

Tennessee Valley Authority  
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:  
Dike C Buttress Work Plan – Section C

Date Submitted:  
04/16/2010

Submitted to whom  
Leo Francendese

Concurrence

Received      Not Applicable

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Received      Not Applicable

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Julie Pfeffer

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Date 4/19/10

EPA Leo Francendese

Date 4/24/10

consulted w/ TDEC

cc:

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- Cynthia Anderson, TVA
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- Katie Kline, TVA
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**Kingston Ash Recovery Project  
Time Critical Removal Action for the  
Dike C Buttress Work Plan – Section C**

**Prepared by:  
Jacobs**

**for the Tennessee Valley Authority**

<b>Revision</b>	<b>Description</b>	<b>Date</b>
1	Dike C Buttress Work Plan – Section C for TVA Review	April 13, 2010

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## APPENDICES

Appendix A: Design Drawings

Appendix B: Design Specifications

Appendix C: Quality Control Plan

## 1 INTRODUCTION AND PURPOSE

The scope of this Work Plan is to describe the construction activities for the second of four sections of the *Dike C Risk Mitigation Plan – Section D*. This segment, known as Section C, covers buttress construction from Stations 128 to 138 as defined in the Stantec Drawings (Appendix A). Work is currently being completed on Section D. Stantec remains the Engineer of Record for the dikes and has designed the buttress system to increase the stability of the dike system at the Kingston Ash Recovery Site. Work will be completed per the Specifications (Appendix B), the Quality Control (QC) Plan (Appendix C), and Design Drawings. The buttress will consist of a sand filter overlain by gravel and riprap. Work to be performed includes the removal of riprap, removal of topsoil, and the placement of the graded filter system.

## 2 DESIGN AND CONSTRUCTION COMPONENTS

Section C of the buttress is to be constructed according to the Drawings, Specifications, and QC Plan provided by Stantec. As defined in the documents, the buttress is a sand filter system designed to allow water to seep out from the dike without carrying dike material with it. The sand filter is held in place by larger stone and covered with riprap. The riprap provides additional mass to prevent sloughing and is of the right size to reduce scouring during high flow events. TVA Civil Projects (CP) is responsible for the construction of the buttress. CP will utilize excavators and dozers to place the material. Excavators with global positioning systems (GPS) will be utilized to assist in obtaining elevations of placed material in the water. Data may also be obtained using standard survey methods. As described in Section 4.5 of the *Dike C Mitigation Work – Section D Plan*, additional sand material will be placed to ensure that a minimum of 6 inches is present. The depth of all materials will be confirmed by either excavator mounted GPS or standard surveying services provided by TVA surveyors.

Material will be delivered to the site in a two-stage approach. The first stage will be delivery from the quarry to a stockpile area. Currently this area is located at the MAP area. The stockpile area is set up to allow the material to be delivered without the trucks entering the Exclusion Zone. The second phase of material delivery is to transport the material from the stockpile area to the buttress construction area using trucks dedicated to working in the exclusion zone. The two-stage approach causes double handling which may alter the size of the material, but it is more practical than decontaminating each delivery truck. To ensure that the material placed for construction meets the design criteria, gradation samples of in-place material are collected at intervals specified in the Stantec QC Plan. Tested materials which do not meet specification are identified with a nonconformance report and the acceptability of the material is reviewed by the Stantec Quality Assurance (QA) Manager. Material that is not acceptable is to be removed.

The buttress, as a whole, will extend from Dike D, in the north along the Emory River, to the Red Water Wetlands, along the Plant Intake Channel in the south.

Stantec performed modeling of slope stability for Dike C and based on the information TVA determined that improvements were needed to prevent any sloughing of the slopes along the dike. Stantec developed a plan to buttress the dike and TVA, with the concurrence of the U.S. Environmental Protection Agency (EPA) implemented the plan. A complete design package will be provided as a separate document by Stantec in the coming weeks; however, it was determined that construction needed to proceed as soon as possible. Material used for the construction of Section C remains the same as those previously approved for Section D. Since the material has not changed, no additional calculations have been provided.

### **3 CONSTRUCTION QUALITY CONTROL**

A Construction Quality Control (CQC) Plan was developed by Stantec and approved by TVA and EPA for Section D buttress construction. The CQC Plan was amended with Addendum 1 to increase the tolerances for material acceptance. Addendum 1 has been incorporated into the QC Plan for Section C. Materials placed for construction of the buttress must be tested for acceptance at the intervals specified in the plan. In-place materials that do not meet the acceptance criteria will be documented with a nonconformance report. The report will be sent to the Stantec QA Manager for a determination of acceptability. Material that is not acceptable will be removed.

Stantec will provide the field QC to ensure that construction is progressing according to design. The Stantec QA Manager will provide guidance and work with the Stantec Engineer of Record to resolve any deviations from the design documents. MACTEC will provide independent testing of the material used for the construction of the buttress. Jacobs will provide project QA support to ensure that construction is being documented as required. The QA person will also work with EPA and the Bureau of Reclamation (BOR) to obtain concurrence that ash does not exist in quantities which could pose future hazards to the environment.

### **4 SAFETY AND HEALTH**

The newly established Work Process Plan will be utilized for each contractor working on this project. The plans will be approved by the designated person. Task not previously identified in the work plans will require separate plans and work on these tasks will not begin until the Work Process Plan is approved.

### **5 TRANSPORTATION MANAGEMENT**

No specific transportation management requirements are planned for this project.

### **6 WASTE MANAGEMENT**

No specific wastes are planned to be generated from this project.

### **7 PROJECT MANAGEMENT**

#### **7.1 Organization**

7.1.1 TVA Technical Contract Manager – Kathryn Nash

7.1.2 Jacobs Project Manager – Tod Woodson

7.1.3 Jacobs Construction Manager – Don Givens

#### **7.2 Contractors**

7.2.1 CP Construction – Jim Robinson

7.2.2 Stantec QC – Skip Layton

7.2.3 Stantec Engineer of Record – Don Fuller

7.2.4 MACTEC Materials and Testing – Jim Law

7.2.5 BOR Consultants to the EPA for Work Approval – Jim Lawrence

7.2.6 TVA Surveying – Surveying services

7.3 Work Breakdown Structure (WBS)

7.3.1 The WBS has already been developed and work will continue to follow the established structure. The general WBS number is A110.

7.4 Cost Estimate

7.4.1 The baseline budget has already been established for Stage 1 and includes construction of Section C.

7.5 Schedule

7.5.1 The scheduled has already been developed with all segments included. The schedule is based on a production rate of 20 feet per day for a total of 280 days to complete.

**8 REFERENCES**

*Dike C Risk Mitigation Plan – Section D*, EPA-AWP-035. Prepared by TVA, December 1, 2009.

*Construction Quality Control Plan Dike C Buttress – Addendum 001*, EPA-AWP-035B. Prepared by Stantec, March 24, 2010.





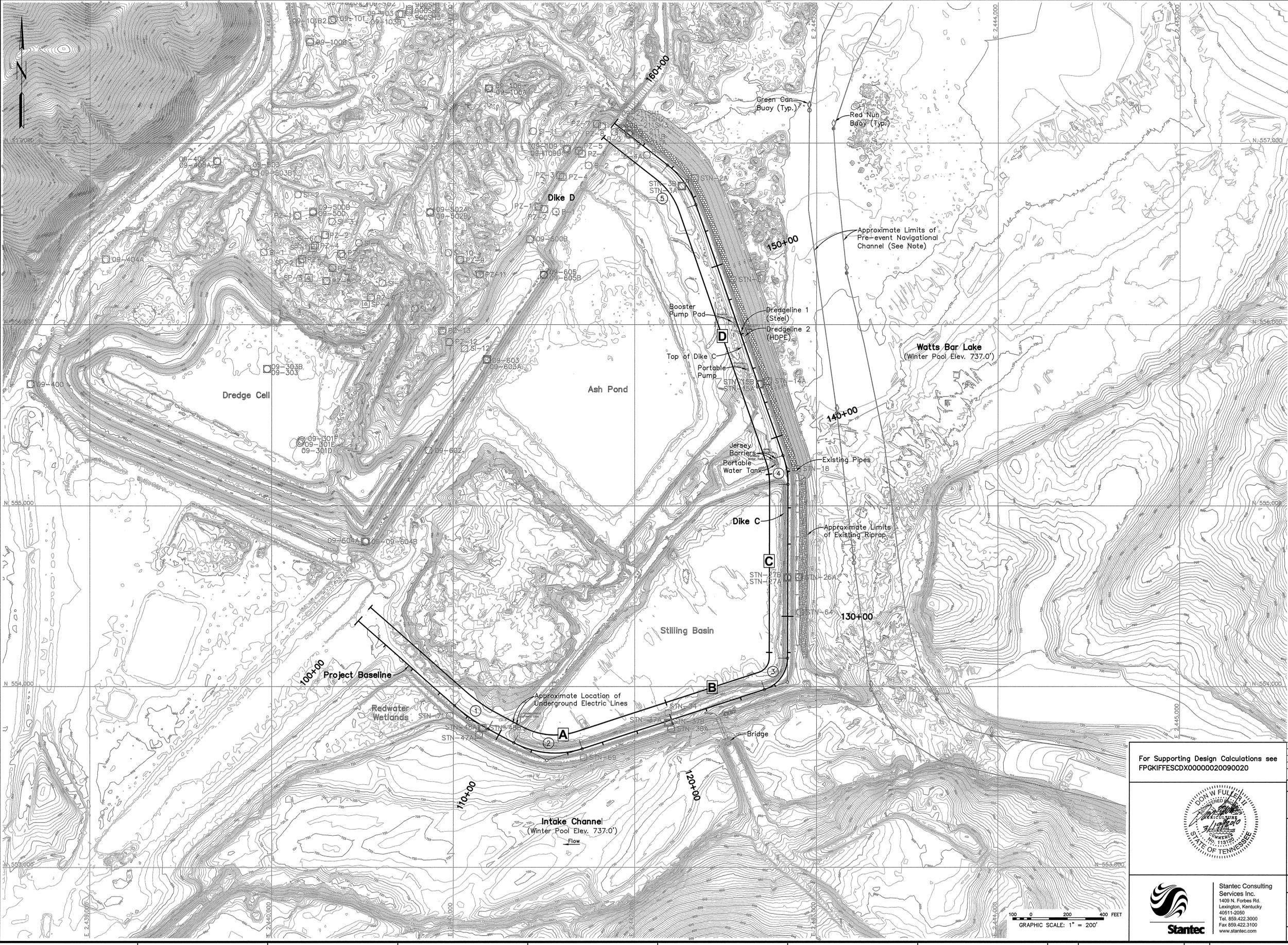


TABLE OF BASELINE COORDINATES			
STATION	BASELINE	NORTHING	EASTING
100+00.00	Begin Project Baseline	554,363.86	2,440,477.77
160+00.00	End Project Baseline	557,109.43	2,441,888.38

**BASELINE CURVE DATA**

①	②	③	④	⑤
P.I. Sta. = 108+20.74 Northing = 553,819.18 Easting = 2,441,091.71 $\Delta = 13^{\circ}20'06''$ R = 974.68' T = 113.94' L = 226.85' E = 6.64' P.C. Sta. = 107+06.80 P.T. Sta. = 109+33.65	P.I. Sta. = 112+99.93 Northing = 553,591.92 Easting = 2,441,514.77 $\Delta = 46^{\circ}19'10''$ R = 479.84' T = 205.26' L = 367.92' E = 42.06' P.C. Sta. = 110+94.67 P.T. Sta. = 114+82.59	P.I. Sta. = 126+71.85 Northing = 554,024.61 Easting = 2,442,840.47 $\Delta = 71^{\circ}45'50''$ R = 182.94' T = 132.33' L = 229.13' E = 42.85' P.C. Sta. = 125+39.52 P.T. Sta. = 127+68.65	P.I. Sta. = 138+12.12 Northing = 555,200.41 Easting = 2,442,843.77 $\Delta = 19^{\circ}21'32''$ R = 479.84' T = 81.84' L = 162.13' E = 6.93' P.C. Sta. = 137+30.28 P.T. Sta. = 138+92.41	P.I. Sta. = 154+96.30 Northing = 556,792.40 Easting = 2,442,289.43 $\Delta = 32^{\circ}28'34''$ R = 479.84' T = 139.75' L = 271.98' E = 19.94' P.C. Sta. = 153+56.55 P.T. Sta. = 156+28.53

- SEGMENT STATIONS**
- Segment 'A' - Sta. 100+00.0 to Sta. 120+00.0
  - Segment 'B' - Sta. 120+00.0 to Sta. 128+00.0
  - Segment 'C' - Sta. 128+00.0 to Sta. 138+00.0
  - Segment 'D' - Sta. 138+00.0 to Sta. 160+00.0

**INSTRUMENTATION LEGEND**

- STN-1 Slope Inclinometer (SI)
- STN-2 Piezometer (PZ)
- STN-3 Settlement Platform (SP)

- NOTES**
- Topographic mapping was generated from a LIDAR survey performed on April, 2009 by Tuck Mapping Solutions, Inc.
  - The hydrographic contours shown here were provided by TVA.
  - The navigational channel limits shown were provided by TVA using U.S. Army Corps of Engineers Nashville District data and was reviewed by the U.S. Coast Guard for its approximate location. The location shown is pre-event and is subject to change when clean-up operations are completed.
  - Segment D as depicted represents the proposed design; not an as-built configuration.

