



**CORRESPONDENCE COVER SHEET
WASTE PERMITS DIVISION
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

Date: 11/5/2021
 Facility Name: Big Brown Steam Electric Station
 Permit or Registration No.: 30081

Nature of Correspondence:
 Initial/New
 Response/Revision*

*If Response/Revision, please provide previous TCEQ Tracking No.:
 (Previous TCEQ Tracking No. can be found in the Subject line of the TCEQ's response letter to your original submittal.)

This cover sheet should accompany all correspondences submitted to the Waste Permits Division and should be affixed to the front of your submittal as a cover page. Please check the appropriate box for the type of correspondence being submitted. For questions regarding this form, please contact the Waste Permits Division at (512) 239-2335.

Table 1 - Municipal Solid Waste

APPLICATIONS	REPORTS and RESPONSES
<input type="checkbox"/> New Notification	<input type="checkbox"/> Closure Report
<input type="checkbox"/> New Permit (including Subchapter T)	<input type="checkbox"/> Groundwater Alternate SRC Demonstration
<input type="checkbox"/> New Registration (including Subchapter T)	<input type="checkbox"/> Groundwater Corrective Action
<input type="checkbox"/> Major Amendment	<input type="checkbox"/> Groundwater Monitoring Report
<input type="checkbox"/> Minor Amendment	<input type="checkbox"/> Groundwater Statistical Evaluation
<input type="checkbox"/> Limited Scope Major Amendment	<input type="checkbox"/> Landfill Gas Corrective Action
<input type="checkbox"/> Notice Modification	<input type="checkbox"/> Landfill Gas Monitoring
<input type="checkbox"/> Non-Notice Modification	<input type="checkbox"/> Liner Evaluation Report
<input type="checkbox"/> Transfer/Name Change Modification	<input type="checkbox"/> Soil Boring Plan
<input type="checkbox"/> Temporary Authorization	<input type="checkbox"/> Special Waste Request
<input type="checkbox"/> Voluntary Revocation	<input type="checkbox"/> Other:
<input type="checkbox"/> Subchapter T Workplan	
<input type="checkbox"/> Other:	

Table 2 - Industrial & Hazardous Waste

APPLICATIONS	REPORTS and RESPONSES
<input type="checkbox"/> New	<input type="checkbox"/> Annual/Biennial Site Activity Report
<input type="checkbox"/> Renewal	<input type="checkbox"/> CfPT Plan/Result
<input type="checkbox"/> Post-Closure Order	<input type="checkbox"/> Closure Certification/Report
<input type="checkbox"/> Major Amendment	<input type="checkbox"/> Construction Certification/Report
<input type="checkbox"/> Minor Amendment	<input type="checkbox"/> CPT Plan/Result
<input type="checkbox"/> Class 3 Modification	<input type="checkbox"/> Extension Request
<input type="checkbox"/> Class 2 Modification	<input type="checkbox"/> Groundwater Monitoring Report
<input type="checkbox"/> Class 1 ED Modification	<input type="checkbox"/> Interim Status Change
<input type="checkbox"/> Class 1 Modification	<input checked="" type="checkbox"/> Interim Status Closure Plan
<input type="checkbox"/> Endorsement	<input type="checkbox"/> Soil Core Monitoring Report
<input type="checkbox"/> Temporary Authorization	<input type="checkbox"/> Treatability Study
<input type="checkbox"/> Voluntary Revocation	<input type="checkbox"/> Trial Burn Plan/Result
<input type="checkbox"/> 335.6 Notification	<input type="checkbox"/> Unsaturated Zone Monitoring Report
<input type="checkbox"/> Other:	<input type="checkbox"/> Waste Minimization Report
	<input type="checkbox"/> Other:



November 5, 2021

Daniela Ortiz De Montellano, Project Manager
Texas Commission on Environmental Quality
Waste Permits Division
Industrial and Hazardous Waste Permits Section
MC-130
PO Box 13087
Austin, Texas 78711-3087

RE: Former Big Brown Steam Electric Station (SWR 30080) – Ash Disposal Area 2

Dear Ms. Ortiz De Montellano:

On behalf of Falcon Development, LLC (CN605732817), ATON, LLC is submitting this Updated Closure Plan for the Ash Disposal Area 2 (WMU 005) at the Former Big Brown Steam Electric Station (BBSES). The stormwater design is dependent upon approval of this cap plan design elevations; therefore, the final stormwater design will be completed and submitted following TCEQ cap plan approval.

Please contact me at (512) 566-6878 or adam.kaiser@atonenv.com if you have any questions or comments.

Sincerely,

A handwritten signature in black ink that reads "Adam J. Kaiser".

Adam J. Kaiser, PE
Senior Project Engineer
ATON LLC

CC:

Falcon Development, LLC

UPDATED CCR CLOSURE PLAN ASH DISPOSAL AREA 2 LANDFILL

*Former Big Brown Steam Electric Station
Freestone County, Texas*

Submitted to:
FALCON DEVELOPMENT LLC

Submitted by:
ATON LLC
2275 Cassens Drive, Suite 118
Fenton, Missouri 63026

November 2021

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1.0 INTRODUCTION

On behalf of Falcon Development, LLC (Falcon Development), ATON, LLC (ATON) has prepared this Updated Closure Plan for the Ash Disposal Area 2 (ADA 2) landfill (WMU 005) at the former Big Brown Steam Electric Station (BBSES) located in Fairfield, Texas (Figure 1). The BBSES previously consisted of two coal/lignite-fired units with a combined operating capacity of approximately 1,150 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash, and boiler slag were generated as part of BBSES unit operation. The BBSES Plant power generation ended in 2018 and in December 2019, Big Brown Power Company LLC transferred the Big Brown site to Falcon Development. In January 2020, the dismantling of the units commenced.

A CCR Closure Plan for the BBSES ADA 2 Area (PBW, 2016) was submitted by the Luminant Generation Company, LLC to the Texas Commission on Environmental Quality (TCEQ) in October 2016. The 2016 CCR Closure Plan addressed an approximate 240 acres area; however, due to the plant closure and less ash materials, the ADA 2 will encompass approximately 140 acres. This Updated Closure CCR Plan shall address the final grading and capping of the ADA 2 landfill.

2.0 SITE DESCRIPTION

The site is located along FM 2570, approximately 9 miles northeast of the town of Fairfield in Freestone County Texas (Figure 1). Big Brown went into operation in 1971 and is located on the north shore of Lake Fairfield. Big Brown Creek was impounded to form the plant's cooling source and the dam was completed in 1969 creating Fairfield Lake. Remnants of power generating operations, including the generating units, coal-storage areas, railroad corridor, and ash-handling areas, occupy the former plant area.

The ADA 2 landfill is located northeast of the former generating units (Figure 1) and areas southwest of the landfill include plant support-facilities such as the bottom ash ponds, operating pond, railroads, plant access and parking areas. Land use to the north of the ADA 2 landfill is primarily undeveloped former mining ground.

3.0 ADA 2 LANDFILL – DISPOSAL AREA

The ADA II landfill was originally designed for 20 cells; however, BBSES units were shut down in 2018. ADA 2 received bottom ash, fly ash, and related wastes from the BBSES and is considered an existing CCR landfill under the CCR rule. This updated closure plan will close the ADA 2 with 10 cells. The ADA 2 is no longer receiving CCR material, the only material currently being placed in Cell 10 is demolition debris from the BBSES demolition per the applicable industrial waste codes.

In February 2020, Falcon Development began dewatering the bottom ash ponds (WMU 008 & WMU 009) (TCEQ SWR #39099) and ash removal to the ADA 2. In October 2020, the ash removal was complete, and the ash ponds are considered closed (ATON, 2021a), and ADA 2 will receive no additional ash material.

ADA 2 was registered with the TCEQ as a Class 2 non-hazardous industrial waste landfill in 1986 under SWR No. 30080 and the registration was amended in 2009 to include Cell 11 and future Cells 12 through 20. Per the 2009 ADA 2 Registration Amendment (HDR, 2009) and 2016 CCR Closure Plan (PBW, 2016) the landfill is constructed partially above and partially below grade and is

surrounded by engineered earthen dikes that extend approximately 10 to 15 feet above the surrounding grade. Cells 1 through 5 were constructed in sequence beginning in approximately 1987 and Cells 6 through 11 were constructed in sequence beginning in 1992. Cells 1 through 11 are constructed with a 3-foot-thick compacted clay liner. Cells 12 through 20 are not completed.

