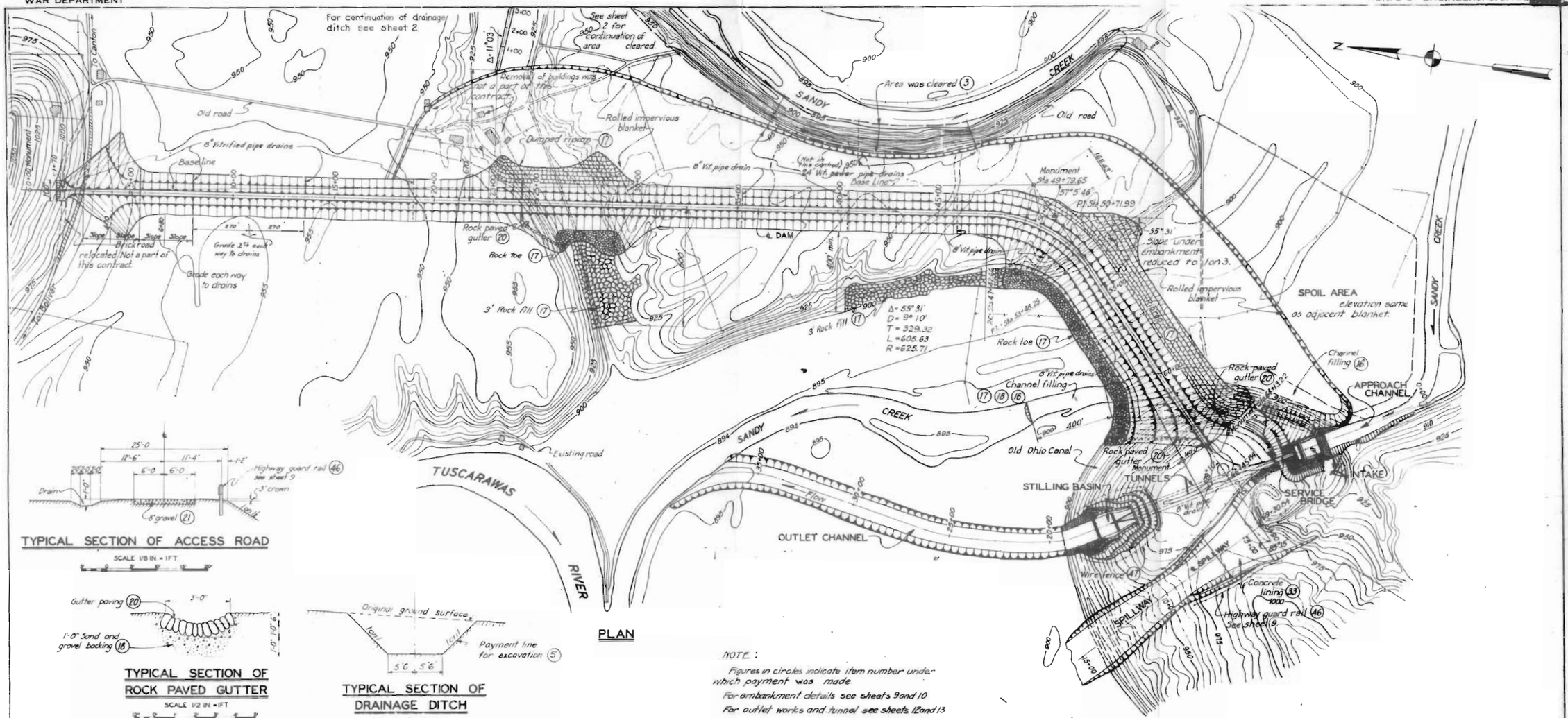
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



TYPICAL SECTION OF ACCESS ROAD

SCALE 1/8 IN. = 1 FT.

TYPICAL SECTION OF ROCK PAVED GUTTER

SCALE 1/2 IN = 1 FT

TYPICAL SECTION OF DRAINAGE DITCH

SCALE 1/8 IN = 1 FT.

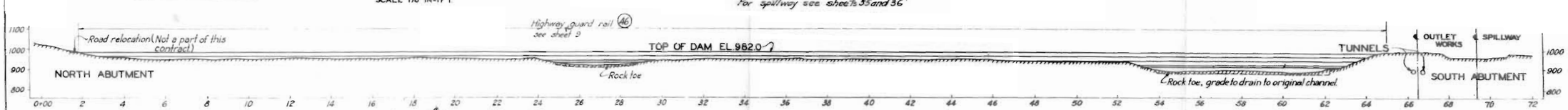
NOTE:

Figures in circles indicate item number under which payment was made.

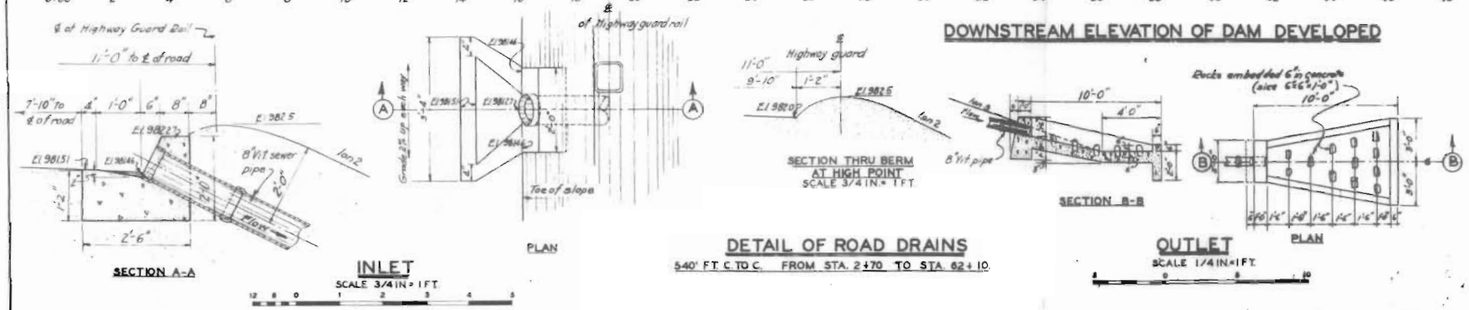
For embankment details see sheets 9 and 10

For outlet works and tunnel see sheets 12 and 13

For spillway see sheets 35 and 36



DOWNSTREAM ELEVATION OF DAM DEVELOPED



DETAIL OF ROAD DRAINS

540' FT ℄ TO ℄ FROM STA. 2+70 TO STA. 62+10.

DATE	REVISION	REV BY	CK BY	AP BY
5-25-35	Bench wall added Sta 33+00 to 52+18			
	DO and minor revisions			
6-14-35	Wing walls & minor revisions			
7-16-35	℄ Dam relocated to straight line, 0+00 to 30+18			
8-30-35	Roadway and embankment line revised at south abutment			
10-9-35	Curve data corrected			
2-12-36	Terrace rock toe added			
5-14-36	Drainage ditch added			
5-15-37	Road and blanket drainage added			
2-2-38	30" Pipe changed to 24" dia.			
3-29-38	Minor revisions as constructed			
6-8-50	Road drain at Station 5+50 added (by hired labor)			

WORK AS CONSTRUCTED

MUSKINGUM WATERSHED

BOLIVAR DAM

SANDY CREEK

PLAN AND ELEVATION OF DAM

SHEET 8 OF 46 SHEETS

SCALE: 1 IN. = 200 FT.

GRAPHIC SCALE - FEET

U. S. ENGINEER OFFICE, ZANESVILLE, O. APRIL, 1935

SUBMITTED: APPROVAL RECOMMENDED: APPROVED:

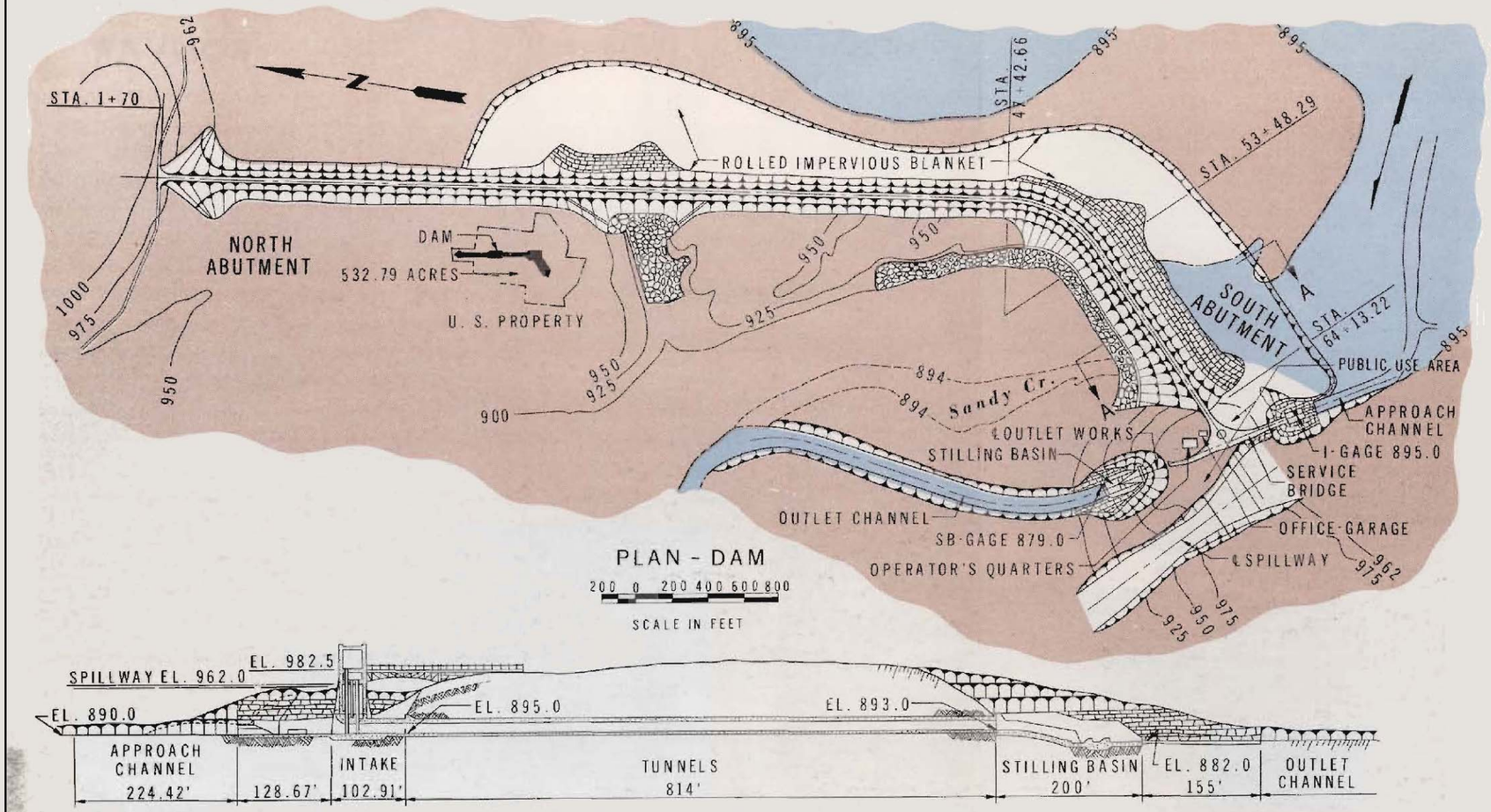
DESIGNED:

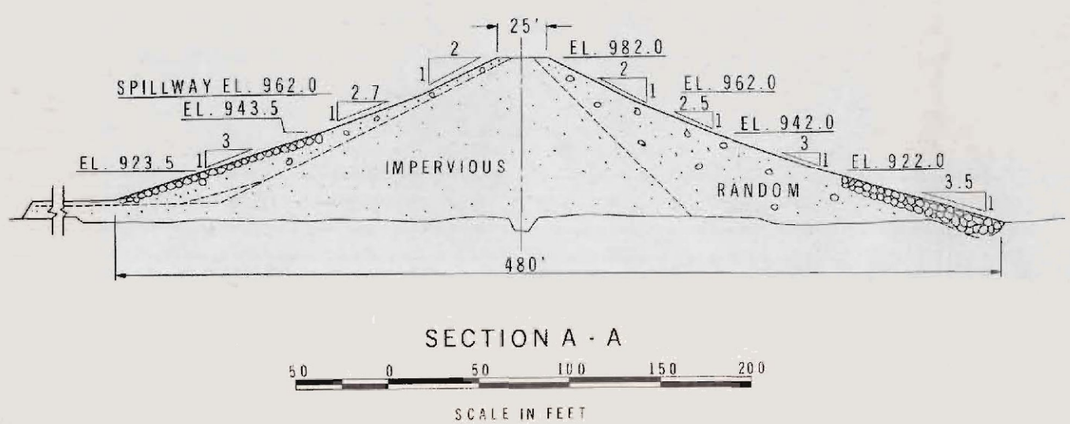
REVISED IN ACCORDANCE WITH ADDENDA OF JUNE 14, 1938, TO ACCOMPANY SPECIFICATIONS DATED MAY 1935

SERIAL No. 1411.

EXHIBIT NO. 8

PLATE A1





Periodic Inspection Report No. 1

MUSKINGUM RIVER

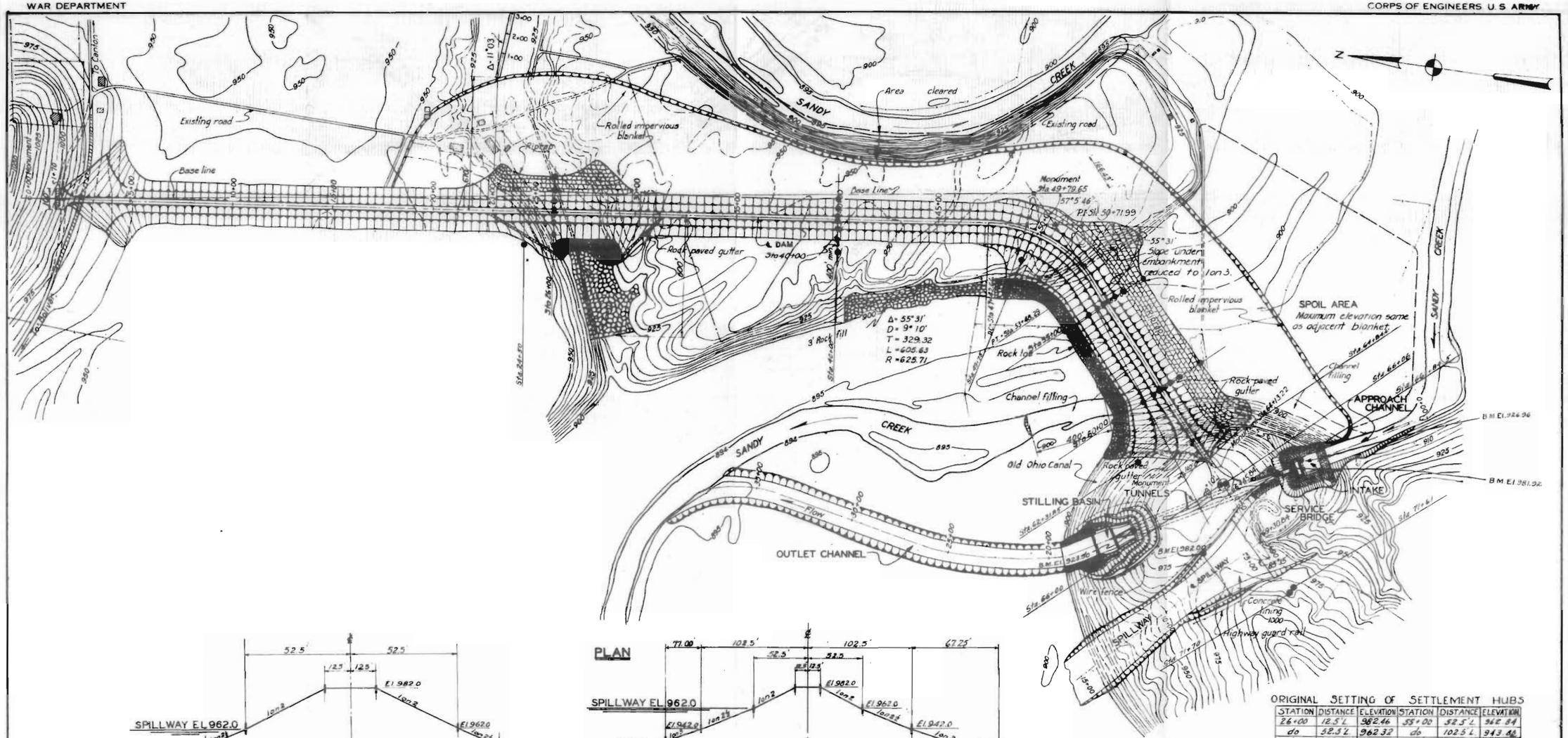
BOLIVAR RESERVOIR

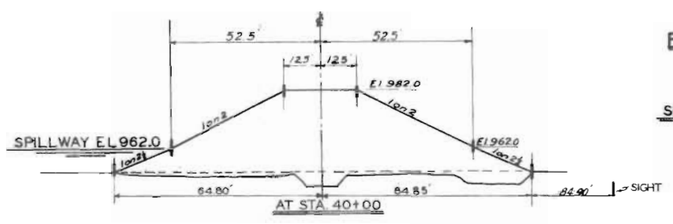
DAM, SPILLWAY

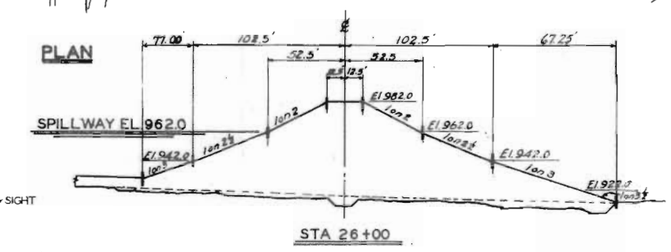
PLANS, PROFILE AND SECTIONS

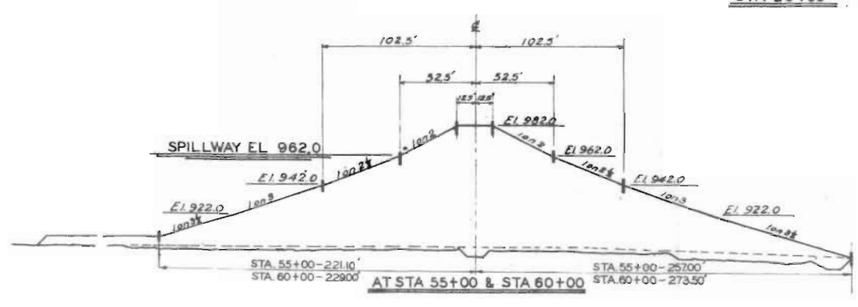
HUNTINGTON DISTRICT, HUNTINGTON, W. VA.

Revised: 30 JUNE 1969









PERMANENT REFERENCE HUBS

STATION	DISTANCE	ELEVATION
24+50	169.75'R	953.47
40+00	169.75'R	Sight ⊙
62+31.85	281.50'R	929.04
49+75	165.30'R	Sight ⊙
66+00	12.5'R	987.37
66+06	12.5'L	986.61
71+61	12.5'L	Sight ⊙
71+70	12.5'R	Sight ⊙
64+24.4	236.80'L	966.90
66+82.5	240.00'L	Sight ⊙

ORIGINAL SETTING OF SETTLEMENT HUBS

STATION	DISTANCE	ELEVATION	STATION	DISTANCE	ELEVATION
26+00	12.5'L	982.46	55+00	52.5'L	962.84
do	52.5'L	962.32	do	102.5'L	943.46
do	102.5'L	944.15	do	221.10'L	909.33
do	179.5'L	930.89	do	12.5'R	982.46
do	12.5'R	982.31	do	52.5'R	961.94
do	52.5'R	962.53	do	102.5'R	942.47
do	102.5'R	943.40	do	257.0'R	899.57
do	169.75'R	932.12	60+00	12.5'L	982.22
40+00	12.5'L	981.86	do	52.5'L	962.43
do	52.5'L	962.58	do	102.5'L	943.43
do	64.8'L	959.49	do	229.0'L	908.87
do	12.5'R	982.11	do	12.5'R	982.51
do	52.5'R	962.78	do	52.5'R	962.51
do	84.85'R	952.15	do	102.5'R	942.79
			do	273.5'R	897.93
55+00	12.5'L	982.52			

MUSKINGUM WATERSHED

BOLIVAR DAM

SANDY CREEK

SETTLEMENT AND REFERENCE HUBS

SHEET 1 OF 1 — SCALE: 1 IN. = 200 FT.

