



**Stantec Consulting Services Inc.**  
10509 Timberwood Circle, Suite 100, Louisville, KY 40223

October 6, 2016  
File: rpt\_001\_let\_1755550008  
Revision 0

Tennessee Valley Authority  
1101 Market Street  
Chattanooga, Tennessee 37402

**RE: Liner Design Demonstration  
Active Ash Pond 2  
EPA Final Coal Combustion Residual (CCR) Rule  
TVA Johnsonville Fossil Plant  
Humphreys County, Tennessee**

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## **1.0 PURPOSE**

This letter documents Stantec's certification of the existing liner assessment for the TVA Johnsonville Fossil Plant's Active Ash Pond 2. Based on the assessment, the Active Ash Pond 2 is considered an unlined CCR surface impoundment as described in the Final CCR Rule at 40 CFR 257.71(a)(3).

## **2.0 EXISTING LINER ASSESSMENT**

An existing surface impoundment must be evaluated as to whether or not it was constructed with a liner as described in 40 CFR 257.71(a)(1)(i)-(iii).

## **3.0 SUMMARY OF FINDINGS**

The attached report presents the analysis for the existing liner assessment. The report concludes that the Active Ash Pond 2 at the Johnsonville Fossil Plant meets the CCR Rule requirements of consisting of a minimum of 2 feet of soil with a hydraulic conductivity of no more than  $1 \times 10^{-7}$  cm/sec. It does not meet the EPA's April 15, 2015 clarification of this subpart. Therefore, this unit is considered an unlined surface impoundment that is allowed to remain in operation in compliance with the requirements of §257.101(a).

## **4.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION**

I, Stephen H. Bickel, being a Professional Engineer in good standing in the State of Tennessee, do hereby certify, to the best of my knowledge, information, and belief:

1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;
2. that the information contained herein is accurate as of the date of my signature below;  
and



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**RE: Liner Design Demonstration  
Active Ash Pond 2  
EPA Final Coal Combustion Residual (CCR) Rule  
TVA Johnsonville Fossil Plant  
Humphreys County, Tennessee**

3. that the TVA Johnsonville Fossil Plant's Active Ash Pond 2 is considered an unlined CCR surface impoundment as described in 40 CFR 257.71(a)(3).

SIGNATURE

DATE 10/6/2016

ADDRESS: Stantec Consulting Services Inc.  
10509 Timberwood Circle, Suite 100  
Louisville, KY 40223

TELEPHONE: (502) 212-5000

ATTACHMENTS: JOF Active Ash Pond 2 Liner Design Demonstration



## **Liner Design Demonstration**

Johnsonville Fossil Plant  
Active Ash Pond 2  
Humphreys County, Tennessee



Prepared for:  
Tennessee Valley Authority  
Chattanooga, Tennessee

Prepared by:  
Stantec Consulting Services Inc.

October 6, 2016  
Revision 0

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## LINER DESIGN DEMONSTRATION

Background  
October 6, 2016

# 1.0 BACKGROUND

## 1.1 INTRODUCTION

On April 17, 2015, the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule (EPA Final CCR Rule) was published in the Federal Register. The Tennessee Valley Authority (TVA) contracted Stantec Consulting Services Inc. (Stantec) to determine whether the Active Ash Pond 2 at Johnsonville Fossil Plant (JOF) met the liner design criteria described in §257.71 of the EPA Final CCR Rule.

JOF is a coal-fired, electric generating plant. The plant is located on the eastern bank of Kentucky Lake (Tennessee River Mile 100) in Humphreys County, Tennessee, which is approximately 70 miles west of Nashville. Active Ash Pond 2 is an existing CCR surface impoundment as defined by the EPA Final CCR Rule consisting of approximately 87 acres with a constructed perimeter dike system varying in height from 25 to 30 feet.

This assessment concludes that while this unit is underlain by native clay soils, it is classified as an unlined CCR surface impoundment per the EPA Final CCR Rule. Active Ash Pond 2 consists of the boundary area denoted in Figure 1.



