INTRODUCTION

In the interest of increasing efficiency as well as proficiency in the design of plans and specifications for AML projects, AML is desirous of adopting standard drawing details and standard language for specifications wherever practical. The Design Section of AML intends to provide as much standardization of drawing details and specifications, both in format and in substance, as possible. To that end, AML has developed this guide for the preparation of reclamation designs utilizing standard details and specifications.

The Consultant is requested to consider the need for inclusion of items into the plans and specifications to address the following issues:

- Natural stream channel design
- Preservation of bat habitat
- Limited passive water treatment design
- Pavement repair design
- Horizontal boring design
- Reforestation

The Consultant is advised that he is responsible for obtaining the following permits, if they are required for the project, as part of his design services:

- NPDES Stormwater Permit
- WVDOH Encroachment Permit
- ACOE Regional Permit
- WVDEP 401 Certification

These Guidelines were developed by a committee comprised of Engineers and Construction Inspectors from both the Design Section and the Construction Section of AML. The Consultant is to adhere to these Guidelines as closely as is practical in the preparation of Design Plans and Specifications, but this does not preclude the development of site specific details or specifications where deemed necessary.

GUIDELINES FOR PREPARATION OF DESIGN PLANS AND SPECIFICATIONS

Plans

Design plans should include as follows:

A cover/title sheet,

A composite site plan sheet indicating access to the site(s) from a state or county route,

Existing conditions sheets showing the location of any borings that were drilled,

Erosion and sediment control sheets,

Reclamation plan sheets,

Tax map overlay sheets on the reclamation plan,

Sheets for cross sections where applicable,

Sheets for profiles where applicable, and

Sheets for design details where applicable.

Details for individual items should have an assigned number and this number should be referenced by the sheet number on which the detail is shown. Then this identification reference should be provided on the reclamation plan sheets at the locations where the detail applies.

Plan drawings should be 22" x 34" blackline drawings printed on 24" x 36" paper.

Please see the attached standard detail drawings. These details are to be utilized for reference in the preparation of specific details on design projects. Specific dimensions should be utilized in place of the dimensionless units of measurement indicated on the standard detail drawings as field investigations warrant.

Final plans should be signed and sealed by a Professional Engineer registered in West Virginia.

Specifications

There are two sections of specifications - I. Special Provisions and II. Technical Specifications. Design specifications should include both of these sections plus a Table of Contents, any Boring Logs, the Contractor's Bid Schedule, and the Engineer's Estimate.

I. SPECIAL PROVISIONS

This section includes:

I. LOCATION / SITE DESCRIPTION
II. REFERENCE SPECIFICATIONS / DEFINITIONS
III. SCOPE OF WORK
IV. BIDDERS TO EXAMINE LOCATION
V. SCHEDULE OF WORK
VI. MEASUREMENT OF QUANTITIES
VII. BORROW (DISPOSAL) AREAS
VIII. DISPOSAL OF UNSUITABLE MATERIAL
IX. INTERPRETATION OF APPROXIMATE ESTIMATE OF QUANTITIES
X. SAFETY
XI. REGULATIONS
XII. LAWS TO BE OBSERVED
XIII. PERMITS, LICENSES AND FEES
XIV. ELECTRICITY, WATER SUPPLY AND SANITARY FACILITIES
XV. UTILITIES AND OTHER OBSTRUCTIONS
XVI. SITE CLEANUP
XVII. ROCK BLASTING
XVIII. TEMPORARY ACCESS ROADS
XIX. SITE CONDITIONS AND ENVIRONMENTAL PROTECTION
XX. CONTROL AND REVIEW OF WORK BY THE ENGINEER
XXI. CITATION OF OTHER SPECIFICATIONS

Generally, the language for each of these sections is standard. However, there are some sections that address items that are specific to the particular project concerned; e.g.,

1. Location/Site Description, 3. Scope of Work, 8. Permits, Licenses and Fees, and 15. Utilities and Other Obstructions.

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II. TECHNICAL SPECIFICATIONS

Project Name

I. SPECIAL PROVISIONS

I. LOCATION / SITE DESCRIPTION

[Enter a narrative description of the site and directions to the site here, and include a location map of the project area on a County highway map]

Directions to site:

The GPS location is as follows: __° __’ __.__” __° __’ __.__”

II. REFERENCE SPECIFICATIONS / DEFINITIONS

All references to “Owner” in these Specifications shall mean West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands and Reclamation (WVDEP).

All references to “Engineer” in these Specifications shall mean the Regional Engineer or authorized representative.

All references to “ASTM” shall mean the American Society of Testing and Material Specifications, Latest Edition unless otherwise noted.

All references to “AASHTO Specifications” shall mean the Standard Specifications for Transportation Materials and Methods of Sampling and Testing by the American Association of State Highway and Transportation Officials, latest edition, and all subsequent addenda thereto.

All references to “WVDOH Standard Specifications” shall mean State of West Virginia Department of Transportation, Division of Highways Standard Specifications for Roads and Bridges, adopted 2010, and all-subsequent addenda thereto.

All references to the “Contractor” shall be understood to mean the successful bidder and/ or firm or corporation undertaking the execution of the work under the terms of these Specifications.

All references to "OSHA" shall be understood to mean The Occupational Safety and Health Administration and the standards set in the Occupational Safety and Health Act of 1970.

All references to "refuse" and/or "mine spoil" shall be understood to mean all coal refuse, shale, sandstone and other rock fragments that were generated and disposed of as such within the project area during mining and processing of coal.

All references to "AMD" shall be understood to mean all acid mine drainage discharges from the project site.

All references to "OSMRE" shall be understood to mean Office of Surface Mining Reclamation and Enforcement.

All references to "NEPA" shall be understood to mean National Environmental Policy Act.

All reference to "NPDES" shall be understood to mean National Pollutant Discharge Elimination System

III. SCOPE OF WORK

The work covered by the Special Provisions and Technical Specifications consists of furnishing all labor, plant, power, equipment and supplies, and performing all operations necessary for the completion of the project. The Contractor shall perform all operations necessary for:

[Enter the items included in the scope of work in bulletized format here]

The Contractor shall also be responsible for surveying, including establishing construction baseline, measuring and developing all completed quantities on the job, and the ordering, purchase and delivery of any and all materials required for construction or required for development of support areas. The Contractor shall perform all other operations as incidental to the program as specified herein.