GRAPHIC SCALE - FEET

U.S. ENGINEER OFFICE, ZANESVILLE, O. — APRIL, 1935

SUBMITTED: ENGINEER, CHIEF PLANNING SECTION

APPROVAL RECOMMENDED: SENIOR ENGINEER, CHIEF ENGINEER'S DIVISION

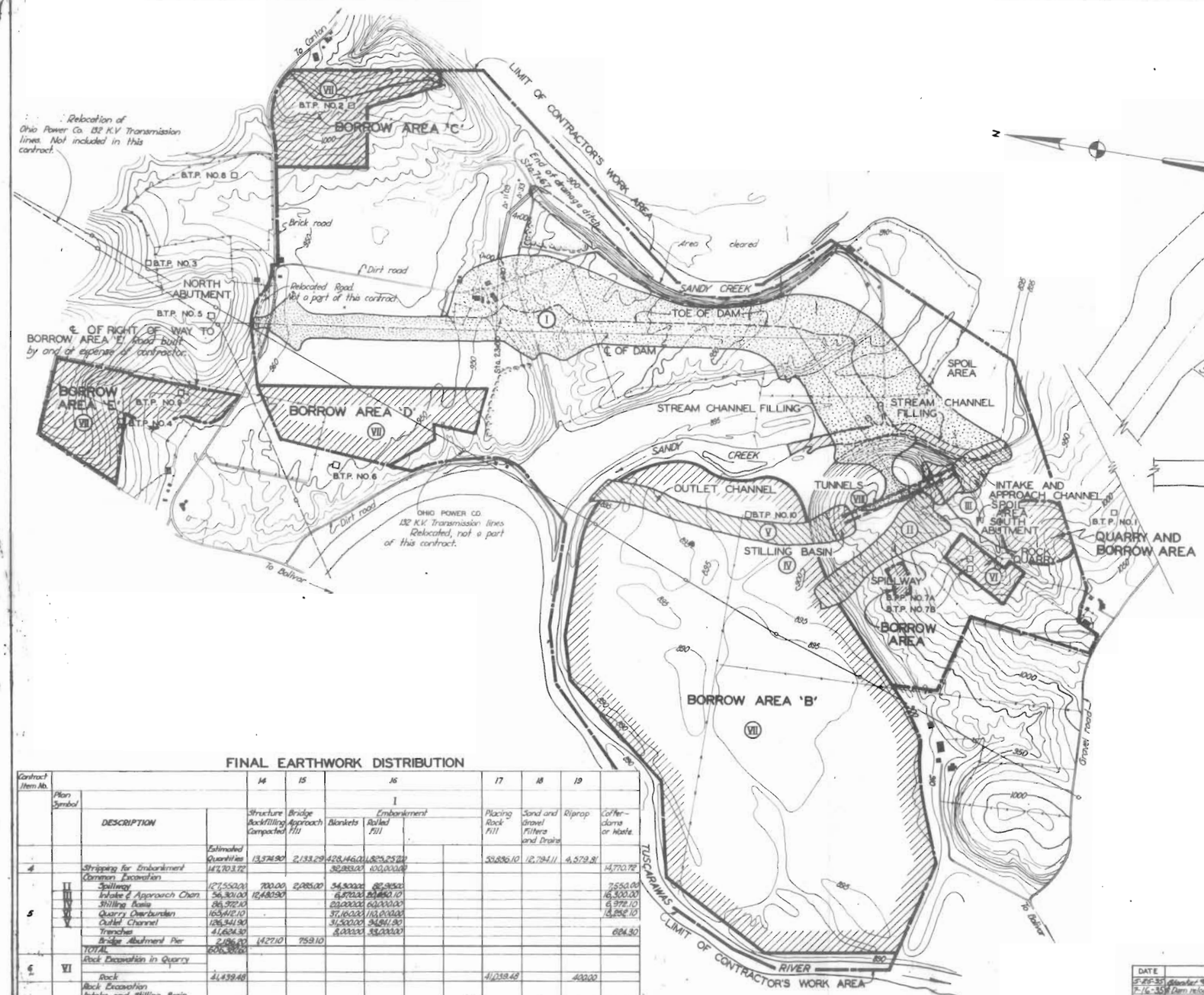
APPROVED: MAJOR, CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: A. L. Allen, ENGINEER

DRAWN BY: W.B.E.W.
TRACED BY: W.E.C.
CHECKED BY:

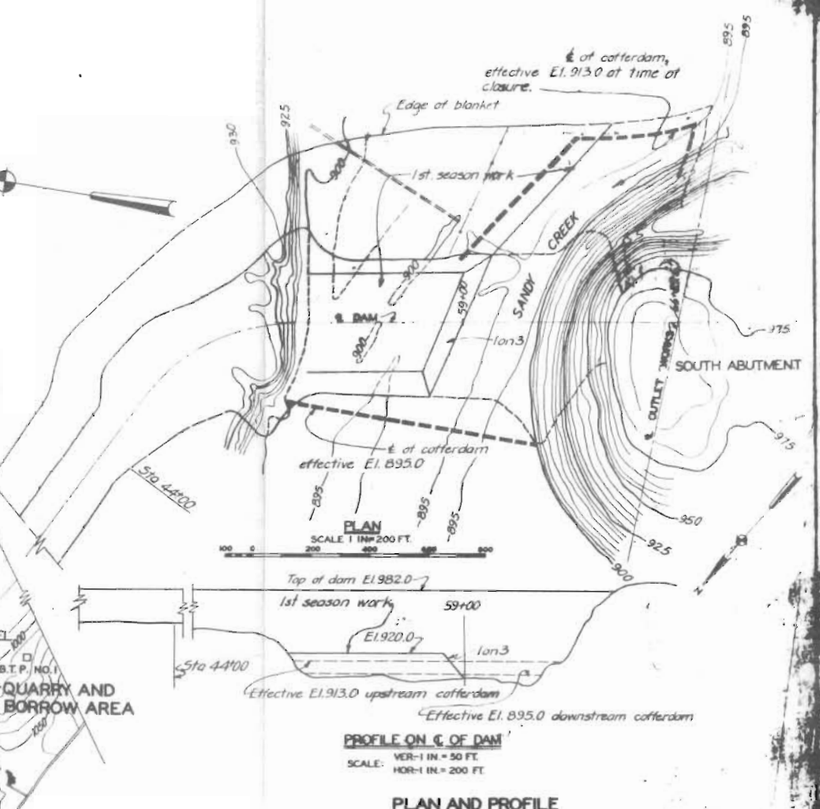
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



GENERAL PLAN

SCALE 1 IN. = 400 FT.



PROFILE ON ℄ OF DAM

SCALE: VER.-1 IN. = 50 FT. HOR.-1 IN. = 200 FT.

PLAN AND PROFILE SHOWING METHOD OF CLOSURE FOR ROLLED FILL METHOD

FINAL EARTHWORK DISTRIBUTION

Contract Item No.	Plan Symbol	DESCRIPTION		14 Structure Backfilling Compacted	15 Bridge Approach Fill	16 Embankment I: Blankets	16 Embankment I: Rolled Fill			17 Placing Rock Fill	18 Sand and Gravel Filters and Drains	19 Riprap	Coffer-dams or Waste
			Estimated Quantities	13,574.90	2,133.29	428,146.00	1,825,251.00			53,886.10	12,794.11	4,579.81	
4		Stripping for Embankment	147,703.72			32,893.00	100,000.00						14,770.72
5		Common Excavation											
	II	Spillway	127,552.00	700.00	2,285.00	34,900.00	82,900.00						7,550.00
	III	Intake & Approach Chan.	56,301.00	12,480.90		6,870.00	20,850.10						16,300.00
	IV	Stilling Basin	86,972.10			20,000.00	60,000.00						6,972.10
	VI	Quarry Overburden	165,412.10			37,160.00	110,000.00						18,252.10
	V	Outlet Channel	126,341.90			31,500.00	94,841.90						
		Trenches	41,624.30			8,000.00	33,000.00						624.30
		Bridge Abutment Pier	2,486.00	1,427.10	759.10								
		TOTAL	606,689.60										
6	VI	Rock Excavation in Quarry											
		Rock	41,439.48							41,039.48		400.00	
7		Rock Excavation Intake and Stilling Basin											
	III	Intake and Approach Channel	19,980.40			10,000.00				800.00		1,200.00	7,980.40
	IV	Stilling Basin	62,637.90			55,600.00				1,200.00		800.00	7,037.90
		TOTAL	82,618.30										
8	II	Rock Excavation Spillway	27,003.30			5,000.00				2,960.58		3,006.00	16,042.72
9		Rock Excavation Trenches	1,453.58			500.00							953.58
11	VIII	Tunnel Excavation	22,948.19			12,000.00							10,948.19
	VIII	Tunnel No. "B" Rolled	1,118,796.00	1,442.00		110,000.00	998,000.00				10,294.11		
	VIII	Tunnel No. "C" Rolled	540,820.00			10,000.00	400,000.00				3,500.00		
	VII	Borrow Area "C"	445,819.00			45,819.00	400,000.00						
			18,594.00				18,594.00						
			1,139,530	1,442.00	2,044.00	34,000	1,416,594.00			44,039.48	12,794.11	3,606.00	10,000.00

DATE	REVISION	REV BY	CK BY	AP BY
5-19-35	Detailed "Cut Matrix" of Closure.	[illegible]	[illegible]	[illegible]
7-16-35	Dam relocated to straight line, 0+00 to 50+72	[illegible]	[illegible]	[illegible]
8-30-35	Plan adjusted for roadway revision at S. Abut.	[illegible]	[illegible]	[illegible]
2-12-38	Revised for additional rock quarry	[illegible]	[illegible]	[illegible]
5-24-38	Drainage ditch added	[illegible]	[illegible]	[illegible]
3-29-38	Hydraulic fill method eliminated. Earth-mark distribution revised, borrow areas added as constructed.	[illegible]	[illegible]	[illegible]

WORK AS CONSTRUCTED
MUSKINGUM WATERSHED

BOLIVAR DAM

SANDY CREEK

GENERAL PLAN AND EARTHWORK DISTRIBUTION

SHEET 2 OF 46 SHEETS

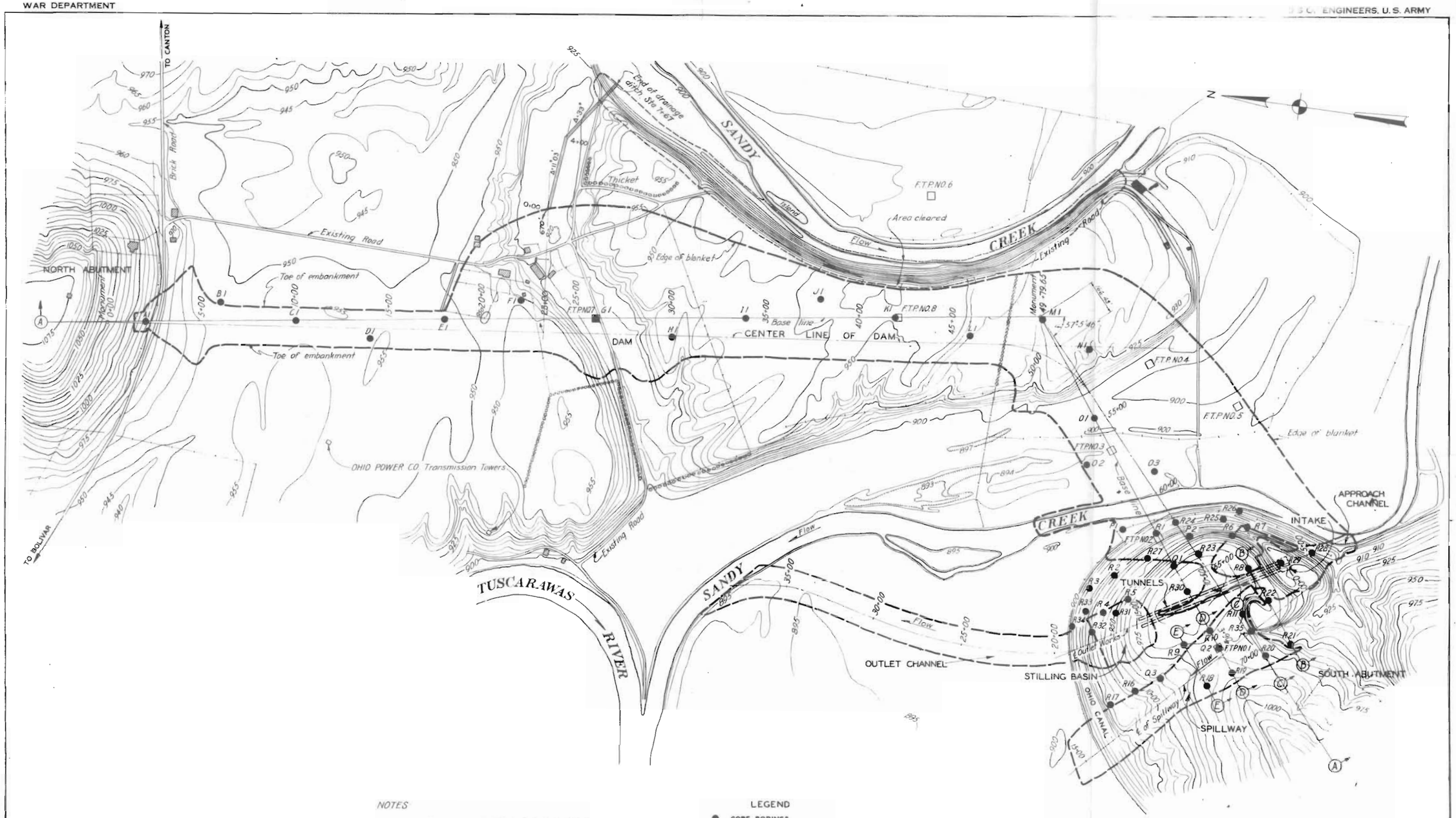
SCALES AS SHOWN

U. S. ENGINEER OFFICE, ZANESVILLE, O. APRIL 1[illegible]

SUBMITTED: APPROVAL RECOMMENDED: APPROVED:

PLATE A4

EXHIBIT NO. 3



NOTES

For profiles A-A, B-B, C-C, D-D, E-E & on ℄ of outlet works and spillway see sheet 4.

For record of foundation explorations see sheets 4, 5 and 6.

The entire area was systematically covered by auger borings. The logs and samples were available for inspection at the U.S. Engineer Office, Zanesville, Ohio.

LEGEND

- ● CORE BORINGS
- □ TEST PITS
- — — — OUTLINES OF STRUCTURES, LIMITS OF CHANNELS AND SPILLWAY CUTS

DATE	REVISION	REV BY	CK BY	AP BY
5-25-35	Blanket added, Sta 31+00 to 48+00			
7-16-35	℄ Dam relocated to straight line 0+00 to 30+00			
8-30-35	Plan adjusted for roadway revisions at S. Abut.			
5-14-36	Drainage ditch added			

WORK AS CONSTRUCTED
MUSKINGUM WATERSHED
BOLIVAR DAM
SANDY CREEK
PLAN OF FOUNDATION EXPLORATION

SHEET 3 OF 46 SHEETS — SCALE: 1 IN. = 200 FT.

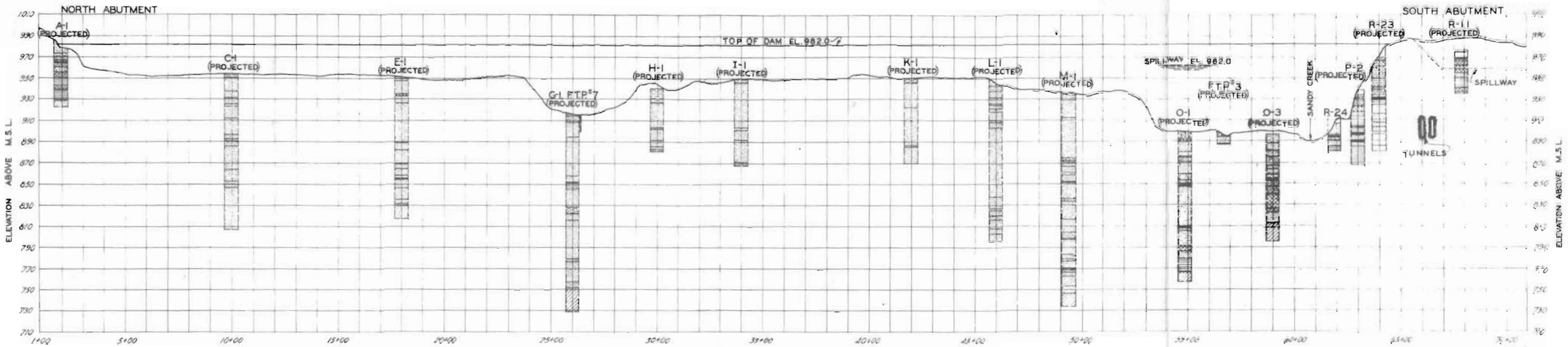
GRAPHIC SCALE - FEET

U.S. ENGINEER OFFICE, ZANESVILLE, O. — APRIL 1935

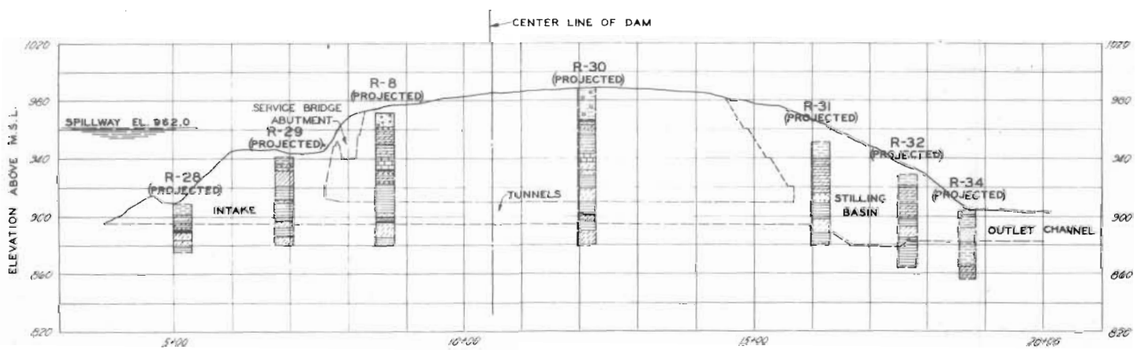
SUBMITTED: CHIEF, PLANNING SECTION — APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION — APPROVED: DISTRICT ENGINEER

DESIGNED: ENGINEER

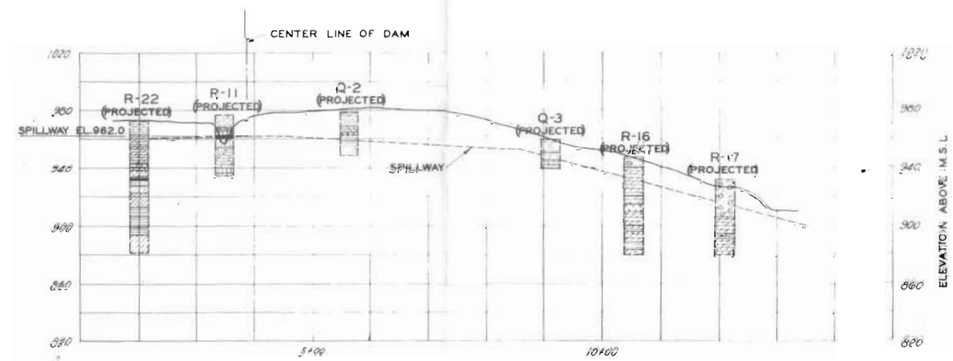
EXHIBIT NO. 4



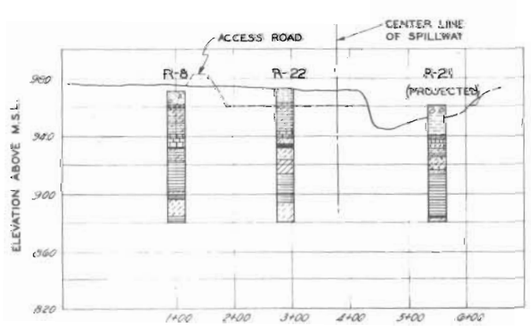
PROFILE ON LINE A-A



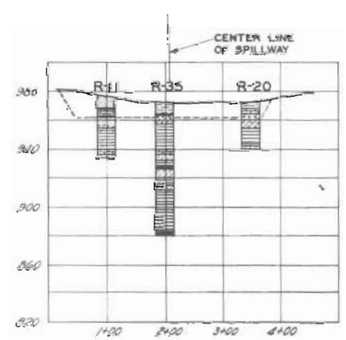
PROFILE ON CENTER LINE OF OUTLET WORKS



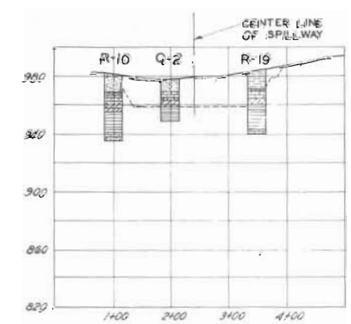
PROFILE ON CENTER LINE OF SPILLWAY



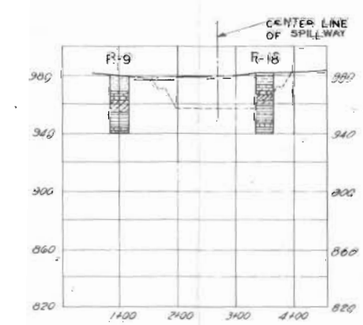
PROFILE ON LINE B-B



PROFILE ON LINE C-C



PROFILE ON LINE D-D



PROFILE ON LINE E-E

LEGEND

SAND, SILT, SHALE, CLAY, GRAVEL, SANDSTONE, LIMESTONE, WEATHERED SANDSTONE, WEATHERED SHALE, COAL

NOTES:
For location of profiles and borings see sheet 3.
For location of foundation test pits see sheet 3.
For location of borrow pit test pits see sheet 2.
Center line of borings and test pits is center line of legend.

