# AMENDED CLOSURE PLAN FOR BOTTOM ASH LANDFILL

Plant Gorgas Alabama Power Company Parrish, Alabama

July 2019

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# AMENDED CLOSURE PLAN PLANT GORGAS BOTTOM ASH LANDFILL ALABAMA POWER COMPANY

40 C.F.R. § 257.102(b)(3) and ADEM Admin. Code r. 335-13-15-.07(3)(b)3. ADEM Admin. Code r. 335-13-4-.20

### 1. Introduction

This Amended Closure Plan has been prepared to support the permit application previously submitted to the Alabama Department of Environmental Management (ADEM) for the CCR Landfill known as the Plant Gorgas Bottom Ash Landfill, located near Parrish, Walker County, Alabama. The permit application was submitted in accordance with ADEM Admin. Code r. 335-13-15-.09(1)(c) and r. 335-13-5-.02. This Amended Closure Plan, along with other documents, is intended to supplement the previous submittal in response to the ADEM letter dated May 24, 2019 which provided response comments to the original application.

### 2. General

The Plant Gorgas Bottom Ash Landfill received and stored coal combustion residuals produced during the electric generating process at Plant Gorgas. CCR products were conditioned, transported by truck and then compacted in the landfill for storage. The landfill covers approximately 56 acres, and currently stores about 4,100,000 cubic yards of CCR.

The Bottom Ash Landfill at Plant Gorgas has been in operation for many years, and there are not formal design plans available related to the original construction. The Bottom Ash Landfill is formed by excavations in previously placed mine spoil material and natural hillsides, as well as low earthen embankments. The foundation materials beneath the CCR unit generally consist of previously placed mine spoils.

The Plant Gorgas Bottom Ash Landfill is not constructed with a liner nor a leachate collection system. Prior to ADEM's promulgation of its CCR rule, the Bottom Ash Landfill was not subject to solid waste regulation under state or federal law. Thus, the Bottom Ash Landfill was not required to operate with the design features described in ADEM Admin. Code r. 335-13-4-.18. Since that time, the federal CCR rule was enacted without requiring an existing CCR landfill to have a liner. See 40 C.F.R. § 257.70 (imposing design criteria for new CCR landfills and expansions of existing landfills, but not for existing landfills). This was not an oversight on EPA's part, but rather a recognition that "the potential for disruption in CCR disposal capacity . . . would be significant" if such facilities were required to retrofit, and such disruptions "are associated with significant risks to public health and the environment in their own right." 80 Fed. Reg. 21,301, 21,370 (Apr. 17, 2015). EPA also noted that existing landfills like the Bottom Ash Landfill at Plant Gorgas would be subject to other protective measures of the CCR rule, including groundwater monitoring and corrective action. *Id.* The text of the comparable design criteria in ADEM's regulations is the same in substance as § 257.70 of the federal regulations. See ADEM Admin. Code r. 335-13-15-.04(1). Therefore, it is our

understanding that ADEM's CCR regulations do not require installation of additional design features at the Bottom Ash Landfill. If ADEM takes a different view of the requirements of its regulations, we will request a variance pursuant to r. 335-13-15-.15 on the grounds that such a determination is not any less stringent than the federal CCR rule and is protective of public health and the environment, which is supported by EPA's determination as expressed in the 2015 federal rule and preamble.

As of April 2019, Plant Gorgas has now been retired, and the Bottom Ash Landfill is being prepared for closure. The footprint will be consolidated, and the final cover system will be applied to the consolidated footprint of approximately 27 acres.

The final cover will be designed to minimize infiltration and erosion. Current plans are to have the cover system include a 60-mil geomembrane overlain with a geocomposite, both covered with 18 inches of protective soil and 6 inches of topsoil. The cover system to be used meets or exceeds the requirements of 40 CFR § 257.102(d)(3)(ii) and r. 335-13-4-.20(2)(b)1. in that the permeability of the final cover system will be less than or equal to the permeability of the subgrade beneath the landfill. Final design will ensure the disruption of the integrity of the final cover system is minimized through a design that accommodates settlement and subsidence, in addition to providing an erosion layer for protection from wind or water erosion.

The final cover system will be constructed to control, minimize or eliminate, to the maximum extent feasible, post closure infiltration of liquids into the waste and potential releases of CCR from the unit. This will be prevented by including sufficient grades and slopes as part of the final cover system which will: 1) preclude the probability of future impoundment of water, slurry, or sediment; 2) ensure slope and cover system stability; 3) minimize the need for further maintenance; and 4) be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

Additional details regarding the cover system can be found in Sections 4.e. and 4.f. of this document. Cover system details are also shown on the attached design drawings.

### 3. Notification of Intent to Close

Notification of intent to close the Plant Gorgas Bottom Ash Landfill was placed in the plant's Operating Record on April 15, 2019. The notice of intent was subsequently submitted directly to ADEM. Closure of the landfill will be conducted under § 257.102(d) and r. 335-13-15-.07(3)(d), closure performance standard when leaving CCR in place. As described in more detail below, the landfill will be closed in a manner that will control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated runoff to the ground or surface waters or to the atmosphere. Closure will also preclude the probability of future impoundment of water, sediment or slurry. Measures will be taken during design and construction of the closure system that provide for major slope stability to prevent the sloughing or movement of the final cover system. Closure will also minimize the need for further maintenance of the CCR unit.

Major closure activities will commence following receipt of a CCR permit from ADEM pursuant to r. 335-13-15-.09.

### 4. Written Closure Plan - § 257.102(b)(1)(i),(iii) and r. 335-13-15-.07(3)(b)1.(i),(iii)

### a. Overview

A written closure plan to comply with § 257.102(b) was posted to the Plant Gorgas Operating Record on October 17, 2016. A revised written closure plan incorporating reference to applicable ADEM Administrative Codes was submitted as a part of the original CCR Permit application.

As required by § 257.102(b)(3)(ii) and r. 335-13-15-.07(3)(b)3.(ii), the written closure plan must be amended whenever (i) there is a change in the operation of the CCR unit that would substantially affect the written closure plan or (ii) before or after closure activities have commenced when unanticipated events necessitate a revision of the written closure plan. The time frames for amendment to the written closure plan is in accordance with those specified in § 257.102(b)(3)(iii) and r. 335-13-15-.07(3)(b)3.(iii).

### b. Closure Steps

The closure of the Plant Gorgas Bottom Ash Landfill will involve the following general activities:

- Installation of Erosion & Sediment Control/BMPs as part of site preparation activities
- Clearing and grubbing as part of site preparation activities
- General excavation and grading around the site
- CCR excavation, consolidation, and grading
- Installation of the final cover system
- Construction of final stormwater control and conveyance systems

Plant Gorgas formally ceased generation of electricity on April 15, 2019, and the Bottom Ash Landfill ceased receiving CCR on or before this date. A Notice of Intent to initiate closure was placed in the Plant Gorgas Operating Record on April 15, 2019.

A Contractor has been selected for the closure project and has mobilized to the site to begin preparation for closure. Their initial activities include installation of erosion and sediment control structures, followed by clearing and grubbing. Most of the site is relatively barren of vegetation, but there is a limited amount of vegetation scattered around the perimeter of the landfill, including an area of trees to the south that will need to be removed.

As this facility is a landfill containing dry stacking of CCR, there is no dewatering required to facilitate closure.

### c. Procedures During Closure

### i. Erosion and Sedimentation Control

Prior to initiation of closure activities, erosion and sedimentation controls will be established along with Best Management Practices. Erosion and sedimentation control details can be found on Drawings E720292 and E720293.

### ii. Stormwater Management

The only stormwater generated within the Bottom Ash Landfill results from precipitation that falls within the Bottom Ash Landfill drainage basin. There is no current discharge from the Bottom Ash Landfill; water that collects within the cell at the southern end evaporates. As a part of the closure project, grading activities will develop new drainage patterns to drain stormwater to a new detention pond (to be installed in the early phases of the project.) The pond will have an outlet control structure. Stormwater collected during the project will be treated and/or rerouted to other Plant water treatment facilities prior to discharge.

Stormwater from adjoining areas will be diverted around the landfill and managed through existing stormwater facilities or NPDES permit points, as applicable.

### iii. CCR Removal Activities and Verification

Closure construction is going to involve consolidation of the CCR footprint, which will involve excavation of ash from some areas, with the excavated ash placed and compacted in the consolidation footprint that will be beneath the final cover system. As previously stated, the Bottom Ash Landfill area will be reduced from approximately 56 acres to about 27 acres. CCR will be excavated from outside the consolidation footprint until all visual ash has been removed. CQA personnel will perform a visual inspection to note if any visible ash remains in these areas. If visible ash is noted, further excavation will be performed. If no visible ash is noted, a grid or other reference points will be established, and a survey of the area taken to document the excavated surface. Also, the exposed soils will be visually classified and photographed. The classification indicator will be gray to black, sand-to-gravel sized particles as this area was used predominately for bottom ash storage. If possible, visual classification will be supported by use of the Munsell color system. However, as this area was previously disturbed with surface mine activities, the Munsell color chart usage may not be fully viable. The area will then be overexcavated an additional 6 inches, with the excavated soil placed within the consolidation footprint. The bottom of the overexcavation area will also be surveyed to document the excavation took place over the entire excavation area. Hand auger borings, if possible, may also be performed to a depth of about 12 inches below the exposed surface to provide a further check against the presence of deeper ash. Hand auger borings will be performed at a frequency of approximately 1 per acre.

The Contractor selected for the closure construction project will retain the services of an engineering and testing firm to provide quality control (QC) services. Southern Company, on behalf of Alabama Power, will retain the services of an additional engineering and testing firm to provide quality assurance services during the closure project. The services of each firm are outlined in the attached Technical Specifications. The removal of ash from outside the consolidation footprint will be observed and documented by the Contractor, the QC firm and the QA firm, with records from this process included in the final closure certification report.

### iv. CCR Placement

The new consolidated footprint will be in an area where dry stacking of ash has taken place for several years, so the area is relatively stable in its current condition. The subgrade will be assessed before the placement of any additional CCR using proofrolling or other similar techniques. Prior to any work in the area, erosion and sediment controls and other BMPs will be installed in accordance with the project plans and specifications.

As the area has been dry stacked for years, there is no dewatering involved in the closure process (either free water or interstitial water). The groundwater level is approximately 40 feet or more below the consolidated footprint.

CCR from the excavated area will be excavated using conventional earthmoving equipment and loaded in to trucks for transport to the consolidation area. The CCR is to be placed in loose lifts not exceeding 8-in thickness and compacted to a minimum of 95 percent of the materials standard Proctor maximum dry density. Following such measures will result in a compact and stabilized consolidation footprint.

### v. Fugitive Dust Control Plan

Fugitive dust control will be performed in accordance with the previously established fugitive dust control plan for Plant Gorgas. During construction, water trucks and compaction will be used to minimize dust. Ash will be conditioned as needed for compaction and to minimize dust generation. Trucks transporting ash and other materials will be operated at speeds intended to reduce generation of dust along roadways and other travel paths.

On-site personnel will assess the effectiveness of the control measures by performing visual observations of the ash pond and surrounding areas and implementing appropriate corrective actions for fugitive dust, as necessary.

Should a complaint be received from a citizen regarding a CCR fugitive dust event at the facility, the complaint will be documented and investigated. Appropriate steps will be taken, including any corrective action, as appropriate.

### vi. Surface Water Management

Water that accumulates within the Bottom Ash Landfill footprint during closure construction may be used for ash conditioning water to support compaction and dust suppression in conjunction with the Fugitive Dust Control Plan. Any water not used for such purposes will be conveyed to the Plant's permanent wastewater treatment system. Non-contact stormwater which will be diverted around the landfill during construction will be managed through the site's normal NPDES operations.

### vii. Equipment Decontamination

Before moving a piece of equipment that has been in contact with CCR from the active work area, the equipment will be cleaned with water in a designated area. CCR generated from this cleaning process will be incorporated with other CCR within the consolidated footprint prior to construction of the final cover system. Water generated during this process will be managed as contact water using the methods described previously.

### viii. Site Security

The Bottom Ash Landfill is located on Plant Gorgas property, and access to the Plant, and thereby the landfill, is restricted with security gates manned 24 hours a day. Public access is not allowed unless escorted by authorized personnel. Access to the construction area will be limited to authorized personnel only during the closure project.

### ix. Groundwater Monitoring

A groundwater monitoring plan was submitted with the original Bottom Ash Landfill permit application. Please refer to Appendix 4 of the original permit application.

### x. Operational Inspections

Inspections will be conducted by a Qualified Person at intervals not exceeding 7 days to look for appearances of structural weakness and for proper operation of all outlet structures maintained for use during closure. Furthermore, an annual inspection will continue to be conducted by a qualified Professional Engineer throughout the closure process.

### d. Closure Design Features

The closure of the Gorgas Bottom Ash Landfill will include the consolidation of dry stacked ash within the landfill prior to the construction of the cover. The operational disposal footprint will be consolidated to reduce the acreage that will be under cover. A stormwater management pond will be constructed to manage non-contact runoff from the closed facility. Where needed, additional earthen berms will be constructed to separate the closed cell from the stormwater pond, contain the ash, and provide a berm for the closure geomembrane anchor trench. The cell is contained on many sides by existing berms. No special containment structures or slurry walls will be needed as a part of closure.

### e. Final Cover System

As currently planned, the final cover system for the Bottom Ash Landfill will consist of a composite cover system incorporating a 60-mil HDPE geomembrane overlain with a geocomposite, both covered with 18 inches of protective soil and 6 inches of topsoil. This cover system meets the requirements of § 257.102(d)(3)(i)(I) and (II) and r. 335-13-15-.07(3)(d)3.(i)(I) and (II). Infiltration of liquids will be prevented by the presence of both an 18-in infiltration/protective layer and the 60-mil HDPE geomembrane. A minimum 6-in erosion layer of soil capable of sustaining native plant growth will cover the infiltration layer and provide erosion protection for the final cover system. The final cover system will be installed over the consolidated area, eliminating direct exposure of CCR to the surrounding environment.

Disruption of the integrity of the cover system will be minimized through a program of regular inspection and maintenance as outlined in the post-closure care plan.

### f. Achievement of Closure Performance Standards

Closure of the Bottom Ash Landfill will meet the requirements of § 257.102(d) and r. 335-13-15-.07(3)(d). Details of how the cover system will meet the final cover system requirements of § 257.102(d)(3)(i) and r. 335-13-15-.07(3)(d)3.(i) were addressed in 4.e. above. [Consider including a reference to how the final cover system will meet 257.102(d)(1) and 335-13-15-.07(3)(d)1.]The site will be graded during closure to direct surface runoff to a central rip-rap lined conveyance channel discharging to the new detention pond located to the southwest of the closed landfill. Surface grades in the consolidated footprint will range from 25 percent to 3 percent. Therefore, Alabama Power will be requesting a variance from the minimum 5 percent grades. As the waste material will be compacted bottom ash, we do not anticipate significant settlement of the cap and cover that would create depressions or other impedances to surface flow of stormwater. Furthermore, with a majority of the slopes being approximately 6 percent or flatter, we have not incorporated benching into the design as required by r. 335-13-15-.07(3)(d)3.(i)(V).

### g. Corrective Measures

Based on groundwater monitoring results and an Alternate Source Demonstration, submitted to the Department in July 2019, for the facility, no Assessment of Corrective Measures has been proposed for this facility and was therefore not incorporated into the closure design. However, site conditions will be monitored and, if necessary under § 257.96(a) and r. 335-13-15-.06(7)(a), corrective measures will be initiated.

### h. Completion of Closure Activities

Closure of the facility is expected to be completed by November 2020. Pursuant to 335-13-15-.07(3)(f)2.(i), Alabama Power intends to submit a demonstration showing that it is not feasible to complete the closure of the CCR landfill within the 6 month timeframe contemplated by § 257.102(f)(1)(i) and r. 335-13-15-.07(3)(f)1.(i). The timeline for closure is based on the volume of material to be moved and grading activities required to consolidate the closure footprint and construct the new detention pond.

# 5. Maximum Inventory of CCR- § 257.102(b)(1)(iv) and r. 335-13-15-.07(3)(b)1.(iv)

The maximum inventory of CCR stored in the Bottom Ash Landfill during its operation is approximately 4,100,000 cubic yards. The amount of CCR to be included in the consolidated footprint and under the cover system is approximately 3,800,000 cubic yards.

### Largest Area Requiring Final Cover <u>§ 257.102(b)(1)(v)</u> and r. 335-13-15-.07(3)(b)1.(v)

The Gorgas Bottom Ash Landfill covers about 56 acres. The footprint will be consolidated, and the final cover system will be applied to the consolidated footprint of 27 acres.

### 7. Schedule for Completing Closure Activities – § 257.102(b)(1)(vi) and r. 335-13-15-.07(3)(b)1.(vi)

Notification of intent to initiate closure was placed in the Plant Gorgas Operating Record on April 15, 2019. A Contractor has been selected for the closure project and has mobilized to the site to begin preparation for closure. Their initial activities have included installation of erosion and sediment control structures, followed by clearing and grubbing. Initial excavation of CCR from the footprint of the new detention pond has also begun, with the excavated ash moved to the consolidated footprint. Closure construction is expected to be complete by November 2020. A detailed construction schedule is attached to this Amended Closure Plan.

### 8. Certification of Closure

In accordance with § 257.102(h) and r. 335-13-15-.07(3)(h), a notification of completion of closure will be prepared and placed in the Plant Gorgas Operating Record. The notification of completion of closure will include a certification by a qualified professional engineer licensed in the State of Alabama in accordance with § 257.102(f)(3) and r. 335-13-15-.07(3)(f)3. verifying that closure has been completed in accordance with the closure plan required by § 257.102(b) and r. 33-13-15-.07(3)(b).

APC will also submit confirmation that a notation on the property deed has been recorded in accordance with r. 335-13-15-.07(3)(h)(i).

### 9. Directional Informational Signs

Upon completion of closure, signs will be posted at the entrance to the facility notifying users that the landfill is closed. Contact information will be provided on the sign.

### 10. Vegetative Plan

The upper 6-in vegetative layer of the designed cover system is designed to promote vegetative growth while limiting erosion from wind and water. To promote the growth of vegetation, the vegetative layer of the cover system will be seeded and amended, as needed, with lime, fertilizer or similar products after installation. Details regarding the vegetative plan are shown on the closure design drawings.

Prior to the establishment of permanent vegetation, temporary stabilization measures will be incorporated as needed to limit erosion during closure construction completion.

### 11. Site Equipment Needed

The Contractor selected to perform closure construction will be responsible for all equipment needed during the construction period. For post-closure care, Alabama Power will provide all necessary company owned, leased or contracted equipment needed to perform maintenance and any necessary repairs.

### 12. Sediment Removal

On a periodic basis, accumulated sediment will be removed when necessary from drop inlets, drainage pipes, diversion ditches and other drainage structures.

### 13. Erosion and Sediment Control

Erosion and sediment control structures are included in the closure design structures and will be installed as a part of closure construction. Temporary erosion and sediment control and other BMP measures will be installed and maintained until construction is complete and permanent vegetation is established.

### 14. Cost of Closure

Through coordination with the engineering design team and the subcontractor selected to execute the closure activities, the estimated cost of closing Plant Gorgas's Bottom Ash Landfill is approximately \$27.6 million. The estimate is considered to be at control level with a high level of project definition. However, due to the complexity, quantities, and duration of the overall project, some variability in costs is expected. Additional expenses of post closure care, maintenance, and corrective action are currently estimated at \$6.6 million. Fully detailed long-term maintenance and corrective action strategies have not yet been determined which will have the potential to influence current estimates.

### 15. Closure Schedule

A construction schedule is attached to this Amended Closure Plan as Table 1.

### 16. Recordkeeping/Notification/Internet Requirements

As outlined in § 257.105 and r. 335-13-15-.08(1), each Owner or Operator of a CCR unit subject to the Department regulations must maintain files of certain information in an operating record at the facility. Each file is to be retained for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record or study. Electronic storage of the records is acceptable. These records are to be made available to the Department upon request.

Certain notifications are to be made in accordance with the requirements of § 257.106 and r. 335-13-15-.08(2). In many instances, such notifications are to be placed in the facility's Operating Record. In certain instances, further notifications are to be made to the Department Directory within 30 days of placement of a notification into the Operating Records. Furthermore, a publicly accessible internet site must be established for posting of certain notifications and compliance information within 30 days of it being placed in the Operating Record.

Alabama Power and Plant Gorgas maintain an electronic Operating Record for the facility. In addition, a publicly accessible internet site has already been established for compliance with EPA's CCR Rule. Required notifications and compliance data, as outlined in § 257.105 through § 257.107 and r. 335-13-15-.08 and as applicable to the Plant Gorgas Bottom Ash Landfill, will be maintained in the electronic Operating Record, and as required, made available on the publicly accessible internet site within 30 days of placement in the Operating Record. Furthermore, required notifications will be made to the Department Director within 30 days of placement in the Operating Record.

Certain plans and assessments are required to be updated at specified intervals and/or upon modification of certain components of the facility. If and when applicable, updates will be made to the respective plans and assessments, and notifications placed in the Operating Record, posted to the publicly accessible internet site, and communicated in writing to the Department Director in accordance with the Department rules.

### 17. Written Post-Closure Plan

40 CFR § 257.104 and ADEM Administrative Code r. 335-13-15-.07(5) require the owner or operator of an existing CCR landfill that is closed in place to provide for post-closure care of the unit for a period of at least 30 years. Post-closure care includes maintenance of the facility, as well as groundwater monitoring in accordance with § 257.90 through § 257.98 and r. 335-13-15-.06(1) through r. 335-13-15-.06(9).

The Plant Gorgas Bottom Ash Landfill is currently expected to be closed in place under the performance standards outlined in § 257.102(d) and r. 335-13-15-.07(3)(d). Following closure, maintenance will be provided on the final cover system for the required post-closure care period so that the integrity and effectiveness of the final cover system will be maintained. Maintenance activities will include, as needed, repairs to the final cover to correct any effects related to settlement, subsidence, erosion or other events, and will be performed to prevent run-on or run-off from eroding or otherwise damaging the final cover. Maintenance tasks could include, but not be limited to, repair of erosion features, replacement of eroded cover soils and re-establishment of vegetation, where applicable. Maintenance will be performed on a semi-annual schedule, or more frequently if needed.

The groundwater monitoring system will be maintained throughout the required post-closure care period. Groundwater monitoring will be performed on a semiannual basis during the required post-closure care period as well.

The following office(s) can be contacted about the facility during the post-closure care period.

Gorgas Steam Plant Compliance and Support Manager 460 Gorgas Road, Parrish, AL 35580-5715 1-205-686-2103 G2CCRPostGOR@southernco.com

At the present time, there is no planned use of the facility after closure. If current plans change, they will be noted in an amendment to the post-closure care plan. Any future use of the property after closure will not disturb the integrity of the final cover, liner or any other component of the containment system. Furthermore, the functionality of the groundwater monitoring system will be maintained.

No later than 60 days following completion of the post-closure care period of 30 years, Alabama Power Company will prepare a notification verifying completion of the post-closure care.

Table 1: Gorgas Bottom Ash Landfill Closure Milestones Schedule (335-13-15-.07(3)(b)1.(vi))

Closure Activity	Completion Date
Notice of Intent to Close	October 2016
Cease Receipt of Waste Streams/Initiate Construction Activities	April 2019
Initiate Free Water Dewatering Activities	n/a
Begin CCR Consolidation and Stabilization	May 2019
Begin Final Cover Cap Construction Activities	September 2019
End Final Cap Construction Activities	August 2020
Project Completion	December 2020

# SOUTHERN COMPANY GENERATION ENGINEERING AND CONSTRUCTION SERVICES

# TECHNICAL SPECIFICATIONS SECTION 31 21 00

**FOR** 

EARTHWORK AND FINAL COVER INSTALLATION FOR CLOSURE OF BOTTOM ASH STORAGE AREA

**FOR** 

**PLANT GORGAS** 

**ALABAMA POWER COMPANY** 

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# TECHNICAL SPECIFICATIONS EARTHWORK AND FINAL COVER INSTALLATION FOR CLOSURE OF BOTTOM ASH STORAGE AREA

### 1.0 GENERAL

- 1.1 These technical specifications will pertain to the closure of the Bottom Ash Storage Area located at Plant Gorgas near Parrish, Walker County, Alabama. The storage area will be closed under the applicable requirements of ADEM Admin. Code 335-13-15, known hereafter as the "ADEM Solid Waste Regulations."
- 1.1 These Specifications, and all related attachments and associated documents, cover the furnishing of all materials (unless otherwise noted), labor, and supervision required for the closure of the storage area, including installation of a final cover system for the storage area as described herein and presented on the Closure Drawings, and the technical and construction requirements, including notes, specifications, and design data contained in the Drawings. The Drawings and Notes are an integral part of these Specifications.
- 1.2 The following terms shall apply to these Technical Specifications ("Specifications"):
  - a) The term "Purchaser" means Alabama Power Company (APC).
  - b) The term "Contractor" means the entity awarded the contract to furnish the materials and perform the work as described herein, and to construct the final cover system as specified in the contract documents.
  - c) The term "Construction Site Manager" (CSM) means the on-site manager of the project or his designated representative. He is the authorized representative at the site for the Purchaser.
  - d) The term "Purchaser's Representative" means the representative designated by the CSM to perform certain activities under these Specifications.
  - e) The terms "Accepted, Acceptable, or Approved" denotes that of which must be acceptable, accepted or approved by the CSM or his authorized representative.
  - f) The terms "CQC Firm", "CQC Inspector", and "CQC Professional Engineer" refer to the Contractor's third-party firm responsible for construction quality control monitoring, testing and documentation for all work performed during the construction of the facility.
- 1.3 Any discrepancies between the Drawings noted in Section 3.1 and the provisions of the Specifications shall be brought to the attention of the Purchaser for resolution before the performance of the work. In the case of discrepancies between the scale dimensions on the Drawings and the written dimensions, the written dimensions shall govern.
- 1.4 The Contractor shall ensure that all work is performed in accordance with the Occupational Safety and Health Act of 1970 and other standards and codes listed herein (latest revision).

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- 1.5 As necessary, the Purchaser will file for a National Pollutant Discharge Elimination System (NPDES) Construction General Permit for storm water discharge under ALR100000 (discharges from construction activities that result in a total land disturbance of one acre or greater and sites less than one acre but are part of a common plan of development or sale) from the Alabama Department of Environmental Management
- for conducting the work covered by these Specifications.

  1.4 All land disturbing activities shall be consistent with the minimum standards in the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, latest revision.

(ADEM). The Contractor shall be responsible for obtaining any other necessary permits

- Installation and maintenance of erosion and sediment control measures (e.g. "BMPs") and monitoring of surface waters during construction, if required, shall be performed by the Contractor in accordance with the NPDES Construction General Permit (Permit Number ALR100000) and the Construction Best Management Practices Plan (CBMPP), respectively.
- 1.6 The Contractor shall provide methods, means, and facilities to prevent contamination of the soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by the construction activities. Toxic liquids, chemicals, fuels, and lubricants shall be deposited into containers for subsequent removal offsite in accordance with all applicable federal, state, and local codes and standards.
- 1.7 The Contractor shall furnish and keep in good working condition at all times sufficient equipment of the proper design and capacity to do all work described under these Specifications and in accordance with the established schedule. The Purchaser's acceptance of the Contractor's list of equipment shall not be construed to mean that the listed equipment is adequate or sufficient to perform the work or that additional equipment shall not be required to maintain the schedule or perform the work specified herein.
- 1.8 The Contractor shall furnish appropriate equipment for minimizing fugitive dust. The Contractor shall continually take steps necessary to minimize dust created by all equipment, vehicles, work activities, or storage areas. These steps shall include, but not be limited to, watering roads and work areas. Open-bodied trucks handling sand, stone, gravel, or earth shall be covered if the truck is traveling off site. The Contractor shall not deposit dirt, mud, or debris on public roads, plant roads, or adjacent properties.
- 1.9 The Contractor is responsible for the unloading, handling, and storage of all materials supplied by him and shall ensure that all materials are handled and stored so as to prevent any damage. Materials damaged during handling, shipping, or storage shall be replaced at no cost to the Purchaser. The Contractor shall store materials only in areas as directed by the Purchaser. Any security measures taken for the protection of the Contractor's equipment shall be at the Contractor's expense.
- 1.10 Construction activities, except as shown on the Drawings, will not be performed within the areas designated as the Buffer Zone. This Buffer Zone is indicated on the Drawings. The Buffer Zone will be flagged and marked by the Contractor prior to construction.
- 1.11 The Contractor shall have the responsibility for obtaining third party QC testing for all

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- work performed during the construction of the facility.
- 1.12 All earthwork, including ramps and access roads, done for the convenience of the Contractor, shall be done at his expense unless instructed to be completed by the purchaser. Such work will be restored to its original elevation at the Contractor's expense if the Purchaser so desires.
- 1.13 The Contractor shall install, at his expense unless expected to be completed by the purchaser, any drainage piping required because of the Contractor's mode of operation including ramps and roads.
- 1.14 Plant Gorgas is an active power generation site. The Contractor and the PCM, or his representative, shall mutually determine a designated path for vehicles that are used by the Contractor or that haul material to and within the site for the Contractor. The Contractor's vehicles outside the designated traffic path must not obstruct or hinder traffic flow on the site. The Contractor shall provide traffic control during roadway related construction activities and material deliveries. This shall be coordinated with other activities ongoing at the plant. If within active and congested areas around the plant, traffic control shall include flag persons, barriers, and other control aids to provide for the safe routing of traffic in the affected area.
- 1.15 At all times, the Contractor shall provide protection to prevent damage to existing facilities, roads, underground pipes, and other Purchaser's equipment and property that may be on site. The Contractor will be liable for any damages to APC property caused by the Contractor.
- 1.16 The Purchaser shall have the right to inspect the Contractor's work as deemed necessary. The Purchaser shall have the right to inspect the Contractor's work locations, to inspect the materials in use, to meet and discuss with the Contractor the progress of the work and the manner in which it is being done. The Purchaser shall have the authority to reject materials or suspend any work not performed in accordance with these Specifications. The Contractor shall be responsible for performing the work in strict accordance with these Specifications, and the presence of the Purchaser's Representative shall not relieve the Contractor and his subcontractors of that responsibility.
- 1.17 Piezometers and Groundwater Monitoring Wells located in the site area shall not be damaged or destroyed by construction activities. The Contractor shall provide Purchaser approved measures to protect the piezometers and wells in the site area. Any monitoring well(s) damaged or destroyed by the Contractor and/or his activities shall be replaced at no cost to the Purchaser.
- 1.18 Priority pollutant testing shall be performed of any off-site borrow materials or topsoil material. The Contractor shall provide the Purchaser notice at least three weeks before hauling begins so that the Purchaser can schedule a time for collecting soil samples for chemical analyses. No off-site borrow material may be brought onto the site until the Purchaser has reviewed the analytical results and approved the borrow source.

### 2.0 COVER SYSTEM AND CERTIFICATION

## 2.1 Cover System

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Closure of the Bottom Ash Storage Area shall be accomplished by the installation of a final cover system designed to minimize infiltration and erosion. The cover system will be a composite system consisting of a 60-mil high density polyethylene (HDPE) textured geomembrane overlain by a geocomposite drainage material, a minimum 18 inches of protective cover soil, and a minimum 6 inches of topsoil.

### 2.2 Certification

The installation of the final cover system for the Storage Area shall be certified as being constructed in accordance with the applicable ADEM Solid Waste Regulations. This certification shall be performed by a professional engineer registered to practice in the State of Alabama and placed in the Bottom Ash Storage Area operating record within 60 days of the completion of all construction activities. This Certification will be provided by the Purchaser or the Purchaser's Representative.

### 3.0 APPLICABLE DOCUMENTS

### 3.1 **Drawings**

The Drawing List is contained on the Drawings.

### 3.2 **Codes and Standards**

The following Codes, Standards, Specifications, Publications, and/or Regulations shall be made part of these Specifications and will become part of the contract entered into for performance of the work covered herein. The latest edition in effect at the time of the contract shall apply. Other codes and standards shall be incorporated as referenced in this document. The omission of any Codes and/or Standards from this list does not relieve the Contractor of his responsibility to follow the latest revision of all applicable codes and standards for conducting the work.

If codes or standards are found to conflict with each other, it should be brought to the attention of the Purchaser to determine which is most applicable.