As of 2018, most of the surface areas of Cells 1 through 8 have been covered with either a permanent clay cap or a temporary soil cap. The permanent clay cap covers an area of approximately 17.5 acres along the west side of the landfill and a small portion of the north side of the landfill (1.5 acres). The temporary soil cap covers an area of approximately 75-acres and varies in thickness from approximately 10 to 24 inches of sandy clay. Vegetation has already been established on both covered areas. Cell 11 was used to manage contact water from ADA 2; however, CCR has not been placed in the cell (Golder, 2018). The existing area where the permanent clay cap has been installed will be integrated with the overall permanent landfill cap as part of final landfill closure. A permanent landfill cap is proposed to be constructed on top of the areas covered with a temporary soil cap as part of final landfill closure.

4.0 UPDATED CLOSURE PLAN

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule was October 19, 2015. The Texas CCR regulations were adopted in June 2021, Title 30, Texas Administrative Code (30 TAC), Chapter 352.

The CCR Rule defines coal combustion residuals such as fly ash, bottom ash, boiler slag, flue gas desulfurization (FGD) materials (gypsum), and related solids generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The closure plan requirements of the CCR Rule apply to existing and new CCR landfills that dispose or otherwise engage in solid waste management of CCR. Additionally, the TCEQ Draft Technical Guidance #30 - CCR Landfill was consulted for the closure design.

The CCR Rule establishes national operating criteria for existing CCR surface impoundments and landfills, including development of closure plans for all CCR impoundments and landfills. A CCR Closure Plan was submitted to the TCEQ in 2016 that addressed an approximate 240 acres area; however, due to the plant closure and less ash materials, the ADA 2 will encompass approximately 140 acres. This Updated Closure Plan shall address the final grading and capping the ADA 2 landfill.

Oversight will be performed during construction and Falcon Development shall implement a quality assurance (QA) program during construction of the ADA 2 landfill cap to confirm that the closure is completed in accordance with the overall objectives and regulations for the site. Slight variances between construction and design may occur based on field conditions; however, the basic design elements for the cap system and landfill closure shall comply with the specifications as presented in this section. Any noticed variances from the approved design plan will be reported to TCEQ in a QA report summarizing the third-party QA oversight activities. The QA parameters are further discussed in the Technical Specifications included in Appendix A.

4.1 Grading Plan

This preliminary design report focuses on two major areas: the material selection for the final cap on ADA 2 and the grading plan for the cap. The attached grading plan shows the concept being pursued to cap this area. The plan maintains a minimum 3% slope, a maximum slope of 5%, and ties into the surrounding grade. This grading plan was designed to utilize the existing surface of ADA 2 landfill as efficiently as possible; however, to form the desired slope it will be necessary to cut material from some areas and fill in other areas. ADA 2 landfill stopped receiving waste well short of its original design capacity and was not left in a condition where an effective grading plan could be created without bringing in additional material. As discussed previously, most of this required fill material came from the bottom ash from the BAPs. The proposed contours cut and fill diagram, cross-section drawings, and cap details are included as Figure 2 and 3, respectively.

4.2 Landfill Capping System

This section contains the description of the final cover system and installation methods as outlined in 30 TAC §352.1221/40 CFR §257.102(d)(3). The final cover system for the landfill will be designed and constructed to minimize infiltration and erosion and maximize runoff. The primary design elements of the updated closure plan for the remaining portion of the ADA 2 are discussed below.

The final cover system must be designed and constructed to meet the following criteria:

- The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} centimeters per second (cm/sec), whichever is less.
- The cover system must have an infiltration layer of a minimum of 18 inches of earthen material;
- The final cover system must have a minimum of 6 inches of erosion layer of earthen material that can sustain native plant growth; and
- The final cover system must be designed to accommodate settling and subsidence.

Cover material should consist of a well-graded, fine-grained, clay-rich soil having low cracking potential and good workability and compaction characteristics. The TCEQ recommends a soil containing at least 20% of material passing a No. 200 sieve, having a plasticity index between 10% and 35%, having less than 10% gravel, and that includes no rocks larger than two inches in diameter. Based on general engineering practices, the TCEQ recommends that the compacted soil should have a hydraulic conductivity of 1×10^{-7} centimeters per second or less. If a suitable soil is not available on the site, it will be necessary to import the appropriate cover material or modify on-site material. The cover should be constructed and maintained to avoid ponding and erosion. The landfill cap shall be constructed to the lines and grades presented on the updated closure site plan in accordance with performance criteria established in the existing closure plan.

A typical cross-section illustrating the proposed soil cap is included in the updated grading plan (Figure 2 & Figure 3). Placement, compaction, and construction quality assurance testing procedures for the cap installation shall conform to the Technical Specifications included in Appendix A. Third party construction quality assurance oversight of the cap placement will be performed, and related documentation of the cap construction will be maintained by Falcon Development.

The inspections will include observations for:

- Soil erosion;
- Vegetation deterioration;
- Subsidence/settlement;
- Drainage problems/seepage; and
- Damage due to wildlife, weather or man-made activities.

Potential problem areas will be repaired as necessary through backfilling, grading/reshaping, seeding and related activities.

5.3 Maintenance Records

The CCR rules under 30 TAC 352, Subchapter K, Recordkeeping, Notification, and Posting of Information to the Internet, contain requirements for CCR landfill(s). Each inspection and maintenance activity will be documented in a written inspection and maintenance log. Documentation will include the date, time, name of the individual performing the inspection/maintenance, a description of the problems observed (if any), maintenance/repairs performed (if any), and related information. The inspection and maintenance log will be maintained to provide an inspection and maintenance history for ADA 2.

The Owner/Operator of CCR landfill(s) must maintain records (files) generated in response to 30 TAC §352.1301/40 CFR §257.105 for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record or study, and submit to the TCEQ I&HW Permits Section any demonstration or documentation, if requested.

6.0 CERTIFICATION STATEMENT

This updated closure plan, and all attachments were prepared by ATON LLC under my direction and supervision. This closure plan meets the requirements of 30 TAC 352, Subchapter J, and has been prepared in a manner consistent with recognized and generally accepted good engineering practices.



Adam J. Kaiser, PE
Senior Project Engineer
ATON LLC



7.0 REFERENCES

ATON LLC (ATON), 2021a. *Revised Closure Report – Bottom Ash Ponds, Former Big Brown Steam Electric Station*. August 13.

ATON, 2021b. *2020 Annual CCR Groundwater Monitoring Report – Ash Disposal Area 2, Former Big Brown Steam Electric Station*. January.

Golder Associates, Inc., 2018. *CCR Rule Location Restriction Demonstration, Big Brown Steam Electric Station. Ash Disposal Area 2*. October 10

