October 2016

Dynegy Midwest Generation, LLC
10901 Baldwin Road
Baldwin, IL 62217

RE: History of Construction
USEPA Final CCR Rule, 40 CFR § 257.73(c)
Baldwin Energy Complex
Baldwin, Illinois

On behalf of Dynegy Midwest Generation, LLC, AECOM has prepared the following history of construction for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond at the Baldwin Energy Complex in accordance with 40 CFR § 257.73(c).

BACKGROUND

40 CFR § 257.73(c)(1) requires the owner or operator of an existing coal combustion residual (CCR) surface impoundment that either (1) has a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) has a height of 20 feet or more to compile a history of construction by October 17, 2016 that contains, to the extent feasible, the information specified in 40 CFR § 257.73(c)(1)(i)–(xii).

The history of construction presented herein was compiled based on existing documentation, to the extent that it is reasonably and readily available (see 80 Fed. Reg. 21302, 21380 [April 17, 2015]) and AECOM site experience. AECOM's document review included construction drawings, geotechnical investigations, observation reports, instrument monitoring reports, construction specifications, operation and maintenance information, etc. for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond at the Baldwin Energy Complex.

HISTORY OF CONSTRUCTION

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

Owner:	Dynegy Midwest Generation, LLC
Address:	1500 Eastport Plaza Drive Collinsville, IL 62234
CCR Units:	Old East Fly Ash Pond East Fly Ash Pond West Fly Ash Pond Bottom Ash Pond

The above named CCR units do not have a state assigned identification number.

§ 257.73(c)(1)(ii): The location of the CCR unit identified on the most recent USGS 7$^{1}/_{2}$ or 15 minute topographic quadrangle map or a topographic map of equivalent scale if a USGS map is not available.

The locations of the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond have been identified on an USGS 7-1/2 minute topographic quadrangle map in **Appendix A**.

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

The following captures the purpose of each CCR unit:

- The Old East Fly Ash Pond (inactive) was used to store and dispose of fly ash.
- The East Fly Ash Pond (inactive) was used to store and dispose of fly ash.
- The West Fly Ash Pond is being used to store and dispose of dry-stacked fly ash and to clarify CCR contact stormwater prior to discharge in accordance with the station's NPDES permit.
- The Bottom Ash Pond is being used to store and dispose of sluiced bottom ash, with bottom ash mined for beneficial use, to temporarily store spray dry absorption (SDA) waste, and to clarify plant process water, including other non-CCR station process wastewaters, prior to discharge in accordance with the station's NPDES permit.

Notice of intent to close the Old East Fly Ash Pond and East Fly Ash Pond was provided in November, 2015. Notice of intent to close the West Fly Ash Pond was provided in October, 2016.[1]

[1] This history of construction report was prepared on a facility-wide basis for CCR surface impoundments at the Baldwin Energy Complex. The inclusion of the Old East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond in this history of construction report does not concede and should not be construed to concede that the Old

AECOM

§ 257.73(c)(1)(iv): The name and size in acres of the watershed where the CCR unit is located.

The Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are located at the northern edge of the Baldwin Lake-Kaskaskia River Watershed with a 12-digit Hydrologic Unit Code (HUC) of 071402040908 and a drainage area of 17,034 acres. The Baldwin Lake-Kaskaskia River Watershed is located within the Kaskaskia River Watershed (HUC: 0714020409) (USGS, 2016).

§ 257.73(c)(1)(v): A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

Physical properties of the foundation materials for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are described from top to bottom in this paragraph. The area encompassing the ash ponds is immediately to the east of the alluvial plain of the Kaskaskia River. The uppermost material is a 5 to 10-foot-thick layer of loess described as low to medium plastic silty clay. The loess is underlain by a 5 to 20-foot thick zone of glacio-lacustrine and glacial till soils. The upper portion of the zone is typically glacio-lacustrine, a stiff to very stiff, low to medium plastic clay with occasional sand and silt zones. This grades downward to glacial till which is a very stiff to hard, medium plastic clay with varying amounts of sand and gravel. Within the glacial till random pockets of sand and gravel were encountered. The glacial till is underlain by a layer of either moderate to highly weathered limestone or a very stiff to hard, high plastic residual clay (decomposed shale). Bedrock exists below the till or residual clay and consists primarily of weathered clay shale with interbedded limestone.

An alluvium layer of low-strength silt/clay mixture with trace sand and organics (creek deposit) was found at the southern end of the West Fly Ash Pond, which lies on a former creek channel. A layer of sand was found under the northern embankment of the West Fly Ash Pond and East Fly Ash Pond and in the northern portion of the Bottom Ash Pond. An available summary of the engineering properties of the foundation materials is presented in **Table 1** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 1. Summary of Foundation and Abutment Material Engineering Properties

Material	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
Alluvium	115	100	28	1,500	0
Loess	120	100	28	1,500	0
Glacio-lacustrine/Till	120	1,000	20	2,000	0
Residual Clay	120	100	28	2,000	0
Shale	125	1,000	28	4000	0

East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond are subject to the Design Criteria or all Operating Criteria in the CCR Rule.

The abutment materials for the Bottom Ash Pond consist of recompacted loess. Physical properties of the loess are described as low to medium plastic silty clay. The Old East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond are enclosed impoundments with dikes and do not have abutments. An available summary of the engineering properties of the abutment materials is presented in **Table 1** above.

§ 257.73(c)(1)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The physical properties of the materials used for initial embankment construction and embankment raise construction (where applicable) of the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond generally consist of low to medium plastic clay and silty clay with zones of high plastic clay (typically recompacted loess). An available summary of the engineering properties of the construction materials is presented in **Table 2** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 2. Summary of Construction Material Engineering Properties

Material Description	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
1969 Dike Construction	115	100	28	1,500	0
1989 Dike Construction	115	100	28	2,000	0

Site preparation and construction of the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond were completed in accordance with the applicable construction specification (see §257.73(c)(1)(xi) below for corresponding construction specifications).

The approximate dates of construction of each successive stage of construction of the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are provided in **Table 3** below.

Table 3. Approximate dates of construction of each successive stage of construction.

Date	Event
1969	Construction of Old East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond external perimeter embankment
1979	Construction of East Fly Ash Pond and West Fly Ash Pond northern embankment
1989	Inboard perimeter raise of the entire East Fly Ash Pond and West Fly Ash Pond
1995	Construction of interior dike between the East Fly Ash Pond and West Fly Ash Pond
1999	Raise of interior dike between the East Fly Ash Pond and West Fly Ash Pond; replacement of outlet pipe from the West Fly Ash Pond to the Secondary Pond
2012	Modification of Bottom Ash Pond embankment (original construction date unknown)

§ 257.73(c)(1)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Drawings that contain items pertaining to the requested information for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are listed in **Table 4** below. Items marked as "Not Available" are items not found during a review of the reasonably and readily available record documentation.

Table 4. List of drawings containing items pertaining to the information requested in § 257.73(c)(1)(vii).

	Old East Fly Ash Pond	East Fly Ash Pond	West Fly Ash Pond	Bottom Ash Pond
Dimensional plan view (all zones)	E-BAL1-B39	E-BAL1-B38, E-BAL1-C119	E-BAL1-B38, E-BAL1-C119	BAL1-C1033
Dimensional cross sections	E-BAL1-B39	E-BAL1-B38, CE-BAL1-B1488	E-BAL1-B38, CE-BAL1-B1488	BAL1-C1035
Foundation Improvements	E-BAL1-B39	E-BAL1-B38	E-BAL1-B38	BAL1-C1035
Drainage Provisions	Not Applicable	Not Applicable	E-BAL1-M1077-1	BAL1-C1033
Spillways and Outlets	Not Applicable	E-BAL1-C120, E-BAL1-C122	E-BAL1-C127	BAL1-C1033, BAL1-C1035, BAL1-C1038
Diversion Ditches	E-BAL1-B39	E-BAL1-B38	E-BAL1-B38	BAL1-C1033, BAL1-C1037
Instrument Locations	Figure 2	Figure 2	Figure 2	Figure 2
Slope Protection	E-BAL1-B39	E-BAL1-B38	E-BAL1-B38	BAL1-C1034, BAL1-C1036
Normal Operating Pool Elevation	Not Available	Not Available	Not Available	BAL1-C1035
Maximum Pool Elevation	Not Available	Not Available	Not Available	BAL1-C1035
Approximate Maximum Depth of CCR in 2016	23 feet	44 feet	21 feet	43 feet

All drawings referenced in **Table 4** above can be found in **Appendix B** and **Appendix C**.

Based on the review of the drawings listed above, no natural or manmade features that could adversely affect operation of these CCR units due to malfunction or mis-operation were identified.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Existing instrumentation consists of slope inclinometers and vibrating-wire piezometers installed within the southern embankment of the West Fly Ash Pond near the location of the 1995 slope movement (see § 257.73(c)(1)(xii) below). Additional vibrating-wire piezometers were later installed in 2015 throughout the Old East Fly Ash Pond, East Fly Ash Pond, and

Bottom Ash Pond. The purpose of the slope inclinometers is to measure subsurface movements and deformations. The purpose of the piezometers is to measure the pore water pressures within the embankment. There are two (2) existing slope inclinometers and eighteen (18) existing piezometers within the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond. A location map of the existing instrumentation is presented in **Appendix C**.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

The area-capacity curves for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are presented in **Figures 1** to **3** below. "Area-capacity curves", as defined by 40 CFR § 257.53, "means graphic curves which readily show the reservoir water surface area, in acres, at different elevations from the bottom of the reservoir to the maximum water surface, and the capacity or volume, in acre-feet, of the water contained in the reservoir at various elevations."

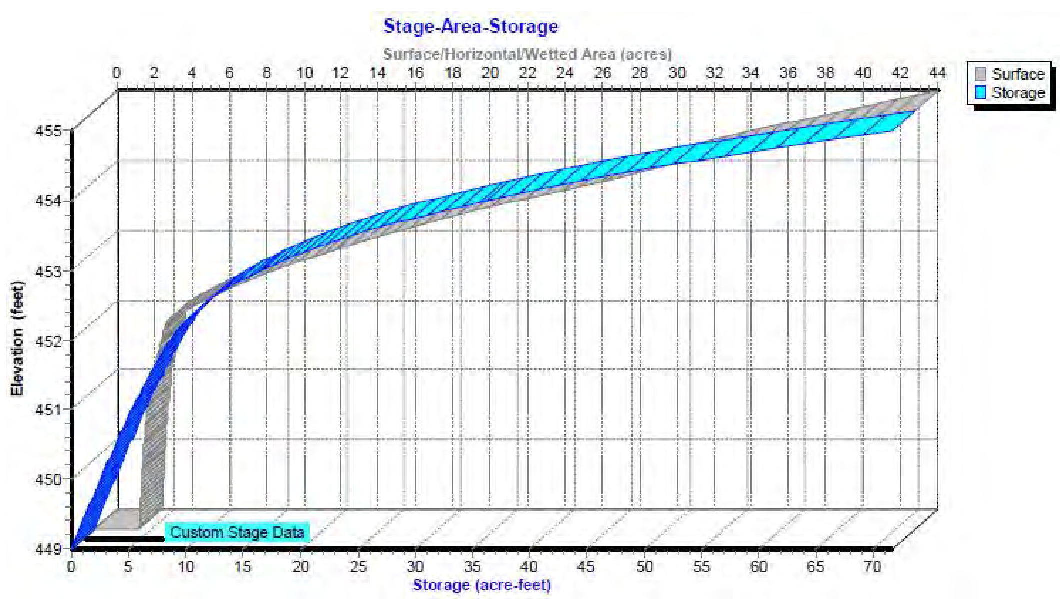


Figure 1. Area-capacity curve for the Old East Fly Ash Pond and East Fly Ash Pond

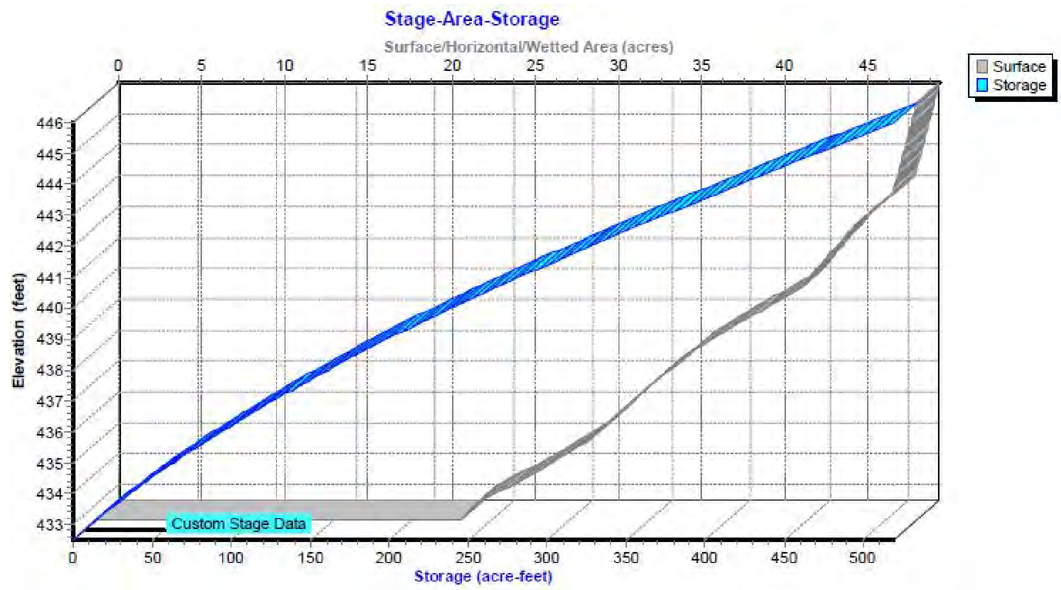


Figure 2. Area-capacity curve for West Fly Ash Pond

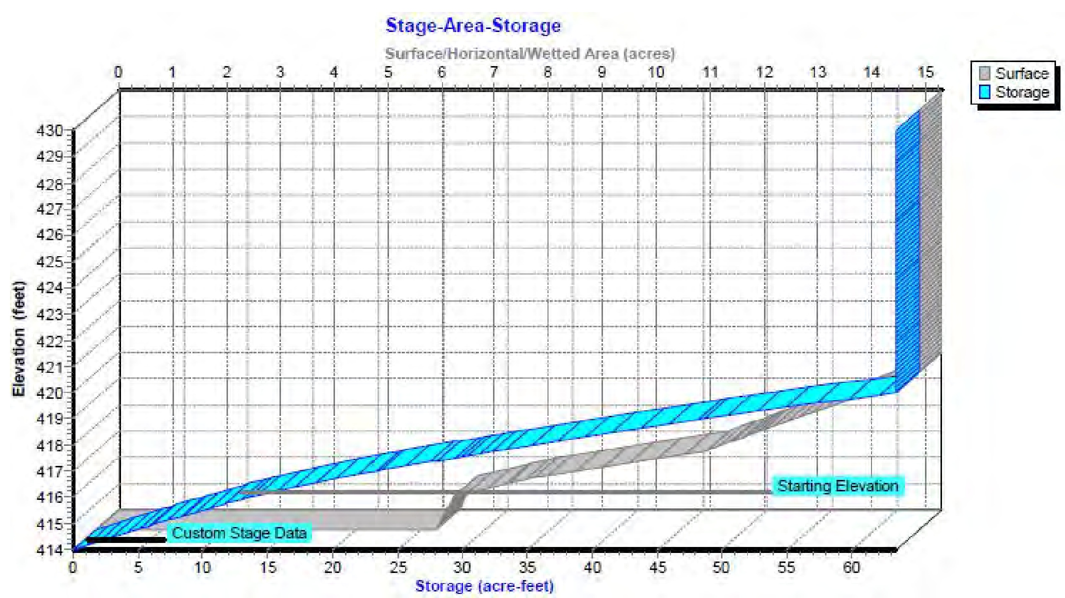


Figure 3. Area-capacity curve for Bottom Ash Pond

The area-capacity curves shown were taken from the pond modeling analysis. Actual pond capacity is limited to the approximate berm elevation listed in **Table 3** below. Any information above berm elevation should be disregarded.

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

Stormwater flow from the Old East Fly Ash Pond and East Fly Ash Pond is controlled by a series of five (5) 12-inch diameter (dia.) ductile iron pipe (DIP) risers and is diverted into the

West Fly Ash Pond. The separator dike in between the East Fly Ash Pond and the West Fly Ash Pond also contains an overflow emergency spillway armored with rip rap with an approximate invert at El. 453 feet. Unless otherwise mentioned, all elevations listed in the report are in the NAVD88 datum.

The West Fly Ash Pond contains a 36-inch dia. DIP culvert that discharges into the Secondary Pond. However, the inlet elevation of 432.5 feet is above the normal pool elevation of 424.3 feet; therefore, the pipe acts as an overflow spillway during heavy rain events. During normal operations, water from the West Fly Ash Pond is pumped through a 10-inch dia. high-density polyethylene (HDPE) pipe into the Bottom Ash Pond.

The Bottom Ash Pond contains a drop inlet spillway that discharges to the Secondary Pond via a 30-inch dia. HDPE pipe. The Bottom Ash Pond also contains a pumping station that discharges into the Cooling Pond via two 18-inch dia. HDPE pipes during heavy rain events. The pumping station consists of four pumps, two of which turn on at El. 417.4 feet and two which turn on at El. 417.6 feet. The pumps turn off again when the water level in the impoundment drops to El. 417.2 feet. In 2016 the discharge capacity of the Bottom Ash Pond was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. The model results indicates that the Bottom Ash Pond emergency spillway will activate during the 1,000-year, 24-hour storm event. The results of the HydroCAD 10 analysis are presented below in **Table 5**.

Table 5. Results of HydroCAD 10 analysis

	Bottom Ash Pond
Approximate Minimum Berm Elevation[1] (ft)	419.0
Approximate Emergency Spillway Elevation[1] (ft)	417.7
Starting Pool Elevation[1] (ft)	415.8
Peak Elevation[1] (ft)	418.7
Time to Peak (hr)	16.8
Surface Area (ac)	13.7
Storage[2] (ac-ft)	32.7

Note: 1. Elevations are based on NAVD88 datum
2. Storage given is from Starting Pool Elevation to Peak Elevation.

§ 257.73(c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

The construction specification for the Old East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond are located in the document titled *Specification T-2226* (presented in **Appendix D**). As indicated on the construction drawings, the construction specification for the Bottom Ash Pond is located in the document titled *Specification H-3026*, but that document is not reasonably and readily available.

The provisions for surveillance, maintenance, and repair of the East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are available in *Baldwin Ash Pond; IDNR Dam Safety Operating and Maintenance Plan* (2013) (presented in **Appendix E**).

The operations and maintenance plans for the Old East Fly Ash Pond, East Fly Ash Pond, West Fly Ash Pond, and Bottom Ash Pond are currently being revised by Dynegy Midwest Generation, LLC. This section will be updated when the new operations and maintenance plans are available.

§ 257.73(c)(1)(xii): Any record or knowledge of structural instability of the CCR unit.

In February 1995, a slide occurred on the southern embankment of the West Fly Ash Pond. The slide was first observed as a 10-inch wide scarp which progressively grew larger. After discovering the slide, an investigation was performed by Woodward-Clyde Consultants, Inc. and the pond elevation was lowered. As a further preventive measure, approximately 600 linear feet of the southern embankment crest was removed to reduce the driving forces acting within the slide area. A separator dike was constructed in between the East Fly Ash Pond and West Fly Ash Pond to allow for normal operations of the East Fly Ash Pond and a lowered normal pool level in the West Fly Ash Pond. Following the remedial actions, slope inclinometer readings showed that subsurface movement was insignificant and it was concluded that the remedial actions were successful. The slope movement did not result in any known release of CCR material. The *Final Report of Geotechnical Investigation* by Woodward-Clyde Consultants, Inc. (1995) is presented in **Appendix F**.

A separate surficial slope movement occurred in 2011 on the northwest embankment of the West Fly Ash Pond. The soil movement was investigated by URS and was believed to be caused by recent heavy rains. The entire slide mass was removed and replacement material was compacted and graded to match the adjacent embankment slopes. Information about this event can be found in the 2011 letter by URS presented in **Appendix G**. A similar movement of surficial soil occurred in 2015 further east from the 2011 location and was repaired in the same fashion. Photos from the 2015 surficial movement are provided in **Appendix H**.

There is no record or knowledge of structural instability of the Old East Fly Ash Pond, East Fly Ash Pond, and Bottom Ash Pond at the Baldwin Energy Complex.

LIMITATIONS

The signature of AECOM's authorized representative on this document represents that to the best of AECOM's knowledge, information and belief in the exercise of its professional judgment, it is AECOM's professional opinion that the aforementioned information is accurate as of the date of such signature. Any recommendation, opinion or decisions by AECOM are made on the basis of AECOM's experience, qualifications and professional judgment and are not to be construed as warranties or guaranties. In addition, opinions relating to environmental, geologic, and geotechnical conditions or other estimates are based on available data and that actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Sincerely,

Claudia Prado
Project Manager

Victor Modeer, P.E., D.GE
Senior Project Manager

AECOM

REFERENCES

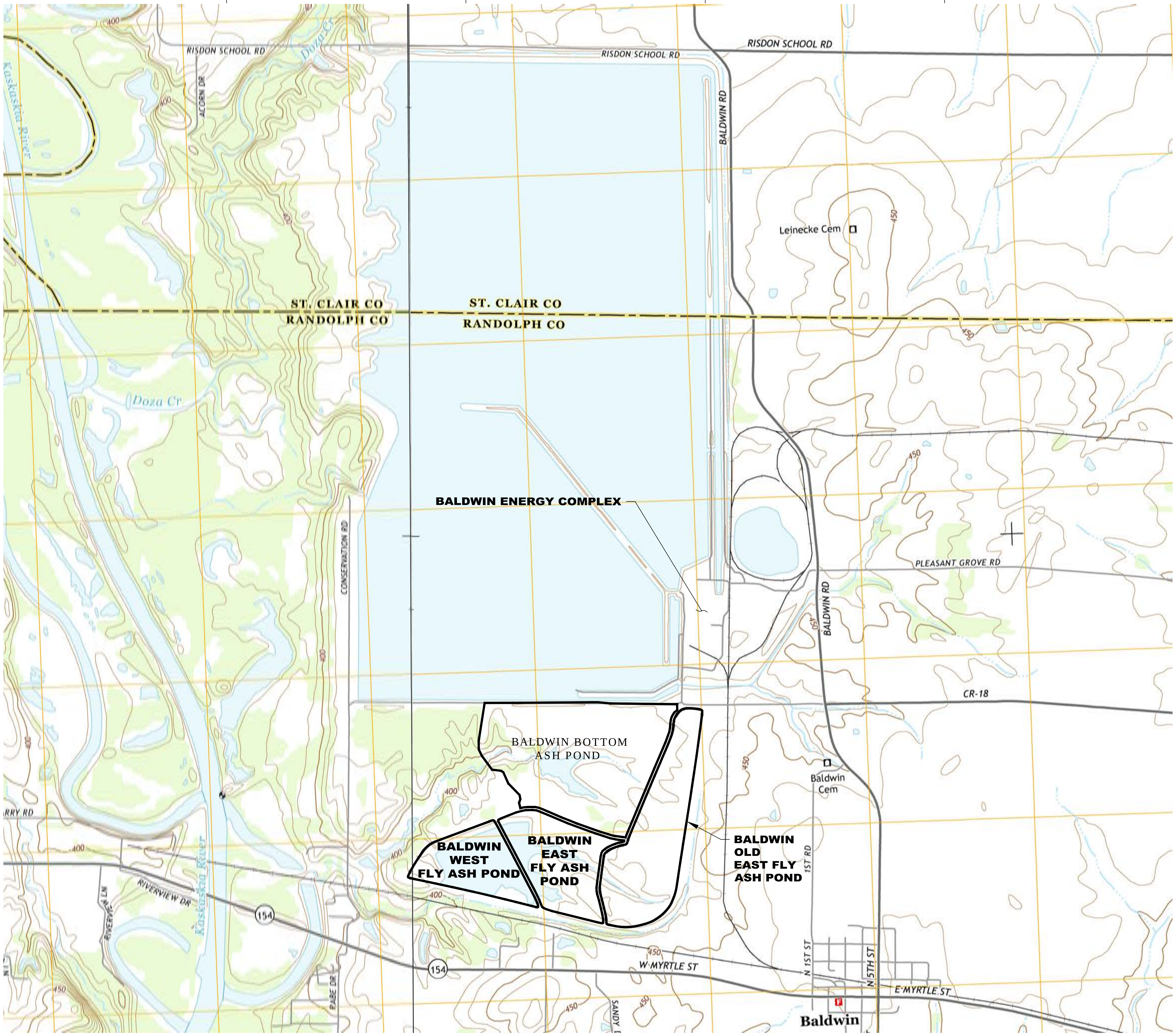
United States Environmental Protection Agency (USEPA). (2015). *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule.* 40 CFR Parts 257 and 261, 80 Fed. Reg. 21302, 21380 April 17, 2015.

United States Geological Survey (USGS). (2016). The National Map Viewer. http://viewer.nationalmap.gov/viewer/. USGS data first accessed in March of 2016.

APPENDICES

Appendix A: History of Construction Vicinity Map
Appendix B: Baldwin Energy Complex Drawings
Appendix C: Baldwin Energy Complex Piezometer and Inclinometer Locations
Appendix D: Specification T-2226
Appendix E: Baldwin Ash Pond; IDNR Dam Safety Operating and Maintenance Plan (2013)
Appendix F: Final Report of Geotechnical Investigation, Baldwin Power Station, Fly Ash Pond South Dike, Baldwin, Illinois, Woodward-Clyde Consultants, Inc. (1995)
Appendix G: Observation of Slope Movement at Fly Ash Pond, Baldwin Energy Complex, Baldwin, Illinois, URS (2011)
Appendix H: Photos from the 2015 surficial movement

Appendix A: History of Construction Vicinity Map



LEGEND

CCR UNITS

SOURCE:
MAP PROVIDED FROM ELECTRONIC USGS DIGITAL RASTER GRAPHIC 7.5 MINUTE TOPOGRAPHIC MAP OF RED BUD, ILLINOIS AND BALDWIN, ILLINOIS, REVISED 2015.

QUADRANGLE LOCATION

N

0 1000 2000 3000

SCALE IN FEET

AECOM
1001 Highlands Plaza Drive, Suite 300
St. Louis, Mo. 63110
314 429-0100 (phone)
314-429-0462 (fax)

Dynegy Midwest Generation, LLC
10901 Baldwin Road
Baldwin, IL 62217

HISTORY OF CONSTRUCTION

BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

ISSUED FOR BIDDING — DATE BY

ISSUED FOR CONSTRUCTION — DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
△		
△		
△		
△		
△		

AECOM PROJECT NO:	60489731
DRAWN BY:	DJD
DESIGNED BY:	DJD
CHECKED BY:	MN
DATE CREATED:	2016-04-13
PLOT DATE:	
SCALE:	1" = 1000'
ACAD VER:	2014

SHEET TITLE

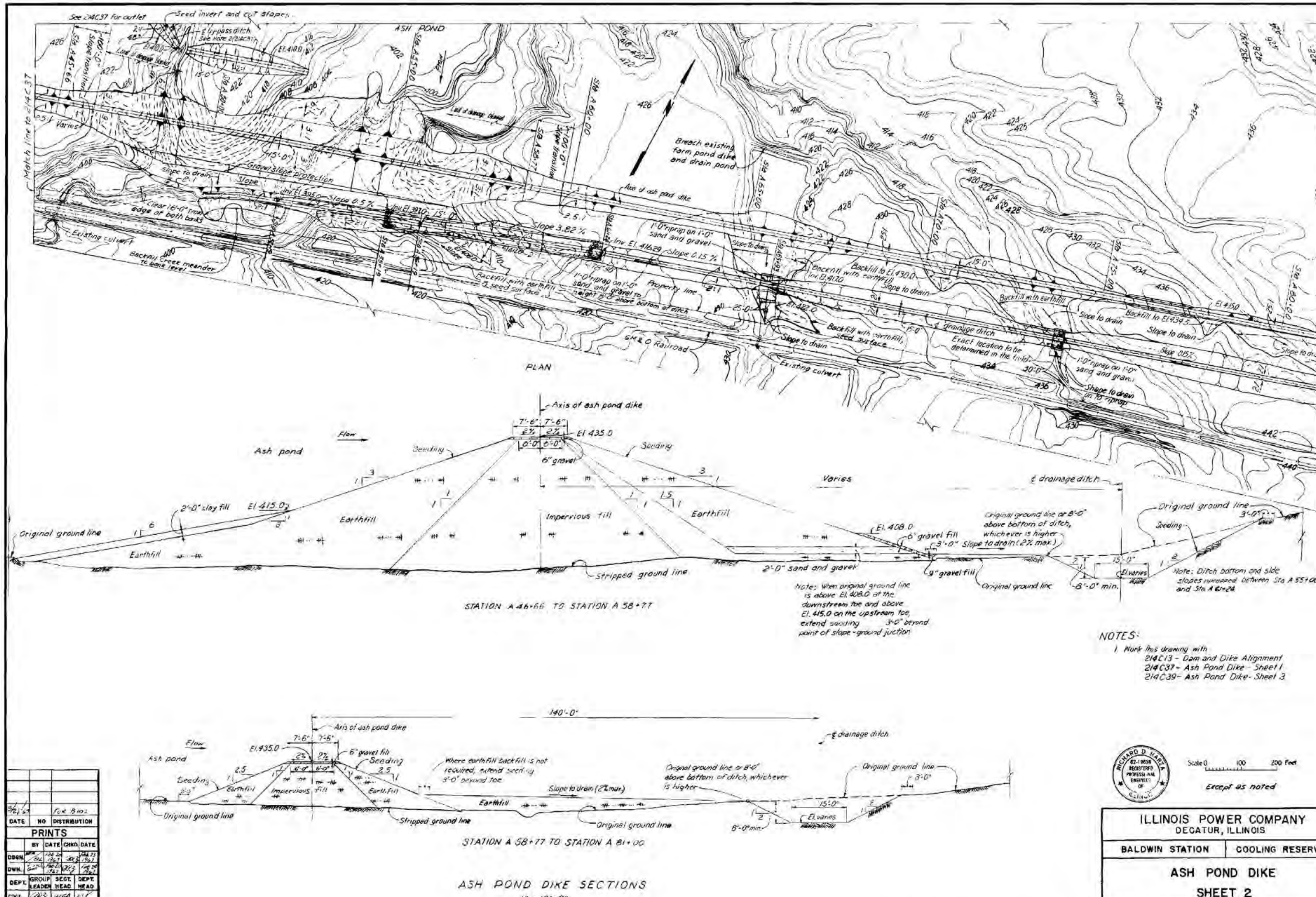
HISTORY OF CONSTRUCTION VICINITY MAP

01

AECOM DRAWING PATH: P:\Projects\Geotech\60428794_DynegyCCR\13_Construction History\04 Technical Production\1_Baldwin\References\Vicinity Location Map References\Figures\C-01 History of Construction Vicinity Map (Baldwin)_without non-CCR Units.dwg NANAK, MATT, 8/22/2016 11:37 AM

Appendix B: Baldwin Energy Complex Drawings

1. “Ash Pond Dike Sheet 2”, Drawing No. E-BAL1-B38, Revision A, 18 November, 1969, Sargent & Lundy Engineers.
2. “Ash Pond Dike Sheet 3”, Drawing No. E-BAL1-B39, Revision A, 18 November, 1969, Sargent & Lundy Engineers.
3. “Primary Ash Pond Site Plan, Vertical Extension of Intermediate Embankment”, Drawing No. E-BAL1-C119, Revision 3, 27 January, 2000, Illinois Power Company.
4. “Plan and Profile, Vertical Extension of Intermediate Embankment”, Drawing No. E-BAL1-C120, Revision 1, 27 January, 2000, Illinois Power Company.
5. “Miscellaneous Details of Intermediate Embankment, Vertical Extension of Intermediate Embankment”, Drawing No. E-BAL1-C122, Revision 3, 27 January, 2000, Illinois Power Company.
6. “Bottom Ash Pond Dike Improvements, Grading and Drainage Plan”, Drawing No. C1033, Revision 0, 28 November, 2012, Sargent & Lundy, LLC.
7. “Bottom Ash Pond Dike Improvements, Surfacing Plan”, Drawing No. C1034, Revision 0, 28 November, 2012, Sargent & Lundy, LLC.
8. “Bottom Ash Pond Dike Improvements, Grading Sections”, Drawing No. C1035, Revision 0, 28 November, 2012, Sargent & Lundy, LLC.
9. “Bottom Ash Pond Dike Improvements, Grading and Surfacing Details”, Drawing No. C1036, Revision 0, 28, November, 2012, Sargent & Lundy, LLC.
10. “Bottom Ash Pond Dike Improvements, Storm and Erosion Control Details Sheet 1”, Drawing No. C1037, Revision 0, 28 November, 2012, Sargent & Lundy, LLC.
11. “Bottom Ash Pond Dike Improvements, Storm and Erosion Control Details Sheet 2”, Drawing No. C1038, Revision 0, 28 November, 2012, Sargent & Lundy, LLC.
12. “Final Outlet Pipe Replacement, Primary Ash Pond”, Drawing No. E-BAL1-C127, Revision 2, 27 January, 2000, Illinois Power Company.
13. “Partial Plot Plan, Pond Ash Piping”, Drawing No. E-BAL1-M1077-1, Revision 0, 28 June, 2000, Illinois Power Company.



NOTES:

1. Work this drawing with
   214C13 - Dam and Dike Alignment
   214C37 - Ash Pond Dike - Sheet 1
   214C39 - Ash Pond Dike - Sheet 3

Scale 0 100 200 Feet

Except as noted

DATE	NO	DISTRIBUTION		
PRINTS				
	BY	DATE	CHKD	DATE
DSGN.				
DWN.				
DEPT.	GROUP LEADER	SECT. HEAD	DEPT. HEAD	
CIVIL				
MECH.				
ELECT.				
PLAN.				
STAFF				

REV. NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
A		AS BUILT			
		CONSTRUCTION			

ILLINOIS POWER COMPANY
DECATUR, ILLINOIS

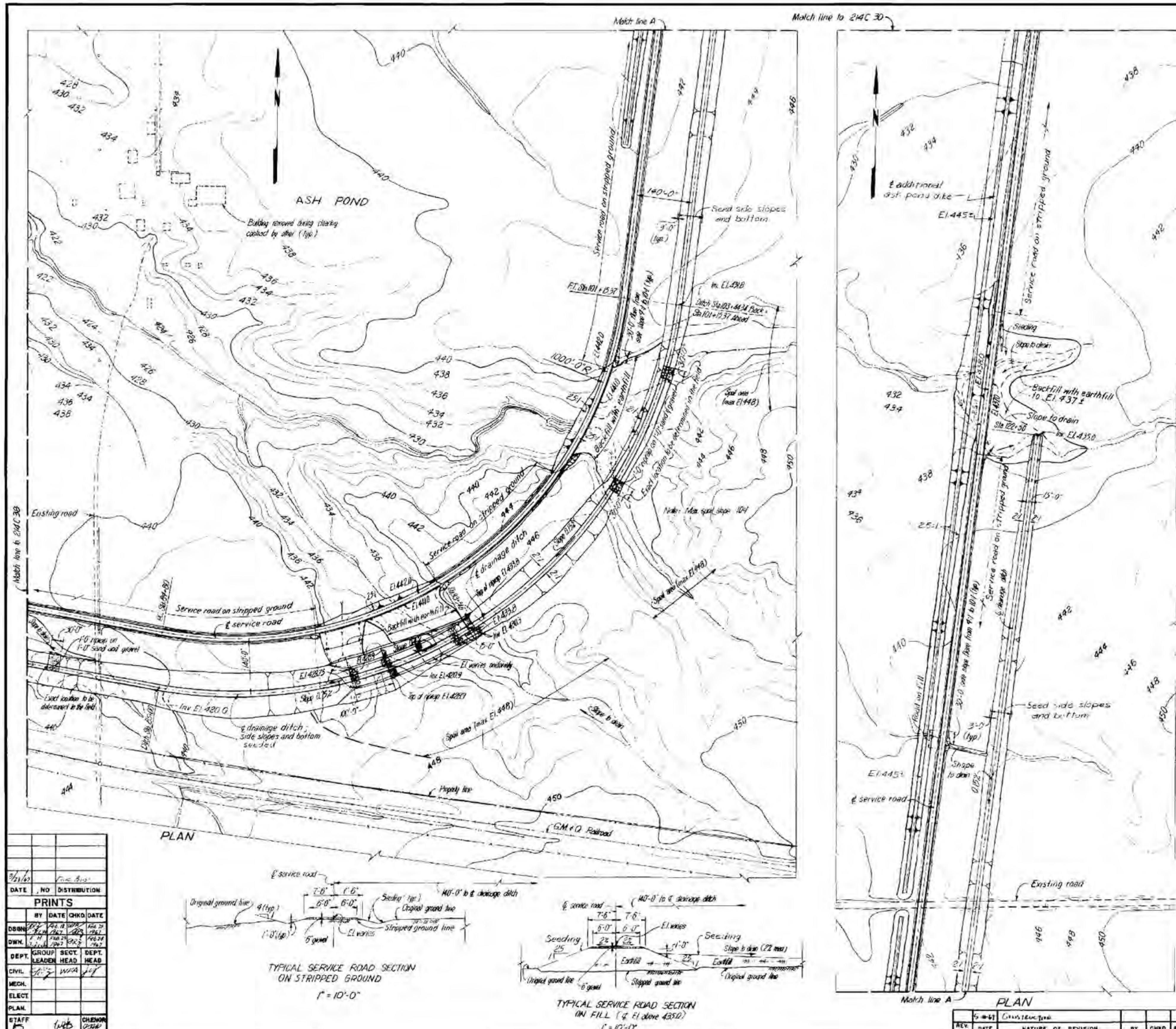
BALDWIN STATION | COOLING RESERVOIR

ASH POND DIKE
SHEET 2

SARGENT & LUNDY ENGINEERS
CHICAGO, ILLINOIS

HARZA ENGINEERING COMPANY
APPROVED
DATE MAR 16, 196
DWG. NO.

S&L B-38 | HEC 214C38



NOTES:

1. Work this drawing with:
   214C 13 Dam and Dike Alignment
   214C 30 Intake
   214C 38 Ash Pond Dike - Sheet 2

RICHARD D. HARZA, REGISTERED PROFESSIONAL ENGINEER OF ILLINOIS

Scale 0 100 200 Feet
Except as noted

ILLINOIS POWER COMPANY DECATUR, ILLINOIS	
BALDWIN STATION	COOLING RESERVOIR
ASH POND DIKE SHEET 3	
SARGENT & LUNDY ENGINEERS CHICAGO, ILLINOIS	HARZA ENGINEERING COMPANY APPROVED Richard D. Harza DATE MAR 16, 1967 DWG. NO.
S&L B-39	HFC 214C39

REV. NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
	5-4-67	Construction			
A		AS BUILT			

PRINTS

DATE	NO	DISTRIBUTION

	BY	DATE	CHKD	DATE
DSGN.				
DWN.				

DEPT.	GROUP LEADER	SECT. HEAD	DEPT. HEAD
CIVIL		WFA	
MECH.			
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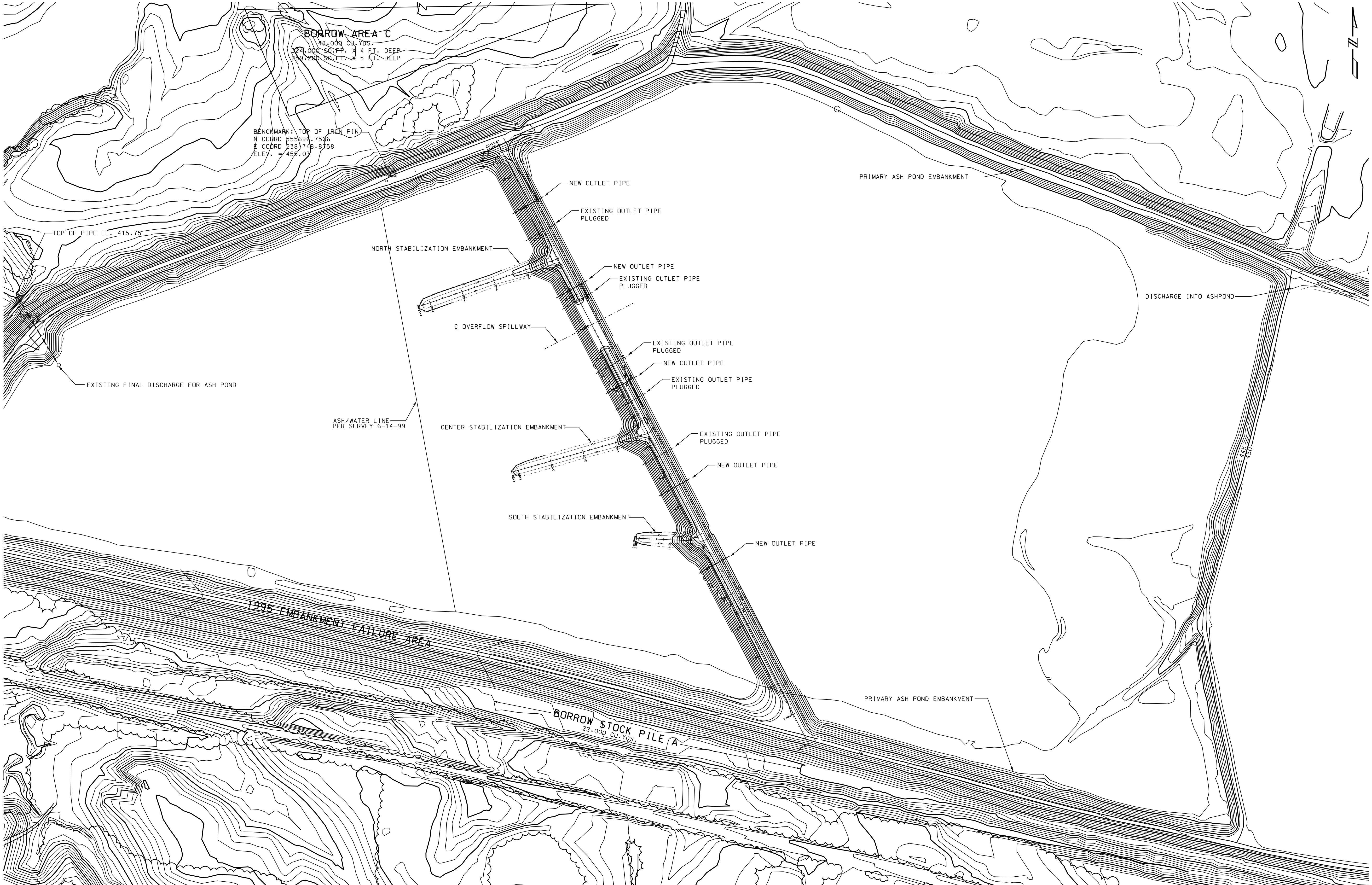
STAFF			

JAN 11 1967 JAN 26 1967 FEB 6 1967 FEB 14 1967 FEB 23 1967 FEB 24 1967 FEB 27 1967 FEB 28 1967 MAR 2 1967 MAR 17 1967



REVISION STATUS: □ -CONSTRUCTION ○ -RECORD

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
①	10-4-99	GBD	REMOVED BORROW STOCK PILE B	RCW	RCW	RCW							
②	10-5-99	GBD	ADDED BORROW AREA INFORMATION	RCW	RCW	RCW							
③	01-27-00	MEC	AS-BUILT - INTERMEDIATE EMBANKMENT. VERTICAL. EXTENTION 1999	RCW	RCW	RCW							

NOTES

REFERENCES

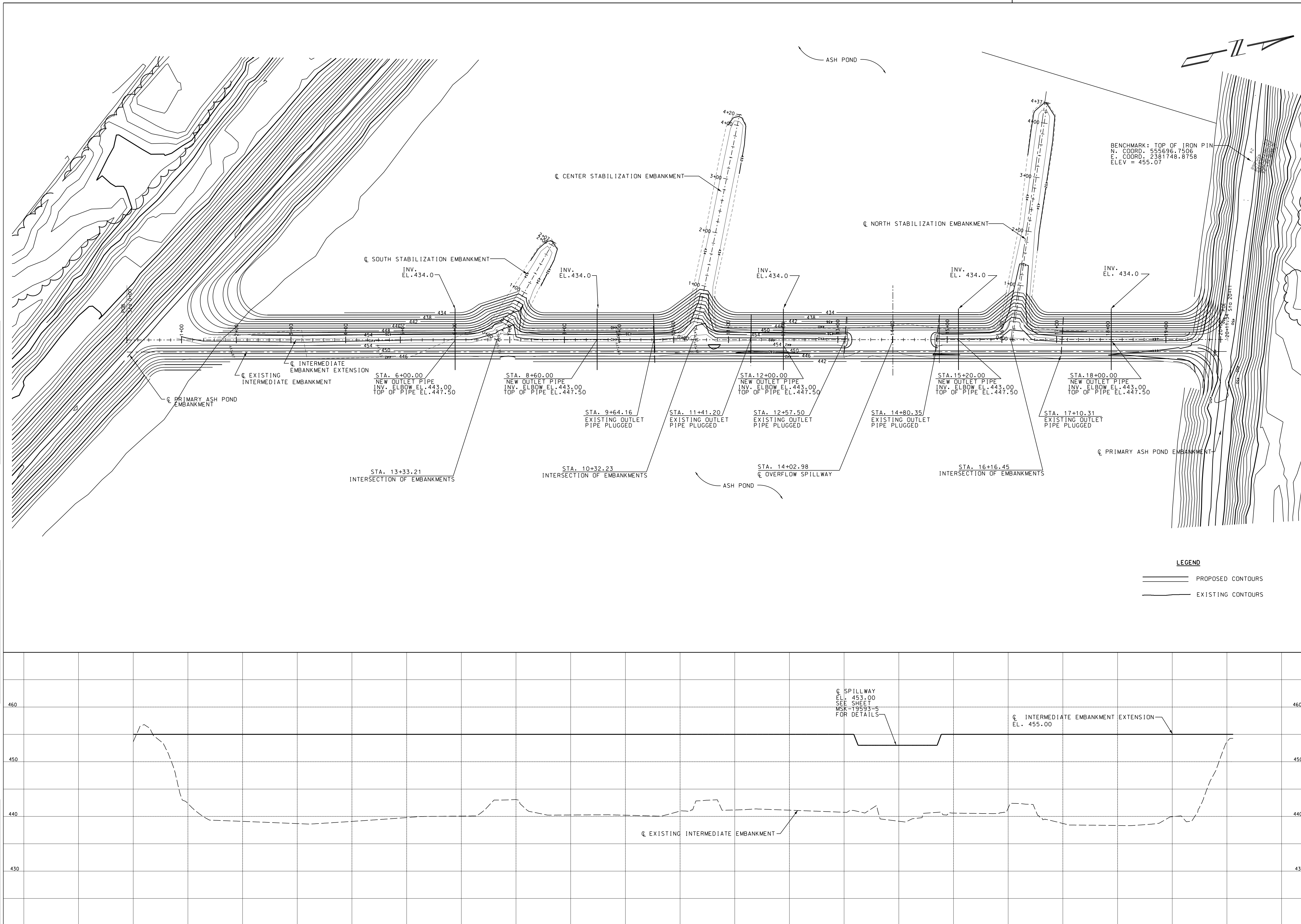
ILLINOIS POWER COMPANY
DECATUR

PRIMARY ASH POND SITE PLAN
VERTICAL EXTENSION OF INTERMEDIATE EMBANKMENT
BALDWIN POWER STATION

DR RKF	CAD RKF	DATE 7-20-99
OK RCW	CKD	SCALE 1"=100'
APP	PLOTTED 2-14-2000	E-BAL1-C119
APP		

E-BAL1-C119

COMPUTER DWG. - DO NOT REVISE MANUALLY



SAG TEMPLATE NO'S.

NO	DATE	REVISIONS DESCRIPTION	BY	APP
1	01-27-00	AS-BUILT - INTERMED. EMBNK. VERTICAL. EXTENTION. 1999	MEC	RCW

Scanned by Illinois Power Company-1995

REVISION STATUS: ☐-CONSTRUCTION ☐-RECORD

ILLINOIS POWER COMPANY
DECATUR

DR. TR. CKD. DK.
APP. DATE SCALE:

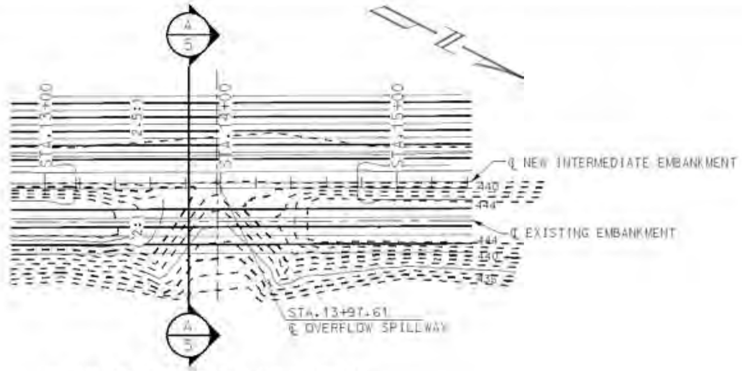
REV. NO. 1

INTERMEDIATE EMBANKMENT
BALDWIN POWER STATION

PLOTTED 2-14-2000

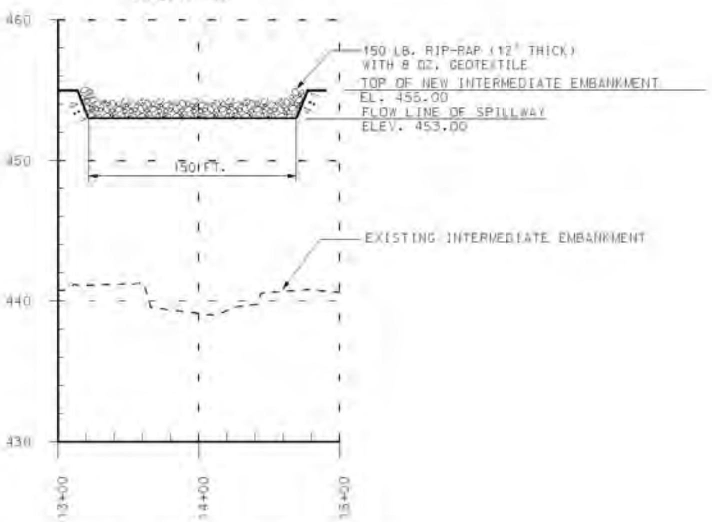
PLAN AND PROFILE
VERTICAL EXTENSION OF INTERMEDIATE EMBANKMENT
BALDWIN POWER STATION

DRAWING NUMBER E-BAL1-C120



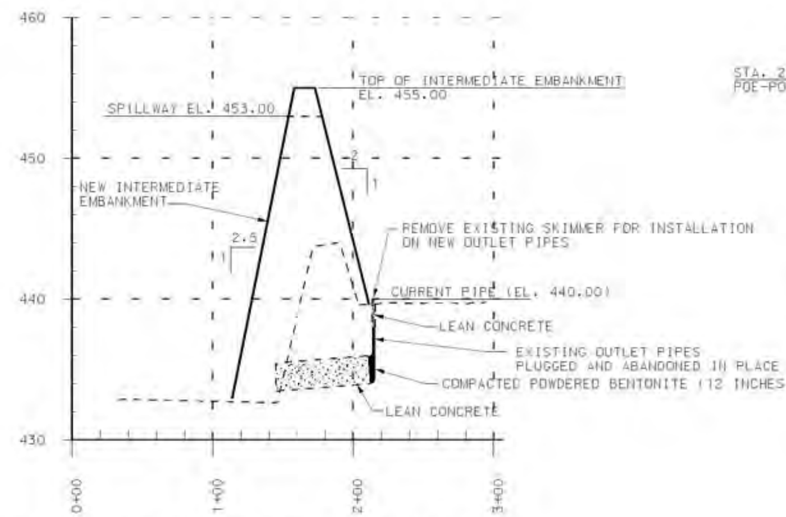
PLAN OF OVERFLOW SPILLWAY

SCALE: 1"=40'



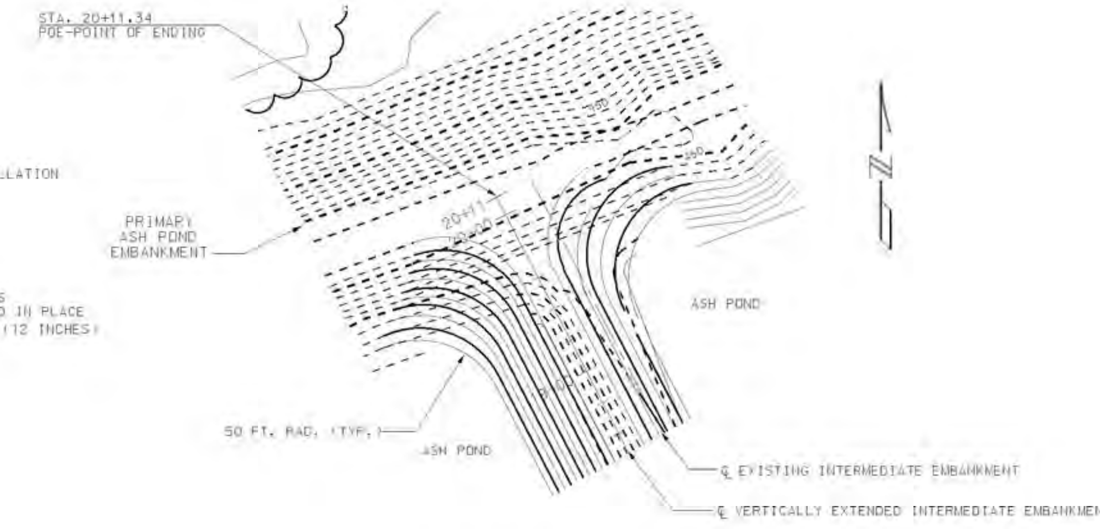
PROFILE OF OVERFLOW SPILLWAY

SCALE: 1"=50' HORZ 1"=5' VERT

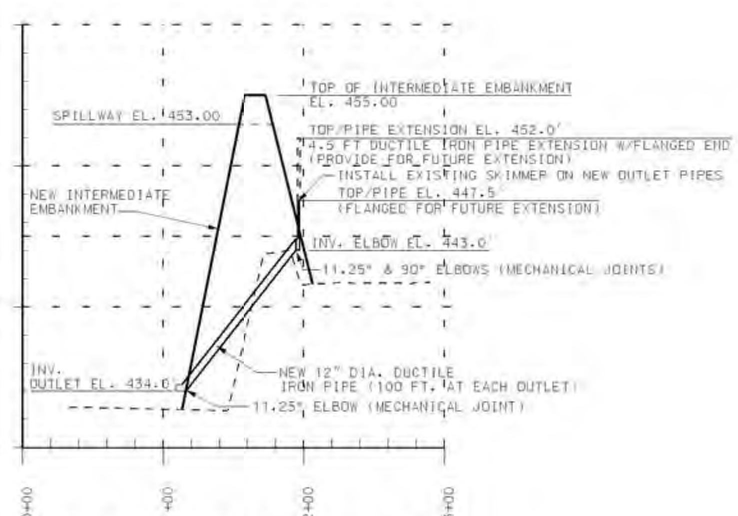


SECTION THRU EXISTING OUTLET PIPES (TYP.)

SCALE: 1"=50' HORZ 1"=5' VERT

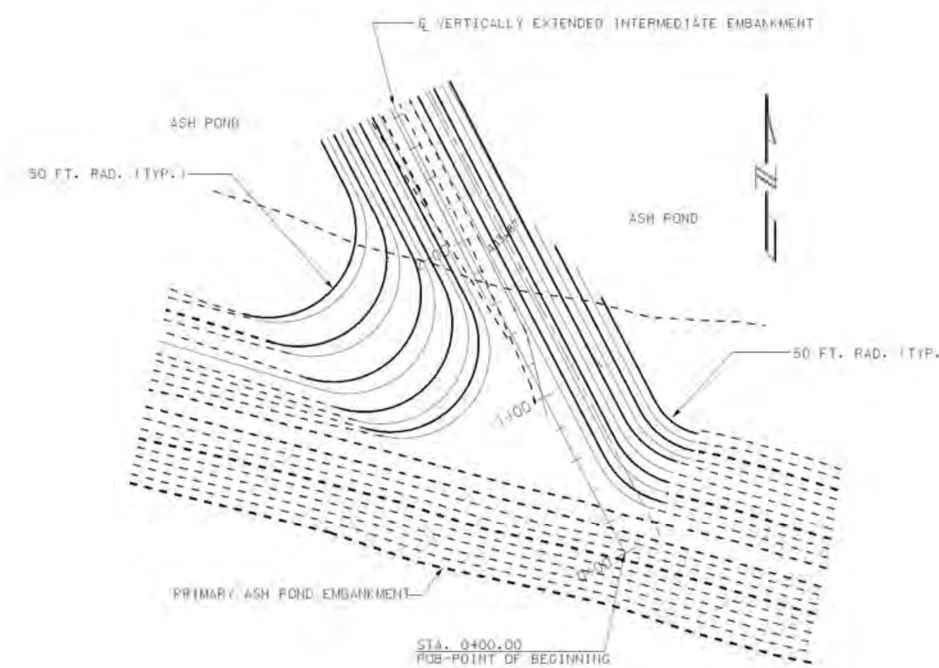


DETAIL OF NORTH END OF INTERMEDIATE EMBANKMENT



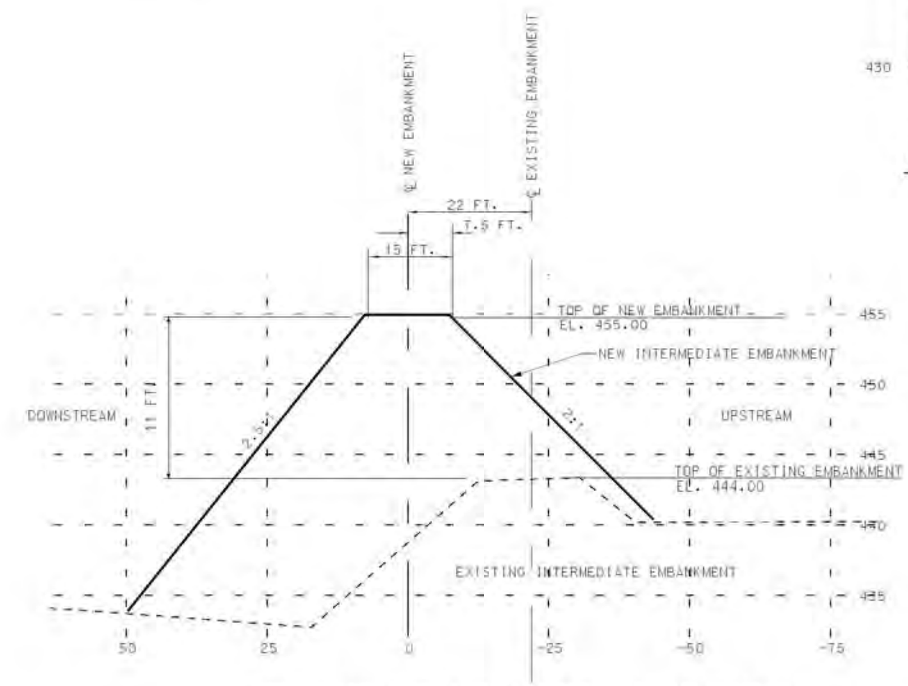
SECTION THRU NEW OUTLET PIPES (TYP.)

SCALE: 1"=50' HORZ 1"=5' VERT



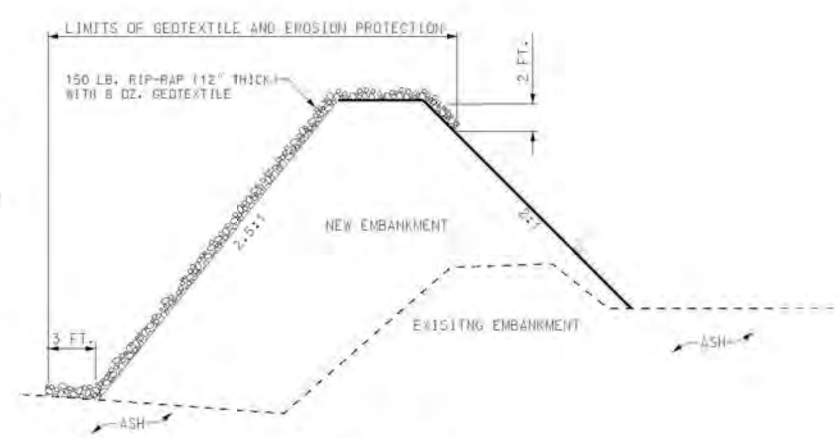
DETAIL OF SOUTH END OF INTERMEDIATE EMBANKMENT

SCALE: 1"=40'



TYPICAL SECTION THRU INTERMEDIATE EMBANKMENT

SCALE: 1"=50' HORZ 1"=5' VERT



SECTION A-A

SCALE: 1"=50' HORZ 1"=5' VERT

REVISION STATUS: ☐-CONSTRUCTION ○-RECORD

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
1	10-4-99	GBD	REMOVED REVETMENT AND GEOTEXTILE REINFORCING LAYERS	RCW	RCW	RCW							
2	10-5-99	GBD	CHANGED PIPE EXTENSION INFORMATION	RCW	RCW	RCW							
3	01-27-00	MEC	AS-BUILT - INTERMEDIATE EMBANKMENT. VERTICAL. EXTENTION 1999	RCW	RCW	RCW							

NOTES

REFERENCES

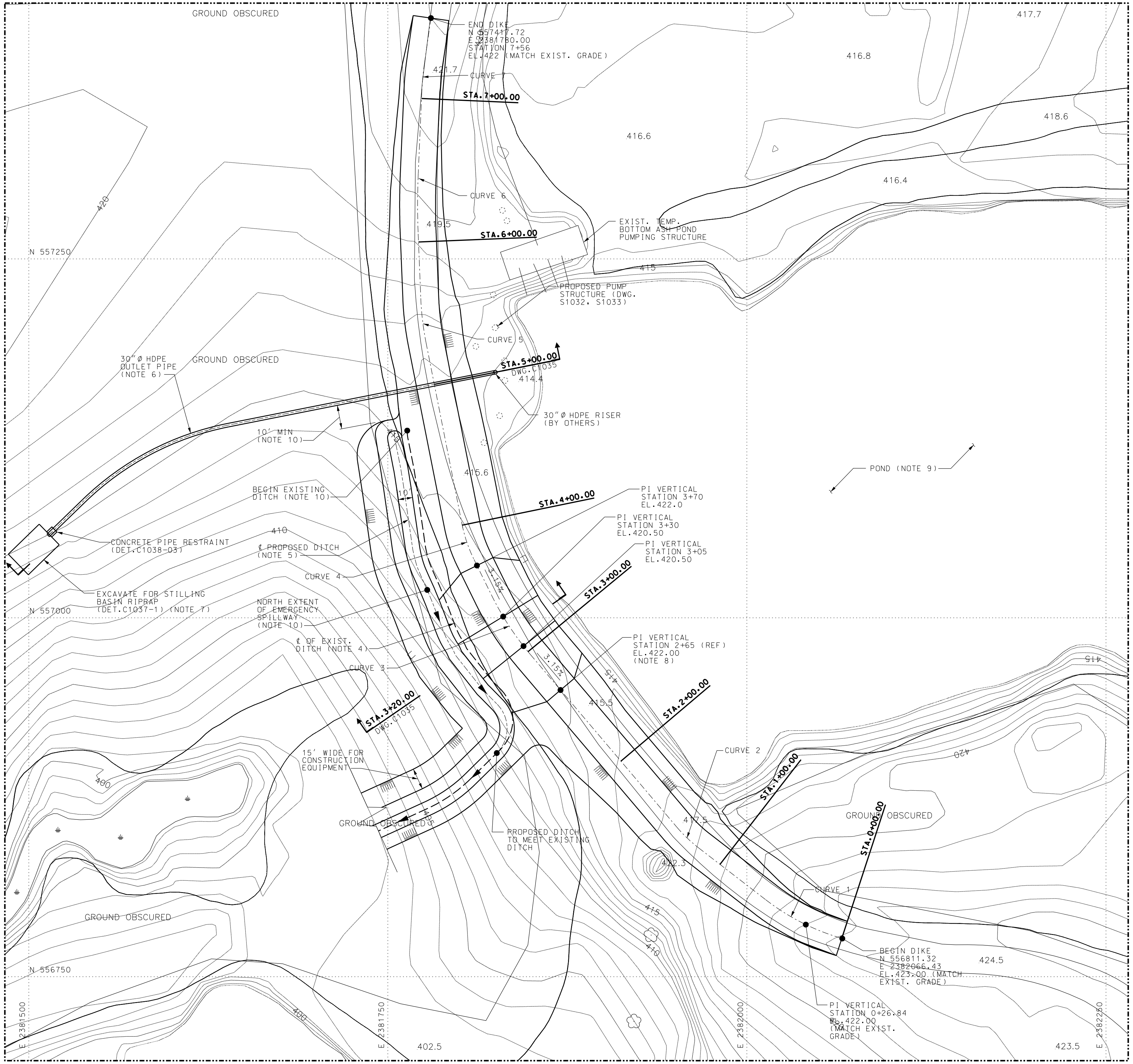
ILLINOIS POWER COMPANY

DECATUR

MISCELLANEOUS DETAILS OF INTERMEDIATE EMBANKMENT
VERTICAL EXTENSION OF INTERMEDIATE EMBANKMENT
BALDWIN POWER STATION

DR RKF	CAD RKF/MEC	DATE 7-22-99
CK RCW	CKD	SCALE
APP	PLOTTED 2-14-2000	E-BAL1-C122
APP		

E-BAL1-C122



BERM HORIZONTAL ALIGNMENT SCHEDULE			
CURVE NO.	POINT OF CURVATURE (STATION)	POINT OF TANGENT (STATION)	RADIUS OF CURVE (FT)
CURVE 1	0+00.0	0+59.7	158
CURVE 2	1+19.0	1+39.9	100
CURVE 3	2+97.5	3+46.9	200
CURVE 4	3+74.6	4+00.8	100
CURVE 5	5+29.7	5+60.7	200
CURVE 6	6+05.6	6+47.6	500
CURVE 7	7+05.1	7+24.9	200

(ADJUST FOR CURRENT IN-FIELD CONDITIONS)

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.
2. THE LOWEST ELEVATION OF THE DIKE AND THE WATER ELEVATION PER THE AERIAL SURVEY (REFERENCED HEREIN) IS 415.5FT AND 412.6FT RESPECTIVELY, OR 2.9 FEET DIFFERENCE. THE PUMP STRUCTURE FLOOR, WHICH HAS ALREADY BEEN INSTALLED ON THE SITE IS AT ELEVATION 423.0FT (REFER TO "S" SERIES DRAWINGS ATTACHED HEREIN) THE ELEVATION DIFFERENCE BETWEEN THE PROPOSED PUMP STRUCTURE FLOOR ELEVATION AND THE LOWEST ELEVATION OF THE DIKE WAS SHOT (SURVEYED) IN THE FIELD AND DETERMINED TO BE 5.31FT (REFER TO CALC BA-APS-C-1). ALL PROPOSED ELEVATIONS AND EXISTING ELEVATIONS INDICATED ON THESE "C" DRAWINGS ARE BASED ON THE TOP OF THE PROPOSED PUMP STRUCTURE FLOOR ELEVATION OF 423.0FT AND A 5.31FT ELEVATION DIFFERENCE BETWEEN THE PROPOSED PUMP STRUCTURE AND TOP OF EXISTING DIKE ELEVATION. CONTACT THE OWNER FOR BENCHMARK INFORMATION.
3. BASED ON FIELD OBSERVATIONS AND AS NOTED IN TOPOGRAPHIC SURVEY, DUE TO FOLIAGE OBSCURING THE GROUND ON THE REFERENCED AIR SURVEY, THE CONTOURS IN HEAVILY VEGETATED AREAS ARE ESTIMATED. THE DIKE LAYOUT ON THIS DRAWING IS BASED ON THE CONTOURS PROVIDED. THE ELEVATIONS ARE BASED ON A FIELD SURVEY (REFER TO NOTE 2). FIELD ADJUSTMENTS MAY BE REQUIRED DURING CONSTRUCTION BASED ON ACTUAL CONTOUR ELEVATIONS. ALL ADJUSTMENTS MUST BE REVIEWED BY THE OWNER PRIOR TO INSTALLATION.
4. EXISTING DITCH LOCATION IS ESTIMATED BASED ON FIELD OBSERVATIONS (REFER TO NOTES 2 AND 3).
5. PROPOSED DITCH SHALL BE INSTALLED AT THE BASE OF THE TOE OF FILL SLOPE. THE DITCH SHALL HAVE A CONSISTENT WIDTH AND DEPTH AS INDICATED ON PLAN AND DETAILS AND SLOPED AT 0.5% MINIMUM TO THE DOWNSTREAM POND APPROXIMATELY 1000' AWAY. THE PROPOSED DITCH INVERT ELEVATION SHALL MATCH THE EXISTING FLOW LINE OF THE EXISTING DITCH.
6. INSTALL 30 INCH DIAMETER HDPE OUTLET PIPE IN SAME LOCATION AND INVERT ELEVATIONS OF EXISTING 36 INCH DIAMETER CMP PIPE. THE GROUND SURFACE UNDER THE PIPE SHALL BE LEVEL LATERALLY AND SLOPED UNIFORMLY IN THE LONGITUDINAL DIRECTION FROM THE PIPE/DIKE DAY LIGHT POINT TO THE END OF THE PIPE AT THE DOWNSTREAM PIPE DISCHARGE POINT. THE ROUTE SHALL BE FREE OF SHARP ROCKS OR OTHER HARD OBJECTS. REFER TO DETAIL C-1037-03 FOR CULVERT BEDDING AND BACKFILL REQUIREMENTS.
7. PIPE TERMINATION POINT TO BE DETERMINED BY OWNER. MAINTAIN A 2% MINIMUM SLOPE IN OUTLET PIPE.
8. EMERGENCY SPILLWAY SHALL BE LOCATED IN THE FIELD SUCH THAT THE ENTIRE SPILLWAY IS PLACED WITHIN THE LIMITS OF THE DITCH.
9. THE WATER ELEVATION DURING NORMAL OPERATING CONDITIONS SHALL BE MAINTAINED AT MAXIMUM WATER SURFACE ELEVATION 417.6 FT.
10. PROPOSED DITCH SHALL BEGIN AT THE NORTH EXTENT OF THE EMERGENCY SPILLWAY OR THE EXISTING UPSTREAM DITCH LOACTION, WHICHEVER RESULTS IN THE LONGEST DITCH. DITCH INVERT SHALL MATCH EXISTING DITCH INVERT ELEVATION.

REFERENCE DRAWINGS

S1032	ASH POND STRUCTURE PLANS, SECTIONS AND DETAILS
S1033	ASH POND STRUCTURE SECTIONS AND DETAILS
C1035	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING SECTIONS
C1036	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING AND SURFACING DETAILS
C1037	BOTTOM ASH POND DIKE IMPROVEMENTS STORM AND EROSION CONTROL DETAILS SHEET 1
C1038	BOTTOM ASH POND DIKE IMPROVEMENTS STORM AND EROSION CONTROL DETAILS SHEET 2
040212	AERIAL SURVEY BY HENDERSON AERIAL SURVEYS, INC. ON 04-02-12

NORTH

30 0 30 60
GRAPHIC SCALE

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

Sargent & Lundy LLC

CAD FILE: C1033.DGN

REFERENCE DRAWINGS

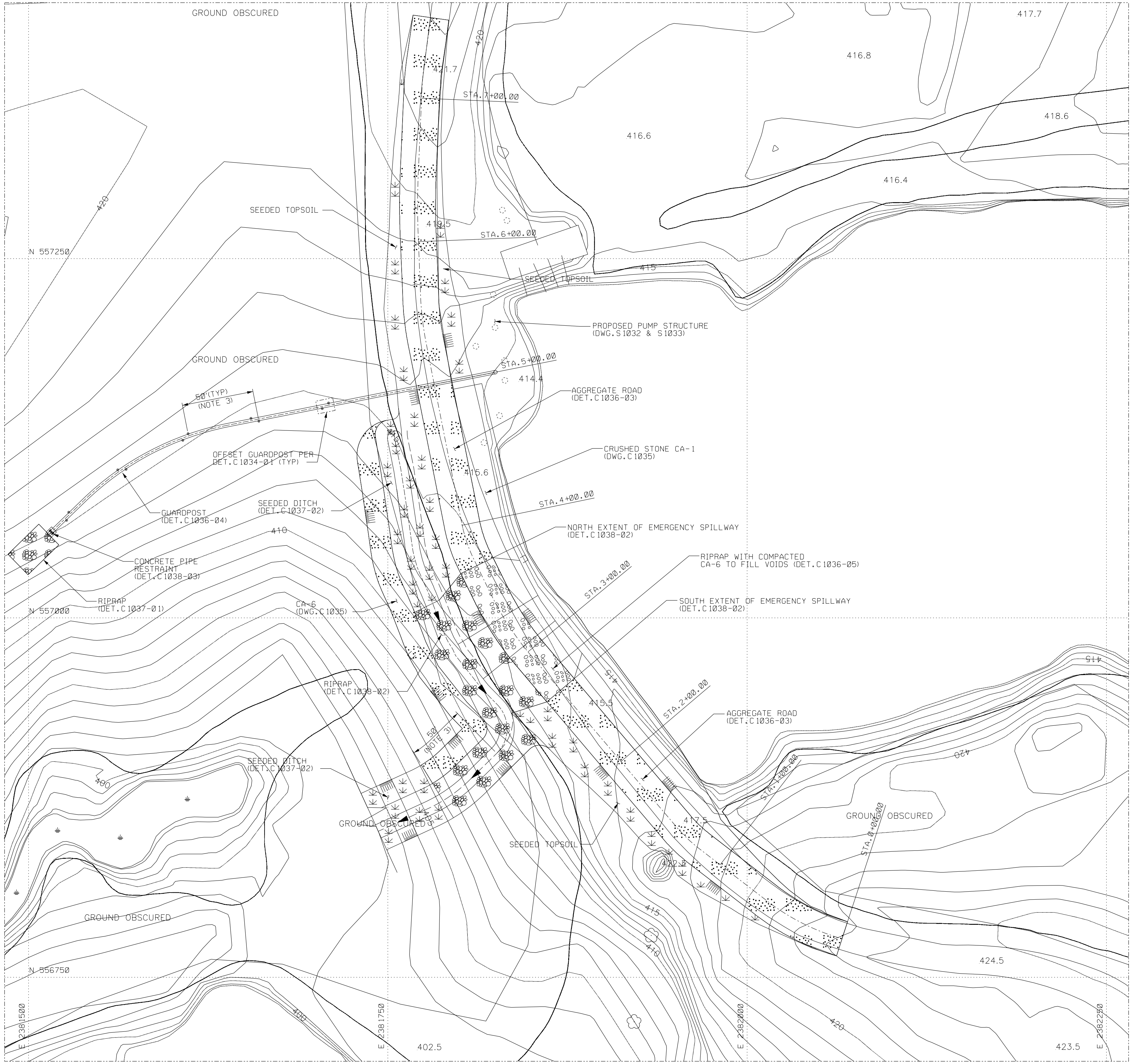
NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD, P.S.# 49427	C.FLAMINI	T. PITSCH	

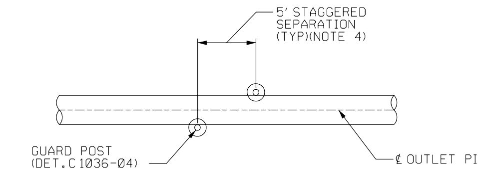
SCALE: 1"=30'-0"		
DWN. ALS	DATE 10-04-2012	
CHK. T.M.P.	DATE 10-04-2012	
APPV. D.J.D.	DATE 10-04-2012	

DYNEGY

BOTTOM ASH POND DIKE IMPROVEMENTS
GRADING AND DRAINAGE PLAN
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C1033
REV. 0





GUARD POST SEPARATION
DETAIL C1034-01
N.T.S.

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.
2. CONTOUR ELEVATIONS INDICATED ON PLAN ARE APPROXIMATE REFER TO NOTES ON DRAWING C-1033.
3. PLACE RIPRAP SURFACING IN SWALE 50FT BEYOND FLUME EXIT.
4. INSTALL GUARDPOST ON EACH SIDE OF CULVERT AT 50FT SPACINGS, OR AS NECESSARY IN FIELD TO LIMIT THE MOVEMENT BETWEEN TREES. GUARDPOST SHALL BE INSTALLED IN A STAGGERED PATTERN AS INDICATED ON PLAN TO CONTROL THE DIRECTION OF PIPE DEFLECTION DUE TO THERMAL EXPANSION.

REFERENCE DRAWINGS

S1032	ASH POND STRUCTURE PLANS, SECTIONS AND DETAILS
S1033	ASH POND STRUCTURE SECTIONS AND DETAILS
C1035	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING SECTIONS
C1036	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING AND SURFACING DETAILS
C1037	BOTTOM ASH POND DIKE IMPROVEMENTS STORM AND EROSION CONTROL DETAILS SHEET 1
C1038	BOTTOM ASH POND DIKE IMPROVEMENTS STORM AND EROSION CONTROL DETAILS SHEET 2
040212	AERIAL SURVEY BY HENDRESON AERIAL SURVEYS, INC. ON 04-02-12

NORTH

30 0 30 60
GRAPHIC SCALE

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

Sargent & Lundy LLC

CAD FILE: C1034.DGN

REFERENCE DRAWINGS

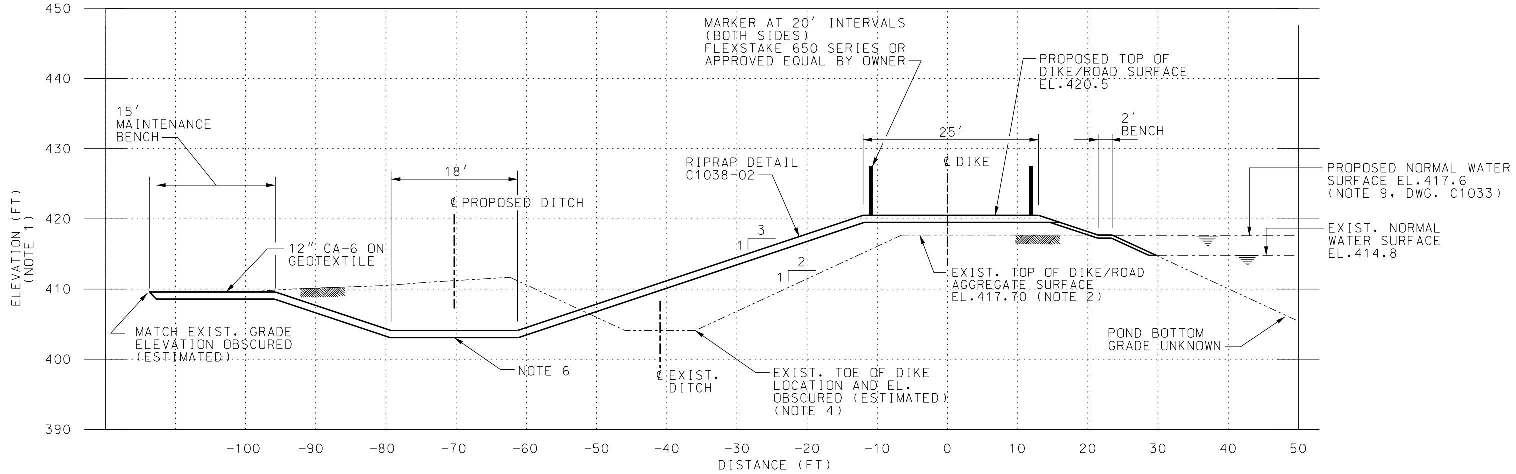
NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD. P.S.# 49427	C. FLAMINI	T. PITSCH	

SCALE: 1"=30'-0"
DWN. ALS DATE 10-04-2012
CHK. T.M.P. DATE 10-04-2012
APPV. D.J.D. DATE 10-04-2012

DYNEGY

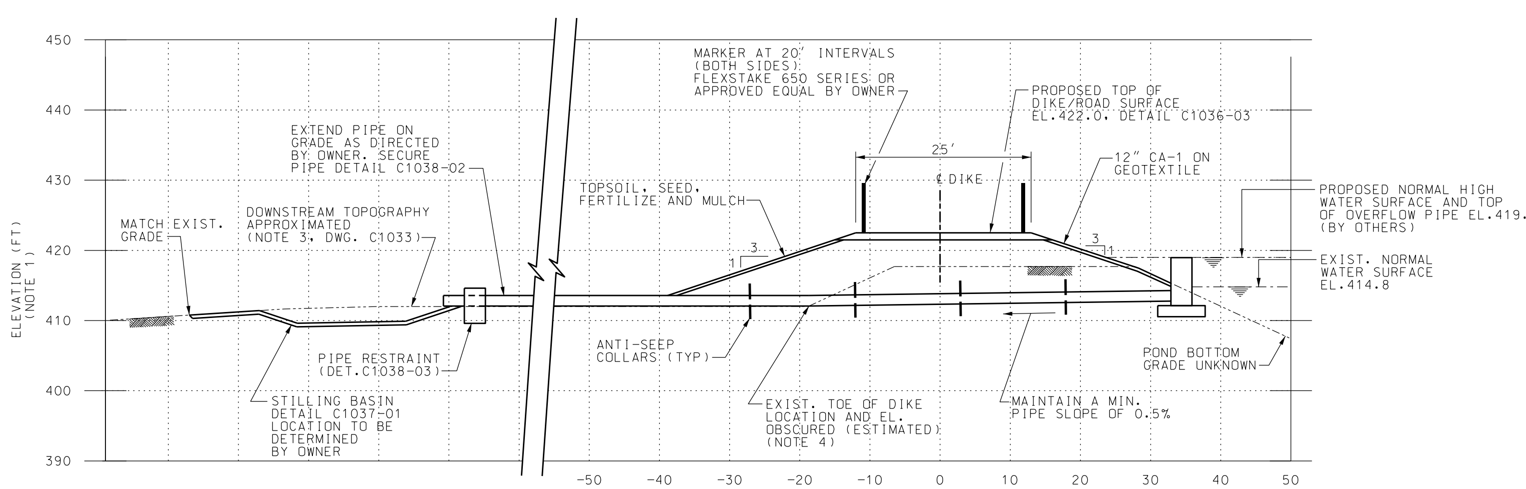
BOTTOM ASH POND DIKE IMPROVEMENTS
SURFACING PLAN
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C1034
REV. 0



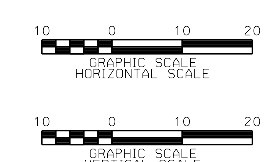
SECTION 3+20.00

AT EMERGENCY SPILLWAY



SECTION 5+00.00

AT OVERFLOW PIPE



NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.
2. REFER TO NOTES 2 ON DRAWING C1033 FOR CLARIFICATION ON ELEVATIONS PROVIDED ON THIS DRAWING.
3. REMOVE AND DISPOSE OF EXISTING GRANULAR SURFACING, DELETERIOUS MATERIAL, VEGETATION, ROOTS, AND SOIL NOT MEETING FILL REQUIREMENTS IN SPECIFICATION SECTION 312201 PARAGRAPH 201.2b FROM WATER SURFACE TO DOWNSTREAM TOE OF DIKE AND TO DOWNSTREAM EXTENT OF OVERFLOW DITCH AND MAINTENANCE BENCH. UNTIL CLAY SUBGRADE IS EXPOSED PRIOR TO PLACING FILL (REFER TO DETAIL C1036-01).
4. ELEVATION AND LOCATION OF EXISTING DITCH IS ESTIMATED (SEE NOTE 3 ON DWG. C1033).
5. ELEVATIONS ON SECTIONS BASED ON CONTRACTOR'S DATUM WHERE TOP OF NEW PUMP STRUCTURE IS AT EL.423.0
6. THE PROPOSED DITCH INVERT ELEVATION SHALL MATCH THE INVERT ELEVATION OF THE EXISTING DITCH.

REFERENCE DRAWINGS

C1033	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING AND DRAINAGE PLAN

Sargent & Lundy LLC

CAD FILE: C1035.DGN

REFERENCE DRAWINGS

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD. P.S.# 49427	C. FLAMINI	T. PITSCH	

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D

SCALE: AS NOTED

DWN. ALS	DATE 10-04-2012
CHK. T.M.P.	DATE 10-04-2012
APPV. D.J.D.	DATE 10-04-2012

DYNEGY

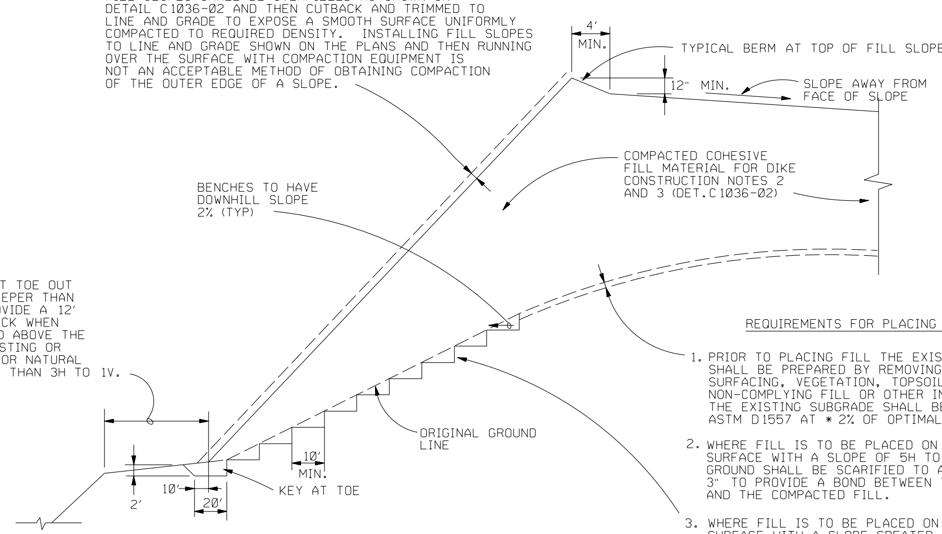
BOTTOM ASH POND DIKE IMPROVEMENTS
GRADING SECTIONS
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115

CLIENT: DYNEGY MIDWEST GENERATION

DWG. NO.: C1035 REV. 0

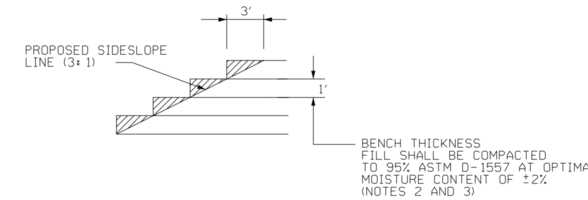
FILL SLOPES SHALL BE OVERFILLED AS SHOWN ON DETAIL C1036-02 AND THEN CUTBACK AND TRIMMED TO LINE AND GRADE TO EXPOSE A SMOOTH SURFACE UNIFORMLY COMPACTED TO REQUIRED DENSITY. INSTALLING FILL SLOPES TO LINE AND GRADE SHOWN ON THE PLANS AND THEN RUNNING OVER THE SURFACE WITH COMPACTION EQUIPMENT IS NOT AN ACCEPTABLE METHOD OF OBTAINING COMPACTION OF THE OUTER EDGE OF A SLOPE.



REQUIREMENTS FOR PLACING FILL

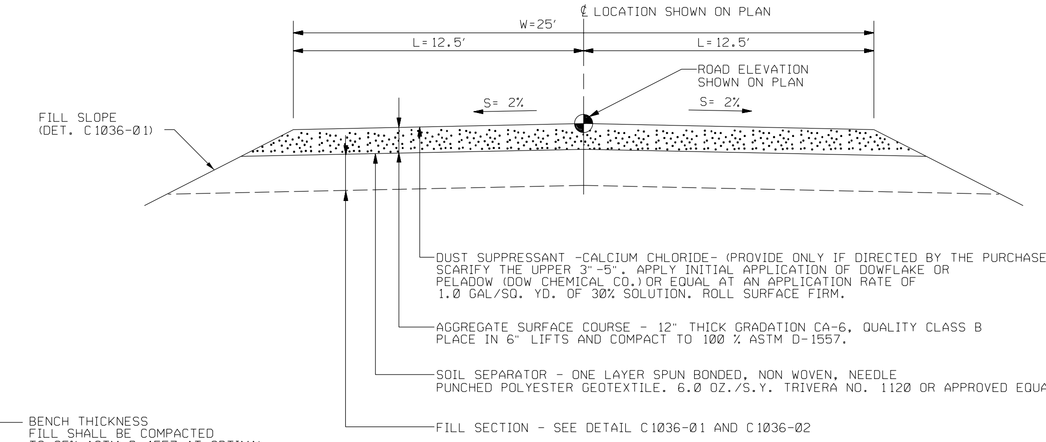
1. PRIOR TO PLACING FILL THE EXISTING GROUND SHALL BE PREPARED BY REMOVING CRUSHED STONE SURFACING, VEGETATION, TOPSOIL AND ANY OTHER NON-COMPLYING FILL OR OTHER INCOMPETENT MATERIAL. THE EXISTING SUBGRADE SHALL BE COMPACTED TO 95% ASTM D1557 AT * 2% OF OPTIMAL MOISTURE CONTENT.
2. WHERE FILL IS TO BE PLACED ON AN EXISTING GROUND SURFACE WITH A SLOPE OF 5H TO 1V OR LESS, THE GROUND SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3" TO PROVIDE A BOND BETWEEN THE INSITU MATERIAL AND THE COMPACTED FILL.
3. WHERE FILL IS TO BE PLACED ON AN EXISTING GROUND SURFACE WITH A SLOPE GREATER THAN 5H TO 1V THE FILL SHALL BE KEYED IN AT THE TOE AND CONTINUOSLY BENCHED INTO THE NATURAL SLOPE. BENCHES SHALL SLOPE DOWNHILL 2% IN CROSS-SECTION AND SHALL BE LEVEL LONGITUDINALLY FOLLOWING THE NATURAL CONTOURS. MATERIAL CUT FROM BENCHES SHALL BE MIXED WITH COMPACTED FILL AND RECOMPACTED.

TYPICAL DETAIL
PLACEMENT OF FILL ON A SLOPE
DETAIL C1036-01
N.T.S.

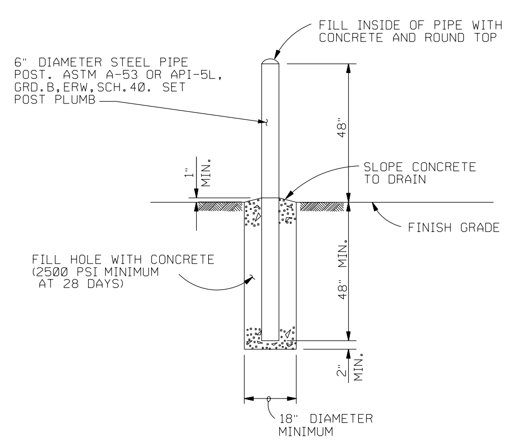


TRIM EXCESS TO ACHIVE PROPER FINISH LINE FOR SIDESLOPE.

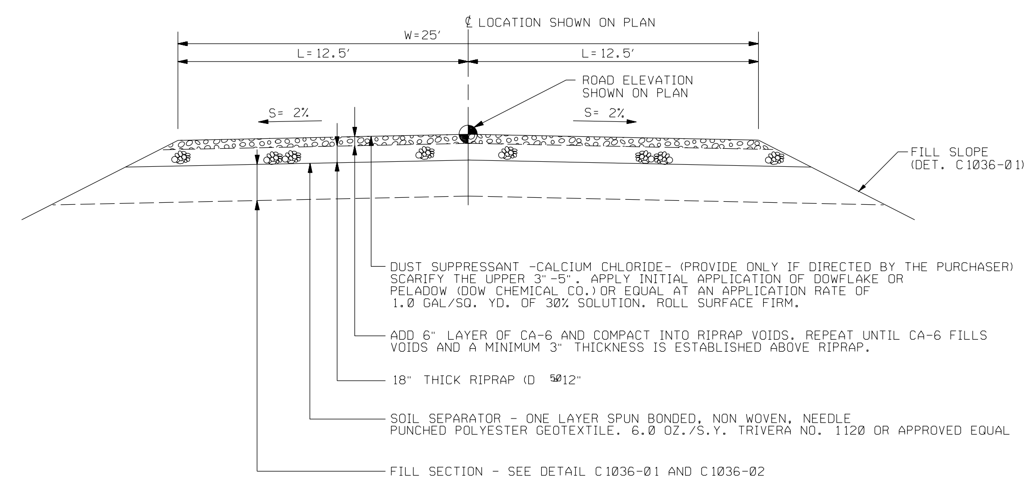
ENLARGED DETAIL A
BENCHES, TRIMMING AND SIDESLOPE COMPACTION
DETAIL C1036-02
N.T.S.



TYPICAL SECTION
AGGREGATE SURFACED PERMANENT ROAD
SECTION C1036-03
N.T.S.



GUARD POST
DETAIL C1036-04
N.T.S.



AGGREGATE SURFACED PERMANENT
ROAD IN EMERGENCY SPILLWAY
SECTION C1036-05
N.T.S.

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.
2. COHESIVE MATERIAL SHALL CONTAIN NOT MORE THAN 1 PERCENT ORGANIC OR OTHER DELETERIOUS MATERIAL, SHALL HAVE A MAXIMUM PARTICLE SIZE OF 2 INCHES AND SHALL HAVE ATTERBERG LIMITS ABOVE THE "A" LINE WITH A LIQUID LIMIT OF LESS THAN 40 AND A PLASTICITY INDEX LESS THAN 25. ACCEPTABLE SOILS ARE CLASSIFIED AS FINE-GRAINED SOILS IN THE UNITED SOIL CLASSIFICATION SYSTEM ASTM D2487. CLASSIFICATION IS CL.
3. AFTER COMPLETION OF A LIFT IS ACHIEVED, THE SURFACE SHALL BE SUFFICIENTLY ROUGHENED TO CREATE A BOND FOR THE NEXT SUCCEEDING LIFT.

REFERENCE DRAWINGS

C1032	BOTTOM ASH POND DIKE IMPROVEMENTS EROSION CONTROL PLAN

Sargent & Lundy LLC

CAD FILE: C1036.DGN

REFERENCE DRAWINGS

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD, P.S.* 49427	C. FLAMINI	T. PITSCH	

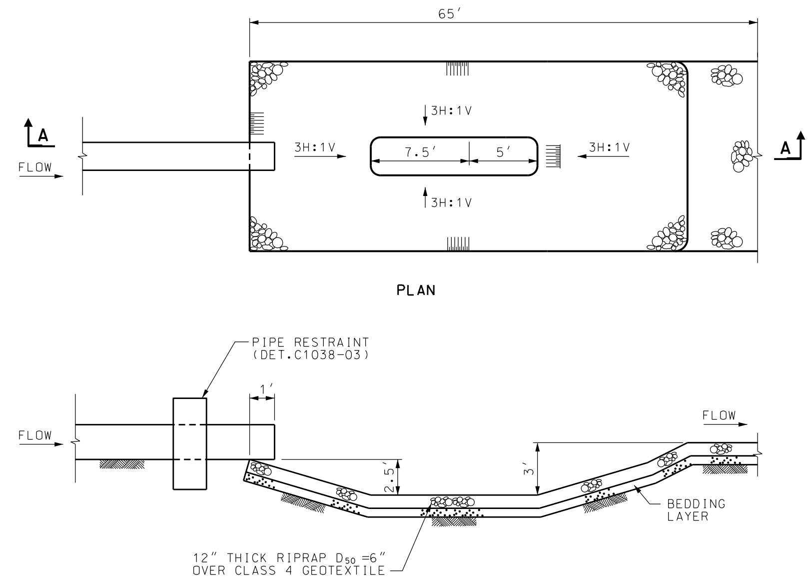
SCALE: NONE
DWN. ALS DATE 10-04-2012
CHK. T.M.P. DATE 10-04-2012
APPV. D.J.D. DATE 10-04-2012

DYNEGY

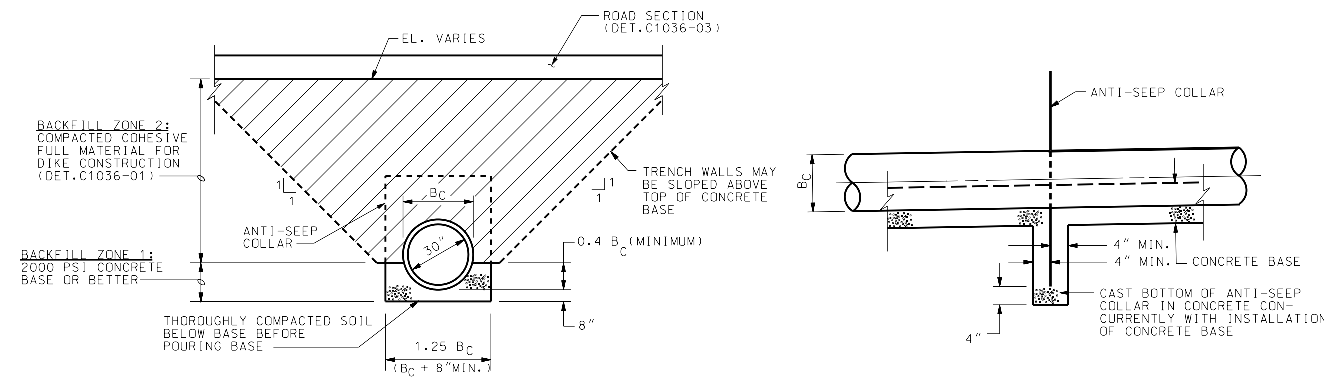
BOTTOM ASH POND DIKE IMPROVEMENTS
GRADING AND SURFACING DETAILS
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C1036
REV. 0

A | B | C | D



PROTECTION AT CULVERT IN AN UNDEFINED CHANNEL STILLING BASIN
DETAIL C1037-01
N.T.S.



SINGLE PIPE BEDDING AND BACKFILL REQUIREMENTS
DETAIL C1037-03
N.T.S.

NOTES PERTAINING TO OUTLET BEDDING AND BACKFILL DETAIL C1037-03

1. BEDDING AND BACKFILL MATERIAL SPECIFICATIONS

A. SELECT GRANULAR MATERIAL
"SELECT GRANULAR MATERIAL" SHALL CONSIST OF WELL GRADED SAND, STONE, CRUSHED STONE, PIT RUN GRAVEL, OR CRUSHED GRAVEL WITH A MAXIMUM STONE OF ¾" Ø, FREE FROM EXCESS OF SOFT AND UNSOUND PARTICLES AND OTHER OBJECTIONABLE MATTER.

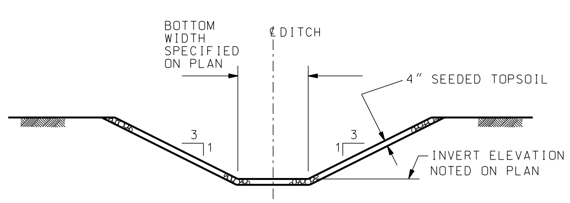
ACCEPTABLE GRADATIONS ARE:
ASTM C-33 - FINE CONCRETE AGGREGATE (WELL GRADED SAND)
ASTM C-33 - GRADATION NO.67 OR GRADATION NO.7 GRADATION SIMILAR TO WELL GRADED FINE ROAD BASE MATERIAL: I.E. ASTM D-1241, GRADATION C AND GRADATION D.

B. GRANULAR BEDDING MATERIAL
MATERIAL FOR "GRANULAR BEDDING MATERIAL" SHALL CONSIST OF WELL GRADED STONE SCREENINGS, CRUSHED STONE, PIT RUN GRAVEL, OR WASHED GRAVEL WITH A MAXIMUM STONE SIZE OF ½" Ø FOR BEDDING FOR PLASTIC PIPE, OR ¾" Ø FOR BEDDING OTHER TYPES OF PIPE, FREE FROM EXCESS OF SOFT AND UNSOUND PARTICLES AND OTHER OBJECTIONABLE MATTER. THE FOLLOWING GRADATIONS ARE ACCEPTABLE:

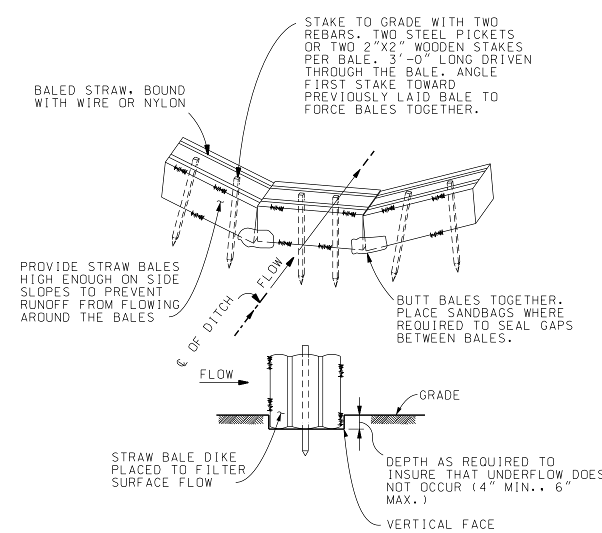
US STANDARD SIEVE SIZE	PERCENT PASSING ASTM C-33 GRADATION NO.67	ASTM C-33 GRADATION 7
1"	100	-
¾"	90-100	100
½"	-	90-100
⅜"	20-55	40-70
NO.4	0-10	0-15
NO.8	0-5	0-5

2. SOFT TRENCH BOTTOM

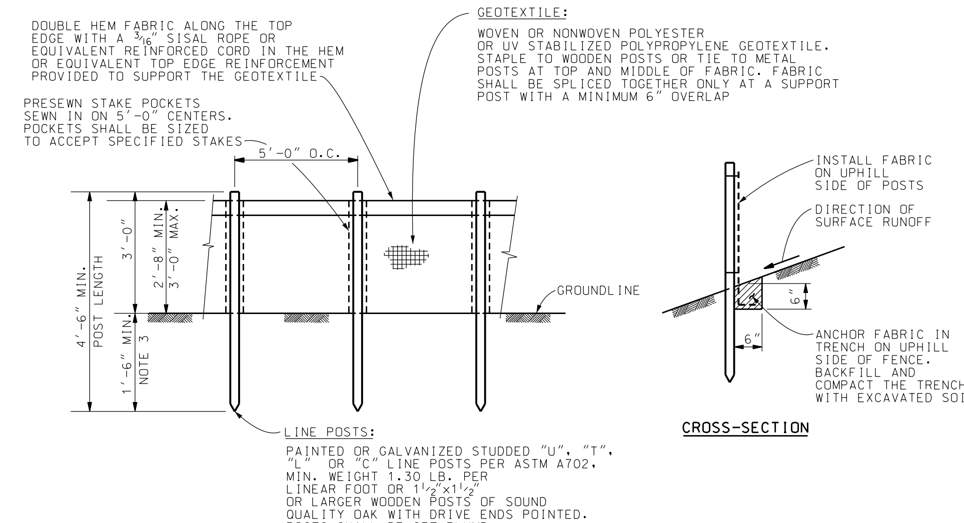
IF THE BOTTOM OF THE TRENCH IS SOFT, OVER EXCAVATE UP TO 2'-0" MINIMUM, AND REPLACE WITH "GRANULAR BEDDING MATERIAL" COMPACTED TO 90% ASTM D1557.



SEEDED DITCH
DETAIL C1037-02
N.T.S.



STRAW BALE EROSION CHECK FOR TRAPEZOIDAL DITCH (TYPICAL DETAIL)
DETAIL C1037-04
N.T.S.



NOTES:

1. AFTER INSTALLATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE FENCE. THE CONTRACTOR SHALL INSPECT FENCES AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. CONTRACTOR IS RESPONSIBLE FOR REMOVING AND REPLACING SILT FENCING NOT FUNCTIONING DUE TO CLOGGING, DAMAGE OR DETERIORATION.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND DISPOSAL OF FENCING WHEN, AS DETERMINED BY THE OWNER, THE FENCING IS NO LONGER NEEDED.
3. WHERE 18" DEPTH IS IMPOSSIBLE TO ACHIEVE THE POSTS SHALL BE SECURED TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT LOAD.

SELF-SUPPORTING SILT FENCE (TYPICAL DETAIL)
DETAIL C1037-05
N.T.S.

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.
2. SEED MIXTURE SHALL BE A TYPE AND MIXTURE MEETING THE REQUIREMENTS OF ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRICTION SECTION 250.

REFERENCE DRAWINGS

C1032	BOTTOM ASH POND DIKE IMPROVEMENTS EROSION CONTROL PLAN
C1033	BOTTOM ASH POND DIKE IMPROVEMENTS GRADING AND DRAINAGE PLAN

Sargent & Lundy LLC

CAD FILE: C1037.DGN

REFERENCE DRAWINGS

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD, P.S.# 49427	C. FLAMINI	T. PITSCH							

SCALE: NONE
DWN. ALS DATE 10-04-2012
CHK. T.M.P. DATE 10-04-2012
APPV. D.J.D. DATE 10-04-2012

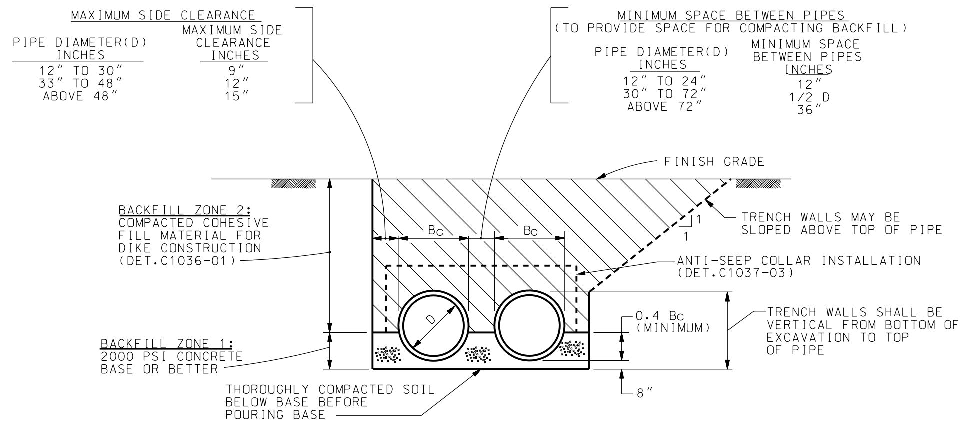
DYNEGY

BOTTOM ASH POND DIKE IMPROVEMENTS
STORM AND EROSION CONTROL DETAILS SHEET 1
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C1037
REV. 0

1 | 2 | 3 | 4

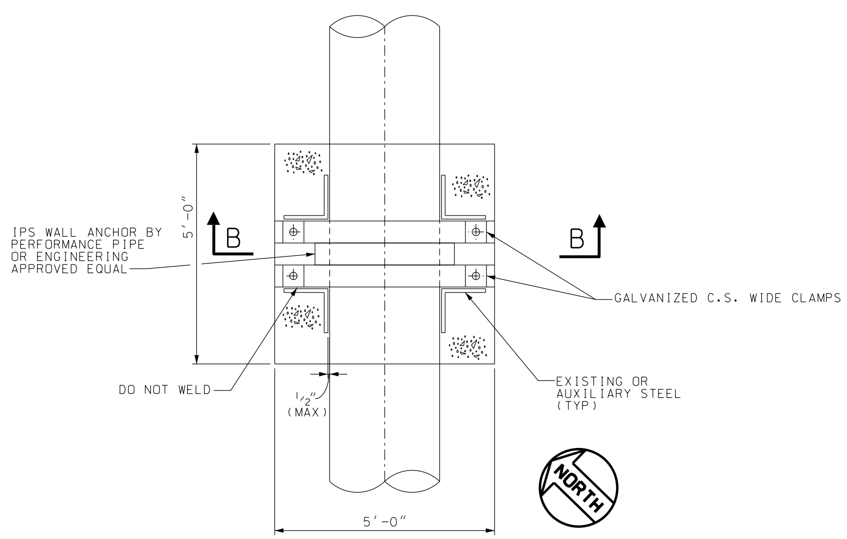
A | B | C | D



MULTIPLE PIPE BEDDING AND BACKFILL REQUIREMENTS

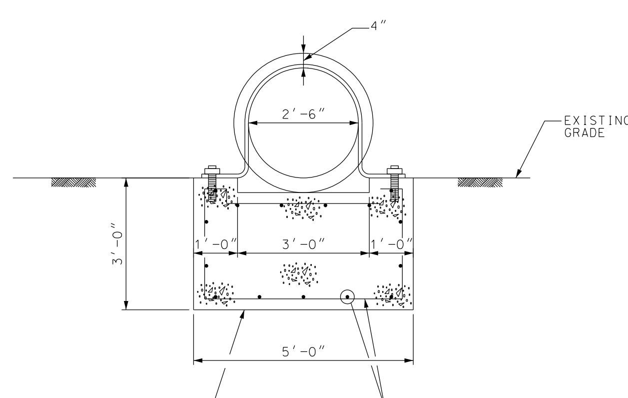
DETAIL C1038-01

N.T.S.



PLAN

N.T.S.

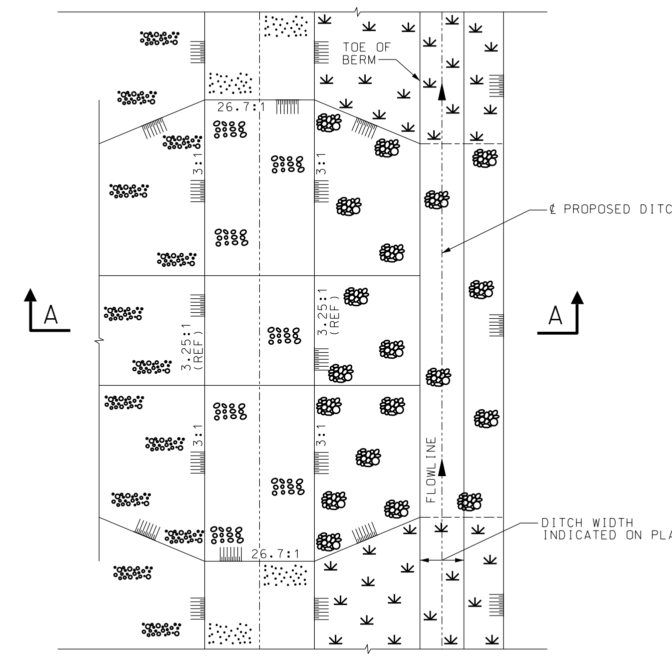


SECTION B

PIPE RESTRAINT

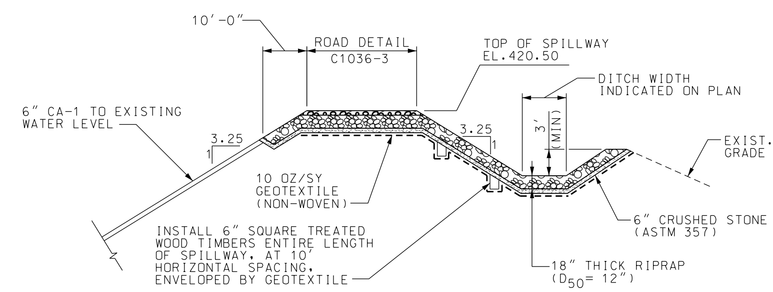
DETAIL C1038-03

N.T.S.



PLAN

N.T.S.

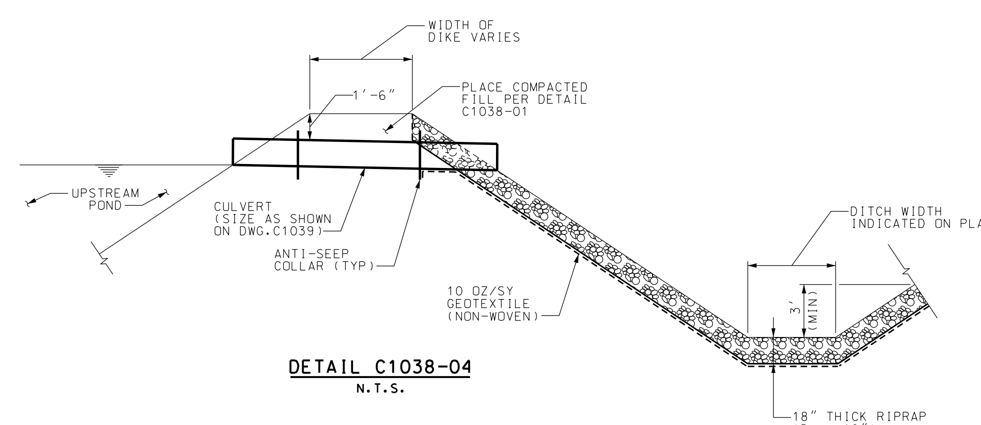


SECTION A

EMERGENCY SPILLWAY AND FLOW SPREADER

DETAIL C1038-02

N.T.S.



DETAIL C1038-04

N.T.S.

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION H-3026. WHERE NOTES ON THIS DRAWING CONFLICT WITH THE NOTES IN SPECIFICATION H-3026, THE NOTES ON THIS DRAWING SHALL GOVERN.

REFERENCE DRAWINGS

C1033	BOTTOM ASH POND DIKE EROSION CONTROL PLAN
C1034	BOTTOM ASH POND DIKE IMPROVEMENTS SURFACING PLAN

Sargent & Lundy LLC

CAD FILE: C1038.DGN

REFERENCE DRAWINGS

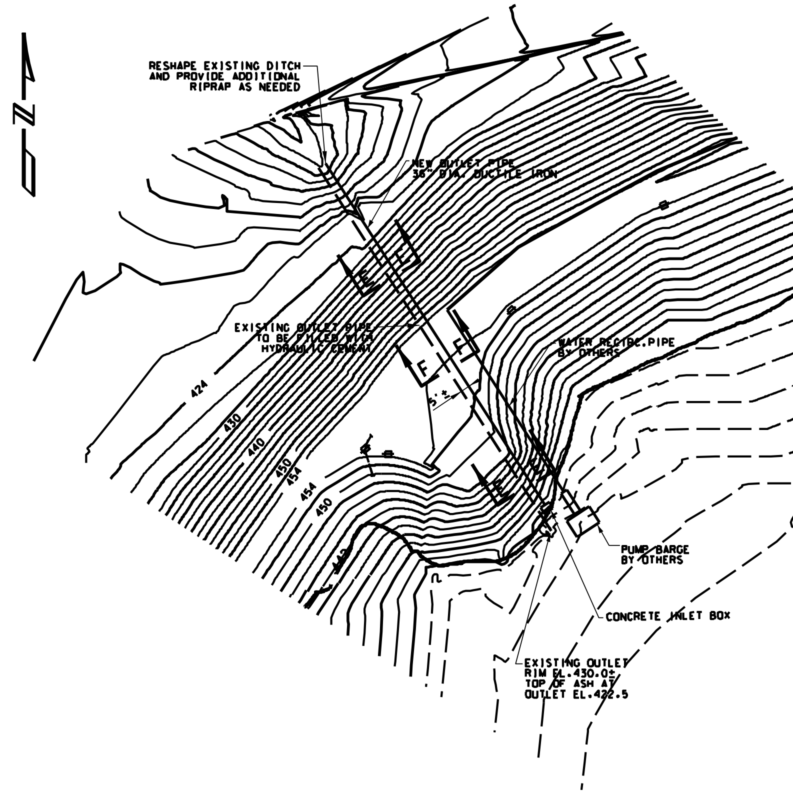
NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0	11-28-2012	FOR RECORD, P.S.# 49427	C. FLAMINI	T. PITSCH							

SCALE:	NONE	
DWN.	ALS	DATE 10-04-2012
CHK.	T.M.P.	DATE 10-04-2012
APPV.	D.J.D.	DATE 10-04-2012

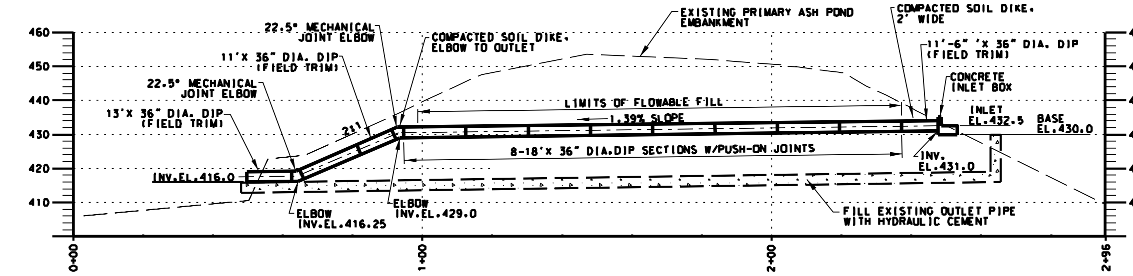
DYNEGY

BOTTOM ASH POND DIKE IMPROVEMENTS
STORM AND EROSION CONTROL DETAILS SHEET 2
BALDWIN ENERGY COMPLEX UNIT 2
DYNEGY MIDWEST GENERATION

PROJECT NO.: 12160-115
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C1038
REV. 0

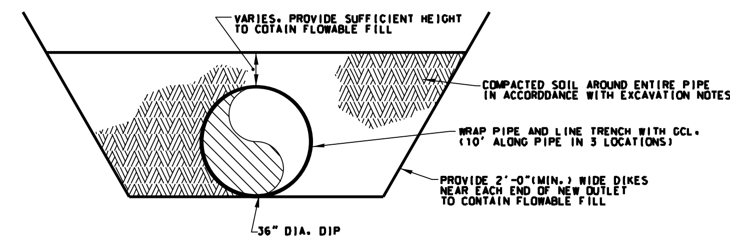


DETAIL OF FINAL DISCHARGE PIPE

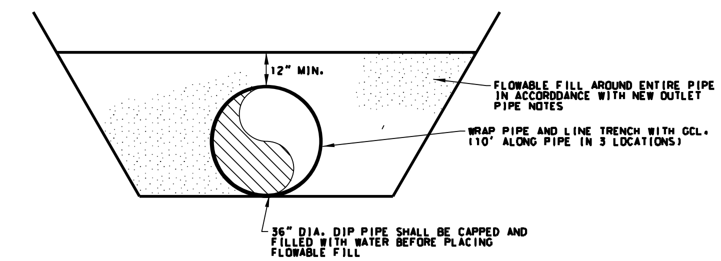


SECTION THRU FINAL DISCHARGE PIPE

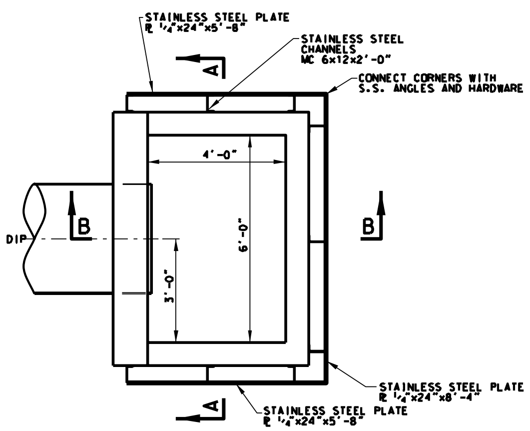
SCALE: 1"=20' HORZ : 1"=20' VERT



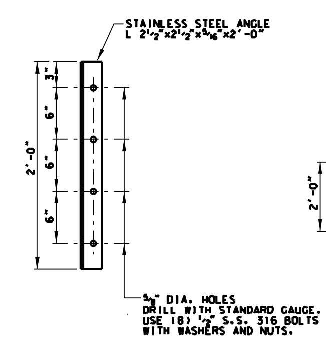
SECTION "E-E"
N.T.S.



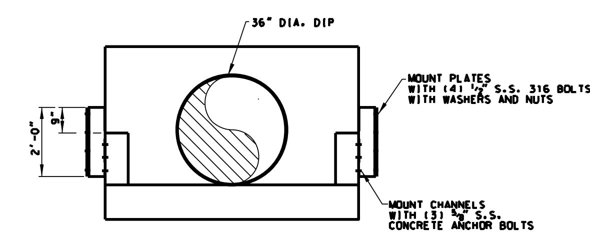
SECTION "F-F"
N.T.S.



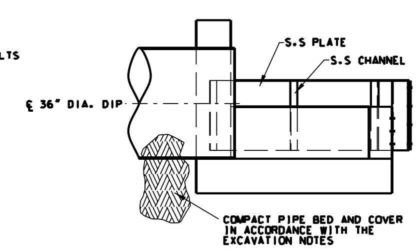
PLAN VIEW



S.S. CORNER ANGLES
SCALE: 1 1/2"= 1'-0"



SECTION "A-A"



SECTION "B-B"

ASSEMBLY - CONCRETE INLET BOX AND SKIMMER

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

CONSTRUCTION NOTES and SPECIFICATIONS

GENERAL

Except as noted otherwise, the Contractor shall furnish all labor, material, tools, and equipment necessary for concrete work shown on the drawings and specified herein.

All work shall be performed in accordance with applicable ACI, OSHA and other applicable guidelines. This work shall also be performed under the personal and constant supervision of a competent Construction Superintendent or Foreman experienced in concrete work, earthwork and general construction activities.

The General Conditions, Safety and Environmental Performance, Earthwork, Riprap, Seeding and Permits sections of the previously provided SPECIFICATION FOR VERTICAL EXTENSION OF EXISTING INTERMEDIATE EMBANKMENT AT PRIMARY ASH POND are applicable to this additional work and shall be considered as part of these Construction Notes and Specifications.

EXCAVATION

All excavated materials shall be stockpiled on-site for re-use. All affected areas shall be returned to its former condition.

Compaction requirements for all phases of the work shall be 95% or greater of the maximum dry density and within ±3% of the optimum moisture content as determined by ASTM D698 (commonly referred to as the Standard Proctor test).

REINFORCING

Reinforcing bars shall conform to ASTM A615, Grade 60 unless otherwise noted on the foundation drawings. All reinforcing shall be free from hard rust, dirt and oil.

All bars shall be bent accurately, placed in position as shown on the drawings, securely tied with #16 gauge black, annealed wire at all intersections, and securely held in place by spacers, chairs, or other approved supports in accordance with ACI 315R. At time of placing concrete, all reinforcing shall be free of loose rust, scale, oil, paint, mud, or other coatings, which will destroy or reduce the concrete bond. Unless otherwise shown on the drawings or specified, the spacing, amount of concrete coverage, splicing, and bending of reinforcing steel shall conform to the requirements of ACI 318. All steel shall have a minimum of 3" concrete cover unless otherwise noted on drawings.

CONCRETE MIXES

Two concrete mixes shall be needed for this project. These are for the concrete inlet box and for the existing outlet pipe plug. The concrete mix designs to be used on the project shall be supplied to the Company by the Contractor 3 days prior to any concrete placement at the job site. All materials incorporated into the concrete mix shall be identified by brand name, gradation, and the supplier.

Type II Portland cement shall be used for the concrete inlet structure. The plug for the existing outlet structure shall consist of hydraulic cement. Type K, M or S Portland cement shall be used in the hydraulic cement plug.

All concrete shall have a minimum compressive strength of 4000 psi at 28 days. Both mixes shall have a maximum water cement ratio of 0.45 (by weight).

All concrete shall have 5 to 7 per cent entrained air.

Concrete for the inlet box shall have a slump of 3 to 4 inches. Concrete for the existing outlet pipe plug shall have a slump of 1 to 2 inches without plasticizer.

Water-reducing admixtures may be used to help meet the above concrete mixture specifications, following admixture manufacturer recommendations.

Ready-Mixed concrete shall be used for all concrete. It shall be mixed and delivered in accordance with the requirements set forth in ASTM C94. The concrete for the outlet pipe plug shall have plasticizer added at the site just prior to final mixing and placement. Final mixing shall be sufficient to fully incorporate plasticizer.

The concrete for the existing outlet pipe plug shall be pumped into the pipe. A tremie tube or hose shall be used to ensure that the concrete fills the entire pipe. Additionally, concrete for the plug shall be placed/pumped continuously until the entire outlet structure is filled. No delays between concrete deliveries shall be allowed.

CONCRETE FINISHES ON EXPOSED SURFACES

Exposed formed surfaces shall be rubbed to the extent of removing small irregularities. Minor voids may be filled with cement mortar. The surface shall not be brush-coated with a cement paste after rubbing.

NEW OUTLET PIPE

Contractor shall install a new outlet pipe through the existing primary ash pond embankment.

Pipe material shall be 36-inch ductile iron pipe, 150-psi pressure class.

The new outlet will consist of approximately 200 feet of straight run pipe and two 22.5° elbows.

Inlet, outlet and elbow invert elevations are shown on the project plans.

Buried, straight run pipe sections shall have push-on joints.

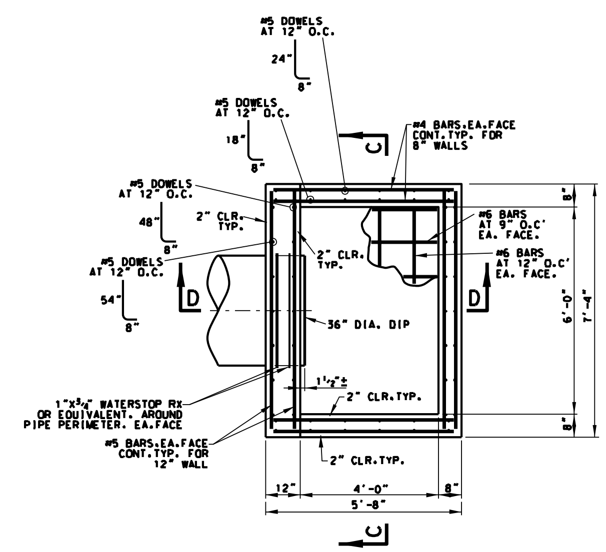
All elbows shall be mechanical joints.

Flowable fill shall be installed as shown on the "Section Thru Final Discharge Pipe".

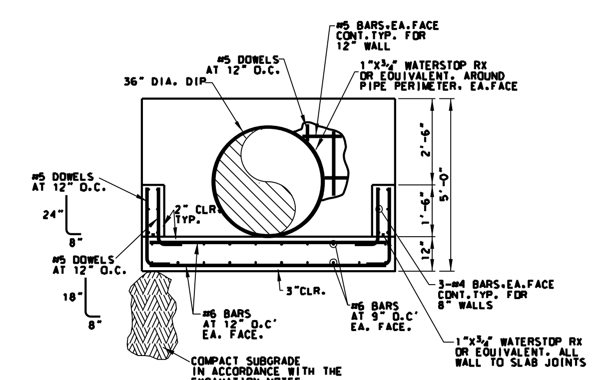
Flowable fill shall consist of a low strength concrete with a max.compressive strength of 300 psi.

Pipe shall be capped and filled with water before placing flowable fill

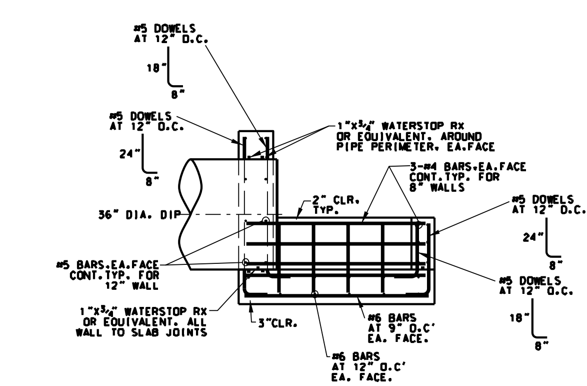
Geocomposite Liner (GCL) shall be Claymax 200R, Bentomat ST, or equivalent.



PLAN VIEW



SECTION "C-C"



SECTION "D-D"

REINFORCING DETAILS - CONCRETE INLET BOX

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

REVISION STATUS: □-CONSTRUCTION ○-RECORD

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
(1)	10-29-99	DEC	ADDED FLOWABLE FILL DETAILS	RCW	RCW	RCW							
(2)	01-27-00	MEC	AS-BUILT - INTERMEDIATE EMBANKMENT, VERTICAL, EXTENTION 1999	RCW	RCW	RCW							

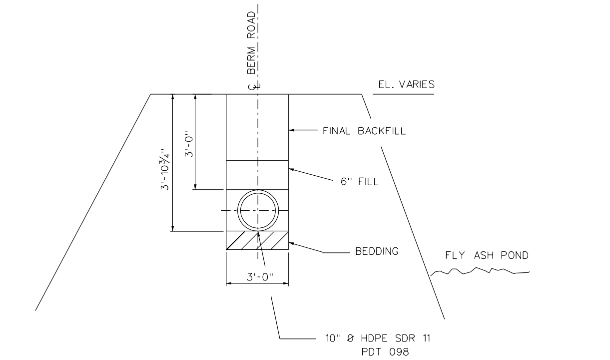
NOTES

REFERENCES

ILLINOIS POWER COMPANY DECATUR		
FINAL OUTLET PIPE REPLACEMENT PRIMARY ASH POND BALDWIN POWER STATION		
DR RKF	CAD RKF	DATE 7-22-99
CK RCW	CKD	SCALE 1"=40'
APP APP	PLOTTED 2-14-2000	E-BAL1-C127

E-BAL1-C127

PLOT SCALE=40



SECTION A-A

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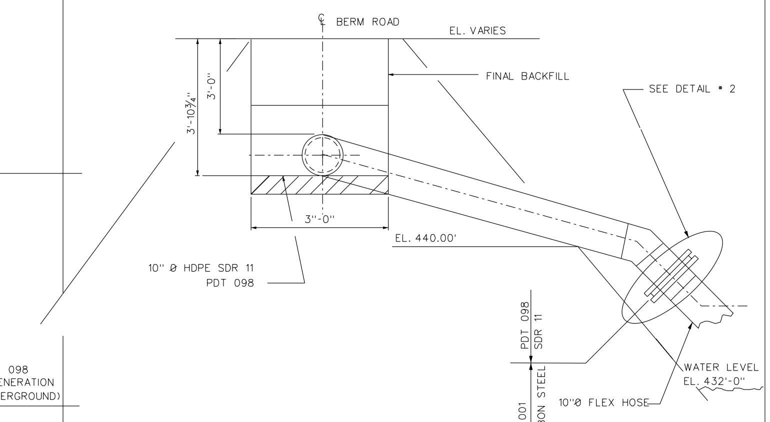

DETAIL # 1

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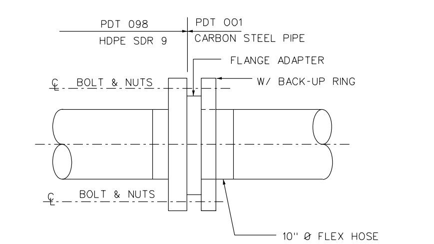


DETAIL # 2

SCALE = NONE

PDT 098 HDPE SDR 9

PDT 098 HDPE SDR 11

HEAT FUSION JOINT

DETAIL # 3

SCALE = NONE

R.L. Rupinskas
6-25-99

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
⓪	06/28/2000	A.T	RECORD REVISION	W.B	R.O	——					W.B	R.O	——

NOTES

1.- ALL DIMENSIONS SHOWN SHALL BE ADJUSTED BY CONTRACTOR TO SUIT INSTALLATION AND FABRICATION TOLERANCES.