# Occupational Safety and Health Administration

Occupational Safety and Health Act of 1970

# **ASTM International (ASTM)**

- ASTM C 117 Standard Test Method for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
- ASTM C 136 Standard Test Method for Sieve Analysis of fine and Coarse Aggregates
- ASTM D 422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D 698 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft<sup>3</sup> (600 kN-

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 $m/m^3$ ))

- ASTM D 792 Standard Test Methods for Density and Specific Gravity (relative density) and Density of Plastics by Displacement
- ASTM D 1004 Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting
- ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
- ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique
- ASTM D 1603 Standard Test Method for Carbon Black in Olefin Plastics
- ASTM D 1556 Standard Test Method for Density and Unit Weight of Soil In - Place by the Sand Cone Method
- ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN $m/m^3$ )
- ASTM D 1587 Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
- ASTM D 2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D 2434 Standard Test Method for Permeability of Granular Soils (Constant Head)
- ASTM D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 2488 Description and Identification of Soils (Visual-Manual Procedure)
- ASTM D 2937 Standard Test Method for Density of Soil In Place by the Drive Cylinder Method
- ASTM D 3017 Standard Test Method for Water Content of Soil and Rock In Place Nuclear Methods (Shallow Depth)
- ASTM D 3895 Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
- ASTM D 4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- ASTM D 4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

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- ASTM D 4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- ASTM D 4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- ASTM D 4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
- ASTM D 4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- ASTM D 4643 Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
- ASTM D 4716 Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- ASTM D 4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile
- ASTM D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
- ASTM D 4959 Standard Test Method for Determination of Water (Moisture)
   Content of Soil by Direct Heating Method
- ASTM D 5035 Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
- ASTM D 5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- ASTM D 5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- ASTM D 5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
- ASTM D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
- ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics

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Geomembranes

- ASTM D 5721 Standard Practice for Air-Oven Aging of Polyolefin
- ASTM D 5885 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry
- ASTM D 5994 Standard Test Method for Measuring Core Thickness of **Textured Geomembranes**
- ASTM D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
- ASTM D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
- ASTM D 6938 Rev B Standard Test Method for In-Place Density and Water Content of Soil and Soil - Aggregate In Place by Nuclear Methods (Shallow Depth)
- ASTM D 7005 Determining the Bond Strength (Ply Adhesion) of Geocomposites
- ASTM D1204 -Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
- ASTM D1693 Standard Test Method for Environmental Stress-Cracking of **Ethylene Plastics**
- ASTM D1907 Standard Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method
- ASTM D2256 -Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
- ASTM D3218 -Standard Specification for Polyolefin Monofilaments
- ASTM D5323 Standard Test Method for Determination of 2% Secant Modulus for Polyethylene Geomembranes
- ASTM D5617 Standard Test Method for Multi-Axial Tension Test for Geosynthetics
- ASTM D6913 -Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- ASTM D7007 Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earth Materials

Geosynthetic Research Institute GRI Standards

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- GM 10 The Stress Crack Resistance of HDPE Geomembrane Sheet
- GM 11 Accelerated Weathering of Geomembranes using a Fluorescent UVA Device
- GM 12 Asperity Measurement of Textured Geomembranes Using a Depth Gage
- GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Geomembranes
- GM 19 Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes
- GRI-GM17 Test Methods, Test Properties, and Testing Frequency and for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

### United States Environmental Protection Guidance

- Environmental Protection Agency (EPA) regulations
- EPA/600/R-93/182, September 1993, 305 pgs.
- U. S. Environmental Protection Agency Technical Guidance Document "Quality Control Assurance and Quality Control for Waste Containment Facilities"

Corps of Engineers EM-LST, Appendix VII, Falling-Head Permeability Test

Alabama Department of Environmental Management (ADEM) regulations

Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas

### 4.0 SITE CONDITIONS

- 4.1 The Contractor shall visit the site and acquaint himself with site conditions, utility locations, and the proposed scope of work.
- 4.2 The Contractor is responsible for acquiring and maintaining a dig permit per Alabama state law.
- 4.3 Vibratory equipment shall have vibratory devices mechanically disengaged and rendered inoperable while operating on dikes or the Bottom Ash Storage Area.

## 5.0 THIRD PARTY QUALITY CONTROL

- 5.1 The Contractor shall provide to the Purchaser, for the Purchaser's acceptance and approval, the following documentation indicating that the Contractor's Third Party Quality Control firm and personnel that will participate on this Project meets the minimum experience and qualifications indicated herein.
- 5.2 The Contractor shall provide to the Purchaser the qualifications of a third-party CQC Inspector for construction quality control (CQC) for the placement and compaction of

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- the compacted structural fill.
- 5.3 The Contractor shall provide to the Purchaser the qualifications of a third-party CQC Inspector for construction quality control (CQC) of the ClosureTurf<sup>TM</sup> Final Cover System installation documenting the minimum requirements of Section 11.3.5 of these Specifications.
- 5.4 The Contractor shall provide to the Purchaser a statement of qualifications of a third-party CQC Inspector for construction quality control (CQC) of the geomembrane liner and drainage geocomposite installation documenting the minimum requirements of Section 11.3.3 of these Specifications.
- 5.5 The Contractor shall provide to the Purchaser the qualifications of the third party's soil testing laboratory contracted to perform the CQC testing for the structural earth fill.

## 6.0 LINES AND GRADES

The project shall be constructed to the elevations, lines, grades and cross sections shown on applicable Drawings. The Purchaser reserves the right to increase the foundation widths, change the embankment slopes, and to make such other changes in the embankment sections as conditions indicate are necessary for the construction of a safe and permanent structure. The Contractor shall be compensated for the changes in plan and/or sections resulting in changes in quantities of materials.

## 7.0 CLEAR, GRUBBING, AND STRIPPING

- 7.1 Prior to any clearing or grubbing operations, initial BMPs shall be installed. Erosion control measures and best management practices shown on the construction drawings shall be followed.
- 7.2 The footprint of the Bottom Ash Storage Area shall be cleared of any woody vegetation prior to excavation and/or fill operations. Grassy vegetation and grass mats are not required to be removed.
- 7.3 Trees, stumps, and brush cleared from the above areas shall be disposed of outside the closure areas by mulching or burning, if allowed by Purchaser. Mulch may be used as a temporary perimeter BMP, but shall ultimately be disposed of off-site.
- 7.4 Spoil material shall be disposed of outside the closure areas only in areas to be designated by the Purchaser. The Contractor shall slope the spoil area for drainage and provide silt fences and a perennial stand of vegetation.
- 7.5 Bottom ash laden roots on grubbed and stripped material may be cleaned as much as practical by screening and washing processes, or other approved methods, prior to leaving the site for disposal. Usable material, as approved by the Purchaser, may be stockpiled for future use at Purchaser designated locations.
- 7.6 Adequate erosion control measures shall be installed around the spoil and stockpile areas in accordance with details shown on the construction drawings.
- 7.7 Burning of brush and debris will not be allowed.

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#### 8.0 FOUNDATION AND SUBGRADE PREPARATION

### 8.1 Areas to Receive Fill

- The Contractor shall prepare, install and maintain erosion and sediment control 8.1.1 measures, as required by the construction drawings. If measures beyond those in the construction drawings are deemed necessary, contact the PCM to have those reviewed & approved by the engineer and the construction drawings updated PRIOR to the measures being installed.
- 8.1.2 Material suitable for topsoil, material to be used for the eighteen (18) inch protective soil layer, and the material to be used as structural earth fill shall be stockpiled separately in a location specified by the Purchaser's Representative.
- Proof-roll the entire subgrade utilizing loaded, off-road trucks with a gross machine 8.1.3 weight, including payload of 40 tons of soil. Any areas failing proof-roll shall be undercut and replaced with structural soil fill and re-rolled, or modified through the use of bridging layer as described in section 9.0.
- 8.1.4 Prior to receiving structural earth fill, the foundation areas shall be scarified by harrowing or other suitable means. The moisture content of the roughened surface shall be adjusted to within the limits provided in section 10.1.9. No fill shall be placed on any part of the subgrade until such areas have been conditioned, proof-rolled, inspected, and approved in writing by the Contractor's QC Inspector and the Purchaser.
- Work flow shall be planned such that the first embankment fill lift is placed soon after 8.1.5 subgrade compaction to minimize subgrade exposure to inclement weather.

### 8.2 Geomembrane

- 8.2.1 The Contractor shall maintain the subgrade suitability and integrity until the geomembrane installation is completed and accepted.
- The Contractor shall repair rough areas and any damage to the subgrade caused by 8.2.2 installation of the geomembrane.
- Subgrade shall be smooth, uniform, firm and free from rocks or other debris. For 8.2.3 deployment over soil subgrade, no rocks or protrusions greater than 1/2-inch in diameter shall be exposed at the subgrade surface.
- The Contractor shall verify that the surface on which the geomembrane will be installed 8.2.4 is acceptable. In so doing the Contractor shall assume full liability for the accepted surface.
- 8.2.5 The Contractor shall submit written certificates of subgrade acceptance, signed by the Contractor, CQC Inspector, and the Purchaser's Representative, for each area prepared for geomembrane placement.
- 8.2.6 The beginning of installation means acceptance of existing conditions. The Contractor shall be responsible for maintenance of the geomembrane covered subgrade once installation of geomembrane begins.

### 9.0 **BRIDGING LAYER**

Where it can be demonstrated that it is impracticable to proof-roll the subgrade as 9.1

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- specified in section 8.1 or achieve the degree of compaction specified in section 10.1, a bridging layer may be placed.
- 9.2 The bridging layer shall be of sufficient thickness to allow the passage of earthmoving equipment with minimal surface heaving, but no more than four feet in thickness
- 9.3 The bridging layer shall be end-dumped and spread in a single layer. The compaction requirements of Section 10.1 will not apply to the bridging layer.
- 9.4 Acceptable materials for the construction of the bridging layer include structural earth fill as defined in Section 10.1, bottom ash fill, sand, and rock fill materials.
- 9.5 Any bottom ash fill used in the bridging lift must have been excavated from the Bottom Ash Storage Area and not at any point been transported out of the pond.
- 9.6 Geogrid reinforcement may be used as part of the bridging layer. All geogrid should be placed in accordance with the manufacturer's recommendations.

# 10.0 STRUCTURAL EARTH FILL AND BOTTOM ASH FILL

### 10.1 Structural Earth and Bottom Ash Fill

- 10.1.1 The Contractor shall provide third party CQC testing for all earth work performed for the closure of the Bottom Ash Storage Area.
- 10.1.2 Compacted earth fill should generally consist of sandy clays (CL), clayey silts (ML), clayey sands (SC), and clayey to silty sands (SC/SM) from a Purchaser approved borrow area.
- 10.1.3 No earth fill or bottom ash shall be placed on any part of the foundation until such areas have proof-rolled, inspected, and approved in writing by the soils CQC Inspector and the Purchaser's Representative.
- 10.1.4 Fill materials shall be placed in uniform layers of eight inches, nominal thickness, loose measurement, for one foot beyond the full width of the fill on each side. The thickness of each layer shall be kept uniform with the necessary grading equipment. Upon completion of compaction, the slopes shall be cut back to the final slope. Particular care must be used to obtain the required compaction along the edges of the fill slopes.
- 10.1.5 If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it shall be loosened by harrowing, or as directed by the Purchaser's Representative, before the succeeding layer is placed.
- 10.1.6 During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate for removal of roots and debris from all structural earth fill materials and all stones and clay clods greater than three inch maximum. Clay clod size may be reduced in size to meet this Specification by disking, tilling or other means. The distribution of materials throughout the structural fill shall be essentially uniform and free of any lenses, pockets, streaks, or layers of materials differing substantially in texture, moisture content, or gradation from the surrounding material.
- 10.1.7 The compacted structural fill and bottom ash subgrade beneath the HDPE component of the final cover shall be free of roots, debris, and all stones and clay clods greater than one-half (1/2) inch maximum. Clay clod size may be reduced in size to meet this Specification by disking, tilling or other means.

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- 10.1.8 Structural earth fill and bottom ash material shall be compacted to a minimum of 95% of the relative maximum dry density as determined by the standard Proctor compaction test (ASTM D 698). The moisture content of the earth fill at the time of placement shall be within -2% and +2% of the optimum moisture obtained by standard Proctor compaction test.
- When moisture content is too low, the moisture content shall be adjusted to within the 10.1.9 above limits prior to compaction. Moisture adjustment shall be achieved by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and harrowing of the layer shall be done after deposition, but before compaction.
- 10.1.10 If the moisture content is too high, the Contractor will be permitted to disk in place or stockpile and disk the earth fill material to promote drying to bring it back within the allowable moisture range.
- 10.1.11 The Contractor will be required to remove any compacted material that does not comply with the compaction requirements and replace the compacted earth fill to comply with this Specification at his own expense.
- 10.1.12 Structural earth fill or bottom ash which cannot be compacted with roller equipment because of inadequate clearances shall be spread in four-inch layers and compacted with hand-guided power tampers to the extent required by these Specifications. Rocks two inches and greater, in any dimension, roots, and debris shall be removed from the fill and disposed of in an approved manner.
- 10.1.13 Field density and moisture content tests shall be performed daily in all types of material being placed. At a minimum, one in place density test shall be performed for each lift for each day fill material is placed.
- 10.1.14 For earth fill and bottom ash material, at least one field moisture content and density test shall be performed for every 1,000 cy of fill (one per acre of lift area) or more often if deemed necessary in the opinion of the Purchaser's Representative.
- 10.1.15 If an in-place density or moisture test fails to meet the requirements for compaction and/or moisture, the area shall be reworked and then retested. If, however, the second test fails to meet the criteria, the area failing the criteria shall be delineated, and reworked or removed, and then retested. The areas requiring reworking/recompacting shall be noted on record drawings and reported.
- 10.1.16 In the event of repeated failures, or water content and density test values plotting far from the Proctor curves used for comparison in computing percent compaction, it shall be the option of the Purchaser's Representative, to require one or two-point Proctor checks to verify that the proper Proctor curve is being referenced. If not, a new Proctor curve determined by a five-point test shall be required.
- 10.1.17 The surveyed location, lift designation, and elevation or depth of the field density and moisture tests (passing, failing, and retests) shall be recorded and noted on the respective test records. The locations of these tests shall be shown on a figure or drawing.
- 10.1.18 Excavations required for density and moisture tests shall be repaired by scarifying the walls of the excavation, backfilling, and compacting the fill material to the criteria specified above.

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- 10.1.19 If the construction of the embankment is interrupted, the Contractor shall be required to shape and smooth the last layer of earth fill material placed on the fill to provide a surface that will shed as much water as possible during the interruption. When the work is resumed, the Contractor shall be required to level, scarify and compact the last layer of earth fill material before placing additional layers.
- 10.1.20 At least one Proctor compaction check plug shall be produced for each type of soil being placed during the day to ensure that the correct reference Proctor curves are being used for compaction check.
- 10.1.21 Earth fill areas, ditches, and other disturbed areas outside the cover area shall be grassed upon reaching final grade in accordance with these Specifications, the construction drawings and the Vegetation Schedule shown on the Drawings.

### 11.0 COMPOSITE COVER SYSTEM

### 11.1 General

- 11.1.1 The final bottom ash subgrade of the Bottom Ash Storage Area shall be covered with a 60 mil textured HDPE geomembrane overlain by a double sided geocomposite drainage layer with a minimum 18-inch protective soil cover. An erosion control layer consisting of a minimum of six inches of topsoil that will support vegetative growth shall be placed over the soil cover.
- 11.1.2 The HDPE and drainage material shall be placed in accordance with these Specifications, the manufacturer's recommendations, and the details indicated on the Drawings.

## 11.2 Submittals

- 11.2.1 The Contractor shall provide to the Purchaser the Manufacturer's Quality Control (CQC) Program and Manual, or descriptive documentation for manufacture of the geomembrane and geocomposite from the manufacturer.
- 11.2.2 The Contractor shall provide to the Purchaser, for review and approval, qualification statements from the geomembrane and geocomposite manufacturer, certified installer, and CQC Inspector documenting the minimum requirements of sections 11.3 and 11.11 of these Specifications.
- 11.2.3 The Contractor shall provide to Purchaser placement procedures and a panel layout for placement of the geomembrane and geocomposite panels over the area of installation fourteen days prior to the start of liner installation.
- 11.2.4 Upon each shipment, the Contractor shall furnish the geomembrane and geocomposite manufacturer's Quality Assurance/Quality Control (QA/QC) roll certifications, signed by a responsible party employed by the manufacturer, to verify that the materials supplied for the project are in accordance with the requirements of sections 11.4 and 11.13 this Specification. The certifications shall reference the lot and roll number as well as the manufacturer's name and address.
- 11.2.5 As installation proceeds, the Contractor shall submit certificates of subgrade acceptance, signed by the Contractor, the CQC Inspector, and the Purchaser's

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- Representative for each area that is covered by the geomembrane.
- 11.2.6 After installation, the Contractor shall submit a certification, signed by the Contractor and signed and sealed by the CQC Firm's Professional Engineer, that the geomembrane and geocomposite was placed in accordance with these Specifications.
- 11.2.7 The Contractor shall provide certification that all resin used in the manufacture of the geocomposite drainage geonet for this job meets the Specifications and provide a copy of the quality control certificates issued by the resin supplier.

# 11.3 Geomembrane Contractor Qualifications

- 11.3.1 The manufacturer of the geomembrane (HDPE) must have produced at least ten million square feet of product, with at least eight million square feet installed.
- 11.3.2 The geomembrane installer must either have installed at least one million square feet of product or must provide to Alabama Power satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the geomembrane will be installed in a competent, professional manner.
- 11.3.3 The Contractor shall provide, a third-party inspector for construction quality control (CQC) of the geomembrane installation. The inspector shall be an individual or company who is independent from the manufacturer and installer and shall be responsible for monitoring and documenting activities related to the CQA of the geomembrane throughout installation. The inspector shall have provided CQC services for the installation of the proposed or similar products for at least five completed projects totaling not less than one million square feet. The inspector should be an engineer registered to practice in the State of Alabama or a geosynthetics installation technician certified through the Inspector Certification Program (ICP) administered by the Geosynthetics Certification Institute (GCI). The Contractor shall provide the Purchaser with a statement of the inspector's qualifications with the bid.
- 11.3.4 A Manufacturer's Representative shall be on site during the initial phase of the geomembrane installation to provide assistance to the Contractor.

## 11.4 Geomembrane Material

- 11.4.1 The geomembrane shall be a 60 mil textured high density polyethylene (HDPE) with a minimum 23 feet seamless width. There shall be no factory seams. Carbon black shall be added to the resin if the resin is not compounded for ultra-violet resistance.
- 11.4.2 The geomembrane shall be manufactured of polyethylene resins and shall be compounded and manufactured specifically for the intended purpose. The Contractor shall submit a certification from the manufacturer of the geomembrane that the raw materials meet the physical property requirements indicated in the following table.
- 11.4.3 The surface of the geomembrane shall not have striations, roughness, pinholes, or bubbles and shall be free of holes, blisters, undispersed raw materials, or any contamination by foreign matter except that, if in the opinion of the Purchaser's Representative, the blemish will not adversely affect properties and use of the liner.
- 11.4.4 The geomembrane shall be supplied in rolls; folds will not be permitted. Identify each roll with labels indicating lot number, roll number, thickness, length, width,

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- manufacturer, and plant location.
- 11.4.5 Resin shall be HDPE, new, first quality, compounded and manufactured specifically for producing HDPE geomembrane.
- 11.4.6 Extrudate Rod or Bead shall be made from same resin as the geomembrane. Additives shall be thoroughly dispersed. The rods or beads shall be free of contamination by moisture or foreign matter.
- 11.4.7 The materials shall be stored in space allocated by the Purchaser.
- 11.4.8 The materials shall be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or other damage.
- 11.4.9 The materials shall be stored on level prepared surface (not on wooden pallets).
- 11.4.10 The materials shall be stacked per Manufacturer's recommendation but no more than three rolls high.
- 11.4.11 Appropriate handling equipment shall be used to load, move or deploy geomembrane rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader and roll bars for deployment. Dragging panels on ground surface will not be permitted.
- 11.4.12 The Installer is responsible for storage, and transporting material from storage area to installation area.
- 11.4.13 Damaged geomembrane will be documented by the Purchaser's Representative.
- 11.4.14 Damaged geomembrane may be repaired, if approved by the Purchaser's Representative, in accordance with these Specifications or shall be replaced at no additional cost to the Owner.
- 11.4.15 The geomembrane shall have the following properties:

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TEXTURED HDPE GEOMEMBRANE - 60 mil							
Property	Frequency	Test Method	Minimum Average Value				
Density	Once per 200,000 lbs of resin	ASTM D 792	Max. 0.940 g/cc				
Melt Index	Once per 200,000 lbs of resin	ASTM D 1238,190°C, 2.16kg	$\leq 1.0 \text{ g/}10 \text{ min.}$				
Oxidative Induction Time (OIT) Standard OIT	Once per 200,000 lbs resin	ASTM D 3895	100 min. (min. avg.)				
Or High Pressure OIT		ASTM D 5885	400 min. (min. avg.)				
Thickness:  Nominal  Minimum Average  Minimum 8 of 10  Lowest individual	per roll	ASTM D 5994	60 mil 57 mil 54 mil 51 mil				
Asperity Height	Every 2 <sup>nd</sup> Roll	ASTM D 7466 GRI GM12	10 mil				
Tensile Properties (avg. both directions) (min. avg)  Break Strength  Break Elongation	20,000 lbs.	ASTM D 6693, Type IV	≥90 lb/in 100 %				
Tear Resistance	45,000 lbs	ASTM D 1004	42 lb (min. avg.)				
Puncture Resistance	45,000 lbs	ASTM D 4833	90 lb (min. avg.)				
Carbon Black Content	20,000 lbs.	ASTM D 4218	2.0 % - 3.0 %				
Carbon Black Dispersion <sup>1</sup> Oxidative Induction Time (OIT)	45,000 lbs. 200,000 lbs	ASTM D 5596	See Note (1)				
Standard OIT Or	200,000 lbs	ASTM D 3895	100 min. (min. avg.)				
High Pressure	D E 1	ASTM D 5885	400 min. (min. avg.)				
Oven Aging @ 85° C Standard OIT (min. avg.) – % retained after 90 days	Per Each Formulation	ASTM D 5721 ASTM D3895	55%				
High Pressure OIT min. avg.) – % retained after 90 days		ASTM D5885	80%				
UV Resistance High Pressure OIT min. avg.) – % retained after 1600 hours	Per Each Formulation	GM11 ASTM D5885	50%				

(1) Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than one (1) view from Category 3.

### 11.5 **Equipment**

- Heavy vehicles shall not be permitted to operate directly on the liner material. Rubber-11.5.1 tired ATV's and trucks are acceptable if wheel contact is less than six (6) psi.
- In areas of heavy traffic, the geomembrane shall be protected by placing protective 11.5.2 cover, with a minimum thickness of three (3) feet, over the geomembrane.
- If the geomembrane is damaged by vehicular traffic, it shall be replaced at the 11.5.3

Rev. 1 Page 18 of 31 Contractor's expense.

### 11.6 **Geomembrane Installation**

- 11.6.1 The geomembrane shall be packaged and shipped by appropriate means to ensure that no damage is incurred. The geomembrane shall be stored so as to be protected from puncture, dirt, grease, solvents, moisture and excessive heat. Damaged material shall be stored separately for repair or replacement. Storage stacking of the rolls is allowed following manufacturer's recommendations.
- 11.6.2 The manufacturer assumes responsibility for initial loading the geomembrane. Offloading and storage of the materials shall be the responsibility of the Contractor. The Contractor shall be responsible for replacing any damaged or unacceptable material at no cost to the Purchaser. No off-loading shall be done unless monitored by the Purchaser's Representative. Damage occurring during off-loading shall be documented by the Purchaser and the Contractor. The Purchaser shall be the final authority on determination of damage.
- The installation of the geomembrane shall be in accordance with the manufacturer's 11.6.3 recommendations and these Specifications. The Contractor shall submit a panel layout drawing and a detailed, written installation procedure for the Purchaser's review fourteen days prior to installation.
- 11.6.4 All seam and non-seam areas of the geomembrane shall be inspected by the CQC Inspector for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection.
- The anchor trench shall be excavated to the lines, grades, and widths shown on the 11.6.5 project construction drawings, prior to liner system placement. Slightly rounded corners shall be provided in the trench to avoid sharp bends in the geomembrane.
- 11.6.6 The Contractor is responsible for ensuring that the geomembrane is handled and installed in such a manner that it is not damaged.
- The geomembrane shall not be deployed during precipitation, in the presence of 11.6.7 excessive moisture, in areas of ponded water, in the presence of excessive winds, or in excessive heat or cold.
- Each panel shall be marked with an "identification code" (number or letter) consistent 11.6.8 with the layout plan. The identification code shall be simple and logical. Markings shall not be used that permanently alter the line, such as stampings, weld marks, hydrocarbon marks, etc. The number of panels deployed in one day shall be limited by the number of panels which can be seamed on the same day. All deployed panels shall be seamed to adjacent panels by the end of each day.
- The rolls shall be deployed using a spreader bar assembly attached to a loader bucket or 11.6.9 by other methods approved by the Purchaser's Representative. The equipment shall not damage the geomembrane by handling, trafficking, leakage of hydrocarbons, deployment or other means. The placement shall be observed by the CQC Inspector and the Purchaser's Representative.
- 11.6.10 The Contractor shall inspect the subgrade preparation prior to liner installation. The

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subgrade shall be compacted in accordance with the project specifications. Weak or compressible areas which cannot be satisfactorily compacted should be removed and replaced with properly compacted clay liner material. All surfaces to be lined shall be smooth, free of all foreign and organic material, sharp objects, stones greater than one-half inch in diameter, or debris of any kind. The subgrade shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade. The surface shall contain no rutting, cracks or tire tracks. Standing water or excessive moisture shall not be allowed.

- 11.6.11 The Contractor, on a daily basis, shall approve the surface on which the geomembrane will be installed. After the supporting soil surface has been approved, it shall be the Contractor's responsibility to indicate to the Purchaser any changes to its condition that may require repair work.
- 11.6.12 The Contractor shall submit written Certificates of Subgrade Acceptance, signed by the Contractor, CQC Inspector, and Purchaser's Representative, for each area prepared for geomembrane installation. This shall be done prior to commencing work.
- 11.6.13 Equipment or tools shall not damage the geomembrane during handling, transportation and deployment.
- 11.6.14 Personnel working on the geomembrane shall not smoke or wear damaging shoes.
- 11.6.15 The method used to unroll the panels shall not cause scratches, crimps, or creases in the geomembrane.
- 11.6.16 Unroll panels with the spike down and the stud side up for the structured geomembrane to assure that the deployment method protects the geomembrane from scratches and crimps and protects soil surface.
- 11.6.17 Unroll panels with adequate tension to prevent undulations or wrinkles when placed on the ground. The spike side down prevents easy movement of the panel. Individual panels placed with more than 5 undulations greater than 2-inches in height shall be deployed again.
- 11.6.18 Use a method to minimize wrinkles, especially differential wrinkles between adjacent panels.
- 11.6.19 Place adequate hold-downs to prevent uplift by wind. Adequate loading (e.g., sand bags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels).
- 11.6.20 Protect geomembrane in heavy traffic areas by geotextile, extra geomembrane or other suitable materials.
- 11.6.21 Do not allow vehicular traffic on unprotected geomembrane surface.
- 11.6.22 Panels deployed on grades steeper than 12% shall extend a minimum of 3 feet beyond the crest or toe of that grade with no cross seams.
- 11.6.23 Visually inspect sheet surface during unrolling of geomembrane and mark faulty or suspect areas for repair or test. Replace faulty (requires more than one patch per 200 square feet) geomembrane stock at no additional cost to the Owner.
- 11.6.24 Geomembrane deployment shall proceed between ambient temperatures of 32° F and 104° F measured 6 inches above the membrane surface. Placement can proceed below 32° F only after it has been verified by the CQC Inspector that the material can be

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- seamed according to the Specification. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog, rain, dew) or in the presence of excessive winds, as determined by the installation supervisor.
- 11.6.25 After panel deployment and before welding, any horizontal wrinkles must be walked down or wiggled down the slope to minimize wrinkles after welding.
- 11.6.26 Limit maximum wrinkle height to 4 inches during warmer ambient temperatures and 2 to 3 inches in cooler temperatures.
- 11.6.27 Geomembrane wrinkles shall not be folded over.
- 11.6.28 After each panel welding, the sheet should be hand pulled in order to avoid the formation of ridging along the seams (snapping).
- 11.6.29 Physically remove wrinkles by walking them or by pretension pulling on the sheet after welding each panel.

### 11.7 **Geomembrane Field Seaming**

- 11.7.1 Field seams shall be made in accordance with the manufacturer's recommendations. The Contractor shall submit a copy of the proposed seaming procedures (both fusion and extrusion welding, including preparation procedures), prior to commencement of seaming, for the Purchaser's review and approval.
- Remove studs and spikes from the structured geomembrane at butt weld locations. 11.7.2 During the stud/spike removal operation, do not reduce the thickness of the barrier section of the geomembrane to less than the minimum thickness listed in section 12.4.
- The only approved seaming processes are fusion and extrusion welding. On side 11.7.3 slopes, seams shall be oriented in the general direction of maximum slope, i.e., oriented down, not across the slope. In corners and odd-shaped geometric locations, the number of field seams shall be minimized. Cross seams will be allowed on slopes provided that cross seams are cut at 45° and adjacent cross seams are staggered. Cross seams shall be kept to the lower half of the slope. No more than one cross seam will be allowed per panel slope length.
- No seam of any kind shall be closer than five feet from the toe of the slope. Seams 11.7.4 shall be aligned with the least possible number of wrinkles and "fishmouths". If a fishmouth or wrinkle is found, it shall be relieved and cap-stripped.
- Geomembrane panels must have a finished minimum overlap of four inches for fusion 11.7.5 welding and six inches for extrusion welding.
- 11.7.6 Cleaning solvents may not be used unless the product is approved by the liner manufacturer.
- 11.7.7 Generators used to power welding/grinding apparatus shall be placed on a rub sheet and/or on a HDPE tub to prevent damages caused by vibrations/equipment leaks and to protect the liner during refueling of these generators.
- The Installer shall non-destructively test all field seams over their full length using 11.7.8 either Vacuum Box Testing for extrusion welds or Air Pressure Testing for double fusion seams.

### 11.8 **Geomembrane Field Trial Seams**

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- 11.8.1 Field trial seams shall be made in accordance with the manufacturer's recommendations and these Specifications. The Contractor shall submit a copy of the proposed testing procedures for the Purchaser's review and approval.
- 11.8.2 Field trial seams shall be conducted, per seaming apparatus and per seamer, on the liner to verify that seaming conditions are satisfactory. Trial seams shall be conducted at the beginning of each seaming period, at least once every four hours for each seaming apparatus and personnel used that day. Additional field trial seams may be requested by and at the discretion of the Purchaser's Representative.
- 11.8.3 All trial seams shall be made in contact with the subgrade. Welding rod used for extrusion welding shall have the same properties as the resin used to manufacture the geomembrane.
- 11.8.4 Field trial seaming shall be conducted under the same ambient temperature and preheating conditions as the production seams.
- 11.8.5 Field trial seams shall be destructively tested in accordance with section 12.9.

## 11.9 Geomembrane Destructive Seam Testing for Fusion and Extrusion Seaming

- 11.9.1 Destructive seam testing should be minimized to preserve the integrity of the liner. The Contractor shall take one (1) destructive test sample once per 500 cumulative feet of seam length, per fusion welding device, from a location specified by the CQC Inspector. This frequency applies to extrusion seams as well. If the amount of extrusion seaming is < 500 feet then a minimum of one (1) extrusion destructive test shall be performed.
- In order to obtain test results prior to completion of liner installation, samples shall be cut by the Installer as the seaming progresses. The Installer shall also record the date, location, and pass or fail description. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately patched and vacuum tested.
- 11.9.3 The samples shall be a minimum of 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three equal-length pieces, one to be given to the Installer, one to be given to the Contractor's CQC Inspector, and one to the Purchaser.
- 11.9.4 The Installer shall test ten one-inch wide specimens from his sample; five specimens for shear strength and five for peel strength. The CQC Inspector shall submit samples to an independent laboratory for confirmation testing. Seam test results shall be evaluated using the current GRI Test Method GM19 which allows for four of five specimens meeting the required seam strength and the fifth specimen meeting 80% of the required strength. Additionally, peel separation shall not exceed 25%.
- 11.9.5 Seams shall be tested according to the following methodology:

Property	Test Method	Minimum Average Value
Seam Properties	ASTM D 6392	
1. Shear Strength	GM19	120 lb/in
2. Peel Strength		

Hot Wedge	91 lb/in
Extrusion Fillet	78 lb/in

- 11.9.6 The Purchaser, at his discretion and expense, may send seam samples to a laboratory for testing. The test method and procedures to be used by the independent laboratory shall be the same as used in field testing.
- The following procedures shall apply whenever a sample fails the field destructive test: 11.9.7
  - The installer shall cap strip the seam between the failed location and any passed test locations.
  - The installer shall retrace the welding path to a location (initially a minimum of b) 10 feet on each side of the failed seam location) to identify and isolate the failed seam in both previous and next direction of failed destructive, by taking two new samples, one from each direction. If these tests pass, then the seam shall be cap stripped between the passing tests. If the test fails, then the process is repeated.
  - Over the length of seam failure, the installer shall either cut out the old seam, c) reposition the panel and reseam, or add a cap strip.
  - All seams and non-seam areas of the geomembrane shall be inspected by the d) inspector for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection.
  - Each suspect location in seam and non-seam areas shall be non-destructively e) tested as appropriate in the presence of the inspector. Each location that fails the non-destructive testing shall be marked by the inspector and repaired accordingly.