**ISSUED FOR CONSTRUCTION**

For Supporting Design Calculations see FPGKIFFESCDX00000020090020



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REV	NO.	DATE	DSGN	DRWN	CHKD	SUPV	RWVD	APPD	ISSD	PROJECT	AS CONST	REV

SCALE: 1"=200'											
YARD DIKE C BUTTRESS											
STAGE 1 CONSTRUCTION											
EXISTING CONDITIONS											
WORK PLAN 2 (KIF-100319-WP-2)											
DESIGNED BY:	DRWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:					
D. FULLER	D. GRAHAM	T. GRILLY	D. FULLER	D. FULLER	D. FULLER	T. JOHNSON					
KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000	DATE	3/19/10	36	C	10W229-57	R 0					

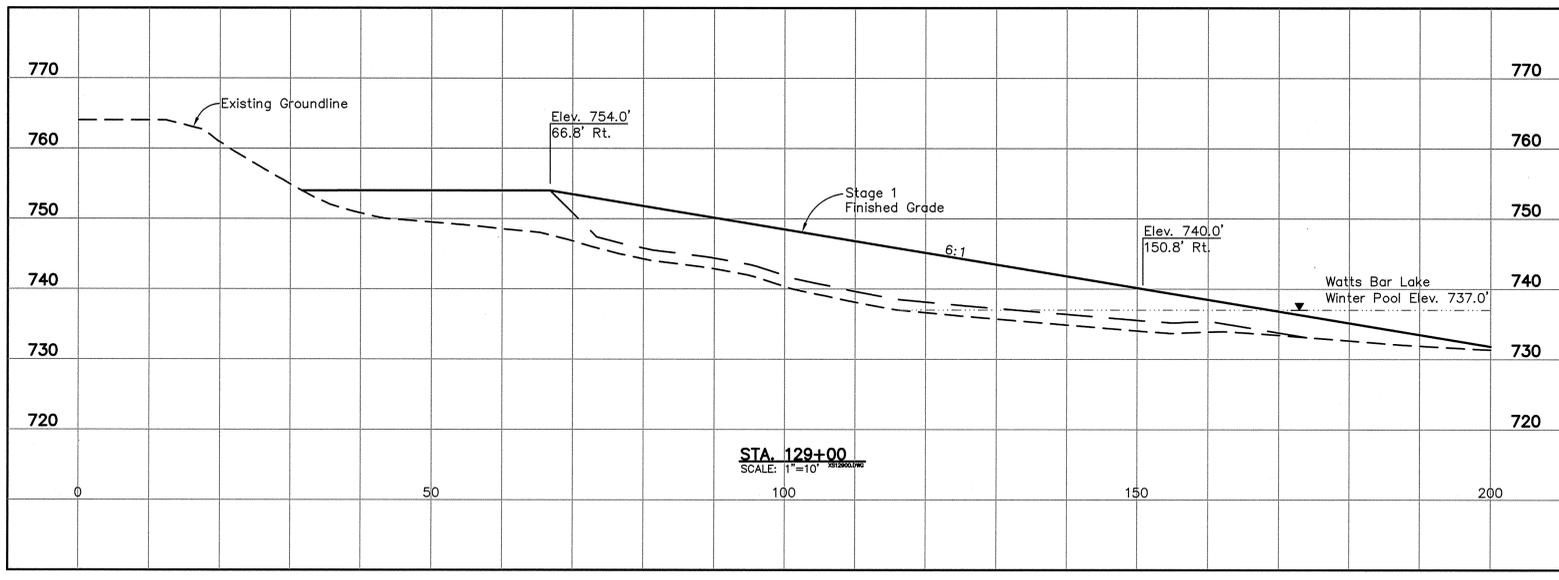
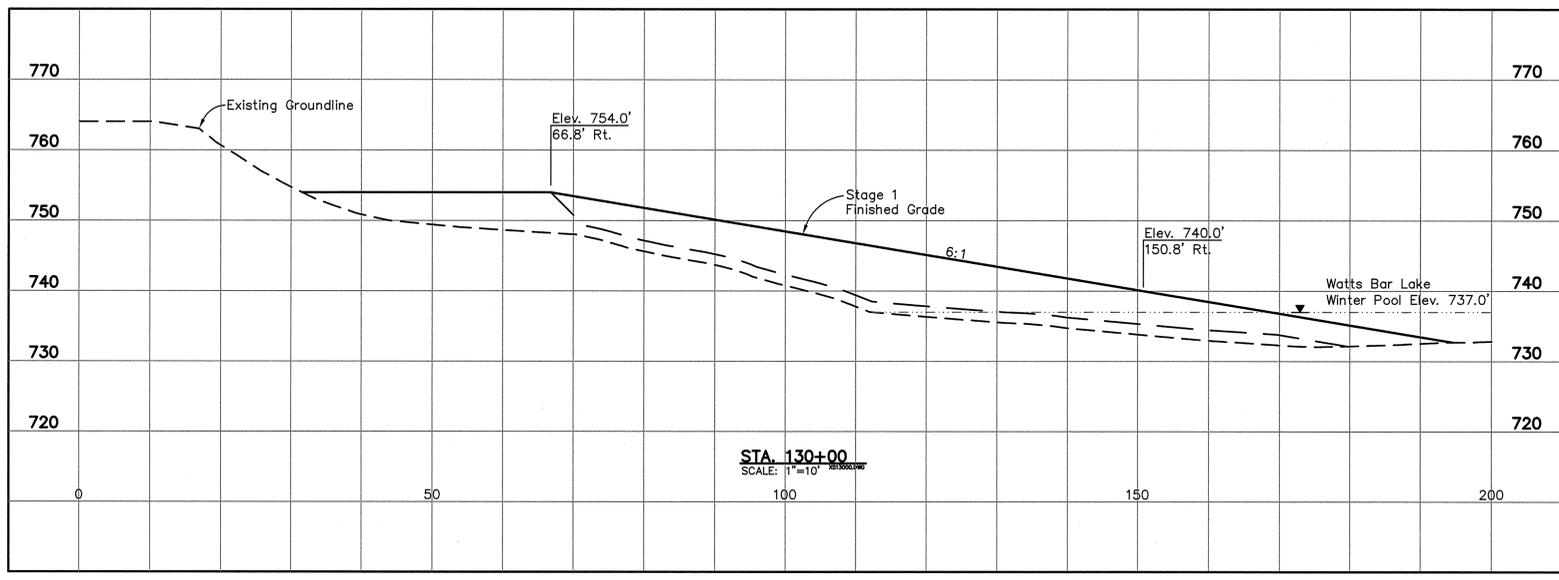
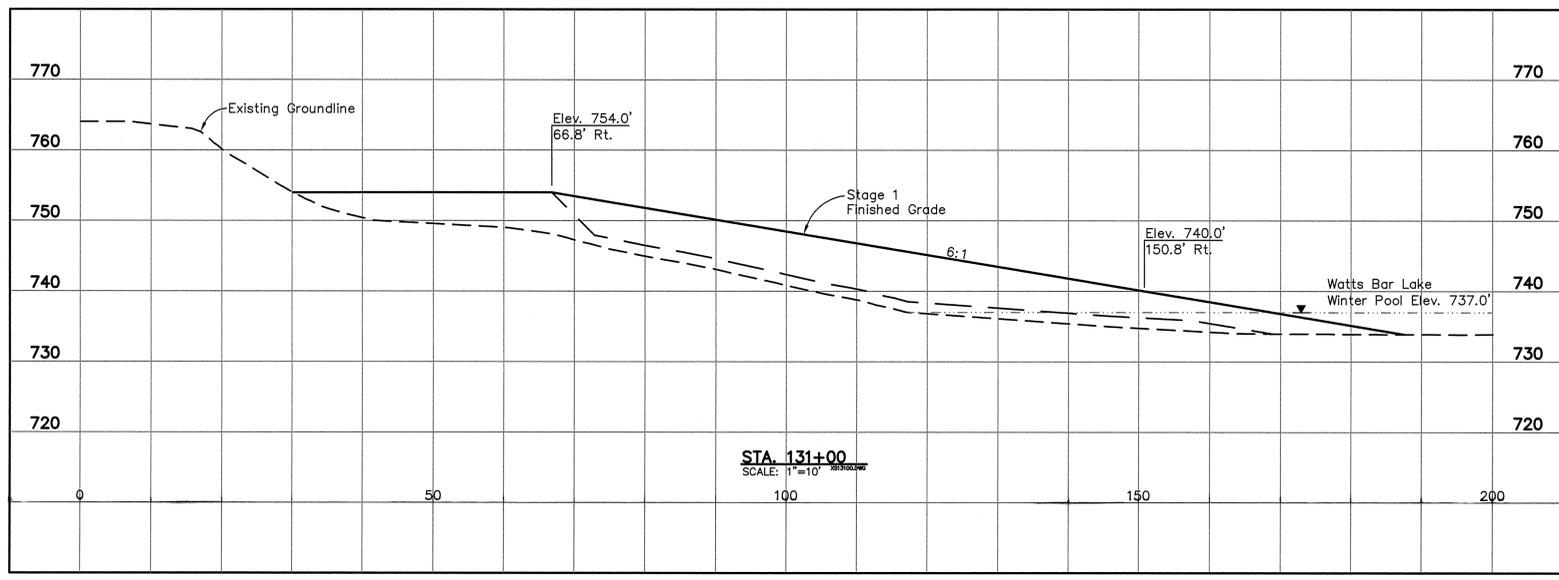
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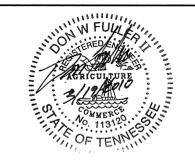
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**NOTE:**  
For Filter configurations see Typical Sections 10W229-65.

