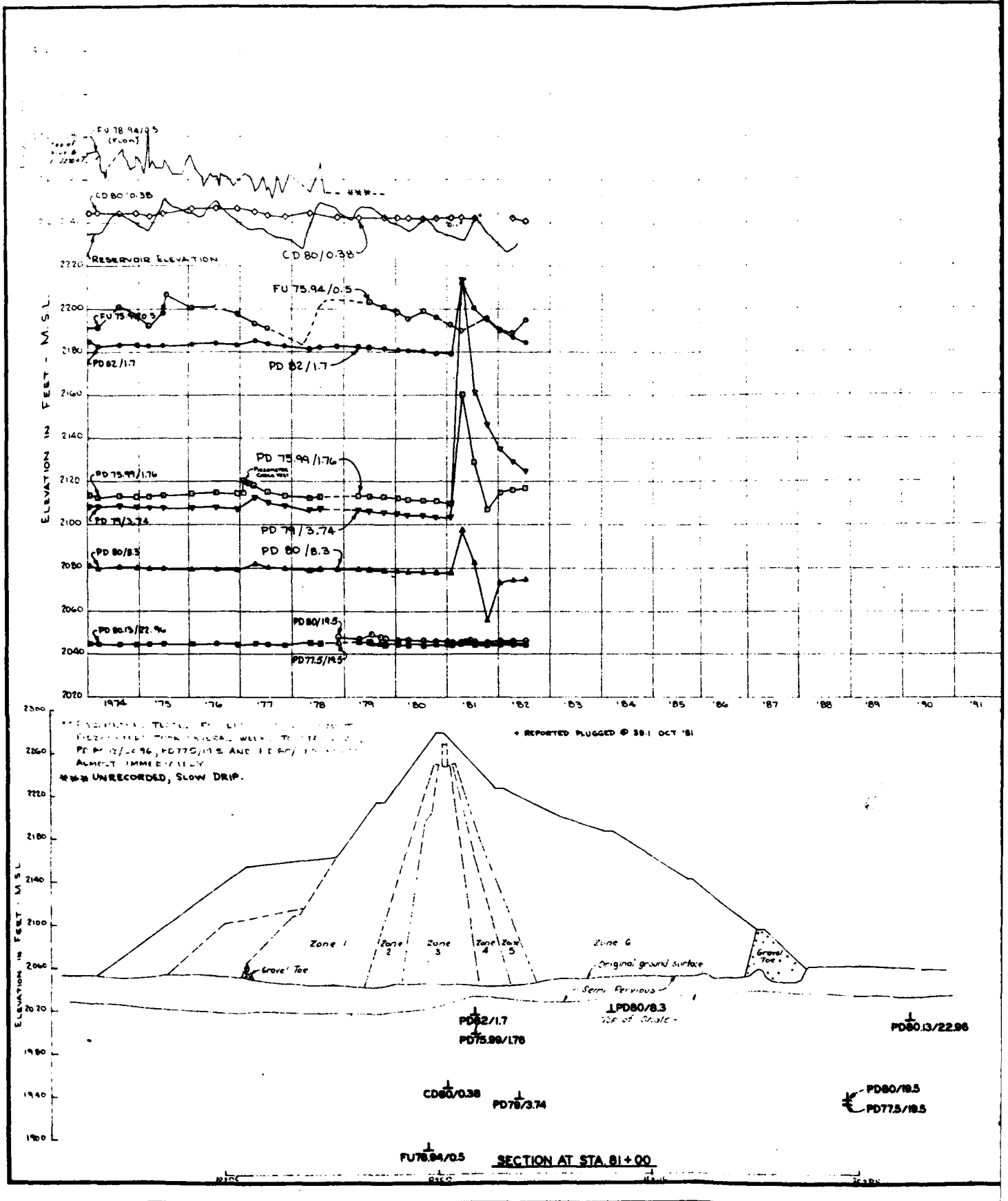
PERMANENT WELL RELIEF SYSTEM AND PERMANENT PIEZOMETER INSTALLATIONS ALONG RANGE 20+00-D

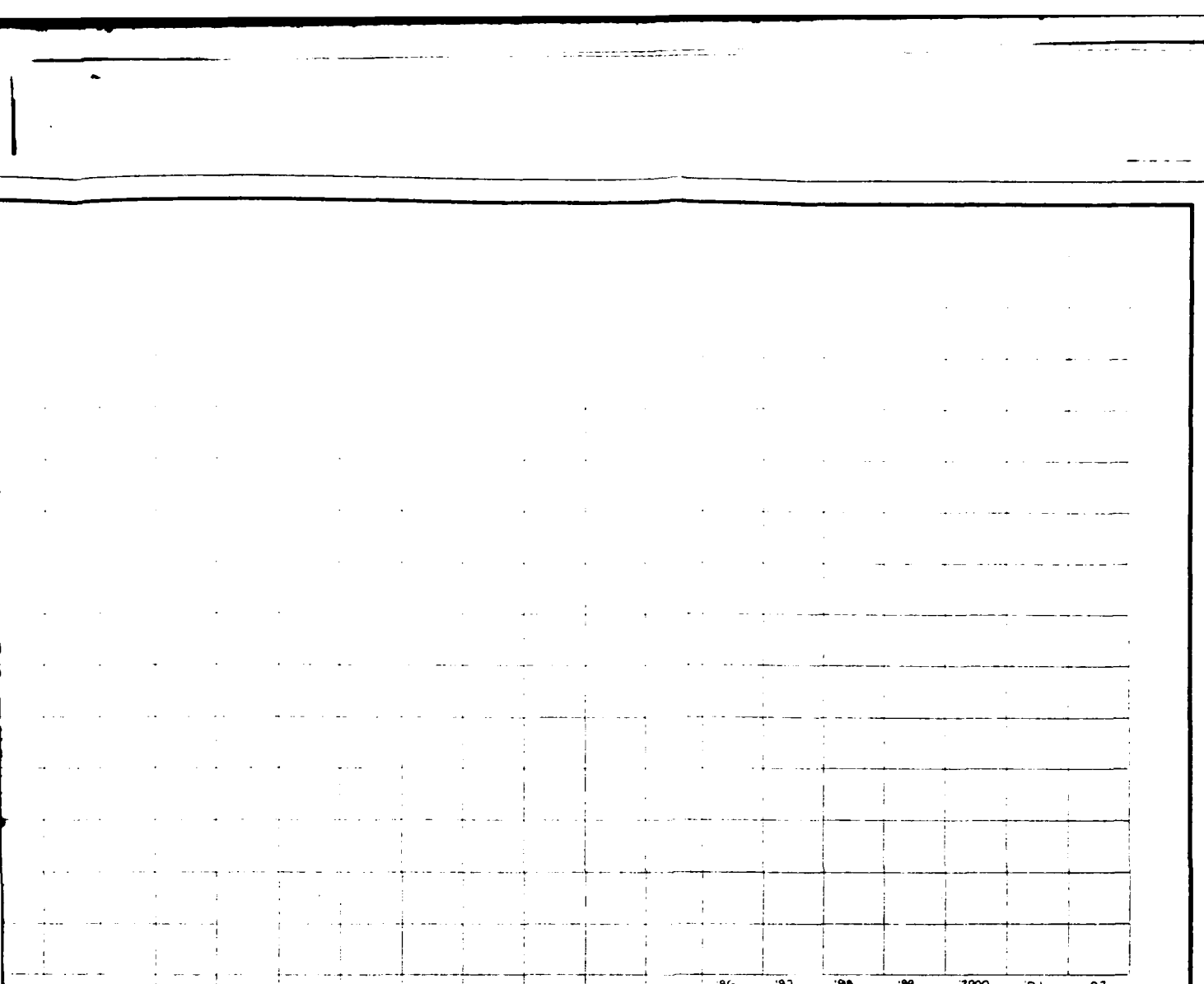
SCALE AS SHOWN

6296.93A-6A

CONSTRUCTION FOUNDATION REPORT PLATE 58

2


FU 78.94/0.5 (FLOW)
CD 80/0.38
RESERVOIR ELEVATION
CD 80/0.38
FU 75.94/0.5
PD 82/1.7
PD 75.99/1.76
PD 79/3.74
PD 80/8.3
PD 80/19.5
PD77.5/19.5
PD 80.13/22.96
ELEVATION IN FEET - M.S.L.
2220
2200
2180
2160
2140
2120
2100
2080
2060
2040
2020
1974
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87
'88
'89
'90
'91
UNRECORDED, SLOW DRIP.
+ REPORTED PLUGGED @ 39:1 OCT '81
2300
2260
2220
2180
2140
2100
2060
2020
1980
1940
1900
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Gravel Toe
Original ground surface
Semi Pervious
PD80/8.3
Top of Slope
PD82/1.7
PD75.99/1.76
PD80.13/22.96
CD80/0.38
PD79/3.74
PD80/19.5
PD77.5/19.5
FU78.94/0.5
SECTION AT STA. 81+00

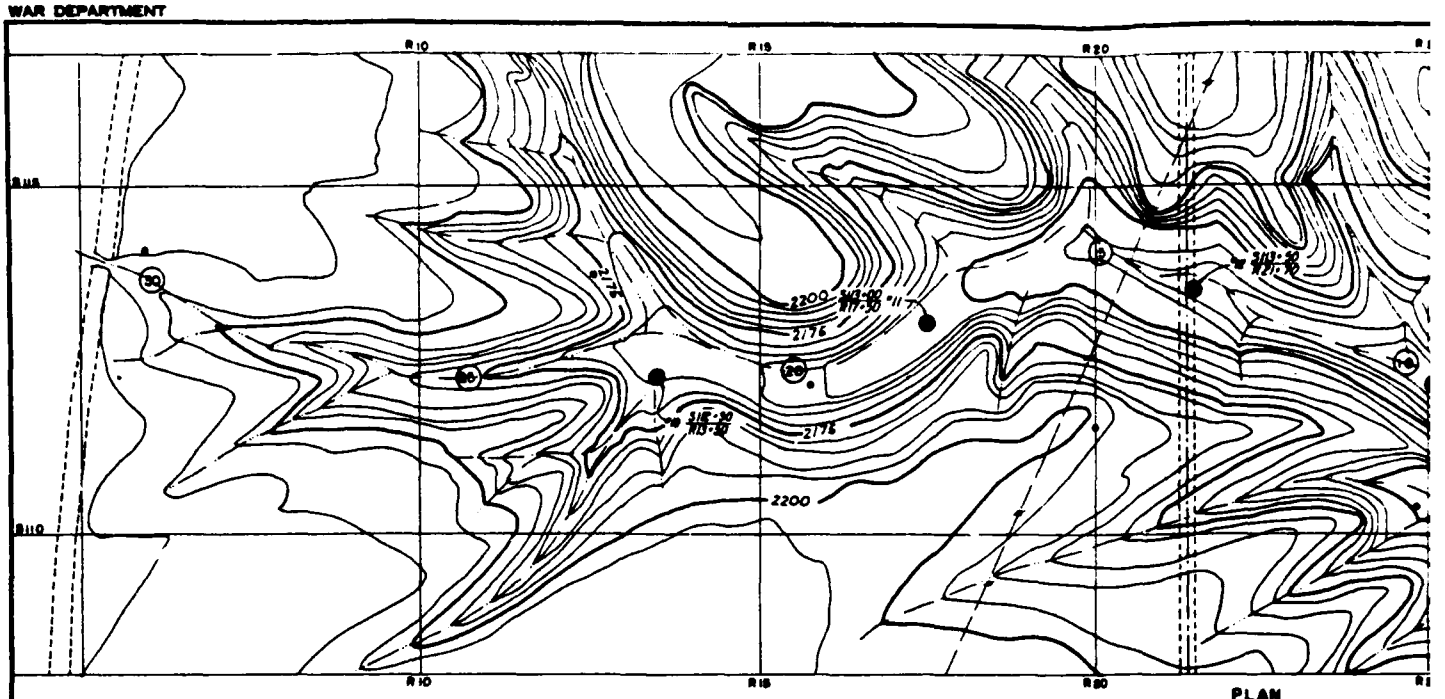


CONSTRUCTION FOUNDATION REPORT

PLATE 59

2

WAR DEPARTMENT



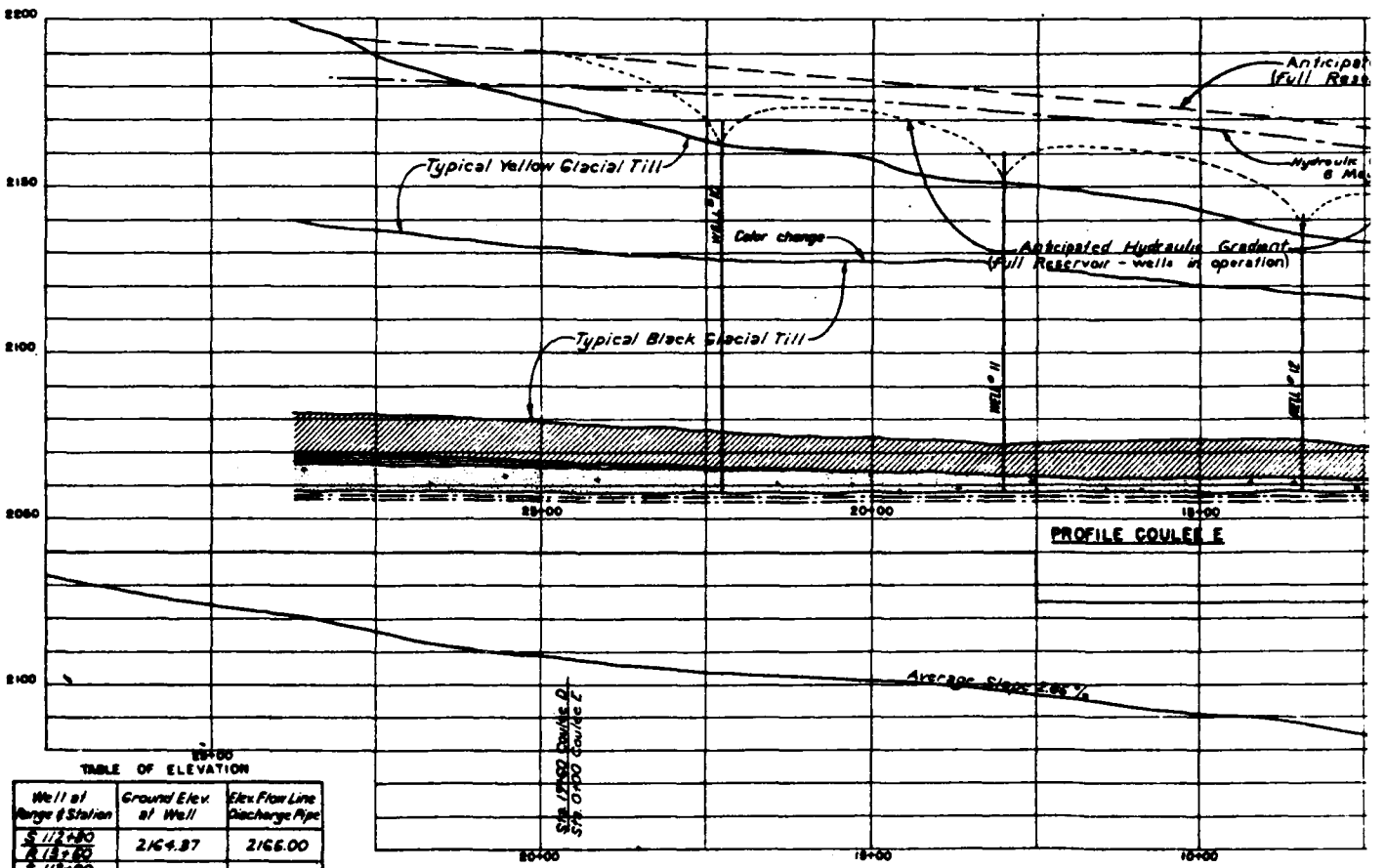
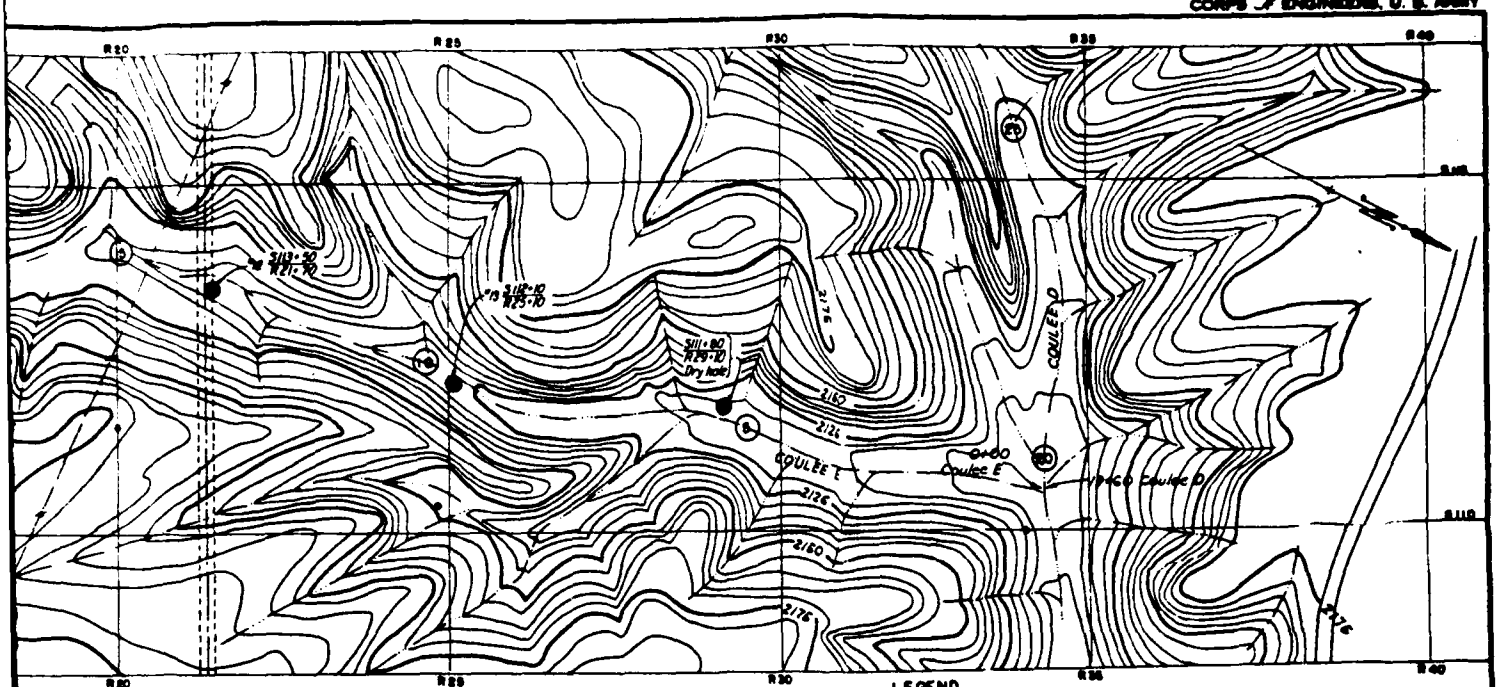


TABLE OF ELEVATION

Well at Range & Station	Ground Elev. at Well	Elev. Flow Line Discharge Pipe
R 11 T 20 S 30	2164.87	2166.00
R 15 T 20 S 30	2162.1 Filled	2161.70
R 11 T 20 S 12	2147.2 Filled	2148.8
R 17 T 20 S 30	2180.2 Filled	2128.60
R 11 T 20 S 12	2118.18	2116.70

CORPS OF ENGINEERS, U. S. ARMY

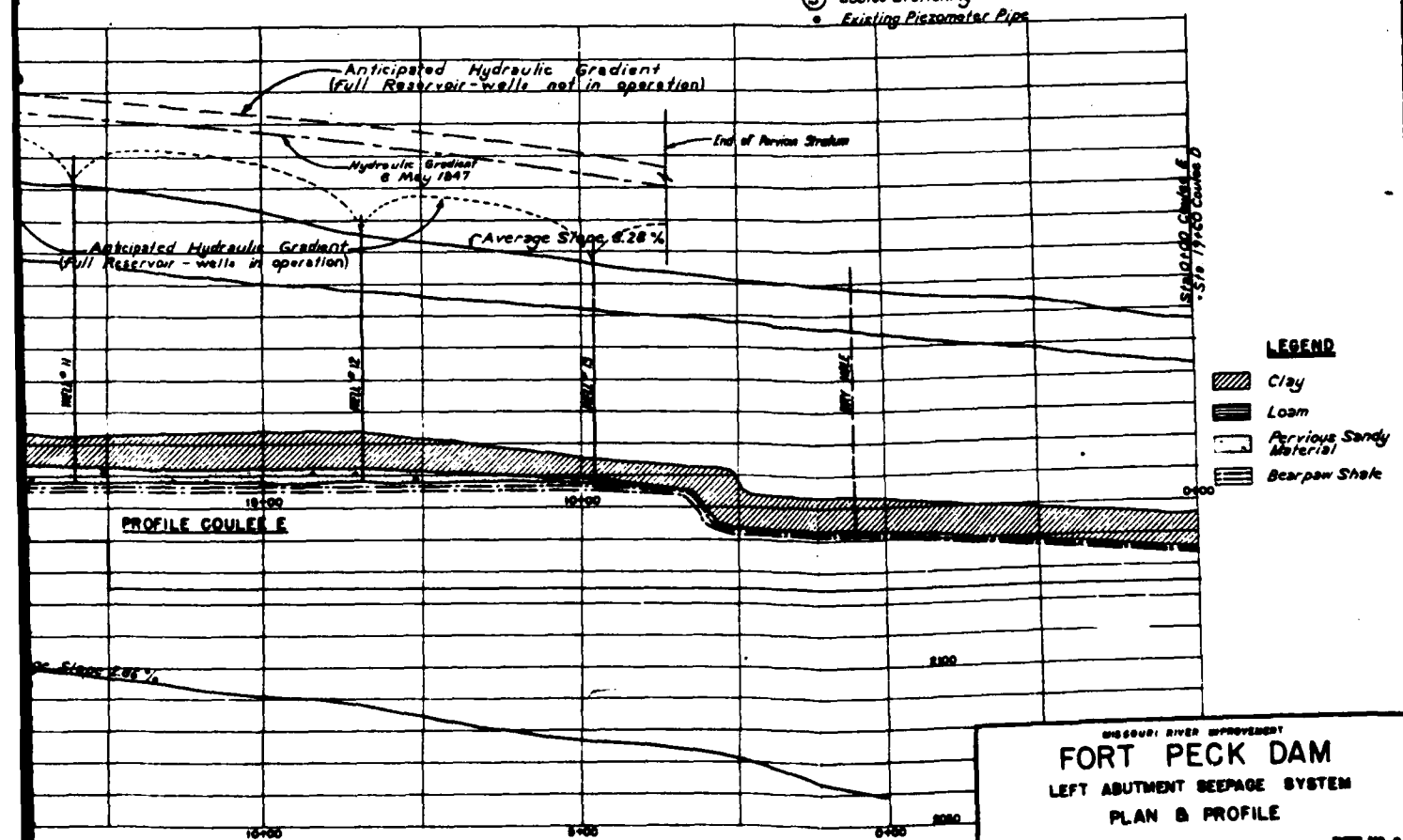


PLAN

SCALE FEET

LEGEND

- Well
- (5) Coulee Stationing
- Existing Piezometer Pipe



LEGEND

- Clay
- Loam
- Pervious Sandy Material
- Bearpaw Shale

PROFILE COULEE E

PROFILE COULEE D

No.	Description	Date	Appd.
3	Soil Profile Revised to As Built	5-15-47	
2	Well Numbers Added	12-5-46	
1	Corrected Well Locations	1-14-47	CVJ

REVISIONS

MISSOURI RIVER IMPROVEMENT

FORT PECK DAM

LEFT ABUTMENT SEEPAGE SYSTEM

PLAN & PROFILE

IN 2 SHEETS SCALE AS SHOWN SHEET NO. 2

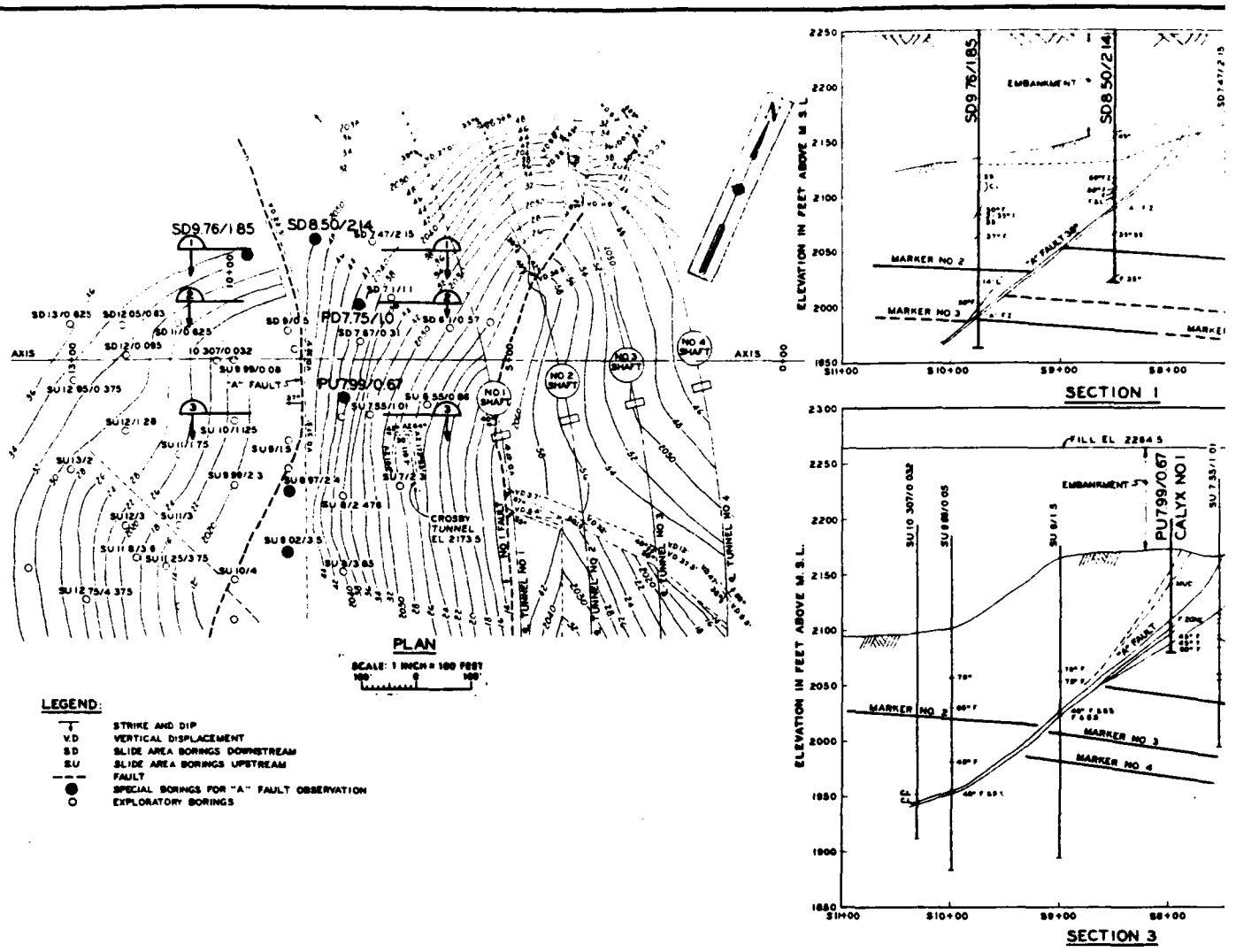
U. S. ENGINEER OFFICE, FORT PECK, MONTANA 6 MAY 1947

Submitted Approved Approved

Drawn Traced Checked

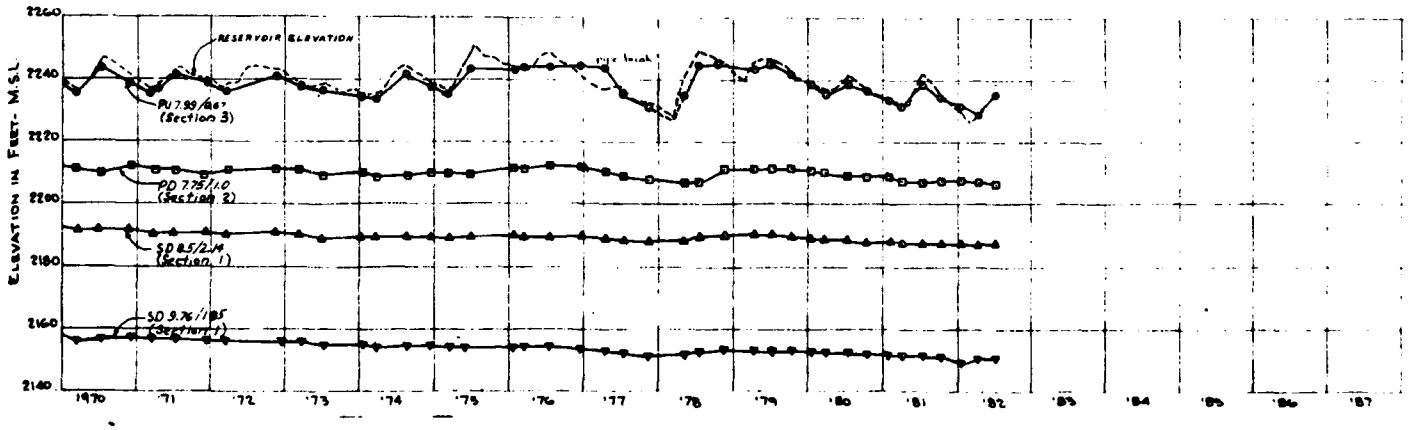
6296.93C-4

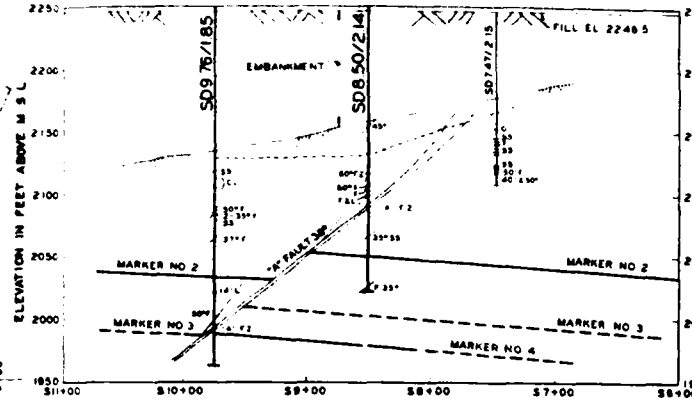
CONSTRUCTION FOUNDATION REPORT PLATE 60


SD9.76/185
SD8.50/214
PD7.75/10
PU799/067
AXIS
"A" FAULT
NO.1 SHAFT
NO.2 SHAFT
NO.3 SHAFT
NO.4 SHAFT
CROSBY TUNNEL EL 2173.5
PLAN
SCALE: 1 INCH = 100 FEET
LEGEND:
STRIKE AND DIP
V.D VERTICAL DISPLACEMENT
SD SLIDE AREA BORINGS DOWNSTREAM
SU SLIDE AREA BORINGS UPSTREAM
FAULT
SPECIAL BORINGS FOR "A" FAULT OBSERVATION
EXPLORATORY BORINGS

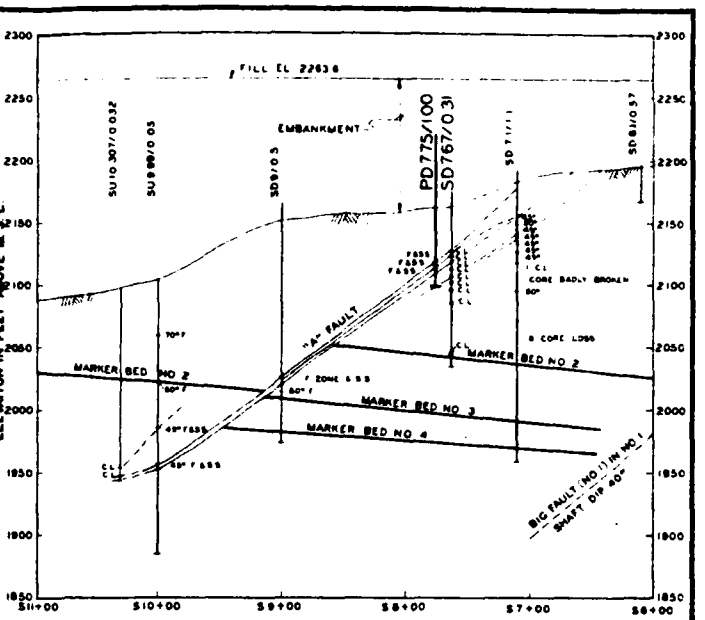
ELEVATION IN FEET ABOVE M.S.L.
SD9.76/185
SD8.50/214
EMBANKMENT
MARKER NO 2
MARKER NO 3
"A" FAULT
SECTION 1

ELEVATION IN FEET ABOVE M.S.L.
FILL EL 2284.5
EMBANKMENT
PU799/067
CALYX NO 1
MARKER NO 2
MARKER NO 3
MARKER NO 4
"A" FAULT
SECTION 3

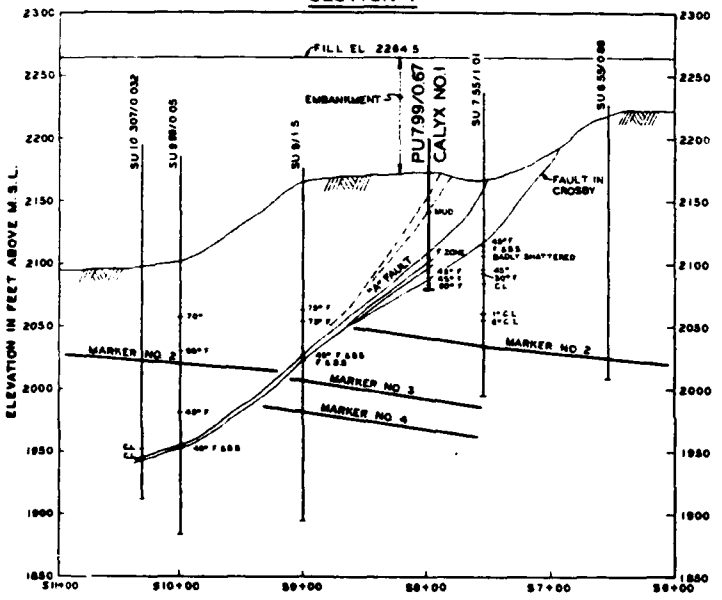

ELEVATION IN FEET- M.S.L.
RESERVOIR ELEVATION
PU 7.99/667 (Section 3)
PD 7.75/10 (Section 2)
SD 8.5/2.14 (Section 1)
SD 9.76/185 (Section 1)
1970
'71
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87



SECTION 1



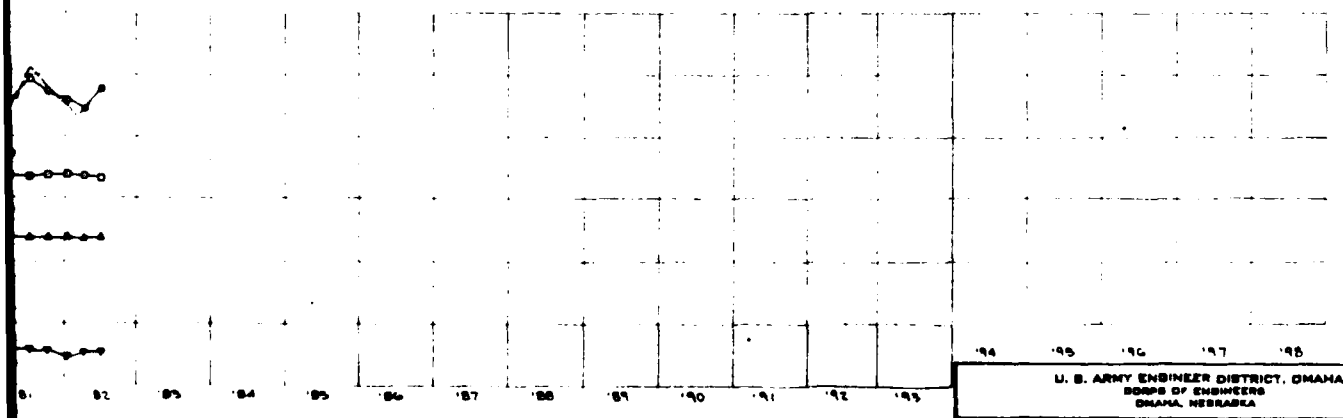
SECTION 2



SECTION 3

LEGEND:

SS	SLICKENSIDES
C.L.	CORE LOSS
SH.	SHATTERED
45°F	FAULT PLANE
H.W.	HANGING WALL
F & SS	FAULT PLANE WITH SLICKENSIDES
MARKER NO	MARKER BEDS OF BENTONITE



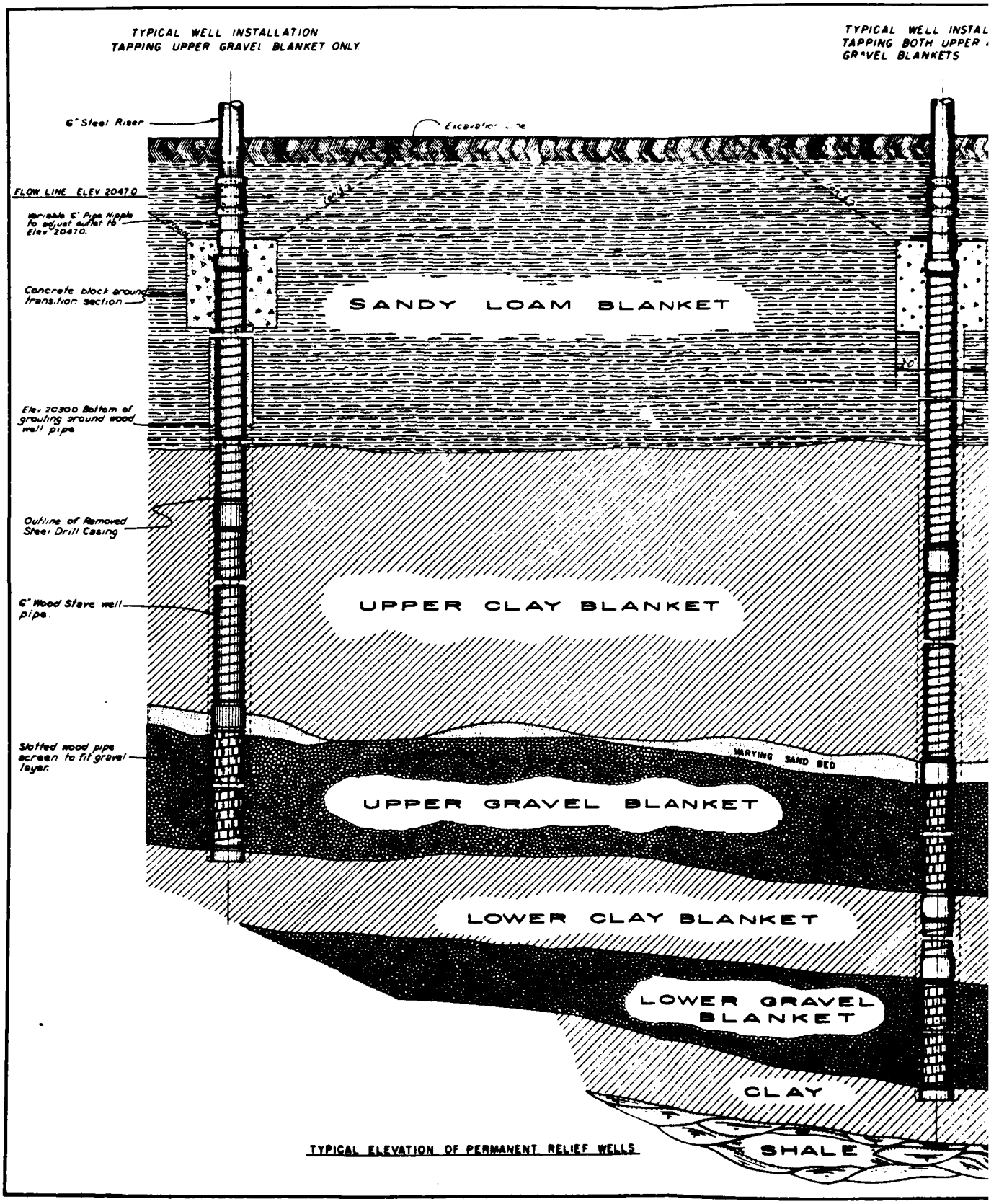
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
UNDERSEEPAGE STUDIES
RIGHT ABUTMENT PIEZOMETERS
"A" FAULT INVESTIGATION

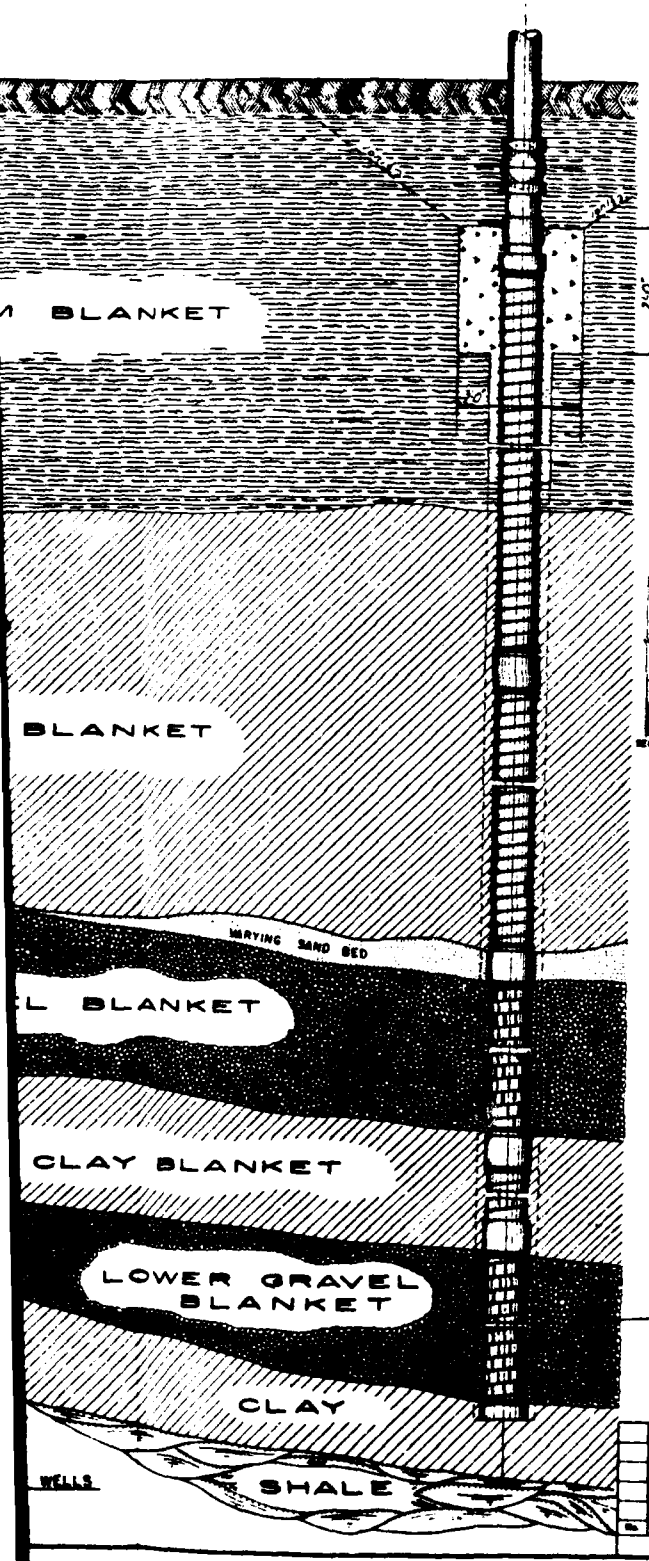
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
TRACED
CHECKED
APPROVED
DATE
SCALE AS SHOWN
DRG. NO.
SHEET

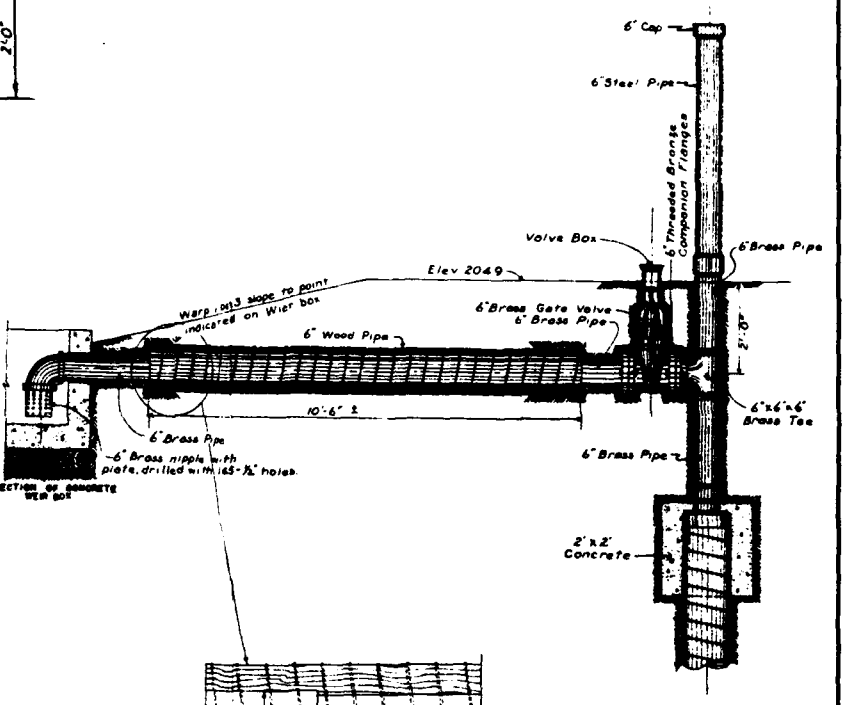
CONSTRUCTION FOUNDATION REPORT PLATE 61

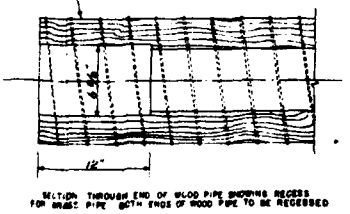


TYPICAL ELEVATION OF PERMANENT RELIEF WELLS

TYPICAL WELL INSTALLATION
TAPPING BOTH UPPER AND LOWER
GRAVEL BLANKETS







SECTION THROUGH END OF WOOD PIPE SHOWING RECESS FOR BRASS PIPE BOTH ENDS OF WOOD PIPE TO BE RECESSED

TYPICAL RELIEF WELL DISCHARGE FEATURES

Slots of Bail Plug Section may extend below gravel in order to fit all other screen sections within gravel lim.ts.

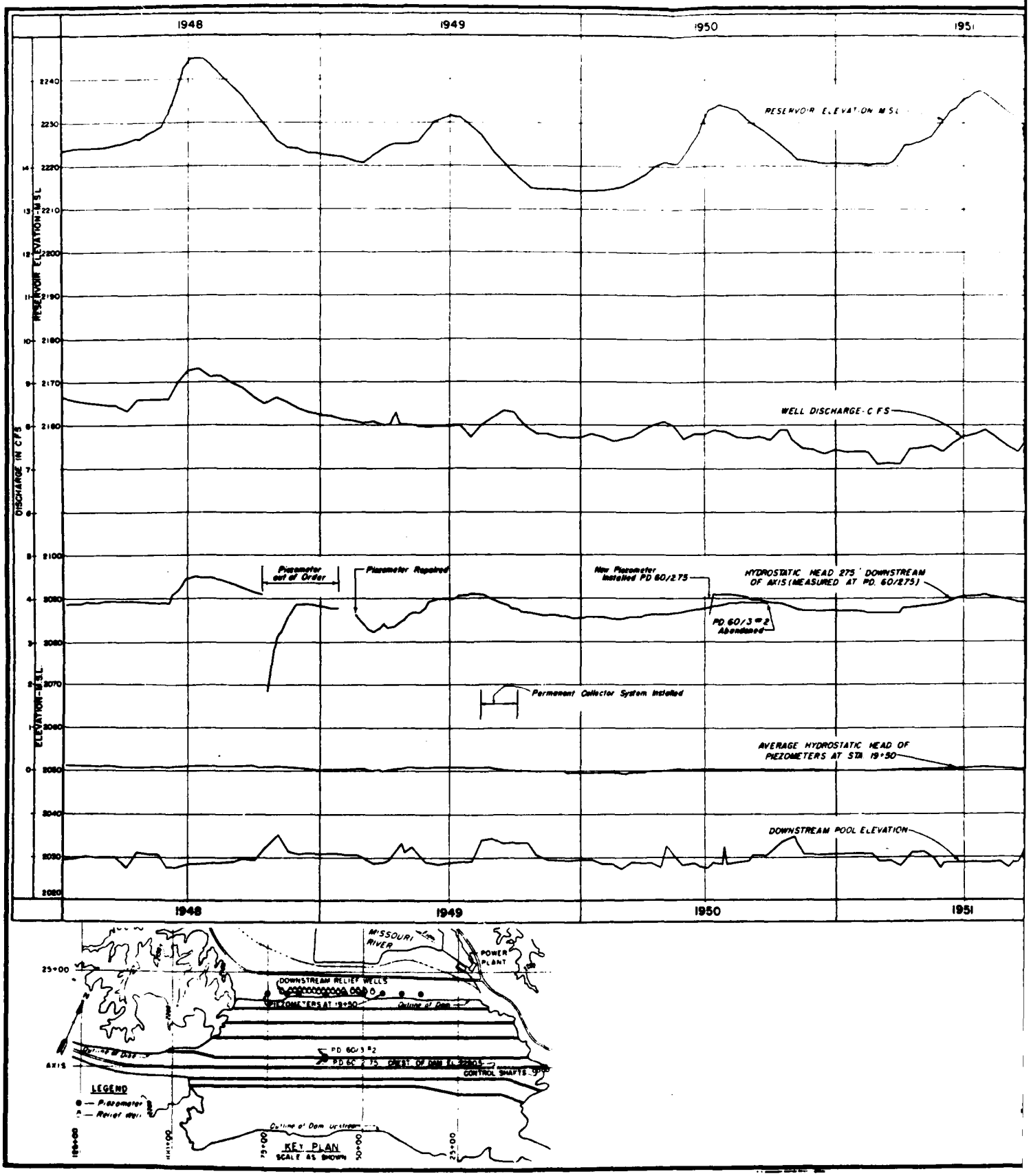
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

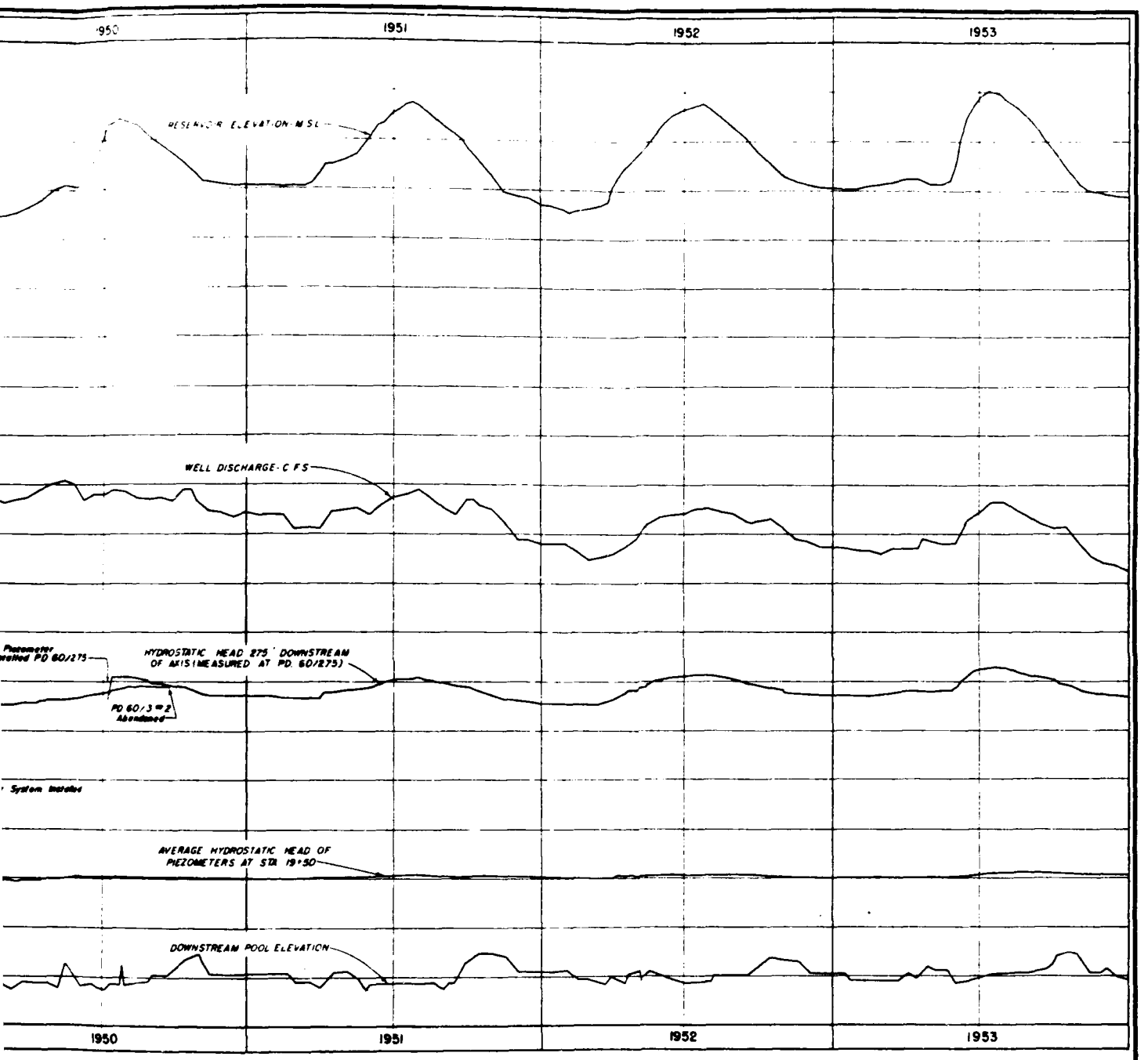
MISSOURI RIVER IMPROVEMENT
FORT PECK DAM
PERMANENT WELL RELIEF SYSTEM
TYPICAL WELL INSTALLATIONS
IN SHEETS NO SCALE SHEET NO.
U.S. ENGINEER OFFICE, FORT PECK, MONTANA MAY 23,1934
Drawn: GHH Traced: GHH Checked:
Approved:
6296.97-1-74

No.	Description	Date	Appr'd
	REVISIONS		

CONSTRUCTION FOUNDATION REPORT PLATE 64

2


1948
1949
1950
1951
RESERVOIR ELEVATION - M.S.L.
DISCHARGE IN C.F.S.
ELEVATION - M.S.L.
RESERVOIR ELEVATION M.S.L.
WELL DISCHARGE - C.F.S.
Piezometer out of Order
Piezometer Repaired
New Piezometer Installed PD 60/275
HYDROSTATIC HEAD 275' DOWNSTREAM OF AXIS (MEASURED AT PD. 60/275)
PD 60/3 & 2 Abandoned
Permanent Collector System Installed
AVERAGE HYDROSTATIC HEAD OF PIEZOMETERS AT STA. 19+50
DOWNSTREAM POOL ELEVATION
MISSOURI RIVER
POWER PLANT
DOWNSTREAM RELIEF WELLS
PIEZOMETERS AT 19+50
Outline of Dam
PD 60/3 & 2
PD 60/275 CREST OF DAM EL. 2230.5
CONTROL SHAFTS
AXIS
LEGEND
Piezometer
Relief Well
Outline of Dam Upstream
KEY PLAN
SCALE AS SHOWN



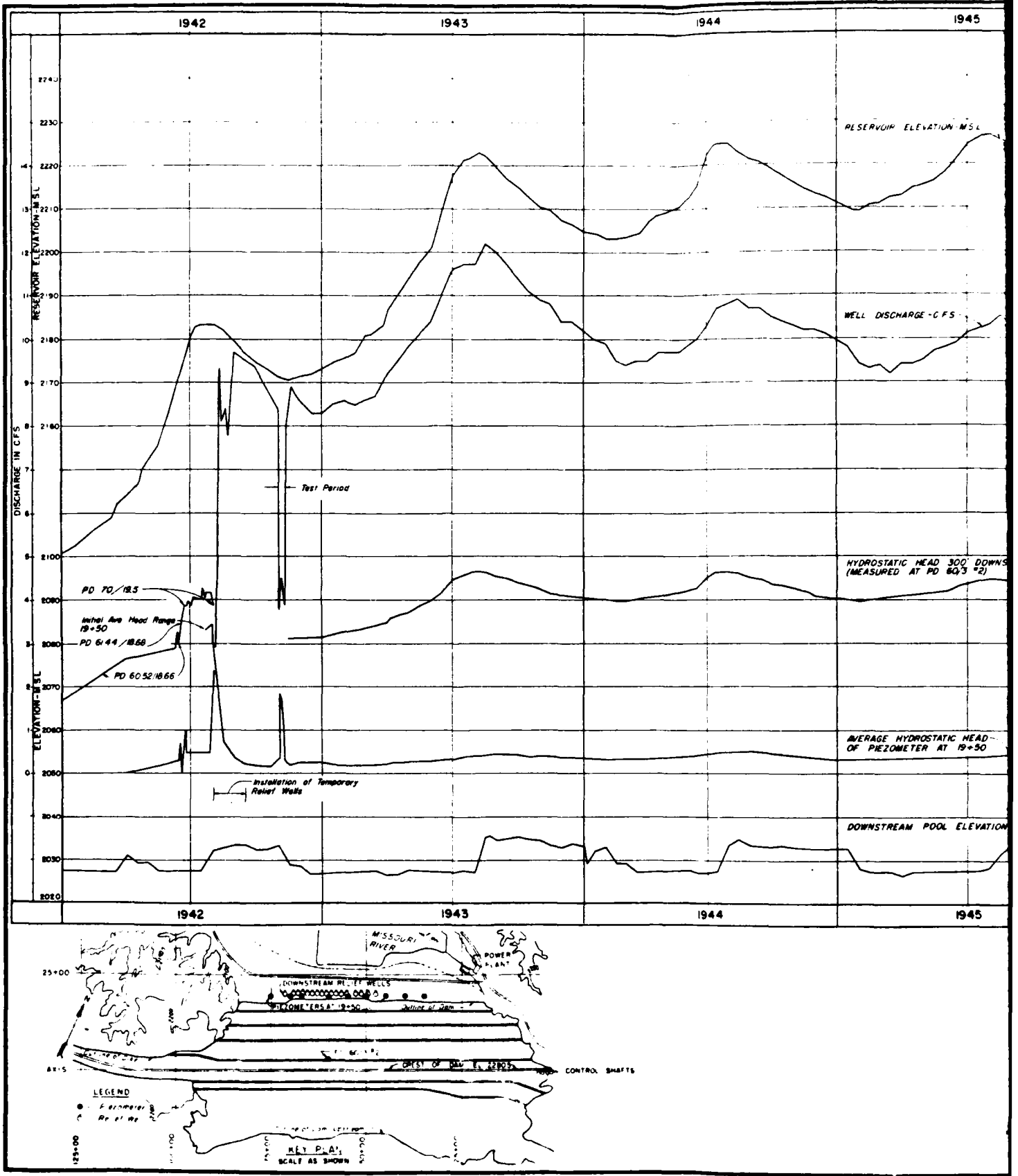
CORPS OF ENGINEERS U S ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT
RIVERDALE, N.D.

MISSOURI RIVER
FORT PECK DAM
SUMMARY OF HYDRAULIC DATA
DOWNSTREAM
PRESSURE RELIEF WELL SYSTEM
1948 - 1953

JUNE 1967

SCALE AS SHOWN

6296 97-1-102


1942
1943
1944
1945
RESERVOIR ELEVATION M.S.L.
WELL DISCHARGE - C.F.S.
Test Period
HYDROSTATIC HEAD 300' DOWNS
(MEASURED AT PD 60/3 #2)
PD 70/12.5
Initial Ave Head Range
19+50
PD 61/44/18.68
PD 60/52/18.66
AVERAGE HYDROSTATIC HEAD
OF PIEZOMETER AT 19+50
Installation of Temporary
Relief Wells
DOWNSTREAM POOL ELEVATION
DISCHARGE IN C.F.S.
RESERVOIR ELEVATION M.S.L.
ELEVATION-M.S.L.
MISSOURI RIVER
POWER PLANT
DOWNSTREAM RELIEF WELLS
PIEZOMETERS AT 19+50
CREST OF DAM EL. 2205
CONTROL SHAFTS
LEGEND
KEY PLAN
SCALE AS SHOWN



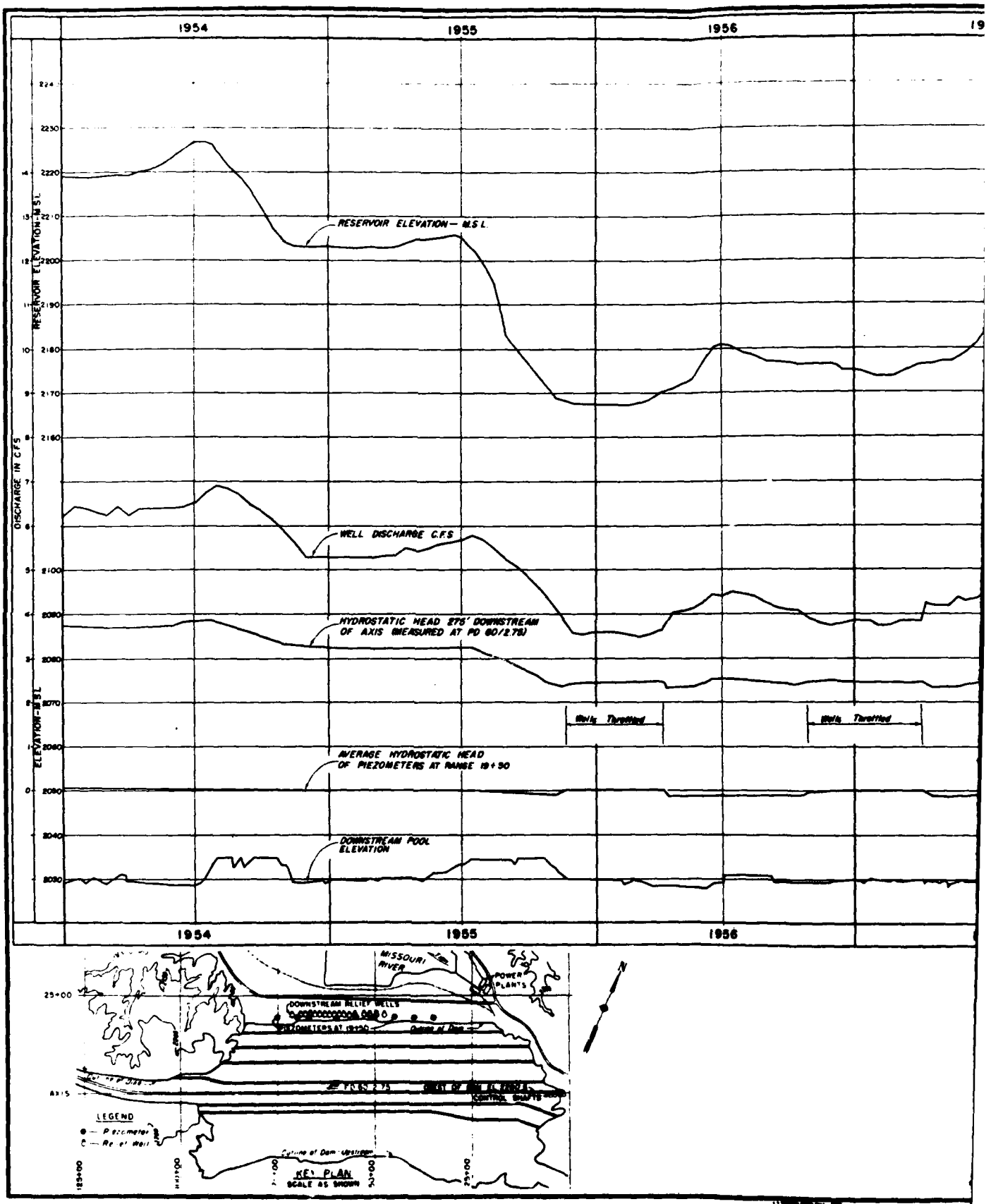
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
GARRISON DISTRICT

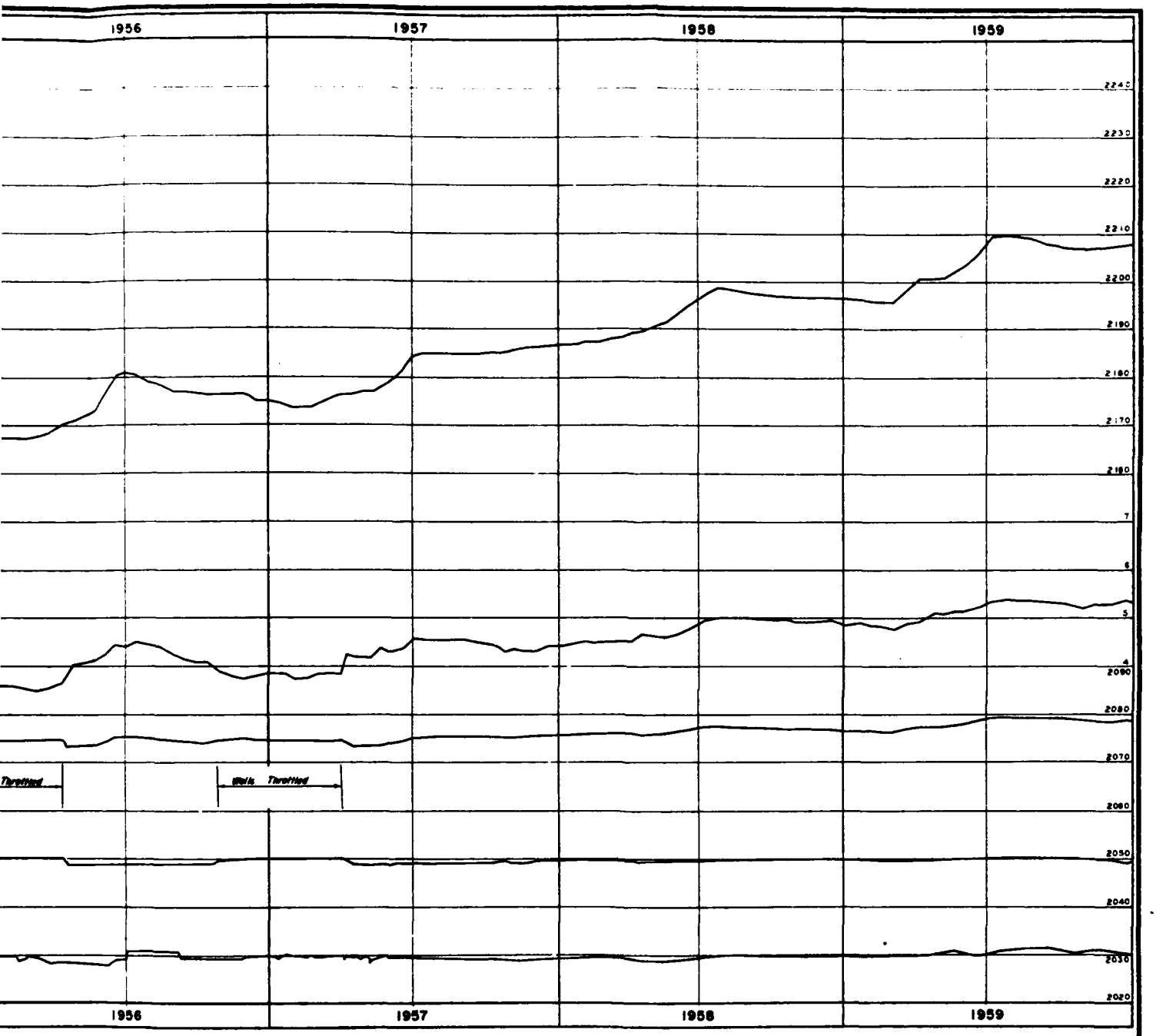
MISSOURI RIVER
FORT PECK DAM
SUMMARY OF HYDRAULIC DATA
DOWNSTREAM
PRESSURE RELIEF WELL SYSTEM
1942-1947

JUNE 1957

AS SHOWN

6296 97-1-101


1954
1955
1956
RESERVOIR ELEVATION — M.S.L.
WELL DISCHARGE C.F.S.
HYDROSTATIC HEAD 275' DOWNSTREAM OF AXIS (MEASURED AT PD 60/2.75)
Wells Throttled
Wells Throttled
AVERAGE HYDROSTATIC HEAD OF PIEZOMETERS AT RANGE 19+90
DOWNSTREAM POOL ELEVATION
RESERVOIR ELEVATION - M.S.L.
DISCHARGE IN C.F.S
ELEVATION - M.S.L.
MISSOURI RIVER
POWER PLANTS
DOWNSTREAM RELIEF WELLS
PIEZOMETERS AT 19+90
AXIS
LEGEND
Piezometer
Relief Well
KEY PLAN
SCALE AS SHOWN
N



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

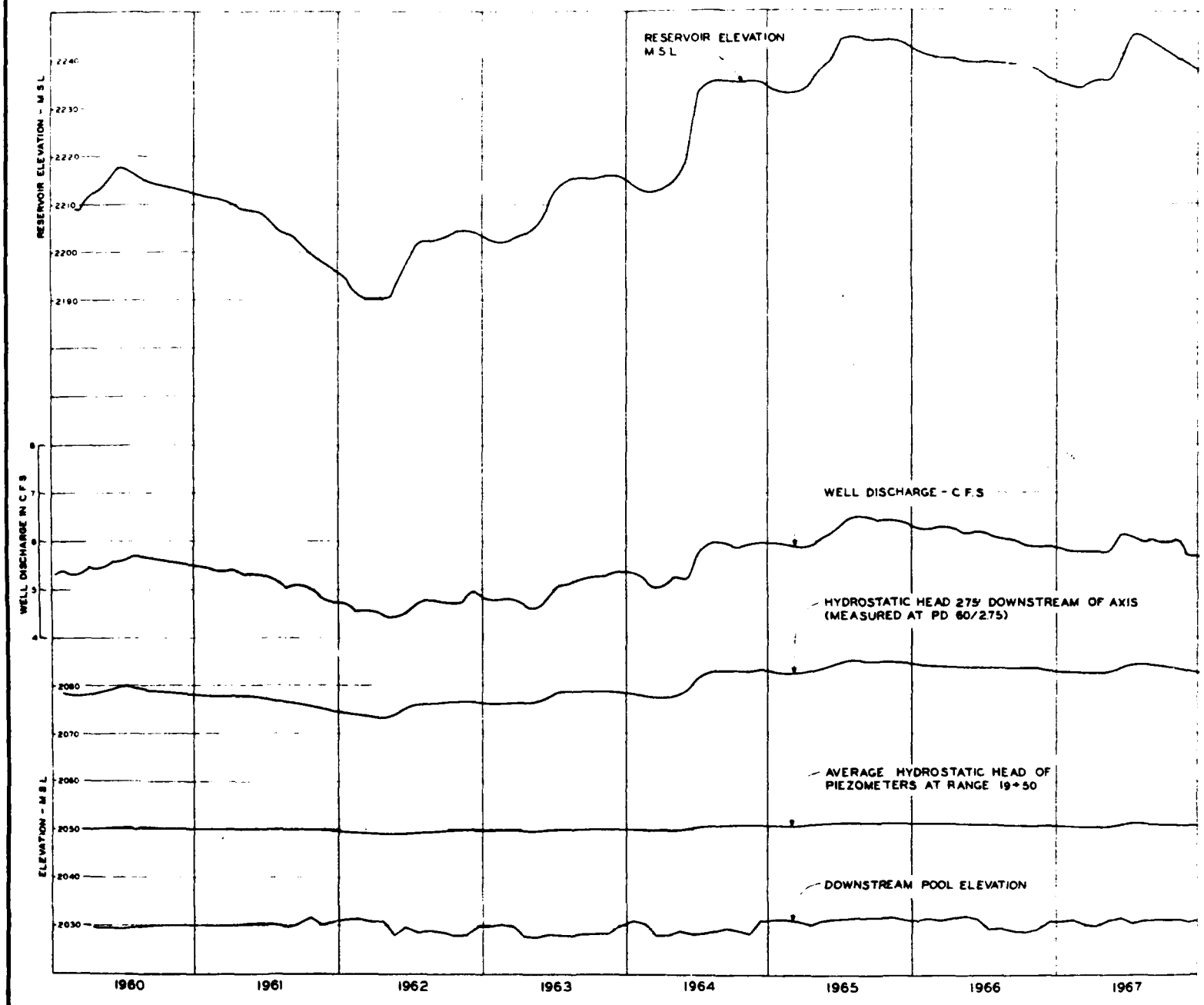
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
OMAHA DISTRICT
OMAHA, NEBR.

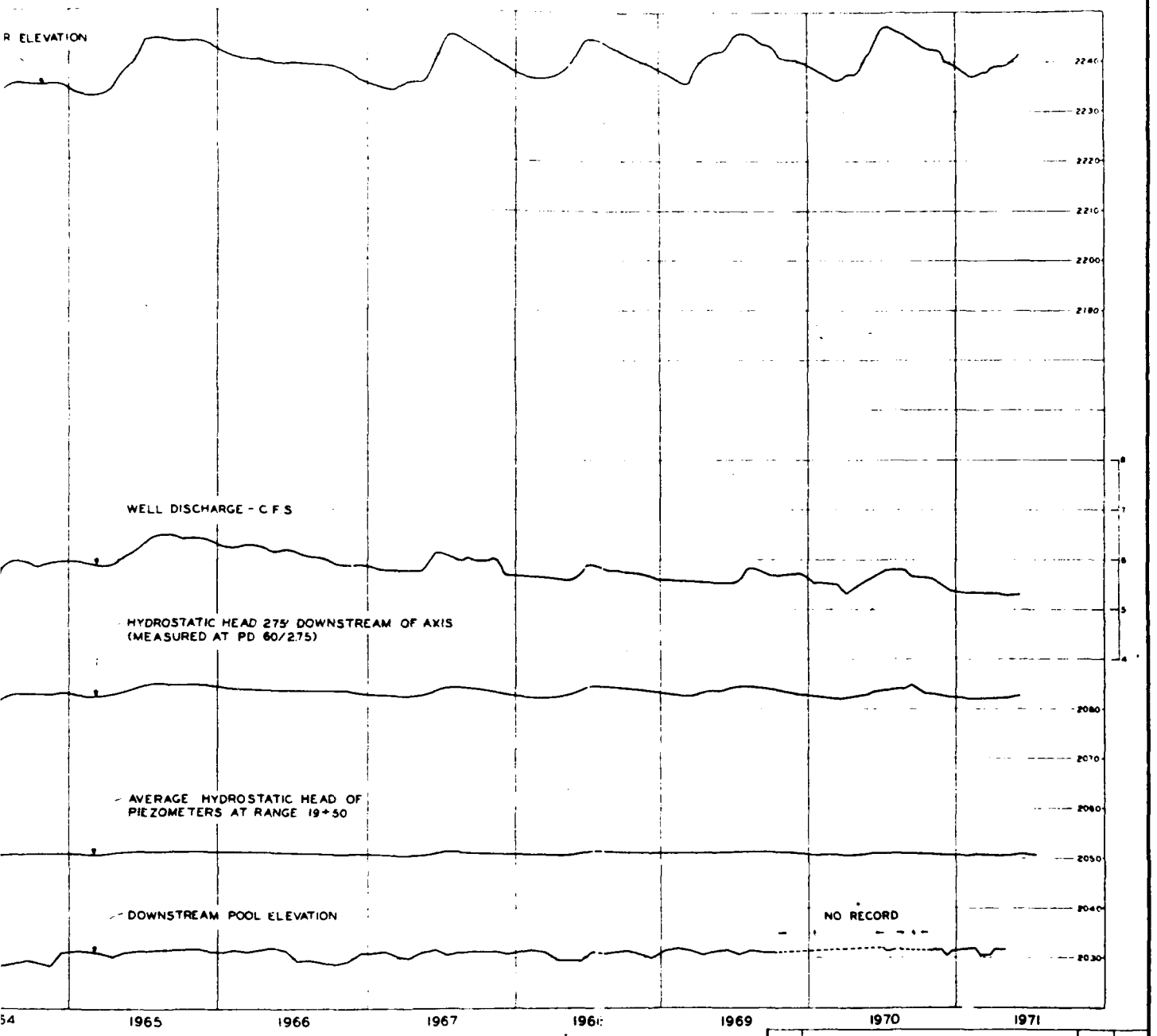
MISSOURI RIVER
FORT PECK DAM
SUMMARY OF HYDRAULIC DATA
DOWNSTREAM
PRESSURE RELIEF WELL SYSTEM
1954 - 1959

DRAWN: HAZ
DATE: JUNE 1957
SCALE: AS SHOWN
DRAWING NO. 6296 97-1-103

CONSTRUCTION FOUNDATION REPORT PLATE 67

2


RESERVOIR ELEVATION
M S L
RESERVOIR ELEVATION - M S L
2240
2230
2220
2210
2200
2190
WELL DISCHARGE - C F S
WELL DISCHARGE IN C F S
HYDROSTATIC HEAD 275' DOWNSTREAM OF AXIS
(MEASURED AT PD 60/275)
2080
2070
2060
AVERAGE HYDROSTATIC HEAD OF
PIEZOMETERS AT RANGE 19+50
2050
2040
DOWNSTREAM POOL ELEVATION
ELEVATION - M S L
2030
1960
1961
1962
1963
1964
1965
1966
1967



U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

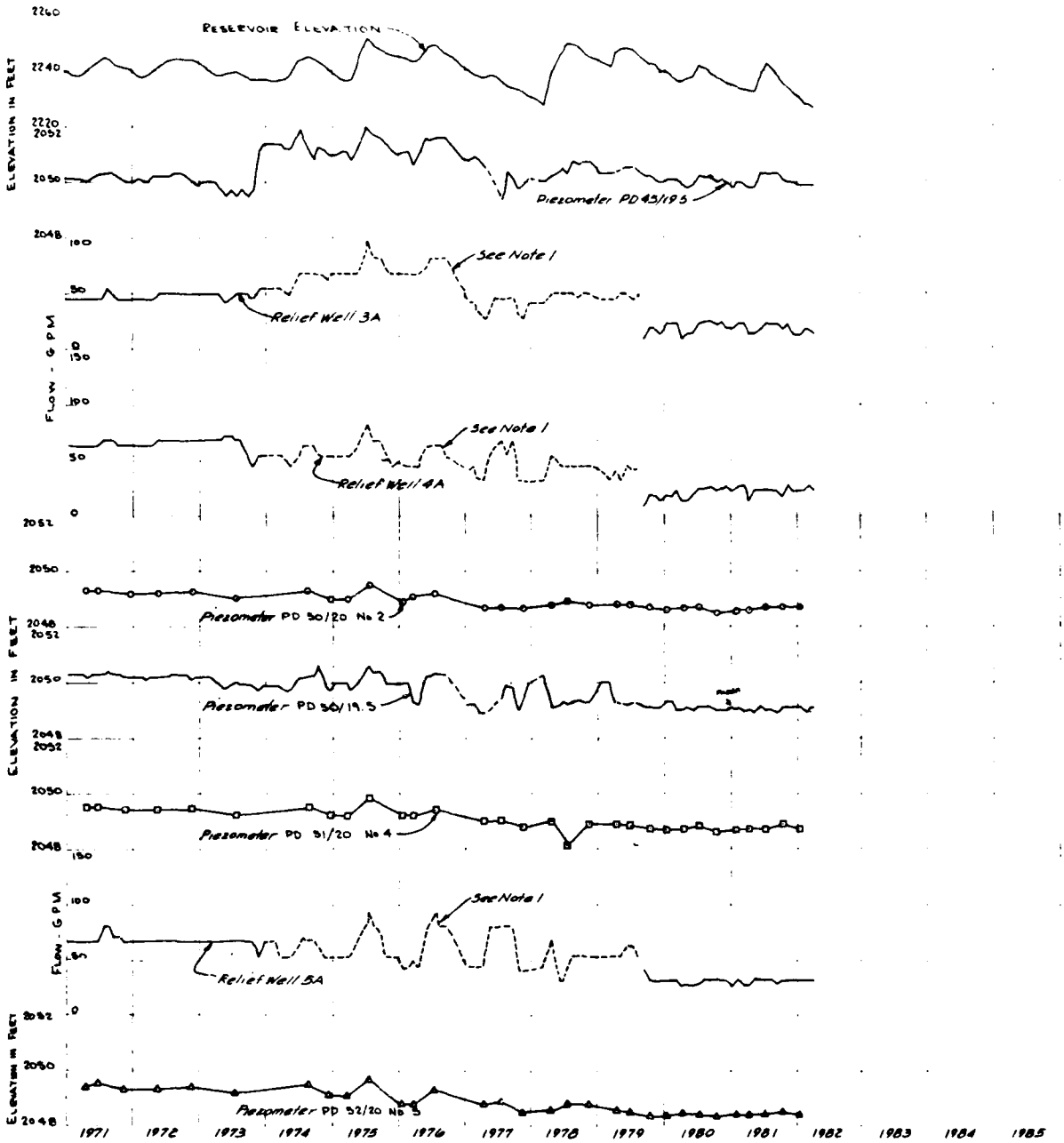
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SUMMARY OF HYDRAULIC DATA
DOWNSTREAM
PRESSURE RELIEF WELL SYSTEM
1960-1971

SAFETY PAYS

THIS PLAN AGEC (PANIED CONTRACT No
MODIFICATION No

CONSTRUCTION FOUNDATION REPORT PLATE 68

2



Notes

1 Relief Well Weirs not recalibrated between October 1973 and August 1979 The flow readings during this period are therefore not considered accurate The Weir was recalibrated in August 1979

1982 1983 1984 1985

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	CHKD	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982

STA. 45+00 - 52+00

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
DATE
SUPERVISION
APPROVED
DATE
CHIEF, ENGINEERING DIVISION
SCALE AS SHOWN
DRWG. NO.
CHIEF
CHIEF, ENGINEERING DIVISION
CHIEF, ENGINEERING DIVISION
SHEET

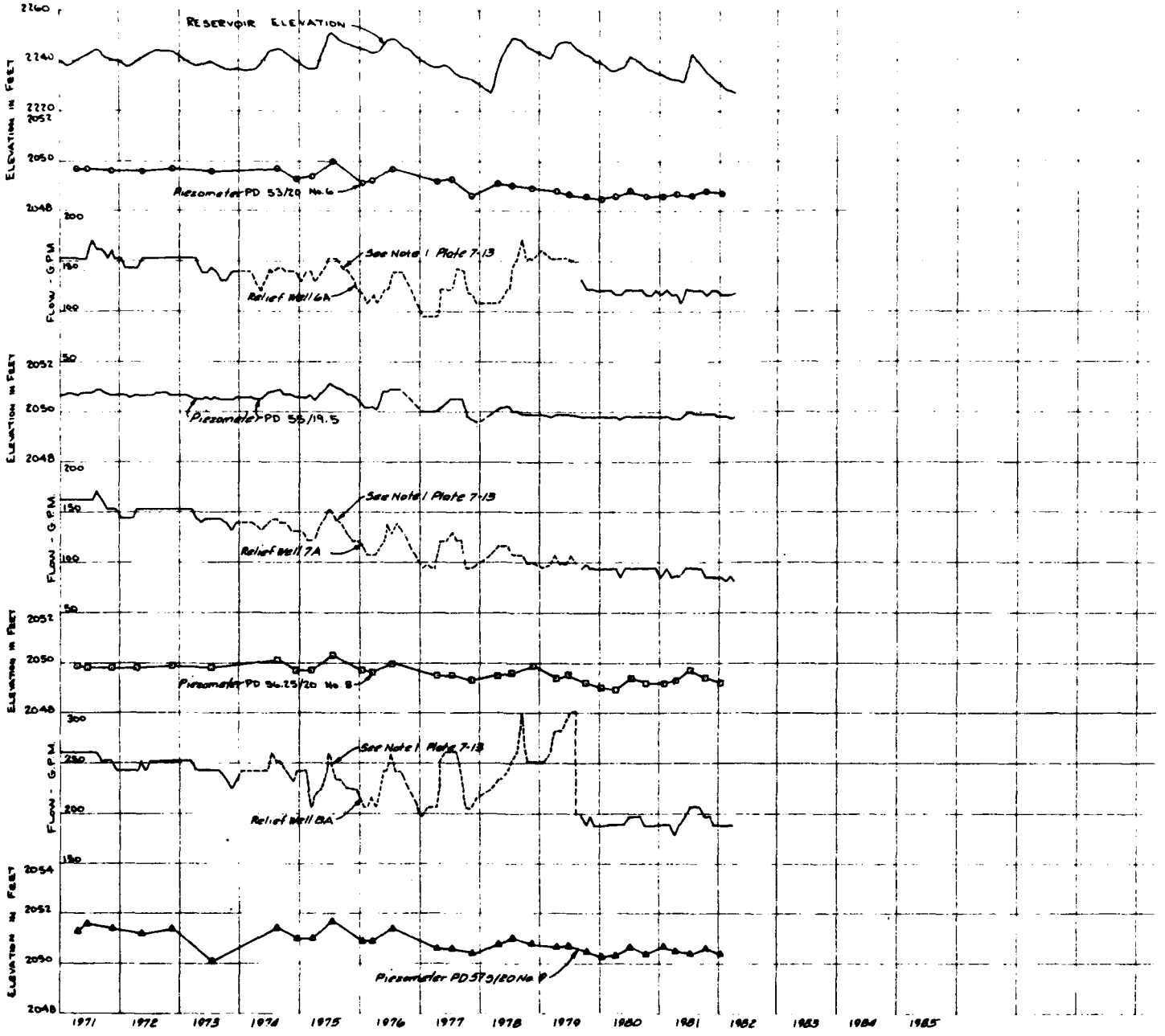
SAFETY PAYS

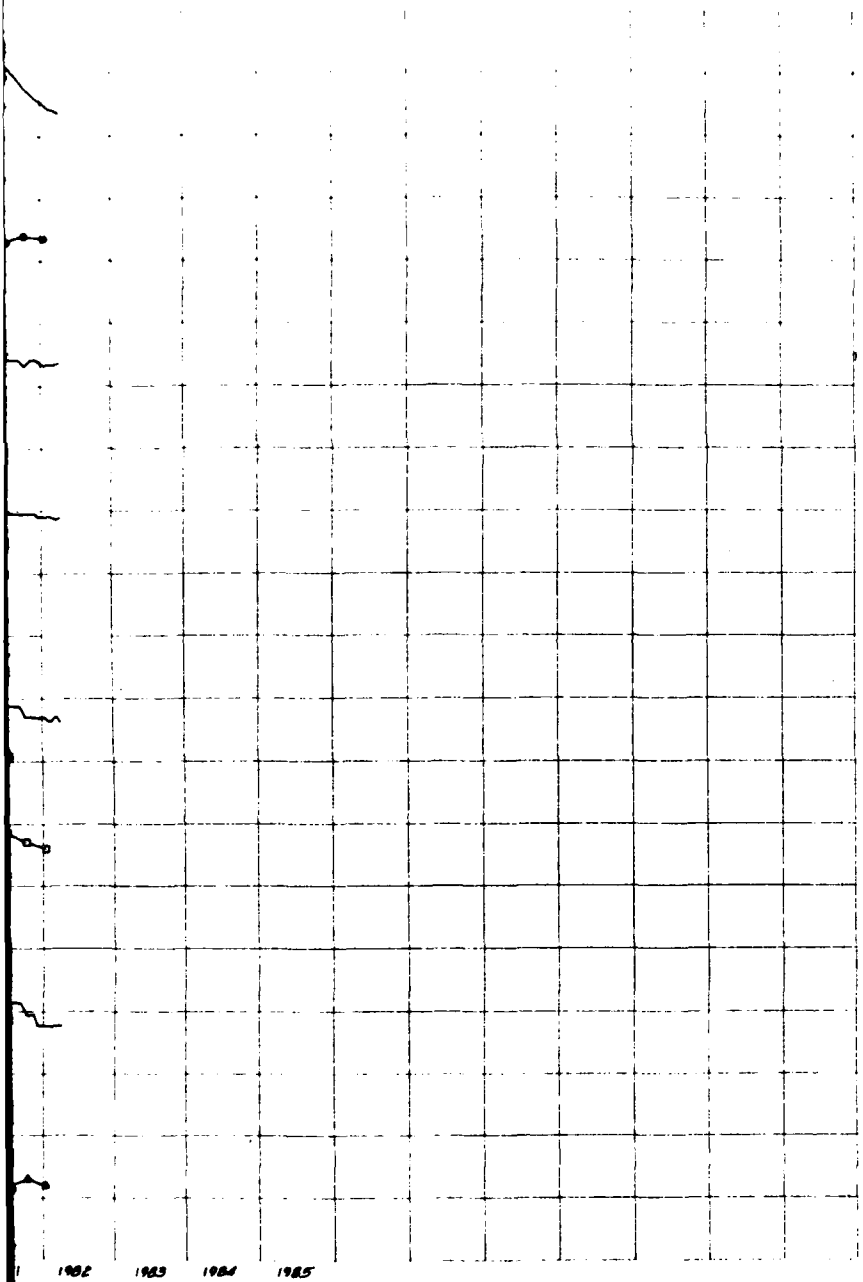
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

PLATE 69

2


RESERVOIR ELEVATION
ELEVATION IN FEET
Piezometer PD 53/20 No. 6
FLOW - G.P.M.
See Note 1 Plate 7-13
Relief Well 6A
Piezometer PD 56/19.5
Relief Well 7A
Piezometer PD 56.25/20 No. 8
Relief Well 8A
Piezometer PD 57.5/20 No. 9
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	DRAWN	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY:
TRACED BY:
CHECKED BY:
SCALE: AS SHOWN
QUANT.:

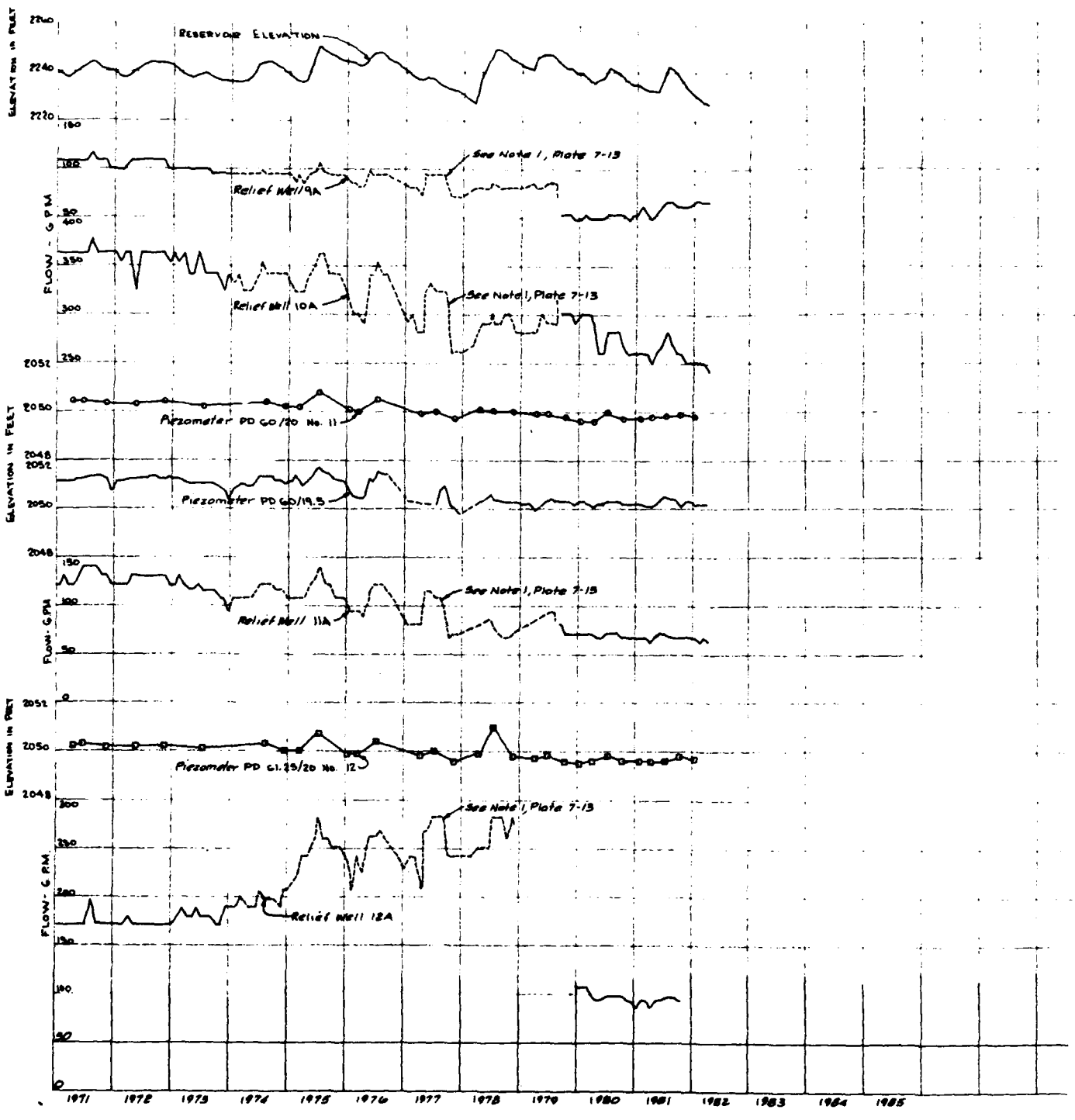
MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982
(STA. 52+00 - 98+00)

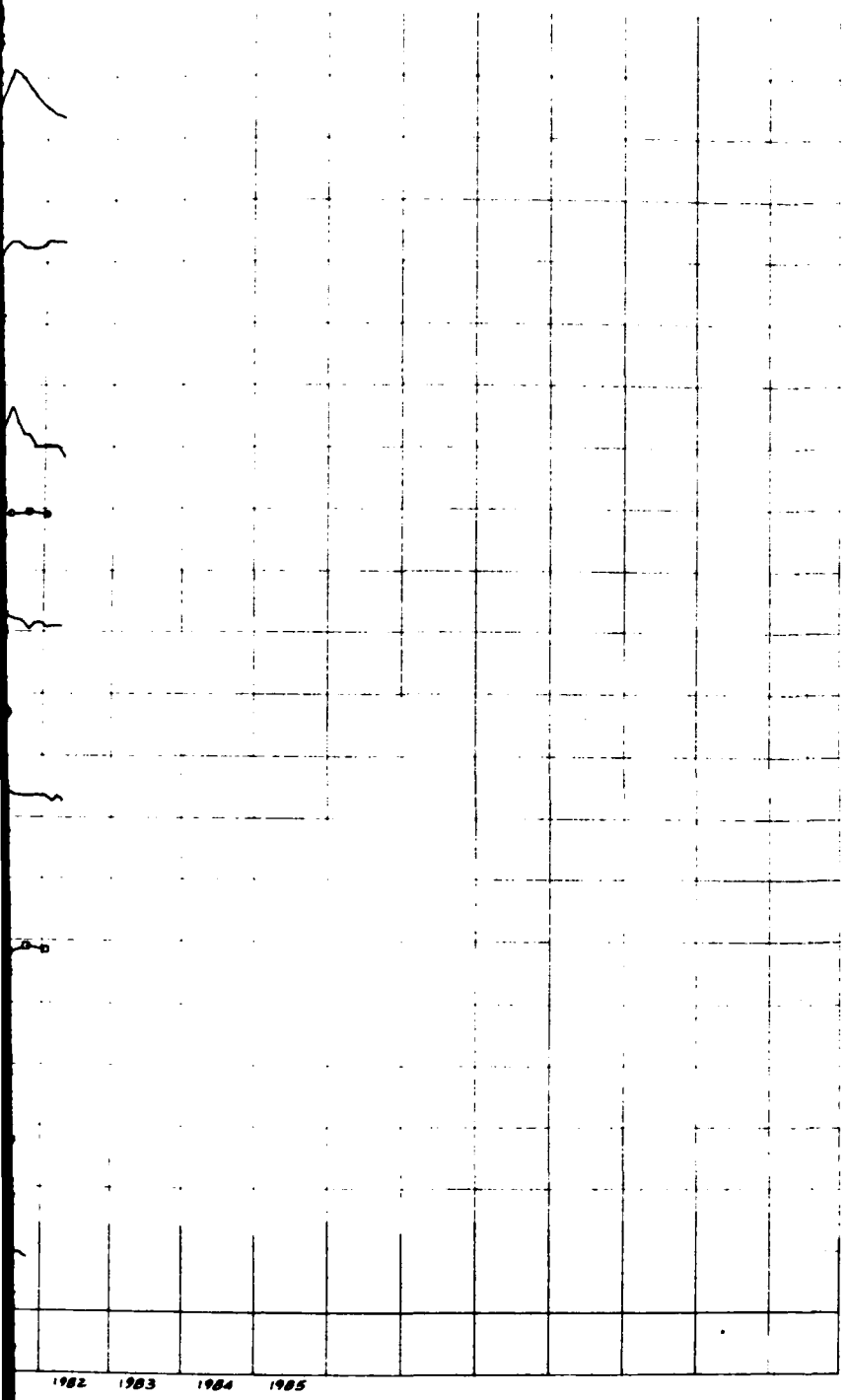
APPROVED: _____ DATE: _____
CHIEF, ENGINEERING DIVISION

APPROVED: _____ DATE: _____
COL, C.E.
DISTRICT ENGINEER

SAFETY DAYS

THIS PLAN ASSEMBLED UNDER CONTRACT NO.
MODIFICATION NO.
U.S. GOVT. PRINTING OFFICE


ELEVATION IN FEET
2260
2240
2220
RESERVOIR ELEVATION
180
See Note 1, Plate 7-13
Relief Well 9A
FLOW - G.P.M.
400
350
300
Relief Well 10A
See Note 1, Plate 7-13
2052
250
2050
Piezometer PD GO/20 No. 11
2048
2052
Piezometer PD GO/19.5
2050
2048
150
100
50
Relief Well 11A
See Note 1, Plate 7-13
FLOW - G.P.M.
ELEVATION IN FEET
2052
0
2050
Piezometer PD GI.25/20 No. 12
2048
300
250
200
150
100
50
0
See Note 1, Plate 7-13
Relief Well 12A
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	DRAWN	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
DATE
SUPERVISOR

MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982

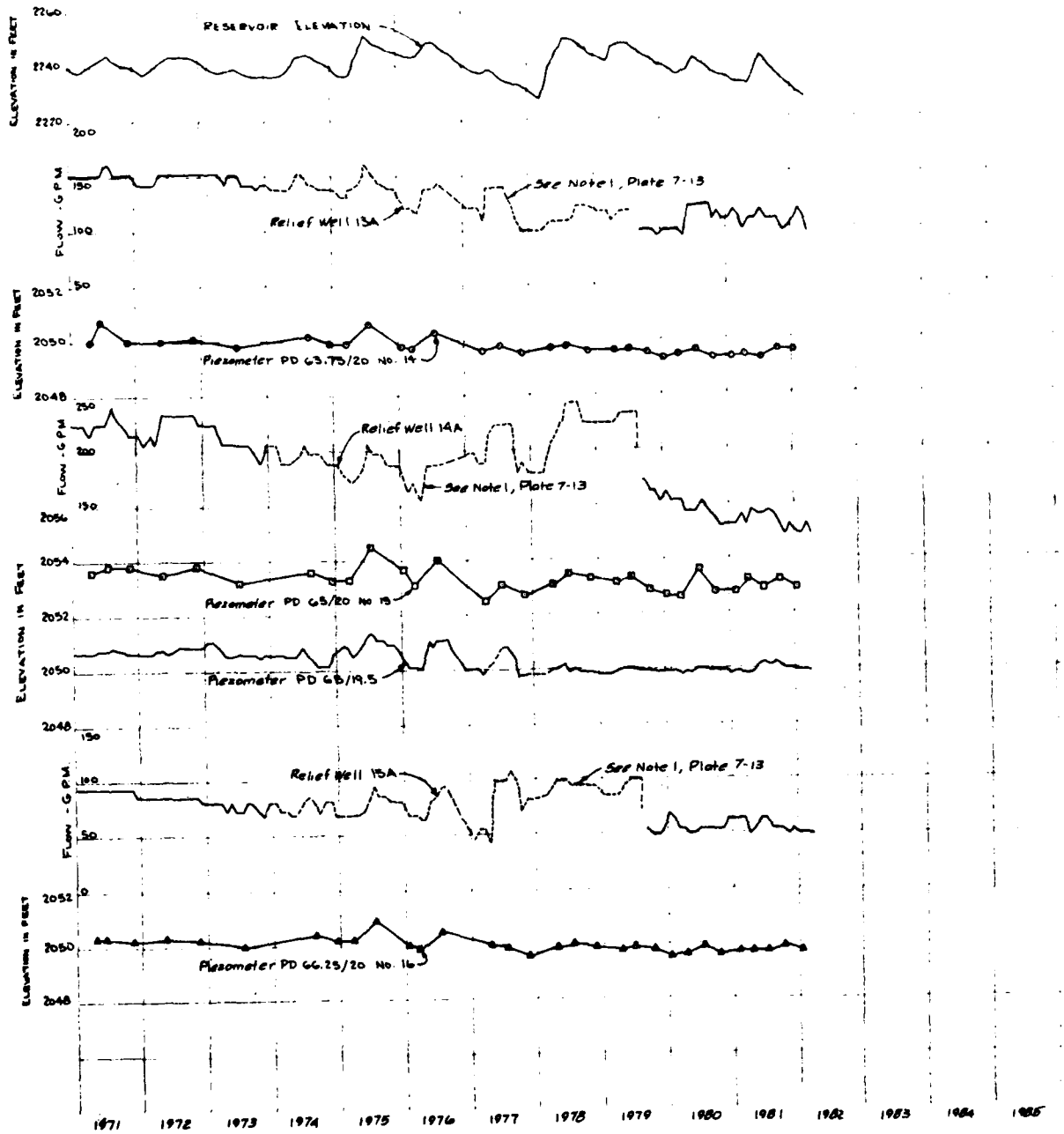
ISTA. 57+00 - 62+00

APPROVED
DATE
RECOMMENDED
CHIEF, ENGINEERING DIVISION
DATE
APPROVED
CHIEF, CONSTRUCTION DIVISION
DATE

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 71

2


ELEVATION IN FEET
2260
2240
2220
RESERVOIR ELEVATION
200
FLOW - G P M
150
100
50
Relief Well 13A
See Note 1, Plate 7-13
ELEVATION IN FEET
2052
2050
Piezometer PD 63.75/20 No. 14
2048
250
200
150
Relief Well 14A
See Note 1, Plate 7-13
2056
2054
Piezometer PD 65/20 No 15
2052
2050
Piezometer PD 66/19.5
2048
150
100
50
0
Relief Well 15A
See Note 1, Plate 7-13
2052
2050
2048
Piezometer PD 66.25/20 No. 16
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985







7-13


1981 1982 1983 1984 1985

THIS DRAWING WAS REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
CHIEF, DIVISION:
SUPERVISED:
CHIEF, BRANCH:

MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982

(STA. 62+00 - 66+00)

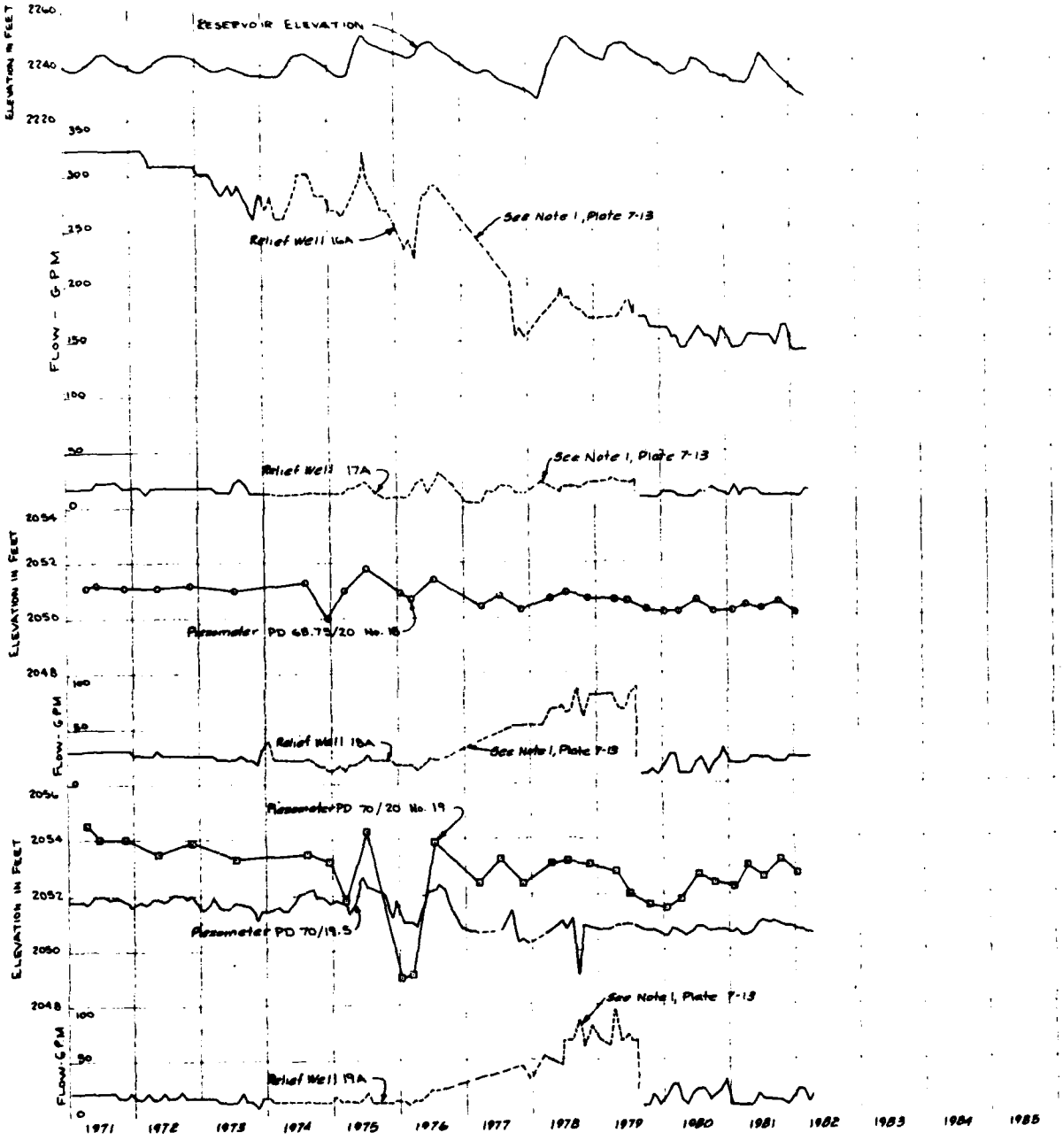
APPROVED: DATE:
CHIEF, ENGINEERING DIVISION
SCALE AS SHOWN DRG. NO.
APPROVED: SUBMITTED:
CHIEF, O. E. DIVISION DATE:

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 72

2


ELEVATION IN FEET
2260
2240
2220
RESERVOIR ELEVATION
FLOW - GPM
350
300
250
200
150
100
50
0
Relief Well 16A
See Note 1, Plate 7-13
Relief Well 17A
See Note 1, Plate 7-13
ELEVATION IN FEET
2054
2052
2050
Piezometer PD 68.75/20 No. 18
2048
FLOW - GPM
100
50
0
Relief Well 18A
See Note 1, Plate 7-13
ELEVATION IN FEET
2056
2054
2052
2050
2048
Piezometer PD 70/20 No. 19
Piezometer PD 70/19.5
FLOW - GPM
100
50
0
See Note 1, Plate 7-13
Relief Well 19A
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985

1982 1983 1984 1985

THIS DRAWING HAS BEEN REDUCED TO THREE-E EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	CHKD	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
CHIEF
SUPERVISOR
DATE

MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982
(STA. 66+00 - 72+00)

APPROVED
CHIEF, ENGINEERING DIVISION
DATE

SCALE AS SHOWN
SPEC. NO.

APPROVED
CHIEF, CONSTRUCTION BRANCH
DATE

DRAWING NUMBER

THIS PLAN ACCOMPANIES CONTRACT NO.
SPECIFICATION NO.