DATE	REVISION	REV BY	CK BY	AP BY
12-14-36	Location of Service Bridge Abutment added to profile on ℄ of Dam	E.S.	CWR	

WORK AS CONSTRUCTED
MUSKINGUM WATERSHED
BOLIVAR DAM
SANDY CREEK
RECORD OF FOUNDATION EXPLORATIONS-NO. 1

SHEET 4 OF 46 SHEETS — SCALE AS SHOWN

U.S. ENGINEER OFFICE, ZANESVILLE, O. — APRIL, 1935

SUBMITTED: ENGINEER, CHIEF, PLANNING SECTION — APPROVAL RECOMMENDED: SENIOR ENGINEER, CHIEF, ENGINEERING DIVISION — APPROVED: SENIOR CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: ENGINEER

DR. BY W.W.B.-E.L.W. TR. BY L.K.F.-A.M. CK. BY L.B.Y.

TO ACCOMPANY SPECIFICATIONS DATED MAY, 1935.

SERIAL NO. EXHIBIT NO. 5

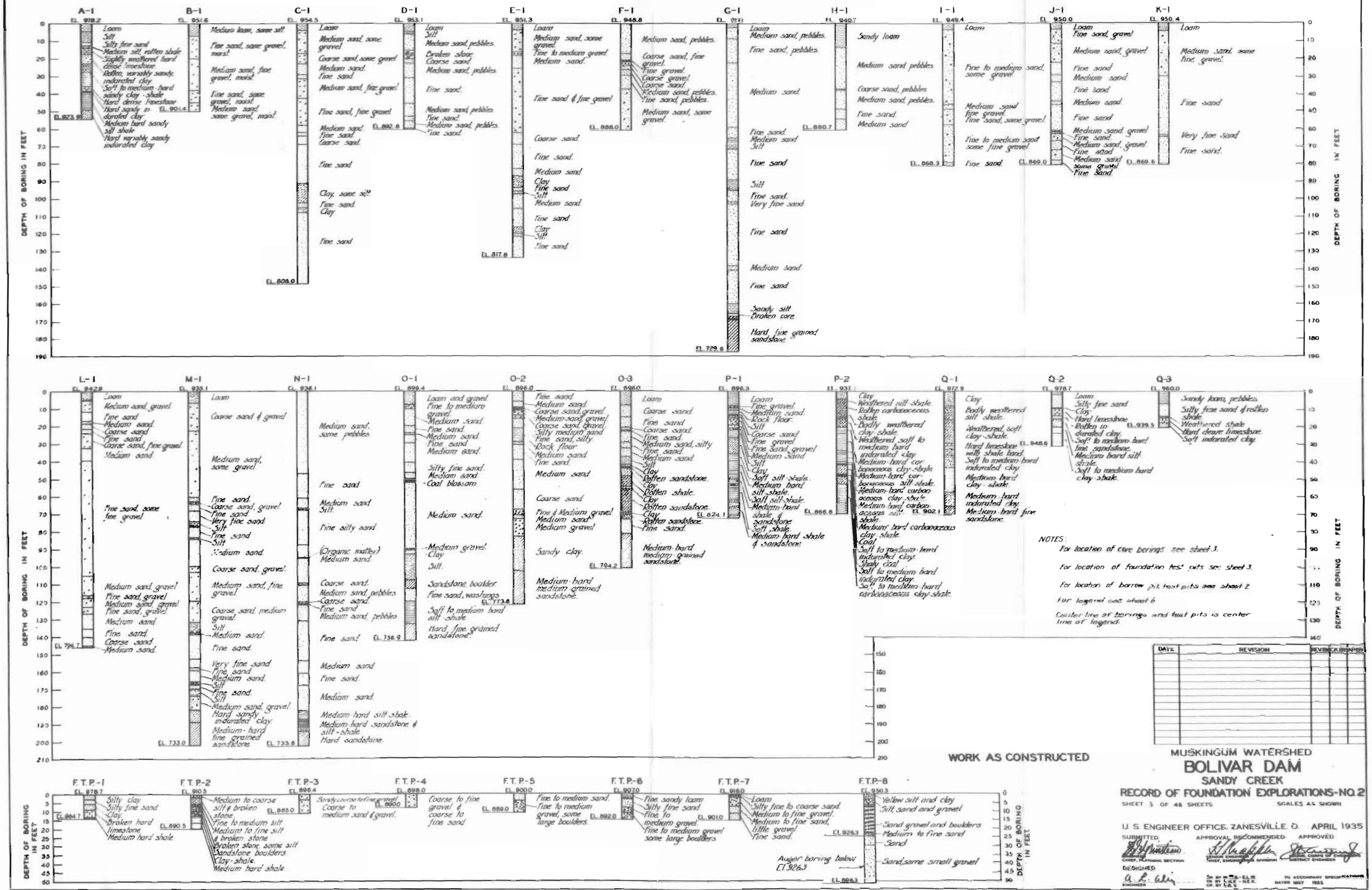
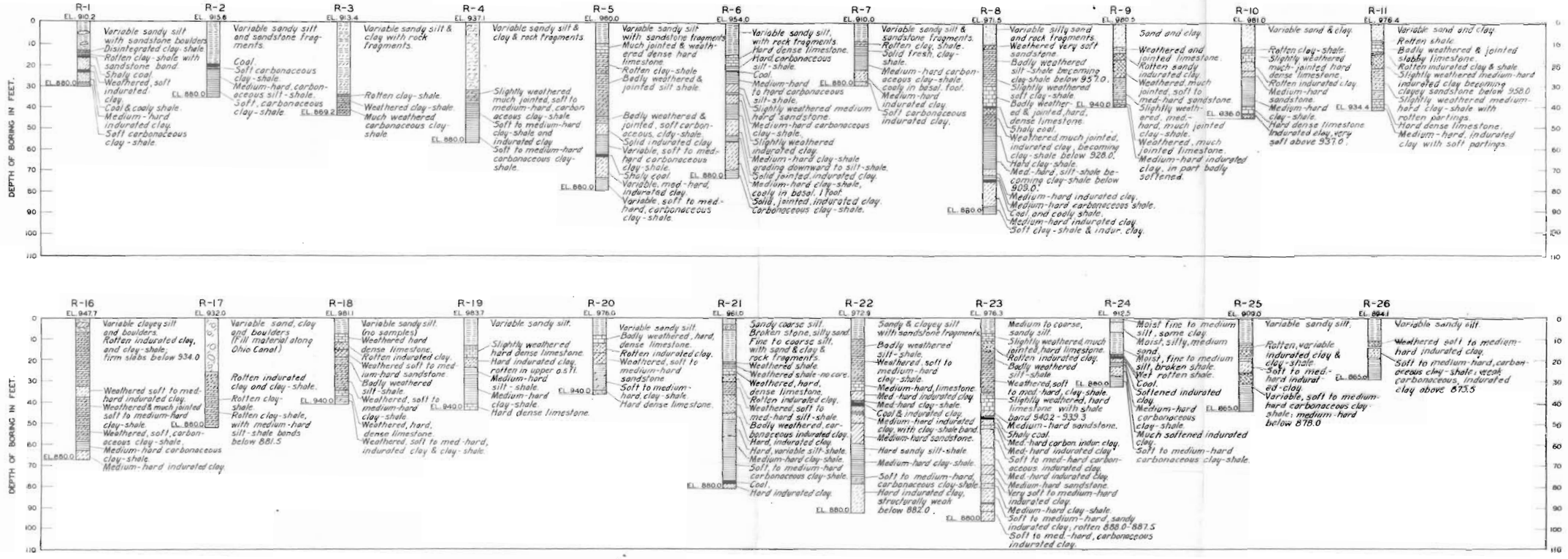


EXHIBIT NO. 6

PLATE A7



NOTES:

For location of core borings see sheet 3

For location of foundation test pits see sheet 3

For location of borrow pit test pits see sheet 2

Center line of borings and test pits is center line of legend.

DATE	REVISION	REV BY	CK BY	AP BY

LEGEND

SAND, GRAVEL, SILT, CLAY, SHALE, WEATHERED SHALE, SANDSTONE, WEATHERED SANDSTONE, LIMESTONE, COAL

WORK AS CONSTRUCTED
MUSKINGUM WATERSHED
BOLIVAR DAM
SANDY CREEK
RECORD OF FOUNDATION EXPLORATIONS-NO.3

SHEET 6 OF 48 SHEETS — SCALE AS SHOWN

U. S. ENGINEER OFFICE, ZANESVILLE, O. — APRIL 1935

SUBMITTED: CHIEF, PLANNING SECTION — APPROVAL RECOMMENDED: SENIOR ENGINEER, CHIEF ENGINEERING DIVISION — APPROVED: MAJOR CORPS OF ENGINEERS, DISTRICT ENGINEER

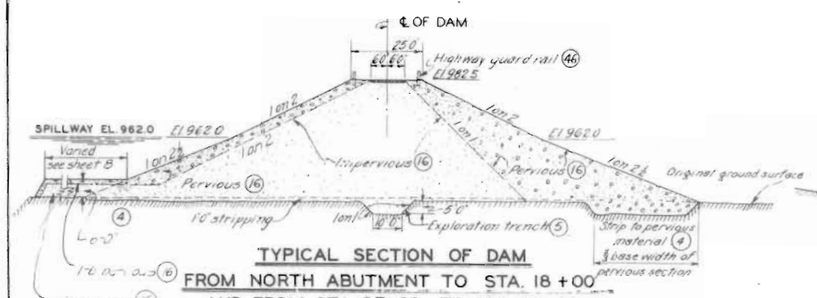
DESIGNED: ENGINEER

DR. BY: W.B.-E.L.W. TR. BY: R.F.-A.L.R. CK. BY: C.R.V.

TO ACCOMPANY SPECIFICATIONS DATED MAY 1935.

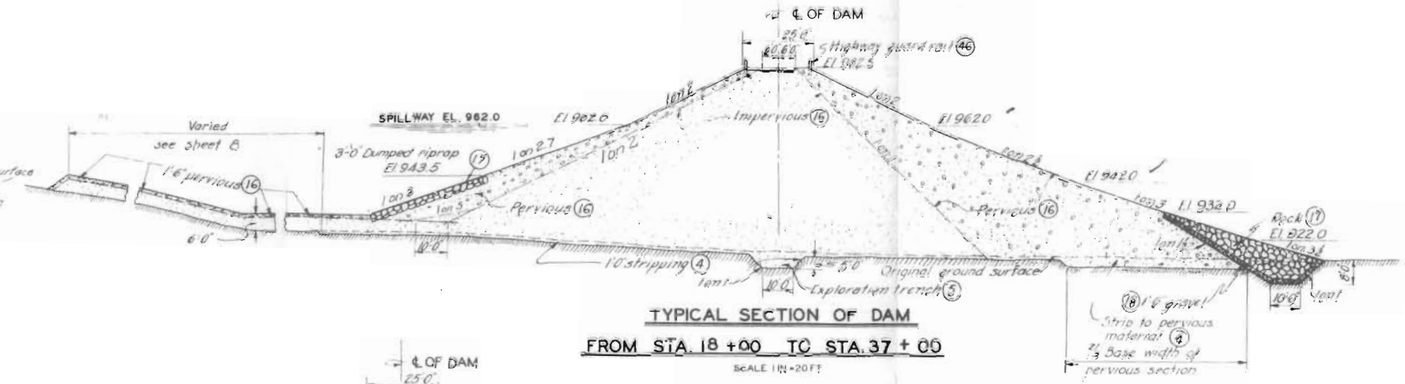
SERIAL NO.

EXHIBIT NO. 7



TYPICAL SECTION OF DAM
FROM NORTH ABUTMENT TO STA. 18 + 00
AND FROM STA. 37+00 TO STA. 48+00

SCALE 1IN = 20FT



TYPICAL SECTION OF DAM
FROM STA. 18 + 00 TO STA. 37 + 00

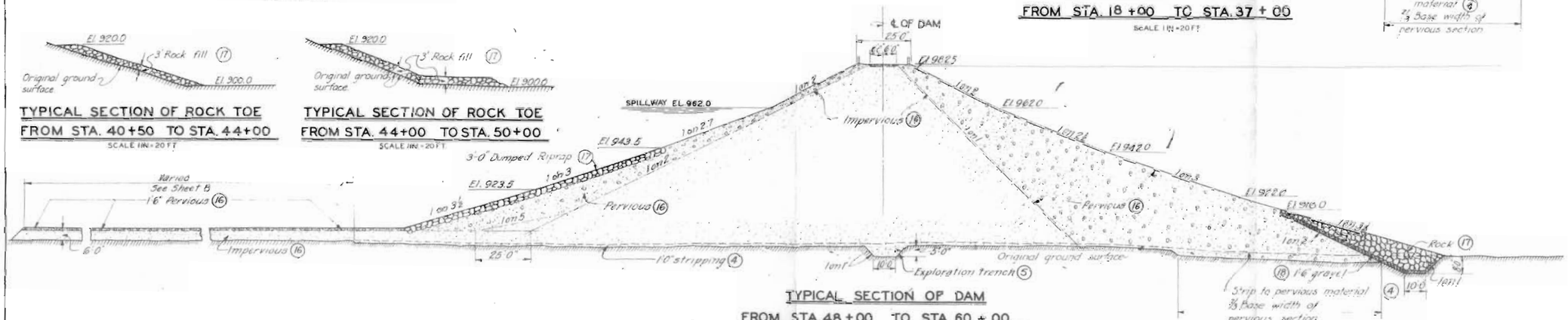
SCALE 1IN = 20FT

TYPICAL SECTION OF ROCK TOE
FROM STA. 40+50 TO STA. 44+00

SCALE 1IN = 20FT

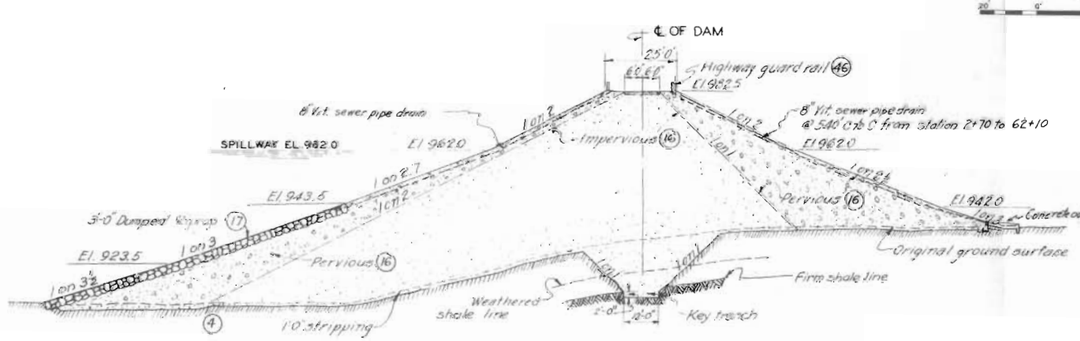
TYPICAL SECTION OF ROCK TOE
FROM STA. 44+00 TO STA. 50+00

SCALE 1IN = 20FT



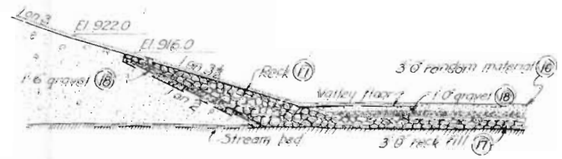
TYPICAL SECTION OF DAM
FROM STA. 48 + 00 TO STA. 60 + 00

SCALE 1IN = 20FT



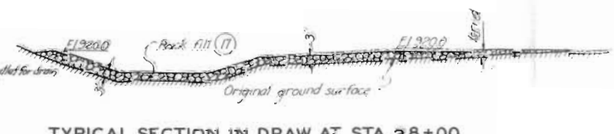
TYPICAL SECTION OF DAM
FROM STA. 60 + 00 TO SOUTH ABUTMENT

SCALE 1IN = 20FT



SECTION IN STREAM CHANNEL
BELOW DAM

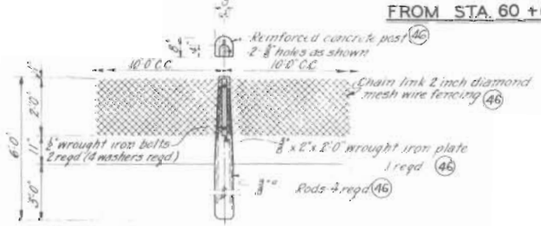
SCALE 1IN = 20 FT



TYPICAL SECTION IN DRAW AT STA. 28+00

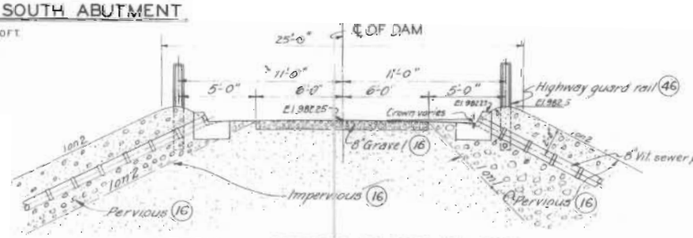
SCALE 1IN = 20FT

NOTES:
Figures in circles indicate item numbers under which payment was made



HIGHWAY GUARD RAIL

SCALE 1/2IN = 1FT



TYPICAL SECTION OF TOP OF DAM

SCALE 1/4IN = 1FT

DATE	REVISION	REV BY	CK BY	AP BY
5-20-36	Blanket added. Stations changed and minor revisions.			
4-14-35	Stripping sequence under pervious work from N. abut to 18+00 & 37+00 to 48+00			
6-12-36	Terrace rock toe added.			
7-8-37	South abutment key wall eliminated & key trench added			
9-15-37	Road drainage added			
3-30-38	Minor changes as constructed.			

WORK AS CONSTRUCTED

MUSKINGUM WATERSHED

BOLIVAR DAM

SANDY CREEK

EMBANKMENT DETAILS-ROLLED FILL

SHEET 9 OF 46 SHEETS

SCALE AS SHOWN

U. S. ENGINEER OFFICE, ZANESVILLE, O. APRIL, 1935

SUBMITTED: ENGINEER, CHIEF, PLANNING SECTION

APPROVAL RECOMMENDED: SENIOR ENGINEER, CHIEF, ENGINEERING DIVISION

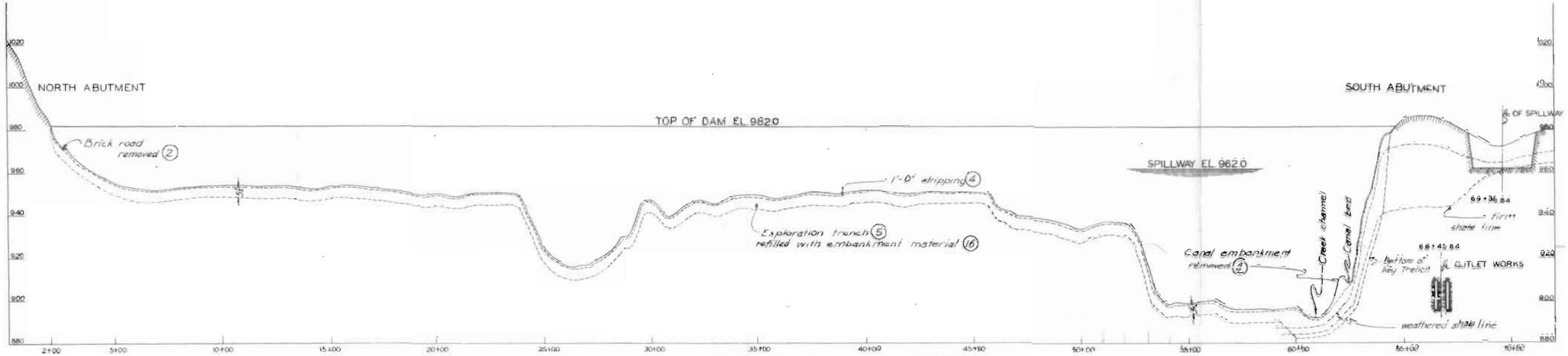
APPROVED: MAJOR, CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: ENGINEER

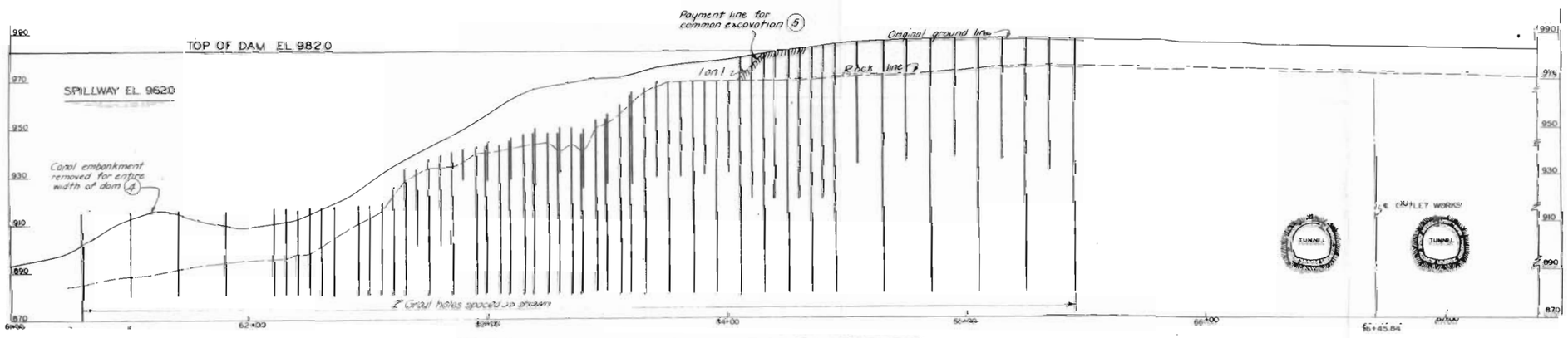
REVISED IN ACCORDANCE WITH ADDENDA OF DATE (4-19-33) TO ACCOMPANY SPECIFICATIONS DATED MAY, 1933

SERIAL No.

