TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF WATER RESOURCES

LAND RECLAMATION SECTION

SPECIFICATIONS

FOR THE

CLIFTY - HALE

RECLAMATION PROJECT

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CLIFTY - HALE RECLAMATION PROJECT

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SPECIFICATIONS FOR THE CLIFTY - HALE RECLAMATION PROJECT

Section 100.0 - Introduction

The following specifications are for reclamation services on the abandoned mine areas at the location shown on the contract drawings.

Definitions:

State: The State, as used in these specifications, shall mean the Tennessee Department of Environment and Conservation, Division of Water Resources, Land Reclamation Section and its representatives.

Project Officer: The project officer, as used in these specifications, shall mean the employee of the Land Reclamation Section of the Tennessee Division of Water Resources who is currently assigned to this project.

Engineer: The engineer, as used in these specifications, shall mean the Environmental Protection Specialist of the Land Reclamation Section.

Contractor: The contractor, as referred to in these specifications, shall mean the general earthmoving contractor selected to perform the proposed reclamation that has a proven performance history.

Section 101.0 - Delivery Time

All work specified in this contract is to be completed within approximately 180 days after your receipt of order.

The period of performance for the federal grant that funds this project ends on September 30, 2021. All work must be completed before September 30 and the determination of final quantities, delivery of weight tickets and certifications, final inspections and acceptance of work and processing of the invoice must be completed by November 30, 2021. Payment cannot be made for any work completed after September 30, 2021.

Performance milestones will be checked on May 15 and July 1. If 25% of the acreage is not complete by May 15, the contractor will be given a warning. If 50% of the acreage is not complete by July 1, the contract will be terminated in accordance with Section 7 of the contract terms and conditions.

Work must be completed in sequential order from Area 1 to Area 9.

Work is to commence as soon as possible, but no later than 30 days, after receipt of order.

Once work begins, the contractor shall use the necessary labor, equipment, and materials to actively pursue the work.

Section 102.0 - Summary of Work

This project is located in White and Cumberland Counties, Tennessee. It consists of 67.1 acres of abandoned strip mines at nine sites. The sites are characterized by highwalls, water-filled pits, and barren spoil. Items of work for this project include clearing and grubbing, area grading, water pit treatment and dewatering, constructing rip-rapped channels, constructing anoxic limestone drains, establishing drainage patterns, road restoration, and vegetation establishment. ***Work must be completed in sequential order from Area 1 to Area 9.***

Section 103.0 - Applicant Violator System

This project is funded through a grant with the U.S. Department of Interior's Office of Surface Mining. Therefore, the contractor must not have outstanding violations with the Office of Surface Mining or be listed for any reason on the OSM Applicant Violator System (AVS).

A construction contract cannot be issued for this project to any contractor who has unfavorable status on the AVS. The successful bidder is required to submit company ownership and control information to the Land Reclamation office for certification. The Land Reclamation Section will provide the necessary forms for submittal.

Section 105.0 - Operator Qualifications

All equipment operators shall be competent and experienced with the type of equipment for which they are assigned, and they shall also be experienced in working to the lines and grade established on cut and fill stakes in the field.

Section 106.0 - Increase or Decrease in Quantities

All quantities set forth in these specifications and on the bid sheet are estimates. The State reserves the right to increase or decrease the actual quantities as site conditions warrant. The unit price bid shall remain unchanged. Any increase in contract quantities will be made in writing prior to performing any work.

Partial payments will be made based on the amount of work accomplished at the time of the payment request. Payment request shall be accompanied by supporting measurement and calculation documents. Payment request shall be mutually developed by the contractor and project officer. Any payment request without the concurrence of these two will not be processed.

Final payment shall be calculated using the total number of units utilized and measured in the project at the unit price bid for each item.

Section 107.0 - Preparation of Erosion Control Measures

Best Management Practices found in Chapter 7 of the Tennessee Erosion and Sediment Control Handbook (August 2012, Fourth Edition) shall be utilized, except as modified herein. Special care shall be taken during all phases of construction to prevent pollution of streams with harmful or polluting materials such as but not limited to fuels, oils, bitumen, and calcium chloride. Payment will be a subsidiary of Section 201, Clearing and Grubbing.

Section 108.0 - Care of Public and Private Property

The contractor shall take all necessary precautions to prevent damage to all overhead, underground, and above ground structures and to protect and preserve property within or adjacent to the project and shall be responsible for all damage thereto. The contractor shall exercise special care in the execution of the work to avoid interference or damage to all operating facilities or structures. The contractor shall be responsible for any damage or injury to public or private property and shall otherwise restore or replace such damage or injury to property as may be deemed necessary by the engineer.

The contractor shall cooperate with utilities during any relocation work, adjustment, removal and reconstruction of any such utility or facility within the work areas.

Section 109.0 - Site Access

The contractor shall be responsible for maintaining the access roads in a passable condition during the life of the contract. All roads not designated as permanent shall be closed and water barred upon the completion of the project to prevent public access to the affected area. No other access points will be used unless approved by the engineer.

Passable condition means roadway shall be graded as often as necessary to remove ruts that will trap water or erode. Access roads will be ditched, water barred, graded, have culverts installed, or have whatever other measures are necessary to protect the road from erosion and to maintain a relatively smooth surface.

Section 111.0 - Working Hours

All work on this project, except for dewatering, will be restricted to daylight hours unless specifically approved in writing by the Program Manager of the Land Reclamation Section. The contractor may be required at the project officer's discretion to perform the necessary dewatering on a 24-hour basis.

Section 112.0 - Site Clean Up

All work areas and areas disturbed during the project shall be thoroughly cleaned of all rubbish, debris, construction waste, or other unsightly materials. Sanitary facilities shall be removed and/or backfilled in a manner acceptable to the project officer.

Section 114.0 - Maintenance During Construction

The contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end, that ensures the area is always kept in a satisfactory condition. No separate payment will be made for this item.

All costs of maintenance work during construction and before the project is accepted shall be a subsidiary to the lump sum bid price for mobilization.

Section 115.0 - Unacceptable Material and Workmanship

All material not conforming to the requirements of the specifications will be considered as unacceptable. All unacceptable materials and workmanship, whether in place or not, will be rejected and shall be removed immediately from the site of the work unless otherwise directed by the engineer. In case of failure by the contractor to comply promptly with any order by the engineer to remove rejected material and workmanship, the engineer shall have authority to have such rejected work and materials removed by other means and to deduct the expense of such removal from any monies due, or to become due, to the contractor. Corrective actions to repair unacceptable work and materials will be completed at no cost to the State.

Section 116.0 - Final Inspection and Acceptance

(a) All work (which term includes but is not limited to materials, workmanship, and manufacture and fabrication of components) shall be subject to inspection and test by the State at all reasonable times and at all places prior to acceptance. Any such inspections and tests are for the sole benefit of the State and shall not relieve the contractor of the responsibility of providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the State shall be construed as constituting or implying acceptance. Inspection or

test shall not relieve the contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the State after acceptance of the completed work under the terms of paragraph (f) of this clause, except as hereinabove provided.

(b) The contractor shall, without charge, replace any material or correct any workmanship found by the State not to conform to the contract requirements. The contractor shall promptly segregate and remove rejected material from the premises.

(c) If the contractor does not promptly replace rejected material or correct rejected workmanship, the State (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the contractor, or (2) may terminate the contractor's right to proceed in accordance with the clause of this contract entitled "Cancellation."

(d) The contractor shall furnish promptly, without additional charge, all facilities, labor, and materials reasonably needed for performing such inspection and test as may be required by the engineer. All inspection and test by the State shall be performed in such manner as to not unnecessarily delay the work. Special, full size and performance tests shall be performed as described in this contract.

(e) Should it be considered necessary or advisable by the State at any time before acceptance of the entire work to make an examination of work already completed, by removing or tearing out some, the contractor shall, on request, promptly furnish all necessary facilities, labor, and materials. If such work is found to be defective or nonconforming in any material respect, due to the fault of the contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction.

(f) Unless otherwise provided in this contract, acceptance by the State shall be made as promptly as practicable after completion and inspection of all work required by this contract, or that portion of the work that the engineer determines can be accepted separately. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the State's rights under any warranty or guarantee.

(g) Upon due notice from the contractor of presumptive completion of the entire project work, the engineer will make a site inspection. If all construction provided for and contemplated by the contract is found completed to his satisfaction, a final inspection will be scheduled within five (5) days. The final inspection shall be conducted by the Program Manager of the Land Reclamation Section or his designee, the Division Engineer and the Project Officer. The contractor shall be present along with his superintendent and all subcontractors, if any, that have worked on the project.

The contractor shall not remove any equipment from the site until after he receives written notice of final acceptance of the work. Written notice of the final inspection and acceptance will be issued to the Contractor stating final acceptance and the date of release.