REFERENCES

1.- M-2425 FLOW DIAGRAM
2.- M-1077-2 BARGE PUMP PIPING
3.- M-1077-3 WATER PIPING TO MIXING HEAD
4.- (UCC) 510-54671-26 & 27 (SHT. 1 OF 4)

REVISION STATUS
☐ -CONSTRUCTION
○ -RECORD

ILLINOIS POWER COMPANY
DECATUR

PARTIAL PLOT PLAN
POND ASH PIPING
BALDWIN UNIT 1, 2 AND 3

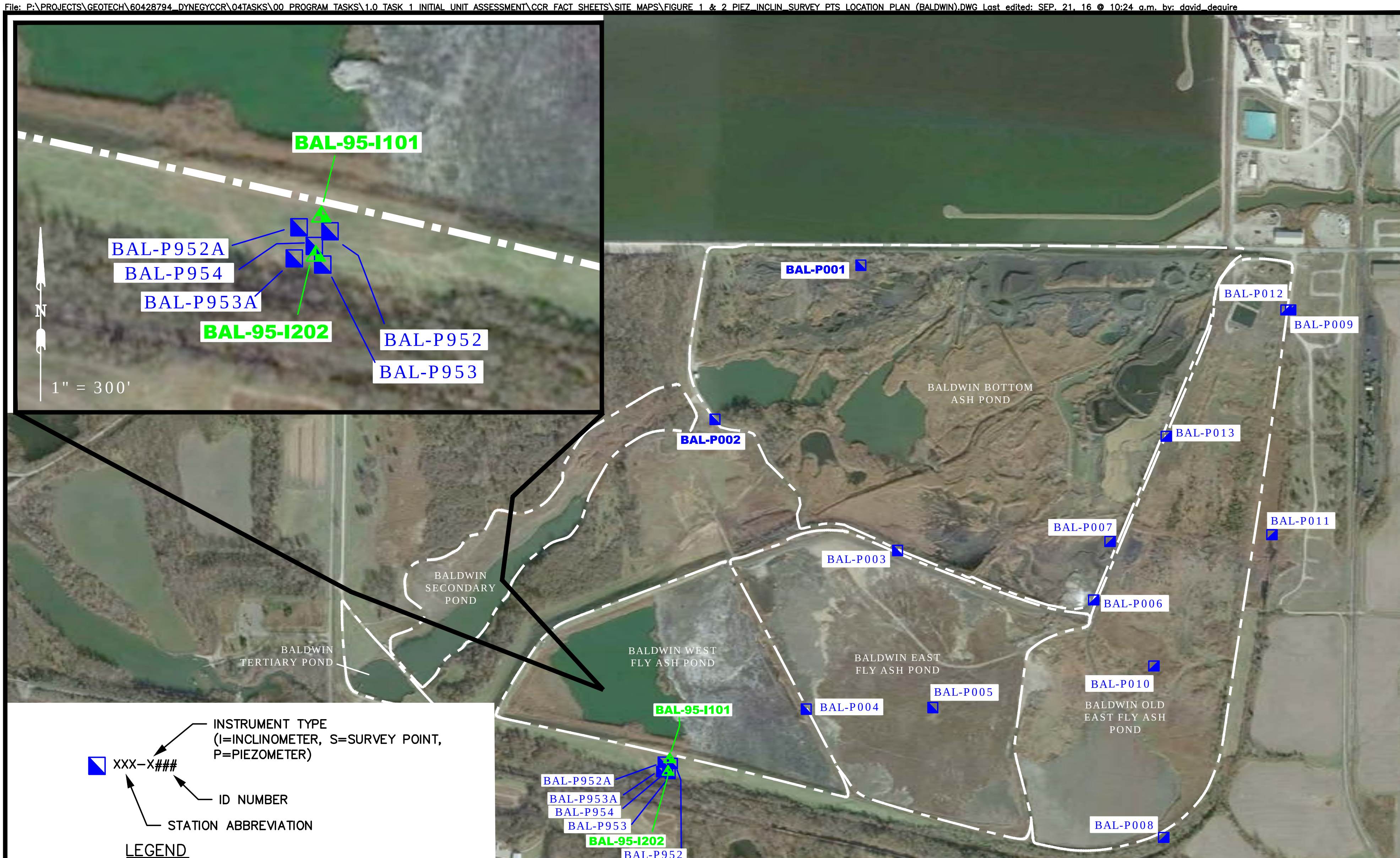
DR	CAD	DATE 11-24-99
OK	CKD	SCALE 1"=300'-0"
APP	PLOTTED	E-BAL1-M1077-1
APP		

FILENAME: M1077-1.DGN

COMPUTER DWG. - DO NOT REVISE MANUALLY

Appendix C: Baldwin Energy Complex Piezometer and Inclinometer Locations

File: P:\PROJECTS\GEOTECH\60428794_DYNEGYCCR\04TASKS\00_PROGRAM_TASKS\1.0_TASK_1_INITIAL_UNIT_ASSESSMENT\CCR_FACT_SHEETS\SITE_MAPS\FIGURE_1_&_2_PIEZ_INCLIN_SURVEY_PTS_LOCATION_PLAN_(BALDWIN).DWG Last edited: SEP. 21, 16 @ 10:24 a.m. by: david_dequire



XXX–X###

INSTRUMENT TYPE (I=INCLINOMETER, S=SURVEY POINT, P=PIEZOMETER)

ID NUMBER

STATION ABBREVIATION

LEGEND

INCLINOMETER LOCATION

PIEZOMETER LOCATION

CCR UNIT BERM ALIGNMENT

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

0 1000

APPROXIMATE SCALE FEET

N

DYNEGY MIDWEST GENERATION LLC	PROJECT NO. 60440739

AECOM

DRN. BY:djd November 2015 DSGN. BY:djd CHKD. BY:kmb	Baldwin Ash Pond Complex Piezometer and Inclinometer Locations	FIG. NO. 2

Appendix D: Specification T-2226

EXHIBIT "B-1"

May 9, 1967

ADDENDUM NO. 1

TO

SPECIFICATION T-2226

(DATED MARCH 28, 1967)

FOR

COOLING RESERVOIR AND ASH POND WORK

BALDWIN POWER STATION - UNIT 1

ILLINOIS POWER COMPANY

With reference to the above Specification, the following revisions shall apply:

1. Proposal Data Form: The following shall apply:

   A. Page 2, Item A4: Insert the words "liming and" before the work "fertilizing".

   B. Page 4, Item L6: For sub-items b, c and d, revise the figures 1/4", 3/8" and 1/2" deep to 1/2", 3/4" and 1" deep, respectively.

   C. Page 7: This page has been revised May 8, 1967, and extra copies are attached. Revision consists of additions to Item 3, Schedule of Work. Also see Item 4D of this Addendum No. 1.

   ALL ADDENDUM ITEMS FOLLOWING COVER REVISIONS TO SPECIFICATION

2. Page 1-1, Article 1-04C, Work Furnished and Installed, or Performed: The following shall apply:

   A. Paragraph C: Revise end of paragraph to read:

      , subdivided as indicated and subject to Base Bid Schedule of Work and Alternate 1 and Alternate 2 Schedules as indicated in Article 1-05:

   B. Subparagraph b, Ash Pond: Revise "culverts" on last line to read "out fall structures".

3. Page 1-2, Paragraph D, Work By Others: Add a new Item c as follows:

   c. Preliminary site work.

4. Starting on Page 1-2, Article 1-05, Schedule of Work: The following shall apply:

   A. Paragraph A, Subparagraph a: In second line, revise "three (3)" to read "two (2)".

   B. Page 1-3, Top of Page: Revise present Item (3), the portion of .... to new Item (2); revise present Item (2), Work on dam and spillways.... to new Subparagraph b; revise present Subparagraphs b and c to new Subparagraphs c and d; and in new Subparagraph d, revise "three (3)" to read "two (2)".

   C. Page 1-3, Paragraph B: Revise entire paragraph to read:

      B. Schedule Dates for Base Bid:

         a. In accordance with foregoing requirements, Contractor shall perform the WORK in accordance with following schedule:

ITEMS	BY DATES BELOW
a. Start WORK at site	May 25, 1967
b. Install observation wells	Before creek at dam site is permanently closed.
e. Complete all WORK, except final seeding (providing that work on dam and spillway is authorized by July 1, 1967, and that Access Pending areas are released for work by October 2, 1967)	December 1, 1967
f. Complete final seeding, subject to conditions indicated in Article 1-05C	May 1, 1968

   D. Page 1-4: Revise Paragraphs C through G to read:

      C. Alternate 1 - Release of Access Pending Areas by ~~May~~ June 1, 1968: Release of Access Pending areas may be delayed beyond October 2, 1967. Contractor shall state, as set forth in Item 3 of the Proposal Data form, the dates by which he would complete work for these two areas, and dates for completing final seeding for these two areas, if these two areas are released by ~~May~~ June 1, 1968.

      D. Alternate 2 - Release of WORK after ~~May~~ June 1, 1968: If any area of WORK is not released to Contractor by ~~May~~ June 1, 1968 and Purchaser does not delete that portion of WORK from the Contract, Contractor will be granted a time extension and an equitable adjustment to the FIRM LUMP SUM PRICE to reflect costs incurred by Contractor due to the delay of portions of WORK beyond ~~May~~ June 1, 1968.

E. Contractor's Schedule of WORK: Within one week after notification of award of Contract, Contractor shall submit, in duplicate, a schedule graphically representing starting and completion dates of each phase of the WORK.

F. Work by Others: Related work by others is scheduled as follows:

ITEMS	BY DATES BELOW
a. Complete initial site clearing	April 15, 1967
b. Earthwork and grading for roadway embankment between river pump house and reservoir area:	
(1) Start WORK	April 15, 1967
(2) Complete WORK	August 1, 1967
c. Preliminary Site Work:	
(1) Start WORK	March 15, 1967
(2) Complete WORK	November 1, 1967

5. Page 1-7, Article 1-09: Revise entire Article to read:

1-09. LINES AND GRADES
As specified in Article 3 of Form 1714. The property lines from which the axes shall be located are indicated on the E. M. Webb Property Line Maps listed in Article 2-03.

6. Page 2-2, under Article 2-02A: Revise title of Drawing B-57 to read:

B-57 Drainage Structure To Doza Creek

7. Page 2-3, Article 2-03, Survey Drawings: In Paragraph B, Item a, revise title to read:

a. Watershed Area NW of Baldwin:

Sheets 1, 2, 2A, 3, 3A, 4, 4A and 5 of 5

8. Page 3-1, Article 3-03B, Initial Clearing Contract: Revise "1'-0" above" to read "at".

9. Page 3-6, under Article 3-06Bd: Revise 3-10 after "Article" in last line to read "5-03".

10. Page 4-1, Article 4-01, Scope: Revise listing for Article 4-03 to read:

    4-03. Liming and Fertilizing:

11. Page 4-1, Article 4-03: Revise heading to read:

    4-03. LIMING AND FERTILIZING

12. Page 5-2, Article 5-03, Portland Cement Concrete Work: The following shall apply:

    A. Paragraph D, Splice Requirements for Reinforcing Bars: In third line, after ACI 318, insert the words ", or those indicated on drawings,".

    B. Paragraph F, Formwork: In third line, delete the words "in curing and".

13. Page 5-4, Paragraph K, Mud Slab: Revise first sentence to read:

    A concrete mud slab, 3 inches thick, shall be placed over foundation of spillway where indicated on drawings.

14. Page 5-6, under Paragraph N, Control Joints: In Subparagraph b, second line, insert "wall" before "control joints".

15. Page 6-2, under Article 6-04: The following shall apply:

    A. Paragraph E, Rubber Sealant Closures: Revise Subparagraph a to read:

       a. Conform to applicable requirements of Form 1755, except depth of sealant in joints shall be equal to width of joint.

    B. Paragraph F, Rubber Control Joint Strips: In second line, insert the word "wall" before "control joints".

16. Page 6-6, under Article 6-09C, Installation: Revise Subparagraph d to read:

    d. Backfill: As specified in Article 7.6 of Form 1714 and as indicated on drawings.

Bidder shall state in his proposal that provisions of this Addendum No. 1 have been covered.

COOLING RESERVOIR AND ASH POND WORK
BALDWIN POWER STATION - UNIT 1
ILLINOIS POWER COMPANY

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EXHIBIT "B-2"
SPECIFICATION T-2226
March 28, 1967

Where Specification is revised by Addendum notation in margin indicates Addendum number and Addendum item which pertains.

SPECIFICATION FOR
COOLING RESERVOIR AND ASH POND

SECTION 1 - SPECIAL CONDITIONS

1-01. PURCHASER: ILLINOIS POWER COMPANY.

1-02. NAME OF PROJECT: BALDWIN POWER STATION - UNIT 1.

1-03. LOCATION OF PROJECT
Near Baldwin, Illinois

1-04. SCOPE OF WORK

A. Contractor shall perform the following WORK for and at the above Station site:

COOLING RESERVOIR AND ASH POND WORK, complete as indicated on drawings and as hereinafter specified.

B. Specification Sections: For convenience of reference, this Specification covering the WORK consists of 6 sections, as indicated in the Table of Contents which forms a part hereof.

C. WORK FURNISHED AND INSTALLED, OR PERFORMED: Contractor shall furnish, deliver, and unload materials for, shall store and remove materials from storage for, and shall construct, erect, install and/or perform and finish the following WORK, subdivided as indicated: ADD.1 Item 2

a. Cooling Reservoir: The portion of the WORK for the Cooling Reservoir will include the following major features: Earth dam, concrete spillways, earth dikes around and within the Cooling Reservoir, grading within the Cooling Reservoir, intake, discharge and drainage channels, drainage ditches around the Cooling Reservoir, concrete box culvert in ditch to Doza Creek, and gravel service roads providing access to and along the crest of the Cooling Reservoir dam and dikes.

b. Ash Pond: The portion of the WORK for the Ash Pond will include the following major features: Earth dikes on two sides of the Ash Pond, corrugated metal and timber outfall structures, earth-rock dikes at outfall structures, and gravel service road providing access to dikes and culverts. ADD.1 Item 2

c. The foregoing WORK includes the following:

(1) Completion of clearing and grubbing (including disposal of material) of areas for embankments, spillway, outfall structures, channels, dikes, reservoir gradings, drainage ditches, service road, and borrow areas.

(2) Diversion and care of water, including temporary cofferdams, channels, flumes, drains, sumps, pumps and all other temporary facilities required to perform the WORK in the dry, and including removal of all such temporary facilities.

(3) Excavation for embankments, spillways, outfall structures, channels, ditches, reservoir grading, and excavation from borrow areas.

(4) Compacted fill for dam and dikes, etc., including foundation preparation, impervious fill, earthfill, sand and gravel fill, gravel fill, riprap, topsoil, seeding, etc.

(5) Concrete spillway and other miscellaneous concrete work.

(6) Gravel service road including foundation preparation and gravel for road on crest of dikes and for access roads to dikes.

(7) All other work as indicated on drawings, as herein specified or as required to properly complete the WORK.

D. WORK BY OTHERS: The following related work will be furnished and delivered, or furnished and installed, or performed, by others:

a. Initial site clearing, consisting of the following:

(1) Cutting all trees 1" in diameter or larger level with existing grade elevations, in Reservoir area, Ash Pond area and Plant area.

(2) Knocking over or cutting of all trees 1" in diameter or larger in dike and dam area.

(3) Disposal and/or burning of all cut and/or knocked down trees, bushes, brush and loose vegetation.

b. Earthwork and grading for roadway embankment between river pump house and reservoir area. ADD.1 Item 3

1-05. <u>SCHEDULE OF WORK</u>

A. General Release of Areas for WORK:

a. It will not be possible for Purchaser to immediately release all areas for the WORK to Contractor since three (3) areas within the limits of WORK will not be owned by Purchaser at the time the WORK begins. These areas, identified on the drawings as "Access pending", are as follows: ADD.1 Item 4

(1) The portion of the Cooling Reservoir including dikes, reservoir grading, and borrow area in the southwest corner of the Cooling Reservoir.

(2) Work on dam and spillways cannot start until Purchaser has secured a flood easement for "Access Pending" areas.

(3) The portion of the ash pond, including dikes, in the northwest corner of the Ash Pond. ADD.1 Item 4

b. Until arrangements have been completed by Purchaser to secure these pieces of property, Contractor shall neither trespass nor perform any work on these pieces of property without securing written approval from Purchaser to proceed with work in these areas.

c. Contractor shall include in the FIRM LUMP SUM PRICE AND FIRM UNIT PRICES all costs which may result from delays in completing the WORK in these three (3) areas.

B. Scheduled Dates:

a. In accordance with foregoing requirements, Contractor shall perform the WORK in accordance with following schedule: ADD.1 Item 4

	ITEM	BY DATES BELOW
a.	Start WORK for Cooling Reservoir....	May 1, 1967
b.	Start WORK for Ash Pond.............	June 1, 1967
c.	Install observation wells...........	Before creek at dam site is permanently closed
d.	Installation of Closure Dike at southeast corner of Cooling Reservoir.........................	Shall be last portion of Cooling Reservoir dike system constructed unless otherwise approved by Purchaser. Do not place any fill for dike before authorization received from Purchaser.
e.	Complete all WORK, except final seeding (providing that areas not owned by Purchaser at time construction is started are released for work by October 1, 1967).......	December 1, 1967
f.	Complete final seeding, subject to conditions indicated in Article 1-05C	May 1, 1968

C. Extension of Scheduled Dates: Should there be any delay in release of areas for WORK that are not owned by Purchaser at time WORK begins, the Scheduled Dates will be extended in accordance with the following provisions providing that the particular areas are released to Contractor for the WORK before May 1, 1968: ADD.1 Item 4

a. If area in southwest corner of Cooling Reservoir has not been released by October 1, 1967, the date for completing WORK in this area will be extended to July 1, 1968.

b. If area in northwest corner of Ash Pond has not been released by November 1, 1967, the date for completing WORK in this area will be extended to June 1, 1968.

D. The date for completing final seeding in areas released after October 1, 1967 will be extended to September 15, 1968 or the end of the first final seeding period following temporary seeding. ADD.1 Item 4

E. Release of WORK after May 1, 1968: If any area of WORK is not released to Contractor by May 1, 1968 and Purchaser does not delete that portion of WORK from the Contract, Contractor will be granted a time extension and an equitable adjustment to the FIRM LUMP SUM PRICE to reflect costs incurred by Contractor due to the delay of portions of WORK beyond May 1, 1968. ADD.1 Item 4

F. Contractor's Schedule of WORK: Within one week after notification of award of Contract, Contractor shall submit, in duplicate, a schedule graphically representing starting and completion dates of each phase of the WORK. ADD.1 Item 4

G. Work by Others: Related work by others is scheduled as follows: ADD.1 Item 4

ITEM	BY DATES BELOW
a. Complete initial site clearing..........	April 15, 1967
b. Earthwork and grading for roadway embankment between river pump house and reservoir area:	
(1) Start Work	April 15, 1967
(2) Complete Work....................	August 1, 1967

1-06. SPECIFIED PRODUCTS AND SUBSTITUTIONS

The BASE BID shall not contain substitutions for Specified Products; see Standard Requirements Form 1707.

1-07. DEFINITIONS

A. See Standard List, Form 1708.

B. Harza Engineering Company is acting as the subcontractor to Sargent & Lundy for design of the WORK under this Specification T-2226.

C. Wherever the terms "approved", "as approved", "satisfactory", "as requested", or other similar terms are used in this Specification, they shall mean "as approved, etc., by the Consulting Engineers", unless otherwise specifically stated.

D. Contractor is herewith designated as the Reservoir Contractor.

1-08. JOB CONDITIONS

A. Examination of Site:

a. Contractor shall visit site during Bid Period to familiarize himself with conditions under which WORK required to be done.

b. Contractor shall consult with Purchaser's Construction Department as to means of access to site of WORK and methods to be used in unloading and bringing materials and equipment onto site.

c. Contractor's plea of ignorance of existing or foreseeable conditions which will create difficulties or hindrances in execution of WORK not acceptable as excuse for any failure on part of Contractor to fulfill in every detail all requirements of Specification and/or drawings. Furthermore, Contractor's plea of ignorance not acceptable as basis for any claim whatsoever for additional or extra compensation.

B. Railroad Facilities: The Gulf, Mobile and Ohio Railroad passes through Baldwin. At present there is no railroad sidetrack at the site.

C. Highway Access:

a. Illinois State Highway 154 passes through Baldwin, and an approved secondary road runs north from Baldwin near the eastern edge of the site.

b. Access roads into and within the site area, if required, shall be furnished and installed by Contractor at his own expense, and shall be located and shall be of construction as approved or as requested by Purchaser.

D. Utilities: Contractor shall provide all necessary electricity, water and compressed air required for his WORK.

E. Toilet Facilities:

a. Contractor shall provide own temporary sanitary toilet facilities required for own work.

b. Contractor shall maintain all toilet facilities in a clean condition whether or not used by other than own employees, provide all necessary towels, paper, etc., and repair and maintain such facilities if and as requested.

F. Office and Storage:

a. Purchaser will provide, free of charge, suitable space for location of Contractor's office, shops and warehouses and for storage of materials and equipment.

b. Purchaser will designate areas available for such use at time Contractor visits job site during bid period. Contractor shall provide any additional facilities required for own use.

c. Contractor shall provide and maintain temporary buildings and associated electrical work required for own use.

d. Prior to erection of any temporary buildings, Contractor shall submit plans to Purchaser's representative for general approval of materials and appearance.

G. Burning of Debris on Premises: Will be permitted, subject to requirements of Article 4.5.2 of Form 1714.

H. Fire Protection: Provide, as specified in Article 4.5.2.5 of Form 1714.

I. Temporary Barricades: The Contractor shall provide all temporary barricades as required for safety.

J. Temporary Heat:

a. Contractor shall provide and maintain all temporary heating and temporary enclosures as required to insure continuous, efficient and uninterrupted execution of WORK.

b. Temporary enclosures shall be weathertight and shall provide for proper access to all work.

c. Temporary heating equipment, operation and maintenance thereof, shall be such as to cause no fire hazard.

K. Identification and Admittance of Workmen: Purchaser's Gate Officers will not be permitted to admit Contractor's or his subcontractors' employees until they have been identified by Contractor's or his subcontractors' delegated representative on the WORK.

L. Station Rules: Abide by any/all rules Purchaser may have in effect at station site pertaining to handling of men, equipment and materials.

M. Removal of Temporary Facilities: Contractor shall remove temporary facilities provided on premises for own use at termination of their usefulness or termination of WORK, or when requested, and shall leave premises in condition satisfactory to Purchaser's representative in every respect.

1-09. LINES AND GRADES

As specified in Article 3 of Form 1714. ADD.1 Item 3

1-10. PROTECTION

Contractor is responsible for protecting all facilities and work in vicinity from damage from his operations. The following are particularly called to his attention:

A. Numerous cased oil, gas, and water wells; various public utility lines; tracks of the Gulf, Mobile, and Ohio Railroad, State Highway Route 154; etc. are within or immediately adjacent to reservoir area.

B. In addition, all or portions of three farms are in the area of the WORK that will not be made immediately available to Contractor. These farms will probably be maintained in operation during the progress of the WORK.

C. Contractor shall provide all necessary protection, as required, as approved, or as requested, to prevent damage to any portions of cased wells, utilities, farms, railroad tracks or highways, and to prevent any interruption of utility or railway services.

D. Contractor shall exercise extreme care to protect all fences outside of areas released for WORK, and to keep farm fence gates closed so as not to permit escape of farm animals.

E. Contractor shall pay costs of any damages arising from Contractor's acts of omission or commission with respect to these requirements.

1-11. MAINTENANCE OF EXISTING ROADS ON PURCHASER'S PROPERTY

A. Maintain all existing roads at site which are indicated to remain as permanent roads, and which are used by Contractor during course of WORK. Provide maintenance as required, as approved and/or requested, and satisfactory to Purchaser in every respect.

B. Provide temporary bridges, as approved and/or as requested, across all road openings which Contractor cuts for WORK and which interfere with movement of traffic (as determined by Purchaser's representative) at site.

C. Replace portions of existing roads cut by Contractor in accordance with requirements hereinafter specified in Section 3.

1-12. PERMITS

A. Purchaser will obtain all State, County, Township and City permits for the WORK.

B. Contractor shall obtain, at his own expense, all other permits required for the WORK in accordance with Article 11 of Purchaser's General Conditions. Contractor shall arrange with Purchaser for Purchaser's representative to accompany Contractor in securing all such permits.

1-13. PERFORMANCE OF WORK

A. The WORK shall be performed using a normal work week of eight hours per day, five days per week, Monday through Friday. However, Contractor in performing the WORK shall adequately man the job and work such hours per day and days per week as may be necessary to meet the construction schedule, such overtime to be at no additional cost to Purchaser.

B. In the event Contractor determines it necessary to schedule his work force more than eight hours per day for five days per week Monday through Friday, he shall consult in advance with Purchaser's representative to make certain that such a schedule will not conflict with other WORK at the job site. Contractor shall bear all costs that may be incurred in procurring and/or maintaining the necessary labor force on the job, including such items as overtime, bonus or premium time, and transportation and living expenses.

COOLING RESERVOIR AND ASH POND WORK
BALDWIN POWER STATION - UNIT 1
ILLINOIS POWER COMPANY

SECTION 2 - DRAWINGS, SUPPLEMENTS AND STANDARD SPECIFICATIONS

2-01. SCOPE

This section of the Specification includes the following, under the Article numbers indicated, which shall apply to the WORK:

2-02. List of Design Drawings (Consulting Engineers')
2-03. List of Survey Drawings
2-04. List of Supplements and Standard Specifications
2-05. Requirements for Contractor's Shop Drawings
2-06. Requirements for Samples

2-02. DESIGN DRAWINGS (CONSULTING ENGINEERS')

A. The following design drawings by Harza Engineering Company and the Consulting Engineers, dated or revised March 28, 1967, form a part hereof:

C12 Location and Project Plan
C13 Dam & Dike Alignment
C14 Location of Exploration, Borrow, and Grading
C15 Boring Logs - Sheet 1
C16 Boring Logs - Sheet 2
C17 Boring Logs - Sheet 3
C18 Boring Logs - Sheet 4
C19 Boring Logs - Sheet 5
C20 Boring Logs - Sheet 6
C21 Boring Logs - Sheet 7
C22 Test Pits & Trenches - Sheet 1
C23 Test Pits & Trenches - Sheet 2
C24 Laboratory Data - Sheet 1
C25 Laboratory Data - Sheet 2
C26 West Dike - Sheet 1
C27 West Dike - Sheet 2
C28 West Dike - Sheet 3
C29 South Dike
C30 Intake Channel
C31 East Dike - Sheet 1

C32 East Dike - Sheet 2

C33 East Dike - Sheet 3

C34 North Dike

C35 Drainage Ditch to Doza Creek

C36 Baffle Dike

C37 Ash Pond Dike - Sheet 1

C38 Ash Pond Dike - Sheet 2

C39 Ash Pond Dike - Sheet 3

C40 Ash Pond Dike - Sheet 4

C41 Dam - Plan

C42 Dam - Sections & Details

C43 Dam & Spillway Excavation

C44 Spillway - Plan & Sections

C45 Spillway - Sections

C46 Spillway - Details

C47 Spillway - Reinforcement - Sheet 1

C48 Spillway - Reinforcement - Sheet 2

B-57 Drainage Structure - Plan and Sections

B-60 Ash Pond Outfall Structures ADD. 1 Item 6

B. The following design drawings by the Consulting Engineers form a part hereof for reference only:

a. General:

B-1 Plan of Test Boring and Initial Site Clearing - Sh 1

B-2 Plan of Test Boring and Initial Site Clearing - Sh 2

B-3 Logs of Test Borings - Sh 1

B-4 Logs of Test Borings - Sh 2

B-5 Logs of Test Borings - Sh 3

B-6 Logs of Test Borings - Sh 4

B-8 Location Plan - Sheet 1

B-9 Location Plan - Sheet 2

b. Preliminary Work Contract:

B-53 Initial Site Development Plan - Plant Area - Sheet 1 - Unit 1

B-54 Initial Site Development Plant Area - Sheet 2 - Unit 1

c. River Pump House Contract:

B-69 River Pump House - Roadway and Grading - Plan

B-70 River Pump House - Roadway and Grading - Sections

2-03. SURVEY DRAWINGS

The following survey drawings are available for reference inspection at the offices of the Consulting Engineers, and prints will be issued to Contractor, after award of Contract, if Contractor so requests:

A. Property Line Maps by E. M. Webb:

Sheet 0 through Sheet 9 - Land Survey Plat

B. Aerial Topographic Survey Drawings by Clyde E. Williams & Associates, Inc., compiled by photogrammetric methods:

a. Watershed Area North of Baldwin:
Sheets 1, 2, 2A, 3, 3A, 4, 4A and 5 of 5 ADD.1 / Item 7

b. Plant Site and Dike Area North:
Sheets 1 and 2 of 2

c. Baldwin Dam Site and Northwest Dike Area:
Sheet 1 of 1

2-04. SUPPLEMENTS, STANDARD SPECIFICATIONS

A. The following are attached hereto and form a part hereof:

a. Supplements:

(1) Form 303-IPCo. General Conditions (12-23-66).
(2) Purchaser's Contract Insurance Provisions dated 4-18-67. These provisions shall prevail in the event of any conflict with corresponding provisions of the General Conditions (Form 303-IPCo). *
(3) Purchaser's Statement of Policy - Field Labor Contracts (11-15-61).

b. Building Standard Specifications:

(1) Form 1701-E - Standard Specification for Welding in Building Construction.

(2) Form 1707-B - Standard Requirements for Specified Products and List of Approved Manufacturers.

(3) Form 1708 - Standard List of Definitions and Reference Publications.

(4) Form 1714 - Standard Specification for Earthwork.

(5) Form 1715-Q - Standard Specification for Concrete Work.

(6) Form 1737-B - Standard Specification for Anchor Bolts.

(7) Form 1742-E - Standard Specification for Miscellaneous Metalwork, Building Work and Embedded Work.

(8) Form 1743-B - Standard Specifications for Crib House Grills, Stop Logs and Gates.

(9) Form 1746-K - Standard Specification for Plumbing Work (pages 1 through 15 only - no Standard Drawings).

(10) Form 1755 - Standard Specification for Rubber Sealants.

(11) Form 1760 - Standard Specification for Carpentry and Millwork.

(12) Form 1790-E - Standard Specification for Prime Coat Painting.

B. Reference to foregoing Standard Specifications elsewhere in this Job Specification and on drawings do not include letter suffix (which indicates latest revision) after form number.

C. In the event of variation between the foregoing Standard Specifications, and the Job Specification or Design Drawings, the Job Specification and Design Drawings shall govern.

2-05. SHOP DRAWINGS (CONTRACTOR'S)

A. Submit shop drawings for approval as follows:

a. As specified in the respective Standard Specifications.

b. Five (5) sets of shop drawings for all fabricated materials included in the WORK, and for which shop drawings are not specified elsewhere.

B. Submit drawings and receive approval of the Consulting Engineers prior to starting any work relating to said drawings.

C. After final approval of the above required drawings, furnish the Consulting Engineers with seven (7) complete sets of approved shop drawings.

2-06. REQUIREMENTS FOR SAMPLES

A. Submit in accordance with Form 1707.

B. Address samples and containers to following:

a. Samples to Purchaser:

Illinois Power Company
500 South 27th Street
Decatur, Illinois
Attention: Mr. A. Kraakevik, Vice President

b. Samples to Sargent & Lundy:

Sargent & Lundy, Engineers
140 South Dearborn Street
Chicago, Illinois 60603
Attention: Mr. S. Rurka

C. Products for which samples are required are hereinafter listed in the last Article of applicable Sections, and these Sections are identified in the Index by the notation "Samples Required".

COOLING RESERVOIR AND ASH POND WORK
BALDWIN POWER STATION - UNIT 1
ILLINOIS POWER COMPANY

SECTION 3 - CLEARING, DEMOLITION, ALTERATION AND EARTHWORK

3-01. SCOPE

This section of the Specification includes requirements for the following, as indicated on the drawings, as hereinafter specified (under the Article numbers indicated), or as required to properly complete the WORK:

3-02. Physical Data

3-03. Clearing, Grubbing, Demolition and Alteration Work

3-04. Diversion and Care of Water

3-05. Excavation

3-06. Fill

3-07. Laboratory Control for Fill Compaction

3-08. Instrumentation.

3-02. PHYSICAL DATA

Physical data indicated on drawings, including topography, boring logs, and laboratory soil test results are furnished for information only, and it is expressly understood that neither Purchaser nor the Consulting Engineers will be responsible for any interpretation or conclusion therefrom. Driller's logs for all borings made at the site and detailed results of laboratory soil tests are available for inspection at the Chicago office of the Consulting Engineers. In addition to the borings made for this WORK, additional borings were made in the area of the Power Station for purpose of plant foundation design. The location and the logs for these supplemental borings are also available for inspection at the Chicago office of the Consulting Engineers. Contractor will be allowed, at his own expense, to collect his own physical data.

3-03. CLEARING, GRUBBING, DEMOLITION AND ALTERATION WORK

A. Scope: Contractor shall complete clearing, and shall grub areas on which the embankments, spillway, outfall structures, drainage ditches, and service roadways will be built and shall complete clearing of areas behind dikes where fill will be placed to raise natural ground level. These requirements do not pertain to clearing and grubbing of borrow areas and Contractor's work areas.

B. Initial Clearing Contract: Initial clearing operations have been conducted within the cooling reservoir area up to property lines or clearing limits indicated on drawings. Trees have generally been cut off 1'-0" above ground level. The uncleared area in ADD.1 Item 8 southwest corner of cooling reservoir, where access is pending, will be cleared by the Initial Site Clearing Contractor as soon as access can be arranged. Where additional clearing is required to construct the WORK, it shall be performed in accordance with the following paragraph "Additional Clearing."

C. Additional Clearing: Where additional clearing is necessary to construct the WORK, conform to applicable requirements of Article 4 of Form 1714, and to following requirements:

a. No clearing shall be done outside of area necessary to construct the WORK without specific approval.

b. Purchaser reserves right to designate any vegetation to be carefully protected from damage by Contractor's operations.

c. Trees: Remove by either cutting within 6" above ground or by uprooting. If trees are uprooted, backfill holes with compacted earthfill as specified in Article 3-06.

d. Grubbing: As specified in Article 4.4 of Form 1714. Contractor shall grub all areas under structures and as indicated on drawings. Explosives may be used. Holes formed by grubbing operations shall be filled with compacted earthfill as specified in Article 3-06.

e. Disposal: As specified in Article 4.5 of Form 1714, except that buried material shall have 2'-0" of cover.

D. Demolition Work:

a. Purchaser may elect to sell certain existing buildings for removal from site. Contractor shall check with Purchaser's representative during visit to site to determine extent of these operations.

b. Contractor shall remove all other existing buildings and fences down to ground level. Foundations need not be removed, but shall be filled to ground level with compacted earthfill as specified in Article 3-06.

E. Altering of Existing Well Casings:

a. A number of cased gas, oil, and water wells are located on Purchaser's property. As indicated on drawings, some of these are located in areas of required excavation or grading. Precautions shall be taken to prevent hitting these wells with construction equipment during excavation or hauling operations in the vicinity.

b. When adjacent ground has been excavated to grade, well casings shall be cut off to grade upon approval of Purchaser's representative. Although wells are plugged, there is a possibility that gas could escape through the plug and provide a potential source of danger should casing be penetrated with a cutting torch. In this regard, casings of all altered wells shall first be vented by removing the cap and/or by making a vent hole with an electric drill bit soaked with oil or water.

c. The wells will be replugged by others under the direction of the Purchaser. The Contractor shall permit unrestricted access to the wells for this purpose.

3-04. DIVERSION AND CARE OF WATER

A. General: Contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, and sumps, and shall furnish, install, and operate all pumps needed for diversion and care of water from any source so that all work can be performed in the dry.

B. Approval of Plans: Contractor's plans for diversion and care of water shall be subject to approval by Purchaser.

C. Responsibility: Contractor shall be responsible for all diversion and care of water and shall repair at his own expense any damage to foundation or structures caused by water from any source regardless of previous approval.

D. Responsibility for Restriction of Natural Drainage by Dikes:

a. Contractor shall not place any fill for dikes across routes of natural drainage until provisions are made to drain surface runoff into reservoir or into drainage ditches forming part of the WORK.

b. No surface runoff shall be ponded or restricted to a greater degree than would have occurred naturally either before the beginning of construction or after completion of the WORK, unless approved by Purchaser.

c. Should ponding or restriction of surface runoff result in water being backed up onto property not owned by Purchaser or onto Purchaser's property where work by other contractors is either under way or completed or where materials or equipment are being stored, all damages resulting therefrom shall be responsibility of Contractor.

E. Temporary Slopes: Temporary construction slopes in excavation or in fill used for diversion channels or cofferdams within an area from 200 feet upstream to 200 feet downstream of center line of dam shall not be steeper than 4 horizontal to 1 vertical, except as indicated on drawings or as approved.

F. Unwatering: Unwatering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of excavated slopes and bottoms of trenches, and will result in all construction operations to be performed in the dry except in approved sumps.

3-05. EXCAVATION

A. Scope: Contractor shall perform all excavation for embankments, spillway, outfall structures, service roads, intake, discharge, and drainage channel, drainage ditches and culverts. Excavation shall conform to applicable requirements of Article 5 of Form 1714, and to requirements hereinafter specified.

B. Definitions:

a. Stripping is defined as removal of sod, topsoil and rubbish in areas indicated on drawings and in borrow areas.

b. Common excavation is defined as all excavation not otherwise defined as stripping, rock excavation, dental excavation, or borrow excavation.

c. Rock excavation is defined as excavation of all solid rock in place which cannot be removed by hand, power shovel, dragline, ripping, or earth moving equipment without continuous and systematic blasting, barring, or wedging. Removal of boulders or individual loose rock, one cubic yard or more in volume, will be classified as rock excavation.

d. Dental excavation is defined as excavation consisting of removal of rock fragments or decomposed materials from seams, joints and solution channels beyond lines of excavation when such removal requires use of hand tools and hand methods. Extent of dental excavation is expected to be small and shall be as requested by Purchaser's representative.

e. Borrow excavation is defined as all excavation in borrow areas, except stripping.

C. Procedures: Excavation may be accomplished by any method and by use of any excavation and hauling equipment adapted to the work. Blasting may be used, subject to requirements of Article 5.11 of Form 1714. All necessary precautions shall be taken to preserve material below bottom of spillway excavation in undisturbed condition. Any damage to work due to Contractor's operations, including disturbance of material beyond lines of excavation, shall be repaired where requested in a manner as approved, and by and at expense of Contractor. Methods of dental excavation shall be such as to avoid fracturing of rock adjacent to material being removed.

D. Limits: All excavation shall be performed to lines and grades indicated on drawings or as requested. Any over-excavation or excess excavation, not requested by Purchaser, shall be at expense of Contractor.

E. Repair of Over-Excavation: Where required or requested to complete work, over-excavation shall be backfilled with materials furnished and placed at expense of Contractor. Underneath embankments, backfill shall consist of impervious fill placed in accordance with Article 3-06. Underneath the portion of the spillway upstream of the drainage blanket, backfill shall consist of impervious fill, placed at optimum moisture content and compacted to 100% standard Proctor maximum density. Downstream of the spillway control structure but upstream of the portion of the stilling basin on rock, backfill shall consist of sand and gravel compacted to 70% relative density. Where rock beneath the stilling basin is over-excavated, backfill shall consist of concrete.

F. Foundation Protection: Finished excavated surfaces shall be protected against damage by movements of construction equipment or other causes. As far as practicable, excavated surfaces shall be protected against erosion by surface runoff. Finished grade on which concrete structures will be placed shall be covered with a drainage blanket or a 3-inch protective concrete layer (mud slab) where indicated on drawings within 24 hours after excavating. Drainage blanket shall also be covered with a mud slab. No traffic shall be allowed on final excavated surface until protective concrete layer (mud slab) has been placed and properly cured. This procedure may be carried out in sections in order to facilitate work.

G. Excavated Materials: Suitable excavated materials may be used as fill or as topsoil if usable and approved. Material excavated from the dam core trench shall be used only as random fill unless otherwise approved. Material may be placed either immediately or may be stockpiled first. Excess excavated material or unsuitable material shall be disposed of in spoil areas within the reservoir where indicated on drawings, in abandoned portions of borrow areas below elevation 425.0, or as approved. Disposal banks shall be sloped to drain and shall not interfere with natural drainage from surrounding land.

H. Borrow Areas: All fill not available from required excavation shall be taken from borrow areas as indicated on drawings or as otherwise approved. Fill for dam shall come from dam and spillway excavation, from Borrow Area A, and from approved required excavation. Purchaser does not guarantee that all material within designated borrow areas will meet requirements of the Specification. Selective loading and placing might be required to produce required quality and uniformity of fill in embankments. At all times during operations in borrow areas, Contractor shall maintain adequate drainage to nearest natural drainage outlet. Sand, gravel, riprap, and rockfill shall not come from areas within Purchaser's property unless otherwise approved.

3-06. FILL

A. Scope: Contractor shall prepare the foundation, furnish, place and compact all fill, and maintain structures in a satisfactory condition at all times until acceptance of the WORK.

B. Foundation Preparation:

a. No material shall be placed until the foundation therefor has been unwatered and suitably prepared and has been approved.

b. Except for areas of abutment blanketing at dam, the earth foundation shall be prepared by leveling and scarifying to a depth of 2 inches. Surface material shall be compacted with, and as part of, the first layer of fill as herein specified for subsequent layers of fill. All existing cavities in foundation shall be filled with compacted earthfill.

c. Areas of abutment blanketing shall be scarified to a depth of 6 inches and compacted with a tamping roller. Where depressions exist, such as holes left from grubbing operations or narrow erosion gullies, they shall be filled with impervious fill and scarified to a depth of 2 inches.

d. Rock surface on bottom of core trench shall be the top of alternating limestone and shale. Contractor shall remove all loose blocks and fragments by barring, prying, and employment of other hand methods which will not further fracture the rock. Rock surface shall be free of overhangs. Local fractured zones shall be removed by dental excavation methods, and backfilled with dental concrete. Dental concrete shall conform to requirements for Class AA concrete in accordance with Article 3-10. ADD.1 Item 9

e. Subgrade under the portion of gravel service roads placed on stripped ground surface shall be scarified to a depth of 4 inches and compacted with heavy pneumatic tired rollers as specified in Article 3-06 Fa "Moisture Content and Compaction - Impervious Fill and Earthfill". To provide a reasonably firm and smooth foundation for overlying gravel surface, grading or rolling with a smooth cylindrical roller may be required.

C. Materials:

a. Impervious Fill: Impervious fill shall consist of fine grained soil as obtained from required excavation or the borrow areas indicated on drawings. Impervious fill shall contain at least 50% material passing No. 200 U. S. Standard Sieve. It shall not contain cobbles or broken rock larger than 5 inches nor shall it contain more than 1% organic material.

b. Clay Fill: Clay fill, used as slope protection on Baffle Dike, shall consist of cohesive, fine grained soil classified by the United Soil Classification System as CL. It shall contain not more than 1% organic material.

c. Earthfill: Earthfill shall consist of fine and/or coarse grained soil from required excavation and borrow areas indicated on drawings. Earthfill shall not contain cobbles or broken rock larger than 5 inches nor shall it contain more than 1% organic material.

d. Random Fill: Random fill shall consist of any soil from required excavation and borrow areas indicated on drawings providing that it does not contain more than 5% organic material.

e. Sand and Gravel Fill: Sand and gravel fill shall consist of a clean, well graded mixture of sand and gravel, crushed stone or crushed gravel conforming to following gradation limits:

(1) Maximum Size: 3 inches.
(2) Between 65% and 85% shall pass 1½ inch U. S. Standard Sieve.
(3) Between 40% and 60% shall pass No. 4 U. S. Standard Sieve.

(4) Between 20% and 35% shall pass No. 30 U. S. Standard Sieve.

(5) Between 15% and 25% shall pass No. 50 U. S. Standard Sieve.

(6) Less than 15% shall pass No. 100 U. S. Standard Sieve.

(7) Less than 5% shall pass No. 200 U. S. Standard Sieve.

f. Gravel for Service Roads: Gravel for service roads on crest of dam, dikes, and elsewhere shall consist of gravel, crushed gravel or crushed stone meeting requirements of Section 29 (Gravel or Crushed Stone Base Course) of the State of Illinois Division of Highways' Standard Specification for Road and Bridge Construction.

g. Gravel Fill: Shall consist of gravel, crushed stone or crushed gravel, reasonably well graded from No. 4 U. S. Standard Sieve to 3 inches. Not more than 15% shall pass No. 4 sieve and not more than 5% shall pass No. 200 sieve.

h. Gravel Drain: Gravel for gravel drain under spillway shall meet criteria specified in ASTM C337 for coarse concrete aggregate. 3/4 inch to No. 4.

i. Riprap:

(1) Riprap shall consist of quarried stone, or other stone, free from structural defects and of approved quality. Stone containing shale, unsound sandstone or any other material which will readily disintegrate under handling and placing or weathering, shall not be used. Any stone which is free from incipient fractures and seams and has given evidence of ability to withstand weathering after long exposure to the elements shall be considered suitable for this purpose. Upon presentation of satisfactory evidence of ability to withstand weathering, such stone may be used without laboratory testing. In case newly quarried stone or stone of questionable weathering quality is proposed, it shall be subjected to the sodium sulphate soundness test and shall show a loss, after five cycles, of not more than 25%. Materials failing this test may be approved if, when subjected to fifty cycles of freezing and thawing, it has a loss not greater than 25%. Soundness method AASHO T104 (ASTM C88), "Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate" or T103, "Method of Test for Soundness of Aggregates by Freezing and Thawing" shall be used. The moist unit weight of riprap shall not be less than 140 pounds per cubic foot.

(2) Riprap shall be reasonably well graded with a gradation conforming to following weight limits (in pounds) for the particular layer thickness:

	Layer Thickness	At least 50% Larger Than	Maximum Size	Minimum Size
(a)	12 inches	40	150	5
(b)	18 inches	90	350	10
(c)	24 inches	160	650	20

(d) The shortest dimension of any stone shall be not less than 1/3 of the longest dimension.

j. Rockfill: Rockfill shall consist of quarried stone or other stone that meets requirements for a 12 inch layer of riprap as specified foregoing.

k. Topsoil: Topsoil shall be obtained from approved stockpiles of materials from stripping for dam, dikes, spillway, borrow areas, reservoir grading or other required excavation, and from other approved areas within limits of reservoir and ash pond. Material shall contain the most fertile loam available from approved sources. Material shall be free from excessive quantities of grass, roots, weeds, sticks, stones, or other objectionable materials.

l. Temporary Slope Protection: Upstream portion of dam below riprap shall be protected from reservoir wave action during reservoir filling by a 12 inch layer of temporary slope protection. This layer shall consist of either clay fill or gravel fill as specified foregoing or rock from required excavation or quarry operations. If rock is used, it does not have to meet the quality requirements for riprap providing that it will not readily disintegrate under handling and placing or during three years of weathering.

D. Equipment:

a. Compaction Equipment: Equipment to be used for constructing various types of fill may consist of any type normally considered suitable to construct embankments for dams or major highways. Main compaction equipment, including heavy pneumatic tired rollers, tamping rollers, segmented pad rollers, vibratory compactors, shall be subject to approval of Purchaser's representative.

b. In addition to the foregoing equipment, Contractor shall have the following equipment available at the WORK:

(1) Power tampers to be used for compaction of material in areas where it is impractical to use a roller or tractor.

(2) A plain cylindrical roller, weighing not less than 1,000 lbs. per lineal foot for rolling the surface of fill smooth for drainage in case of heavy precipitation.

(3) Discs, harrows, and motor graders for drying and maintaining fill.

E. Placing:

a. General. Fills shall be placed to lines and grades indicated on drawings. No brush, roots, sod, or other perishable or unsuitable materials shall be placed in fills. No material shall be placed when either fill material or foundation is frozen.

b. Placing Impervious Fill, Earthfill, and Random Fill.

(1) Fill materials shall be placed in continuous, approximately horizontal layers with moisture content and thickness as specified in Article 3-06F, "Moisture Control and Compaction." Embankments shall be maintained approximately level but with sufficient slope to assure rapid runoff of rainfall.

(2) Distribution and gradation of materials throughout rolled fill shall be such that fill will be free from lenses, pockets, streaks, or layers of material differing materially in texture or gradation from surrounding material. Combined excavation and placing operations shall be such that materials when compacted in the fill will be blended sufficiently to secure the best practicable degree of compaction, impermeability, and stability. Travel on the fill shall be satisfactorily controlled to prevent tracking or cutting fill.

(3) Successive loads of material shall be dumped so as to produce the best practicable distribution of material, and for this purpose locations in earthfill where individual loads shall be deposited may be designated, to the end that more clayey materials shall be placed in areas adjacent to center of embankments and less clayey materials placed toward outside slopes. If the surface of any layer of rolled fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, or has formed a hard overcompacted crust from traffic, it shall be moistened or both moistened and scarified as required before the succeeding layer of material is placed.

(4) When rain is expected, and at the end of each working day, fill shall be rolled with a plain cylindrical roller to form a smooth surface with sufficient slope to cause rapid runoff of rainwater. Before resuming placement, this surface shall be scarified. If, in the opinion of Purchaser's representative, the rolled surface of any layer of earthfill in place is too wet for proper compaction of fill thereon, it shall be removed, allowed to dry, or shall be worked with a harrow, scarifier or other suitable equipment, to reduce water content to the required amount, and then shall be recompacted before the next succeeding layer of fill is placed.

(5) All openings through embankments required for construction and temporary drainage purposes shall be subject to approval, and such openings, if approved, shall be constructed so that side slopes are not steeper than 4 horizontal to 1 vertical. Approach or construction ramps on Cooling Reservoir or Ash Pond face shall be removed and those on outside face shall be removed and/or trimmed, as requested.

c. Placing Impervious Fill on Rock Surface at Bottom of Core Trench:

(1) Immediately prior to placement of impervious fill, rock surface at bottom of core trench shall be thoroughly cleaned of dirt and debris by streams of high pressure air and/or by brooms. Surface shall then be moistened but shall be free of running or standing water. A ½ inch minimum thickness of slush grout shall be broomed onto the cleaned surface of rock. Slush grout shall consist of a mixture of two parts soil to one part cement with a water-cement ratio of about 0.55 by weight. After slush grout has been applied and while it is still plastic and before it has taken an initial set, impervious fill shall be placed and compacted.

(2) Impervious fill shall be hand placed into depressions in foundation area and on top of slush grout and compacted by power tampers until fill is built up over the area to a depth sufficient for operation of roller equipment. Depth of hand placed layers shall be 4 inches and material shall be compacted to the density required for impervious fill under paragraph 3-06F, "Moisture Control and Compaction."

d. Placing Clay Fill Blanket on Baffle Dike:

(1) The layer of clay fill on each side of Baffle Dike may be placed as the earthfill portion of dike is being constructed or it may be placed on the slope of the completed earthfill embankment.

(2) If the surface of any layer of clay fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, or has formed a hard over-compacted crust from traffic, it shall be moistened or both moistened and scarified before the succeeding layer of material is placed.

(3) When rain is expected, and at the end of each working day, clay fill shall be rolled with a plain cylindrical roller to form a smooth surface to cause rapid runoff of rainwater.

e. Placing Sand and Gravel Fill, Gravel Fill and Gravel Drain:

(1) Drawings indicate thicknesses of sand and gravel fill, gravel fill, and gravel drain to be placed in various portions of the WORK.

(2) Method of placing shall be such as not to disturb the foundation on which sand and gravel or gravel layers are placed to the point that drainage efficiency of layer is impaired. Method of loading, hauling and placing shall be such that a uniform, unsegregated layer is obtained.

(3) All fine grained soil that accumulates on surface of sand and gravel fill during construction operations shall be removed before subsequent layers are placed.

f. Placing Gravel for Service Roads: Gravel service roads shall be 6 inches thick and shall be placed in accordance with requirements of Section 29 (Gravel or Crushed Stone Base Course) of the State of Illinois Division of Highways' Standard Specification for Road and Bridge Construction, with the exceptions indicated in Article 3-06F, "Moisture Control and Compaction".

g. Placing Riprap:

(1) Riprap may be placed by dumping and shall be placed on face of sand and gravel layer to the lines and grades indicated on drawings. Placement operations, including handling, stockpiling and transporting, shall be accomplished in such manner as to produce a reasonably well graded mass of rock with minimum percentage of voids, free from objectionable pockets of small stones and clusters of large stones and having a reasonably regular finished surface.

(2) Riprap shall be placed to its full course thickness in one operation, when placed in a layer, and in such manner as to avoid displacing underlying sand and gravel layer more than 3 inches. In no case, however, shall a bulldozer be used in shaping the riprap slope. Average thickness of any layer shall not be less than the full specified thickness required. A tolerance of plus or minus 2 inches from slope lines and grades indicated on drawings will be allowed in the finished surface for riprap in the layer 12 inches thick. A tolerance of plus or minus 3 inches will be allowed in the finished surface for riprap in the layer 18 inches thick. For either layer thickness, extremes of such tolerance shall not occur within areas of less than 100 square feet. Handplacing to a limited extent may be required but only to the extent necessary to secure results specified foregoing.

h. Placing Rockfill: Rockfill shall be placed by dumping to lines and grades indicated on drawings. Placement operations, including hauling, stockpiling, and transporting shall be accomplished in such manner as to produce a reasonable well graded mass of rock with minimum percentage of voids, free from objectionable pockets of small stones and clusters of large stones.

i. Placing Topsoil: Areas to receive topsoil shall be brought to within 4 inches of prescribed final cross-section at all points and finished smooth and uniform before topsoil is applied. Topsoil shall be evenly placed and spread over graded area and rolled, in accordance with paragraph 110.3 of the State of Illinois Division of Highways' "Standard Specification for Road and Bridge Construction."

j. Placing Temporary Slope Protection: Temporary slope protection shall be placed and compacted as specified above for either clay fill, gravel fill or riprap depending on the particular material used.

F. Moisture Control and Compaction:

a. Impervious Fill and Earthfill: Impervious fill and earthfill shall immediately before compaction, have a water content not less than 2% below nor more than 4% above standard Proctor optimum moisture content. Impervious fill and earthfill shall be compacted using a maximum uncompacted layer thickness of 12 inches with either a tamping roller, a heavy pneumatic tired roller or a segmented pad roller to a density of at least 95% standard Proctor maximum density. The only exception to this is for impervious fill beneath and within 15 ft. of spillway which shall be compacted to a density of at least 100% standard Proctor maximum density. In confined areas which cannot be compacted by rollers, equivalent compaction shall be obtained by using power tampers or other approved methods using a maximum uncompacted layer of 4 inches.

b. Clay Fill: Clay fill shall, immediately before compaction, have a water content not less than standard Proctor optimum moisture content nor more than 4% above standard Proctor optimum moisture content. Clay fill shall be compacted using a maximum uncompacted layer thickness of 12 inches with either a tamping roller, a heavy pneumatic tired roller or a segmented pad roller to an average density of at least 95% standard Proctor maximum density for each 1000 cubic yards placed; however, in no case shall density be less than 90% standard Proctor maximum density. After the final layer of clay fill has been compacted, the surface shall be rolled smooth by use of a plain cylindrical roller.

c. Random Fill: Random fill shall, after placing, but before compacting, have a water content not less than 2% below nor more than 6% above standard Proctor optimum moisture content. Random fill shall be compacted using a maximum uncompacted layer thickness of 12 inches with either a tamping roller, a heavy pneumatic tired roller, a segmented pad roller or crawler type tractor to a density of at least 90% standard Proctor maximum density.

d. Sand and Gravel Fill; Gravel Fill, and Gravel Drains:

(1) Sand and gravel fill for drainage blankets under dam, spillway and a portion of the dike system and the gravel drain shall be placed in layers not to exceed 12 inches in thickness after compaction. Sand and gravel shall be thoroughly wet before placing to insure proper compaction. No sprinkling in place will be allowed.

(2) The portion of sand and gravel fill and the gravel drain used for drainage blankets shall be compacted with either a heavy pneumatic tired roller, a vibratory compactor or hand tampers to a density of at least 70% relative density.

(3) Moisture conditioning and compaction of the portion of sand and gravel used as riprap bedding or as channel slope protection and gravel fill will not be required.

e. Gravel for Service Roads: The gravel, crushed stone or crushed gravel used as gravel roadway material shall be moisture conditioned and compacted as specified under Construction Methods (Type A) in Section 29 (Gravel or Crushed Stone Base Coarse) of the State of Illinois, Division of Highways' Standard Specification for Road and Bridge Construction, with the exceptions that layer thickness after compaction may be 6 inches and that vibratory compactors may be used.

f. Rockfill: Rockfill shall be hosed with water during dumping and just prior to compaction. Compaction shall consist of one pass of a crawler type tractor or vibratory compactor.

G. Blanketing of Abutments of the Dam:

a. Where stripped ground is to be covered with an impervious fill blanket, Contractor shall:

(1) Scarify stripped ground surface to a depth of 4 inches.

(2) Compact scarified ground with four passes of a tamping or segmented pad roller.

(3) Place and compact impervious fill blanket as specified foregoing for impervious fill.

(4) Provide a reasonably smooth, dense surface by compacting surface of the top layer of fill with a rubber tired roller or plain cylindrical roller.

b. Where stripped ground is only to be compacted, Contractor shall:

(1) Scarify stripped ground to a depth of 4 inches.

(2) Compact scarified ground with four passes of a tamping roller.

(3) Provide a reasonably smooth, dense surface by compacting the surface with a rubber tired roller or a plain cylindrical roller.

3-07. LABORATORY CONTROL FOR FILL COMPACTION

Verification tests will be performed by a Testing Laboratory retained by Purchaser to ensure compliance with compaction requirements of these specifications. Contractor shall provide unskilled labor and shall otherwise assist Purchaser's representative in having these verification tests made.

3-08. INSTRUMENTATION

Contractor shall furnish and install 15 surface settlement monuments as indicated on drawings. In addition, Contractor shall install 16 observation wells as indicated on drawings and as specified in Article 6-05.

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SECTION 4 - SEEDING WORK

4-01. SCOPE

This section of the Specification includes requirements for the following, as indicated on the drawings, as hereinafter specified (under the Article numbers indicate), or as required to properly complete the WORK:

4-02. General — ADD.1 Item 10

4-03. Fertilizing

4-04. Seeding and Mulching

4-02. GENERAL

A. Contractor shall furnish all materials and perform all operations for both temporary and final seeding to produce a uniform stand of healthy grass where drawings indicate seeded surfaces and/or seeded topsoil.

B. Temporary Seeding and Final Seeding: Temporary seeding, as used herein, covers all items incident to the sowing of the grain or cover crop. Final seeding as used herein covers all items incident to the sowing of grass-seed mixtures for a permanent turf crop.

C. Lines and Grades: Ground preparation shall conform to requirements of Article 110.3 (b) Standard Specifications for Roads and Bridges Construction of Highways State of Illinois. Contractor shall grade the surface as required to assure a neat finished appearance to the lines and grades indicated on drawings.

4-03. FERTILIZING

A. Liming: Agricultural ground lime, conforming to requirements of paragraph 130.6 (Agricultural Ground Lime stone) of the State of Illinois, Division of Highways' "Standard Specifications for Road and Bridge Construction", shall be thoroughly mixed, at the rate of 2 tons per acre, with surface soil before completion of ground preparations. — ADD.1 Item 11

B. Fertilizer:

a. Fertilizer shall consist of Nitrogen, Phosphate and Potassium nutrients.

b. Fertilizer shall be applied at such rate that each acre will receive the following amounts of available units:

(1) Nitrogen 60 pounds

(2) Phosphate (P_2O_5) 100 pounds

(3) Potassium (K_2O) 100 pounds

c. Fertilizer can be placed during ground preparation or mixed with and placed with seed and mulch during final seeding.

d. Condition of fertilizer prior to placing shall be as approved by Purchaser.

4-04. SEEDING AND MULCHING

A. Seed:

a. All seed used shall conform to requirements of paragraph 130.3 (Seeds) of the State of Illinois, Division of Highways', "Standard Specifications for Road and Bridge Construction".

b. Maximum depth of planting shall be 1/2 inch.

c. Seed for temporary cover shall consist of rye grass applied at the rate of 40 pounds per acre.

d. Final seeding where surface is essentially level shall consist of a mixture of the following seeds in the amounts indicated:

Type of Seed in Mixture	Pounds per Acre
(1) Fescue (Kentucky 31 or Alta)	15
(2) Rye Grass, perennial	15
(3) Red Top, solid	8
(4) Lincoln Brome	15
(5) Clover, Alsike (inoculated)	5

e. Final seeding where slopes exceed 4 horizontal to 1 vertical shall consist of a mixture of the following seeds in the amount indicated:

Type of Seed in Mixture	Pounds per Acre
(1) Fescue (Kentucky 31 or Alta)	20
(2) Rye Grass, perennial (cover crop)	15
(3) Red Top, solid	8
(4) Vetch	15
(5) Lincoln Brome	15
(6) Clover, Alsike (inoculated)	5

B. Mulch:

a. Fine mulch, similar or equal to Silva-Fiber as produced by

Weyerhaeuser Company, Tacoma, Washington, shall be placed on any area seeded at the rate of at least 1200 pounds per acre.

b. A course mulch, similar or equal to Slope Protection Blanket as produced by American Excelsior Company, Chicago, Illinois (not necessarily in blanket form) shall be placed on top of the fine mulch at the rate of at least 3000 pounds per acre on all areas with slopes exceeding 4 horizontal to 1 vertical.

c. Mulch shall be smolder resistant and non-toxic to vegetation. It shall not prevent germination of seeds or be injurious to Personnel applying it.

C. Seeding and Mulching:

a. Temporary seeding:

(1) If final seeding cannot be completed during the specified time, Contractor may apply a temporary cover of Rye Grass to help prevent soil from eroding. Rye Grass seed shall be applied at the rate of 40 pounds per acre and may be applied without fertilizer or mulch.

(2) Rye Grass used for temporary seeding shall be uniformly distributed by use of a farm grass seeder.

b. Final Seeding:

(1) Final seeding shall be performed in accordance with paragraph 110.4 (Final Seeding) of the State of Illinois, Division of Highways' "Standard Specifications for Road and Bridge Construction" except for the first sentence in 110.4 (a) seeding time, and 110.4 (c) Fertilizer and Liming.

(2) Final seeding shall be performed between April 15 to June 15 or between August 15 to September 15.

(3) Inoculant shall be applied to vetch seed at suppliers recommended rate at time of seeding. Inoculant shall be applied at three times suppliers recommended rate if vetch seed is mixed with mulch and applied with hydraulic seeder.

c. Mulching: Fine or coarse mulching shall be uniformly distributed over the area at seeding time, using power mulching equipment. Fine mulch may be mixed with the seed and applied with a hydraulic seeder. If the slope being seeded is steeper than 4.0 horizontal to 1.0 vertical, in which case both fine and coarse mulch are to be placed on the slope, mulches shall be distributed separately with the fine mulch placed first.

d. Except as otherwise specified foregoing, methods of preparation of seed beds, fertilizing, mulching, seeding, sprinkling, maintaining, repair, and reseeding as required, will be at option of Contractor. Work shall be considered completed after a uniform and dense stand of healthy grass, free from bare spots and gullies formed by erosion, has been produced in accordance with these specifications.

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SECTION 5 - CONCRETE WORK

5-01. SCOPE

This section of the Specification includes requirements for the following, as indicated on the drawings, as hereinafter specified (under the Article numbers indicated), or as required to properly complete the WORK:

5-02. Asphaltic Concrete Gutters

5-03. Portland Cement Concrete Work

5-02. ASPHALTIC CONCRETE GUTTERS

A. Scope: Contractor shall prepare the foundation and shall furnish and place asphaltic concrete gutters indicated on drawings.

B. Foundation Preparation: Just prior to placing gutters, Contractor shall shape the natural ground or the fill or excavation surface to be covered by asphaltic concrete gutters as indicated on drawings or as otherwise requested. This shaped surface shall be compacted thoroughly and finished to a smooth, firm surface. All soft and yielding or other unsuitable material shall be removed and earthfill as specified in Article 3-06, "Fill", shall be substituted.

C. Materials:

a. Asphalt cement: Asphalt cement shall conform to ASTM D946 "Specification for Asphalt Cement for Use in Pavement Construction." The penetration grade shall be either 60 to 70 or 85 to 100. The amount of asphalt cement to be used in mixture shall be from 6% to 8% of the weight of dry aggregate.

b. Aggregate: Shall consist of a clean, well graded mixture of fine and course aggregate with a maximum size of 3/4 inch conforming to requirements specified in ASTM C33.

D. Preparing Mixture:

a. Mixing shall be done in an approved pugmill type mixer. Pug mill type mixer may be either batch or continuous type.

b. Unless otherwise approved, the asphalt plant supplying asphaltic concrete shall conform to requirements of ASTM D995 "Specification for Requirements for Mixing Plants for Hot Laid Bituminous Paving Mixtures".

E. Placing Mixture:

a. Mixture shall be placed on prepared bed only when foundation is dry and temperature is above 60° F.

b. Mixture shall be placed in one course, compacted to a uniform thickness. Curbs shall be formed as necessary and placed with adjacent paving to form monolithic construction.

c. The course shall be smoothed by raking or screeding and shall be thoroughly compacted by rolling with a power or hand-operated plain cylindrical roller weighing not less than 300 pounds. Curbs and areas that cannot be reached with rollers may be compacted with hand tampers.

d. After compaction, gutters shall be of thickness and cross section indicated on drawings. They shall be smooth and even and of a dense and uniform texture.

5-03. PORTLAND CEMENT CONCRETE WORK

A. Conform to applicable requirements of Standard Specification Form 1715 and to requirements hereinafter specified.

B. Concrete: Class AA (air-entrained) for all work unless otherwise indicated.

C. Cement: After brand and source of cement have initially been approved, changing of brands or source will not be permitted.

D. Splice Requirements for Reinforcing Bars: In place of splice requirements specified in Item (2), Table 15-29, Page 15-6 of Form 1715, splice requirements of ACI 318 shall govern. Reinforcing shop drawing setting plans for the work shall also clearly indicate length of lap for each bar. ADD.1 Item 12

E. Services of Testing Laboratory: Will be furnished by Purchaser, as specified in Article 9 of Form 1715.

F. Formwork: As specified in Articles 5 and 13 of Form 1715, with additional requirement that forms shall be removed as soon as practicable to avoid delay in curing and in repair of surface irregularities. ADD.1 Item 12

G. Consolidation of Concrete: As specified in Article 10.4.5 of Form 1715 and as follows:

a. Concrete shall be placed with the aid of mechanical vibrating equipment, supplemented by hand spading and tamping.

b. Vibrating equipment shall be of the internal type and shall at all times be adequate in number of units and power of each unit to properly consolidate all concrete. Internal vibrators shall maintain a frequency when submerged in concrete of not less than 7000 impulses per minute. In locations adjacent to formed surfaces, concrete shall be vibrated sufficiently until entrapped air bubbles between concrete and forms have had time to emerge from the concrete. Form or surface vibrators shall not be used unless specifically approved.

c. Duration of vibration shall be limited to that necessary to produce satisfactory consolidation without causing objectionable segregation. In consolidating each layer of concrete, vibrator shall be operated in a near vertical position, and vibrating head shall be allowed to penetrate under the action of its own weight and revibrate the concrete in the upper portion of underlying layer. Additional concrete shall not be placed until concrete previously placed has been vibrated thoroughly as specified or requested.

H. Time between Pours: Time between pours shall be defined as the time elapsing from end of striking off one pour to start of placing next one. Unless otherwise requested or approved, minimum time elapsing between adjacent pours shall be not less than 72 hours. Minimum time elapsing between placing successive lifts shall be 72 hours.

I. Time of Pouring the Ogee Section: To insure that final elevation of crest of spillway ogee section will be at normal reservoir elevation, the ogee section shall not be poured until 30 days after remainder of control structure of spillway has been poured and until 30 days after portions of the dam adjacent to spillway control structure have been placed.

J. Curing: As specified in Article 12 of Form 1715, and as follows:

a. All concrete surfaces on or against which concrete is to be placed shall be moist cured. Curing period shall be at least seven consecutive days, except for adjacent or successive pours as hereinbefore specified. All other surfaces shall be either moist cured for seven days or shall be covered with a curing compound. Before actual placement of each pour begins, Contractor shall have on hand and ready to install all equipment and materials needed for curing.

b. Moist curing shall be accomplished as follows:

(1) A continuous (not intermittent) application of water by a system of perforated pipes, mechanical sprinklers, or porous hose.

(2) Or by covering concrete with a 2-inch layer of saturated sand or other material kept wet continuously.

(3) Water for curing shall be clean and free from any element which might cause objectionable staining or discoloration of the concrete.

c. Membrane Curing: As specified in Article 12.4 of Form 1715, and as follows:

(1) Compound shall be applied by spraying in one coat to provide a continuous, uniform membrane over entire area. Coverage shall not exceed 150 square feet per gallon, and on rough areas coverage shall be decreased as necessary.

(2) When curing compound is used on unformed surfaces, application shall be made immediately after finishing operations. When curing compound is used on formed surfaces, surfaces shall be moistened with a light spray of water immediately after forms are removed, and shall be kept wet until surfaces will not absorb more moisture. As soon as surface film of moisture disappears, but while surface still has a damp appearance, curing compound shall be applied. Special care shall be taken to insure ample coverage at edges, corners, and rough spots.

(3) After curing compound has been applied and surface is dry to touch, any required repair of concrete shall be performed. Each repair, after being finished, shall be moistened and coated as specified herein.

(4) Traffic and other operations by Contractor shall be such as to avoid damage to coatings of wiring compound for a period of not less than 14 days. Where it is impossible, because of construction operations, to avoid traffic over surfaces coated with curing compound, membrane shall be protected by a covering of sand or earth not less than one inch in thickness at all times. Protective cover shall not be placed until curing compound is completely dry. Before final acceptance of work, Contractor shall remove all sand or earth in an approved manner. Any curing membrane that is damaged or that peels from concrete surfaces shall be repaired without delay.

K. Mud Slab: A concrete mud slab, 3 inches thick, shall be placed over entire foundation of spillway. Mud slab shall be placed immediately following final excavation to grade for upper part of spillway, and immediately following placement of sand and gravel fill in lower part of spillway. A polyethylene membrane, not less than 0.006" in thickness, shall be placed on top of the sand and gravel or gravel drain, whichever is higher, fill to prevent penetration of concrete paste into the drainage blanket. Concrete mix for mud slab shall be as approved. ADD.1 Item 13

L. Construction Joint Cleaning and Roughening:

a. Cleaning Horizontal Joints: Horizontal construction joints on lifts with relatively open and accessible surfaces may be prepared for receiving next lift by either wet sandblasting or by cutting with an air-water jet, as specified following:

(1) Air-water cutting. Air-water cutting of a construction joint shall be performed after initial set has taken place but before concrete has obtained its final set. Surface shall be cut with a high-pressure air-water jet to remove all laitance and to expose clean, sound aggregate, but not so as to undercut edges of larger particles of aggregate. After cutting, surface shall be washed and rinsed as long as there is any trace of cloudiness of wash water.

(2) Wet sandblasting. When employed in preparation of construction joints, wet sandblasting shall be performed immediately before placing following lift. Operation shall be continued until all unsatisfactory concrete, and all laitance, coating, stains, debris, and other foreign materials are removed. Surface of concrete shall then be washed thoroughly to remove all loose material.

(3) If surface of a lift is congested with reinforcing steel, is relatively inaccessible, or if for any other reason Purchaser's representative considers it undesirable to disturb surface of a lift before final set has taken place, surface cutting by means of air-water jets will not be permitted and use of wet sandblasting or light bush hammering will be required.

b. Cleaning Vertical Construction Joints. Vertical construction joints shall be cleaned by wet sandblasting, as hereinbefore specified, or by light bush hammering.

M. Contraction and Expansion Joints: Contraction and expansion joints shall be located respectively in floor and wall of spillway, as indicated on drawings. Direction of keys in floor slab only may be reversed upon approval. Waterstops (see Article 6-04) shall be center dumbbell type. Pre-molded filler (see Article 6-04) shall be placed as indicated on drawings. All faces of joint not covered with a pre-molded filler shall be coated generously to break bond. Curing compound may be used to break bond. Rubber sealant (see Article 6-04) shall be applied in all permanently exposed expansion joints.

N. Control Joints:

a. Control joints shall be constructed as indicated on drawings.

One-half of all reinforcement shall be cut at each control joint. Corrugated metal strips (see Article 6-04) shall be securely fastened to reinforcement and shall be coated on one side to break bond. Flat dumbbell waterstops (See Article 6-04) shall be installed as indicated on drawings. It will be at option of Contractor whether to place concrete continuously through joint or whether to interrupt placing and to form a construction control joint.

b. Rubber control joint strips (see Article 6-04) shall be used at exposed faces of all control joints. ADD.1 Item 14

O. Finishes and Finishing:

a. General: Types of finishes to be given various surfaces shall be as specified herein or as indicated on drawings. Surface irregularities are classified as "abrupt" or "gradual". Offsets caused by displaced or misplaced form sheathing or lining or form sections, or by loose knots in forms or otherwise defective form lumber, will be considered as abrupt irregularities, and will be tested by direct measurement. All other irregularities will be considered as gradual irregularities and will be tested by template. Length of template will be 5 feet for testing of formed surfaces and 10 feet for testing of unformed surfaces. Honeycomb is not considered an irregularity and shall be repaired without cost to Purchaser, wherever it occurs. Contractor shall clean all exposed surfaces of unsightly encrustations and stains.

b. Formed Surfaces Other Than Water Passages:

(1) Surfaces Backfilled: Surfaces upon or against which backfill or concrete is to be placed will require no treatment after form removal except repair of honeycomb and other defective concrete, and specified curing. Corrections or surface irregularities will be required for depressions only, and only for those which impair structural properties of work.

(2) Exposed Surfaces: Exposed surfaces will require no treatment other than that needed for repair of honeycomb and other defective concrete, and specified curing. Surface irregularities shall not exceed 1/4 inch for abrupt irregularities and 1/2 inch for gradual irregularities.

c. Formed Water Passages: Formed surfaces of water passages need no surface treatment other than that needed for repair of honeycomb and other defective concrete, and specified curing. Abrupt irregularities shall not exceed 1/8 inch.

Gradual irregularities shall not exceed 1/4 inch. As an exception to the foregoing, abrupt irregularities normal to direction of flow (with low side upstream of high side) shall be ground smooth.

d. Unformed Surfaces: Types of finish for unformed concrete surfaces are indicated as screed and float. Finishing of unformed concrete surfaces shall be performed by skilled workmen. Surfaces shall be sloped for drainage where indicated on drawings or as requested. Surfaces which will be exposed to weather and which would normally be level, shall be sloped for drainage. Unless use of other slopes or level surfaces is indicated on drawings or otherwise directed, narrow surfaces such as tops of walls and curbs, shall be sloped approximately 3%. Types of finish shall apply as follows:

(1) Screed Finish: Screed finish shall be applied to unformed surfaces that will be covered by backfill. Screed finish shall also be used as first stage of float finishes. Finishing operations shall consist of sufficient leveling to required grade and screeding to produce even, uniform surfaces. Gradual surface irregularities shall be such as not to impair structural properties of work.

(2) Float Finish: Float finish shall be applied to unformed surfaces not permanently concealed by backfill or concrete. Floating may be performed by use of hand or power driven equipment. Floating shall be started as soon as screeded surface has stiffened sufficiently, and shall be minimum necessary to produce a surface free from screed marks and uniform in texture. Gradual surface irregularities shall not exceed 1/4 inch. Joints and edges shall be tooled where indicated on drawings or where requested. Abrupt irregularities normal to direction of flow shall be ground smooth in spillway crest and ogee and apron or where requested.

COOLING RESERVOIR AND ASH POND WORK
BALDWIN POWER STATION - UNIT 1
ILLINOIS POWER COMPANY

SECTION 6 - MISCELLANEOUS METALWORK, EMBEDDED WORK AND MISCELLANEOUS WORK

6-01. SCOPE

This section of the Specification includes requirements for the following, as indicated on the drawings, as hereinafter specified (under the Article numbers indicate), or as required to properly complete the WORK:

6-02. Services of Testing Laboratory
6-03. Welding
6-04. Miscellaneous Metalwork and Embedded Work
6-05. Observation Wells
6-06. Spillway Stop Log Assembly and Bridge Guard Railing
6-07. Spillway Anchor Bars
6-08. Cast Iron Pipe Drains
6-09. Corrugated Metal Pipe Culverts
6-10. Ash Pond Outfall Structures
6-11. Galvanizing
6-12. Cleaning and Painting
6-13. Samples Required

6-02. SERVICES OF TESTING LABORATORY

Will be furnished by Purchaser for inspection of welding, as specified in Article 10 of Form 1701, where deemed necessary by Purchaser and/or the Consulting Engineers.

6-03. WELDING

As specified in Article 8.5 of Form 1742.

6-04. MISCELLANEOUS METALWORK AND EMBEDDED WORK

A. Conform to applicable requirements following Standard Specifications, and to requirements hereinafter specified:

a. Form 1701.

b. Form 1737.

c. Form 1742.

d. Form 1743.

B. Include all applicable work included under Article 4 of Form 1742. Galvanize all ferrous metal, except cast iron and unless otherwise indicated, as specified in Article 6-06.

C. Waterstops:

a. Type and Size: As specified in Article 10.1 of Form 1742.

b. Continuous strips without field splices are preferred, although field splicing in accordance with manufacturer's recommendations, using special fittings and rubber cement, will be allowed. Bends shall have a radius of not less than 6 inches.

D. Premolded Joint Fillers for Expansion Joints:

a. Type: Sponge rubber, as specified in Article 18.1 of Form 1742.

b. Fillers shall be cut and installed as indicated on drawings, with removable strips to provide for rubber sealant closures in joints on all exposed faces.

E. Rubber Sealant Closures:

a. Conform to applicable requirements of Form 1755. ADD.1 Item 15

b. Provide Type A, Thiokol base, for all uses.

c. Color: To match color of adjacent surfaces as closely as possible, unless otherwise indicated.

d. Bond Breaker: Before priming surfaces to receive rubber sealant, cover top of premolded surfaces with plain kraft paper (do not use any adhesive type material) to serve as a bond breaker between rubber sealant and pre-molded joint fillers.

F. Rubber Control Joint Strips: A rubber control joint strip shall be used at exposed faces of all control joints. This filler shall be as indicated on drawings and as manufactured by Williams Form Engineering Corporation. Installation nails shall be clipped flush with outside surface of filler after stripping of form work. ADD.1 Item 15

G. Corrugated Sheet Metal: Corrugated sheet metal installed at all control joints as indicated on drawings shall consist of galvanized 22 gauge steel sheets with a depth of 3/4 inch. Galvanizing shall conform to ASTM A93, using a coating class of 1.25 ounce per square foot. Sheets shall be cut to required widths with no lateral lapping permitted.

6-05. OBSERVATION WELLS

A. Scope: Contractor shall furnish, fabricate and install observation wells as indicated on drawings.

B. Materials:

a. Well Screens: Type 304 Stainless Steel and of the wire wrapped type similar to the drive point as manufactured by Edward E. Johnson, Inc., St. Paul, Minnesota. Length of screen shall be 24 inches. Slot openings shall be 0.010 inch. Outside diameter of drive point shall not exceed 2 inches.

b. Riser Pipe: Standard 1¼ inch galvanized steel pipe. Couplings shall be galvanized. Pipe shall be fitted with a standard galvanized pipe cap with 1/16 inch air hole.

c. Sand Pack: The sand pack around well screen shall be clean, well-graded, fine to coarse sand with a gradation conforming to ASTM C33 for fine concrete aggregate. Sand with a finer gradation, as approved, may be used, providing that less than 85% passes No. 30 U. S. Standard Sieve.

d. Clay Seal: Shall consist of material conforming to requirements for clay fill in Article 3-06, "Fill" or a mixture of sand and bentonite.

C. Installation: Observation wells shall be installed in drill holes as specified following and as indicated on drawings:

a. Drilling: Holes for observation wells shall be drilled to depths indicated on drawings by any rotary drilling method using equipment approved by Purchaser's representative, which will insure proper placement of well screen, riser pipe, and sand pack. Hole diameter shall be determined by Contractor but shall not be less than 4 inches. Drilling muds shall not be used. When drilling below ground water table, Contractor shall keep water level in drill hole above ground water level at all times. Where necessary to keep drill hole open, steel casing with a minimum inside diameter of 4 inches shall be used and casing raised as installation progresses. During drilling for installation of observation wells, Contractor shall take representative jar samples of overburden at 5 foot intervals or closer where there is a distinct change in strata. Holes shall be logged by Contractor and logs shall be submitted to Purchaser's representative.

b. Placement of Well Screen, Riser Pipe and Sand Pack: Prior to placing well screen and riser pipe, sand pack material shall be placed at bottom of well as indicated on drawings. Assembled riser pipe and screen shall then be placed in hole as indicated on drawings so as to avoid jarring impacts and to assure that assembly is not damaged or displaced. Top of riser pipe shall be held at designated elevation during placement of sand pack. The sand pack material shall be added to level indicated on drawings, withdrawing any casing as necessary.

c. Placement of Clay Seal: Clay fill shall be placed to form a clay seal as indicated on drawings, with sufficient hand tamping to assure an impervious seal.

d. Alignment: Each completed well shall be reasonably straight and plumb, with screen and riser pipe centered in drilled hole.

e. Washing: After well has been backfilled, well shall be washed with water or water and air for at least five minutes.

6-06. SPILLWAY STOP LOG ASSEMBLY AND BRIDGE GUARD RAILING
Conform to applicable requirements of Articles 6-02 through 6-04, and to following

A. Galvanized Pipe: ASTM A120 "Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses".

B. Treated Select Structural Grade Timber, Rough Sawn: Section 125 (Timber and Preservative Treatment) of State of Illinois, Division of Highways' "Standard Specifications for Road and Bridge Construction".

C. Cable: The cable fastened to stop logs shall be nylon coated, galvanized aircraft cable as indicated in Catalog No. 72 of McMaster-Carr Supply Co., Chicago, Illinois.

D. Handwheel: The handwheel shall be fabricated entirely from metal. It may be either purchased or fabricated by Contractor, and shall include a secure means of locking the wheel in any position.

E. Flexible Beam Guardrail: As specified in Article 20.9 of Form 1742, and as follows:

a. Metal Thickness: 12 gauge

b. Railing Terminals: Provide standard terminal sections.

6-07. SPILLWAY ANCHOR BARS

A. Scope: Contractor shall drill holes and furnish and install reinforcing bars for spillway anchor bars.

B. Installation: After drilling, anchor bar holes shall be washed and blown out with an air jet until no water or dirt remains in holes. If anchor bars are not to be grouted in place immediately, holes shall be tightly plugged and again washed and cleaned immediately prior to placing and grouting of bars. At time of placing, the hole shall be partially filled with a thoroughly mixed, thick sand-cement grout, having a water-cement ratio of less than 0.9 by volume (0.6 by weight) and a sand-cement ratio of 3 (by weight). The reinforcing bar used as the anchor bar shall be forced into place while being vibrated by a concrete vibrating machine after which any remaining void shall be filled with grout. The entire grouting procedure shall be subject to approval. Grouting of bars shall be done not less than six days in advance of their embedment in concrete. Any bars which are found to be loose after grout has set up shall be removed and reset at no additional cost to Purchaser. Holes into which water is seeping or running shall be grouted upward from the bottom by means of a tremie pipe to prevent dilution of grout.

6-08. CAST IRON PIPE DRAINS

Conform to applicable requirements of Form 1746 and to following:

A. Pipe and Fittings: Cast iron bell and spigot, as specified in Article 4J of Form 1746. Pipe and fittings shall be Class A.

B. Installation:

a. Underneath upstream end of stilling basin floor slab, within gravel drain material, pipe shall be laid with open joints. Ends shall be centered in bell ends of Tee sections, leaving sufficient room for free passage of water but preventing gravel from entering pipe. Outer ends of pipe shall be closed by cast iron plugs or gratings retaining gravel fill.

b. Where located in concrete, joints shall be packed and caulked thoroughly and pipe shall be firmly supported to prevent movement during concrete placing operations.

c. Care shall be taken to avoid clogging of pipe during progress of work. Wooden plugs shall be provided and placed in any temporary openings and in permanent drain outlets. Wood plugs shall be removed after spillway has been completed and all debris has been cleaned out. If any drain should become plugged, it shall be cleaned out in an approved manner, or shall be replaced by and at the expense of Contractor.

6-09. CORRUGATED METAL PIPE CULVERTS

A. Scope: Contractor shall furnish and install all corrugated metal pipe (CMP) culverts and shall place all crushed rock, riprap, and concrete at entrances and exits of culverts as shown on the drawings. Conform to applicable requirements of Form 1746 and to requirements hereinafter specified.

B. Pipe: Double bituminous coated corrugated metal pipe as specified in Article 9 of Form 1746, with addition that pipe also be bituminous paved.

C. Installation: As specified in Article 9 of Form 1746, and as follows:

a. Camber Pipe 1% of height of future overlying fill, unless otherwise indicated.

b. Install piping in trenches excavated through partially completed embankments. Depth of trenches shall be at least 1½ times pipe diameter, and width of trenches shall be about 2 feet wider than pipe diameter.

c. Bed piping to 20 or 25% of its circumference in base foundation.

d. Backfill: As specified in Article 7.6 of Form 1714 and Article 9 of Form 1746. ADD.1 Item 16

6-10. ASH POND OUTFALL STRUCTURES

A. Scope: Contractor shall furnish and install all material comprising the ash pond outfall structures as indicated on drawings. This includes timber access bridge and inlet support frame, concrete work, and corrugated metal pipe for each of the two outfall structures under ash pond dikes.

B. Materials and Installation:

a. Lumber: Preservative Treated Douglas Fir or Yellow Pine as specified in Form 1760.

b. Anchor Bolts, Angles, Nails, Fasteners, and other Materials: Anchor bolts shall conform to applicable requirements of Form 1737. All angles, nails, fasteners, and other metal work shall be hot dipped galvanized.

c. Concrete Work: As specified in Section 5.

d. Corrugated Metal Pipe: As specified in Article 6-09.

6-11. GALVANIZING

As specified in Article 24 of Form 1742.

6-12. CLEANING AND PAINTING

A. Shop Work: As specified in Article 25 of Form 1742.

B. Field Work: Provide as specified in Articles 11, 12, 13, 14 and 17 of Form 1790, as applicable.

6-13. SAMPLES REQUIRED

Submit samples for following materials specified in this Section 6:

A. Waterstops: Standard sample.

B. Expansion Joint Filler: Standard sample.

Appendix E: Baldwin Ash Pond; IDNR Dam Safety Operating and Maintenance Plan

DYNEGY MIDWEST GENERATION, LLC

BALDWIN ENERGY COMPLEX

Baldwin, Illinois

Randolph County

BALDWIN ASH POND

IDNR DAM SAFETY

OPERATING AND MAINTENANCE PLAN

IDNR Dam Identification No. N/A
IDNR Permit No. N/A

October 2013

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1.0 OPERATING PLAN

1.1 Emergency Telephone Numbers

The function of the Baldwin ash pond is for ash disposal for the station. This station is staffed with a full operation crew 24 hours/day, 365 days per year. The first notice of any type emergency to the dam or any portion of the embankments shall be made to the Shift Supervisor on duty (618-785-2294). It shall be the responsibility of the Shift Supervisor on duty to notify:

- Bob Kipp; Managing Director (618-785-3212; Bob.Kipp@dynegy.com);
- Tom Buelter; BEC Production Director, (618-785-3259; Tom.Buelter@dynegy.com);
- Don Crone, Manager Environment & Chemistry (618-785-3244; Donald.Crone@dynegy.com); and
- Nathan Rietz, Manager - Fueling (618-785-2611; Nathan.Reitz@dynegy.com).

One of the above designated personnel shall notify the following state government officials of an emergency condition as well as the following county personnel:

- Illinois Department of Natural Resources; Office of Water Resources; Division of Water Resources Management, Dam Safety Section, Dam Safety Engineers (217-782-3863)
- Illinois Emergency Management Agency, 24-hour service (217-782-7860)
- Randolph County Local Emergency Services & Disaster Agency (ESDA); (618-826-5000, ext. 227; 618-853-2656)
- St. Clair County Local Emergency Services & Disaster Agency (ESDA); (618-277-3012)

The following Dynegy Midwest Generation, LLC and Dynegy Operating Company personnel should then be notified:

- Dan Thompson, Vice President – DMG LLC (618-343-7822; Daniel.P.Thompson@dynegy.com)

- Jeff Biethman, Director Project Engineering (618-343-7742; Jeff.Biethman@dynegy.com)

- Rick Diericx; Senior Director – DOC Environmental Compliance (618-343-7761, 217-519-4034; Rick.Diericx@dynegy.com)

1.2 Responsible Party

The Managing Director and his staff shall be responsible for the operations and maintenance of the Baldwin ash pond. They shall be assisted in areas of inspection, maintenance, and operation, as required, through a contract with an appropriate qualified engineering firm.

1.3 General Description

The ash pond system consists of multiple structures, adjacent to each other. The bottom ash disposal is located on the northeast part of the system. The inactive fly ash pond is located at the southeast end of the system. The active fly ash pond contains a splitter dike and is located to the west. The eastern portion of the active fly ash pond, referred to as the the active primary fly ash pond, is essentially full. The western part of the active fly ash pond is currently in use and is referred to as the active secondary fly ash pond.

The original embankment was constructed in 1969. An inboard embankment raise of the secondary fly ash pond was constructed in 1989. The dikes were constructed mainly using clay from a nearby borrow source. Bottom ash was used to support the 1989 embankment raise on the sluiced fly ash, within the pond interior.

The ground surface varies, with embankment heights ranging from 20 to 60 feet. The elevation of the embankment crests appear to be El. 456 feet, except along the south embankment where the 1995 slide occurred.

Along this section of the 1995 slide, the embankment crest has been lowered to approximately El. 434 feet. A blanket drain was installed at the downstream toe, during the repair phase of the 1995 slide. Also, as a result of the 1995 slide, the water level was lowered to El. 430; and, soil was excavated from the top of the slide. One functional inclinometer and five piezometers, installed in 1995 in the slide area, are periodically monitored.

Water from the ash ponds is directed to a series of settling ponds, at the southwest corner of the site. Drop inlets and pipes also are used to convey water from the eastern part of the active secondary pond to the western side.

Spillways are not installed. However, one seepage berm is located at the final pond.

A pumping station is installed between the bottom ash pond and the secondary pond and is used to pump the bottom slag and bottom ash pond to the cooling pond, when the bottom slag and bottom ash pond reach a certain elevation.

1.4 Ash Pond Monitoring

<u>Weekly Surveillance and Inspection</u>

Inspections shall be made of the dams and outfall structure by BEC personnel.

<u>Quarterly Inspection</u>

Inspections shall be made quarterly by BEC personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration.

<u>Annual Inspection and Surveillance</u>

The annual inspection of the dam and embankments shall be made in the fall of each year by a licensed professional engineer, experienced in performing such inspections. This inspection shall be followed by a verbal and written list of recommendations. Based on the findings and recommendations of the inspection, corrective action shall be taken by the BEC staff, as required, to assure safe and continued operation of the cooling pond.

Procedures and the methods of correction shall be performed in accordance with the recommendations of the professional engineer and as outlined in the maintenance portion of this report. Copies of this engineer's report, along with a listing of the corrective action taken, shall be forwarded to the Environmental Compliance Group office in Collinsville, Illinois. Because the berm is unpermitted, the reports will not be submitted to the Illinois Department of Natural Resources, Office of Water Resources, Division of Water Resources Management in Springfield, IL.

2.0 EMERGENCY ACTION PLAN

A separate Emergency Action Plan (EAP) is currently being prepared. The separate EAP shall be used for emergency response at this facility.

3.0 MAINTENANCE

3.1 General

Regular inspections and repairs as required of the dam, outfall structure, and embankments. These inspections, along with the review and recommendations made by the licensed professional engineer, shall be the basis for all maintenance activities.

3.2 Vegetation

In order to protect and retain vegetation on the slopes of the dam and embankments, fertilizing and reseeding shall take place in damaged or barren areas. This shall be conducted as soon as appropriate after being discovered. Trees and shrubs observed during the inspections shall be cut and removed from the dam, embankments, and spillway.

Routine mowing shall be conducted as needed on the crest of the embankments to facilitate inspections.

3.3 Earth Embankment Seeding

Barren or damaged areas shall be seeded as soon as possible after discovery. Damaged areas shall be filled with topsoil, limed, fertilized, and seeded with tall fescue (18-24”) or smooth brome.

3.4 Method to Ensure Adequate Visual Inspection of the Ash Pond Embankments

The embankments shall be burned if needed to facilitate visual inspection. Utilize a team to walk the embankment to inspect for animal burrows, sloughing, cracks, woody vegetation, and other factors that may threaten the integrity of the cooling pond embankment.

3.5 Animal Damage and Repairs

Animal burrows and holes discovered during inspections shall be backfilled with clay and compacted. Special attention shall be given to animal burrows in the embankments and dam.

3.6 Restriction of Unauthorized Vehicles

The embankments and dam approaches shall be fenced, and signs shall be posted to prevent unauthorized travel on the roadways and slopes.

3.7 Instrumentation

One functional inclinometer and five piezometers, installed in 1995 in the slide area, are periodically monitored - on a semi-annual basis and with formal report submittals - to monitor for any evidence of significant berm movement or settlement.

4.0 Inspection Checklists

The following Inspection checklists should be used during the weekly and quarterly inspections. Beginning in July 2013, formal documentation using these forms will be required.

Baldwin Energy Complex
Ash Pond
***Weekly* Inspection Form**

Dam Location: Baldwin Energy Complex; Randolph County

Owner: Dynegy Midwest Generation, LLC

Permit No.: Unpermitted **Class of Dam:** N/A

Type of Dam: Earthen embankment

Type of Spillway: Drop inlet

Date Inspected: ________________________

Weather Conditions: ____

Pool Elevation: ________________________

Inspection Personnel:

______________________________ ______________________________

Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

Condition Codes:

NE	-	No evidence of a problem.
GC	-	Good condition
MM	-	Item needing minor maintenance and/or repairs within the year, the safety or integrity of the item is not yet imperiled.
IM	-	Item needing immediate maintenance to restore or ensure its safety or integrity. Remediation should be completed within one month.
EC	-	Emergency condition which if not immediately repaired or other appropriate measures taken could lead to failure of the dam. Emergency measures to be implemented as instructed by engineering; such as pool draw down or stoppage of downstream road and rail traffic.
OB	-	Condition requires regular observation to ensure that the condition does not become worse.
NA	-	Not applicable to this dam.
NI	-	Not inspected – (list the reason for non-inspection)

Baldwin Energy Complex
Ash Pond
***Quarterly* Inspection Form**

Dam Location: Baldwin Energy Complex; Randolph County

Owner: Dynegy Midwest Generation, LLC

Permit No.: Unpermitted **Class of Dam:** N/A

Type of Dam: Earthen embankment

Type of Spillway: **Drop inlet**

Date Inspected: ______________________

Weather Conditions: ____

Pool Elevation: ______________________

Inspection Personnel:

______________________________ ______________________

Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Downstream Fill Slopes		
Upstream Fill Slopes		
Unusual Movement or Cracking at or Beyond Toe		
Seepage (Condition/Color)		
Vegetative Cover (Tree growth)		
Animal Damage		
Embankment Erosion		
Water Passages		
Structural Cracking		
Outfall Structures		
Other		

Condition Codes:

NE	-	No evidence of a problem.
GC	-	Good condition
MM	-	Item needing minor maintenance and/or repairs within the year, the safety or integrity of the item is not yet imperiled.
IM	-	Item needing immediate maintenance to restore or ensure its safety or integrity. Remediation should be completed within one month.
EC	-	Emergency condition which if not immediately repaired or other appropriate measures taken could lead to failure of the dam. Emergency measures to be implemented as instructed by engineering; such as pool draw down or stoppage of downstream road and rail traffic.
OB	-	Condition requires regular observation to ensure that the condition does not become worse.
NA	-	Not applicable to this dam.
NI	-	Not inspected – (list the reason for non-inspection)

AECOM

Appendix F: Final Report of Geotechnical Investigation, Baldwin Power Station, Fly Ash Pond South Dike, Baldwin, Illinois, Woodward-Clyde Consultants, Inc. (1995)

Woodward-Clyde

Engineering & sciences applied to the earth & its environment

September 7, 1995
5E08560

Mr. Jeffrey E. Lamb
Senior Project Manager
Illinois Power Company
500 South 27th Street
Decatur, IL 62525

Subject: **Final Report of Geotechnical Investigation**
Baldwin Power Station
Fly Ash Pond South Dike
Baldwin, Illinois
Illinois Power Purchase Order P0900881

Dear Jeff:

This letter transmits our final report for the investigation of the ash pond dike slope failure at the Baldwin Power Station. The report provides our evaluation of the cause of the failure and recommends repair measures. This report supersedes the draft report of June 23, 1995.

We appreciate the opportunity to work with you on this challenging project and will call you to discuss the report within a few days.

Very truly yours,

Thomas L. Cooling, P.E.
Senior Associate

Melvin I. Esrig/mlr

Melvin I. Esrig, P.E., Ph.D.
Senior Consultant

TLC/MIE:mlr

Attachment

Woodward-Clyde Consultants, Inc.
2318 Millpark Drive • Maryland Heights, Missouri 63043
314-429-0100 • Fax 314-429-0462

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The slide occurred in February 1995 on the ash pond south dike over a distance of about 500 lineal feet at a location where the dike is the tallest (55 ft) and crossed a former creek. The dike was constructed in two phases; a 35 ft high compacted clay dike built in 1969, and a 20 ft high "raise" constructed in 1989 on the upstream slope of the older dike. The 1989 raise consists of two materials: 1) bottom ash placed underwater extending to the crest of the older dike, and 2) compacted clay above the bottom ash extending to the current crest. A former haul road consisting of lime treated bottom ash and gravel exists at the crest of the old dike and is hydraulically connected to the bottom ash fill. Both clay dikes were well compacted; the bottom ash is very loose due to underwater placement.

Foundation Materials

The dike rests on a foundation of stiff clayey soils about 20 ft to 30 ft thick overlying weathered shale and limestone bedrock. Over time the surface of the shale has weathered to high plastic clay containing fissures and zones of weakness (slickensides) along which movement has occurred in the past (perhaps ancient landslides). A thin stratum of locally water-washed decomposed limestone and/or glacial till overlies this high plastic clay.

Cause of Slide

The overall slide consists of two portions: shallow and deep. The shallow portion occurred at the contact of the upper clay dike and bottom ash and caused significant damage to the 1989 raise.

The deep slide was not visually apparent at first, but was detected by deep instrumentation. The deep failure plane is located about 70 ft below the existing crest elevation at about the top of the fissured high plastic clay noted above. Prior to raising the pond level in October 1994, the dike was probably close to failure due to the low strength of the clay on the deep failure plane. When the pond level was raised, the deep failure was believed to be initiated by water pressure in the pervious water-washed zone directly above the high plastic clay. It is hypothesized that movement of the dike on the deep failure plane then formed a crack that extended through the clay dikes and bottom ash. As the crack widened, it created a void that was filled by soil and bottom ash migrating into it. This resulted in the upper dike settling. Concurrently the bottom ash and granular haul road permitted hydrostatic pressure equal to the pond head to develop beneath the toe of the upper clay dike. This water pressure lifted the toe allowing the upper clay dike to move laterally. Finally, rainwater in the tension cracks of the failed upper dike aggravated further movement. Lowering of the pond by 6 ft reduced the rate of movement significantly.

Earthquake Considerations

Baldwin is in an area of moderate seismicity. Due to its loose condition, the bottom ash could lose significant strength during earthquake shaking. Such a strength loss, termed liquefaction, could result in post earthquake settlement cracking of the upper dike, failure of the upstream slope of the 1989 raise and probable breaching of the dike where the raise is underlain by significant amounts of bottom ash.

Stability of the Remainder of the South Dike at Full Pond Head

Potential for deep failure (similar to the current failure) exists where the dike is higher than about 35 feet. In addition, the potential for shallow failure exists where bottom ash extends near the downstream slope of the dike. In both areas, the potential exists for earthquake induced liquefaction of the bottom ash.

Interim Repairs

To stabilize the slide area until the permanent repairs can be made, 20+ feet of soil was removed at the crest of the dike for about 600 lineal to reduce the driving forces of the slide. The excavated soil was stockpiled away from the slide area along the downstream toe of the dike for future reuse. This work, completed in July 1995, arrested the slide which had been moving at a rate of about 1/4 inch per day.

Repair Options

Analysis indicates that the most cost-effective method to stabilize the slide is to reduce the water pressure on the failure plane by draining the water-washed zone. Three primary remedial options were developed, two of which focused on drainage. The third option involved rebuilding the dike about 150 ft downstream of its present location. Key details of the three options are summarized below:

OPTION	KEY ELEMENTS	ESTIMATED COST (millions)	REMARKS
Parallel Wall	Cutoff wall, two drain walls pumps in drain walls	$4.3	Lowers groundwater level by pumping from drain walls. Preferred option by IP
Translated Dike	New dike 150 ft downstream of existing dike	$6.1[1]	Passive system (no pumps). May need right of way
HDPE wall	Impermeable cutoff wall of HDPE in center of dike	$5.7	Passive system, lowers groundwater level by very impermeable cutoff wall

[1] Does not include cost of additional right-of-way.

Parallel Wall - the Preferred Option

The Parallel Wall option is preferred by Illinois Power primarily due to cost and because the dike can be maintained along its current alignment with its current shape. Key elements of the Parallel Wall option for areas of potential deep and shallow failure are as follows:

Areas of potential deep failure (1,200 lineal feet)

- A soil-bentonite cutoff wall parallel to the dike constructed near the upstream toe of the dike to cutoff flow through the bottom ash.

- A "drain wall" consisting of drainage backfill such as coarse sand constructed by slurry trench methods using a biodegradable slurry to form a continuous drain. The drain wall will be located downstream of the cutoff wall to intercept seepage along the water-washed layer and seepage that penetrates the cutoff wall. The drain wall will extend about 60 feet deep and will include three pumps that will remove seepage collected by the drain wall. The pumps will operate continuously, but the amount of water to be pumped should be small (a few hundred gallons per minute) because the upstream cutoff wall should significantly retard seepage. During pond closure, a gravity system can be installed to replace the pumps. Pumping is also expected to mitigate the potential for liquefaction of the bottom ash.

- A shallow (25 ft deep) drain wall near the toe of the dike to collect and remove seepage that recharges from the stream. Pumps will be installed in this drain wall, but again the amount of water to be pumped should be small.

- Clay fill to restore the dike to its shape before failure. The clay can be placed when the water pressure at the failure plane has sufficiently drained based on field piezometers measurements.

Areas of Potential Shallow Failure (1,200 lineal feet)

- A soil-bentonite cutoff wall located upstream of the toe of the dike and extending through the bottom ash. This wall will be a continuation of the cutoff wall located in the area of potential deep failure.

- A series of three wells within the bottom ash located immediately downstream of the cutoff wall. The wells will be pumped to drain the bottom ash in order to control the head below the upper clay dike and mitigate the potential for shallow failure as the pond level is raised. Pumping should also mitigate the potential for liquefaction of the bottom ash. Again, the amount of water to be pumped should be small due to the cutoff wall.

Construction Schedule

A tentative construction schedule is to install the cutoff wall, drain walls, and pumps during the Spring and Summer of 1996. The clay fill to restore the dike to its original shape could be done the following Summer or Fall. This would allow about one year for drainage to occur.

Instrumentation

After the repairs are made, instrumentation should be installed within the dike to monitor its performance, especially as the pond level is raised.

Risk

Due to the uncertainties involved, stabilization of landslides involves a greater degree of risk than conventional design. Consequently, the preferred repair involves some risk of poor performance. This risk could be reduced by more conservative design which would involve greater design and construction cost.

FINAL REPORT OF GEOTECHNICAL INVESTIGATION
BALDWIN POWER STATION
FLY ASH POND SOUTH DIKE
BALDWIN, ILLINOIS

1.0 INTRODUCTION

1.1 SCOPE

This report presents results of the geotechnical investigation of the slope failure of the south ash pond dike at Illinois Power's Baldwin Power Station near Baldwin, Illinois (Figure 1). Woodward-Clyde Consultants (WCC) performed this work in general compliance with our proposal of March 29, 1995 and change order request of April 28, 1995. The study was performed under Illinois Power Company Purchase Order number P0900881 dated May 5, 1995. The purpose of the investigation was to address the following key issues:

1. The cause of slope failure.

2. Stability of the remainder of the south dike at the full pond elevation.

3. Recommendations to repair the dike to permit its operation at the full pond elevation.

A draft report was issued June 23, 1995. Subsequently, a meeting of WCC senior-level engineering and construction personnel was held July 21, 1995, at the plant site in an effort to develop other, more cost-effective, repair options than those recommended in the draft report. Two additional repair options, including the 'Parallel Wall" option currently favored by Illinois Power, were developed at the meeting and are discussed and described herein. This report supersedes the June 23, 1995, draft version.

1.2 BACKGROUND

We understand that the original dike forming the 60-acre ash pond was built in the late 1960's. At that time, the dike was built to a crest elevation of about 435$\pm$, resulting in maximum height of about 40$\pm$ ft. The highest portion of the dike, which is in the area of failure, was situated in a former north-south trending stream channel. The dike was raised in 1989 by constructing an addition on the upstream (north) side. Construction was performed and costs reduced by the placement of bottom ash from pond bottom (el. 400$\pm$) up to the crest of the existing dike at about el. 435. Clay was placed above the ash from el. 435$\pm$ to the current crest elevation of 456$\pm$ as shown in Figure 2. Thus, a lower, original dike and an upper, new dike was formed. In the area of the slope failure, the pond has accumulated only a small quantity of fly ash. The normal pool elevation has been maintained during recent years at about el. 432. In October 1994, the pool was raised 6 ft to about el. 438 and maintained there until it was dropped in March 1995.

The following is a chronology of key events relating to the slide:

- February 22, 1995 - 150 ft long crack and a vertical drop in crest elevation (scarp) was found at the crest near Station 2+00[1] and noted by IP personnel. Vertical displacement at the crack, 10 inches.

- March 4 - Vertical displacement at crest scarp, 18 inches.

- March 7 - Vertical displacement at crest scarp, 3 ft. Large crack also noted 60 ft downslope from the crest on the downstream face parallel to the crest. Heavy rains evening of March 6 and morning of March 7.

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[1] Refers to dike stationing established for this study.

*All elevations are in feet and are in NGVD datum.

- March 8 - First visit by WCC. Length of slide is 300 ft, vertical displacement of crest scarp is 3 ft. Crack 60 ft downslope (mid-slope scarp) is about 180 ft long with 1.5 to 2 ft vertical displacement.

- March 13 - Illinois Power begins lowering pond level at a rate of 0.5 inch per hour.

- March 14 - Second WCC visit. 150 ft long crack has formed west of crest scarp. Vertical displacement at crest scarp is 4 ft. Vertical displacement at mid-slope scarp is 3 ft; water visible in mid-slope scarp.

- March 20 - Water level has now been dropped by 6 ft to about el. 436. Movement of slide appears negligible. Heavy rains in late March and April cause some small additional movement.

- April 21 - Inclinometers show that a deep slide is occurring below the dike on a failure plane near el. 385, about 15 ft below the level of the ground surface at the toe of the dike.

- May and June - Crack propagates slowly westward at crest. Failed area about 500 ft long by June 9. Inclinometers indicate the slide is moving laterally at about 1/4 in. per day.

- June and July - Approximately 22 ft of soil was removed from the slide area as an interim repair. Movement along the failure plane during August has been negligible.

2.0
RECORDS REVIEW

As part of our investigation, WCC reviewed design drawings and construction records provided by IP which addressed the original dike construction and the subsequent raise.

A summary list of the records received and reviewed include:

- As-built drawings for the original embankment construction dated November 18, 1969

- Plan and Section Drawings of the proposed south dike embankment addition dated 1-6-81. (However, these design drawings for the proposed south dike addition do not match the 1988 construction drawings and records. The 1981 drawings show the raise made of clay and on the downstream face of the 1969 dike. The 1988 drawings show the raise consisting of clay and bottom ash and situated on the upstream face of the 1969 dike).

- A plan of the South Dike Addition dated May 14, 1986

- Earthwork cut/fill cross-sections dated April 15, 1988

- Specifications for South Dike Addition (W.O. 24579) dated May 1988

- Soil boring and soils testing letter report prepared by Professional Services Industries (PSI) dated August 19, 1988

- Partial soils test data (moisture-density relationship tests) performed by PSI dated August 1988.

2.1 ORIGINAL DIKE DESIGN AND CONSTRUCTION

The original dike was constructed during November 1969 using "earthfill" and "impervious fill" material as shown in the drawings. We presume both types of material were actually low plastic clay fill obtained on-site within the present pond area. The original embankment section had a 15-ft wide crest and 3H:1V side slopes between Station 46+66 and 58+77. (Dike stationing refers to stationing for the original dike construction as shown on construction drawings. The failure area is between Station 50+00 and 57+00.) The crest elevation was el. 435±.

Between Stations 46+66 and 58+77, a 6-inch thick gravel erosion protection layer was placed on the downstream slope surface of the dike between el. 408 ft and 400 ft. A 2-ft thick horizontal sand and gravel blanket drain was placed at the embankment toe and extended approximately 50 ft upstream beneath the embankment. A flat-bottomed drainage ditch was built about 40 ft downstream of the embankment toe. From the embankment toe, the ground surface was sloped at approximately 2 percent towards the drainage ditch. Upstream of the upstream toe at el. 415, the embankment slope transitions at a 6H:1V slope.

Between Station 58+77 and Station 81+00, the side slope changes to 2.5H:1V and the blanket drain was eliminated.

The top of the dike had a 6-inch thick layer of bottom ash surfacing along its entire length.

No construction records were provided documenting placement and compaction of 1969 embankment fill, although tests in this study show that it appears to be well compacted.

2.2 1989 DIKE RAISE DESIGN AND CONSTRUCTION

In 1989, the raise was constructed by first end-dumping bottom ash into the pond against the upstream slope of the embankment and over the fly ash deposited on the pond bottom. The bottom ash created a working platform above the water (Figure 3). The maximum total thickness of this bottom ash material is estimated to be approximately 35 ft. A haul road was built along the top of the original embankment to facilitate construction of the bottom ash working platform. It was constructed by placing a driving surface of bottom ash along the crest of the dike and stabilizing the ash with lime and fly ash. A pozzolonic reaction occurred between the bottom ash and the lime/fly ash, creating a surface resembling a weak concrete. The surface of the bottom ash working platform was placed against the upstream face to el. 436 ft, or approximately 1 ft above the roadway crest. The design indicated that the ash was to be placed to el. 434 ft, or approximately 1 ft below the top of the roadway (Figure 2). The fact that the bottom ash was placed to a level above the crest of the lower dike, plus the presence of the stabilized bottom ash roadway, are important factors in the failure, as noted later.

Within the water-inundated area, between approximately Stations 46+50 and Station 75+00, clay fill was placed directly on the surface of the bottom ash working platform to the crest of the present upper dike (el. 456), a height 20± ft above the original embankment crest.

The downstream slope of the addition was placed as an uninterrupted extension of the original 3H:1V downstream embankment face. (Survey data show that the actual slope is somewhat steeper, about 2.77H:1V) This resulted in the centerline of the upper dike being set back in the upstream direction approximately 60 ft from the original dike centerline. The remainder of the embankment section consisted of a 16 ft wide crest and an upstream face with a 2.5H:1V slope to the top of the bottom ash working platform.

To the east of Station 75+00, the height of the original dike was relatively small and resulted in the toe of the dike being setback relative to the toe of the higher portion of the dike further to the west. Between Station 65+00 and Station 74+00, a transition section was constructed where the dike centerline moved from the setback position to a position to coincide with the original dike centerline (Figure 4). The added height of the addition over the original embankment centerline results in an absence of a setback in the toe of the eastern portion of the embankment relative to the western portion. The cross-sectional template of the eastern portion of the dike matched that of the western portion. Compacted fill within the transition section and that further to the east consisted of clay and was placed directly on the existing ground surface.

Construction records indicate that the bottom ash (type "B" fill) on the upstream side of the lower dike was not compacted except for the top 12 inches, which was compacted to 90 percent of its maximum dry density according to ASTM D698.

The fill for the 1989 raise was borrowed from an area north of the ash pond north dike. It was generally silty clay, although some clayey silt was also used. It was reportedly compacted in lifts to 95 percent of its maximum dry density according to ASTM D698. Field density tests by PSI indicate that the specified level of compaction was achieved for all materials tested, although the actual test locations are difficult to verify.

3.0
SITE GEOLOGY

The site is geologically located upon the western flank of the Illinois Basin as shown in Figure 5. This structure defines both the structural geology and stratigraphy of the region. The Illinois Basin developed as a gradual down-warping of the earth's crust beginning in Cambrian time and continuing through the Pennsylvanian time period. Sediments accumulated within this trough from the advance and regression of ancient seas. The uppermost, Pennsylvanian-aged, sedimentary materials consist of interbedded limestones, claystones, shales, sandstones, and coals. These materials comprise the near-surface bedrock of the Spoon Formation that unconformably underlies the overburden materials at this site. Units of the Spoon Formation within the stratigraphic column encountered at the site include the following members: Vergennes Sandstone Member, Stonefort Limestone Member, Wise Ridge Coal Member, Creal Springs Limestone Member, Granger Sandstone Member, Cheltenham Clay Member, Curlew Limestone Member, Seville Limestone Member, and Assumption Coal Member. These units are typically thin, generally less than 2 feet in individual thickness, and are discontinuous in lateral extent. The Cheltenham Clay Member is of particular interest. It is comprised of the thinning out and merging of several underclay units where the coals, which typically overlie the underclays, are absent. These underclays are composed of high percentages of highly plastic clay minerals that are typically highly expansive and exhibit low shear strength as a result of water softening. All the sedimentary units encountered at the site are moderately to completely weathered due to water softening.

The deep-seated failure in the dike foundation occurred in a shale bed at the top of the sedimentary units. Water softening and weathering of the shale over geologic time reduced the shale strength and thereby contributed to the failure.

The surface topography and morphology of the site is controlled by surface deposits of glacio-fluvial and glacio-lacustrine origin. The Illinoisan aged, Vandalia till of the Glasford Formation was deposited unconformably as an end moraine on the Pennsylvanian-aged bedrock by the retreat of the glacier. The till is comprised of undifferentiated sand, silt, and clay materials. Near the end of the Wisconsinian period, the area adjacent to the Kaskaskia River became temporarily choked with excess sediment load creating a glacial lake. Mapping by the Illinois State Geological Survey indicates the glacial lake was located adjacent to the Kaskaskia River with the blockage occurring at a location within the immediate vicinity of the Baldwin Reservoir. Fine-grained sediments, light gray silts and clays of the Equality formation, were deposited within this slackwater area. Stream flows eventually cut through the sediment blockage and permitted the draining of the lake bed. The inundation of large areas by the glacial lake permitted deep-seated water softening of the clay based materials of the Pennsylvanian shales. Wind-blown, silty clay (loess) deposits 5 to 10 ft in thickness cover sediments of both the Glasford and Equality Formations. These wind-blown materials are classified as the Peoria Loess and Roxana Silt Formations. They form the present day, native surface soils.

3.1 REGIONAL SEISMIC SETTING

The geologic framework of southern Illinois is dominated by the Illinois basin to the east, the Ozark Uplift in southeastern Missouri, and the Mississippi embayment to the south along the Arkansas-Tennessee border. Within the Mississippi embayment to the south of the Illinois basin lies an ancient rift complex, which did not develop sufficiently to separate the continent, but caused the crust of the earth in that region to be greatly fractured and weakened. This rift complex is located in the region called New Madrid, where Missouri, Illinois, Kentucky, Tennessee, and Arkansas converge.

The New Madrid region has been the most seismically active region of central and eastern North America during historical times. In the winter of 1811-1812, three of the largest earthquakes known to occur in the interior of a tectonic plate shook the New Madrid region. These events were felt as far away as New England, a distance of over 1,000 miles. Although instrumental data are not available, a study of damage and felt effects by Nuttli (1973)[2] indicates that the events of December 16, 1811, January 23, 1812, and February 7, 1812 had surface-wave magnitudes (M_s) of about 8.6, 8.4, and 8.7, respectively. Current monitoring indicates that earthquakes of smaller magnitudes continually shake Southern Illinois.

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[2] Nuttli, O.W. (1973). "The Mississippi Valley earthquakes of 1811 and 1812: Intensities, ground motion and magnitudes," Bulletin of the Seismological Society of America, Vol. 63, No. 1, pp. 227-248.

A regional map indicating the epicentral locations of earthquakes having surface wave magnitudes (M_s) of 5 or more from 1811 to 1993 is shown in Figure 6. Superimposed on this figure are the acceleration contours having a 90 percent probability of not being exceeded in 50 years based on USGS data (NEHRP, 1988). This map is also used by Illinois DOT for design of bridges. The acceleration contours correspond to a return period of about 475 years and indicate bedrock acceleration at the site of about of 0.12g. For a larger return period such as 2500 years (considered the "maximum credible" level of shaking by the Uniform Building Code), the estimated bedrock acceleration according to NEHRP is 0.25g. For purposes of this study, we have used an acceleration of 0.12g. IDOT Division of Water Resources considers the site to be in Seismic Zone 2 corresponding to a "moderate probability of damage."

4.0
FIELD INVESTIGATION

The field investigation was conducted in two phases. The first phase was completed between March 17 and April 14, 1995, during which a total of 15 conventional test borings, 23 piezocone penetrometer soundings (CPTU) and 8 exploratory test pits were made. After completion of four of the borings, inclinometer casings were installed to measure lateral movement at depth. In addition, one conventional standpipe piezometer and 4 vibrating wire piezometers were installed to measure pore water pressures.

The exploration was concentrated in the slide area. Exploratory locations were selected along the crest of the existing dike and along the downstream slope, as shown in Figure 7. Borings and CPTU soundings were generally conducted to refusal and varied in depth from approximately 15 to 80 ft. A total of 8 test pits were excavated on the downstream slope of the dike, both in and outside the failure area, to visually assess conditions within the dike. Test pits were generally located at the elevation of the mid slope scarp because soils in that area were originally suspected of being the cause of the failure.

Outside the failure area, borings and CPTU soundings were performed only along the center line of the dike in alternating fashion at horizontal spacings of approximately 250 ft, as shown in Figure 4. Generalized subsurface profiles along the centerline of the dike and normal to the dike through the failed area are given in Figures 4 and 8, respectively.

After completion of the borings in mid-April, inclinometer readings indicated that a deep failure was occurring at approximately el. 385, i.e., approximately 70 ft below the crest of the dike. To further investigate this area, a second phase of explorations was performed from May 3 to May 19, 1995. Two additional borings (B-101 and B-102) with inclinometers and five additional vibrating wire piezometers (P-2A, P-3A, P-4, P-5A, and P-7) were installed. The vibrating wire piezometers were installed at the elevation of the suspected failure plane both within the failed area and outside the failed area to compare pore pressures in those two general locations. Borings B-101 and B-102 were advanced into bedrock by NX coring or a Pitcher Sampler to evaluate quality of bedrock.

Details of the field investigation are given in Appendix A along with the detailed boring logs, CPTU logs, and test pit logs. Inclinometer and vibrating wire piezometer data are given in Appendix C.

5.0
LABORATORY TESTING

Laboratory tests were performed to evaluate the index and engineering properties of subsurface materials. Initially, we suspected that the upper fill materials may have been improperly compacted. Consequently, a significant number of density tests and liquid and plastic limit tests were performed on the dike fill materials, principally the new (1989) dike. Laboratory compaction tests were also performed; two on soil from the new dike and two on soil from the old dike. Gradation and specific gravity tests were performed on the ash material. Finally, consolidated-undrained triaxial tests with pore pressure measurements were made to estimate the undrained and drained strength of the dike materials and certain foundation materials. Direct shear tests were performed on soil samples near the deep failure plane. Testing was concentrated on samples from the failure area; more limited tests were performed outside the failure area. Results of the laboratory tests are given in Appendix B.

6.0
SITE AND SUBSURFACE CONDITIONS

6.1 SURFACE OBSERVATIONS

Initial observations of the slide made in mid-March 1995 indicated significant movement and failure in the new portion of the dike, i.e., the portion above el. 435±, which was constructed in 1989. The ground surface of the failed area appeared to have settled and rotated downward and outward. As noted previously, the main scarp with the largest offset (4 ft in mid-March) was located in the crest of the dike approximately between Stations 1+00 and 3+00. (See photograph 1 in Appendix A.) A crack at the crest was also visible between approximately Stations 0-50 to 1+00 with minimal vertical offset. By June, however, about 1 ft of vertical offset had developed along this crack and it had extended westward to near Station -1+00. At the east end of the slide, the main scarp at the crest turned downstream and extended to nearly the toe. A crack about 50 ft long developed at the southeast corner of the slide and joined the scarp extending down the slope (Figure 7). On the westside, the crest scarp stopped on the downstream slope only a few feet below the roadway at the crest.

Another major feature of the slide was the mid-slope scarp, which developed parallel to the crest at the crest elevation of the original dike, i.e., el. 435±. Soil on the downslope side of the midslope scarp was lifted vertically 2 to 3 ft. It appeared that the upper portion of the dike moved downward and rotated such that it slid slightly beneath the surficial soil at the face of the original dike below el. 435 (see photograph No. 2 and Appendix A). Test pits confirmed this mode of movement.

Except for the crack noted at the southeast corner of the failure, there were no obvious signs of movement below the midslope scarp in March. This crack was judged to be a secondary crack related to the movement of the soil above. No other signs of movement on the lower portion of the dike such as bulging at the toe, significant cracking or movement of trees were noticed in early March.

Inclinometer readings on April 21 indicated that a deep slide was occurring about 70 ft beneath the crest of the dike (el. 385±). Surface observations were made on April 22 to visually check for signs of movement of the old dike. We suspected that the dike was moving laterally into the creek south of the dike, however, no signs of movements were apparent. Later observations in May suggested that the movement was into the creek and that the creek was eroding the toe of the dike and washing it downstream. Heavy rains during April and May aggravated the movements and caused cracks at the crest and elsewhere to widen.

6.2 TEST PIT OBSERVATIONS

Test Pits TP-1 and 2 were hand excavated about 1 ft deep north of the north toe of the upper dike to obtain samples of bottom ash for testing. Test Pits TP-3, 4, and 5 were machine excavated in the failed area across the midslope scarp. Test Pits TP-6 and 7 were excavated outside the failure area at a comparable elevation to TP-3 through 5 to compare conditions outside the failed area to those in the failed area. TP-8 was excavated across the crack at the southeast portion of the failure area. Test pit locations are shown in plan on Figures 4 and 7. Test pit logs and photographs are given in Appendix A.

6.2.1 Test Pits Through Failed Area (TP-3, 4, and 5)

Test pits confirmed that a 1± ft thick granular zone near el. 435 separated the upper and lower portions of the dike and extended to near the downstream face. This zone was presumably the old haul road and consisted chiefly of bottom ash and gravel, with some fly ash and clay. It was apparently lime treated in some areas, making it difficult to excavate (see test pit logs TP-3, 4, and 5 in Appendix A and photos 4, 5, and 6 in Appendix A). This zone was sheared vertically at the midslope scarp and the downslope portion was lifted upward a foot or more with respect to the upslope portion. Water was seen observed from the granular zone indicating that it was relatively permeable with respect to the clays above and below (Photo 7 in Appendix A). In some trenches, the midslope scarp was traced vertically to the bottom of the trench. It was 2 to 3 inches wide and filled with soft clay.

The test pits also verified that the older and newer portions of the dike consist generally of compacted low to medium plastic clay in a stiff to very stiff condition.

Test Pit TP-8 at the southeast portion of the failure area indicates stiff to very stiff low plastic clay fill. The crack at the ground surface extended vertically downward to the bottom of the test pit. It was one to two inches wide and contained very soft clay.

6.2.2 Test Pits Outside the Failed Area

Test Pits TP-6 and 7 were located west and east of the failed area, respectively. Both test pits encountered the old haul road material at the contact between the upper and lower portions of the dike (Photos 8 and 9). No seepage, however, was noted from this zone as it was in the trenches of the failed area. This zone in the non-failed area appeared to be stronger, perhaps treated with more lime than in other areas, causing it also to be less permeable. The granular layer in Test Pits TP-6 and 7 was also nearly level, since it had not been displaced by the slide as in the failed area. The clay fill of the upper and lower dikes was similar in the non-failed areas. At Test Pit TP-6, it appeared that the upper 3 ft of soil was poorly compacted. We suspect this soil was spread over the surface of the slope to regrade and smooth the transition between the old and new dikes.

6.3 SOIL CONDITIONS

Explorations revealed nine key materials comprising the dike and its foundation, as described below and shown graphically in Figures 4 and 8. Key geotechnical data are given in Table 1.

6.3.1 Dike Materials

New Dike

The new dike is composed of generally to medium plastic clays and silty clays with occasional zones of high plastic clay. The undrained shear strength of these materials is generally greater than 1.0 tsf. Two laboratory compaction tests (ASTM D-698) indicate an average maximum dry density of 106.1 pcf and optimum water content of 20 percent. Dry densities determined from

Shelby tube samples were compared with the maximum dry density from the compaction test to determine the percent compaction of the embankment. In general, compaction met or exceeded the 95 percent design criterion, as shown in Figure 9.

Old Dike

Materials of the old dike are similar to the new and consist generally of low and medium plastic clays. The undrained shear strength is typically about 1.0 tsf. The laboratory maximum dry density is 102.4 pcf and the average optimum water content is 22 percent. Based on dry density data from the borings, the lower dike was also generally compacted in excess of 95 percent, as indicated in Figure 9.

Bottom Ash

The bottom ash beneath the new dike has the gradation of medium to coarse sand with traces of fine gravel and contains less than 5 percent silt-size or finer material. The upper two to three feet has generally been well compacted and/or lime treated, causing it to be very strong. In some cases, cone penetration equipment met refusal on top of the bottom ash. Below the upper two to three feet, however, the bottom ash is loose to very loose with Standard Penetration test N-values of about 5. This is consistent with loose placement under water.

6.3.2 Foundation Materials

The native soils forming the dike foundation consist of alluvium, loess, glacio-lacustrine and glacial till deposits, residual high plastic clay (decomposed shale), and interbedded shale and limestone bedrock.

Alluvium (Creek Deposit)

As noted, the failure area occupies a former stream channel. Consequently, the soils directly below that area are alluvium approximately 5 ft thick which can be characterized as a gray clayey silt and silty clay with traces of silty sand and black organics. The alluvium generally has a stiff to very stiff consistency with an undrained shear strength of about of 1.0 tsf.

Loess

Outside of the area occupied by the stream channel, the dike is directly underlain by 5 to 10 ft of loess, a wind deposited silt which has weathered in place to a low to medium plastic silty clay. It is typically brown in color and has a firm to stiff consistency. The existing dam materials are constructed primarily of compacted loess since this was the most probable material exposed at shallow depth in the borrow area. The loess was not found in the borings drilled within the old stream channel.

Glacio-Lacustrine Soils and Glacial Till

The loess and alluvium is underlain by a 5 to 20 ft thick zone of glacio-lacustrine and glacial till soils. The upper portion of the zone is typically glacio-lacustrine, a stiff to very stiff low to medium plastic clay with occasional sand and silty zones. This grades downward to glacial till which is a very stiff to hard medium plastic clay with varying amounts of sand and gravel. Within the glacial till, random pockets of sand and gravel were encountered.

Residual Clay

The glacial till rests upon either a thin moderate to highly weathered limestone stratum or a very stiff to hard high plastic residual clay (decomposed shale) which has formed in-place from weathering of the underlying shale. Inclinometer data indicate that the deep failure is occurring at the contact between the till and the underlying soil or rock. Direct shear tests on samples of the residual clay indicated a residual (large displacement) friction angle of 12°. In Piezometer P-4, a thin zone of gravel that appeared to have had the fine matrix surrounding it washed away by flowing water was encountered at the suspected depth of the failure plane. Borings generally encountered a mixture of silt, clay, and gravel at this contact which may be decomposed limestone bedrock or glacial till that has been sheared by this or past slides.

Limestone and Shale Bedrock

Bedrock exists below the till or residual clay and consists primarily of weathered clay shale with interbedded limestone. Limestone beds are thin, usually less than 1 ft, and slightly to moderately weathered. The upper portion of the shale is clayey, high plastic, highly weathered with low strength, especially along the bedding planes. Slickensides (shiny surfaces of earlier movements) are visible in some samples. Weathering decreases somewhat with depth.

6.4 GROUNDWATER

A total of ten piezometers were installed to measure pore pressure at various depths within and below the dike. With the exception of Piezometer P-1, all were vibrating wire piezometers so the response time would be short in the clayey soils of the embankment and foundation. Piezometer P-1 was a standpipe piezometer installed in the bottom ash to measure pond level. Piezometer P-6 was then installed adjacent to P-1 to a depth of several feet above the bottom ash. Piezometers P-2 and P-3 were installed prior to detection of the deep failure and were installed above the failure zone in either the old dike or the underlying creek deposit. Later, Piezometers P-2A, P-4, and P-3A were installed in the failed area at about the depth of the failure plane. P-5 was located outside the failure area at a comparable depth as P-2 installed within the failure zone. Later, after the deep failure plane was recognized, Piezometers P-5A and P-7 were installed outside the failure area to an equivalent elevation as the failure plane.

The shallow and deep piezometers show different pore pressures, suggesting two groundwater regimes; one in the embankment related to flow through the bottom ash and another in the foundation at depth (Figure 10). At the toe and within the failed area, the pore pressures near the failure plane are higher than those in the embankment, probably because of the presence of the blanket drain.

Outside the failure area, the deep piezometers show water levels similar to those of the deep piezometers in the failed area. The shallow piezometers, however, show a lower head in the unfailed area than in the failed area. This suggests that the ash may be less pervious, perhaps due to lime treatment, producing significant head loss to begin further from the downstream face in the unfailed area than in the failed area. Piezometer data are summarized in Table 2.

6.5 INCLINOMETER AND CRACK SETTLEMENT GAUGE DATA

Inclinometer data are plotted on Figure 11 and indicate that movement near the crest of the dike is occurring at the contact of upper dike and the ash. Further downstream failure is occurring near el. 385, at about the contact between the till and high plastic clay. Inclinometers B-11A and B-12, indicate that movement appears to be occurring in a very thin zone. In the inclinometers in Borings B-101 and B-102, movement occurred over a greater depth. The latter two inclinometers were installed about a month after B-11A and B-12.