### 11.10 **Geomembrane Repair Procedures**

- 11.10.1 The geomembrane will be inspected before and after seaming for evidence of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be swept or washed by the Installer if surface contamination inhibits inspection. The Installer shall ensure that an inspection of the geomembrane precedes any seaming of that section.
- 11.10.2 Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
- 11.10.3 Repair, removal and replacement shall be at the Installers expense if the damage results from the Installer's activities.
- 11.10.4 Repair any portion of the geomembrane exhibiting a flaw, or failing a destructive or non-destructive test. The Installer shall be responsible for repair of damaged or defective areas. Agreement upon the appropriate repair method shall be decided between the Purchaser's Representative and the Installer.
- 11.10.5 The following repair procedures shall apply:

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- a) Defective seams shall be cap stripped or replaced.
- b) All holes of any size shall be patched.
- c) Tears shall be repaired by patching. If the tear is on a slope or an area susceptible to stress and has a sharp end it must be rounded prior to patching.
- d) Blisters, large cuts and undispersed raw materials shall be repaired by patches.
- e) Patches shall be completed by extrusion welding. The weld area shall be ground no more than 10 minutes prior to welding. No more than 10% of the thickness shall be removed by grinding. Welding shall commence where the grinding started and must overlap the previous seam by at least two inches. Reseaming over an existing seam without regrinding shall not be permitted. The welding shall restart by grinding the existing seam and rewelding a new seam.
- f) Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum of six (6) inches beyond the edge of defects.
- g) All T's and intersections shall be patched. Welding the excess overlap is not permitted.
- h) Geomembrane surfaces to be repaired shall be abraded (extrusion welds only) no more than 1/2 hour prior to the repair.
- i) All geomembrane surfaces shall be clean and dry at the time of repair.
- j) The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the Owner's Representative.
- k) Extend patches or caps at least 6 inches beyond the edge of the defect, i.e., be a minimum of 12 inches in diameter, and round all corners of material to be patched.
- l) Bevel the edge of the patch and do not cut patch with repair sheet in contact with geomembrane. Temporarily bond the patch to the geomembrane with an approved method, extrusion weld the patch and then vacuum test the repair.

## 11.11 Verification of Repairs

- 11.11.1 Each repair shall be non-destructively tested. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.
- 11.11.2 The inspector shall keep daily documentation of all non-destructive and destructive testing. This documentation shall identify all seams that initially failed the test and include evidence that these seams were repaired and successfully retested. (i.e., Test 1 followed by Test 1R1).

## 11.12 Geocomposite Contractor Qualifications

- 11.12.1 The drainage material manufacturer shall have successfully manufactured five (5) million square feet of polyethylene drainage material.
- 11.12.2 Installation of the drainage material shall be performed by the manufacturer or be a manufacturer-approved dealer/installer. The drainage material installer must either have installed at least one (1) million square feet of product, or must provide to the

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Purchaser satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the respective geosynthetic will be installed in a competent, professional manner.

- 11.12.3 The installation supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the contract documents.
- 11.12.4 The Contractor shall provide a third-party inspector for CQC of the geocomposite installation. The inspector shall be an individual or company who is independent from the manufacturer and installer and shall be responsible for monitoring and documenting activities related to the CQC of the geocomposite throughout installation. The inspector who is on site monitoring the installation activities every day that they are taking place, shall have provided CQC services for the installation of the proposed or similar products for at least five (5) completed projects totaling not less than one (1) million square feet. The inspector should be an engineer registered to practice in the State of Georgia or a geosynthetics installation technician certified through the Inspector Certification Program (ICP) administered by the Geosynthetics Certification Institute (GCI). The Contractor shall provide the Purchaser with a statement of the inspector's qualifications prior to starting installation of the geocomposite.
- 11.12.5 A Manufacturer's Representative may be on site during the initial phase of the geocomposite installation to provide assistance to the Contractor.

## 11.13 Geocomposite Labeling, Delivery, Storage, and Handling Requirements

- 11.13.1 Each roll of material delivered to the site shall be wrapped and labeled by the manufacturer. The label shall contain the following information:
  - a) manufacturer's name
  - b) product identification
  - c) length and width
  - d) roll number
- 11.13.2 The material shall be stored as specified by the manufacturer in an area specified by the Purchaser. The storage will be free of materials capable of damaging the material.
- 11.13.3 Unloading of the drainage material from the delivery trucks will be performed by the Contractor. Unloading of the materials will be performed as directed by the manufacturer.
- 11.13.4 The rolls must be adequate for safe transportation to the point of delivery, offloading and storage. Storage measures will be taken as specifically stated by the manufacturer.

## 11.14 Geocomposite Material Properties

- 11.14.1 The geocomposite shall consist of one (1) layer of HDPE drainage net (geonet) connected between two (2) layers of non-woven geotextile to create a double-sided geocomposite.
- 11.14.2 The drainage net shall be manufactured of new first quality polyethylene resin and shall be compounded and manufactured specifically for the intended application.
- 11.14.3 The Contractor shall provide written certification from the manufacturer that all resin used in the manufacture of the drainage net for this job meets the Specifications which

- shall include a copy of the quality control certificates issued by the resin supplier.
- 11.14.4 The Contractor shall provide written certification from the manufacturer that the material was manufactured in accordance with this Specification, together with a report of test results, prior to material shipment.
- 11.14.5 The minimum average properties of the geocomposite shall be as follows:

	DOUBLE-SIDED DR	AINAGE GEOCOMPO	SITE	
<b>Tested Property</b>	Test Method	Frequency	Value <sup>(1)</sup>	Units
	Geo	net Core <sup>(2)</sup>		
Raw Materials:				
Density	ASTM D792, B	Per lot	0.94	g/cc
	ASTM D1505			
Melt Index	ASTM D1238	Per lot	≤ 1.0	g/ 10 min.
Thickness	ASTM D 5199	1/50,000 ft <sup>2</sup>	300	mil
Density	ASTM D 1505	1/50,000 ft <sup>2</sup>	0.94	g/cc
Carbon Black Content	ASTM D 4218	1/50,000 ft <sup>2</sup>	2.0 – 3.0	%
Tensile Strength	ASTM D 5035	1/50,000 ft <sup>2</sup>	75	lbs/inch
Transmissivity <sup>(3)</sup>	ASTM D 4716	1/50,000 ft <sup>2</sup>	8 x 10 <sup>-3</sup>	m²/sec
	Geotextile (p	rior to lamination) <sup>4</sup>		•
Mass per Unit Area	ASTM D 5261	1/100,000 ft <sup>2</sup>	6.0	oz/yd²
Grab Tensile	ASTM D 4632	1/100,000 ft <sup>2</sup>	160	lbs
Flow Rate	ASTM D 4491	1/100,000 ft <sup>2</sup>	110	gpm/ft <sup>2</sup>
Puncture Strength	ASTM D 4833	1/100,000 ft <sup>2</sup>	95	lbs
Permittivity	ASTM D 4491	1/100,000 ft <sup>2</sup>	1.5	Sec <sup>-1</sup>
AOS	ASTM D 4751	1/100,000 ft <sup>2</sup>	70 sieve	US Sieve
UV Resistance	ASTM D 4355	once per	70	%
		formulation		retained
Geocomposite				
Transmissivity <sup>(3)</sup>	ASTM D 4716	1/500,000 ft <sup>2</sup>	9 x 10 <sup>-4</sup>	m²/sec
Peel Adhesion	ASTM D 7005	1/50,000 ft <sup>2</sup>	1.0	lbs/in

## Notes

- 1. These are minimum average roll values (MARV values) and are based on the cumulative results of specimens tested. AOS in mm units is a maximum average roll value.
- 2. Component properties prior to lamination.
- 3. Gradient of 0.1, normal load of 10,000 psf, water at  $70^{\circ}$  F, between stainless steel plates for 15 minutes
- 4. Refer to geotextile product data sheet for additional specifications.

## 11.15 Geocomposite Placement

- 11.15.1 The geocomposite roll shall be installed in the direction of the slope and in the intended direction of flow unless otherwise specified by the Purchaser's Representative.
- 11.15.2 In the presence of wind, all geocomposites shall be weighted down with sandbags or the equivalent. Such sandbags shall be used during placement and remain until replaced with cover material.
- 11.15.3 Each component of the geocomposite will be secured or seamed to the like component at overlaps. Adjacent edges of the geonet along the length of the roll shall be placed with the edges of each geonet butted against each other. The overlaps shall be joined by tying the geonet structure with plastic cable ties spaced every five (5) feet along the roll length, located at least 3 intact ribs away from the leading edge and be a contrasting color to the geonet material.
- 11.15.4 Adjoining geocomposite rolls (end to end) across the roll width should be shingled down in the direction of the slope, with the geonet portion of the top overlapping the geonet portion of the bottom geocomposite a minimum of twelve (12) inches across the roll width. The overlaps shall be joined by tying the geonet structure with plastic cable ties spaced every twelve (12) inches along the roll width, located at least 3 intact ribs away from the leading edge and be a contrasting color to the geonet material.
- 11.15.5 The geonet portion shall be tied every six (6) inches in the anchor trench, located at least 3 intact ribs away from the leading edge and be a contrasting color to the geonet material.
- 11.15.6 Prior to covering the deployed geocomposite, each roll shall be inspected for damage resulting from construction.
- 11.15.7 Any rips, tears or damaged areas on the deployed geocomposite shall be removed and patched. The patch shall be secured to the original geonet by tying every six (6) inches with the approved tying devices. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be joined in accordance with sections 11.14.3 and 11.14.4 above.
- 11.15.8 All geocomposite geotextile overlaps shall be sewn at the seams.

## 11.16 Anchor Trenches

- 11.16.1 As directed by the project Drawings and Specifications, the end of the geomembrane and geocomposite rolls shall be placed in an anchor trench. The front edge of the trench should be rounded so as to eliminate any sharp corners. Loose soil should be removed from the floor of the trench.
- 11.16.2 The geomembrane and geocomposite should cover the entire trench floor.
- 11.16.3 The anchor trench shall be backfilled by the earthwork contractor. Trench backfill material shall be well compacted by approved methods to minimize water intrusion or material pull-out.
- 11.16.4 The anchor trench shall be backfilled with soil meeting the requirements of Structural Fill as described in section 10.0 with the exception that the maximum particle size shall be limited to one (1) inch in the largest dimension.
- 11.16.5 Care shall be taken when backfilling the trenches to prevent any damage to the

geomembrane or geocomposite. If damage occurs, it shall be repaired prior to backfilling and at the Contractor's expense.

#### 11.17 **Protective Cover Soils**

- 11.17.1 The protective soil cover material shall be free of angular stones or other foreign matter that could damage the geocomposite and the geomembrane. The first lift placed over the geocomposite shall have no particles in excess of 1 inch in maximum diameter. Subsequent lifts shall have no particles in excess of 4 inches in maximum diameter.
- 11.17.2 In applying the protective cover material, no equipment shall drive directly across the geocomposite. The specified fill material shall be placed in loose lifts no thicker than nine (9) inches and spread utilizing vehicles with a low ground pressure.
- 11.17.3 The protective soil cover shall be placed on the geocomposite in a manner that prevents damage to the geocomposite.
- 11.17.4 Soil cover should be placed in a manner that prevents the soil from entering the geocomposite overlap zones. Soil cover shall be pushed from the toe of slopes up, not from top of slopes down, to minimize tensile forces on the geocomposite and geomembrane.
- 11.17.5 The protective cover shall be placed over the geocomposite using low contact pressure, wide-tracked construction equipment that minimizes stresses on the geocomposite. The cover shall be placed and spread by making a minimum of four complete passes with the tracks of the equipment. Special care and attention shall be made by the Contractor to ensure that the underlying geocomposite is not damaged.
- 11.17.6 The protective cover soil shall be a minimum eighteen (18) inches thick. This thickness does not apply to frequently trafficked areas or roadways, for which a minimum thickness of three feet is required.

#### 11.18 **Topsoil**

- 11.18.1 Topsoil material is generally defined as the upper surface of dark fertile soil, which contains decaying matter and roots. Topsoil shall be free of subsoil, clay, weeds, large roots, or foreign material that would interfere with seeding or maintenance.
- 11.18.2 Testing of samples of topsoil may be required to determine if any nutrients should be added to the soil in addition to the application of fertilizer and lime.
- 11.18.3 The topsoil cover shall be placed in a minimum loose lift thickness of six inches and then grassed. If erosion occurs before grassing operations, the area shall be repaired to the satisfaction of the PCM.

#### 12.0 SEDIMENT AND EROSION CONTROL

- 12.1 Minimum sediment and erosion control measures are shown on the Drawings for the Plant Gorgas Bottom Ash Storage Area Closure. Additional measures shall be taken as required or as directed by the Purchaser to minimize erosion of soil.
- 12.2 During the course of this project, the Contractor shall plan and coordinate his work to minimize the amount of suspended soil particles entering rivers and streams or leaving the general work area and being deposited in undesirable places. Any property damage

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- or fines resulting from the Contractor's negligence shall be borne by the Contractor.
- 12.3 The Contractor shall not excavate, uncover or denude areas of work until adequate erosion and sediment control measures are installed. The Contractor's earthmoving operations shall at all times be in full compliance with the requirements of the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas
- 12.4 The Purchaser will inspect the sediment and erosion control practices (e.g. "BMPs") employed to evaluate their effectiveness. Any deficiencies shall be immediately corrected by the Contractor at no cost to the Purchaser.
- 12.5 Erosion and sediment control measures shall be utilized and maintained as indicated in the Plans.

## 13.0 VEGETATION

- 13.1 A minimum six-inch layer of topsoil shall be placed on all areas to be grassed.
- Earth fill areas and other disturbed areas shall be grassed. Hydroseeding methods may be used.
- 13.3 The Contractor shall produce a satisfactory stand of perennial grass in accordance with the Vegetation Schedule as shown on the Drawings. If it is necessary to repeat any or all the work, including plowing, fertilizing, watering, mulching and seeding, the Contractor shall repeat these operations until a satisfactory stand is obtained.
- A satisfactory stand of grass is defined as 100% of soil surface being uniformly covered in permanent vegetation with a density of 70% or greater, or landscaped according to the Plan (uniformly covered with landscaping materials in planned landscaped areas), or equivalent permanent stabilization measures as defined in the Handbook (excluding a crop of annual vegetation and a seeding of target crop perennials appropriate for the region).
- 13.5 Measures shall be taken to prevent erosion of the topsoil layer and vegetation until a full vegetative growth has been obtained. After seeding, an erosion control biodegradable straw blanket shall be installed on any slopes equal to or steeper than 3H:1V. This material shall be as indicated on the Drawings. The blanket shall be installed per manufacturer's installation instructions. However, the blanket shall be tacked as necessary to the ground to withstand the upward growth of grass and to permit the establishment of grass through the blanket. Failure to accomplish this will require that the affected area be re-grassed.
- Water required to promote a satisfactory growth shall be furnished and applied by the Contractor as often as necessary to achieve the results outlined above.
- 13.7 The Contractor shall make daily inspections of the seeded areas and repair all eroded areas to the satisfaction of the Purchaser.

## 14.0 RECORDS

## 14.1 Quality Control Records

14.1.1 The quality control records of inspection and field quality control records shall be compiled by the Contractor's CQC Inspector and provided to the Purchaser on an on-

- going basis or as directed. The final records will provide the background data necessary for the certification of the final cover construction. All records shall be forwarded to the Plant's permanent file to be retained as a permanent record of the project.
- 14.1.2 At the completion of the construction of the final cover, a Construction Quality Assurance Report (Construction Certification), prepared by the Purchaser, shall be submitted along with a registered engineer's certification that the final cover was constructed in accordance with the approved Closure/Post Closure drawings and the ADEM Solid Waste Regulations. The Contractor shall provide, at a minimum, the following information for preparation of the Certification Report:
  - a) Elevation Contour Drawings of the subgrade on a maximum 100ft. by 100ft. grid. Drawings to be signed and sealed by a land surveyor registered to practice in the State of Alabama.
  - b) For the Composite Cover System:
    - 1. Final geomembrane panel layout
    - 2. Final geocomposite panel layout
    - 3. Elevation Contour Drawings of the top surface of the 18 inch Protective Soil Layer on a maximum 100ft. by 100ft. grid (as used for the subgrade). Protective Soil Cover thickness relative to the subgrade shall be indicated at the grid points. Drawings to be signed and sealed by a land surveyor registered to practice in the State of Alabama.
    - 4. Finished Grade elevation contour drawings with thickness of topsoil indicated on the same maximum 100 ft. x 100 ft. grid as the Protective Cover Soil Elevation Contour Drawing. Drawings to be signed and sealed by a land surveyor registered to practice in the State of Alabama.
  - c) All survey shots shall be "storage stacked" in order to properly verify the given layer's thickness. The use of interpolation or other computer generated methods to achieve point storage stacking are not acceptable.
  - d) Thickness determinations obtained at grid points on slopes shall be made normal to the slopes.
  - e) All survey and topographic information shall be submitted in both pdf and dwg file formats which are compatible with AutoCAD 2016.
  - f) A summary of major construction activities which shall include a description of the activity and schedule dates. This summary shall be based on daily logs provided by the on-site inspector. This shall also serve to document the presence of a qualified member of the inspection team during any construction activity involving structural fill or any component of the liner.
  - Project CQC summary reports including all field testing and inspection results. This summary shall be inclusive of all passing tests as well as failing tests and retests. This shall include at a minimum, all field moisture content and density tests, Proctor curves, Atterberg limits, particle size distribution, CQC resumes, CQC welding rod certificates, subgrade acceptance forms, HDPE panel deployment logs, fusion and extrusion trial seam logs, fusion and extrusion seam logs, HDPE repair logs, pressure and vacuum test logs, fusion and

- extrusion destructive test logs, concrete cylinder break reports, concrete pour cards, concrete tickets, rebar mill certification reports, and all daily field reports.
- h) Copies of all field CQC reports for structural fill, bottom ash fill, and geosynthetic installation.

## 14.2 Record Topographic Survey

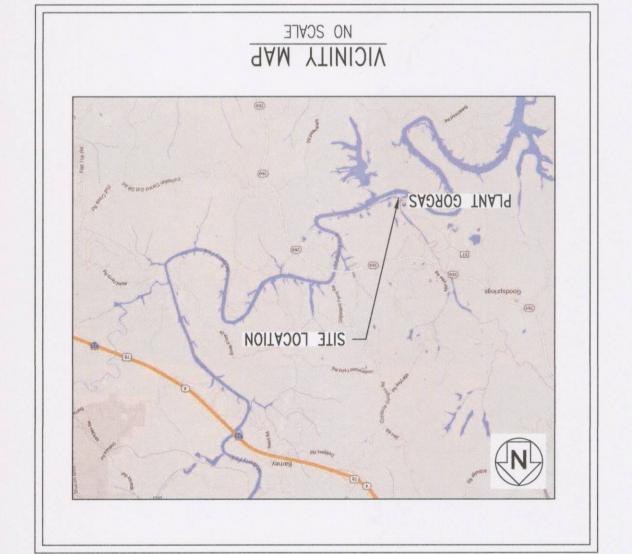
A record topographic survey will be performed by the Purchaser to fully document the lateral and vertical extent of the developed area. This survey will be maintained as part of the permanent record. Drawings to be signed and sealed by a land surveyor registered to practice in the State of Alabama.

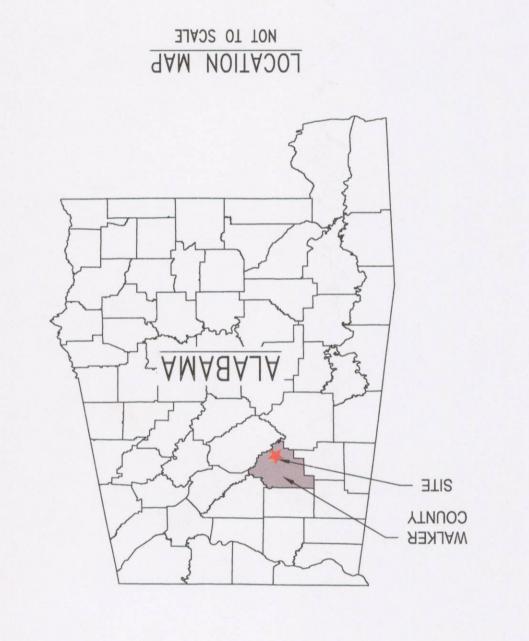
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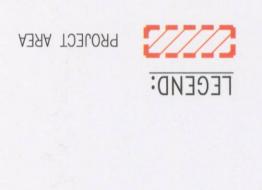
# PLANT GORGAS BOTTOM ASH STORAGE AREA CLOSURE SITEWORK CONSTRUCTION DRAWINGS

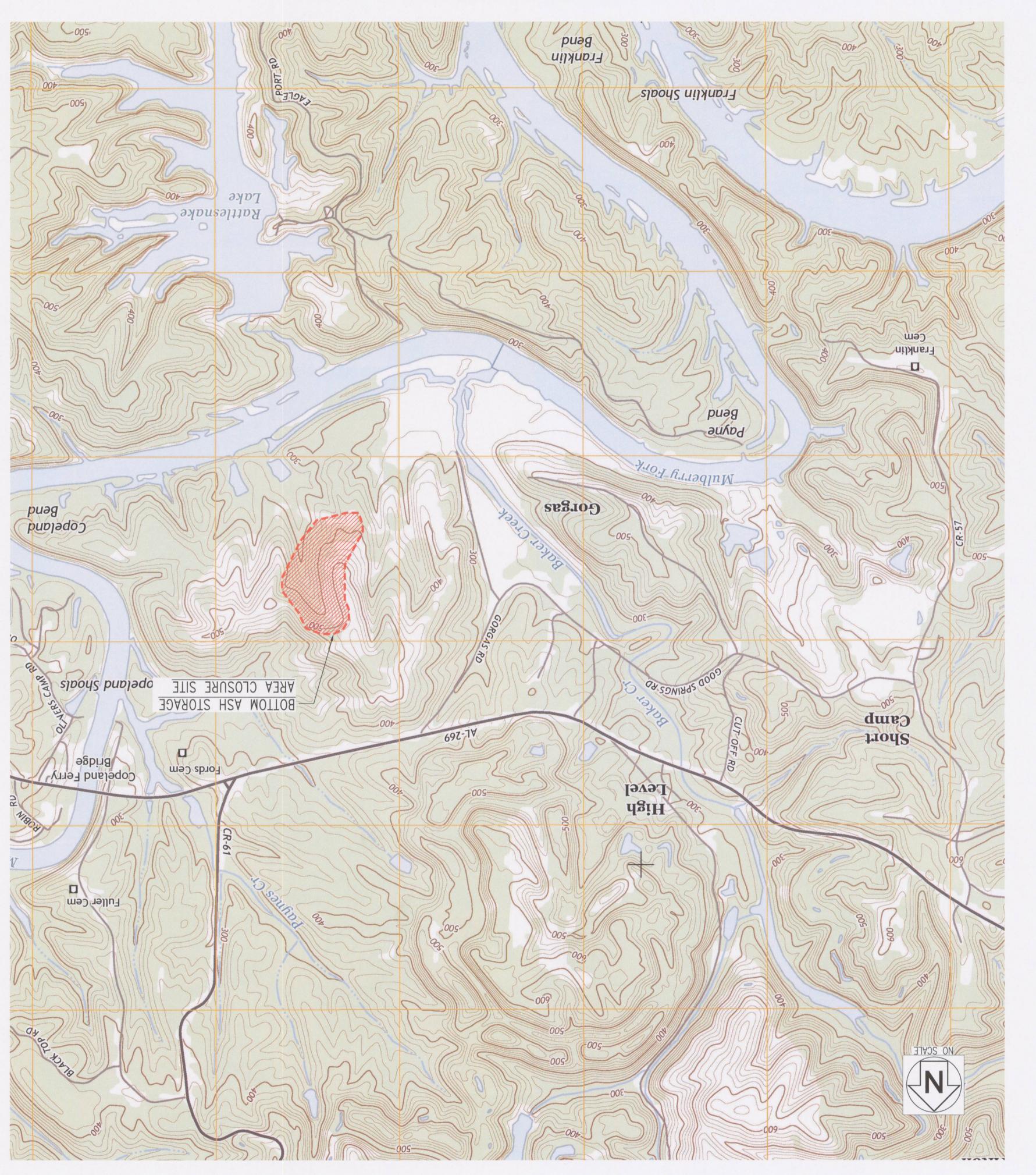
WALKER COUNTY, ALABAMA "ALKER COUNTY, ALABAMA

SECTIONS 17 AND 20, TOWNSHIP 16 SOUTH, RANGE 6 WEST









GOODSPRINGS, AL QUADRANGLE

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PARRISH, ALABAMA 35580
460 GORGAS ROAD
PLANT GORGAS

PERMINGHAM, ALABAMA 35203
BIRMINGHAM, ALABAMA 35203

PROJECT MANAGER:

SOUTHERN COMPANY SERVICES, INC.

PARRISH, ALABAMA 35580-5715

TEL: (205) 992-7266

TEL: (205) 992-7266

E720258 BA CHK,D CINIT PABB EFECT PAPB INC APPR MECH APPR DISC MGR BY CHK,D CINIL APPR ELECT PAPPR DISC MGR BY CHK,D CIVIL APPR DISC MGR BY BA CHK,D CINIT YABB EFECT APPR DISC MGR BY CHK,D CIVIL APPR DISC MGR BY CH CHK,D | CINIT APPR | ELECT APPR | I/C APPR | MECH APPR | DISC MGR DRAWING NUMBER BOTTOM ASH STORAGE AREA CLOSURE TITLE SHEET AND DRAWING INDEX SITEWORK PLANT GORGAS SSUED FOR CONSTRUCTION Alabama Power Company DATE DATE DATE DATE *KENISION* DATE KEVISION 0 DATE **KEVISION** DATE **KEVISION** DATE **KEVISION** *KEVISION KEVISION* This document contains proprietary, confidential, and/or trade secret information of the Southern Company. Unauthorized parties, it is intended for use only by employees of, or uthorized contractors of, the subsidiaries of the Southern Company. Unauthorized possession, use, distribution, copying, dissemination, or disclosure of any portion hereof is prohibited. Engineering and Construction Services FOR Southern Company Generation Copyright © 2018 Southern Company Services, Inc.

E720259 1CP XXX XXX CBN 1KB XXX 1KB XXX XXX | YXX | XXX | XXX | XXX NONE MEM SES AAL MWL CHK,D | CIVIL APPR | ELECT APPR | I/C APPR | MECH APPR | DISC MGR SHEEL CONL,D DRAWING NUMBER SCALE BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR CHK,D | CINIT PARE | EFECT APPR | MECH APPR | DISC MGR | BY | CHK,D | CINIT APPR | LICE APPR | MECH APPR | DISC MGR SOTTOM ASH STORAGE AREA CLOSURE OTTOM ASH STORAGE AREA CLOSURE BOTTOM ASH STORAGE AREA CLOSURE PROJ ID: GOR18003 PROJ ID: GOR18003 PROJID: GOR18003 CENERAL NOTES, ABBREVIATIONS AND LEGENI

SITEWORK PLANT GORGAS CONTROL LEGEND SSUED FOR CONSTRUCTION REVISED SPECIFICATION TITLE AND NUMBER. ADDED RIPRAP-LINED SWALE AND SILT FENCE TO EROSION Alabama Power Company DATE 01/16/2019 DATE 11/30/18 SENIZION 0 **KENIZION** J 01/24/2019 3TAG | KENIZION 5 **DATE** *KEVISION* **JTAO KEVISION JTAO KEVISION** DATE *KEVISION* **DATE** use, distribution, copying, dissemination, or disclosure of any portion hereof is prohibited. This document contains proprietary, confidential, and/or trade secret information of the Southern Company or of third parties. It is intended for use only by employees of, or thousand to such contractors of, the subsidiaries of the Southern Company. Unauthorized possession Engineering and Construction Services Southern Company Generation

1. SEE DRAWING E720258 FOR DRAWING INDEX. **NOTES:** 

- 6. MAXIMUM SLOPES SHALL BE 4-FEET HORIZONTAL TO 1-FOOT VERTICAL UNLESS SHOWN OTHERWISE.
- DELINEATED AS SUCH BY THE DISTURBANCE LIMITS SHOWN ON THE DRAWINGS.
- WETLANDS. NORMAL GRADING ACTIVITIES SUCH AS CUT/FILL OPERATIONS WITHIN THIS 50 FEET SHALL BE PERMITTED IF 5. BORROW SITE OR SITES FOR STOCKPILING FILL DIRT SHALL BE PROHIBITED WITHIN 50 FEET OF STREAM BANKS AND
- DRAWINGS. THE CONTRACTOR WILL ESTABLISH ALL NECESSARY BENCHMARKS AND BASE LINES REQUIRED FOR THE WORK. 4. ALL EARTHWORK CONSTRUCTION SHALL BE DONE TO THE LINES, GRADES, AND CROSS SECTIONS SHOWN ON THE
  - E720263-E720265 AND E720275-E720287. FOR TOPSOIL, PAVING, BUILDING PAD, ETC. FOR DELINEATION OF FINISHED GRADE ELEVATIONS, SEE DRAWINGS

NOISIA

- PROPOSED GRADES INDICATED ON THIS PLAN ARE TO FINISH GRADE. CONTRACTOR SHALL MAKE SUBGRADE ADJUSTMENTS
- TO USE. PURCHASER. MATERIAL SHALL BE CLEAN/UNCONTAMINATED AND FREE OF CULTURAL RESOURCES AND APPROVED PRIOR
- 2. EARTH FILL MATERIAL SHALL BE OBTAINED FROM APPROVED BORROW AREAS AS DESIGNATED OR APPROVED BY THE
- EARTHWORK AND FINAL COVER INSTALLATION" (LATEST REVISION). 1. REFER TO THE PROJECT TECHNICAL SPECIFICATIONS TITLED "TECHNICAL SPECIFICATIONS SECTION 31 20 00 FOR

# EARTHWORK AND CONSTRUCTED FILL

- 13. THE PROJECT LIMITS SHOWN ON THE CONSTRUCTION DRAWINGS FOR THIS PROJECT WILL ALSO ACT AS THE LIMITS OF
- ACCOUNT FOR THIS DURING CONSTRUCTION. TO ESTABLISH AN ACCEPTABLE FINAL VEGETATIVE COVER. THE CONTRACTOR SHALL ADJUST HIS/HER BID ACCORDINGLY TO
- 12. SEVERAL APPLICATIONS OF TEMPORARY OR PERMANENT VECETATION MAY BE REQUIRED DURING CONSTRUCTION IN ORDER FOR ALL AREAS THAT REQUIRE PERMANENT SEEDING. SHALL PERFORM SOIL TESTS TO IDENTIFY AND IMPLEMENT SITE—SPECIFIC FERTILIZER NEEDS OR OTHER SOIL AMENDMENTS
- STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME I" LATEST EDITION. THE CONTRACTOR SPECIFICALLY, PAGE 119 THROUGH 127 OF THE "ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND APPLICATION OF SEEDING. THE CONTRACTOR SHALL ADHERE TO PROPER SEEDING PROCEDURES AND SPECIFICATIONS, 11. SIX INCHES OF UNSETTLED TOPSOIL SHALL BE PLACED ON ALL AREAS THAT REQUIRE PERMANENT GRASSING PRIOR TO
- (LATEST EDITION). EROSION CONTROL, SEDIMENT CONTROL, AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS" MAINTAINED, AS SHOWN IN THE PLANS AND ASSOCIATED DETAILS, IN CONFORMANCE WITH THE "ALABAMA HANDBOOK FOR AND POLLUTION CONTROL PLANS (ES&PCP). BEST MANAGEMENT PRACTICES (BMP'S) ARE TO BE INSTALLED AND DISCHARGE, THEREFORE IT DOES NOT REQUIRE A NOTICE OF INTENT (N.O.I.) OR A SET OF PERMITTED EROSION, SEDIMENT,
- WILL BE CONTAINED AND REUSED ON-SITE. THE EXISTING WASTE WATER POND HAS A PERMITTED AND MONITORED 10. DRAINAGE FROM THE DISTURBED AREA WITHIN THE PROJECT LIMITS WILL DRAIN TO THE EXISTING WASTE WATER POND OR
- LANDFILLS OFFSITE. 9. CONSTRUCTION DEBRIS, FLOWABLE FILL, OLD SUPPORT MATERIALS OR OTHER REFUSE SHALL BE DISPOSED IN APPROVED
  - LIMITS OF DISTURBANCE UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR AS APPROVED BY THE PCM.
- 8. CONSTRUCTION ACTIVITIES INCLUDING MATERIAL STOCKPILING ARE NOT PERMITTED IN AREAS OUTSIDE OF THE DESIGNATED
- APPURTENANCES INCLUDING ANY DEEP EXCAVATIONS REQUIRING AN ENGINEER'S DESIGN. RECULATIONS. CONTRACTOR IS RESPONSIBLE FOR ALL SHORING/CRIBBING REQUIRED FOR INSTALLATION OF PIPES AND
- 7. ALL WORK SHALL BE IN STRICT COMPLIANCE WITH CURRENT OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION SHALL BE AT NO ADDITIONAL EXPENSE TO THE PURCHASER.
- CONTROL, AND PROVISIONS FOR DRAINAGE OF EXCAVATIONS, AND FOR THE PLACEMENT OF MATERIALS. SUCH WORK 6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLANNING AND OPERATING ANY DEWATERING, SURFACE WATER RUNOFF
- INDUSTRY PRACTICE TO ASSUME COMPLIANCE WITH THESE DRAWINGS AND TECHNICAL SPECIFICATIONS. PROGRAM OR PRACTICES AND SHALL INSTITUTE ANY ADDITIONAL CONTROLS OR PROCEDURES IN ACCORDANCE WITH PROVEN
- 5. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING HIS OWN STANDARD QUALITY CONTROL AND QUALITY ASSURANCE
- CONTRACTOR TO THE SATISFACTION OF THE PURCHASER'S PROJECT CONSTRUCTION MANAGER, PCM. 4. EXISTING ACCESS AND ROADS SHALL BE MAINTAINED AND REPAIRED AS NECESSARY DURING CONSTRUCTION BY THE
- EQUIPMENT AND PERSONNEL PERFORMING WORK NEAR HIGH VOLTAGE POWER LINES ARE SPECIFIED IN OSHA 1910.333.
- 3. CONTRACTOR TO USE CAUTION WHEN WORKING UNDER OR NEAR TRANSMISSION LINES. REQUIRED CLEARANCES FROM
  - 2. SEE SURVEY AND TOPOGRAPHY NOTES, THIS DRAWING, FOR SURVEY INFORMATION.
    - 1. GRID COORDINATE SYSTEM IS ALABAMA WEST STATE PLANE NAD 27.