If, however, the inspection discloses any work in whole or in part, as being unsatisfactory, the engineer will give the contractor the necessary instructions for the correction of the deficiencies and the contractor shall immediately comply with and execute such instructions. Upon completion of the corrective work, another inspection shall be made which shall constitute the final inspection provided all work has been satisfactorily completed.

Section 117.0 - Accidents

The contractor shall provide, at the site and at his own expense, such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work.

The contractor must promptly report in writing to the project officer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on, or adjacent to the site which caused death, personal injury, or property damages, giving full details and statements of witnesses. In addition, if death, serious injuries, or serious

damages are caused, the accident shall be reported immediately by telephone or messenger to both the project officer and the contracting officer.

If any claim is made against the contractor or any subcontractor on account of any accident, the contractor shall promptly report the facts in writing to the project officer, giving full details of the claim.

Section 118.0 - Completion Time

The completion time is approximately 180 days which includes no days for bad weather, holidays and weekends. The contractor shall take this time frame for completion into consideration when bidding on this project. An extension shall not be granted unless there are unusual circumstances, such as an act of God. Poor planning, inefficiency, equipment breakdown, or any other factor of which the contractor has control over, shall not be justification for time extensions.

The period of performance for the federal grant that funds this project ends on September 30, 2021. All work must be completed before September 30 and the determination of final quantities, delivery of weight tickets and certifications, final inspections and acceptance of work and processing of the invoice must be completed by November 30, 2021. Payment cannot be made for any work completed after September 30, 2021.

Performance milestones will be checked on May 15 and July 1. If 25% of the acreage is not complete by May 15, the contractor will be given a warning. If 50% of the acreage is not complete by July 1, the contract will be terminated in accordance with Section 7 of the contract terms and conditions.

Work must be completed in sequential order from Area 1 to Area 9.

Section 119.0 - Safety

The contractor shall conduct his operations in such a manner that all applicable laws and regulations are adhered to during performance of this contract.

119.01 - Barricades, Warning Signs, and Other Devices - The contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices, and shall take all necessary precautions for the protection of the work and safety of the public.

119.02 - No direct payment will be made for work required in this section, but the cost thereof will be included in bid price under Section 200.0, Mobilization.

Section 120.0 - Dust Control

The contractor shall take all available precautions to control dust. Dust shall be controlled by sprinkling, by applying calcium chloride, or by other methods as approved. If sprinkling is the selected method for controlling dust, the contractor shall water as often as necessary to control dust that is produced as a result of the movement of construction equipment and vehicles. The use of other methods shall be effective in preventing dust formation. Oil will not be used.

Section 121.0 - Superintendence by Contractor

At all times during performance and until all the work is completed and accepted, the contractor shall give their personal superintendence to the work or have a competent superintendent on site who is satisfactory to the division Program Manager and with authority to act for the contractor.

Section 123.0 – Tennessee One-Call Center

In the state of Tennessee, state law requires anyone about to engage in either digging, excavation, moving of earth, demolition, or any type of activity that disturbs the earth and therefore possibly involving a danger to damaging underground utility lines, to notify Tennessee One-Call, of their intent to dig.

Tennessee One-Call will then notify the member utilities of your proposed work. The utility company locator will then have 72 hours, excluding holidays and weekends, to locate those underground facilities.

While not required by law, in addition to calling Tennessee One-Call, you may also want to contact any non-member utilities that you know are in the area of your proposed work.

The locate ticket you receive is only valid for 15 calendar days from the start date indicated on the ticket, after which time, it expires. If you wish to continue working, you must call in at least three working days before the expiration date to renew your locate ticket, at which time you would be given a new ticket number.

The contractor must call the Tennessee One-Call Center at 811 or 1-800-351-1111 at least three days prior to starting work. Tennessee 811 accepts locate requests 24 hours a day, seven days a week.

Section 200.0 - Mobilization

Description

200.01 - The work in this section consists of furnishing all plant, equipment, labor, materials, and supervision; and performing all operations in connection with mobilization of the contractor's forces and equipment necessary for performing the work required under this contract.

Mobilization shall include the purchase of contract bonds; transportation of personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary facilities at the site; and other preparatory work at the site. The specification covers mobilization for work required by the contract at the time of award.

Demobilization is also included under this pay item.

A licensed surveyor shall be required to locate property pins and a fence at Area 1. The cost for furnishing the licensed surveyor and all work required to place the property pins and fence shall be included under in the lump sum price bid under this section. The general locations of the pins and fence are shown on sheet 2 and 3 of the drawings.

Payment will be made lump sum for completion of all work in this section.

Work must be completed in sequential order from Area 1 to Area 8.

Measurement and Payment

200.02 - Measurement will be one (1) lump sum of which will include mobilization.

Payment will be made lump sum for completion of the work in this section.

Section 201.0 - Clearing and Grubbing

Special Project Specifications

201.00 – Clearing and grubbing limits will be flagged by the project officer. The contractor shall confine all work within the flagged area. Care shall be taken to not damage any trees outside the flagged limits.

Area 1 has been mostly logged recently. The cleared debris can easily be buried at the site. All other areas have not been logged. It is still anticipated that all the debris can be buried in the pits, provided the debris does not exceed four feet in compacted depth. The debris will be cleared and placed in the pits prior to grade work operations. The debris in the pits shall be placed in layers and compacted to form a dense mass. If the clearing debris exceeds a four-foot compacted layer, the excess shall be piled and burned. The contractor will be responsible for acquiring the appropriate burn permits.

Some debris can be windrowed to aid in sediment control. The project officer will determine the location of any windrowed brush. The windrowed brush will consist of densely packed treetops and saplings to act as a filter to aid in sediment control.

All clearing debris shall be treated according to Methods 1, 4, and 6 of Section 201.05, Windrowing Construction Slash, Burying, and Piling and Burning.

Payment for this Section shall be made to the nearest 0.1 acre surveyed by the State.

Work must be completed in sequential order from Area 1 to Area 9.

Description

201.01 - This work shall consist of clearing, grubbing, trimming, removing, and disposing of timber, construction slash, and debris. This work shall also include preservation of vegetation and objects designated to remain from injury or defacement.

Construction Requirements

201.02 – Clearing and Grubbing: All debris, trees, stumps, roots, and other protruding obstructions within the clearing limits, not designated to remain, shall be cleared, grubbed, removed, and disposed of, except for the following:

(a) Undisturbed stumps outside the embankment areas, provided they do not extend more than 12 inches above the original ground nor closer than two (2) feet to the finished sub grade or one (1) foot to any slope surface and do not interfere with the placement or compaction of embankments.

(b) Stable trees up to six (6) inches in diameter within the clearing limits but beyond the embankment and uncut vegetation less than three (3) feet in height and less than three (3) inches in diameter.

(c) Grubbing of pits, channel changes, rock sections, and channels below the depth of the proposed excavation.

All roots over three (3) inches in diameter within the embankment area shall be grubbed to a minimum depth of six (6) inches below sub grade. Roots protruding from the excavated slope shall be cut flush with the excavated slope surface.

Trees shall be felled into the area being cleared when ground conditions, tree lean, and shape of clearing permit. Controlled felling shall be used that will ensure the direction of fall when necessary to prevent damage to property, structures, trees designated to remain, or traffic.

Snags and trees outside the clearing limits that are designated for individual removal, shall be cut off not more than 12 inches above the ground and treated in accordance with Subsections 201.03 and 201.05.

Limits of work are flagged on the ground by means of paint or colored ribbon. All work shall be confined within the flagged boundary. Any clearing done outside the flagged boundary will not be paid for.

201.03 – Disposal of Merchantable Timber (Timber Meeting Utilization Standards): Timber meeting utilization standards shall be disposed of in accordance with the Special Project Specifications.

201.04 - Pioneer Roads: The construction of pioneer roads shall be approved by the engineer.

201.05 - Slash Treatment: Treatment of construction slash shall be accomplished by one or more of the following methods as shown on the drawings.

(1) Windrowing Construction Slash

(2) Windrowing of Large Material

(3) Windrowing and Covering

(4) Burying

(5) Chipping

(6) Piling and Burning

(7) Decking Unmerchantable Material

Pieces of wood that are less than three (3) inches in diameter and three (3) feet in length may be scattered within the clearing limits.

(a) All Methods: No material shall be deposited in lakes, meadows, streams, or streambeds. Construction slash that interferes with drainage structures shall be removed immediately.

Trees adjacent to the clearing limits scorched or damaged beyond recovery shall be felled and disposed of in accordance with Subsection 201.03 or treated as construction slash.