Figure 1 Active Ash Pond 2 Approximate Boundary

## LINER DESIGN DEMONSTRATION

Background  
October 6, 2016

### 1.2 OBJECTIVE

The objective of this demonstration is to evaluate compliance related to §257.71, specifically whether Active Ash Pond 2 was constructed with one of the following:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no greater than  $1 \times 10^{-7}$  cm/sec;
- A composite liner that meets the requirements of § 257.70(b); or
- An alternative composite liner that meets the requirements of § 257.70(c).

Based on the EPA presentation dated April 15, 2015 and titled, "Top 20 Questions on EPA's CCR Final Rule", compacted soil means soil that is *mechanically* compacted in lifts.

### 1.3 SUMMARY OF HISTORICAL INFORMATION

TVA completed Active Ash Pond 2's perimeter dike and enclosed the area in 1969. The perimeter dike was built to Elevation 378 feet. The material used was excavated from within the interior of the diked area. This material was reportedly placed in compacted lifts. The dikes were raised 12 feet in 1977 to Elevation 390 feet using compacted clay. Applicable Record Drawings are included in Appendix A.

The following geotechnical reports have been reviewed:

- Stantec Consulting Services Inc. 2010. Report of Geotechnical Exploration and Slope Stability Evaluation – Johnsonville Fossil Plant, Ash Disposal Areas 2 and 3. Prepared for Tennessee Valley Authority. April 13, 2010.
- Stantec Consulting Services Inc. 2016. 2012 Geotechnical Exploration Letter – Johnsonville Fossil Plant, Active Ash Pond 2. Prepared for Tennessee Valley Authority. October 5, 2016.

These reports include soil borings drilled along the perimeter dike and interior of the pond. The boring logs indicate natural clay foundation soils were encountered throughout the ash pond area, and its average thickness is about 20 feet (a minimum clay thickness of 8 feet was measured). The boring locations are shown on Figure 2. Laboratory testing of thin wall tube samples from 13 borings indicated that the clay beneath the ash exhibits permeability values ranging from  $9.41 \times 10^{-9}$  to  $1.11 \times 10^{-7}$  cm/sec. This means that the clay meets or exceeds the target for a mechanically compacted clay liner. Review of these reports and applicable Record Drawings could not conclude that a mechanically compacted clay liner was originally constructed under Active Ash Pond 2.

# LINER DESIGN DEMONSTRATION

Background  
October 6, 2016

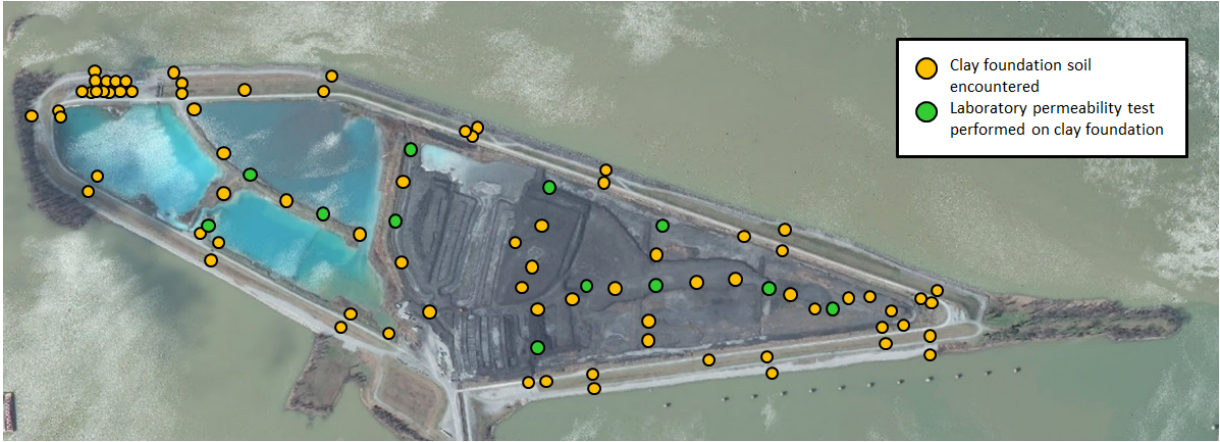


Figure 2 Boring Location Map

## LINER DESIGN DEMONSTRATION

Field Exploration  
October 6, 2016

### 2.0 FIELD EXPLORATION

There have been no additional field explorations at this facility.