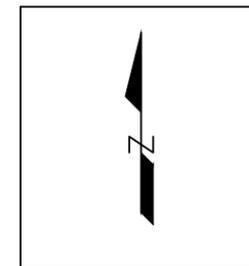
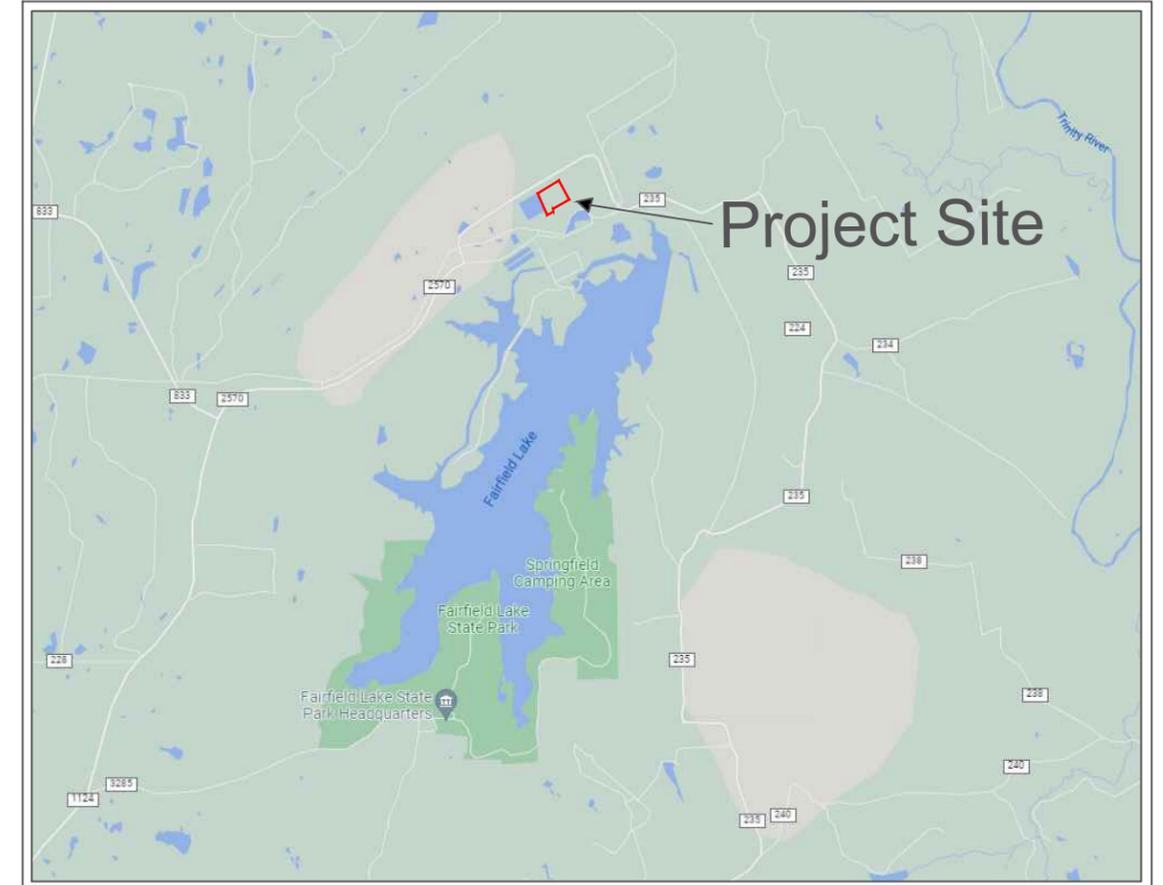
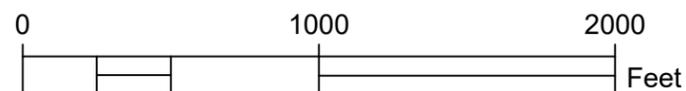
HDR Engineering, Inc., 2009. *Registration Amendment Big Brown Steam Electric Station. Ash Disposal Area 2, Registration #30080*. August.

Pastor, Behling & Wheeler, LLC (PBW), 2016. *CCR Closure Plan, Big Brown Steam Electric Station, Ash Disposal Area 2*. October.

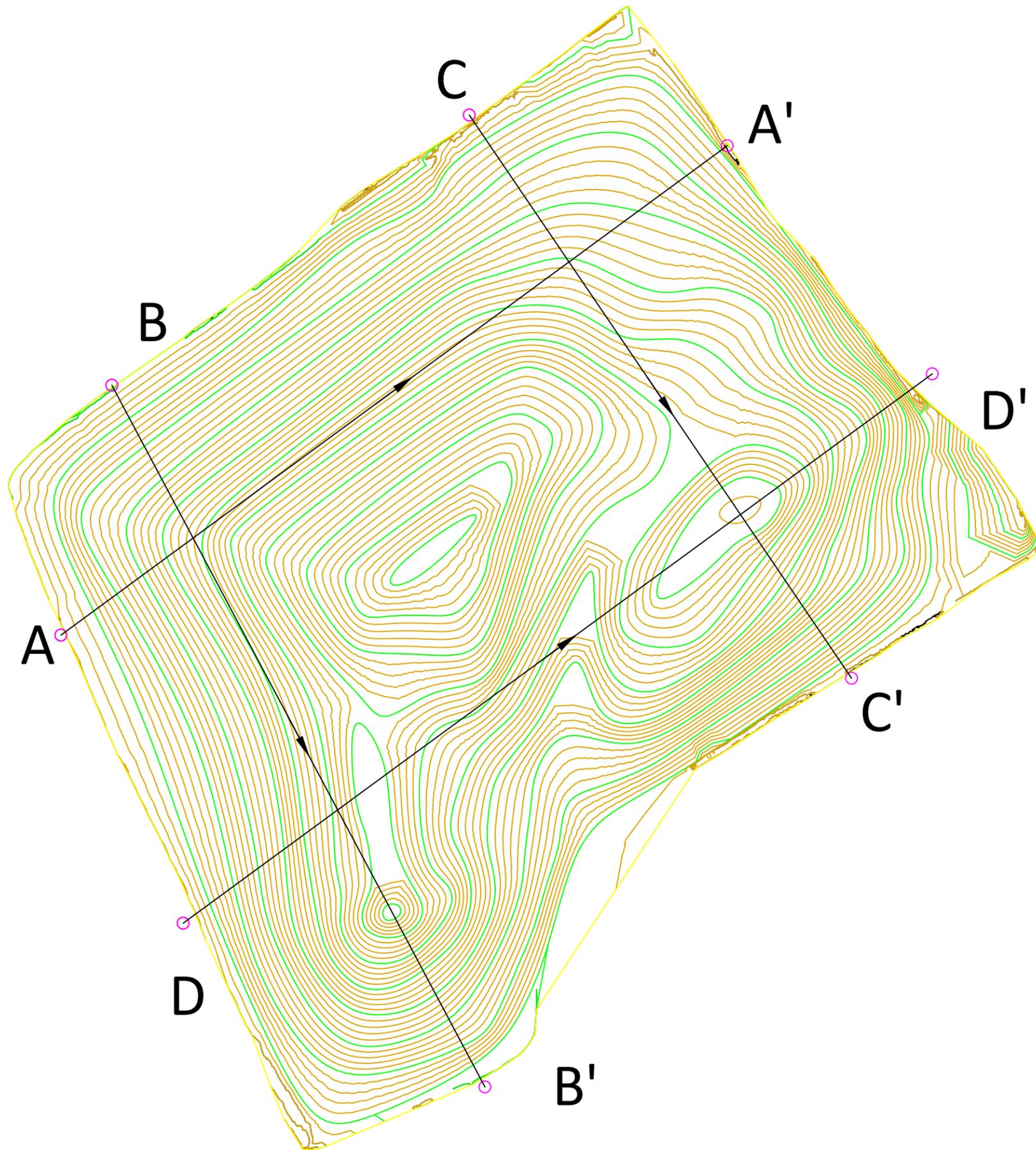
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FIGURES

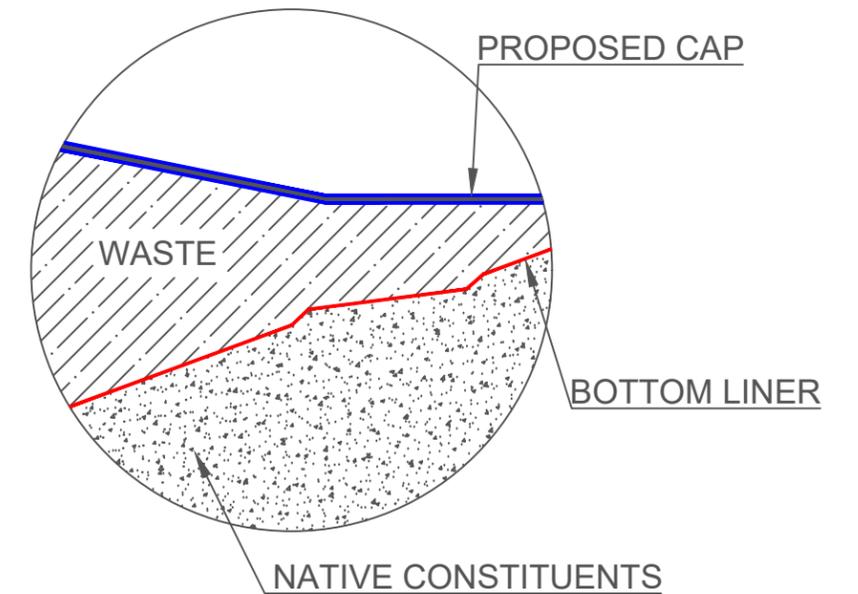
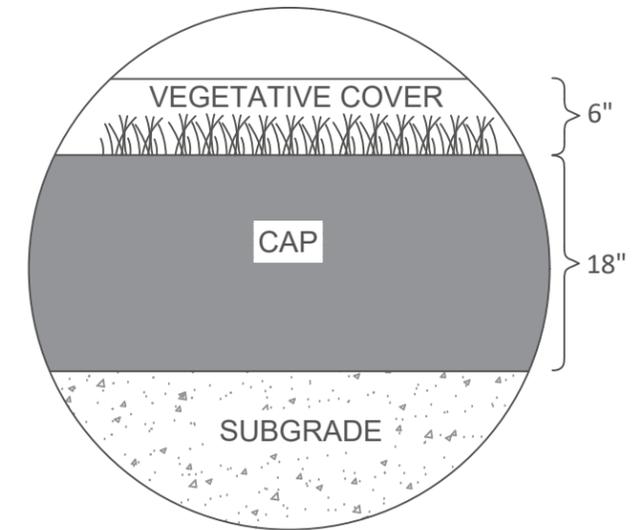
Falcon Development Ash Area II Revision (Former Big Brown Steam Electrical Station)



