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HISTORY OF CONSTRUCTION REPORT – ASH POND B
WINYAH GENERATING STATION

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EXECUTIVE SUMMARY

Winyah Generating Station (WGS) is a 1,260 megawatts coal-fired steam electric generating facility owned and operated by South Carolina Public Service Authority (Santee Cooper). The Site is situated between Pennyroyal and Turkey Creeks and is located at 661 Steam Plant Drive in Georgetown, South Carolina. Coal combustion residuals (CCR) generated at WGS have been historically managed in existing CCR surface impoundments.

On April 17, 2015 the United States Environment Protection Agency (EPA) published the Final Rule for the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (CCR Rule). CCR Rule section §257.73(c)(1*)* requires the owner of existing CCR surface impoundments to compile a history of construction containing available information pertaining to the location, purpose, design, construction, and maintenance of the unit.

The purpose of this report is to provide a detailed history of construction record for Ash Pond B at WGS. Ash Pond B is a 65-acre surface impoundment and is located within the Sampit River Watershed. The unit historically received decanted ash sluice water, low volume wastewater, and Unit 2 Slurry Pond stormwater from Ash Pond A. Ash Pond B provides final polishing of wastewater by gravity settling. Although Ash Pond B foundation materials are variable, foundation materials and dike fill soils primarily consist of poorly graded to silty sands. Original drawings depict the design geometry of Ash Pond B dikes and appurtenances. A topographic survey conducted in 2011 shows the height of the Ash Pond B perimeter dikes is approximately 12 ft to 15 ft in the west, and 20 ft to 24.5 ft in the east.. Ash Pond B discharges to the Discharge Canal through a concrete riser structure located in the Southwest corner. A staff gauge installed in Ash Pond B provides information on the water surface elevation in the unit. Facility personnel utilize the perimeter and intermediate dikes for periodic pond surveillance and maintenance.

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Geosyntec
consultants

1. INTRODUCTION

In response to the recently published Coal Combustion Residual (CCR) Rule (40 Code of Federal Regulations (CFR) Part 257), Santee Cooper retained Geosyntec Consultants, Inc. (Geosyntec) to prepare documentation required by the CCR Rule for existing surface impoundments (SI) at Winyah Generating Station (WGS or the Site), located southwest of Georgetown, South Carolina. Four coal-fired generating units are operated at WGS with a total generating capacity of 1,260 megawatts.

Section §257.73(c)(1) of the CCR Rule states that *"No later than October 17, 2016, the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xii) of this section."*

This History of Construction Report (Report) is intended to meet the requirements of Part 257.73 (c)(1)(i–xii) of the CCR Rule for Ash Pond B at WGS, by documenting the dike geometry, engineering properties, material parameters, instrumentation, and other required information. The remaining sections of this Report are organized to satisfy specific requirements of the CCR Rule as follows:

Report Section	Regulatory Citation
Section 2 - provides owner and unit information	*40 CFR §257.73(c)(1)(i)*
Section 3 - provides the location of the unit	*40 CFR §257.73(c)(1)(ii)*
Section 4 - describes the purpose of the CCR unit	*40 CFR §257.73(c)(1)(iii)*
Section 5 - describes the contributing watersheds	*40 CFR §257.73(c)(1)(iv)*
Section 6 - describes the physical and engineering properties of foundation materials	*40 CFR §257.73)(c)(1)(v)*
Section 7 - presents construction methods and dates, and physical and engineering properties of materials used	*40 CFR §257.73(c)(1)(vi)*
Section 8 - provides dimensional drawings	*40 CFR §257.73(c)(1)(vii)*
Section 9 - describes the existing instrumentation	*40 CFR §257.73(c)(1)(viii)*
Section 10 - presents the area-capacity curves	*40 CFR §257.73(c)(1)(ix)*
Section 11 - describes spillway and diversion features	*40 CFR §257.73(c)(1)(x)*
Section 12 - discusses the surveillance, maintenance and repair provisions	*40 CFR §257.73(c)(1)(xi)*
Section 13 - discusses any record or knowledge of instability	*40 CFR §257.73(c)(1)(xii)*
Section 14 - provides the sources referenced within this Report	

2. OWNER AND UNIT INFORMATION

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

WGS is a coal-fired steam electric generating facility owned and operated by Santee Cooper. Santee Cooper's corporate offices are located at One Riverwood Drive, Moncks Corner, SC 29461. The Site is situated between Pennyroyal and Turkey Creeks and is located approximately four miles southwest of Georgetown, SC. WGS is located at 661 Steam Plant Drive in Georgetown, SC 29440.

Ash Pond B at WGS is a 65 acre surface impoundment (SI) which is regulated as a wastewater impoundment by the South Carolina Department of Health and Environmental Control (SCDHEC) Bureau of Water. Ash Pond B is exempt from the state's dam program and has not been assigned an identification number.

3. UNIT LOCATION

Section §257.73(c)(1)(ii) of the CCR Rule requires *"The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available."*

A map depicting the location of Ash Pond B identified on a United States Geologic Survey (USGS) 7 ½ minute topographic quadrangle map (USGS, 2014) is presented as **Figure 1.** CCR SI boundaries at WGS are provided in **Figure 2**.

Ash Pond B is located east of the power block. Ash Pond B is bounded by Ash Pond A to the north, the Cooling Pond to the east and south, and the Discharge Canal to the west.

4. PURPOSE

Section §257.73(c)(1)(iii) of the CCR Rule requires *"A statement of purpose for which the CCR unit is being used."*

Ash Pond B historically received decanted ash sluice water, low volume wastewater, and Unit 2 Slurry Pond stormwater from Ash Pond A. The purpose of Ash Pond B is to provide final polishing of wastewater by gravity settling prior to discharge of water to the Discharge Canal.

5. WATERSHED DESCRIPTIONS

Section §257.73(c)(1)(iv) of the CCR Rule requires *"The name and size in acres of the watershed within which the CCR unit is located."*

Ash Pond B is located in the Sampit River Watershed (ID: 03040207-01). The Sampit River Watershed encompasses 105,260 acres (ac) in the Lower Coastal Plain and Coastal Zone regions of South Carolina and consists primarily of the Sampit River and its tributaries (SCDHEC, 2015).

6. FOUNDATION MATERIALS

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

6.1 Regional Geology

Georgetown County is located in the Atlantic Coastal Plain physiographic province, which is characterized by Quaternary terrace deposits produced by fluctuating sea levels. Coastal plain sediments are underlain by Tertiary and late Cretaceous sediments to a depth of approximately 2,200 ft below ground surface (bgs) in the Georgetown area. Descriptions of geologic units of interest in the area were provided in a paper by Campbell and Coes, 2010. The thickness of each unit was estimated based on information from several borings referenced in Campbell and Coes (2010). Specifically, these borings include: 1) CHN-0820, which is located approximately 12 miles to the south of WGS, 2) GEO-0088, which is located approximately 7 miles to the southeast of WGS, and 3) GEO-0185, which is located less than 1.5 miles to the northwest of WGS. General information about the regional geologic units is summarized below, from the top unit to the bottom unit:

- Undifferentiated Quaternary Sediments: this geologic unit consists of yellowish-brown and reddish-orange poorly sorted, very fine to very coarse, clayey sand and gravel. Accessory minerals include opaque heavy minerals, mica, and feldspar. The Undifferentiated Quaternary sediments thickness ranges between 20 and 42 ft in the area;

- The Williamsburg Formation (Williamsburg): this geologic unit consists of gray to black interbedded clay and coarse quartz sand overlying shelly clay and calcareous clay. The Williamsburg can include sandy shale, fuller's earth, fossiliferous clayey sand (Lower Bridge Member), and fossiliferous clayey sand and mollusk-rich, bioclastic limestones (Chicora Member). The thickness of the Williamsburg in the vicinity of the site ranges between 30 and 90 ft.

- The Lang Syne Formation: As described in the literature by Muthig and Colquhoun (1988), this geologic unit consists of red and yellow (where weathered) or white, gray, and black (where freshly exposed) interbedded sand,

silt, and clay and thin beds of silicified shell debris. Opaline clay stone is the most characteristic lithology of the Lang Syne Formation.

- The Rhems Formation: This geologic unit consists of light-gray to black shale interlaminated with thin seams of fine-grained sand and mica.

- The Peedee Formation: this geologic unit consists of a dark-green to gray, fossiliferous, glauconitic clayey sand and silt. The combined thickness of the Lang Syne, Rhems, and Peedee Formations ranges between 185 and 378 ft in the vicinity of WGS.

Additional late Cretaceous Formations are present to a depth of approximately 2,200 ft bgs in the area. These formations, in descending order, include: Donoho Creek, Bladen, Coachman, Cane Acre, Caddin, Sheppard Grove, Pleasant Creek, Cape Fear and undifferentiated Cretaceous sediments.

6.2 Foundation Materials

Historical soil borings (PCRA, 1993) and soil borings and Cone Penetrometer Test (CPT) soundings (Geosyntec, 2016) advanced within the vicinity of Ash Pond B perimeter dikes were evaluated. The foundation material properties are described below.

Foundation materials were observed to be variable across the Ash Pond B footprint consisting primarily of poorly graded to silty sands with shells and few isolated seams of clayey sand to high plasticity clay (Geosyntec, 2016). Uncorrected Standard Penetration Test (SPT) blow counts within sandy foundations ranged from 2 to 30 blows per foot with tip resistances from 25 to 150 tons per square foot (tsf) (Geosyntec, 2016). In isolated areas, foundation materials were observed to be relatively poorly graded clean to silty sands (< 20% fines). The poorly graded and silty sands were composed typically of 58% to 90% sand sized material with 5% to 30% fines (Geosyntec, 2016). Some samples, described historically as "shell hash", contained predominantly shells and fine gravel constituting 5% to 24% of the sample by weight (Geosyntec, 2016).

The effective friction angle of foundation sands computed using the correlation developed by Hatanaka and Uchida (1996) typically ranged from 28° to 36°

(Geosyntec, 2016). Sandy and sandy clay foundation soils were found to typically have total unit weights between 105 and 115 pcf (Geosyntec, 2016).

7. PHYSICAL AND ENGINEERING MATERIAL PROPERTIES AND CONSTRUCTION METHODS AND DATES

Section §257.73(c)(1)(vi) of the CCR Rule states *"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."*

This section provides a description of the construction materials, site preparation, and construction methods, and dates for Ash Pond B. Burns and Roe, prepared the original design, while Lockwood-Greene prepared the civil construction drawings. All available drawings are included in **Appendix A**.

In 1975, Burns and Roe completed the design and construction of the unlined Ash Pond B concurrently with Ash Pond A to manage CCR. Original design drawings indicate that the Ash Pond B perimeter dikes were designed to a crest elevation of 34.5 ft National Geodetic Vertical Datum of 1929 (NGVD 29) (Drawing CV-504).

In 1993, Paul C. Rizzo Associates (PCRA) evaluated the feasibility of raising the Ash Pond B dikes to 41.0 ft NGVD 29. After a focused geotechnical investigation, PCRA recommended that the dikes be raised and constructed with 2:1 horizontal to vertical (H:V) downstream slopes (PCRA, 1993). PCRA recommended using downstream dike construction methods, where the downstream dike toe is backfilled with structural fill to the design crest elevation (PCRA, 1993). Per the construction specifications (included in **Appendix B**), structural fill was to consist of clayey sand with 30 to 40% fines (material passing through the No 200 sieve) and compacted to 95% standard Proctor maximum dry density (PCRA, 1993). The design called for the placement of riprap on the upstream side slopes of the raised dikes to protect against erosion. As a part of the engineering design report, PCRA prepared a boring location map and designed cross sections perpendicular to the perimeter dikes at each of the borings (PCRA, 1993). Ultimately, the raised Ash Pond B dikes were constructed in 1997 (Dewberry and Davis, 2011).

In 2011, a new concrete riser structure was installed through the southwest perimeter dike of Ash Pond B. The new outlet control structure was designed in accordance with the original drawdown structure, with the exception of depth (Santee Cooper, 2012).

First, a concrete riser structure was installed approximately 360 ft. south southwest of the original structure. Next, a 24-in diameter HDPE pipe was installed within a trench through the perimeter dike to discharge into the Discharge Canal. It is noted that the 24-in diameter (SDR 21) HDPE pipe was incased in controlled low strength material (CLSM) (i.e., flowable fill) within the perimeter dike and covered with structural fill compacted to 95% maximum dry density (Santee Cooper, 2012).

After the new Ash Pond B discharge structure was in operation for seven months, Santee Cooper began abandoning the original structure by removing approximately the furthest downstream 8 ft of RCP and constructing a CLSM plug (Santee Cooper, 2012). Afterwards, CLSM using Type I/II Portland cement was pumped into the discharge and allowed to settle and set for 24 hr. Subsequently, additional CLSM was used to fill the remaining void space of the discharge structure and outlet pipe (Santee Cooper, 2012). A report detailing the installation of the new drawdown structure and abandonment of the original drawdown structure is presented in **Appendix C**.

In 2013, geotechnical investigations were conducted at 54 locations within Ash Ponds A and B (Geosyntec, 2014). Three investigation campaigns were completed from February to December 2013, and soil borings and CPT soundings (Geosyntec, 2016) were advanced within the vicinity of Ash Pond B perimeter dikes. Collected data, and historical boring logs and design cross sections (PCRA, 1993) were used to develop a triangular-irregular-network (TIN) surface of the pond bottom in AutoCAD® Civil 3D based on interpolation between available data points.

In September 2016, Santee Cooper submitted a permit application to construct a spillway between the existing outlet pipes on the divider dike between Ash Pond A and Ash Pond B. The spillway with a base width of 100 ft., 10H:1V side slopes, and an invert elevation of 37 ft. NGVD29, will be constructed as soon as approval is received. This work is expected to be completed in October, 2016.

Dike fill soils for Ash Pond B perimeter dikes were generally observed to be medium dense to very dense, poorly graded to silty sands with uncorrected SPT blow counts typically ranging from 9 to 51 blows per foot (Geosyntec, 2016). CPT tip resistances in the top 10 ft of fill typically ranged from 30 to 200 tsf, while CPT tip resistances below the top 10 ft of fill typically ranged from 200 to 450 tsf (Geosyntec, 2016). Grain size distribution analysis indicated that these dike fill soils typically consist of approximately 70% to 90% sand sized (smaller than No. 4 sieve but greater than No.

200 sieve) and approximately 8% to 27% silt and clay sized material (% fines), with most samples containing less than 10% fines (Geosyntec, 2016). The dike fill soil's effective friction angle was computed using the correlation developed by Hatanaka and Uchida (1996) and was found to range between 38° and 55° (Geosyntec, 2016). Based on the estimated pond bottom, the combined volume of material in Ash Pond B was computed to be 951 acre ft (Geosyntec, 2014 and Thomas and Hutton, 2011).

8. DIMENSIONAL DRAWINGS

Section §257.73(c)(1)(vii) of the CCR Rule states *"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."*

The purpose of this section is to document information related to the design, construction, operation, and maintenance of the Ash Pond B on dimensional drawings, to the extent this information is available.

Available original design drawings, and construction specifications (PCRA, 1993) are presented in Appendix A and Appendix B respectively. Original design documents for the construction of Ash Pond B are limited to a grading plan (CV-504 (Rev. 12)) prepared by Lockwood-Greene (1972). Drawing CV-504 indicates that the Ash Pond B dikes were originally designed with 2H:1V upstream and 3H:1V downstream slopes. The dikes were designed with a crest elevation of 34.5 ft NGVD 29 (approximately 7 ft less than the intermediate dike and Ash Pond A perimeter dikes). Drawing CV-504 (Rev. 12) depicts a single concrete riser structure located adjacent to the west dike approximately 360 ft from the southwest corner of Ash Pond B. The design cross section of the riser structure and horizontal discharge piping (drawing CV-508) shows a 24 inch diameter horizontal discharge pipe with an upstream invert of 18.0 ft NGVD 29.

PCRA (1993) indicates that the Ash Pond B water surface elevation was controlled by a metal overflow gate set at an elevation of 28.5 ft NGVD 29, on the concrete riser. PCRA recommended raising the concrete riser and overflow gate by 7 ft, with the metal overflow gate set to an elevation of 35.5 ft NGVD 29 (PCRA, 1993).

A recent survey of the current outfall structure shows the elevation of the top of concrete riser and the top of overflow board to be 38.8 ft and 34.9 ft NGVD 29, respectively (Thomas and Hutton, 2016). The riser structure discharges water through a

24-in rubber coated pipe with invert elevations of 29.90 ft and 19.88 ft NGVD 29 at the pipe inlet and pipe outlet respectively (Thomas and Hutton, 2016).

The height of the Ash Pond B perimeter dikes is approximately 12 ft to 15 ft in the west, and 20 ft to 24.5 ft in the east, with a maximum crest elevation of 41.4 ft NGVD 29 (Thomas and Hutton, 2011).

Based on the available information, a dimensional site plan delineating the layout and grading of Ash Pond B is provided in **Figure 3**. Normal and maximum operating pool elevations, and depth of the CCR unit, is depicted in the cross sections provided in **Figure 4.** Maximum operating pool elevation was calculated based on a 100 yr., 72-hr storm event. The calculations assume that Santee Cooper will build a spillway at the intermediate dike between Ash Ponds A and B (Geosyntec, 2016). Location of instrumentation is provided in **Figure 5**.

9. EXISTING INSTRUMENTATION

Section §257.73(c)(1)(viii) of the rule states *"A description of the type, purpose, and location of existing instrumentation."*

Staff gauges have been installed at WGS to monitor surface water in the vicinity of CCR impoundments and the Cooling Pond.

As shown on **Figure 5**, one staff gauge has been installed at the principal discharge structure for Ash Pond B (W-SW-APB) to monitor the water surface elevation.

10. AREA-CAPACITY CURVES

Section §257.73(c)(1)(ix) of the rule states *"Area-Capacity curves for the CCR unit."*

Topographic (2-ft contour interval) and bathymetric data was utilized to create an existing conditions TIN surface in AutoCAD® to represent the top of ash (Thomas and Hutton, 2011). The surface area of each contour within Ash Pond B was measured and tabulated. The storage capacity in each depth increment was calculated by averaging the surface area of the upper and lower contour and multiplying by the change in elevation between each contour. Surface area and pond capacity by elevation is presented in **Table 1**. The area-capacity curve is provided in **Figure 6**.

11. SPILLWAY AND DIVERSION FEATURES

Section §257.73(c)(1)(x) of the rule states *"A description of each spillway and diversion design features and capacities and calculations used in their determination."*

A spillway with a base width of 100 ft, side slopes of 10H:1V, and invert elevation 37 ft NGVD29 will be constructed in the divider dike between Ash Ponds A and B. Once constructed, Ash Pond B will not be overtopped by the 100 yr, 72 hour storm event. Operational Plans are in place in case the design storm event occurs before the construction of the spillway is completed. An emergency spillway for overtopping flows was not originally provided for Ash Pond B.

12. SURVEILLANCE, MAINTENANCE, AND REPAIR PROVISIONS

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

Santee Cooper conducts periodic surveillance and maintenance of Ash Pond B. Santee Cooper engineers inspect Ash Pond B dikes in accordance with dike inspection procedures that are presented in **Appendix D**. Site personnel conduct weekly and annual inspections of the ash pond embankments. Personnel performing inspections are required to undergo an initial inspector training as well as refresher training every 3 years. Qualified dam safety engineers accompanied by Site personnel conduct annual inspections. Internal inspection of the outlet structure in Ash Pond B is conducted every five years.Weekly observations and routine inspections are documented on Inspection Checklists (**Appendix D**).

Maintenance of dikes and culverts at Ash Pond B are conducted as needed, as determined by routine observations conducted by facility personnel. Vegetation on the dike slopes and crest is cut or inspected every day by Site personnel using a long reach excavator with a 60" rotary cutter head and a flat tractor with a 15' batwing mower.

13. RECORD OF STRUCTURAL INSTABILITY

Section §257.73(c)(1)(xii) of the rule states *"Any record of knowledge of structural instability of the CCR unit."*

There are no records or knowledge of structural instability associated with Ash Pond B.

14. REFERENCES

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TABLES

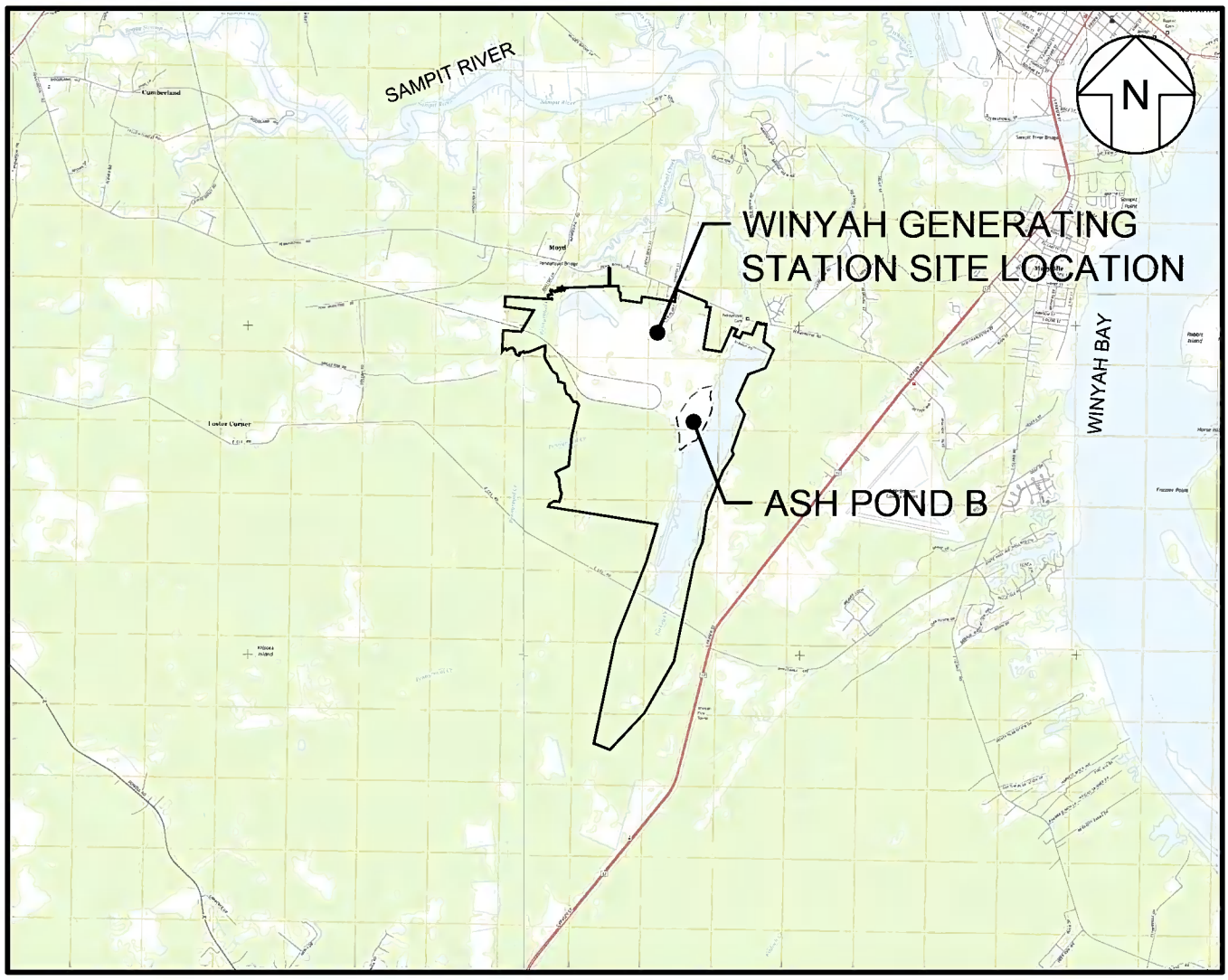
Table 1. Area-Capacity Table for Ash Pond B

Elevation (ft)	Area (ac.)	Volume (ac-ft)
39.68	62.211	222.29
38	59.773	119.82
36	30.021	30.03
34	0.006	0.00

Notes:

1. Elevations are provided in ft NGVD 29.
2. Δ Volume (ac-ft) computed as the average surface area × the difference in elevation (ft).

FIGURES



LEGEND

APPROXIMATE PROPERTY LINE

APPROXIMATE LIMIT OF POND

NOTES:

1. SOURCE OF USGS TOPOGRAPHIC MAP: https//store.usgs.gov, PUBLISHED BY THE US GEOLOGICAL SURVEY, GEORGETOWN SOUTH QUADRANGLE, DATE 2014, AND KILSOCK ISLAND QUADRANGLE, DATE 2014, 7.5 MINUTE SERIES.
2. THE WGS INCLUDES 2,527.47 ACRES ZONED AS HEAVY INDUSTRIAL.
3. WGS BOUNDARY SHOWN PROVIDED BY THOMAS & HUTTON DATED 10 JANUARY 2014.

