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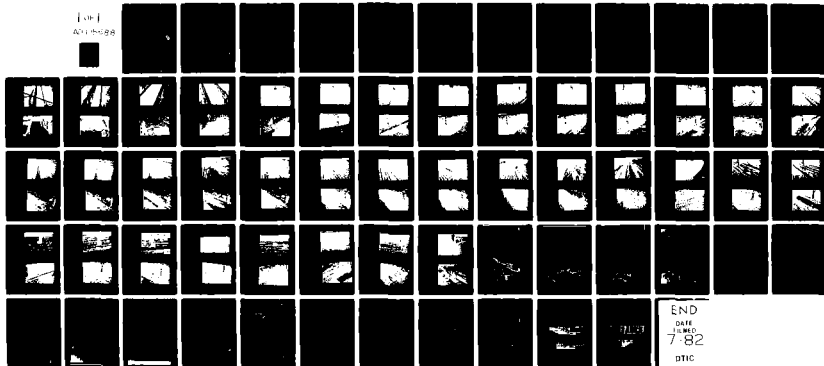
ARMY ENGINEER DISTRICT LOUISVILLE KY
SUPPLEMENT NUMBER 4: SOUTHWESTERN JEFFERSON COUNTY, KENTUCKY--L--ETC(U)
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18. SUPPLEMENTARY NOTES Construction section 4a levee and wall; Station 868+90 to station 910+50
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flood protection Geology Jefferson County, Kentucky Foundations Excavation
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Results of inspection of construction site from a point of tie-in at Dixie Highway and Kentucky State Highway 44 to a point just north of Pond Creek. 1-1

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FOUNDATION REPORT

SUPPLEMENT NO. 4

SOUTHWESTERN JEFFERSON COUNTY, KENTUCKY

LOCAL FLOOD PROTECTION PROJECT

CONTRACT NO. DACW27-81-C-0047

CONSTRUCTION SECTION 4A LEVEE AND WALL

STATION 868+90 to STATION 910+50

MARCH 1982

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Volume I - Main Line Station 868+90 to 910+50

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INTRODUCTION

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The construction

1-01 Location of Section 4A. Section 4A, the fourth reach to be constructed, extends from a point of tie-in at Dixie Highway (Station 868+90), just north of the intersection of Dixie Highway and Kentucky State Highway 44, to a point just north of Pond Creek (Station 910+50). It includes approximately 550 feet of concrete wall, 3,600 feet of earth levee and a closure structure across Kentucky Highway 44. Plate numbers 1 and 2 of this supplement show the location of Section 4A in detail.

1-02 Contractors. The prime contractor for construction of Section 4A was The E. Randle Company of Frankfort, Kentucky. Mr. Gilbert Newman, Vice President, was the home office principal directly responsible for the project. Mr. Kenneth Downs was Project Engineer responsible for all onsite operations throughout the duration of the contract. The E. Randle Company did all concrete work on Section 4A.

Four firms contracted to the prime contractor for earthwork, seeding reinforcing steel and stone and asphalt. These firms were:

- a. Earthwork - Bluegrass Contracting Corporation
Lexington, Kentucky
- b. Seeding - Four Oaks Landscaping
Vine Grove, Kentucky
- c. Reinforcing Steel - National Reinforcing Steel Co.
Louisville, Kentucky
- d. Stone and Asphalt - Lucas Paving Company
Radcliff, Kentucky

1-03 Contract Supervision. Government personnel responsible for onsite administration of the Section 4A work was:

Mr. Gary V. Fitzgerald - Resident Engineer
(Beginning through completion)

FOUNDATION EXPLORATIONS

2-01 Subsurface Investigations Prior to Construction. Investigations were made for the levee and floodwall using drive sampling, Denison, NX core, power auger and hand auger methods. The borrow areas were investigated mainly by the use of hand augers. Boring locations are presented in Design Memorandum No. 1 on plates 1B-29, 33-35, 37-42 and 54-61. Graphic logs are presented on plates 63 through 78. Initial drilling to determine the scope of work was begun in 1965 and was accomplished by contract drilling. This was supplemented by District drilling in 1966, 1970 and 1971. A portion of these logs are presented in plate number 3 of this supplement. Locations of the borings are shown on plates 1 and 2 of this supplement.

2-02 Foundation Investigation During Construction. Investigations during construction consisted of visual inspection of the foundation and inspection trench prior to embankment placement. A required inspection trench was excavated from Station 874+15.50 to Station 911+75. Foundation conditions were also visually inspected after excavation and prior to construction of the concrete T-wall and closure structures.

GEOLOGY

3-01 Engineering Characteristics of Overburden Materials. The section at Station 921+80 is the highest section in the vicinity of Section 4A of the levee. The stability analyses for this section were included in Supplement No. 2 to Design Memorandum No. 1 dated October 1974. Data pertinent to this report have been taken from that supplement. Stability analyses were facilitated by the use of a GE 437 electronic computer. Critical circle or wedge configurations were then checked by manual computations. The critical analyses are presented on plates 52 through 55 of Supplement No. 2 to Design Memorandum No. 1. A seismic coefficient of 0.1 was used. Results of the stability analyses are listed in Table 3.3.

3-01.1 Selection of Shear Strengths.

a. Embankment. Shear strength values were the same as those used for Station 433+30 in Section 1. The values were selected by testing material from borings HA-537, HA-243 and HA-609. These three borings are considered to be representative of the borrow areas for the entire project. A summary of the shear strengths is found in Supplement No. 2 to Design Memorandum No. 1, plates 18 through 20. The adopted shear strengths are given in Table 3-1.

TABLE 3-1

ADOPTED SHEAR STRENGTHS FOR THE EMBANKMENT

<u>Test</u>	<u>Tan ϕ</u>	<u>Cohesion (TSF)</u>
Q	0.160	0.95
R	0.283	0.43
S	0.594	0.00

b. Foundation. Two undisturbed borings, UDC 520 and UDC 521, were drilled in the foundation at Pond Creek. The shear strength values used for the foundation were based on the test results from these two borings. The test data from these borings are shown on plates 59 through 92 of Supplement No. 2 to Design Memorandum No. 1. The adopted shear strengths are given in Table 3-2.

TABLE 3-2

ADOPTED SHEAR STRENGTHS FOR THE FOUNDATION

POND CREEK DAM (STATION 921+80)

<u>Test</u>	<u>Tan ϕ</u>	<u>Cohesion (TSF)</u>
Q	0.095	0.20
R	0.374	0.35
S	0.554	0.00

3-01.2 End of Construction. The most critical factor of safety for end of construction with earthquake was 1.13, which was a wedge type failure in the foundation at elevation 387. The 1.13 was above the required 1.0. Without earthquake, the minimum safety factor was 1.76.

3-01.3 Steady Seepage. The most critical factor of safety for steady seepage with earthquake was 1.33, which was a circle type failure tangent to elevation 387. The 1.33 was above the required 1.0. Without earthquake, the minimum safety factor was 2.09.

3-01.4 Sudden Drawdown. The most critical factor of safety for sudden drawdown was 1.79, which was a circle type failure tangent to elevation 337. The 1.79 was well above the required 1.2.

TABLE 3-3

STABILITY ANALYSIS RESULTS

POND CREEK DAM (STATION 921+80)

<u>Case</u>	<u>Minimum Factor of Safety</u>		<u>Required</u>	
	<u>With Earthquake</u>	<u>Without Earthquake</u>	<u>With Earthquake</u>	<u>Without Earthquake</u>
End of Construction	1.13	1.76	1.0	1.3
Steady Seepage	1.33	2.09	1.0	1.5
Sudden Drawdown		1.79		1.2

3-02 T-Wall.

a. General. The T-wall stability analysis and test data are presented in Design Memorandum No. 1 and summarized in Supplement No. 2 to Design Memorandum No. 1. Strength values obtained from tests on soil from boring U-501A and U-502 were used in analyzing the wall. Both structural and sliding stability analyses were done using a GE 225 computer. Program number 41-G1-H201 was used.

b. Structural Stability Analysis. Plate 79 of Design Memorandum No. 1 shows the dimensions and forces used in the manual check of the computer. The calculations are shown on plates 80 through 83 of Design Memorandum No. 1. The resultant from loading number 1 is 0.033 foot in from the quarter point and the resultant from loading number 2 is 0.675 foot in from the one-third point, thus satisfying the conditions for the point of action of resultants set forth in EM 1110-2-2501.

The toe pressure, creep ratio and estimated horizontal movement were also calculated and the calculations are shown on plates 84 and 85 of Design Memorandum No. 1. All of the above items were within the allowable limits established in EM 1110-2-2501.

c. Sliding Stability Analysis. For simplicity of design, a flat failure plane was assumed. The method of analysis is shown in Figure 5-10 of EM 1110-2-2501. In computing the uplift along the failure plane, a straight line assumption was used in lieu of a flow net with full flood head assumed acting at the bottom of the key with the intersection at the failure plane and ground surface being the point of zero potential. This assumption has been proven to be on the conservative side.

The manual calculations made to check the computer results for sliding stability are shown on plates 86 and 87 of Design Memorandum No. 1. The lowest factor of safety obtained for the "Q" case was 5.17 and the lowest factor of safety for the "R" case was 3.01.

Plates 88 and 89 of Design Memorandum No. 1 show the required shearing strength curves obtained by using a factor of safety of 1.0 and 1.5+2c. These curves were based on the test values obtained from holes U-501A and U-502 since no values were available on borrow areas at the time of the analysis. Tests on the borrow areas yielded higher strengths than the values used. Therefore, it was not considered necessary to rerun the analysis since the new values would raise the factor of safety.

EXCAVATION PROCEDURES FOR FOUNDATIONS

4-01 Excavation Grades. The contract plans and specifications call for the levee to be built essentially on existing ground after stripping whatever organic material existed. Very little additional excavation for unsuitable material was necessary. The areas that were undercut occurred at locations where the drainage in the existing ground was poor and a small wet area had built up. These areas were located under the earth embankment portion of the levee.

Plate numbers 4 and 5 show excavation limits along the centerline profile of the project. A typical cross section of the levee is also shown on plate number 4. Typical sections of the 20' T-wall and 22' T-wall are shown on plate number 6.

Plate number 7 shows the profile of the wall and closure structure. The numbering of the wall and closure monoliths on this plate will reference locations of foundation photographs for the wall and closure included in this supplement.

4-02 Method of Excavation. The following paragraphs describe the various methods used to excavate the different features of the work:

4-02.1 Stripping. Stripping excavation involved removal of organic material from beneath the levee embankment limits plus an additional five feet outside the toe. This excavation was done using motorized, rubber-tired scrapers. The average depth of removal was six inches. There were several small areas which had poor drainage and these areas contained up to five feet of very soft, wet material that overlaid more solid material beneath it. These areas were not composed of organic material but instead were of suitable material that would not provide a firm suitable foundation after conventional treatment. These areas were excavated by rubber-tired scrapers assisted by a push tractor. After the unstable material in these areas was removed, then the foundation was treated by conventional equipment in the normal manner. All foundations under the concrete wall, after stripping and excavating to required depths, were determined to be suitable with no additional excavation or undercut required.

4-02.2 Inspection Trench. The contract documents show where the inspection trench was to be excavated. The trench was excavated by rubber-tired scrapers assisted by push tractor. The trench width was excavated to sufficient width to permit dozers and rollers to work in them to recompact the material after the subsurface ground conditions were inspected.

4-03 Foundation Preparation. The earth embankments for this section of the project were founded on essentially the same type of foundation material throughout the entire length. Accordingly, the foundation preparation procedures were basically consistent for all reaches of the earth levee. The preparation consisted of thoroughly breaking the foundation to a depth of six inches using scarifying teeth on a grader, bringing the insitu material to the proper moisture content and recompacting the material with four passes of an approved roller. After this operation was performed to the satisfaction of the Government, embankment placement proceeded in accordance with the contract requirements. In those reaches where the concrete wall was constructed, the foundation required no extra or unusual treatment; in all reaches, the foundation was excavated to the lines and grades specified, the foundation was inspected and placement of concrete proceeded.