(b) Specific Methods:

(1) Windrowing Construction Slash: Areas used for windrow construction slash shall be cleared to accommodate the windrow. Construction slash shall be placed outside the embankment in neat, compacted windrows laid approximately parallel with the toe-line of embankment slopes. The top of windrows shall not extend higher than ten (10) feet. All material in the windrow shall be matted down with construction equipment to form a compact and uniform pile. Windrows shall have 16-foot minimum length breaks at least every 200 feet. Windrows shall not be placed against trees. A pioneer road may be constructed to provide an area for placement of windrows provided the excavated material is kept within the clearing limits and does not adversely affect the embankment construction.

(2) Windrowing of Large Material: Construction slash ten (10) inches or more in diameter at the small end and six (6) feet or more in length shall be windrowed as in subsection (1) above. Small material shall be treated by one or more of the other included options for slash treatment.

(3) Windrowing and Covering: Construction slash shall be placed and compacted as in subsection (1) above and shall be covered with at least six (6) inches of rock and soil to form a smooth and uniform windrow.

(4) Burying: Construction slash shall be buried at the locations shown on the drawings and designated on the ground. Construction slash shall be matted down in layers and covered with at least two (2) feet of rock and soil. The final surface shall be smooth and sloped to drain.

(5) Chipping: Construction slash up to at least four (4) inches in diameter shall be processed through a chipping machine. Chips shall be deposited on embankment slopes to a loose depth not exceeding six (6) inches. Minor amounts of chips may be permitted within the embankment if they are thoroughly mixed with soil and do not form a layer.

(6) Piling and Burning: Construction slash shall be burned in areas shown on the drawings and designated on the ground. Piles shall be constructed so that burning does not damage standing trees. If burning is incomplete, the slash remaining shall be re-piled and burned until the pieces are reduced to less than three (3) inches in diameter and three (3) feet in length. These pieces shall then be scattered.

The contractor shall conduct burning operations in compliance with all local, state, and federal laws, ordinances, and regulations. It is the contractor's responsibility to obtain all licenses, permits, payment of fees, etc., in order to comply.

(7) Decking Unmerchantable Material: Logs not meeting utilization standards that are six (6) inches or more in diameter shall be bucked into lengths not to exceed 32 feet and piled at the locations shown on the drawings.

Measurement and Payment

201.06 - The method of measurement will be to the nearest 0.1 acre for all work completed and accepted. Horizontal measurement shall be used in the data collection.

Payment will be paid at the contract unit price bid per acre and shall be full compensation for furnishing and applying all materials, labor, equipment, and other incidentals necessary to complete the work.

Section 204.0 - Area Grading

Special Project Specifications

204.00 - The work in this section consists of the grading of spoil to eliminate pits and highwalls. The highwalls will be backfilled to the approximate original contours in most areas. The backfilled slopes will range from a 3:1 slope to flatter than 8:1 slope. Final slopes for the Clifty Site are shown on sheets 3 – 8 of the drawings. Final slopes for Hale Site are shown on sheets 11-12 of the drawings.

The cut and fill yardage for the Clifty Site is approximately 242,000 yd^3 cut and 231,000 yd^3 fill. The yardage at the Hale Site is approximately 61,000 yd^3 cut and 58,000 yd^3 fill.

At Area 1 of the Clifty Site, there is a fence that runs along the spoil at stations 24+00 - 34+00. The fence will be reinstalled after work has been completed. In addition, there are three property corners that will be disturbed during construction. The property corners may or may not be currently marked with pins. A licensed surveyor will be required to mark the property corners with pins after construction has been completed. All cost associated with placing the fence and the property pins will be included in the price bid under Section 200.00, Mobilization.

At the Hale Site, there is a stream that runs between Areas 8 and 9. Care will be taken not impact the stream. Sediment control will be a priority at these sites.

Before backfilling operations can begin, all water in pits shall be tested and treated to ensure that the water meets water quality standards. If the water in the pits cannot be safely absorbed, water shall be pumped or drained down prior to backfilling to not create mud or sludge. See Section 214.0, Pond Treatment and Dewatering for details and anticipated treatment for individual pits.

Method 1 of Section 204.03, Side Casting, will be used for placing of fill in pits and backfilling highwalls. The backfilling and grading of the pits and depressions, where water is still pooled after pumping and draining, shall be in a slow, consistent operation that allows for the soil to absorb the remaining water. Backfilling must cease when the ground within the water-filled pits becomes unstable to the point the backfill will not support the weight of a dozer.

The material at the base of the highwall must be walked-in every ten (10) vertical feet in order to reduce settling of backfill material. Compaction by rolling with the earthmoving equipment used for grading operations will be acceptable.

All slopes will be tracked in perpendicular to the slope when grading is complete <u>or</u> when active grading operations of the slope will cease for more than 72 hours <u>or</u> before an anticipated rain event.

The work will provide positive grade for drainage on all graded areas and will eliminate all depressions that will hold water. After all rough grading is complete, surface drainage shall be provided by construction of grass-lined waterways and terraces. Where the grade on grassed waterways exceeds three percent, diversion channels lined with filter fabric and rip-rap will be constructed. Typical sections of terraces, grassed waterways, and rip-rapped diversion channels are shown on sheet 13 of the drawings. Terraces and waterways may be needed as determined by the project officer.

Terrace construction, grass-lined waterway construction, rip-rap channel construction, and subsurface drain construction are included in the unit price bid under Section 204.0 (a), Area Grading, including those specified and any additional ones that may be required. Payment for this Section shall be made to the nearest 0.1 acre surveyed by the State.

Work must be completed in sequential order from Area 1 to Area 9.

Description

204.01 - The work in this section consists of the excavation, filling, and grading of all materials of whatever nature. It includes all hauling, formation of fills and embankments, ditch excavation, berm construction, disposal of unsuitable or surplus material, and finishing and final dressing.

Materials

204.02 - The backfill material required for this work shall be the material on site, unless stated otherwise in this contract special provisions.

Construction

204.03 - Construction of Fills: Final grade shall approximate the lines and grade configuration shown on the plans. Regardless of the method of fill placement, the fill shall be so constructed that positive surface drainage shall always be provided. Ponding of water will not be allowed on the surface of the fill. Fill material may be placed in one of several different methods. These options are listed, and any required option or options shall be shown on the drawings.

Method of placing fill:

(1) Side Casting: This method allows the dumping or pushing of material over the side of previously placed material. The material pushed or dumped must not exceed four (4) feet in thickness on the face of previously placed material. This method may be used in areas where finished grade is not critical to establishing final drainage patterns and in areas where settlement is not considered a problem. Small amounts of herbaceous and vegetative material (trees and brush) will be permitted in the base of the fill, provided it is not bunched up to form a loose pile of brush that will rot and leave a void that results in subsidence. When trees and brush are placed in the fill, the trees and brush shall be placed on the bottom of the pit and compacted to form a dense mass not to exceed four (4) feet in thickness. This method of brush disposal will only be allowed where future subsidence will not cause pits to be formed, and disposal areas will be shown on the drawings. Scattered individual trees may be allowed in the fill provided they are on the bottom of the pit area and fill material surrounds the trees. Compaction is not required. This method is particularly applicable for pushing off spoil ridges into open pits to form a uniform finished grade that approximates original contour or contour shown on the drawings.

Pits that are holding water and designated to be backfilled shall be dewatered before backfilling. See Section 214.0, Pond Treatment and Dewatering.

In some instances, pits with shallow water may be backfilled with the pushing of earth material into the pit from the end and absorbing the water with the soil material. In the event absorption is allowed, the contractor shall push backfill material slowly to allow the soil particles to absorb the water and remain stable to the point of supporting the equipment used to move the backfill material.

Any mud or very soft backfill shall be covered with dry material to a depth that will support a dozer. If the mud cannot be made stable, then the contractor shall provide a guard to make sure no one enters onto the area until the area has been stabilized.

If absorption of the water is permitted, then specifications will be included in Section 204.00, Special Project Specifications. Otherwise absorption will not be permitted.

(2) Layer Placement of Fill: Fill material shall be placed in layers not to exceed one (1) foot in thickness and compacted by rolling with the earthmoving equipment used for transporting or hauling the fill material.

(a) Movement of materials will not be permitted when material is frozen or completely saturated. Material must be in a condition that allows placement without bogging equipment down.

(b) Placement of fill or embankment will not be permitted in areas of bogs or swampy areas until those areas are drained and the sub grade of the fill prepared to receive fill materials.

(c) Preparation of surfaces to receive embankment shall be prepared by clearing all vegetative and organic materials from the site where fill materials are to be placed.