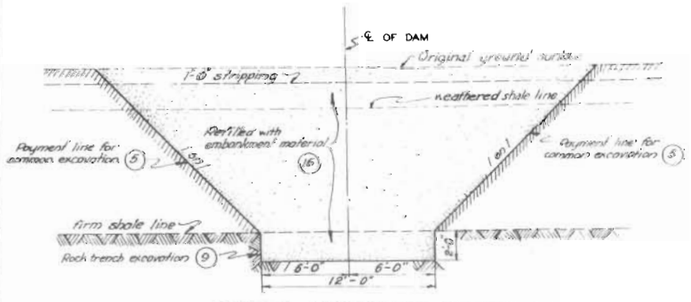
EXHIBIT NO. 9



PROFILE ON CENTERLINE OF DAM LOOKING UPSTREAM



PROFILE ON CENTERLINE OF DAM AT SOUTH ABUTMENT



TYPICAL SECTION OF KEY-TRENCH
FROM STA. 60+00 TO STA. 64+47

SCALE 1/4 IN = 1 FT

NOTES

Figures in circles indicate item number under which Payment was made.
Grouting under key trench was done in alternate holes first. Additional grouting was determined in the field.
Surfaces trenched were dependent upon field determination.

DATE	REVISION	REV BY	CK BY	A.P.B.
5-24-35	Minor revisions			
6-14-35	Minor revisions			
1-5-35	Stations changed for relocation of ℄ of Dam			
7-9-37	Soft abutment key wall elevated & key trench added	C.L.		
3-24-38	Grouting holes revised as constructed			

WORK AS CONSTRUCTED

MUSKINGUM WATERSHED
BOLIVAR DAM
SANDY CREEK
FOUNDATION TREATMENT

SHEET 14 OF 46 SHEETS — SCALE AS SHOWN

U.S. ENGINEER OFFICE: ZANESVILLE, O. APRIL, 1935

SUBMITTED: ENGINEER, CHIEF PLANNING SECTION — APPROVAL RECOMMENDED: CHIEF, PLANNING DIVISION — APPROVED: COLONEL, CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: ENGINEER

DR. BY: B.C.L.W. TR. BY: C.A.W. CK. BY: A.P.B.

REVISED IN ACCORDANCE ADDENDA OF JUNE 14, 19 TO ADDENDUM SPECIFICATIONS DATED MAY 1, 1935

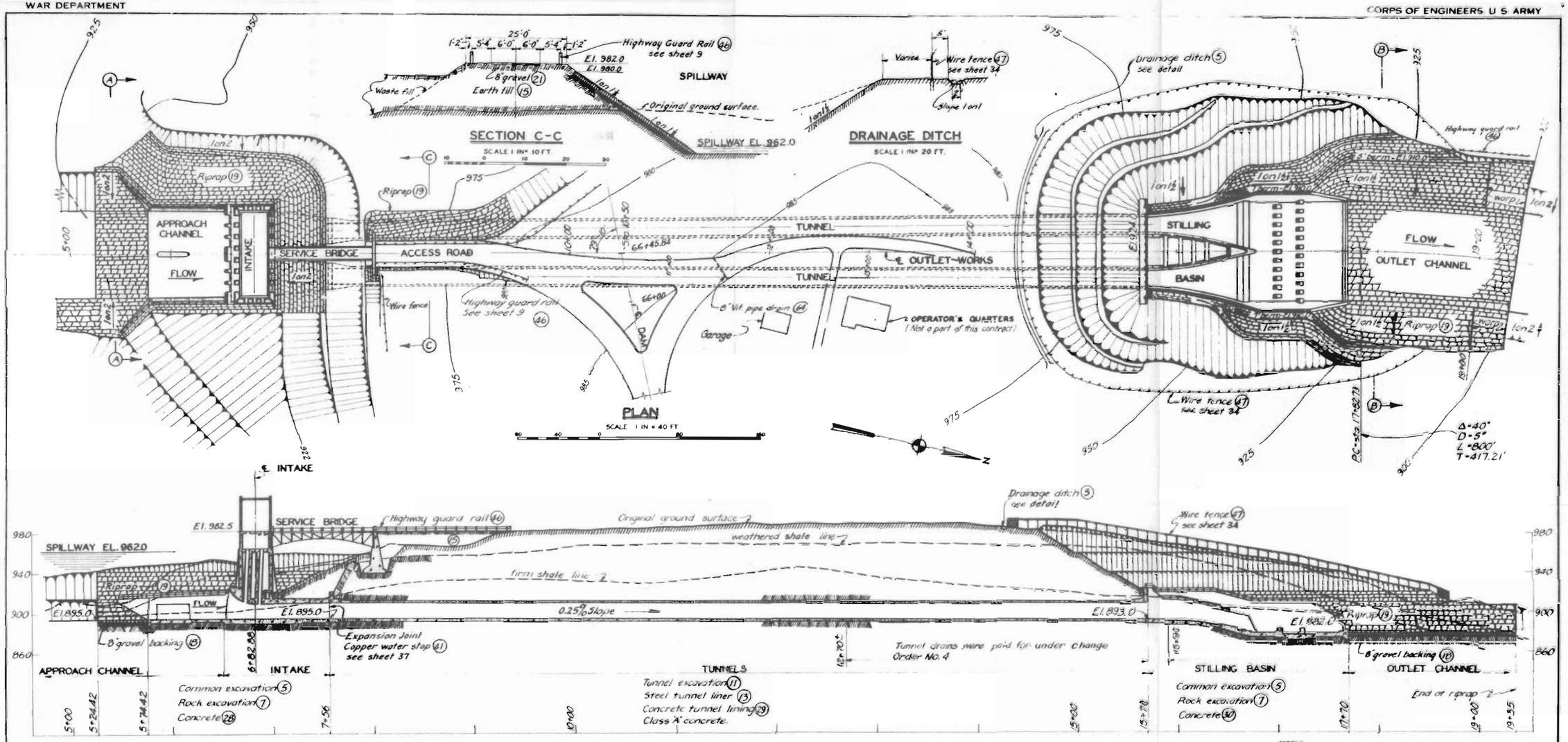
SERIAL NO.

EXHIBIT NO. 10

PLATE A10

WAR DEPARTMENT

CORPS OF ENGINEERS U S ARMY



DATE	REVISION	REV. BY	CK. BY	APP. BY
5-25-35	Minor revisions			
6-14-35	Wing walls and Minor revisions			
7-5-35	Minor revisions			
8-30-35	Roadway layout and minor revisions			
1-30-36	Tunnel drains added			
5-28-36	Contours & slopes revised as constructed			

NOTE:
Figures in circles indicate item number under which payment was made.

For Approach and Outlet Channels see sheet 13.

For Approach Channel lining see sheet 15.

For Intake see sheets 14, 16, 17, 18, 19, 20, 21, 22 and 23.

For Stilling Basin see sheets 32, 33 and 34.

For Tunnels see sheet 31

WORK AS CONSTRUCTED
MUSKINGUM WATERSHED

BOLIVAR DAM

SANDY CREEK

OUTLET WORKS-PLAN AND PROFILE

SHEET 12 OF 46 SHEETS — SCALES AS SHOWN

U. S. ENGINEER OFFICE, ZANESVILLE, O. — APRIL, 1935

SUBMITTED: CHIEF, PLANNING SECTION — APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION — APPROVED: DISTRICT ENGINEER

DESIGNED: A. R. Alin, ENGINEER

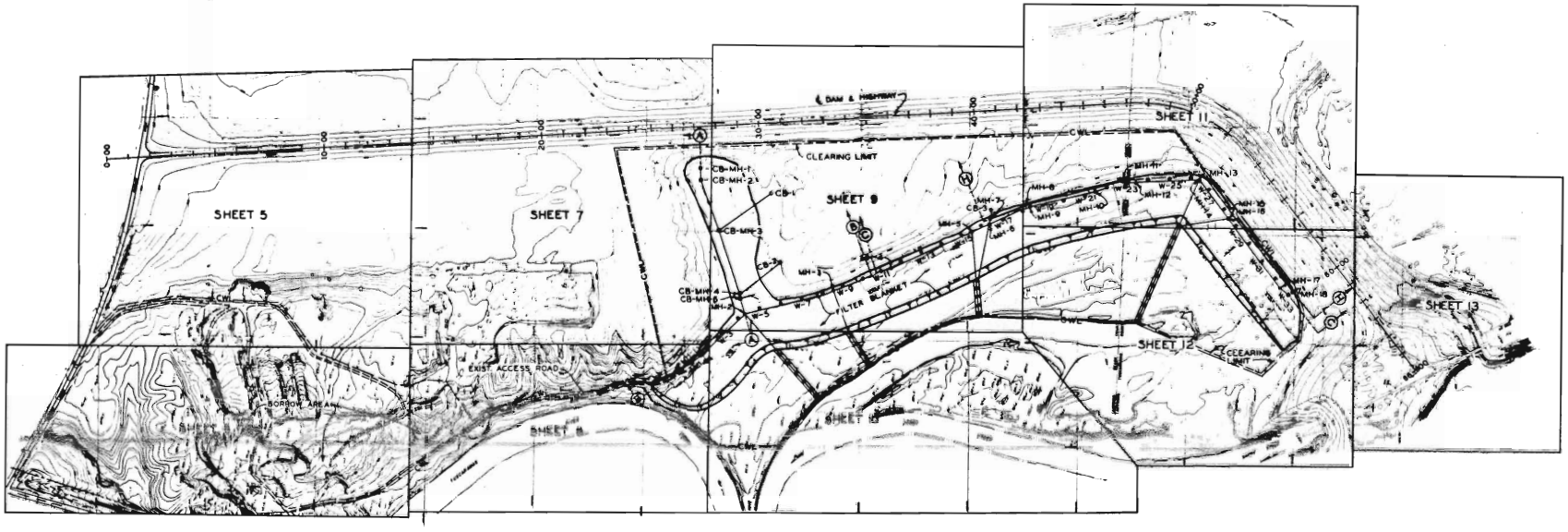
REVISED IN ACCORDANCE WITH ADDENDA OF JUNE 15, 1938 AND ACCOMPANY SPECIFICATIONS DATED MAY 1935

SERIAL NO. 14

PLATE A11

EXHIBIT NO. 11

Good Engineering Produces Better Environment



INDEX

SHT NO.	DRAWING NO	BOLIVAR DAM
1	027-1-UB-1-87/1	SITE PLAN & INDEX
2	87/2	SECTIONS, TABLES & LOCATION MAP
3	87/3	SECTION & TABLES
4	87/4	SECTIONS
5	87/5	ACCESS ROAD & BORROW AREA
6	87/6	ACCESS ROAD & BORROW AREA
7	87/7	ACCESS ROAD & BORROW AREA
8	87/8	RELIEF WELL LOCATION & DRAINAGE PLAN
9	87/9	RELIEF WELL LOCATION & DRAINAGE PLAN
10	87/10	RELIEF WELL LOCATION & DRAINAGE PLAN
11	87/11	RELIEF WELL LOCATION & DRAINAGE PLAN
12	87/12	RELIEF WELL LOCATION & DRAINAGE PLAN
13	87/13	EMBANKMENT PLAN
14	87/14	CATCH BASINS CB 2-3 & 2-4
15	87/15	WELL & HOUSING DETAILS
*16	87/16	GEOLOGY & SOILS LEGEND
*17	87/17	GRAPHIC LOGS OF BORINGS
*18	87/18	GRAPHIC LOGS OF BORINGS
*19	87/19	GRAPHIC LOGS OF BORINGS
*20	87/20	GRAPHIC LOGS OF BORINGS
*21	87/21	GRAPHIC LOGS OF BORINGS

*FOR INFORMATION PURPOSES ONLY

NOTES

1. CONTRACTOR SHALL MAINTAIN ACCESS THROUGH THE BORROW AREA AT ALL TIMES.
2. LIMITS OF EXCAVATION FOR BORROW ARE SHOWN AS CONTOUR LINES ON DRAWING NOS 87/6 AND 87/8.
3. MAXIMUM SLOPE FOR DISTURBED AREA OF THE BORROW AREA SHALL BE 1 VERTICAL TO 3 HORIZONTAL.

INDEX

SHT NO.	DRAWING NO.	DOVER DAM
1	027-UD-3-75/1	SITE PLAN & INDEX
2	75/2	CROSS SECTIONS
3	75/3	CROSS SECTIONS
4	75/4	FLOOR PLAN & ELEVATIONS
5	75/5	ELECTRICAL DETAILS
6	75/6	HEATING, VENTILATING & AIR COND. DETAILS
7	75/7	PLUMBING DETAILS
	12/107/1	ENVIRONMENTAL PROTECTION MEASURES
	12/107/2	ENVIRONMENTAL PROTECTION MEASURES

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: K.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.E.-C.D.B.
SUBMITTED BY: [illegible]
APPROVED: [illegible] DATE:
COL. C.E. DISTRICT ENGINEER
APPROVED FOR: DATE:

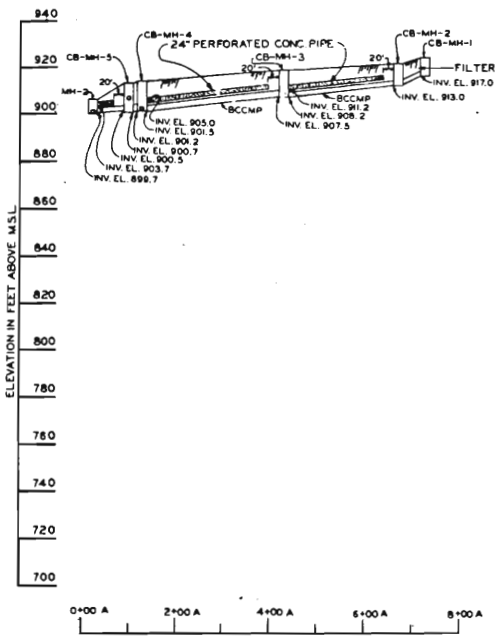
SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
SITE PLAN & INDEX

SCALE: 1" = 200' CONTR. NO.
DRAWING NUMBER 027-14-UB-1-87/1
SHEET 1 OF 21

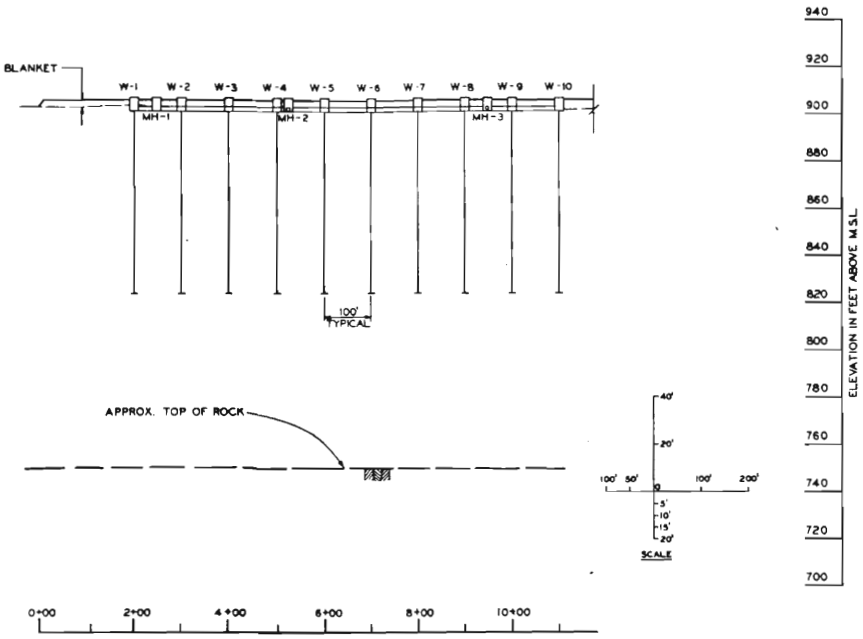
PLATE A12

EXHIBIT NO. 1

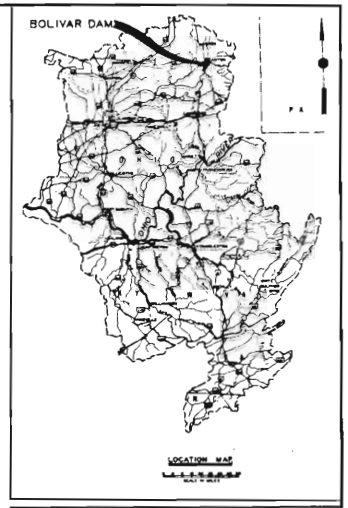
Good Engineering Produces Better Environment

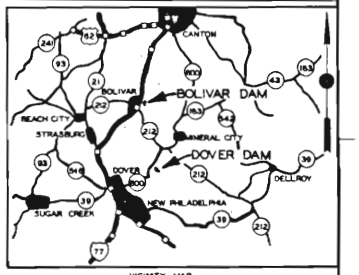


SECTION A-A



SECTION B-B





RELIEF WELL TABLE

WELL NUMBER	ELEVATION BOTTOM OF WELL SCREEN	LENGTH OF STAINLESS STEEL SCREEN & RISER (FT.)	ELEV. TOP OF STAINLESS STEEL RISER PIPE	ELEV. TOP OF FILTER PACK	ELEV. TOP OF CONCRETE	LENGTH OF 48" BCCMP HOUSING PIPE (FT.)	INVERT. ELEV. CONNECTOR PIPE AT COLLECTOR PIPE OR MANHOLE	ELEV. TOP OF 30" PERMANENT CASING
W-1	824.0	79.22	903.22	898.22	902.22	4.78	901.99	901.22
W-2	824.0	78.74	902.74	897.74	901.74	5.26	901.54	900.74
W-3	824.0	78.54	902.54	897.54	901.54	5.46	901.44	900.54
W-4	824.0	78.34	902.34	897.34	901.34	5.66	901.24	900.34
W-5	824.0	78.16	902.16	897.16	901.16	5.84	901.06	900.16
W-6	824.0	77.96	901.96	896.96	900.96	6.04	900.86	899.96
W-7	824.0	77.76	901.76	896.76	900.76	6.24	900.66	899.76
W-8	824.0	77.56	901.56	896.56	900.56	6.44	900.46	899.56
W-9	824.0	77.56	901.56	896.56	900.56	6.44	900.46	899.56
W-10	824.0	77.40	901.40	896.40	900.40	6.60	900.11	899.40

MANHOLE TABLE

MANHOLE NUMBER	SCALED COORDINATES	ELEVATION TOP OF 48" BCCMP OR 60" BCCMP *	ELEVATION BOTTOM OF 48" BCCMP OR 60" BCCMP *	ELEV. TOP OF CONCRETE AT FLOOR OF MANHOLE	FROM MANHOLE TO	BCCMP SIZE (INCHES)	INVERT ELEV. OF OPENINGS AT MANHOLES
MH-1	N 503,238	906.3	900.99	901.49	W-1	18"	901.99
	E1,999,927				MH-2	24"	901.49
MH-2	N 503,036	906.1 *	898.43 *	898.93	MH-1	24"	900.93
	E2,000,124				CB-MH-5	36"	899.93
					MH-3	24"	900.93
					OUTLET	48"	898.93
MH-3	N 502,835	906.2	898.61	899.11	MH-2	24"	900.11
	E2,000,227				W-10	24"	900.11
					OUTLET	36"	898.11

NOTES

1. FOR LOCATION OF SECTION A-A & B-B SEE 87/7 THRU 87/10
2. RELIEF WELLS SHALL HAVE STAINLESS STEEL WELL SCREENS & RISERS.
3. SECTION STATIONING (ALONG WELL ALIGNMENT) DOES NOT CORRESPOND TO DAM STATIONING.
4. CONNECTOR PIPE SIZES NOT SHOWN IN MANHOLE TABLE SHALL BE 18 INCH BCCMP.
5. ELEVATIONS AND LOCATIONS FOR RELIEF WELLS ARE APPROXIMATE & MAY VARY AFTER THE FILTER BLANKET HAS BEEN PLACED AND RESULTS FROM PILOT HOLE DRILLING ARE OBTAINED.