**ISSUED FOR CONSTRUCTION**

For Supporting Design Calculations see FPGKIFFESCDX00000020090020



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REV.	NO.	DATE	DSGN	DRWN	CHKD	SUPV	RWMD	APPR	ISSD	PROJECT	BY	AS CONST	REV.
YARD DIKE C BUTTRESS													
STAGE 1 CONSTRUCTION													
SEGMENT 'C' CROSS SECTIONS													
WORK PLAN 2 (KIF-100319-WP-2)													
DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:							
D. FULLER	D. GRAHAM	T. CRILLY	D. FULLER	J. MONTGOMERY	D. FULLER	T. JOHNSON							
KINGSTON FOSSIL PLANT													
TENNESSEE VALLEY AUTHORITY													
FOSSIL AND HYDRO ENGINEERING													
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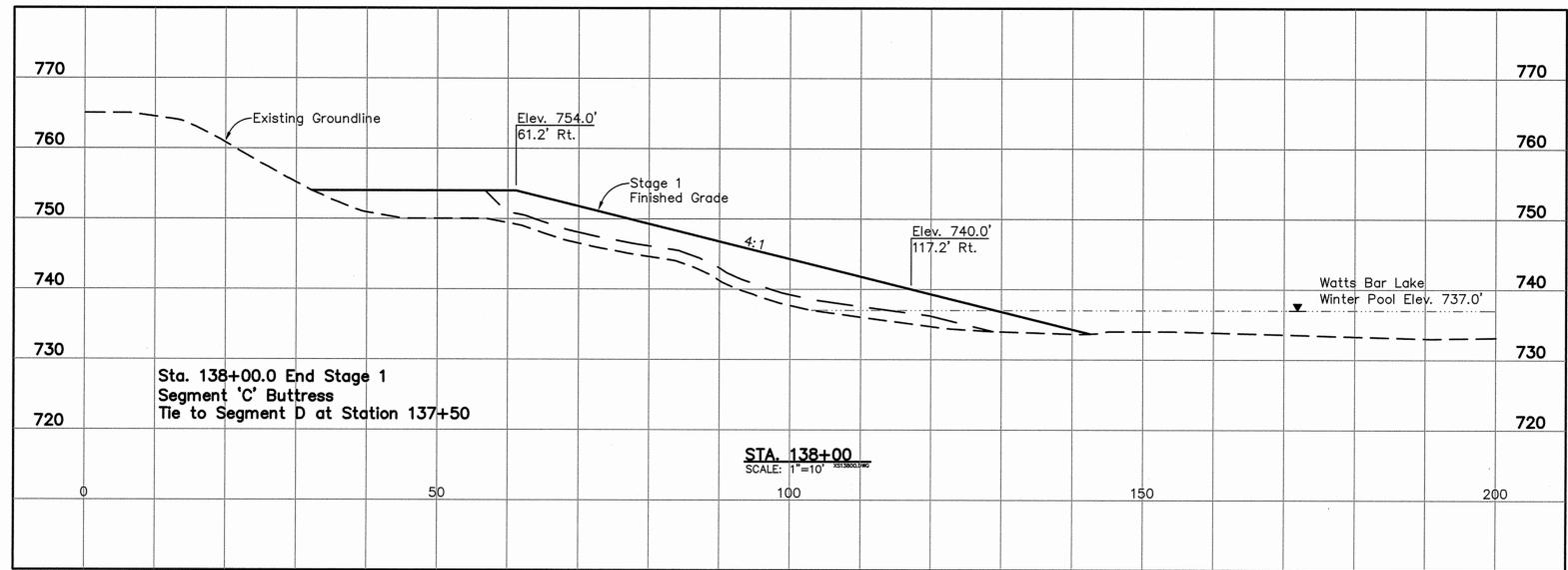
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**NOTE:**  
For Filter configurations see Typical Sections 10W229-65.

**ISSUED FOR CONSTRUCTION**

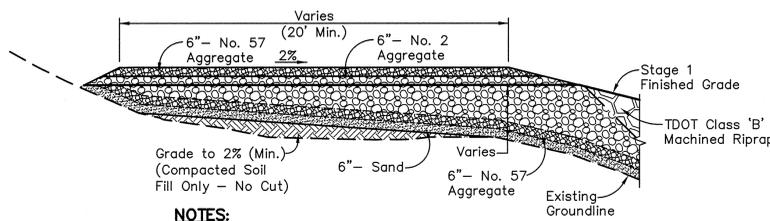
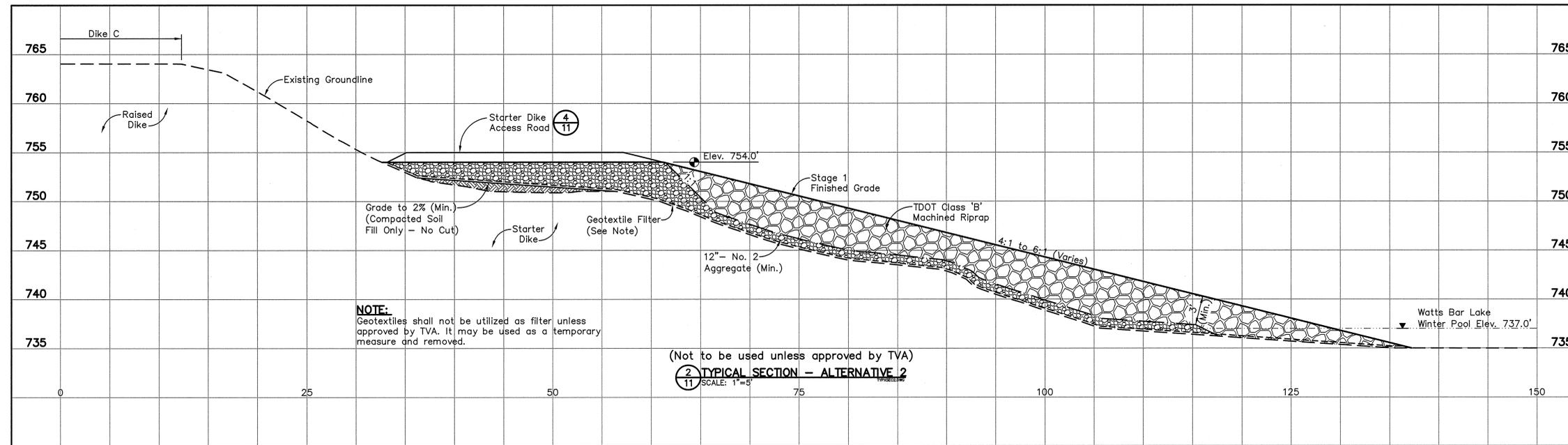
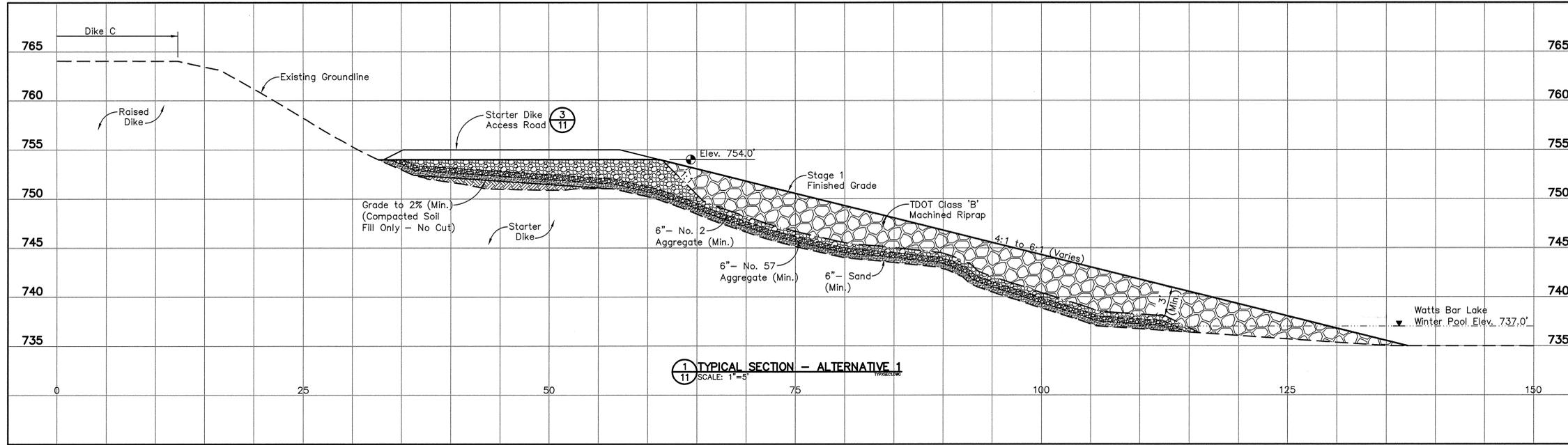
For Supporting Design Calculations see  
FPGKIFFESCDX00000020090020



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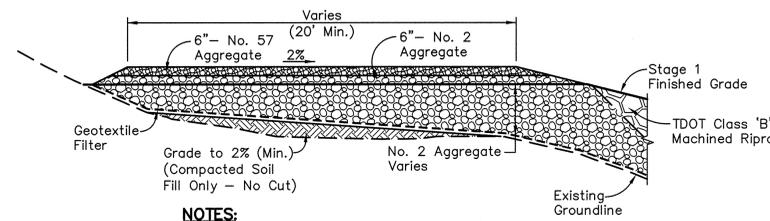
DESIGNED BY: D. FULLER	DRAWN BY: D. GRAHAM	CHECKED BY: T. CRILLY	SUPERVISED BY: D. FULLER	REVIEWED BY: J. MONTGOMERY	APPROVED BY: D. FULLER	ISSUED BY: T. JOHNSON
<p>YARD DIKE C BUTTRESS STAGE 1 CONSTRUCTION SEGMENT 'C' CROSS SECTIONS WORK PLAN 2 (KIF-100319-WP-2)</p>						
<p>KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING</p>						
AUTOCAD R 2000	DATE 03/19/10	36	C	10W229-64	R 0	

PLOT DATE: 03/19/2010 USER: GRAHAM, DAVE  
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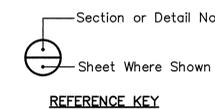
**NOTES:**

1. The minimum cover thickness from road surface to top of sand filter is 36-inches.
2. Place No. 2 Aggregate and No. 57 Aggregate on Riprap or No. 2 Aggregate as applicable to form a reverse filter for road surface.
3. Remove aggregate contaminated with ash as directed by the QC Manager.



**NOTES:**

1. The minimum cover thickness from road surface to top of geotextile is 36-inches.
2. Place No. 2 Aggregate and No. 57 Aggregate on Riprap or No. 2 Aggregate as applicable to form a reverse filter for road surface.
3. Remove aggregate contaminated with ash as directed by the QC Manager.



**ISSUED FOR CONSTRUCTION**

For Supporting Design Calculations see  
FPGKIFFESCDX0000020090020

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REV. NO.	DATE	DSGN	DRWN	CHKD	SURV	RWVD	APPR	ISSD	PROJECT	AS CONST	DISCIPLINE
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SCALE: AS SHOWN EXCEPT AS NOTED											
YARD DIKE C BUTRESS											
STAGE 1 CONSTRUCTION TYPICAL SECTIONS AND DETAILS WORK PLAN 2 (KIF-100319-WP-2)											
DESIGNED BY:	DRWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:					
D. FULLER	D. GRAHAM	T. GRILLY	D. FULLER	D. FULLER	D. FULLER	T. JOHNSON					
KINGSTON FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000	DATE	36	C	10W229-65	R 0						
	03/19/10										





**Stantec**



**ISSUED FOR CONSTRUCTION**

Technical Specifications

Dike C Buttress  
Phase 1 Segment C  
Construction  
Kingston Fossil Plant  
Harriman, Roane County,  
Tennessee

**TECHNICAL SPECIFICATIONS**  
**SECTION 02100 – EROSION CONTROL AND STABILIZATION**

**PART 1 - GENERAL**

**1.1. Descriptions**

- 1.1.1. This Section includes provisions for erosion control and stabilization. All construction activities shall be conducted in accordance with applicable environmental requirements. Install sediment and erosion control measures prior to disturbance where applicable.
- 1.1.2. CIVIL PROJECTS (CP) shall become familiar with the Final Grading Plan, Erosion and Sediment Control Details and Best Management Practices (BMP) Plan, and shall anticipate, and therefore plan in advance for each construction activity.

**1.2. Related Documents**

- 1.2.1. The Quality Control Plan and Engineering Drawings apply to the work of this section.

**PART 2 - MATERIALS**

- 2.1. Refer to the BMP Plan at the end of this Specification, the Sediment and Erosion Control Plan, the Details, and Section 02936 – Revegetation for products and materials to be employed in erosion control and stabilization efforts.
- 2.2. This Section provides material requirements for silt fence, and fiber rolls.

**PART 3 - EXECUTION**

**3.1. Construction Phase Operations**

- 3.1.1. CP shall evaluate the work of the project and plan to minimize the surface area disturbed at any one time. Excavation shall be limited to the area that can be buttressed in accordance with these Specifications and Drawings within 24 hours.
  - 3.1.1.1. Perform clearing and grubbing, excavation or grading, fabric installation, rock cover and riprap buttress construction at the site in stages to avoid exposing large areas of bare soil. Excavate and place earth fill material during dry weather, when possible.
  - 3.1.1.2. Establish final grade as quickly as possible.
  - 3.1.1.3. Seed and mulch disturbed areas of soil adjacent to work areas as soon as possible.
- 3.1.2. CP shall control fugitive dust emissions.

- 3.1.2.1. Control dust generation by covering disturbed areas promptly with the geotextile fabric and by wetting haul roads or applying approved (by TVA) chemical soil binders, as needed.
- 3.1.3. CP shall not discharge raw silt and sediment laden water from the site without providing for removal of soil particles.
  - 3.1.3.1. Use rock filters or sediment filter bags, fiber rolls and/or use silt fence enclosures or de-silting basins.
  - 3.1.3.2. Use rock silt checks and rip-rap or channel lining when dewatering through ditches and swales.
  - 3.1.3.3. TVA shall provide inspection and maintenance of best management practices at minimum on a weekly basis.
  - 3.1.3.4. In addition, inspect all best management practices after each rainfall of 0.5 inches or more.
  - 3.1.3.5. Maintain all best management devices by removing accumulated silt, repairing or replacing damaged devices and by cleaning up any excess discharges, or mud on gravel roads.