4-04 Deviations From Planned Conditions. Only one area was uncovered that revealed conditions differing from what was anticipated by the plans. In June 1981 while excavating the inspection trench, a network of clay field tile was encountered between centerline stations 903+20 and 909+40. The clay tiles were approximately 2.5 feet below original ground. This was an area where some residences were previously located and the tiles were probably either a subsurface drainage net or lateral lines from septic disposal systems or a combination thereof. All drainage tiles encountered were removed entirely to their termination point or to five feet outside the toe of the levee. Below is a tabulation of the tiles encountered and the lengths removed from under the levee foundation outside the limits of the inspection trench.

908+67 Rt	S/W	100 feet
908+50 Lt	N/E	78 feet
908+60 Rt	N/W	35 feet
908+00 Rt	N/W	40 feet
908+40 Lt	S/E	20 feet
909+40 Lt	S/E	10 feet
907+50 Lt	S/E	75 feet
909+60 Lt	S/E	100 feet
905+75 Lt	N/E	20 feet
905+60 Lt	S/E	60 feet
904+60 Lt	S/E	45 feet
904+50 Rt	N/W	45 feet
903+20 Rt	N/W	100 feet

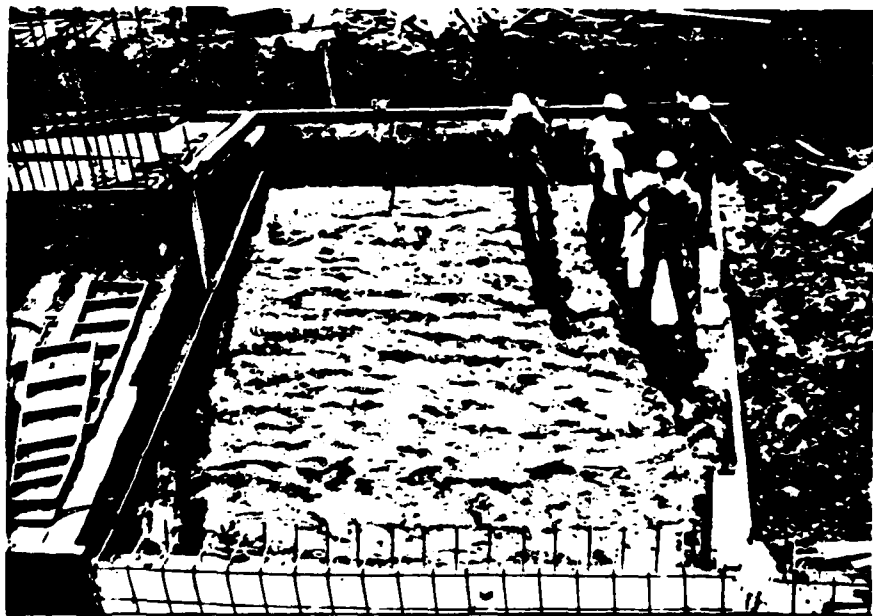
POSSIBLE FUTURE PROBLEMS

5-01 Conditions That Could Produce Problems. There were no founding conditions encountered that are anticipated to produce future problems. The only conditions that deviated from planned conditions were discussed in paragraph 4-04. Those conditions discussed in paragraph 4-04 were corrected by entirely removing the tile encountered from the foundation beneath the levee and they are not anticipated to produce any future problems.

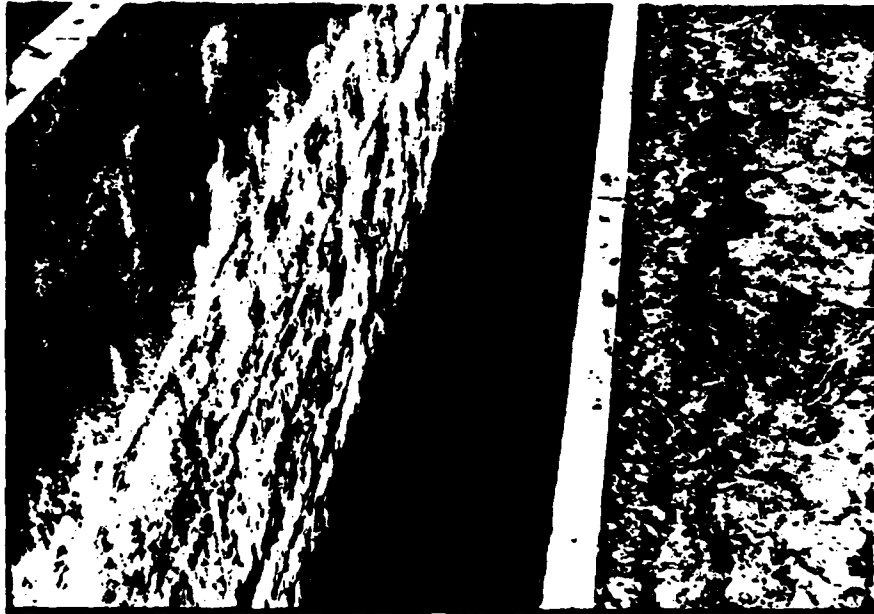
5-02 Recommended Observations. Observations should be made immediately after flood situations where water has been against the levee for indications of sliding.



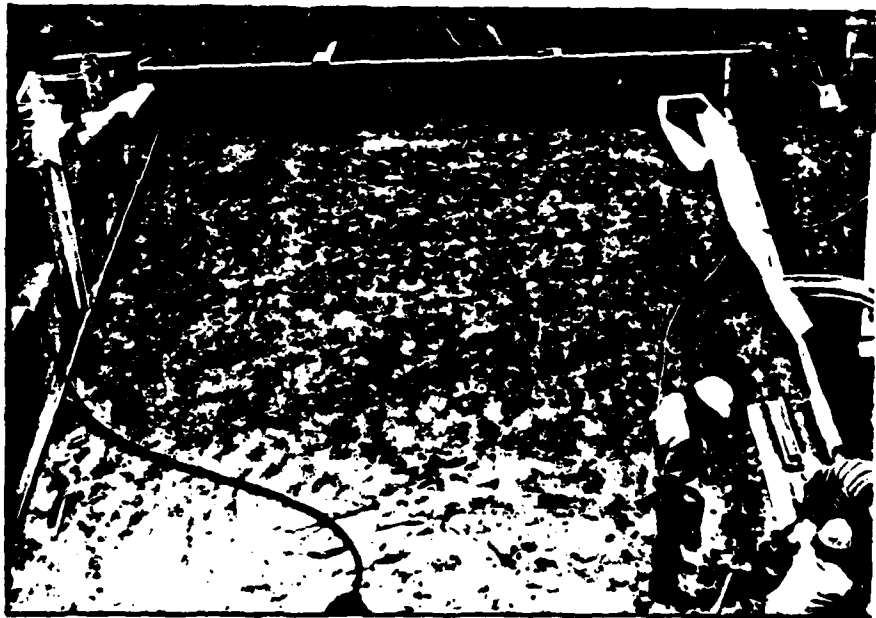
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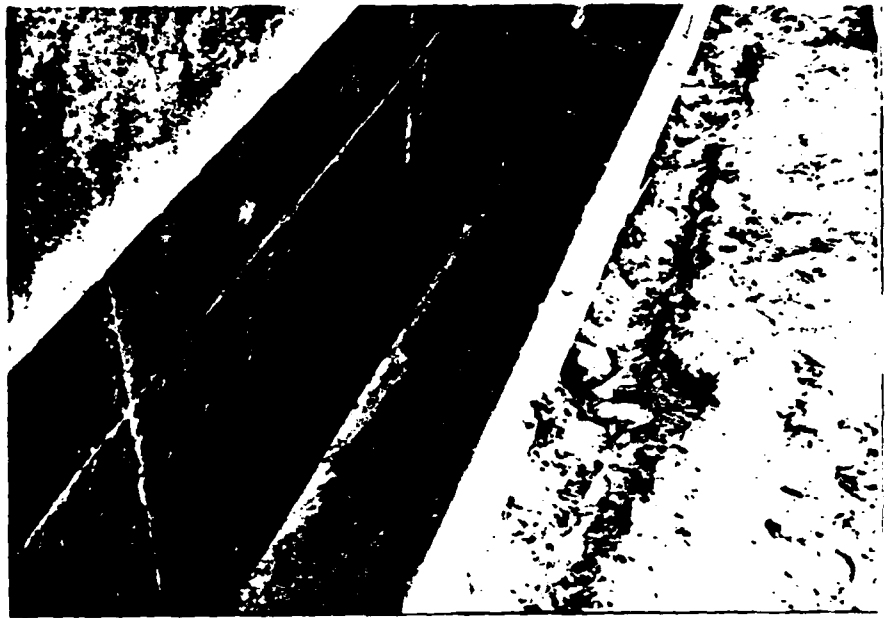
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FOOTER SEC. T-5



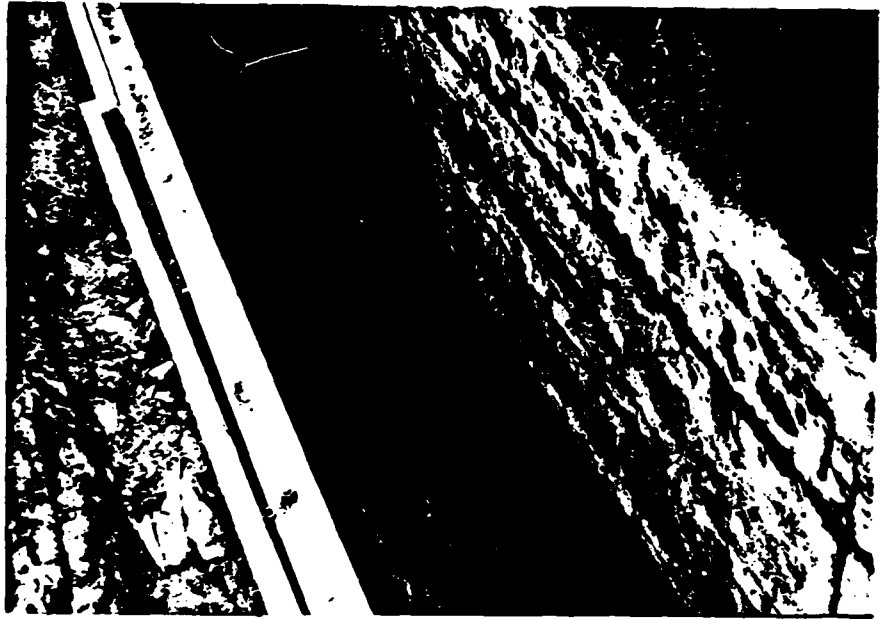
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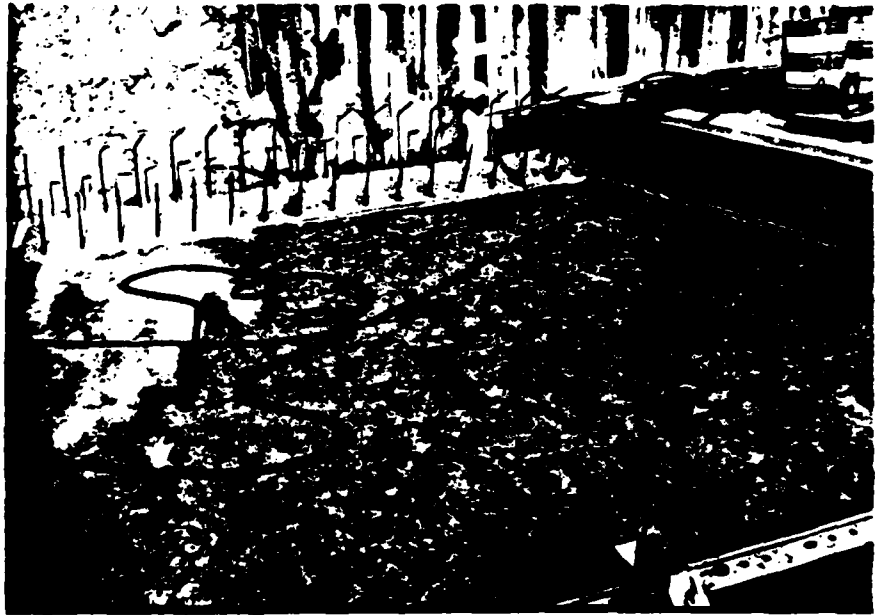
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CLOSURE SLAB C-1A



FOOTER SEC. T-2



SLAB SEC. T-2



STA 874+15 LT.