0 8,000'

SCALE IN FEET

ASH POND B LOCATION MAP
SANTEE COOPER
WINYAH GENERATING STATION

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FIGURE 1

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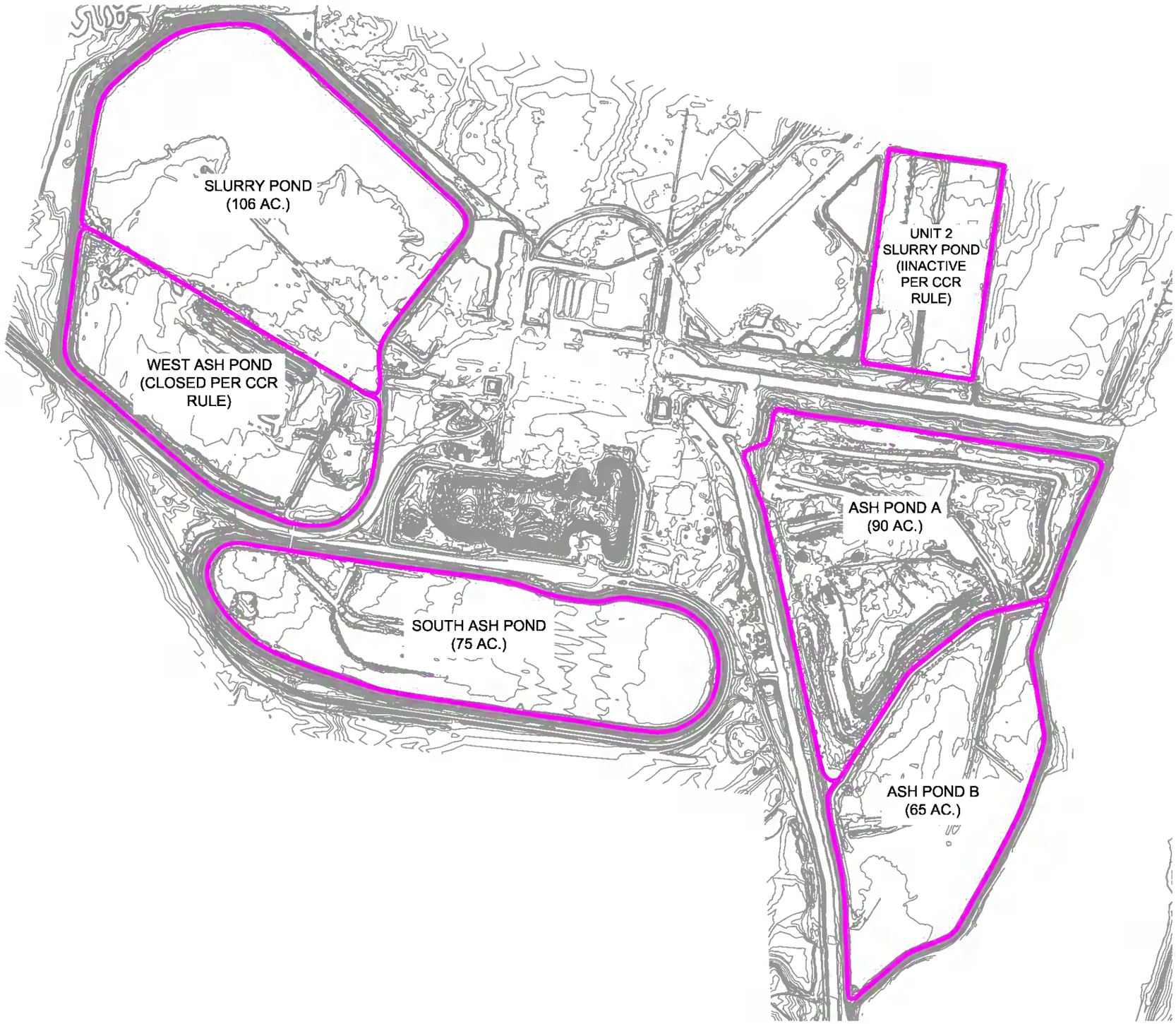

LEGEND

SURFACE IMPOUNDMENT DRAINAGE AREA BOUNDARY

NOTES:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS AND HUTTON (2011).
2. SURFACE IMPOUNDMENT AREAS ESTIMATED BY GEOSYNTEC (2015).

N

0 800'

SCALE IN FEET

SURFACE IMPOUNDMENT BOUNDARIES

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FIGURE 2

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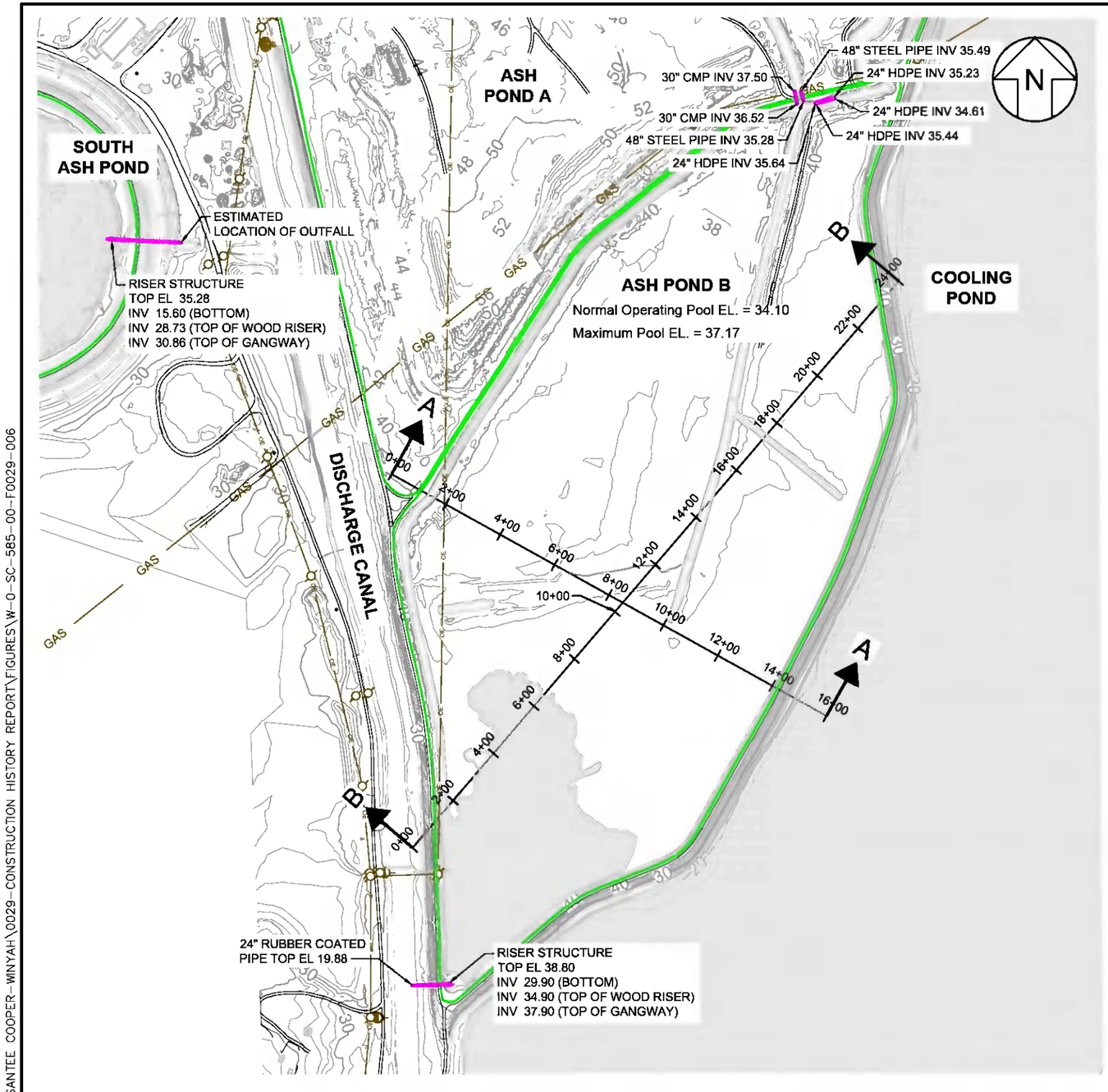

LEGEND

- APPROXIMATE LIMIT OF ASH PONDS
- DIRT/GRAVEL ROAD
- EXISTING GRADES
- GAS LINE
- OUTFALL PIPE AND STRUCTURE
- OVERHEAD ELECTRIC LINE
- RAILROAD
- WATER

NOTES:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS & HUTTON DATED 06/29/11 AND REVISED ON 01/14/12.
2. DIKE CREST ELEVATIONS, OUTFALL STRUCTURES, AND PIPES SOURCE: THOMAS AND HUTTON SURVEY, RECEIVED FILE ON 2/5/2016. FILE NAME: 23021T12_DikeCrests.dwg.
3. PROPERTY BOUNDARY LINE PROVIDED BY THOMAS & HUTTON, DRAWING TITLED "PLAT OF THE BOUNDARY AND COMBINATION OF VARIOUS PARCELS CONTAINING 2527.47 ACRES TOTAL COMPRISING WINYAH GENERATING STATION AND THE SUBDIVISION TO CREATE TRACT A AND TRACT B", PLAT DATE 11/25/13.
4. COORDINATES AND DIRECTIONS SHOWN ON THIS DRAWING ARE BASED ON SOUTH CAROLINA STATE PLANE COORDINATE SYSTEM (NAD83) (CORS) (INT'L FT). DISTANCES SHOWN ARE GROUND DISTANCES, NOT GRID DISTANCES.
5. ELEVATIONS ON THIS SURVEY ARE REFERENCED TO NGVD 1929 DATUM AS DERIVED FROM NGS MONUMENT PID#DD1957.
6. SECTIONS WERE CUT TO PASS THROUGH LOWEST POINT ON DIKE CREST.
7. MAXIMUM POOL ELEVATION ESTIMATED BASED ON A 100 YR, 72-HR STORM EVENT

0 400'
SCALE IN FEET

SANTEE COOPER
WINYAH GENERATING STATION
ASH POND B SITE PLAN

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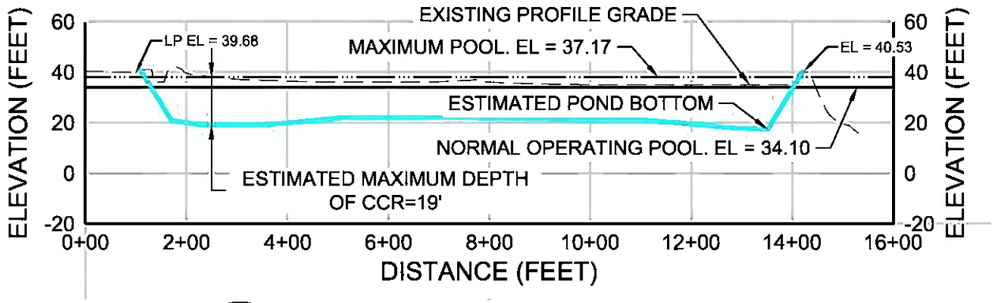
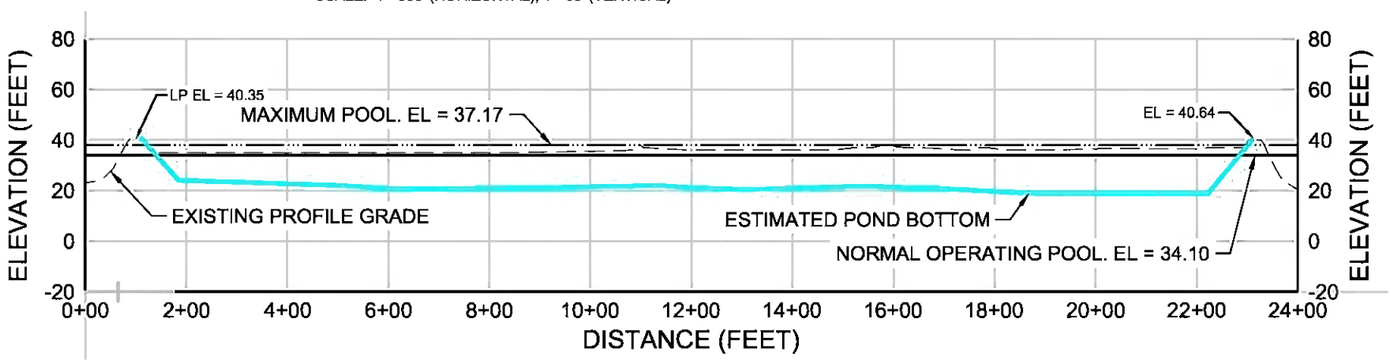
FIGURE 3

M:\S\SANTEE COOPER\SANTEE COOPER - WINYAH\0029 - CONSTRUCTION HISTORY REPORT\FIGURES\W-0-SC-585-00-F0029-006



A/3 PROFILE
SECTION AT DIKE CREST LOW POINT
SCALE: 1"=300' (HORIZONTAL); 1"=60' (VERTICAL)



B/3 PROFILE
SECTION AT DIKE CREST LOW POINT
SCALE: 1"=300' (HORIZONTAL); 1"=60' (VERTICAL)

LEGEND

- ESTIMATED POND BOTTOM
- EXISTING PROFILE GRADE
- MAXIMUM POOL ELEVATION
- NORMAL OPERATING POOL ELEVATION

NOTE:

1. POND BOTTOM WAS ESTIMATED FROM HISTORICAL BORINGS AND FIELD INVESTIGATIONS PERFORMED BY GEOSYNTEC IN 2013 AND 2014.

0 300'
HORIZONTAL
SCALE IN FEET

0 300'
VERTICAL
SCALE IN FEET

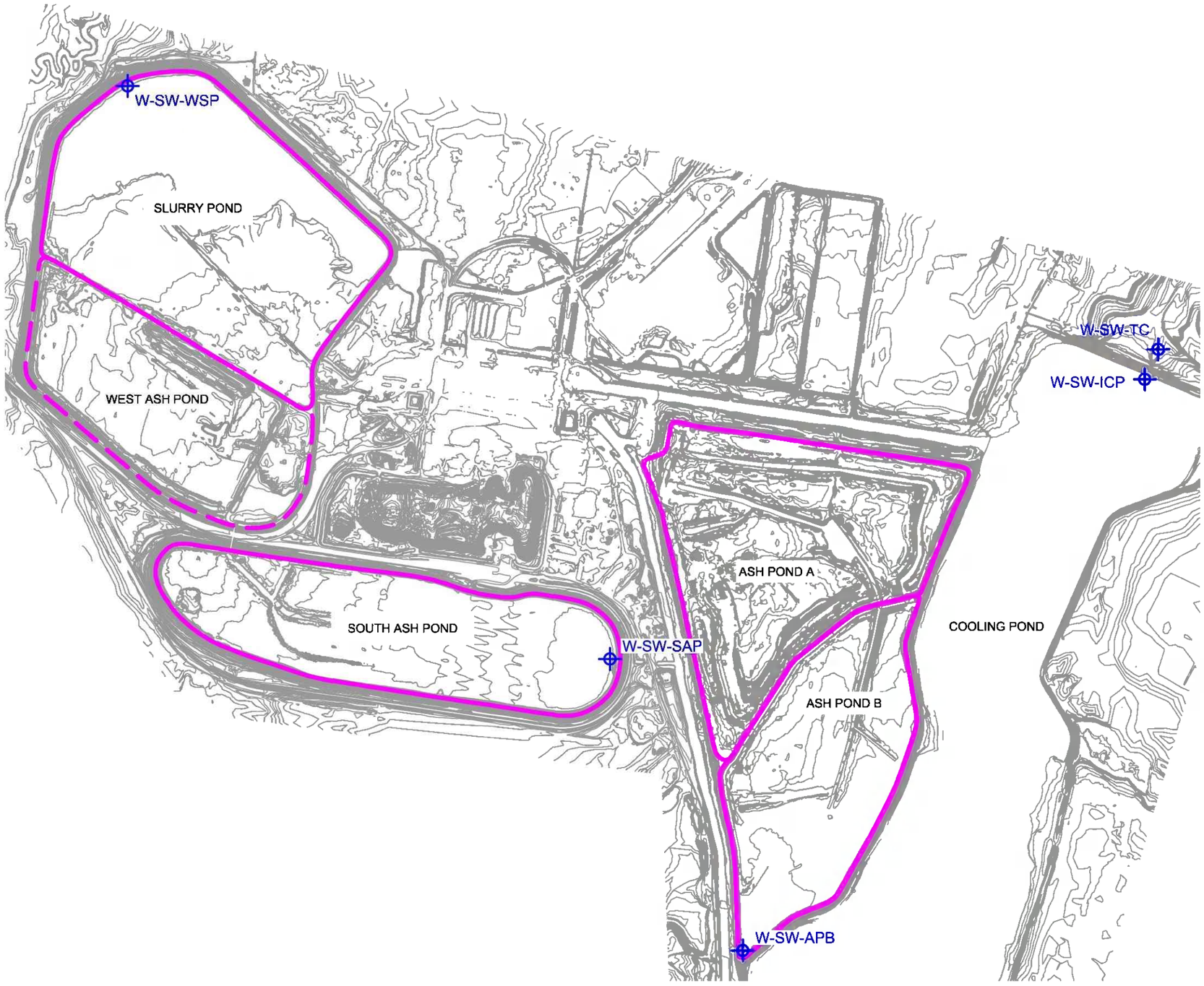
SANTEE COOPER
WINYAH GENERATING STATION
ASH POND B
DIKE LOW POINT SECTIONS

Geosyntec consultants

FIGURE
4

PROJECT NO: GSC5242 | JULY 2016

M:\S\SANTEE COOPER\SANTEE COOPER - WINYAH\0029 - CONSTRUCTION HISTORY REPORT\FIGURES\W-0-SC-585-00-F0029-006



LEGEND

SURFACE IMPOUNDMENT DRAINAGE AREA BOUNDARY

CCR EXEMPT SURFACE IMPOUNDMENT WITH AREA DRAINAGE TO EXISTING SURFACE IMPOUNDMENT

NOTE:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS AND HUTTON (2011).

N

0 900'

SCALE IN FEET

STAFF GAUGE LOCATIONS

Geosyntec consultants

PROJECT NO: GSC5242 | JULY 2016

FIGURE 5

M:\S\SANTEE COOPER\SANTEE COOPER-WINYAH\0029-CONSTRUCTION HISTORY REPORT\FIGURES\W-0-SC-585-00-F0029-008

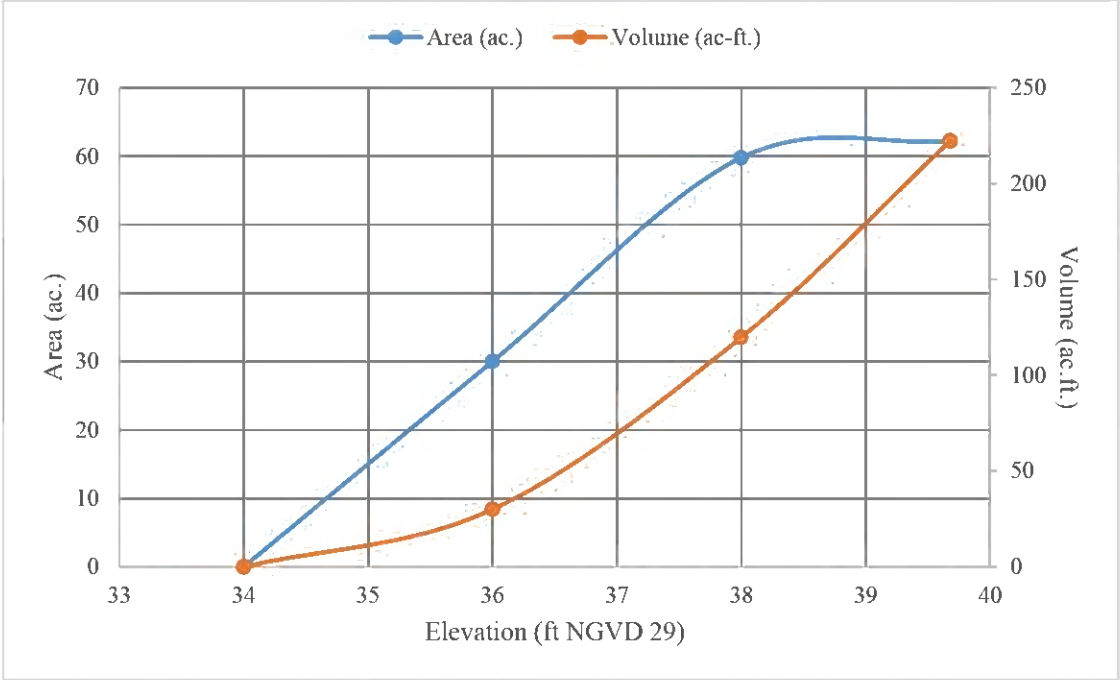


Figure 6. Area- Capacity Curve for Ash Pond B

Notes:

1. Elevations are provided in ft NGVD 29.
2. Δ Volume (ac-ft) computed as the average surface area × the difference in elevation (ft).

APPENDIX A

Lockwood-Greene Design Drawings

no.	date	revision	by	ck.	appr.
12		ADDED AS BUILT INFO.			
11		REVISED AIR VALVE DETAIL CONTRACT S-2862-61	DRC		
8		REVISED ROAD AROUND PLANT			
7		RELOCATED DIKE			
4		REVISED DISCHARGE CANAL ALIGNMENT			

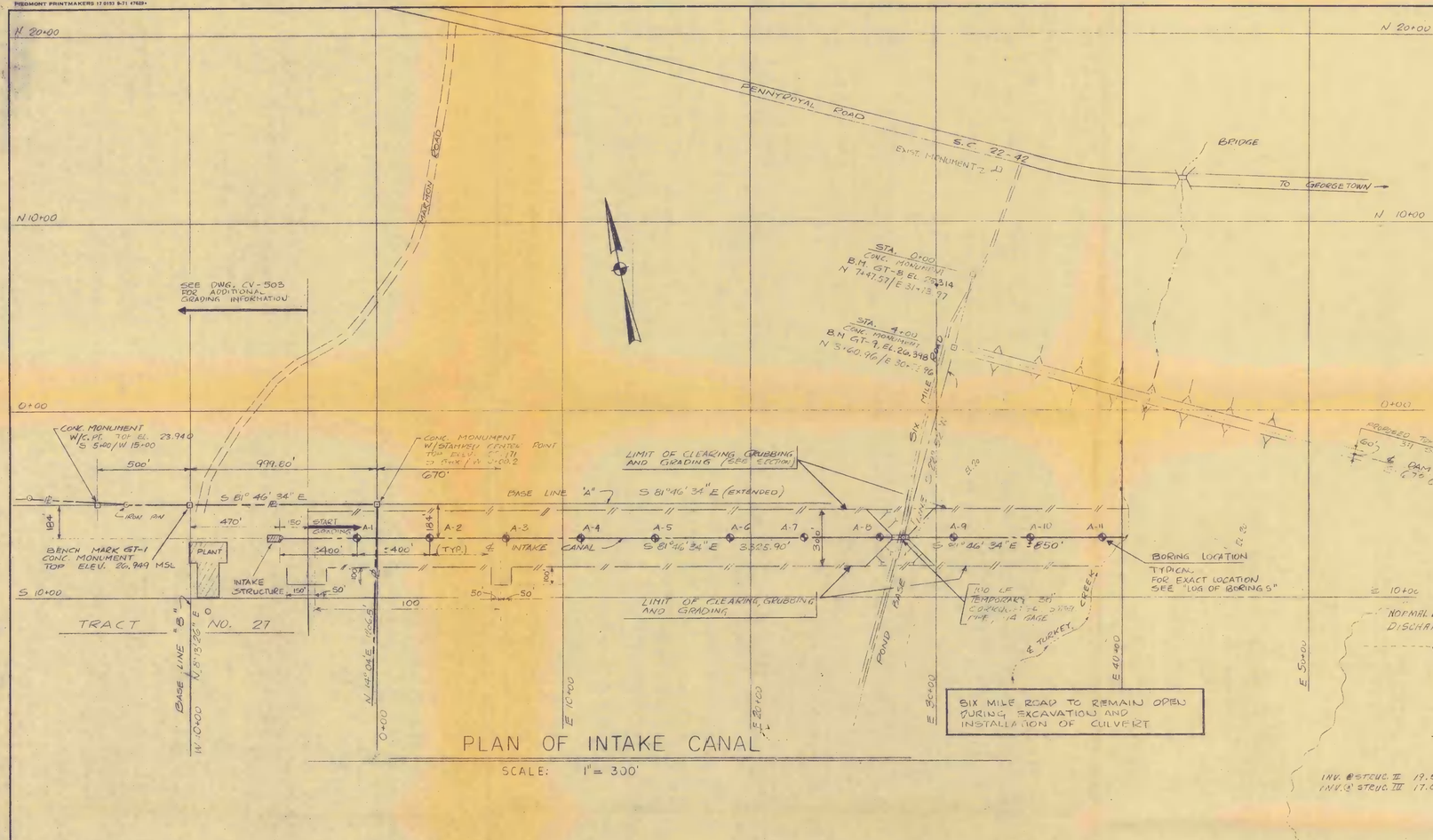
BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS
ORADELL, N.J. HEMPSTEAD, N.Y. LOS ANGELES, CALIF.

ATLANTA — NEW YORK
LOCKWOOD GREENE
ARCHITECTS · ENGINEERS
SPARTANBURG, S.C.

Sheet title: SITE PLAN COOLING POND SHEET N-1

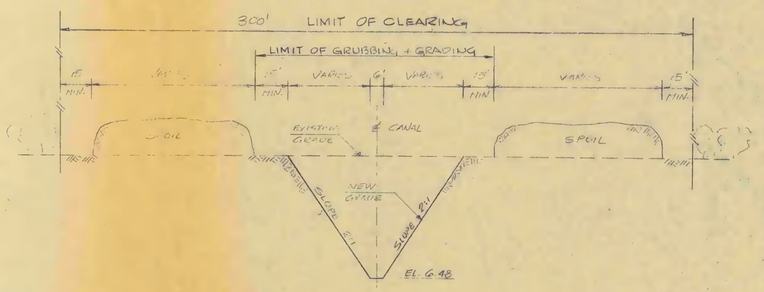
SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
GEORGETOWN GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

L-G JOB NO. 71029
B&R W.O. NO. 2862-02
DWG. NO. CV-504 rev. no. 12



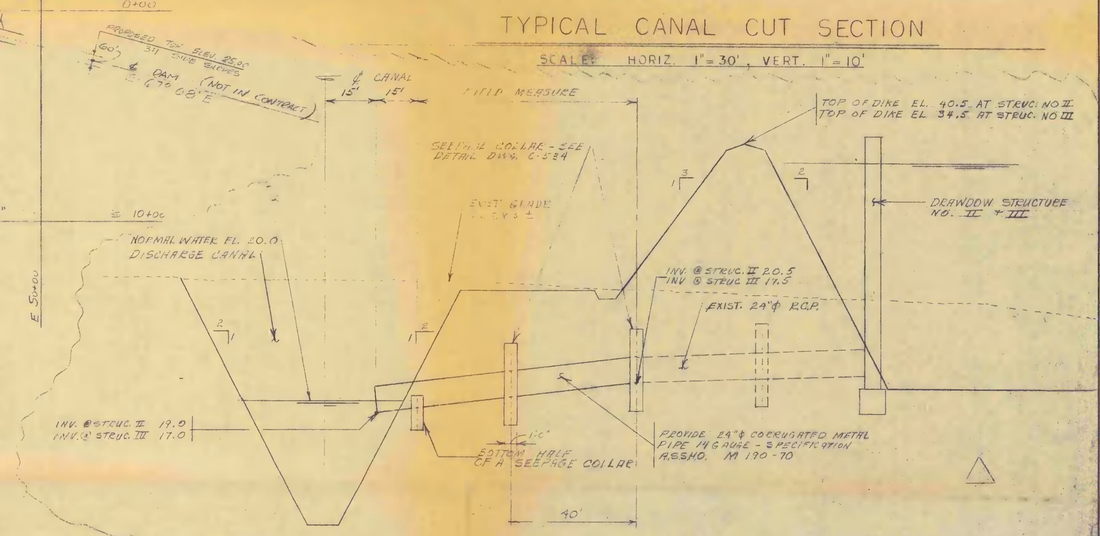
PLAN OF INTAKE CANAL

SCALE: 1" = 300'



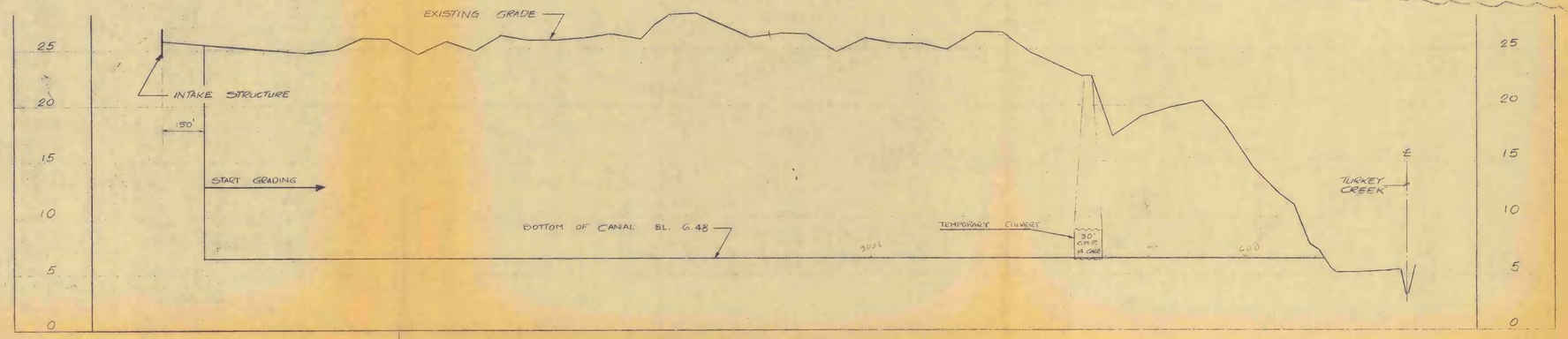
TYPICAL CANAL CUT SECTION

SCALE: HORIZ. 1" = 30', VERT. 1" = 10'



SECTION (2 / CV-504)

SCALE HORZ. 1" = 20'
VERT. 1" = 5'



PROFILE AT ℄ OF INTAKE CANAL

SCALE = HORZ: 1"=200', VERT.: 1"=5'

NOTICE OF REVISION

REVISIONS AS NOTED ON THIS DRAWING MAY CONSTITUTE A CHANGE TO ORIGINAL CONTRACT. IF CHANGES AFFECT THE CONTRACT PRICE CONTRACTOR SHALL SUBMIT A DETAILED ESTIMATE OF THESE CHANGES TO THE ENGINEER WITHIN 15 DAYS OF RECEIPT OF THIS DRAWING. NO WORK SHALL COMMENCE UNTIL THIS PRICE CHANGE IS AGREED UPON. SEE GENERAL CONDITIONS, PARAGRAPH 3.0.