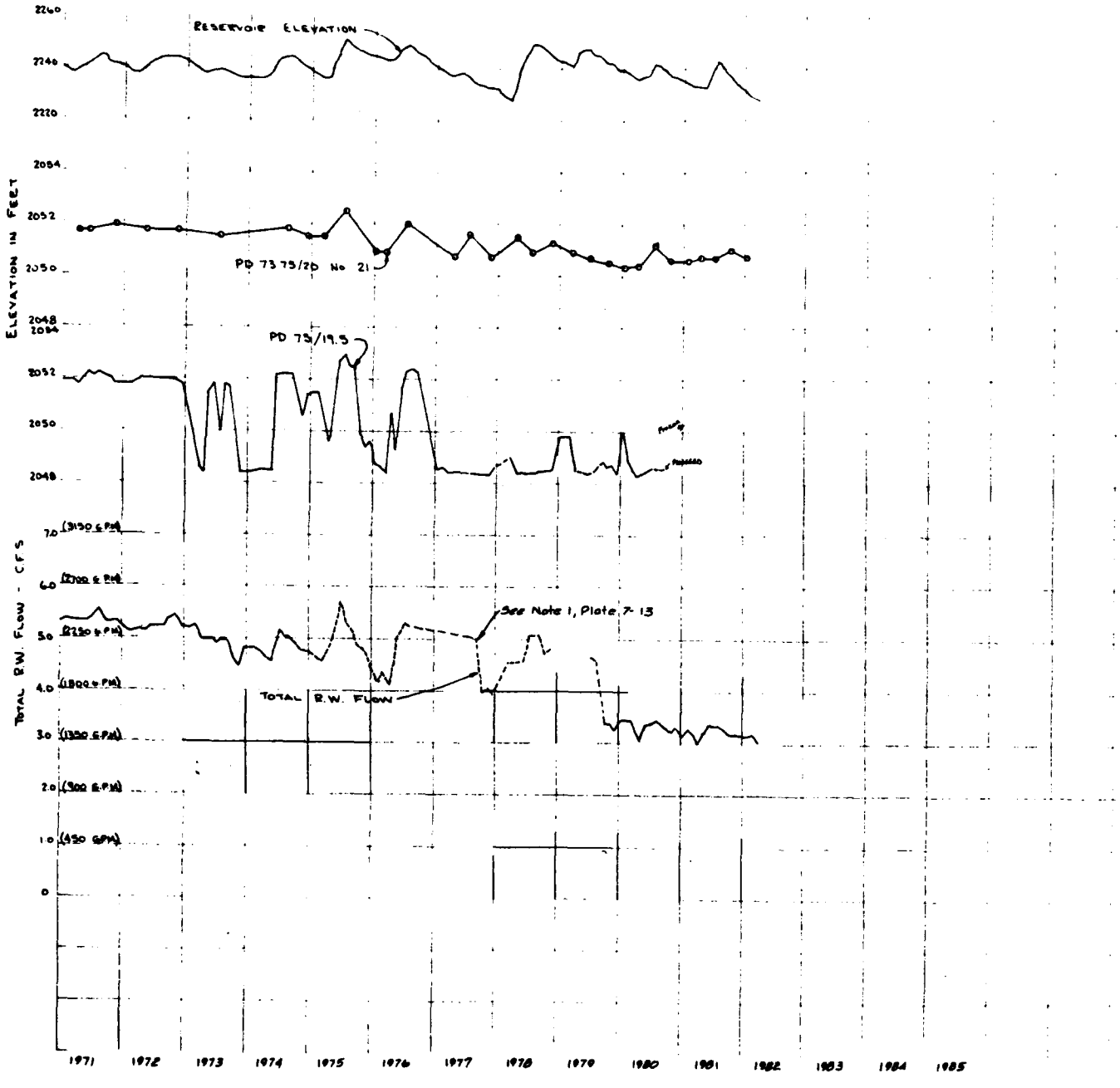
U. S. ARMY ENGINEER DISTRICT

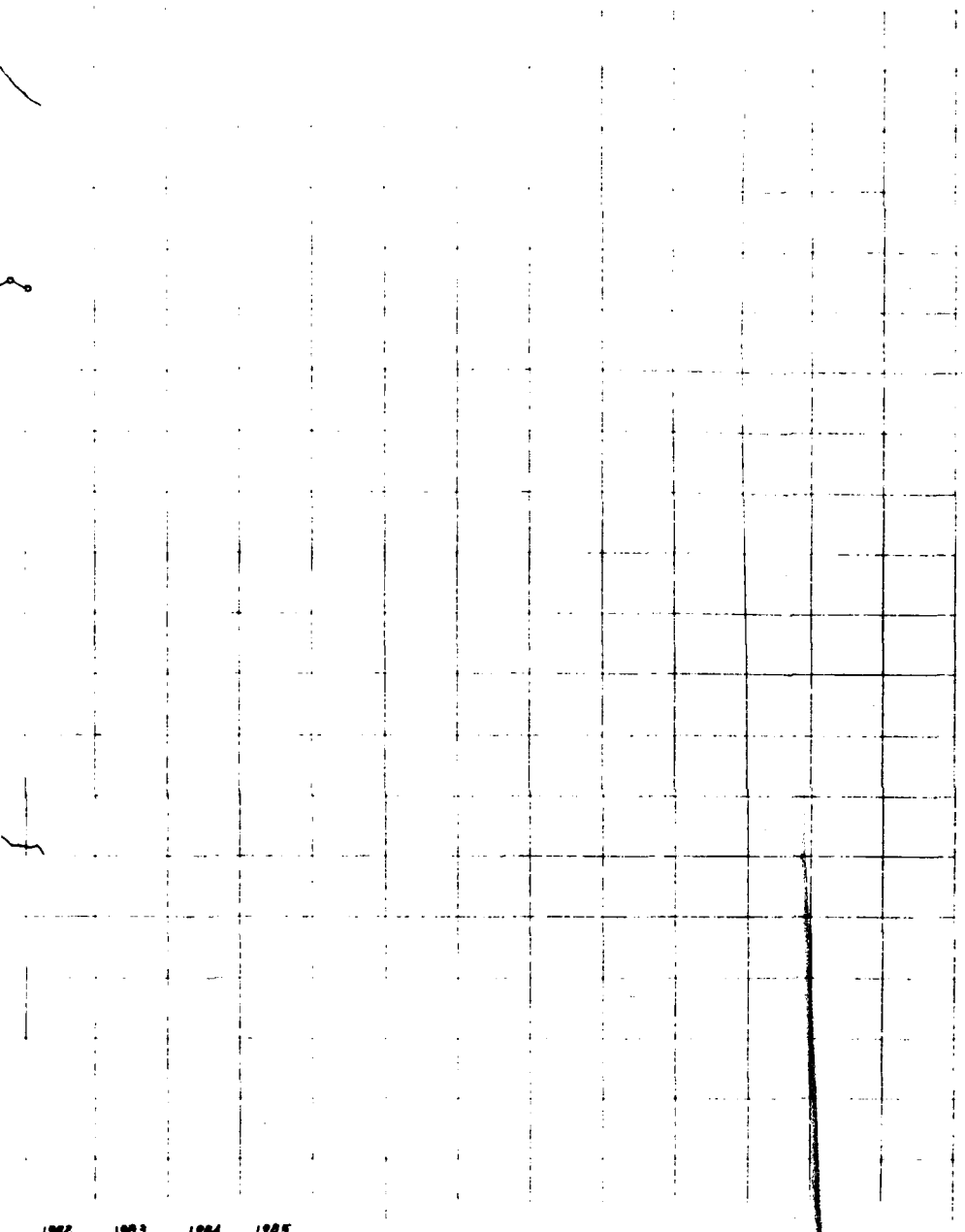
SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT

PLATE 73

2


RESERVOIR ELEVATION
2240
2220
2084
2052
2050
2048
ELEVATION IN FEET
PD 7375/20 No 21
2084
2052
2050
2048
PD 75/19.5
7.0 (3150 G.P.M.)
6.0 (2700 G.P.M.)
5.0 (2250 G.P.M.)
4.0 (1800 G.P.M.)
3.0 (1350 G.P.M.)
2.0 (900 G.P.M.)
1.0 (450 GPM)
0
TOTAL R.W. FLOW - C.F.S.
See Note 1, Plate 7-13
TOTAL R.W. FLOW
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY:
CHECKED BY:
QUANTITIES BY:
TRACED:
CHECKED:

MISSOURI RIVER
FORT PECK LAKE MONTANA
SUMMARY OF HYDRAULIC DATA FOR
DOWNSTREAM PRESSURE RELIEF WELL SYSTEM, 1971 - 1982
STA. 72+00 - 74+00

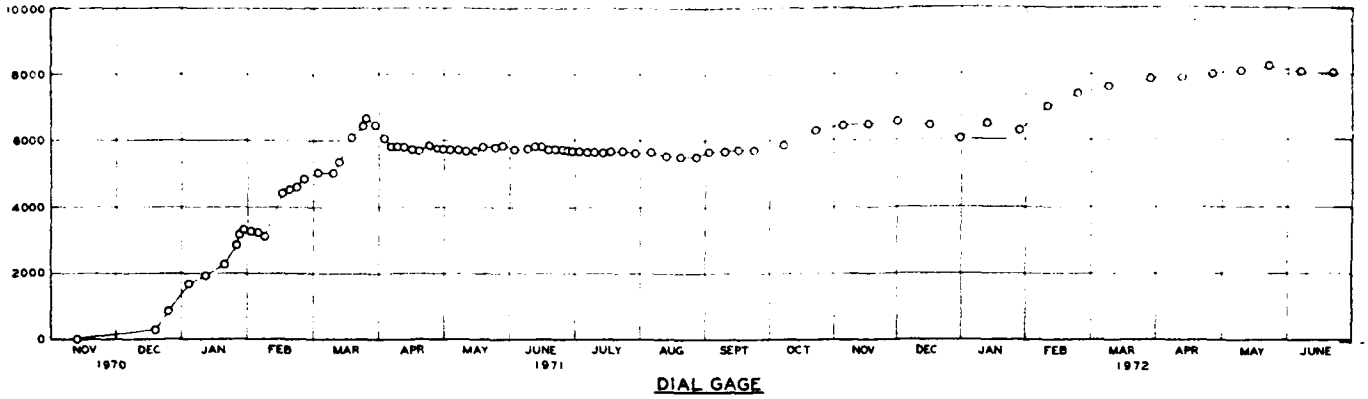
RECOMMENDED: DATE:
CHIEF, ENGINEERING BRANCH
APPROVED: SCALE AS SHOWN DWG. NO.
CHIEF, ENGINEERING DIVISION
DATE:

SAFETY DAYS

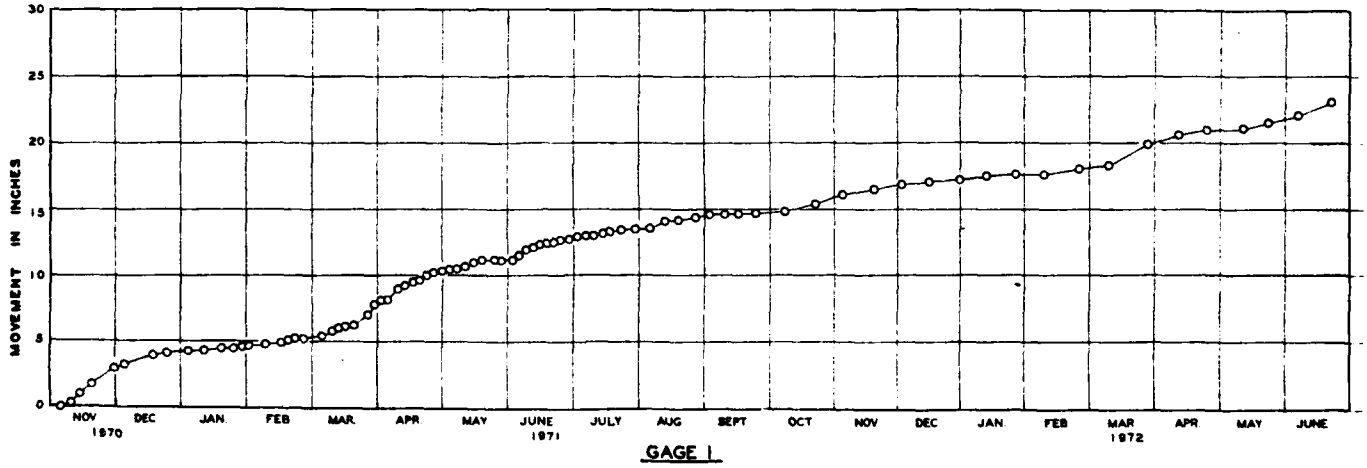
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.
U. S. A. E. W. D. OMAHA

CONSTRUCTION FOUNDATION REPORT PLATE 74

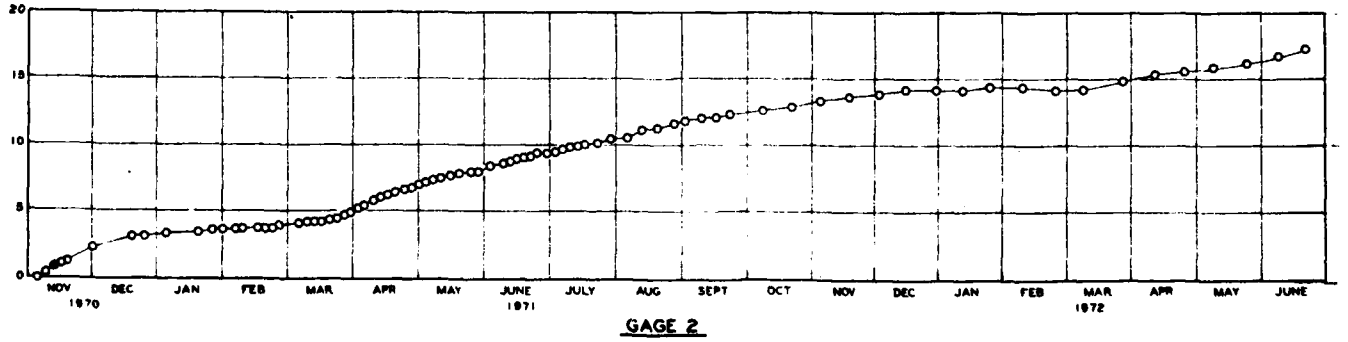
2



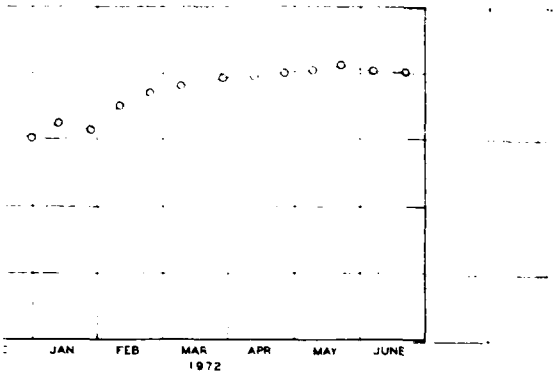
DIAL GAGE

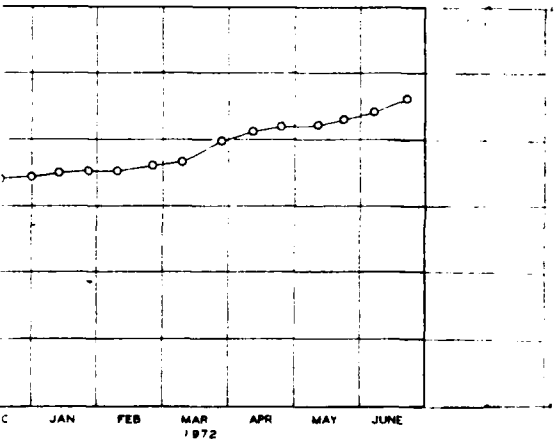


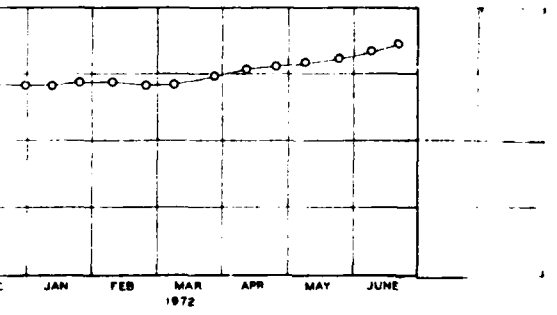
GAGE 1



GAGE 2







THIS DRAWING HAS BEEN REDUCED TO THREE EIGHTHS THE ORIGINAL SCALE

DATE	DESCRIPTION	CHKD	APPD'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

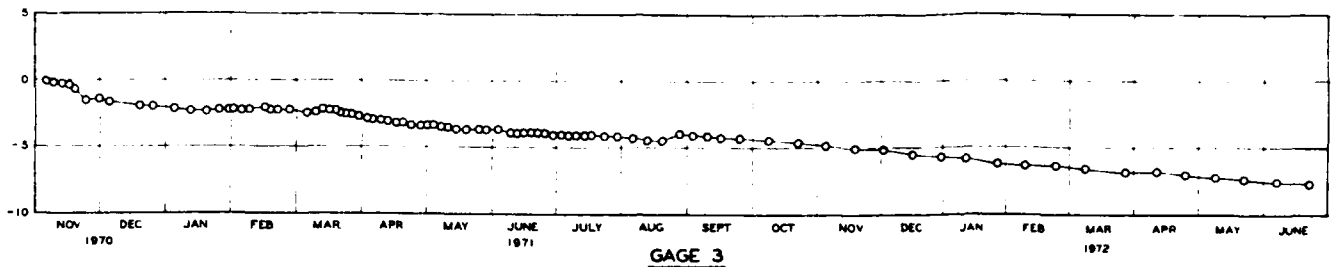
MISSOURI RIVER
FORT PECK LAKE, MONTANA
POWERHOUSE SLOPE EXCAVATION
SLIDE MOVEMENT OBSERVATIONS
DIAL & WIRE GAGES - SHEET 1

DESIGNED BY: R J M
DRAWN BY: M E B
CHECKED BY: C V J
SUBMITTED BY: L. E. Graham
RECOMMENDED: J. F. Ellis
APPROVED: [illegible]
DATE: JULY 1972
APPROVED: Kenneth D. Walton
SCALE AS SHOWN
DWG. NO.

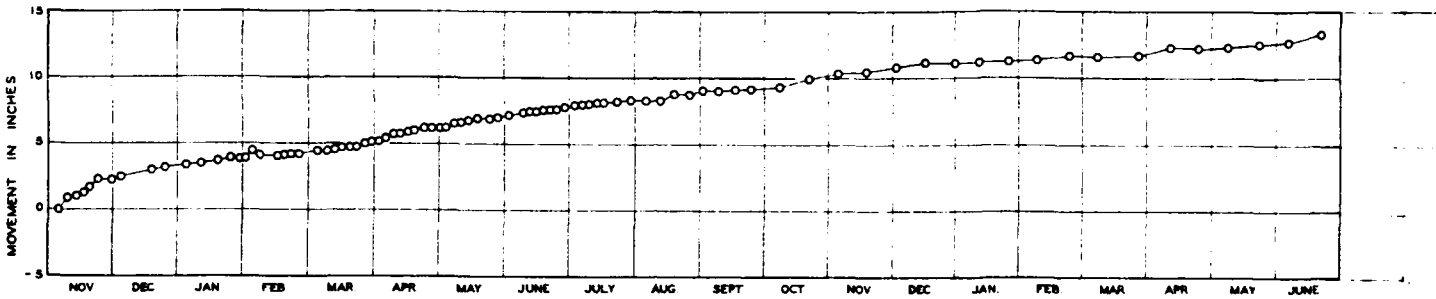
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
SPECIFICATION NO.

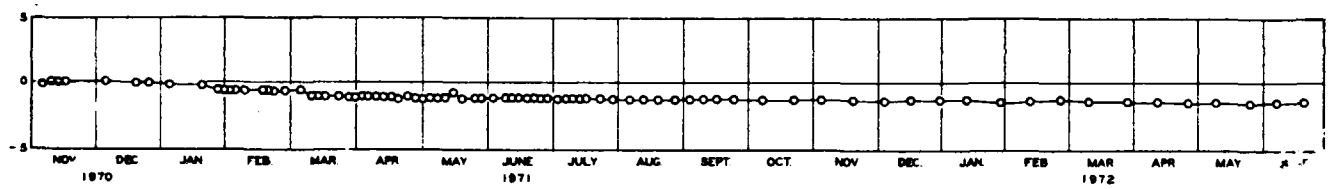
CONSTRUCTION FOUNDATION REPORT PLATE 74A



GAGE 3



GAGE 4



GAGE 5

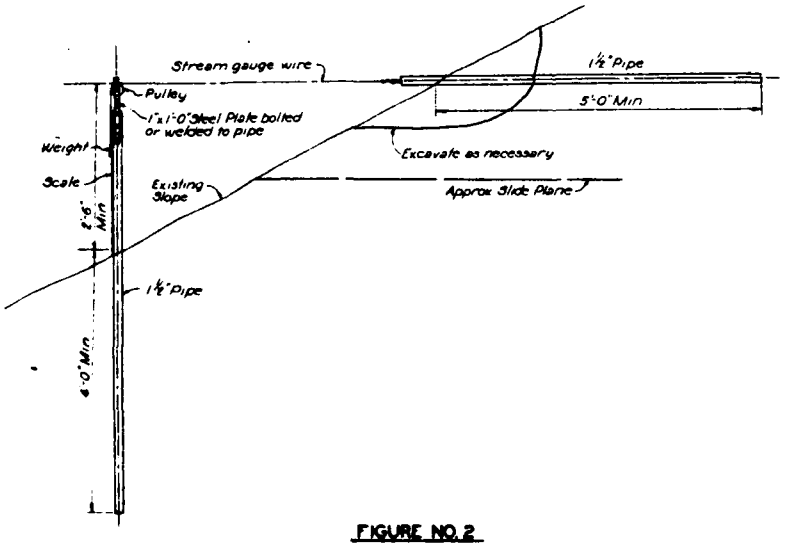
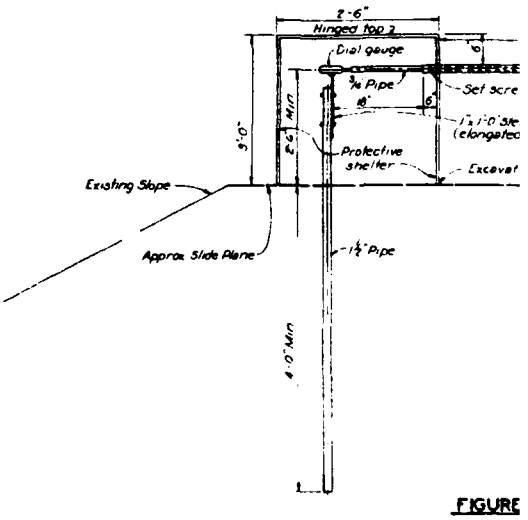
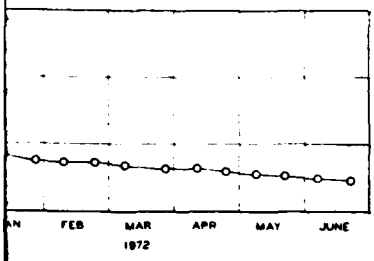
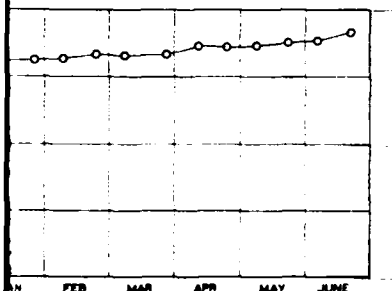


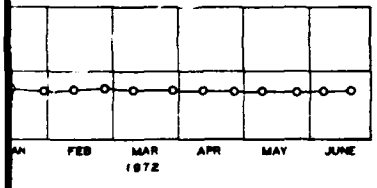
FIGURE NO. 2



FIGURE







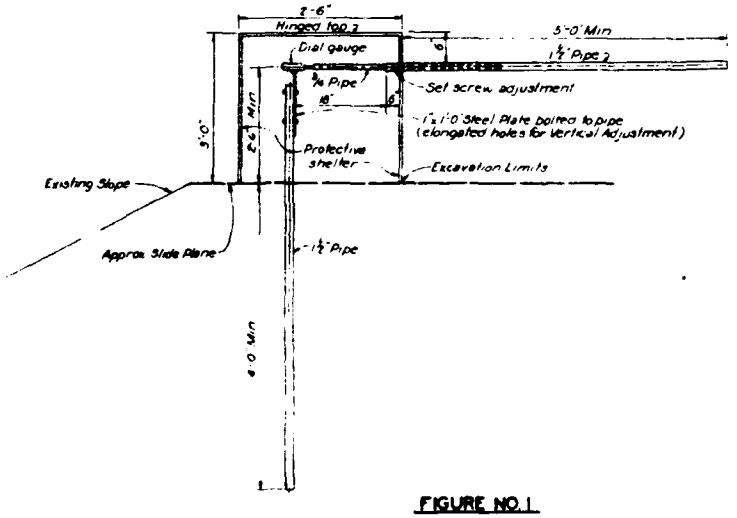


FIGURE NO. 1

THIS DRAWING HAS BEEN REDUCED TO THREE EIGHTHS THE ORIGINAL SCALE

DATE	DESCRIPTION	MADE	APPD'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

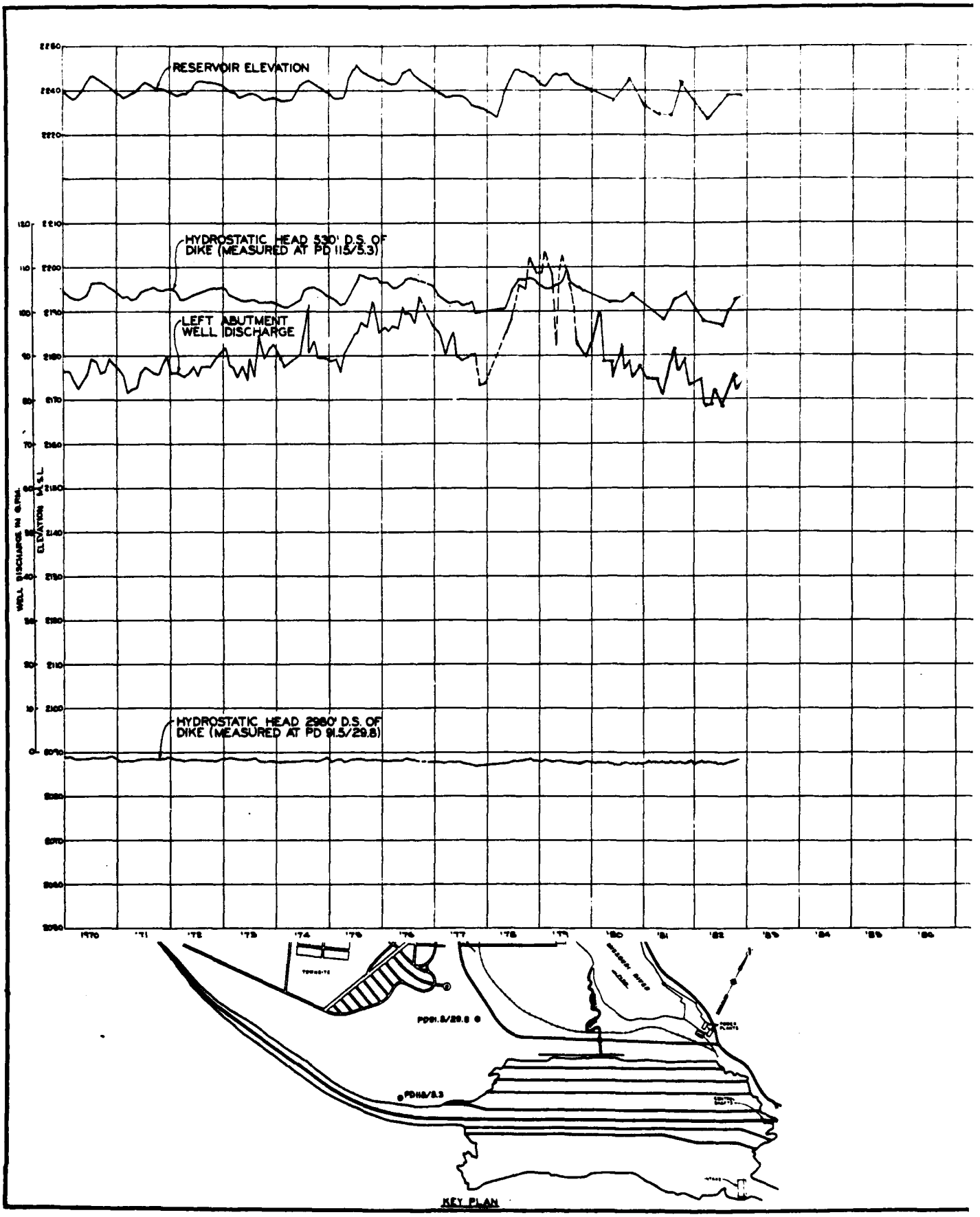
MISSOURI RIVER
FORT PECK LAKE, MONTANA
POWERHOUSE SLOPE EXCAVATION
SLIDE MOVEMENT OBSERVATIONS
DIAL & WIRE GAGES - SHEET 2

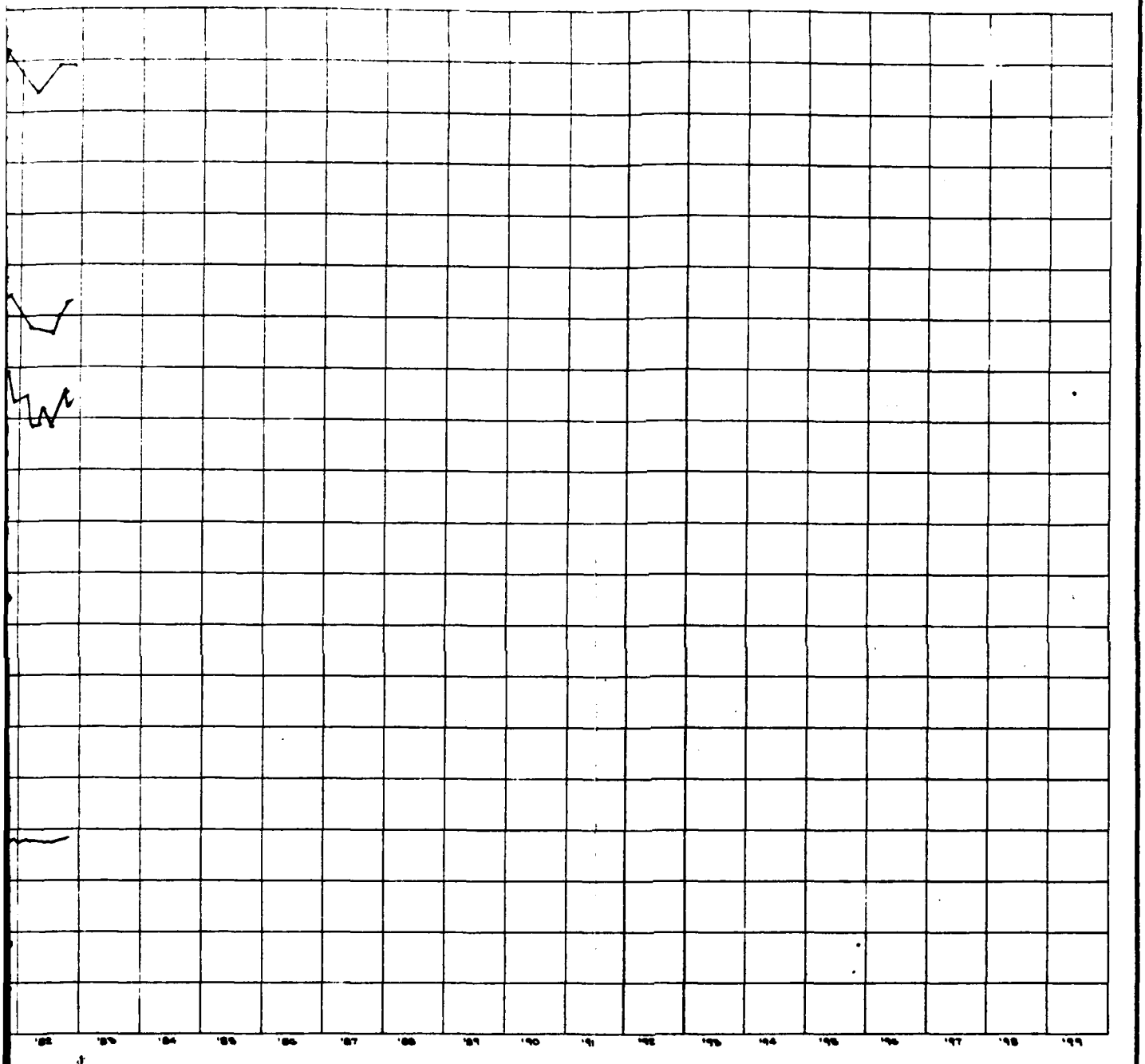
DESIGNED BY: R.J.M.
DRAWN BY: M.E.B.
TRACED BY: C.V.J.
QUANTITIES BY: J.
CHECKED BY: Del Nixon
RECOMMENDED: S.F. Colley
APPROVED: [illegible]
DATE: JULY 1972
SCALE AS SHOWN
DRG. NO.
APPROVED: Kenneth D. Austin
CHIEF, ENGINEERING DIV.
CHIEF, DESIGN BRANCH
CHIEF, CONSTRUCTION BRANCH

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT 2 PLATE 7-4B


RESERVOIR ELEVATION
HYDROSTATIC HEAD 530' D.S. OF DIKE (MEASURED AT PD 115/5.3)
LEFT ABUTMENT WELL DISCHARGE
HYDROSTATIC HEAD 2980' D.S. OF DIKE (MEASURED AT PD 91.5/29.8)
WELL DISCHARGE IN G.P.M.
ELEVATION M.S.L.
2260
2240
2220
2210
2200
2190
2180
2170
2160
2150
2140
2130
2120
2110
2100
2090
2080
2070
2060
2050
120
110
100
90
80
70
60
50
40
30
20
10
0
1970
'71
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
PD91.5/29.8
PD115/5.3
KEY PLAN



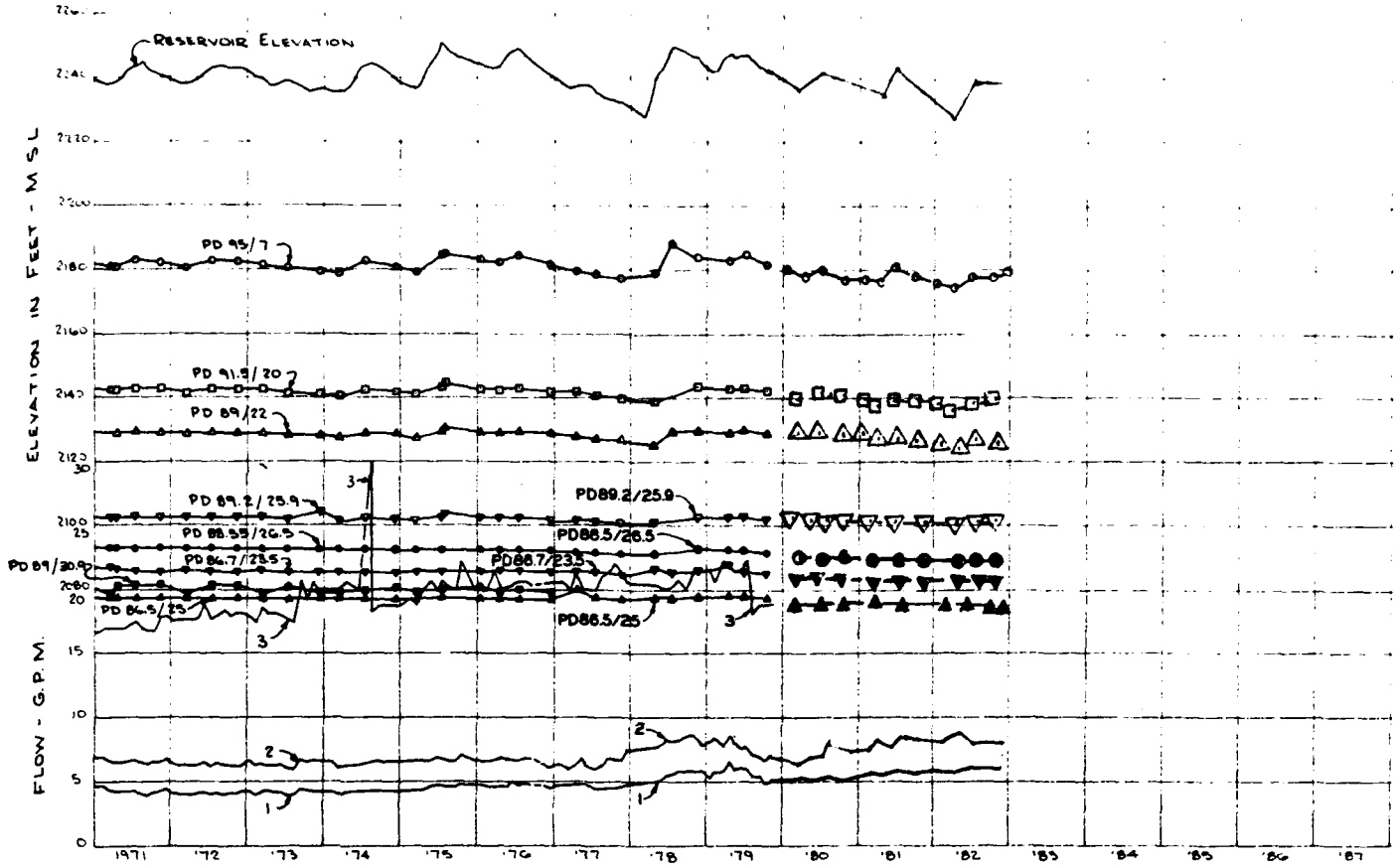
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

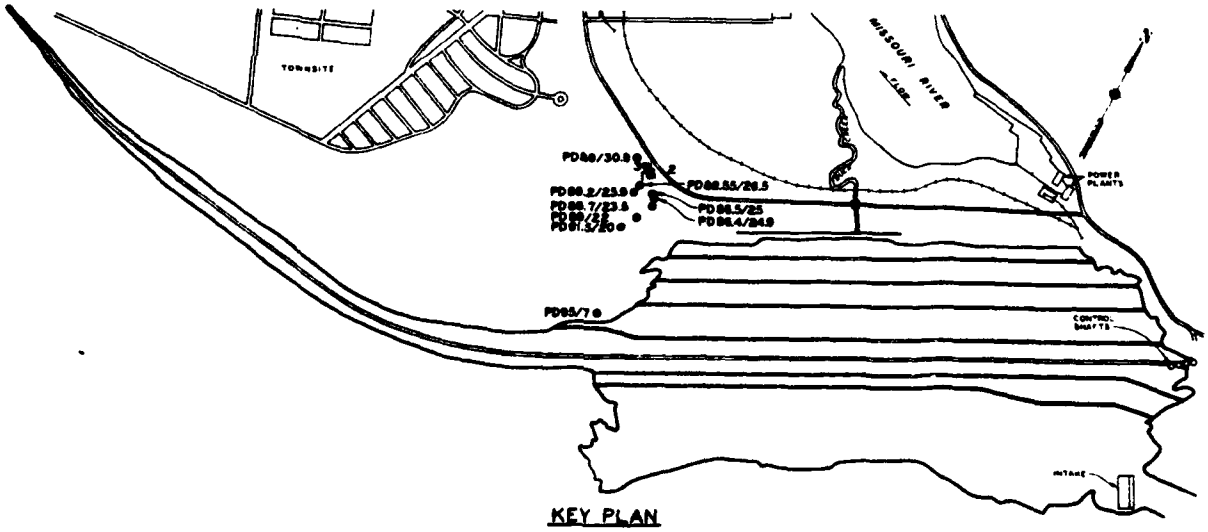
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

FORT PECK LAKE, MONTANA
SUMMARY OF HYDRAULIC DATA
LEFT ABUTMENT
PRESSURE RELIEF WELL SYSTEM
1970 - 1999

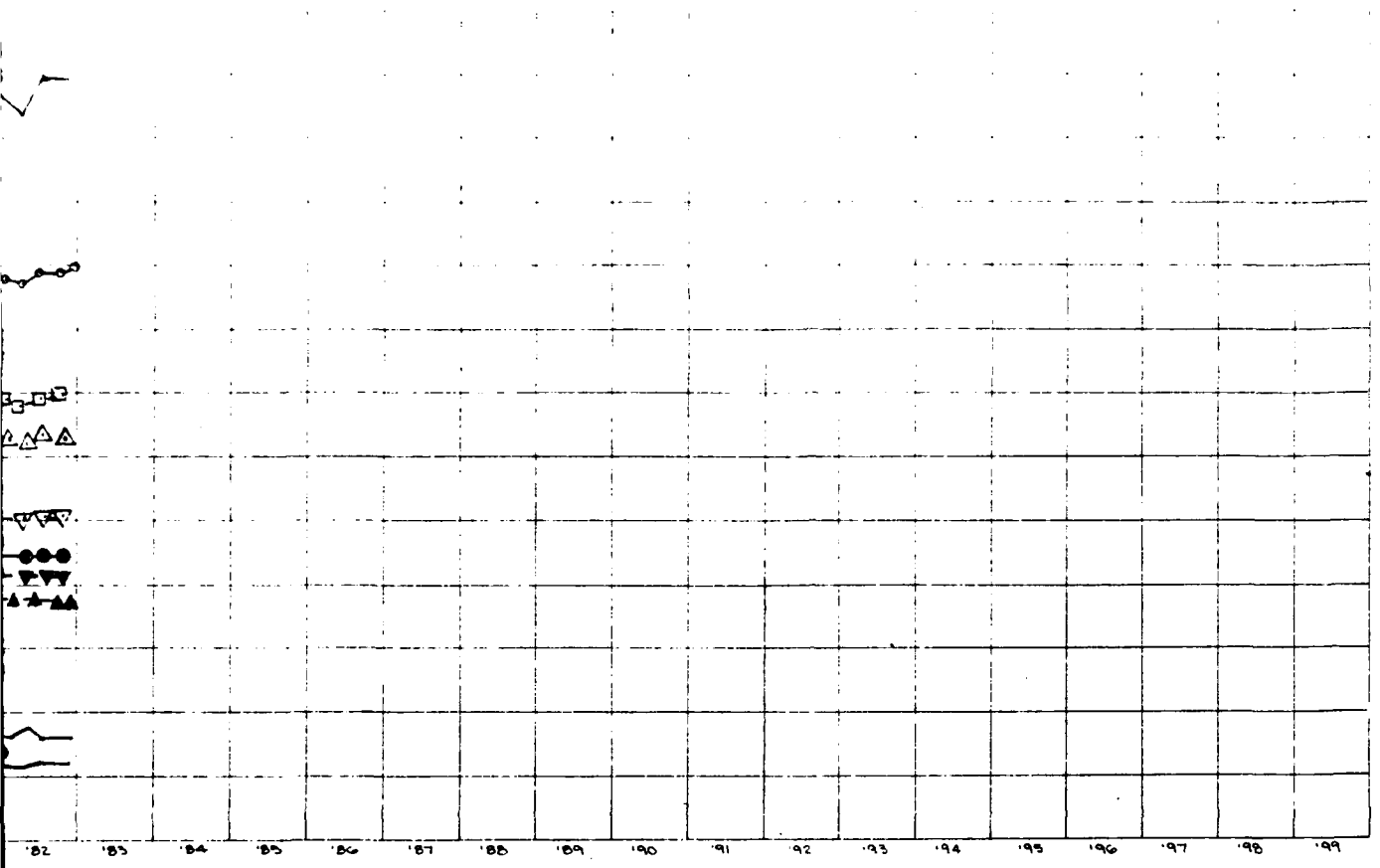
SAFETY DAYS

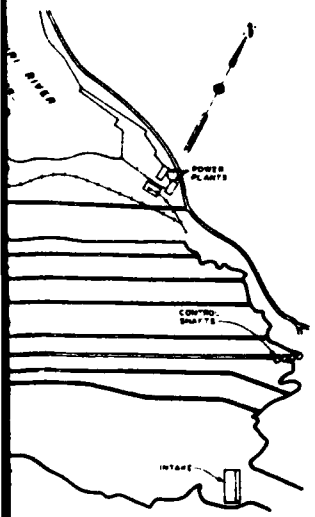
CONSTRUCTION FOUNDATION REPORT PLATE 75


RESERVOIR ELEVATION
ELEVATION IN FEET - M.S.L.
PD 95/7
PD 91.5/20
PD 89/22
PD 89.2/25.9
PD 88.55/26.5
PD 86.7/23.5
PD 86.5/25
PD 89/20.9
PD 84.5/25
FLOW - G.P.M.
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87


TOWNSITE
MISSOURI RIVER
POWER PLANTS
CONTROL SHAFTS
INTAKE
PD88/30.9
PD88.55/26.5
PD88.2/25.9
PD88.7/23.5
PD86.5/25
PD86.4/24.9
PD85/7

KEY PLAN





THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

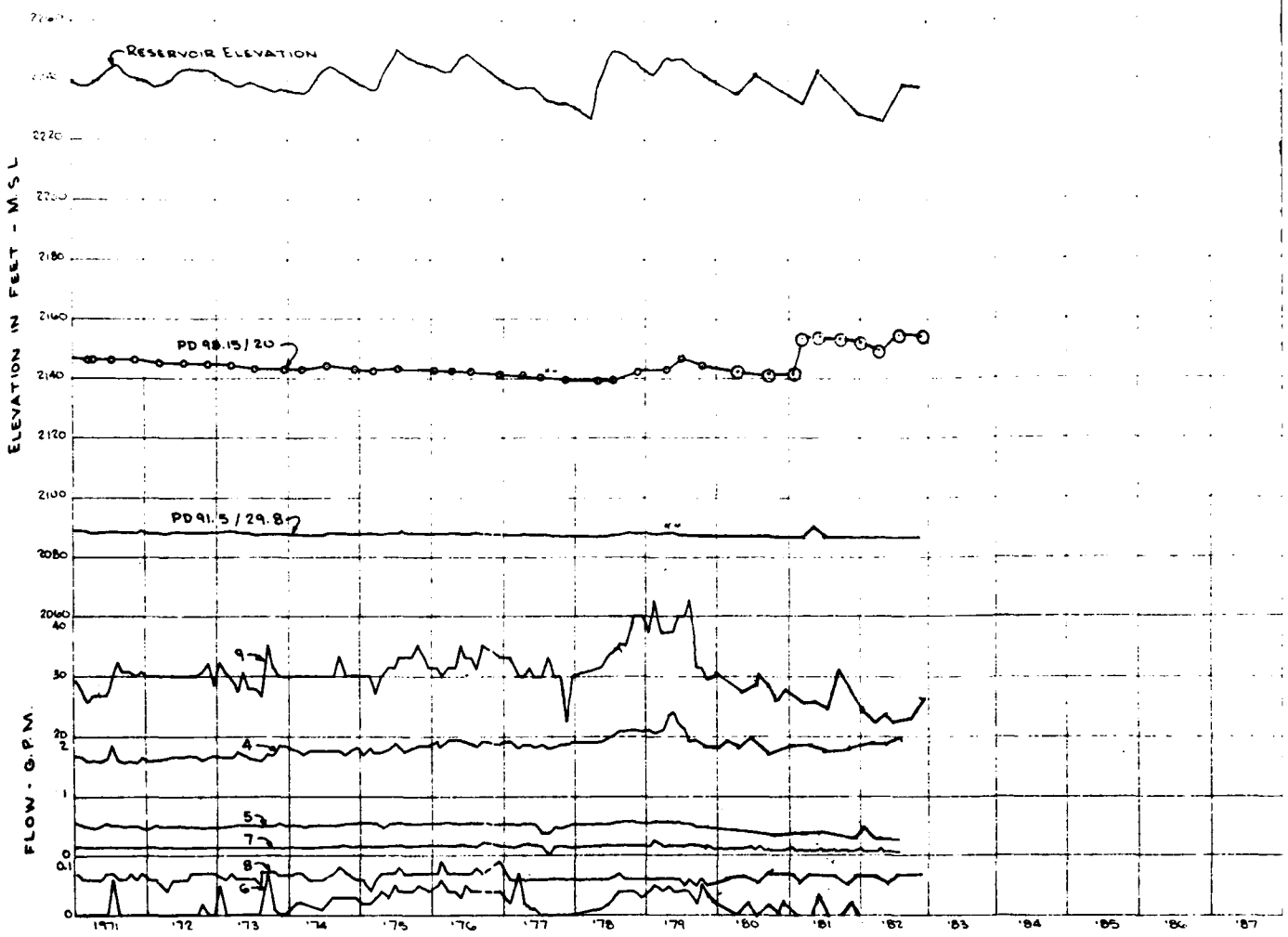
MISSOURI RIVER
FORT PECK LAKE, MONTANA
LEFT ABUTMENT RELIEF WELLS AND PIEZOMETERS
COULEE "B"

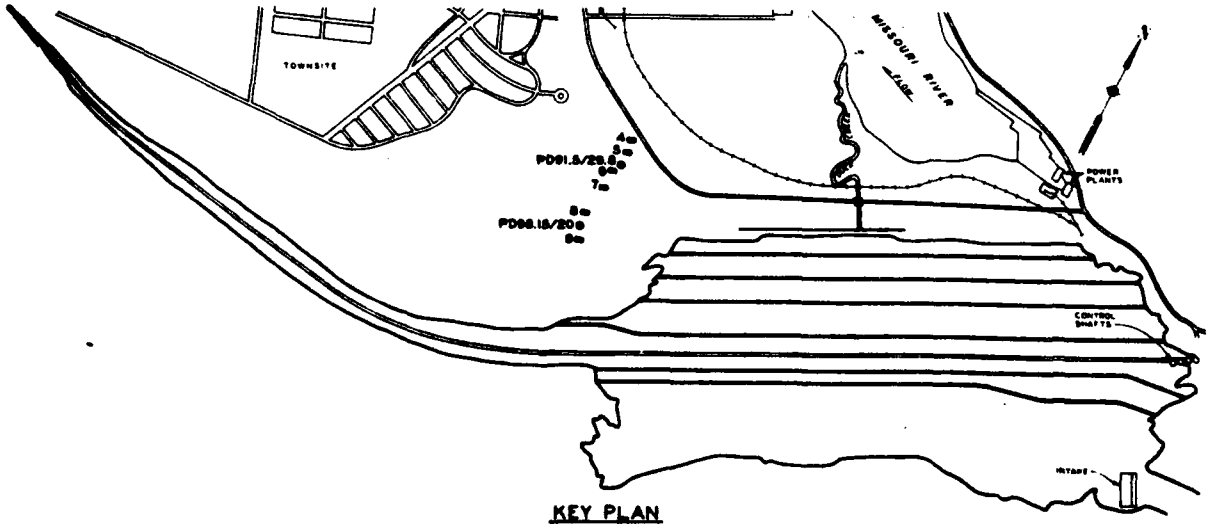
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 76

2

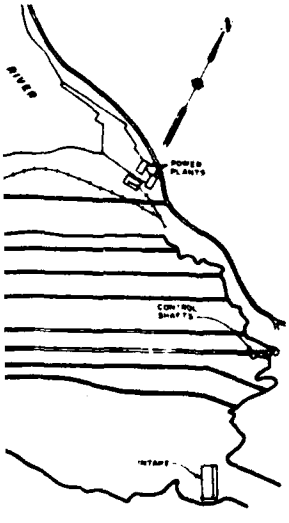

RESERVOIR ELEVATION
ELEVATION IN FEET - M.S.L.
2220
2200
2180
2160
2140
2120
2100
2080
2060
PD 98.15/20
PD 91.5/29.8
FLOW - G.P.M.
40
30
20
2
1
0
0.1
0
9
4
5
7
8
6
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87


TOWNSITE
MISSOURI RIVER
POWER PLANTS
CONTROL SHAFTS
INTAKE
PD91.5/29.8
PD98.15/20

KEY PLAN

'82 '83 '84 '85 '86 '87 '88 '89 '90 '91 '92 '93 '94 '95 '96 '97 '98 '99

IMMEDIATELY [illegible] HAS AN APPROXIMATE 7-14 DAY TIME LAG.



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

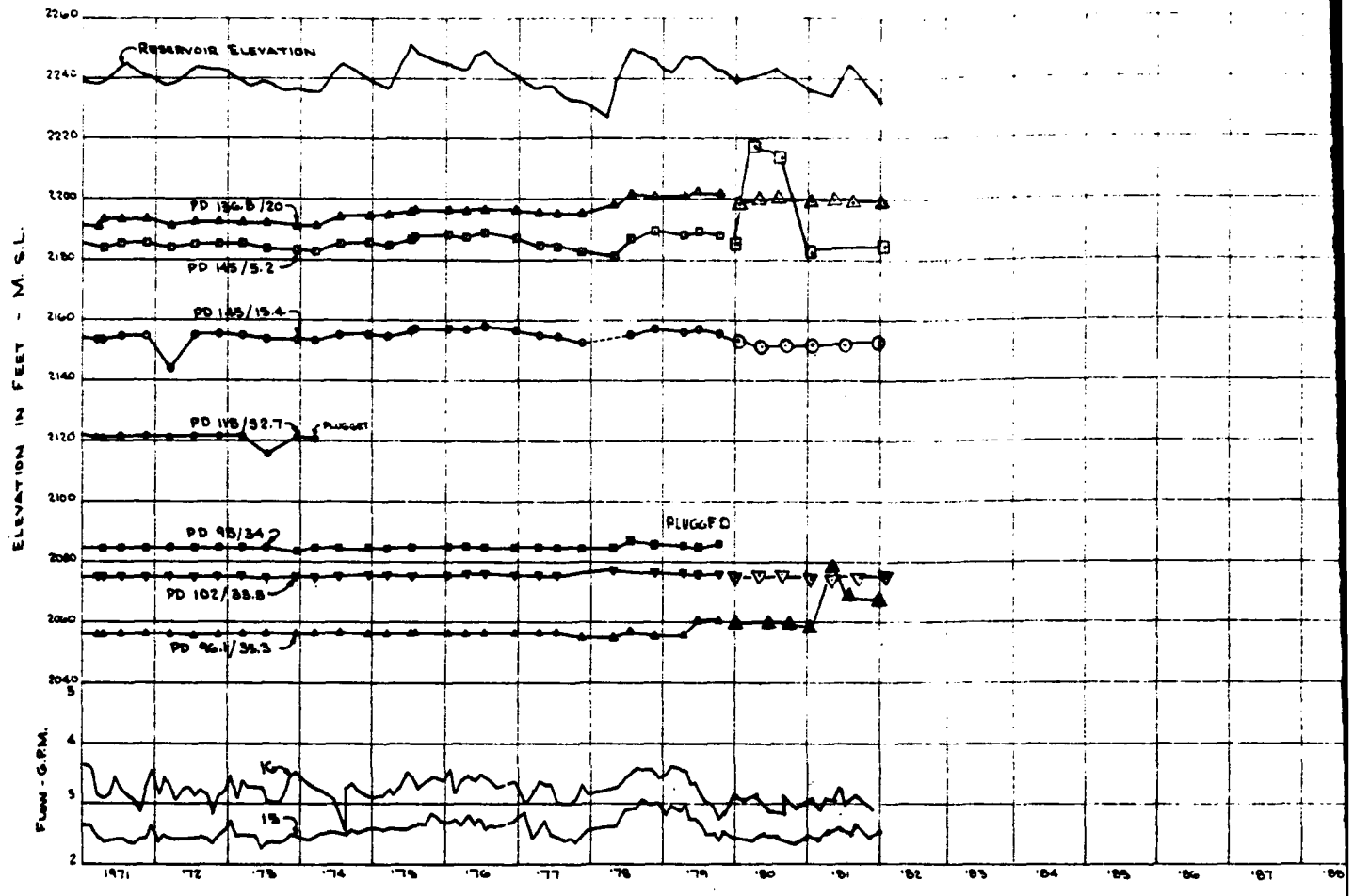
MISSOURI RIVER
FORT PECK LAKE, MONTANA
LEFT ABUTMENT RELIEF WELLS AND PIEZOMETERS
COULEE "C"

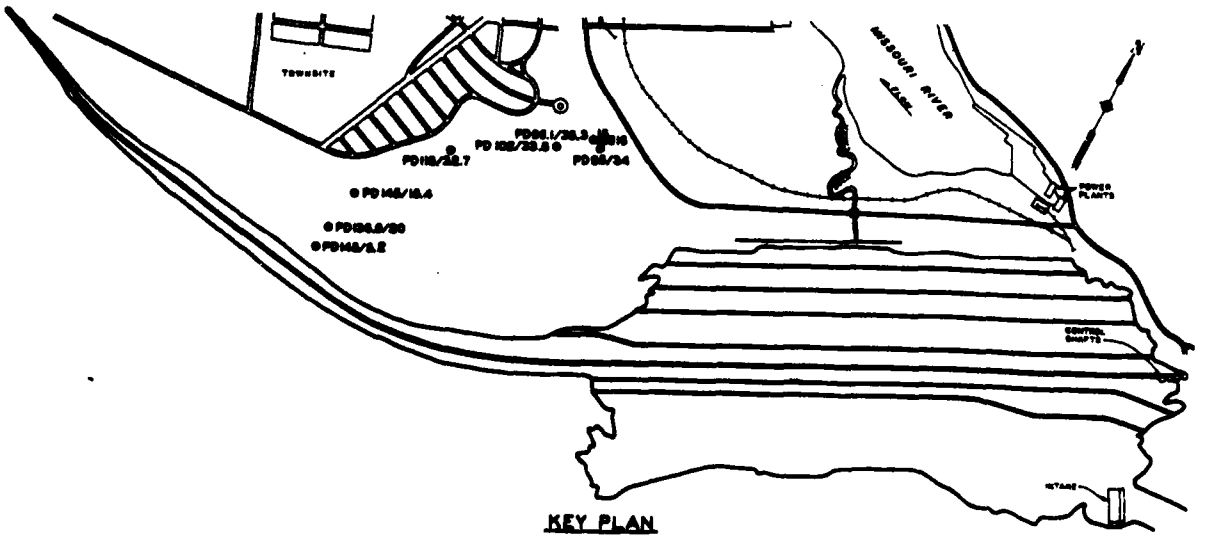
DESIGNED BY:
DRAWN BY:
TRACED BY:
SUBMITTED BY:
DATE
RECOMMENDED
APPROVED
CHIEF, ENGINEERING DIVISION
DATE
SCALE AS SHOWN
DWG. NO.
APPROVED
CHIEF, ENGINEERING BRANCH
DATE

SAFETY PAYS

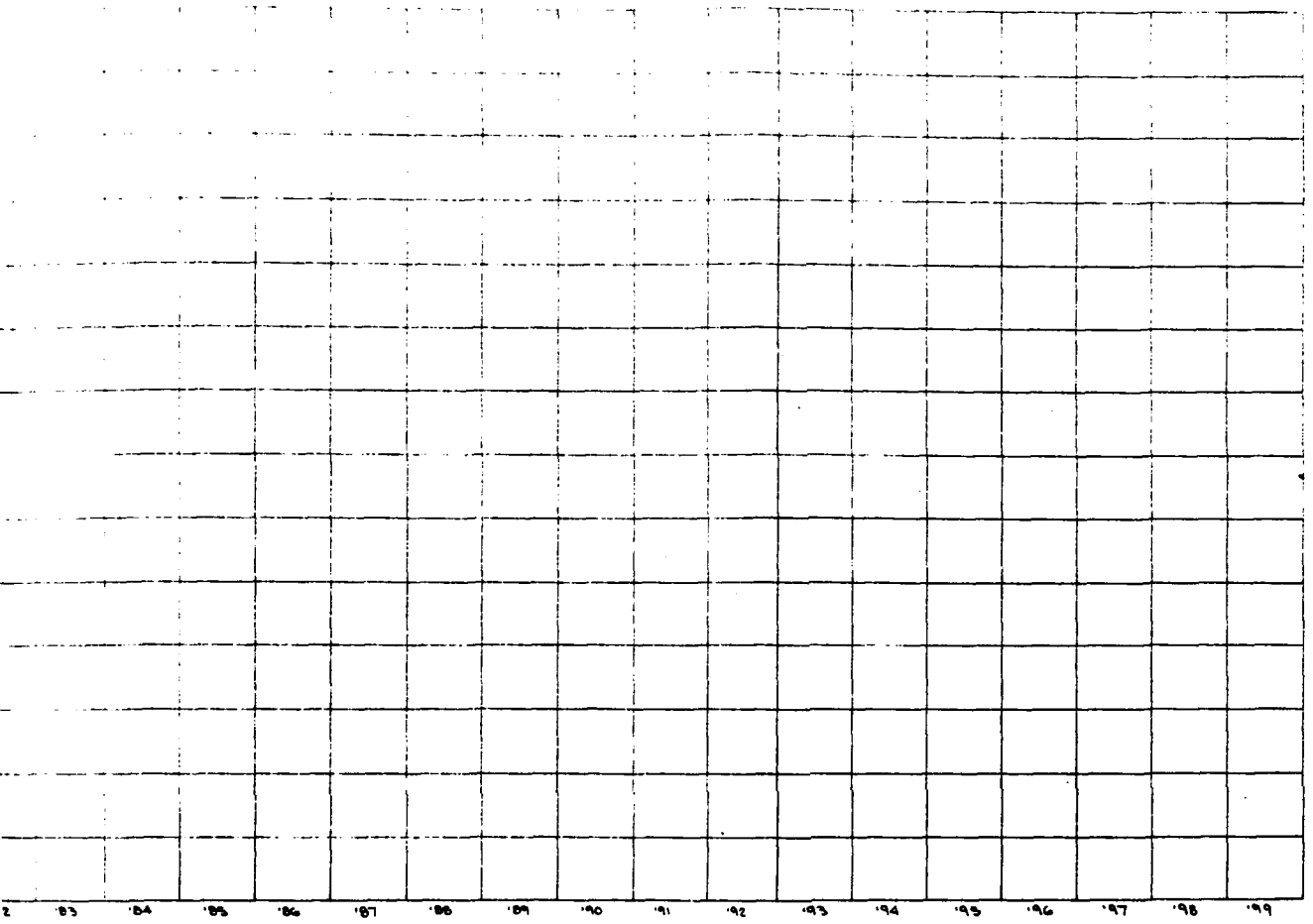
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 77

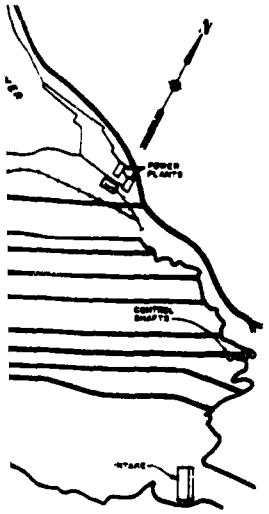

RESERVOIR ELEVATION
PD 136.5/20
PD 145/5.2
PD 145/19.4
PD 118/32.7
PLUGGED
PD 95/34.2
PLUGGED
PD 102/33.8
PD 96.1/35.3
ELEVATION IN FEET - M.S.L.
FLOW - G.P.M.
K
15
2260
2240
2220
2200
2180
2160
2140
2120
2100
2080
2060
2040
5
4
3
2
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87


TOWNSITE
MISSOURI RIVER
POWER PLANTS
CONTROL GATES
INTAKE
PD 118/32.7
PD 102/33.8
PD 95/34
PD 145/19.4
PD 136.5/20
PD 145/5.2

KEY PLAN



** PIEZOMETERS TESTED FOR EFFECTIVENESS DURING AUG 1977; PD 9A-1/35-2 AND PD 145/5-2 HAD TIME LAGS OF 7 TO 14 DAYS, PD 118/37-7 HAS BEEN FLUSHED. ALL OTHER INSTRUMENTS RESPONDED IMMEDIATELY.



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
LEFT ABUTMENT RELIEF WELLS AND PIEZOMETERS
COULEE "D"

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
QUANTITIES BY
APPROVED
DATE

SCALE AS SHOWN

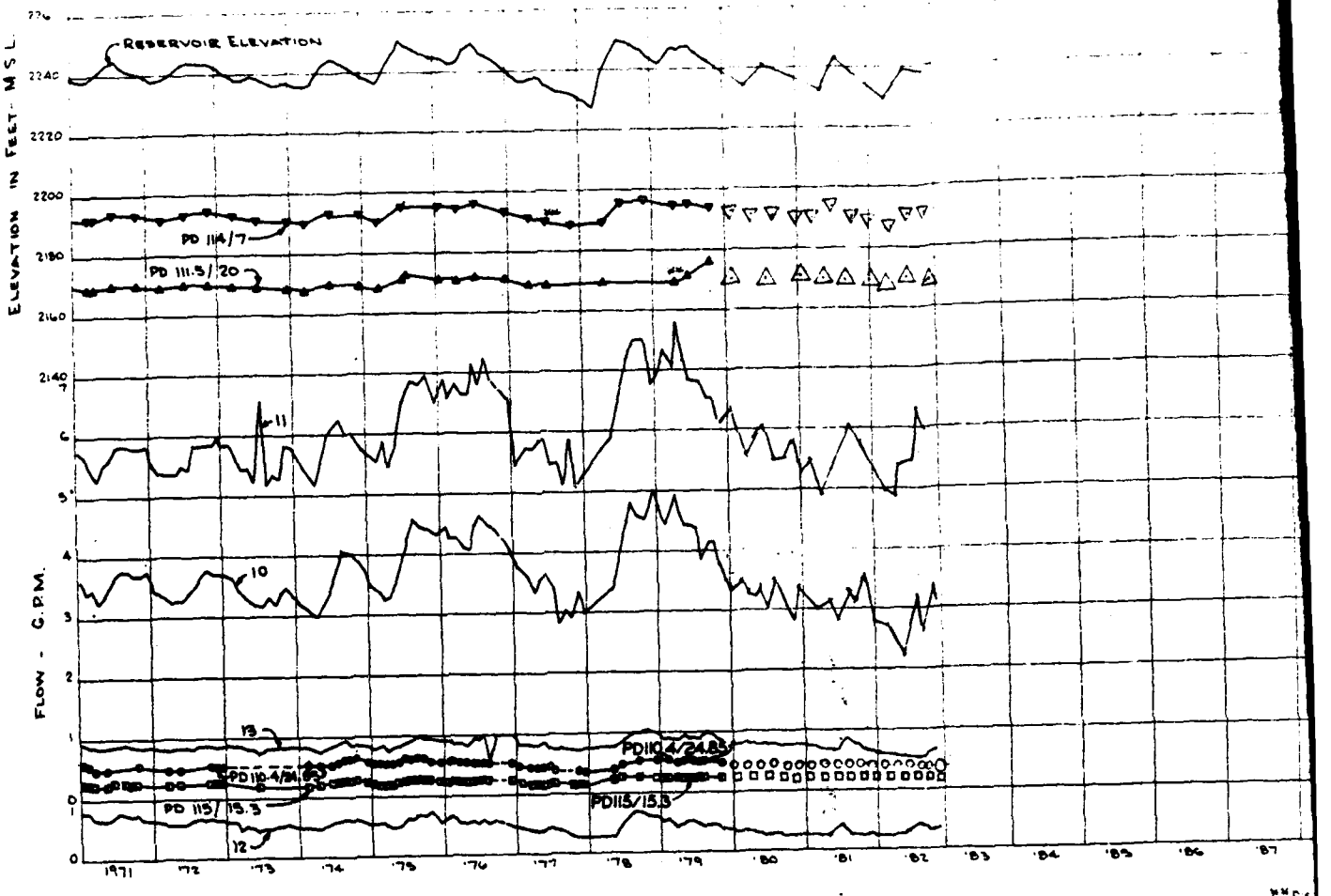
SAFETY PAYS

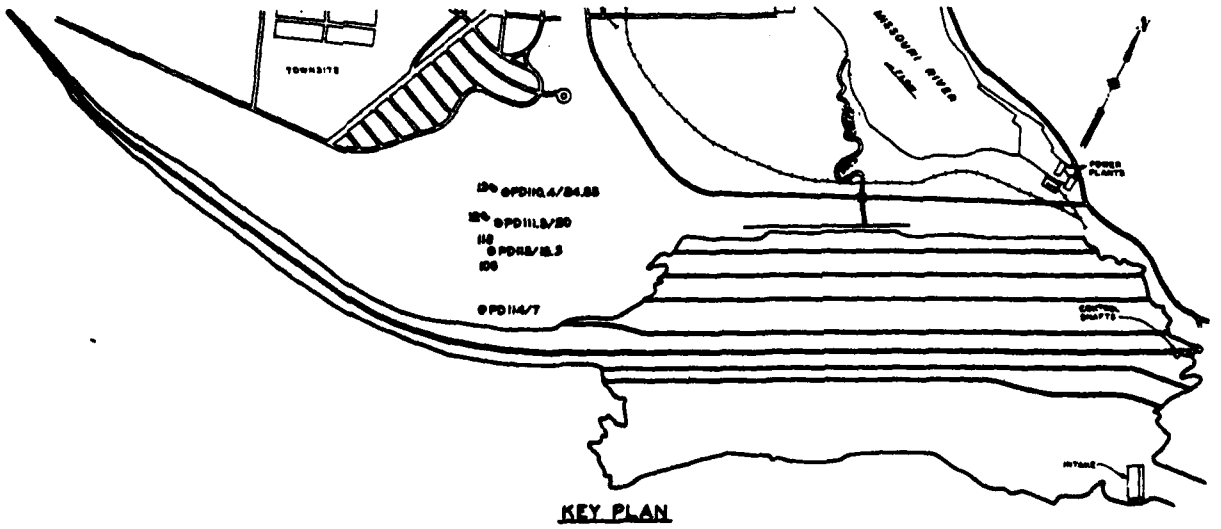
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

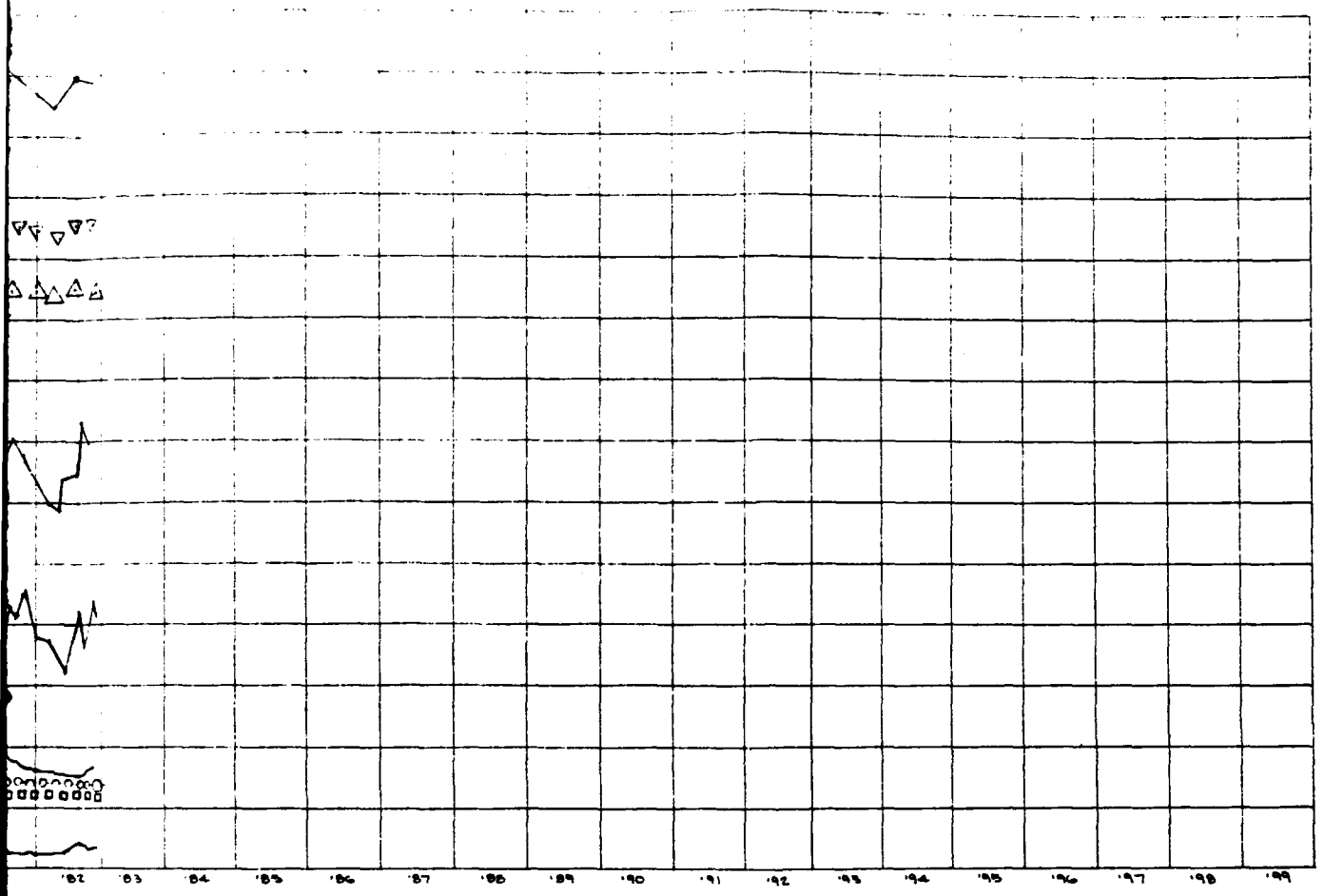
PLATE 78

2

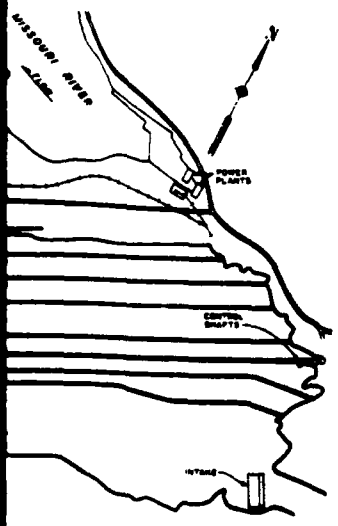

RESERVOIR ELEVATION
ELEVATION IN FEET - M.S.L.
2240
2220
2200
2180
2160
2140
PD 114/7
PD 111.5/20
11
10
13
12
PD110.4/24.85
PD 110.4/24.85
PD 115/15.3
PD115/15.3
FLOW - G.P.M.
6
5
4
3
2
1
0
-1
1971
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87


TOWNSITE
MISSOURI RIVER
POWER PLANTS
PD110.4/24.85
PD111.5/20
PD115/15.3
PD114/7

KEY PLAN



** PIEZOMETERS PLOTTED FOR EFFECTIVENESS; ALL INSTRUMENT (NOT NOTED AS FLOWING) RECORDED INSTANTANEOUSLY.



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BASED	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

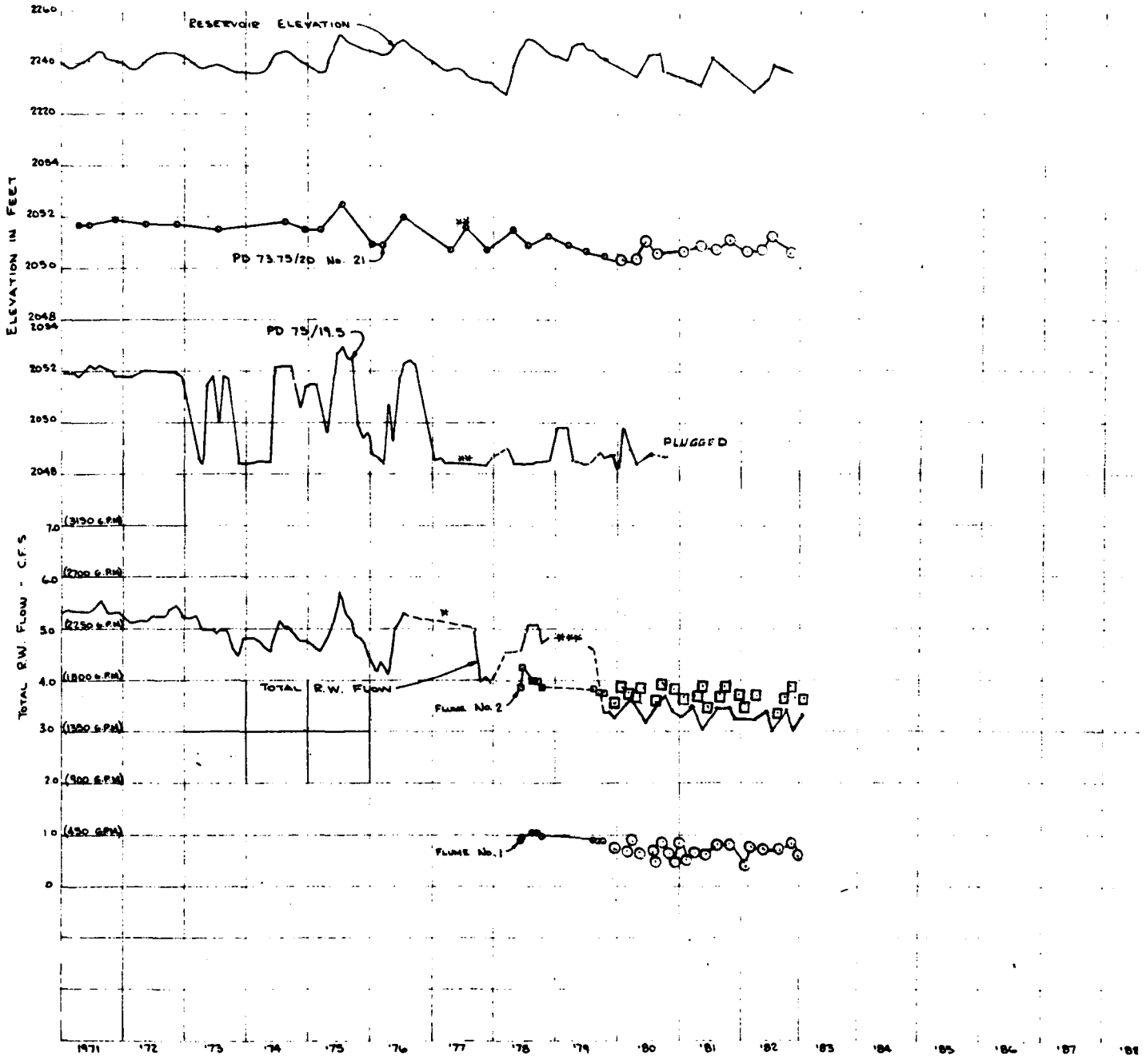
MISSOURI RIVER
FORT PECK LAKE, MONTANA

LEFT ABUTMENT RELIEF WELLS AND PIEZOMETERS
COULEE "E"

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. _____ SPECIFICATION NO. _____

U.S. ENGINEER OFFICER _____ DATE _____

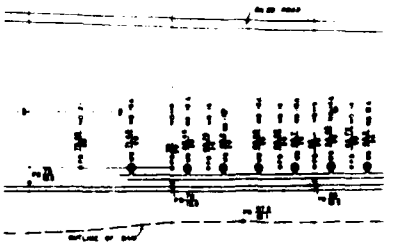


NOTE. TOTAL RELIEF WELL FLOW IS SUMMATION OF INDIVIDUAL R.W. FLOWS. THE SUM OF FLUME NO. 1 AND FLUME NO. 2 SHOULD APPROXIMATE THE TOTAL R.W. FLOW.

* WELLS 1GA, 18A AND 19A UNDER REPAIR.

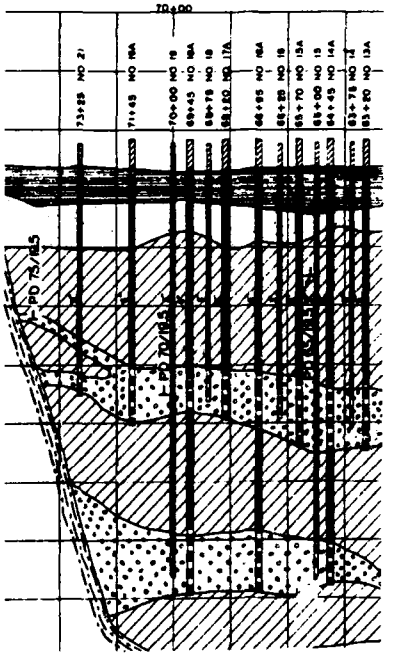
** FLOWMETER TESTS [illegible] DURING JULY '77. ALL WELLS ALL IN

*** WELLS 11A AND 12A UNDER REPAIR



PLAN

SCALE 0 100 200 300 400 FEET



PROFILE AT RANGE 20+00

THIS DRAWING WAS REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

'82 '83 '84 '85 '86 '87 '88 '89 '90 '91 '92 '93 '94

DATE	DESCRIPTION	MADE	APPR'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM

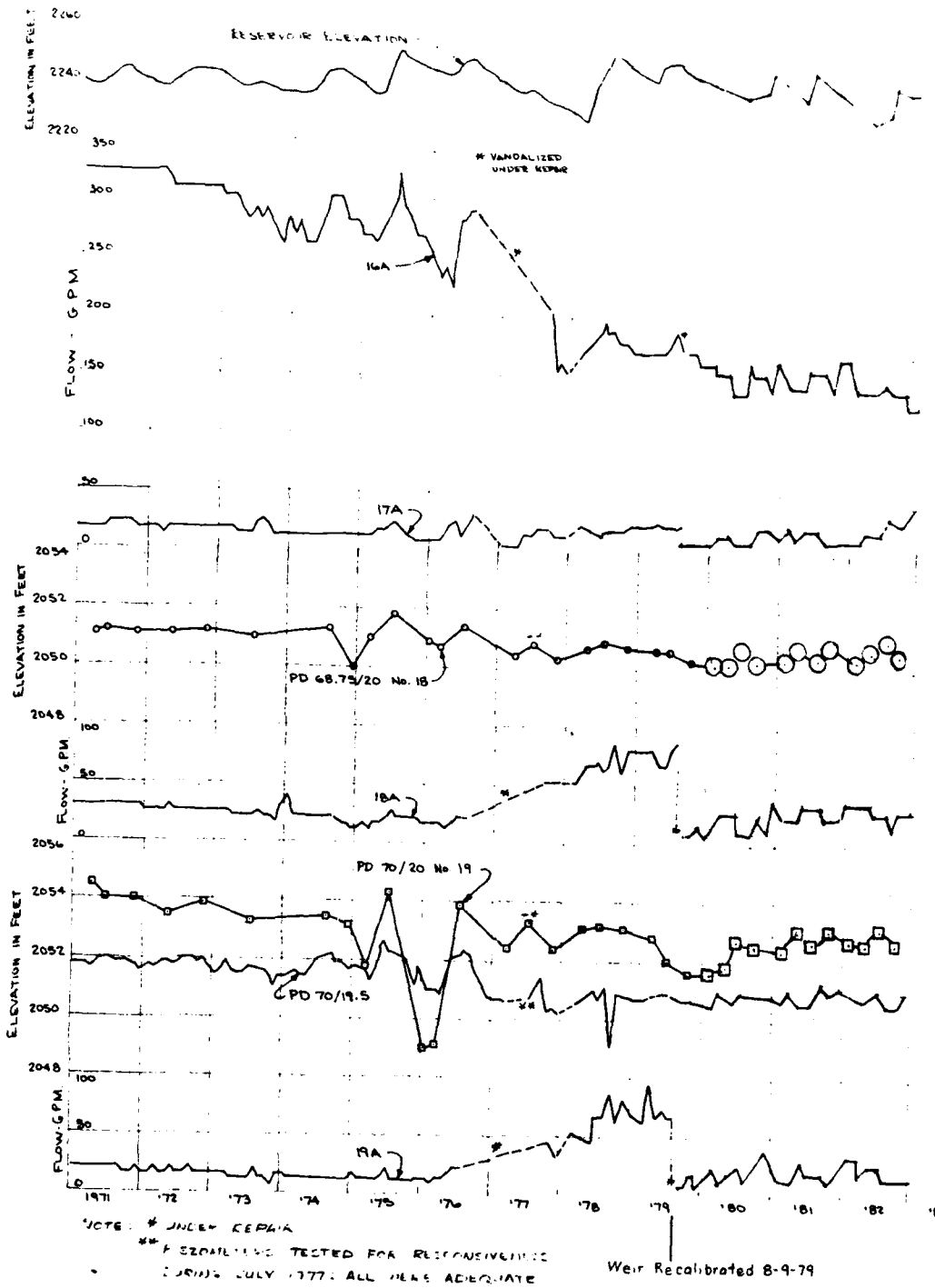
DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIPE

DESIGNED BY:
DRAWN BY:
TRACED BY:
QUANTITIES BY:
CHECKED BY:
APPROVED
DATE
SCALE AS SHOWN
DWG. NO.
SUBMITTED
CHIEF, ENGINEERING DIVISION
CHIEF, ENGINEERING BRANCH
CHIEF, DESIGN SECTION

SAFETY DAYS

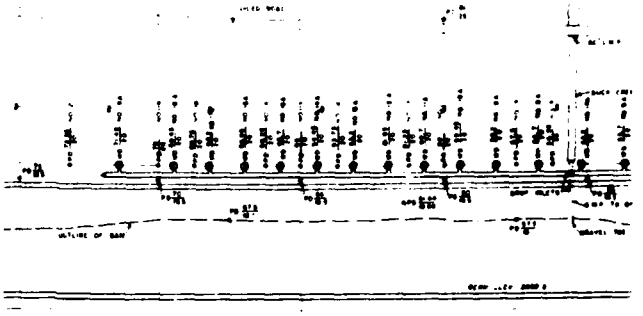
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT 2 PLATE 80



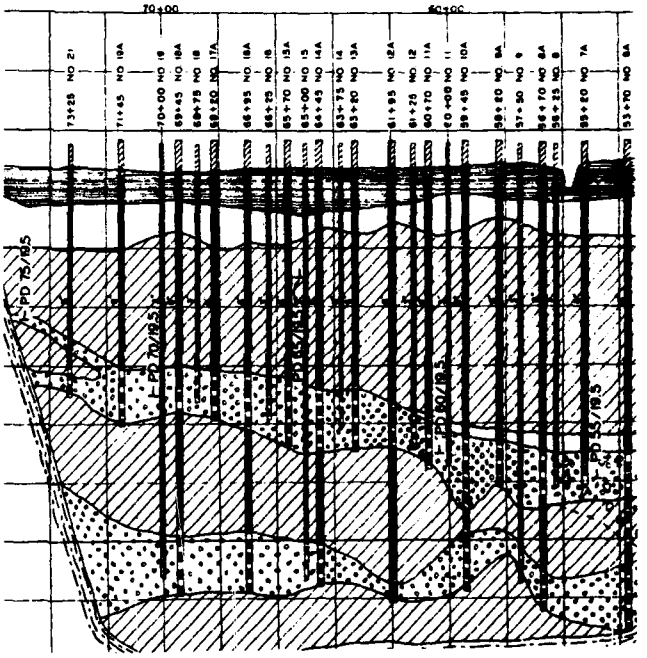
NOTE: # UNDER REPAIR

** PIEZOMETERS TESTED FOR RESPONSIVENESS DURING JULY 1977; ALL WERE ADEQUATE



PLAN

SCALE 100 0 100 200 300 400 500 FEET



PROFILE AT RANGE 20+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	DRAWN	APPVD
	REVISIONS		

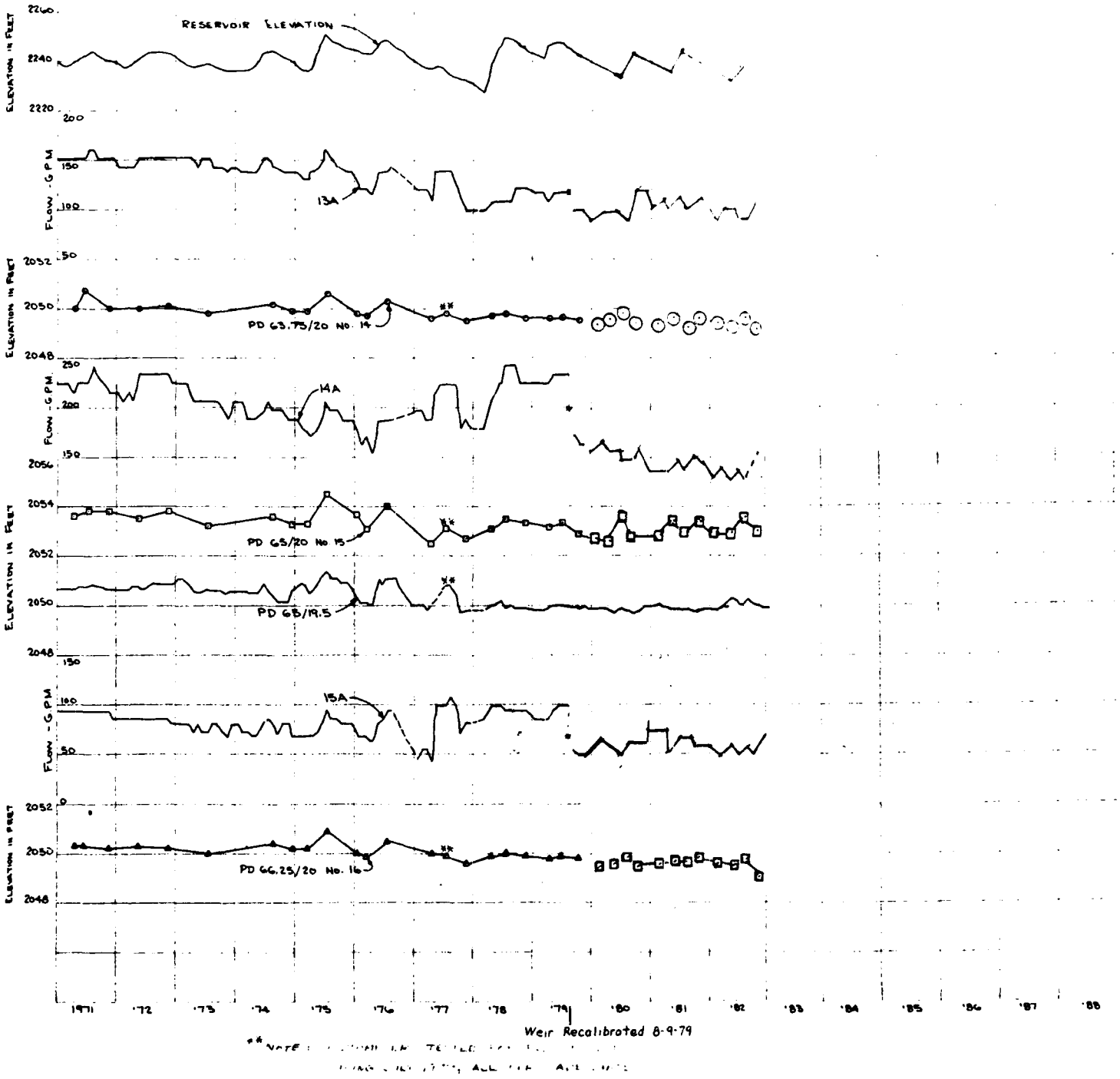
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

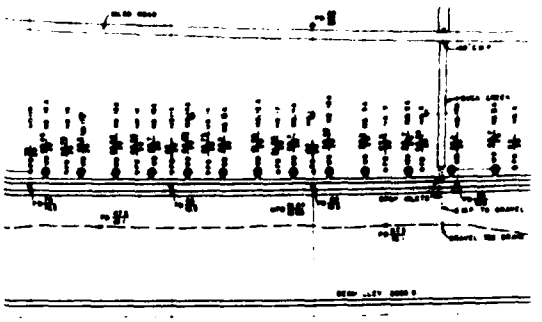
MISSOURI RIVER
FORT PECK DAM
DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIEZ.

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

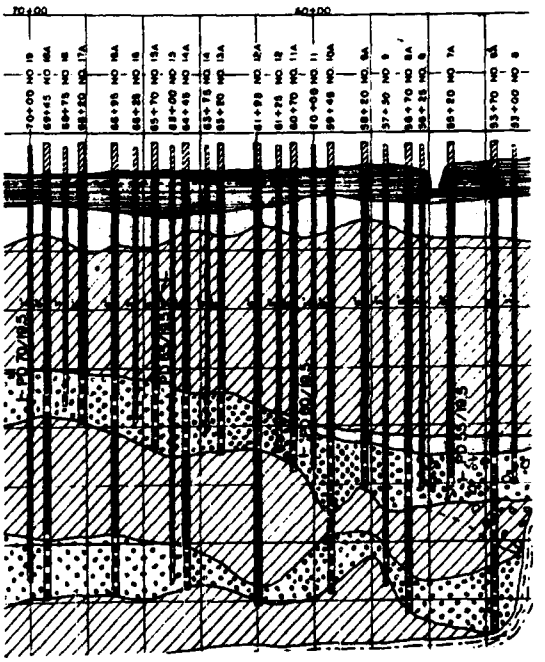
CONSTRUCTION FOUNDATION REPORT 2 PLATE 80A


RESERVOIR ELEVATION
ELEVATION IN FEET
2260
2240
2220
200
FLOW - G.P.M.
150
100
13A
2052
50
2050
PD 63.75/20 No. 14
2048
250
200
14A
2056
2054
PD 65/20 No 15
2052
2050
PD 66/19.5
2048
150
100
15A
50
0
2052
2050
PD 66.25/20 No. 16
2048
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87
'88
Weir Recalibrated 8-9-79



PLAN

SCALE 100 0 100 200 300 400 500 FEET



PROFILE AT RANGE 20+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

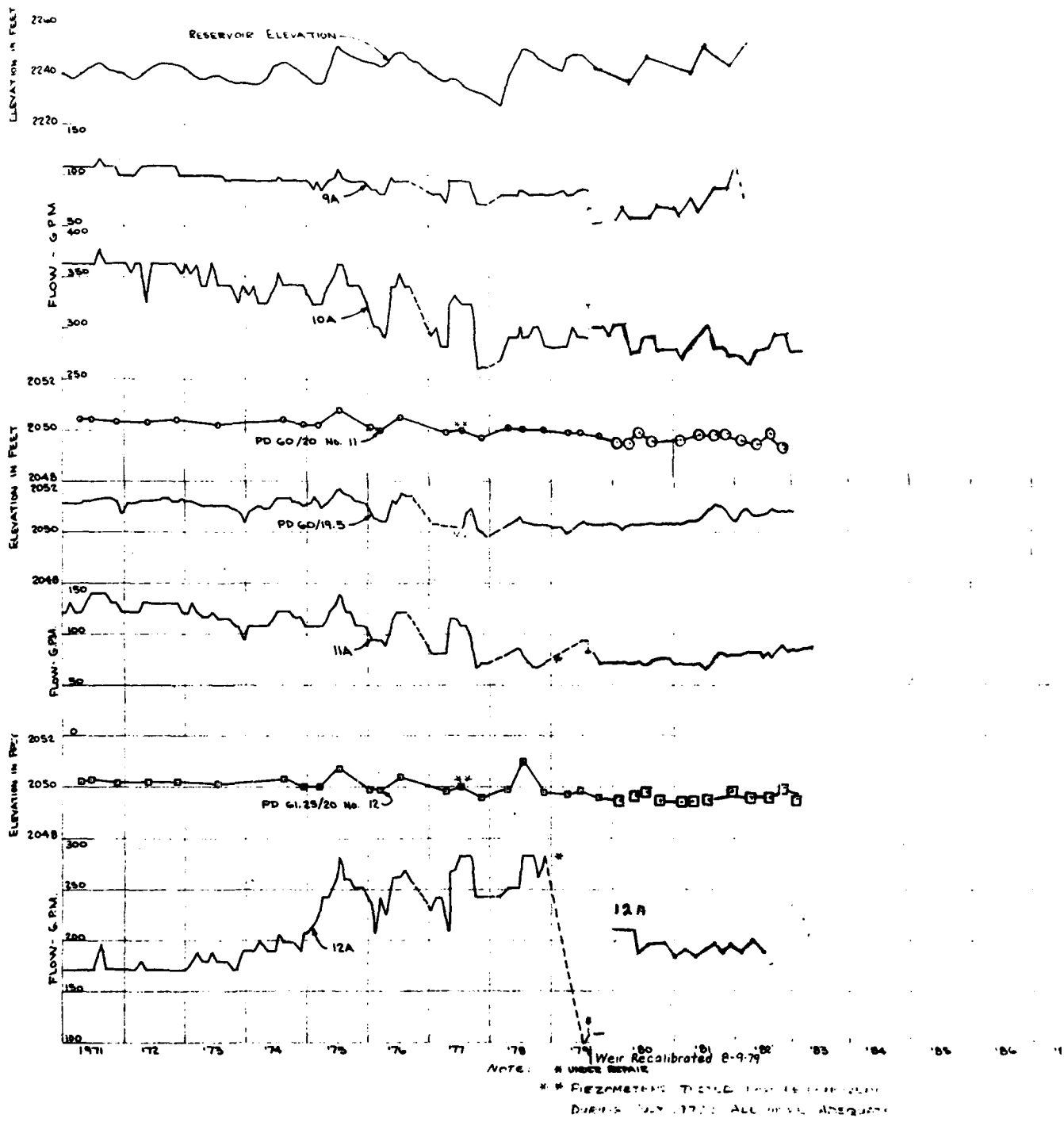
83 84 85 86 87 88 89 90 91 92

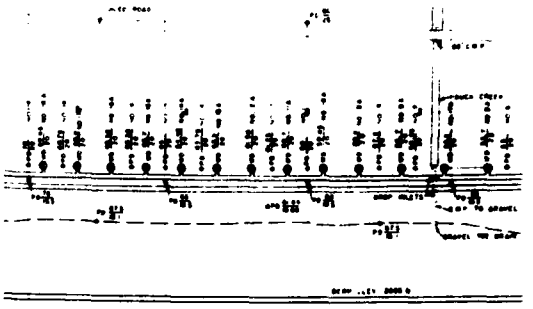
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM
DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIEZ

SAFETY PAYS

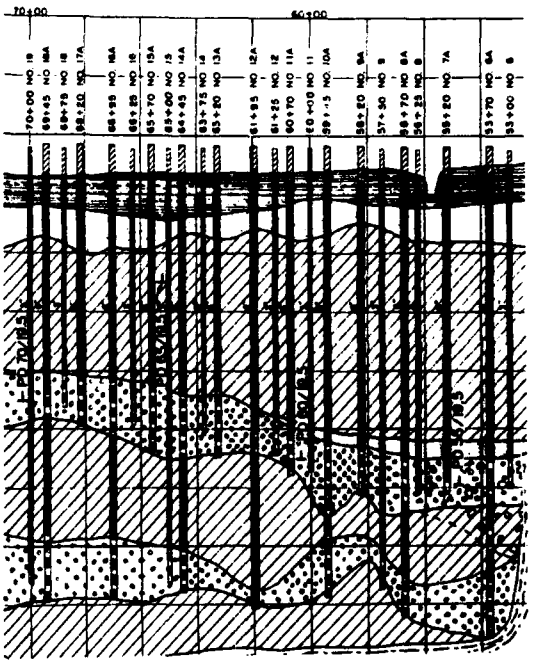
THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.


ELEVATION IN FEET
RESERVOIR ELEVATION
FLOW - G.P.M.
9A
10A
PD 60/20 No. 11
PD 60/19.5
11A
PD 61.25/20 No. 12
12A
12A
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
Weir Recalibrated 8-9-79
Note: # UNDER REPAIR



PLAN

SCALE 100 0 100 200 300 400 500 FEET



PROFILE AT RANGE 20+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BASED	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM
DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIPE

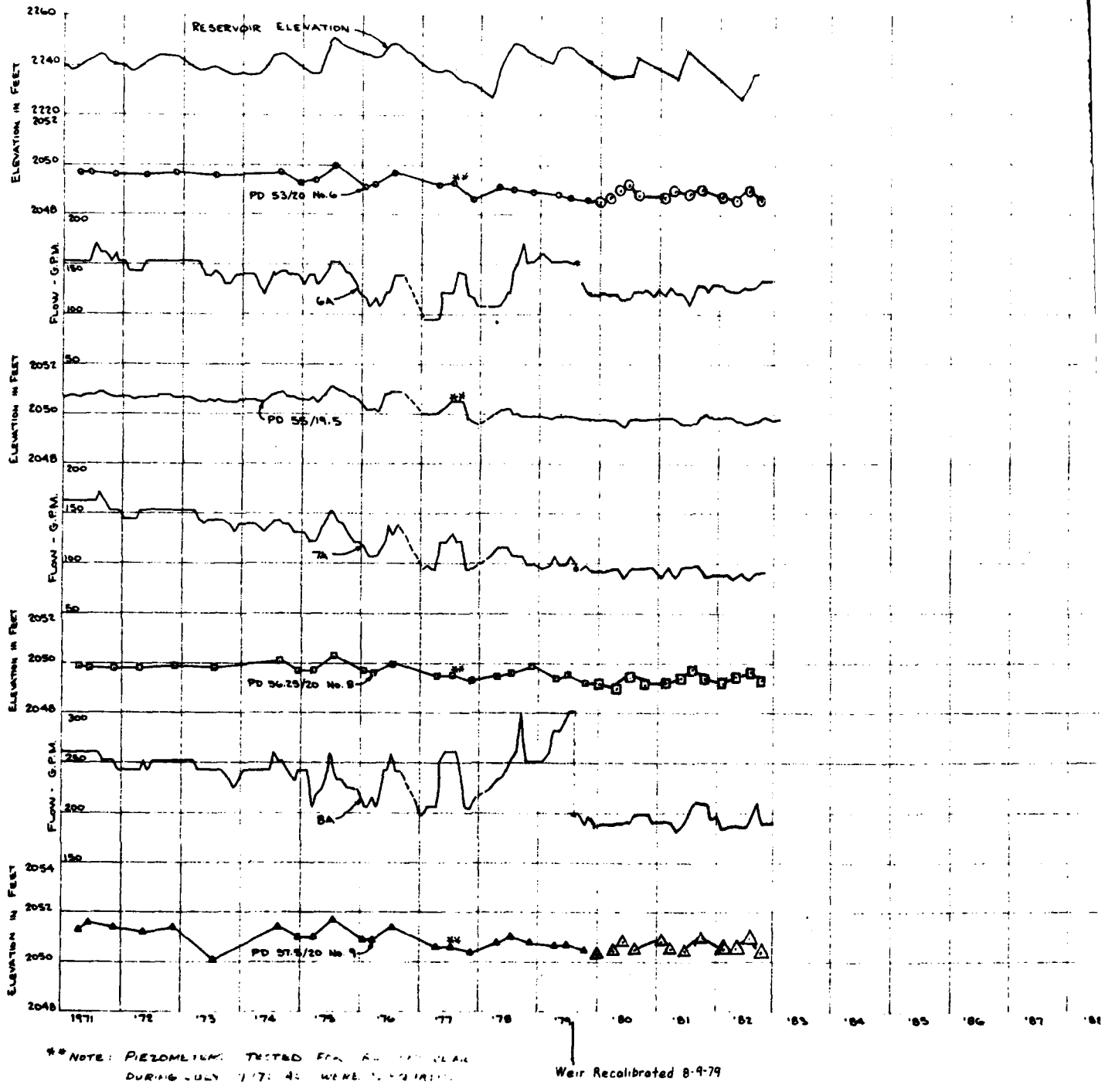
DESIGNED BY
DRAWN BY
TRACED BY
QUANTITIES BY
CHECKED BY
APPROVED
DATE
SUBMITTED
RECOMMENDED
APPROVED
CHIEF, ENGINEERING DIVISION
DATE
SCALE AS SHOWN
SHEET NO.
CHIEF, ENGINEERING DIVISION
CHIEF, DESIGN BRANCH

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

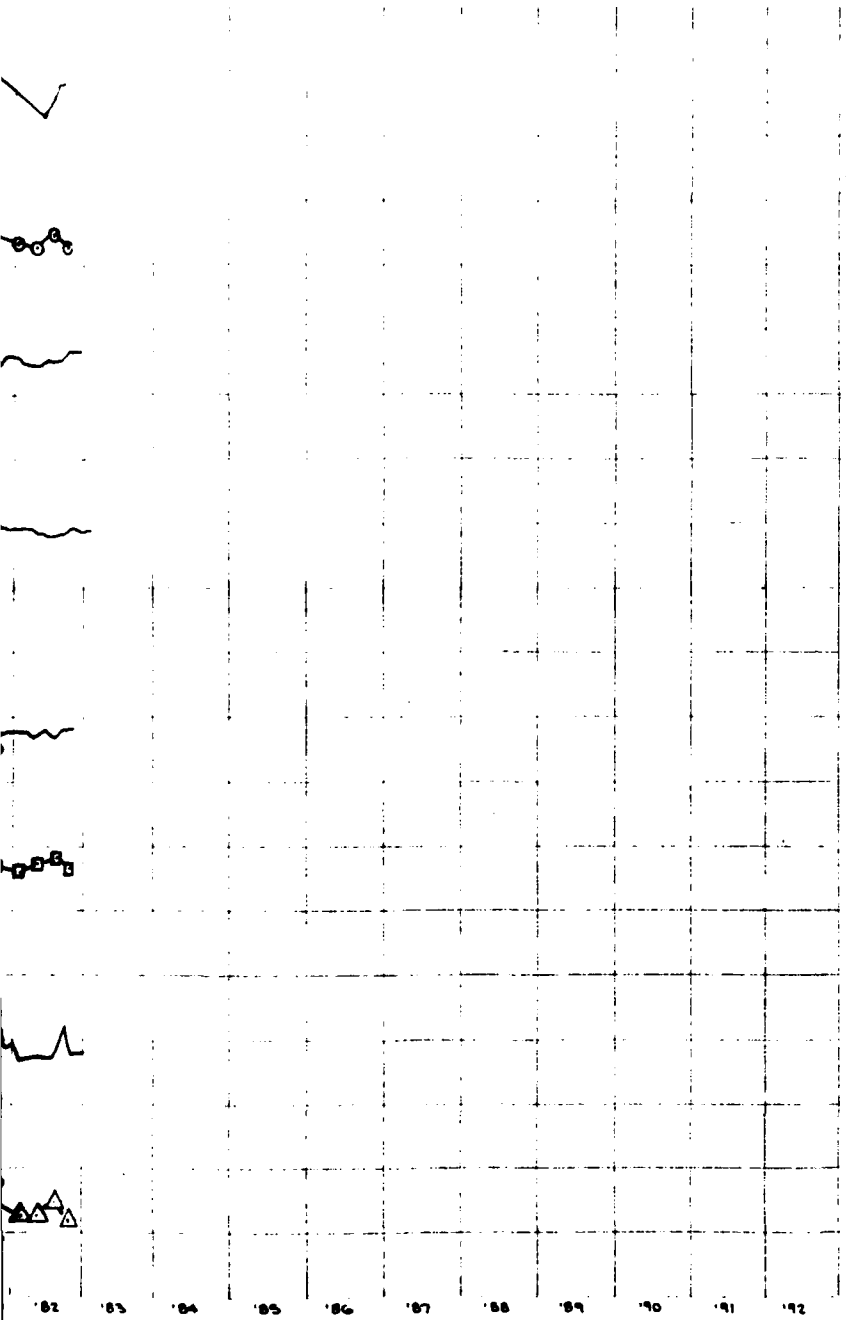
U. S. A. ENGINEER DIVISION

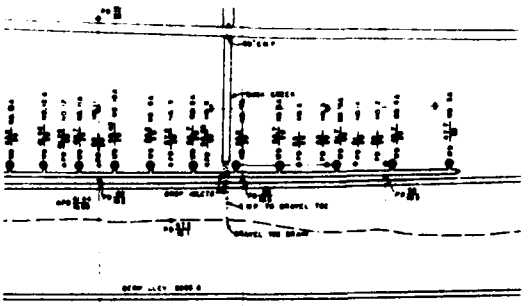
SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT 2 PLATE 82



** NOTE: PIEZOMETERS TESTED FROM ... DURING JULY 1977 AS WERE ... IN 1973





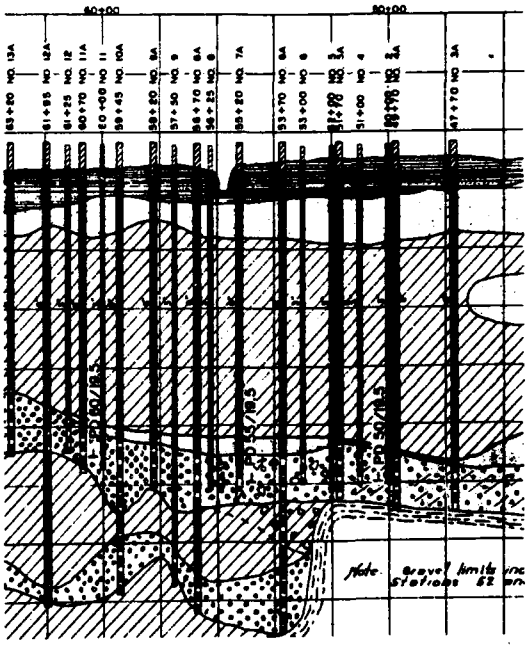
PLAN

SCALE 400 0 400 800 1200 1600 2000 FEET

LEGE

Permanent Pi

Piezometer P



PROFILE AT RANGE 20+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM

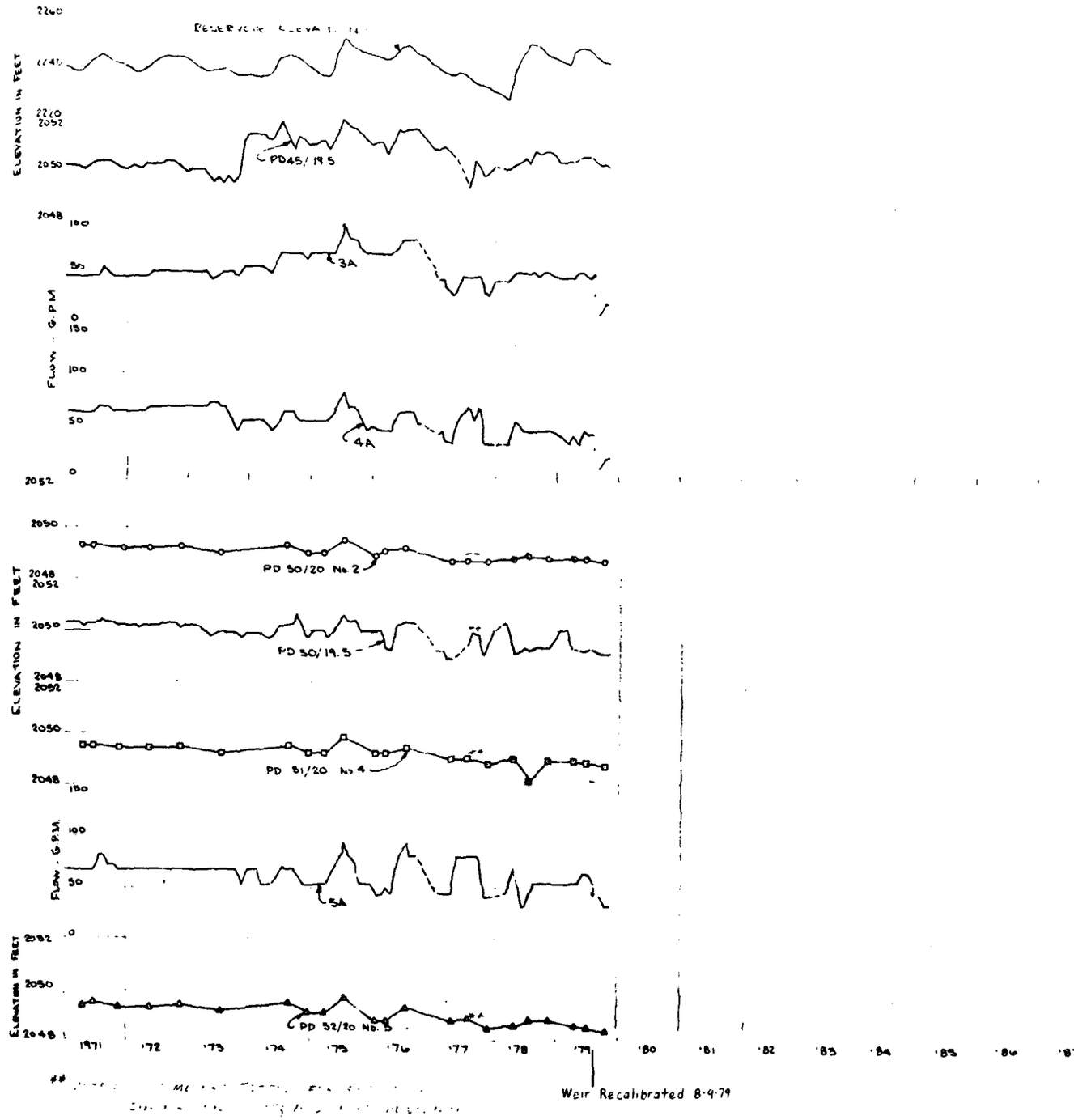
DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIEZ.

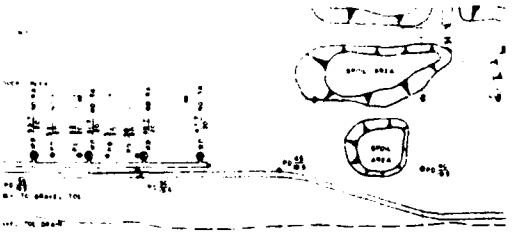
SAFETY DAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 83

2

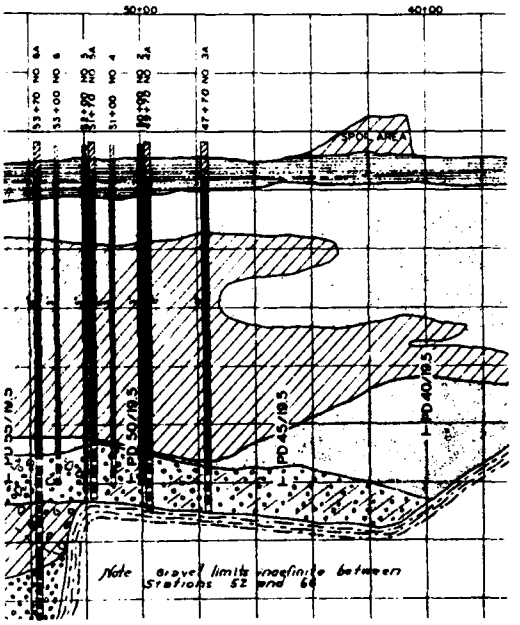

ELEVATION IN FEET
2260
2240
2220
2052
2050
2048
PD45/19.5
100
50
0
FLOW - G.P.M.
150
100
50
0
3A
4A
2052
2050
2048
PD 50/20 No. 2
2052
2050
2048
PD 50/19.5
2052
2050
2048
PD 51/20 No. 4
100
50
0
5A
2052
2050
2048
PD 52/20 No. 5
1971
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
'84
'85
'86
'87
Weir Recalibrated 8-9-79



LEGEND

● Permanent Pressure Relief Wells

• Piezometer Pipe (Existing)



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

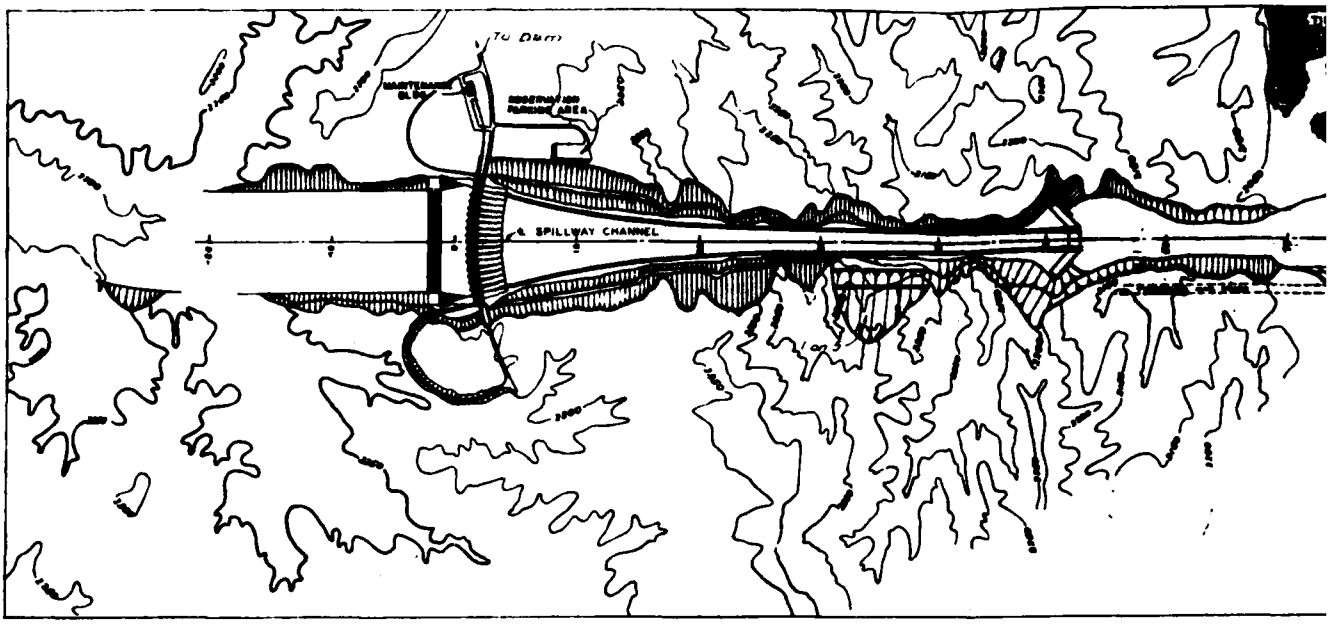
MISSOURI RIVER
FORT PECK DAM

DOWNSTREAM TOE AREA
RELIEF WELLS AND RELIEF WELL PIPE

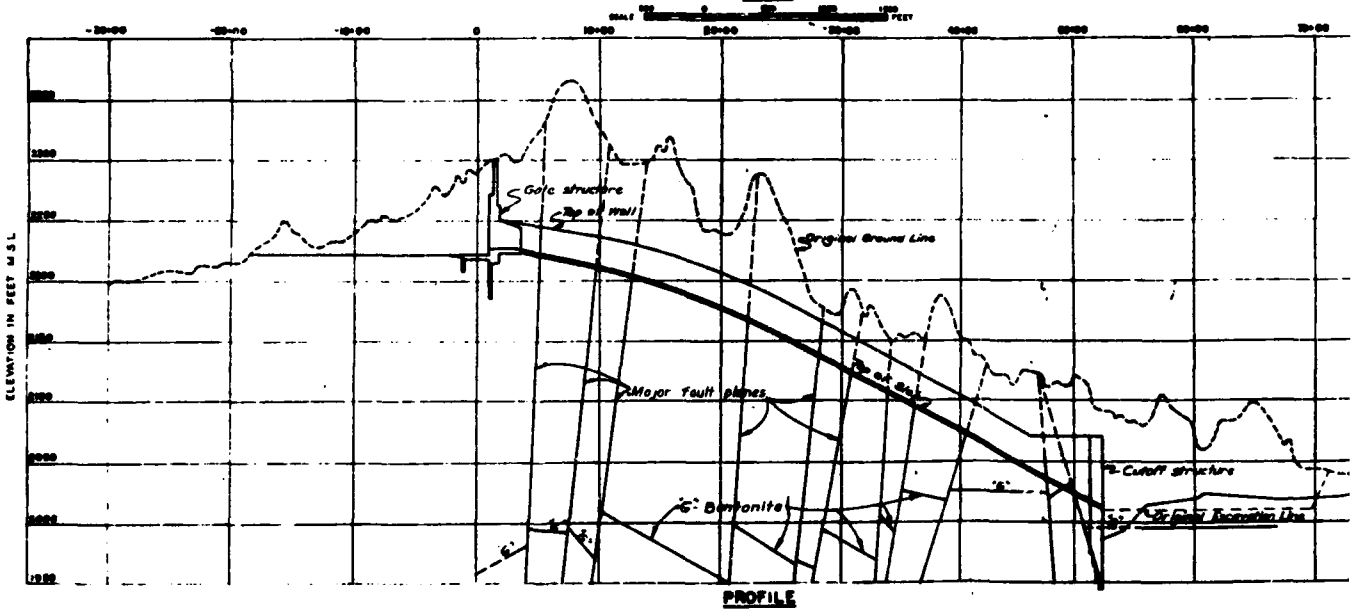
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT 2 PLATE 84



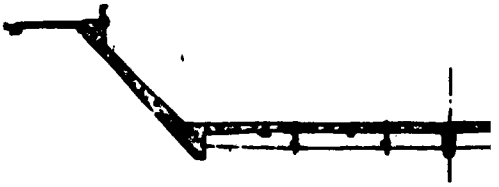
PLAN



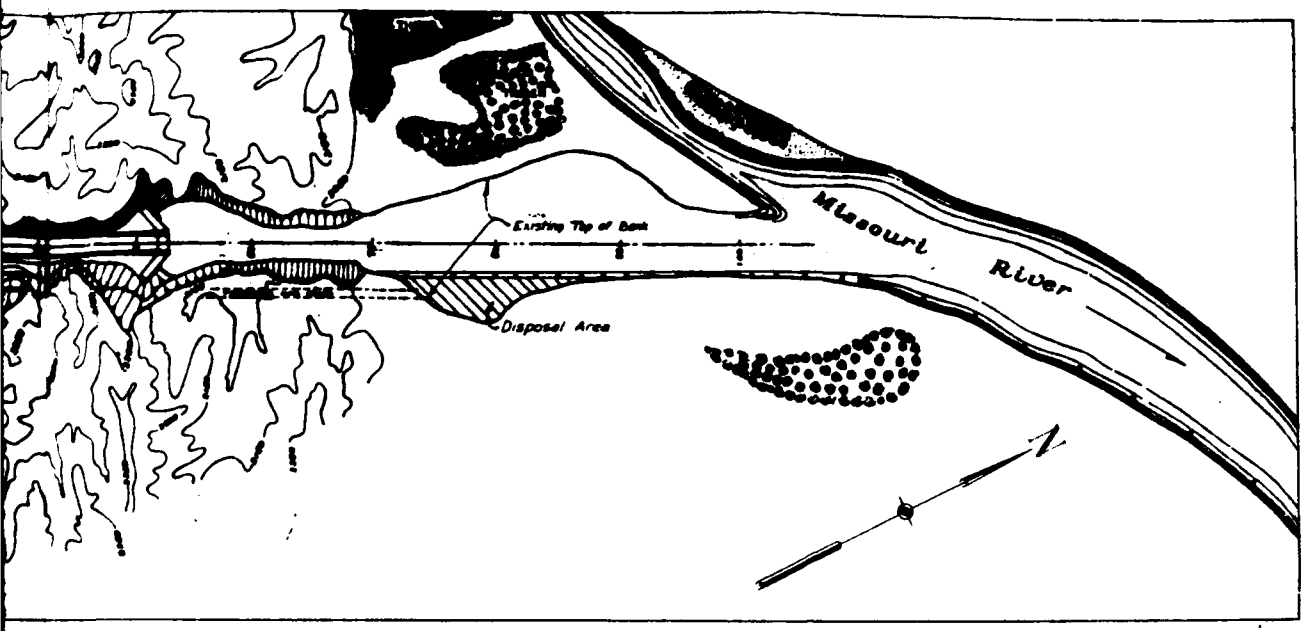
PROFILE

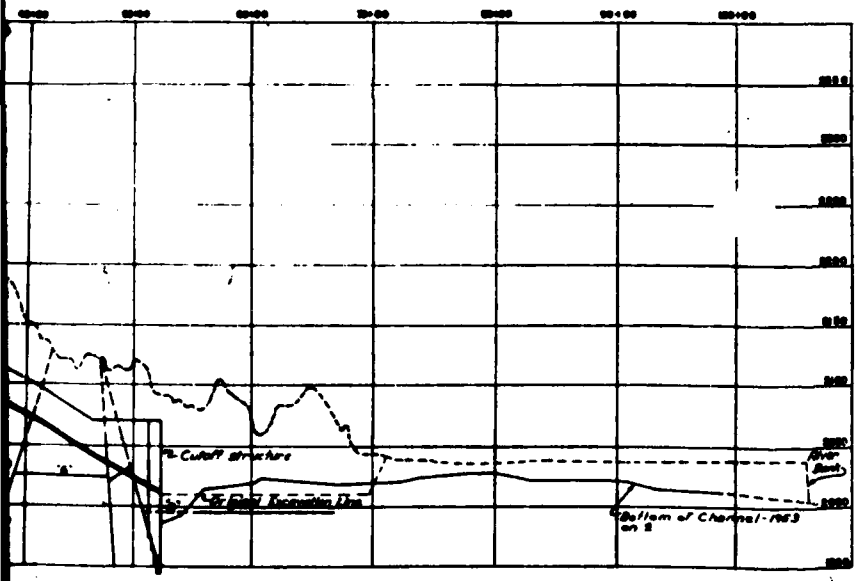


TYPICAL SECTION THRU GATE STRUCTURE



TYPICAL SECTION TH





THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



TYPICAL SECTION THRU CHANNEL

DATE	DESCRIPTION	MADE	APPR'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

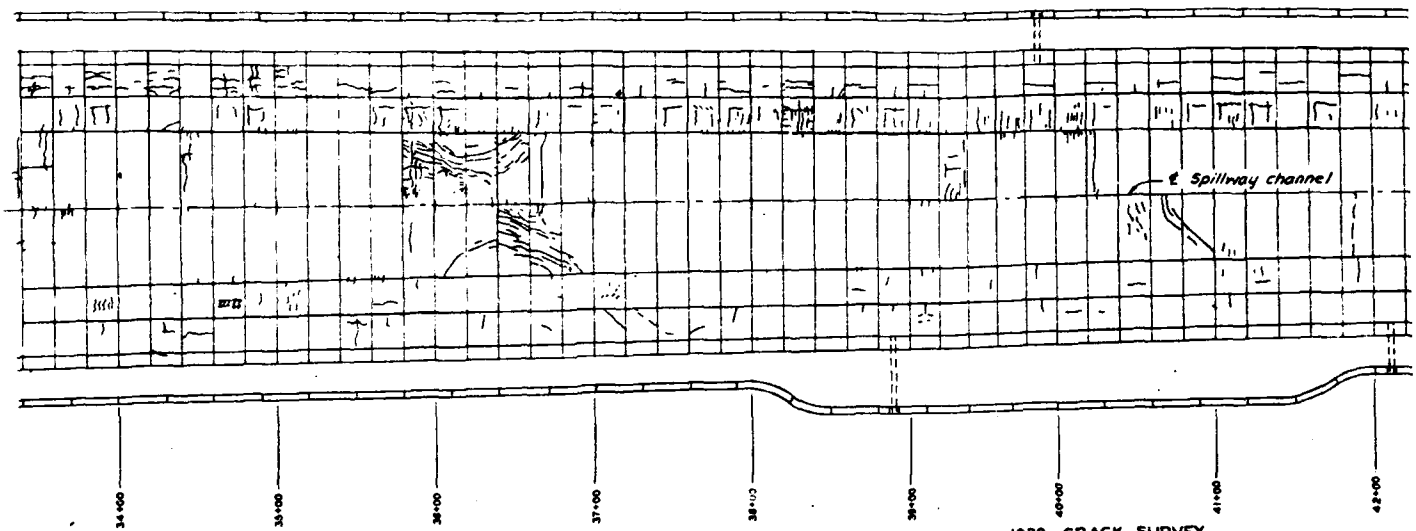
DESIGNED BY C.V.J.
DRAWN BY B.R.A.
CHECKED BY O.W.A.
SUBMITTED BY
RECOMMENDED FOR ADOPTION
APPROVED
CHIEF, ENGINEERING DIVISION

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
PLAN, PROFILE, TYPICAL SECTIONS AND SPOIL AREAS

APPROVED
CHIEF, ENGINEERING DIVISION
DATE SEPT. 1966
SCALE AS SHOWN
DWG. NO.
DRAWING NUMBER
SHEET

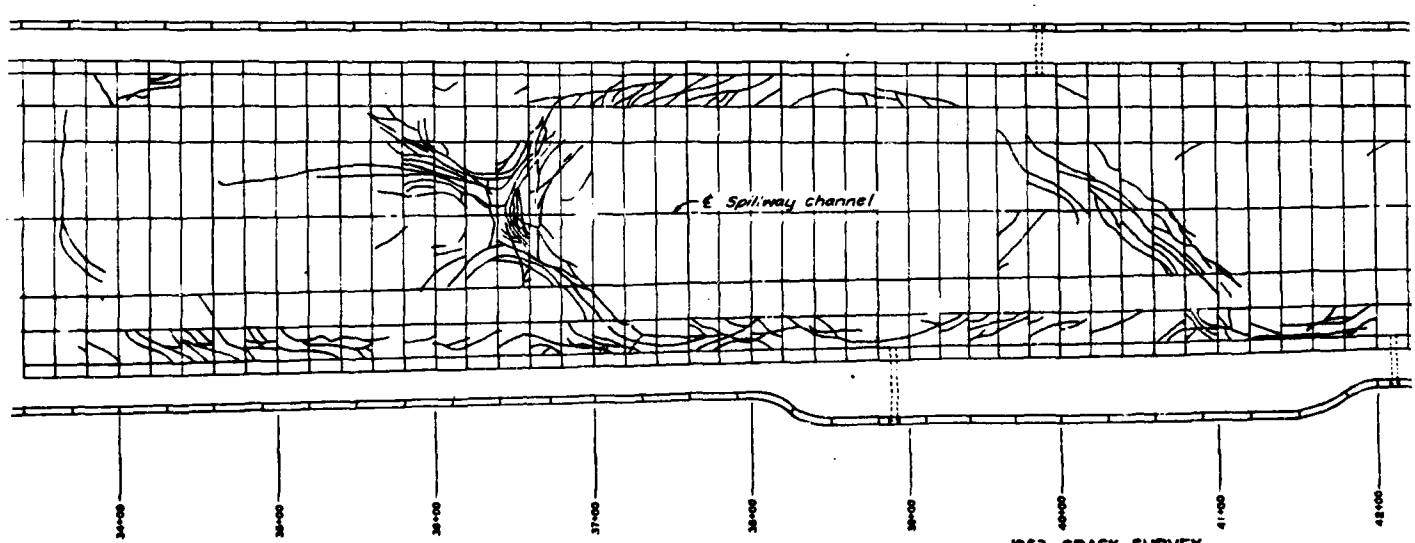
U.S. ARMY ENGINEER DISTRICT, OMAHA

CORPS OF ENGINEERS



1939 CRACK SURVEY

SCALE 1 INCH = 60 FEET



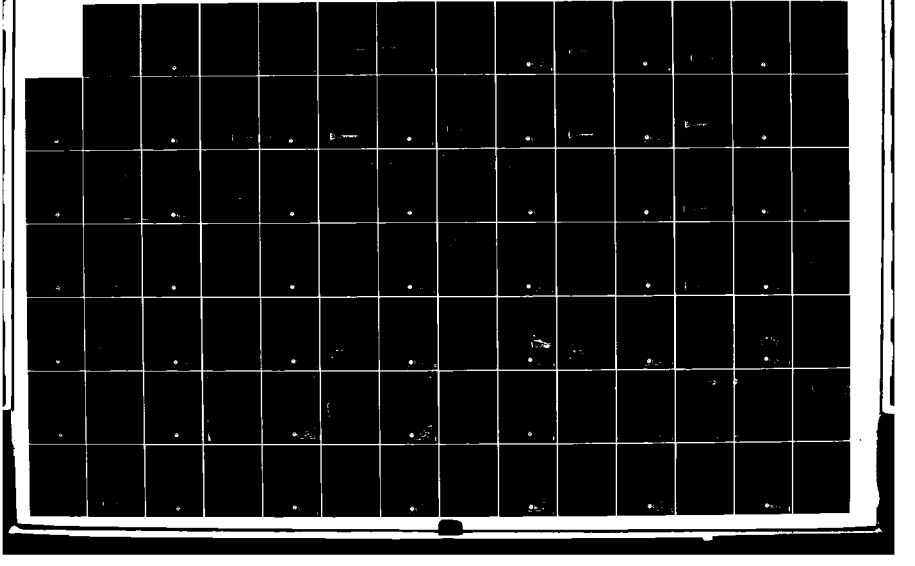
1963 CRACK SURVEY

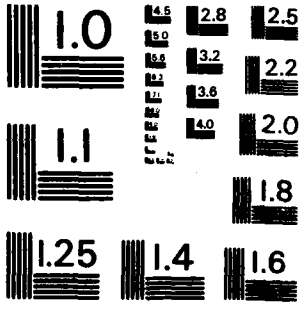
THIS DRAWING HAS BEEN REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE.