### **3.2. Sediment Barriers**

CP shall install silt fences, and/or fiber rolls or other suitable measures as practicable along the contour adjacent to Watts Barr Lake prior to any disturbance above the area. Silt fence may also be required at other locations based upon field conditions. The silt fence shall be removed segmentally as an area is ready for geotextile fabric overlay. Floating turbidity curtains shall be installed as needed to protect intake locations. If an area is completed in terms of armoring within one day of initial disturbance and no rain is forecast, then sediment barriers may not be required.

#### **3.2.1. Silt Fences**

Silt fences shall conform to the material requirements shown on the Drawings. Install below proposed disturbed areas in accordance with the plans and details and as needed in other areas. Embed silt fence as shown on the Drawings. Turn ends of silt fence slightly toward the uphill side to mitigate against bypassing.

#### **3.2.2. Fiber Rolls**

Fiber rolls and other commercial products made from coconut fiber, rice straw, plastic, wood shavings, or other material can also be used as sediment barriers along streams. Follow manufacturers' installation instructions and ensure that sediment filter spacing on slopes is correct. Make sure runoff does not bypass barriers, coconut rolls, or other barriers underneath or around the ends.

#### **3.2.3. Maintenance**

Inspect silt fences and other installed manmade barriers once a week and after rainfalls of 0.5 inch or more. Remove sediment before it reaches six inches in depth. Traps and basins are to be cleaned out when half full. Reinstall sections of fence which have washed out underneath the fence. Replace broken, torn or worn fences. Rebuild or replace damaged brush barriers and fiber rolls. Make repairs within three days of discovering.

### 3.2.4. Turbidity Curtains

Turbidity curtains may be needed in the intake channel to control sediment advance towards plant intake points.

### 3.3. Slope Protection

3.3.1. The CP shall take measures as necessary to minimize sheet, rill and gully erosion prior to placing geotextile fabric. Slopes shall be stabilized immediately after tree removal and grubbing with measures as described below.

- A. **Divert Upland Runoff** – Use diversion berms as practicable to control flow and route around work areas.
- B. **Tracking**– Track a dozer up and down the slopes to create horizontal breaks which will slow the overland flow of water.
- C. **Sediment Barriers** – See paragraph 3.2.

### 3.4. Sediment Traps and Basins

TVA shall observe effluent leaving the site during rainfall events. If water appears to be excessively muddy or silt-laden, TVA shall review the BMP Plan and insure that all structures are properly installed and functioning, and that all prescribed measures have been taken to minimize erosion. If they appear to be functioning properly upon inspection or after necessary repairs and the effluent is still not acceptable, then TVA shall take immediate action to have CP construct sediment traps as indicated herein. TVA will support CP in the design and location of such traps.

#### 3.4.1. Sediment Traps

Any depression, swale or low-lying place that receives muddy flows from exposed soil areas can serve as a sediment trap. Installing several small traps at strategic locations is often better than building one large basin. The simplest approach is to dig a hole or build a dike (berm) of earth or stone where concentrated flows are present. This will help to detain runoff so sediment can settle out. The outlet can be a rock-lined depression in the containment berm.

#### 3.4.2. Sizing and Design Considerations

3.4.2.1. A minimum storage of 134 cubic yards per acre of exposed soil drained is required for basins and traps. Traps and basins are designed so that flow paths through the trap or basin are as long as possible, to promote greater settling of soil particles. Sediment basin length must be twice the width or more if possible – the longer the flow path through the basin, the better. Side slopes for the excavation or earthen containment berms are 2:1 or flatter. Berms are made of well compacted clayey soil, with a height of 5 feet or less. Well mixed rock can also be used as a containment berm for traps. Place soil fill for the berm or dam in 6" layers and compact. The entire trap or basin, including the ponding area, berms, outlet, and discharge area, must be seeded and mulched immediately after construction.

3.4.2.2. An overflow outlet can be made by making an notch in the containment berm and lining it with rock. Rock in the notch must be large enough to handle overflows, and the downhill outlet should be stabilized with rock or other flow dissipaters similar to a culvert outlet. The overflow should be at an elevation so the dam will not overtop. Allow at least one foot of

freeboard. Outlets must be designed to promote sheet flow of discharges onto vegetated areas if possible. If the discharge will enter a ditch or channel, make sure it is stabilized with vegetation or lined.

**3.4.3. Inspection and Maintenance**

Inspect inlets, berms, spillways, and outlet areas for erosion after each rain exceeding 0.5 inch and every seven days. Repair gullied areas and any upslope areas contributing large volumes of sediment. Repair and reseed bare areas. Ensure that downstream receiving area is stable. Remove sediment before it fills half the trap or basin volume.

**3.5. Inspection and Maintenance**

**3.5.1.** CP is responsible for inspection and maintenance of the construction site and all best management practices.

**3.5.2. Inspection**

Erosion and sediment controls must be inspected weekly and after each rain exceeding 0.5 inch. Keep records of inspection observations and actions taken, and file with other erosion and sediment control plan paperwork.

**3.5.3. Maintenance**

Daily inspect equipment and hydraulic oil systems at the beginning of the day. Repair or replace frayed or damaged lines or hoses before use in or near water and provide containment measures if required.

**3.5.3.1.** Keep erosion and sediment controls in good working order until the project is completed. Brush and other debris should be removed from work areas. Sediment accumulating behind silt fences or other sediment filters should be removed regularly. All structures that have become dislodged or damaged (such as silt fences, etc.) should be repaired within three days of discovery.

**3.5.3.2.** Make sure that waste materials, building materials, and supplies are properly tied down or contained so that wind and storm water runoff cannot carry the materials away. Fuel, lubricants, and hazardous waste products should be stored in an approved tank or other structure to avoid spills and runoff. Provide spill kits and containment material on-site, especially near fueling or equipment service areas. Maintain vehicles and equipment away from the site if possible. If maintenance must occur on-site, ensure that spills are cleaned up quickly.

## Best Management Practices Plan Dike C Buttress Construction – Phase 1

### Purpose of the Best Management Practices Plan

The purpose of the Best Management Practices (BMP) plan is to evaluate potential sources of sediment and other pollutants at the project site and put controls in place that will effectively prevent pollutant discharges to surface and ground waters. Construction activities shall be performed in accordance with the Kingston site wide Stormwater Pollution Prevention Plan. This BMP is a guideline for the Dike C work activities. The following general pollution control requirements have been addressed in the BMP Plan, as applicable:

1. Control limited threat discharges to minimize impacts to water quality;
2. Prevent the discharge of pollutants associated with construction activities to surface waters;
3. Retain soil and sediment on site;
4. Permanently stabilize disturbed soils.

This plan has been developed based on an understanding of the current conditions of the watershed, a general knowledge of the previous activities at the site, and an anticipation of the proposed remediation activities scheduled for the site. This plan is intended to be a “living” document, in that as the Work at the site progresses, this plan must be periodically reviewed and adjusted to suit the actual conditions and situations as they develop. CIVIL PROJECTS and all SUBCONTRACTORS shall become familiar with this plan, and shall constantly monitor the site conditions, making appropriate modifications as needed.

### Site Description:

The Kingston Fossil Plant Dike C is located along the Emory River / Watts Bar Lake in Roane County, Tennessee. Dike C is the containment embankment for the Kingston Fossil Plant ash pond and stilling basin. The toe of the embankment extends into Watts Bar Lake and is being armored with riprap and other materials to improve the stability of the containment structure.

### Construction Activities Proposed:

This work involves buttressing Dike C of the ash pond/ stilling basin at the Kingston Fossil Plant. Work measures required to stabilize the site include:

- A. Installation of sediment and erosion control measures for the site
- B. Shaping of starter dike bench to improve drainage including the removal of existing pipes and placement of embankment
- C. Documentation of location and removal of trees and rootwads on the embankment
- D. Surface preparation to allow filter placement.
- E. Placement of sand filter on designated areas of slope above and below the water surface.
- F. Placement of stone cover on the sand and construction of riprap buttress.
- G. Revegetation of disturbed areas outside limits of riprap placement.
- H. Removal of temporary sediment control measures.

**Work Sequence:**

1. Installation of perimeter sediment and erosion control measures in accordance with the Drawings, Section 02100 of the Specifications and the Sediment and Erosion Control Measures Section below.
2. Protection of existing geotechnical instrumentation as described in Section 02150 of these Specifications.
3. Surveying and photographing trees to be removed as described in Section 02150 of these Specifications.
4. Excavation and stockpiling of gravel from starter dike bench road as described in Section 02150 of these Specifications.
5. Shaping the starter dike bench to drain towards Watts Bar Lake. as described in Section 02150 of these Specifications.
6. Removing drain pipes from starter dike bench and backfilling as described in Section 02150 of these Specifications.
7. Removing trees and other vegetation as described in Section 02150 of these Specifications.
8. Grubbing of rootwads as described in Section 02150 of these Specifications.
9. Removal of organic materials and topsoil as described in Section 02150 of these Specifications.
10. Placing manufactured sand product in tree rootwad removal areas as described in Section 02150 of these Specifications.
11. Excavation and stockpiling of previously placed riprap as described in Section 02150 of these Specifications.
12. Grading surface to allow placement of geotextile or granular filter as described in Sections 02373 and 02410 of these Specifications.
13. Construction of access roads or temporary access ramps as described in Section 02410 of these Specifications.
14. Construction of riprap buttress as described in Section 02410 of these Specifications.
15. Removal of temporary sediment control measures in a segmental manner. Protection of existing site improvements or utilities from damage.

**Sediment and Erosion Control Measures:**

Due to the lack of available area downstream of the limits of disturbance caused by the presence of work extending into Watts Bar Lake there is inadequate area for a sediment pond. Alternative measures have been analyzed and will be employed to reduce total suspended solids (TSS) during construction. Measures to reduce TSS for the remainder of the site are described below:

1. Use of geotextile filter on the slopes, roads and other disturbed areas.
2. Placement of aggregate and riprap armor on slopes along the Lake.
3. Installation of silt fence and fiber logs around the perimeter of the disturbed areas.
4. Seeding of areas disturbed by Construction activity outside of buttress placement.

5. The installation of rock check dams in temporary diversion ditches.
6. The use of booms or berms to contain sediment from affecting other portions of the Lake.

**Other Control Measures:**

Dust generation shall be minimized by spraying with water.

**Other State or Local Plans:**

Work on-site shall adhere to all applicable state and local laws.

**Maintenance:**

All silt fences, fiber coils, booms and other sediment control devices shall be inspected as described below. Tears in the fence shall be repaired or portions of the fence replaced within 3 days of discovery. Sumps shall be cleaned of accumulated sediment when sediment depths exceed six inches. CP shall likewise ensure that all roads maintain adequate gravel cover and replace same to maintain the design template.

**Inspections:**

Qualified personnel shall inspect storm water control measures, discharge locations, vehicle exits, disturbed areas of the site and material storage areas at a minimum of every 7 calendar days and within 24 hours of every 0.5 inch precipitation event. Areas that have been temporarily stabilized shall be inspected at least once per month. Revisions to the BMP Plan based on the results of these inspections shall be implemented within seven days.

A report summarizing the scope of the inspection, names and qualifications of the inspecting personnel, the date of the inspection, observations as they relate to the BMP Plan and corrective actions shall be noted in the report. All reports shall be kept for at least three years after the date of the inspection or for one year after coverage under the site specific stormwater prevention plan. Each report shall be signed, and shall be available at the site for review.

**Non-Storm Water Discharges:**

All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Preventive maintenance such as changing oil shall be performed off-site. Any spills of hydraulic fluid or oil from machinery shall be immediately cleaned up using rags, mops, kitty litter, sand, sawdust and placed in plastic cans before being disposed off in a legal manner. Containment of any spill using dikes, plastic liners or other methods will be used as necessary. Manufacturer's methods for spill cleanup will be posted on-site and site personnel will be made aware of the location of the procedural information and cleanup supplies. Any spill of toxic or hazardous substances will be immediately reported to the EPA. The site superintendent will be the spill prevention and cleanup coordinator.