# GENERAL CONSTRUCTION NOTES

- 8. ALL EXISTING IMPROVEMENTS SHALL REMAIN UNLESS SPECIFICALLY NOTED, "TO BE REMOVED".
- WITH APPLICABLE ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT REGULATIONS AND REQUIREMENTS. 7. REMOVAL AND DISPOSAL OF ANY AND ALL MATERIALS FROM DEMOLITION ACTIVITIES WILL BE DONE IN ACCORDANCE
  - IMPROVEMENTS THAT ARE IN CONFLICT WITH THE PROPOSED IMPROVEMENTS.
- 6. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL/RELOCATION OF ALL ABOVE AND BELOW GROUND EXISTING
- 5. ALL UTILITY LOCATIONS, DIMENSIONS AND ELEVATIONS SHOWN ARE APPROXIMATE AND OTHER UTILITIES MAY EXIST.
  - 4. CONTRACTOR SHALL COORDINATE WITH PURCHASER PRIOR TO DISRUPTION OF ANY UTILITY SERVICE. ANY DEMOLITION AND/OR CONSTRUCTION OPERATIONS.
- CONTRACTOR SHALL HAVE ANY AND ALL EXISTING UTILITIES LOCATED BY UTILITY LINE LOCATER SERVICE PRIOR TO SHALL USE EXTREME CAUTION WHILE WORKING IN THESE AREAS TO ASSURE NO UTILITY SERVICE INTERRUPTIONS.

3. SOME EXISTING UTILITIES SCHEDULED TO REMAIN ARE LOCATED WITHIN PROPOSED DEMOLITION AREAS. CONTRACTOR

- THE PROJECT LIFE.
- CONTRACTOR SHALL COORDINATE DEMOLITION OPERATION PHASING WITH PURCHASER PRIOR TO AND THROUGHOUT
- 2. CONTRACTOR SHALL COORDINATE WITH PURCHASER PRIOR TO BEGINNING ANY AND ALL DEMOLITION OPERATIONS.
- PURCHASER'S SATISFACTION.
- CONSTRUCTION OF THIS PROJECT. ANY DAMAGE WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE AND TO THE
- 1. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES TO EXISTING IMPROVEMENTS ON- OR OFF-SITE DUE TO THE

## DEMOLITION NOTES:

- 4. CONTOURS WERE PRODUCED BY DIGITAL TERRAIN MODEL.
- 3. CONTOUR INTERVAL 1 FOOT @ 30 SCALE, 2 FOOT @ 100 SCALE. 2. AERIAL LIDAR PROVIDED BY HALIS, LLC.
- SERVICES AND SOUNDING DATA COLLECTED JULY 2015 MAY 2018. 1. CONTOURS ARE A COMPOSITE OF AERIAL LIDAR AND GROUND SURVEY BY SOUTHERN COMPANY CIVIL - FIELD

## SURVEY AND TOPOGRAPHY NOTES:

- EARTHWORK AND FINAL COVER INSTALLATION" (LATEST REVISION). 1. REFER TO THE PROJECT TECHNICAL SPECIFICATIONS TITLED "TECHNICAL SPECIFICATIONS SECTION 31 20 00 FOR
  - TECHNICAL SPECIFICATION REFERENCE

- BE CASKETED WATER TIGHT. ENGINEERING. THE PIPES SHALL HAVE A SMOOTH INTERIOR AND ANGULAR EXTERIOR CORRUGATIONS. PIPE JOINTS SHALL 7. STORM PIPES SHALL BE HANCOR BLUE SEAL OR ADS DUAL WALL, N-12 WIIB HOPE PIPE OR AN EQUAL APPROVED BY
- 6. ALL STORM PIPES SHALL BE BEDDED IN A MINIMUM OF 6" OF CRUSHED AGGREGATE (ALDOT #57 STONE OR APPROVED
  - INSTALLATION. THE PURCHASER SHALL BE NOTIFIED OF ANY DEVIATIONS PRIOR TO CONSTRUCTION.
  - 5. THE CONTRACTOR SHALL VERIFY ALL EXISTING AND NEW STORM PIPE GRADES AND CONNECTION POINTS PRIOR TO
    - 4. STORM DRAINAGE SYSTEMS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM.
    - CONSTRUCTION MANAGER PRIOR TO INSTALLATION AND/OR FABRICATION.
- 3. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL STORM PIPE MATERIALS AND STRUCTURES TO THE PROJECT
- JOINTS AND PIPE ENTRY/EXIT POINTS TO PROVIDE A WATERTIGHT STRUCTURE. 2. ALL MANHOLES SHALL CONTAIN STEPS INSTALLED IN ACCORDANCE WITH OSHA REGULATIONS AND SHALL BE SEALED AT
  - MANHOLES CENTER OF MANHOLE WORK POINTS FOR PIPES/STRUCTURES:

PIPES WITH SLOPE PAVED HEADWALL - END OF PIPE/FACE OF CONCRETE.

1. PIPE LENGTHS AND SLOPES ARE CALCULATED FROM THE WORK POINTS OF THE PIPES/STRUCTURES.

## STORM DRAINAGE PIPES/APPURTENANCES GENERAL INFORMATION & NOTES

- 5. COMPRESSION TESTING OF FLOWABLE FILL INCLUDING MAKING OF TEST CYLINDERS IS NOT REQUIRED FOR THIS PROJECT.
  - SUPPORTS ARE NOT ALLOWED.
  - 4. PIPE SUPPORT MATERIAL FOR FLOWABLE FILL CONSTRUCTION SHALL BE CONCRETE BLOCKS OR BRICKS. WOODEN
  - 3. TO PREVENT FLOTATION, HOLD DOWN STRAPS SHALL BE USED ON HDPE PIPES PRIOR TO PLACING FLOWABLE FILL.
    - 2. ALL FLOWABLE FILL TO SET 72 HOURS PRIOR TO PLACING COMPACTED SOIL BACKFILL ON FLOWABLE FILL.
      - 87 GALLONS OF WATER(POTABLE) 200 LBS OF CONCRETE SAND(OPTIONAL)
      - 120 LBS OF CEMENT 2000 LBS OF CLASS "F" FLY ASH
      - 1. A FLY ASH/CEMENT FLOWABLE FILL MIX SHALL CONSIST OF THE FOLLOWING:

## FLOWABLE FILL

EQUAL).

- OTHERWISE NOTED IN PURCHASE ORDER. 12. REBAR FABRICATOR SHALL OBTAIN APPROVAL OF HIS DETAIL DRAWINGS BEFORE BEGINNING FABRICATION, UNLESS
- NOTED. 11. ALL REINFORCING BAR HOOKS SHOWN ON DRAWINGS SHALL BE ACI STANDARD 90 DEGREE HOOKS, UNLESS OTHERWISE
- 10. EMBEDMENT AND SPLICE LENGTHS FOR REINFORCING STEEL SHALL CONFORM TO ACI-318, UNLESS OTHERWISE NOTED.
  - 9. PROVIDE A MINIMUM COVER OF 3" FOR ALL REINFORCING STEEL.
- 8. CHAMFER ALL EXPOSED EXTERNAL CORNERS OF CONCRETE WITH A 45 DEGREE CHAMFER, UNLESS OTHERWISE NOTED.
- SHALL BE ASTM A185 PLAIN TYPE. 7. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60. WELDED STEEL WIRE FABRIC
  - 6. CONCRETE SLABS SHALL HAVE A LIGHT BROOM FINISH.
- 5. IF READY-MIX CONCRETE IS USED FROM AN APPROVED SUPPLIER, ALL CONCRETE SHALL BE PLACED WITHIN 1/2 HOURS
- MATERIAL, UNLESS OTHERWISE APPROVED BY THE ENGINEER. FLY ASH SHALL CONFORM TO REQUIREMENTS OF ASTM C618, 4. CONCRETE MIX USING FLY ASH SHALL HAVE A FLY ASH CONTENT EQUAL TO 15-30% OF THE TOTAL CEMENTITIOUS
  - 3. USE A TYPE I/II PORTLAND CEMENT AND A W/C RATIO OF 0.45.
- OTHERWISE NOTED. 2. ALL CAST-IN-PLACE CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI IN 28 DAYS, UNLESS
  - -ACI-347R RECOMMENDED PRACTICE FOR CONCRETE FORMWORK.
  - -ACI-315 MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES. -ACI-318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
  - SPECIFICATIONS UNLESS OTHERWISE MODIFIED ON THE DESIGN DRAWINGS.
  - 1. DESIGN, MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE FOLLOWING LATEST STANDARDS AND

CONCRETE

EXISTING STORM DRAINAGE PIPE CLOSURE CAP LIMITS ------------PROJECT LIMITS **TZOAGRAUD** RIPRAP AGGREGATE ROADS EXIZING LENCE EXIZING ROADS & NEW DITCHES

08.817 X EXISTING SPOT ELEVATION FINISH GRADE CONTOURS (MINOR)

CLASS F.

-CRSI RECOMMENDED PRACTICE FOR PLACING REINFORCING STEEL.

PT POINT OF TANGENT PCC \_\_\_ POINT OF COMPOUND CURVE PC \_\_ POINT OF CURVE PI POINT OF INTERSECTION N.T.S. \_\_\_ NOT TO SCALE

F.B. \_\_\_ FLAT BOTTOM EX: \_\_\_ EXISTING EP \_\_ END POINT EL. \_\_\_ ELEVATION

**ABBREVIATIONS:** 

TYP \_\_\_ TYPICAL R\_\_RADIUS PVI \_\_\_ POINT OF VERTICAL INTERSECTION \_\_\_\_

CKD. BRK. — CRADE BREAK

DWG. \_\_\_ DRAWING BP \_\_\_ BEGIN POINT

MUMINIM \_\_\_ NIM MUMIXAM \_\_\_\_ .XAM LP \_\_\_ LOW POINT LF \_\_\_ LINEAR FEET IE. \_\_\_ INVERT ELEVATION

G.A.B. \_\_\_ GRADED ACCRECATE BASE

A.S.T.M. \_\_\_ AMERICAN SOCIETY OF TESTING MATERIALS ACI \_\_\_ AMERICAN CONCRETE INSTITUTE

HP HICH POINT HDBE --- HICH DENZILL BOLYETHYLENE

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TSG TOPSOILING TEMPORARY SEEDING

(SB) SIFT FENCE

EROSION CONTROL BLANKET

DC DUST CONTROL

LAND GRADING

\_\_\_\_\_\_

RIPRAP-LINED SWALE

PERMANENT SEEDING

OUTLET PROTECTION

——— OHE ——— OVERHEAD ELECTRICAL

EXISTING WATER

EXISTING CONTOURS (MINOR)

EXISTING CONTOURS (MAJOR)

STORM DRAINAGE PIPE

EROSION CONTROL LEGEND

STORM PIPE WITH RISER SECTION STORM PIPE WITH CONCRETE

manage and a second contract and a second contract of the second con

\_\_\_\_\_\_

FINISH GRADE SPOT ELEVATION

*TECEND* 

FINISH GRADE CONTOURS (MAJOR) 

E720260 MEM CEN 1KB XXX XXX WBB 1CB A CHKD CHI SHAB FECT SHAB DRAWING NUMBER PROJ ID: GOR18003 BOTTOM ASH STORAGE AREA CLOSURE PLANT GORGAS
SITEWORK
TOPOGRAPHIC MAP ISSUED FOR CONSTRUCTION Alabama Power Company DATE 11/30/18 KEVISION 0 DATE **KEVISION** DATE REVISION DATE DATE KENIZION REVISION DATE Southern Company Generation Engineering and Construction Services FOR **BEVISION** This document contains proprietary, confidential, and/or trade secret information of the Southern Company or of third parties. It is intended for use only by employees of, or authorized contractors of, the subsidiaries of the Southern Company. Unauthorized possession, use, distribution, copying, dissemination, or disclosure of any portion hereof is prohibited. DATE KENIZION DATE **KEVISION** ( IN FEET ) 1 inch = 100 ft. Copyright © 2018 Southern Company Services, Inc. CERPHIC SCALE 845 8-14 WS. 29.61 PSI. 59.61 PSI. 59.61 PSI. N 1328000 CAPSUM CELL CCB CETT

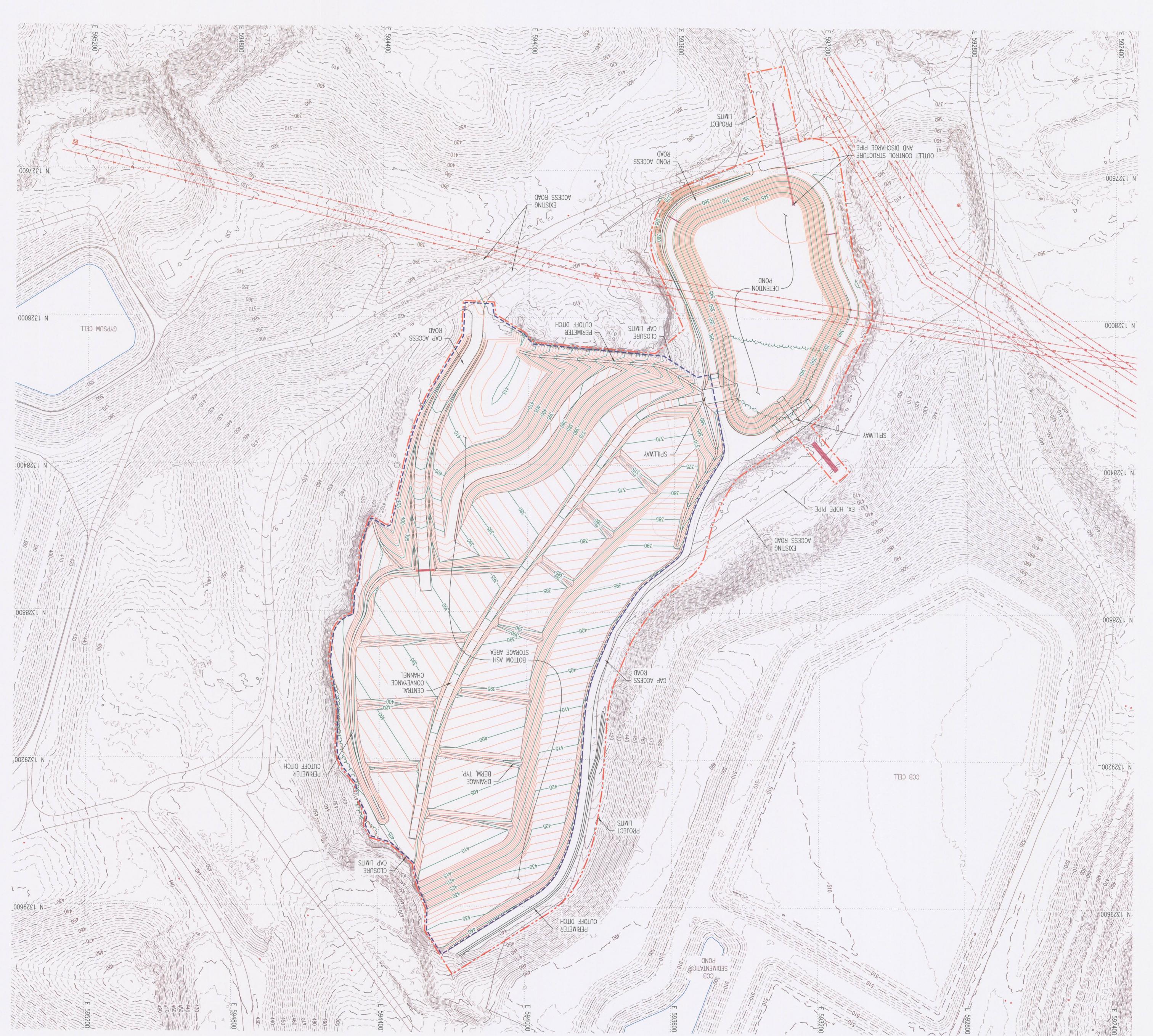
AL WEST NOTES:

E720261 BA CHK,D CIAIT PABE ETECT PABE INC PABE WECH PABE DISC WEB ETECT PABE INC PABE WECH PABE DISC WEB ETECT PABE INC PABE DISC WEB BA CHK,D CIAIT PABE DISC WEB BA CH DRAWING NUMBER BA CHK,D CINIT PPPR ELECT APPR I/C APPR MECH APPR DISC MGR SCALE BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR

PROJ ID: GOR18003

BOTTOM ASH STORAGE AREA CLOSURE BOTTOM ASH STORAGE AREA CLOSURE PLANT GORGAS
SITEWORK
GENERAL ARRANGEMENT
AND PROJECT LIMITS SPILLWAYS, WEST SLOPES ISSUED FOR CONSTRUCTION REVISED CENTRAL CONVEYANCE CHANNEL, POND Alamba Power Company DATE 11/30/18 KEVISION 0 DATE 02/26/19 REVISION 1 DATE **KEVISION** 3TAQ KENIZION DATE DATE **KEVISION** KENIZION DATE DATE **KEVISION** SEVISION Southern Company Generation Engineering and Construction Services This document contains proprietary, confidential, and/or trade secret information of the Southern Company or of third parties. It is intended for use only by employees of, or authorized contractors of, the subsidiaries of the Southern Company. Unauthorized possession, use, distribution, copying, dissemination, or disclosure of any portion hereof is prohibited. ( IN FEET ) t inch = 100 ft. Copyright © 2018 Southern Company Services, Inc.

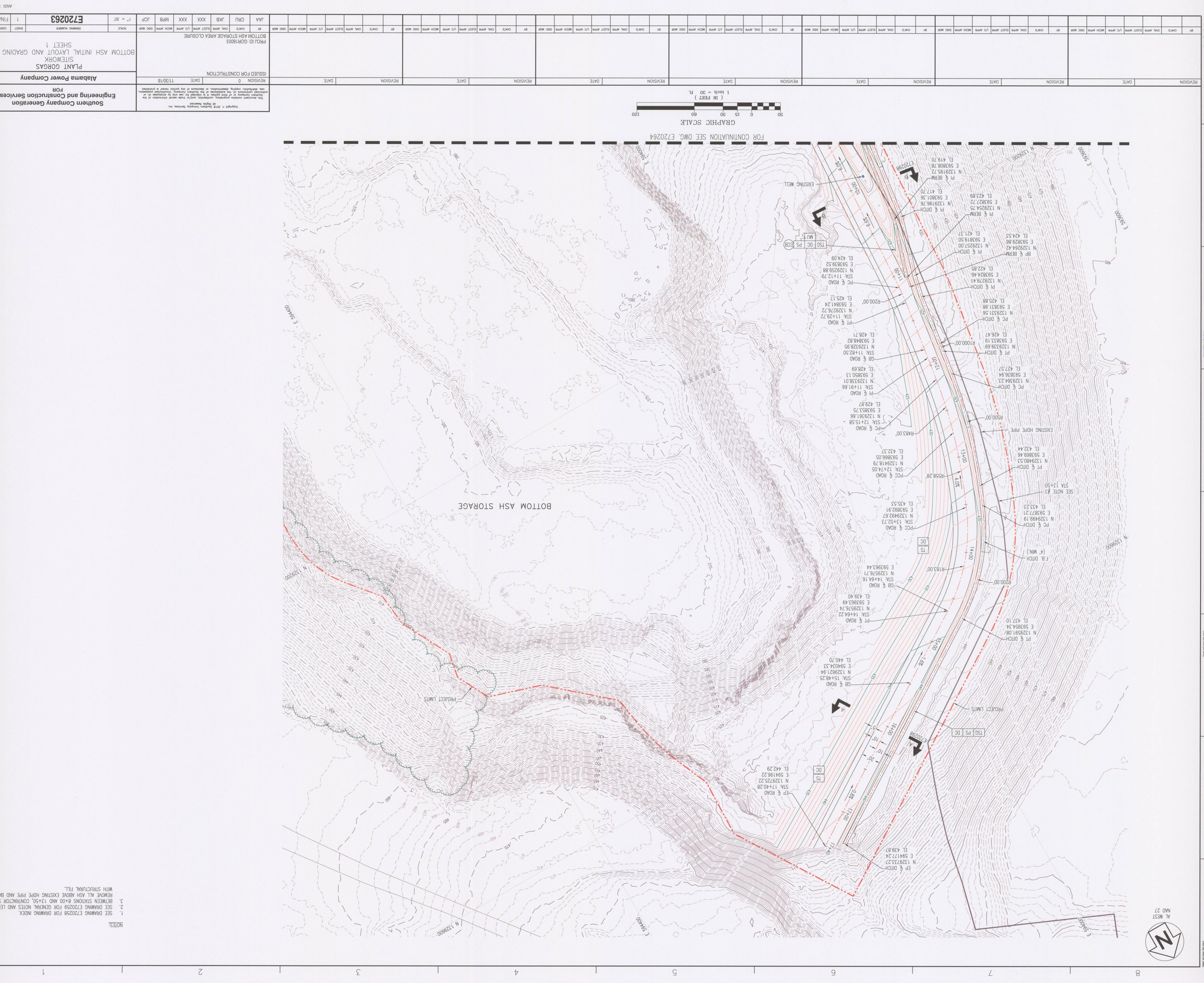
CERPHIC SCALE

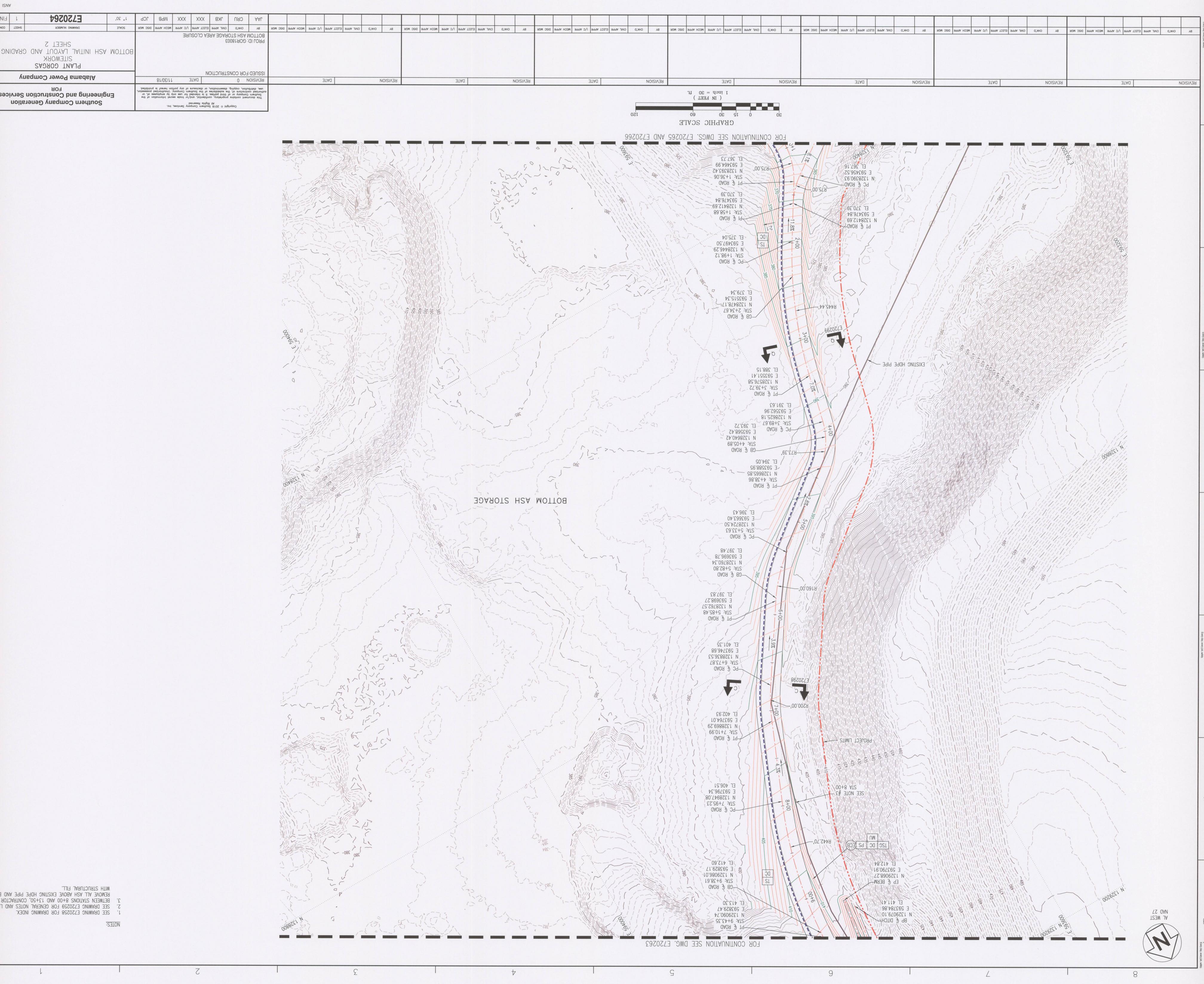


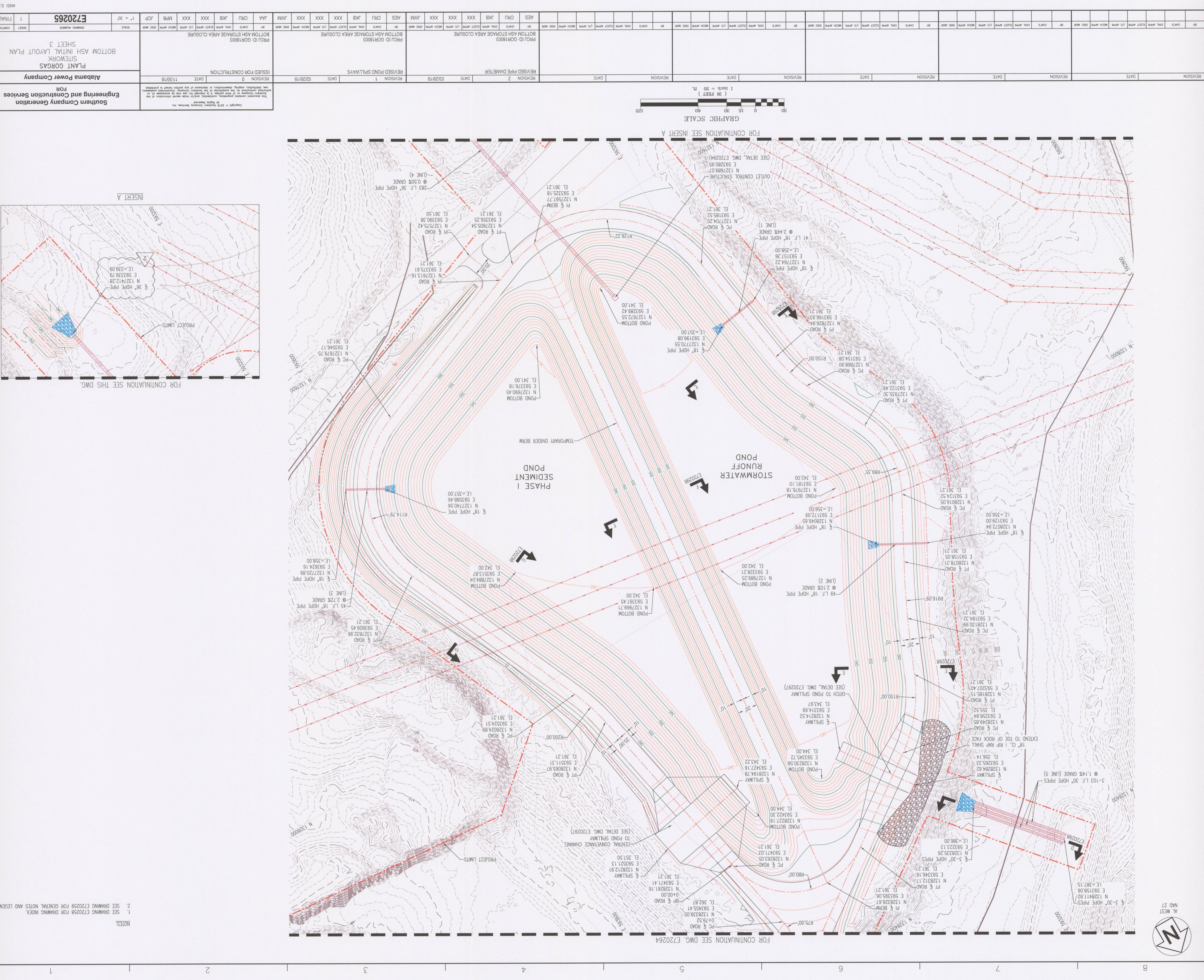
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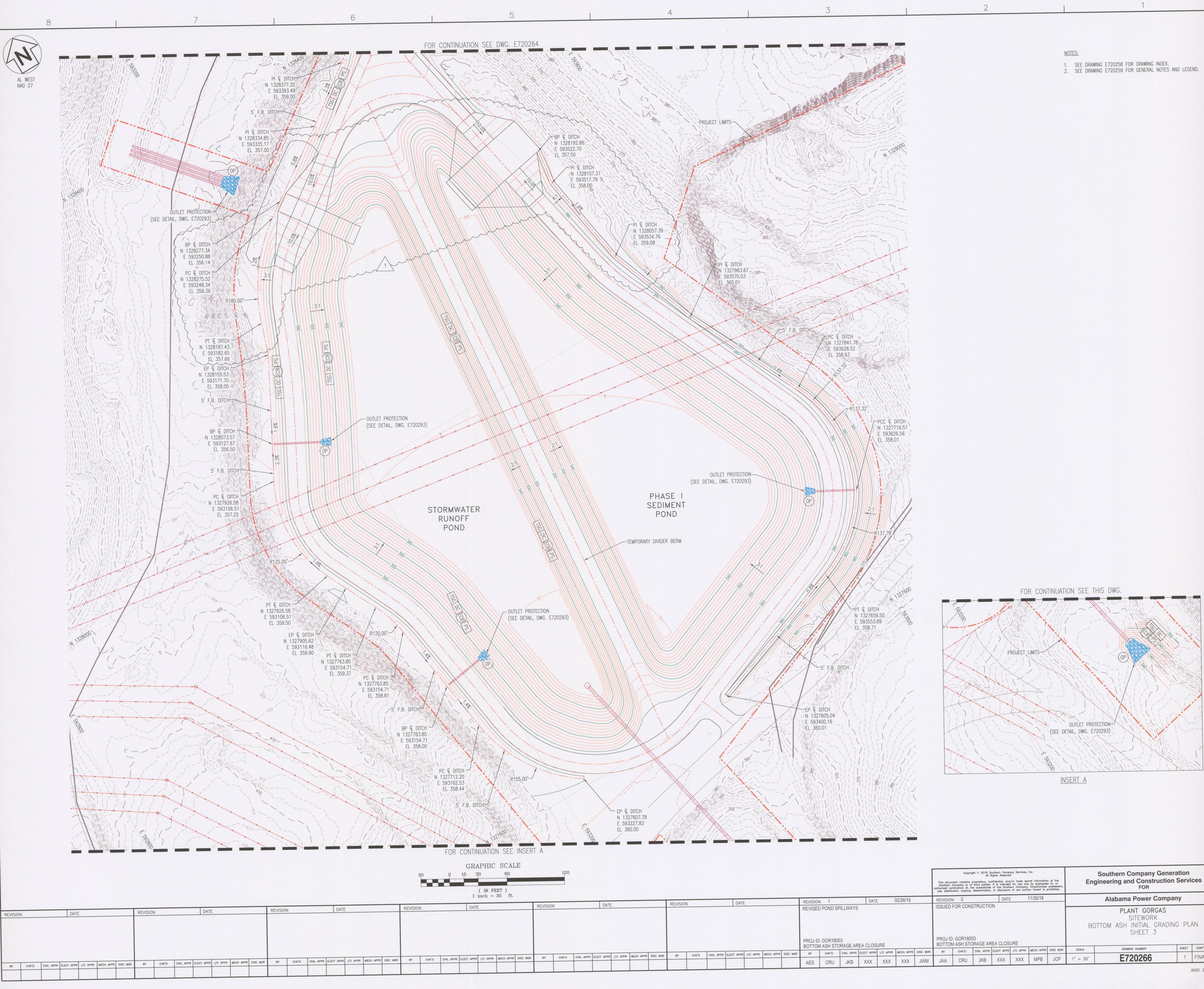
AL WEST