(d) When rock is used as a foundation, the foundation shall be stripped and cleaned of all overlying materials. All loose, disintegrated, or light slab portions of the rock shall be removed. In rock foundations where the rock is shattered below the foundation elevation, the shattered material shall be removed, and the space so created by removal of material shall be rebuilt with the same type of construction as the proposed overlying construction.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the normal 8-12 inch thickness without crushing, pulverizing or further breaking down the pieces resulting from excavation methods, such material may be placed in the embankment in layers not exceeding four (4) feet in depth. All rock to be placed in the embankment shall be broken into sizes not exceeding three (3) feet in maximum dimension. Larger pieces may be placed on the embankment face when permitted by the engineer. Each layer shall be leveled and smoothed with suitable leveling equipment and by the distribution of finer fragments of rock or other satisfactory material.

204.03.1 - Ditches, Berms, and Dikes:

(a) Diversion channels, berms, check dams, and other minor erosion control measures shall be a part of this work and shall be constructed in accordance with the details shown on the drawings.

(b) Ditch and Berm Construction: The construction of diversion channels and berms, that are necessary for the control of drainage on the sites, shall be constructed to the template cross-section shown on the drawings. All channels or berms not designated as permanent structures shall be removed prior to final acceptance.

Minimum side slopes for channels and berms shall be two (2) feet horizontal to one (1) foot vertical or flatter. Maximum grade of the ditch bottom shall not exceed two (2) percent unless otherwise designated or directed by the engineer.

The channels shall be seeded and mulched immediately after construction of the ditch or berm is complete. Channels or berms shall be maintained throughout the life of the contract to function as constructed.

204.03.2 - Drainage Excavation: Drainage excavation shall include construction of terraces, minor channel changes, ditches, water bars, diversion channels, and other minor earth drainage structures as shown on the drawings.

204.04 - Temporary Dozer Access Road: The temporary dozer access road shall be built on the flagged grade. Maximum grade shall not exceed 12 percent unless approved in writing by the engineer. The road will have a maximum disturbance width of twenty feet. Upon abandonment, the road will be water barred directing water to the outside and revegetated. Water bar locations will be flagged on the ground by the engineer.

Measurement and Payment

204.05 – The method of measurement will be to the nearest 0.1 acre for all work completed and accepted. Horizontal measurement shall be used in the data collection.

Payment will be paid at the contract unit price bid per acre and shall be full compensation for furnishing and applying all materials, labor, equipment, and other incidentals necessary to complete the work.

Section 208.0 - Ditches, Terraces, and Channels

Special Project Specifications

208.00 – Terraces, grassed waterways, and rip-rap channels shall be constructed to carry surface drainage after grade work has been completed. The State will be present and help locate the areas for the channels. Locations for planned terraces, grassed waterways, and rip-rap channels are shown on the Final View sheets of the drawings.

There are 9 anticipated rip-rap channels and one grass-lined waterway for the project. The rip-rap channels shall be 8 feet wide. The grass-lined waterway shall be 20 feet wide. Details for the rip-rap channel and grass-lined waterway construction are shown on sheet 13 of the drawings. After grade work has been completed, the project officer will determine if any additional rip-rap channels may be required.

The approximate lengths and rock requirements of the rip-rap channels are as follows:

		Length	Rock
Area 1	Rip-Rap Channel #1	240’	210 tons
	Rip-Rap Channel #2	230’	200 tons
Area 2	Rip-Rap Channel #3	230’	200 tons
Area 4	Rip-Rap Channel #4	220’	190 tons
Area 5	Rip-Rap Channel #5	230’	200 tons
Area 6	Rip-Rap Channel #6	470’	400 tons
Area 7	Rip-Rap Channel #7	380’	320 tons
	Rip-Rap Channel #8	310’	260 tons
Area 9	Rip-Rap Channel #9	150’	130 tons
Total		2,460’	2,110 tons

Additional terraces and grass-lined waterways may be required as grade work progresses. The project officer will make the final determination in the field. The terraces and grassed waterways shall have an outfall grade of no more than two percent. In no case shall the grade exceed two percent, unless the bottom is on bedrock. The grade of the terraces shall be checked with a level to ensure proper construction. Rock checks shall be constructed to slow the flow of surface water. The project officer shall locate any rock checks after grading has been completed.

Payment for constructing all terraces, rip-rapped channels, rock checks, and grass-lined waterways (those specified in the plans and any additional ones) shall be included in the unit price bid under Section 204.0, Area Grading. Payment for rip-rap and filter fabric used in constructing the channels shall be under Section 209.0, Rip-rap.

Description

208.01 - This work shall consist of the layout and construction of diversion channels, terraces, and channels necessary to prevent or minimize erosion, and control water flow and direction on the project site.

Equipment

208.02 – The equipment size and quantity shall be suited for the size drainage structure shown on the drawings and it shall be available to perform the work. Large equipment shall not be permitted when cutting small diversion channels if an excessive area of disturbance is the result of the use of large equipment.

Construction Requirements

208.03 - All ditches, terraces, and waterway channels shall be constructed to the grades and dimensions shown on the drawings, but in no case shall the bottom grade of any ditch be greater than two (2) percent unless approved in writing by the engineer.

Soil removed from the excavation of the ditch or terrace shall be deposited where it will not interfere with flow into the watercourse. Lining, if required, and vegetation shall be placed and established immediately upon completion of the ditch.

Measurement and Payment

208.04 - Separate payment will not be made for construction of rip-rapped waterways, grassed-lined waterways, or terraces, but will be a subsidiary item of work under Section 204.0, Area Grading.

Payment for filter fabric and rip-rap used in construction of rip-rapped waterways will be made under Section 209.0, Rip-Rap.

Section 209.0 - Rip-Rap

Special Project Specifications

209.00 – Nine rip-rap channels shall be constructed at the locations shown on the final views of the drawings. The rip-rap channels shall require 2,110 tons of limestone. The limestone shall be a combination of 6”-12” limestone and Class-B limestone. Larger limestone (Class-B) will be mixed throughout to keep the smaller limestone from washing down slope.

Seven anoxic limestone drains shall be constructed to collect subsurface drainage from pits. The subsurface drain shall require 1,350 tons of clean, 4” – 9” limestone. See Section 302.0, Limestone Subsurface Drain Construction, for construction details. Subsurface drain locations are shown on sheet 2 of the drawings and a typical section is shown on sheet 13 of the drawings.

A total of 3,460 tons of rip-rap will be required. Five-ounce, non-woven filter fabric shall be placed under the rip-rap channels and on all sides of the subsurface drain. A total of 8,350 yd^2 of filter fabric shall be required.

All limestone shall be high calcium limestone, at least 92% calcium carbonate. All stone used in this project shall be clean and free of all fines. Any material delivered on site that does not comply with specifications will be rejected.

Rock checks shall be placed in any grass-lined waterways as determined by the project officer. Additional rip-rap channels and subsurface drains may be required. See sheet 13 of the drawing for a typical section for rock checks.

Payment for stone and filter fabric shall be paid under this Section. Payment for constructing the rip-rap channels, rock checks, and anoxic limestone drains shall be under Section 204.0 (a), Area Grading.

Description

209.01 - This work shall consist of furnishing and placing hard durable limestone rock on the slopes of embankments, dikes, stream banks, on bottom and sides of ditches and channels, gullies, culvert outlets, wing walls, structure outlets and at other locations shown on the drawings.

Materials

209.02 - Stones used for rip-rap shall be hard angular limestone rock meeting the following requirements for durability absorption ratio as defined below:

If the Durability Absorption Ratio (DAR) is 23 or greater, the rock is acceptable. If DAR is between 10 and 23, it is acceptable if the Durability Index is 52 or greater. If DAR is less than 10, the rock is unacceptable.

The Durability Index and percent absorption shall be determined by AASHTO T-210 and AASHTO T-85, respectively. The minimum specific gravity of the rock shall be 2.5 as determined by AASHTO T-85. Contractor shall furnish a certified test report.

CLASS	SIZE
A	From 2 inches to 1.25 feet with no more than 20 percent by weight less than 4 inches.
B	From 3 inches to 2.25 feet with no more than 20 percent by weight less than 6 inches.
C	From 5 inches to 3 feet with no more than 20 percent by weight less than 9 inches.

All rock shall be clean shot rock containing no sand, dust, or organic materials. The stone shall be uniformly distributed throughout the size ranges.

209.021 - Nonwoven Filter Fabric: The filter fabric shall be a nonwoven geotextile composed of polypropylene fibers and shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids. The filter fabric shall as a minimum exhibit the following properties:

Property	Test Method	Unit	Results
Grab Tensile	ASTM D 4632	lbf	115
Elongation	ASTM D 4632	%	50
Puncture	ASTM D 4833	lbf	65
Trapezoid Tear	ASTM D 4533	lbf	50
Permittivity	ASTM D 4491	sec^{-1}	1.10-2.00
Flow Rate	ASTM D 4491	$gal/min/ft^2$	120-140
AOS	ASTM D 4751	US Sieve	70
Mullen Burst	ASTM D 3786	psi	175

Delivery, Storage, and Handling: During shipment and storage, the filter fabric shall be wrapped in a heavy-duty protective covering. The storage area shall be such that the fabric is protected from mud, soil, dust, and debris. Fabric that is not installed immediately shall not be stored in direct sunlight.