AD A134 914 CONSTRUCTION FOUNDATION REPORT MISSOURI RIVER FORT PECK MONTANA VOLUME 2 DRAWINGS(U) ARMY ENGINEER DISTRICT OMAHA NE JAN 83

3/4

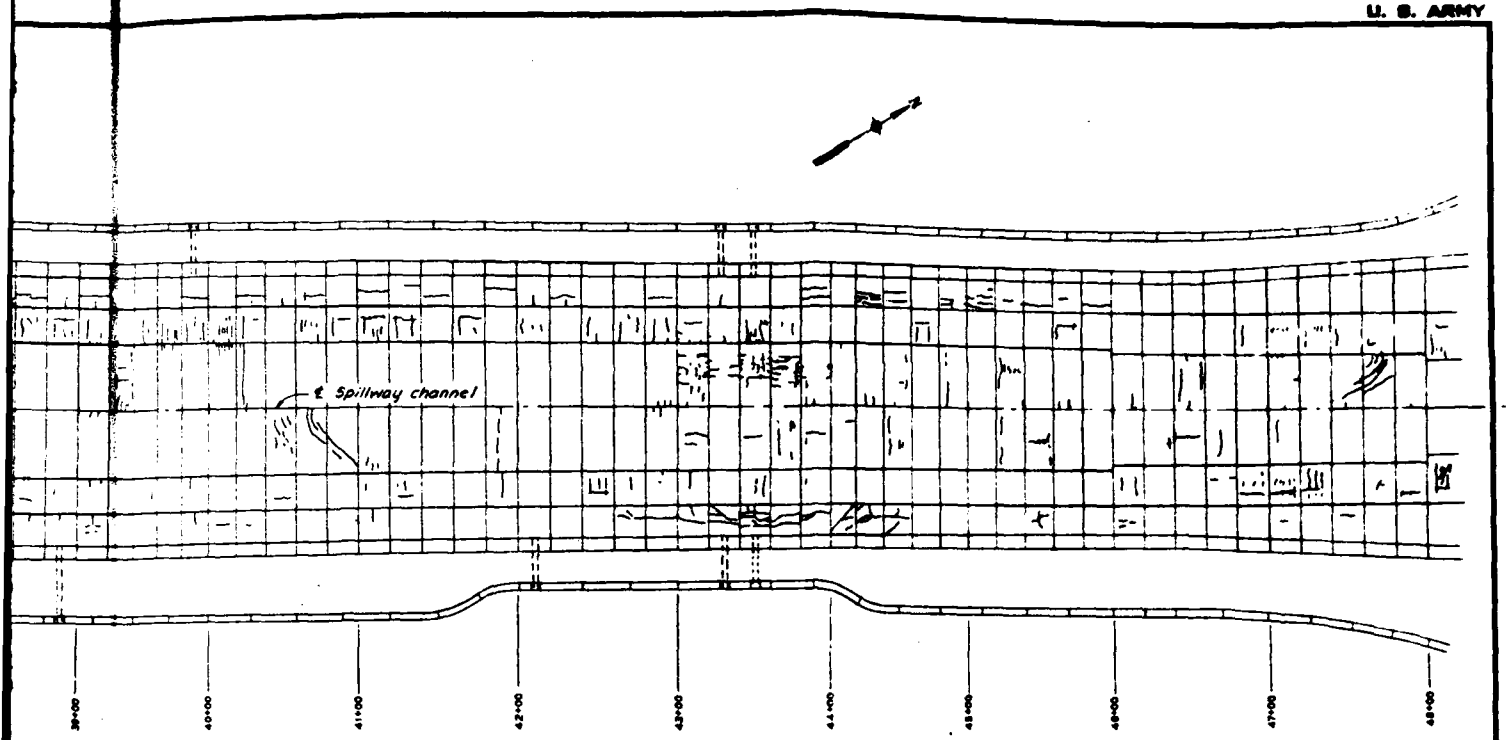
UNCLASSIFIED F/G 13/13 NL





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

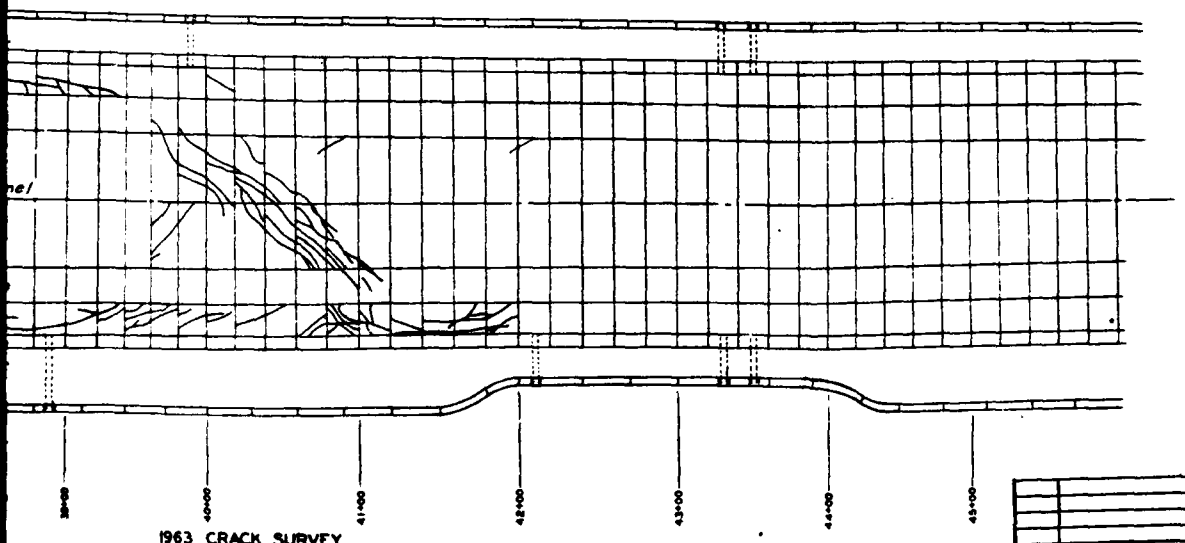
U. S. ARMY



1939 CRACK SURVEY

SCALE 1 INCH = 40 FEET

40 0 40'



1963 CRACK SURVEY

SAFETY PAYS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION

CRACK SURVEYS
1939 VS 1963

DRAWN BY C.P.J.-G.W.A.

TRACED BY G.W.A.

APPROVED Charles E. Hipp

DATE SEPT. 1963

APPROVED Harold J. St. Clair

CHIEF, ENGINEERING DIVISION

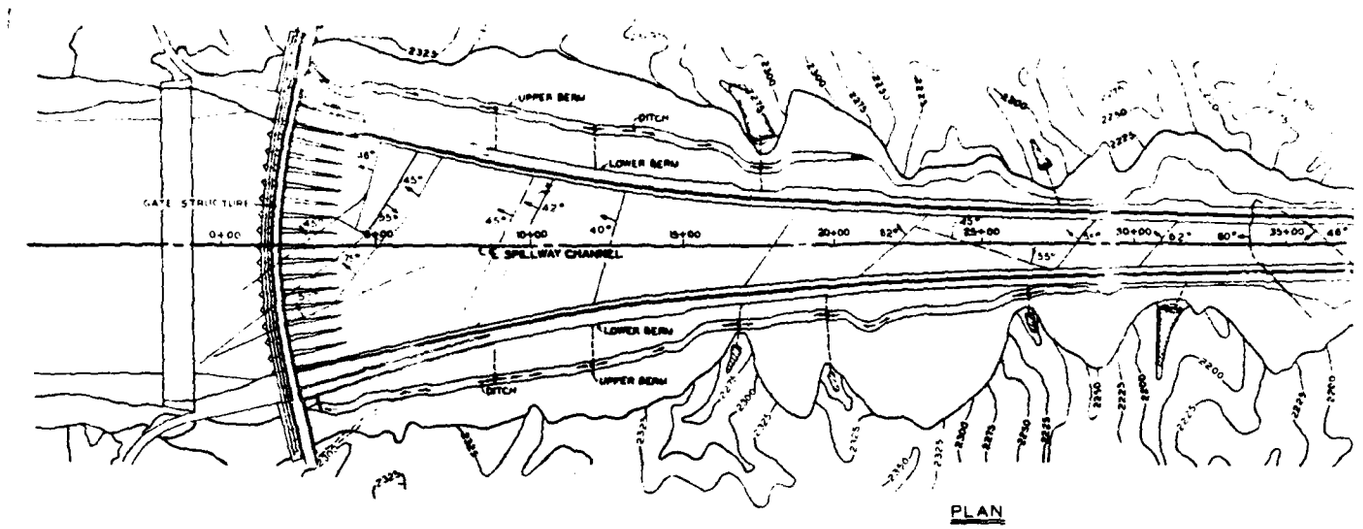
THIS PLAN ACCOMPANIES CONTRACT NO. DA-23-[illegible]

IDENTIFICATION NO.

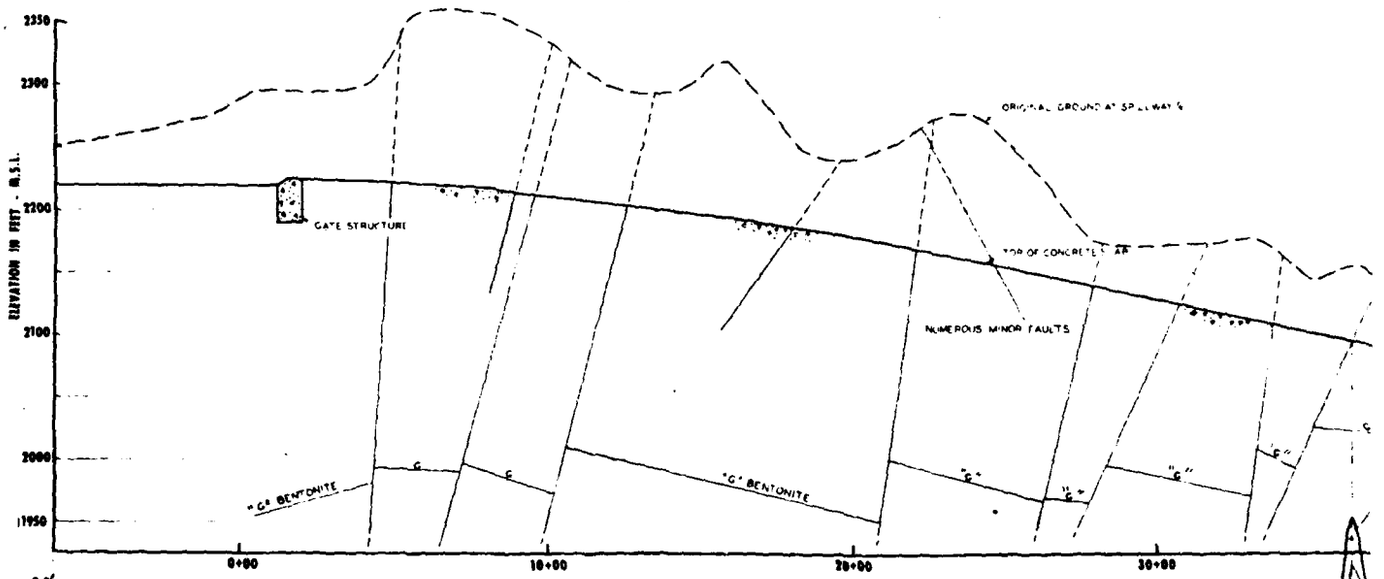
CONSTRUCTION FOUNDATION REPORT

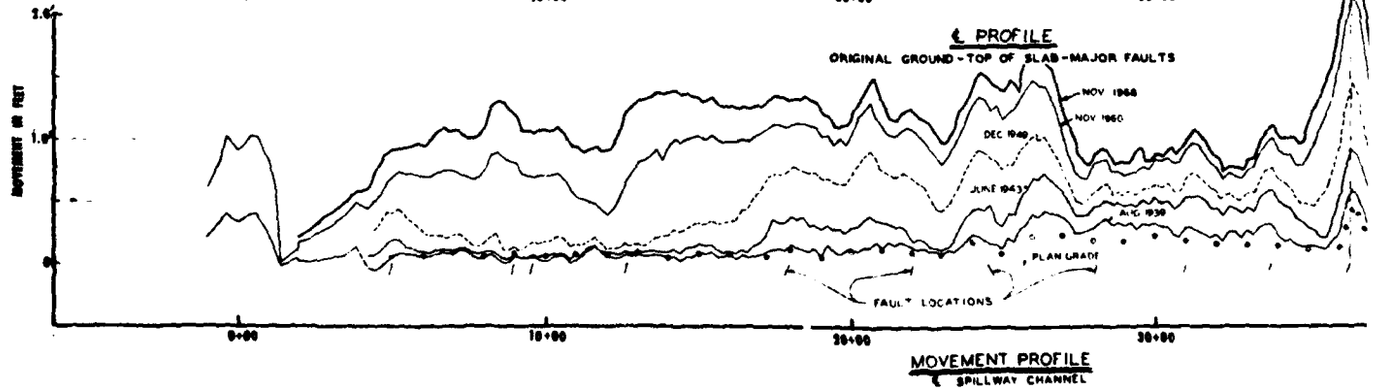
PLATE 86

2

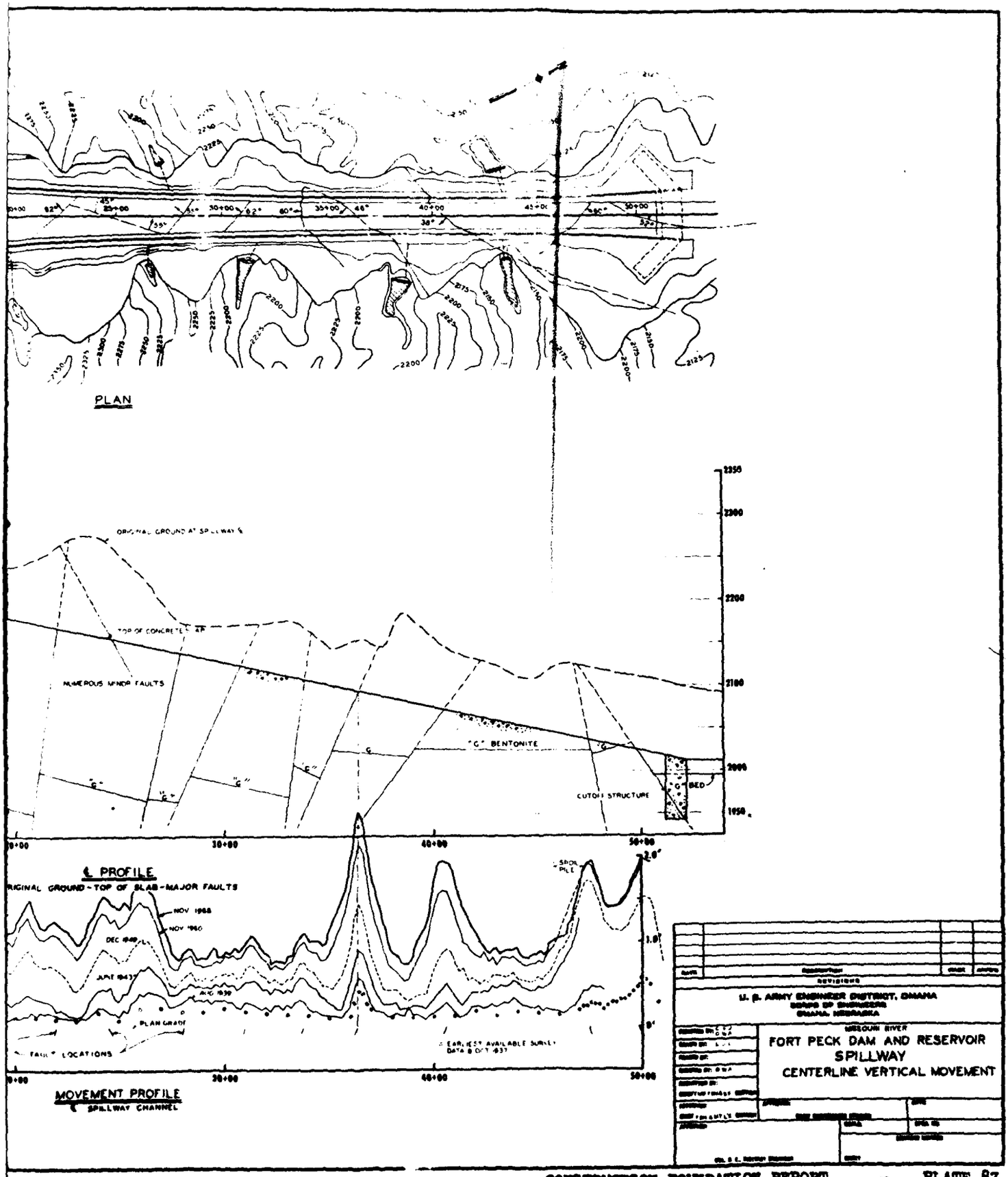


PLAN



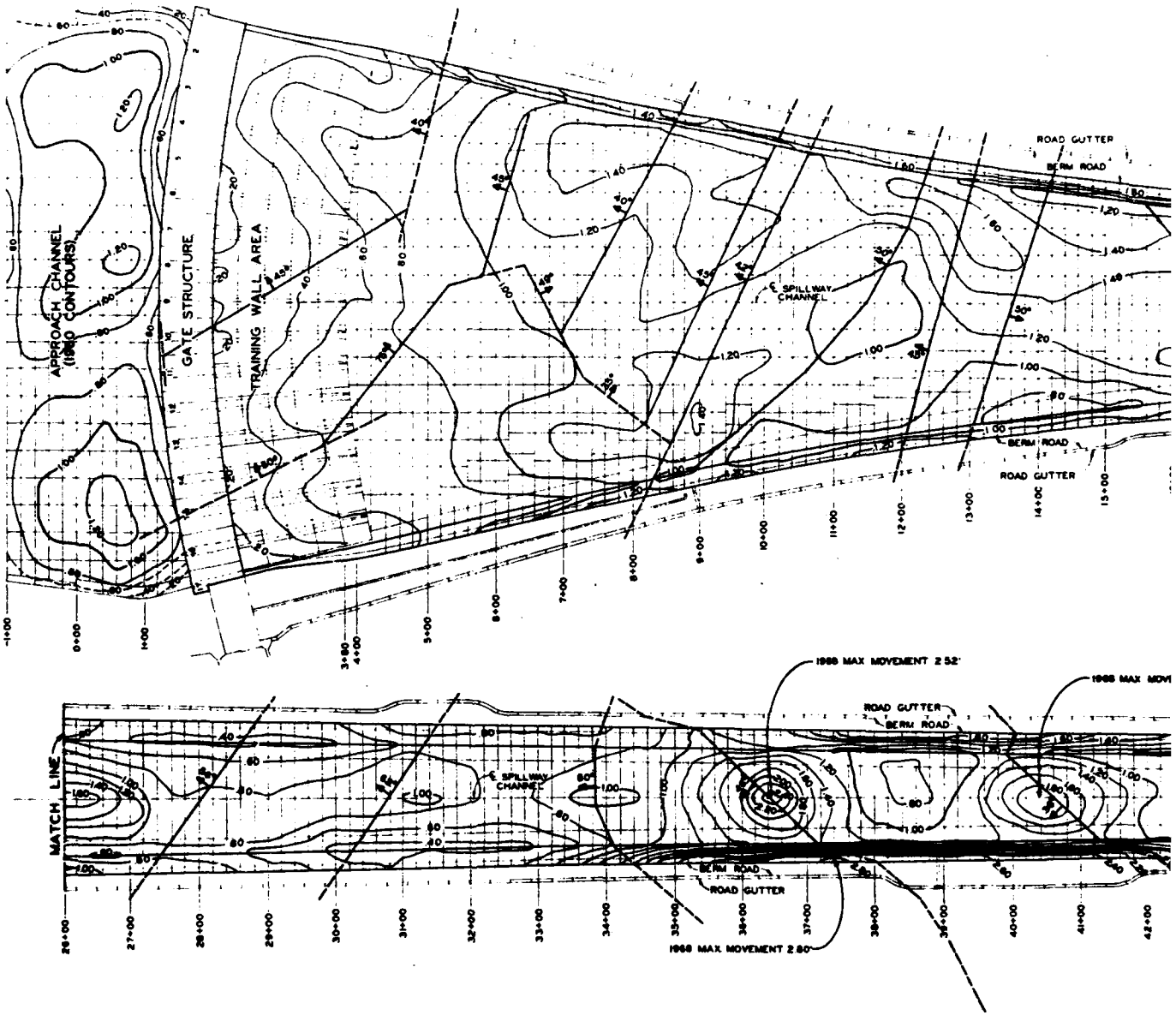


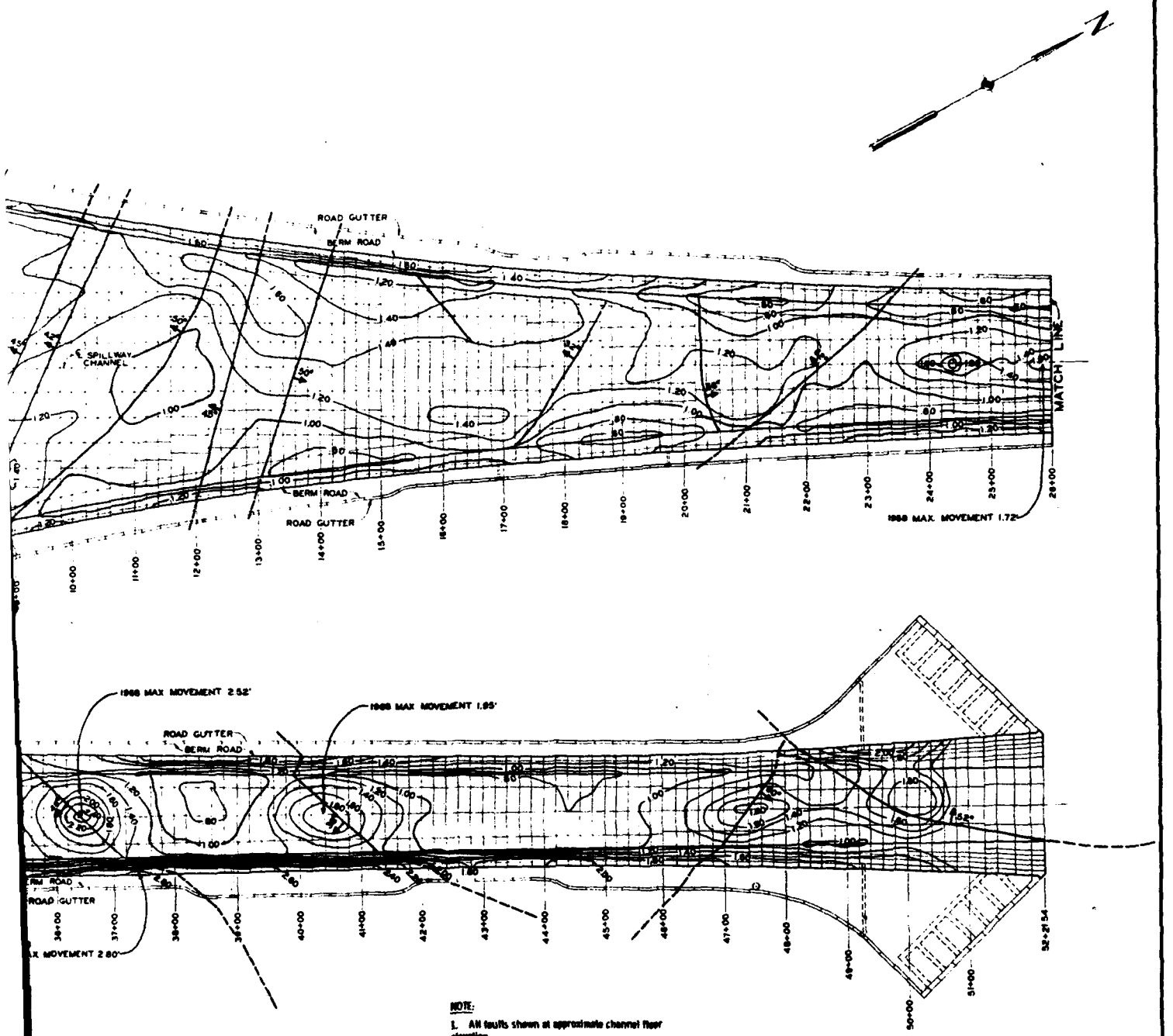
MOVEMENT PROFILE
℄ SPILLWAY CHANNEL



U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY
CENTERLINE VERTICAL MOVEMENT


APPROACH CHANNEL (1980 CONTOURS)
GATE STRUCTURE
TRAINING WALL AREA
E. SPILLWAY CHANNEL
ROAD GUTTER
BERM ROAD
ROAD GUTTER
BERM ROAD
1988 MAX MOVEMENT 2.52'
1988 MAX MOVEMENT 2.80'
MATCH LINE
E. SPILLWAY CHANNEL
BERM ROAD
ROAD GUTTER



NOTE:

1. All faults shown at approximate channel floor elevation.

LEGEND:

Fault showing direction and amount of dip.

Contours show feet of vertical displacement (1968).

Approach Channel Contours (1960)

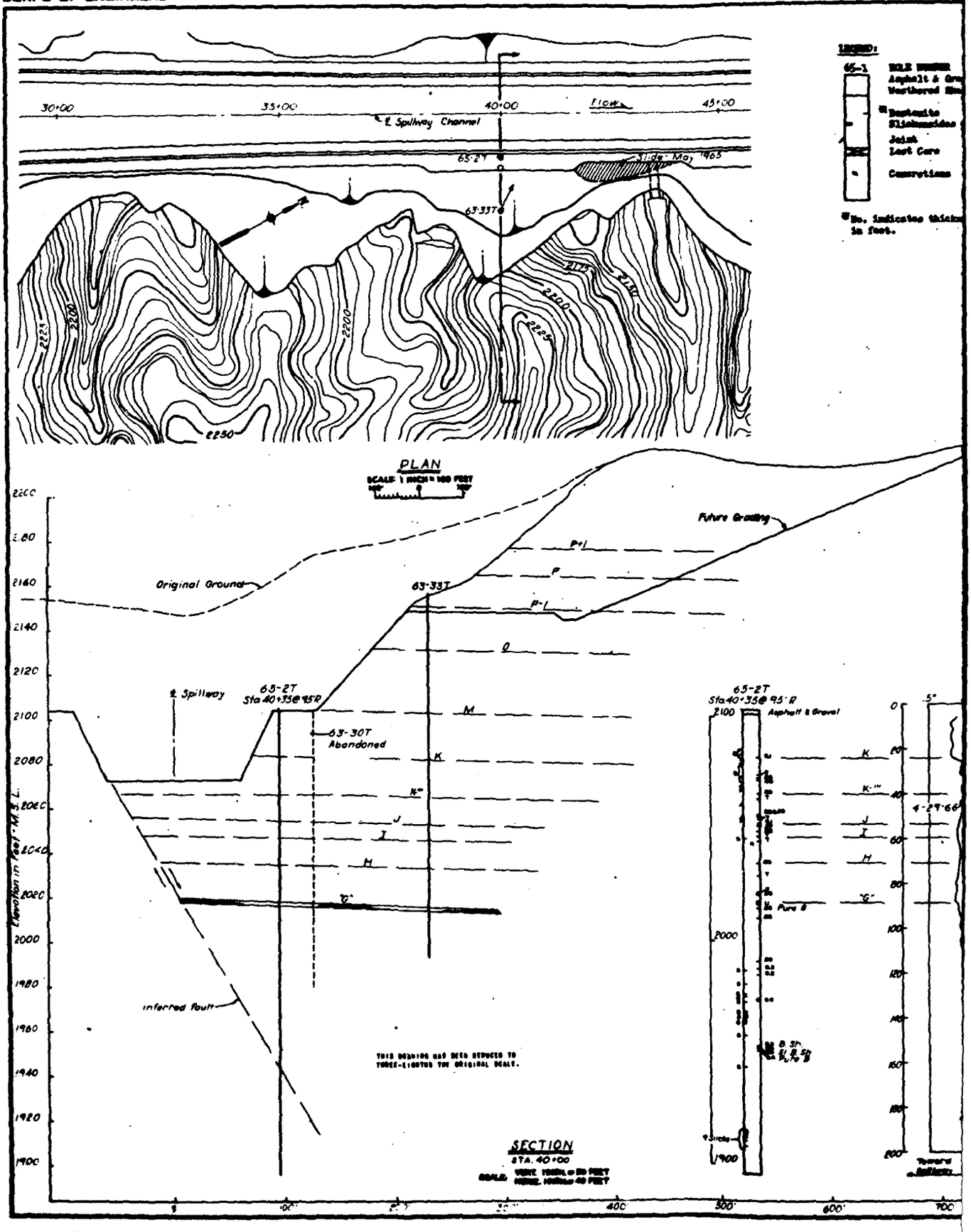
SCALE 1 INCH 80 FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY
VERTICAL DISPLACEMENT CONTOURS
NOVEMBER 1968

CORPS OF ENGINEERS

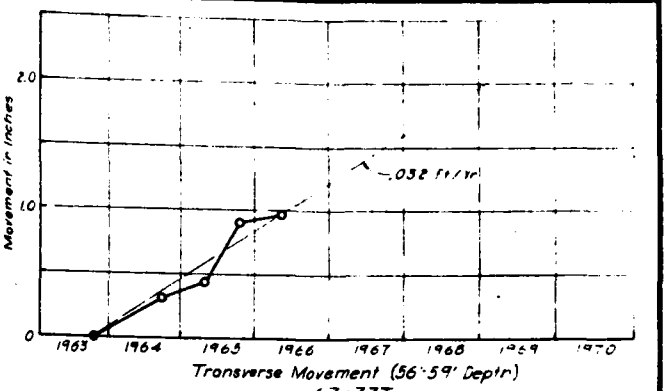


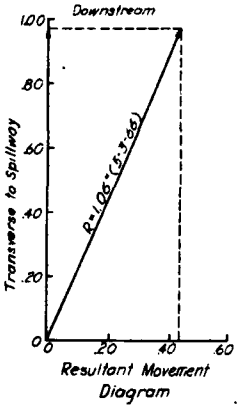


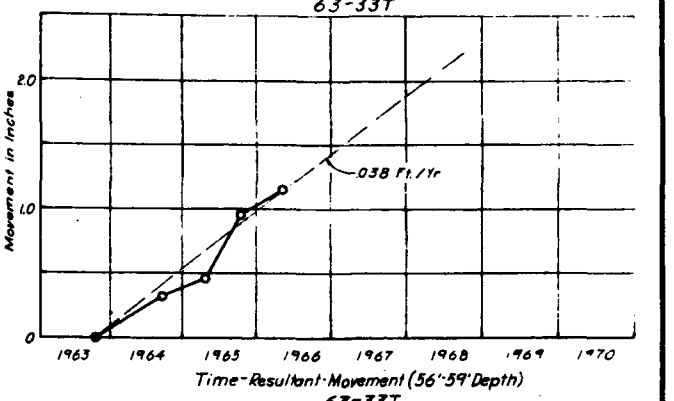
LEGEND:

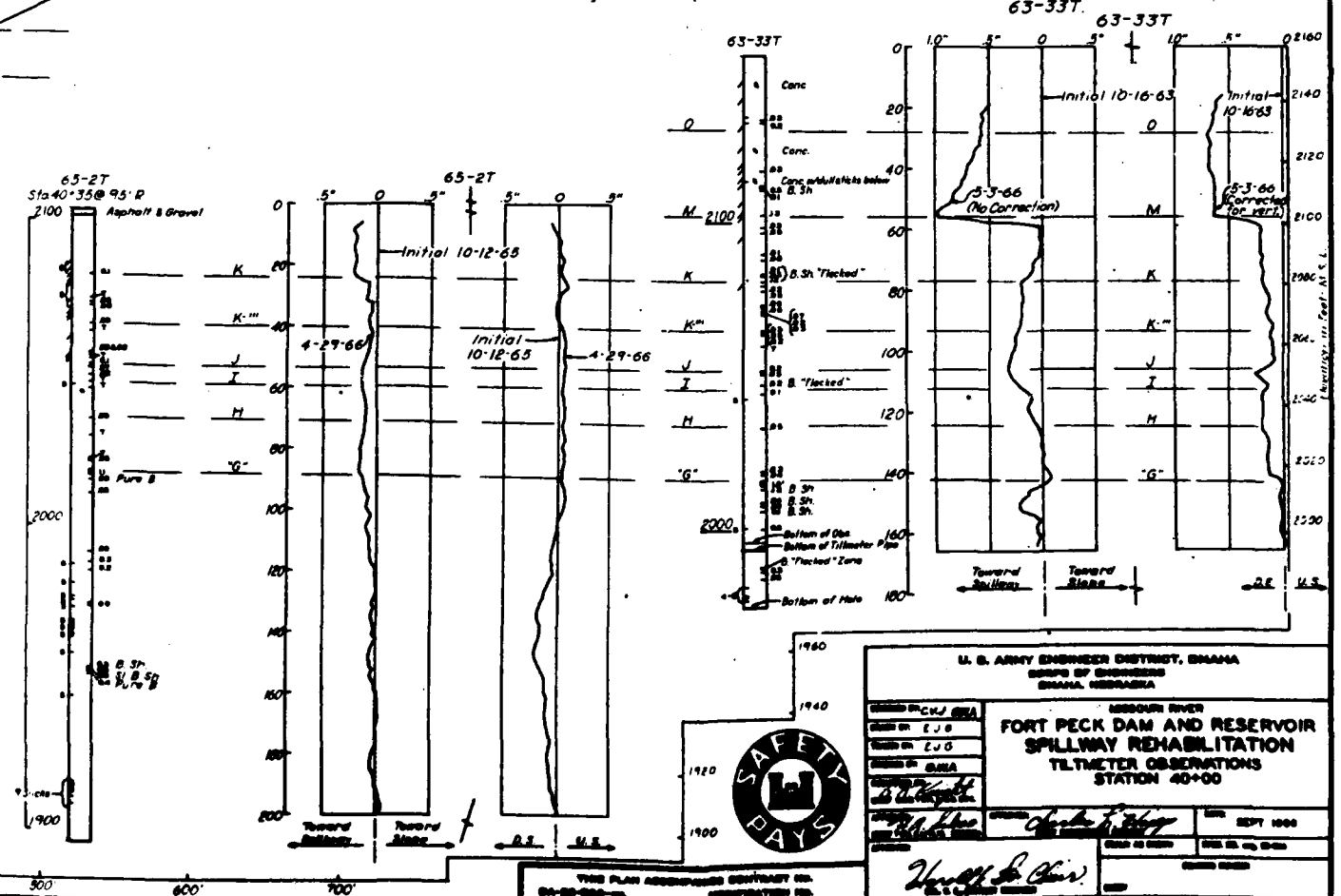
65-1 HOLE NUMBER
Asphalt & Gravel or Weathered Shale
Bentonite Claystone
Joint
Lost Core
Concretions

*No. indicates thickness in feet.









U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
TILTMETER OBSERVATIONS
STATION 40+00

SEPT 1966

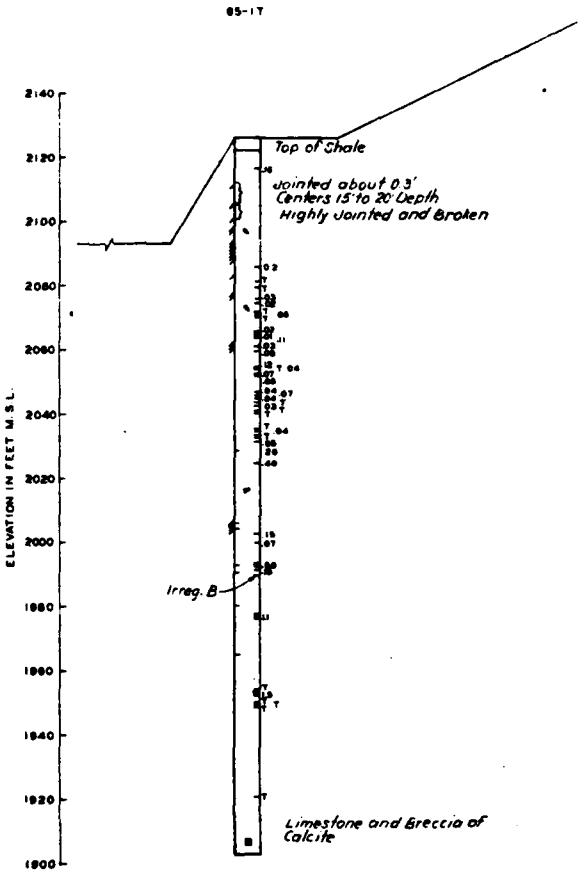
SAFETY PAYS

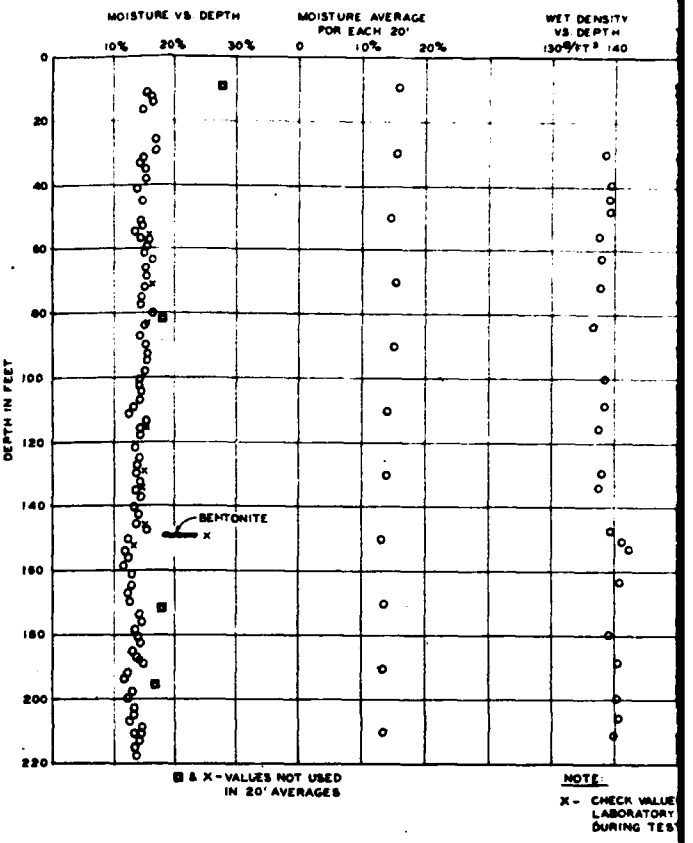
CONSTRUCTION FOUNDATION REPORT

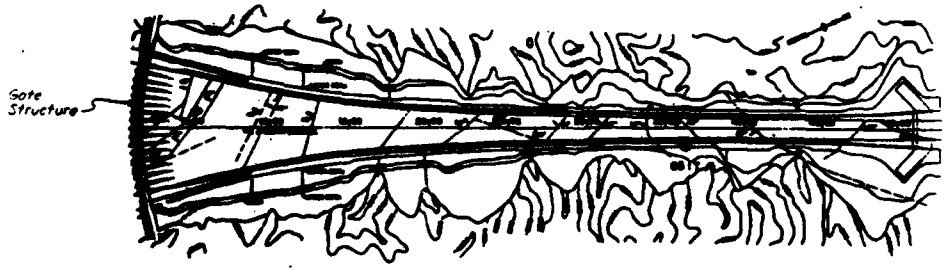
PLATE 89

2

CORPS OF ENGINEERS

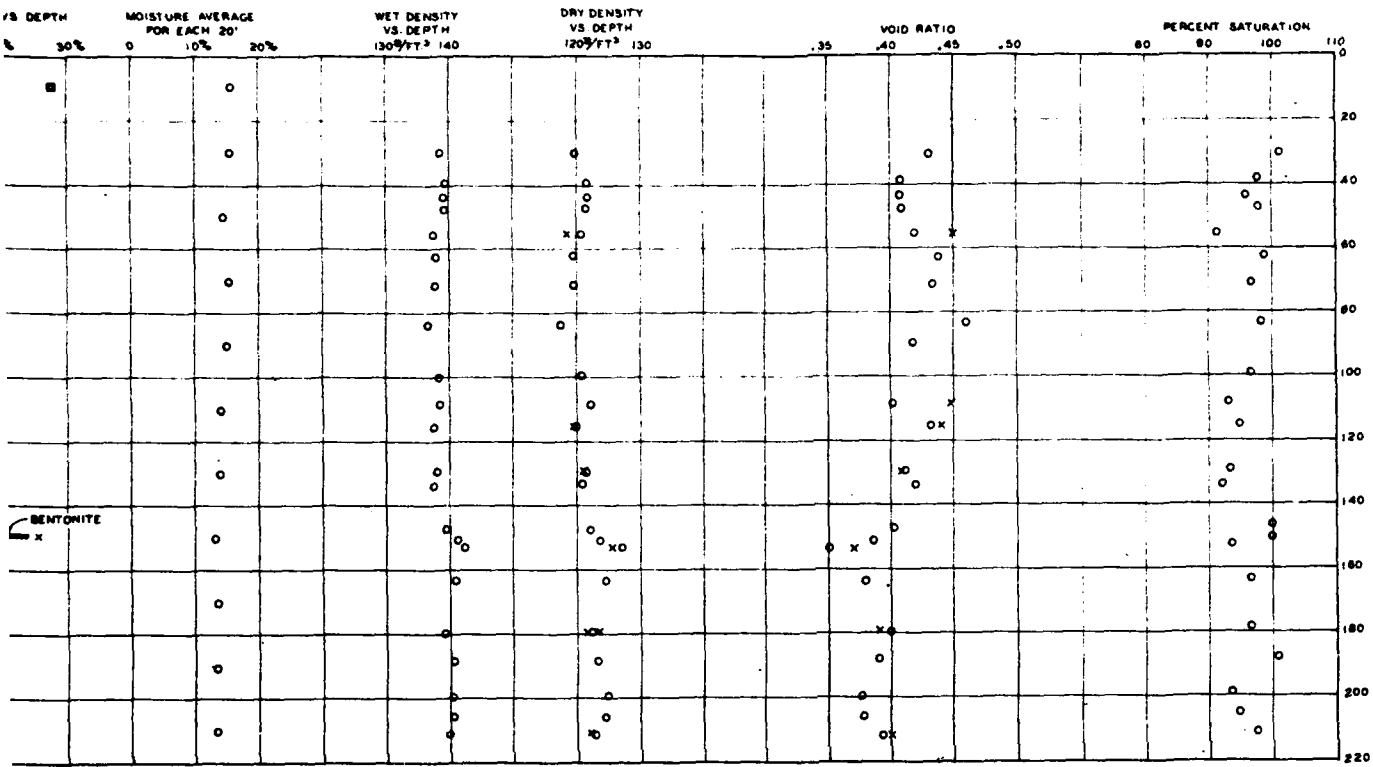






KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO
100ES-1100THS THE ORIGINAL SCALE.



O & X - VALUES NOT USED IN 20' AVERAGES

NOTE:
X - CHECK VALUES DETERMINED FROM LABORATORY ANALYSIS OF SAMPLES DURING TESTING.

VOID RATIO AND PERCENT SATURATION DETERMINED USING CONSTANT VALUE OF $G_s = 2.75$

LEGEND:

65-1 HOLE NUMBER
Asphalt & Gravel or Weathered Shale
Bentonite
Slickensides
Joint
Lost Core
Concretions

*No. indicates thickness in feet.

SAFETY PAYS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
HOLE 65-1T
MOISTURE, DENSITY, VOID RATIO AND PERCENT SATURATION

DESIGNED BY: C.W.A-C.V.J.
DRAWN BY: B.A.
TRACED BY: B.A.
CHECKED BY: D.W.A.
APPROVED:
DATE: SEPT 1960

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

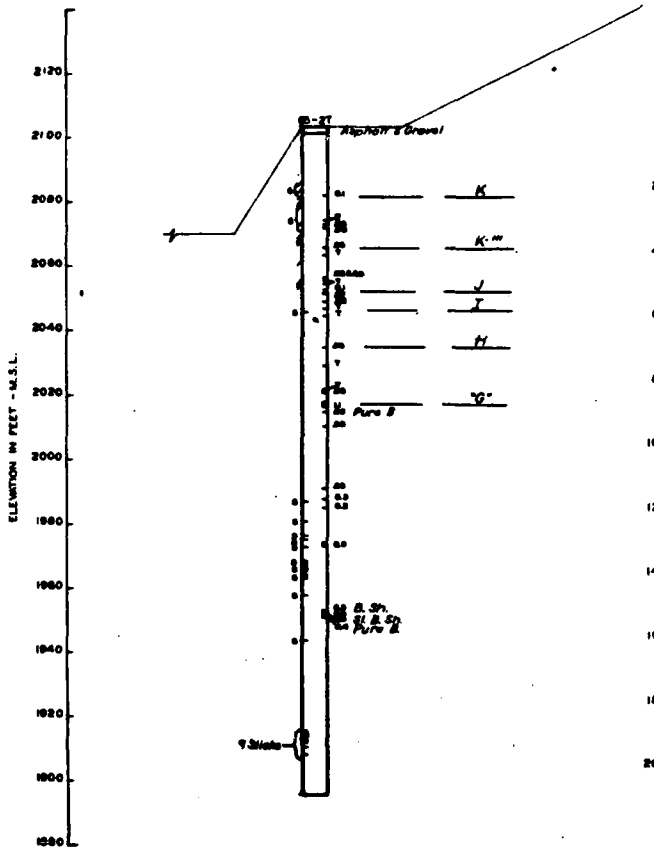
THIRD PLAN ASSEMBLY CONTRACT NO. DA-39-066-eng-
IDENTIFICATION NO.

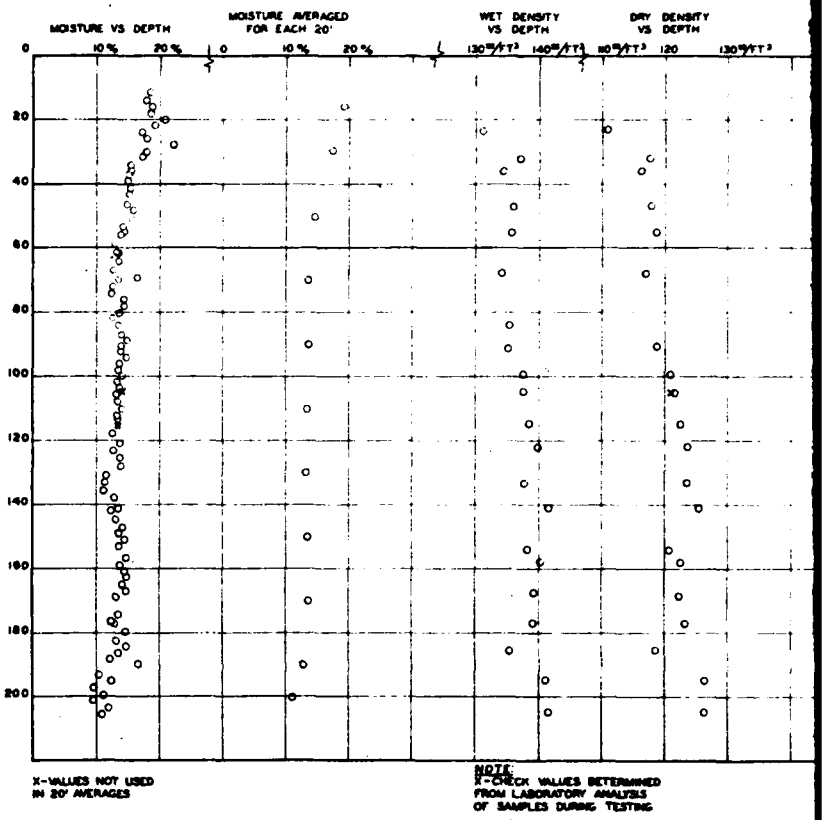
CONSTRUCTION FOUNDATION REPORT

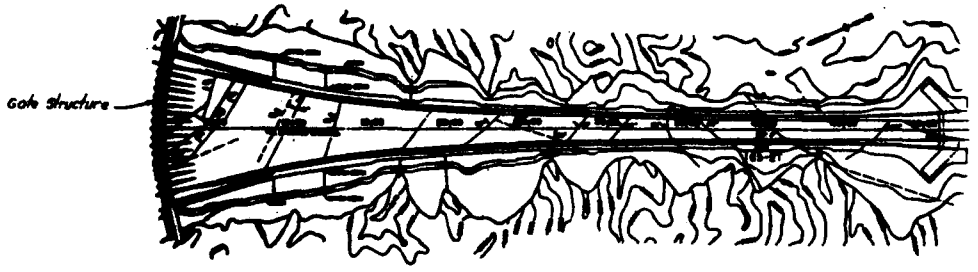
PLATE 90

2

CORPS OF ENGINEERS

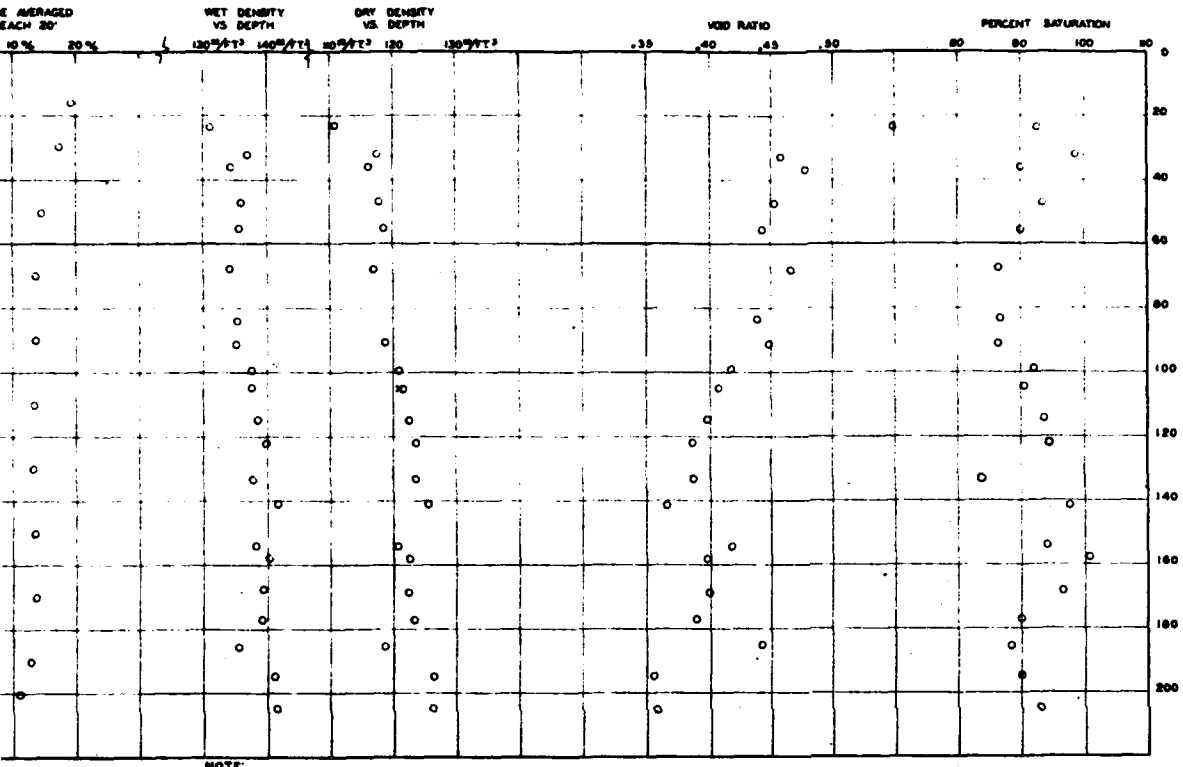






KEY PLAN

This drawing was reduced to three-eighths the original scale.



NOTE:
X-CHECK VALUES DETERMINED FROM LABORATORY ANALYSIS OF SAMPLES DURING TESTING

VOID RATIO AND PERCENT SATURATION DETERMINED USING CONSTANT VALUE OF G_s=2.75



LEGEND:



65-1 HOLE NUMBER
Asphalt & Gravel or Weathered Shale
*Bentonite Slickensides
Joint
Lost Core
Concretions

*No. indicates thickness in feet.



REVISIONS			
DATE	DESCRIPTION	MADE	APPROVED

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
HOLE 65-2T
MOISTURE, DENSITY, VOID RATIO AND PERCENT SATURATION

DESIGNED BY C.H.J.-OMA
DRAWN BY D. E. R.
TRACED BY D. E. R.
CHECKED BY E. W. A.
APPROVED
DATE SEPT. 1966

THIS DRAWING AND DATA REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

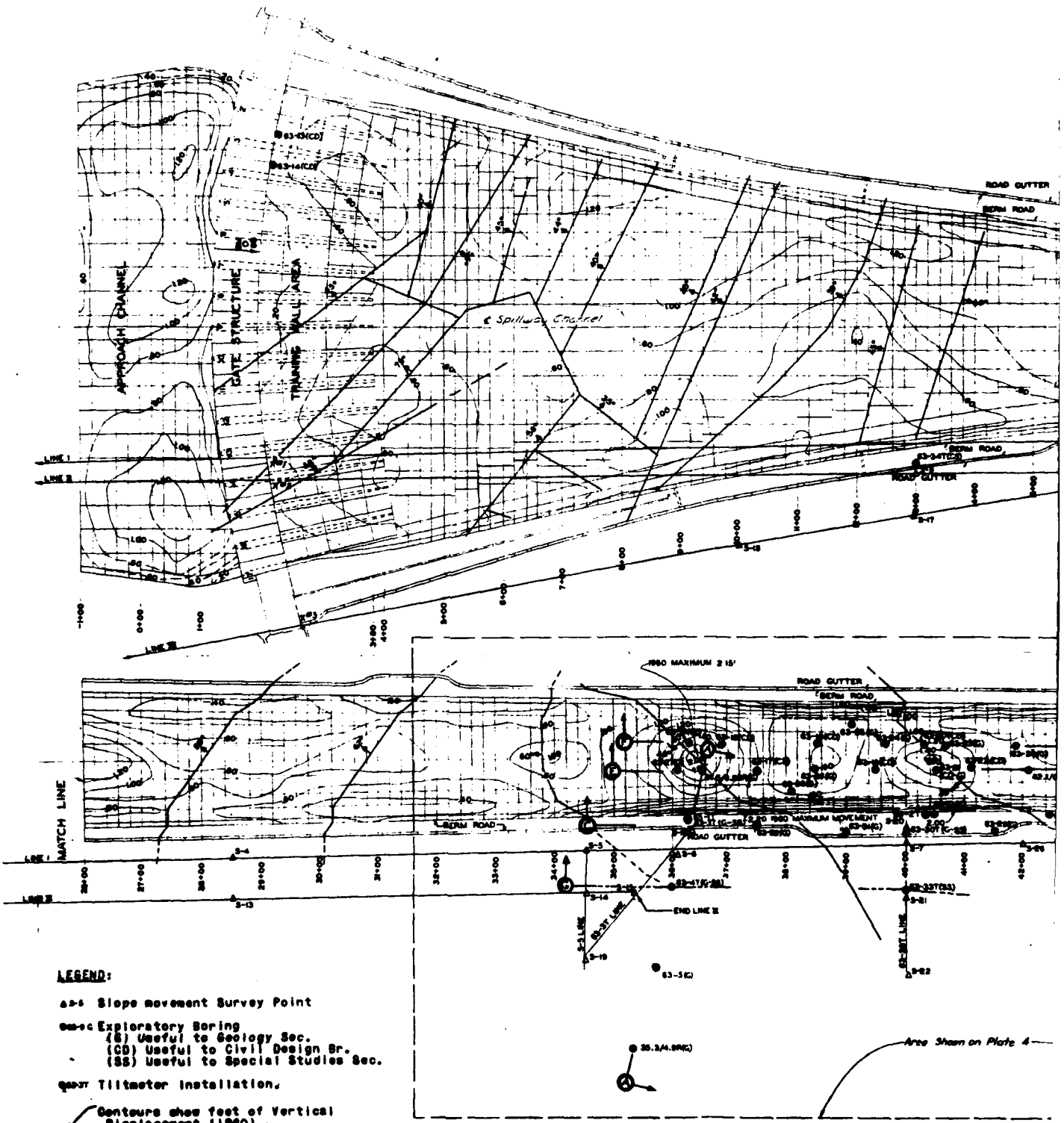
VOID PLAN ACCEPTED
DATE
SUBMITTED

CONSTRUCTION FOUNDATION REPORT

PLATE 91

2

CORPS OF ENGINEERS



LEGEND:

△-△ Slope movement Survey Point

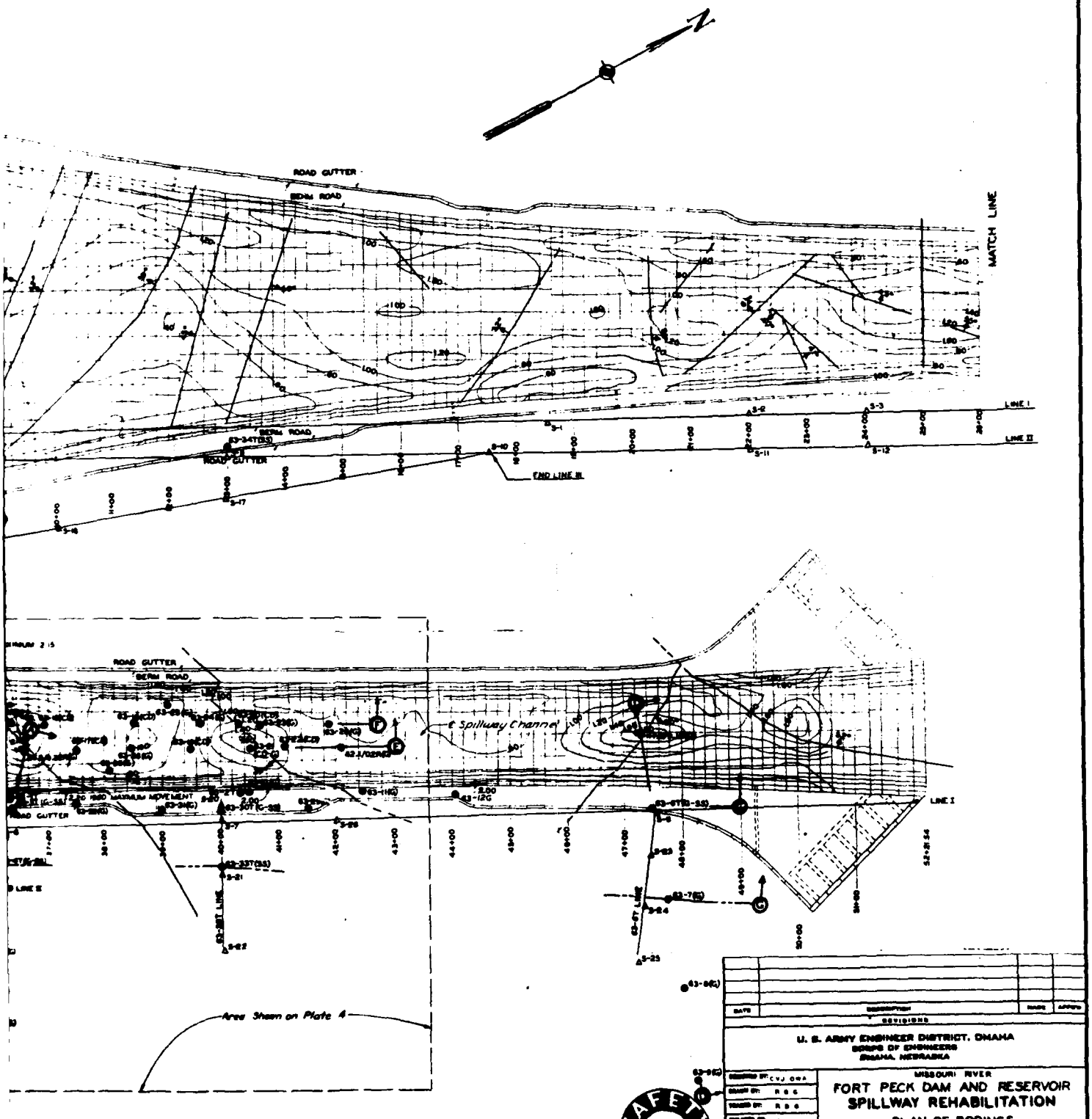
●-● Exploratory Boring
(G) Useful to Geology Sec.
(CD) Useful to Civil Design Br.
(SS) Useful to Special Studies Sec.

●-T Tiltmeter Installation.

Contours show feet of Vertical Displacement (1960)

SCALE 1 INCH = 8

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
PLAN OF BORINGS
& SURFACE MOVEMENT POINTS

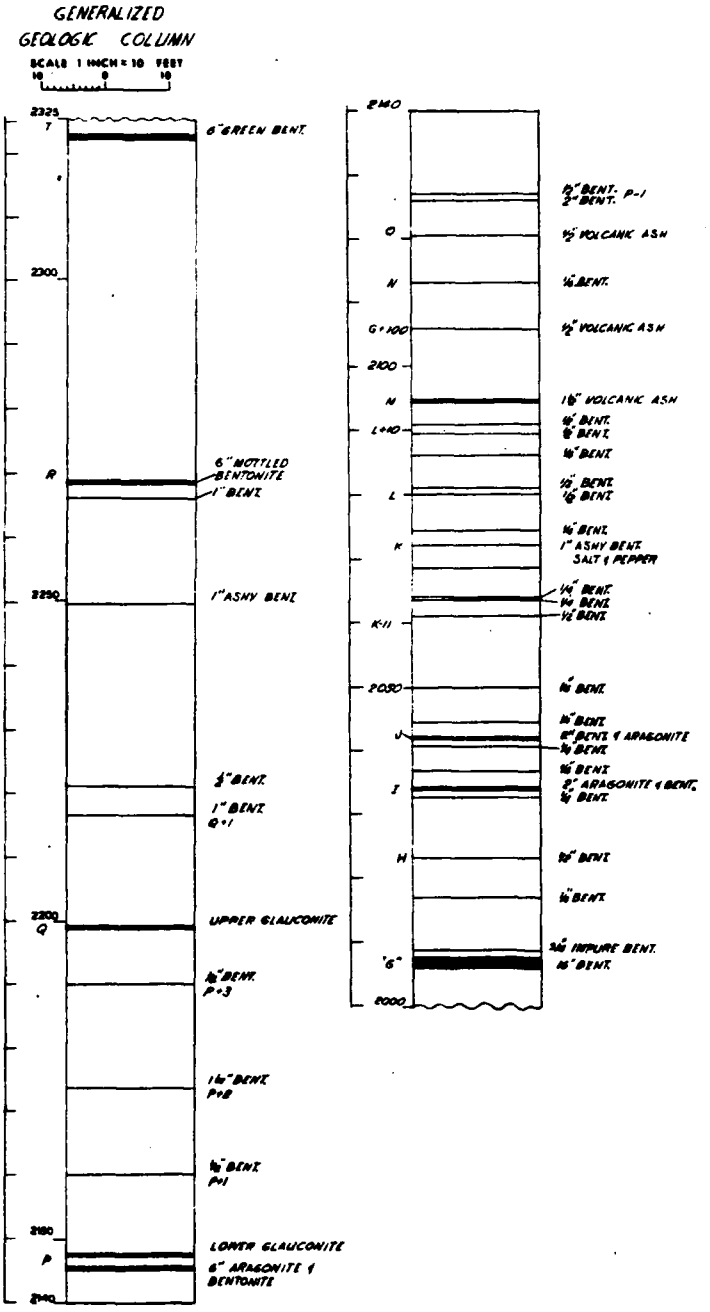
SEPT 1988

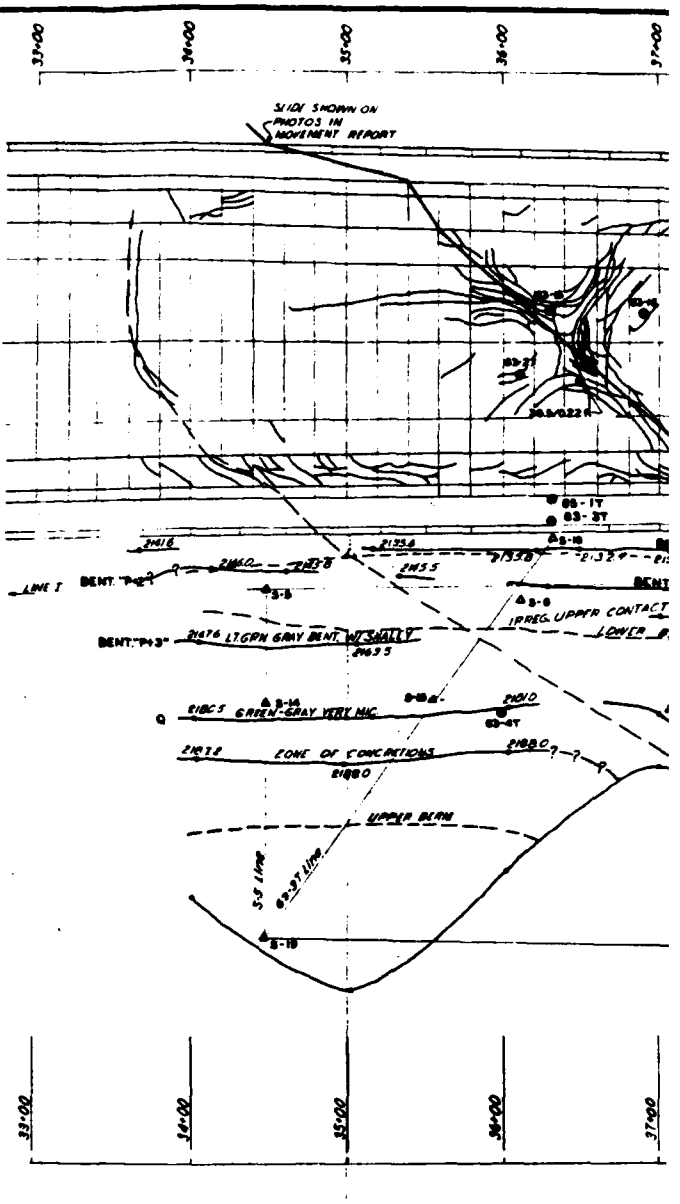
AS SHOWN

THIS PLAN ACCOMPANIES CONTRACT NO. DA-09-[illegible]

SAFETY PAYS

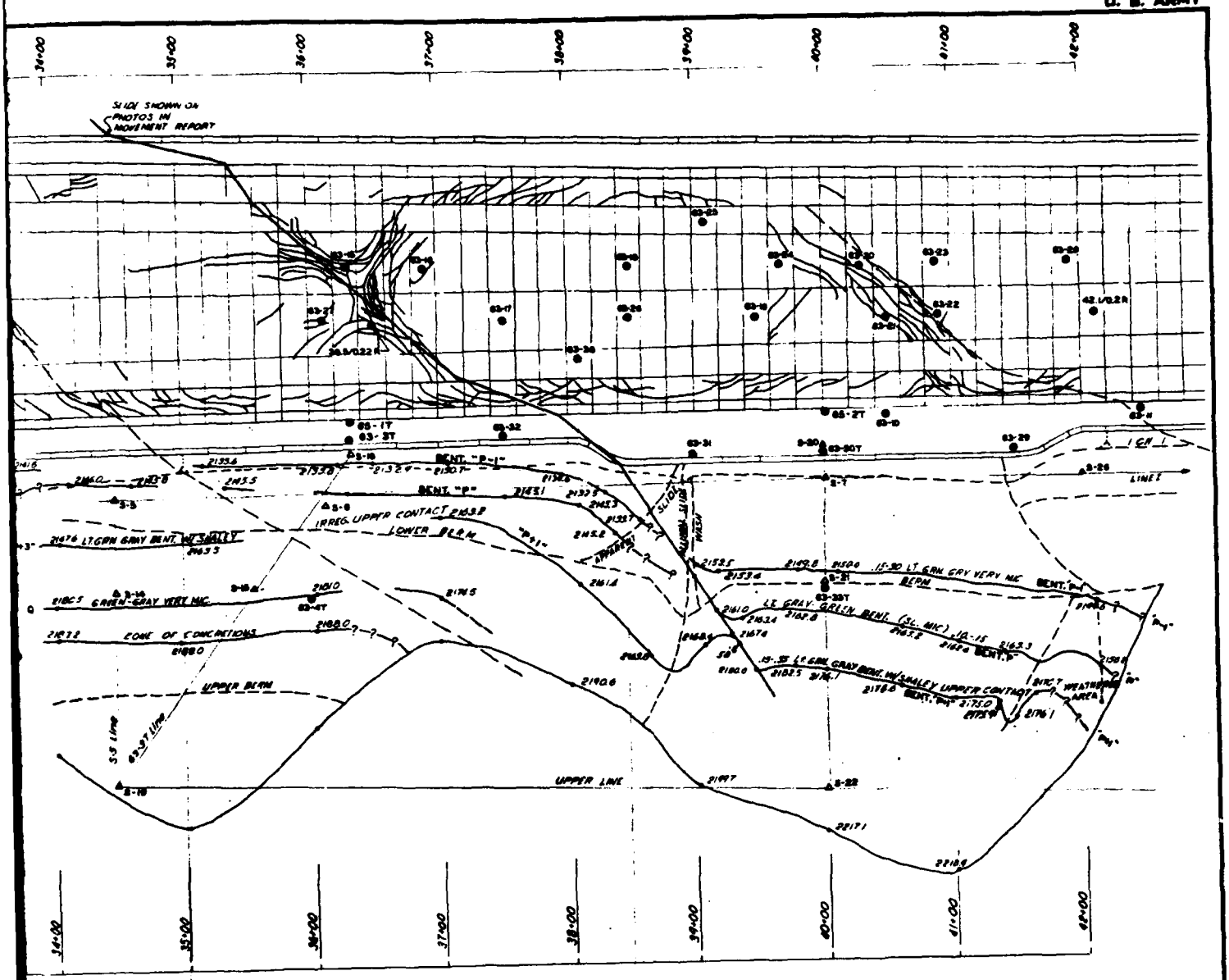
CORPS OF ENGINEERS





THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY



U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
CRACK SURVEY, SLOPE MAPPING
AND GEOLOGIC COLUMN

DESIGNED BY F.A.S.
DRAWN BY
TRACED BY
CHECKED BY F.A.S.
APPROVED
APPROVED
DATE SEPT 1988
SCALE AS SHOWN

SAFETY PAYS

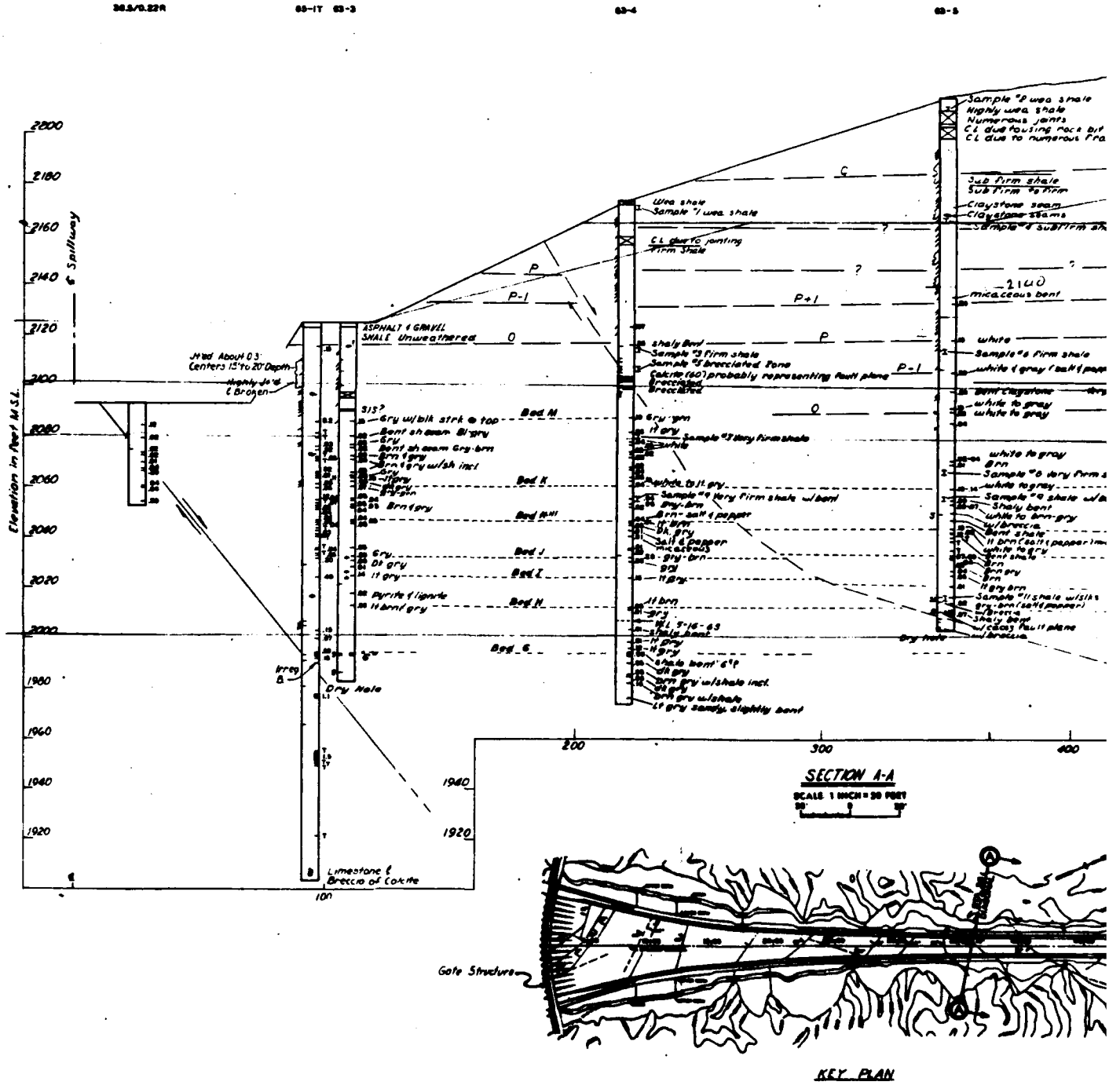
THIS PLAN ACCOMPANIES CONTRACT NO.
DA-09-020-

CONSTRUCTION FOUNDATION REPORT

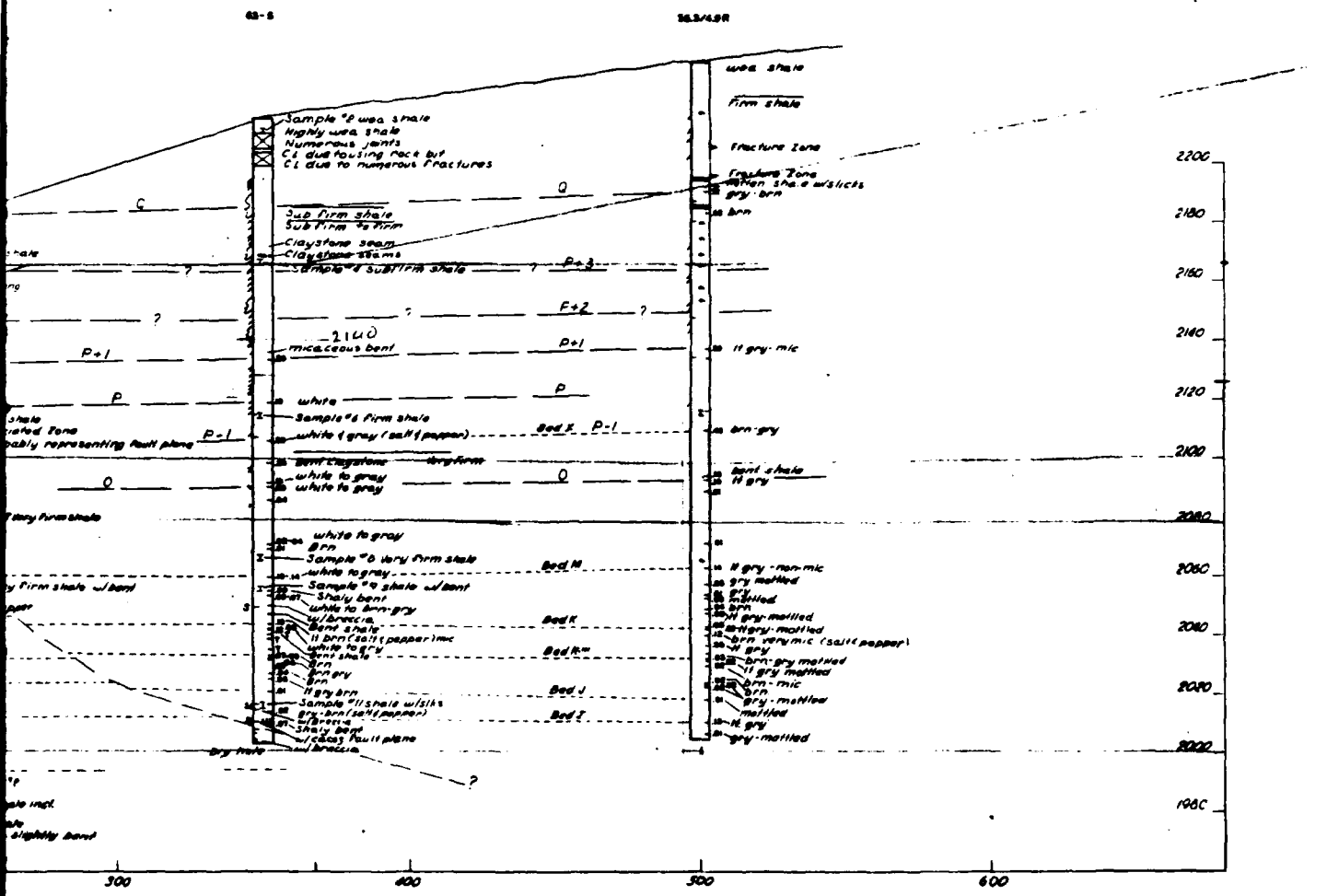
PLATE 93

2

CORPS OF ENGINEERS

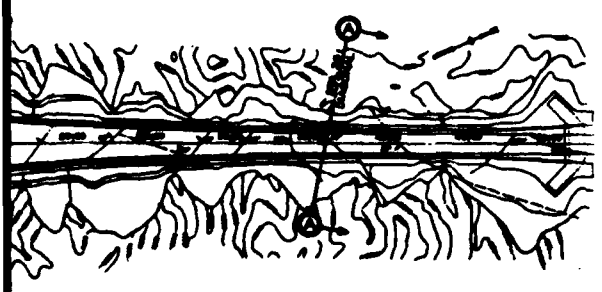


THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY 1/2 OF THE ORIGINAL SCALE.



SECTION A-A

SCALE 1 INCH = 20 FEET



KEY PLAN

LEGEND

69-1 HOLE NO
Concrete
Beartpaw shale
Bentonite seam
Slickenside
Joint
Lost core
Water level
Concretion

SAFETY PAYS

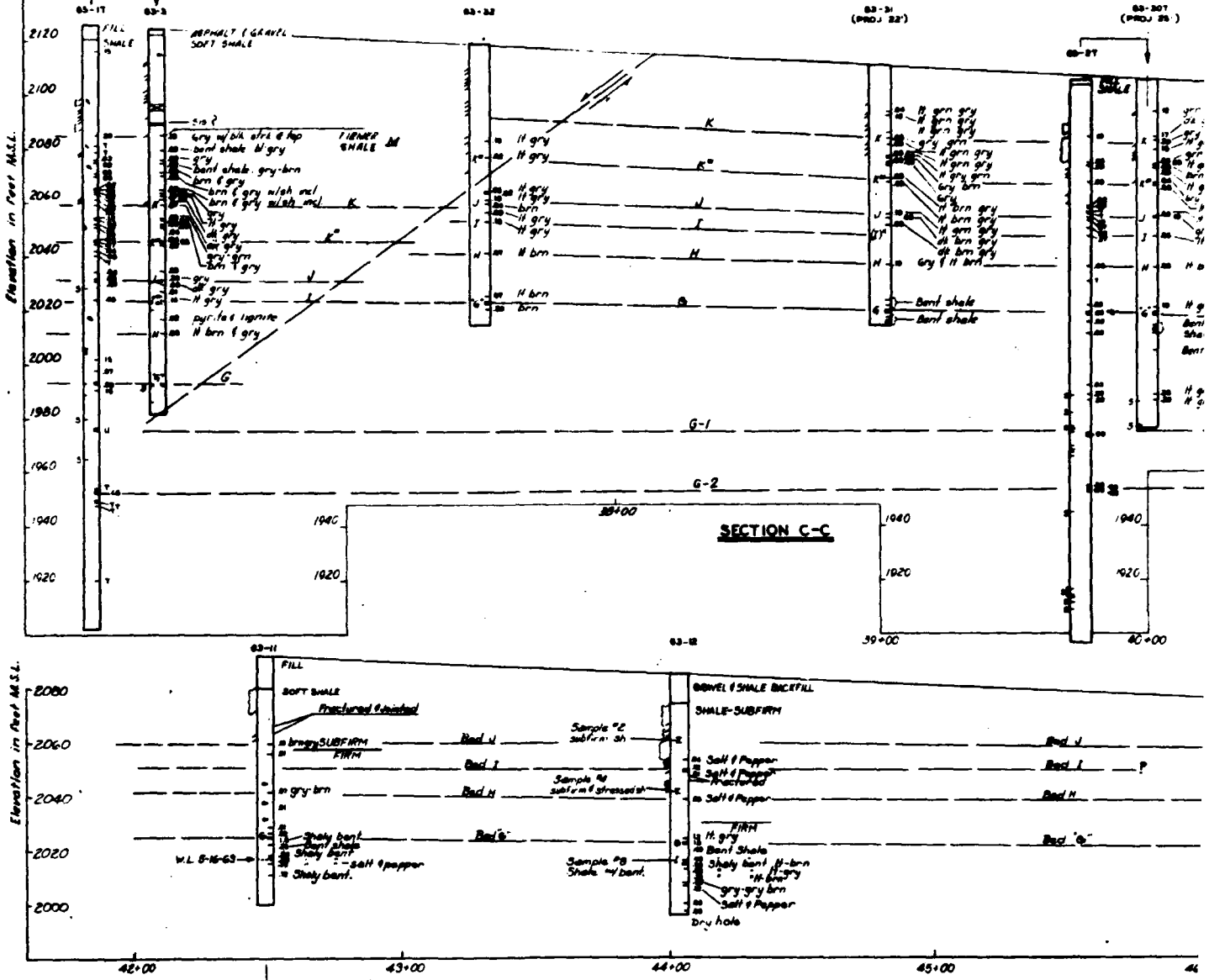
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
GEOLOGIC SECTION A-A
STA. 38 DIAGONAL

DESIGNED BY FAS
DRAWN BY
CHECKED BY
QUANTITIES BY FAS
SUBMITTED
RECOMMENDED
APPROVED
DATE SEPT 1968
SCALE AS SHOWN

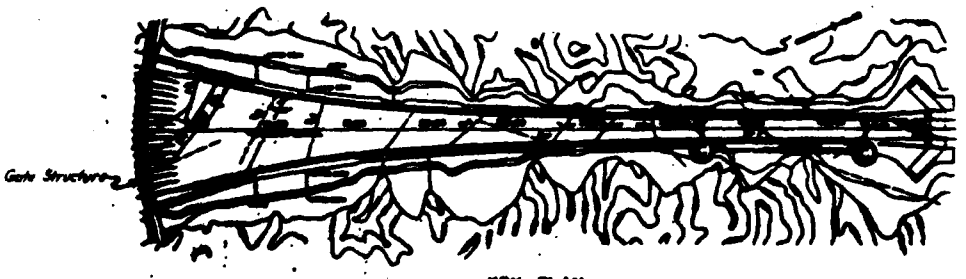
THIS PLAN ASSIGNED CONTRACT NO. DA-39-066-eng
IDENTIFICATION NO.

CORPS OF ENGINEERS



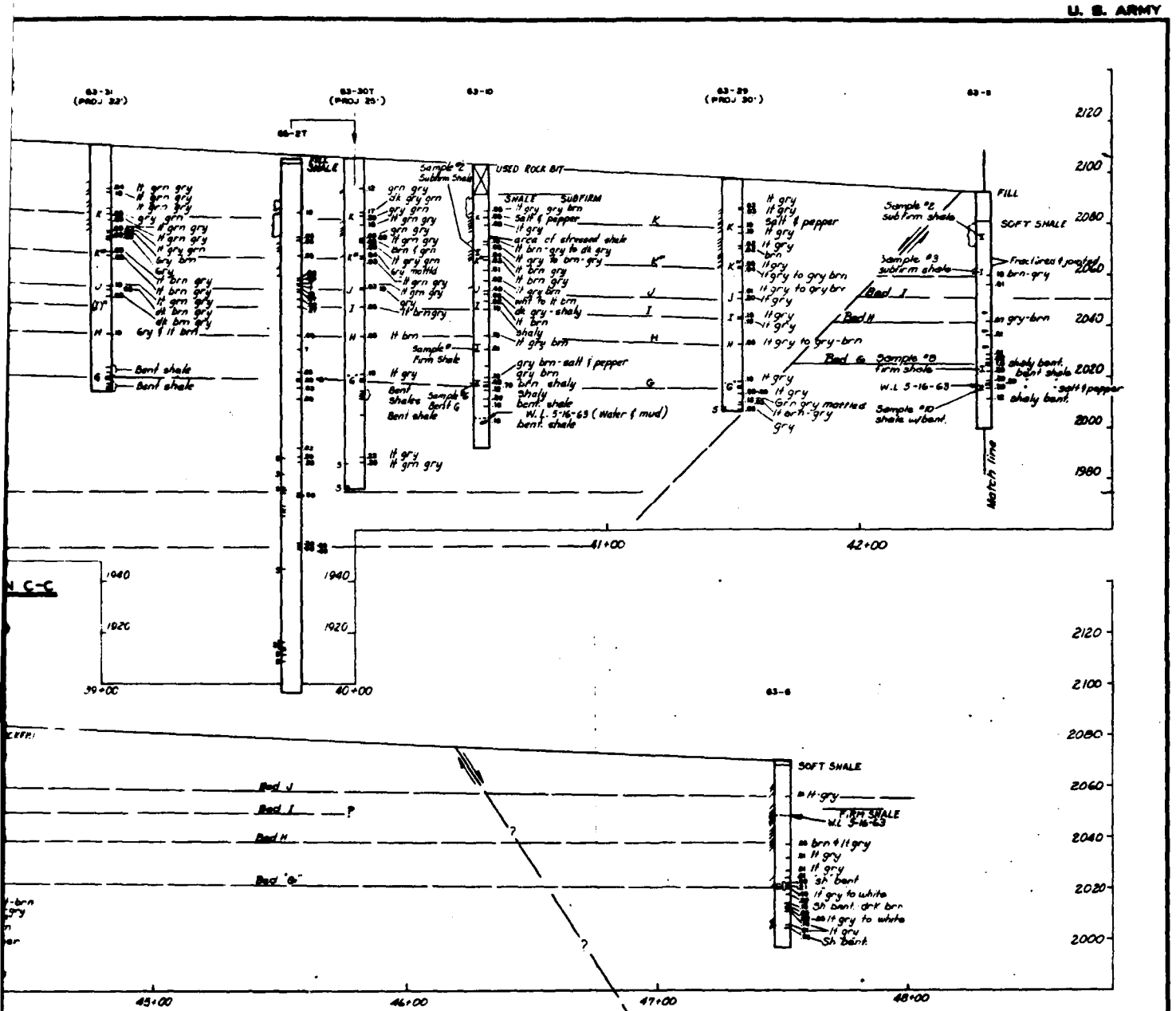
SECTION C-C (CONTD)

SCALE: 1 INCH = 50 FEET



KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO 100% OF THE ORIGINAL SCALE.



SECTION C-C (CONTD)

SCALE: 1 INCH = 20 FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
GEOLOGICAL SECTION C-C

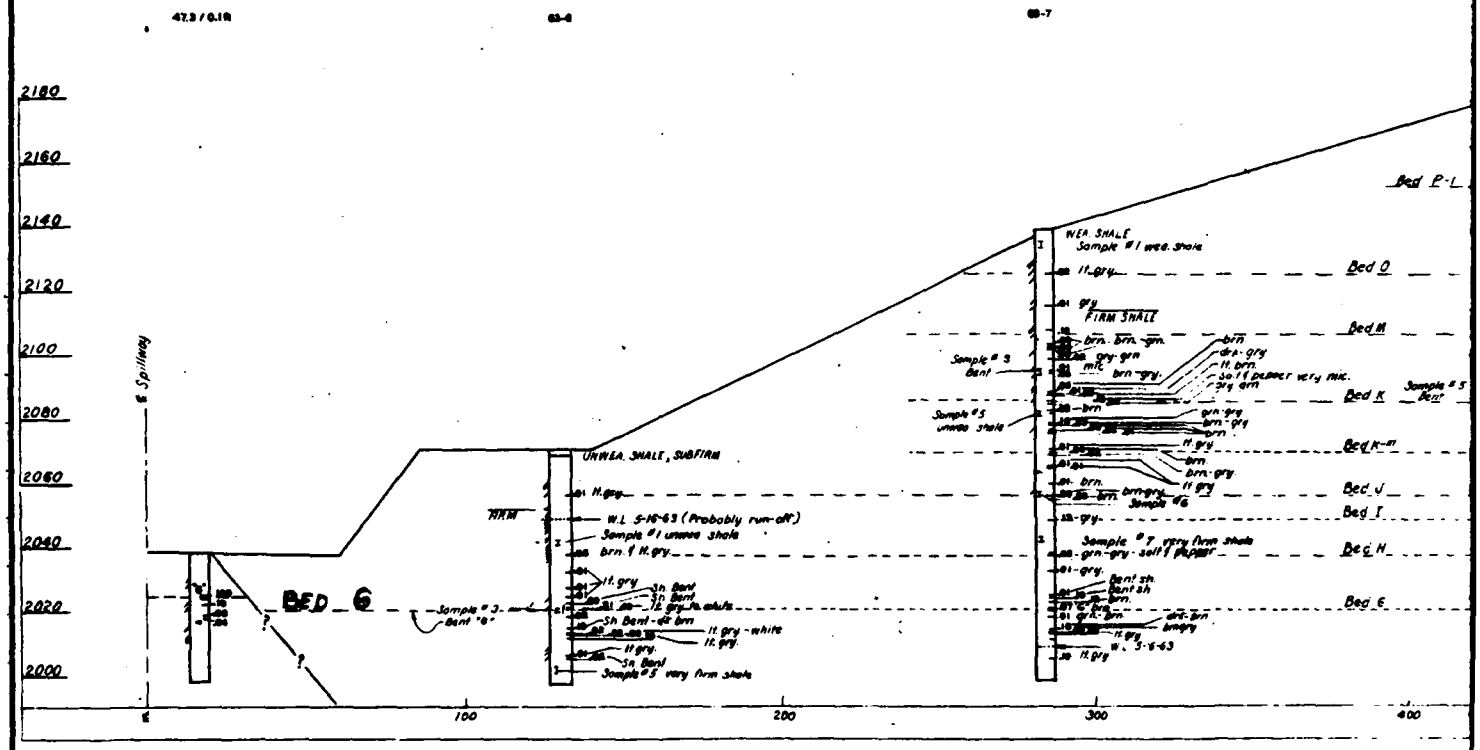
DESIGNED BY: F.A.S.
DRAWN BY:
TRACED BY:
CHECKED BY: F.A.S.
APPROVED: Charles E. Hoff
DATE: SEPT. 1963
SUBMITTED: Edward J. St. Clair
GRID AS SHOWN

THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-065-eng-
IDENTIFICATION NO.

SAFETY PAYS

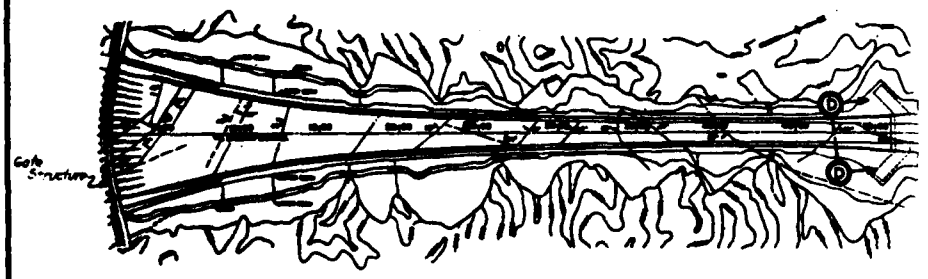
DRAWING HAS BEEN REDUCED TO
CONFORM TO CE/OMAHA SCALE.

CORPS OF ENGINEERS



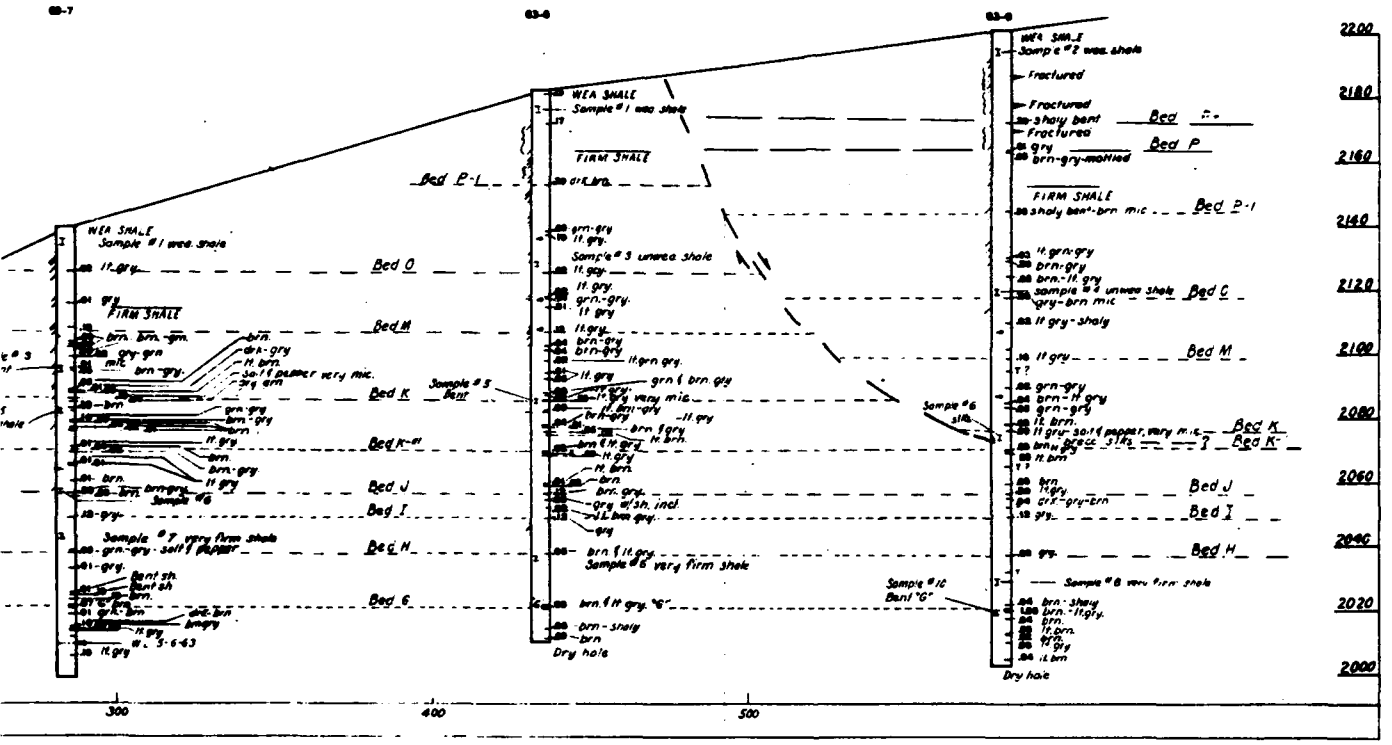
SECTION D-D

SCALE: 1 INCH = 20 FEET



KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



SECTION D-D

SCALE: 1 INCH = 20 FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
GEOLOGIC SECTION D-D

DESIGNED BY: F.A.D.
DRAWN BY:
TRACED BY:
CHECKED BY: F.A.D.
APPROVED: Charles E. Hutt
DATE: SEPT. 1966
SCALE AS SHOWN
APPROVED: Harold J. St. Clair

THIS PLAN ACCOMPANIES CONTRACT NO. DA-39-066-eng-
IDENTIFICATION NO.

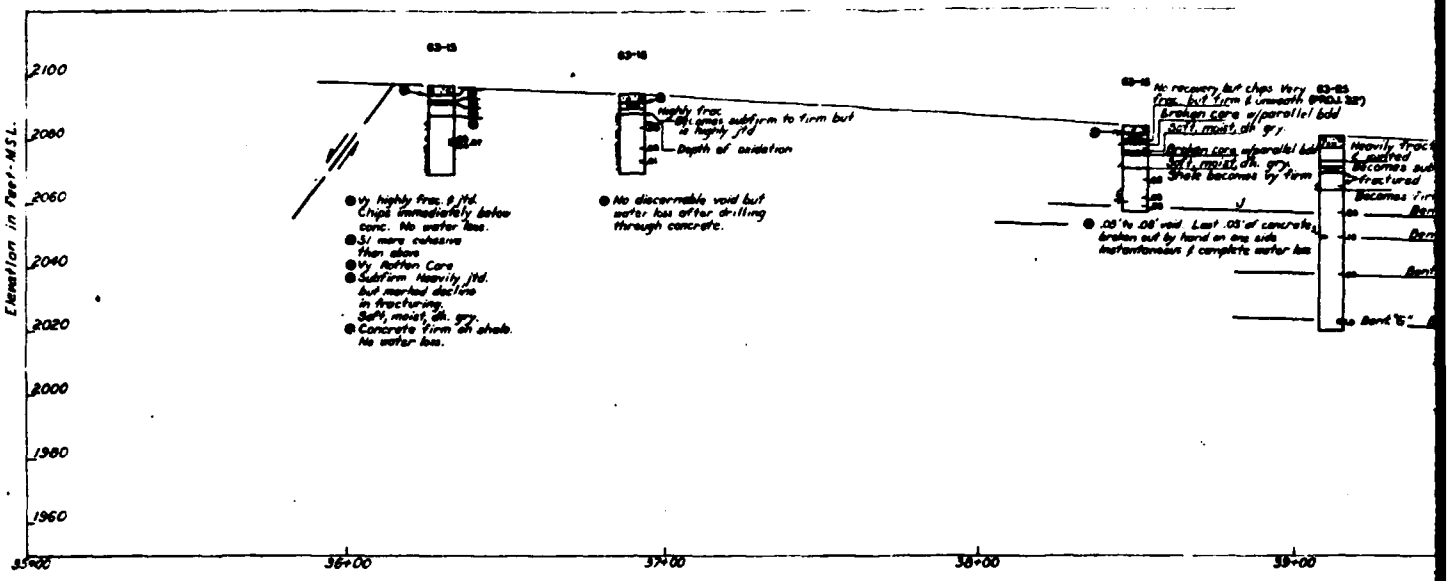
SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT

PLATE 96

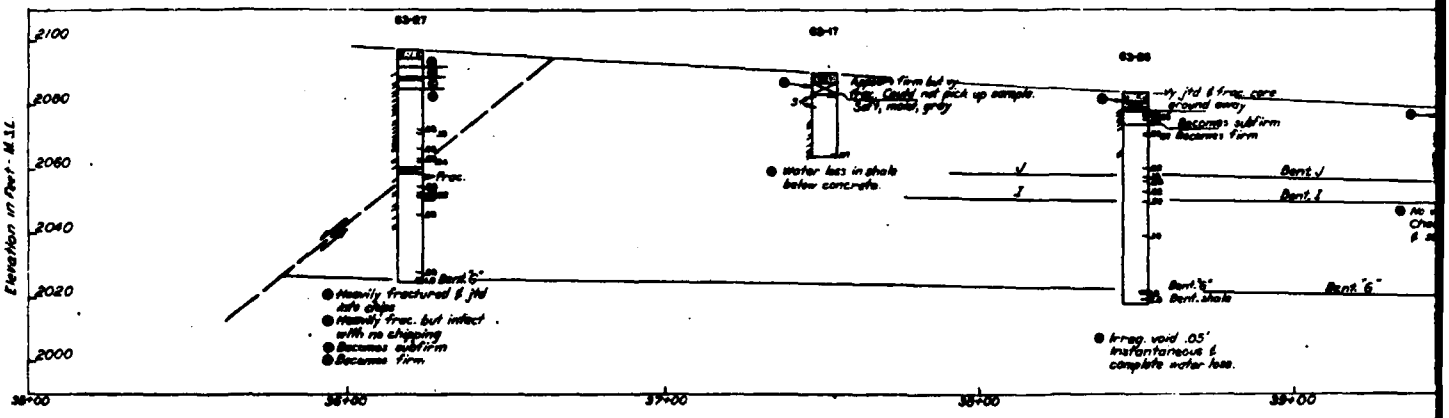
2

CORPS OF ENGINEERS



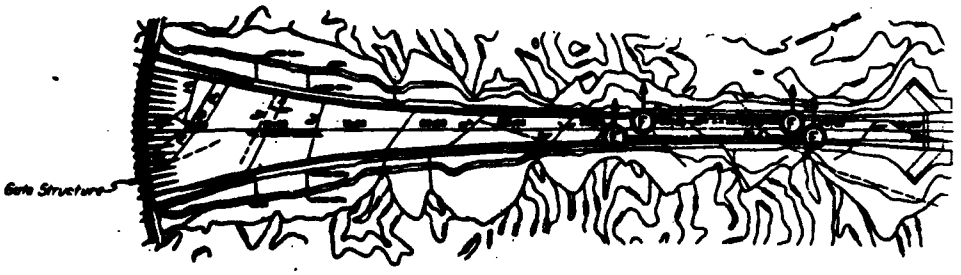
SECTION F-F

SCALE: 1 INCH = 20 FEET



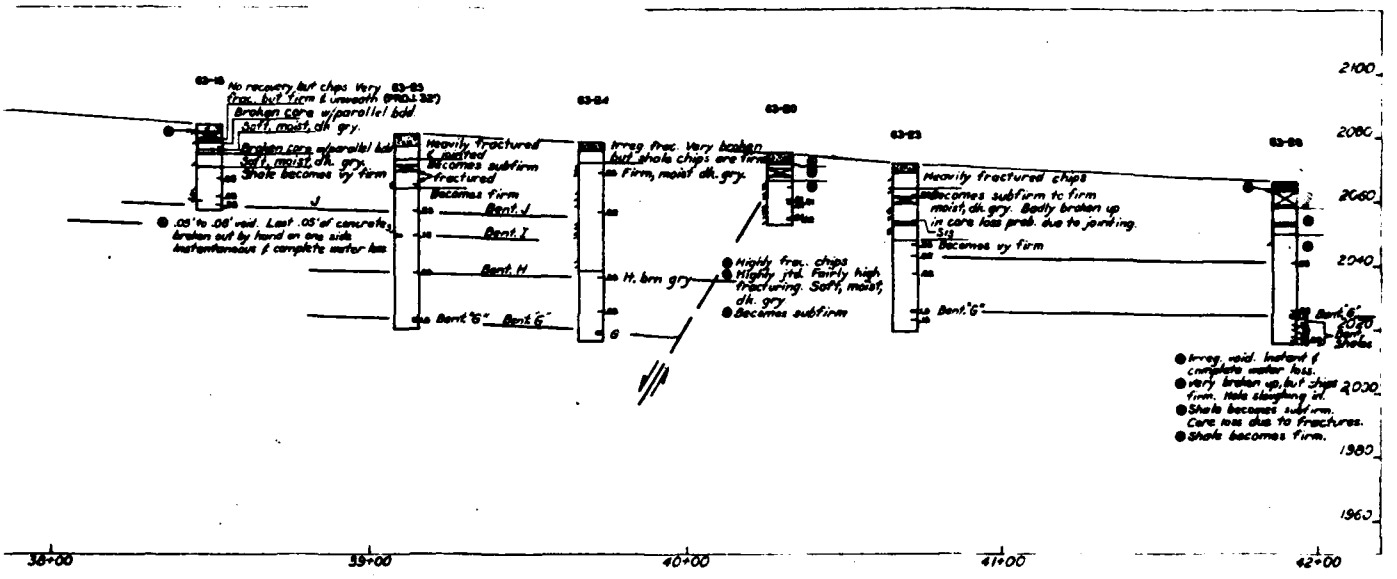
SECTION E-E

SCALE: 1 INCH = 20 FEET

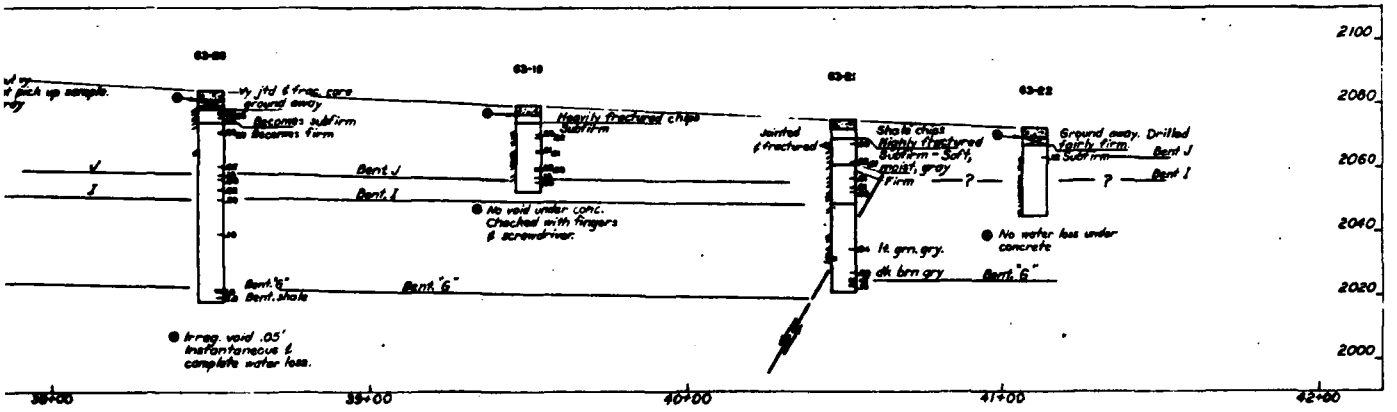


KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



SECTION F-F
SCALE: 1 INCH = 20 FEET



SECTION E-E
SCALE: 1 INCH = 20 FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
GEOLOGIC SECTIONS E-E & F-F

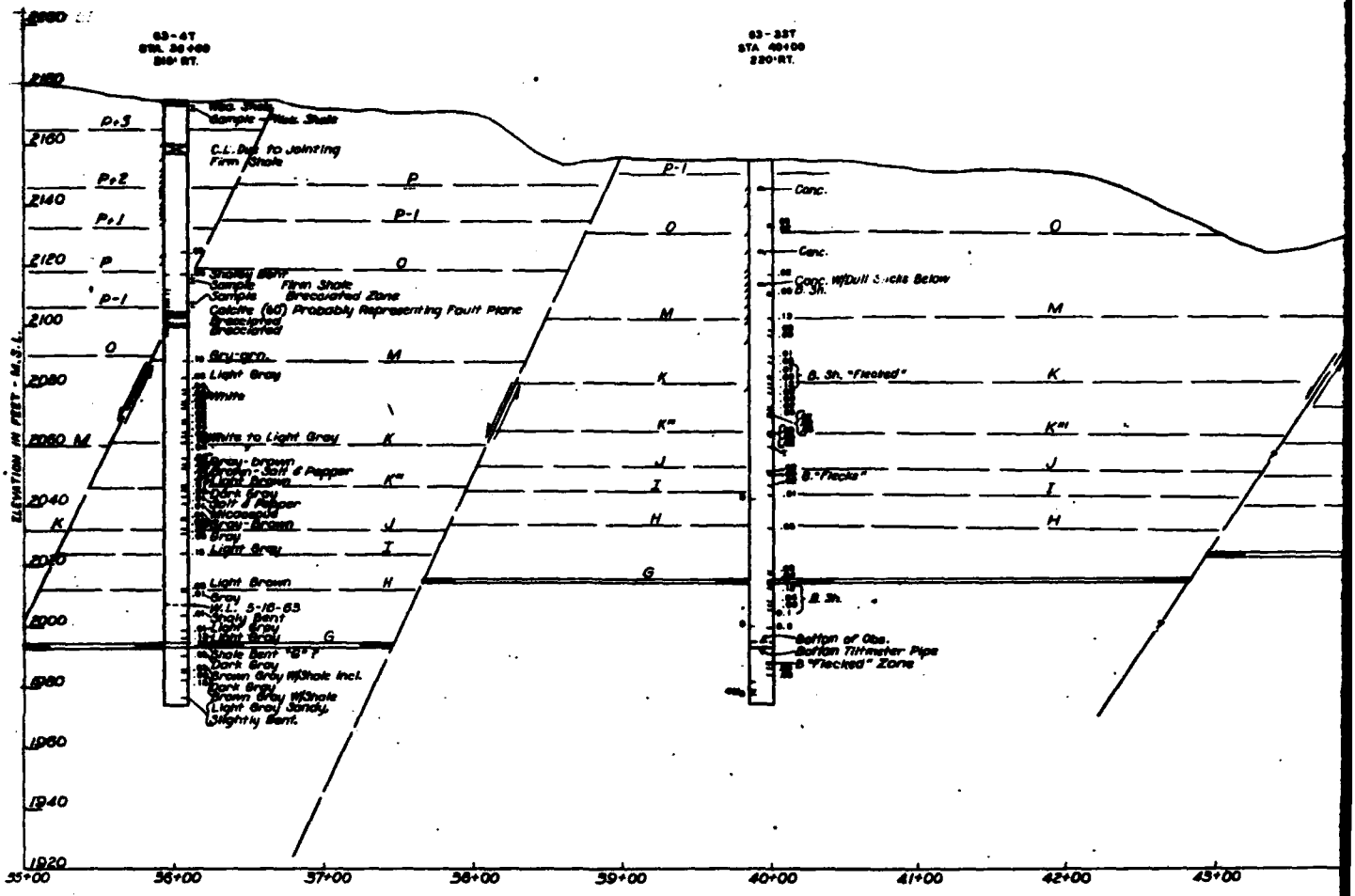
DESIGNED BY: F.A.S.
DRAWN BY:
TRACED BY:
CHECKED BY: F.A.S.