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: R.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.C.-C.D.B.
SUBMITTED BY:
CHIEF, DESIGN BRANCH
APPROVAL RECOMMENDED:
CHIEF, ENG. DIVISION
APPROVED FOR:
DATE:

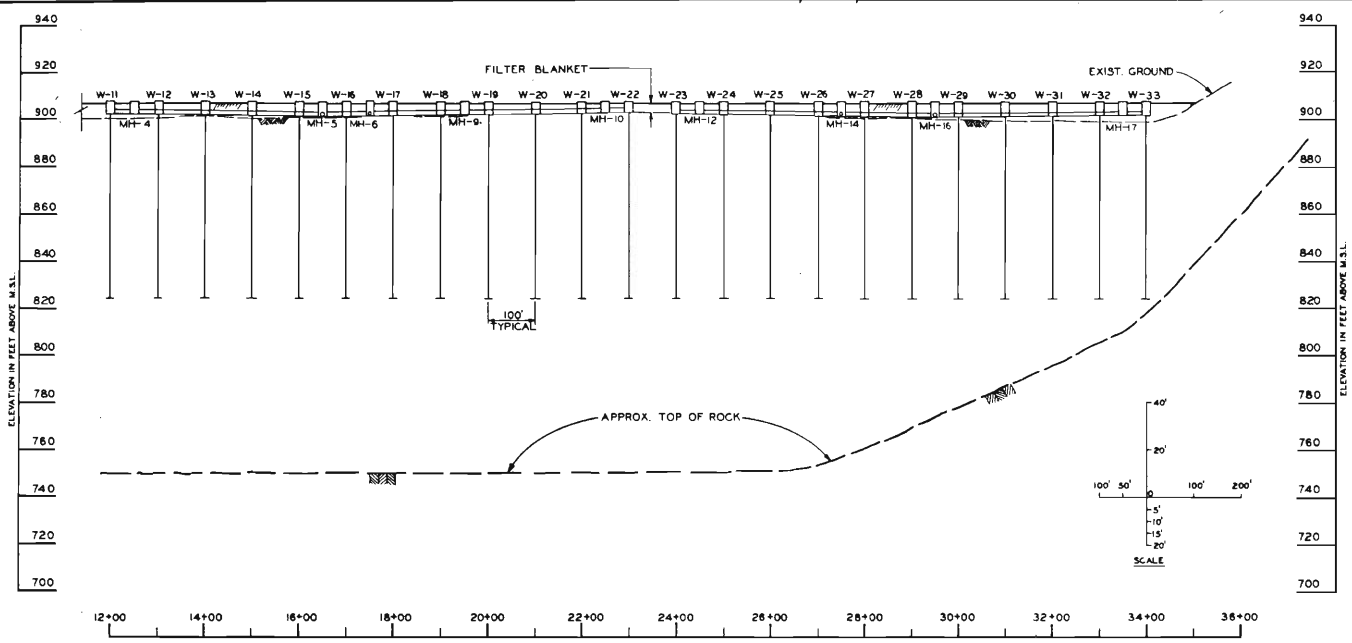
SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
SECTIONS, TABLES & LOCATION MAP

APPROVED: DATE:
COL. C.E. DISTRICT ENGINEER
SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER 0 27 15-UB-1-87/2
SHEET 2 OF 21

PLATE A13

EXHIBIT NO. 2

Good Engineering Produces Better Environment



SECTION C-C

CATCH BASIN TABLE

CATCH BASIN NUMBER	SCALED COORDINATES	FLOW LINE ELEVATION	ELEV. TOP OF CONCRETE AT FLOOR OF CATCH BASIN	SIZE OF CATCH BASIN	WALL & BASE SLAB THICKNESS
CB-1	N 502,921 E2,000,680	926.5	920.0	(2-3)	8"
CB-2	N 502,865 E2,000,374	920.5	916.5	(2-3)	8"
CB-3	N 501,902 E2,000,627	910.5	899.47	(2-3)	8"

CATCH BASIN-MANHOLE TABLE

CATCH BASIN MANHOLE NUMBER	SCALED COORDINATES	FLOW LINE ELEVATION	ELEV. TOP OF CONCRETE AT FLOOR OF CATCH BASIN MANHOLE	SIZE OF CATCH BASIN MANHOLE	WALL AND BASE SLAB THICKNESS
CB-MH-1	N 503,252 E2,000,795	923.1	917	(2-3)	8"
CB-MH-2	N 503,255 E2,003,736	922.4	913	(2-3)	8"
CB-MH-3	N 503,164 E2,000,509	919.5	907.5	(2-3)	8"
CB-MH-4	N 503,065 E2,000,224	913.5	901.2	(2-5)	8"
CB-MH-5	N 503,058 E2,000,199	913	900.5	(2-4)	8"

RELIEF WELL TABLE

WELL NUMBER	ELEVATION BOTTOM OF WELL SCREEN	LENGTH OF STAINLESS STEEL SCREEN & RISER (FT.)	ELEV. TOP OF STAINLESS STEEL RISER PIPE	ELEV. TOP OF FILTER PACK	ELEV. TOP OF CONCRETE	LENGTH OF 48" BCCMP HOUSING PIPE (FT.)	INVERT ELEV. CONNECTOR PIPE AT COLLECTOR PIPE OR MANHOLE	ELEV. TOP OF 30" PERMANENT CASING
W-11	824	78.84	902.84	897.84	901.84	5.0	901.37	902.84
W-12	824	77.95	901.95	896.95	900.95	5.8	900.90	899.95
W-13	824	77.75	901.75	896.75	900.75	6.1	900.70	899.75
W-14	824	77.55	901.55	896.55	900.55	6.3	900.50	899.55
W-15	824	77.35	901.35	896.35	900.35	6.6	900.30	899.35
W-16	824	77.22	901.22	896.22	900.22	6.6	900.17	899.22
W-17	824	77.42	901.42	896.42	900.42	6.2	900.37	899.42
W-18	824	77.62	901.62	896.62	900.62	6.0	900.57	899.62
W-19	824	77.94	901.94	896.94	900.94	5.8	900.89	899.94
W-20	824	78.14	902.14	897.14	901.14	5.6	901.09	900.14
W-21	824	78.34	902.34	897.34	901.34	5.4	901.29	900.34
W-22	824	79.23	903.23	898.23	902.23	4.5	901.76	901.23
W-23	824	78.80	902.80	897.80	901.80	4.9	901.62	900.80
W-24	824	78.19	902.19	897.19	901.19	5.5	901.17	900.19
W-25	824	77.79	901.79	896.79	900.79	5.9	900.77	899.79
W-26	824	77.39	901.39	896.39	900.39	6.4	900.37	899.39
W-27	824	76.99	900.99	895.99	899.99	6.7	899.97	898.99
W-28	824	76.59	900.59	895.59	899.59	7.1	899.57	898.59
W-29	824	76.59	900.59	895.59	899.59	7.1	899.57	898.59
W-30	824	76.99	900.99	895.99	899.99	6.5	899.97	898.99
W-31	824	77.39	901.39	896.39	900.39	6.3	900.37	899.39
W-32	824	77.79	901.79	896.79	900.79	5.8	900.77	899.79
W-33	824	78.40	902.40	897.40	901.40	5.2	901.22	900.40

MANHOLE TABLE

MANHOLE NUMBER	SCALED COORDINATES	ELEVATION TOP OF 48" BCCMP OR 60" BCCMP*	ELEVATION BOTTOM OF 48" BCCMP OR 60" BCCMP*	ELEV. TOP OF CONCRETE AT FLOOR OF MANHOLE	FROM MANHOLE TO	BCCMP SIZE (INCHES)	INVERT ELEV. OF OPENINGS AT MANHOLES
MH-4	N 502,356 E2,000,342	906.2	900.12	900.62	W-11	18"	901.12
					MH-5	24"	900.62
MH-5	N 501,992 E2,000,510	906.2	898.57	899.07	MH-4	24"	900.07
					MH-6	24"	900.07
					OUTLET	36"	899.07
MH-6	N 501,914 E2,000,546	906.2	897.5	898.0	MH-5	24"	901.0
					MH-7	30"	898.1
					MH-9	30"	898.6
					OUTLET	36"	898.0

MANHOLE TABLE (CONT'D)

MANHOLE NUMBER	SCALED COORDINATES	ELEVATION TOP OF 48" BCCMP OR 60" BCCMP*	ELEVATION BOTTOM OF 48" BCCMP OR 60" BCCMP*	ELEV. TOP OF CONCRETE AT FLOOR OF MANHOLE	FROM MANHOLE TO	BCCMP SIZE (INCHES)	INVERT ELEV. OF OPENINGS AT MANHOLES
MH-7	N 501,912 E2,000,563	906.4	897.76	898.26	MH-6	30"	898.26
					CB-3	24"	898.76
					MH-8	24" CONC.	898.6
MH-8	N 501,736 E2,000,633	906.4	899.1	902.0	MH-7	24" CONC.	902.0
					MH-11	24" CONC.	902.0
MH-9	N 501,722 E2,000,632	906.3	899.66	900.16	MH-6	30"	900.16
					MH-10	24"	900.41
MH-10	N 501,427 E2,000,792	906.2	900.51	901.01	MH-9	24"	901.01
					W-22	18"	901.76
MH-11	N 501,299 E2,000,745	906.5	902.5	903.0	MH-8	24" CONC.	903.0
					MH-13	24" CONC.	903.5
MH-12	N 501,231 E2,000,738	906.1	900.62	901.12	W-23	18"	901.62
					MH-14	24"	901.12
MH-13	N 500,926 E2,000,781	909.5	901.5	902.0	MH-11	24" CONC.	902.5
					MH-15	24" CONC.	902.5
					MH-14	30"	902.0
MH-14	N 500,943 E2,000,763	906.3	898.48	898.98	MH-12	24"	899.98
					MH-13	30"	899.48
					MH-16	24	899.98
					OUTLET	36	898.98
MH-15	N 500,797 E2,000,803	906.5	901.0	901.5	MH-13	24" CONC.	902.0
					MH-18	24" CONC.	902.0
					MH-16	30	901.5
MH-16	N 500,815 E2,000,591	906.1	897.64	898.14	MH-14	24"	899.14
					MH-15	30"	898.64
					MH-17	24"	899.14
					OUTLET	36"	898.14
MH-17	N 500,573 E2,000,774	906	900.22	900.72	MH-16	24"	900.72
					W-33	18	901.22
MH-18	N 500,318 E2,000,244	906.5	902.0	902.5	MH-15	24" CONC.	902.5

NOTES

1. FOR LOCATION OF SECTION C-C SEE 87/9, 11 AND 12
2. RELIEF WELLS SHALL HAVE STAINLESS STEEL WELL SCREENS & RISERS
3. SECTION STATIONING (ALONG WELL ALIGNMENT) DOES NOT CORRESPOND TO DAM STATIONING.
4. CONNECTOR PIPE SIZES NOT SHOWN IN MANHOLE TABLE SHALL BE 18 INCH BCCMP.
5. ELEVATIONS AND LOCATIONS FOR RELIEF WELLS ARE APPROXIMATE & MAY VARY AFTER THE FILTER BLANKET HAS BEEN PLACED & RESULTS FROM PILOT HOLE DRILLING ARE OBTAINED.
6. FOR LOCATION OF CATCH BASINS SEE 87/9
7. FOR LOCATION OF CATCH BASIN & MANHOLES, SEE 87/7 AND 87/9.

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: R.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L. C.D.B.
SUBMITTED BY:
CHIEF, DESIGN BRANCH:
APPROVAL RECOMMENDED: APPROVED: DATE:
CHIEF ENG. DIVISION: COL. C.E. DISTRICT ENGINEER
APPROVED FOR:
DATE

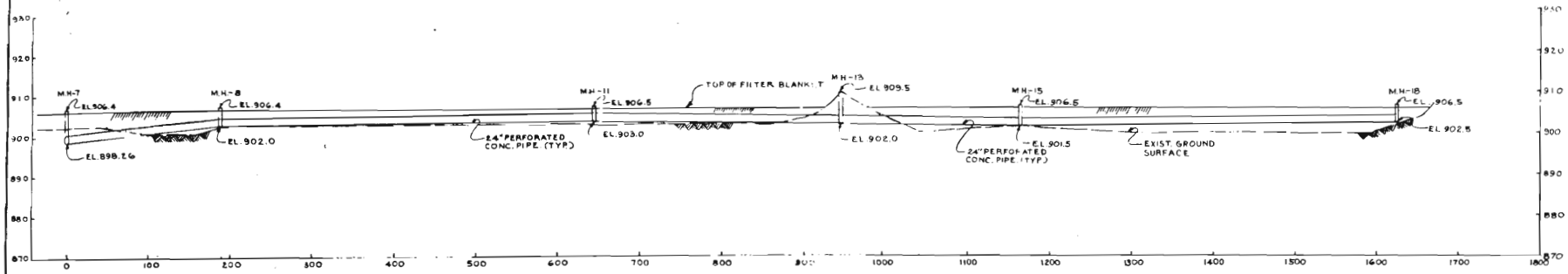
SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
SECTION & TABLES

SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER 0 27 11-UB-1-87/3
SHEET 3 OF 21

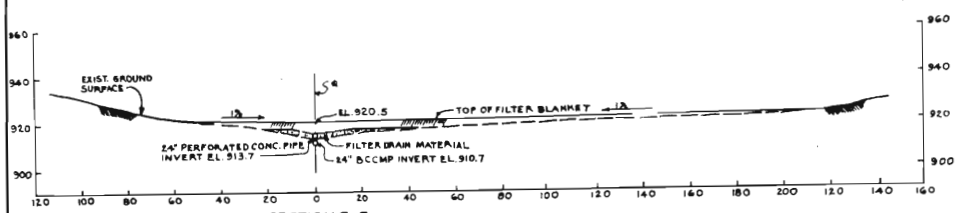
PLATE A14

EXHIBIT NO. 3

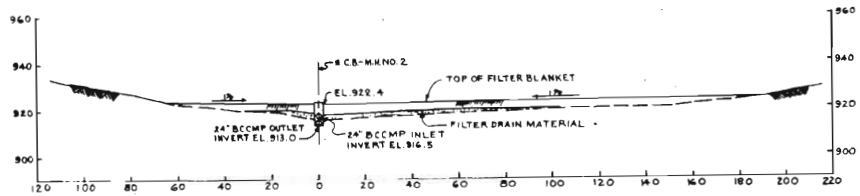
Good Engineering Produces Better Environment



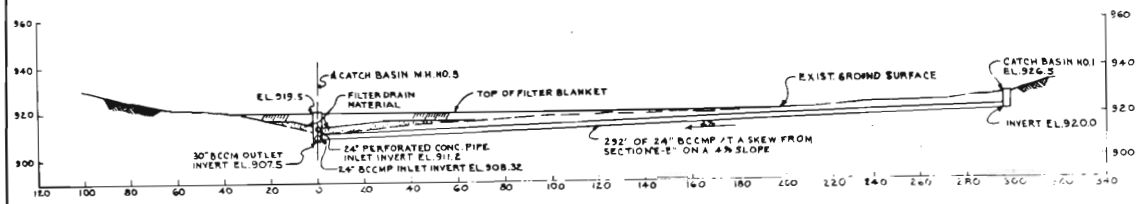
SECTION H-H



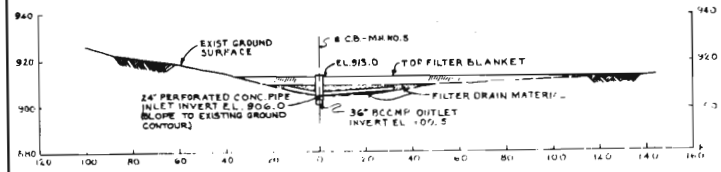
SECTION F-F



SECTION G-G



SECTION E-E



SECTION D-D

NOTES

1. FOR LOCATION OF D-D, E-E, F-F, G-G, SEE 87/7 & 87/9.
2. FOR LOCATION OF SECTION H-H, SEE 87/9, 87/11 & 87/12.

REVISION	DATE	DESCRIPTION	BY

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: D.W.
DRAWN BY: D.W.
CHECKED BY: R.C.B.
SUBMITTED BY:
CHIEF, DESIGN BRANCH
APPROVAL RECOMMENDED: APPROVED DATE
CHIEF, ENG. DIVISION — COL. C.E. DISTRICT ENGINEER
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
SECTIONS

SCALE: AS SHOWN | CONTR. NO.
DRAWING NUMBER: 0 27 13-UB-1-87/4
SHEET 4 OF 21

PLATE A15

EXHIBIT NO. 4

Good Engineering Produces Better Environment

NOTE
GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM.

SCALE IN FEET
50' 0 50' 100' 150'
TWO FOOT CONTOUR INTERVAL

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: M.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L.-C.D.B.
SUBMITTED BY:
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED
CHIEF ENG. DIVISION
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
ACCESS ROAD & BORROW AREA

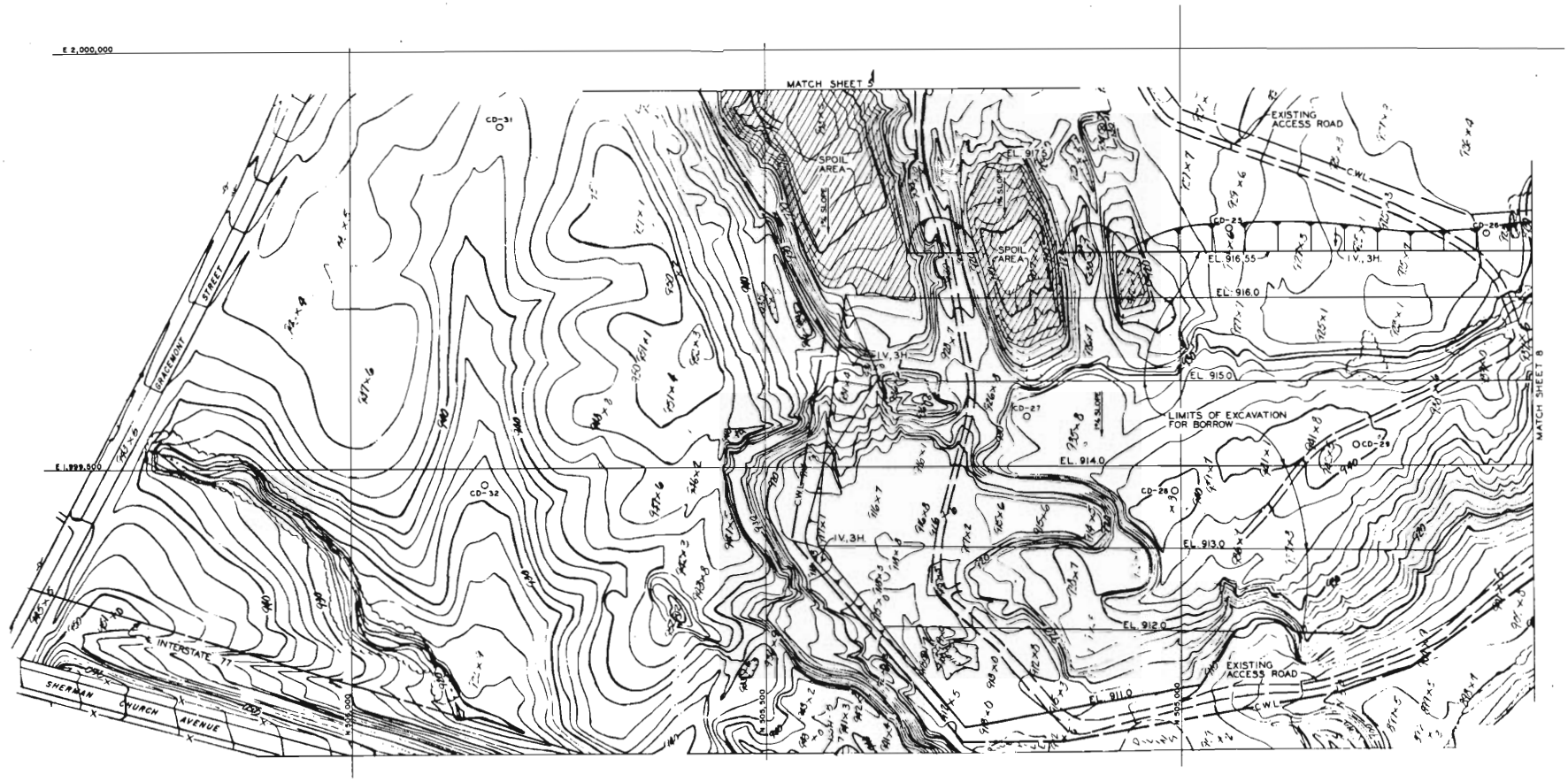
APPROVED: DATE:
COL. C.E. DISTRICT ENGINEER

SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER: 0 27 18-JB-1-87/5
SHEET 5 OF 21

PLATE A16

EXHIBIT NO. 5

Good Engineering Produces Better Environment



NOTE:
GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM

SCALE IN FEET
50' 0 50' 100' 150'
TWO FOOT CONTOUR INTERVAL

LEGEND

(hatched)	FILL AREAS
—C.W.L.—	CONTRACTORS WORK LIMITS
CD-27 ○	DISTURBED SAMPLE BORING
CD-14 ○	DISTURBED SAMPLE BORING WITH PIEZOMETER, SEE B7/16

REVISION	DATE	DESCRIPTION	BY

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: K.K.A. - T.D.W.
DRAWN BY: TDW
CHECKED BY: J.W.L.-C.D.B.
SUBMITTED BY:
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED
CHIEF ENG. DIVISION
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
ACCESS ROAD & BORROW AREA