INSPECTION TRENCH STA 874+15



STA 875+00 LT



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STA 876+00 LT.



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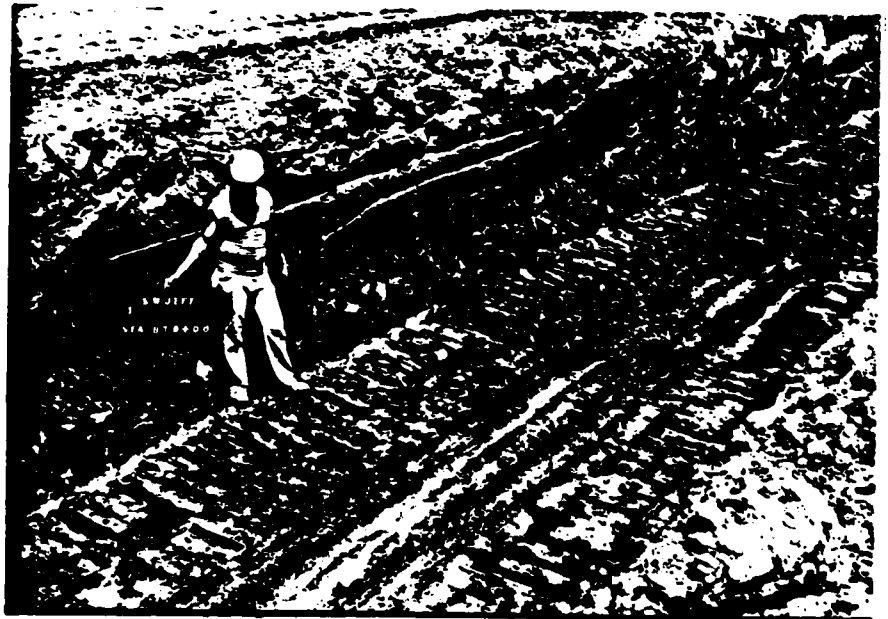
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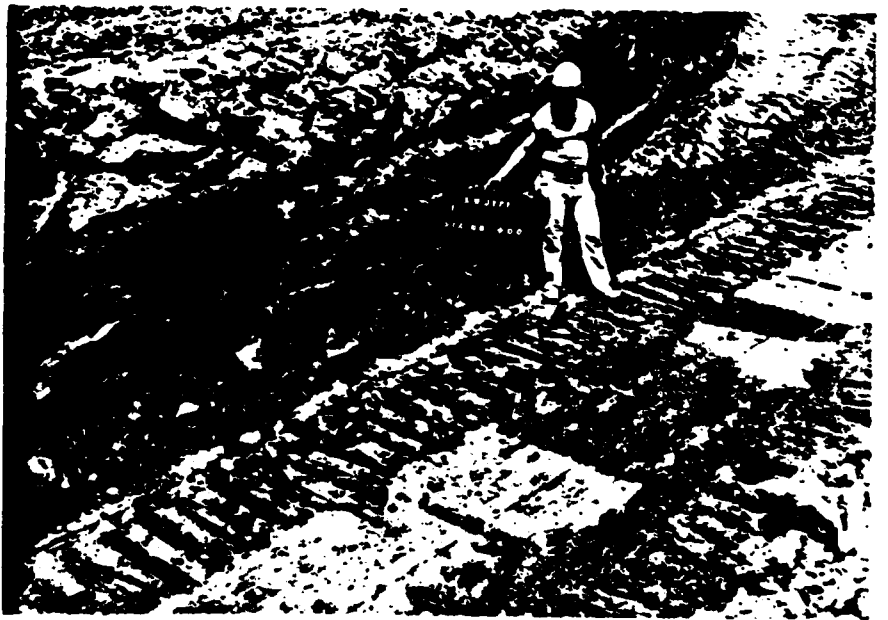
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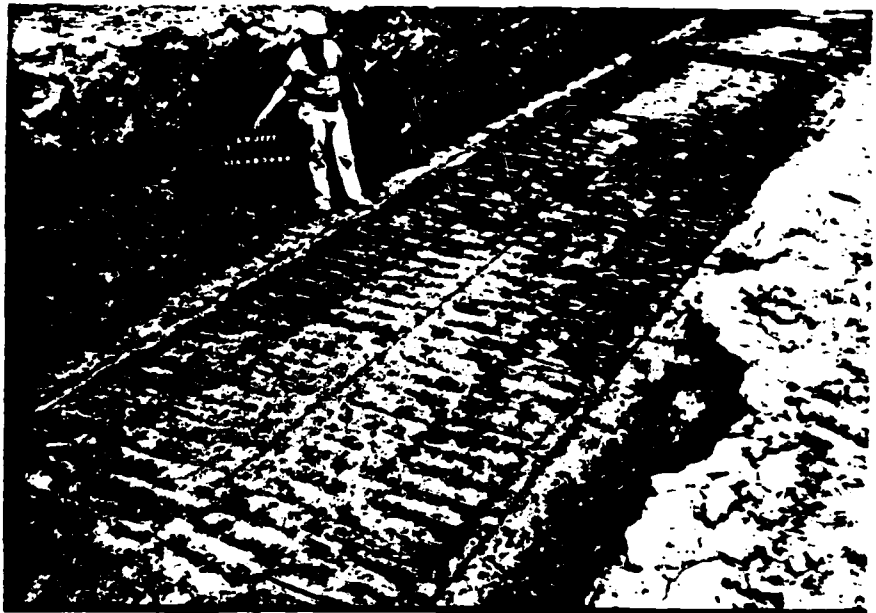
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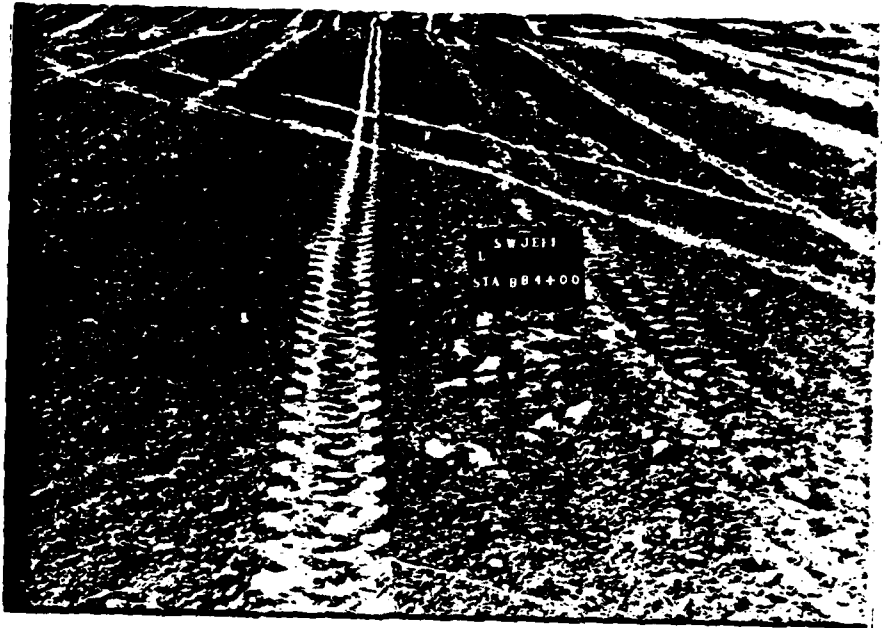
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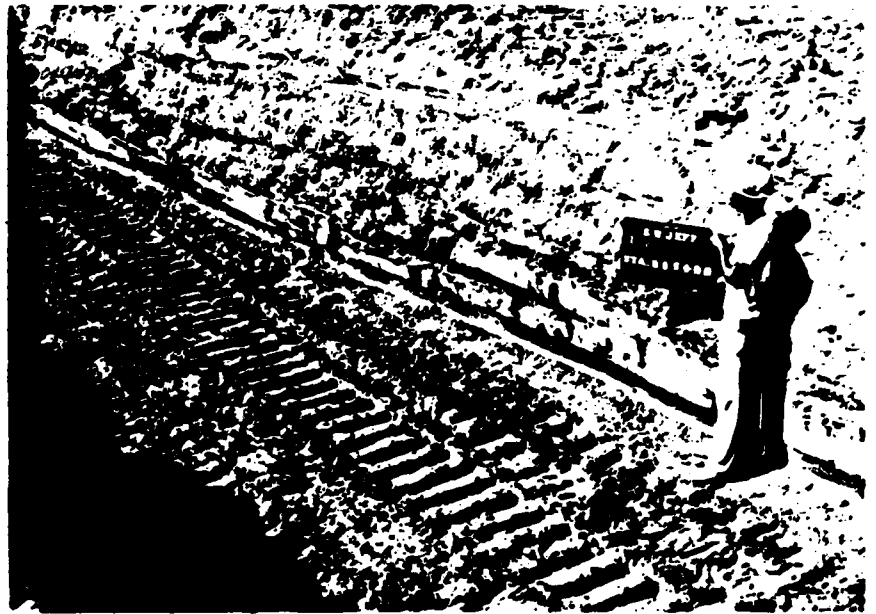
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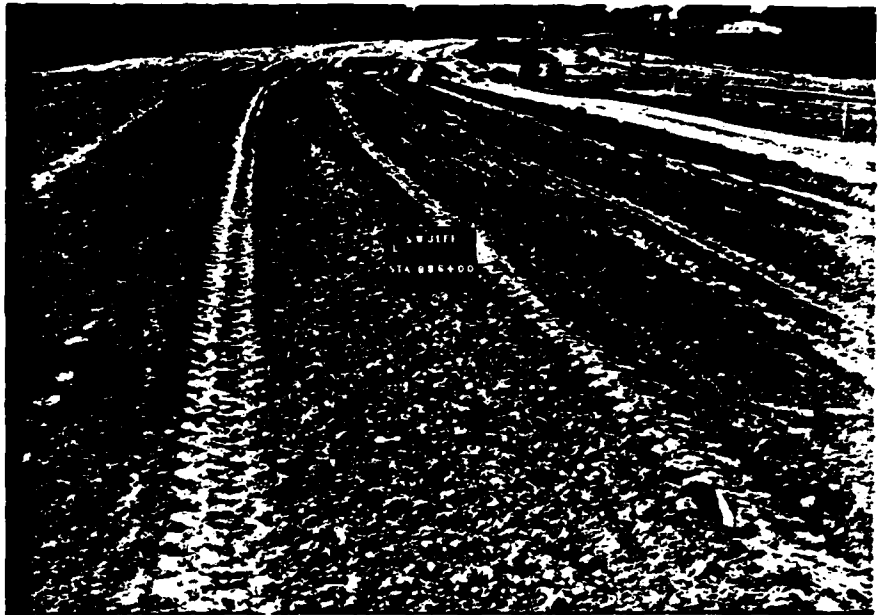
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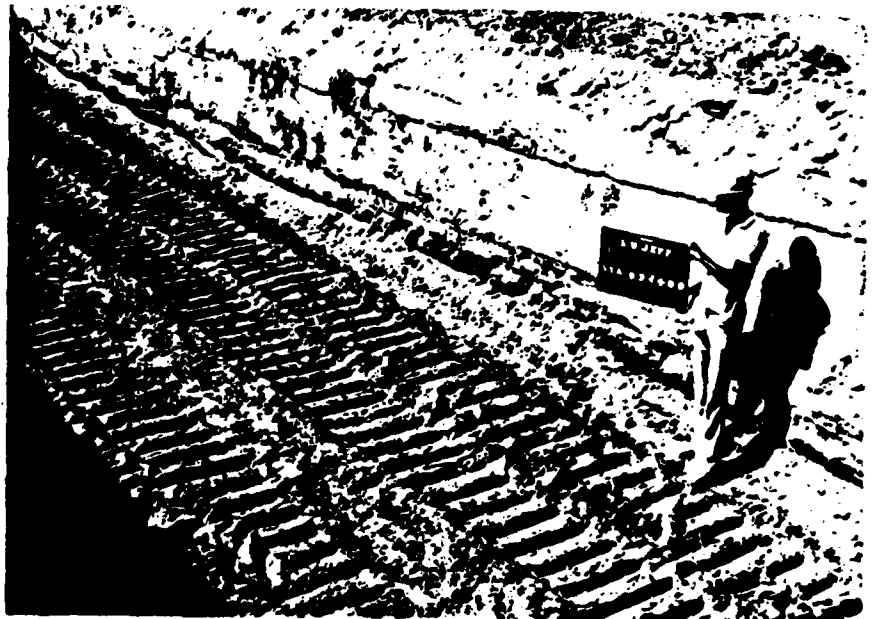