Illinois Power installed several crack gauges across the main scarp and mid-slope scarp. The first group were installed in early March when movement was first noted, and a second group was installed after April 21, when the deep slide was noted. Results of these data are presented in Appendix C and on Figure 17. They indicate an average daily settlement of approximately 2.7 inches per day in early March 1995 prior to lowering the pond level 6 ft. The rate of movement dropped to 0.3 inch per day during late April and May. This was comparable to the rate of horizontal movement observed in the inclinometers for that time period. Therefore, lowering the water level 6 ft resulted in about a tenfold reduction in the rate of movement. Movement after the interim repair was negligible as shown in Figure 17.

7.0
DISCUSSION

7.1 CAUSE OF THE FAILURE

Data indicate that initially two slides occurred, one in the upper dike at its contact with the bottom ash, the second in the foundation on the residual clay. Slide movement is very sensitive to water pressures; therefore, lowering the pond 6 ft appeared to reduce the rate of movement by a factor of 10. After lowering the pond, the vertical settlements that were being measured became nearly imperceptible without instrumentation..

Our initial premise of the cause of failure was poor compaction of the upper dike. Test data showed, however, that the upper dike was generally well compacted and had relatively high strength. There was some suspicion of a low strength material at the base of the upper dike, however, none was found.

Another premise was that the pervious haul road fill found in the failure area was an avenue for water to travel from the ash to the face of the dike and to produce pond level hydrostatic head near the toe of the upper dike. This pressure certainly reduced the strength at the toe of the upper dike but calculations did not indicate that failure should occur for a 6 ft head difference.

When the deep failure was detected, we backfigured the strength along the failure plane assuming water pressures on the failure surface equal to the pond level at el. 438$\pm$, the level when failure first occurred. The backfigured friction angle was 15.5 degrees, assuming no cohesion. This low friction angle is consistent with residual (large displacement) friction angles measured in fissured or slickensided high plastic clays and shale such as found at the Baldwin Plant. Such low residual friction angles can develop over time as movement occurs or can be the result of movements that have occurred in the past, such as by former slides, shrinkage or swelling, or stress relief. The geologic history of the area, the overriding of the area by a glacier followed by inundation by a former glacial lake provided the opportunity for such stress relief and for softening of the residual clay and shale. This may have caused an ancient slide in this area or at least produced significant enough movements to reach the residual strength. Compounding the problem of low strength clay (decomposed shale) was the presence of a thin "washed out" zone immediately above the clay. This relatively pervious zone, that appears to have been created by water-washing, allowed pore pressures from the pond to develop at the failure plane. It is clear from the piezometer readings that pore water pressures nearly equal to pond level were (and are) present on the failure surface.

Based on the information to date, we believe the failure occurred as follows:

1. The original dike was near failure prior to raising the water level in October 1994 due to progressive failure or past movement on the low strength clay on the deep failure plane.

2. After the pond level was raised 6 ft, the water-washed zone directly above the failure plane allowed additional head to develop which initiated the failure along the low strength clay. The time needed for the development of these water pressures is unclear because the continuity and permeability of the water-washed zone is unknown. This may account for the delay from October 1994 to February 1995 for the failure to become apparent.

3. As lateral movement occurred, the dike cracked to the depth at the deep failure surface along a near-vertical failure plane within and below the crest. Soil and bottom ash migrated into the resulting crack which allowed a void to develop below the upper dike.

4. After enough movement and loss of ground had occurred, the upper clay dike slumped down to fill the resulting void caused by continued movement. Concurrently, hydrostatic pressure in the bottom ash lifted the toe of the upper dike, allowing the upper dike to slide horizontally below the failed toe area. This created the mid-slope scarp.

5. Lowering the water table slowed the rate of movement but did not stop it. Continuing lateral movement created void space resulting in loss of ground and continued settlement of the failed area.

During this entire process, the heavy Spring rains filled cracks in the failed dike thereby adding to the movement.

7.2 ESTIMATED PERFORMANCE OF THE REMAINDER OF THE SOUTH DIKE

Two potential modes of failure are possible along the south dike similar to those that occurred in the failed area. These are: 1) deep seated failure on the high plastic clay and 2) shallow failures due to hydrostatic pressure in the bottom ash causing uplift of the upper dike.

7.2.1 Areas of Potential Deep Failure

To evaluate the potential for deep failures, we calculated slope stability factors of safety at various locations along the dike, assuming a weak layer at depth. Our calculations indicate that where the height of dike is less than approximately 35 ft, deep failure is unlikely. Based on this, it appears that the potential for deep failure is greatest between stations -6-50 and 5+50 (approximately 1,200 lineal feet).

7.2.2 Areas of Potential Shallow Failure

Shallow failure at full pond head is possible along those portions of the dike where bottom ash is present and near the downstream face. Test borings encountered bottom ash from the west end of the dike to approximately Station 14+00. Design cross sections show ash extending near the face to about Station 13+00. Based on these data, we estimate that failure of the upper portion of the dike due to hydrostatic pressure in the ash could extend from the west end of the dike to about Station 14+00.

7.3 LIQUEFACTION POTENTIAL

Another concern with the bottom ash is the potential for liquefaction; the temporary loss of strength in saturated granular materials due to earthquake shaking. Liquefaction would cause compaction at the bottom ash, settlement and cracking of the upper dike bearing on the ash and the potential for rain-induced lateral movement. We evaluated liquefaction potential based on a bedrock acceleration of 0.12g and a corresponding earthquake magnitude of 6.5. Based on this level of shaking and the strength of the ash estimated from the Standard Penetration Test and cone penetrometer, it is very likely that liquefaction would occur in the bottom ash. For higher levels of shaking, the probability of liquefaction occurring increases.

The consequences of liquefaction vary depending on the water level and the thickness of fly ash within the pond. As a minimum, liquefaction would cause densification of the bottom ash and settlement and cracking of the upper clay dike. With water at the full pond elevation (el. 454±) and no fly ash as a stabilizing berm, stability analysis indicates that failure of the upstream slope of the pond is probable. This type of failure would extend to the downstream face and likely cause breaching of the dike and loss of water. On the other hand, the potential for failure of the upstream face and breaching of the dike is lower if the fly ash level is near the pond level. To reduce the potential for breaching of the dike due to liquefaction, it is believed necessary to strengthen the ash or closely control the fly ash and water levels. To be conservative, we recommend that the loose bottom ash be strengthened (or drained) to minimize the risk of liquefaction regardless of pond level. Our remedial design assumes that IP wishes to follow such an approach.

8.0
STABILITY AND SEEPAGE ANALYSES

8.1 STABILITY ANALYSIS

Our stability analyses consisted of the following three distinct tasks:

1. During the first task, we attempted to evaluate the material strengths necessary to cause the observed slope failure of the south dike.

2. The second task involved using these strengths in the analysis to determine the recommended repairs to the slide.

3. The third task involved the analysis of liquefaction potential of the upstream slope of the upper dike.

The computer program UTEXAS3, which is based on the Spencer Method, was used to conduct the analyses.

Strength parameters used in the analyses for the dike system and foundation were estimated using laboratory test results, experience, and engineering judgment. The strength parameters are presented in Table 3.

The dikes, alluvium, and loess were assigned the same strength characteristics based on (1) evaluation of triaxial tests conducted on material from the dikes, alluvium, and loess, and (2) the assumption that the dike system was constructed using loess. The remaining materials were assigned strengths based on index property tests, unconfined compression test, CPT data, and judgment.

Task A - Failure Plane Strength

A back-calculation was conducted to estimate the material strength at the failure plane. Complete strength was applied to each soil type while the strength of a thin soil layer at the estimated elevation of the failure plane was varied in order to develop a factor of safety at unity. The analyses estimated that a material with a friction angle of approximately 15.5 degrees and no cohesion could cause a wedge shaped failure of the dike system. The basic geometry assumed during the back-calculation stability analyses is presented on Figure 12. The failure plane predicted by UTEXAS3 is presented on Figure 13.

Task B - Repair Stability

Stability analyses were completed for the slide repair designs in general accordance with procedures outlined in the Illinois Department of Transportation publication Procedural Guidelines for Preparation of Technical Data to be Included in Applications for Permits for Construction and Maintenance of Dams, January 1993. Selected cases including steady state, end of construction, and earthquake loading were evaluated for areas of (1) potential deep sliding, and (2) potential shallow sliding for the three primary repair options. The resulting factors of safety are presented in Appendices D, E, and F, which discuss each primary repair option.

Task C - Liquefaction Potential

Liquefaction potential of the impounded bottom ash is significant considering the nature of the bottom ash and the pond level. A stability analysis was conducted to evaluate the potential for a failure of the upstream slope due to liquefaction of the bottom ash.

Based on published data for clean sands, the liquefied bottom ash was estimated to have a residual strength during liquefaction of approximately 100 pounds per square foot. Considering the strength of the bottom ash and the undrained strength of the remaining materials, the stability results indicate that slope failure is very likely as shown in Figure 14. Such a failure could result in breaching the dike and loss of fly ash and water.

8.2 SEEPAGE ANALYSIS

We conducted seepage analyses for the primary slide repair options using the finite element program SEEP/W (Version 3, 1994) by GEO-SLOPE International, Ltd.

Seepage Model and Analyses

Based on the results of the exploratory investigation and the elements of the slide repair options, the site stratigraphy was separated into 15 different materials which were used in the analyses.

The stratigraphy of the dike system and foundation (exclusive of repair elements) consisted of eight material types. The materials included: (1) 1989 Dike, (2) Bottom Ash, (3) 1969 Dike, (4) Alluvium (creek deposit), (5) Glacial Till, (6) Permeable Residual Clay, (7) Residual Clay, and (8) Weathered Shale. The slide repair elements consisted of the remaining 7 material types. All materials were assumed to be isotropic and homogeneous. The specific material properties are discussed below and summarized in Table 4.

1. The 1989 dike material is classified as a low to medium plastic clay or silty clay with occasional zones of high plastic clay.

2. The bottom ash is classified as a medium to coarse sand with traces of fine gravel and contains less than 5 percent fines.

3. The 1969 dike material consisted of low to medium plastic clays.

4. The alluvial material consisted of a stiff to very stiff gray clayey silt and silty clay with traces of silty sand and organics.

5. The glacial till consisted of a stiff to very stiff medium to high plastic clay with occasional sand and silty zones. This material grades downward to a very stiff to hard medium plastic clay with varying amounts of sand and gravel. The material was assumed to be homogeneous.

6. Based on vibrating wire piezometers screened across the estimated failure plane, a permeable water washed zone of silt, clay, and gravel termed "permeable" residual clay lies between the glacial till and less permeable residual clay. This is the suspected permeable zone that allowed excess head to develop below the downstream toe.

7. The residual clay is characterized as high plastic clay.

8. The weathered shale consisted primarily of clay shale with interbedded limestone. The upper portion of the shale is clayey, high plastic, highly weathered with low strength, especially along the bedding planes. The material was assumed to be homogeneous.

The slide repair elements consisted of various materials that were combined differently for the various repair options. The repair elements included; soil-bentonite wall, drain wall, HDPE wall, cement-bentonite wall, drain wall, lime/fly ash injected bottom ash, and light-weight fill. The properties of these materials assumed for analysis are given in Table 4.

The phreatic surface upstream of the dike system was assumed to be two feet below the dike crest (el. 454$\pm$). At the downstream toe, the phreatic surface was assumed to match the flow line of the creek at el. 395$\pm$ unless it was artificially lowered by pumping.

9.0
COST ESTIMATES

Cost estimates made for the various repair options are based on approximate quantities determined from existing drawings and topographic information plus subsurface information determined from the borings and CPT soundings.

All estimates include a 15 percent allowance for overhead and profit, 15 percent for engineering services (design and construction monitoring), and a 20 percent contingency.

Unit prices were determined based on information from Illinois Power, contractors, material suppliers, Means 1994 Cost Estimating Guide, and judgment. A summary of the key unit prices assumed is given in Table 5.

10.0
REMEDIAL DESIGN

Remedial designs address three potential modes of failure:

1. Deep failure in the foundation
2. Shallow failure in the bottom ash due to excess hydrostatic pressure
3. Liquefaction-induced failure in the bottom ash.

Different repairs are recommended for each potential failure mode as discussed below.

10.1 FAILED AREA AND POTENTIAL DEEP SLIDE AREAS (Station -6-50 to 5+50)

Two general categories of repair techniques exist: 1) those that strengthen soil along the failure plane, and 2) those that reduce the forces causing instability (decrease the driving forces and/or increase the resisting forces).

Methods to increase the strength along the failure plane include drainage to reduce hydrostatic pressure, the removal and replacement of the failure plane materials, or mechanical strengthening of the failure zone. Such strengthening could involve construction of a shear key extending below the failure plane or by use of structural elements, such as drilled piers, stone columns, or tiedback retaining walls. Because of the low frictional resistance along the failure surface and, therefore, the large force needed to restrain the slide, drainage is more economical than the other approaches and is a very common technique. Also, the slide appears very sensitive to changes in water pressure as shown by the significant reduction in the rate of movement that followed the lowering of the pond level 6 ft.

The significant increase in the calculated Factor of Safety that results from lowering the water table below the downstream slope is shown in Figure 15. This figure indicates that lowering the water table about 8 ft is equivalent to constructing a large toe berm and the use of lightweight fill (as discussed with the HDPE option in Appendix F). Due to the significant benefit of lowering the water level below the downstream slope, repair options focused heavily on drainage.

The second repair category, i.e., methods to reduce driving forces, generally involves grading to flatten the slope, the removal of material from the crest, or the placement of material near the toe.

We considered the above techniques either alone or in combination, to develop the remedial options. We selected the target factors of safety similar to those required by the IDOT Division of Water Resources, as follows.

	Condition	Target Slope Stability Factor of Safety
1.	Steady state seepage, full pond head	1.5
2.	End of construction, full pond head	1.4
3.	Earthquake (acceleration 0.12g), full pond head,	1.0
	downstream slope	1.0
	Upstream slope (no liquefaction)	1.0

10.2 REMEDIAL OPTIONS CONSIDERED

Three primary options for repair of the potential deep failure areas were developed along with several secondary options that were briefly considered but not pursued due to obvious deficiencies. The three major options are named as follows:

- Parallel Wall Option (The preferred option)
- Translated Dike Option
- HDPE Wall

The first two options were developed in our meeting of July 21, 1995: the last option, HDPE Wall, was originally proposed as the recommended option in our draft report of June 23, 1995. Each of these three primary options are summarized in the discussion below, but details of each are included in Appendices D, E, and F, respectively. A summary of the options indicating estimated costs, advantages and disadvantages is given in Table 6.

10.2.1 Parallel Wall Option

This is the favored option of Illinois Power and consequently the one developed in most detail. It is preferred because it involves significantly less cost than the others, and will maintain the current alignment and shape of the south dike. A typical cross-section of this repair option is shown on Figure D-1.

The intent is to cut off flow below the dike and lower the water level below the downstream slope to el. 385±, i.e., the elevation of the failure plane. By controlling the downstream groundwater level, the dike can be reconstructed with conventional earth materials along its current alignment. Key elements of this option are shown graphically in Appendix D and are discussed as follows.

1. A soil bentonite cutoff wall upstream of the existing dike to cutoff the flow through the bottom ash.

2. A "drain wall" installed downstream of the cutoff wall by slurry trench techniques and extending about 5 ft below the failure plane elevation. The drain wall will be backfilled with pervious material and three small wells will be installed within the drain wall to pump water out.

3. A shallow drain wall near the toe of the slope, extending 5 ft ± below the failure plane elevation. Again three small pumps, will remove water collected by the drain wall.

When the ground water has been lowered sufficiently below the downstream slope (as determined by pore pressure measurements), the compacted clay fill for the dike can be replaced to the configuration prior to slope failure.

The key advantages to this option are cost and the maintenance of the dike along its current alignment, i.e., not shifted up or downstream. The primary disadvantage of this alternate is that pumping will be required throughout the life of the pond until closure, at which time a gravity drain can be constructed. The amount of pumping, however, should be small; a few hundred gallons per minute or less because the soil-bentonite cutoff wall greatly reduces flow through the bottom ash. Another potential disadvantage of this option is that the rate of water table lowering is uncertain due to the variability in permeability and thickness of the water washed zone above the failure plane which this option intends to drain. Therefore there is some risk that additional measures such as a toe berm, or intermediate sand drains may be needed to provide additional stability. We anticipate constructing the cutoff and drain walls in the Spring and Summer of 1996, and replacing the compacted fill approximately one year later in the Summer or Fall of 1997. This would allow approximately one year to lower the ground water level to the desired elevation. During this time, pore pressure measurements will be made. Further details of this option are given in Appendix D.

10.2.2 Translated Dike Option

This option involves building a new dike in the deep failure area approximately 150 ft downstream of the existing dike. This will require the new dike to straddle the creek and necessitate the construction of a large box culvert as shown in Appendix E, Figure E-1. The new dike would be constructed of clay obtained on-site. Foundation drainage would be provided by a drain wall that will flow by artesian pressure, (i.e., no pumps) up into a gravel blanket drain. In addition, a chimney drain is included within the dike to collect seepage through the embankment. The advantage of this option is that it would be passive, i.e., no pumps or significant maintenance would be required after construction. The disadvantages of this option are the significantly higher cost than the parallel wall option, and additional right-of-way may be required for its construction. Details are given in Appendix E.

10.2.3 HDPE Wall

This was the recommended option given in our draft report of June 23, 1995. The objective is to cut off seepage below the downstream slope of the dike with a very low permeability wall along the center line of the dike. Due to potential recharge of water from the stream however, the cutoff is not likely to be fully effective and, therefore, a stabilizing toe berm and use of lightweight fill to rebuild the slope would be required to achieve the desired factor of safety. (See Figure F-1 , Appendix F) In addition, it would be necessary to lime/fly ash inject the bottom ash below the upstream portion of the dike to mitigate liquefaction.

Key elements of this option included the following:

1. HDPE cutoff wall within a cement-bentonite slurry wall
2. Inclined sand filled pressure relief wells
3. A coarse rock toe berm
4. Lightweight fill
5. Lime/fly ash stabilized bottom ash

The advantages of this option are; it is passive, and would maintain the dike along its current alignment. Major disadvantages, however, include cost, use of fly ash backfill that may entail significant environmental constraints, and need for a toe berm. Details are given in Appendix F.

10.2.4 Secondary Options

Several other options were also considered, but after a brief review, were not developed further. These options were; key trench, regrading, and use of drill piers. Key trench and regrading options are shown schematically and approximate cost estimates are given in Appendix G. The drill pier option was not developed far enough to include cost. Each of these options are discussed briefly below.

Key Trench

This involved removing the upper slide material and most of the lower slide and constructing a key trench through the shale. It would also involve a cutoff wall and injection of the fly ash. The disadvantage of this approach was the risk of slope failure during construction and the high cost.

Regrading

This option included regrading to flatten the slope to 5H:1V and moving the crest upstream into the ash pond. This would still require a cutoff wall, but probably eliminate the toe berm. We did not pursue this further due to cost and construction difficulty.

Drilled Piers

We also considered use of drilled piers to key the slide to the underlying material, but preliminary calculations indicated that the cost would be excessive. During the course of the work, it became obvious that due to the low friction angle along the failure plane, control of water pressures was the only practical and economical option to significantly increase stability.

10.3 REMEDIAL DESIGN FOR AREAS OF POTENTIAL SHALLOW SLIDES

Two potential problems exist where the bottom ash is present between the upper and lower dikes and beneath the upper dike, even outside of the area where potential deep failure can occur. The two problems are:

- The potential for shallow slides as the pond level is raised.

- The potential for liquefaction of the bottom ash during earthquake shaking and potential failure of the dike.

These could be eliminated by removal and replacement of the bottom ash with compacted clay fill. This, however, would be expensive since it would require removal and replacement of the existing dike and would produce significant difficulty controlling the pond water level while replacing the bottom ash. Therefore, other measures are needed.

10.3.1 Mitigation of Shallow Slides

To mitigate the potential for slope failure as the pond level is raised, it will be necessary to control the hydrostatic pressure in the bottom ash beneath the downstream slope of the 1989 dike. A practical way to do this is by the installation of a cutoff wall extending through the 1989 dike into the older dike or clay foundation soils. Either soil-bentonite or cement-bentonite is feasible, however, soil-bentonite is less expensive. A cutoff wall is recommended for both the parallel wall and HDPE wall options. In addition to the cutoff wall, a small gravity drain such as a French drain, is needed to collect the small amount of water that passes through the cutoff wall and the clay fill.

10.3.2 Liquefaction Mitigation

We considered two approaches to liquefaction mitigation; 1) Strengthening the bottom ash by lime/fly ash slurry injection, or 2) draining the bottom ash using wells. The first option, lime/fly ash slurry injection, is intended to give the bottom ash cohesion. Specialty contractors quoted a cost of about $3.50 per cubic yard of treated material for lime/fly ash injection. A test section would be needed at the outset of work to determine the actual quantity of lime/fly ash needed to achieve the desired strength. Illinois Power expressed concern about the potential for increasing pH of the pond with a lime/fly ash slurry injection. To preclude changes of pH, it may be possible to inject the lime/fly ash slurry after installation of a cutoff wall. However, careful monitoring of pressures will be needed to prevent damaging the wall. The lime/fly ash injection is a passive system, i.e., no pumping is required. We considered it in conjunction with HDPE wall approach and the other passive approach of the translated dike.

The second option is the installation of wells to drain the bottom ash after construction of the cutoff wall. This is an active approach which would require continuous pumping over the life of the pond. However, with a cutoff wall in place, the quantity of pumping would be small. This approach was included with the parallel wall option, which is also an active approach.

10.4 INSTRUMENTATION

After the slide area is repaired, we recommended that instrumentation be used to monitor the slope performance, especially as the pond level is raised. Instrumentation should include piezometers, surface monuments, and inclinometers. The final number, locations, and details can be determined in final design.

11.0
INTERIM REPAIRS

In late June and July, 1995, interim repairs were done to arrest the movement of the slide which was then moving at a rate of approximately 1/4 inch per day. Interim repairs involved removal of approximately 20 ft of earth fill at the top of the slide as shown in Figure 16. After the interim repairs were completed, two inclinometers were installed on the slide area to monitor further movement. Both inclinometers show that movement to date has been insignificant and within the error of the instruments. Therefore, we conclude that the interim repairs were successful. A plot of the rate of movement of the slide during the spring and summer of 1995 is shown in Figure 17 .

12.0
CONCLUSIONS AND RECOMMENDATIONS

1. At the location of the failure, the dike is about 55 ft high and is located in the former stream channel of a creek which traversed the area prior to dike construction. The dike is composed of three key components; a 35-ft high compacted clay dike constructed in 1969, bottom ash which was placed through water in the pond and brought to the crest elevation of the 1969 dike, and a new clay dike in 1989 placed atop the bottom ash and 1969 dike.

2. In the failure area, an old haul road consisting of bottom ash, fly ash, gravel, and clay extends to the downstream face of the dike and is hydraulically connected to the bottom ash. This haul road allowed water pressure equal to the level in the pond to be felt near the toe of the upper clay dike at the downstream face. Data indicate that the clay fill in both the old and new dike is strong and generally well compacted. The entire dike rests on a foundation of natural soils, generally clay, which overlie weathered shale bedrock interbedded with thin strata of limestone. Over time, the weathered shale surface has softened into a highly plastic clay, with weakened zones possibly due to ancient landslides during geologic time.

3. Data indicate that two slides have occurred; an upper slide occurring near the base of the upper dike and bottom ash, and a deeper slide occurring about 70 ft below the dike crest on a stratum of highly plastic clay. We believe the failure first occurred on the deep slide plane along a zone of weakness, perhaps part of an ancient landslide. The failure was aggravated by excess water pressure along a thin, permeable zone of granular material directly above the high plastic clay layer. Movement of the dike on the deep failure plane opened a crack through the dike below the crest. As lateral movement continued the crack widened creating a void. Migration of bottom ash and soil into the resulting void allowed the upper dike to settle. Uplift pressure developed at the toe of the upper dike due to the bottom ash and old haul road. This lifted the toe allowing the upper portion of the dike to slide laterally below the uplifted toe as it settled.

4. The bottom ash is very loose and susceptible to significant strength loss during earthquake shaking caused by liquefaction. Liquefaction can result in failure of the upstream slope of the upper portion of the dike. This could result in breaching of the dike and loss of water.

5. Our analysis indicates that the potential for failure of the upper portion of the dike exists at full reservoir head due to water pressure in the relatively permeable bottom ash underlying the less permeable clay dike. We believe that such potential failures are possible for approximately 2,400 lineal feet of the dike, if left as is.

6. Analysis indicates that the most effective means to stabilize the deep slide area is to lower the groundwater elevation below the downstream slope of the dike. Three primary options were developed to stabilize the deep slide area; two of the options involve groundwater control, the other involves rebuilding the dike downstream of the present location. These three options are:

OPTION	KEY ELEMENTS	ESTIMATED COST (millions)	REMARKS
Parallel Wall	Cutoff wall, two drain walls pumps in drain walls	$4.3	Lowers groundwater level by pumping from drain walls. Preferred option by IP.
Translated Dike	New dike 150 ft downstream of existing dike	$6.1[1]	Passive system (no pumps). May need more right of way.
HDPE wall	Impermeable cutoff wall of HDPE in center of dike	$5.7	Passive system, lowers groundwater level by very impermeable cutoff wall.

[1] Does not include cost of additional right-of-way.

7. The Parallel Wall option is preferred by Illinois Power due to cost and because the dike can be maintained on its current alignment with its current configuration. The option requires continuous pumping while the pond is in operation, however, the amount of water to be pumped should be small (a few hundred gallons per minute) due to the cutoff wall which restricts flow through the permeable bottom ash. When the water level is lowered sufficiently, as determined by piezometers, the clay fill can be replaced and the pond put back into full operation. A year between installation of the drainage measures and replacement of the clay fill is recommended to allow time for drainage.

8. In areas of potential shallow failure a cutoff wall is recommended through the bottom ash to control hydrostatic pressure below the upper clay dike. Two methods were considered to mitigate liquefaction in areas of potential shallow failure; 1) strengthen the bottom ash by lime/fly ash slurry injection, and 2) drain the ash by small pumps. The later approach (preferred by Illinois Power) is the more economical and is similar to the pumping concept used with the Parallel Wall option in areas of deep failure.

9. Following remedial construction, we recommend that instrumentation including inclinometers, surface monuments, and piezometers be used to monitor performance of the repaired south dike. Monitoring is very important to verify that the drainage measures are effective. If not, additional measures may be needed.

13.0
CONTINUITY OF GEOTECHNICAL ENGINEERING SERVICES

The geotechnical investigation and this report are the first steps in the evaluation of subsurface conditions and remedial design. Because actual subsurface conditions can vary from those inferred from the exploration, it is essential that the geotechnical engineer of record be present on-site during remedial construction to confirm that the subsurface soil and groundwater conditions match the design assumptions. Consequently, we recommend that WCC be retained to document remedial construction. We also recommend that we be involved with the design of the remedial measures and during development of the plans and specifications related to our work to verify that our recommendations have been properly interpreted and incorporated into the final design.

14.0
LIMITATIONS

The evaluation and design of remedial measures to stabilize landslides involve a significant number of uncertainties. While we believe that our exploration program has been detailed enough to identify key subsurface conditions, it is possible that unknown conditions exist between the exploratory locations. Changes in groundwater conditions can also occur over time. These possible unknown conditions could aggravate sliding and adversely affect the mitigation design. Therefore, even with remedial measures installed, there is some risk of future movement and potential dike failure.

SUMMARY OF TYPICAL AND ASSUMED MATERIAL PROPERTIES

Generalized Material Type	TYPICAL MATERIAL VALUES					ASSUMED DESIGN VALUES FOR ANALYSES					
	Atterberg Limits						Drained Strengths		Undrained Strengths		
	LL	PL	Water Content, %	Blow Count (N)	Undrained Shear Strength, tsf	Total Unit Weight, pcf	Cohesion, psf	Friction Angle	Cohesion, psf	Friction Angle	Permeability, cm/sec
DIKE:											
1989 Dike	40 - 50	17 - 22	15 - 25		>1.0	115.0	100	28	2,000	0	5.0E-06
Bottom Ash	NP	NP		5		97.0	0	30	0	30	1.0E-02
1969 Dike	40 - 50	17 - 22	20 - 25		1.0	115.0	100	28	1,500	0	5.0E-06
Lime Treated Ash*	-	-	-	-	-	97.0	0	30	0	30	1.0E-03
Light Weight Fill*	-	-	-	-	-	95.0	0	35	0	35	1.0E-03
FOUNDATION:											
Alluvium	-	-	20 - 30		0.7 - 1.1	115.0	100	28	1,500	0	1.0E-06
Loess	30 - 40	17 - 24	20 - 25	7 - 15	0.5 - 1.5	120.0	100	28	1,500	0	-
Glacio-lacustrine / Till	35 - 45	15 - 20	15 - 30	10 - 22	1.2 - 2.2	120.0	1,000	20	2,000	0	1.0E-07
Failure Plane	50 - 75	30 - 40	-	-	-	120.0	0	14	0	14	-
Residual Clay	45 - 55	25 - 35	18 - 21	11 - 38	1.5 - 2.5	120.0	100	28	2,000	0	1.0E-07
Shale	45 - 55	25 - 35	23	24 - ref.	>2	125.0	1,000	20	2,000	0	1.0E-07

* Materials included as part of the suggested slide repair

Piezometer Data

Illinois Power Levee Landslide
5E08560
Piezometer Data

		Apr-95 Factory Calibration	4/12/95	4/13/95	4/14/95	4/18/95	4/21/95	4/24/95	4/28/95	5/1/95	5/4/95	5/8/95	5/11/94	5/15/95	5/19/95	5/23/95	5/25/95	5/30/95	6/2/95	6/9/95	7/19/95	8/25/95
Standpipe																						
P-1	Depth (ft)	21.4			21.40	21.18	21.23	21.15	21.15	21.08	21.1	21.05	20.9		21.15	20.82	20.6	Piezometer Sheared Off				
Vibrating Wire																						
P-2	Voltage	11697		11645	10744	9870	9956	10008	10067	10127	10177	10269	10387	10540	10604	10582	10580	10600	10614	10650	10838	10916
(25 ft)	Pressure(psi)			0	6.47	12.74	12.13	11.75	11.33	10.90	10.54	9.88	9.03	7.93	7.47	7.63	7.65	7.50	7.40	7.14	5.79	5.23
	Feet of Water			0	14.92	29.40	27.97	27.11	26.13	25.14	24.31	22.79	20.83	18.30	17.24	17.61	17.64	17.31	17.08	16.48	13.37	12.07
	Elevation (ft)			50	65	79	78	77	76	75	74	72	70	68	67	67	67	67	67	66	63	62
P-2A	Voltage	9149												8368	8531	8369	8368	8364	8373	8373	8387	8365
(41.5 ft)	Pressure(psi)													12.61	9.98	12.60	12.61	12.68	12.53	12.53	12.31	12.66
	Feet of Water													29.10	23.03	29.06	29.10	29.25	28.91	28.91	28.39	29.21
	Elevation (ft)													62	56	62	62	62	62	62	61	62
P-3	Voltage	11454		11410	10990	10827	10800	10782	10800	10834	10851	10938	11008	11016	10896	10891	10885	10864	10895	10891	10950	10964
(10 ft)	Pressure(psi)			0	2.93	4.07	4.26	4.38	4.26	4.02	3.90	3.29	2.80	2.75	3.59	3.62	3.66	3.81	3.59	3.62	3.21	3.11
	Feet of Water			0	6.76	9.38	9.82	10.11	9.82	9.27	9.00	7.60	6.47	6.34	8.27	8.35	8.45	8.79	8.29	8.35	7.40	7.18
	Elevation (ft)			41	48	50	51	51	51	50	50	48	47	47	49	49	49	50	49	49	48	48
P-3A	Voltage	9309													8563	8574	8570	8571	8578	8576	8587	8578
(22.2 ft)	Pressure(psi)														11.50	11.33	11.40	11.38	11.27	11.30	11.13	11.27
	Feet of Water														26.54	26.15	26.29	26.25	26.00	26.08	25.68	26.00
	Elevation (ft)														55	55	55	55	55	55	54	55
P-4	Voltage	9225												8569	8572	8570	8570	8566	8572	8570	8578	8566
(30.8 ft)	Pressure(psi)													12.61	12.55	12.59	12.59	12.67	12.55	12.59	12.44	12.67
	Feet of Water													29.09	28.96	29.05	29.05	29.22	28.96	29.05	28.70	29.22
	Elevation (ft)													57	57	57	57	57	57	57	57	57
P-5	Voltage	10093		10051	9224	9136	9118	9100	9114	9153	9160	9170	9185	9128	9098	9115	9099	9092	9112	9111	9140	9091
(25 ft)	Pressure(psi)			0	5.79	6.40	6.53	6.65	6.56	6.28	6.23	6.16	6.06	6.46	6.67	6.55	6.66	6.71	6.57	6.58	6.37	6.72
	Feet of Water			0	13.35	14.77	15.06	15.35	15.12	14.49	14.38	14.22	13.98	14.90	15.38	15.11	15.37	15.48	15.16	15.17	14.70	15.49
	Elevation (ft)			50	63	65	65	65	65	64	64	64	64	65	65	65	65	65	65	65	65	65
P-5A	Voltage	9447												8542	8531	8540	8533	8533	8542	8543	8564	8547
(45 ft)	Pressure(psi)													15.44	15.62	15.47	15.59	15.59	15.44	15.42	15.07	15.35
	Feet of Water													35.62	36.05	35.70	35.97	35.97	35.62	35.58	34.76	35.42
	Elevation (ft)													66	66	66	66	66	66	66	65	65
P-6	Voltage	11256	11261		11420	11342	11345	11329	11336	11350	11365	11376	11387	11388	11386	11392	11434	11459	11365	11320	Eliminated	
(18 ft)	Pressure(psi)		0		-1.13	-0.58	-0.60	-0.49	-0.53	-0.63	-0.74	-0.82	-0.90	-0.89	-0.89	-0.93	-1.23	-1.41	-0.74	-0.42		
	Feet of Water		0		-2.62	-1.33	-1.38	-1.12	-1.23	-1.46	-1.71	-1.89	-2.07	-2.06	-2.06	-2.16	-2.85	-3.26	-1.71	-0.97		
	Elevation (ft)		80		78	79	79	79	79	79	78	78	78	78	78	78	77	77	78	79		
P-7	Voltage	9324													8572	8584	8573	8576	8586	8585	8592	8584
(26.4 ft)	Pressure(psi)														12.75	12.54	12.73	12.68	12.51	12.52	12.40	12.54
	Feet of Water														29.41	28.93	29.37	29.25	28.85	28.89	28.62	28.93
	Elevation (ft)														54	54	54	54	53	53	53	54

NOTE: Negative pressures may not indicate true water elevations.

TABLE 2

TABLE 3
SUMMARY OF ASSUMED MATERIAL PROPERTIES
FOR STABILITY ANALYSIS

Generalized Material Type	Total Unit Weight, pcf	Drained Strengths		Undrained Strengths		Source
		Cohesion, psf	Friction Angle	Cohesion, psf	Friction Angle	
DIKE:						
1989 Dike	115.0	100	28	2,000	0	Triaxial Test Results (CIU, UU), judgement
Bottom Ash	97.0	0	30	0	30	Experience, judgement
1969 Dike	115.0	100	28	1,500	0	Triaxial Test Results (CIU, UU), judgement
Gravel Road*	125.0	0	42	-	-	Judgement
Cemented Ash*	125.0	0	42	-	-	Judgement
Lime Treated Ash**	97.0	0	30	0	30	Experience, judgement
Light Weight Fill**	95.0	0	35	0	35	Experience, judgement
FOUNDATION:						
Alluvium	115.0	100	28	1,500	0	Triaxial Test Results (CIU, UU), judgement
Loess***	120.0	100	28	1,500	0	Triaxial Test Results (CIU, UU), judgement
Glacio-lacustrine / Till	120.0	1,000	20	2,000	0	Experience, judgement
Failure Plane	120.0	0	14	0	14	Back-calculation, judgement
Residual Clay	120.0	100	28	2,000	0	Experience, judgement
Shale	125.0	1,000	20	2,000	0	Experience, judgement

* Materials included as features to back-calculation geometry
** Materials included as features to slide repair geometry
*** Material included as a feature to shallow slide area geometry

TABLE 4
SUMMARY OF ASSUMED MATERIAL PROPERTIES
FOR PERMEABILITY ANALYSIS

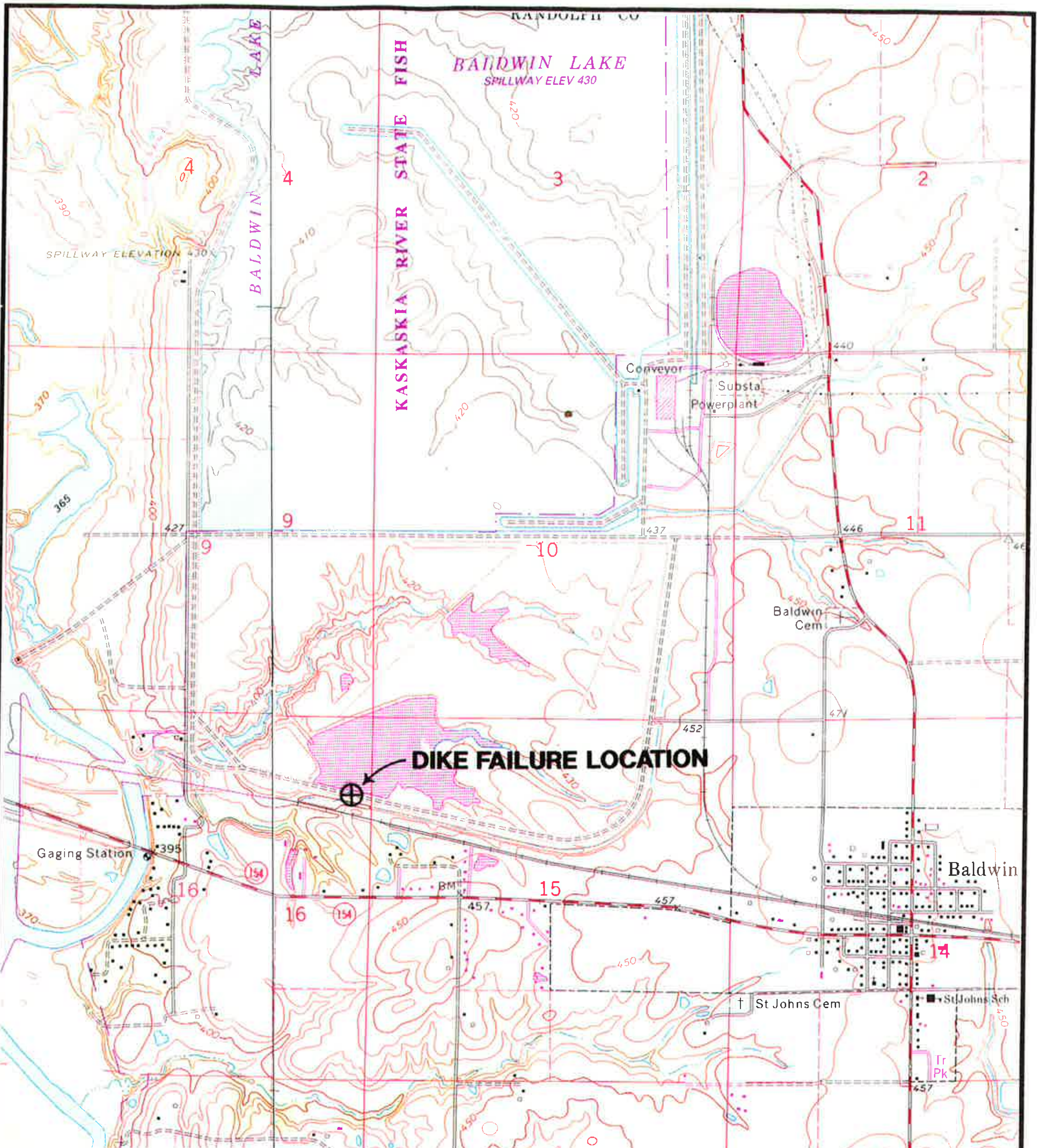
Generalized Material Type	Permeability, cm/sec	Source
DIKE:		
1989 Dike	5.0E-06	Experience, previous test data on similar compacted clays
Bottom Ash	1.0E-02	Experience, judgement
1969 Dike	5.0E-06	Experience, previous test data on similar compacted clays
FOUNDATION:		
Alluvium	1.0E-06	Experience, previous test data on similar compacted clays
Glacio-lacustrine / Till	1.0E-07	Experience, judgement
Permeable Residual Clay	1.0E-05	Judgement, vibrating-tip piezometers
Residual Clay	1.0E-07	Experience, judgement
Shale	1.0E-07	Experience, judgement
REPAIR FEATURES:		
Lime Treated Ash	1.0E-03	Experience, judgement
Light Weight Fill	1.0E-03	Experience, judgement
Geomembrane Wall	1.0E-12	GUNDLE
Inclined Drains	1.0E-03	Experience, judgement
Soil-Bentonite Wall	1.0E-06	Experience, judgement
Drain Wall	1.0E-03	Experience, judgement
Cement-Bentonite Wall	1.0E-06	Experience, judgement

SUMMARY OF KEY UNIT PRICES USED IN COST ESTIMATES

Description	Unit Price ($)	Unit	Source
1. HDPE wall "GundWall" in cement-bentonite slurry wall	10.50	Ft^2	Slurry Walls, Inc. 301/934-1846
2. Cement-bentonite slurry wall	4.25	Ft^2	Slurry Walls, Inc. 301/934-1846
3. Inclined wells	40.00	L.F.	Warren-George Drilling 201/433-9797
4. Lime fly ash injection of bottom ash	3.50	c.y. of treated soil	Woodbine-GKN/Hayward-Baker
5. Excavate soil in slide area and recompact	5.00	c.y.	Illinois Power
6. Excavate soil and stockpile	2.50	c.y.	Judgment
7. Drain rock or shot rock	15.00	c.y.	Rogers Ready Mix 618/282-3844
8. Seed and mulch	0.50	s.y.	Means Guide, 1994
9. Strip topsoil	0.90	c.y.	Means Guide, 1994
10. Lime stabilized fly ash (lightweight fill)	5.00	c.y.	Judgment
11. Soil-bentonite slurry wall	4.00	s.f.	Geo-Con 817/383-1400
12. Drain wall	9.00	s.f.	Geo-Con 817/383-1400
13. 8 by 10 Box culvert	600.00	L.F.	Means Guide, 1994
14. Vertical wells, pumps, warning system	15,000.00	each	Layne-Western 314/343-3700

SUMMARY OF PRIMARY REPAIR OPTIONS

Option	Estimated Cost (millions)	*Design Intent*/Key Elements		Advantages	Disadvantages
		Deep Failure Areas	**Shallow Failure Areas**		
Parallel Wall	$4.3	*Lower groundwater elevation below downstream slope with drains/pumps.* • Upstream cutoff wall • Upstream drain wall • Downstream drain wall • Pumps within drain walls	*Drain bottom ash by cutoff wall and pumps to mitigate shallow failure and liquefaction.* • Upstream cutoff wall • Pumps in bottom ash	• Lowest cost • Maintain dike alignment • Maintain dike shape	• Continuous pumping (active system)
Translated Dike	$6.1 (w/o additional R.O.W.)	*Build new dike downstream of failure area and without bottom ash fill.* • New clay dike • Drain wall below new dike	*Cutoff flow through bottom ash with cutoff wall. Mitigate liquefaction by lime/fly ash injection to strengthen bottom ash.* • Cutoff wall • Lime/fly ash inject bottom ash • French drain	• Passive system (no pumping)	• High cost • May need additional R.O.W.
HDPE Wall	$5.7	*Lower groundwater level below downstream slope with very impervious wall. Use lightweight fill and toe berm to supplement drainage.* • Centerline HDPE wall • Inclined wells • Lightweight (fly ash) fill • Rock toe berm	*Cutoff flow through bottom ash with cutoff wall. Mitigate liquefaction by lime/fly ash injection to strengthen bottom ash.* • Centerline cutoff wall • Lime/fly ash inject bottom ash • French drain	• Passive system (no pumping) • Maintain dike alignment and shape	• Cost • Complicated construction • Environmental concerns with fly ash fill



Reference Drawing taken from USGS topographic map N38Ø7.5–W8952.5/7.5 & N38Ø7.5–W8945/7.5

N

Ø 1

SCALE MILE

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5EØ856Ø
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	

DRN. BY: bdl 5/22/95 DSGN. BY: gaz CHKD. BY: KMB 6/23/95	Vicinity Map	FIG. NO. 1

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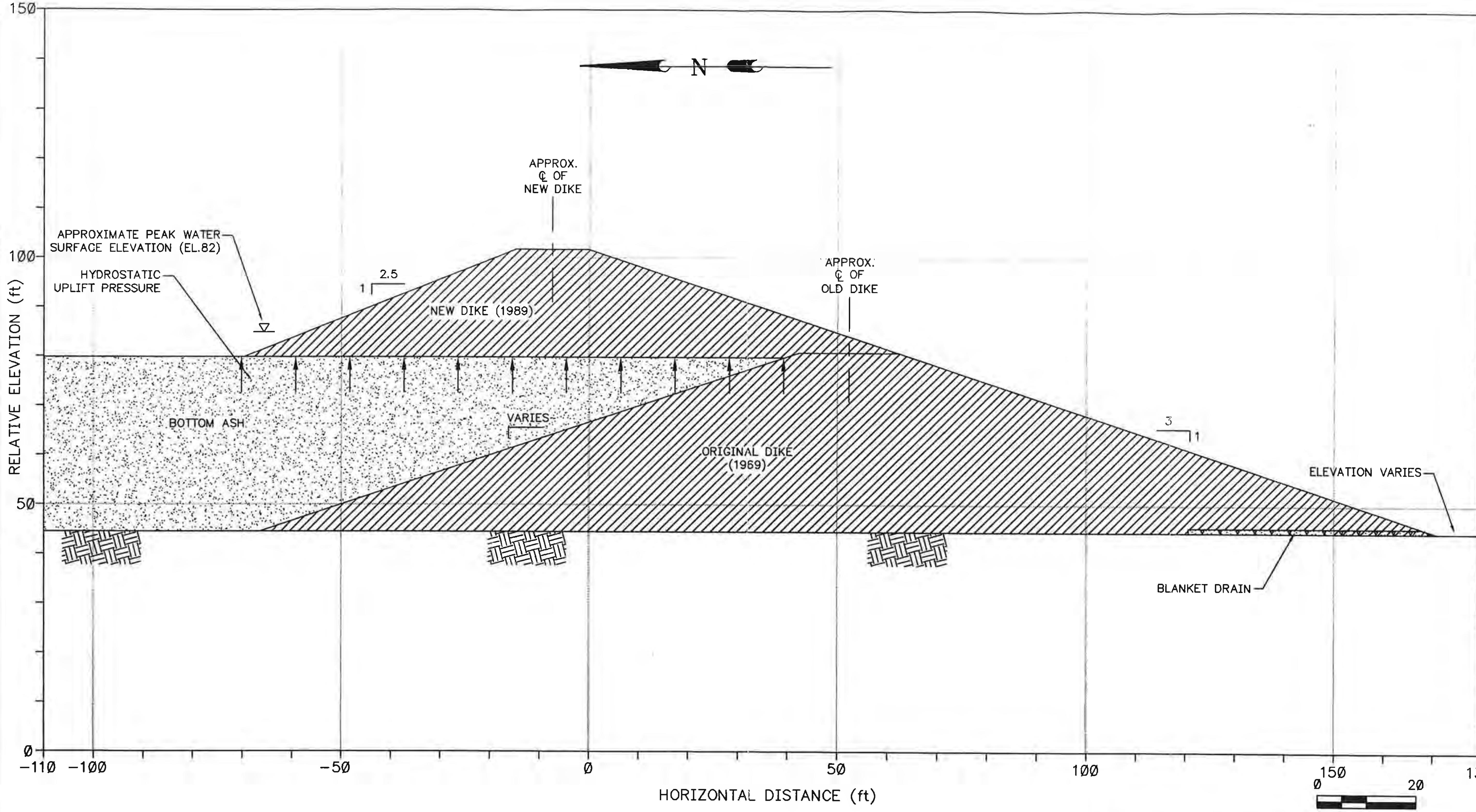

Note: This typical cross section is based on the construction drawings and records provided by Illinois Power.

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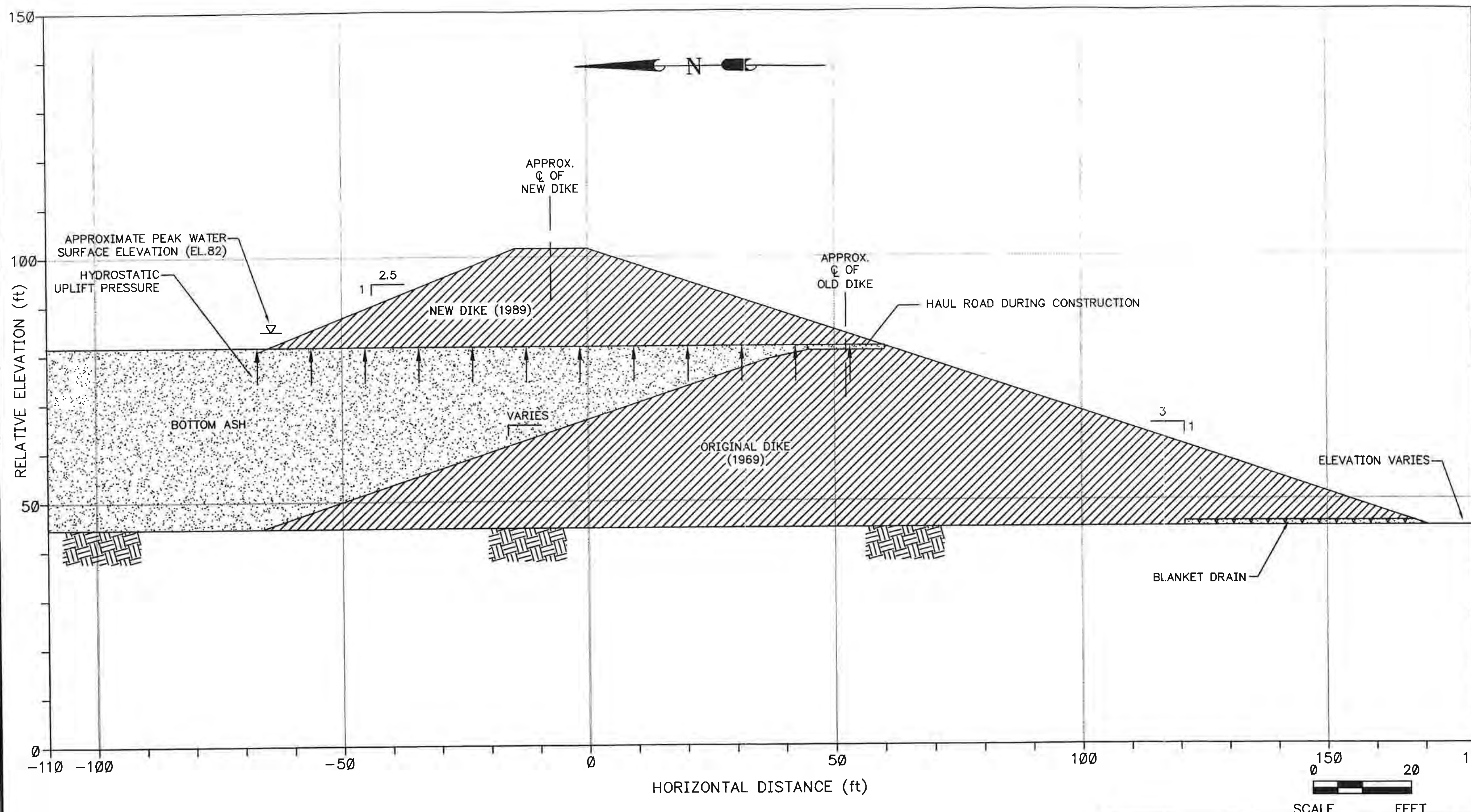
ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 5/22/95 DSGN. BY: gaz CHKD. BY: TMB 6/23/95 — As Designed Section in Failed Area	FIG. NO. 2



Note: This typical cross section is based on the construction drawings and records provided by Illinois Power.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 5/22/95 DSGN. BY: gaz CHKD. BY: KMB 6/23/95	As Built Section in Failed Area	FIG. NO. 3

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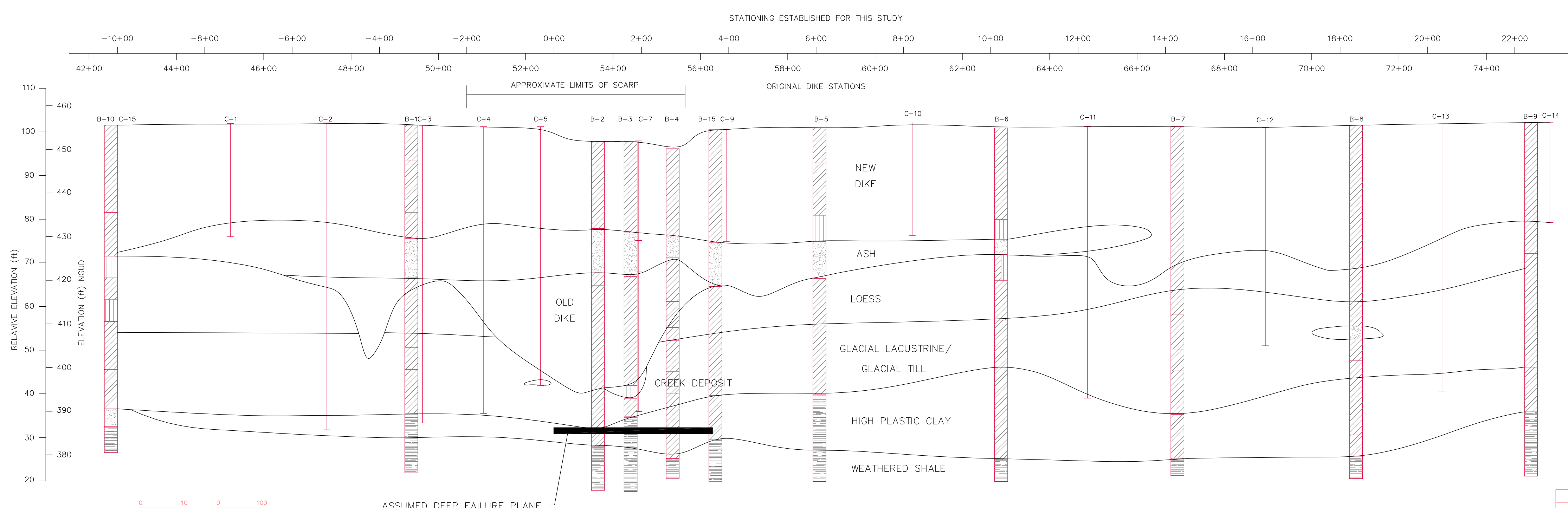
PLAN

NOTE: GROUND SURFACE ELEVATION CONTOURS WERE SCANNED FROM DRAWING HEC 214C38 DATED MARCH 16, 1967 BY HARZA ENGINEERS.

DIKE STATIONING FOR ORIGINAL CONSTRUCTION. STATION 0+00 FOR THIS STUDY=STATION 52+60 FOR ORIGINAL CONSTRUCTION.

A SITE AND EXPLORATIO PLAN AT A SCALE OF 1in EQUALS 50ft IS LOCATED IN FIGURE 7 OF THIS REPORT.



GENERALIZED SUBSURFACE PROFILE ALONG CENTERLINE OF NEW DIKE

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE
- CPTU (CONE PENETRATION TEST)
- BORING
- TEST PIT
- PIEZOMETER
- APPROXIMATE FOOTPRINT OF NEW DIKE
- APPROXIMATE FOOTPRINT OF OLD DIKE

NOTES:
1. THIS DRAWING SHOWS GENERALIZED SUBSURFACE CONDITIONS. SEE ORIGINAL BORING LOGS FOR DETAILS.
2. LINES INDICATING STRATA BETWEEN EXPLORATORY LOCATIONS ARE INFERRED. STRATA SHOWN ARE KNOWN ONLY AT EXPLORATORY LOCATION – NOT BETWEEN.

Revision No.	Description	Date	By	App.

REVISIONS

ILLINOIS POWER COMPANY
BALDWIN POWER STATION

ASH POND, SOUTH DIKE
PLAN AND PROFILE

Date: 4/10/95	Project Number: 5E08560	Figure Number: 4
Drawn by: kdw	Design by: gaz	Checked by:

Woodward–Clyde Consultants
Engineering & sciences applied to the earth & its environment

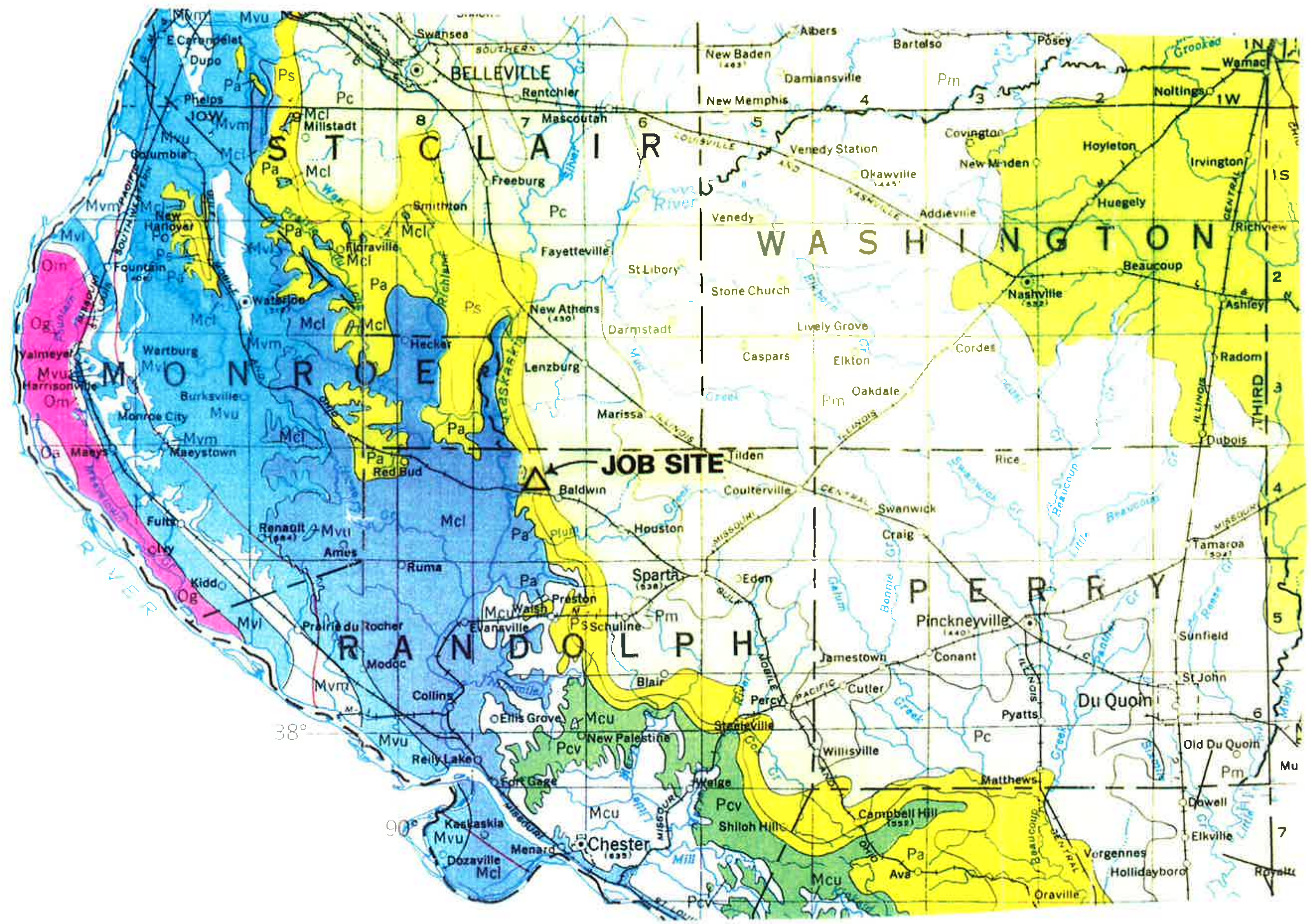
Glacial Boundaries

Wisconsinan

- Late Woodfordian
- Middle Woodfordian
- Early Woodfordian
- Altonian

Illinoian

Kansan



PENNSYLVANIAN

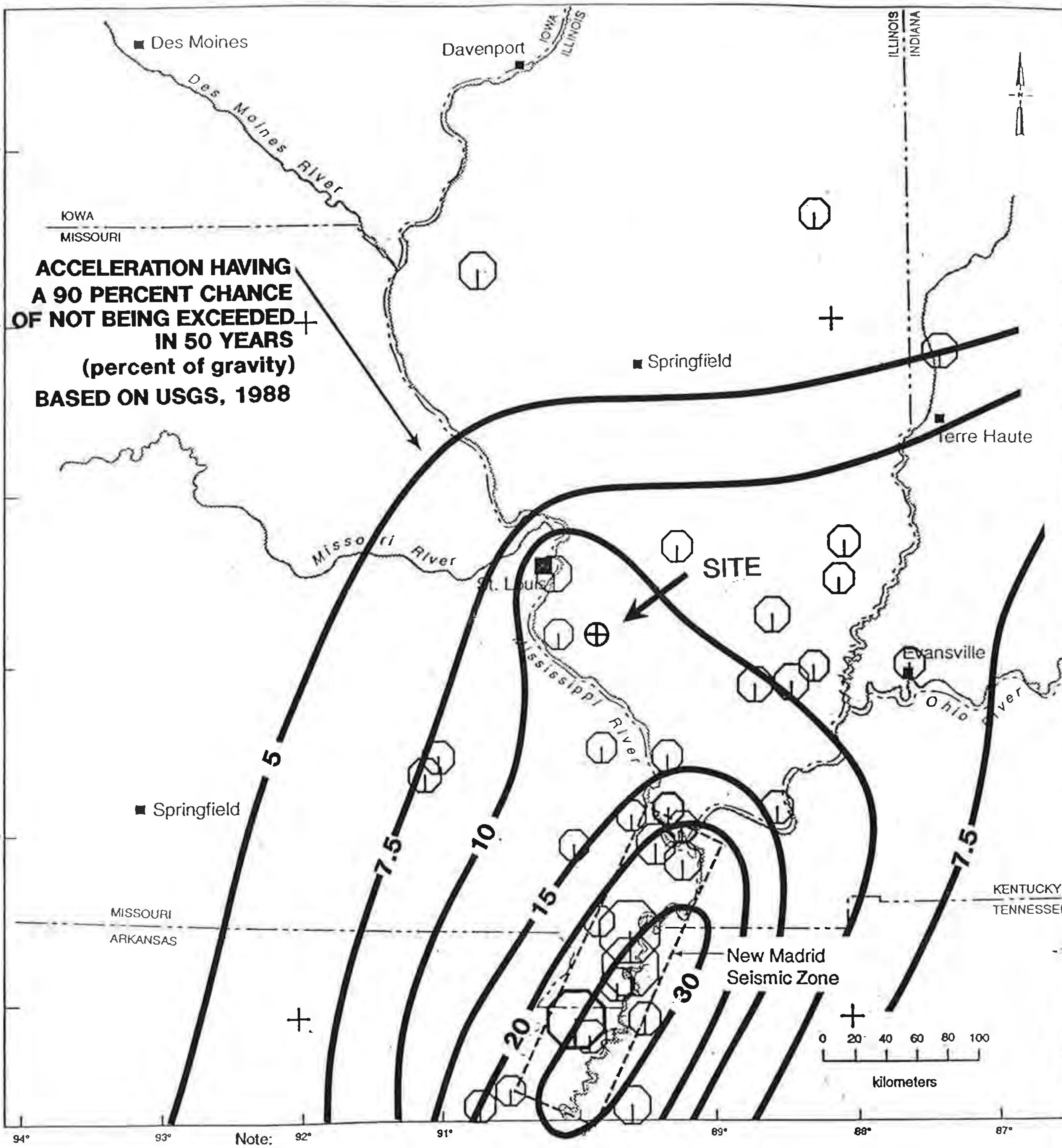
Pc	Carbondale
Ps	Spoon (includes Pa in northeast)
Pa	Abbott
Pcv	Caseyville

MISSISSIPPIAN

Mcu	Upper Chesterian (Grove Church-Tar Springs)
Mcl	Lower Chesterian (Glen Dean-Renault)
Mvu	Upper Valmeyeran (Aux Vases, Ste. Genevieve, St. Louis)

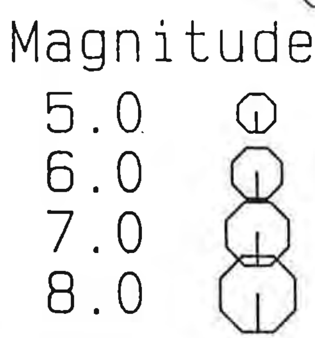
Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment
2318 Millpark Drive
Maryland Heights, Missouri 63043

ILLINOIS POWER FLY ASH SEDIMENTATION POND	PROJECT NO: 5E08560	CHK'D BY: TKD
BEDROCK STRATIGRAPHY	DATE: 5/25/95	FIGURE 5



Note:

Epicenter data from National Earthquake Information Center.



ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

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DRN. BY: bdl 5/22/95 DSGN. BY: gaz CHKD. BY:	Estimated Bedrock Acceleration	FIG. NO. 6

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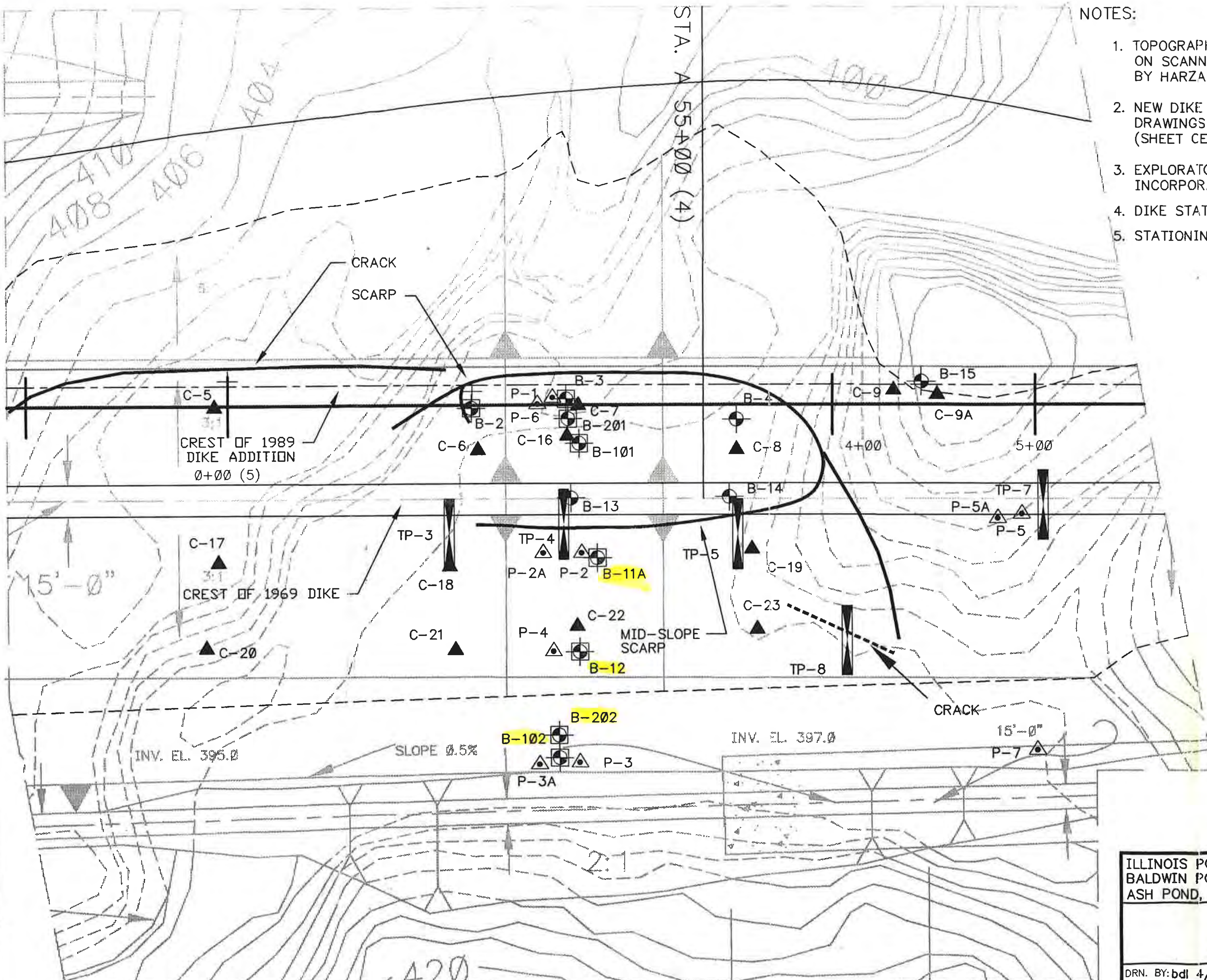


NOTES:

1. TOPOGRAPHY AND OLD DIKE FOOTPRINT BASED ON SCANNED IMAGE FROM CONSTRUCTION DRAWINGS BY HARZA ENGINEERING COMPANY (SHEET 2),(NOV. 18, 1969).
2. NEW DIKE FOOTPRINT BASED ON CONSTRUCTION DRAWINGS PROVIDED BY ILLINOIS POWER COMPANY (SHEET CE-BAL1-B15-03X),(MAY 14, 1986).
3. EXPLORATORY LOCATIONS SURVEYED BY FREESEN INCORPORATED.
4. DIKE STATIONING FOR ORIGINAL CONSTRUTION
5. STATIONING FOR THIS STUDY

LEGEND

- ▲ CPTU
- BORING
- TEST PIT
- PIEZOMETER
- BORING WITH INCLINOMETER

0 50
SCALE FEET

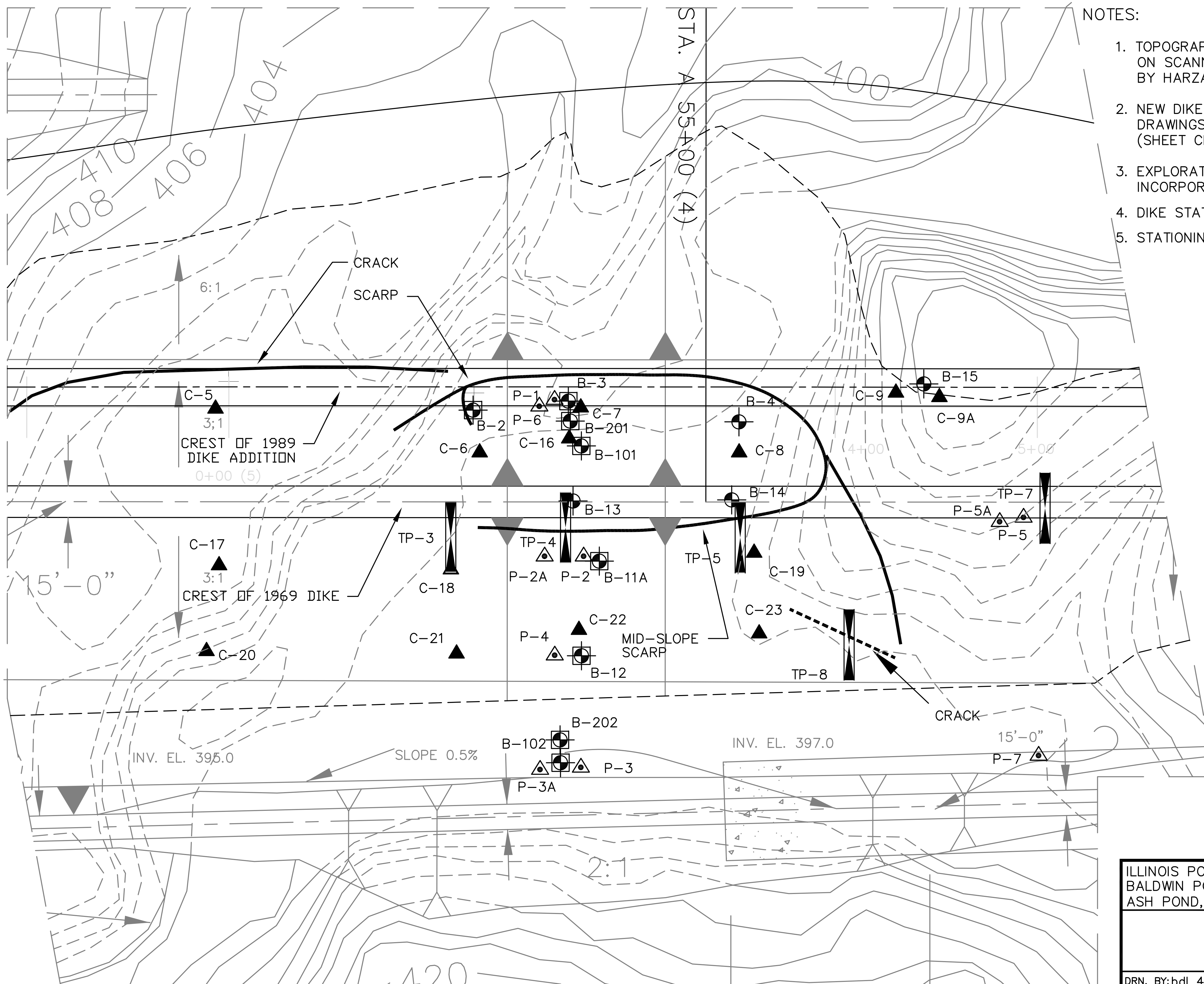
N

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 4/27/95 DSGN. BY: gaz CHKD. BY: BMB 8/30/95	SITE AND EXPLORATION PLAN IN FAILED AREA	FIG. NO. 7

File: F:\5E08560\TASK240\SCRPPLAN.DWG Last edited: 08/24/95 @ 4:48 p.m. @ WCC-ST.LOUIS



NOTES:

1. TOPOGRAPHY AND OLD DIKE FOOTPRINT BASED ON SCANNED IMAGE FROM CONSTRUCTION DRAWINGS BY HARZA ENGINEERING COMPANY (SHEET 2),(NOV. 18, 1969).
2. NEW DIKE FOOTPRINT BASED ON CONSTRUCTION DRAWINGS PROVIDED BY ILLINOIS POWER COMPANY (SHEET CE-BAL1-B15-03X),(MAY 14, 1986).
3. EXPLORATORY LOCATIONS SURVEYED BY FREESEN INCORPORATED.
4. DIKE STATIONING FOR ORIGINAL CONSTRUTION
5. STATIONING FOR THIS STUDY

LEGEND

- ▲ CPTU
- BORING
- TEST PIT
- PIEZOMETER
- BORING WITH INCLINOMETER

0 50
SCALE FEET

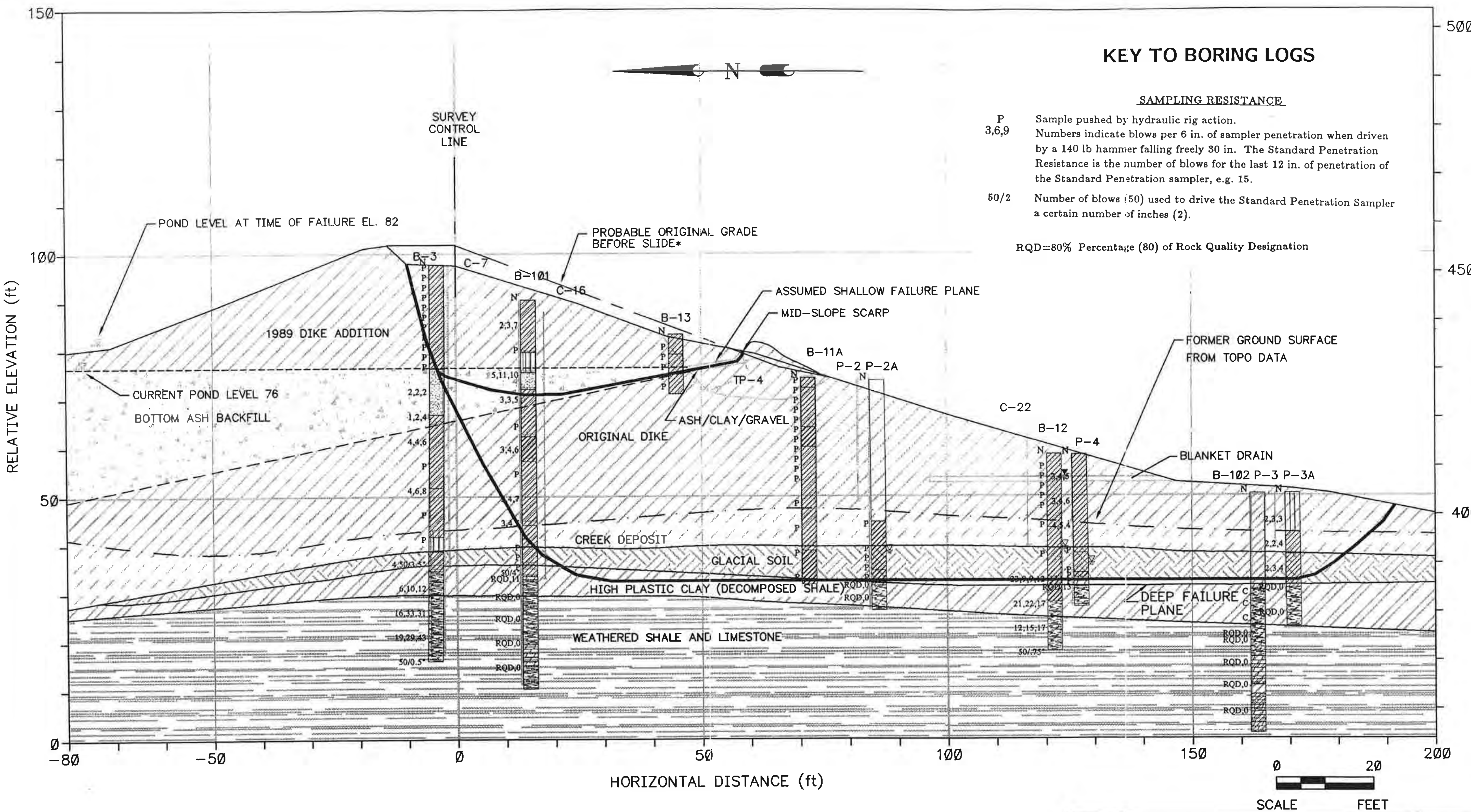
N

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 4/27/95 DSGN. BY: gaz CHKD. BY:	SITE AND EXPLORATION PLAN IN FAILED AREA	FIG. NO. 7

File: F:\5E08560\TASK240\SCRPPLAN.DWG Last edited: 08/24/95 @ 4:48 p.m. @ WCC-ST.LOUIS



Notes:

1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE

ILLINOIS POWER
BALDWIN STATION SOUTH ASH POND DIKE
BALDWIN, IL.

PROJECT NO. 5E08560

Woodward-Clyde Consultants
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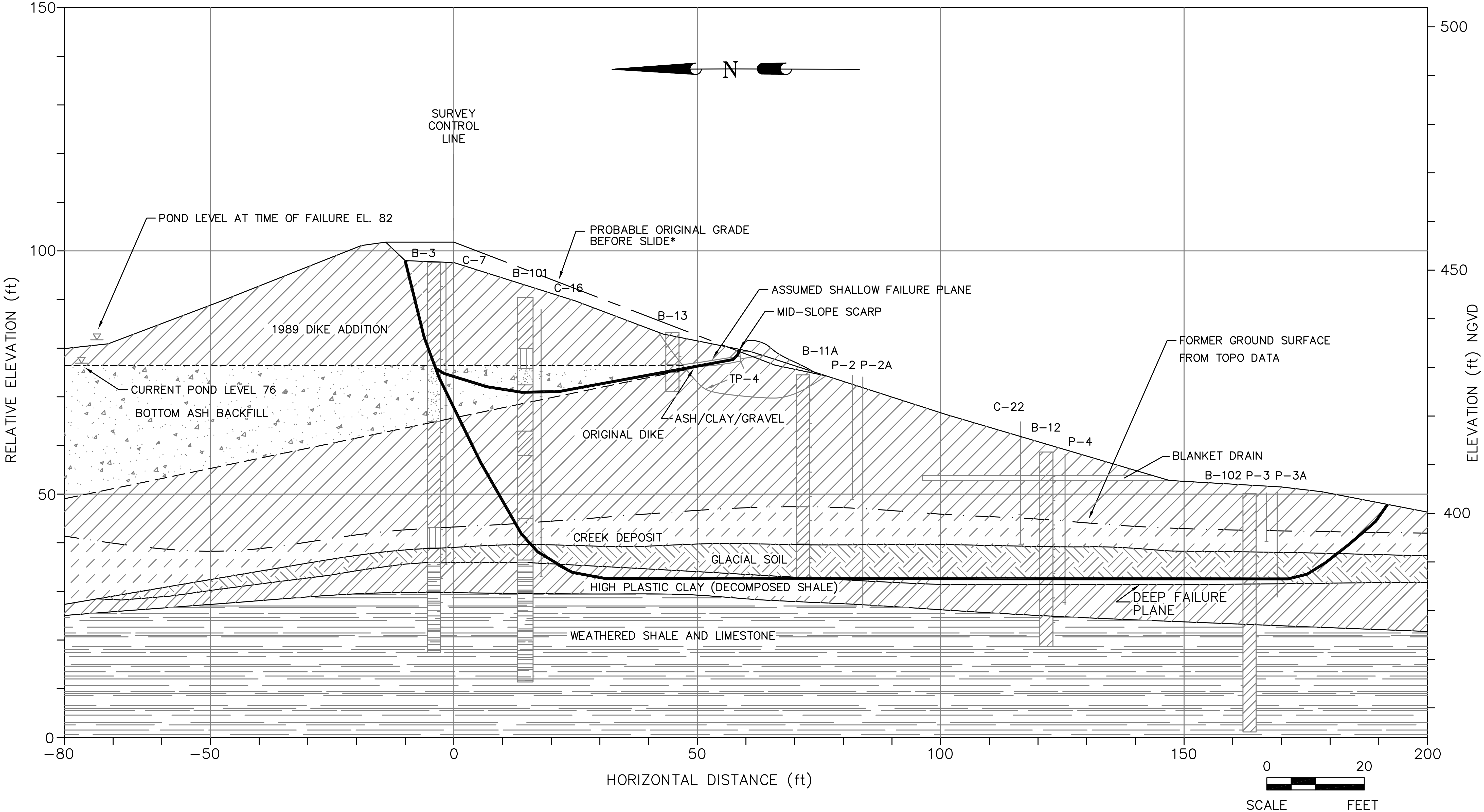
DRN. BY: bdl 4/20/95
DSGN. BY: gaz
CHKD. BY: KMB 10/23/95

Generalized Section Through Center of Failure

FIG. NO. 8

File: F:\5E08560\TASK240\SECTHSLD.DWG Last edited: 06/23/95 @ 1:59 p.m. @ WCC-ST.LOUIS



Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE

ILLINOIS POWER
BALDWIN STATION SOUTH ASH POND DIKE
BALDWIN, IL.

PROJECT NO. 5E08560

Woodward–Clyde Consultants
Engineering & sciences applied to the earth & its environment

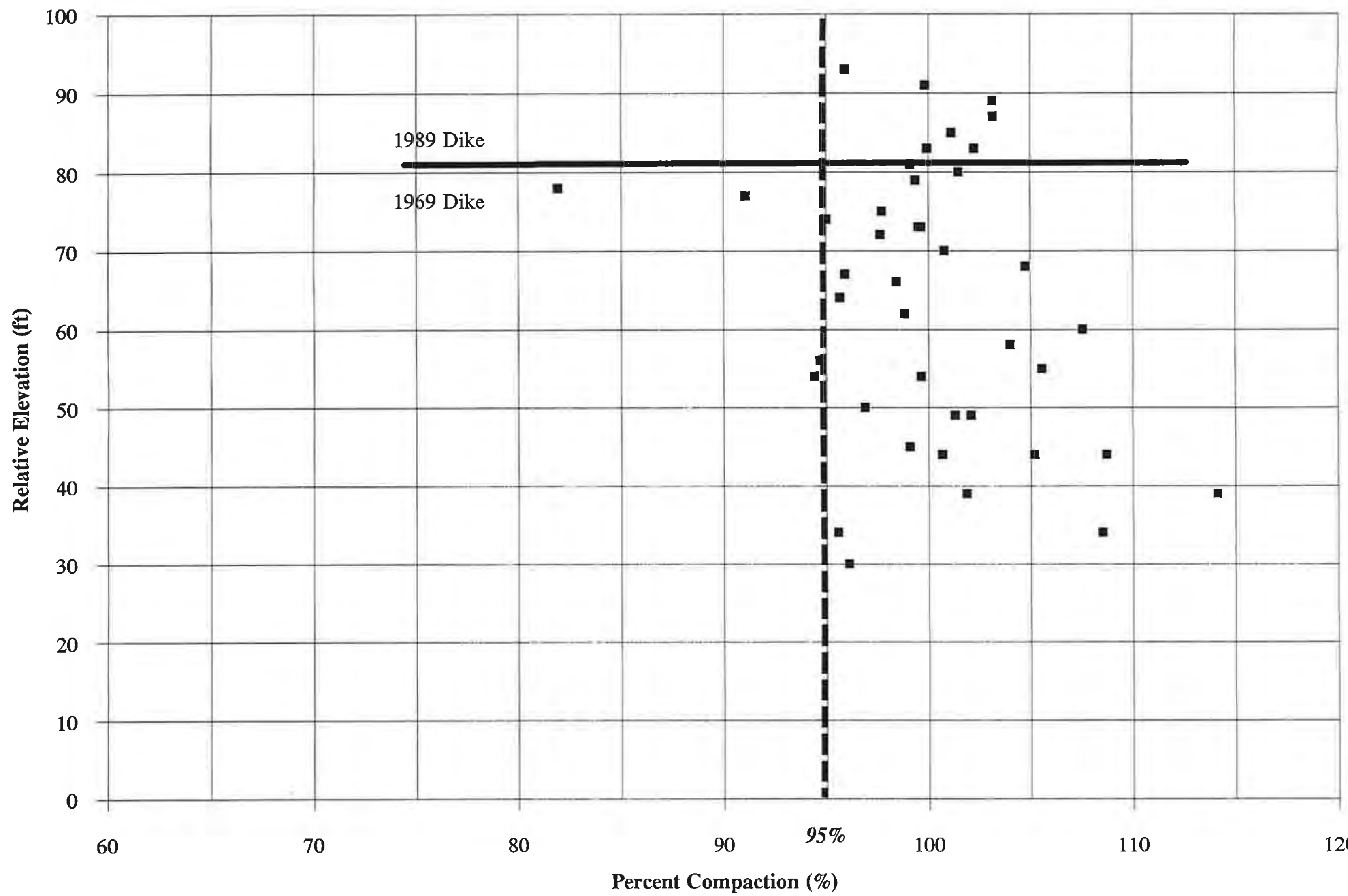
DRN. BY: bdl 4/20/95
DSGN. BY: gaz
CHKD. BY:

Generalized Section Through Center of Failure

FIG. NO. 8

File: F:\5E08560\TASK240\SECTHSLD.DWG Last edited: 06/23/95 @ 1:59 p.m. @ WCC-ST.LOUIS

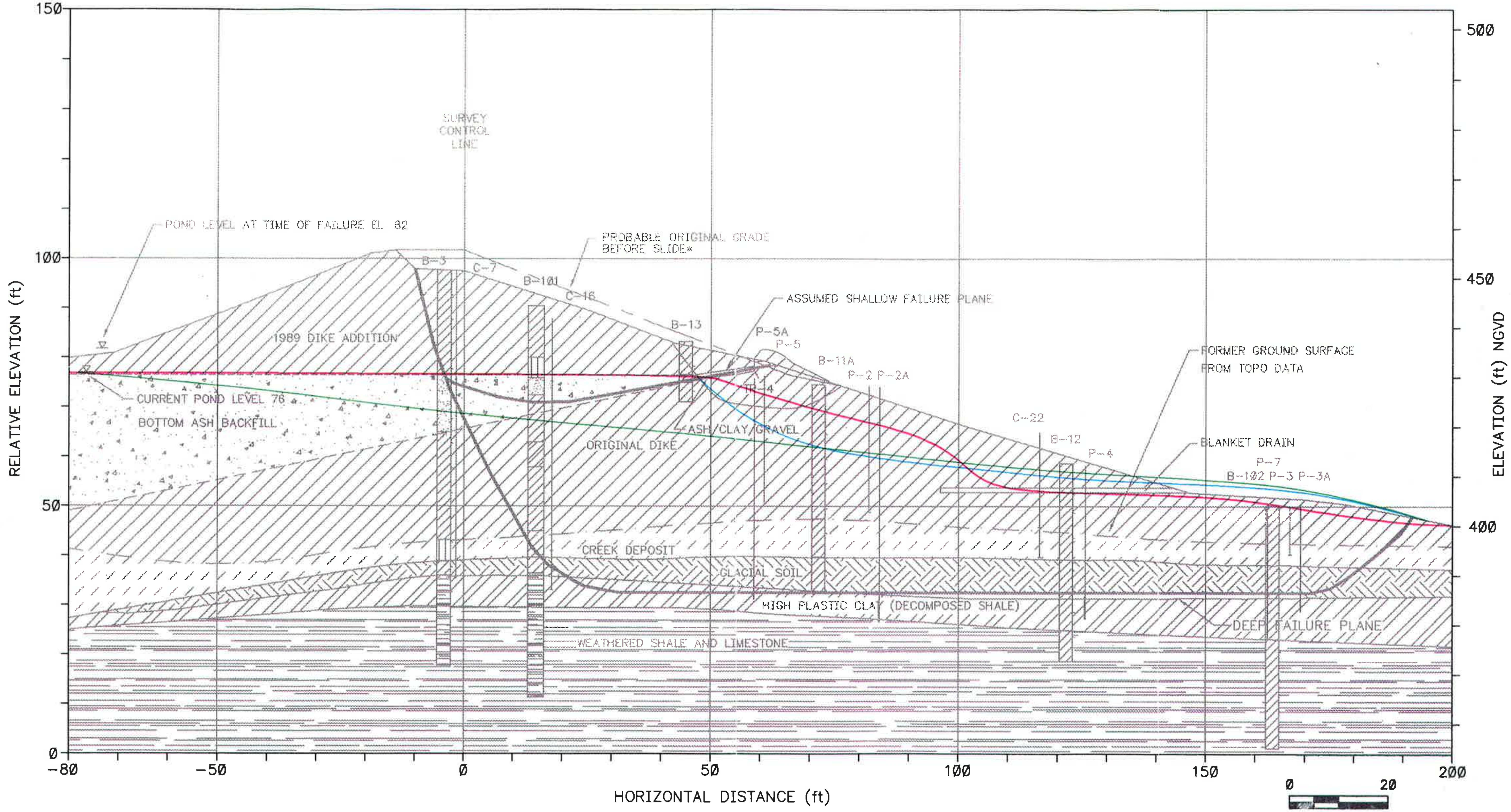
RESULTS OF ESTIMATED COMPACTION FOR DIKES



DENSITY.XLS Chart 1

Woodward-Clyde Consultants

FIGURE 9



Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location — not between.

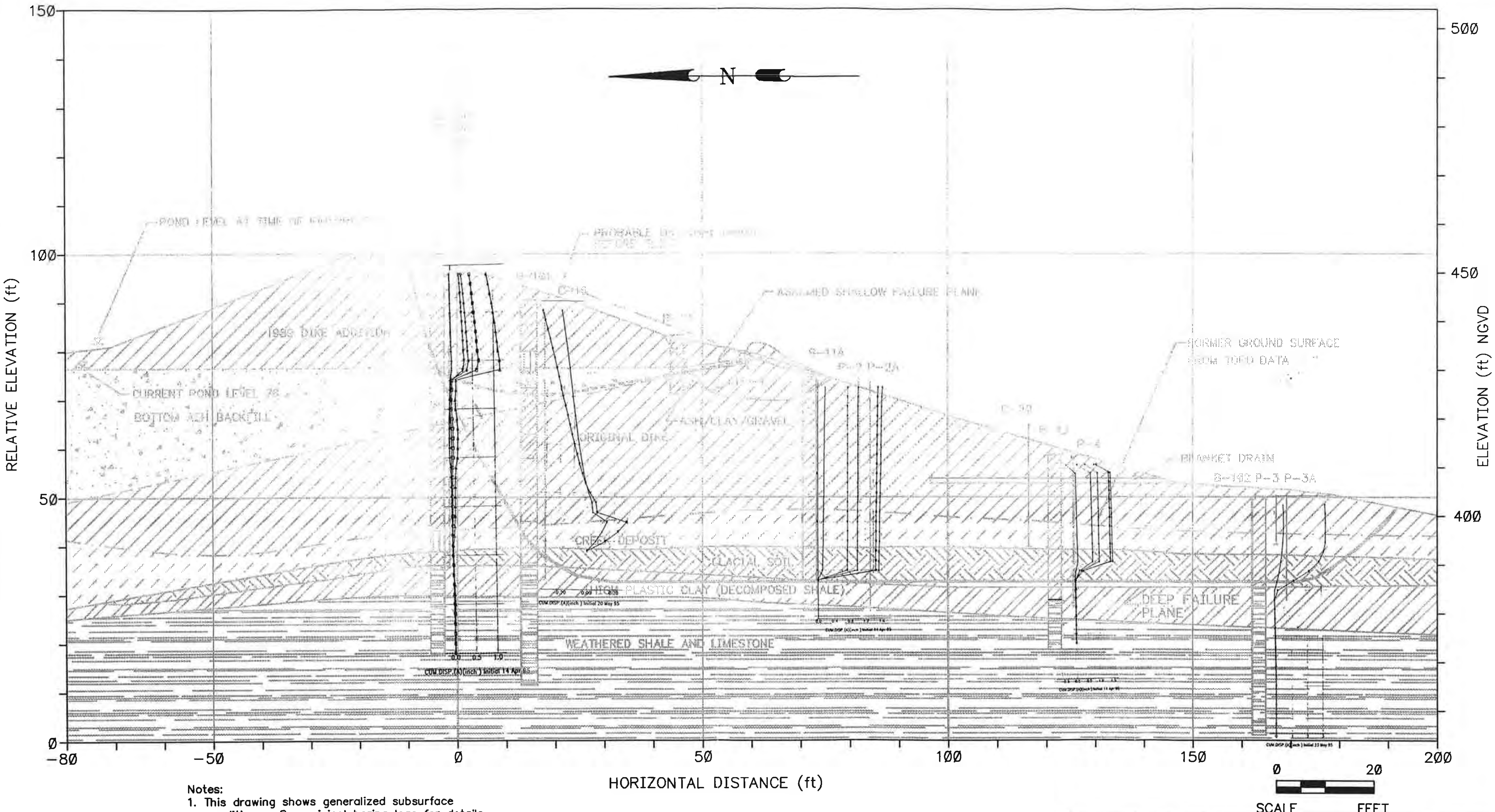
WATER LEVELS FROM PIEZOMETERS

WITHIN FAILURE ZONE:
- SHALLOW PIEZOMETERS
- DEEP PIEZOMETERS (ON FAILURE PLANE)

OUTSIDE FAILURE (SHALLOW AND DEEP PIEZOMETERS)

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/20/95 DSGN. BY: gaz CHKD. BY: JMB 6/23/95	Piezometeric Heads in Dam and Foundation
FIG. NO.	10

File: F:\5E0850\TASK240\INCLDATA.DWG Last edited: 06/23/95 @ 2:08 p.m. @ WCC-ST.LOUIS



Notes:

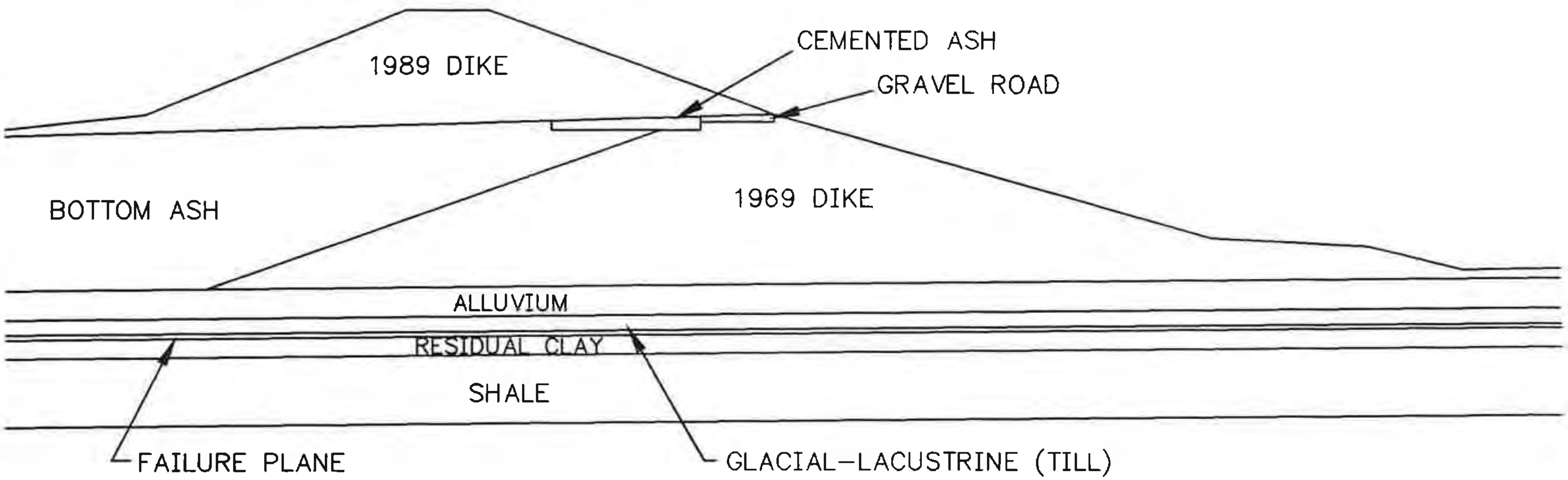
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.
3. Inclinometers B–11A and B–12 installed in April 1995; B–101 and B–102 install in May 1995.
4. During second reading of B–101, inclinometer probe would not go past 52ft deep. All future readings referenced to that depth. Bottom of inclinometer was moving laterally.

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/20/95 DSGN. BY: gaz CHKD. BY: KMB 6/23/95	Inclinometer Data
	FIG. NO. 11

BASIC GEOMETERY FOR BACK CALCULATION

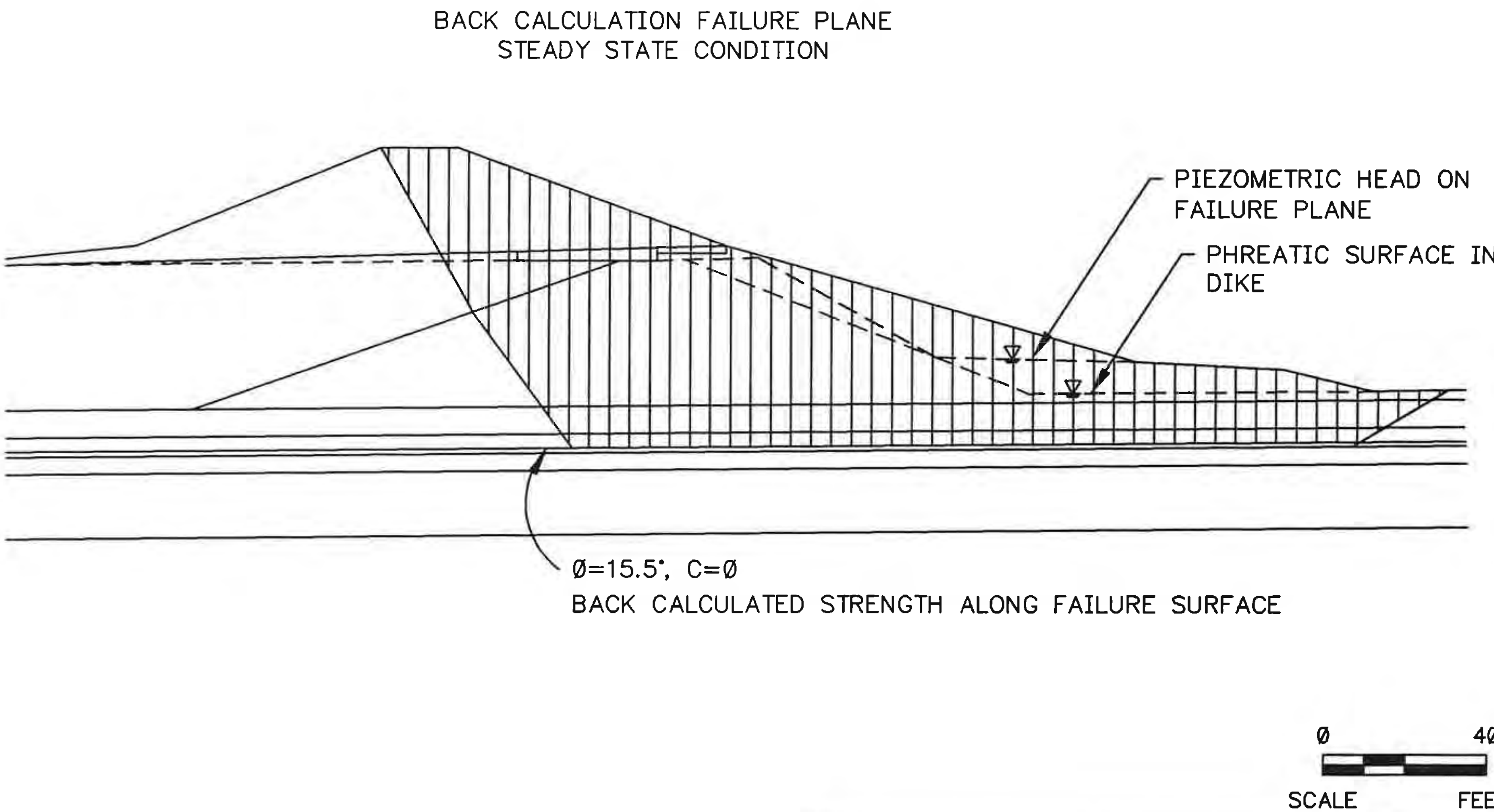


ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5EØ856Ø

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 8/28/95 DSGN. BY: kmb CHKD. BY: KMB 8/30/95	Basic Geometry for Back Calculation	FIG. NO. 12

File: F:\5E08560\TASK700\FIG12.DWG Last edited: 08/30/95 @ 11:44 a.m. @ WCC-ST.LOUIS



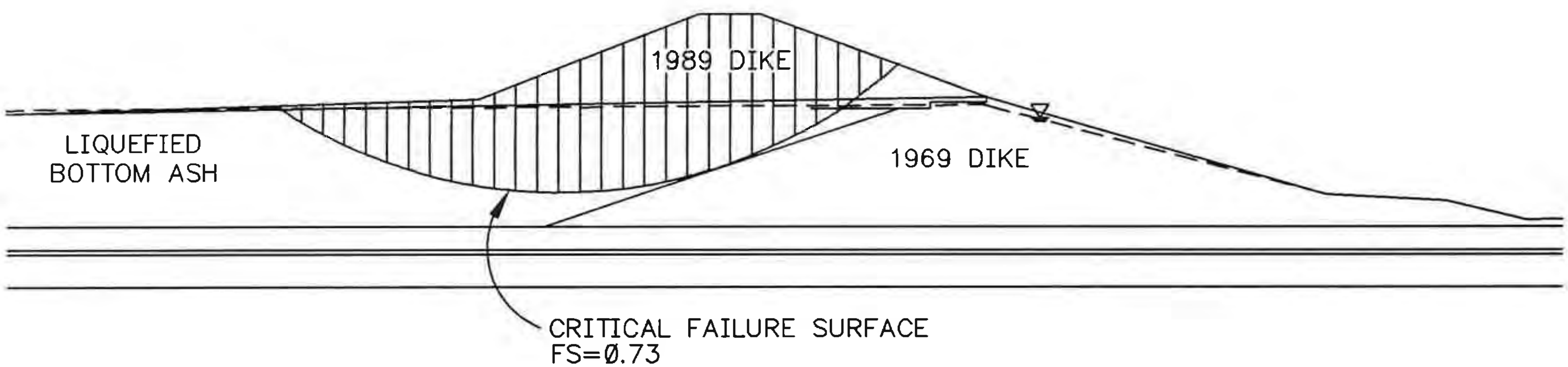
ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5EØ856Ø

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 8/28/95 DSGN. BY: kmb CHKD. BY: KMB 9-6-95	Back Calculation Failure Plane Steady State Condition	FIG. NO. 13

File: F:\5E08560\TASK700\FIG13.DWG Last edited: 09/06/95 @ 1:31 p.m. @ WCC-ST.LOUIS

LIQUEFACTION FAILURE OF UPSTREAM SLOPE



Ø 40

SCALE FEET

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5EØ856Ø

Woodward-Clyde Consultants

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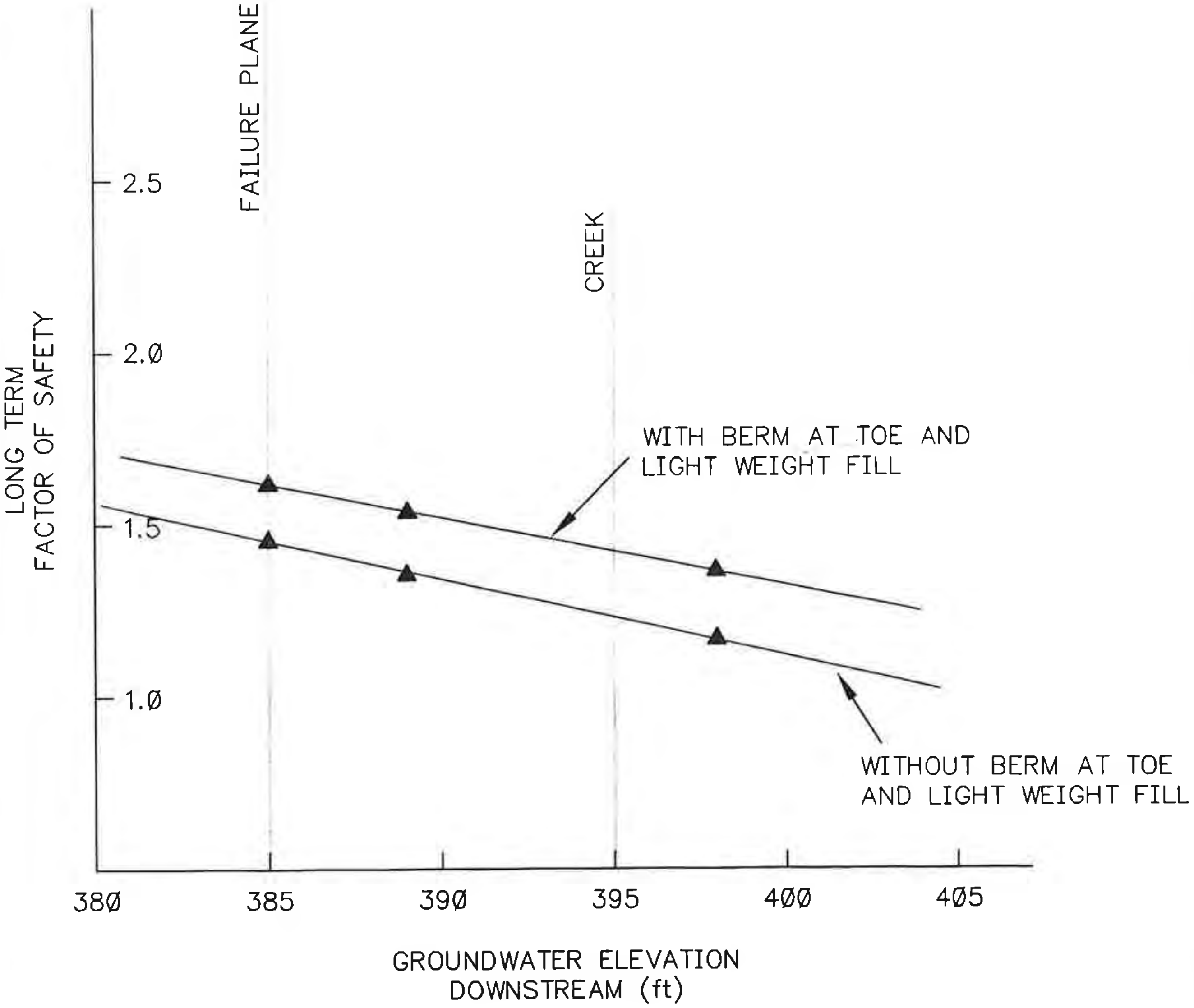
DRN. BY: bdl 8/28/95 DSGN. BY: kmb CHKD. BY: KMP 9-6-95	Liquefaction of Upstream Slope	FIG. NO. 14

File: F:\5E08560\TASK700\FIG14.DWG Last edited: 09/06/95 @ 1:39 p.m. @ WCC-ST.LOUIS



ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

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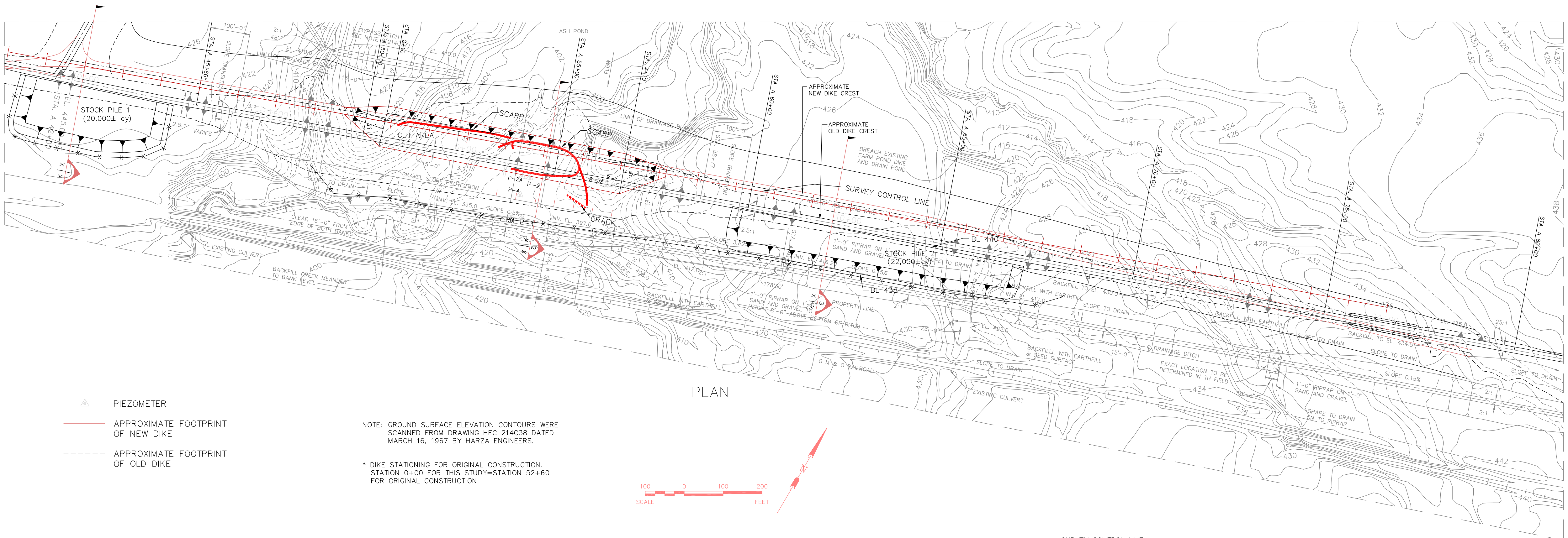
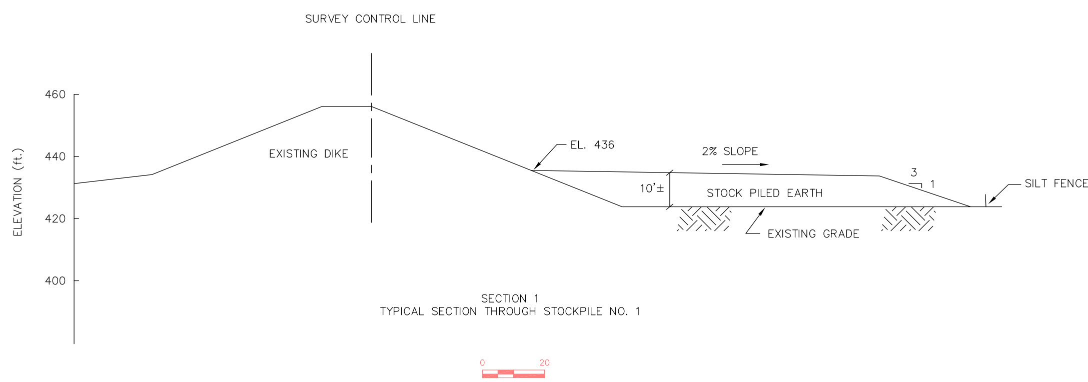
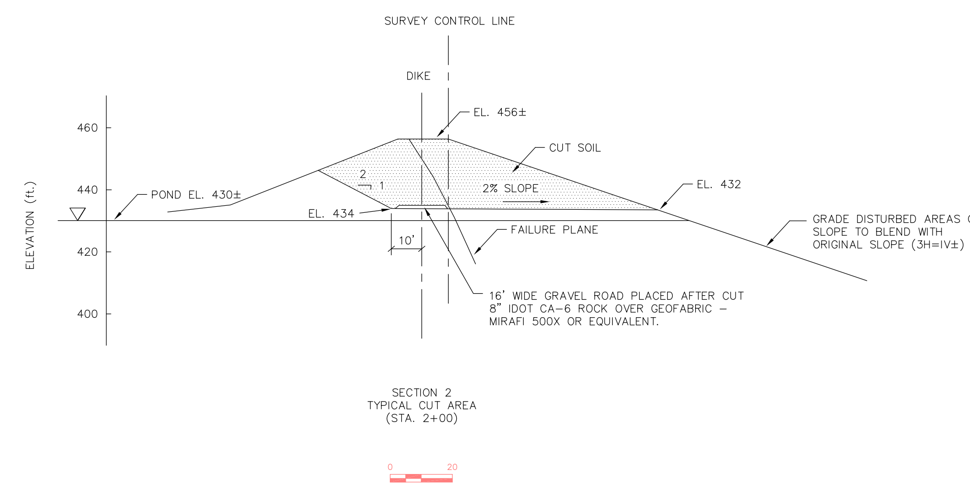
DRN. BY: bdl 8/25/95 DSGN. BY: kmb CHKD. BY: KMR 8/31/95	Factor of Safety Chart	FIG. NO. 15

File: F:\5E08560\TASK700\GRAPH.DWG Last edited: 08/31/95 @ 1:41 p.m. @ WCC-ST.LOUIS

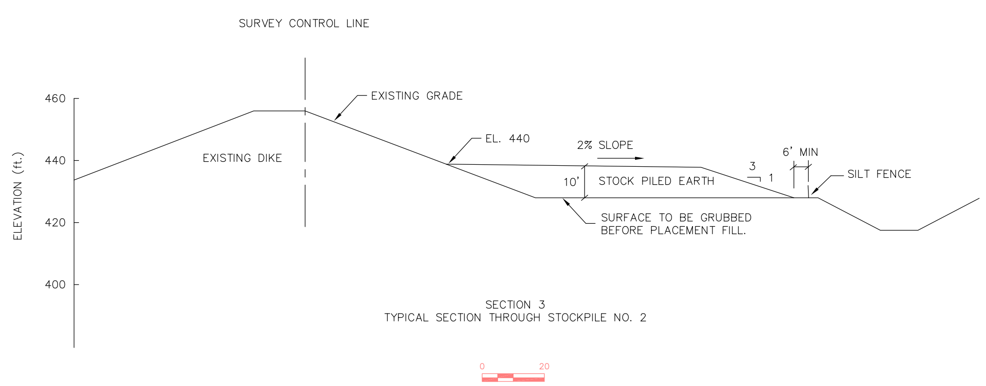




SECTION 1
TYPICAL SECTION THROUGH STOCKPILE NO. 1



SECTION 2
TYPICAL CUT AREA
(STA. 2+00)



SECTION 3
TYPICAL SECTION THROUGH STOCKPILE NO. 2

NOTES:
1. STRIP VEGETATION AND TOP SOIL PRIOR TO FILL PLACEMENT. STOCKPILE TOPSOIL SEPARATELY FROM EARTH.
2. PLACE STOCKPILE IN 12in LIFTS, COMPACT BY TRAFFICKING WITH HAULING AND SPREADING EQUIPMENT.
3. SLOPE FILL AREAS TO DRAIN.
4. SEED STOCKPILE AREAS, CUT AREAS, AND DISTURBED AREAS ON DOWNSTREAM SLOPE WITH CLASS 3 TYPE SEEDING MIXTURE PER SECTION 250, IDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, JULY 1, 1994. PROTECT SEEDED AREAS BY MULCHING PER IDOT STANDARD 251.03, METHOD 2.
5. PLACE AND MAINTAIN SILT FENCE, DOWNSLOPE OF WORK AREAS. SILT FENCES TO BE MIRAFI 100X OR EQUIVALENT.
6. LIMITS OF CUT AREA ARE APPROXIMATE, MAY BE FIELD ADJUSTED.

Revision No.	Description	Date	By	App.

REVISIONS

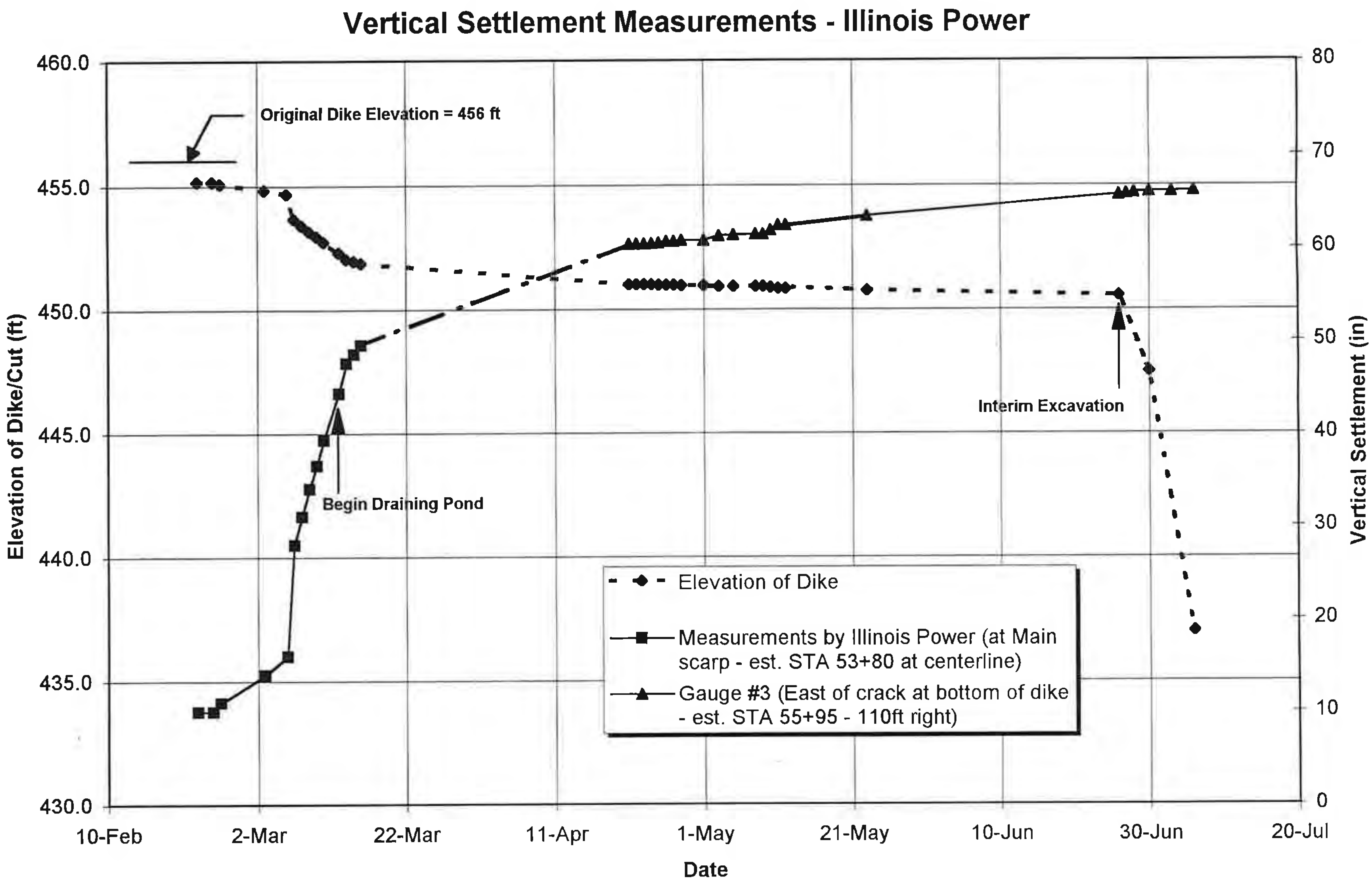
ILLINOIS POWER COMPANY
BALDWIN POWER STATION

ASH POND, SOUTH DIKE
INTERIM REPAIR

Date: 4/10/95	Project Number: 5E08560	Figure Number: 16
Drawn by: kdw	Design by: goz	Checked by:

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

File: F:\5E08560\TASK240\INTERIM.DWG Last edited: 06/23/95 @ 11:51 a.m. @ WCC-ST.LOUIS



MVMENT.XLS

Figure 17

APPENDIX A

FIELD INVESTIGATION

A-1 PHOTOGRAPHS

A-2 TEST PITS

A-3 BORINGS

A-4 PIEZOCONE SOUNDINGS

APPENDIX A
FIELD INVESTIGATION

APPENDIX A-1 - PHOTOGRAPHS

Woodward-Clyde personnel used photographs to document the site conditions in March and April 1995. The content of the photographs include test pits and the area surrounding the failure scarp. Each photograph contains a description concerning the content of the photograph. The photographs are presented in this appendix as Figures A-1-1 through A-1-10.

4/7/95	Looking west over scarp at crest of slide. (21 March 1995). Rig working on Boring B-2.	