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no	date	REVISION	by	ck.	appr.
4	6/26/72	ADJUSTED BM'S GT-8 AND GT-9	G.T.	B.K.	
3	5/19/72	ISSUED FOR CONSTRUCTION, CONTRACT NO. S 2862-02	ER	CRT.	DWS
2	3/16/72	ADDED LOCATION OF BORINGS	ER		
1	1/18/72	REVISED PIPE SIZE AT INTAKE NO. S 2862-R	ER		DCT
0	1/4/72	ISSUED FOR REVIEW	ER		
5	2-24-72	EXTENDED PIPE FOR DRAWDOWN STRUC. II & III CONTRACT NO. S 2862-02	TW	TED	DWR

drawn by E. KNABENHANS
dept. ck. W. K. DUKES
dept. appr. J. R. MORRIS
coord. ck. W. K. DUKES
p.m. appr. O. S.
B&R appr.

ATLANTA NEW YORK
LOCKWOOD GREENE
ARCHITECTS · ENGINEERS
SPARTANBURG, S.C.

sheet title: INTAKE CANAL PLAN AND PROFILE

job name: SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
GEORGETOWN GENERATING STATION
GEORGETOWN SOUTH CAROLINA

scale: AS NOTED
date: 2-17-72
L-G JOB NO. 71029
B&R W.O. NO. 2862-02
DWG. NO. CV-508
rev. no. 5

APPENDIX B

Ash Pond B Construction Specifications (PCRA, 1993)

Project No. 93-1356
December 1993

Paul C. Rizzo Associates, Inc.
CONSULTANTS

Report

Ash Pond B Dike Elevation

Winyah Generating Station

South Carolina Public Service Authority (Santee Cooper)
Moncks Corner, South Carolina

REPORT

ASH POND B
DIKE ELEVATION
WINYAH GENERATING STATION

PROJECT NO. 93-1356
DECEMBER 8, 1993

PAUL C. RIZZO ASSOCIATES
763 JOHNNIE DODDS BOULEVARD
MT. PLEASANT, SOUTH CAROLINA 29464
TELEPHONE: (803) 856-9700
TELEFAX: (803) 856-9002

r2-t931356/SC

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2.0 GEOTECHNICAL INVESTIGATION 2
3.0 LABORATORY TESTING 3
4.0 DESIGN OF DIKE ELEVATION 4
5.0 SUMMARY 6

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APPENDIX B - LABORATORY TEST RESULTS
APPENDIX C - BORROW SOIL VOLUME CALCULATION
APPENDIX D - CONSTRUCTION SPECIFICATIONS

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1	BORING AND CROSS SECTION LOCATION PLAN
2	CROSS SECTION B-1
3	CROSS SECTION B-2
4	CROSS SECTION B-3
5	CROSS SECTION B-4
6	CROSS SECTION B-5
7	CROSS SECTION B-6
8	LONGITUDINAL PROFILE OF DIKE RECONSTRUCTION
9	EXISTING ASH POND B DISCHARGE STRUCTURE, SHEET 1 OF 2
10	EXISTING ASH POND B DISCHARGE STRUCTURE, SHEET 2 OF 2
11	EXTENSION OF EXISTING ASH POND B DISCHARGE STRUCTURE

ASH POND B
DIKE ELEVATION
WINYAH GENERATING STATION

1.0 INTRODUCTION

Paul C. Rizzo Associates was initially retained by South Carolina Public Service Authority (Santee Cooper) to evaluate the feasibility of raising the Ash Pond B earth embankment at the Winyah Generating Station in order to increase storage capacity. Tim Onstott and Jeff Holchin of our firm met Ms. Joan Cahill and Mr. Henry Stevens of Santee Cooper at the site on August 30, 1993. A reconnaissance of the site and a nearby potential soil borrow source was performed. Photographs of the site and associated facilities were taken. A plan drawing of the site and an aerial photograph were obtained from Santee Cooper.

After careful evaluation of the field observations and the requirements of Santee Cooper for storage of fly ash, it was concluded that elevation of the earth embankment at Ash Pond B to increase storage capacity of the pond is feasible.

Subsequently, Paul C. Rizzo Associates was retained by Santee Cooper to perform a geotechnical investigation of the site and to provide plans and specifications for raising the embankment.

This report provides a description of the geotechnical investigation and the results obtained, and it also provides plans and specifications for the raising of the Ash Pond B impounding dike.

2.0 GEOTECHNICAL INVESTIGATION

Six borings were drilled at the site on October 21 and 22, 1993. The borings were drilled from the crest of the Ash Pond B dike (Figure 1) to an approximate depth of 30 feet. The borings were drilled with hollow-stem augers, and Standard Penetration Test (SPT) samples were obtained at five-foot intervals. Logs for each of the borings drilled are provided in Appendix A to this report. A plan view of the boring locations is provided on Figure 1.

Both the embankment and foundation soils were found to be competent. The embankment soils are generally clayey or silty fine sand with SPT blow counts generally exceeding 30 except near the surface. The foundation soil is a silty fine sand with SPT blow counts generally averaging 10 or higher.

No piezometers were installed at the site, but water levels observed in the boreholes during the drilling indicate that the phreatic surface is well below the impoundment water level. Approximate phreatic surfaces based on the field observations are shown on the embankment cross sections presented on Figures 2 through 7. The cross sections also show the stratigraphy, as determined from the borings, the variation of SPT blow count with depth, the geometry of the embankment, and the levels of upstream and downstream water. Note that the water levels shown are those when the cross sections were surveyed and will vary somewhat.

The cross section geometry and top of boring elevation at each boring location was determined from survey data provided by Santee Cooper personnel. Because there was no stationing system for the Ash Pond B embankment, a temporary system was established by Paul C. Rizzo Associates (Figure 1) to aid in locating in the field the cross sections shown on Figures 2 through 7 and to facilitate field construction activities.

As part of the field investigation, samples of potential borrow soil were obtained with a tractor-mounted backhoe from the nearby property of Mr. Orrin Harrelson. Samples for laboratory testing were obtained from two locations.

3.0 LABORATORY TESTING

Two samples of potential borrow soil were obtained from property near the Winyah Generating Station owned by Mr. Orrin Harrelson. The samples were taken to a geotechnical testing laboratory where the following tests were run:

- Grain-size
- Atterberg limits
- Standard Proctor Compaction

The grain-size analyses indicated that the soil samples are very uniform fine sands with fines contents (portion passing the No. 200 sieve) of nearly 20 percent. Based on the Unified Soil Classification System, the soil samples can be classified as clayey sands, which are very suitable for constructing the addition to the embankment.

Standard Proctor Compaction tests were performed in order to establish the compaction characteristics of the two soil samples. The optimum moisture content for compaction averaged 17 percent and the average maximum dry density of the samples was 109 pcf. Results of the laboratory testing are provided in Appendix B.

4.0 DESIGN OF DIKE ELEVATION

The perimeter dike of Ash Pond B will be raised by approximately seven feet to increase the storage capacity. The portion of the dike between Ash Pond A and Ash Pond B is already at an adequate elevation. The existing pond discharge structure for Ash Pond B will also be raised by about seven feet.

The existing dike for Ash Pond B consists of a competent fine sand with silt or clay fines. Grass is the primary vegetation, with some marsh vegetation present at the toe of the upstream slope and small shrubs and on the downstream slope along with marsh vegetation at the toe. The existing crest width ranges from approximately 12 to 17 feet, and side slopes range between approximately 2 horizontal to 1 vertical (2:1) and 4 horizontal to 1 vertical (4:1), as shown on Figures 2 through 7. Some riprap protection is present on the lower portion of the upstream face of the existing dike.

The dike elevation is shown on the cross sections presented on Figures 2 through 7. The top of the existing dike will be raised to Elevation 41.0 feet (NGVD). The embankment slopes for the reconstructed dike will be 2 horizontal to 1 vertical (2:1). The design width of the crest is 12 feet. This is approximately the minimum width of the existing dike, and will not restrict vehicle or equipment travel. Note that the centerline of the reconstructed dike will be shifted outward from that of the existing dike. A longitudinal profile of the dike elevation is presented on Figure 8.

The existing dike surface will be cleared of vegetation, and any top soil will be removed and stored for later use. The existing side slopes will be notched so that the imported backfill can be tied into the existing surface, as shown on the cross sections presented on Figures 2 through 7. In some cases, the toe of the downstream slope of the reconstructed dike will extend into the existing waterway for a short distance. In areas where this occurs, soft soil or muck will be removed and riprap will be placed to provide a dry, solid base upon which to construct the new dike. Geotextile will be placed between the riprap and the embankment soil to minimize movement of embankment soil particles into the riprap. Riprap will also be placed, as needed, on the upstream slope of the reconstructed dike to minimize the potential for erosion. The completed dike will be seeded. Complete specifications for the embankment reconstruction are provided in Appendix D.

The existing pond discharge structure is shown on Figures 9 and 10. This structure is essentially a concrete drop-inlet box in which the water drops down a shaft and out a lateral discharge pipe under the dike and into the discharge canal. The ash pond level is controlled by a metal overflow gate which slides in angle-iron gate tracks. To accommodate the new pond level, the existing structure will simply be raised by approximately seven feet, as shown on Figure 11. Reinforced concrete will be placed as

shown, and the overflow gate can be extended to the elevation desired by Santee Cooper. The existing walkway, railing, grating, and gate hoist will be reattached to the rebuilt structure.

A calculation of the estimated volume of borrow soil required for the dike reconstruction is provided in Appendix C. Two calculation methods were employed and survey data provided by Santee Cooper were utilized. The average volume of borrow soil required is approximately 80,000 cubic yards based on this analysis.

Complete construction specifications are provided in Appendix D. The construction specifications are basically those used by Santee Cooper for previous projects with some minor modifications or additions to meet the requirements of this project. The changes to the specifications are provided in an addendum at the beginning of Appendix D.

5.0 SUMMARY

Paul C. Rizzo Associates has been retained by Santee Cooper to investigate the feasibility of raising the elevation of the impounding dike at Ash Pond B at the Winyah Generating Station and to provide plans and specifications for the work.

It has been determined that elevation of the dike is feasible, as indicated to Santee Cooper in our letter report of September 7, 1993

As part of the present investigation, six borings were drilled from the crest of the existing embankment to an approximate depth of 30 feet. The borings indicate that the existing embankment is well compacted. The underlying foundation soils are also in generally good condition.

Cross sections of the reconstructed dike have been provided at each of the six locations where drilling was performed. A longitudinal profile of the reconstruction has also been provided. Design drawings are also provided for modification of the outlet structure. Specifications for the work are presented in Appendix D to this report.

Respectfully submitted,
Paul C. Rizzo Associates

Jeffrey D. Holchin

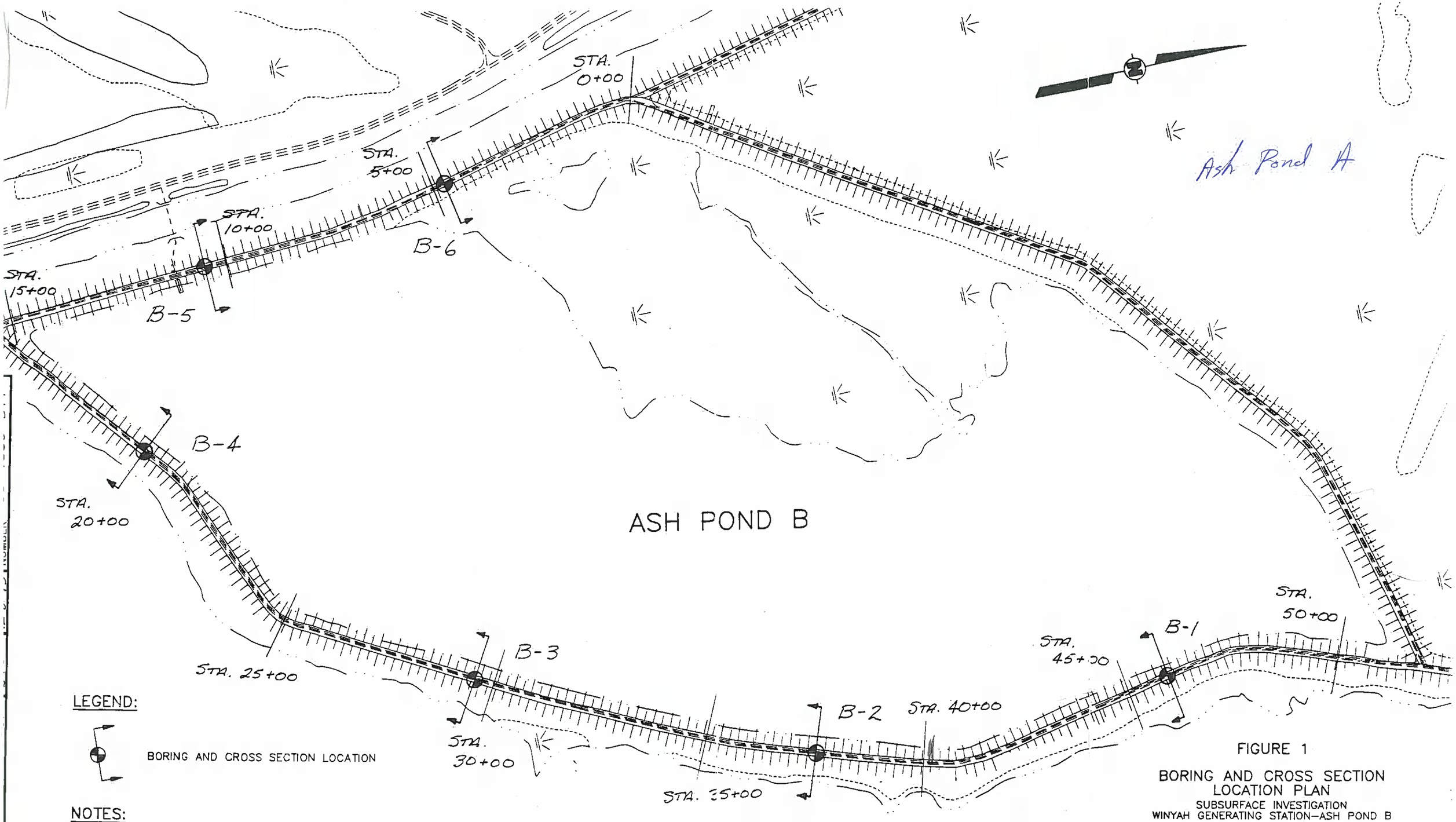
Jeffrey D. Holchin, P.E.
Project Engineer

Jim Onstott

J. Timothy Onstott
Project Manager

JDH/JTO/rcr

FIGURES



LEGEND:

BORING AND CROSS SECTION LOCATION

NOTES:

1. THE REFERENCE DRAWING WAS PROVIDED BY SANTEE COOPER, SIGNED "JKC", AND DATED AUGUST 31, 1993.
2. THE NORTH ARROW SHOWN REPRESENTS APPROXIMATE NORTH.
3. THE STATIONING SHOWN REPRESENTS AN APPROXIMATE AND TEMPORARY SYSTEM ESTABLISHED BY PAUL C. RIZZO ASSOCIATES FOR CONSTRUCTION PURPOSES ONLY.

SCALE
200 0 200 FEET

FIGURE 1

BORING AND CROSS SECTION LOCATION PLAN
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION–ASH POND B

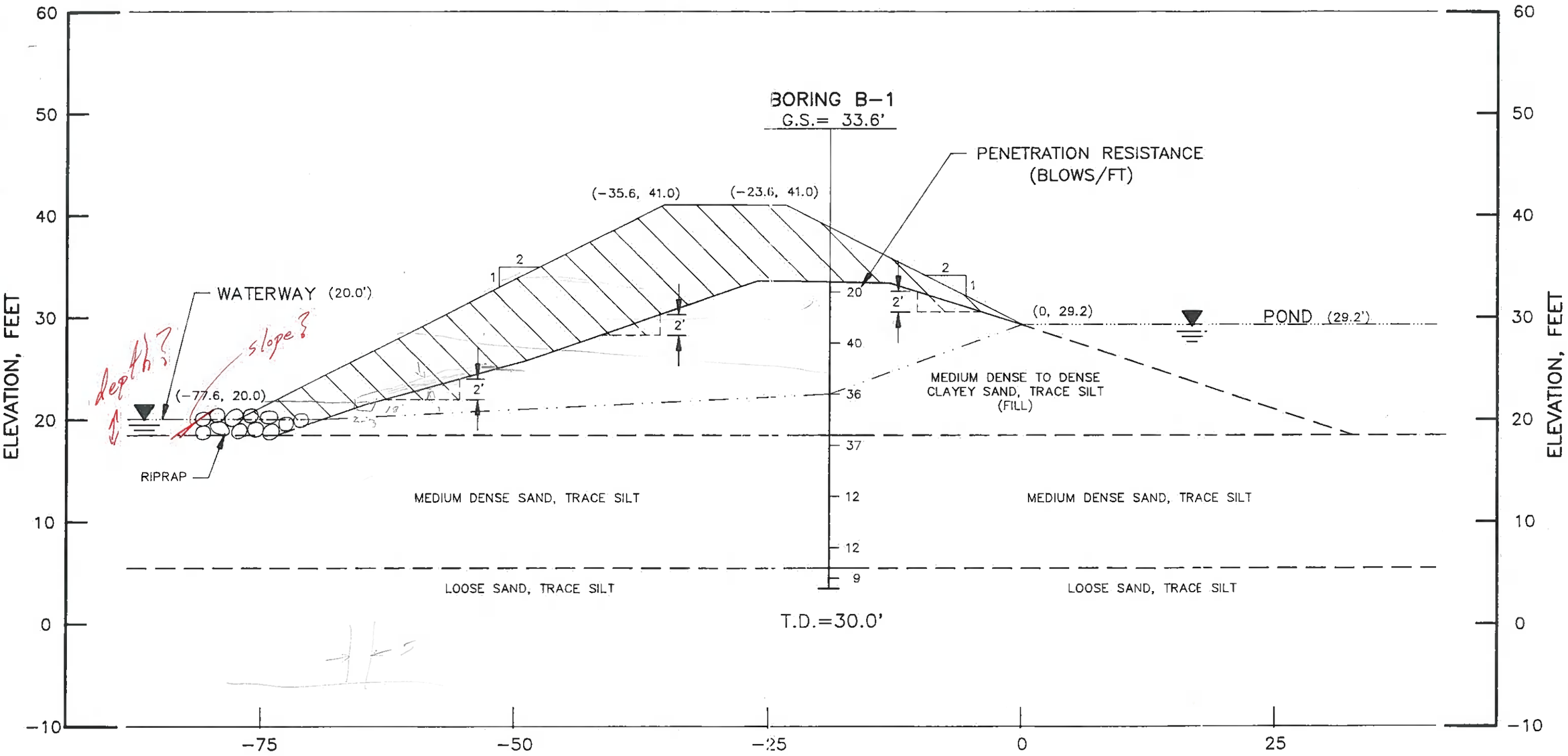
PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

T.Meskel 12-7-93	CHECKED BY	J.D.H.	12-7-93
	APPROVED BY	JTC	12-8-93
DRAWN BY			
PLOT 1:10			

CAD FILE NUMBER 93-1356-B1



NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 2

CROSS SECTION B-1
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

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APPROVED BY	JTO	12-8-93	
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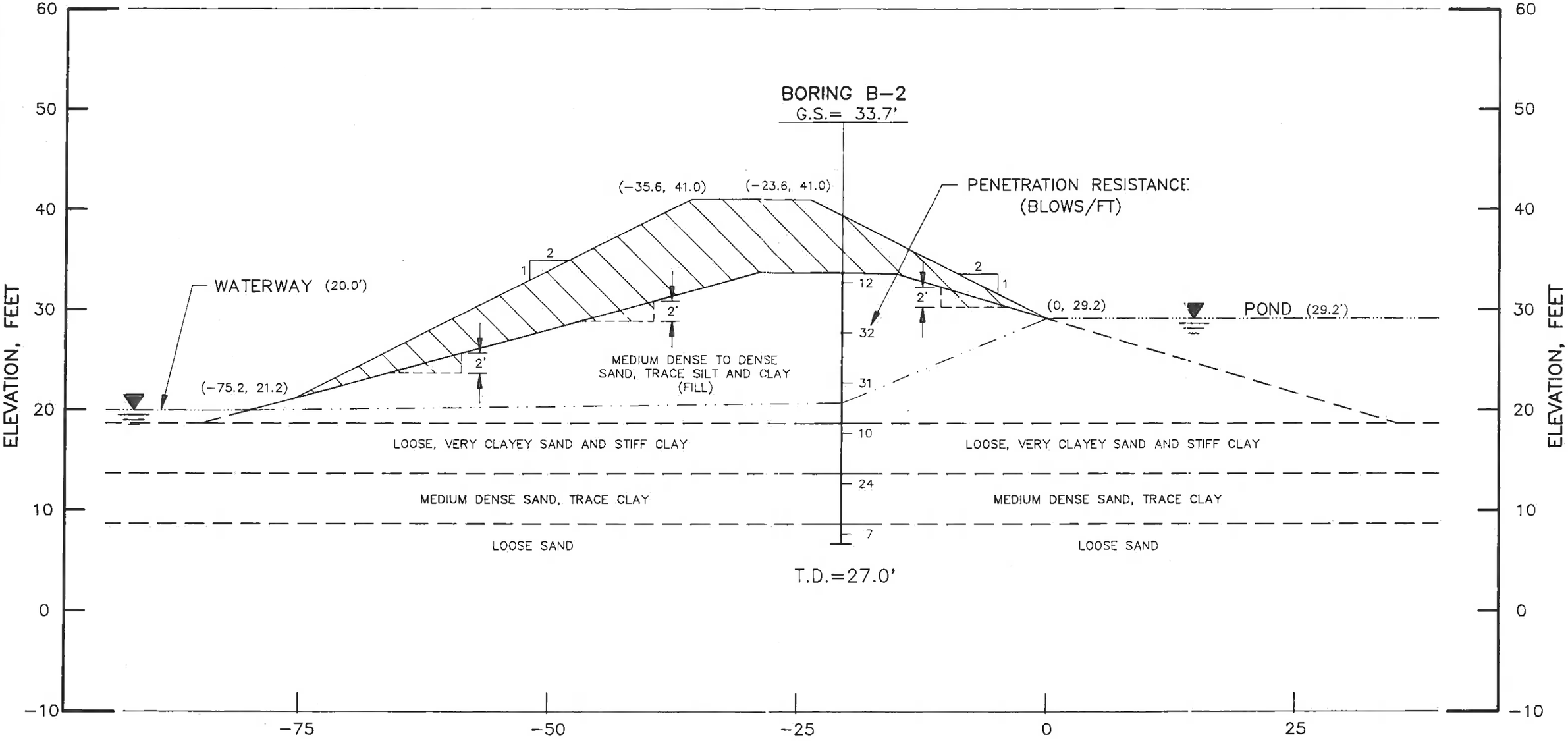

NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 3

CROSS SECTION B-2
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

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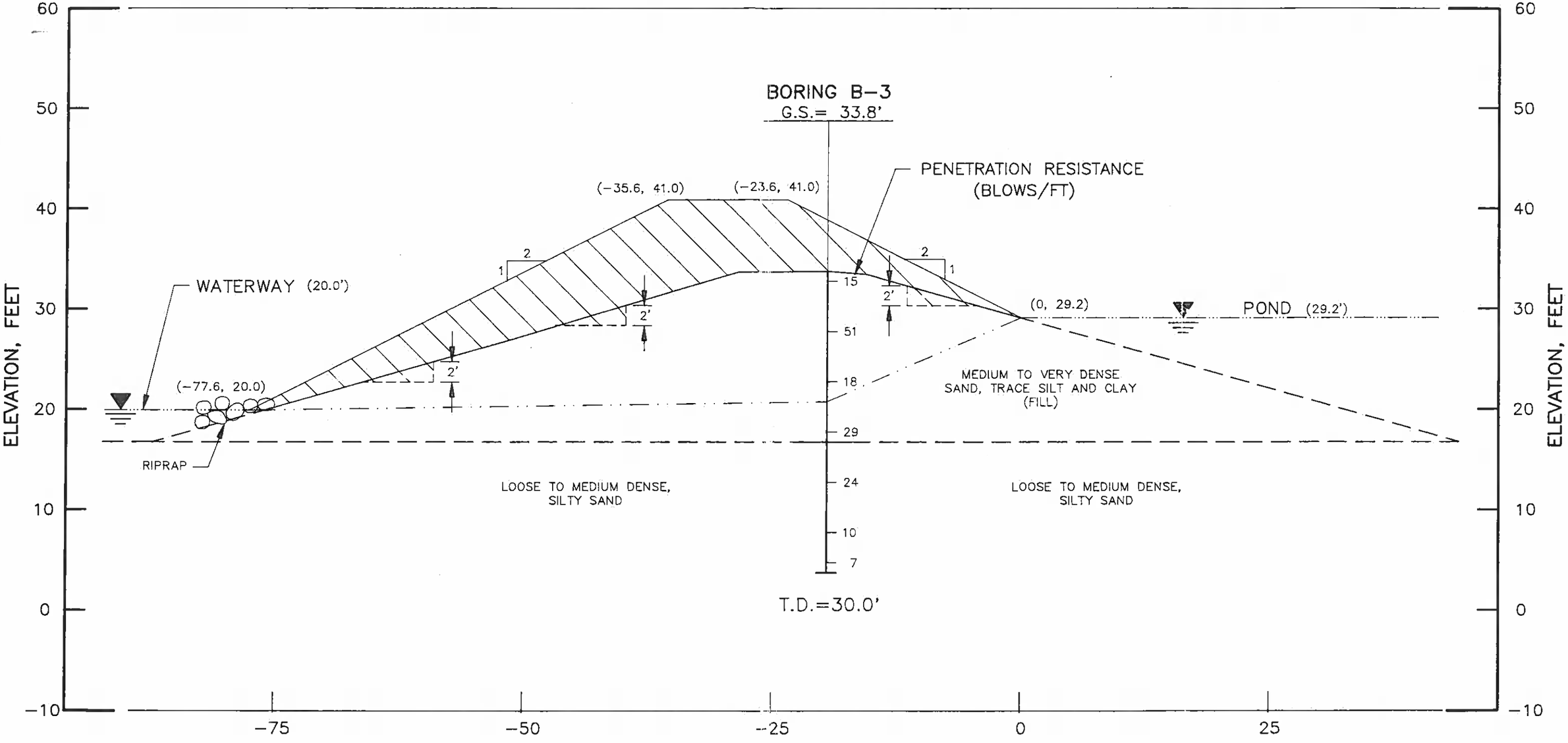

NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 4

CROSS SECTION B-3
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

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CHECKED BY	J.D.H.	12-7-93	CAD FILE NUMBER 93-1356-B4
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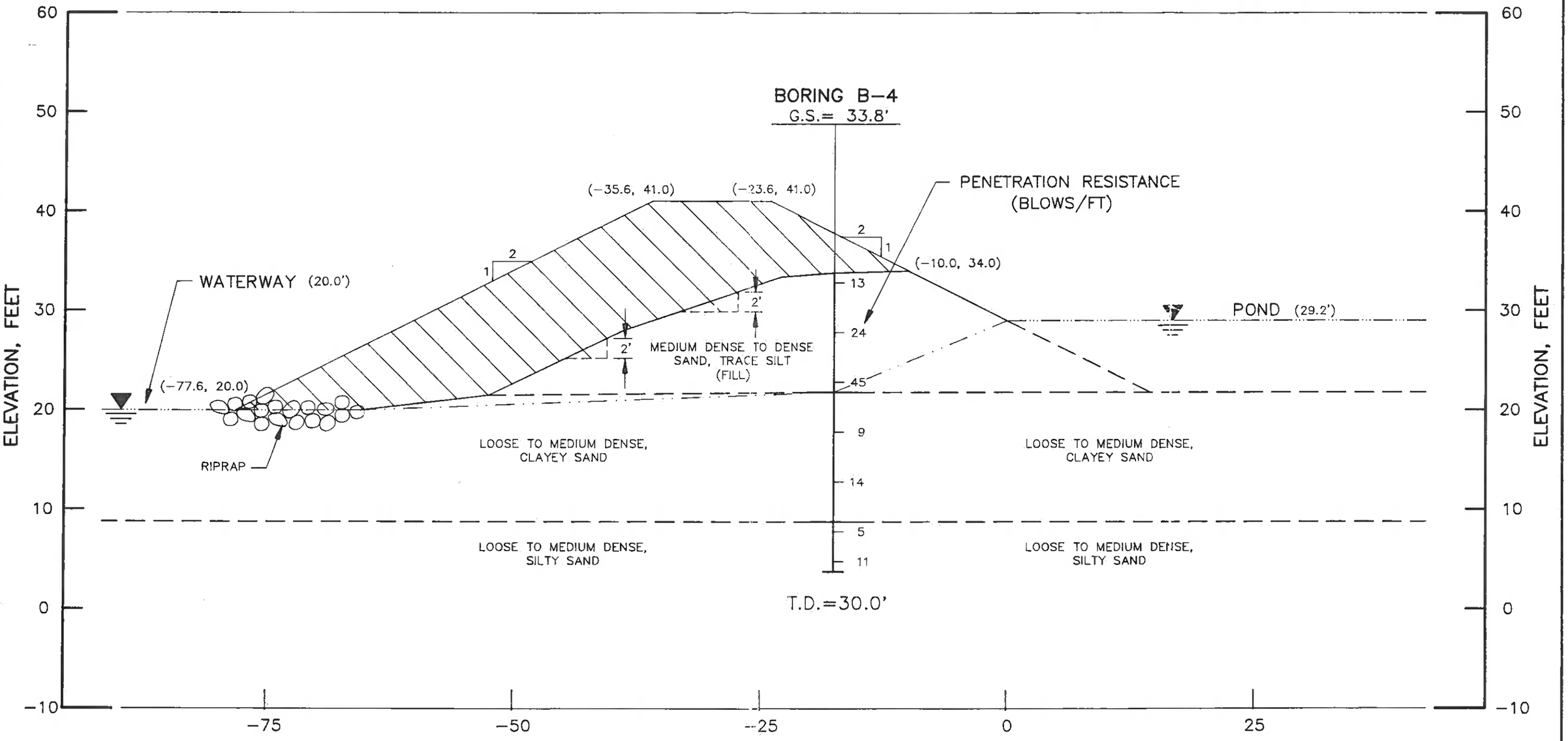
PLOT	1:10		



NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 5

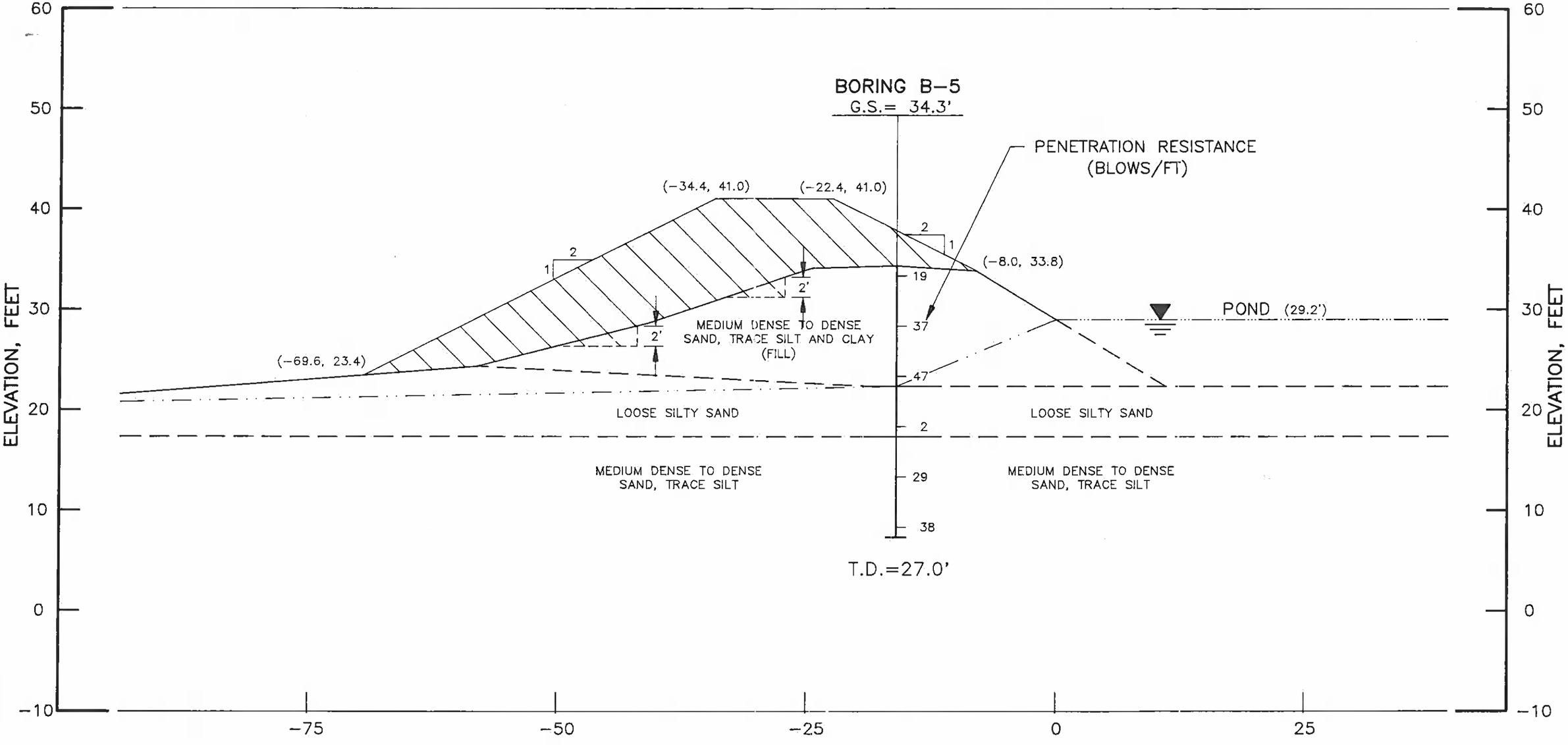
CROSS SECTION B-4
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

T.Meskel	CHECKED BY	J.D.H.	12-7-93
12-7-93	APPROVED BY	JHO	12-8-93
DRAWN BY			CAD FILE NUMBER 93-1356-B5
PLOT 1:10			



NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 6

CROSS SECTION B-5
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

T.Meskel 12-7-93	CHECKED BY	J.D.H. 12-7-93	CAD FILE NUMBER 93-1356-B6
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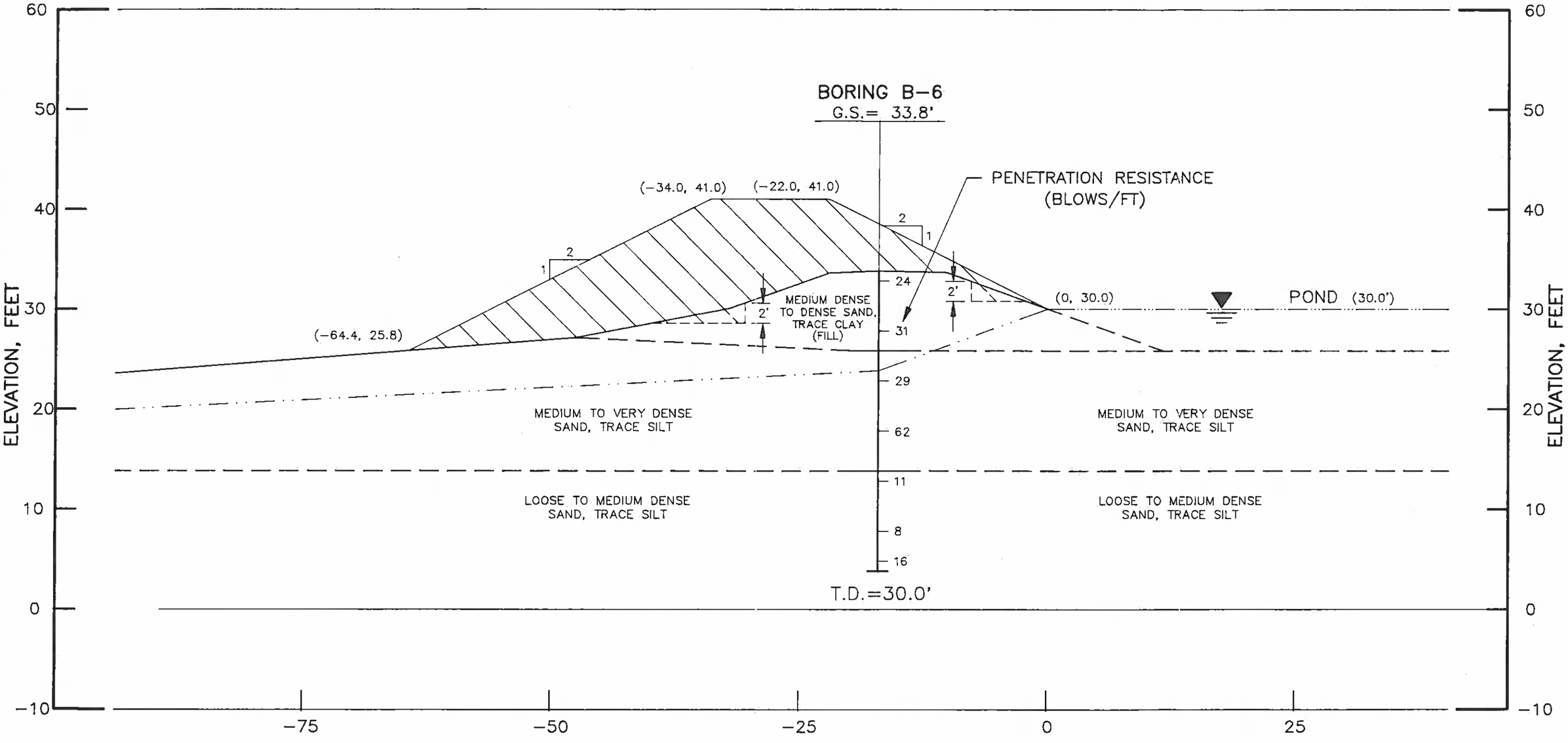

NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. SOME RIPRAP MAY BE REQUIRED TO PROVIDE A SOLID BASE IF THE DOWNSTREAM TOE OF THE DIKE ADDITION EXTENDS INTO THE WATERWAY.
3. NOTCH THE EXISTING DIKE SLOPES AS SHOWN TO TIE IN ADDITIONAL DIKE SOIL.

SCALE
10 0 10 FEET

FIGURE 7

CROSS SECTION B-6
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION-ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

DRAWN BY	T.Meskel	12-6-93
CHECKED BY	J.D.H.	12-6-93
APPROVED BY	TTO	12-8-93
CAD FILE NUMBER	93-1356-B10	
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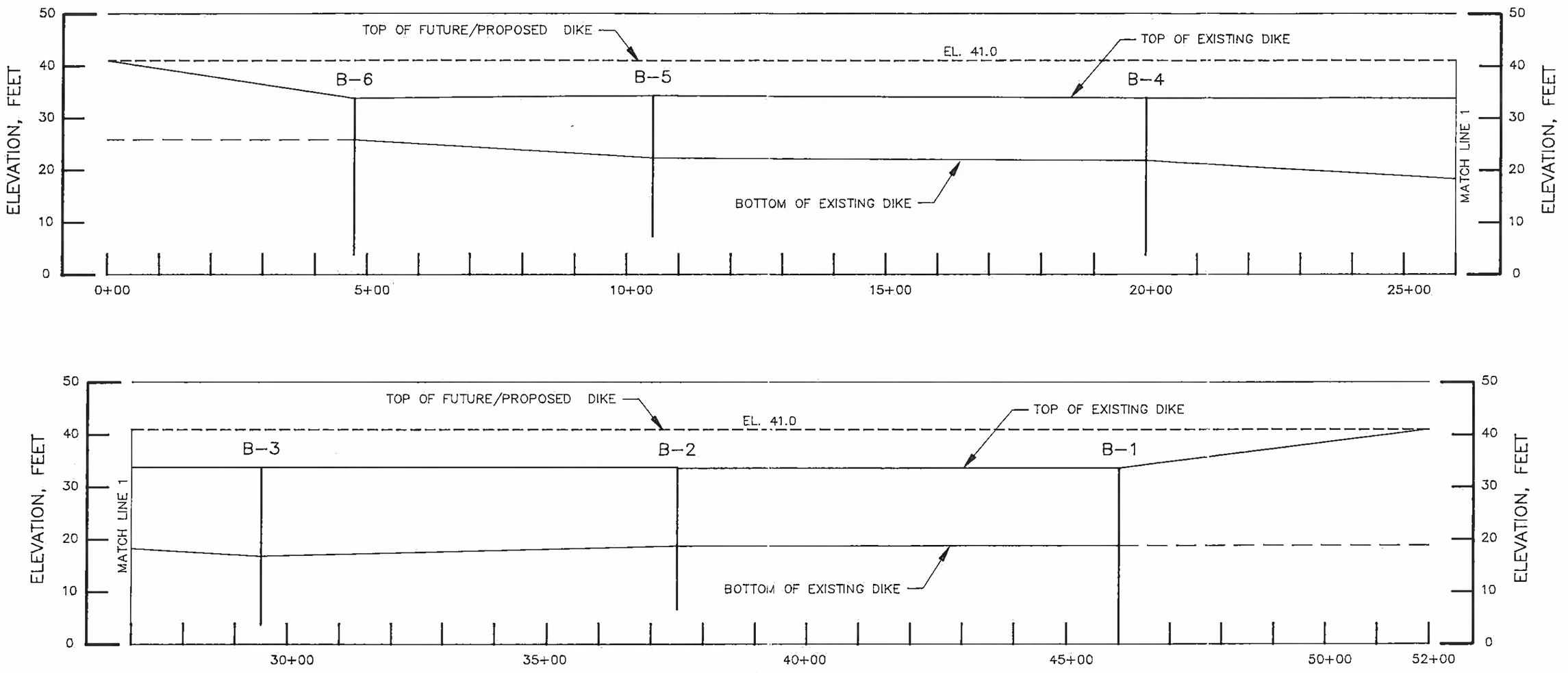


10X VERTICAL EXAGGERATION

HORIZONTAL SCALE
SCALE
200 0 200 FEET

VERTICAL SCALE
SCALE
20 0 20 FEET

NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. TIE TOP OF FUTURE DIKE INTO EXISTING GROUND SURFACE AT ENDS OF DIKE.

FIGURE 8

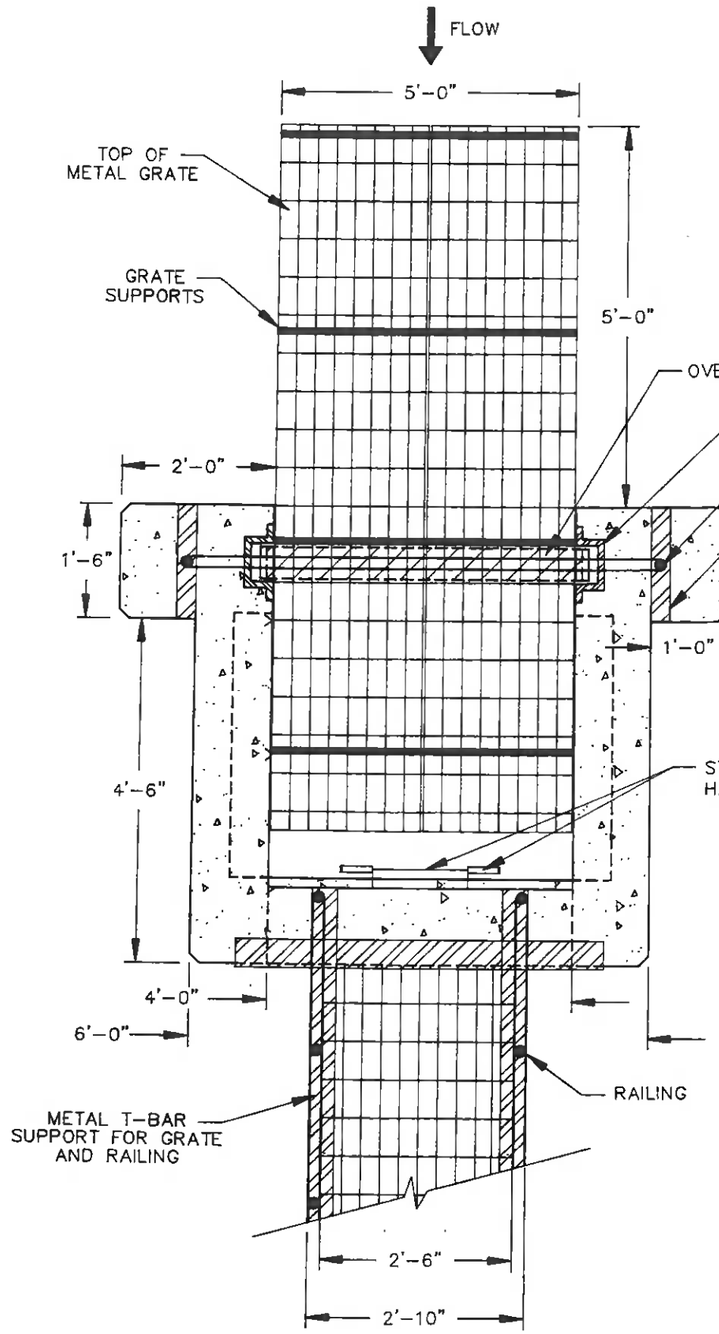
LONGITUDINAL PROFILE
OF DIKE RECONSTRUCTION
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION–ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

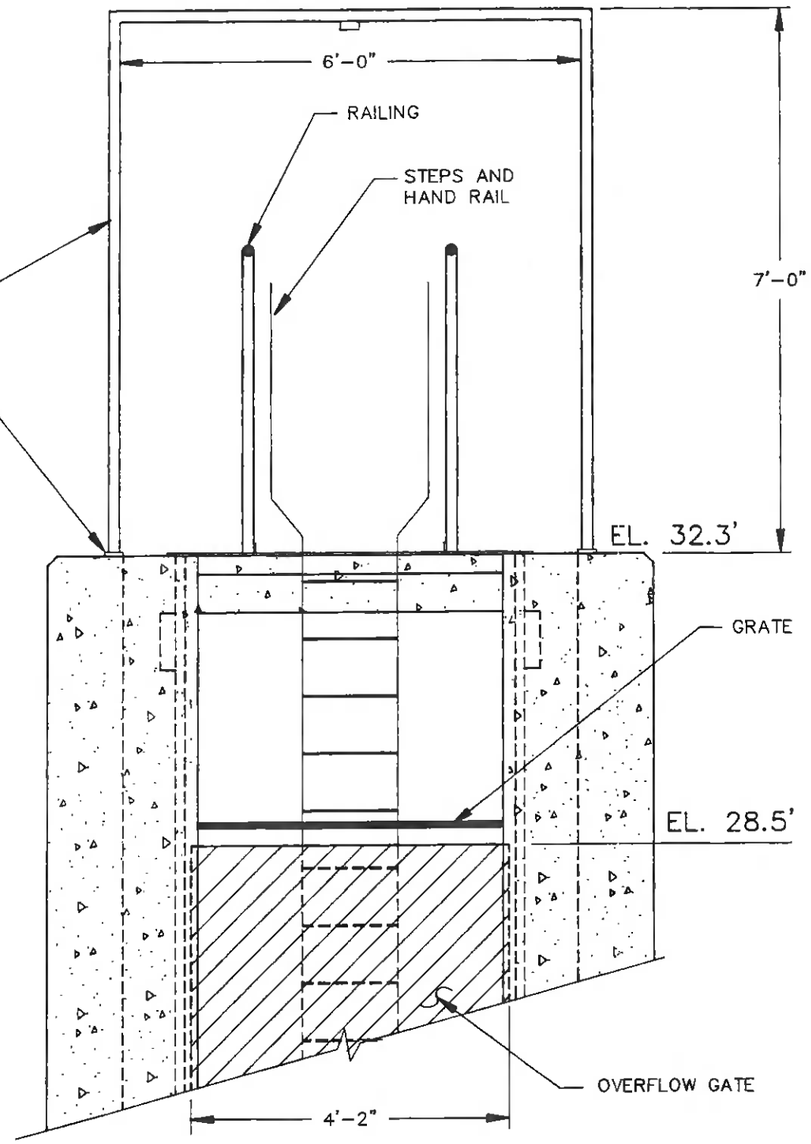
Paul C. Rizzo Associates, Inc.
CONSULTANTS

DRAWN BY	T.Meskel 12-7-93	CHECKED BY	J.D.H. 12-7-93
		APPROVED BY	JTC 12-8-93
PLOT 1:1		CAD FILE NUMBER	93-1356-B7



PLAN VIEW

SCALE: 1" = 2'



ELEVATION

SCALE: 1" = 2'

NOTE:

1. ALL ELEVATIONS ARE FROM NGVD.

FIGURE 9

EXISTING ASH POND B
DISCHARGE STRUCTURE
SHEET 1 OF 2

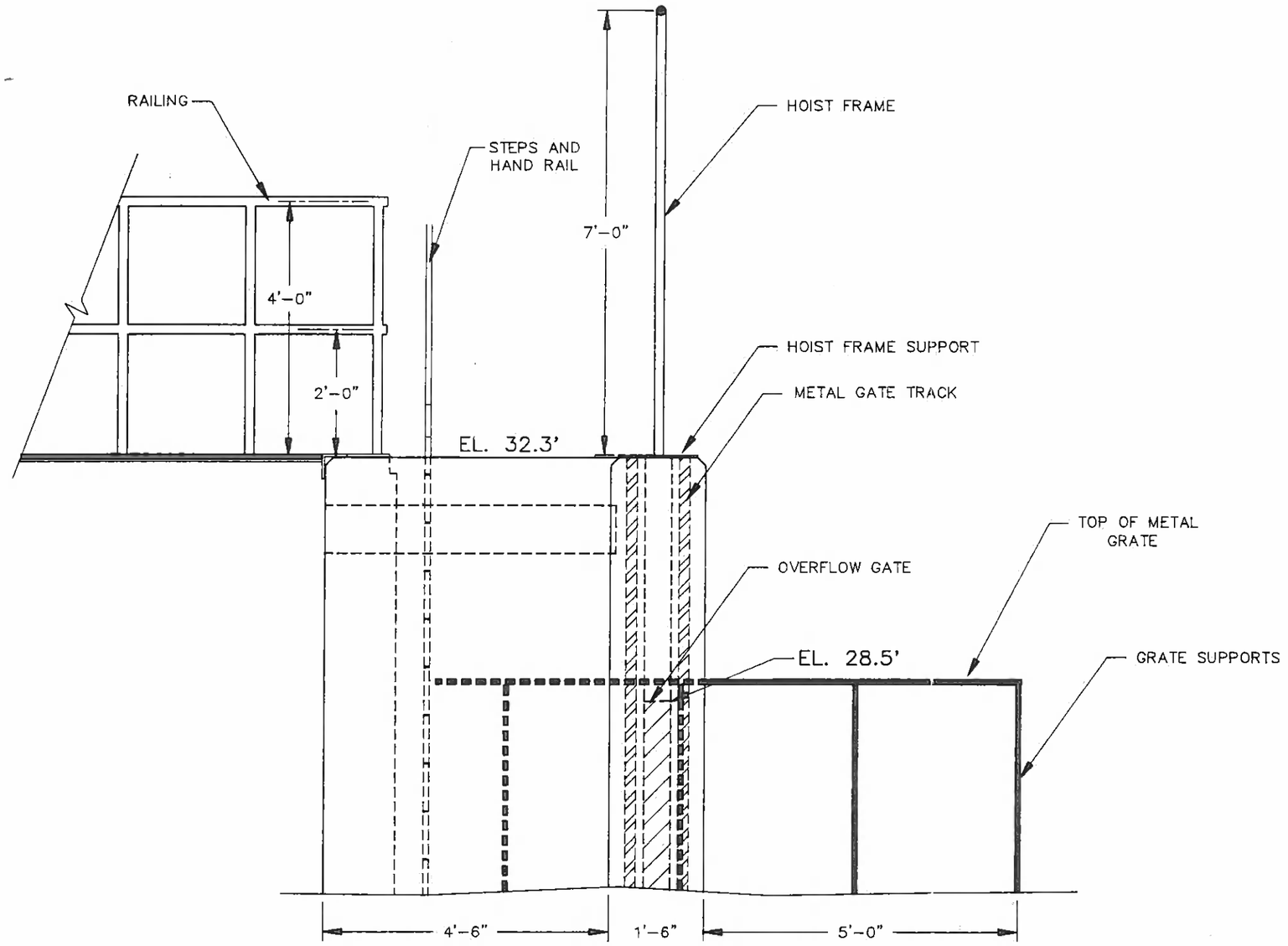
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION–ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