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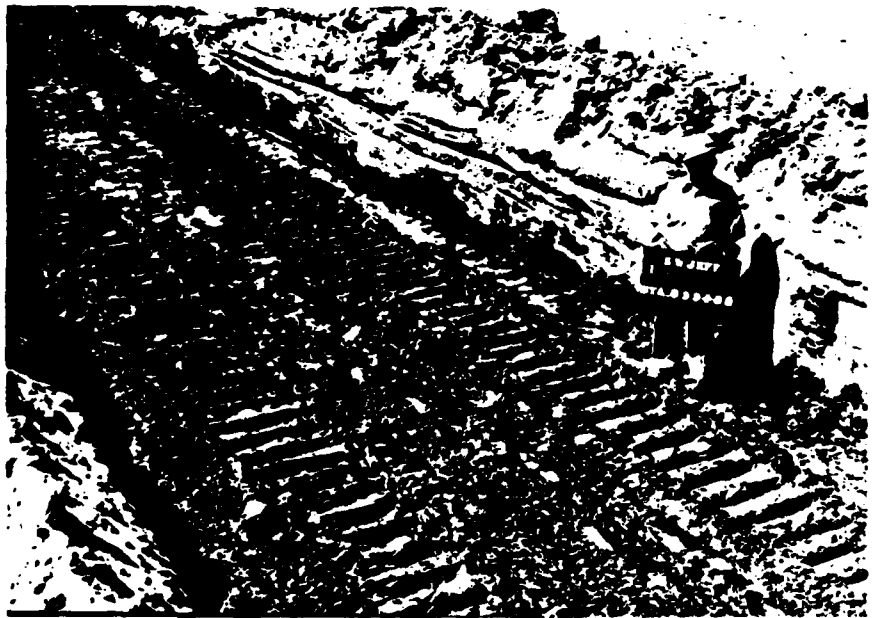
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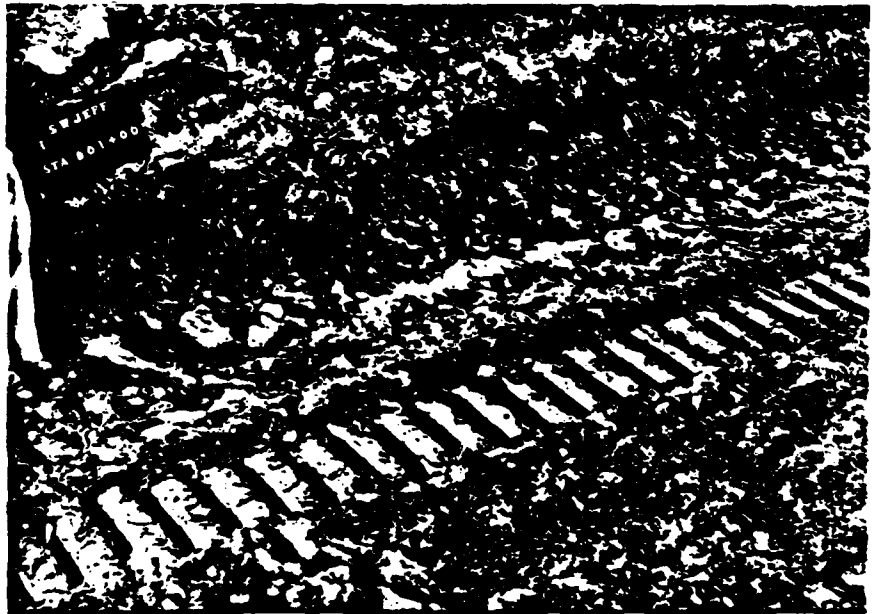
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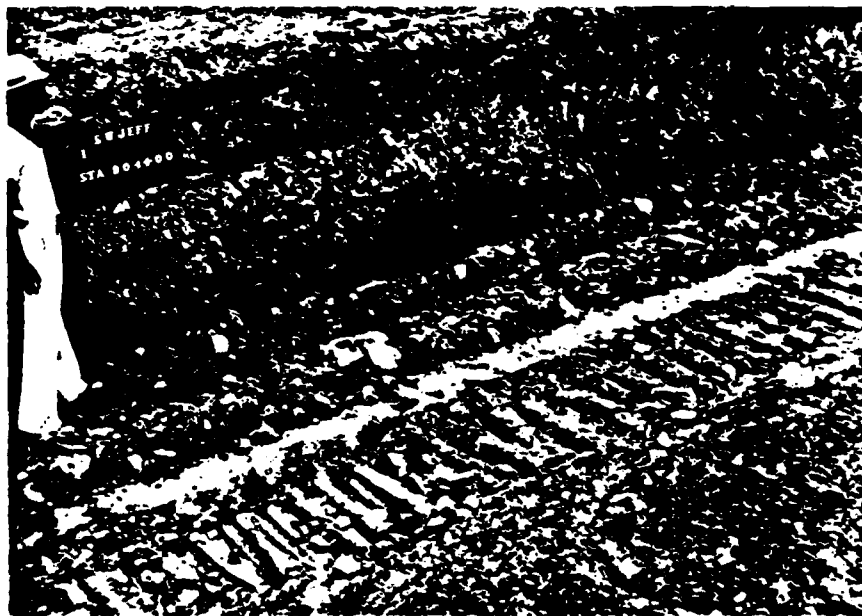
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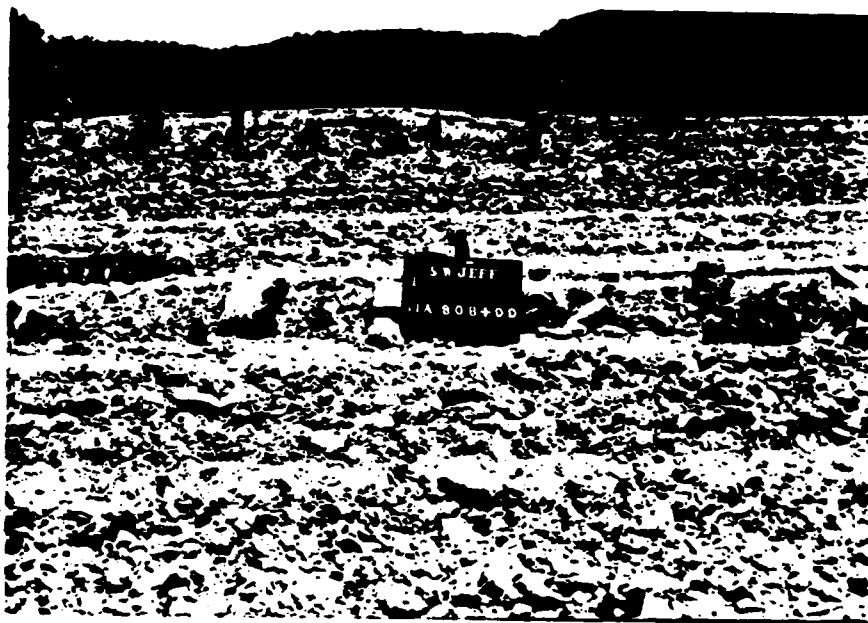
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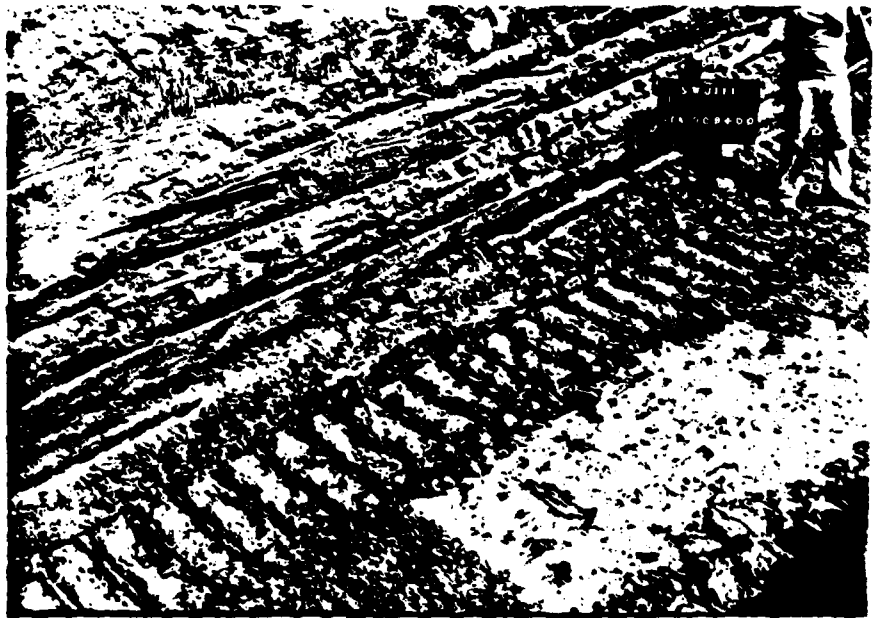
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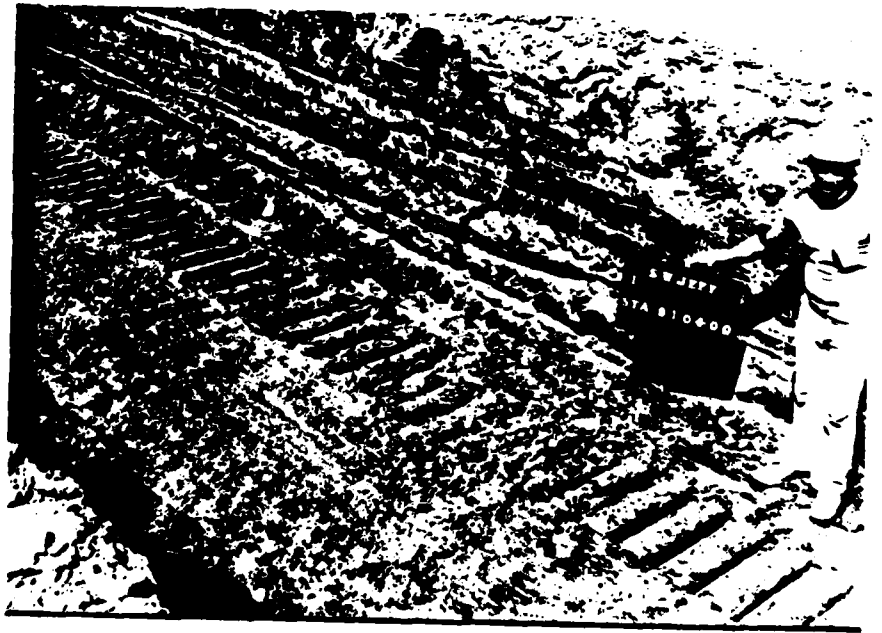
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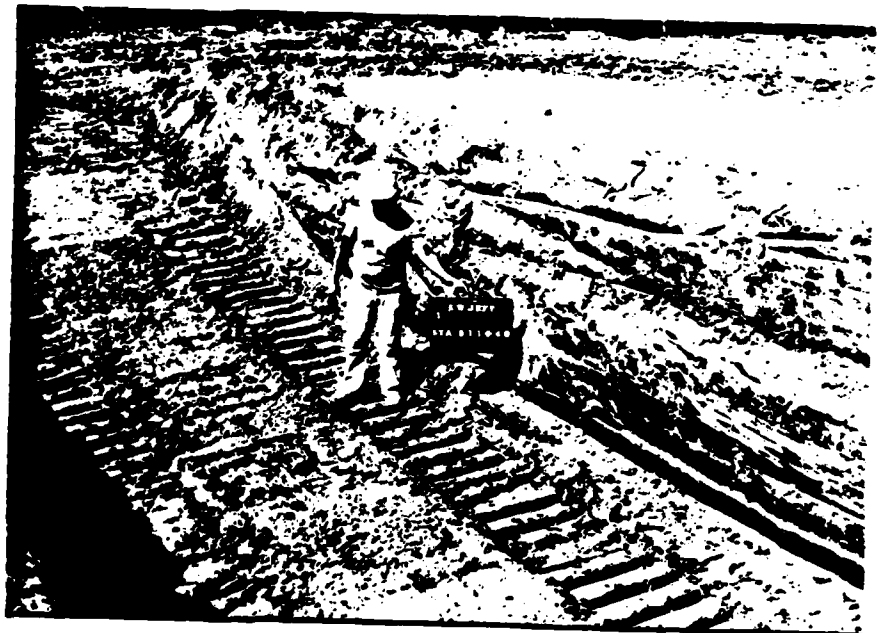
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STA 911+00 RT.