SEPT. 1956

SAFETY PAYS

) HAS BEEN REDUCED TO
TO THE ORIGINAL SCALE.

2



SECTION G-G

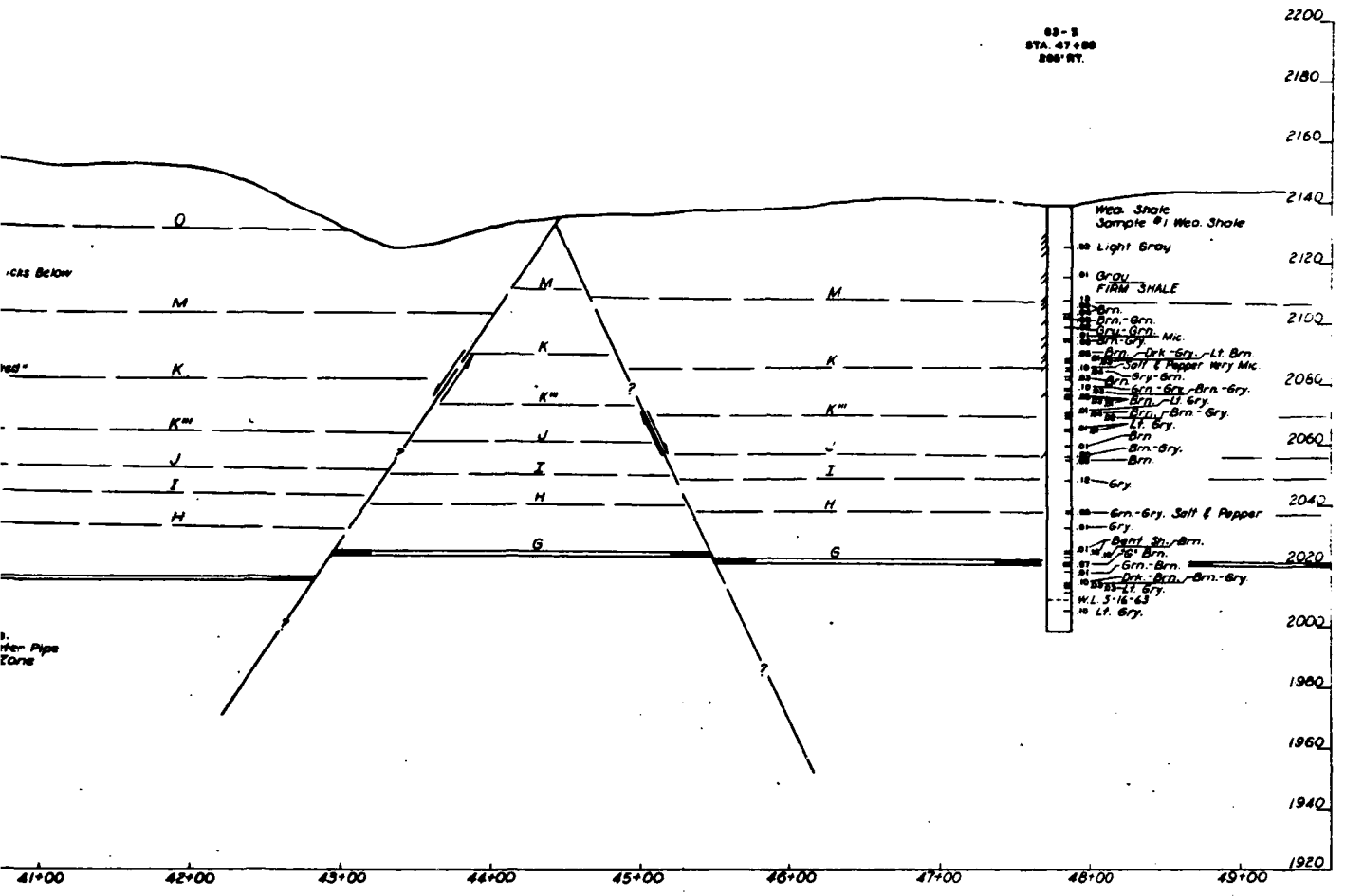
SCALE: VERT. 1 INCH = 20 FEET
HORIZ. 1 INCH = 40 FEET



KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY



SECTION G-G

SCALE: VERT. 1 INCH = 20 FEET
HORIZ. 1 INCH = 40 FEET

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
GEOLOGIC SECTION G-G

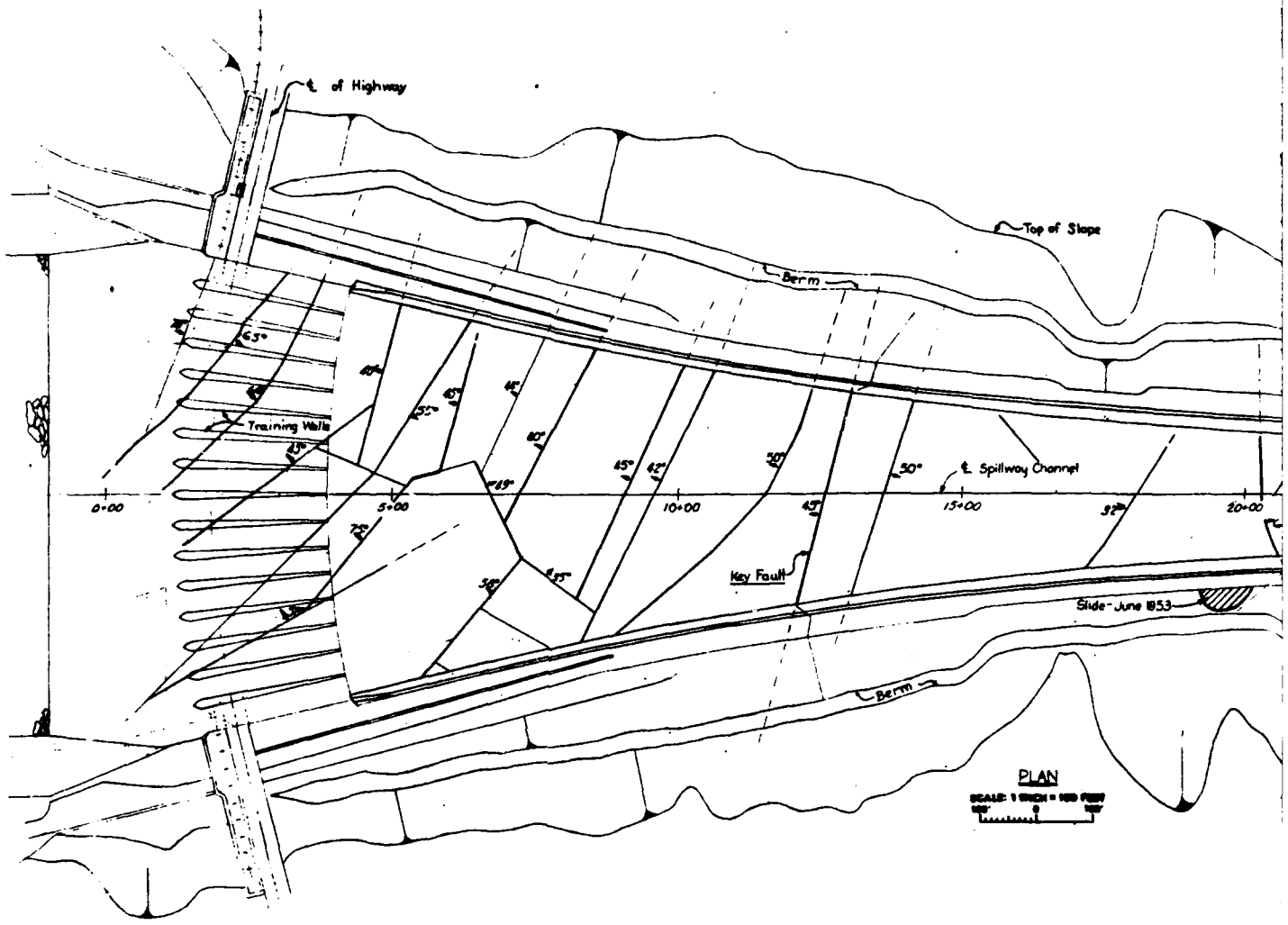
DESIGNED BY F. A. J.
DRAWN BY L. M. G.
TRACED BY L. M. G.
CHECKED BY F. A. J.

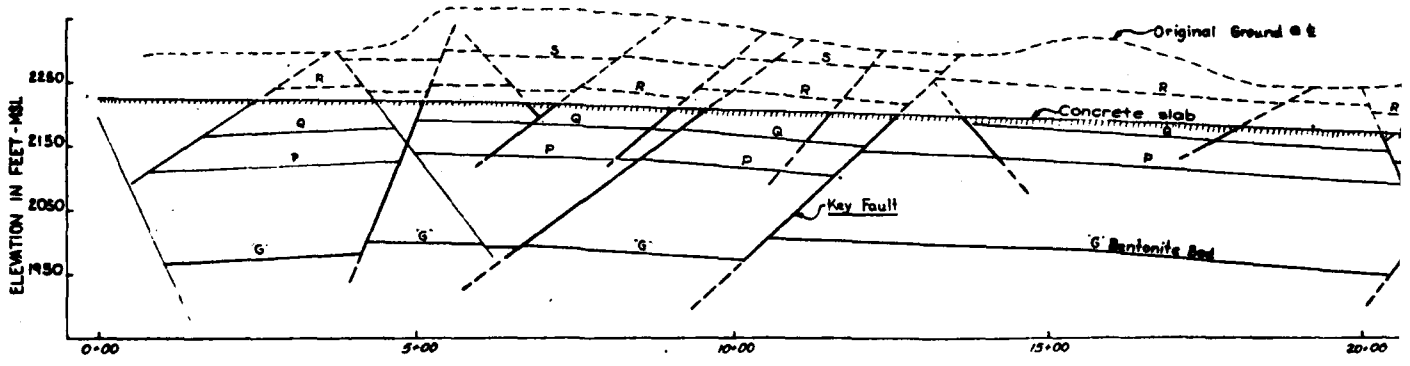
SEPT. 1968

SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT 2 PLATE 98

CORPS OF ENGINEERS

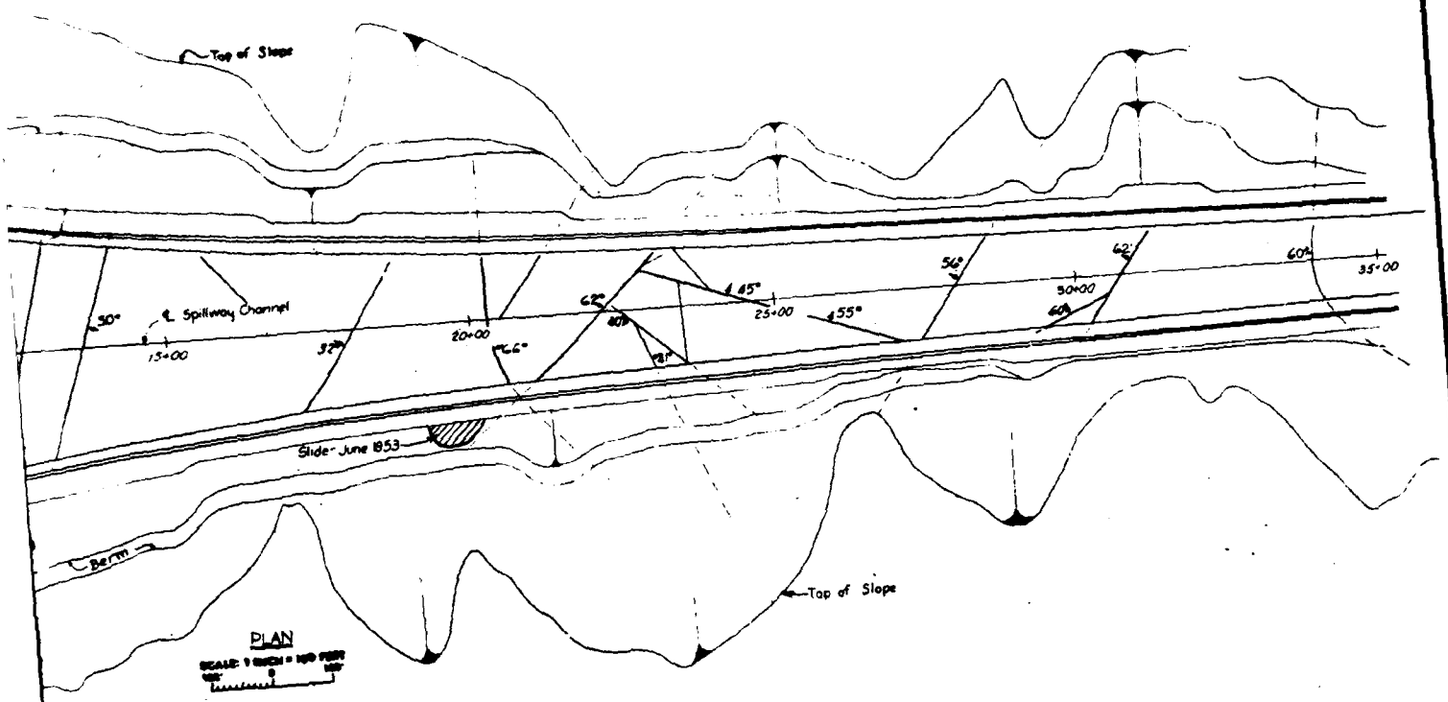




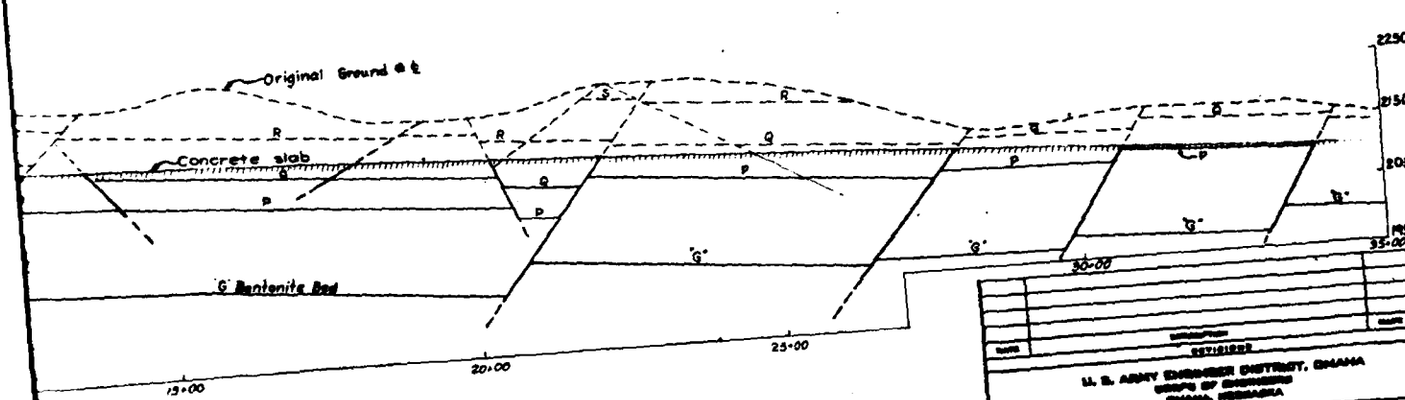
PROFILE
Faulting along Spillway ℄

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY



PLAN



PROFILE
Faulting along Spillway ℄

SAFETY PAYS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION

SPILLWAY GEOLOGY
STA 0+00 THROUGH 35+00

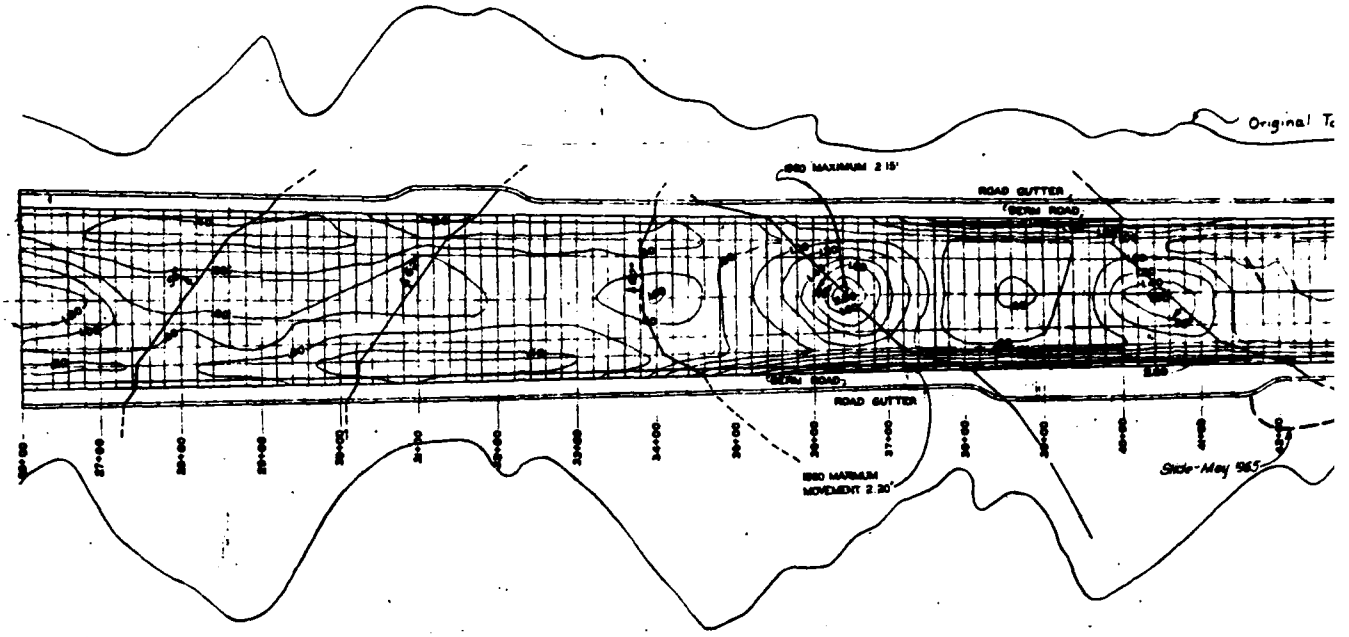
DESIGNED BY O.W.A
DRAWN BY A.B.
TRACED BY A.B.
CHECKED BY
APPROVED BY
DATE SEPT 1955
AS SHOWN

THIS PLAN AS DESIGNATED CONTRACT NO. DA-23-[illegible]-eng-
IDENTIFICATION NO.

DRAWING HAS BEEN REDUCED TO 1/2 SCALE

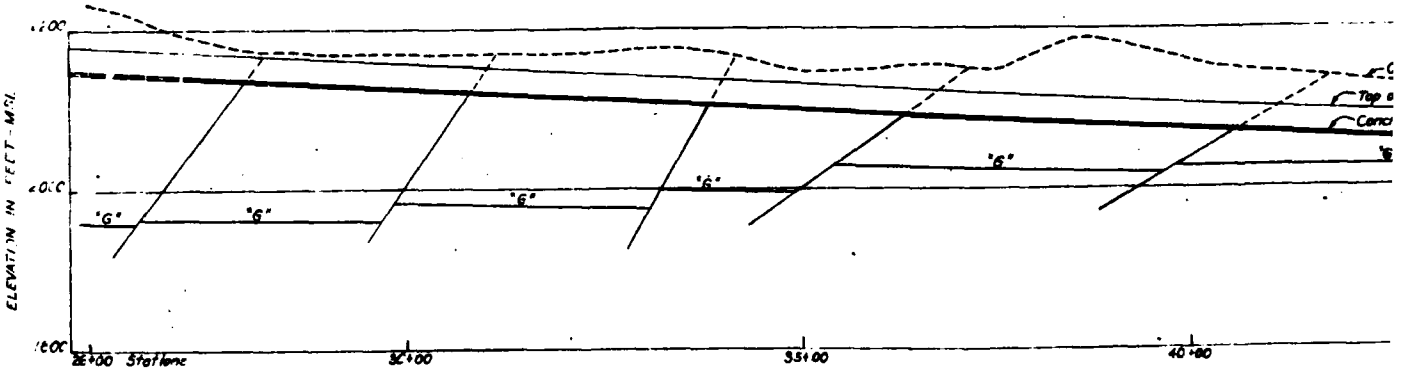
CONSTRUCTION FOUNDATION REPORT 2 PLATE 99

CORPS OF ENGINEERS



PLAN

SCALE: 1 INCH 60 FEET



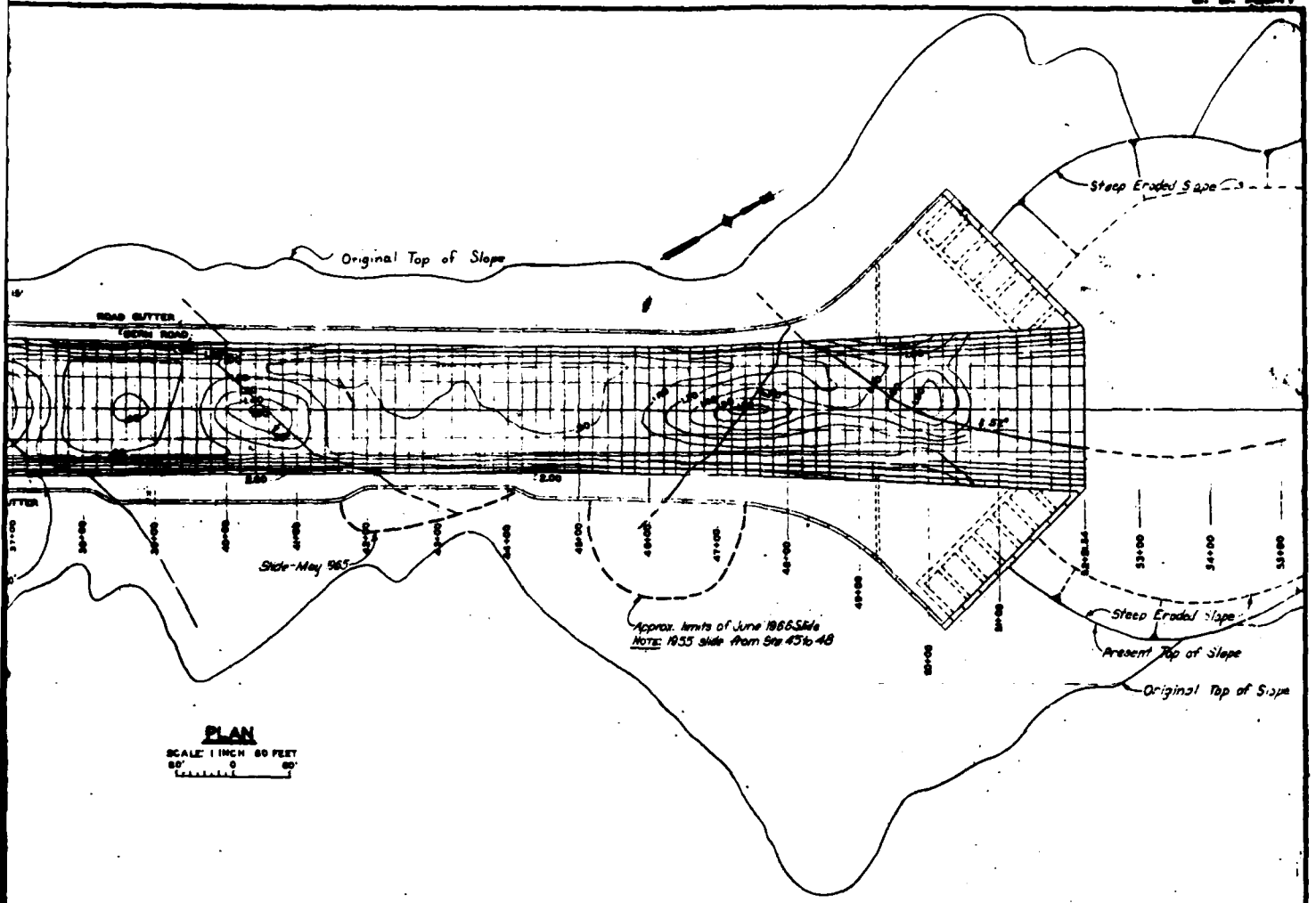
PROFILE

Faulting along Spillway ℄

LEGEND

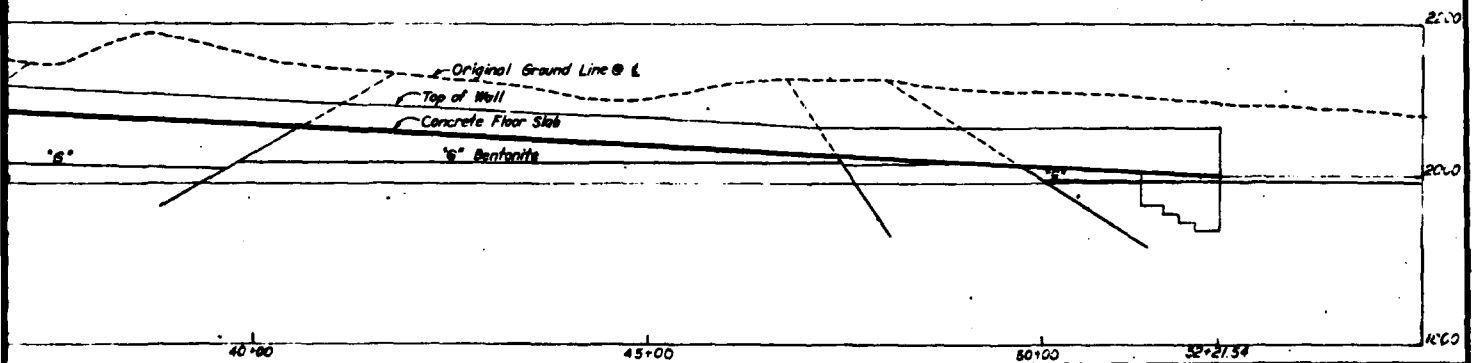
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY



PLAN

SCALE: 1 INCH 60 FEET



PROFILE

Faulting along Spillway ℄

LEGEND:

"B" Bentonite marker bed

Fault showing direction and amount of dip

Contours show feet of vertical displacement (1960)

SAFETY PAYS

DATE	DESCRIPTION	BY

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
SPILLWAY GEOLOGY
STATION 39+00 TO 55+00

DESIGNED BY E.W.J.-E.W.A.
DRAWN BY
TRACED BY
CHECKED BY E.W.A.
SUBMITTED
APPROVED
FILE NUMBER

DATE: SEPT. 1966

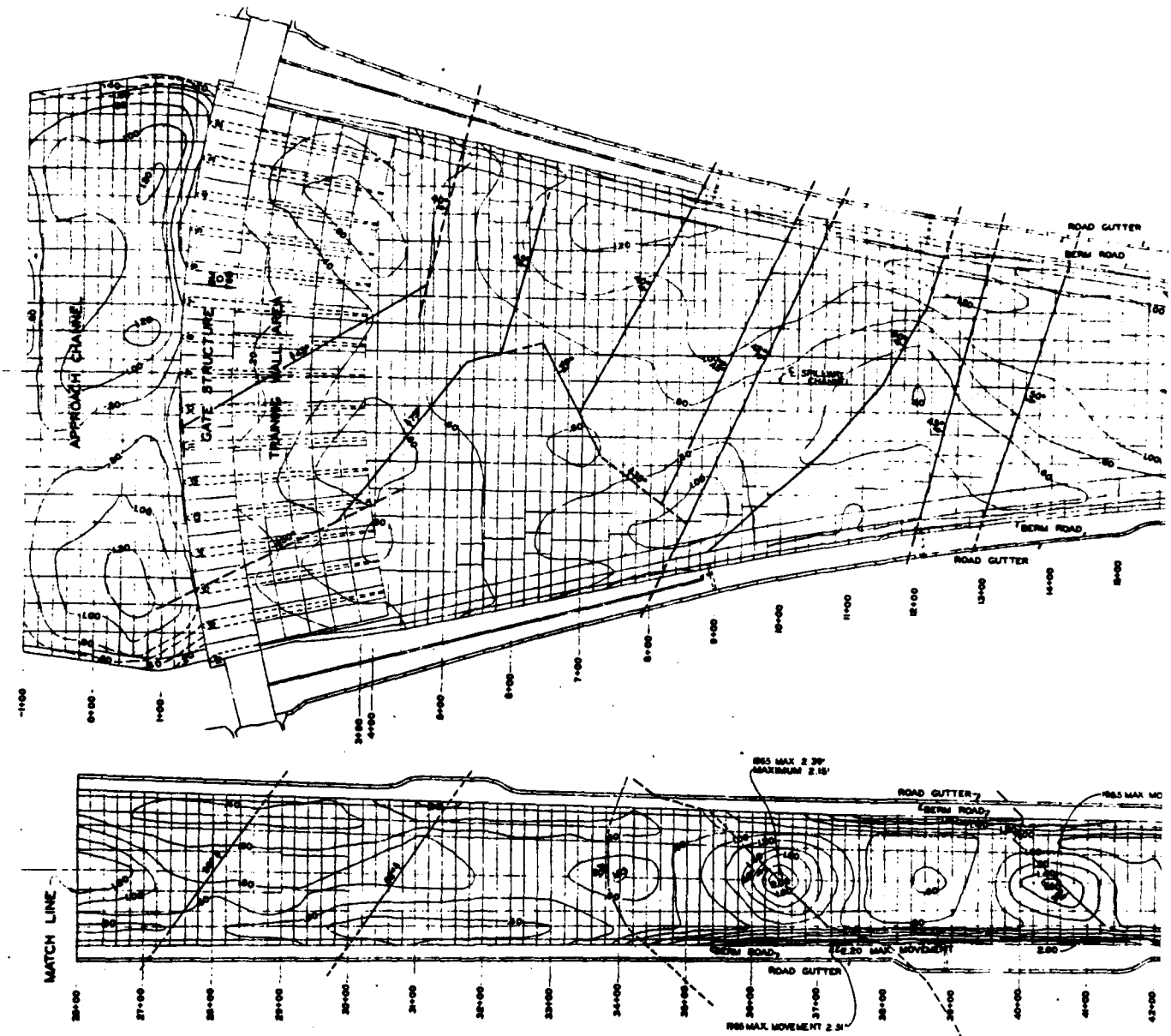
THIS PLAN ASSEMBLY CONSISTS OF NO. SHEETS
DRAWING NO. 3-328-100-100 IDENTIFICATION NO.

Drawn with ink on mylar

CONSTRUCTION FOUNDATION REPORT

PLATE 100

2

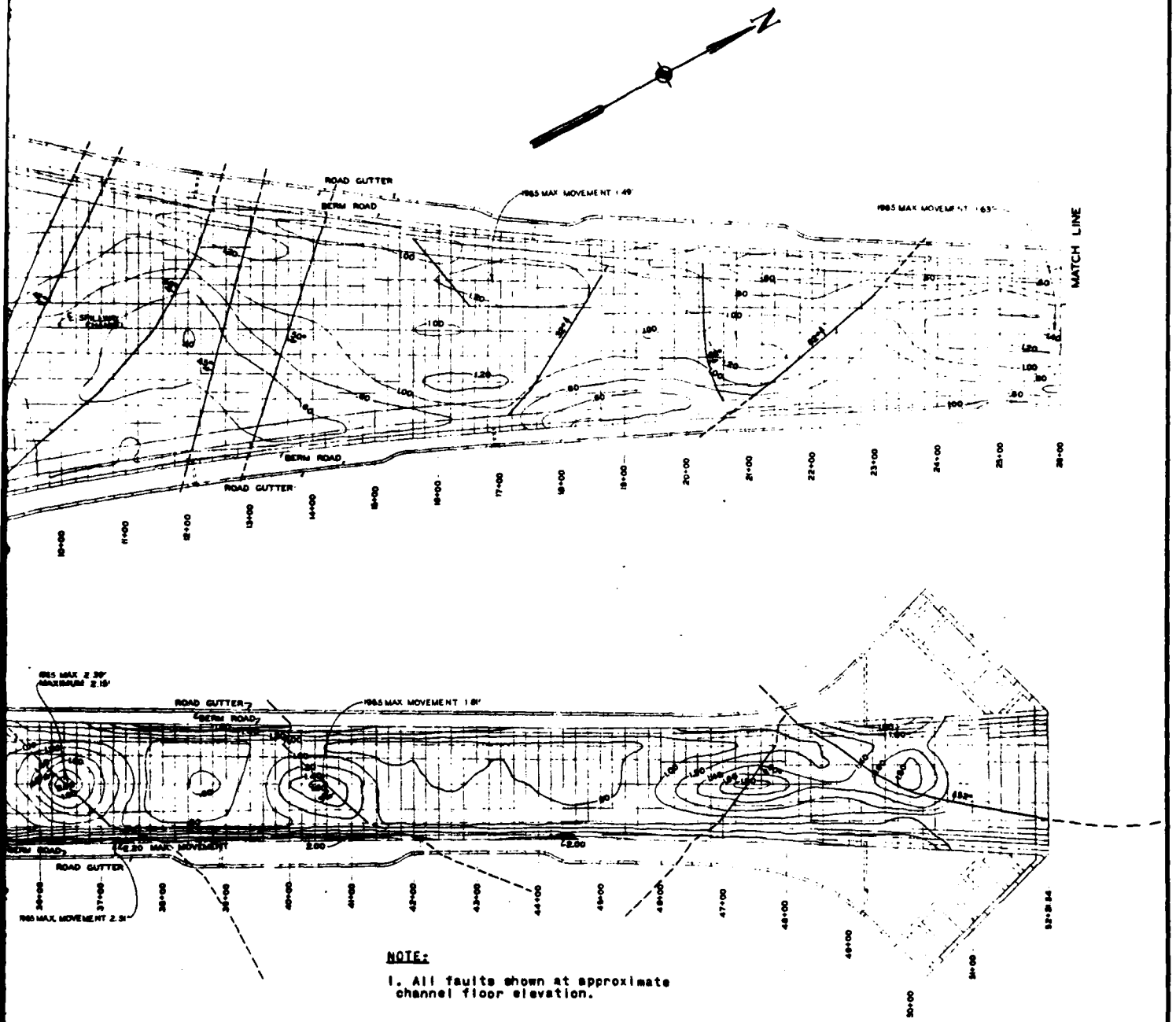


NOTE

1. A
cha

LEG

THIS DRAWING HAS BEEN REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE.



NOTE:

1. All faults shown at approximate channel floor elevation.

LEGEND:

Fault showing direction and amount of dip.

Contours show feet of vertical displacement (1960)

SCALE: 1 INCH = 80 FEET

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT No. DA-566-[illegible]
MODIFICATION No.

DATE	DESCRIPTION	MADE	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

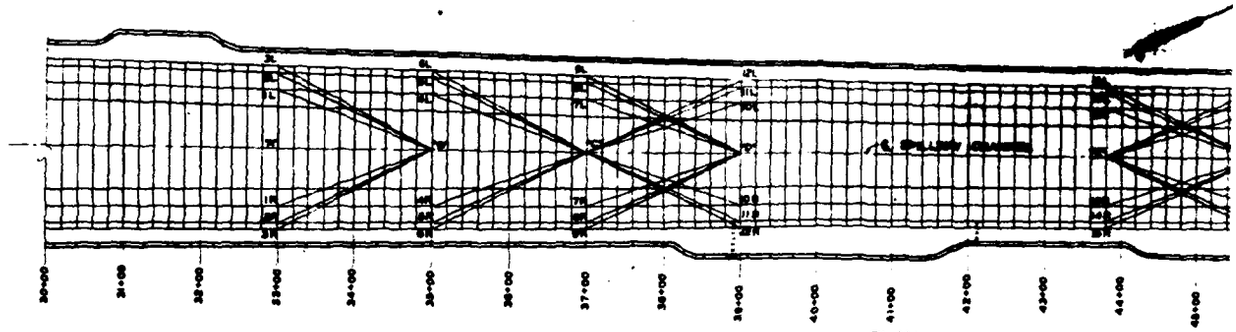
DESIGNED BY C.V.J. DMA
DRAWN BY R.D.S.
TRACED BY R.D.S.
CHECKED BY D.M.A.

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
VERTICAL DISPLACEMENT CONTOURS
NOVEMBER 1980

APPROVED: W. A. Libbe
APPROVED: Charles E. Hopp
DATE: SEPT 1981
APPROVED: Harold J. McClure
SHEET

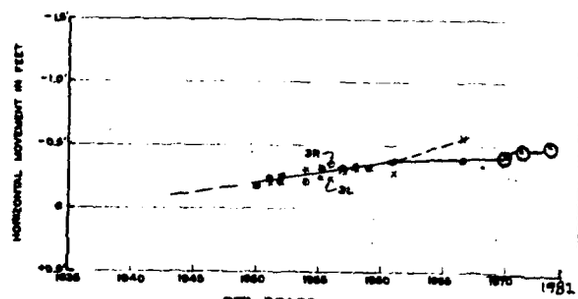
CONSTRUCTION FOUNDATION REPORT 2 PLATE 101

CORPS OF ENGINEERS



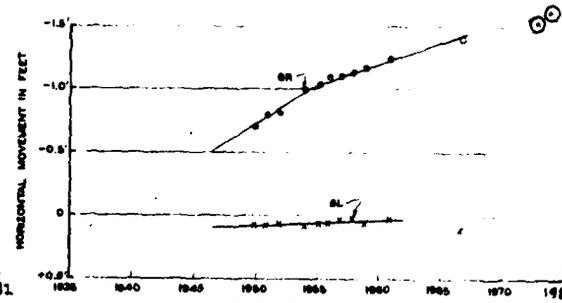
PLAN

SCALE 1 INCH = 80 FEET



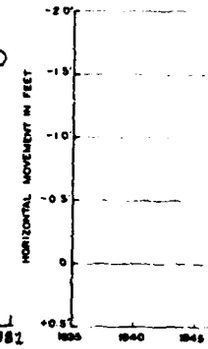
STA 33+00

SECTION A-POINTS 3R & 3L

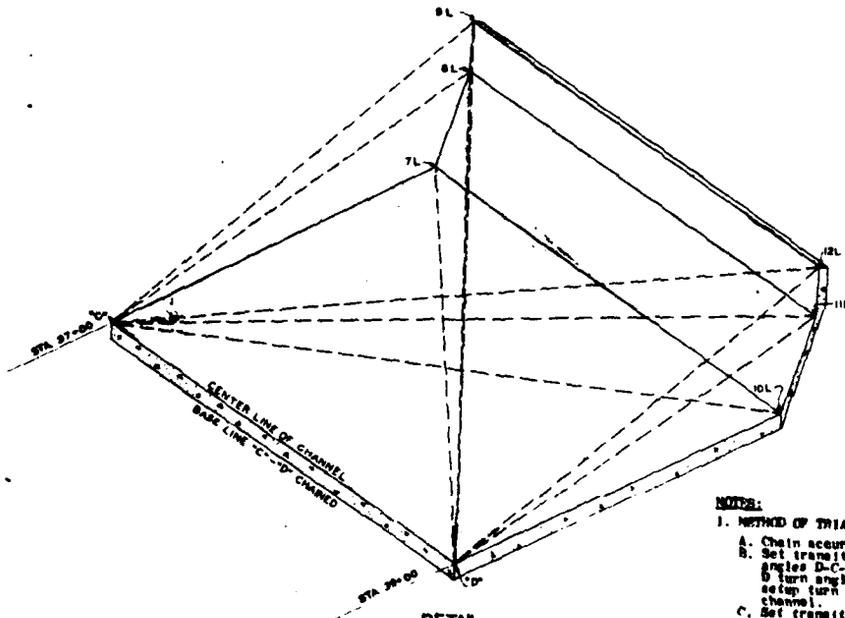


STA 35+00

SECTION B-POINTS 6R & 6L

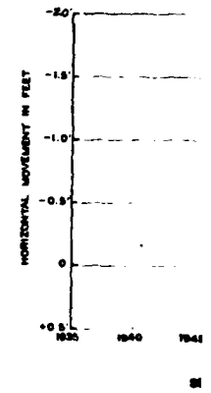


SECT



DETAIL

ISOMETRIC VIEW OF LEFT SIDE OF SPILLWAY CHANNEL BETWEEN STA. 37+00 & STA. 39+00 SHOWING METHOD OF TRIANGULATION

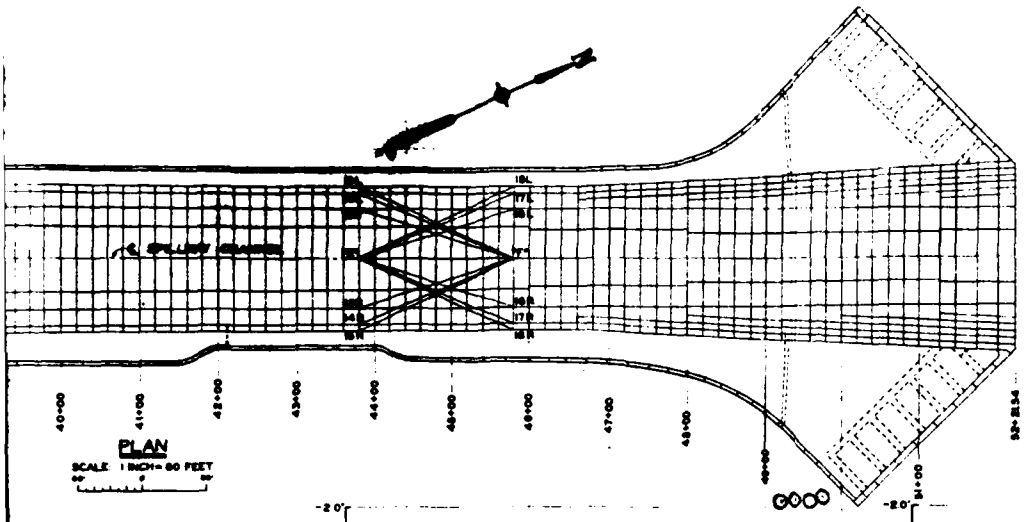


SE

NOTES:

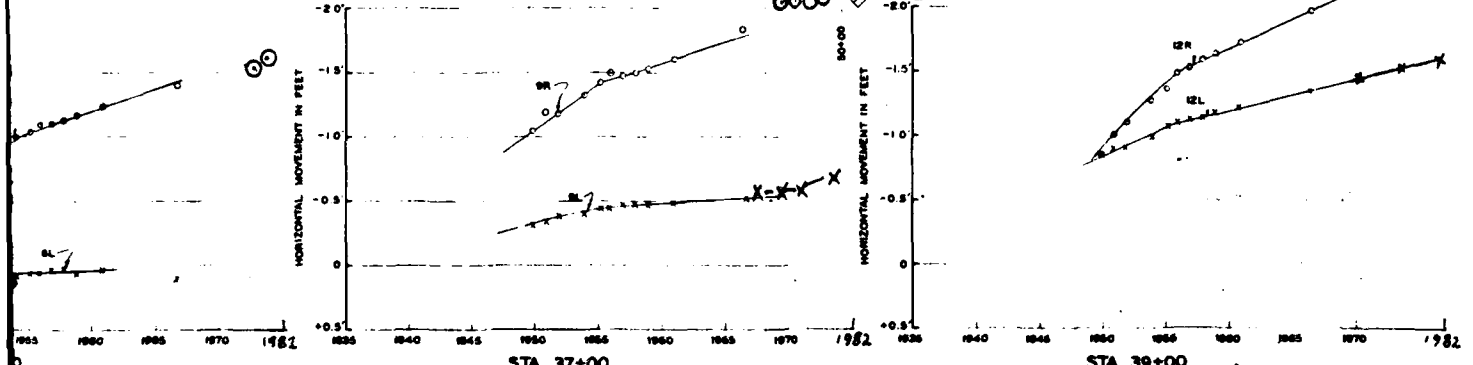
1. METHOD OF TRIANGULATION:
   A. Chain accurately base line C-D.
   B. Set transit on point C, backsight to point D, then turn angles D-C-7L; D-C-6L; D-C-9L again backsighting to point D turn angles D-C-10L; D-C-11L and D-C-12L. During same setup turn the corresponding angles on the right side of channel.
   C. Set transit at point D, backsight to point C and turn angles C-D-10L; C-D-11L; C-D-12L; likewise turn angles C-D-7L; C-D-6L; C-D-9L and corresponding angles on right side of channel from same setup.
   D. Each angle must be doubled and average reading recorded.
2. Movement shown by graphs is change in distance (shortening) between wall points on right & left side of the channel.

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



PLAN

SCALE 1 INCH = 80 FEET

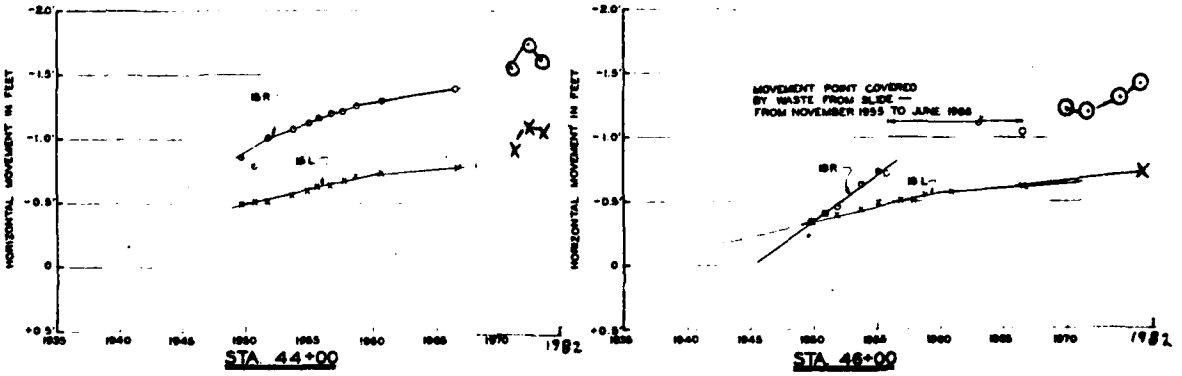


STA 37+00

SECTION C-POINTS 9R & 9L

STA 39+00

SECTION D-POINTS 12R & 12L



STA 44+00

SECTION E-POINTS 15R & 15L

STA 46+00

SECTION F-POINTS 15R & 15L

IANGULATION:

rately base line C-D.
t on point C, backsight to point D, then turn
-7L; D-C-9L; D-C-9L again backsighting to point
ise D-C-10L; D-C-11L and D-C-12L. During same
the corresponding angles on the right side of

t at point D, backsight to point C and turn
10L; C-D-11L; C-D-12L; likewise turn angles
-9L; C-D-9L and corresponding angles on right
annel from same setup.
must be doubled and average reading recorded.

n by graphs is change in distance (shortening)
points on right & left side of the channel.

DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY: C.V.J.
DRAWN BY: R.B.S.
TRACED BY: R.B.S.
CHECKED BY: G.D.A.

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR SPILLWAY REHABILITATION

HORIZONTAL MOVEMENT SURVEY-PLAN, DETAIL, & TIME MOVEMENT GRAPHS

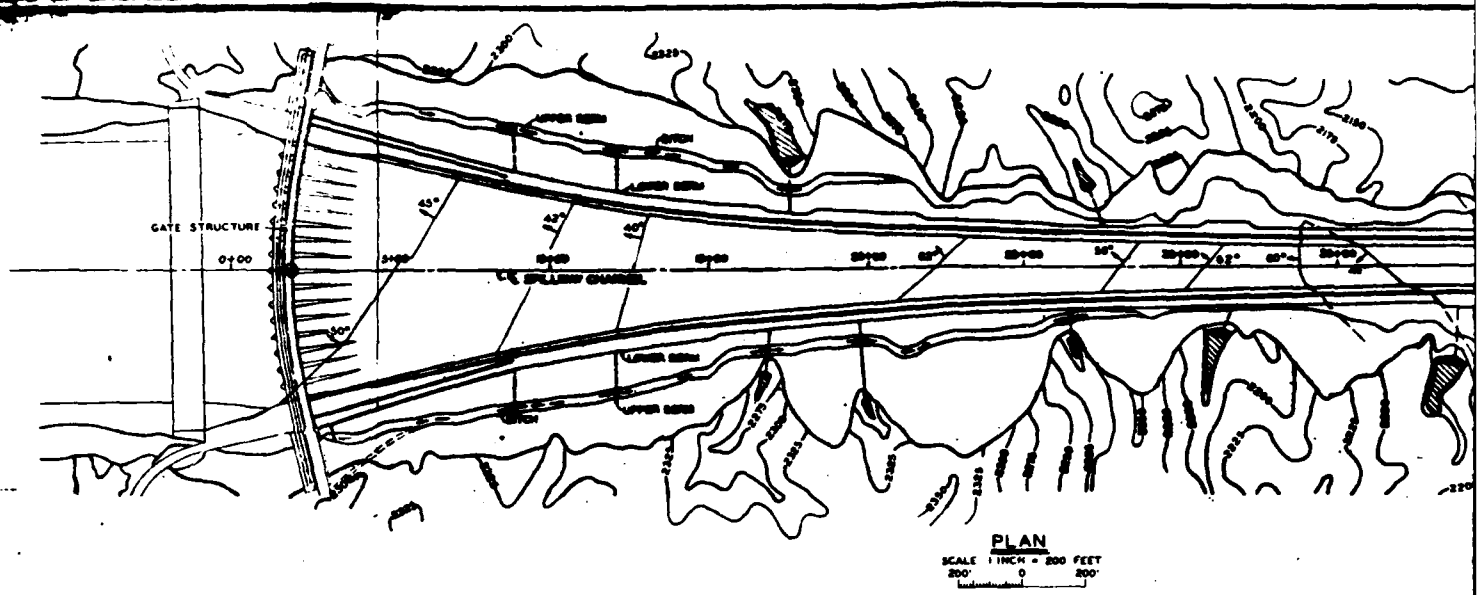
APPROVED: Charles E. Hoff
DATE: SEPT 1966

APPROVED: Harold J. McClean
SCALE: AS SHOWN

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. DA-22-066-CIVENG-
MODIFICATION NO.

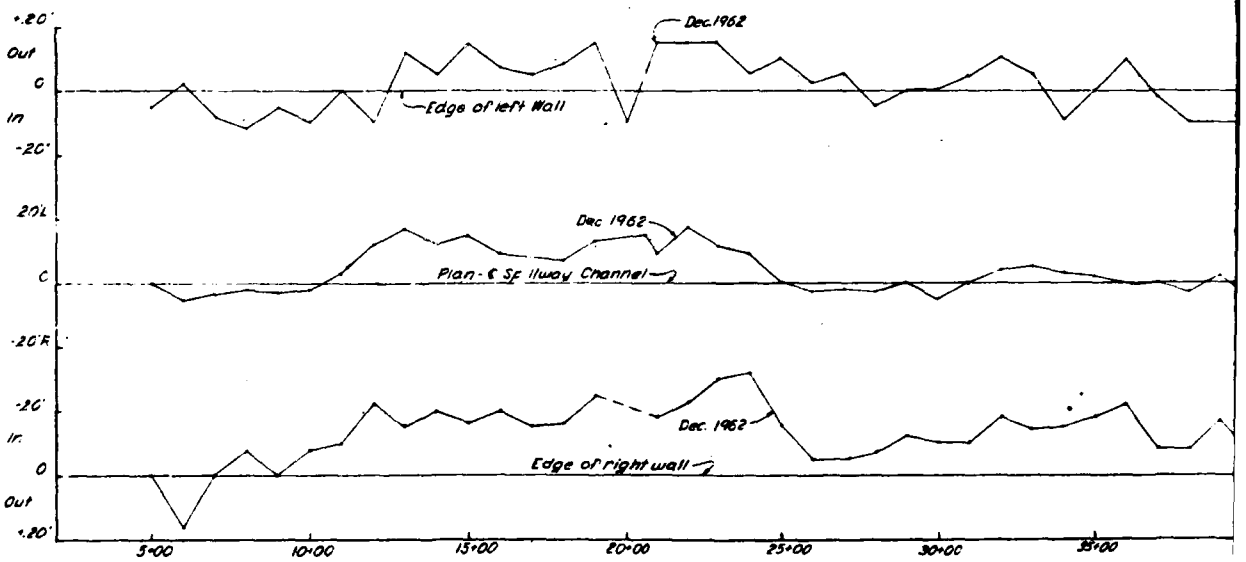
CONSTRUCTION FOUNDATION REPORT 2 PLATE 102



PLAN

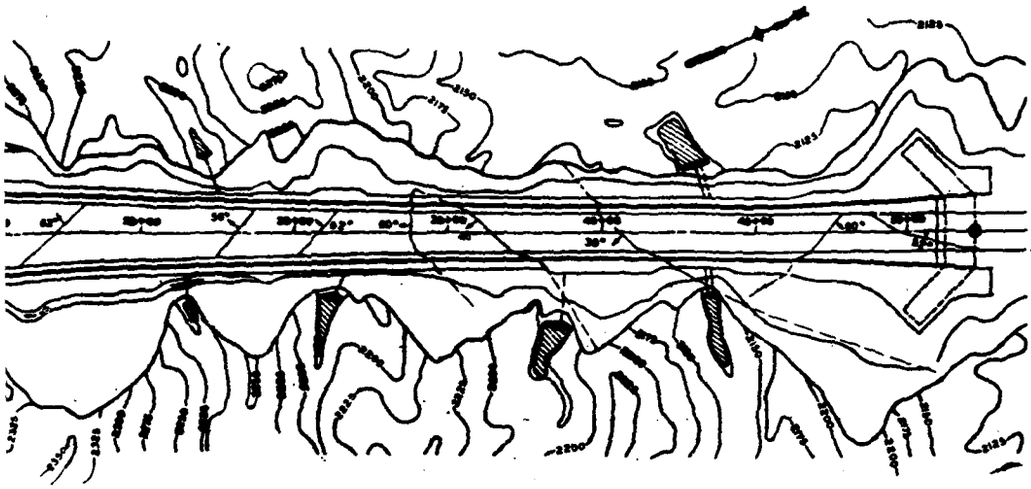
SCALE 1 INCH = 200 FEET

200' 0 200'



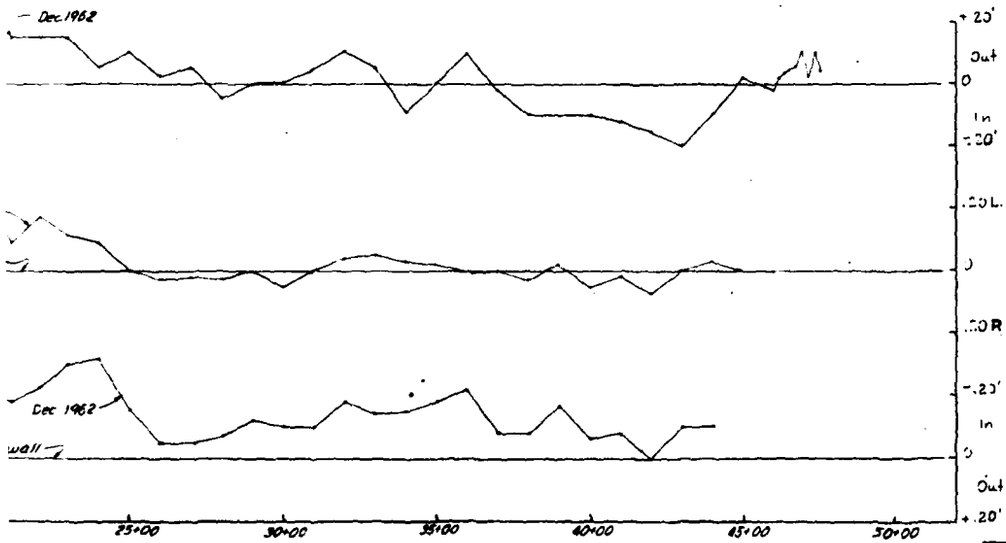
CHANNEL ALIGNMENT

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



PLAN
SCALE 1 INCH = 200 FEET
200' 0 200'

LEGEND:
⊗ ASSUMED DATUM CONTROL



CHANNEL ALIGNMENT

DATE	DESCRIPTION REVISIONS	NAME	APPROVED

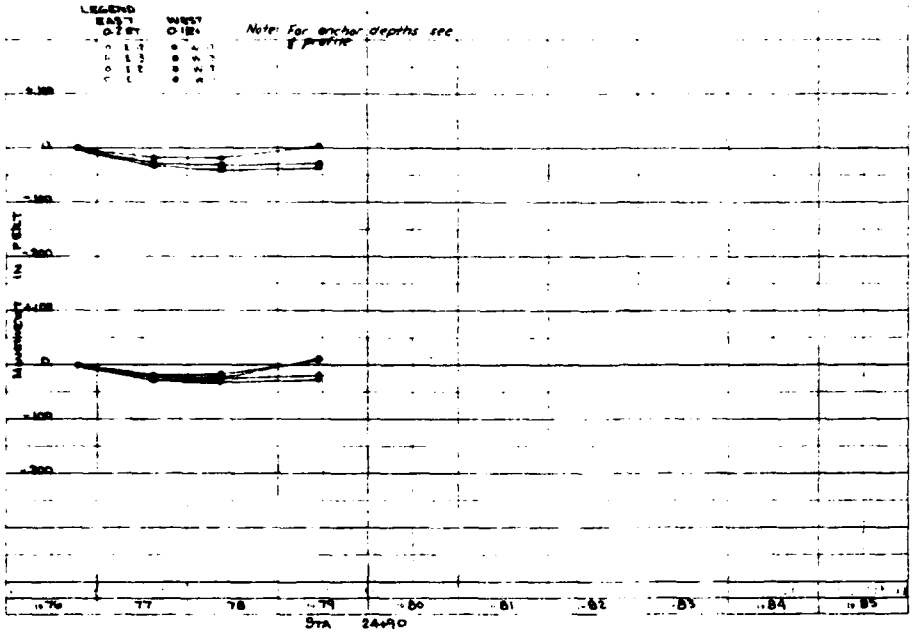
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

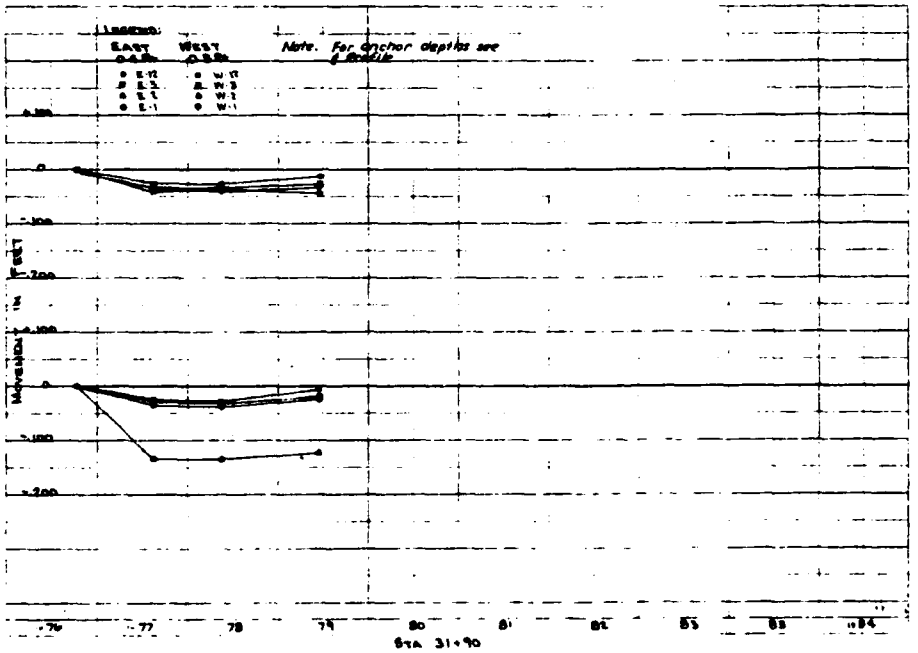
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
ALIGNMENT OF CHANNEL & AND WALLS

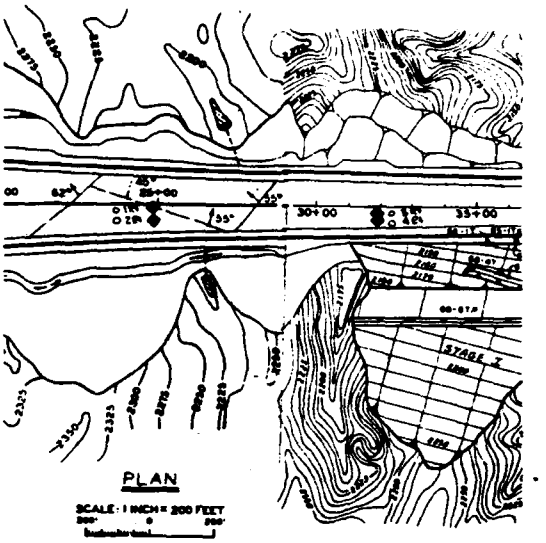
DESIGNED BY: L.V.J. D.P.A.
DRAWN BY:
TRACED BY:
CHECKED BY: D.W.A.
SUBMITTED: K. Kennedy
RECOMMENDED: W. J. Schmidt
APPROVED: Charles E. Hippe
DATE: SEPT. 1966
CHIEF, ENGINEERING DIVISION: Rudolf J. Schaar
CHIEF, CONSTRUCTION DIVISION:
DATE OF SURVEY:
DATE OF DRAWING:
SHEET NUMBER:

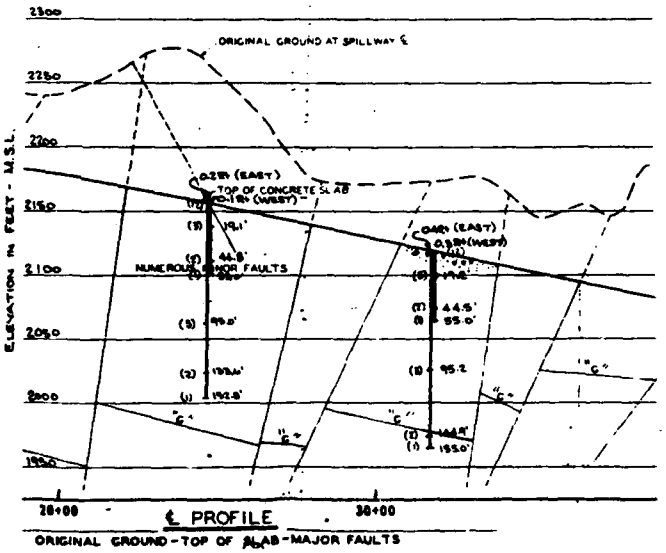
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. DA-23-065-eng-
MODIFICATION NO.


LEGEND
EAST
WEST
Note: For anchor depths see
profile
MOVEMENT IN FEET
76
77
78
79
80
81
82
83
84
85
STA 24+90


LEGEND:
EAST
WEST
Note. For anchor depths see
profile
MOVEMENT IN FEET
76
77
78
79
80
81
82
83
84
STA 31+90





Note: Plotted data obtained from yearly precision survey. Intermittent readings, not plotted, obtained by gaging deflections relative to the deepest anchor, assumed to be fixed.

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

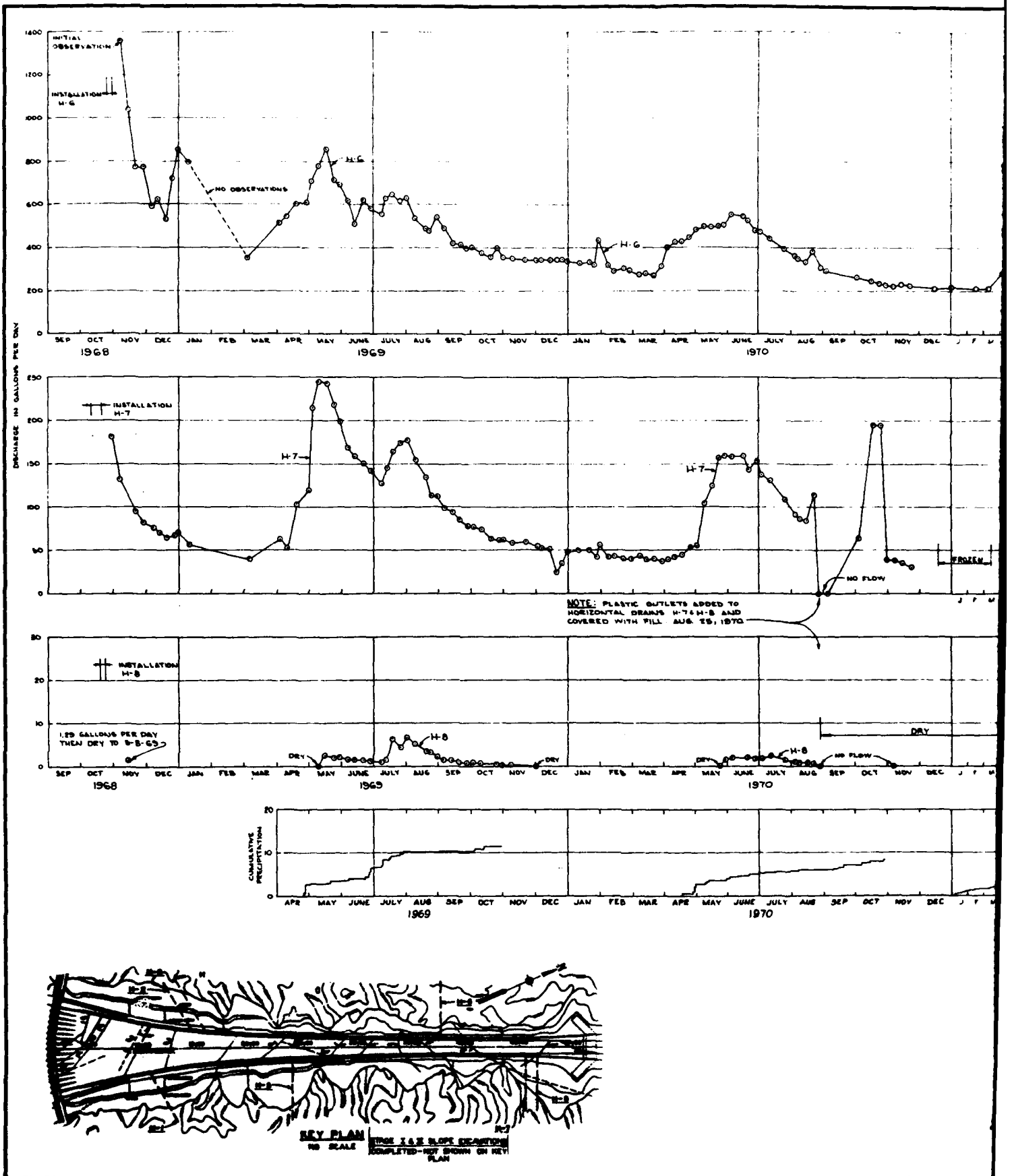
MISSOURI RIVER
FORT PECK DAM
SPILLWAY

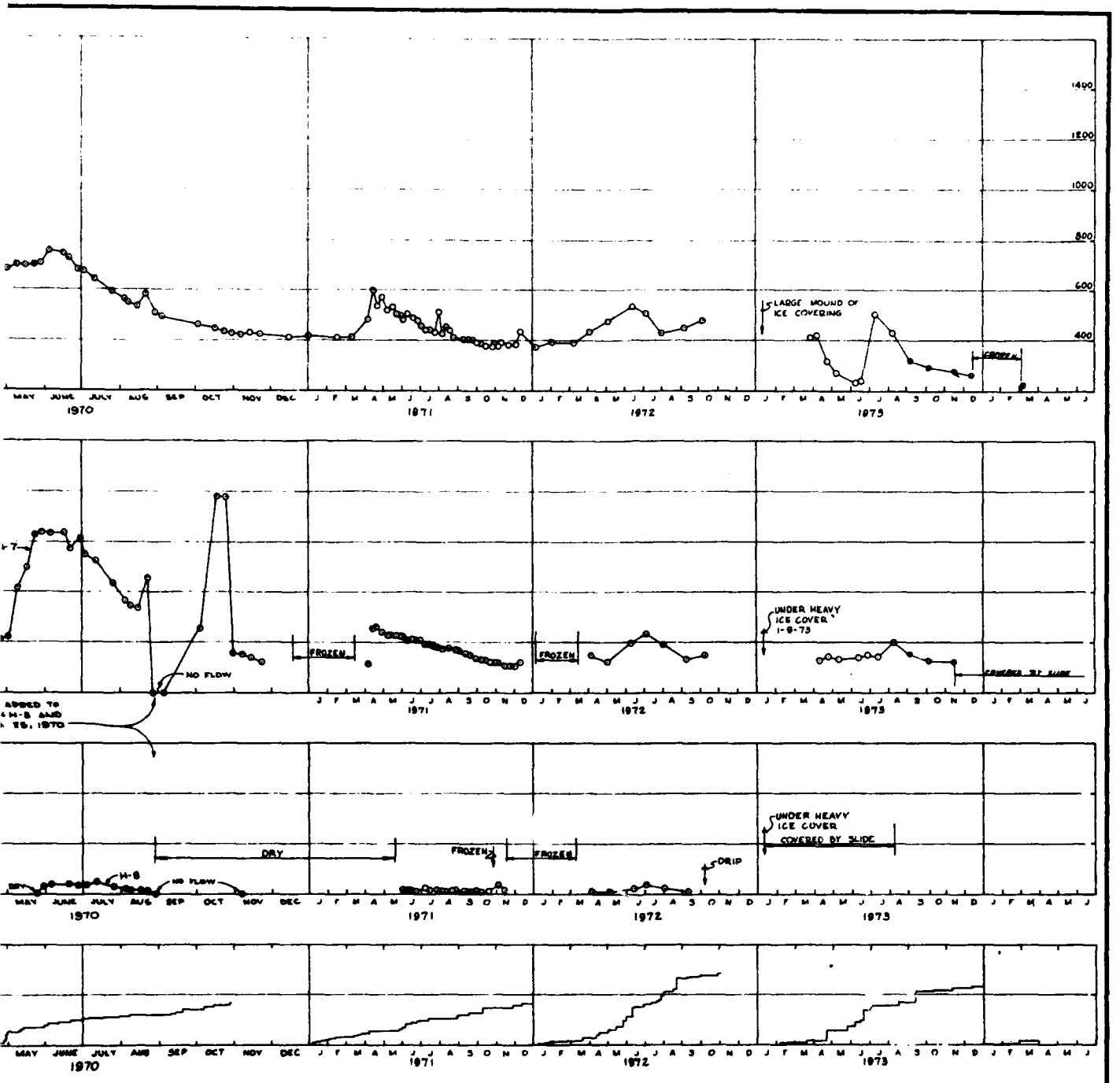
MULTIPLE REBOUND GAGES

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT 2 PLATE 104


DISCHARGE IN GALLONS PER DAY
INITIAL OBSERVATION
INSTALLATION H-6
NO OBSERVATIONS
H-6
1968
1969
1970
INSTALLATION H-7
H-7
NOTE: PLASTIC OUTLETS ADDED TO HORIZONTAL DRAINS H-7 & H-8 AND COVERED WITH FILL AUG. 25, 1970
NO FLOW
FROZEN
INSTALLATION H-8
1.29 GALLONS PER DAY THEN DRY TO 8-8-69
DRY
H-8
CUMULATIVE PRECIPITATION
KEY PLAN
NO SCALE
STAGE 2 & 3 SLOPE EXCAVATION COMPLETED - NOT SHOWN ON KEY PLAN



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

REVISIONS			
DATE	DESCRIPTION	CHECKED	APPROVED

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
HORIZONTAL DRAINS
TIME DISCHARGE RECORD
SHEET 2

DESIGNED: [illegible]
DRAWN: L.V.L.
TRACED: D.R.A.
QUANTITIES: [illegible]
CHECKED: [illegible]
APPROVED: [illegible]
DATE: SEP. 1973
SUBMITTED: Alfred L. Bratbing
CHIEF, U.S. ENGINEER DIVISION
CHIEF: [illegible]
DRAFT: [illegible]

THIS PLAN ACCOMPANIES CONTRACT NO. [illegible]
IDENTIFICATION NO. [illegible]

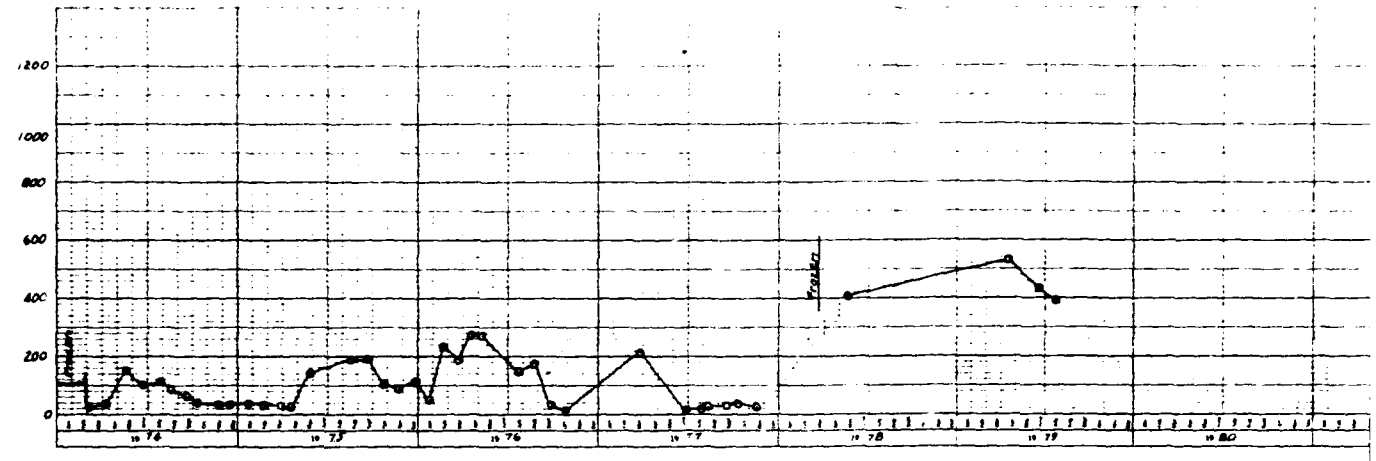
SAFETY DAYS

CONSTRUCTION FOUNDATION REPORT

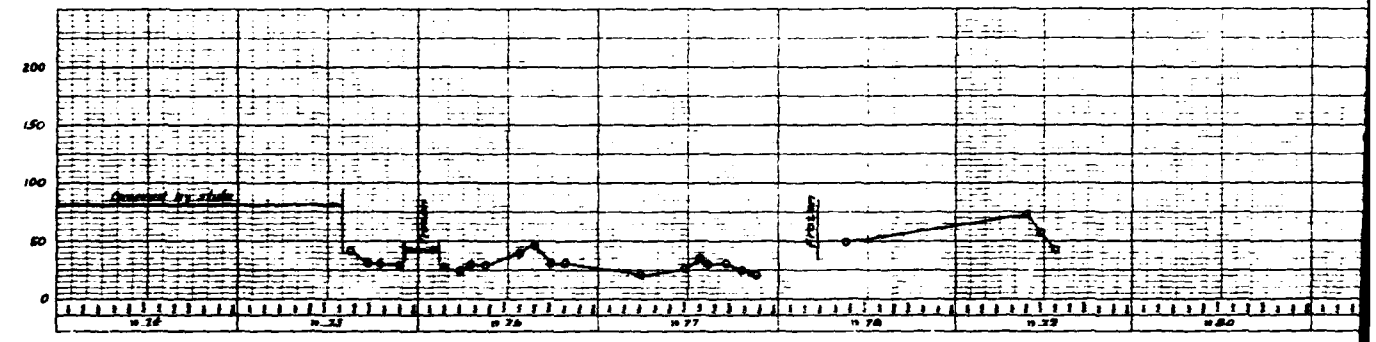
PLATE 105

2

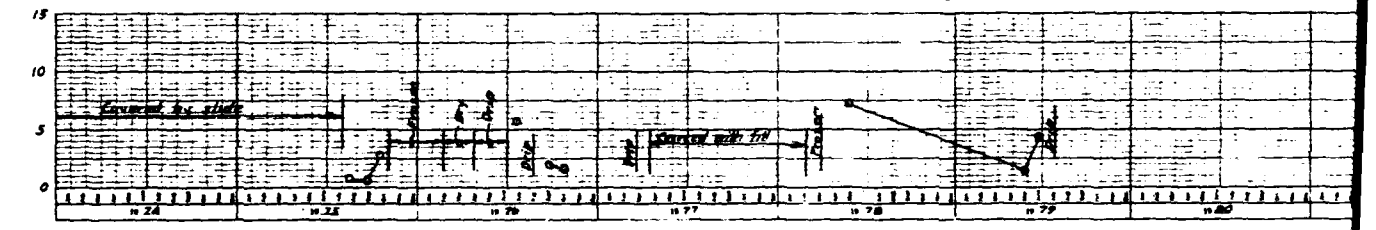
DISCHARGE IN GALLONS PER DAY



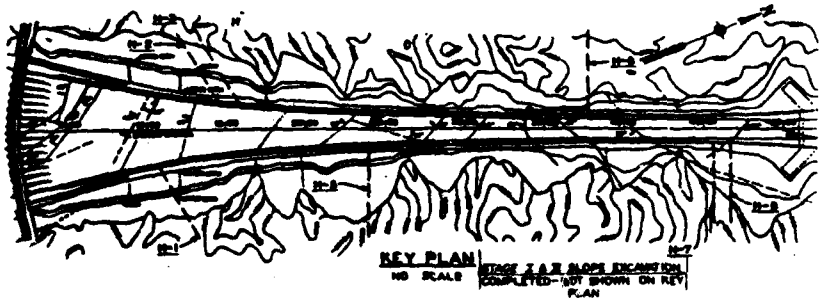
H-6



H-7

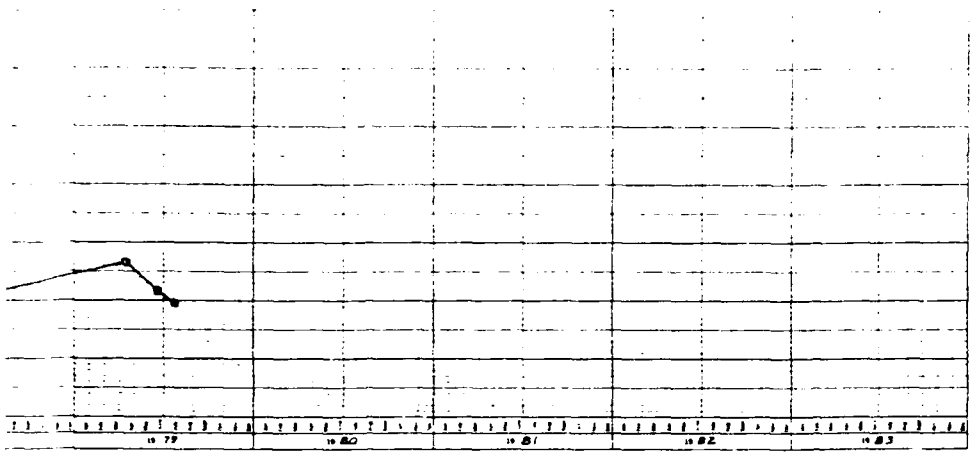


H-8

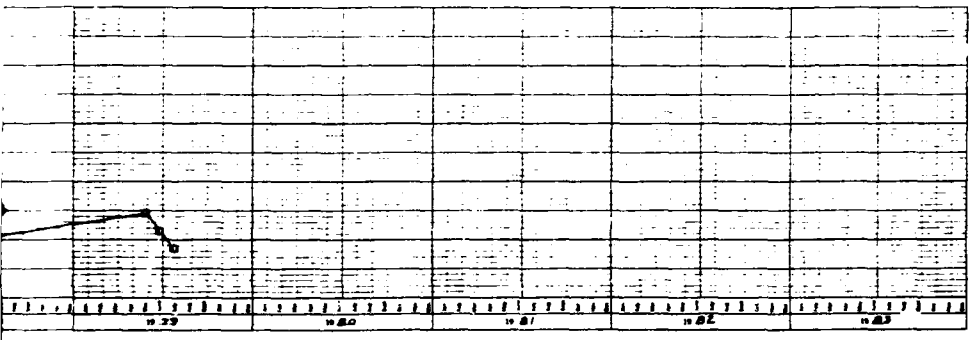


KEY PLAN
NO SCALE

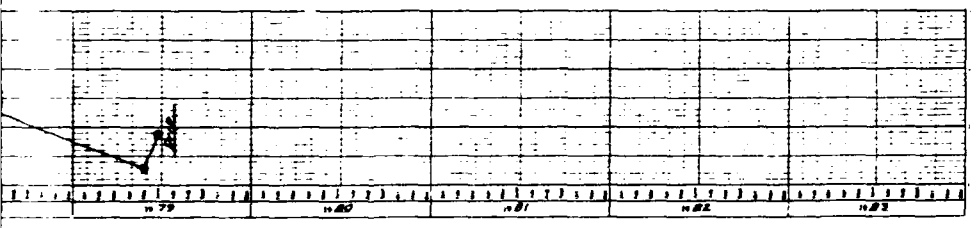
STAGE 7 & 8 SLOPE EXCAVATION COMPLETED - NOT SHOWN ON KEY PLAN



H-6



H-7



H-8

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	ENGR	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

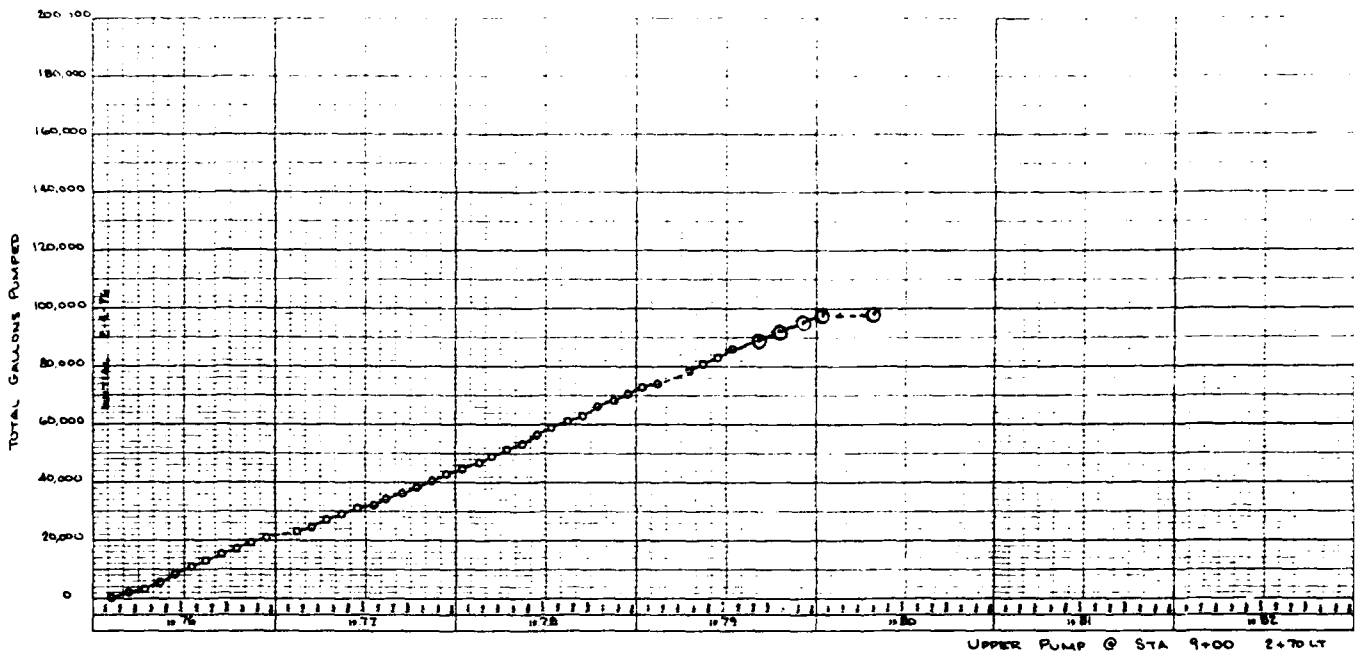
MISSOURI RIVER

FORT PECK LAKE MONTANA
SPILLWAY SLOPE EXCAVATION
HORIZONTAL DRAINS
TIME DISCHARGE RECORD
SHEET 2A

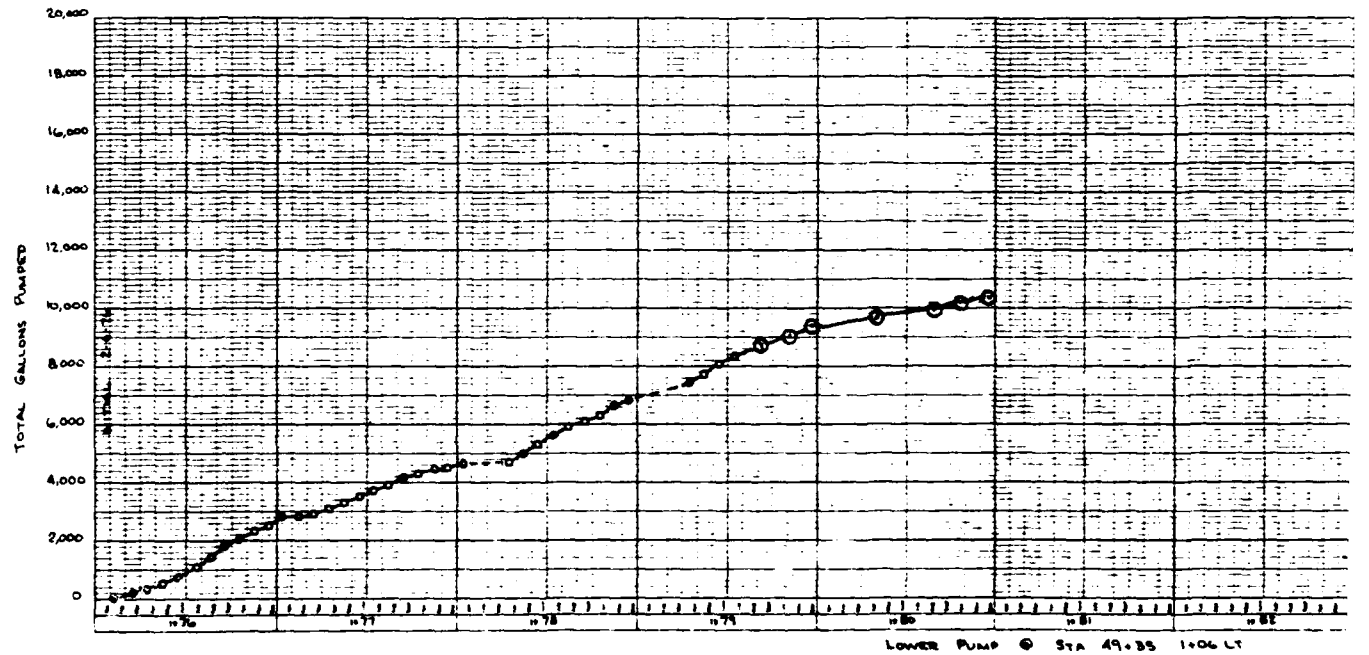
SAFETY PAYS

THIS PLAN ACCOMPANIED CONTRACT NO. MODIFICATION NO.

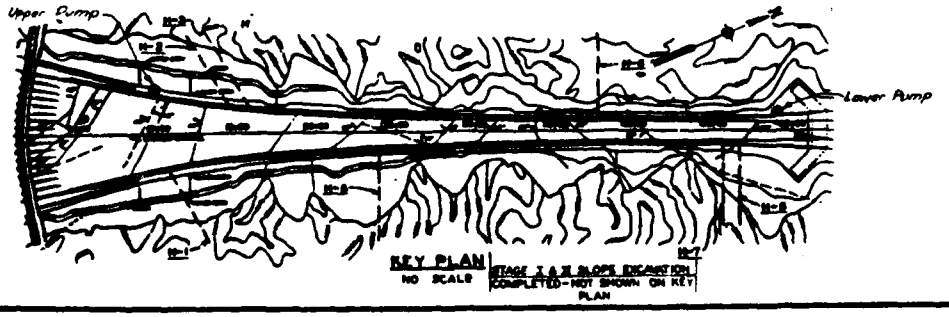
CONSTRUCTION FOUNDATION REPORT 2 PLATE 106



UPPER PUMP @ STA 9+00 2+70 LT

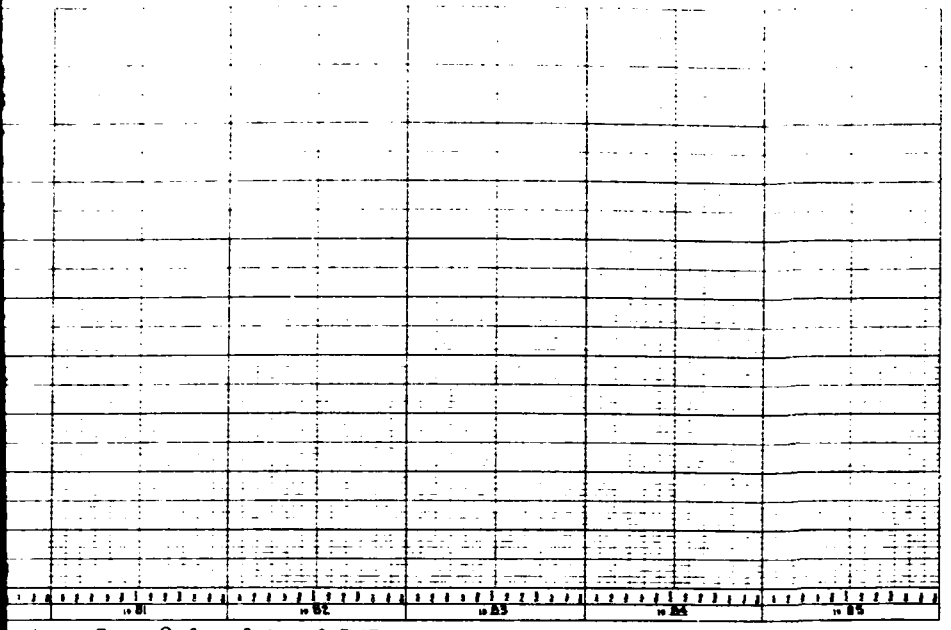


LOWER PUMP @ STA 49+35 1+06 LT

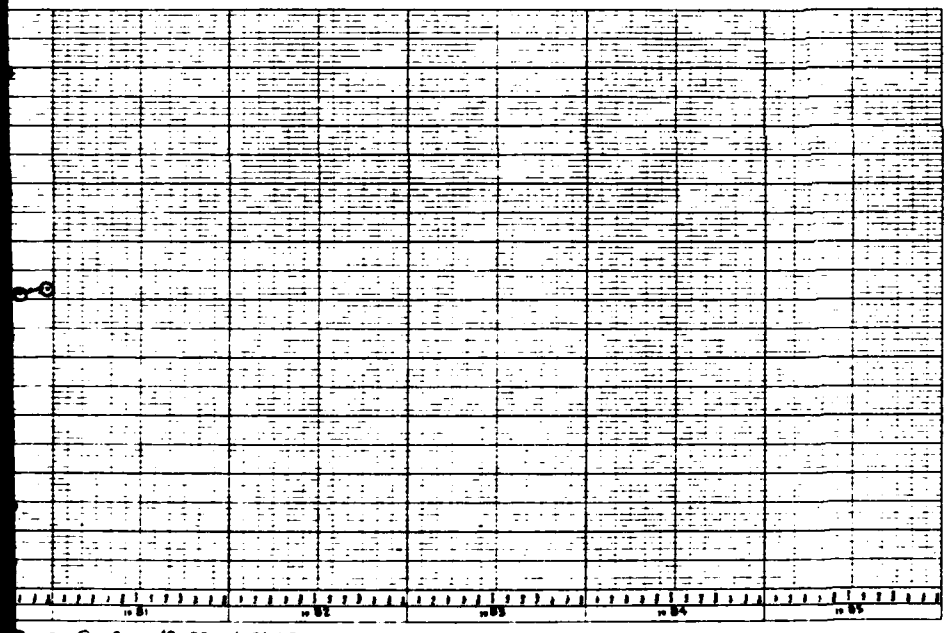


KEY PLAN
NO SCALE

STAGE 1 & 2 SLOPE EXCAVATION COMPLETED - NOT SHOWN ON KEY PLAN



UPPER PUMP @ STA 9+00 2+70 LT



PUMP @ STA 49+35 1+06 LT

er Pump

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SIZE.

DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
TRACED:
CHECKED:

MISSOURI RIVER
FORT PECK DAM
SPILLWAY

SHALE PUMPED DRAINAGE WELLS
SW 9/2 74 L & SW 49 3/1 04L

APPROVED: DATE:
CHIEF, ENGINEERING DIVISION

APPROVED: SCALE AS SHOWN DWG. NO.
CHIEF, CONSTRUCTION DIVISION DRAWING NUMBER

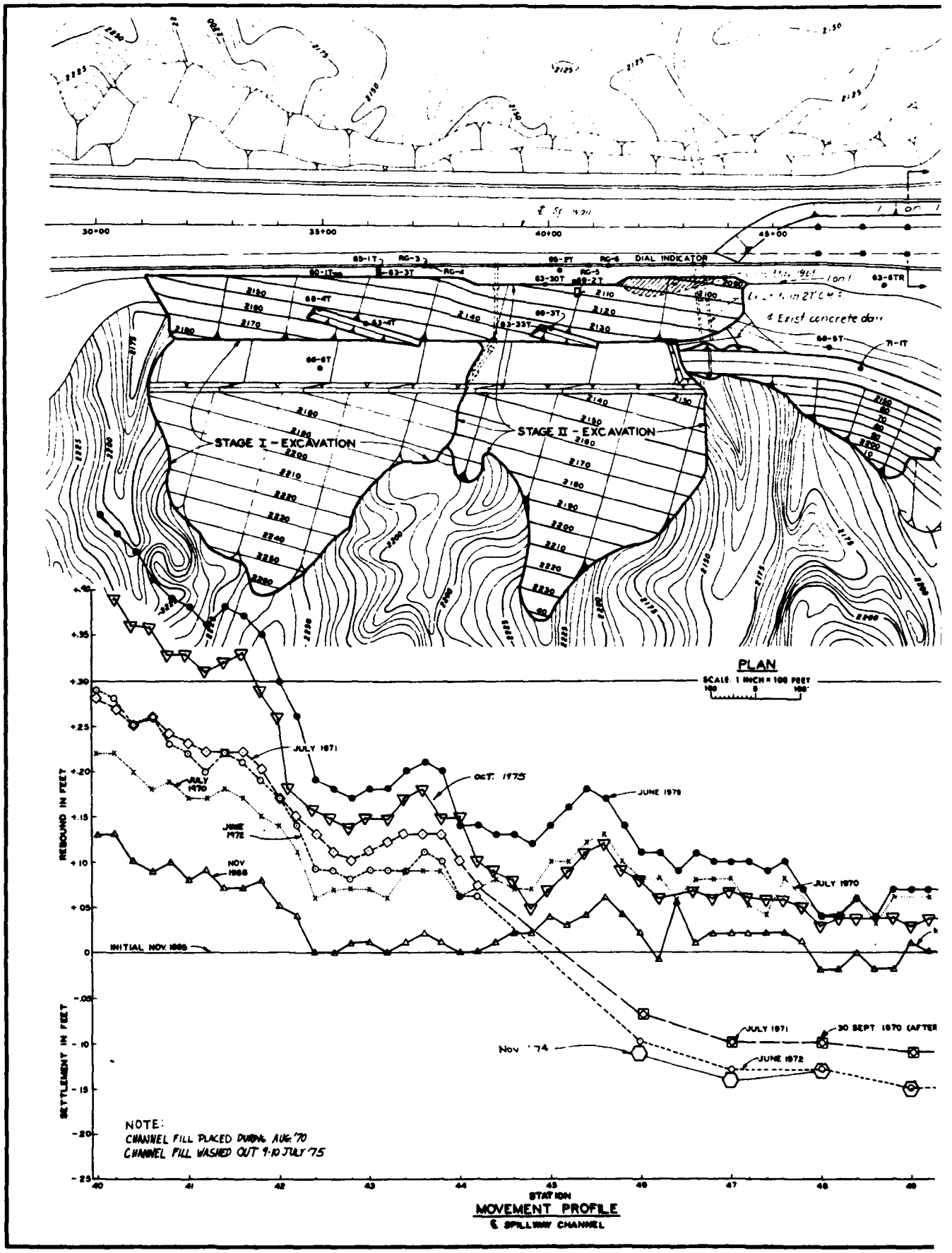
DATE:

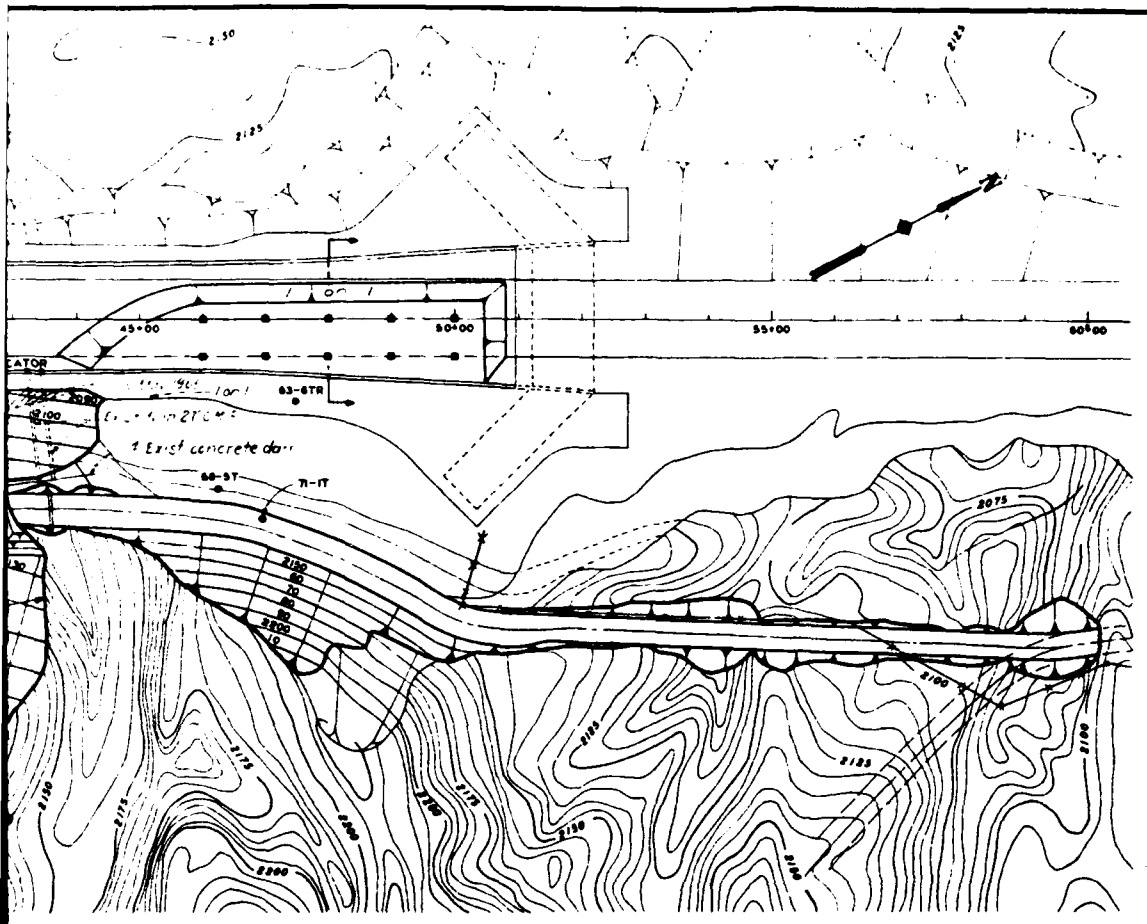
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

PLATE 107


STAGE I - EXCAVATION
STAGE II - EXCAVATION
DIAL INDICATOR
Exist concrete dam
PLAN
SCALE: 1 INCH = 100 FEET
REBOUND IN FEET
SETTLEMENT IN FEET
JULY 1971
JULY 1970
JUNE 1972
NOV 1968
OCT. 1975
JUNE 1973
JULY 1970
INITIAL NOV 1968
Nov '74
JULY 1971
30 SEPT 1970 (AFTER
JUNE 1972
NOTE:
CHANNEL FILL PLACED DURING AUG '70
CHANNEL FILL WASHED OUT 9-10 JULY 75
STATION
MOVEMENT PROFILE
℄ SPILLWAY CHANNEL

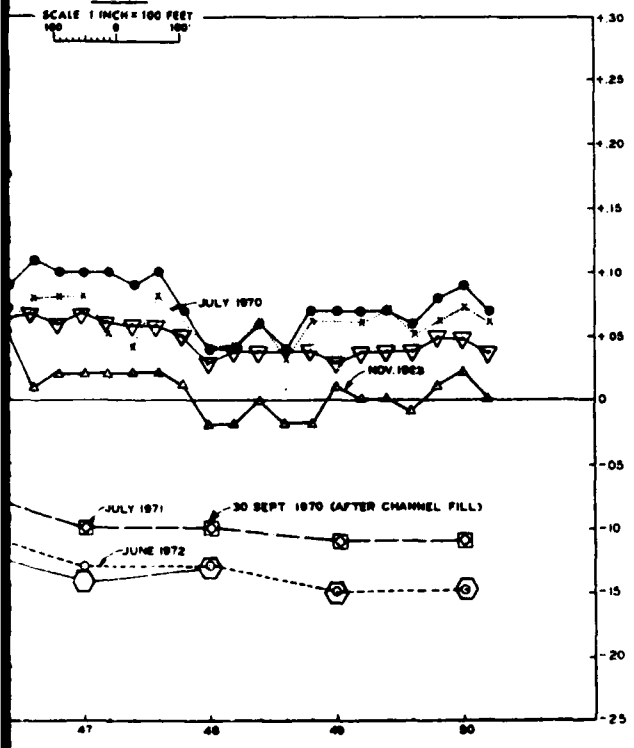


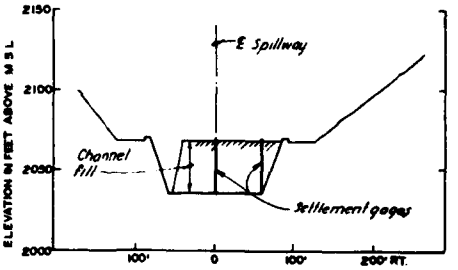
LEGEND:

- TILTMETER
- REBOUND GAGES
- SETTLEMENT GAGES
- DIAL INDICATOR INSTALLATION

PLAN

SCALE 1 INCH = 100 FEET





SECTION
STA. 48+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	ISSUED	APPVD
	REVISIONS		

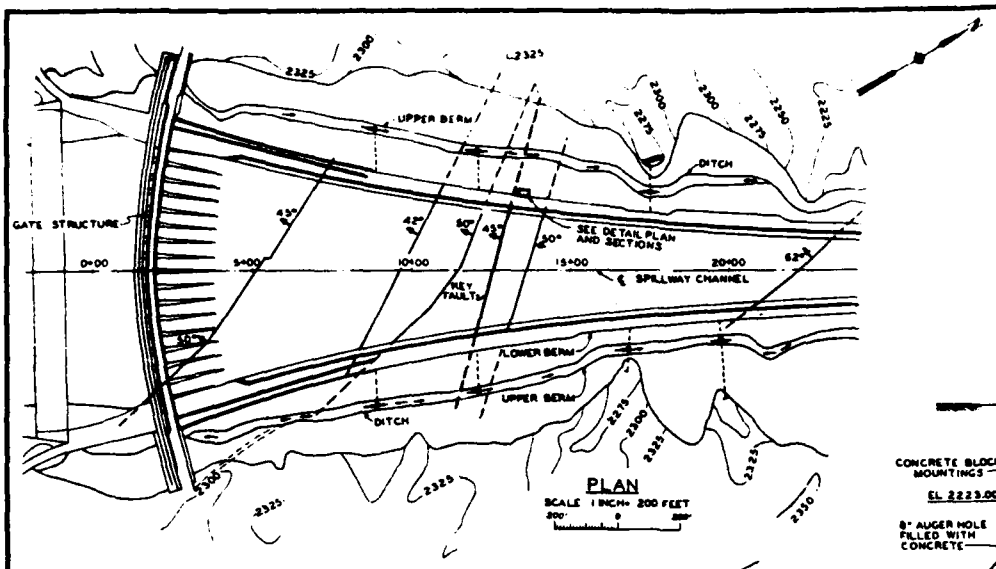
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
CHANNEL FILL
SETTLEMENT GAGES

DESIGNED BY: O W A
DRAWN BY: R L M
TRACED BY: C V J
SUBMITTED BY: Art Thomas
CHIEF, ENGR. DES. SECTION
RECOMMENDED: C.A. Thomas
CHIEF, E & D BR.
APPROVED: R.E. Sarno
CHIEF, ENGINEERING DIVISION
DATE: SEP 1972
APPROVED: Alfred L. Brielby
CHIEF, U.S. ENGINEER DIVISION
SCALE AS SHOWN
DRAWING NUMBER
SHEET

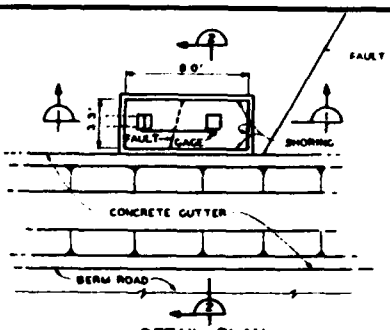
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
IDENTIFICATION NO.



