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ARMY ENGINEER DISTRICT LOUISVILLE KY  
PIGEON CREEK THREE PUMP STATIONS, EVANSVILLE, INDIANA. LOCAL FL--ETC(U)  
MAY 82 V C BOARMAN, A W GOODAKER

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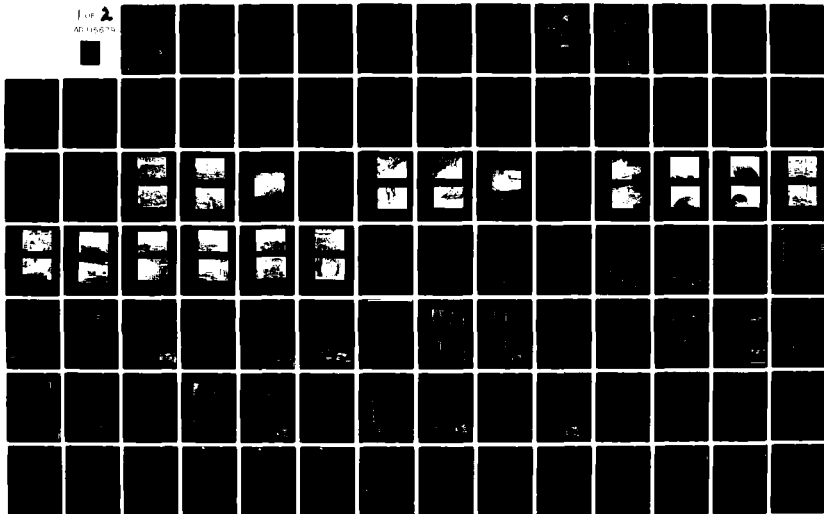
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Levee  
Pump Stations  
Pigeon Creek  
Evansville, IN

ABSTRACT (Continue on reverse side if necessary and identify by block number)  
This report supplements the prior foundation report on the Evansville, IN, levee. It covers foundation conditions encountered and methods of constructing three pump stations within those conditions.

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Foundation Report  
 Supplement No. 2 Volume II  
 Evansville, Indiana  
 Local Flood Protection Project  
 Pigeon Creek Section  
 Unit 2 (Part I) Pump Stations  
Sixth Ave., Dresden St., Delaware St.

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FOUNDATION REPORT  
SUPPLEMENT NO. 2 VOLUME II  
EVANSVILLE, INDIANA  
LOCAL FLOOD PROTECTION PROJECT  
PIGEON CREEK SECTION  
UNIT 2 (PART I) PUMP STATIONS  
SIXTH AVE., DRESDEN ST., DELAWARE ST.

Foundation Report  
Supplement No. 2 Volume II  
Evansville, Indiana  
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Unit 2 (Part I) Pump Stations  
Sixth Avenue, Dresden Street, Delaware Street

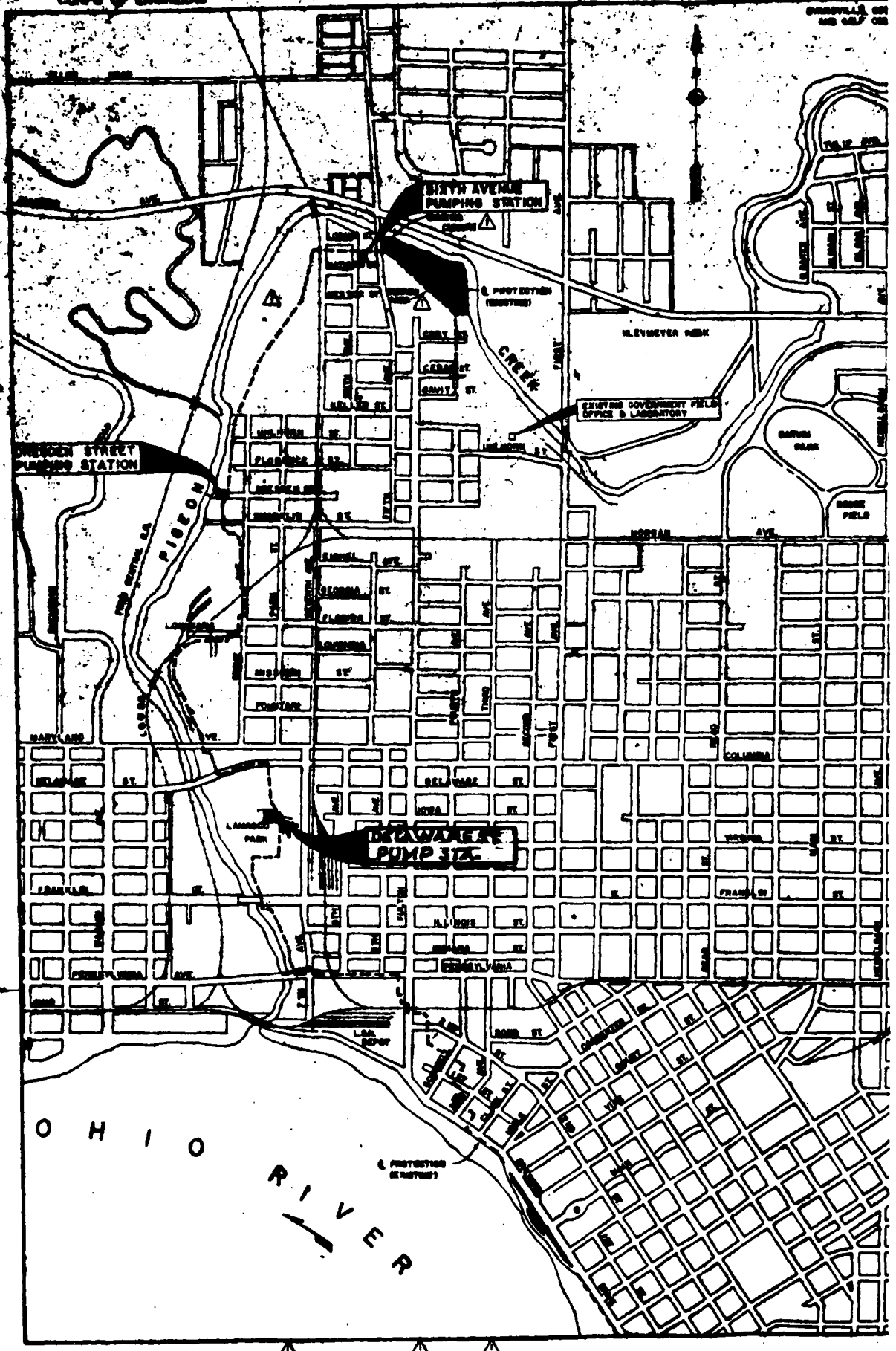
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*Plate 1*





## PART I - INTRODUCTION

1-01 Location. The local protection project for Evansville, Indiana is located in Vanderburgh County, Indiana on the Ohio River. The city limits extend from points approximately opposite River Mile 784 to Mile 796 miles below Pittsburgh. Completed Unit I, Howell and Knight Township sections serve as protection along the Ohio River and Unit II will serve, when completed, as protection along the left bank of a tributary called Pigeon Creek. This report will cover the foundation conditions and construction of three Pumping Plants which will serve for the disposal of interior drainage during flood periods in the area of Unit II - (Part 1). See Plate No. 1. A previously submitted report for Unit II - (Part 1) Volume I covered the Levee construction along the same reach of protection of which the three plants serve. The construction of the Delaware Street, Dresden Street and Sixth Avenue Pumping Plants marks the completion of the Evansville, Indiana Flood Protection Project called Pigeon Creek Unit II - (Part 1).

1-02 Description. Each Pumping Station consists of a brick faced concrete block building with precast concrete roof units and built-up roofing.

Dresden Street Station has three storm water pumps with 30 inch discharge having a capacity of 31,400 g.p.m. each at 9.8 foot head.

Sixth Avenue Station has two storm water pumps with 30 inch discharge and a capacity of 26,200 g.p.m. each at 21.4 foot static head.

Delaware Street Station has two sewage pumps and three storm water pumps. The sewage pumps have 24 inch discharge and 13,450 g.p.m.

capacity each at 52.0 foot head. The storm water pumps have 60 inch discharge and a capacity of 113,400 g.p.m. each at 15 foot static head.

1-03 Authority. The authorization for this construction is the same as for the Levee construction which is the Flood Control Act approved 28 August 1937. The work covered in this report is a part of the overall flood protection plan for the City of Evansville.

1-04 Purpose of Report. This report has been prepared as a record of foundation conditions encountered during construction as well as a record of procedure used to build on the foundation.

1-05 Contractor and Contract Supervision

1-05.1 Dresden Street & Sixth Avenue Pumping Stations

Contract No. DACW27-77-C-0140

Contractor: J. L. Wilson Co., Inc.  
Bloomfield, IN

Awarded: October 1977

Substantially Complete: December 1979

Resident Engineer: Arnold W. Goodaker

Inspection: Victor C. Boarman (Supv.)  
Jerry M. Wade  
Kenneth R. Haywood

1-05.2 Delaware Street Pumping Station

Contract No. DACW27-78-C-0076

Contractor: Indiana Construction Co., Inc.  
Fort Wayne, IN

Awarded: June 1978

Substantially Complete: February 1982

Resident Engineer: Arnold W. Goodaker

Inspection: Victor C. Boarman (Supv.)  
Jerry M. Wade  
Alva B. Johnson  
Kenneth R. Haywood

## PART II - FOUNDATION EXPLORATION

2-01 Investigation Prior to Construction. Investigation consisted of field reconnaissance and subsurface investigations. Samples of foundation material were obtained by standard penetration methods, hand augers and undisturbed Denison and Shelby tube samples. Investigations were first started in 1938 with additional investigations being made every few years up to December 1977. Boring locations are shown on Plate No. 18 for Sixth Avenue Station and Plate No. 21 for Dresden Street Station. Boring locations for Delaware Street are on Plate No. 25. Boring data for Dresden Street and Sixth Avenue is on Plate No. 24. Boring data for Delaware Street is shown on Plate Nos. 26 through 29.

2-02 Investigation During Construction. No additional borings were made at Dresden Street or Sixth Avenue sites during construction since the foundations were open cut and relatively shallow.

Additional borings were made at the Delaware Street site by Stoll Evans and Associates from Ann Arbor, Michigan in July 1978 for Indiana Construction Company prior to beginning work as a part of a Value Engineering Study. The Value Engineering proposal was not accepted by the Corps of Engineers but the investigative materials have been included in Appendix IV to supplement borings previously made by the Geotechnical Branch. In addition, eleven cores were obtained as part of the contract obligation by J. E. Hoskins Drilling, Inc. to assist in determining the founding elevation for the 44 caissons that support the station. This information is contained in Appendix V of this report.

### PART III - GEOLOGY

3-01 Geology of the Project Area. The project area is located near the end of the Eastern Interior Coal Field, in the wide, alluvial filled Ohio River Valley. This valley was carved out during the preglacial and early glacial period. During the late glacial period, melt water from receding glaciers deposited alluvial fill consisting of sand, gravel, silt and clay in the valley. Bedrock in the project area is correlated with the Upper Pennsylvanian Coal measures which usually consists of successive strata of sandstone, shale and coal.

Bedrock formations at or near surface in the Evansville area include, in ascending order, the Dugger, Shelburn and Patoka Formations, all of Pennsylvania age, the age of the great coal deposits of the Eastern United States. The only coal bed that has been actively mined is the Springfield Coal Member (V) of the Petersburg Formation. The coal is about 250 feet beneath downtown Evansville. The approximate thickness of the coal is 4.0 feet.

3-02 Overburden. The overburden at Dresden Street consisted mostly of lean, gray clay with a thin sand seam at approximate Elevation 365+ which contained a small amount of water.

The overburden at Sixth Avenue was mostly a lean, brown clay. The material at both Sixth Avenue and Dresden Street sites was reused for backfill. At the Delaware Street site, overburden consisted of cinders, brick, wood and other random trash fill down to about Elevation 350. The remainder to

Elevation 330 was a lean, gray, silty clay, ranging from wet and soft to damp and very stiff. Below Elevation 330, the material varied between silty clay to fine to medium silty sand. The material below Elevation 330 was only removed from within the caissons. No part of this overburden was used for backfill. All of this material was deposited in the designated waste disposal area.

3-03 Bedrock. No rock was encountered at either the Dresden Street or Sixth Avenue Pumping Station sites.

Bedrock at the Delaware Street site is a soft fissile shale. Core borings made during construction of the pump plant indicated the presence of a disturbance, a possible fault, in the area of caissons C-7 and D-7. The initial phase of the construction contract was to drill 6-inch core holes and set the foundation grade for the caissons. After 10 borings were made and the core analyzed, the grades for the caissons were as shown on the block diagram, Plate No. 33.

Drilling encountered bedding dipping  $5^{\circ}$  to  $10^{\circ}$  in two borings and a 3-foot thick disturbed zone in the shale below the dipping beds in core hole C-6A and C-6. This zone is indicated by soft and broken shales and high core losses in C-6. Below the disturbed zone, bedding is horizontal and the shale is firm. The attached block diagram illustrates a dipping structure of approximately  $51^{\circ}$  with a strike on top of bedrock extending from near caisson D-7 to caisson A-1. There appears to be little, if any, displacement although no good control bedding was penetrated. Boring C-1 encountered shallow dipping beds in the top 3 feet of bedrock, but did not encounter the

disturbed zone, indicating the disturbed zone is not continuous through the foundation of the Delaware Street Pump Plant. The block diagram makes the supposition that the zone is continuous as the worst case.

PART IV - EXCAVATION PROCEDURES

4-01 Sixth Avenue Pumping Station. Prior to excavation at Sixth Avenue site, temporary shoring was driven to protect the existing Levee. PZ27 sheet piling, in 40 foot lengths, was driven on a line 26 feet from the Levee side face of the structure. See Plate Nos. 18, 19 and 20. The toe of the piling was driven to Elevation 341. A berm 22 feet wide with a 1V to 1.5 H slope was left against the piling during excavation for support. The foundation was then excavated to near grade with a drag line bucket. A small dozer was used for cutting final grade prior to placing the mud mat. No free or running water was encountered. The foundation was firm and dry. See Photo Plates 2, 3 and 4 - Appendix I.

4-02 Dresden Street Pumping Station. Steel sheet pile shoring was also driven at the Dresden Street site. Bracing this piling was considerably more difficult because of the limited space. See Plate Nos. 21 and 22. This foundation was also excavated with a drag line and then cut to final grade with a backhoe. A small amount of water was encountered in a sand seam; however, it was easily controlled by ditches and the foundation itself was firm and relatively dry. See Photo Plate Nos. 5, 6 and 7 - Appendix II.

4-03 Delaware Street Pumping Station. A Government designed sheet piling cofferdam was installed at Delaware Street site from Elevation 360+. See Plate No. 23. After the piling was driven and the dewatering system installed, forty four 66-inch diameter caissons were installed to a pre-determined rock elevation. (See Appendix VI). This was done by first

augering a 90-inch diameter hole and installing an 84-inch diameter temporary casing with the bottom of the casing set approximately 2 feet below the top elevation of the permanent caisson. A 72-inch diameter hole was then augered to the top of rock and a 66-inch diameter permanent casing was then seated. A 60-inch diameter rock bit was then used to drill to the established founding elevation. The bottom was then cleaned of all loose material and the caisson filled with concrete to the proper elevation. Twenty four hours later the temporary casing was refilled with sand to Elevation 360. The temporary casing was pulled and reused for another hole. After all forty-four caissons were complete plus one more which had not been located properly (see Plate 32, Appendix VI), the H pile supports for the bracing sets were driven. The cofferdam was then excavated to the elevation of the first bracing set. The set was installed and excavation continued. Three sets of bracing were installed. The excavation was accomplished by clamming, by using a small backhoe and by hand. The progress was very slow because of the limited working space due to the bracing, H pile supports and finally the caissons with protruding re-steel. The cofferdam was excavated to approximately 18 inches below grade, leveled up with about 1.0 feet of gravel and a 6-inch concrete mud mat was placed. The final grade was a blue gray, silty, sandy clay. The material was very stiff. An air spade was used to assist the laborers working with shovels. The final grade was reasonably dry. A few areas contained water which came through the pile sheeting or resulted from rain but the grade was very firm prior to placing mud mat. (See Appendix III for photos).

4-03.1 Excavation for 72" and 78" R.C.P.

Since the invert elevations of the entrance pipes for the Delaware Street station are considerably higher than the subgrade for the building, separate cofferdams were driven for these excavations. The actual as-built invert for the 78" R.C.P. is 344.35. Only one piece of pipe, approximately 6.5 feet long, cut at a 60° angle was needed to tie the existing pipe to the building. After the cofferdam was driven, it was excavated down to top of the existing pipe with a clam bucket. The remainder of the excavation was done by hand. The subgrade was a blue silty clay. The pipe was then installed and aligned. The concrete bedding was placed followed by the connecting collar. The excavation was backfilled with sand to approximately 356+. The remainder of the fill was silty clay from borrow area "G".

The actual as-built invert for the 72" R.C.P. is 339.36. Three pieces of pipe, eight feet long, were used to make the connection between the existing pipe and the building. After the cofferdam was installed and excavated, a mud mat was placed over the entire cofferdam bottom. Water was coming from under the existing pipe and through the piling on the northwest corner. Once the pipe was installed, aligned and supported, the concrete bedding and connecting collar were placed. Sand was used to backfill the excavation because of the water problem. There may be as much as 6 or 7 feet of sand over the pipe. The remainder of the fill is a silty clay from borrow "G". The piling was then pulled using a vibratory extractor. The piling under the pipe was, of course, left in place. (See Plate Nos. 34 and 35 - Appendix VII).

4-04 Dewatering Provisions. There were no dewatering systems needed for either Dresden Street or Sixth Avenue Pumping Stations other than very minor ditching and surface pumps.

At the Delaware Street site, an eductor system was installed around the entire perimeter of the cofferdam. A total of forty points approximately 7 to 8 feet on centers were installed. Sixteen piezometers were used to monitor the system on a daily basis. The pumping of the system continued until all concrete work was complete to Elevation 360+ at which time the dewatering system and the cofferdam piling were removed. It was determined that there was no danger of flotation before the sump would flood and if it should later become a danger, the sump could be flooded through the 78-inch and/or 72-inch lines. The dewatering system was adequate for the job. There was little problem maintaining piezometer readings below Elevation 327 except on the northeast side. It was generally believed that water on that side was from trash fill at a much higher elevation and did not constitute a danger of up lift. The only real problem with the dewatering system was a maintenance problem due to high iron content in the water clogging the well points.

There was one boil where water was coming up along the sheet piling between caissons 3F and 4F on the northeast side. This was determined to be due to a pile sheet not driven to rock. A second effort to drive the sheet piling proved to be successful and the water flow was cut off. There was seepage through the piling at approximately 350+ <sup>at</sup> on the same location afterward which supported the theory of water from the trash

fill. This water was controlled throughout construction by surface pumps in the piling webs inside the cofferdam between the sheet piling and the concrete line.

#### 4-05 Foundation Preparation.

4-05.1 Dresden Street and Sixth Avenue Sites. At these sites, a concrete "mud mat" was placed as soon as possible after the foundation was excavated and graded. No other preparation was necessary since the foundation was in excellent condition (See Photos - Appendix I and II).

4-05.2 Delaware Street. The Delaware Street subgrade is not the load carrying portion of the structure since the structure is supported by caissons. Care was taken, however, to keep the subgrade in as good a condition as possible. It was prepared in sections since there was a great deal of hand work involved. As soon as an area was graded it was covered with a minimum of 1.0 foot of gravel and a 6-inch concrete "mud mat". A "mud mat" was used in lieu of filter cloth to give the contractor a better working surface. No areas were left to deteriorate over night. This subgrade was a very firm silty clay. There was one boil as previously mentioned but once this was controlled there were no other major water problems. (See Photos - Appendix III).

4-05.3 Caissons. The caissons were excavated as previously described in Paragraph 4-03. The subcontractor that did the work was Millgard Corporation from Livonia, Michigan. The founding elevations for the caissons was determined by Loren Christman, a Geologist from

S&I Branch, and others from Geotechnical Branch using core samples taken from ten locations. The log of the cores and actual founding elevations are included in this report in Appendixes V and VI. Almost all the foundations were dry. A few had a very small amount of seepage coming in under the steel casing. None had any water coming up from the bottom. As soon as possible after cleanup, the caissons were filled with concrete, usually within one hour. No caissons were left open to the founding elevation overnight. In some cases, a caisson was excavated to top of rock and left overnight then completed the next day. This occurred when the excavation could not be completed in time to get concrete from the plant the same day. A summary of the caisson logs and final locations are included as a part of this report in Appendix VI. Photographs of caisson bottoms are typical for all (Plate Nos. 9 and 10 - Appendix III).

## PART V - PILE DRIVING

5-01 Permanent Piling. There was no permanent piling driven at any of the three sites except for some very short pieces under the paved ditch at Dresden Street.

5-02 Temporary Piling.

5-02.1 Sixth Avenue. Temporary shoring was driven at each of the three sites in order to protect the Levee fill. At Sixth Avenue, the piling was driven on a line 26 feet from the face of the structure. See Plate Nos. 18, 19 and 20. The driving was very difficult and very slow. The contractor was unable to pull the piling with the equipment he had so all the piling was cut off approximately 1.5 feet below grade and left in place.

5-02.2 Dresden Street. Temporary shoring was also driven at Dresden Street. This line of piling was driven approximately 15 feet from the face of the structure. See Plate Nos. 21 and 22. The sheet piling was braced against a battered set of H pile driven 37 feet into the ground and set on 8 foot centers. (See Photos - Appendix II). Seven sets of H pile were left in place. Four sets were poured into the concrete base of the structure. All the rest of the bracing and piling was removed as the backfill progressed.

5-02.3 Delaware Street. A rather elaborate Government designed cofferdam was built at the Delaware Street Pump Station site. (See Plate No. 23). The piling was driven using a vibrating type hammer

( Foster Electric Model 275A). The sheet piling was used as the outside form of the structure. Corrugated sheet metal was tack welded to the inside face of the piling to minimize concrete waste and to allow the piling to be pulled after it was no longer needed. The void between the piling and the corrugated sheeting was filled with river gravel prior to pulling the piling. The only piling left in place is under the 72" pipes.

PART VI - POSSIBLE FUTURE PROBLEMS

6-01 72" Influent Pipe - Delaware Street. Sometime in mid October 1981, 72-inch entrance pipe was discovered to have settled. The most obvious failure was the first joint outside the structure wall. There was approximately a 2-inch offset between the two sections at this joint. A subsequent profile of the pipe invert indicated that the lowest point was actually at the connecting collar between the existing pipe and three sections of new pipe used to connect to the structure. There did not appear to be any serious cracking or pipe failure in any joint except the first one outside the building structure. This was due to the fact that some 2 feet-9 inches of the first section of pipe is embedded in the structure wall and, therefore, could not flex. After monitoring the pipe for nearly two months, it did not appear that any more movement was taking place. There was a constant flow of water through the pipe joints that increased and decreased as the river elevation changed. Engineering Division decided the most economical repair would be to insert a 28 foot long, 66-inch diameter, 3/8-inch thick steel pipe inside the 72-inch pipe and fill the annular space with non-shrink grout. A change order was given to Indiana Construction Company to do the work. They engaged Penetryn System, Inc. from Knoxville, Tennessee to stop the flow of water through the joints by injecting a gel sealer. After this work was successfully completed, Deig Brothers Construction Company subcontracted the installation and grouting of the steel pipe. The steel pipe had to be cut into four pieces and then rewelded in the sump area due to the limiting size of the access hatch. The annular space was filled by pumping approximately 5 yards of 12 bag sand, cement

grout into it. A Master Builders high range fluidifier called L.A.-3 was added to the mix in order to reduce the water cement ratio and thereby minimize shrinkage. A periodic inspection of this pipe might be in order to assure no future settlement occurs. See Plate No. 17 - Appendix III, also Appendix VII.

6-02 Earthquake and Coal Mines. Evansville lies along the northern border of an area in which the possibility of severe earthquake damage exists. Shocks similar to the severity produced by the New Madrid earthquake of 1811 - 1812 would cause much damage. A repeat of the New Madrid would create shocks of intensity VIII (considerable damage even in well built structures).

A large part of downtown Evansville is built over abandoned underground coal mines. The voids left are filled with water, but they are subject to roof collapse which consists of shale in most places. Collapse may eventually lead to the surface and cause damage to surface structures. A large earthquake event could contribute to collapse.

The Delaware Street Pump Plant is located within 1,000 feet of mapped underground mines. It is a possibility that the disturbed zone is more an indication of subsidence as opposed to a fault. The lack of fault gouge, slicken sides, displacement and continuity of disturbance found in rock core indicates some structure other than faulting. Dipping beds at ground surfaces with some disturbance below is more indicative of subsidence.

Mapping done for Special Report 12, titled "Environmental Geology of The

Evansville Area, Southern Indiana", by the Indiana Geological Survey, shows underground mining has taken place directly under the Dresden Street and Sixth Avenue Pump Plants. If any cracks develop in the three structures, the cracks should be monitored for the possibility of subsidence producing such cracking.