Materials expected to be on-site include: Petroleum based products, fertilizer, grass seed, mulch, geotextiles, geomembranes, steel, stone, coal combustion products and agricultural lime.

**CP, Subcontractors and Owner:**

The CP and each subcontractor shall implement the appropriate control measures outlined in this BMP plan. The project OWNER for the purpose of this submittal is the Tennessee Valley Authority.

**Certification:**

I certify under penalty of the law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this Certification”

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Printed or Typed Name and Title

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Signature

Representing:

Phone: Office:

Date: \_\_\_\_\_

**END OF SECTION 02100**

**TECHNICAL SPECIFICATIONS**  
**SECTION 02150 – SITE PREPARATION**

**PART 1 - GENERAL**

**1.1. RELATED DOCUMENTS**

The conditions and description of work shown in other sections of these Specifications as well as the Engineering Drawings and Quality Control Plan apply to this Section.

**1.2. SUMMARY**

**1.2.1.** This section includes the following:

- Surveying and photographing trees to be removed.
- Excavation and stockpiling of gravel from starter dike bench road
- Shaping the starter dike bench to drain towards Watts Bar Lake.
- Removing drain pipes from starter dike bench and backfilling
- Removing trees and other vegetation.
- Grubbing of rootwads.
- Removal of organic materials and topsoil
- Placing manufactured sand product in tree rootwad removal areas
- Excavation and stockpiling of previously placed riprap
- Grading or smoothing of surface to allow placement of filter
- Removal of temporary sediment control measures in a segmental manner. Protection of existing site improvements or utilities from damage.

**1.2.2.** Related Sections include the following:

- Section 02100 – Erosion Control and Stabilization
- Section 02373 – Geotextile Placement
- Section 02410 – Rock Buttress and Granular Filter Components

**1.3. DEFINITIONS**

**1.3.1. Starter Dike**

The starter dike is the lower in elevation portion of Dike C at approximate elevation 748 feet and below immediately adjacent to Watts Bar Lake.

**1.3.2. Dike Bench**

The dike bench is the relatively flat area at the top of the starter bench upon which the raised dike was constructed at approximate elevation 748 feet. A portion of this area remains and is currently covered with gravel and being used as a road.

**1.3.3. Rootwads**

Rootwads consist of the tree stump as well as roots greater than 2 inches in mean diameter.

**1.3.4. Topsoil**

Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than two inches in diameter; and free of weeds, roots and other deleterious materials.

**1.3.5. Drain Pipes**

Steel or plastic piping previously installed to drain the dike bench.

**PART 2 - PRODUCTS**

- 2.1. Remove cleared topsoil for use elsewhere or dispose of as it is not required in the landfill area but is required in borrow areas for use in re-vegetation.
- 2.2. Manufactured Sand Product is a durable quarry produced material free of deleterious amounts of shale conforming to Rogers Group Inc. Roane County Quarry Manufactured Sand Product Tennessee Department of Transportation Concrete Sand or QC Manager approved equal. The gradation shall conform to the following:

<b>Sieve/Screen Size</b>	<b>Percent Passing</b>
3/8	100
No. 4	70-100
No. 8	50-100
No.16	35-85
No. 30	15-60
No. 50	10-45
No. 100	2-25
No. 200	0-5

- 2.3. There are no requirements for the cutting or stacking of trees or timber.
- 2.4. Embankment soils used for promoting positive drainage on the dike bench shall consist of clean soils that classify as CL or CH according to the Unified Soil Classification System. These soils shall not contain organic debris, ash or contain rock exceeding two inches in diameter

**PART 3 - EXECUTION**

**3.1. PREPARATION**

- 3.1.1. Protect and maintain geotechnical instrumentation from disturbance during construction. Install silt fencing along furthest downstream point practicable.

- 3.1.2.** Locate and survey trees to be removed to document their position in case seeps occur. Photograph trees and relate them to the survey positions. Photography of trees is to be completed as per TVA-KIF-SOP-26, *Standard Operating Procedure For: Photograph Management For the TVA Kingston Fossil Plant Ash Recovery Project*.
- 3.1.3.** Remove gravel from the starter dike bench road and stockpile for later use. Install temporary silt fence just below starter dike bench.
- 3.1.4.** Through the placement of embankment material, shape the starter dike bench to slope towards Watts Bar Lake at 2% minimum slope. Prior to placement of embankment materials, exposed surfaces shall be stripped of all vegetation, organic soils and vegetative cover soils as well as any other deleterious materials. Exposed surfaces shall be scarified to promote lift bonding. The sequence of filling shall commence at the lowest section (in elevation) of the subject footprint and proceed upward in maximum eight-inch loose lifts in a manner to maintain positive drainage at all times. Positive drainage through minimum two percent cross slopes shall be maintained on all fill surfaces. The fill sequence shall also be performed in a manner that reduces the potential for uncontrolled sediment runoff. For areas with slopes greater than 20%, embankment benches shall be provided which are conducive to horizontal lift construction. These embankment benches shall be constructed on 10 foot vertical increments during Phase 2 construction and are not required for Phase 1.
- Each lift of soil embankment shall be compacted with a tamping foot or sheep foot roller, or equivalent approved by the QC MANAGER, to a minimum of 95 percent of standard Proctor maximum dry density. Following initial compaction, the surface shall be sealed with a smooth drum roller to reduce the potential for surface water infiltration. Prior to placement of subsequent lifts the surface shall be scarified to promote lift bonding.
- 3.1.5.** Remove piping below starter dike bench and compact embankment into excavated areas. Compact embankment using manual tampers or other means to achieve 95% of standard Proctor maximum dry density.

## **3.2. CLEARING AND GRUBBING**

Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade. In general, all trees and brush with a mean diameter of 2-inches or greater at ground level shall be grubbed out. Where it is not reasonable to remove trees by a mowing with a bush hog or with similar mowing equipment the following guidelines apply:

- 3.2.1.** All trees 2-inches in diameter or greater are to be surveyed in-place by TVA
- 3.2.2.** All trees shall be cut using a handsaw or chainsaw and the cut tree and branches discarded.
- 3.2.3.** Remove the remaining tree trunk, stump, and rootwad
- 3.2.4.** Grub any remaining roots of the tree so that only 2 inches or smaller roots are left in place
- 3.2.5.** The resulting cavity from removal of the rootwad shall be cleaned of loose soil and debris

- 3.2.6.** The cavity shall then be backfilled with manufactured sand product and graded to blend and match adjacent slopes.

**3.3. TOPSOIL STRIPPING**

- 3.3.1.** Remove sod and grass before stripping topsoil.
- 3.3.2.** Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other materials. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
- 3.3.3.** Dispose of excess topsoil as specified for materials disposal.
- 3.3.4.** Employ perimeter Best Management Practices, such as silt fences or berms, to minimize runoff of silt and sediment laden waters from the stockpiled topsoil and waste materials.

**3.4. RIPRAP EXCAVATION**

Relocate or remove silt fence as needed. Excavate previously placed riprap after clearing activities are completed. Excavate riprap as practicable and limit sediment production by dip excavation using buckets. Only loose riprap shall be removed. Riprap embedded into the slope shall remain. In areas under water the excavator bucket shall be used to probe loose riprap, snags or trees and remove same. Embedded items shall remain in place. Stockpile riprap for re-use as practicable. Reinstall silt fence at completion of riprap removal.

**3.5. PREPARE SURFACE FOR GRANULAR FILTER OR GEOTEXTILE PLACEMENT**

- 3.5.1.** CP shall prepare the exposed surface to receive granular filter or geotextile fabric placement by grading, blading, tamping or use of backhoe bucket to provide a relatively even, smooth surface free of protrusions, rocks, roots and other items that would keep the filter from making contact with the soil. This may also be achieved using an excavator with no teeth and a welded plate. Surfaces not immediately receiving filter shall be tracked as practicable with equipment moving up and down slopes. If tracking results in an irregular surface, utilize a plate tamper mounted on the excavator or the back of the bucket to “iron” or smooth the area. Tamp soft areas as practicable to obtain a smooth surface.
- 3.5.2.** Work shall be performed in segments and disturbance shall be limited as practicable to limit exposure of exposed soils to rainfall events and subsequent erosion. This time limit is set at 24 hours. Silt fencing or other sediment control devices shall be removed immediately before granular filter or geotextile placement.
- 3.5.3** The thickness of each filter layer shall be determined for the QC Manager on a daily basis by the use of stakes. Stakes shall be installed at 25’ increments and at slope breaks as a method of measuring the thickness of the filter layers. TVA shall perform complete surveys of prepared subgrade, the surface of each completed filter layer, and the final grade of the rip rap at 100’ intervals corresponding to the intervals shown on the construction drawings. This survey information shall be submitted to the QC Manager at the completion of each survey interval.

**END OF SECTION 02150**

## **TECHNICAL SPECIFICATIONS**

### **SECTION 02373 – GEOTEXTILE FILTER (ALTERNATIVE 2)**

#### **PART 1 - GENERAL**

##### **1.1. RELATED DOCUMENTS**

The Engineering Drawings, Quality Control Plan and other Sections of the Project specifications apply to the Work specified in this Section. Geotextile shall not be utilized as filter unless approved in writing by TVA. It may be used as a temporary measure and removed.

##### **1.2. DESCRIPTION OF WORK**

This work shall consist of furnishing and placing a minimum 15 ounce per square yard weight non-woven filter geotextile on the starter dike extending underwater to the limits shown on the Drawings. Work above water shall consist of placing the fabric in firm contact with soils as specified. Work for placement of the geotextile filter underwater consists of sinking the geotextile in a controlled manner, with appropriate overlap where not pre-seamed. The role of the filter geotextile is as an underlayment for riprap buttress.

Prior to installation, the geotextile manufacturer shall provide the QC MANAGER with certification signed by an authorized employee of the manufacturer. The certification shall indicate that the geotextile material meets or exceeds the specified minimum average roll values provided in Table 1. The manufacturer shall also provide certified laboratory test data for unit weight, tensile strength, puncture strength, mullen burst strength, permittivity, apparent opening size and trapezoidal tear strength measured in accordance with the procedures listed in Table 1 at a minimum frequency of 1 test per 100,000 ft<sup>2</sup> of geotextile produced, with exception to U.V. resistance which shall be provided a minimum frequency of twice per year.

#### **PART 2 - MATERIAL**

##### **2.1. GENERAL**

The geotextile materials supplied under these specifications shall be first quality products specifically manufactured for cushion applications and shall have demonstrated by prior use their suitability for such applications. The geotextile manufacturer shall provide at least three references encompassing at least 10,000,000 ft<sup>2</sup> of geotextile used in similar projects.

##### **2.2. GEOTEXTILE FABRIC**

The geotextile shall meet the physical requirements of Table 1. Acceptable geotextile fabrics include Mirafi 1160N, DalTex 1160, Geosynthetic Inc. NW16 and Geotex 1701 or equivalent products. The geotextile shall be free of holes, tears, defects, and patch-repairs of defects. The geotextile shall be composed of nonwoven needle-punched, discontinuous (staple) fibers. Fibers used in manufacture of the geotextile shall consist of a material composed of at least 85 percent by weight polyolefins, polyesters, or polyamides.

**Table 1. Geotextile Filter Properties**

Property	Test Method	English	Metric
Unit Weight	ASTM D 3776	15 oz/yd <sup>2</sup>	542 g/m <sup>2</sup>
Tensile Strength	ASTM D 4632	380 lbs	1.69 kN
Puncture Strength	ASTM D 4833	235 lbs	1.04 kN
Mullen Burst Strength	ASTM D 3787	740 psi	5,098 kPa
Trapezoidal Tear Strength	ASTM D 4533	140 lbs	0.623 kN
Grab Tensile Elongation	ASTM D 4632	50%	50%
AOS	ASTM D 4751	100 sieve	0.15 mm
Permittivity	ASTM D 4491	0.5 sec <sup>-1</sup>	-
U.V. Resistance	ASTM D 4355	70%	70%

**Note:**

All numerical values represent minimum average roll values (i.e., average of test results from any sampled roll in a lot shall meet or exceed the minimum average roll values in the table) in weaker principle direction. Lot sampled according to ASTM D 4354, "Practice for Sampling Geosynthetics for Testing."