4/7/95	Looking east over scarp at crest. Piezometer P-1 in foreground. (21 March 1995)	A-1-1

PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike

4/7/95	Looking southwest across slide from crest on east edge of slide. Midslope scarp at center. Test pits TP-4 and TP-5 open (21 March 1995)

4/7/95	Looking southeast across slide area from crest at west edge of slide. Note midslope scarp running diagonally across photo. Test pit TP-4 behind man. (21 March 1995)	A-1-2

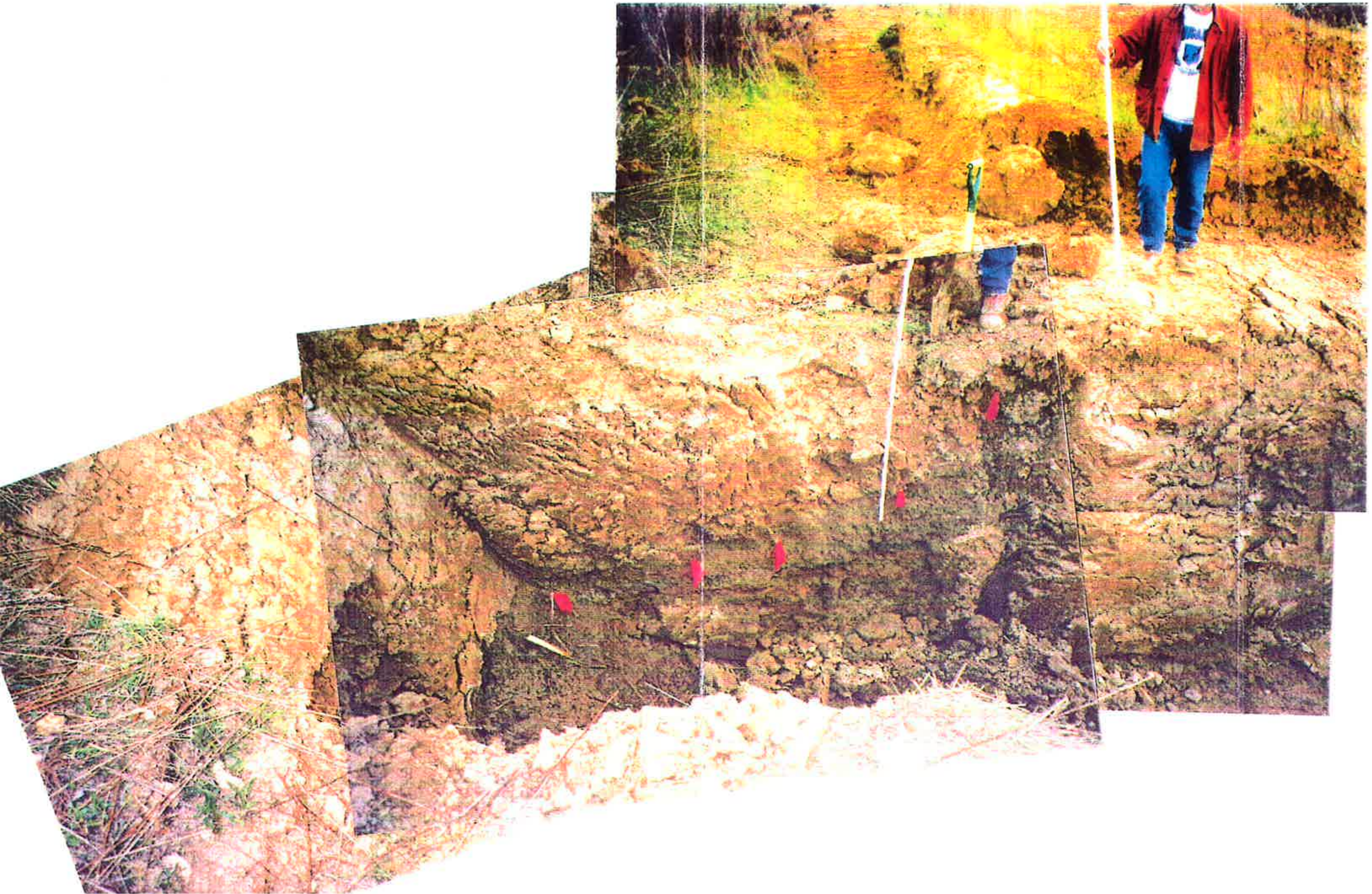
PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike

4/7/95	Both photos show scrap at lower east edge of slide; looking east from about midheight of slope. (21 March 1995)	A-1-3

PHOTOGRAPHS

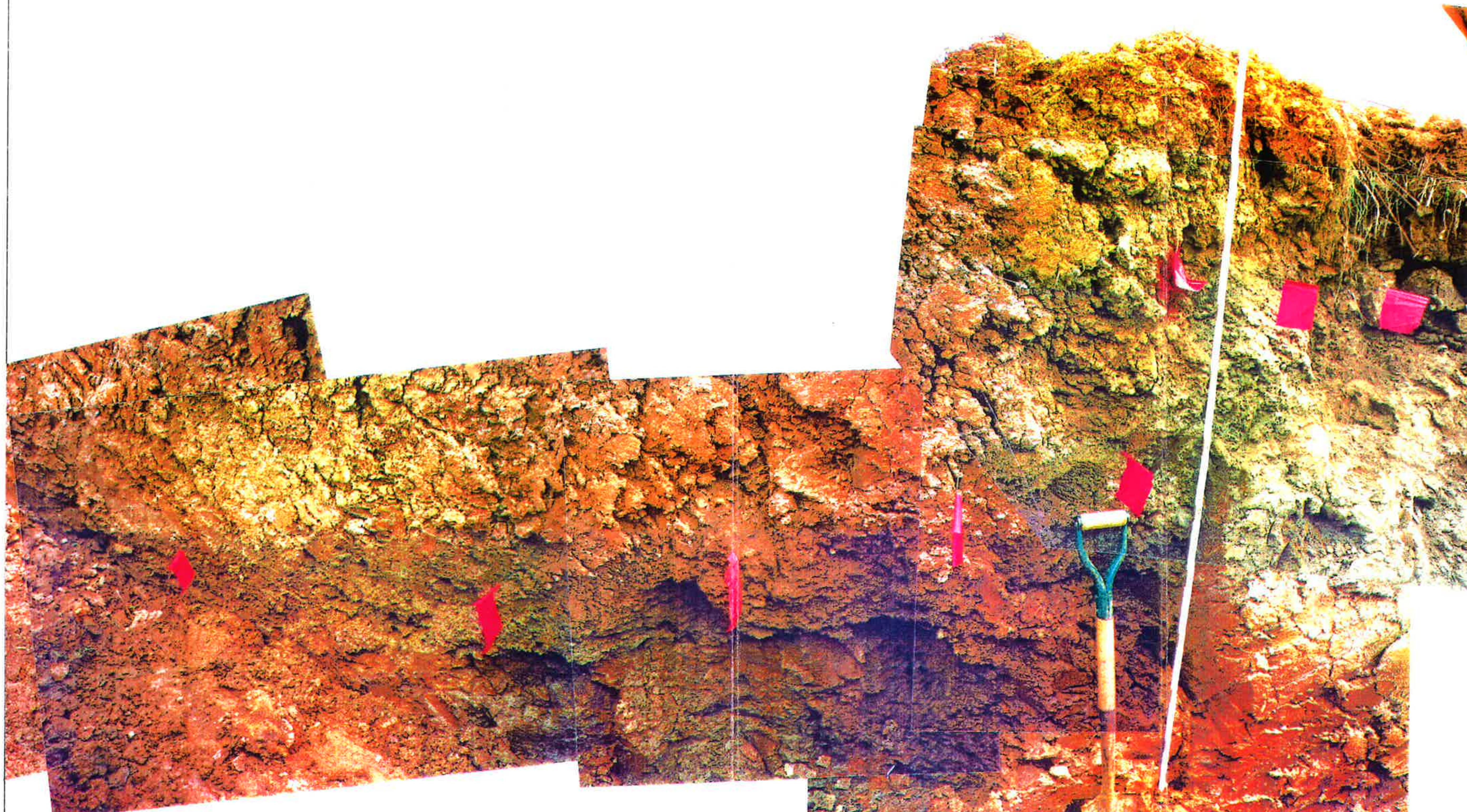
Illinois Power Co. - Baldwin Power Station

Ash Pond - South Dike



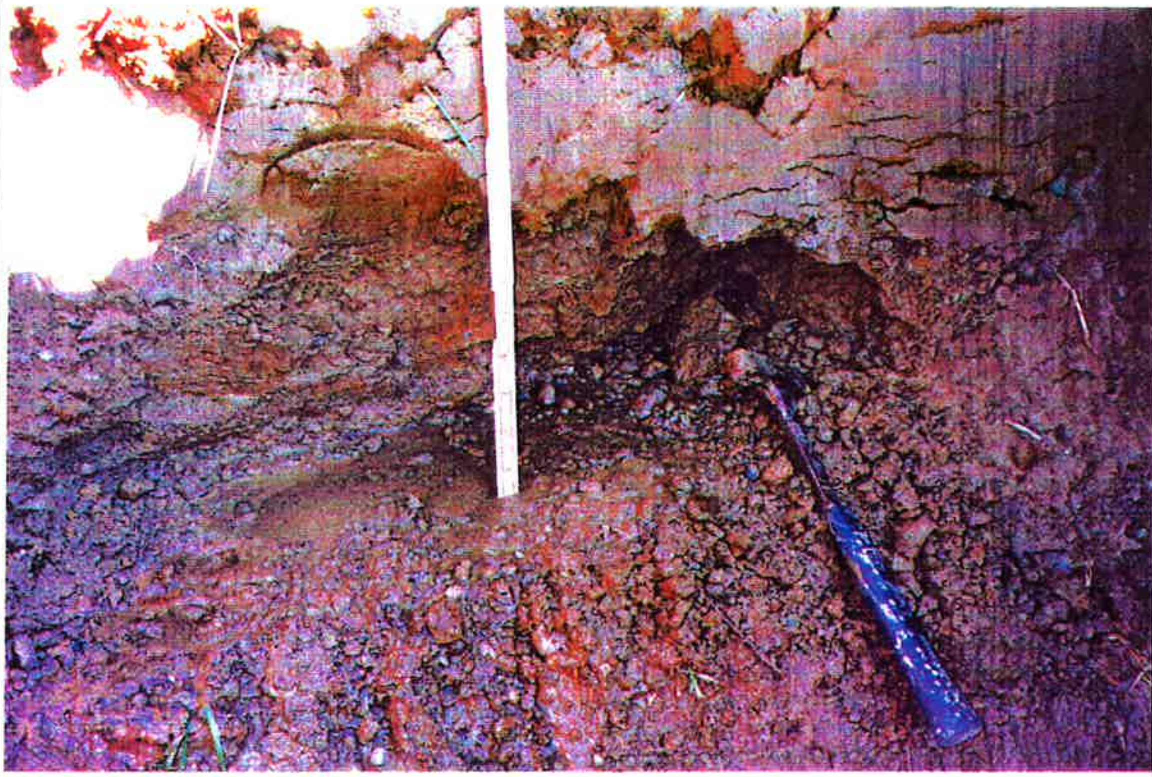
PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike

4/7/95	Test Pit TP-4: East face. Note zone of fly ash/bottom ash, gravel and clay. Midslope scarp visible in center of photo. Could not trace scarp deeper than about 3 ft. below grade. Seepage at north face in pervious zone when trench opened. (20 March 95)	A-1-5



4/7/95	Test Pit TP-5: Panorama of east face looking from north (left) to east (at location of shovel). Flags are at top of pervious fly ash/bottom ash, gravel and clay zone. Rule is at midslope scarp. Note that a portion of the right zone (downslope) of scarp is lifted above portion on the left (upslope). Scarp extends below the pervious zone at right of rule. Seepage was noted at the north end of the pervious zone when the trench was opened 20 March 1995. (photo taken 22 March 19995).	A-1-6

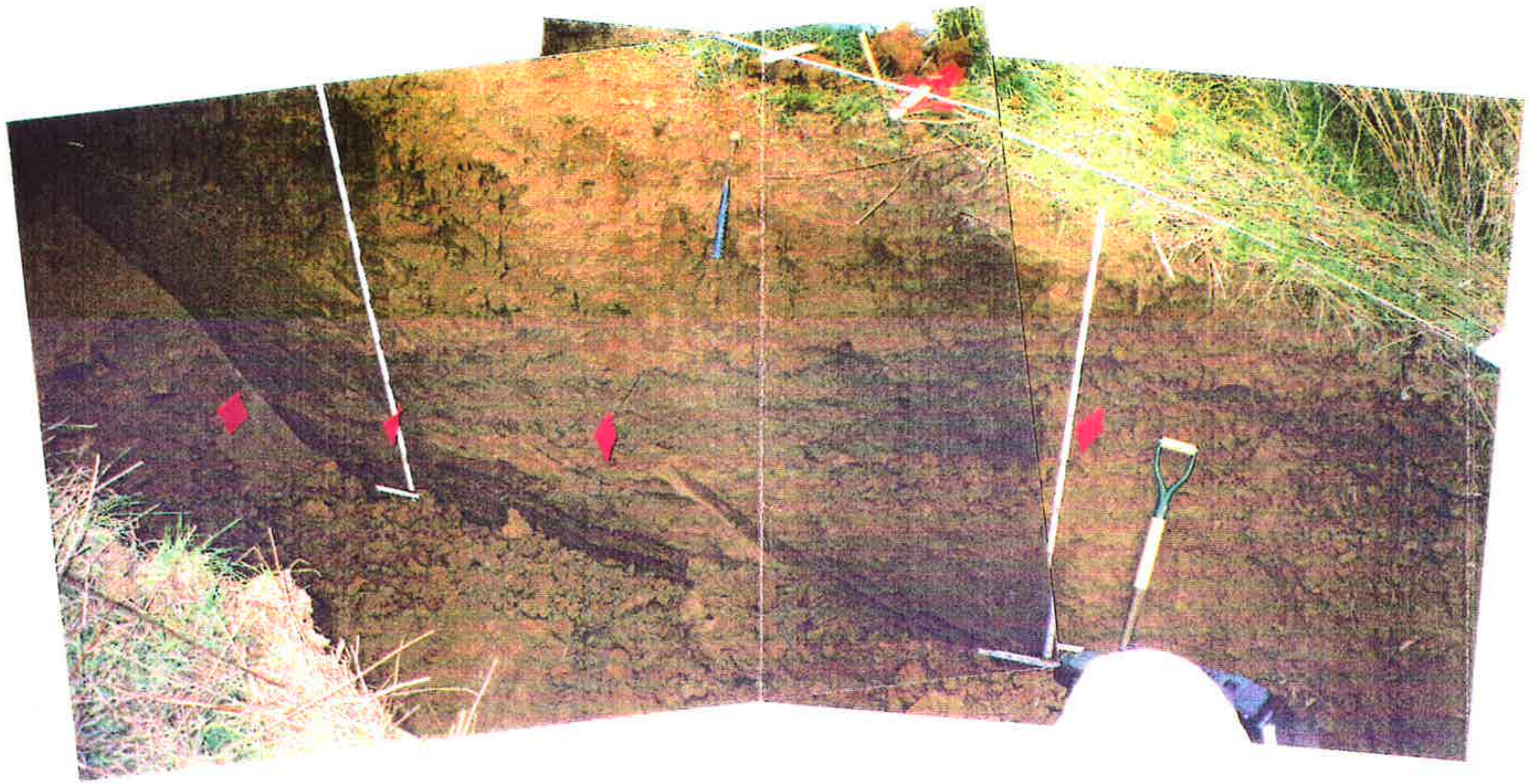
PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike



4/7/95	Seepage from the pervious fly ash/bottom ash, gravel and clay zone into the north end of Test Pit TP-5 shortly after excavation. (20 March 1995). Rockpick needed to excavate this zone due to cementation (lime treatment?)	A-1-7

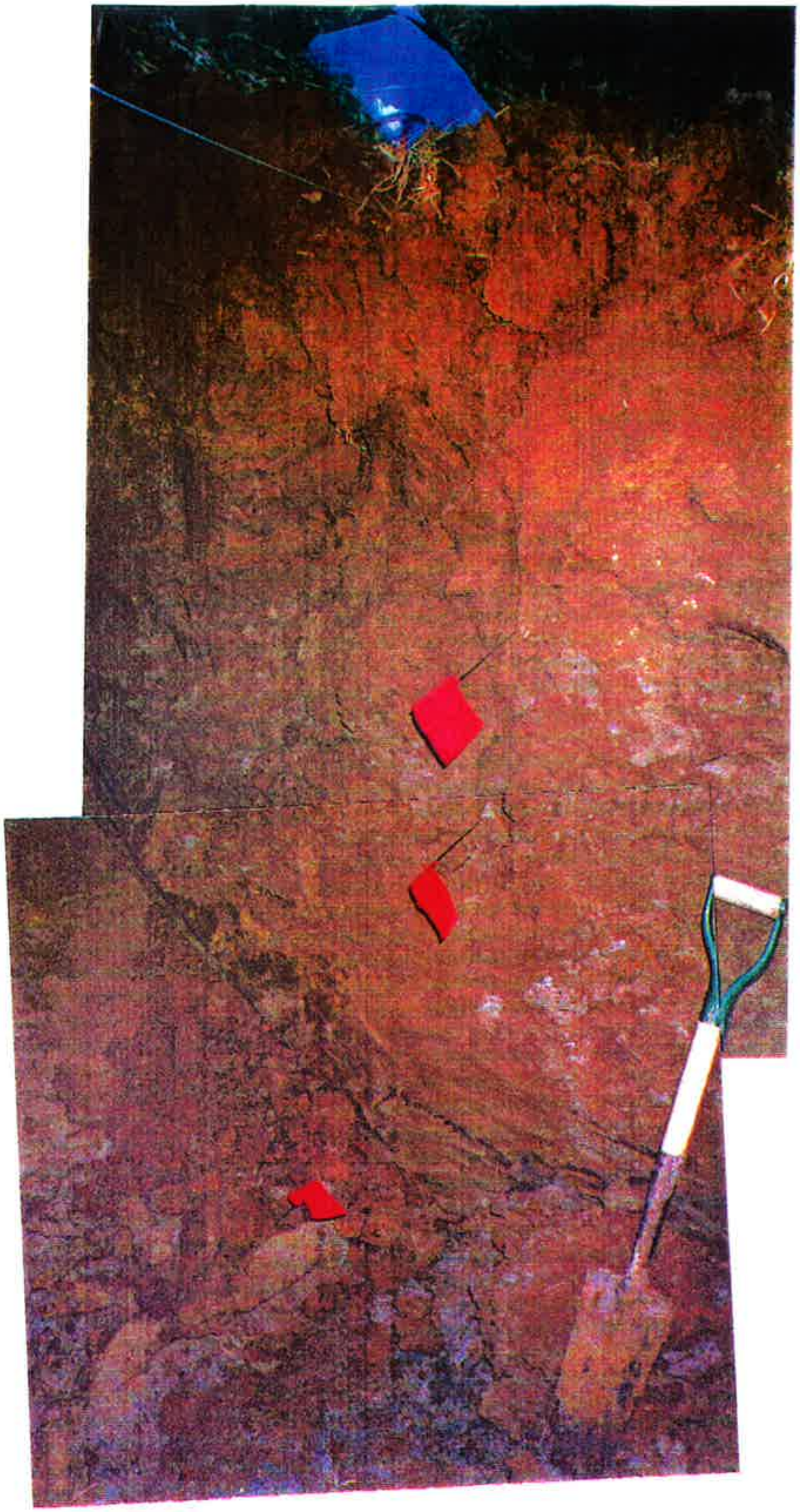
PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike

4/7/95	Test Pit TP-6: Looking Northeast. Note zone of fly ash/bottom ash, gravel and clay. North end of this zone is lime treated and hard. No seepage visible. (22 Mar 95)	A-1-8



Test Pit TP-7: East face looking northeast. Note zone of fly ash/bottom ash, gravel and clay. Northern portion of this zone is lime treated and hard. No seepage. (22 March 95)

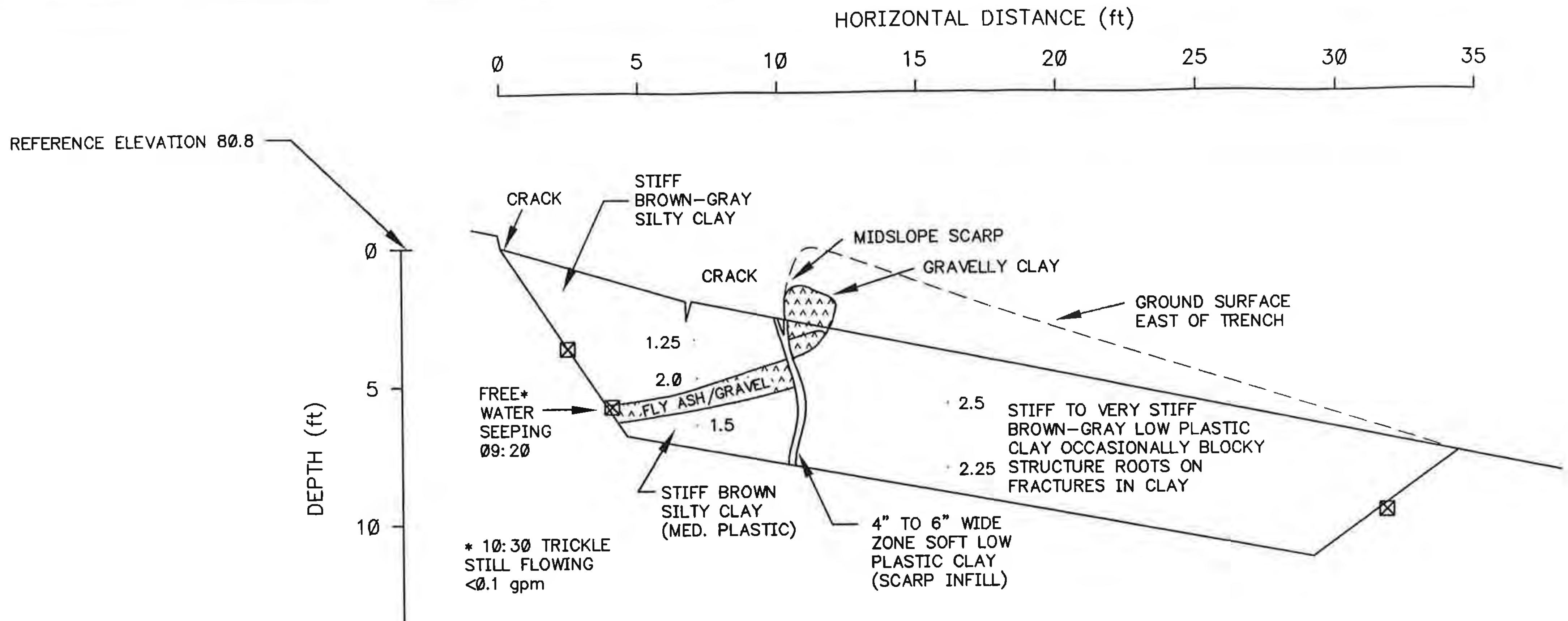
PHOTOGRAPHS
Illinois Power Co. - Baldwin Power Station
Ash Pond - South Dike



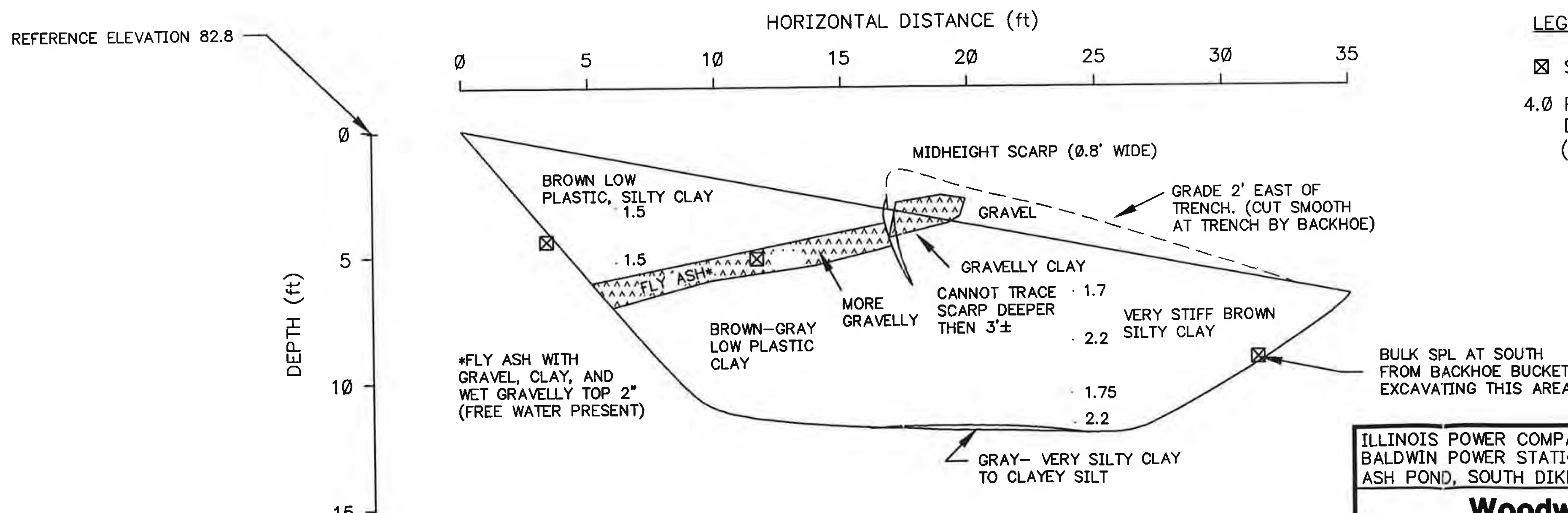
4/7/95	Test Pit TP-8: East face. Flags trace scarp to bottom. Scarp zone consists of very soft clay zone 1 to 2 in. wide. Soil on either side is very stiff clay.	A-1-10

APPENDIX A-2 - TEST PITS

A total of 8 test pits were excavated between March 20, 1995 and March 22, 1995 using a track-mounted Caterpillar backhoe equipped with a 48-inch wide, 2.5 cubic yard bucket. The test pits were positioned to intercept the potential failure surfaces, both within and outside of the observable failure areas. Detailed logs of the test pits are included in Figures A-2-1 through A-2-3.



TEST PIT 3 EAST FACE
(EXCAVATED MARCH 21, 1995)



TEST PIT 4 LOOKING EAST
(EXCAVATED MARCH 20, 1995)

LEGEND

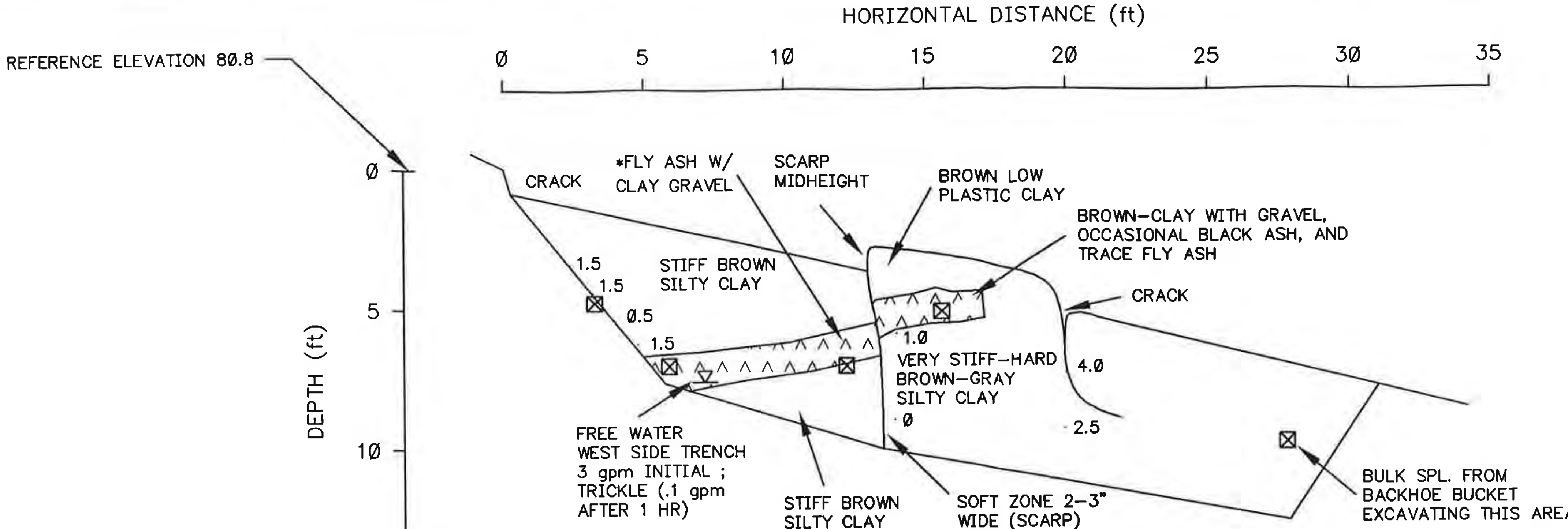
⊠ SOIL SAMPLE

4.0 POCKET PENETROMETER DIRECT READING (UNCONFINED COMPRESSIVE STRENGTH, TSF)

SCALE 0 5 FEET

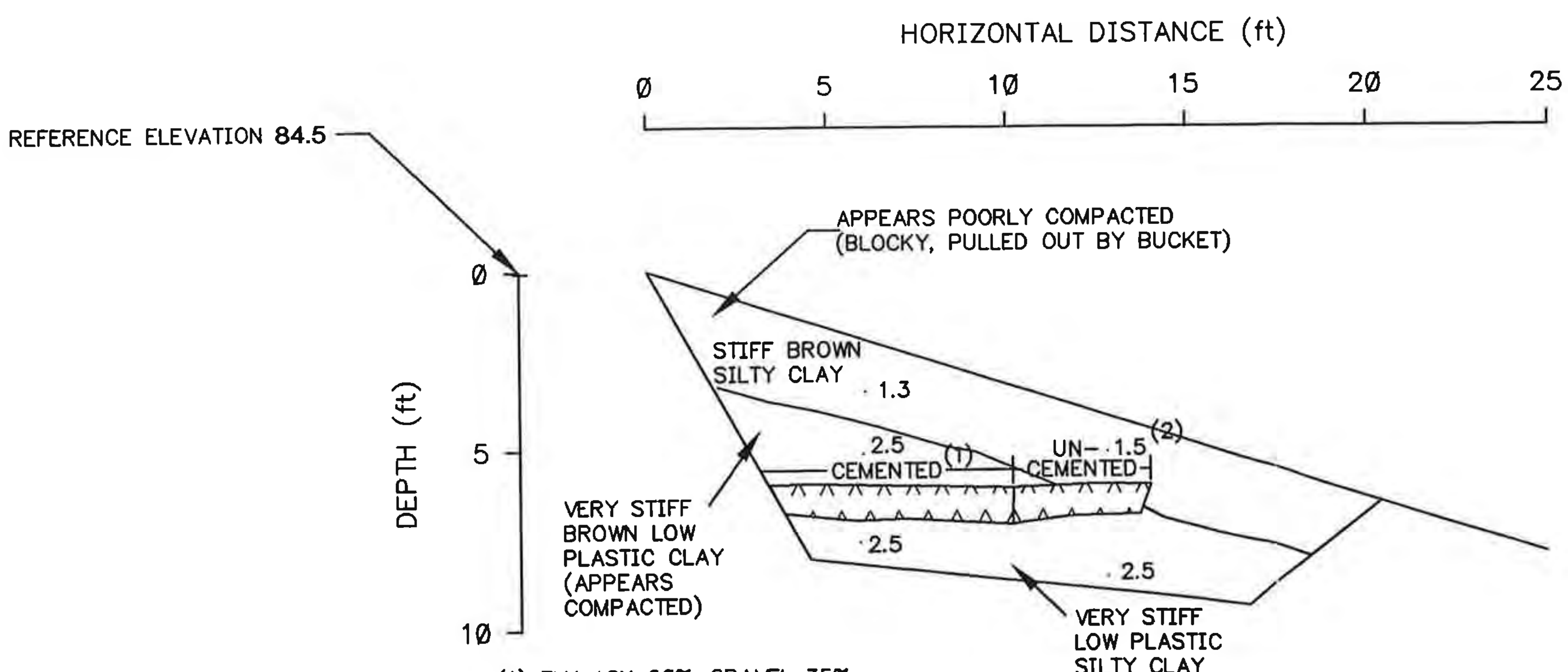
ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/25/95 DSGN. BY: gaz CHKD. BY: KMB 9-6-95	TEST PIT LOGS TP-3, TP-4 — FIG. NO. A-2-1

File: F:\5E08560\TASK240\TESTPIT3.DWG Last edited: 09/06/95 @ 3:53 p.m. @ WCC-ST.LOUIS



*FLY ASH WITH CLAY, OCCASIONAL GRAVEL, PURE ASH SOME LOCATIONS, WET

TEST PIT 5 EAST FACE
(EXCAVATED MARCH 2Ø, 1995)



(1) FLY ASH 6Ø%, GRAVEL 35%, BOTTOM ASH 5% (CEMENTED)
(2) FLY ASH 5Ø%, GRAVEL 3Ø%, BOTTOM ASH 5%, CLAY 15% (UNCEMENTED)

NO FREE WATER VISIBLE

TEST PIT 6 EAST FACE
(EXCAVATED MARCH 22, 1995)

LEGEND

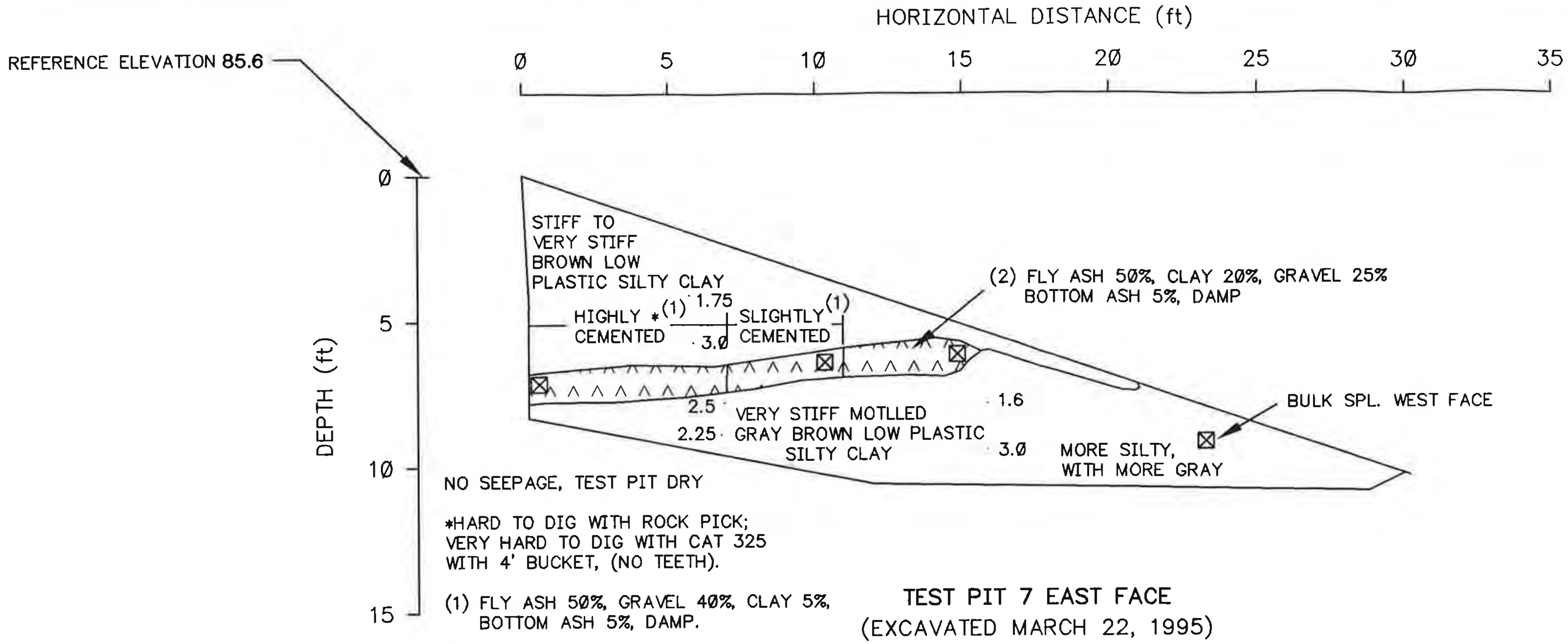
⊠ SOIL SAMPLE

4.Ø POCKET PENETROMETER DIRECT READING (UNCONFINED COMPRESSIVE STRENGTH, TSF)

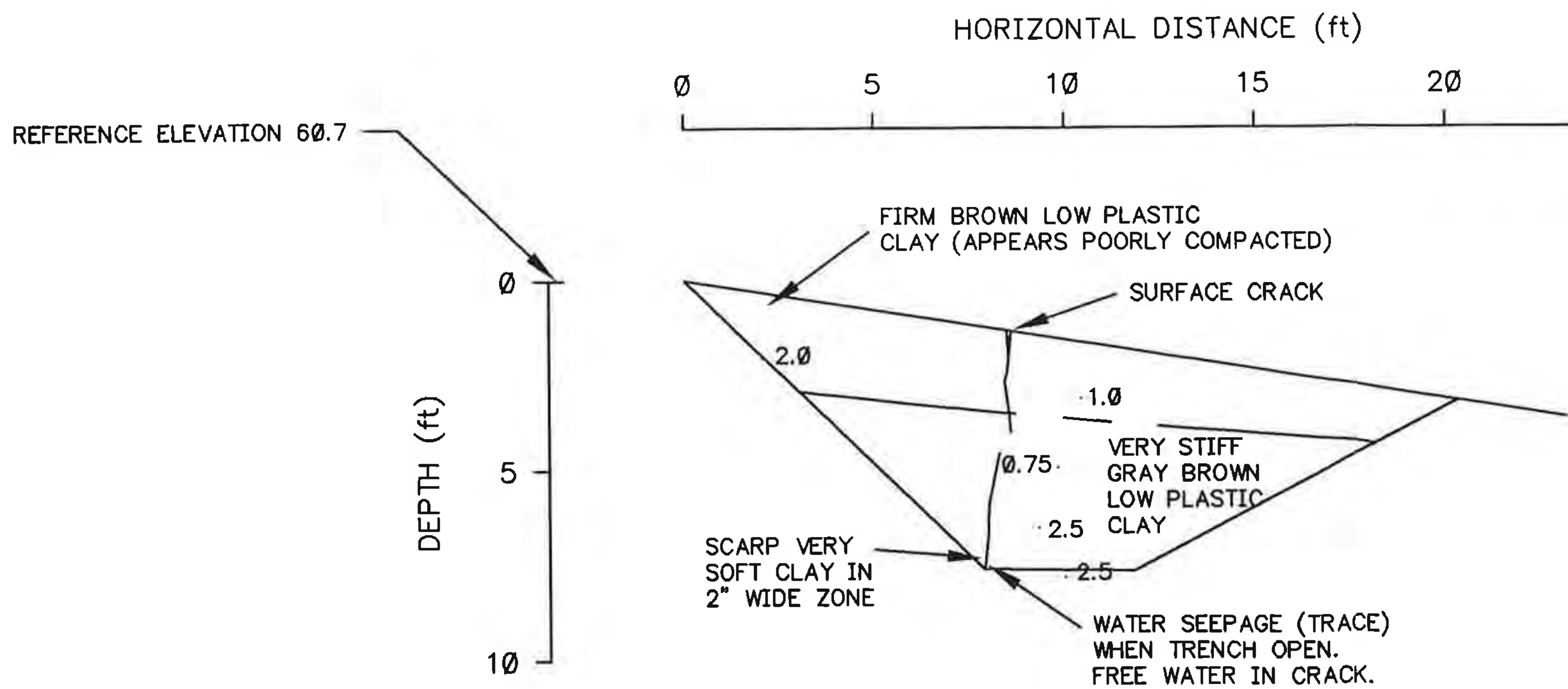
Ø 5
SCALE FEET

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5EØ856Ø
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/25/95 DSGN. BY: gaz CHKD. BY: KMA 9-6-95	TEST PIT LOGS TP-5, TP-6
FIG. NO.	A-2-2

File: F:\5E08560\TASK240\TESTPIT5.DWG Last edited: 09/06/95 @ 3:55 p.m. @ WCC-ST.LOUIS



TEST PIT 7 EAST FACE
(EXCAVATED MARCH 22, 1995)



TEST PIT 8 EAST FACE
(EXCAVATED MARCH 22, 1995)

LEGEND

⊠ SOIL SAMPLE

4.0 POCKET PENETROMETER DIRECT READING (UNCONFINED COMPRESSIVE STRENGTH, TSF)

SCALE 0 5 FEET

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/26/95 DSGN. BY: gaz CHKD. BY: KMB 9-6-95	TEST PIT LOGS TP-7, TP-8 — FIG. NO. A-2-3

File: F:\5E08560\TASK240\TESTPIT7.DWG Last edited: 09/06/95 @ 3:58 p.m. @ WCC-ST.LOUIS

APPENDIX A-3 - BORINGS

Seven of the 15 borings (B-1, B-5, B-6, B-7, B-8, B-9, and B-15) were made with a Dietrich 120 drill rig, owned and operated by Midwest Engineering Services, Inc. of Champagne. Two borings (B-101 and B-102) and five piezometers (P-2A, P-3A, P-4, P-5A, and P-7) were made with a CME-750 all terrain drill rig, owned and operated by Roberts Environmental Drilling, Inc. of Millstadt, Illinois. All of the other explorations and instrumentation installations were made by a CME-750 all terrain drill rig, owned and operated by Layne-Western Company, Inc. of St. Louis. Layne-Western had two drill rigs on site for a period of two days, but they removed one rig to take it to another site. The drill rigs were under subcontract to WCC.

The borings were advanced through the soil using either 4-in. O.D. continuous flight auger (CFA), 4.25-in. I.D. hollow stem auger (HSA), 6.25-in. I.D. HSA, or rotary wash with a 5-in diameter tri-cone bit. The depths of the borings ranged from approximately 10 to 80 feet. Surveyed locations (station, offset, and elevation) for the borings of the first phase were provided to WCC by Illinois Power. The locations for the second phase borings was estimated based upon the survey information that was provided.

Samples of subsurface materials were obtained at about 5-ft intervals using three types of samplers: 1) a hydraulically pushed, 2-in. I.D., thick-walled liner-tube sampler (modified California sampler); 2) a 2-in. O.D. split-spoon sampler driven by a 140-lb. hammer in conjunction with a Standard Penetration Test (ASTM D-1586), and 3) hydraulically pushed 3-in. diameter thin-walled Shelby tubes. Some shelby tubes were obtained using a fixed piston sampler.

The borings were logged in the field based upon recovered samples, cuttings, and drilling characteristics. Boring logs were subsequently modified as appropriate based on laboratory test results. Detailed boring logs are included as Figures A-3-1 through A-3-23 of this appendix.

KEY TO BORING LOGS

	Graphic Symbol	Description	USC Class.
GRAVEL		GRAVEL with little or no fines	GP or GW
GRAVEL		Silty GRAVEL	GM
GRAVEL		Clayey GRAVEL	GC
SAND		SAND with little or no fines	SP or SW
SAND		Silty SAND	SM
SAND		Clayey SAND	SC
LOW PLASTIC SILTS AND CLAYS		Inorganic low plastic SILT	ML
LOW PLASTIC SILTS AND CLAYS		Inorganic low plastic CLAY	CL
LOW PLASTIC SILTS AND CLAYS		Silty	CL
LOW PLASTIC SILTS AND CLAYS		Sandy	CL
LOW PLASTIC SILTS AND CLAYS		Gravelly	CL
LOW PLASTIC SILTS AND CLAYS		Organic low plastic SILT or CLAY	OL
HIGH PLASTIC SILTS AND CLAYS		Inorganic high plastic SILT	MH
HIGH PLASTIC SILTS AND CLAYS		Inorganic high plastic CLAY	CH
HIGH PLASTIC SILTS AND CLAYS		Organic high plastic SILT or CLAY	OH
		Peat and other highly organic soils	PT
ROCKS		LIMESTONE	
ROCKS		SHALE	
ROCKS		SANDSTONE	
ROCKS		SILTSTONE	
SURFACE MATERIALS		Topsoil or pavement	
SURFACE MATERIALS		FILL	

TERMS DESCRIBING CONSISTENCY OR CONDITION

Coarse grained soils (major portion retained on No. 200 sieve): Includes gravels and sands. Condition is rated according to the Standard Penetration Resistance, as shown below.

Descriptive Term	Blows per Foot
Very loose	0 - 5
Loose	5 - 10
Medium dense	10 - 30
Dense	30 - 50
Very dense	Greater than 50

Fine grained soils (major portion passing No. 200 sieve): Includes clays and silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

Descriptive Term	Unconfined Compressive Strength, tons/sq.ft	Hand Test
Very soft	less than 0.25	Extrudes between fingers
Soft	0.25 - 0.50	Molded by slight pressure
Firm	0.50 - 1.00	Molded by strong pressure
Stiff	1.00 - 2.00	Indented by thumb
Very stiff	2.00 - 4.00	Indented by thumbnail
Hard	4.00 and higher	Difficult to indent

LEGEND AND NOMENCLATURE

	Standard Penetration Sample
	Liner-tube sample, obtained by penetration of thick wall sampler containing 2 in. diameter liner-tubes (California sampler).
	Undisturbed sample, obtained by penetration of minimal 3 in. diameter, thin wall tube or, where indicated, fixed-piston sampling head.
	NX core.
PP,tsf	Unconfined compressive strength in tsf estimated with pocket penetrometer.
TV,tsf	Undrained shear strength in tsf estimated with torvane.
NMC,%	Natural Moisture Content, %
LL	Liquid Limit
PI	Plasticity Index
Qu, ksf	Unconfined Compressive Strength (Laboratory), ksf
RQD=80%	Percentage (80) of Rock Quality Designation
∇	Depth Groundwater enters at time of drilling.
▼	Groundwater Level at some specified time after drilling.

SAMPLING RESISTANCE

P	Sample pushed by hydraulic rig action.
3 6 9	Numbers indicate blows per 6 in. of sampler penetration when driven by a 140 lb hammer falling freely 30 in. The Standard Penetration Resistance is the number of blows for the last 12 in. of penetration of the Standard Penetration sampler, e.g. 15.
15	Standard Penetration Resistance
50/2	Number of blows (50) used to drive the Standard Penetration Sampler a certain number of inches (2).

ABBREVIATIONS USED UNDER "FIELD NOTES"

HSA = Hollow Stem Auger
CFA = Continuous Flight Auger
ATD = At Time of Drilling
AD = After Drilling
DWL = Drill Water Loss
DWR = Drill Water Return

LOG of BORING No. B-01

DATE 3/30/95 SURFACE ELEVATION, FT 101.6 DATUM TBM=100 STA./OFFSET -3+01/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm, damp, reddish-brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition (SPT used automatic hammer)
5		P	100						17			7.8	
				Very stiff, wet to moist, reddish-brown, medium plastic, Silty CLAY (CH)(Fill)	94.1 / 7.5								
10		P	100				3.4	1.3	27	61	40		
15		P	83						15			7.2	
20		P	83	Moist, low plastic, Silty CLAY (CL)(Fill)	81.6 / 20.0				19				Sample appeared to be slough

Completion Depth: 80.2 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Midwest Eng. Service Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-01

DATE 3/30/95 SURFACE ELEVATION, FT 101.6 DATUM TBM=100 STA./OFFSET -3+01/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		1 3 5	67	Loose, wet, black, bottom ash (SP)(Fill)	76.4 25.2								
30		1 2 2	78										
				Firm, damp to moist, mottled reddish-brown/light brownish-gray, low plastic, Silty CLAY (CL)(Fill)	67.6 34.0								Driller reported a change in material at 34.0 feet Original Dike
35		2 5 6	56						19				
40		P	33						25				Sample appeared to be mostly slough
45		P	56				0.8	0.9	23	44	27		
					51.6								

Completion Depth: 80.2 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng. Service

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

LOG of BORING No. B-01

DATE 3/30/95 SURFACE ELEVATION, FT 101.6 DATUM TBM=100 STA./OFFSET -3+01/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		2 3 3	100	Firm, moist, reddish-brown, low plastic, silty CLAY (CL)	50.0				14				
55		P	100	Soft, moist to wet, light brown, Silty CLAY (CL)	46.6 55.0				26				Approximate top of natural ground Peoria Loess
60		3 5 5	100						30				
65		4 8 10	100	Stiff to hard, moist, light gray, highly weathered SHALE	36.6 65.0				25				Equality/Glasford Formation Driller reported stiff material with trace gravel 63.5-64.5 feet SHALE Spoon Formation
70		14 21 24	100	Grades some purple, highly weathered shale					19				

Completion Depth: 80.2 Ft. Water Depth: ___ ft., After ___ hrs.

Project No.: 5E08560 ___ ft., After ___ hrs.

Project Name: Illinois Power/Baldwin Power Station ___ ft., After ___ hrs.

Drilling Contractor: Midwest Eng. Service Logged by: K. Berry

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Figure No. A-3-1

LOG of BORING No. B-01

DATE 3/30/95 SURFACE ELEVATION, FT 101.6 DATUM TBM=100 STA./OFFSET -3+01/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		7 15 21	100	Light brown, highly weathered SHALE	21.6 80.0				23				
80		100/2.2		LIMESTONE	21.4 80.2								
				Bottom of boring at 80.2 feet									
85													
90													
95													

Completion Depth: 80.2 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Midwest Eng. Service Logged by: K. Berry

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

Figure No. A-3-2

LOG of BORING No. B-02

DATE 3/30/95 SURFACE ELEVATION, FT 97.9 DATUM TBM=100 STA./OFFSET 1+21/2 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Very stiff, moist, reddish-brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 6-1/4 inch I.D. HSA (SPT used automatic hammer) 1989 Dike Addition
5		P	94				2.4	1.6	20	37	20		(sample may be disturbed)
10		P	100	Becomes stiff			1.9	0.9	21	44	26		
15		P	94	Becomes mottled reddish-brown/light brownish-gray			2.8	0.9	22	44	25		
				Becomes high plastic	78.9 / 19.0								
20		P	83				1.5	0.8	26	55	34		
				Very loose, wet, black, bottom ash (SP)(Fill)	76.9 / 21.0								Switched to mud rotary with 4 inch tricone bit (modified to 5 inches)

Completion Depth: 79.7 Ft.

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Logged by: K. Berry

LOG of BORING No. B-02

DATE 3/30/95 SURFACE ELEVATION, FT 97.9 DATUM TBM=100 STA./OFFSET 1+21/2 RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25	2 2 2	33	SAME: Very loose, wet, black, bottom ash (SP)(Fill)				28				Ash FILL (similar to sand)
30	2 2 2	56	Soft, moist, gray, low plastic SILT and CLAY (CL)(Fill)	68.1 / 29.8			23				Appears to be a transition zone Original dike
			Firm to stiff, moist, brown/mottled brown and brownish-gray, low plastic CLAY (CL)(Fill)	65.4 / 32.5							
35	4 3 6	56					23				Advanced augers to 35 feet due to sloughing problem when trying to sample at 40 feet
40	P	96	Becomes very stiff, reddish-brown		2.1	0.8	32	49	30		Began using fixed piston sampler
45	P	100	Becomes very stiff to hard		2.9	1.6	18	38	20		

Completion Depth: 79.7 Ft. Water Depth: ____ ft., After ____ hrs.
Project No.: 5E08560 ____ ft., After ____ hrs.
Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.
Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-02

DATE 3/30/95 SURFACE ELEVATION, FT 97.9 DATUM TBM=100 STA./OFFSET 1+21/2 RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50	P	100	SAME: Very stiff, moist, reddish-brown, low plastic CLAY (CL) (Fill)		3.1	1.8	23	51	31		Boring had problems with the clay "squeezing" in at 35 feet
											Advanced augers to 50 fee
55	P	100			1.9	0.7	21	34	16		
			Small wood fragments, grass and roots	41.3 / 56.6							
			Very stiff, moist, mottled reddish-brown and light gray, low plastic, silty CLAY (CL)								Approximate top of natural ground Peoria Loess
											Continued having problems getting steel to go back down the boring
60	P	100			2.1 1.5	0.9	18	35	20		
65	P	100			>4.5	0.8	25	34	15		
			Hard, moist, light gray, high plastic CLAY (CH); with little sand	32.4 / 65.5							Excess recovery was slough Tube refusal at 65.5 feet Driller reported hard drilling to 66.9 feet Glasford/Equality Formation
70	15 25 18	83	Light brown to gray, highly weathered SHALE; with some silt and sand	28.4 / 69.5			22				Spoon Formation

Completion Depth: 79.7 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

LOG of BORING No. B-02

DATE 3/30/95 SURFACE ELEVATION, FT 97.9 DATUM TBM=100 STA./OFFSET 1+21/2 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		21 42 36	100	SAME: Light brown to gray, highly weathered SHALE; with some silt and sand									
		50/2.5"	80		18.2								SPT was bouncing
80				Bottom of boring at 79.7 feet	79.7								Inclinometer installed
85													
90													
95													

Completion Depth: 79.7 Ft. Water Depth: ______ ft., After ______ hrs.

Project No.: 5E08560 ______ ft., After ______ hrs.

Project Name: Illinois Power/Baldwin Power Station ______ ft., After ______ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

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LOG of BORING No. B-03

DATE 4/7/95 SURFACE ELEVATION, FT 98.0 DATUM TBM=100 STA./OFFSET 1+67/3 LT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0	P	71	Stiff to hard, damp to moist, reddish-brown, low plastic, Silty CLAY (CL)(Fill)		2.4	0.7	24				Boring advanced using 4-1/4 inch I.D. HSA Shelby tube samples taken with fixed piston sampler 1989 Dike Addition
	P	71			3.0	0.9	20				
	P	88	Becomes damp		3.2	1.4	18				
5	P	100			4.8	1.8	17				
	P	100			3.6	1.9	18	43	25		
10	P	100			4.8	2.3	18				
	P	96	Trace gravel		2.9	1.2	18	37	19		
	P	100	Becomes brown		3.8	1.0	20	44	26		
15	P	58	Becomes gray with fly ash		2.8	0.9	17	46	25		
	P	100	Becomes brown and gray		1.9	0.8	23	47	27		
20	P	88		77.0	4.4	0.3	18				
			Loose, moist, black, bottom ash (SP)(Fill)	21.0							Mixed mud to fill augers

Completion Depth: 80.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-03

DATE 4/7/95 SURFACE ELEVATION, FT 98.0 DATUM TBM=100 STA./OFFSET 1+67/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		2 2 2	50	Very loose, wet, black, bottom ash (SP)(Fill)					18				
30		1 2 4	39	Firm, moist, gray, low plastic, Silty CLAY (CL)(Fill)	67.8 30.2				22				Original dike
35		4 4 6	67	Becomes brown and gray					25				Stopped using mud
40		P	17						20	44	26		Sample in a jar
45		4 6 8	67	Firm to stiff, moist, reddish-brown with trace gray, low plastic, silty CLAY (CL)	53.0 45.0								Approximate Top of Natural Ground Peoria Loess

Completion Depth: 80.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-03

DATE 4/7/95 SURFACE ELEVATION, FT 98.0 DATUM TBM=100 STA./OFFSET 1+67/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		P	100	Firm to stiff, moist, gray, low plastic, silty CLAY (CL)	43.0								Peoria Loess
55		P	0	Stiff, wet, light gray, non-plastic, sandy SILT (ML)	55.0 40.0								Pushed a split spoon to get a sample Equality/Glasford Formation
				Stiff to very stiff, moist, brown, low plastic, silty CLAY (CL); with trace gravel	58.0								Driller reported material change at 58.0 feet
60		4 50/3.5"	100	Becomes reddish-brown	36.0								SPT bouncing after 8 inches
				Stiff to hard, damp to moist, light green/light brown/gray, highly weathered SHALE	62.0								Spoon Formation
				9 inches cobble									
65		6 10 12	33										
70		16 33 31	83	Becomes purple then orangish-brown									

Completion Depth: 80.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-03

DATE 4/7/95 SURFACE ELEVATION, FT 98.0 DATUM TBM=100 STA./OFFSET 1+67/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		19 29 43	100	Damp to moist, green, highly weathered SHALE									
80		50/0.5'	0		17.5								Driller reported hard material
				Bottom of boring at 80.5 feet	80.5								Installed inclinometer
85													
90													
95													

Completion Depth: 80.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

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Figure No. A-3-4

LOG of BORING No. B-04

DATE 4/11/95 SURFACE ELEVATION, FT 94.0 DATUM TBM=100 STA./OFFSET 2+52/11'RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm to stiff, moist, reddish-brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition
5		P	67						20				
10		P	83						17	43	25		1 inch zone of brown high plastic clay in shoe
15		P	75										Sample slid
				Becomes gray (mixed with fly ash)									
20		P	8	Loose, wet, black, bottom ash (SP)(Fill)	73.9 / 20.1								Placed a plug inside augers
25		1	39	Soft, moist to wet, green, medium plastic	69.0 / 25.0				27	50	31		Brown, silty clay in shoe

Completion Depth: 75.5 Ft.

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-04

DATE 4/11/95 SURFACE ELEVATION, FT 94.0 DATUM TBM=100 STA./OFFSET 2+52/11'RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
	2 3		CLAY (CL)(Fill)								Original dike
30	2 4 5	50	Firm, moist, brown, low plastic, silty CLAY (CL)(Fill)				20	42	22		
35	P	100	Becomes stiff, mottled brown and light gray				16	42	22	2.7	
40	P	88	Stiff, moist, brown, low plastic, silty CLAY (CL)	53.7 40.3	1.3						Approximate top of natural ground
			Becoming light reddish-brown; with trace roots, oxidation	51.0 43.0							Peoria Loess
45	- 5 7	100					23				First 6 inches of SPT - rods fell down boring
50	P	100	Firm, moist, mottled orangish-brown and gray, high plastic CLAY (CH)	44.0 50.0							

Completion Depth: 75.5 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

Logged by: K. Berry

LOG of BORING No. B-04

DATE 4/11/95 SURFACE ELEVATION, FT 94.0 DATUM TBM=100 STA./OFFSET 2+52/11'RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
					39.0								
55		P	100	Firm, moist, orangish-brown, low plastic, silty CLAY (CL); with trace gravel	55.0				24				Rods slid into boring Glasford Formation Driller reported hard drilling at 57.0 feet
					34.0								
60		14 20 12	83	Very stiff to hard, moist, light brown, severely weathered CLAY-SHALE; with some gravel	60.0				19				Spoon Formation Gray, high plastic clay in shoe
65		25 22 18	89						12				Appeared to be decomposing rock Maroon, high plastic clay in shoe
70		22 25 28	100	Hard, moist, light gray, highly weathered SHALE					19				
75		50/1.5"	50		18.5				27				
				Bottom of boring at 75.5 feet	75.5								Auger refusal at 75.5 feet

Completion Depth: 75.5 Ft.

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Logged by: K. Berry

LOG of BORING No. B-05

DATE 4/5/95 SURFACE ELEVATION, FT 101.1 DATUM TBM=100 STA./OFFSET 6+05/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Damp, reddish-brown, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4inch I.D. HSA without a center plug 1989 Dike Addition
5		P	100										
					93.6 / 7.5								
				Very stiff, damp, reddish-brown, high plastic, Silty CLAY (CH)									
10		P	50				2.1	1.0	21				
15		P	83	Becomes brown									
					81.1 / 20.0								
20		P	100	Very stiff, damp, light gray, Clayey SILT (ML)			3.6	1.2	17				

Completion Depth: 81.3 Ft. Water Depth: 28.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

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LOG of BORING No. B-05

DATE 4/5/95 SURFACE ELEVATION, FT 101.1 DATUM TBM=100 STA./OFFSET 6+05/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		P	67		75.6								
				Loose, wet, black, bottom ash (SP)(Fill) ▽	25.5								
30		1 3 2	67						22				Placed a plug in augers before advancing
					67.1								
				Soft to firm, moist, orangish-brown, medium plastic CLAY (CL); with trace roots (Fill)	34.0								Driller reported material change at 34.0 feet Original Dike
35		4 4 6	83										
					61.1								
40		P	0	Firm, moist, orangish-brown, medium plastic CLAY (CL)	40.0								Approximate top of natural ground Peoria Loess
45		P	8	Becomes light reddish-brown									

Completion Depth: 81.3 Ft. Water Depth: 28.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

LOG of BORING No. B-05

DATE 4/5/95 SURFACE ELEVATION, FT 101.1 DATUM TBM=100 STA./OFFSET 6+05/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		3 4 6	100	Firm, moist, brown and gray, medium plastic CLAY (CL)					20				Equality/Glasford Formation
55		P	100	Grades trace sand									
60		8 13 15	100	Very stiff to stiff, damp, gray and light green, highly weathered SHALE	41.1 60.0								Spoon Formation
65		5 8 14	100	Becomes stiff, light green 65.7 feet - 1 inch coal layer									
													6 inches cobble (almost auger refusal)
70		3 4 14	100	Becomes light brown 1/2 inch coal layer Becomes light gray					23				Possible slough/disturbance first 6 inches of SPT

Completion Depth: 81.3 Ft. Water Depth: 28.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Figure No. A-3-5

LOG of BORING No. B-05

Sheet 4 of 4

DATE 4/5/95 SURFACE ELEVATION, FT 101.1 DATUM TBM=100 STA./OFFSET 6+05/3 LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		15 35 59	100	Hard, dry, light gray SHALE									
80		11 45 55	100		19.8								
				Bottom of boring at 81.3 feet	81.3								
85													
90													
95													

Completion Depth: 81.3 Ft.
Water Depth: 28.0 ft., After ATD hrs.
Project No.: 5E08560
ft., After hrs.
Project Name: Illinois Power/Baldwin Power Station
ft., After hrs.
Drilling Contractor: Midwest Eng.Services
Logged by: K. Berry

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Figure No. A-3-6

LOG of BORING No. B-06

Sheet 1 of 4

DATE 4/4/95 SURFACE ELEVATION, FT 101.7 DATUM TBM=100 STA./OFFSET 10+16/7 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, damp, reddish-brown, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA without a center plug 1989 Dike Addition
5		P	8										Sample in a jar
10		P	100						17			5.8	
15		P	75						18	47	29		
20		P	50		81.2		3.6	1.2	17				Shelby tube refusal
				Very stiff, dry, gray SILT (ML)(Fill)	20.5								
													Black fine gravel (ash) in cuttings
					76.7								

Completion Depth: 81.5 Ft.
Project No.: 5E08560
Project Name: Illinois Power/Baldwin Power Station
Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: K. Berry

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

LOG of BORING No. B-06

DATE 4/4/95 SURFACE ELEVATION, FT 101.7 DATUM TBM=100 STA./OFFSET 10+16/7 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		3 3 4	78	Loose, wet, black, bottom ash (SP)(Fill)	25.0 72.7				25				A plug was placed in augers
				Stiff, damp to moist, gray, Clayey SILT (CL-ML); with oxidation (Fill)	29.0								Driller stated possible material change at 29.0 feet - Original dike
30		5 7 8	100	Becomes light brown	66.7								
35		P	67	Moist, gray, low plastic CLAY (CL)	35.0				21			1.4	(sample was possibly slough)
40		P	100	Becomes light reddish-brown; with oxidation	58.2				23				
				Firm, moist, brown and gray, high plastic CLAY (CH)	43.5								Approximate top of natural ground Peoria Loess Repushed 8 inches for recovery of a sample but only recovered a little slough
45		P	0										

Completion Depth: 81.5 Ft.
Project No.: 5E08560
Project Name: Illinois Power/Baldwin Power Station
Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: K. Berry

LOG of BORING No. B-06

DATE 4/4/95 SURFACE ELEVATION, FT 101.7 DATUM TBM=100 STA./OFFSET 10+16/7 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		P	67	Becoming light gray; with oxidation					20			3.6	
55		6 10 15	100	Becomes orangish-brown									
60		7 13 25	100	Very stiff to hard, light brown and light gray, high plastic CLAY (CH)	41.7 60.0								Equality/Glasford Formation
65		6 12 18	100	Becomes brown					22				
70		6 15 76	100	With some chert					16				Driller reported a hard zone at 71.0 feet
					26.7								

Completion Depth: 81.5 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-06

DATE 4/4/95 SURFACE ELEVATION, FT 101.7 DATUM TBM=100 STA./OFFSET 10+16/7 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		7 22 33	100	Hard, light brown to light green, highly weathered SHALE	75.0								Spoon Formation Driller reported very hard drilling at 78.5 feet
80		8 15 40	100	Becomes light green and gray	20.2								
				Bottom of boring at 81.5 feet	81.5								
85													
90													
95													

Completion Depth: 81.5 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-07

DATE 4/4/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 14+26/33 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm to stiff, damp, brown, low plastic, Silty CLAY (CL) (Fill)									Boring advanced using 3-1/4 inch I.D. HSA without a center plug 1989 Dike Addition
5		P	100										
10		P	54	Becomes reddish-brown			4.1	1.3	18				
15		P	100										
20		P	83						21			8.1	
				Trace fly ash									
													Black fine gravel fragments in cuttings

Completion Depth: 80.9 Ft.

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-07

DATE 4/4/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 14+26/33 RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25	3 6 7	78	SAME: Brown and reddish-brown, Silty CLAY (CL) (Fill)				15				Original dike
30	P	83	Becoming moist				17			7.3	
35	P	65	Becomes gray with oxidation		2.6	0.8	25				
40	P	83		59.5 / 42.5			22			4.4	
			Stiff, moist, gray, medium plastic CLAY (CL); trace gravel								Top of natural ground Peoria Loess
45	4 5 7	100									
				52.0							Driller reported softer drilling

Completion Depth: 80.9 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-07

DATE 4/4/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 14+26/33 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		P	100	Firm, moist, brownish-gray, high plastic CLAY (CH); with trace organics and gravel	50.0				18				Sand in shoe Driller reported a cobble at 54 feet
55		5 9 10	100	Very stiff, moist, reddish-brown, low plastic, silty CLAY (CL)	47.0 55.0								Sample appeared to be mostly slough? - steel at correct depth
60		10 13 15	6										Sample was slough Driller reports soft drilling
65		6 5 6	97	Stiff, moist, light reddish-brown, high plastic CLAY (CH)	37.0 65.0				22				Equality/Glasford Formation
70		P	8		27.0								Sample in a jar (sample from shoe)

Completion Depth: 80.9 Ft.
Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Logged by: K. Berry

LOG of BORING No. B-07

DATE 4/4/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 14+26/33 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		16 12 12	67	Very stiff to hard, damp, light green, highly weathered SHALE	75.0								Spoon Formation
													Driller reported a cobble at 78 feet
80		44 56/5"	78	Possible weathered limestone	21.1				18				
				Bottom of boring at 80.9 feet	80.9								SPT stiffened up after 3 inches
85													
90													
95													

Completion Depth: 80.9 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-08

DATE 4/1/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 18+33/55 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm to very stiff, moist, brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition
5		P	100						17			6.1	
10		P	100						18			6.1	
15		P	100	Grades trace ash (black sand)(Fill)					16				
20		P	50				2.4	0.9	25	46	24		

Completion Depth: 81.5 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: K. Berry

Figure No. A-3-8

LOG of BORING No. B-08

DATE 4/1/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 18+33/55 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		4 7 10	100	SAME: Brown, Silty CLAY (CL)(Fill)					15				Original Dike
30		P	100						16			6.8	
35		3 4 6	100	Becoming mottled reddish-brown/light gray					19				
40		P	67						20			3.2	
45		2 4 3	100	Becoming orangish-brown	56.4 45.6				31				
				Loose, wet, orangish-brown, medium to fine sand (SP); with trace silt	54.0 48.0								
				Stiff, damp to moist, multi-colored reddish-brown, light brown, gray, orangish-brown, med. plastic CLAY(CL)									Approximate top of natural ground

Completion Depth: 81.5 Ft.
Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Project No.: 5E08560
Project Name: Illinois Power/Baldwin Power Station
Drilling Contractor: Midwest Eng.Services
Logged by: K. Berry

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

LOG of BORING No. B-08

DATE 4/1/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 18+33/55 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		5 6 9	100	SAME: Firm to stiff, damp to moist, reddish-brown, light brown, gray, medium plastic CLAY (CL)	49.0 53.0				20				Trace coal in shoe
				Firm to stiff, moist, light reddish-brown, low plastic, silty CLAY (CL)									Approximate top of natural ground Peoria Loess
55		P	67						19				Sample was mostly slough
60		4 5 8	100	Becoming light gray, medium plastic					23				Equality/Glasford Formation
65		P	8										Sample was slough
70		4 6 8	100	Firm to stiff, moist, brown, high plastic CLAY (CH) Becomes gray	32.0 70.0				21				Glasford Formation
					27.0								

Completion Depth: 81.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Woodward-Clyde Consultants

Figure No. A-3-8

LOG of BORING No. B-08

Sheet 4 of 4

DATE 4/1/95 SURFACE ELEVATION, FT 102.0 DATUM TBM=100 STA./OFFSET 18+33/55 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		11 16 26	100	Very stiff to hard, light gray, highly weathered SHALE	75.0				20				Spoon Formation
80		11 22 31	100	Becomes gray	20.5				21				
				Bottom of boring at 81.5 feet	81.5								
85													
90													
95													

Completion Depth: 81.5 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

LOG of BORING No. B-09

DATE 3/31/95 SURFACE ELEVATION, FT 102.7 DATUM TBM=100 STA./OFFSET 22+29/57 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, moist, brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition
5		P	100						22				
				Becoming dark brown (possibly mixed with ash)(Fill)									
10		P	75	Becomes mottled brown/brownish-gray (Fill)			4.1	1.5	22	50	30		
15		P	100						18				Sample contained some duct tape Clay appears to be mixed with fly ash at 15.5 feet
20		P	75	Becomes mottled reddish-brown/light gray	82.7 / 20.0								Original Dike
				Becomes gray									

Completion Depth: 80.8 Ft. Water Depth: 45.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-09

DATE 3/31/95 SURFACE ELEVATION, FT 102.7 DATUM TBM=100 STA./OFFSET 22+29/57 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		4 4 6	78	Firm to stiff, mottled reddish-brown/light gray, silty CLAY (CL)					24				
30		1 3 4	83	Becoming soft, silty; some organic material	72.7 30.0				20				
35		P	83						20			3.7	Sample had the appearance of slough
40		P	100	Becoming firm to stiff, orangish-brown			1.0	0.5	23	34	16		Tube was pushed approximately 2-3 inches too far
													Trace gravel, coal 2 thin sand layers
45		6 9 12	100	∇ Moist, orangish-brown, low plastic, Silty CLAY (CL)	56.7 46.0								Approximate top of natural ground Peoria Loess

Completion Depth: 80.8 Ft. Water Depth: 45.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-09

DATE 3/31/95 SURFACE ELEVATION, FT 102.7 DATUM TBM=100 STA./OFFSET 22+29/57 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		7 10 10	83	Becoming light reddish-brown with little gravel					17				
					47.7								Driller reported a boulder at 54-56 feet
55		11 5 9	100	Firm to stiff, moist, orangish-brown, high plastic CLAY (CH) Becoming stiff to very stiff, light gray	55.0				23				Glasford/Equality Formation Driller reported stiffer drilling
60		6 13 12	0						14				Driller reported top 1/2 of run being hard
					37.2								
65		14 51 50/3.5"	100	Hard, dark gray, weathered SHALE	65.5								Spoon Formation
70		30 43 64	17						25				

Completion Depth: 80.8 Ft. Water Depth: 45.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

LOG of BORING No. B-09

DATE 3/31/95 SURFACE ELEVATION, FT 102.7 DATUM TBM=100 STA./OFFSET 22+29/57 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		26 25 30	100	Hard, damp, gray, clayey weathered SHALE					16				
80		38 62/2.5			21.9				11				
				Bottom of boring at 80.8 feet	80.8								
85													
90													
95													

Completion Depth: 80.8 Ft.

Water Depth: 45.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services

Logged by: K. Berry

LOG of BORING No. B-10

DATE 3/27/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET -10+09/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm, moist, reddish-brown, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition
5		P	100						23				
10		P	83	Becoming mottled with light brownish-gray					15				
15		P	100				>4.5	1.7	15	42	24		Shelby refusal
20		26 33 32	89	Becoming hard with some ash (sand); trace gravel					11				
25		5	78	Firm to stiff, moist, light gray, low					24	43	25		

Completion Depth: 75.1 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-10

DATE 3/27/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET -10+09/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
		5 10		plastic, Silty CLAY (CL); with 1 inch ash zone (Fill)	71.9								
30		P	100	Hard, damp, light brownish-gray, Clayey SILT (ML)	30.0 66.9				19			5.8	Sampler refusal Original Dike
35		2 6 7	100	Firm to stiff, moist, mottled reddish-brown/light brown, low plastic, Silty CLAY (CL)	35.0 61.9				22				
40		P	100	Firm, moist, light brown, Clayey SILT (ML)	40.0 56.9				26	32	8		Approximate top of natural ground Peoria Loess
45		P	100	Stiff, wet, light brown to brown, low plastic, Silty CLAY (CL)	45.0		1.4	0.9	24	32	14		Water at approximately 45.0 feet
50		P	100						25	40	22	1.9	

Completion Depth: 75.1 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Layne-Western Logged by: K. Berry

LOG of BORING No. B-10

DATE 3/27/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET -10+09/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
					46.9								
55		P	100	Stiff, moist, high plastic CLAY (CH)	55.0				19	57	42	6.3	Glasford/Equality Formation
60		P	17						27				Sample in jar
					37.9								
				Medium dense to dense, wet, brown SAND (SW); with trace silt 1/2 inch clay layer	64.0								Driller reported very soft material at 64.0 feet
65		10 12 20	100						14				Sand flowed into augers. Switched to rotary wash with 3 7/8 inch tricone bit
					33.9								
				Hard, dark brown, highly weathered SHALE	68.0								Approximate top of rock SHALE Spoon Formation
70		17 28 45	67						24	52	24		
					26.8								
75		50/1.5"	0	Bottom of boring at 75.1 feet	75.1								

Completion Depth: 75.1 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ______ ft., After ______ hrs.
______ ft., After ______ hrs.
______ ft., After ______ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

Figure No. A-3-11

LOG of BORING No. B-11A

Sheet 1 of 2

DATE 4/5/95 SURFACE ELEVATION, FT 74.5 DATUM TBM=100 STA./OFFSET 1+81/74 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0		P	92	Soft, damp, reddish-brown, Silty CLAY (CL); with organic roots (Fill)			0.3						Original Dike
					72.5								
		P	54	Very stiff to hard, damp, reddish-gray with black specks, Silty CLAY (CL)(Fill)	2.0		2.3						
		P	100				3.6	1.8	20	39	18		
5				Becoming reddish-brown									
		P	54	Becoming moist, reddish-brown			2.6	1.6	21				
		P	63				1.5		25	47	26		Pushed twice Started using Fixed Piston Sampler
					64.5								
10		P	71	Becoming reddish-brown with gray, high plastic CLAY (CH)(Fill)	10.0		3.1	1.7	23	52	29		
		P	79				2.3	1.3	24				
					60.5								
		P	75	Very stiff, moist, reddish-brown-gray, low plastic CLAY (CL); with trace sand (Fill)	14.0		2.3	1.7	20				
15													
		P	75	Becoming gray with reddish-brown; trace sand			2.8	1.7	20				
		P	88				2.0	1.4	20	45	26		
20		P	100				2.3	1.2	21	47	29		

Completion Depth: 42.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

Logged by: J. Oldham

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

LOG of BORING No. B-11A

DATE 4/5/95 SURFACE ELEVATION, FT 74.5 DATUM TBM=100 STA./OFFSET 1+81/74 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		P	79	Stiff, moist, dark gray, low plastic, silty CLAY (CL); with organic roots			1.9	0.9	20	49	28		Approximate top of natural ground
30		P	100	Stiff, moist, gray with reddish-brown sand and organics wood			1.9	0.9	21	29	12		
35		P	96	Stiff, reddish-brown, high plastic CLAY (CH); with sand and gravel	39.5 / 35.0		1.9	1.0	13				Equality/Glasford Formation
40		P	69	Becomes hard			1.9	0.9	26				Shelby refusal
				Bottom of boring at 42.0 feet	32.5 / 42.0								2 inch S/S - 75 for 1.5 inches Auger refusal Set Inclinometer at 42.0 feet
45													

Completion Depth: 42.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: J. Oldham

LOG of BORING No. B-12

DATE 4/6/95 SURFACE ELEVATION, FT 58.7 DATUM TBM=100 STA./OFFSET 1+75/123 RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0			Stiff, moist, mottled orangish-brown and gray, low plastic, Silty CLAY (CL)(Fill)								Boring advanced using 4-1/4 inch I.D. HSA Original Dike
	P	75			1.8						
	P	63			1.8	1.0	23				
5			Becoming mottled brown and gray								
	P	96	Trace fine sand at bottom of tube		1.3						
	P	100			1.2	0.7	31	61	39		
10	P	63	Becoming very stiff		2.0						
	P	92		43.7	2.6	0.8	18				
15			Very stiff, moist, mottled brown and gray, low plastic, Silty CLAY (CL); trace organics	15.0							Approximate top of natural ground Peoria Loess
20	P	100			2.5						
			trace fine gravel								
				33.7							

Completion Depth: 40.1 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: 19.0 ft., After ATD hrs.

4.5 ft., After 1.0 hrs.

___ ft., After ___ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

Figure No. A-3-12

LOG of BORING No. B-12

Sheet 2 of 2

DATE 4/6/95 SURFACE ELEVATION, FT 58.7 DATUM TBM=100 STA./OFFSET 1+75/123 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		23 9 9 12	63	Stiff, damp to dry, brown and gray, high plastic CLAY (CH)	25.0				20	46	23		Shelby tube refusal at 25.0 feet Glasford/Equality Formation
					28.7								
30		21 22 17	72	Hard, moist, light green, severely weathered CLAY-SHALE	30.0				22	47	23		Spoon Formation
35		12 15 17	100	Becoming highly weathered									
					18.6								
40		50/.75"	0	Bottom of boring at 40.1 feet	40.1								Auger and SPT refusal Inclinometer installed to a depth of 40.0 feet
45													

Completion Depth: 40.1 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: 19.0 ft., After ATD hrs.

4.5 ft., After 1.0 hrs.

ft., After hrs.

Logged by: K. Berry

Figure No. **A-3-13**

LOG of BORING No. B-13

Sheet 1 of 1

DATE 4/4/95 SURFACE ELEVATION, FT 83.3 DATUM TBM=100 STA./OFFSET 1+69/46 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, damp, reddish-brown, Silty CLAY (CL)(Fill)									1989 Dike Addition
		P	79				1.8						
					79.3								
		P	100	Very stiff, moist, sandy, Silty CLAY (CL)(Fill)	4.0		2.1	0.7	21				
5													Original Dike
		P	83				2.4	0.7	23				
		P	96	Becoming damp, reddish-brown with gray			2.8						Tube refusal
10		P	100				3.3						
					71.3								
				Bottom of boring at 12.0 feet	12.0								
15													
20													

Completion Depth: 12.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: J. Oldham

Woodward-Clyde Consultants

Figure No. A-3-14

LOG of BORING No. B-14

Sheet 1 of 1

DATE 4/5/95 SURFACE ELEVATION, FT 80.2 DATUM TBM=100 STA./OFFSET 2+51/49 RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0		P	83	Very stiff, damp, reddish-brown, Silty CLAY (CL); with sand and organics, grass (fill)			2.8						Original Dike
		P	42				3.0						
		P	79	Becoming reddish-brown with gray			1.8	0.6	27				
5													
		P	83				3.4	0.9	24				
		P	63				2.3						
				Becoming gray	70.2								
10				Bottom of boring at 10.0 feet	10.0								
15													
20													

Completion Depth: 10.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Logged by: J. Oldham

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

LOG of BORING No. B-15

DATE 4/6/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET 3+42/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, damp to moist, low plastic, Silty CLAY (CL)(Fill)									Boring advanced using 3-1/4 inch I.D. HSA without center plug 1989 Dike Addition
5		P	100						16				
10		3 5 7	100						17				
15		P	65										
20		P	67	Becomes mottled reddish-brown/gray					16			0.0	

Completion Depth: 81.5 Ft. Water Depth: 32.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Figure No. A-3-15

LOG of BORING No. B-15

Sheet 2 of 4

DATE 4/6/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET 3+42/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		1 5 7	67	Loose to medium dense, moist to wet, black, bottom ash (SP)	76.4 25.5				20				
30		3 3 3	67						19				
35		2 2 3	67	Firm to stiff, moist, gray, low plastic CLAY (CL); with oxidation	66.4 35.5				24				Original Dike
40		P	100				2.5						
45		P	100	Firm, moist, reddish-brown, medium plastic CLAY (CL); with oxidation	56.9 45.0				24				Approximate top of natural ground Peoria Loess

Completion Depth: 81.5 Ft.

Water Depth: 32.0 ft., After ATD hrs.

ft., After hrs.

ft., After hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Midwest Eng.Services

Logged by: K. Berry

LOG of BORING No. B-15

DATE 4/6/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET 3+42/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50		3 3 4	100	SAME: Firm, moist, reddish brown, medium plastic CLAY (CL); with oxidation					24				Peoria Loess
55		P	100	Becoming more plastic	41.9				22				
60		2 1 3 4	100	Soft to firm, moist, mottled orangish-brown and gray, high plastic CLAY (CH); with trace gravel	60.0				26				Glasford/Equality Formation 6 inches slough
65		P	50		31.9				37				
70		7 12 19	100	Very stiff to hard, light green, highly weathered SHALE	70.0				23				Spoon Formation

Completion Depth: 81.5 Ft. Water Depth: 32.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

LOG of BORING No. B-15

DATE 4/6/95 SURFACE ELEVATION, FT 101.9 DATUM TBM=100 STA./OFFSET 3+42/0

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		7 20 33	100	Light green, highly weathered SHALE									
80		1 6 27	100	Becomes brown; weathered SHALE	20.4								6 inches of slough in boring
				Bottom of boring at 81.5	81.5								
85													
90													
95													

Completion Depth: 81.5 Ft. Water Depth: 32.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Midwest Eng.Services Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-101

DATE 5/3/95 SURFACE ELEVATION, FT 88.0 DATUM TBM=100 STA./OFFSET 1+74/19RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, damp, reddish-brown, low plastic, Silty CLAY (CL) (Fill)									Boring advanced using 4-1/4 inch I.D. HSA 1989 Dike Addition
5		2 3 7	97										
10		P	100		77.5								
				Damp, gray, clayey Silt (ML); with trace organics	10.5								
					73.4								
15		5 11 10	72	Medium dense, wet, black ash (medium to coarse sand size) (SP)	14.6								
					70.0								
				Firm to stiff, moist, orangish-brown and gray, low plastic, Silty CLAY (CL); with trace gravel (Fill)	18.0								Original Dike
20		3 3 5	67										Driller reported a material change at 21.0 feet

Completion Depth: 79.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Roberts Env.

Water Depth: ___ ft., After ___ hrs.

___ ft., After ___ hrs.

___ ft., After ___ hrs.

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. B-101

DATE 5/3/95 SURFACE ELEVATION, FT 88.0 DATUM TBM=100 STA./OFFSET 1+74/19RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25	P	0									
			Stiff, moist, light gray and brown, high plastic CLAY (CH)	60.5 / 27.5							
30	3 4 6	67									
			Very stiff, moist, light gray, low plastic CLAY (CL); with oxidation	55.5 / 32.5							
35	P	100			3.0						
40	5 4 7	100	Becomes reddish-brown								Approximate top of natural ground Peoria Loess
45	3 4 5	83									
			Firm, moist, light gray, Silty CLAY (CL); with organics	42.5 / 45.5							Glasford/Equality Formation Alluvium

Completion Depth: 79.0 Ft. Water Depth: ____ ft., After ____ hrs.
Project No.: 5E08560 ____ ft., After ____ hrs.
Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.
Drilling Contractor: Roberts Env. Logged by: K. Berry

LOG of BORING No. B-101

DATE 5/3/95 SURFACE ELEVATION, FT 88.0 DATUM TBM=100 STA./OFFSET 1+74/19RT

DEPTH, ft.	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
50	P	100	Stiff to very stiff, moist, mottled orangish brown/gray, low to medium plastic CLAY (CL); with trace gravel		1.0						Till
	P	100			4.0						
											Tube refusal at 53.0 feet
	P	100	Becomes hard, with sand and gravel(highly weathered shale and sandstone)		>4.5						
55	50/4"	100									Spoon Formation
	RQD 11	100		32.0 / 56.0							Tube refusal at 54.5 feet
			Gray, slightly weathered LIMESTONE								SPT advanced 4 inches in 2 blows, then bounced
			Gray, highly weathered CLAY-SHALE; fissured with calcareous zones	31.4 / 56.6							Switched to coring with NX core barrel
				28.8 / 59.2							Core Run #1 Start: 55.0 feet Stop: 59.5 feet DWR: 90%
60	RQD 0	31	59.2 feet - Orange sand, clay and gravel; decomposed limestone								Core Run #2 Start: 59.5 feet Stop: 64.0 feet DWR: 95% Driller had problem with silt in casing
				24.5 / 63.5							
65	RQD 0	13	Green, highly weathered, high plastic CLAY-SHALE; with oxidation								Core Run #3 Start: 64.0 feet Stop: 69.0 feet DWR: 90%
70	RQD 0	100	Damp to moist, highly weathered shale (clayey silt - ML)	18.1 / 69.9							Reamed to 71.7 feet
	RQD	40	Gray, fine grained, thinly bedded, slightly weathered LIMESTONE; strong with shale partings 71.7 feet - Moderately weathered for 0.7 feet	13.6 / 74.4							Core Run #4 Start: 71.7 feet Stop: 74.0 feet DWR: 90% Driller reported clay seams

Completion Depth: 79.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Roberts Env.

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

Logged by: K. Berry

LOG of BORING No. B-101

DATE 5/3/95 SURFACE ELEVATION, FT 88.0 DATUM TBM=100 STA./OFFSET 1+74/19RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
75		0		72.0 feet - Hard clay for 0.2 feet 73.6 feet - Moderately fractured with stiff clay for 0.3 feet 74.0 feet - 0.2 feet limestone 74.2 feet - 0.3 feet gray clay and limestone									Core Run #5 Start: 74.0 Stop: 79.0 DWR: 80% Had to extrude sample with A-rod
				74.5 feet - Dark gray to black, weathered SHALE	9.3 78.7								Driller reported that last 2 inches felt like limestone (not recovered)
80				Weathered limestone at 78.7 feet	9.0 79.0								Inclinometer installed
				Bottom of boring at 79.0 feet									
85													
90													
95													

Completion Depth: 79.0 Ft.

Water Depth: ____ ft., After ____ hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Roberts Env.

Logged by: K. Berry

LOG of BORING No. B-102

DATE 5/17/95 SURFACE ELEVATION, FT 50.8 DATUM TBM=100 STA./OFFSET 1+67/178RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				(Refer to log of Piezometer P-03A)									Boring advanced using 5-7/8 inch tricone bit with rotary wash
				Bottom Overburden	32.1 / 18.7								
				LIMESTONE	31.1								
20		C	84	Hard, light gray, moderately weathered CLAY-SHALE	19.7								Complete tricone at 19.7 feet Begin Pitcher Sampler Run #1 Start: 19.7 feet Stop: 22.2 feet
		C	100	Very stiff to hard, greenish-gray, severely to completely weathered CLAY-SHALE	28.6 / 22.2								Run #2 Start: 22.2 feet Stop: 25.0 feet
25		C	36	Limestone stringer at 25.2 feet									Run #3

Completion Depth: 49.0 Ft.
Project No.: 5E08560
Project Name: Illinois Power/Baldwin Power Station
Drilling Contractor: Roberts Env.

Water Depth: ____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: T. Deddens

LOG of BORING No. B-102

DATE 5/17/95 SURFACE ELEVATION, FT 50.8 DATUM TBM=100 STA./OFFSET 1+67/178RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
													Start: 25.2 feet Stop: 28.0 feet
		RQD 0	100										NX Core Barrel Core Run #4 Start: 28.3 feet Stop: 29.6 feet
30		RQD 0	100										Core Run #5 Start: 29.6 feet Stop: 34.0 feet
					17.5 33.3								
35		RQD 0	91	Dark gray, crystalline, moderately weathered LIMESTONE; with numerous horizontal joints	15.9 34.9								Core Run #6 Start: 34.0 feet Stop: 38.5 feet
				Soft to medium stiff, greenish-gray, severely to completely weathered CLAY-SHALE	15.1 35.7								
				Dark gray, crystalline, severely weathered, highly fractured LIMESTONE; with seam of greenish-gray clay	12.9 37.9								
40		RQD 0	55	Soft, greenish-gray, completely weathered CLAY-SHALE; with limestone fragments	11.9 38.9								Core Run #7 Start: 38.5 feet Stop: 44.0 feet
				Soft to hard, dark gray, moderately to completely weathered CLAY-SHALE	11.7 39.1								
				Absent, wash away	9.9 40.9								
				Soft to hard, dark gray, moderately to completely weathered, fissile CLAY-SHALE	7.5 43.3								
45		RQD 0	88	Dark gray, shaley, slightly weathered, thin bedded LIMESTONE	6.8 44.0								Core Run #8 Start: 44.0 feet Stop: 49.0 feet
				Dark gray, very weathered SHALE	6.2 44.6								
				Dark gray, shaley, moderately weathered LIMESTONE	5.4 45.4								
				Dark gray, moderately to severely weathered, limey CLAY-SHALE	3.9 46.9								
				Dark gray, moderately weathered, thin bedded LIMESTONE; with dark gray shale seam	1.8 49.0								Inclinometer installed
50				Bottom of boring at 49.0 feet									

Completion Depth: 49.0 Ft. Water Depth: ______ ft., After ______ hrs.

Project No.: 5E08560 ______ ft., After ______ hrs.

Project Name: Illinois Power/Baldwin Power Station ______ ft., After ______ hrs.

Drilling Contractor: Roberts Env. Logged by: T. Deddens

LOG of BORING No. P-02A

DATE 5/10/95 SURFACE ELEVATION, FT 74.6 DATUM TBM=100 STA./OFFSET 1+56/76RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Boring not sampled 0 - 29.0 feet (See Log of Boring B-11A)									Boring advanced using 4-1/4 inch I.D. HSA
5													
10													
15													
20													

Completion Depth: 47.0 Ft.

Water Depth: 35.0 ft., After ATD hrs.

Project No.: 5E08560

ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station

ft., After hrs.

Drilling Contractor: Roberts Env.

Logged by: K. Berry

LOG of BORING No. P-02A

DATE 5/10/95 SURFACE ELEVATION, FT 74.6 DATUM TBM=100 STA./OFFSET 1+56/76RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25													
					45.6								
		P	21	Stiff to very stiff, moist, orange and gray, high plastic CLAY (CH); with trace gravel	29.0								(No pp - sample slid) Glacial Soils
30													
		P	100				1.5						
35				▽									
		P	100	Becomes very stiff, light brown; with little sand			3.0						
		P	100		35.6		>4.5		28	59	33		
				Hard, high plastic CLAY (CH) (highly weathered shale)	39.0								Spoon Formation Driller reported stiff material at 39.5 feet
40		P	0		33.1								
		RQD 0	80	Highly weathered LIMESTONE	41.5								Auger refusal at 41.5 feet Switched to rotary wash with NX core (new shale carbide bit) Core Run #1 Start: 41.5 feet Stop: 44.0 feet DWR: 95%
				Brown and gray, high plastic, highly weathered SHALE; with trace sand and gravel Possible slickenside at 43.0 feet	32.5 42.1								
		RQD 0	86										Core Run #2 Start: 44.0 feet Stop: 47.0 feet DWR: 95% Driller reported 75% DWR at 46.0 feet Piezometer installed
45													
					27.6								
				Bottom of boring at 47.0 feet	47.0								

Completion Depth: 47.0 Ft. Water Depth: 35.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

LOG of BORING No. P-03

DATE 4/13/95 SURFACE ELEVATION, FT 50.8 DATUM TBM=100 STA./OFFSET 1+57/3LT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Medium stiff, moist, brown, low plastic, silty CLAY (CL) to clayey silt									Boring advanced using 4-inch diameter CFA
		P	92				0.0						
5				Becomes very soft, wet, gray; with some sand									
				▽									
		P	100				2.3						
				Becomes stiff, gray and orangish-brown	40.8								
10				Bottom of Boring at 10.0 feet	10.0								Piezometer installed 4 feet west
15													
20													

Completion Depth: 10.0 Ft.
Water Depth: 7.0 ft., After ATD hrs.
ft., After hrs.
ft., After hrs.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Layne-Western

Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. P-03A

DATE 5/15/95 SURFACE ELEVATION, FT 50.8 DATUM TBM=100 STA./OFFSET 1+56/178RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Firm, moist to wet, medium gray, low plastic, Clayey SILT (ML); trace roots, wet, pocket of medium sand									Boring advanced using 4-1/4 inch I.D. HSA Fill
5		2 3 3	100		42.8								
				Firm, moist to wet, medium gray, medium to high plastic, Silty CLAY (CL); with 6-inch layer of fine grained, silty sand	8.0								Alluvium
10		2 2 4	100		38.3								
				Firm, moist, light gray, medium to high plastic, Silty CLAY (CL); with mottles of tan, sandy clay, trace coarse to medium sand	12.5								Glacio-Lacustrine/Till
15		2 3 4	100		32.1								
		RQD 0	84	Dark gray, moderately weathered LIMESTONE	18.7 31.5								Switched to NX core barrel Core Run #1 Start: 18.8 feet Stop: 23.8 feet Spoon Formation
20				Dark gray, severely weathered SHALE 0.2 feet Limestone at 20.0 feet	19.3								
		RQD 0	38	Trace gravel, shale becomes greenish-gray at 23.8 feet									Core Run #2 Start: 23.8 feet

Completion Depth: 27.0 Ft. Water Depth: ____ ft., After ____ hrs.

Project No.: 5E08560 ____ ft., After ____ hrs.

Project Name: Illinois Power/Baldwin Power Station ____ ft., After ____ hrs.

Drilling Contractor: Roberts Env. Logged by: T. Deddens

Woodward-Clyde Consultants

LOG of BORING No. P-03A

DATE 5/15/95 SURFACE ELEVATION, FT 50.8 DATUM TBM=100 STA./OFFSET 1+56/178RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25													Stop: 27.0 feet
				Becomes maroon	23.8								
				Bottom of boring at 27.0 feet	27.0								Piezometer installed
30													
35													
40													
45													

Completion Depth: 27.0 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Roberts Env.

Water Depth: ______ ft., After ______ hrs.

______ ft., After ______ hrs.

______ ft., After ______ hrs.

Logged by: T. Deddens

Woodward-Clyde Consultants

LOG of BORING No. P-04

DATE 5/11/95 SURFACE ELEVATION, FT 58.7 DATUM TBM=100 STA./OFFSET 1+65/122RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Medium stiff, moist, brown, low plastic CLAY (CL) (Fill)									Boring advanced using 4-1/4" I.D. HSA
5		3 4 5	78										
10		3 4 6	72	Becomes gray, more silty									
15		4 5 4	100										
		P	100		38.7		0.8						
20				Stiff to very stiff, moist to wet, brown, medium plastic, Silty CLAY (CL); some fine gravel, coarse sand, trace medium to fine sand ▽	20.0								Glacial Soils
		P	100		34.7		2.5	1.8	16	29	13		Driller reported stiffer material at approximately 24.5 feet
		P	100	Firm to stiff, orange-brown, high plastic,	24.0		0.5	0.7		73	36		

Completion Depth: 30.8 Ft. Water Depth: 22.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. P-04

DATE 5/11/95 SURFACE ELEVATION, FT 58.7 DATUM TBM=100 STA./OFFSET 1+65/122RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF
25		P	100	CLAY (CH); trace fine gravel, coarse sand	33.7 / 25.0							
		RQD 13	93	Moist, orange, silty CLAY (CL); with rock fragments	32.9 / 25.8		1.0-3.5					
				25.8 - 26.9: LIMESTONE	31.8 / 26.9							
				26.9 - 27.2: Probable clay (no recovery)	31.5 / 27.2							
				Damp, green, high plastic, highly weathered CLAY-SHALE; with silt and oxidation	28.2 / 30.5							
30				Becomes highly weathered LIMESTONE	27.9 / 30.8							
				Bottom of boring at 30.8 feet								
35												
40												
45												

FIELD NOTES

Driller reported hard material at 25.0 feet
Probable shear zone at 23.9 feet
Appeared to be weathered rock
Driller reported a 4 inch soft zone at 26.8 feet
Core Run #1
Start: 25.8 feet
Stop: 26.3 feet
DWR: 90%
Changed from carbide bit to a surface set bit
Core Run #2
Start: 26.3
Stop: 30.8
DWR: 90%
Piezometer installed

Completion Depth: 30.8 Ft. Water Depth: 22.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

LOG of BORING No. P-05A

DATE 5/11/95 SURFACE ELEVATION, FT 75.0 DATUM TBM=100 STA./OFFSET 3+83/55RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Stiff, moist, low to medium plastic CLAY (CL) (Fill)									Boring advanced using 4-1/4 inch I.D. HSA Original Dike
5		2 4 6	78										
10		3 4 7	83	Becoming stiff, medium plastic CLAY (CL)									
15		3 6 6	100	Stiff, moist, gray, medium plastic CLAY (CL); with trace oxidation	60.3 / 14.7								
				Stiff, moist, brown, medium plastic CLAY (CL); with trace fine roots	57.5 / 17.5								Approximate top of natural ground Peoria Loess
20		4 4 7	100										
		4	100	Firm to stiff, moist, gray, low plastic, Silty CLAY (CL); with little oxidation									Light reddish-brown in shoe

Completion Depth: 45.5 Ft. Water Depth: 29.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

Woodward-Clyde Consultants

LOG of BORING No. P-05A

DATE 5/11/95 SURFACE ELEVATION, FT 75.0 DATUM TBM=100 STA./OFFSET 3+83/55RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		4 4			47.5								Glacial Soils
30		3 4 4	100	Soft to medium stiff, moist, orangish-brown, low plastic, silty CLAY (CL); with trace fine sand, pebbles ▽	27.5 41.0								
35		4 5 8	100	Stiff, moist, light brown, medium to high plastic CLAY (CL); with trace sand (1/2 inch rounded pebbles)	34.0 37.8								Till Sandstone in shoe (in jar)
40		9 18 50/2"	67	Very stiff to hard, damp, orangish-brown, low plastic CLAY (CL)	37.2 33.5								Spoon Formation Driller reported stiff material at 38.5 feet Clay had structure to it Driller reported approximately 6 inches of highly fractured rock at 40.2 feet
45		10 14 19	67	Hard, damp, light green, high plastic CLAY (CH); with trace sand	41.5 29.5								Gravel-sized, severely weathered limestone, then shale in shoe (shale on bottom)
				Bottom of boring at 45.5 feet	45.5								Advanced augers to 45.5 for permeability test Piezometer installed

Completion Depth: 45.5 Ft.

Project No.: 5E08560

Project Name: Illinois Power/Baldwin Power Station

Drilling Contractor: Roberts Env.

Water Depth: 29.0 ft., After ATD hrs.

ft., After hrs.

ft., After hrs.

Logged by: K. Berry

LOG of BORING No. P-07

DATE 5/15/95 SURFACE ELEVATION, FT 51.0 DATUM TBM=100 STA./OFFSET 4+01/172RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
0				Moist, brown, Silty CLAY (CL)	47.0								Boring advanced using 4 1/4 inch I.D. HSA
5		3 4 5	72	Stiff, moist, greenish-gray, medium to high plastic CLAY (CL/CH); with trace organics	4.0 44.0								Alluvium
10		3 5 6	100	Medium stiff, moist, mottled orangish brown, low plastic, silty clay and gray, high plastic CLAY (CL/CH); with little sand	7.0 39.0								(TILL)
15		4 6 8	100	Stiff, moist, light brown, high plastic CLAY (CH); with little sand, fine pebbles	12.0								(TILL)
20		P	100	Becomes mottled gray and brown	29.0		1.5						
		7	100	Dry to damp, light gray, high plastic CLAY (highly weathered shale)	22.0								21.8 - 22.1 feet: driller reported possible rock Becomes green in shoe

Completion Depth: 27.0 Ft. Water Depth: 14.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

Figure No. A-3-23

LOG of BORING No. P-07

DATE 5/15/95 SURFACE ELEVATION, FT 51.0 DATUM TBM=100 STA./OFFSET 4+01/172RT

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	TV, TSF	NMC, %	LL	PI	Qu, KSF	FIELD NOTES
25		17 16			24.0								
				Bottom of boring at 27.0 feet	27.0								Permeability test at 27.0 feet Installed piezometer
30													
35													
40													
45													

Completion Depth: 27.0 Ft. Water Depth: 14.0 ft., After ATD hrs.

Project No.: 5E08560 ft., After hrs.

Project Name: Illinois Power/Baldwin Power Station ft., After hrs.

Drilling Contractor: Roberts Env. Logged by: K. Berry

6/13/95 WCCXILPW 58560

Woodward-Clyde Consultants

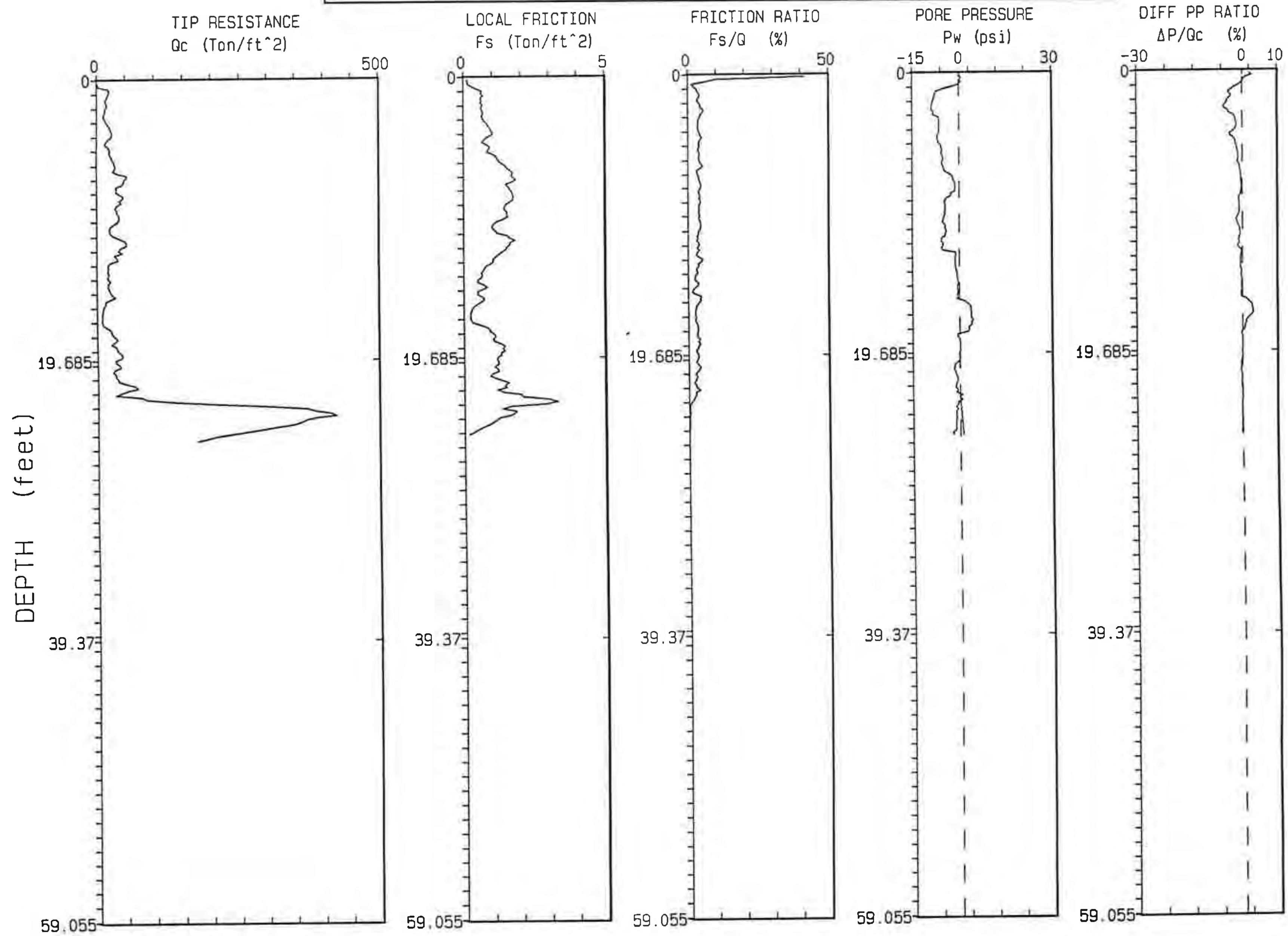
APPENDIX A-4 - PIEZOCONE SOUNDINGS

The 23 cone penetration tests were performed with a 10-ton electronic subtraction cone equipped with a pore pressure transducer. The cones have a tip area of 10 cm^2 and a friction sleeve area of 150 cm^2. The pore pressure transducer is located directly behind the tip. The cone was advanced in the field by hydraulic pushing from a drill rig at a rate of 1 inch per second. Data was collected at a 5 cm vertical interval. The Cone Penetration Test (CPT) was performed in accordance with ASTM D-3441. Plotted results of the CPT tests are included as Figures A-4-1 through A-4-23 of this appendix. Data Tables from the CPT tests are given after each CPT plot.

WOODWARD-CLYDE CONSULTANTS

CPT-1

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 25.43 ft

FIG. A-4-1

WOODWARD-CLYDE CONSULTANTS

CPT-1

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	11.37	0.30	2.68	0.03	silty clay to clay	UNDFND	UNDFD	7	.6
0.60	2	16.80	0.63	3.74	0.09	silty clay to clay	UNDFND	UNDFD	11	.9
0.95	3	14.66	0.67	4.55	0.15	clay	UNDFND	UNDFD	14	.8
1.25	4	24.68	0.93	3.77	0.22	silty clay to clay	UNDFND	UNDFD	16	1.4
1.55	5	18.98	0.79	4.17	0.28	silty clay to clay	UNDFND	UNDFD	12	1.1
1.85	6	28.70	1.13	3.93	0.33	silty clay to clay	UNDFND	UNDFD	18	1.6
2.15	7	41.52	1.64	3.94	0.39	clayey silt to silty clay	UNDFND	UNDFD	20	2.4
2.45	8	39.12	1.65	4.22	0.45	silty clay to clay	UNDFND	UNDFD	25	2.2
2.75	9	40.57	1.66	4.10	0.51	silty clay to clay	UNDFND	UNDFD	26	2.3
3.05	10	37.12	1.47	3.97	0.57	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
3.35	11	25.73	1.09	4.24	0.63	silty clay to clay	UNDFND	UNDFD	16	1.4
3.65	12	45.22	1.62	3.57	0.69	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
3.95	13	32.63	1.19	3.66	0.75	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
4.25	14	19.68	0.73	3.71	0.81	silty clay to clay	UNDFND	UNDFD	13	1.1
4.55	15	21.73	0.64	2.94	0.87	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
4.85	16	21.27	0.58	2.75	0.93	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
5.15	17	9.88	0.28	2.88	0.98	silty clay to clay	UNDFND	UNDFD	6	.5
5.45	18	19.00	0.61	3.19	1.04	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
5.75	19	32.30	1.15	3.57	1.10	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
6.05	20	38.63	1.28	3.32	1.16	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
6.40	21	33.97	1.11	3.26	1.23	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
6.70	22	52.85	1.34	2.54	1.29	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
7.00	23	140.12	2.43	1.74	1.35	sand to silty sand	70-80	40-42	34	UNDEFINED
7.35	24	387.83	1.50	0.39	1.39	gravelly sand to sand	>90	44-46	>50	UNDEFINED
7.65	25	279.07	0.58	0.21	1.42	gravelly sand to sand	>90	42-44	45	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

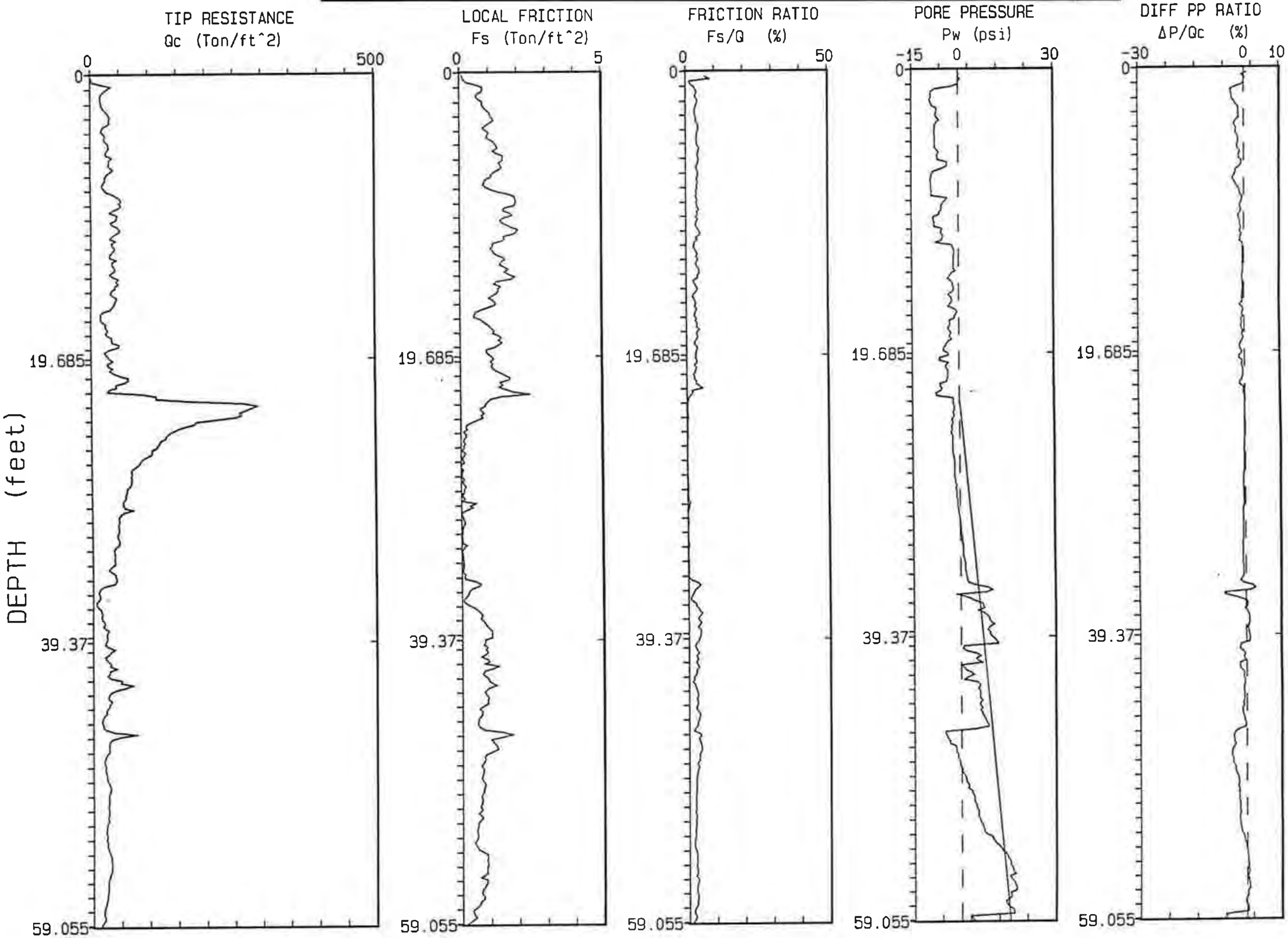
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-1

WOODWARD-CLYDE CONSULTANTS

CPT-2

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

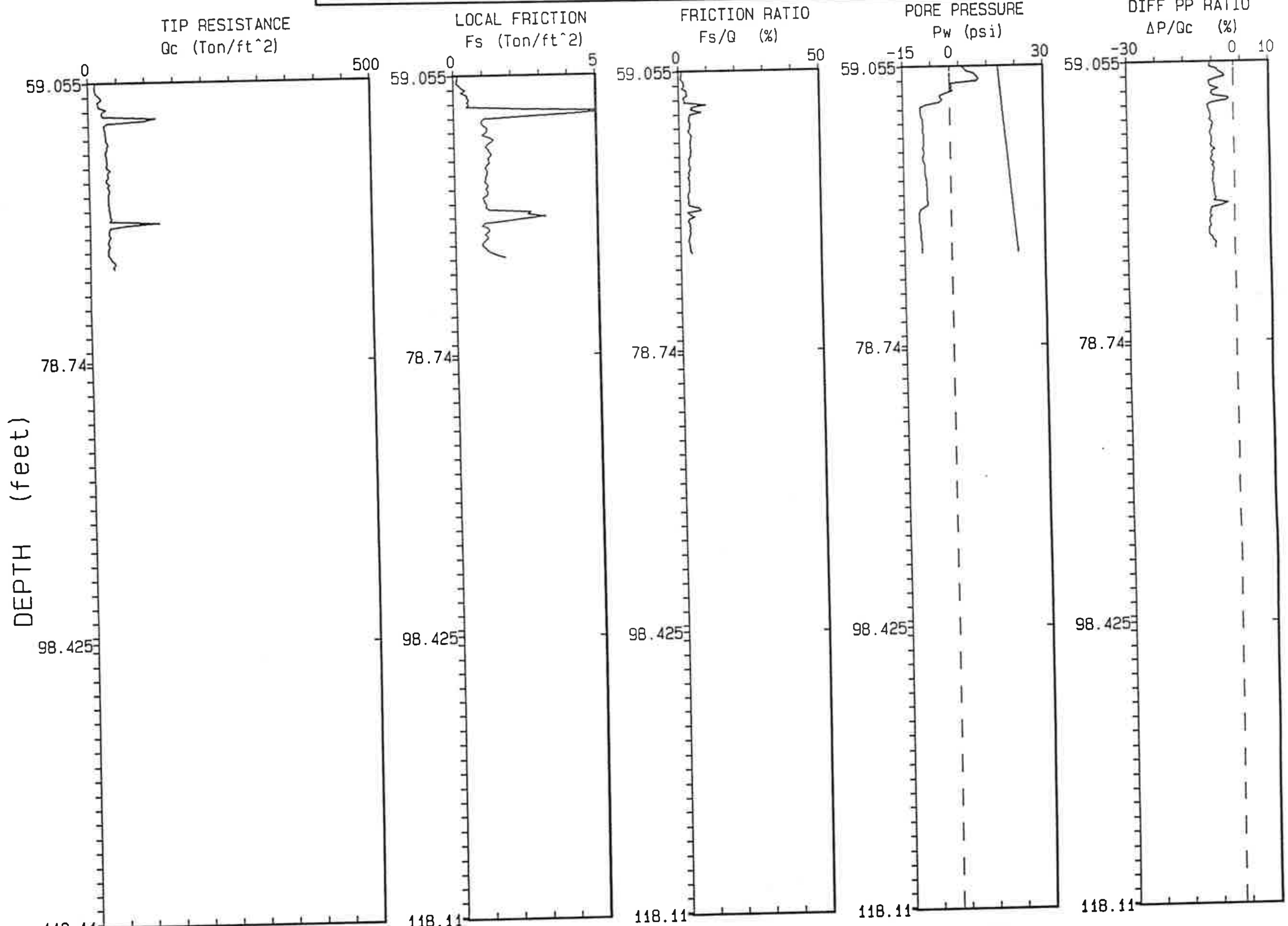
Max Depth : 72.18 ft

FIG. A-4-2

WOODWARD-CLYDE CONSULTANTS

CPT-2

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 72.18 ft

FIG. A-4-2

CPT-2

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

·EPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	14.55	0.33	2.29	0.03	clayey silt to silty clay	UNDFND	UNDFD	7	.8
0.60	2	18.98	0.70	3.69	0.09	silty clay to clay	UNDFND	UNDFD	12	1.1
0.95	3	28.16	0.96	3.42	0.15	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
1.25	4	24.57	0.98	3.99	0.22	silty clay to clay	UNDFND	UNDFD	16	1.4
1.55	5	28.02	1.10	3.92	0.28	silty clay to clay	UNDFND	UNDFD	18	1.6
1.85	6	31.35	1.38	4.40	0.33	silty clay to clay	UNDFND	UNDFD	20	1.8
2.15	7	32.65	1.32	4.06	0.39	silty clay to clay	UNDFND	UNDFD	21	1.8
2.45	8	23.52	0.94	4.00	0.45	silty clay to clay	UNDFND	UNDFD	15	1.3
2.75	9	48.83	1.82	3.73	0.51	clayey silt to silty clay	UNDFND	UNDFD	23	2.8
3.05	10	43.05	1.68	3.91	0.57	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
3.35	11	44.15	1.73	3.92	0.63	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
3.65	12	38.48	1.46	3.79	0.69	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
3.95	13	37.63	1.31	3.47	0.75	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
4.25	14	38.48	1.56	4.06	0.81	silty clay to clay	UNDFND	UNDFD	25	2.2
4.55	15	43.65	1.49	3.42	0.87	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
4.85	16	40.38	1.19	2.95	0.93	sandy silt to clayey silt	UNDFND	UNDFD	15	2.3
5.15	17	23.40	0.74	3.17	0.98	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
5.45	18	25.45	0.96	3.76	1.04	silty clay to clay	UNDFND	UNDFD	16	1.4
5.75	19	39.15	1.34	3.43	1.10	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
6.05	20	30.18	1.04	3.45	1.16	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
6.40	21	40.23	1.23	3.06	1.23	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
6.70	22	44.60	1.54	3.44	1.29	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
·00	23	174.40	1.42	0.82	1.35	sand	70-80	42-44	33	UNDEFINED
,5	24	247.71	0.73	0.29	1.39	gravelly sand to sand	80-90	42-44	40	UNDEFINED
7.65	25	150.20	0.21	0.14	1.42	sand	70-80	40-42	29	UNDEFINED
7.95	26	117.15	0.12	0.10	1.45	sand	60-70	40-42	22	UNDEFINED
8.25	27	92.93	0.08	0.09	1.48	sand	50-60	38-40	18	UNDEFINED
8.55	28	71.08	0.02	0.03	1.51	sand	50-60	36-38	14	UNDEFINED
8.85	29	64.68	0.10	0.15	1.54	sand to silty sand	40-50	36-38	15	UNDEFINED
9.15	30	56.80	0.19	0.33	1.57	sand to silty sand	40-50	36-38	14	UNDEFINED
9.45	31	53.55	0.12	0.23	1.59	sand to silty sand	40-50	34-36	13	UNDEFINED
9.75	32	45.60	0.06	0.13	1.62	sand to silty sand	<40	34-36	11	UNDEFINED
10.05	33	43.78	0.06	0.13	1.65	sand to silty sand	<40	32-34	10	UNDEFINED
10.35	34	38.82	0.04	0.10	1.68	sand to silty sand	<40	32-34	9	UNDEFINED
10.65	35	35.85	0.07	0.20	1.71	sand to silty sand	<40	32-34	9	UNDEFINED
10.95	36	22.08	0.41	1.84	1.74	sandy silt to clayey silt	UNDFND	UNDFD	8	1.1
11.25	37	8.70	0.15	1.68	1.76	clayey silt to silty clay	UNDFND	UNDFD	4	.3
11.55	38	15.45	0.59	3.84	1.79	silty clay to clay	UNDFND	UNDFD	10	.7

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-2

CPT-2

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH s)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	22.70	0.90	3.96	1.82	silty clay to clay	UNDFND	UNDFD	14	1.2
12.15	40	26.57	0.88	3.29	1.85	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
12.45	41	27.13	0.83	3.05	1.88	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
12.80	42	33.99	0.90	2.64	1.91	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
13.10	43	46.10	0.95	2.06	1.94	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
13.40	44	28.12	0.85	3.01	1.97	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
13.75	45	18.39	0.61	3.31	2.00	clayey silt to silty clay	UNDFND	UNDFD	9	.9
14.05	46	38.88	1.08	2.78	2.03	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1
14.35	47	27.25	1.11	4.09	2.06	silty clay to clay	UNDFND	UNDFD	17	1.4
14.65	48	20.83	0.74	3.57	2.09	silty clay to clay	UNDFND	UNDFD	13	1.0
14.95	49	23.93	0.70	2.93	2.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
15.25	50	28.98	0.74	2.55	2.14	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
15.55	51	26.50	0.65	2.45	2.17	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
15.85	52	25.25	0.61	2.40	2.20	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
16.15	53	22.85	0.52	2.27	2.23	sandy silt to clayey silt	UNDFND	UNDFD	9	1.1
16.45	54	25.93	0.52	2.00	2.26	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
16.75	55	31.62	0.86	2.72	2.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
17.05	56	28.60	0.80	2.78	2.31	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
17.35	57	25.53	0.74	2.90	2.34	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
17.65	58	21.55	0.63	2.91	2.37	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
17.95	59	18.20	0.38	2.08	2.40	clayey silt to silty clay	UNDFND	UNDFD	9	.8
18.25	60	13.08	0.17	1.28	2.43	sandy silt to clayey silt	UNDFND	UNDFD	5	.5
18.55	61	20.85	0.44	2.09	2.45	sandy silt to clayey silt	UNDFND	UNDFD	8	1.0
.85	62	53.92	2.64	4.91	2.48	silty clay to clay	UNDFND	UNDFD	34	2.9
.20	63	28.20	1.06	3.76	2.51	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
19.50	64	30.68	1.19	3.89	2.54	silty clay to clay	UNDFND	UNDFD	20	1.5
19.80	65	30.52	1.21	3.98	2.57	silty clay to clay	UNDFND	UNDFD	19	1.5
20.15	66	32.63	1.13	3.45	2.60	clayey silt to silty clay	UNDFND	UNDFD	16	1.6
20.45	67	33.40	1.11	3.32	2.63	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
20.75	68	33.62	1.07	3.18	2.66	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
21.05	69	55.33	2.17	3.92	2.69	clayey silt to silty clay	UNDFND	UNDFD	27	3.0
21.35	70	33.47	1.20	3.59	2.72	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
21.65	71	32.18	1.03	3.20	2.75	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
21.95	72	38.10	1.11	2.91	2.77	sandy silt to clayey silt	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-2

CPT-2

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (...eters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	22.70	0.90	3.96	1.82	silty clay to clay	UNDFND	UNDFD	14	1.2
12.15	40	26.57	0.88	3.29	1.85	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
12.45	41	27.13	0.83	3.05	1.88	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
12.80	42	33.99	0.90	2.64	1.91	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
13.10	43	46.10	0.95	2.06	1.94	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
13.40	44	28.12	0.85	3.01	1.97	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
13.75	45	18.39	0.61	3.31	2.00	clayey silt to silty clay	UNDFND	UNDFD	9	.9
14.05	46	38.88	1.08	2.78	2.03	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1
14.35	47	27.25	1.11	4.09	2.06	silty clay to clay	UNDFND	UNDFD	17	1.4
14.65	48	20.83	0.74	3.57	2.09	silty clay to clay	UNDFND	UNDFD	13	1.0
14.95	49	23.93	0.70	2.93	2.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
15.25	50	28.98	0.74	2.55	2.14	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
15.55	51	26.50	0.65	2.45	2.17	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
15.85	52	25.25	0.61	2.40	2.20	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
16.15	53	22.85	0.52	2.27	2.23	sandy silt to clayey silt	UNDFND	UNDFD	9	1.1
16.45	54	25.93	0.52	2.00	2.26	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
16.75	55	31.62	0.86	2.72	2.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
17.05	56	28.60	0.80	2.78	2.31	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
17.35	57	25.53	0.74	2.90	2.34	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
17.65	58	21.55	0.63	2.91	2.37	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
17.95	59	18.20	0.38	2.08	2.40	clayey silt to silty clay	UNDFND	UNDFD	9	.8
18.25	60	13.08	0.17	1.28	2.43	sandy silt to clayey silt	UNDFND	UNDFD	5	.5
18.55	61	20.85	0.44	2.09	2.45	sandy silt to clayey silt	UNDFND	UNDFD	8	1.0
18.85	62	53.92	2.64	4.91	2.48	silty clay to clay	UNDFND	UNDFD	34	2.9
19.20	63	28.20	1.06	3.76	2.51	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
19.50	64	30.68	1.19	3.89	2.54	silty clay to clay	UNDFND	UNDFD	20	1.5
19.80	65	30.52	1.21	3.98	2.57	silty clay to clay	UNDFND	UNDFD	19	1.5
20.15	66	32.63	1.13	3.45	2.60	clayey silt to silty clay	UNDFND	UNDFD	16	1.6
20.45	67	33.40	1.11	3.32	2.63	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
20.75	68	33.62	1.07	3.18	2.66	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
21.05	69	55.33	2.17	3.92	2.69	clayey silt to silty clay	UNDFND	UNDFD	27	3.0
21.35	70	33.47	1.20	3.59	2.72	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
21.65	71	32.18	1.03	3.20	2.75	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
21.95	72	38.10	1.11	2.91	2.77	sandy silt to clayey silt	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-2

WOODWARD-CLYDE CONSULTANTS

CPT-3

Operator: J. Oldham		CPT Date:	3/27/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

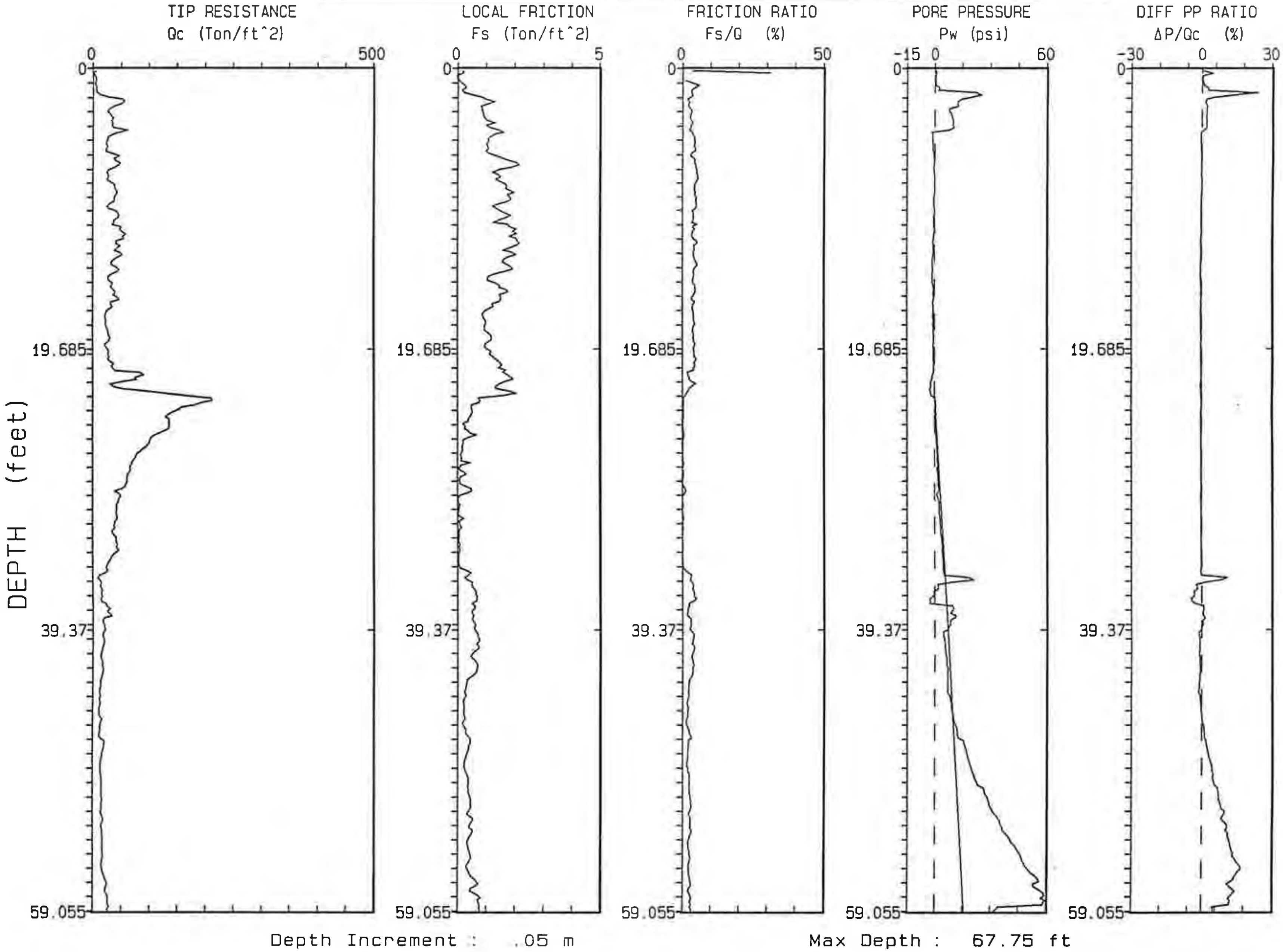
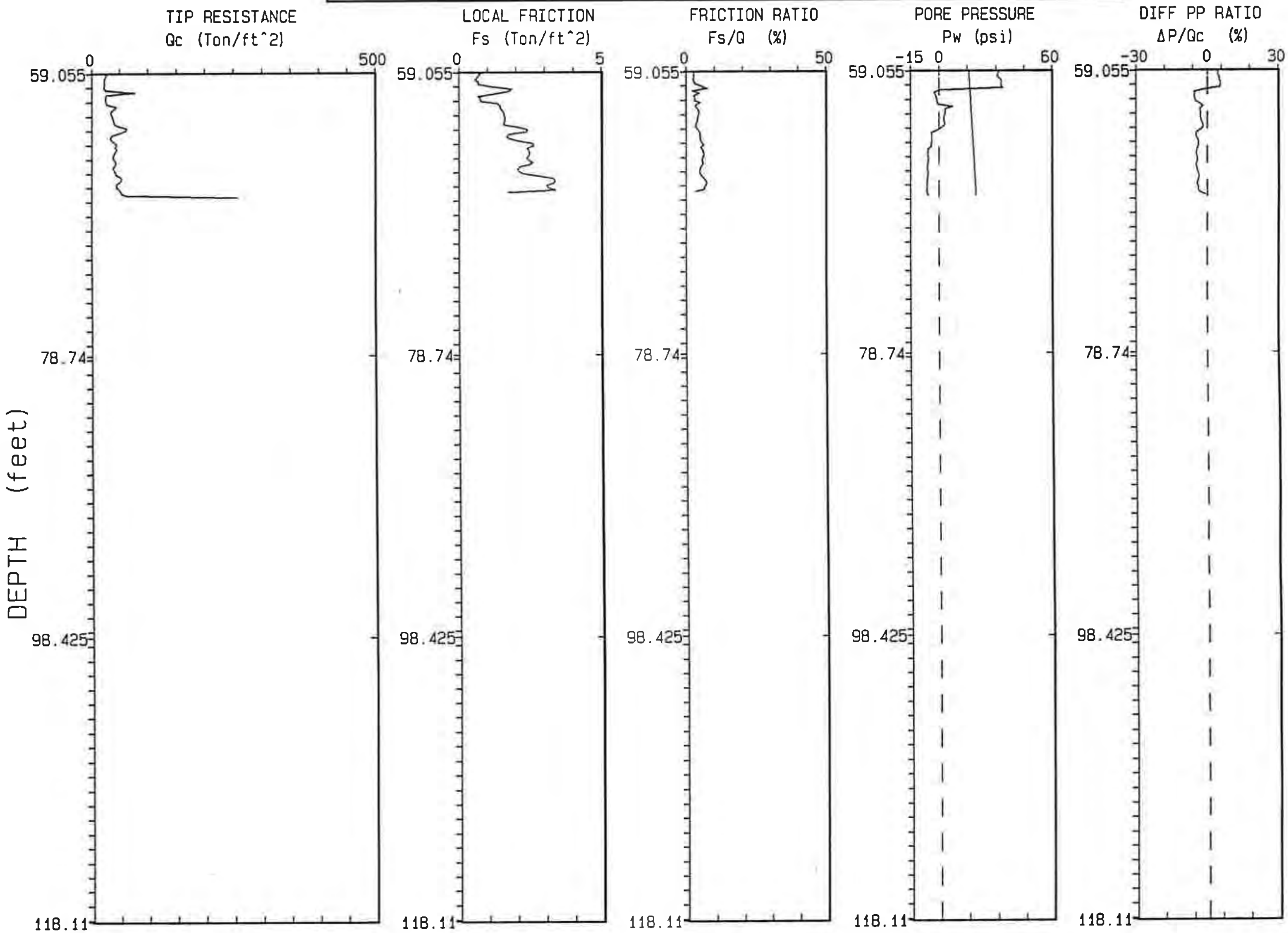


FIG. A-4-3

WOODWARD-CLYDE CONSULTANTS

CPT-3

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 67.75 ft

FIG. A-4-3

WOODWARD-CLYDE CONSULTANTS

CPT-3

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	3.95	0.09	2.19	0.03	clay	UNDFND	UNDFD	4	.2
0.60	2	10.50	0.37	3.55	0.09	clay	UNDFND	UNDFD	10	.6
0.95	3	39.91	0.96	2.42	0.15	sandy silt to clayey silt	UNDFND	UNDFD	15	2.3
1.25	4	34.28	1.05	3.05	0.22	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
1.55	5	36.38	1.26	3.47	0.28	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
1.85	6	28.98	1.09	3.76	0.33	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
2.15	7	39.25	1.81	4.62	0.39	silty clay to clay	UNDFND	UNDFD	25	2.2
2.45	8	28.33	1.44	5.07	0.45	clay	UNDFND	UNDFD	27	1.6
2.75	9	39.83	1.79	4.50	0.51	silty clay to clay	UNDFND	UNDFD	25	2.3
3.05	10	32.97	1.52	4.61	0.57	silty clay to clay	UNDFND	UNDFD	21	1.9
3.35	11	40.12	1.61	4.01	0.63	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
3.65	12	52.45	1.95	3.72	0.69	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
3.95	13	43.42	1.93	4.46	0.75	silty clay to clay	UNDFND	UNDFD	28	2.5
4.25	14	39.48	1.77	4.47	0.81	silty clay to clay	UNDFND	UNDFD	25	2.2
4.55	15	34.07	1.35	3.97	0.87	silty clay to clay	UNDFND	UNDFD	22	1.9
4.85	16	35.17	1.53	4.36	0.93	silty clay to clay	UNDFND	UNDFD	22	2.0
5.15	17	36.28	1.33	3.68	0.98	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
5.45	18	22.42	0.93	4.14	1.04	silty clay to clay	UNDFND	UNDFD	14	1.2
5.75	19	26.65	1.04	3.91	1.10	silty clay to clay	UNDFND	UNDFD	17	1.5
6.05	20	25.43	1.06	4.18	1.16	silty clay to clay	UNDFND	UNDFD	16	1.4
6.40	21	30.87	1.36	4.40	1.23	silty clay to clay	UNDFND	UNDFD	20	1.7
6.70	22	69.72	1.75	2.51	1.29	sandy silt to clayey silt	UNDFND	UNDFD	27	4.0
7.00	23	86.48	1.60	1.84	1.35	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
7.35	24	178.20	0.60	0.34	1.39	sand	70-80	42-44	34	UNDEFINED
7.65	25	133.95	0.35	0.26	1.42	sand	60-70	40-42	26	UNDEFINED
7.95	26	115.47	0.39	0.34	1.45	sand	60-70	40-42	22	UNDEFINED
8.25	27	89.82	0.16	0.18	1.48	sand	50-60	38-40	17	UNDEFINED
8.55	28	69.77	0.16	0.23	1.51	sand to silty sand	50-60	36-38	17	UNDEFINED
8.85	29	62.20	0.14	0.23	1.54	sand to silty sand	40-50	36-38	15	UNDEFINED
9.15	30	50.35	0.29	0.57	1.57	sand to silty sand	40-50	34-36	12	UNDEFINED
9.45	31	43.67	0.04	0.09	1.59	sand to silty sand	<40	32-34	10	UNDEFINED
9.75	32	41.32	0.07	0.18	1.62	sand to silty sand	<40	32-34	10	UNDEFINED
10.05	33	37.53	0.07	0.18	1.65	sand to silty sand	<40	32-34	9	UNDEFINED
10.35	34	42.67	0.06	0.13	1.68	sand to silty sand	<40	32-34	10	UNDEFINED
10.65	35	30.37	0.04	0.13	1.71	silty sand to sandy silt	<40	30-32	10	UNDEFINED
10.95	36	17.42	0.31	1.77	1.74	sandy silt to clayey silt	UNDFND	UNDFD	7	.8
11.25	37	14.65	0.57	3.88	1.76	silty clay to clay	UNDFND	UNDFD	9	.7
11.55	38	20.52	0.62	3.00	1.79	clayey silt to silty clay	UNDFND	UNDFD	10	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-3

CPT-3

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	23.85	0.54	2.25	1.82	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
12.15	40	19.32	0.65	3.37	1.85	clayey silt to silty clay	UNDFND	UNDFD	9	.9
12.45	41	17.92	0.70	3.93	1.88	silty clay to clay	UNDFND	UNDFD	11	.9
12.80	42	15.80	0.59	3.74	1.91	silty clay to clay	UNDFND	UNDFD	10	.7
13.10	43	15.35	0.50	3.23	1.94	silty clay to clay	UNDFND	UNDFD	10	.7
13.40	44	12.63	0.28	2.22	1.97	clayey silt to silty clay	UNDFND	UNDFD	6	.5
13.75	45	11.56	0.22	1.88	2.00	clayey silt to silty clay	UNDFND	UNDFD	6	.5
14.05	46	13.08	0.22	1.68	2.03	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.35	47	13.65	0.34	2.51	2.06	clayey silt to silty clay	UNDFND	UNDFD	7	.6
14.65	48	18.12	0.37	2.05	2.09	clayey silt to silty clay	UNDFND	UNDFD	9	.8
14.95	49	14.12	0.25	1.77	2.11	clayey silt to silty clay	UNDFND	UNDFD	7	.6
15.25	50	14.65	0.34	2.31	2.14	clayey silt to silty clay	UNDFND	UNDFD	7	.6
15.55	51	15.27	0.38	2.49	2.17	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.85	52	15.17	0.44	2.87	2.20	clayey silt to silty clay	UNDFND	UNDFD	7	.7
16.15	53	16.27	0.43	2.67	2.23	clayey silt to silty clay	UNDFND	UNDFD	8	.7
16.45	54	16.42	0.45	2.72	2.26	clayey silt to silty clay	UNDFND	UNDFD	8	.7
16.75	55	17.07	0.38	2.20	2.28	clayey silt to silty clay	UNDFND	UNDFD	8	.8
17.05	56	16.15	0.38	2.36	2.31	clayey silt to silty clay	UNDFND	UNDFD	8	.7
17.35	57	19.63	0.49	2.48	2.34	clayey silt to silty clay	UNDFND	UNDFD	9	.9
17.65	58	23.40	0.59	2.53	2.37	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
17.95	59	26.37	0.76	2.87	2.40	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
18.25	60	23.67	0.67	2.83	2.43	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
18.55	61	33.03	1.23	3.71	2.45	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
18.85	62	34.13	1.34	3.92	2.48	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
19.20	63	46.39	1.78	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
19.50	64	39.83	2.03	5.09	2.54	clay	UNDFND	UNDFD	38	2.1
19.80	65	40.88	2.45	6.00	2.57	clay	UNDFND	UNDFD	39	2.1
20.15	66	41.96	2.29	5.45	2.60	clay	UNDFND	UNDFD	40	2.2
20.45	67	48.98	3.17	6.47	2.63	clay	UNDFND	UNDFD	47	2.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-3

WOODWARD-CLYDE CONSULTANTS

CPT-4

Operator:	J. Oldham		CPT Date:	3/27/95
Page:	1/2		Location:	Baldwin
Cone Used:	243		Job Number:	5E08560