INSPECTION TRENCH STA 911+50

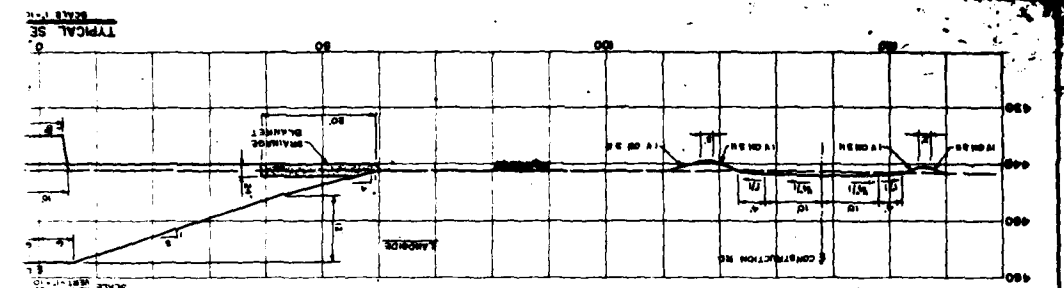
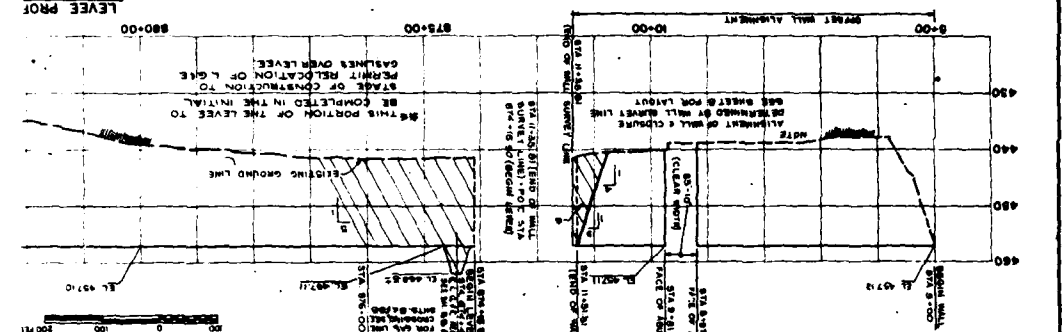
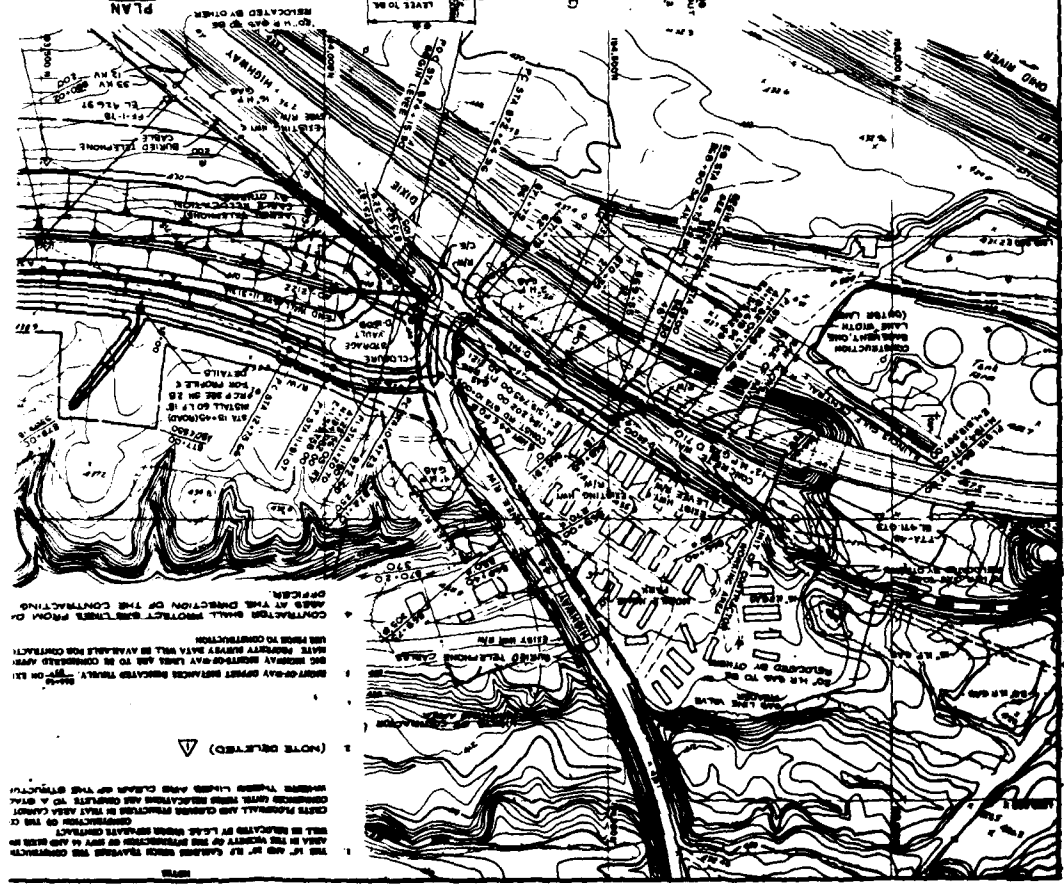
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CORPS OF ENGINEERS

Plate 1

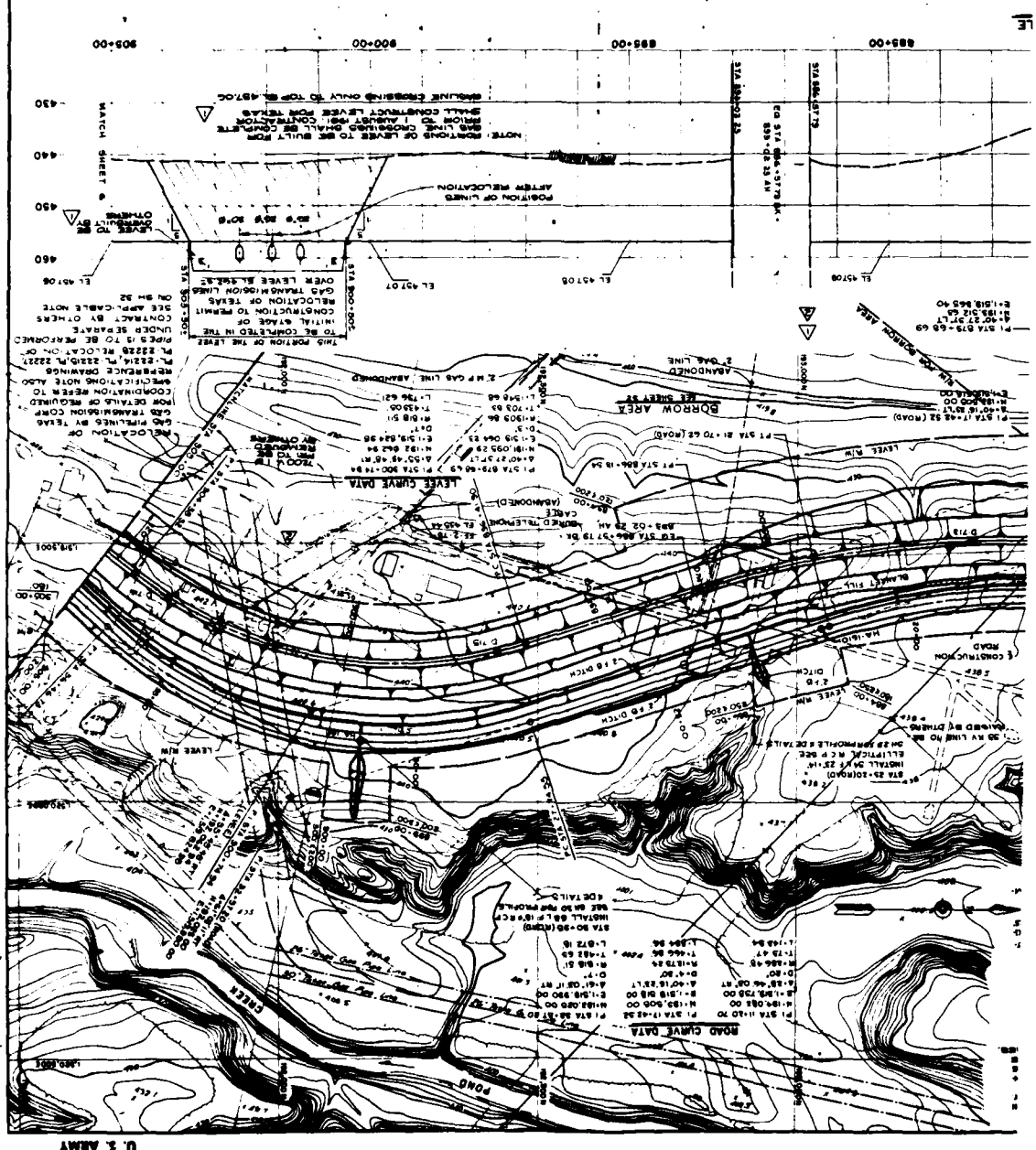
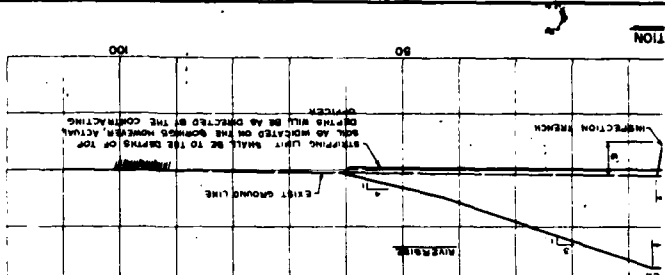
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SOUTHWESTERN JEFFERSON COUNTY, KY.
LOCAL FLOOD PROTECTION
 SECTION - 4A (REVISED)