IV. BIDDERS TO EXAMINE LOCATION

Prospective bidders are required to examine the locations of the proposed work and to determine, each in their own way, the difficulties which may be encountered in the prosecution of the same. The submission of a bid shall be prima facie evidence that such examination and determinations have been made by the Bidder. No claims for additional compensation will be considered by the Owner based on obstruction or conditions at the location of the work, which may add to the difficulties or costs of construction, even though such obstructions or conditions are not shown on the contract plans or indicated in the other construction documents. Prospective bidders are advised that should they deem it necessary to obtain any subsurface samples of test borings etc. at the site, they should obtain their own permission from the landowners.

V. SCHEDULE OF WORK

Before commencing work on this project, the Contractor shall prepare and submit a schedule of construction activities for approval by the Owner.

The Contractor shall provide adequate supervision, labor, tools, equipment, and materials to prosecute the work energetically and complete the work within the time specified.

It is the intention not to delay the work for the checking of lines or grades, but if necessary, working operations shall be suspended for such reasonable time as the Engineer may require for the purpose. No special compensation shall be paid for the cost to the Contractor for any of the work or delay occasioned by checking lines and grades, by making other necessary measurements, or by inspection.

The work hours on this project shall be between 7:00 am and 7:00 pm Monday through Saturday. Work on Sundays and major holidays will not be allowed on this project. Major holidays are as follows: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas.

VI. MEASUREMENT OF QUANTITIES

The Contractor shall be responsible for providing all necessary volumetric, dimension, and weight measurement equipment necessary to prosecute the work as shown on the Construction Drawings and to accurately determine quantities for payment of Contract Bid Items as approved by the Engineer. Such measurements and equipment shall be subject to the approval of the Engineer for use in this project.

VII. BORROW (DISPOSAL) AREAS

All borrow (disposal) areas must be approved by WVDEP. Should the Contractor decide to obtain and utilize any borrow areas outside of construction limits, or move material from one property owner to another, unless designated on the plans, the Contractor shall be responsible to obtain from the property owner(s) of the borrow areas, all necessary rights of entry, including rights of entry for WVDEP and OSMRE for inspection purposes. The said rights of entry agreement must state that the property owner(s) indemnify and hold harmless the WVDEP for Contractor's action for any injury or damages whatsoever resulting from the use of the property.

The Contractor also shall submit a borrow/disposal area reclamation plan for prior approval by WVDEP. The Contractor shall observe the following NEPA compliance schedule relative to selecting and utilizing any off site borrow areas and/or any waste disposal areas.

a. No borrow (disposal) site operations will affect a site listed in, eligible for or proposed to be listed in the National Register of Historic Places.

b. No borrow (disposal) operations will be located within one-quarter mile of any federally listed established or prospective component of the National Wild and Scenic River System under 16 USC 1274 and 1276.

c. Borrow (disposal) site operations will not cause a significant encroachment within the base floodplain (CE.O. 11988: Floodplain Management).

d. Borrow (disposal) site operations will not be located in or affect a critical habitat of a Federally listed endangered or threatened species under 16 USC 1531, et. seq.

e. No borrow (disposal) operations will occur in wetland areas which are designated by appropriate agencies.

f. Borrow (disposal) site operations will be consistent with any approved plans governing ambient air quality.

g. Adherence to these mitigation measures does not relieve the Contractor of the obligation or responsibility to obtain any other federal, state, or local approvals required to use borrow (disposal) areas and conduct such activities.

h. Documentation: Copies of borrow (disposal) site approvals and concurrences will be submitted to the WVDEP prior to the commencement of reclamation activities.

i. Site Monitoring: Borrow (disposal) activities will be monitored by the state to ensure compliance with contractual requirements, applicable federal, state, and local laws, and any permit conditions.

VIII. DISPOSAL OF UNSUITABLE MATERIAL

All waste areas shall be obtained in accordance with Special Provisions Section VII (Borrow/Disposal Areas) of these specifications. All unsuitable materials (wood, trash, debris, and garbage) as determined by the Engineer shall be wasted by the Contractor, at his/her expense, outside the limits of work conforming to the requirements of Sections 4.3.8 of these Specifications. Wood may be burned in conformity with Sections 4.3.7 of these Specifications.

The Contractor shall observe the NEPA compliance schedule relative to selecting and utilizing any off-site disposal areas in accordance with Special Provisions Section VII of these Specifications.

IX. INTERPRETATION OF APPROXIMATE ESTIMATE OF QUANTITIES

The estimate of quantities of work to be done and/or materials to be furnished under the Special Provisions and Technical Specifications, as shown on the Contract Bid Schedule, is approximate and is given only as a basis of calculation upon which the award of the Contract is to be made. DEP may omit any item or items in the contract, provided that the notice of intent to omit such item or items is given to the Contractor before any material has been purchased or labor involved has been performed, and such omission shall not constitute grounds of any claim for damages or loss of anticipated profits. DEP may omit any item or items shown on the estimate, at any time, by agreeing to compensate the Contractor for the reasonable expense already incurred and to take over at actual cost any unused material purchased in good faith for use for the item or items omitted.

X. SAFETY

All regulations of the Occupational Safety and Health Act of 1970 (OSHA) are in effect for this Contract. WVDEP shall not be liable for any citations received by the Contractor as a result of failure to comply with applicable OSHA standards. Compensation is to be included in the various items of the contract for the expense involved in complying with these standards. In addition, the Contractor shall comply with Section 107.7 of the WVDOH Standard Specifications regarding public convenience and safety.

XI. REGULATIONS

All appropriate townships, county, state, and federal regulations shall apply to this Contract. It shall be the Contractor's sole responsibility to be aware of these regulations and to comply with them. WVDEP shall not be liable for any citations received by the Contractor. The Contractor shall keep the existing roads open and safe to public vehicular traffic as shown on the DOH approved Traffic Control Plan and Permit. The contractor shall provide appropriate barriers and warning devices as directed by the Engineer.