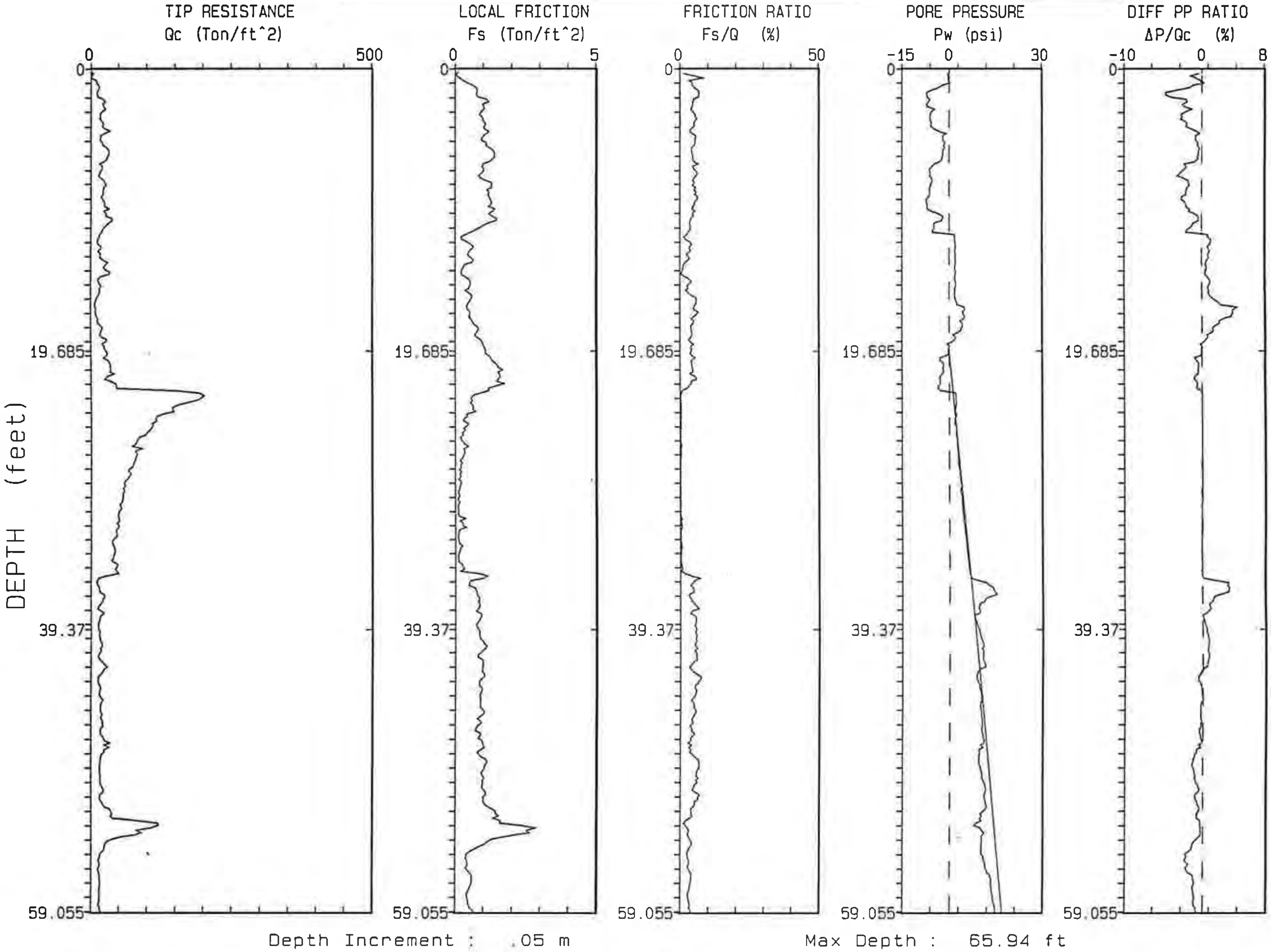
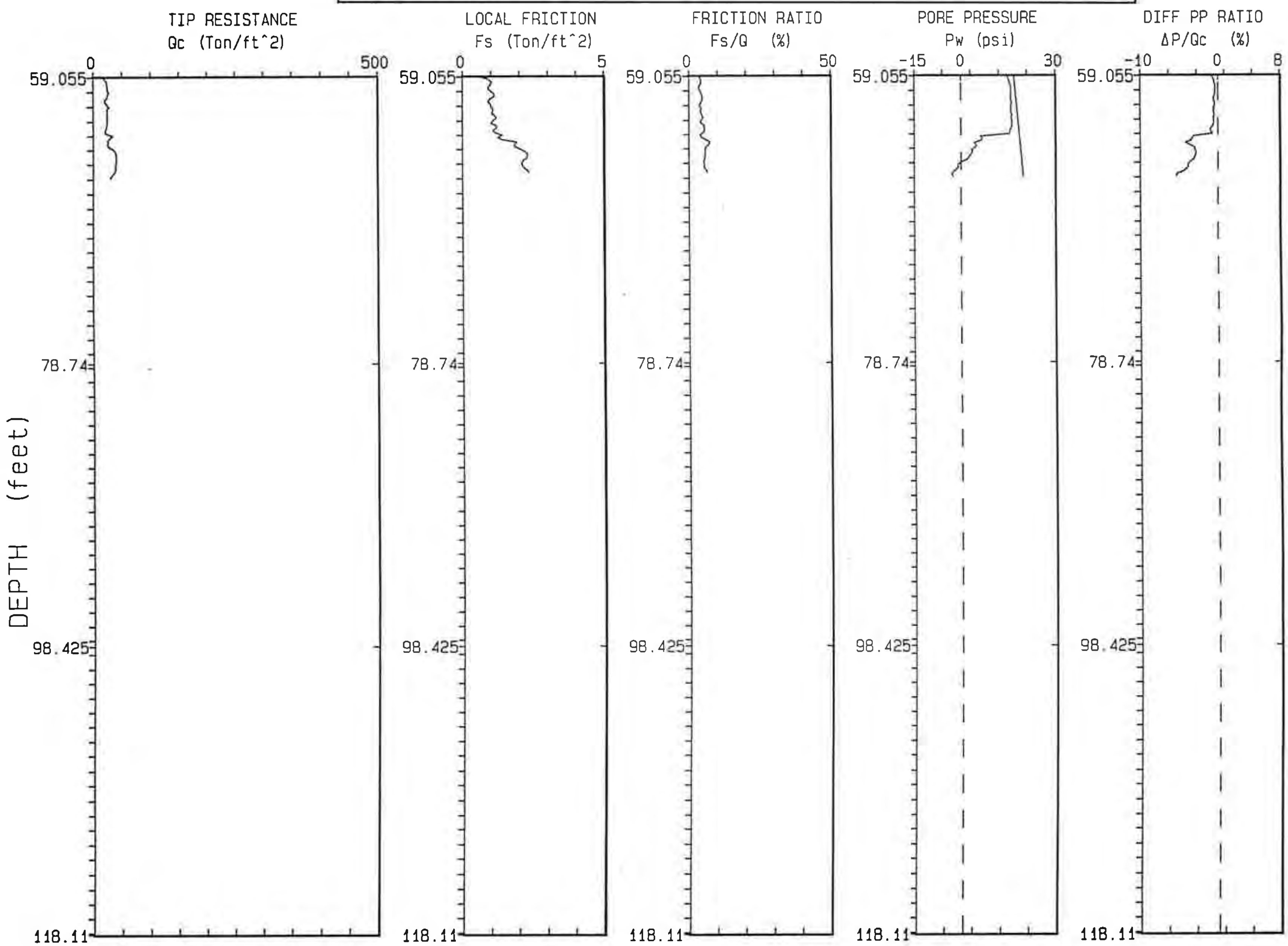


FIG. A-4-4

WOODWARD-CLYDE CONSULTANTS

CPT-4

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 65.94 ft

FIG. A-4-4

WOODWARD-CLYDE CONSULTANTS

CPT-4

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	4.33	0.18	4.27	0.03	clay	UNDFND	UNDFD	4	.2
0.60	2	12.67	0.76	5.97	0.09	clay	UNDFND	UNDFD	12	.7
0.95	3	22.00	1.02	4.65	0.15	clay	UNDFND	UNDFD	21	1.2
1.25	4	20.00	1.01	5.07	0.22	clay	UNDFND	UNDFD	19	1.1
1.55	5	22.17	1.06	4.77	0.28	clay	UNDFND	UNDFD	21	1.2
1.85	6	28.67	1.29	4.50	0.33	silty clay to clay	UNDFND	UNDFD	18	1.6
2.15	7	20.50	1.08	5.24	0.39	clay	UNDFND	UNDFD	20	1.1
2.45	8	20.50	1.05	5.13	0.45	clay	UNDFND	UNDFD	20	1.1
2.75	9	21.17	1.21	5.69	0.51	clay	UNDFND	UNDFD	20	1.2
3.05	10	26.33	1.28	4.87	0.57	clay	UNDFND	UNDFD	25	1.5
3.35	11	30.67	1.21	3.93	0.63	silty clay to clay	UNDFND	UNDFD	20	1.7
3.65	12	15.50	0.41	2.68	0.69	clayey silt to silty clay	UNDFND	UNDFD	7	.8
3.95	13	16.17	0.53	3.29	0.75	silty clay to clay	UNDFND	UNDFD	10	.9
4.25	14	24.33	0.44	1.80	0.81	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
4.55	15	21.50	0.39	1.81	0.87	sandy silt to clayey silt	UNDFND	UNDFD	8	1.2
4.85	16	15.17	0.50	3.27	0.93	silty clay to clay	UNDFND	UNDFD	10	.8
5.15	17	8.33	0.47	5.60	0.98	clay	UNDFND	UNDFD	8	.4
5.45	18	12.67	0.59	4.62	1.04	clay	UNDFND	UNDFD	12	.6
5.75	19	20.50	0.78	3.83	1.10	silty clay to clay	UNDFND	UNDFD	13	1.1
6.05	20	25.50	1.03	4.03	1.16	silty clay to clay	UNDFND	UNDFD	16	1.4
6.40	21	31.57	1.41	4.46	1.23	silty clay to clay	UNDFND	UNDFD	20	1.7
6.70	22	34.83	1.57	4.49	1.29	silty clay to clay	UNDFND	UNDFD	22	1.9
7.00	23	139.33	0.98	0.70	1.35	sand	70-80	40-42	27	UNDEFINED
7.35	24	155.00	0.60	0.38	1.39	sand	70-80	40-42	30	UNDEFINED
7.65	25	112.67	0.38	0.33	1.42	sand	60-70	40-42	22	UNDEFINED
7.95	26	91.33	0.26	0.29	1.45	sand	50-60	38-40	17	UNDEFINED
8.25	27	81.33	0.35	0.42	1.48	sand to silty sand	50-60	38-40	19	UNDEFINED
8.55	28	75.33	0.20	0.27	1.51	sand to silty sand	50-60	36-38	18	UNDEFINED
8.85	29	65.33	0.18	0.27	1.54	sand to silty sand	40-50	36-38	16	UNDEFINED
9.15	30	58.50	0.13	0.23	1.57	sand to silty sand	40-50	36-38	14	UNDEFINED
9.45	31	53.50	0.11	0.21	1.59	sand to silty sand	40-50	34-36	13	UNDEFINED
9.75	32	49.33	0.22	0.44	1.62	sand to silty sand	<40	34-36	12	UNDEFINED
10.05	33	45.67	0.16	0.36	1.65	sand to silty sand	<40	34-36	11	UNDEFINED
10.35	34	40.83	0.16	0.40	1.68	silty sand to sandy silt	<40	32-34	13	UNDEFINED
10.65	35	42.33	0.15	0.35	1.71	sand to silty sand	<40	32-34	10	UNDEFINED
10.95	36	32.33	0.67	2.07	1.74	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
11.25	37	15.67	0.65	4.16	1.76	clay	UNDFND	UNDFD	15	.7
11.55	38	18.17	0.84	4.63	1.79	clay	UNDFND	UNDFD	17	.9

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-4

WOODWARD-CLYDE CONSULTANTS

CPT-4

Operator:	J. Oldham	CPT Date:	3/27/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.50	0.85	4.85	1.82	clay	UNDFND	UNDFD	17	.8
12.15	40	14.67	0.82	5.59	1.85	clay	UNDFND	UNDFD	14	.7
12.45	41	18.17	1.01	5.55	1.88	clay	UNDFND	UNDFD	17	.9
12.80	42	19.43	0.92	4.75	1.91	clay	UNDFND	UNDFD	19	.9
13.10	43	17.17	0.97	5.64	1.94	clay	UNDFND	UNDFD	16	.8
13.40	44	16.00	0.89	5.57	1.97	clay	UNDFND	UNDFD	15	.7
13.75	45	18.86	0.92	4.88	2.00	clay	UNDFND	UNDFD	18	.9
14.05	46	20.17	0.87	4.32	2.03	clay	UNDFND	UNDFD	19	1.0
14.35	47	20.17	0.83	4.09	2.06	silty clay to clay	UNDFND	UNDFD	13	1.0
14.65	48	26.33	0.92	3.50	2.09	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
14.95	49	16.50	1.04	6.32	2.11	clay	UNDFND	UNDFD	16	.7
15.25	50	16.33	0.96	5.89	2.14	clay	UNDFND	UNDFD	16	.7
15.55	51	19.00	1.01	5.32	2.17	clay	UNDFND	UNDFD	18	.9
15.85	52	25.00	1.15	4.60	2.20	clay	UNDFND	UNDFD	24	1.2
16.15	53	72.67	1.63	2.24	2.23	silty sand to sandy silt	40-50	34-36	23	UNDEFINED
16.45	54	74.33	2.17	2.92	2.26	sandy silt to clayey silt	UNDFND	UNDFD	28	4.1
16.75	55	22.83	0.78	3.41	2.28	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
17.05	56	14.17	0.41	2.88	2.31	clayey silt to silty clay	UNDFND	UNDFD	7	.6
17.35	57	14.67	0.56	3.81	2.34	silty clay to clay	UNDFND	UNDFD	9	.6
17.65	58	15.17	0.48	3.15	2.37	silty clay to clay	UNDFND	UNDFD	10	.6
17.95	59	15.00	0.50	3.31	2.40	silty clay to clay	UNDFND	UNDFD	10	.6
18.25	60	22.83	0.89	3.92	2.43	silty clay to clay	UNDFND	UNDFD	15	1.1
18.55	61	23.17	1.01	4.38	2.45	clay	UNDFND	UNDFD	22	1.1
18.85	62	25.00	1.08	4.33	2.48	silty clay to clay	UNDFND	UNDFD	16	1.2
19.20	63	24.29	1.16	4.78	2.51	clay	UNDFND	UNDFD	23	1.2
19.50	64	28.00	1.71	6.11	2.54	clay	UNDFND	UNDFD	27	1.4
19.80	65	39.33	2.20	5.60	2.57	clay	UNDFND	UNDFD	38	2.0
0.00	0	30.14	1.27	4.23	1.65	silty clay to clay	UNDFND	UNDFD	19	1.6

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

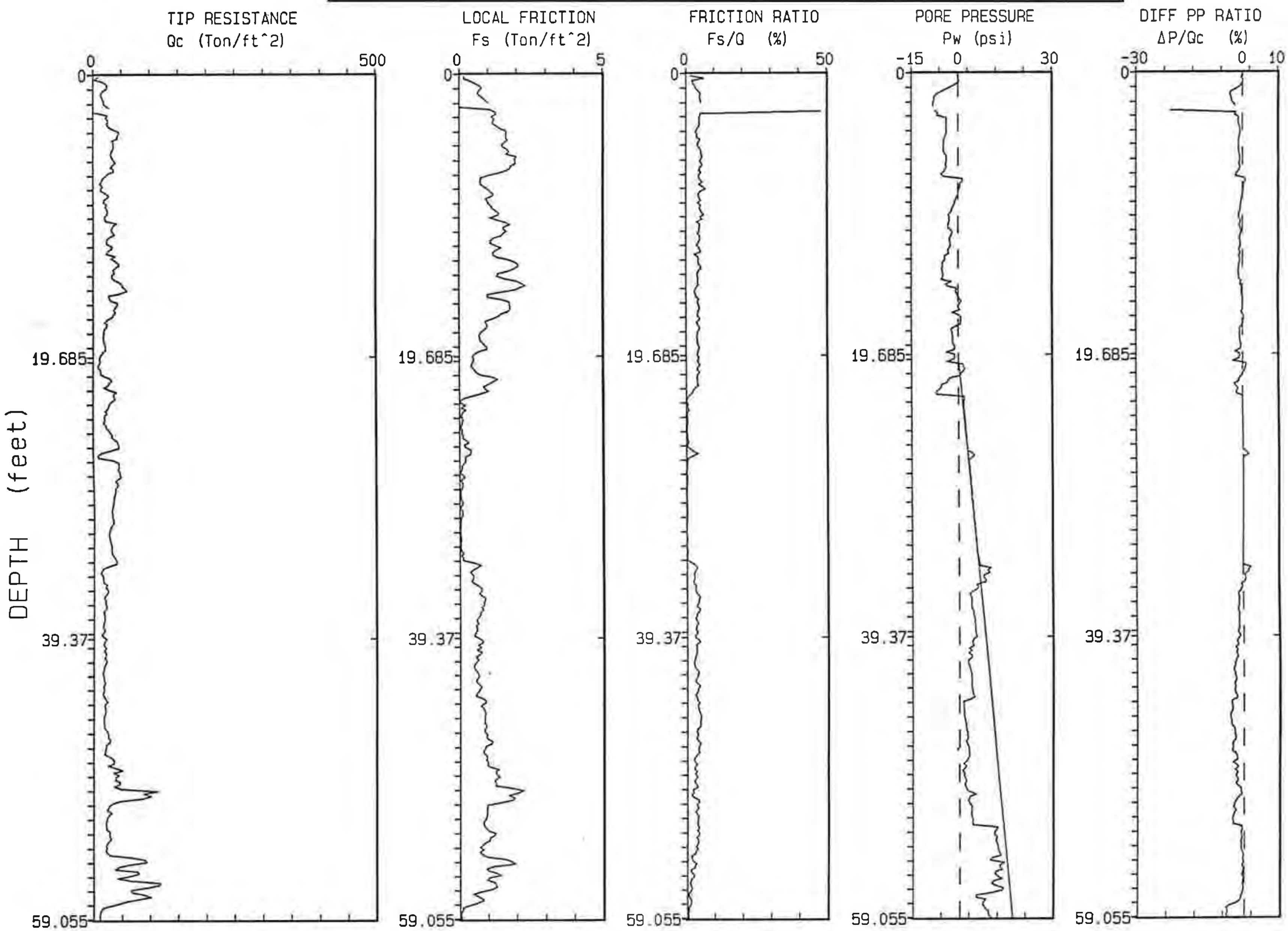
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-4

WOODWARD-CLYDE CONSULTANTS

CPT-5

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : 05 m

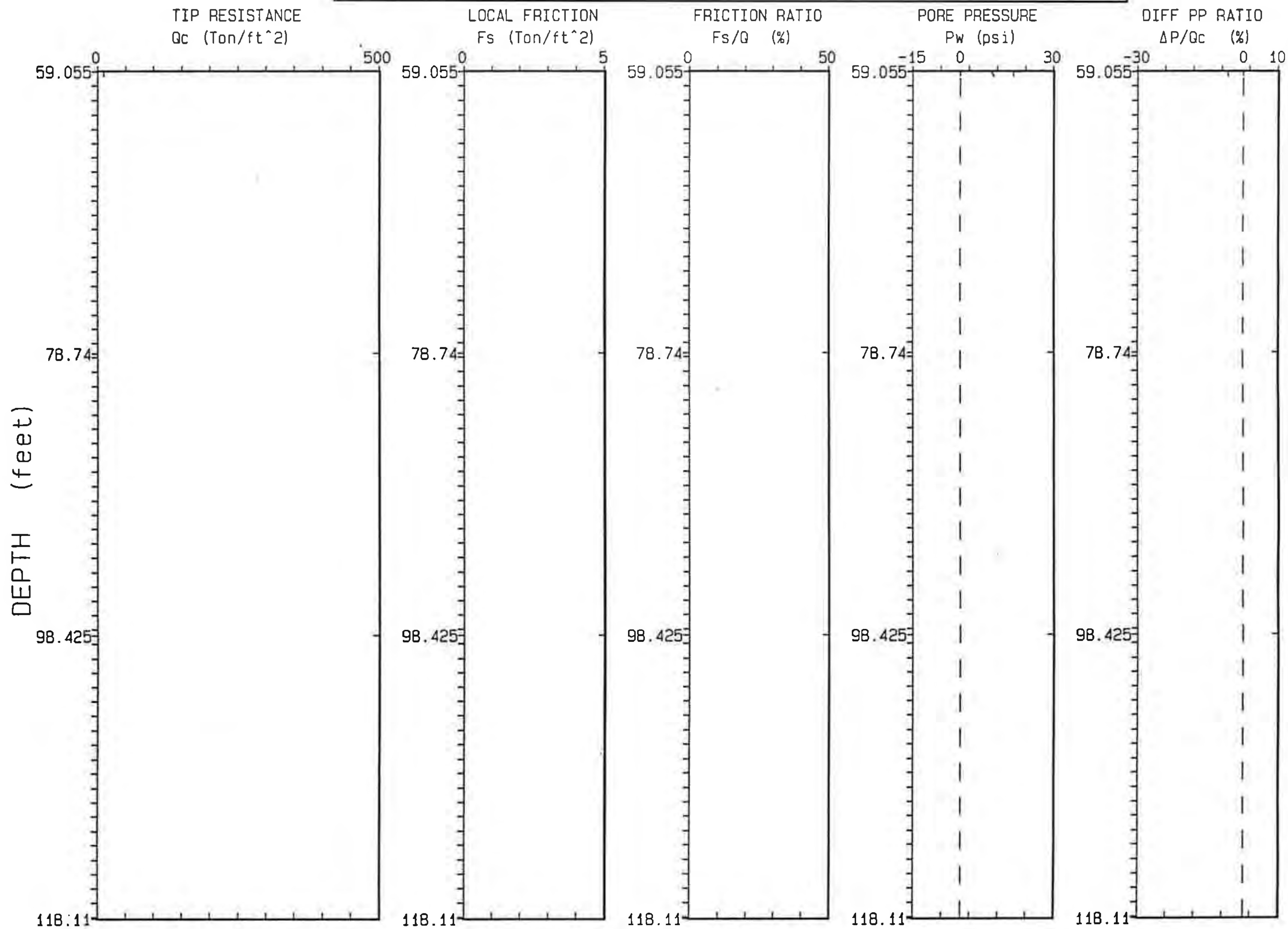
Max Depth : 59.38 ft

FIG. A-4-5

WOODWARD-CLYDE CONSULTANTS

CPT-5

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 59.38 ft

FIG. A-4-5

WOODWARD-CLYDE CONSULTANTS

CPT-5

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	16.75	0.47	2.82	0.03	clayey silt to silty clay	UNDFND	UNDFD	8	.9
0.60	2	16.10	0.81	5.01	0.09	clay	UNDFND	UNDFD	15	.9
0.95	3	17.81	0.85	4.76	0.15	clay	UNDFND	UNDFD	17	1.0
1.25	4	33.68	1.40	4.15	0.22	silty clay to clay	UNDFND	UNDFD	22	1.9
1.55	5	37.57	1.60	4.26	0.28	silty clay to clay	UNDFND	UNDFD	24	2.1
1.85	6	34.10	1.83	5.36	0.33	clay	UNDFND	UNDFD	33	1.9
2.15	7	30.53	1.59	5.22	0.39	clay	UNDFND	UNDFD	29	1.7
2.45	8	14.78	0.83	5.60	0.45	clay	UNDFND	UNDFD	14	.8
2.75	9	22.62	1.07	4.72	0.51	clay	UNDFND	UNDFD	22	1.3
3.05	10	22.58	1.22	5.41	0.57	clay	UNDFND	UNDFD	22	1.2
3.35	11	32.78	1.58	4.83	0.63	clay	UNDFND	UNDFD	31	1.8
3.65	12	28.40	1.28	4.50	0.69	silty clay to clay	UNDFND	UNDFD	18	1.6
3.95	13	31.03	1.37	4.40	0.75	silty clay to clay	UNDFND	UNDFD	20	1.7
4.25	14	38.97	1.83	4.69	0.81	silty clay to clay	UNDFND	UNDFD	25	2.2
4.55	15	45.75	1.91	4.18	0.87	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
4.85	16	39.52	1.42	3.59	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
5.15	17	37.10	1.65	4.44	0.98	silty clay to clay	UNDFND	UNDFD	24	2.1
5.45	18	21.50	0.97	4.49	1.01	clay	UNDFND	UNDFD	21	1.2
5.75	19	18.80	0.76	4.02	1.04	silty clay to clay	UNDFND	UNDFD	12	1.0
6.05	20	15.27	0.69	4.49	1.07	clay	UNDFND	UNDFD	15	.8
6.40	21	12.40	0.53	4.30	1.10	clay	UNDFND	UNDFD	12	.6
6.70	22	27.37	1.07	3.92	1.13	silty clay to clay	UNDFND	UNDFD	17	1.5
7.00	23	35.23	0.41	1.17	1.16	silty sand to sandy silt	<40	34-36	11	UNDEFINED
7.35	24	22.71	0.12	0.54	1.19	silty sand to sandy silt	<40	30-32	7	UNDEFINED
7.65	25	25.62	0.07	0.29	1.22	silty sand to sandy silt	<40	32-34	8	UNDEFINED
7.95	26	41.02	0.20	0.49	1.25	silty sand to sandy silt	<40	34-36	13	UNDEFINED
8.25	27	23.37	0.29	1.23	1.28	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
8.55	28	45.72	0.08	0.18	1.31	sand to silty sand	40-50	34-36	11	UNDEFINED
8.85	29	40.62	0.09	0.23	1.33	sand to silty sand	<40	34-36	10	UNDEFINED
9.15	30	35.10	0.06	0.17	1.36	sand to silty sand	<40	32-34	8	UNDEFINED
9.45	31	31.92	0.07	0.21	1.39	silty sand to sandy silt	<40	32-34	10	UNDEFINED
9.75	32	29.70	0.03	0.10	1.42	silty sand to sandy silt	<40	32-34	9	UNDEFINED
10.05	33	29.03	0.03	0.11	1.45	silty sand to sandy silt	<40	30-32	9	UNDEFINED
10.35	34	34.77	0.09	0.25	1.47	silty sand to sandy silt	<40	32-34	11	UNDEFINED
10.65	35	20.65	0.52	2.51	1.50	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
10.95	36	19.68	0.55	2.79	1.53	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.25	37	20.48	0.80	3.88	1.56	silty clay to clay	UNDFND	UNDFD	13	1.0
11.55	38	19.55	0.75	3.86	1.59	silty clay to clay	UNDFND	UNDFD	12	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-5

CPT-5

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.57	0.60	3.42	1.62	silty clay to clay	UNDFND	UNDFD	11	.8
12.15	40	17.85	0.64	3.60	1.64	silty clay to clay	UNDFND	UNDFD	11	.9
12.45	41	20.60	0.66	3.22	1.67	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
12.80	42	18.09	0.56	3.10	1.70	clayey silt to silty clay	UNDFND	UNDFD	9	.9
13.10	43	17.87	0.65	3.65	1.73	silty clay to clay	UNDFND	UNDFD	11	.9
13.40	44	19.42	0.72	3.70	1.76	silty clay to clay	UNDFND	UNDFD	12	.9
13.75	45	19.13	0.84	4.38	1.79	clay	UNDFND	UNDFD	18	.9
14.05	46	21.45	0.89	4.14	1.82	silty clay to clay	UNDFND	UNDFD	14	1.1
14.35	47	24.33	0.98	4.01	1.85	silty clay to clay	UNDFND	UNDFD	16	1.2
14.65	48	28.50	0.91	3.18	1.88	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
14.95	49	38.78	1.21	3.12	1.91	clayey silt to silty clay	UNDFND	UNDFD	19	2.1
15.25	50	53.98	1.50	2.77	1.94	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
15.55	51	63.87	1.64	2.57	1.97	sandy silt to clayey silt	UNDFND	UNDFD	24	3.5
15.85	52	25.35	0.93	3.67	1.99	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
16.15	53	24.28	0.95	3.90	2.02	silty clay to clay	UNDFND	UNDFD	16	1.2
16.45	54	25.42	0.94	3.68	2.05	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
16.75	55	54.72	1.11	2.02	2.08	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
17.05	56	61.12	1.30	2.12	2.11	sandy silt to clayey silt	UNDFND	UNDFD	23	3.3
17.35	57	83.40	1.14	1.36	2.14	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
17.65	58	73.08	0.67	0.92	2.16	sand to silty sand	40-50	34-36	18	UNDEFINED
17.95	59	14.03	0.10	0.68	2.19	sandy silt to clayey silt	UNDFND	UNDFD	5	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

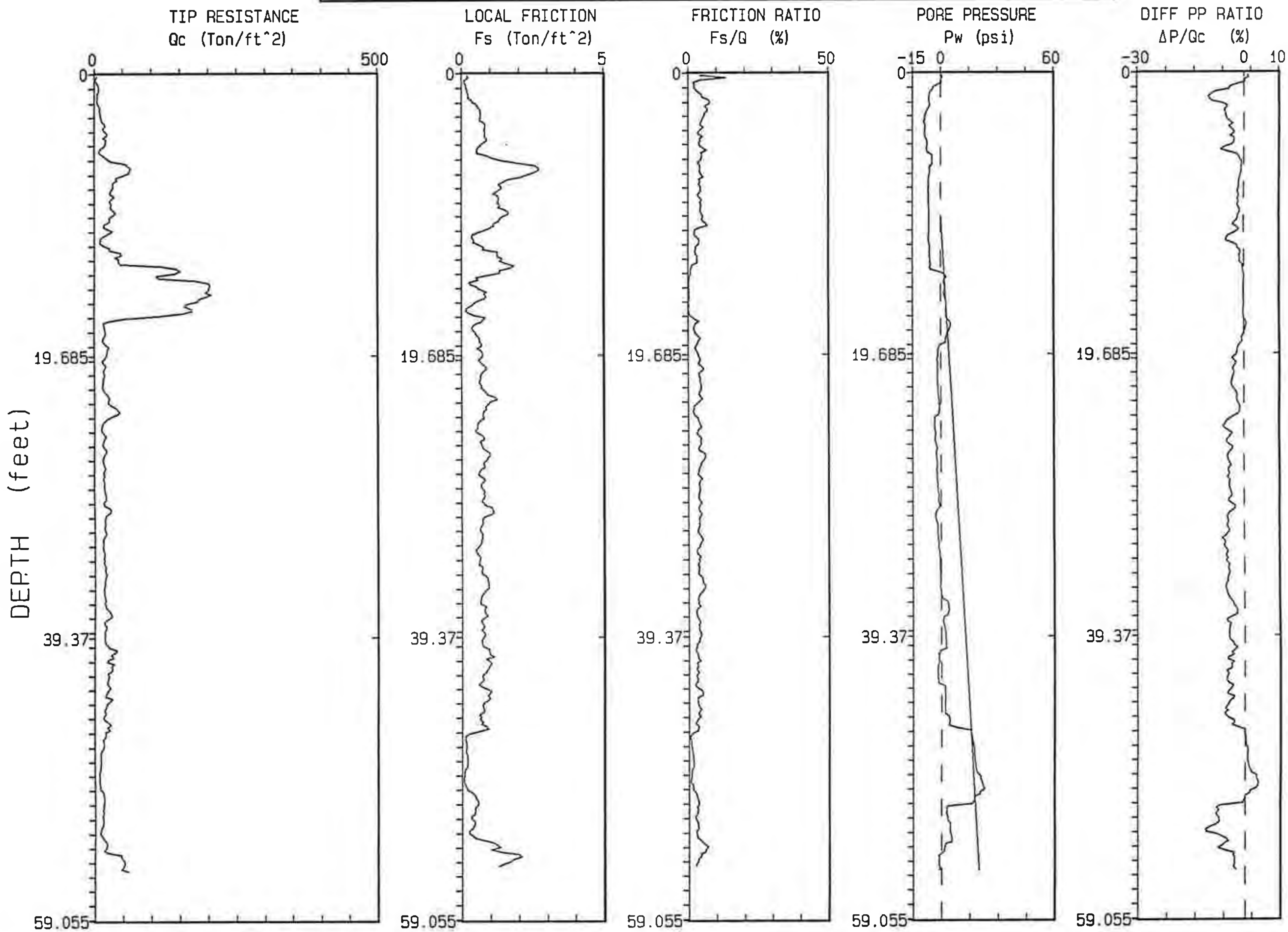
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-5

WOODWARD-CLYDE CONSULTANTS

CPT-6

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 55.61 ft

FIG. A-4-6

WOODWARD-CLYDE CONSULTANTS

CPT-6

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	4.68	0.15	3.27	0.03	clay	UNDFND	UNDFD	4	.2
0.60	2	5.33	0.27	5.00	0.09	clay	UNDFND	UNDFD	5	.3
0.95	3	10.07	0.62	6.13	0.15	clay	UNDFND	UNDFD	10	.5
1.25	4	17.42	0.78	4.47	0.22	clay	UNDFND	UNDFD	17	1.0
1.55	5	18.67	0.79	4.21	0.28	clay	UNDFND	UNDFD	18	1.0
1.85	6	16.82	0.83	4.94	0.33	clay	UNDFND	UNDFD	16	.9
2.15	7	59.07	2.46	4.16	0.39	clayey silt to silty clay	UNDFND	UNDFD	28	3.4
2.45	8	34.67	1.53	4.42	0.45	silty clay to clay	UNDFND	UNDFD	22	2.0
2.75	9	29.83	1.24	4.16	0.51	silty clay to clay	UNDFND	UNDFD	19	1.7
3.05	10	31.55	1.46	4.64	0.57	silty clay to clay	UNDFND	UNDFD	20	1.8
3.35	11	23.72	1.09	4.61	0.61	clay	UNDFND	UNDFD	23	1.3
3.65	12	15.12	0.46	3.04	0.64	clayey silt to silty clay	UNDFND	UNDFD	7	.8
3.95	13	38.42	1.12	2.91	0.67	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
4.25	14	107.78	1.51	1.40	0.69	sand to silty sand	70-80	42-44	26	UNDEFINED
4.55	15	167.65	0.52	0.31	0.72	sand	80-90	44-46	32	UNDEFINED
4.85	16	193.57	0.75	0.39	0.75	sand	80-90	44-46	37	UNDEFINED
5.15	17	154.75	0.29	0.19	0.78	sand	80-90	44-46	30	UNDEFINED
5.45	18	25.63	0.58	2.25	0.81	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
5.75	19	17.62	0.58	3.27	0.84	clayey silt to silty clay	UNDFND	UNDFD	8	.9
6.05	20	21.95	0.67	3.07	0.86	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
6.40	21	16.86	0.74	4.39	0.89	clay	UNDFND	UNDFD	16	.9
6.70	22	15.27	0.65	4.29	0.93	clay	UNDFND	UNDFD	15	.8
7.00	23	22.88	0.99	4.32	0.95	silty clay to clay	UNDFND	UNDFD	15	1.2
7.35	24	35.09	0.81	2.31	0.98	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
7.65	25	14.22	0.55	3.89	1.02	silty clay to clay	UNDFND	UNDFD	9	.7
7.95	26	17.02	0.71	4.20	1.04	clay	UNDFND	UNDFD	16	.9
8.25	27	17.72	0.89	5.01	1.07	clay	UNDFND	UNDFD	17	.9
8.55	28	17.45	0.70	4.00	1.10	silty clay to clay	UNDFND	UNDFD	11	.9
8.85	29	17.23	0.72	4.17	1.13	clay	UNDFND	UNDFD	17	.9
9.15	30	18.72	0.76	4.07	1.16	silty clay to clay	UNDFND	UNDFD	12	.9
9.45	31	23.72	0.97	4.11	1.19	silty clay to clay	UNDFND	UNDFD	15	1.2
9.75	32	18.35	0.68	3.73	1.21	silty clay to clay	UNDFND	UNDFD	12	.9
10.05	33	15.97	0.68	4.28	1.24	clay	UNDFND	UNDFD	15	.8
10.35	34	16.00	0.56	3.52	1.27	silty clay to clay	UNDFND	UNDFD	10	.8
10.65	35	18.30	0.67	3.64	1.30	silty clay to clay	UNDFND	UNDFD	12	.9
10.95	36	17.43	0.90	5.18	1.33	clay	UNDFND	UNDFD	17	.9
11.25	37	17.40	0.70	4.01	1.36	silty clay to clay	UNDFND	UNDFD	11	.8
11.55	38	24.77	0.79	3.20	1.38	clayey silt to silty clay	UNDFND	UNDFD	12	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-6

CPT-6

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	19.40	0.72	3.70	1.41	silty clay to clay	UNDFND	UNDFD	12	1.0
12.15	40	18.97	0.73	3.86	1.44	silty clay to clay	UNDFND	UNDFD	12	.9
12.45	41	31.38	0.93	2.97	1.47	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
12.80	42	27.89	0.89	3.19	1.50	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
13.10	43	24.57	0.71	2.88	1.53	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
13.40	44	23.67	0.92	3.89	1.56	silty clay to clay	UNDFND	UNDFD	15	1.2
13.75	45	18.07	0.68	3.78	1.59	silty clay to clay	UNDFND	UNDFD	12	.9
14.05	46	23.87	0.66	2.76	1.62	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
14.35	47	15.33	0.13	0.84	1.65	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
14.65	48	11.33	0.17	1.49	1.68	clayey silt to silty clay	UNDFND	UNDFD	5	.4
14.95	49	9.10	0.12	1.32	1.70	clayey silt to silty clay	UNDFND	UNDFD	4	.3
15.25	50	9.57	0.12	1.22	1.73	clayey silt to silty clay	UNDFND	UNDFD	5	.3
15.55	51	15.60	0.48	3.10	1.76	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.85	52	14.35	0.41	2.88	1.79	clayey silt to silty clay	UNDFND	UNDFD	7	.6
16.15	53	11.62	0.36	3.10	1.82	silty clay to clay	UNDFND	UNDFD	7	.4
16.45	54	18.17	0.89	4.88	1.85	clay	UNDFND	UNDFD	17	.8
16.75	55	39.35	1.65	4.21	1.87	silty clay to clay	UNDFND	UNDFD	25	2.1

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-6

WOODWARD-CLYDE CONSULTANTS

CPT-7

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

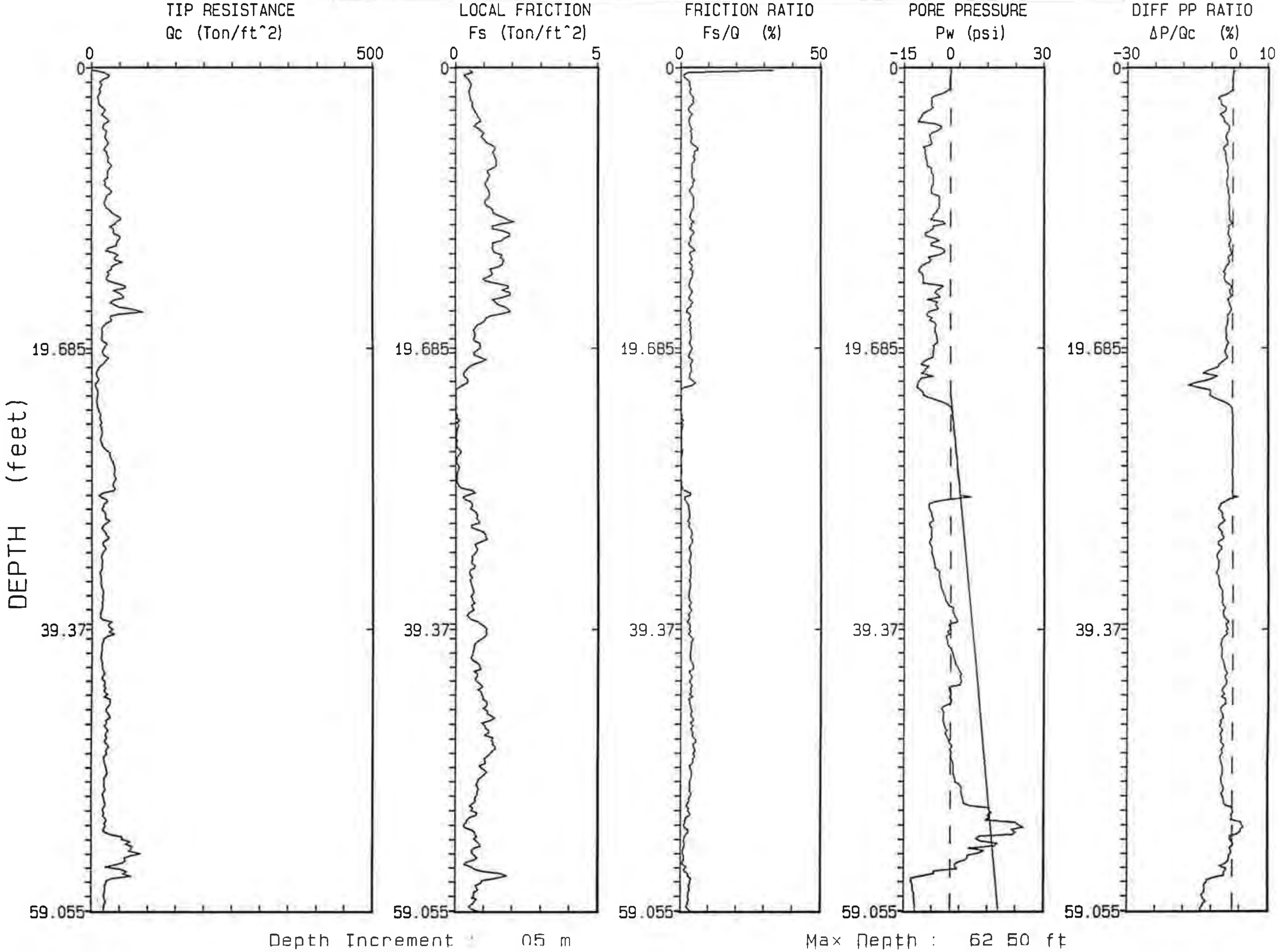


FIG. A-4-7

WOODWARD-CLYDE CONSULTANTS

CPT-7

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

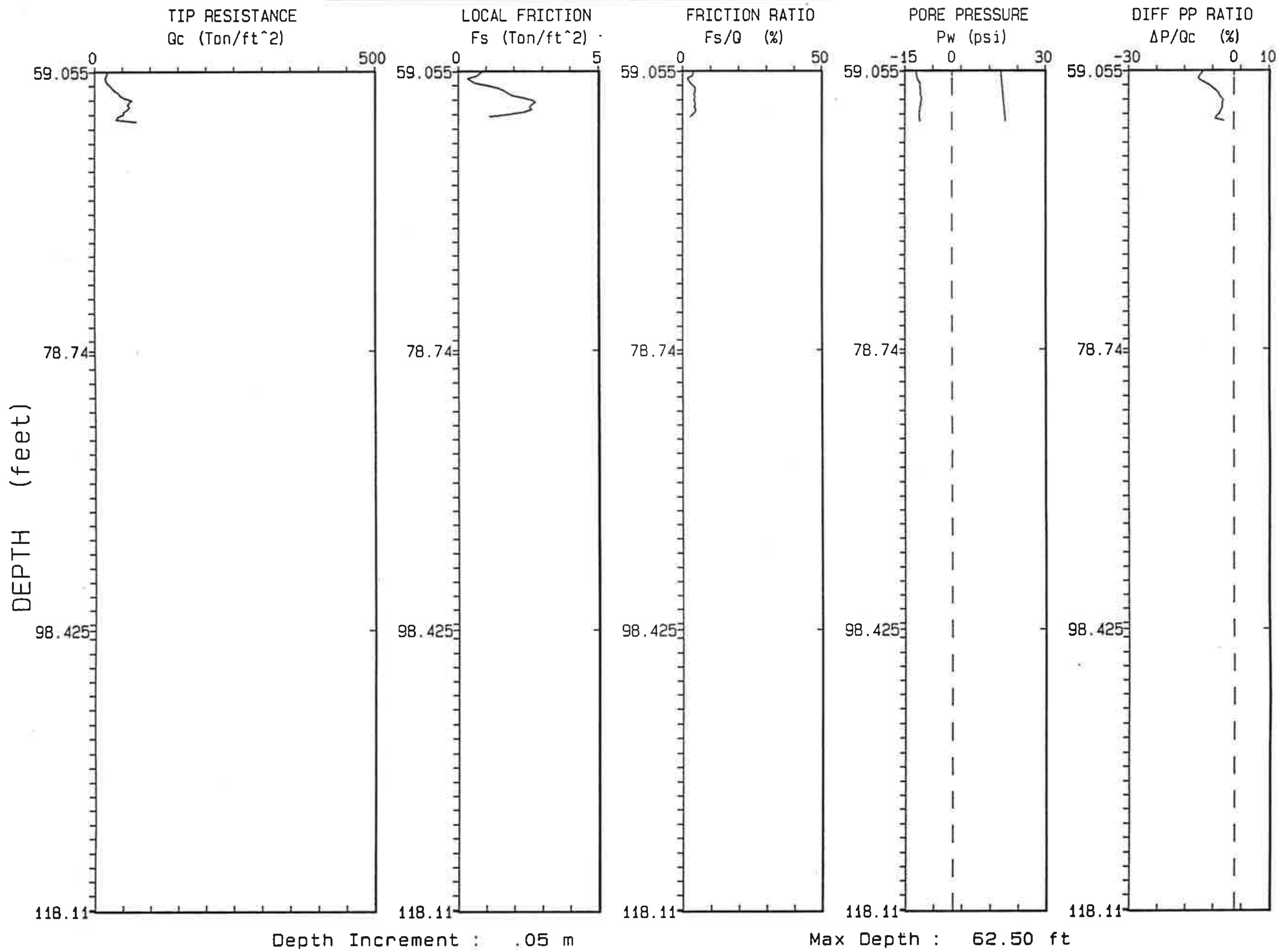


FIG. A-4-7

WOODWARD-CLYDE CONSULTANTS

CPT-7

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	19.87	0.46	2.29	0.03	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
0.60	2	14.48	0.50	3.43	0.09	silty clay to clay	UNDFND	UNDFD	9	.8
0.95	3	16.86	0.59	3.49	0.15	silty clay to clay	UNDFND	UNDFD	11	.9
1.25	4	24.00	0.77	3.22	0.22	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
1.55	5	24.88	0.92	3.71	0.28	silty clay to clay	UNDFND	UNDFD	16	1.4
1.85	6	26.55	1.30	4.88	0.33	clay	UNDFND	UNDFD	25	1.5
2.15	7	31.48	1.40	4.46	0.39	silty clay to clay	UNDFND	UNDFD	20	1.8
2.45	8	27.08	1.13	4.19	0.45	silty clay to clay	UNDFND	UNDFD	17	1.5
2.75	9	29.62	1.13	3.82	0.51	silty clay to clay	UNDFND	UNDFD	19	1.7
3.05	10	25.87	1.15	4.43	0.57	silty clay to clay	UNDFND	UNDFD	17	1.4
3.35	11	44.28	1.66	3.75	0.63	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
3.65	12	41.62	1.63	3.93	0.69	clayey silt to silty clay	UNDFND	UNDFD	20	2.4
3.95	13	37.67	1.38	3.65	0.75	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
4.25	14	43.83	1.63	3.71	0.81	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
4.55	15	30.05	1.17	3.89	0.87	silty clay to clay	UNDFND	UNDFD	19	1.7
4.85	16	51.15	1.77	3.46	0.93	clayey silt to silty clay	UNDFND	UNDFD	24	2.9
5.15	17	49.08	1.58	3.23	0.98	clayey silt to silty clay	UNDFND	UNDFD	24	2.8
5.45	18	44.93	1.30	2.90	1.04	sandy silt to clayey silt	UNDFND	UNDFD	17	2.5
5.75	19	19.02	0.68	3.59	1.10	silty clay to clay	UNDFND	UNDFD	12	1.0
6.05	20	21.93	0.79	3.58	1.16	silty clay to clay	UNDFND	UNDFD	14	1.2
6.40	21	21.56	0.74	3.44	1.23	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
6.70	22	9.80	0.35	3.59	1.29	clay	UNDFND	UNDFD	9	.5
7.00	23	8.68	0.13	1.48	1.35	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.35	24	9.96	0.01	0.07	1.39	sensitive fine grained	UNDFND	UNDFD	5	.5
7.65	25	15.15	0.07	0.45	1.42	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
7.95	26	17.25	0.04	0.22	1.45	silty sand to sandy silt	<40	<30	6	UNDEFINED
8.25	27	22.12	0.08	0.38	1.48	silty sand to sandy silt	<40	30-32	7	UNDEFINED
8.55	28	36.07	0.07	0.19	1.51	sand to silty sand	<40	32-34	9	UNDEFINED
8.85	29	40.85	0.06	0.16	1.54	sand to silty sand	<40	32-34	10	UNDEFINED
9.15	30	31.22	0.34	1.09	1.57	silty sand to sandy silt	<40	30-32	10	UNDEFINED
9.45	31	21.87	0.46	2.10	1.59	sandy silt to clayey silt	UNDFND	UNDFD	8	1.1
9.75	32	25.70	0.75	2.93	1.62	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
10.05	33	23.43	0.82	3.51	1.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
10.35	34	22.87	0.81	3.54	1.68	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
10.65	35	18.05	0.60	3.32	1.71	clayey silt to silty clay	UNDFND	UNDFD	9	.9
10.95	36	15.85	0.53	3.35	1.74	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	18.23	0.58	3.20	1.76	clayey silt to silty clay	UNDFND	UNDFD	9	.9
11.55	38	18.78	0.58	3.11	1.79	clayey silt to silty clay	UNDFND	UNDFD	9	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-7

CPT-7

Operator:	J. Oldham	CPT Date:	3/24/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	19.52	0.55	2.79	1.82	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
12.15	40	32.48	1.03	3.16	1.85	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
12.45	41	18.65	0.71	3.83	1.88	silty clay to clay	UNDFND	UNDFD	12	.9
12.80	42	17.33	0.67	3.85	1.91	silty clay to clay	UNDFND	UNDFD	11	.8
13.10	43	20.53	0.74	3.61	1.94	silty clay to clay	UNDFND	UNDFD	13	1.0
13.40	44	24.32	0.87	3.59	1.97	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
13.75	45	29.00	1.04	3.58	2.00	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
14.05	46	28.35	1.16	4.08	2.03	silty clay to clay	UNDFND	UNDFD	18	1.5
14.35	47	26.25	1.16	4.42	2.06	silty clay to clay	UNDFND	UNDFD	17	1.3
14.65	48	27.08	1.32	4.88	2.09	clay	UNDFND	UNDFD	26	1.4
14.95	49	24.02	1.00	4.15	2.11	silty clay to clay	UNDFND	UNDFD	15	1.2
15.25	50	25.15	0.94	3.75	2.14	silty clay to clay	UNDFND	UNDFD	16	1.3
15.55	51	22.03	0.76	3.47	2.17	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
15.85	52	22.57	0.61	2.71	2.20	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
16.15	53	23.63	0.51	2.15	2.23	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
16.45	54	35.63	0.62	1.74	2.26	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
16.75	55	70.77	0.72	1.02	2.28	sand to silty sand	40-50	34-36	17	UNDEFINED
17.05	56	52.55	0.57	1.09	2.31	silty sand to sandy silt	<40	32-34	17	UNDEFINED
17.35	57	51.10	1.24	2.42	2.34	sandy silt to clayey silt	UNDFND	UNDFD	20	2.8
17.65	58	24.20	0.75	3.10	2.37	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
17.95	59	23.33	0.62	2.64	2.40	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
18.25	60	21.05	0.62	2.93	2.43	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
18.55	61	39.82	1.69	4.24	2.45	silty clay to clay	UNDFND	UNDFD	25	2.1
18.85	62	59.52	2.60	4.37	2.48	clayey silt to silty clay	UNDFND	UNDFD	29	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

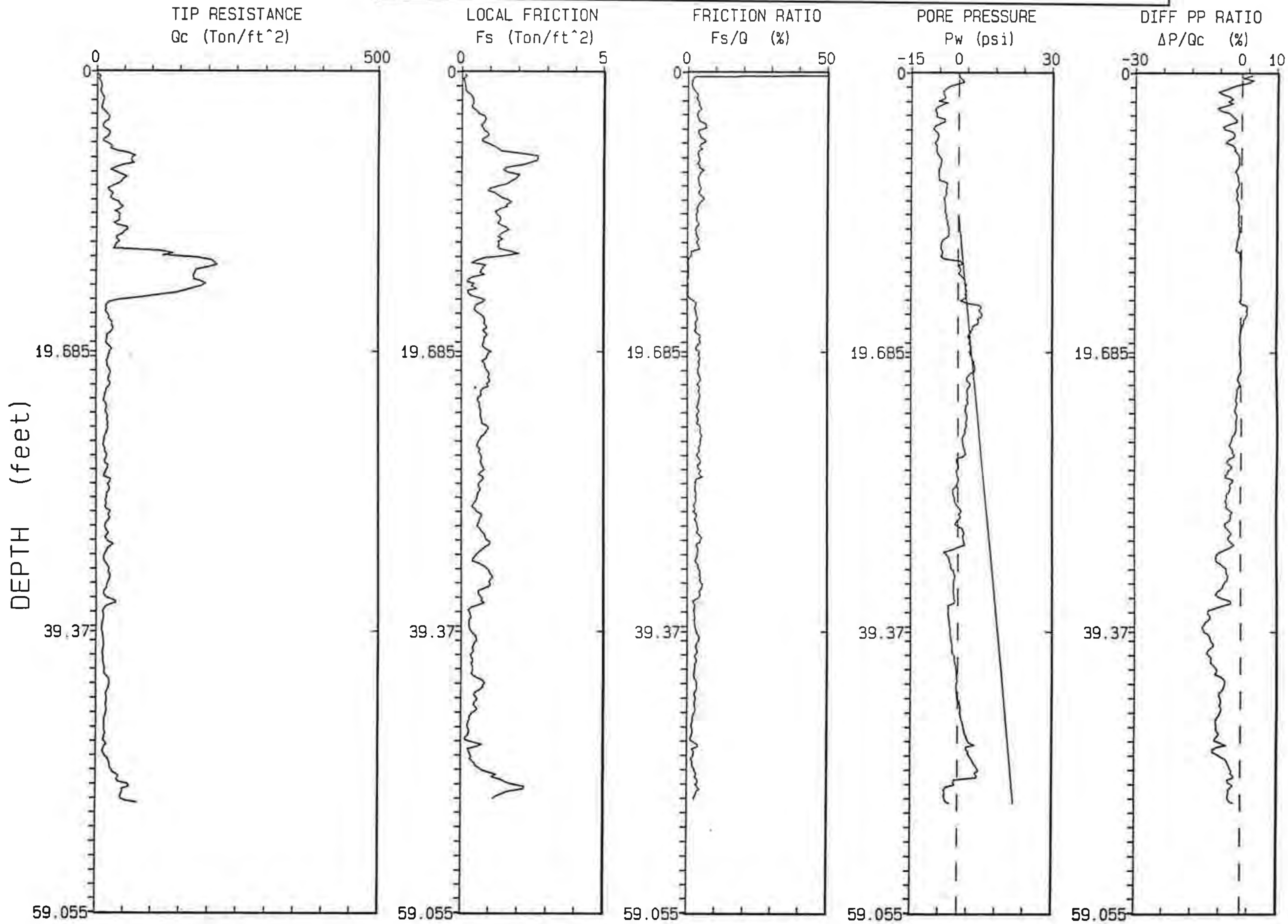
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-7

WOODWARD-CLYDE CONSULTANTS

CPT-8

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : 05 m

Max Depth : 51 35 ft

FIG. A-4-8

WOODWARD-CLYDE CONSULTANTS

CPT-8

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	4.97	0.10	2.01	0.03	silty clay to clay	UNDFND	UNDFD	3	.2
0.60	2	8.73	0.27	3.05	0.09	silty clay to clay	UNDFND	UNDFD	6	.5
0.95	3	12.90	0.50	3.85	0.15	clay	UNDFND	UNDFD	12	.7
1.25	4	16.20	0.78	4.78	0.22	clay	UNDFND	UNDFD	16	.9
1.55	5	18.57	0.87	4.70	0.28	clay	UNDFND	UNDFD	18	1.0
1.85	6	46.72	1.88	4.02	0.33	clayey silt to silty clay	UNDFND	UNDFD	22	2.7
2.15	7	45.98	1.96	4.26	0.39	silty clay to clay	UNDFND	UNDFD	29	2.6
2.45	8	42.95	1.75	4.07	0.45	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
2.75	9	25.48	1.24	4.88	0.51	clay	UNDFND	UNDFD	24	1.4
3.05	10	40.70	1.46	3.60	0.57	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
3.35	11	41.12	1.40	3.40	0.61	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
3.65	12	43.78	1.43	3.27	0.64	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
3.95	13	78.80	1.56	1.97	0.67	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
4.25	14	198.35	0.68	0.34	0.69	sand	>90	44-46	38	UNDEFINED
4.55	15	180.42	0.47	0.26	0.72	sand	80-90	44-46	35	UNDEFINED
4.85	16	141.40	0.38	0.27	0.75	sand	80-90	42-44	27	UNDEFINED
5.15	17	22.33	0.60	2.68	0.78	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
5.45	18	25.12	0.80	3.17	0.81	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
5.75	19	23.58	0.85	3.59	0.84	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
6.05	20	22.97	0.86	3.76	0.86	silty clay to clay	UNDFND	UNDFD	15	1.2
6.40	21	20.80	0.85	4.09	0.89	silty clay to clay	UNDFND	UNDFD	13	1.1
6.70	22	23.52	0.96	4.10	0.93	silty clay to clay	UNDFND	UNDFD	15	1.3
7.00	23	17.22	0.73	4.21	0.95	clay	UNDFND	UNDFD	16	.9
7.35	24	16.79	0.64	3.80	0.98	silty clay to clay	UNDFND	UNDFD	11	.9
7.65	25	20.07	0.78	3.87	1.02	silty clay to clay	UNDFND	UNDFD	13	1.0
7.95	26	15.75	0.75	4.75	1.04	clay	UNDFND	UNDFD	15	.8
8.25	27	15.73	0.63	4.01	1.07	silty clay to clay	UNDFND	UNDFD	10	.8
8.55	28	17.42	0.73	4.20	1.10	clay	UNDFND	UNDFD	17	.9
8.85	29	18.87	0.69	3.64	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	20.65	0.60	2.90	1.16	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
9.45	31	18.37	0.47	2.53	1.19	clayey silt to silty clay	UNDFND	UNDFD	9	.9
9.75	32	20.55	0.64	3.12	1.21	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
10.05	33	18.80	0.77	4.11	1.24	silty clay to clay	UNDFND	UNDFD	12	.9
10.35	34	22.22	0.82	3.68	1.27	silty clay to clay	UNDFND	UNDFD	14	1.1
10.65	35	16.93	0.59	3.48	1.30	silty clay to clay	UNDFND	UNDFD	11	.8
10.95	36	22.60	1.03	4.57	1.33	clay	UNDFND	UNDFD	22	1.2
11.25	37	15.95	0.77	4.85	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	22.67	0.58	2.56	1.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.2

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-8

CPT-8

Operator:	J. Oldham	CPT Date:	3/28/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.80	0.31	2.59	1.41	silty clay to clay	UNDFND	UNDFD	8	.5
12.15	40	11.35	0.40	3.56	1.44	silty clay to clay	UNDFND	UNDFD	7	.5
12.45	41	12.85	0.44	3.44	1.47	silty clay to clay	UNDFND	UNDFD	8	.6
12.80	42	13.29	0.38	2.89	1.50	silty clay to clay	UNDFND	UNDFD	8	.6
13.10	43	19.72	0.57	2.91	1.53	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
13.40	44	19.97	0.62	3.09	1.56	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
13.75	45	18.09	0.49	2.71	1.59	clayey silt to silty clay	UNDFND	UNDFD	9	.9
14.05	46	14.62	0.26	1.80	1.62	clayey silt to silty clay	UNDFND	UNDFD	7	.6
14.35	47	14.47	0.26	1.76	1.65	clayey silt to silty clay	UNDFND	UNDFD	7	.6
14.65	48	14.88	0.44	2.92	1.68	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.95	49	24.72	0.52	2.10	1.70	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
15.25	50	40.57	1.37	3.37	1.73	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
15.55	51	48.25	1.66	3.44	1.76	clayey silt to silty clay	UNDFND	UNDFD	23	2.6

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

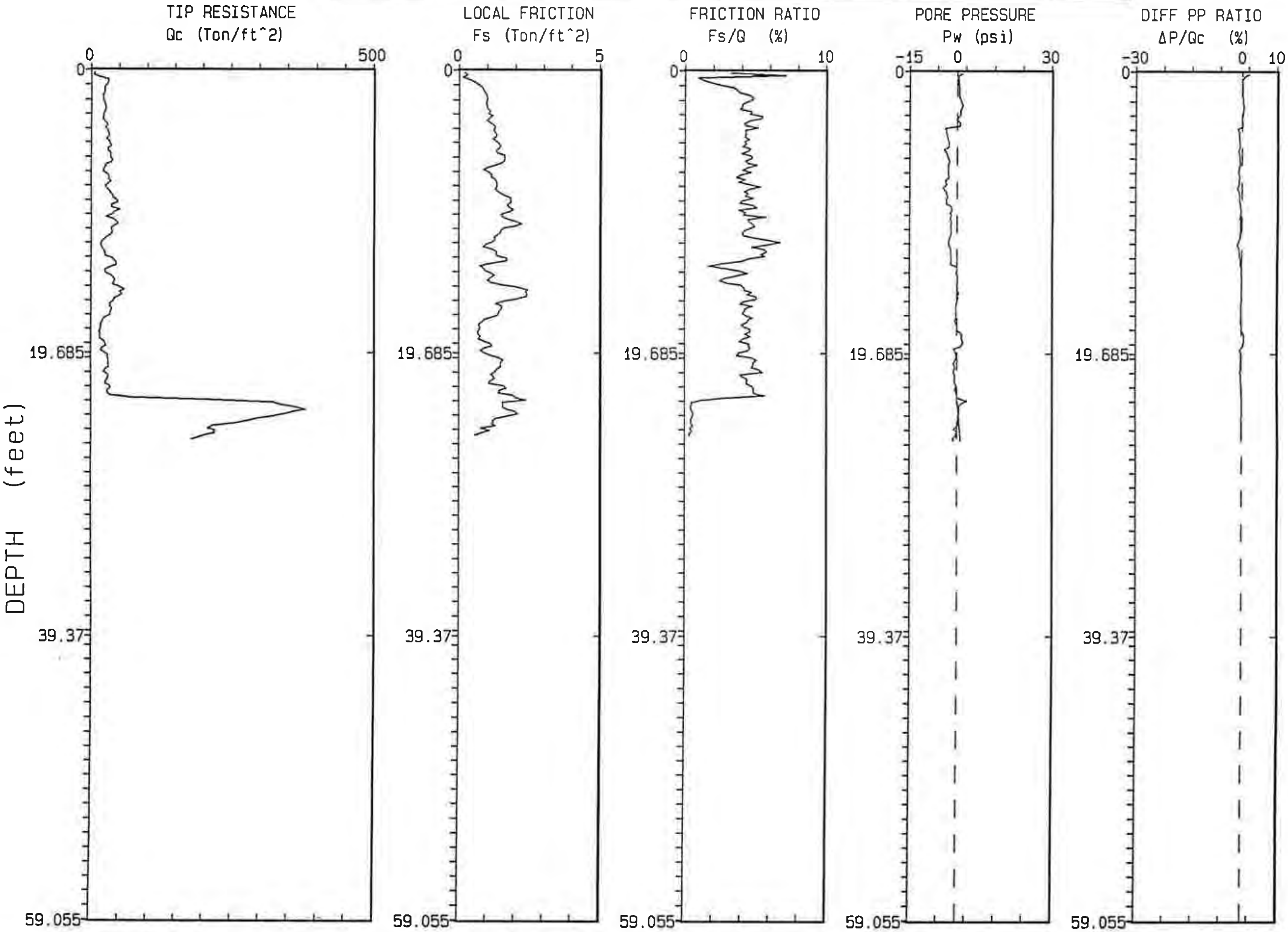
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-8

WOODWARD-CLYDE CONSULTANTS

CPT-9

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 25.75 ft

FIG. A-4-9

WOODWARD-CLYDE CONSULTANTS

CPT-9

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	18.65	0.38	2.01	0.03	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
0.60	2	22.30	0.92	4.12	0.09	silty clay to clay	UNDFND	UNDFD	14	1.3
0.95	3	23.46	1.03	4.40	0.15	clay	UNDFND	UNDFD	22	1.3
1.25	4	25.03	1.15	4.58	0.22	clay	UNDFND	UNDFD	24	1.4
1.55	5	30.45	1.31	4.30	0.28	silty clay to clay	UNDFND	UNDFD	19	1.7
1.85	6	32.97	1.46	4.42	0.33	silty clay to clay	UNDFND	UNDFD	21	1.9
2.15	7	27.73	1.24	4.48	0.39	silty clay to clay	UNDFND	UNDFD	18	1.6
2.45	8	30.00	1.26	4.20	0.45	silty clay to clay	UNDFND	UNDFD	19	1.7
2.75	9	35.77	1.56	4.37	0.51	silty clay to clay	UNDFND	UNDFD	23	2.0
3.05	10	40.87	1.75	4.27	0.57	silty clay to clay	UNDFND	UNDFD	26	2.3
3.35	11	38.52	1.84	4.78	0.63	silty clay to clay	UNDFND	UNDFD	25	2.2
3.65	12	28.40	1.34	4.70	0.69	clay	UNDFND	UNDFD	27	1.6
3.95	13	21.23	1.17	5.51	0.75	clay	UNDFND	UNDFD	20	1.2
4.25	14	36.90	1.19	3.22	0.81	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
4.55	15	36.18	1.19	3.29	0.87	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
4.85	16	50.07	2.28	4.55	0.93	silty clay to clay	UNDFND	UNDFD	32	2.8
5.15	17	34.60	1.46	4.21	0.98	silty clay to clay	UNDFND	UNDFD	22	1.9
5.45	18	21.42	0.93	4.36	1.04	clay	UNDFND	UNDFD	21	1.1
5.75	19	16.98	0.73	4.29	1.10	clay	UNDFND	UNDFD	16	.9
6.05	20	23.70	1.00	4.20	1.16	silty clay to clay	UNDFND	UNDFD	15	1.3
6.40	21	28.67	1.42	4.95	1.23	clay	UNDFND	UNDFD	27	1.6
6.70	22	28.60	1.23	4.29	1.29	silty clay to clay	UNDFND	UNDFD	18	1.6
7.00	23	68.45	1.80	2.62	1.35	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
7.35	24	347.31	1.73	0.50	1.39	gravelly sand to sand	>90	44-46	>50	UNDEFINED
7.65	25	244.85	1.14	0.46	1.42	sand	80-90	42-44	47	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

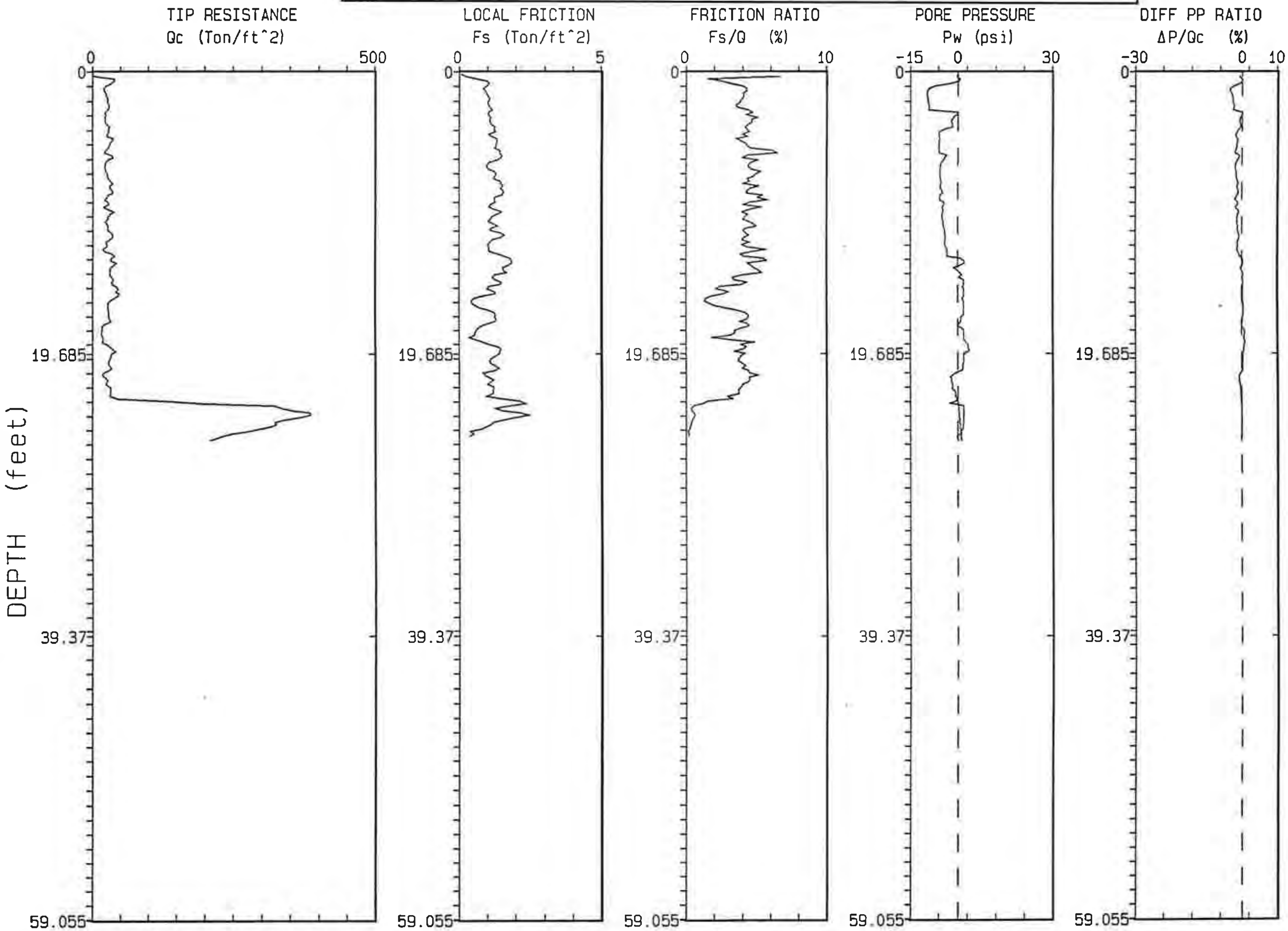
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-9

WOODWARD-CLYDE CONSULTANTS

CPT-9A

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 25.75 ft

FIG. A-4-9A

WOODWARD-CLYDE CONSULTANTS

CPT-9A

Operator:	J. Oldham		CPT Date:	4/3/95
Page:	1/1		Location:	Baldwin
Cone Used:	243		Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	23.00	0.66	2.86	0.03	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
0.60	2	23.98	0.98	4.07	0.09	silty clay to clay	UNDFND	UNDFD	15	1.4
0.95	3	25.73	1.07	4.16	0.15	silty clay to clay	UNDFND	UNDFD	16	1.5
1.25	4	26.52	1.18	4.46	0.22	silty clay to clay	UNDFND	UNDFD	17	1.5
1.55	5	30.80	1.24	4.03	0.28	silty clay to clay	UNDFND	UNDFD	20	1.7
1.85	6	28.43	1.40	4.94	0.33	clay	UNDFND	UNDFD	27	1.6
2.15	7	23.23	1.10	4.73	0.39	clay	UNDFND	UNDFD	22	1.3
2.45	8	30.72	1.40	4.54	0.45	silty clay to clay	UNDFND	UNDFD	20	1.7
2.75	9	28.98	1.40	4.81	0.51	clay	UNDFND	UNDFD	28	1.6
3.05	10	28.52	1.23	4.33	0.57	silty clay to clay	UNDFND	UNDFD	18	1.6
3.35	11	26.05	1.15	4.41	0.63	silty clay to clay	UNDFND	UNDFD	17	1.4
3.65	12	30.73	1.29	4.21	0.69	silty clay to clay	UNDFND	UNDFD	20	1.7
3.95	13	28.87	1.33	4.60	0.75	clay	UNDFND	UNDFD	28	1.6
4.25	14	34.35	1.70	4.96	0.81	clay	UNDFND	UNDFD	33	1.9
4.55	15	36.13	1.27	3.51	0.87	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
4.85	16	41.83	0.89	2.12	0.93	sandy silt to clayey silt	UNDFND	UNDFD	16	2.4
5.15	17	28.28	0.88	3.10	0.98	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
5.45	18	25.02	1.05	4.19	1.04	silty clay to clay	UNDFND	UNDFD	16	1.4
5.75	19	17.28	0.57	3.31	1.10	silty clay to clay	UNDFND	UNDFD	11	.9
6.05	20	34.02	1.34	3.94	1.16	silty clay to clay	UNDFND	UNDFD	22	1.9
6.40	21	28.66	1.16	4.05	1.23	silty clay to clay	UNDFND	UNDFD	18	1.6
6.70	22	24.92	1.08	4.34	1.29	silty clay to clay	UNDFND	UNDFD	16	1.3
7.00	23	51.42	1.36	2.65	1.35	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9
7.35	24	334.57	1.93	0.58	1.39	gravelly sand to sand	>90	44-46	>50	UNDEFINED
7.65	25	312.05	1.01	0.32	1.42	gravelly sand to sand	>90	44-46	50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

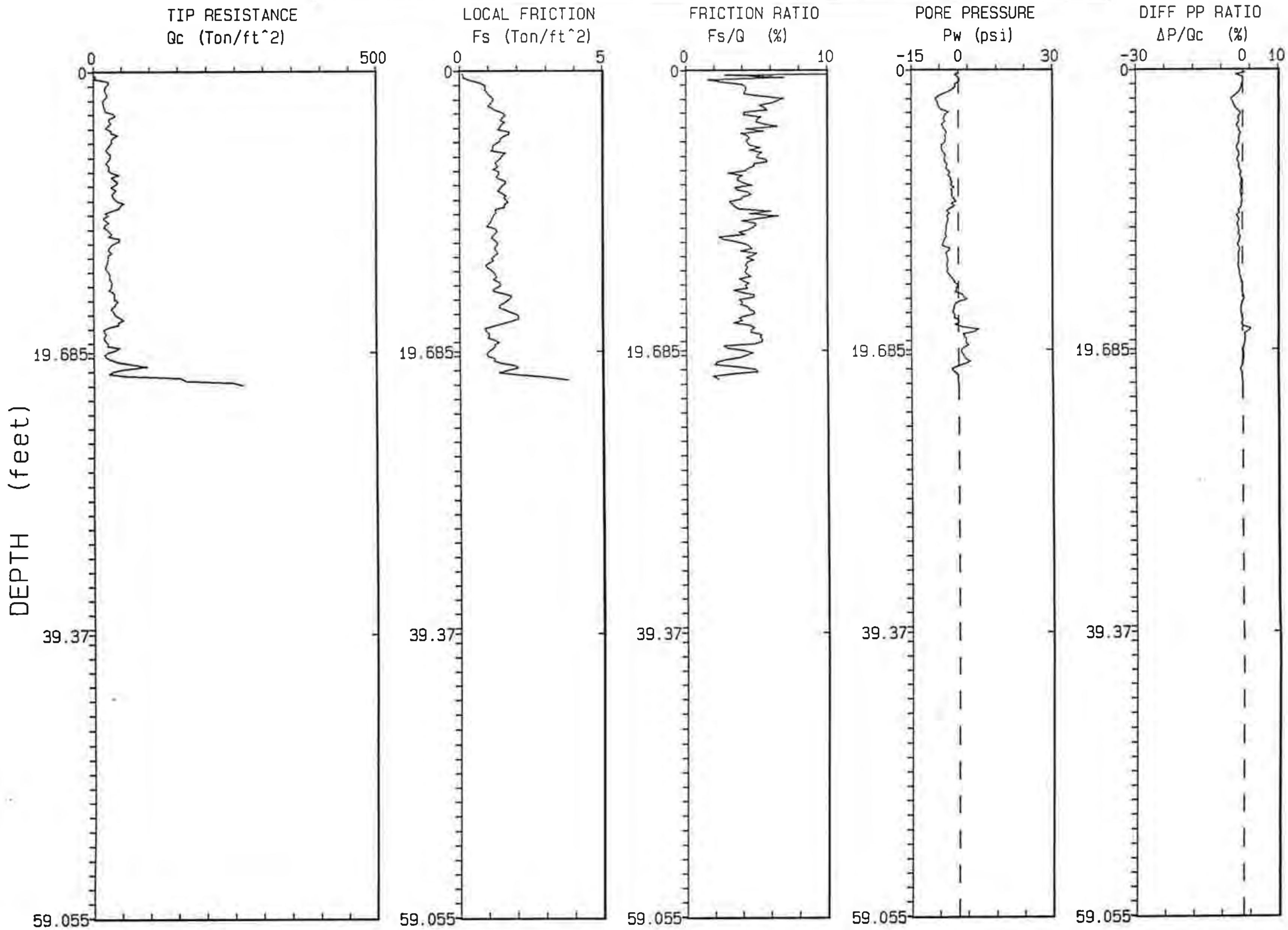
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-9A

WOODWARD-CLYDE CONSULTANTS

CPT-10

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	1/1	Location:	Baldwin
Cone Used:	233	Job Number:	5E08560



Depth Increment : 05 m

Max Depth : 21.98 ft

FIG. A-4-10

WOODWARD-CLYDE CONSULTANTS

CPT-10

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	13.50	0.39	2.88	0.03	silty clay to clay	UNDFND	UNDFD	9	.7
0.60	2	21.12	1.01	4.78	0.09	clay	UNDFND	UNDFD	20	1.2
0.95	3	24.70	1.25	5.08	0.15	clay	UNDFND	UNDFD	24	1.4
1.25	4	27.75	1.45	5.22	0.22	clay	UNDFND	UNDFD	27	1.6
1.55	5	33.93	1.52	4.49	0.28	silty clay to clay	UNDFND	UNDFD	22	1.9
1.85	6	26.55	1.33	5.00	0.33	clay	UNDFND	UNDFD	25	1.5
2.15	7	26.47	1.30	4.91	0.39	clay	UNDFND	UNDFD	25	1.5
2.45	8	38.08	1.46	3.82	0.45	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
2.75	9	37.45	1.51	4.02	0.51	silty clay to clay	UNDFND	UNDFD	24	2.1
3.05	10	37.85	1.43	3.78	0.57	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
3.35	11	21.95	1.09	4.98	0.63	clay	UNDFND	UNDFD	21	1.2
3.65	12	36.65	1.23	3.36	0.69	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
3.95	13	28.22	1.27	4.50	0.75	silty clay to clay	UNDFND	UNDFD	18	1.6
4.25	14	24.05	1.06	4.40	0.81	clay	UNDFND	UNDFD	23	1.3
4.55	15	30.22	1.29	4.27	0.87	silty clay to clay	UNDFND	UNDFD	19	1.7
4.85	16	34.28	1.47	4.29	0.93	silty clay to clay	UNDFND	UNDFD	22	1.9
5.15	17	37.22	1.57	4.22	0.98	silty clay to clay	UNDFND	UNDFD	24	2.1
5.45	18	43.20	1.76	4.08	1.04	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
5.75	19	20.03	1.01	5.03	1.10	clay	UNDFND	UNDFD	19	1.1
6.05	20	29.87	1.15	3.84	1.16	silty clay to clay	UNDFND	UNDFD	19	1.6
6.40	21	49.76	1.49	3.00	1.23	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
6.70	22	151.97	1.68	1.11	1.29	sand to silty sand	70-80	40-42	36	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

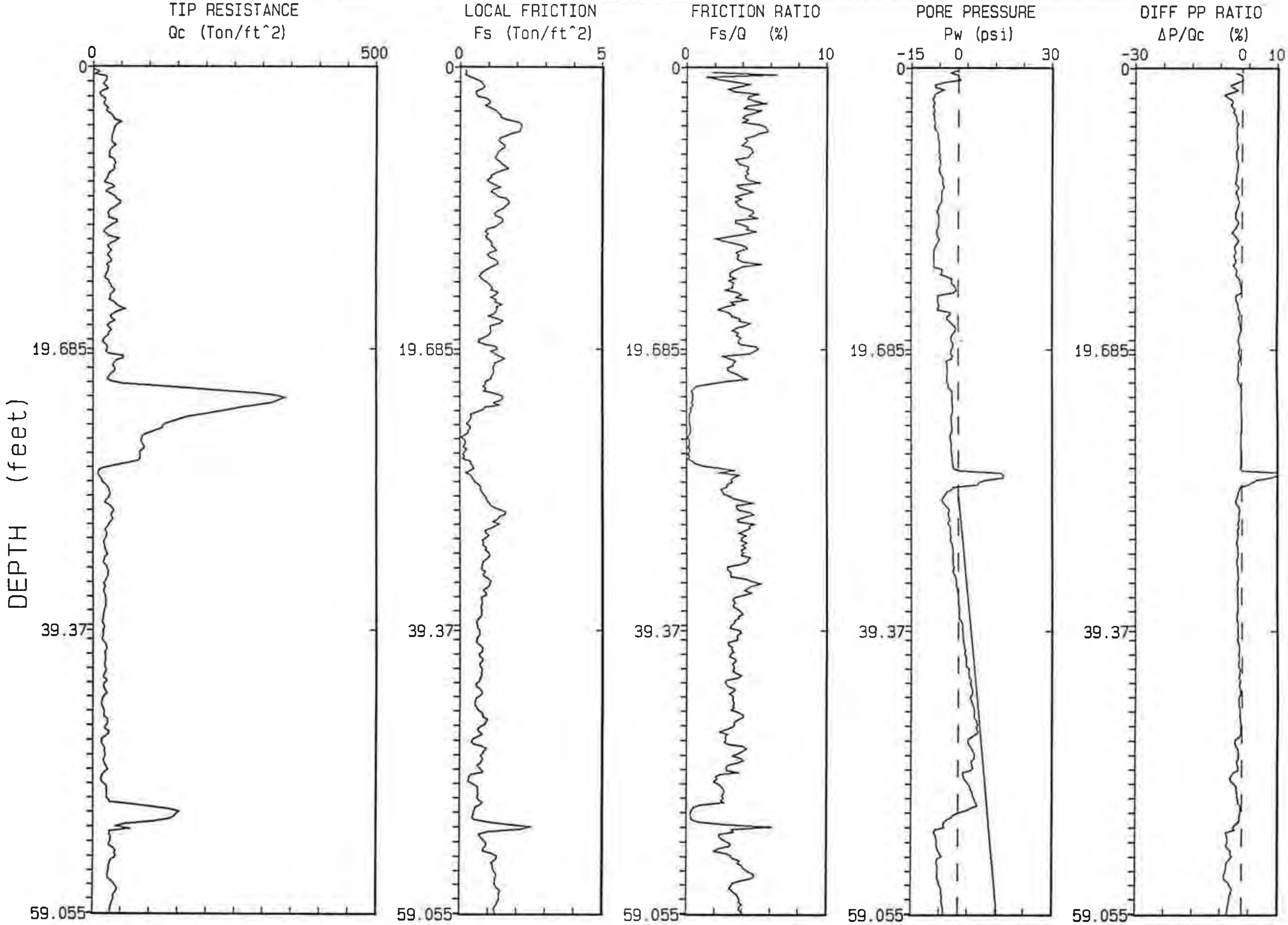
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-10

WOODWARD-CLYDE CONSULTANTS

CPT-11

Operator:	J. Oldham	**CPT Date:**	4/3/95
Page:	1/2	**Location:**	Baldwin
Cone Used:	243	**Job Number:**	5E08560



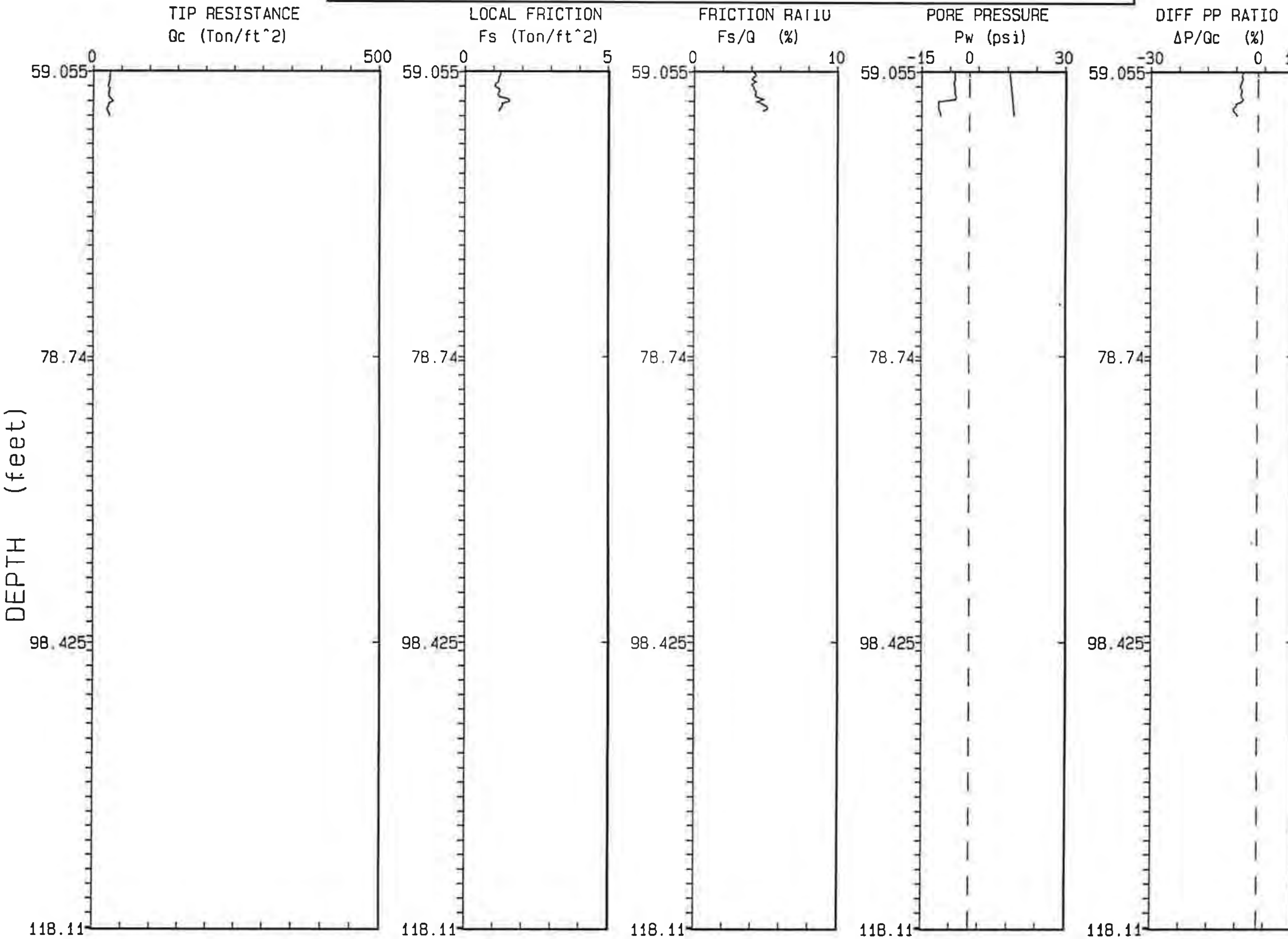
Depth Increment : .05 m
Max Depth : 62.01 ft

FIG. A-4-11

WOODWARD-CLYDE CONSULTANTS

CPT-11

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 62.01 ft

FIG. A-4-11

WOODWARD-CLYDE CONSULTANTS

CPT-11

Operator: J. Oldham		CPT Date:	4/3/95
Page: 1/2		Location:	Baldwin
Cone Used: 243		Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	13.97	0.37	2.63	0.03	clayey silt to silty clay	UNDFND	UNDFD	7	.8
0.60	2	17.87	0.69	3.87	0.09	silty clay to clay	UNDFND	UNDFD	11	1.0
0.95	3	22.44	1.07	4.77	0.15	clay	UNDFND	UNDFD	21	1.3
1.25	4	39.52	1.81	4.57	0.22	silty clay to clay	UNDFND	UNDFD	25	2.3
1.55	5	34.40	1.73	5.03	0.28	clay	UNDFND	UNDFD	33	2.0
1.85	6	32.37	1.43	4.41	0.33	silty clay to clay	UNDFND	UNDFD	21	1.8
2.15	7	35.85	1.44	4.01	0.39	silty clay to clay	UNDFND	UNDFD	23	2.0
2.45	8	25.63	1.14	4.46	0.45	clay	UNDFND	UNDFD	25	1.4
2.75	9	31.70	1.24	3.92	0.51	silty clay to clay	UNDFND	UNDFD	20	1.8
3.05	10	40.28	1.58	3.93	0.57	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
3.35	11	33.30	1.37	4.11	0.63	silty clay to clay	UNDFND	UNDFD	21	1.9
3.65	12	27.72	0.99	3.56	0.69	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
3.95	13	31.67	1.15	3.63	0.75	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
4.25	14	28.82	1.17	4.07	0.81	silty clay to clay	UNDFND	UNDFD	18	1.6
4.55	15	24.85	0.82	3.29	0.87	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
4.85	16	33.87	1.15	3.39	0.93	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
5.15	17	41.03	1.28	3.11	0.98	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
5.45	18	35.78	1.27	3.56	1.04	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
5.75	19	27.72	1.02	3.68	1.10	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
6.05	20	21.93	0.98	4.46	1.16	clay	UNDFND	UNDFD	21	1.2
6.40	21	40.70	1.31	3.22	1.23	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
6.70	22	31.85	1.09	3.43	1.29	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
7.00	23	197.10	1.02	0.52	1.35	sand	80-90	42-44	38	UNDEFINED
7.35	24	285.84	1.11	0.39	1.41	gravelly sand to sand	>90	44-46	46	UNDEFINED
7.65	25	152.78	0.33	0.22	1.48	sand	70-80	40-42	29	UNDEFINED
7.95	26	99.30	0.22	0.22	1.54	sand	60-70	38-40	19	UNDEFINED
8.25	27	86.78	0.16	0.18	1.59	sand	50-60	38-40	17	UNDEFINED
8.55	28	61.58	0.32	0.52	1.65	sand to silty sand	40-50	36-38	15	UNDEFINED
8.85	29	12.35	0.40	3.26	1.71	silty clay to clay	UNDFND	UNDFD	8	.6
9.15	30	27.57	0.76	2.76	1.77	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
9.45	31	28.85	1.10	3.80	1.80	silty clay to clay	UNDFND	UNDFD	18	1.5
9.75	32	32.57	1.40	4.29	1.83	silty clay to clay	UNDFND	UNDFD	21	1.8
10.05	33	23.88	1.00	4.21	1.86	silty clay to clay	UNDFND	UNDFD	15	1.2
10.35	34	21.32	0.87	4.08	1.88	silty clay to clay	UNDFND	UNDFD	14	1.1
10.65	35	22.23	0.88	3.95	1.91	silty clay to clay	UNDFND	UNDFD	14	1.1
10.95	36	25.53	0.89	3.50	1.94	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
11.25	37	20.53	0.93	4.53	1.97	clay	UNDFND	UNDFD	20	1.0
11.55	38	22.20	0.76	3.42	2.00	clayey silt to silty clay	UNDFND	UNDFD	11	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-11

CPT-11

Operator:	J. Oldham	CPT Date:	4/3/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	18.37	0.68	3.71	2.03	silty clay to clay	UNDFND	UNDFD	12	.9
12.15	40	18.60	0.65	3.52	2.05	silty clay to clay	UNDFND	UNDFD	12	.9
12.45	41	21.75	0.70	3.23	2.08	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	22.00	0.73	3.33	2.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
13.10	43	22.02	0.73	3.30	2.14	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
13.40	44	21.58	0.69	3.19	2.17	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
13.75	45	17.74	0.60	3.40	2.20	silty clay to clay	UNDFND	UNDFD	11	.8
14.05	46	23.33	0.85	3.65	2.23	silty clay to clay	UNDFND	UNDFD	15	1.2
14.35	47	22.00	0.60	2.73	2.26	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
14.65	48	20.37	0.77	3.76	2.29	silty clay to clay	UNDFND	UNDFD	13	1.0
14.95	49	22.33	0.74	3.31	2.32	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
15.25	50	17.42	0.44	2.52	2.35	clayey silt to silty clay	UNDFND	UNDFD	8	.8
15.55	51	24.38	0.63	2.60	2.38	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
15.85	52	89.13	0.63	0.70	2.40	sand to silty sand	50-60	36-38	21	UNDEFINED
16.15	53	105.23	1.08	1.03	2.43	sand to silty sand	50-60	36-38	25	UNDEFINED
16.45	54	36.48	1.04	2.86	2.46	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
16.75	55	35.78	0.98	2.74	2.49	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
17.05	56	31.07	1.19	3.83	2.52	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
17.35	57	29.63	1.25	4.21	2.55	silty clay to clay	UNDFND	UNDFD	19	1.5
17.65	58	40.28	1.37	3.39	2.57	clayey silt to silty clay	UNDFND	UNDFD	19	2.1
17.95	59	33.37	1.29	3.85	2.60	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
18.25	60	28.25	1.17	4.16	2.63	silty clay to clay	UNDFND	UNDFD	18	1.4
18.55	61	27.88	1.21	4.35	2.66	silty clay to clay	UNDFND	UNDFD	18	1.4
18.85	62	27.30	1.09	4.00	2.69	silty clay to clay	UNDFND	UNDFD	17	1.3

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

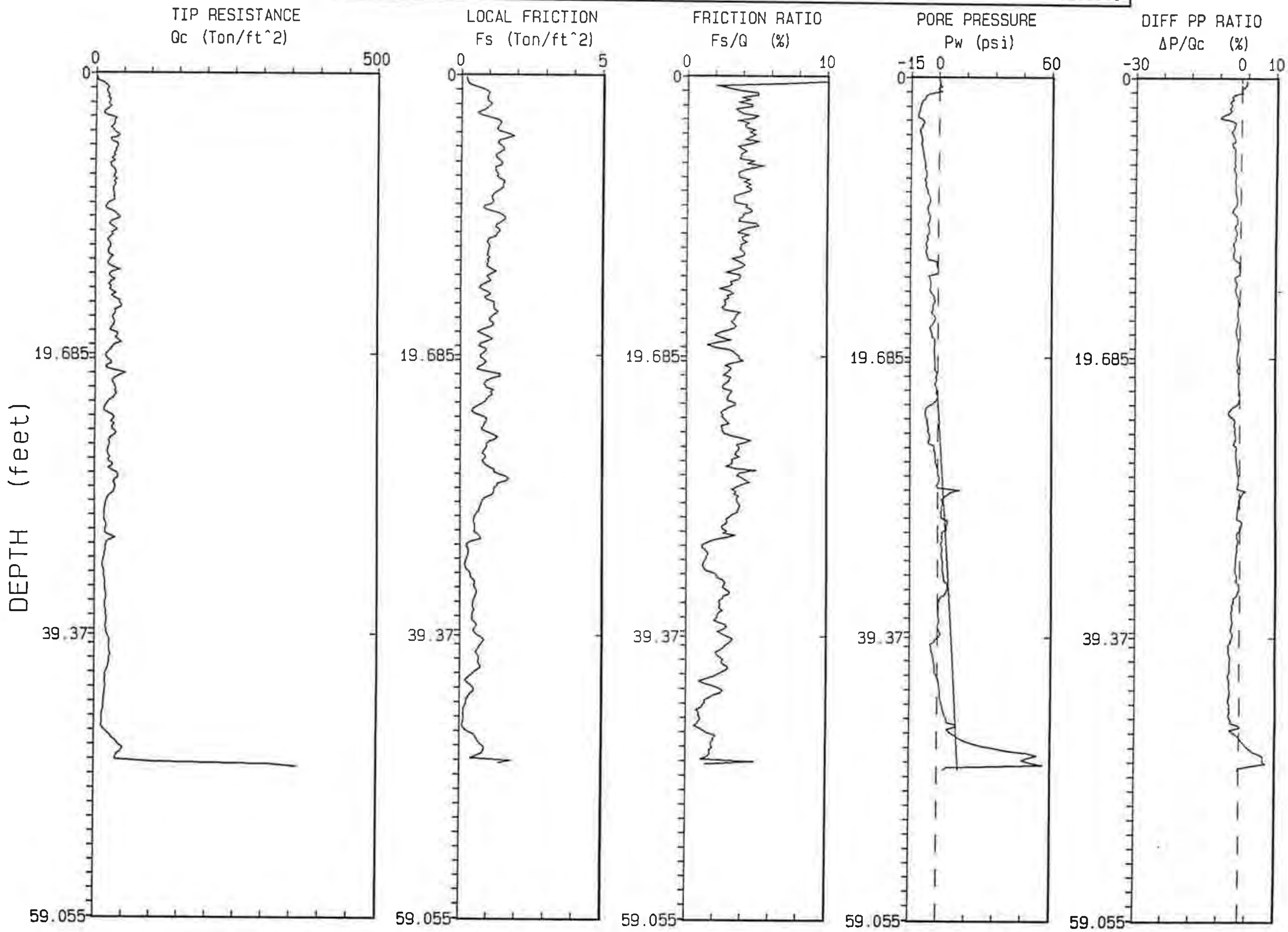
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-11

WOODWARD-CLYDE CONSULTANTS

CPT-12

Operator:	J. Oldham	**CPT Date:**	4/4/95
Page:	1/1	**Location:**	Baldwin
Cone Used:	243	**Job Number:**	5E08560



Depth Increment : .05 m

Max Depth : 48.56 ft

FIG. A-4-12

WOODWARD-CLYDE CONSULTANTS

CPT-12

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	9.97	0.37	3.74	0.03	clay	UNDFND	UNDFD	10	.5
0.60	2	22.08	0.97	4.41	0.09	clay	UNDFND	UNDFD	21	1.2
0.95	3	22.60	0.91	4.05	0.15	silty clay to clay	UNDFND	UNDFD	14	1.3
1.25	4	31.50	1.41	4.49	0.22	silty clay to clay	UNDFND	UNDFD	20	1.8
1.55	5	35.72	1.52	4.26	0.28	silty clay to clay	UNDFND	UNDFD	23	2.0
1.85	6	33.33	1.38	4.13	0.33	silty clay to clay	UNDFND	UNDFD	21	1.9
2.15	7	31.27	1.30	4.15	0.39	silty clay to clay	UNDFND	UNDFD	20	1.8
2.45	8	33.38	1.47	4.40	0.45	silty clay to clay	UNDFND	UNDFD	21	1.9
2.75	9	31.68	1.14	3.61	0.51	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
3.05	10	29.00	1.20	4.13	0.57	silty clay to clay	UNDFND	UNDFD	19	1.6
3.35	11	32.95	1.38	4.18	0.63	silty clay to clay	UNDFND	UNDFD	21	1.9
3.65	12	26.70	1.09	4.08	0.69	silty clay to clay	UNDFND	UNDFD	17	1.5
3.95	13	26.12	0.99	3.78	0.75	silty clay to clay	UNDFND	UNDFD	17	1.4
4.25	14	29.52	1.06	3.59	0.81	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
4.55	15	27.78	0.89	3.21	0.87	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
4.85	16	33.20	0.98	2.96	0.93	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
5.15	17	39.48	1.23	3.12	0.98	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
5.45	18	31.38	1.04	3.33	1.04	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
5.75	19	38.73	0.88	2.27	1.10	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
6.05	20	25.53	0.79	3.11	1.16	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
6.40	21	29.26	0.89	3.05	1.23	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
6.70	22	35.57	1.03	2.89	1.29	sandy silt to clayey silt	UNDFND	UNDFD	14	2.0
7.00	23	33.37	1.04	3.11	1.35	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
7.35	24	22.27	0.63	2.81	1.39	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
7.65	25	31.72	0.86	2.72	1.42	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
7.95	26	29.02	1.12	3.87	1.45	silty clay to clay	UNDFND	UNDFD	19	1.6
8.25	27	24.10	0.85	3.53	1.48	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
8.55	28	30.58	1.11	3.64	1.51	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
8.85	29	37.48	1.49	3.97	1.54	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
9.15	30	27.77	1.00	3.61	1.57	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
9.45	31	18.12	0.65	3.59	1.59	silty clay to clay	UNDFND	UNDFD	12	.9
9.75	32	18.35	0.51	2.78	1.62	clayey silt to silty clay	UNDFND	UNDFD	9	.9
10.05	33	24.47	0.54	2.19	1.65	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
10.35	34	18.45	0.26	1.40	1.68	sandy silt to clayey silt	UNDFND	UNDFD	7	.9
10.65	35	14.93	0.21	1.41	1.71	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
10.95	36	17.88	0.46	2.55	1.74	clayey silt to silty clay	UNDFND	UNDFD	9	.9
11.25	37	19.83	0.55	2.76	1.76	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.55	38	19.40	0.46	2.38	1.79	clayey silt to silty clay	UNDFND	UNDFD	9	1.0

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CPT-12

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	20.43	0.51	2.50	1.82	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
12.15	40	23.32	0.68	2.93	1.85	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
12.45	41	26.52	0.65	2.45	1.88	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
12.80	42	24.27	0.65	2.69	1.91	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
13.10	43	19.22	0.33	1.71	1.94	sandy silt to clayey silt	UNDFND	UNDFD	7	.9
13.40	44	17.70	0.34	1.94	1.97	clayey silt to silty clay	UNDFND	UNDFD	8	.8
13.75	45	14.76	0.15	0.98	2.00	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
14.05	46	14.88	0.16	1.10	2.03	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
14.35	47	34.83	0.67	1.93	2.06	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
14.65	48	43.08	0.90	2.08	2.09	sandy silt to clayey silt	UNDFND	UNDFD	17	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

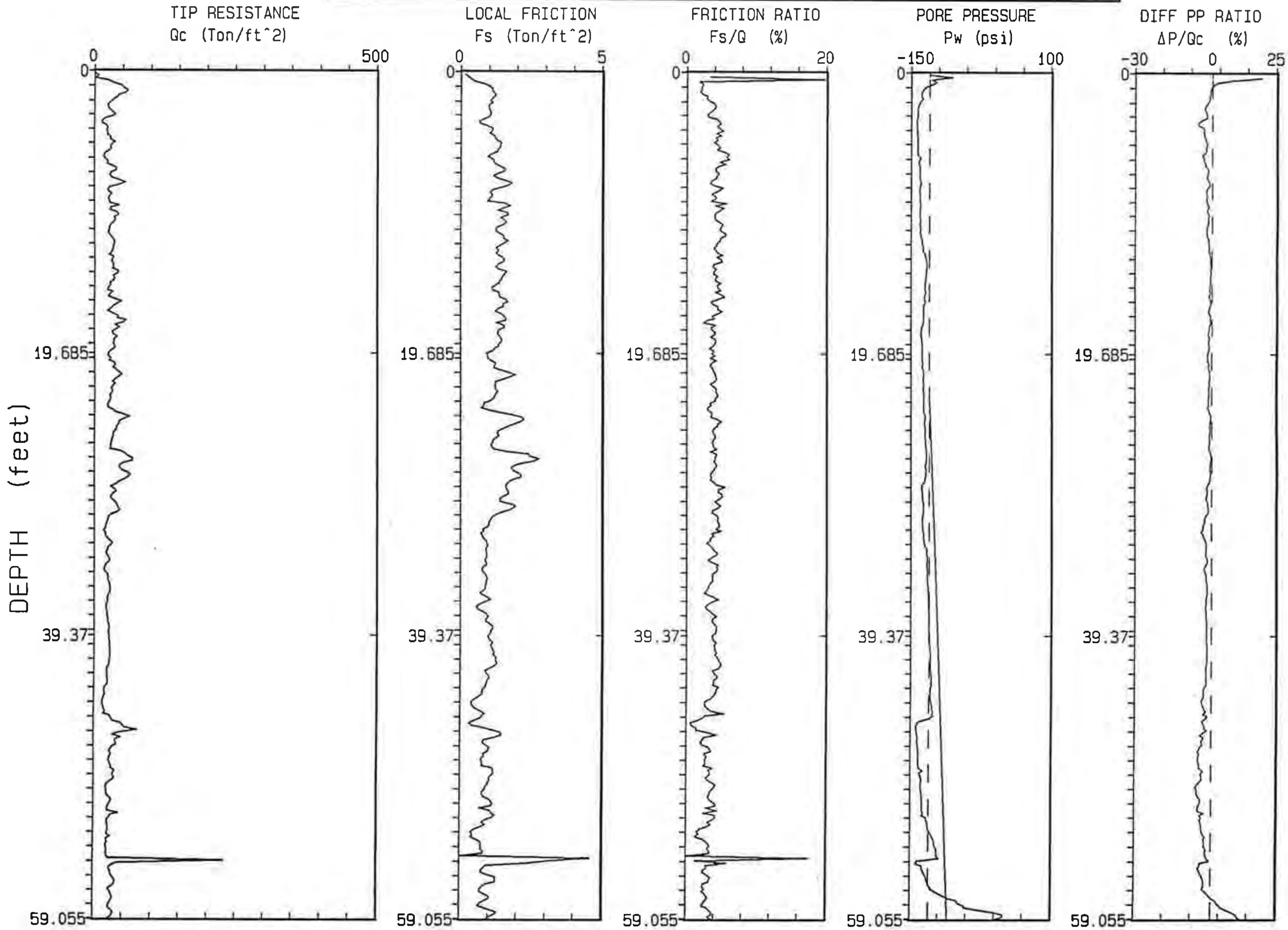
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-12

WOODWARD-CLYDE CONSULTANTS

CPT-13

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



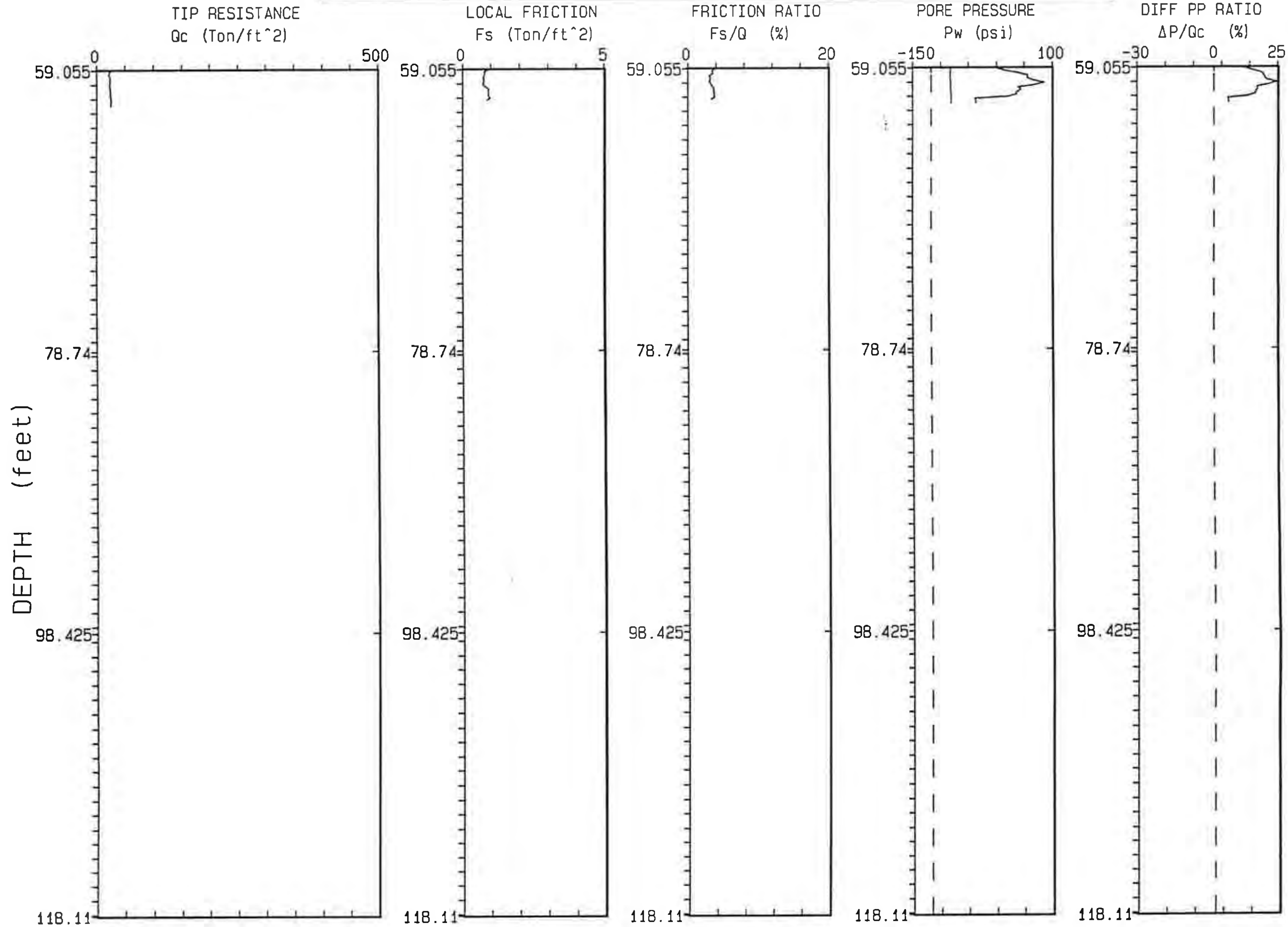
Depth Increment : .05 m   Max Depth : 61.52 ft

FIG. A-4-13

WOODWARD-CLYDE CONSULTANTS

CPT-13

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : 05 m

Max Depth : 61.52 ft

FIG. A-4-13

WOODWARD-CLYDE CONSULTANTS

CPT-13

Operator: J. Oldham		CPT Date:	4/4/95
Page: 1/2		Location:	Baldwin
Cone Used: 243		Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	19.20	0.51	2.63	0.03	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
0.60	2	46.05	1.13	2.46	0.09	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
0.95	3	28.76	1.02	3.55	0.15	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
1.25	4	18.95	0.89	4.71	0.22	clay	UNDFND	UNDFD	18	1.1
1.55	5	28.47	1.24	4.36	0.28	silty clay to clay	UNDFND	UNDFD	18	1.6
1.85	6	22.42	1.19	5.29	0.33	clay	UNDFND	UNDFD	21	1.2
2.15	7	30.02	1.37	4.55	0.39	silty clay to clay	UNDFND	UNDFD	19	1.7
2.45	8	37.40	1.48	3.97	0.45	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
2.75	9	26.12	1.05	4.02	0.51	silty clay to clay	UNDFND	UNDFD	17	1.5
3.05	10	34.80	1.59	4.56	0.57	silty clay to clay	UNDFND	UNDFD	22	2.0
3.35	11	31.25	1.44	4.60	0.63	silty clay to clay	UNDFND	UNDFD	20	1.8
3.65	12	29.72	1.49	5.00	0.69	clay	UNDFND	UNDFD	28	1.7
3.95	13	30.75	1.34	4.36	0.75	silty clay to clay	UNDFND	UNDFD	20	1.7
4.25	14	33.43	1.43	4.27	0.81	silty clay to clay	UNDFND	UNDFD	21	1.9
4.55	15	32.77	1.40	4.27	0.87	silty clay to clay	UNDFND	UNDFD	21	1.8
4.85	16	28.00	1.32	4.72	0.93	clay	UNDFND	UNDFD	27	1.5
5.15	17	34.30	1.44	4.19	0.98	silty clay to clay	UNDFND	UNDFD	22	1.9
5.45	18	44.83	1.51	3.37	1.04	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
5.75	19	35.15	1.38	3.91	1.10	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
6.05	20	30.43	1.14	3.74	1.16	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
6.40	21	33.61	1.24	3.69	1.23	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
6.70	22	37.50	1.49	3.97	1.29	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
7.00	23	28.20	1.19	4.23	1.35	silty clay to clay	UNDFND	UNDFD	18	1.5
7.35	24	36.13	1.23	3.41	1.39	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
7.65	25	41.72	1.80	4.32	1.42	silty clay to clay	UNDFND	UNDFD	27	2.3
7.95	26	31.10	1.21	3.89	1.45	silty clay to clay	UNDFND	UNDFD	20	1.7
8.25	27	47.50	1.91	4.03	1.48	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
8.55	28	52.32	2.06	3.93	1.51	clayey silt to silty clay	UNDFND	UNDFD	25	2.9
8.85	29	47.60	1.83	3.84	1.54	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
9.15	30	33.20	1.55	4.67	1.57	silty clay to clay	UNDFND	UNDFD	21	1.8
9.45	31	38.80	1.64	4.23	1.59	silty clay to clay	UNDFND	UNDFD	25	2.1
9.75	32	21.67	0.98	4.52	1.62	clay	UNDFND	UNDFD	21	1.1
10.05	33	22.73	0.82	3.59	1.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
10.35	34	23.67	0.91	3.86	1.68	silty clay to clay	UNDFND	UNDFD	15	1.2
10.65	35	20.95	0.83	3.97	1.71	silty clay to clay	UNDFND	UNDFD	13	1.1
10.95	36	25.03	0.90	3.58	1.74	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
11.25	37	25.85	0.86	3.31	1.76	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
11.55	38	22.15	0.73	3.31	1.79	clayey silt to silty clay	UNDFND	UNDFD	11	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-13

CPT-13

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.65	1.00	4.07	1.82	silty clay to clay	UNDFND	UNDFD	16	1.3
12.15	40	26.02	1.05	4.02	1.85	silty clay to clay	UNDFND	UNDFD	17	1.3
12.45	41	27.68	1.15	4.15	1.88	silty clay to clay	UNDFND	UNDFD	18	1.4
12.80	42	24.70	1.11	4.50	1.91	clay	UNDFND	UNDFD	24	1.3
13.10	43	22.42	0.93	4.16	1.94	silty clay to clay	UNDFND	UNDFD	14	1.1
13.40	44	16.93	0.64	3.79	1.97	silty clay to clay	UNDFND	UNDFD	11	.8
13.75	45	20.26	0.63	3.12	2.00	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
14.05	46	51.07	0.75	1.48	2.03	silty sand to sandy silt	<40	32-34	16	UNDEFINED
14.35	47	37.92	1.03	2.72	2.06	sandy silt to clayey silt	UNDFND	UNDFD	15	2.0
14.65	48	28.20	0.85	3.00	2.09	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
14.95	49	32.20	1.02	3.17	2.11	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
15.25	50	27.53	0.96	3.48	2.14	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
15.55	51	26.58	0.94	3.52	2.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
15.85	52	29.10	1.05	3.62	2.20	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
16.15	53	24.73	0.70	2.82	2.23	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
16.45	54	24.55	0.60	2.46	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
16.75	55	58.37	1.70	2.91	2.28	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
17.05	56	32.35	1.11	3.42	2.31	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
17.35	57	34.47	1.03	2.98	2.34	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
17.65	58	31.53	0.87	2.76	2.37	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
17.95	59	30.88	1.02	3.30	2.40	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
18.25	60	23.25	0.78	3.35	2.43	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
18.55	61	23.98	0.86	3.59	2.45	clayey silt to silty clay	UNDFND	UNDFD	11	1.1

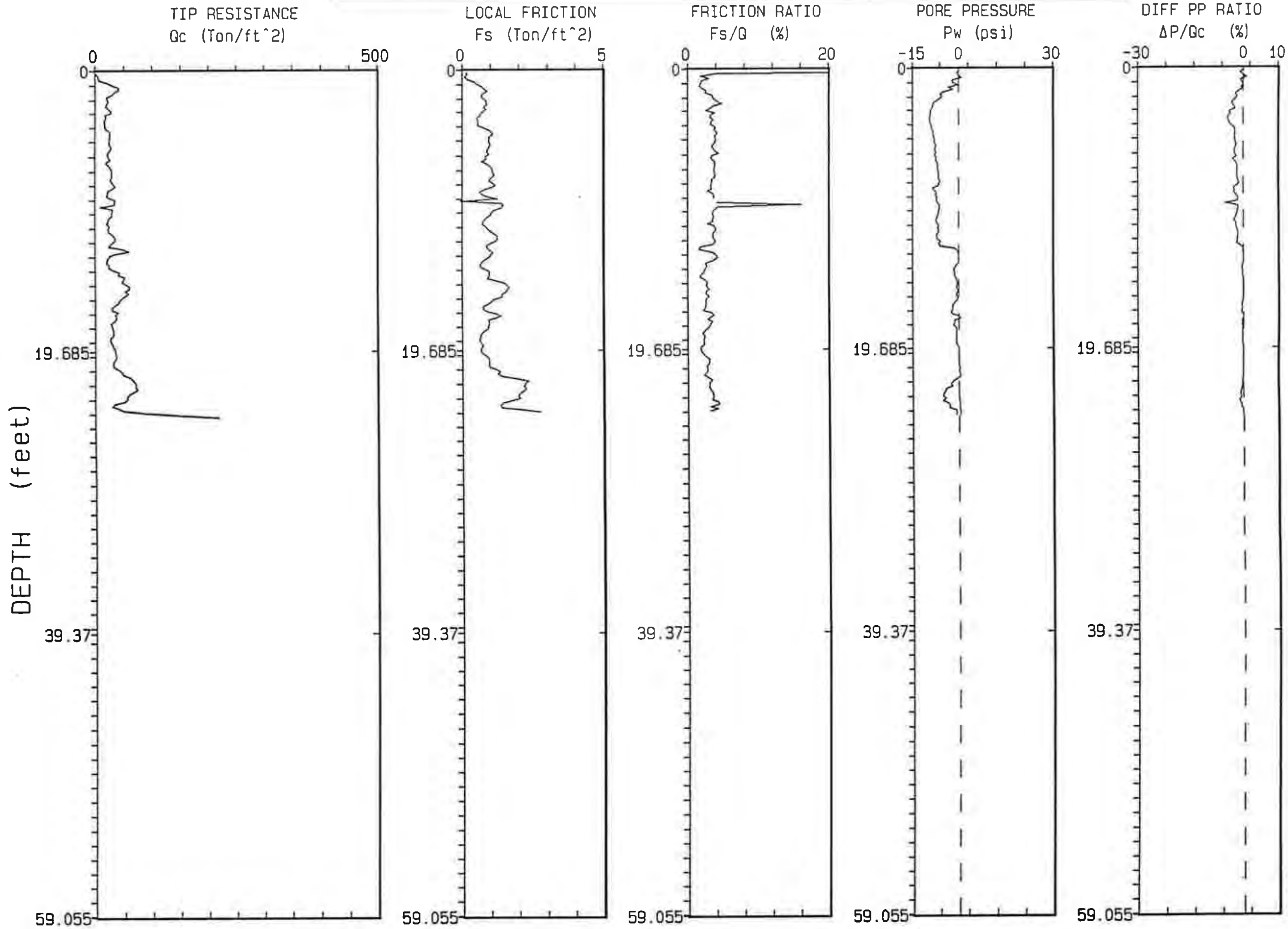
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

WOODWARD-CLYDE CONSULTANTS

CPT-14

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 24.28 ft

FIG. A-4-14

WOODWARD-CLYDE CONSULTANTS

CPT-14

Operator:	J. Oldham	CPT Date:	4/4/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	11.07	0.26	2.37	0.03	clayey silt to silty clay	UNDFND	UNDFD	5	.6
0.60	2	30.45	0.75	2.46	0.09	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
0.95	3	21.80	0.79	3.64	0.15	silty clay to clay	UNDFND	UNDFD	14	1.2
1.25	4	17.18	0.59	3.43	0.22	silty clay to clay	UNDFND	UNDFD	11	.9
1.55	5	24.95	0.98	3.94	0.28	silty clay to clay	UNDFND	UNDFD	16	1.4
1.85	6	24.40	0.91	3.71	0.33	silty clay to clay	UNDFND	UNDFD	16	1.4
2.15	7	24.85	0.92	3.70	0.39	silty clay to clay	UNDFND	UNDFD	16	1.4
2.45	8	29.87	1.07	3.59	0.45	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
2.75	9	25.37	0.87	3.41	0.51	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
3.05	10	27.53	1.05	3.81	0.57	silty clay to clay	UNDFND	UNDFD	18	1.5
3.35	11	23.58	0.82	3.47	0.63	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
3.65	12	29.80	1.11	3.74	0.69	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
3.95	13	36.43	0.97	2.67	0.75	sandy silt to clayey silt	UNDFND	UNDFD	14	2.0
4.25	14	23.93	0.76	3.17	0.81	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
4.55	15	46.78	1.07	2.28	0.87	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
4.85	16	54.43	1.52	2.80	0.93	sandy silt to clayey silt	UNDFND	UNDFD	21	3.1
5.15	17	35.57	0.89	2.51	0.98	sandy silt to clayey silt	UNDFND	UNDFD	14	2.0
5.45	18	32.57	1.10	3.37	1.04	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
5.75	19	29.57	0.75	2.53	1.10	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
6.05	20	32.17	0.69	2.13	1.16	sandy silt to clayey silt	UNDFND	UNDFD	12	1.8
6.40	21	34.87	0.96	2.76	1.23	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
6.70	22	60.37	1.75	2.90	1.29	sandy silt to clayey silt	UNDFND	UNDFD	23	3.4
7.00	23	63.65	2.11	3.31	1.35	sandy silt to clayey silt	UNDFND	UNDFD	24	3.6
7.35	24	62.71	1.53	2.44	1.39	sandy silt to clayey silt	UNDFND	UNDFD	24	3.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

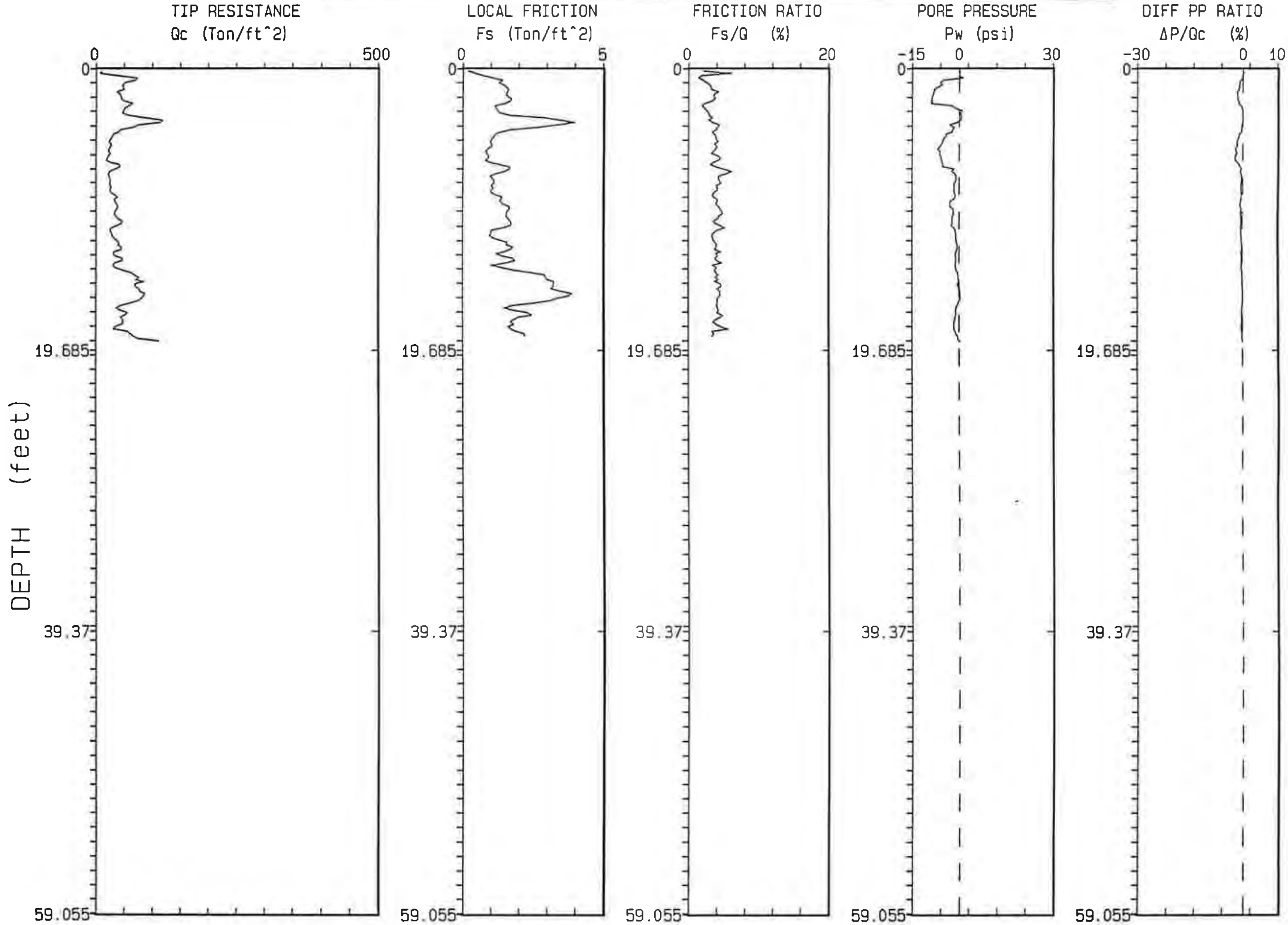
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-14

WOODWARD-CLYDE CONSULTANTS

CPT-15

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m   Max Depth : 19.03 ft

FIG. A-4-15

WOODWARD-CLYDE CONSULTANTS

CPT-15

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	41.22	0.85	2.07	0.03	sandy silt to clayey silt	UNDFND	UNDFD	16	2.4
0.60	2	44.60	1.56	3.50	0.09	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
0.95	3	51.91	1.41	2.71	0.15	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
1.25	4	85.55	3.01	3.52	0.22	sandy silt to clayey silt	UNDFND	UNDFD	33	5.0
1.55	5	31.70	1.21	3.83	0.28	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
1.85	6	24.42	0.92	3.77	0.33	silty clay to clay	UNDFND	UNDFD	16	1.4
2.15	7	30.33	1.22	4.02	0.39	silty clay to clay	UNDFND	UNDFD	19	1.7
2.45	8	23.83	1.16	4.88	0.45	clay	UNDFND	UNDFD	23	1.3
2.75	9	29.25	1.12	3.83	0.51	silty clay to clay	UNDFND	UNDFD	19	1.6
3.05	10	35.07	1.51	4.31	0.57	silty clay to clay	UNDFND	UNDFD	22	2.0
3.35	11	39.23	1.64	4.18	0.63	silty clay to clay	UNDFND	UNDFD	25	2.2
3.65	12	29.32	1.13	3.86	0.69	silty clay to clay	UNDFND	UNDFD	19	1.6
3.95	13	38.77	1.56	4.02	0.75	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
4.25	14	37.22	1.51	4.06	0.81	silty clay to clay	UNDFND	UNDFD	24	2.1
4.55	15	67.98	2.71	3.99	0.87	clayey silt to silty clay	UNDFND	UNDFD	33	3.9
4.85	16	77.35	3.46	4.48	0.93	clayey silt to silty clay	UNDFND	UNDFD	37	4.4
5.15	17	56.75	2.37	4.17	0.98	clayey silt to silty clay	UNDFND	UNDFD	27	3.2
5.45	18	48.88	2.04	4.16	1.04	clayey silt to silty clay	UNDFND	UNDFD	23	2.8
5.75	19	53.88	1.62	3.00	1.10	sandy silt to clayey silt	UNDFND	UNDFD	21	3.1

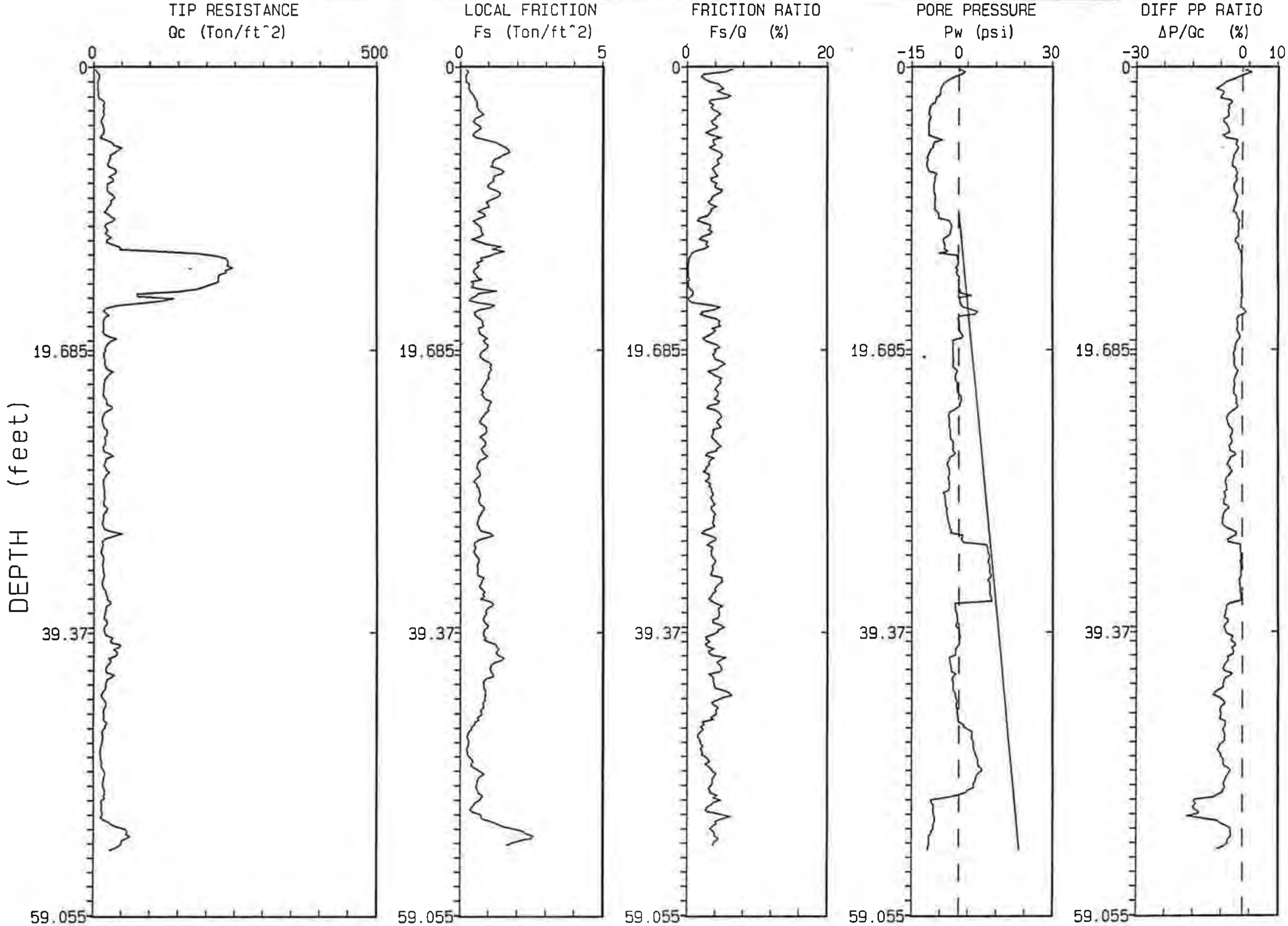
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