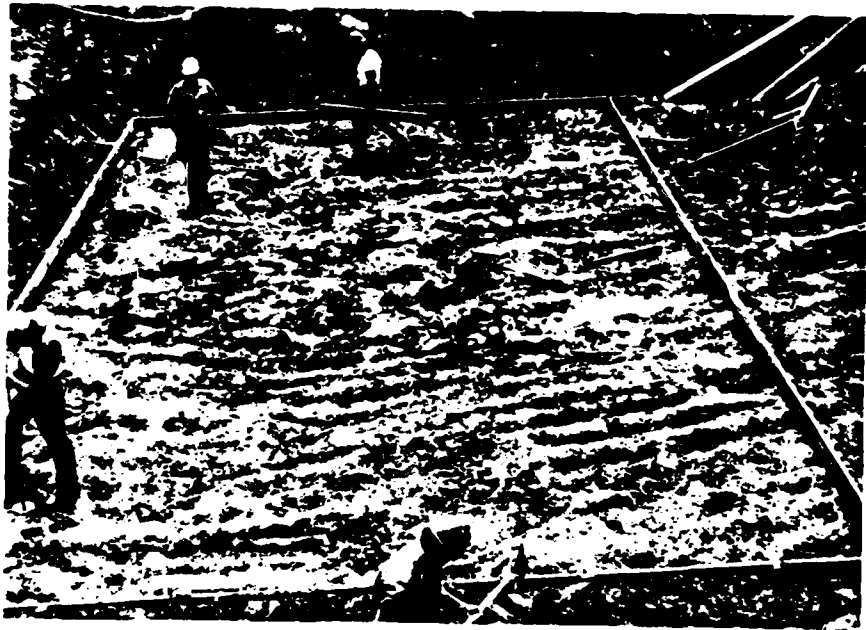
Appendix I

Photographs - Sixth Avenue

Pump Station



Sixth Avenue Pump Station Foundation - View East



Sixth Avenue Pump Station Foundation - View South



Southeast Corner of Foundation



Southwest Corner of Foundation



Temporary Shoring for Levee Protection

2

Appendix II

Photographs - Dresden Street

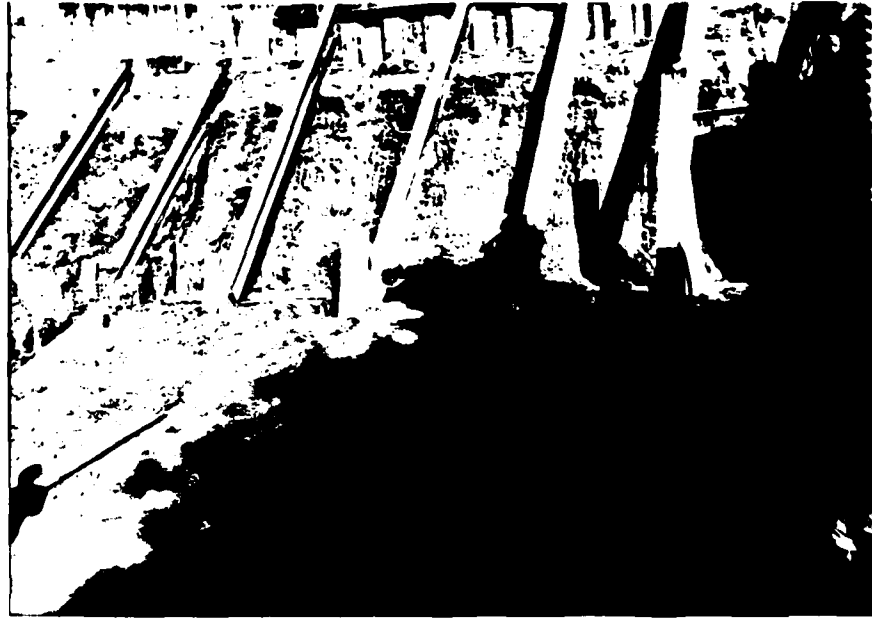
Pump Station



Northern Half of Foundation



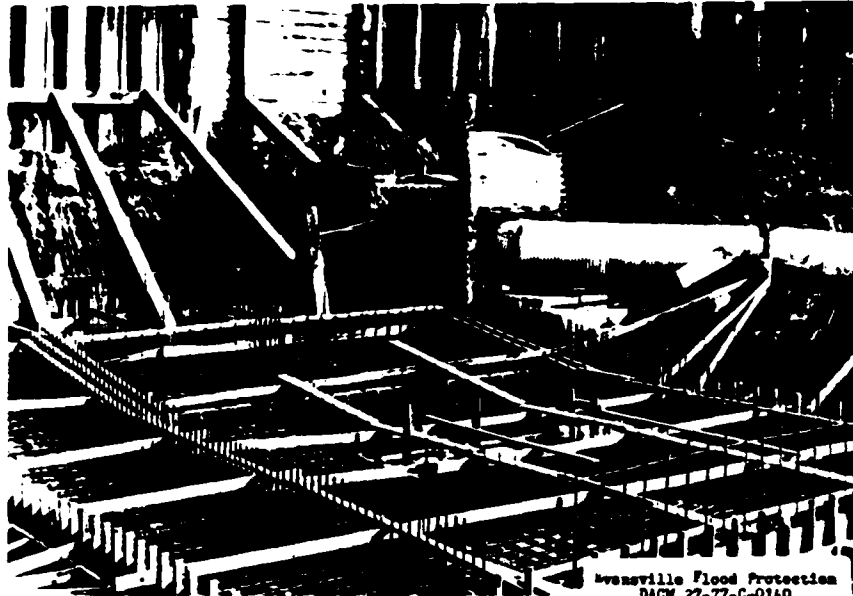
Southwest Corner of Foundation  
Brown Silty Clay



East Side of Foundation and  
Temporary Shoring and Bracing



Northwest Corner of Foundation



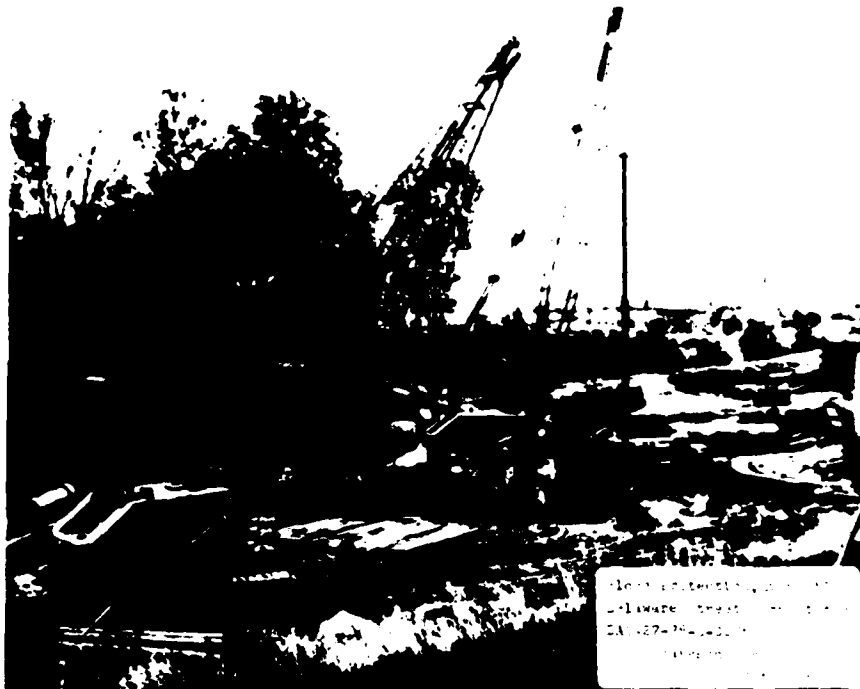
Avensville Flood Protection  
DACW 27-77-C-0140  
Dresden St. Main Flg.  
Nov. 1978 East

**View East  
Temporary Shoring  
Temporary Water By-Pass  
Foundation Resteal Just Prior to Concrete**

Appendix III

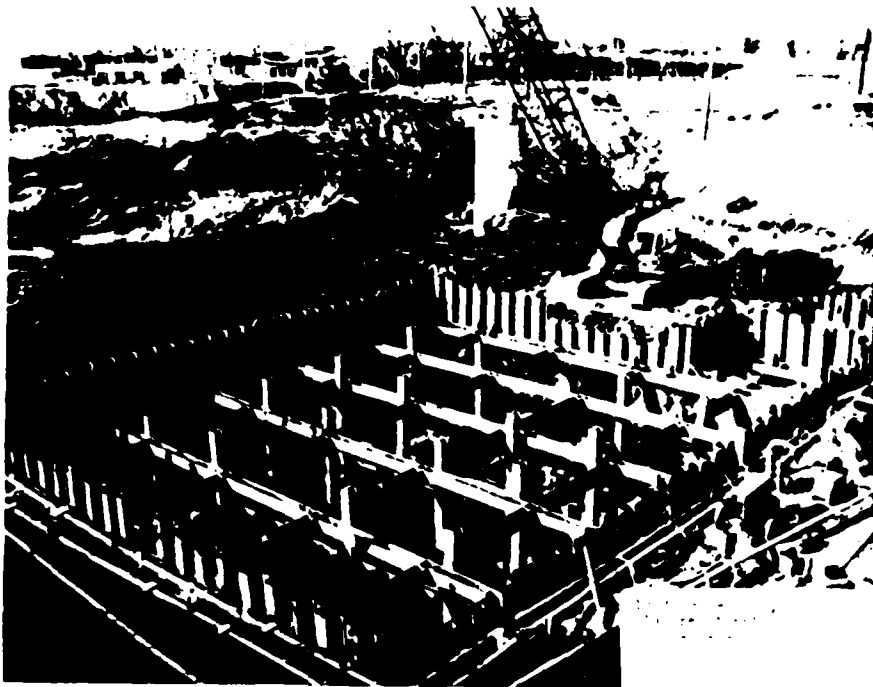
Photographs - Delaware Street

Pump Station



View looking west from  
Delaware Street  
CA 927-74-1010  
1/10/50

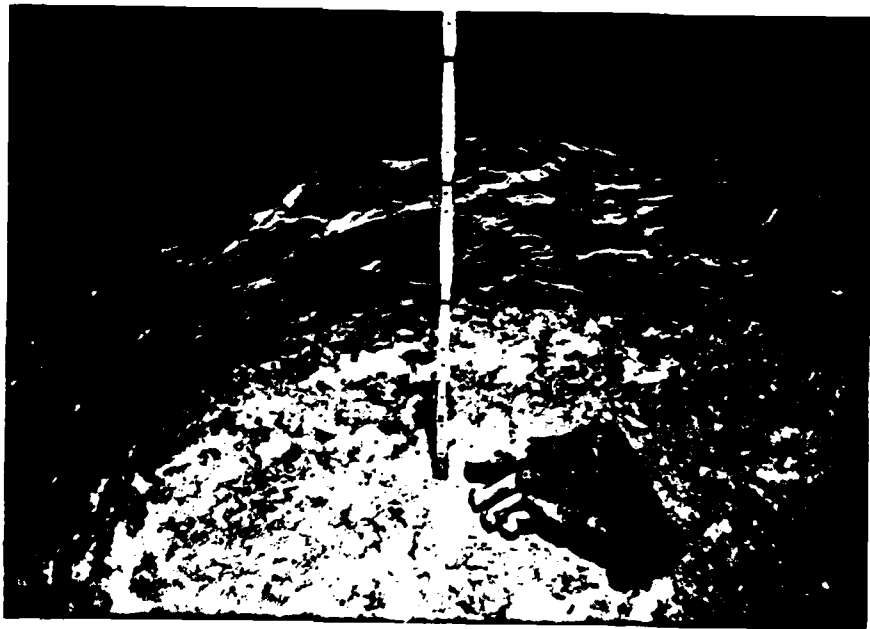
Installing Caissons - Delaware Street



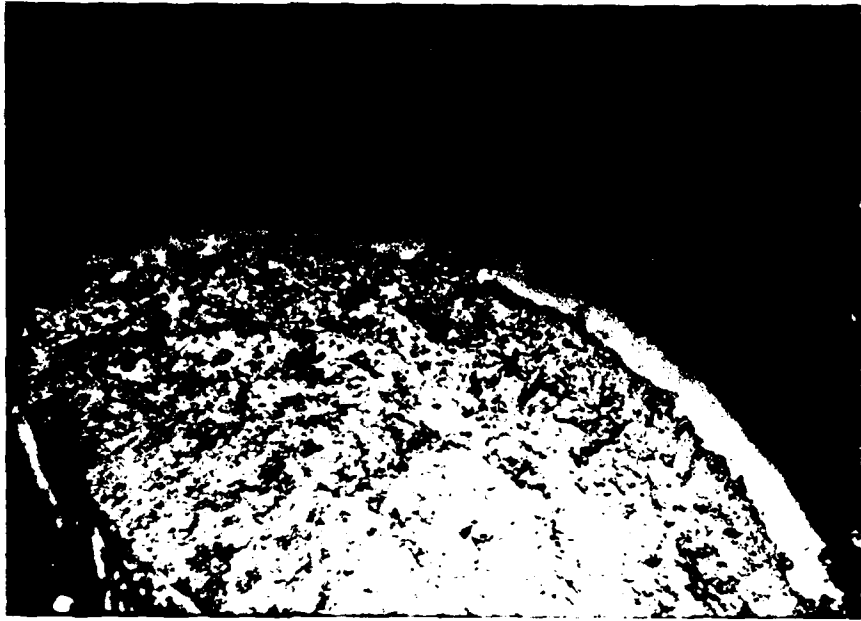
Installing Bracing for Cofferdam  
View West



Caisson Bottom 8-F



Caisson Bottom 8-F



Caisson Bottom 3-A



Caisson Bottom 3-A



North Corner - Partial "Mud Slab" and Caissons



Excavating For "Mud Slab" - East Corner



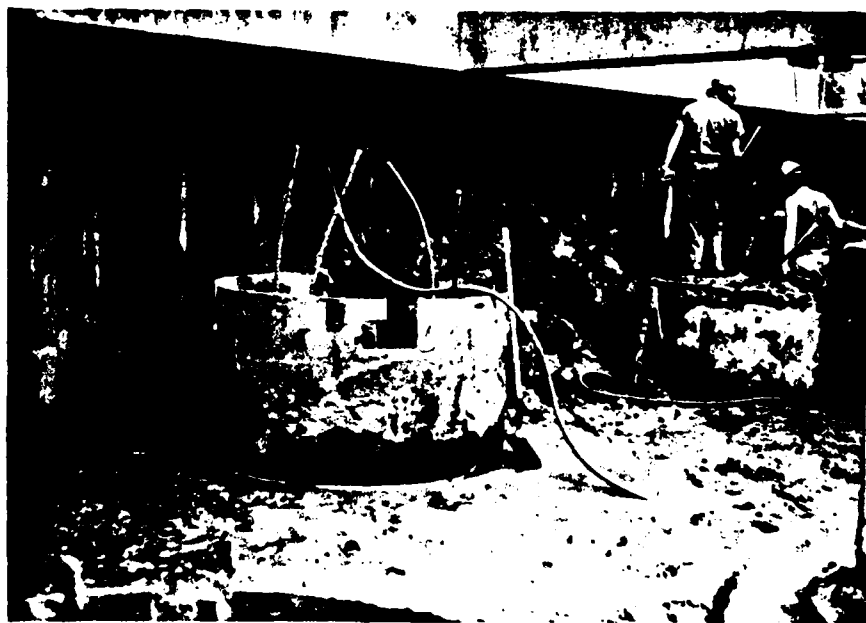
West Corner - Caissons and "Mud Slab"



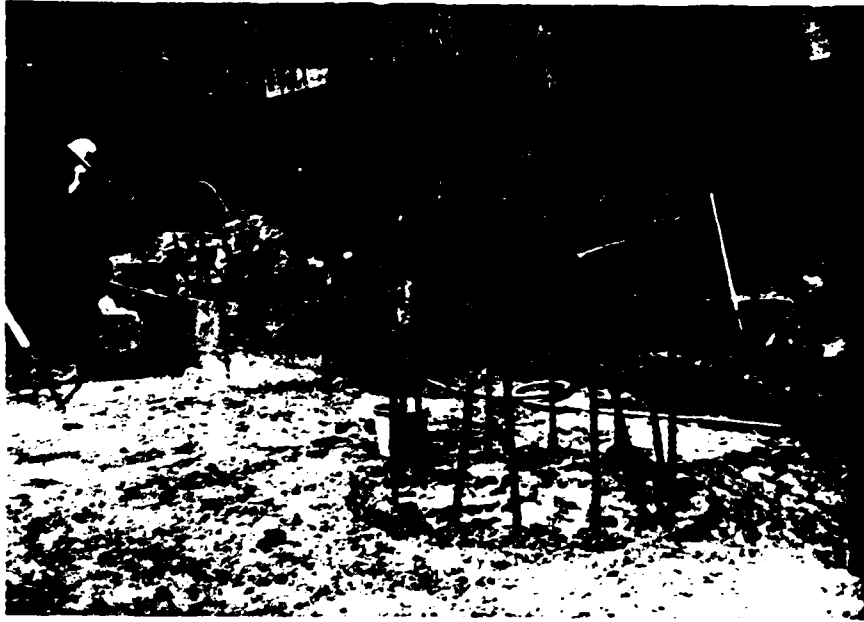
Excavating For "Mud Slab"  
Caissons 3-E and 3-F



Excavating for "Mud Slab" - Northeast Side



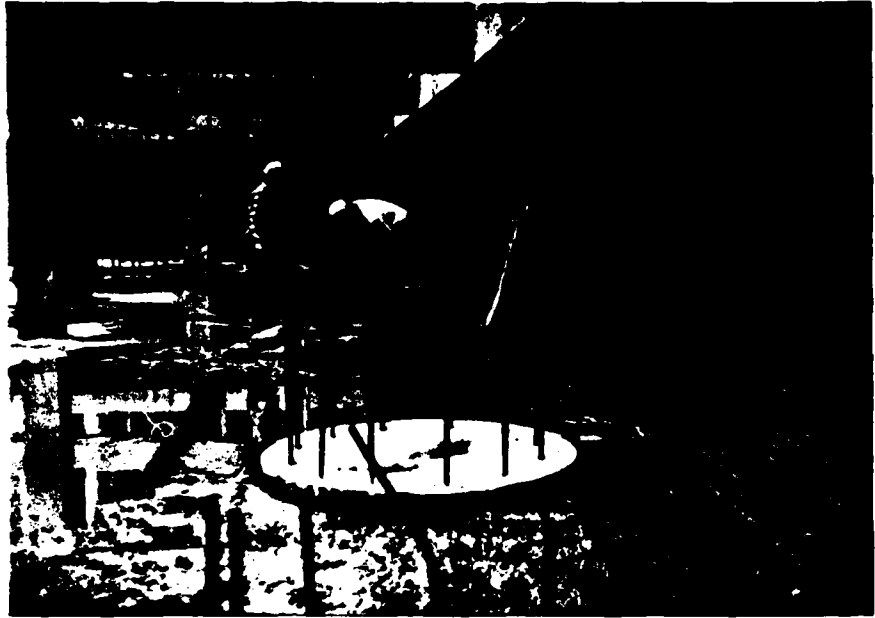
Excavating for "Mud Slab" - Northeast Side



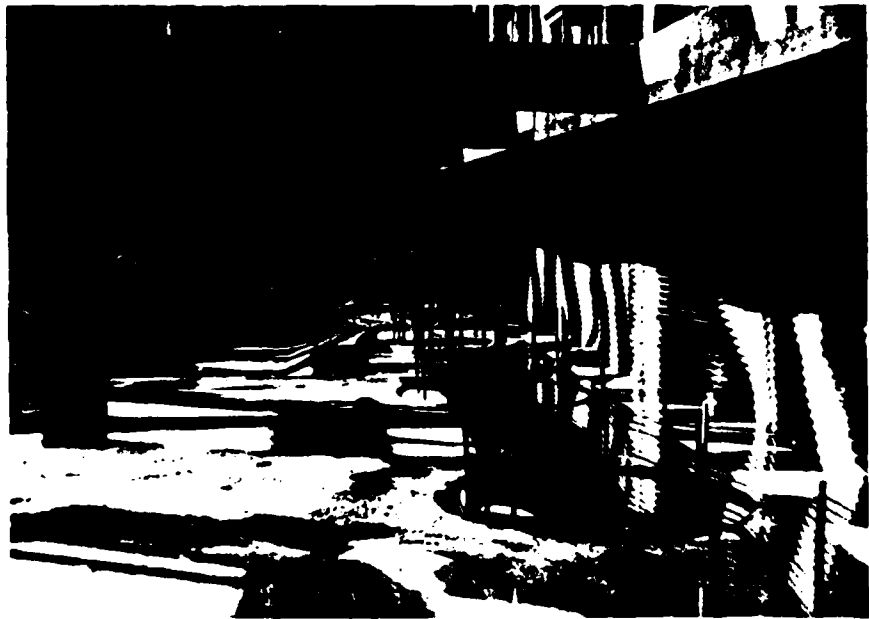
Excavating - Northeast Side



Southeast Wall Line - "Mud Slab" and Caissons



Northeast Wall Line



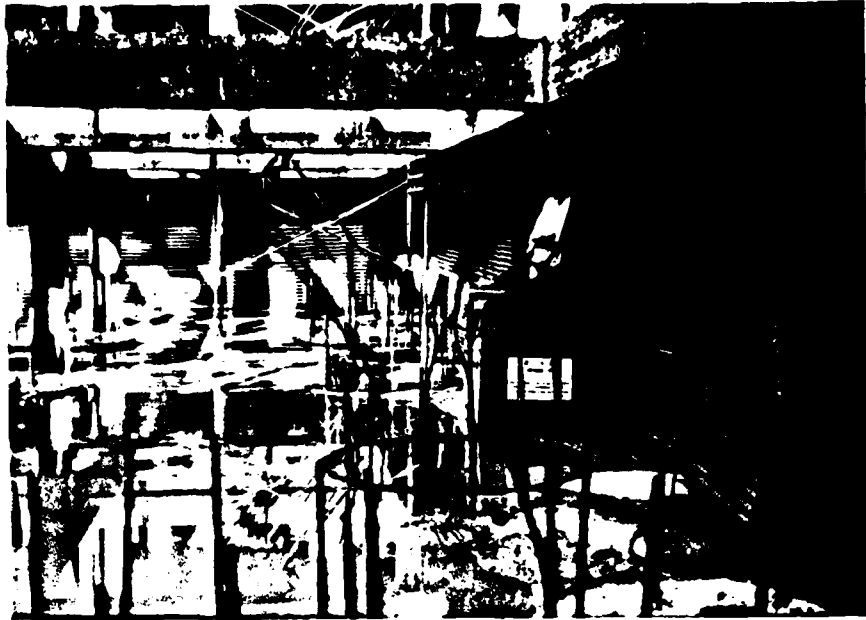
Southwest Wall Line



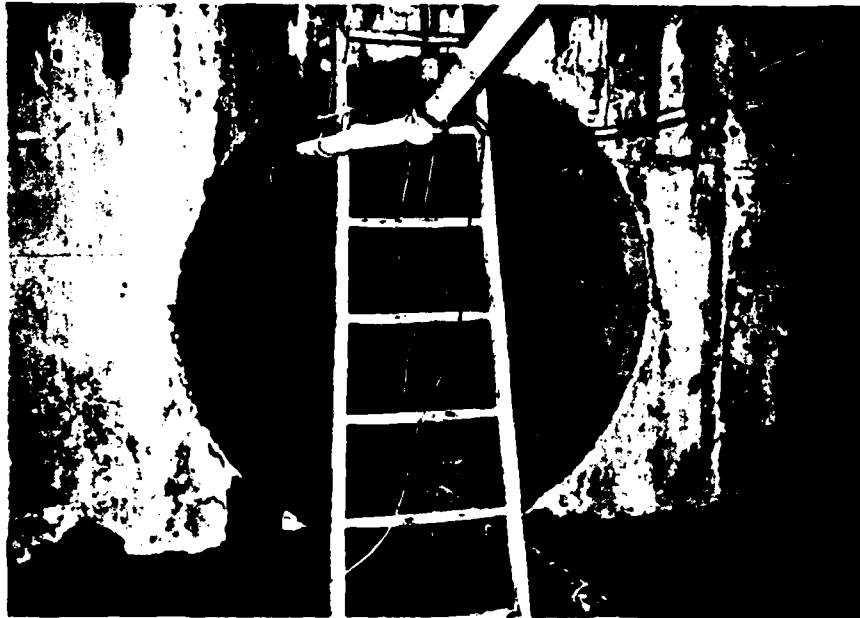
View Toward East Corner



View Toward South Corner



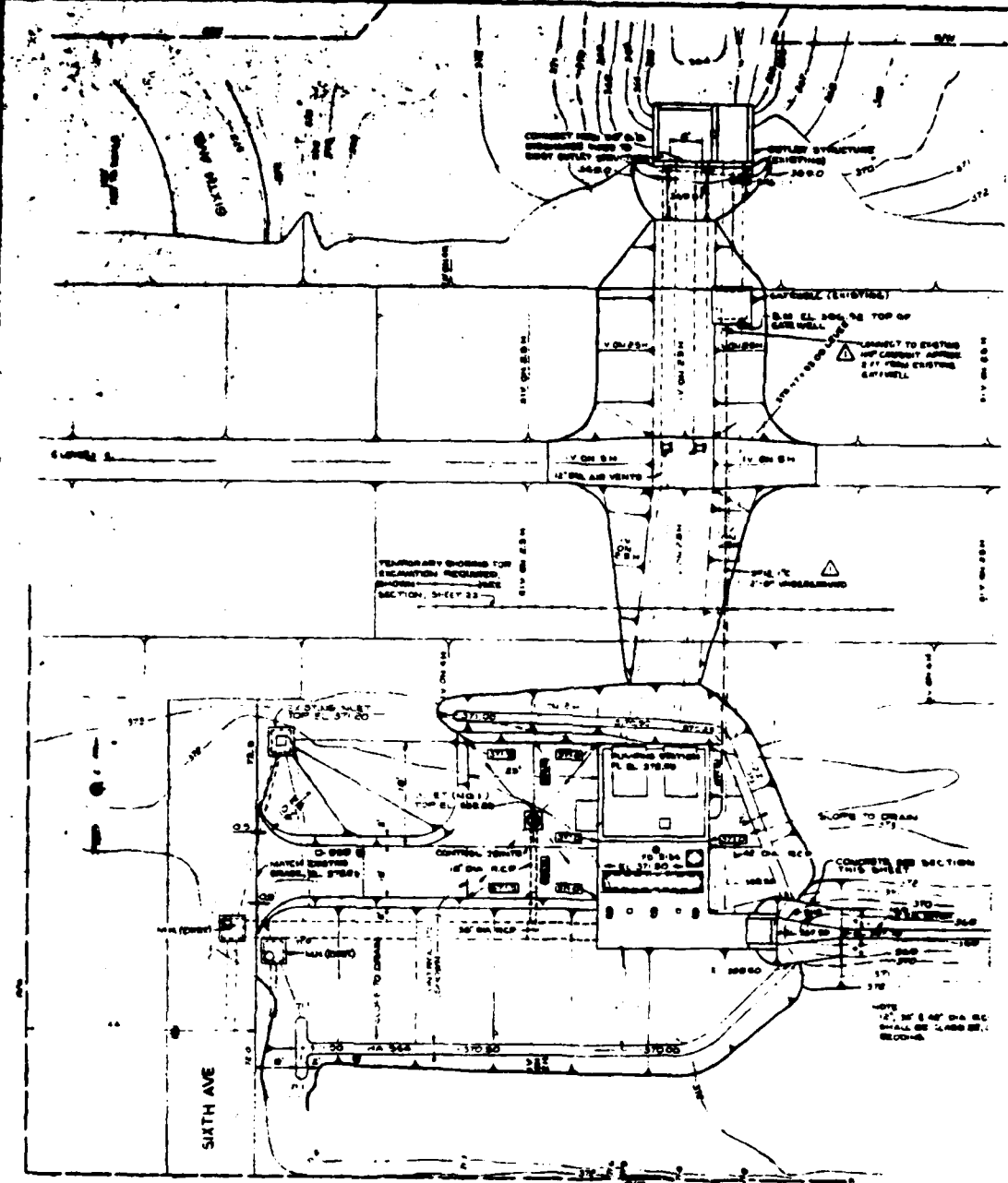
Northwest Wall Line



72" R.C.P. with 66" Steel Liner Installed

Plate 18

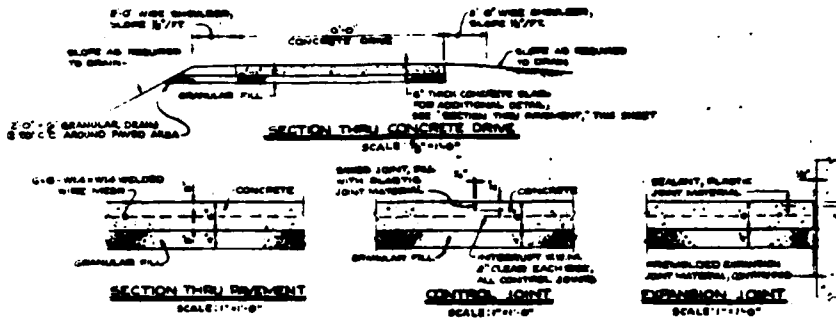
**CROSS SECTION**



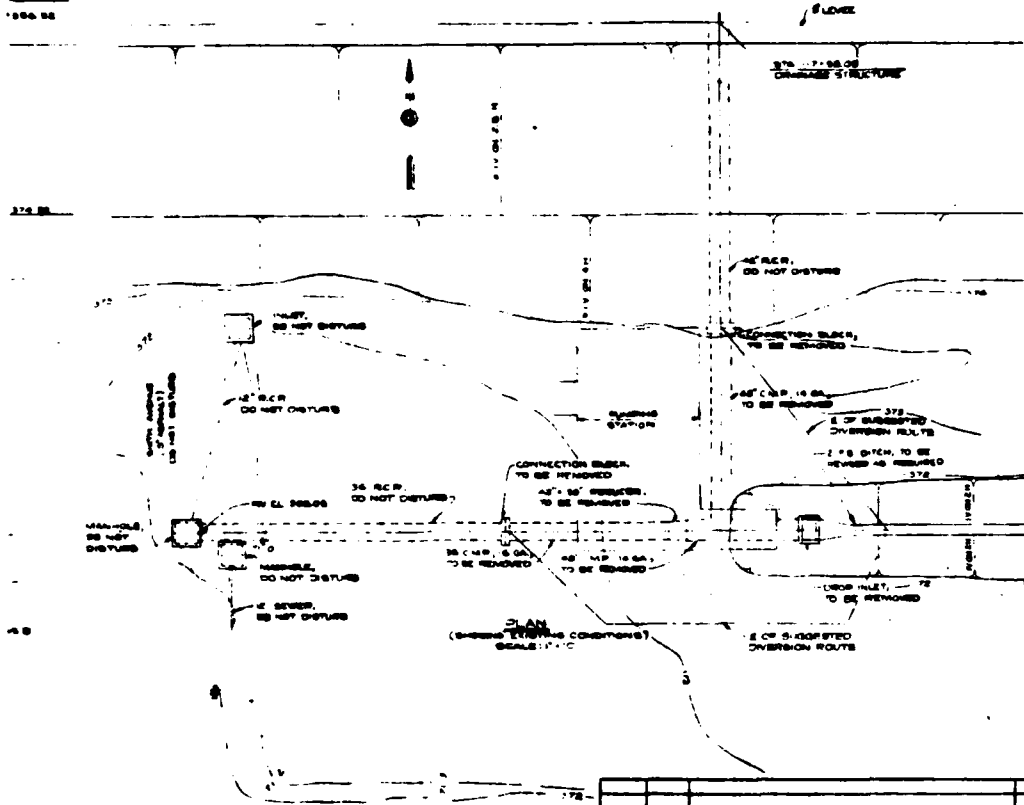
**PLAN VIEW**

TOP OF CONCRETE SLAB  
 EL. 480.0  
 CONCRETE FOR SECTION THIS BAYLET  
 SCALE 1/4" = 1'-0"