XII. LAWS TO BE OBSERVED

The Contractor shall at all times, observe, comply with, and post as required all federal, state, and local laws, ordinances, and regulations in any manner affecting the conduct of the work or applying to employees on the project as well as all orders or decrees which have been or may be promulgated or enacted by any legal bodies or tribunals having authority or jurisdiction over the work, materials, employees, or contract. The Contractor shall protect and indemnify WVDEP and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree whether by the Contractor or by the Contractor's employees.

XIII. PERMITS, LICENSES AND FEES

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work. Permits required for this project may include but not be limited to: Water Quality Certification from WVDEP and burning permits from WVDNR and WVDEP Office of Air Quality. A copy of the permit/permits as procured shall be furnished to the Owner prior to initiation of the work under this Contract. The WVDEP will obtain the Permits (MM 109 Form) from WVDOH and NPDES from WVDEP. Contractor shall be responsible for any Stream Activity Permits necessary to complete the project work.

XIV. ELECTRICITY, WATER SUPPLY AND SANITARY FACILITIES

Arrangements for connecting to electric service, water supply and sanitary facilities shall be made by the Contractor, and all costs for such arrangements shall be borne by the Contractor at no additional cost to the Department.

XV. UTILITIES AND OTHER OBSTRUCTIONS

The Contractor shall be solely responsible to correctly locate all existing active underground and overhead utilities at the project sites and take precautions to avoid damage to them. Any existing utility lines damaged by the Contractor shall be replaced by the Contractor or repaired at no cost to the Owner. The Contractor shall notify the

utility companies likely to be affected well in advance and before beginning any work within the project sites. In the event of damage to the existing utilities or other facilities, the Contractor shall notify the affected utility Owner(s) and the Engineer immediately and make, or have made, all necessary repairs and bear the expense thereof and resulting damages caused thereby. It shall be the responsibility of the Contractor to arrange for relocating the utility lines, where required and as directed by the Engineer, in accordance with the guidelines set forth by the utility company, prior to beginning construction. The Contractor will be reimbursed for actual charges invoiced by the utility company. The utility companies (and WVMIS) must be contacted by the Contractor at least one week prior to commencement of construction activities for the purpose of field locating and marking utility owned facilities within the project area. The name and phone number of the WVMIS Utility location service and of the utility companies are as follows: WVMIS1-800-245-4848

[For projects where it is known that utility relocation is necessary, specific information regarding the affected utilities shall be provided here]

[For utilities that are subject to regulation by the Public Service Commission, language should be provided here indicating that payment will be made directly to the affected utility by the WVDEP, as opposed to reimbursement to the contractor for actual charges invoiced by the utility company]

XVI. SITE CLEANUP

Before the project shall be considered as having been satisfactorily completed, the Contractor shall clean and remove, from the project site, all surplus and discarded materials, and equipment and shall further remove all debris and objectionable materials of any kind from areas used or disturbed by the construction operations within or within sight of the project area.

XVII. ROCK BLASTING

All blasting operations shall be conducted in strict accordance with applicable state and federal laws relating to rock blasting and the storage and use of explosives. The contractor shall maintain and keep in full force and effect blasting insurance to protect and indemnify the Owner and/or his agents or representative from claims for damages and shall defend all suits at law. The Contractor shall submit to the Owner a request for permission to blast rock, a reclamation plan for the area to be disturbed, and proof of blasting insurance coverage prior to initiating blasting operations. Failure to obtain approval for blasting prior to initiating the work will result in no payment for items utilizing this rock.

XVIII. TEMPORARY ACCESS ROADS

The Contractor shall construct and maintain temporary access roads for convenient access to the various parts of the work, and for other necessary purposes incidental to the performance of this contract. The location of access roads shall be approved by the Engineer prior to construction. No separate payment for construction and maintenance of such roads will be made. The Contractor shall erect such temporary fences or guards as may be necessary to keep unauthorized persons away from the work. Grading and surfacing of temporary access roads, excavations, fills and embankments for purposes of construction, or for convenience, beyond the limits of ordered excavations and all temporary fences and guards, shall be provided by the Contractor and shall be maintained in good condition. The Contractor shall be required to maintain all roads used by his hauling equipment in a dust controlled condition. Upon completion, the Contractor shall return the disturbed areas to the approximate original condition as approved by the Engineer.

XIX. SITE CONDITIONS AND ENVIRONMENTAL PROTECTION

Conditions at the site shall be examined by the Contractor, and he shall assume responsibility as to the contours and the character of the earth, rock, water and other items that may be encountered during the excavation and filling operations. Ground water may be encountered at various locations within the proposed work areas.

The Contractor shall be responsible for the operation and maintenance of any required diversion or pumping facilities for removing ground water from work areas during progress of the work under this contract.

The Contractor shall take any necessary steps to prevent erosion or silting problems from occurring and to minimize pollution or sedimentation of the stream. If any such problems develop, the Contractor shall be responsible for taking immediate corrective action.

The Contractor shall be responsible for the repair or replacement of streets or driveways (blacktop, gravel & concrete), trees, shrubs, fences, or any other physical features disturbed by construction under this contract to original condition or better.

The Contractor shall be responsible for the replacement of any existing boundary or survey corner markers disturbed by construction activities.

XX. CONTROL AND REVIEW OF WORK BY THE REGIONAL ENGINEER

All services rendered by the Regional Engineer consist of professional opinions and recommendations made in accordance with generally accepted engineering practice. Under no circumstances is it the intent of the Regional Engineer to directly control the physical activities of the Contractor or the Contractor's workmen's accomplishment of work on this project.

The presence of the Department's Field Representative and/or Regional Engineer at the site is to provide the Department a continuing source of professional advice, opinions and recommendations based upon the Field Representative's and/or Regional Engineer's observations of the Contractor's work and does not include any superintending, supervision or direction of the actual work of the Contractor or the Contractor's workmen.