## LINER DESIGN DEMONSTRATION

Conclusion  
October 6, 2016

### 3.0 CONCLUSION

Based on a review of existing geotechnical reports, Active Ash Pond 2 at the Johnsonville Fossil Plant has a natural soil layer beneath the ash that meets the thickness and hydraulic conductivity requirements of §251.101. However, documentation that the layer was mechanically compacted is not available for review. Therefore, the impoundment is considered an unlined surface impoundment that is allowed to remain in operation in compliance with the requirements of §257.101(a).

## LINER DESIGN DEMONSTRATION

References  
October 6, 2016

### 4.0 REFERENCES

Stantec Consulting Services Inc. 2010. Report of Geotechnical Exploration and Slope Stability Evaluation – Johnsonville Fossil Plant, Ash Disposal Areas 2 and 3. Prepared for Tennessee Valley Authority. April 13, 2010.

Stantec Consulting Services Inc. 2016. 2012 Geotechnical Exploration Letter – Johnsonville Fossil Plant, Active Ash Pond 2. Prepared for Tennessee Valley Authority. October 5, 2016.

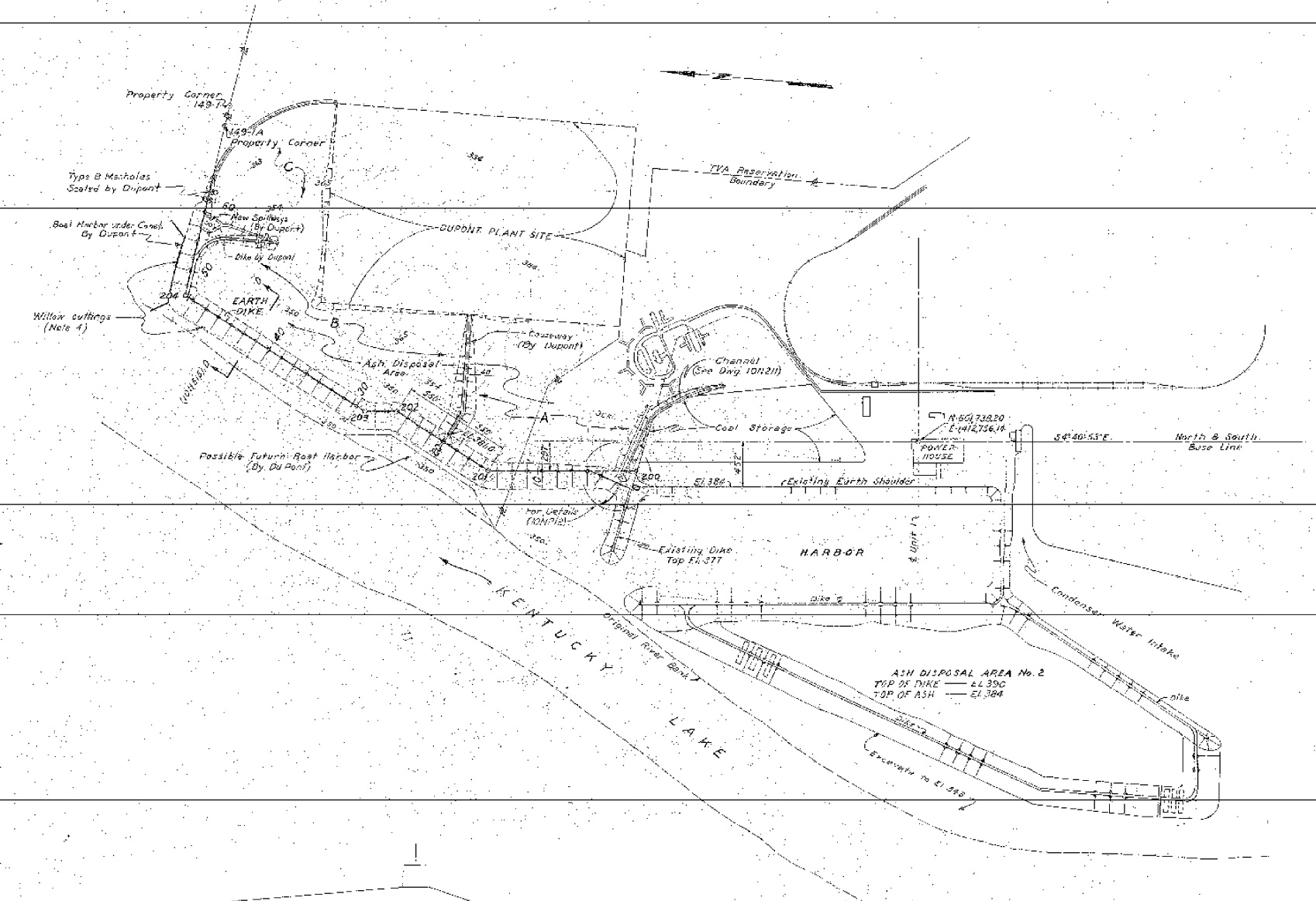
# **APPENDIX A HISTORICAL DRAWINGS**

E05N01

1410,000

1410,000

NO.	DESCRIPTION	DATE
1	DESIGNED	11-15-54
2	CHECKED	11-15-54
3	APPROVED	11-15-54
4	CONSTRUCTION	11-15-54
5	AS BUILT	11-15-54
6	REVISION	
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DIKE LOCATION				