**PART 3 - EXECUTION**

**3.1. SHIPMENT AND STORAGE**

The geotextile shall be labeled, stored, and handled in accordance with ASTM D-4873, "Guide for Identification, Storage, and Handling of Geosynthetics." The geotextile shall be kept dry and wrapped in a waterproof wrapping such that it is protected from UV light and the elements during shipping and storage. Geotextile rolls shall be stored in a manner which protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof, opaque cover.

**3.2. INSTALLATION**

**3.2.1. General**

The geotextile shall not be installed until conformance test results are reviewed and the geotextile is accepted by the QC MANAGER. CP shall handle all geotextiles in such a manner as to ensure the geotextile is not damaged. The above water surface base on which the geotextile is to be placed shall be prepared to a smooth condition free of debris or obstructions which may damage the geotextile. The surface base shall be approved by the QC MANAGER prior to geotextile placement. Care shall be taken not to entrap stone, excessive dust, or moisture in the geotextile. The CONTRACTOR shall not operate heavy equipment on the geotextile without a minimum 36 inch cover of approved material. Geotextile shall not be placed underwater until the area is approved by the regulatory authority noted in the Quality Control Plan

### **3.2.2. Deployment**

- Geotextiles placed above water level shall be deployed free of wrinkles and folds. On slopes, the geotextiles shall be anchored at the top and unrolled down the slope. In the presence of wind, all geotextiles shall be weighted with sandbags or other material which will not damage the geotextile. Geotextile uplifted by wind may be reused upon approval by the QC MANAGER.
- Geotextiles placed in water require ballast to promote sinking. There are a number of methods to place geotextile in water. One method employed by Contractors involves using a long reach excavator to reach the full length of placement. The geotextile is rolled onto a steel pole with a buoy attached at one of the pole. The lead edge of the geotextile is anchored under the excavator and the roll lowered/pushed into place. Aggregate is then placed on the fabric and the pole retrieved for re-use. In areas inaccessible to equipment a steel wire net of sufficient weight to sink the geotextile fabric may be used. This net can be attached to the geotextile using ties and rolled up and transported to the installation area. A barge may be used to pull the steel net/fabric out to final position. Small floats or paint marks that can be observed from the surface or by divers can be used to mark the edge of the fabric to provide for proper overlaps. Ballast smaller than the net apertures can be used to weigh down the geotextile and the steel net retrieved for re-use.
- CP shall develop a plan for geotextile deployment for review and approval by the QC MANAGER. Geotextile shall not be deployed until the deployment plan is approved

### **3.2.3. Geotextile Placed Above Water**

Adjacent geotextile panels shall be heat bonded or sewn. Minimum two foot overlaps are required. All seams shall be oriented parallel to (in the direction of) the slope. Seams constructed perpendicular or transverse to the direction of the slope will not be accepted. The geotextile shall be examined over the entire surface after installation to ensure that no potentially harmful objects are present.

### **3.2.4. Geotextile Placed Under Water**

Adjacent geotextiles panels may be pre-sewn or heat bonded prior to placement in water up to the width that can be practicably placed. Otherwise, overlaps shall not be less than five feet.

### **3.3. HEAT-BONDED SEAMS**

Seams may be heat bonded using hot plate, hot knife, or ultrasonic devices. Manual or automatic machine driven seaming devices may be used; however, machine driven seaming equipment is preferred. Continuous or spot seams may be used as required by the contract documents. For spot seams, a minimum 6-inch long heat-bonded seam shall be manufactured for each 3-feet of geotextile length. All locations where heat bonding has melted through either geotextile panel shall be repaired. Adjacent geotextile panels shall be overlapped 24-inches prior to seaming. The geotextile panels shall be completely clean dry prior to seaming. The geotextile panel edges shall lay flat against each other prior to seaming such that no gaps are formed in the seam. Heat seaming shall not be performed during rain or snow. Ambient temperatures for seaming should be above freezing, i.e. 32°F, unless test strips indicate satisfactory seams can be fabricated at lower temperatures. The use of a seaming board or slip sheet is recommended for some seaming operations. A seaming board or slip sheet may be a wood board or piece of geomembrane which is placed below the geotextile panels at the location of seaming. The board or sheet may be pulled with a rope or strap as seaming progresses. The purpose of the

seaming board or slip sheet are to provide a firm, clean surface for seaming and to reduce condensation onto the geotextile from an underlying soil layer as a result of seaming.

### **3.4. REPAIRS**

Damaged geotextiles and geotextiles contaminated with dirt shall be repaired immediately. Repairs shall be made with the same geotextile product style as the original material. All repairs shall meet the approval of the QC MANAGER, prior to cover placement.

Geotextile panels which require repair shall be removed and replaced with new material. Replacement material shall be sewn or heat bonded as previously described in this specification. All seams shall be oriented parallel to (in the direction of) the slope. Seams constructed perpendicular or transverse to the slope will not be accepted.

### **3.5. COVER PLACEMENT**

#### **3.5.1. General**

Placement of cover (No. 2 aggregate) on the geotextile shall be accomplished in a manner as to ensure that the geotextile is not damaged. Cover material shall be placed within 14 days of deployment for geotextile above water and immediately below water. Geotextile exposure periods may exceed 14 days when approved by the QC MANAGER based on evaluation of geotextile resistance to UV degradation and on local environmental conditions

#### **3.5.2. Placement**

The cover shall meet the material requirements of the engineering documents and shall be approved by the QC MANAGER, or other TVA representative prior to placement. Cover material shall be placed such that excess tensile stress is not mobilized in the geotextile. Cover placement operations shall comply with the requirements and limitations of the contract documents and project design documents.

#### **3.5.3. Protection**

Low ground pressure (< 5 lb/in<sup>2</sup>) equipment shall be used to place No. 2 aggregate cover and build access ways. Cover thickness on the geotextile shall be greater than or equal to 1.0 ft prior to operation of low ground pressure equipment and 36 inches or more prior to operation of heavy equipment. When approved by the QC MANAGER, higher ground pressure (>5 lb/in<sup>2</sup>) equipment may be operated on the cover in accordance with the cover thickness requirements provided in Table 2. On slopes cover shall be placed beginning at the bottom of the slope and extending upward. Any damaged areas of geotextile shall be repaired or replaced as noted in Paragraph 3.4 of this section.

**Table 2. Geotextile or Sand Filter Cover Lift Thickness Requirements for Equipment Operation**

<b>Maximum Allowable Equipment Ground Pressure (psi)</b>	<b>Lift Thickness of Overlying Cover Material (ft)</b>
<5	1.0
5-10	1.5
10-20	2.0
>20	3.0

**Note:** Cover lift thickness to be approved by the QC MANAGER.

### **3.6. CONFORMANCE SAMPLING AND TESTING**

#### **3.6.1. Sampling Frequency**

The geotextile shipment shall be divided into lots to facilitate conformance sampling. A lot is to be considered as any separate portion of the shipment that differs from other portions in specification, style, or origin of manufacture. Roll(s) shall be selected at random from each lot for conformance testing. These roll(s) are herein referred to as conformance sampling units. One conformance sampling unit shall be selected for every 100,000 square feet of geotextile included in the lot. All rolls sampled for conformance testing shall be securely re-covered with an opaque, waterproof cover and shall remain covered until time of installation.

#### **3.6.2. Sample Identification**

The QC MANAGER shall be responsible for collection of conformance samples from the selected sampling units. Samples shall be 3 feet long and taken across the entire width of the roll and shall not include the first complete revolution of fabric on the roll. Each conformance sample shall be clearly identified with the style number, roll number, and manufacturer's name. The QC MANAGER shall be responsible for conformance testing of unit weight, tensile strength, puncture strength, mullen burst strength, trapezoidal tear strength, apparent opening size, and permittivity in accordance with the procedures listed in Table 1.

#### **3.6.3. Testing Methods**

Compliance of geotextile materials to this project specification shall be determined in accordance with ASTM D 4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics." The lot shall be considered in compliance with this specification and accepted for construction if the average test values of lot sampling units meet or exceed specification values provided in Table 1. The QC MANAGER shall examine all conformance test results and approve the geotextile prior to deployment.

#### **3.6.4. Retesting**

If the average test value for any individual lot sampling unit fails to meet one or more of the specification values, the lot shall be resampled and retested. This testing shall be done at the expense of the manufacturer. Any individual lot sampling unit which fails initial testing shall not be

included in the lot for resampling. The geotextile manufacturer may request retesting be performed with a technical representative of the manufacturer present. The lot shall be considered in compliance with this specification and accepted for construction if the average test values for all resampled lot sampling units meet the specification values. The lot shall be rejected if an average test value for any resampled lot sampling unit fails to meet one or more of the specification values.

**3.6.5. Independent Retesting**

Alternatively, the manufacturer may elect retesting be performed by two independent third party testing laboratories. The lot shall be considered in compliance with this specification and accepted for construction if both laboratories report average test values which meet the specification values. The lot shall be rejected if either laboratory reports average test values which do not meet one or more of the specification values.

**3.6.6. Isolation Testing**

The QC MANAGER may permit additional testing to isolate the portion of a rejected lot which is in noncompliance provided rolls within the lot are numbered consecutively. This testing shall be performed at the expense of the manufacturer. To isolate the portion of the lot which is in noncompliance, two additional samples shall be taken from the two rolls having roll numbers immediately higher and lower than the failing roll. If both additional tests meet or exceed specification values, the roll that represents the initial failing sample and the roll manufactured immediately after that roll shall be considered out of specification and rejected. The procedure may be repeated with additional tests to bracket noncompliant rolls within the lot. The remainder of the lot shall be considered within specification and accepted.

**END OF SECTION 02373**

## TECHNICAL SPECIFICATIONS

### SECTION 02410 – ROCK BUTTRESS AND GRANULAR FILTER COMPONENTS

#### PART 1 - GENERAL

##### 1.1. DESCRIPTION OF WORK

This Specification covers placement of manufactured sand, No. 57 aggregate, No. 2 aggregate and riprap to construct the granular filter and rock buttress for Dike C of the Ash Pond and Stilling Pool for the Kingston Fossil plant. A geotextile filter is shown in the Drawings as Alternate 2 but shall not be utilized unless approved in writing by TVA. Geotextile filter shall conform to the requirements of Section 02373 – Geotextile Filter. Erosion and sediment control measures shall conform to Section 02100– Erosion Control and Stabilization of these Specifications.

##### 1.2. SUBMITTALS

Certification statements shall be provided by each supplier that the product conforms to these specifications. In addition all materials shall meet the testing schedules noted in the QC Plan.

#### PART 2 - MATERIALS

##### 2.1. AGGREGATE

No. 2 aggregate and No. 57 aggregate shall consist of quarried stone generally meeting the requirements of Section 903 of the Tennessee Department of Transportation (TDOT) “Standard Specifications for Road and Bridge Construction” (Standard Specifications) latest edition. The gradation shall conform to the following:

No. 57 Aggregate

Sieve/Screen Size	Percent Passing
1.5	100
1	70-100
1/2	25-85
No. 4	0-35
3.5 mm	0-15
No. 8	0-5

No. 2 Aggregate:

Sieve/Screen Size	Percent Passing
3	100
2.5	90-100
2.4 (60mm)	10-100
1.5	0-100
1.0	0-15
3/4	0-5

## **2.2. GEOTEXTILE FILTER**

Geotextile filter if approved by TVA for filter use beneath the rock buttress materials shall conform to Section 02373 – Geotextile Filter of these Specifications.

## **2.3. TDOT CLASS B MACHINED RIPRAP**

Riprap buttress stone shall consist of quarry stone meeting the requirements of Section 709 of the Tennessee Department of Transportation “Standard Specifications for Road and Bridge Construction” latest edition. Machined Riprap (Class B) shall vary in size from 3 inches to 2.25 feet (from 75 to 675 mm) with no more than 20% by weight being less than 6 inches in size (150 mm).

## **2.4. MANUFACTURED SAND PRODUCT**

This product shall conform to Section 02150, Part 2, Paragraph 2.2 of these specifications.

Other sources of sand product may be approved by QC MANAGER subject to filter analysis based on gradation and the quality of the sand.

# **PART 3 - EXECUTION**

## **3.1. GRANULAR FILTER**

Granular filter shall consist of a minimum of six inches manufactured sand product placed on soil subgrade with the sand then overlain by six inches TDOT No. 57 aggregate which is in turn overlain by six inches TDOT No. 2 aggregate. Surfaces to receive granular filter shall be prepared to a condition free of large protrusions as directed by the QC MANAGER. No filter shall be placed until the subgrade is approved by the QC Manager or the designated representative on the QC Team.