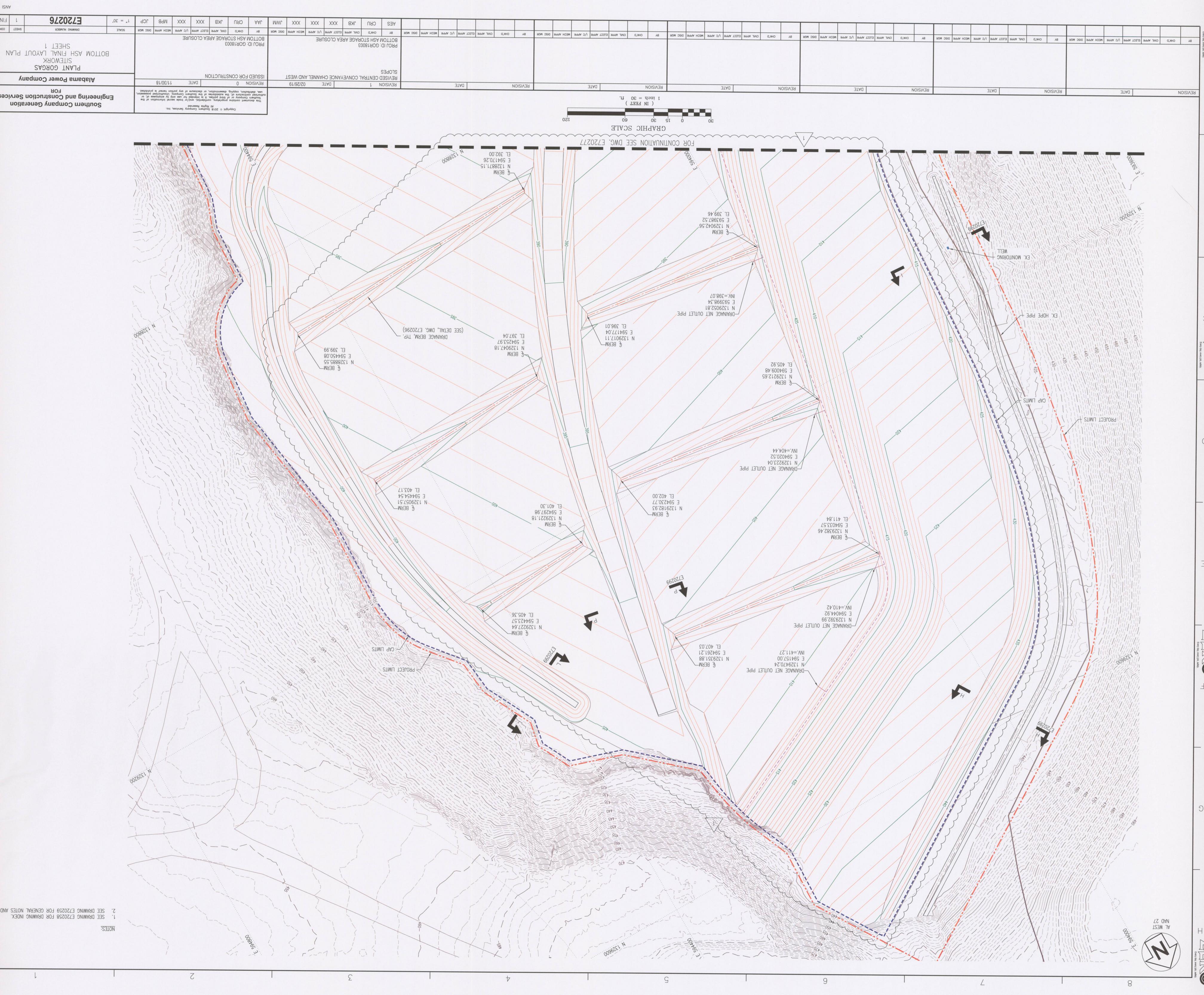




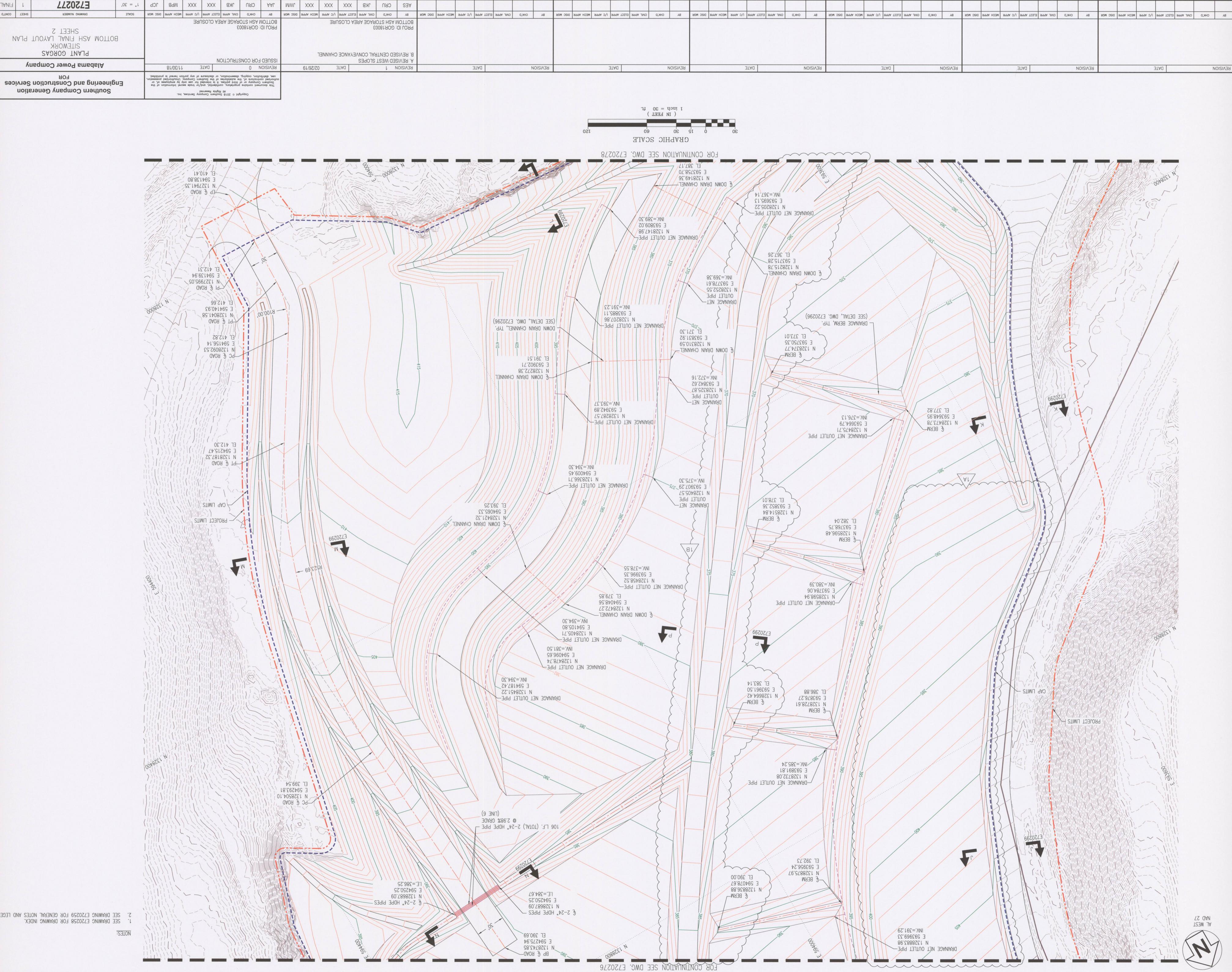


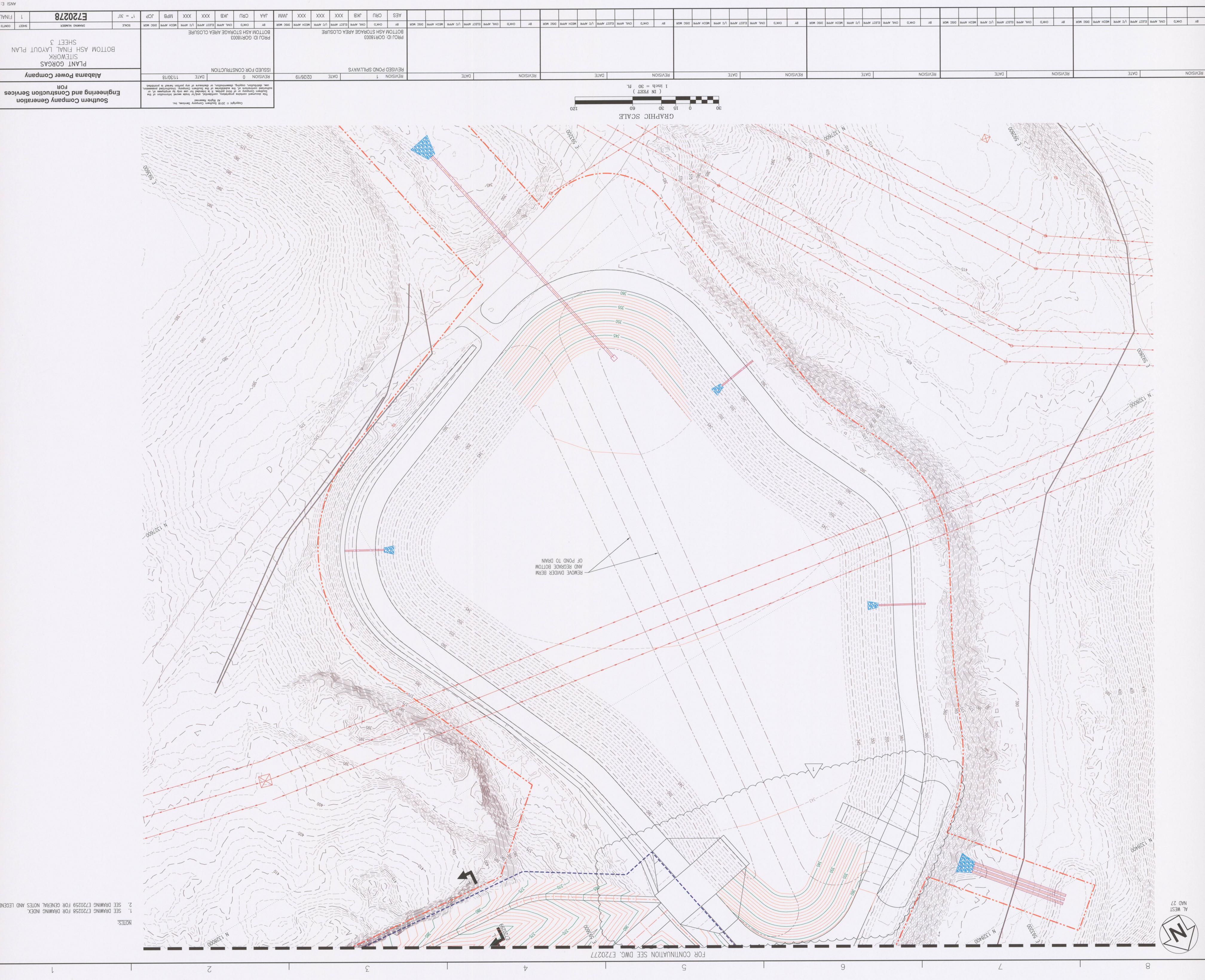


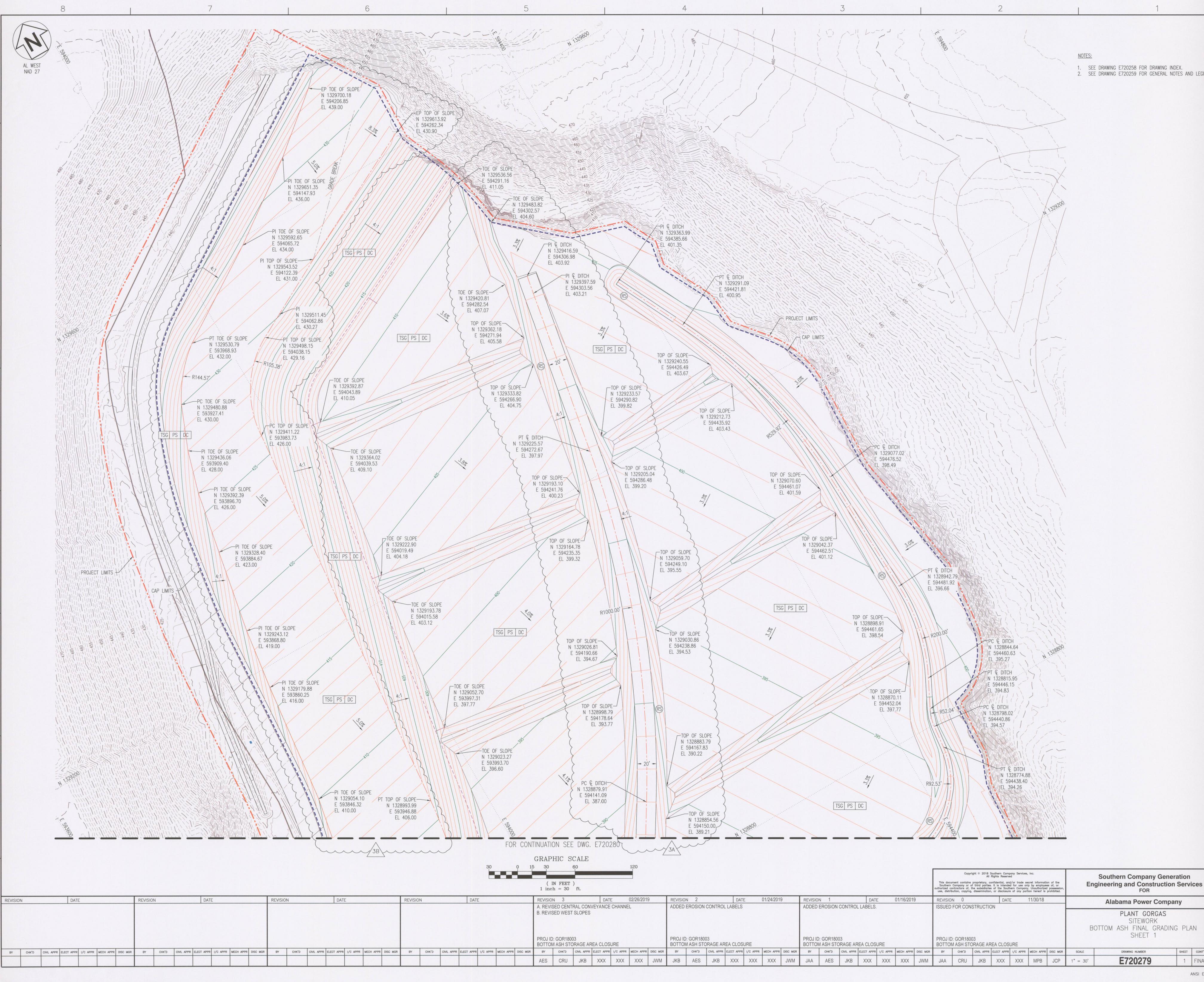




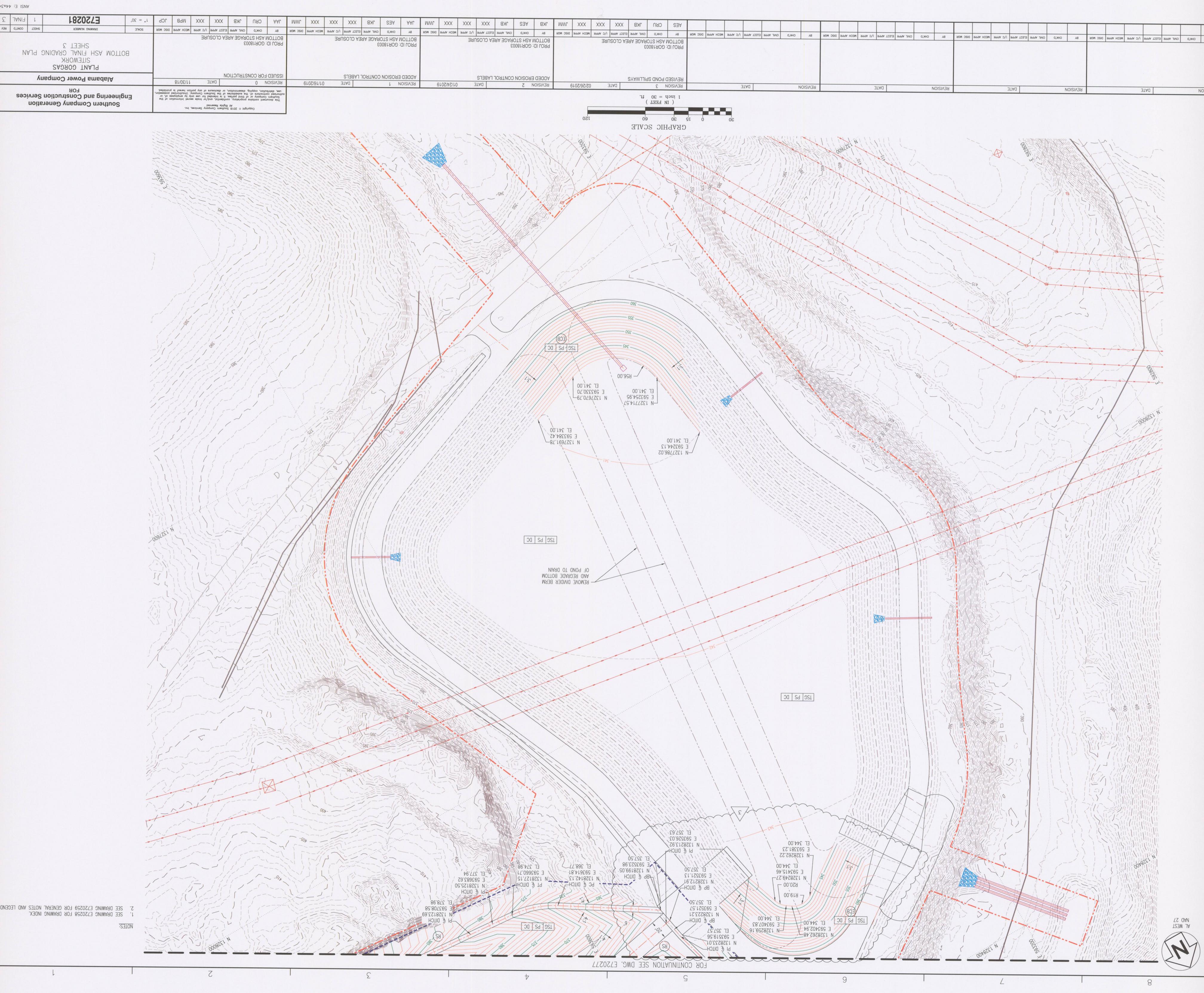
FINAL ENDING







VES CEU JKB XXX XXX XXX JWM JKB AES JKB XXX XXX JWM BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR MWL XXX XXX XXX BAL SAA AAL BA CHK,D CINIT YEAR ETECT APPR I/C APPR MECH APPR DISC MGR BY 1AA CRU JKB XXX XXX MPB JCP E720280 CHK,D CINIT YPPR ELECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR MECH APPR DISC MGR BA CHK,D CINIT PARE ETECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR MECH APPR DISC MGR CHK,D CINIT APPR ELECT APPR I/C APPR MECH APPR DISC MGR BY CHK'D CIVIL APPR ELECT APPR I/C APPR MECH APPR DISC MGR BOTTOM ASH STORAGE AREA CLOSURE DRAWING NUMBER BOTTOM ASH STORAGE AREA CLOSURE BOTTOM ASH STORAGE AREA CLOSURE BOTTOM ASH STORAGE AREA CLOSURE PROJ ID: GOR18003 PROJ ID: GOR18003 PROJ ID: GOR18003 PROJ ID: GOR18003 SHEEL 5 BOTTOM ASH FINAL GRADING PLAN C. REVISED BENCH SITEWORK B. REVISED WEST SLOPES 3. ADDED ELEVATIONS AT TOE OF SLOPE. PLANT GORGAS A. REVISED CENTRAL CONVEYANCE CHANNEL **KEVISION** DATE ADDED EROSION CONTROL LABELS **KEVISION** A. ADDED EROSION CONTROL LABELS DATE **KEVISION** DATE SSUED FOR CONSTRUCTION **BEVISION DATE** KENIZION 3 DATE 02/26/2019 **BEVISION** 2 DATE **KEVISION** 1 01/24/2019 DATE Alabama Power Company 01/16/2019 SEVISION 0 DATE 11/30/18 This document contains proprietary, confidential, and/or trade secret information of the Southern Company or of third parties. It is intended for use only by employees of, or authorized contractors of, the subsidiaries of the Southern Company. Unauthorized possession, use, distribution, copying, dissemination, or disclosure of any portion hereof is prohibited. Engineering and Construction Services Southern Company Generation Copyright © 2018 Southern Company Services, Inc. 1 inch = 30 ft. ( IN EEEL ) 15 30 CEAPHIC SCALE LOR CONTINUATION SEE DWG. E720281 EL 366.00 E 293630.39 EF 298.00 N 1328196.61 EL 358.92 E 593896.34 E 593761.74 -10P OF SLOPE / N 1328136.82/ E 293487.06 EL 361,53 N 1328346.80 BP & BENCH 42.619563 EL 412.00 E 593917.79 N 1328108.59 PC & DITCH-1328233.06 E 293973.85 66.920468 48.83E J3 PC & DITCH N 1328104.54 N 1328092.11 81.269562 42.885 J FPC & DITCH 64.867562 Ξ EL 364.44 EP & DITCH 1328205.17 EL 368.01 N 1328156.41 E 293490.18 TOE OF SLOPE-TSG PS DC E 293563.46 ▶ PC & BENCH N 1328378.06 84.804 J3 N 1328268.22 26.896563 PT & DITCH -TOP OF SLOPE 11.0018281 N PPT & DITCH EL 371.40 E 293544.02 EL 410.89 74.28353.47 E 594120.34 -BP TOP OF SLOPE. 1328061.54 EL 412.54 EP € DITCH— EL 415.11 TE 293950.07 E 294028.26 N 1328150.92 E 293222.63 EL 366.92 1328109.61 TOP OF SLOPE N 1328430.85 E 293740.78 —BP € RIDGE PI & DITCH 00.695 13 --- R214" 75.1128511 N EL 376.01 E 293753.65 EL 372.76 PT & DITCH— 57.293593 N 1328295.33 95.7<u>2</u>62523 Ξ E 294164.59 EL 410.78 EL 415.20 1328417.22 -TOP OF SLOPE N 1328438.70 N 1328052.65 E 594136.22 E 594042.90 -PI TOP OF SLOPE PC & DITCH N 1328144.22 N 1328104.95 FEP & DITCH EL 370.40 PC & DITCH -PT & RIDGE EL 370.76 TSG PS DC E 593747.07 EL 410.78 EL 391.49 E 593821.38 -B475/ E 593903.93 E 594176.03 N 1328355.02 N 1328295.62 47.1328251 N 10P OF SLOPE N 1328080.06 )LOE OF SLOPE— EL 415.29 PCC & DITCH— N 1328490.91— PT & BENCH E 294063.09 EF 212 N 1258422.30 10E OF SLOPE— N 1328177.59 3.0% —Ы € BIDCE 1:4 EF 410.65 E 294199.71 EL 410.65 —PI & DITCH
N 1328115.97 1:4 E 294158.18 09.141.8281 N EL 371.30 3.0% РІ € DІТСН 29.295 13 E 293764.09 ₽7.23953.74 N 1328378.40 N 1328326.10 EL 384.52 TOP OF SLOPE PC € BENCH EL 375.83 EL 415.00 E 293580.11 EL 382,00 E 294100.14 E 293657.86 EL 373.71 E 293663.90 97.8569.76 N 1328236.78 PI TOP OF SLOPE-N 1328502.66 E 593878.43 52.9748221 N PT & DITCH →PC € RIDGE 1328376.55 -TOE OF SLOPE TOE OF SLOPE EL 410.00 EL 410.00 EL 388.33 E 594236.24 E 294194.70 TSG PS DC N 1328174.32 89.168568 3 N 1328200.32 —РТ € DITCH N 1328618.42 PT & DITCH EP & DITCH EL 391.00 E 293600.72 E 293587.46 394.00 EL 375.48 DC Sd DC 81818851 N N 1328633.50 / E 293849.08 HIGH POINT E 282701.57 BP TOE OF SLOPE 01.328495.10 TOP OF SLOPE TOP OF SLOPE-EL 379.35 PI TOP OF SLOPE-E 593763.71 0 1328578.45 E 293603.31 -TOE OF SLOPE 87.014 J3 PI TOE OF SLOPE-E 294153.96 E 293734.51 EL 394.00 N 1328348.93 E 593642.42 —EP € RIDGE N 1328603.12 N 1328682.60 PT & BENCH | EL 393.63 | EL 393.63 | EL 393.63 | ENCH | EN PI TOP OF SLOPE— EL 376.32 -PI TOE OF SLOPE E 293866.10 N 1328518.47 EL 390.00 80.085 13 - CAP LIMITS TOP OF SLOPE E 293752.71 TSG PS DC E 593783.17 EF 282.00 N 1328624.60 94.9958251 N E 293677.89 N 1328710.73 PROJECT LIMITS PI TOP OF SLOPE -TOE OF SLOPE E 594121.16 EL 380.17 PC & BENCH ─PI TOE OF SLOPE HIGH POINT E 294059.77 89.2748221 N TOE OF SLOPE EL 396.00 EL 382.00 /E 593703.23 E 594122.91 N 1328736.67 01.28485.19 -PI TOE OF SLOPE TOE OF SLOPE— TSG PS DC EL 397.00 E 293719.20 N 1328760.59 E 282928.50 N 1328645.34 EL 393.62 E 294198.16 CAP LIMITS -EL 384.11 /88.806.68/ E 593872.81 EL 381.99 TOP OF SLOPE-PT & BENCH E 294269.37 N 1328502.28 1328709.86 F 594009.11 TOE OF SLOPE-01.44886t N -TOP OF SLOPE PROJECT LIMITS HAVIN EL 380.07 EL 395.00 E 294017.58 E 293850.16 BP © DITCH N 1328657.33 1328747.99 52.7388521 N EL 381.75 00.004 7 PC TOP OF SLOPE-→10P OF SLOPE E 293975.41 E 593768.48 EL 392.68 N 1328832.64 Z9.791492 E N 1328668.83 EL 389.90 N 1328610.70 TOP OF SLOPE -PI TOE OF SLOPE E 294127.55 N 1328648.92 TOE OF SLOPE E 594318.24 E 293890.86 CTOP OF SLOPE-N 1328505.92 N 1328732.48 −РС € DIТСН TOE OF SLOPE 56.085 20.25.02 EL 393.62 N 1328702.37 E 594212.22 PC & DITCH EF 230.56 ↑7.0038221 N N 1328606.22 EL 403.00 EP & BENCH 00.665 13 69.667568 69.806568 57.224469 E 284045.06 37.0098221 N N 1328842.04 N 1328550.86 —PI TOE OF SLOPE PCC TOP OF SLOPE— 77.1928691.42 E 594237.91 **НЕР** & DITCH -TOP OF SLOPE EL 389.85 87.88666.78 E 293958.66 TSG PS DC TOP OF SLOPE-N 1328856.03 X------TOE OF SLOPE TSG PS DC EL 387.40 E 294308.25 E 294077.65 78.6598551 N/ N 1328818.25 EL 386.16 PPI & DITCH 594412.14 TOP OF SLOPE-E 594248.41 EL 406.00 1328586.40 88.785 96.3838ZZ1 N E 293826.49 ₩РТ € ВІТСН E 594304.53 ВР & DITCH 96.7368521 N -88.689.881 N PI TOE OF SLOPE EF 282.64 BP & DITCH AL WEST E 594112.65 EL 389.52 SEE DRAWING E720259 FOR GENERAL NOTES AND LEGEND. 94.288321 N E 294260.01 EL 392,58 EL 390.98 SEE DRAWING E720258 FOR DRAWING INDEX. EL 408.00 E 294374.35 PPT & DITCH N 1328702.64 E 293968.30 15.858583 TOP OF SLOPE-EL 390.27 EL 388.35 N 1328649.86 N 1328884.05 44.1109251 V E 594341.43 E 294093.50 РС € DITCH F 594351.14 N 1328844.13 N 1328682.80 PC € DITCH—N 1328692.27 FOR CONTINUATION SEE DWG. E720279



THAN BAGGED FERTILIZER.

CLAYEY SOILS: 2 TONS/ACRE

USE 2 TONS/ACRE).

SOIL AMENDMENTS

EACH CUBIC YARD.

(DO NOT APPLY LIME TO ALKALINE SOILS).