PLOT	1:1	
DRAWN BY		
T.Meskel	12-6-93	
CHECKED BY	J.D.H.	12-7-93
APPROVED BY	JTD	12-8-93
CAD FILE NUMBER	93-1356-B8	



SIDE VIEW

1" = 2'

NOTE:

1. ALL ELEVATIONS ARE FROM NGVD.

FIGURE 10

EXISTING ASH POND B
DISCHARGE STRUCTURE
SHEET 2 OF 2

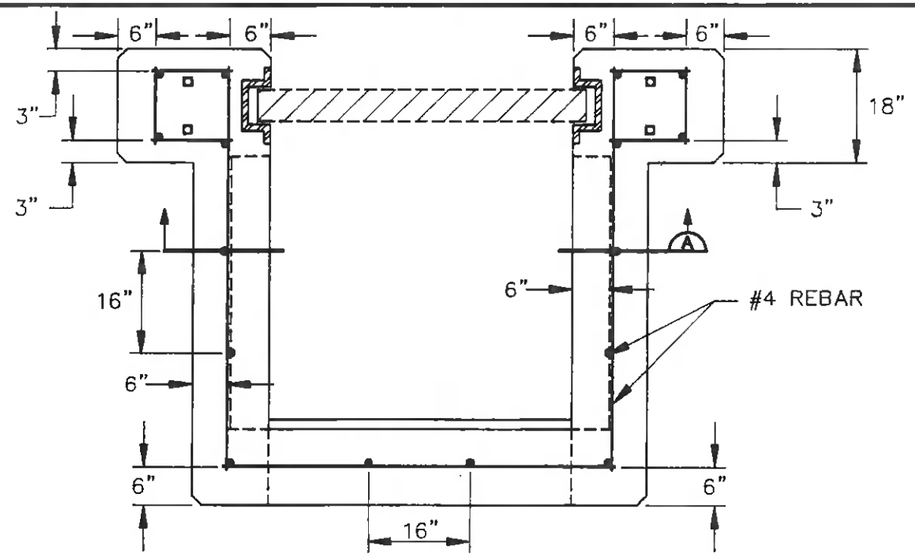
SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION–ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

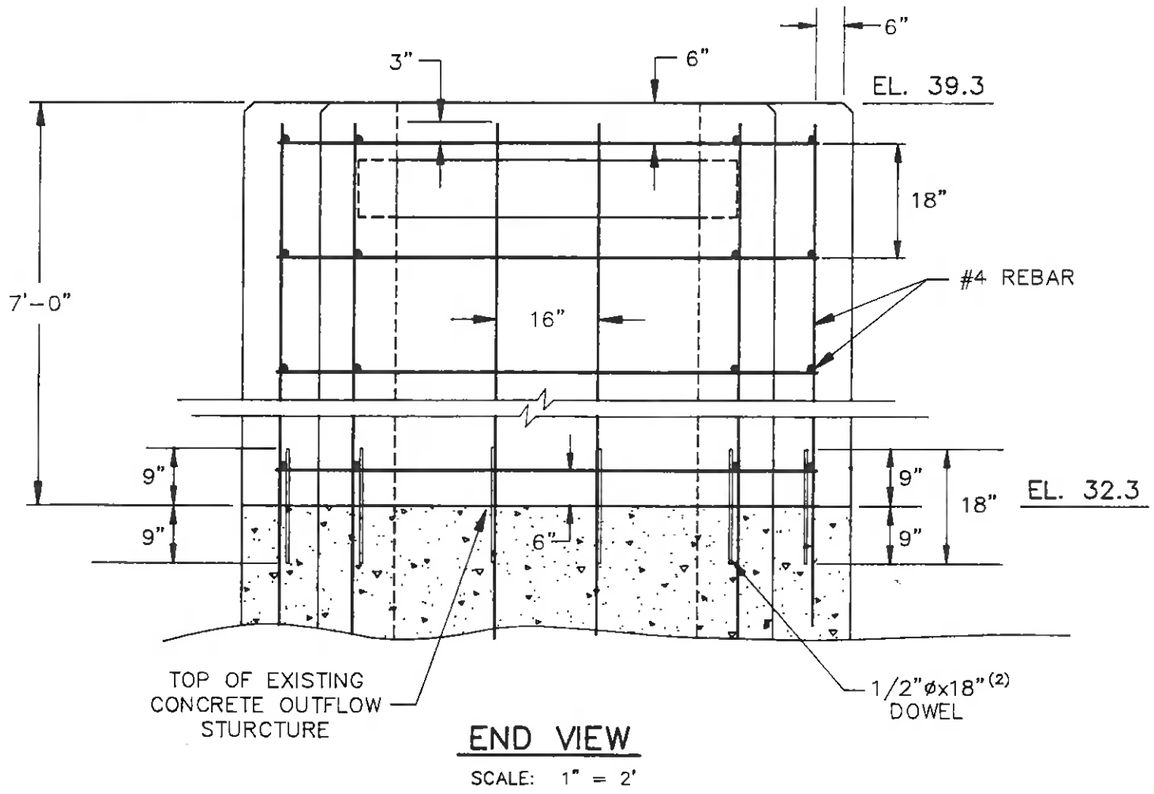
Paul C. Rizzo Associates, Inc.
CONSULTANTS

T.Meskel 12-7-93	CHECKED BY	J.D.H.	12-7-93
	APPROVED BY	JTD	12-8-93
DRAWN BY			CAD FILE NUMBER 93-1356-B9
PLOT 1:2			



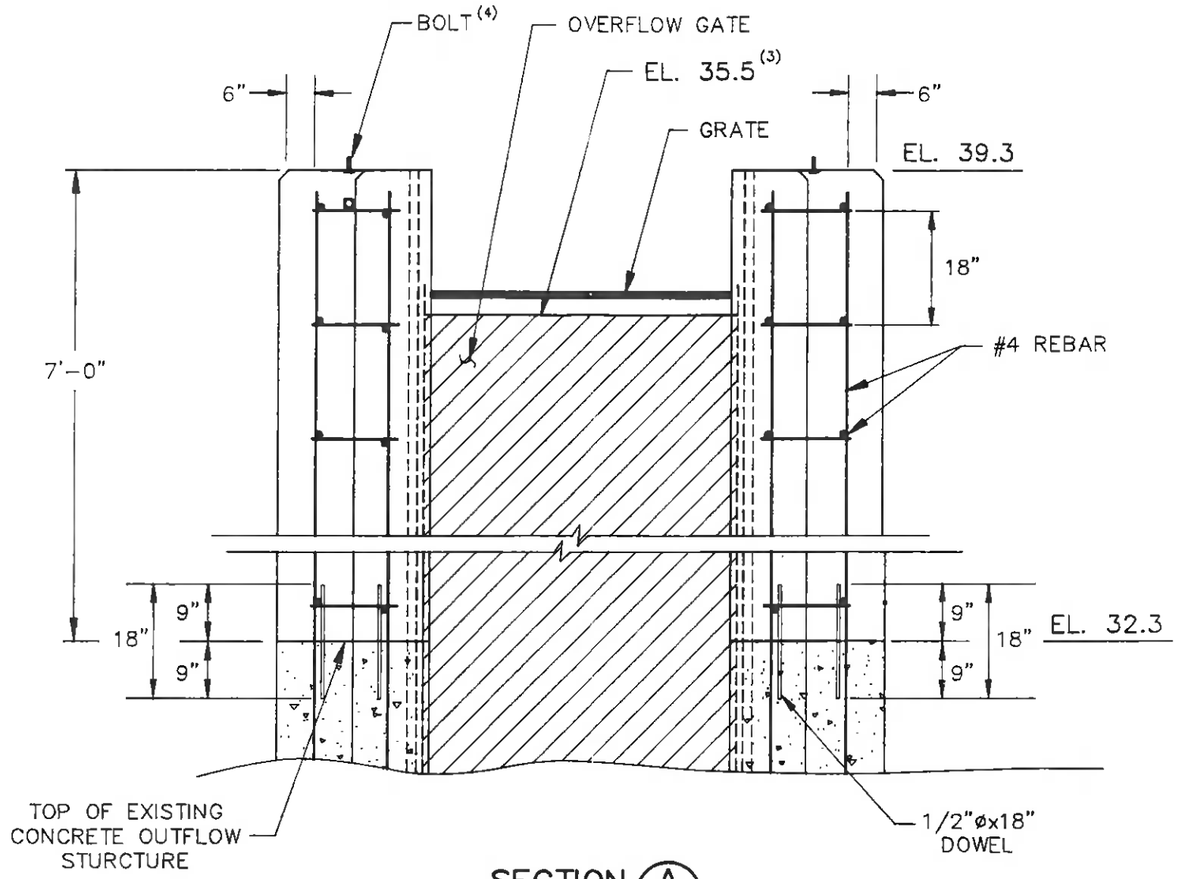
PLAN VIEW

SCALE: 1" = 2'



END VIEW

SCALE: 1" = 2'



SECTION A

SCALE: 1" = 2'

NOTES:

1. ALL ELEVATIONS ARE FROM NGVD.
2. OPENINGS IN THE TOP OF THE EXISTING CONCRETE CAN BE USED FOR PLACING THE DOWEL BARS.
3. THE ELEVATION OF THE OVERFLOW GATE IS TO BE DETERMINED BY SANTEE COOPER.
4. BOLTS ARE FOR ATTACHMENT OF HOIST FRAME.
5. THE MODIFIED ASH POND DISCHARGE STRUCTURE SHOULD BE BUILT TO THE SPECIFIED ELEVATION, AND MATCH THE EXISTING STRUCTURE IN CONFIGURATION, OPENINGS, AND ATTACHMENTS, SUCH AS RAILING, GRATING AND HOIST FRAME.

FIGURE 11

EXTENSION OF EXISTING ASH POND B DISCHARGE STURCTURE

SUBSURFACE INVESTIGATION
WINYAH GENERATING STATION–ASH POND B

PREPARED FOR

SANTEE COOPER
MONCKS CORNER, SOUTH CAROLINA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

APPENDIX A

BORING LOGS

GUIDE FOR SOIL DESCRIPTIONS:

1. SOIL DENSITY/CONSISTENCY.
2. COLOR (INCL. DARK, LIGHT, MED.).
3. SECONDARY SOIL TYPE (SILTY, ETC.) 30–40% BY WEIGHT.
4. PRIMARY SOIL TYPE (CLAY, ETC.).
5. DESCRIPTIVE TERMS, SUCH AS:
   - SOME (12–30% BY WEIGHT)
   - TRACE (5–12% BY WEIGHT)
   - LENS (≤ 1" IN THICKNESS)
   - LAYER (> 1" IN THICKNESS)
   - INTERBEDDED
   - SLICKENSIDED
   - POCKETS, ETC.
6. MOISTURE (DRY, MOIST, OR WET COMPARED TO OPTIMUM M/C).

MEASURED CONSISTENCY

MEASURED CONSISTENCY= UNCONFINED COMPRESSIVE STRENGTH FROM POCKET PENETROMETER TEST; RESULTS OF TORVANE TESTS ARE IDENTIFIED AS SUCH ON THE LOGS.

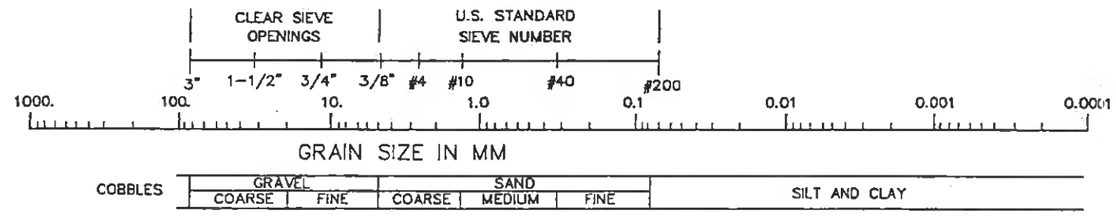
DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE(1)
VERY LOOSE	0–4
LOOSE	5–10
MEDIUM DENSE	11–30
DENSE	31–50
VERY DENSE	OVER 50

(1) STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 OR 24 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE SECOND AND THIRD INTERVALS IS THE STANDARD PENETRATION RESISTANCE.

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)	FIELD IDENTIFICATION
VERY SOFT	LESS THAN 0.25	EASILY PENETRATED SEVERAL INCHES WITH FIST
SOFT	0.25 TO 0.50	EASILY PENETRATED SEVERAL INCHES WITH THUMB
MEDIUM STIFF	0.50 TO 1.0	PENETRATED SEVERAL INCHES WITH THUMB UNDER MODERATE PRESSURE
STIFF	1.0 TO 2.0	READILY IDENTED WITH THUMB, BUT PENETRATED WITH GREAT EFFORT
VERY STIFF	2.0 TO 4.0	READILY IDENTED WITH THUMBNAIL
HARD	MORE THAN 4.0	INDENTED WITH DIFFICULTY WITH THUMBNAIL



COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURE
	GC	CLAYEY GRAVELS
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-CLAY MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASICITY
SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH ORGANIC CONTENTS

FOR USCS (UNIFIED SOIL CLASSIFICATION SYSTEM) CLASSIFICATIONS ON BORING LOGS, UPPER CASE LETTERS INDICATE LAB TEST CLASSIFICATION, LOWER CASE LETTERS INDICATE VISUAL FIELD CLASSIFICATION.

SYMBOLS TO BE USED FOR DESIGNATION OF SUBSURFACE MATERIALS ON ALL BORING LOGS AND SUBSURFACE SECTIONS

SOILS

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC MATERIAL

GRAIN SIZE DESIGNATIONS FOR BOTH GRANULAR SOILS AND GRANULAR ROCKS FOLLOW USCS NOMENCLATURE

ROCKS

- LIMESTONE
- SILTSTONE
- SANDSTONE
- MASSIVE MUDSTONE OR CLAYSTONE
- SHALE
- COAL
- DOLOMITE
- CONGLOMERATE
- IGNEOUS ROCK
- METAMORPHIC ROCK

MISCELLANEOUS

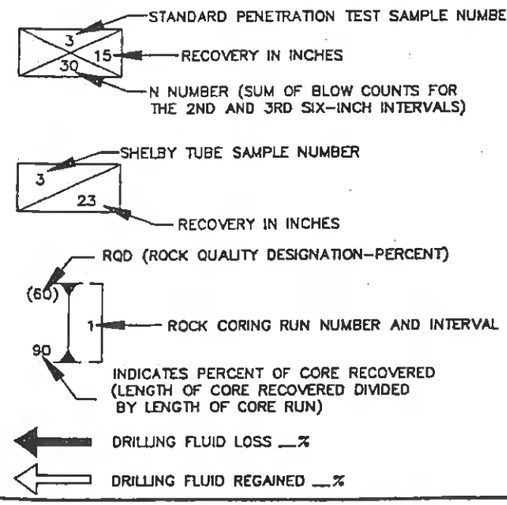
- SLAG
- FILL OR MINE SPOIL
- REFUSE
- CONCRETE
- VOID (INDICATE SIZE OF VOID)
- WATER
- APPROXIMATE EXISTING GROUND SURFACE
- APPROXIMATE TOP OF ROCK

THE SPACING OF THE DISCONTINUITIES IN THE ROCK MAY BE DESCRIBED BY ONE OF THE FOLLOWING TERMS

DESCRIPTIVE TERMS	SPACING
VERY BROKEN	LESS THAN 1 IN.
BROKEN	1 IN. TO 3 IN.
SLIGHTLY BROKEN	3 IN. TO 6 IN.
UNBROKEN	6 IN. AND GREATER

TERMS USED TO DESCRIBE THE RELATIVE DEGREES OF ROCK CORE HARDNESS

DESCRIPTIVE TERMS	DEFINING CHARACTERISTICS
VERY SOFT	CRUSHES UNDER PRESSURE OF FINGERS AND/OR THUMB
SOFT	CRUSHES UNDER PRESSURE OF PRESSED HAMMER
MEDIUM HARD	BREAKS EASILY UNDER SINGLE HAMMER BLOW BUT WITH CRUMBLY EDGES
HARD	BREAKS UNDER ONE OR TWO STRONG HAMMER BLOWS BUT WITH RESISTANT SHARP EDGES
VERY HARD	BREAKS UNDER SEVERAL STRONG HAMMER BLOWS BUT WITH VERY RESISTANT SHARP EDGES AND MAY SPALL LEAVING CONCHOIDAL FRACTURES



NOTES

1. THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL AND ROCK CONDITIONS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS.
2. THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

GENERAL NOTES AND LEGEND – BORINGS IN SOIL AND ROCK

Paul C. Rizzo Associates, Inc.
CONSULTANTS

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION–ASH POND B
LOG OF BORING NO. B–1

LOCATION
STATION: ~46+00 DISTANCE: 19'
SURFACE EL: 33.6'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
30	0	1 16 20		MEDIUM DENSE, REDDISH BROWN TO DARK GRAY, FINE, CLAYEY SAND, MOIST	sc		0'–15' FILL
	5	2 19 40		5.5'	sc		
					sp		
	10	3 20 36		DENSE, LIGHT TO DARK GRAY, FINE SAND, TRACE SILT, WET	sp		
20				15.0'			
	15	4 18 37			sp		15.0'–30.0' FOUNDATION SOILS
				MEDIUM DENSE, BROWNISH GRAY TO DARK BLACKISH BROWN, FINE SAND, TRACE TO SOME SILT, WET			
	20	5 22 12			sp		
10							
	25	6 20 12			sp		SLIGHT ORGANIC ODOR
				28.0'			
3.6	30	7 24 9		LOOSE, DARK BROWNISH GRAY, FINE SAND, TRACE SILT, WET 30.0'	sp		SLIGHT ORGANIC ODOR
				BOTTOM OF BORING 30.0'			
	35						

PROJECT NO.: 93–1356
DATE STARTED: 10–21–93
DATE COMPLETED: 10–21–93
FIELD GEOLOGIST: JDH
CHECKED BY: JTO

GWL: DEPTH ~11' DATE/TIME 10–21–93 0820
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION–ASH POND B
LOG OF BORING NO. B–2

LOCATION
STATION: ~37+50 DISTANCE: 20.5'
SURFACE EL: 33.7'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
30	0	1 18 12		MEDIUM DENSE, REDDISH BROWN AND GRAY, FINE TO MEDIUM CLAYEY SAND, SOME CLAY LENSES, MOIST	sc		0'–15' FILL
				2.0'			
	5	2 24 32		DENSE, GRAY, FINE TO MEDIUM SAND, TRACE SILT, MOIST TO WET	sp		
	10	3 20 31			sp		
20				15.0'			
	15	4 17 10		LOOSE, TANNISH GRAY, FINE TO MEDIUM, CLAYEY TO VERY CLAYEY SAND AND STIFF CLAY, WET	sc/cl		15.0'–27.0' FOUNDATION SOILS
				20.0'			
	20	5 24 24		MEDIUM DENSE, TANNISH TO PALE GRAY, FINE TO MEDIUM SAND, TRACE CLAY, WET	sp		
10				25.0'			
	25	6 24 7		LOOSE, GRAY TO DARK GRAY, FINE TO MEDIUM SAND, WET	sp		
6.7				27.0'			
				BOTTOM OF BORING 27.0'			
	30						
	35						

PROJECT NO.: 93–1356
DATE STARTED: 10–21–93
DATE COMPLETED: 10–21–93
FIELD GEOLOGIST: JDH
CHECKED BY: JTO

GWL: DEPTH ~13' DATE/TIME 10–21–93 1100
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION—ASH POND B
LOG OF BORING NO. B-3

LOCATION
STATION: ~29+50 DISTANCE: 19'
SURFACE EL: 33.8'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
	0	1 16 15		MEDIUM STIFF, REDDISH BROWN, SANDY CLAY, MOIST 0.5'	cl sc		0'-17' FILL
30				MEDIUM DENSE, GRAYISH BROWN, MEDIUM SAND, MOIST 3.0'			CUTTINGS TURNING BLACK
	5	2 20 51		VERY DENSE, DARK GRAY TO BLACK, FINE TO MEDIUM SAND, TRACE CLAY LENSES, MOIST 10.0'	sp		
	10	3 18 18		MEDIUM DENSE, TAN, LIGHT TO DARK GRAY AND BLACK, FINE SAND, TRACE SILT, MOIST TO WET	sp		
20	15	4 17 29		17.0'	sp		17.0'-30.0' FOUNDATION SOILS
	20	5 20 24		LOOSE TO MEDIUM DENSE, DARK GRAY TO DARK GRAYISH BROWN AND BLACK, FINE, SILTY SAND, WET	sm		
10	25	6 24 10			sm		
3.8	30	7 24 7		30.0'	sm		
				BOTTOM OF BORING 30.0'			
	35						

PROJECT NO.: 93-1356
DATE STARTED: 10-21-93
DATE COMPLETED: 10-21-93
FIELD GEOLOGIST: JDH
CHECKED BY: JTO

GWL: DEPTH ~13' DATE/TIME 10-21-93 1300
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION–ASH POND B
LOG OF BORING NO. B–4

LOCATION
STATION: ~20+00 DISTANCE: 17.5'
SURFACE EL: 33.8'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
30	0	1 18 13		MEDIUM DENSE TO DENSE, DARK GRAY, TAN, AND BROWNISH GRAY, FINE SAND, TRACE SILT, MOIST	sp		0'–12' FILL
	5	2 18 24			sp		TRACE CLAY LENSES WOOD FRAGMENTS
	10	3 20 45			sp		WOOD FRAGMENTS
20				12.0'			12.0'–30.0' FOUNDATION SOILS
	15	4 16 9		LOOSE TO MEDIUM DENSE, DARK GRAY TO BLACK, FINE TO MEDIUM, CLAYEY SAND, WET	sc		
	20	5 0 14			–		NO SAMPLE WOOD FRAGMENT BLOCKING SPOON
10				25.0'			
	25	6 16 5		LOOSE TO MEDIUM DENSE, DARK GRAY TO BLACK, FINE SILTY SAND, WET	sm		2" WOOD FRAGMENTS
3.8	30	7 16 11		30.0'	sm		
				BOTTOM OF BORING 30.0'			
	35						

PROJECT NO.: 93–1356
DATE STARTED: 10–21–93
DATE COMPLETED: 10–21–93
FIELD GEOLOGIST: JDH
CHECKED BY: JTO

GWL: DEPTH ~12' DATE/TIME 10–21–93 1410
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION—ASH POND B
LOG OF BORING NO. B-5

LOCATION
STATION: ~10+50 DISTANCE: 16'
SURFACE EL: 34.3'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
30	0	1 17 19	//	MEDIUM DENSE, BROWN TO GRAY BROWN, FINE SAND, TRACE CLAY LENSES, MOIST	sp		0'–12' FILL 1/2" CLAY LENS
	5	2 24 37	~	DENSE, BROWN TO BLACK, FINE SAND, TRACE SILT, MOIST TO WET	sp		WOOD FRAGMENTS
	10	3 15 47	~		sp		WOOD FRAGMENTS 12.0'–27.0' FOUNDATION SOILS
20	15	4 24 2	~	LOOSE, DARK BROWN TO BLACK, SILTY SAND, WET	sm		TRACE ROOTS IRON STAINING
	20	5 24 29	~	MEDIUM DENSE TO DENSE, BROWN, GRAYISH BROWN, AND BLACK, FINE SAND, TRACE SILT, WET	sp		WOOD FRAGMENTS SAND HEAVING INTO AUGER
10	25	6 24 38	~		sp		SAND HEAVING INTO AUGER
7.3	27.0'			BOTTOM OF BORING 27.0'			
	30						
	35						

PROJECT NO.: 93-1356
DATE STARTED: 10-22-93
DATE COMPLETED: 10-22-93
FIELD GEOLOGIST: JDH/ADM
CHECKED BY: JTO

GWL: DEPTH ~12' DATE/TIME 10-22-93 1100
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

WINYAH GENERATING STATION–ASH POND B
LOG OF BORING NO. B–6

LOCATION
STATION: ~4+75 DISTANCE: 17'
SURFACE EL: 33.8'

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	PROFILE	DESCRIPTION	USCS SYMBOL	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
30	0	1 20 24		MEDIUM DENSE TO DENSE, BROWNISH GRAY, DARK GRAY, AND BLACK, FINE SAND, TRACE CLAY, MOIST TO WET	sp		0'–8' FILL TRACE CLAY LENSES
	5	2 19 31			sp		
				8.0'			8.0'–30.0' FOUNDATION SOILS
20	10	3 17 29		MEDIUM TO VERY DENSE, DARK GRAY TO BLACK, FINE SAND, TRACE SILT, WET	sp		WOOD FRAGMENTS AND ROOTS
	15	4 19 62			sp	62	IRON STAINING
				20.0'			
10	20	5 24 11		LOOSE TO MEDIUM DENSE, DARK GRAYISH BLACK, FINE SAND, TRACE SILT, WET	sp		
	25	6 24 8			sp		SAND HEAVING INTO AUGER
3.8		7 24 16			sp		
	30			30.0'			
				BOTTOM OF BORING 30.0'			
	35						

PROJECT NO.: 93–1356
DATE STARTED: 10–22–93
DATE COMPLETED: 10–22–93
FIELD GEOLOGIST: JDH/ADM
CHECKED BY: JTO

GWL: DEPTH ~10' DATE/TIME 10–22–93 0950
GWL: DEPTH ____ DATE/TIME ____
DRILLING METHOD: 4 1/4" I.D. H.S.A., SPT SAMPLING (140 lb HAMMER, 30" DROP, 2 WRAPS ON CATHEAD)

NOTES:
CONTRACTOR: S&ME
RIG: CME 55
DRILLER: Chris Simril
Distance under location is from ash pond water edge.
All elevations are from NGVD.