209.022 - Securing Pins: Shall be of steel, a minimum of 3/16 inch in diameter and at least 15 inches long. Other equivalent securing devices may be substituted if recommended by the fabric manufacturer.

209.023 - Bedding Stone for Rip-Rap: The bedding stone shall be T-DOT designation #57 as specified in T-DOT Standard Specifications for Roads and Bridges, (March 1, 1995, Edition) in Section 903.22 Sizes of Coarse Aggregate. Quality of rock shall comply with Section 903.03.

Rock Rip-Rap Flume

209.03 - This work shall consist of limestone rip-rap for channel protection furnished and constructed in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions specified. Construction shall be at the locations shown on the plans or established by the engineer.

1. Excavation and Foundation Preparation: Foundation and other necessary excavations shall be approved by the engineer before the placing of rip-rap is begun. Where filling of depressions is required, the backfill material shall be compacted with hand or mechanical tampers. Unless otherwise shown, rip-rap shall begin in a toe trench constructed in original ground around the toe of the rock fill or the top of the cut slope. Where rip-rap is to commence under water, the two trenches shall be omitted and an apron of rip-rap shall be substituted.

2. Placement of Stone Rip-Rap: Rip-rap shall be dumped into place to form a dense compact layer to the design thickness. The tolerance shall be +12 inches with no under tolerance.

209.031 - Filter Fabric: The plastic filter fabric shall be placed in the manner and at the location indicated on the plans. The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions, and debris.

The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for

each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within three (3) inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip will overlap the downstream strip. The fabric shall be placed loosely to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three (3) feet during construction. The fabric shall always be protected during construction from clogging due to clay, silts, chemicals, or other contaminants. Any contaminated fabric shall be removed and replaced with uncontaminated fabric at no expense to the State. Any fabric damaged during its installation or during placement of rip-rap shall be replaced by the contractor at no additional cost to the State. Filter fabric shall conform to Section 209.021 of this section.

209.032 - Grouted Rip-Rap: Grouted rip-rap shall be placed as specified above for stone rip-rap, except care shall be taken to prevent earth from filling the spaces between stones. After the stone has been acceptably placed, the spaces between them shall be filled with a 1:3 grout composed of Portland cement and sand mixed thoroughly with sufficient water to give a thick, creamy consistency. The grout shall be placed beginning at the toe and finished by sweeping with a stiff bristle broom. After the grouting is completed, the rip-rap shall be covered and kept wet for five (5) days or covered and kept wet for 24 hours, and then coated with a white pigmented membrane curing compound. Grout shall not be placed when air temperature is below 40° F or when there is frost on the rip-rap. Grout shall be protected from freezing.

209.033 - The contractor shall exercise care in placing and in preparation of the rip-rap subgrade to ensure that the design template is maintained. When deemed necessary by the Division Engineer, the rip-rap shall be rolled with tracked equipment or tamped in place with a backhoe bucket to provide a denser mass.

Upon completion of the work, visual inspection shall reveal that approximately 50 percent of the surface area consists of stones no smaller than one-half of the maximum size specified.

Measurement and Payment

209.04 - (a) Rip-Rap:

Measurement of the rip-rap shall be to the nearest 0.1 ton of rip-rap placed and accepted. Weight tickets will be accepted for dumped in place material.

Payment of rip-rap will be made at the contract unit price bid per ton.

(b) Filter Fabric:

Measurement of the filter fabric shall be to the nearest square yard installed and accepted.

Payment of filter fabric will be made at the contract unit price bid per square yard.

Section 211.0 - Silt Retention Barrier

Special Project Specifications

211.00 - Approximately 14,000 feet of straw wattles shall be required for the project. The wattles will be installed at the toe of the mine spoil. The straw wattles shall be constructed and maintained for the duration of the project. The straw wattles will be installed along contour. The ends and any long stretches will be turned up slope forming a J-hook to slow and filter any concentrated flow behind the wattles. The straw wattles shall be constructed at an early stage of construction after clearing and grubbing. See sheet 13 of project drawings for details of straw wattle construction. Wattles may also be utilized in terraces and grassed waterways as needed for sediment control.

Twelve-inch diameter wattles shall be required. The wattles will be placed in a 3”-5” trench. Stakes shall be used to anchor the wattles to the ground. The stakes shall be a minimum of 1” by 1” in width and four feet in length. The stakes shall be placed a maximum of four feet apart. One half of the stake must be under ground level.

Payment for the straw wattles shall be made to the nearest one (1) foot for completed and accepted work.

Description

211.01 - The work in this section consists of furnishing all materials, equipment, labor, and other incidentals necessary for the construction of silt checks and temporary silt fences designated on the drawings and other silt control devices described in these specifications.

Materials

211.021 – Silt Fence: Filter fabric shall be a woven polypropylene filaments needle punched network such that yarns retain their relative positions to each other.

Minimum properties for the filter shall be:

Grab strength ASTM D-1682-64	30 lb.
Bursting strength ASTM D-3786-80a	210 psi
Permeability co-efficient CFMC-GET	20.01 cm/sec
Water flow rate	40 gal/min/sq. ft

Material for the fence posts shall be of 2" X 2" X 4 1/4' oak minimum as furnished by the manufacturer or as approved by the engineer.

211.022 - Straw Wattles. Wattles will consist of 100% weed seed free agricultural straw inside flexible and durable tubular polyester netting.

Stakes to anchor wattles shall be one-inch diameter stakes, 4 foot in length approved by the project officer.

Construction

211.03 - Silt fences and straw wattles shall be constructed at the general location shown on the drawings. The exact location will be as staked on the ground.

Temporary Silt Fences: Using a woven filter cloth as a filter medium, silt fences shall be constructed at the locations staked and shall be erected before beginning any earth work. Exceptions shall be approved by the project officer.

Maintenance

211.04 - During the life of the contract, the contractor shall maintain the straw wattles in an effective condition. Sediment build up will be removed in a timely manner.

Measurement and Payment

211.05 – Measurement for the silt retention barriers shall be made to the nearest one (1) foot for completed and accepted work. Measurement will be linear measurement.

Payment for the silt retention barriers shall be made at the contract unit price bid which shall be full payment for completed and accepted work.

Section 214.0 - Pond Treatment and Dewatering

Special Project Specifications

214.00 – All water-filled pits shall be checked to ensure compliance before discharging operations can commence. When the pits were sampled by Division personnel, all water pits were found to be out of compliance with water quality standards. If the water in the pits cannot be safely absorbed, treatment shall be required. Any water to be discharged must be tested before discharge operations can begin to ensure compliance with water quality standards. The contractor is to submit the analytical results from the composite samples along with his plan of treatment, mixing, and dewatering to the project officer for approval prior to starting this phase of the work.

Extreme care will be taken by the contractor so as not to allow sludge or sediment from the bottom of the pits to be discharged and to not allow offsite damage to occur as a result of increased quantity and velocity of water.

The estimated volumes of water for each pit and its anticipated method of treatment are as follows:

		pH	Volume	Method
Area 1	Pit 1	3.8	220,000 gallons	Absorb during backfilling
	Pit 2	4.1	60,000 gallons	Absorb during backfilling
	Pit 3	4.5	480,000 gallons	Treat and discharge
	Pit 4	4.5	770,000 gallons	Treat and discharge
	Pit 5	3.8	330,000 gallons	Treat and discharge
Area 2	Pit 6	3.8	700,000 gallons	Treat and discharge
Area 7	Pit 7		85,000 gallons	Absorb during backfilling
	Pit 8		50,000 gallons	Absorb during backfilling
Area 8	Pit 9		350,000 gallons	Treat and discharge
Area 9	Pit 10	5.7	410,000 gallons	Treat and discharge
	Pit 11	5.6	550,000 gallons	Treat and discharge
	Pit 12	6.7	250,000 gallons	Treat and discharge

The anticipated method of treatment may not be applicable at the time of construction as conditions and water volume could have changed.

Section 214.03 will be followed ***strictly*** during the dewatering process.

No dewatering shall take place until a treatment and discharge plan is approved by the state. Refer to Section 214.02 for approval steps to be followed ***strictly***. Effluent limits must be verified by the contractor and project officer.

Description

214.01 - The work in this section consists of treating and draining the ponded water in several locations at the site.