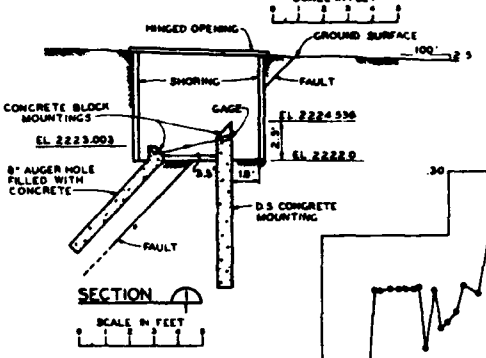
PLAN

SCALE 1 INCH= 200 FEET



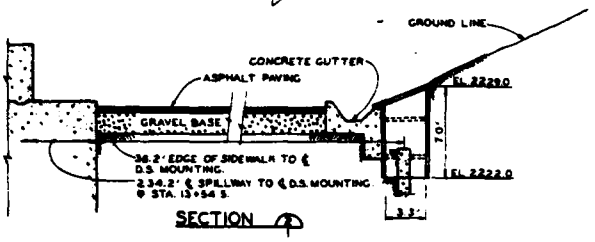
DETAIL PLAN

SCALE IN FEET



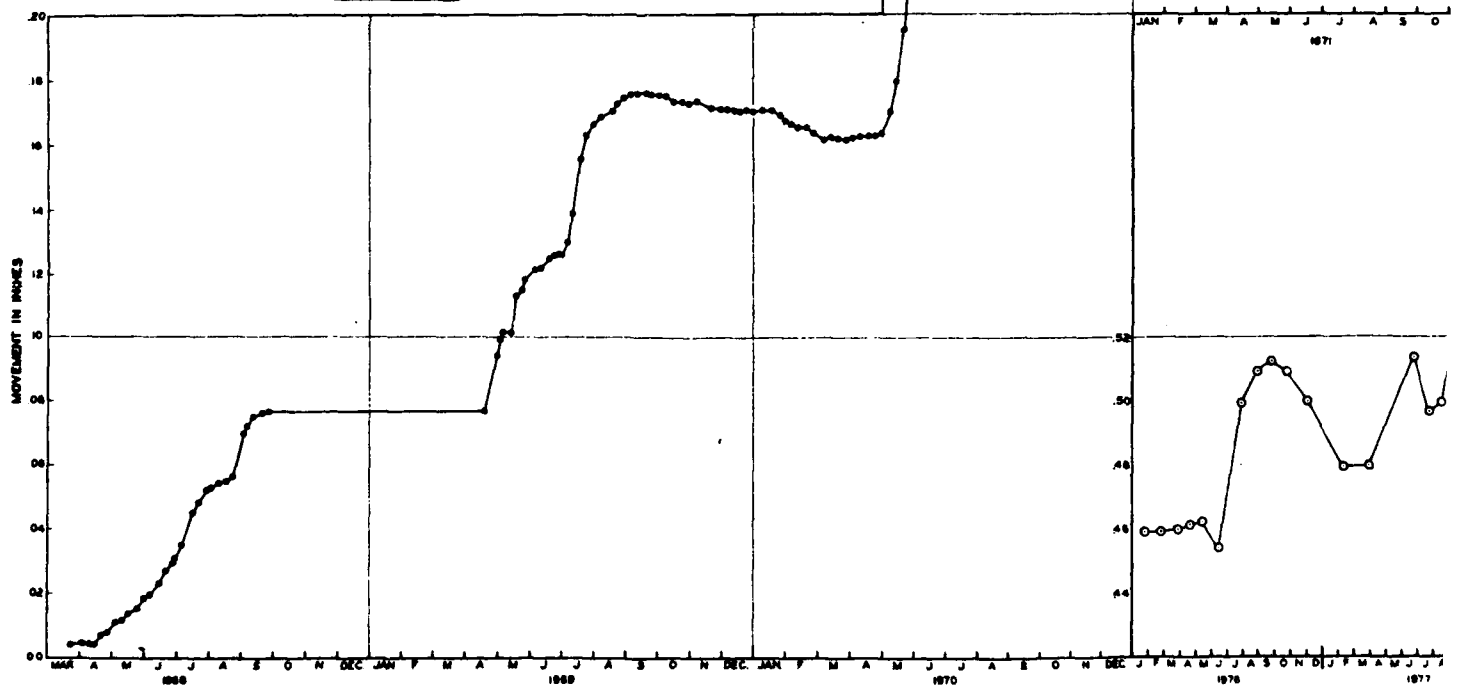
SECTION

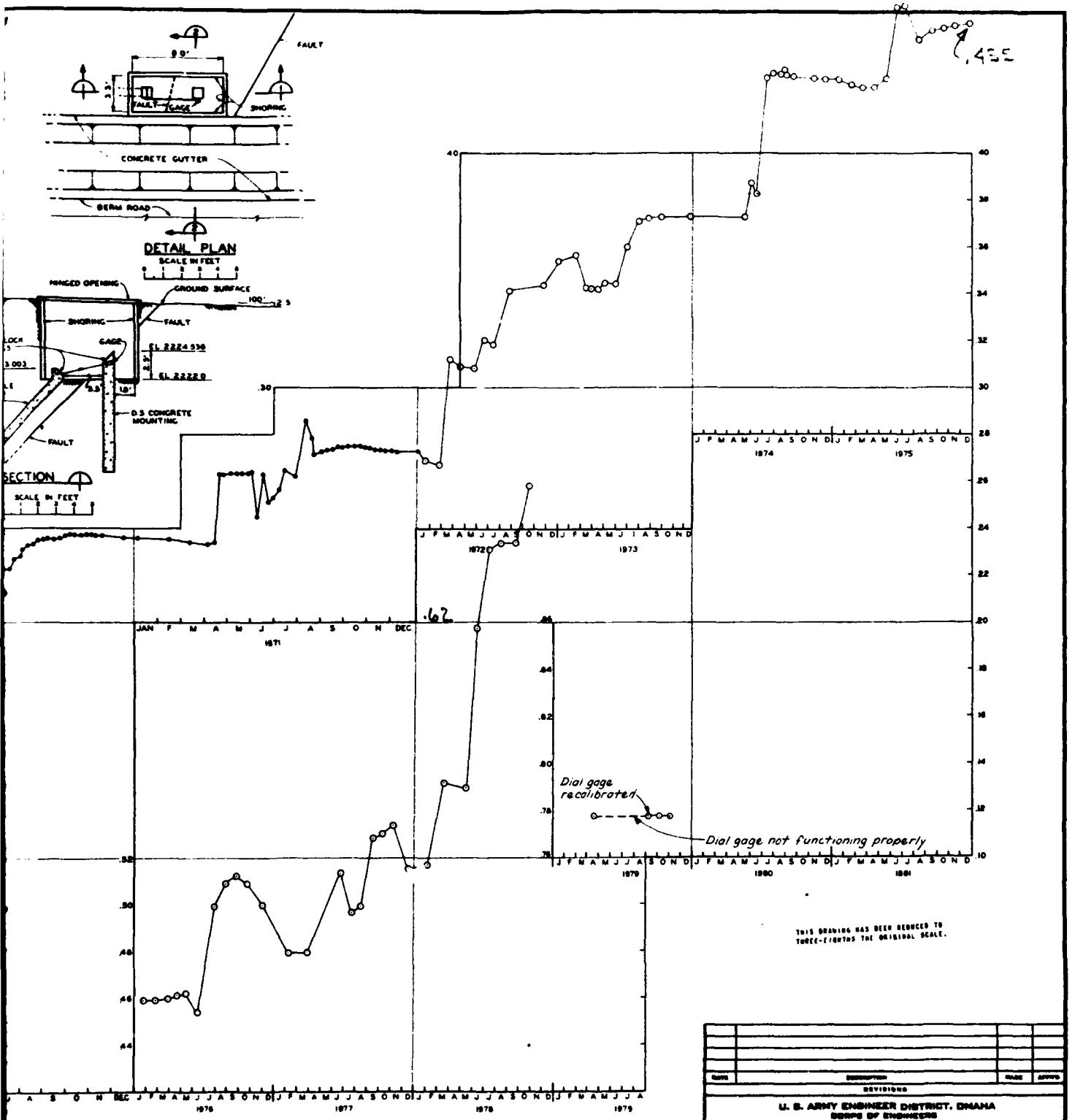
SCALE IN FEET



SECTION

SCALE: 1 INCH=5 FEET





THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BASED	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

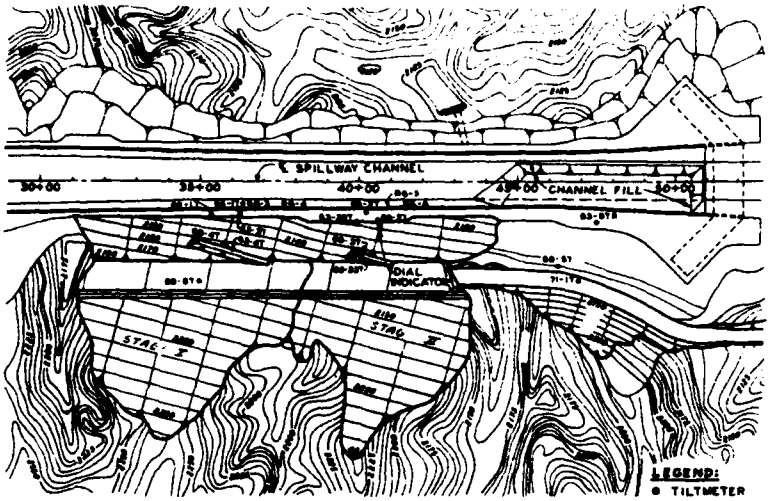
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
DIAL INDICATOR GAGE
ACROSS KEY FAULT-STA 13+55L

DESIGNED BY: G.W.A.
DRAWN BY: C.M.B.
CHECKED BY: C.V.J.
SUBMITTED BY: A.L. Williams, CHIEF, ENGR. DIV.
RECOMMENDED: E.E. Hansen, CHIEF, E.&M. BR.
APPROVED: Alfred L. Brisbin, COL., C.E., DISTRICT ENGINEER
DATE: SEP. 1973
SCALE AS SHOWN
DRG. NO.
SHEET

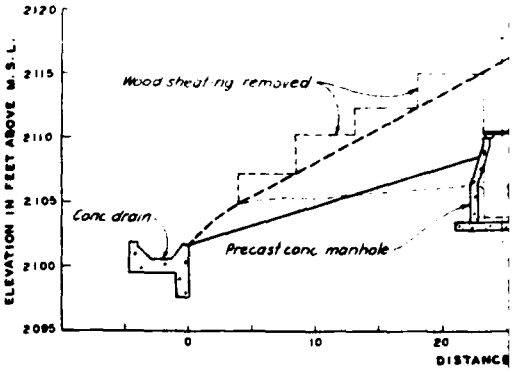
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. _____ MODIFICATION No. _____

CONSTRUCTION FOUNDATION REPORT 2 PLATE 109

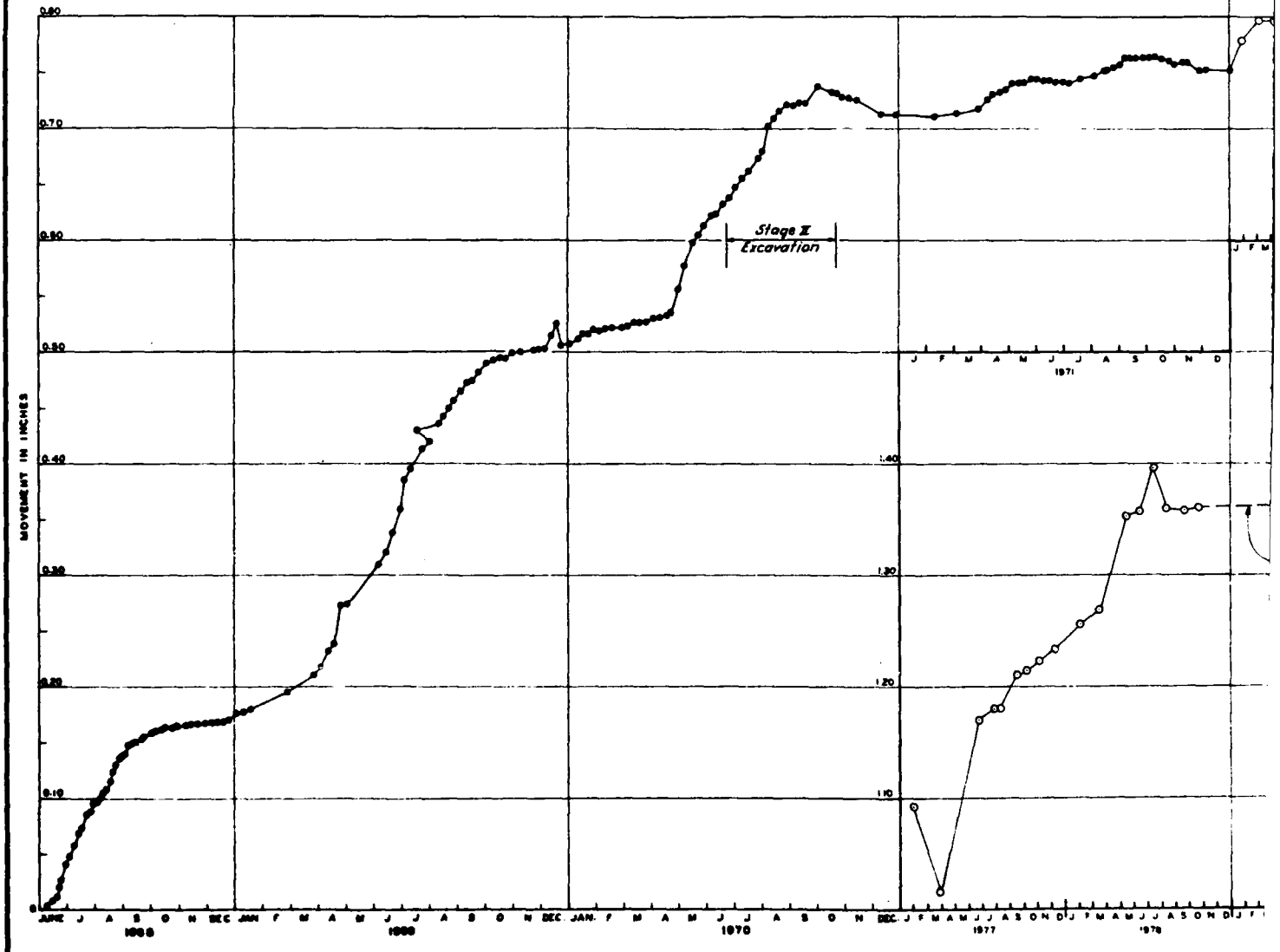


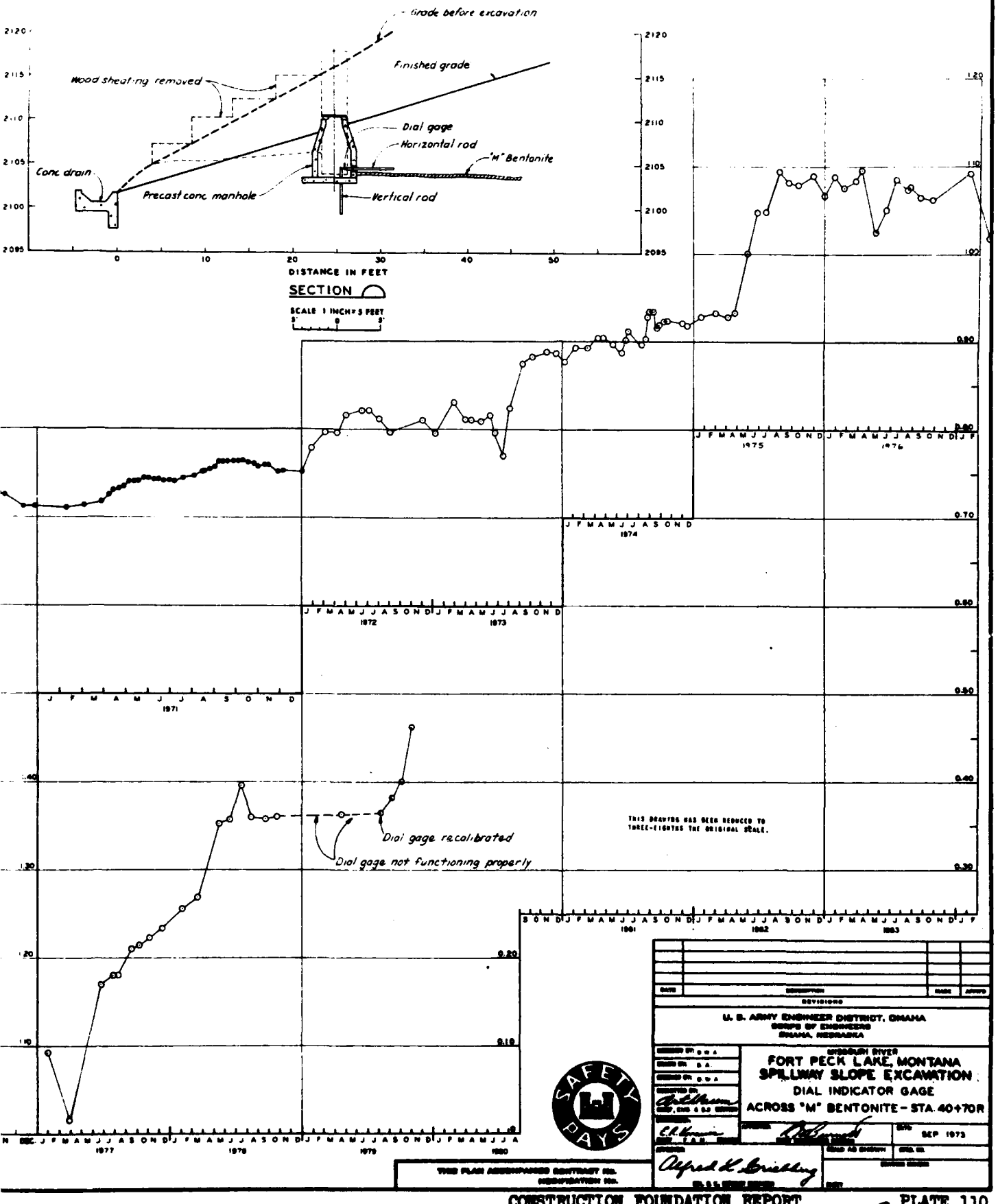
KEY PLAN



SECTIO

SCALE 1 IN





U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
DIAL INDICATOR GAGE
ACROSS "M" BENTONITE - STA. 40+70R

SEP 1973

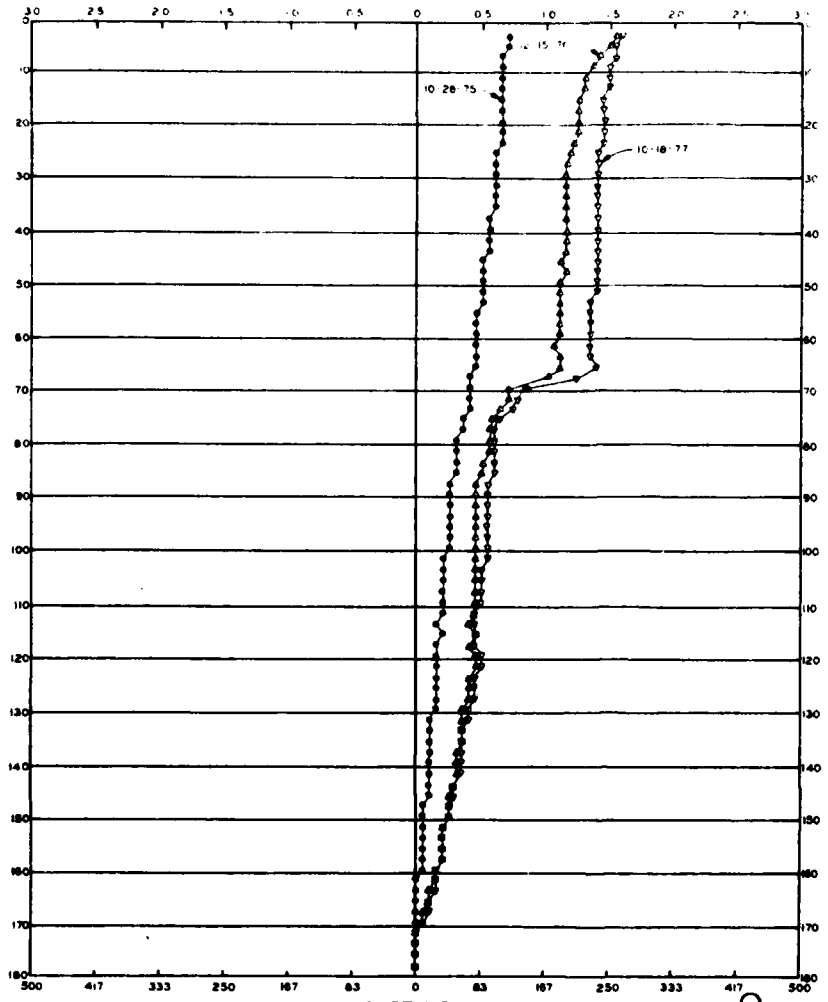
Alfred K. Brickley

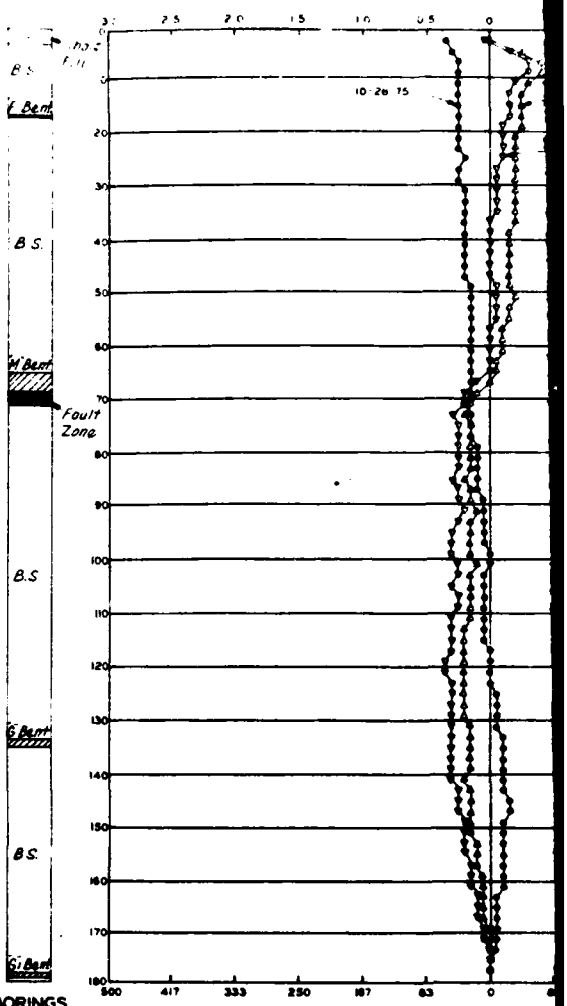
SAFETY DAYS

CONSTRUCTION FOUNDATION REPORT

PLATE 110

2



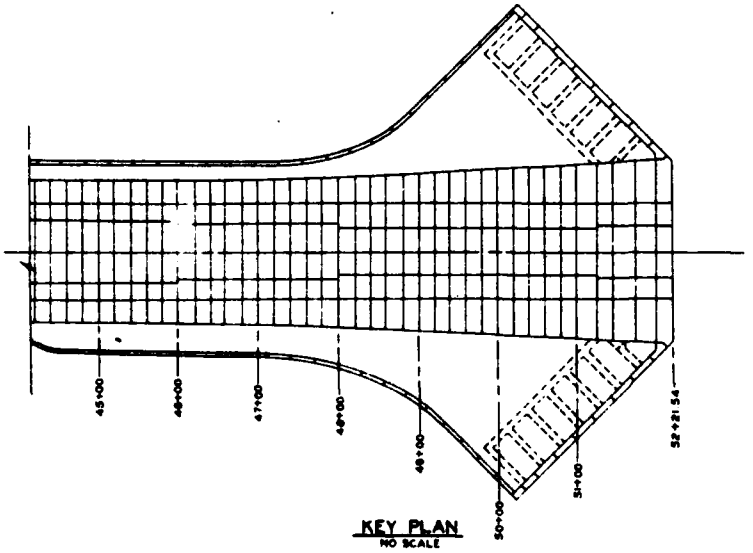


BORINGS

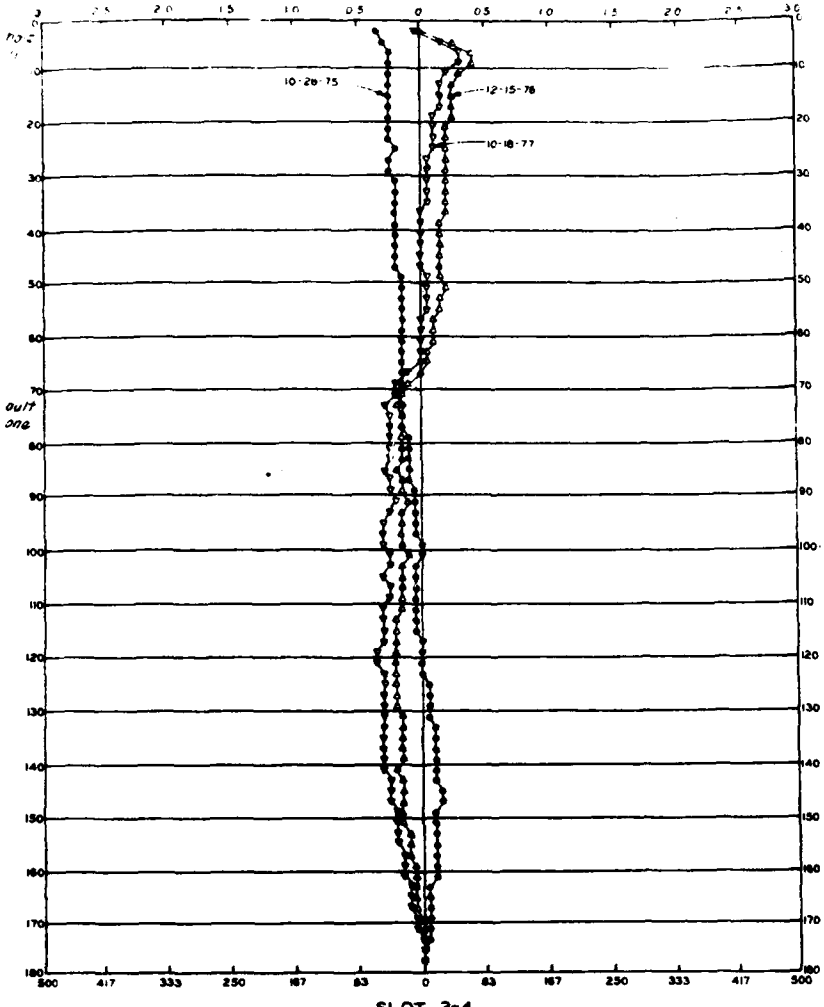
Note: B.S. = Bearpaw FM. Clay Shale

Note: Fault zone distinguished by a significant slickensided surface and a lower crushed zone. Calculated vertical displacement measured to be 17.6 ft.

TILTMETER 75-12T

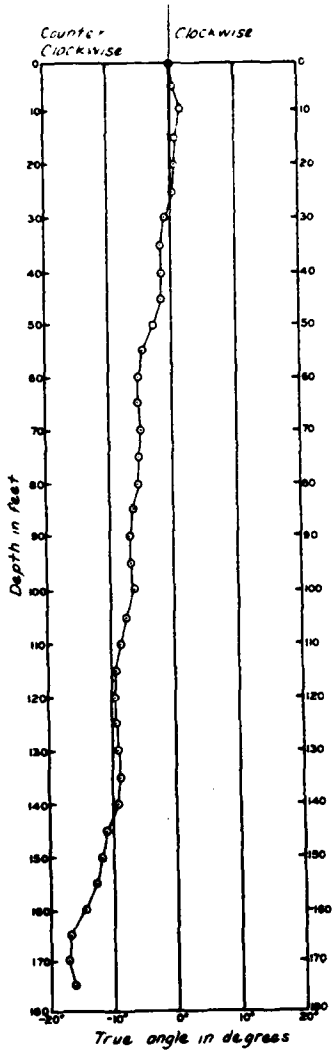


KEY PLAN
NO SCALE

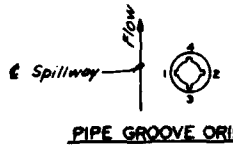


SLOT 3-4

Bearpaw FM Clay Shale
't zone distinguished by a significant
ed surface and a lower crushed zone.
' vertical displacement measured
ft.



GROOVE SPIRAL
11-18-75



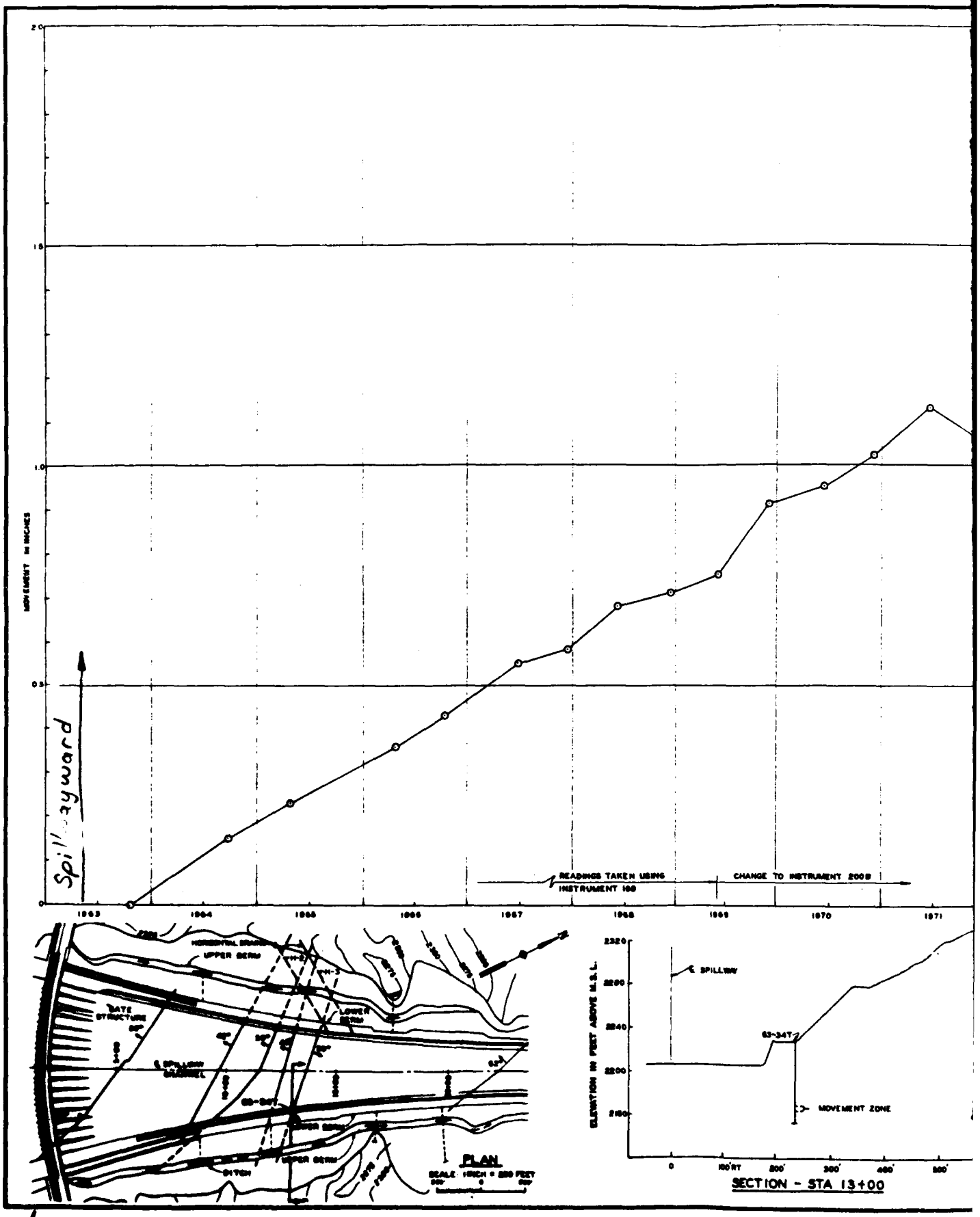
PIPE GROOVE ORIENTATION

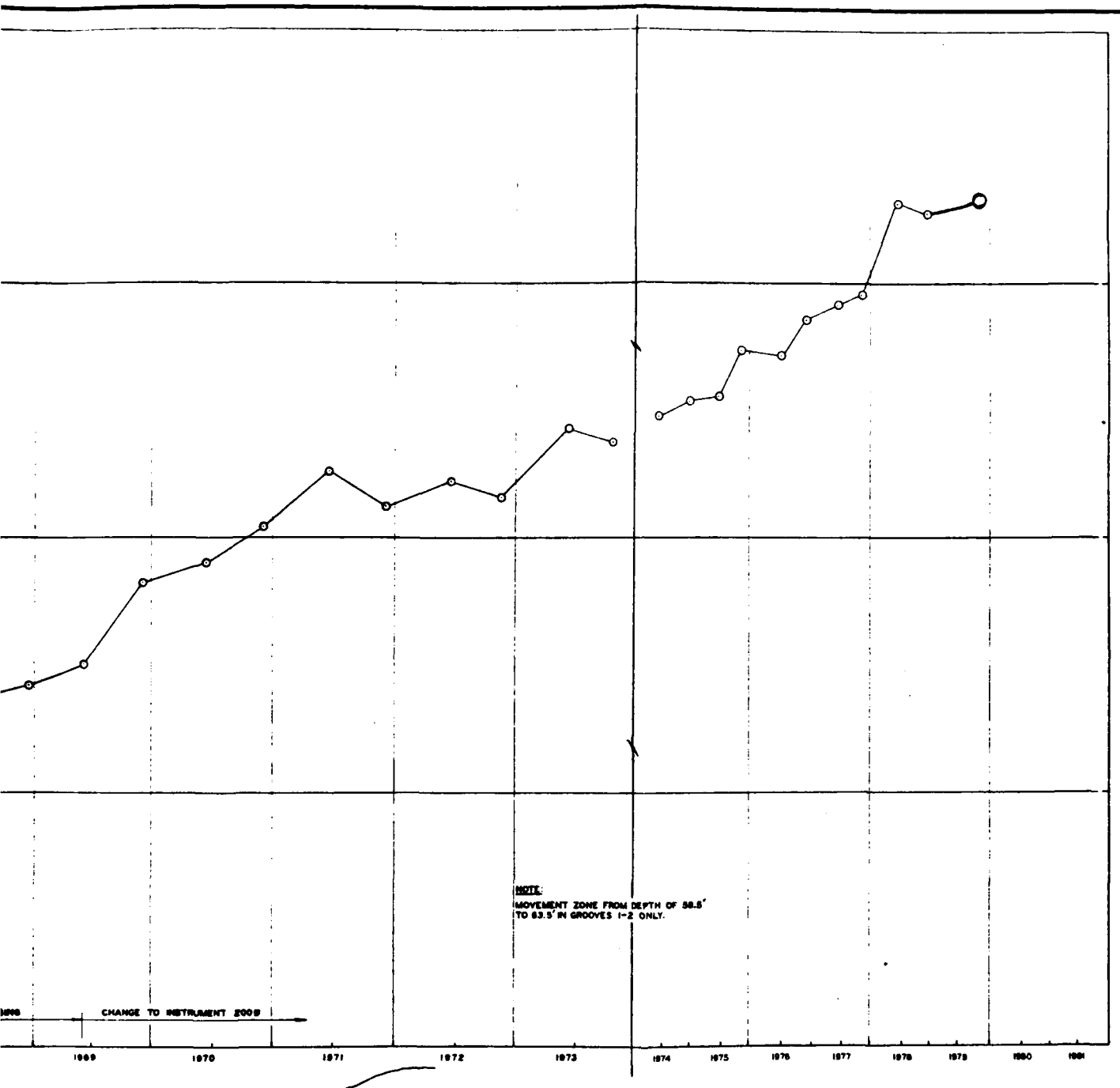
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

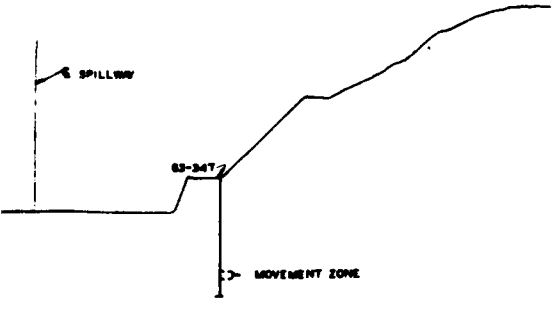
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM
TILTMETER OBSERVATIONS
SLOPE INDICATOR 75-12T
INSTRUMENT-2008
ACCUMULATED DEFLECTION

SAFETY PAYS


MOVEMENT IN INCHES
2.0
1.5
1.0
0.5
0
1963
1964
1965
1966
1967
1968
1969
1970
1971
Spillway ward
READINGS TAKEN USING INSTRUMENT 108
CHANGE TO INSTRUMENT 2008
PLAN
SCALE: 1 INCH = 200 FEET
SECTION - STA 13+00
ELEVATION IN FEET ABOVE M.S.L.
2320
2280
2240
2200
2160
E. SPILLWAY
63-34T
MOVEMENT ZONE
0
100' RT
200'
300'
400'
500'





SECTION - STA 13+00

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BASED	APPRD
	REVISIONS		

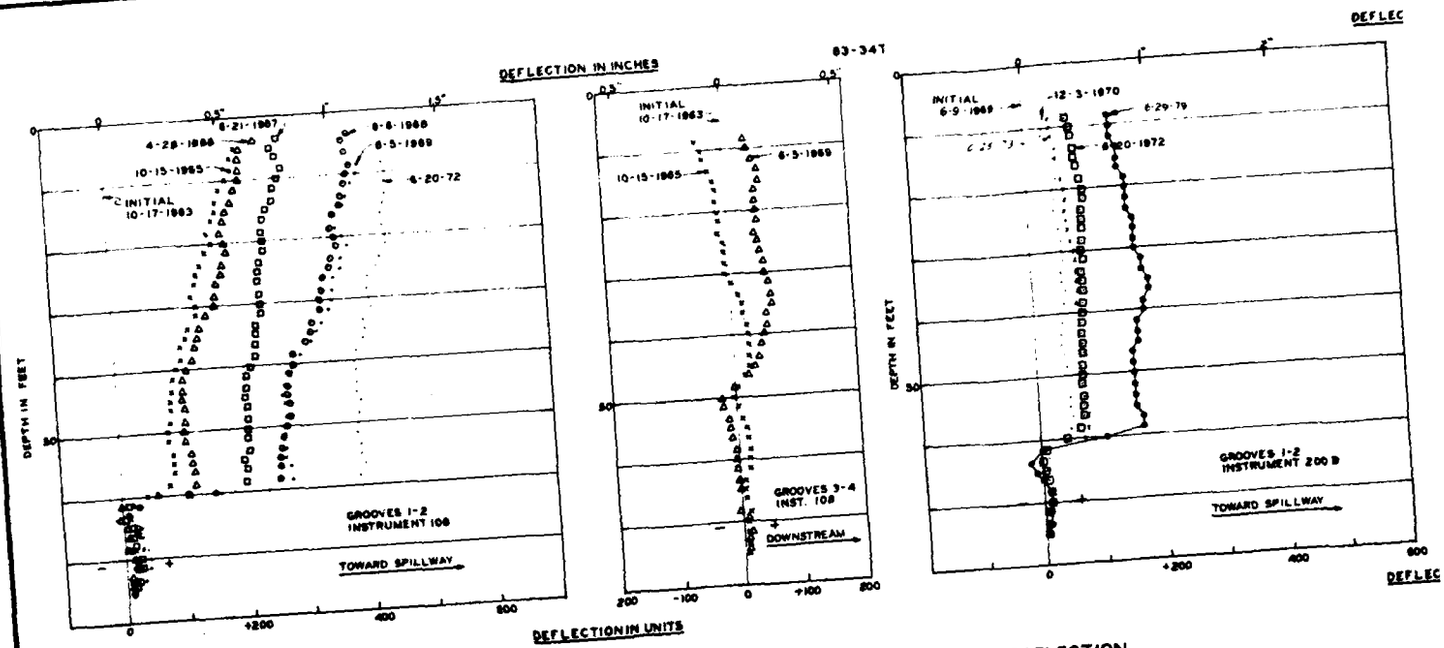
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TIME MOVEMENT
63-34T STA 13+23 RT.

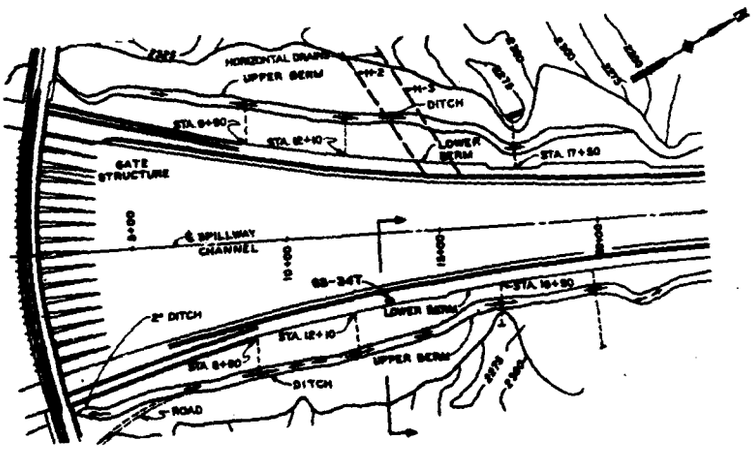
DESIGNED BY: C.V.J.
DRAWN BY:
TRACED BY:
CHECKED BY: C.H.
APPROVED: Alfred L. Brudding
DATE: SEP. 1973

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

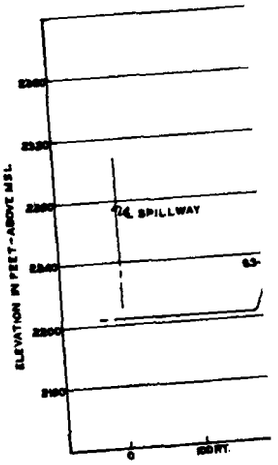


DEPTH VS DEFLECTION

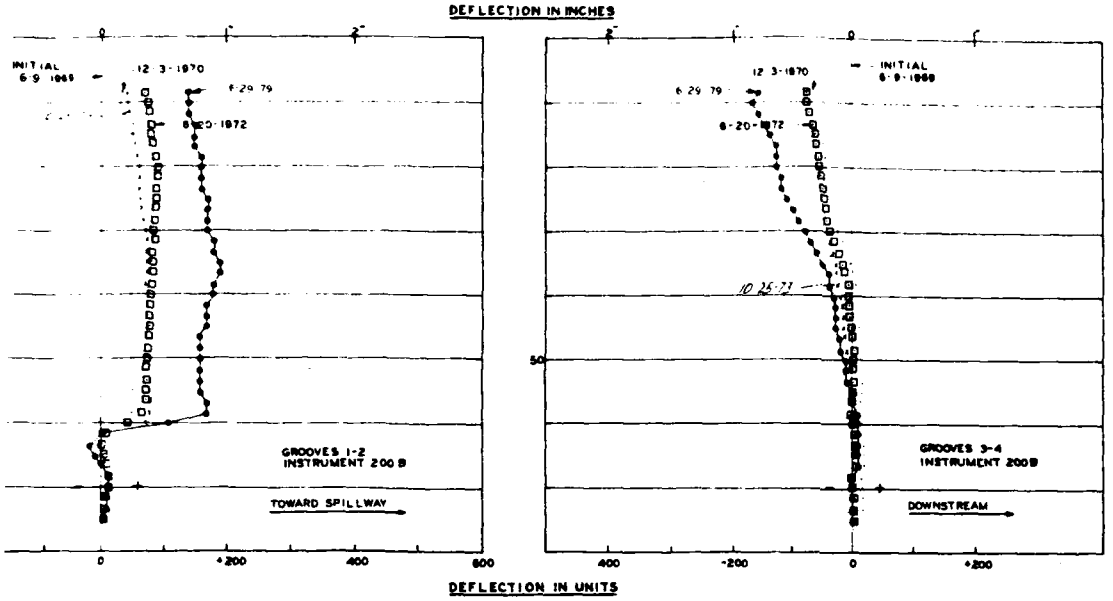


KEY PLAN

SCALE: 1 INCH = 200 FEET

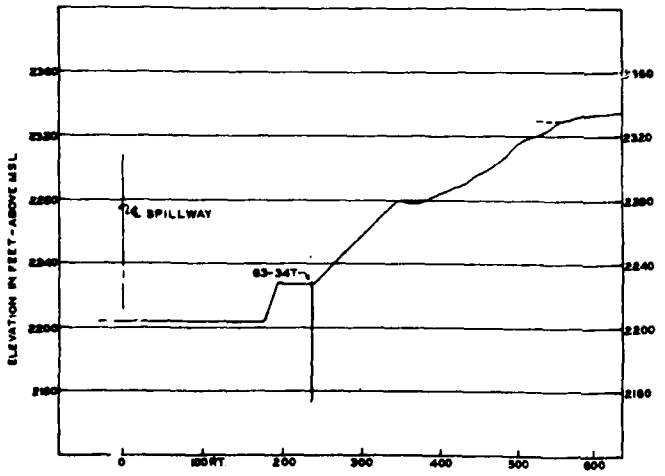


SEC

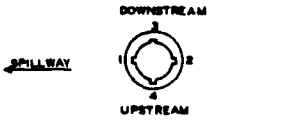


VS DEFLECTION





SECTION - STA. 13+00



PIPE GROOVE ORIENTATION

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

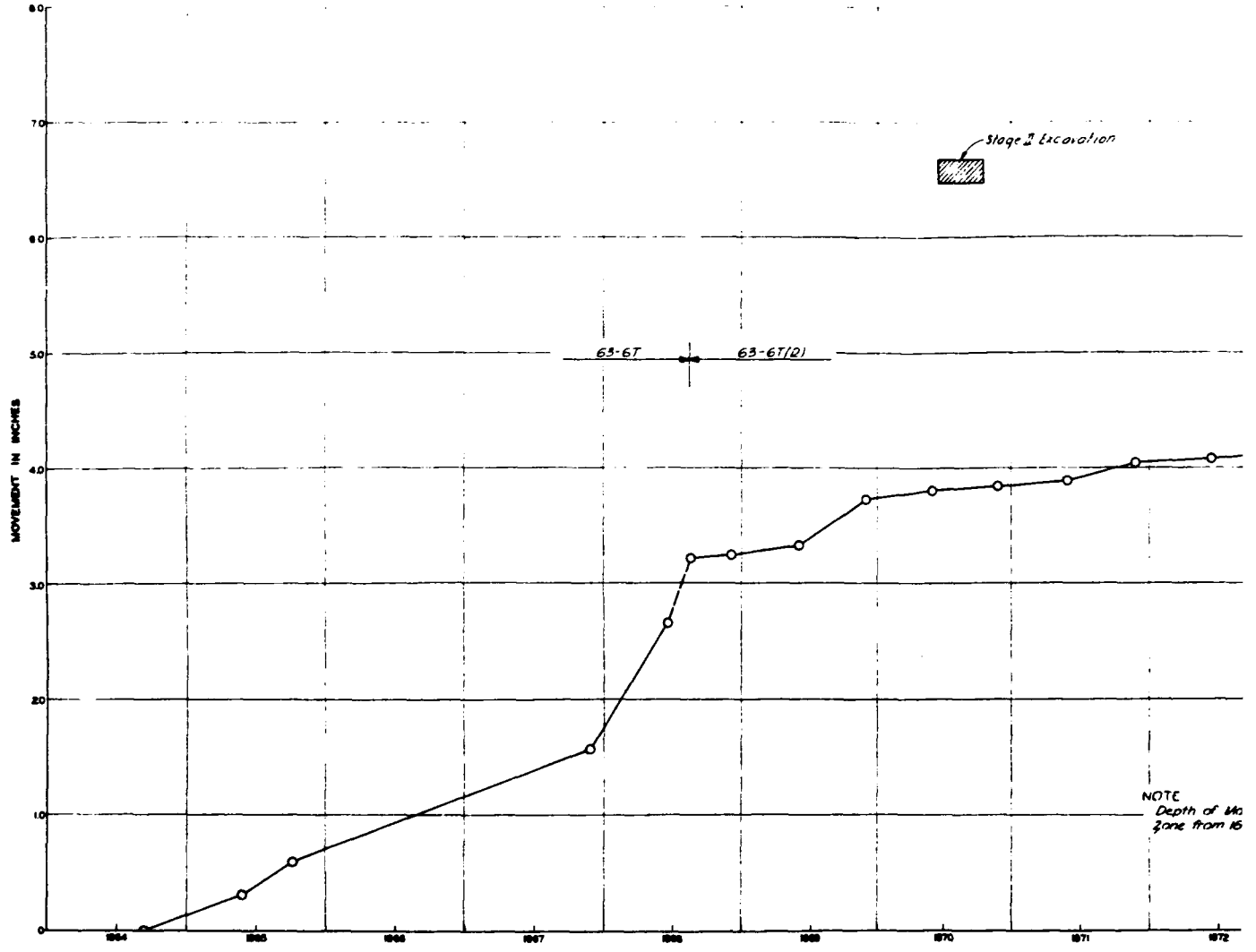
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TILTMETER OBSERVATIONS
63-34T-STA. 13+2.3 RT.

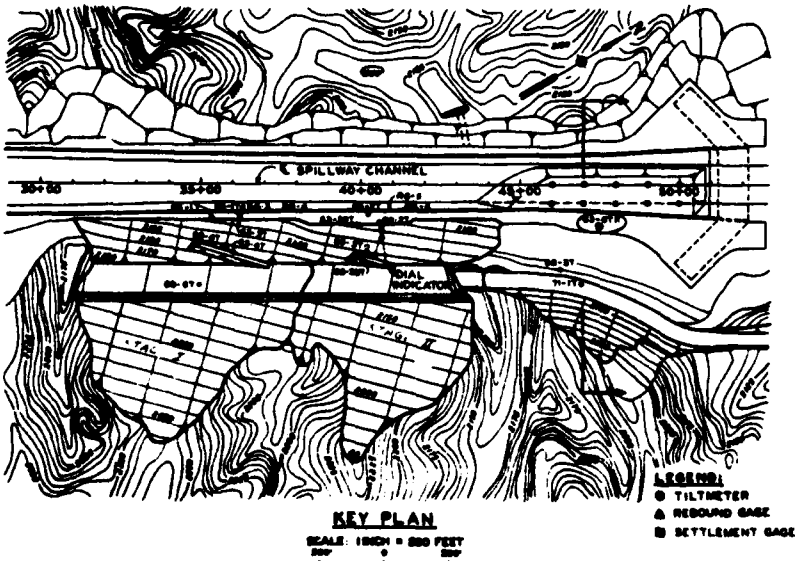
SEP. 1973

Alfred L. Brisbin

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

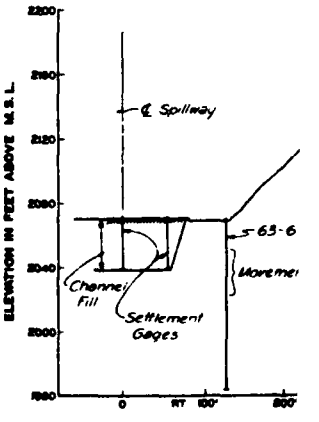
SAFETY PAYS



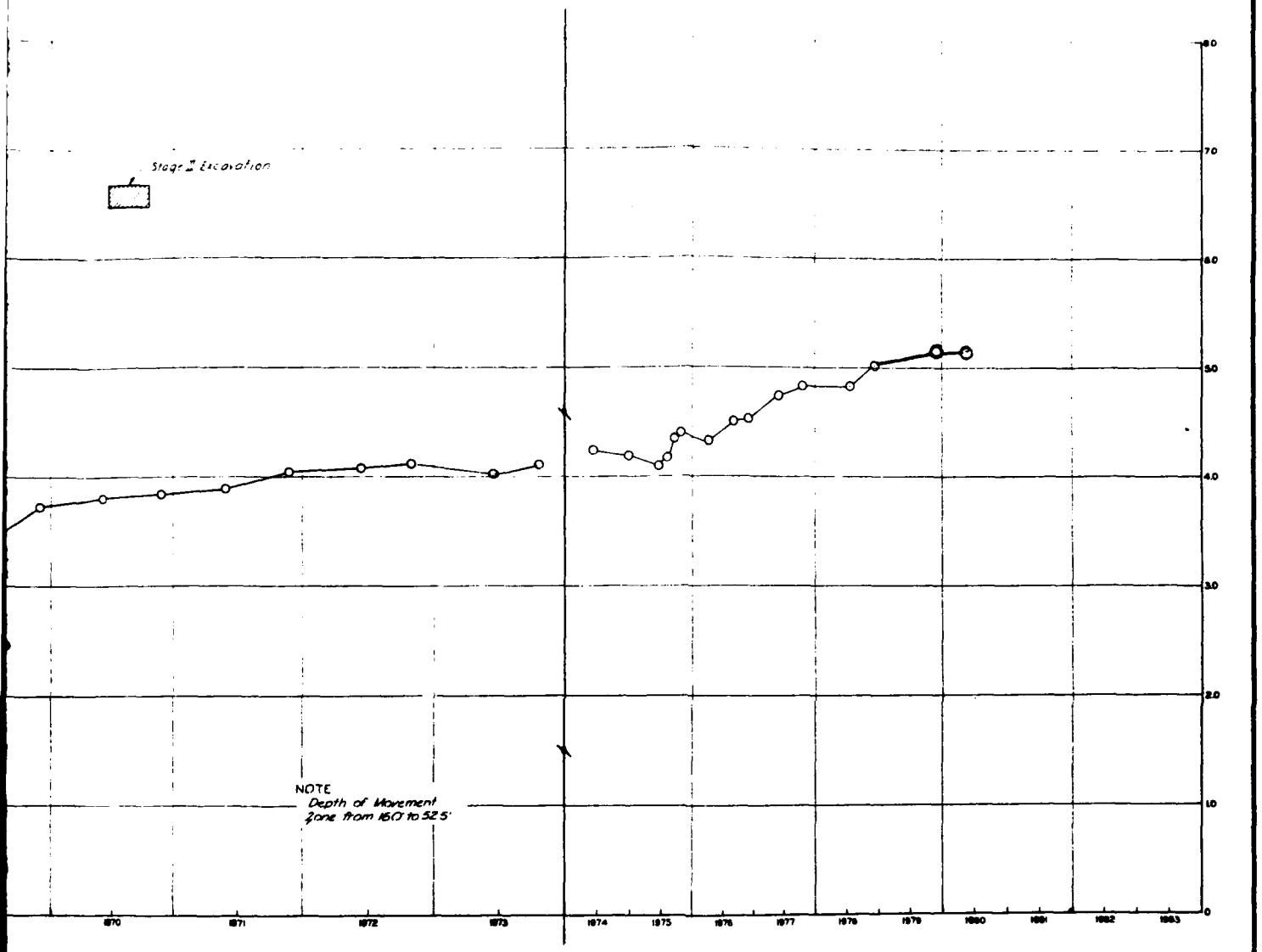


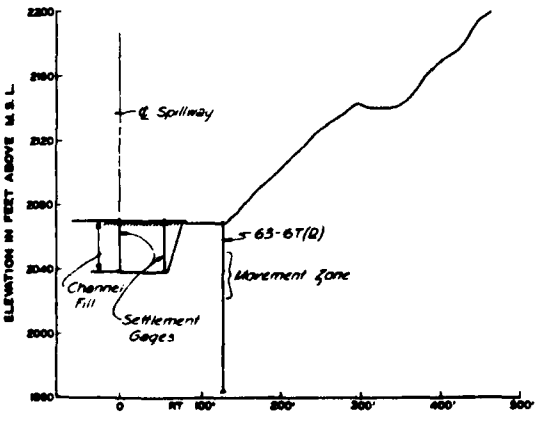
KEY PLAN

SCALE: 1INCH = 200 FEET

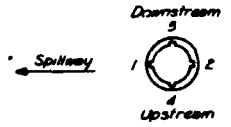


SECTION-S





SECTION - STA. 47+00



PIPE GROOVE ORIENTATION

THIS DRAWING HAS BEEN REDUCED TO THREE-FOURTHS THE ORIGINAL SCALE.

SAFETY PAYS

DATE	DESCRIPTION	CHKD	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

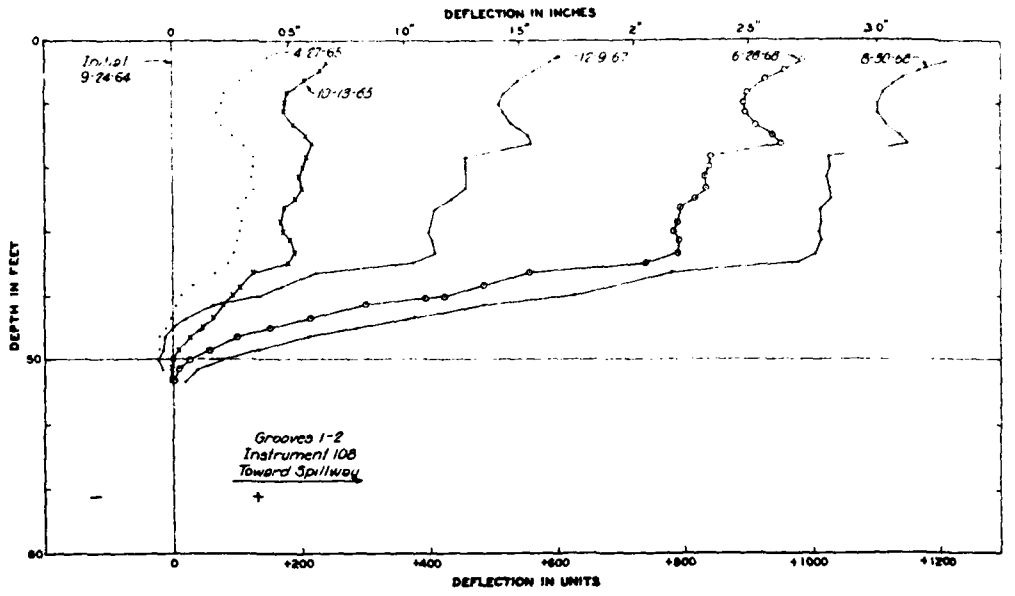
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TIME MOVEMENT
63-6T, 63-6T(2), STA. 47+50 130' RT.

DESIGNED BY: G.W.A.	APPROVED: C.R. Kennedy, CHIEF, ENGR. DIV.	DATE: SEP. 1973
DRAWN BY: M.B.H.		
CHECKED BY: C.V.J.		
SUBMITTED BY: Robert Brown, CHIEF, DESIGN BRANCH		
APPROVED: Alfred L. Brilling, CHIEF, ENGINEERING DIVISION		

THIS PLAN ASSIGNMENT CONTRACT NO.
IDENTIFICATION NO.

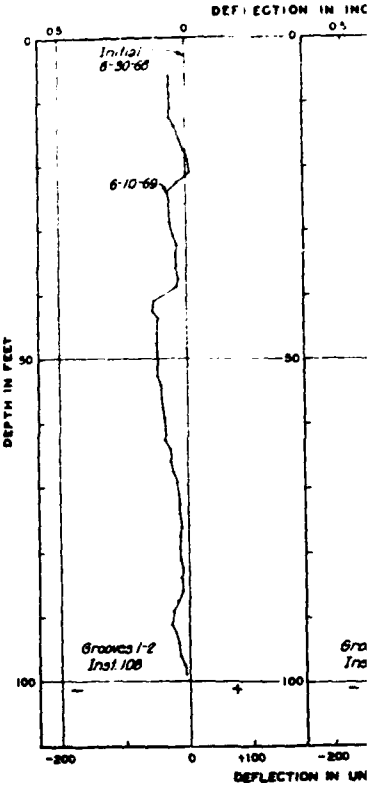
SHEET

CONSTRUCTION FOUNDATION REPORT 2 PLATE 114



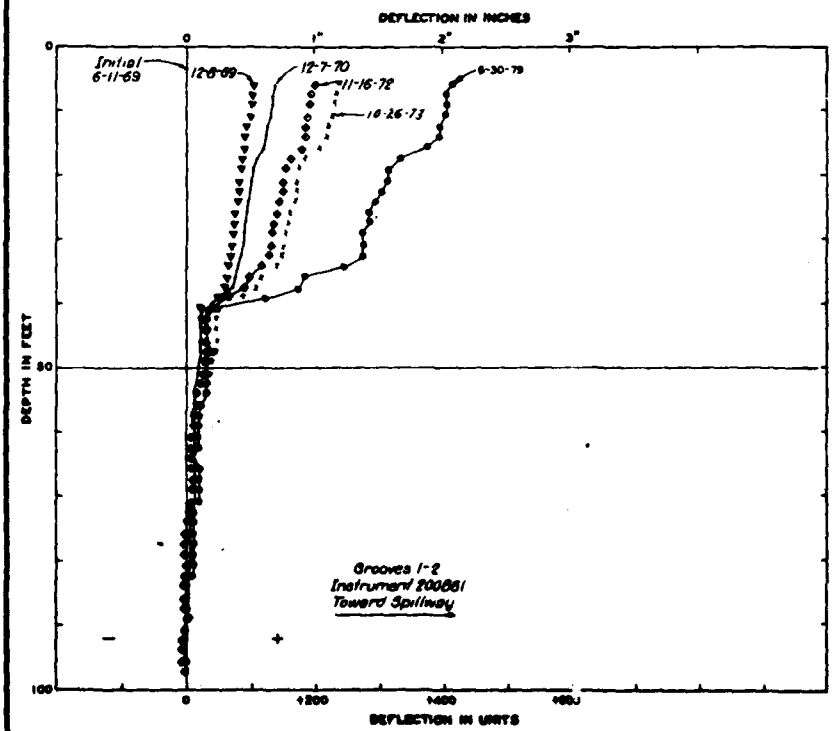
DEPTH VS. DEFLECTION

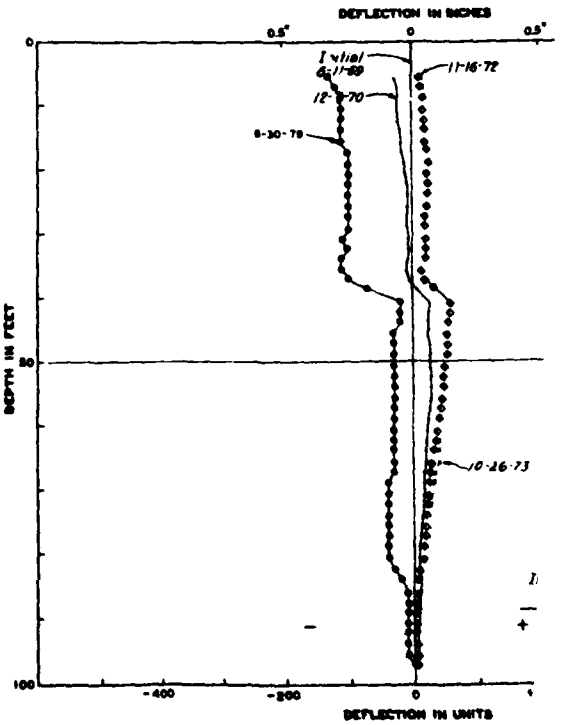
63-6T



DEPTH VS. DEFLI

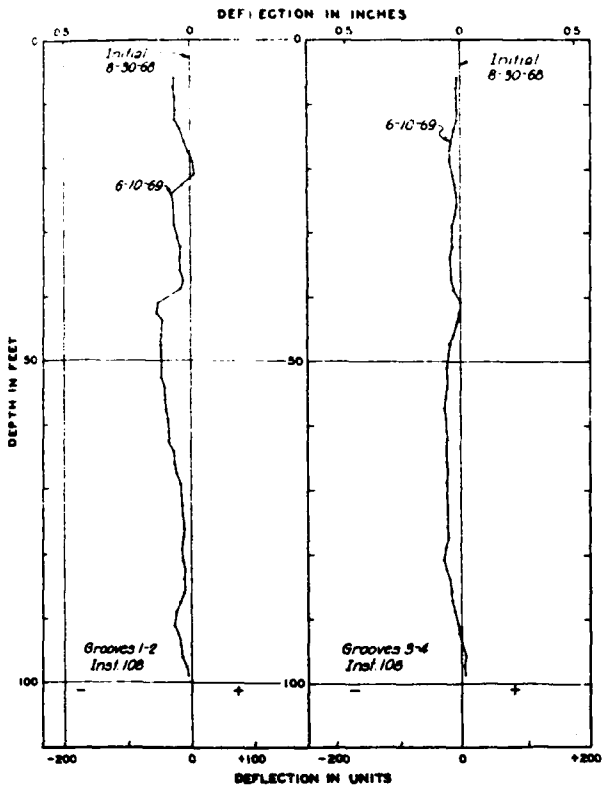
63-6T(R)





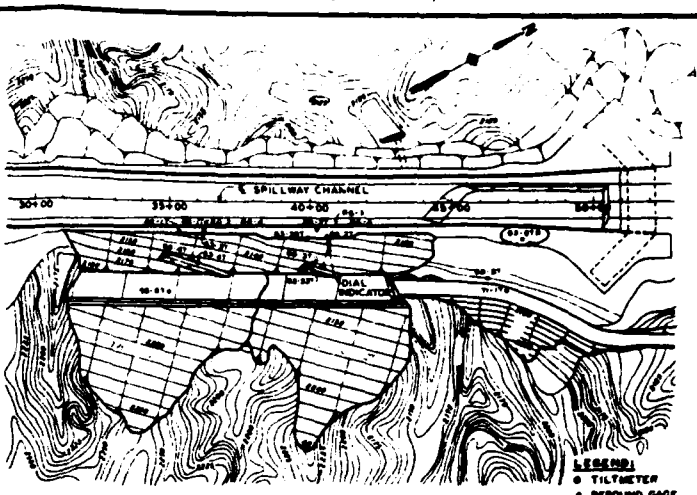
DEPTH VS. DEFLECTION

63-6T(R)



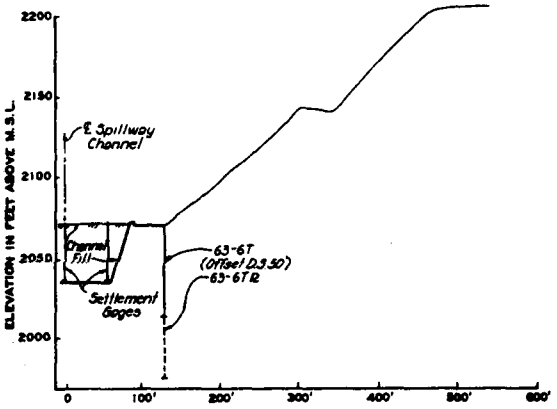
DEPTH VS. DEFLECTION

63-6T(R)



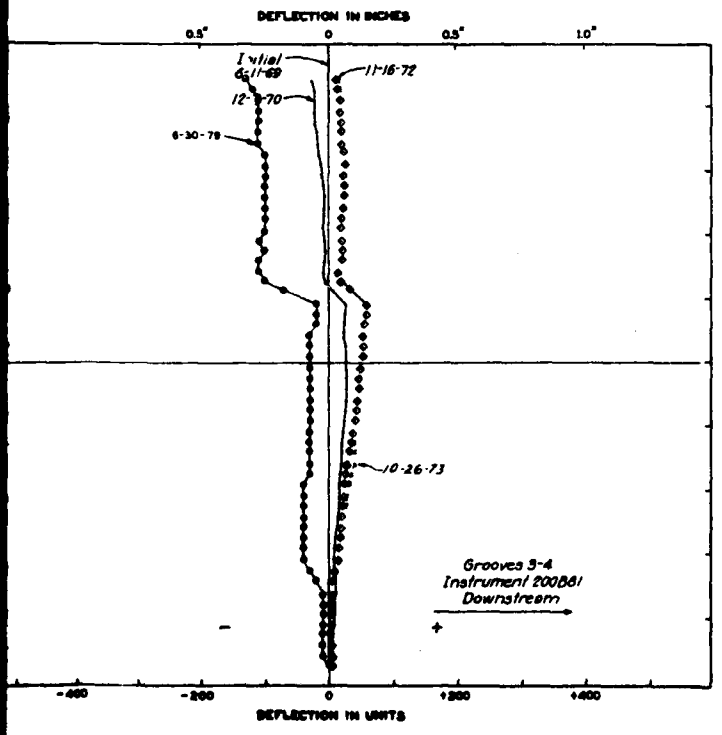
KEY PLAN

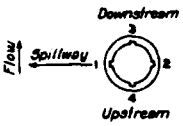
SCALE: 1 INCH = 200 FEET



SECTION - STA. 47+00

SCALE: VERT. 1 INCH = 40 FEET
HORIZ. 1 INCH = 80 FEET





PIPE GROOVE ORIENTATION

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	NAME	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY: G.W.A.
DRAWN BY: M.E.S.
TRACED BY: C.V.J.
CHECKED BY: [illegible]
SUBMITTED: [illegible]
APPROVED: Alfred L. Bressler

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TILTMETER OBSERVATIONS
63-6T & 63-6T(R) - STA. 47+50 : 130' RT.

DATE: SEP. 1973
DRAWING NO.

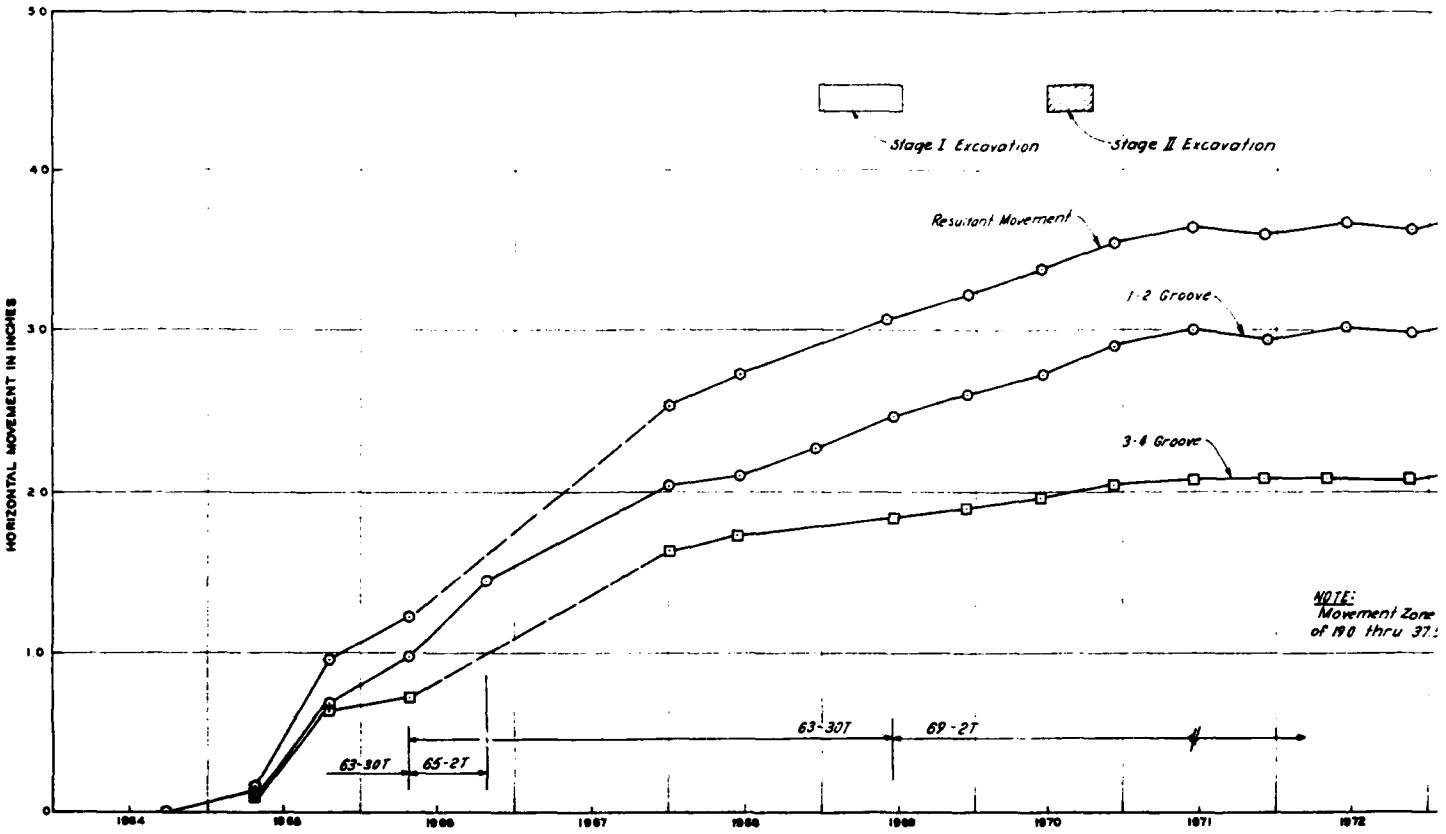
THIS PLAN ASSEMBLED UNDER CONTRACT NO. [illegible]
MODIFICATION NO. [illegible]

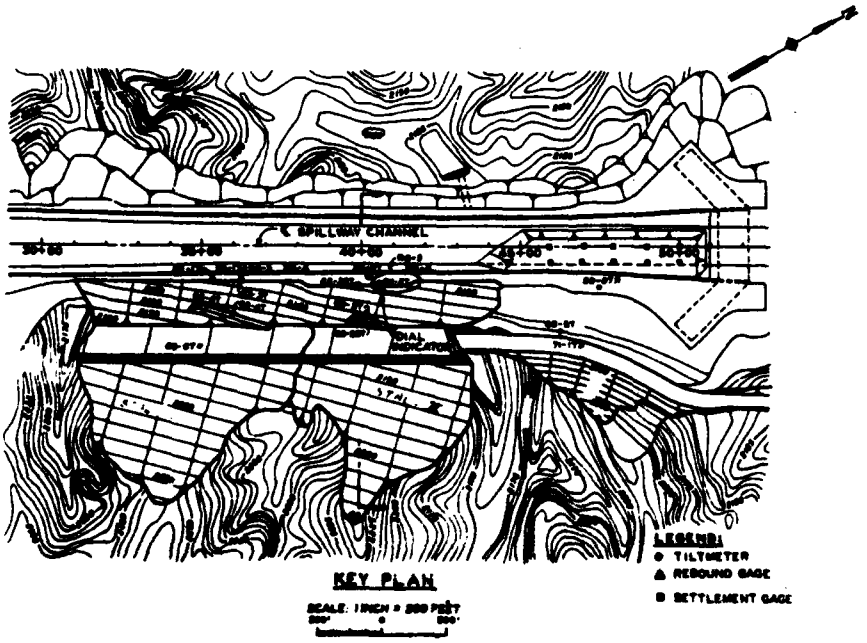
SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT

PLATE 115

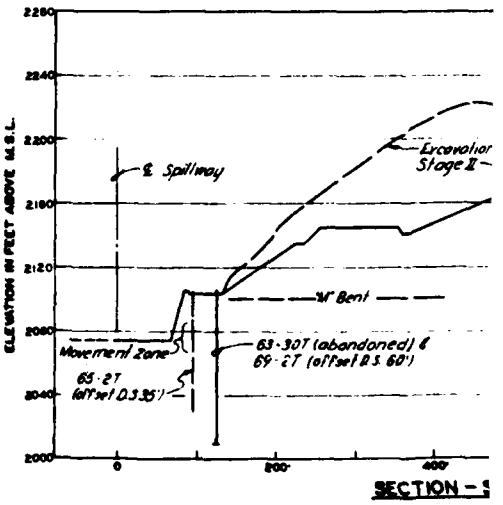
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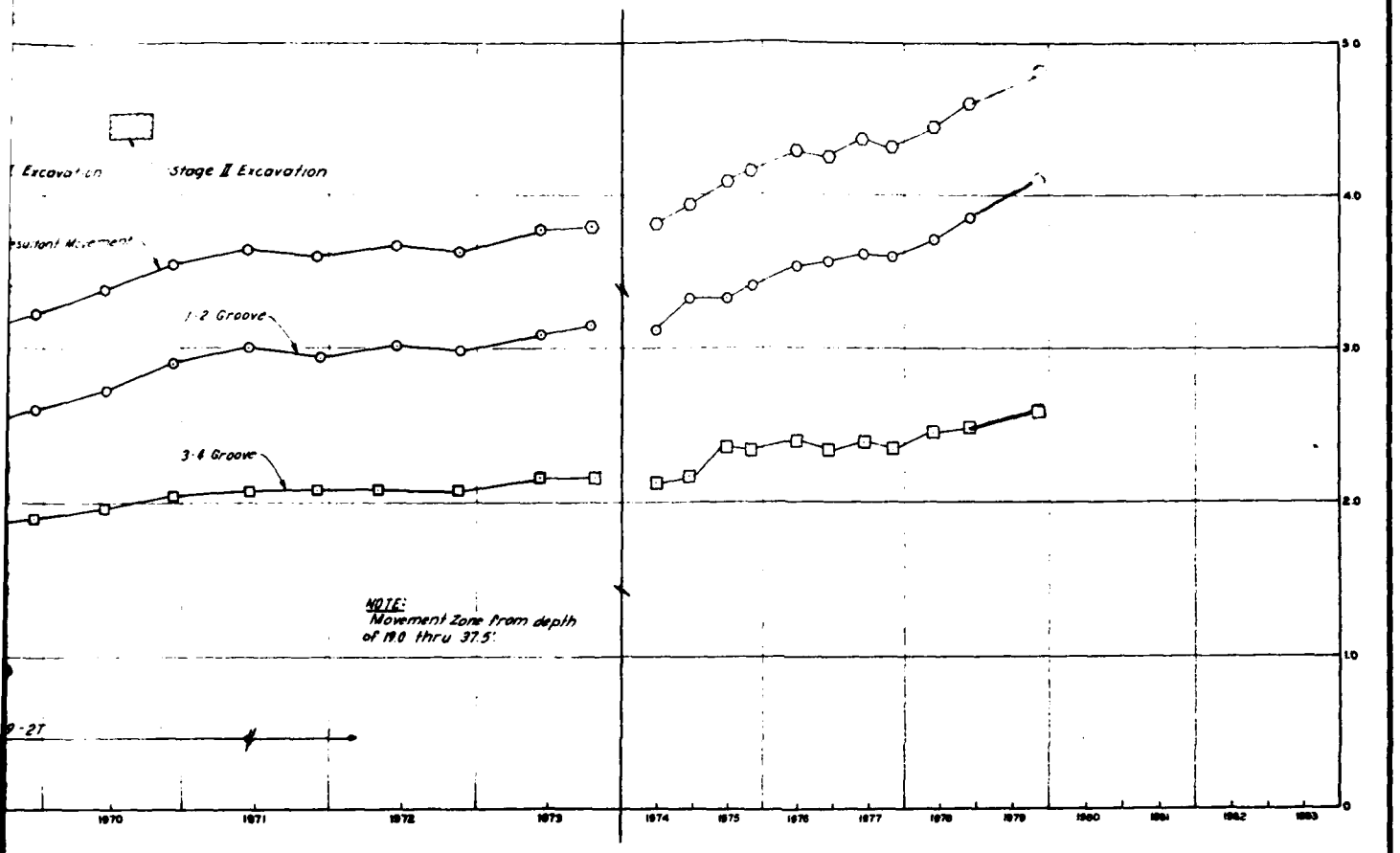


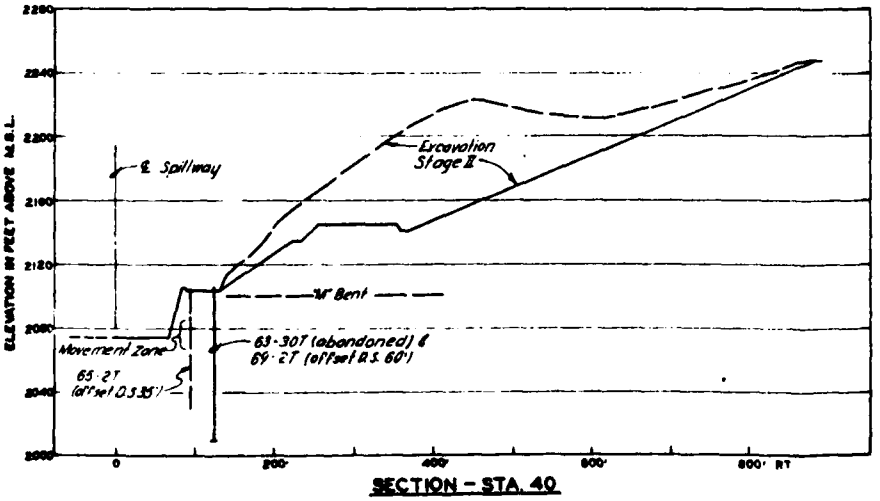
KEY PLAN

SCALE: 1 INCH = 200 FEET



SECTION –





SECTION - STA. 40

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPD.
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

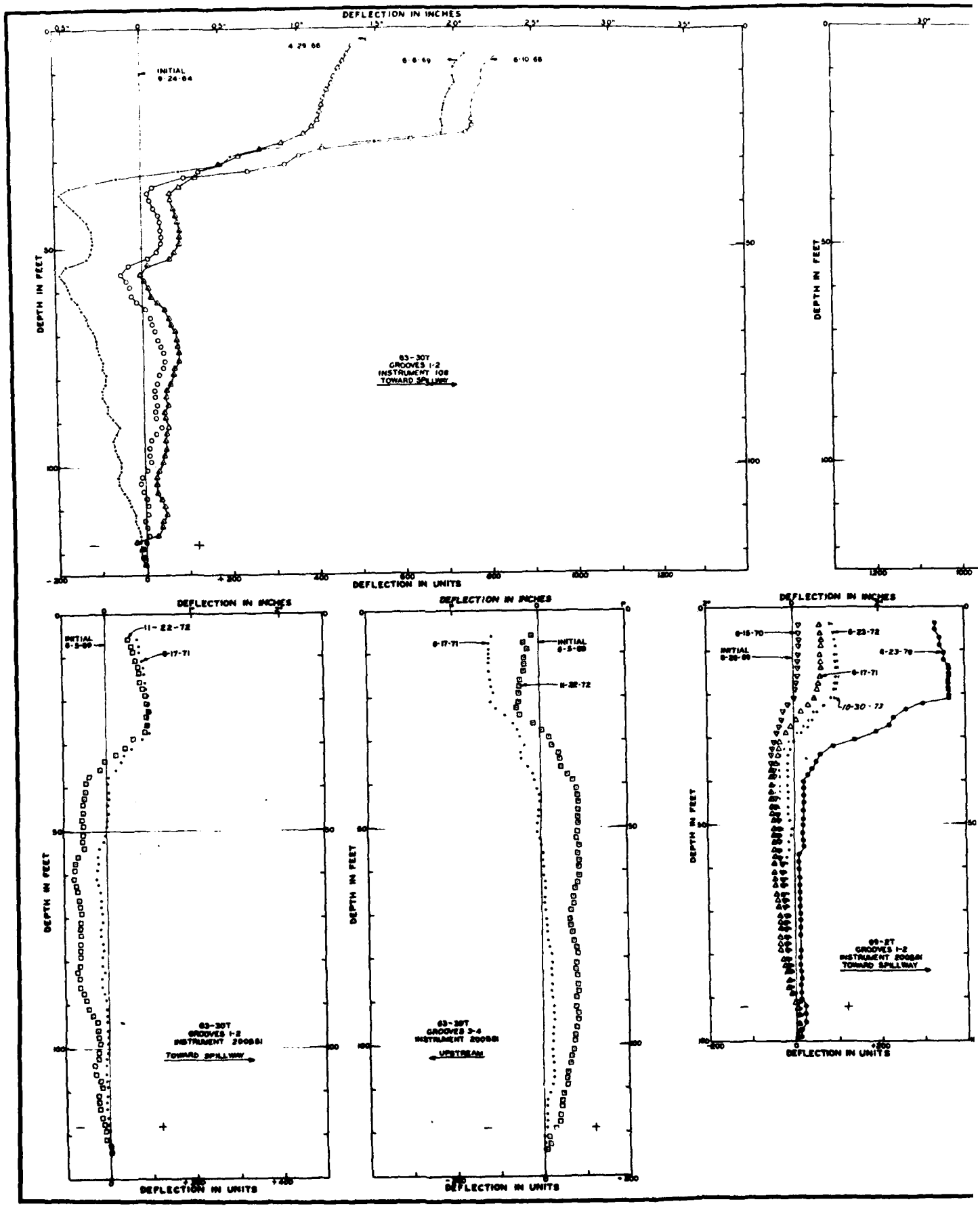
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TIME MOVEMENT - STA. 40
63-30T, 65-2T & 69-2T

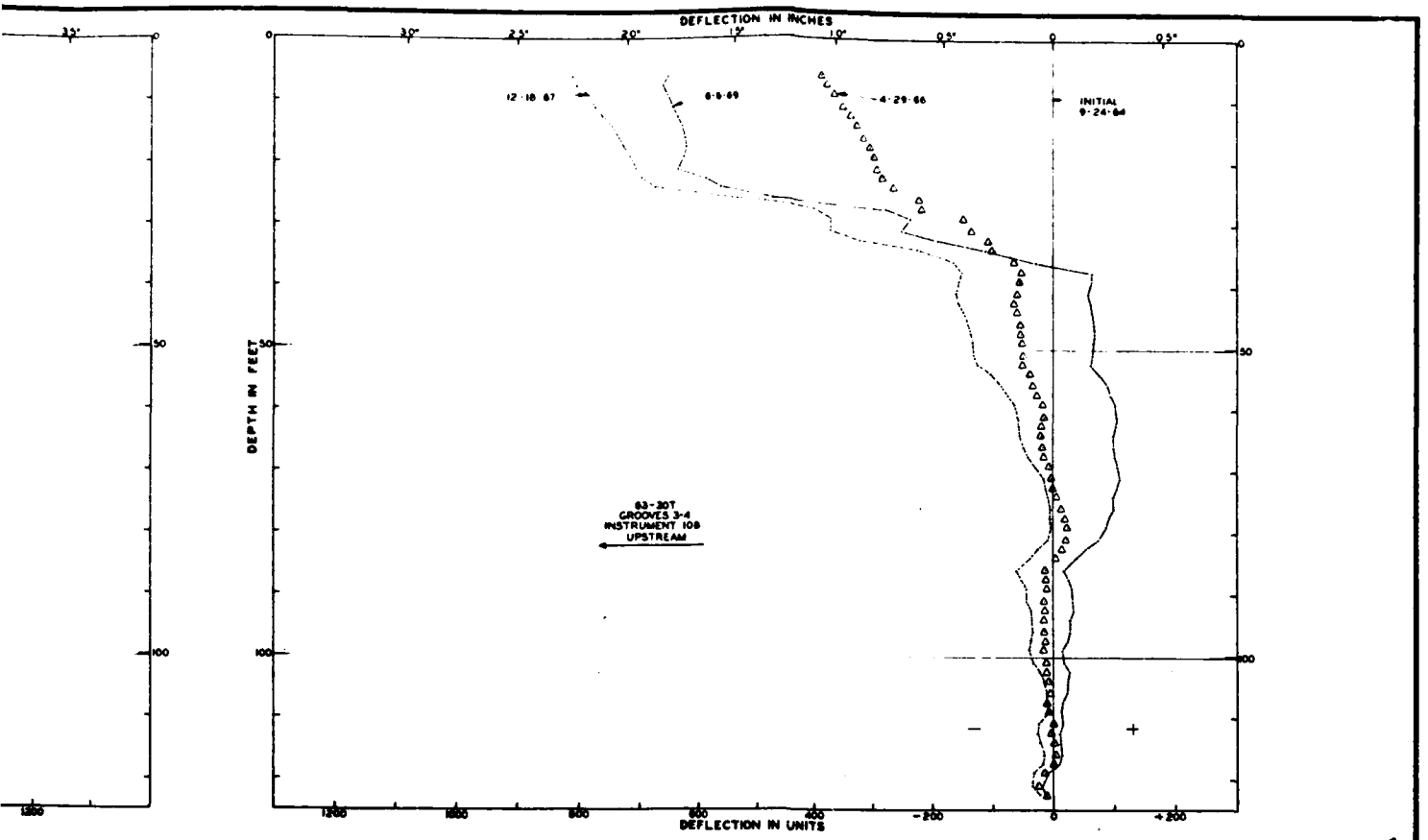
SEP. 1973

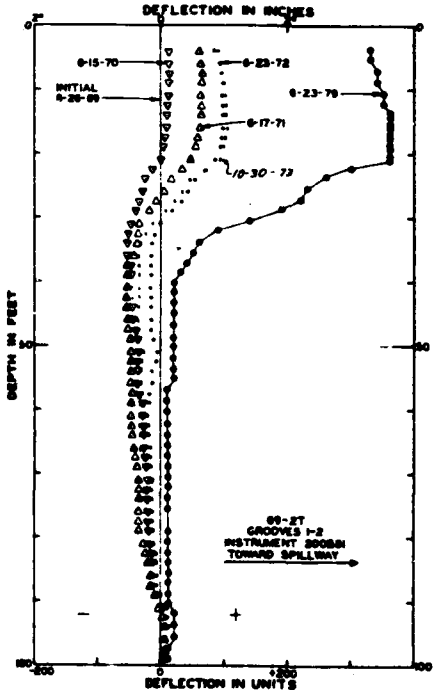
Alfred L. Brubling

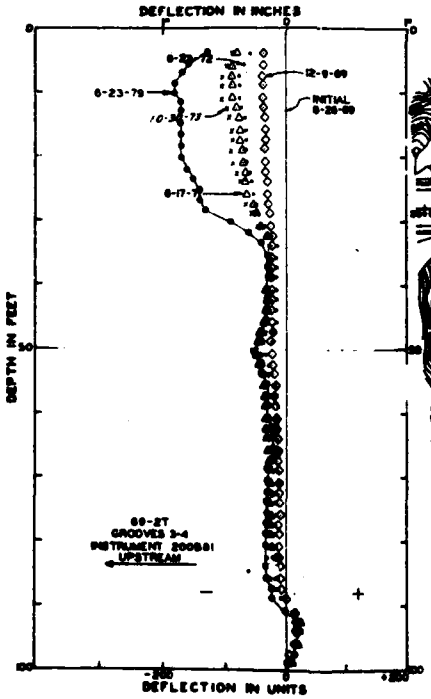
THIS PLAN ASSEMBLED UNDER CONTRACT NO. _____
MODIFICATION NO. _____

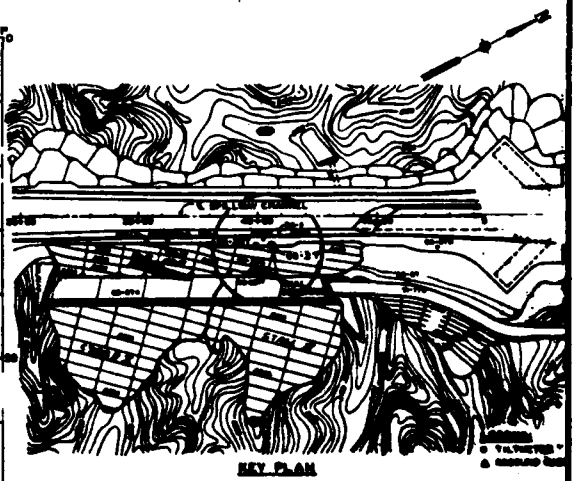
SAFETY PAYS


DEFLECTION IN INCHES
INITIAL 9-24-64
4-29-66
6-6-69
6-10-68
DEPTH IN FEET
63-30T GROOVES 1-2 INSTRUMENT 108 TOWARD SPILLWAY
DEFLECTION IN UNITS
DEFLECTION IN INCHES
INITIAL 6-5-69
11-22-72
6-17-71
DEPTH IN FEET
63-30T GROOVES 1-2 INSTRUMENT 2908SI TOWARD SPILLWAY
DEFLECTION IN UNITS
DEFLECTION IN INCHES
6-17-71
INITIAL 6-5-69
11-22-72
DEPTH IN FEET
63-30T GROOVES 3-4 INSTRUMENT 2908SI UPSTREAM
DEFLECTION IN UNITS
DEFLECTION IN INCHES
6-15-70
INITIAL 6-28-66
6-23-72
6-23-72
6-17-71
10-30-73
DEPTH IN FEET
69-2T GROOVES 1-2 INSTRUMENT 2908SI TOWARD SPILLWAY
DEFLECTION IN UNITS









KEY PLAN

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

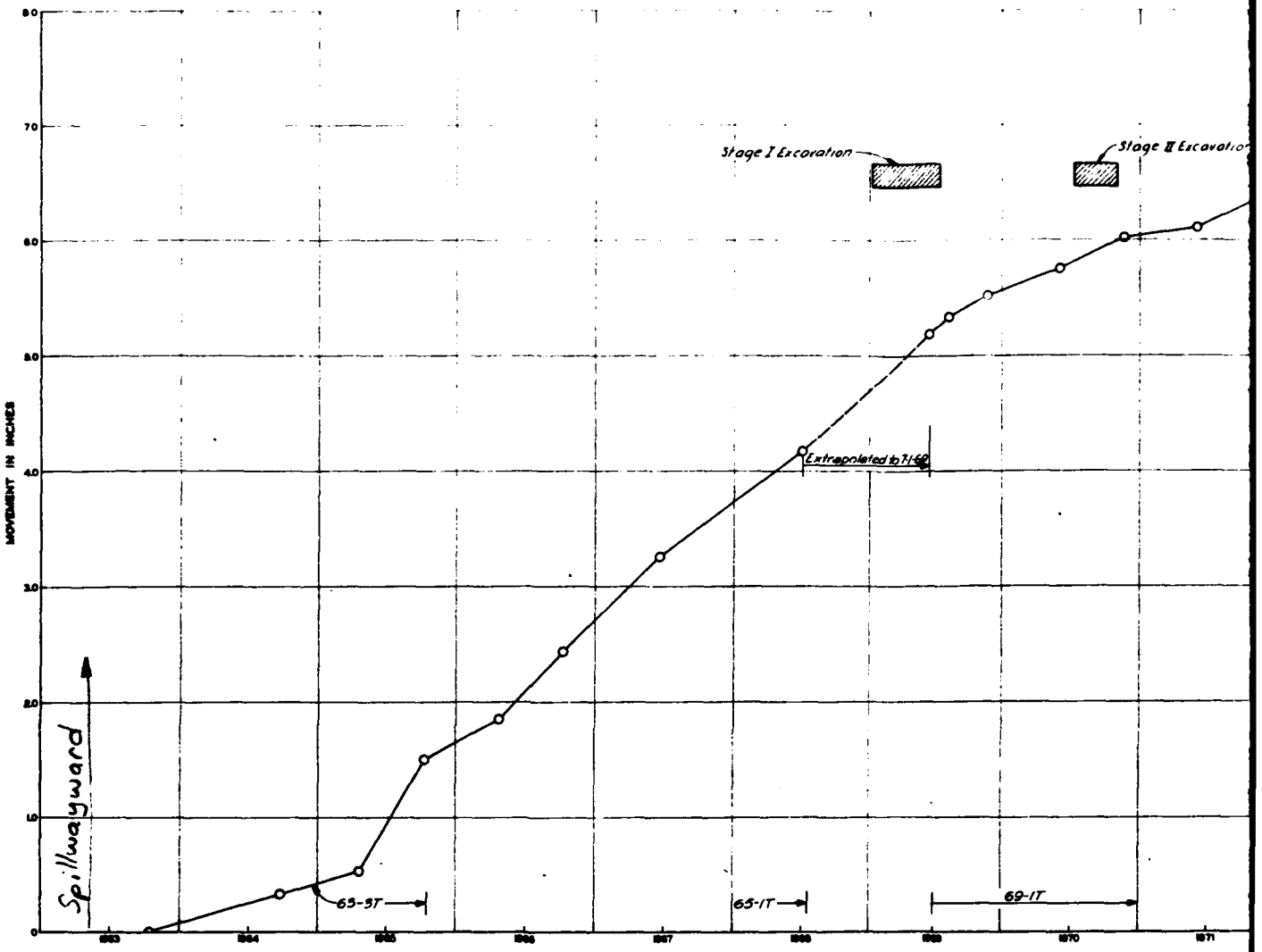
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TILTMETER OBSERVATIONS
63-30T AND 69-2T
STA. 40+ RANGE 1.25 RT.

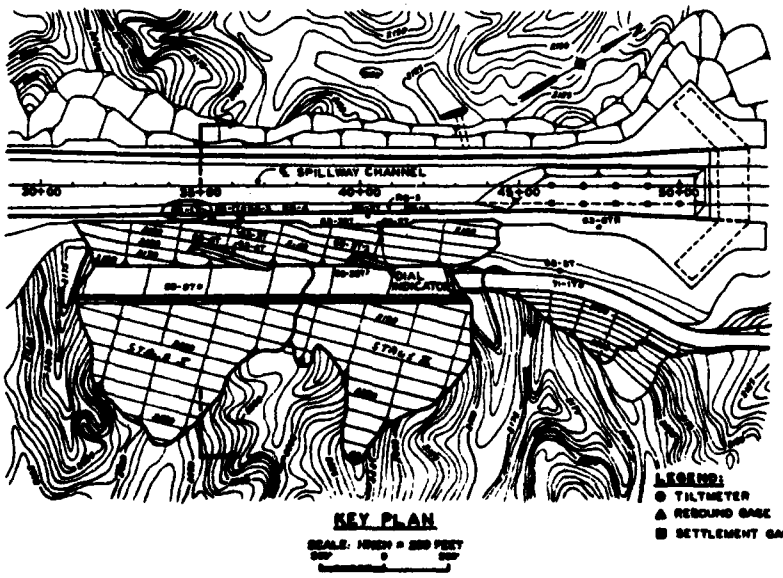
DESIGNED BY: G W A
DRAWN BY: J L C
TRACED BY: C V J
QUANTITIES BY:
CHECKED BY: C.R. Thomas
APPROVED: [signature] DATE: SEP. 1973
APPROVED: Alfred L. Brickling
DRAWING NO. DIV. NO.

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. DACW45-
SPECIFICATION NO.

CONSTRUCTION FOUNDATION REPORT PLATE 117

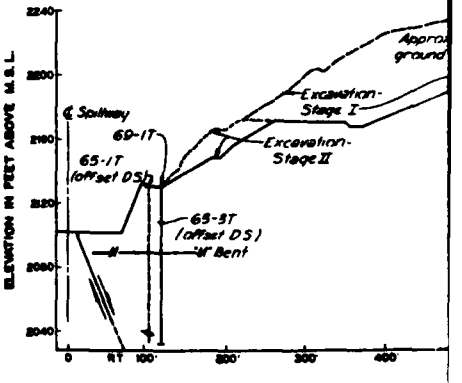




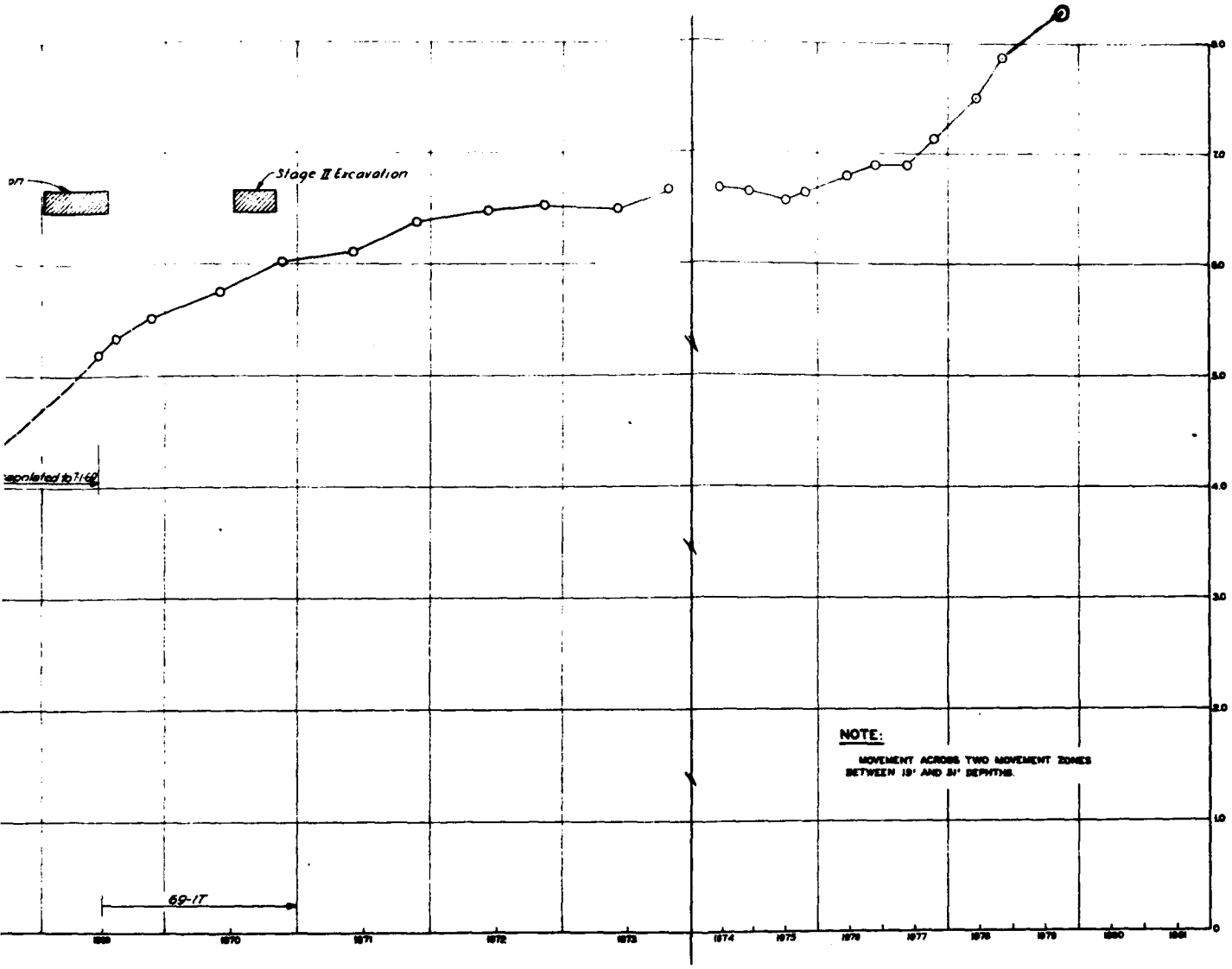
KEY PLAN

SCALE: INCH = 200 FEET

LEGEND:
- TILTMETER
- REBOUND GAGE
- SETTLEMENT GAGE

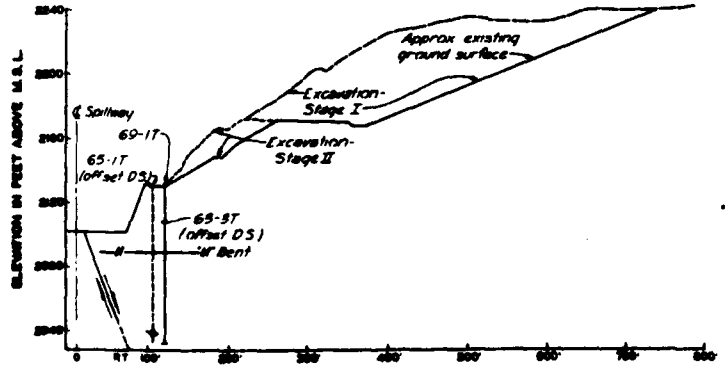


SECTION - STA. 3

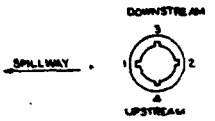


NOTE:

MOVEMENT ACROSS TWO MOVEMENT ZONES BETWEEN 19' AND 31' DEPTHS.



SECTION - STA 35+00



65-1T

PIPE GROOVE ORIENTATION

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TIME MOVEMENT
65-3T, 65-1T & 69-1T

SEP. 1973

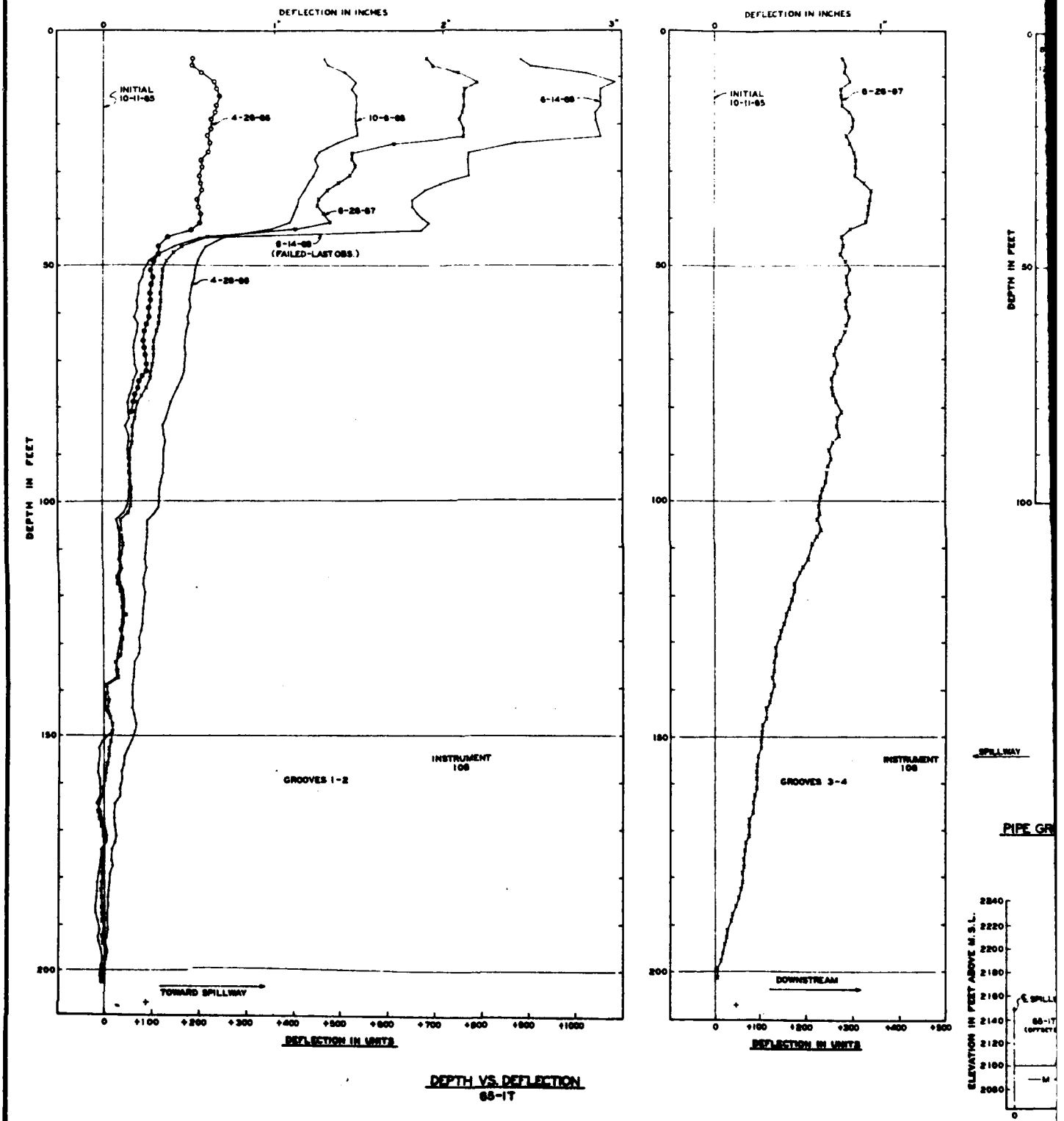
Alfred L. Brisling

SAFETY PAYS

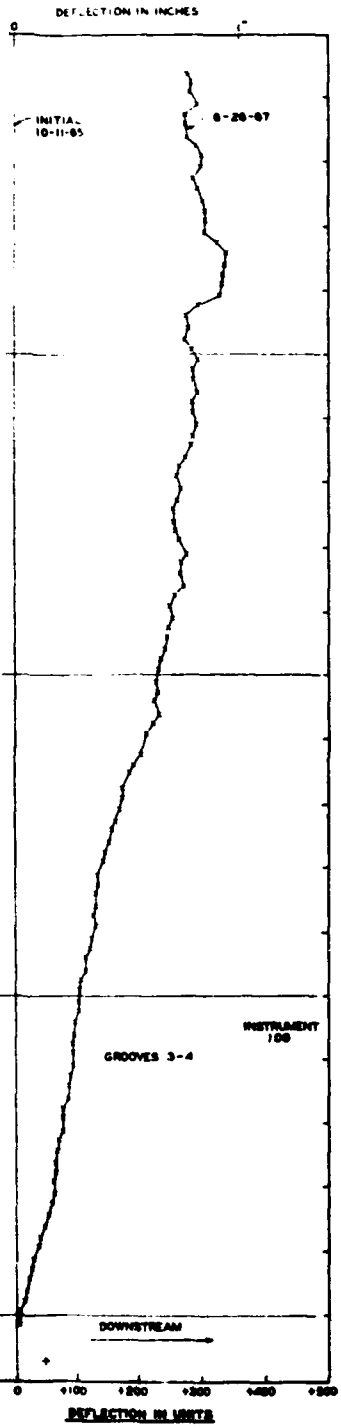
CONSTRUCTION FOUNDATION REPORT

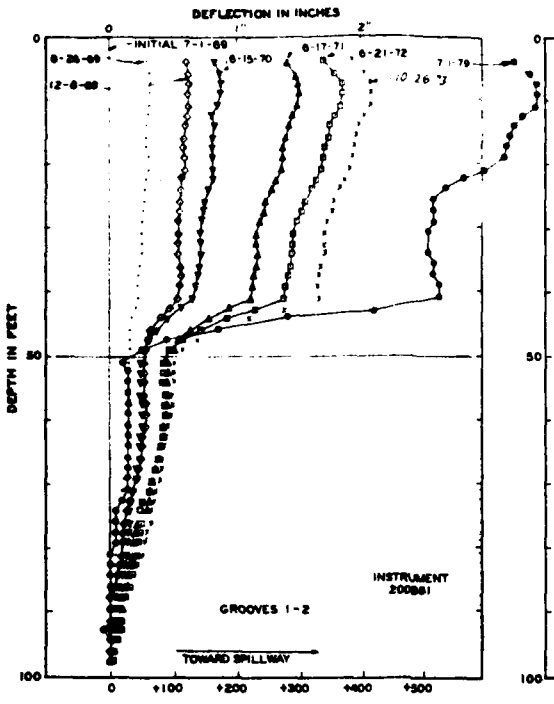
PLATE 118

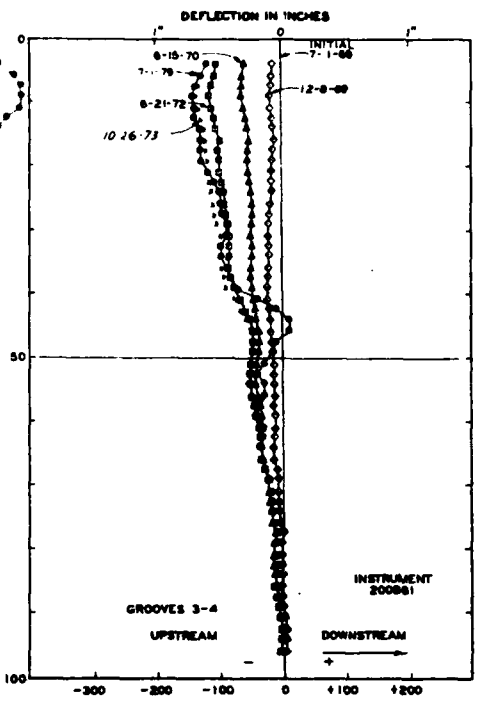
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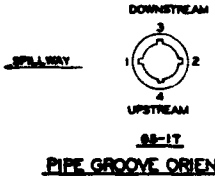
DEPTH VS. DEFLECTION
68-IT



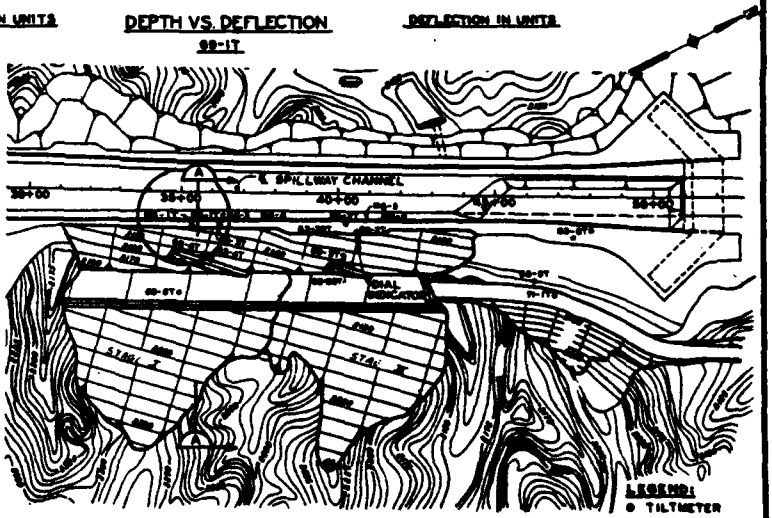




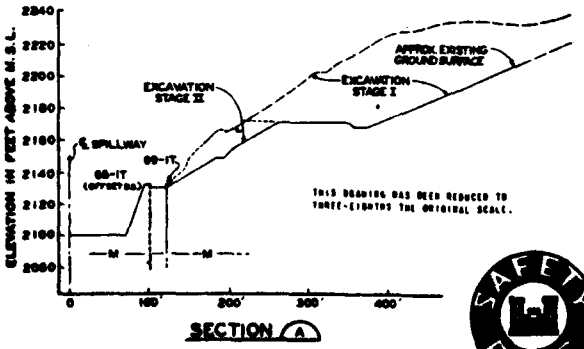
DEPTH VS. DEFLECTION
68-1T



68-1T
PIPE GROOVE ORIENTATION



KEY PLAN



THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

SECTION A

SAFETY PAYS

DATE	DESCRIPTION	CHECK	APPROVED

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY G.W.A.
DRAWN BY M.E.D.
TRACED BY C.V.J.
SUBMITTED BY
CHIEF, ENGINEERING DIVISION

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
TILTMETER OBSERVATIONS
68-1T AND 69-1T

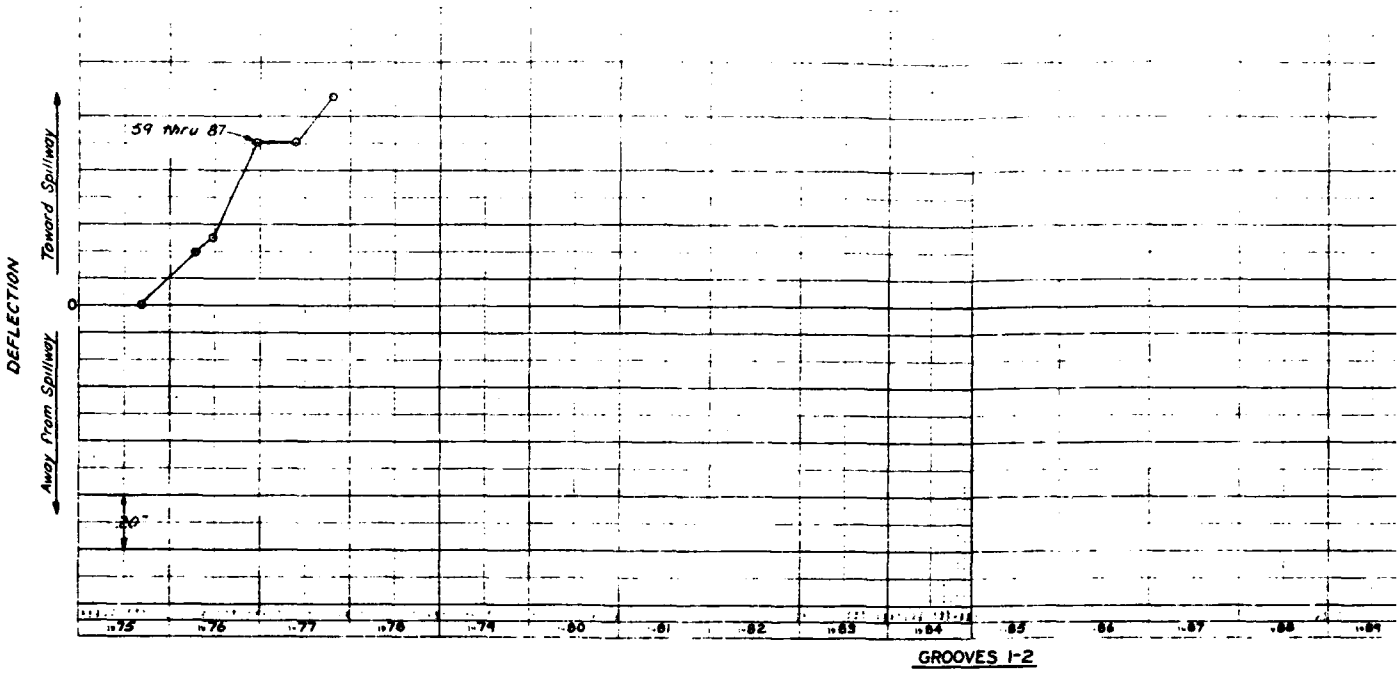
APPROVED
CHIEF, ENGINEERING DIVISION

DATE SEP. 1973

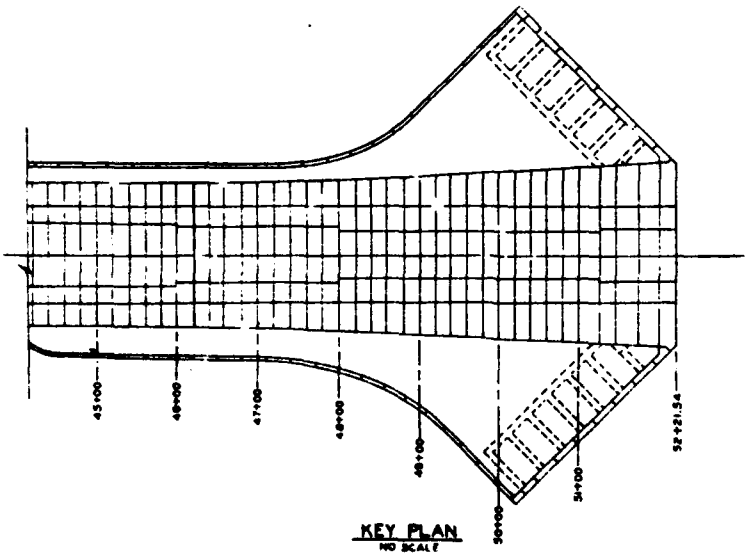
APPROVED
Alfred L. Brickley
Lt. Col., Corps of Engineers
DISTRICT ENGINEER

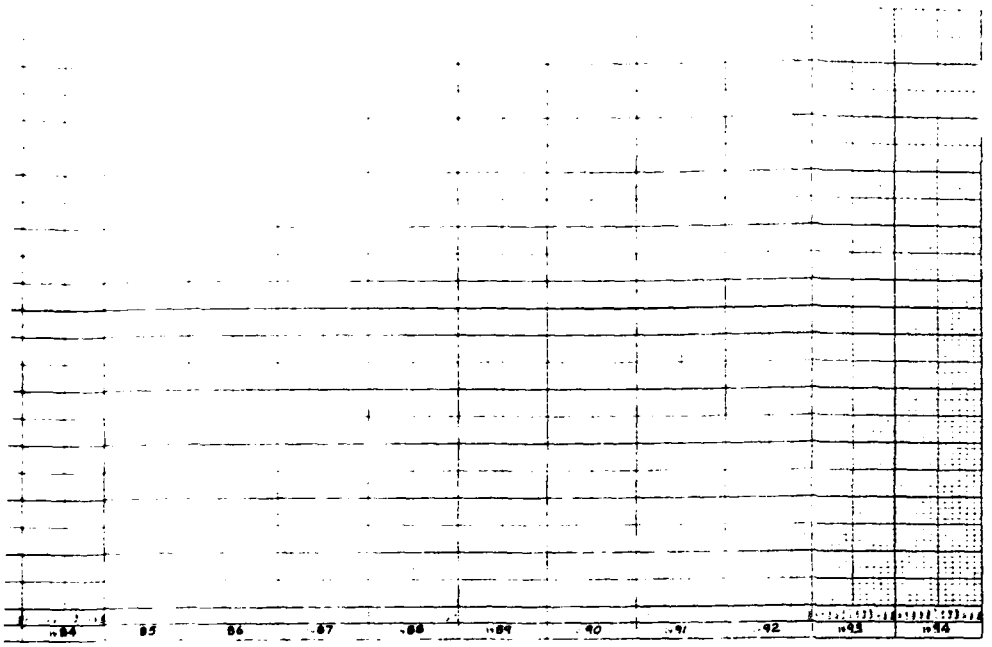
SCALE AS SHOWN
DRAWING NUMBER

THIS PLAN ACCOMPANIES CONTRACT NO.
SPECIFICATION NO.