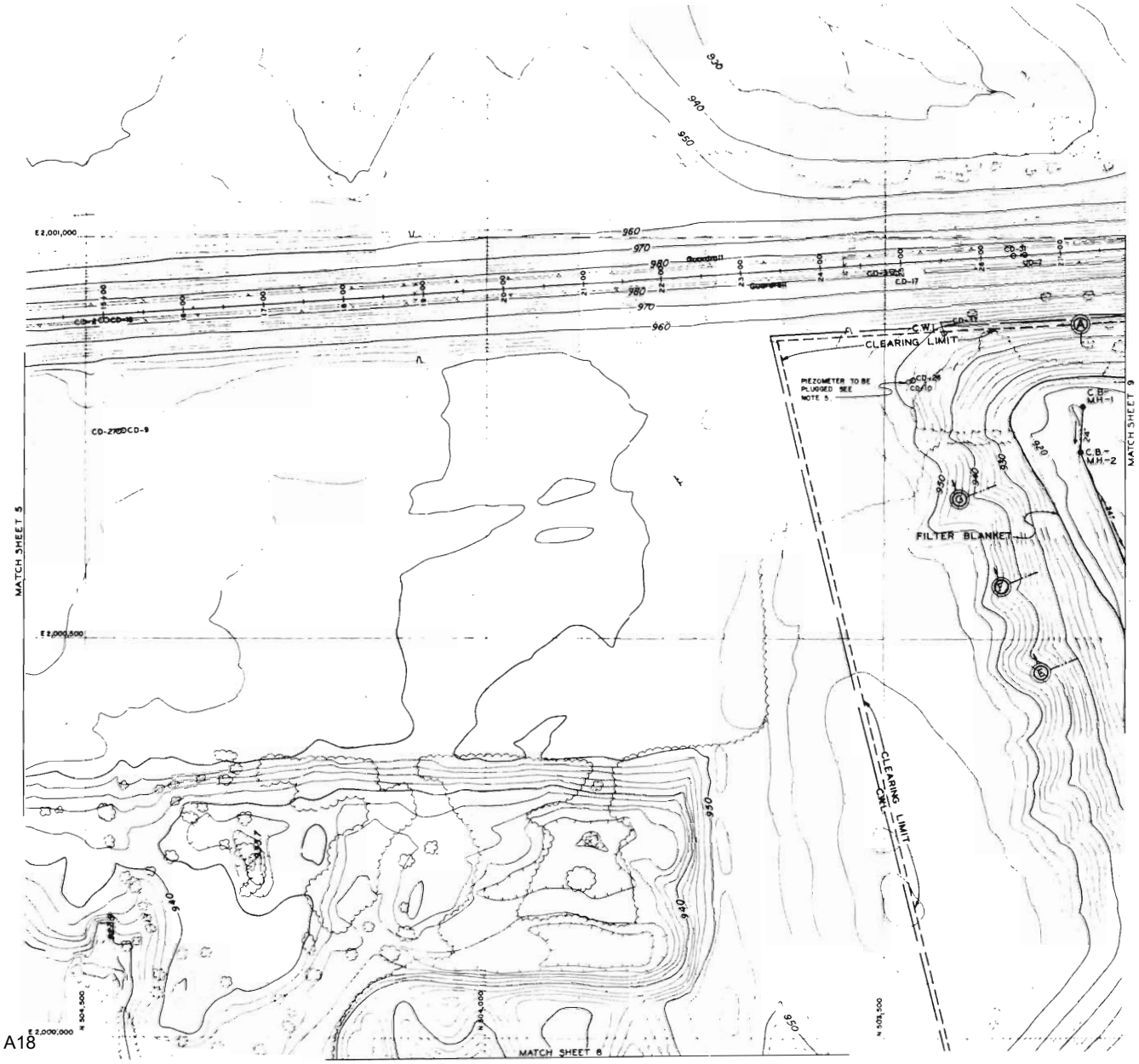
APPROVED: DATE
COL. C.E. DISTRICT ENGINEER

SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER
O 27b-UB-1-87/6
SHEET 6 OF 21

PLATE A17

EXHIBIT NO. 6

Good Engineering Produces Better Environment



NOTES

1. GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM.
2. FOR SECTION A-A SEE 87/2.
3. FOR SECTIONS E-E THRU G-G SEE 87/4.
4. FOR CATCH BASIN-MANHOLE TABLE SEE 87/3.
5. EXISTING PIEZOMETER CD-10 IS SAME AS DEPICTED ON PIEZOMETER DETAIL 87/13. REMOVE EXISTING 2" STEEL PIPE AND CONCRETE, CUT AND CAP 3/4" PIPE BELOW GROUND SURFACE AND BACKFILL.

SCALE IN FEET
50' 0 50' 100' 150'
TWO FOOT CONTOUR INTERVAL

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY K.R.A. - T.D.W.
DRAWN BY T.D.W.
CHECKED BY J.M.L. - C.D.B.
SUBMITTED BY
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED
CHIEF ENG. DIVISION
APPROVED FOR
DATE

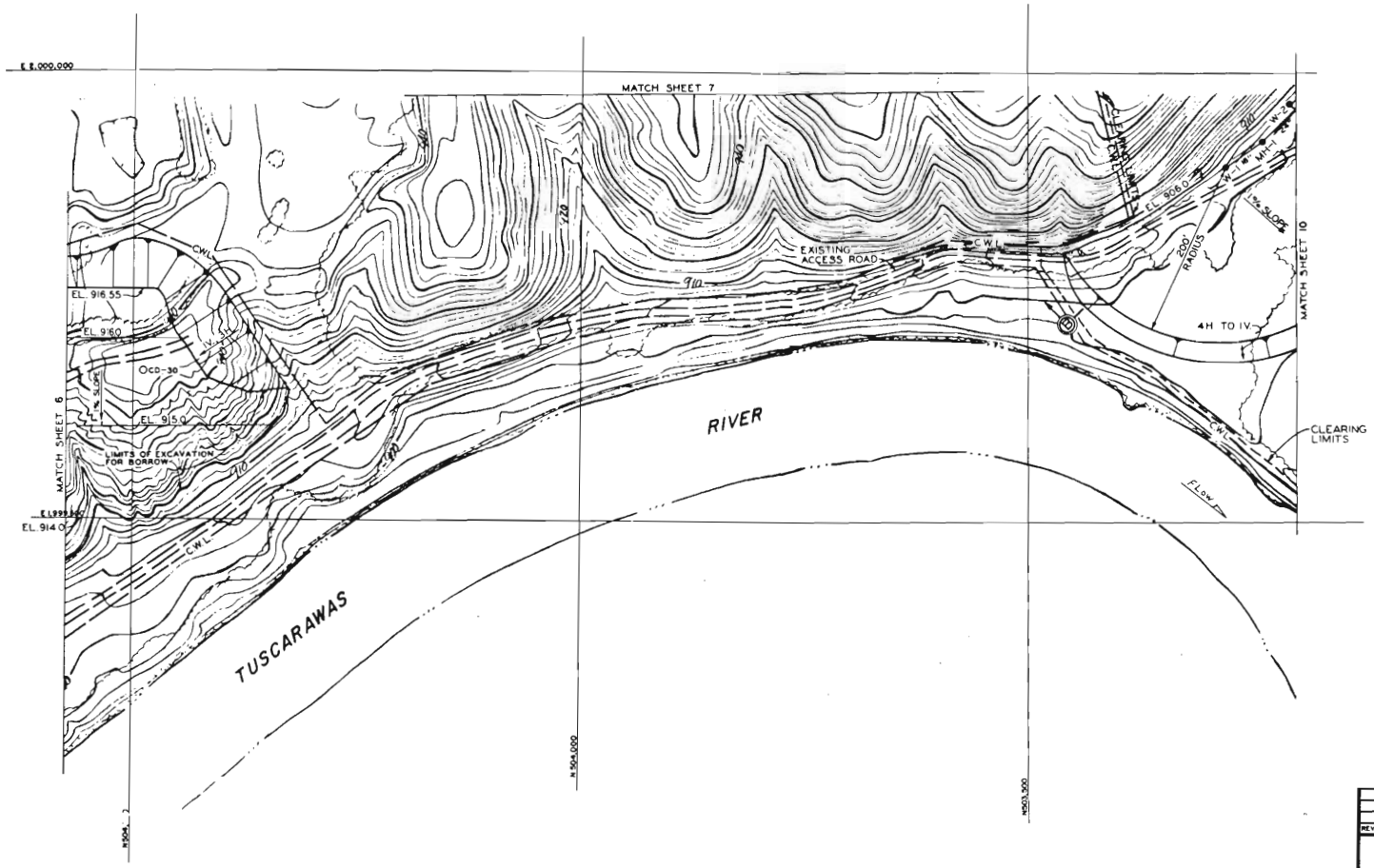
SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
ACCESS ROAD & BORROW AREA

APPROVED DATE
COL. C.E. DISTRICT ENGINEER
SCALE AS SHOWN CONTR NO
DRAWING NUMBER 0.27 13-UB-1-87/7
SHEET 7 OF 21

PLATE A18

EXHIBIT NO. 7

Good Engineering Produces Better Environment



NOTES

1. GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM
2. FOR SECTION B-B SEE 87/2
3. CONTRACTORS WORK LIMITS (CWL) MAY VARY SLIGHTY ALONG EXIST ACCESS ROAD BETWEEN THE GRAVEL PIT AND FILTER BLANKET FOR THE PASSING OF HAULING EQUIPMENT

SCALE IN FEET
30 0 30 100' 130'
TWO FOOT CONTOUR INTERVAL

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: R.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L.-C.O.B.
SUBMITTED BY:
CHIEF, REGION BRANCH
APPROVAL RECOMMENDED:
CHIEF, ENG. DIVISION
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
RELIEF WELL LOCATION & DRAINAGE PLAN

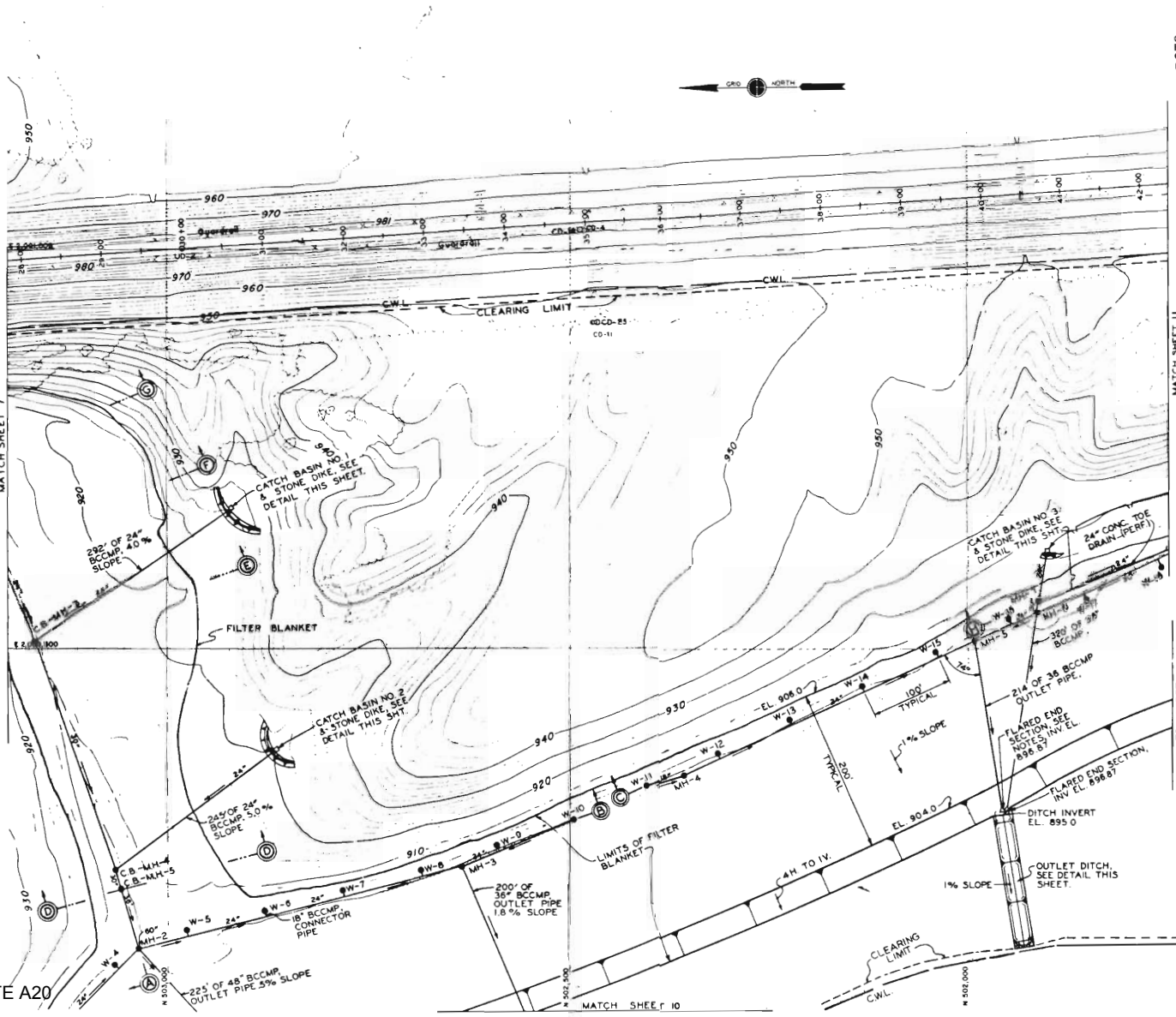
APPROVED: DATE
COL. C.E. DISTRICT ENGINEER

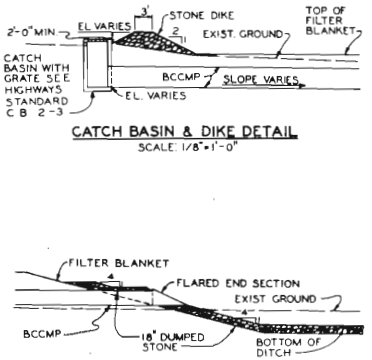
SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER
SHEET 8 OF 21
O 27 18-UB-1-87/8

PLATE A19

EXHIBIT NO. 8 OCT 90

Good Engineering Produces Better Environment





CATCH BASIN & DIKE DETAIL
SCALE: 1/8"=1'-0"

OUTLET DETAIL
SCALE: 1/8"=1'-0"

DITCH DETAIL
SCALE: 1/8"=1'-0"

NOTES

1. FOR CATCH BASIN & CATCH BASIN-MANHOLE DETAILS SEE 87/5
2. SAND FOR BEDDING BASIN AND MANHOLE STRUCTURE AND MAP FILE IN STATE PLANE COORDINATE SYSTEM
3. FOR SECTION A-A & B-B SEE 87/2
4. FOR SECTION C-C SEE 87/3
5. FLARED END SECTIONS SHALL BE GALVANIZED BITUMINOUS COATED WITH TOE PLATE AS MANUFACTURED BY ARMCO OR EQUAL.
6. CATCH BASINS & CATCH BASIN-MANHOLES SHALL CONFORM TO THE OHIO DEPARTMENT OF HIGHWAYS STANDARDS, SEE 87/14.
7. FOR SECTIONS D-D THRU H-H, SEE 87/4

SCALE IN FEET
50' 0 50' 100' 150'
TWO FOOT CONTOUR INTERVAL

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: K.N.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L.-C.D.P.
SUBMITTED BY:
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED
CHIEF ENG. DIVISION
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
RELIEF WELL LOCATION
& DRAINAGE PLAN

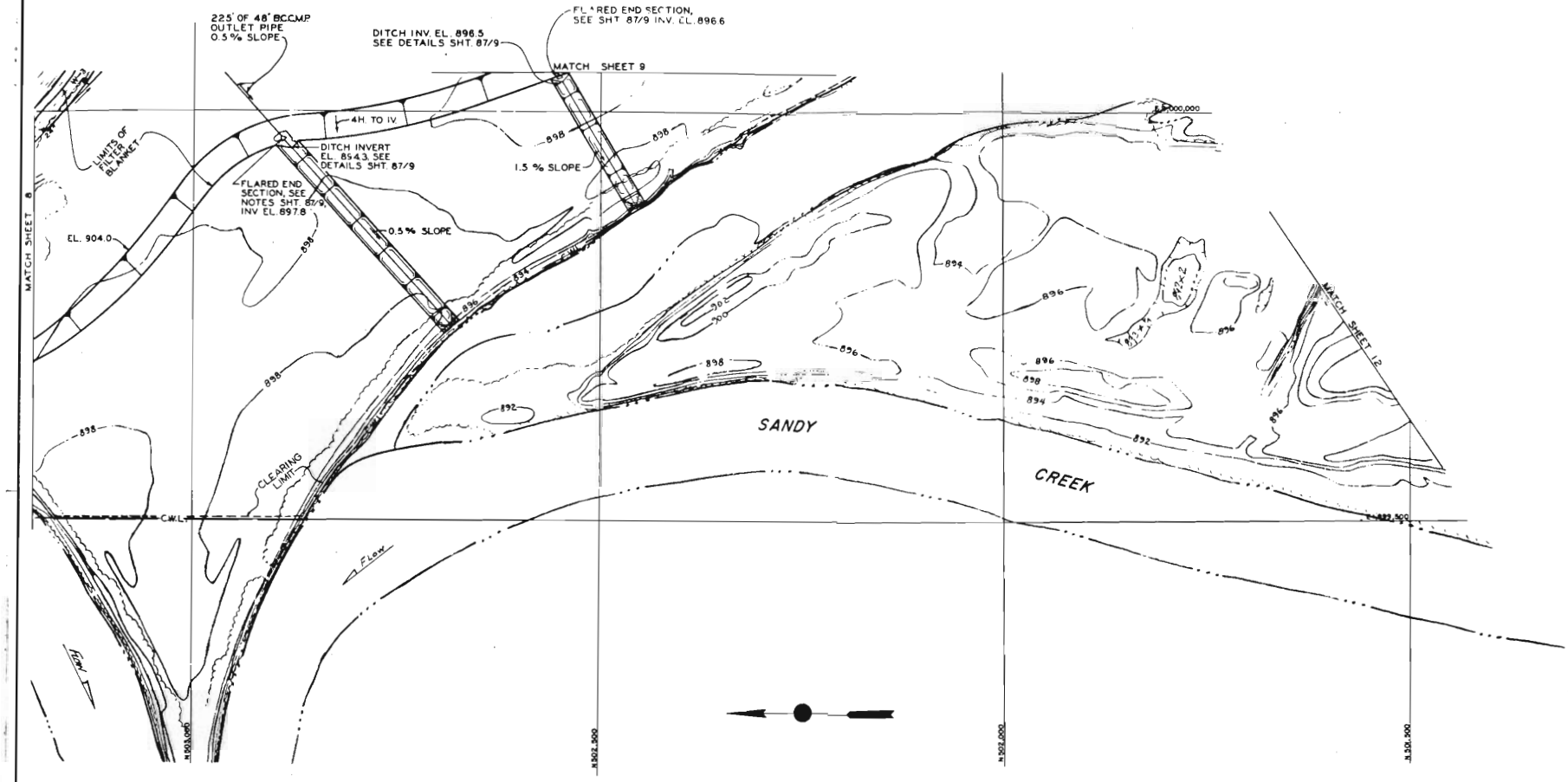
APPROVED: COL. C.E. DISTRICT ENGINEER
DATE:

SCALE AS SHOWN
CONTR. NO.
DRAWING NUMBER
0 27 10-UE-1-87/9
SHEET 9 OF 21

PLATE A20

EXHIBIT NO. 9

Good Engineering Produces Better Environment



NOTES

1. GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM
2. FOR SECTION B-B SEE 87/2

SCALE IN FEET
50' 0 50' 100' 150'
TWO FOOT CONTOUR INTERVAL

REVISION	DATE	DESCRIPTION	BY

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: M.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L.-C.D.B.
SUBMITTED BY:
CHIEF, DESIGN BRANCH:
APPROVAL RECOMMENDED:
CHIEF, ENG. DIVISION:
APPROVED FOR:
DATE:

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
RELIEF WELL LOCATION & DRAINAGE PLAN