 ATON	Falcon Development Former Big Brown Steam Electrical Station	
	11/05/2021	
Revised Capping of Ash Area II	Drawn: RK	1 of 4
	Checked: AP	

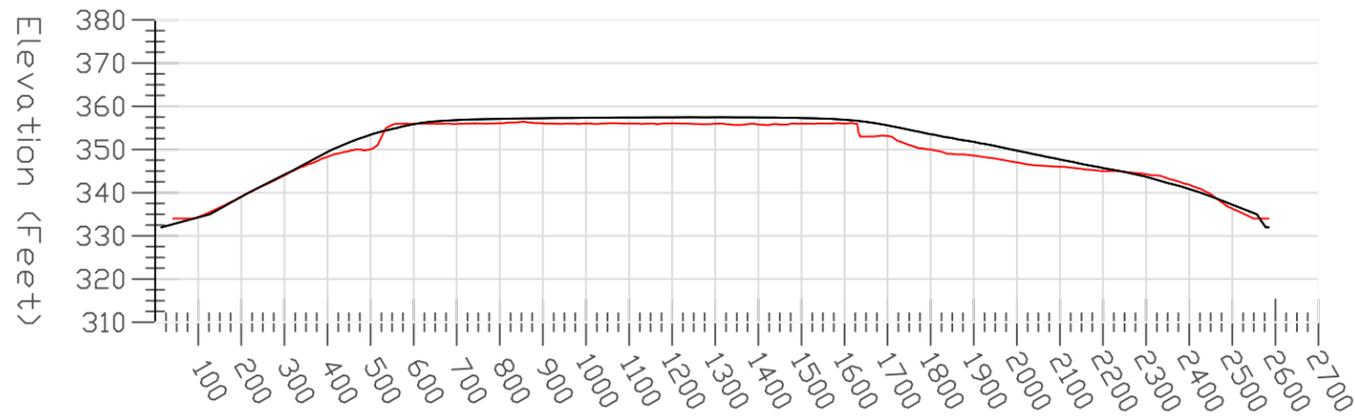


CAP CONSTRUCTION

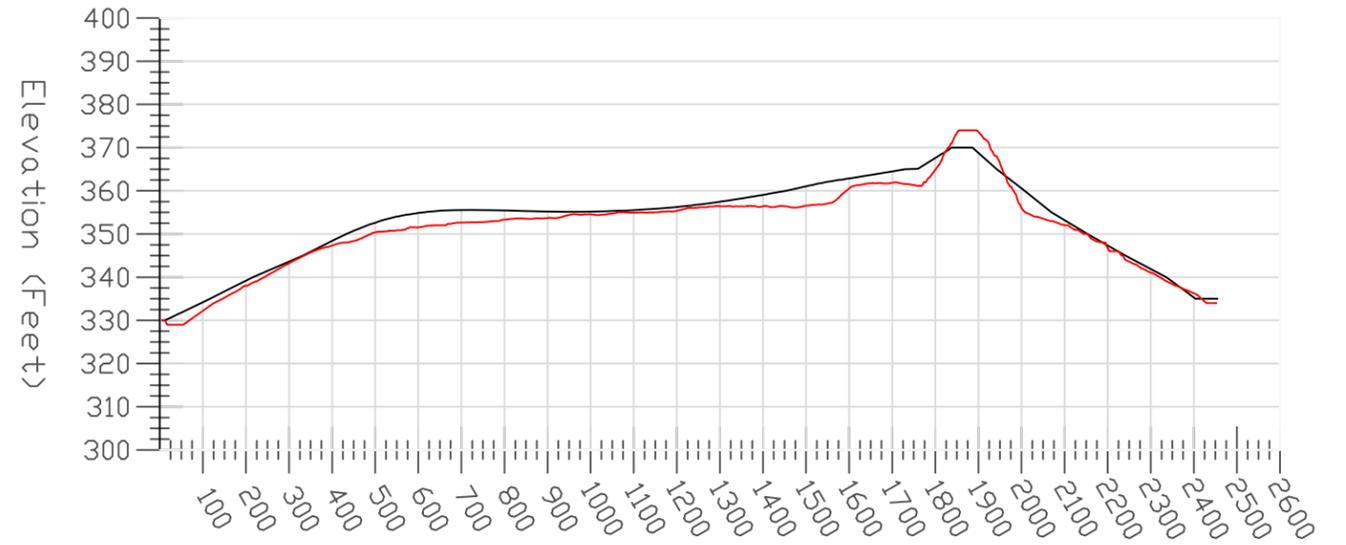


 ATON	Falcon Development Former Big Brown Steam Electrical Station	
	11/05/2021	
Revised Capping of Ash Area II	Drawn: RK	2 of 4
	Checked: AP	

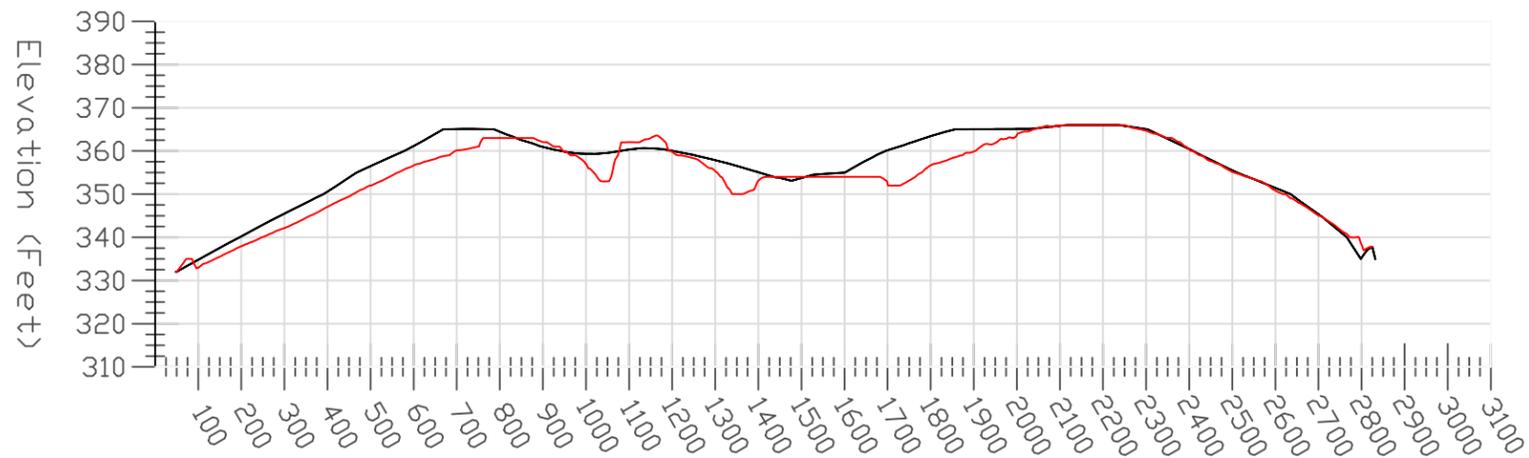
Cross Section A-A'