F–237
ADM 12/3/93

BORING NO. B–6
SHEET 1 OF 1

APPENDIX B

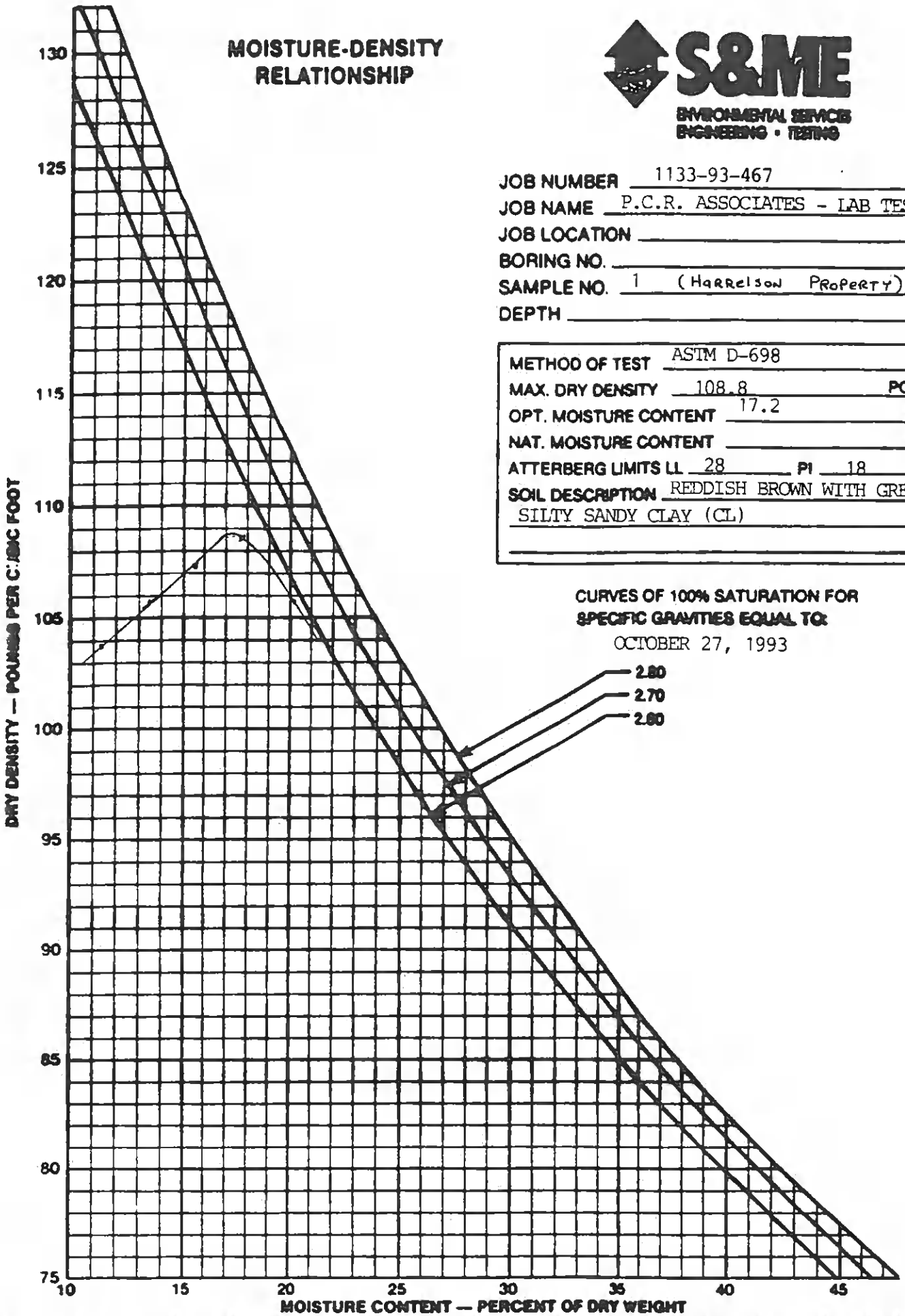
LABORATORY TEST RESULTS

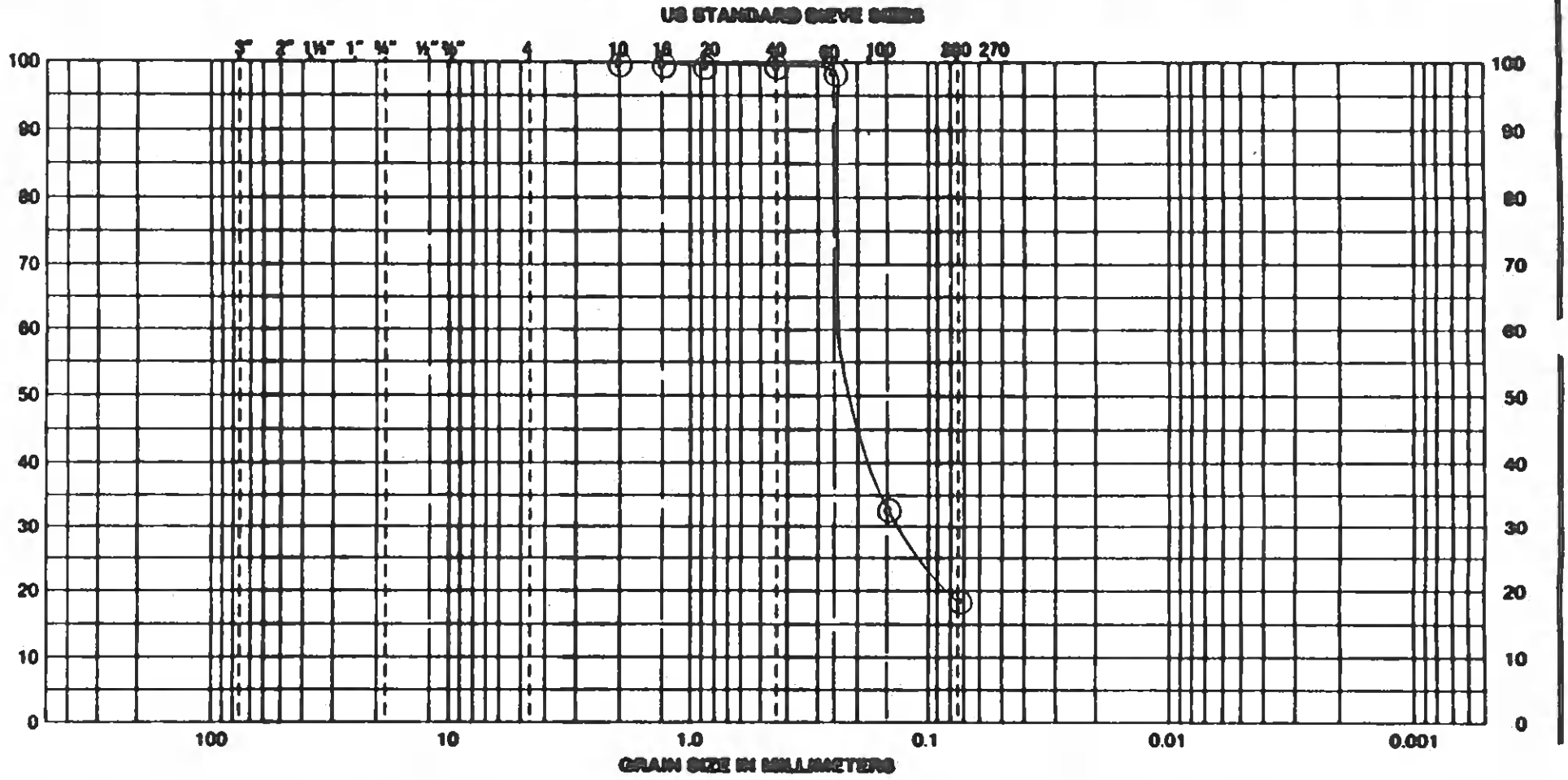
MOISTURE-DENSITY RELATIONSHIP

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING • TESTING

JOB NUMBER 1133-93-467
JOB NAME P.C.R. ASSOCIATES - LAB TESTING
JOB LOCATION
BORING NO.
SAMPLE NO. 1 (HARRELSON PROPERTY)
DEPTH

METHOD OF TEST ASTM D-698
MAX. DRY DENSITY 108.8 PCF
OPT. MOISTURE CONTENT 17.2 %
NAT. MOISTURE CONTENT %
ATTERBERG LIMITS LL 28 PI 18
SOIL DESCRIPTION REDDISH BROWN WITH GREY SILTY SANDY CLAY (CL)





BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV./DEPTH	NAT. WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
SAMPLE 1			28	18	10	CL - SANDY LEAN CLAY

JOB NO 1133-93-467

GRAIN SIZE DISTRIBUTION

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MOISTURE-DENSITY RELATIONSHIP

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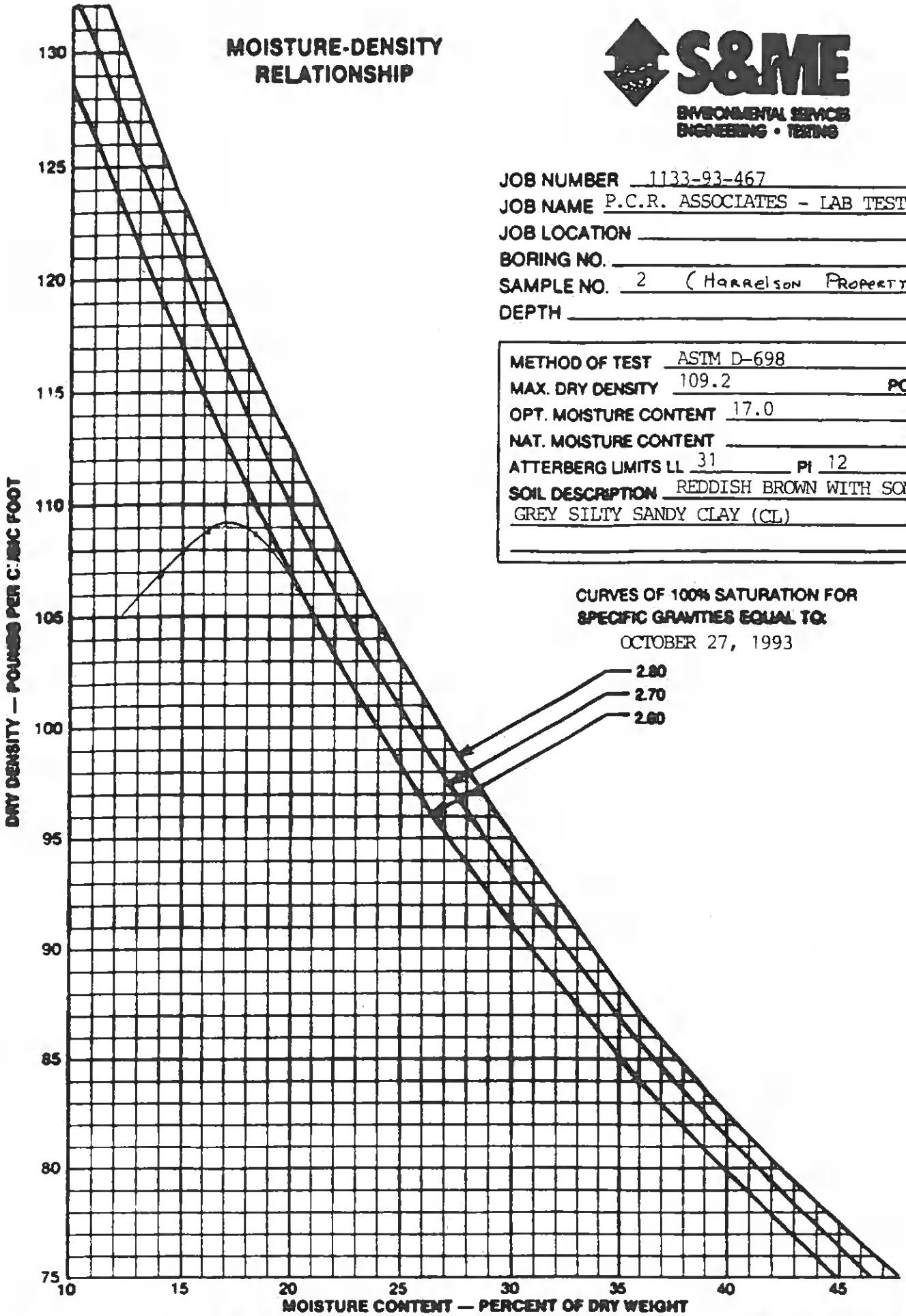
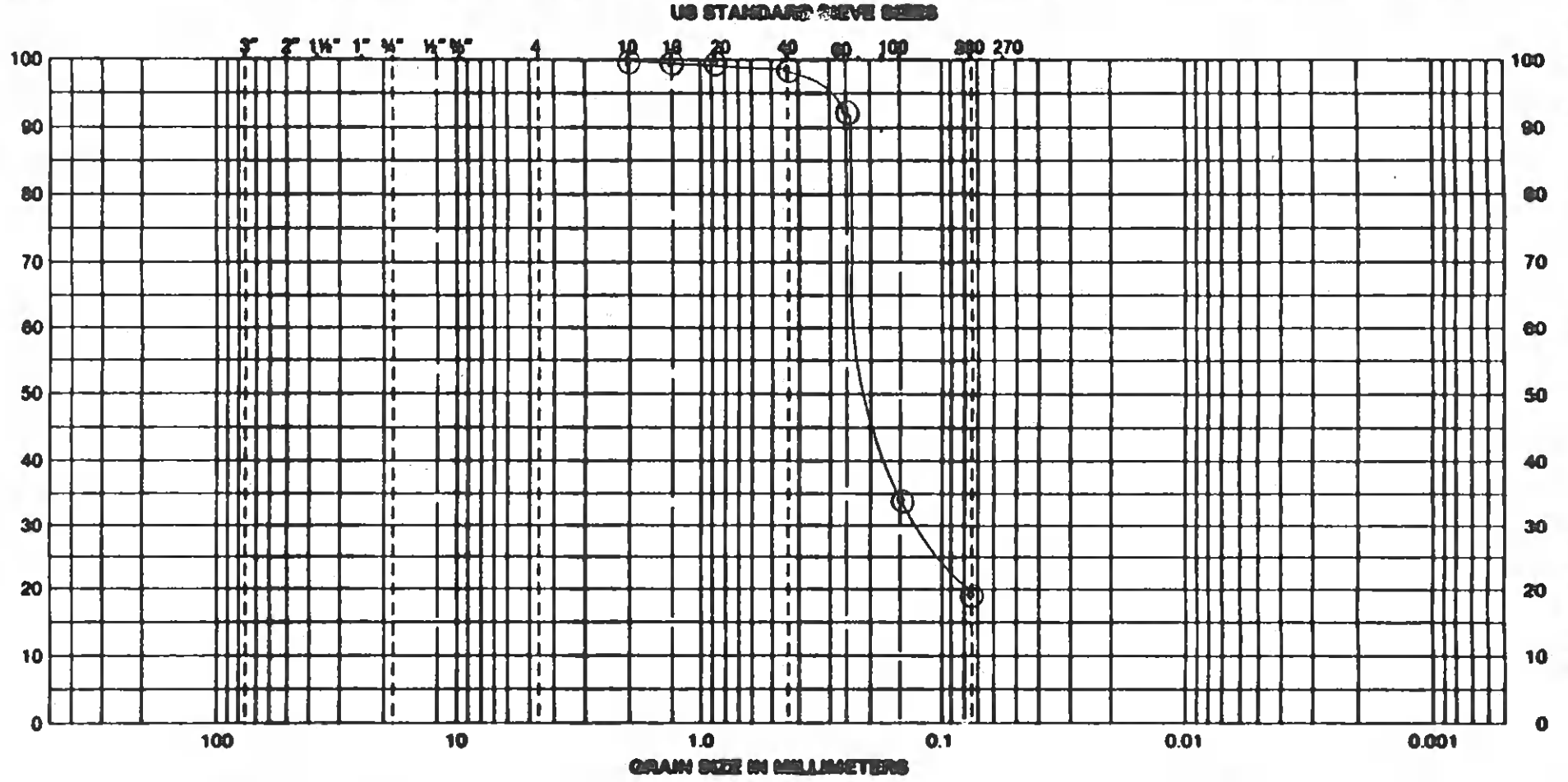
JOB NUMBER 1133-93-467
JOB NAME P.C.R. ASSOCIATES - LAB TESTING
JOB LOCATION
BORING NO.
SAMPLE NO. 2 (HARRELSON PROPERTY)
DEPTH

METHOD OF TEST ASTM D-698
MAX. DRY DENSITY 109.2 PCF
OPT. MOISTURE CONTENT 17.0 %
NAT. MOISTURE CONTENT %
ATTERBERG LIMITS LL 31 PI 12
SOIL DESCRIPTION REDDISH BROWN WITH SOME GREY SILTY SANDY CLAY (CL)





BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV./DEPTH	NAT. WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
SAMPLE 2			31	19	12	CL - SANDY LEAN CLAY

JOB NO 1133-93-467

GRAIN SIZE DISTRIBUTION

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APPENDIX C

BORROW SOIL VOLUME CALCULATION

Paul C. Rizzo Associates, Inc.
CONSULTANTS

By ADM Date 11-17-93 Subject SANTEE COOPER Sheet No. 1 of 3
Chkd. By JDH Date 12-7-93 VOLUME OF BERM ADDITION Proj. No. 93-1356
WILLYAH - ASH POND B

PURPOSE: DETERMINE THE VOLUME OF SOIL NEEDED FOR THE BERM ADDITION AT ASH POND B.

PROCEDURE: INCREASE THE ELEVATION 7'. CREST WIDTH ≥ 15'. ALL SLOPES 2 TO 1. DETERMINE AVERAGE CROSS-SECTIONAL AREA OF BERM ADDITION, AND USING TOTAL LENGTH, DETERMINE VOLUME.

REFERENCES:

1) SANTEE COOPER, PLAN VIEW DWG. - ASH POND B, 1" = 200'

2) PAUL C. RIZZO ASSOCIATES, CROSS SECTION DWGS., DWG. NOS. 93-1356-B1 - 93-1356-B6

Paul C. Rizzo Associates, Inc.
CONSULTANTS

By ADM Date 11-17-93 Subject SANTEE COOPER Sheet No. 2 of 3
Chkd. By JDH Date 12-7-93 VOLUME OF BERM ADDITION Proj. No. 93-1356
VINYAL - ASH POND B

DRWG. NO.	* CROSS-SECTIONAL AREA (ft^2)
93-1356-B1	442.96
93-1356-B2	343.60
93-1356-B3	367.71
93-1356-B4	517.50
93-1356-B5	356.63
93-1356-B6	356.63
	2385.03

AVG. AREA: $\frac{2385.03}{6} = 397.51 \sim 398\ ft^2$

LENGTH OF FILL: ~ 5200

VOLUME OF FILL: (5200)(398)(1.1 SWELL FACTOR)

$= 2276560\ ft^3$

$= 84317\ CY$

$\cong 84000\ CY$

* CROSS-SECTIONAL AREA DETERMINED USING CROSS-SECTION DRWGS & ACAD AREA ROUTINE.

Paul C. Rizzo Associates, Inc.
CONSULTANTS

By ADM Date 12-7-93 Subject SANTEE COOPER Sheet No. 3 of 3
Chkd. By JDH Date 12-7-93 VOLUME OF PERM ADDITION Proj. No. 93-1356
KUNYAH - ASH POND B

AVERAGE END AREA METHOD:

VOLUME OF FILL =

$$= \left[\frac{(0 + 442.96)}{2} \times 600 \text{ ft}\right] +$$

$$\left[\frac{(442.96 + 343.60)}{2} \times 850\right] +$$

$$\left[\frac{(343.60 + 367.71)}{2} \times 800\right] +$$

$$\left[\frac{(367.71 + 517.50)}{2} \times 950\right] +$$

$$\left[\frac{(517.50 + 356.63)}{2} \times 950\right] +$$

$$\left[\frac{(356.63 + 356.63)}{2} \times 575\right] +$$

$$\left[\frac{(356.63 + 0)}{2} + 475\right] +$$

$$= 1877149 \text{ (1.1 SWELL FACTOR)}$$

$$= 2064864 \text{ ft}^3$$

$$= 76,476 \text{ CY}$$

$V \approx 76,500$ CY

APPENDIX D

CONSTRUCTION SPECIFICATIONS

ADDENDUM TO SPECIFICATIONS

SECTION 1 - EARTH WORK

REPLACE EXISTING PART 2, I WITH THE FOLLOWING:

A suitable source of borrow fill material has been identified on nearby property owned by Mr. Orrin Harrelson. The fill material, as tested, contains approximately 20 percent clayey fines passing a number 200 sieve, with a plasticity index of approximately 10. Any soil obtained from the borrow area which does not have these approximate characteristics or is obviously not suitable shall not be used.

ADD THE FOLLOWING AFTER PART 2, I:

II. GEOTEXTILE

A. All geotextile shall be sealed in plastic at the factory prior to shipment to the job site. Geotextile shall be protected from precipitation, inundation, ultraviolet exposure, dirt, puncture, cutting, and other damaging or deleterious condition.

The geotextile shall be a filter-type fabric, either a mono-woven, needle punched, continuous filament, polyester or polypropylene material. It shall meet or exceed all of the following properties:

a. Grab strength = 160 lbs (ASTM D4632)
b. Puncture Strength = 80 lbs (ASTM D4833)
c. Mullen Burst Strength = 275 lbs (ASTM D3786)
d. Trapezoidal Tear Strength = 50 lbs (ASTM D4533)
e. AOS = 50 sieve (ASTM D4491)
f. Permeability = 0.1 cm/sec (ASTM D4491)
g. UV Resistance @ 150 hours = 70% (ASTM D4355)

The Contractor shall obtain certification from the supplier that the above requirements are met.

ADD THE FOLLOWING AFTER PART 3, II, A, 2:

3. The existing dike slopes shall be notched as shown on drawings in order to tie the new soil into the existing slope. The notch shall be two feet in depth and shall have a horizontal bottom.

In areas where the downstream toe of the reconstructed dike extends into the waterway, any soft soil or muck shall be removed, geotextile shall be placed, and riprap shall then be placed to an elevation at least one (1) foot above the waterway. The riprap shall be at least 6 inches in diameter and shall extend at least 2 feet beyond the toe of the reconstructed dike.

ADD THE FOLLOWING AFTER PART 3, V:

VI. RIPRAP PROTECTION OF UPSTREAM SLOPE

A. Riprap: Riprap shall be in sizes ranging from 6 inches to 2 feet. Riprap shall be sound, dense, and resistant to abrasion, and shall be relatively free of cracks, seams, and other defects which would tend to increase damage and deterioration from water and frost action.

B. Placement: Prior to riprap placement, geotextile shall be placed with a minimum 2-inch overlap between edges and shall be field sewn. All holes or tears shall be replaced with a patch of equivalent geotextile. The geotextile shall also be placed between the riprap and the fill soil for the reconstructed embankment. Riprap need not be compacted, but shall be placed in a manner to ensure that larger rock fragments are uniformly distributed and the smaller rock fragments serve to fill the spaces between larger fragments in such a manner as will result in well-keyed, densely placed, uniform layers of specified thickness. Hand placement will be required if mechanical placement does not result in satisfactory packing and arrangement.

Riprap shall be placed on the upstream embankment of the reconstructed dike, extending approximately two feet above the current typical water surface elevation. The riprap should be extended upward as the water level in the pond rises.

SECTION 2 - CONCRETE

ADD THE FOLLOWING AFTER PART 2, I, D:

E. Metal Works: Metal to be used to extend the existing angle-iron gate tracks, overflow gate, ladder, and grate supports shall match the existing metal. Any welding or fabrication shall be performed by qualified welders or fabricators, as certified by the American Welding Society (AWS) Standard D1.1. In addition, all welding and modification shall conform to the same Standard of Structural Welding code of the AWS.

ADD THE FOLLOWING AT THE END OF PART 3, II, C,1:

Anchor bolts shall be placed by the Contractor to provide a means for attaching the gate-hoist frame, ladder, and walkway to the modified concrete structure. The anchor bolts shall be sized to carry the anticipated load.

ADD THE FOLLOWING AT THE END OF PART 3, II, C, 2:

The existing angle-iron gate tracks shall be extended by use of similar angle iron to the dimensions and height shown on the drawings. The angle-iron gate tracks shall be securely attached to the formwork prior to placement of concrete.

ADD THE FOLLOWING AFTER PART 3, II, D:

E. Removal of Existing Metal Work: Prior to placement of formwork, remove the following existing metal works: gate-hoist frame, grating, railing, and walkway.

ADD THE FOLLOWING AFTER PART 3, VI:

VII. METAL WORK

A. General: After placement of concrete and subsequent curing, the Contractor shall extend the ladder, grate supports, and overflow gate, as shown on the drawings. This shall be followed by the reinstallation of the gate hoist frame, grating, walkway, and railing.

SECTION 4 - STEEL BAR AND WIRE REINFORCEMENT

ADD THE FOLLOWING AFTER PART 2, I, C:

D. Dowels: Dowel bars shall be cut from the specified reinforcing bars or material of equal strength.

ADD THE FOLLOWING AFTER PART 3, II, C:

D. Dowels: Dowel bars shall be to the dimensions and locations detailed on the design drawings. A dowel bar is required for each vertical reinforcing bar. Holes for the dowel bars shall be drilled by the Contractor so that adequate space is available for the dowel and epoxy. The dowel bars shall be secured in place with epoxy resin injected into the hole.

SECTION 1 - EARTH WORK

PART 1 - GENERAL

I. DEFINITIONS:

A. Materials: Where the terms approved, suitable, unsuitable, and similar designations are used in this section, it means earth or materials designated as being approved, suitable, or unsuitable for their intended use by the engineer or his authorized representative. Suitable material shall be free of organic matter, roots larger than one inch in diameter or longer than two feet, debris and particles larger than six inches in any dimension.