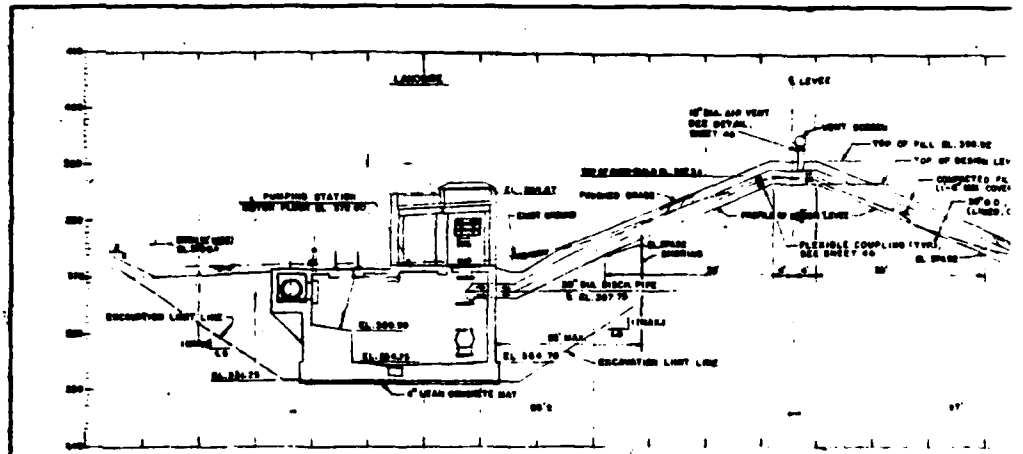
**CONCRETE PAVEMENT DETAILS**  
SCALE AS SHOWN



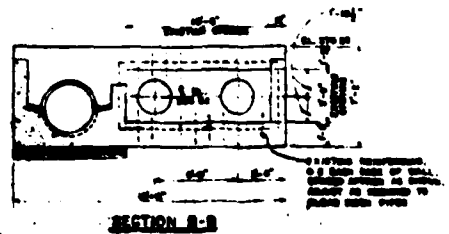
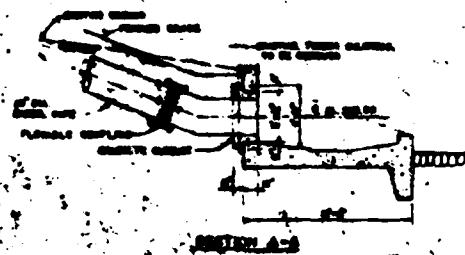
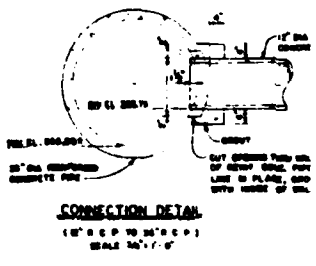
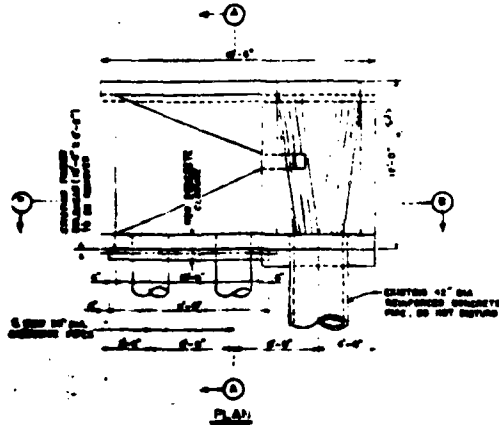
- NOTES:
1. FOR SECTION ON GENERAL LINE OF PAVING STRIP AND DETAILS OF PAVEMENT CONNECTION TO EXISTING OUTLET STRUCTURE, SEE SHEET 2.
  2. FOR DETAILS OF 18" DIA. AIR VALVE, SEE SHEET 4.
  3. DIMENSIONS INDICATED @ 0'-0", ETC., USE SHEET 4.
  4. EXISTING AND PROPOSED LOCATIONS INDICATED BY AN ARROW IN (A) ARE DESIGN LEVELS.

U. S. ARMY ENGINE DISTRICT, LOUISVILLE		ENGINEER	
<b>FLOOD PROTECTION EVANSVILLE, INDIANA</b>			
PUMPS ON SECTION - UNIT 2 (PART II)			
SIXTH AVENUE PUMPING STATION			
SITE PLAN AND DETAILS			
DATE: JULY 1973		DRAWING NUMBER	
BY: [Signature]		793-EL/20	

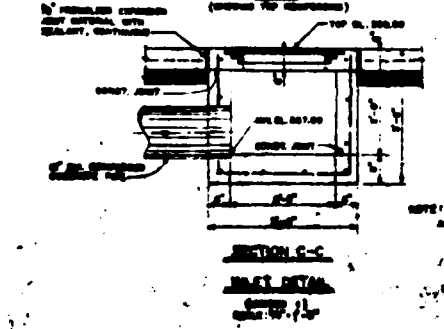
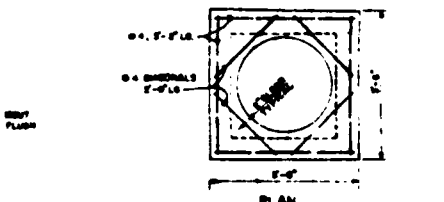
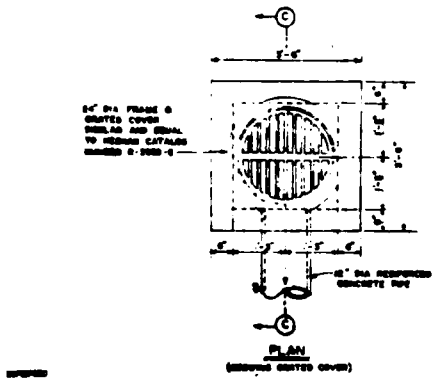
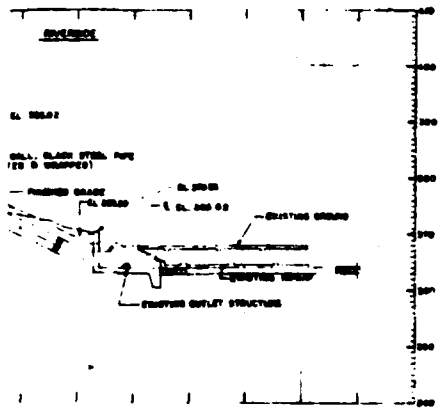
*Plate 19*



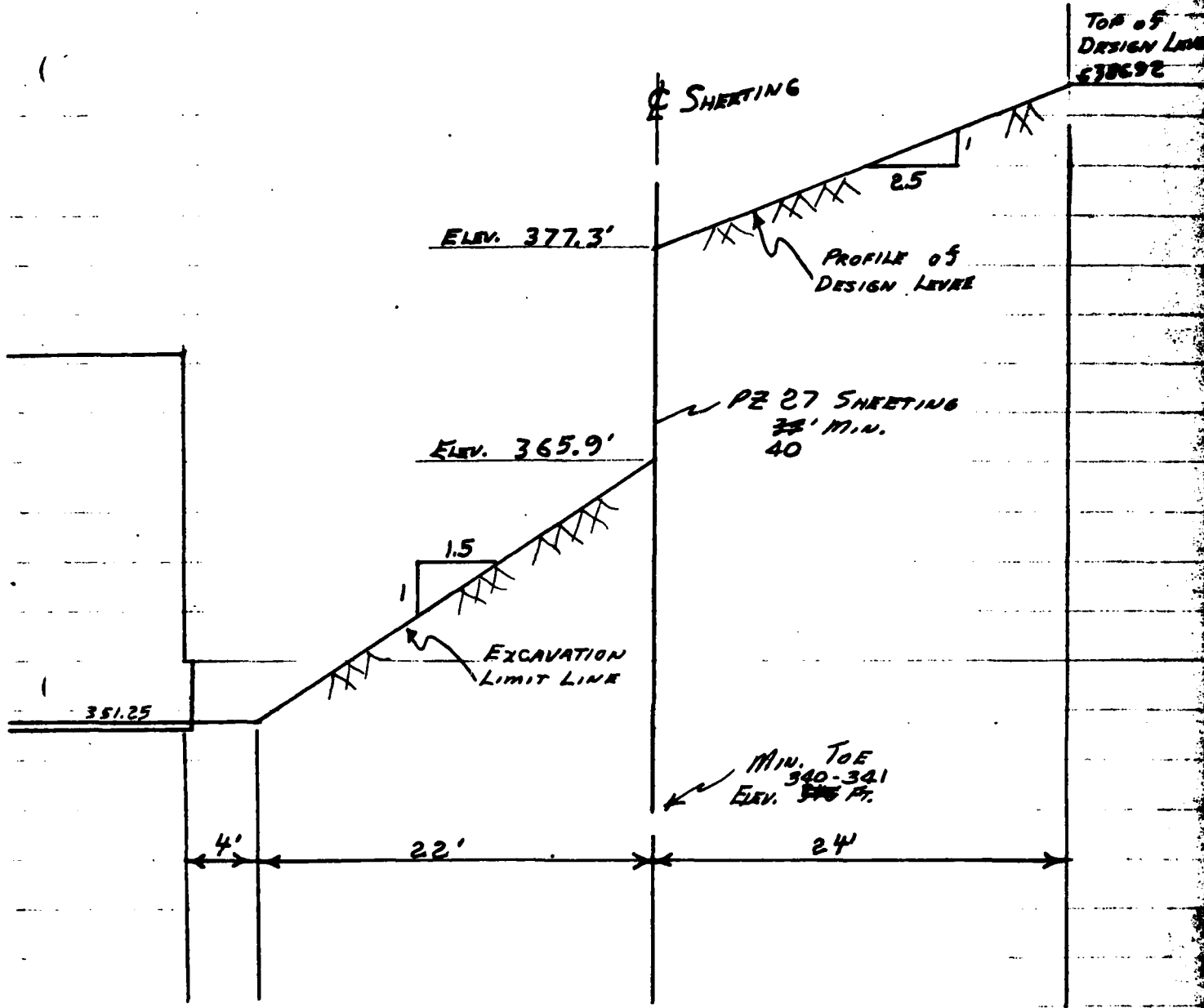
SECTION ON E OF PUMPING STATION  
SCALE: 1/4" = 1'-0"



CONNECTION TO HEADWALL  
(SHOWS SUPPLY STRUCTURE)  
SCALE: 1/4" = 1'-0"

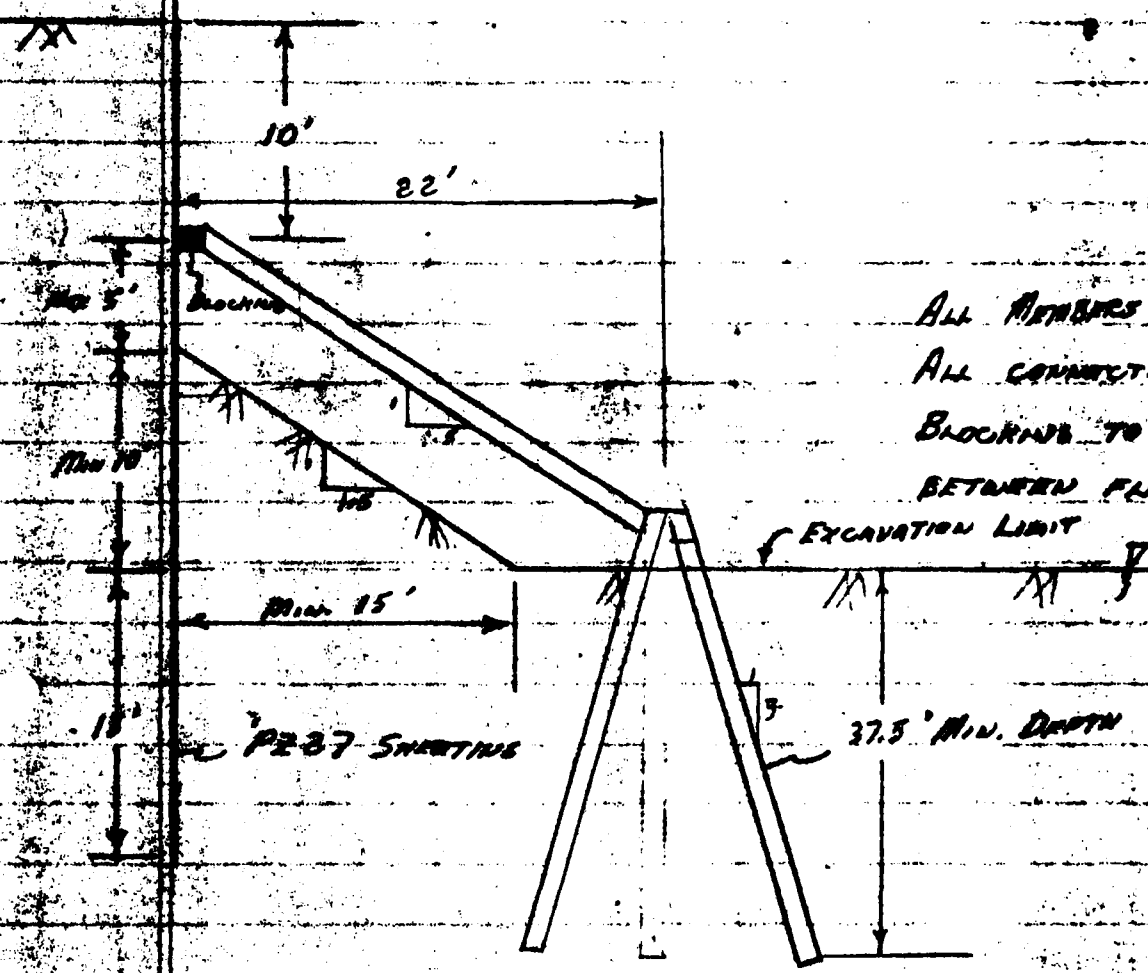


U. S. ARMY ENGINEER DISTRICT, INDIANAPOLIS	
CORPS OF ENGINEERS	
GENERAL DIVISION	
FLOOD PROTECTION EVANSVILLE, INDIANA	
PAPER GREEN (SECTION - DETAIL 11000)	
SIXTH REGIMENT PAPER SECTION	
SECTION AND DETAILS	
THIS SET OF	
DRAWINGS NUMBER	
703-2350	



SECTION ON & of PUMPING STATION (6<sup>th</sup> AVE.)

FLOOD PROTECTION, EVANSVILLE, INDIANA  
 J. L. WILSON CO., INC.  
 DESIGN OF SHEET PILE WALL  
 DRESDEN ST. PUMP STATION DACW 77-77-C-0140



ALL MEMBERS ARE 160P53  
 ALL CONNECTIONS TO BE WELDED  
 BLOCKING TO BE PLACED  
 BETWEEN FLANGES

STIFF CLAY  $q_c = 2 \text{ Ton/SF}$

SHORT TERM

$\gamma = 120 \text{ pcf}$   
 $\gamma' = 65 \text{ pcf}$   
 $c = 1000 \text{ psf}$   
 $\phi = 0^\circ$

LONG TERM

$\gamma = 120 \text{ pcf}$   
 $\gamma' = 65 \text{ pcf}$   
 $c = 0$   
 $\phi = 30^\circ$   
 $\delta = 10^\circ$   
 $K_p = 4.20$   
 $K_a = 0.33$

DESIGN ASSUMPTIONS:

TREAT AS TIED WALL WITH  $H = 25'$

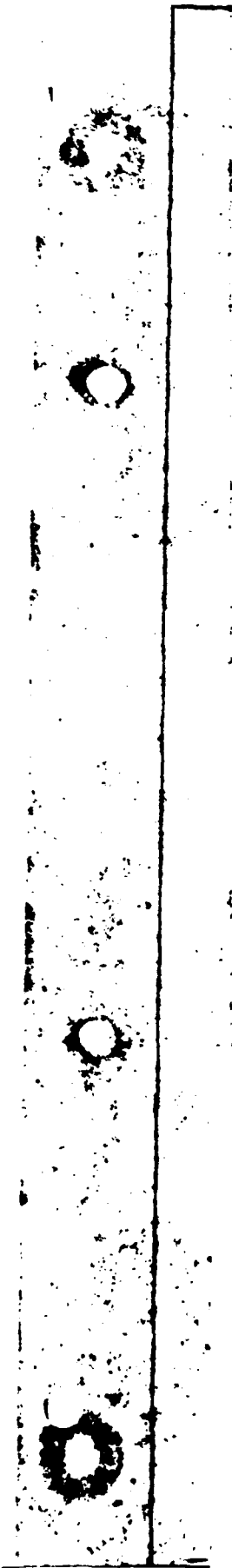
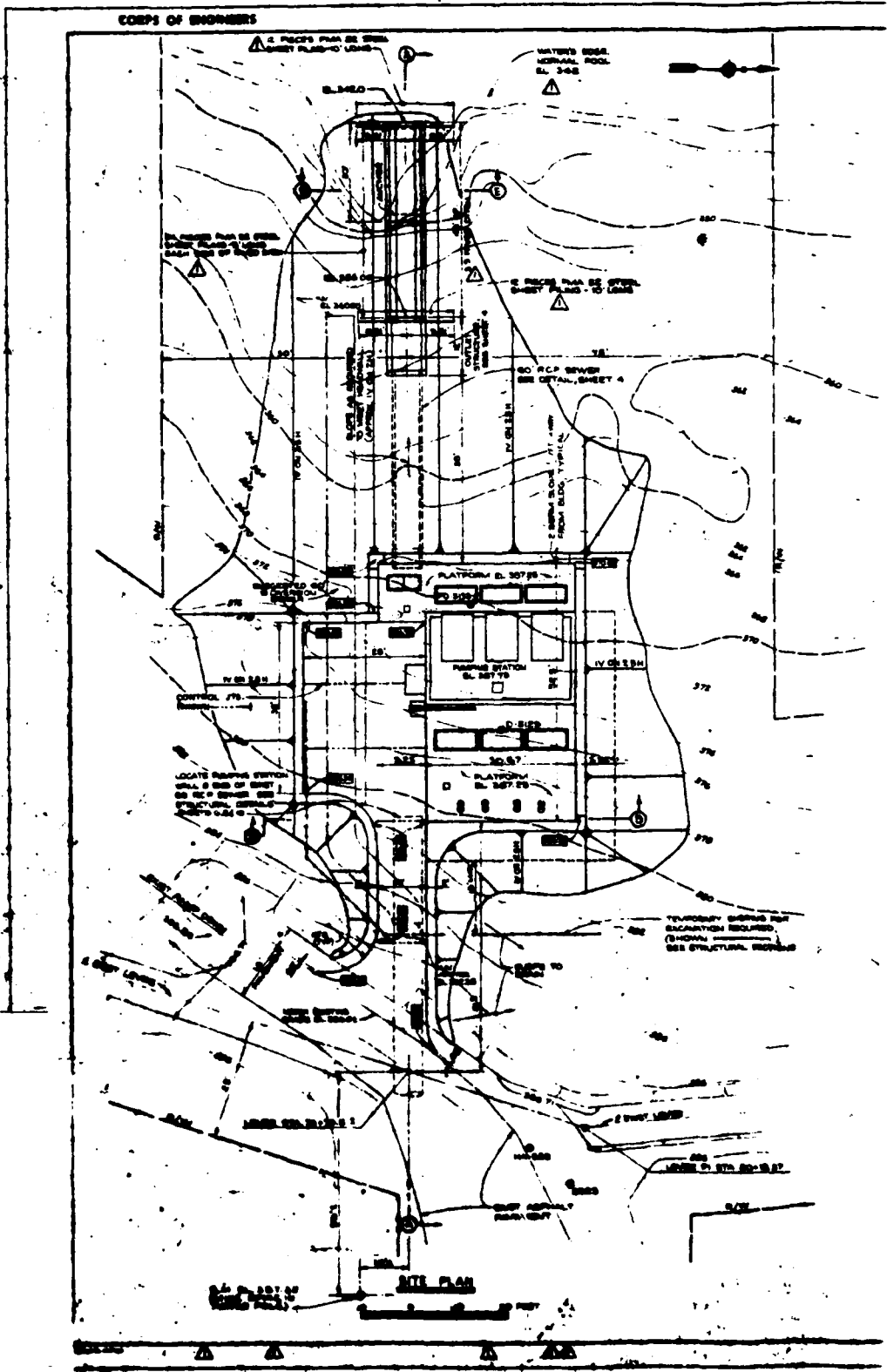
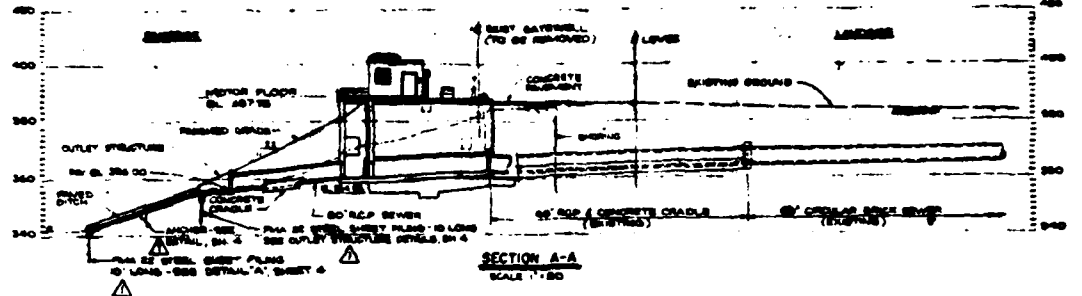


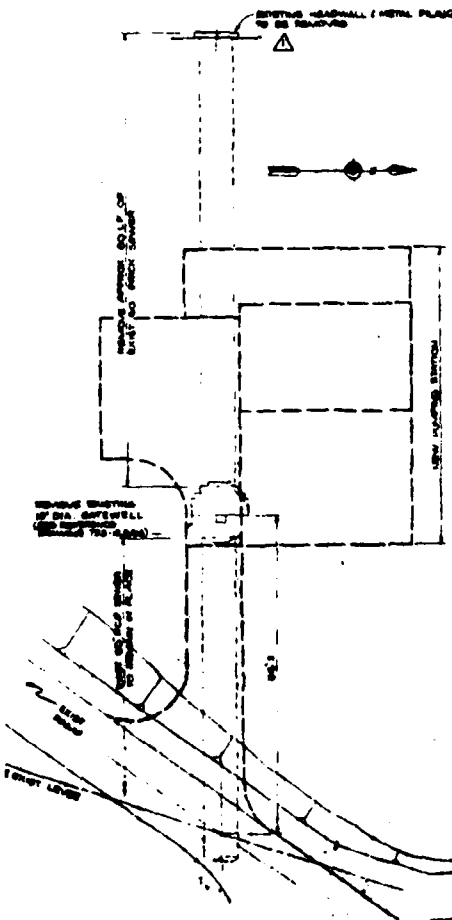
Plate 21

CORPS OF ENGINEERS

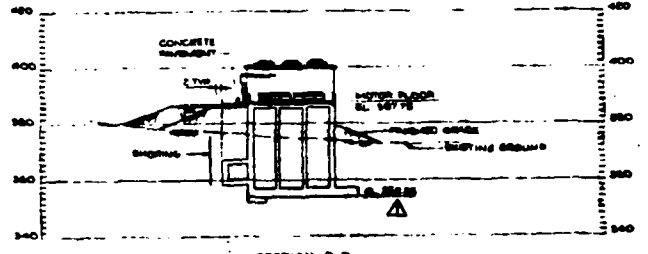




SECTION A-A  
SCALE 1/80



EXISTING SITE AND REMOVAL PLAN  
SCALE 1/80



SECTION B-B  
SCALE 1/80

SEE CONCRETE REINFORCEMENT DETAILS AND SECTION E-E, SEE SHEET A

<p>U. S. ARMY                  ENGINEERING CENTER                  WASHINGTON, D. C.</p>	
<p>DATE: 1950-01-10                  DRAWN BY: [Name]                  CHECKED BY: [Name]</p>	<p>AS PER INSTRUCTIONS, SPECIFICATIONS, AND                  CONTRACT DOCUMENTS, THIS DRAWING                  IS A PART OF THE CONTRACT DOCUMENTS.                  IT IS THE RESPONSIBILITY OF THE CONTRACTOR                  TO OBTAIN AND UNDERSTAND THE                  MEANING OF ALL NOTES AND                  DIMENSIONS SHOWN THEREON.                  NO PART OF THIS DRAWING IS TO BE                  REPRODUCED OR TRANSMITTED IN ANY                  FORM OR BY ANY MEANS, ELECTRONIC                  OR MECHANICAL, INCLUDING PHOTOCOPYING,                  RECORDING, OR BY ANY INFORMATION                  STORAGE AND RETRIEVAL SYSTEM, WITHOUT                  PERMISSION IN WRITING FROM THE                  ENGINEERING CENTER.</p>