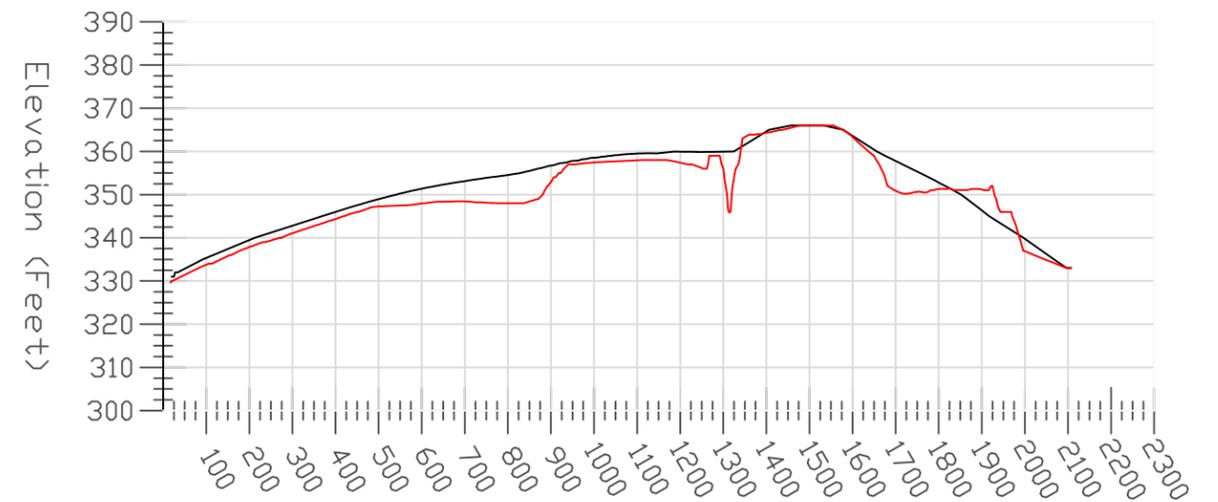
Cross Section B-B'



Cross Section C-C'



Cross Section D-D'



Legend

- Current Contour
- Proposed Contour



ATON

Falcon Development
Former Big Brown Steam
Electrical Station

Revised Capping
of Ash Area II

11/05/2021

Drawn: RK
Checked: AP

3 of 4

CONSTRUCTION OF CAP SUBGRADE

- A. Subgrade underlying the clay cap shall conform to the following:
 - 1. After the final lift has been placed and compacted to the required elevations, the cap subgrade shall be proof rolled.
 - 2. Do not place fill material on surfaces that are frozen.
 - 3. Any area of the cap subgrade shown to be unstable or non-uniform after proof rolling shall be recompacted and/or reworked until proof rolled to the satisfaction of the Engineer.
- B. After completion of the cap subgrade, but before beginning installation of the overlying clay cap, Contractor shall survey the finished elevations of the cap subgrade to ensure that the top of the cap subgrade is at the specified grades and elevations presented in the Closure Plan. There shall be a minimum of one survey point for every 5,000 square feet of cap surface area, 50-ft cross sections (horizontal-lift sidewall liners) Contractor shall verify that existing topographic conditions in the Work Area as shown on the Drawings are an accurate representation of existing site conditions prior to initiating construction activities.

CONSTRUCTION OF CLAY CAP

- A. The cap material should contain clay-rich soil with at least 20 percent of material passing a No. 200 sieve, having a plasticity index between 10 percent and 35 percent, having less than 10 percent gravel, and that includes no rocks larger than 2-inches in diameter.
- B. Compaction of all materials shall be performed with an appropriately heavy, properly ballasted penetrating foot compactor. The compacted soil will have a soil permeability of 1×10^{-5} centimeters/second or less.
- C. The daily work area shall extend a distance no greater than necessary to maintain moist conditions and continuous operations. Desiccation and crusting of the lift surface shall be avoided.
- D. Clay cap material should be placed in lifts not less than 6-inches nor greater than 9- inches, compacted with a roller to appropriate density and water content, and scarified to a minimum depth of two inches prior to placement of the of the following lift.
- E. The clay cap must be a minimum of 18 inches thick.
- F. Contractor shall survey the finished elevations of the cap subgrade to ensure that the top of the cap subgrade is at the specified grades and elevations presented in the Closure Plan. There shall be a minimum of one survey point for every 5,000 square feet of cap surface area, 50-ft cross sections (horizontal-lift sidewall liners)

VEGETATIVE SOIL LAYER

- A. Vegetative soil layer shall be a clay loam or silty clay loam as classified by the United States Department of Agriculture and shall comply with all the following:
 - 1. Free of deleterious material, materials toxic to plant growth, noxious weed seeds, rhizomes, roots, subsoil, rocks, or other debris.
 - 2. The pH shall be adequate to achieve the appropriate vegetative growth for the climate conditions.
- B. Vegetative soil shall not be placed until the underlying soil has been approved by the Engineer.
- C. Vegetative soil shall be placed in one 6-inch lift without damaging the underlying soil. Vegetative Soil shall be tracked in and smoothed out using tracked equipment. No direct compactive effort shall be used on vegetative soil.
- D. After completion of the vegetative Soil layer, Contractor shall survey the finished elevations of the Vegetative Soil to ensure that the top of the protective soil is at the grades and elevations specified on the Drawings.

VEGETATION

- A. Seed mixture shall be appropriate for the season in which it is planted and shall be approved by the Engineer prior to placement.
- B. Alternative seed mixtures may be submitted in writing to the Engineer and must be approved by the Engineer prior to seed application.
- C. Seed suppliers must provide labeling of variety, purity, and germination. The supplier must satisfy State of Texas seed quality laws. The Owner must approve seed supplier. Seed shall be applied evenly by broadcast or hydroseed application at the rate specified in this section.
- D. The Contractor shall conduct seeding during the proper growing season and proceed during appropriate weather conditions in the spring, winter, and fall.
- E. Contractor shall not sow immediately following rain, when ground is too dry, or during windy periods. Mulch shall be applied to all seeded areas within 24-hours after seeding operations unless otherwise approved by the Engineer. Straw or hay mulch shall be applied at a rate of approximately 150 pounds per 1000 square feet (6,500 pounds per acre) and crimped in place. Cellulose fiber mulch shall be applied at a rate of approximately 75 pounds per 1,000 square feet (3,200 pounds per acre). Contractor shall irrigate seeded areas if and as necessary to comply with the Uniform Grass Coverage (UGC) requirements of this Section.