POINT	AZIMUTH	DISTANCE	COORDINATES	
			EAST	NORTH
200			1,412,228	604,547
201	175° 19'	147.2	1,412,108	604,612
202	208° 19'	110.0	1,412,630	606,981
203	175° 19'	330.1	1,412,602	607,376
204	208° 19'	21.50'	1,413,623	608,802
149-LA	278° 08'	178.7	1,413,333	608,958
149-L	278° 08'	205	1,415,536	608,929

APPROXIMATE QUANTITIES  
 Hydraulic Fill 375,000 Cu. Yds.  
 Gravel Surfacing 800 Cu. Yds.

\* Net embankment quantity based on 4:1 inside slope; 1 1/2:1 outside slope.

NOTE  
 (1) SURFACING Gravel surfacing 4" thick shall be applied for the full width of the dike in accordance with section 210 of the T.I. Specifications.  
 (2) CLEARING Area bounded on North by Ash Dike (Original 201), East by E. 355', South and West by North Dike to be cleared of all trees, no stumping required.  
 (3) Profile of existing dike prior to July 1, 1954 and detailed cross sections, see dwgs. 10N503-519.  
 (4) Willow cuttings to be planted on lake side of dike from elevation 38.0 to top of dike. Areas of the dike slopes above 300' shall be bare of vegetation shall be planted in the fall of 1954 to 1955 at the rate of 20 lbs. per acre. No fertilizer or mulch is required.

REFERENCE DRAWINGS:  
 10N503-519 BILL OF MATERIAL  
 COMPARISON DRAWINGS:  
 10N512- Drainage & Dike Details Ash Disposal Area

Scale: 1" = 500' Except as noted.