### **3.1.1. Sand Placement**

The sand component of the graded filter shall be placed to a minimum thickness of six inches. This measurement shall be made perpendicular to the surface of the dike.

### **3.1.2. Underwater Placement**

The sand component of the filter placed under water shall be performed in such a manner as to provide a minimum thickness of six inches. One such method involves placement by excavator of overlapping buckets of sand. In some areas the sand thickness will likely exceed six inches and form a sinusoidal wave pattern of placement.

### **3.1.3. Stone Placement**

Stone and riprap shall be placed to the minimum thickness indicated on the Drawings. Measurement shall be made perpendicular to the slope.

### **3.1.4. Contamination Issues**

Placed sand shall be covered with No. 57 stone as quickly as practicable. In no event shall sand remain exposed for more than 24 hours. Any contamination of sand from soil or ash shall be cause to remove and replace the sand. The action of covering of sand by No. 57 stone and No. 2 stone shall be performed in such a manner that aggregate cover will lag sand placement by five feet to reduce

contamination risk. This lag may be adjusted based on field operations and conditions as deemed necessary by the QC Manager.

### **3.1.5. Riprap Placement**

Riprap may be placed by mechanical means using an excavator or loader. The maximum allowable drop height for riprap placement is two feet. The rock shall be placed to the depths, extents and template shown in the drawings. The surface of the lining, upon completion, shall be graded as practicable into final position to ensure proper thickness and a uniform surface. Larger rocks shall be uniformly distributed with the small rocks and spalls filling the voids between the larger rocks.

### **3.2. CUSHION GEOTEXTILE FILTER**

Surfaces to receive cushion geotextile shall be prepared to a relatively smooth condition, free of jagged rocks, depressions and debris. Any soft areas shall be excavated and backfilled. Geotextile shall be placed in accordance with the requirements of Section 02373 – Geotextile Filter of these Specifications. Note that geotextile filter shall not be used without written authorization by TVA

### **3.3. ACCESS TO CONSTRUCTION**

#### **3.3.1. Access to Work – Areas of Granular Filter**

Riprap shall not be placed until the granular filter has been approved by the QC MANAGER or the designated representative on the QC Team. In order to access locations of riprap placement, temporary access ramps or roads may be needed. Where operating heavy equipment or trucks over the filter, additional cover shall be placed to a minimum total depth of 36 inches over the sand component of the filter. This cover shall consist of an additional 18 inches of No. 2 aggregate spread on access areas and covered on the surface with 6 inches of No. 57 aggregate. The No. 2 aggregate shall be spread in a single lift utilizing low ground pressure equipment conforming to Table 2 of Section 02373 of these Specifications or by using excavator buckets. The No. 57 aggregate shall be spread in a single lift. The temporary road surface can be reclaimed and re-used as needed. If aggregate is left in place a minimum cover of 3 feet of riprap is required. Where the No. 57 aggregate surface has been contaminated with ash, it shall be removed and wasted as directed by the QC MANAGER.

#### **3.3.2. Access to Work – Geotextile Filter (where approved by TVA)**

Riprap shall not be placed until the protective cover of No. 2 aggregate has been approved by the QC MANAGER. In order to access locations of riprap placement, temporary access ramps or roads may be needed. Where operating heavy equipment or trucks over the geotextile filter and No. 2 aggregate cover, additional cover shall be placed to a minimum total depth of 36 inches. This cover shall consist of an additional 18 inches of No. 2 aggregate spread on access areas and covered on the surface with 6 inches of No. 57 aggregate. The No. 2 aggregate shall be spread in a single lift utilizing ground pressure equipment conforming to Table 2 of Section 02373 of these Specifications or by using excavator buckets. The No. 57 aggregate shall be spread in a single lift. The temporary road surface can be reclaimed and re-used as needed. If aggregate is left in place a minimum cover of 3 feet of riprap is required. Where the No. 57 aggregate surface has been contaminated with ash, it shall be removed and wasted as directed by the QC MANAGER.

**END OF SECTION 02410**

**TECHNICAL SPECIFICATIONS**  
**SECTION 02936 – REVEGETATION**

**PART 1 - GENERAL**

**1.1. DESCRIPTION**

This Work consists of furnishing all labor, equipment and materials for preparing the seedbed, adding soil amendments, and seeding disturbed areas both in borrow areas and adjacent to work zones.

**1.2. RELATED WORK**

- A. Quality Control Plan
- B. Section 02100 – Erosion Control and Stabilization
- C. Section 02150 – Site Preparation
- D. Section 02370 – Geotextile Filter
- E. Section 02410 – Rock Buttress and Granular Filter Components

**1.3. SUBMITTALS**

- A. Agronomic soil test results shall be submitted to the QC MANAGER.
- B. Seed tickets, fertilizer certification and CaC03 equivalency certification shall be submitted to the QC MANAGER.
- C. A sample of the netting proposed by CP shall be submitted to the QC MANAGER.
- D. A sample of the Erosion Control Blanket shall be submitted to the QC MANAGER.

**1.4. QUALITY CONTROL**

- 1.4.1.** Agricultural limestone shall be purchased from quarries approved by the Tennessee Department of Agriculture.
- 1.4.2.** Fertilizer (bagged or bulk) either dry or liquid, must be manufactured and sold under the jurisdiction of the Tennessee Department of Agriculture, Ag Inputs Section.
- 1.4.3.** All seed shall be certified by an Official Seed Certifying Agency. Seeds shall have been tested within nine months prior to use. Each kind of seed shall be separately packed and delivered to the project in a seed-tight bag. Each bag shall bear a tag or label bearing the seal of the Official Seed Certifying Agency. The analysis of the seed (% pure seed, % germination, date tested, etc.) shall be attached to the bag.

## **PART 2 - PRODUCTS**

### **2.1. LIME**

Agricultural ground limestone or its equivalent shall be used. The ground limestone must meet the following requirements: contain sufficient calcium and magnesium carbonate and be equivalent to not less than 80 percent calcium carbonate and must be fine enough so that not less than 90 percent shall pass through a US Standard No. 10 sieve and not less than 35 percent shall pass through a US Standard No. 50 sieve. Lime shall be applied at the rate specified in Paragraph 3.1. Agricultural ground limestone shall be purchased from quarries approved by the Tennessee Department of Agriculture.

### **2.2. FERTILIZER**

The fertilizer shall be a commercial fertilizer containing the plant nutrients of nitrogen (N), available phosphoric acid (P<sub>2</sub>O<sub>5</sub>) and soluble potash (K<sub>2</sub>O) and shall be applied at the rate specified in Section 3.1. Bagged fertilizer shall display the following information on the bag or on a sticker or tag attached to the bag: net weight, brand and grade, guaranteed analysis, and name and address of manufacturer. Bulk fertilizer (dry or liquid) shall be accompanied by a statement from the manufacturer which contains the same information required for the bagged fertilizer.

### **2.3. SEED**

- 2.3.1.** Seed shall be applied to all disturbed areas, in accordance with Table 1 with no alterations except with the written consent of the QC MANAGER. The seed mixture shall be totally free of any wild onion, giant foxtail, nodding thistle, Johnsongrass, and Canada thistle seed and contain less than two percent other crop seed. The seed shall also comply with all Tennessee seed laws and regulations.
- 2.3.2.** Seed shall be furnished fully tagged and labeled in accordance with the state laws and the US Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitations for bid. All seed must be from the latest crop available. No seed will be accepted with a date of test of more than nine (9) months prior to the date of delivery to the site. Any seed which has become wet, moldy or otherwise damaged in transit or storage will not be accepted.
- 2.3.3.** All seed shall be delivered in separate bags or packages according to species or be a certified seed mixture. The tags from each seed bag shall be given to the QC MANAGER at the site. These tags will be required for final payment.
- 2.3.4.** All legume seed shall be treated with inoculant prior to seeding in accordance with Paragraph 2.6 (Inoculants).

Table 1

Seed Mixtures	Hydroseed Rate (pounds/acre PLS*)
Application Period: February 1 to May 15	
Endophyte Free Kentucky 31 Tall Fescue	40
Potomac or Boone Orchard Grass	20
Korean Lespedeza	10
White Sweet Clover	10
Plus:	
Perennial or Annual Rye (2/15 to 4/15)	15
or	
Weeping Lovegrass (4/15 to 5/15)	3
Application Period: May 15 to August 1	
Endophyte Free Kentucky 31 Tall Fescue	40
Potomac or Boone Orchard Grass	20
Birdsfoot Trefoil	3
Weeping Lovegrass	3
Application Period: August 1 to November 15	
Endophyte Free Kentucky 31 Tall Fescue	40
Potomac or Boone Orchard Grass	20
White Sweet Clover	12
Birdsfoot Trefoil	8
Perennial Rye	15

\*PLS Pure Live Seed is determined by multiplying the percent germination of the seed times the percent purity

**Note:** Any lawn areas disturbed shall be seeded with an approved lawn seed mixture. Mulch areas and plant 60 lbs. per acre winter wheat between November 15<sup>th</sup> and February 1<sup>st</sup>.

**2.4. MULCH**

The mulch shall consist of wheat straw, hay or rye straw. The mulch material shall be air dry, reasonably light in color and shall not be musty, moldy, caked or otherwise of low quality. The use of mulch that contains noxious weeds will not be permitted. Mulch shall be applied at the rate specified in Paragraph 3.3.

**2.5. NETTING**

Plastic netting manufactured from extruded rectangular mesh plastic, a minimum of 45-inches wide with approximately ¾-inch by 1-inch mesh openings, weighing not less than 2.6 pounds per 1,000 square feet (± ½ pound) shall be used. Other netting may be used if approved by the QC MANAGER. Staples will be U-shaped and made from steel wire of No. W1-W1.5 or W2 or adequate polymaterial fasteners as needed for installation conditions. The staples shall have a minimum length of six (6) inches. Staples shall be driven flush with the soil surface. Netting shall be installed per the specifications in Paragraph 3.3.

## **2.6. INOCULANTS**

The inoculant for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container or otherwise specified. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed. Four times the amount of the inoculant recommended by the manufacturer shall be used. Seed shall be sown within 24 hours of treatment and shall not remain in a hydroseeder longer than four (4) hours.

## **2.7. EROSION CONTROL BLANKET**

Erosion control blanket shall be a manufactured product consisting of plastic netting on both sides with excelsior or coconut in between.

## **PART 3 - EXECUTION**

### **3.1. SEEDBED PREPARATION**

**3.1.1.** Immediately following final grading, the areas to be seeded shall be dressed to a reasonably smooth, firm surface, as determined by the QC MANAGER. Sludge shall be placed to a depth of two inches and incorporated into the top six inches of soil by disking or tilling. Lime shall be applied uniformly at the rate of seven (7) tons per acre. Fertilizer shall be applied at a rate sufficient to supply a minimum of 70 pounds of nitrogen (N), 145 pounds of phosphorus (P<sub>2</sub>O<sub>5</sub>) and 70 pounds of potash (K<sub>2</sub>O) per acre. These rates are subject to change depending on results of soil tests to be performed immediately prior to seeding. These soil tests shall be the responsibility of TVA.

**3.1.2.** The surface shall be tilled to a minimum depth of six (6) inches with either a tandem or offset disk meeting the following specifications:

- A. Disk Size: 22 inches minimum
- B. Disk Spacing: 13 inches maximum
- C. Weight: 400 pounds per foot of cut minimum
- D. Equipped with a drag of sufficient weight to remove any furrows left by the disk.

**3.1.3.** Seedbed preparation shall be suspended when soil conditions are not suitable for the preparation of a satisfactory seedbed. The QC MANAGER shall make this determination.

### **3.2. SEEDING**

**3.2.1.** The specified mixtures of pure live seed (PLS) will be used on all disturbed areas using the seasonal variations shown.

**3.2.2.** All areas shall be seeded immediately following seedbed preparation. In the event the date does not concur with the seeding schedules specified, seeding shall be accomplished using any one of the specified rates or an equivalent rate designed to fit the site and weather conditions, as directed by the QC MANAGER.

**3.2.3.** All seed shall be broadcast evenly over the area immediately following tilling using a hydroseeder. The slurry PH shall not be allowed to drop below a pH of 5.0. In addition, the CP shall provide an accurate pH meter to monitor the slurry at all times.