TOLERANCES

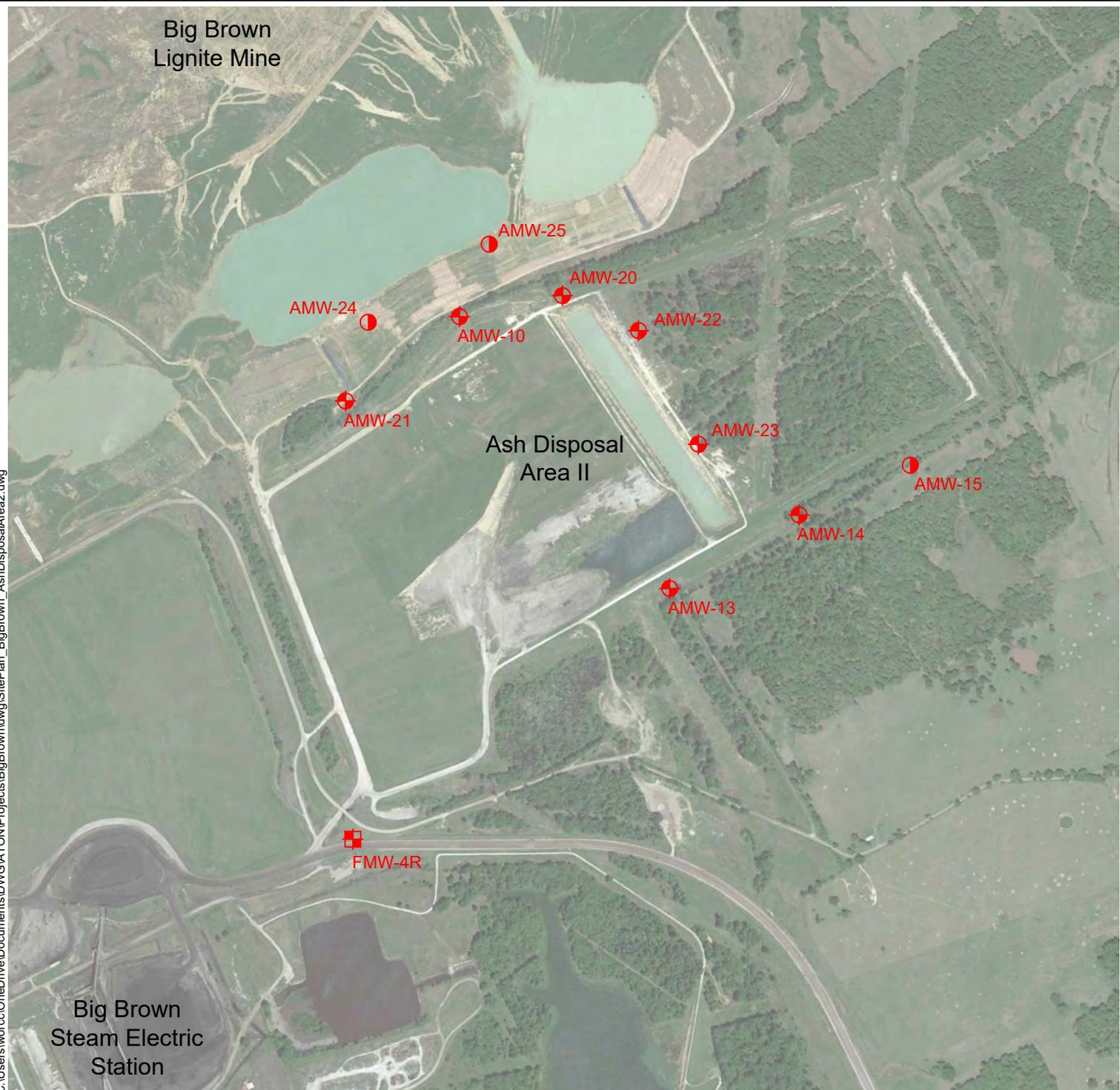
- A. Grades and slopes of all earthwork shall be straight and true. Unless otherwise specified, Contractor shall complete all earthwork within the dimensional tolerances presented below.
- B. Elevation Tolerances:
All Surfaces: plus 0.2-foot, minus 0.1-foot
- C. Thickness Tolerances:
All Thicknesses: plus 0.2 foot, minus 0.1 foot
- D. Grade Tolerances: All grades/slopes shall be completed within
All Surfaces: plus or minus 0.1 percent of design slope
- E. Horizontal Coordinates and/or Earthwork Dimensions: plus or minus 0.5 feet

SUBMITTALS

- A. Following clearing, grubbing, and cap subgrade preparation the subgrade shall be surveyed by a Texas licensed professional land surveyor (PLS) and provided to the Owner.
- B. Contractor shall submit copies to the owner of all cap geotechnical laboratory reports and field tests within 14 working days after sample collection. Following cap placement an PE certified report shall be provided to the Owner.
- C. Following cap placement, the cap shall be surveyed by a Texas PLS and provided to the Owner.
- D. Contractor shall submit information regarding proposed seed, fertilizer, mulch, tackifier, and any other materials to be used to establish vegetation at least 10 days prior to delivery.
- E. Following placement of the vegetative cover the landfill area shall be surveyed by a Texas PLS and provided to the Owner.

	ATON	Falcon Development Former Big Brown Steam Electrical Station	
		11/05/2021	
Revised Capping of Ash Area II		Drawn: RK	4 of 4
		Checked: AP	

C:\Users\wrcoc\OneDrive\Documents\DWG\ATON\Projects\BigBrown\dwg\SitePlan_BigBrown_AshDisposalArea2.dwg



LEGEND

- AMW-13  Downgradient CCR Monitoring Well
- FMW-4R  Upgradient CCR Monitoring Well
- AMW-24  CCR Nature & Extent Well

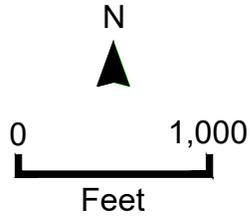


Figure 5
 Site Plan
 Project: Ash Disposal Area II
 Site: Big Brown Power Plant
 Client: Falcon Development

Chkd:	AK
Drawn:	EFC
Page:	1 of 1
Date:	10/20/2020
Scale:	As Shown

APPENDIX A
TECHNICAL SPECIFICATION FOR ADA 2 CLOSURE



ATON

TECHNICAL SPECIFICATIONS

Former Big Brown Steam Electric Station
Updated Closure Plan – Ash Area 2 Landfill

Prepared By:

ATON LLC

2275 Cassens Drive, Suite 118
Fenton, Missouri 63026

Prepared For:

FALCON DEVELOPMENT, LLC

November 2021

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2.0

**DIVISION 2
SITE WORK**

2.1 Section 02200 – Site Preparation

PART 1 – GENERAL

DESCRIPTION

- A. This section consists of all work associated with preparing the work area for earthwork and other construction activities, including removal of existing vegetation and verification of existing site conditions.

EXISTING SITE CONDITIONS

- A. Contractor shall verify that existing topographic conditions in the Work Area as shown on the Drawings are an accurate representation of existing site conditions prior to initiating construction activities.
- B. If Contractor contends that existing topographic conditions are different from that shown on the Drawings, Contractor shall submit survey data from a Texas-registered land surveyor to document actual topographic conditions and shall identify with such submission additional work required which was not accounted for in the Contractor's bid. There shall be no opportunity for a claim for extra work due to differing topographic conditions once stripping or excavation work has started.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

CLEARING

- A. Clearing shall consist of removal of all trees and shrubs within the limits of the landfill and borrow areas. Clearing shall be limited to the areas required to perform the work.
- B. Contractor shall segregate material removed, as part of clearing, from soils to be incorporated into subsequent earthwork activities.

VEGETATIVE SOIL STRIPPING AND STOCKPILING

- A. After completion of clearing activities, the Contractor shall strip existing vegetative soil from the cleared areas. Stripped material identified as vegetative soil shall be subject to Engineer's approval for reuse in the landfill area.
- B. Contractor shall stockpile stripped vegetative soil in the work area in a location acceptable to the Engineer.

DISPOSAL OF BRUSH AND OTHER VEGETATIVE MATERIAL

- A. Contractor shall dispose of all brush and other vegetative materials generated during site clearing in accordance with all applicable regulations and as approved by the Engineer.
- B. If approved by the Engineer, Contractor may burn brush and other vegetative material in accordance with the requirements of TCEQ Publication RG-049 "Outdoor Burning in Texas", as modified to comply with Owner requirements. The Contractor shall make sure that Titus County is not under a burn ban. Specific requirements for burning of brush and other vegetative material include, but are not limited to, the following:
 - 1. Commence or continue burning only when the wind direction and other weather conditions are such that the smoke and other pollutants will not present a hazard to any public road, landing strip, or water body or have an adverse effect on any off-site structure.
 - 2. Don't start burning unless weather conditions are such that the smoke will dissipate (winds of at least 6 miles per hour; no temperature inversions) while still allowing the fire to be contained and controlled (winds no faster than 23 miles per hour).
 - 3. Post someone to flag traffic if at any time the burning causes or may tend to cause smoke to blow onto or across a road or highway.
 - 4. Begin burning no earlier than one hour after sunrise, end it the same day and no later than one hour before sunset, and make sure that a responsible party is present while the burn is active, and the fire is progressing.
 - 5. At the end of the burn, extinguish isolated residual fires or smoldering objects if the smoke they produce can be a nuisance or a traffic hazard.

- C. Contractor will be responsible for controlling fires in compliance with all Federal, State, and Local laws and regulations. The securing of necessary burning permits shall be the responsibility of the Contractor. All burning shall be under the constant care of competent watchmen. All materials resulting from clearing and grubbing operations and disposed of by burning on the site shall be thoroughly and completely reduced to ashes.

- D. Contractor shall be responsible for providing a suitable location (subject to Engineer and Owner approval) for off-site disposal of cleared material not burned on-site. Once Engineer and Owner have approved the disposal location, Contractor shall transport and dispose the material in accordance with all applicable regulations.

2.2 Section 02300 – Earthwork

PART 1 – GENERAL

DESCRIPTION

- A. This Section consists of all activities associated with earthwork construction, including, but not necessarily limited to:
1. Excavation, loading, transportation, unloading and stockpiling of borrow soil from Owner- designated locations;
 2. Placement and grading of various earthen materials; and
 3. All other activities required to complete earthwork construction as shown on the Drawings, specified herein and or required by the Engineer.