Tiltmeter 75-12T

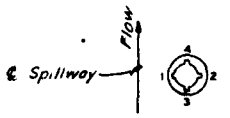




GROOVES 1-2

12T

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



PIPE GROOVE ORIENTATION

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

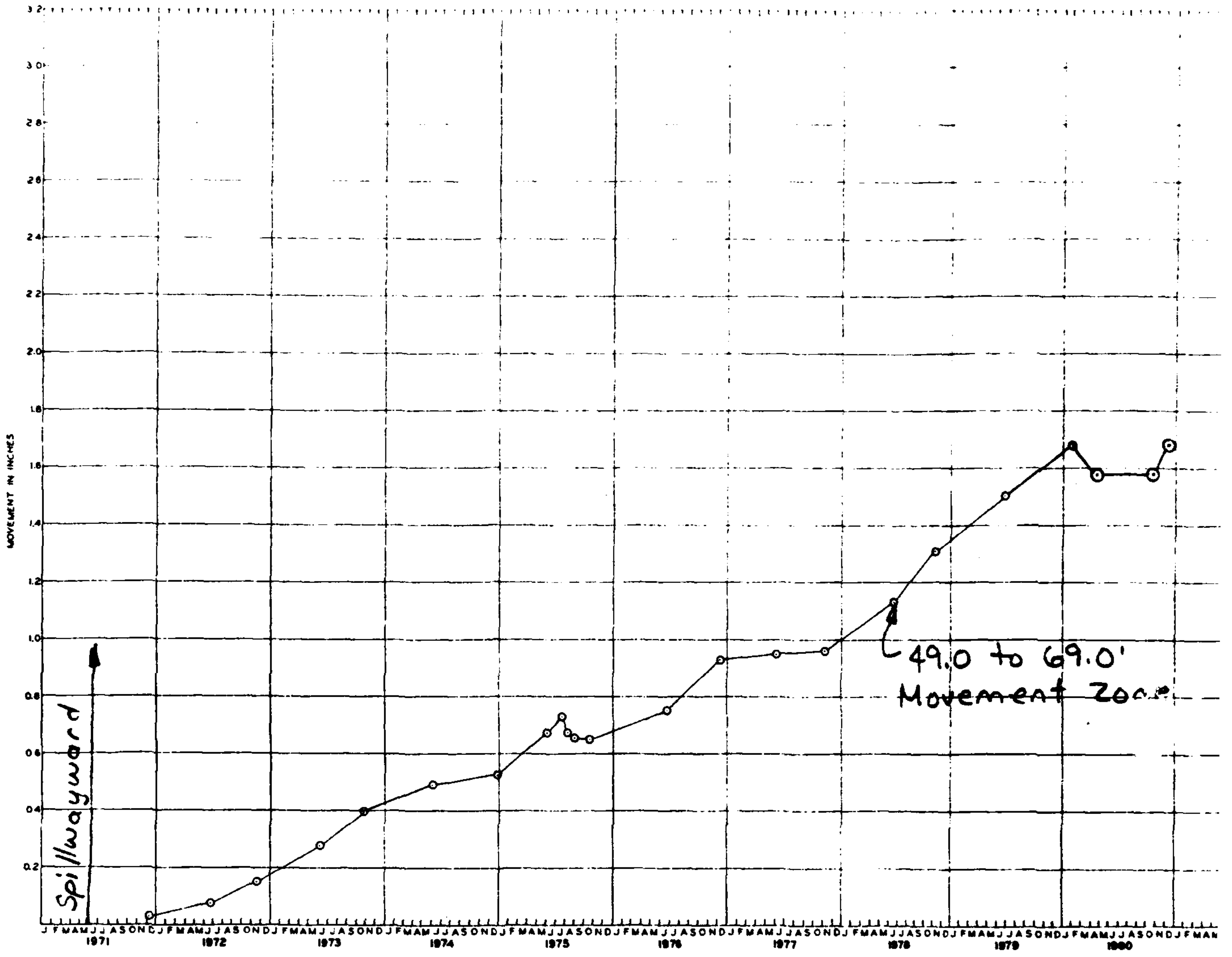
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

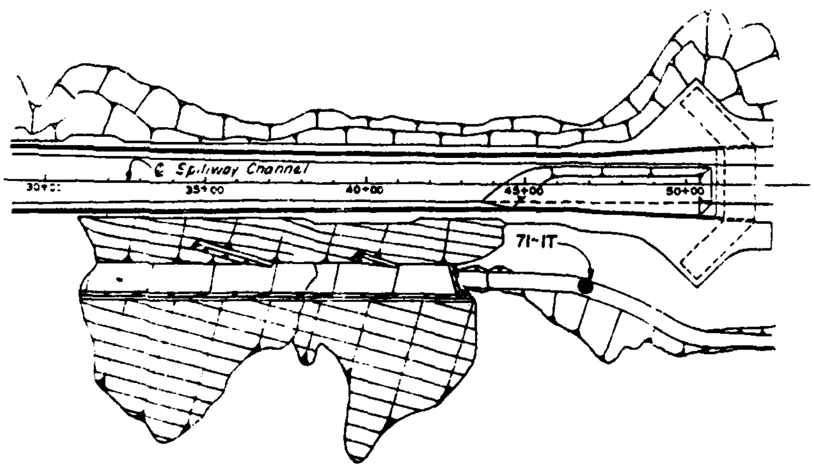
MISSOURI RIVER
FORT PECK DAM
TILTMETER OBSERVATIONS
SLOPE INDICATOR 75-12T
INSTRUMENT-2008
DEFLECTION VS TIME

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

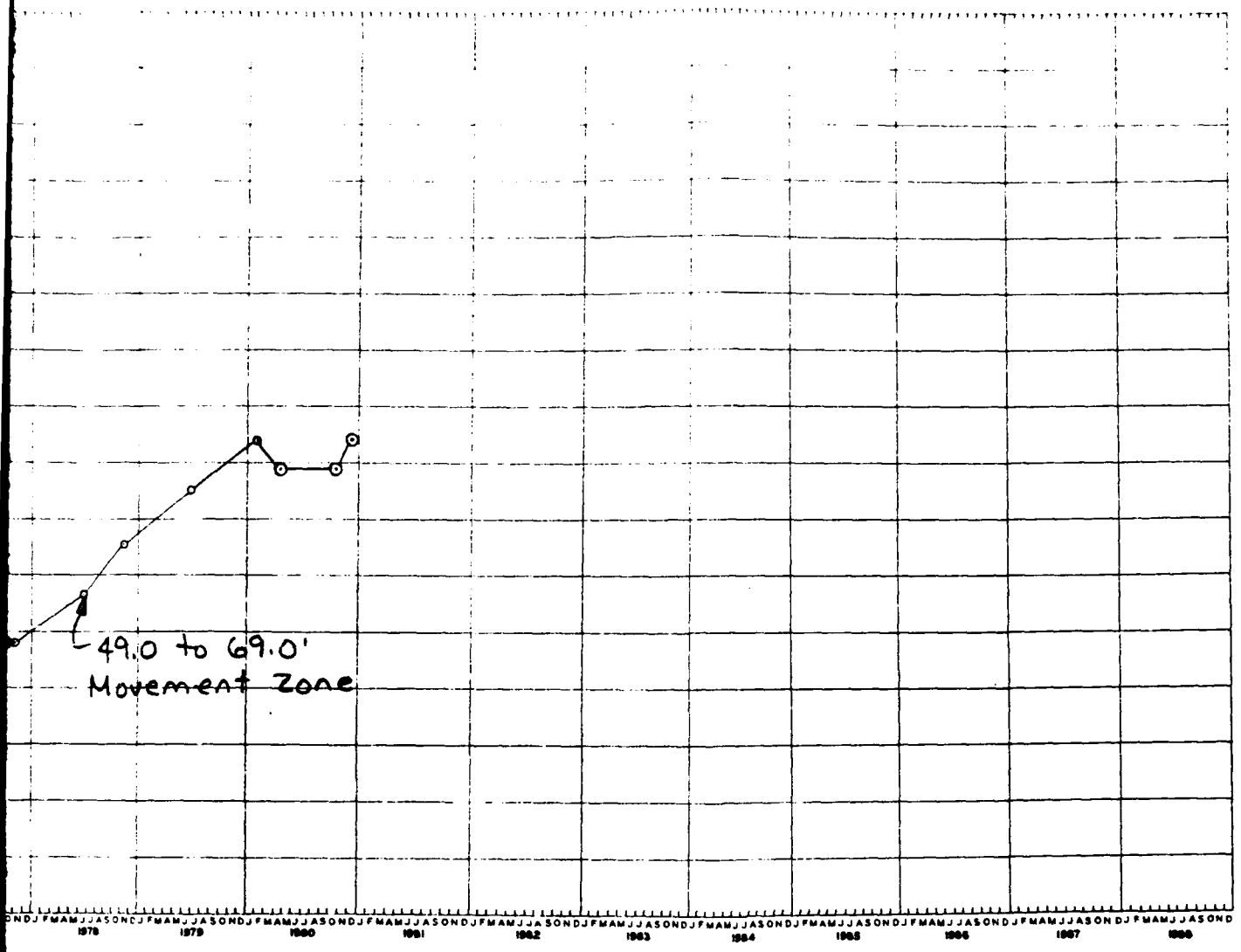
CONSTRUCTION FOUNDATION REPORT 2 PLATE 120

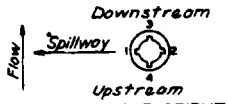




KEY PLAN

SCALE 1 INCH = 200 FEET





PIPE GROOVE ORIENTATION

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	MADE	APPR'D
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM
TILTMETER OBSERVATIONS
SLOPE INDICATOR 71-IT
INSTRUMENT- 200 B
DEFLECTION VS. TIME

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
CHIEF
CONTROL
CHIEF
APPROVED
DATE
DATE AS SHOWN
DATE OF SURVEY
DRAWING NUMBER
SHEET

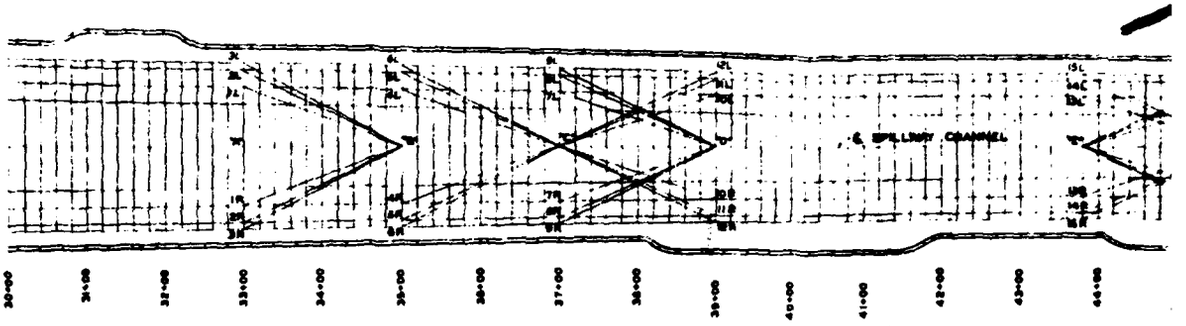
SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO.
IDENTIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

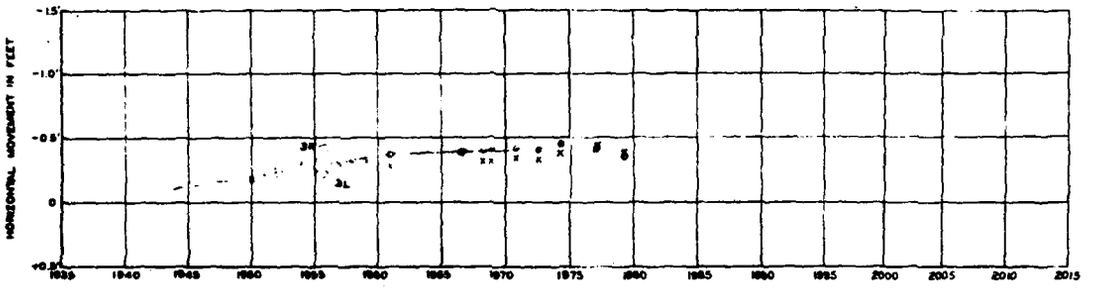
PLATE 121

CORPS OF ENGINEERS



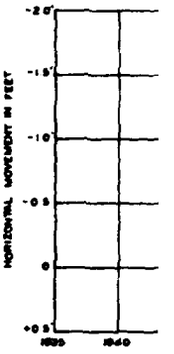
PLAN

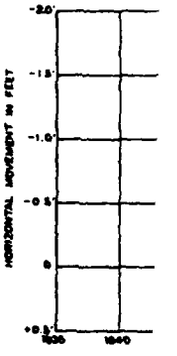
SCALE 1 INCH = 80 FEET

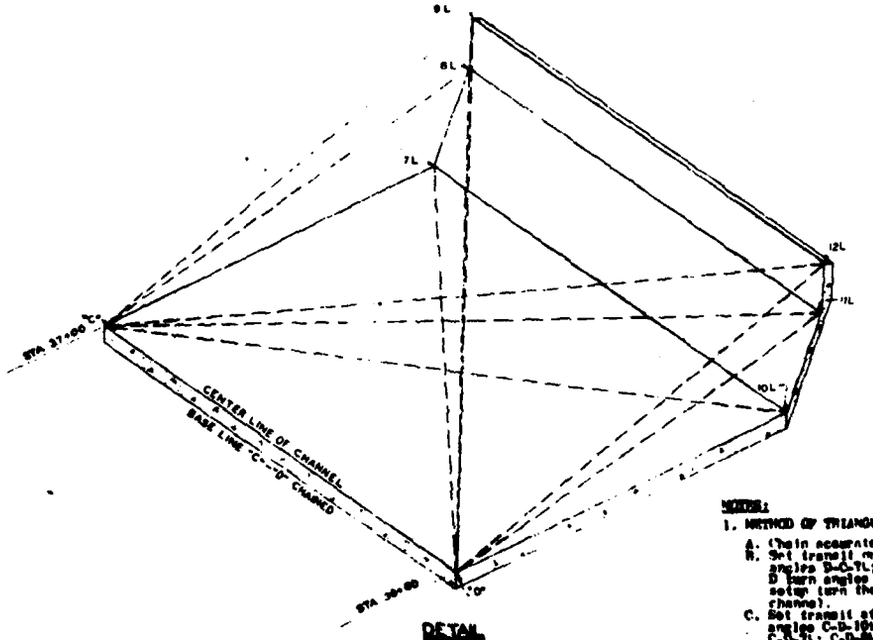


STA 33+00

SECTION A-POINTS 3R & 3L





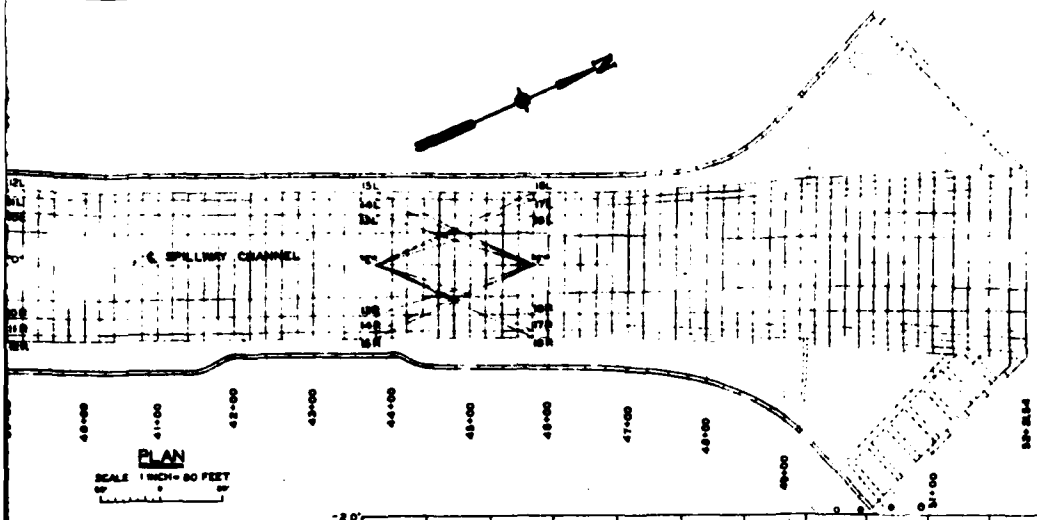


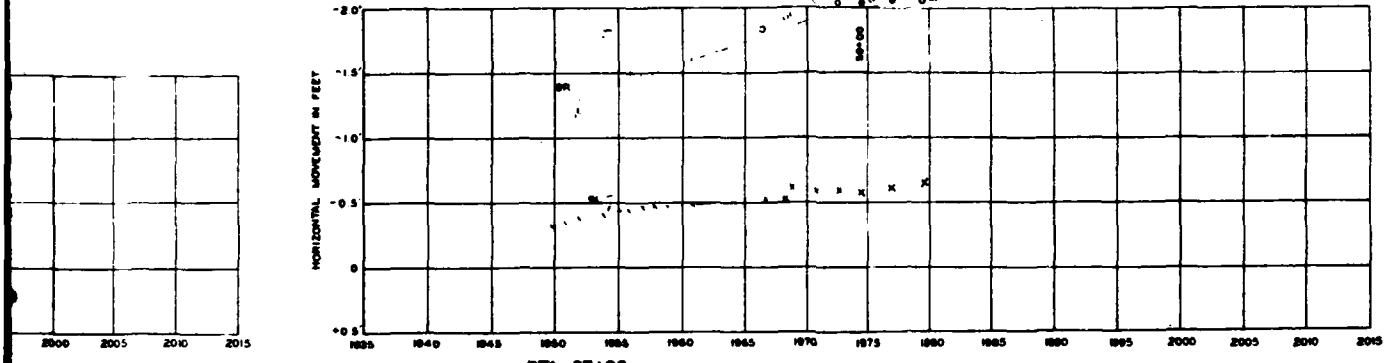
DETAIL

ISOMETRIC VIEW OF LEFT SIDE OF SPILLWAY CHANNEL BETWEEN STA. 37+00 & STA. 39+00 SHOWING METHOD OF TRIANGULATION

NOTES:

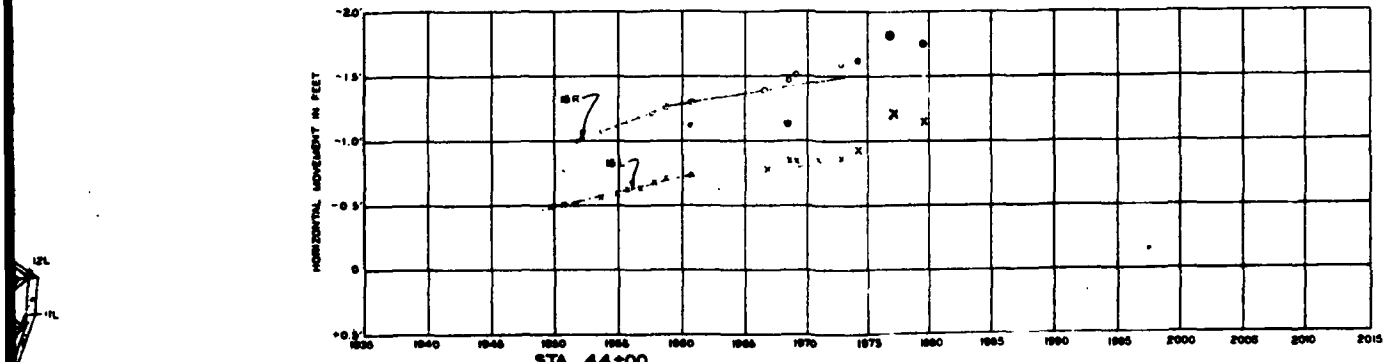
1. METHOD OF TRIANGULATION:
   A. Chain accurately base line C-D.
   B. Set transit on point C, backsight to point D, then turn angles D-C-7L; D-C-6L; D-C-9L again backsighting to point D turn angles D-C-12L; D-C-11L and D-C-10L. During each setup turn the corresponding angles on the right side of channel.
   C. Set transit at point D, backsight to point C and turn angles C-D-10L; C-D-11L; C-D-12L; likewise turn angles C-D-7L; C-D-6L; C-D-9L and corresponding angles on right side of channel from each setup.
   D. Each angle point is doubled and average reading recorded.
2. Movement shown by graphs as changes in distance (shortening) between wall points on right & left side of the channel.





STA 37+00

SECTION C-POINTS BR & BL



STA 44+00

SECTION E-POINTS BR & BL

TRIANGULATION:

accurately base line C-D.
angle at point C, backsight to point D, then turn
D-C-1L; D-C-2L; D-C-3L again backsighting to point
angles D-C-1R; D-C-2R; D-C-3R. During each
read the corresponding angles on the right side of
l.
angle at point D, backsight to point C and turn
C-D-1R; C-D-2R; C-D-3R; likewise turn angles
C-D-1L; C-D-2L and corresponding angles on right
channel from base angle.
angle must be doubled and average reading recorded.
shown by graphs by sidings in distance (shore-tapping)
all points on right & left side of the channel.

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. DA-23-020-eng-
MODIFICATION NO.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
HORIZONTAL MOVEMENT SURVEY-PLAN, DETAIL, & TIME MOVEMENT GRAPHS
SHEET 1

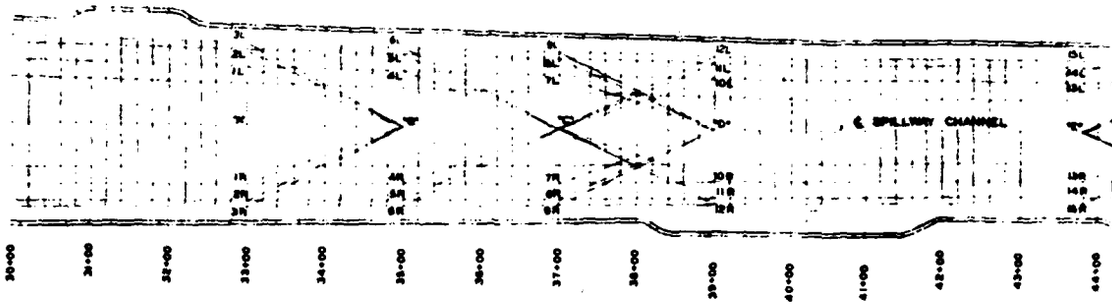
SEPT. 1970

CONSTRUCTION FOUNDATION REPORT

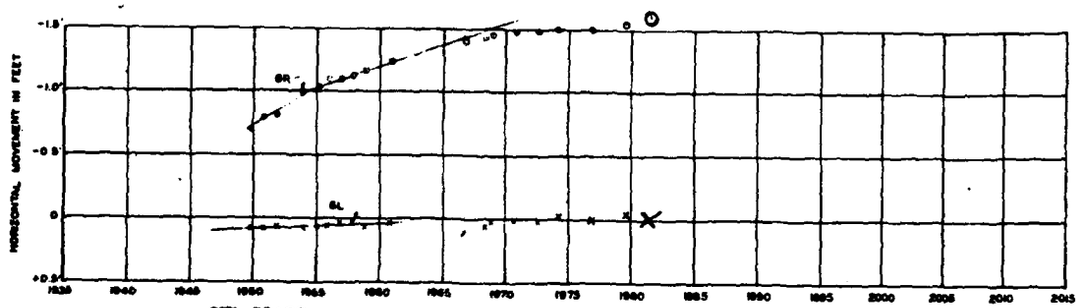
PLATE 122

2

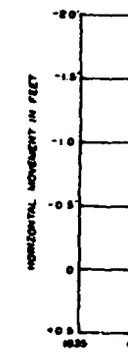
CORPS OF ENGINEERS

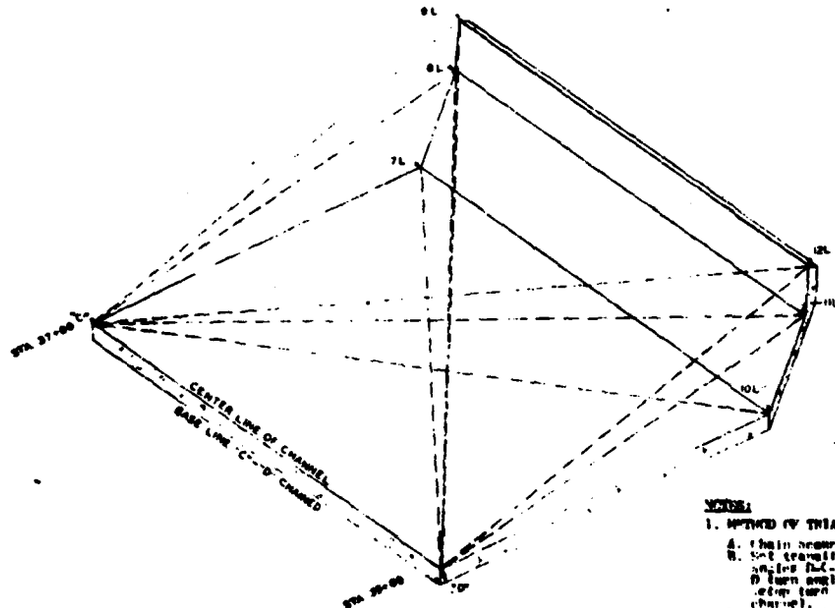


PLAN
SCALE: 1 INCH = 60 FEET

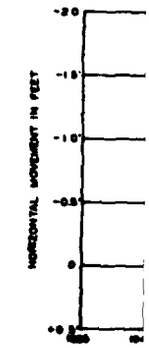


STA. 35+00
SECTION S-POINTS 8R & 6L

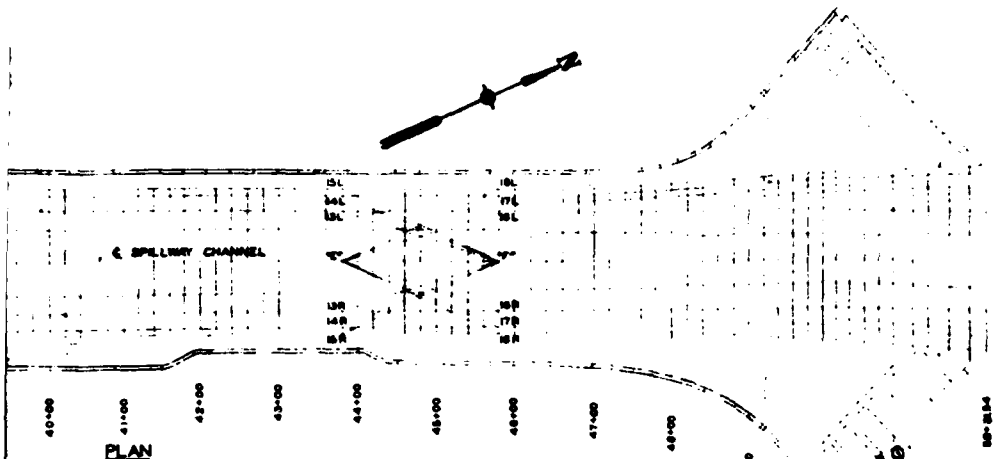




DETAIL
[illegible] OF LEFT [illegible]
[illegible] STATION 37+00, 39+00 & STA. 35+00
SHOWING METHOD OF TRIANGULATION

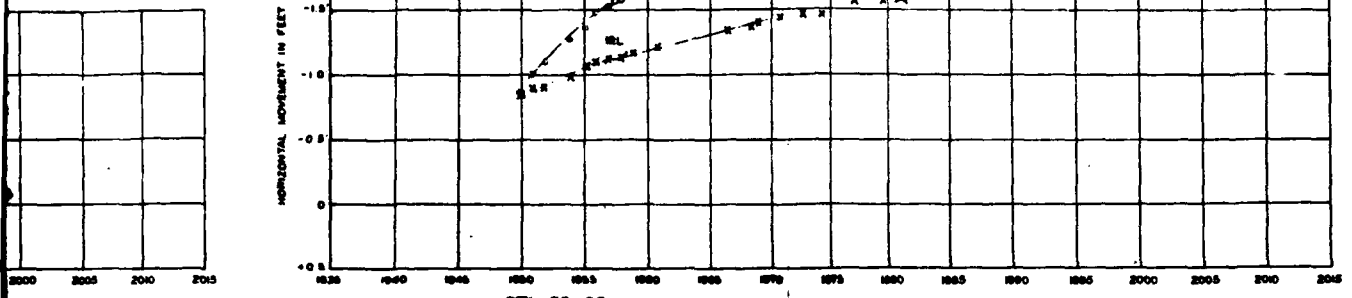


NOTES:
1. METHOD OF TRIANGULATION:
   A. Chain accurately base line C-D.
   B. Set transit on point C, backsight to point D, then turn angles D-C-7L; D-C-8L; D-C-9L again backsighting to point D turn angles D-C-10L; D-C-11L and D-C-12L, turning a [illegible] turn the corresponding angles on the right side of channel.
   C. Set transit at point D, backsight to point C and turn angles C-D-10L; C-D-11L; C-D-12L; likewise turn including C-D-7L; C-D-8L; C-D-9L and corresponding angles on right side of channel from above setup.
   D. Each angle must be doubled and average readings recorded.
2. Movement shown by graphs is change in distance between points on right & left side of the channel.



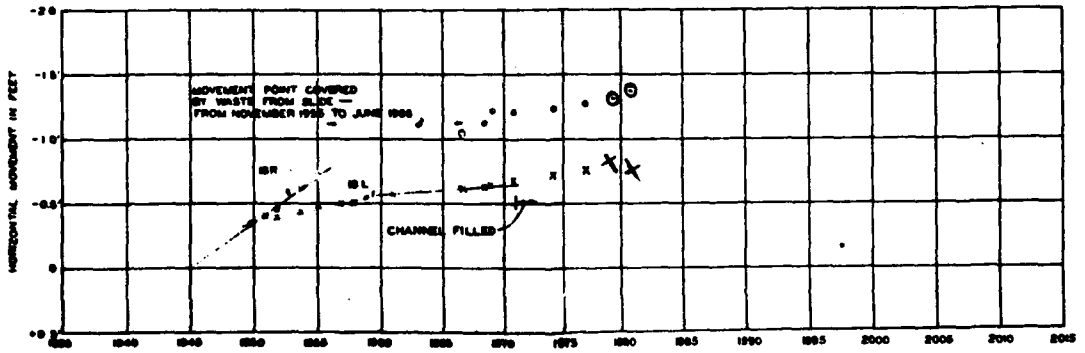
PLAN

SCALE 1 INCH = 60 FEET



STA 39+00

SECTION D-POINTS ISR & ISL



STA 46+00

SECTION F-POINTS ISR & ISL

EXPLANATION:

...especially from time C-D.
...ait on point C, backsight to point D, then turn
...C-7½; D-C-8½; D-C-9½ again backsighting to point
...angles D-C-10½; D-C-11½ and D-C-12½, turning a...
...on the corresponding angles on the right side of

...ait at point D, backsight to point ... and turn
...D-8½; C-D-9½; C-D-9½; likewise turn angle
...-D-10½; C-D-11½ and corresponding angles on right
...channel from zero setup.
...to be doubled and average read, be recorded.

...ows by graphs is change in distance between...
...points on right & left side of the channel.

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

SAFETY PAYS

DATE	DESCRIPTION		

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGN BRANCH

FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
HORIZONTAL MOVEMENT SURVEY-PLAN, DETAIL, & TIME MOVEMENT GRAPHS
SHEET 2

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
SUBMITTED BY
APPROVED BY

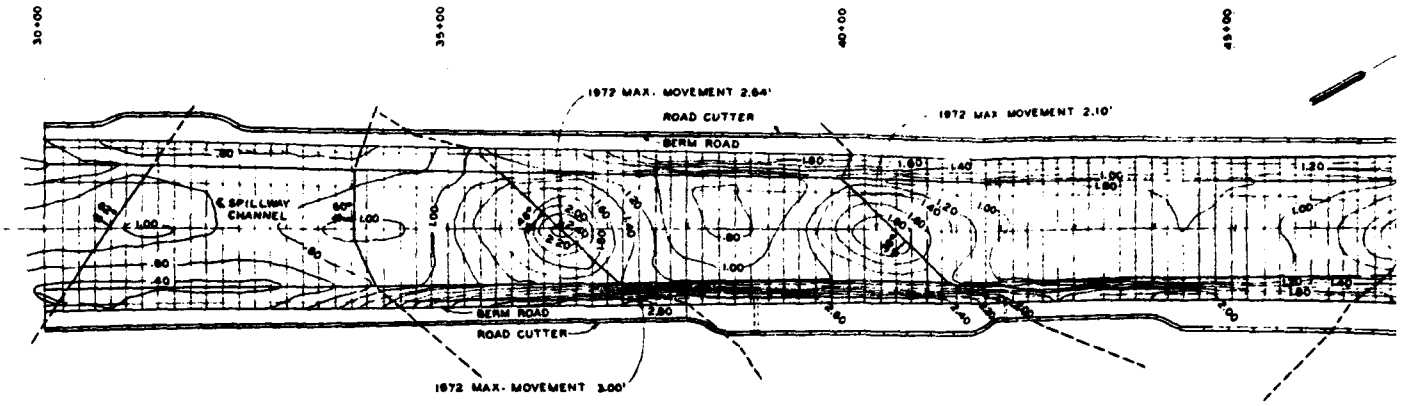
DATE SEPT 1973

CHIEF, ENGINEERING DIVISION

THIS PLAN ACCOMPANIES CONTRACT NO. DA-56-066-eng
MODIFICATION NO.

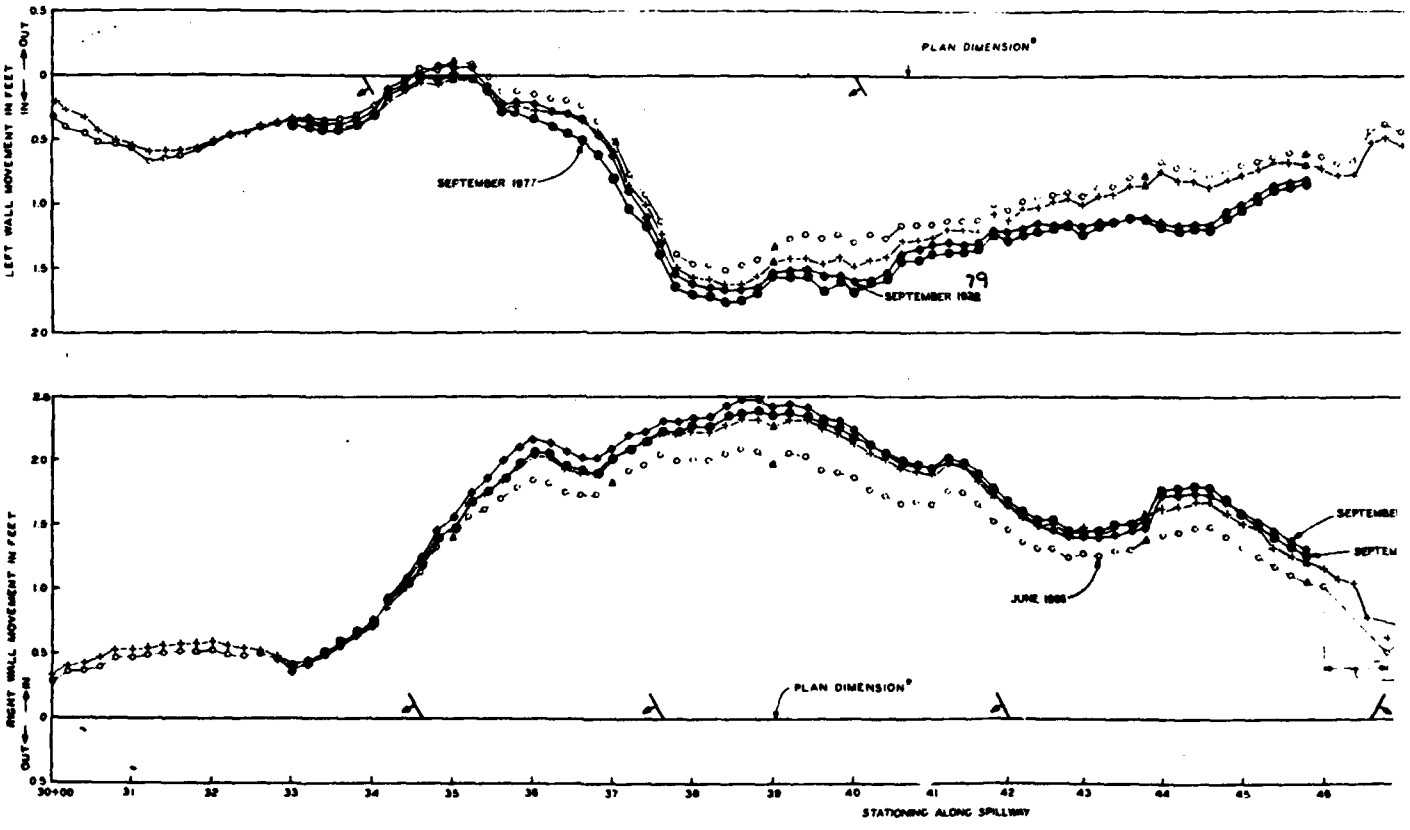
CONSTRUCTION FOUNDATION REPORT

PLATE 123



PLAN

SCALE 1 INCH = 80 FEET

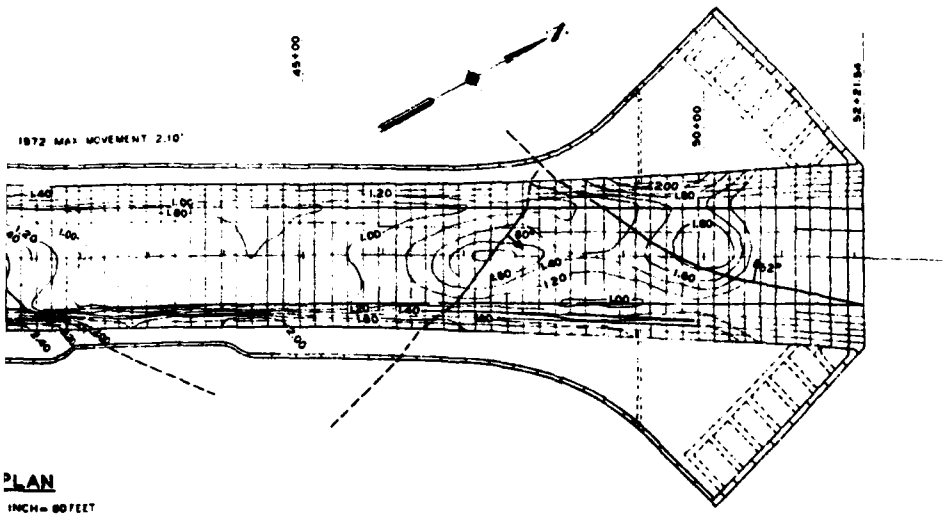


HORIZONTAL MOVEMENT

TOP OF RIGHT AND LEFT WALLS

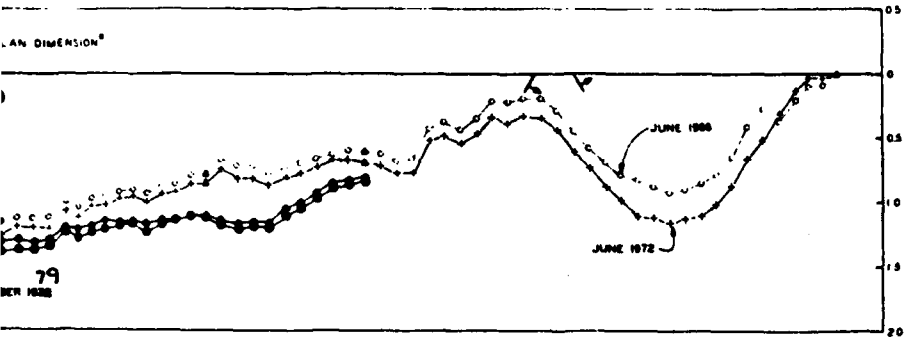
A 103 Hanscomatic Film or A Paper Reproducible Record
Copy Must Be Made Before Every Addendum and/or Modification

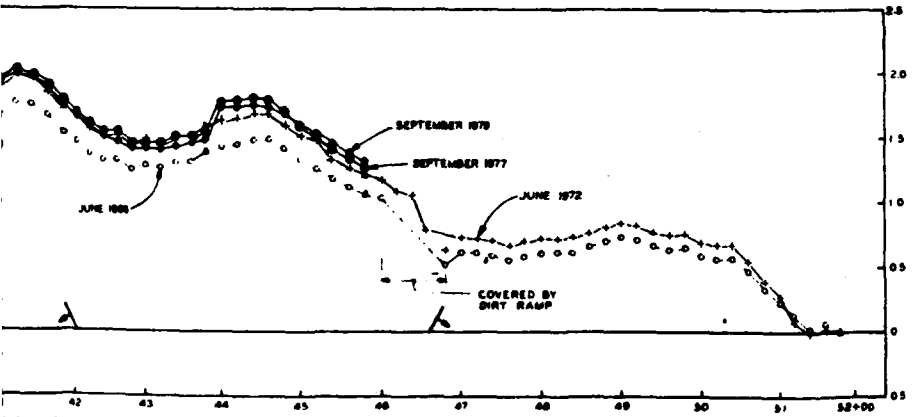
ADDENDA NO.	
DATE	
MODIFICATION	
DATE	



PLAN

INCH = 80 FEET





L MOVEMENT
AND LEFT WALLS

Legend:

- Contours show feet of vertical displacement (1968).
- Fault showing direction and amount of dip.
- Spillway constructed during 1936 & 1937.
- By triangulation survey.
- Survey June 1966
- Survey June 1972
- Survey Sept. 1977
- Survey Sept. 1979

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

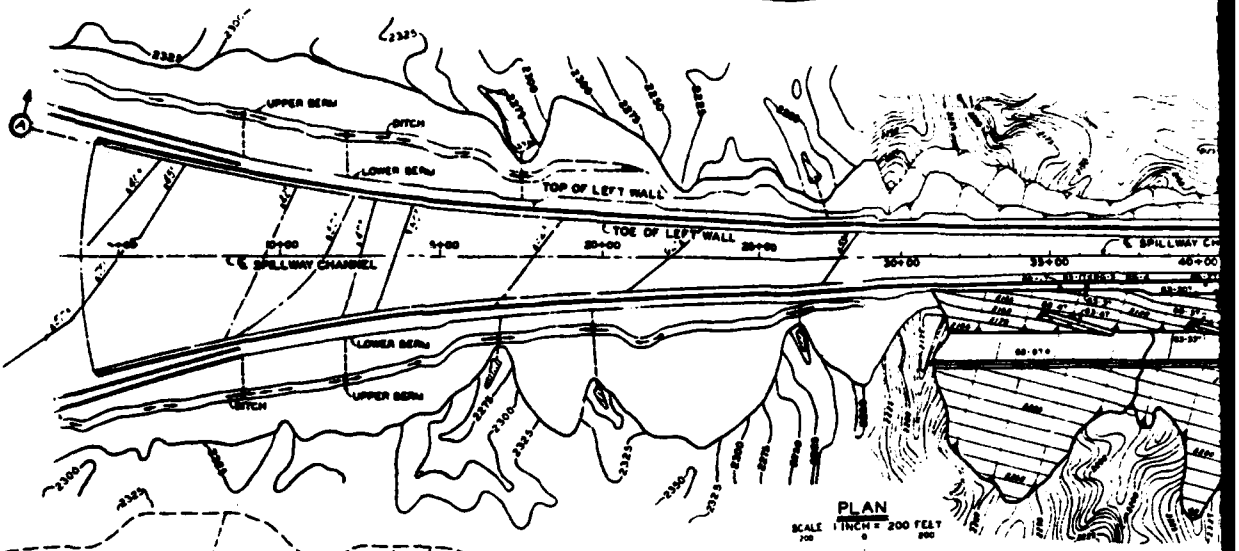
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
HORIZONTAL MOVEMENT-TOP OF WALL
STA. 30+00 TO CUT-OFF WALL

Designed by O.D.A.
Drawn by D.A.
Checked by C.V.J.
Traced by
Checked by
Approved
Date SEP 1979
Submitted
Alfred L. Brilling
Chief, Engineering Division
Drawing Number
Sheet

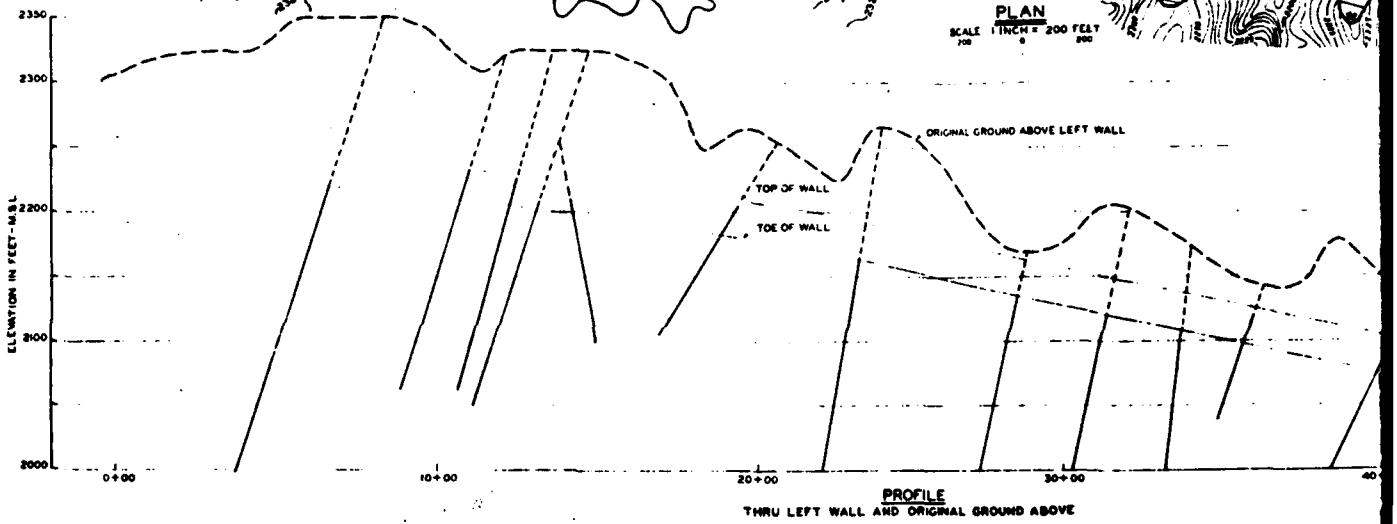
THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-066-xx MODIFICATION NO.

SAFETY DAYS

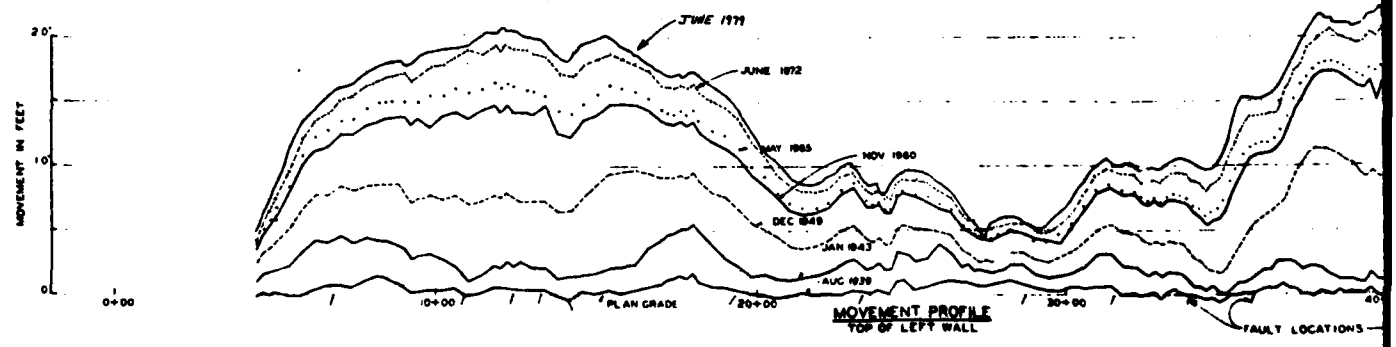


PLAN

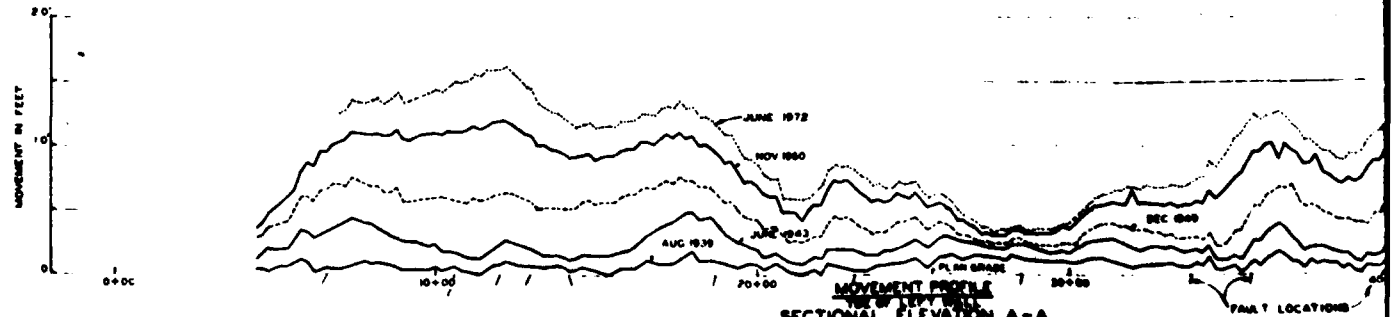
SCALE 1 INCH = 200 FEET



PROFILE
THRU LEFT WALL AND ORIGINAL GROUND ABOVE



MOVEMENT PROFILE
TOP OF LEFT WALL

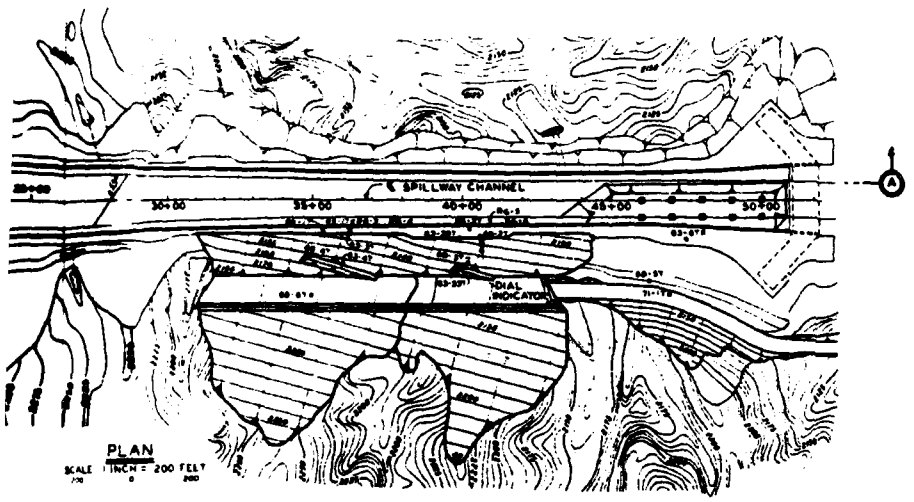


MOVEMENT PROFILE
TOE OF LEFT WALL

SECTIONAL ELEVATION A-A

ADDENDA NO.	
DATE	
MODIFICATION	
DATE	

A 185 Microcopy Film or A Paper Reproducible Record
Copy Must Be Made Before Every Addendum and/or Modification

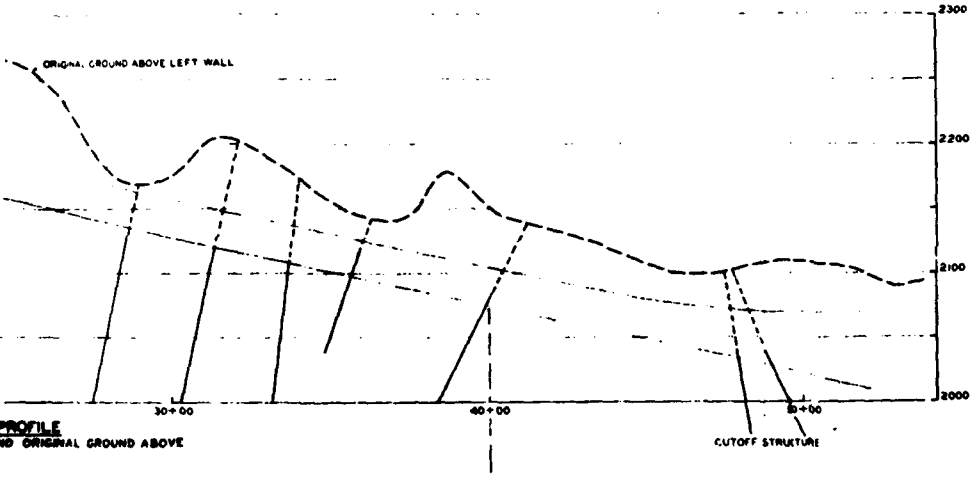


PLAN

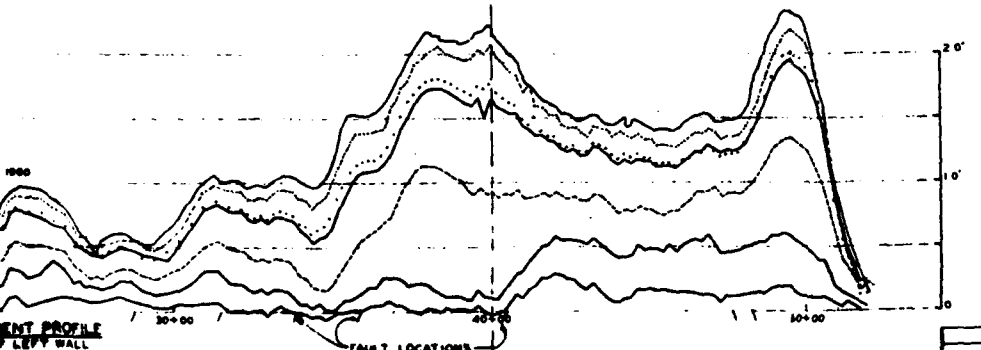
SCALE 1 INCH = 200 FEET

LEGEND:

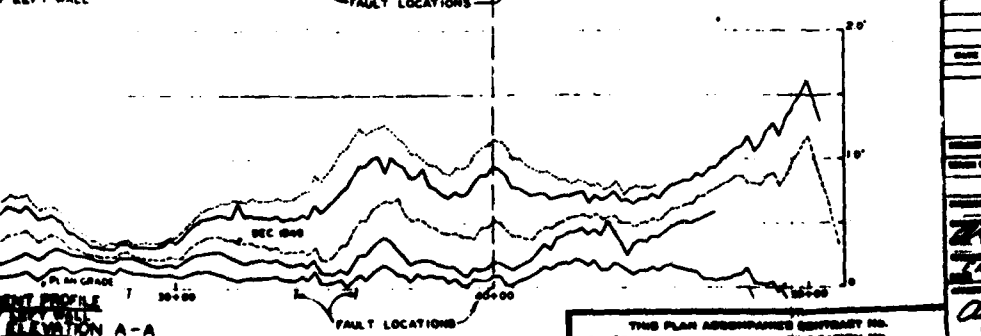
- TILTMETER
- REBOUND GAGES
- SETTLEMENT GAGES



PROFILE
ND ORIGINAL GROUND ABOVE



ENT PROFILE
LEFT WALL



NT PROFILE
LEFT WALL
LEVATION A-A

NOTES:

1. Faults are shown at correct location at toe of wall profile and apparent dip drawn up and down from this line.
2. Keat (left) wall and cantilever slab placed from sta. 4+40 to Sta. 5+26 during 1937 construction season.

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

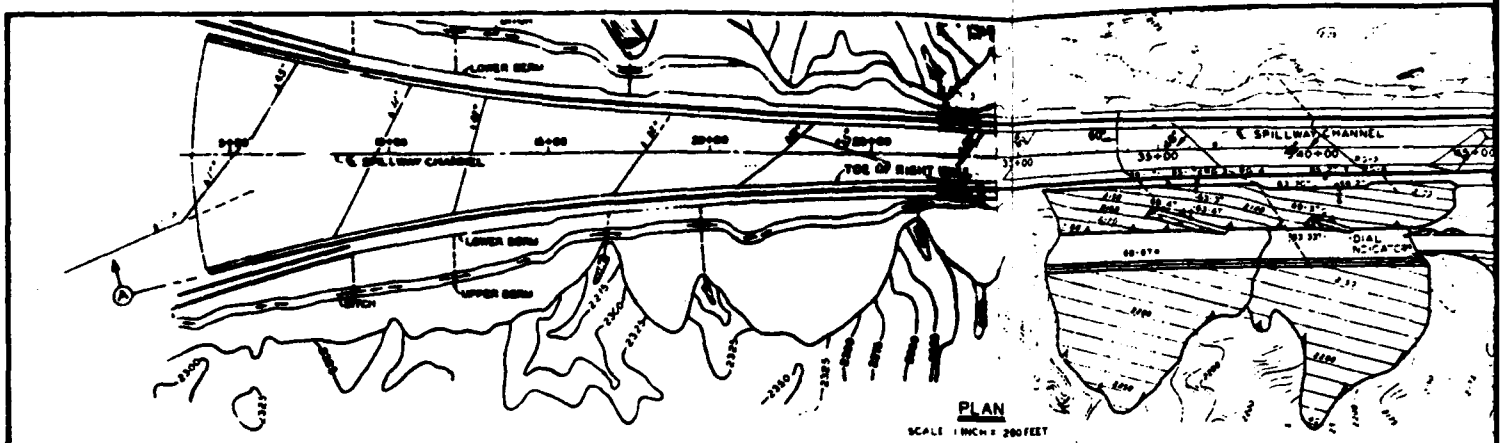
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION

LEFT WALL VERTICAL MOVEMENT VS. ORIGINAL GROUND AND FOUNDATION FAULTING

DESIGNED BY R.B.A.
DRAWN BY A.S.
CHECKED BY E.V.J.
TRACED BY
CHECKED
APPROVED
Alfred L. Brilling
CHIEF, ENGINEERING DIVISION

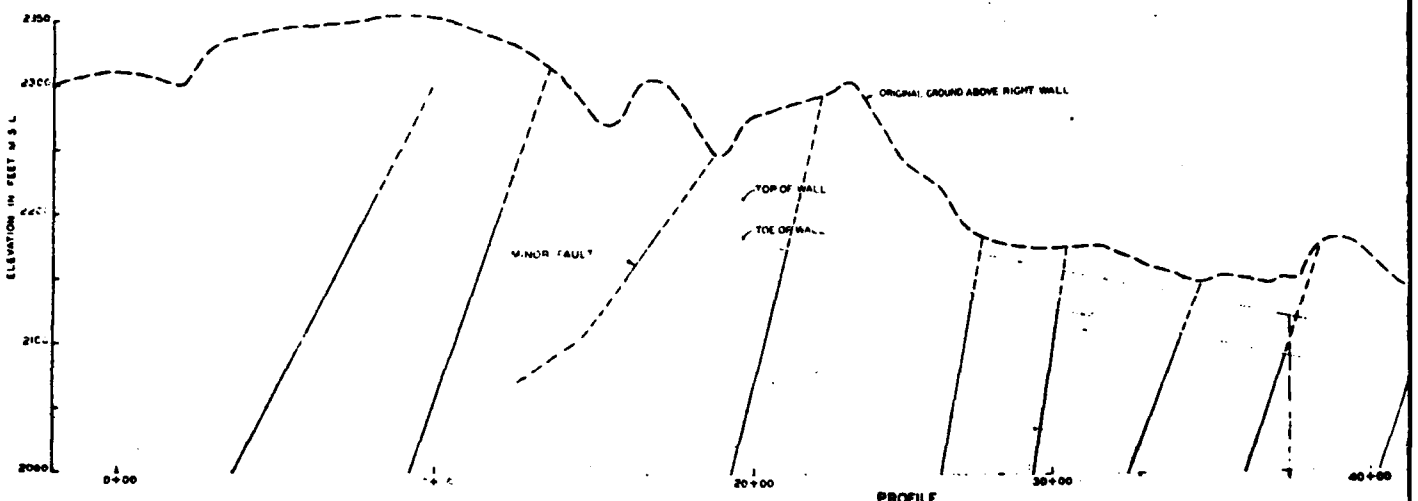
DATE SEP 1940
SCALE AS SHOWN
DRG NO. 49-1240-1240

THIS PLAN ACCOMPANIES SURVEY NO. DA-25-066-eng-
IDENTIFICATION NO.



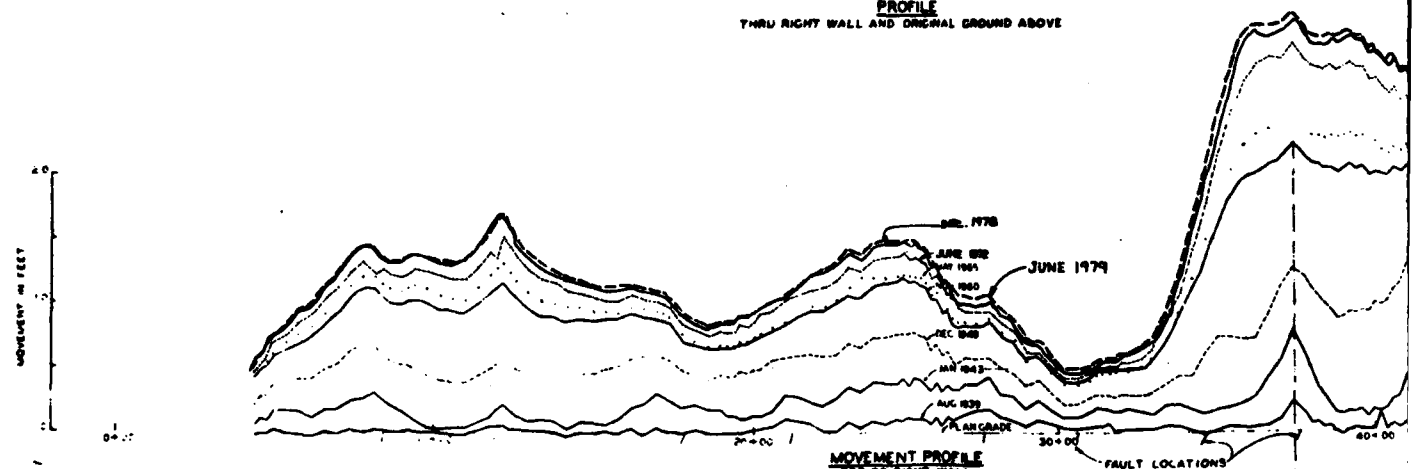
PLAN

SCALE 1 INCH = 200 FEET



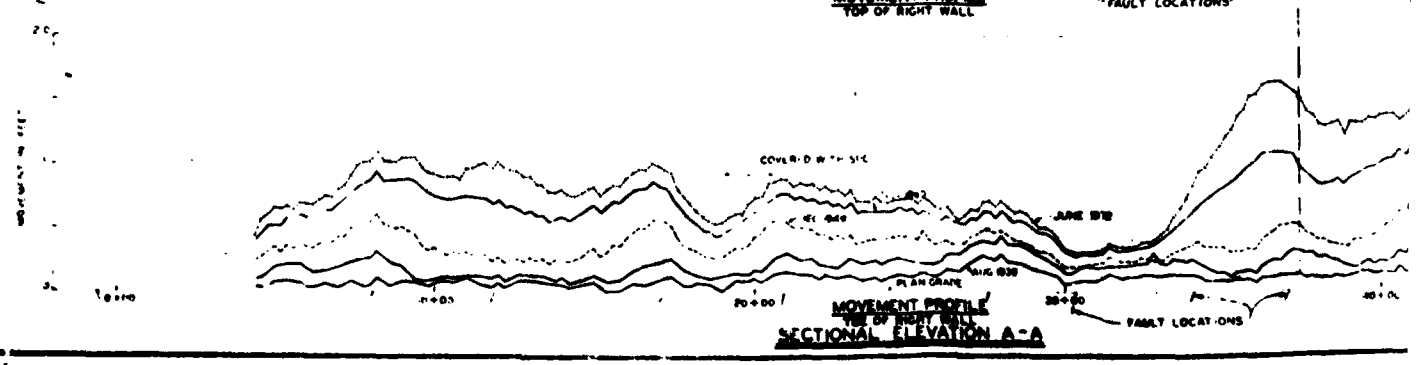
PROFILE

THRU RIGHT WALL AND ORIGINAL GROUND ABOVE



MOVEMENT PROFILE

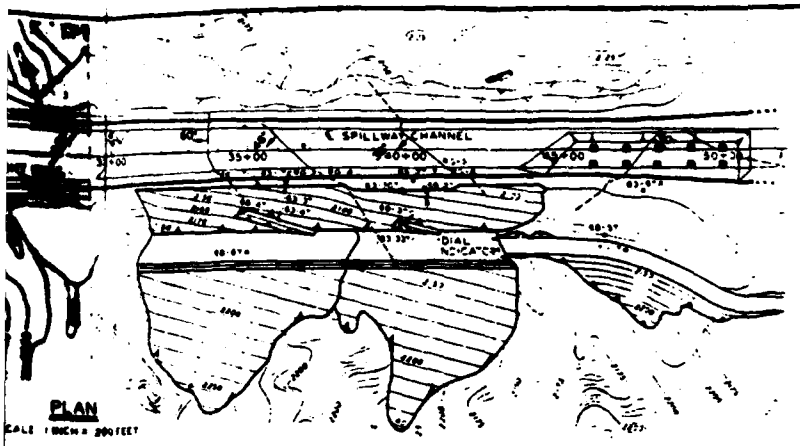
TOP OF RIGHT WALL



MOVEMENT PROFILE

TOE OF RIGHT WALL

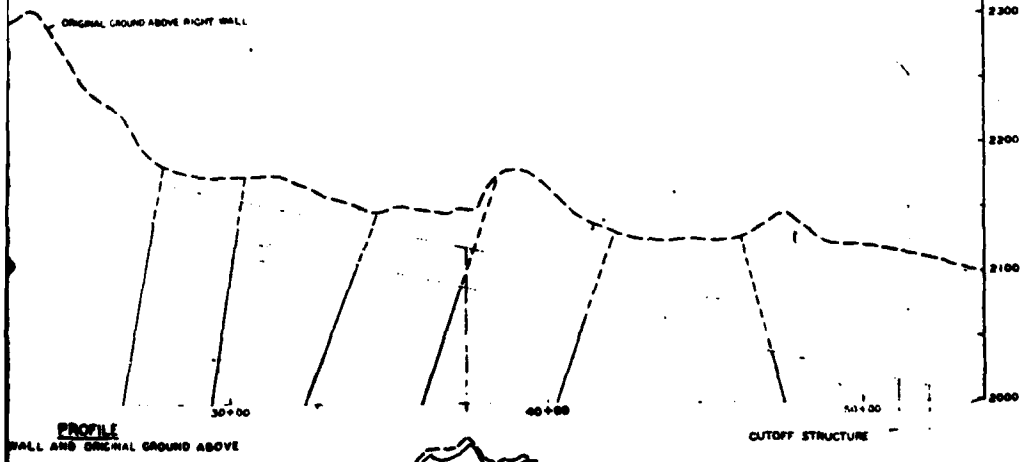
SECTIONAL ELEVATION A-A



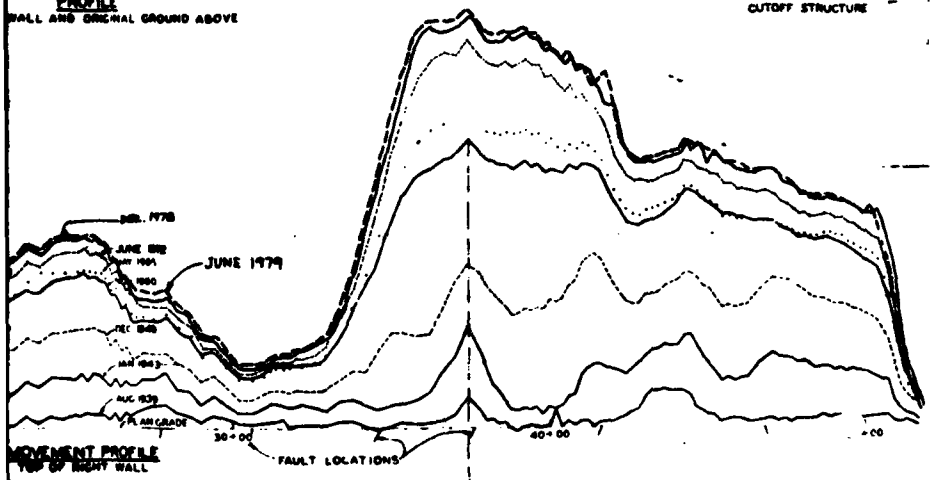
PLAN

SCALE 1 INCH = 200 FEET

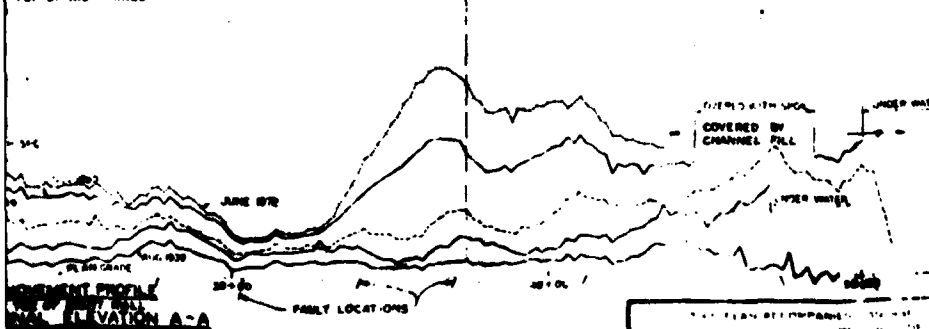
LEGEND:
- ● TILTMETER
- ▲ REBOUND GAGE
- ■ SETTLEMENT GAGE



PROFILE
WALL AND ORIGINAL GROUND ABOVE



MOVEMENT PROFILE
TOP OF RIGHT WALL



MOVEMENT PROFILE
ELEVATION A-A

This drawing has been reduced to three-eighths the original scale.

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

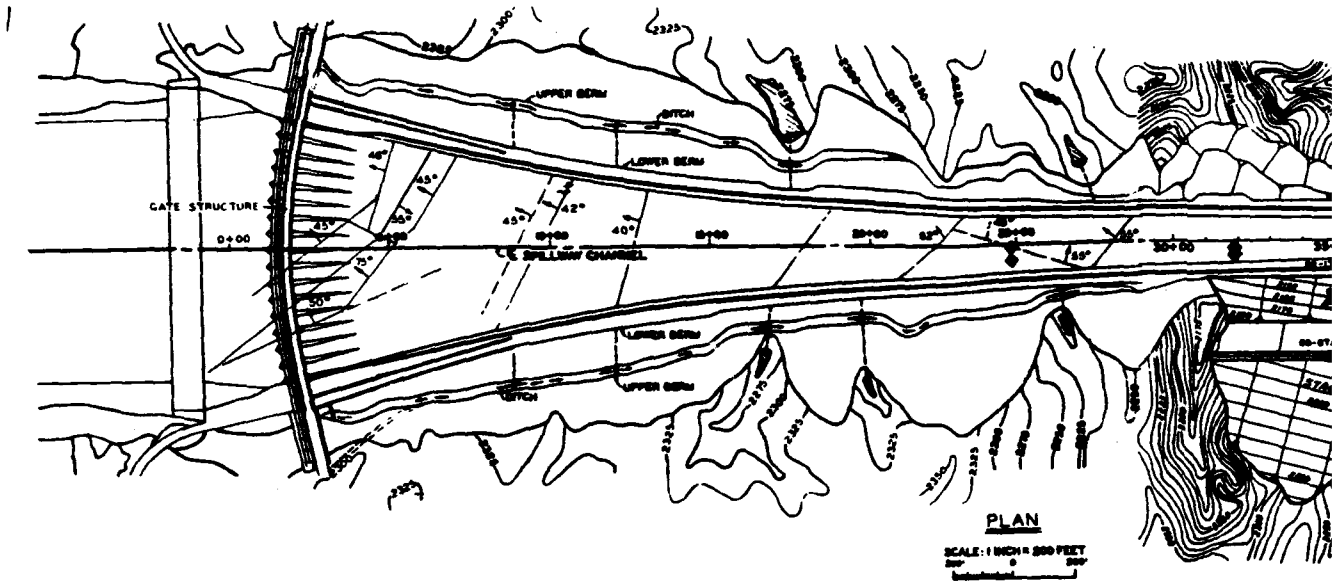
MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
RIGHT WALL VERTICAL MOVEMENT VS ORIGINAL GROUND AND FOUNDATION FAULTING

Alfred L. Bradley

CONSTRUCTION FOUNDATION REPORT

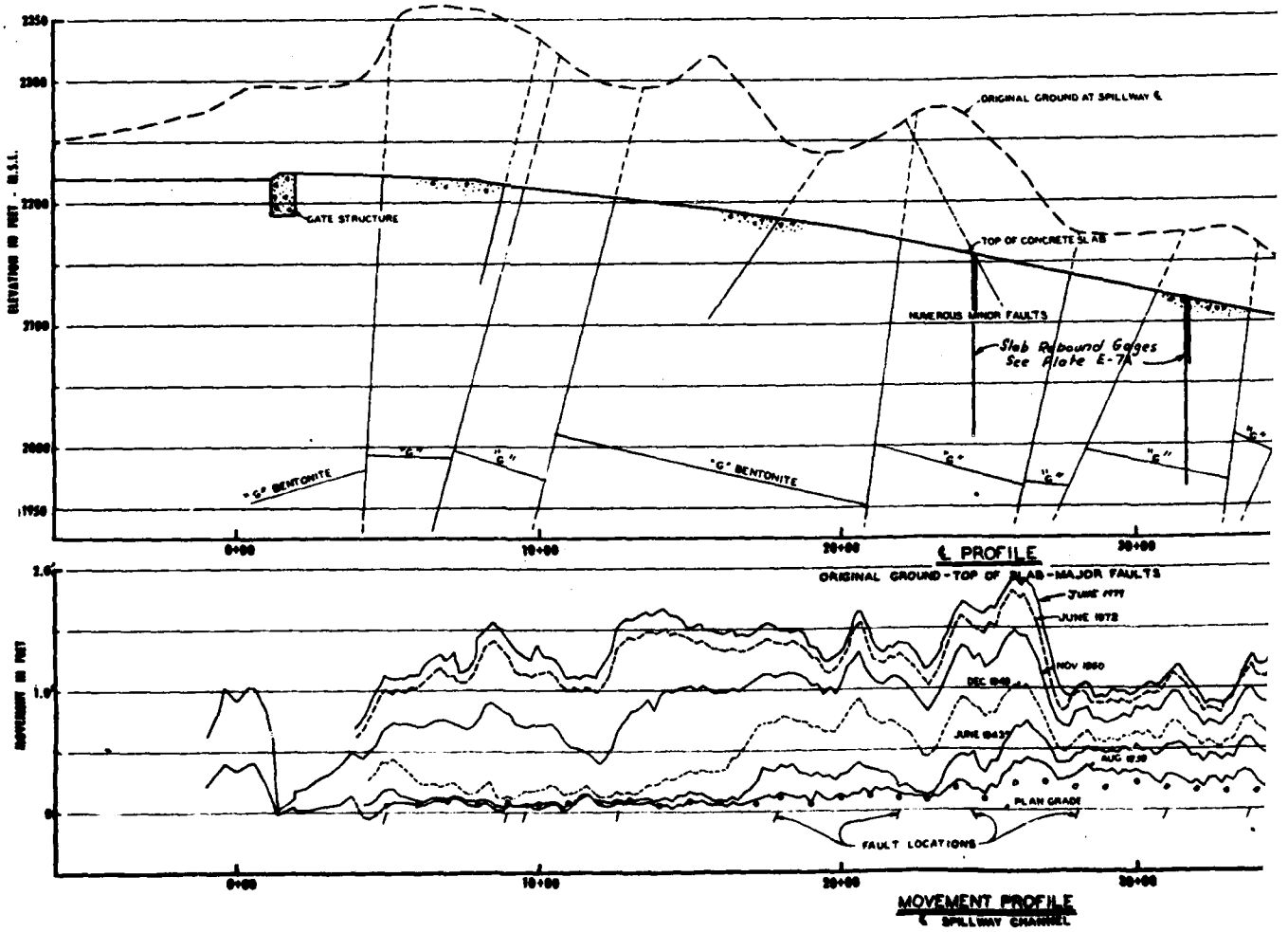
PLATE 126

2



PLAN

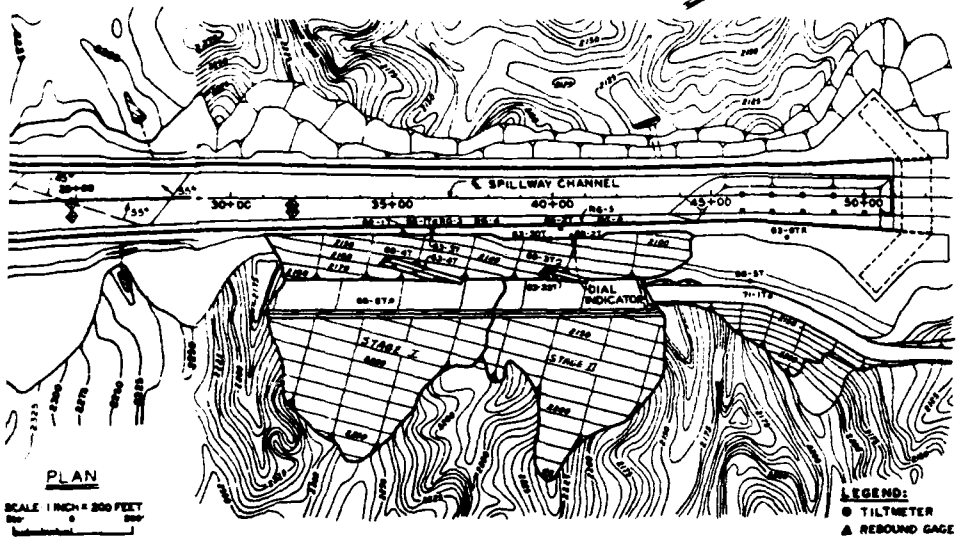
SCALE: 1 INCH = 200 FEET



℄ PROFILE

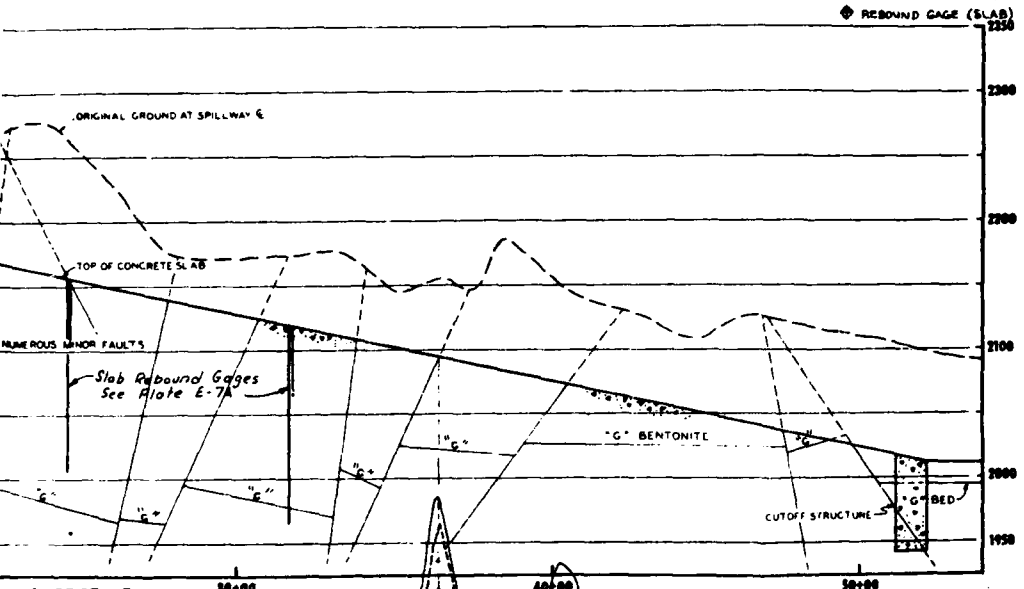
MOVEMENT PROFILE

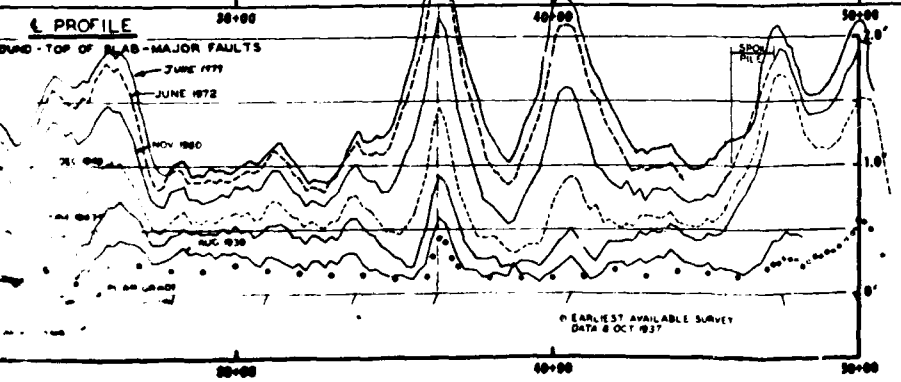
℄ SPILLWAY CHANNEL



LEGEND:

- ● TILTMETER
- ▲ REBOUND GAGE (BERM)
- ■ SETTLEMENT GAGE (DESTROYED 1975)
- ◆ REBOUND GAGE (SLAB)





THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

1/77	Minimal gain (1.4 ft) observed 1978	SLM	
DATE	DESCRIPTION	BY	APPVD

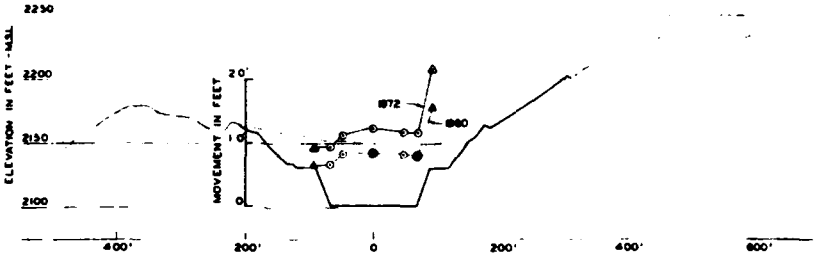
DIVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

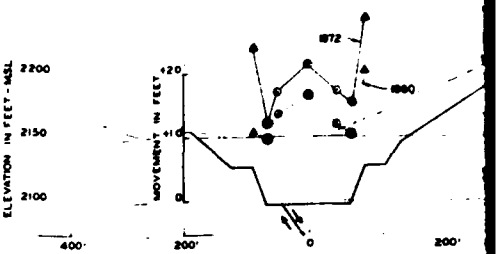
MISSOURI RIVER

FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
CENTERLINE VERTICAL MOVEMENT VS ORIGINAL GROUND & FOUNDATION FAULTING

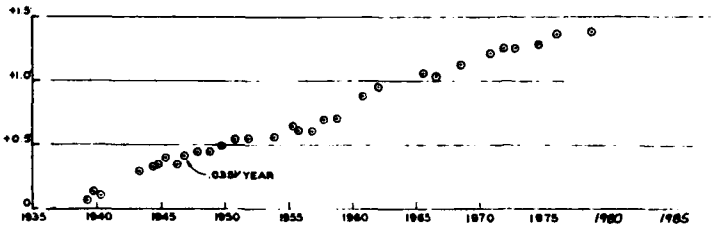
DESIGNED BY G.W.J.
DRAWN BY L.J.L.
CHECKED BY C.V.J.
TRACED BY
SUBMITTED
SEP 1979
RECOMMENDED
APPROVED
Alfred L. Bradley
DIV. U.S. ENGINEER



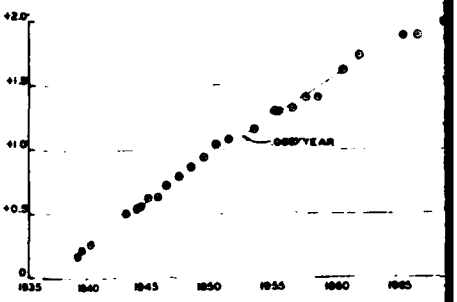
SECTION - STA. 35+00



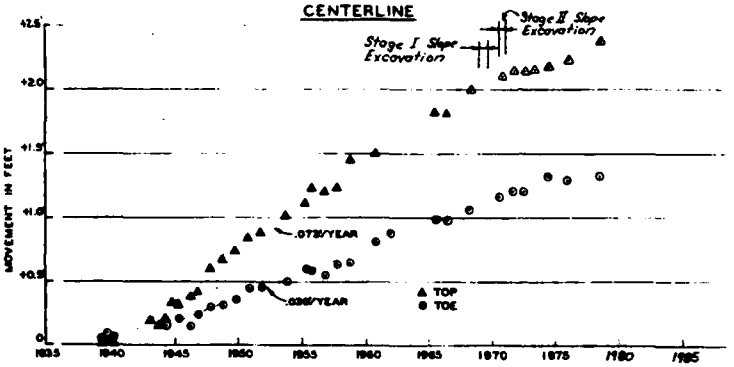
SECTION - STA. 36+00



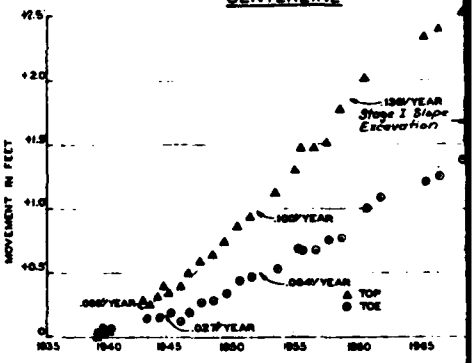
CENTERLINE



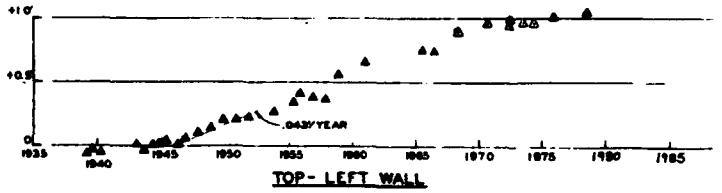
CENTERLINE



RIGHT WALL



RIGHT WALL



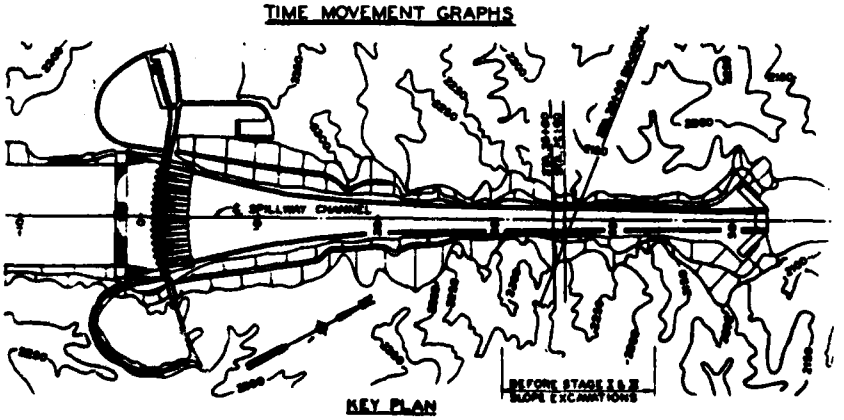
TOP - LEFT WALL

TIME MOVEMENT GRAPHS



LEFT WALL

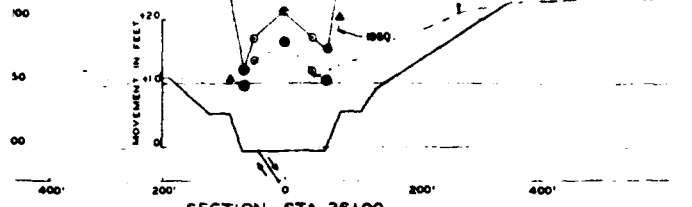
TIME MOVEMENT GRAPHS



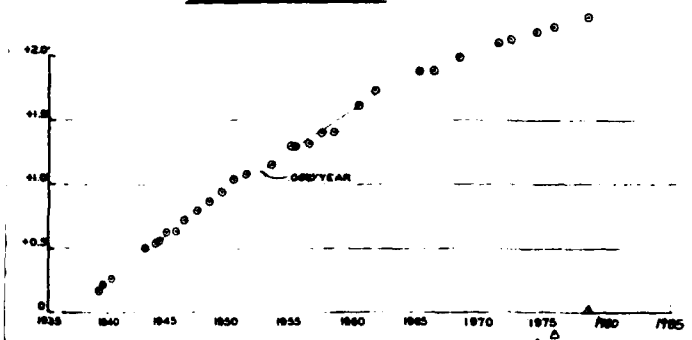
KEY PLAN

ADDENDA NO.				
DATE				
MODIFICATION				
DATE				

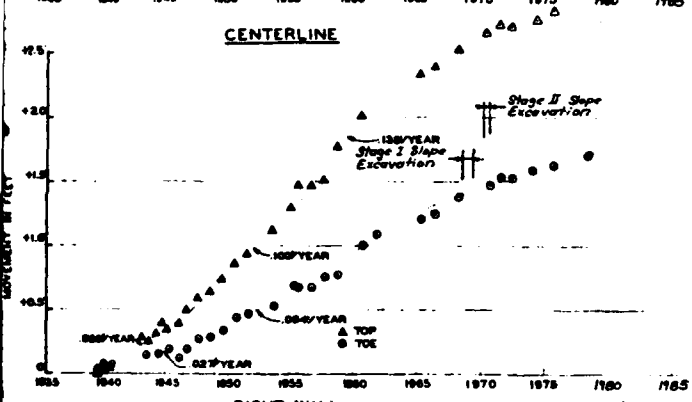
A 105 Microcopy No. or A Paper Reproducible Record Copy Must Be Made Before Every Addendum and/or Modification



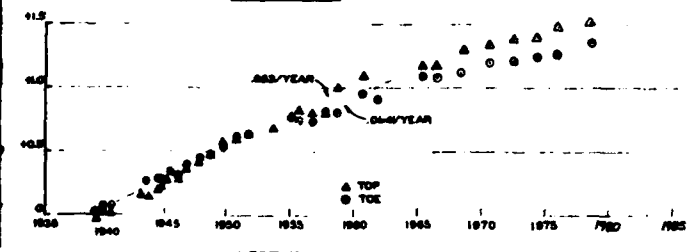
SECTION - STA. 36+00



CENTERLINE

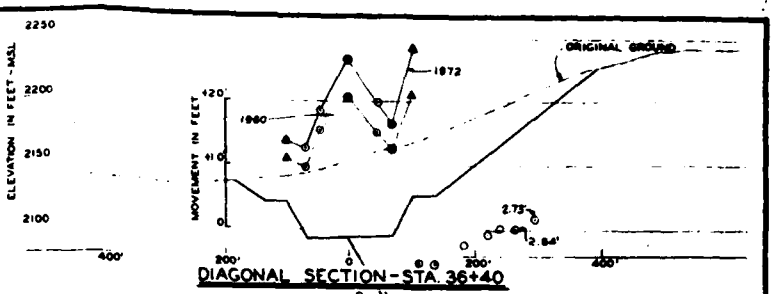


RIGHT WALL

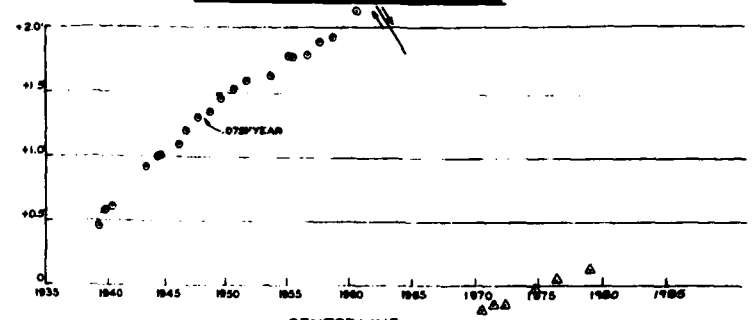


LEFT WALL

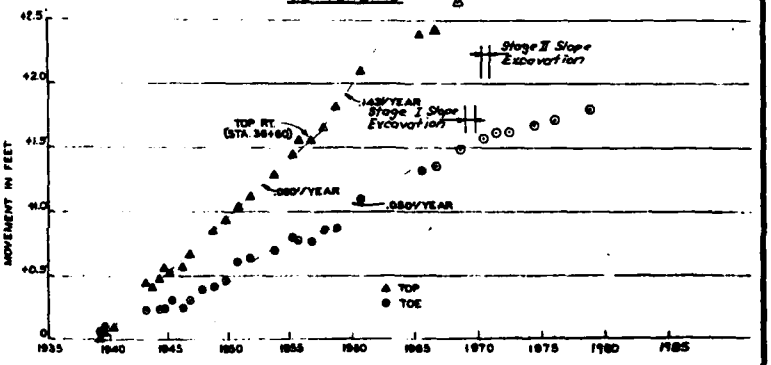
TIME MOVEMENT GRAPHS



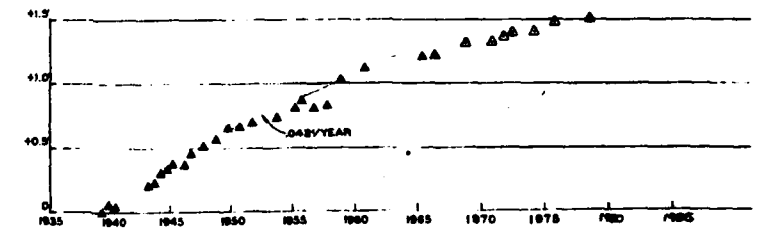
DIAGONAL SECTION - STA. 36+40



CENTERLINE



RIGHT WALL



TOP - LEFT WALL

TIME MOVEMENT GRAPHS

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESCRIPTION	INITIALS	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY C.V.J. D.W.A.
DRAWN BY D.R.A.
CHECKED BY D.W.A.

MISSOURI RIVER

FORT PECK LAKE, MONTANA
SPILLWAY SLOPE EXCAVATION
CHANNEL SECTIONS-STA. 35+00, 36+00& 36+40
VERTICAL-TIME MOVEMENT RECORDS

APPROVED: R. E. Connell — DATE: SEP 1959

Alfred L. Brilling
COL., C.E., DISTRICT ENGINEER

SAFETY PAYS

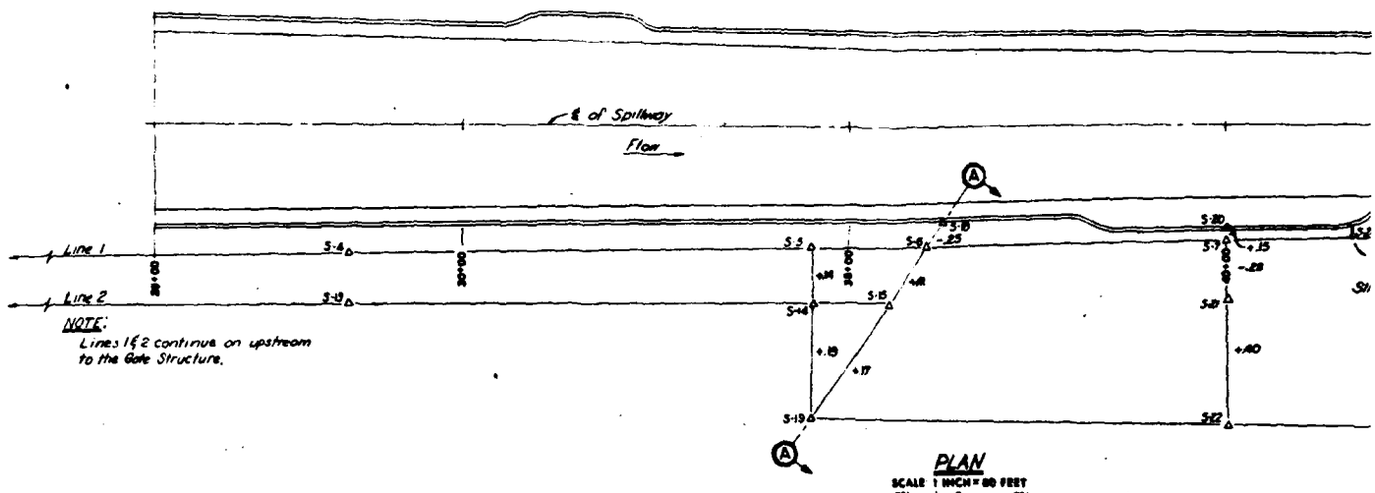
THIS PLAN ACCOMPANIES CONTRACT NO. DA-56-564-eng-
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

2

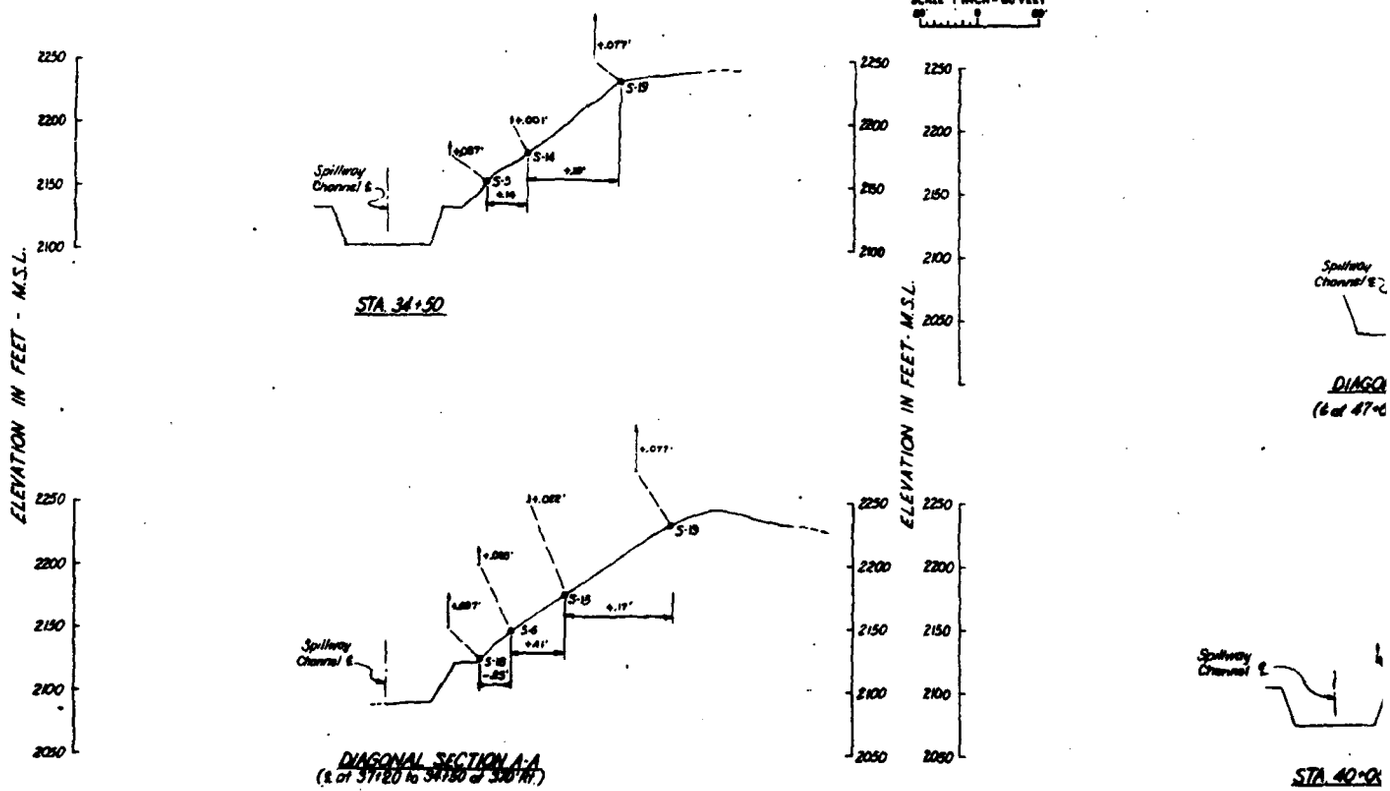
PLATE 128

CORPS OF ENGINEERS

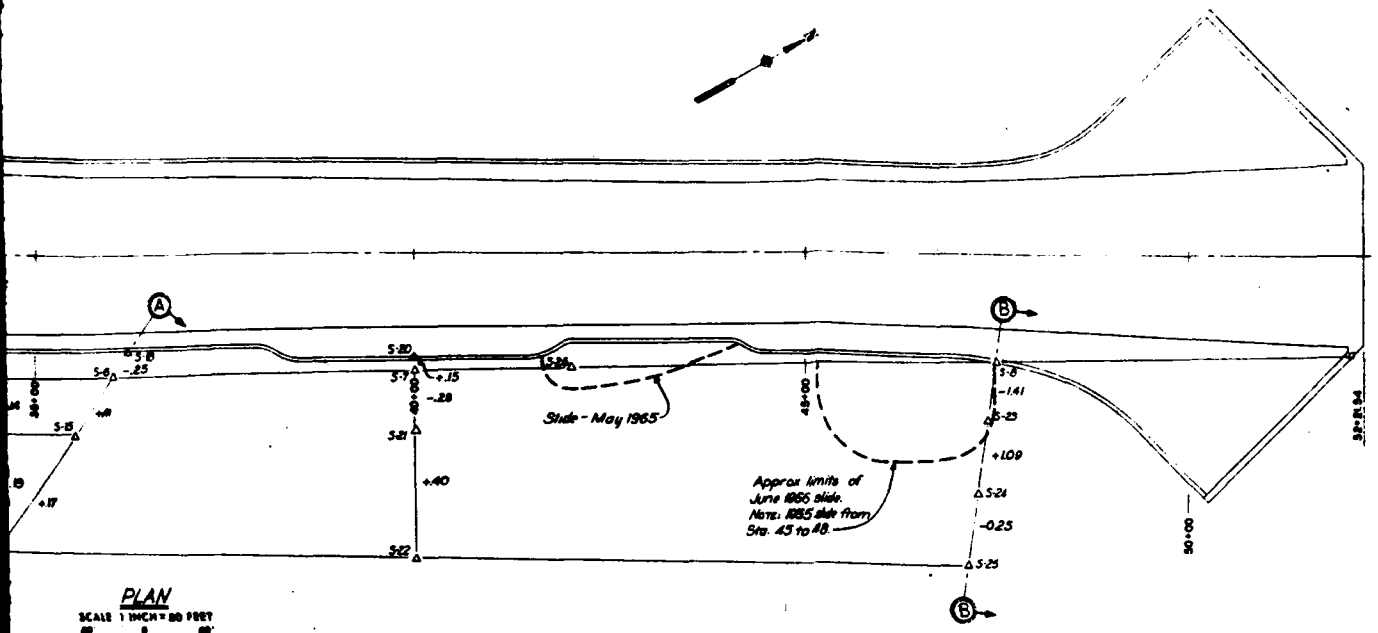


NOTE:
Lines 1 & 2 continue on upstream to the Gate Structure.

PLAN
SCALE 1 INCH = 60 FEET

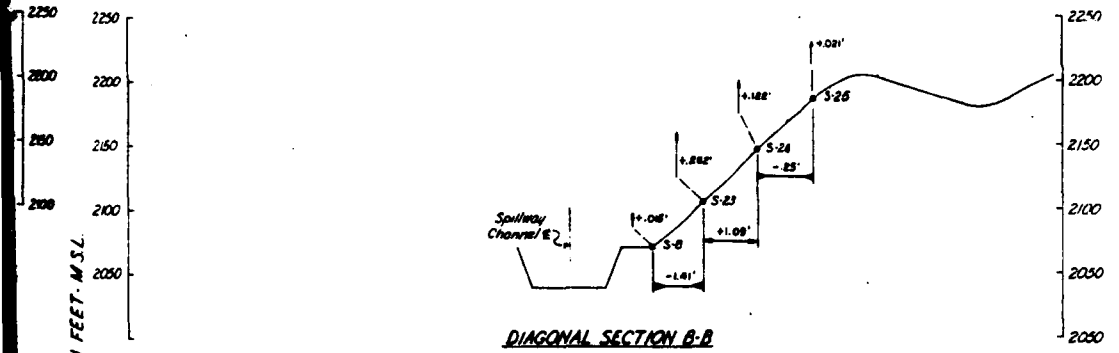


THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



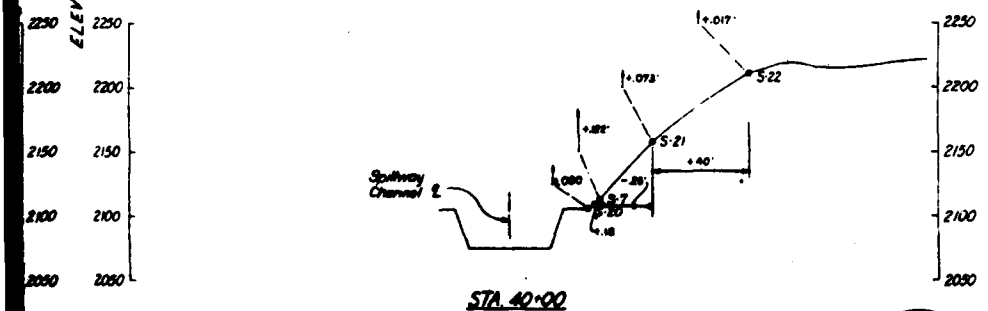
PLAN

SCALE 1 INCH = 80 FEET



DIAGONAL SECTION B-B

(℄ at 47+65 to 47+25 at 390' RH)



STA. 40+00

NOTE:

1. Slope movement shown on sections is from Initial Nov. 1963 to June 1966.
2. +.19 indicates 0.19 foot elongation of horizontal distance or gain in elevation of point. Minus (-) indicates shortening of horizontal distance or settlement of point.

DATE	DESCRIPTION	NAME	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
SLOPE MOVEMENT OBSERVATIONS
PLAN AND SECTIONS

DESIGNED BY: C.V.J.
DRAWN BY: J.N.H.
TRACED BY: J.N.H.
CHECKED BY: O.H.A.

APPROVED: Charles E. Hippe
DATE: SEPT. 1966
CHIEF, ENGINEERING DIVISION

APPROVED: Harold J. St. Clair
CHIEF, ENGINEERING DIVISION

DRAWING NO. AS SHOWN

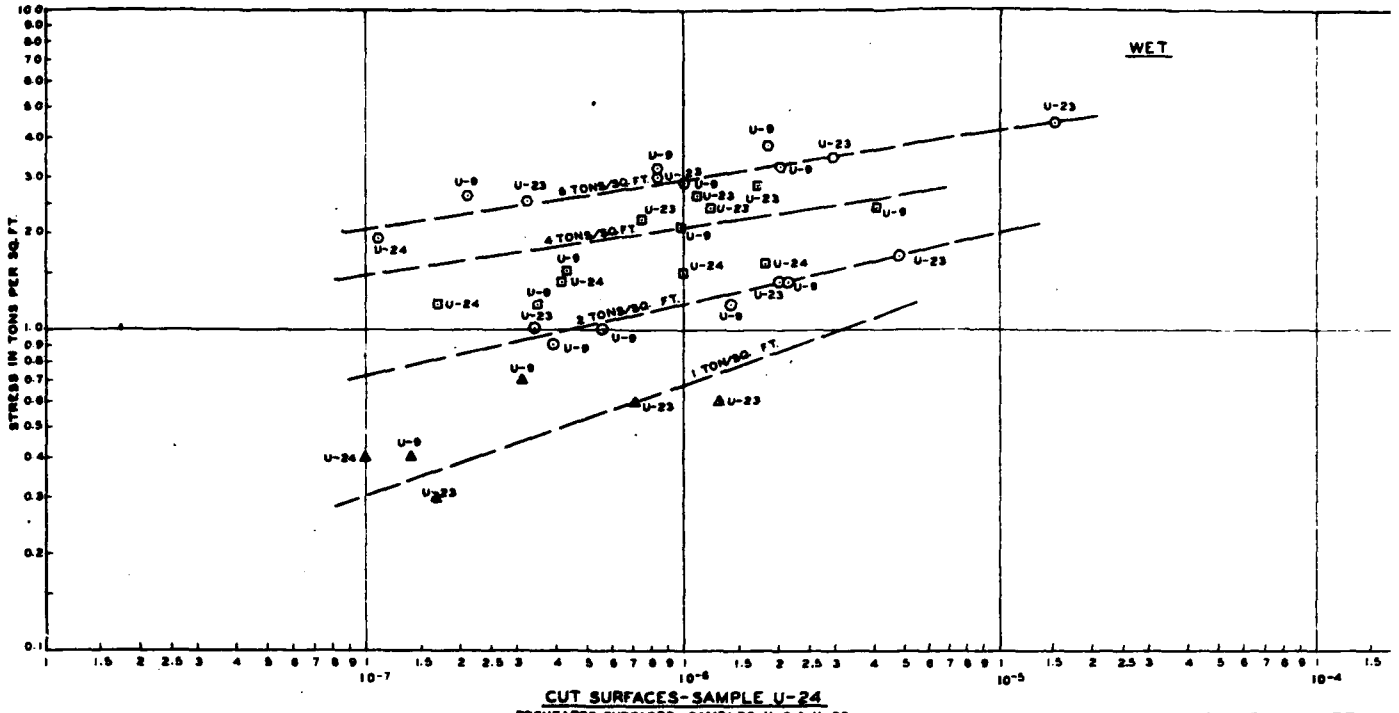
THIS PLAN ACCOMPANIES CONTRACT NO. DA-23-066-CIVENG-
IDENTIFICATION NO.

SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT

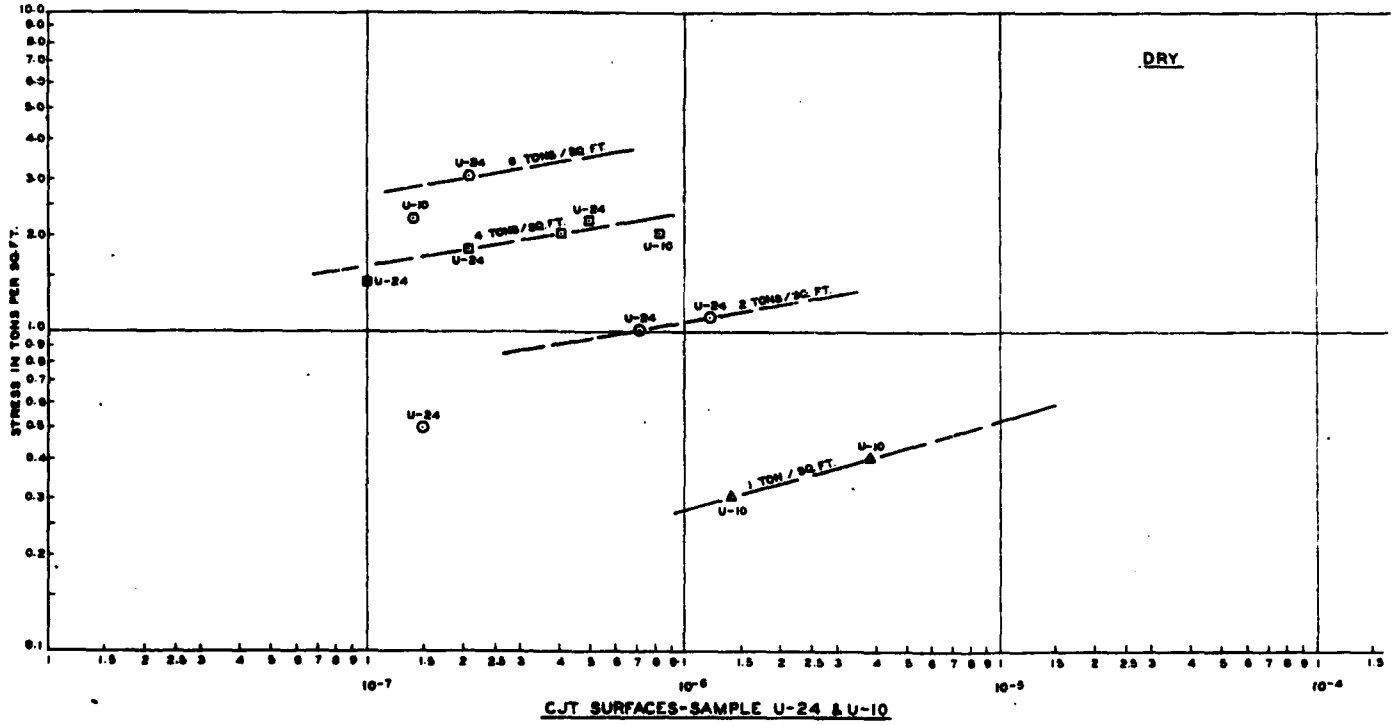
PLATE 129

2



CUT SURFACES-SAMPLE U-24
RESHEARED SURFACES- SAMPLES U-9 & U-23

RATE OF STRAIN IN INCHES PER MINUTE

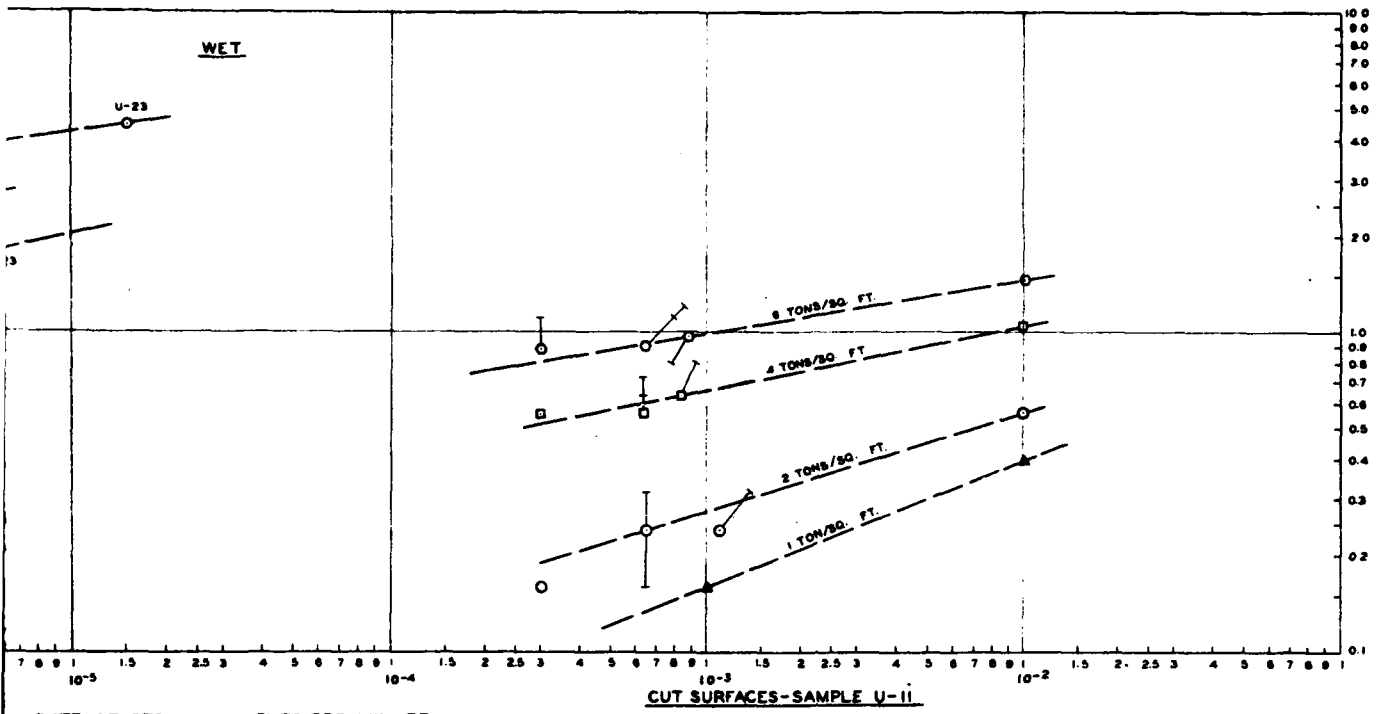


CUT SURFACES-SAMPLE U-24 & U-10

RATE OF STRAIN IN INCHES PER MINUTE

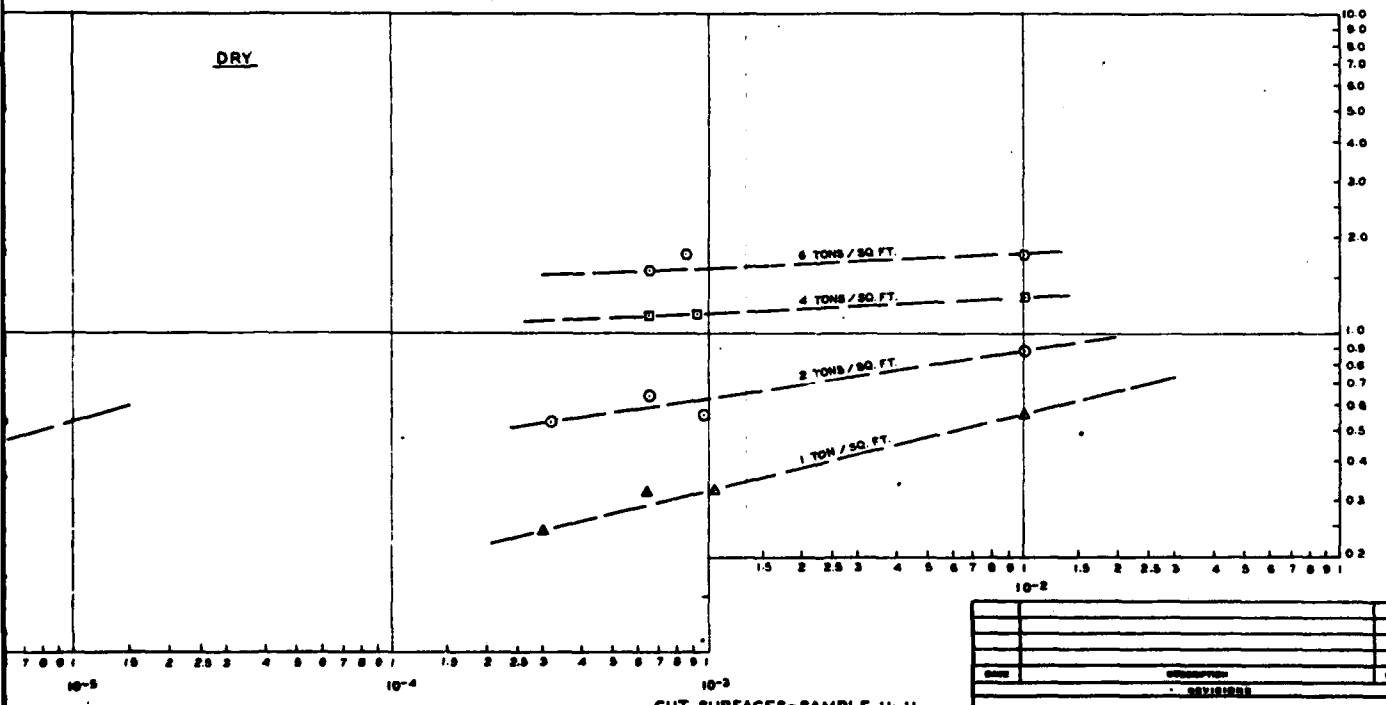
THIS DRAWING HAS BEEN REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE

U. S. ARMY



CUT SURFACES-SAMPLE U-11

RATE OF STRAIN IN INCHES PER MINUTE



CUT SURFACES-SAMPLE U-11

RATE OF STRAIN IN INCHES PER MINUTE

LEGEND:

▲ 1 TON
⊙ 2 TONS
⊡ 4 TONS
○ 6 TONS

SAFETY PAYS

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

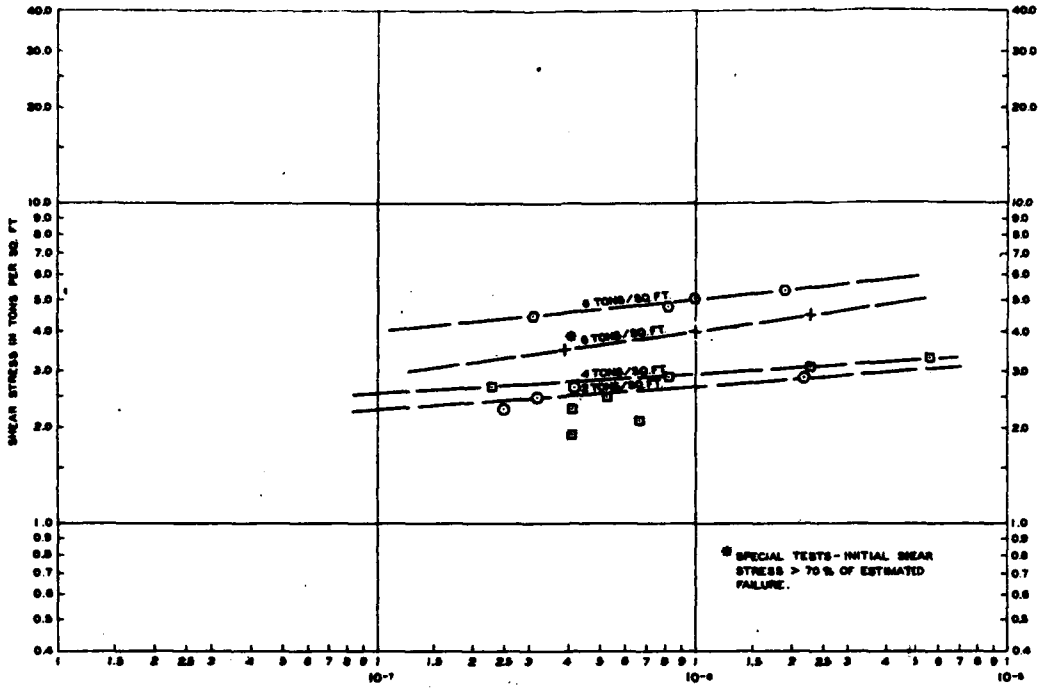
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U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
RATE OF STRAIN VS. STRESS
SHALE FRICTION TESTS

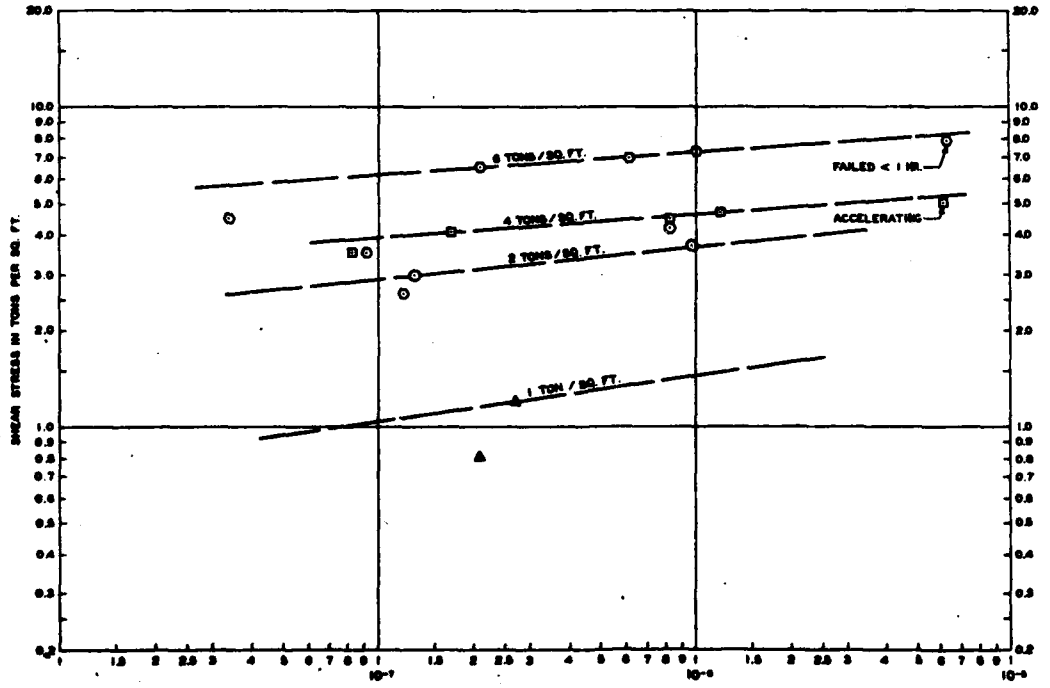
DESIGNED BY
DRAWN BY S.A.
TRACED BY S.A.
CHECKED BY
SUBMITTED
RECOMMENDED
APPROVED
DATE SEPT. 1968
CHIEF
SUPV. NO.
CHIEF, [illegible]

CONSTRUCTION FOUNDATION REPORT 2 PLATE 130



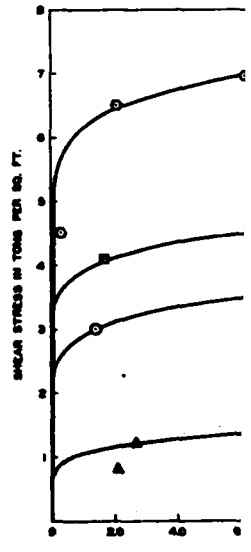
RATE OF STRAIN IN INCHES PER MINUTE

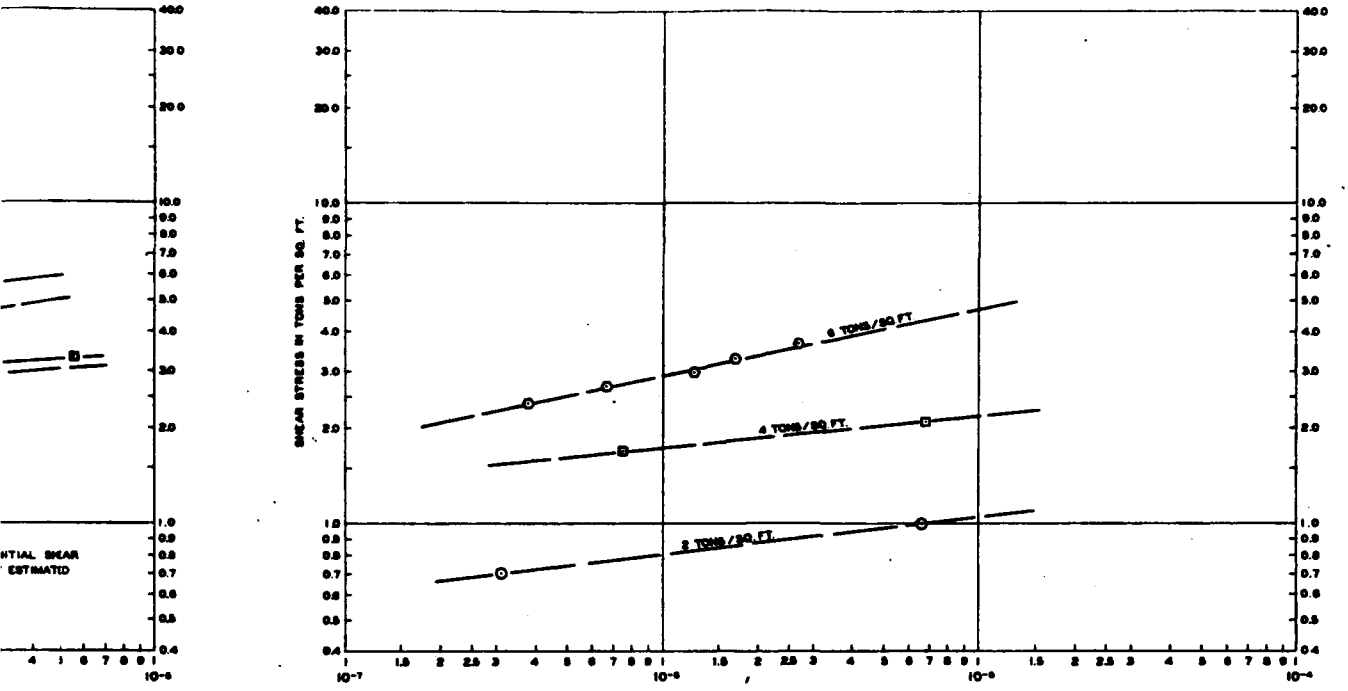
SHALE SAMPLE U-9



RATE OF STRAIN IN INCHES PER MINUTE

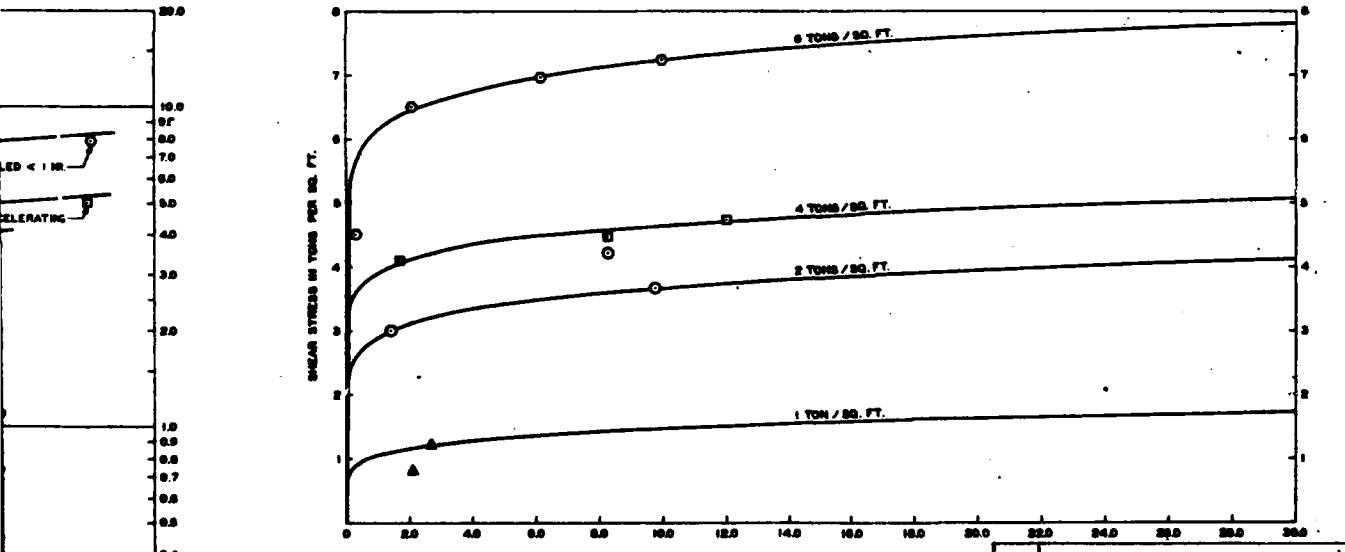
SHALE SAMPLE U-23





RATE OF STRAIN IN INCHES PER MINUTE

BENTONITE SAMPLE U-20



RATE OF STRAIN IN INCHES PER MINUTE X 10^{-7}

SAMPLE U-23 D.H. 65-1T

ARITHMETIC PLOT

LEGEND:

- ▲ 1 TON
- ○ 2 TONS
- ■ 4 TONS
- ● 6 TONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

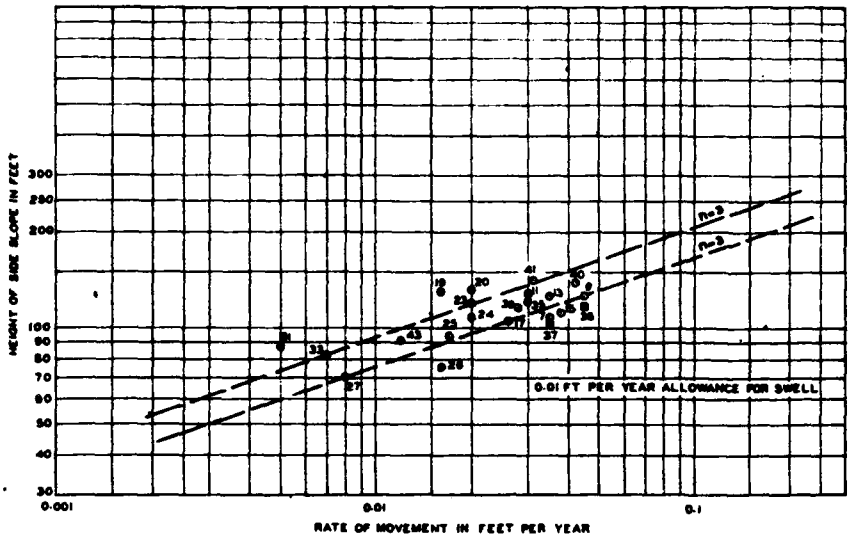
MISSOURI RIVER

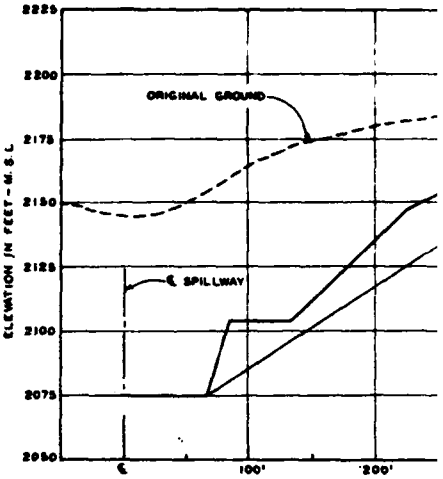
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
RATE OF STRAIN VS. STRESS
DIRECT SHEAR TESTS

SEPT. 1965

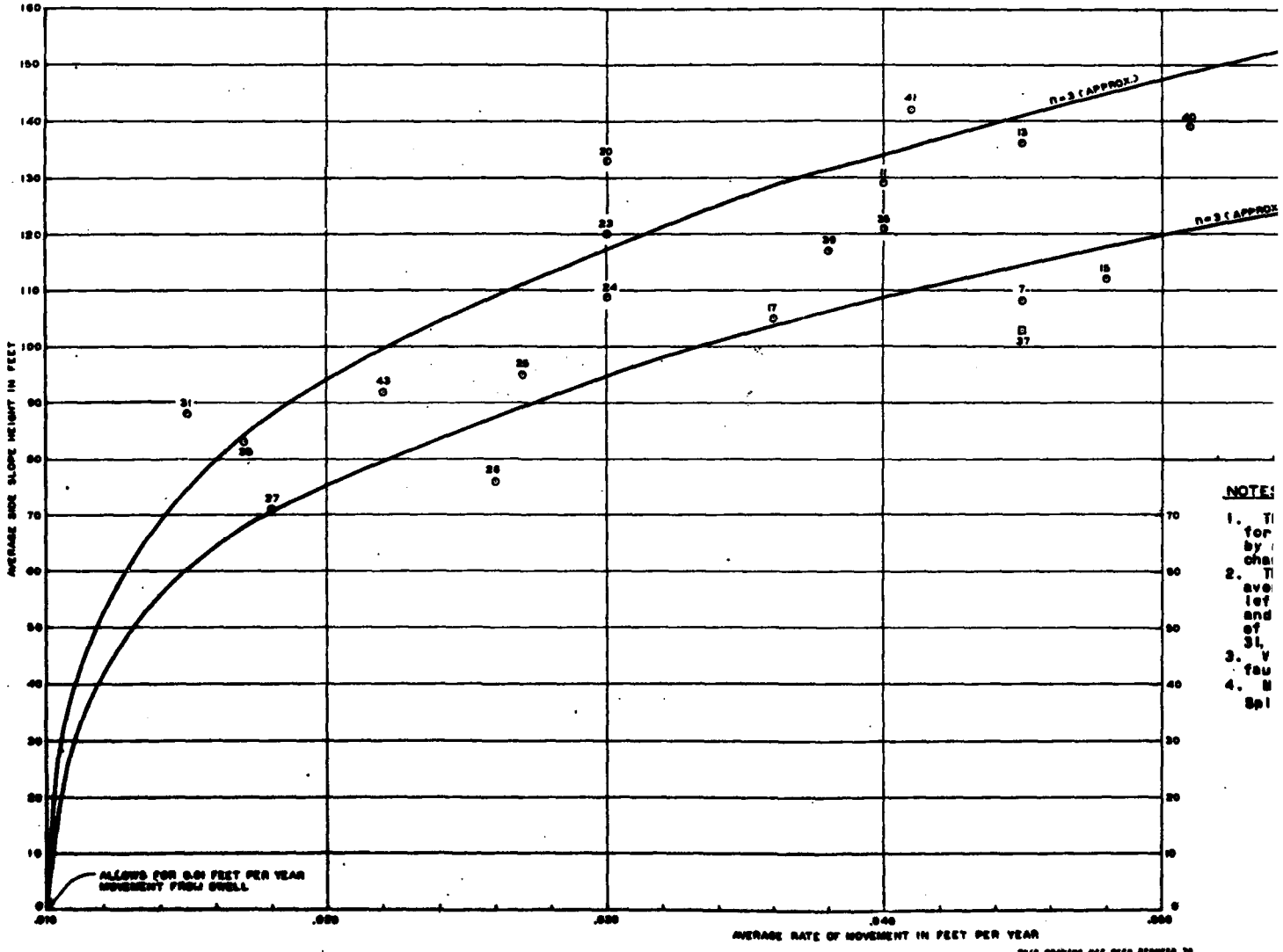
THIS DRAWING AND DATA REFERRED TO THESE FIGURES FOR ORIGINAL SCALE.

CORPS OF ENGINEERS





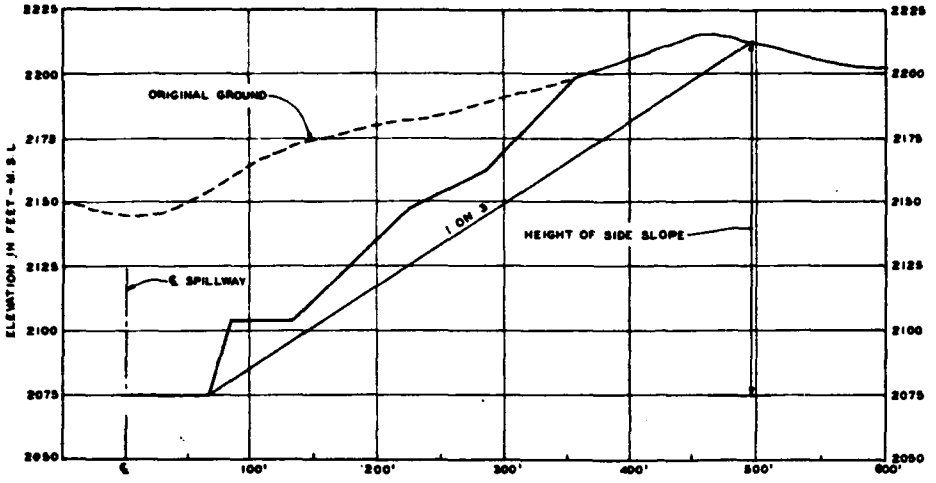
TYPIC



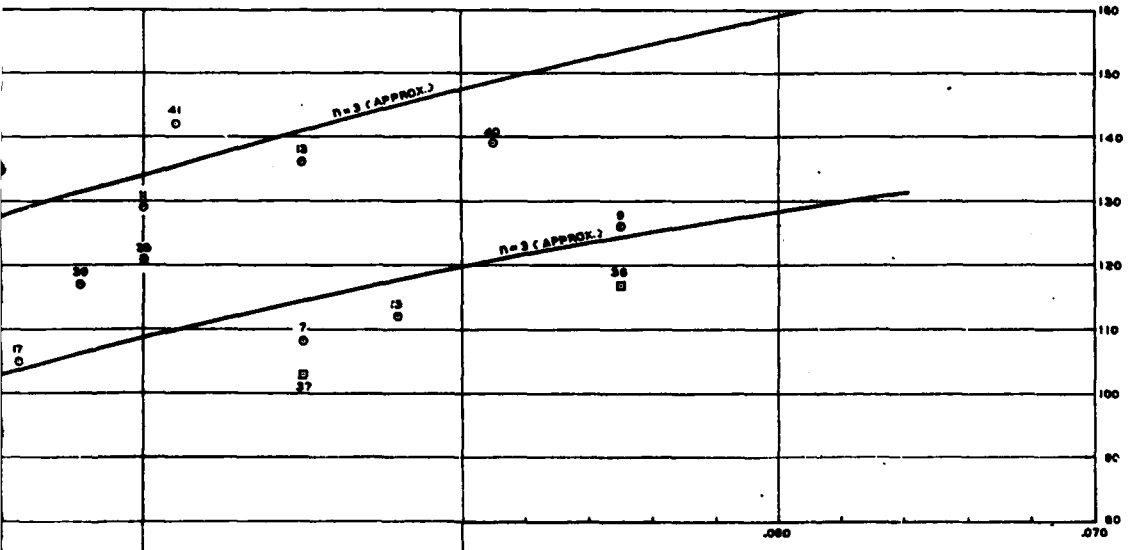
NOTES

1. T
for
by
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2. T
ave
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and
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31,
3. V
fau
4. M
Spi

THIS GRAPHING AND DATA REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE.

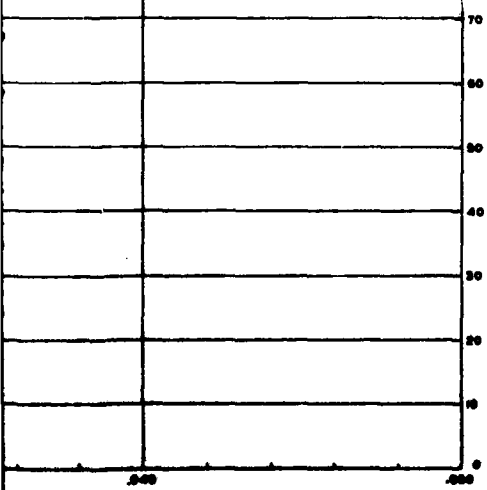


TYPICAL SECTION



NOTES:

1. The average rate of movement per section for the period 1949 through 1960 computed by averaging all movement points accross the channel floor for each section.
2. The average side slope height computed by averaging the slope heights for right and left side and including the station upstream and downstream in the average, i.e. an average of 6 values for each section. Below station 31, right side only used.
3. Values shown by ■ (square) effected by fault.
4. Numbered Points ● or ■ represent Spillway stations.



RATE OF MOVEMENT IN FEET PER YEAR

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
AVERAGE RATE OF MOVEMENT
VS. AVERAGE SIDE SLOPE HEIGHT

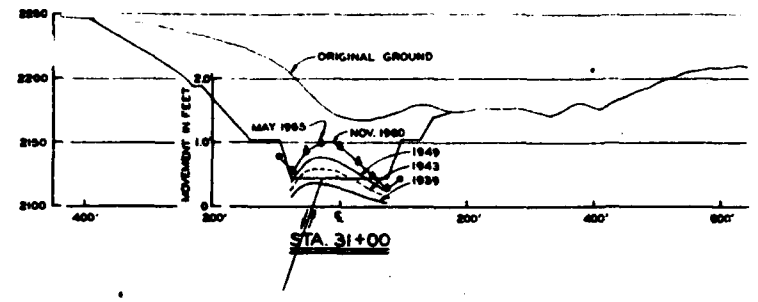
DESIGNED BY C.V.J.-D.W.S.
DRAWN BY B.A.
TRACED BY B.A.
CHECKED BY D.W.A.
APPROVED
DATE SEPT. 1960

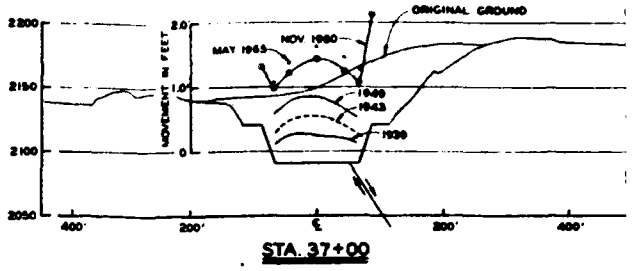
THIRD PLAN ASSESSMENTS CONTRACT NO.
INVESTIGATION NO.

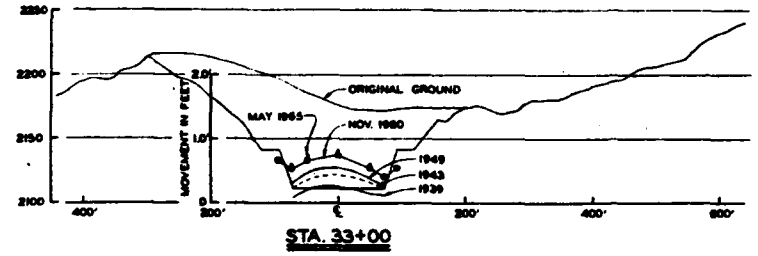
CONSTRUCTION FOUNDATION REPORT

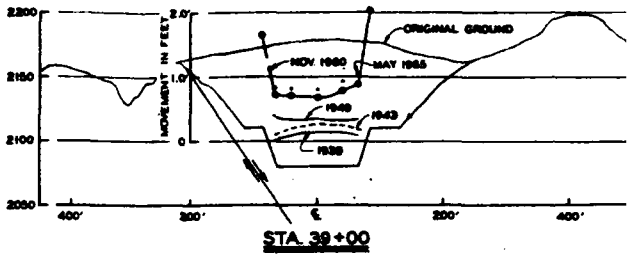
PLATE 132

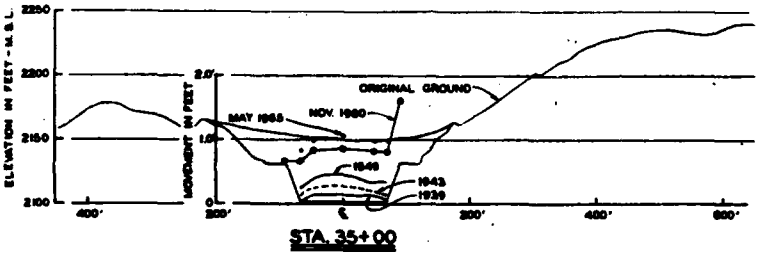
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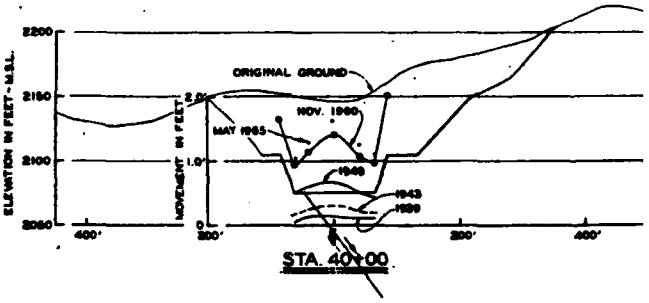


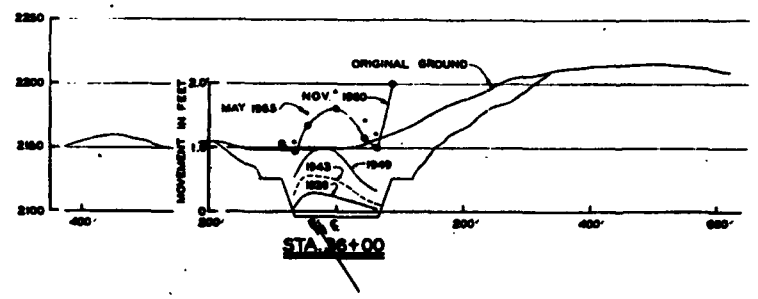


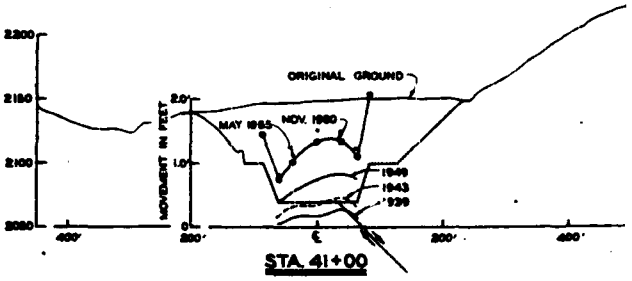


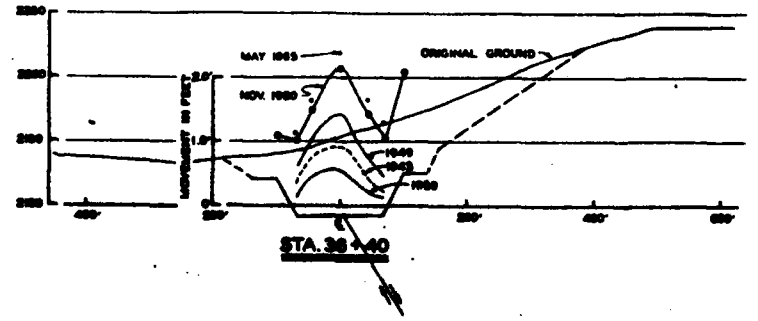


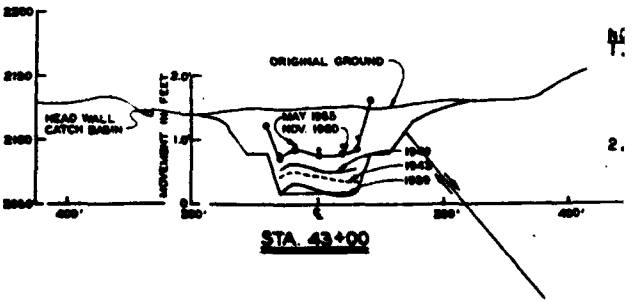




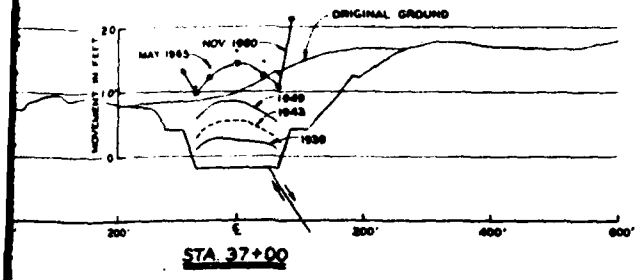




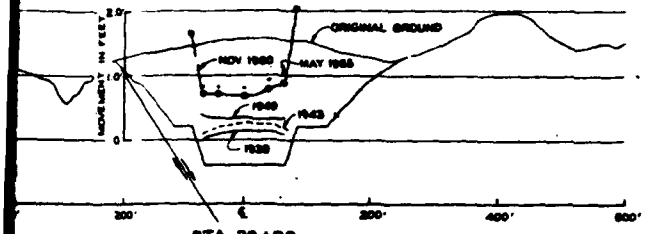




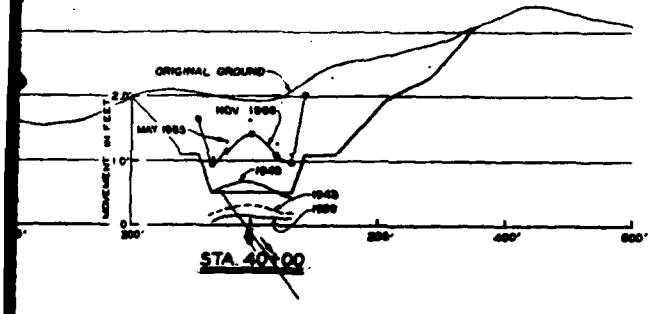
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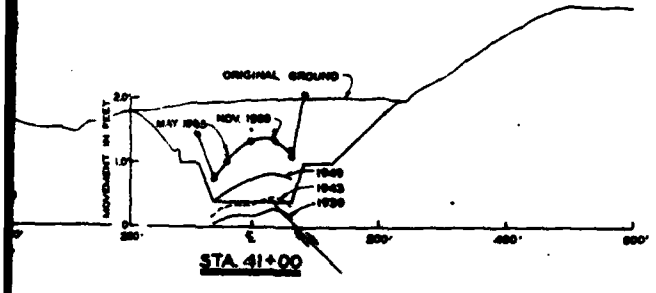
STA. 37+00



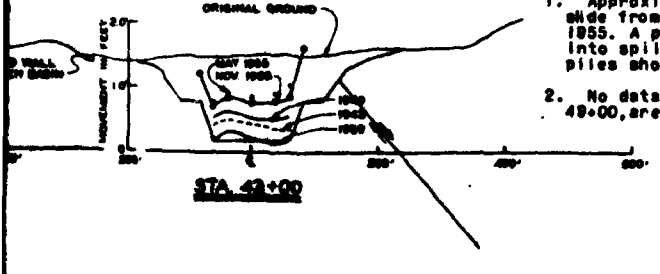
STA. 39+00



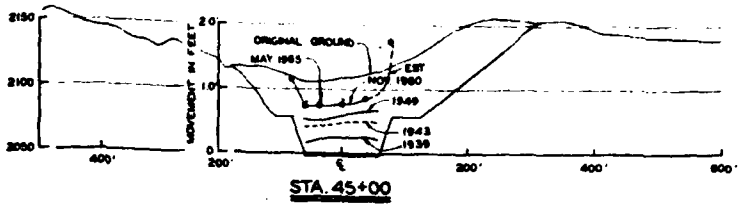
STA. 40+00



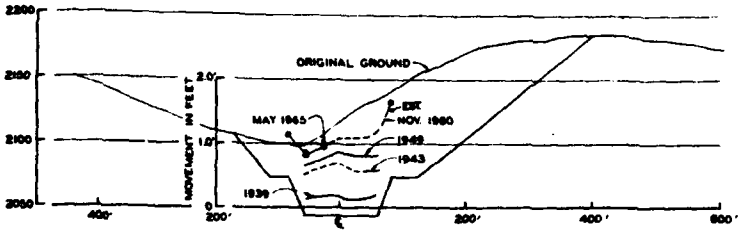
STA. 41+00



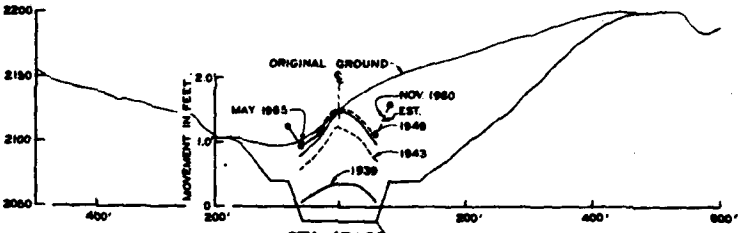
STA. 42+00



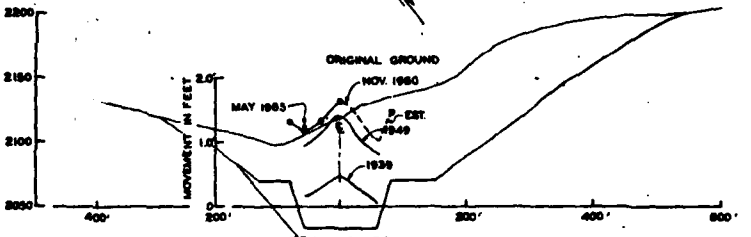
STA. 45+00



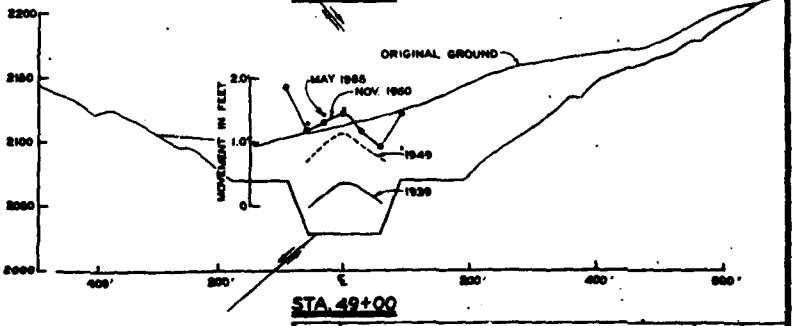
STA. 46+00



STA. 47+00



STA. 48+00



STA. 49+00

NOTES:

1. Approximately 15,000 cu.yds. of material slide from right side slope after rain in 1955. A portion of this material was wasted into spillway channel causing the spoil piles shown on sections 45+00 to 48+00.

2. No data for 1943 at sta. 49+00 and 49+00, area covered by water.

DATE	DESCRIPTION	MADE	APPVD

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

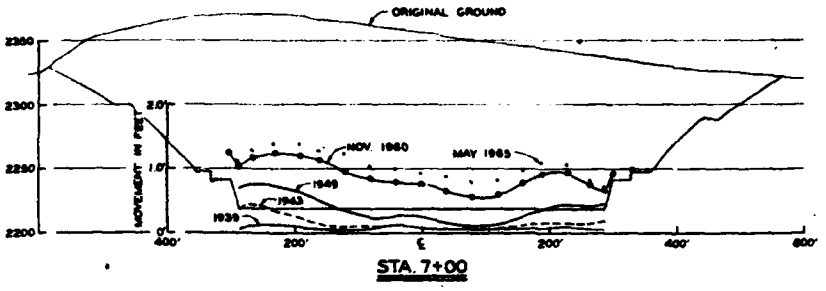
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
STUDY OF CROSS SECT. & VERTICAL MOVEMENT
STATION 31+00 THRU 48+00

DESIGNED BY C.V.J.
DRAWN BY D.E.A.
TRACED BY D.E.A.
QUANTITIES BY D.M.A.
CHECKED
APPROVED
CHIEF, ENGINEERING DIVISION
CHIEF, CONSTRUCTION DIVISION
SUBMITTED
CHIEF, ENGINEERING DIVISION
APPROVED
DATE SEPT. 1966
DIVISION ENGINEER

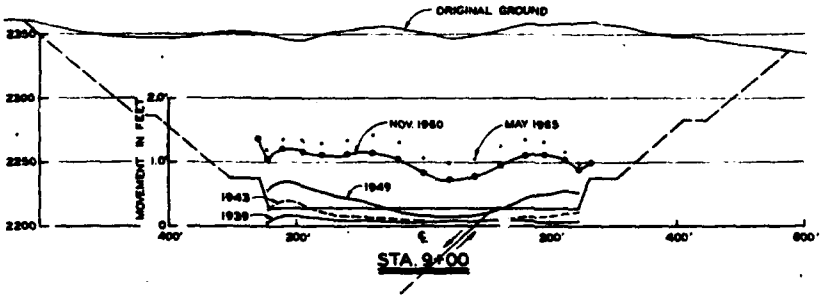
THIS PLAN ACCOMPANIES CONTRACT NO. DA-39-090-CIVENG-[illegible], DESIGNATION NO. [illegible]

CONSTRUCTION FOUNDATION REPORT 2 PLATE 133

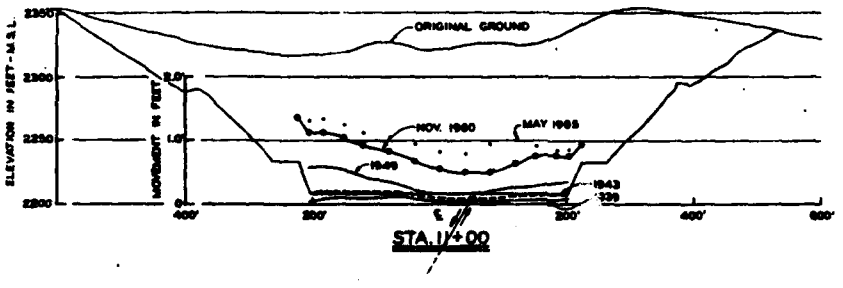
CORPS OF ENGINEERS



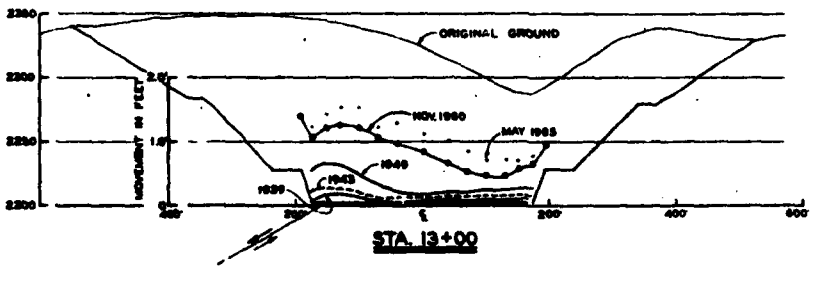
STA. 7+00



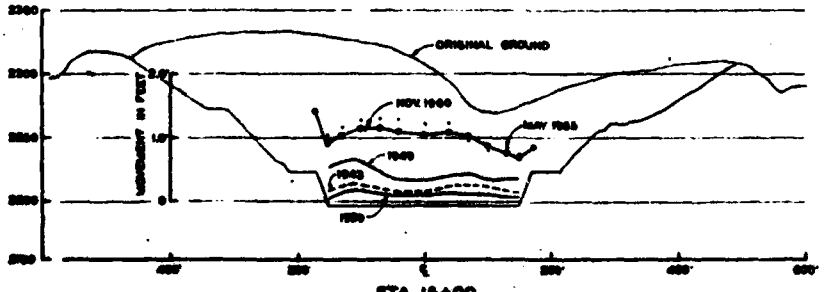
STA. 9+00



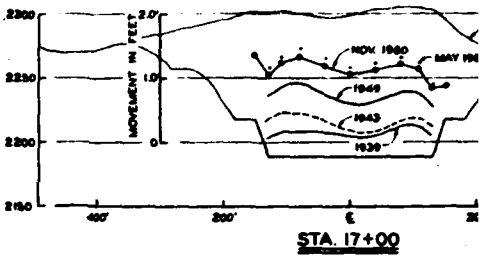
STA. 11+00



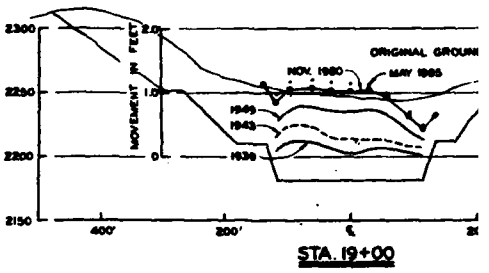
STA. 13+00



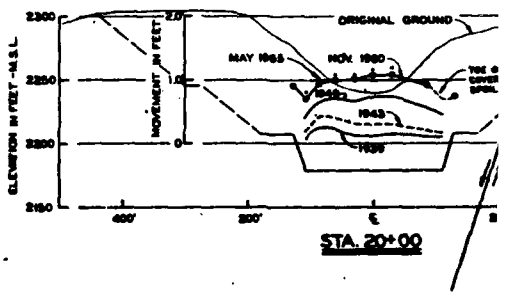
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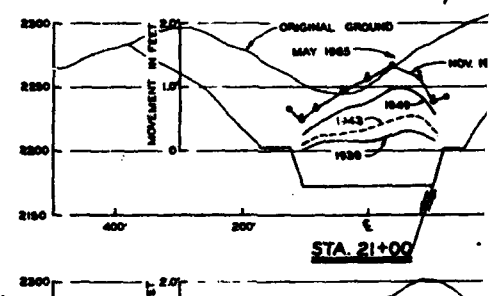
STA. 17+00



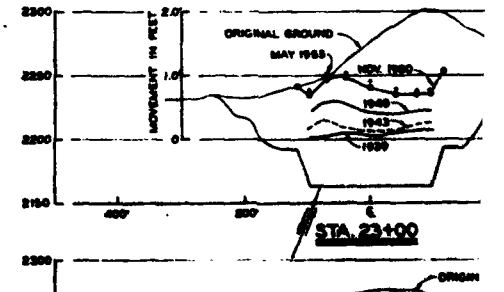
STA. 19+00



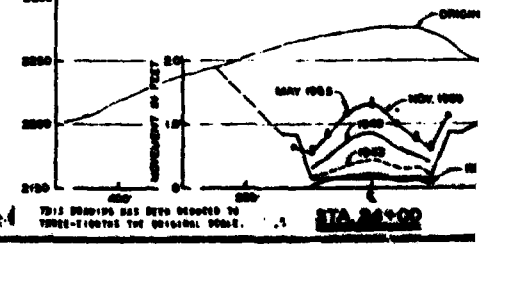
STA. 20+00



STA. 21+00



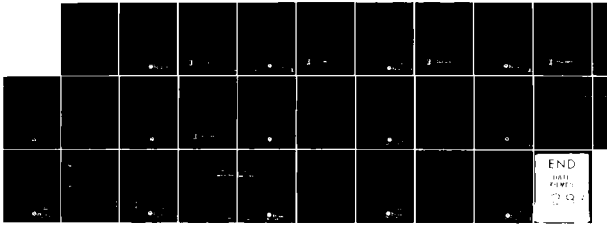
STA. 23+00

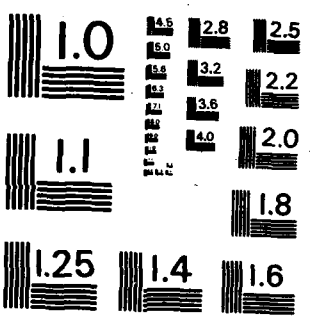


STA. 24+00

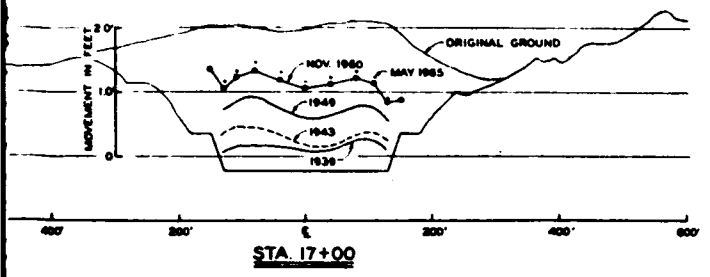
AD-A134 914 CONSTRUCTION FOUNDATION REPORT MISSOURI RIVER FORT PECK MONTANA VOLUME 2 DRAWINGS(U) ARMY ENGINEER DISTRICT OMAHA NE JAN 83 4/4

UNCLASSIFIED F/G 13/13 NL

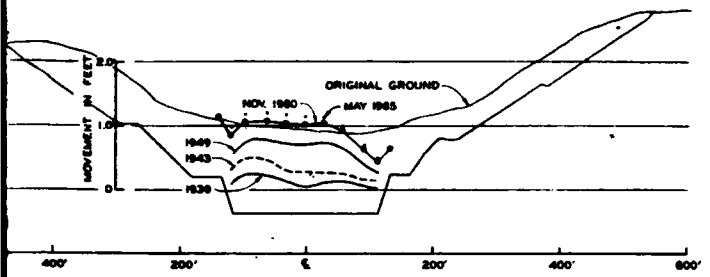




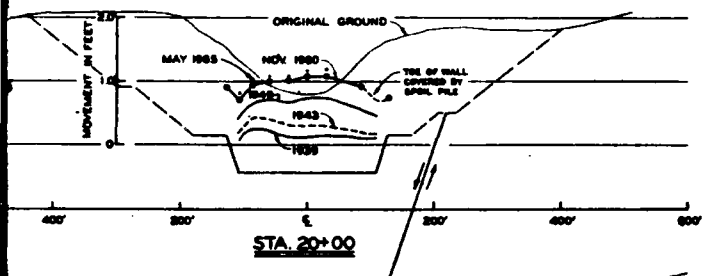
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



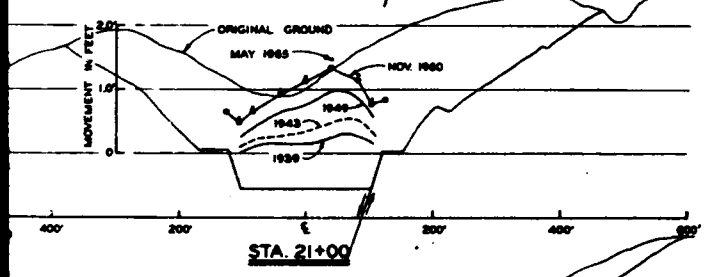
STA. 17+00



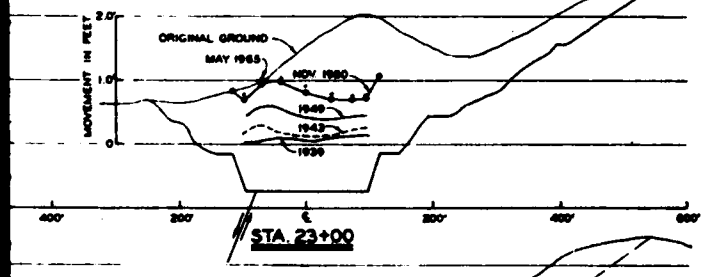
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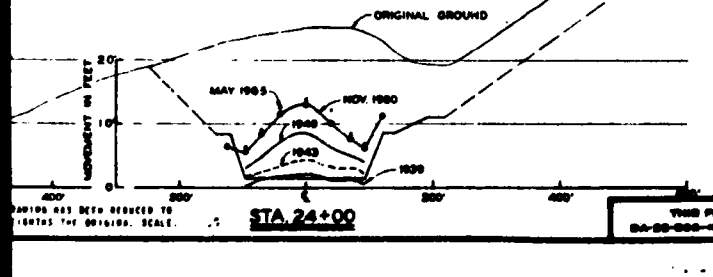
STA. 20+00



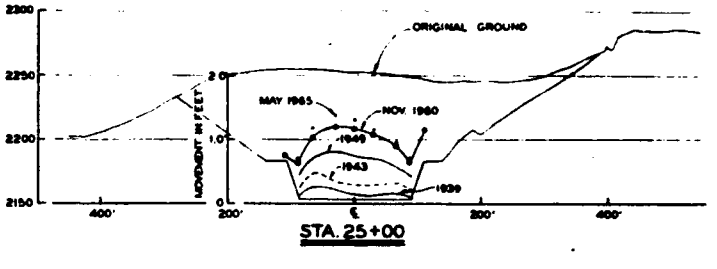
STA. 21+00



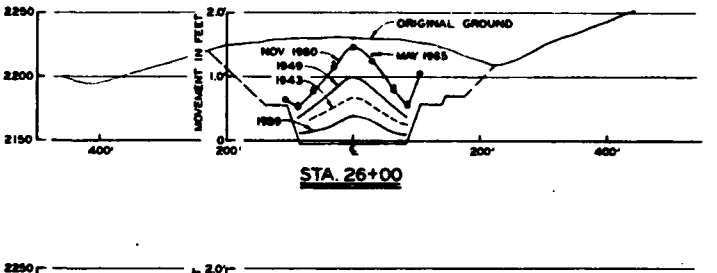
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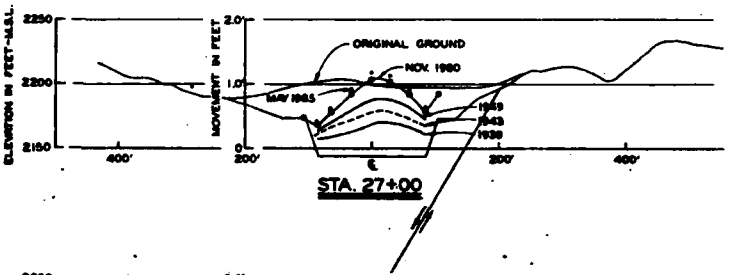
STA. 24+00



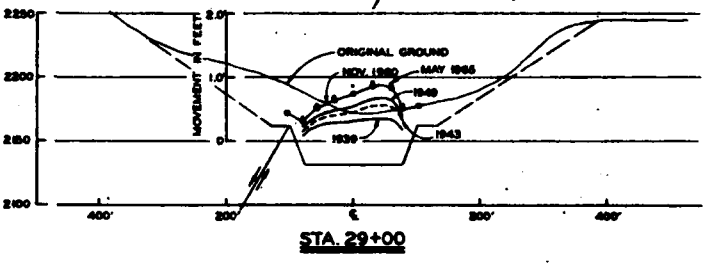
STA. 25+00



STA. 26+00



STA. 27+00



STA. 29+00

SAFETY PAYS

DATE	DESCRIPTION	BY	APPD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

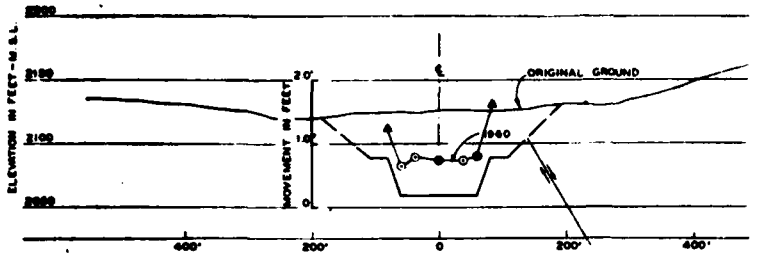
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
STUDY OF CROSS SECTIONS AND VERTICAL MOVEMENT
STATION 7+00 THRU 29+00

DESIGNED BY: E.N.J. / E.M.A.
DRAWN BY: E.E.A.
TRACED BY: E.E.A.
CHECKED BY: E.M.A.
APPROVED: Charles E. Elliott
DATE: SEPT 1980

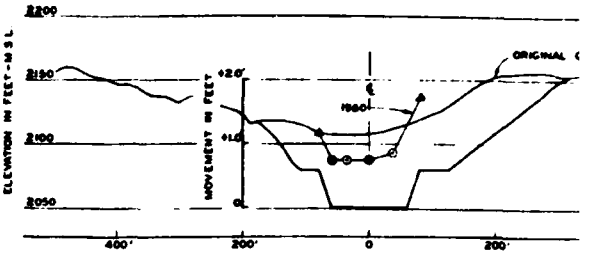
TIME PLAN ASSIGNMENT(S) CONTRACT NO. DA-25-066-CIVENG-
IDENTIFICATION NO.

DRAWING NOT DRAWN TO SCALE. DRAWING TO BE REDUCED TO 1/2 FOR DESIGN. SCALE: .5

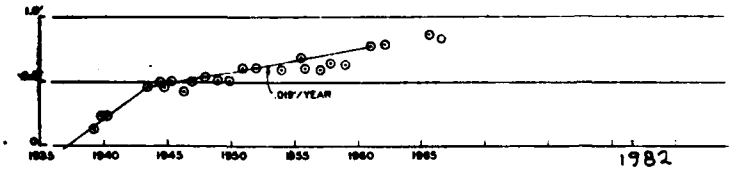
CORPS OF ENGINEERS



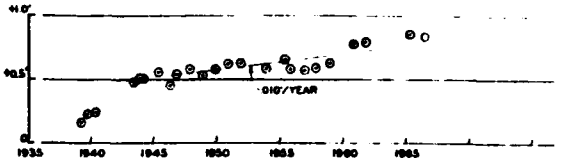
SECTION - STA. 43+00



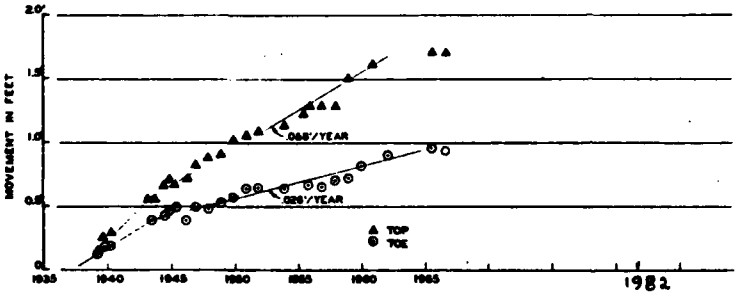
SECTION - STA. 45+00



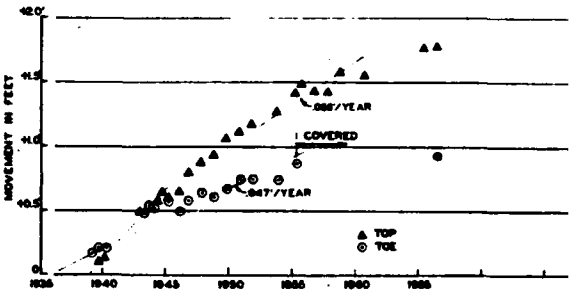
CENTERLINE



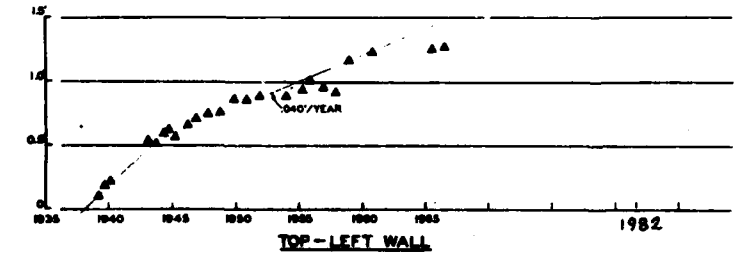
CENTERLINE



RIGHT WALL

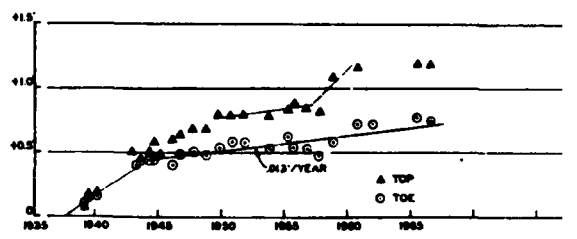


RIGHT WALL



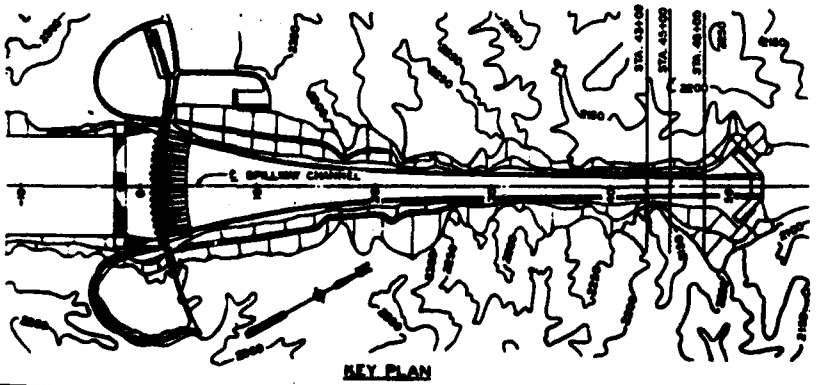
TOP - LEFT WALL

TIME MOVEMENT GRAPHS



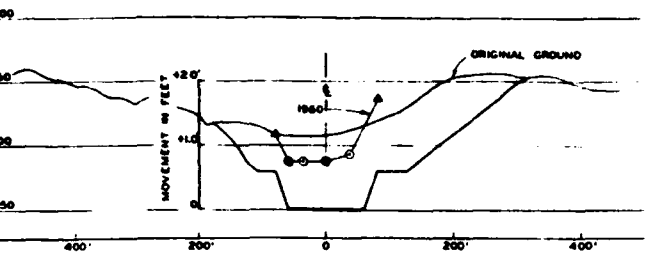
LEFT WALL

TIME MOVEMENT GRAPHS

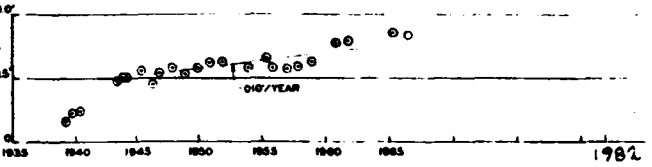


KEY PLAN

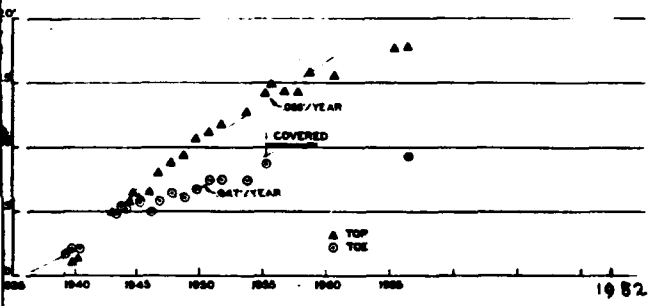
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



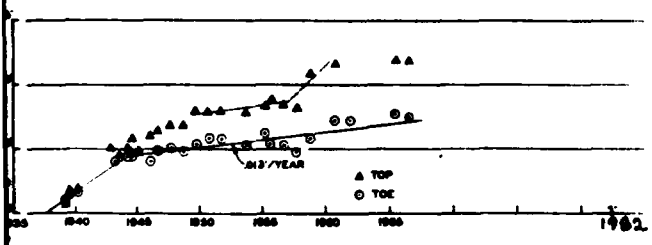
SECTION - STA. 45+00



CENTERLINE

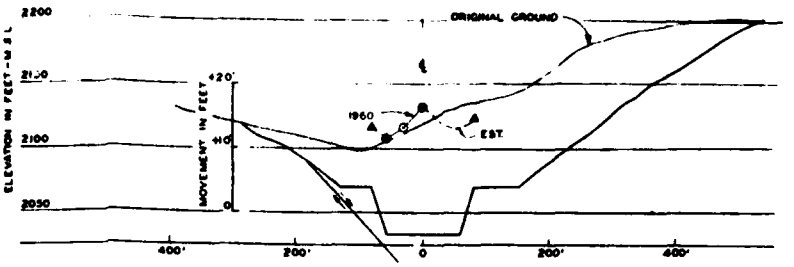


RIGHT WALL

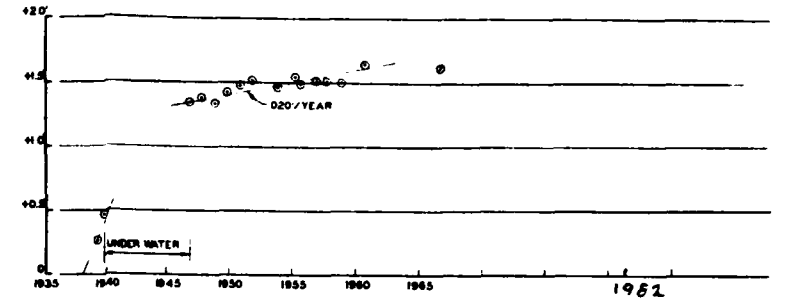


LEFT WALL

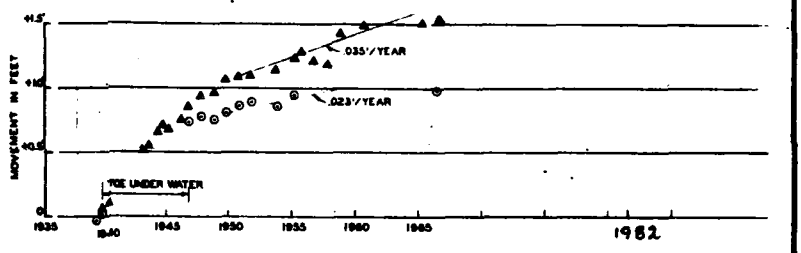
TIME MOVEMENT GRAPHS



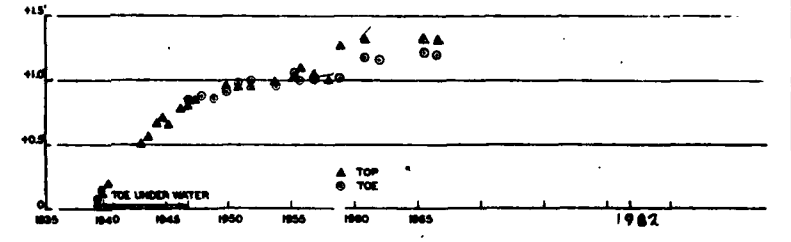
SECTION - STA. 48+00



CENTERLINE



RIGHT WALL



LEFT WALL

TIME MOVEMENT GRAPHS

DATE	DESCRIPTION	MADE	APPVD

DESIGNED

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY: C.V.J. / O.M.A.
DRAWN BY: S.P.S.
TRACED BY: S.P.S.
CHECKED BY: O.M.A.

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
CHANNEL SECTIONS-STA.43+00,45+00&48+00
VERTICAL-TIME MOVEMENT RECORDS

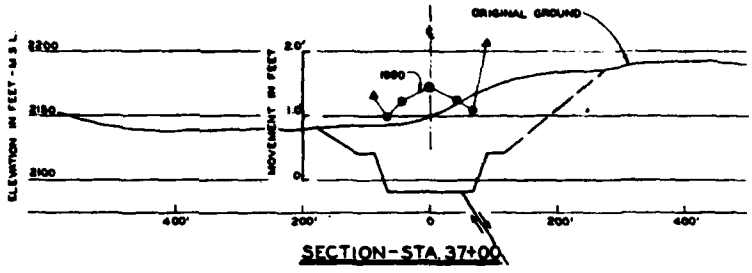
APPROVED: Charles E. Hoff — DATE: SEPT. 1966
APPROVED: Harold J. St. Clair — SCALE AS SHOWN — SHEET

THIRD PLAN ASSIGNMENTS CONTRACT NO. DA-25-066-
MODIFICATION NO.

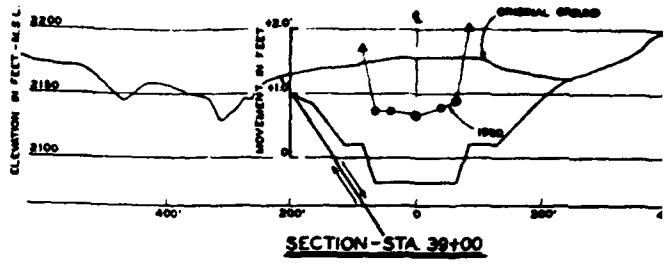
SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT 2 PLATE 135

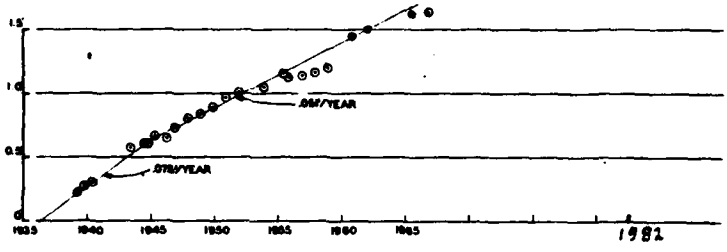
CORPS OF ENGINEERS



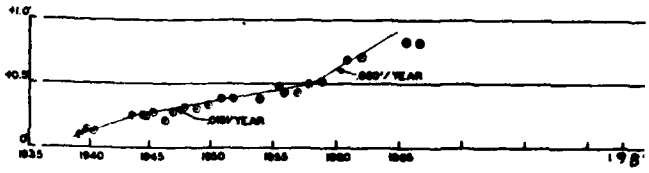
SECTION - STA. 37+00



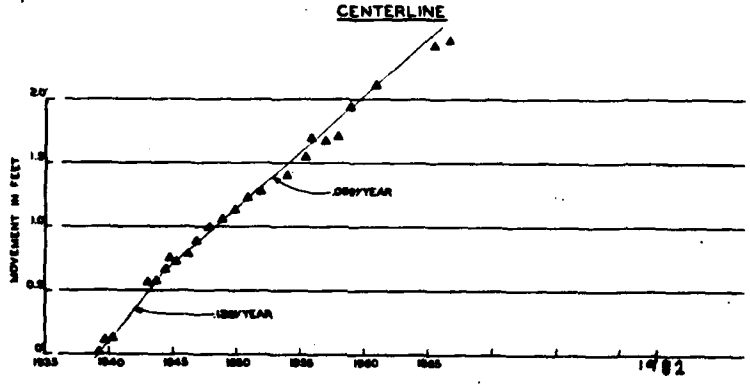
SECTION - STA. 39+00



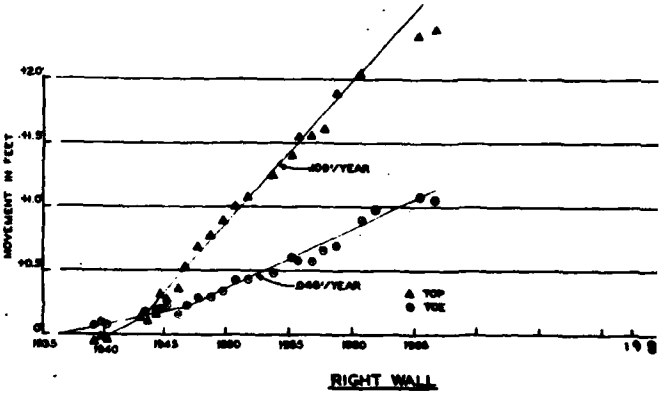
CENTERLINE



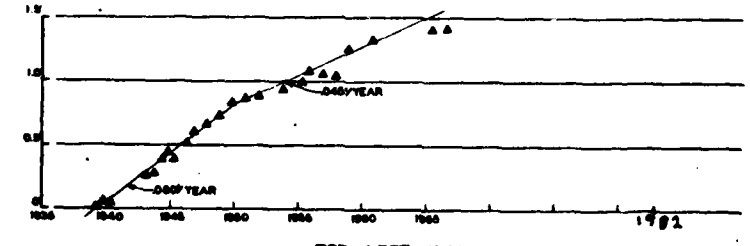
CENTERLINE



TOP - RIGHT WALL

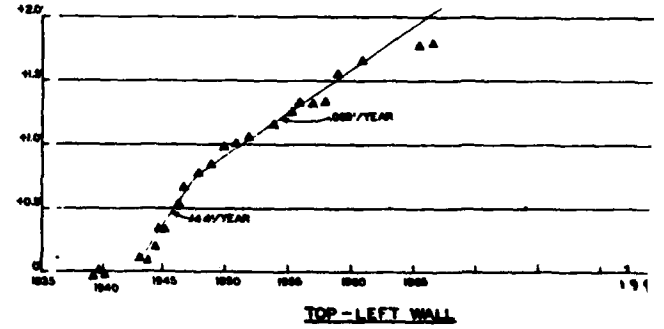


RIGHT WALL



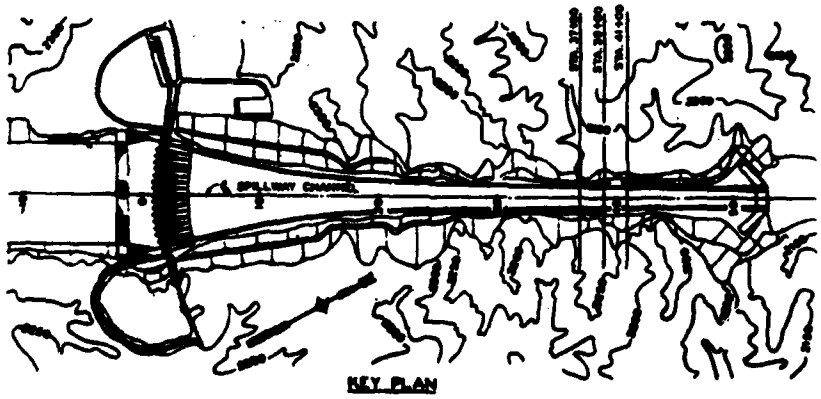
TOP - LEFT WALL

TIME MOVEMENT GRAPHS



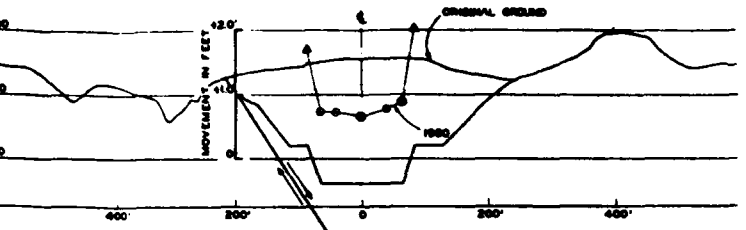
TOP - LEFT WALL

TIME MOVEMENT GRAPHS

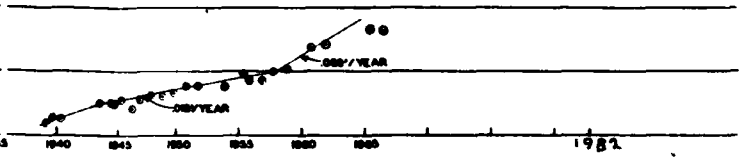


KEY PLAN

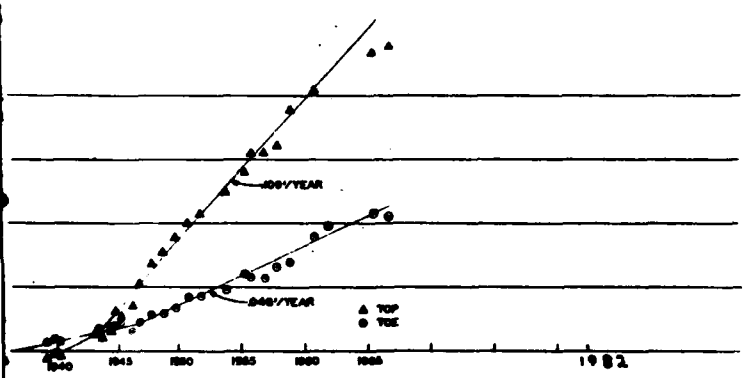
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



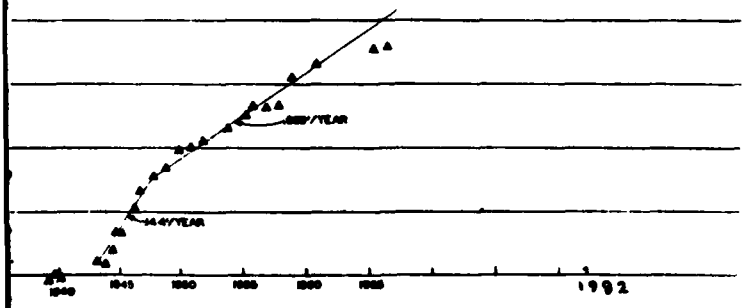
SECTION - STA. 39+00



CENTERLINE

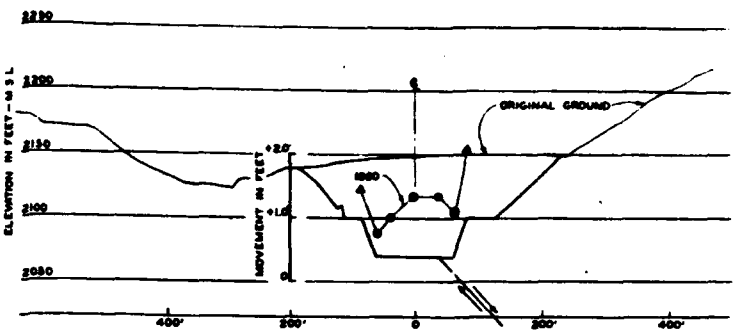


RIGHT WALL

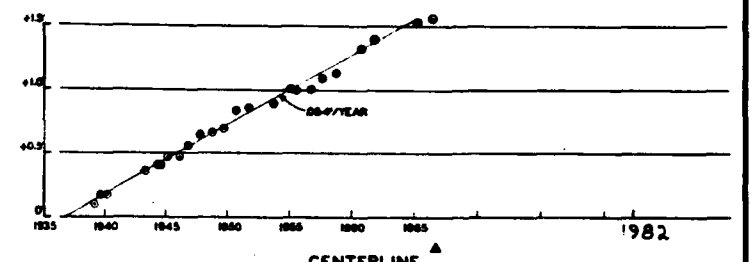


TOP - LEFT WALL

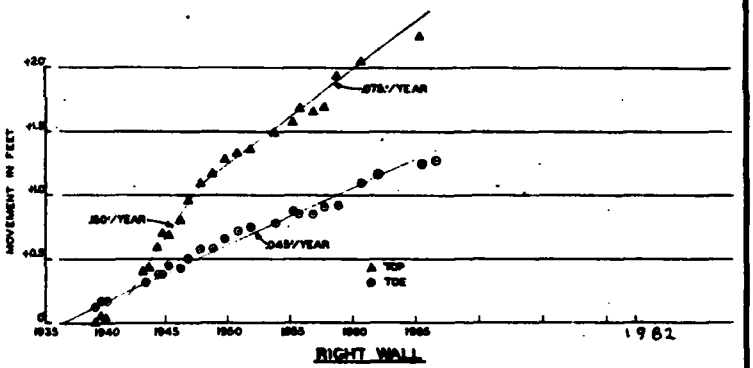
TIME MOVEMENT GRAPHS



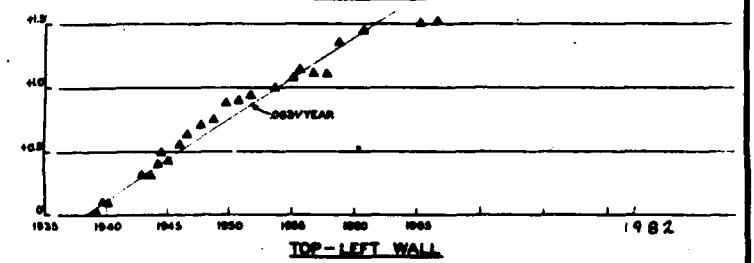
SECTION - STA. 41+00



CENTERLINE



RIGHT WALL



TOP - LEFT WALL

TIME MOVEMENT GRAPHS

DATE	DESCRIPTION	ISSUED	APPROVED

REVISIONS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
QUANTITIES BY
APPROVED

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION

CHANNEL SECTIONS - STA. 37+00, 39+00 & 41+00
VERTICAL - TIME MOVEMENT RECORDS

APPROVED Charles E. Hoff
DATE SEPT. 1984

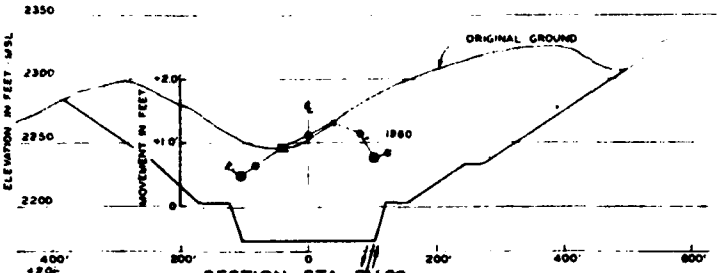
APPROVED
COMPLETION DATE

SAFETY PAYS

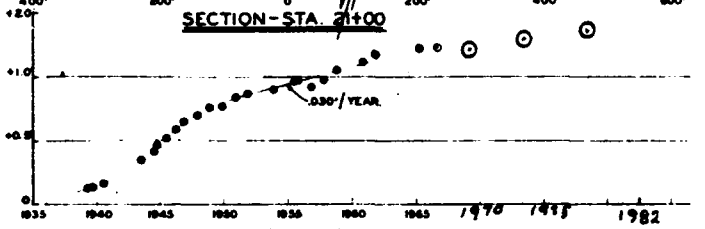
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-066-eng
MODIFICATION NO.

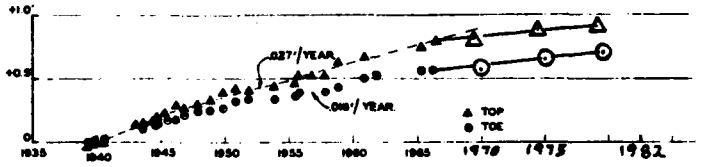
CORPS OF ENGINEERS



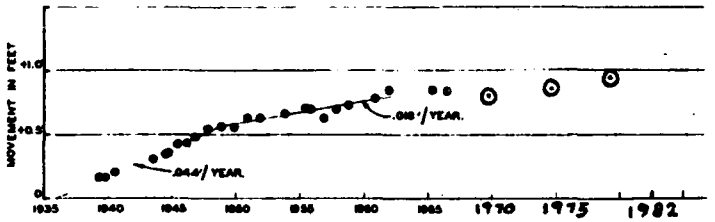
SECTION - STA. 21+00



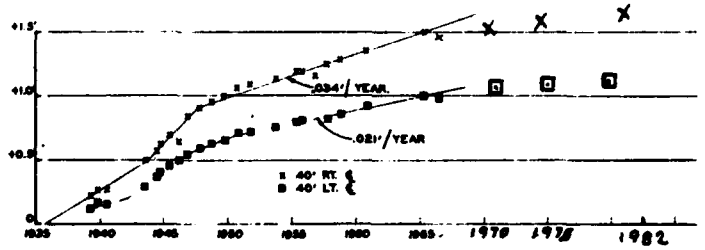
CENTERLINE



LEFT WALL

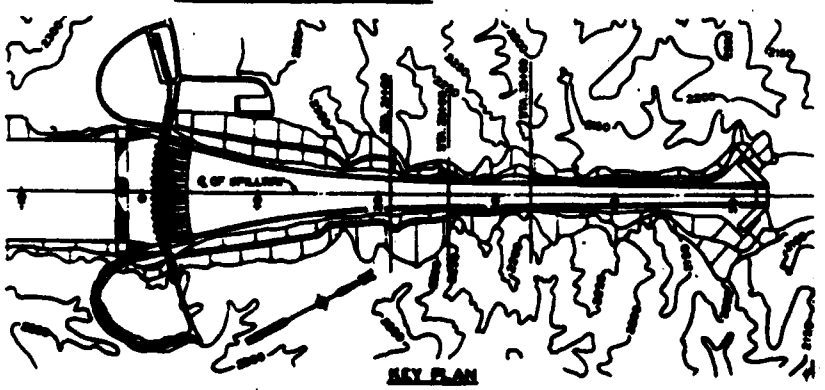


TOE - RIGHT WALL

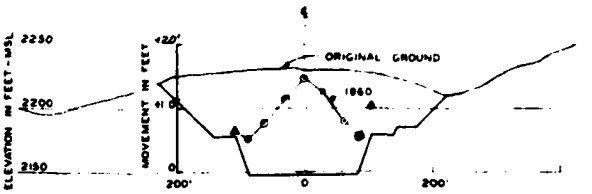


40' RIGHT & LEFT ℄

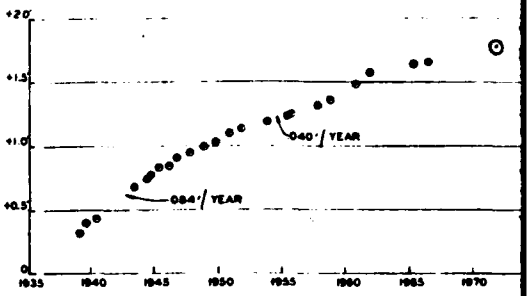
TIME MOVEMENT GRAPHS



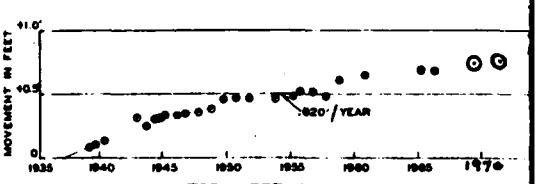
KEY PLAN



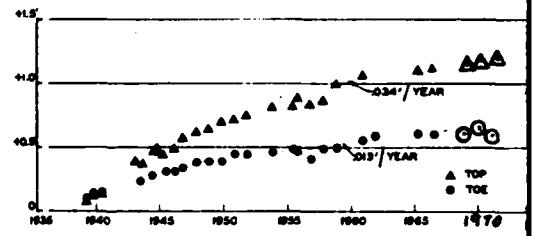
SECTION - STA. 26+00



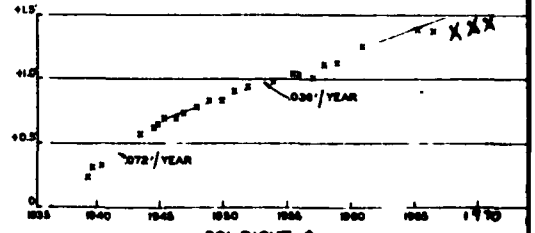
CENTERLINE



TOP - LEFT WALL



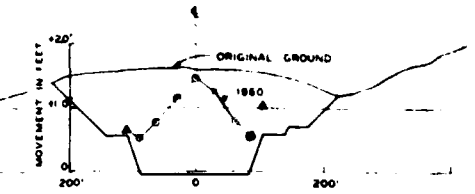
RIGHT WALL



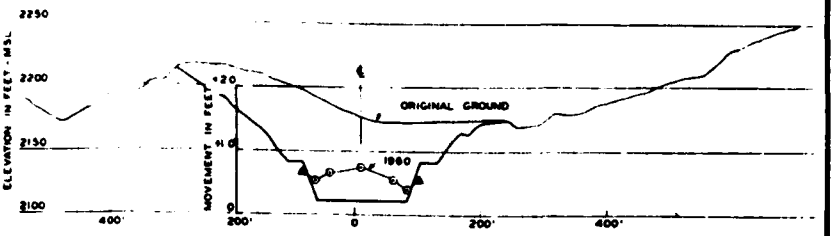
30' RIGHT ℄

TIME MOVEMENT GRAPHS

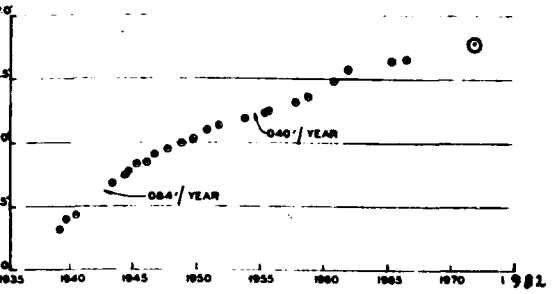
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



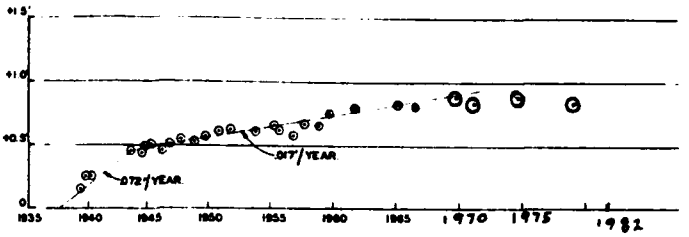
SECTION - STA. 26+00



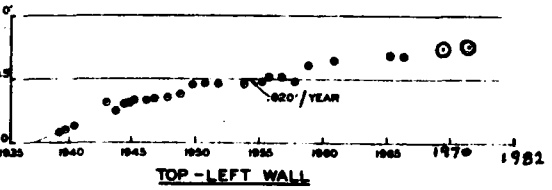
SECTION - STA. 33+00



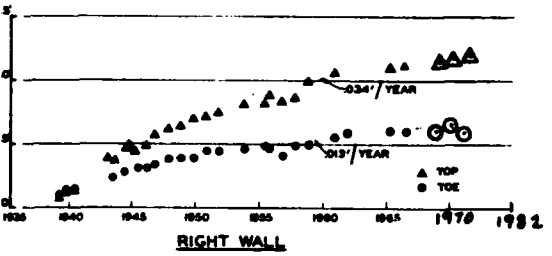
CENTERLINE



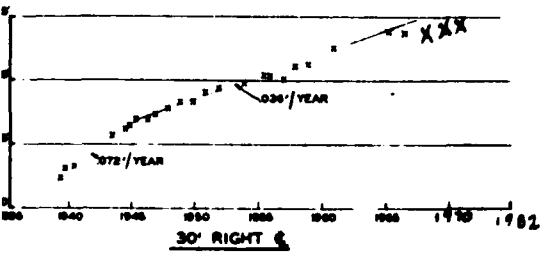
CENTERLINE



TOP - LEFT WALL

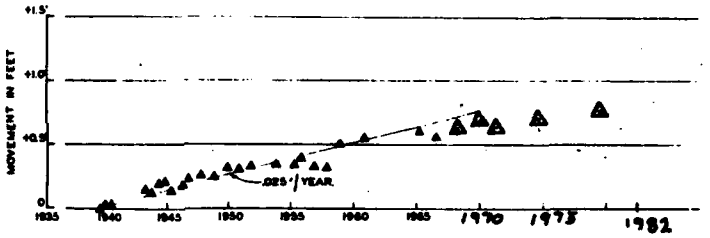


RIGHT WALL

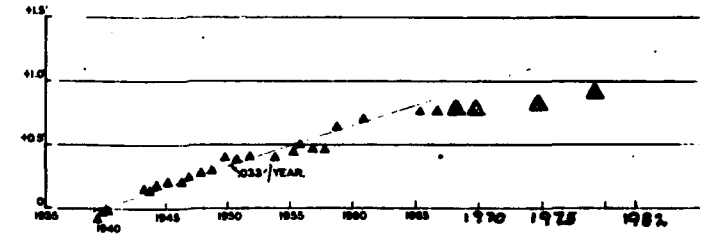


30' RIGHT ℄

TIME MOVEMENT GRAPHS



TOP - RIGHT WALL



TOP - LEFT WALL

TIME MOVEMENT GRAPHS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER

FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION

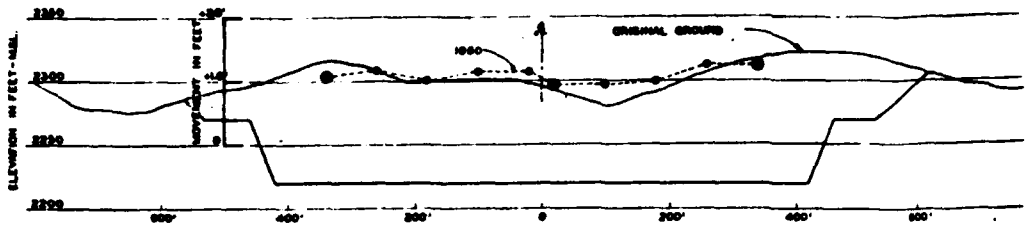
CHANNEL SECTIONS-STA. 21+00, 26+00 & 33+00
VERTICAL - TIME MOVEMENT RECORDS

SAFETY PAYS

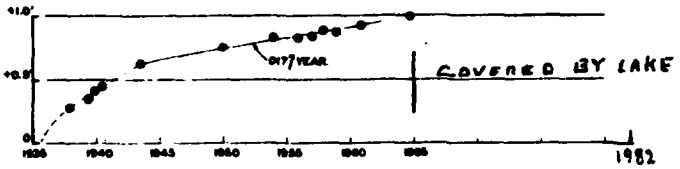
THIS PLAN ASSEMBLED UNDER CONTRACT NO. DA-25-066-eng-

SEPT. 1980

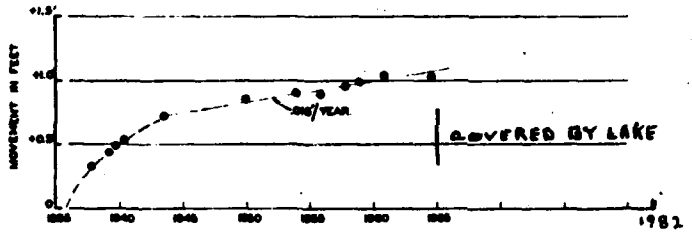
CONSTRUCTION FOUNDATION REPORT 2 PLATE 137



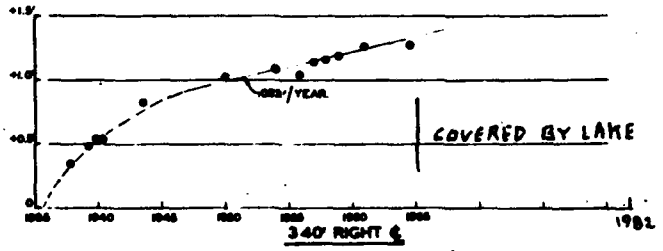
SECTION - STA. 0+40
APPROACH CHANNEL



20' RIGHT ℄

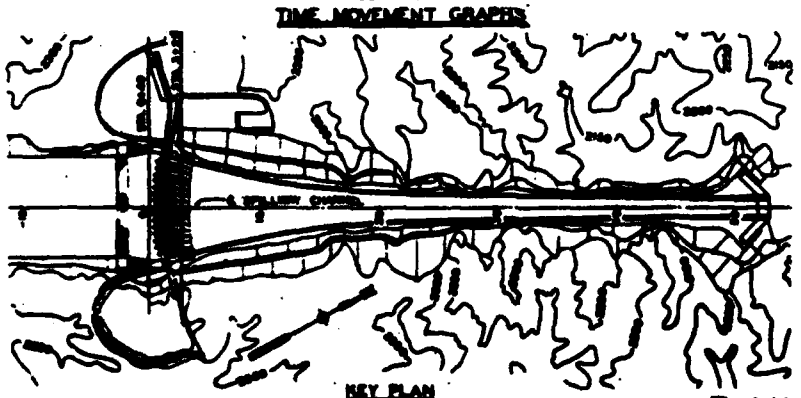


340' LEFT ℄



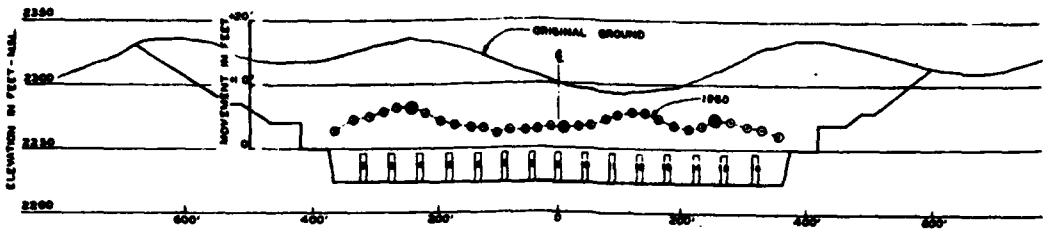
340' RIGHT ℄

TIME MOVEMENT GRAPHS

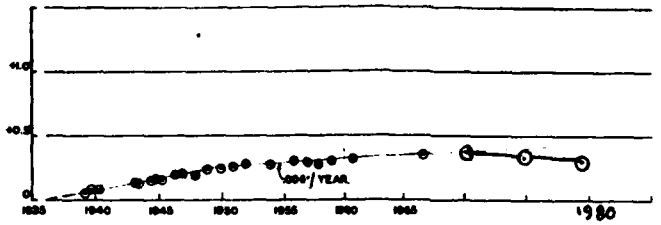


KEY PLAN

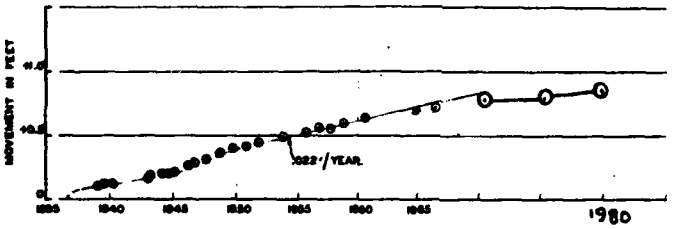
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



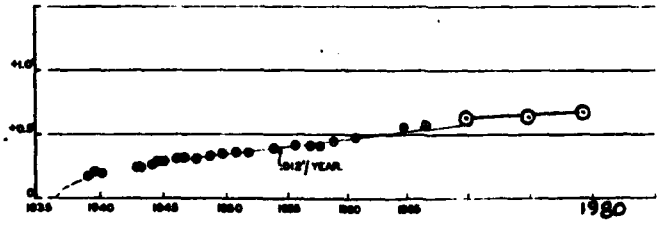
SECTION - STA. 3+25
TRAINING WALL AREA
J - LINE



PIER 9



BAY 3-4



BAY 14-15

TIME MOVEMENT GRAPHS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

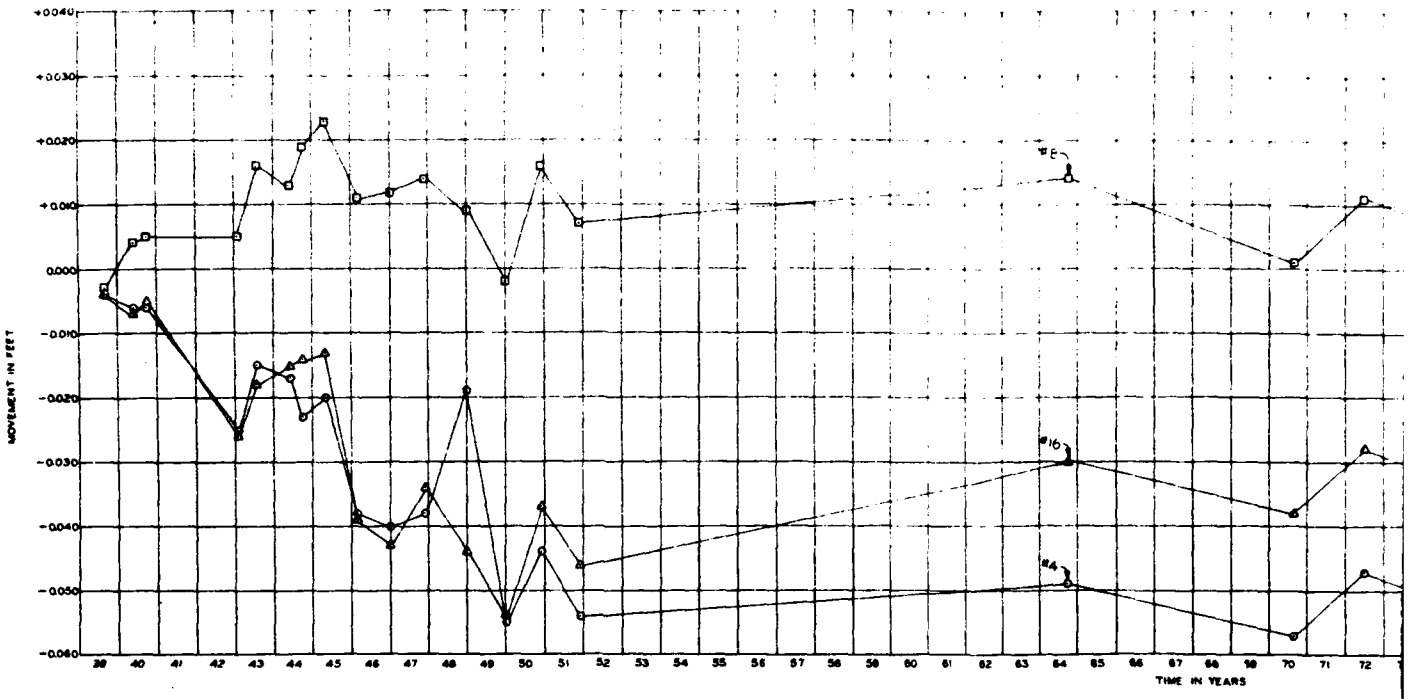
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
APPROACH CHANNEL & TRAINING WALL AREA
VERTICAL - TIME MOVEMENT RECORDS

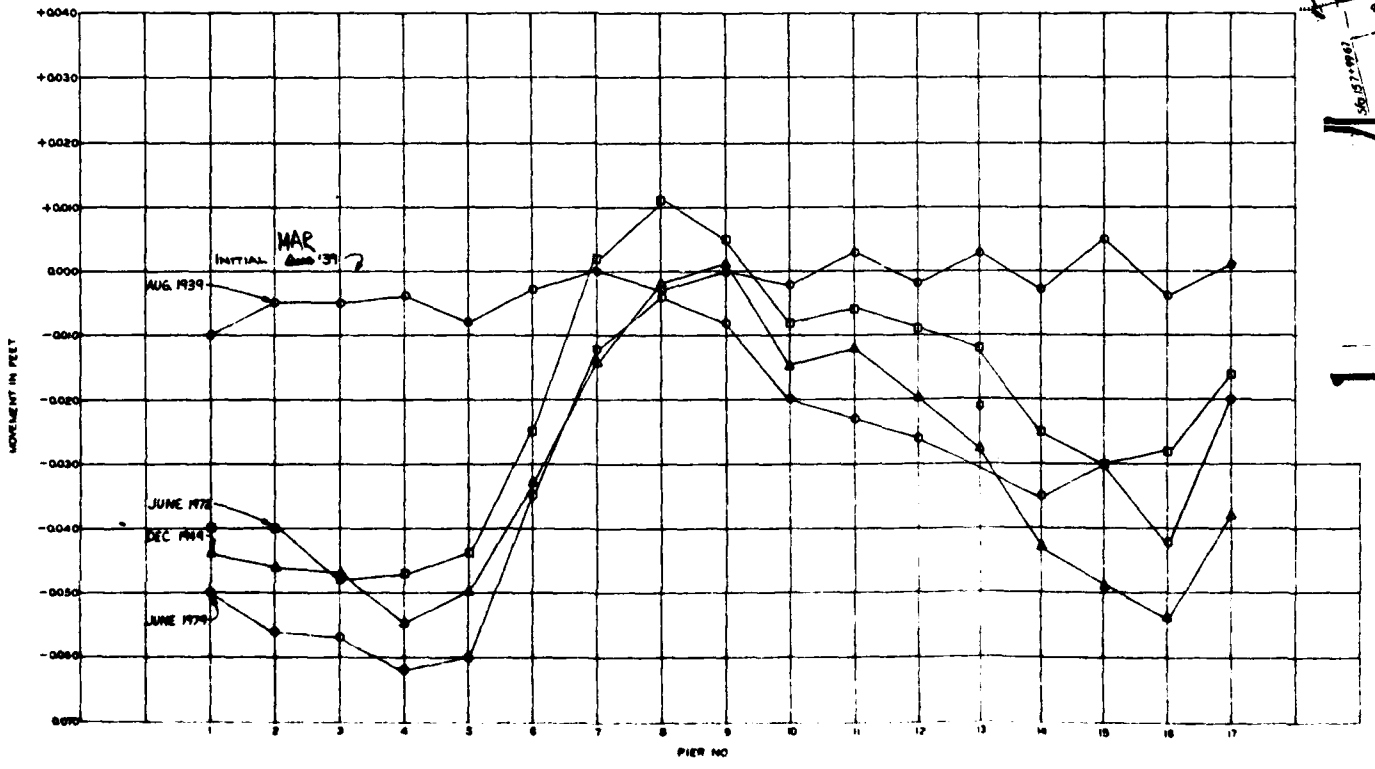
SEPT. 1980

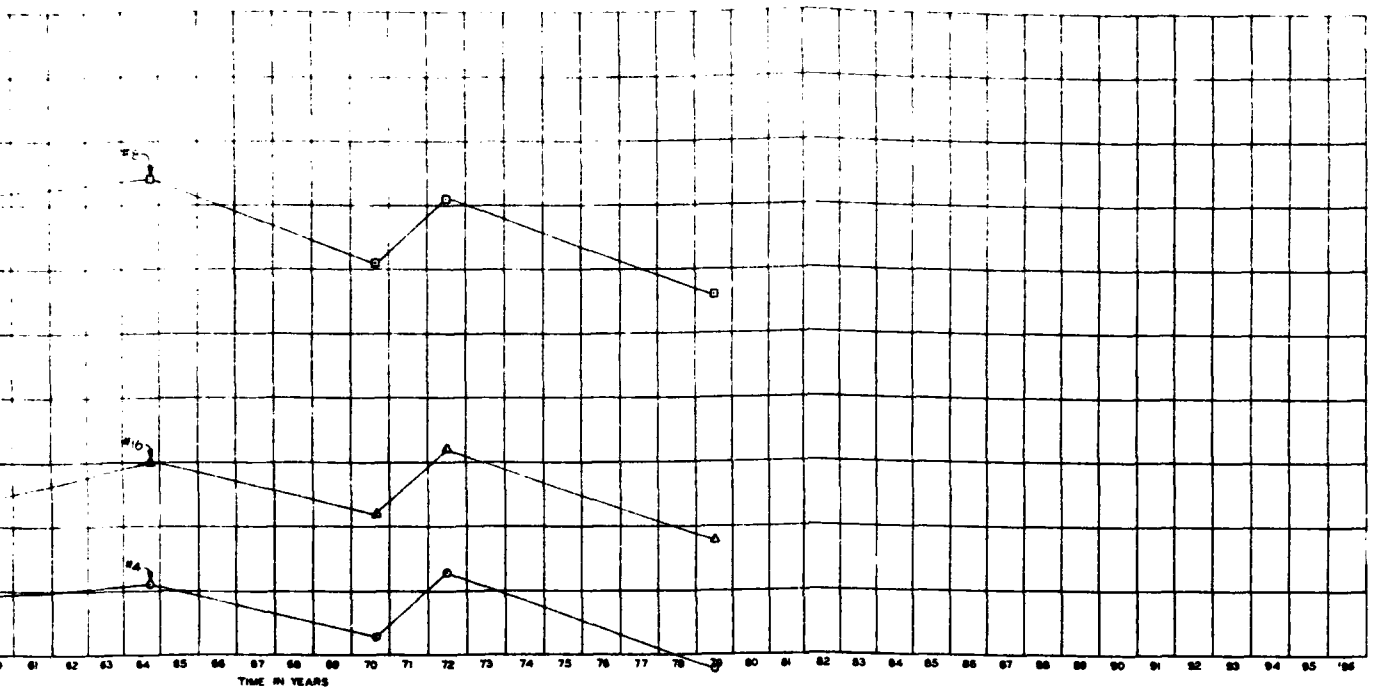
SAFETY PAYS

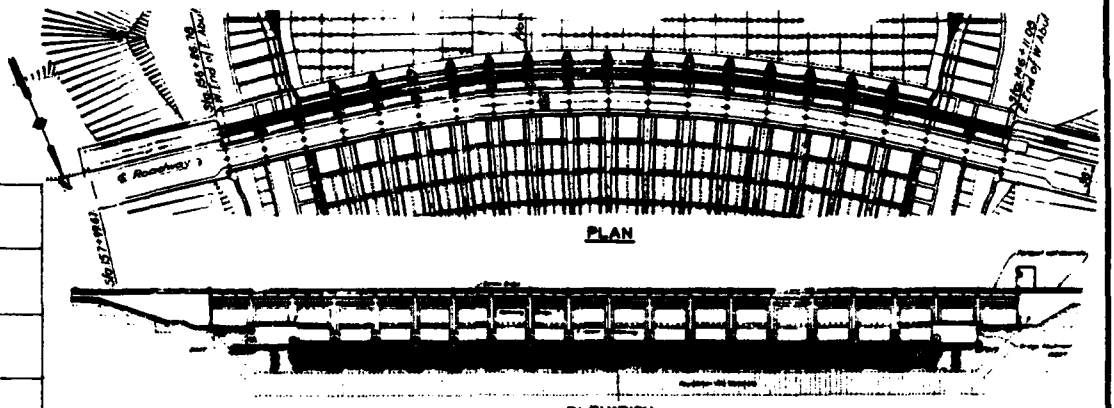
THIS PLAN ACCOMPANIES CONTRACT NO. DA-30-065-[illegible]

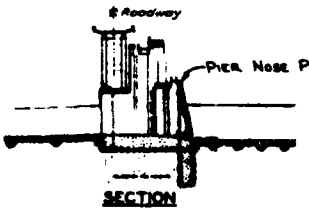
CONSTRUCTION FOUNDATION REPORT 2 PLATE 138

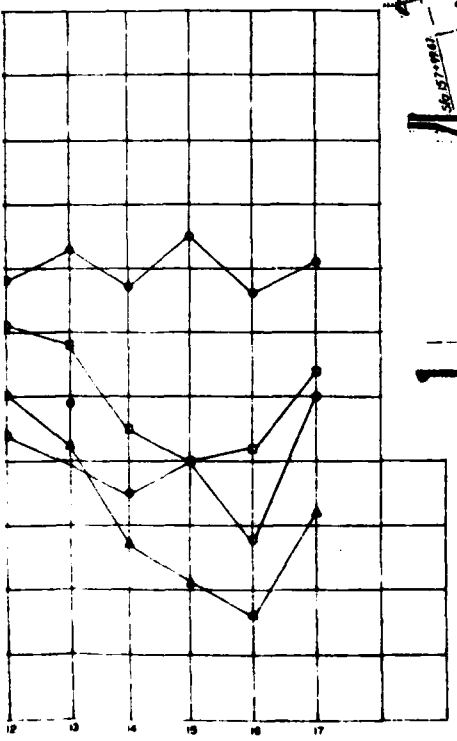

MOVEMENT IN FEET
TIME IN YEARS
#8
#16
#4


MOVEMENT IN FEET
PIER NO
INITIAL MAR 1939?
AUG. 1939
JUNE 1972
DEC 1969
JUNE 1979









THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

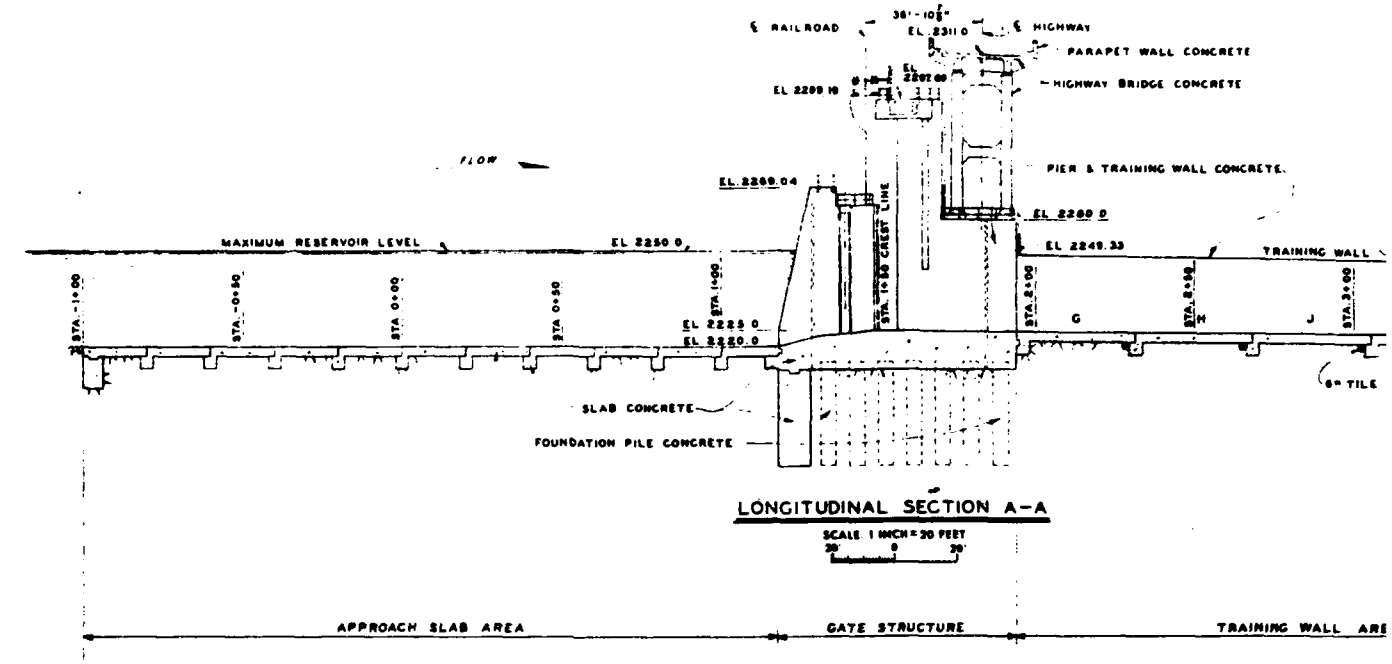
DATE	DESCRIPTION	CHKD	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK LAKE, MONTANA
SPILLWAY-GATE STRUCTURE
VERTICAL MOVEMENT

SAFETY PAYS

THIS PLAN ACCOMPANIES CONTRACT NO. _____
IDENTIFICATION NO. _____

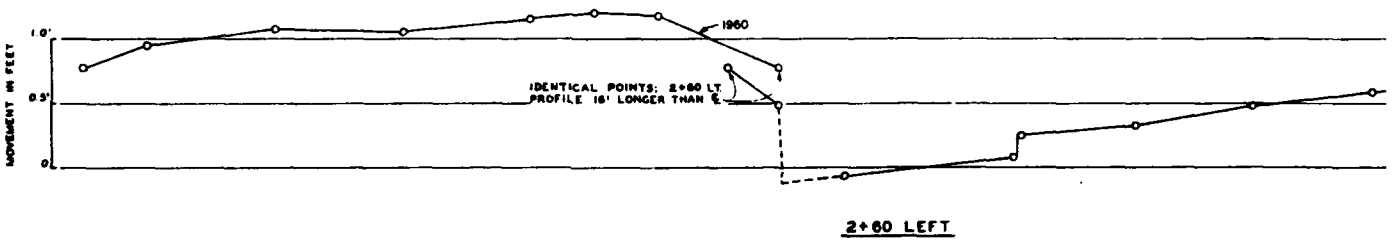


LONGITUDINAL SECTION A-A

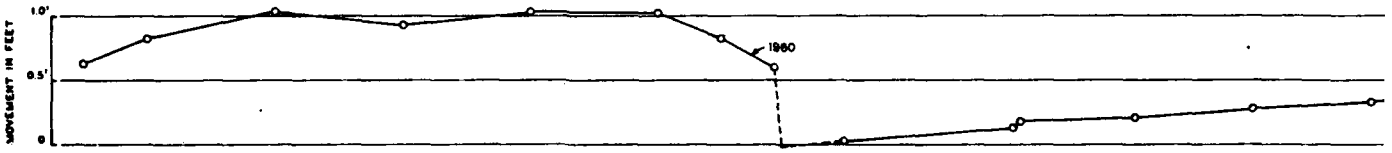
SCALE 1 INCH = 20 FEET

20' 0 20'

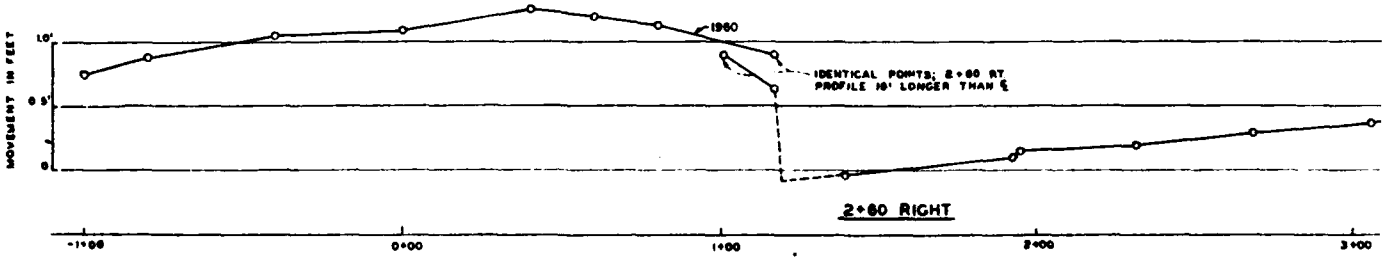
APPROACH SLAB AREA | GATE STRUCTURE | TRAINING WALL ARE



2+60 LEFT

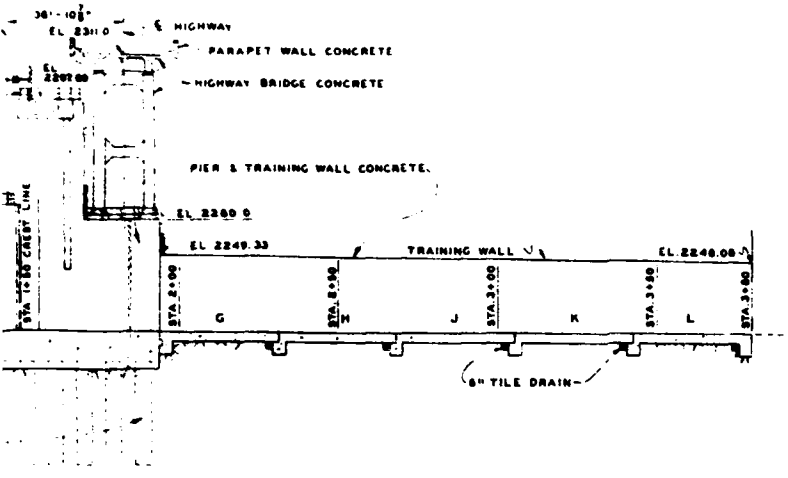


CENTERLINE



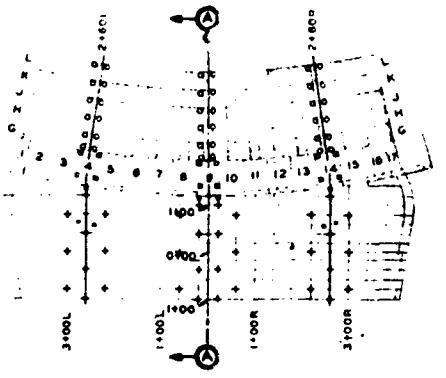
2+60 RIGHT

MOVEMENT PROFILES

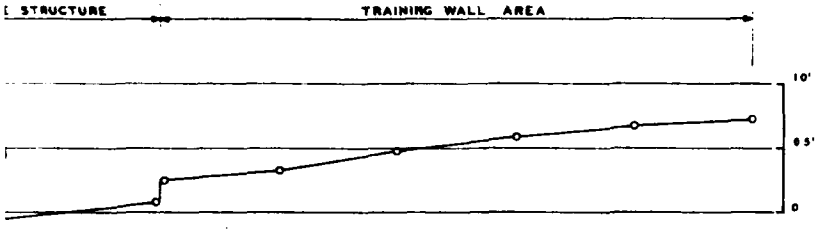


AL SECTION A-A

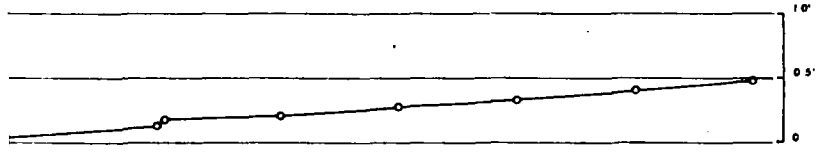
1 INCH = 20 FEET
0 20



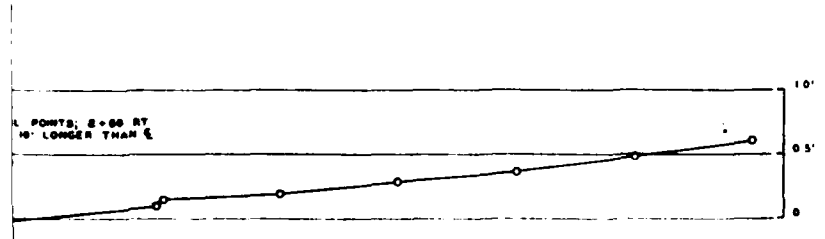
KEY PLAN



60 LEFT



NTERLINE



0 RIGHT

T PROFILES

SAFETY PAYS

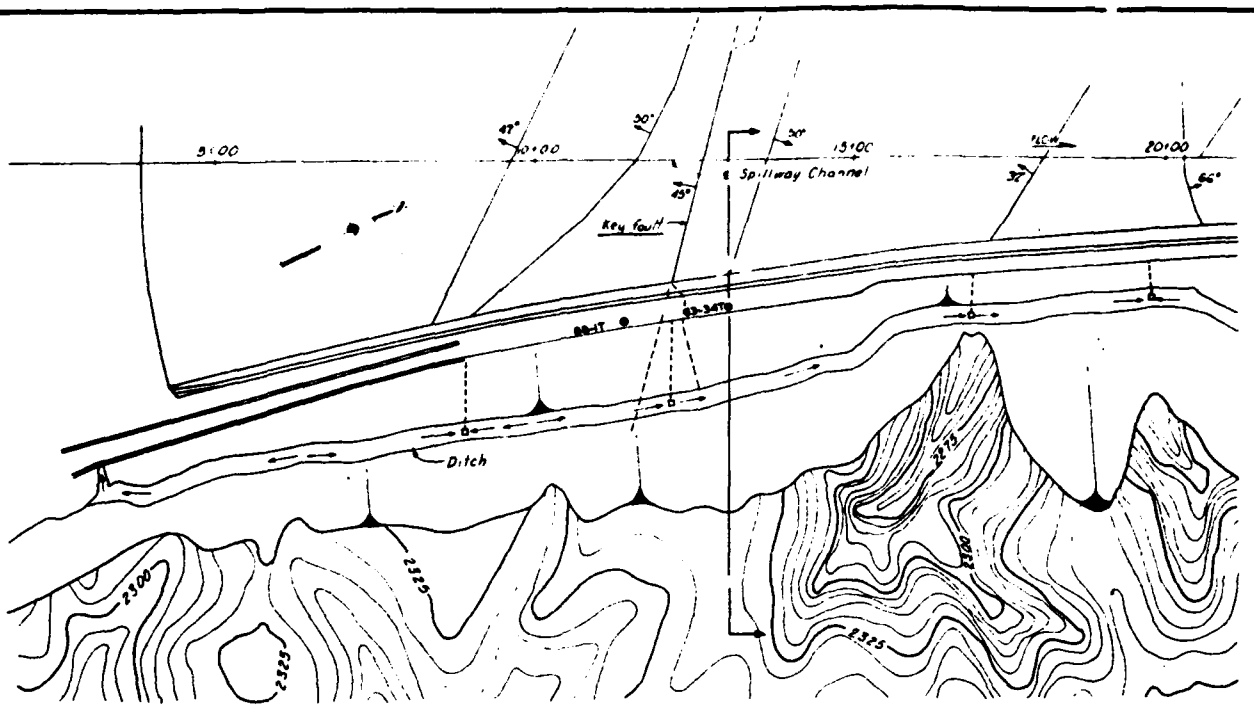
THIS PLAN ACCOMPANIES CONTRACT No. DA-25-066-
MODIFICATION No.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY MOVEMENT
MOVEMENT PROFILES
THROUGH TRAINING WALL AREA,
GATE STRUCTURE & APPROACH SLAB AREA

SEPT 1952

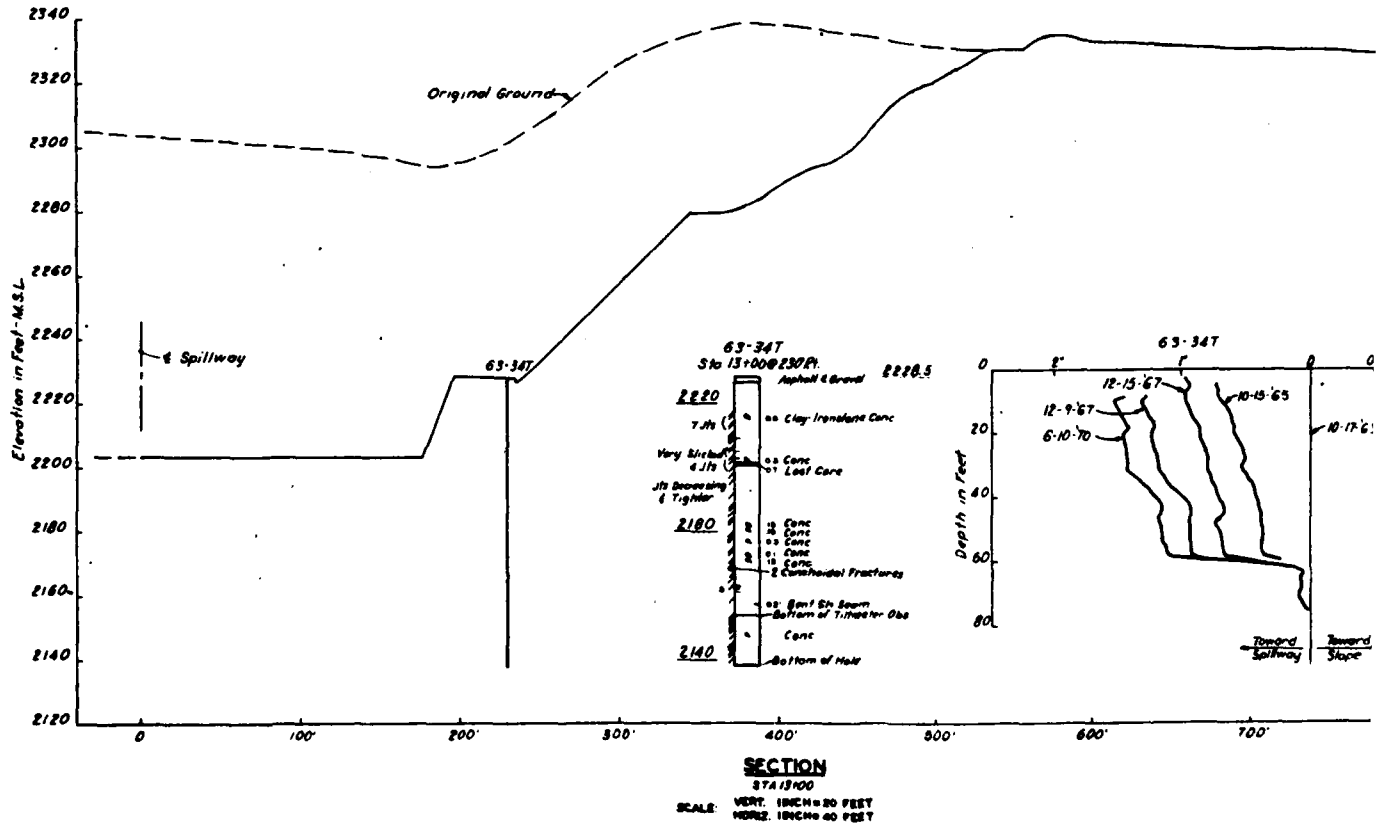
CONSTRUCTION FOUNDATION REPORT 2 PLATE 140



PLAN

SCALE: 1 INCH = 100 FEET

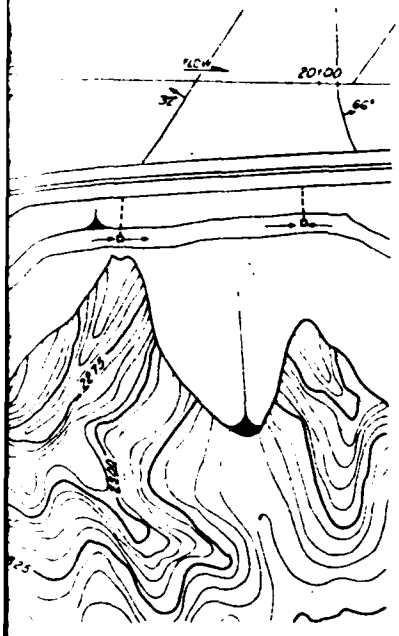
100' 0 100'

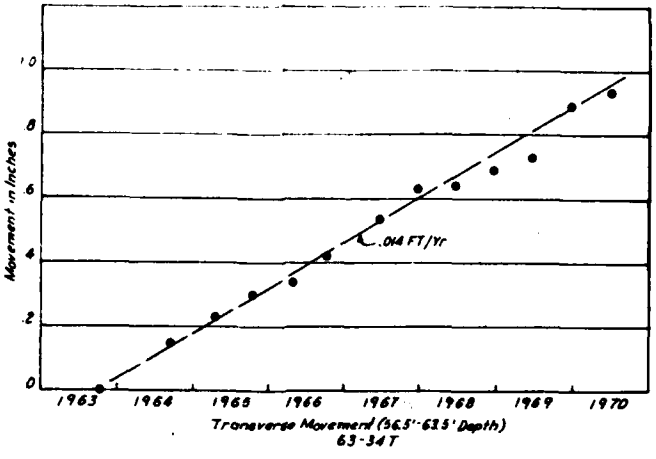


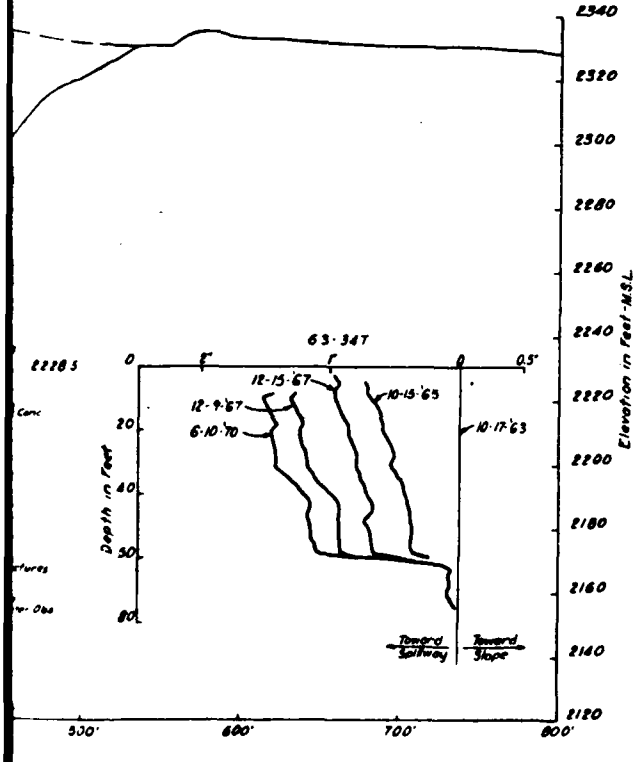
SECTION

STA 13+00

SCALE: VERT. 1 INCH = 20 FEET
HORIZ. 1 INCH = 40 FEET







LEGEND:

65-1 HOLE NUMBER

Asphalt & Gravel or Weathered Shale

*Bentonite Slickensides

Joint Lost Core

Concretions

*No. indicates thickness in feet.