WOODWARD-CLYDE CONSULTANTS

CPT-16

Operator: J. Oldham		CPT Date:	3/29/95
Page: 1/1		Location:	Baldwin
Cone Used: 243		Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 54.46 ft

FIG. A-4-16

WOODWARD-CLYDE CONSULTANTS

CPT-16

Operator:	J. Oldham	CPT Date:	3/29/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	6.82	0.21	3.15	0.03	clay	UNDFND	UNDFD	7	.3
0.60	2	7.15	0.36	5.03	0.09	clay	UNDFND	UNDFD	7	.4
0.95	3	16.04	0.60	3.76	0.15	silty clay to clay	UNDFND	UNDFD	10	.9
1.25	4	15.15	0.62	4.08	0.22	clay	UNDFND	UNDFD	15	.8
1.55	5	17.32	0.62	3.60	0.28	silty clay to clay	UNDFND	UNDFD	11	1.0
1.85	6	38.12	1.53	4.02	0.33	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
2.15	7	28.85	1.23	4.26	0.39	silty clay to clay	UNDFND	UNDFD	18	1.6
2.45	8	32.72	1.27	3.88	0.45	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
2.75	9	29.08	1.22	4.21	0.51	silty clay to clay	UNDFND	UNDFD	19	1.6
3.05	10	26.22	0.92	3.50	0.57	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
3.35	11	28.72	0.68	2.38	0.61	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
3.65	12	24.72	0.70	2.81	0.64	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
3.95	13	78.08	1.17	1.50	0.67	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
4.25	14	234.65	0.74	0.32	0.69	sand	>90	46-48	45	UNDEFINED
4.55	15	225.22	0.56	0.25	0.72	gravelly sand to sand	>90	44-46	36	UNDEFINED
4.85	16	148.77	0.68	0.46	0.75	sand	80-90	44-46	28	UNDEFINED
5.15	17	70.82	0.74	1.04	0.78	sand to silty sand	60-70	40-42	17	UNDEFINED
5.45	18	20.58	0.66	3.20	0.81	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
5.75	19	23.00	0.77	3.36	0.84	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
6.05	20	23.38	0.88	3.76	0.86	silty clay to clay	UNDFND	UNDFD	15	1.3
6.40	21	20.79	0.93	4.46	0.89	clay	UNDFND	UNDFD	20	1.1
6.70	22	24.60	0.98	4.00	0.93	silty clay to clay	UNDFND	UNDFD	16	1.3
7.00	23	18.63	0.80	4.29	0.95	clay	UNDFND	UNDFD	18	1.0
7.35	24	26.01	0.99	3.81	0.98	silty clay to clay	UNDFND	UNDFD	17	1.4
7.65	25	17.07	0.79	4.66	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	22.53	0.85	3.77	1.04	silty clay to clay	UNDFND	UNDFD	14	1.2
8.25	27	23.23	0.85	3.64	1.07	silty clay to clay	UNDFND	UNDFD	15	1.2
8.55	28	21.60	0.68	3.15	1.10	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
8.85	29	21.08	0.61	2.89	1.13	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
9.15	30	19.38	0.67	3.46	1.16	silty clay to clay	UNDFND	UNDFD	12	1.0
9.45	31	20.52	0.75	3.66	1.19	silty clay to clay	UNDFND	UNDFD	13	1.0
9.75	32	17.18	0.66	3.82	1.21	silty clay to clay	UNDFND	UNDFD	11	.8
10.05	33	29.28	0.86	2.94	1.24	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
10.35	34	15.23	0.51	3.35	1.27	silty clay to clay	UNDFND	UNDFD	10	.7
10.65	35	16.67	0.63	3.78	1.30	silty clay to clay	UNDFND	UNDFD	11	.8
10.95	36	16.87	0.70	4.15	1.33	clay	UNDFND	UNDFD	16	.8
11.25	37	20.28	0.79	3.88	1.36	silty clay to clay	UNDFND	UNDFD	13	1.0
11.55	38	24.18	0.98	4.06	1.38	silty clay to clay	UNDFND	UNDFD	15	1.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-16

CPT-16

Operator:	J. Oldham	CPT Date:	3/29/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	20.70	0.88	4.23	1.41	silty clay to clay	UNDFND	UNDFD	13	1.0
12.15	40	23.87	0.87	3.63	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
12.45	41	40.33	1.25	3.09	1.47	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
12.80	42	27.51	1.26	4.59	1.50	clay	UNDFND	UNDFD	26	1.4
13.10	43	26.73	1.00	3.73	1.53	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
13.40	44	17.68	0.88	4.96	1.56	clay	UNDFND	UNDFD	17	.8
13.75	45	19.67	0.80	4.06	1.59	silty clay to clay	UNDFND	UNDFD	13	1.0
14.05	46	19.77	0.52	2.65	1.62	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
14.35	47	16.30	0.28	1.74	1.65	clayey silt to silty clay	UNDFND	UNDFD	8	.7
14.65	48	12.60	0.28	2.21	1.68	clayey silt to silty clay	UNDFND	UNDFD	6	.5
14.95	49	15.80	0.51	3.23	1.70	silty clay to clay	UNDFND	UNDFD	10	.7
15.25	50	18.07	0.67	3.72	1.73	silty clay to clay	UNDFND	UNDFD	12	.8
15.55	51	18.33	0.68	3.70	1.76	silty clay to clay	UNDFND	UNDFD	12	.9
15.85	52	14.38	0.49	3.44	1.79	silty clay to clay	UNDFND	UNDFD	9	.6
16.15	53	31.10	1.23	3.96	1.82	silty clay to clay	UNDFND	UNDFD	20	1.6
16.45	54	56.48	2.27	4.02	1.85	clayey silt to silty clay	UNDFND	UNDFD	27	3.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

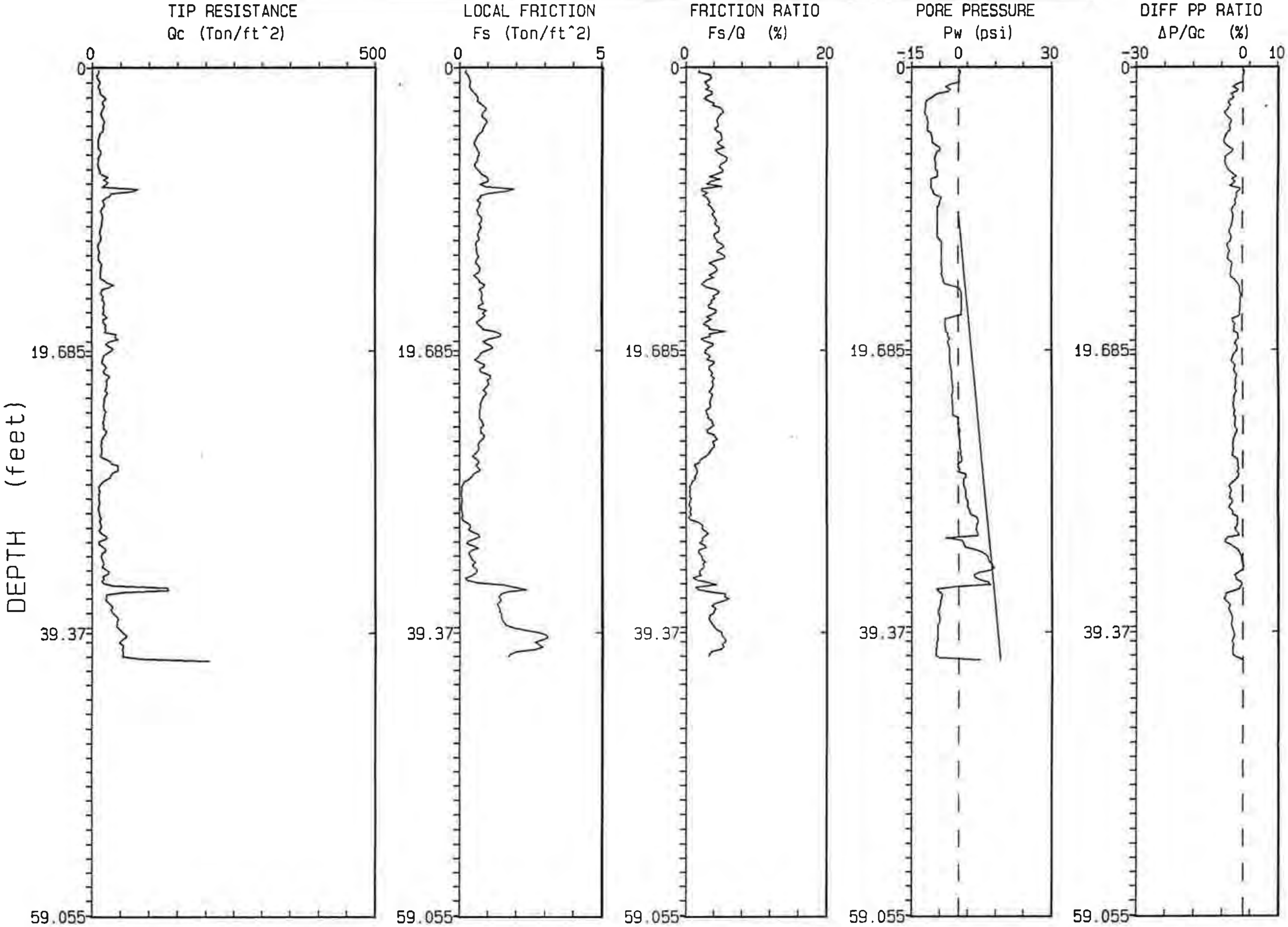
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-16

WOODWARD-CLYDE CONSULTANTS

CPT-17

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 41.34 ft

FIG. A-4-17

WOODWARD-CLYDE CONSULTANTS

CPT-17

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	10.58	0.29	2.75	0.03	silty clay to clay	UNDFND	UNDFD	7	.6
0.60	2	14.35	0.47	3.25	0.09	silty clay to clay	UNDFND	UNDFD	9	.8
0.95	3	19.16	0.78	4.07	0.15	silty clay to clay	UNDFND	UNDFD	12	1.1
1.25	4	18.90	0.87	4.63	0.22	clay	UNDFND	UNDFD	18	1.0
1.55	5	14.60	0.69	4.73	0.28	clay	UNDFND	UNDFD	14	.8
1.85	6	12.67	0.61	4.81	0.33	clay	UNDFND	UNDFD	12	.7
2.15	7	11.10	0.60	5.42	0.39	clay	UNDFND	UNDFD	11	.6
2.45	8	22.05	0.87	3.95	0.45	silty clay to clay	UNDFND	UNDFD	14	1.2
2.75	9	43.12	1.18	2.75	0.51	sandy silt to clayey silt	UNDFND	UNDFD	17	2.5
3.05	10	18.67	0.67	3.60	0.57	silty clay to clay	UNDFND	UNDFD	12	1.0
3.35	11	17.65	0.74	4.19	0.61	clay	UNDFND	UNDFD	17	1.0
3.65	12	15.30	0.69	4.52	0.64	clay	UNDFND	UNDFD	15	.8
3.95	13	12.13	0.60	4.96	0.67	clay	UNDFND	UNDFD	12	.6
4.25	14	14.63	0.65	4.45	0.69	clay	UNDFND	UNDFD	14	.8
4.55	15	18.45	0.65	3.54	0.72	silty clay to clay	UNDFND	UNDFD	12	1.0
4.85	16	22.80	0.81	3.53	0.75	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
5.15	17	20.87	0.79	3.80	0.78	silty clay to clay	UNDFND	UNDFD	13	1.1
5.45	18	22.65	0.76	3.37	0.81	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
5.75	19	33.25	1.15	3.45	0.84	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
6.05	20	30.10	0.98	3.25	0.86	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
6.40	21	20.54	0.72	3.52	0.89	silty clay to clay	UNDFND	UNDFD	13	1.1
6.70	22	25.35	0.97	3.83	0.93	silty clay to clay	UNDFND	UNDFD	16	1.4
7.00	23	24.70	0.92	3.73	0.95	silty clay to clay	UNDFND	UNDFD	16	1.3
7.35	24	22.19	0.74	3.33	0.98	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
7.65	25	21.37	0.77	3.60	1.02	silty clay to clay	UNDFND	UNDFD	14	1.1
7.95	26	21.05	0.79	3.74	1.04	silty clay to clay	UNDFND	UNDFD	13	1.1
8.25	27	16.78	0.60	3.60	1.07	silty clay to clay	UNDFND	UNDFD	11	.8
8.55	28	38.02	0.65	1.71	1.10	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1
8.85	29	26.70	0.35	1.31	1.13	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
9.15	30	12.62	0.07	0.59	1.16	sandy silt to clayey silt	UNDFND	UNDFD	5	.6
9.45	31	12.80	0.07	0.57	1.19	sandy silt to clayey silt	UNDFND	UNDFD	5	.6
9.75	32	15.02	0.21	1.43	1.21	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
10.05	33	18.38	0.49	2.67	1.24	clayey silt to silty clay	UNDFND	UNDFD	9	.9
10.35	34	18.55	0.42	2.24	1.27	clayey silt to silty clay	UNDFND	UNDFD	9	.9
10.65	35	19.83	0.49	2.49	1.30	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
10.95	36	22.60	0.45	2.00	1.33	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
11.25	37	68.15	1.74	2.56	1.36	sandy silt to clayey silt	UNDFND	UNDFD	26	3.8
11.55	38	31.18	1.41	4.51	1.38	silty clay to clay	UNDFND	UNDFD	20	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-17

CPT-17

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	42.95	1.54	3.58	1.41	clayey silt to silty clay	UNDFND	UNDFD	21	2.3
12.15	40	53.22	2.67	5.01	1.44	silty clay to clay	UNDFND	UNDFD	34	2.9
12.45	41	52.60	2.47	4.69	1.47	silty clay to clay	UNDFND	UNDFD	34	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

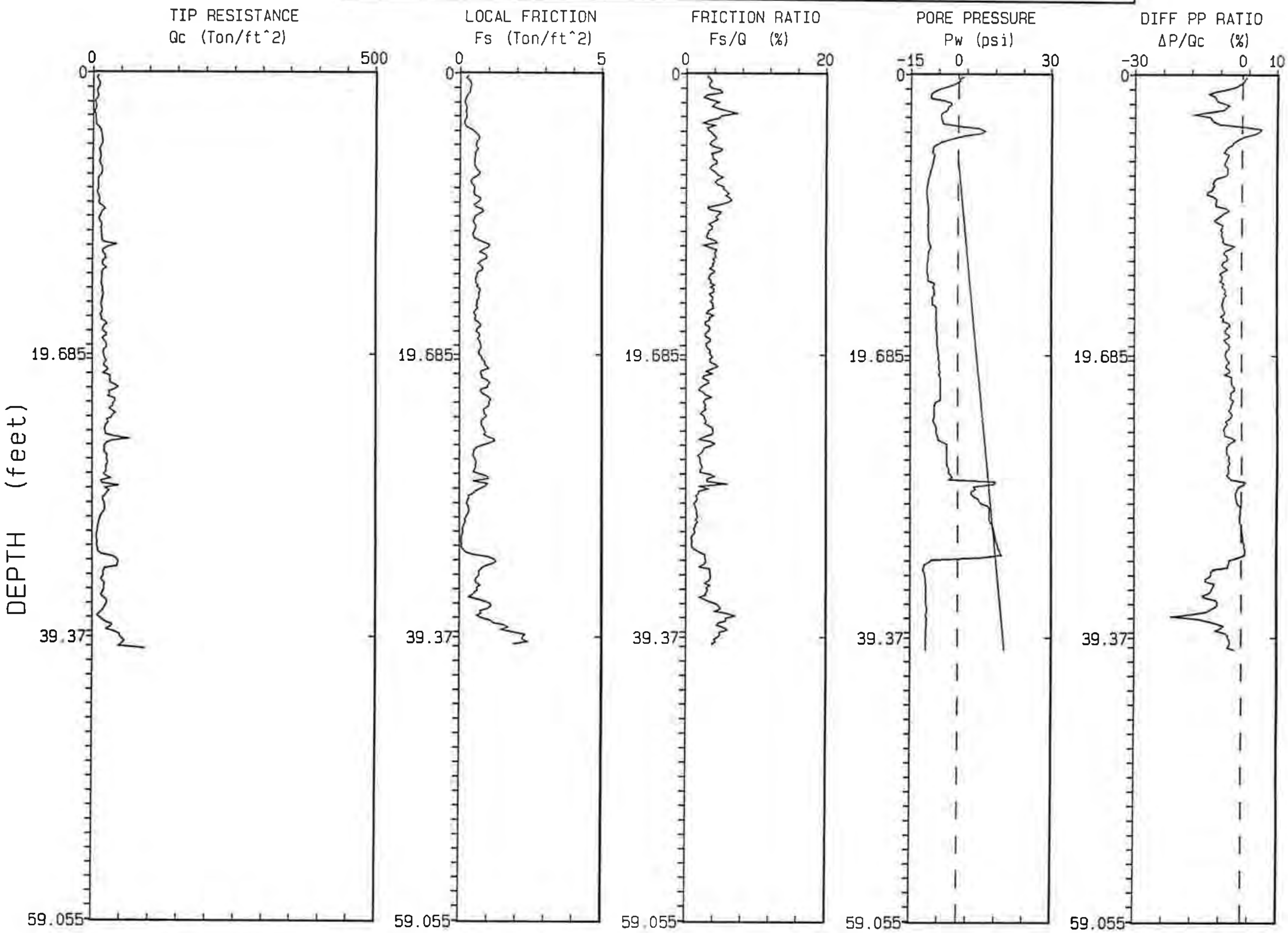
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-17

WOODWARD-CLYDE CONSULTANTS

CPT-18

Operator:	J. Oldham	CPT Date:	3/29/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 40.19 ft

FIG. A-4-18

WOODWARD-CLYDE CONSULTANTS

CPT-18

Operator:	J. Oldham	CPT Date:	3/29/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	9.27	0.31	3.34	0.03	clay	UNDFND	UNDFD	9	.5
0.60	2	6.35	0.24	3.78	0.09	clay	UNDFND	UNDFD	6	.3
0.95	3	4.21	0.20	4.77	0.15	clay	UNDFND	UNDFD	4	.2
1.25	4	8.40	0.27	3.24	0.22	clay	UNDFND	UNDFD	8	.4
1.55	5	15.67	0.60	3.85	0.28	silty clay to clay	UNDFND	UNDFD	10	.9
1.85	6	12.75	0.54	4.23	0.33	clay	UNDFND	UNDFD	12	.7
2.15	7	14.83	0.59	3.96	0.39	silty clay to clay	UNDFND	UNDFD	9	.8
2.45	8	9.47	0.46	4.88	0.42	clay	UNDFND	UNDFD	9	.5
2.75	9	9.73	0.59	6.07	0.45	clay	UNDFND	UNDFD	9	.5
3.05	10	15.53	0.64	4.13	0.48	clay	UNDFND	UNDFD	15	.8
3.35	11	13.72	0.51	3.72	0.51	silty clay to clay	UNDFND	UNDFD	9	.7
3.65	12	20.60	0.66	3.20	0.54	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
3.95	13	21.90	0.88	4.02	0.56	silty clay to clay	UNDFND	UNDFD	14	1.2
4.25	14	18.65	0.71	3.83	0.59	silty clay to clay	UNDFND	UNDFD	12	1.0
4.55	15	16.40	0.58	3.56	0.62	silty clay to clay	UNDFND	UNDFD	10	.9
4.85	16	17.72	0.66	3.74	0.65	silty clay to clay	UNDFND	UNDFD	11	.9
5.15	17	15.78	0.57	3.61	0.68	silty clay to clay	UNDFND	UNDFD	10	.8
5.45	18	19.97	0.63	3.15	0.71	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
5.75	19	21.68	0.67	3.08	0.73	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
6.05	20	21.38	0.72	3.37	0.76	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
6.40	21	22.94	0.85	3.70	0.79	silty clay to clay	UNDFND	UNDFD	15	1.2
6.70	22	34.80	0.92	2.65	0.82	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
7.00	23	34.52	0.91	2.63	0.85	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
7.35	24	35.40	0.92	2.59	0.88	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
7.65	25	24.05	0.81	3.38	0.91	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
7.95	26	34.65	1.01	2.91	0.94	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
8.25	27	23.58	0.51	2.16	0.97	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
8.55	28	24.33	0.57	2.35	1.00	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
8.85	29	26.50	0.85	3.20	1.03	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
9.15	30	22.62	0.37	1.61	1.05	sandy silt to clayey silt	UNDFND	UNDFD	9	1.2
9.45	31	19.10	0.28	1.48	1.08	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
9.75	32	10.60	0.15	1.40	1.11	clayey silt to silty clay	UNDFND	UNDFD	5	.5
10.05	33	8.17	0.08	0.92	1.14	clayey silt to silty clay	UNDFND	UNDFD	4	.3
10.35	34	20.77	0.51	2.47	1.17	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
10.65	35	32.37	0.89	2.76	1.20	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
10.95	36	19.08	0.62	3.24	1.22	clayey silt to silty clay	UNDFND	UNDFD	9	.9
11.25	37	19.92	0.58	2.91	1.25	clayey silt to silty clay	UNDFND	UNDFD	10	1.0
11.55	38	17.67	0.88	4.99	1.28	clay	UNDFND	UNDFD	17	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-18

CPT-18

Operator:	J. Oldham	CPT Date:	3/29/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.92	1.30	5.22	1.31	clay	UNDFND	UNDFD	24	1.3
12.15	40	49.58	2.16	4.35	1.34	silty clay to clay	UNDFND	UNDFD	32	2.7

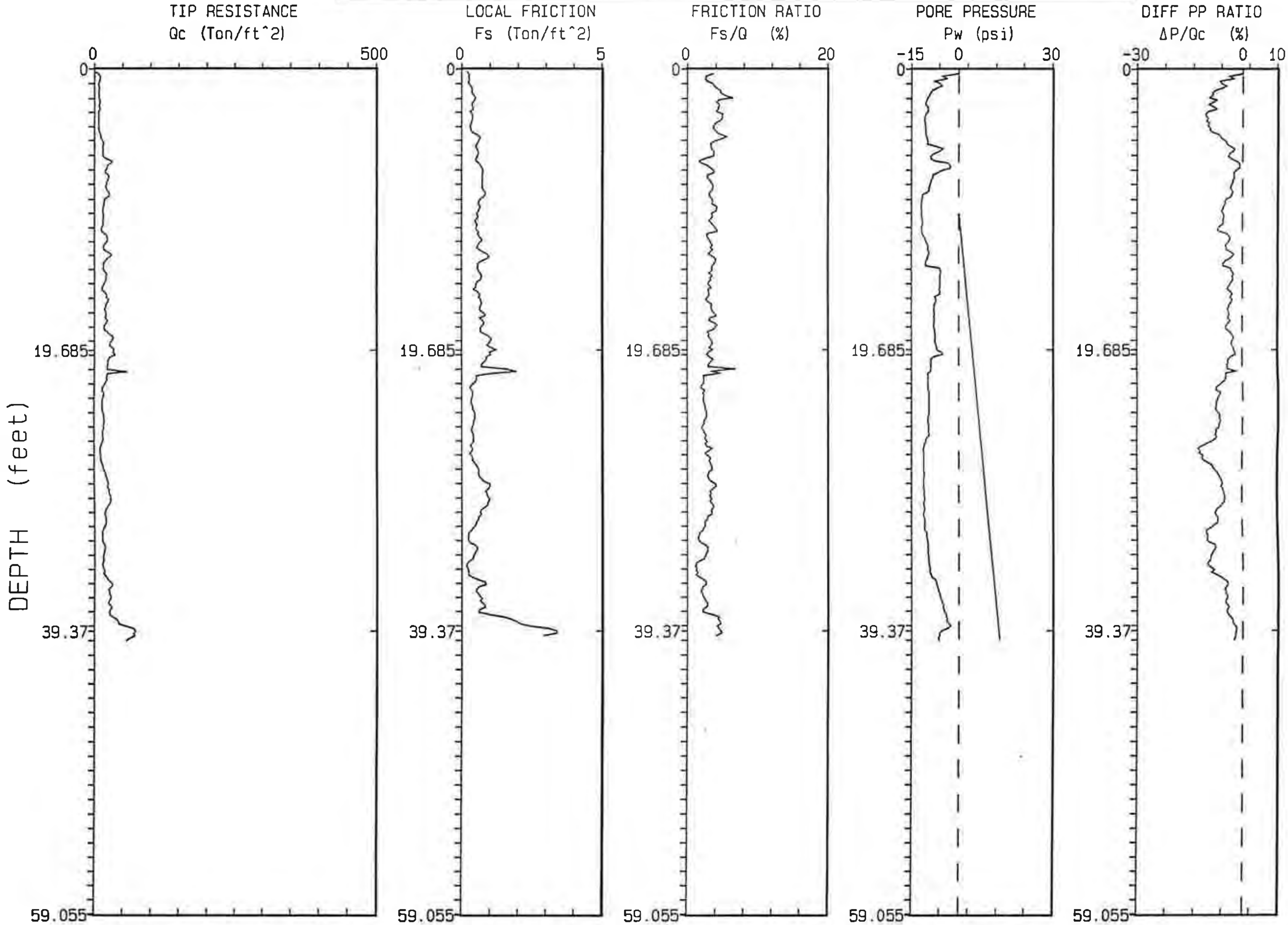
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

WOODWARD-CLYDE CONSULTANTS

CPT-19

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 40.03 ft

FIG. A-4-19

CPT-19

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	6.97	0.24	3.41	0.03	clay	UNDFND	UNDFD	7	.4
0.60	2	7.88	0.38	4.81	0.09	clay	UNDFND	UNDFD	8	.4
0.95	3	8.44	0.37	4.40	0.15	clay	UNDFND	UNDFD	8	.4
1.25	4	7.80	0.33	4.28	0.22	clay	UNDFND	UNDFD	7	.4
1.55	5	11.30	0.51	4.47	0.28	clay	UNDFND	UNDFD	11	.6
1.85	6	15.28	0.54	3.52	0.33	silty clay to clay	UNDFND	UNDFD	10	.8
2.15	7	24.22	0.62	2.57	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
2.45	8	22.50	0.73	3.25	0.45	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
2.75	9	22.72	0.76	3.33	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
3.05	10	15.72	0.59	3.79	0.57	silty clay to clay	UNDFND	UNDFD	10	.8
3.35	11	15.02	0.52	3.47	0.61	silty clay to clay	UNDFND	UNDFD	10	.8
3.65	12	18.67	0.61	3.26	0.64	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
3.95	13	20.52	0.67	3.25	0.67	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
4.25	14	18.97	0.71	3.72	0.69	silty clay to clay	UNDFND	UNDFD	12	1.0
4.55	15	19.37	0.63	3.26	0.72	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
4.85	16	17.38	0.53	3.06	0.75	clayey silt to silty clay	UNDFND	UNDFD	8	.9
5.15	17	20.95	0.67	3.18	0.78	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
5.45	18	20.40	0.75	3.70	0.81	silty clay to clay	UNDFND	UNDFD	13	1.1
5.75	19	25.08	0.81	3.22	0.84	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
6.05	20	30.43	1.01	3.31	0.86	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
6.40	21	25.74	0.93	3.59	0.89	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
6.70	22	27.43	0.83	3.01	0.93	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
7.00	23	15.58	0.34	2.18	0.95	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.35	24	14.99	0.38	2.54	0.98	clayey silt to silty clay	UNDFND	UNDFD	7	.7
7.65	25	17.38	0.41	2.35	1.02	clayey silt to silty clay	UNDFND	UNDFD	8	.9
7.95	26	15.38	0.39	2.53	1.04	clayey silt to silty clay	UNDFND	UNDFD	7	.8
8.25	27	11.37	0.33	2.87	1.07	silty clay to clay	UNDFND	UNDFD	7	.5
8.55	28	14.43	0.48	3.32	1.10	silty clay to clay	UNDFND	UNDFD	9	.7
8.85	29	22.05	0.71	3.24	1.13	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
9.15	30	26.38	0.91	3.47	1.16	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
9.45	31	23.65	0.82	3.45	1.19	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
9.75	32	19.73	0.55	2.79	1.21	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
10.05	33	14.62	0.27	1.85	1.24	clayey silt to silty clay	UNDFND	UNDFD	7	.7
10.35	34	17.18	0.45	2.61	1.27	clayey silt to silty clay	UNDFND	UNDFD	8	.8
10.65	35	15.32	0.26	1.72	1.30	clayey silt to silty clay	UNDFND	UNDFD	7	.7
10.95	36	21.60	0.41	1.92	1.33	sandy silt to clayey silt	UNDFND	UNDFD	8	1.1
11.25	37	27.83	0.61	2.19	1.36	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
11.55	38	27.73	0.72	2.59	1.38	sandy silt to clayey silt	UNDFND	UNDFD	11	1.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-19

CPT-19

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	2/2	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	35.52	1.46	4.10	1.41	silty clay to clay	UNDFND	UNDFD	23	1.9
12.15	40	66.70	2.52	3.78	1.44	clayey silt to silty clay	UNDFND	UNDFD	32	3.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

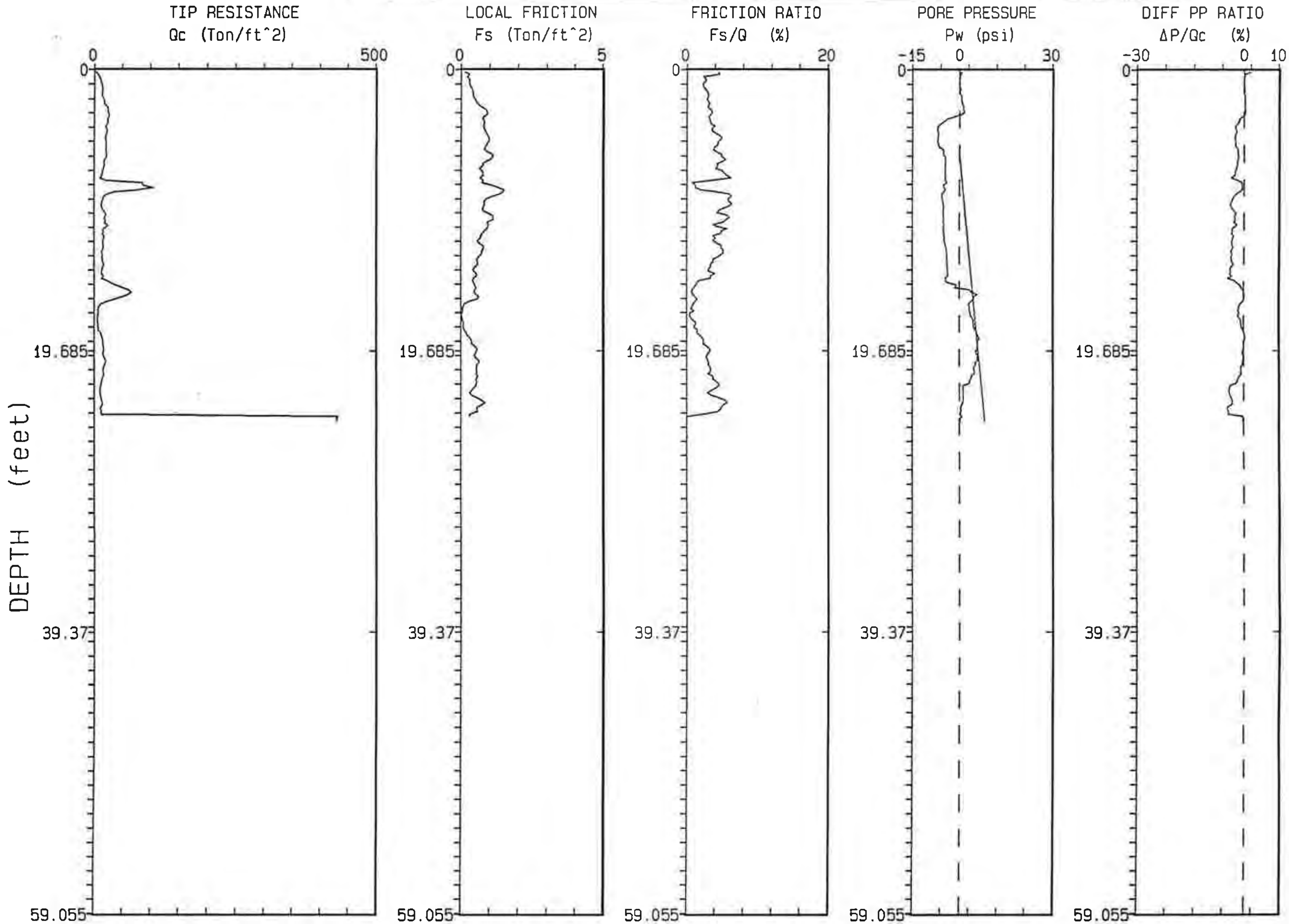
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-19

WOODWARD-CLYDE CONSULTANTS

CPT-20

Operator:	J. Oldham	**CPT Date:**	3/30/95
Page:	1/1	**Location:**	Baldwin
Cone Used:	243	**Job Number:**	5E08560



Depth Increment : 05 m   Max Depth : 24 61 ft

FIG. A-4-20

WOODWARD-CLYDE CONSULTANTS

CPT-20

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	8.68	0.25	2.82	0.03	silty clay to clay	UNDFND	UNDFD	6	.5
0.60	2	14.27	0.40	2.81	0.09	clayey silt to silty clay	UNDFND	UNDFD	7	.8
0.95	3	22.29	0.73	3.28	0.15	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
1.25	4	23.03	0.79	3.44	0.22	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
1.55	5	21.10	0.92	4.38	0.28	clay	UNDFND	UNDFD	20	1.2
1.85	6	21.30	0.94	4.41	0.33	clay	UNDFND	UNDFD	20	1.2
2.15	7	16.73	0.79	4.74	0.39	clay	UNDFND	UNDFD	16	.9
2.45	8	38.47	0.79	2.06	0.42	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
2.75	9	44.78	1.26	2.80	0.45	sandy silt to clayey silt	UNDFND	UNDFD	17	2.6
3.05	10	15.35	0.81	5.26	0.48	clay	UNDFND	UNDFD	15	.8
3.35	11	20.52	1.03	5.00	0.51	clay	UNDFND	UNDFD	20	1.1
3.65	12	16.18	0.72	4.47	0.54	clay	UNDFND	UNDFD	16	.9
3.95	13	14.88	0.72	4.84	0.56	clay	UNDFND	UNDFD	14	.8
4.25	14	14.83	0.54	3.66	0.59	silty clay to clay	UNDFND	UNDFD	9	.8
4.55	15	18.28	0.47	2.55	0.62	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
4.85	16	54.15	0.52	0.96	0.65	silty sand to sandy silt	50-60	40-42	17	UNDEFINED
5.15	17	15.15	0.18	1.20	0.68	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
5.45	18	6.22	0.05	0.79	0.71	sensitive fine grained	UNDFND	UNDFD	3	.3
5.75	19	10.88	0.20	1.80	0.73	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.05	20	16.12	0.47	2.90	0.76	clayey silt to silty clay	UNDFND	UNDFD	8	.8
6.40	21	17.64	0.55	3.09	0.79	clayey silt to silty clay	UNDFND	UNDFD	8	.9
6.70	22	14.45	0.53	3.70	0.82	silty clay to clay	UNDFND	UNDFD	9	.7
7.00	23	10.83	0.43	3.94	0.85	clay	UNDFND	UNDFD	10	.5
7.35	24	12.87	0.61	4.70	0.88	clay	UNDFND	UNDFD	12	.6

Dr - All sands (Jamiolkowski et al. 1985)   PHI - Robertson and Campanella 1983   Su: Nk= 17

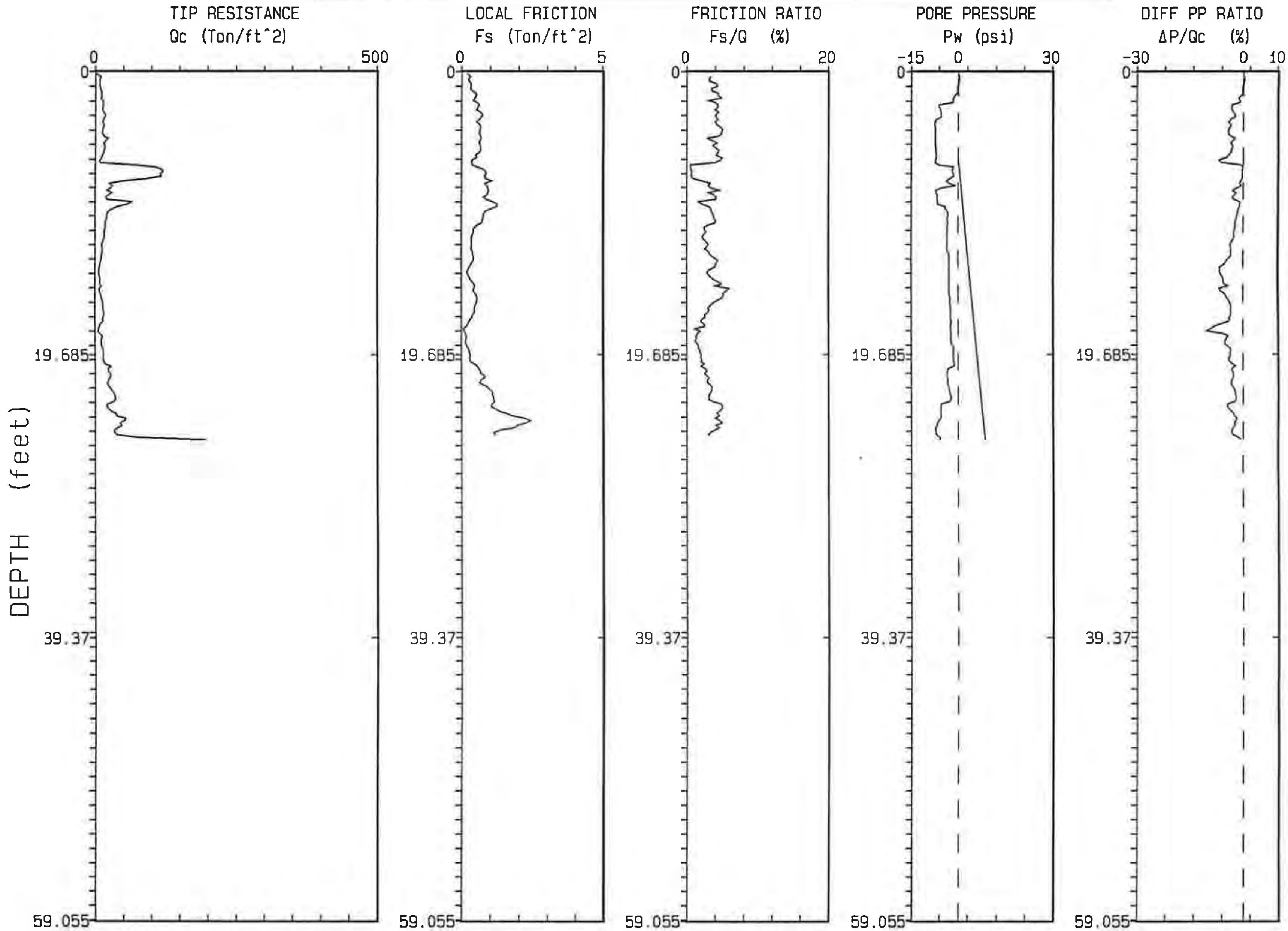
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-20

WOODWARD-CLYDE CONSULTANTS

CPT-21

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m   Max Depth : 25.59 ft

FIG. A-4-21

WOODWARD-CLYDE CONSULTANTS

CPT-21

Operator:	J. Oldham	CPT Date:	3/30/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	6.72	0.28	4.13	0.03	clay	UNDFND	UNDFD	6	.3
0.60	2	10.83	0.43	3.93	0.09	clay	UNDFND	UNDFD	10	.6
0.95	3	14.66	0.61	4.18	0.15	clay	UNDFND	UNDFD	14	.8
1.25	4	13.63	0.62	4.53	0.22	clay	UNDFND	UNDFD	13	.7
1.55	5	16.78	0.65	3.84	0.28	silty clay to clay	UNDFND	UNDFD	11	.9
1.85	6	12.48	0.55	4.41	0.33	clay	UNDFND	UNDFD	12	.7
2.15	7	90.07	0.62	0.69	0.39	sand to silty sand	70-80	44-46	22	UNDEFINED
2.45	8	56.38	0.89	1.57	0.42	silty sand to sandy silt	60-70	42-44	18	UNDEFINED
2.75	9	30.02	0.91	3.04	0.45	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
3.05	10	31.53	0.97	3.07	0.48	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
3.35	11	17.72	0.59	3.30	0.51	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
3.65	12	14.55	0.37	2.56	0.54	clayey silt to silty clay	UNDFND	UNDFD	7	.8
3.95	13	11.88	0.38	3.17	0.56	silty clay to clay	UNDFND	UNDFD	8	.6
4.25	14	7.63	0.29	3.80	0.59	clay	UNDFND	UNDFD	7	.4
4.55	15	8.77	0.35	3.96	0.62	clay	UNDFND	UNDFD	8	.4
4.85	16	9.68	0.49	5.06	0.65	clay	UNDFND	UNDFD	9	.5
5.15	17	14.50	0.45	3.12	0.68	silty clay to clay	UNDFND	UNDFD	9	.7
5.45	18	10.22	0.23	2.20	0.71	clayey silt to silty clay	UNDFND	UNDFD	5	.5
5.75	19	10.07	0.14	1.43	0.73	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.05	20	14.02	0.26	1.83	0.76	clayey silt to silty clay	UNDFND	UNDFD	7	.7
6.40	21	20.79	0.50	2.42	0.79	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
6.70	22	24.25	0.76	3.13	0.82	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
7.00	23	32.77	1.09	3.32	0.85	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
7.35	24	32.07	1.45	4.52	0.88	silty clay to clay	UNDFND	UNDFD	20	1.8
7.65	25	41.78	1.82	4.36	0.91	silty clay to clay	UNDFND	UNDFD	27	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

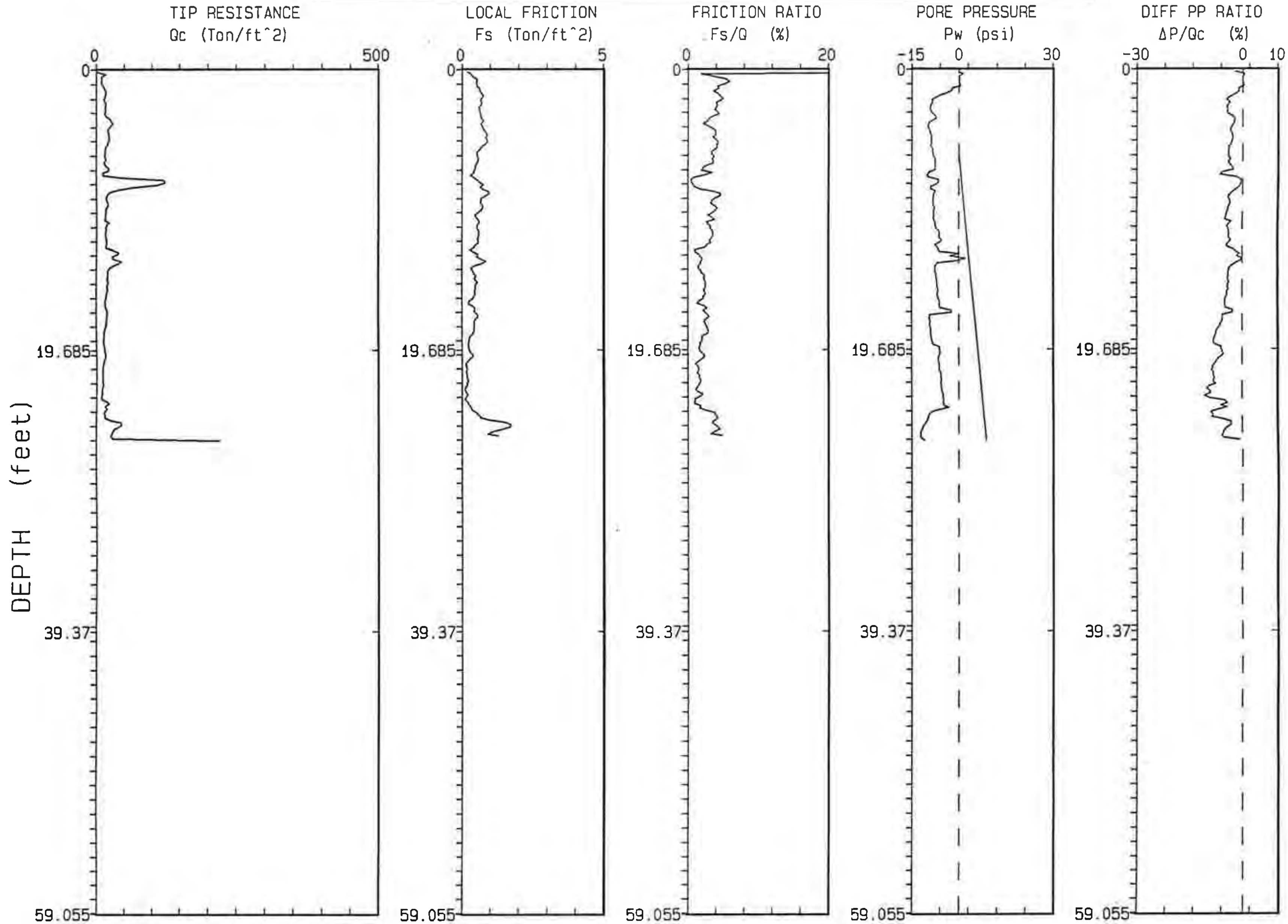
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-21

WOODWARD-CLYDE CONSULTANTS

CPT-22

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m   Max Depth : 26.08 ft

FIG. A-4-22

WOODWARD-CLYDE CONSULTANTS

CPT-22

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	9.10	0.40	4.43	0.03	clay	UNDFND	UNDFD	9	.5
0.60	2	15.17	0.66	4.33	0.09	clay	UNDFND	UNDFD	15	.8
0.95	3	15.43	0.65	4.19	0.15	clay	UNDFND	UNDFD	15	.8
1.25	4	24.57	0.71	2.90	0.22	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
1.55	5	21.73	0.86	3.96	0.28	silty clay to clay	UNDFND	UNDFD	14	1.2
1.85	6	16.27	0.62	3.83	0.33	silty clay to clay	UNDFND	UNDFD	10	.9
2.15	7	17.92	0.50	2.79	0.39	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
2.45	8	71.20	0.51	0.72	0.42	sand to silty sand	60-70	42-44	17	UNDEFINED
2.75	9	31.97	0.80	2.50	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	1.8
3.05	10	18.17	0.66	3.66	0.48	silty clay to clay	UNDFND	UNDFD	12	1.0
3.35	11	17.28	0.54	3.14	0.51	clayey silt to silty clay	UNDFND	UNDFD	8	.9
3.65	12	16.95	0.57	3.37	0.54	silty clay to clay	UNDFND	UNDFD	11	.9
3.95	13	26.43	0.46	1.72	0.56	sandy silt to clayey silt	UNDFND	UNDFD	10	1.5
4.25	14	32.40	0.58	1.79	0.59	sandy silt to clayey silt	UNDFND	UNDFD	12	1.8
4.55	15	20.38	0.46	2.24	0.62	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
4.85	16	18.98	0.46	2.40	0.65	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
5.15	17	16.88	0.35	2.09	0.68	clayey silt to silty clay	UNDFND	UNDFD	8	.9
5.45	18	18.38	0.49	2.66	0.71	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
5.75	19	14.37	0.37	2.55	0.73	clayey silt to silty clay	UNDFND	UNDFD	7	.7
6.05	20	13.97	0.25	1.79	0.76	clayey silt to silty clay	UNDFND	UNDFD	7	.7
6.40	21	13.26	0.24	1.84	0.79	clayey silt to silty clay	UNDFND	UNDFD	6	.7
6.70	22	11.20	0.18	1.60	0.82	clayey silt to silty clay	UNDFND	UNDFD	5	.5
7.00	23	10.03	0.16	1.55	0.85	clayey silt to silty clay	UNDFND	UNDFD	5	.5
7.35	24	16.29	0.29	1.77	0.88	clayey silt to silty clay	UNDFND	UNDFD	8	.8
7.65	25	30.65	1.20	3.91	0.91	silty clay to clay	UNDFND	UNDFD	20	1.7
7.95	26	60.65	0.78	1.29	0.94	silty sand to sandy silt	50-60	38-40	19	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

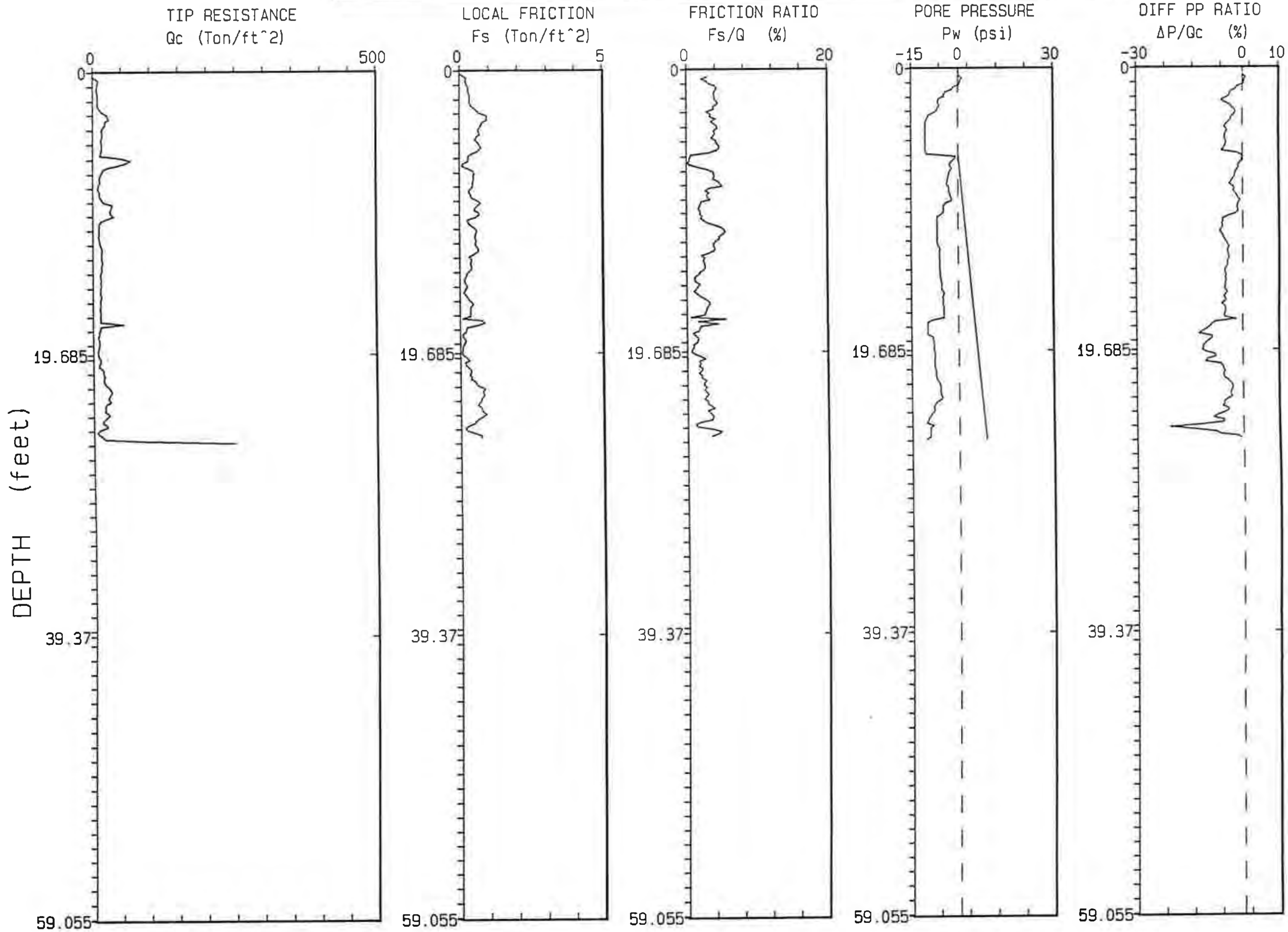
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-22

WOODWARD-CLYDE CONSULTANTS

CPT-23

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560



Depth Increment : .05 m

Max Depth : 25.92 ft

FIG. A-4-23

WOODWARD-CLYDE CONSULTANTS

CPT-23

Operator:	J. Oldham	CPT Date:	3/31/95
Page:	1/1	Location:	Baldwin
Cone Used:	243	Job Number:	5E08560

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	5.55	0.17	3.14	0.03	clay	UNDFND	UNDFD	5	.3
0.60	2	8.07	0.33	4.05	0.09	clay	UNDFND	UNDFD	8	.4
0.95	3	15.29	0.55	3.61	0.15	silty clay to clay	UNDFND	UNDFD	10	.8
1.25	4	20.70	0.79	3.84	0.22	silty clay to clay	UNDFND	UNDFD	13	1.2
1.55	5	16.08	0.64	3.96	0.28	silty clay to clay	UNDFND	UNDFD	10	.9
1.85	6	29.07	0.51	1.76	0.33	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
2.15	7	29.58	0.29	0.97	0.39	silty sand to sandy silt	40-50	38-40	9	UNDEFINED
2.45	8	10.93	0.47	4.25	0.42	clay	UNDFND	UNDFD	10	.6
2.75	9	14.08	0.43	3.06	0.45	silty clay to clay	UNDFND	UNDFD	9	.7
3.05	10	33.20	0.63	1.89	0.48	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
3.35	11	14.17	0.41	2.91	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.7
3.65	12	11.50	0.56	4.84	0.54	clay	UNDFND	UNDFD	11	.6
3.95	13	15.62	0.54	3.45	0.56	silty clay to clay	UNDFND	UNDFD	10	.8
4.25	14	15.63	0.39	2.49	0.59	clayey silt to silty clay	UNDFND	UNDFD	7	.8
4.55	15	13.92	0.21	1.50	0.62	clayey silt to silty clay	UNDFND	UNDFD	7	.7
4.85	16	13.77	0.22	1.61	0.65	clayey silt to silty clay	UNDFND	UNDFD	7	.7
5.15	17	13.55	0.40	2.92	0.68	silty clay to clay	UNDFND	UNDFD	9	.7
5.45	18	20.27	0.49	2.42	0.71	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
5.75	19	10.68	0.16	1.49	0.73	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.05	20	9.33	0.09	0.97	0.76	clayey silt to silty clay	UNDFND	UNDFD	4	.4
6.40	21	14.03	0.28	1.98	0.79	clayey silt to silty clay	UNDFND	UNDFD	7	.7
6.70	22	21.33	0.47	2.20	0.82	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
7.00	23	29.63	0.78	2.64	0.85	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
7.35	24	22.91	0.74	3.21	0.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
7.65	25	16.18	0.38	2.32	0.91	clayey silt to silty clay	UNDFND	UNDFD	8	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 17

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIG. A-4-23

APPENDIX B

LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed to characterize the index and engineering properties of the subsurface soils. Index tests consisted of visual classification, water content, dry unit weight, and liquid and plastic limits. Engineering property tests consisted of a direct shear test, unconfined compression tests, unconsolidated-undrained (UU) triaxial compression tests, and consolidated-undrained (CIU) triaxial compression tests. The direct shear test was extended to determine the residual strength.

Results of the laboratory tests are summarized and given in Tables B-1 through B-3 in this appendix, and appear on the detailed boring logs. Plots of the grain size distributions are shown in Figures B-1 through B-6. Compaction curves are included as Figures B-7 through B-10. Consolidated drained triaxial test results for drained peak strength are given in Figures B-11 through B-14. Direct shear test results are shown in Figures B-15 and B-16.

TABLE B-1
SUMMARY OF LABORATORY TEST DATA
Illinois Power/Baldwin Power Station 5E08560

BORING NO.	DEPTH (ft)	USC Group Symbol	Water Content (%)	Dry Density (pcf)	LL (%)	PL (%)	Unconf. Strength Qu(ksf)	Strn. (%)	(%) pass 200
B-01	5.0	CL	17				7.8	11.7	
B-01	10.0	CH	27		61	21			
B-01	15.0	CL	15				7.2	11.2	
B-01	20.0	CL	19						
B-01	35.0	CL	19						
B-01	40.0	CL	25						
B-01	45.0	CL	23		44	17			
B-01	50.0	CL	14						
B-01	55.0	CL	26						
B-01	60.0	CL	30						
B-01	65.0	CL	25						
B-01	70.0	CL	19						
B-01	75.0	CL	23						
B-02	5.0	CL	20		37	17			
B-02	10.0	CL	21		44	18			
B-02	15.0	CL	22		44	19			
B-02	20.0	CH	26		55	21			
B-02	24.5	SP	28						
B-02	29.5	CL	23						
B-02	34.5	CL	23						
B-02	39.5	CL	32		49	19			
B-02	44.5	CL	18		38	18			
B-02	49.5	CH	23		51	20			
B-02	54.5	CL	21		34	18			
B-02	59.5	CL	18		35	15			
B-02	64.5	CL	25		34	19			
B-02	69.5	CL	22						
B-03	0.0		24						
B-03	2.0		20						
B-03	4.0		18						
B-03	6.0		17						
B-03	8.0	CL	18		43	18			
B-03	10.0		18						
B-03	12.0	CL	18		37	18			
B-03	14.0	CL	20		44	18			
B-03	16.0	CL	17		46	21			
B-03	18.0	CL	23		47	21			
B-03	20.0	SM	18						
B-03	25.0		18						
B-03	30.0	CL	22						

TABLE B-1
SUMMARY OF LABORATORY TEST DATA
Illinois Power/Baldwin Power Station 5E08560

BORING NO.	DEPTH (ft)	USC Group Symbol	Water Content (%)	Dry Density (pcf)	LL (%)	PL (%)	Unconf. Strength Qu(ksf)	Strn. (%)	(%) pass 200
B-03	35.0	CH	25						
B-03	40.0	CL	20		44	18			
B-03	45.0	CH							
B-03	55.0	ML							
B-03	60.0	CH							
B-03	65.0	CH							
B-03	75.0	CH							
B-04	5.0	CL	20						
B-04	10.0	CL	17		43	18			
B-04	25.0	ML	27		50	20			
B-04	30.0	CL	20		42	20			
B-04	35.0	CL	16	111	42	20	2.7	15.0	
B-04	45.0	CL	23						
B-04	55.0	CH	24						
B-04	60.0		19						
B-04	65.0		12						
B-04	70.0	CH	19						
B-04	75.0	CH	27						
B-05	10.0		21						
B-05	20.0		17						
B-05	30.0		22						
B-05	35.0	CH							
B-05	50.0	CH	20						
B-05	60.0	CH							
B-05	65.0	CH							
B-05	70.0	CH	23						
B-05	75.0	CH							
B-06	5.0	CL							
B-06	10.0	CL	17	116			5.8	15.1	
B-06	15.0	CL	18		47	18			
B-06	20.0		17						
B-06	25.0		25						
B-06	30.0	CL							
B-06	35.0	CL	21	109			1.4	15.0	
B-06	40.0	CL	23						
B-06	50.0	CH	20	111			3.6	11.1	
B-06	55.0	CH							
B-06	60.0	CH							
B-06	65.0	CH	22						
B-06	70.0		16						

TABLE B-1
SUMMARY OF LABORATORY TEST DATA
Illinois Power/Baldwin Power Station 5E08560

BORING NO.	DEPTH (ft)	USC Group Symbol	Water Content (%)	Dry Density (pcf)	LL (%)	PL (%)	Unconf. Strength Qu(ksf)	Strn. (%)	(%) pass 200
B-06	75.0	CH							
B-07	5.0	CL							
B-07	10.0		18						
B-07	15.0	CL							
B-07	20.0	CL	21	116			8.1	13.5	
B-07	25.0	CL	15						
B-07	30.0	CL	17	117			7.3	14.9	
B-07	35.0		25						
B-07	40.0	CL	22	108			4.4	3.9	
B-07	45.0	CL							
B-07	50.0	CL	18						
B-07	55.0	CL							
B-07	65.0	CH	22						
B-07	70.0	CL							
B-07	75.0	CH							
B-07	80.0	CH	18						
B-08	5.0	CL	17				6.1	14.9	
B-08	10.0	CL	18				6.1	14.8	
B-08	15.0	CL	16						
B-08	20.0	CL	25		46	22			
B-08	25.0	CL	15						
B-08	30.0		16	111			6.8	11.1	
B-08	35.0	CL	19						
B-08	40.0		20	106			3.2	6.0	
B-08	45.0	SP	31						
B-08	50.0		20						
B-08	55.0	CL	19						
B-08	60.0	CL	23						
B-08	70.0	CL	21						
B-08	75.0		20						
B-08	80.0	CL	21						
B-09	5.0		22	104					
B-09	10.0	CH	22		50	20			
B-09	15.0		18	79					
B-09	25.0	CL	24						
B-09	30.0	CL	20						
B-09	35.0		20	110			3.7	13.8	
B-09	40.0	CL	23		34	18			
B-09	50.0	CL	17						
B-09	55.0	CL	23						

TABLE B-1
SUMMARY OF LABORATORY TEST DATA
Illinois Power/Baldwin Power Station 5E08560

BORING NO.	DEPTH (ft)	USC Group Symbol	Water Content (%)	Dry Density (pcf)	LL (%)	PL (%)	Unconf. Strength Qu(ksf)	Strn. (%)	(%) pass 200
B-09	60.0	CL	14						
B-09	70.0		25						
B-09	75.0	CL	16						
B-09	80.0	CL	11						
B-10	5.0	CL	23						
B-10	10.0	CL	15	114					
B-10	15.0	CL	15		42	18			
B-10	20.0	CL	11						
B-10	25.0	CL	24		43	18			
B-10	30.0	CL	19	107			5.8	11.6	
B-10	35.0	CL	22						
B-10	40.0	ML	26		32	24			
B-10	45.0	CL	24		32	18			
B-10	50.0	CL	25	97	40	18	1.9	11.3	
B-10	55.0	CH	19	107	57	15	6.3	15.5	
B-10	60.0	CL	27						
B-10	65.0	SM	14						
B-10	70.0	CH	24		52	28			
B-11A	4.0	CL	20		39	21			
B-11A	6.0		21						
B-11A	8.0	CL	25		47	21			
B-11A	10.0	CH	23		52	23			
B-11A	12.0		24						
B-11A	14.0		20						
B-11A	16.0		20						
B-11A	18.0	CL	20		45	19			
B-11A	20.0		21		47	18			
B-11A	25.0	CL	20		49	21			
B-11A	30.0	CL	21		29	17			
B-11A	35.0		13						
B-11A	40.0		26						
B-12	4.0		23						
B-12	8.0	CH	31		61	22			
B-12	14.0		18						
B-12	25.0	CL	20		46	23			
B-12	30.0	CL	22		47	24			
B-13	4.0		21						
B-13	6.0		23						
B-14	4.0		27						
B-14	6.0		24						

TABLE B-1
SUMMARY OF LABORATORY TEST DATA
Illinois Power/Baldwin Power Station 5E08560

BORING NO.	DEPTH (ft)	USC Group Symbol	Water Content (%)	Dry Density (pcf)	LL (%)	PL (%)	Unconf. Strength Qu(ksf)	Strn. (%)	(%) pass 200
B-15	5.0	CH	16						
B-15	10.0	CL	17						
B-15	20.0	CL	16	101			0.0	0.0	
B-15	25.0		20						
B-15	30.0		19						
B-15	35.0	CL	24						
B-15	45.0	CL	24						
B-15	50.0		24						
B-15	55.0		22						
B-15	60.0	CH	26						
B-15	65.0	CH	37						
B-15	70.0	CH	23						
B-15	75.0	CH							
B-15	80.0	CH							
P-02A	38.0	CH	28		59	26			
P-04	23.0	CL	16		29	16			
P-04	24.0	CH			73	37			

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TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS								STRENGTH					REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
B-1	S-2	10-12								126.2						
B-1	S-2	11.9	26.6	61	21	40	CH				1.3	3.4				
B-1	S-9	45-47								119.8						
B-1	S-9	46.9	22.6	44	17	27	CL				0.8	0.9				
B-2	S-1	5-7								117.0						
B-2	S-1	6.9	19.6	37	17	20	CL				1.6	2.4				
B-2	S-2	10-12								127.9						
B-2	S-2	11.9	20.6	44	18	26	CL	92.9	34		0.9	1.9				
B-2	S-3	15-17								102.1						
B-2	S-3	16.9	21.7	44	19	25	CL				0.9	2.8				
B-2	S-4	20-22								114.7						
B-2	S-4	20.05	17.9								1.6	>4.5				
B-2	S-4	20.2					CH	95.0	34	128.7						
B-2	S-4	20.65	26.3	55	21	34	CH				0.8	1.5				
B-2	S-4	20.8	17.7													Bot. Ash
B-2	S-4	21.0								117.7						Bot. Ash
B-2	S-8	39.5-41.5								128.0						
B-2	S-8	41.4	32.4	49	19	30	CL				0.8	2.1				
B-2	S-9	44.5-46.5								122.4						
B-2	S-9	46.4	18.0	38	18	20	CL				1.6	2.9				
B-2	S-10	49.5-51.5								126.7						
B-2	S-10	51.4	22.9	51	20	31	CH				1.8	3.1				
B-2	S-11	54.5-56.5								126.3						
B-2	S-11	56.4	21.1	34	18	16	CL				0.7	1.9				
B-2	S-12	59.5-61.5								131.0						
B-2	S-12	61.4	17.9	35	15	20	CL				0.9	2.1				
B-2	S-13	64.5-65.5								122.8						
B-2	S-13	64.4	24.8	34	19	15	CL				0.8	>4.5				

Prepared by: CMT Reviewed by: ȷ7 Date: 6/7/95

TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS								STRENGTH					REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
B-3	S-1	0-2								126.2						
B-3	S-1	1.9	24.0								0.7	2.4				
B-3	S-2	2-4								126.9						
B-3	S-2	3.9	19.8								0.9	3.0				
B-3	S-3	4-6								129.0						
B-3	S-3	5.9	17.9								1.4	3.2				
B-3	S-4	6-8								128.5						
B-3	S-4	7.9	17.4								1.8	4.8				
B-3	S-5	8-10								126.7						
B-3	S-5	8.2	18.1								1.5	2.6				
B-3	S-5	8.55	17.3	44	19	25	CL			123.0			CIU'-C @5psi			
B-3	S-5	8.8	16.4								2.5	4.8				
B-3	S-5	9.0	17.8	41	17	24	CL			131.5			CIU'-C @10psi			
B-3	S-5	9.35	18.4								2.3	4.3				
B-3	S-5	9.9	17.7								1.4	2.8				
B-3	S-6	10-12								127.8						
B-3	S-6	10.2	19.5								2.3	>5				
B-3	S-6	10.75	15.9								2.3	4.8				
B-3	S-6	11.1	18.0							128.1			CIU'-C @15psi			
B-3	S-6	11.35	17.9								2.2	4.8				
B-3	S-7	12-14								124.3						
B-3	S-7	13.9	18.2	37	18	19	CL				1.2	2.9				
B-3	S-8	14-16								122.5						
B-3	S-8	14.2	20.4								0.9	4.2				
B-3	S-8	14.35	19.9	44	18	26	CL	96.9	29	129.1			UU @13psi	44.5	13.4	
B-3	S-8	14.75	16.2								0.9	3.3				
B-3	S-8	15.35	19.0								1.2	3.9				
B-3	S-8	15.95	15.9													
B-3	S-9	16-18								109.3						

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS								STRENGTH					REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
B-3	S-9	16.25	17.3								1.0	3.1				
B-3	S-9	16.5	18.7	46	21	25	CL			124.0			CIU'-C @10psi			
B-3	S-9	16.8	17.1								0.7	2.6				
B-3	S-10	18-20								121.7			CIU'-C @11.5,20psi			
B-3	S-10	18.15	21.6								0.7	1.8				
B-3	S-10	18.8	22.6								1.0	2.1				
B-3	S-10	19.1	23.4	52	22	30	CH			124.2			CIU'-C @15psi			
B-3	S-10	19.4	24.2								0.8	1.8				
B-3	S-10	19.65	21.4	42	19	23	CL	88.6	21	126.1			CIU'-C @20psi			
B-3	S-11	20-22								119.9						
B-3	S-11	21.9	17.5		np		SM				0.3	4.4				
B-3	S-17	50-52														
B-5	S-2	10-12								128.5						
B-5	S-2	11.9	21.1								1.0	2.1				Bot. Ash
B-6	S-4	20-22								134.9						
B-6	S-4	21.9	17.2								1.2	3.6				
B-7	S-2	10-12								121.9						
B-7	S-2	11.9	17.5								1.3	4.1				
B-7	S-7	35-37								120.3						
B-7	S-7	36.9	24.7								0.8	2.6				
B-8	S-4	20-22								136.0						
B-8	S-4	21.9	24.5	46	22	24	CL				0.9	2.4				
B-9	S-2	10-12								126.5						
B-9	S-2	11.9	22.2	50	20	30	CH				1.5	4.1				
B-9	S-8	40-42								124.3						

Prepared by: CMT Reviewed by: 97 Date: 6/7/95

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TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS: WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	STRENGTH: TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	REMARKS
B-9	S-8	41.9	22.7	34	18	16	CL				0.5	1.0				
B-10	S-3	15-16.5								127.3						
B-10	S-3	16.4	15.0	42	18	24	CL				1.7	>4.5				
B-10	S-9	45-47								127.6						
B-10	S-9	46.9	24.3	32	18	14	CL				0.9	1.4				
B-11	S-1	1-5														
B-11A	S-1	0-2														
B-11A	S-2	2-4														
B-11A	S-3	4-6								123.3						
B-11A	S-3	5.9	19.5	39	21	18	CL				1.8	3.6				
B-11A	S-4	6-8								129.7						
B-11A	S-4	7.9	20.9								1.6	2.6				
B-11A	S-5	8-10								121.9						
B-11A	S-5	8.5	24.1													
B-11A	S-5	8.65	24.0								0.8	1.8				
B-11A	S-5	8.95	24.7	47	21	26	CL			125.7			UU @8.5psi	20.5	15	
B-11A	S-5	9.9	25.7								1.1	1.9				
B-11A	S-6	10-12								120.4						
B-11A	S-6	11.9	22.9	52	23	29	CH				1.7	3.1				
B-11A	S-7	12-14								125.9						
B-11A	S-7	13.9	24.4								1.3					
B-11A	S-8	14-16								131.8						
B-11A	S-8	15.9	19.7								1.7					
B-11A	S-9	16-18								128.1						
B-11A	S-9	17.9	20.3								1.7					
B-11A	S-10	18-20								118.1						
B-11A	S-10	18.55	23.8													

Prepared by: CMT Reviewed by: ЯJ Date: 6/7/95

Project No.: 5E08560-230 File: INDX1.XLS

TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS: WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	STRENGTH: TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	REMARKS
B-11A	S-10	18.85	19.8								1.4	2.0				
B-11A	S-10	19.15	20.0	45	19	26	CL			129.7			UU @10psi	32.0	15	
B-11A	S-10	19.5	19.9													
B-11A	S-11	20-22								138.4						
B-11A	S-11	20.15	21.1								0.8	1.8				
B-11A	S-11	20.35	19.6	45	18	27	CL			130.4			CIU'-C @10psi			
B-11A	S-11	20.7	16.8								1.2	2.8				
B-11A	S-11	21.25	20.0								1.2	2.5				
B-11A	S-11	21.6	25.2	49	18	31	CL			128.9			CIU'-C @20psi			
B-11A	S-11	21.9														
B-11A	S-12	25-27								124.9						
B-11A	S-12	25.05	23.5								0.8	2.3				
B-11A	S-12	25.36	21.2							128.2			CIU'-C @10psi			
B-11A	S-12	25.6	19.0								1.3	4.2				
B-11A	S-12	25.75	20.1													
B-11A	S-12	26.07	20.7	49	21	28	CL			128.4			CIU'-C @30psi			
B-11A	S-12	26.45	18.8								1.6	4.5				Organics
B-11A	S-12	26.9	19.5								0.9	1.9				
B-11A	S-13	30-32								124.2						Wood frag.
B-11A	S-13	30.7	22.5	36	16	20	CL			127.2			CIU'-C @20psi			
B-11A	S-13	30.45	22.4								0.8	1.8				
B-11A	S-13	31	21.1								0.9	1.9				
B-11A	S-13	31.35	20.7	29	17	12	CL			130.0			UU @26psi	23.4	15	
B-11A	S-13	31.75	20.9													
B-11A	S-14	35-37								132.5						Organics
B-11A	S-14	36.9	13.4								1.0	1.9				
B-11A	S-15	40-42								123.5						
B-11A	S-15	41.9	26.2								0.9	1.9				
B-12	S-1	2-4														

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS								STRENGTH					REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
B-12	S-2	4-6								125.8						
B-12	S-2	5.9	23.3								1.0	1.8				
B-12	S-3	6-8														
B-12	S-4	8-10								130.0						
B-12	S-4	9.9	31.0	61	22	39	CH				0.7	1.2				
B-12	S-5	10-12														
B-12	S-6	12-14														
B-12	S-7	14-16								131.8						
B-12	S-7	15.9	18.4								0.8	2.6				
B-13	S-1	2-4														
B-13	S-2	4-6								126.2						
B-13	S-2	4.05	24.7								0.6	1.3				
B-13	S-2	4.65	17.7								0.5	1.9				
B-13	S-2	5.25	22.5								0.5	2.0				
B-13	S-2	5.85	17.6								1.1	3.2				
B-13	S-3	6-8								117.8						
B-13	S-3	6.05	22.8								0.7	1.6				
B-13	S-3	6.65	22.1								0.6	3.1				
B-13	S-3	7.22	22.2													
B-13	S-3	7.85	23.4													
B-13	S-4	8-10														
B-13	S-5	10-12														
B-14	S-1	0-2														
B-14	S-2	2-4														
B-14	S-3	4-6								114.3						Organics
B-14	S-3	4.1	26.6								0.6	1.4				
B-14	S-3	4.64	31.0								0.2	0.8				
B-14	S-3	5.3	23.8								0.9	3.2				

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

Project No.: 5E08560-230 File: INDX1.XLS

TABLE B-2

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS								STRENGTH					REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	TOTAL UNIT WEIGHT (pcf)	TORVANE Su (tsf)	POCKET PENETR q u (tsf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
B-14	S-4	6-8								123.4						
B-14	S-4	6.05	26.4								0.5	1.2				
B-14	S-4	6.65	27.7								0.9	2.1				
B-14	S-4	7.25	22.9								0.9	3.3				
B-14	S-4	7.9	24.1								0.8	3.2				
B-15	S-3	15-17														
B-15	S-8	40-42														
B-101	S-10	49.5-51.5								133.1						
B-101	S-11	51.5-53.5								130.1						
B-101	S-12	53.5-55.5								128.7						
B-101	S-12	54.25	23.7							125.5			DS			Slickenslides
P-2A	S-4	38-40								124.2						
P-2A	S-4	38.2		31	14	17	CL	73.9	22							
P-2A	S-4	38.4	15.5													
P-2A	S-4	38.5	23.2													@ ext. interface
P-2A	S-4	38.5	27.7	59	26	33	CH									@ int. interface
P-2A	S-4	38.6	39.1													
P-2A	S-4	38.75		65	38	27	MH	97.3	59							
73.9																
P-4	S-5	23-25								126.9						
P-4	S-5	23.7	15.9	29	16	13	CL	70.4	19		1.8	2.5				above shear
P-4	S-5	23.9	22.4					70.5	26							shear zone
P-4	S-5	24.2	44.2	73	37	36	CH	93.9	68		0.7	0.5				below shear

Note: (1) Plasticity of fines for USCS symbol based on visual observation unless Atterberg limits reported.

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

Project No.: 5E08560-230 File: INDX2.XLS

TABLE B-3

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS							COMPACTION							REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	SPECIFIC GRAVITY (-4 mat'l)	ASTM STD.	OPT. WATER CONTENT (%)	MAX . DRY UNIT WGT. (pcf)	- 3/8	- 3/4	PREP wet	PREP dry	
TP-1		0-1							2.642								
TP-2		0-1	17.8				SP-SM	5.0									
TP-3	N End	1 of 3	23.0														
TP-3	N End	2 of 3	24.3	40	18	22	CL										
TP-3	N End	3 of 3	24.4														
TP-3	N End	COMP	23.3							D698-91	19.9	105.8	X		X		
TP-3	S End	1 of 3	26.4														
TP-3	S End	2 of 3	24.1														
TP-3	S End	3 of 3	28.4														
TP-3	S End	COMP	24.4	50	20	30	CL			D698-91	22.9	100.8	X		X		
TP-4	11.5'S E Face	3.1	22.9				CL	55.8									
TP-4	N End	1 of 2	22.4	41	18	23	CL										
TP-4	N End	2 of 2	21.9														
TP-4	S End	7'	24.6														
TP-4	S End	2 of 2 7'	23.8														
TP-5	15.5'SE		14.3				CL	63.7									
TP-5	5'S of N End	5'	18.8				CL	66.4									
TP-5	5.8'S	1.5					CL	61.0									
TP-5	E Face	12'S	23.7				CL	67.1									
TP-5	N End	1 of 2 4'	26.0														
TP-5	N End	2 of 2 4'	21.7														
TP-5	N End	COMP 4'	22.3	42	18	24	CL			D698-91	20.0	106.4	X		X		
TP-5	S End	1 of 2	20.0														
TP-5	S End	2 of 2	19.3														
TP-5	S End	COMP	20.4	47	19	28	CL			D698-91	20.7	104.0	X		X		
TP-5	W Wall 12'S	3.5															
TP-7	Bag 1	3.2	21.8				CL	50.2									
TP-7	Bag 2	1.4	12.9				SC	48.6									
TP-7	Bag 3	6	17.4				CL	66.4									
TP-7	New fill	1 of 2	24.7	51	22	29	CH										

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

TABLE B-3

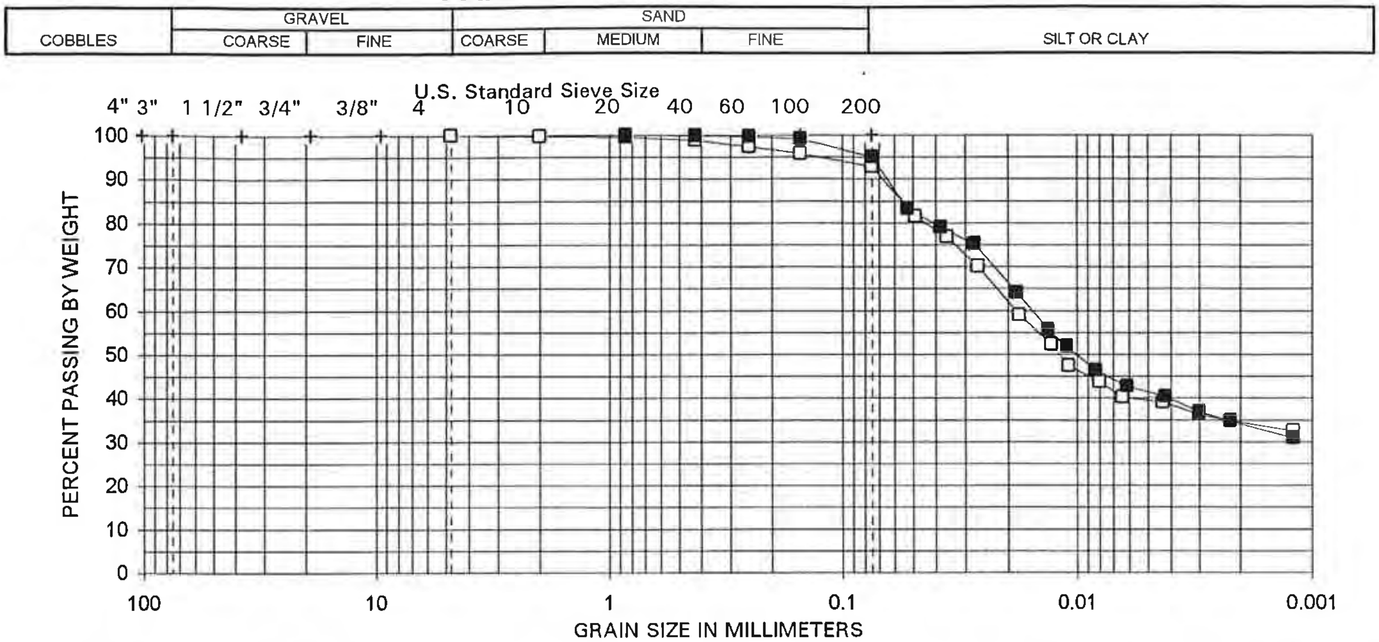
LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

BORING	SAMPLE	DEPTH	IDENTIFICATION TESTS							COMPACTION							REMARKS
NO.	NO.	(ft)	WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	SPECIFIC GRAVITY (-4 mat'l)	ASTM STD.	OPT. WATER CONTENT (%)	MAX . DRY UNIT WGT. (pcf)	- 3/8	- 3/4	PREP wet	PREP dry	
TP-7	New fill	2 of 2	23.3														
TP-7	Old fill	1 of 2	21.6														
TP-7	Old fill	2 of 2	22.3	48	21	27	CL										

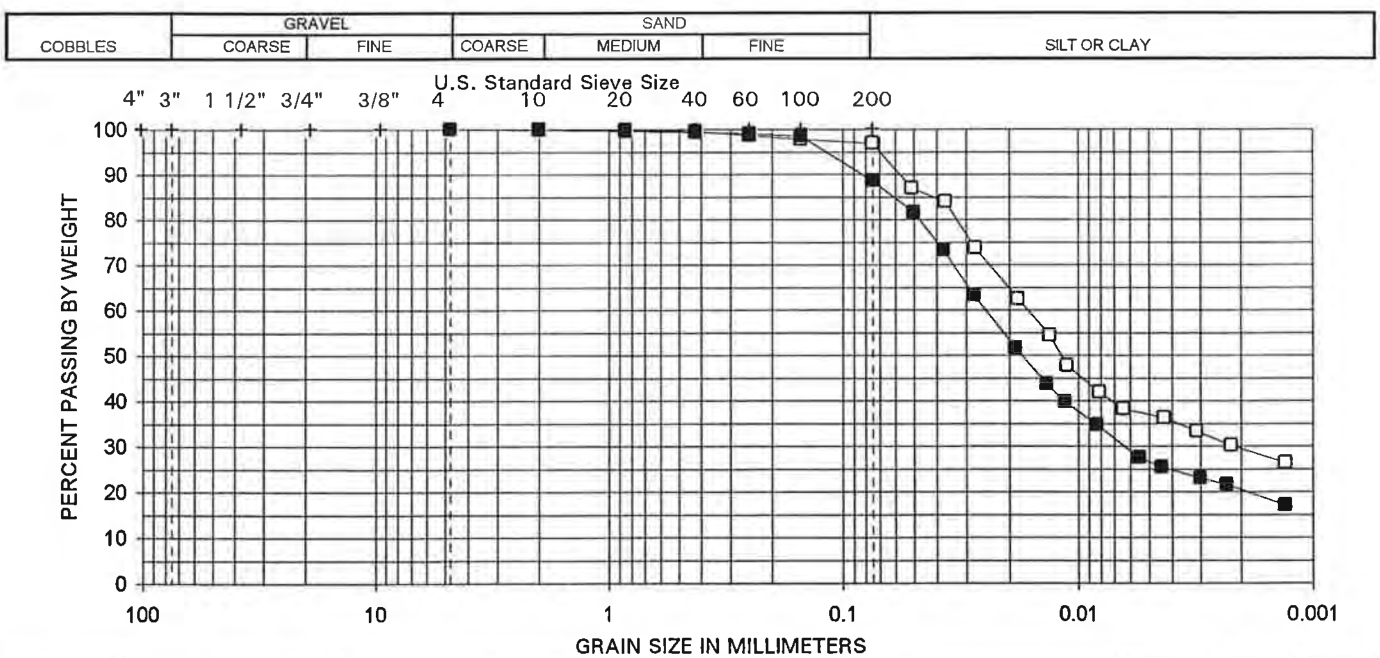
Note: (1) Plasticity of fines for USCS symbol based on visual observation unless Atterberg limits reported.

Prepared by: CMT Reviewed by: [signature] Date: 6/7/95

PARTICLE-SIZE DISTRIBUTION



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
B-2	S-2	10-12	□	CL, brown plastic silty CLAY, trace m-f sand; mica noted.	20.6	44	18
B-2	S-4	20.2	■	CH, brown plastic silty CLAY, trace f. sand; mica noted.	---	---	---



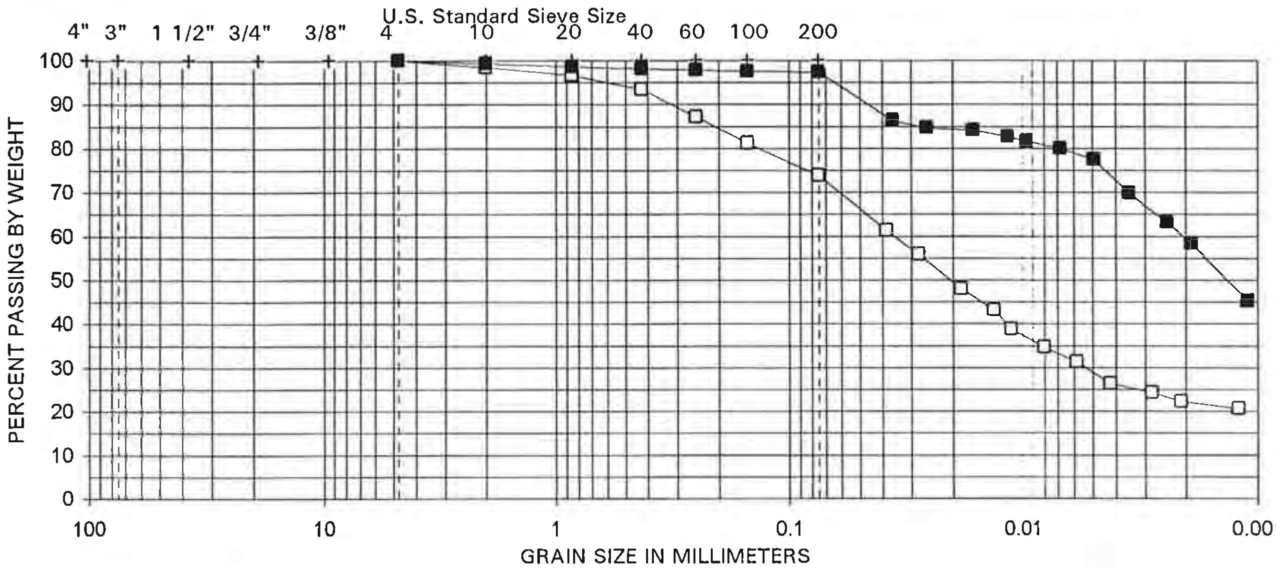
BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
B-3	S-8	14.35	□	CL, brown plastic silty CLAY, trace f. sand; mica noted.	19.9	44	18
B-3	S-10	19.65	■	CL, brown plastic silty CLAY, trace f. sand; mica noted.	21.4	42	19

File: SIEV1A.XLS Project No.: 5E08560-230 Plotted by: CMT Reviewed by: CMT Date: 5/25/95

Figure B–1

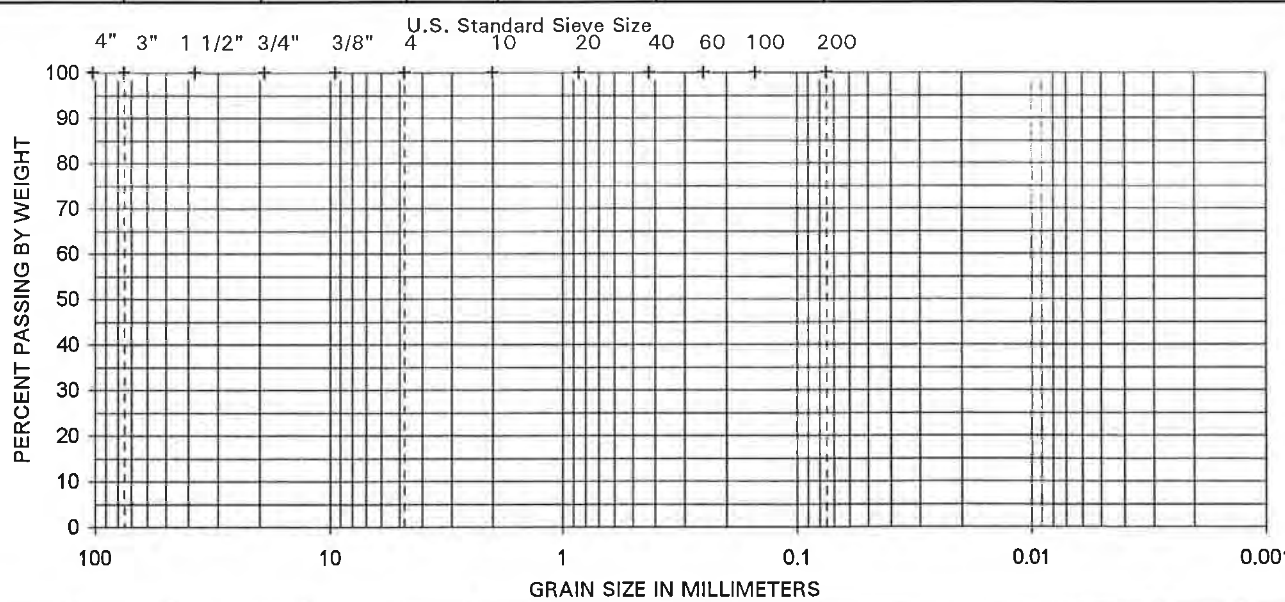
PARTICLE-SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
P-2A	4-A	38.2	□	CL, brown medium plastic silty CLAY, some f. sand, trace	---	31	14
				c-m sand; mica noted.			
P-2A	4-B	38.75	■	MH, mottled green, brown and orange plastic clayey SILT,	---	65	38
				trace m-f sand; mica noted.			

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

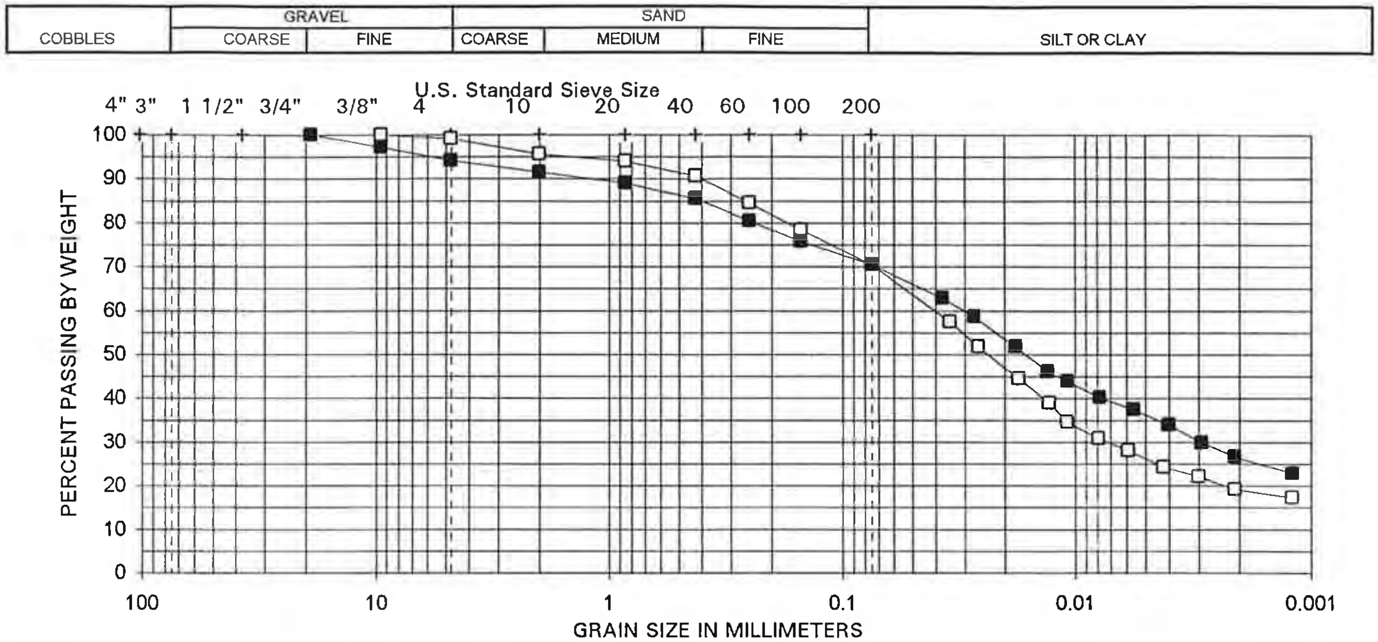


BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
---	---	---	□		---	---	---
---	---	---	■		---	---	---

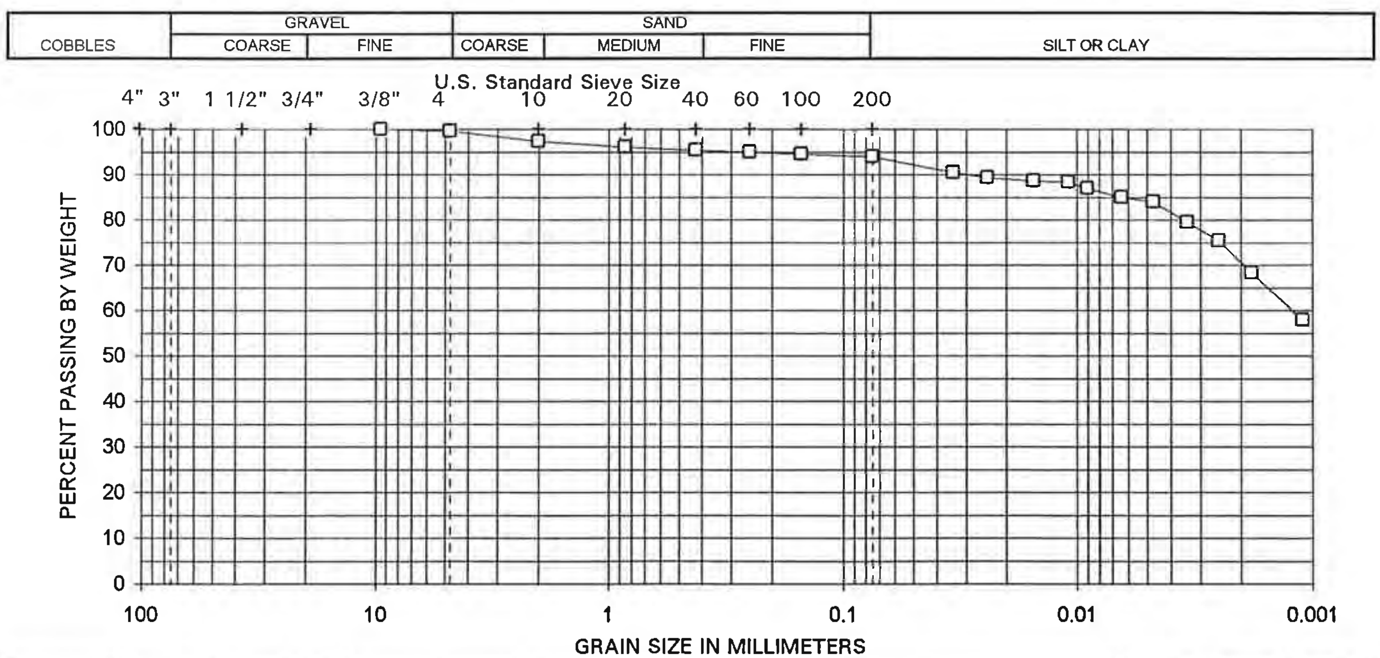
File: SIEV1C.XLS Project No.: 5E08560-230 Plotted by: EK Reviewed by: ________ Date: 6/5/95

Figure B-2

PARTICLE-SIZE DISTRIBUTION



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
P-4	S-5	---	□	CL, brown medium plastic silty CLAY, some c-f sand; mica	15.9	29	16
Above shear zone				noted.			
P-4	S-5	23.9	■		22.4	---	---
Shear zone							



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
P-4	S-5	---	□	MH, brown plastic clayey SILT, trace c-f sand; mica noted.	44.2	73	37
Below shear zone							
---	---	---	■		---	---	---

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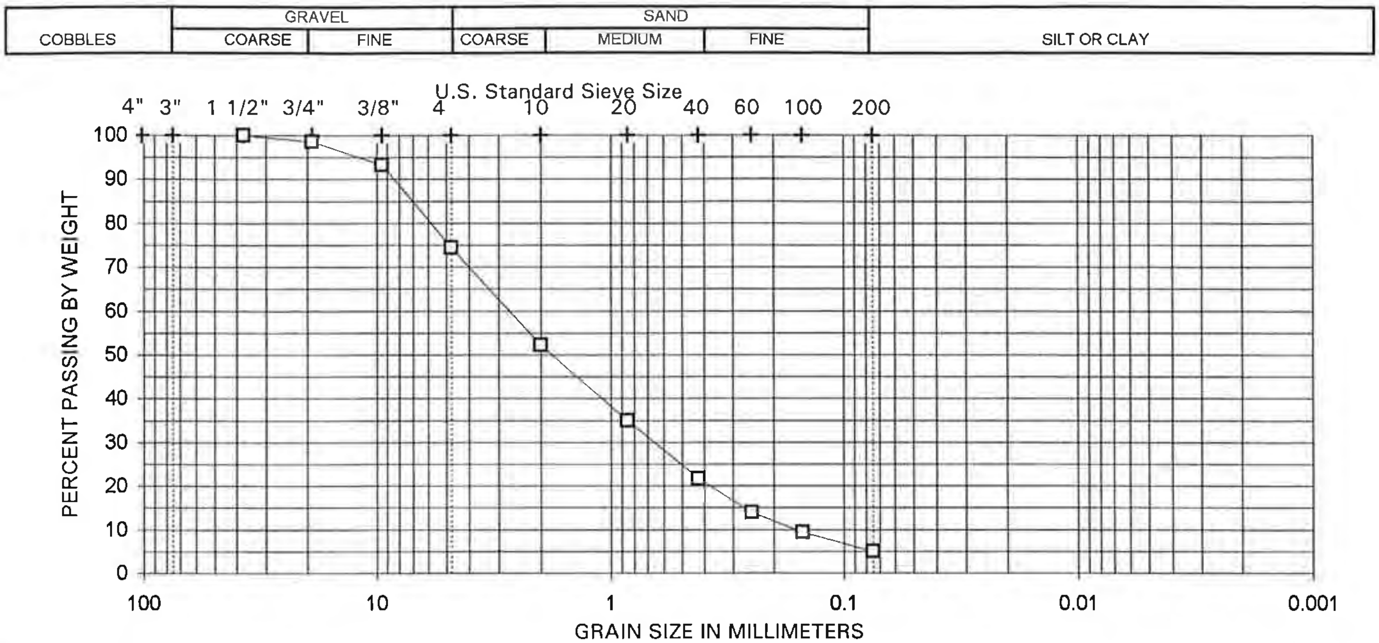
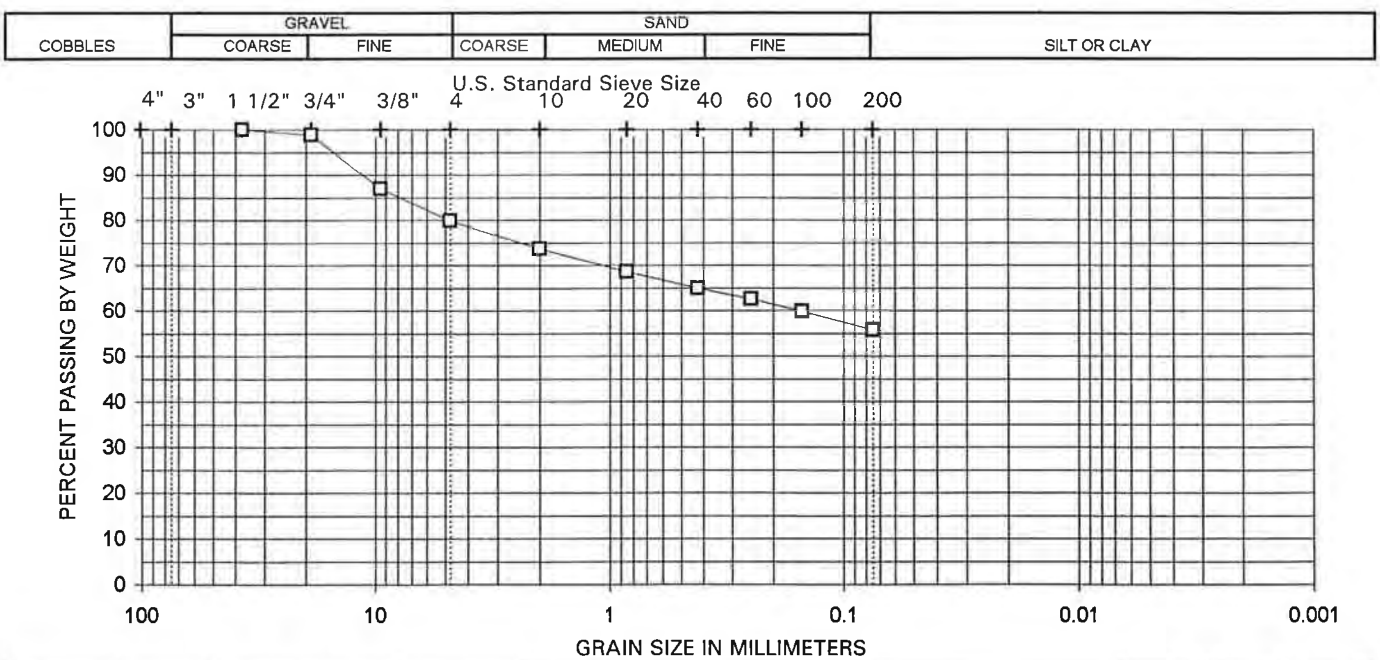
Figure B-3

PARTICLE-SIZE DISTRIBUTION



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-2	---	0-1	□	SP-SM, brown c-f SAND, some f. gravel, trace c. gravel and	17.8	---	---
				silt; bottom ash material noted.			
---	---	---	■		---	---	---



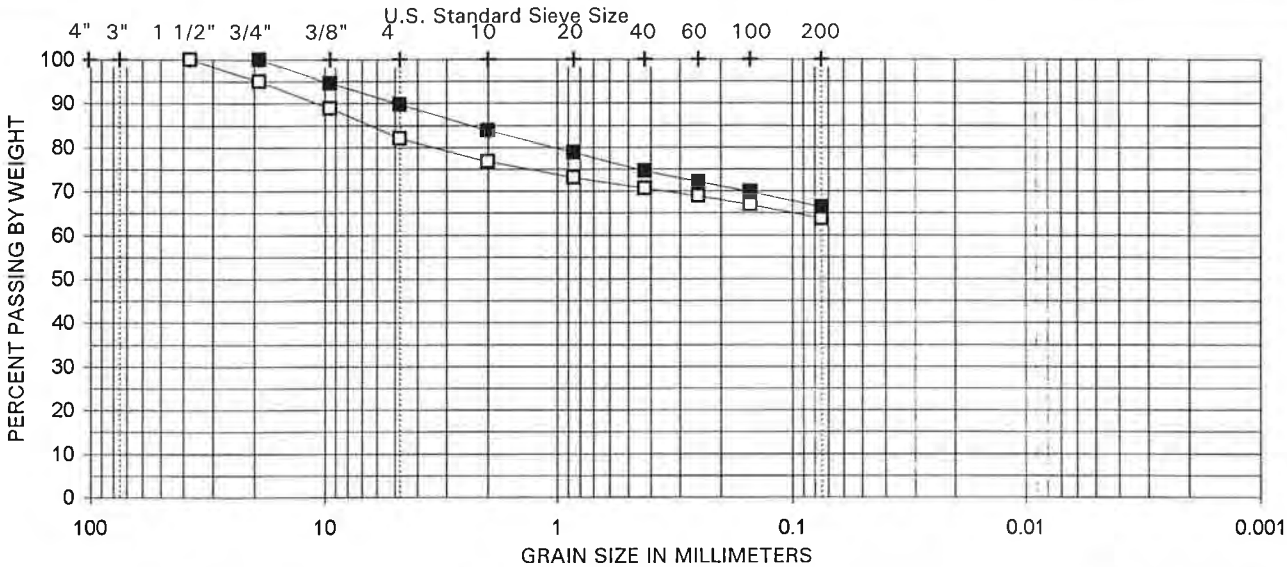
BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-4	11.5' S	3.1	□	CL, brown plastic silty CLAY, some f. gravel and c-f sand,	22.9	---	---
				trace c. gravel; bottom ash material noted.			
---	—	---	■		---	---	---

File: SIEV2A.XLS Project No.: 5E08560-230 Plotted by: CMT Reviewed by: CMT Date: 3/31/95

Figure B-4

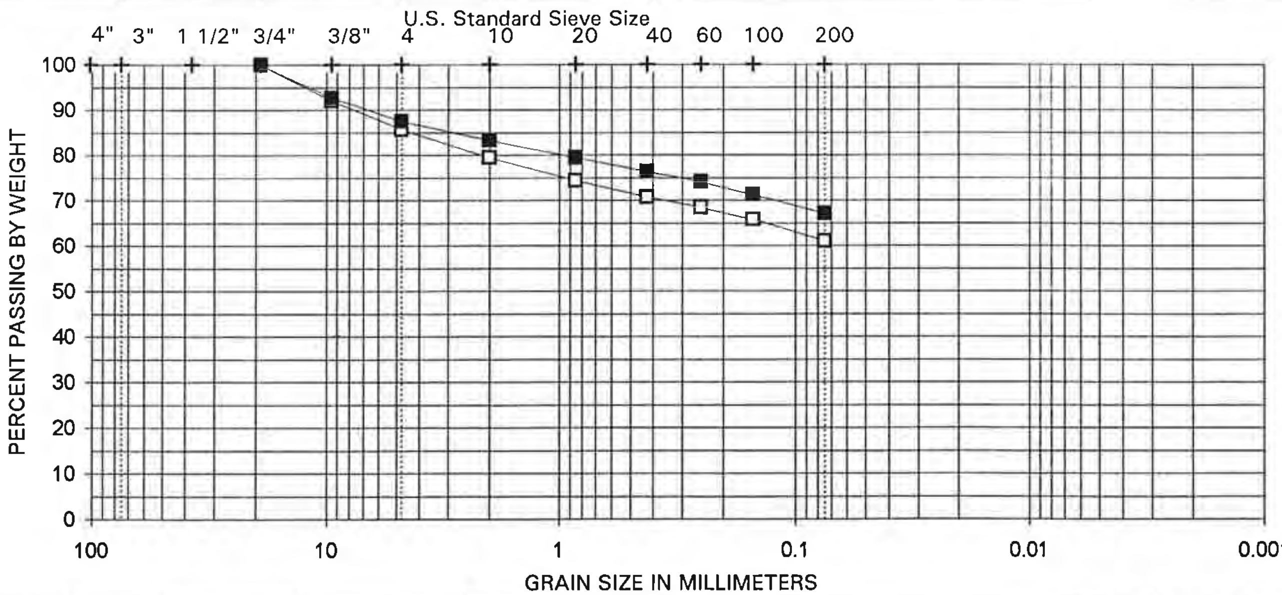
PARTICLE-SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-5	15.5' SE	---	□	CL, brown plastic CLAY, some gravel and c-f sand; bottom	14.3	---	---
				ash material noted.			
TP-5	5' S of N End	5	■	CL, brown plastic CLAY, some c-f sand, trace f. gravel;	18.8	---	---
				bottom ash material noted.			

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

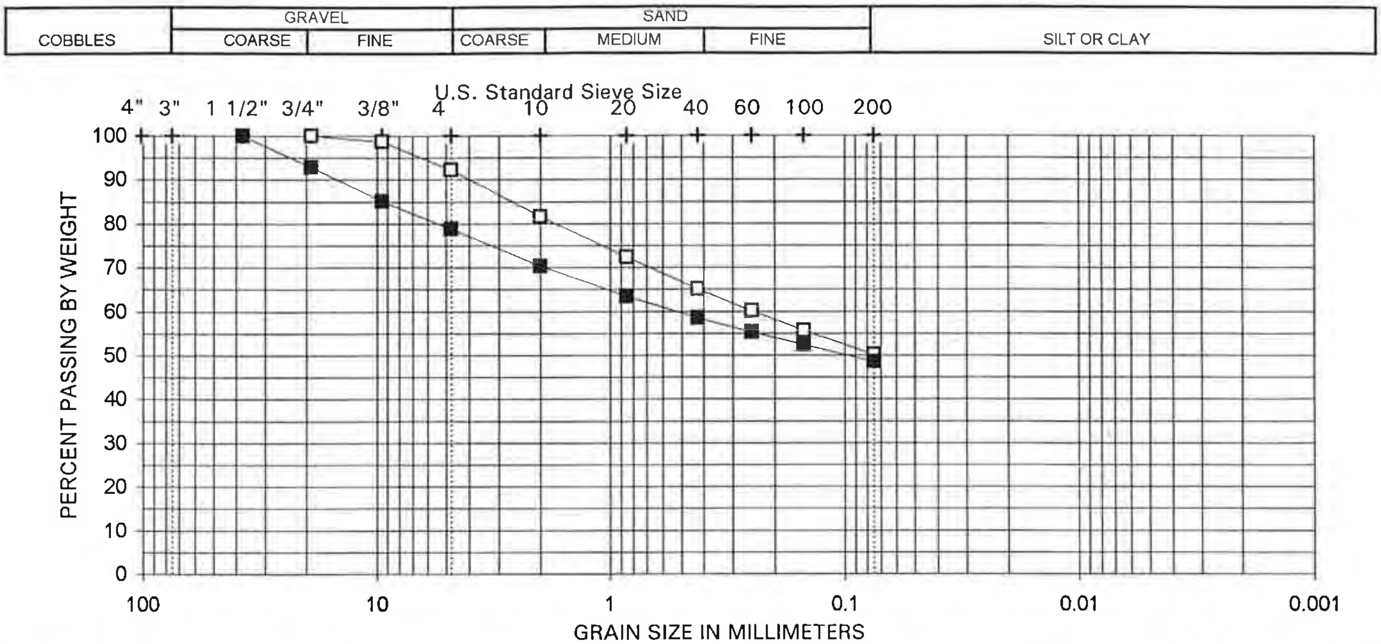


BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-5	5.8' S	1.5	□	CL, brown plastic CLAY, some f. gravel and c-f sand;	---	---	---
				bottom ash material noted.			
TP-5	E Face 12'S		■	CL, brown plastic CLAY, some f. gravel and c-f sand;	23.7	---	---
				bottom ash material noted.			

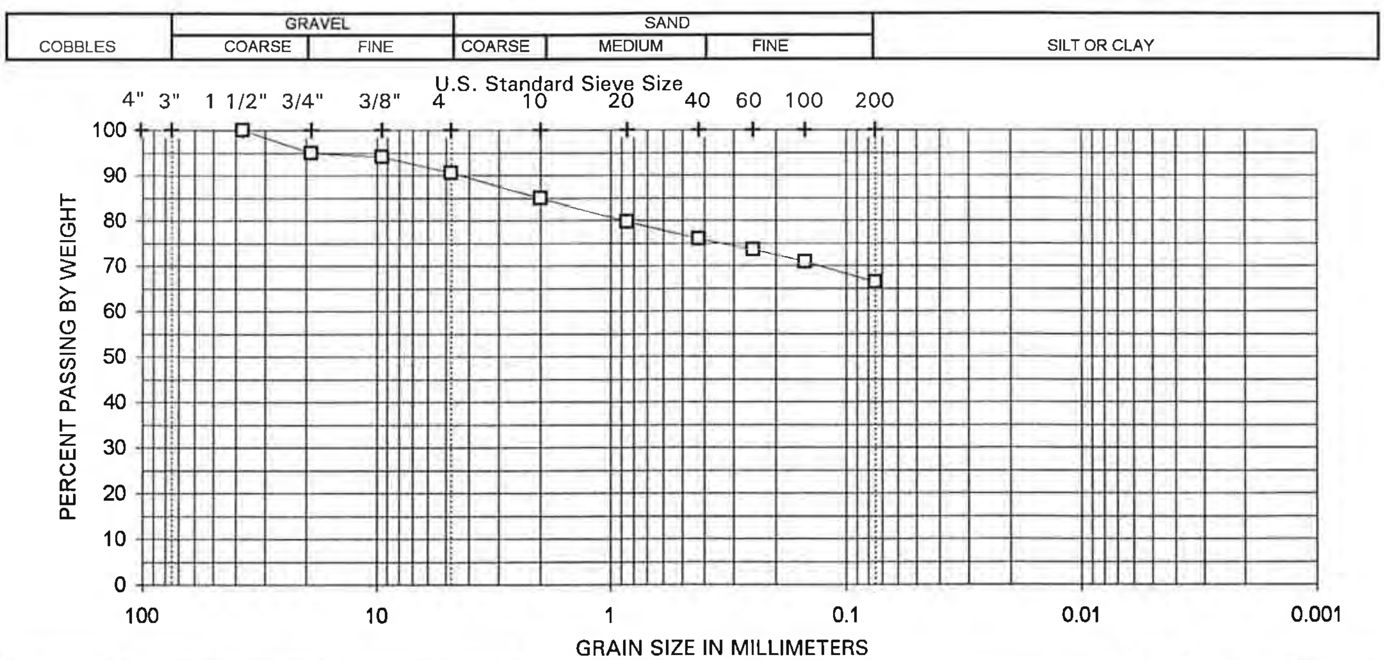
File: SIEV2B.XLS Project No.: 5E08560-230 Plotted by: CMT Reviewed by: CMT Date: 3/31/95

Figure B-5

PARTICLE-SIZE DISTRIBUTION



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-7	Bag 1	3.2	□	CL, brown plastic c-f sandy CLAY, trace f. gravel; bottom	21.8	---	---
				ash material noted.			
TP-7	Bag 2	1.4	■	SC, brown clayey c-f SAND, some gravel; bottom ash	12.9	---	---
				material noted.			



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
TP-7	Bag 3	6	□	CL, brown plastic CLAY, some c-f sand, trace gravel; bottom	17.4	---	---
				ash material noted.			
---	---	---	■		---	---	---

File: SIEV2C.XLS Project No.: 5E08560-230 Plotted by: CMT Reviewed by: CMT Date: 3/31/95

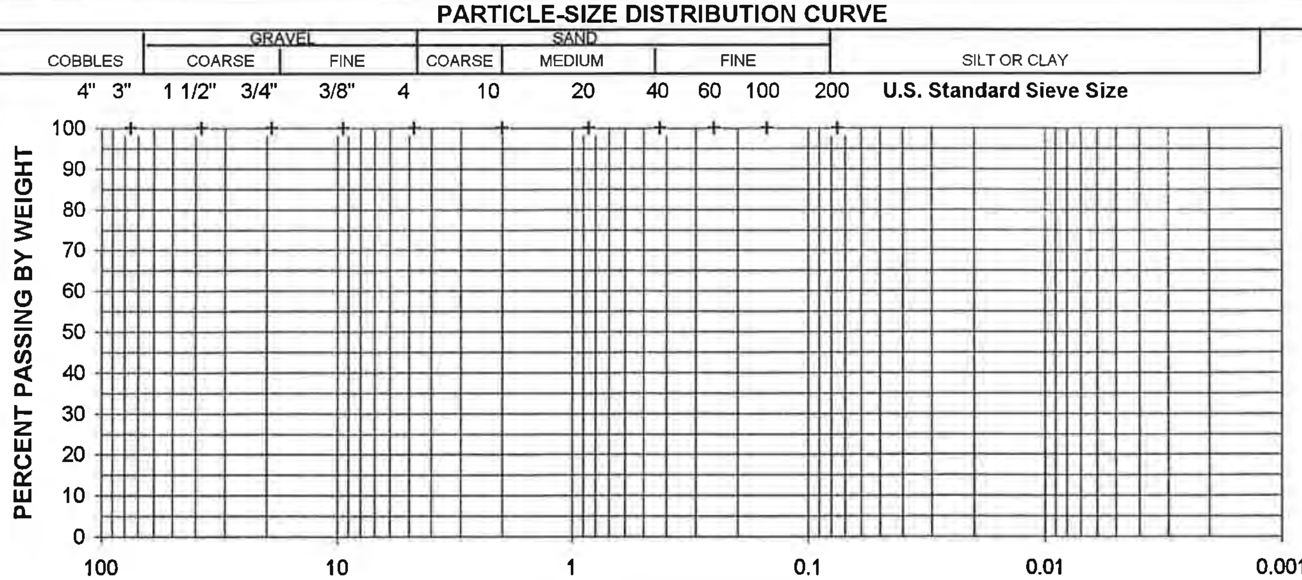
Figure B-6

COMPACTION CURVE

Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ❍ Other Effort

Compaction Procedure: **B** Specimen Preparation Method: **Moist**

PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ❍ Representative of entire sample △ Representative of compacted specimen ☐ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-3 N End Comp			19.9	105.8			CL, brown plastic silty CLAY, trace f. sand.

PROJECT NAME:
PROJECT NUMBER: 5E08560-230

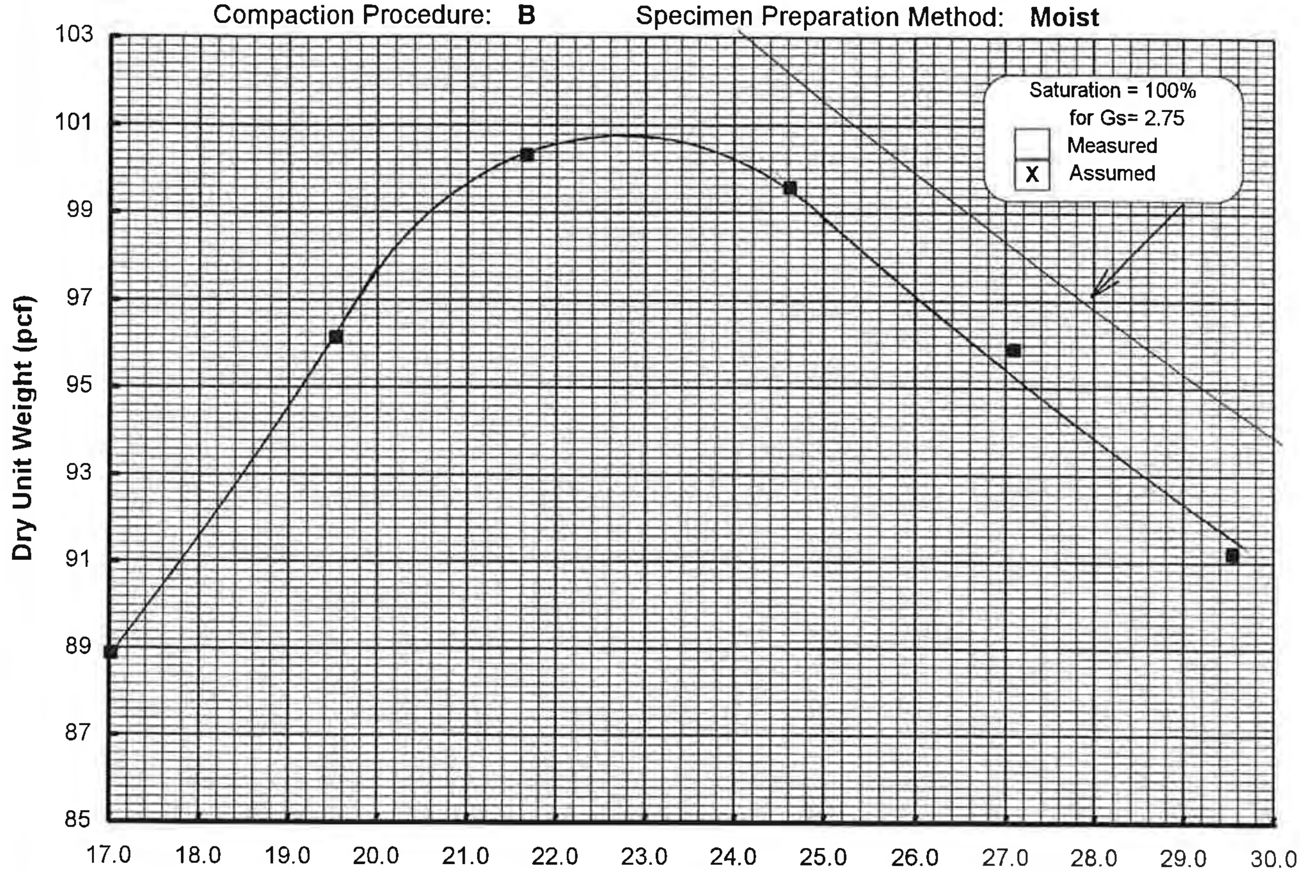
COMPACTION AND INDEX PROPERTY DATA

FIGURE No. B-7

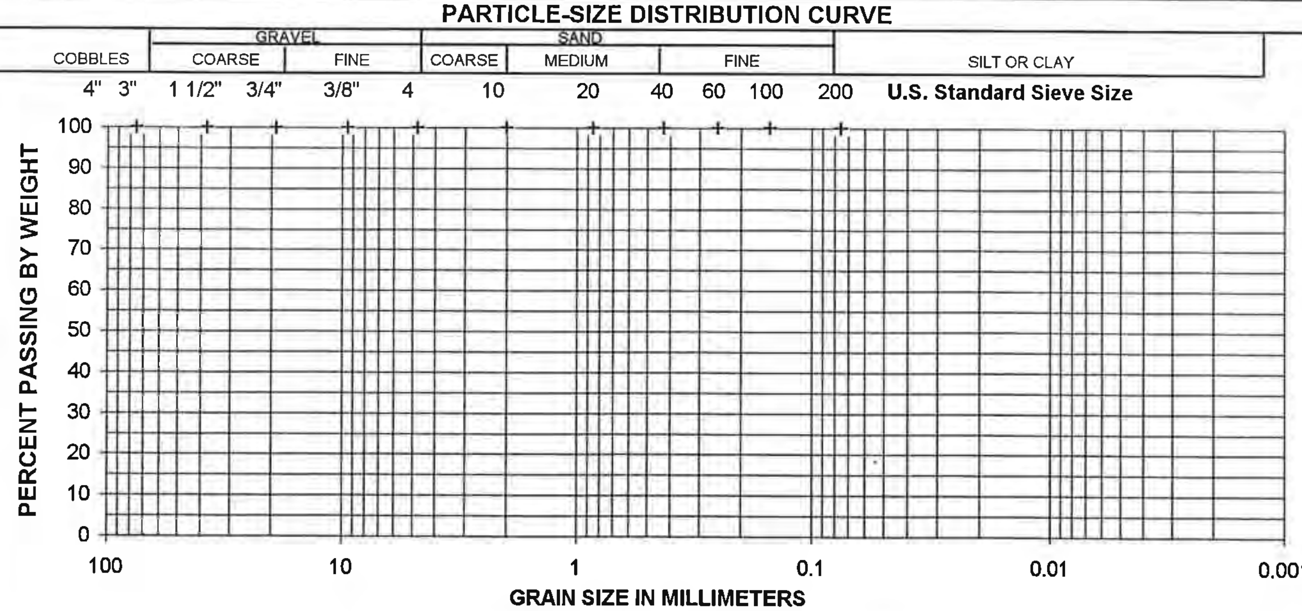
COMPACTION CURVE

Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ❍ Other Effort

Compaction Procedure: **B** Specimen Preparation Method: **Moist**



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ❍ Representative of entire sample Δ Representative of compacted specimen ☐ Representative of compacted specimen and entire sample

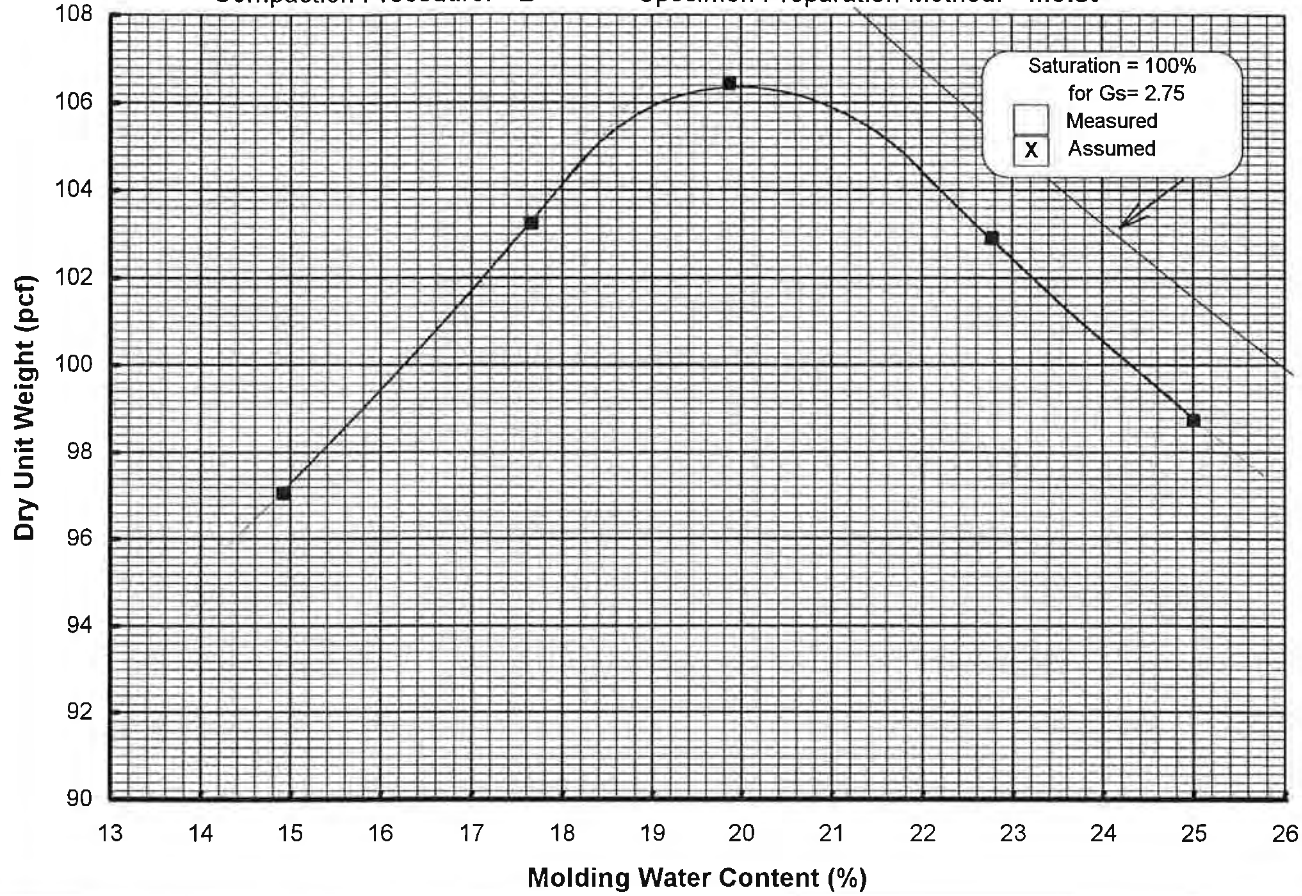
Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-3 S End Comp			22.9	100.8	50	30	CL, light brown plastic CLAY, trace f. sand.

PROJECT NAME: PROJECT NUMBER: 5E08560-230	COMPACTION AND INDEX PROPERTY DATA	FIGURE No. B-8

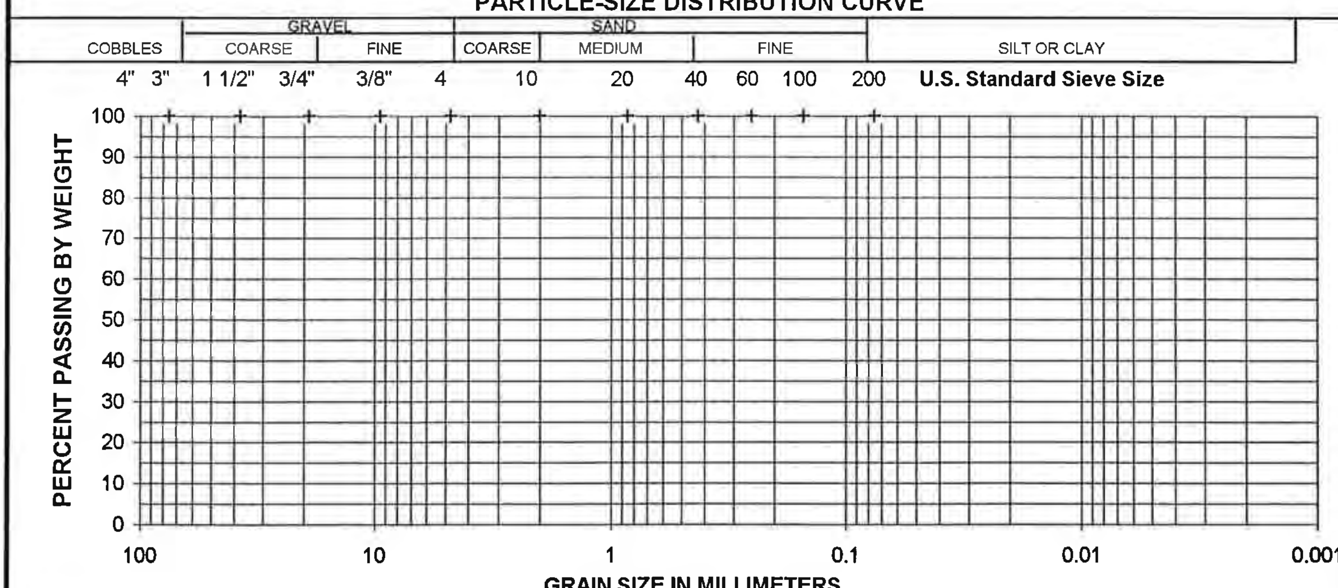
COMPACTION CURVE

Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ○ Other Effort

Compaction Procedure: **B** Specimen Preparation Method: **Moist**



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ○ Representative of entire sample △ Representative of compacted specimen □ Representative of compacted specimen and entire sample

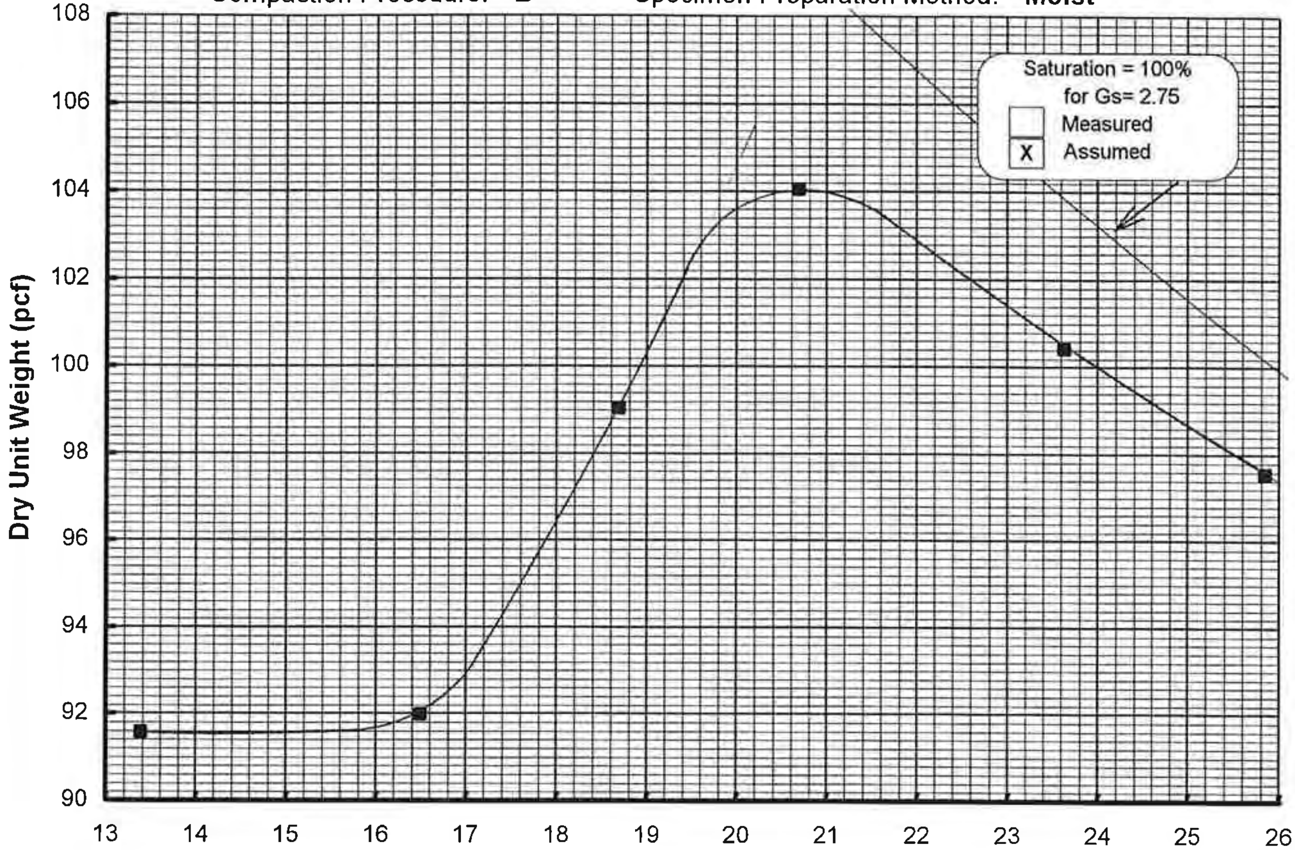
Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-5 N End Comp			20.0	106.4	42	24	CL, brown plastic silty CLAY, trace f. sand.