Plate 23

CORPS OF ENGINEERS

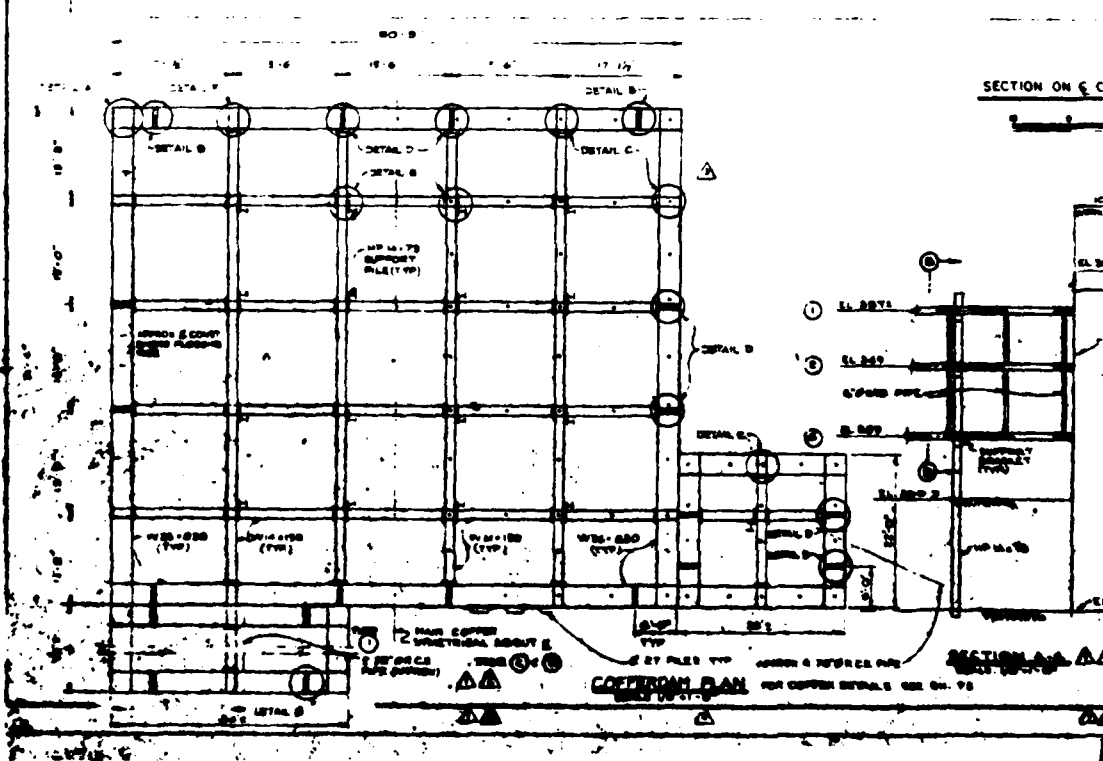
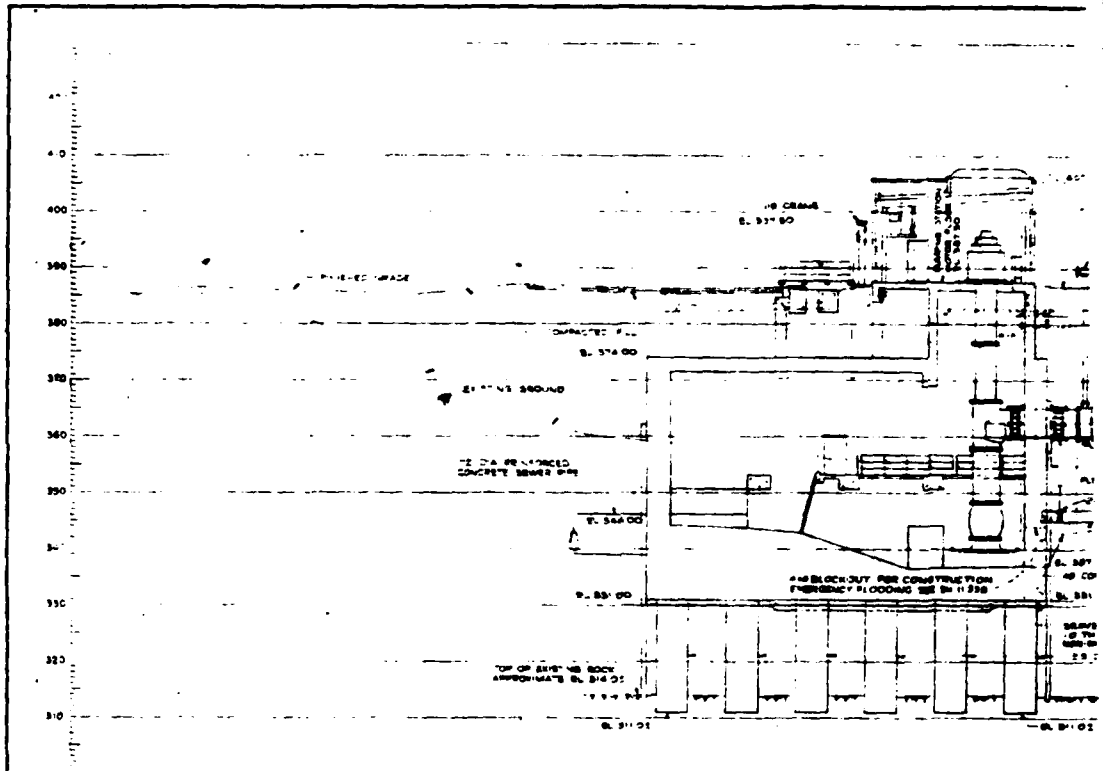
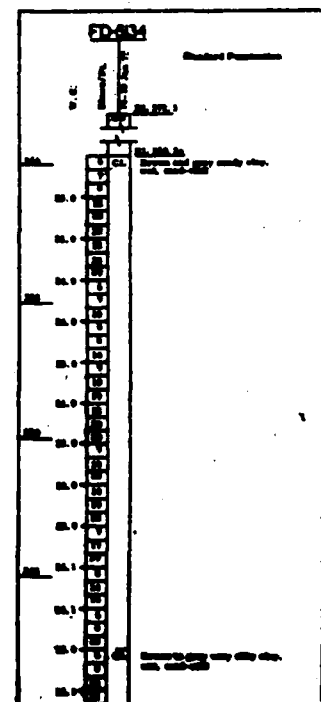
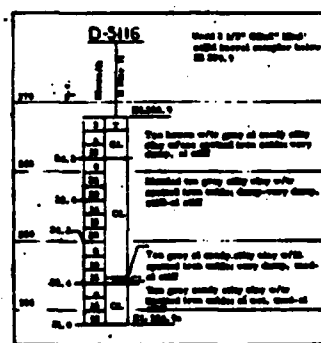
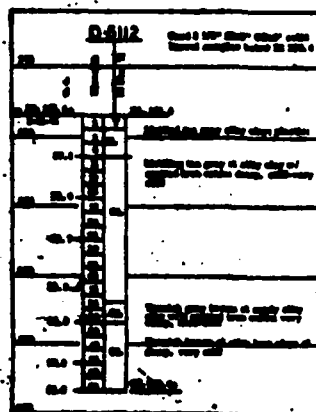
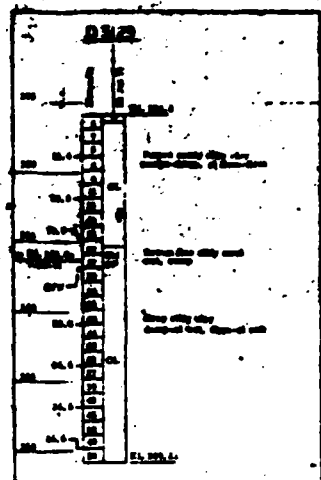
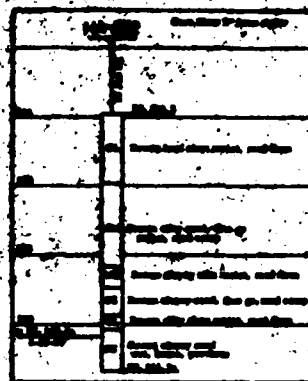
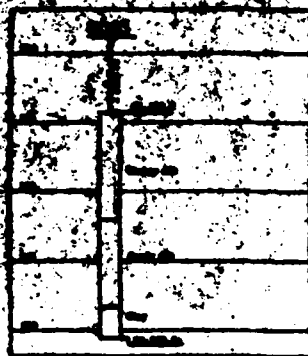
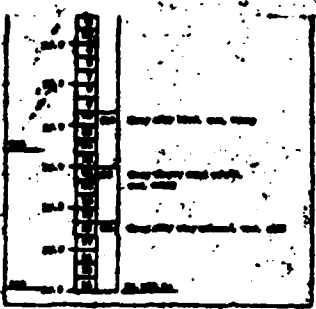
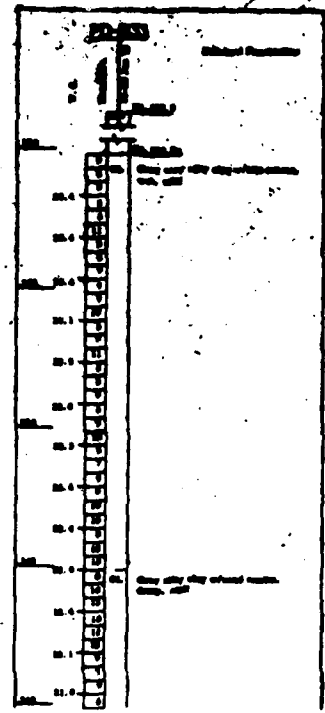




Plate 29

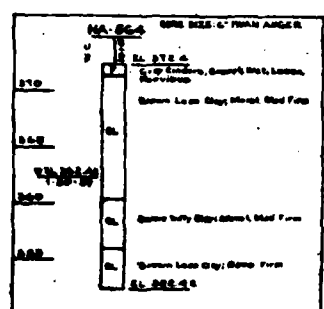
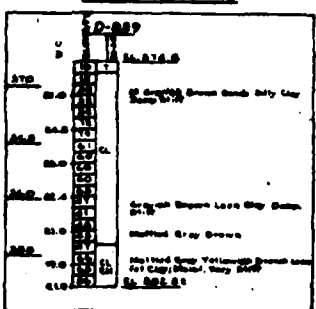
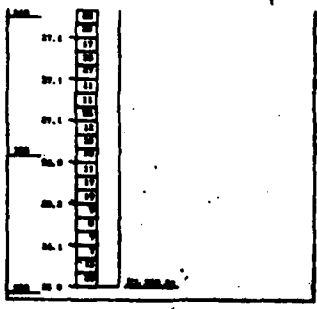
Series of Diagrams





DRESDEN STREET

SIXTH AVENUE



U. S. ARMY ENGINEERING CENTER CORPS OF ENGINEERS WATERWAYS DIVISION	
610 BARR MAN FLOOD PROTECTION EVANSVILLE IND. PUMPING SECTION - UNIT 2 (PART 1) PUMPING SYSTEMS BORING LOGS	
JULY 1977	
750-2-1349	

Appendix IV

Boring Data

Delaware Street

Pump Station

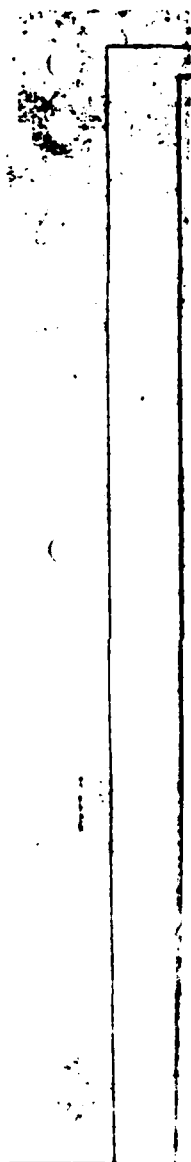
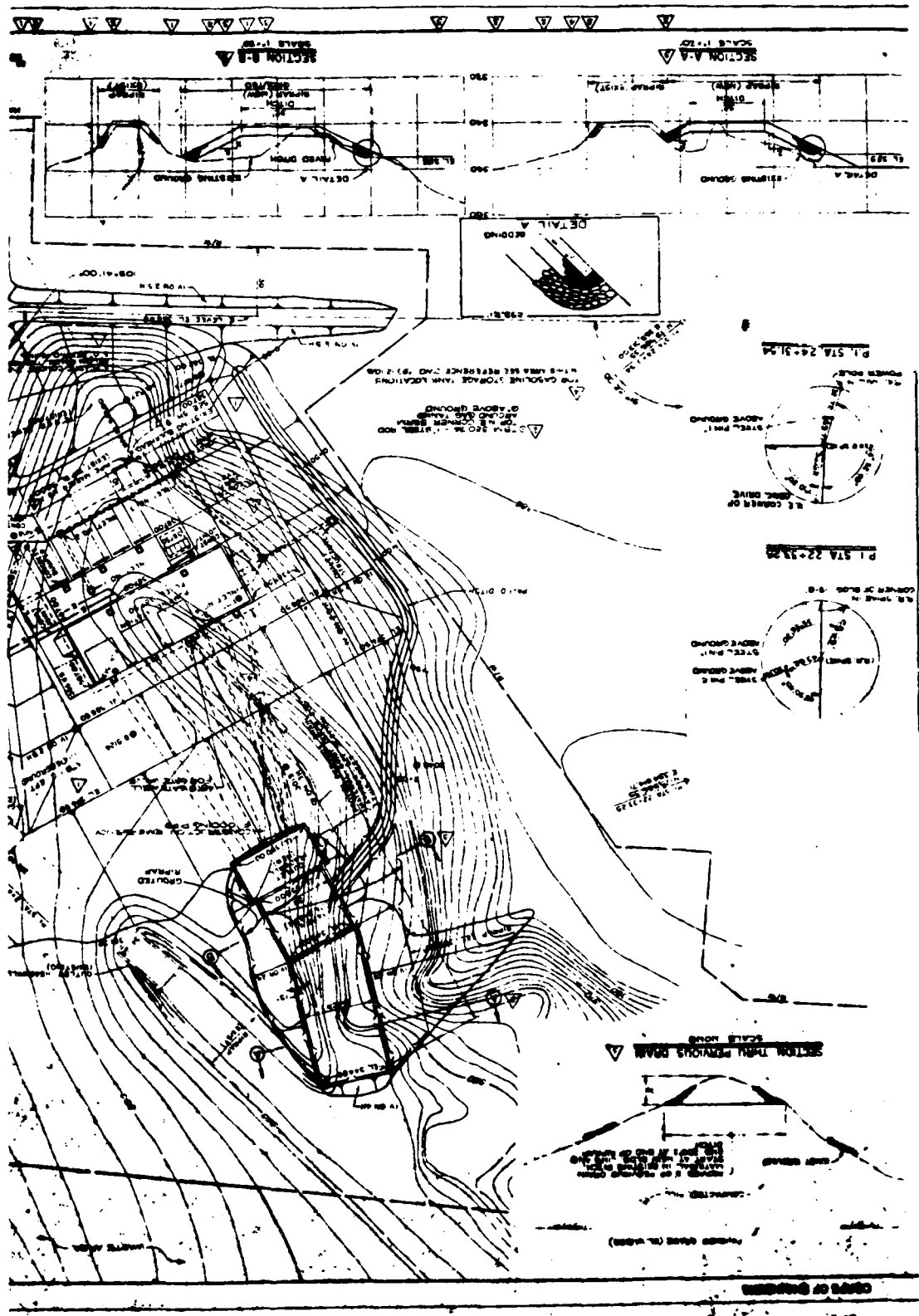
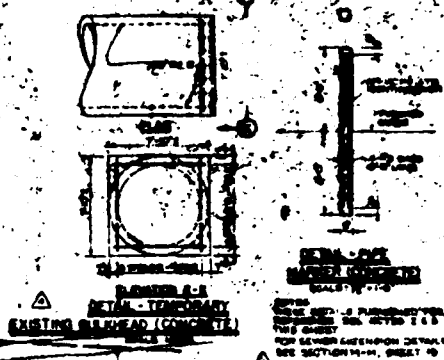
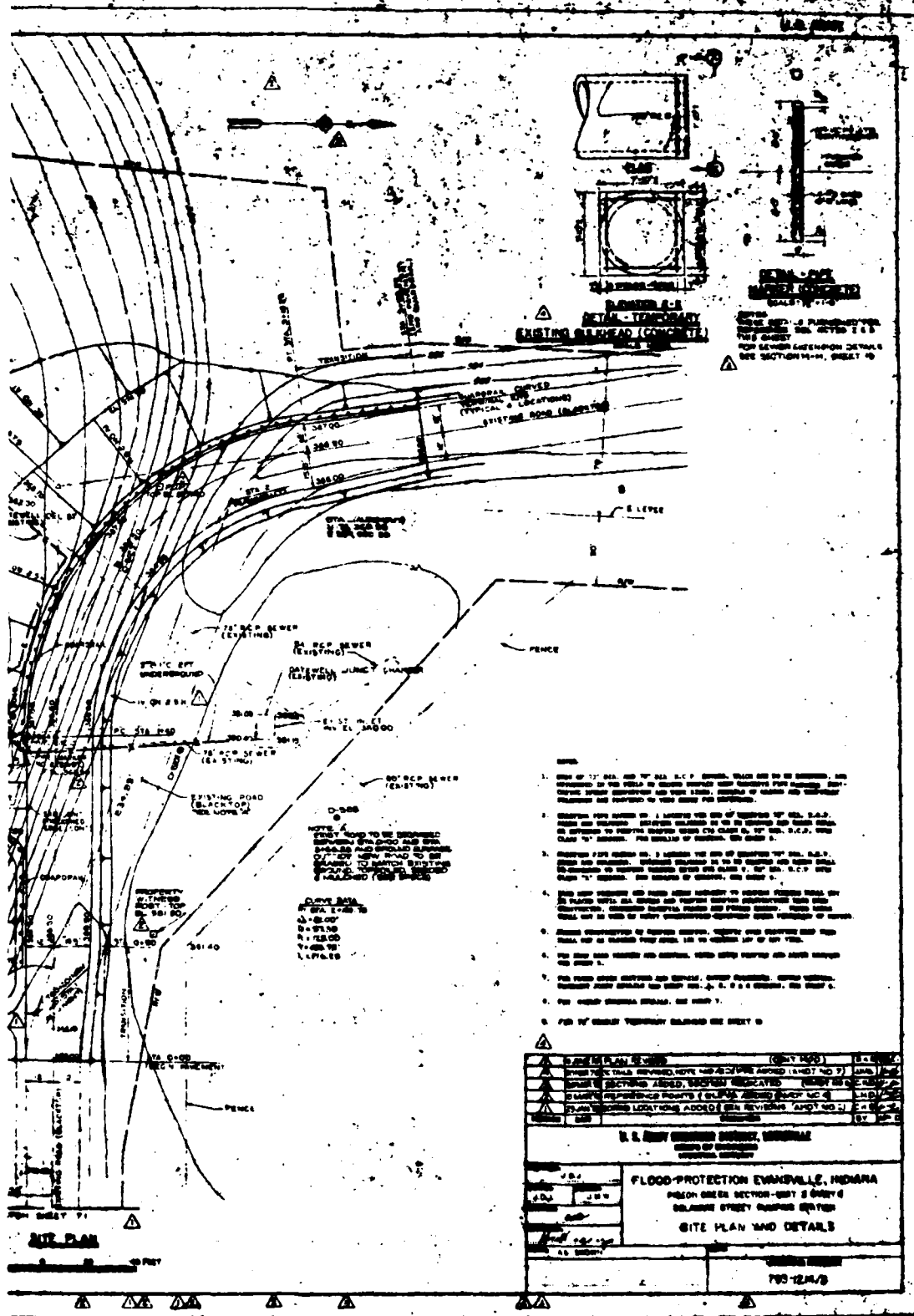


Plate 25





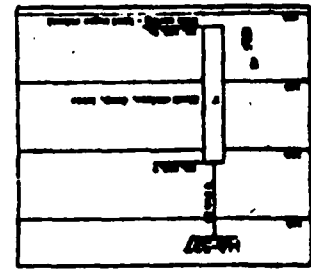
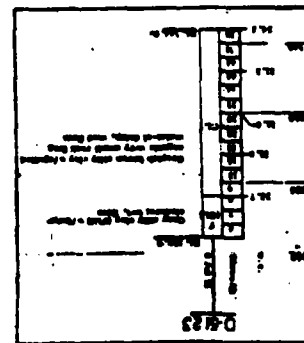
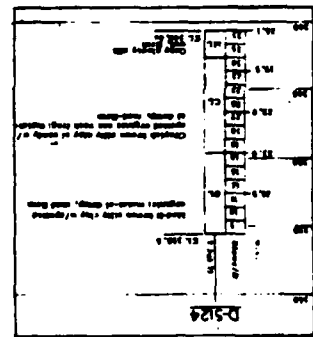
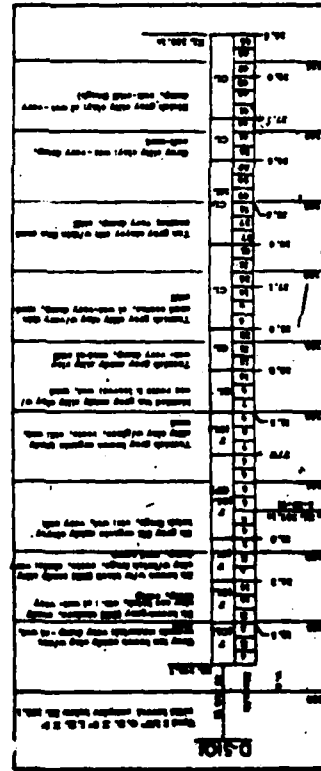
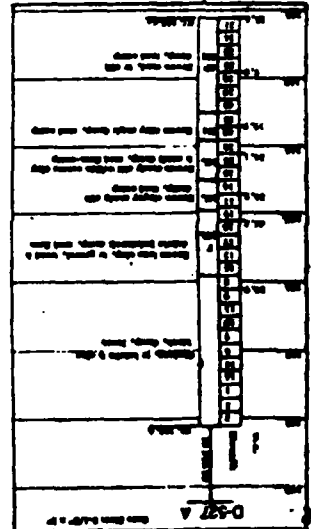
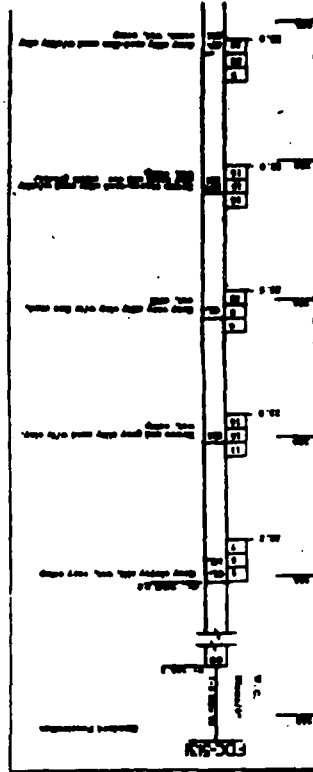
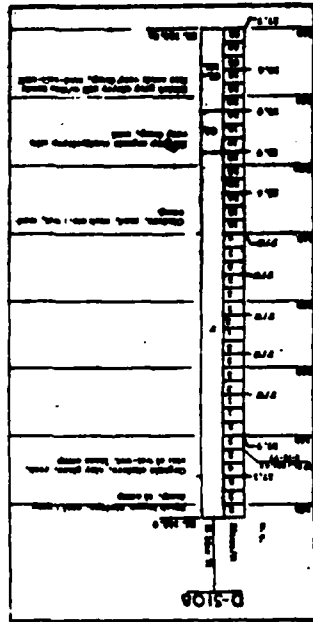
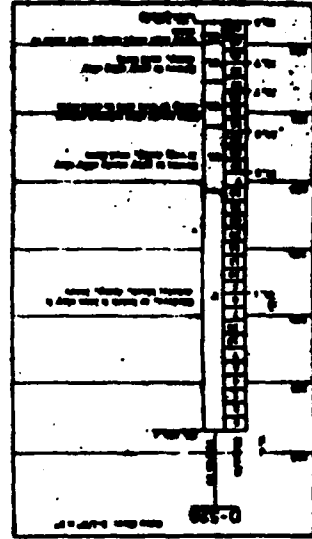
MANHOLE DETAIL - CONCRETE  
MANHOLE DETAIL - TEMPORARY  
EXISTING SEWERHEAD (CONCRETE)

1. THE 12" DIA. AND 12" DIA. R.C.P. SEWERS SHALL BE TO BE INSTALLED AND PLACED WITHIN THE FLOOD PROTECTION AREA AS SHOWN ON THIS PLAN. THE EXISTING SEWER SHALL BE REMOVED AND THE NEW SEWER SHALL BE INSTALLED IN THE SAME LOCATION AS SHOWN ON THIS PLAN.
2. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
3. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
4. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
5. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
6. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
7. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.
8. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE. THE 12" DIA. R.C.P. SEWERS SHALL BE INSTALLED WITH A 1% GRADE TO THE 12" DIA. R.C.P. MANHOLE.