SEASON. BERMUDAGRASS IS TOLERANT OF MOST MOWING RECIMES AND CAN BE MOWED OFTEN AND CLOSE, IF SO DESIRED, DURING ITS GROWING BEFORE IT ATTAINS TALL GROWTH (OVER 8"). RYECRASS IS TOLERANT OF MOST MOWING REGIMES AND MAY BE MOWED OFTEN AND AS CLOSE AS 4" TO 6" IF THIS REGIME IS STARTED

SATISFACTORY ESTABLISHMENT MAY REQUIRE REFERTILIZING THE STAND, ESPECIALLY IF THE PLANTING IS MADE EARLY IN THE PLANTING IF VEGETATION FAILS TO GROW, HAVE THE SOIL TESTED TO DETERMINE WHETHER PH IS IN THE CORRECT RANGE OR NUTRIENT DEFICIENCY IS

EXTENT OF REMEDIAL ACTIONS SUCH AS SEEDBED PREPARATION AND RESEEDING. A QUALIFIED DESIGN PROFESSIONAL SHOULD BE A STAND SHOULD BE UNIFORM AND DENSE FOR BEST RESULTS. STAND CONDITIONS, PARTICULARLY THE COVERAGE, WILL DETERMINE THE ERODED AREAS SHOULD BE ADDRESSED APPROPRIATELY BY FILLING AND/OR SMOOTHING, AND REAPPLICATION OF LIME, FERTILIZER, SEED INSPECT THE SITE FOR EROSION. INSPECT SEEDINGS WEEKLY UNTIL A STAND IS ESTABLISHED AND THEREAFTER AT LEAST MONTHLY FOR STAND SURVIVAL AND VIGOR. ALSO, MAINTENANCE

FORMULATED FOR CHANNELS OR AN APPROPRIATE EROSION CONTROL BLANKET. OR HIGH IN CLAY OR SAND). AREAS WITH CONCENTRATED FLOW SHOULD BE TREATED DIFFERENTLY AND REQUIRE A HYDROMULCH SITE CONDITIONS INCLUDE THE FOLLOWING: SLOPES STEEPER THAN 3:1 AND ADVERSE SOILS (SOILS THAT ARE SHALLOW TO ROCK, ROCKY, CONDITIONS AND IS ESSENTIAL TO SEEDING SUCCESS UNDER HARSH SITE CONDITIONS (SEE MULCHING PRACTICE FOR GUIDANCE). HARSH THE USE OF APPROPRIATE MULCH PROVIDES INSTANT COVER AND HELPS ENSURE ESTABLISHMENT OF VEGETATION UNDER NORMAL

ESTABLISHED. FERTILIZER SHOULD NOT BE MIXED WITH THE SEED-INOCULANT MIXTURE BECAUSE FERTILIZER SALTS MAY DAMAGE SEED AND REDUCE

COVERED BY RAKING OR CHAIN DRAGGING, AND THEN LIGHTLY FIRMED WITH A ROLLER OR CULTIPACKER. BE PLANTED NO MORE THAN 1" DEEP, AND GRASSES AND LEGUMES NO MORE THAN 1" DEEP. SEED THAT ARE BROADCAST MUST BE SEEDING AND HYDROSEEDING ARE APPROPRIATE FOR STEEP SLOPES WHERE EQUIPMENT CANNOT OPERATE SAFELY. SMALL GRAINS SHOULD EVENLY APPLY SEED USING A CYCLONE SEEDER (BROADCAST), DRILL SEEDER, CULTIPACKER SEEDER, OR HYDROSEEDER. BROADCAST PLANTING METHODS

IN COMBINATION WITH AGRICULTURAL LIMESTONE OR SELMA CHALK TO PROVIDE EQUIVALENT VALUES TO AGRICULTURAL LIMESTONE. SELECTED SHOULD BE PROVIDED IN AMOUNTS THAT PROVIDE EQUAL VALUE TO THE CRITERIA LISTED FOR AGRICULTURAL LIME OR BE USED ALKALINE SOILS OR TO AREAS WHICH HAVE BEEN LIMED DURING THE PRECEDING 2 YEARS. OTHER LIMING MATERIALS THAT MAY BE OR EQUIVALENT PER ACRE ON COARSE TEXTURED SOILS AND 2 TONS PER ACRE ON FINE TEXTURED SOILS. DO NOT APPLY LIME TO

10 LBS PLS=10/0.72=13.9 LBS OF THE SPECIES TO BE PLANTED.

HTUOS	CENTRAL	ИОВТН	SEEDING RATES/AC	SPECIES
	SEEDING DATES		PLS	21 50150
St SUA-1 A9A	APR 1-AUG 15	1 DUA-1 YAM	√0 FB2	МІГГЕТ, ВКОМИТОР, ОК СЕРМАИ
SEP 15-NOV 15	SEP 15-NOV 15	SEP 1-NOV 15	3 BU	ВАЕ
SEP 1-0CT 15	2EP 1-0CT 15	AUG 1-SEP 15	20 FB2	KYEGRASS
ZI DUA-1 A9A	APR 15-AUG 1	1 DUA-1 YAM	40 FBS	SORGHUM-SUDAN HYBRIDS
APR 1-AUG 15	PPR 15-AUG 1	1 DUA-1 YAM	40 FBS	SUDANGRASS
SEP 15-NOV 15	SEP 15-NOV 15	SEP 1-NOV 1	2 BN	WHEAT
MAR 1-JULY 15	AR 15-JULY 15	1 YJUL-1 A9A	10 FBS	COMMON BERMUDAGRASS
SEP 1-NOV 1	SEP 1-NOV 1	SEP 1-NOV 1	10 FB2	CKIMSON CLOVER
PLANT 10 LBS PLS	. FOR EXAMPLE, TO	DJUST SEEDING RATES	) IS NSED 10 H	PLS MEANS PURE LIVE SEED AND

ADAPTATION AND SEEDING DATES (FIGURE TS-1). FOR PLANTINGS ON RICHTS-OF-WAYS. NOTE: JEFFERSON COUNTY IS LOCATED IN THE NORTH GEOGRAPHICAL AREA FOR SPECIES VOLUME 1. SEEDING MIXTURES COMMONLY SPECIFIED BY THE ALABAMA DEPARTMENT OF TRANSPORTATION ARE AN APPROPRIATE ALTERNATIVE HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, AND FIGURE TS-1, GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES, AS FOUND ON PAGE 159 IN THE 2014 ALABAMA SELECT PLANTS THAT CAN BE EXPECTED TO MEET PLANTING OBJECTIVES. TO SIMPLIFY PLANT SELECTION, USE TABLE TS-1 ON THIS DRAWING DESIGN CRITERIA

SURFACES DURING CONSTRUCTION. TEMPORARY OR PERMANENT SEEDING IS NECESSARY TO PROTECT EARTHEN STRUCTURES SUCH AS DIKES, SEDIMENT BASINS AND SEDIMENT BARRIERS. IN ADDITION, IT REDUCES PROBLEMS OF MUD AND DUST PRODUCTION FROM BARE SOIL PLANTING THE DESIRED PERMANENT SPECIES, IT HELPS PREVENT COSTLY MAINTENANCE OPERATIONS ON OTHER PRACTICES SUCH AS THIS PRACTICE APPLIES WHERE SHORT-LIVED VEGETATION CAN BE ESTABLISHED BEFORE FINAL GRADING OR IN A SEASON NOT SUITABLE FOR VEGETATION PROVIDES ECONOMICAL EROSION CONTROL FOR UP TO A YEAR AND REDUCES THE AMOUNT OF SEDIMENT MOVING OFF THE SITE. TEMPORARY SEEDING IS THE ESTABLISHMENT OF FAST-GROWING ANNUAL VEGETATION FROM SEED ON DISTURBED AREAS. TEMPORARY

# TEMPORARY SEEDING (TS) (TS)

MILLET, SORGHUM-SUDAN HYBRIDS, SUDANGRASS, RYE AND WHEAT MAY BE MOWED, BUT NO LOWER THAN 6" (CLOSER MOVING MAY DAMAGE TEMPORARY PLANTINGS MAY BE MOWED AND BALED OR SIMPLY MOWED TO COMPLIMENT THE USE OF THE SITE.

SEASON. FOLLOW SOIL TEST RECOMMENDATIONS OR THE SPECIFICATIONS PROVIDED TO ESTABLISH THE PLANTING.

CONSULTED TO ADVISE ON REMEDIAL ACTIONS. CONSIDER DRILL SEEDING WHEN DOING A REMEDIAL PLANTING.

CERMINATION AND SEEDLING VIGOR. FERTILIZER MAY BE APPLIED WITH A HYDROSEEDER AS A SEPARATE OPERATION AFTER SEEDLINGS ARE RECOMMENDED RATE WHEN ADDING INOCULANT TO A HYDROSEEDER SLURRY. THE MIXTURE SHOULD BE APPLIED WITHIN ONE HOUR AFTER IS DYED AN APPROPRIATE COLOR TO FACILITATE UNIFORM APPLICATION OF SEED. USE THE CORRECT LEGUME INOCULANT AT 4 TIMES THE TREATED. THE SEED CARRIER SHOULD BE A CELLULOSE FIBER, NATURAL WOOD FIBER OR OTHER APPROVED FIBER MULCH MATERIAL WHICH MIX SEED, INOCULANT IF REQUIRED, AND A SEED CARRIER WITH WATER AND APPLY AS A SLURRY UNIFORMLY OVER THE AREA TO BE NECESSARY FOR HYDROSEEDING OPERATIONS; LARGE CLODS, STONES, AND IRREGULARITIES PROVIDE CAVITIES IN WHICH SEEDS CAN LODGE. FOR LIME, FERTILIZER, AND SEED. THE SURFACE SHOULD NOT BE COMPACTED OR SMOOTH. FINE SEEDBED PREPARATION IS NOT SURFACE ROUGHENING IS PARTICULARLY IMPORTANT WHEN HYDROSEEDING, AS A ROUGHENED SLOPE WILL PROVIDE SOME NATURAL COVERAGE

RREGULAR SURFACE OF CLODS. HARROWING, OR OTHER SUITABLE METHODS. WHEN HYDROSEEDING METHODS ARE USED, THE SURFACE SHOULD BE LEFT WITH A MORE IF RAINFALL HAS CAUSED THE SURFACE TO BECOME SEALED OR CRUSTED, LOOSEN IT JUST PRIOR TO SEEDING BY DISKING, RAKING, SMOOTH. IF SOILS BECOME COMPACTED DURING GRADING, LOOSEN THEM TO A DEPTH OF 6" TO 8" USING A RIPPER OR CHISEL PLOW. GOOD SEEDBED PREPARATION IS ESSENTIAL TO SUCCESSFUL PLANT ESTABLISHMENT. A GOOD SEEDBED IS WELL PULVERIZED, LOOSE, AND

> INCORPORATE LIME AND FERTILIZER INTO THE TOP 6" OF SOIL DURING SEEDBED PREPARATION. APPLICATION OF SOIL AMENDMENTS

FERTILIZER DEALER FOR BULK FERTILIZER BLENDS. THIS MAY BE MORE ECONOMICAL THAN BAGGED FERTILIZER. NOTE: FERTILIZER CAN BE BLENDED TO MEET EXACT FERTILIZER RECOMMENDATIONS. TAKE SOIL TEST RECOMMENDATIONS TO LOCAL

NITROGEN FERTILIZER SHOULD BE APPLIED. WHEN VEGETATION HAS EMERGED TO A STAND AND IS GROWING, 30 TO 40 LBS/ACRE (APPROXIMATELY 0.8 LBS/1000 FT2) OF ADDITIONAL

APPLY FERTILIZER ACCORDING TO SOIL TEST RESULTS. IF A SOIL TEST IS NOT AVAILABLE, APPLY 8-24-24 FERTILIZER. FERTILIZER

APPLY LIME ACCORDING TO SOIL TEST RECOMMENDATIONS. IF A SOIL TEST IS NOT AVAILABLE, USE 1 TON OF AGRICULTURAL LIMESTONE

SAFELY AND EFFICIENTLY BE USED TO APPLY SOIL AMENDMENTS AND ACCOMPLISH SEEDBED PREPARATION AND SEEDING. COMPLETE GRADING AND SHAPING BEFORE APPLYING SOIL AMENDMENTS IF NEEDED TO PROVIDE A SURFACE ON WHICH EQUIPMENT CAN SITE PREPARATION AND SOIL AMENDMENTS

HTUOS	CENTRAL SEEDING DATES	нтяои	SEEDING PLS PLS	SPECIES
St SUA-1 A9A	APR 1-AUG 15	1 DUA-1 YAM	₹0 FB2	ИІГГЕТ, ВКОМИТОР, ОК СЕРМАИ
SEP 15-NOV 15	SEP 15-NOV 15	SEP 1-NOV 15	Ja S	SAE
2EP 1-0CT 15	SEP 1-0CT 15	AUG 1-SEP 15	20 FB2	SYEGRASS
APR 1-AUG 15	1 SUA-B1 A9A	1 DUA-1 YAM	40 FBS	SORGHUM-SUDAN HYBRIDS
APR 1-AUG 15	1 SUA-21 A9A	1 DUA-1 YAM	SB7 O₺	SOLOHOM
SEP 15-NOV 15	SEP 15-NOV 15	SEP 1-NOV 1	2 BN	WHEAT
MAR 1-JULY 15	AMR 15-JULY 15	1 YJUL-1 A9A	10 CBS	COMMON BERMUDAGRASS
SEP 1-NOV 1	SEP 1-NOV 1	SEP 1-NOV 1	10 LBS	СВІМЗОИ СГОЛЕВ
PLANT 10 LBS PLS	and the second of the second o	ADJUST SEEDING RATES.	ID IS USED TO	PLS MEANS PURE LIVE SEED AN OF A SPECIES WITH GERMINATION

TABLE TS-1 COMMONLY USED PLANTS FOR TEMPORARY COVER

DIVERSIONS, GRASS-LINED CHANNELS AND THE BANKS AND DAMS OF SEDIMENT BASINS.

# PERMANENT SEEDING PS

2. SEE DRAWING E720259 FOR GENERAL NOTES AND LEGEND.

1. SEE DRAWING E720258 FOR DRAWING INDEX.

NOTES:

RECOMMENDATIONS TO LOCAL FERTILIZER DEALER FOR BULK FERTILIZER BLENDS. THIS MAY BE MORE ECONOMICAL

GRASSES ALONE: USE 400 LBS/ACRE OF 8-24-24 OR THE EQUIVALENT. APPLY 30 LBS OF ADDITIONAL NITROGEN

SANDY SOILS: USE 1 TON/ACRE (EXCEPTION ON SANDY SOILS - IF THE COVER WILL BE TALL FESCUE AND CLOVER

UNIVERSITY SOIL TESTING LABORATORY AND PROVIDES RECOMMENDATIONS BASED ON FIELD TESTS ON ALABAMA SOILS.

LIME AND FERTILIZER NEEDS SHOULD BE DETERMINED BY SOIL TESTS. SOIL TESTING IS PERFORMED BY THE AUBURN

WHEN SOIL TESTS ARE NOT AVAILABLE, USE THE FOLLOWING RATES FOR APPLICATION OF SOIL AMENDMENTS.

THE LOCAL COUNTY COOPERATIVE EXTENSION SERVICE CAN PROVIDE INFORMATION ON OBTAINING SOIL TESTS.

COMMERCIAL LABORATORIES THAT MAKE RECOMMENDATIONS BASED ON SOIL ANALYSIS MAY BE USED.

NOTE: FERTILIZER CAN BE BLENDED TO MEET EXACT FERTILIZER RECOMMENDATIONS. TAKE SOIL TEST

LEGUMES ALONE: USE 400 TO 600 LBS/ACRE OF 0-20-20 OR THE EQUIVALENT.

GRASS-LEGUME MIXTURES: USE 800 TO 1200 LBS/ACRE OF 5-10-10 OR THE EQUIVALENT.

WHEN GRASS HAS EMERGED AND BEGUN GROWTH (APPROXIMATELY 0.8 LBS/1000 FT2).

DESIBED, DURING THEIR GROWING SEASON. BERMUDAGRASS AND BAHIAGRASS ARE TOLERANT OF MOST MOWING REGIMES AND CAN BE MOWED OFTEN AND CLOSE, IF SO

NEXT GROWING SEASON: FESCUE SHOULD NOT BE MOWED CLOSE DURING THE SUMMER; SERICEA SHOULD NOT BE MOWED CLOSE CERTAIN SPECIES CAN BE WEAKENED BY MOWING REGIMES THAT SIGNIFICANTLY REDUCE THEIR FOOD RESERVES STORED FOR THE OTHER AREAS SHOULD BE MOWED TO COMPLIMENT THE USE OF THE SITE.

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MOW VEGETATION ON STRUCTURAL PRACTICES SUCH AS EMBANKMENTS AND GRASS-LINED CHANNELS TO PREVENT WOODY PLANTS FERTILIZING IS OFTEN NEEDED ANNUALLY OR PERIODICALLY TO MAINTAIN A HEALTH STAND AND COVER SUFFICIENT FOR EROSION

RECOMMENDATIONS OR THE SPECIFICATIONS PROVIDED TO ESTABLISH AND MAINTAIN THE PLANTING. AFTER THE SECOND YEAR, SATISFACTORY ESTABLISHMENT MAY REQUIRE FERTILIZING THE STAND IN THE SECOND GROWING SEASON. FOLLOW SOIL TEST SEED AND MULCH.

ERODED AREAS SHOULD BE ADDRESSED APPROPRIATELY BY FILLING AND/OR SMOOTHING, AND REAPPLICATION OF LIME, FERTILIZER, CONSIDER DRILL SEEDING WHERE POSSIBLE. PREPARATION AND RESEEDING. A QUALIFIED DESIGN PROFESSIONAL SHOULD BE CONSULTED TO ADVISE ON REMEDIAL ACTIONS. STAND CONDITIONS, PARTICULARLY THE COVERAGE, WILL DETERMINE THE EXTENT OF REMEDIAL ACTIONS SUCH AS SEEDBED

TESTED TO DETERMINE WHETHER Ph IS IN THE CORRECT RANGE OR NUTRIENT DEFICIENCY IS A PROBLEM. POOR SEEDBED PREPARATION OR WEATHER) AND TAKE CORRECTIVE ACTION. IF VEGETATION FAILS TO GROW, HAVE THE SOIL IF A STAND IS INADEQUATE, IDENTIFY THE CAUSE OF FAILURE (CHOICE OF PLANT MATERIALS, LIME AND FERTILIZER QUANTITIES, INSPECT SEEDINGS MONTHLY FOR STAND SURVIVAL AND VIGOR. ALSO, INSPECT THE SITE FOR EROSION.

FOR 1 FULL YEAR FROM PLANTING. INSPECT VEGETATED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND VEGETATE AS GENERALLY, A STAND OF VEGETATION CANNOT BE DETERMINED TO BE FULLY ESTABLISHED UNTIL SOIL COVER HAS BEEN MAINTAINED

WATER CAN BE MORE HARMFUL THAN NO SUPPLEMENTAL WATER. WATER APPLICATION RATES MUST BE CAREFULLY CONTROLLED TO PREVENT RUNOFF. INADEQUATE OR EXCESSIVE AMOUNTS OF

IRRICATION IS RARELY CRITICAL FOR LOW-MAINTENANCE VEGETATION PLANTED AT THE APPROPRIATE TIME OF THE YEAR. FOR ESTABLISHMENT OF VECETATION FROM SOD AND SPRICS AND SHOULD BE USED ELSEWHERE WHEN FEASIBLE. HOWEVER, HELPFUL IN ASSURING ADEQUATE STANDS IN DRY SEASONS OR TO SPEED DEVELOPMENT OF FULL COVER. IT IS A REQUIREMENT MOISTURE IS ESSENTIAL FOR SEED GERMINATION AND VEGETATION ESTABLISHMENT. SUPPLEMENTAL IRRIGATION CAN BE VERY

APPROPRIATE EROSION CONTROL BLANKET. CONCENTRATED FLOW SHOULD BE TREATED DIFFERENTLY AND REQUIRE SOD, A HYDROMULCH FORMULATED FOR CHANNELS OR AN INCLUDE: SLOPES STEEPER THAN 3:1 AND ADVERSE SOILS (SHALLOW, ROCKY, OR HIGH IN CLAY OR SAND). AREAS WITH AND IS ESSENTIAL TO SEEDING SUCCESS UNDER HARSH SITE CONDITIONS (SEE MULCHING PRACTICE). HARSH SITE CONDITIONS THE USE OF MULCH PROVIDES INSTANT COVER AND HELPS ENSURE ESTABLISHMENT OF VEGETATION UNDER NORMAL CONDITIONS

BACK TO THE SURFACE. A MULCH TACKING MACHINE MAY BE USED TO PRESS SPRIGS INTO THE SOIL. TOP 1" TO 2" OF SOIL WITH A CULTIPACKER OR WITH A DISK SET NEARLY STRAIGHT SO THAT THE SPRICS ARE NOT BROUGHT WHEN BROADCASTING IS USED FOR SPRIG PLANTING, BROADCAST SPRIGS AT THE SPECIFIED RATE (TABLE PS-1). PRESS INTO THE

NO FARTHER THAN 2 FEET APART IN THE ROW AND SO THAT AT LEAST ONE ROOTING NODE IS IN THE FURROW. WHEN SPRICS ARE PLANTED WITH A SPRIGGING MACHINE, FURROWS SHOULD BE 4-6" DEEP AND 2 FEET APART. PLACE SPRIGS

(SEE SODDING PRACTICE). ESTABLISHING COMMON AND HYBRID BERMUDAGRASS, CENTIPEDECRASS AND ZOYSIA INCLUDE SODDING, PLUGGING AND SPRIGGING HYBRID BERMUDAGRASS CANNOT BE GROWN FROM SEED AND MUST BE PLANTED VEGETATIVELY. VEGETATIVE METHODS OF

ONTO STEEPER SLOPES IN DRY FORM. THE SEED SLURRY AND APPLIED AT SEEDING OR IT MAY BE APPLIED WITH THE FERTILIZER MIXTURE. ALSO LIME CAN BE BLOWN LIME IS NOT NORMALLY APPLIED WITH A HYDRAULIC SEEDER BECAUSE IT IS ABRASIVE BUT IF NECESSARY IT CAN BE ADDED TO

FERTILIZER MAY BE APPLIED WITH A HYDROSEEDER AS A SEPARATE OPERATION AFTER SEEDLINGS ARE ESTABLISHED.

REDUCE GERMINATION AND SEEDLING VIGOR. FERTILIZER SHOULD NOT BE MIXED WITH THE SEED-INOCULANT MIXTURE BECAUSE FERTILIZER SALTS MAY DAMAGE SEED AND

BE APPLIED WITHIN ONE HOUR AFTER MIXING TO REDUCE DAMAGE TO SEED. INOCULANT AT 4 TIMES THE RECOMMENDED RATE WHEN ADDING INOCULANT TO A HYDROSEEDER SLURRY. THE MIXTURE SHOULD MATERIAL WHICH IS DYED AN APPROPRIATE COLOR TO FACILITATE UNIFORM APPLICATION OF SEED. USE THE CORRECT LEGUME BE TREATED. THE SEED CARRIER SHOULD BE A CELLULOSE FIBER, NATURAL WOOD FIBER OR OTHER APPROVED FIBER MULCH MIX SEED, INOCULANT IF REQUIRED, AND A SEED CARRIER WITH WATER AND APPLY AS A SLURRY UNIFORMLY OVER THE AREA TO

PREPARATION IS NOT NECESSARY FOR HYDROSEEDING OPERATIONS; LARGE CLODS, STONES, AND IRREGULARITIES PROVIDE CAVITIES COVERAGE FOR LIME, FERTILIZER, AND SEED. THE SURFACE SHOULD NOT BE COMPACTED OR SMOOTH. FINE SEEDBED SURFACE ROUGHENING IS PARTICULARLY IMPORTANT WHEN HYDROSEEDING, AS A ROUGHENED SLOPE WILL PROVIDE SOME NATURAL HADBOSEEDING

THAN 3" DEEP. GOOD SEED CONTACT. SMALL GRAINS SHOULD BE PLANTED NO MORE THAN 1" DEEP AND GRASSES AND LEGUME SEED NO MORE COVER BROADCAST SEED BY RAKING OR CHAIN DRAGGING; THEN FIRM THE SURFACE WITH A ROLLER OR CULTIPACKER TO PROVIDE UNIFORM PATTERN; THEN APPLY THE SECOND HALF IN THE SAME WAY, BUT MOVING AT RIGHT ANGLES TO THE FIRST PASS. SEED NEEDED FOR EACH SECTION. APPLY ONE-HALF THE SEED WHILE MOVING BACK AND FORTH ACROSS THE AREA, MAKING A

WHEN USING BROADCAST-SEEEDING METHODS, SUBDIVIDE THE AREA INTO WORKABLE SECTIONS AND DETERMINE THE AMOUNT OF FRESHLY PREPARED SEEDBED. FRIABLE SEEDBED. IF THE SEEDBED HAS BEEN SEALED BY RAINFALL, IT SHOULD BE DISKED SO THE SEED WILL BE SOWN INTO A

PLANT SEED UNIFORMLY WITH A CYCLONE SEEDER, A DRILL SEEDER, A CULTIPACKER SEEDER, OR BY HAND ON A FRESH, FIRM, INOCULATION ARE LOCATED IN CHAPTER 2 IN THE PART ON VEGETATION FOR EROSION AND SEDIMENT CONTROL UNDER INOCULATION INOCULATE LEGUME SEED WITH THE RHIZOBIUM BACTERIA APPROPRIATE TO THE SPECIES OF LEGUME. DETAILS OF LEGUME

COUNTY IS LOCATED IN THE NORTH GEOGRAPHICAL AREA FOR ADAPTATION AND SEEDING. SEDIMENT CONTROL AND STORMWATER MANACEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1. NOTE: JEFFERSON SPECIES ADAPTATION AND SEEDING DATES FOUND ON PAGE 121 OF THE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEEDING DATES ARE DETERMINED USING TABLE PS-1 FOUND ON THIS DRAWING AND FIGURE PS-1 GEOGRAPHICAL AREAS FOR

SEEDS. SEED MUST MEET STATE STANDARDS FOR CONTENT OF NOXIOUS WEEDS). SEED SOLD IN ALABAMA IS REQUIRED BY LAW TO BE TAGGED TO IDENTIFY SEED PURITY, GERMINATION, AND PRESENCE OF WEED IMPROVEMENT ASSOCIATION TO MEET HIGH QUALITY STANDARDS AND WILL BE TAGGED WITH A "CERTIFIED SEED" TAG. (NOTE: ALL USE CERTIFIED SEED FOR PERMANENT SEEDING WHENEVER POSSIBLE. CERTIFIED SEED IS INSPECTED BY THE ALABAMA CROP

PLANTING METHODS

SMOOTH AND FIRM THE SOIL INTO A UNIFORM SURFACE. FILL IN OR LEVEL DEPRESSIONS THAT CAN COLLECT WATER. PREPARE A FRIABLE SEEDBED WITH TILLAGE TO A DEPTH OF AT LEAST 6". BREAK UP LARGE CLODS, ALLEVIATE COMPACTION, AND

APPROVED PLAN. INSTALL NECESSARY SEDIMENT CONTROL PRACTICES BEFORE SEEDBED PREPARATION AND COMPLETE GRADING ACCORDING TO THE

SEEDBED PREPARATION AND SEEDING. IF NEEDED, GRADE AND SHAPE TO PROVIDE A SURFACE ON WHICH EQUIPMENT CAN SAFELY AND EFFICIENTLY BE USED FOR SEEDBED PREPARATION

PREPARATION, FERTILIZER AND LIME CAN BE APPLIED WITH A HYDROSEEDER. MEANS DURING SEEDBED PREPARATION. OPERATE MACHINERY ON THE CONTOUR. ON SITES TOO STEEP FOR SEEDBED APPLY LIME AND FERTILIZER EVENLY AND INCORPORATE INTO THE TOP 6" OF SOIL BY DISKING, CHISELING OR OTHER SUITABLE

TABLE PS-1 COMMONLY USED PLANTS FOR PERMANENT COVER WITH SEEDING RATES AND DATES THE PLANTS USED FOR TEMPORARY VEGETATION MAY BE USED FOR COMPANION PLANTS PROVIDED THE SEEDING RATE

MONTHS AFTER EXCAVATION. CUIDANCE ON TOPSOILING SEE TOPSOILING PRACTICE). THESE AMENDMENTS SHOULD ONLY BE NECESSARY WHERE CONDITIONS. THE SOIL CONDITIONERS DESCRIBED BELOW MAY BE BENEFICIAL OR TOPSOIL MAY BE APPLIED (FOR ACIDIC TO FOSTER VECETATION - CHISELING, TOPSOIL, OR SPECIAL AMENDMENTS SHOULD BE USED TO IMPROVE SOIL IF ANY OF THE ABOVE ATTRIBUTES ARE NOT MET: I.E., IF THE EXISTING SOIL IS TOO DENSE, COARSE, SHALLOW OR SLOPES STEEPER THAN 3:1 IF THEY ARE TO BE HYDROSEEDED.

SOIL MUST MEET CERTAIN MINIMUM REQUIREMENTS AS A GROWTH MEDIUM. A GOOD GROWTH MEDIUM SHOULD HAVE MEASURES HAVE BEEN COMPLETED TO CORRECT THESE PROBLEMS. TO MAINTAIN A GOOD STAND OF VEGETATION, THE INAPPROPRIATE SOIL TEXTURE, POOR DRAINAGE, CONCENTRATED OVERLAND FLOW, OR STEEPNESS OF SLOPE UNTIL RO NOITOA MOD OT BUT OF VEGETATION SHOULD NOT BE ATTEMPTED ON SITES THAT ARE UNSUITABLE DUE TO COMPACTION OR 10/0.70 = 13.9 LBS. OF THE SPECIES TO BE PLANTED.

12

OF A SPECIES WITH GERMINATION OF 80% AND PURITY OF 90%, PLS =  $0.8 \times 0.9 = 72\%$ . 10 LBS PLS =

СОММОИ 10 FBS 1 YJUL-1 A9A AR 15-JULY 15 MAR 1-JULY 15 BERMUDAGRASS, PENSACOLA 40 FBS BAHIAGRASS, 1 YJUL-1 AAM FEB 1-NOV 1 S7d SEEDING DATES SPECIES RATES / AC SEEDING **HTRON** CENTRAL

COVER. MIXTURES COMMONLY SPECIFIED BY THE ALABAMA DEPARTMENT OF TRANSPORTATION ARE AN APPROPRIATE SITES AND URBAN AREAS, VOLUME 1, AND TABLE PS-1 ON THIS DRAWING, COMMONLY USED PLANTS FOR PERMANENT ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION PS-1 GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES FOUND ON PAGE 121 OF THE 2014 SELECT PLANTS THAT CAN BE EXPECTED TO MEET PLANTING OBJECTIVES. TO SIMPLIFY PLANT SELECTION, USE FIGURE PLANT SELECTION

 VERMICULITE – USE HORTICULTURAL GRADE. SAND - SHOULD BE CLEAN AND FREE OF TOXIC MATERIALS.

• A FAVORABLE PH RANGE FOR PLANT GROWTH, USUALLY 6.0-6.5. TOPSOILING IS NOT FEASIBLE.

• SUFFICIENT NUTRIENTS (NITROGEN, PHOSPHORUS AND POTASSIUM) FOR INITIAL PLANT ESTABLISHMENT.

SJG 2BJ 01 TNAJG	TES. FOR EXAMPLE, TO I	USED TO ADJUST SEEDING RA	VE SEED AND IS	PLS MEANS PURE LI
L-G1 AAM	ZI NUL-ZI AAM	31 NUL-1 A9A	SB1 7	SWITCHGRASS,
FEB 15-JU	∂1 YJUL-1 AAM	SI YJUL-ZI AAM	10 FB2 40 FB2	SERICEA & COMMON
LEB 12-10	AAM 1-JULY 15	SI YJUL-ZI AAM	S87 09-0₺	SERICEA
	SEP 1-NOV 1	SEP 1-NOV 1	S87 09-07	FESCUE, TALL
BS-91 834	1 DUA-1 AAM	1 DUA-1 AAM	SPRICS 1/SQ FT	BERMUDAGRASS, HYBRID (LAWN TYPES)
ANYTIME	ANTTIME	ANTTMA	QOS QITOS	HYBRID (LAWN TYPES)
			2 TBS	COMMON BEKMUDAGRASS,
JUL-1 AAM	1 YJUL-1 AAM		20 FB2	PENSACOLA PENSACOLA

ALTERNATIVE FOR PLANTINGS ON RICHTS-OF-WAYS.

PERMANENT SEEDING IS THE ESTABLISHMENT OF PERENNIAL VEGETATION ON DISTURBED AREAS FROM SEED. PERMANENT

DESIGN CRITERIA SITE. THIS PRACTICE IS USED WHEN VEGETATION IS DESIRED AND APPROPRIATE TO PERMANENTLY STABILIZE THE SOIL. VEGETATION PROVIDES ECONOMICAL LONG-TERM EROSION CONTROL AND HELPS PREVENT SEDIMENT FROM LEAVING THE

SUPPLY NUTRIENTS REQUIRED TO ESTABLISH VEGETATION. COMMERCIAL GRADE FERTILIZERS THAT COMPLY WITH CURRENT ALABAMA FERTILIZER LAWS SHOULD BE USED TO PLANT NUTRIENTS CHALK TO PROVIDE EQUIVALENT VALUES TO AGRICULTURAL LIMESTONE. THE CRITERIA LISTED FOR AGRICULTURAL LIME OR BE USED IN COMBINATION WITH AGRICULTURAL LIMESTONE OR SELMA OT BE SELECTED SHOULD BE PROVIDED IN AMOUNTS THAT PROVIDE EQUAL VALUE TO

EQUIVALENT AND 90 PERCENT WILL PASS THROUGH A 10 MESH SIEVE. SELMA CHALK SHOULD HAVE A NEUTRALIZING VALUE OF NOT LESS THAN 80 PERCENT CALCIUM CARBONATE CARBONATE EQUIVALENT AND 90 PERCENT WILL PASS THROUGH A 10 MESH SIEVE AND 50 PERCENT WILL PASS LIME (AGRICULTURAL LIMESTONE) SHOULD HAVE A NEUTRALIZING VALUE OF NOT LESS THAN 90 PERCENT CALCIUM LIMING MATERIALS

• ROTTED MANURE - USE STABLE OR CATTLE MANURE NOT CONTAINING UNDUE AMOUNTS OF STRAW OR OTHER FRESH-WATER SOURCES. PEAT SHOULD BE SHREDDED AND CONDITIONED IN STORAGE PILES FOR AT LEAST 6 • PEAT - APPROPRIATE TYPES ARE SPHAGNUM MOSS PEAT, REED-SEDGE PEAT, OR PEAT HUMUS, ALL FROM SOILS HAVE LIMITATIONS THAT MAKE THEM POOR FOR PLANT GROWTH OR FOR ESTABLISHMENT.

• THOROUGHLY ROTTED SAWDUST - SHOULD BE FREE OF STONES AND DEBRIS. ADD 6 LBS OF NITROGEN TO

LAYERS SUCH AS HARDPANS SHOULD BE 12" FOR MORE, EXCEPT ON SLOPES STEEPER THAN 2:1 WHERE SUFFICIENT DEPTH OF SOIL TO PROVIDE AN ADEQUATE ROOT ZONE. THE DEPTH TO ROCK OR IMPERMEABLE ENOUGH FINE-GRAINED SOIL MATERIAL (SILT AND CLAY) TO MAINTAIN ADEQUATE MOISTURE AND NUTRIENT SUPPLY. SUFFICIENT PORE SPACE TO PERMIT ROOT PENETRATION. THESE ATTRIBUTES:

FREEDOM FROM LARGE ROOTS, BRANCHES, STONES, OR LARGE CLODS. CLODS AND STONES MAY BE LEFT ON

TEMPORARY VECETATION. RYEGRASS OR OTHER HIGHLY COMPETITIVE PLANTS SHOULD NOT BE USED AS A COMPANION IS REDUCED BY ONE HALF. SEE THE TEMPORARY SEEDING PRACTICE FOR ADDITIONAL INFORMATION ON ESTABLISHING

APPLICATION OF SOIL AMENDMENTS

Engineering and Construction Services

Southern Company Generation

(INCHE2) 1000 SQ. FT. DEPTH TO SPREAD CUBIC YARDS PER

A DEPTH OF AT LEAST 2" BY DISKING.

SITE PREPARATION

ABOVE.

BEDROCK (LESS THAN 24") IS INVOLVED.

SHOULD BE REMOVED IN FINAL GRADING.

ROOT DEVELOPMENT.

VECETATION ESTABLISHMENT.

REPAIR ERODED OR DAMAGED AREAS AND REVEGETATE.

MIXING AND BONDING OF THE TWO SOILS SHOULD BE ENHANCED.