PROJECT NAME: **PROJECT NUMBER:** 5E08560-230	**COMPACTION AND INDEX PROPERTY DATA**	**FIGURE No. B-9**

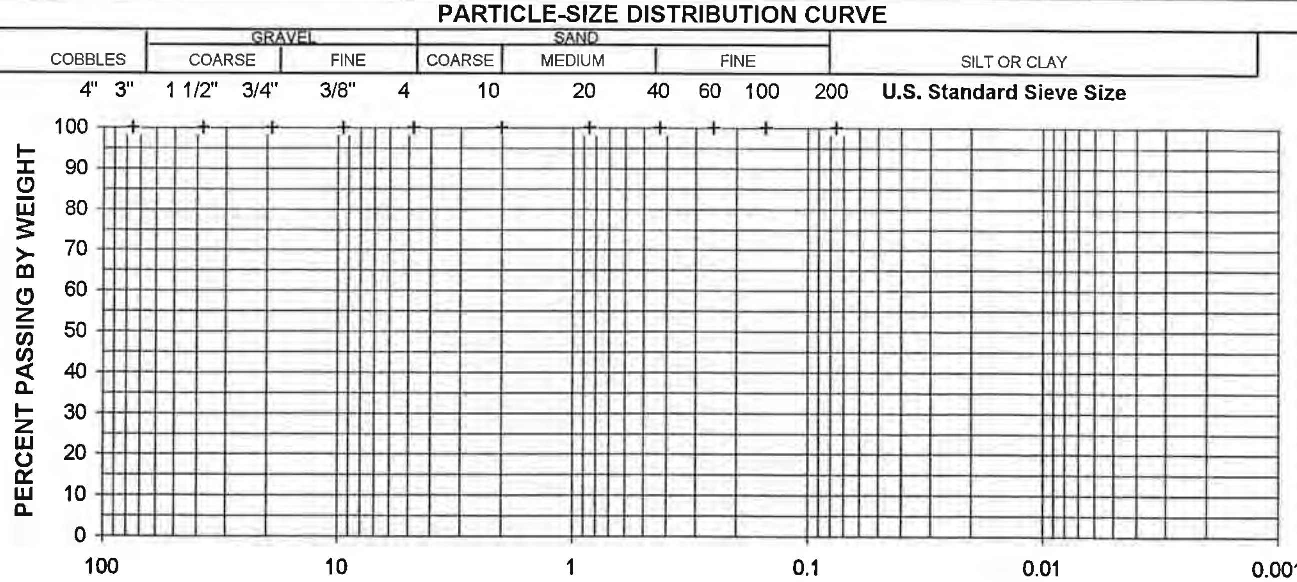
COMPACTION CURVE

Test Method: ● ASTM D 1557-91 ■ ASTM D 698-91 ◆ CA-DWR: S-10 ❍ Other Effort

Compaction Procedure: **B** Specimen Preparation Method: **Moist**



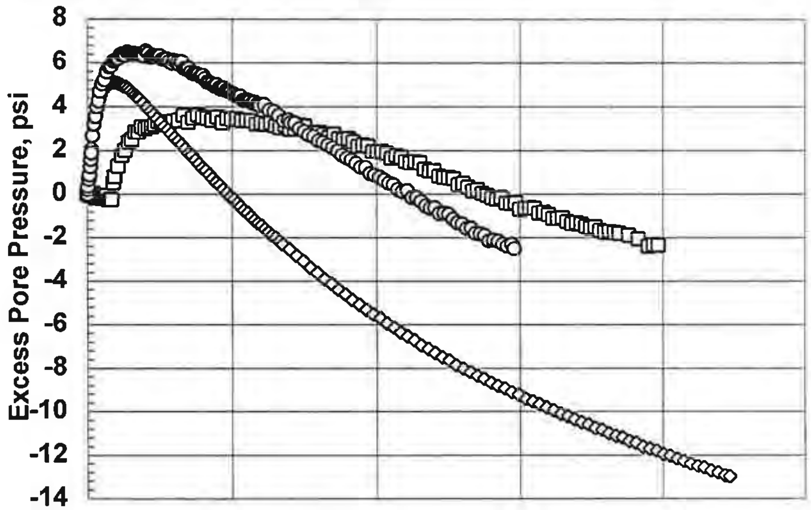
PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ❍ Representative of entire sample Δ Representative of compacted specimen ☐ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
TP-5 S End Comp			20.7	104.0	47	28	CL, brown plastic silty CLAY, trace m-f sand.

PROJECT NAME: **PROJECT NUMBER:** 5E08560-230	**COMPACTION AND INDEX PROPERTY DATA**	**FIGURE No.** B-10

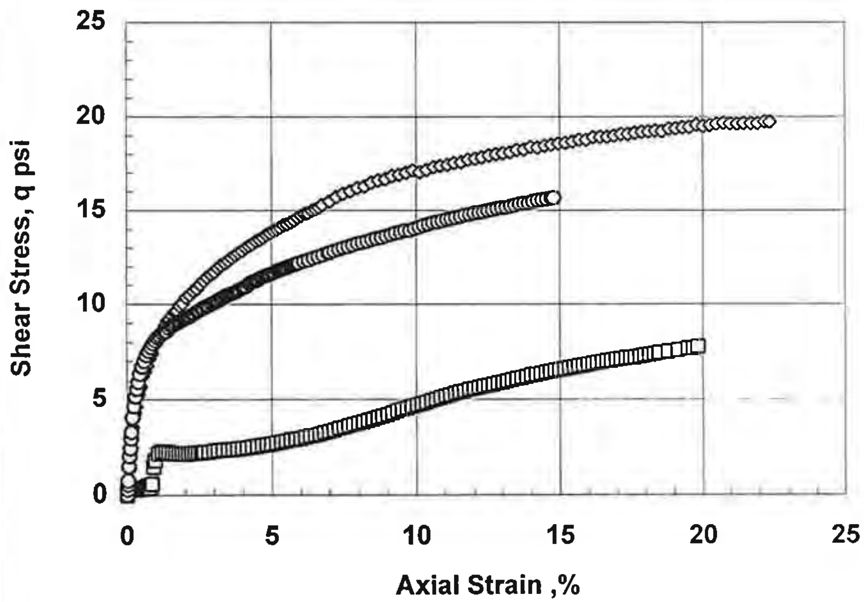


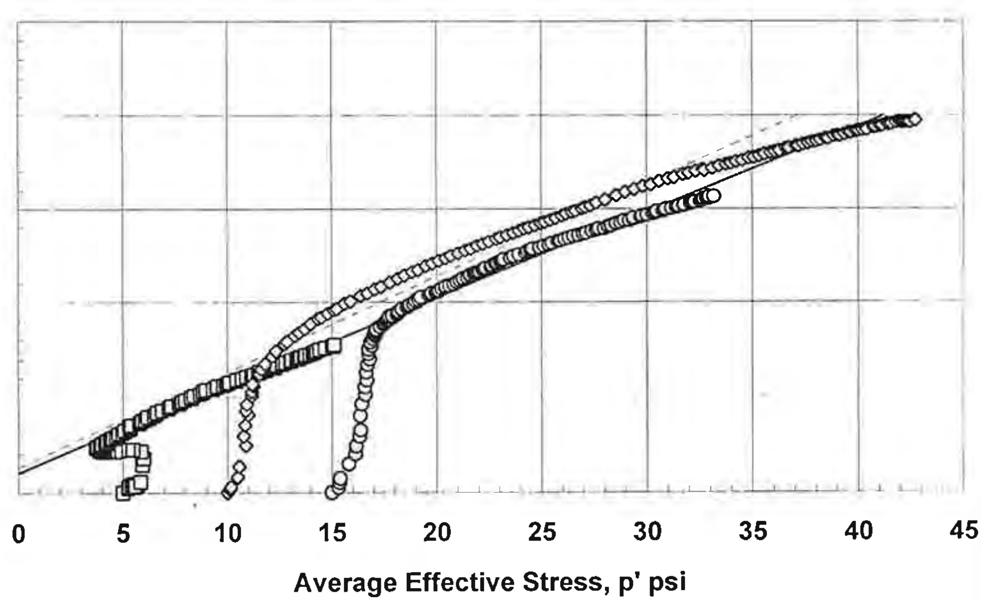
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c	LL	PI
□	T-1191	B-3	S-5	8.55	17.3	123.0	5.0	44	25
◊	T-1194	B-3	S-5	9	17.8	131.5	10.0	41	24
○	T-1192	B-3	S-6	11	18.0	128.1	15.0	---	---

SERIES SUMMARY

Notation	Failure Criteria	c'(psi)	Φ' (degrees)
———	15% strain	1.016	27.4
- - - -	Peak Obliquity	1.295	30.2



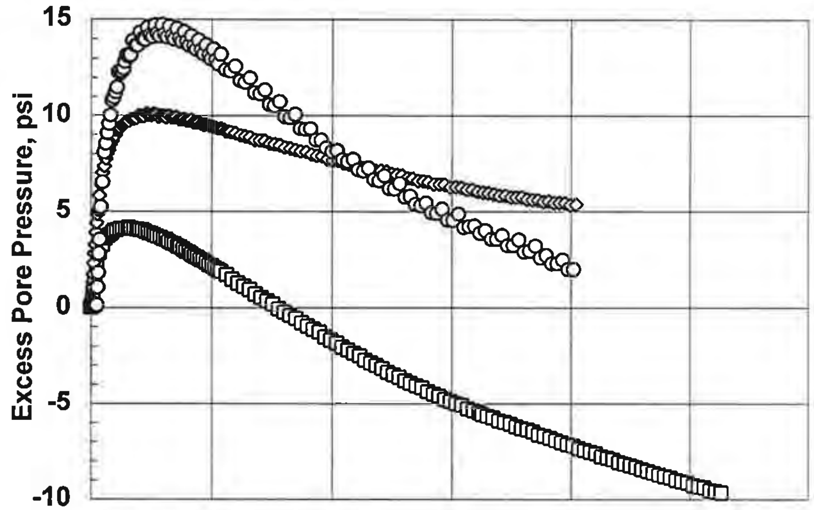


Test by:
Prepared by: CMT
Checked by: GT

		CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements SERIES SUMMARY
Woodward-Clyde Consultants	Project No.: 5E08560	May 1995 Fig. Series 1

6/7/95

Figure B-11

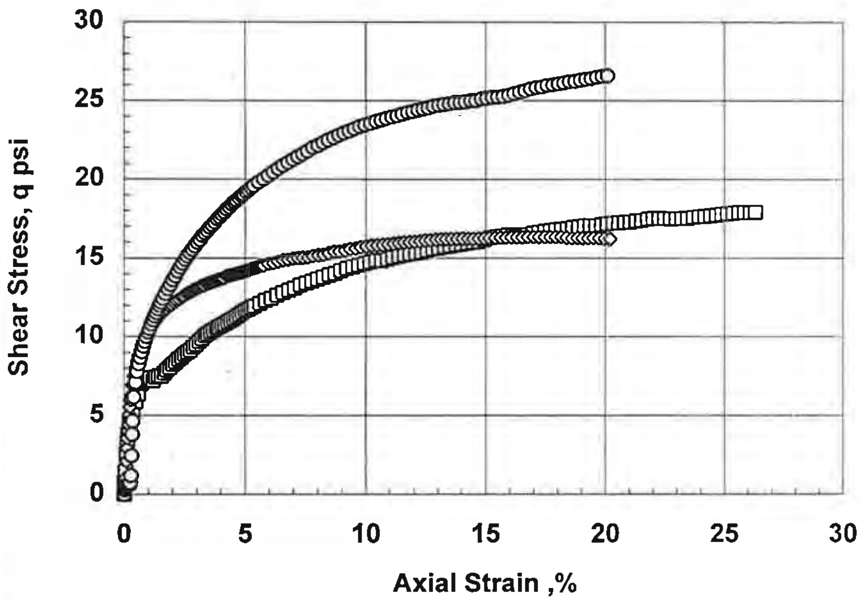


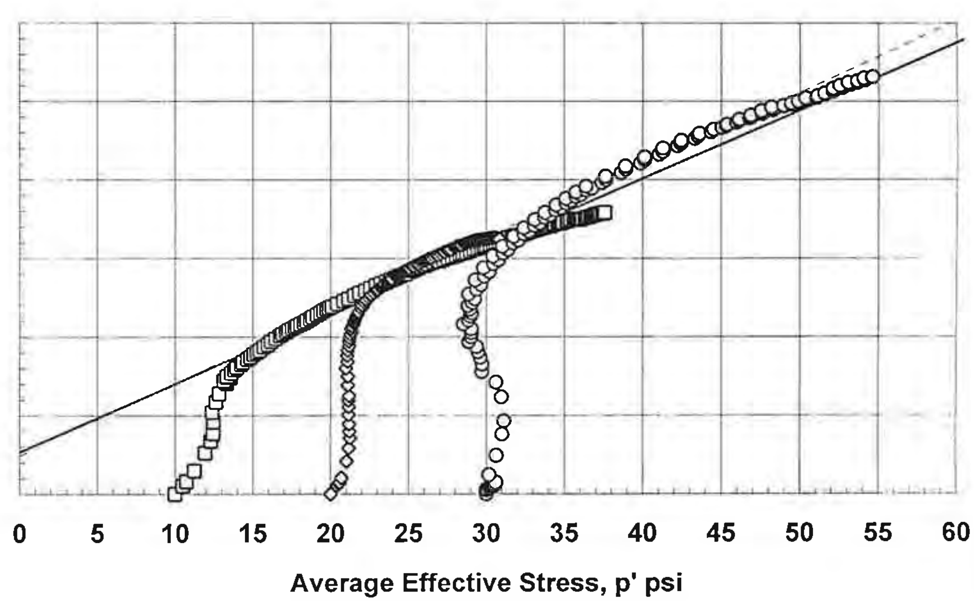
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c	LL	PI
□	T-1199	B-11A	S-12	25	21.2	128.1	10.0	---	---
◊	T-1201	B-11A	S-13	31	22.5	127.2	20.0	36	20
○	T-1200	B-11A	S-12	26	20.7	128.4	30.0	49	28

SERIES SUMMARY

Notation	Failure Criteria	c'(psi)	Φ' (degrees)
———	15% strain	2.66	25.8
- - - -	Peak Obliquity	2.415	27.6



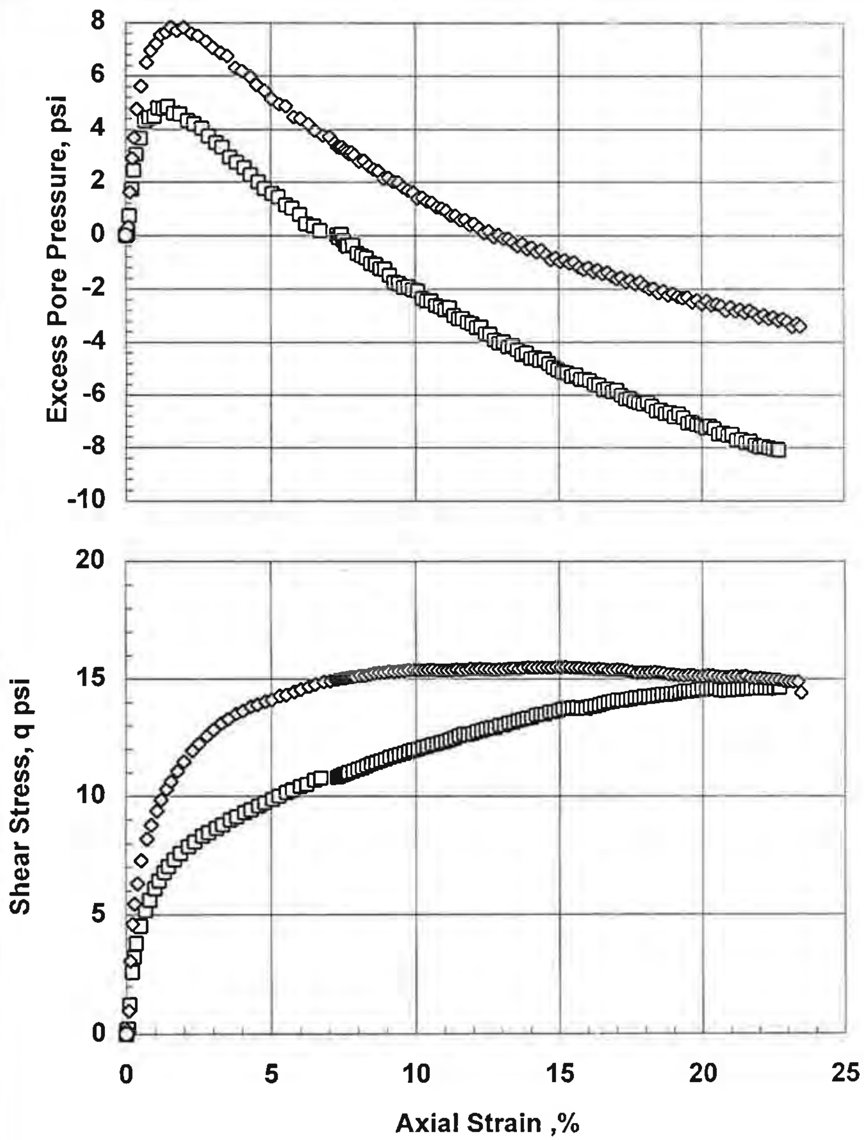


Test by:
Prepared by: CMT
Checked by: GT

		CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements SERIES SUMMARY
Woodward-Clyde Consultants	Project No.: 5E08560	May 1995 Fig. Series 4

6/7/95

Figure B-12

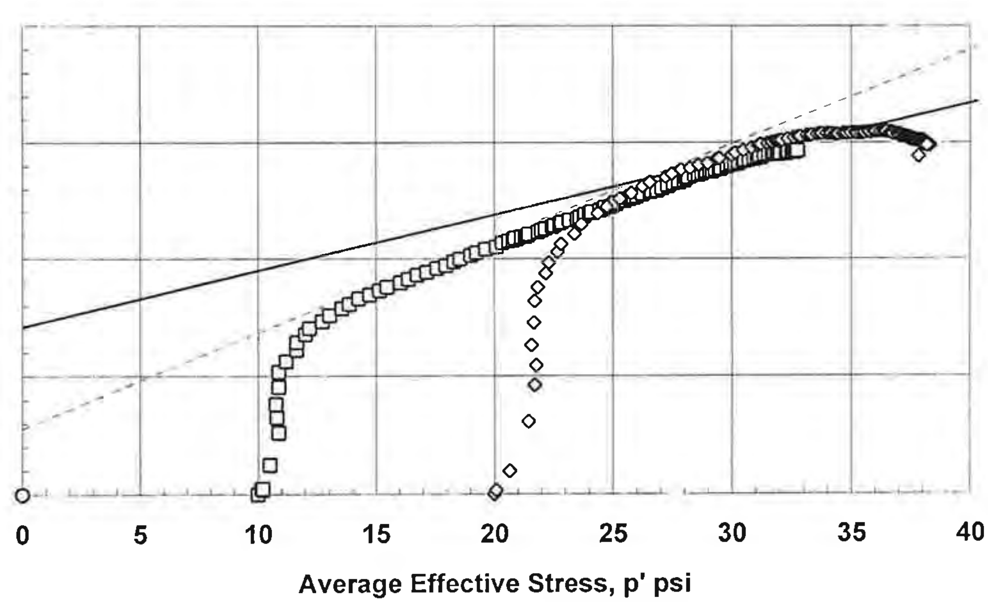


LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c	LL	PI
□	T-1203	B-11A	S-11	20	19.6	130.4	10.0	46	21
◊	T-1202	B-11A	S-11	22	25.2	128.8	20.0	52	30
○	---	---	---	---	---	---	---	---	---

SERIES SUMMARY

Notation	Failure Criteria	c'(psi)	Φ' (degrees)
———	15% strain	7.082	13.9
- - - -	Peak Obliquity	2.796	23.9



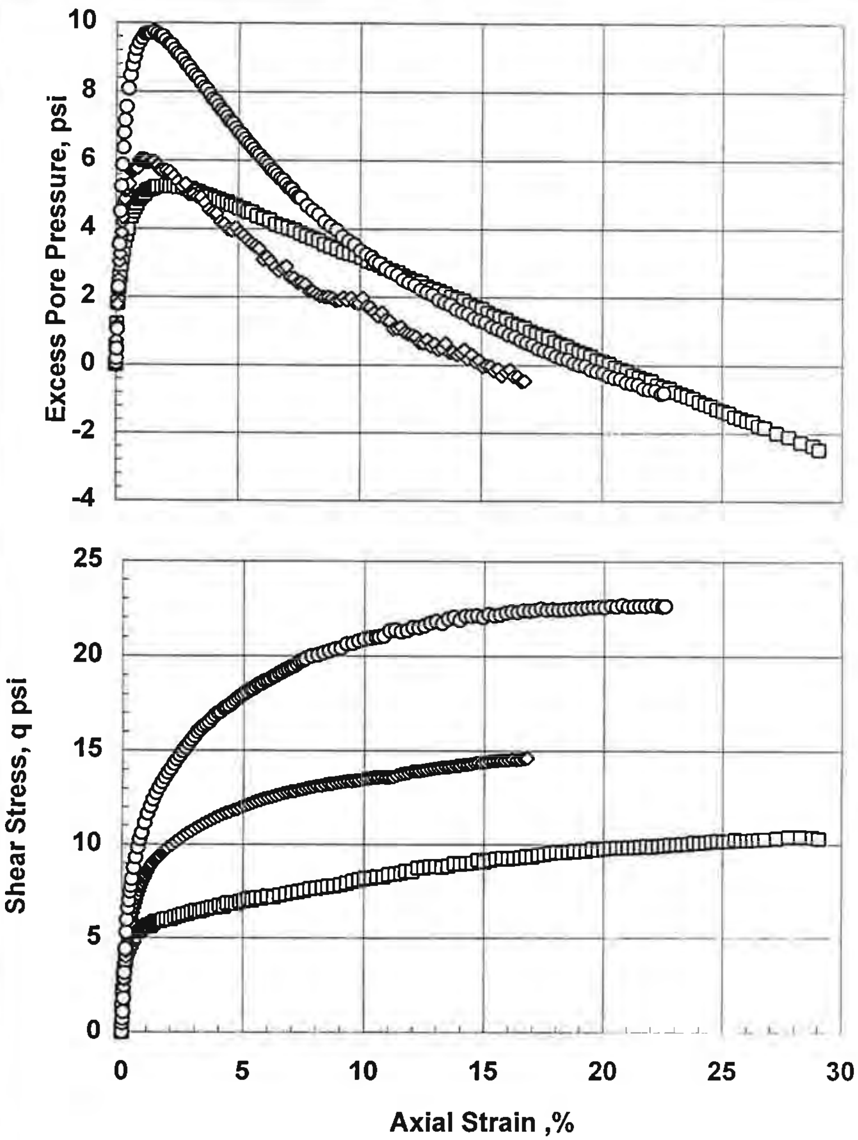
Prepared by: CMT

Checked by: GS

		CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements SERIES SUMMARY
Woodward-Clyde Consultants	Project No.: 5E08560	May 1995 Fig. Series 3

6/7/95

Figure B-13

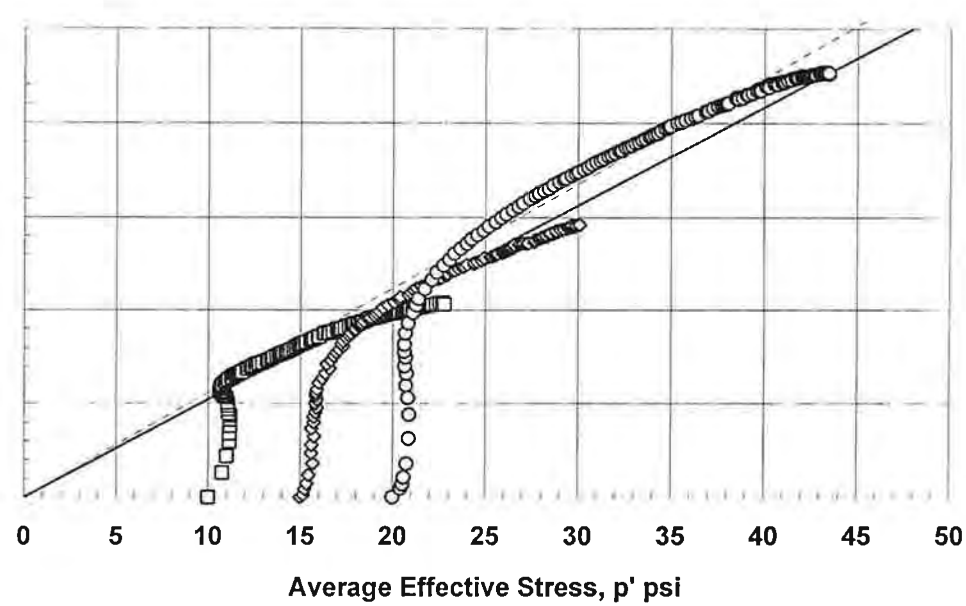


LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c	LL	PI
□	T-1190	B-3	S-9	17	18.7	124.0	10.0	46	25
◊	T-1195	B-3	S-10	19	23.4	124.1	15.0	52	30
○	T-1193	B-3	S-10	20	21.4	126.1	20.0	42	23

SERIES SUMMARY

Notation	Failure Criteria	c'(psi)	Φ' (degrees)
— —	15% strain	0	31.4
- - -	Peak Obliquity	0	34



Test by:
Prepared by: CMT
Checked by: GT

		CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements SERIES SUMMARY
Woodward-Clyde Consultants	Project No.: 5E08560	May 1995 Fig. Series 2

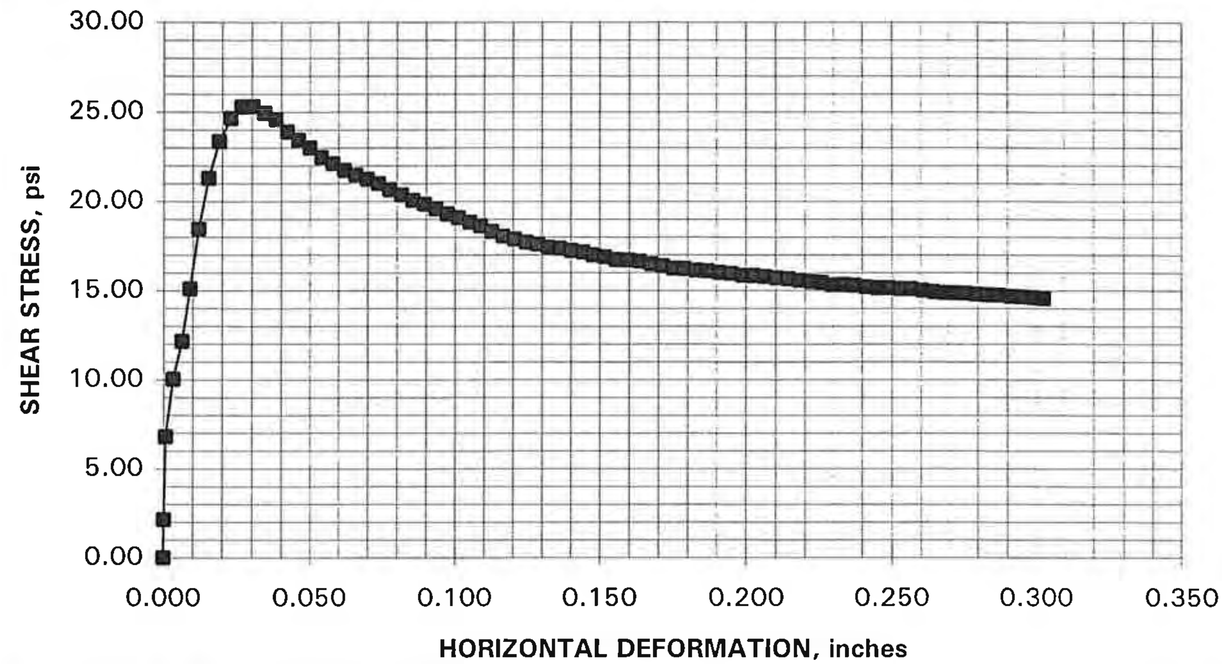
6/7/95

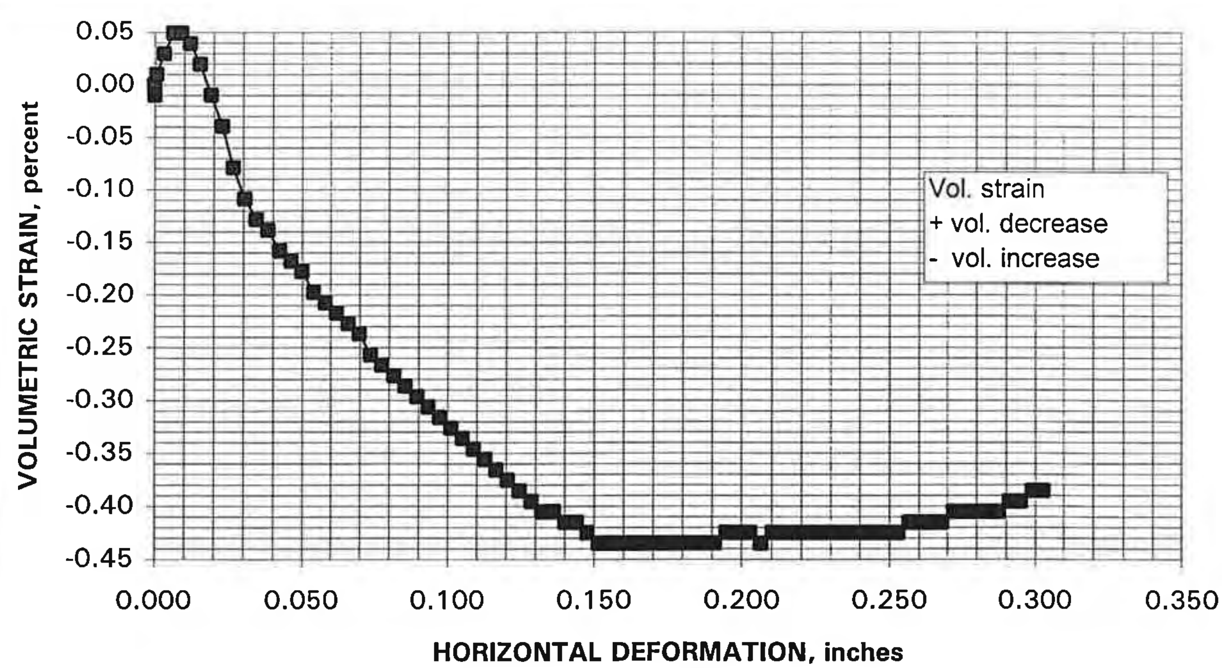
Figure B-14

DIRECT SHEAR TEST

Boring No.:	B-101	Spec. Hgt.:	1.012 in.	Proj. No.:	5E08560
Sample No.:	S-12	Spec. Dia.:	2.500 in.	Test No.:	DS-062
Spec. No.:	NONE	Load Rate:	4.8E-2 in/min		
Depth (ft):	54.25	Output Units:	psi		

Eff. Vert. Conf. Stress: 34.7 psi



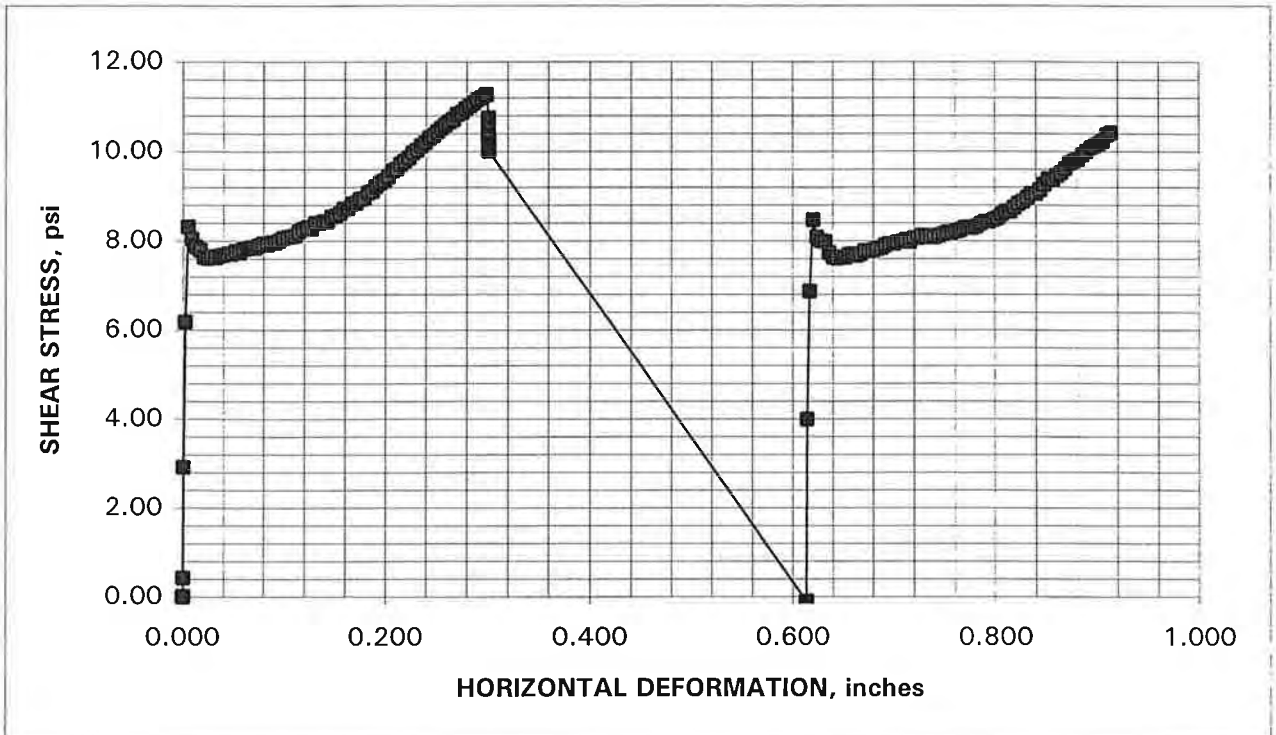


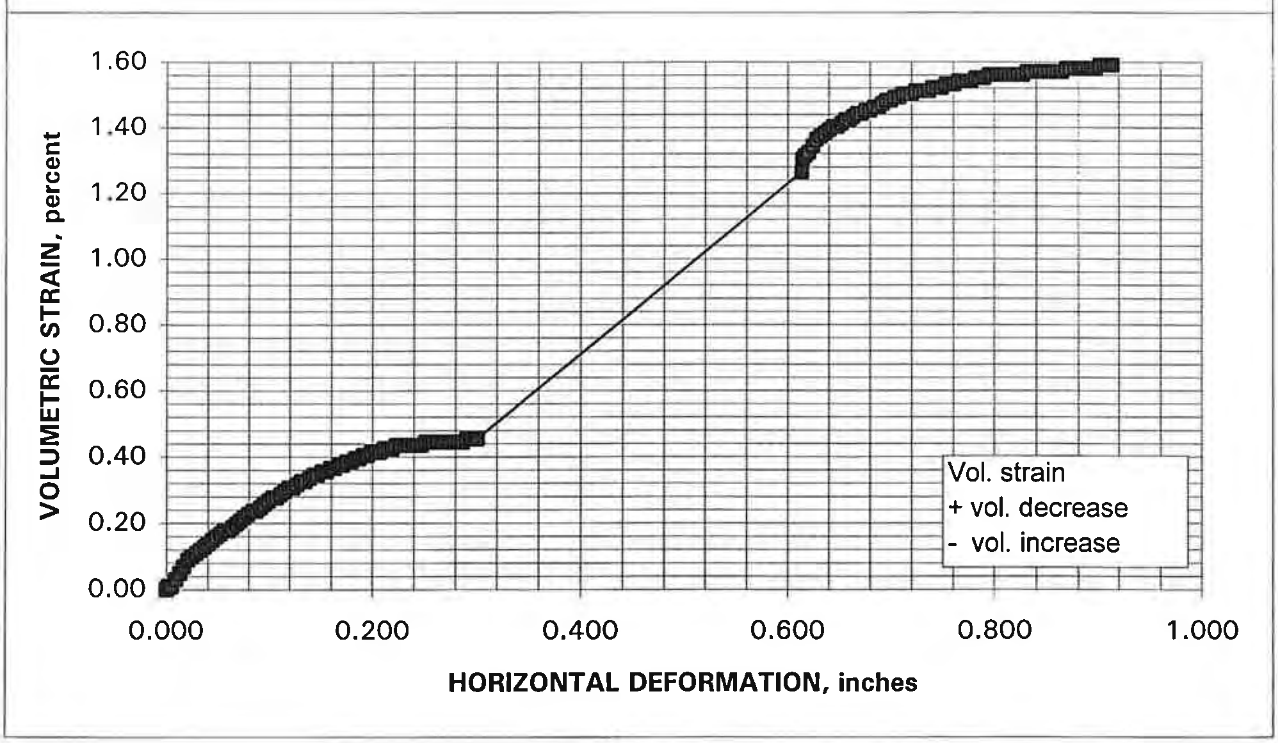
File: DS-062A.XLS Prepared by: CMT Reviewed by: GT Date: 5/16/95 **Figure B-15**

DIRECT SHEAR TEST

Boring No.:	B-101	Spec. Hgt.:	1.012 in.	Proj. No.:	5E08560
Sample No.:	S-12	Spec. Dia.:	2.500 in.	Test No.:	DS-062
Spec. No.:	NONE	Load Rate:	4.8E-2 in/min		
Depth (ft):	54.25	Output Units:	psi		

Eff. Vert. Conf. Stress: 34.7 psi





File: DS-062B.XLS Prepared by: CMT Reviewed by: ____ Date: 5/16/95 **Figure B-16**

APPENDIX C

INSTRUMENTATION

C-1 INCLINOMETERS

C-2 PEIZOMETER LOGS

C-3 ILLINOIS POWER CRACK GAGES

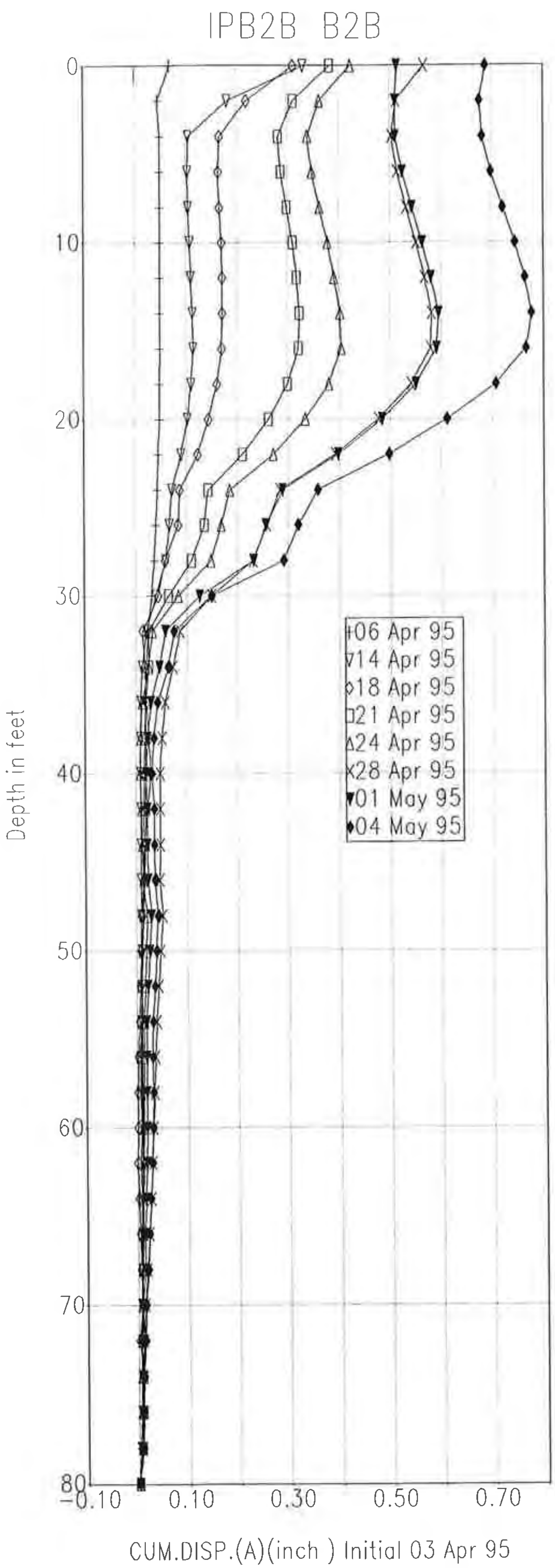
APPENDIX C
INSTRUMENTATION

APPENDIX C-1 - INCLINOMETERS

Six inclinometers were installed in borings within the landslide area. The purpose of the inclinometers was to determine the elevations of the slide planes and the rate of movement. Inclinometers were installed at depths ranging from 40 to 80 ft. Measurements within the inclinometers were made biweekly and summaries of the readings are shown in Figures C-1-1 through C-1-6. The amount of movement of the slides has been so great that all of the inclinometers eventually could not be read beyond the depth of the failure plane. Although new readings are not possible, the inclinometers clearly indicate the depth of the failure planes.

After the removal of soil for the interim repair, two additional inclinometers were installed to monitor possible movement along the failure plane. The readings taken in the month after installation indicate no significant movement and are shown in Figures C-1-7 and C-1-8.

Figure C-1-1


IPB2B B2B
Depth in feet
CUM.DISP.(A)(inch) Initial 03 Apr 95
06 Apr 95
14 Apr 95
18 Apr 95
21 Apr 95
24 Apr 95
28 Apr 95
01 May 95
04 May 95

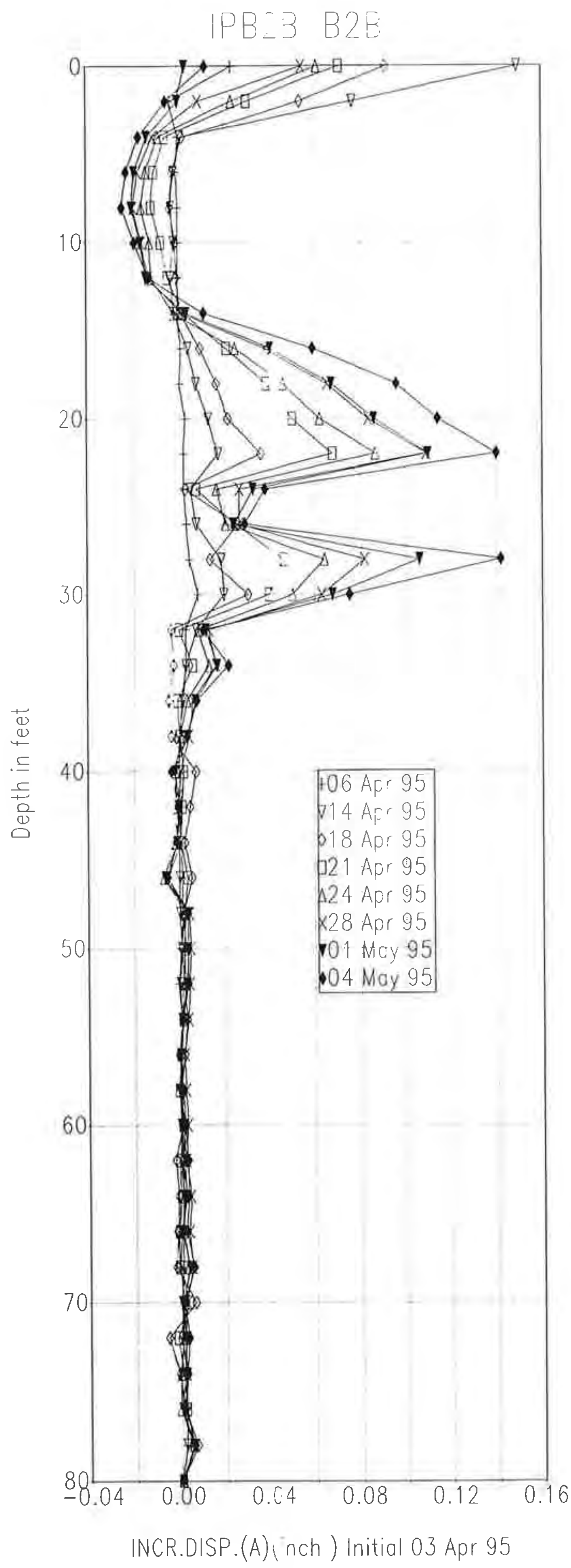
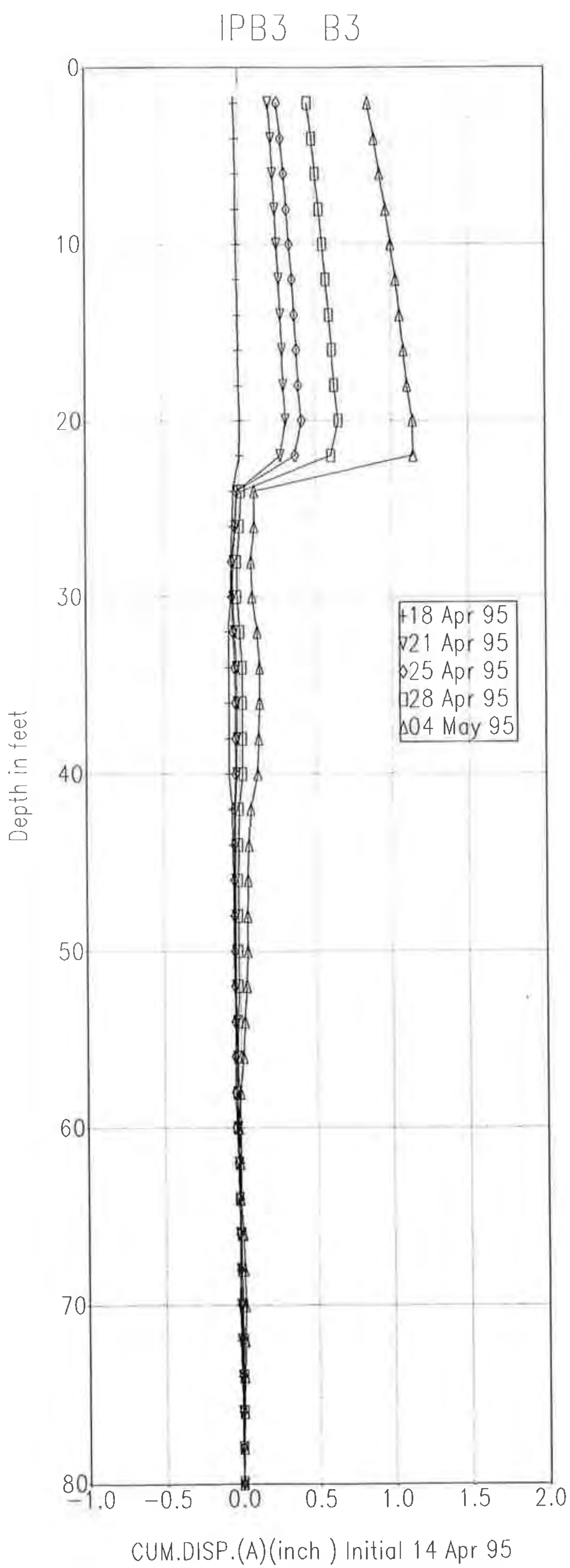
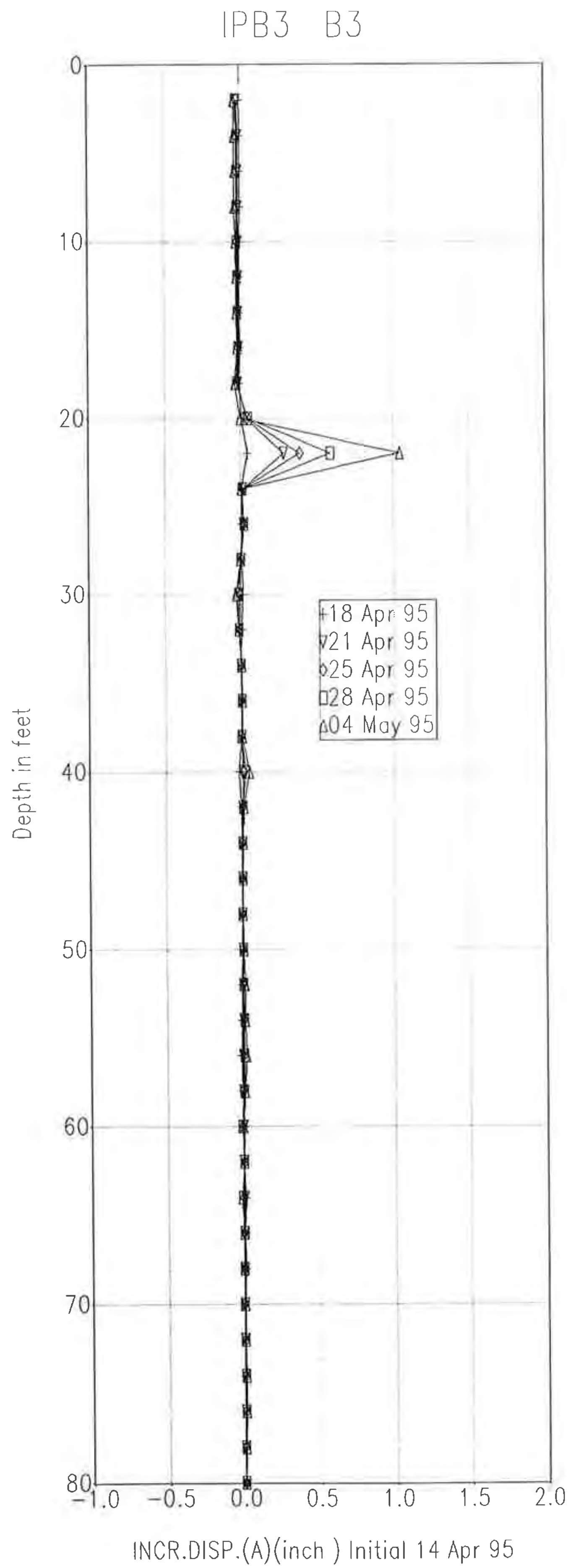

Depth in feet
INCR.DISP.(A)(inch) Initial 03 Apr 95
06 Apr 95
14 Apr 95
18 Apr 95
21 Apr 95
24 Apr 95
28 Apr 95
01 May 95
04 May 95

Figure C-1-2

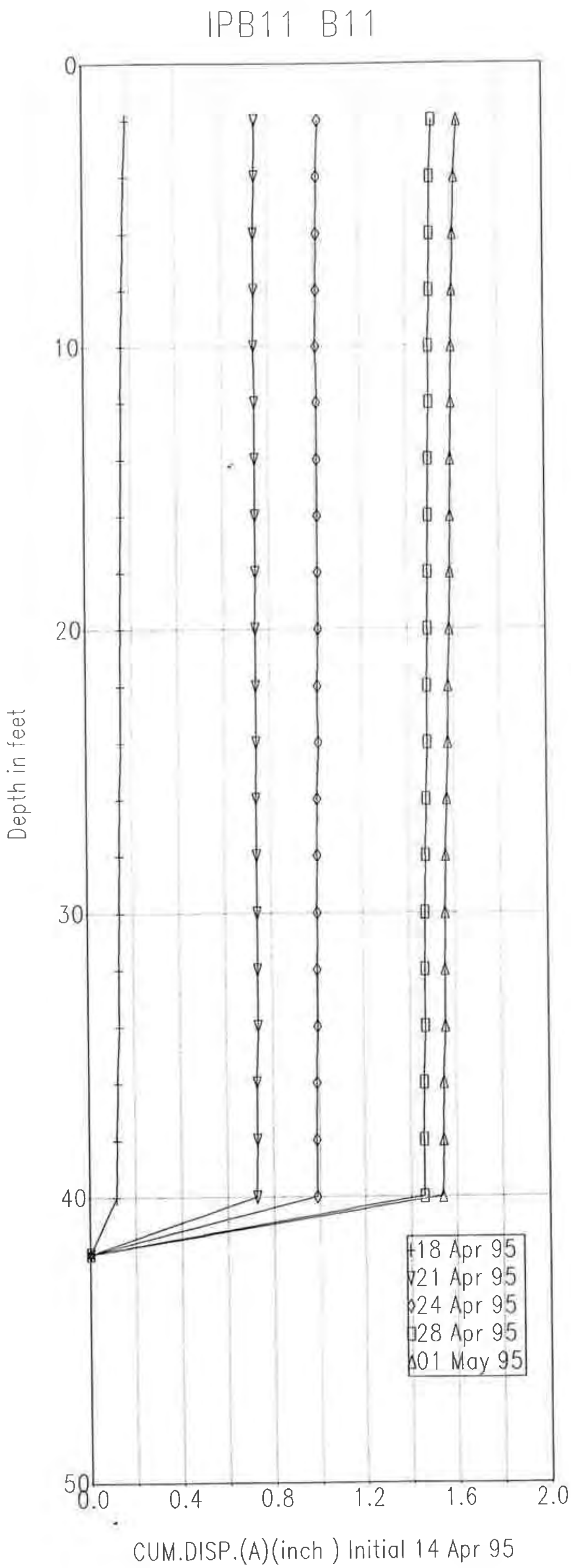


IPB3 B3
Depth in feet
0
10
20
30
40
50
60
70
80
−1.0 −0.5 0.0 0.5 1.0 1.5 2.0
CUM.DISP.(A)(inch) Initial 14 Apr 95
+18 Apr 95
▽21 Apr 95
◇25 Apr 95
□28 Apr 95
△04 May 95



IPB3 B3
Depth in feet
0
10
20
30
40
50
60
70
80
−1.0 −0.5 0.0 0.5 1.0 1.5 2.0
INCR.DISP.(A)(inch) Initial 14 Apr 95
+18 Apr 95
▽21 Apr 95
◇25 Apr 95
□28 Apr 95
△04 May 95

Figure C-1-3


IPB11 B11
Depth in feet
0
10
20
30
40
50
0.0
0.4
0.8
1.2
1.6
2.0
CUM.DISP.(A)(inch) Initial 14 Apr 95
+18 Apr 95
▽21 Apr 95
◇24 Apr 95
□28 Apr 95
△01 May 95

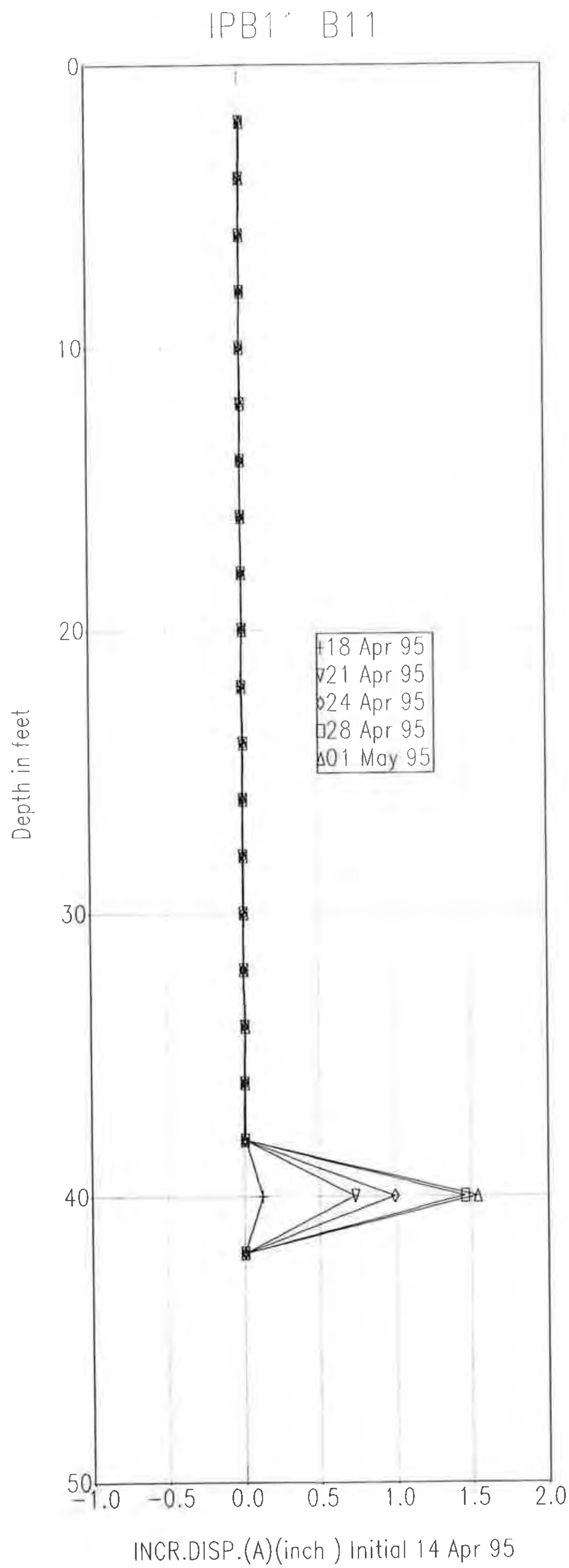
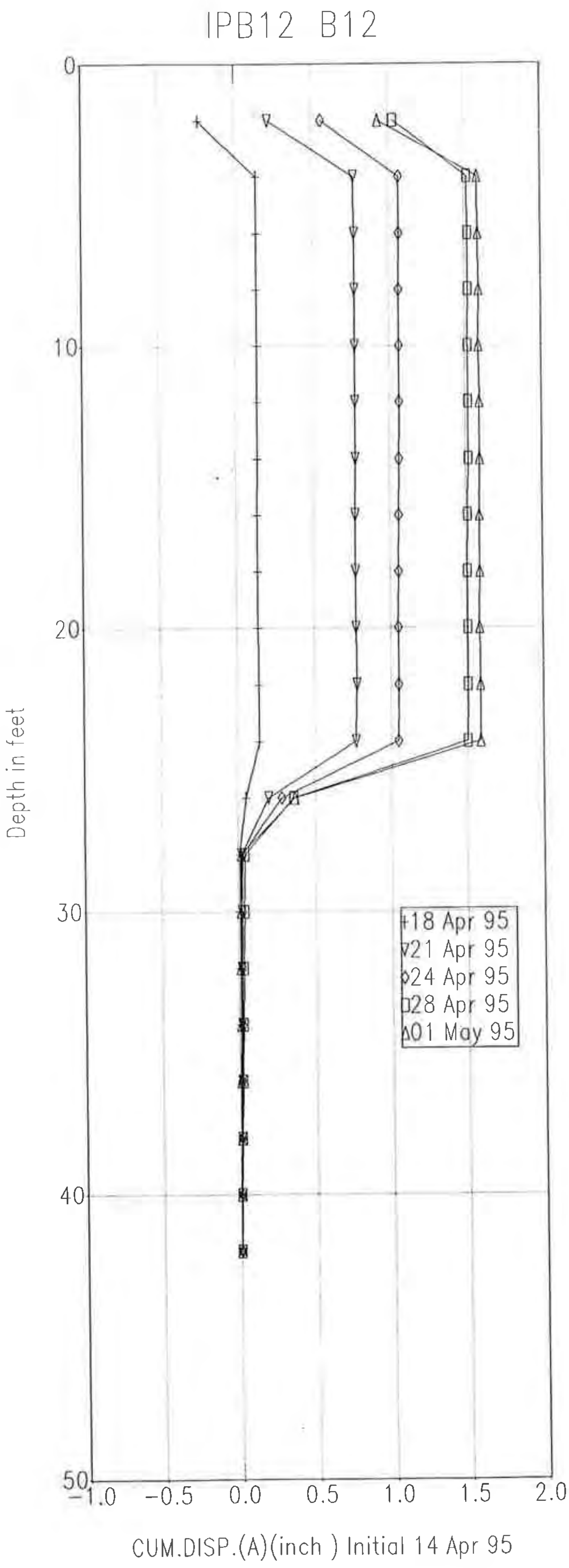
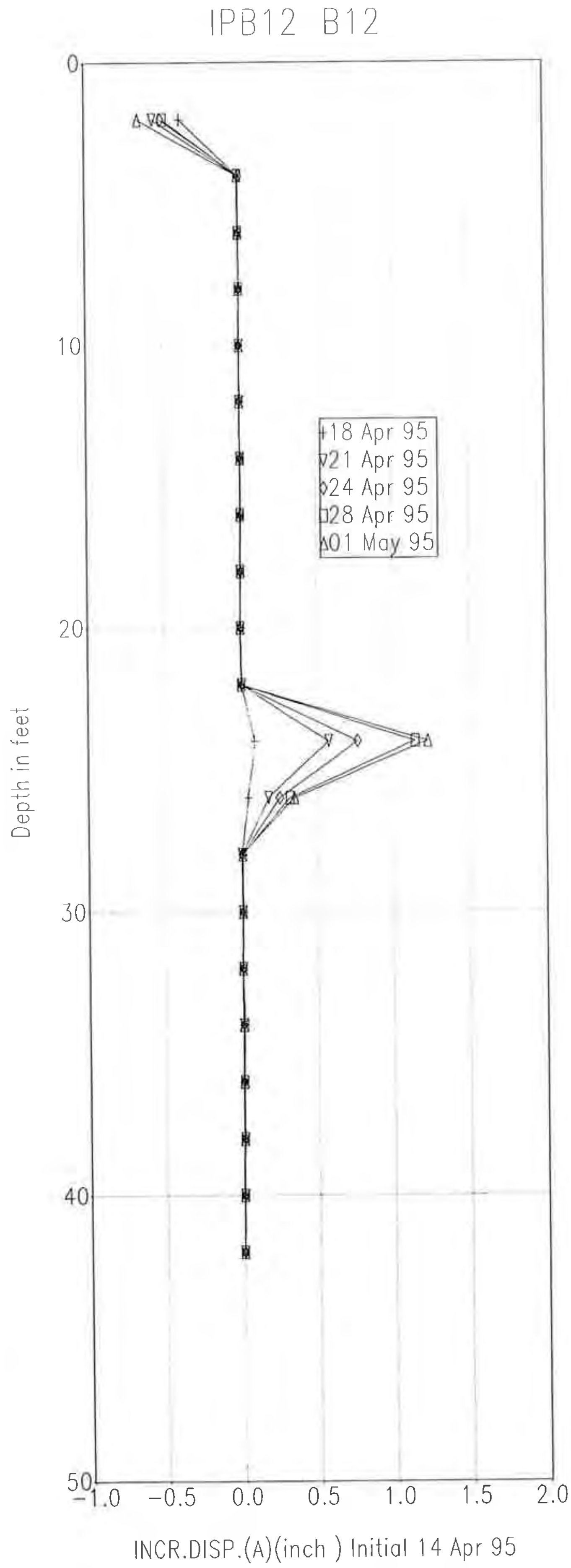

IPB1 B11
Depth in feet
0
10
20
30
40
50
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
INCR.DISP.(A)(inch) Initial 14 Apr 95
+18 Apr 95
▽21 Apr 95
◇24 Apr 95
□28 Apr 95
△01 May 95

Figure C-1-4

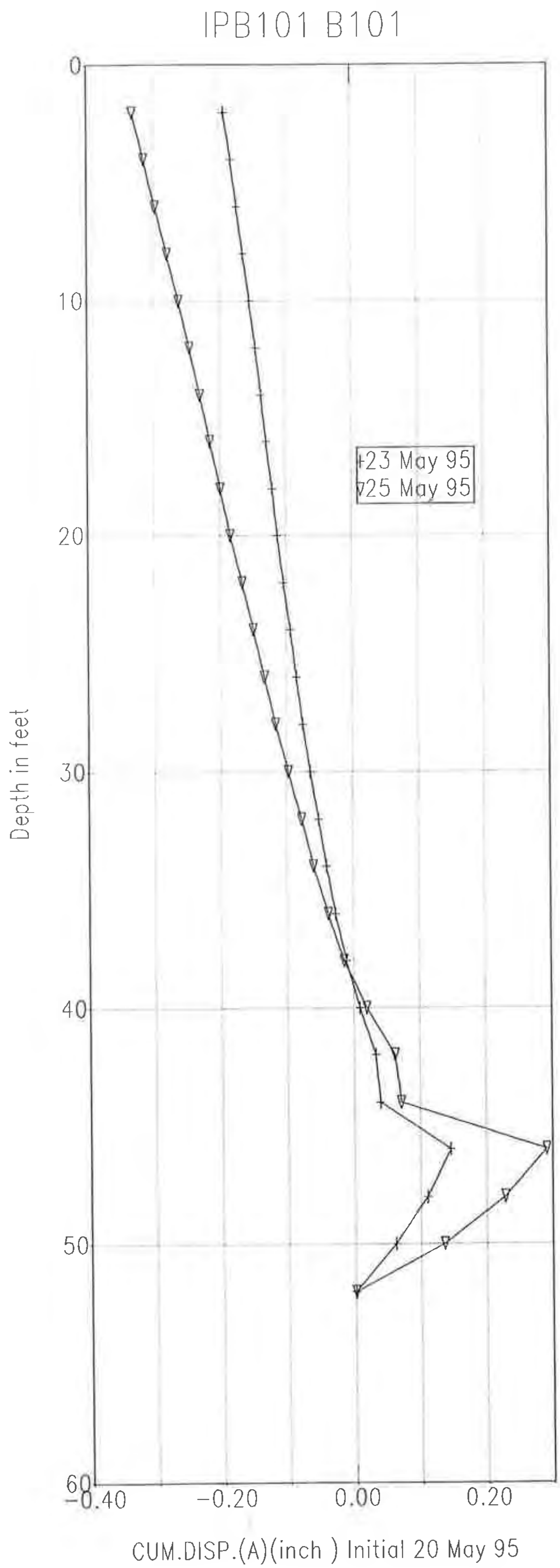


IPB12 B12
0
10
20
30
40
50
Depth in feet
+18 Apr 95
▽21 Apr 95
◇24 Apr 95
□28 Apr 95
△01 May 95
−1.0 −0.5 0.0 0.5 1.0 1.5 2.0
CUM.DISP.(A)(inch) Initial 14 Apr 95



IPB12 B12
0
10
20
30
40
50
Depth in feet
+18 Apr 95
▽21 Apr 95
◇24 Apr 95
□28 Apr 95
△01 May 95
−1.0 −0.5 0.0 0.5 1.0 1.5 2.0
INCR.DISP.(A)(inch) Initial 14 Apr 95

Figure C-1-5


IPB101 B101
Depth in feet
+23 May 95
▽25 May 95
CUM.DISP.(A)(inch) Initial 20 May 95

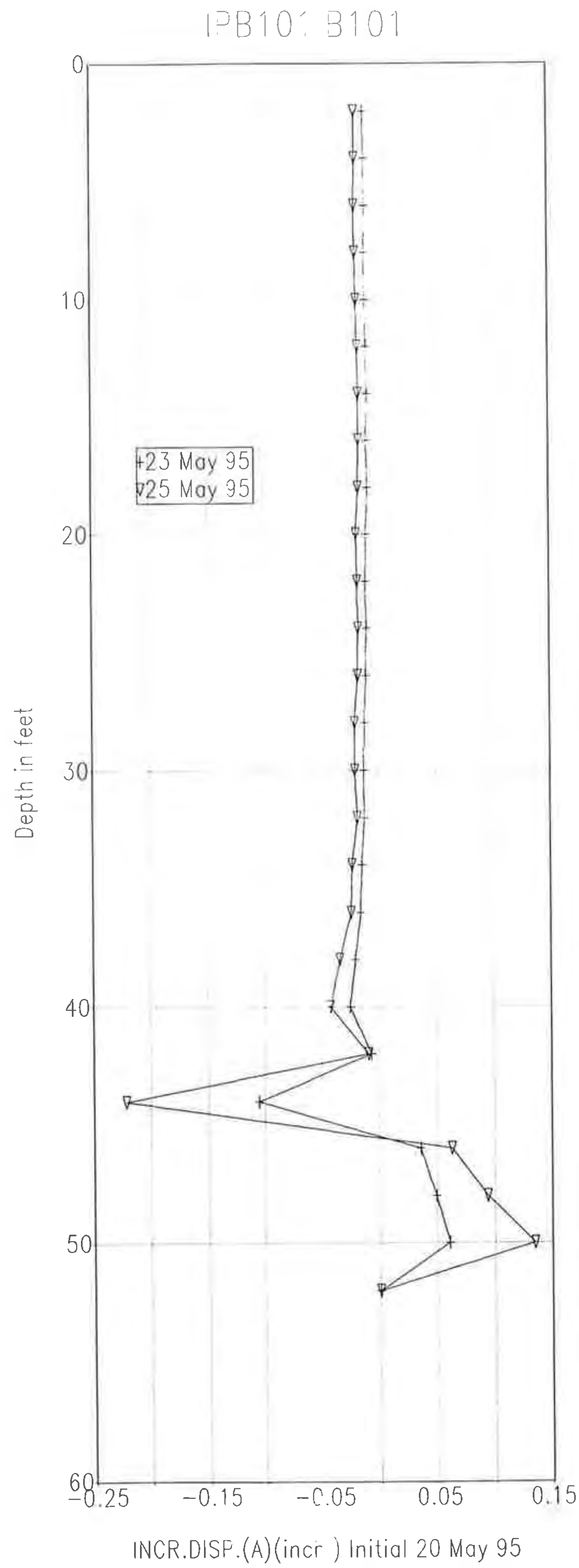
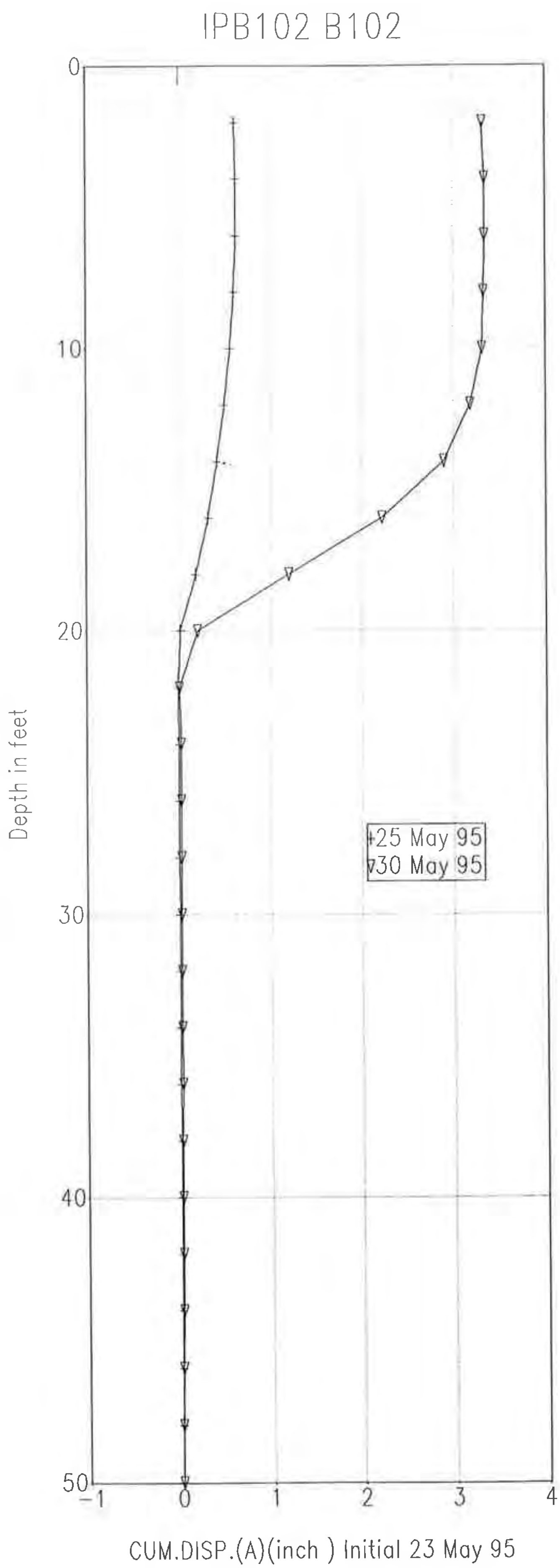

IPB101 B101
Depth in feet
+23 May 95
▽25 May 95
INCR.DISP.(A)(incr) Initial 20 May 95

Figure C-1-6


IPB102 B102
0
10
20
30
40
50
Depth in feet
-1
0
1
2
3
4
CUM.DISP.(A)(inch) Initial 23 May 95
+25 May 95
∇30 May 95

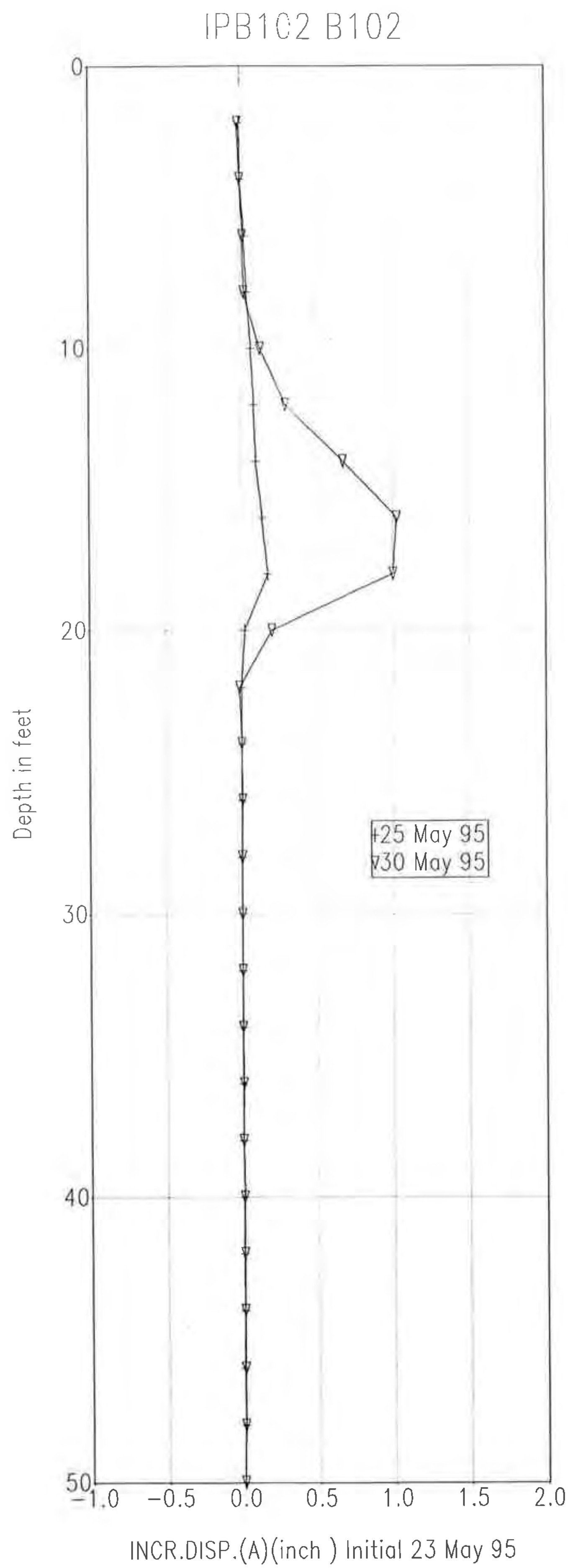
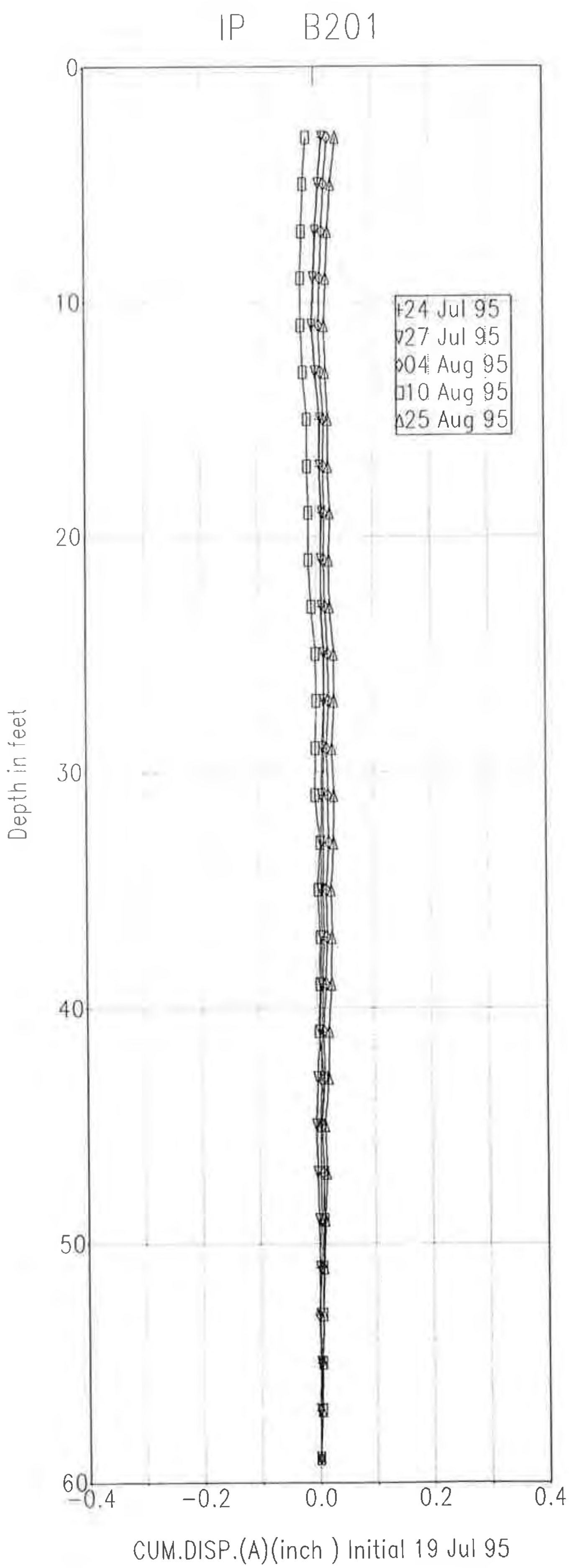
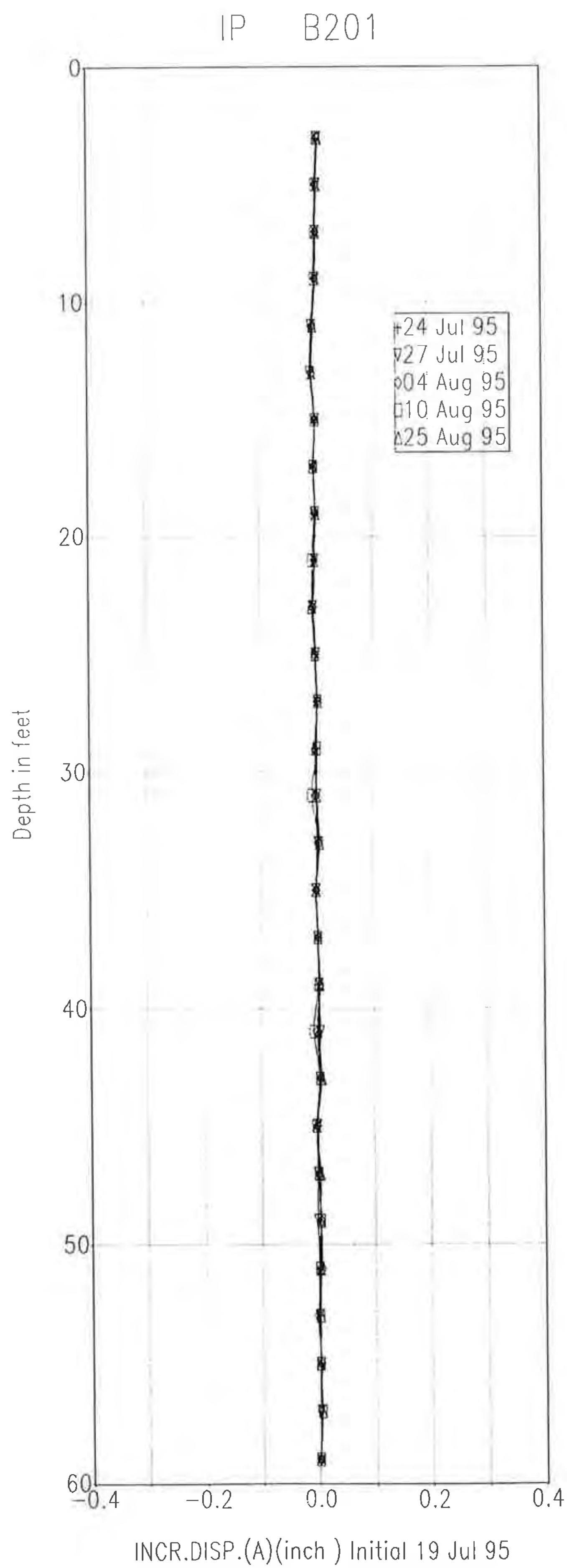

IPB102 B102
0
10
20
30
40
50
Depth in feet
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
INCR.DISP.(A)(inch) Initial 23 May 95
+25 May 95
∇30 May 95

Figure C-1-7

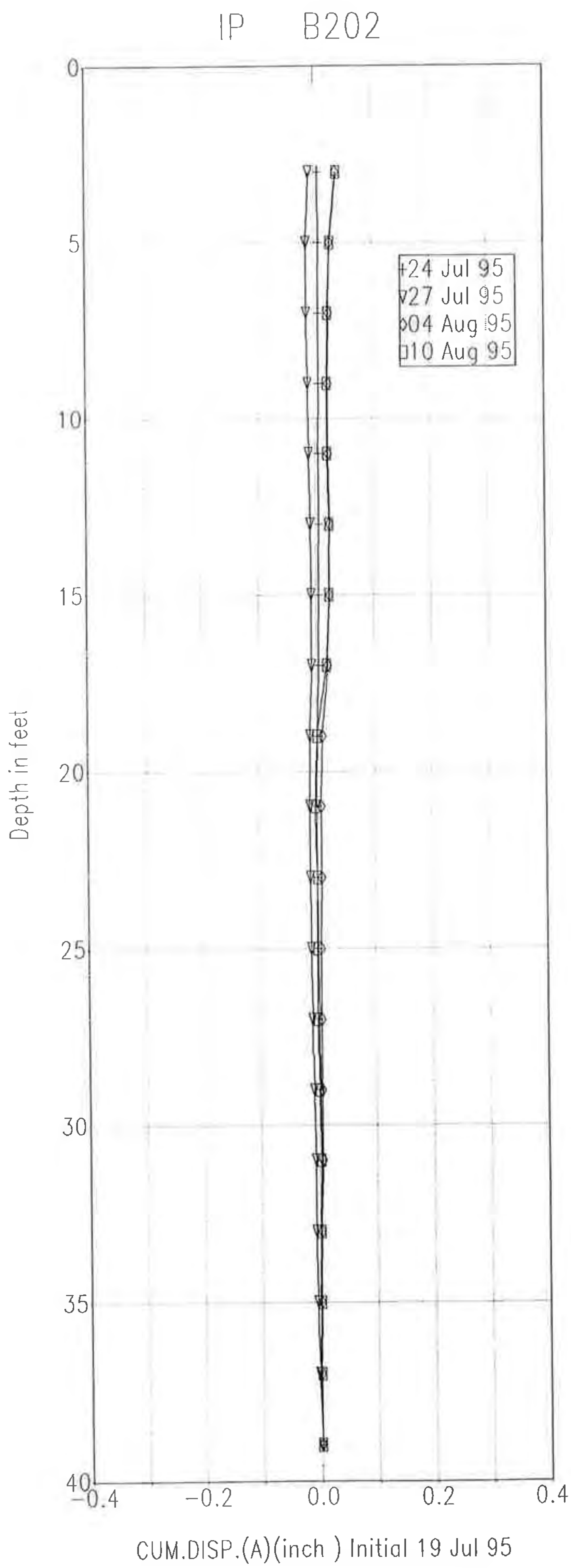


IP B201
Depth in feet
0
10
20
30
40
50
60
−0.4
−0.2
0.0
0.2
0.4
+24 Jul 95
▽27 Jul 95
◇04 Aug 95
□10 Aug 95
△25 Aug 95
CUM.DISP.(A)(inch) Initial 19 Jul 95

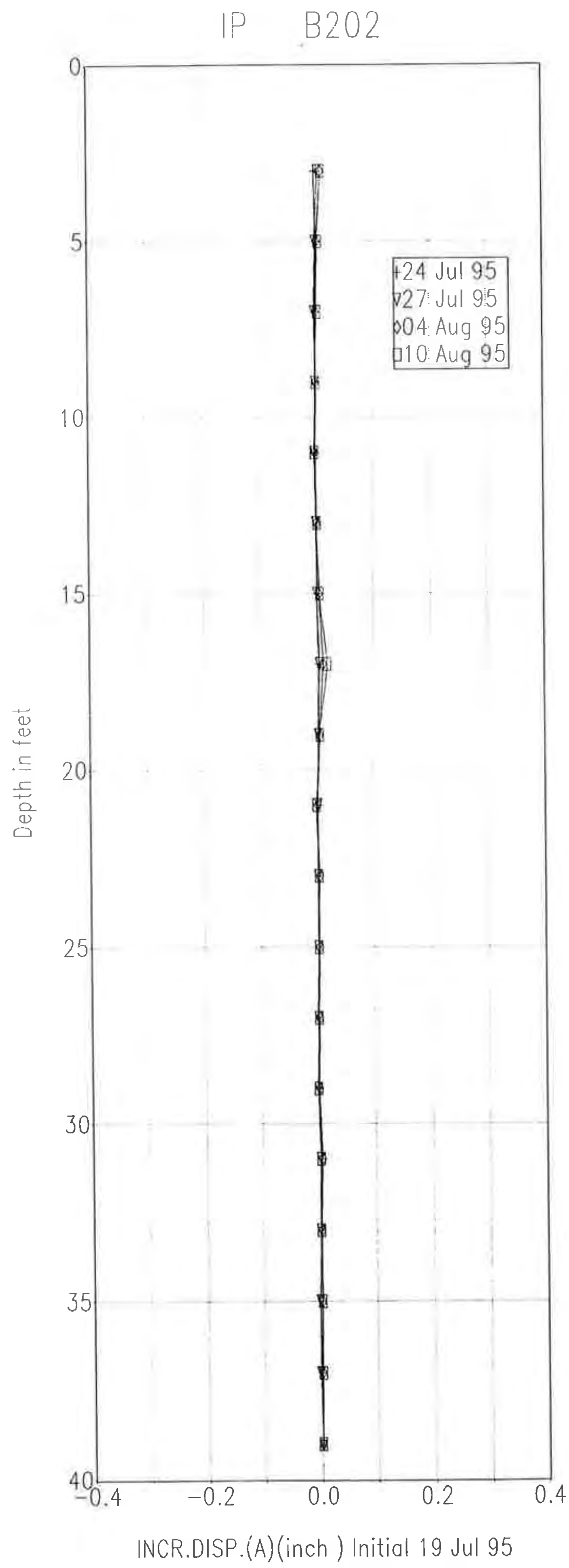


IP B201
Depth in feet
0
10
20
30
40
50
60
−0.4
−0.2
0.0
0.2
0.4
+24 Jul 95
▽27 Jul 95
◇04 Aug 95
□10 Aug 95
△25 Aug 95
INCR.DISP.(A)(inch) Initial 19 Jul 95

Figure C-1-8



IP B202
0
5
10
15
20
25
30
35
40
Depth in feet
+24 Jul 95
∇27 Jul 95
◊04 Aug 95
□10 Aug 95
−0.4
−0.2
0.0
0.2
0.4
CUM.DISP.(A)(inch) Initial 19 Jul 95



IP B202
0
5
10
15
20
25
30
35
40
Depth in feet
+24 Jul 95
∇27 Jul 95
◊04 Aug 95
□10 Aug 95
−0.4
−0.2
0.0
0.2
0.4
INCR.DISP.(A)(inch) Initial 19 Jul 95

APPENDIX C-2 - PIEZOMETER LOGS

A total of 10 piezometers were installed at the site to determine groundwater levels within the area. One stand-pipe piezometer was installed to a depth of 27-ft in P-1. Six vibrating wire piezometers were installed within the landslide, and three were installed east of the landslide. Detailed piezometer installation logs are included as Figures C-2-1 through C-2-10. A summary of the data collected from the piezometers is shown in Table 2. Results are plotted in Figure 10.

MONITORING WELL INSTALLATION REPORT **FIG. C-2-1**

Well No. PZ-01

Project Illinois Power/Baldwin Power Station

Location Baldwin, IL

Project No 5E08560 Installed By Layne-Western

Date 3/20/95 Time

Method of Installation

LOG OF BORING AND WELL

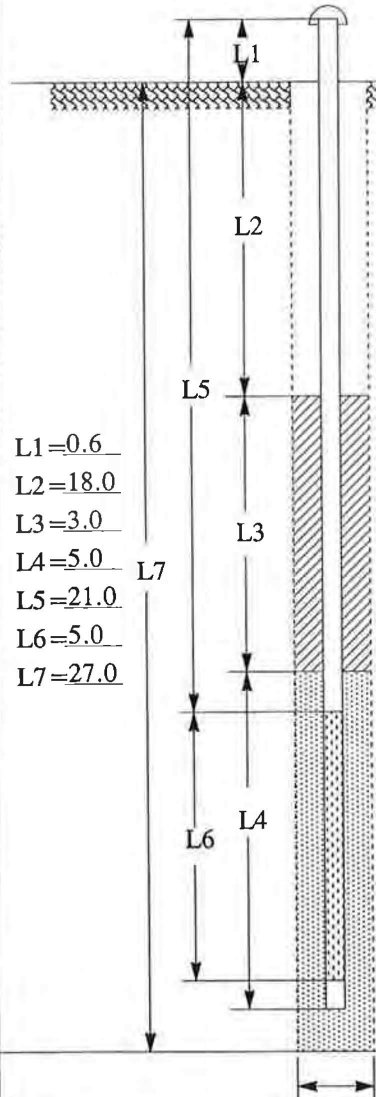
BORING

Depth in Ft.	Description	Symbol
0.00	Medium stiff, damp to moist, reddish-brown, low plastic, Silty CLAY (CL)(FILL) Becomes damp Becomes moist Grades trace gravel Becomes damp, brown Becomes gray with fly ash Becomes brown and gray	
21.00	Loose, moist, black, bottom ash (SP) Very loose, wet, black, bottom ash (SP)	

WELL

Type of Well Piezometer

Ground Elev. 98.0 Top of Riser Elev. 98.0



L1 = 0.6
L2 = 18.0
L3 = 3.0
L4 = 5.0
L5 = 21.0
L6 = 5.0
L7 = 27.0

Riser Pipe I.D., in. 2

Type of Pipe Schedule 40 PVC

Backfill Type Around Riser Grout

Top of Seal Elevation 80.0

Type of Seal Material Enviroplug

Top of Filter Elevation 77.0

Type of Filter Material Sand and ash sluff

Size of Opening, in. 0.01

Diameter of Well Tip, in. 2.0

Bottom of Screen Elevation 72.0

Bottom of Riser Elevation 72.0

Bttm of Boring Elev. 71.0

Diameter of Boring, in. 4.3

Remarks

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-2**

Well No. PZ-02

Project Illinois Power/Baldwin Power Station — Location Baldwin, IL

Project No 5E08560 — Installed By Layne-Western — Date 4/13/95 — Time

Method of Installation Drive point vibrating wire piezometer. Piezometer is pushed for final 5 feet of installation.

LOG OF BORING AND WELL

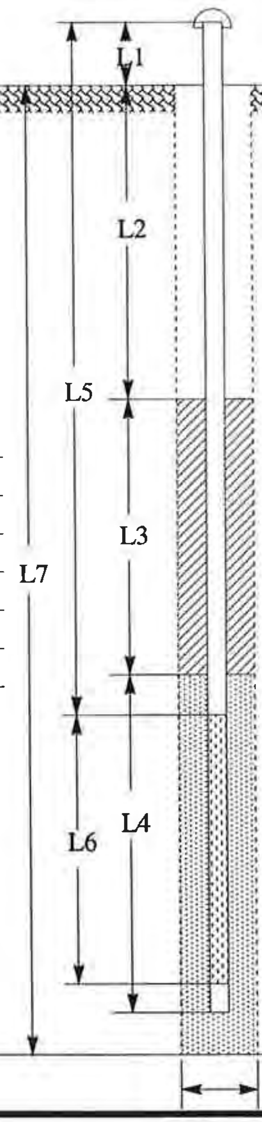
BORING

Depth in Ft.	Description	Symbol
0.00	Soft, damp, reddish-brown, Silty CLAY (CL); with organic roots	
2.00	Medium stiff, damp, reddish-gray with black specks, Silty CLAY (CL) Becoming reddish-brown Damp	
10.00	Becoming reddish-brown with gray, high plastic CLAY (CH)	
14.00	Reddish-brown-gray, low plastic CLAY (CL); with trace sand Becoming gray with reddish-brown; trace sand Gray with reddish brown	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 74.5 — Top of Riser Elev. 74.5



L1 = 0.0
L2 = 18.0
L3 = 2.0
L4 = 5.0
L5 = 25.0
L6 = 0.0
L7 = 25.0

Riser Pipe I.D., in. N/A

Type of Pipe Wire

Backfill Type Around Riser Cement grout

Top of Seal Elevation 56.5

Type of Seal Material Bentonite pellets

Top of Filter Elevation 54.5

Type of Filter Material N/A

Size of Opening, in. 0.00

Diameter of Well Tip, in. 1.3

Bottom of Screen Elevation 49.5

Bottom of Riser Elevation 49.5

Bttm of Boring Elev. 54.5

Diameter of Boring, in. 4.0

Remarks

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C–2–3**

Well No. **PZ-02A**

Project **Illinois Power/Baldwin Power Station** Location Baldwin, IL

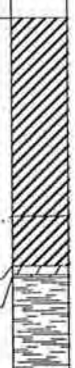
Project No **5E08560** Installed By Roberts Env. Date 5/10/95 Time

Method of Installation

LOG OF BORING AND WELL

BORING

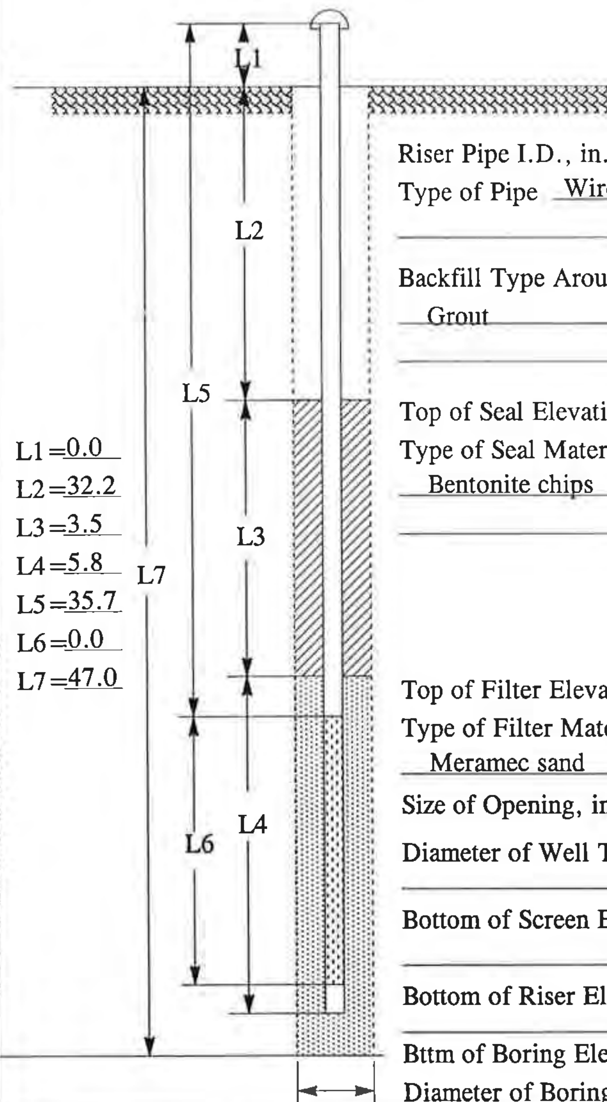
Depth in Ft.	Description
0.00	Boring not sampled 0 - 29.0 feet (See Log of Boring B-11A)
29.00	Stiff to very stiff, moist, orange and gray, high plastic CLAY (CH); with trace gravel
	Becomes very stiff, light brown; with little sand
39.00	Hard, high plastic CLAY (CH) (highly weathered shale)
41.50	Highly weathered LIMESTONE
42.10	Brown and gray, high plastic, highly weathered SHALE; with trace sand and gravel Possible slickenside at 43.0 feet



WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 74.5 Top of Riser Elev. 74.5



L1 = 0.0
L2 = 32.2
L3 = 3.5
L4 = 5.8
L5 = 35.7
L6 = 0.0
L7 = 47.0

Riser Pipe I.D., in. N/A

Type of Pipe Wire

Backfill Type Around Riser Grout

Top of Seal Elevation 42.3

Type of Seal Material Bentonite chips

Top of Filter Elevation 38.8

Type of Filter Material Meramec sand

Size of Opening, in. 0.00

Diameter of Well Tip, in. 0.5

Bottom of Screen Elevation 33.0

Bottom of Riser Elevation 33.0

Bttm of Boring Elev. 27.5

Diameter of Boring, in. 8.0

Remarks

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-4**

Well No. PZ-03

Project Illinois Power/Baldwin Power Station — Location Baldwin, IL

Project No 5E08560 — Installed By Layne-Western — Date 4/13/95 — Time

Method of Installation Drive point vibrating wire piezometer. Piezometer is pushed for final 5 feet of installation.

LOG OF BORING AND WELL

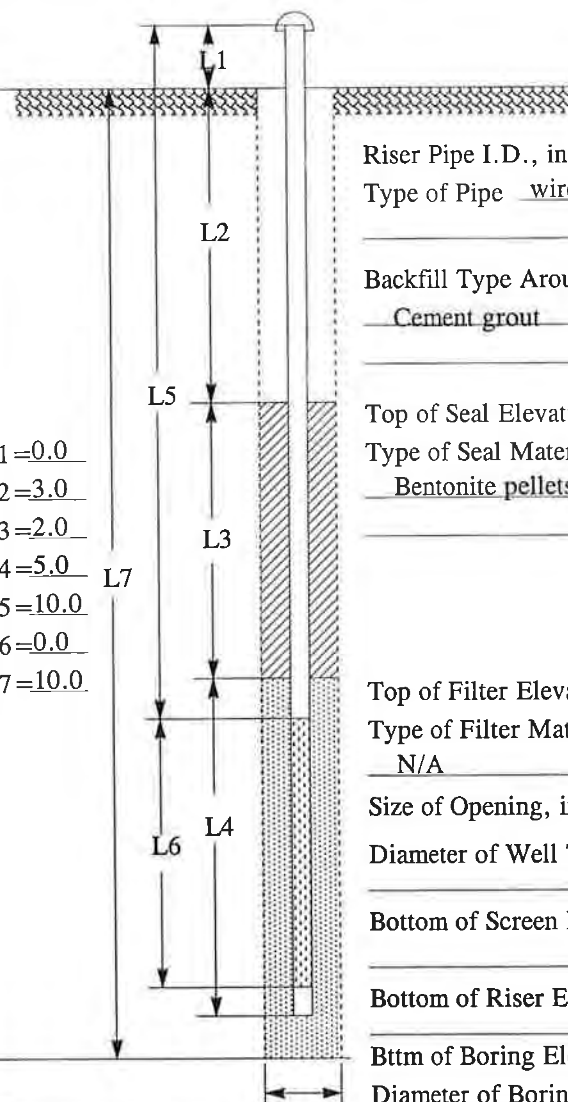
BORING

Depth in Ft.	Description	Symbol
0.00	Medium stiff, moist, brown, low plastic, silty CLAY (CL) to clayey silt	
	Becomes very soft, wet, gray; with some sand	
	Becomes stiff, gray and orangish-brown	
	Bottom of Boring at 10.0 feet	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 50.8 — Top of Riser Elev. 50.8



L1 = 0.0
L2 = 3.0
L3 = 2.0
L4 = 5.0
L5 = 10.0
L6 = 0.0
L7 = 10.0

Riser Pipe I.D., in. N/A

Type of Pipe wire

Backfill Type Around Riser Cement grout

Top of Seal Elevation 47.8

Type of Seal Material Bentonite pellets

Top of Filter Elevation 45.8

Type of Filter Material N/A

Size of Opening, in. 0.00

Diameter of Well Tip, in. 1.3

Bottom of Screen Elevation 40.8

Bottom of Riser Elevation 40.8

Bttm of Boring Elev. 45.8

Diameter of Boring, in. 4.0

Remarks

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-5**

Well No. PZ-03A

Project Illinois Power/Baldwin Power Station

Location Baldwin, IL

Project No 5E08560 Installed By Roberts Env.

Date 5/15/95 Time

Method of Installation

LOG OF BORING AND WELL

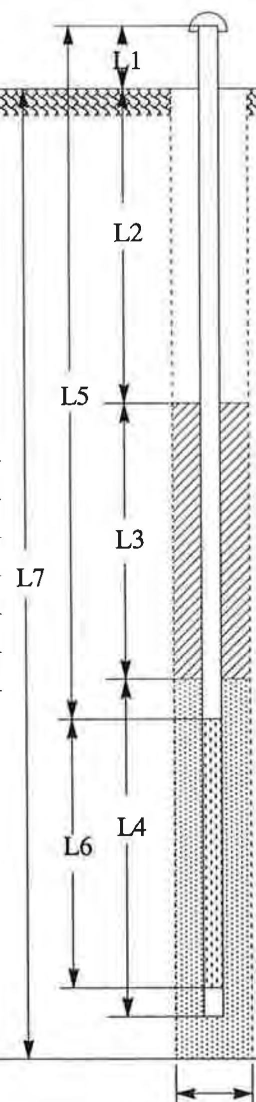
BORING

Depth in Ft.	Description	Symbol
0.00	Firm, moist to wet, medium gray, low plastic, Clayey SILT (ML); trace roots, wet, pocket of medium sand	
8.00	Firm, moist to wet, medium gray, medium to high plastic, Silty CLAY (CL); with 6-inch layer of fine grained, silty sand	
12.50	Firm, moist, light gray, medium to high plastic, Silty CLAY (CL); with mottles of tan, sandy clay, trace coarse to medium sand	
18.70	Dark gray, moderately weathered LIMESTONE	
19.30	Dark gray, severely weathered SHALE 0.2 feet Limestone at 20.0 feet Trace gravel, shale becomes greenish-gray at 23.8 feet Becomes maroon	
	Bottom of boring at 27.0 feet	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 50.8 Top of Riser Elev. 50.8



L1 = 0.0
L2 = 16.3
L3 = 2.0
L4 = 3.9
L5 = 22.2
L6 = 0.0
L7 = 27.0

Riser Pipe I.D., in. N/A

Type of Pipe wire

Backfill Type Around Riser Grout

Top of Seal Elevation 34.5

Type of Seal Material Bentonite chips

Top of Filter Elevation 32.5

Type of Filter Material WB-40 sand

Size of Opening, in. 0.00

Diameter of Well Tip, in. 0.5

Bottom of Screen Elevation 28.6

Bottom of Riser Elevation 28.6

Bttm of Boring Elev. 23.8

Diameter of Boring, in. 2.9

Remarks

Inspected By T. Deddens

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT

FIG. C-2-6

Well No. **PZ-04**

Project **Illinois Power/Baldwin Power Station** Location Baldwin, IL

Project No **5E08560** Installed By Roberts Env. Date 5/12/95 Time ______

Method of Installation ______

LOG OF BORING AND WELL

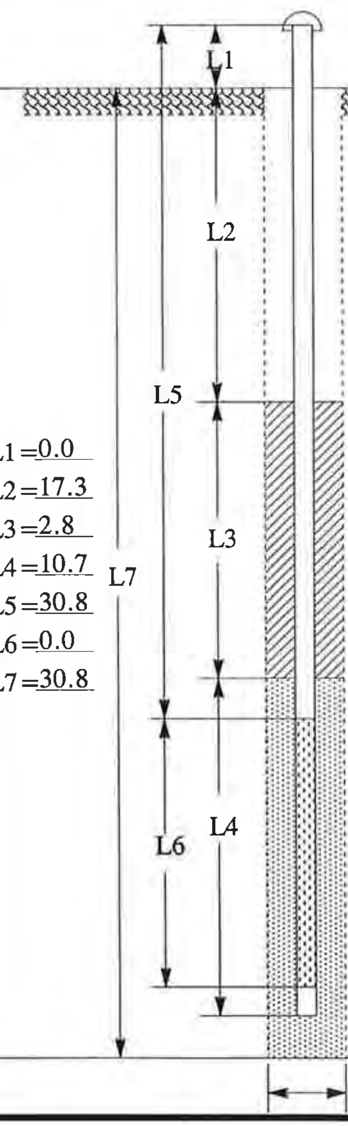
BORING

Depth in Ft.	Description	Symbol
0.00	Medium stiff, moist, brown, low plastic CLAY (CL) (Fill)	
	Becomes gray, more silty	
20.00	Stiff to very stiff, moist to wet, brown, medium plastic, Silty CLAY (CL); some fine gravel, coarse sand, trace medium to fine sand	
24.00	Firm to stiff, orange-brown, high plastic CLAY (CH); trace fine gravel, coarse sand	
25.00	Moist, orange, silty CLAY (CL); with rock fragments	
25.80	25.8 - 26.9: LIMESTONE	
26.90	26.9 - 27.2: Probable clay (no recovery)	
27.20	Damp, green, high plastic, highly weathered CLAY-SHALE; with silt and oxidation	
30.50	Becomes highly weathered LIMESTONE	
	Bottom of boring at 30.8 feet	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 58.7 Top of Riser Elev. 58.7



L1 = 0.0
L2 = 17.3
L3 = 2.8
L4 = 10.7
L5 = 30.8
L6 = 0.0
L7 = 30.8

Riser Pipe I.D., in. N/A

Type of Pipe wire

Backfill Type Around Riser
Grout

Top of Seal Elevation 41.4

Type of Seal Material
Bentonite chips

Top of Filter Elevation 38.6

Type of Filter Material
Sand

Size of Opening, in. 0.00

Diameter of Well Tip, in. 0.5

Bottom of Screen Elevation 27.9

Bottom of Riser Elevation 27.9

Bttm of Boring Elev. 27.9

Diameter of Boring, in. 8.0

Remarks ______

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT

FIG. C-2-7

Well No. **PZ-05**

Project **Illinois Power/Baldwin Power Station** Location Baldwin, IL

Project No **5E08560** Installed By Layne-Western Date 4/13/95 Time

Method of Installation Drive point vibrating wire piezometer. Piezometer is pushed for final 5 feet of installation.

LOG OF BORING AND WELL

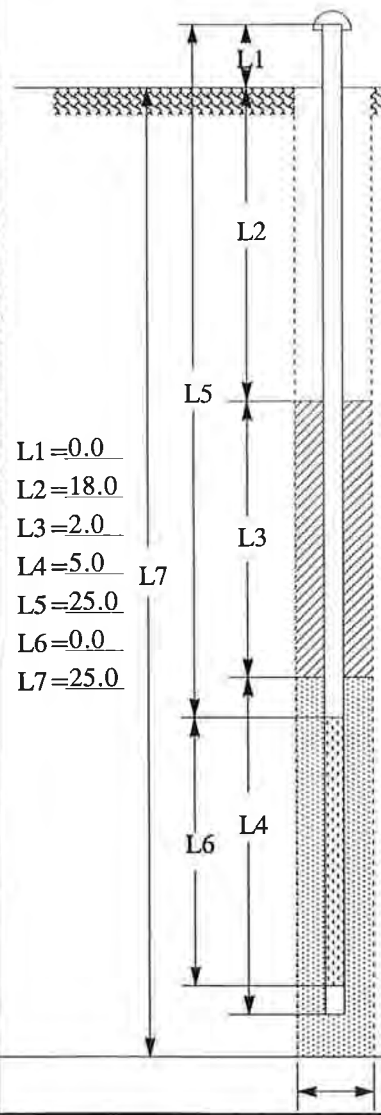
BORING

Depth in Ft.	Description	Symbol
0.00	Medium stiff, brown, low plastic, Silty CLAY (CL)	
6.00	Damp, fly ash/gravel (SP); with clay	
7.50	and bottom ash	
	Very stiff, mottled gray and brown, low plastic, Silty CLAY (CL)	
10.00	Becoming reddish-brown with gray, high plastic CLAY (CH)	
14.00	Reddish-brown-gray, low plastic CLAY (CL); with trace sand Becoming gray with reddish-brown; trace sand Gray with reddish-brown	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 75.0 Top of Riser Elev. 75.0



L1 = 0.0
L2 = 18.0
L3 = 2.0
L4 = 5.0
L5 = 25.0
L6 = 0.0
L7 = 25.0

Riser Pipe I.D., in. N/A

Type of Pipe wire

Backfill Type Around Riser Cement grout

Top of Seal Elevation 57.0

Type of Seal Material Bentonite pellets

Top of Filter Elevation 55.0

Type of Filter Material N/A

Size of Opening, in. 0.00

Diameter of Well Tip, in. 1.3

Bottom of Screen Elevation 50.0

Bottom of Riser Elevation 50.0

Bttm of Boring Elev. 55.0

Diameter of Boring, in. 4.0

Remarks

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-8**

Well No. PZ-05A

Project: Illinois Power/Baldwin Power Station — Location: Baldwin, IL

Project No: 5E08560 — Installed By: Roberts Env. — Date: 5/11/95 — Time:

Method of Installation:

LOG OF BORING AND WELL

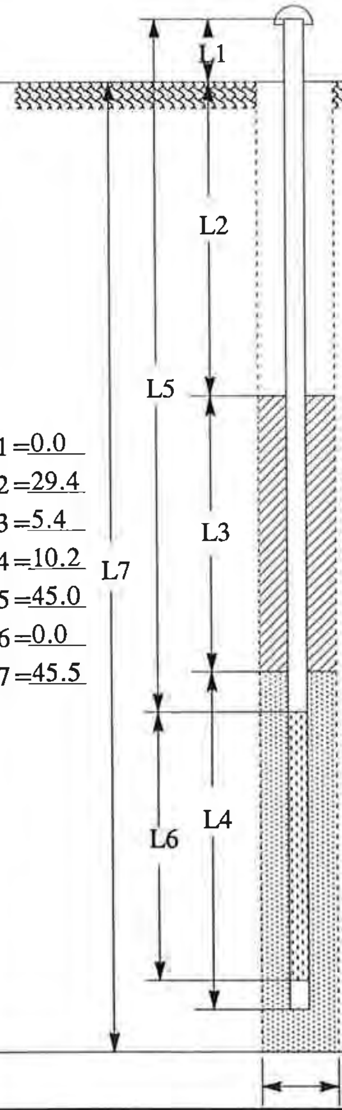
BORING

Depth in Ft.	Description	Symbol
0.00	Stiff, moist, low to medium plastic CLAY (CL) (Fill)	
	Becoming stiff, medium plastic CLAY (CL)	
14.70	Stiff, moist, gray, medium plastic CLAY (CL); with trace oxidation	
17.50	Stiff, moist, brown, medium plastic CLAY (CL); with trace fine roots	
	Firm to stiff, moist, gray, low plastic, Silty CLAY (CL); with little oxidation	
27.50	Soft to medium stiff, moist, orangish-brown, low plastic, silty CLAY (CL); with trace fine sand, pebbles	
34.00	Stiff, moist, light brown, medium to high plastic CLAY (CL); with trace sand (1/2 inch rounded pebbles)	
37.20	Very stiff to hard, damp, orangish-brown, low plastic CLAY (CL)	
41.50	Hard, damp, light green, high plastic CLAY (CH); with trace sand	
	Bottom of boring at 45.5 feet	

WELL

Type of Well: Vibr. Wire Piezo.

Ground Elev. 75.0 — Top of Riser Elev. 75.0



L1 = 0.0
L2 = 29.4
L3 = 5.4
L4 = 10.2
L5 = 45.0
L6 = 0.0
L7 = 45.5

Riser Pipe I.D., in. N/A

Type of Pipe: Wire

Backfill Type Around Riser: Grout

Top of Seal Elevation: 45.6

Type of Seal Material: Bentonite chips

Top of Filter Elevation: 40.2

Type of Filter Material: Meramec sand

Size of Opening, in. 0.00

Diameter of Well Tip, in. 0.5

Bottom of Screen Elevation: 30.0

Bottom of Riser Elevation: 30.0

Bttm of Boring Elev. 29.5

Diameter of Boring, in. 8.0

Remarks:

Inspected By: K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-9**

Well No. PZ-06

Project: **Illinois Power/Baldwin Power Station**

Location: Baldwin, IL

Project No: **5E08560**

Installed By: Layne-Western

Date: 4/12/95

Time:

Method of Installation: Drive point vibrating wire piezometer. Piezometer is pushed for final 5 feet of installation.

LOG OF BORING AND WELL

BORING

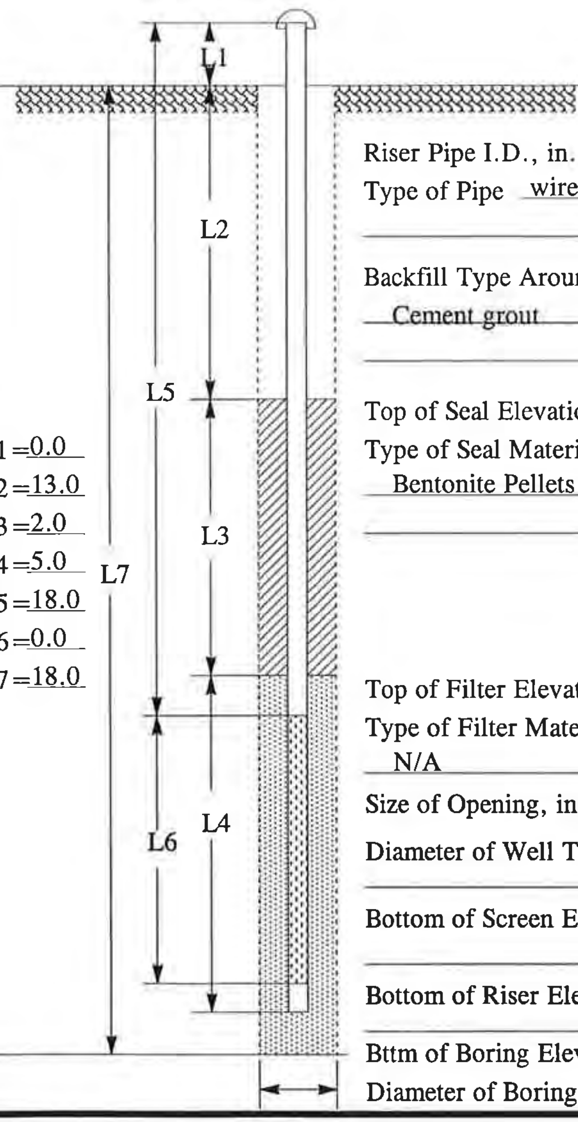
Depth in Ft.	Description	Symbol
0.00	Medium stiff, damp to moist, reddish-brown, low plastic, Silty CLAY (CL)(FILL) Becomes damp Becomes moist Grades trace gravel Becomes damp, brown Becomes gray with fly ash	

WELL

Type of Well: Piezometer

Ground Elev. 97.9

Top of Riser Elev. 97.9



L1 = 0.0
L2 = 13.0
L3 = 2.0
L4 = 5.0
L5 = 18.0
L6 = 0.0
L7 = 18.0

Riser Pipe I.D., in. N/A

Type of Pipe: wire

Backfill Type Around Riser: Cement grout

Top of Seal Elevation: 86.9

Type of Seal Material: Bentonite Pellets

Top of Filter Elevation: 84.9

Type of Filter Material: N/A

Size of Opening, in. 0.00

Diameter of Well Tip, in. 1.3

Bottom of Screen Elevation: 79.9

Bottom of Riser Elevation: 79.9

Bttm of Boring Elev. 84.9

Diameter of Boring, in. 4.0

Remarks:

Inspected By: K. Berry

WOODWARD-CLYDE CONSULTANTS

MONITORING WELL INSTALLATION REPORT **FIG. C-2-10**

Well No. PZ-07

Project Illinois Power/Baldwin Power Station Location Baldwin, IL

Project No 5E08560 Installed By Roberts Env. Date 5/15/95 Time

Method of Installation

LOG OF BORING AND WELL

BORING

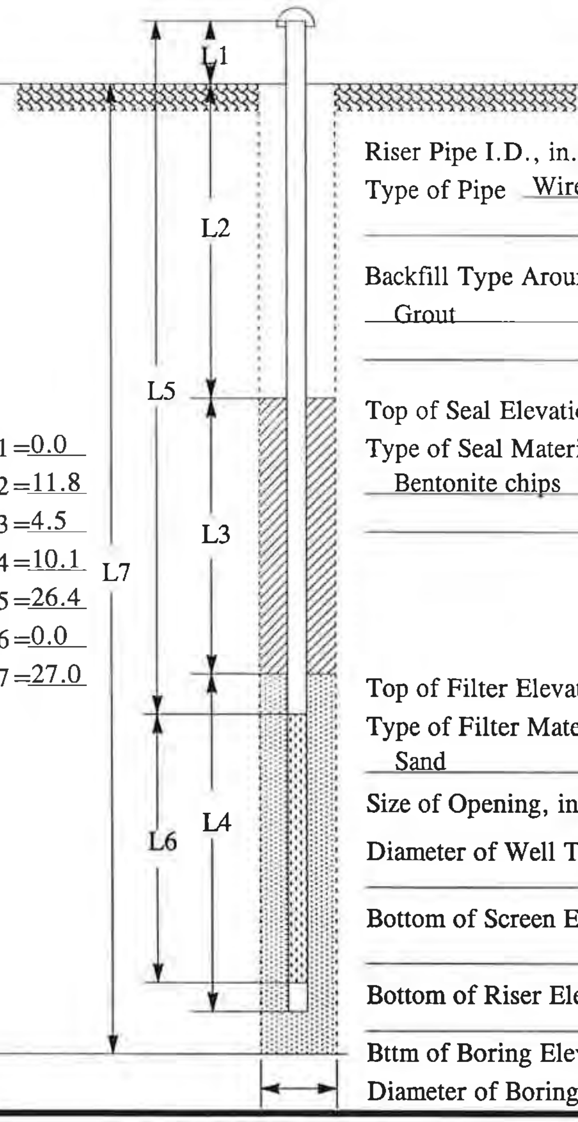
Depth in Ft.	Description	Symbol
0.00	Moist, brown, Silty CLAY (CL)	
4.00	Stiff, moist, greenish-gray, medium to high plastic CLAY (CL/CH); with trace organics	
7.00	Medium stiff, moist, mottled orangish brown, low plastic, silty clay and gray, high plastic CLAY (CL/CH); with little sand	
12.00	Stiff, moist, light brown, high plastic CLAY (CH); with little sand, fine pebbles Becomes mottled gray and brown	
22.00	Dry to damp, light gray, high plastic CLAY (highly weathered shale)	
	Bottom of boring at 27.0 feet	

WELL

Type of Well Vibr. Wire Piezo.

Ground Elev. 51.0 Top of Riser Elev. 51.0

L1 = 0.0
L2 = 11.8
L3 = 4.5
L4 = 10.1
L5 = 26.4
L6 = 0.0
L7 = 27.0



Riser Pipe I.D., in. N/A

Type of Pipe Wire

Backfill Type Around Riser
Grout

Top of Seal Elevation 39.2

Type of Seal Material
Bentonite chips

Top of Filter Elevation 34.7

Type of Filter Material
Sand

Size of Opening, in. 0.00

Diameter of Well Tip, in. 0.5

Bottom of Screen Elevation 24.6

Bottom of Riser Elevation 24.6

Bttm of Boring Elev. 24.0

Diameter of Boring, in. 8.0

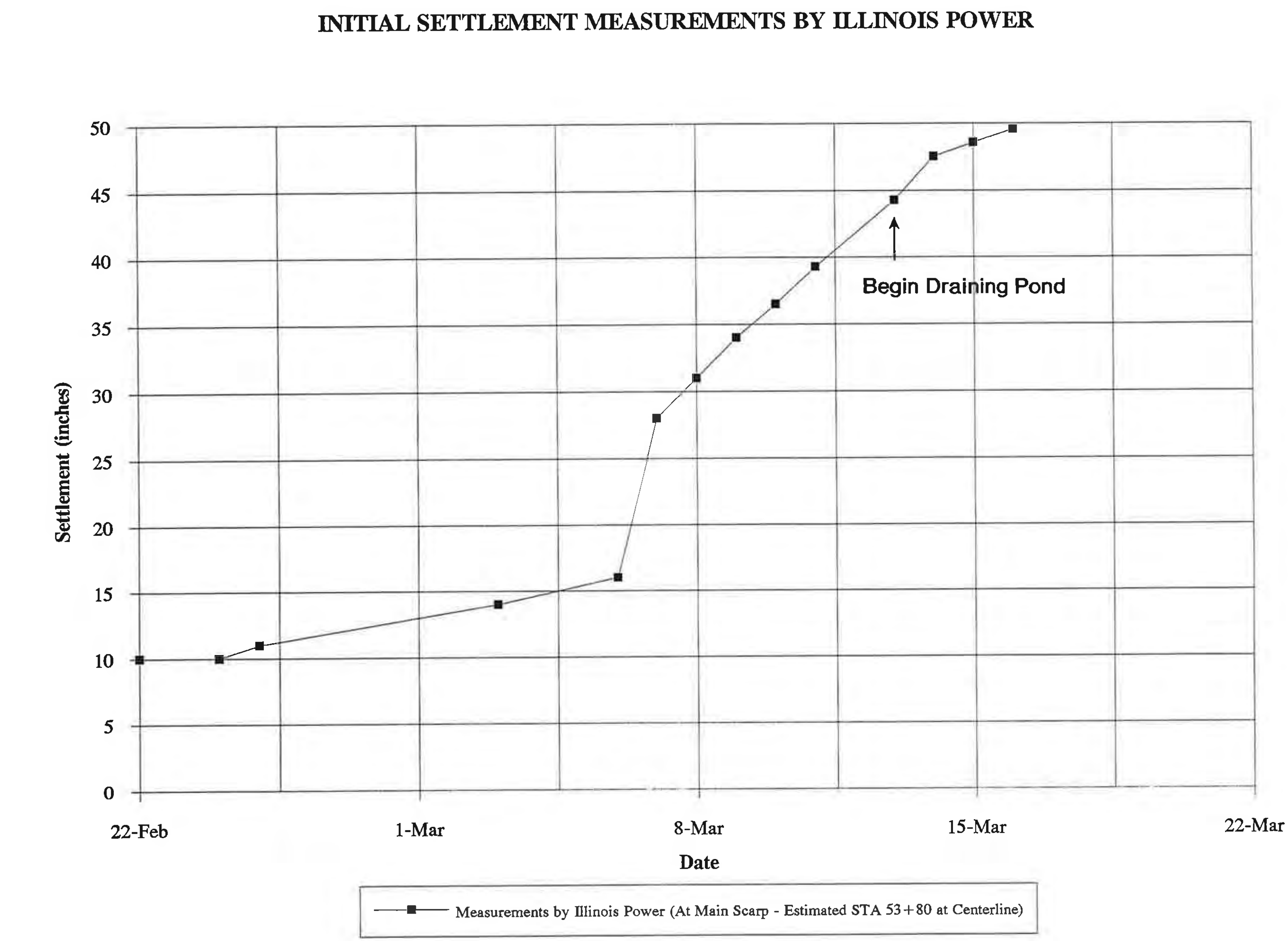
Remarks 11:07 - 11:22 temp

Inspected By K. Berry

WOODWARD-CLYDE CONSULTANTS

APPENDIX C-3 - ILLINOIS POWER CRACK GAUGES

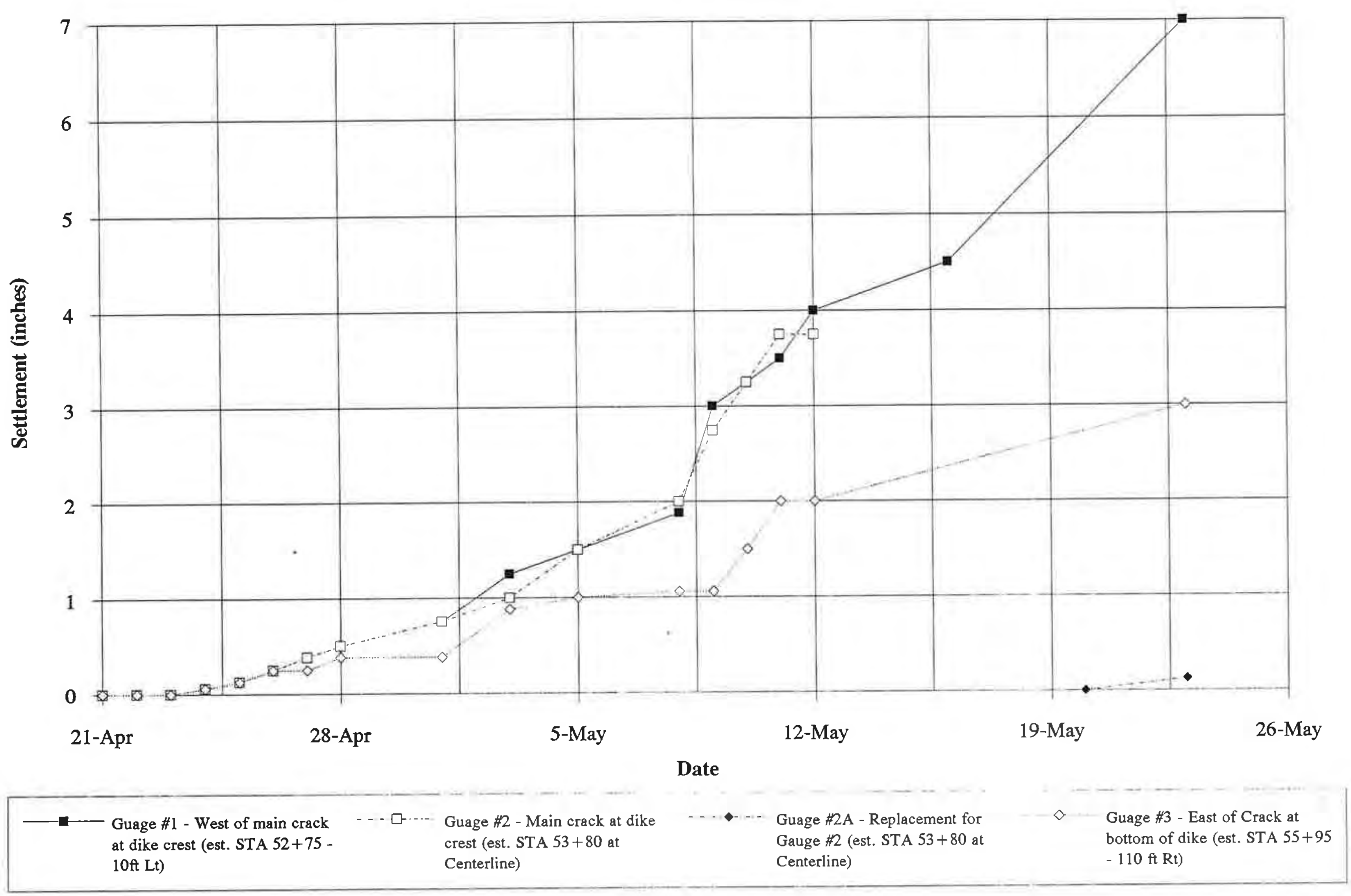
Crack monitoring gauges were installed across the crest and midslope scarps at major cracks by Illinois Power personnel in February and April, 1995. Crack gauges consisted of two reinforcing bars driven into the ground, one on each side of the crack. One was driven vertically, the other horizontally. The relative vertical and sometimes horizontal movement between the two was recorded by a tape measure. The initial crack gauge installed in February had to be removed in March to provide access for drilling activities. Plots of the crack gauges are shown in Figures C-3-1 and C-3-2.



SETLMNT.XLS Chart 3

Figure C-3-1

SETTLEMENT GAUGE READINGS BY ILLINOIS POWER



SETLMNT.XLS Chart 2

Figure C-3-2

APPENDIX D

PARALLEL WALL OPTION

APPENDIX D
PARALLEL WALL OPTION

This appendix describes in detail the "Parallel Wall" option which was conceived during our meeting of senior level personnel at the site on July 21, 1995. This option is currently the one favored by Illinois Power, primarily due to cost.