APPROVED: DATE
COL. C.E. DISTRICT ENGINEER

SCALE: AS SHOWN | CONTR. NO.:
DRAWING NUMBER: 0 27 11-UB-1-87/10
SHEET 10 OF 21

PLATE A21

EXHIBIT NO. 10

Good Engineering Produces Better Environment

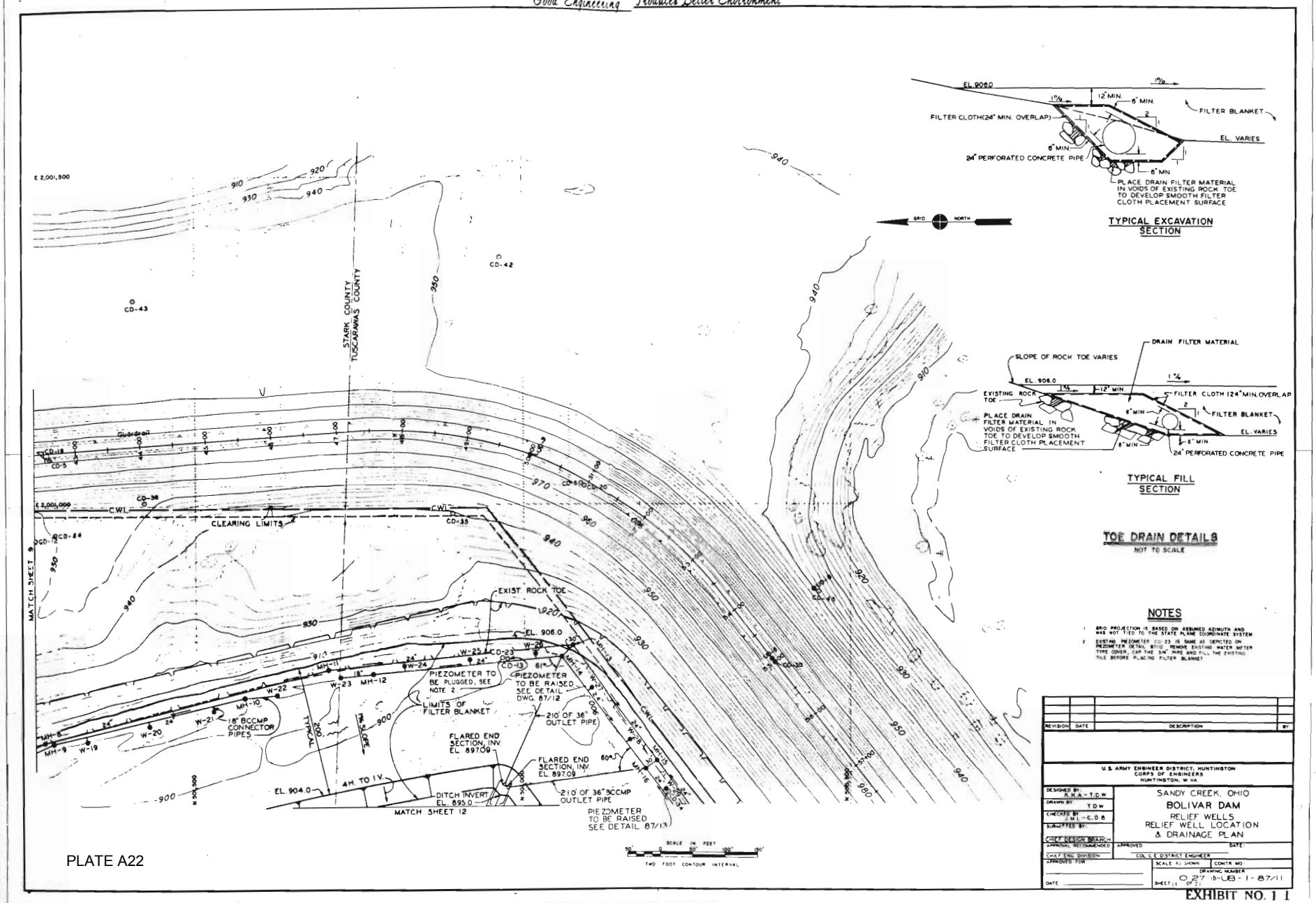
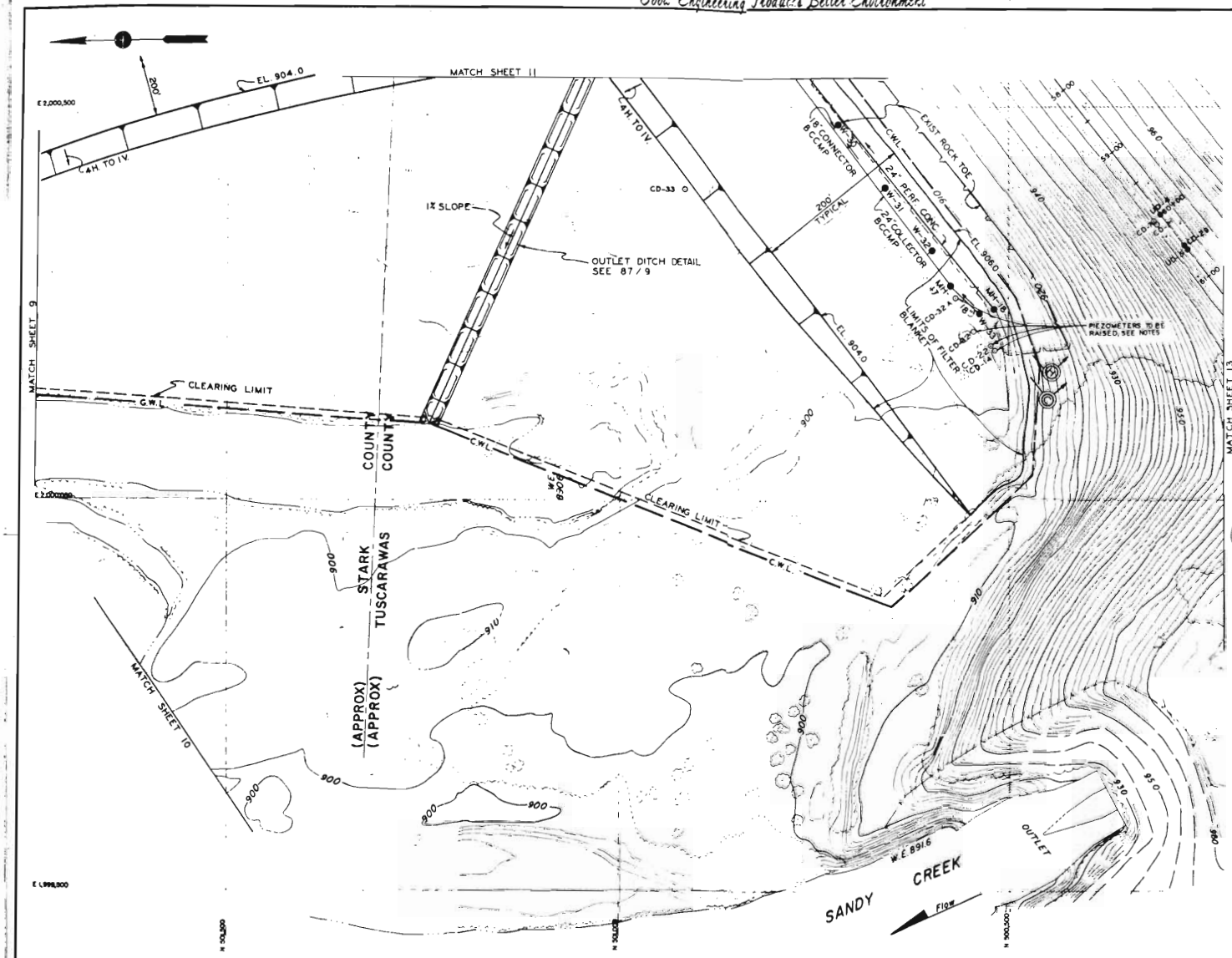
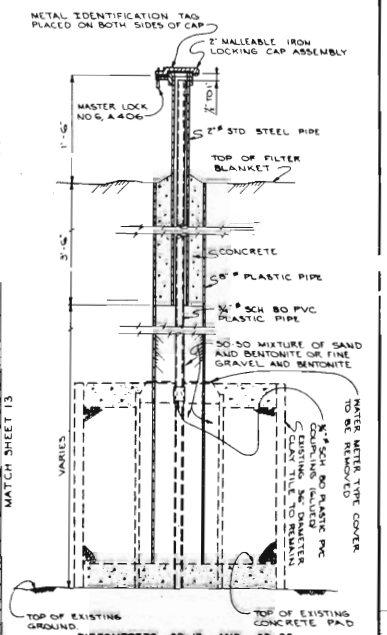


PLATE A22

EXHIBIT NO. 11

Good Engineering Produces Better Environment





PIEZOMETERS CD-13 AND CD-22 TO BE RAISED

PIEZOMETER DETAIL

SCALE 1 1/2" = 1' - 0"

NOTES

1. GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM.
2. FOR SECTION C-C, SEE 87/3.
3. FOR SECTION H-H, SEE 87/4
4. PIEZOMETERS CD-14, CD-32, CD-32A, CD-34 TO BE RAISED, SEE DETAIL 87/13.
5. PIEZOMETERS CD-13 AND CD-22 TO BE RAISED, SEE THIS SHEET
6. PIEZOMETERS CD-10 AND CD-23 TO BE PLUGGED SEE 87/11 AND 87/7

REVISION	DATE	DESCRIPTION	BY

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

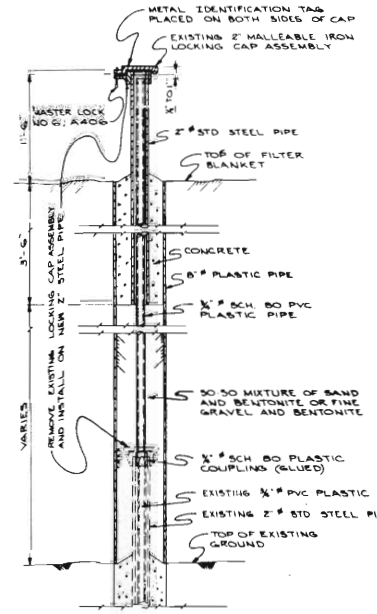
DESIGNED BY: F.K.A.-T.D.W.
DRAWN BY: T.D.W.
CHECKED BY: J.M.L.-C.D.B.
SUBMITTED BY:
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED: APPROVED: DATE
CHIEF, ENG. DIVISION
COL. C.E. DISTRICT ENGINEER
APPROVED FOR
DATE

SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
RELIEF WELL LOCATION & DRAINAGE PLAN

SCALE AS SHOWN | CONTR. NO.
DRAWING NUMBER: O 27 16-UB-1-87/12
SHEET 12 OF 23

PLATE A23

EXHIBIT NO. 12



PIEZOMETERS CD-14, CD-32, CD-32A, AND CD-34

TO BE RAISED

PIEZOMETER DETAIL

SCALE 1" = 1'-0"

NOTES

1. FOR LOCATION OF PIEZOMETERS CD-14, CD-32 AND CD-32A SEE 87/12.
2. FOR LOCATION OF PIEZOMETER CD-34 SEE 87/11.
3. GRID PROJECTION IS BASED ON ASSUMED AZIMUTH AND WAS NOT TIED TO THE STATE PLANE COORDINATE SYSTEM.

REVISION	DATE	DESCRIPTION	BY

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

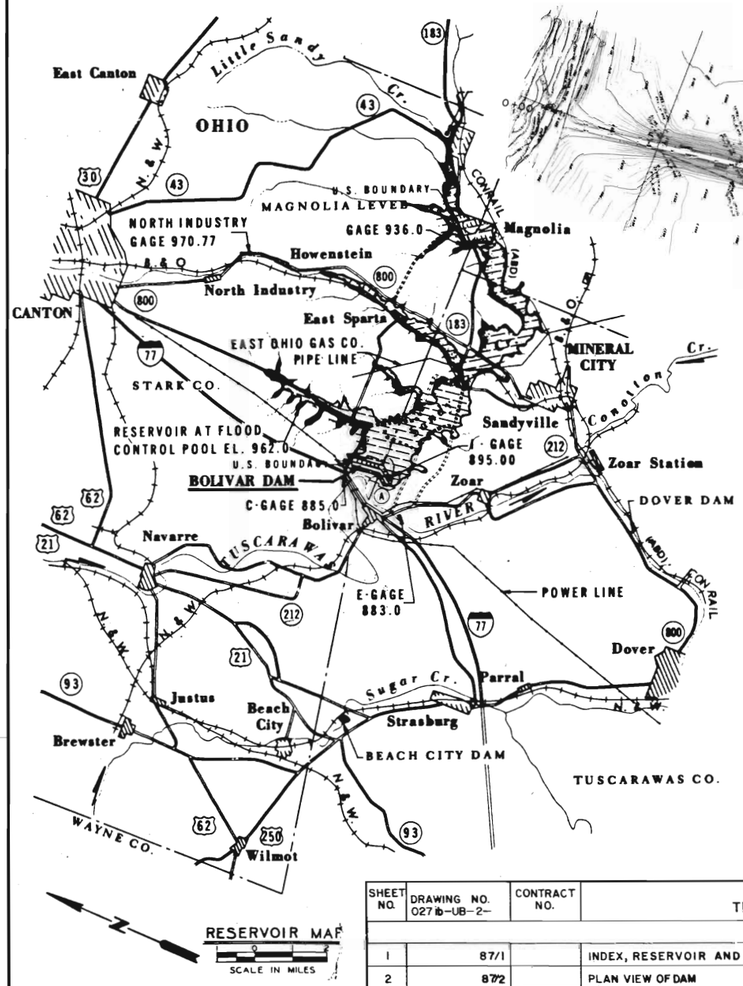
DESIGNED BY K.K.A. - T.D.W.
DRAWN BY T.D.W.
CHECKED BY J.M.L. - C.D.B.
SUBMITTED BY
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED
CHIEF ENG. DIVISION
APPROVED FOR
DATE

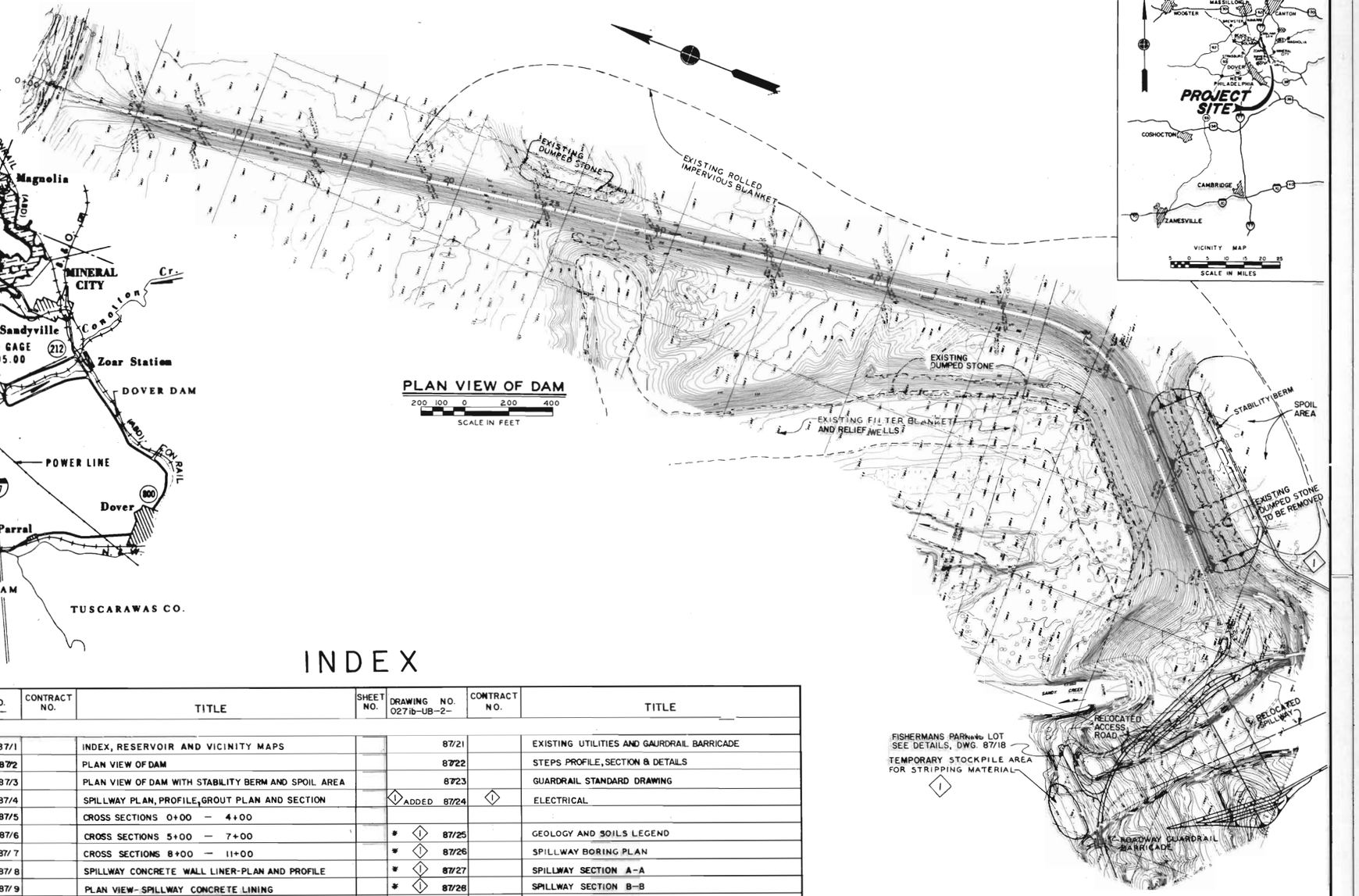
SANDY CREEK, OHIO
BOLIVAR DAM
RELIEF WELLS
EMBANKMENT PLAN

APPROVED DATE
COL. C.E. DISTRICT ENGINEER
SCALE 1" = 100'-0" CONTR. NO.
DRAWING NUMBER 0 27 15-UB-1-87/13
SHEET 13 OF 21

PLATE A24

EXHIBIT NO. 13





INDEX

SHEET NO.	DRAWING NO. 027ib-UB-2-	CONTRACT NO.	TITLE	SHEET NO.	DRAWING NO. 027ib-UB-2-	CONTRACT NO.	TITLE
1	87/1		INDEX, RESERVOIR AND VICINITY MAPS		87/21		EXISTING UTILITIES AND GAURDRAIL BARRICADE
2	87/2		PLAN VIEW OF DAM		87/22		STEPS PROFILE, SECTION & DETAILS
3	87/3		PLAN VIEW OF DAM WITH STABILITY BERM AND SPOIL AREA		87/23		GUARDRAIL STANDARD DRAWING
4	87/4		SPILLWAY PLAN, PROFILE, GROUT PLAN AND SECTION		1 ADDED 87/24	1	ELECTRICAL
5	87/5		CROSS SECTIONS 0+00 — 4+00				
6	87/6		CROSS SECTIONS 5+00 — 7+00		* 1 87/25		GEOLOGY AND SOILS LEGEND
7	87/7		CROSS SECTIONS 8+00 — 11+00		* 1 87/26		SPILLWAY BORING PLAN
8	87/8		SPILLWAY CONCRETE WALL LINER-PLAN AND PROFILE		* 1 87/27		SPILLWAY SECTION A-A
9	87/9		PLAN VIEW-SPILLWAY CONCRETE LINING		* 1 87/28		SPILLWAY SECTION B-B
10	87/10		CONCRETE WALL LINER SECTIONS AND ANCHOR BAR DETAILS		* 1 87/29		SPILLWAY SECTION C-C
11	87/11		CONCRETE WALL LINER SECTIONS AND KEY DETAIL		* 1 87/30		SPILLWAY SECTION D-D
12	87/12		PARAPET WALL AND STEEL BEAM GUARDRAIL DETAILS		* 1 87/31		SPILLWAY SECTION E-E
13	87/13		PLAN VIEW OF DAM, TYPICAL SECTION FOR STABILITY BERM AND SPOIL AREA		* 1 87/32		SPILLWAY SECTION F-F
14	87/14		RELOCATED ACCESS ROAD PLAN, PROFILE AND SECTIONS		* 1 87/33		SPILLWAY SECTION G-G
15	87/15		RELOCATED ACCESS ROAD CROSS SECTIONS-0+00-10+00		* 1 87/34		SPILLWAY GRAPHIC LOGS
16	87/16		RELOCATED ACCESS ROAD CROSS SECTIONS-11+00-15+00		* 1 87/35		SPILLWAY GRAPHIC LOGS
17	87/17		RELOCATED ACCESS ROAD CROSS SECTIONS-16+00-23+00		* 1 87/36		SPILLWAY GRAPHIC LOGS
18	87/18		FISHERMANS ACCESS ROAD AND PARKING LOT PLAN AND PROFILE		* 1 87/37		SPILLWAY GRAPHIC LOGS
19	87/19		FISHERMANS ACCESS ROAD- CROSS SECTIONS-0+00-3+41.33		* 1 87/38		SPILLWAY GRAPHIC LOGS
20	87/20		MISCELLANEOUS DETAILS		* 1 87/39		SPILLWAY GRAPHIC LOGS
					* 1 87/40		HYDROLOGIC DATA
					* Z2-107/1		ENVIRONMENTAL PROTECTION MEASURES
					* Z2-107/2		ENVIRONMENTAL PROTECTION MEASURES