Treatment

214.02 - Ponds will be treated and drained as follows:

The contractor shall be required to collect a composite sample from each impoundment for analysis. All necessary precautions such as prompt analysis, cooling of samples, etc., are to be taken to maintain the integrity of the samples. The contractor shall perform titration tests to determine neutralization requirements and, at a minimum, the pH, acidity, alkalinity, total iron, manganese, and suspended solids as well as the conditions under which the samples were collected (weather, number and location of sampling point, etc.). The contractor is to submit the analytical results from the composite samples along with his plan of treatment, mixing, and dewatering to the project officer for approval prior to starting this phase of the work. The neutralizing agent must be approved prior to treatment by the project officer.

Contractor's treatment plans along with test results are to be submitted ten days prior to treatment and discharge.

The contractor shall have all the necessary equipment set up, ready for use, and materials available on site prior to beginning treatment. The contractor shall uniformly apply one-half the estimated volume of neutralizing agent to the impoundment and mix by pumping. High volume pumps (3,000 gpm minimum) will be required per impoundment in order to assure thorough mixing in a timely manner. The mixing pumps shall have their intake located near but not on the bottom of the impoundment. The contractor must have the capability of directing the discharge from the mixing pumps to the extremities of the impoundment in order to assure thorough mixing. Following the initial mixing, the State will spot check the contractor's analysis of pH, Fe, TSS, and Mn content. The contractor shall add additional neutralizing agent in order to meet NPDES standards.

Effluent Characteristic	Discharge Limitations	Monitoring Requirements	
	Daily Maximum	Measurement Frequency	Sample Type
Iron, Total	6.0 mg/l	5 per day	Grab
Manganese, Total	4.0 mg/l	5 per day	Grab
Total Suspended Solids	70.0 mg/l	5 per day	Grab
pH	6.0 - 9.0	5 per day	Grab
Flow, GPM		5 per day	Est.

Compliance with the above effluent limits must be verified by the contractor and the project officer before discharge of the treated water to the receiving stream. The contractor must periodically monitor water quality during dewatering operations as specified in the monitoring requirements. The contractor shall furnish the results of the monitoring samples to the project officer immediately.

Dewatering

214.03 - Upon approval of test results by the project officer, the contractor may begin discharge according to a prior approved discharge plan.

The discharged water must be in compliance with NPDES standards when it leaves the project boundaries. In order to comply with total suspended solids, all discharge must be directed onto an approved splash pad. It may be necessary for the contractor to construct temporary flumes.

Extreme care must be taken by the contractor so as not to allow sludge or sediment from the bottom of the pond to be discharged and to not allow offsite damage to occur as a result of increased quantity and velocity of water.

The project officer may at any time during discharge issue a cease order for noncompliance with these requirements. In such case the contractor shall immediately terminate discharge operations until the problem is corrected and approval to discharge has been reissued.

The project officer will determine when each impoundment has been sufficiently drained and will approve backfilling operations which shall be in accordance with Section 203.0, Excavation and Embankment, and Section 204.0, Area Grading.

Measurement and Payment

214.04 - Measurement will be lump sum for the work completed and accepted.

Payment will be made at the lump sum price bid which shall be full compensation for furnishing all materials, labor, supervision, equipment, and all other incidentals necessary to complete the work.

Section 302.0 - Limestone Subsurface Drain Construction

Special Project Specifications

302.00 – Seven anoxic limestone drains shall be constructed during the project. The subsurface drains shall be 5' wide and 2' deep. The length of the subsurface drains is approximately 2,550 feet total. See sheet 2 for the locations of subsurface drains. The subsurface drains shall require 1,350 tons of clean, 4" – 9" limestone. The limestone shall be at least 92% calcium carbonate. The subsurface drains shall be wrapped with 5-ounce non-woven filter fabric. If any additional seeps appear or wet areas develop, additional anoxic limestone drains may be needed.

Water-filled pits that require anoxic limestone drains shall be pumped down and graded such that the ALD is installed next to the highwall and on the bottom of the pit. The ALD is not only to control the subsurface water, but also to treat the water. A small dam shall be constructed at the outlet to back water up into the ALD before discharging for better treatment. See sheet 13 of the drawings for anoxic limestone drain construction.

The approximate lengths and rock requirements of the anoxic limestone drains are as follows:

		Length	Rock	
Area 1	ALD #1	130'	70	tons
	ALD #2	280'	150	tons
	ALD #3	670'	350	tons
	ALD #4	590'	310	tons
Area 4	ALD #5	260'	140	tons
Area 5	ALD #6	280'	150	tons
	ALD #7	340'	180	tons
Total		2,550'	1,350	tons

Payment for all work associated with the construction and installation of the limestone under drains shall be paid for under Section 204.0 (a), Area Grading. Payment for the limestone and filter fabric used in the construction of the under drain will be under Section 209.0 Rip-Rap.

Description

302.01 - This work shall consist of the layout and construction of subsurface drains and placement of limestone for the treatment of acid drainage.

Equipment

302.02 - Equipment size and quantity suited for the size drainage shown on the drawings shall be available to perform the work. Large equipment shall not be permitted when cutting small drains if an excessive area of disturbance is the result of the use of large equipment.

Materials

302.03 - Nonwoven Filter Fabric: The filter fabric shall be a nonwoven geotextile composed of polypropylene fibers and shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids. The filter fabric shall as a minimum exhibit the following properties:

Property	Test Method	Unit	Results
Grab Tensile	ASTM D 4632	lbf	115
Elongation	ASTM D 4632	%	50
Puncture	ASTM D 4833	lbf	65
Trapezoid Tear	ASTM D 4533	lbf	50
Permittivity	ASTM D 4491	sec^{-1}	1.10-2.00
Flow Rate	ASTM D 4491	$gal/min/ft^2$	120-140
AOS	ASTM D 4751	US Sieve	70
Mullen Burst	ASTM D 3786	psi	175

Delivery, Handling, and Storage: During shipment and storage, the filter fabric shall be wrapped in a heavy-duty protective covering. The storage area shall be such that the fabric is protected from sun, mud, soil, dust, and debris. Fabric that is not installed immediately shall not be stored in direct sunlight. Fabric storage on the ground will not be permitted longer than 12 hours.

Filter and Buffering Stone: The stone in the subsurface drain shall be limestone meeting the following requirements. Limestone from the Monteagle formation is acceptable and possibly limestone from the Holston formation. A certificate of analysis will be required wherever the source. A 92 percent $CaCO_3$ or better will be required. Dolomite limestone will not be acceptable; only those rock composed principally of mineral calcite will be acceptable. The rock gradation size will be as shown below. The rock shall be clean rock free of detrimental substances. Percent wear shall not exceed 40 percent as determined by AASHTO T-96. Rock shall have a specific gravity of at least 2.65 as determined by AASHTO T-85. The contractor shall furnish a certified test report that the rock meets these requirements.

Sieve Size	% Passing
3"	100
2-1/2"	90-100
2"	35-70
1-1/2"	0-15
3/4"	0-5

Placement of Filter Stone: Rock may be dumped into place to form a dense mass to the dimensions shown on the drawings.

Plastic Film Wrap: A 6 mil. plastic shall be polyethylene film at least 10 feet wide. Plastic shall be stored in a dark room or in the closed shipping container away from sunlight.

302.04 - Plastic film shall be installed as follows:

After the trench has been excavated as approved, the plastic liner shall be placed in the trench. A minimum of an 18-inch overlap shall be provided at each lap.

Care shall be taken to assure a tight seal around the crushed stone after it is in place.

Extreme care shall be exercised to prevent damage to the plastic. It is imperative that the drain remains completely encased in the plastic sheet to seal out the air from the interior of the trench. Any damaged plastic shall be replaced by the contractor at no additional cost to the Department.

Construction Requirements

302.05 - All drains shall be constructed to the grades and dimensions shown on the drawings but in no case shall the bottom grade of any ditch be greater than one (1) percent or less than 1/4 percent unless approved in writing by the engineer.

Soil removed from the excavation of the ditch shall be deposited where it will not interfere with surface flow into a watercourse.

Unless otherwise specified, excavation shall begin at the outlet end and progress upstream.

The trench or excavation shall be constructed to the depths and cross sections shown in the drawings. The trench width may be increased above the top of the tile, at the option of the contractor.

Trench shields, shoring and bracing, or other methods necessary to safeguard the workmen and work, and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

Filter fabric lining is required and shall conform to the requirements stated herein. Minimum overlap shall be one (1) foot. Care shall be taken in placing to avoid punching holes in the fabric. Fabric with holes shall be removed and replaced at the contractor's expense.