Any construction review of the Contractor's performance conducted by the Regional Engineer is not intended to include review of the adequacy of the Contractor's safety measures in or near the construction site.

XXI. CITATION OF OTHER SPECIFICATIONS

Whenever the Specifications for this contract refer to the specifications of any society, institute, association or government organization, then such specifications cited shall become a part of this contract as if written in full. Commonly used abbreviations have the following meanings:

ASTM - American Society for Testing Materials

ASA - American Standards Association

AWWA - American Water Works Association

AASHTO - American Association of State Highway and Transportation Officials

ACI - American Concrete Institute

Where reference is made to a Specification, it shall be the latest revision at the time called for bids, except as noted on the Plans or elsewhere herein.

II. TECHNICAL SPECIFICATIONS

1.0 MOBILIZATION AND DEMOBILIZATION

1.1 Description

This work shall consist of the performance of construction preparatory operations, including the movement of personnel and equipment to the project sites and for the establishment of the Contractor's offices, buildings and other facilities including the construction of all temporary access roads as necessary to begin work on a substantial phase of the contract. The location of the Contractor's office to be established shall be approved by WVDEP. It also shall include all demobilization activities involving the removal from the sites of all plant, equipment, supplies and personnel after completion of the work including cleanup of all rubbish and waste materials generated during the construction of this project and restoration of any damage to existing site improvements resulting from the Contractor's activities at the site. This item shall also include the installation of the project sign at the beginning of the project and the removal of the sign prior to the Final Inspection. All equipment and material storage areas shall be approved by WVDEP.

Upon receipt of a notice to proceed, the Contractor shall initiate and complete measures necessary to commence the work. Mobilization shall also consist of delivering to the site and assembling in working order all necessary equipment, materials, and supplies to be furnished by the Contractor to complete the work.

Demobilization shall consist of the removal from the site of all the Contractor's equipment and materials after completion of the work and cleanup of the site. Work shall be done to the satisfaction of the Regional Engineer.

1.2 Method of Measurement

The method of measurement will be per lump sum.

1.3 Basis of Payment

The bid for "Mobilization and Demobilization" shall be a lump sum and cannot be more than 10% of the TOTAL AMOUNT BID for the project. Partial payments will be as follows:

(a) One-half of the amount bid will be released to the Contractor with the first estimate payable, not less than 15 days after the start of work at the project site.

(b) The final one-half of the amount bid shall be released with the last estimate payable after the work is accepted by the WVDEP and after all Final Inspection submittals are received and approved by WVDEP.

Nothing herein shall be construed to limit or preclude partial payments otherwise provided for by the contract. **No deduction will be made nor will any increase be made, in the lump sum mobilization and demobilization item amount regardless of decreases or increases in the final total contract amount or for any other cause.**

1.4 Pay Item

Item 1.0 "Mobilization and Demobilization" per lump sum cannot be more than 10% of the TOTAL AMOUNT BID for the project.

2.0 CONSTRUCTION LAYOUT

2.1 Description

This item consists of furnishing, placing, and maintaining construction layout stakes, (**based on the original baselines and/or control points in the plans**), necessary for the proper performance of the work under this contract including borrow/waste areas. It shall further consist of determining the exact units of measure for payment. It also consists of checking and making any field adjustment to the plan alignment, grades and elevations as considered necessary by the Engineer. Additionally, this item shall also include the preparation of "As-Built" Plans including the Reclamation Plan and any others specifically requested by the WVDEP. All of these "As-Built" Plans shall be provided prior to the Final Inspection Meeting. This item will be paid according to the following schedule: up to fifty percent of the total bid amount of this item will be released for payment when all required layout work is completed. The remaining 50% will be paid on the final invoice once the As-Builts are submitted and approved.

2.2 Materials

Conventional survey stakes, hubs, batter boards, flagging, templates, straightedges and other devices necessary for laying out all parts of the work.

2.3 Construction Methods

2.3.1 The Contractor shall be responsible for the proper layout of the work. The Owner will provide the Contractor with survey information regarding the baselines and the existing surface features shown on the Construction Drawings. The Contractor shall make all calculations involved and shall furnish and place all layout stakes.

2.3.2 The Contractor shall provide field forces and shall set all additional stakes as needed, such as offset stakes, reference point stakes, slope stakes, grade stakes, stakes for drainage, or other structures, supplementary bench marks, and any other horizontal or vertical controls necessary to secure a correct layout of the work including the re-establishment of the survey and construction baselines (as necessary), as shown on the Construction Drawings.

2.3.3 The Contractor shall be responsible for assuring the layout staking work is in conformance to the lines, grades, elevations, dimensions, and locations shown on the Construction Drawings or as required by the Engineer. The Contractor shall furnish a copy of his/her survey records for review by the Engineer and for the

Owner's permanent file. These records shall be furnished as they are completed during the progress of the work.

Any inspection or review of the Contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his/her responsibility to secure the proper dimensions, grades, and elevations of the several parts of the work.

2.3.4 **The Contractor shall exercise care in the preservation of stakes and benchmarks, including existing property line markers, and shall have them reset at his/her expense when any are damaged, lost, displaced or removed.** The Contractor shall use competent personnel and suitable equipment for the layout work required and shall provide that it be done under the supervision of, or directed by, a Licensed Land Surveyor registered in the State of West Virginia. As the survey is completed**,** the Licensed Land Surveyor shall certify that the site layout is complete for all necessary grades (both cut and fill), location and grades of all ditches, all cross-sections related to cut-fill where grade lines are necessary for construction and or billing. This layout shall include location stakes and cut-fill lines marked on the stakes for each pre-manufactured or formed on site structures (manholes, drop inlets, headwalls, etc.). The layout shall also include centerline stake with cut-fill lines for each channel and any areas of excavation and re-grade. The certified layout and cross-sections surveyed must be submitted to the WVDEP for approval prior to beginning construction for each item.