REFERENCES

- A. American Society of Testing Materials (ASTM) Standards/Publications (Latest version):
- | | |
|-------|---|
| D422 | Method of Particle Size Analysis of Soils |
| D698 | Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) |
| D1556 | Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method. |
| D1557 | Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) |
| D1587 | Standard Practice for Thin-walled Tube Sampling of Soils D2487 Classification of Soils for Engineering Purposes |
| D2487 | Classifying mineral and organo-mineral soils for engineering purposes based on laboratory determination of particle-size characteristics, liquid limit, and plasticity index and shall be used when precise classification is required. |
| D2922 | Density of Soil in Place by Nuclear Density Gage D4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils |
| D5084 | Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter |
| D4318 | Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils |

DEFINITIONS

- A. Cap Subgrade Existing low permeability soil or coal combustion residuals (CCRs) in the work area that remains after clearing and stripping of existing surface cover from the limits of the active landfill.
- B. General Fill Any non-classified soil deemed suitable by the Engineer.
- C. Clay Cap The cap is the component of the landfill that overlies waste, serves to minimize water infiltration. The clay cap will be from Owner-identified borrow areas.
- D. Vegetative Soil Growth medium used along with any necessary admixtures to support vegetation. The soil layer serves to minimize water infiltration, promote good surface drainage, maximize runoff, and to separate the cap from animals, plant roots, and surface exposure Placed on top of cap the soil layer will be from Owner-identified borrow areas.

QUALITY CONTROL

- A. Contractor shall perform construction surveys, as needed, to ensure that the lines and grades of all excavations, embankments, ditches, and graded surfaces are in accordance with the drawings and specifications.
- B. Owner or Engineer may perform pre-construction and post-construction topographic surveys of the work area and related areas and may perform additional quality assurance surveys. Contractor shall coordinate his activities with Owner's or Engineer's surveyor and provide safe access to all excavation areas for survey and/or verification sampling activities.

TESTING

- A. The number and type of testing required for each type of earthwork shall be as described in the specific section related to the type of earthwork.
- B. Owner or Engineer will select the locations for all tests. Tests performed at locations not approved by the Owner or Engineer will not be accepted.

TOLERANCES

- A. Grades and slopes of all earthwork shall be straight and true. Unless otherwise specified, Contractor shall complete all earthwork within the dimensional tolerances presented below.
- B. Elevation Tolerances:

All Surfaces: plus 0.2-foot, minus 0.1-foot
- C. Thickness Tolerances:

All Thicknesses: plus 0.2 foot, minus 0.1 foot
- D. Grade Tolerances: All grades/slopes shall be completed within

All Surfaces: plus or minus 0.2 percent of design slope
- E. Horizontal Coordinates and/or Earthwork Dimensions:

 plus or minus 0.5 feet

UTILITIES

- A. Owner will attempt to deactivate electrical and other utilities in areas to be excavated; however, Contractor shall be ultimately responsible for ensuring that no energized equipment or utilities are present prior to initiating excavation activities. If Contractor identifies energized or active equipment or utilities, Contractor shall cease work and deactivate the equipment or utilities. Contractor shall again check the equipment and utilities to ensure they are deactivated prior to proceeding with excavation activities.

EARTHWORK SAFETY

- A. As discussed in other areas of these specifications, Contractor shall be fully responsible for the health and safety of all personnel in the work area, at all times, and shall take all necessary precautions to protect personnel.

- B. In addition to general health and safety responsibilities, Contractor shall be fully responsible for complying with all applicable OSHA and related regulations regarding earthwork, including, but not limited to, the requirements of 40 CFR Part 126.

2.3 Section 02400 – Cap Subgrade

PART 1 – GENERAL

DESCRIPTION

- A. This section shall govern work associated with grading, excavation, supply, hauling, placement, and compaction of cap subgrade material.
- B. Work associated with the cap subgrade shall also conform to Section 02300 – Earthwork of the Specifications.

MATERIALS INCLUDED IN THIS SECTION

- A. Existing CCR used as cap subgrade
- B. Contractor-supplied material used as cap subgrade

SUBMITTALS

- A. Following cap subgrade preparation, the subgrade shall be surveyed by a Texas-registered land surveyor and provided to the Owner.

PART 2 - PRODUCTS

COAL COMBUSTION BY-PRODUCTS AS CAP SUBGRADE

- A. Owner will supply CCRs or existing CCRs (Bottom Ash Ponds) within the landfill may be re-graded for use as cap subgrade.
- B. Owner will identify the location of CCRs outside of the landfill that may be used to supplement existing landfilled materials. Contractor shall be responsible for loading, transporting, placement, and compaction of CCRs used as cap subgrade.
- C. Cap subgrade shall be free of large roots, brush, or other perishable materials and debris.

CONTRACTOR-SUPPLIED MATERIAL AS CAP SUBGRADE

- A. Contractor-supplied cap subgrade material shall be as specified herein and certified by the Contractor.

- B. Cap subgrade may include crushed rock, broken rock, broken concrete, and similar materials. Surface of cap subgrade shall be clean fill material free of large stones, sticks, or other deleterious material.

PART 3 – EXECUTION

GENERAL

- A. Compaction of all materials shall be performed with an appropriately heavy, properly ballasted compactor.

CONSTRUCTION OF CAP SUBGRADE

- A. Subgrade underlying the clay cap shall conform to the following:
 - 1. After the final lift has been placed and compacted to the required elevations, the cap subgrade shall be proof rolled.
 - 2. Do not place fill material on surfaces that are frozen.
 - 3. Any area of the cap subgrade shown to be unstable or non-uniform after proof rolling shall be recompacted and/or reworked until proof rolled to the satisfaction of the Engineer.
- B. After completion of the cap subgrade, but before beginning installation of the overlying clay cap, Contractor shall survey the finished elevations of the cap subgrade to ensure that the top of the cap subgrade is at the specified grades and elevations presented in the Conceptual Closure Plan. There shall be a minimum of one survey point for every 5,000 square feet of cap surface area, 50-ft cross sections (horizontal-lift sidewall liners) Contractor shall verify that existing topographic conditions in the Work Area as shown on the Drawings are an accurate representation of existing site conditions prior to initiating construction activities.

2.5 Section 02500 – Clay Cap

PART 1 – GENERAL

DESCRIPTION

- A. This section shall govern work associated with grading, excavation, supply, hauling, placement, and compaction of the clay cap material.
- B. Work associated with the clay cap shall also conform to Section 02300 – Earthwork of the Specifications.

MATERIALS INCLUDED IN THIS SECTION

- A. Owner-supplied material used as clay cap will be provided from the site.

B. SUBMITTALS

- 1. Contractor shall submit copies to the owner of all cap geotechnical laboratory reports and field tests within 14 working days after sample collection. Following cap placement a certified report stamped by a Texas registered Professional Engineer (PE) shall be provided to the Owner.
- 2. Following cap placement, the cap shall be surveyed by a Texas-registered land surveyor and provided to the Owner.

PART 2 - PRODUCTS

OWNER-SUPPLIED MATERIAL AS CLAY CAP

- A. Owner will identify a suitable on-site borrow area for supplying clay cap material.
- B. Contractor shall be responsible for loading, transporting, placement, and compaction of material used as the clay cap.
- C. Clay cap material shall be free of roots, brush, sod, or other perishable materials and debris.

PART 3 - EXECUTION

GENERAL

- A. The cap material should contain clay-rich soil with at least 20 percent of material passing a No. 200 sieve, having a plasticity index between 10 percent and 35 percent, having less than 10 percent gravel, and that includes no rocks larger than 2-inches in diameter.
- B. Compaction of all materials shall be performed with an appropriately heavy, properly ballasted penetrating foot compactor. The compacted soil will have a permeability of 1×10^{-5} centimeters/second or less.
- C. The daily work area shall extend a distance no greater than necessary to maintain moist conditions and continuous operations. Desiccation and crusting of the lift surface shall be avoided.
- D. Recommended Tests for Borrow Source Materials:

<i>Soil Test Category</i>	<i>Type of Test</i>	<i>Standard Test Methods^a</i>	<i>Minimum Frequency of Testing^b</i>
Borrow Source Materials	Unified Soil Classification	ASTM D2487	One per soil type
	Moisture/Density Relationship	ASTM D698 or D1557	
	Sieve (gradation)	ASTM D422 or D1140	
	Atterberg Limits	ASTM D4318	
	Coefficient of Permeability	ASTM D5084 or CoE EM1110-2-1906	One per Moisture/Density Relationship

CONSTRUCTION OF CLAY CAP

- A. Clay cap material should be placed in lifts not less than 6-inches nor greater than 9- inches, compacted with a roller to appropriate density and water content, and scarified to a minimum depth of two inches prior to placement of the of the following lift.
- B. Compaction of all materials shall be performed with an appropriately heavy, properly ballasted penetrating foot compactor. The compacted soil will have a permeability of 1×10^{-5} centimeters/second or less.