The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within three (3) inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip will overlap the downstream strip. The fabric shall be placed loosely to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three (3) feet during construction. The fabric shall always be protected during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric shall be removed and replaced with uncontaminated fabric at no expense to the Department. Any fabric damaged during its installation or during placement of rip-rap shall be replaced by the contractor at no additional cost to the State. Filter fabric shall conform to Section 209.021 of this section.

Measurement and Payment

302.06 – No separate measurement or payment shall be made for anoxic limestone drain construction, but will be a subsidiary item of Section 204.0, Area Grading.

Limestone and filter fabric used in construction of the anoxic limestone drain shall be paid for under Section 209.0, Rip-Rap.

Section 701.0 - Road Restoration

Special Project Specifications

701.00 – Access to the Areas 1, 2, and 3 will be from Eastland Road. There are access roads off Eastland Road for the Areas. The access road for Area 1 leads right to the site. The access road off Eastland Road for Areas 2 and 3 travels between the sites. Short roads shall be constructed from the access road to Areas 2 and 3. The length of the two roads are 50 feel and 150 feet respectively.

Access to Areas 4 – 7 shall be from Taylors Chapel Road. The access road is in good shape to within 500 feet of Area 7. The last 500 feet of road to Area 7 is overgrown and it will require light clearing and grade work. Access to Areas 4-6 will be by an old haul road from Area 7. The haul road will also require light clearing and grading for use in hauling limestone to the sites.

The access road to Areas 8 and 9 will be from Old Ross Road. The access road is in very good shape. Only light work and maintenance work will be required.

All access roads will be left in as good as or better condition than they were at the beginning of the project.

Road rock shall be placed as needed on any soft spots that may develop. Limestone shall be used when necessary to stabilize the road. No. 2, No. 57, and crusher-run limestone will be utilized as needed for the constructed roads. Two hundred (200) tons of road limestone is estimated for the project. Any access roads impacted during construction shall be re-established after construction.

Payment under Section 701.0(A) shall include all work needed to construct, maintain, and upgrade the roads. Road rock shall be paid for under Section 701.0 (b), Limestone.

Description

701.01 - The work in this section consists of maintenance of roads for safe traffic flow during work on this project. Upon completion of the reclamation work, the road will be revegetated, water barred, and blocked.

Materials

701.02 - Materials for shaping the roadbed shall be the onsite materials within the roadway. Crushed limestone with a maximum 1 ½-inch size shall meet the requirements of Section 903 of the Tennessee Highway Department of Standard Specifications, 1995 Edition.

Construction and Maintenance

701.03 - The roadway shall always be maintained for traffic. The road shall be graded to maintain a smooth riding surface that will permit automobile traffic to safely travel through the project.

Soft areas within the roadway will have to be ripped out and reworked to the density specified. The roadbed shall be graded to a smooth surface before application of the surfacing.

Safety

701.04 - It will be the contractor's responsibility to take whatever measures necessary to maintain traffic on the county road during the work. Flagman, lights and warning signs will be in accordance with the current edition of the "Manual for Uniform Traffic Control Devices for Streets and Highways" Federal Highway Administration including all addenda.

Construction of signs, lights and barricades shall conform to the Section 712.04 of the Tennessee Highway Department Standard Specifications for Road and Bridges, 1981 edition.

Measurement and Payment

701.05 – (a) Road Restoration:

Measurement shall be one job for all work completed and accepted.

Payment shall be lump sum for complete and accepted work and shall constitute full and complete payment for all work in this section.

(b) Road Limestone:

Measurement of stone placed on road shall be to the nearest 0.1 ton placed and accepted. Weight tickets will be accepted for dumped in place material.

Payment of all stone will be made at the contract unit price bid per ton.

Section 801.0 - Vegetation Establishment

Special Project Specifications

801.00 – All disturbed areas shall be revegetated after construction has been completed. One thousand pounds per acre of 19-19-19 fertilizer and twelve tons per acre of lime will be worked into the soil.

The entire disturbed area shall have lime and fertilizer spread and the soil shall be pulverized to a depth of four to six inches.

Seeding on this project will be done with a hydro seeder, cultipacker seeder, or tractor-mounted cyclone seeder. If a hydroseeder is used, four to five pounds per 1,000 square feet of wood mulch will be used to identify the area covered.

Seed requirements and rates are as follows:

Orchard Grass ----------	20 Pounds Per Acre
Switchgrass ----------	5 Pounds Per Acre
Timothy ----------	7 Pounds Per Acre
Foxtail Millet ----------	3 Pounds Per Acre
Partridge Pea ----------	3 Pounds Per Acre
Perennial Rye ----------	20 Pounds Per Acre
Winter Wheat ----------	30 Pounds Per Acre
Birds foot Trefoil ----------	15 Pounds Per Acre
Ladino Clover ----------	10 Pounds Per Acre
Alsike Clover ----------	9 Pounds Per Acre
Black Eyed Susan ----------	1 Pound Per Acre

Three tons of straw or hay mulch per acre is required and mulch shall be held in place by using a crimper or other compatible method to anchor the mulch into the soil. The crimper shall be capable of pushing the mulch into the soil to a depth of two inches.

Any areas that are seeded must be mulched on the same day that they are seeded. If an area is seeded, but not mulched and crimped, and it rains, the area must be re-disked and re-seeded. Additional seed required by poor planning of the contractor shall be at the expense of the contractor.

The project officer shall be on site during the vegetation process.

Tree and shrub seedling will be planted any disturbed areas within twenty feet of the grass-lined waterway at the Hale site and within twenty feet at the work limits along Potts Creek. The trees and shrubs seedlings shall be planted on 8' by 8' centers. The project officer will direct the contractor on where each species will be planted at each area.

The tree and shrub seedlings types and quantities required are as follows:

Tree and Shrub seedlings

Shagbark Hickory	700
Silky Dogwood	700
Sugarberry	700
Pawpaw	700
Red Chokeberry	700
Total	3,500

All shrubs and seedlings shall be hand planted.

The cost for furnishing all materials, equipment, labor, and other incidentals necessary for the supplying and planting the shrub seedling shall be included in the unit price bid per acre under this Section.

Description

801.01 – Grasses. Seeding shall consist of furnishing and placing seed, commercial fertilizer, agricultural limestone and mulch material when specified, all in accordance with these specifications, on all newly graded earthen areas or other areas shown on the drawings.

Seedbed will be prepared in accordance with Section 801.05.

Seed certification will be required before seeding is started. (See Section 801.021)

Seedlings. The contractor will be required to purchase, then store, transport, and plant the seedling species that are specified in Section 801.00. If some seedlings are not available at the time of planting, after getting approval from the project officer, substitute species of tree seedlings may be used.

The Tennessee Department of Agriculture, Division of Forestry at the East Tennessee Nursery at Delano, Tennessee, should have sufficient amounts of seedling species for this project.

The contractor shall take only a two-day supply of trees from a cooler or storage facility when planting begins. Contractor shall submit the location of the storage facility for approval by the State before use.

ROOT PRUNING WILL NOT BE PERMITTED.

Planting stock shall be picked up at a cooler or storage facility as needed for planting within two days and protected from exposure to sun and drying during shipment, delivery to planting site and handling at project site. Planting stock shall be dormant when planted and shall be planted immediately following delivery to the project site. The seedlings shall be moistened, and the bundles remain unopened until ready to plant. All seedlings shall be planted within two days after picking up at a storage facility. Seedlings to be planted the second day shall be placed in a cool shady area.

Seedling pickup should be scheduled to minimize the amount of time between pickup at the storage facility and field planting.

Care should be taken to prevent seedling bags/bales from being crushed. Heavy objects, such as planter's tools, should not be stacked on the seedlings.

Seedlings should not be transported in the same cargo space with, or any cargo space contaminated with, diesel fuel, gasoline, any petroleum product, pesticides, or any substance toxic to plants.

Seedlings should not be allowed to freeze or overheat. Internal bag temperature should be kept between 35° and 45° Fahrenheit.

Materials

801.02 – Grasses. Materials used in this construction shall meet the requirements of the following specifications:

801.021 - Grass Seed: The seed shall meet the requirements of the Tennessee Department of Agriculture and no "Below Standard" seed will be accepted.

Grass seed furnished under these specifications shall be packed in new bags or bags that are sound and not mended.

The vendor shall notify the Department before shipments are made so that arrangements can be made for inspection and testing of stock.

The vendor shall furnish the Department a certified laboratory report from an accredited commercial seed laboratory or from a State seed laboratory showing the analysis of the seed to be furnished. The report from an accredited commercial seed laboratory shall be signed by a Registered Member of the Society of Commercial Seed Technologists. At the discretion of the Department, samples of the seed may be taken for check against the certified laboratory report. Sampling and testing will be in accordance with the requirements of the Tennessee Department of Agriculture.