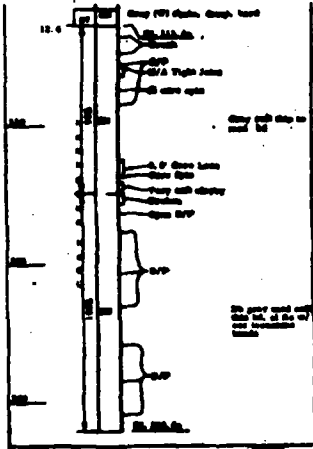
DATE	7/1/58	BY	J.M.
SCALE	AS SHOWN	CHECKED	J.M.
PROJECT	FLOOD PROTECTION EVANSVILLE, INDIANA		
SHEET	SECTION 2 - SHEET 2 OF 4		
CONTRACT	793-124/8		



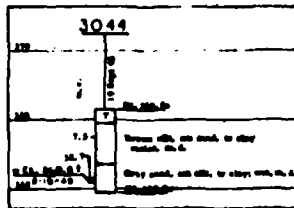
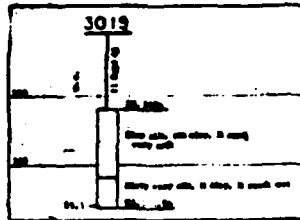
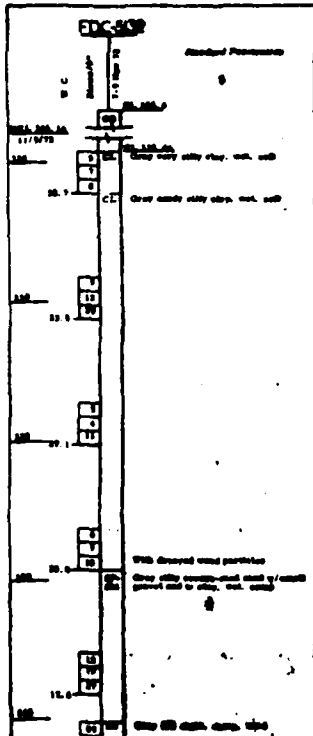
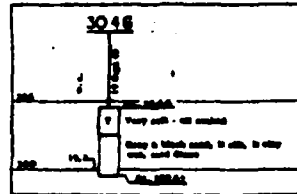
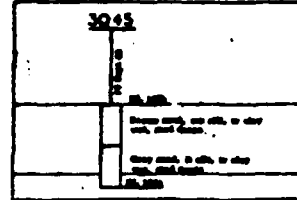
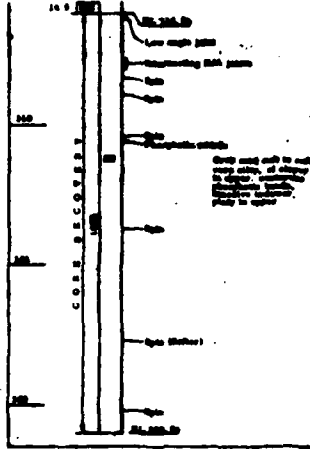
Plate 26



FDC-5131 CONTINUED



FDC-5132 CONTINUED

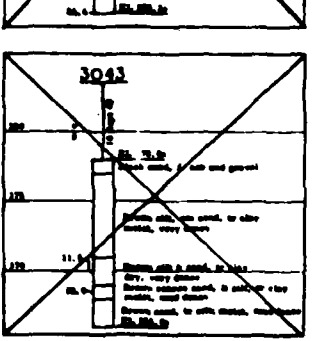
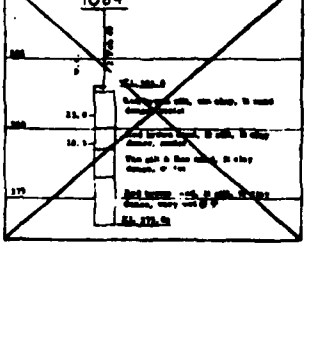
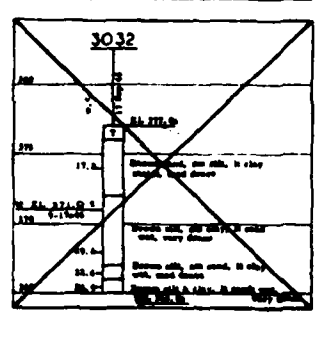
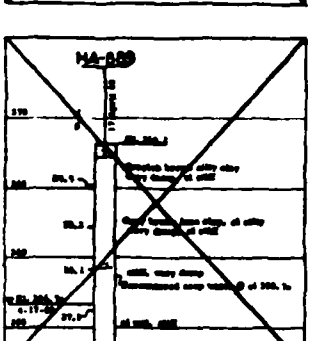
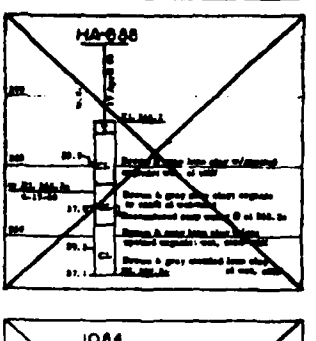
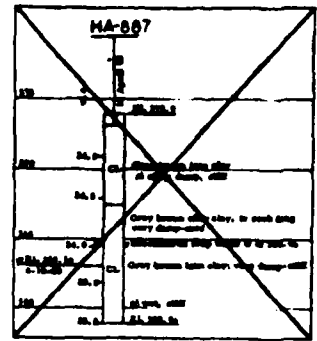
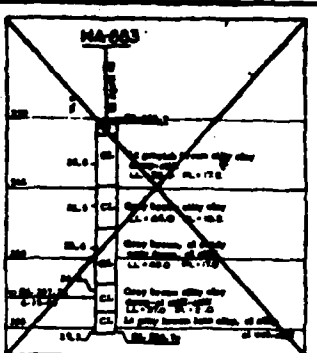
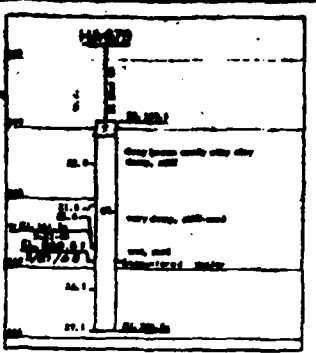
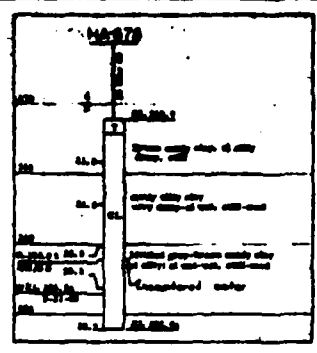


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U. S. ARMY ENGINEER DISTRICT, INDIANAPOLIS	
HEADQUARTERS ENGINEER DISTRICT, INDIANAPOLIS	
FLOOD PROTECTION EVANSVILLE, INDIANA	
PUGNAH DAM SECTION - UNIT 2 (PUGNAH)	
INLAND STREET PUMPING UNIT FOR	
BORING LOSS	
BORING NUMBER 783-1234/87	

Platc 27



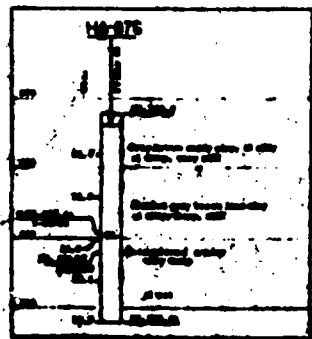
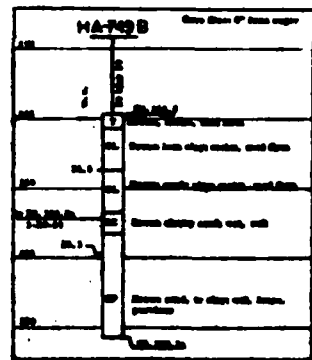
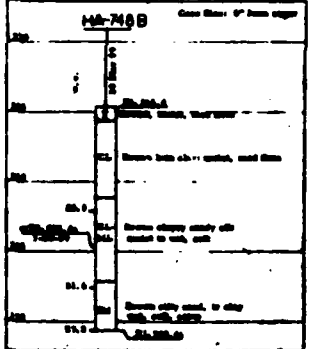
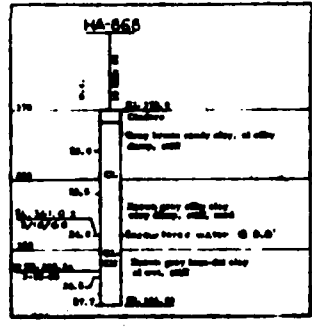
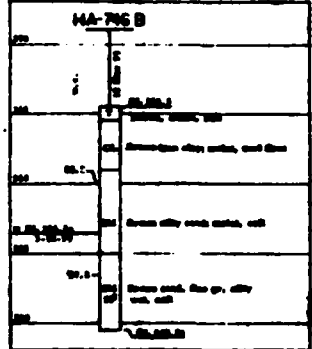
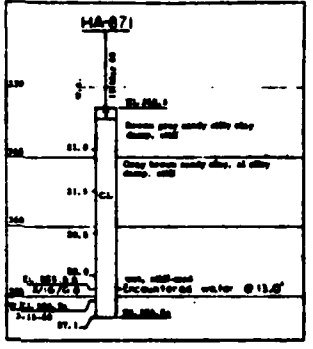
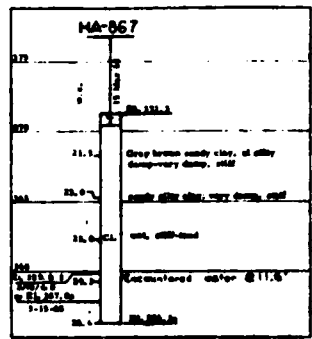
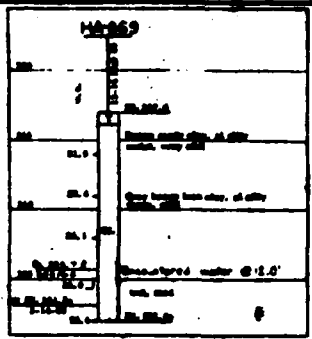
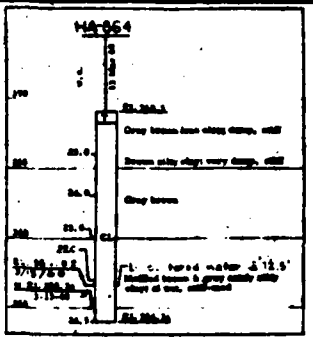
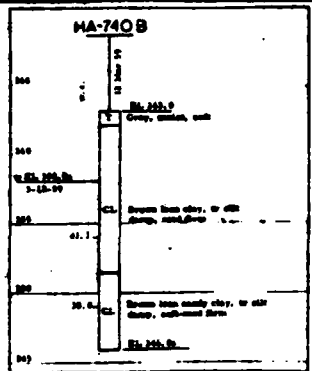


TOP OF BENCH SLABINGS ARE FROM FLOOD PROTECTIVE WALLS AND MAY NOT BE CORRECT.

U.S. ARMY ENGINEERING CENTER WATER DIVISION	
NO. 703-12.14/88	FLOOD PROTECTIVE WALLS FROM SIDE OF CANAL AND A PART OF ADJACENT CITY STREET WALLS DRAINAGE LOSS DRAINAGE LOSS
DATE: 12/14/88	BY: [Signature]
SCALE: AS SHOWN	PROJECT NO. 703-12.14/88

Plate 20





TOP OF GRADE SHOWN AND ALSO FLOOD CONTROL AND THE USE OF GRADE.

U.S. ARMY ENGINEER CENTER	
ENGINEER CENTER	
300 WEST GERM ROAD FLOOD PROTECTION DIVISION, MEMPHIS MEMPHIS, TENNESSEE, 38101 (40471)	
ENGINEER CENTER	
FORM NO. 1-68	
789-12,14/68	

*Plate 29*

△ LABORATORY TEST RESULTS  
 BORING DC-5800

DEPTH (F.T.)	INITIAL W.C. (%)	DRY DENSITY BEFORE TEST (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)
48.8-49.8	0.0	122.0	325
50.0-50.8	8.7	116.0	385
52.4-52.8	10.0	130.4	235
53.0-53.4	10.2	110.6	100
55.35-56.0	NOT DETERMINED	122.0	187
57.0-57.7	NOT DETERMINED	122.0	36
58.25-58.0	NOT DETERMINED	118.3	72

NOTE:  
 ALL BORINGS IN THIS CONTRACT, WITH THE EXCEPTION OF  
 DC-5800 AND DC-5801, WERE DRILLED PRIOR TO CONSTRUCTION  
 OF LEVEE.

DC-5800, DC-5801

△	SMALL	"83" RESULTS ADDED - AMC - NO. 4	EJM
		SHEET ADDED (SMY 182)	EJM
DATE	BY	BY	APP.
<b>U. S. ARMY ENGINEER DISTRICT, LOUISVILLE</b> GROUP OF DISTRICTS CIVILIAN DIVISION			
ONE RIVER BANK <b>FLOOD PROTECTION (EVANSVILLE INDIANA</b> PULASKI STREET SECTION, UNIT 8 (PART I) BELLEVILLE STREET TO RIVER CENTER BORING LOG			
DESIGN NUMBER <b>798-12.14/88A</b>			



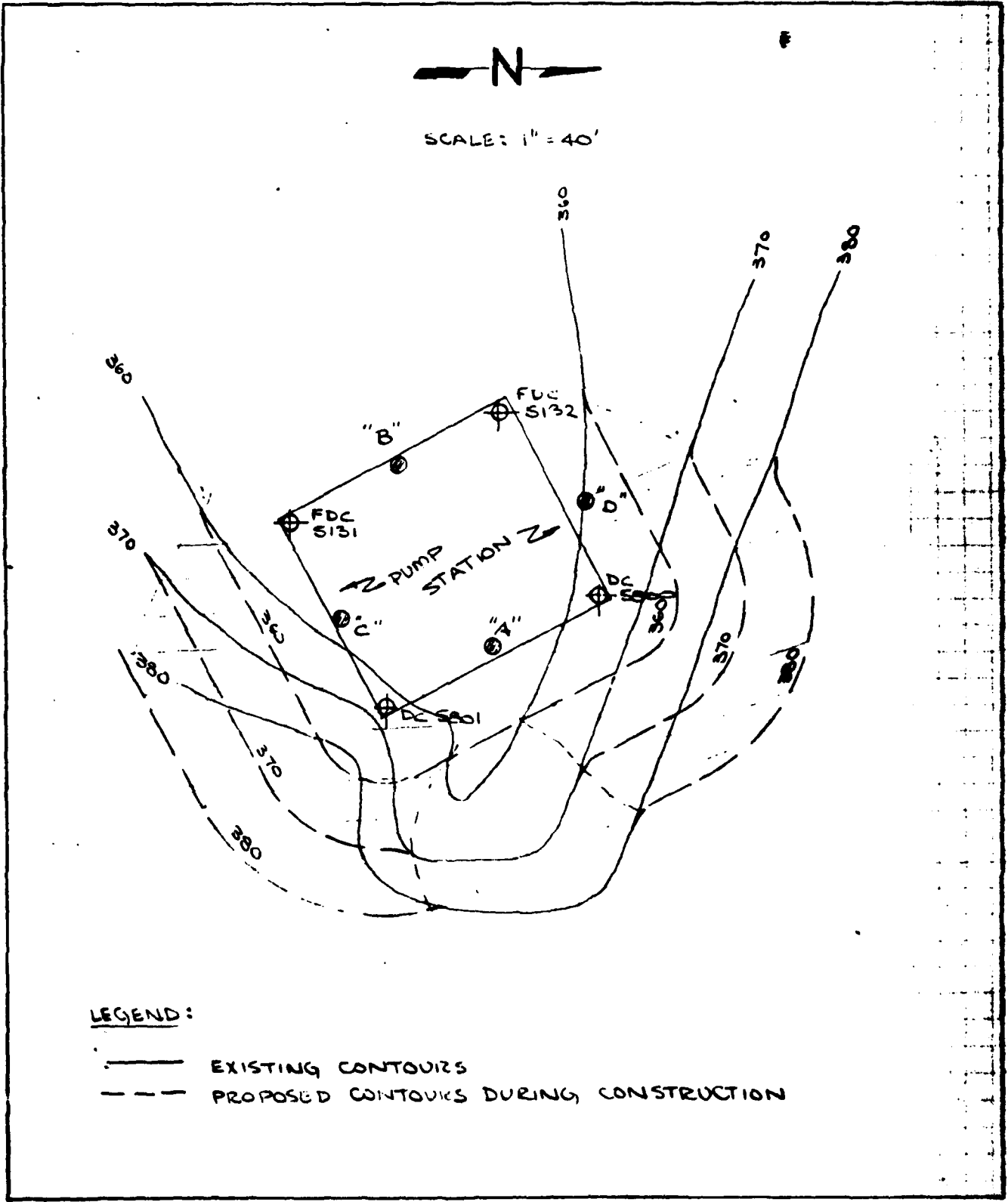




**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS      DATE: 7/78      SHEET: A  
SUBJECT: BORING LOCATION PLAN  
PROPOSED TEMPORARY RE-CONTOURING

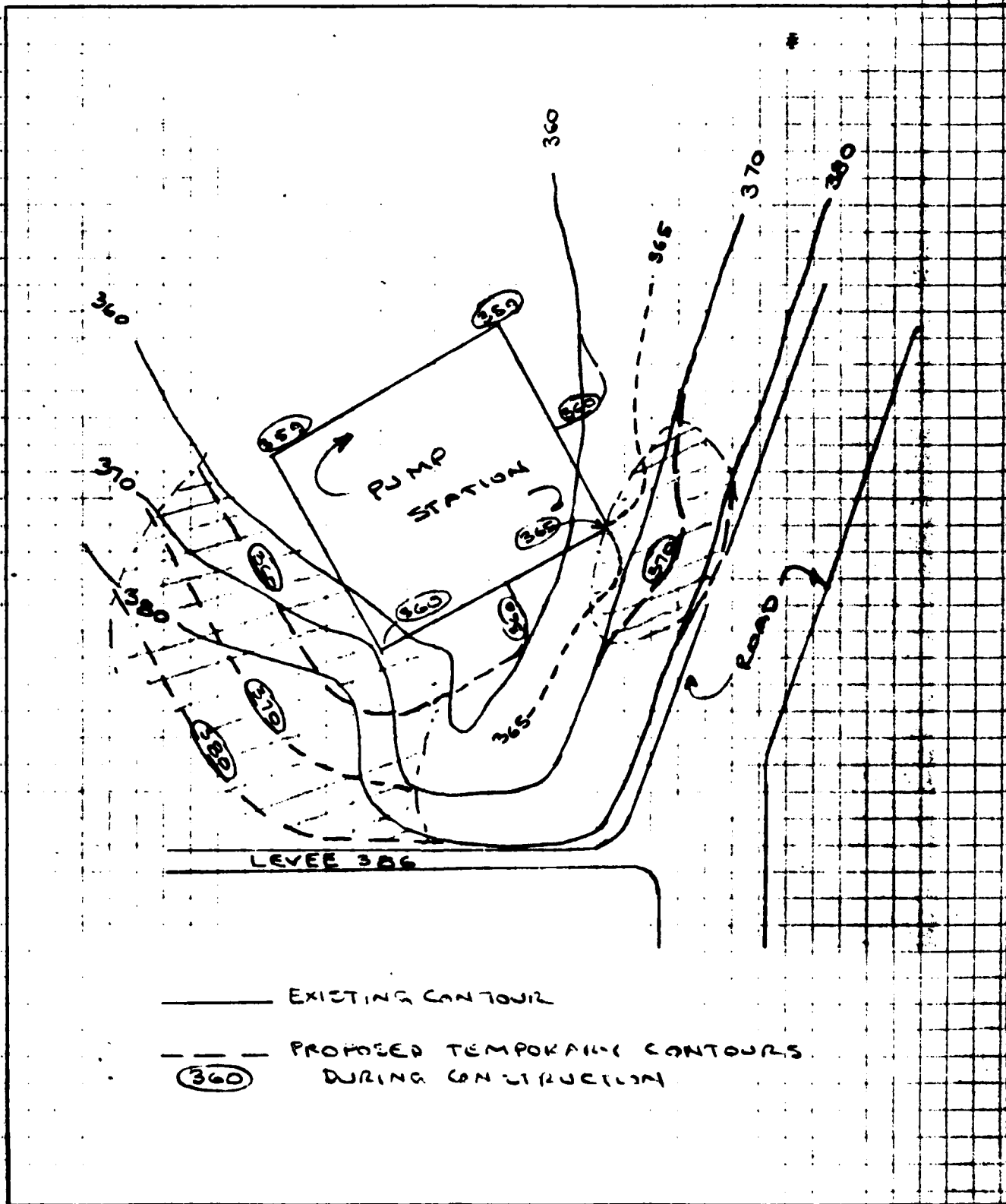




**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS      DATE: 7/78      REV: A  
SUBJECT: REVISED TEMPORARY CONTOURING  
(MAINTAINING EXISTING LEVEE & ROADS)

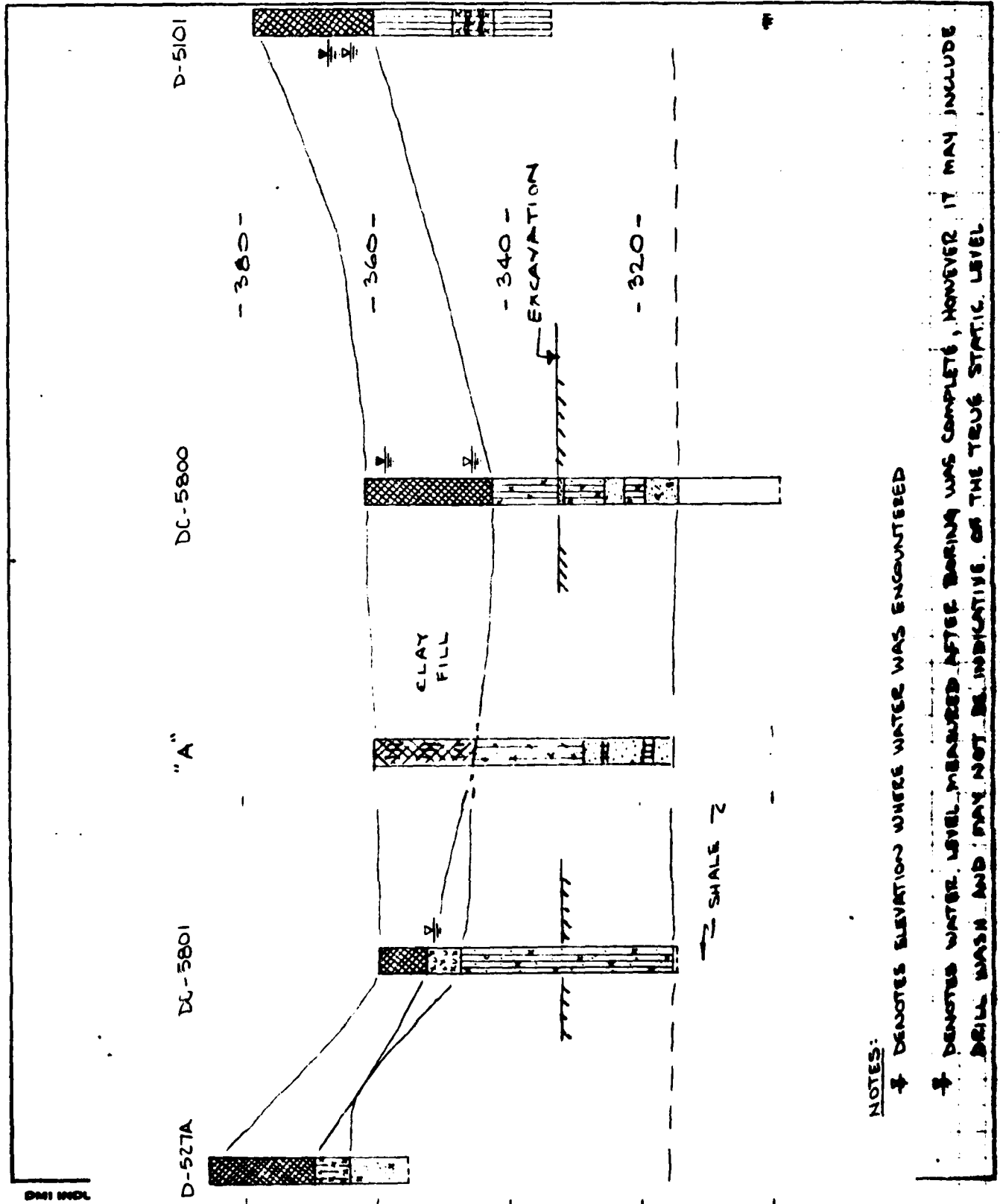




**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION  
 JOB LOCATION: EVANSVILLE, INDIANA  
 CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS DATE: 7/78 SHEET: A-1  
 SUBJECT:



- NOTES:**
- † DENOTES ELEVATION WHERE WATER WAS ENCOUNTERED
  - ‡ DENOTES WATER LEVEL MEASURED AFTER BORING WAS COMPLETE, HOWEVER IT MAY INCLUDE DRILL WASH AND MAY NOT BE INDICATIVE OF THE TRUE STATIC LEVEL.