* FOR INFORMATION PURPOSES ONLY

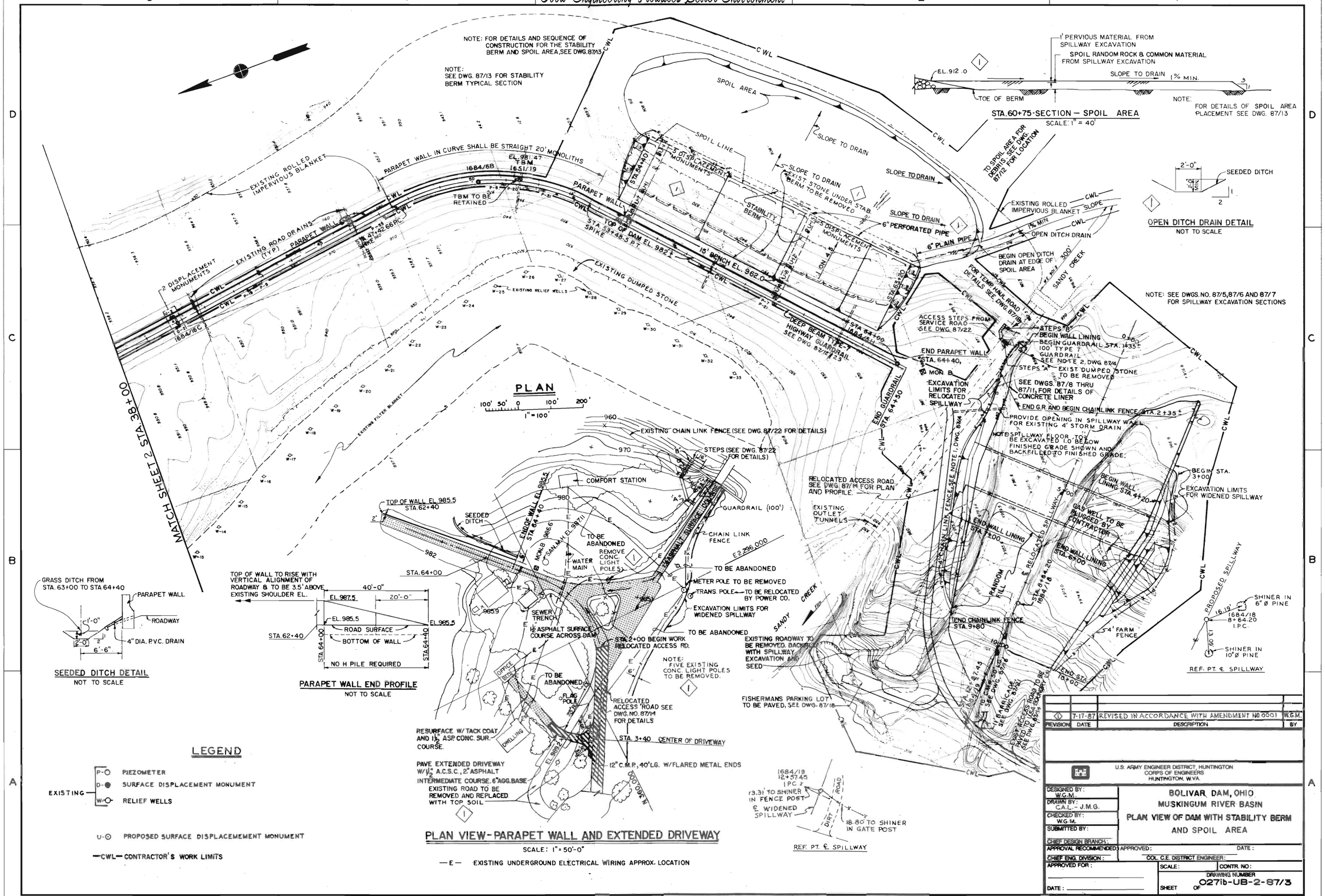
REVISION	DATE	DESCRIPTION	BY
1	7-17-87	REVISED IN ACCORDANCE WITH AMENDMENT NO. 0001	W.G.M.

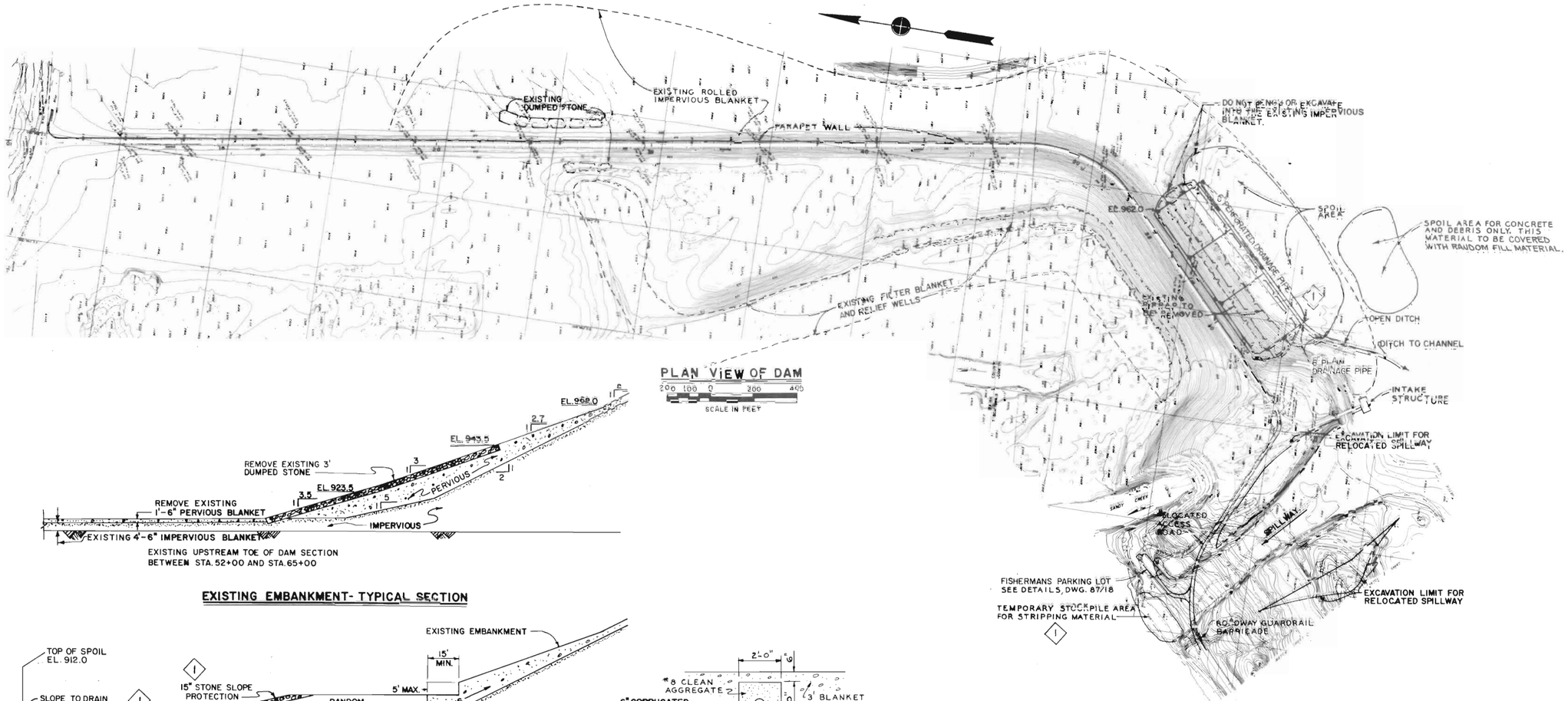
U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: W.G.M.
DRAWN BY: J.M.G.-C.A.L.
CHECKED BY: W.G.M.
SUBMITTED BY: A. M. Hadlipe
CHIEF DESIGN BRANCH
APPROVAL RECOMMENDED: A. M. Hadlipe
CHIEF, ENG. DIVISION SPEC.
APPROVED FOR:
DATE:

BOLIVAR DAM, OHIO
MUSKINGUM RIVER BASIN
SPILLWAY REMEDIAL WORK
INDEX
RESERVOIR AND VICINITY MAPS

APPROVED: DISTRICT ENGINEER: DATE: JUNE 1987
SCALE:
CONTR. NO:
DRAWING NUMBER 027ib-UB-2-87/1
SHEET OF

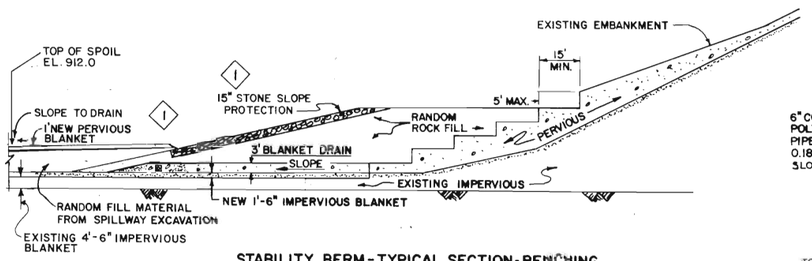

NOTE: FOR DETAILS AND SEQUENCE OF CONSTRUCTION FOR THE STABILITY BERM AND SPOIL AREA, SEE DWG. 87/13
NOTE: SEE DWG. 87/13 FOR STABILITY BERM TYPICAL SECTION
PLAN
1" = 100'
MATCH SHEET 2 STA. 38+00
PARAPET WALL IN CURVE SHALL BE STRAIGHT 20' MONOLITHS
EXISTING ROLLED IMPERVIOUS BLANKET
EXISTING ROAD DRAINS (TYP)
PARAPET WALL
2 DISPLACEMENT MONUMENTS
TBM TO BE RETAINED
TOP OF DAM EL. 982.1
15' BENCH EL. 962.0
EXISTING DUMPED STONE
EXISTING RELIEF WELLS
EXISTING FILTER BLANKET
DEEP BEAM TYPE 1 HIGHWAY GUARDRAIL SEE DWG. 87/12 & 23
SPOIL AREA
SPOIL LINE
SLOPE TO DRAIN
STABILITY BERM
EXIST. STONE UNDER STAB. BERM TO BE REMOVED
6" PERFORATED PIPE
6" PLAIN PIPE
OPEN DITCH DRAIN
BEGIN OPEN DITCH DRAIN AT EDGE OF SPOIL AREA
SANDY CREEK
FOR TEMP. HAUL ROAD DETAILS SEE DWG. 87/18
ACCESS STEPS FROM SERVICE ROAD SEE DWG. 87/22
END PARAPET WALL STA. 64+40
MON. B
EXCAVATION LIMITS FOR RELOCATED SPILLWAY
END GUARDRAIL STA. 64+50
STEPS "B"
BEGIN WALL LINING
BEGIN GUARDRAIL STA. 1+35±
100' TYPE 7 GUARDRAIL SEE NOTE 2, DWG. 87/4
STEPS "A"
EXIST. DUMPED STONE TO BE REMOVED
SEE DWGS. 87/8 THRU 87/11, FOR DETAILS OF CONCRETE LINER
END G.R. AND BEGIN CHAINLINK FENCE STA. 2+35±
PROVIDE OPENING IN SPILLWAY WALL FOR EXISTING 4" STORM DRAIN
NOTE: SPILLWAY FLOOR TO BE EXCAVATED 1.0' BELOW FINISHED GRADE SHOWN AND BACKFILLED TO FINISHED GRADE.
RELOCATED ACCESS ROAD SEE DWG. 87/14 FOR PLAN AND PROFILE.
EXISTING OUTLET TUNNELS
EXISTING CHAIN LINK FENCE (SEE DWG. 87/22 FOR DETAILS)
STEPS (SEE DWG. 87/22 FOR DETAILS)
COMFORT STATION
GUARDRAIL (100')
CHAIN LINK FENCE
TOP OF WALL EL. 985.5 STA. 62+40
SEEDED DITCH
END OF WALL EL. 985.5 STA. 64+40
TO BE ABANDONED
REMOVE CONC. LIGHT POLES
WATER MAIN
STA. 64+00
METER POLE TO BE REMOVED
TRANS. POLE — TO BE RELOCATED BY POWER CO.
EXCAVATION LIMITS FOR WIDENED SPILLWAY
SEWER TRENCH
1½" ASPHALT SURFACE COURSE ACROSS DAM
STA. 2+00 BEGIN WORK RELOCATED ACCESS RD.
NOTE: FIVE EXISTING CONC. LIGHT POLES TO BE REMOVED.
RELOCATED ACCESS ROAD SEE DWG. NO. 87/14 FOR DETAILS
STA. 3+40 CENTER OF DRIVEWAY
12" C.M.P., 40' LG. W/FLARED METAL ENDS
RESURFACE W/ TACK COAT AND 1½" ASP. CONC. SUR. COURSE.
PAVE EXTENDED DRIVEWAY W/1½" A.C.S.C., 2" ASPHALT INTERMEDIATE COURSE. 6" AGG. BASE
EXISTING ROAD TO BE REMOVED AND REPLACED WITH TOP SOIL
OFFICE BLDG.
FLAG POLE
DWELLING
EXISTING ROADWAY TO BE REMOVED, BACKFILL WITH SPILLWAY EXCAVATION AND SEED
FISHERMANS PARKING LOT TO BE PAVED, SEE DWG. 87/18
END CHAINLINK FENCE STA. 9+80
END STA. 10+00
RANDOM FILL
END WALL LINING STA. 4+00
END WALL LINING STA. 6+00
BEGIN WALL LINING STA. 4+20
GAS WELL TO BE PLUGGED BY CONTRACTOR
BEGIN STA. 3+00
EXCAVATION LIMITS FOR WIDENED SPILLWAY
4' FARM FENCE
PROPOSED SPILLWAY
SHINER IN 6" Ø PINE
SHINER IN 10" Ø PINE
REF. PT. ℄ SPILLWAY
1684/18 12+57.45 I.P.C.
13.3' TO SHINER IN FENCE POST
℄ WIDENED SPILLWAY
18.80' TO SHINER IN GATE POST
REF. PT. ℄ SPILLWAY
GRASS DITCH FROM STA. 63+00 TO STA. 64+40
PARAPET WALL
ROADWAY
4" DIA. P.V.C. DRAIN
SEEDED DITCH DETAIL
NOT TO SCALE
TOP OF WALL TO RISE WITH VERTICAL ALIGNMENT OF ROADWAY & TO BE 3.5' ABOVE EXISTING SHOULDER EL.
40'-0"
20'-0"
EL. 987.5
EL. 985.5
ROAD SURFACE
BOTTOM OF WALL
NO H PILE REQUIRED
STA. 62+40
STA. 64+00
PARAPET WALL END PROFILE
NOT TO SCALE
LEGEND
EXISTING
P-O PIEZOMETER
D-● SURFACE DISPLACEMENT MONUMENT
W-O RELIEF WELLS
U-O PROPOSED SURFACE DISPLACEMENT MONUMENT
—CWL— CONTRACTOR'S WORK LIMITS
—E— EXISTING UNDERGROUND ELECTRICAL WIRING APPROX. LOCATION
PLAN VIEW - PARAPET WALL AND EXTENDED DRIVEWAY
SCALE: 1" = 50'-0"
1' PERVIOUS MATERIAL FROM SPILLWAY EXCAVATION
SPOIL RANDOM ROCK & COMMON MATERIAL FROM SPILLWAY EXCAVATION
SLOPE TO DRAIN 1% MIN.
TOE OF BERM
STA. 60+75 - SECTION - SPOIL AREA
SCALE: 1" = 40'
NOTE: FOR DETAILS OF SPOIL AREA PLACEMENT SEE DWG. 87/13
TO SPOIL AREA FOR DEBRIS, SEE DWG. 87/12 FOR LOCATION
SEEDED DITCH
OPEN DITCH DRAIN DETAIL
NOT TO SCALE
NOTE: SEE DWGS. NO. 87/5, 87/6 AND 87/7 FOR SPILLWAY EXCAVATION SECTIONS
7-17-87 REVISED IN ACCORDANCE WITH AMENDMENT NO 0001 W.G.M.
REVISION DATE DESCRIPTION BY
U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W.VA.
DESIGNED BY: W.G.M.
DRAWN BY: C.A.L. - J.M.G.
CHECKED BY: W.G.M.
SUBMITTED BY:
CHIEF DESIGN BRANCH:
APPROVAL RECOMMENDED:
APPROVED:
DATE:
CHIEF ENG. DIVISION:
COL. C.E. DISTRICT ENGINEER:
APPROVED FOR:
DATE:
SCALE:
CONTR. NO:
DRAWING NUMBER
027ib-UB-2-87/3
SHEET OF
BOLIVAR DAM, OHIO
MUSKINGUM RIVER BASIN
PLAN VIEW OF DAM WITH STABILITY BERM AND SPOIL AREA



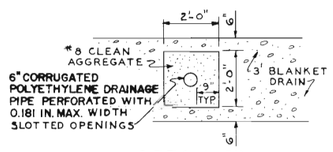
PLAN VIEW OF DAM

200 100 0 200 400
SCALE IN FEET

EXISTING EMBANKMENT- TYPICAL SECTION

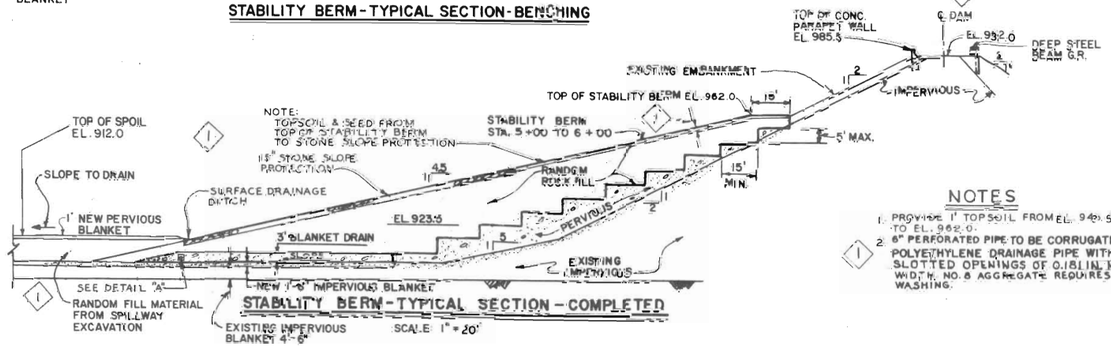


STABILITY BERM-TYPICAL SECTION-BENCHING



DETAIL "A"

SCALE: 1"=2'-0"



STABILITY BERM-TYPICAL SECTION-COMPLETED

NOTES

1. PROVIDE 1' TOPSOIL FROM EL. 943.5 TO EL. 962.0.
2. 6" PERFORATED PIPE TO BE CORRUGATED POLYETHYLENE DRAINAGE PIPE WITH MAX. SLOTTED OPENINGS OF 0.181 IN. MAX. WIDTH. NO. 8 AGGREGATE REQUIRES WASHING.

CONSTRUCTION SEQUENCE FOR PLACEMENT OF STABILITY BERM AND SPOIL MATERIAL

BEGIN CLEARING AND GRUBBING OPERATION AT ELEVATION 962.0 AND TERMINATE AT END OF IMPERVIOUS BLANKET BETWEEN APPROXIMATELY STA.52+00 AND STA. 65+00 ON THE UPSTREAM SIDE OF DAM. ALL DEPRESSIONS CREATED IN THE EXISTING 4'-6" IMPERVIOUS BLANKET DUE TO CLEARING AND GRUBBING OPERATIONS SHALL BE BACKFILLED WITH IMPERVIOUS MATERIAL IMMEDIATELY TO THE LINES AND GRADES SPECIFIED BY THE CONTRACTING OFFICER AND COMPACTED TO A STABLE DENSE MASS. REMOVE THE EXISTING 1'-6" PERVIOUS BLANKET AND REPLACE WITH 1'-6" OF IMPERVIOUS MATERIAL.

INITIATE BENCHING OF THE PERVIOUS OUTER SHELL OF THE EMBANKMENT AND EXISTING 3' DUMPED STONE-FLARE BLANKET DRAIN AND 6" ABS SLOTTED PIPE WITH #8 AGGREGATE AROUND THE PIPE AND BEGIN PLACING RANDOM ROCK STABILITY BERM. BENCHING OF THE PERVIOUS SHELL SHALL BE RESTRICTED TO 5' ABOVE STABILITY BERM LIFT. CARE SHALL BE TAKEN DURING THE BENCHING OPERATION TO PREVENT BENCHING INTO THE IMPERVIOUS CORE OF THE DAM. IN THE EVENT BENCHING EXTENDS INTO THE IMPERVIOUS CORE, BACKFILLING SHALL BE WITH BLANKET DRAIN MATERIAL TO ASSURE A CONTINUOUS CONNECTION BETWEEN THE PERVIOUS SHELL MATERIAL AND THE BLANKET DRAIN.

IN SPOIL AREA USING SPILLWAY EXCAVATION PLACE RANDOM FILL OVER THE NEW IMPERVIOUS BLANKET. COMPLETE PLACING RANDOM ROCK FILL AND 15" STONE SLOPE PROTECTION. SLOPE RANDOM FILL TO DRAIN AND COVER WITH PERVIOUS MATERIAL.

REVISION	DATE	DESCRIPTION	BY
2	7-17-87	REVISED IN ACCORDANCE WITH AMENDMENT NO. 5	

U. S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, W. VA.

DESIGNED BY: J.R.O.
DRAWN BY: J.M.G.
CHECKED BY: S.V.O.-W.G.M.
SUBMITTED BY:
CHIEF, DESIGN BRANCH
APPROVAL RECOMMENDED:
CHIEF, ENG. DIVISION
DATE

BOLIVAR DAM, OHIO
MUSKINGUM RIVER BASIN
PLAN VIEW OF DAM, TYPICAL SECTION
FOR STABILITY BERM AND SPOIL AREA

APPROVED:
DISTRICT ENGINEER
SCALE
CONTR. NO.
DRAWING NUMBER
DATE
SHEET
DACW70-JB-2-87/13