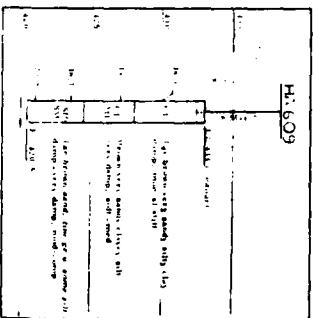
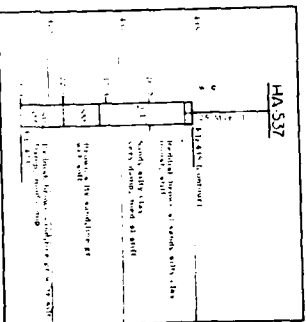
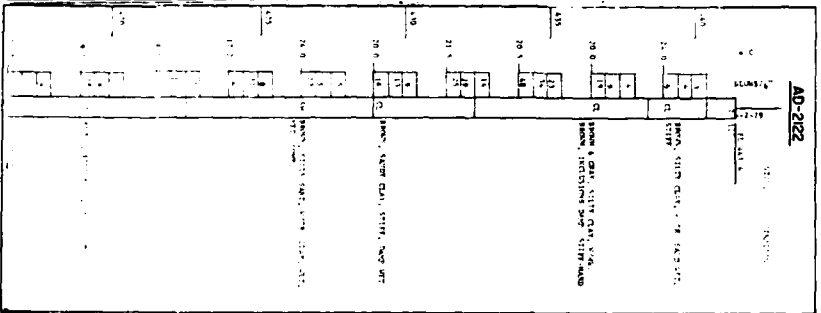
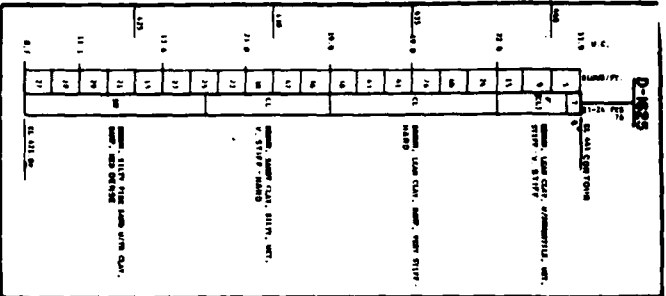
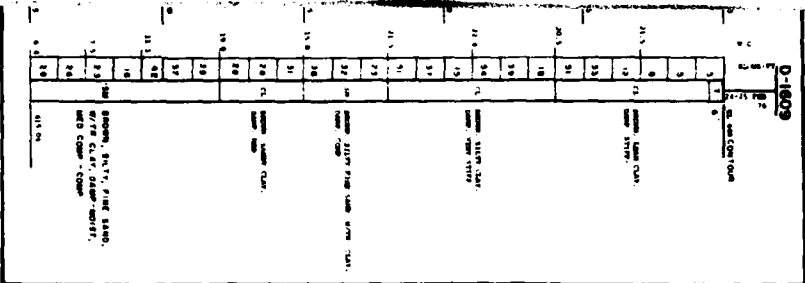
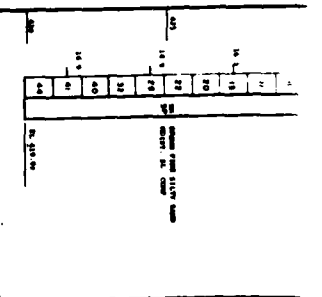
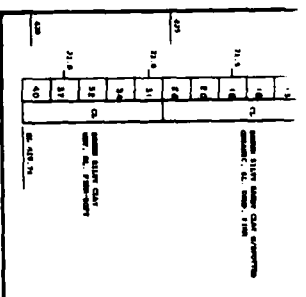
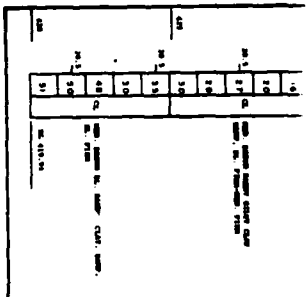
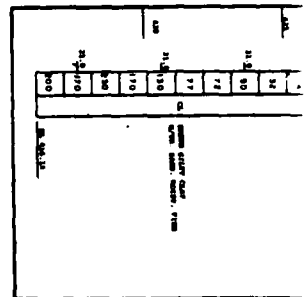
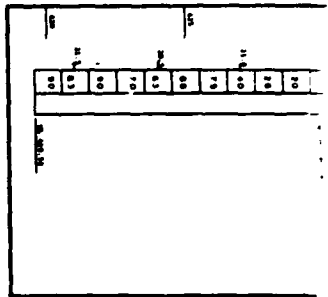
PLAN, PROFILE & TYPICAL SECTION

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
 DISTRICT OF MISSOURI

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U. S. ARMY



REVISION	DATE	DESCRIPTION

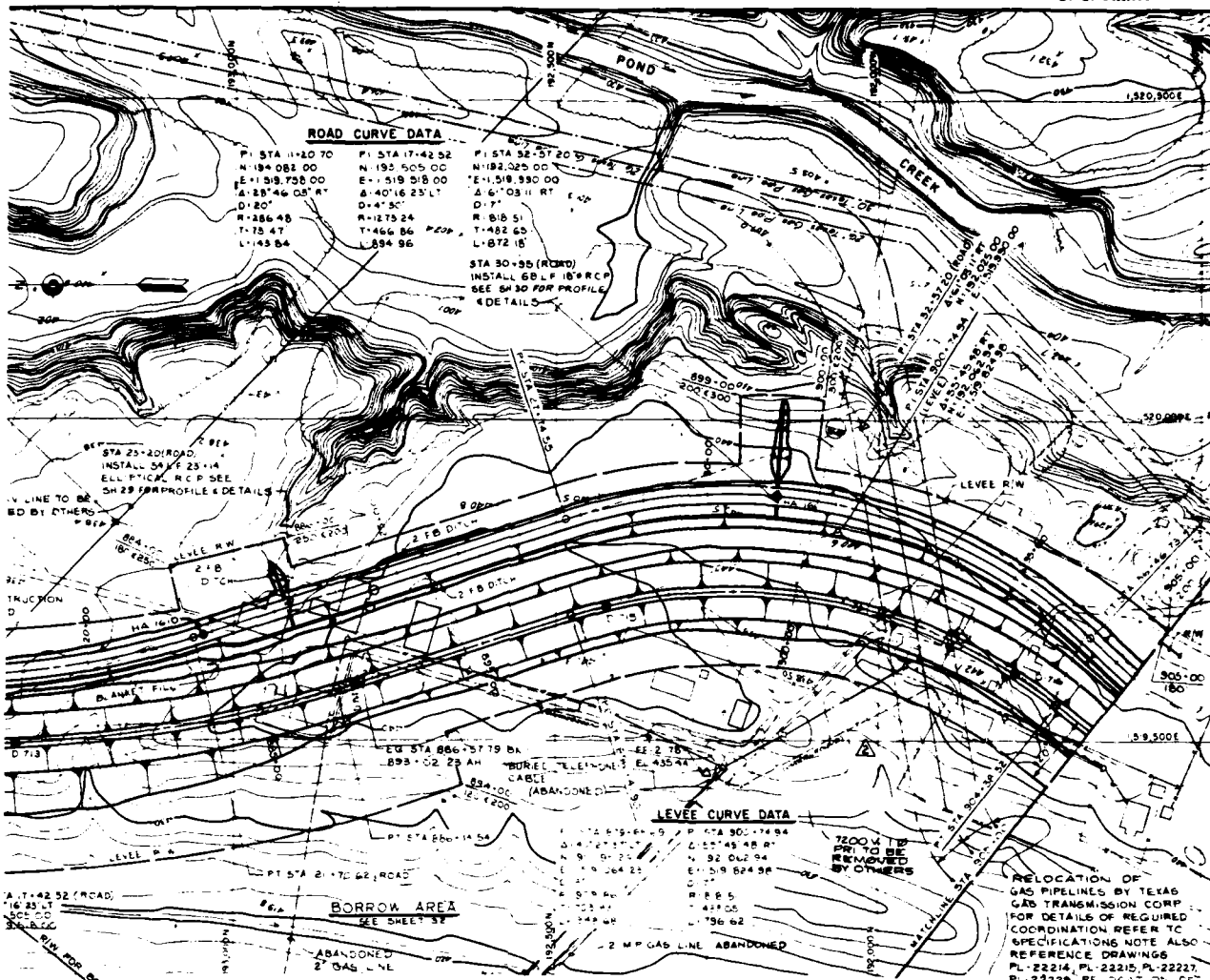
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS LOUISVILLE, KENTUCKY

DRAWN BY: [] **CHECKED BY: []**

DESIGNED BY: [] **APPROVED BY: []**

SOUTHWEST JEFFERSON CO. KY.
LOCAL FLOOD PROTECTION
SECTION 4A
BORING LOGS

PLATE 3



ROAD CURVE DATA

PI STA 11+20.70	PI STA 17+42.52	PI STA 32+57.20
N=194.082 00	N=192.505 00	N=182.025 00
E=1519.738 00	E=1519.518 00	E=1518.930 00
L=181°46'03" RT	L=40°16'23" LT	L=6°03'11" RT
D=120'	D=43.50'	D=7'
R=286.48	R=1275.24	R=816.51
T=73.47	T=466.86	T=482.60
L=145.84	L=894.96	L=872.15

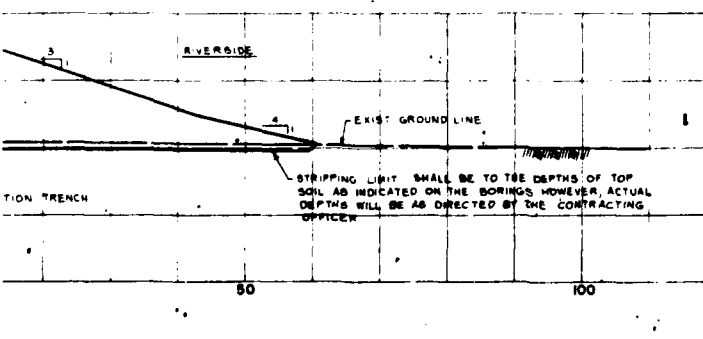
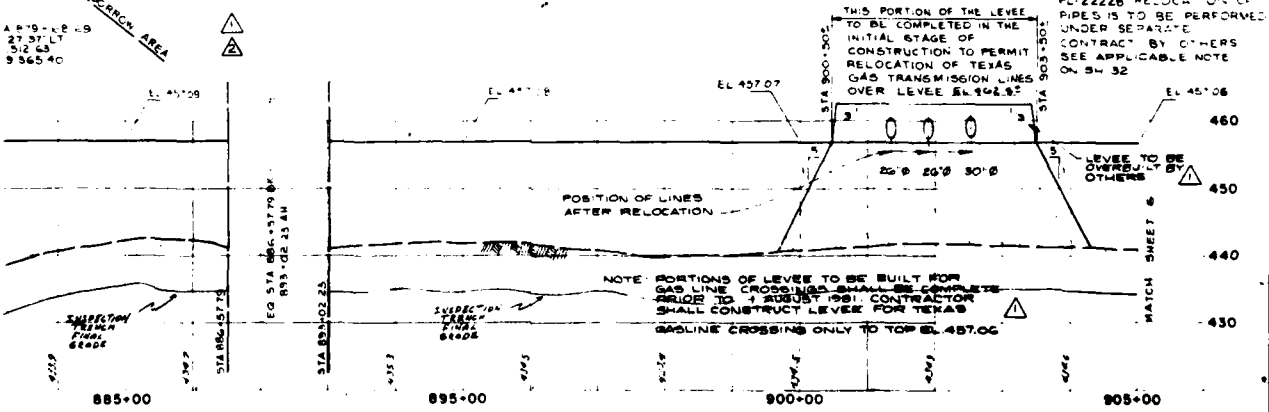
STA 30+55 (ROAD)
INSTALL 60 LF 18" RCP
SEE SH 30 FOR PROFILE
& DETAILS

LEVEE CURVE DATA

PI STA 866+37.79	PI STA 900+00.00
N=893.022 25	N=924.548 81
E=1519.524 25	E=1519.524 25
L=120°00'00"	L=92°00'00"
D=120'	D=120'
R=286.48	R=286.48
T=73.47	T=73.47
L=145.84	L=145.84