DM1 INCL



**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION

BY: UWS

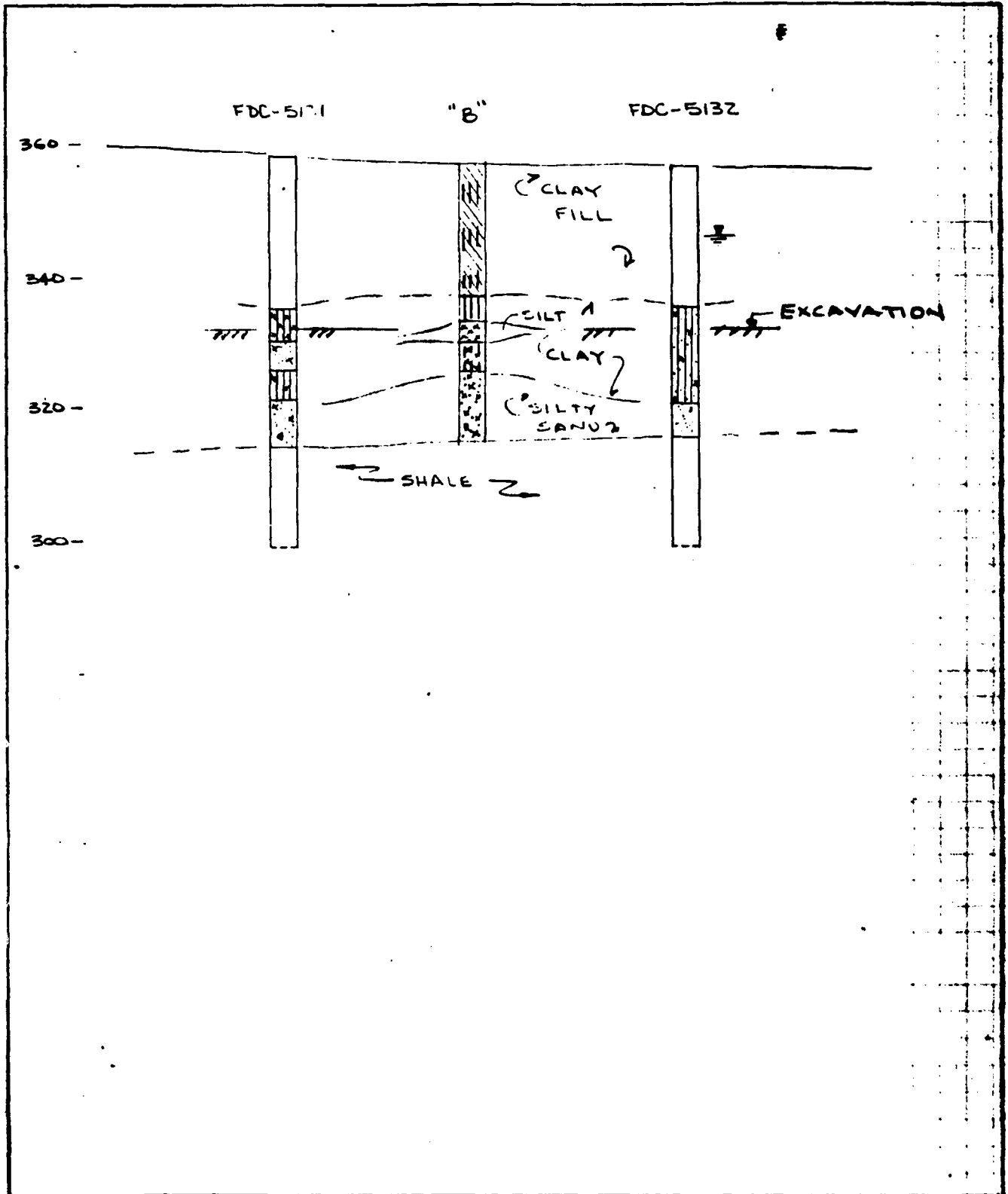
DATE: 7/78

SHEET: A-2

JOB LOCATION: EVANSVILLE, INDIANA

SUBJECT:

CLIENT: INDIANA CONSTRUCTION CORPORATION





**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME PUMP STATION  
JOB LOCATION EVANSVILLE, INDIANA  
CLIENT INDIANA CONSTRUCTION CORPORATION

BY JAM DATE 7/78 SHEET B-1  
SUBJECT LABORATORY DATA SUMMARY

SAMPLE IDENTIFICATION			LABORATORY DESCRIPTION	NATURAL MOISTURE (%)	DRY DENSITY (PCF)	SHEAR STRENGTH (KSF)
BORING NUMBER	SAMPLE NUMBER	DEPTH (FEET)				
B-B	S-1	6'-6"	SOFT GRAY CLAY FILL	51.41		TV= .2
B-C	S-1	26'	VERY SILTY GRAY CLAY (DISTURBED SAMPLE)	22.38		TV= 1.1
B-A	ST-1	5-7'	STIFF BROWN SILTY CLAY WITH SOME GRAY CLAY	17.05		PP=4.2
B-A	ST-2	10 - 12'	BROWN SILTY CLAY WITH DARK CLAY SILTY	19.56		PP=1.8
B-A	ST-4	20 - 22'	STIFF GRAY SILTY CLAY	27.10		PP=2.5
B-A	ST-5	25 - 27'	STIFF GRAY SILTY CLAY WITH BROWN CLAY	25.71		PP=2.45
B-A	ST-6	30 - 32'	STIFF GRAY SILTY CLAY WITH BROWN CLAY	22.06		PP=1.3
B-A	ST-7	35 - 37'	STIFF GRAY SILTY CLAY WITH BROWN CLAYEY FINE SAND &	19.51		PP=1.4
B-B	ST-2	8 - 10'	OLIVE-GRAY MOTTLED SILTY CLAY AND ORGANIC MATTER	32.43		TV= .5 to .74
B-B	ST-3	13 - 15'	STIFF GRAY SILTY CLAY WITH SOME BROWN	23.42		PP=1.7
B-B	ST-4	18 - 20'	GRAY SILT WITH TRACE OF CLAY BINDER	24.0		TV= .9
B-B	ST-5	23 - 25'	SOFT GRAY SILT WITH SOME CLAY BINDER	24.45		PP=2.2
B-B	ST-6	28 - 30'	STIFF GRAY SILTY CLAY WITH SOME BROWN MOTTLING	21.03		PP=1.7
B-B	ST-7	33 - 35'	SOFT GRAY CLAY SAND WITH SILT	23.62		TV= .4
B-B	ST-9	43 - 43'4"	VERY STIFF COMPACTED SILT, LITTLE CLAY BINDER & BROWN MOTTLING	13.69		PP=4.5
B-C	ST-1	4 - 5'	BROWN SILTY CLAY	23.65		PP=1.3
B-C	ST-2	8 - 10'	BROWN MOTTLED SILTY CLAY WITH TRACE OF SAND	23.27		TV= .4
B-C	ST-3	13 - 15'	STIFF GRAY SILTY CLAY	26.09		PP=1.9
B-C	ST-4	18 - 20'	SOFT GRAY SILTY CLAY WITH BROWN FINE SAND SEAMS	24.93		PP=2.0
B-C	ST-6	28 - 30'	GRAY FINE TOMED (CLAYEY) SAND (SAMPLE HAD SOME CLAY AT PERIMETER WHICH SUGGESTS DISTURBED SAMPLE)	21.46		

\* BASED ON TORVANE SHLAR TEST OR PENETROMETER TEST



**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: PCJ DATE: 7/78 SHEET: B-2  
SUBJECT: LABORATORY DATA SUMMARY

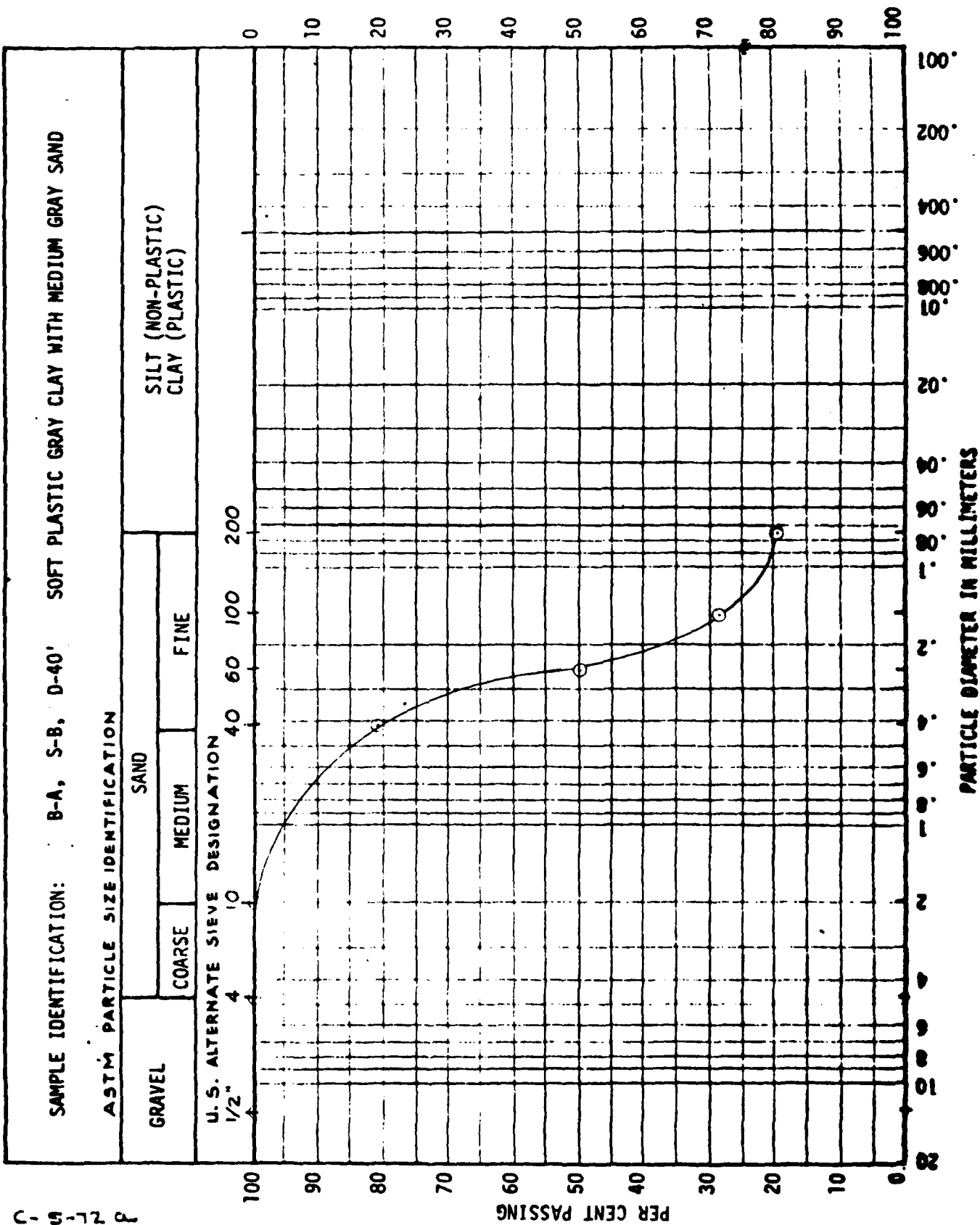
SAMPLE IDENTIFICATION			LABORATORY DESCRIPTION	NATURAL MOISTURE (%)	DRY DENSITY (PCF)	SHEAR STRENGTH (KSF)
BORING NUMBER	SAMPLE NUMBER	DEPTH (FEET)				
B-D	ST-1	3 - 5'	OLIVE GRAY MOTTLED SILTY CLAY WITH ORGANIC MATTER	28.96		PP= 3.25 to 3.75
B-D	ST-2	8 - 10'	BROWN SILTY CLAY WITH POSSIBLE SILT SEAMS	22.25		PP= 2.25 to 2.35
B-D	ST-3	13 - 15'	GRAY VERY SILTY CLAY (CLAYEY SILT)	25.60		PP= 2.9 to 3.5
B-D	ST-4	18 - 20'	GRAY VERY SILTY CLAY (CLAYEY SILT)	27.69		PP= 1.5
B-D	ST-5	23 - 25'	GRAY VERY SILTY CLAY WITH SILT SEAMS (CLAYEY SILT)	24.94		PP= 1.35 to 1.75
B-D	ST-6	28 - 30'	GRAY SANDY SILTY CLAY	21.28		TV = .72
B-D		30+	GRAY FINE TO MEDIUM SAND			
B-E	ST-1	4 - 6'	BROWN SILTY CLAY WITH SOME SAND (POSSIBLE FILL)	23.21		PP= 1.2 to 1.3
B-E	ST-2	8 - 10'	BROWN-GRAY MOTTLED SANDY SILTY CLAY	24.17		TV = .48
B-E	ST-3	13 - 15'	BROWN-GRAY MOTTLED VERY SILTY CLAY	27.19		PP= 1.0 to 1.25
B-E	ST-4	18 - 20'	GRAY CLAYEY SILT	27.75		TV = .64
B-E	ST-5	23 - 25'	GRAY CLAYEY SILT	28.46		TV = .42 to .66
B-E	ST-6	28 - 30'	OLIVE-GRAY SILTY CLAY WITH SAND	23.56		TV = .78
B-F	ST-1	3 - 5'	BROWN FINE TO MEDIUM SAND WITH SOME SILT	- -		- -
B-F	ST-4	18 - 20'	GRAY SILTY CLAY WITH TRACE OF SAND	28.00		TV = .66
B-F	ST-5	23 - 25'	GRAY CLAYEY SILT	28.14		PP = 1.4
B-F	ST-6	28 - 30'	GRAY CLAYEY SILT	26.74		PP= .9 to 1.0

\* BASED ON TORVANE SHLAR TEST OR PENETROMETER TEST



JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS  
DATE: 7/78  
SHEET: B-3  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



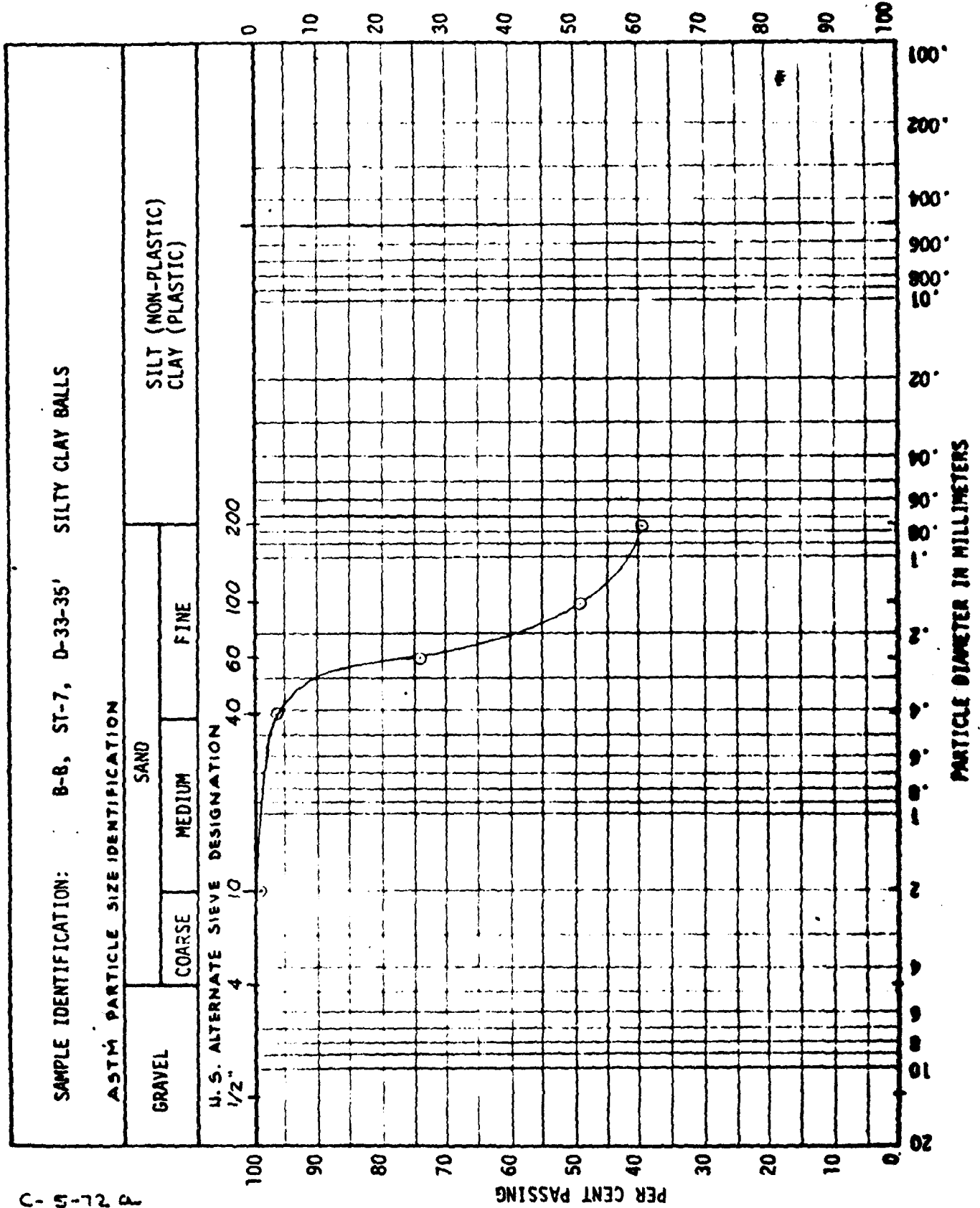
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**STOLL, EVANS & ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS DATE: 7/78 SHEET: B-4  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY

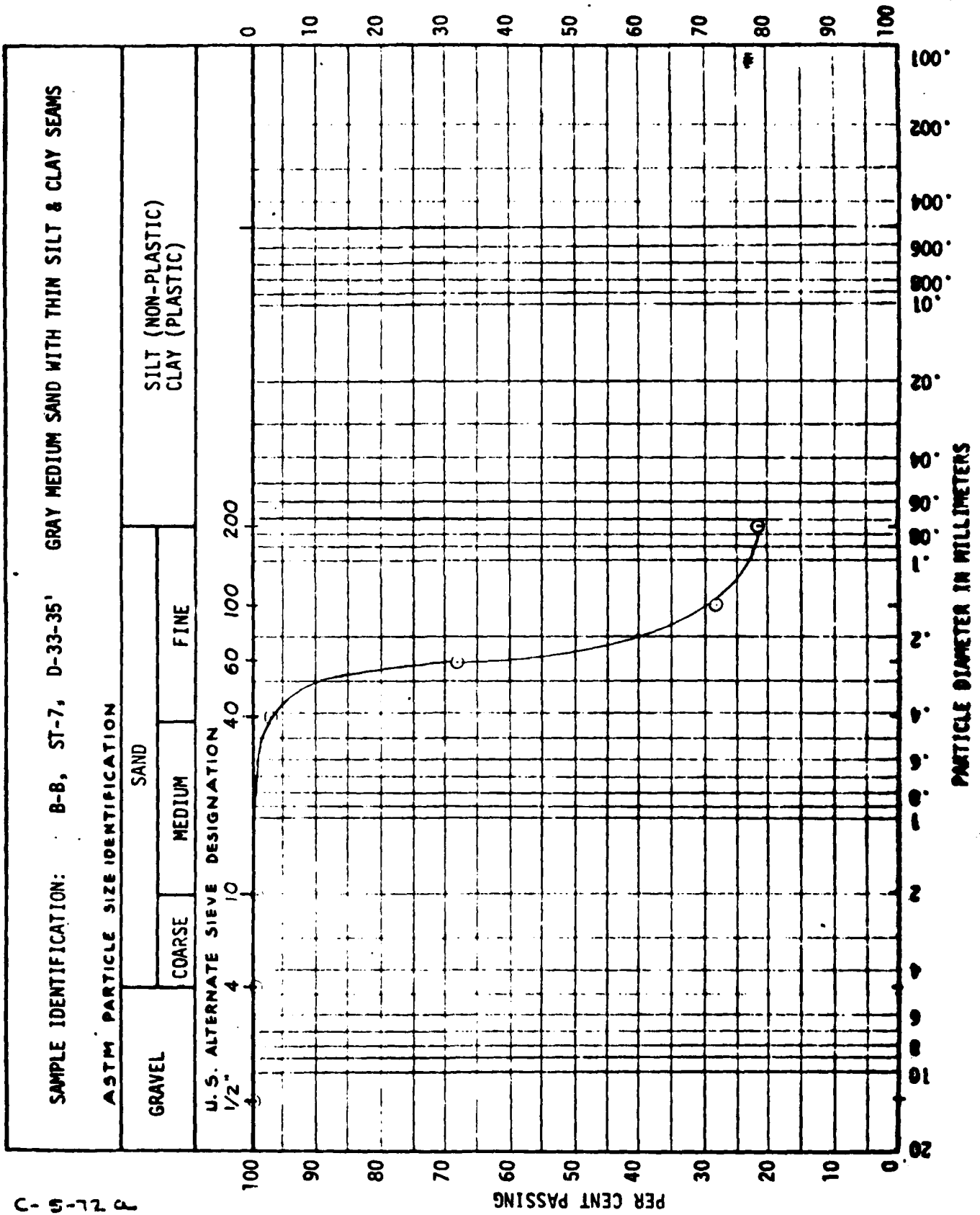


22-5-2



JOB NAME: PUMP STATION  
JOB LOCATION: EVANSVILLE, INDIANA  
CLIENT: INDIANA CONSTRUCTION CORPORATION

BY: UWS DATE: 7/78 SHEET: B-5  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



3 21-5-0









Appendix V

Core Data

Delaware Street

Pump Station

CONTR DACW 78-C-0076

Hole No. C-1

DRILLING LOG		DIVISION	INSTALLATION	SHEET
CONSTRUCTION			ORLCD	OF 2 SHEETS
PROJECT FLOOD PROTECTION		10. SIZE AND TYPE OF BIT 6" Diamond		
EVANSVILLE INDIANA UNIT		11. DAYON FOR ELEVATION SHOWN (FEET OR METERS)		
LOCATION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL		
S.W. CORNER OF STRUCTURE		PORTADRILL		
DRILLING AGENCY		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		UNDISTURBED
J. E. HOSKINS DRILLING INC.		N/A		N/A
14. HOLE NO. (As shown on drawing title and file number)		14. TOTAL NUMBER CORE BOXES		
		3		
15. NAME OF DRILLER		15. ELEVATION GROUND WATER		
MIKE SCHUBERT				
16. DIRECTION OF HOLE		16. DATE HOLE		COMPLETED
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		18 Oct. 78		19 Oct. 78
17. THICKNESS OF OVERBURDEN 44.2'		17. ELEVATION TOP OF HOLE 360.5 Top Casing		
18. DEPTH DRILLED INTO ROCK 14.3'		18. TOTAL CORE RECOVERY FOR BORING 100%		
19. TOTAL DEPTH OF HOLE 60.0'		19. SIGNATURE OF INSPECTOR		
		Loren A. Christian		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, run in logs, depth of weathering, etc., if significant)
360.5	0.0		TOP OF CASING			
359.0	1.5		Top of Ground			
314.8	45.7		TOP OF ROCK			
314.4		SH	SHALE CLAYEY, bluish gray, soft y. frac. 314.8-314.4 26° dipping beds 314.4, 316.1, 313.6, 313.8, 312.1, 312.5		Box No 1	Bedding dipping 26° from 314.8 to 311.7
311.7	48.8		TOP OF FIRM ROCK			
310.3	50.2		SHALE CLAYEY med. h. 1 sa. seam incl. 1/2" sa seams @ 309.6 (conc)		Box No 2	solid core below 311.7 cut 4.9' Rock 4.5' soft 0.4'
305.9	55.1				Box No 3	Cut 9.9' Rock 9.8' Gain 0.4'
303.0						
302.7						
302.2						
301.7						
301.3						

18 Oct 78  
19 Oct 78

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE 360.5 Top of ...		Hole No. C-1		
PROJECT EVANSVILLE INDIANA		INSTALLATION		SHEET 2 OF 2 SHEETS		
DELAWARE STREET PUMP MAIN		011-6				
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
303.5	57.0					
	58.0					
	59.0					
300.5	60.0		Bottom of Hole		Box No 3	
						After casing completed hole was grouted back to 330. EL.

1900x75

CONTR NO. DACW 27-78-C-0076

Hole No. C-2

DRILLING LOG		DIVISION <b>CONSTRUCTION</b>	INSTALLATION <b>ORLCD</b>	SHEET <b>1</b> OF 1 SHEETS
PROJECT <b>EVANSVILLE FLOOD PROTECTION DELAWARE STREET PUMP PLANT</b>			10. SIZE AND TYPE OF BIT <b>6" by 6 1/2"</b>	
LOCATION (Coordinates or Station) <b>CENTER OF WEST SIDE OF STRUCT.</b>			11. DATUM FOR ELEVATION SHOW (Type or Name) <b>MSL</b>	
DRILLING AGENCY <b>J. F. HOSKINS DRILLING INC</b>			12. MANUFACTURER'S DESIGNATION OF DRILL <b>PORTADRILL 524 J</b>	
1. HOLE NO. (As shown on drawing title and file number)			13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN <b>N/A</b>	UNDISTURBED <b>N/A</b>
2. NAME OF DRILLER <b>MIKE SCHUBERT</b>			14. TOTAL NUMBER CORE BOXES <b>3</b>	
3. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN <b>45.3'</b>			16. DATE HOLE STARTED <b>1 Nov. 78</b> COMPLETED <b>1 Nov. 78</b>	
8. DEPTH DRILLED INTO ROCK <b>14.9'</b>			17. ELEVATION TOP OF HOLE <b>357.3</b>	
9. TOTAL DEPTH OF HOLE <b>59.8'</b>			18. TOTAL CORE RECOVERY FOR BORING <b>97</b>	
			19. SIGNATURE OF INSPECTOR <i>Lois A. Christman</i>	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
359.3	0.0					
315.0	44.3		OUB Started Coring @ 315.0			Set 8" casing to 315.0 prior to coring
314.4	44.9		Top of Rock	lost		M.D. Casing dropped to 314.4 when coring started
314.0	45.3	SH	CLAYEY SHALE bl-gr. m h. 1/2" h. concn 30.5, 5' occ. scattered gra. size incl.	lost		when core pulled there was wire in top of barrel.
312.3	47.0		core reduced in size from coring 314.0 to 312.3'		Box	cut 14.9 Top Rock 14.5 Firm Rock 312.3 Loss 0.4'
	48.0					
	49.0					
	50				499	
	51					
	52			100.0	Box 2	
	53					
	54					
309.7	55		concr 20. 309.7-309.6		54.5	
	56					
302.7						
302.1	57	clay	CLAYEY SHALE soft plastic (great Mech)		Box 3	
301.6	57.6	SH	concr 20. 302.1 to 302.0			
	58		6hr 30.1 to 300.5			
300.5	59					
299.5	59.8		Solid core			M.D.