2.3.5 As-Built plans shall be provided to the WVDEP prior to the Final Inspection Meeting. The As-Builts shall include two discs each of the plans in PDF and AutoCAD 2007-2014 format on CD-ROM or DVD and one paper copy of the plans with the same size and scale as contained on the original plans. The As-Builts Shall include the following:

1. The As-Builts shall show all pay items remaining on site post construction.
2. The As-Builts shall show all horizontal and vertical dimensions of all installed components (i.e. pipes, drop inlets, mine seals, drainage channels, splash pads and manholes) as well as surveyed locations of the installed structures..
3. Cut-fill sections shall have the area of the section marked by the section for easier calculation.
4. The As-Builts shall have the lines on the plans shown in either color or line type to distinguish between our original plan lines, the contractor’s original survey lines and the final grade lines. This will apply for all cross-sections on the project.
5. All waste and borrow areas shown on the As-Builts.

6. All work completed by the Licensed Land Surveyor on the As-Builts must be certified by the Licensed Land Surveyor as to completeness and accuracy of the plan submittal.
7. As-builts must show total quantities for all items on the project. The format shall be in a tabular form.

2.4 Measurement and Payment

Measurement and payment for furnishing, setting, maintaining, and resetting the stakes when necessary, and for furnishing all engineering personnel, equipment, materials, and all incidentals thereto, shall be by the lump sum bid for "Construction Layout". The lump sum payment also shall include the cost for providing the Engineer pre- and post-construction ground line cross-sections for all disturbed or re-graded areas including borrow areas and "As-Built" Plans as described herein. Said lump sum bid cannot be more than 5% of the TOTAL AMOUNT BID for the project. **Neither deduction nor increase will be made in the lump sum "Construction Layout" item amount regardless of decreases or increases in the final total contract amount or for any other cause. This item will be paid according to the following schedule: up to fifty percent of the total bid amount of this item will be released for payment when all required layout work is completed. The remaining fifty percent will be paid on the final invoice once the As-Builts are submitted and approved.**

2.5 Pay Item

Item 2.0, "Construction Layout", per lump sum cannot be more than 5% of the TOTAL AMOUNT BID for the project.

3.0 QUALITY CONTROL

3.1 Description

This work shall consist of testing for verification that the materials supplied and the work performed are in accordance with these specifications. When there is a discrepancy between the Plans and Specifications on this project the following hierarchy of documents shall apply:

1. Any and all addendums that were generated for the project either before or after construction began.
2. Plans shall be the document that shall be used in places where discrepancies occur between the Plans and Specifications.

3.2 Materials

3.2.1 The Contractor shall submit a minimum of two (2) copies of shop drawings, catalog cuts and material certifications (as applicable) to the Engineer for all offsite materials to be incorporated into the work. **Written approval from the Engineer will be required prior to incorporation of these items into the work.**

3.2.2 The Contractor shall submit at least two (2) copies of the results of all tests conducted on in-situ material, concrete and grout to be used in this project.

1. As a minimum, the compaction tests will include moisture content & density tests of the soil in accordance with the provisions of ASTM D698 (Standard Proctor) field density tests following compaction. A new Standard Proctor will be run when soil type changes occur on site and/or at the direction of the Engineer or his representative.
2. Soil tests to determine the lime and nutrient requirements of the areas to be re-vegetated.
3. Compressive strength test for grout in accordance with ASTM C109, and for concrete in accordance with ASTM C31 & C39.

3.2.3 Tests Required

Concrete Pour	Testing for compressive strength
Grouted Ditch	Testing for compressive strength
Pipe line Compaction	Testing for backfill material density
Slope fill Compaction	Testing for backfill material density
Soil Test	As needed to determine Nutrient tests NPK
Material Certification	Manufacture certification on all materials on project
Sandstone Riprap	Certification that rock is non-acid producing and

Stone	Sodium sulfate test

3.3 Construction Methods

3.3.1 The Contractor shall furnish the services of his own testing laboratory or select an independent testing laboratory, as long as the laboratory is under the direct supervision of a Registered Professional Civil Engineer. The laboratory must be approved by the Owner.

The Contractor shall furnish a certified technician to perform the required testing at the project site. The technician shall submit a copy of his certification and a copy of that certification shall be submitted WVDEP at the Pre-Construction Conference. The technician shall be responsible for chain of custody of any samples that must leave the site.

3.3.2 Testing for compaction, soil nutrient and lime requirements for soil, compressive strength tests for concrete and grout, shall be performed as required by these specifications and/or ordered by the Engineer or his representative in writing. The Engineer will determine the locations and time of any testing herein specified and the need and extent of any testing in addition to that which is herein specified.

3.3.3 The contractor shall be responsible for performing laboratory tests of the coal, mine spoil, and any natural soil to identify the compaction requirements for their use as fill and cover material, respectively. In addition, field density tests shall be performed in accordance with the Construction Specifications. All test results shall be submitted to the Engineer for approval of compaction criteria prior to compacting the fill material and after fill material is placed to verify that the required compaction is obtained.

3.3.4 Only new and first class materials, which conform to the requirements of these Specifications, shall be used unless specified otherwise. When requested by the Owner, the Contractor shall furnish a written statement of the origin, composition, and manufacturer of any or all materials (manufactured or produced) that are to be used in the work. **The sources of supply of each material used shall be approved by the Engineer before delivery is started. If, at any time, sources previously approved fail to produce materials acceptable to the Owner, the Contractor shall furnish materials from other approved sources.**

3.4 Method of Measurement

The method of measurement for quality control work done as described above will be on a lump sum basis.

3.5 Basis of Payment

The quantity of quality control work done will be paid at the contract lump sum price bid for this item. Said lump sum bid cannot be more than 3% of the TOTAL AMOUNT BID for the project. Nothing herein shall be construed to limit or preclude partial payments on this item up to 100% of the bid amount. **No deduction or increase shall be made in the lump sum "Quality Control"** item amount regardless of decreases or increases in the final total contract amount or for any other cause.

3.6 Pay Item

Item 3.0, "Quality Control", per lump sum cannot be more than 3% of the TOTAL AMOUNT BID for the project.