SAFETY PAYS

DATE	DESCRIPTION	MADE	APPROD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
TILTMETER OBSERVATIONS
STATION 13+00

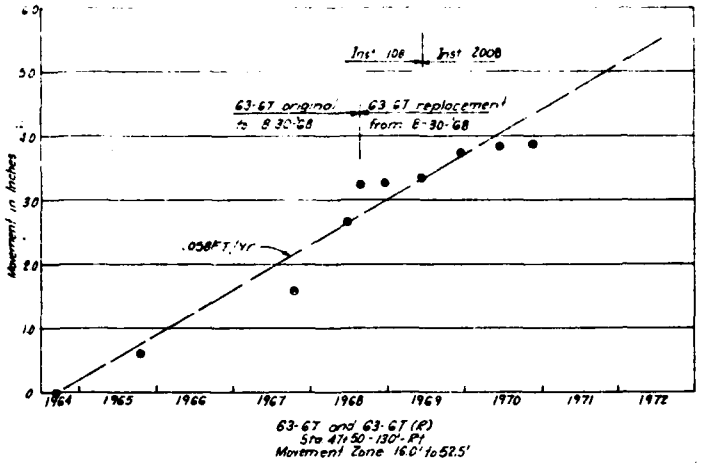
DESIGNED BY: C.V.J.
DRAWN BY: L.J.L.
TRACED BY:
CHECKED BY: G.G.A.
QUAN. & ESTIMATES BY:
APPROVED: [signature] CHIEF, ENGINEERING DIVISION
APPROVED: [signature] CHIEF, ENGINEERING DIVISION
DATE: SEPT 1980
APPROVED: [signature] COL. C.E. DISTRICT ENGINEER
DRAWING NO. 65-34-3

THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-065-eng-[illegible], MODIFICATION NO. [illegible]

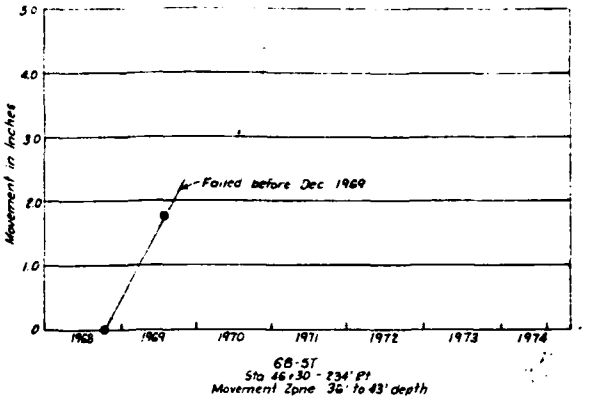
CONSTRUCTION FOUNDATION REPORT

2

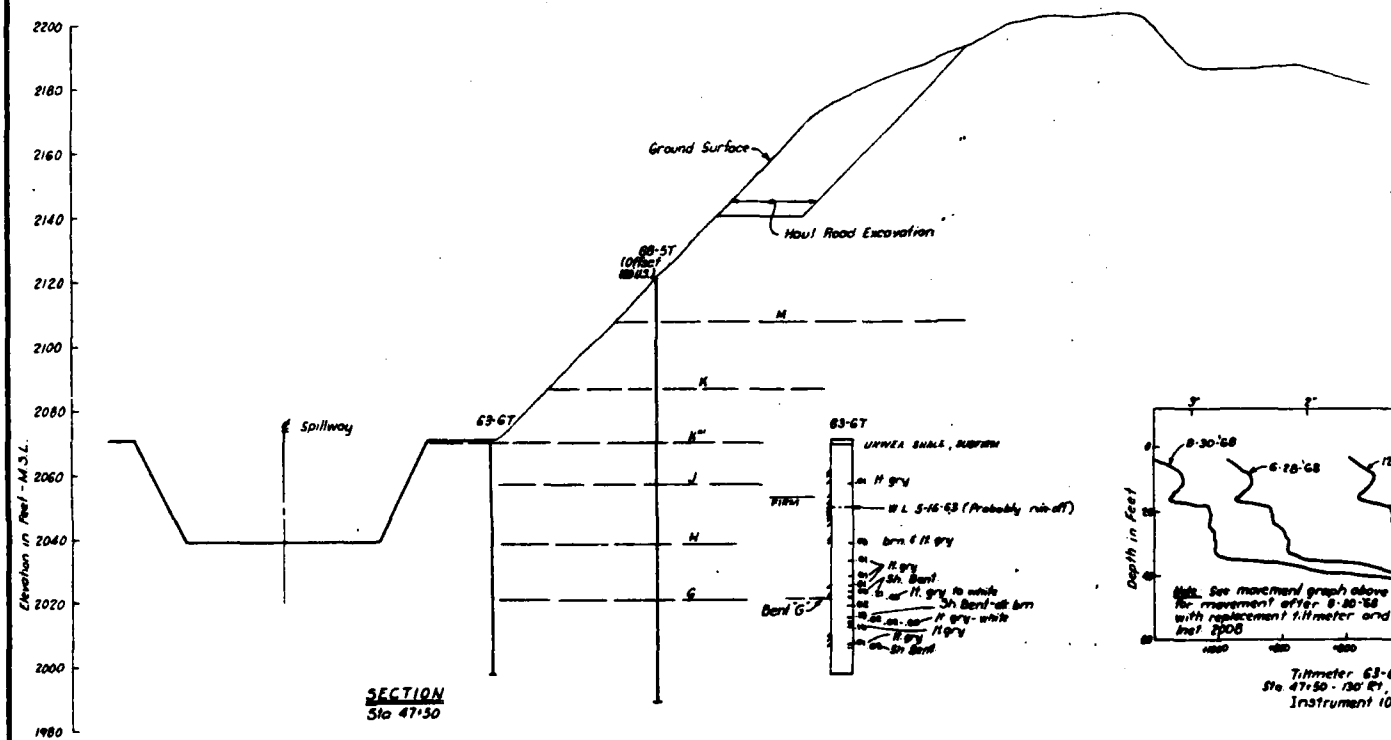
PLATE 140A



63-6T and 63-6T (R)
Sta 47+50 - 130' Rt
Movement Zone 16.0' to 52.5'

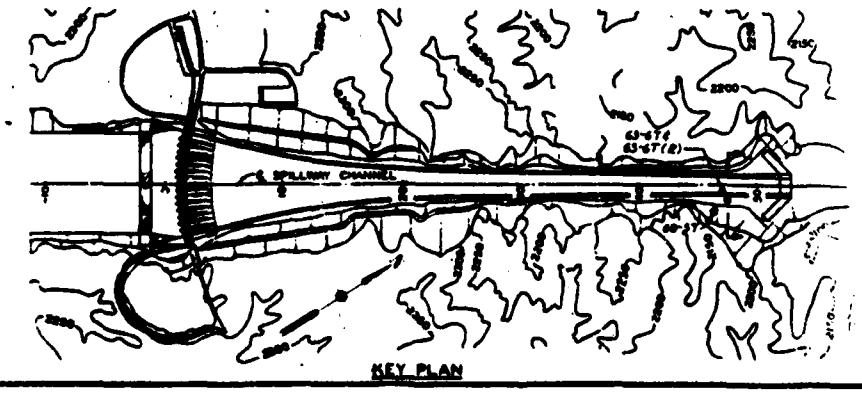


68-5T
Sta 46+30 - 234' Rt
Movement Zone 36' to 43' depth

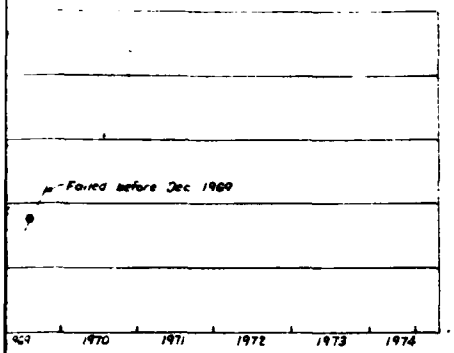


SECTION
Sta 47+50

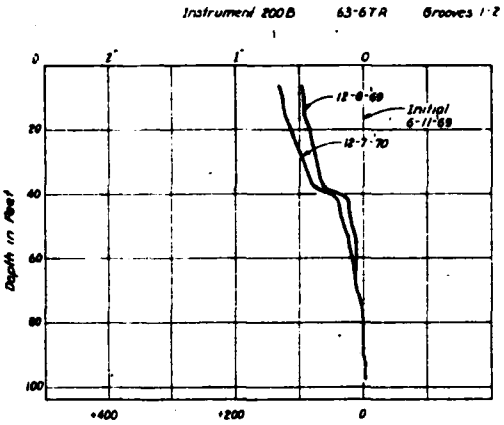
Tiltmeter 63-6T
Sta 47+50 - 130' Rt, Groove 1-2
Instrument 108



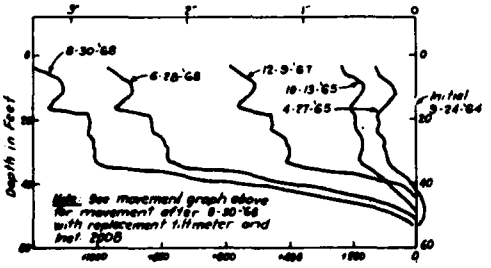
KEY PLAN



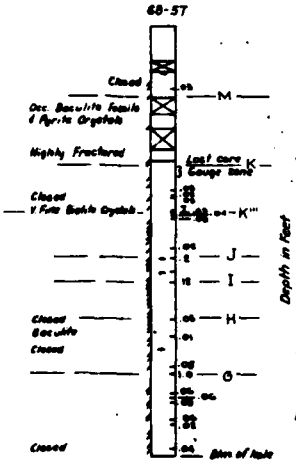
68-5T
Sta 46+30 - 234' Rt
Movement Zone 36' to 43' depth

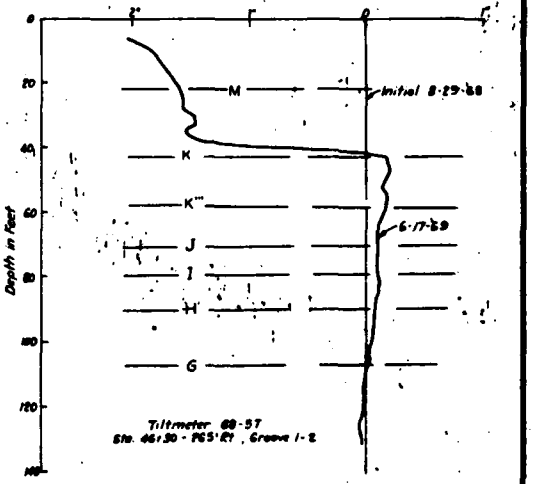


Tiltmeter 63-6T Replacement
Sta 47+60 - 130' Rt ; Groove 1-2
Instrument 200B



Tiltmeter 63-6T
Sta 47+50 - 130' Rt, Groove 1-2
Instrument 108





Tiltmeter 68-5T
Sta. 46+30 - 965' Rt , Groove 1-2

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

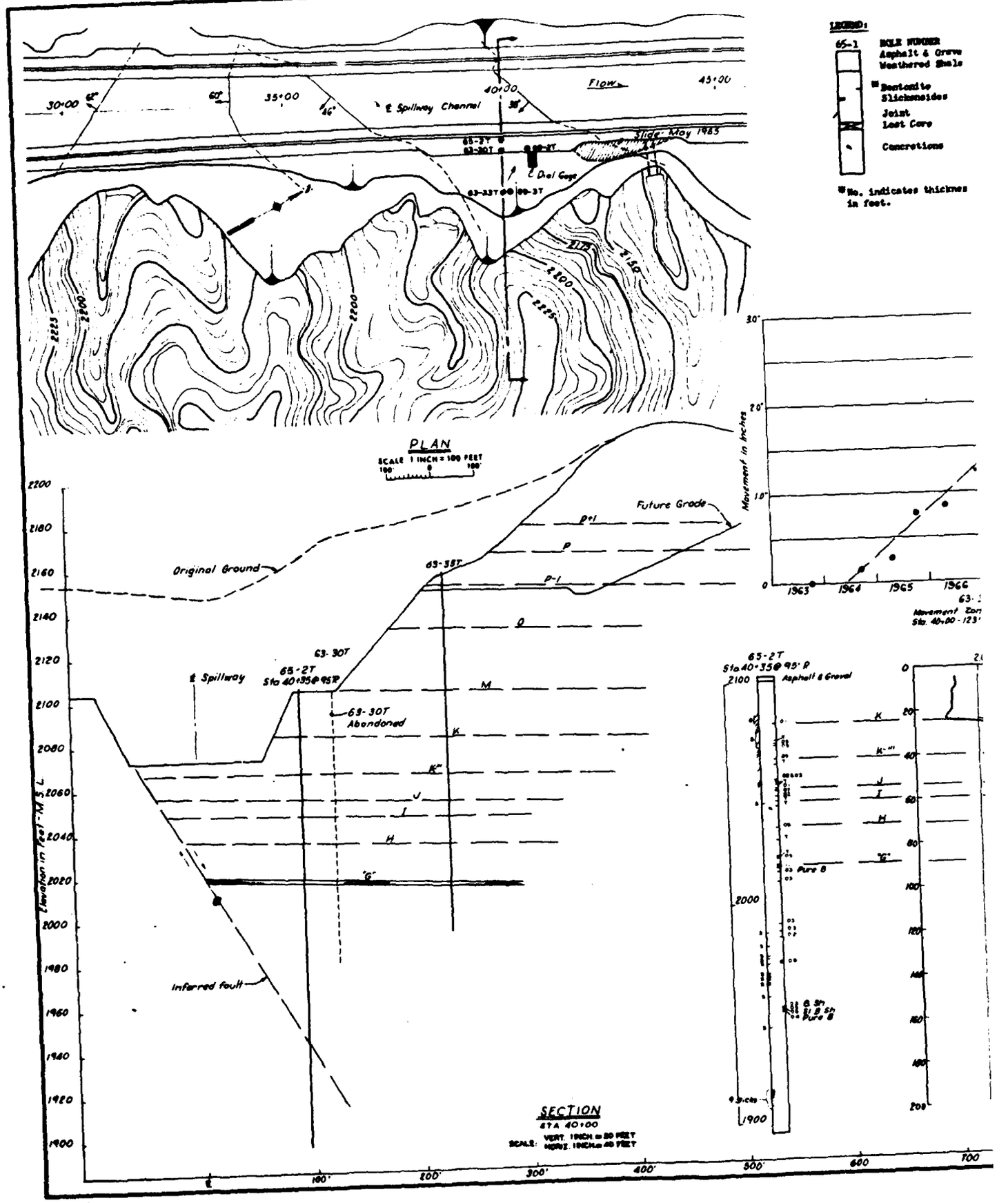
MISSOURI RIVER
FORT PECK LAKE, MONTANA

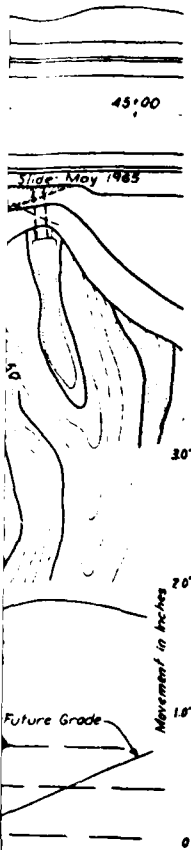
TILTMETER OBSERVATIONS
STA 46+30, 47+30 AND 47+60

THIS PLAN ACCOMPANIES CONTRACT NO.
MODIFICATION NO.

SAFETY PAYS

CONSTRUCTION FOUNDATION REPORT 2 PLATE 141


LEGEND:
65-1 BOLE NUMBER
Asphalt & Grave
Weathered Shale
Bentonite Slickensides
Joint Lost Core
Concretions
No. indicates thickness in feet.
Flow
45+00
40+00
35+00
30+00
E Spillway Channel
Slide May 1965
Dial Gage
63-33T
63-30T
63-3T
2225
2200
2175
2150
2125
2100
PLAN
SCALE 1 INCH = 100 FEET
Future Grade
Original Ground
P+1
P
P-1
O
M
K
K'
J
I
H
G
63-30T Abandoned
63-2T Sta 40+35@95'P
E Spillway
Inferred fault
Elevation in Feet - M.S.L.
2200
2180
2160
2140
2120
2100
2080
2060
2040
2020
2000
1980
1960
1940
1920
1900
SECTION
63A 40+00
VERT. 1 INCH = 20 FEET
HORIZ. 1 INCH = 40 FEET
100'
200'
300'
400'
500'
600'
700'
Movement in Inches
30"
20"
10"
0
1963
1964
1965
1966
63-
Movement Zon
Sta. 40+80 - 123
65-2T
Sta 40+35@95' P
Asphalt & Gravel
2100
2000
1900
Pure B
K
K'
J
I
H
G
0
20
40
60
80
100
120
140
160
180
200

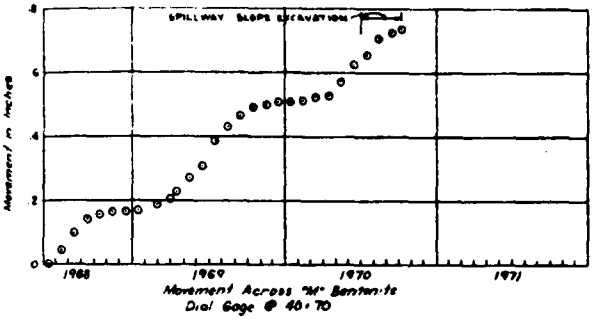


LEGEND:

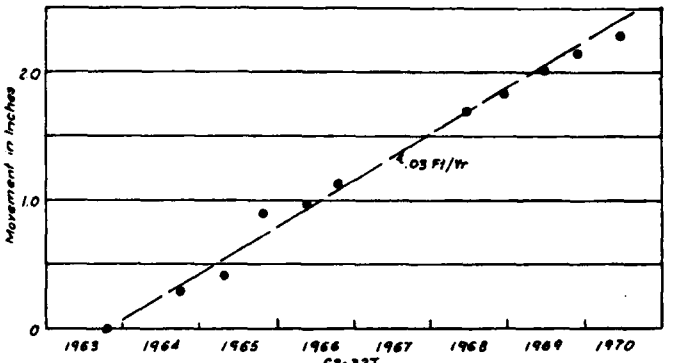


HOLE NUMBER
Asphalt & Gravel or Weathered Shale
*Bentonite Slickensides
Joint
Lost Core
Concretions

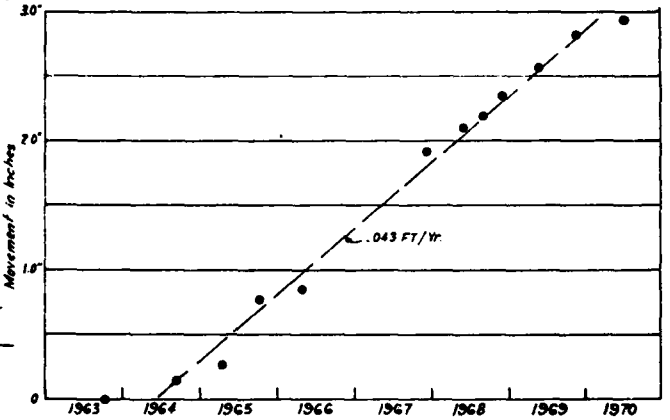
*No. indicates thickness in feet.



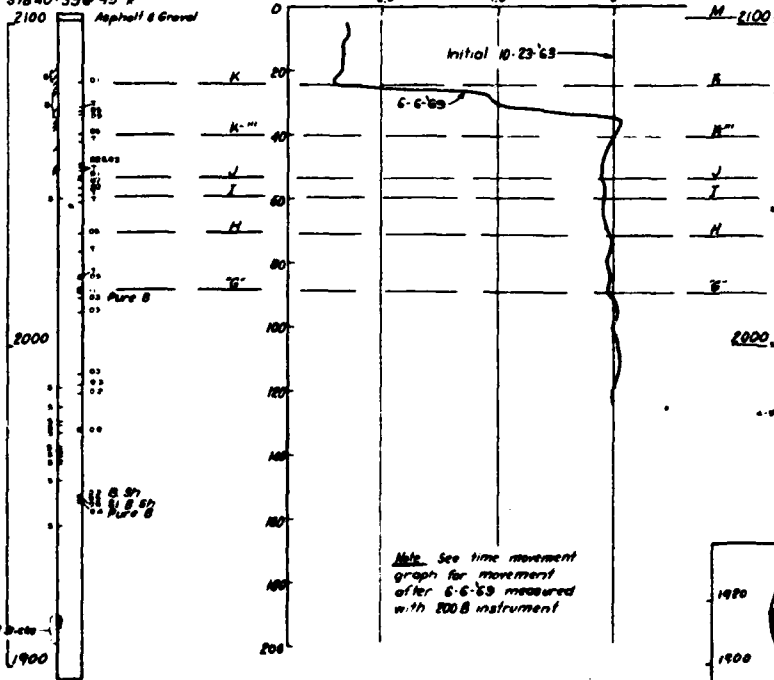
Movement Across "M" Bentonite
Dial Gage @ 40+70

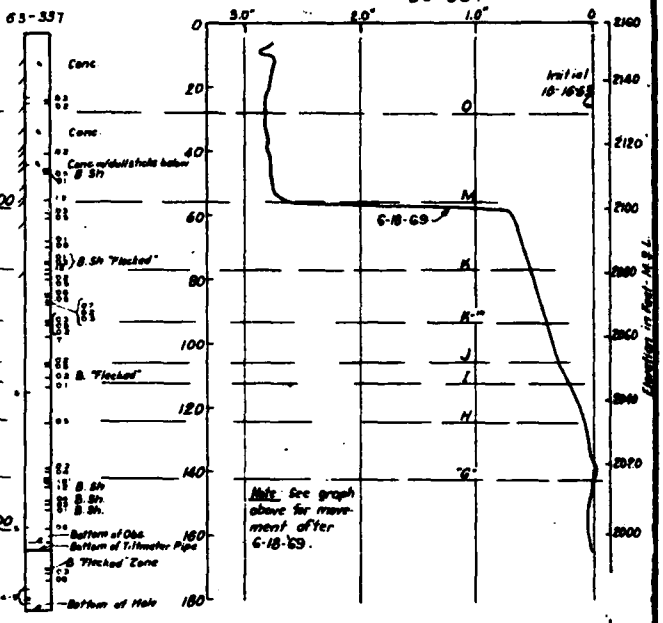


63-33T
Movement Zone 54'-59' Depth
Sta. 40+00 - 225' Rt. ; Groove 1-2



63-30T
Movement Zone 24'-36' Depth
Sta. 40+00 - 123' Rt. ; Groove 1-2





U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

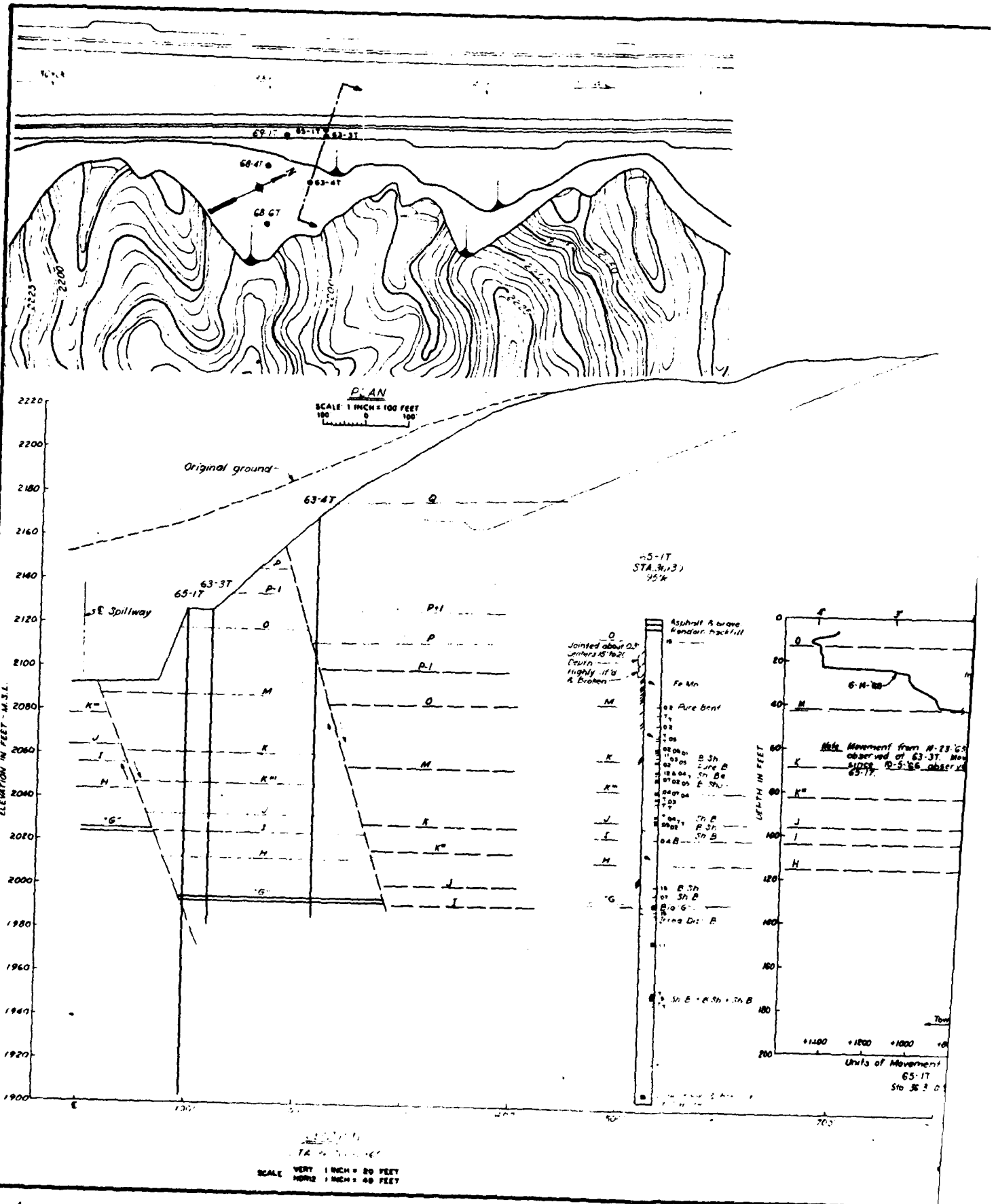
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
TILTMETER OBSERVATIONS
STATION 40+00
AND DIAL GAGE AT STA 40+70

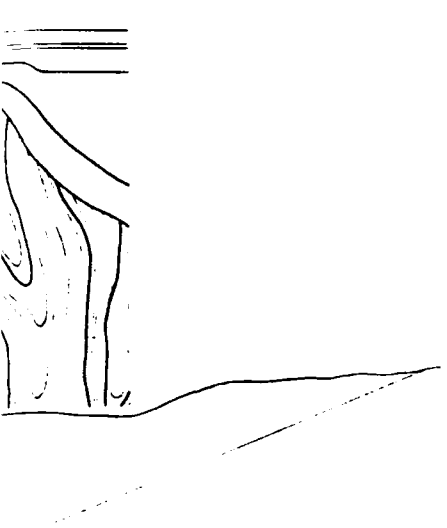
SEPT. 1969

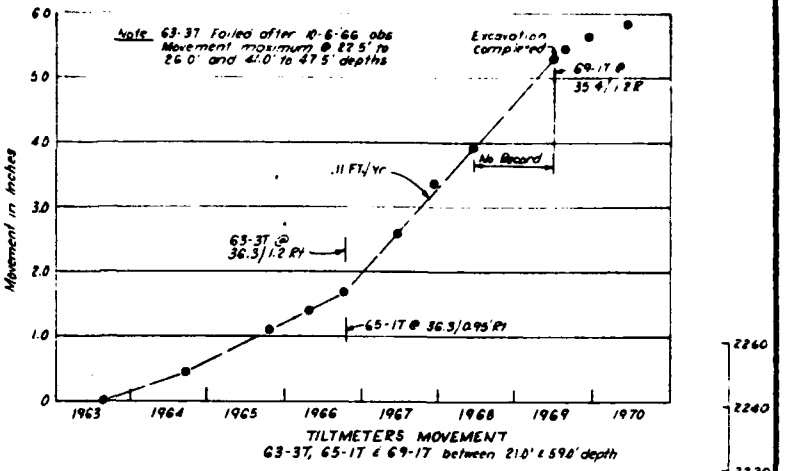
SAFETY PAYS

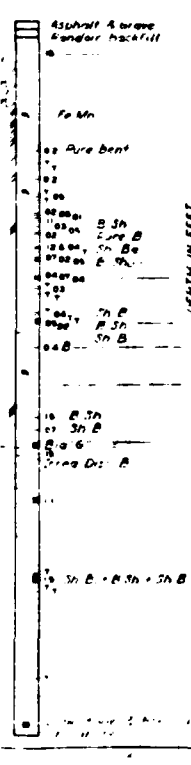
THIS PLAN ACCOMPANIES CONTRACT NO. DA-33-066-[illegible], MODIFICATION NO.

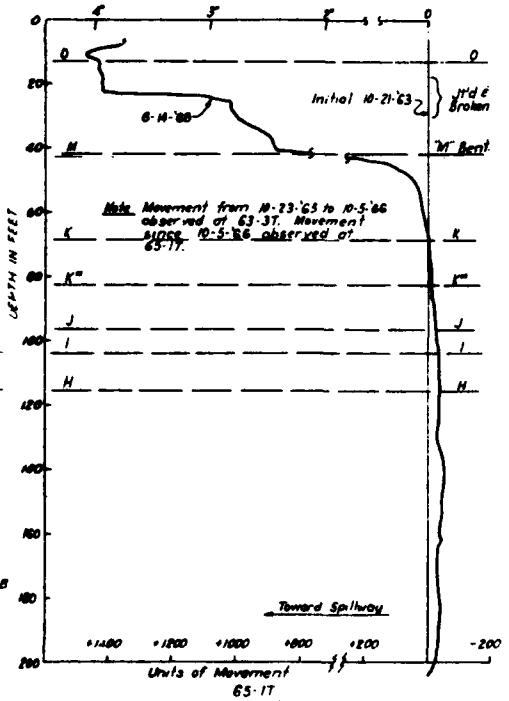
CONSTRUCTION FOUNDATION REPORT 2 PLATE 142

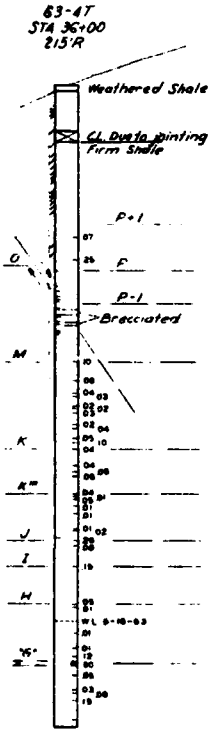

PLAN
SCALE 1 INCH = 100 FEET
68-4T
63-4T
68-6T
2225
2200
Original ground
63-4T
65-1T
63-3T
P-1
Q
M
K''
K'''
J
I
H
"G"
Spillway
ELEVATION IN FEET - M.S.L.
2220
2200
2180
2160
2140
2120
2100
2080
2060
2040
2020
2000
1980
1960
1940
1920
1900
Asphalt & brave
Jointed about 0.5'
Fe Mn
Pure Bent
Units of Movement
65-1T
DEPTH IN FEET
SCALE VERT 1 INCH = 20 FEET
HORIZ 1 INCH = 40 FEET

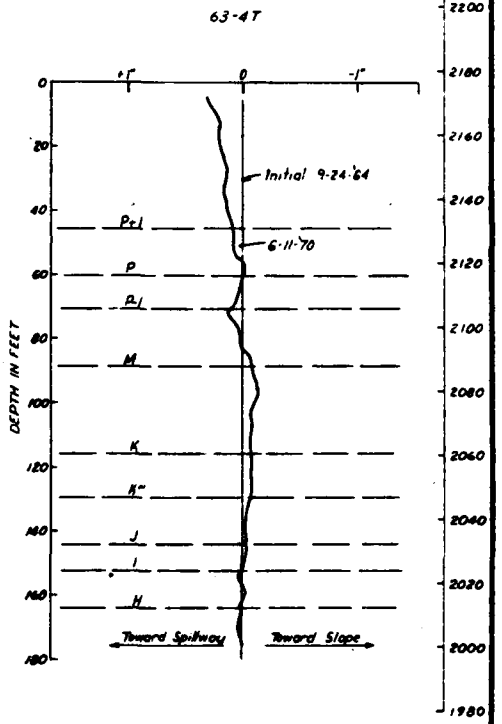












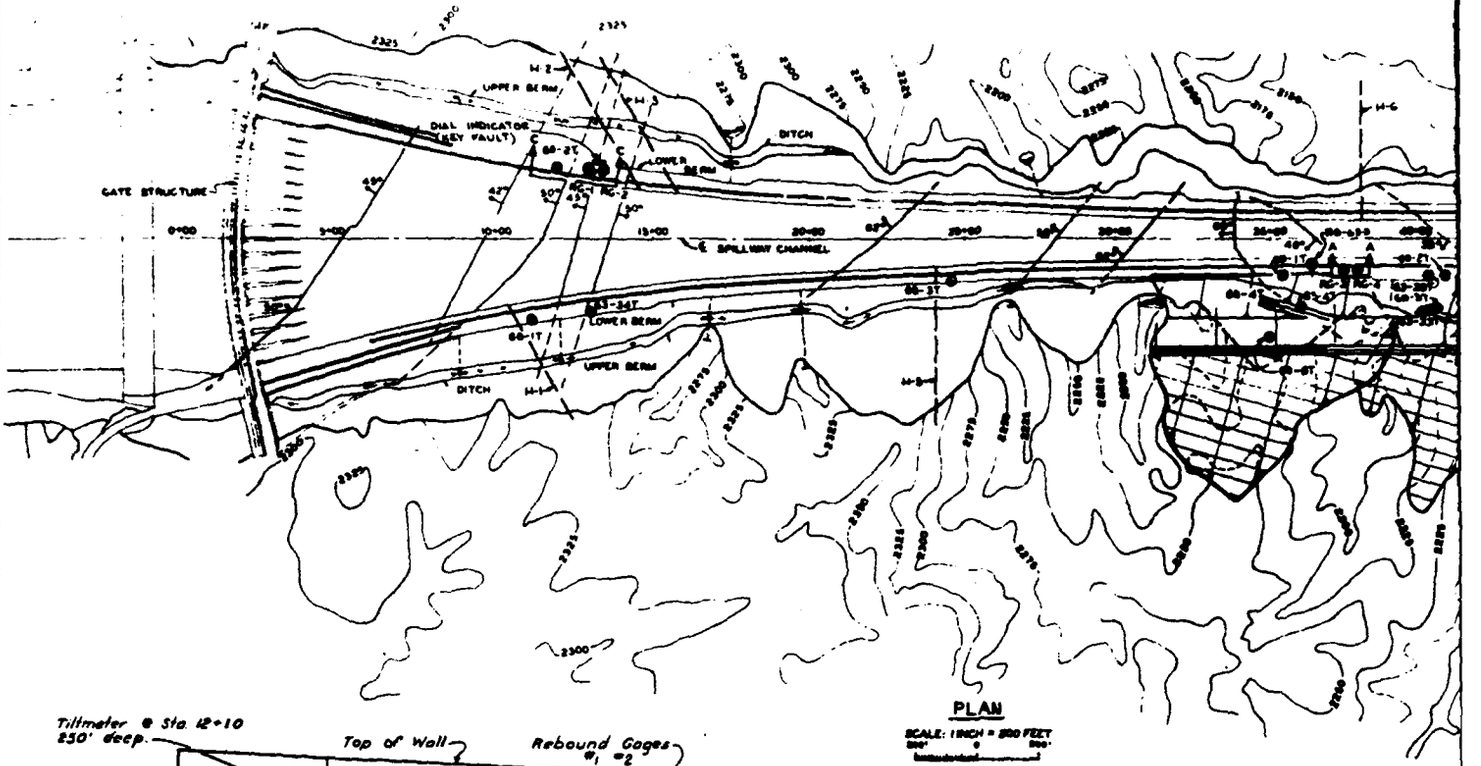
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
TILTMETER OBSERVATIONS
DIAGONAL - STA 36+00 TO 36+60

SEPT 1966

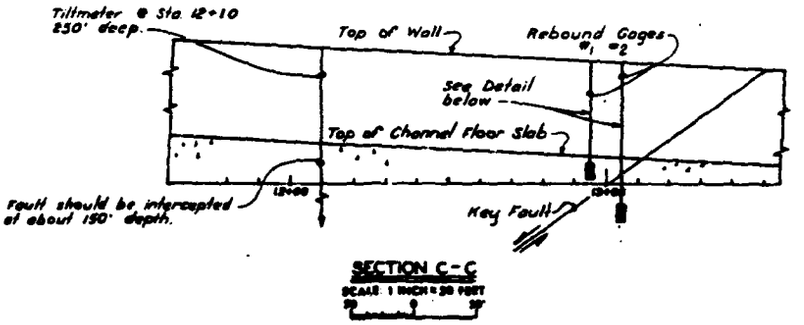
THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-066-eng-
MODIFICATION NO

CONSTRUCTION FOUNDATION REPORT 2 PLATE 143



PLAN

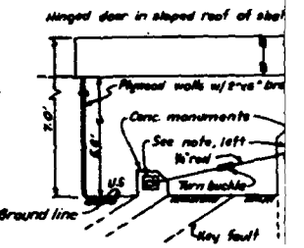
SCALE: 1 INCH = 200 FEET



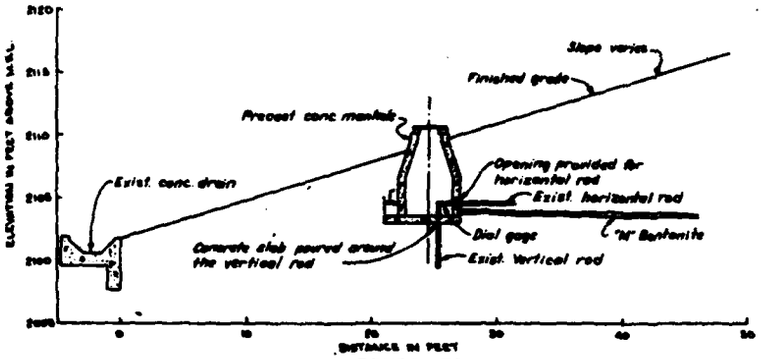
SECTION C-C

SCALE: 1 INCH = 20 FEET

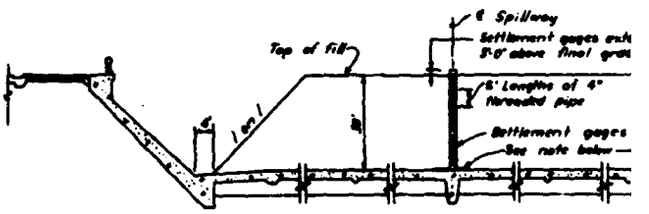
Note: ½" rod with turnbuckle attached to ½" plate fastened to concrete monuments (at each end) with two anchor bolts.



KEY FAULT
DIAL INDICATOR INSTALLATION

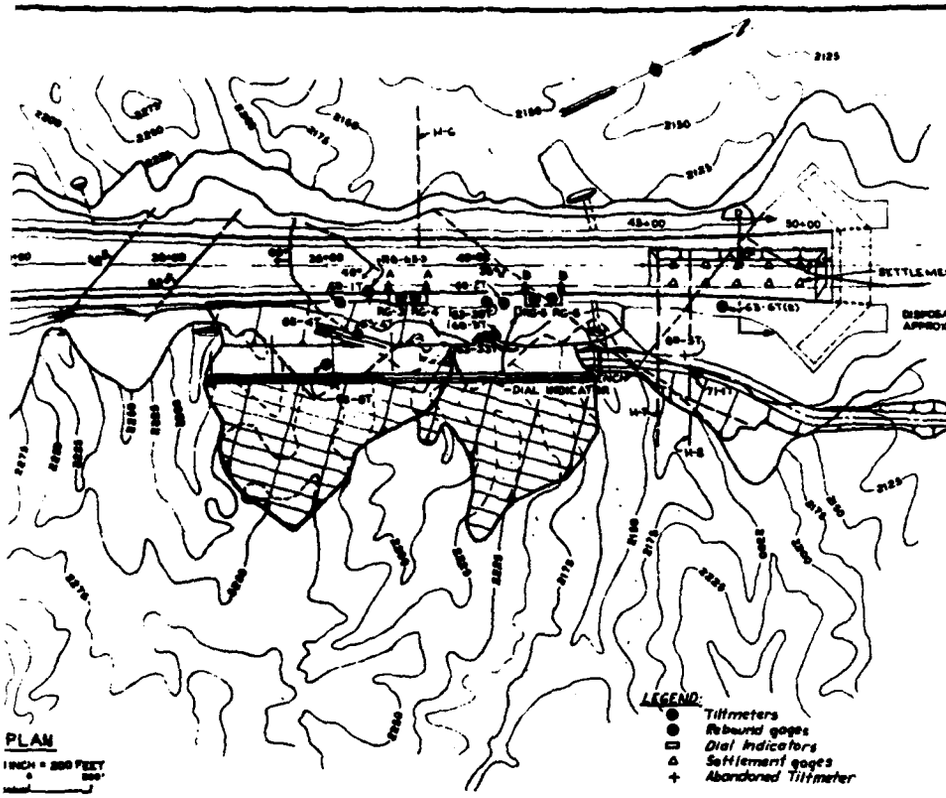


"M" BENTONITE
DIAL INDICATOR INSTALLATION

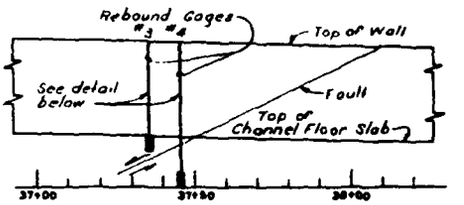


SECTION D
NO SCALE

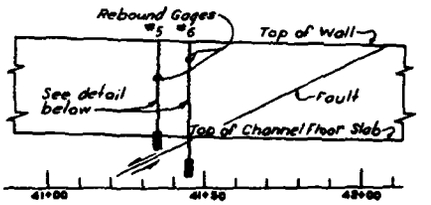
Note: "M" Bentonite (sampling trench) dial gage installation May 1968 in exterior wooden shoring and weather proof shelter. Re-installation during spillway slope excavation stage II in conc manhole Oct 1970 (see above).



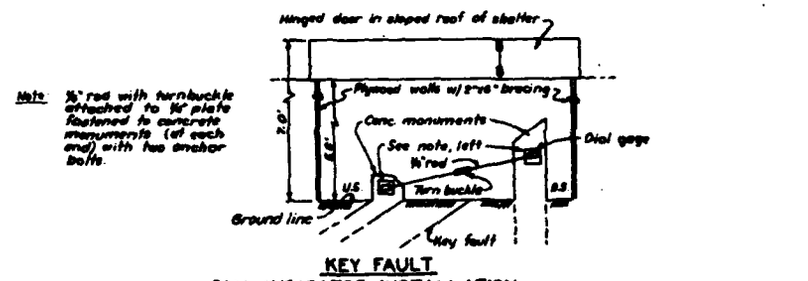
PLAN



SECTION A-A
SCALE: 1 INCH = 20 FEET

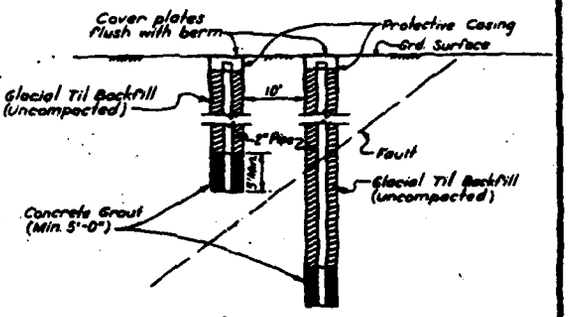


SECTION B-B
SCALE: 1 INCH = 20 FEET

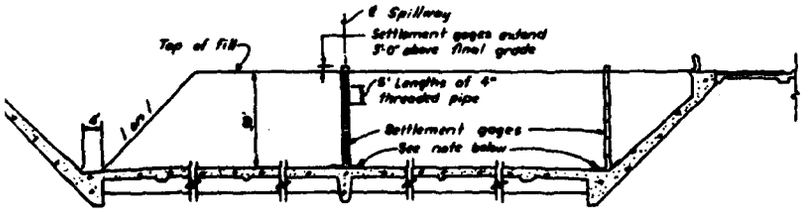


Note: ⅜" rod with turnbuckle attached to ½" plate fastened to concrete monuments (at each end) with two anchor bolts.

KEY FAULT
DIAL INDICATOR INSTALLATION



DETAIL
Rebound Gages
Not to Scale



Note: Cut and weld ⅜" x 1" x 12" strap iron at proper angle so that pipes are held vertical.

SECTION ℗
NO SCALE

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY MOVEMENT
INSTRUMENTATION

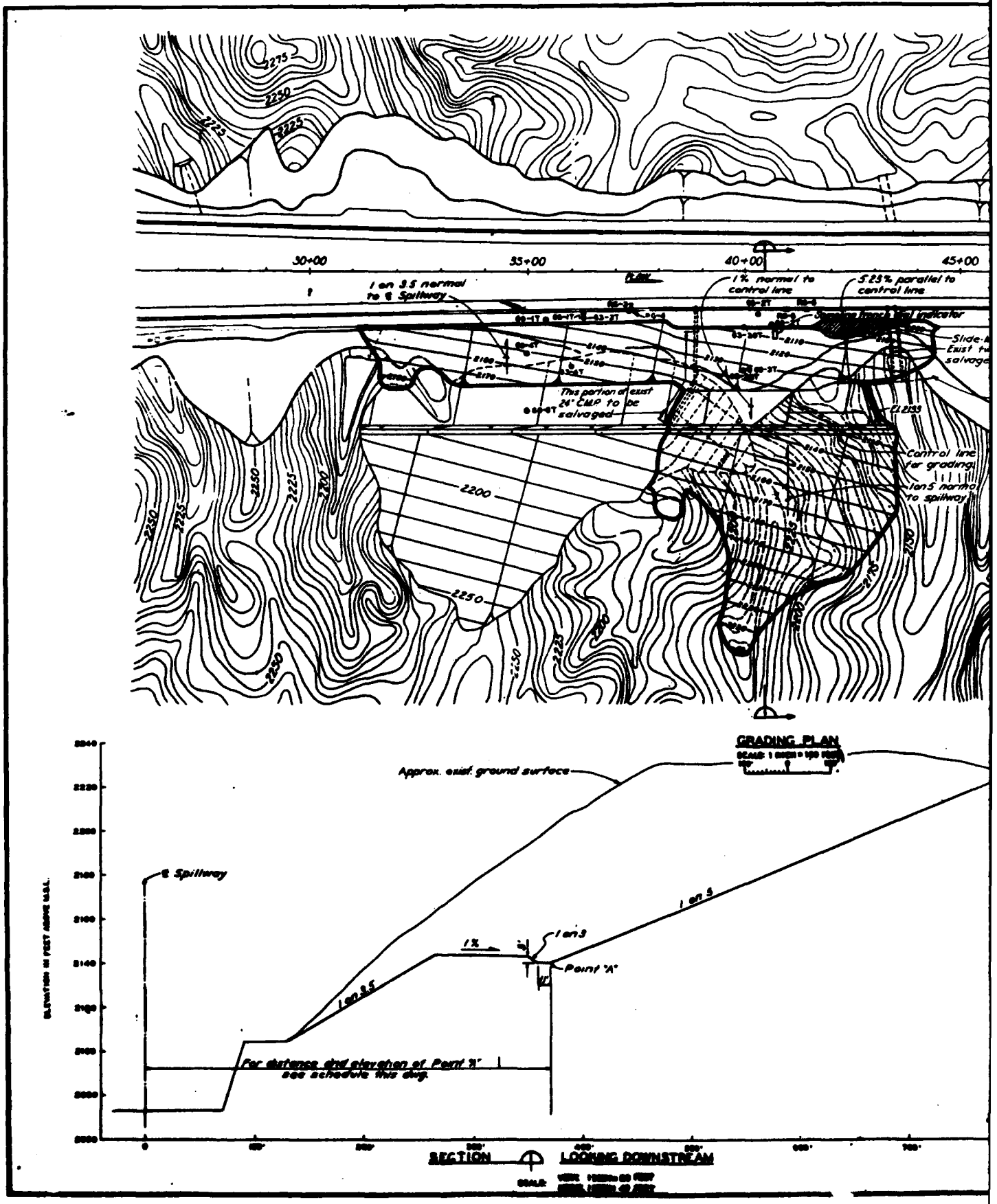
SAFETY DAYS

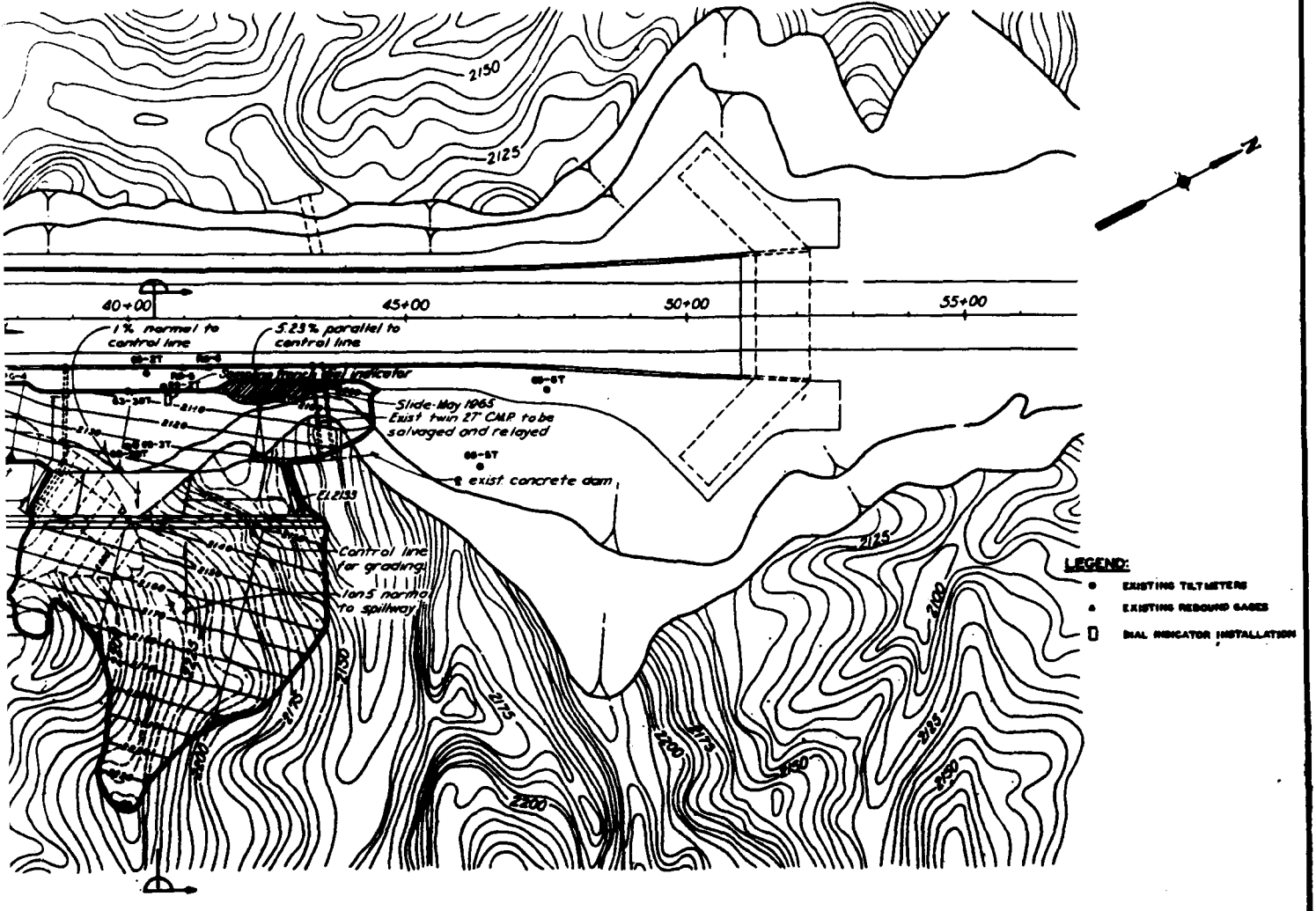
THIS PLAN ACCOMPANIES CONTRACT NO. ____

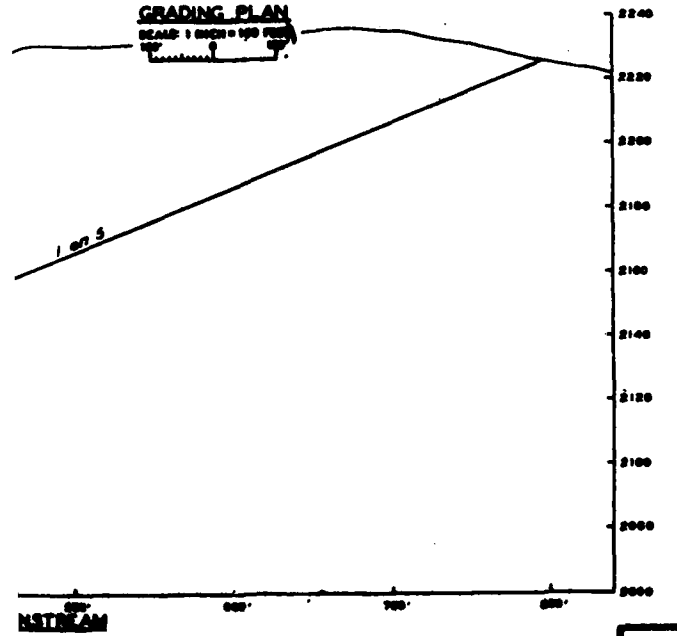
CONSTRUCTION FOUNDATION REPORT

PLATE 144

2


30+00
35+00
40+00
45+00
1 on 3.5 normal to ℄ Spillway
1% normal to control line
5.23% parallel to control line
This portion of exist 24" CMP to be salvaged
Control line for grading
1on5 normal to spillway
2200
2250
GRADING PLAN
Approx. exist. ground surface
℄ Spillway
1 on 3.5
1%
1 on 3
1 on 5
Point "A"
For distance and elevation of Point "A" see schedule this dwg.
SECTION
LOOKING DOWNSTREAM





ALIGNMENT AND ELEVATION SCHEDULE		
STATION	DISTANCE "W"	ELEVATION "W"
39+00	370.00'	2147.16
40+00	370.00'	2141.84
41+00	370.00'	2136.70
42+00	370.00'	2131.47
43+00	370.00'	2126.24

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

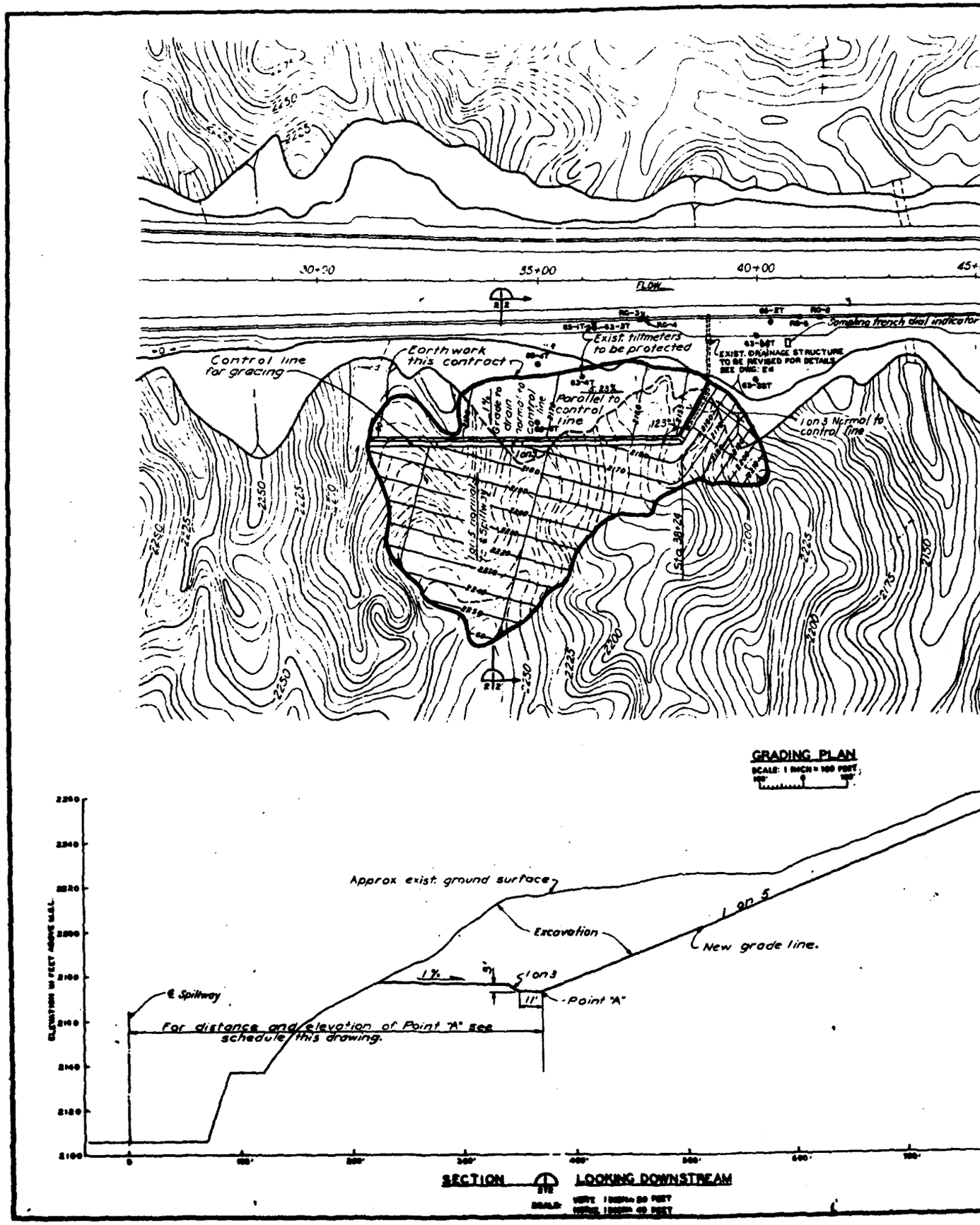
DESIGNED U.S.A.
DRAWN D.R.
CHECKED
QUANTITIES G.M.A.
SUBMITTED

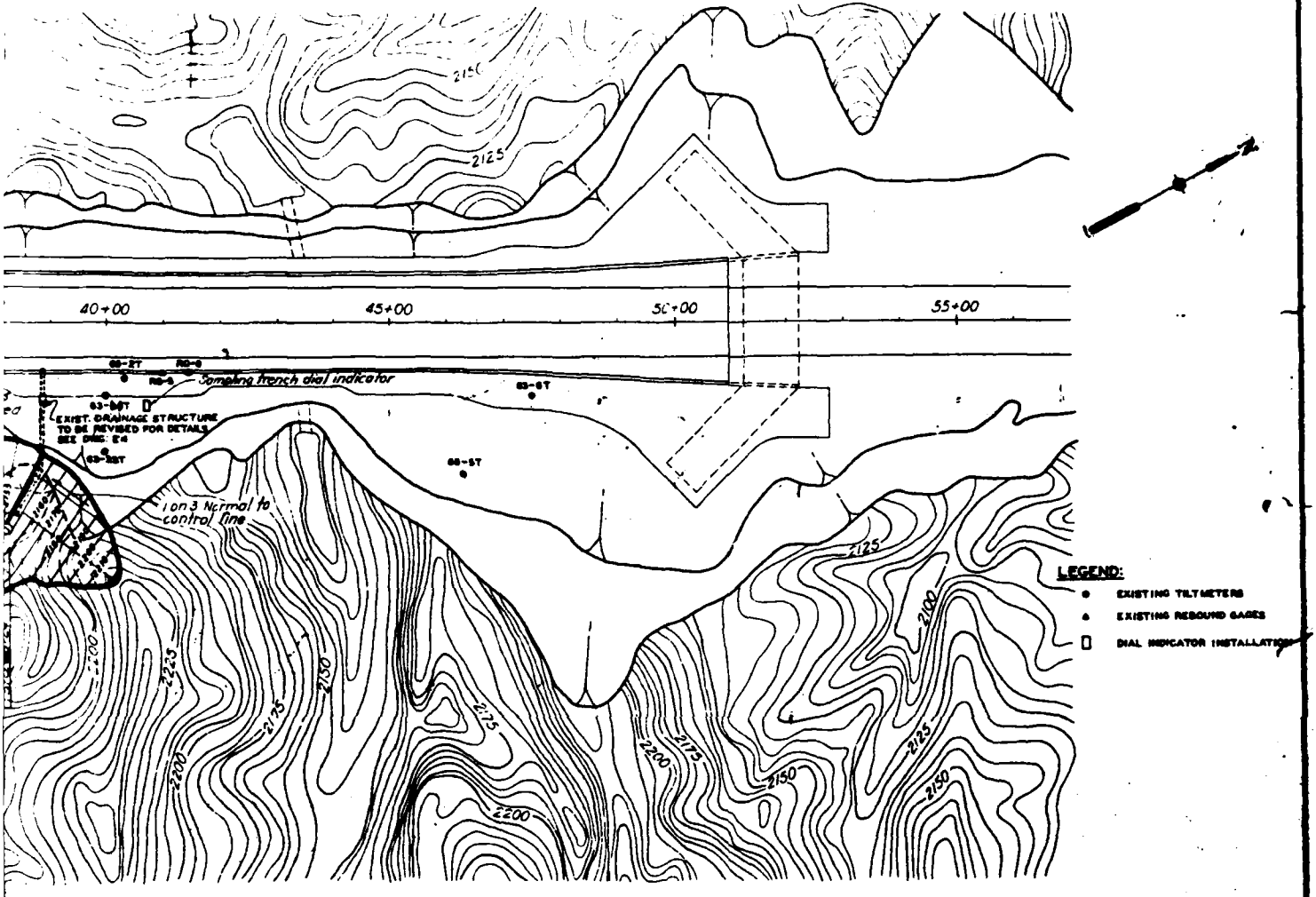
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY SLOPE EXCAVATION
STAGE III
GRADING PLAN AND SECTION

APPROVED: Charles F. Potter, NOV. 1959
RECOMMENDED: B. P. Anderson
SCALE
MFP-113

SAFFIR HAYS

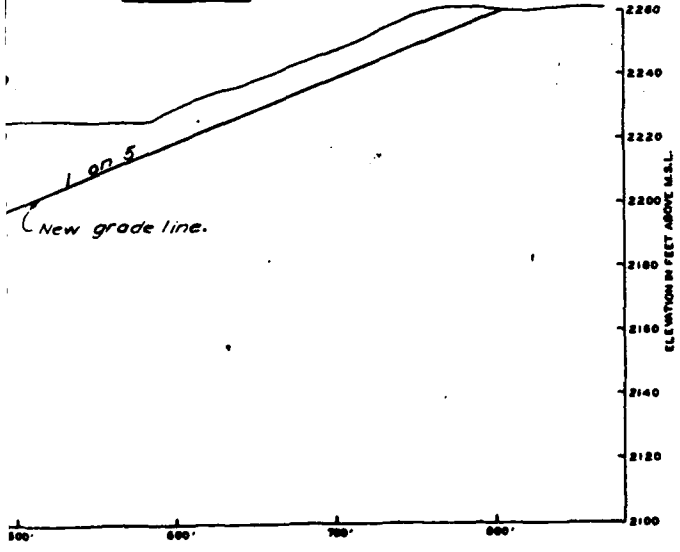
THIS PLANS ASSOCIATED CONSULTANTS INC.
HENDERSONVILLE, N.C.


30+00
35+00
40+00
45+0
FLOW
Control line for gracing
Earthwork this contract
Exist. tiltmeters to be protected
Sampling trench dial indicator
EXIST. DRAINAGE STRUCTURE TO BE REVISED FOR DETAILS SEE DWG. E-6
1% Grade to drain normal to control line
Parallel to control line
1on3 Normal to control line
1on3
1on5 normal to ℄ Spillway
Sta 38+24
2250
2225
2200
2175
2150
GRADING PLAN
SCALE: 1 INCH = 100 FEET
Approx exist. ground surface
Excavation
1on5
New grade line.
1%
1on3
11'
Point "A"
℄ Spillway
For distance and elevation of Point "A" see schedule this drawing.
ELEVATION IN FEET ABOVE M.S.L.
2240
2220
2200
2180
2160
2140
2120
2100
0
100'
200'
300'
400'
500'
600'
700'
SECTION
LOOKING DOWNSTREAM
VERT. 1 INCH = 20 FEET
HORIZ. 1 INCH = 40 FEET



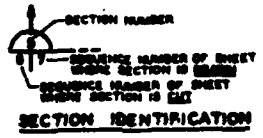
GRADING PLAN

SCALE: 1 INCH = 100 FEET



STREAM

ALIGNMENT AND ELEVATION SCHEDULE		
STATION	DISTANCE "N"	ELEVATION "N"
32+00	370.00'	2183.77
33+00	370.00'	2178.54
34+00	370.00'	2173.31
35+00	370.00'	2168.08
36+00	370.00'	2162.85
37+00	370.00'	2157.62
38+00	370.00'	2152.39



SAFETY PAYS

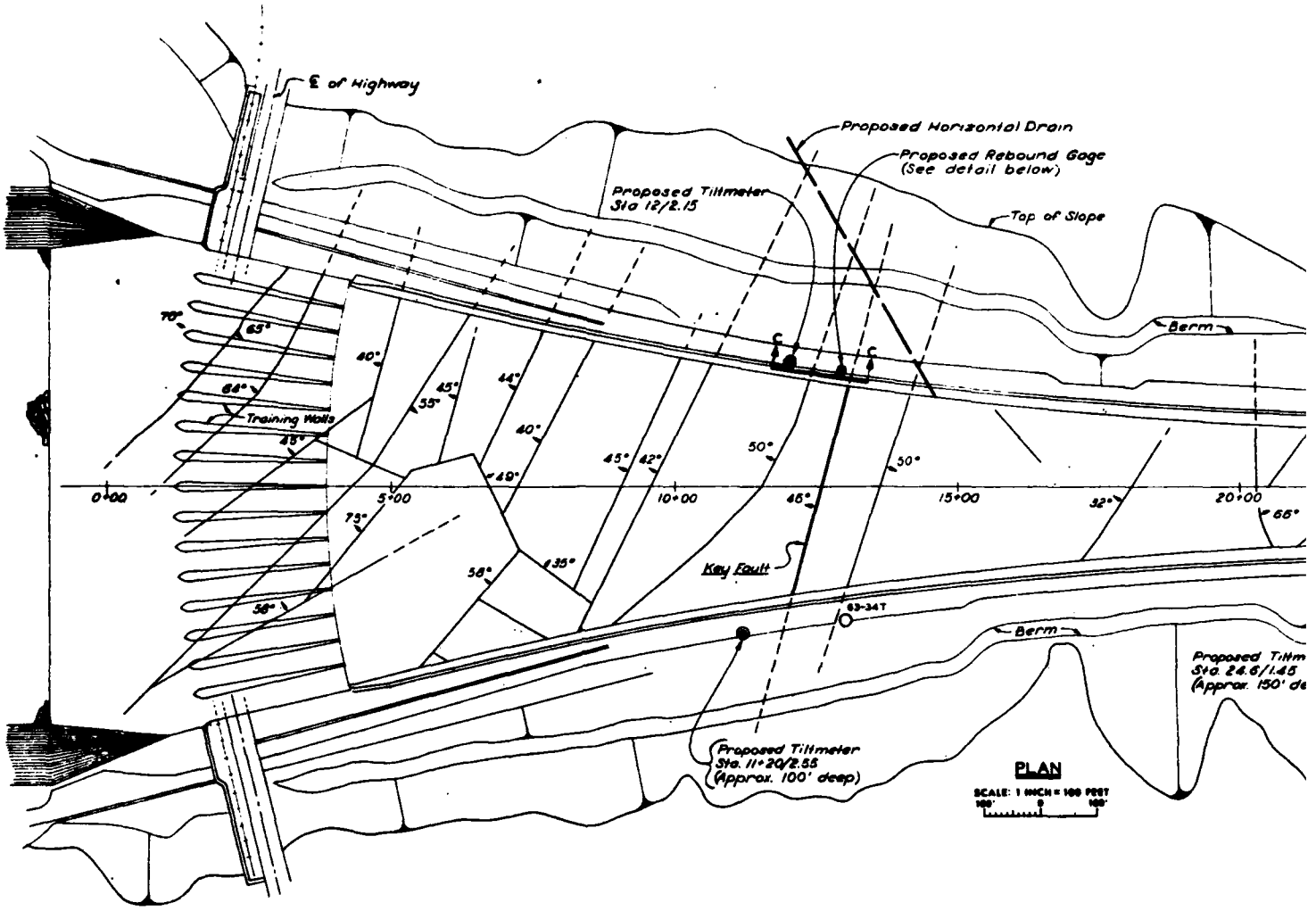
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY SLOPE EXCAVATION
GRADING PLAN AND SECTION

AUG. 1959

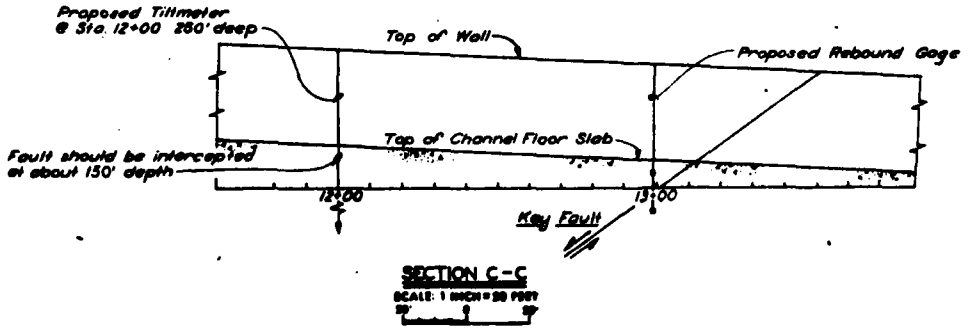
MFP43-SIE2

CONSTRUCTION FOUNDATION REPORT PLATE 146



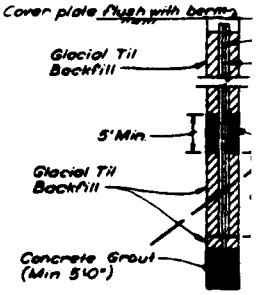
PLAN

SCALE: 1 INCH = 100 FEET



SECTION C-C

SCALE: 1 INCH = 50 FEET

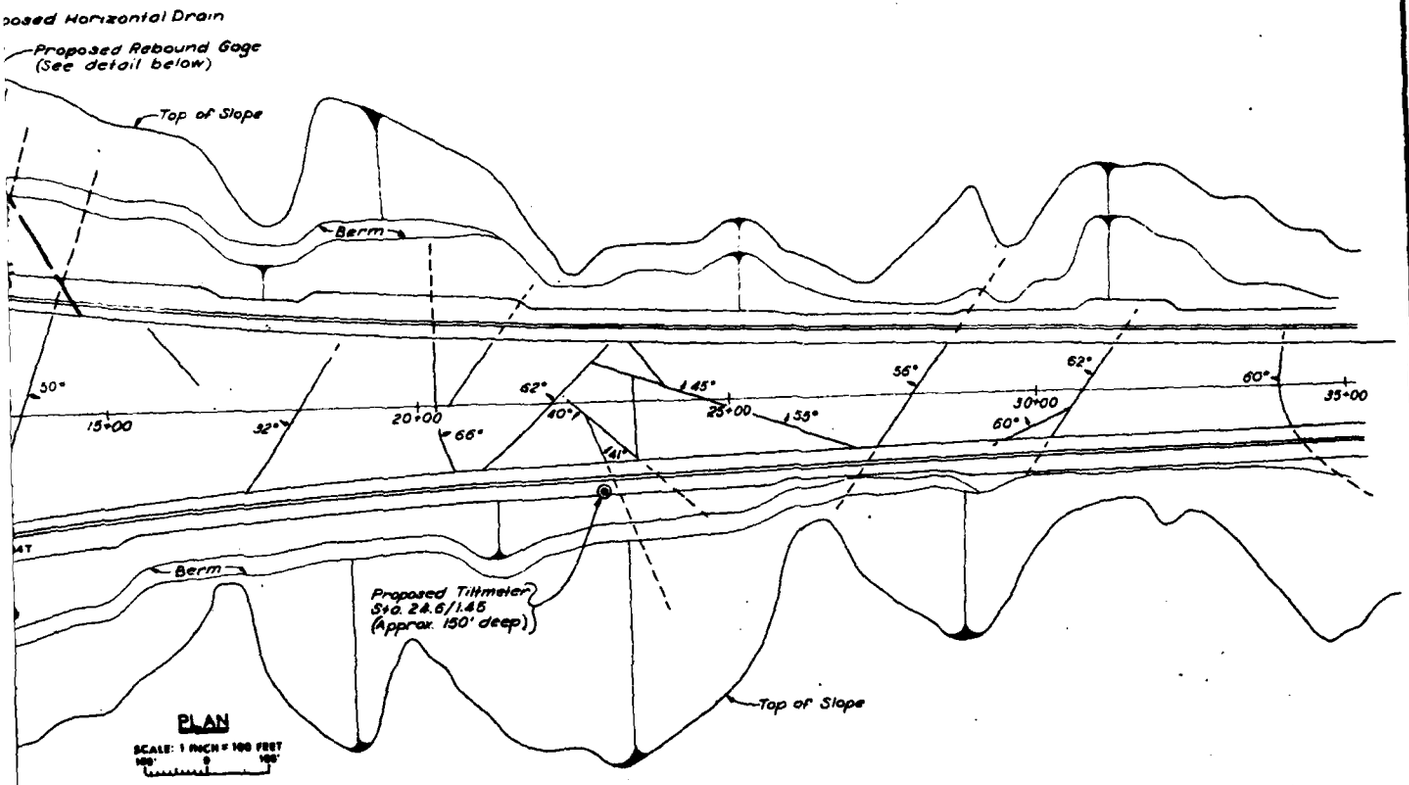


DETAIL

REBOUND GA

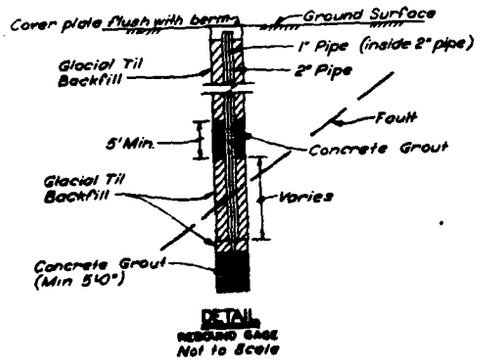
Not to Sca

THIS DRAWING HAS BEEN REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE.



LEGEND:

- PROPOSED TILTMETER
- EXISTING TILTMETER
- PROPOSED REBOUND GAGE



DETAIL
REBOUND GAGE
Not to Scale

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

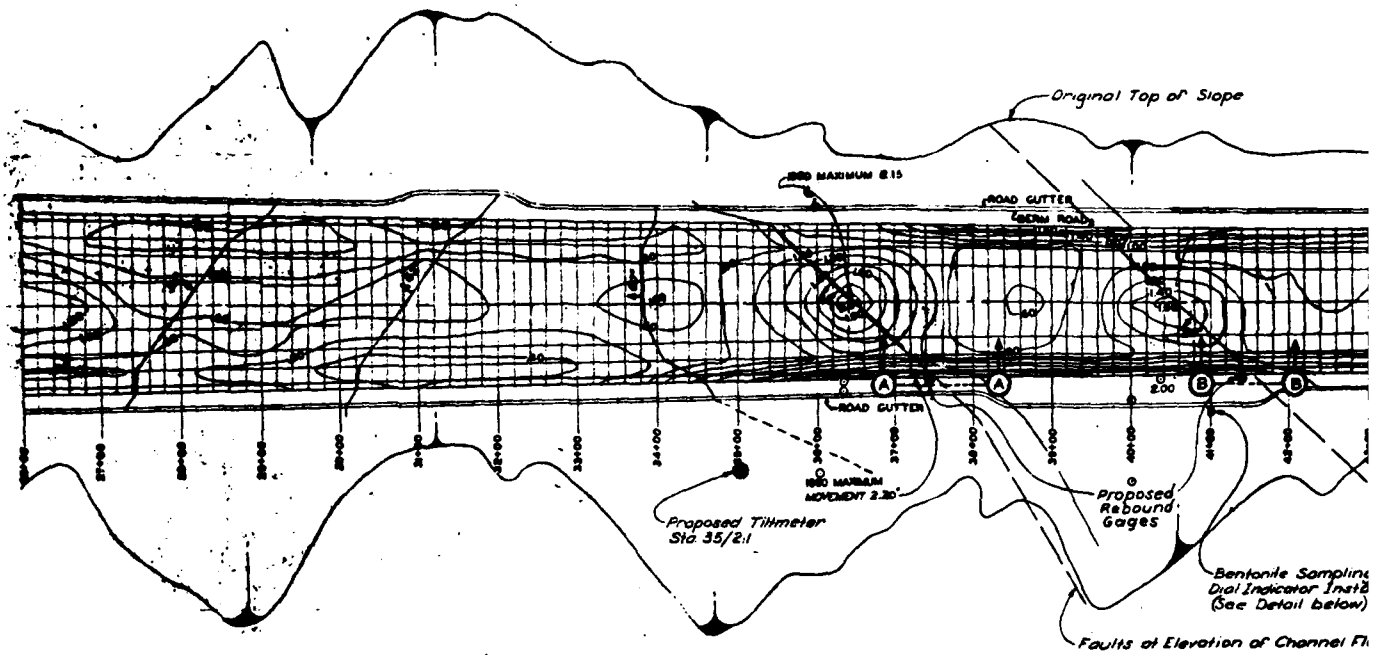
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
UPSTREAM HORIZONTAL DRAIN
AND INSTRUMENTATION

SEPT. 1980

SAFETY PAYS

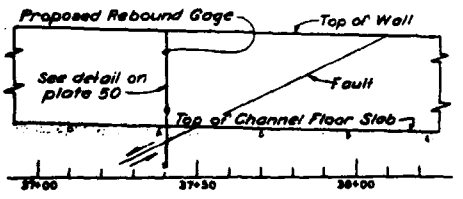
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

THIS PLAN ACCOMPANIES CONTRACT NO. DACW45-80-C-0027, MODIFICATION NO.



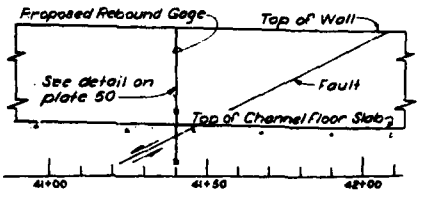
PLAN

SCALE: 1 INCH = 60 FEET



SECTION A-A

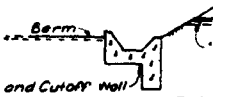
SCALE: 1 INCH = 30 FEET



SECTION B-B

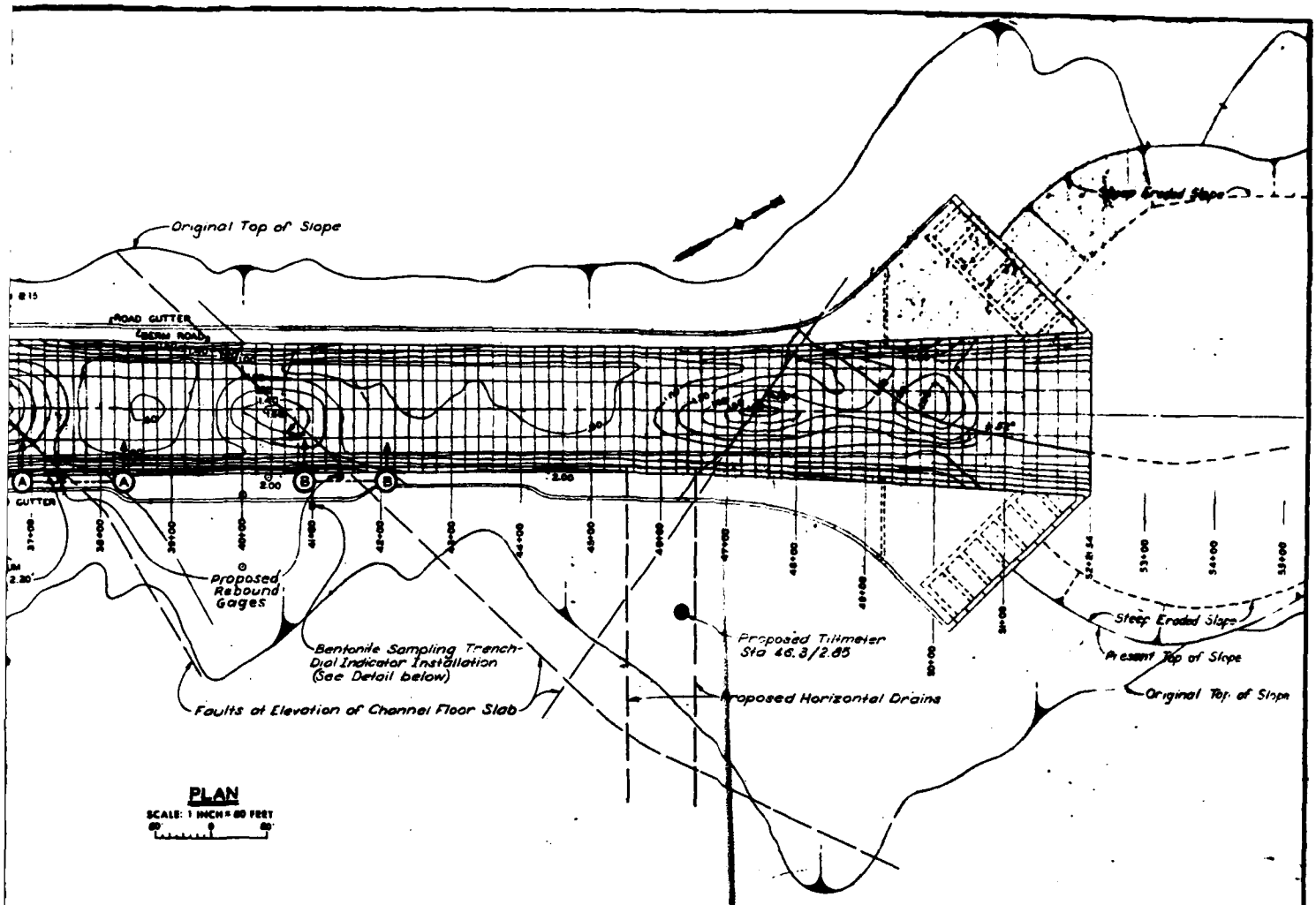
SCALE: 1 INCH = 30 FEET

Shoring and Weathe
For Housing In



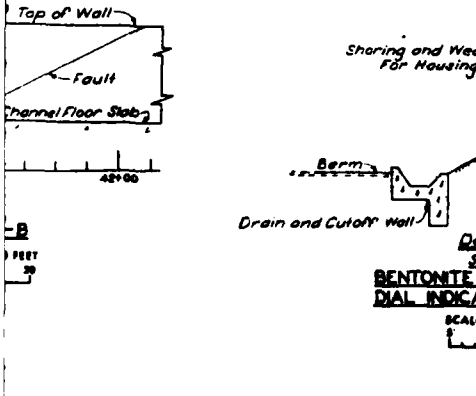
Deta
Sta
BENTONITE S
DIAL INDICAT
SCALE 1

THIS DRAWING HAS BEEN REDUCED TO
THREE-EIGHTHS THE ORIGINAL SCALE.



LEGEND:

- PROPOSED TILTMETERS
- EXISTING TILTMETERS
- PROPOSED REBOUND GAGES



Detail Section
Station 41+00

BENTONITE SAMPLING TRENCH-
DIAL INDICATOR INSTALLATION

SCALE: 1 INCH = 8 FEET

NOTE:
Exact station for trench-Dial Indicator installation to be located in the field

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

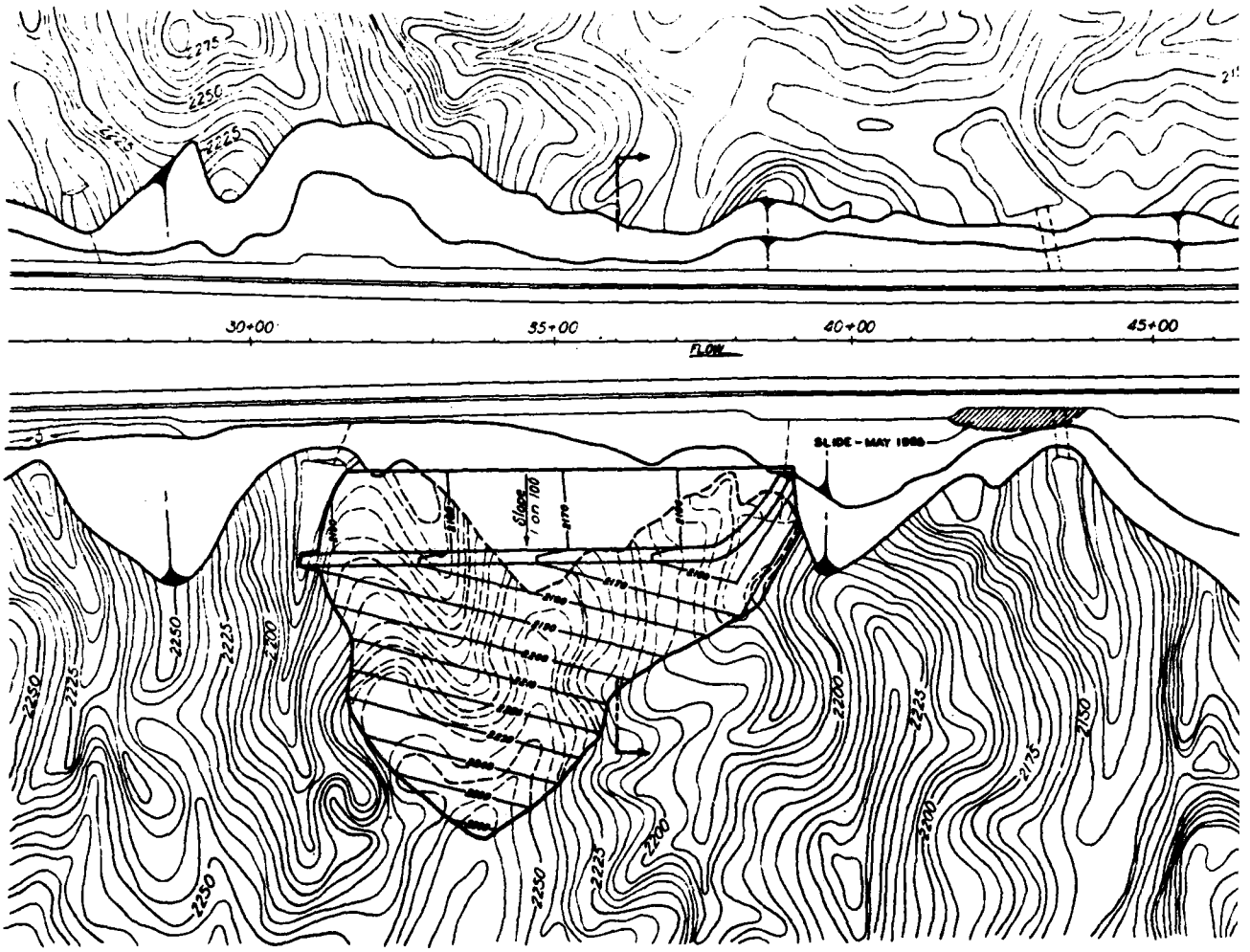
MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
DOWNSTREAM HORIZONTAL DRAIN AND INSTRUMENTATION

SEPT 1988

SAFETY DAYS

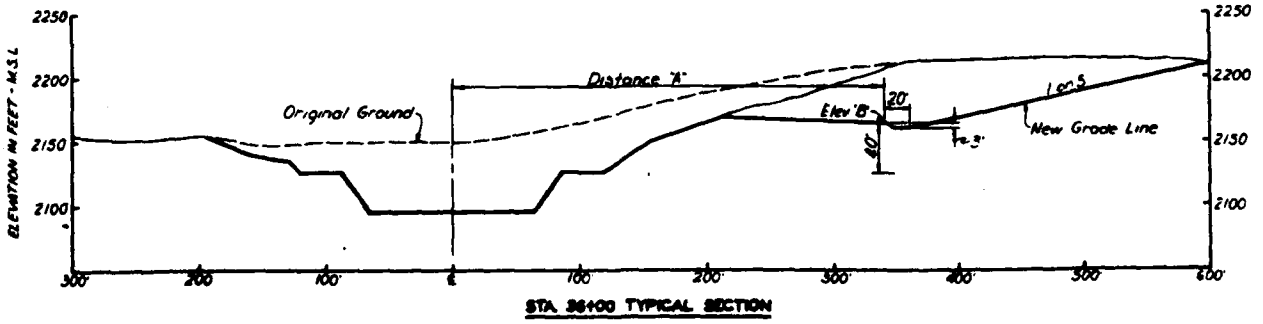
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

CORPS OF ENGINEERS



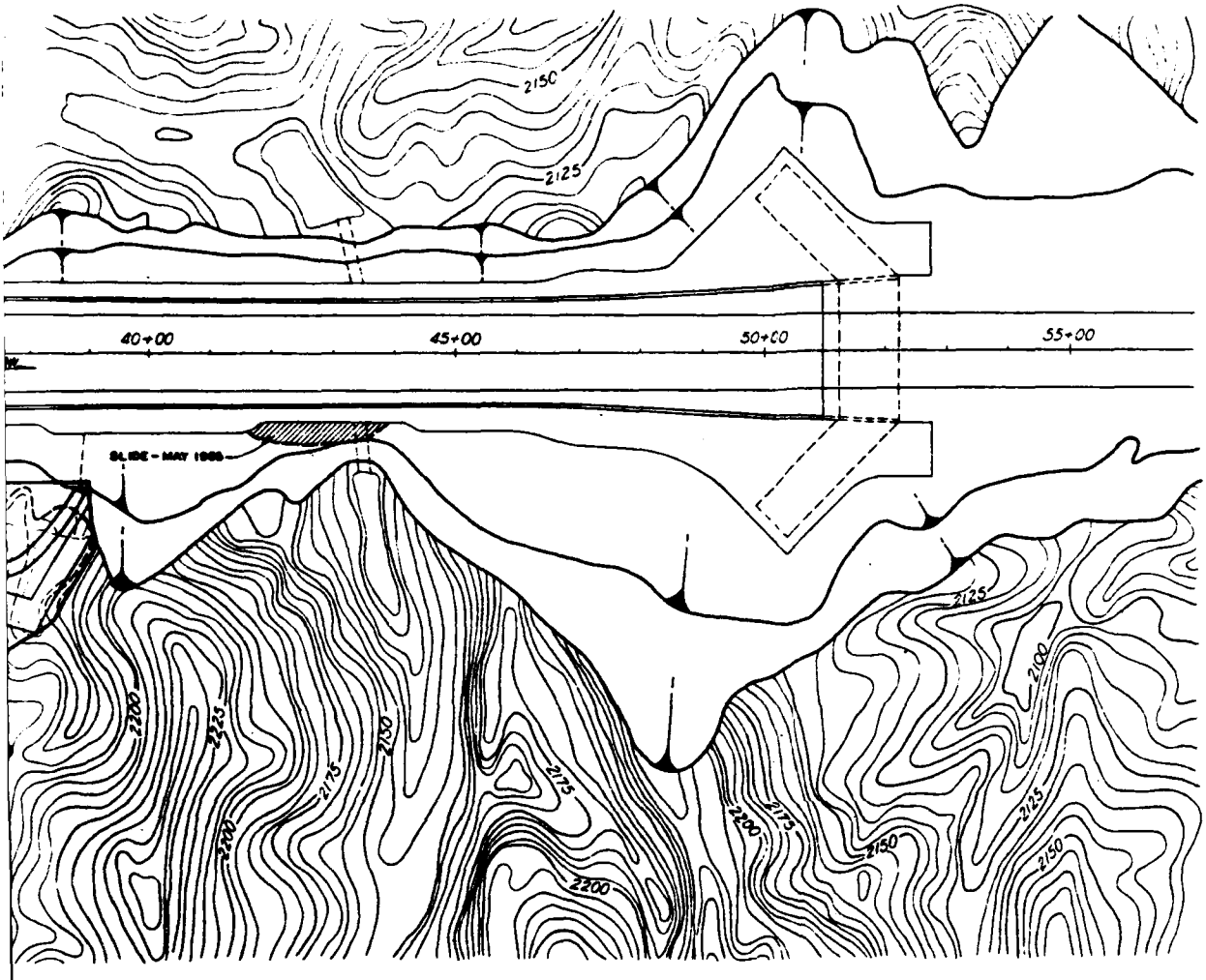
PLAN

SCALE: 1 INCH = 100 FEET



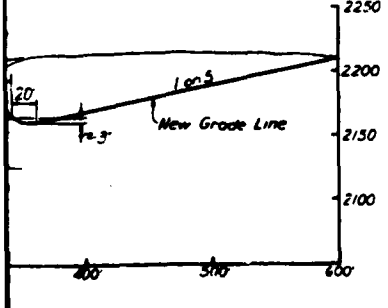
STA. 36+00 TYPICAL SECTION

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.



PLAN

SCALE: 1 INCH = 100 FEET



RIGHT SIDE		
STATION	DISTANCE "A"	ELEV. "B"
32+00	340.00'	2186.77
33+00	340.00'	2181.54
34+00	340.00'	2176.31
35+00	339.81'	2171.08
36+00	338.72'	2165.85
37+00	337.63'	2160.62

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

THIS PLAN ACCOMPANIES CONTRACT NO. DA-25-065-eng- MODIFICATION NO.

SAFETY PAYS

DATE	DESCRIPTION	DRAWN	APPROVED
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY CWJ-GWA
DRAWN BY RM
TRACED BY RM
CHECKED BY GWA

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
EXPERIMENTAL GRADING PLAN
STA. 31+00 TO STA. 39+00

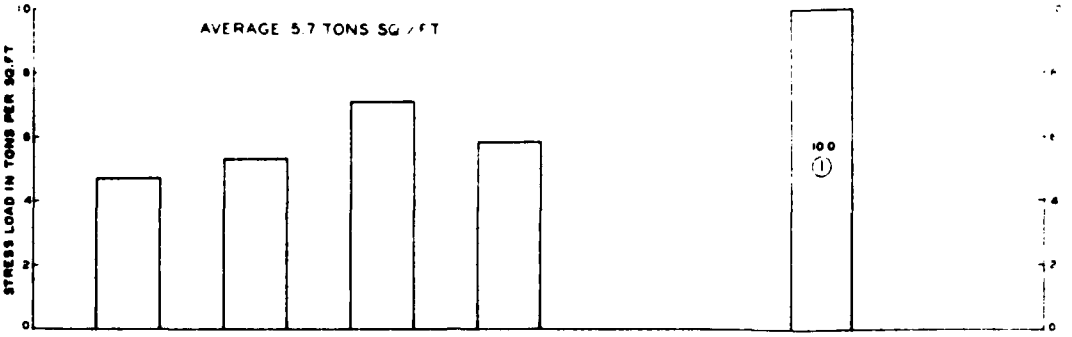
APPROVED: Charles F. Ebert — DATE: SEPT 1969
APPROVED: Harold G. Stiles — DRAWING NO. A3-3-2-0999

CONSTRUCTION FOUNDATION REPORT

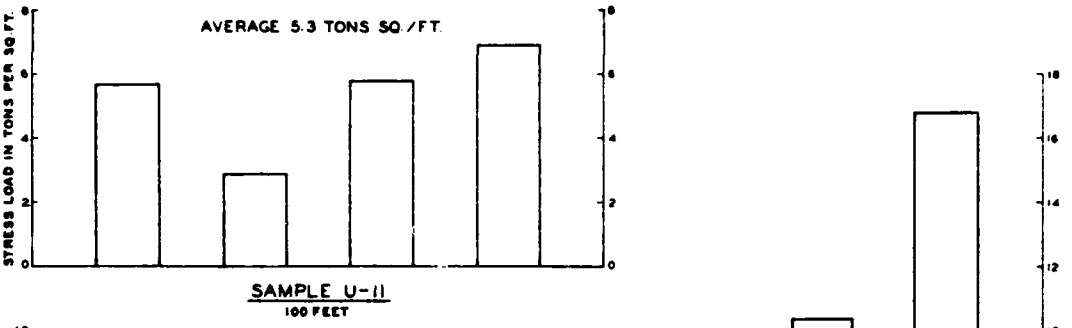
PLATE 149

2

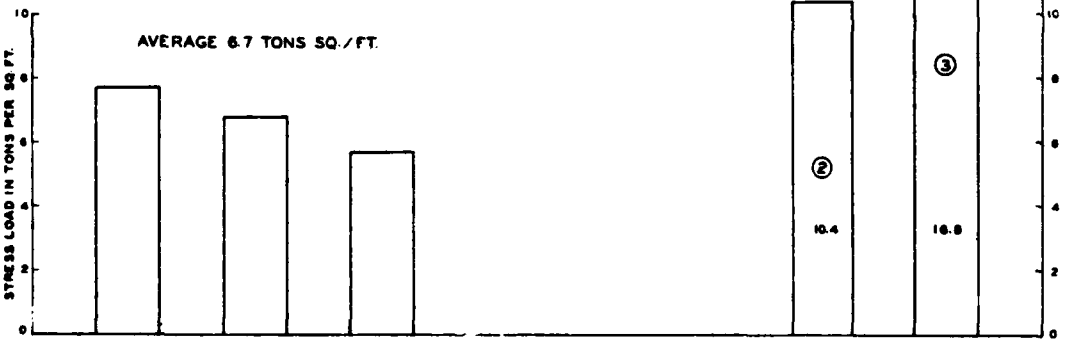
CORPS OF ENGINEERS



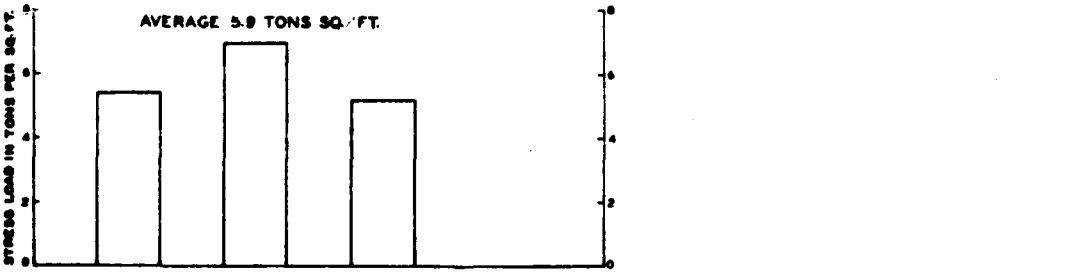
SAMPLE U-7
55 FEET



SAMPLE U-11
100 FEET



SAMPLE U-18
146 FEET



SAMPLE U-27
210 FEET

TYPICAL TENSIL

LEGEND:

① LOADED TO 1 3 THEN QUICK T

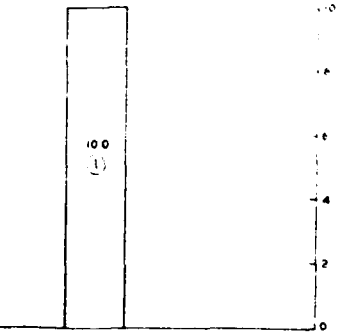
② LOADED TO 2 THEN QUICK T

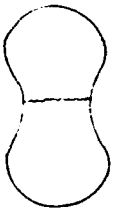
③ LOADED TO 3.2 TONS SQ./ 7 DAYS THEN

QUICK TESTS
600# / MINUTE

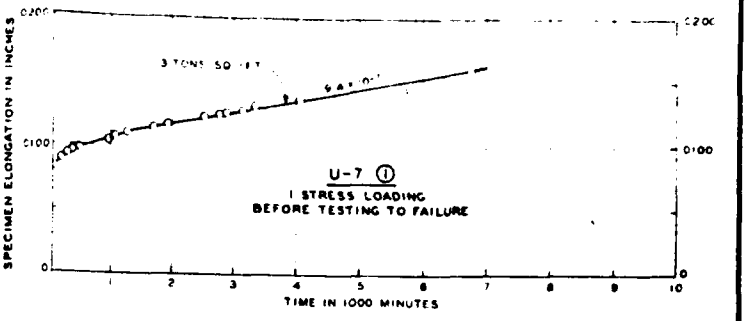
SPECIAL TESTS
SEE LEGEND

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE





TYPICAL TENSILE SPECIMUM FAILURE

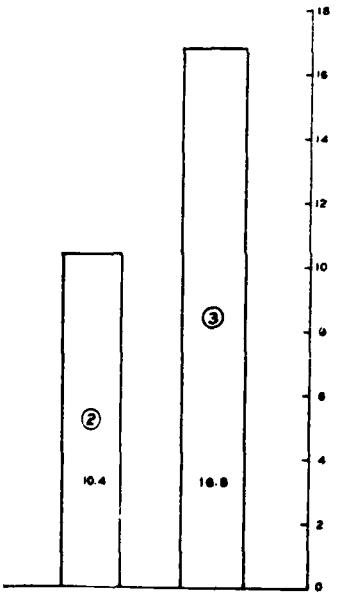


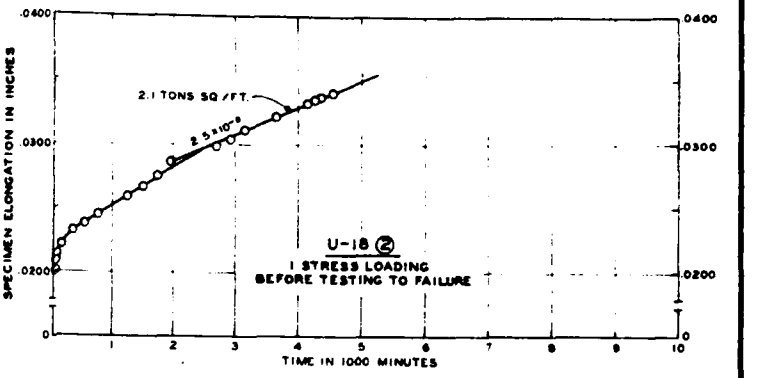
LEGEND:

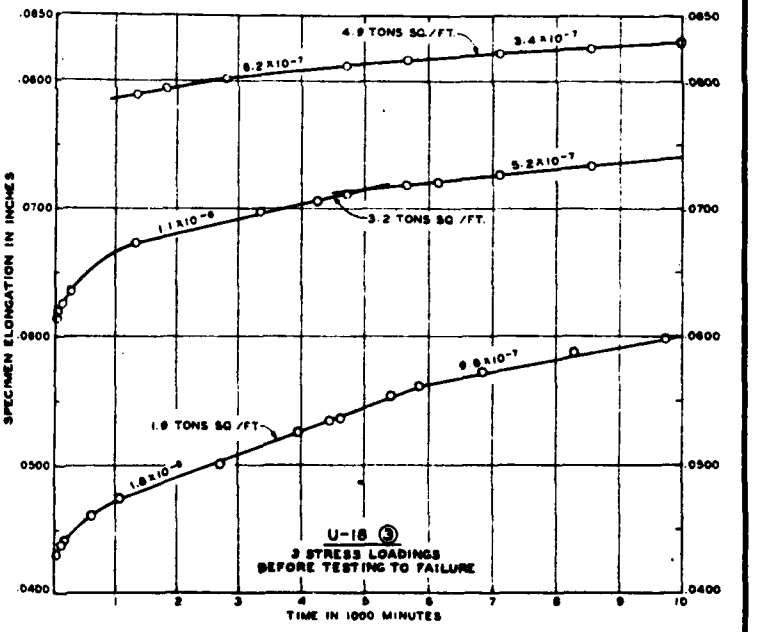
① LOADED TO 1.3 TONS SQ FT. FOR 5½ DAYS THEN QUICK TESTED TO FAILURE

② LOADED TO 2.1 TONS SQ /FT. FOR 3 DAYS THEN QUICK TESTED TO FAILURE

③ LOADED TO 1.9 TONS SQ /FT FOR 7 DAYS; 3.2 TONS SQ /FT FOR 8 DAYS; 4.9 TONS SQ /FT 7 DAYS THEN QUICK TESTED TO FAILURE







DATE	DESCRIPTION	MADE	APPVD
	REVISIONS		

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

DESIGNED BY:
DRAWN BY: R A
TRACED BY: S A
SUBMITTED BY:

MISSOURI RIVER
FORT PECK DAM AND RESERVOIR
SPILLWAY REHABILITATION
SUMMARY OF RESULTS
TENSILE TESTS

APPROVED: Eugene A. Story
DATE: SEPT 1960

SAFETY PAYS

SPECIAL TESTS
SEE LEGEND

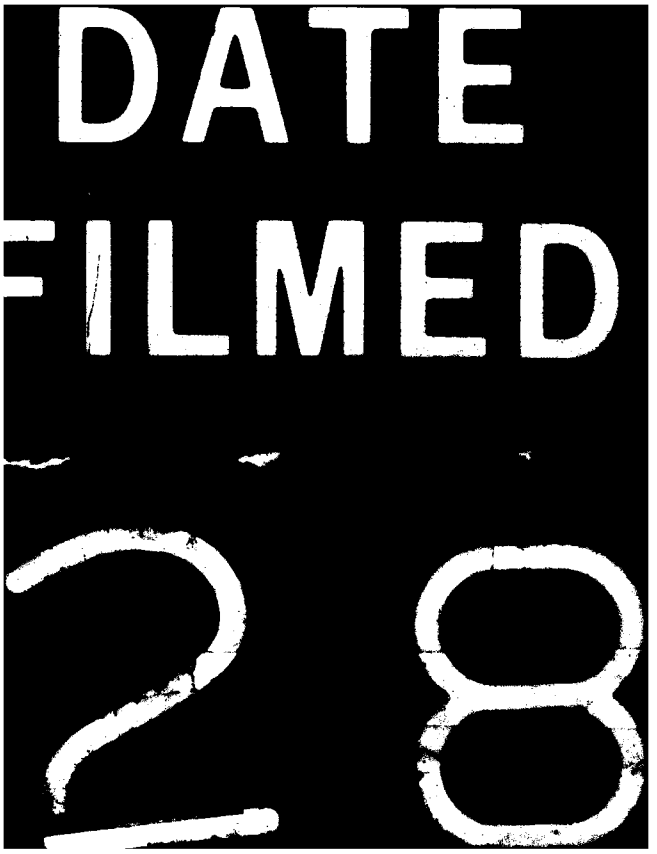
THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

THIS PLAN ACCOMPANIES CONTRACT NO. DA-23-066-eng-
MODIFICATION NO.

CONSTRUCTION FOUNDATION REPORT

PLATE 150

2


DATE
FILMED
28