5.6

INSPECT TOPSOILED AREAS FREQUENTLY UNTIL VEGETATION IS ESTABLISHED.

A MINIMUM COMPACTED DEPTH OF 4". REQUIRED VOLUMES OF TOPSOIL MAY BE DETERMINED USING TABLE TSG-1. SUBSOIL AND TOPSOIL, IMMEDIATELY BEFORE PLACEMENT OF TOPSOIL. TOPSOIL SHOULD BE UNIFORMLY SPREAD TO THE SUBSOIL SHOULD BE DISKED OR CHISELED TO A DEPTH OF 2" OR MORE TO ENHANCE BONDING OF THE APPLYING TOPSOIL

GRADES AND ELEVATIONS BEFORE TOPSOIL PLACEMENT IS STARTED.

SUPPORT CONVENTIONAL ON-SITE EFFLUENT DISPOSAL LINES (FIELD LINES).

SOLUBLE SALTS SHALL NOT EXCEED 500 PPM.

TOPSOIL SHOULD MEET THE FOLLOWING CRITERIA:

NO SUBSTANCE THAT IS POTENTIALLY TOXIC TO PLANT GROWTH.

PRACTICE BEING USED.

TABLE 15G-1 VOLUME OF SOIL NEEDED FOR TOPSOILING

 PLANTING PERMANENT VEGETATION WHEN THE STOCKPILE USE WILL BE INACTIVE OVER 12 MONTHS. SEDIMENT TO DAMAGE EXISTING BUILDINGS OR FACILITIES OR ENTER WATERS. COVERING THE STOCKPILE WITH PLASTIC WHENEVER THE PILES ARE SMALL AND ANY SOIL LOSS WOULD PROVIDE. PLANTING TEMPORARY VEGETATION WHEN THE STOCKPILE IS TO BE INACTIVE OVER 30 DAYS. • MULCHING THE STOCKPILE WHEN IT IS LEFT INACTIVE FOR OVER 13 DAYS. EROSION OF THE STOCKPILES. THESE WOULD INCLUDE: PLACED ON STEEP SLOPES WHERE UNDUE EROSION WILL TAKE PLACE. MEASURES SHOULD BE TAKEN TO PREVENT THE STOCKPILE LOCATION SHOULD BE OUT OF DRAINAGEWAYS AND TRAFFIC ROUTES. STOCKPILES SHOULD NOT BE

BE IN PLACE BEFORE THE TOPSOIL IS STRIPPED. STRIPPING SHOULD NOT BE DONE ON AREAS INTENDED TO

DEPTH IS 4-6" BUT DEEPER DEPTHS MAY BE SATISFACTORY IF THE SOIL IS SUITABLE AND UNDERCUTTING IS

STRIP ONLY THOSE AREAS THAT WILL BE AFFECTED BY CONSTRUCTION OR DEVELOPMENT. A NORMAL STRIPPING

SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT BARRIERS, SEDIMENT BASINS, INLET PROTECTION, ETC., SHOULD ALLOWABLE IN LOCATIONS SUCH AS BUILDINGS, WATER IMPOUNDMENT STRUCTURES, ROADWAYS, ETC. APPROPRIATE

PRACTICAL TO USE A SEDIMENT BARRIER THAN AN EROSION CONTROL PRACTICE.

ACCORDANCE WITH SOIL TESTS AND IN RELATION TO THE SEEDING MIXTURE TO BE PLANTED. INCORPORATE LIME TO

THE SUBGRADES SHOULD BE CHECKED FOR PH AND LIMED IF IT IS LESS THAN 6.0. LIMING SHALL BE DONE IN

AREAS TO BE COVERED WITH TOPSOIL SHALL BE EXCAVATED, GRADED, FILLED AND SHAPED TO THE PROPER LINES,

• IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED IN LESS THAN 14 DAYS, IT MAY BE MORE

TOPSOILING

REPAIR SLOUGHING ON STEEP SLOPES - REMOVE TOPSOIL, ROUGHEN SUBGRADE AND RESPREAD TOPSOIL.

SURFACE IRREGULARITIES THAT WOULD IMPEDE DRAINAGE, INCREASE EROSION OR OTHERWISE DAMAGE THE SITE

EXCESSIVE COMPACTION SHOULD BE PROHIBITED AS IT INCREASES RUNOFF AND INHIBITS SEED GERMINATION AND

PREVENTED. LIGHT COMPACTION IS NECESSARY TO INCREASE SOIL STRENGTH, REDUCE EROSION AND ENHANCE

LINED SWALES, ETC. TOPSOIL SHOULD NOT BE SPREAD WHEN IT OR THE SUBGRADE IS FROZEN OR MUDDY.

PRECAUTIONS SHOULD BE TAKEN TO PREVENT LAYERING OF THE TOPSOIL OVER THE SUBSOIL.

SETTLING OF THE TOPSOIL IS NECESSARY TO BOND THE SOILS TOGETHER, BUT EXCESSIVE COMPACTION SHOULD BE

WHEN APPLYING TOPSOIL, MAINTAIN NEEDED EROSION CONTROL PRACTICES SUCH AS DIVERSIONS, GRASSED SWALES,

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PER ACRE

CUBIC YARDS

CONSULT WITH QUALIFIED DESIGN PROFESSIONAL IF DRAINAGE (WETNESS CAUSED BY SEEPAGE) OR SHALLOWNESS TO

MATERIAL EXCAVATED FROM DEEPER LAYERS MAY BE WORTH STORING IF IT MEETS THE OTHER CRITERIA LISTED GENERALLY, THE UPPER PART OF THE SOIL, WHICH IS RICHEST IN ORGANIC MATTER, IS MOST DESIRABLE; HOWEVER, EXCAVATION AND SPREADING OF TOPSOIL. AS ROCK FRAGMENTS, SLOPE, DEPTH TO WATER TABLE, AND LAYER THICKNESS AFFECT THE EASE OF • THE DEPTH OF MATERIAL MEETING THE ABOVE QUALIFICATIONS SHOULD BE AT LEAST 4". SOIL FACTORS SUCH

WITH SOIL TEST RESULTS OR IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE VECETATIVE ESTABLISHMENT

• PH RANGE SHOULD BE FROM 6.0-7.0. IF PH IS LESS THAN 6.0, LIME SHOULD BE ADDED IN ACCORDANCE

NOXIOUS WEEDS, AND SHALL GIVE EVIDENCE OF BEING ABLE TO SUPPORT HEALTHY VECETATION. IT SHALL CONTAIN

• IF ADDITIONAL OFF-SITE TOPSOIL IS NEEDED, IT SHOULD MEET THE STANDARDS STATED ABOVE.

CLAY LOAM, AND CLAY LOAM). IT SHALL BE RELATIVELY FREE OF DEBRIS, TRASH, STUMPS, ROCKS, ROOTS AND QUALITY TO JUSTIFY STRIPPING. TOPSOIL SHALL BE FRIABLE AND LOAMY (LOAM, SANDY LOAM, SILT LOAM, SANDY FIELD EVALUATION OF THE SITE SHOULD BE MADE TO DETERMINE IF THERE IS SUFFICIENT SURFACE SOIL OF GOOD MATERIALS DESIGN CRITERIA

COMPACTION OR FILLING, AND TO OTHER AREAS WHERE THE SUBSOIL IS UNSUITABLE FOR PLANT GROWTH. ESTABLISHMENT AND PERFORMANCE. THIS PRACTICE APPLIES TO SITES THAT ARE TO BE DISTURBED BY EXCAVATION, OF THE PLANT GROWTH MEDIUM AT THE SITE AND INCREASES THE LIKELIHOOD OF SUCCESSFUL PLANT CONSTRUCTION AND USING IT ON AREAS TO BE VEGETATED. TOPSOILING A SITE USUALLY IMPROVES THE QUALITY TOPSOILING IS THE REMOVAL OF A DESIRABLE SOIL SURFACE, REFERRED TO AS TOPSOIL, AT A SITE PRIOR TO

# EBOSION CONTROL BLANKET ( ECB )

IF BLANKETS SHOULD BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY.

AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE BLANKET, ADD TAMPED SOIL AND RESEED; THEN RESECURE THE BLANKETS. INSPECT AFTER STORM EVENTS UNTIL VEGETATION IS ESTABLISHED FOR EROSION OR UNDERMINING BENEATH THE BLANKETS. IF ANY MAINTENANCE

A CROWN OF 1". APPROPRIATE BIODEGRADABLE STAPLES CAN BE USED IN LIEU OF WIRE STAPLES. SUFFICIENT THICKNESS FOR SOIL PENETRATION WITHOUT UNDUE DISTORTION. THE LEGS OF THE STAPLES SHALL BE AT LEAST 6" LONG WITH

FOR TEMPORARY BLANKETS, STAPLES SHOULD BE U-SHAPED WIRE WITH AN 11 GAUGE THICKNESS OR GREATER. STAPLES SHOULD BE OF LONGITUDINALLY. CHECK SLOTS AND ENDS OF STRIPS SHALL BE STAPLED AT 9" (225 MM) INTERVALS ACROSS THEIR WIDTH.

EACH STRIP SHALL BE STAPLED IN 3 ROWS, AT EACH EDGE AND THE CENTER, WITH STAPLES SPACED NOT MORE THAN 3 FEET (900 MM) TO FOLLOW THE MORE STRINGENT OF THE TWO. RECOMMENDATIONS FOR THE INSTALLATION OF CHECK SLOTS ARE DIFFERENT THAN THOSE GIVEN HERE, THE CONTRACTOR WILL BE REQUIRED THE SOIL A MINIMUM OF 6" (150 MM) DEEP, AND TAMPING AND STAPLING THE FOLD IN PLACE. IF THE MANUFACTURER'S OCCURS EVERY 50 FEET (15 M) OF SLOPE. CHECK SLOTS SHALL BE MADE BY BURYING A TIGHT FOLD OF THE PRODUCT VERTICALLY IN

CHECK SLOTS SHALL BE PLACED SO THAT ONE CHECK SLOT, JUNCTION SLOT, OR ANCHOR SLOT OF THE EROSION CONTROL PRODUCT OTHER LARGE SCALE TEST METHODS MAY BE DETERMINED ACCEPTABLE.

4 MINIMUM AVERAGE ROLL VALUES. EROSION CONTROL TECHNOLOGY COUNCIL TEST METHOD NO.2. VALUES SHOULD BE SUPPORTED BY PERIODIC BENCH SCALE TESTING UNDER SIMILAR TEST CONDITIONS AND FAILURE CRITERIA USING SPECIFIED GRADIENT) TO SOIL LOSS FROM UNPROTECTED (CONTROL) PLOT IN LARGE SCALE TESTING. THESE PERFORMANCE TEST "C" FACTOR CALCULATED AS RATIO OF SOIL LOSS FROM ROLLED EROSION CONTROL PRODUCT PROTECTED SLOPE (TESTED AT THE ROUGHNESS COEFFICIENTS IN THE RANGE OF 0.03 TO 0.05.

LEVELS WERE ESTABLISHED FOR EACH CLASS BASED ON HISTORICAL EXPERIENCE WITH PRODUCTS CHARACTERIZED BY MANNING'S USING EROSION CONTROL TECHNOLOGY COUNCIL TEST METHOD NO. 3. FOR TEMPORARY PRODUCTS THE PERMISSIBLE SHEAR STRESS TEST VALUES SHOULD BE SUPPORTED BY PERIODIC BENCH SCALE TESTING UNDER SIMILAR TEST CONDITIONS AND FAILURE CRITERIA DAMAGE OR EXCESS EROSION (>.5" OF SOIL LOSS) DURING A 30 MINUTE FLOW EVENT IN LARGE SCALE TESTING. THESE PERFORMANCE MINIMUM SHEAR STRESS THE ROLLED EROSION CONTROL PRODUCTS OR TURF REINFORCEMENT MATS CAN SUSTAIN WITHOUT PHYSICAL LOADING AND/OR HIGH SURVIVABILITY REQUIREMENTS TENSILE STRENGTHS OF 3000 POUNDS/FT OR GREATER. MINIMUM AVERAGE ROLL VALUES, MACHINE DIRECTION. FOR TURF REINFORCEMENT MATS USED IN FIELD CONDITIONS WITH HIGH

1.0 50 02.1 1:5 @ 21.0 A/N A\N (500 HOUR EXP.) 6,5 (0040 U MTSA) ε ,ε (e24a d MT2A) (2354 0 MTSA) (46240 MT2A) (POUNDS/SQ. FT.) **PRODUCTS** PERMANENT PRODUCTS (POUNDS/FT.) SHEAR STRESS **TEMPORARY** SETENTION) FOR \* (6525) The match of the match STRENGTH

FACTOR FOR **PERMISSIBLE** (WINIWOW & LENSIFE FOR PERMANENT PRODUCTS CLASS MINIMUM TENSILE MINIMUM "C" MUMIXAM YTIJIBATZ VU MINIMUM THICKNESS (INCHES)

TABLE ECB-5 MINIMUM PHYSICAL REQUIREMENTS FOR EROSION CONTROL BLANKETS THE CONTRACTOR WILL BE REQUIRED TO FOLLOW THE MORE STRINGENT OF THE TWO. IF THE MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OF THE EROSION CONTROL PRODUCT ARE DIFFERENT THAT THOSE GIVEN HERE, AT ALL POINTS. THE PRODUCT SHOULD NOT BE STRETCHED TIGHT IN SUCH A MANNER THAT THE MATERIAL "TENTS" OVER THE SOIL SURFACE. THE EROSION CONTROL PRODUCT SHALL BE SPREAD EVENLY AND SMOOTHLY, AND MOST IMPORTANTLY, SHALL BE IN CONTACT WITH THE SOIL DESIGN PROFESSIONAL, THAT CONDITIONS WARRANT, ANY OTHER EDGE EXPOSED TO EXCESSIVE FLOW SHALL BE BURIED AS NOTED ABOVE. STRIP SHALL BE BURIED IN 6" (150 MM) VERTICAL SLOTS, AND SOIL TAMPED FIRMLY AGAINST IT. WHEN, IN THE OPINION OF THE QUALIFIED ENDS OF STRIPS SHALL OVERLAP AT LEAST 6" (150 MM) WITH THE UPGRADE SECTION ON TOP. THE UPSLOPE END (ANCHOR SLOT) OF EACH

STRIPS ARE REQUIRED TO COVER AN AREA, THEY SHALL OVERLAP AT LEAST 3" (75 MM); HOWEVER, SOME TYPE BLANKETS WILL NOT REQUIRE DITCHES. ON STEEP SLOPES, STRIPS SHALL BE ROLLED OUT IN THE DIRECTION OF FLOW TO REDUCE RILL EROSION. WHEN 2 OR MORE FOLLOW THE MANUFACTURER'S RECOMMENDATIONS. STRIPS SHALL BE ROLLED OUT PARALLEL TO THE DIRECTION OF FLOW, IN FLUMES AND FOLLOW THE MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OR USE THE FOLLOWING INSTRUCTIONS. IF THERE IS A CONFLICT, PRODUCT WILL BE PLACED. THE EROSION CONTROL PRODUCT SHOULD BE PLACED IMMEDIATELY AFTER COMPLETION OF THE PREPARATION OF THE AREA WHERE THE

LAPPING BUT ARE TO BE BUTTED TOGETHER AND STAPLED WITH HALF OF EACH STAPLE LOCATED IN EACH OF THE ADJOINING BLANKETS.

YARNS OR TWINES WOVEN INTO A CONTINUOUS MATRIX. COMPOSED OF PROCESSED RAPIDLY DEGRADING NATURAL OR POLYMER OPEN WEAVE TEXTILE TO FORM A CONTINUOUS MATRIX. OR AN OPEN WEAVE TEXTILE EROSION CONTROL BLANKET OR A SINCLE RAPIDLY DEGRADING, SYNTHETIC OR NATURAL FIBER NETTING NATURAL AND/OR POLYMER FIBERS MECHANICALLY BOUND TOGETHER BY ULTRA-SHORT TERM SINGLE NET AN EROSION CONTROL BLANKET COMPOSED OF PROCESSED DEGRADABLE

> CLASS DESIGNATION USUAL CONFIGURATION

PRODUCT PLACEMENT

DESIGN CRITERIA

CONTROL BLANKETS

TABLE ECB-3 TYPICAL CONFIGURATION AND DURABILITY OF TEMPORARY EROSION

EROSION CONTROL PRODUCTS SHALL HAVE THE CONFIGURATIONS AND DURABILITY AS SHOWN IN TABLES ECB-3 AND ECB-4. CLASS DESIGNATIONS AND DURABILITY

STRESSES UP TO 1.5 POUNDS PER SQUARE FOOT. DESIGNED FOR USE ON GEOTECHNICALLY STABLE SLOPES WITH GRADIENTS UP TO 3:1 AND CHANNELS WITH SHEAR

> CFASS **APPLICATION**

TABLE ECB-1 TEMPORARY EROSION CONTROL BLANKET CLASSES AND APPLICATIONS IS BASED ON THE PHYSICAL PROPERTIES OF THE PRODUCT.

EROSION CONTROL PRODUCTS SHALL BE IDENTIFIED BY A CLASSIFICATION DESIGNATION (CLASS 1.A, 1.B, 1.C, ETC.) WHERE THE CLASSIFICATION

COVER MATERIAL (MULCH, SOD, ETC.) IN PLACE UNTIL AN ACCEPTABLE GROWTH OF NATURAL OR PLANTED MATERIAL IS ESTABLISHED. SKIN OF HUMANS. EROSION CONTROL PRODUCTS SHALL BE OF SUFFICIENT STRENGTH TO HOLD THE PREPARED GROUND AND, IF APPLICABLE, ALL BLANKETS SHALL BE NONTOXIC TO VEGETATION AND TO THE GERMINATION OF SEED AND SHALL NOT BE INJURIOUS TO THE UNPROTECTED

SLOPE, TYPE AND DURATION OF PROTECTION REQUIRED TO ESTABLISH DESIRED VEGETATION, AND PROBABLE SHEER STRESS. EROSION PROTECTION. SOME IMPORTANT FACTORS IN THE CHOICE OF A BLANKET ARE: SOIL CONDITIONS, STEEPNESS OF SLOPE, LENGTH OF EROSION CONTROL BLANKETS ARE TYPICALLY USED AS AN ALTERNATIVE TO MULCHING BUT CAN ALSO BE USED TO PROVIDE STRUCTURAL CHANNELS WHERE THE EROSION HAZARD IS HIGH, AND PLANT GROWTH IS LIKELY TO BE SLOW TO PROVIDE ADEQUATE PROTECTIVE COVER. STRAW, JUTE, WOOD OR OTHER PLANT FIBERS; PLASTIC NYLON, PAPER OR COTTON. THIS PRACTICE IS BEST UTILIZED ON SLOPES AND EROSION CONTROL BLANKETS ARE USED TO AID IN CONTROLLING EROSION ON CRITICAL AREAS BY PROVIDING A PROTECTIVE COVER MADE OF

ADHESIVES FOR USE IN DUST CONTROL ARE LISTED IN TABLE DC-1. BE KEPT OFF TREATED AREAS TO PREVENT THE PRODUCT FROM BECOMING INEFFECTIVE. EXAMPLES OF SPRAY-ON SPRAY-ON ADHESIVES: SPRAY-ON ADHESIVES MAY BE USED ON MINERAL SOILS FOR DUST CONTROL. TRAFFIC MUST

DAMAGE, SITES MAY NEED TO BE RETREATED BECAUSE THE PRODUCT DEGRADES OVER TIME. FLAKES AT A RATE THAT KEEPS THE SURFACE MOIST BUT NOT SO HIGH AS TO CAUSE WATER POLLUTION OR PLANT CALCIUM CHLORIDE: CALCIUM CHLORIDE MAY BE APPLIED BY MECHANICAL SPREADER AS LOOSE, DRY GRANULES OR

TEMPORARY SEEDING PRACTICE GUIDELINES. LONGER, TEMPORARY SEEDING CAN EFFECTIVELY CONTROL DUST. ESTABLISH VEGETATIVE COVER ACCORDING TO TEMPORARY VEGETATIVE COVER: FOR DISTURBED AREAS WHERE NO ACTIVITY IS ANTICIPATED FOR 14 DAYS OR

MULCHING PRACTICE FOR GUIDELINES FOR PLANNING AND INSTALLING THE PRACTICE. MULCHES: MULCH OFFERS A FAST, EFFECTIVE MEANS OF CONTROLLING DUST WHEN PROPERLY APPLIED. SEE

## TEMPORARY METHODS:

NON-WOVEN GEOTEXTILE MEETING THE REQUIREMENTS of ASSHTO M288 SHOULD BE USED UNDER THE STONE. TRAVELED ROADS OR ROADS SUBJECTED TO HEAVY LOADS THE STONE THICKNESS SHOULD BE 8" TO 10". A SHOULD BE SPREAD A MINIMUM OF 6" THICK OVER CONSTRUCTION ROADS IN THE DISTURBED AREA. FOR HEAVILY STONE: STONE USED TO STABILIZE CONSTRUCTION ROADS CAN ALSO BE EFFECTIVE FOR DUST CONTROL. STONE

FOR GUIDANCE. TOP SOILING: THIS ENTAILS COVERING THE SURFACE WITH LESS EROSIVE SOIL MATERIAL. SEE TOPSOILING PRACTICE

METHOD OF DUST CONTROL. ESTABLISH VEGETATIVE COVER ACCORDING TO THE PERMANENT SEEDING OR TEMPORARY VECETATIVE COVER: FOR DISTURBED AREAS NOT SUBJECT TO TRAFFIC, VECETATION PROVIDES THE MOST PRACTICAL

## PERMANENT METHODS: DESIGN CRITERIA

ALIGNMENT

SIDE STOPE

BOTTOM GRADE

HTGIW MORAA

**APRON THICKNESS** 

APRON LENGTH

TAILWATER DEPTH

IS GREATEST.

**CAPACITY** 

DESIGN CRITERIA

CONDILION.

TAILWATER CONDITION.

DURABILITY

TYPICAL

(EES QNA

THE DIAMETER OF THE OUTLET PIPE.

SHALL BE DETERMINED AS FOLLOWS:

APRON.

CONTROLLED. AND OTHER DISTURBED AREAS WHERE ON-SITE AND OFF-SITE DAMAGE OR HAZARDS MAY OCCUR IF DUST IS NOT SOIL PARTICLES (DUST) DURING LAND DISTURBING ACTIVITIES. THIS PRACTICE APPLIES TO CONSTRUCTION ROUTES DUST CONTROL INCLUDES A WIDE RANGE OF TECHNIQUES THAT PREVENT OR REDUCE MOVEMENT OF WIND-BORNE

THE APRON SHALL BE LOCATED SO THAT THERE ARE NO BENDS IN THE HORIZONTAL ALIGNMENT.

IF THE PIPE DISCHARGES INTO A WELL-DEFINED CHANNEL, THE SIDE SLOPES OF THE CHANNEL

OF THE INVERT OF THE RECEIVING CHANNEL. THERE SHALL BE NO OVERFALL AT THE END OF THE

STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232

NOITAVERT ELEVATION OF THE DOWNSTREAM END OF THE APRON SHALL BE EQUAL TO THE ELEVATION

OP-3. (SEE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND

THE PIPE DIAMETER PLUS 0.4 TIMES THE LENGTH OF THE APRON FROM FIGURES OP-2 OR • FOR A MAXIMUM TAILWATER CONDITION, THE DOWNSTREAM END SHALL HAVE A WIDTH EQUAL TO

WIDTH EQUAL TO THE PIPE DIAMETER PLUS THE LENGTH OF THE APRON OBTAINED FROM THE

• FOR A MINIMUM TAILWATER CONDITION, THE DOWNSTREAM END OF THE APRON SHOULD HAVE A

• THE UPSTREAM END OF THE APRON, ADJACENT TO THE PIPE, SHOULD HAVE A WIDTH 3 TIMES

IF THE PIPE DISCHARGES ONTO A FLAT AREA WITH NO DEFINED CHANNEL, THE WIDTH OF THE APRON

ACROSS THE CHANNEL BOTTOM AND UP THE CHANNEL BANKS TO AN ELEVATION ONE FOOT ABOVE IF THE PIPE DISCHARGES DIRECTLY INTO A WELL-DEFINED CHANNEL, THE APRON SHOULD EXTEND

WHEN THE APRON IS LINED WITH CONCRETE, THE MINIMUM THICKNESS OF THE CONCRETE SHALL BE

AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233. THE APRON THICKNESS SHALL BE 1.5 X

EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES SIZE), AS DETERMINED FROM FIGURE OP-2 OR OP-3 FOUND IN THE 2014 ALABAMA HANDBOOK FOR

APRON IS LINED WITH RIPRAP. THE MAXIMUM STONE SIZE SHALL BE 1.5 X d50 (MEDIAN STONE

CONSTRUCTION SITES AND URBAN AREAS, VOLUME 1, PAGES 232 AND 233, ACCORDING TO THE

ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON

THE APRON LENGTH SHOULD BE DETERMINED FROM FIGURE OP-2 OR OP-3 FOUND IN THE 2014

ONTO FLAT AREAS, WITH NO DEFINED CHANNEL, MAY BE ASSUMED TO HAVE A MINIMUM TAILWATER

DIAMETER, IT SHALL BE CLASSIFIED AS A MAXIMUM TAILWATER CONDITION. PIPES WHICH OUTLET

DEPTH IS LESS THAN HALF THE DIAMETER OF THE OUTLET PIPE, IT SHALL BE CLASSIFIED AS A DEPTH. MANNING'S EQUATION MAY BE FOUND IN THE PRACTICE GRASS SWALES. IF THE TAILWATER

THE DESIGN CAPACITY OF THE PIPE. MANNING'S EQUATION MAY BE USED TO DETERMINE TAILWATER

LOCAL ORDINANCES OR THE DESIGN DISCHARGE OF THE WATER CONVEYANCE STRUCTURE, WHICHEVER

FROM THE 25-YEAR 24-HOUR FREQUENCY STORM OR THE STORM SPECIFIED IN STATE LAWS OR

THE STRUCTURALLY LINED APRON SHOULD HAVE THE CAPACITY TO CARRY THE PEAK STORMFLOW

STRUCTURALLY LINED APRONS AT THE OUTLETS OF PIPES AND PAVED CHANNEL SECTIONS SHALL BE

PRE-MANUFACTURED PRODUCTS. THIS PRACTICE APPLIES WHEREVER HIGH VELOCITY DISCHARGE

USUALLY CONSIST OF A RIPRAP-LINED APRON, A REINFORCED CONCRETE FLUME WITH CONCRETE

REDUCING THE VELOCITY OF FLOW AND DISSIPATING THE ENERGY. OUTLET PROTECTION MEASURES

THIS PRACTICE IS DESIGNED TO PREVENT EROSION AT THE OUTLET OF A CHANNEL OR CONDUIT BY

BAFFLES, A REINFORCED CONCRETE BOX WITH CHAMBERS OR BAFFLES AND POSSIBLY

THE DEPTH OF THE TAILWATER IMMEDIATELY BELOW THE PIPE OUTLET MUST BE DETERMINED FOR

MINIMUM TAILWATER CONDITION. IF THE TAILWATER DEPTH IS GREATER THAN HALF THE PIPE

THE APRON THICKNESS SHOULD BE DETERMINED BY THE MAXIMUM STONE SIZE (DMAX), WHEN THE

THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS THE LEAST.

THE APRON SHALL BE CONSTRUCTED WITH NO SLOPE ALONG ITS LENGTH (0.0% GRADE). THE

SHALL NOT BE STEEPER THAN 2:1 (HORIZONTAL: VERTICAL).

## DUST CONTROL DC

WEATHER PERIODS, UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED.

MEASURES ARE WORKING ADEQUATELY. MAINTAIN DUST CONTROL MEASURES CONTINUOUSLY THROUGHOUT DRY MAINTENANCE: CHECK CONSTRUCTION SITE DURING VEHICULAR TRAFFIC OR WINDY CONDITIONS TO SEE IF ABOUT 15 TIMES THE BARRIER HEIGHT.

AIR CURRENTS AND BLOWING SOIL. PLACE BARRIERS PERPENDICULAR TO PREVAILING AIR CURRENTS AT INTERVALS BARRIERS: A BOARD FENCE, WIND FENCE, SEDIMENT FENCE, HAY BALES, OR SIMILAR BARRIERS CAN CONTROL

THE DEPTH TO MOIST SOIL MAY MAKE TILLAGE IMPRACTICAL. BY THE DEPTH TO MOIST SOIL AND THE AMOUNT OF MOIST SOIL DESIRED AT THE SURFACE. IN SANDY SOILS, BLOWING STARTS, BEGIN TILLING ON THE WINDWARD EDGE OF THE SITE, THE DEPTH OF TILLAGE IS DETERMINED A TEMPORARY EMERGENCY MEASURE THAT CAN BE USED ON LARGE OPEN DISTURBED AREAS AS SOON AS SOIL TILLAGE: TILLAGE: TILLAGE IS USED TO ROUGHEN THE SITE AND BRING CLODS AND MOIST SOIL TO THE SURFACE. THIS IS

MAY BE KEPT WET WITH IRRIGATION TO CONTROL DUST AS AN EMERGENCY TREATMENT. OTHER TRAFFIC ROUTES, SPRINKLE THE SITE UNTIL THE SURFACE IS WET. REPEAT AS NEEDED. ALSO BARE AREAS SPRINKLING OR IRRIGATION: SPRINKLING IS ESPECIALLY EFFECTIVE FOR DUST CONTROL ON HAUL ROADS AND

STABILIZATION PRACTICE FOR PLANNING CONSIDERATION BEFORE DECIDING TO USE THIS PRODUCT. SAFETY, STORAGE, AND MIXING OF THE PRODUCT. REFER TO THE PLANNING CONSIDERATIONS FOR CHEMICAL THE STATE. THE MANUFACTURER OR SUPPLIER SHALL ALSO PROVIDE WRITTEN INSTRUCTIONS TO ENSURE PROPER ENSURE UNIFORM COVERAGE TO THE TARGET AND AVOID DRIFT TO NON-TARGET AREAS INCLUDING WATERS OF MANUFACTURER OF SUPPLIER SHALL PROVIDE WRITTEN APPLICATION METHODS. THE APPLICATION METHOD SHALL TRAFFIC MUST BE KEPT OFF TREATED AREAS TO PREVENT THE PRODUCT FROM BECOMING INEFFECTIVE. THE CHEMICAL STABILIZATION (CHS): CHEMICAL PRODUCTS MAY BE USED ON MINERAL SOILS FOR DUST CONTROL.