4.0 SITE PREPARATION

4.1 Description

4.1.1 Clearing & Grubbing

Work performed under this section shall include the removal and disposal of all trees, stumps, shrubs and any other vegetation, wood, debris, garbage of any nature from those areas specified below and/or shown on the plans and/or any other areas as approved by WVDEP. This work shall also include the preservation from injury to all vegetation, utilities or other objects to remain as well as all other ancillary work as described.

4.1.2 Demolition of Structures

This work shall consist of complete demolition and removal of such buildings, mining related structures, equipment and materials, existing ruins and foundation structures, as are specifically designated on the Plans for removal. Demolished concrete and cinder block structures and foundation ruins (all steel residue and wood (burned) must be removed from the site) can be disposed of on-site. Any demolished rubble must be thoroughly compacted in fill areas and not to be used as a replacement for structural materials.

4.1.3 Asbestos Material

This work shall consist of doing a thorough search of all existing structures on the project to ensure that there are no asbestos materials present. If there are any areas that are suspected then an inspection by a certified asbestos removal company will be required. If asbestos is found, the contractor will be responsible for removal and disposal at no cost to the WVDEP. No work shall be allowed at the location of the asbestos until the removal process is completed.

4.1.4 Access Road Construction

Access roads constructed to gain access to, travel between or otherwise required for equipment/vehicular site access shall be kept to a minimum and only constructed where necessary upon approval from the WVDEP, where applicable. If the Contractor constructs such travel routes, they shall be reclaimed and revegetated according to Section 6 upon completion of the construction activities, as deemed necessary by the WVDEP, with associated costs being incidental. Any additional access shall require the Contractor to obtain written permission from the respective land owner. The existing access roads shall be maintained during construction (except when culvert, ditch and road construction are being performed), and shall be left in a condition equal to, or better than, the existing condition upon completion of construction.

Any re-grading necessary for the construction of the Vegetated Access Road will be incidental to the cost of the work described herein.

Final grading, stabilization, and providing final drainage control for existing access roads shall be performed after reclamation operations for the project have been completed.

4.1.5 Access Road Rehabilitation

Any regrading or resurfacing necessary to restore existing roads or driveways used during construction to a condition that is equal to or better than the condition encountered before construction activities.

4.1.6 Permanent Fencing

Any fencing required to be moved and replaced due to construction activities or newly proposed as shown on the plans. Permanent fencing shall be placed at the completion of construction.

4.1.7 Temporary Fencing

Any fencing that is necessary to protect the project area from livestock during construction and vegetation growth. Temporary Fencing will be removed prior to Final Inspection unless the property owner requests it remain.

4.1.7 Farm Gates

Any gates required to be moved and replaced due to construction activities or newly proposed.

4.1.8 Gravel Drive Rehabilitation

The Gravel Drive Rehabilitation roads shall be covered with a layer of Class I crusher run stone. In areas that will not support the stone due to soft conditions, stabilization fabric will be required. Re-grading of any areas where stone is not required but inside of the construction limits.

4.1.9 Permanent Access Road

Permanent Access Road shall be any access road that is labeled on the plans to remain after construction is completed.

4.1.10 Stabilization Fabric

Stabilization fabric shall be woven fabric that is used to stabilize any soft areas on

an access road surface prior to stone application.

4.1.11 Spill Containment Area

Spill containment measures shall be used for fuel and lubricant storage areas. All containers, barrels, buckets, cans, etc., are to be legally disposed of offsite. Used lubricants are to be disposed of according to state law to minimize pollution to the local surface and ground water supplies. Spills are the responsibility of the Contractor and need immediate clean up and maintained at no expense to the State. Fuel tanks manufactured with secondary containment are desirable; the minimum secondary containment shall be 110 percent.

4.2 Materials

4.2.1 Any equipment and construction materials required for clearing, grubbing, grading and stone placement.

4.2.2 Permanent fencing material shall be of type and quality equal to or better than the existing fence unless a different type of fence material is specified on the plans.

4.2.3 Temporary fencing shall be of the type and quality as shown on the plans for temporary fencing.

4.2.4 Gates shall be hot-dipped galvanized as per ASTM A153 specifications for zinc coating (hot dip) on iron and steel hardware. Gates shall be painted Forest Green. Gate width shall be as shown on the plans. All gates shall be two inch (2-inch) diameter 19 Gage heavy duty 7 bar bull gates or approved equivalent. Gate width shall be provided on plans. Provide a lockable latch, which includes protection from the elements for the lock. All gates 10' and longer shall have a 5' X 4" X 4" (2' burial) post installed at 90° to the gate in the closed position to allow the gate to be anchored in the open position. The post shall be installed a distance equal to the length of the gate, from the hinge post and located on the same side of the roadway as the hinges. The post shall have a latch to lock the gate. All hardware and/or accessories necessary for installation of gates shall be incidental to and included in the installation of each gate as part of this bid item. The concrete used to anchor the gate post shall be 3000 psi at 28 day break.

Wood posts and braces shall be pressure-preservative treated according to Federal Specification TT-W-571, Wood Preservation: Treating Practices, latest revision and may be round or square. Decay-resistant species may be used untreated with prior approval from WVDEP Engineer. Gate posts shall be a minimum 6-inch top diameter or square and 8-feet long. Postholes shall be a minimum of three feet (3-feet) deep and twelve inches (12-inches) in diameter or square. Sides shall be nearly vertical.

4.2.5 Stone to be placed for "Gravel Drive Rehabilitation" shall conform to the

requirements for Crusher Run Aggregate. The Gravel Drive Rehabilitation shall be covered with a layer of Crusher Run Aggregate as shown on the plans or as designated by the Engineer.

4.2.6 Stone to be placed for "Access Road Rehabilitation" shall conform to the requirements for Crusher Run Aggregate. The Access Road Rehabilitation shall be covered with a layer of Crusher Run Aggregate. In areas that will not support the stone due to soft conditions, stabilization fabric will be required as directed by the Engineer.