BORROW AREA

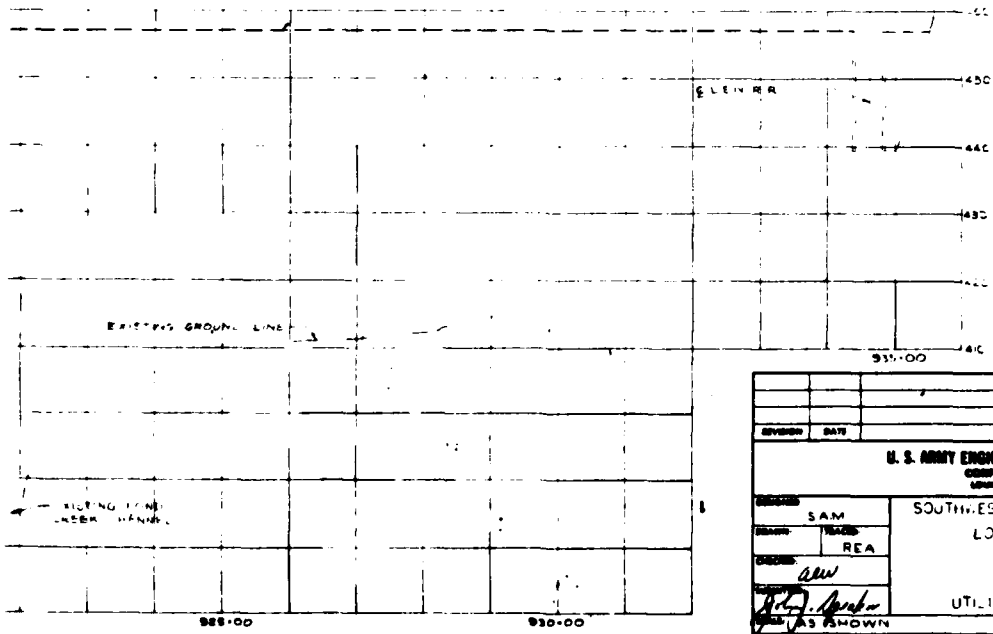
SEE SHEET 37



19AUS81	GASLINE CROSSING DETAIL REVISED (CONT MOD.)	SAW/387
19AUG81	GASLINE CROSSING DETAIL REVISED (CONT MOD.)	SAW/387
REVISION	DATE	DESCRIPTION
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE CORPS OF ENGINEERS LOUISVILLE DISTRICT		
DESIGNED: ALW	SOUTHWESTERN JEFFERSON COUNTY, KY. LOCAL FLOOD PROTECTION, SECTION-4A (REVISED) PLAN, PROFILE & TYPICAL SECTION	
DRAWN: CRP		
CHECKED: SAM		
APPROVED: [Signature]		
DATE: JULY 80	DESIGNED NUMBER: 616-12.4/5	PLATE: Plate 4

FOOTING DIMENSIONS (NOT IN THIS CONTRACT)

PROFILE OF LEVEL AND
DATE: JULY 80



FILE
112 100
110

REVISION	DATE	DESCRIPTION	BY	APP'D
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE CORPS OF ENGINEERS LOUISVILLE DISTRICT				
DESIGNED	SOUTHWESTERN JEFFERSON COUNTY, KY			
DRAWN	LOCAL FLOOD PROTECTION			
CHECKED	SECTION 4A (REVISED)			
DATE	PROFILE OF LEVEL & UTILITY RELOCATION SCHEDULES			
DATE	JULY 80			
AS SHOWN			DRAWING NUMBER	
Plates			616 12 4/7	

CORPS OF ENGINEERS

COORDINATING AGENCY FOR UTILITIES

Texas Gas

Transmission Company
 Mr. James E. Grubbs
 Division Superintendent
 Suite 475 Mail Office Center
 400 Sherburn Lane
 Louisville, Ky. 40207
 Tele. (502) 897-3338

South Central Bell

Telephone Company
 Mr. Haris Newlan, Jr.
 Specialist
 Outside Plant Engineering
 115 South Hubbard Lane
 Louisville, KY 40202
 Tele. (502) 896-2431

Louisville Gas and Electric Company

Gas Engineering 1/ **Electric Distribution 1/**
 Mr. Lou Johnson Mr. J. A. French
 Supervisor Supervisor
 Corner 7th & Ormsby Sts. Corner 7th & Ormsby Sts.
 Louisville, KY 40210 Louisville, KY 40210
 Tele. (502) 566-4389 Tele. (502) 566-4580

1/ Mr. J. A. French is assigned as main coordinator for both the gas engineering and electric distribution system.

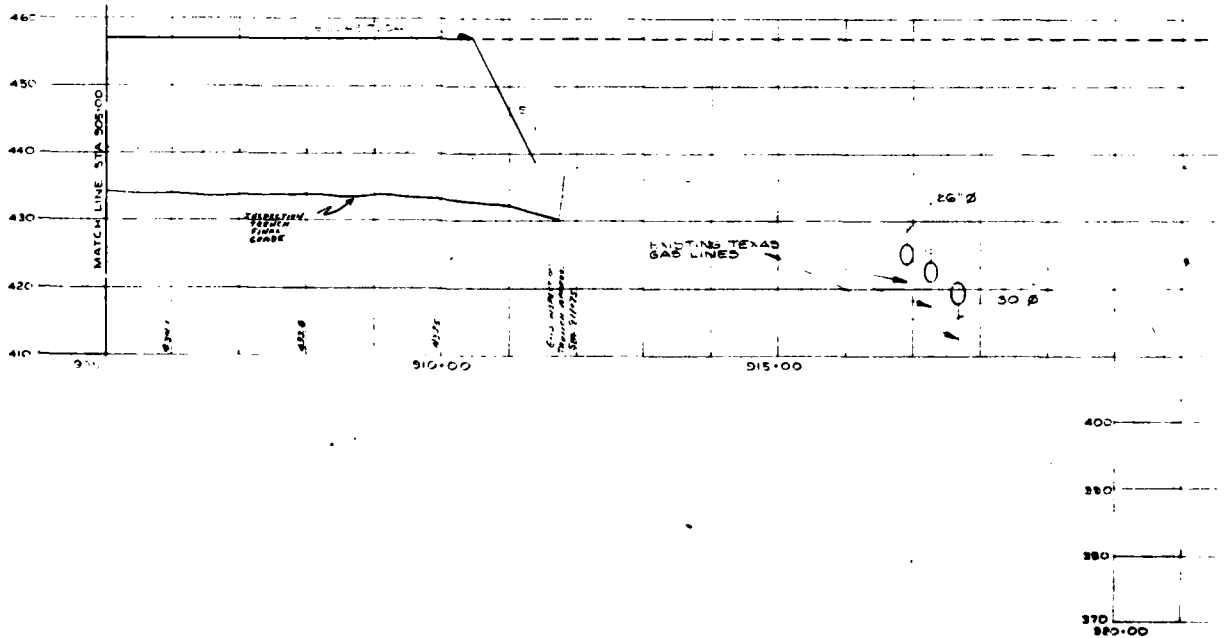
SCHEDULE OF EXISTING UTILITIES AND PROPOSED RELOCATIONS

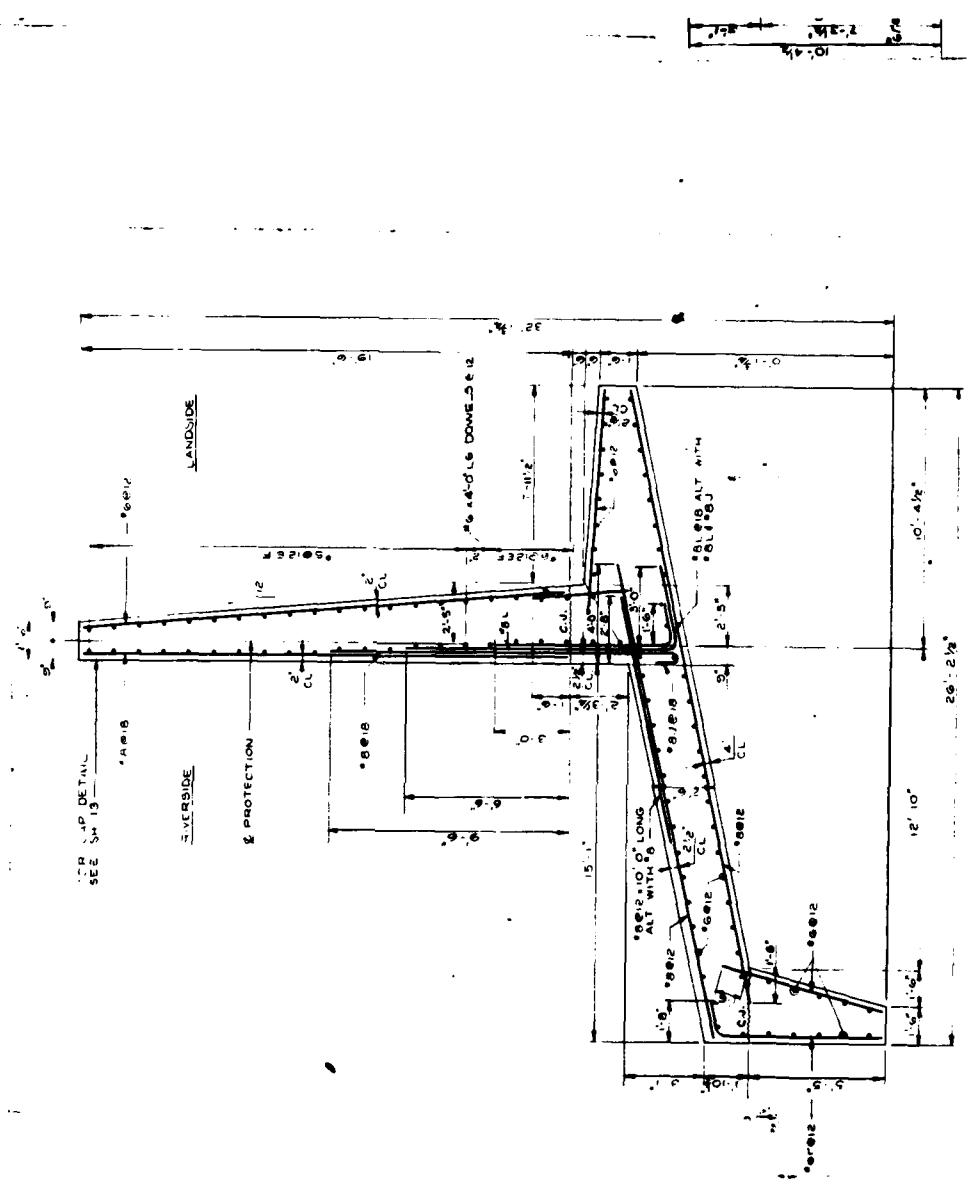
APPROX. 1/ STATION	SHEET REFERENCE	TYPE OF UTILITY	UTILITY OWNER	RELOCATIONS
9+44 (WALL)	5, 8B	16" H.P. GAS	L.G. & E.	TO BE RELOCATED BY OTHERS UNDER SEPARATE CONTRACT
9+58 (WALL)	5, 8B	20" H.P. GAS	L.G. & E.	DO
9+90 (WALL)	5, 8B	2" H.P. GAS	L.G. & E.	DO
916+80 TO 917+60 (LEVEE)	5, 6, BORROW AREA	24", 26" & 30" H.P. GAS 2/	TEXAS GAS TRANSMISSION CO.	TO BE RELOCATED BY OTHERS UNDER SEPARATE CONTRACT
9+80 (WALL)	5, 8B	600 PAIR BURIED TELE. CABLE	SOU. CEN. BELL TELE. CO.	RELOCATED BY OWNER CONVERTED TO AERIAL CROSSING / RELOC. IS COMPLETE
7+52 (WALL)	5, 8B	120 VOLT SECONDARY W/STREET LIGHTS	L.G. & E.	TO BE RELOCATED BY OWNER
10+01 (WALL)	5, 8B	33 KV & 12 KV	L.G. & E.	POLE CHANGES & CLEARANCE CHANGES BY OWNER
7+52 (WALL)	8B	PHONE BOOTH	SOU. CEN. BELL TELE. CO.	TO BE RELOCATED BY OWNER
10+18 (WALL)	5, 8B	7.2 KV 1Ø PRIMARY	L.G. & E.	POLE CHANGES & CLEARANCE CHANGES BY OWNER
879+45 (LEVEE)	5	33 KV	L.G. & E.	POLE CHANGES & CLEARANCE CHANGES BY OWNER
886+00 (LEVEE)	5, BORROW AREA	2" GASLINE (RESIDENCE SERVICE)	L.G. & E.	ABANDONED (CROSSES BORROW AREA) 3/
901+00 (LEVEE)	5, BORROW AREA	2" H.P. GASLINE (RESIDENCE SERVICE)	L.G. & E.	ABANDONED (CROSSES BORROW AREA) 3/
891+00 TO 901+00 (LEVEE)	5, BORROW AREA	BURIED TELE. RESIDENCE SERVICE LINES	SOU. CEN. BELL TELE.	ABANDONED (CROSSES BORROW AREA) 3/
DO	DO	RESIDENTIAL POWER (7200 VOLT 1Ø)	L.G. & E.	ABANDONED (CROSSES BORROW AREA) 3/

1/ LOCATION OF ACTUAL CROSSING OR VICINITY OF PROTECTION - REFER TO SHEETS 5, 6, 8 OR BORROW AREA PLAN SHEET 32

2/ REFER TO TEXAS GAS TRANSMISSION CO. LEVEE CROSSING DRAWINGS.