**3.3. MULCHING**

- 3.3.1.** Mulch materials shall be spread uniformly over all seeded areas. The mulch shall be applied uniformly over all seeded areas of less than 33% slope at the rate of two (2) tons per acre immediately following seeding.
- 3.3.2.** Mulch netting meeting the requirements of Paragraph 2.5 shall be installed on all disturbed areas with slopes less than 33%. The netting shall be installed with a minimum six-inch overlap with adjacent rows. Staples shall be installed at four-foot maximum spacing on all edges and laps. Interior rows of staples shall be at four-foot maximum spacing with staples spaced at eight-foot maximum spacing along each row. Staples in interior row shall alternate in spacing with staples in an adjacent rows.
- 3.3.3.** Erosion control blankets shall be employed to protect slopes 3H:1V or steeper unless otherwise shown on the Drawings. Install up and down the hill (vertical) for long slopes. Walk blankets down to ensure good contact with the soil. Use plenty of staples to keep blankets flat. Overlap blankets at 6 to 8 inches on sides, tops and bottoms. Do not stretch blankets, and do not exceed manufacturer's directions on maximum slope angle for the product. Refer to the Manufacturer's recommendations for installation patterns and stapling.

**3.4. MEASUREMENT OF PERFORMANCE**

- 3.4.1.** TVA shall achieve 90 percent vegetative cover at the end of the second growing season. Such vegetative cover shall be measured using a transects method along the project baseline or other convenient baseline in borrow areas. This method shall involve taping along chosen transects and observing vegetation at each one-foot interval. At each observation point it will be noted whether vegetation is in contact with the transect. The sum of positive observations divided by total observations will determine compliance. Noticeably bare or eroded areas along or between transects shall be repaired even if the overall vegetative cover exceeds 90 percent.

**3.5. EQUIVALENCY**

- 3.5.1.** These seeding specifications are intended to stabilize the project area through establishment of an adequate vegetative cover to provide interim protection and to enhance the wildlife utilization and development of the project area and the surrounding environment. The CP may be permitted to incorporate alternate seeding, fertilization and/or protection techniques which produce the intended results. The CP is encouraged to consider such applications. However, the CP is cautioned that if an alternate technique is utilized, the CP must assume the responsibility for the deviation from this specification and shall still meet the requirements of Paragraph 3.4.
- 3.5.2.** Use of alternative techniques or other deviations from the standards and instructions provided herein must be approved by the QC MANAGER prior to implementation. The QC MANAGER will partially base his assessment on the purity of the constituents proposed, as well as the potential for interference of the proposed alternate techniques with other elements of the project and the overall design intent.

**END OF SECTION 02936**

**Quality Control Plan**  
**Dike C Buttress**  
**Phase 1 Segment C Construction**  
**Kingston Fossil Plant**  
**Harriman, Roane County, Tennessee**

**1. Purpose and Scope**

This document is a site specific Quality Control (QC) plan that addresses construction and monitoring in association with the Dike C buttress project. The QC plan is intended to present minimum project requirements and shall serve as an outline for use in developing site specific protocols based on conditions encountered during the work.

**2. Responsibility and Authority**

A summary of QC personnel and associated responsibilities is presented below.

**2.1. Regulatory Agency**

Work conducted under this project shall be coordinated with the U.S. Environmental Protection Agency (EPA). Designated EPA personnel shall serve as the regulatory contact.

**2.2. Quality Control Manager and Team**

A professional engineer licensed in the state of Tennessee shall be designated as the QC Manager and shall be responsible for overall management of construction monitoring, testing and related documentation as outlined herein. The QC Manager shall determine appropriate test standards and methods for designated field observations and/or laboratory testing and shall be responsible for review of QC data to assess conformance with project requirements. At this time, the QC Manager is Jim Andrew, PE of Stantec Consulting Services Inc. or his duly appointed successor.

The QC Team shall consist of qualified personnel working under the direct supervision of the QC Manager. The QC Team shall be familiar with the materials used and the functional intent of the respective buttress components. The QC Team is Jacobs Engineering or their duly appointed successor.

**2.3. Owner**

The plant and its ancillary functions are owned by the Tennessee Valley Authority (Owner). The Owner shall be responsible for overall management of construction activities to include but not be limited to contracting, administration and retaining the services of qualified consultants as required during the project.

The Owner and/or their Designee shall appoint one representative to serve as the Construction Manager. The Construction Manager shall be responsible for construction activities to include but not be limited to the character and sequence of work, coordination and scheduling.

The Owner's Civil Projects (CP) shall serve as the prime contractor for the Dike C buttress project. Any portion(s) of the work designated to others shall be conducted under the direct supervision of CP.

The Owner shall be responsible for providing qualified professionals to establish and enforce safety protocols related to the project.

### **3. Quality Control Activities**

#### **3.1. Meetings**

Meetings shall be coordinated and conducted by the QC Manager and/or the Construction Manager on a weekly basis. The primary purpose of these meetings shall be to confirm that all parties involved are familiar with the project, required procedures and associated QC objectives along with any safety issues related to construction. Specific safety issues shall be the responsibility of designated safety professionals. Minutes of each meeting shall be prepared by the QC Team and distributed to all parties prior to the next meeting. These minutes shall be documented for inclusion with the project records.

Pre-construction meetings shall be held prior to initiating individual phases of construction. The QC Manager and other parties that will actively participate in the construction activities shall attend these meetings. Minutes shall be prepared and distributed as noted above.

#### **3.2. Alternative Methods**

Consistent with the overall objectives of the project, alternative construction and QC methods may be used during the course of the work. Proposed modifications shall be developed by the QC Manager and submitted to the Owner for review prior to incorporation into the project. Documentation of these alternative methods shall be prepared with copies retained for inclusion with the project records.

#### **3.3. Contractor Submittals**

Contractor submittals shall be reviewed and approved by the QC Manager prior to delivery and/or use of the respective construction materials. Copies of all submittals shall be included with the project records.

### **3.4. Conformance Testing**

Conformance testing consists of periodic testing of materials and/or constructed products. Conformance testing shall be conducted by the QC Team as required by this plan and by additional discretion of the QC Manager. Results of conformance testing shall be reviewed by the QC Manager to assess conformance with project requirements. Copies of all conformance testing results shall be included with the project records.

### **3.5. Field Observations**

The QC Team shall observe and document (as outlined herein) all construction activities associated with the project. Results shall be reported to the QC Manager (with the Owner copied) on a daily basis.

## **4. Ash Removal (within project limits)**

Ash removal within the project limits shall be conducted under separate authority. Prior to construction of Dike C buttress components within subject areas, the Owner and/or their Designee shall obtain written approval from the regulatory contact and/or other appropriate parties that ash has been removed consistent with established guidelines and that construction may proceed.

## **5. Embankment**

### **5.1. General**

Embankment materials shall conform to the requirements established in Section 02150 of the technical specifications. Embankment shall be placed to the lines and grades shown in the drawings in a manner that conforms to the technical specifications.

### **5.2. Quality Control Requirements**

QC requirements are as follows:

- a. Prior to placement, laboratory testing data shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. The exposed surface was inspected to:
  - i. confirm embankment layers are properly compacted and uniform;
  - ii. confirm that elevations are consistent with the project design;
  - iii. confirm that foundation benching has been provided which is conducive to horizontal lift construction in areas with slopes of 20 percent or greater.
- c. Laboratory conformance testing for soil embankment shall consist of one natural moisture content test, standard engineering classification (i.e. sieve and hydrometer, Atterberg Limits and specific gravity) and standard Proctor test per source. This testing is in association with embankment placed on the starter bench road to promote positive drainage.

- d. Field conformance testing shall include in-place density testing to provide documentation of the compaction operations at a minimum one test per two hundred linear feet of starter dike bench length or one test per day whichever is greater or at prescribed intervals established by the QC Manager.
- e. Construction monitoring and field acceptance of embankment placement shall be documented by the QC Team

## **6. Manufactured Sand Product**

### **6.1. General**

Manufactured sand product materials shall conform to the requirements established in Section 02150 of the technical specifications. Manufactured sand product shall be placed as directed by the QC Manager.

### **6.2. QC Requirements**

QC requirements are as follows:

- a. Prior to delivery, supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. Conformance testing shall consist of one gradation for every 10,000 tons delivered to the site. Conformance testing shall also be performed on in-place material with gradation performed for every 500 tons placed, or as otherwise directed by the QC Manager.
- c. Construction monitoring and field acceptance of manufactured sand product placement shall be documented by the QC Team.
- d. For acceptance of the manufactured sand material, the following must be shown for in-place conformance tests:
  - i. A running average of the last 10 conformance tests must have a result of 5.0% or less on average passing the No. 200 sieve, independent of samples taken from the slope or bench areas.
  - ii. Maximum allowable percent passing the 200 sieve is less than 7.0% for any individual test.
  - iii. Running average conformance testing results for 10 tests cannot exceed 5.0 % passing the 200 sieve.
  - iv. In the event that conformance testing does not meet the criteria designated above, subject in-place material shall be removed as practical and replaced with a minimum of 6-inches of sand. Complete removal of the rejected sand is not necessary and removal is not to result in additional disturbance of the underlying subgrade.

- v. If the average of the last 10 conformance tests is not in compliance with (iii) above, the working panel(s) that contains the conformance test that has exceeded 5.0% passing the No. 200 sieve by the greatest margins shall be removed and replaced until the revised running average is in compliance with (iii) above. This may result in more than one panel requiring removal and replacement.

## **7. Geotextile Filter**

### **7.1. General**

Geotextile materials shall conform to the requirements established in Section 02373 of the technical specifications. Geotextile shall be placed to the lines and grades shown in the drawings in a manner that conforms to the technical specifications.

Geotextile shall be unloaded and stored in accordance with manufacturer recommendations. The contractor shall generate a material inventory log during unloading of material shipments to the project site.

### **7.2. QC Requirements**

QC requirements are as follows:

- a. Prior to delivery, manufacturer and supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. Conformance testing schedule and procedures shall be performed as established in the technical specifications.
- c. Construction monitoring and field acceptance of geotextile installation shall be documented by the QC Team.

## **8. Aggregate**

### **8.1. General**

Aggregate materials shall conform to the requirements established in Section 02410 of the technical specifications. Aggregate shall be placed to the lines and grades shown in the drawings in a manner that conforms to the technical specifications.

### **8.2. QC Requirements**

QC requirements are as follows:

- a. Prior to delivery, supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.

- b. Conformance testing shall consist of one gradation at every 30,000 tons delivered to the site. Gradation tests shall be performed on in-place materials at the rate of one test per 1,000 tons placed, or as otherwise directed by the QC Manager.
- c. Construction monitoring and field acceptance of aggregate placement shall be documented by the QC Team.
- d.
  - i. A maximum of one (1) test out of the most recent ten (10) may be outside of the designated gradation ranges.
  - ii. In the event conformance tests do not meet the designated criteria, the subject material shall be removed and replaced.

## **9. Tennessee Department of Transportation Class B Machined Riprap**

### **9.1. General**

Riprap materials shall conform to the requirements established in Section 02410 of the technical specifications. Riprap shall be placed to the lines and grades shown in the drawings in a manner that conforms to the technical specifications.

### **9.2. QC Requirements**

QC requirements are as follows:

- a. Prior to delivery, supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. Conformance testing shall consist of one gradation at every 30,000 tons delivered to the site or at any visual change in gradation as determined by the QC Team. The gradation test shall conform to ASTM D 5519-07 Test Method B.
- c. Construction monitoring and field acceptance of riprap placement shall be documented by the QC Team.

## **10. Revegetation**

### **10.1. General**

Revegetation activities shall conform to the requirements established in Section 02936 of the technical specifications.

### **10.2. QC Requirements**

QC requirements are as follows:

- a. Prior to delivery, supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. The QC Team shall observe seedbed preparation, fertilizer and lime application, seeding and mulching activities to confirm appropriate revegetation procedures per the project requirements. Construction monitoring and field acceptance shall be documented by the QC Team.

## **11. Project Documentation**

Documentation shall be collected and maintained by the QC Manager (copied to the Owner) during the Dike C buttress project. Survey and generation of as-built drawings shall be performed by TVA. The QC Manager shall review as-built Drawings for completeness. This documentation shall include but not be limited to the following:

- Daily construction field reports;
- Observation reports;
- Contractor submittals;
- Material conformance data;
- Photographic documentation;
- Survey and as-built data;
- Construction issue and solution reports;
- Plan modifications; and
- Meeting minutes.