B. Earthwork Debris: All material unsuitable for reuse encountered during earthwork operations performed under this project such as, but not limited to, muck, rock, refuse, stumps, logs, concrete, asphalt, and other combustible or non-combustible materials.

II. QUALITY ASSURANCE:

A. Applicable Standards: The following ASTM specifications are applicable:

D 698 Moisture-Density Relations of Soils Using 5-5 lb. Rammer and 12 Inch Drop (Standard Proctor)

D 1556 Density of Soil in Place by the Sand Cone Method

D 2167 Density of Soil Place by the Rubber Balloon Method

D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

If soil density and moisture content are measured by nuclear methods, the equipment shall be carefully calibrated on soil from the site in accordance with ASTM Specification D 922.

B. Tests:

1. Qualified soils technicians will be employed by the Owner for the purpose of identifying soils, checking densities and classifying soils materials during construction. These services are provided by the Owner.

2. Density tests shall be made as directed by the engineer.

a) One every layer of fill at 500 foot intervals with location of subsequent test staggered from location of previous test.

b) Areas where degree of compaction is in question.

PART 2 - PRODUCTS

I. FILL MATERIAL:

A. Fill materials borrowed from off-site pits shall have the following characteristics:

1. Shall consist of a 20-30% clay sand mixture.

2. 30 to 40 percent of the material shall pass a number 200 sieve.

3. The plasticity index shall be between 5 and 15.

B. Material shall be sampled to determine suitability for use as fill material. When approved, materials

shall be tested periodically as directed by the engineer to determine the degree of compaction.

PART 3 - EXECUTION

I. GRUBBING AND STRIPPING:

A. Clearing: The Contractor shall completely clear, remove, and dispose of all vegetation and unsuitable materials resting on or protruding above the existing dike and ground surface in the fill areas.

B. Stockpiling: Stockpile excavated topsoil, separate from other excavated materials for later use. Keep stockpile free of all undesirable materials. Make stockpiles neatly shaped and free to drain.

C. Spreading: Spread and place topsoil to a minimum depth of 6". Finished topsoiled areas shall be graded and suitable for sowing and proper maintenance of grass. Stockpile areas shall be dressed up smooth and with no standing water pockets after topsoil is spread.

II. FILLS:

A. Placement of Fill Material:

1. In fill construction, the material shall be deposited and spread in successive uniform approximately horizontal layers. The clay sand materials shall be limited to 6 inch lifts, loose measure. Material shall be placed so that, during construction, the center of the fill shall be kept higher than the edges. Each

layer of embankment shall be rolled and compacted to the specified density for the full depth. The Contractor shall furnish equipment of the proper width, weight, and configuration to achieve the required compaction.

Fills and slopes shall be finished true and straight, in conformity with lines and grades as shown with true and even surfaces. Fill shall be constructed of approved suitable materials. Moisture content of soils shall be maintained within the percentage of optimum moisture content specified in this Section.

During periods of dry weather, the contractor shall water material to provide sufficient moisture for compaction. Water required to provide sufficient moisture shall be furnished and applied by the Contractor. Materials containing excessive moisture shall be permitted to dry out or be disced and plowed to dry out to the proper moisture content before compaction is attempted. Care shall be exercised during periods of excessive moisture to prevent damage to existing dike structures. Borrow areas shall be drained and otherwise properly operated to assist in achieving this objective.

At the end of the day's work, the fill surface shall be compacted and graded to drain surface

runoff away from the fill area. On the next work day, the fill surface shall be scarified and recompacted prior to placing additional fill.

2. When the top layer of fill material is too sandy to remain compacted during the rolling operations, the density tests will be run on the next lower or preceding layer, and this procedure shall be followed for each subsequent layer of sandy material. Should the density of the preceding layer fail to meet requirements, it shall be brought to the required minimum by further rolling on the overlying layer before depositing another layer. Fill sections failing to meet requirements shall be removed and replaced, or reworked, until satisfactory to the Engineer, at no additional cost to the Owner.

B. Completed Work: The Contractor shall be responsible until final acceptance for maintaining the stability of all fills made under the contract and shall bear the expense of replacing any portions which, in the opinion of the Engineer, have become displaced due to carelessness or negligence on the part of the Contractor, including failure to properly route or contain surface water run-off. Specifically excluded from extra payment is replacement of slope

material washed away by natural rainfall or run-off, which shall be at the expense of the Contractor.

III. SOIL COMPACTION CONTROL:

A. Compaction Requirements: Fill shall be compacted to 95 percent of maximum dry density. During compaction, the moisture content shall be within ± 2 percent of optimum moisture content. Maximum dry density and optimum moisture shall be as determined by ASTM D 698.

When material is placed on the fill, the moisture content shall not be greater than 4% above optimum moisture content.

B. Compaction Results:

1. The soils technician will advise the Engineer immediately of any compaction tests failing to meet the specified minimum requirements. The Engineer will inform the soils technician of any retesting required. Formal reports of all test results will be submitted.

2. The soils technician will advise the Contractor's superintendent immediately of any compaction tests failing to meet the specified minimum requirements. No additional lift shall be placed on a lift with any portion failing.

C. NOTICE: The Contractor shall give adequate notice of work progress in order that the soils technician can plan his schedule and not delay construction.

IV. FINISHED GRADING:

A. Finish Grading: All exposed earth surfaces shall be graded to within ± 0.10 foot of theoretical grade. Finish for grading slopes shall be that degree ordinarily obtainable for either blade- grade or scraper operations. All ditches shall be finished so they drain readily.

B. Protection: The Contractor is responsible for maintaining the finish grades until finally accepted. Repairs required resulting from negligence are at the Contractor's expense.

V. DISPOSAL OF EARTHWORK DEBRIS:

A. Disposal of Debris or Waste:

1. Deposit non-combustible materials, including, but not limited to, rock, muck, broken concrete, and metals in designated disposal areas as directed by the Engineer. Removal from the site and disposal by the Contractor will be at no additional cost to the Owner.

SECTION 2 - CONCRETE

PART 1 - GENERAL

I. QUALITY ASSURANCE:

A. General: Current editions or revisions of the following specifications and standards shall apply unless specifically noted otherwise on the drawings or specified herein. Modifications to standards specifications will be noted within this specification and will be noted as revisions to standard specifications, but will not nullify unaffected portions of the standard specifications.

B. Applicable Standards: Conform to following standards:

ASTM C31	Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field.
ASTM C33	Specification for Concrete Aggregates
ASTM C39	Test for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Specification for Ready-Mixed Concrete
ASTM C172	Sampling Fresh Concrete
ASTM C183	Sampling Hydraulic Cement
ASTM C192	Making and Curing Concrete Test Specimens in the Laboratory
ASTM C260	Specification for Air-Entraining Admixtures for Concrete
ASTM C494	Specification for Chemical Admixtures for Concrete

ASTM C595 Specification for Blended Hydraulic Cement

ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete

ACI 305 Recommended Practice for Hot Weather Concreting

ACI 306 Recommended Practice for Cold Weather Concreting

ACI 318 Building Code Requirements for Reinforced Concrete

ACI 347 Recommended Practice for Concrete Formwork

II. PRODUCT STORAGE:

A. Cement: Store cement in watertight buildings, bins or silos.

B. Aggregate: Stockpile aggregate in a manner which will prevent contamination with other materials or with other sizes of aggregate. To insure purity, conduct tests for determining conformance to requirements at point of batching. Before using, allow sand to drain until it reaches a uniform moisture content.

C. Admixtures: Store admixtures in a manner which will prevent contamination. Protect admixtures from extreme temperatures which would adversely affect their characteristics.

PART 2 - PRODUCTS

I. MATERIALS:

A. Cement: American Portland cement of standard

manufacturer; free from earth, trash and damp set; brand subject to the Engineer's approval. Unless otherwise permitted by the Engineer, conform to ASTM C595, Type IP (MS). Do not change brand or type of cement without prior approval of the Engineer.

B. Aggregates:

1. General: All aggregates are subject to the Engineer's approval. Do not change source of aggregates without prior approval of the Engineer. Do not use frozen aggregates.

2. Fine Aggregate: Natural and conforming to ASTM C33; free of injurious amounts of shale, alkali, organic matter, loam or other deleterious substances. Do not use manufactured sand without approval of the Engineers.

3. Coarse Aggregate: Clean, crushed stone or gravel conforming to ASTM C33. Unless otherwise approved by the Engineer, use size number 57; however, in no case shall coarse aggregate exceed 3/4 of clear space between reinforcing bars or 1/5 of narrowest dimension between forms or 1/3 of depth of slabs.

C. Water: Clean and potable.

D. Admixtures: With exception of air-entraining, water reducing and retarding admixtures do not use admixtures unless approved by the Engineer. Use air-entraining, water reducing and retarding admixtures only as specifically permitted by this Specification. Chlorides in admixtures not permitted. When admixtures are permitted, conform to:

1. Air-entraining Admixtures: ASTM C260.
2. Water Reducing Admixture: ASTM C494, Type A.
3. Retarding Admixture: ASTM C494, Type D.

II. PROPORTIONS:

A. General: Proportion all concrete to produce a homogeneous material which, when hardened, will have required strength, durability, appearance, watertightness, resistance to abrasion and other properties specified. Proportion vibrated concrete to produce a slump between one and four inches plus tolerances in accordance with ACI 301.

B. Proportioning of Ingredients: The Owner's Testing Laboratory shall determine exact proportions to be used; however, unless permission to deviate is granted by the Engineer, adhere to following:

Type of Construction	Minimum Compressive Strength psi (28 Days)	Total Air	Minimum Cement Factor (Bags/cu.yd.)	Maximum W/C Ratio (Gals/bg)
All Concrete	4000	3.5-6.5%	6.0	5.75

In some instances, maximum water-cement ratios and minimum cement factors may not be compatible due to aggregate characteristics, weather conditions, etc. Under these conditions, a water reducing admixture may be introduced into mix. In hot weather, a retarding admixture may be added to mix in accordance with manufacturer's recommendations. Use of any admixture requires written approval of the Engineer.

III. MIXING:

A. Ready-Mixed Concrete: If ready-mixed concrete is used, mix and transport it in accordance with ASTM C94 and ACI 304. Only ready-mix plants approved by applicable State Highway Department or certified by National Ready-Mix Association shall be used.

B. Retempering: Mix concrete in quantities for immediate use only. Concrete shall be placed within one hour after mixing; do not retemper. Adding water to mix at Project Site will not be permitted unless prior approval is obtained from the Engineer.

C. Weather Conditions:

1. Cold Weather: When mean daily temperature falls below 40 degrees F., do not allow as-mixed temperature to fall below 55 degrees F. If water or aggregate has been heated, combine water and aggregate in mixer before cement is added. Do no add cement to mixture of water and aggregate when temperature of mixture is greater than 100 degrees F. During cold weather, mix concrete in accordance with ACI 306.

2. Hot Weather: In hot weather, a retarding admixture may be added to mix upon receipt of written approval of the Engineer. If necessary, cool ingredients to prevent flash set, cold joints or loss of slump. During hot weather, mix concrete in accordance with ACI 305.

PART 3 - EXECUTION

I. GENERAL:

A. Quality Standard: Unless otherwise specified, place all concrete in accordance with ACI 304.

II. PREPARATORY WORK:

A. Cleaning Equipment: Remove hardened concrete and foreign materials from conveying equipment.

B. Installation of Other Materials: Prior to

placing concrete install formwork and preformed joint fillers.

C. Building Other Materials and Fixtures into Concrete:

1. Anchor Bolts: Anchor bolts shall be set as shown on the Drawings. Anchor bolts shall not deviate from their theoretical center line in excess of the following tolerances: ±1/8 inch for bolts up to two inches in diameter. The top of anchor bolts shall not deviate from their theoretical elevation by more than ±1/4 inches. Set all anchor bolts with a steel or rigid wood template.

2. Miscellaneous Items: Accurately place and secure against displacement all steel, pipe sleeves, inserts, anchors, and similar items. Installation of anchors, inserts and sleeves for mechanical and plumbing is subject to inspection and approval supervisors of particular trades involved. Temporarily fill voids in sleeves and inserts with readily removable material.

D. Water Seal: Contractor shall provide sealant capable of providing a positive, watertight seal in the area of the cold joint between the new and existing drawdown structure.

III. WEATHER CONDITIONS:

A. Protection: Do not place concrete when it is raining, sleeting, or snowing unless adequate protection is provided and approval is obtained from the Engineer. Do not allow rain water to increase mixing water.

B. Placing Temperature:

1. Cold Weather: Do not place concrete when air surrounding concrete is less than 32 degrees F. When temperature of air surrounding concrete will fall below 25 degrees F. within 24 hours after placing, minimum temperature of concrete when placed shall be 50 degrees F. During cold weather, place concrete in accordance with ACI 306.

2. Hot Weather: Do not deposit concrete in hot weather when temperature of concrete will cause loss of slump, flash set or cold joints. During hot weather, place concrete in accordance with ACI 305.

IV. CONVEYING:

A. General: Handle concrete from mixer to place of final deposit as rapidly as practicable and in a manner which will assure that specified quality of concrete is obtained.

V. DEPOSITING:

A. General: Do not deposit concrete which has partially hardened or has been contaminated by foreign matter. Remove all temporary spreaders in forms when concrete has reached an elevation rendering their service unnecessary. However, temporary spreaders may remain in place if made of metal or concrete and approval has been obtained from the Engineer.

B. Segregation: To avoid segregation, deposit concrete as near to its final position as possible. do not subject concrete to any procedure which will cause segregation. Do not drop concrete more than 60 inches; use tremies when longer drops are required.

C. Placing:

1. General: Deposit concrete continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause seams or planes of weaknesses. If a section cannot be placed continuously, locate construction joints at points approved by the Engineer.

D. Consolidation:

1. General: Thoroughly consolidate all concrete by vibrating, spading, rodding, or forking

until concrete is thoroughly worked around reinforcement, embedded items, and into corners of forms. Consolidate each layer of concrete with previously placed layers to eliminate all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. When internal vibrators are used, provide mechanical vibrators with a minimum frequency of 7000 revolutions per minute. Do not use vibrators to transport concrete. insert and withdraw vibrators at points from 18 to 30 inches apart for 5 to 15 seconds duration. Keep spare vibrators at Project Site during all concrete operations.

2. Formed Elements: Use internal vibrators, not form vibrators. When a surface mortar is to be basis of finish, work coarse aggregate back from forms with a suitable tool to bring full surface of motor against form.

VI. PROTECTION:

A. Concrete: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical disturbances. Make all arrangements for protecting concrete prior to placing concrete. Do not permit truck traffic on mats after pouring.

SECTION 3 - CONCRETE FORMS

PART 1 - GENERAL

I. SCOPE:

A. Except as specified below or otherwise indicated on the drawings, place all concrete in temporary forms.

II. QUALITY ASSURANCE:

A. General: Current editions or revisions of the following specifications and standards shall apply unless specifically noted otherwise on the drawings or specified herein. Modifications to standard specifications will be noted within this specification and will be noted as revisions to standard specifications, but will not nullify unaffected portions of the standard specifications.

B. Applicable Standards: Conform to the following standards and those listed in Section 2 - Concrete.

ACI 301 Specifications for Structural Concrete for Buildings.

ACI 318 Building Code Requirements for Reinforced Concrete.

ACI 347 Recommended Practice for Concrete Formwork.

ASTM C31 Making and Curing Concrete Compressive and Flexural Strength Test Specimens in Field.

ASTM C39 Test for Compressive Strength of Cylindrical Concrete Specimens.

USPS PS 1 Construction and Industrial Plywood.

III. DESIGN:

A. Design of formwork is the responsibility of the Contractor. Conform to ACI 301, 318 and 347. When designing forms, provide for anticipated form deflection due to weight of fresh concrete.

PART 2 - PRODUCTS

I. MATERIALS:

A. Plywood Forms: USPS PS 1, B-B Plyform, Exterior Type, Class I, sealed edges, mill oiled and not less than 5/8 inches thick.

B. Lumber Forms: Sound lumber of uniform thickness, dressed, tongue and grooved, free from loose knots and of such moisture content as to prevent free absorption of moisture.

C. Metal Forms: Type subject to engineer's approval.

D. Form Oil: Non-staining type subject to engineer's approval.

E. Form Sealer: Type subject to engineer's approval.

F. Form Accessories: Form ties, anchors, and hangers of sufficient strength to resist displacement of forms due to construction loads and the depositing of concrete. Provide tie-and-spreader type form ties designed so that no metal will be within one

inch of any surface when forms are removed. Where concrete surfaces are exposed to view, do not use form ties which, when removed, will leave a depression larger than one inch in diameter. Use water seal ties in concrete exposed to hydrostatic pressure. Conform to ACI 301 and 347.

G. Screed Chairs: Metal; wood not permitted.

PART 3 - EXECUTION

I. PREPARATORY WORK:

A. Clean and oil forms in accordance with ACI 301 and 347.

II. ERECTION:

A. General: Construct and erect forms in accordance with ACI 301, 318, and 347.

B. Location:

1. Plywood Forms: Erect plywood forms at surfaces exposed to view and elsewhere at Contractor's option.

2. Lumber Forms: Use only at surfaces not exposed to view.

3. Metal Forms: Location subject to Engineer's approval.

C. Construction:

1. Forms: Make forms removable without requiring prying or hammering against concrete and constructed so sides may be removed without

disturbing bottom of forms or its supports. Brace and shore forms to safely support vertical loads, lateral concrete pressures, lateral loads and construction loads and prevent displacement and distortion. Provide positive means of adjusting shores in order that settlement may be taken up during concrete depositing operations. Install truss supports where adequate foundations for shores are not possible. Construct forms for floor slab construction joints full depth of slab. Where indicated, install strips in forms to form bevelled corners.

2. Inserts, Anchors, and Sleeves: Install all inserts, anchors, and sleeves including those required and furnished by other trades.

3. Screeds: Set screeds to proper elevations to facilitate placement of concrete.

III. REMOVAL AND RESHORING:

A. General: Removal of forms and reshoring of forms for early form removal is subject to Engineer's approval.

B. Removal: Remove forms in such a manner as to insure the complete safety and to prevent spalling or chipping of concrete. When removing forms, conform to the following:

1. Non-Weight Supporting Forms: Formwork not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but in no case sooner than 24 hours.

2. Weight Supporting Forms: Unless special permission is granted otherwise by the Engineers, do no remove formwork which supports the weight of concrete until concrete has reached its specified 28 day strength. For the purpose of form removal, determine strength by one of the following methods:

   a. Method No. 1: Cylinders, field cured under the most unfavorable conditions prevailing for any portion of the concrete represented.

   b. Method No. 2: Cylinders, laboratory cured when concrete has been cured as specified in Section 2 - Concrete.

IV. TOLERANCES:

A. Unless otherwise indicated on the drawings, erect formwork to the tolerances specified in ACI 347.

SECTION 4 - STEEL BAR & WIRE REINFORCING

PART 1 - GENERAL

I. QUALITY ASSURANCE:

A. General: Current editions or revisions of the following specifications and standards shall apply unless specifically noted otherwise on the Drawings or specified herein. Modifications to standard specifications will be noted within this Specification and will be noted as revisions to standard specifications, but will not nullify unaffected portions of the standard specifications.

B. Applicable Standards: Conform to the following Standards and those listed in Section 2 - Concrete.

ASTM A185	Specifications for Welded Steel Wire Fabric for Concrete Reinforcement
ASTM A615	Specifications for Deformed and Plain Billet-Steel Bars and Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete
CRSI	Manual of Standard Practice for Reinforced Concrete Construction
CRSI	Recommended Practice for Placing Reinforcing Bars

C. Observations: Shop workmanship and materials will be subject to observations by the Engineer. Notify the Engineer in advance of starting shop

work in order that they may make observations.

PART 2 - PRODUCTS

I. MATERIALS:

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

B. Welded Wire Mesh: ASTM A185.

C. Metal Accessories: All metal devices necessary for placing, spacing, supporting, and fastening reinforcement shall conform to CRSI's "Manual of Standard Practice for Reinforced Concrete Construction." At concrete surfaces which are exposed to weather or located where rust may impair the architectural finish, provide plastic or stainless steel accessories when accessories are in contact with formwork.

PART 3 - EXECUTION

I. CLEANING:

A. Before placing, clean reinforcement of all ice, dirt and other coatings.

II. PLACEMENT:

A. General: Continue reinforcement across all joints in concrete unless otherwise indicated on the Drawings.

B. Reinforcing Bars:

1. General: Place bars accurately, securely supported and wired together to prevent displacement from construction loads or the depositing of concrete. Do not use bars with

kinks or bends not shown on the Drawings. Tack welding of bars or welded bar splices is not permitted, except as specified in Paragraph 3 below.

2. Bar Supports: Concrete blocks may be used to support bars for concrete on grade. Install metal or plastic chairs and spacers over formwork. Support top mats of all slabs and mats on rigid steel frames. Weld frames to steel pile caps to prevent movement.

3. Concrete Protection: If concrete cover over bars are not shown on the Drawings or specified, conform to ACI 318. Where concrete for structural members is deposited against the ground, provide not less than three inches of concrete between bars and ground surface. If formed concrete surfaces are exposed to the weather or in contact with the ground, protect bars with not less than two inches of concrete. If formed concrete surfaces are not exposed to weather, protect bars including stirrups and ties with not less than 3/4 inch of concrete for slabs and walls and 1-1/2 inches of concrete for beams and girders.

4. Tolerances: Place reinforcing bars to tolerances specified in CRSI's "Recommended Practice for Placing Reinforcing Bars."

C. Welded Wire Mesh: Lap mesh two full meshes plus wire extension unless otherwise shown on the Drawings. During placing of concrete at slabs or grade, mesh may be lifted manually in lieu of adequate supports, provided mesh is completely surrounded by concrete and positioned no more than 1/3 of the slab depth from the top of the slab. Lift mesh just ahead of screed.

SECTION 5 - GRASSING

PART 1 - GENERAL

I. SCOPE:

A. This section covers furnishing of all labor, materials, equipment, tools, supervision, and incidentals necessary for grassing as herein specified. The Contractor shall deliver a satisfactory stand of perennial grass which is defined as a full cover of grass that is alive and growing with no bare spots.

PART 2 - PRODUCTS

I. MATERIALS:

A. Lime shall be ground or pulverized limestone passing the requirements of the U.S. Department of Agriculture, Agriculture Conservation and Production Administration, for use on farms of the vicinity.

B. Fertilizer shall be a mixed, commercial, non-acid forming fertilizer, containing percentages of available nitrogen, phosphoric acid and potash of 5-10-10. Fertilizer shall be dry in granular or powdered form, shall be delivered to the site in the manufacturer's original bag or container which shall be plainly marked as to formula and non-acid reaction and shall comply with the state fertilizer laws.

C. Seed: Quality requirements for seed shall be as follows:

Name of Seed	Percent Pure Seed	Percent Germination & Hard Seed	Percent Weed Seed
Bahia-Paspalum notatum (pensacola)	72	70	0.60
Bermuda-Cynodon dactylon (hulled)	97	85	1.00
Rye Grass-lolium	98	97	0.50
Sericea Lespedeza	95	90	0.50

Seed certified by a seed association or certifying agency, and meeting the above requirements will be accepted without further tests, provided the seeds are undamaged at the time of planting, and provided further that no more than ten (10) months have elapsed since the seeds were harvested and certified. Seeds harvested more than ten (10) months previously shall be retested for viability. If percent of germination is less than the requirement above, seeding rates shall be adjusted upward to provide the equivalent viable seed. No downward adjustment will be permitted if viability exceeds the requirements.

D. Water: Water shall be free from oil, acid, alkali, salt, and other substances harmful to growth of grass.

E. Mulch shall be dry grain straw, hay sedge grass or other locally harvested vegetation obtained form approved sources, free of noxious weeds. All such material shall be thoroughly "cured" and dry before spreading.

PART 3 - EXECUTION:

I. PREPARATORY WORK:

A. Topsoil: Spread topsoil over areas to be grassed. Previously stockpiled topsoil shall be utilized. If the quantity of soil is insufficient, additional topsoil shall be provied by the Contractor.

B. Liming shall be done immediately after grading and topsoiling has reached the final "smoothing" stage, even thought actual seeding may not be done until several months later. Lime shall be used at 2.5 tons per acre and shall be spread evenly by means of approved mechanical spreaders or distributors. Lime shall be incorporated in the top 2 to 3 inches of soil by harrowing, disking, or other approved means.

C. Fertilizer shall be spread not more then two (2) weeks in advance of seeding. Fertilizer shall be spread at a rate of 1000 pounds to the acre. Fertilizer shall be protected from damage by weather or otherwise until used. Lumpy fertilizer shall be thoroughly pulverized before placing in the distributor. Within 24 hours after spreading, the fertilizer shall be incorporated into the top 2 to 3 inches of soil by disking, harrowing or other approved methods.

D. Tillage: Equipment necessary for the proper preparation of the ground surface and for handling and placing all required materials shall be on hand, in good condition, and shall be approved before the work

is started. The ground surface shall be cleared of all vegetation, debris, stone, roots, grade stakes, and any other materials which might hinder proper grading, tillage, or subsequent maintenance operations. The areas to be planted shall be thoroughly tilled to a depth of at least 5 inches by plowing, disking, harrowing, or other approved operations. The work shall be performed only during periods when beneficial results are likely to be obtained. Nor work shall be done during periods of drought, excessive moisture or other factors, that satisfactory results are not likely to be obtained. Grades on the areas to be seeded shall be maintained in a true and even condition and all surfaces shall be left at the prescribed grades in an even and properly compacted condition so as to prevent the formation of depressions where water will stand.

E. Soil Tests: The actual quantities of lime and fertilizer and the chemical analysis of fertilizer shall be determined by soil test made by the Contractor. Test results shall be furnished to the rates of lime and fertilizer are subject to approval by the Engineer.

II. PLACEMENT:

A. Bahia Grass Seed shall be sown by means of an approved hand operated mechanical seeder, or other approved methods resulting in even distribution of the seed. Seeding shall not be done when ground is excessively

wet or excessively dry. The seed shall be covered to a depth of 1/2 inch to one inch. Bahia grass shall be covered by raking with a flexible toothed weeder or other approved means to depths to one inch, and shall be compacted by an approved roller.