AD-A115 679

ARMY ENGINEER DISTRICT LOUISVILLE KY  
PIGEON CREEK THREE PUMP STATIONS, EVANSVILLE, INDIANA, LOCAL FL--ETC(U)  
MAY 82 V C BOARMAN, A W GOODAKER

F/6 13/2

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CONTR. NO. DACW-27-78-0076

Hole No. C-3

DRILLING LOG		DIVISION CONSTRUCTION	INSTALLATION ORLCD	SHEET 1
PROJECT EVANSVILLE FLOOD PROTECT. DELAWARE ST PUMP PLANT		10. SIZE AND TYPE OF BIT 6" BU 6 7/8"		OF 1 SHEETS
LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
DRILLING AGENCY J. E. HASKINS DRILLING INC.		12. MANUFACTURER'S DESIGNATION OF BRILL PARTADRILL 524 J.		
HOLE NO. (As shown on drawing title and log number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN N/A	DISTURBED N/A	UNDISTURBED N/A
NAME OF DRILLER MIKE SCHUBERT		14. TOTAL NUMBER CORE BOXES 5		
DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
THICKNESS OF OVERBURDEN 45.1		16. DATE HOLE STARTED 9 Nov. COMPLETED 9 Nov. 78		
DEPTH DRILLED INTO ROCK 15.1		17. ELEVATION TOP OF HOLE		
TOTAL DEPTH OF HOLE 61.2		18. TOTAL CORE RECOVERY FOR BORING		3
		19. SIGNATURE OF INSPECTOR logged by Dana A. Christman		

ELEVATION 340.9 340.2	DEPTH 0.0	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of overburden, etc., if significant)
315.2	45.1					M.D. 45.1
45.3						
46.0		SH.	CLAYEY SHALE 61-gr m.h. discont. concr incl 3 ga. size 315.0, 314.4, 314.1 concr. zo. 312.8 to 312.7 core pa's @ 311.6, 313.7, 313.2, 312.7, 312.2 311.6, 310.8 1/2" discont. concr. mod 311.2 1/2" " " 20.66m 311.0 1/2" h. concr zo 309.6 319.0 308.2		Box No 1	Cut 5.1 Rec'd 4.9 Loss 0.2
310.1	58				50.2	C.D. 50.2
	51					Casing dropped 0.1'
	52				Box 2	
	53			100%	52.9	
	54					Cut 8.8' Rec'd 8.8'
	55					
	56				55.7	
303.7	56.5		Cl. Co. parting core			
	57		core pa's 302.0 301.2		Box 4	
	58				58.4	
301.2	59		h. concr incl. 301.3 solid core 301.2 to 299.0		Box 5	C.D. 59.0 M.D. 59.0 Cut 2.2' Rec'd 2.2'
	60					
299.0	61.2		Bottom of Hole.		61.2	M.D. 61.2

CONTR. D.F.C.W 78-2-0076

Hole No. C-4

DRILLING LOG		DIVISION <b>CONSTRUCTION</b>	INSTALLATION <b>ORLCD</b>	SHEET <b>1</b> of 2 SHEETS
1. PROJECT <b>EVANSVILLE PLANT PROTECT. DELAWARE STREET PUMP PLANT</b>		10. SIZE AND TYPE OF BIT <b>6"</b>		
2. LOCATION (Coordinates or Station) <b>CENTER SOUTH SIDE OF STRUCTURE</b>		11. DATE FOR ELEVATION DETERMINED (BY REC) <b>11/5/78</b>		
3. DRILLING AGENCY <b>J.E. HOSKINS DRILLING, INC.</b>		12. MANUFACTURER'S DESIGNATION OF DRILL <b>PORTADRILL</b>		
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN <b>N/A</b>	14. DISTURBED <b>N/A</b>	15. UNDISTURBED <b>N/A</b>
5. NAME OF DRILLER <b>MIKE SCHUBERT</b>		14. TOTAL NUMBER CORE BOXES <b>4</b>		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN <b>44.3'</b>		16. DATE HOLE STARTED <b>24 Oct 78</b> COMPLETED <b>25 Oct 78</b>		
8. DEPTH DRILLED INTO ROCK <b>15.5'</b>		17. ELEVATION TOP OF HOLE <b>359.5 - 359.3</b>		
9. TOTAL DEPTH OF HOLE <b>60.6 From Top Cas 299</b>		18. TOTAL CORE RECOVERY FOR BORING <b>100</b>		
		19. SIGNATURE OF INSPECTOR Logged By <i>W. H. ...</i>		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of penetration, etc., if pertinent)
352.5	0.0		Top Casing 1' 5" to 16' up			
			OVB			Top firm Rock 314.2
314.2	45.3		Top of Rock			
	46	SH	CLAYEY SHALE; bl. gr. m. h. / sa 50 (1/2")	LOST		Lost 0.3' setting casing and clearing of hole prior to coring
	47		Sandy loam ss 313.3			
			312.2			
			311.3			
	48		308.4			Cut 5.1'
			307.8			Reid 4.8'
			307.3	Run No 1	Box No 1	Lost 0.3'
	49		306.7			
			306.4			
			306.1			
	50		conc. incl. 304.8 to 304.9			Measured Depth 50.9'
	51					
	52		SLS lens 304.0 to 303.8	Run No 2		Cut 10.2'
	53					Reid 10.2'
	54		sa. conc. lenses @ 301.7		Box 2	
			300.6			
	55					
	56					
	57					
	58				Box 3	
	59					
	60.0					Measured Depth 60.6

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. C-9		
PROJECT EVANSVILLE FLOOD PROJECT		EL. 359.5 Top Casing		SHEET 1 OF 2 SHEETS		
DELAWARE STREET PUMP PLANT		INSTALLATION O.P.L.C.D.				
LEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
298.7	60.6		Bottom of Hole		Rox #	Casing dropped 0.2' after first run making top of casing @ 359.3' during 2nd run.

CONTR. NO. DACW 27-78-C-0076

Hole No. C-5

DRILLING LOG		DIVISION	INSTALLATION	SHEET
CONSTRUCTION		ORLCD	of 1 SHEETS	
PROJECT EVANSVILLE FLOOD PROTECTION		10. SIZE AND TYPE OF BIT 6" by 6 7/8"		
DELAWARE STREET PUMP PLANT		11. DAY(S) FOR ELEVATION BROWN TAPE (if any)		
1. LOCATION (Coordinates or Station)		MSL		
2. CENTER OF STRUCTURE		12. MANUFACTURER'S DESIGNATION OF DRILL		
3. CALLING AGENCY		PORTADRILL 524-J		
J.E. HOSKINGS DRILLING INC.		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
4. HOLE NO. (As shown on drawing title and file number)		DISTURBED N/A UNDISTURBED N/A		
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		
MIKE SCHUBERT		3		
6. DIRECTION OF HOLE		15. ELEVATION GROUND WATER		
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		16. DATE HOLE		
		STARTED 30 Oct 78 COMPLETED 31 Oct 78		
7. THICKNESS OF OVERBURDEN 43.9		17. ELEVATION TOP OF HOLE 359.6		
8. DEPTH DRILLED INTO ROCK 15.3'		18. TOTAL CORE RECOVERY FOR BORING 96%		
9. TOTAL DEPTH OF HOLE 60.2		19. SIGNATURE OF INSPECTOR		
		E. H. [Signature] Loren A. [Signature]		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, wash loss, depth of weathering, etc., if significant)
359.6	0.0					
						set 8" casing
314.7	44.9		Top Rock			Measured Depth
	46	SH	CLAYEY SHALE bl-gr. 2 1/4" / 1/2" ss seams 1 occ. conc. incl. 2a @ average 6" centers 314.7 to		Box 1	Prior to start of coring
	47					
	48					
311.0	48.1			100%		Cut 15.3'
	49					Rec'd 14.7'
309.7	50				49.9	Loss 0.6'
	51					
	52				Box 2	
	53		core spin @ 306.4			
	54			Loss		
304.2	54.8				55.4	
	55					
	56			100%	Box 3	
302.2	57.8		mach. bit 302.6 to 302.5 casing 20.4			broken material
301.8	58.2	CLAY	CLAY SUFT. V. SLIC. NO. SH.			cut soft material 302.6 to 301.8 attributed to drilling
	59	SH				
299.4	60.2					Measured Depth
	60.2		Bottom Hole			

30 Oct 31 Oct

DRILLING LOG		INSTALLATION	
CONSTRUCTION		ORLED	
PROJECT EVANSVILLE FLOOD PROTECTION		10. SIZE AND TYPE OF BIT 6" BU 6 3/8"	
DELAWARE STREET PUMP PLANT		11. DAY ON FOR ELEVATION SHOW (FROM - MSL)	
1. LOCATION (Coordinates or Section)		MSL	
2. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL	
J. E. HASKINS DRILLING INC		PORTADRILL Model 524 J	
3. HOLE NO. (As shown on drawing title and site number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
		N/A	
4. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES	
MIKE SCHUBERT		3	
5. DIRECTION OF HOLE		15. ELEVATION GROUND WATER	
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			
6. THICKNESS OF OVERBURDEN 45.0		16. DATE HOLE STARTED	
7. DEPTH DRILLED INTO ROCK 157'		Nov. 278	
8. TOTAL DEPTH OF HOLE 60.7		COMPLETED	
		NOV. 2, 78	
		17. ELEVATION TOP OF HOLE 360.0	
		18. TOTAL CORE RECOVERY FOR BORING 92	
		19. SIGNATURE OF INSPECTOR	
		logged by John A. Chantreaux	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, mud loss, depth of weathering, etc., if significant)
360.0	0.0		TOP casing			
			DUB HIT LOG @ about 12.0'	NONE		
315.0	45.0		CLAYEY SHALE, bl-gr m.h.			TOP Rock
312.3	48.0	SH	slabby blk 315.0 to 315.1		Box 1	partings from 315.6 to 308.6 are open and clay coated
312.2	48.8		low L pa 314.3 to 314.2			
311.4	49.6		v. frac. 314.3 to 314.0			
			low L pa. 313.6 to 313.5			
			low L pa. 312.2 to 312.1			
			low L pa. 311.9 to 311.8			
			v. frac. 312.2 to 311.4			
			low L pa 311.2 to 311.1			
			core blk @ 310.9	100	49.6	
			low L pa's @ 310.1, 309.9, 309.7, 309.6, 309.4			
308.6	51.8	clay	sl. sided pt @ 308.6			
308.2	52.0		CLAY bl-gr. soft. plastic		Box 2	Driller overran space available in barrel 19.25' length to end of enter barrel. Core was so broken up in box that condition of inside rock could not be determined.
		SH	SHALE bl-gr. soft. matrix indicated	63		
306.5	54.0					
305.8	55.0					
304.3	55.7		fresh partings 304.2, 303.6, 303.4, 302.8, 302.6, 301.6, 300.6, 300.0, 299.7.		55.7	
		SH			Box 3	cut 15.7 Rec'd 14.5 Loss 1.2'
				100		
						Hole replaced by C-6A
299.3	60.7		Bottom of Hole			

DACW 27-78-C-0076

Hole No. C-6A

DRILLING LOG		DIVISION	INSTALLATION	SHEET
CONSTRUCTION		CONSTRUCTION	ORLCD	OF 1 SHEETS
PROJECT			10. SIZE AND TYPE OF BIT	
EVANSVILLE FLOOD PROTECTION			6" BY 6 1/2"	
DELAWARE STREET PUMP PLANT			11. DAYTON FOR ELEVATION SHOW (TOP OR BTL)	
LOCATION (Coordinates or Section)			MSL	
12. MANUFACTURER'S DESIGNATION OF DRILL			PORTADRILL Model 524J	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN			DISTURBED	UNDISTURBED
N/A			N/A	N/A
14. TOTAL NUMBER CORE BOXES			3	
15. ELEVATION GROUND WATER				
16. DATE HOLE			STARTED	COMPLETED
8 NOV.			8 NOV.	8 NOV. 78
17. ELEVATION TOP OF HOLE			360.0	
18. TOTAL CORE RECOVERY FOR BORING			100%	
19. SIGNATURE OF INSPECTOR			Logged by John Christian	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
360.0	0.0		OUB Hit 1.98 about 12.0'			Top of casing during first run 360.3. After first run top of casing dropped to 360.8
314.7	45.3		TOP of Rock			M.D. 45.6 Corrected 45.3
	46	SH	CLAYEY SHALE 4-gr 5 to m.h. Solid core 314.7 to h. concn 313.3 pa @ 314.1 to 312.7			Bedding dipping 5° EX. 314.7 to 309.5
313.3	47		v. frac open 313.3 h. concn 312.7 to 312.7 pa @ 312.7			Cut 5.0' Rec'd 4.0'
312.7	47.6		v. frac open 311.9 to 310.3 softening by water moving through rock			M.D. 49.5 Corrected 49.6 Slanted GR.
311.9	48.5		v. frac open 310.3 to 309.8			C.D. 50.6 Corrected 50.3
310.3	50		h. shabby concn 309.7 to 309.5			
309.8	50.8		see below for description material 309.5 to 306.5	100%		
309.5	51		Sli. s. sand pn 306.5 to 306.3 (18° dip) m.h. shale			S. shale h. frac 1.5 to m.h. soft plastic clay seams
304.8	55	SH	h. concn 305.7 to 305.6			Firm m.h. SHALE
	56		occ. concn incl. gr. size 305.3 to 305.1			Cut 7.8' Rec'd 8.0' Gain 1.0'
302.7	57		Bottom of Hole.			M.D. 57.3
	58		309.5 to 309.4 Conc. Tobkn			C.D. Left 0.3'
	59		309.4 to 309.2 S. SH.			
			309.2 to 309.15 S. plastic cl.			
			309.15 to 309.0 S. SH.			
			309.0 to 308.7 S. plastic cl.			
			308.7 to 308.5 S. SH.			
			308.5 to 308.3 S. plastic cl.			
			308.3 to 308.0 S. SH.			
			308.0 to 307.8 S. plastic cl.			
			307.8 to 307.75 concn 20.			
			307.75 to 307.0 S. SH.			
			307.0 to 306.5 - plastic cl.			
			45° fr. j. 307.8 to 307.2			
			45° fr. j. 307.4 to 307.0			
			part way thru core			

CONTR. NO. DACW 27-78-C-0076

Note No. C-7

1. DRILLING LOG	DIVISION CONSTRUCTION	INSTALLATION ORLCD	SHEET 1
2. PROJECT EVANSVILLE FLOOD PROTECTION DELAWARE STREET PUMP PLANT		10. SIZE AND TYPE OF BIT 6"	OF 2 SHEETS
3. LOCATION (Coordinates or Station) N.E. CORNER OF STRUCTURE		11. DAY ON WHICH ELEVATION DETERMINED MSL	
4. DRILLING COMPANY E. HOSKINS DRILLING INC.		12. MANUFACTURER'S DESIGNATION OF DRILL PORTA DRILL	
5. HOLE NO. (As shown on drawing site and site number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED N/A
6. NAME OF DRILLER MIKE SCHUBERT		14. TOTAL NUMBER CORE BOXES	UNDISTURBED N/A
7. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		15. ELEVATION GROUND WATER	
8. THICKNESS OF OVERBURDEN 45.8		16. DATE HOLE	STARTED 23 OCT. 78
9. DEPTH DRILLED INTO ROCK 19.5		COMPLETED 23 OCT. 78	
10. TOTAL DEPTH OF HOLE 59.9		17. ELEVATION TOP OF HOLE	360.0
		18. TOTAL CORE RECOVERY FOR BORING	97.9
		19. SIGNATURE OF INSPECTOR logged by Nader John A. Christman	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, mud loss, depth of weathering, etc., if significant)
360.0	0.0		TOP OF CASING			
	45.8		0.0 TO 19.0 Backfill 19.0 TO 45.3 OUB			Drilled to 45.0 set casing & cleaned hole. Measured depth 45.4' prior to start of coring.
314.6	45.8		TOP OF ROCK			Measured Depth Top firm rock 314.3
310.2	49.8	SH	SHALE CLAYEY bl. gr. m. h.; 1 sa. sc (1/2) @ 311.5 310.9 309.6 308.3	LOSS	BOX 1	Cut 5.0 Rec'd 2.1 Loss 2.6' Loss 0.3'
	51				BOX 2	Cut 9.5 Rec'd 12.1 Gain 2.6
305.2	54.8				BOX 3	

19 OCT 78

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. C-7		
PROJECT EVANSVILLE FLOOD PROTECTION		360.0 Top Casing		SHEET 2		
INSTALLATION DELAWARE ST. PUMP PLANT		ORLCD		OF 2 SHEETS		
ELEVATION a	DEPTH b	LOG NO. c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	57.0					
	58.0				Box 3	
300.1	59.9		Bottom of Hole			Measured depth 59.9
						After drilling completed hole was grouted back to 330 EL.

DRILLING LOG	DIVISION <b>CONSTRUCTION</b>	INSTALLATION <b>ORLCD</b>	SHEET <b>1</b> OF 1 SHEETS
PROJECT <b>EVANSVILLE FLOOD PROTECTION DELAWARE STREET PUMP MAIN</b>		10. SIZE AND TYPE OF BIT <b>6"</b>	
11. DAYTON FOR ELEVATION BROWN (TBM or MSL) <b>M.S.L.</b>		12. MANUFACTURER'S DESIGNATION OF DRILL <b>PORTA DRILL</b>	
13. DRILLING AGENCY <b>J.E. HOSKINS DRILLING INC.</b>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED <b>N/A</b>
14. NAME OF DRILLER <b>MIKE SCHUBERT</b>		UNDISTURBED <b>N/A</b>	
15. ELEVATION GROUND WATER		16. TOTAL NUMBER CORE BOXES	
17. THICKNESS OF OVERBURDEN <b>45.0</b>		18. DATE HOLE STARTED <b>27 Oct.</b> COMPLETED <b>27 Oct 78</b>	
19. DEPTH DRILLED INTO ROCK <b>15.4'</b>		17. ELEVATION TOP OF HOLE <b>360.0</b>	
20. TOTAL DEPTH OF HOLE <b>60.4'</b>		18. TOTAL CORE RECOVERY FOR BORING <b>97</b>	
		19. SIGNATURE OF INSPECTOR <i>John Chapman</i>	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, core loss, depth of overburden, etc., if significant)
360.0	0.0		Top Casing			
			OUB			set 8" casing
315.0	45.0		Top of Rock			
	46.0		CLAYEY SHALE bl-gr. m.h.	Lost.		lost 0.5' at top of run.
	47		solid core 315.0 to 309.9			Run #1 Cut 5.1' Rec'd 3.4'
	48	SH				lost 0.5' left 1.2'
	49				Box No 1	MD. 48.9
309.9	54.0				49.9	
	51					
	52				Box No 2	
306.5	53.5			100%	53.5	Run #2 Cut 10.3' Rec'd 11.5'
	54					Gain 1.2'
	55				Box No 3	Core stuck in barrel 49.9 to 60.4 soften
	56					by exposure to water and left in barrel over week end. Had to be removed cut - barrel badly broken
302.9	57.6		twisted 49.9 to 60.4 m.h.		57.1	
	58		SHALE bl-gr. m.h.		Box No 4	
	59					
299.6	60.4		Bottom of Hole			Measured Depth 60.4

CONTR. NO. DACW27-78-C0076

Hole No. C-9

DRILLING LOG	DIVISION CONSTRUCTION	INSTALLATION ORICD	SHEET OF 1 SHEETS
PROJECT EVANSVILLE FLOOD PROTECTION DELAWARE STREET PUMP PLANT		10. SIZE AND TYPE OF BIT 6" BY 6 7/8"	
1. LOCATION (Coordinates or Station)		11. DAY USE FOR ELEVATION SHOWN (TBM or B.M.) M.S.L.	
2. DRILLING AGENCY J. E. HOSKINS DRILLING INC.		12. MANUFACTURER'S DESIGNATION OF DRILL PORTADRILL 529 J	
3. HOLE NO. (As shown on drawing title and B.S. number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED N/A UNDISTURBED N/A	
4. NAME OF DRILLER MIKE SCHUBERT		14. TOTAL NUMBER CORE BOXES 3	
5. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN 44.8'		16. DATE HOLE STARTED 6 NOV 78 COMPLETED 6 NOV 78	
8. DEPTH DRILLED INTO ROCK 15.6'		17. ELEVATION TOP OF HOLE 359.6	
9. TOTAL DEPTH OF HOLE 60.4'		18. TOTAL CORE RECOVERY FOR BORING 97	
		19. SIGNATURE OF INSPECTOR Signed by Loren A. Christian	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
359.6	0.0		Top Casing			
			OUB			
319.8	44.8		Top of Rock			
		SH	Clayey SHALE, bl-gr m.h.	105%		Loss attributed to SPIV @ top of run.
	46.0		pa @ 313.6			Cut 5.0'
	46.2		hi L jt. 313.6 to 313.3			Rec'd 2.6'
	47.0		pa @ 312.6			Loss 0.4'
			concr. 20.311.4 to 311.3			Left 2.0'
	48.0		pa @ 308.6			M.D. 47.8
	49.0		solid core 308.6 to 304.3/concr incl. on 1/2" centers		Box 1	
309.3	50.0		pa @ 304.3, 304.2,		58.3	T.D. 49.8
	51.0					
	52.0					
	53				Box 2	
	54					
	55					
303.9	55.3				55.3	
303.9	55.7		1/4" soft clay coated low			
303.8	55.8		L pa @ 303.9 to 303.8			
	56		pa @ 301.7			
	56		500 gra. size concr. incl. 302.6 to 300.6			
	57					
	58				Box 3	
	59					
300.3	59		SOFT CLAY PLASTIC			
300.2						
300.2	60					M.D. 60.4

DACW 27-78-C-0076

Hole No. C-10

<b>DRILLING LOG</b>		DIVISION <b>CONSTRUCTION</b>		INSTALLATION <b>ORLCD</b>		SHEET <b>1</b> OF <b>1</b> SHEETS	
PROJECT <b>EVANSVILLE FLOOD PROTECTION DELAWARE STREET PUMP PLANT</b>				10. SIZE AND TYPE OF BIT <b>6" BY 6 1/2"</b>			
LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION BROWN (FEET or MSL) <b>MSL</b>			
DRILLING AGENCY <b>J. E. HOSKINS DRILLING INC.</b>				12. MANUFACTURER'S DESIGNATION OF DRILL <b>PORTADRILL Model 1524T</b>			
1. HOLE NO. (As shown on drawing title and log number)				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		UNDISTURBED	
2. NAME OF DRILLER <b>MIKE SCHUBERT</b>				14. TOTAL NUMBER CORE BOXES <b>3</b>		15. ELEVATION GROUND WATER	
3. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE STARTED <b>9 NOV. 78</b> COMPLETED <b>9 NOV. 78</b>		17. ELEVATION TOP OF HOLE <b>300.1</b>	
7. THICKNESS OF OVERBURDEN <b>45.4</b>				18. TOTAL CORE RECOVERY FOR BORING <b>97</b>			
8. DEPTH DRILLED INTO ROCK <b>15.5</b>				19. SIGNATURE OF INSPECTOR <i>Lois A. Christian</i>			
9. TOTAL DEPTH OF HOLE <b>60.9'</b>							

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water flow, depth of casing, etc., if significant)
360.1	0.0		00B			
314.7	45.4		Top of Rock			Set 8" casing
	46	SH	CLAYEY SHALE, bl-gr. m.h.	100%		ending dip 150 from 314.7 to 310.6
	47		concr. nod. 313.3 to 313.2		Box NO 1	Cut 5.0'
312.3	48		ti. pn. thr core 312.4 to 312.1			Rec'd 3.6'
	48		ti. pn. thr. core 312.1 to 312.0			1.4'
311.5	49		v. frac open 312.4 to 312.1 (Appears water has been moving thr. rock)			Lost 0.5'
	49.5		bding pac's are dipping 15° from 314.7 to 310.6			Left 0.9'
310.6	50		core stuck in barrel 310.6 to 306.2. unable to determine mechanical condition of core from 310.6 to 306.2	100%		M.D. 49.5
	51	Highly crumbly mech.			51.1	C.D. 50.4
	52					After 2.5 hours of work in trying to remove core from barrel 49.5 to 53.9 barrel was taken to shop and heated to remove core.
	53					at 13.5
306.5	54		v. frac. ti. 306.2 to 305.5		70%	Inc 11.4
306.2	54		hor. pac @ 305.5		2	Gain 0.9'
305.5	54.6		304.7			
	55		303.7			
	56		302.8			
	56		302.6		56.4	
	57		301.6			
	57		301.1			
	58		299.5			
	58		303.5		100%	
	59		302.7		3	
	59		302.1			
	59		301.5			
	60		301.0			
	60		300.4			
	60		299.8			
299.2	61.9		Bottom of Hole			M.D.
						Hole grouted to 330 on 9 Nov. 78

DMG FORM 1836 MAR 71

PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT  
EVANSVILLE FLOOD PROTECTION

HOLE NO. C-10

Appendix VI

Caissons

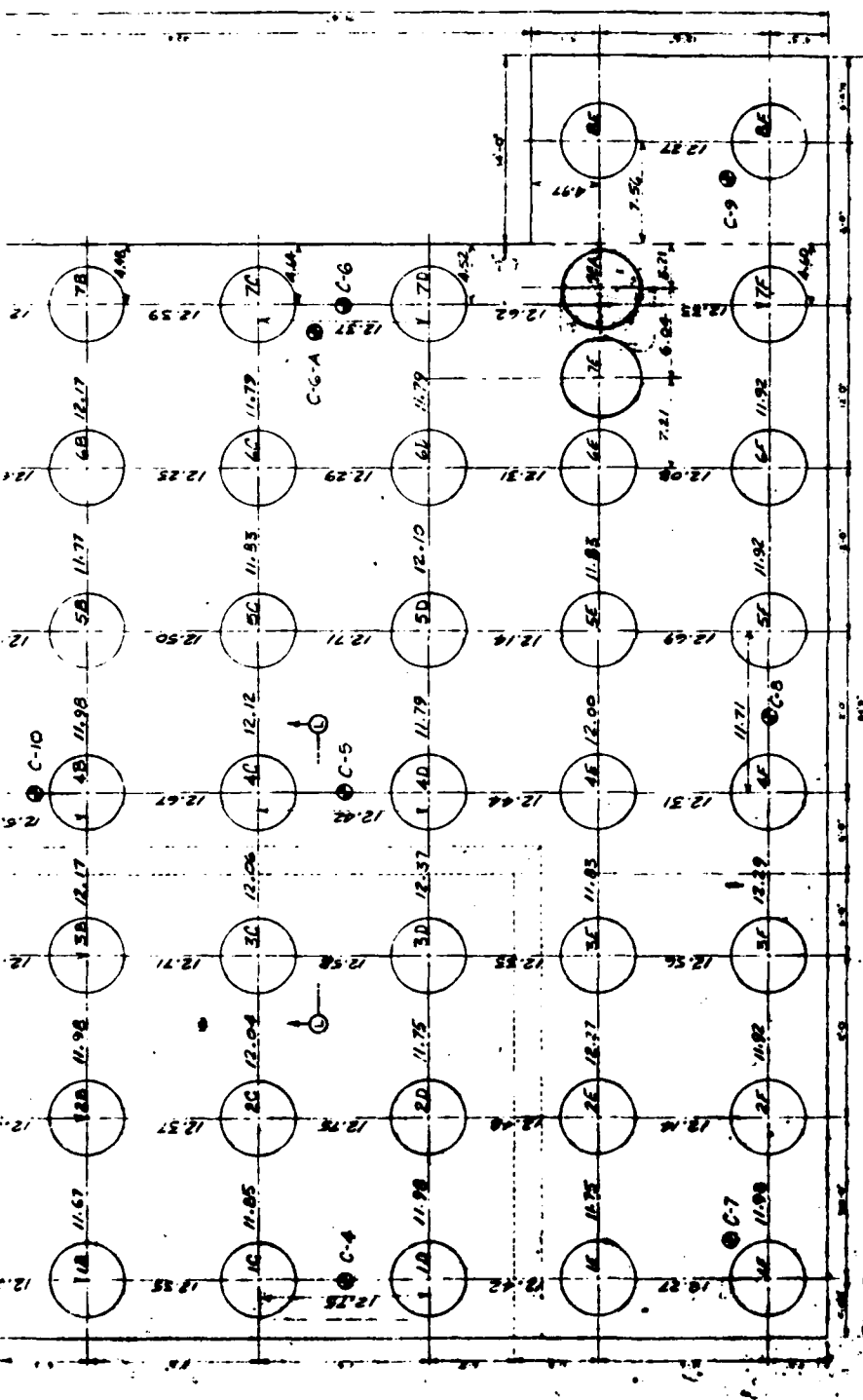
Delaware Street

Pump Station

# CAISSON FIELD REPORT

Casing No.	Date	Elev. Top	Elev. Bot.	Shaft Dia.	Offset	Plumb	Penetr. Resist.	Total Depth	Conc. Strength	Casing	Recess Elev.	
1	F-8	6-18-79	331.0	312.07	5'-6"	4 3/4" W 3 3/4" S	3/4" W 1" S	2.7	19.0	4108	66" x 19'	314.7
2	F-4	6-26-79	330.59	311.34	5'-6"	5" N	O.K.	3.0	19.25	3206	66" x 19'	315.0
3	E-8	6-28-79	330.3	311.20	5'-6"	6" W	O.K. 2" N	3.0	19.0	3418	66" x 19'	315.0
4	F-2	8-16-79	331.0	312.09	5'-6"	3" W	1 1/2" W 1" N	2.6	18.92	4091	66" x 19'	314.7
5	D-1	8-20-79	330.0	311.77	5'-6"	2" N	1 1/2" W 1" N	2.5	18.25	3964	66" x 17'	314.7
6	D-3	8-24-79	330.89	311.52	5'-6"	1" W	1 1/2" W 2" N	3.1	18.5	4354	66" x 17'	314.7
7	B-7	8-27-79	331.9	311.54	5'-6"	1 1/2" W	1 1/2" W 1" N	3.5	19.0	3778	66" x 19'	315.1
8	B-5	8-28-79	330.0	311.0	5'-6"	2 1/2" W	1" W 1 1/2" N	4.0	19.0	3572	66" x 19'	315.0
9	A-5	8-30-79	331.0	311.0	5'-6"	2 1/4" W	1" W 1 1/2" N	4.2	19.0	4690	66" x 19'	315.2
10	A-7	8-30-79	331.0	312.0	5'-6"	1 1/2" W	O.K. 1" N	2.8	19.0	4690	66" x 19'	314.7
11	A-3	8-31-79	331.0	303.73	5'-6"	1" W	1 1/2" W 1/2" N	11.0	17.0	3773	66" x 17'	314.9
12	A-1	9-4-79	331.0	311.24	5'-6"	1" N	2" W	3.5	17.0	3816	66" x 17'	314.8
13	A-6	9-4-79	331.0	311.28	5'-6"	1" W	O.K. 1/2" N	3.7	19.7	4050	66" x 19'	315.1
14	A-4	9-5-79	331.0	312.0	5'-6"	2" W	1/2" W 1" N	3.0	19.0	4516	66" x 19'	315.0
15	F-7	9-6-79	329.0	309.74	5'-6"	1 1/2" W	1 1/2" W 1 1/2" N	5.1	19.25	4605	66" x 19'	314.8
16	D-5	9-7-79	331.0	311.61	5'-6"	1 1/2" W	1 1/2" W 1 1/2" N	3.1	19.5	6076	66" x 19'	314.7
17	A-2	9-7-79	331.0	303.22	5'-6"	1 1/2" W 1 1/2" S	1 1/2" N	11.0	22.9	6076	66" x 19'	314.8
18	B-6	9-10-79	331.0	310.61	5'-6"	2" E	1/2" W	4.4	19.4	4315	66" x 19'	315.0
19	B-4	9-11-79	331.0	304.87	5'-6"	2" N	O.K.	9.83	26.2	4439	66" x 19'	314.7
20	F-5	9-11-79	331.0	311.6	5'-6"	1 1/2" W	O.K.	3.1	19.0	5005	66" x 19'	314.7
21	B-2	9-12-79	330.0	311.6	5'-6"	1" N 1 1/2" W	1 1/2" N 1 1/2" W	3.4	18.5	5005	66" x 17'	314.8
22	D-2	9-13-79	330.0	311.28	5'-6"	2" W	1 1/2" N	3.1	18.75	4692	66" x 17'	314.4
23	E-7	9-13-79	331.0	311.64	5'-6"	4" N	1 1/2" W	3.1	20.25	4616	66" x 19'	314.7
24	B-5	9-17-79	331.0	311.04	5'-6"	1" E	1" N 2" E	3.7	20.0	4828	66" x 19'	314.7
25	E-1	9-18-79	331.0	311.03	5'-6"	1 1/2" N 1" W	2" W	3.7	20.0	5005	66" x 19'	314.7