The seed mixture shall be uniformly mixed using a mechanical mixer and bagged in 50-pound bags. Group seed shall not be mixed until after each type seed that is used to form the "Group" has been tested and inspected separately and approved for purity and germination by the Department. Seed mixed before tests and inspection are made will not be accepted.

Inoculants for Legumes: Inoculants for treating legume seed shall be standard cultures of nitrogen fixing bacteria that are adapted to the particular kind of seed to be treated. The inoculant shall be supplied in convenient containers of a size sufficient to treat the amount of seed to be planted. The label on the container shall indicate the specified legume seed to be inoculated and the date period to be used. Twice the amount recommended by the manufacturer shall be used.

801.022 - Commercial Fertilizer: Manufactured fertilizer shall be a standard commercial fertilizer containing the specified percentages of weight of nitrogen, phosphoric acid, and potash.

If bagged fertilizer is used, fertilizer shall be furnished in standard containers with the name, weight, and guaranteed analysis of the contents clearly marked. The containers shall ensure proper protection in handling and transporting the fertilizer.

All commercial fertilizer shall comply with local, state, and federal fertilizer laws. The contractor shall furnish a supplier's certification of analysis and weight, when bulk fertilizer is supplied. Fertilizer shall be commercial grade 19-19-19 or equivalent.

801.023 - Agricultural Limestone: Agricultural limestone shall contain not less than 85 percent of calcium carbonate and magnesium carbonate combined and shall be crushed so that at least 90 percent will pass the No. 10 mesh sieve and 30 percent through a No. 50 sieve.

801.024 - Mulch Material: All hay and straw mulch material shall be air dried and reasonably free from noxious weeds and weed seeds or other materials detrimental to plant growth on the project or on adjacent agricultural lands.

Hay shall be stalks of approved grasses, sedges, or legumes seasoned before baling or loading. Straw shall be stalks of rye, oats, wheat or other approved grain crops. The mulch shall be reasonably free from weeds, seeds, and foreign materials and shall contain no Johnson grass or wild onions. Weight tickets shall be furnished to verify the quantity of mulch furnished.

Both hay and straw shall be suitable for spreading with standard mulch blower equipment. When wood fiber mulch is used, it shall meet the following specifications:

Moisture Content. . . . . .10% $\pm$ 2.0%
Organic Matter. . . . . 99.4% $\pm$ 0.2%

Ash Content . . . . . .0.6% ± 0.2%
Water Holding Capacity (per hundred grams of oven dry fiber .1050 grams minimum)

801.025 - Mulch Binder: This tack is a free-flowing silicate powder to which hydrophilic polymers sequestering agents are added. Application rate shall be 100 pounds of silicate powder, four (4) bags of fiber mulch and 800 gallons of water per acre when sprayed in hydroseeder. If used in a mulching machine, use one dry pound of material per two gallons of water and three bags of fiber mulch. On all slopes steeper than 3:1, a mulch binder may be used.

Equipment

801.03 - All equipment used in this operation shall be adequate to produce the desired results. Blower equipment used to supply treated mulch in a single operation shall have two (2) or more jets or spray nozzles and shall be located at the near end of the discharge spout to coat mulch material uniformly with glue as it is ejected. If a crimper is used, discs shall have corrugated or notched surfaces and shall be at least 12 inches in diameter. Crimpers shall be capable of pushing mulch into the ground at least two inches with mulch remaining "planted" after crimper moves on without kicking out soil and mulch.

Hydroseeders shall be designed for the purpose of mixing and applying a slurry mixture of seed, fertilizer, and wood fiber mulch. It shall be capable of applying a uniform mixture over the entire area to be seeded. The slurry mixture shall be agitated during application to keep the ingredients thoroughly mixed.

All equipment necessary for the satisfactory performance of this work shall be on the project and approved before work will be permitted to begin.

801.04 - Care during Construction and Acceptable Stand: All seeded areas shall be properly cared for until acceptance of the work.

Areas which have been previously seeded and mulched in accordance the specifications in this Section, but which have been damaged or failed to successfully establish an acceptable stand of grasses or legumes shall be repaired as directed by the project officer.

Construction Requirements

801.05 – Grasses. The contractor shall notify the project officer at least 48 hours in advance of the time he intends to begin seeding operations and shall not do so until permission has been granted by the project officer. Before starting to seed operations, sloping, shaping, and dressing shall have been completed in accordance with these specifications. If the contractor fails to notify the project officer within the specified time, then the seeding operation will not be accepted.

It shall be imperative that the contractor have on site all equipment, materials, labor, and any other incidentals necessary for performing the work to satisfactory completion.

The contractor shall proceed, with vigor, the vegetation process once the process is begun.

(a) Preparing the Seedbed:

The seedbed shall be prepared in the following manner and sequence. Each area to be seeded shall be scarified, disked, harrowed, raked or otherwise worked until it has been loosened and pulverized to a depth of four (4) to six (6) inches or as approved by the project officer. The tilling operation shall be performed only when the soil is in a tillable and workable condition. Fertilizer, 1,000 pounds per acre, of grade 19-19-19 or equivalent and agricultural limestone, twelve (12) tons per acre, shall be applied and shall be uniformly incorporated into the soil to a depth of approximately four (4) to six (6) inches.

(b) Seeding:

Seed of the specified groups shall be sown as soon as preparation of the seedbed has been completed. It shall be sown uniformly by an approved means. Seeds of legumes shall be inoculated before sowing in accordance with the manufacturer's recommendations and as approved by the project officer.

c) Mulching:

Mulch material may be hay or small grain straw and shall be spread evenly over the seedbed area using a mulching machine at an approximate rate of three (3) tons per acre immediately following seeding operations. Sage grass straw or wild grass will not be accepted. Hay or straw mulch shall be held in place by use of an approved mulch binder. Glue tack shall be applied to all seeded and mulched areas. The rate of four (4) to five (5) pounds per 1,000 square feet of wood fiber mulch shall be applied to help identify area covered and help stick the seed to the ground. (Hydroseeding shall not be performed when winds prevent an even and thorough distribution of the mixture.)

On extremely rocky finished grades where crimping will not be practical, crimping will not be permitted, and mulch binder shall be required. Also, crimping will not be permitted except on flat slopes (5:1 or flatter).

A mulch binder shall be required on all slopes steeper than a 3:1 slope. All mulch shall be applied with a mulching machine.

When crimpers are used to anchor the mulch into the soil, crimpers shall be capable of pushing the mulch into the soil to a depth of two inches.

Seedlings. The planting methods for the seedlings are as follows:

1. Hand planting will be done by using a planting bar (dibble) or planting hoe (hoedads). The hole must be large enough for the seedling roots to be spread out and not bent or doubled under. The seedlings must be planted the same depth that they were growing at the nursery.

   After the hole is made and the seedling placed in the ground, the soil shall be pressed firmly around the seedling to assure complete soil-plant contact thus eliminating air pockets that will dry out the roots. The planting hole should be deep enough for roots to fall straight down. Seedlings should be planted so that the root collar is at least one inch below the packed soil surface but to keep the lowest living branch junction above the soil surface. During the planting operations, the roots of the seedlings shall always be maintained in a moistened state. Under no circumstances will roots be allowed to dry out.

2. Only one bag or bale of seedlings should be opened at a time. The remaining bags shall be closed tightly to prevent moisture loss from the remaining seedlings. Once removed from the bag/bale, seedlings must be placed in a planting bag or container immediately. Partially empty bags should be kept in a covered, cool location. Seedlings from opened bags must be planted the same day the bags are opened.

3. The contractor shall inspect and assure that the correct procedures are being followed. Any deviation or violation of these specifications will be reason for the project officer to require that the seedlings planted not be paid for and that new seedlings be furnished and planted at the contractor's expense.

Measurement and Payment

801.06 – The method of measurement will be the number of acres to the nearest 0.1 acre measured along the surface of the area seeded.

Payment will be paid at the contract unit price bid per acre and shall be full compensation for furnishing and applying all materials, labor, equipment, and other incidentals necessary to complete the work.

CLIFTY - HALE RECLAMATION PROJECT

QUOTATION SHEET

(For Field Use Only)

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
200	Mobilization	1	Job	$_____	$_____
201	Clearing and Grubbing	67.1	Ac.	_____	_____
204	Area Grading	67.1	Ac.	_____	_____
209	(a) Rip-Rap	3,460	Ton	_____	_____
	(b) Filter Fabric	8,350	Sq. Yd.	_____	_____
211	Straw Wattles	14,000	L. Ft.	_____	_____
214	Pond Treatment And Dewatering	1	Job	_____	_____
701	(a) Road Restoration	1	Job	_____	_____
	(b) Road Limestone	200	Ton	_____	_____
801	Vegetation Establishment	67.1	Ac.	_____	_____

TOTAL $_____