4.2.7 Stabilization fabric shall be Mirafi 600X or equal.

4.2.8 Pipe Gate installed across access roads to the project sites shall be constructed of 2-inch and 4-inch seamless Type "S" tubular Grade "B" steel. 2-inch tubular steel shall have an outside diameter of 2.375-inch; inside diameter of 1.939-inch; wall thickness of 0.218-inch and weigh 5.02 pounds per foot or approved equal. 4-inch tubular steel shall have an outside diameter of 4.5-inch; an inside diameter of 3.826-inch; wall thickness of 0.337-inch; and weigh 14.98 pounds per foot or approved equal. Also required will be 1/4" grade 50 steel plate, field mixed sakrete, locking mechanism, and gate fabrication including welding. Color will be determined by landowner and Engineer.

4.3 Construction Methods

4.3.1 The specific areas to be cleared and grubbed are as shown on the Contract Drawings and are generally described as, but not limited to, those specific areas of excavation, backfill, soil borrow or drainage structure installation.

4.3.2 The Contractor shall clear the site within the limits of the areas to be regraded. The WVDEP shall exercise control over clearing and shall designate all trees, plants and other objects to be removed or to remain.

4.3.3 Clearing and grubbing shall be completed prior to initiation of earthwork operations only to the extent necessary to complete the work. The Contractor shall confine his operations strictly to required areas. If he clears and grubs beyond the required areas, whether knowingly or accidentally, he shall, at his expense, replant and otherwise restore all areas outside the limit lines to a condition equal to that existing prior to start of work.

4.3.4 All timber eight (8) inches in diameter and larger at stump height shall be saw cut prior to grubbing operations. Timber shall be topped with the branches removed and stacked and stockpiled in an appropriate manner in an accessible location approved by the WVDEP on the property from which it was cut. Timber to be stockpiled shall not be pushed down by equipment prior to being cut nor

can it be indiscriminately shoved into a stockpile.

4.3.5 All stumps, roots, buried logs and brush shall be removed. Grass, however, may be incorporated into the resoiling material. Taproots and other projections over 1½ inches in diameter shall be grubbed out to a depth of at least ten (10) inches below the planned subgrade or slope elevation. All holes remaining after the grubbing operation shall have the sides broken down to flatten out the slopes, and shall be filled with suitable materials, moistened and properly compacted.

4.3.6 Cleared and grubbed areas shall be worked such that positive drainage is provided to prevent ponding of water except for the purpose of sediment control sumps as approved by the WVDEP.

4.3.7 All organic material shall be burned completely to ash or otherwise removed from the site and disposed of in a manner approved by the WVDEP. Burning of the combustible material will not be permitted on or near refuse, mine portals or within close proximity to coal seams, residence, structures or utilities. The Contractor shall obtain all permits and licenses required prior to burning the material. A plan showing the location of material to be burned and all fire control measures to be implemented, including copies of permits and licenses, shall be submitted to the WVDEP's representative at the site for approval. If a permit cannot be obtained because of the conditions stated above the tree top and stumps can be chipped or disposed of offsite to an approved location.

4.3.8 All other materials generated from required clearing and grubbing operations shall be removed and disposed of by the Contractor. All garbage, construction debris, mining debris, etc., shall be disposed of in approved waste areas or landfills (disposal tickets must be furnished to WVDEP). It shall be the responsibility of the Contractor to obtain, at no expense to the WVDEP, all necessary waste and borrow areas or landfills for the disposal of waste materials in accordance with any applicable local, state, and/or federal regulations including compliance with NEPA requirements (See Section VII for NEPA Compliance Schedule). All waste and borrow areas must be approved by the WVDEP and the Contractor must provide a reclamation plan for approval. In addition, for all waste and borrow areas outside the construction limits, the Contractor must obtain from the property owner a right-of-entry agreement in which the property owner indemnifies and holds the WVDEP harmless from any injury or damages whatsoever resulting from the use of the property.

4.3.9 It shall be the sole responsibility of the Contractor to correctly locate and avoid all underground, on-ground, and overhead utilities, facilities and other structures and constructions, and for that purpose, shall employ all necessary precautions and

methods to insure avoidance of and damage to such constructions. In the event damage does occur, the Contractor shall notify the affected Owner and the WVDEP immediately and make or have made all necessary repairs and bear the expense thereof and resulting damage caused thereby. See "Special Provisions", Section XV "Utilities and Other Obstructions", of these specifications for more information on utilities.

4.3.10 Buildings, mining related structures, existing ruins and foundation structures, shall be removed to the existing ground level, which operation shall include removal of concrete slabs or any other type of floors and/or walls resting upon the ground. Basement floors shall be shattered. Pits, trenches, holes or basements shall be backfilled. Coal and/or refuse spillage, concrete, cinder blocks, and foundation ruins shall be excavated and/or removed and incorporated into the fill material. Demolished concrete, cinder blocks and foundation ruins to be incorporated into the fill shall be of size less than 2 feet in any dimension. Boulders, structures, concrete pads and foundations shall be broken and buried in the deepest portion of the fill areas. Broken pieces shall not be consolidated in one area, but shall be dispersed throughout the fill areas to ensure that compaction requirements are achieved.

4.3.11 Trash, garbage, railroad ties, roofing shingles, tires, plastic, metal and other unsuitable material resulting from demolition shall be disposed of by the Contractor at his/her own responsibility and expense outside the work limits in an approved landfill, as approved by the Engineer, unless otherwise directed (disposal tickets must be furnished to WVDEP). Bricks and stone blocks shall be disposed as per Section 4.3.10 of these specifications.

4.3.12 In the area where structures and buildings are demolished and removed, the removal operation shall extend to 1 foot below finished grade. The area shall then be regraded as necessary to blend into adjacent finished grades. Regrading shall be such that all areas are free draining and surface runoff will not pool or impound as directed by the Engineer.

4.3.13 Should offsite disposal or borrow be necessary, the Contractor shall observe the NEPA Compliance Schedule as per Section VII of the Special Provisions.

4.3.14 Existing site access roads shall provide safe, all-weather access to the site. These existing roads, including stoned and paved roads, shall be maintained during construction and left in a better than or equal to condition. The Contractor is responsible for locating and avoiding all underground and overhead utilities and constructions during access road grading and maintenance.