PLAN-CASSON  
 11/1/54

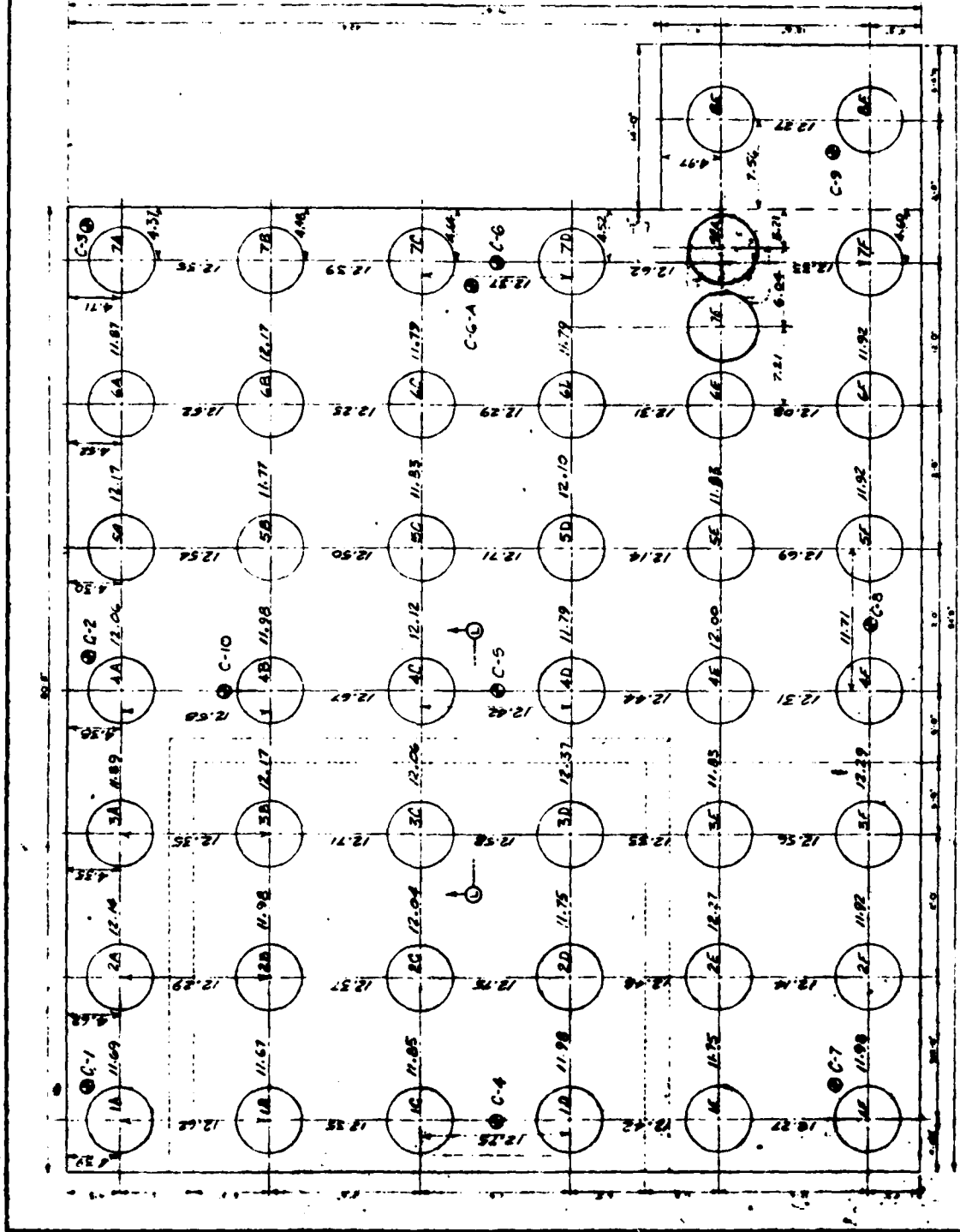
● CORE BORING LOCATIONS

NOTE: CRISSON 76-A MARKED  
 BECAUSE HE DRILLED IN  
 WRONG LOCATION.

75



COPIES OF SHEETS

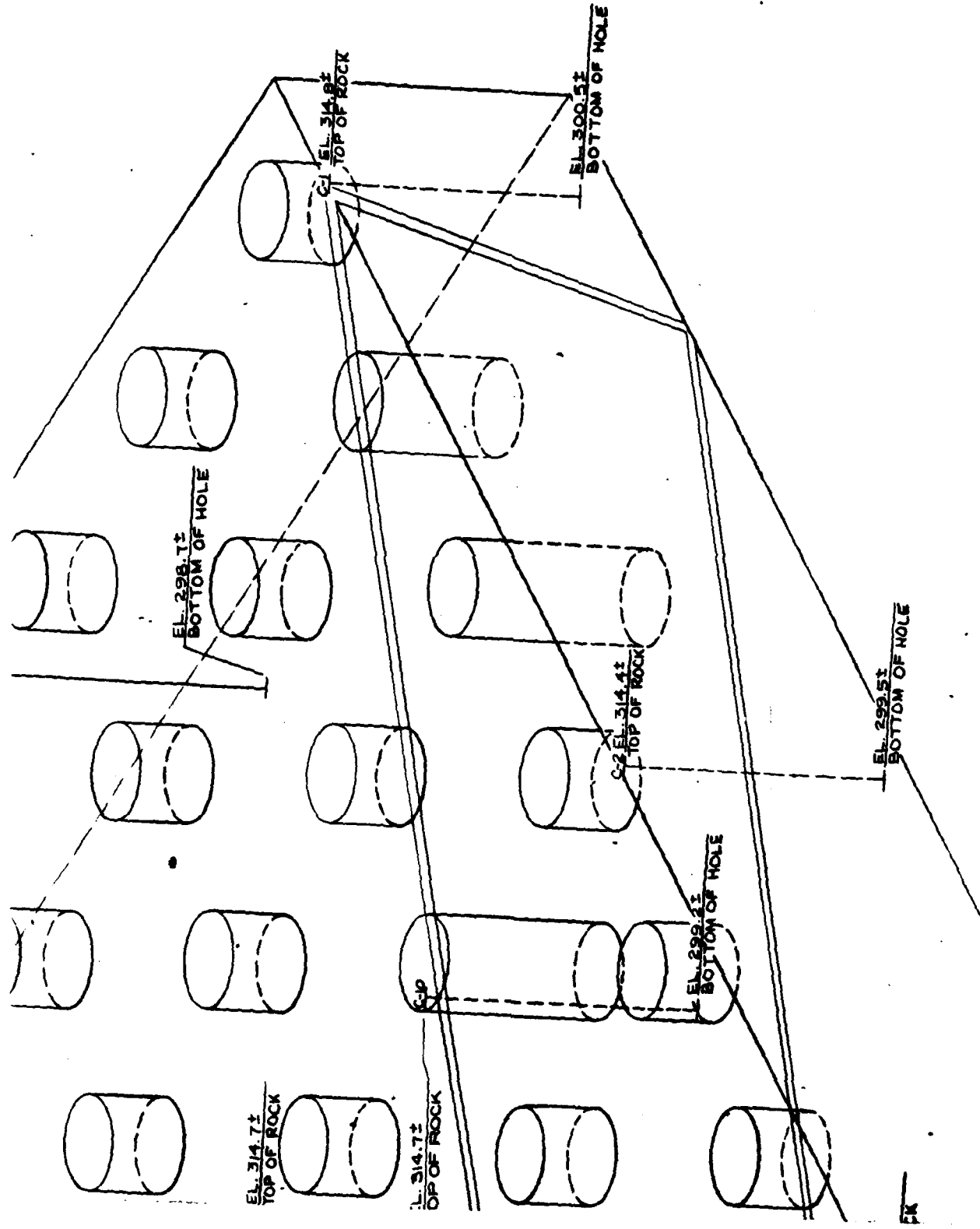


EL. 299.51  
BOTTOM OF HOLE

REVISION	DATE	DESCRIPTION	BY	APP'D.

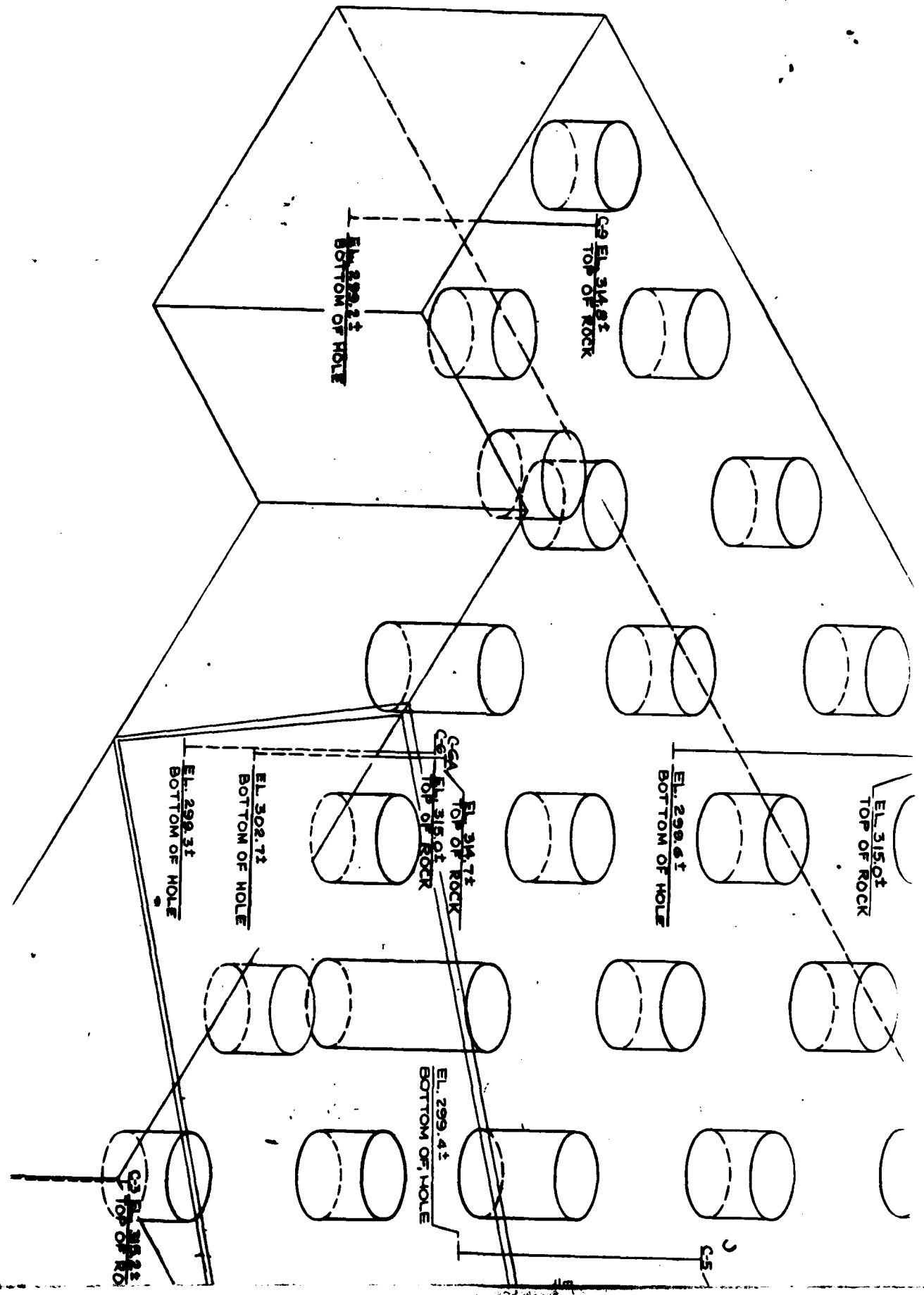
**U. S. ARMY ENGINEER DISTRICT, LOUISVILLE**  
**CORPS OF ENGINEERS**  
**LOUISVILLE, KENTUCKY**

DESIGNED	
DRAWN	
I. BECKHAM	
CHECKED	
SUBMITTED	
SCALE 1" = 50'	
DATE 29 JANUARY, 1962	
DRAWING NUMBER	



FK

C



EL. 315.04  
TOP OF ROCK

EL. 299.61  
BOTTOM OF HOLE

EL. 314.74  
TOP OF ROCK  
C-6  
EL. 315.04  
TOP OF ROCK

EL. 302.72  
BOTTOM OF HOLE  
EL. 299.31  
BOTTOM OF HOLE

EL. 299.41  
BOTTOM OF HOLE

C-9  
EL. 314.81  
TOP OF ROCK

C-9  
EL. 314.81  
TOP OF ROCK

EL. 299.21  
BOTTOM OF HOLE

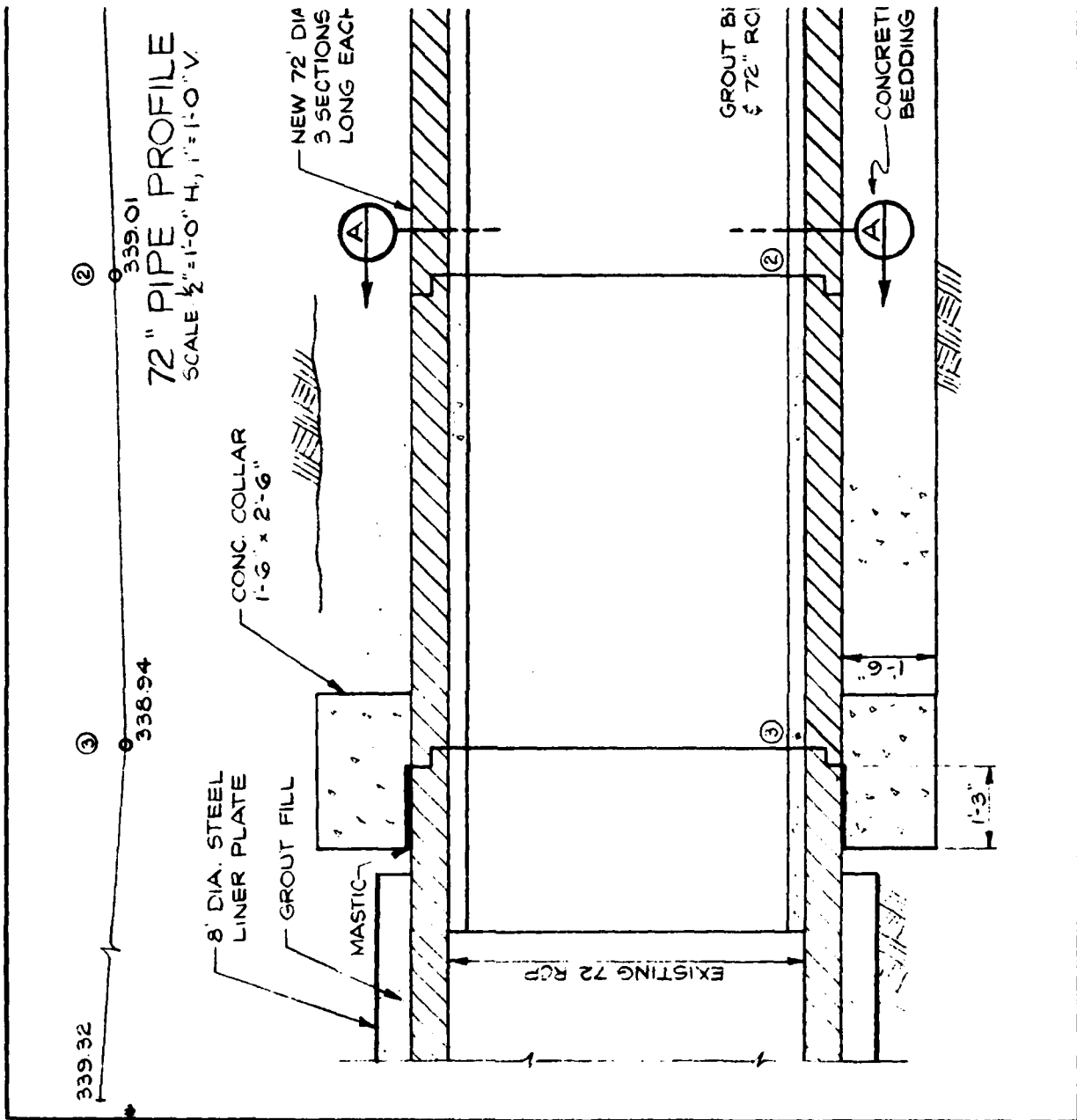
C-5

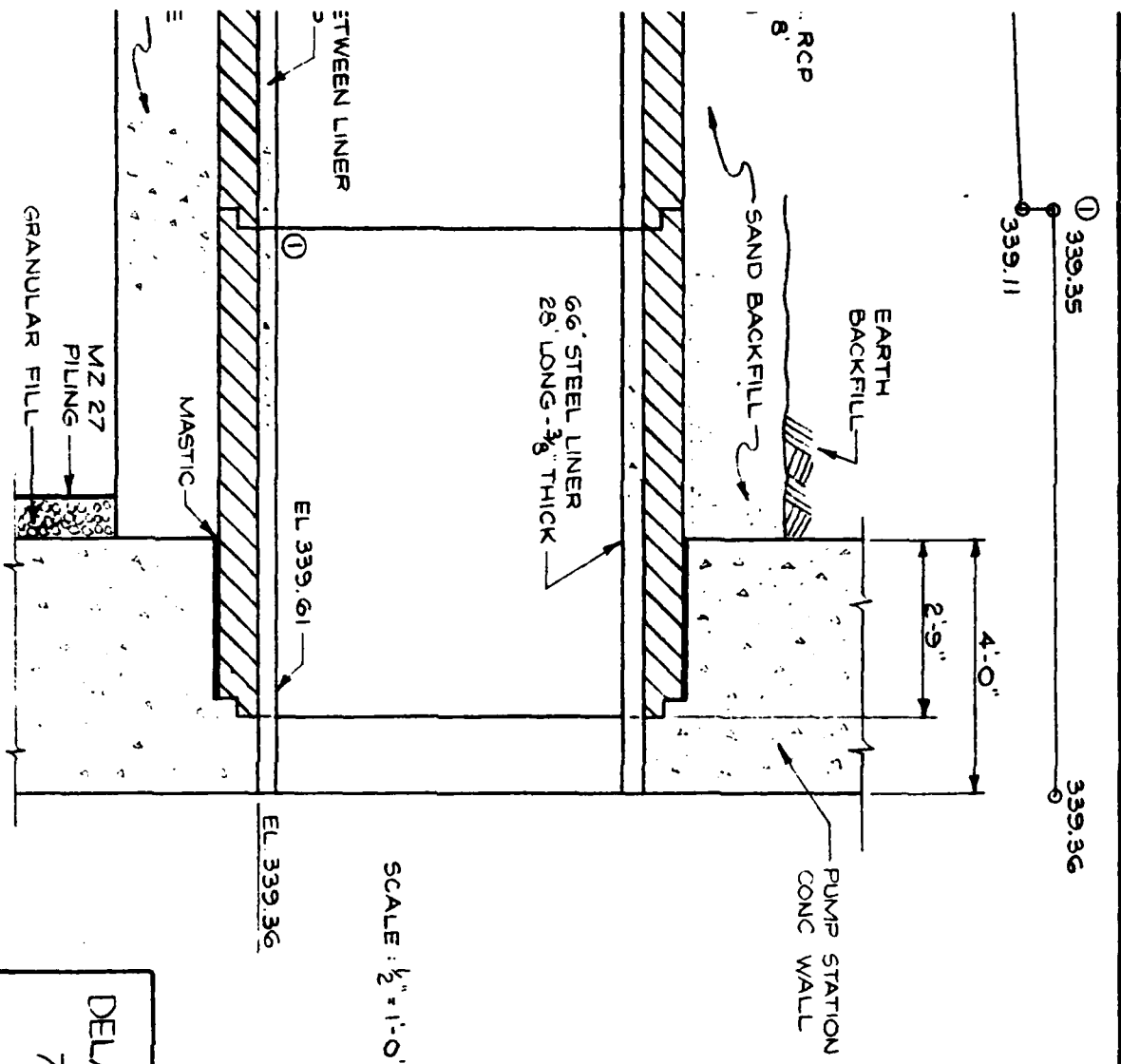
Appendix VII

72" R.C.P. Influent

Delaware Street

Pump Station

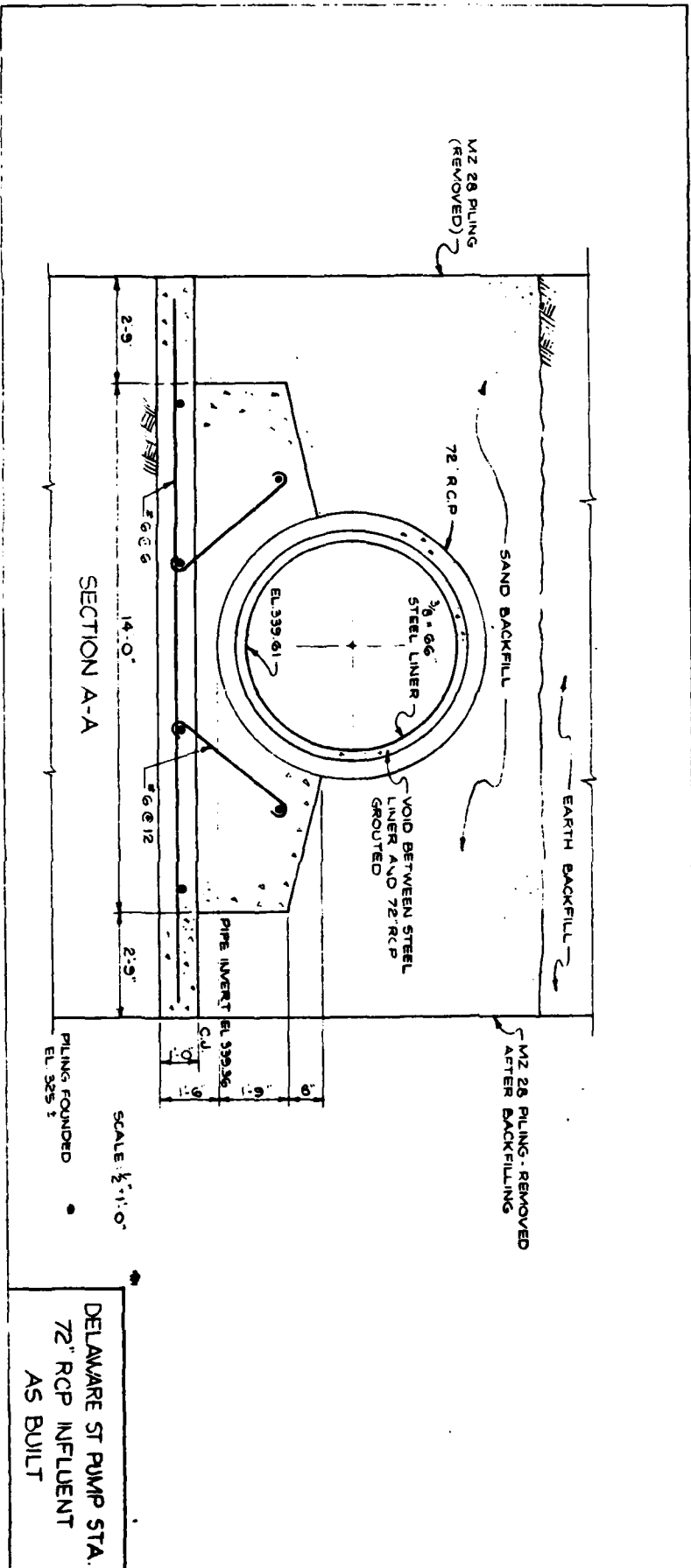




SCALE: 1/2" = 1'-0"

DELAWARE ST PUMP STA  
72" RCP INFLUENT  
AS BUILT

7-11-00



DELAWARE ST PUMP STA.  
72" RCP INFLUENT  
AS BUILT

7/1/11

ATE  
LME  
-8