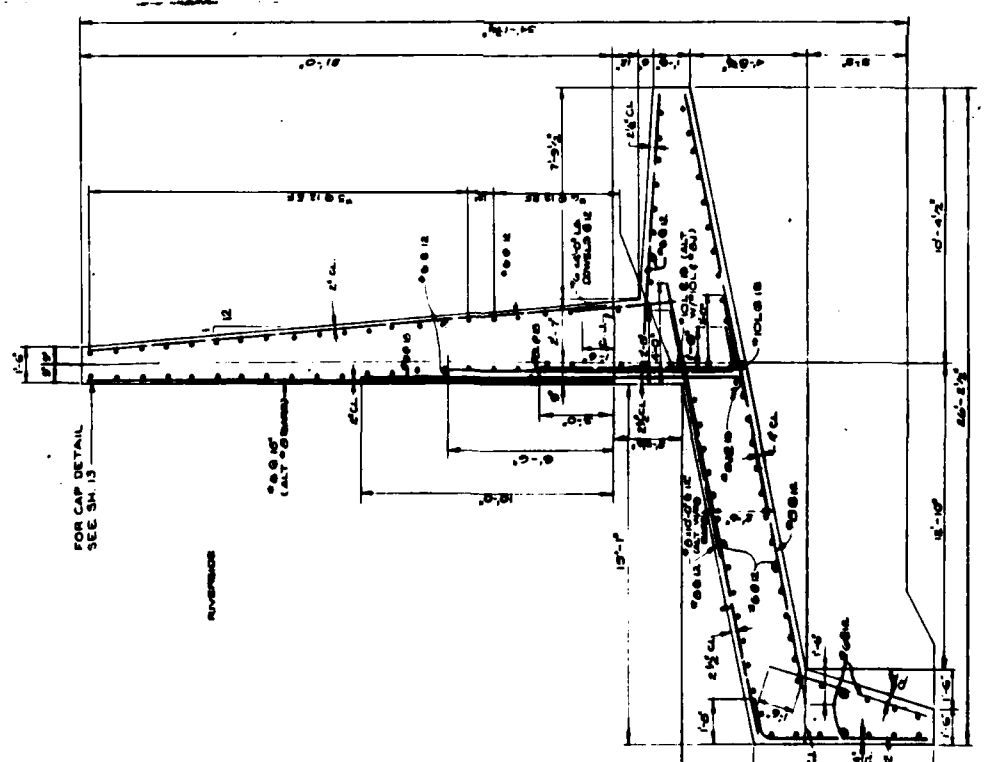
3/ RESIDENTIAL UTILITY SERVICE LINES INDICATED AS ABANDONED ARE DISCONNECTED AND SHALL BE REMOVED AS INDICATED ON SHEET 32. THESE LINES SHALL BE RELOCATED AS SHOWN ON SHEET 32.





NOTE: FOR REINFORCING DETAILS RIVERBANK FACE SEE BK. II

TYPICAL SECTION 20' T-WALL
SCALE 1/8" = 1'-0"

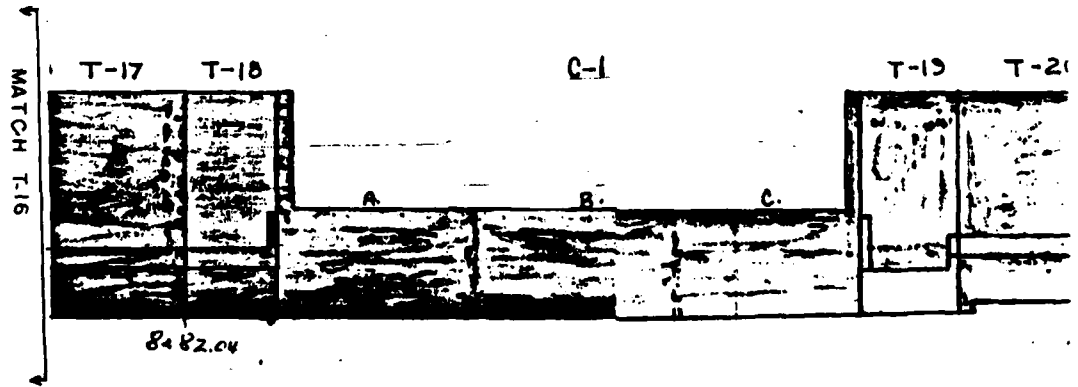
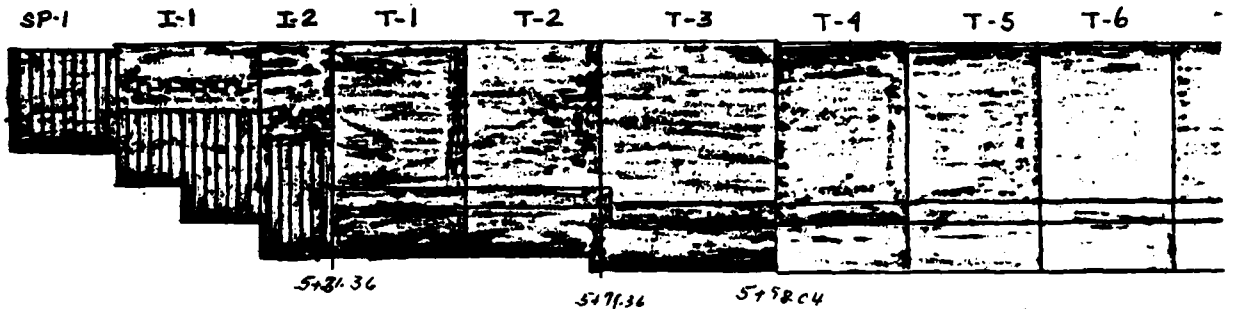


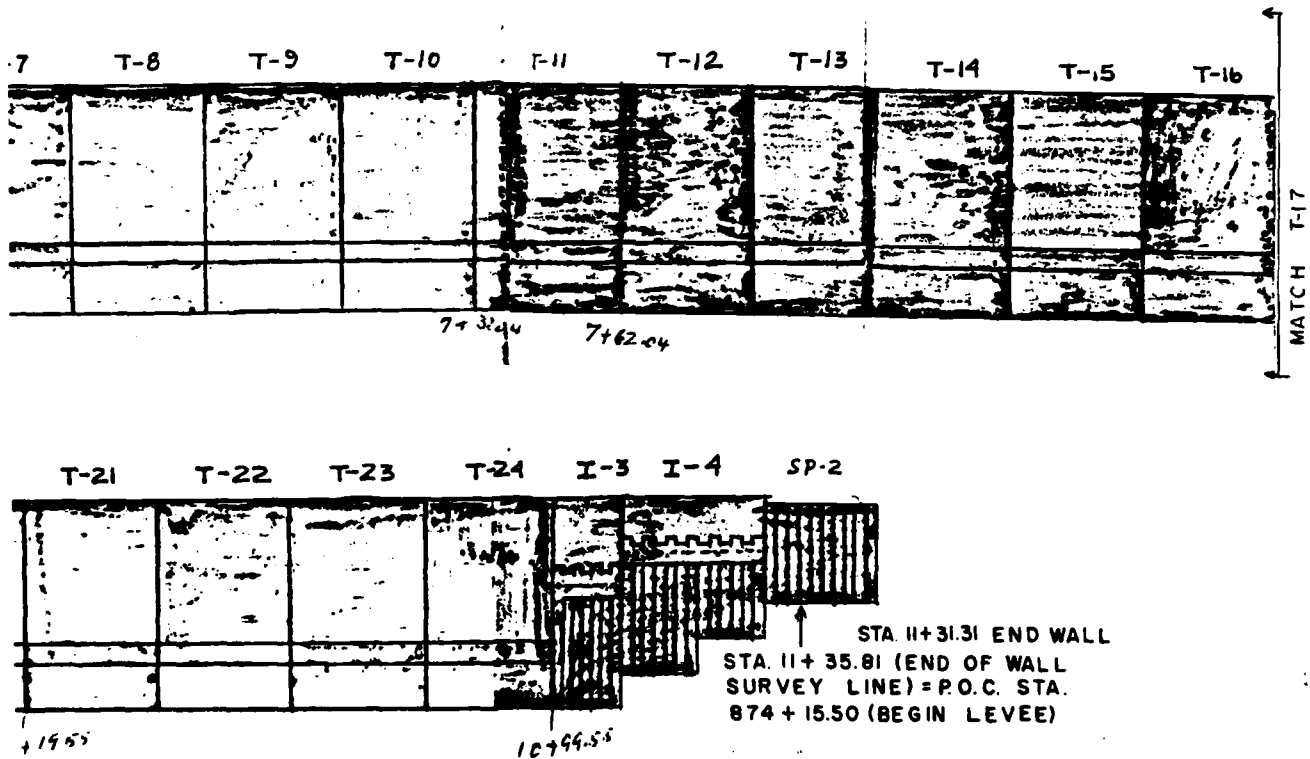
FOR CAP DETAIL
SEE SH. 13

RIVERBANK

TYPICAL SECTION - 22' T-WALL

SOUTH-WESTERN JEFFERSON COUNTY, KY. LOCAL FLOOD PROTECTION SECTION - 4A 22' T-WALL TYPICAL SECTION & SPECIAL MONOLITH		DATE: JULY 80	
D.R.M.	U.S.R.	DRAWN BY: [Signature]	
W.F.S.	U.S.R.	CHECKED BY: [Signature]	
B. S. SMITH ENGINEERING DISTRICT, LOUISVILLE		DATE: JULY 80	
SOUTH-WESTERN JEFFERSON COUNTY, KY. LOCAL FLOOD PROTECTION SECTION - 4A 22' T-WALL TYPICAL SECTION & SPECIAL MONOLITH		DATE: JULY 80	
PLATE 6		616-12.4/11	





REVISION	DATE	DESCRIPTION	BY	APP'D
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE CORPS OF ENGINEERS LOUISVILLE DISTRICT				
DESIGNED		SOUTHWEST JEFF. CO. FLOOD PROTECTION SECTION 4A WALL & CLOSURE PROFILE		
DRAWN	TRACED			
CHECKED				
SUBMITTED				
SEAL		DATE	DRAWING NUMBER PLATE 7	

DA
FIL
7