MAIN PLANT			
DIKE FOR ASH DISPOSAL AREA			
JOHNSONVILLE STEAM PLANT TENNESSEE VALLEY AUTHORITY DIVISION OF DESIGN			
SUBMITTED J. T. Bellamy	RECOMMENDED C. C. Meyer	APPROVED A. C. Thomas	
KNOXVILLE	7-16-52	30	4 10N503 RB
DRAWING AS CONSTRUCTED J. T. Bellamy 11-15-54			

COMPANION DRAWINGS: 10N211 10N510-519

A

B

C

D

E

F

G

H

A

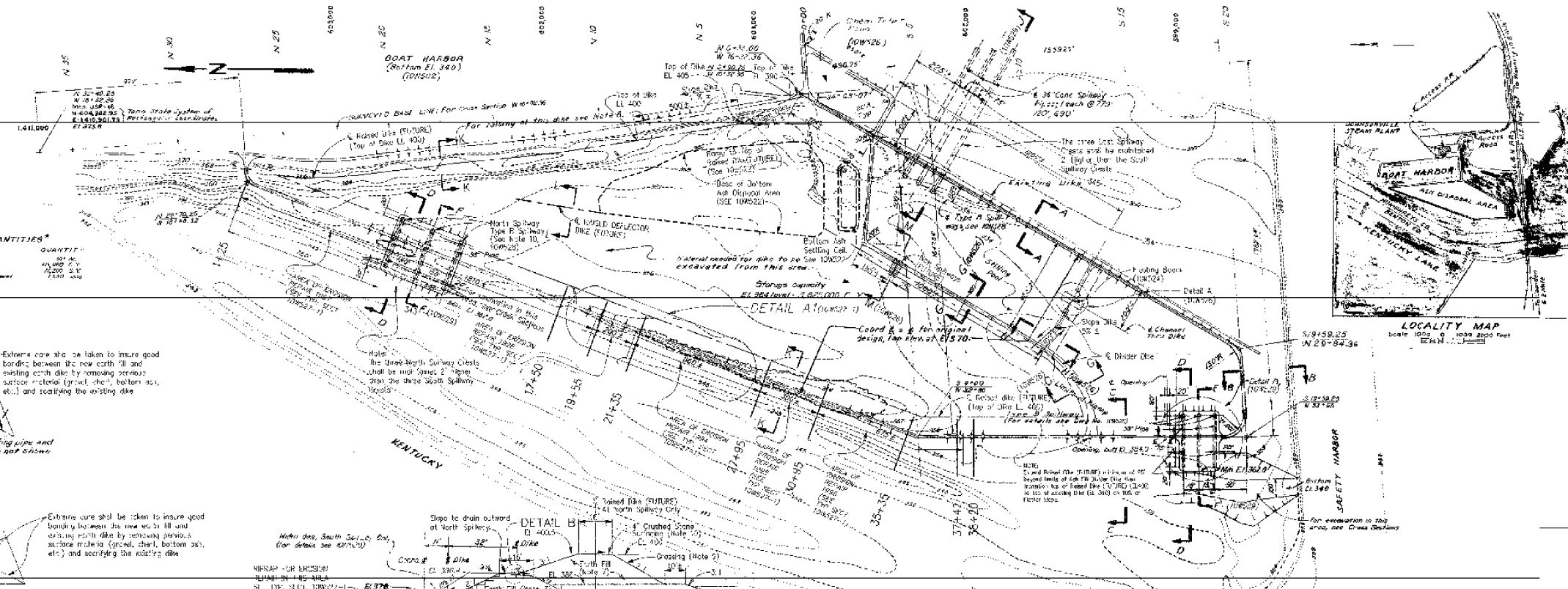
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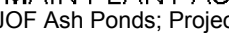
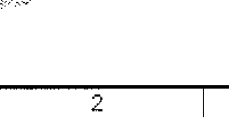
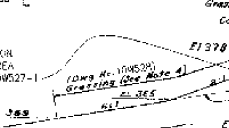
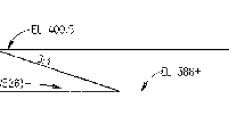
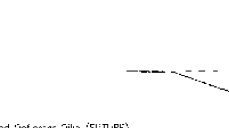
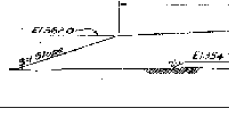
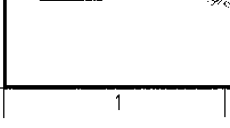
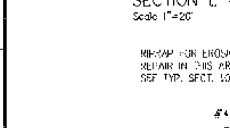
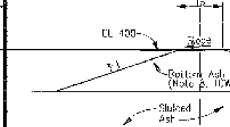
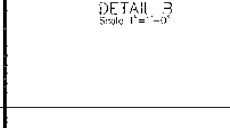
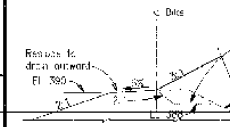
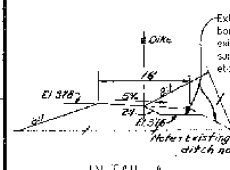
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**SUMMARY OF QUANTITIES\***