- C. The clay cap (infiltration layer) must be a minimum of 18 inches thick.
- D. Recommended Tests for Clay Cap (Constructed Soil Liners):

<i>Soil Test Category</i>	<i>Type of Test</i>	<i>Standard Test Methods^a</i>	<i>Minimum Frequency of Testing^b</i>
Constructed Soil Liners	Field Density	ASTM D1556, D2167, or D6938	One per 8,000 ft ² per 6-inch parallel lift; one per 100 lineal ft per 12-inch sidewall horizontal lift
	Sieve (gradation)	ASTM D422 or D1140	One per 100,000 ft ² per 6-inch parallel lift; one per 2,000 lineal ft per 12-inch sidewall horizontal lift
	Atterberg Limits	ASTM D4318	
	Permeability	ASTM D5084 or CoE EM1110-2-1906 (laboratory) Air Entry Permeameter (field)	
	Thickness	Registered Surveyor or Professional Engineer	One per 5,000 ft ² (parallel lifts); 50-ft cross sections (horizontal-lift sidewall liners)

2.6 Section 02600 – Vegetative Soil Layer

PART 1 – GENERAL

DESCRIPTION

- A. This section shall govern work associated with grading, excavation, supply, hauling, and placement of the vegetative soil material.
- B. Work associated with the vegetative soil layer shall also conform to Section 02300 – Earthwork.

MATERIALS INCLUDED IN THIS SECTION

- A. Owner-supplied material used as vegetative soil
- B. Contractor-supplied material used as vegetative soil

SUBMITTALS

- A. Contractor shall submit copies to the owner of all geotechnical laboratory reports and field tests within 14 working days after sample collection.

PART 2 - PRODUCTS

OWNER-SUPPLIED MATERIAL AS VEGETATIVE SOIL LAYER

- A. Owner will supply Contractor with material for use as vegetative soil layer from the site.
- B. Owner will identify the location of material for Contractor. Contractor shall be responsible for loading, transporting, placement, and compaction of material used as the vegetative soil layer.

CONTRACTOR-SUPPLIED MATERIAL AS VEGETATIVE SOIL LAYER

- A. Vegetative soil layer shall be a clay loam or silty clay loam as classified by the United States Department of Agriculture and shall comply with all the following:
 - 1. Free of deleterious material, materials toxic to plant growth, noxious weed seeds, rhizomes, roots, subsoil, rocks, or other debris.

2. The pH shall be adequate to achieve the appropriate vegetative growth for the climate conditions.

PART 3 - EXECUTION

VEGETATIVE SOIL LAYER PLACEMENT

- A. Vegetative soil shall not be placed until the underlying soil has been approved by the Engineer.
- B. Vegetative soil shall be placed in one 6-inch lift without damaging the underlying soil. Vegetative Soil shall be tracked in and smoothed out using tracked equipment. No direct compactive effort shall be used on vegetative soil.
- C. After completion of the vegetative Soil layer, Contractor shall survey the finished elevations of the Vegetative Soil to ensure that the top of the protective soil is at the grades and elevations specified on the Drawings. There shall be a minimum of one survey point for every 10,000 square feet of vegetative soil surface area.

2.7 Section 02700 – Vegetation

PART 1 – GENERAL

SUMMARY

- A. This Section describes the requirements for vegetation establishment in areas disturbed during construction activities.

SUBMITTALS

- A. Contractor shall submit information regarding proposed seed, fertilizer, mulch, tackifier, and any other materials to be used to establish vegetation at least 10 days prior to delivery.

PART 2 – PRODUCTS

SEED SUPPLIERS

- A. Seed suppliers must provide labeling of variety, purity, and germination. The supplier must satisfy State of Texas seed quality laws. The Owner must approve seed supplier.

SEED DELIVERY, STORAGE, AND HANDLING

- A. Grass seed mixture shall be delivered in sealed containers.
- B. Fertilizer shall be delivered in appropriate waterproof containers showing weight, chemical analysis, and name of manufacturer.

SEED MIXTURE

- A. Seed mixture shall be appropriate for the season in which it is planted and shall be approved by the Engineer prior to placement.
- B. Alternative seed mixtures may be submitted in writing to the Engineer and must be approved by the Engineer prior to seed application.

ACCESSORIES

- A. Mulching materials shall consist of dry oat, wheat, or Bermuda straw, free from weeds and foreign matter detrimental to plant life. Native hay or chopped cornstalks are acceptable. Also acceptable is approved chip-form wood cellulose fiber or wood chips that is free of ingredients that could inhibit growth or germination.
- B. Fertilizer (if necessary) shall be used on vegetative soil layer material and shall be inorganic chemical fertilizer consisting of 20-5-5 fertilizer applied at 200 pounds per acre unless otherwise approved by the Engineer.
- C. Water shall be from fresh water sources and shall be free from soil, acids, alkalis, salt, or any other substance injurious to growth of grass.

PART 3 – EXECUTION

INSPECTION OF VEGETATIVE SOIL

- A. Contractor shall verify that vegetative soil and areas disturbed during construction activities are ready to receive the work covered by this section.

FERTILIZER

- A. All fertilizer shall be applied in accordance with manufacturer's instructions.

SEEDING

- A. Seed shall be applied evenly by broadcast or hydroseed application at the rate specified in this section. Adjustment to rate shall be made for variations in seed purity and germination to achieve the pure live seed equivalent rate. Hydroseeding is acceptable as a broadcast method of seeding and fertilizing. If dry broadcasting is done, seeds must be raked into the upper soil surface and seed must be applied at half of the specified broadcast rate. Designated areas for erosion control may not be seeded more than that which can be covered with erosion control material on the same day.
- B. The Contractor shall conduct seeding during the proper growing season and proceed during appropriate weather conditions in the spring, winter, and fall.
- C. Contractor shall not sow immediately following rain, when ground is too dry, or during windy periods.

SEED PROTECTION/EROSION CONTROL

- A. Mulch shall be applied to all seeded areas within 24-hours after seeding operations unless otherwise approved by the Engineer. Straw or hay mulch shall be applied at a rate of approximately 150 pounds per 1000 square feet (6,500 pounds per acre) and crimped in place. Cellulose fiber mulch shall be applied at a rate of approximately 75 pounds per 1,000 square feet (3,200 pounds per acre).
- B. Seeded sloped areas shall be covered with erosion control fabric on all exterior slopes of 4(H) to 1(V) and steeper, and in all drainage channels and swales.

IRRIGATION

- A. Contractor shall irrigate seeded areas if and as necessary to comply with the Uniform Grass Coverage (UGC) requirements of this Section.
- B. Irrigation may be performed by water truck or by temporary irrigation system. If a temporary irrigation system is used, Contractor shall remove temporary irrigation system once Owner has accepted vegetated areas.
- C. Irrigation shall be performed for a minimum of thirty days after initial planting and for as long as necessary to establish UGC across the entire seeded area.

ESTABLISHMENT AND ACCEPTANCE OF PERMANENT VEGETATION

- A. It shall be solely the Contractor's responsibility to establish UGC across all application areas, regardless of unseasonable climatic conditions or other adverse conditions affecting planting operations and growth of vegetation.
- B. The Owner will deem when UGC has been achieved.
- C. Any application areas, which are not determined to be acceptable by the Owner, shall be replanted, re-fertilized, and reirrigated at no additional cost to the Owner.
- D. The life and satisfactory condition of all plants (including grass) shall be guaranteed by Contractor for a period of up to one calendar year after written notice of first acceptance of vegetation by Owner. The guarantee period shall include one complete growing season and dormant period.