When Bermuda grass or rye grass are to be added by hand, the compacted surface shall be loosened to a depth of 1/4 inch using a flexible toothed weeder or spike toothed barrow. The seed shall then be sown and compacted by one pass of the compacting implement. Skips showing bare ground more than 12 inches wide when the grass comes up shall be remedied by reseeding to conform to the surrounding areas. Seeding rates and dates shall conform to the following table:

Dates	Seed	Pound Per Acre
1 Mar. - 14 Aug.	Scarified Pensacola Bahia	50
	Sericea Lespedeza (Scarified)	50
15 Aug. - 28 Feb.	Unscarified Pensacola Bahia	50
	Sericea Lespedeza (unhulled, unscarified)	80
	Annual Rye Grass	5
	Rye Grain	20

B. Mulching: Mulch shall be spread uniformly at the rate of 4000 pounds per acre. Mulch shall be held in place by asphalt mist. Asphalt mist shall be applied at the rate of 120 gallons per ton of mulch. Mulch shall be blown in place with the asphalt mist applied

APPENDIX C

WGS Ash Pond B – Abandon Existing Drawdown Structure (Santee Cooper, 2012)

santee cooper®

INTER-OFFICE COMMUNICATION

Date: March 2, 2012
To: Jason Williams, Superintendent Technical Services, WGS
From: Robert G. Blackwell, P.E., General Engineer - Civil Projects, OC08
Subject: WGS Ash Pond B – Abandon Existing Drawdown Structure

Per the request of Generation, Civil Projects developed a plan to address the wet area near the existing drawdown structure in Ash Pond B. Civil Projects proposed to replace the existing outfall structure with a shallower outfall structure approximately 360 feet south of the existing structure in Ash Pond B. Winyah Generating Station (WGS) concurred with this proposal and elected to proceed with the work as proposed. The work was completed by Construction Services in three (3) phases between February 2011 and January 2012. These phases are described in the following sections.

Phase One (1) – Install New Drawdown Structure (February 2011 through May 2011)
The new drawdown structure was built according to the original design for the existing structure with the exception of depth. Due to the current capacity and operating level of Ash Pond B, the new structure does not need to be as deep as the existing drawdown structure. In order to install the new drawdown structure a temporary cofferdam was constructed by placing clay soil in Ash Pond B. The new drawdown structure was installed approximately 360 feet south southwest of the existing drawdown structure (to be abandoned). See the attached plan (DWG No. 4046-D09-0002) for the location.

After installing the new drawdown structure an excavation was made through the existing dike for a new outfall pipe. The pipe was sized based on the existing outfall pipe. The plan called for a continuous pipe as opposed to the more traditional jointed pipe. As such, a continuous length of 24" DR-21 HDPE pipe approximately 100 feet long with two (2) forty-five degree bends was installed. The bends were placed in the new outfall pipe to offset the elevation difference between the inverts of the new and existing drawdown structures. The connection between the new outfall pipe and drawdown structure was made water tight by installing a flexible seal then encasing the entire connection in concrete. The excavated section of the new outfall pipe which penetrated the existing dike was encased in 134 cubic yards of controlled low strength material (CLSM)[1]. The existing dike was rebuilt using 972 cubic yards of select backfill compacted to ninety-five (95) percent maximum dry density. For full details see the attached DWG No. 4046-D09-0002.

Phase Two (2) – Observe New Drawdown Structure (May 2011 through December 2011)
The new drawdown structure began operation in May 2011. After seven (7) months of continuous operation plans were finalized to close the existing structure at Ash Pond B.

Phase Three (3) – Abandon Existing Outfall Structure (January 2012)
Construction Services constructed a temporary cofferdam along the bank of the discharge canal so that approximately eight (8) feet of eighteen (18) inch reinforced concrete pipe located at the furthermost downstream end of the Ash Pond B outfall pipe could be removed. The

[1]Controlled Low Strength Material is a self-compacting cementitious material commonly referred to as flowable fill.

eighteen (18) inch stainless steel pipe remained undisturbed along with the eighteen (18) inch RCP that penetrates the existing dike.

Both pipes and the existing drawdown structure were cleaned using a low pressure system and then inspected with a closed circuit television camera. The pipe was found to be in good condition with the exception of the joint at the transition between the RCP and stainless steel pipe. Given the orientation of the joint, it is reasonable to conclude that the small depression found on the downstream slope prior to abandonment was a by-product of this joint during operation. The depression will be repaired and monitored; however, permanent filling of the outfall pipe should eliminate this issue. As previously mentioned no other concerns were noted during the inspection, thus further investigation around the exterior of the outfall pipe was not warranted.

Immediately following the inspection, a second temporary cofferdam was constructed around the downstream end of the stainless steel pipe. CLSM was pumped into the existing concrete drainage structure until the entire outfall pipe was filled. This process required fifteen (15) cubic yards of CLSM. Given the chemical properties of the Coal Combustion Residuals (CCR) a Type I/II Portland Cement was used. The CLSM was given twenty-four (24) hours to cure before a second lift of CLSM was placed to cap the existing drawdown structure. The second lift of CLSM required 9.5 cubic yards of material completely filling the existing outfall structure.

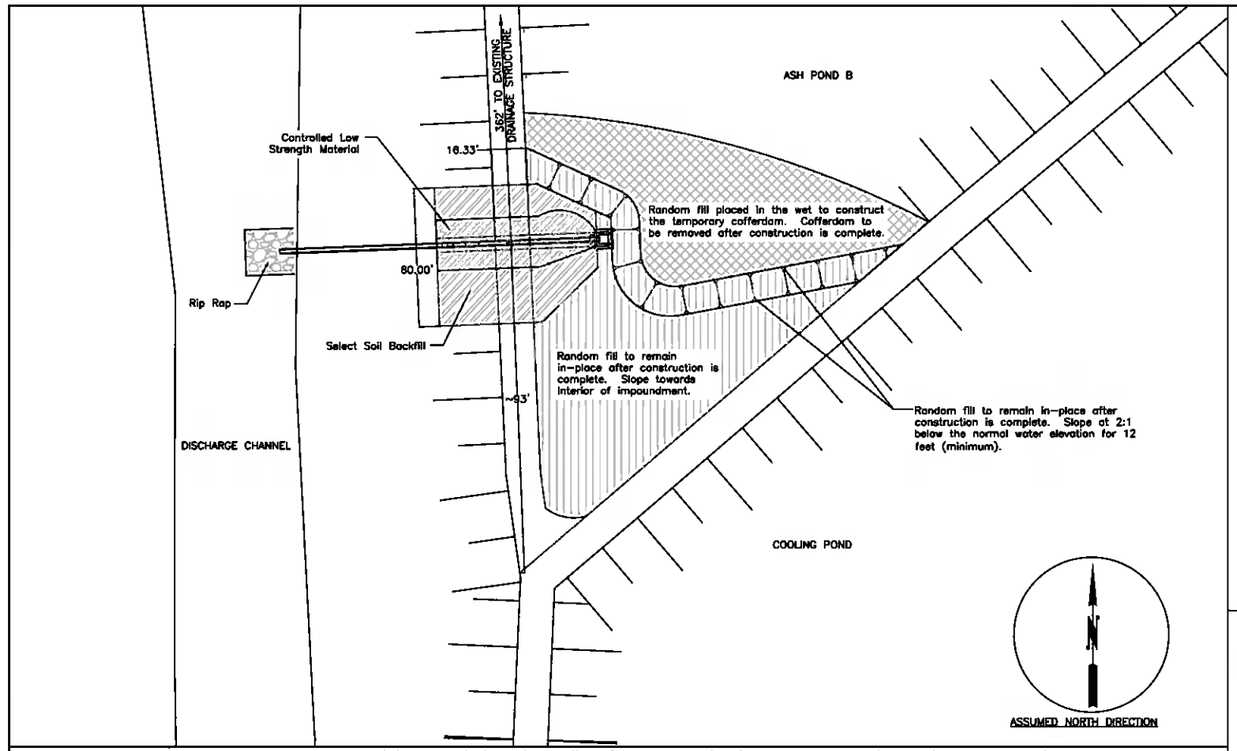
Civil Projects has prepared record drawings (DWG Nos. 4046-D09-0002 and 4046-D09-0005) for the new drawdown structure and abandoning the existing drawdown structure.

Attachments: DWG No. 4046-D09-0002 – Record Drawing – Pipe Penetration through Dike at Ash Pond B
DWG No. 4046-D09-0005 – Record Drawing Abandon Existing Drainage Structure Along Discharge Canal
Internal Camera Inspection for the Existing Ash Pond B Outfall Pipe (CD)

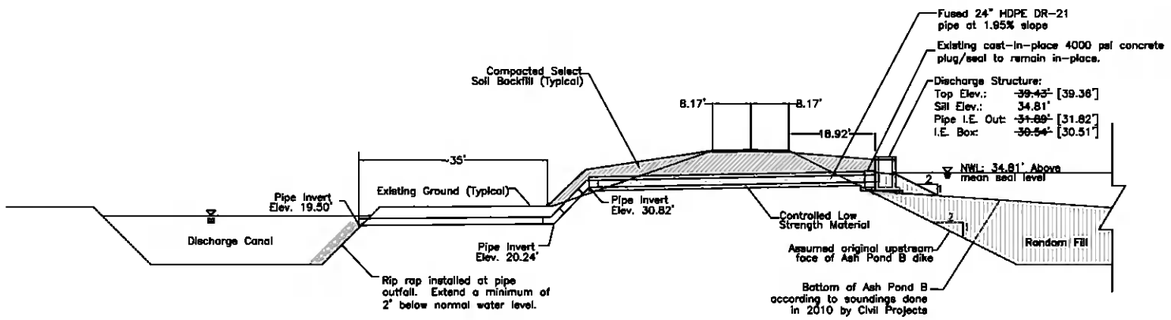
cc: <u>All attachments</u>
Jane Hood, Supervisor Generation Services, A205
File

<u>All attachments except Internal Camera Inspection</u>
Susan Jackson, Supervisor Environmental Services, A203

<u>No attachments</u>
Mitch Mitchum, Manager, WGS
Mark M. Carter, Manager Constr. & Trans. Services, OC08
Shea McMakin, Supervisor Civil Projects, OC08



PLAN VIEW OF PROPOSED PIPE PENETRATION THROUGH ASH POND B DIKE AT WGS
(NTS)



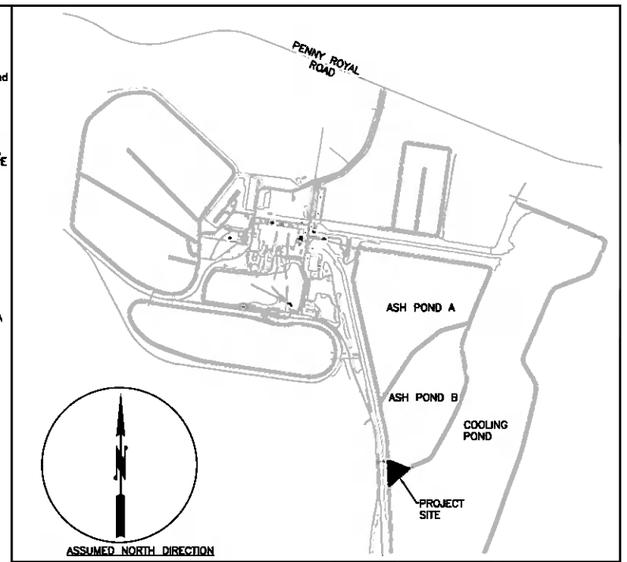
PROFILE VIEW OF PROPOSED PIPE PENETRATION THROUGH ASH POND B DIKE AT WGS
(NTS)

GENERAL NOTES:

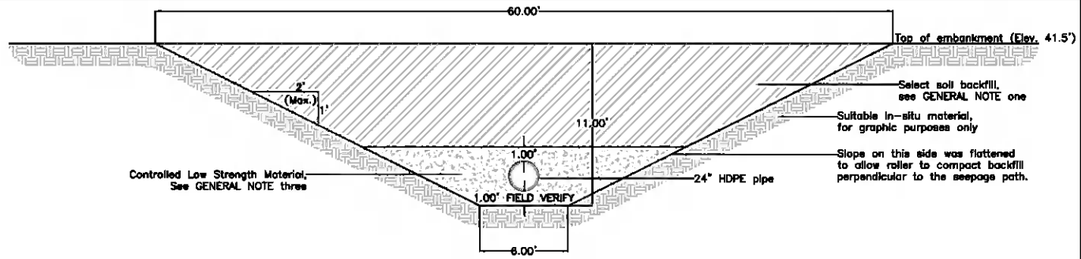
1. Select soil backfill should meet the specifications for "FILL MATERIAL" and PLACEMENT OF FILL MATERIAL" found in the Paul C. Rizzo Associates, Inc. report titled "Ash Pond B Dike Elevation Winyah Generating Station" dated December 1993.
2. Select soil backfill was compacted to 95 percent of maximum dry density and within 2 percent of optimum moisture content. Compaction was verified by field testing.
3. Controlled Low Strength Material (CLSM or Flow Fill) was placed around the pipe, as shown on the "CROSS SECTION AT DIKE CENTER LINE". Depth below the pipe will be determine by where suitable in-situ material is reached (Assumed 1'). Compressive strength for CLSM was between 80 and 150 psi, meets SCDOT Flowable Fill specifications. CLSM was placed in one lift. HDPE pipe was anchored to prevent flotation during CLSM placement. Two (2) No. 5 rebar ten (10) feet long spaced every five (5) feet were used to anchor HDPE pipe. Anchors were abandoned in-place. Fill placement began twenty-four (24) hours after CLSM was placed.
4. Discharge structure was modified to the dimensions shown in "MODIFIED EXISTING DRAINAGE STRUCTURE" detail shown below. Work was completed by Advanced Concrete Cutting & Coring, Inc. As a result of this work some of the steel reinforcement was exposed to the fluid impounded by Ash Pond B. Santee Cooper Construction Services coated the ends of the exposed steel reinforcement by applying a two-part epoxy coating, per manufacturer specifications.
5. Drainage structure dimensions are based off of the shop drawing received from General Precast Manufacturing Co., Inc. via fax on January 6, 2011. A copy can be found in the project file 114046.
6. TBM is a bolt in existing power pole at existing drainage structure, elevation is 42.13'.

BILL OF MATERIALS

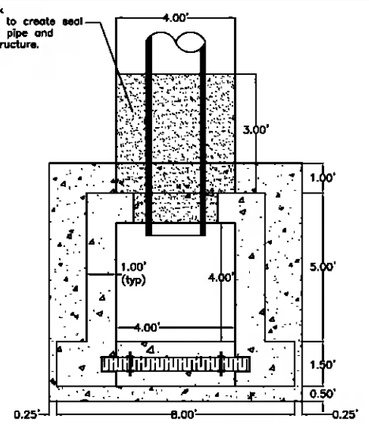
ITEM	QUANTITY	UNIT
Select Soil Backfill	~~657~~ [972]	Cubic Yards
Controlled Low Strength Material	~~202~~ [134]	Cubic Yards
Rip Rap (One Layer)	35	Tons



VICINITY MAP OF WINYAH GENERATING STATION
(NTS)

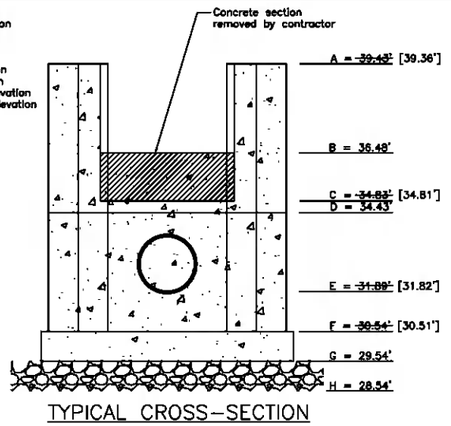


CROSS SECTION AT DIKE CENTER LINE
(NTS)



PLAN

LEGEND:
A: Top of Box Elevation
B: Sill Elevation
C: Saw Cut Elevation
D: Joint Elevation
E: Pipe Invert Elevation
F: Box Invert Elevation
G: Bottom of Box Elevation
H: Bottom of Rock Elevation



TYPICAL CROSS-SECTION

MODIFIED EXISTING DRAINAGE STURCTURE
(NTS)

REVISIONS

Santee Cooper
One Riverwood Drive
P.O. Box 2946101
Moncks Corner, South Carolina 29461-2901
(843)761-8000

santee cooper®

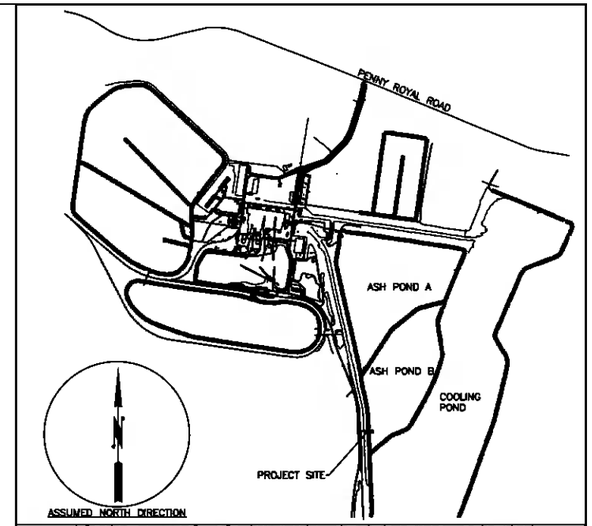
WGS ASH POND B

RECORD DRAWING -
PIPE PENETRATION THROUGH DIKE AT ASH POND B

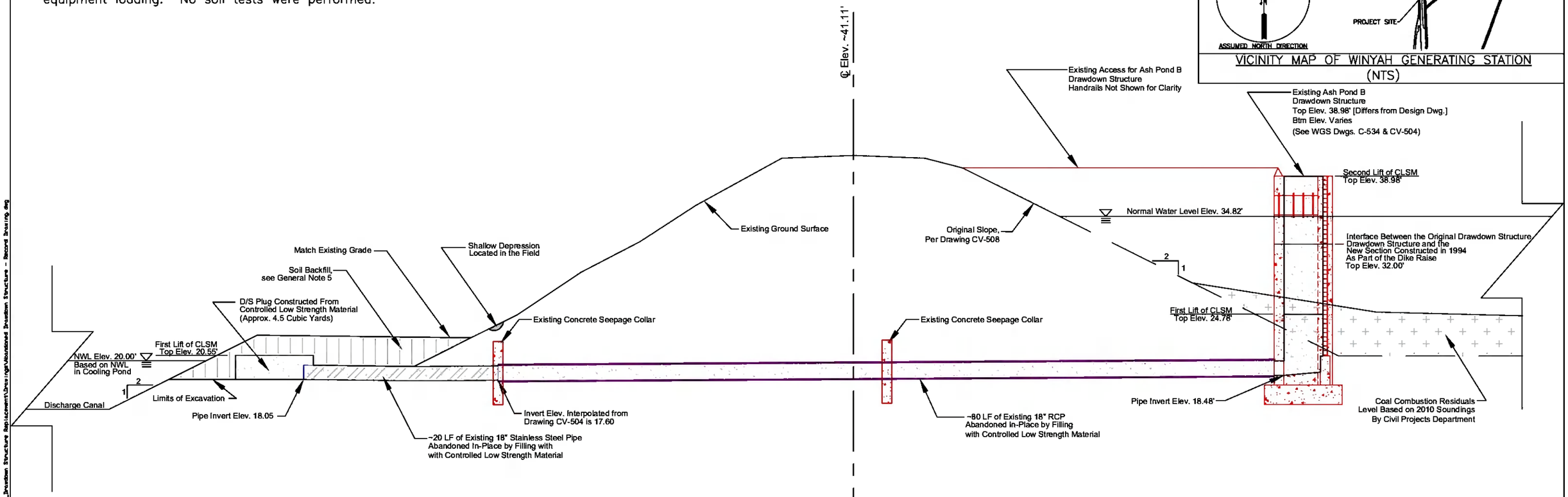
GENERAL NOTES:

1. This drawing is based on a combination of the original design drawings and information collected in the field.
2. Vertical datum used is NGVD 1929.
3. Outfall pipe and existing drawdown structure were cleaned and inspected prior to being abandoned. Work was done by Palmetto Industrial Services, Inc. (888–725–6388). Three (3) copies of the inspection video were provided to Civil Projects. Inspection found the pipes to be in good physical condition; however, a leaking joint was identified at the transition between the RCP and stainless steel pipe. Filling the outfall pipe with CLSM should prevent future deterioration at the transition.
4. Controlled Low Strength Material, also known as CLSM, is a self–compacting cementitious material commonly referred to as flow–fill. CLSM (mix design FFNXP) was ordered from S&W Ready Mix Concrete in Georgetown, SC. Type I/II Portland cement was used based on the chemical properties of the Coal Combustion Residuals (CCR).
5. Backfilled area using select fill from existing material that was excavated to remove the reinforced concrete pipe. Compaction was achieved through normal construction equipment loading. No soil tests were performed.

BILL OF MATERIALS		
ITEM	QUANTITY	UNIT
First Lift of Controlled Low Strength Material (See General Note 4)	15	Cubic Yards
Second Lift of Controlled Low Strength Material (See General Note 4)	9.5	Cubic Yards



VICINITY MAP OF WINYAH GENERATING STATION
(NTS)



LEGEND:

- Existing Reinforced Concrete Pipe (RCP) To Remain
- Existing Stainless Steel (SS) Pipe to Remain
- Existing Reinforced Concrete
- Existing Wooden Stop Log (6 x 6)
- Soil Backfill
- Controlled Low Strength Material
- Coal Combustion Residuals

santee cooper

Construction Services			WGS – Ash Pond B
Civil Projects			Record Drawing Abandon Existing Drainage Structure Along Discharge Canal
DRAFTER: RGB		SUPV.: ROM	
ENGINEER: RGB		CHECKED: TLC	
DATE 02–09–12	AUTH.NO.	SCALE: 1"=10'	
			SHEET 1 OF 1 DWG.NO. 4046–D09–0005

FILENAME: I:\SSTP\Common\WGS\Ash Ponds\B_Ash_Pond\11\4046_Drawdown Structure Replacement\Drawings\Abandoned Drawdown Structure - Record Drawing.dwg

APPENDIX D

Dike Inspection Procedures and Inspection Checklists

4.10.2. The individual inspecting the dike(s) should inspect the crest, the slopes, and the area downstream, and complete the form, noting issues as follows:

Leaks

Any leaks on the dry side of the dike should be described such as the approximate quantity of flow, whether the water is discolored and the exact location of the leak. If a leak is found, Generation Technical Services should be notified immediately so that the appropriate steps to control the situation, and notify agencies if necessary, can be taken.

Seepage

Seepage on the dry side of the dike can be an indication of changes or shifts in the dike structure and possible future leaks. Any seepage should be described in the report.

Wet Spots

The dikes should be inspected when it has been dry for a period of time. Any areas on the dikes where the soil appears damp compared to the surrounding soil should be noted. This could be evidence of seepage.

Aquatic Weed Growth

Any aquatic weeds or wetland weeds, such as cattails, mosses, and algae, seen around the dry side of dikes could signify seepage from the ponds. If wetlands are downstream of the toe on the dry side of the dike, then the aquatic weed growth will not necessarily be a sign of dike seepage and does not need to be included in the report.

Trees and Woody Vegetation

Trees and woody vegetation can obscure problems, provide habitat for burrowing animals, and prevent growth of a protective grass cover. Trees growing along the downstream slope and near the toe of the downstream slope are a special concern and should be noted so maintenance or repair can be made.

Erosion

Any signs of erosion should be included in the report.

Depressions or Ruts

Depressions and ruts can hold water and make maintenance mowing more difficult or can weaken the soil and cause localized sloughing of the slope. These should be filled and graded to drain. Re-establish vegetation if needed.

Water Level in the Pond
Pond levels should be inspected and recorded to be sure freeboard is adequate and the dikes will not be overtopped.

Overall Condition
The overall condition of the dike should be described. The back of the report form can be used to continue any comments or descriptions.

Excessive Sediment Buildup
Stormwater ponds shall be inspected for excessive sediment buildup. Buildup shall be periodically cleaned out of stormwater ponds and properly disposed of.

Discharges and Pipe Crossings
All outlets of hydraulic structures which pass through a dike or abutment or underneath the base of a surface impoundment should be inspected for abnormal discoloration, flow, or discharge of debris or sediment which could indicate a leak. In addition, all pipe crossings, whether through, under, or over a dike, should be inspected.

4.10.3. Driving Inspections should involve a view of both sides of the dike and around the toe of the dike exterior looking up whenever possible. The inspector should walk to evaluate pipe crossings, the area around discharge structures, wet areas, or areas demonstrating erosion.

4.10.4. Inspections by Qualified Dam Safety Engineer shall include participation by station personnel. Documentation shall be as appropriate and shall be provided for station files. When noted, inspections should include internal inspections of principal outlet structures. Consideration should be given to performing the annual walking inspection coincidentally with the Dam Safety Engineer's inspection when required annually.

4.10.5. If any issues are noted, a map or drawing of the dike/pond(s) inspected should be attached to the report form. Sketches of the ponds at each station are available in Appendix E, FORMS. Significant issues shall be immediately communicated to supervision.

4.10.6. Work orders should be written to address any problems noted on the reports. The person performing the inspections is responsible for the writing and follow-up on the work request.

4.10.7. The completed report forms should be reviewed by management, and reviewed and approved by the Station Manager. Copies should be kept in the station's files and sent to Generation Technical Services.

GENERATION - TECHNICAL SERVICES
IMPOUNDMENT INSPECTION REPORT: CCR
WINYAH STATION
ASH POND B (Unit 1 & 2)

DATE: _____
INSPECTOR: _____ SIGNATURE: _____
REVIEWED BY: Station Manager SIGNATURE: _____

FEATURE	OK √	LOCATION & COMMENTS
1. Crest		
Alignment (H)		
Settlement (V)		
Cracks (Measure Dimensions)		
Excessive Vegetation		
Burrows or Ruts		
2. Slopes		
Seepage (Flow, lush grass, clarity)		
Erosion gullies		
Slides (cracks, bulges, scarps)		
Vegetation (trees present, no grass)		Vegetated slopes not to exceed 6 inches
Animal burrows		
Rip-rap displacement		
Freeboard Adequate		
Settlement/Depression		
3. Area Downstream		
Seepage (Flow, lush grass, clarity)		
Boils		
Drainage Ditches		
Drainage Pipes		
Vegetation (trees present, no grass)		
4. Outlet Works		
Inspect Plastic, Concrete, Metal, and Wood		
Flowing as expected from outlet?		
No abnormal flow, discoloration, debris, or sediment?		
5. Crossings		
No flow, settlement, erosion, voids, or sediment loss visible at pipe crossings (Both sides of dike and crest)		View Pond A discharge into Pond B. View Pond B discharge into Cooling Pond.
6. Overall Condition		
Note any other issues		New pipes?
7. Instrumentation		
Staff gauge reading as expected?		Record reading if applicable

NOTE: SHOW LOCATION OF PROBLEM AREAS ON AN ATTACHED DRAWING and DESCRIBE DEFICIENCY
S I M P L E - Sketch, Inspect, Measure, Photograph, Locate, Engage a Qualified Engineer if necessary

Copies: Station Files (original)
Operating Record - ECM
Generation Technical Services - Tim Swicord