ITEM	DESCRIPTION	QUANTITY
101	Excavation (See Note 1)	45,000 CY
102	Gravel (See Note 2)	1,200 CY
103	Crushed Stone (See Note 3)	1,200 CY
104	Grass Seed (See Note 4)	1,200 CY

\* These quantities are for original design to EL 216.0



- NOTES**
- CUT SLOPES ADJACENT TO EXISTING OR PROPOSED DIKES SHALL NOT BE EXCAVATED STEEPER THAN 4:1 AND TOP OF CUT SHALL BE A MINIMUM OF 8' FROM THE TOP OF THE DIKE.
  - BASE LINE FOR CROSS SECTIONS AND CROSS SECTION STATIONS REFER TO ORIGINAL PLANT AND COORDINATES OF POINTS REFER TO ORIGINAL PLANT AND EXCEPT AS NOTED.
  - FOR ADDITIONAL NOTES SEE DRAWING TITLES.
  - FOR PARTIAL OF DIKE SEE TYPICAL SECTION AND NOTE "A" DRAWING 10W527.
  - TOP OF DIKE MUST BE MAINTAINED A MINIMUM OF 4' ABOVE THE ELEVATION OF THE WATER IN THE ASH DISPOSAL AREA.
  - BEFORE PLACING FILL ON EXISTING COMPACTED FILL TO COMPLETE THE DIKE, SURFACES SHALL BE SCARIFIED AND NEW FILL BLENDED TO BOND WITH EXISTING FILL.
  - EARTH FILL COMPACTION SHALL BE DONE WITH INTERMEDIATE DENSITY COMPACTION SHALL BE CONTROLLED BY USE OF A STANDARD PROCTER TEST BY CORROBORATION OF PROCTER TEST READINGS WITH READINGS ESTABLISHED BY THE MATERIAL LABORATORY AS NECESSARY TO ACHIEVE APPROXIMATELY 90% OF STANDARD MAXIMUM DRY DENSITY. FILL MOISTURE SHALL BE CONTROLLED TO ACHIEVE OPTIMUM COMPACTION AND OR SOIL FILL COMPACTION DURING LAYER.
  - UNDESIRABLE GROWTH OF WEEDS SHALL BE REMOVED AS NECESSARY AS AVAILABLE. THE HEAVY ASH SHALL BE USED TO RAISE THE DIKE TO A MIN. ELEV. OF 376.5 AS SHOWN CROSS SECTIONS.
  - CUT AND FILL SLOPES SHALL BE SEEDED WITH TYPE & MIXTURE 1. GRASSED AREAS ARE TO BE PERMITTED AND MAINTAINED IN ACCORDANCE WITH SECTIONS 500 & 501 OF THE T-1 SPECIFICATIONS TO CRUSHED STONE SHALL BE IN ACCORDANCE WITH SECTION 365 OF T-1 SPECIFICATIONS.

**PROJECT REVISION HISTORY**

NO.	DATE	BY	DESCRIPTION
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