Areas of Potential Deep Failure (Sta. -6-50 to 5+50)

As noted during the July 21 meeting, lowering the groundwater level below the downstream slope of the dike has a significant stabilizing effect. Calculations indicate that a factor of safety of approximately 1.5 during steady state conditions can be achieved without use of a toe berm or lightweight fill by lowering the groundwater level below the downstream slope to within a few feet of the failure plan (el. 385±). This elevation is about 10 feet lower than the flow line of the stream near the downstream toe of the dike. Lowering the groundwater level below the stream will require a deep drainage trench extending a few thousand feet to the west, or the use of a pumped system. It was agreed during our meeting on July 21 that a pumped system would be the more easily implemented and economical solution. We recommend a pumped system using a drain wall located near the upstream toe of the dam, a drain wall near the downstream toe, and a soil-bentonite cutoff wall, as shown in Figure D-1.

To reduce the amount of water pumped, it is necessary to construct a cutoff wall through the bottom ash upstream of the drain wall. A soil-bentonite cutoff wall is recommended. The calculated amount of water to be pumped from the drain wall during full reservoir conditions is approximately 30 gallons per minute for a 2,400-foot long cutoff wall. Due to uncertainties in soil permeability, we recommend designing for approximately 300 gallons per minute. To handle this amount of water and to provide redundancy in case of well failure, we recommend that a minimum of three pumps be used within the upstream drain wall. These can be constructed using conventional well screens during installation of the drain wall.

With only a drain wall near the upstream slope, the phreatic surface beneath portions of the downstream slope would be expected to equal the elevation of the creek near the downstream toe. To maintain the phreatic surface below the entire slope near the failure plane, recharge from the creek needs to be controlled. Therefore, we recommend that a second, shallow drain wall be constructed near the creek to intercept the water and pump it back into the stream as shown in Figure D-1. Again, the inflow should be small. We have assumed three pumps on the downstream drain wall. A cross-section of this option is shown in Figure D-2. We also considered use of a cutoff wall instead of a drain wall at the toe. Seepage analysis, however, showed that a cutoff wall would not be as effective as a drain wall in lowering the head sufficiently.

The production of iron and manganese oxides and the formation of slime by iron bacteria, both of which are known to clog well screens, are issues that remain to be evaluated if pumped wells are to be used. It will be necessary for measurements to be made in the field and laboratory of the pH of the water in the bottom ash beneath the dikes and in the fly ash pond. The formation of iron oxides is most rapid when the pH is about 6 and of manganese oxides when the pH is about 9. The current pH of the water in the pond is between 8 and 9. The dissolved metals and the total metals in the water in the fly ash must also be determined to define the quantities of iron, magnesium, calcium and manganese that are present. For purposes of conceptual design, we have assumed that oxides and iron bacteria will not be a significant problem. Layne-Western has indicated costs of about $2,500 per well to clean the wells, if this becomes necessary. Tests are currently underway to identify if oxide problems are likely.

Another concern with this approach is that during a power outage, water could rise in the drain wall system and jeopardize stability. Because of the low inflow rate and the large volume of soil to resaturate, calculations indicate that several days would be needed for the water level to rise enough to decrease the factor of safety significantly. Emergency power could probably be provided in this time. The need for emergency power should be addressed in the operating and maintenance procedures for the system.

As the water level below the downstream toe is lowered, the stability of the dike is increased. Thus, a point in time will be reached when the clay fill removed during the interim repair can be replaced without jeopardizing stability. The time when the replacement can be made will be determined based on piezometers installed near the failure plane. A chimney drain has also been included within the clay dike to capture seepage from the pond and to drain it into the underlying bottom ash.

Another major benefit of this option is that by draining the bottom ash that is below the upper dike, the possibility of liquefaction in the ash is eliminated. Seismically induced settlements of 3 to 6 inches as a result of densification of the bottom ash would still be likely during the design level shaking, but massive failure due to liquefaction would be unlikely. Drainage of the ash may also produce settlement of the bottom ash of approximately 2 inches. We believe the effects of this amount of settlement to be insignificant.

This option relies on pumps to lower the head downstream to the level of the failure plane. While we believe that this is probable, there is some uncertainty that it can be done. The uncertainty is due to the unknown continuity and permeability of the water washed zone found at about the failure plane, which the pumping system is intended to drain. Therefore, there is some risk that the data obtained from the instrumentation will show that additional stabilization measures may be needed. These may involve things such as sand drains to enhance drainage, or stabilizing berms.

Areas of Potential Shallow Failure (Sta. -10-50 to -6-50 and 5+50 to 14+50)

In the areas identified as having the potential for shallow failure, the head in the bottom ash must be controlled to reduce the risk of failure as the pond level rises, and to reduce the potential for liquefaction. To accomplish this, we agreed at the meeting to construct a soil-bentonite cutoff wall at the upstream toe and to install pumps within the bottom ash to dewater the ash after the wall is in place. This concept is shown in Figure D-3. Flow through the bottom ash should be small once the cutoff wall is in place. We have assumed three wells to provide redundancy.

At the time of the eventual closure of the ash pond, it will be necessary to provide a drainage outlet for the drain walls in lieu of pumping. We understand that a gravity drain will be provided at that time and will extend westward from the toe of the drain wall to a lower area. The requirement for the gravity drain should be included in the operation and maintenance manual.

The plan location of the walls and elevation views are shown in Figure D-1. The estimated cost for the "Parallel Wall" option (for areas of both shallow and deep failure) is $4.3 million as summarized in Table D-1.

Construction

We believe it is most practical to construct the repairs in two phases.

The first phase will involve all work except replacement of the fill removed during the interim repair. It will include installation of the various walls and pumps needed to lower the pore pressures in the ground below the dam. The time for the pore pressures to drain is uncertain but estimated to be 6 to 12 months. Once the pore pressures are lowered (based on piezometer measurements), then the second phase of work (replacement of the fill and final grading) can be completed.

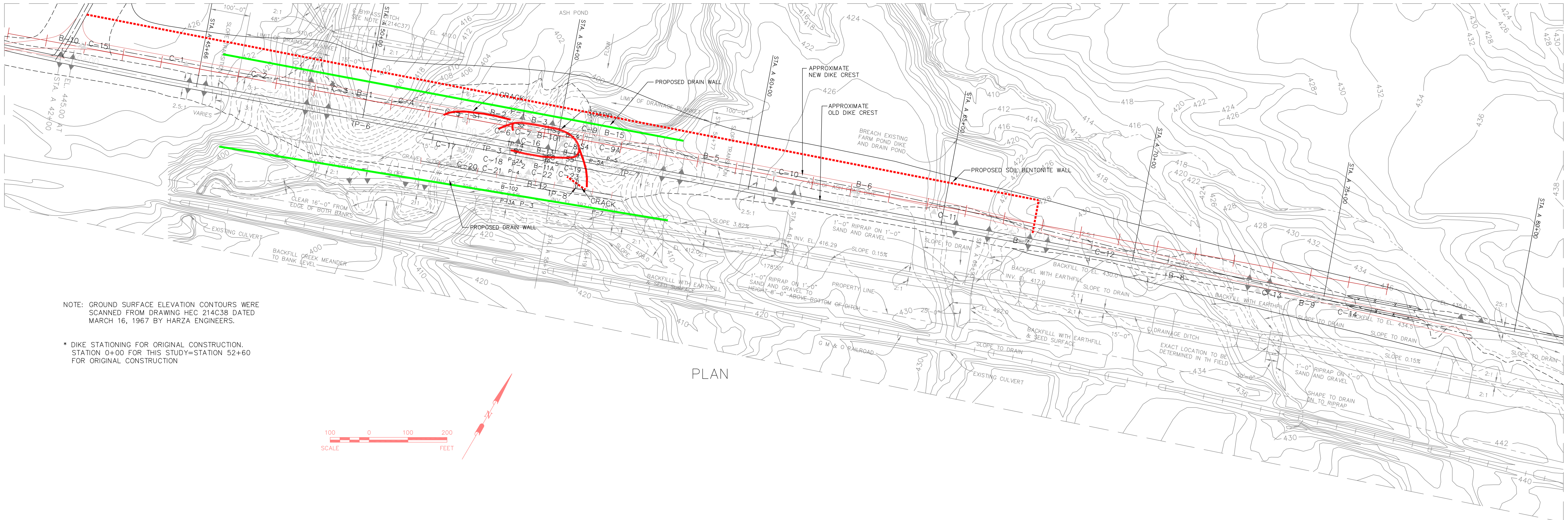
It seems reasonable to expect to construct the first phase in the Spring and Summer of 1996, and the final phase in the Fall of 1997; i.e. allowing about a year for pore pressures to dissipate.

Results of key stability analysis calculated are given in Figures D-4 through D-7.

Additional borings are needed along the cutoff and drain wall alignments to better define subsurface conditions for design and potential bidders. We have provided an allowance for this in the cost estimate. The borings are especially important to help locate rock ledges and estimate the quantity of hard rock removal needed in the drain wall trenches.

TABLE D-1
COST ESTIMATE FOR PARALLEL WALL SYSTEM

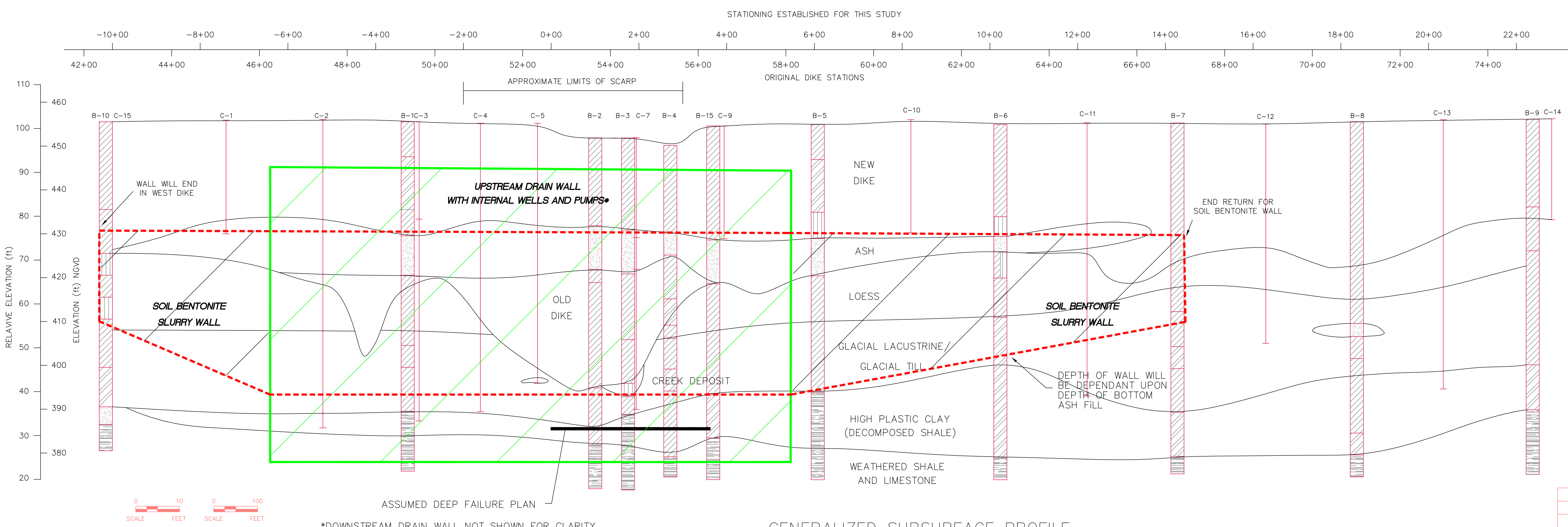
ITEM	WORK ITEM	QUANTITY	UNIT RATE	UNIT	TOTAL
	ESTIMATED CONSTRUCTION COST FOR PARALLEL WALL SYSTEM				
1	Mobilization/Demobilization	1	$200,000	ls	$200,000
2	Strip	20,000	$0.90	cy	$18,000
3	Exacavate and stockpile soil	15,400	$2.50	cy	$38,500
4	Borings for information at proposed walls	1	$50,000	allow	$50,000
5	Soil-Bentonite Wall	95,000	$4.00	sf	$380,000
6	Drain Wall	69,600	$9.00	sf	$626,400
7	Wells, Pumps, Warning System	9	$15,000	ea	$135,000
8	Chimney Drain, French Drain	4,000	$15.00	cy	$60,000
9	Working Pads, Clay Cap	20,000	$5.00	cy	$100,000
10	Downstream Drain Wall	29,000	$9.00	sf	$261,000
11	Replacement of fill from Interim Fix	52,400	$5.00	cy	$262,000
12	Roadway on top of dike	2,300	$5.40	sy	$12,420
13	Seed and Mulch	25,000	$0.50	sy	$12,500
14	Instrumentation	1	$25,000	allow	$25,000
15	Provide electrical service	1	$20,000	allow	$20,000
		Subtotal			$2,200,820
		OH and profit @ 15%			$330,123
		Subtotal			$2,530,943
		Engineer'g/Const' Monit'g @ 15%			$379,641
		Subtotal			$2,910,584
16	Maintenance of Pumps (Present Worth Provided by IP)	1	$650,000	allow	$650,000
		Subtotal			$3,560,584
		Contingency @20%			$712,117
		TOTAL			**$4,272,701**



NOTE: GROUND SURFACE ELEVATION CONTOURS WERE SCANNED FROM DRAWING HEC 214C38 DATED MARCH 16, 1967 BY HARZA ENGINEERS.

* DIKE STATIONING FOR ORIGINAL CONSTRUCTION. STATION 0+00 FOR THIS STUDY=STATION 52+60 FOR ORIGINAL CONSTRUCTION

PLAN



*DOWNSTREAM DRAIN WALL NOT SHOWN FOR CLARITY

GENERALIZED SUBSURFACE PROFILE ALONG CENTERLINE OF NEW DIKE

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE
- CPTU
- BORING
- TEST PIT
- PIEZOMETER
- APPROXIMATE FOOTPRINT OF NEW DIKE
- APPROXIMATE FOOTPRINT OF OLD DIKE

NOTES:
1. THIS DRAWING SHOWS GENERALIZED SUBSURFACE CONDITIONS. SEE ORIGINAL BORING LOGS FOR DETAILS.
2. LINES INDICATING STRATA BETWEEN EXPLORATORY LOCATIONS ARE INFERRED. STRATA SHOWN ARE KNOWN ONLY AT EXPLORATORY LOCATION – NOT BETWEEN.
3. NO EXPLORATIONS WERE PERFORMED AT THE LOCATIONS OF THE PROPOSED WALLS. ALL SUBSURFACE CONDITIONS ARE GENERALIZED AND DO NOT REFLECT THE CONDITIONS AT THE PROPOSED WALLS.

Revision No.	Description	Date	By	App.

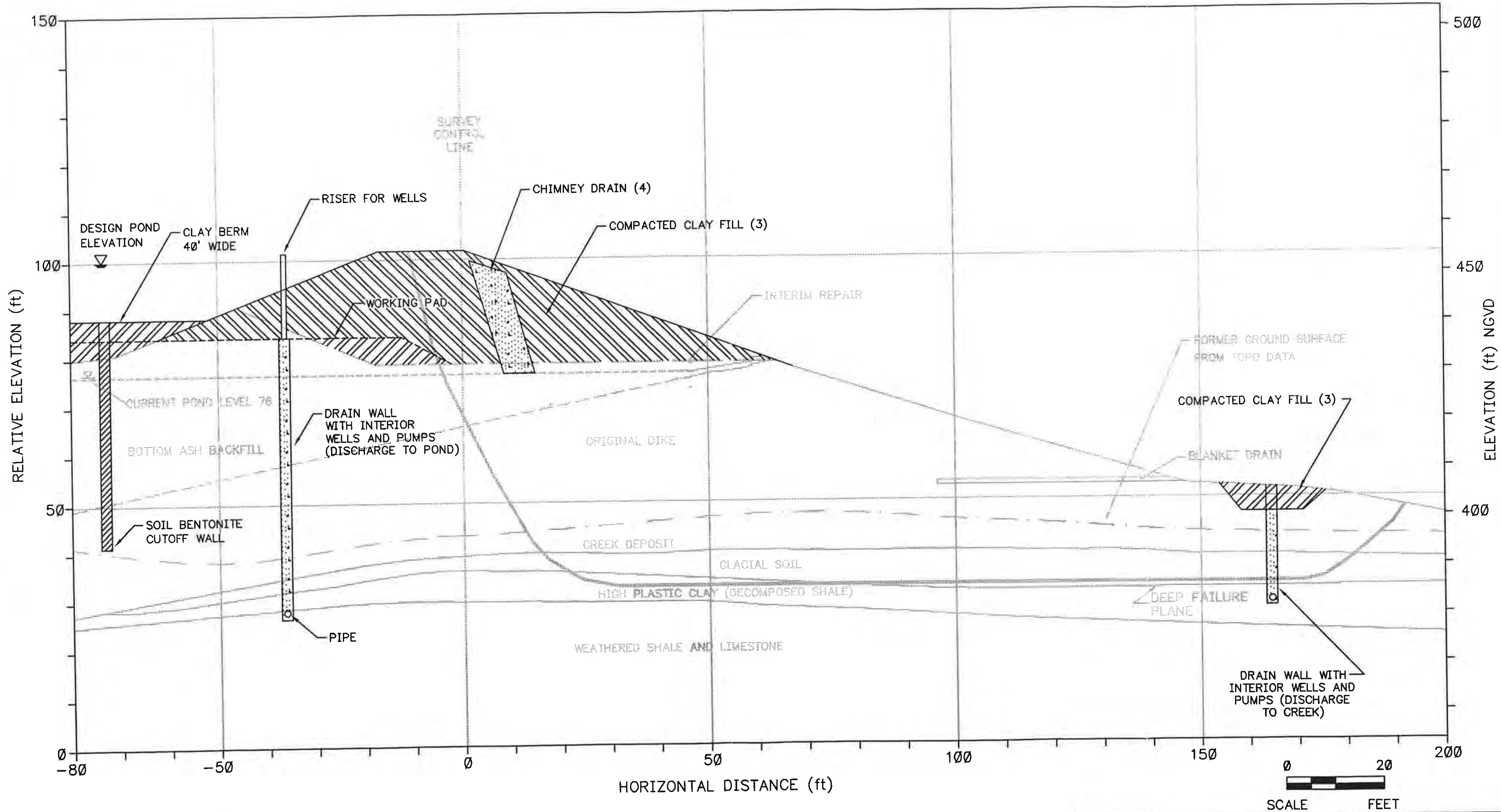
REVISIONS

ILLINOIS POWER COMPANY
BALDWIN POWER STATION

ASH POND, SOUTH DIKE
PLAN AND PROFILE OF REPAIRS
PARALLEL WALL ALTERNATIVE

Date: 7/31/95	Project Number: 5E08560	Figure Number: D-1
Drawn by: wdl	Design by: kmb	Checked by:

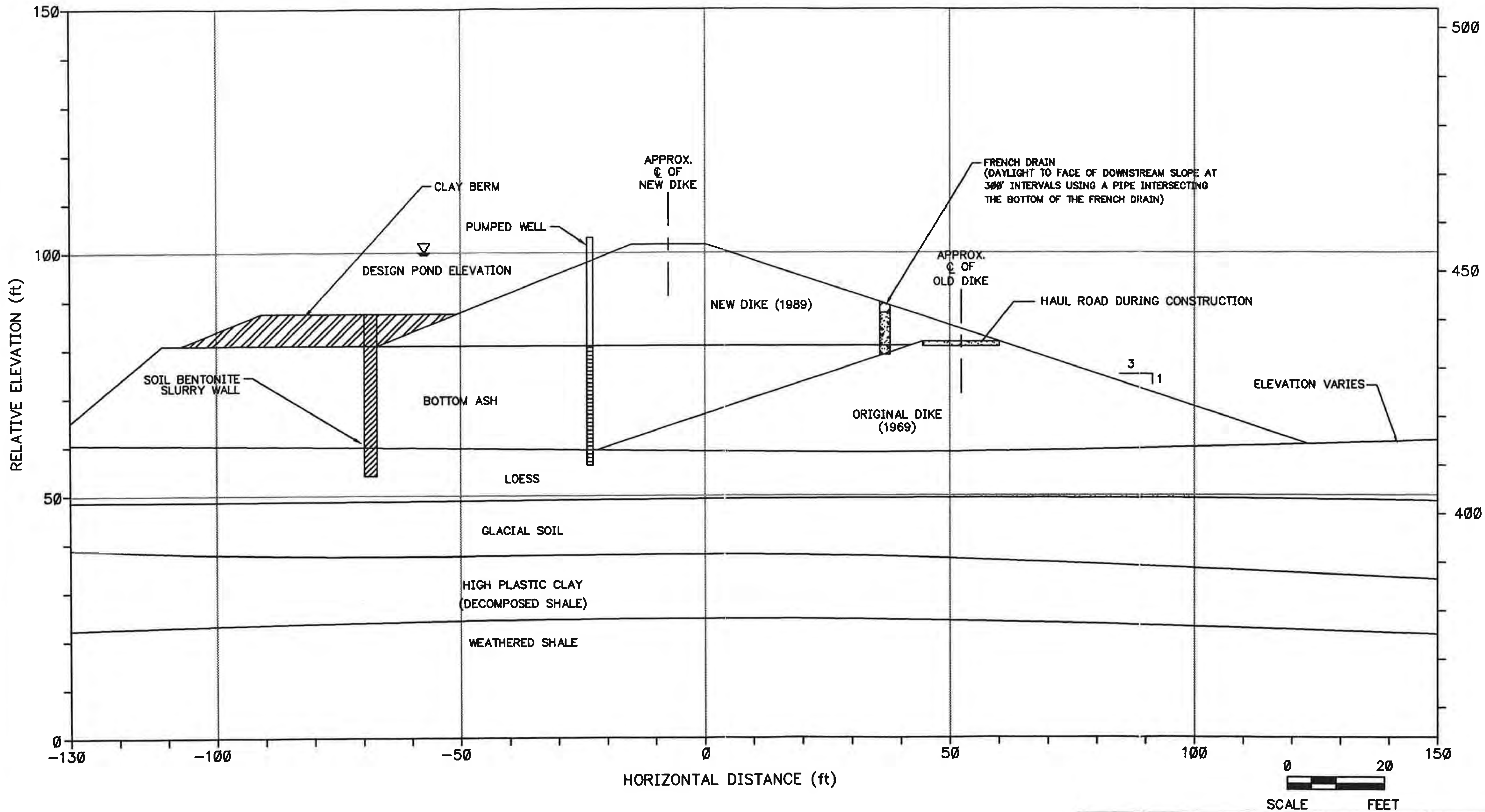
Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment



Notes:
1. There are no borings in the location of the proposed walls, therefore the bottom elevations of the walls are approximate.
2. The drain wall will contain a discontinuous pipe at the bottom and will be pumped using installed wells.
3. Place compacted clay fill after pore pressures downstream of drain wall are at el. 390 or below based on piezometer data.
4. Chimney drain will extend over approximately 600 feet of interim repair A french drain will be constructed over the remaining 600 feet of potential deep slide area.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 8/2/95 DSGN. BY: gaz CHKD. BY: KMB 9-5-95	Repair for Potential Deep Slides Parallel Wall Alternative — FIG. NO. D-2

File: F:\5E08560\TASK240\DULWLSC1.DWG Last edited: 08/31/95 @ 5:00 p.m. @ WCC-ST.LOUIS



Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560

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DRN. BY: bcl 5/24/95 DSGN. BY: gaz CHKD. BY: KMB 9-6-95	Repair for Potential Shallow Slides Parallel Wall Alternative	FIG. NO. D-3

File: F:\5E08560\TASK240\DWA.DWG Last edited: 09/05/95 @ 4:45 p.m. @ WCC-ST.LOUIS

BASIC GEOMETRY FOR DEEP REPAIR
PARALLEL WALL ALTERNATIVE

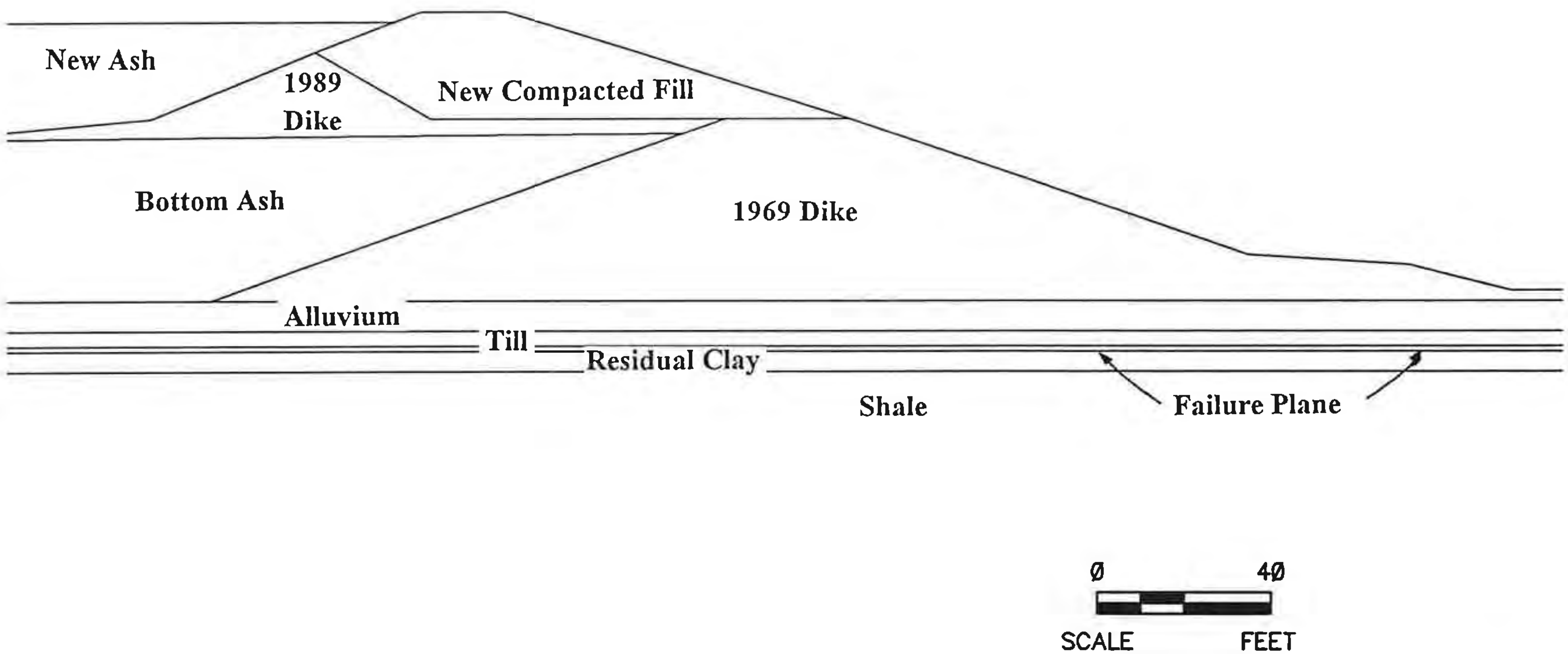
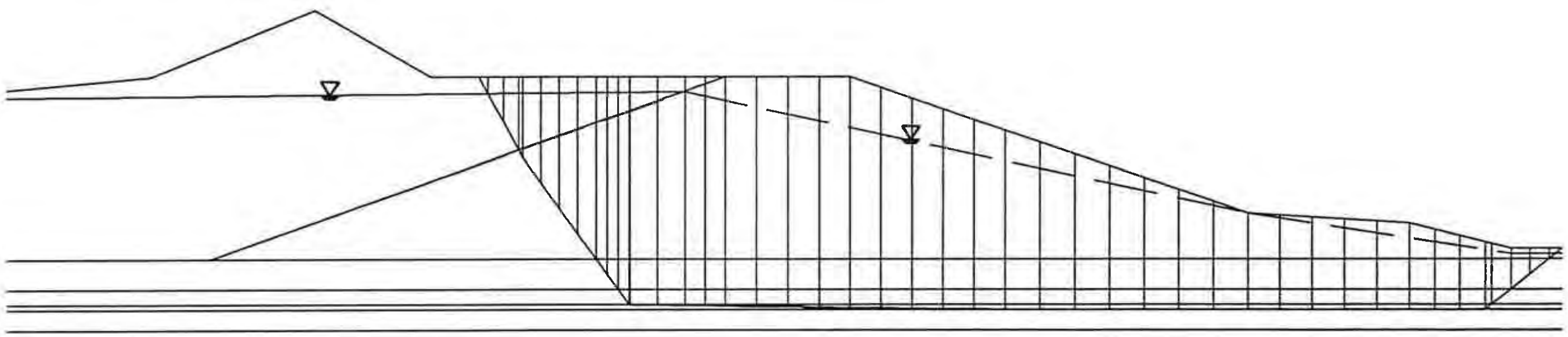


Figure D-4.

END OF CONSTRUCTION GEOMETERY
(BEFORE REPLACEMENT OF CLAY FILL)
WITH ASSUMED FAILURE
PARALLEL WALL ALTERNATIVE



FS = 1.27

Figure D–5

STEADY STATE CONDITION WITH ASSUMED FAILURE PLANE
PARALLEL WALL ALTERNATIVE

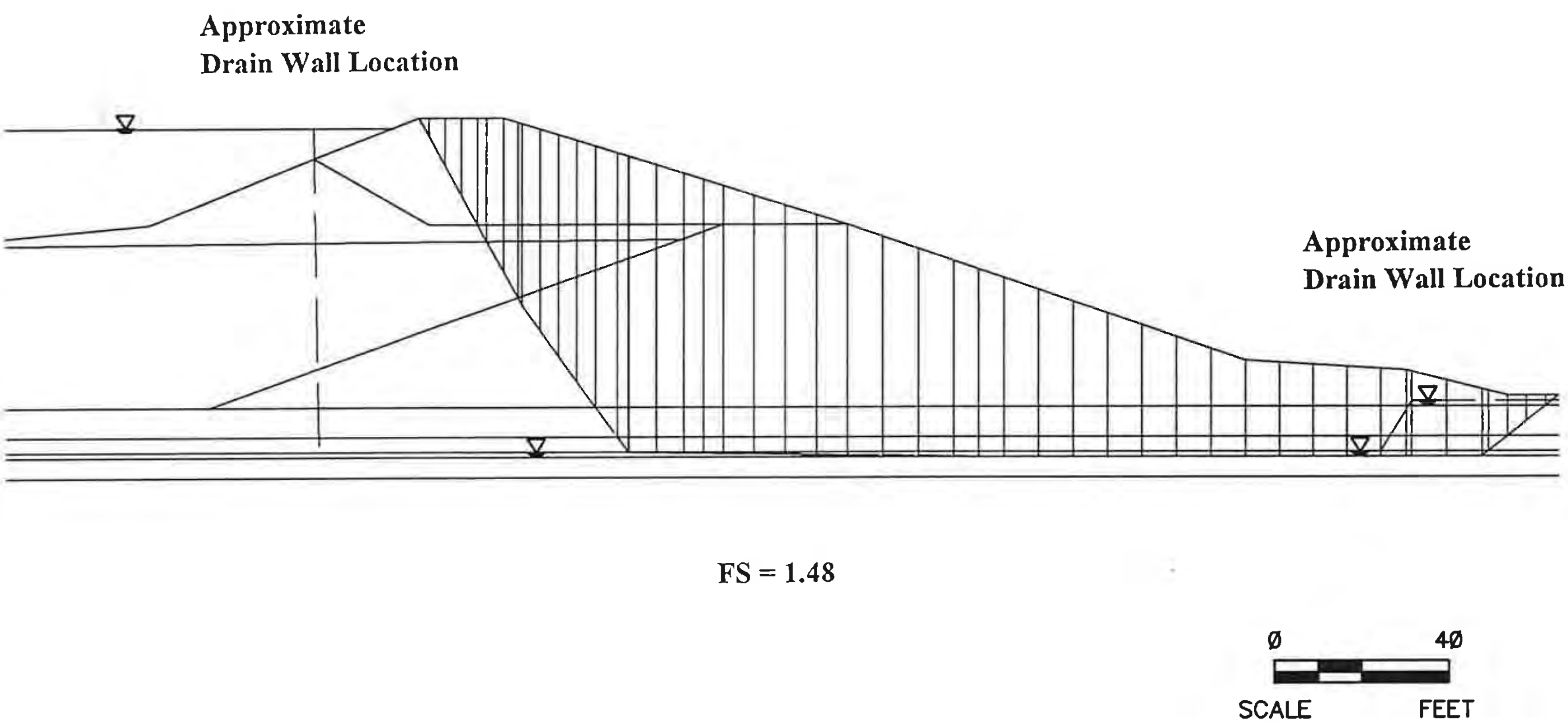
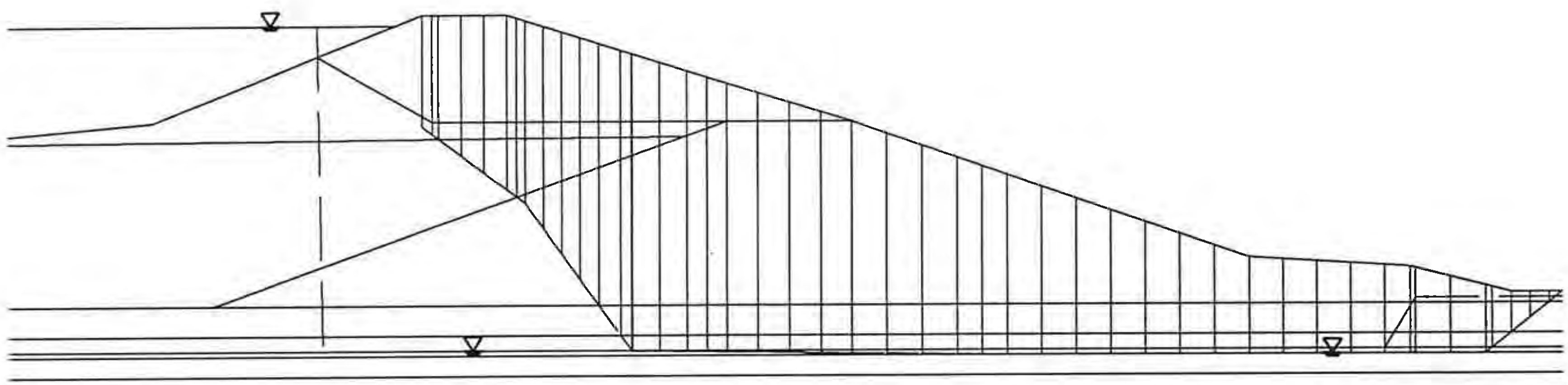


Figure D-6

EARTHQUAKE CONDITION WITH ASSUMED FAILURE PLANE

PARALLEL WALL ALTERNATIVE



FS = 1.02

Ø 40

SCALE FEET

Figure D-7

APPENDIX E

TRANSLATED DIKE

APPENDIX E
TRANSLATED DIKE

This option was also conceived during the July 21, 1995 meeting.

Areas of Potential Deep Failure

This option involves relocation and reconstruction of the dike further downstream, and the straddling of a portion of the creek as shown in Figure E-1. The primary advantage of this approach is that it is passive; i.e. does not require pumping or significant maintenance after construction. Major disadvantages, however, are cost and probable encroachment on the neighboring right-of-way. At this time, we are uncertain of the current limits of Illinois Power's property.

Calculations indicate that an inclination of 2.5H:1V is satisfactory for both the upstream and downstream slopes. Chimney and blanket drains are included in the dike for internal drainage. To control the head in the foundation soils, we included a drain wall below the dike located near the downstream toe of the existing dike. This drain wall would be expected to fill with water and to flow by artesian pressure into the blanket drain which will eventually drain to the creek by gravity.

Areas of Potential Shallow Failure

In order to use a passive system, the repair considered in these areas was similar to that shown in our draft report, i.e., a cutoff wall and lime slurry injection of the bottom ash fill. The cutoff wall is needed to control head below the 1989 clay fill dike to mitigate failure as the pond level is raised. The lime-fly ash injection is needed to mitigate liquefaction. A cross-section is shown in Figure E-2.

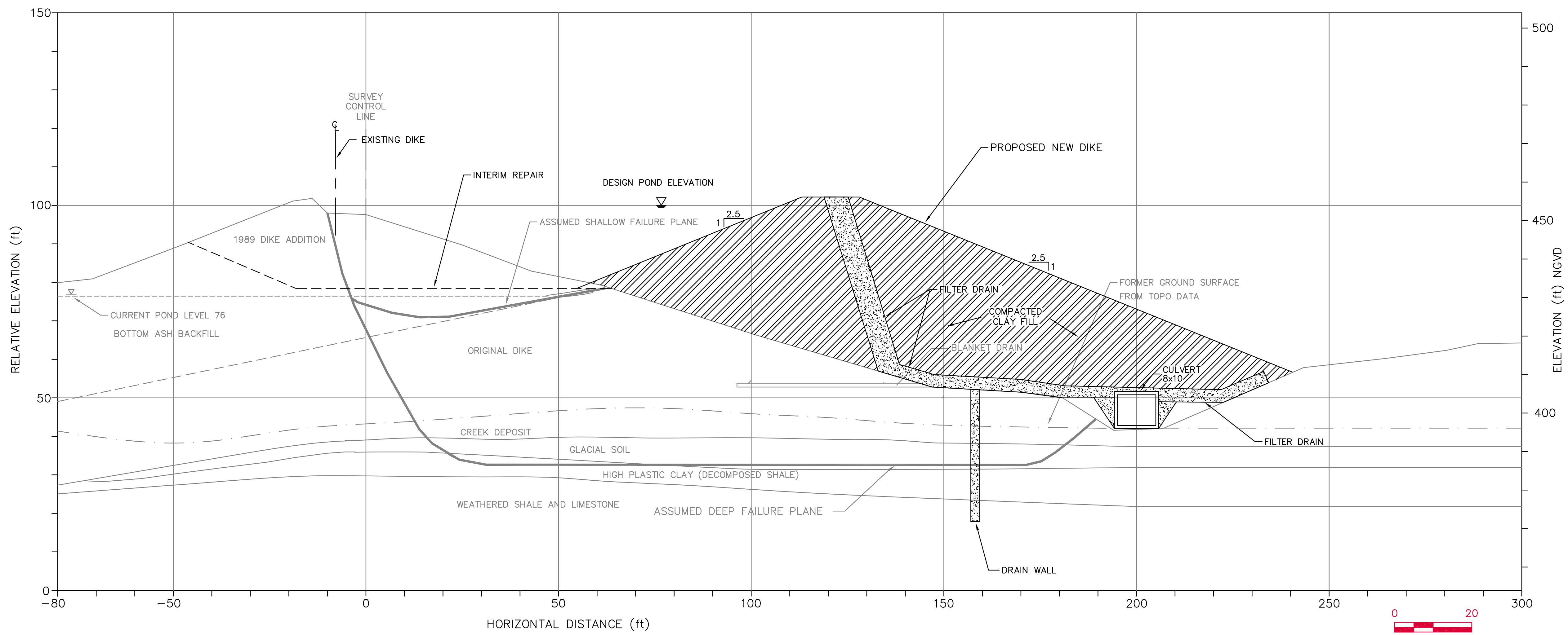
Other Details

A plan view of this option is shown in Figure E-3 and the estimated cost is summarized in Table E-1. The cost of this option, \$6.1 million, does not include the cost of additional right-of-way.

Results of stability analysis are given in Figures E-4 through E-7. Detailed seepage calculations were not performed as water levels were assumed based on judgment considering the placement of the drains.

TABLE E-1
COST ESTIMATE FOR TRANSLATED DIKE

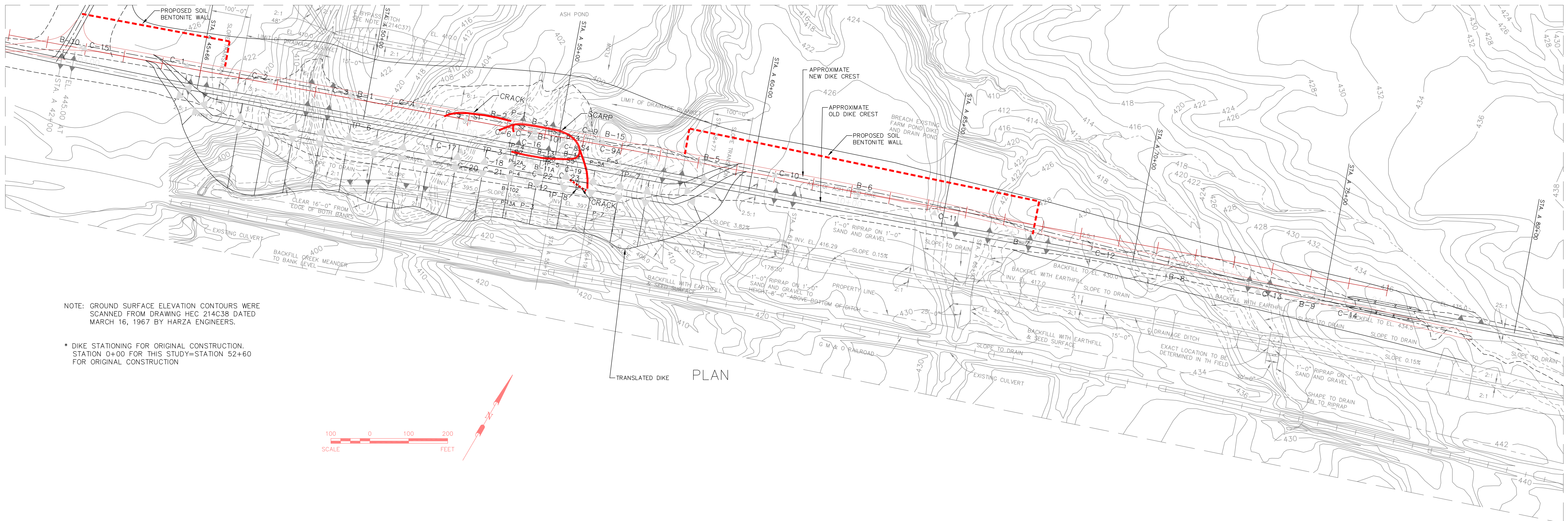
ITEM	WORK ITEM	QUANTITY	UNIT RATE	UNIT	TOTAL
ESTIMATED CONSTRUCTION FOR TRANSLATED DIKE					
1	Mobilization/Demobilization	1	$200,000	ls	$200,000
2	Strip	13,000	$0.90	cy	$11,700
3	Box Culvert	1,200	$600	ft	$720,000
4	Borings at proposed relocation site	1	$100,000	allow	$100,000
5	Drain Wall	42,000	$9.00	sf	$378,000
6	Soil-Bentonite Wall	44,000	$4.00	sf	$176,000
7	Lime Injection	69,000	$3.50	cy	$241,500
8	Filter Drain	30,500	$15.00	cy	$457,500
9	Clay Fill	302,000	$5.00	cy	$1,510,000
10	Clearing and Grubbing	3	$3,000	ac	$9,000
11	Roadway on top of dike	2,300	$5.40	sy	$12,420
12	Seed and Mulch	42,000	$0.50	sy	$21,000
13	Instrumentation	1	$25,000	allow	$25,000
		Subtotal			$3,862,120
		OH and profit @ 15%			$579,318
		Subtotal			$4,441,438
		Engin'g/Constr' Monit'g @ 15%			$666,216
		Subtotal			$5,107,654
		Contingency @20%			$1,021,531
		TOTAL			**$6,129,184**



Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.
3. Strata beyond 180 ft to the right at Survey Control Line have been approximated for this figure.

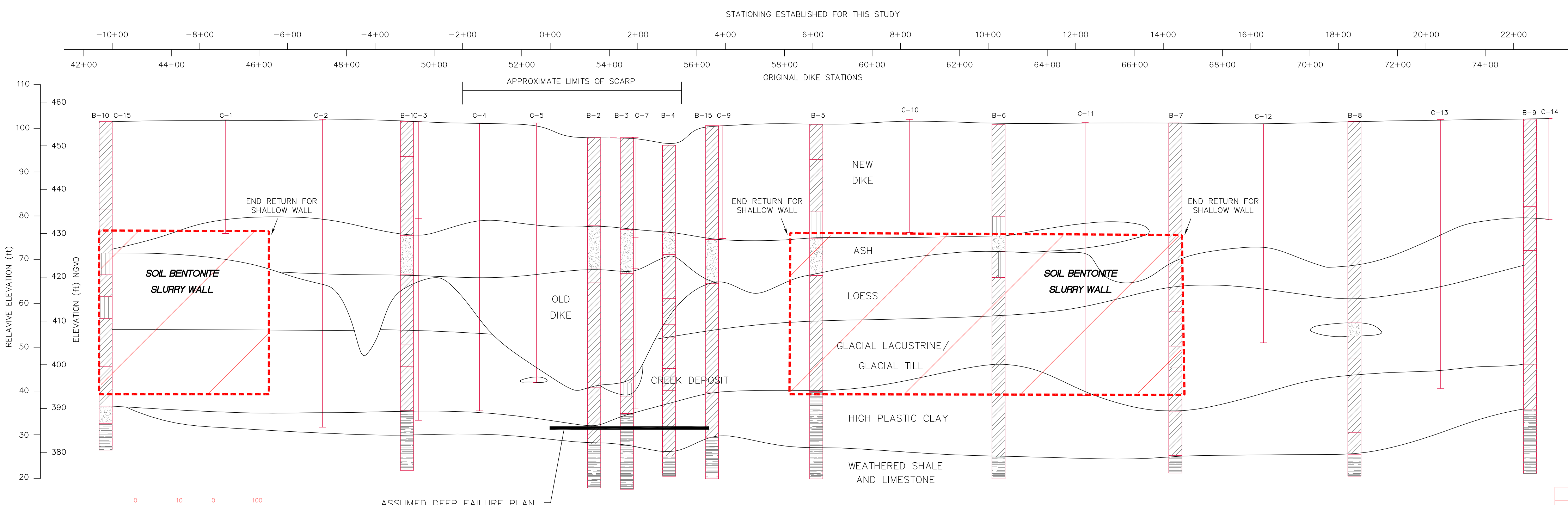
ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward–Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 8/2/95 DSGN. BY: gaz CHKD. BY:	Repair for Potential Deep Slides Translated Dike Alternative
FIG. NO.	E–1

File: F:\5E08560\TASK240\RELOCALT.DWG Last edited: 09/05/95 @ 4:16 p.m. @ WCC–ST.LOUIS



NOTE: GROUND SURFACE ELEVATION CONTOURS WERE SCANNED FROM DRAWING HEC 214C38 DATED MARCH 16, 1967 BY HARZA ENGINEERS.

* DIKE STATIONING FOR ORIGINAL CONSTRUCTION. STATION 0+00 FOR THIS STUDY=STATION 52+60 FOR ORIGINAL CONSTRUCTION



GENERALIZED SUBSURFACE PROFILE
ALONG CENTERLINE OF 1989 DIKE

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE
- CPTU
- BORING
- TEST PIT
- PIEZOMETER
- APPROXIMATE FOOTPRINT OF NEW DIKE
- APPROXIMATE FOOTPRINT OF OLD DIKE

NOTES:
1. THIS DRAWING SHOWS GENERALIZED SUBSURFACE CONDITIONS. SEE ORIGINAL BORING LOGS FOR DETAILS.
2. LINES INDICATING STRATA BETWEEN EXPLORATORY LOCATIONS ARE INFERRED. STRATA SHOWN ARE KNOWN ONLY AT EXPLORATORY LOCATION – NOT BETWEEN.

Revision No.	Description	Date	By	App.

REVISIONS

ILLINOIS POWER COMPANY
BALDWIN POWER STATION

ASH POND, SOUTH DIKE
PLAN AND PROFILE OF REPAIRS
TRANSLATED DIKE ALTERNATIVE

Date: 8/2/95	Project Number: 5E08560	Figure Number: E-2
Drawn by: bdl	Design by: goz	Checked by:

Woodward-Clyde Consultants
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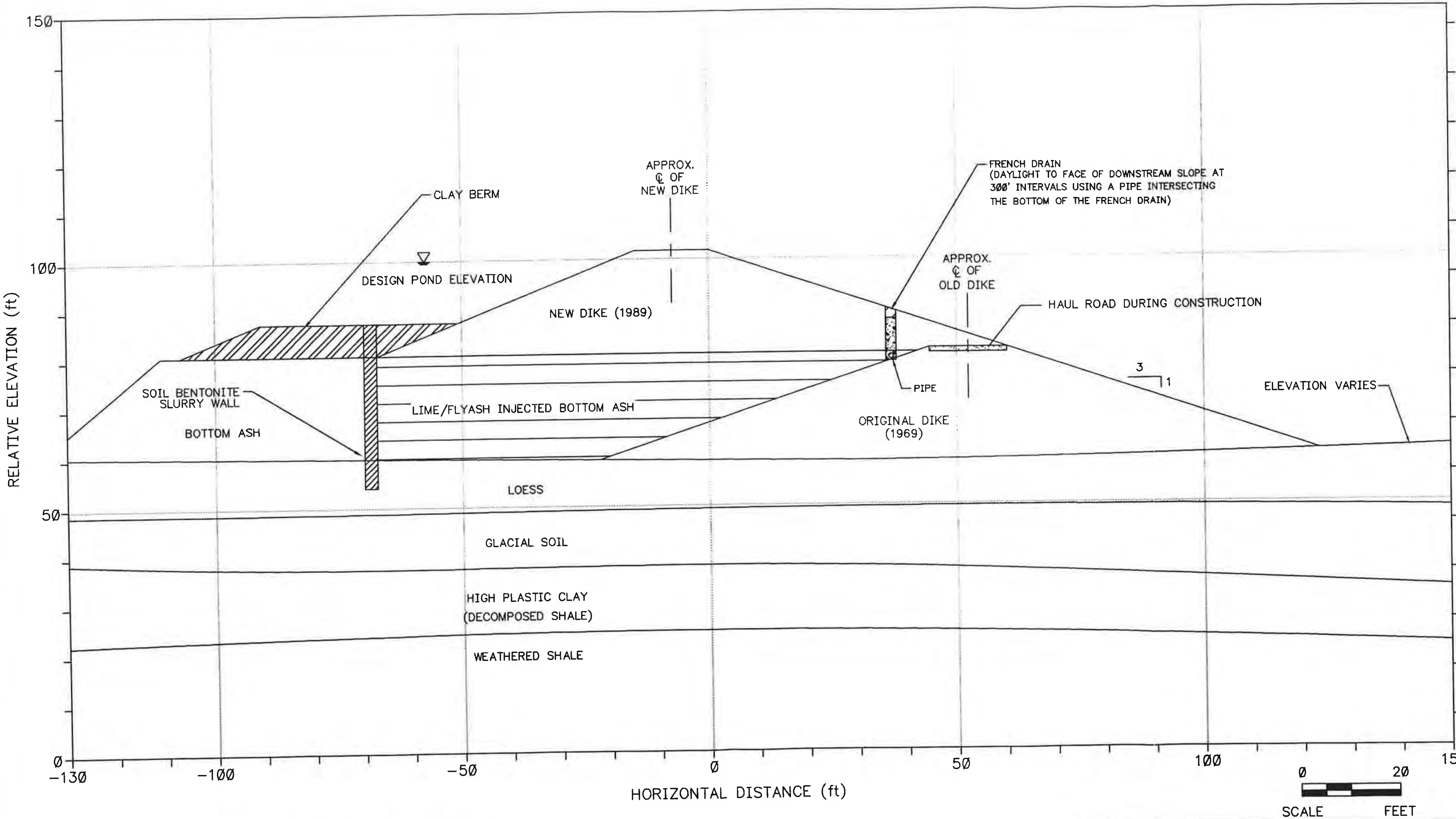


Notes:

1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 5/24/95 DSGN. BY: gaz CHKD. BY: KMB 9-5-95	Repair for Potential Shallow Slides Translated Dike Alternative
FIG. NO. E-3	

File: F:\5E08560\TASK240\TDA.DWG Last edited: 08/31/95 @ 4:57 p.m. @ WCC-ST.LOUIS

BASIC GEOMETRY FOR DEEP REPAIR TRANSLATED DIKE ALTERNATIVE

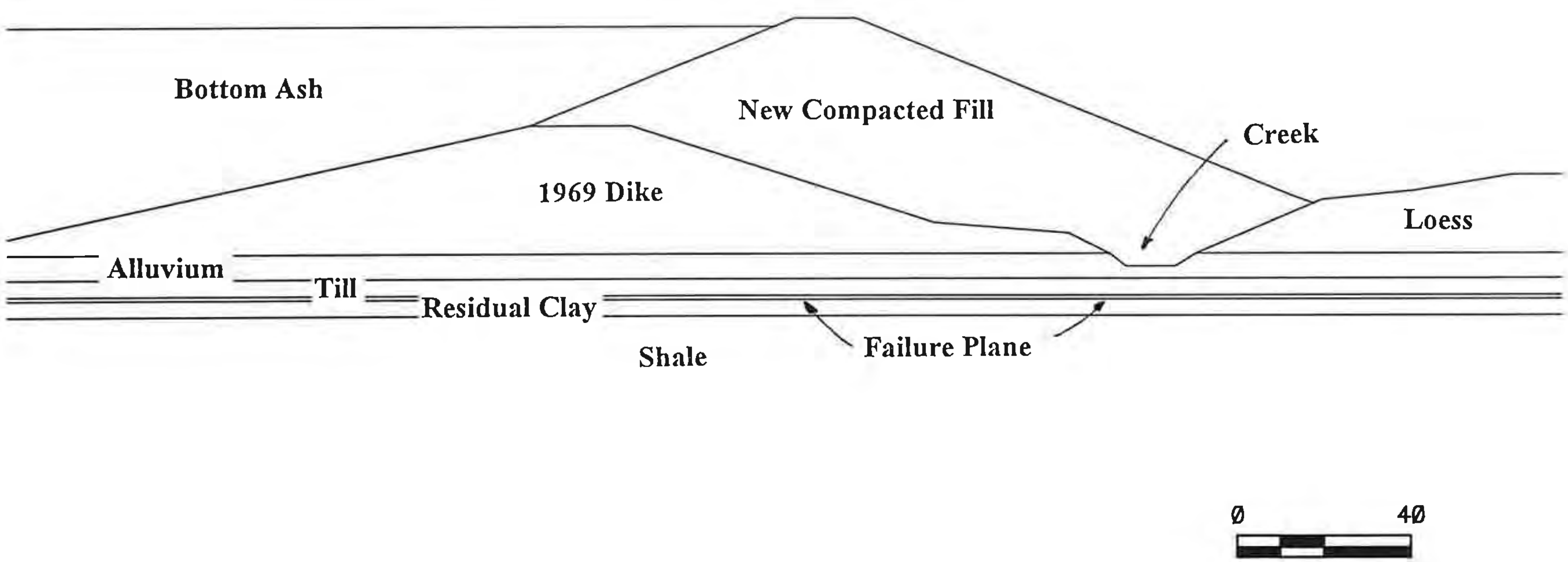
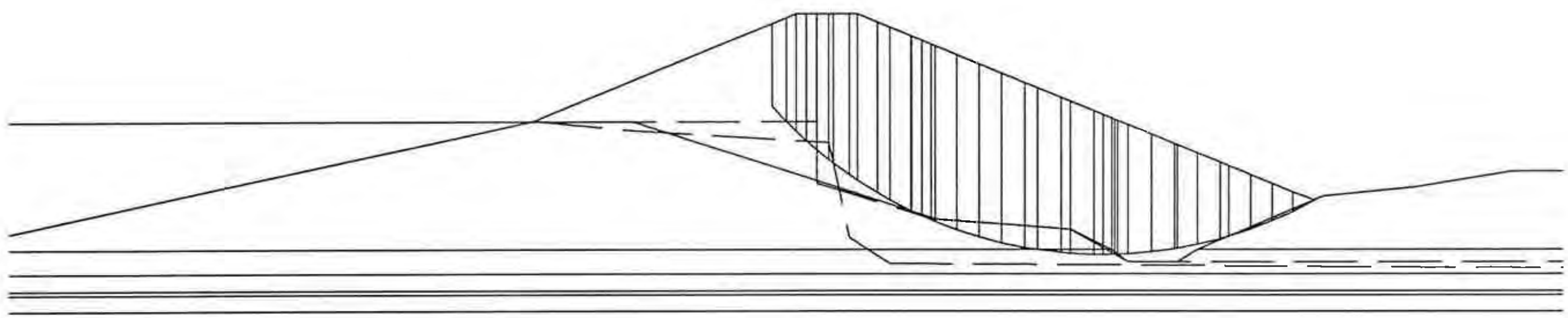


Figure E-4

END OF CONSTRUCTION CONDITION
TRANSLATED DIKE ALTERNATIVE



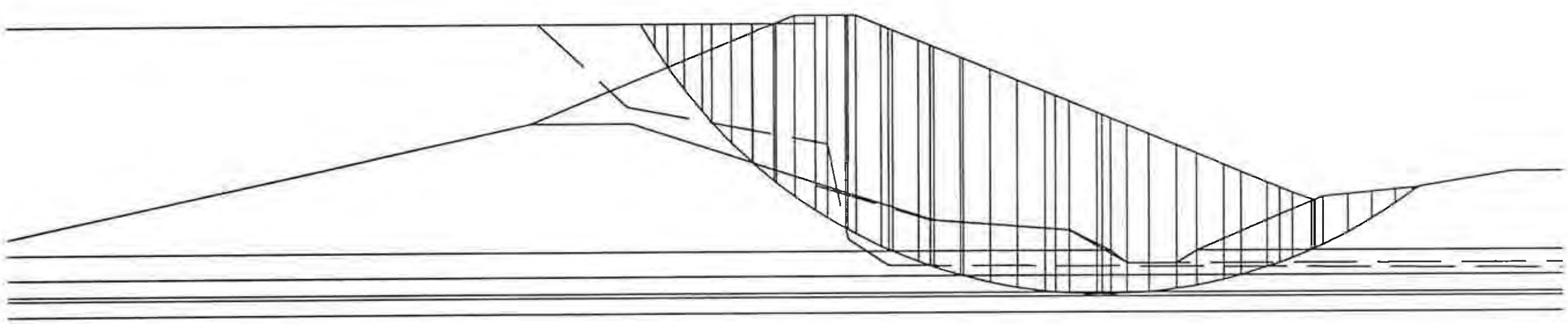
FS = 1.61

Ø 40

SCALE FEET

Figure E–5

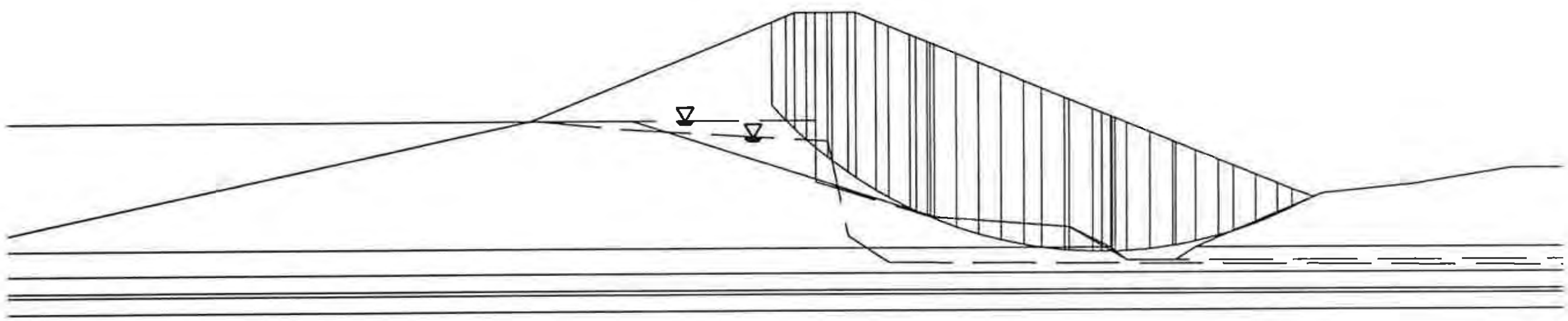
STEADY STATE CONDITION
TRANSLATED DIKE ALTERNATIVE



FS=1.70

Figure E-6

EARTHQUAKE CONDITION
TRANSLATED DIKE ALTERNATIVE



FS = 1.45

Figure E-7

APPENDIX F

HDPE OPTION

APPENDIX F
HPDE WALL OPTION

The HDPE option was the recommended option in the June 23, 1995 draft report. Subsequently developed options are now preferred.

The HDPE option for the deep slide area is shown in cross-section Figure F-1 and involves the following key elements:

1. Removal of the upper dike and replacement with a lightweight fill (compacted fly ash or slag) with a chimney drain and a blanket drain.

2. A centerline cutoff wall consisting of cement bentonite and an HDPE liner extending into the weathered shale constructed by the slurry trench method.

3. Inclined sand-filled drains connected to a drainage blanket at the elevation of the creek to intercept water that seeps beneath or through the cutoff wall.

4. A downstream berm consisting of compacted clay fill and a coarse rock.

5. Lime/fly ash slurry injection of the bottom ash below the upper rebuilt dike.

The aim of this repair is to significantly reduce the hydrostatic pressure on the failure surface. This is to be accomplished by a very low permeability cutoff wall (HDPE, 10^{-10} to 10^{-12} cm per second) and downstream inclined drains to collect seepage that passes either through or below the wall. The combined cutoff and drainage is designed to lower the groundwater level as low as possible (to the creek elevation) without use of pumps. Our calculations indicate however, that lowering the groundwater level to the elevation of the creek only provides a factor of safety for long term conditions of approximately $1.2\pm$. To increase the factor of safety to the target level, additional measures are needed. Therefore, a toe berm and use of lightweight fill at the crest are recommended. In combination with drainage, these measures increase the factor of safety to the target values.

Other techniques could have been used in lieu of the berm, such as drilled piers or stone columns. However, preliminary calculations indicated the cost of these measures would be significantly greater than the cost of the toe berm. Piers or stone columns would have the advantage, however, of not changing the appearance of the downstream slope. Key elements of the recommended repair are described below.

HDPE Wall

We initially assumed that either a soil bentonite or cement bentonite cutoff wall would be sufficient to control water pressures. However, the permeability of these types of walls is not significantly different from that of the existing dam (except for the bottom ash) and foundation materials and therefore, would not significantly change the groundwater flow. To be effective, a cutoff wall must be significantly less permeable than the surrounding media. With this in mind, we selected an HDPE material developed by Gundle (Tradename: GundWall) that is installed as interlocking sheets similar to steel sheet piling except that a sealant can be used in the interlocks. This HDPE material is installed within a cement bentonite slurry wall approximately 2 ft wide excavated from the top of the existing ash elevation (el. 434±). Construction from this elevation will permit use of relatively economical backhoe excavation equipment to extend to the weathered shale. Above the elevation of the bottom ash, the HDPE will be raised as backfilling proceeds although special care will be required to avoid its damage by the earthwork contractor. Telephone conversations with a contractor (Slurry Walls, Inc.) indicate that this type wall will cost approximately $10.50 per square foot. WCC has previous experience with GundWall on a recent hazardous waste project.

A potential construction difficulty is the removal of limestone boulders and ledges below the failure plane. Borings suggest that these are not continuous and generally less than 1 ft thick. Rock removal techniques such as a chisel will probably be required in some areas to construct the wall. Rock removal is more costly than excavating shale and adds some uncertainty to the cost of installing the wall.

Inclined Drains

Inclined drains will be 10 to 12 in. diameter holes drilled with conventional rigs and backfilled with sand to collect seepage from the less pervious surrounding soil and the pervious zone at the failure plane. Due to the very low permeability of the surrounding soils, we do not believe a well screen is needed within the drains. Inclined wells will be drilled from a gravel working platform at approximately el. 395± (at creek level). The gravel working platform will then act as a gravel drain after the wells are installed. A geofabric is recommended below the gravel drain layer for trafficability.

A major concern with the inclined drains is the low permeability of the surrounding soil and the potential lack of a continuous permeable zone in the foundation that can be "tapped" by the drains. The pervious zone above the failure plane is the target drainage layer for the wells to "tap," however, it may be discontinuous causing drainage wells to be marginally effective. Therefore, monitoring pore pressure after construction will be important to evaluate the effectiveness of the wells. It is possible that additional wells or other measures may be needed to enhance drainage.

Compacted Lightweight Fill

To reduce driving forces, lightweight fill is recommended to rebuild the upper slope. For design purposes, we have assumed that the on-site fly ash treated with lime could be used as lightweight fill and would have a unit weight of approximately 95 pounds per cubic foot. It would be capped at the surface by 3 feet of clay fill to permit growth of vegetation and minimize erosion of fly ash. We have not evaluated the environmental implications of using the fly ash as a construction fill material. This would need to be done prior to construction, as well as testing of the fly ash to determine engineering properties. For design purposes, we have assumed properties based on previous experience with compacted fly ash. In lieu of fly ash, blast furnace slag could be used. We have had success using slag with acceptable chemical properties obtained from Granite City on previous projects.

Lime Fly Ash Injected Bottom Ash

We recommend lime/fly ash injection to strengthen the bottom ash and to reduce potential for liquefaction. This would be done by a specialty contractor such as Hayward-Baker whom we contacted regarding pricing and technical feasibility. They indicated that this procedure has been used to strengthen bottom ash. They also indicated a budget price of $3.50 per cubic yard of treated material. Prior to production injection, a test section on-site approximately 50 ft square will be needed to evaluate the effectiveness of the approach and for the contractor to adjust his mix to achieve the specified strength. Lime injection may be hampered in some areas due to the presence of hard lime treated ash at the surface of the bottom ash layer. This may require localized drilling to penetrate this "crust" of hard ash.

Downstream Berm

The downstream toe berm can be constructed of material removed from the crest of the slide and coarse rock. The rock will provide drainage, allow construction of a steeper slope (1.5H:1V), and provide erosion resistance along the creek. We had also considered a mechanically stabilized wall ("Tensar" wall), but judged the rock fill to be more economical and practical.

Sequence of Construction

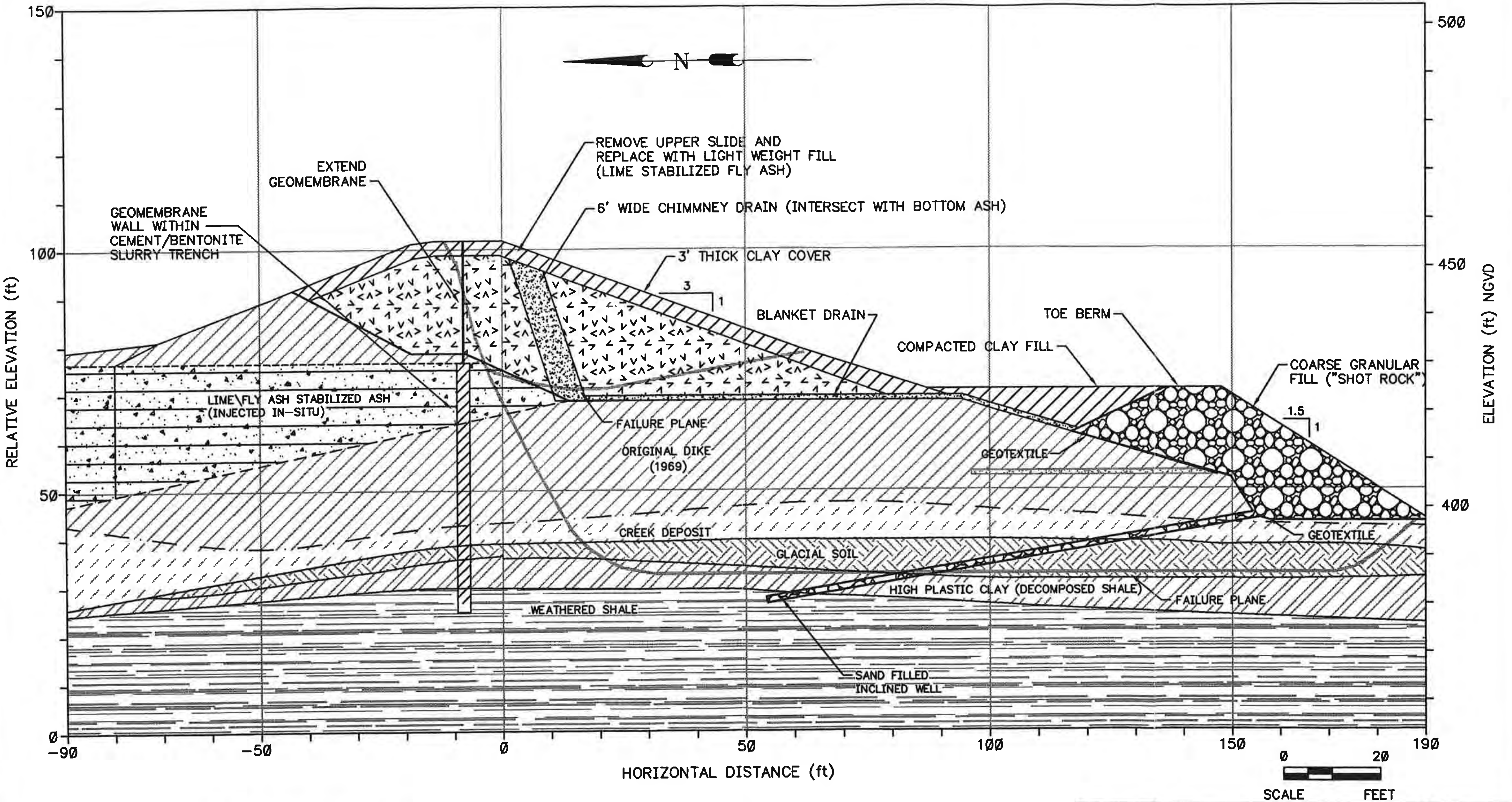
We envision the following sequence of construction, assuming that the upper dike has already been removed to el. 434 within the deep failure area.

1. Remove the upper dike to el. 433± outside the failed area.
2. Inject lime-fly ash into bottom ash.
3. Install HDPE wall.
4. Remove soil in failed area to el. 423± and install blanket drain.
5. Excavate at downstream toe to install gravel drain.
6. Install inclined wells from the downstream toe.
7. After completion of the drains, complete the toe berm.
8. After completion of the cutoff wall, place the lightweight fill at the crest.
9. Install instrumentation to monitor the slide area.

This treatment would be required from approximately Station -6-50 to Station 5+50 as shown in Figure F-2. At each end of the wall, a return would be made toward the downstream portion of the dike, as shown in Figure F-3. Interceptor wells would be installed at each return as shown to intercept seepage coming from either the east or west end of the slide area. A cross-section for areas of potential shallow failure is shown in Figure F-4. The estimated costs for this option is $5.7 million and are summarized in Table F-1. Seepage analyses are shown in Figures F-5 and F-6. The repair elements and Finite Element Mesh are in Figures F-7 and F-8. Results of stability analyses are given in Figure F-9 and F-10. Results of stability analyses for the shallow dikes are shown in Figure F-11.

TABLE F-1
COST ESTIMATE FOR HDPE OPTION REPAIR

ITEM	WORK ITEM	QUANTITY	UNIT RATE	UNIT	TOTAL
ESTIMATED CONSTRUCTION COST FOR HDPE OPTION REPAIR					
1	Mobilization/Demobilization	1	$200,000	ls	$200,000
2	Strip	13,000	$0.90	cy	$11,700
2	Exacavate and stockpile soil	43,900	$2.50	cy	$109,750
3	Deep HDPE slurry wall	99,400	$10.50	sf	$1,043,700
4	Shallow Slurry Wall	52,500	$4.25	sf	$223,125
5	Inclined Sand Drains	5,200	$40.00	ft	$208,000
6	Lime /flyash inject bottom ash	135,000	$3.50	cy	$472,500
7	Excavate for toe berm	10,700	$2.50	cy	$26,750
8	Rock toe berm	36,700	$15.00	cy	$550,500
9	Blanket and chimney drain	13,700	$15.00	cy	$205,500
10	Light weight fill	47,700	$5.00	cy	$238,500
11	Trench drains near toe of upper dike	3,300	$20.00	cy	$66,000
12	Geofabric	13,300	$2.00	sf	$26,600
13	Roadway on top of dike	2,300	$5.40	sy	$12,420
14	Seed and Mulch	25,000	$0.50	sy	$12,500
15	Instrumentation	1	$25,000	allow	$25,000
16	Clay fill at toe berm and cap over lt wt fill	27,500	$5	cy	$137,500
		Subtotal			$3,570,045
		OH and profit @ 15%			$535,507
		Subtotal			$4,105,552
		Engineering @ 15%			$615,833
		Subtotal			$4,721,385
		Contingency @20%			$944,277
		TOTAL			**$5,665,661**



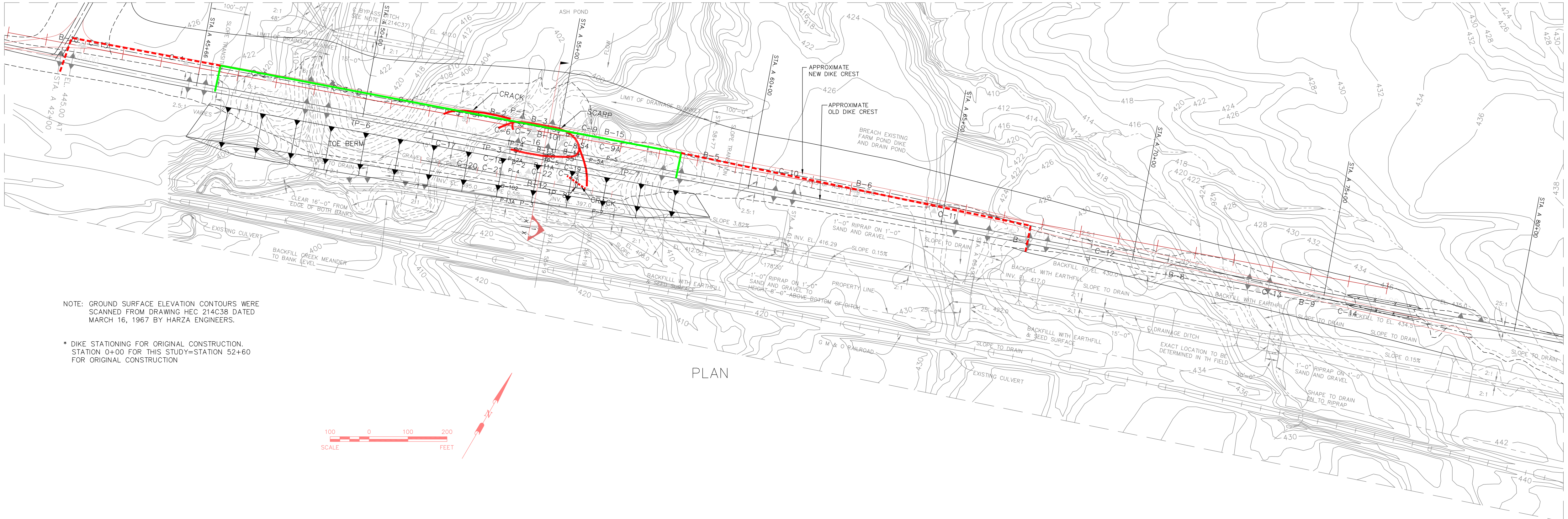
Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location — not between.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 4/20/95 DSGN. BY: gaz CHKD. BY: KMB 9-6-95	HDPE Repair in Areas of Potential Deep Failure — FIG. NO. F-1

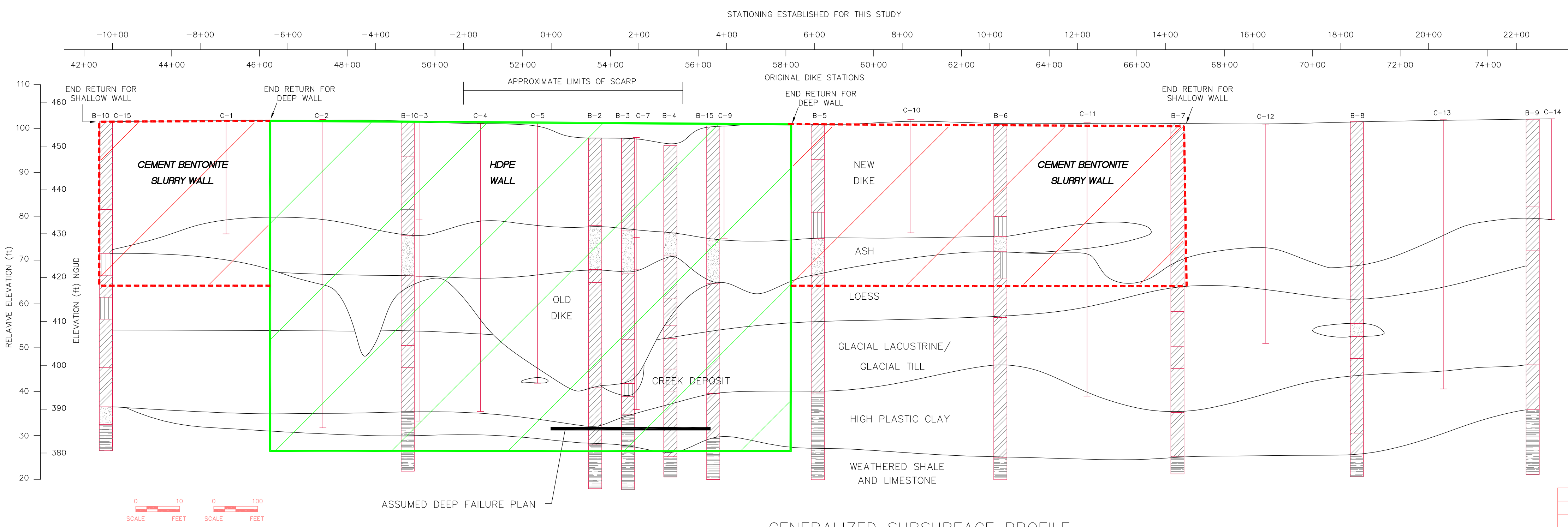
File: F:\5E08560\TASK240\FXFLDAR.DWG Last edited: 09/05/95 ● 4:22 p.m. ● WCC-ST.LOUIS

NOTE: GROUND SURFACE ELEVATION CONTOURS WERE SCANNED FROM DRAWING HEC 214C38 DATED MARCH 16, 1967 BY HARZA ENGINEERS.

* DIKE STATIONING FOR ORIGINAL CONSTRUCTION. STATION 0+00 FOR THIS STUDY=STATION 52+60 FOR ORIGINAL CONSTRUCTION



PLAN



GENERALIZED SUBSURFACE PROFILE
ALONG CENTERLINE OF NEW DIKE

LEGEND

- CLAY (CL)
- CLAY (CH)
- BOTTOM ASH
- SILT (ML)
- SHALE
- CPTU
- BORING
- TEST PIT
- PIEZOMETER
- APPROXIMATE FOOTPRINT OF NEW DIKE
- APPROXIMATE FOOTPRINT OF OLD DIKE

NOTES:
1. THIS DRAWING SHOWS GENERALIZED SUBSURFACE CONDITIONS. SEE ORIGINAL BORING LOGS FOR DETAILS.
2. LINES INDICATING STRATA BETWEEN EXPLORATORY LOCATIONS ARE INFERRED. STRATA SHOWN ARE KNOWN ONLY AT EXPLORATORY LOCATION – NOT BETWEEN.

Revision No.	Description	Date	By	App.

REVISIONS

ILLINOIS POWER COMPANY
BALDWIN POWER STATION

ASH POND, SOUTH DIKE
PLAN AND PROFILE OF REPAIRS
HDPE WALL ALTERNATIVE

Date: 4/10/95	Project Number: 5E08560	Figure Number: F-2
Drawn by: kdw	Design by: gaz	Checked by:

Woodward-Clyde Consultants
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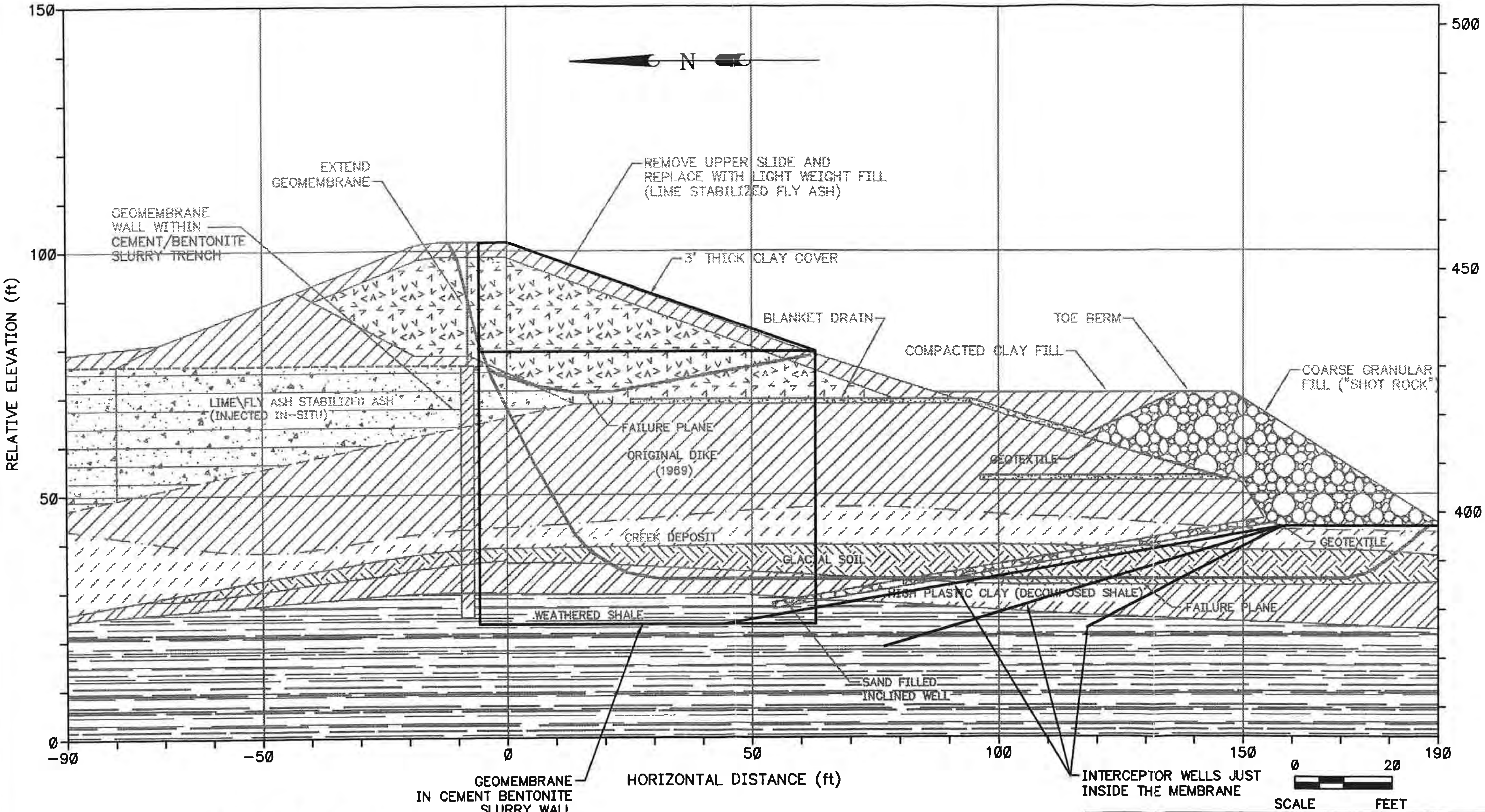

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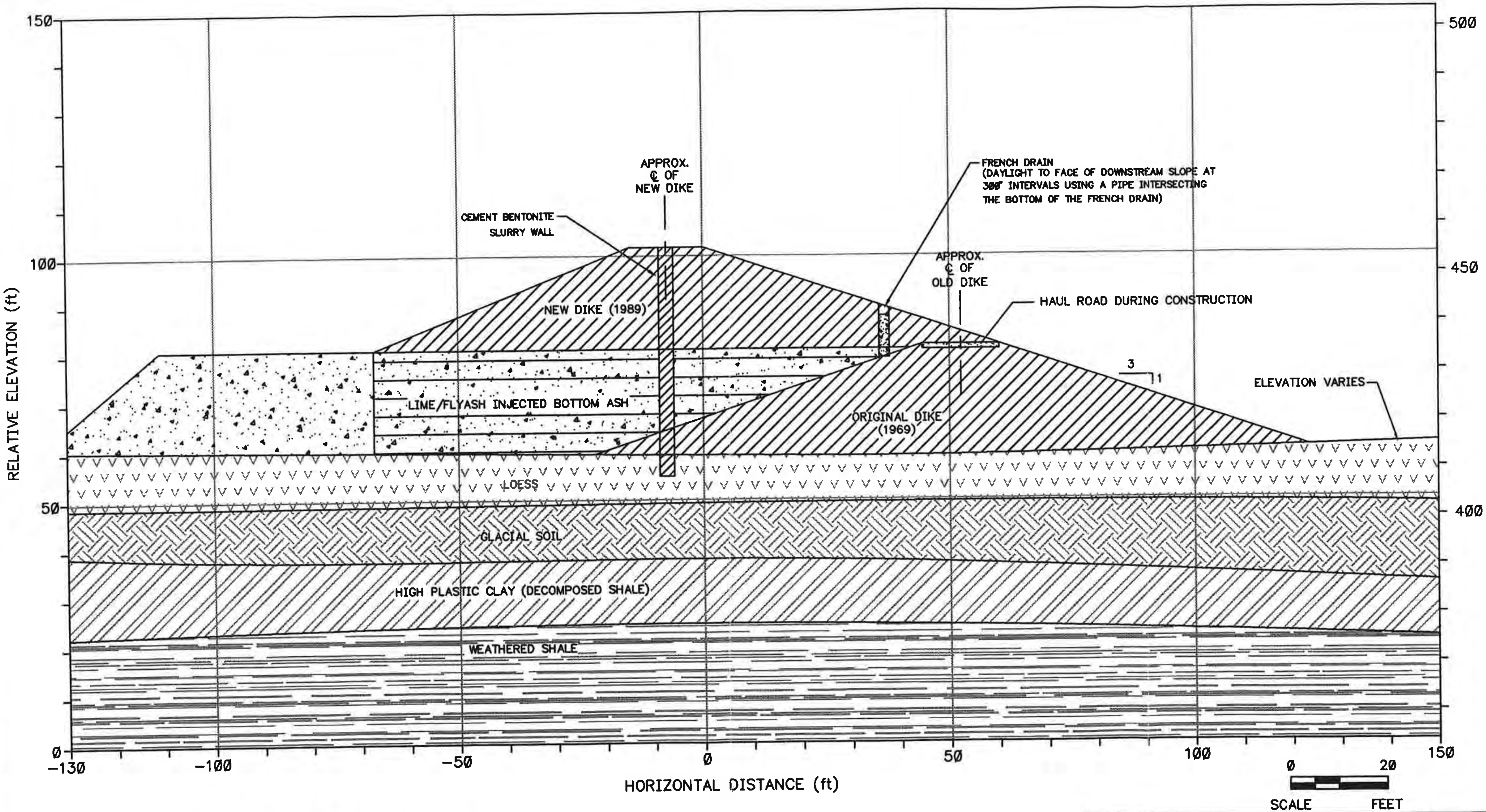
Notes:

1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

ILLINOIS POWER BALDWIN STATION SOUTH ASH POND DIKE BALDWIN, IL.	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	

DRN. BY: bdl 4/20/95 DSGN. BY: gaz CHKD. BY: KMB 9-6-95	Detail of End Return for Areas of Potential Deep Failure	FIG. NO. F-3



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Notes:
1. This drawing shows generalized subsurface conditions. See original boring logs for details.
2. Lines indicating strata between exploratory locations are inferred. Strata shown are known only at exploratory location – not between.

ILLINOIS POWER
BALDWIN STATION SOUTH ASH POND DIKE
BALDWIN, IL.

PROJECT NO. 5E08560

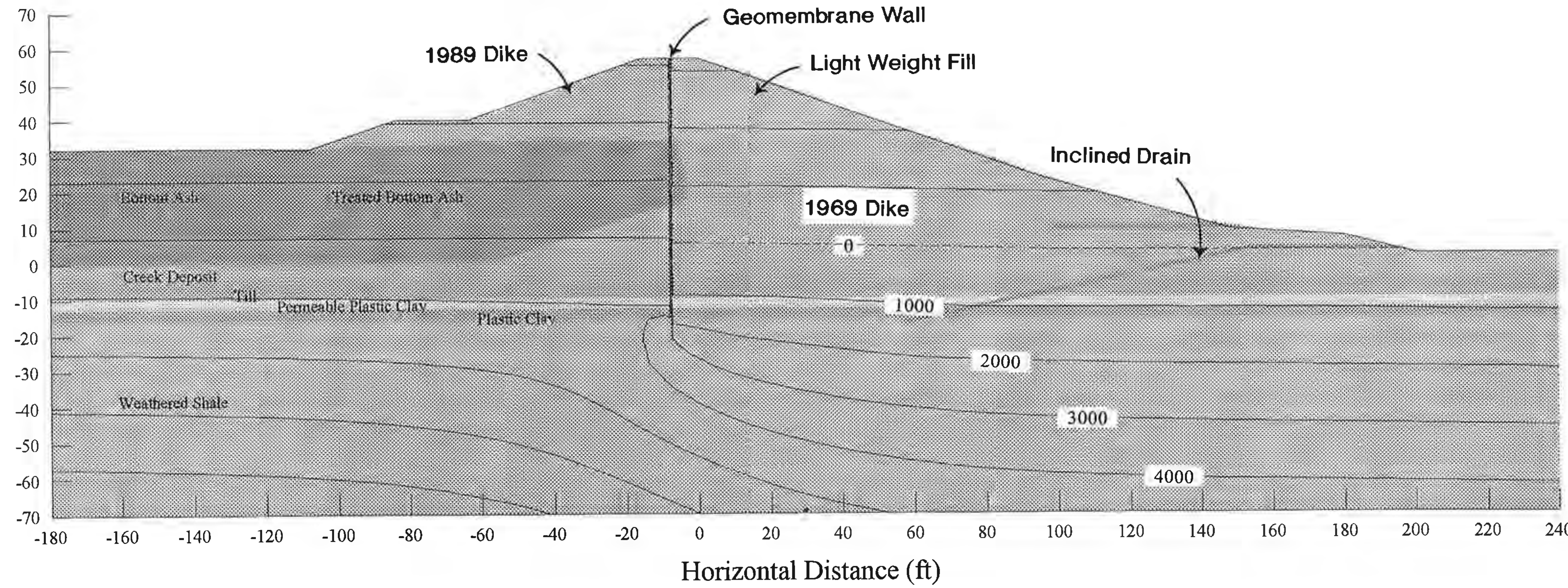
Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: bdl 5/24/95
DSGN. BY: gaz
CHKD. BY: KMB 9-6-95

HDPE Repair for Areas of Potential Shallow Slides

FIG. NO. F-4

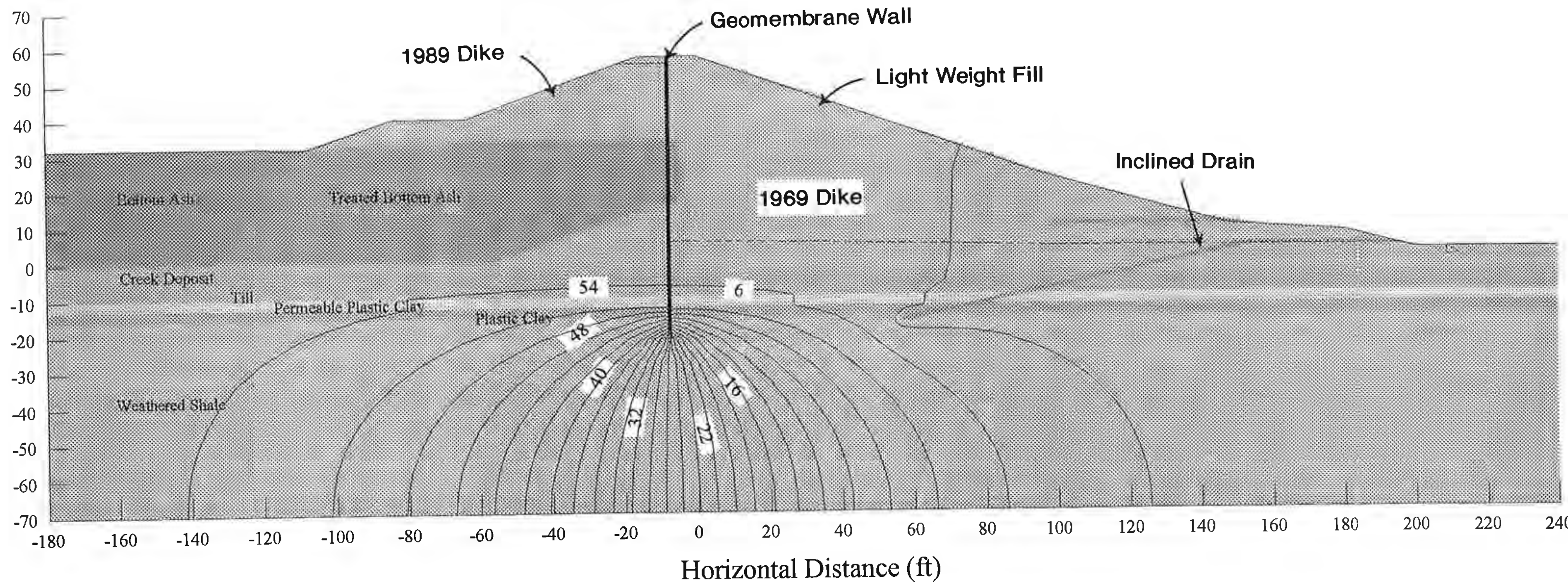
SEEPAGE ANALYSIS FOR RECOMMENDED SLIDE REPAIR
PRESSURE CONTOURS



ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE		PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment		
DRN. BY: bdl 6/23/95 DSGN. BY: kmb CHKD. BY: KMB 9-6-95	SEEPAGE ANALYSIS FOR HDPE WALL OPTION WATER PRESSURE CONTOURS	FIG. NO. F-5

File: F:\5E08560\TASK240\F5.DWG Last edited: 09/06/95 @ 08:22 a.m. @ WCC-ST.LOUIS

SEEPAGE ANALYSIS FOR RECOMMENDED SLIDE REPAIR
TOTAL HEAD CONTOURS



ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

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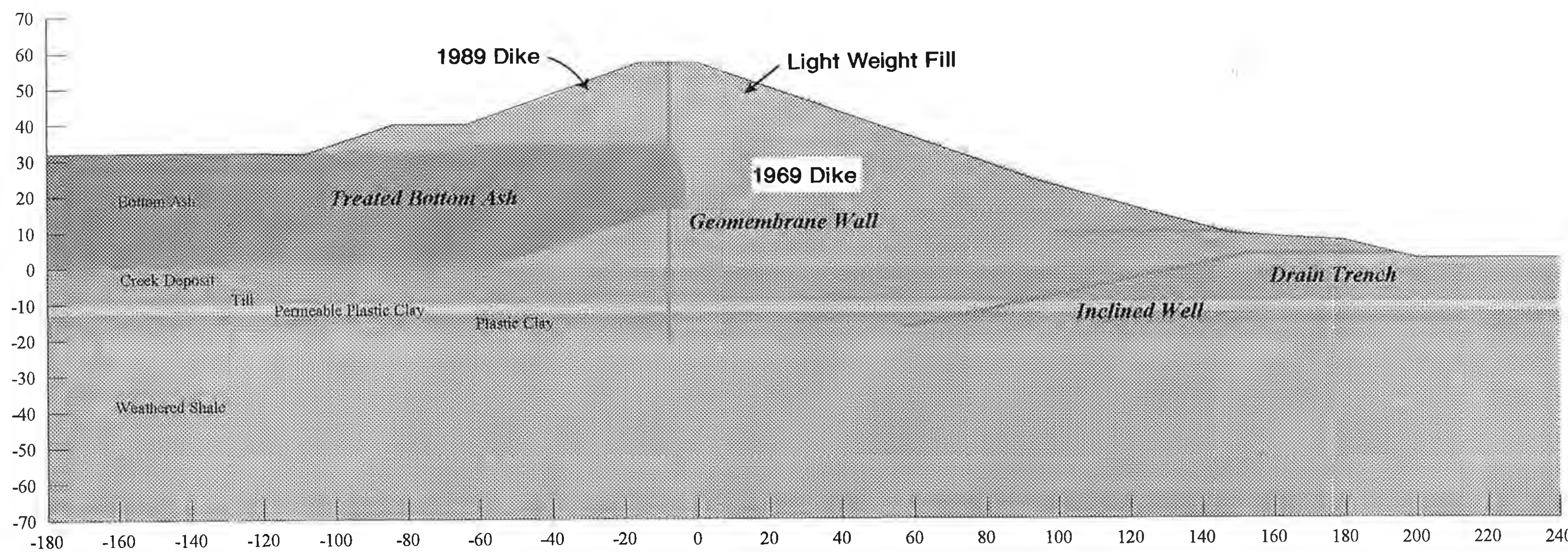
DRN. BY: bdl 6/23/95 DSGN. BY: kmb CHKD. BY: KMB 9-6-95	SEEPAGE ANALYSIS FOR HDPE WALL OPTION TOTAL HEAD CONTOURS	FIG. NO. F-6

File: F:\5E08560\TASK240\F6.DWG Last edited: 09/06/95 @ 08:21 a.m. @ WCC-ST.LOUIS

ELEMENTS OF RECOMMENDED SLIDE REPAIR



ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560

Woodward-Clyde Consultants
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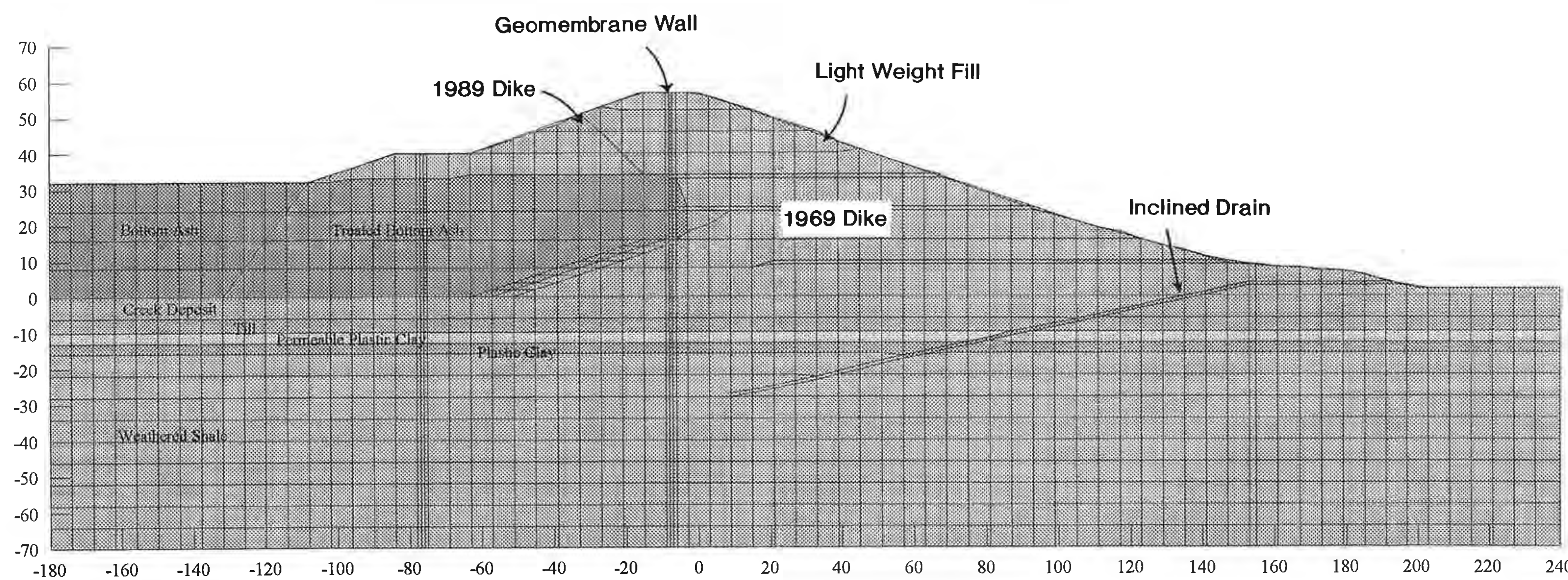
DRN. BY: bdl 6/23/95 DSGN. BY: kmb CHKD. BY: KMB 9-6-95	ELEMENTS OF HDPE WALL OPTION SLIDE REPAIR	FIG. NO. F-7

File: F:\5E08560\TASK240\F7.DWG Last edited: 09/06/95 @ 08:24 a.m. @ WCC-ST.LOUIS

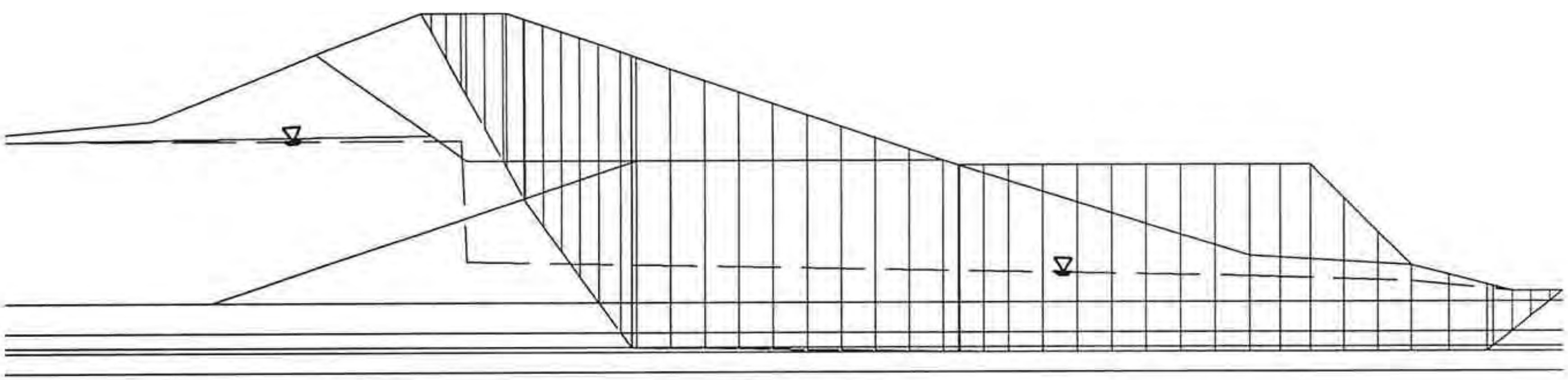
FINITE ELEMENT MESH FOR RECOMMENDED SLIDE REPAIR



File: F:\5E08560\TASK240\F8.DWG Last edited: 09/06/95 @ 08:23 a.m. @ WCC-ST.LOUIS

ILLINOIS POWER COMPANY BALDWIN POWER STATION ASH POND, SOUTH DIKE	PROJECT NO. 5E08560
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: bdl 6/23/95 DSGN. BY: kmb CHKD. BY: KMB 9-6-95	FINITE ELEMENT MESH HDPE WALL OPTION SLIDE REPAIR
FIG. NO. F-8	

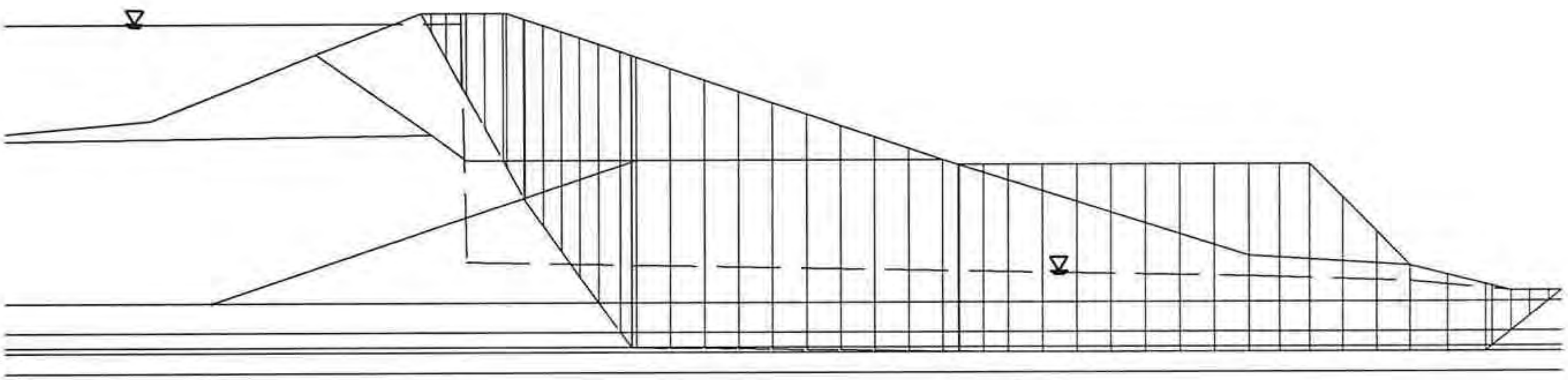
END OF CONSTRUCTION CONDITION
WITH LIGHT-WEIGHT FILL AND TOE BERM
HDPE WALL ALTERNATIVE



FS = 1.43

FIGURE F-9

STEADY STATE SEEPAGE
WITH LIGHT-WEIGHT FILL AND TOE BERM
HDPE WALL ALTERNATIVE



FS = 1.45

(FS = 1.08 Earthquake)

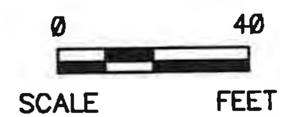
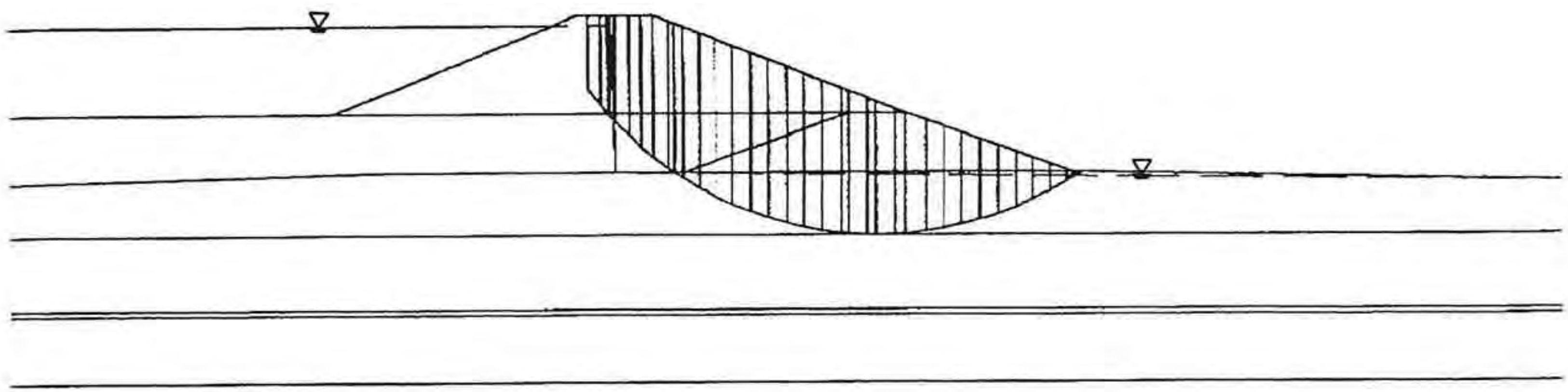


FIGURE F-10

SHALLOW FAILURE
HDPE WALL ALTERNATIVE



FS = 2.8 End of Construction
FS = 1.9 Steady State Seepage
FS = 1.6 Earthquake

Failure planes for each case are similar.

Note: Although these runs were done using the HDPE alternative, results are judjed to be similar for the other primary options since soil and seepage conditions are similar or better than this model.

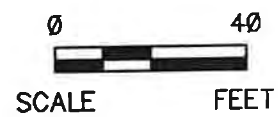


FIGURE F-11

APPENDIX G

SECONDARY OPTIONS

APPENDIX G
SECONDARY OPTIONS

This appendix includes four options that were considered early on, but not pursued in detail due to cost or other deficiencies. For purposes of discussion they are termed secondary options in this report. They were included in the June 23, 1995 Draft Report and are discussed as follows.

1. Removal and Replacement and Deep Shear Key Trench Option

The intent of this option was to remove the upper slide material and provide a shear key of coarse rock extending below the slide plane to strengthen the slide mass and stabilize it. A sketch of this option is given in Figure G-1 and a cost estimate is given in Table G-1. The shear key option involves the following:

- Excavating to below the depth of the deep failure plane to remove soil in the shallow failure and much of the deep failure area.
- Installing a rock-filled key trench below the failed area extending into the shale.
- Installing an HDPE wall in a cement bentonite slurry trench at the dike centerline (same as the HDPE option).
- Lime/fly ash slurry injection of the bottom ash (same as the HDPE option).
- Installing a cement-bentonite slurry wall and trench drains in areas of potential shallow failure (same as the HDPE option).

The estimated cost of this option is about $8 million and it was not considered further. A major concern with option is stability of the excavation during construction since a major cut (to el. 370) is needed.

2. Regrading Option

Regrading to flatten the slope was also considered as shown in Figure G-2. This approach has been used for tailings dams and maintains the downstream toe location and flattens the slope to about 5H:1V. This geometry moves the crest inside the existing pond where a new dike would be needed. A cutoff wall would still be required as well as stabilizing the bottom ash. Horizontal wells would be drilled from the toe to intercept the bottom ash which would act as a large drain.

The advantage of this system is that a downstream toe berm would probably not be needed. The disadvantage, however is that the dam crest would be moved and require construction inside the ash pond. Rough estimates show the cost to be about the same or somewhat more than the HDPE option. Due to the disadvantages noted, this approach was not considered further.

3. Drain Wall Option

Another option that is similar to the HDPE option is use of a "drain wall" at the center of the rebuilt dike in lieu of the HDPE cutoff wall (Figure G-3). (This is similar to the Parallel Wall option). The drain wall would be constructed by the slurry trench method but use a bio-degradable polymer drilling fluid instead of bentonite. The backfill in the drain wall trench would be free-draining such as concrete sand which would be left in place after the drilling fluid breaks down. The backfill would then act as a chimney drain. To remove the water from the drain wall is problematical. A series of inclined wells drilled from the toe to intersect the wall were considered.

This option has merit because it provides positive drainage. Our concern is difficulty of constructing a relatively deep wall and the inclined wells which would need to intersect the wall. Because of these concerns this option was not pursued further. We judged the cost to be similar to the HDPE repair.

4. Remove And Replace Bottom Ash (Shallow Slide Repair Option)

This option is for repair of potential shallow failures which could occur above the top of the old dike, even in areas without deep failure. The option involves removal and replacement of the bottom ash beneath the upper dike. To accomplish this, it will also be necessary to remove and replace the existing upper dike. This option would eliminate the need for the shallow cement-bentonite slurry wall in areas of potential shallow failure. This concept is shown schematically in Figure G-4. In areas of potential deep failure, the HDPE repair is assumed (i.e. HDPE slurry wall, inclined wells, and a toe berm) except that instead of lime/fly ash slurry injection of the bottom ash, we assume it is removed and replaced with compacted clay. The cost estimate of \$8 million is given in Table G-2.

A major problem with this option is dewatering during replacement of the clay fill. To account for this we allowed \$100,000 in dewatering costs based on judgment. Also, a temporary excavation or cofferdam would be needed within the pond to allow removal of the bottom ash. In any case, this option is significantly more expensive than the other options and was not considered further.

TABLE G-1
COST ESTIMATE FOR MASS EXCAVATION AND KEY TRENCH

ITEM	WORK ITEM	QUANTITY	UNIT RATE	UNIT	TOTAL
1	Mobilization/Demobilization	1	$200,000	ls	$200,000
2	Strip	22,000	$0.90	cy	$19,800
2	Exacavate and stockpile soil	323,000	$2.50	cy	$807,500
3	Deep HDPE slurry wall	99,400	$10.50	sf	$1,043,700
4	Shallow Slurry Wall	52,500	$4.25	sf	$223,125
5	Inclined Sand Drains	0	$40.00	ft	$0
6	Lime /flyash inject bottom ash	119,000	$3.25	cy	$386,750
7	Excavate for toe berm	0	$2.50	cy	$0
8	Rock key trench	28,000	$15.00	cy	$420,000
9	Blanket drain	19,600	$15.00	cy	$294,000
10	Replace stockpiled fill	275,400	$5.00	cy	$1,377,000
11	Trench drains near toe of upper dike	2,200	$20.00	cy	$44,000
12	Temp sheet pile	24,000	$10.00	sf	$240,000
13	Roadway on top of dike	2,300	$5.40	sy	$12,420
14	Seed and Mulch	50,000	$0.50	sy	$25,000
15	Instrumentation	1	$25,000	allow	$25,000
		Subtotal			$5,118,295
		OH and profit @ 15%			$767,744
		Subtotal			$5,886,039
		Engineering @ 15%			$882,906
		Subtotal			$6,768,945
		Contingency @20%			$1,353,789
		TOTAL			**$8,122,734**

TABLE G-2
COST ESTIMATE FOR REMOVAL AND REPLACEMENT OF BOTTOM ASH

ITEM	WORK ITEM	QUANTITY	UNIT RATE	UNIT	TOTAL
1	Mobilization/Demobilization	1	$75,000	ls	$75,000
2	Strip	28,000	$0.90	cy	$25,200
2	Exacavate and stockpile soil	357,000	$2.50	cy	$892,500
3	Deep HDPE slurry wall	99,400	$10.50	sf	$1,043,700
4	Shallow Slurry Wall	0	$0.00	sf	$0
5	Inclined Sand Drains	5,200	$40.00	ft	$208,000
6	Replace with clay fill	348,000	$5.00	cy	$1,740,000
7	Excavate for toe berm	10,700	$2.50	cy	$26,750
8	Rock toe berm	36,700	$15.00	cy	$550,500
9	Blanket drain	9,100	$15.00	cy	$136,500
10	Dewatering	1	$100,000	allow	$100,000
11	Trench drains near toe of upper dike	2,200	$20.00	cy	$44,000
12	Temp excavate bottom ash at toe	83,000	$4.00	sf	$332,000
13	Roadway on top of dike	2,300	$5.40	sy	$12,420
14	Seed and Mulch	50,000	$0.50	sy	$25,000
15	Instrumentation	1	$25,000	allow	$25,000
		Subtotal			$5,236,570
		OH and profit @ 15%			$785,486
		Subtotal			$6,022,056
		Engineering @ 15%			$903,308
		Subtotal			$6,925,364
		Contingency @20%			$1,385,073
		TOTAL			**$8,310,437**

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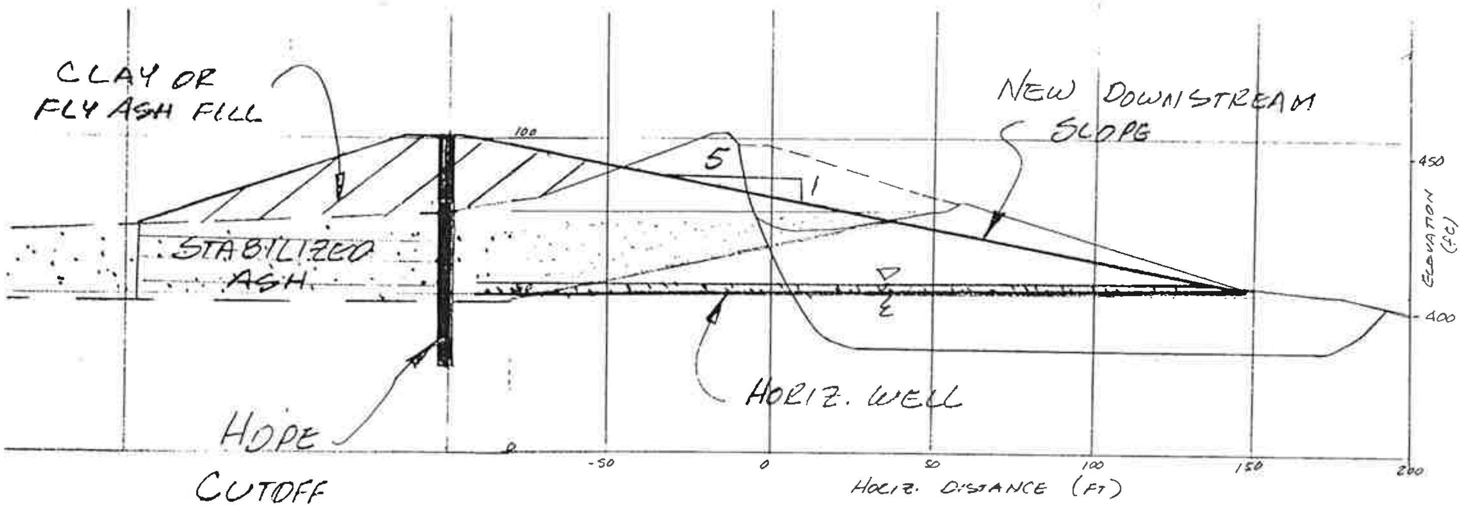

CONCEPTUAL REPAIR FOR DEEP FAILURE

"RE-GRADE"

FIG. 6-2

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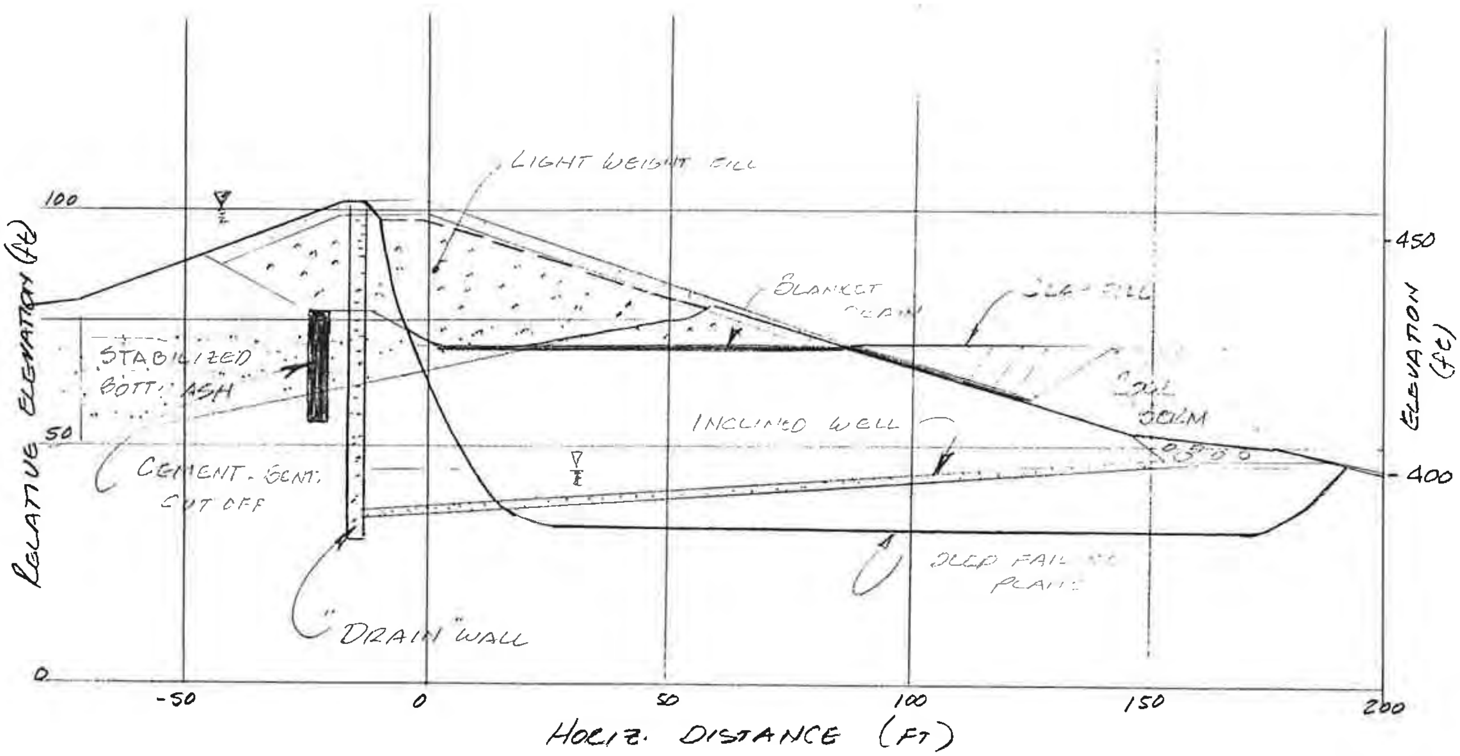

DRAIN WALL INSTALLED BY SLURRY TRENCH METHOD USING BIO-DEGRADABLE POLYMER - SAND BACKFILL

CONCEPTUAL REPAIR FOR DEEP FAILURE "DRAIN WALL"

FIG. G-3

Woodward-Clyde Consultants

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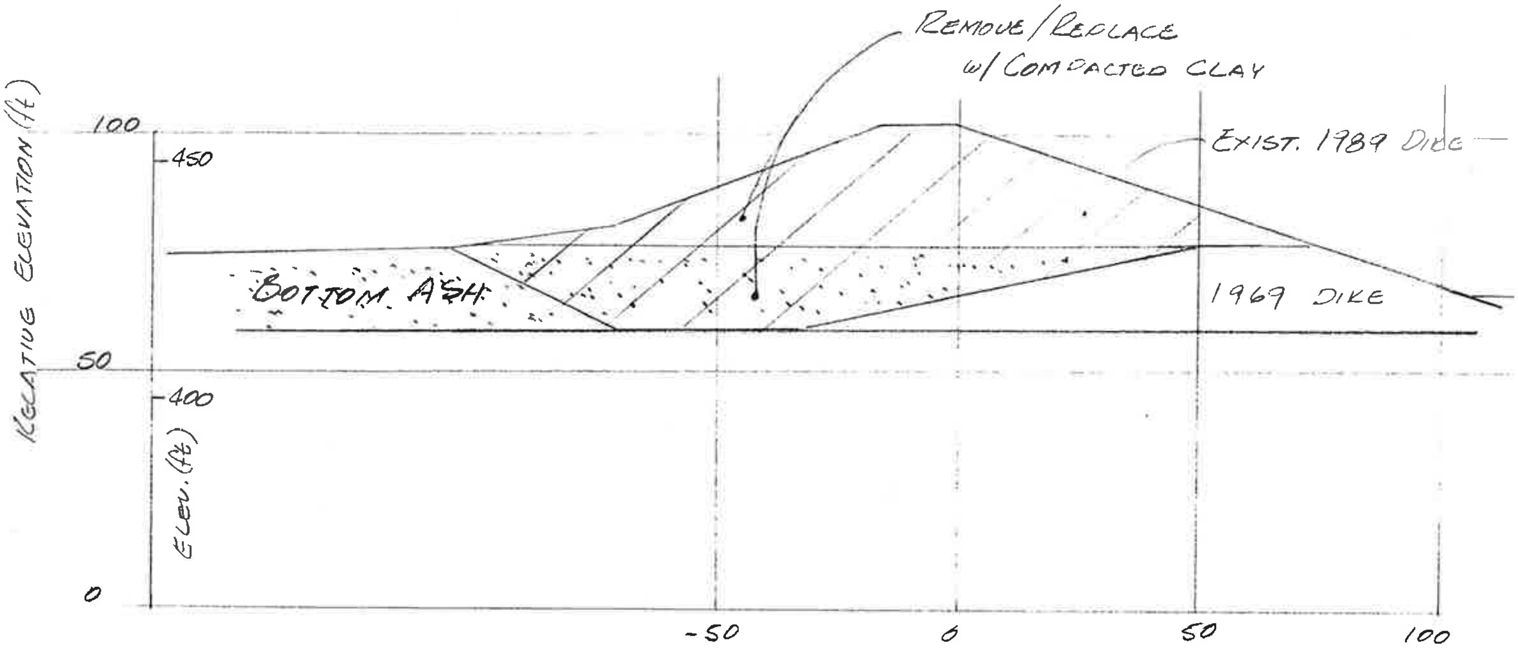
Made by TL Date 6-21-95

Checked by Date



CONCEPTUAL REPAIR

SHALLOW FAILURE AREAS

"REMOVE AND REPLACE BOTTOM ASH"

FIG. G-4

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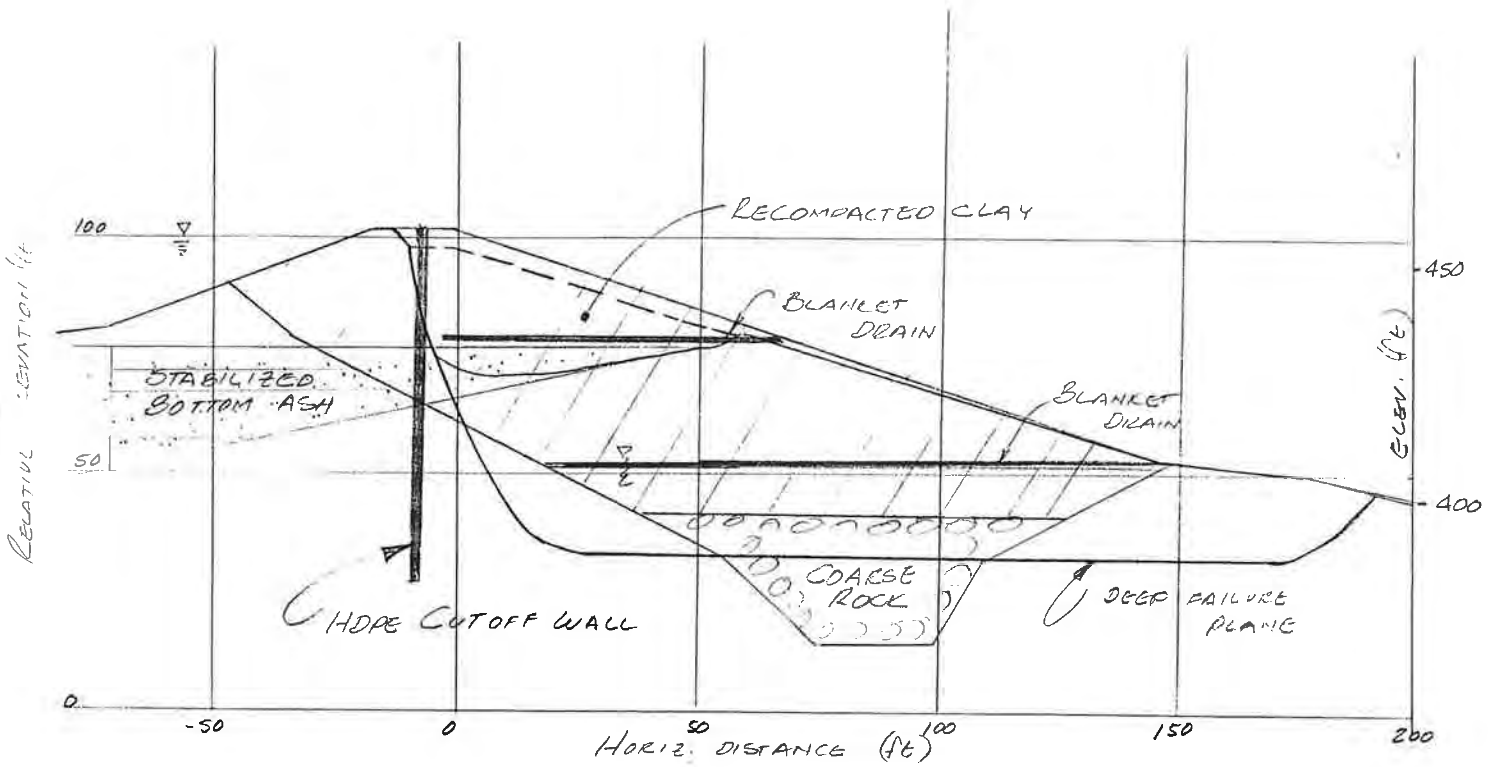

CONCEPTUAL REPAIR
FOR DEEP FAILURE

"KEY TRENCH"

FIG. G-1

AECOM

Appendix G: Observation of Slope Movement at Fly Ash Pond, Baldwin Energy Complex, Baldwin, Illinois, URS (2011)

URS

May 10, 2011

Mr. Charles Nerone
Environment and Chemistry Manager
Dynegy Midwest Generation, Inc.
10901 Baldwin Road, P.O. Box 146
Baldwin, IL 62217

SUBJECT: OBSERVATION OF SLOPE MOVEMENT AT FLY ASH POND BALDWIN ENERGY COMPLEX, BALDWIN, ILLINOIS

Dear Chuck:

I appreciated the opportunity to meet with you on May 2nd to view the slope movement at the north west portion of the Fly Ash Pond (Fly Ash West Cell). It is my understanding that Dynegy wanted me to observe the slope and then make comments on Dynegy's proposed remedial measures.

The embankment is exhibiting signs of distress believed to be due to the prolonged heavy rains that the site has been experiencing. There are signs of soil movement on the slope. The area of movement appears to be a stretch of the embankment which is slightly steeper than the rest of the embankment. The site was wet from recent heavy rains. Phil Morris stated that he was on site the previous week when it was drier, and no signs of seepage were observed. The top of the slide is a few feet below the crest of the embankment, and the bottom of the slide appears to be above the toe of the landside of the embankment. See the attached photos for a view of the movement.

Based on topographic data in our files, the approximate elevations of some key features are as follows:

Crest of embankment = El. 453
Landside toe of slope = El. 424
Pond water elevation = El. 426

Without performing any analyses, it is my opinion that the slide was caused by slope saturation due to the heavy precipitation that the site experienced. The area of the slope where movement occurred appears to be slightly steeper than the adjacent embankment. Given the water level of the pond, it is unlikely that pond seepage contributed to the slide. (This is just my opinion and would need numerical modeling to prove or disprove.)

URS Corporation
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110
Tel: 314.429.0100
Fax: 314.429.0462

URS

I concur with Dynegy's opinion that the area of movement should be remediated in order to prevent a progressive type failure of the slope. It is my understanding that Dynegy intends to perform a removal and replacement of the slide mass. My opinions and comments related to this are as follows:

1) The water level in the pond should remain at its current elevation permanently.

2) This method of slide repair is appropriate as long as the slide mass is relatively shallow (6 feet deep or less). It is unknown how deep the slide extends. The entire slide mass should be removed.

3) After removing the slide mass, the remaining slope will need to be benched to allow a proper connection of the new replacement soil to the remaining slope.

4) The final grade of the slope should be flattened to match the adjacent embankment.

5) The replacement material is anticipated to be clay. The clay fill will need to be thoroughly compacted in lifts at the appropriate moisture content.

We appreciate your consideration of URS for this work.

Sincerely,

Kenneth M Berry

Kenneth M. Berry, P.E.
Sr. Project Manager

Cc: Phil Morris

URS	PHOTOGRAPHIC LOG		
Client Name: Dynegy Midwest Generation	**Site Location:** Baldwin, IL	**Project No.** 21562663	

Photo No. 1	**Date:** 05/02/11

Description:

Northwest slope of Fly Ash Pond – Facing East.

Photo No. 2	**Date:** 05/02/11

Description:

Northwest slope of Fly Ash Pond – Facing West.

Appendix H: Photos from the 2015 surficial movement

Figure I.1. Photo of 2015 surficial movement prior to repairs.

Figure I.2. Photo of 2015 surficial movement area after repairs.