RESIN IN WATER	t:4	FINE SPRAY	200
LATEX EMULSION	12.5:1	FINE SPRAY	722
ANIONIC ASPHALT EMULSION	1:7	COARSE SPRAY	1,200
MATERIAL	WATER DILUTION	TYPE OF NOZZLE	APPLY GAL/AC
TABLE DC-1 SPRAY-ON ADHESIVES	FOR DUST CONTROL	ON MINERAL SOIL	

OUTLET PROTECTION

~~~~~		01:1	C.CC	22.5'	16.0	101, EA. (303' TOTAL)	386.00	387.15,	HDbE	"0Σ−Σ	FINE 2
ALDOT #57 STONE	ALDOT CL. 1	1,13,	,9.62		20.0	782,	329.09,	340.50	HDbE	.92	LINE 4
ALDOT #57 STONE	ALDOT CL. 1	1.35,	23.0'	,0.6		¢2,5	357.00	328.00	HDbE	81	TINE 3
ALDOT #57 STONE	ALDOT CL. 1	'89.0	'6.01	4.5°	,0.6		326.00	326.50	HDbE	.81	LINE 2
ALDOT #57 STONE	ALDOT CL. 1	'89.0	,9.01	4.5°	,0°6	,67		358.00	HDPE	81	LINE 1
ALDOT #57 STONE	ALDOT CL. 1	'89.0	10.5	'∂.4	,0°6	,17	392.00,		PIPE TYPE	PIPE DIA.	
FILTER BEDDING STONE	RIP RAP	DEPTH	W2	LW.	Га	PIPE LENGTH	OUTLET INVERT EL.	INLET INVERT EL.	P DETAILS		

2000	-	1000	200	-	-	S
_	1000	200	90	-	-	7
009	-	500	-	72	-	Σ
200	-	08	-	- I	01	7
100	_	20	_	_	01	ı
06p	94p	09p	q <sub>25</sub>	glp	olp	CFY22
		(.	MEICHL (FB2			

<b>ЧАЯЧІЯ</b>	CEADED	£-90	ABLE

MIDTH, HEIGHT  WIDTH, HEIGHT	ГЕИСТАИСІ КЕСТАИСІ	MEAN SPHERICAL DIAMETER (FEET)	WEIGHT
0.5	4.1	8.0	90
9.0	37.1	1.1	100
۲۵.0	2.0	5.1	120
6.0	2.6	9.1	200
0.1	0.5	6.1	200
22.1	7.5	2.2	1000
č.1	7.4	2.6	1200
8.1	4.2	2.75	2000
2.0	0.9	3.5	0007
2.3	6.9	0.4	0009
2.5	9.7	<b>6.</b> 4	0008
ξ.ξ	0.01	1.9	50000

TABLE OP-2 SIZE OF RIPRAP STONES

STRUCTURES FOR CRACKS AND MOVEMENT. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT BELOW THE RIPRAP HAS TAKEN PLACE OR IF STONES HAVE BEEN DISLODGED. CHECK CONCRETE INSPECT RIPRAP OUTLET STRUCTURES AFTER HEAVY RAINS TO SEE IF ANY EROSION AROUND OR MAINTENANCE

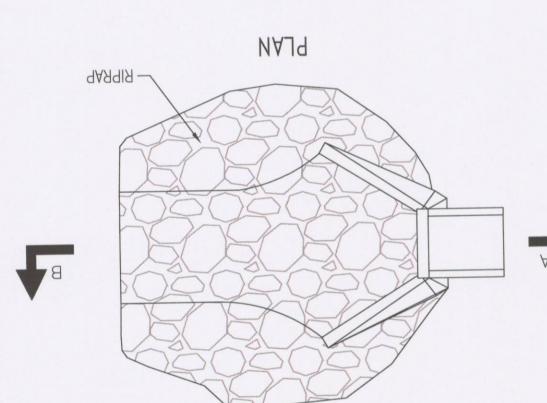
MINIMUM, THE CONCRETE SHOULD BE REINFORCED WITH STEEL WELDED WIRE FABRIC. GUIDELINES SHOULD BE USED TO DESIGN CONCRETE STRUCTURES AND REINFORCEMENT. AS A STRENGTH AT 28 DAYS OF 3000 POUNDS PER SQUARE INCH. AMERICAN CONCRETE INSTITUTE WHEN THE APRON IS LINED WITH CONCRETE, THE CONCRETE SHOULD HAVE A MINIMUM COMPRESSIVE

INDIVIDUAL STONES SHOULD BE AT LEAST 2.5. SUITABLE IN ALL OTHER RESPECTS FOR THE PURPOSE INTENDED. THE SPECIFIC GRAVITY OF THE QUALITY THAT IT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING AND IT SHALL BE APPROXIMATELY RECTANGULAR SHAPE. THE STONE SHOULD BE HARD AND ANGULAR AND OF SUCH STONE FOR RIPRAP SHOULD CONSIST OF FIELD STONE OR ROUGH UNHEWN QUARRY STONE OF

THE ALABAMA DEPARTMENT OF TRANSPORTATION. TABLE OP-3, WHICH SHOWS THE COMMERCIALLY AVAILABLE RIPRAP GRADATIONS AS CLASSIFIED BY THE MEDIAN STONE SIZE (d50). USING THIS MEDIAN WEIGHT, A GRADATION CAN BE SELECTED FROM SPECIFIED USING TABLES OP-2 AND OP-3. TABLE OP-2 IS USED TO DETERMINE THE WEIGHT OF AFTER THE MEDIAN STONE SIZE IS DETERMINED, THE GRADATION OF ROCK TO BE USED SHOULD BE

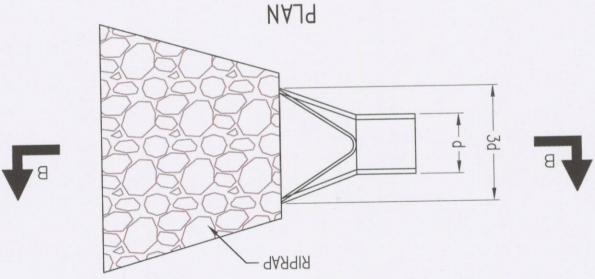
MATERIALS

OR FILTER FABRIC FILTER BLANKET -



NO WELL-DEFINED CHANNEL - A3AA TAJA OT T3JTUO 3919

OR FILTER FABRIC - FILTER BLANKET



AND SOIL FOUNDATION. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP BANK, WHICHEVER IS LESS. ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE IN A WELL-DEFINED CHANNEL, EXTEND THE APRON UP THE CHANNEL BANKS TO AN S. D = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6". La IS THE LENGTH OF THE RIPRAP APRON. NOTES:

DESIGNED ACCORDING TO THE FOLLOWING CRITERIA:

MUST BE RELEASED ON ERODIBLE MATERIAL.

2. SEE DRAWING E720259 FOR GENERAL NOTES AND LEGEND.

1. SEE DRAWING E720258 FOR DRAWING INDEX.

NOTES:

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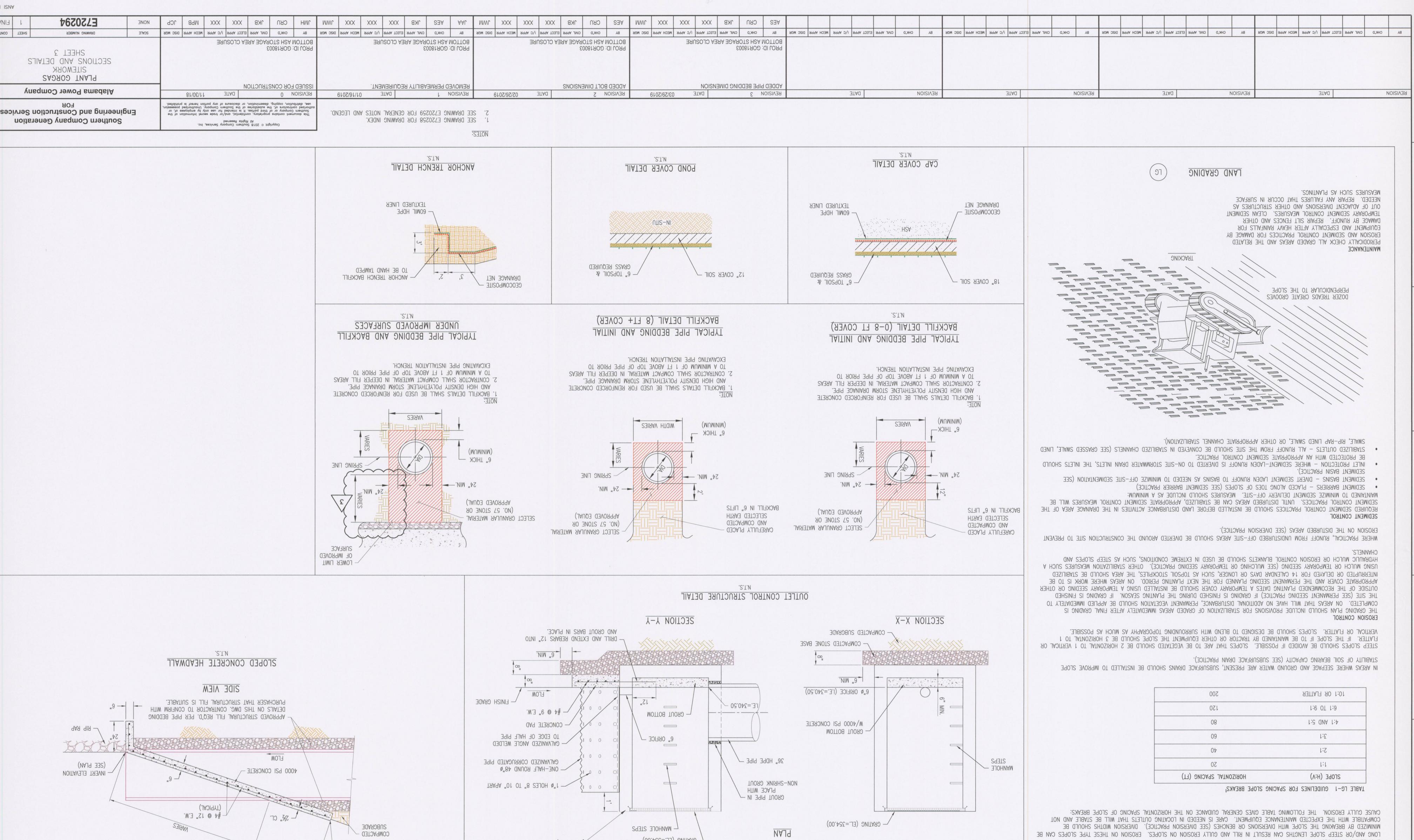
PIPE OUTLET TO WELL-DEFINED CHANNEL

SECTION A-A

SECTION B-B

VOLUME 1, PAGES 232 AND 233) SEDIMENT CONTROL AND STORMWATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS, ACCORDING TO THE TAILWATER CONDITION. (SEE 2014 ALABAMA HANDBOOK FOR EROSION CONTROL, SIZED STONE FOR RIPRAP SHOULD BE DETERMINED FROM THE CURVES ON FIGURE OP-2 AND OP-3 THE APRON MAY BE LINED WITH LOOSE ROCK RIPRAP, GROUTED RIPRAP, OR CONCRETE. THE MEDIAN

THE NON-WOVEN GEOTEXTILE SHOULD MEET THE REQUIREMENTS FOUND IN ASSHTO M288. REQUIRED FOR THE PROJECT TO ENSURE THE AGGREGATE AND SOIL BASE ARE STABLE. GENERALLY, SUBGRADE INTO THE GRADED STONE. THE GEOTEXTILE SHALL BE OF THE STRENGTH AND DURABILITY THE SUBGRADE, THE GEOTEXTILE WILL PREVENT THE MIGRATION OF SOIL PARTICLES FROM THE PLACED IMMEDIATELY ADJACENT TO THE SUBGRADE WITHOUT ANY VOIDS BETWEEN THE FABRIC AND BETWEEN THE GRADED STONE, THE SOIL SUBGRADE, AND THE ABUTMENTS. GEOTEXTILE SHOULD BE WHEN RIPRAP IS USED TO LINE THE APRON, GEOTEXTILE SHOULD BE USED AS A SEPARATOR **GEOTEXTILE** 



AT THE SITE. A QUALIFIED GEOTECHNICAL ENGINEER SHOULD PROVIDE FILL PLACEMENT SPECIFICATIONS USING STANDARD ACCEPTED MOISTURE CONTENT AND TO A DR4Y DENSITY THAT WILL PRODUCE THE DESIGN BEARING STRENGTH REQUIRED FOR STRUCTURES PLANNED LOOSE FILL MATERIAL SHOULD BE PLACED IN LAYERS NOT EXCEEDING 9" IN THICKNESS. THE MATERIALS SHOULD BE COMPACTED TO A

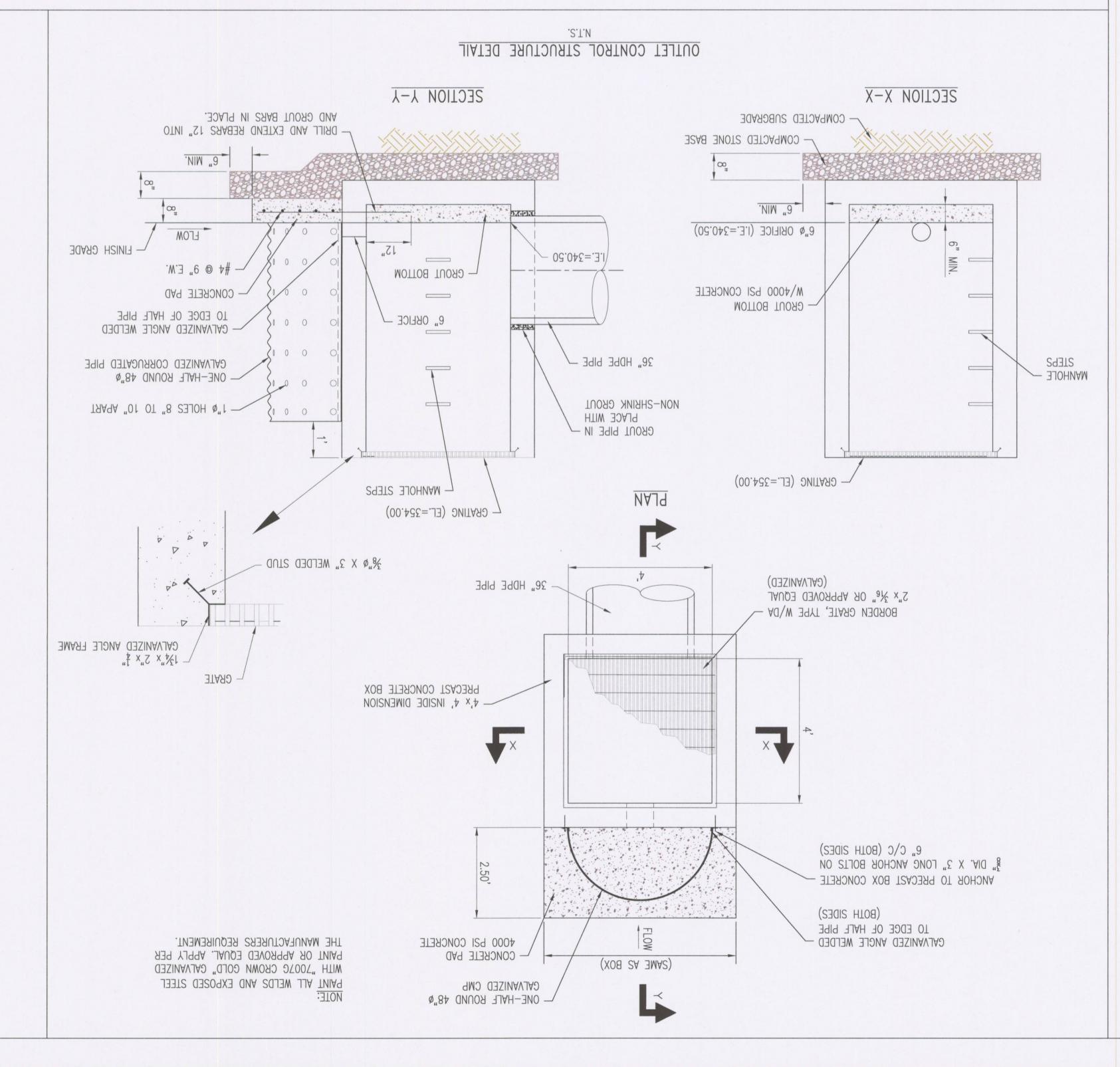
THE LOCATION. TO THE PLANS AND SPECIFICATIONS, SHOULD PROVIDE SUFFICIENT STRENGTH TO SUPPORT STRUCTURES PLANNED FOR CONSTRUCTION AT SOURCE OF FILL MATERIALS, WHICH SHOULD BE OBTAINED ON SITE IF POSSIBLE. MATERIALS USED FOR FILL, WHEN PLACED ACCORDING A PLAN FOR PLACEMENT OF FILL SHOULD BE DEVELOPED BY A QUALIFIED GEOTECHNICAL PROFESSIONAL. THE PLAN SHOULD SPECIFY THE

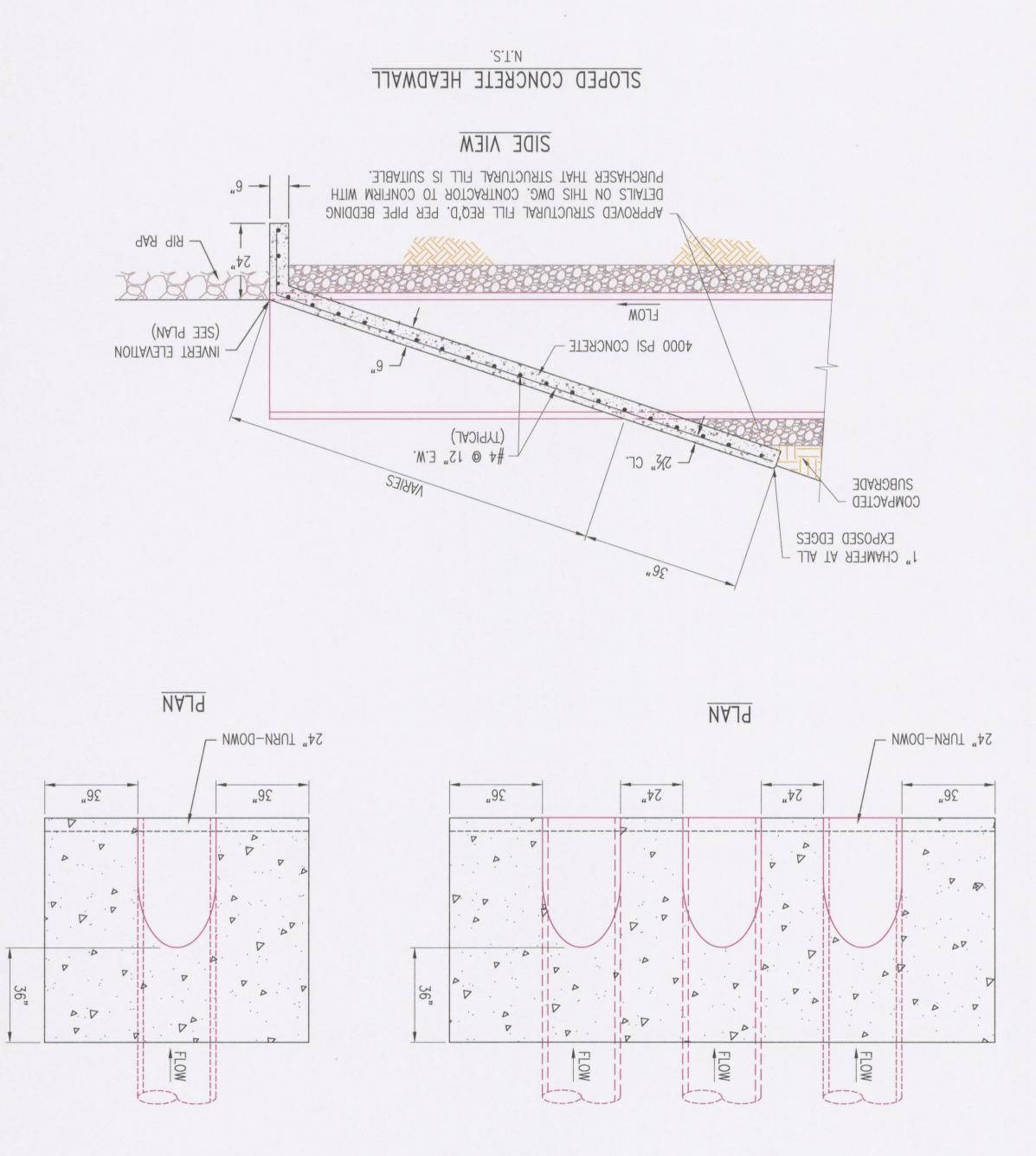
PROFESSIONAL ACCORDING TO ACCEPTED ENGINEERING STANDARDS. TO BE BUILT AT THE SITE. THE EXACT DEPTH OF MATERIAL TO BE REMOVED SHOULD BE DETERMINED BY A QUALIFIED GEOTECHNICAL SHOULD CONSIST OF SOIL OR ROCK MATERIAL OF ADEQUATE STRENGTH TO SUPPORT THE PROPOSED FILL MATERIAL AND THE STRUCTURES LOOSE OR WEAK SOIL AND OVERSIZED ROCKS SHOULD BE REMOVED FROM THE AREA. THE FOUNDATION OF THE AREA TO BE FILLED BE CLEARED AND GRUBBED BY REMOVING REES, VECETATION, ROOTS AND OTHER DEBRIS SUCH AS TRASH. IN AREAS TO BE FILLED ALL TIME USING SEQUENCING AND STACING CONCEPTS. IN AREAS WHERE CLEARING OF EXISTING VEGETATION IS PLANNED, THE AREA SHOULD THE GRADING PLAN SHOULD INCLUDE A SCHEDULE OF DISTURBANCE ACTIVITIES THAT MINIMIZES THE AREA DISTURBED AT ANY POINT IN

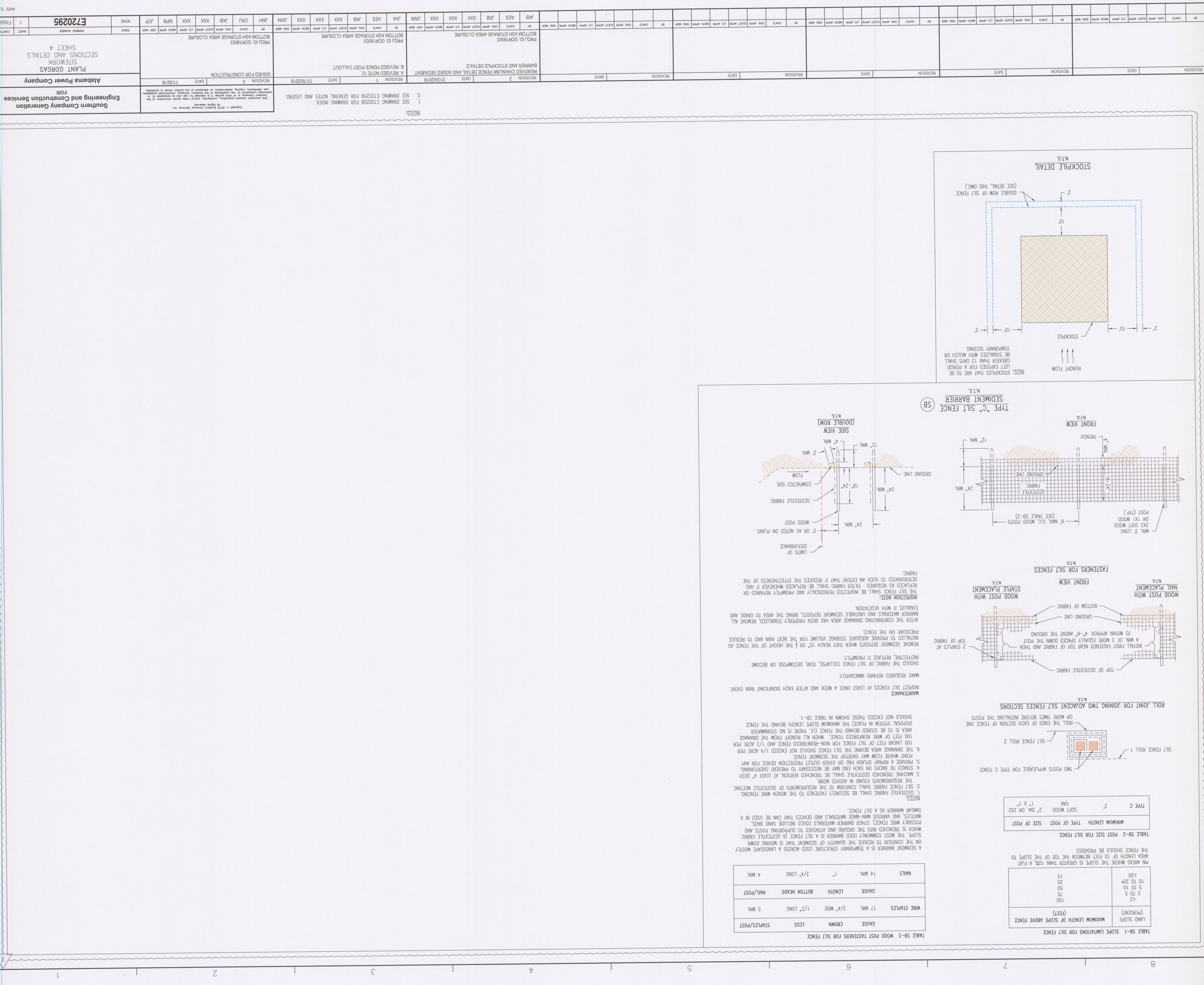
VECETATION OF THE SITE. APPROPRIATE TEMPORARY COVER, SUCH AS PLASTIC, UNTIL IT IS USED TO COVER DISTURBED AREAS IN ADVANCE OF PERMANENT STOCKPILED TOPSOIL SHOULD BE PROTECTED BY TEMPORARY VEGETATION (SEE TEMPORARY VEGETATION PRACTICE) FOR OTHER GRADING PROCESS. THE PLAN SHOULD INCLUDE A LOCATION ON THE CONSTRUCTION SITE WHERE TOPSOIL WILL BE STOCKPILED. THE GRADING PLAN SHOULD REQUIRE THAT THE EXISTING TOPSOIL AT SITES TO BE GRADED BY REMOVED AS THE FIRST STEP IN THE

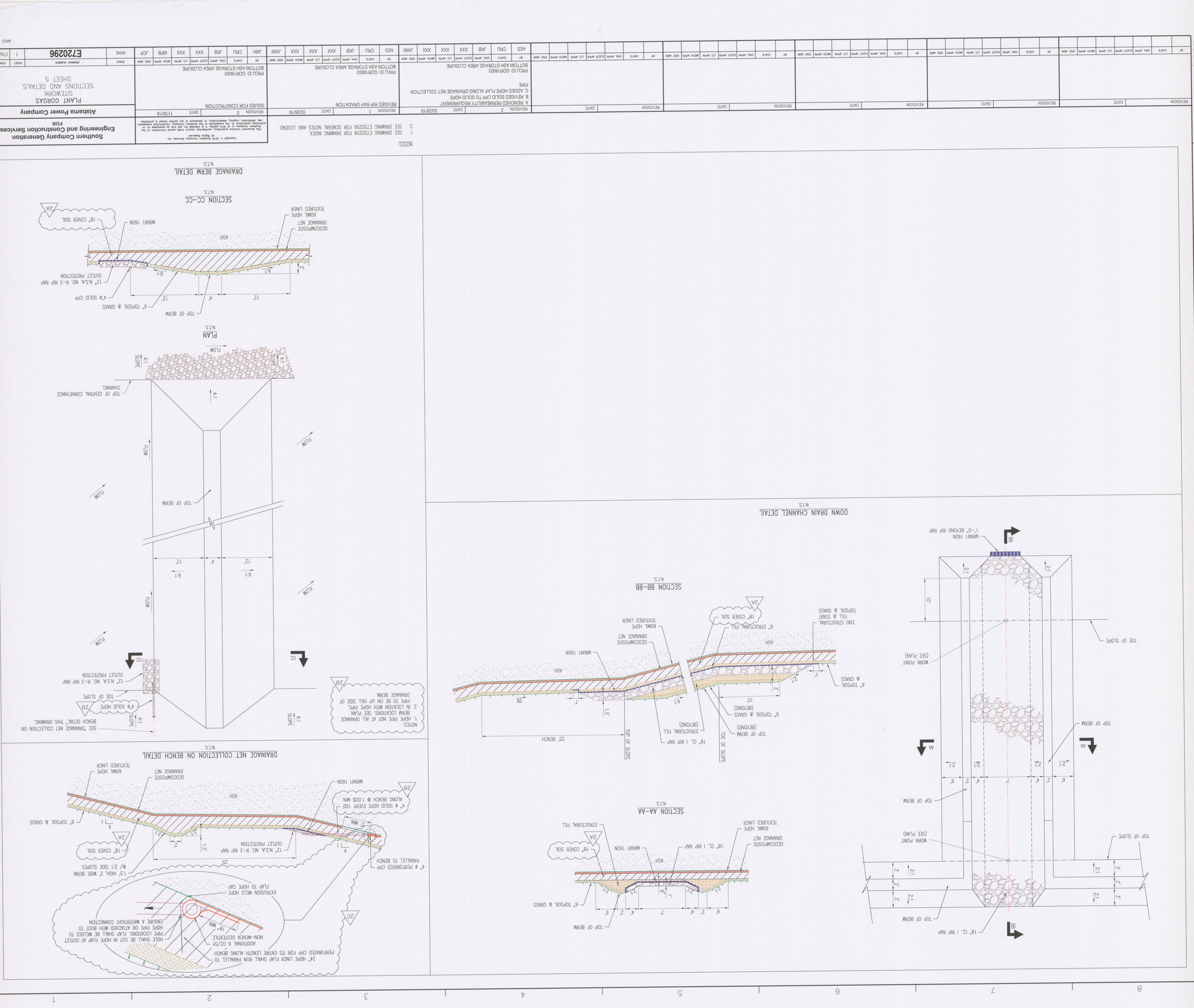
DRAINAGE PATTERNS, LOCATIONS OF EXISTING OVERHEAD AND UNDERGROUND UTILITIES, AND CONSTRUCTION LIMIT BOUNDARIES. DEVELOPMENT. THIS SURVEY SHOULD INCLUDE EXISTING TOPOGRAPHIC INFORMATION A THE SITE INCLUDING EXISTING ELEVATIONS, EXISTING A DETAILED SURVEY OF THE CONSTRUCTION SITE SHOULD BE PERFORMED BY A QUALIFIED SURVEYOR PRIOR TO GRADING PLAN SITE PREPARATION DESIGN CRITERIA

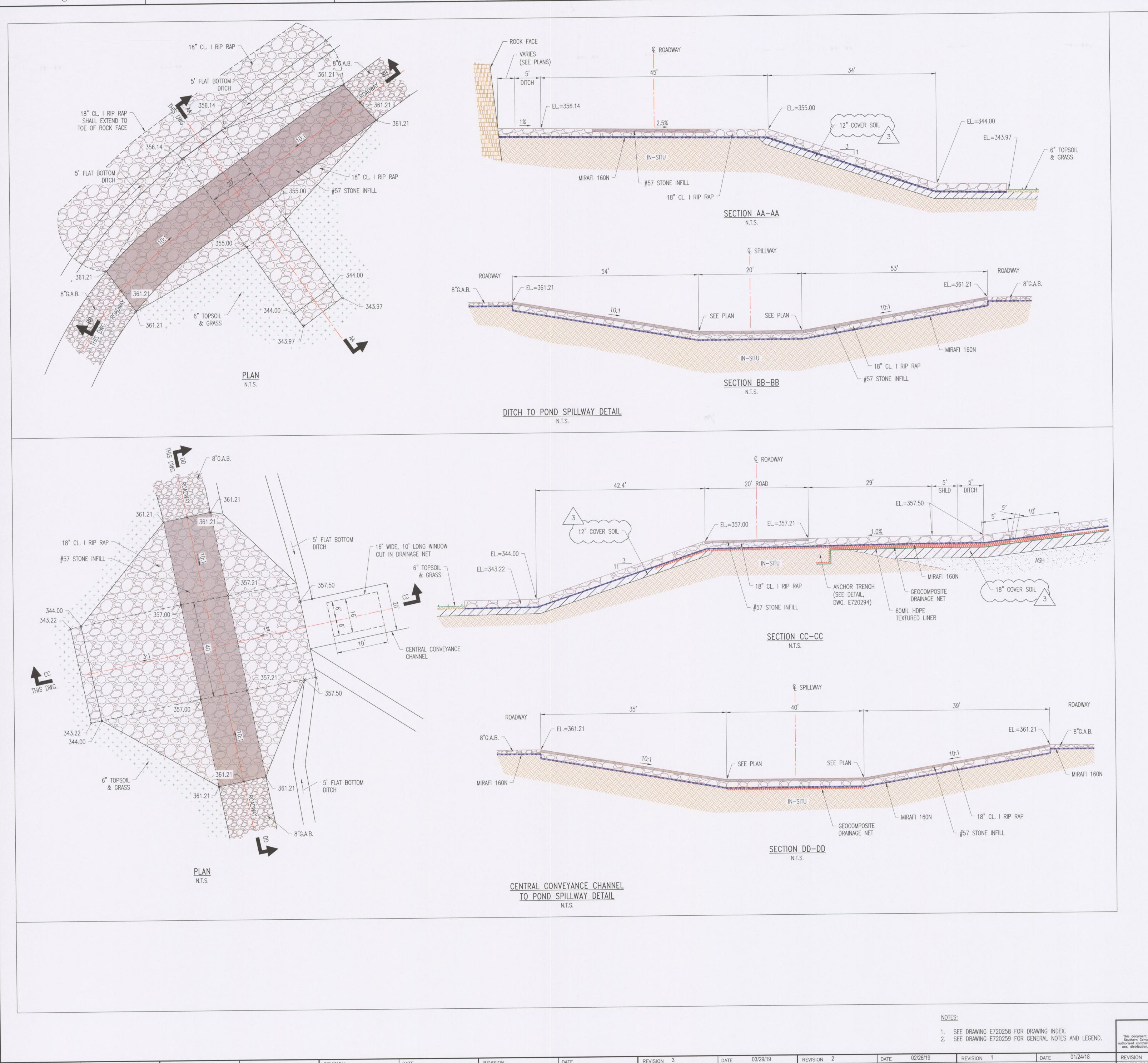
BE USED TO REDUCE THE LENGTH OF CONTINUOUS SLOPES AND REDUCE EROSION POTENTIAL. INSTALLING EROSION AND SEDIMENT CONTROL MEASURES. IN SOME INSTANCES OTHER PRACTICES SUCH AS DIVERSIONS OR BENCHES CAN ADAPTING PROPOSED DEVELOPMENT TO THE EXISTING LANDSCAPE CAN REDUCE THE EROSION POTENTIAL OF THE SITE AND THE COST OF THIS PRACTICE APPLIES TO SITES WHERE THE EXISTING TOPOGRAPHY MUST BE MODIFIED TO PREPARE FOR ANOTHER LAND USE, OR WHERE USES, TO CONTROL SURFACE RUNOFF, AND TO MINIMIZE SOIL EROSION AND SEDIMENTATION BOTH DURING AND AFTER CONSTRUCTION. LAND GRADING IS RESHAPING OF THE GROUND SURFACE TO PROVIDE SUITABLE TOPOGRAPHY FOR BUILDINGS, FACILITIES AND OTHER LAND











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SITEWORK
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