4.3.15 Stone to be placed for "Access Road Rehabilitation" shall conform to the detail as shown on the plans.

4.3.16 Stone to be placed for "Gravel Drive Rehabilitation" shall conform to the detail as shown on the plans.

4.3.17 Stabilization Fabric shall be placed on a prepared subgrade prior to placement of surfacing and resurfacing stone.

4.3.18 When existing fences are encountered within or near work limits, which by necessity of the construction activities require their dismantling, the Owner shall be consulted to secure their approval for the need of fencing, as well as determination as to whether temporary and/or permanent fencing will be utilized. The Contractor will be required to re-construct fence lines of any type located within the project area. Temporary fencing shall be installed along the alignment selected by the Owner, with sufficient material included to alter said alignment as may be required to accommodate the construction activity. Similarly, approval for the use and location of permanent fencing shall be obtained from the Owner well in advance of construction. Typically, permanent fencing shall be compatible with that which existed and installed in the location of the existing fence. Existing fences outside the construction limits and near or adjacent to the project area are to remain undisturbed in place. Any fencing damaged outside the work limits shall be repaired or replaced at the expense of the Contractor, to a condition equal to, or better than, its original condition. Wire for permanent or temporary fencing shall be 15 ½ gauge 4 pronged barbed wire unless otherwise stated in the plans.

4.3.19 Any existing farm gates that are removed, shall be repaired or replaced to an "as good as" or "better than" condition and as approved by the WVDEP. Any proposed farm gates shall be installed per the typical detail in the Plans and conform to Specification Section 4.2.3.

4.3.20 Access road gates shall be fabricated of tubular steel to the lines and grades shown on the plans**.** Pipe gate installation requires field mixing of a packaged concrete product, such as sakrete, or placement of plant mixed, purchased concrete**.** The packaged concrete product shall be approved by the Engineer prior to use and mixed and poured in accordance with the manufacturer's recommendations. Pipe gates shall be installed at the locations shown on the plans.

4.3.20.1 The Contractor will be required to excavate post holes large enough to accommodate the support posts and field mixed concrete as shown on the plans. Some hand filling and compacting may be required to properly seat the support posts. Support posts shall be installed vertical in all directions. Temporary supports may be necessary to hold the posts vertically until the concrete hardens as determined by the manufacturer.

At the discretion of the Regional Engineer a counter balance may be required to ensure the pipe gates are properly supported and function

as intended. Counter balance installation shall include installation of an anchor in line with the pipe gate alignment (in a closed position) and welding of one (1) or more additional 2-inch tubular steel supports from the anchor to the top of the support posts. Said counter balance shall be installed to both support posts. The anchor shall be installed in a similar manner as the support post installation.

The lock box, lock tab, and lock shall require the approval of the Engineer prior to installation onto the pipe gates.

Where the installed access road gates do not project the entire width of the access road or access is available to bypass the pipe gate, the Contractor will be required to install a mechanism or materials to block pipe gate bypass access. The Contractor may install additional tubular steel piping welded to the outside of the gate to block access or place large boulders to block access. Either method is acceptable but shall require the approval of the Engineer prior to installation.

4.3.21 Any existing property markers disturbed or removed during construction activities shall be replaced accurately and to an "as good as" or "better than" condition and as approved by the WVDEP. This work will be paid under Section 2.0 Construction Layout of these Specifications.

4.4 Method Of Measurement

4.4.1 There shall be no measurement of the "Site Preparation" item as it is a lump sum.

4.4.2 Access Road Rehabilitation shall be based upon weigh tickets from the commercial supplier of the stone that is delivered and placed at the locations identified on the plan drawings.

4.4.3 Gravel Drive Rehabilitation shall be by ton based upon weigh tickets from the commercial supplier of the stone that is delivered and placed at the locations identified on the plan drawings.

4.4.4 Stabilization Fabric shall be paid by the square yard.

4.4.5 Permanent Fencing shall be measured per linear foot basis including all necessary materials, supplies, labor and equipment required to install the fencing and tie into existing fencing.

4.4.6 Temporary Fencing shall be measured per linear foot basis including all necessary materials, supplies, labor and equipment required to install the fencing and tie into existing fencing. This item shall also include the removal of the temporary fencing at the completion of the project work

4.4.7 Farm Gates shall be measured per each basis including all necessary materials, supplies, labor and equipment required to install the gate and tie into existing or proposed fencing.

4.4.8 Pipe Gate shall be measured per each basis including all necessary materials, supplies, labor and equipment required to install the pipe gate and tie into existing or proposed fencing.

4.5 Basis Of Payment

4.5.1 The "Site Preparation" item shall be paid at the bid lump sum price. The amount shall not exceed 10% of the TOTAL AMOUNT BID for each bid. Payment shall be full compensation for doing all the work herein prescribed in a workmanlike and acceptable manner; including the furnishing of all labor, materials, tools, equipment, supplies, and incidental necessary to complete the work. This includes all clearing grubbing and demolition required on the project site.

No deduction will be made, nor will any increase be made, in the lump sum "Site Preparation" amount regardless of decreases or increases in the final total contract amount or for any other cause.

4.5.2 The "Access Road Rehabilitation" item shall be paid per unit bid and shall include the following items: materials, labor, equipment and incidentals necessary to perform the work which price and payment shall be full compensation for all work performed.

4.5.3 The "Gravel Road Rehabilitation" item shall be paid per unit bid and shall include the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work.

4.5.4 The "Stabilization Fabric" item shall be paid per unit bid and shall include the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work.

4.5.5 The "Permanent Fencing" item shall be paid per unit and shall include the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work.

4.5.6 The "Temporary Fencing" item shall be paid per unit and shall include the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work.

4.5.7 This "Farm Gate" item shall be paid per unit and shall include the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work.

4.5.8 The "Pipe Gate", item shall be paid per unit and shall include the following items: all materials, labor, equipment and incidentals necessary to perform the work which price and payment shall be full compensation for the work.

4.6 Pay Items

Item 4.1, "Site Preparation", per lump sum. Cannot be more than 10% of the "Total Amount Bid" for the project.

Item 4.2, "Access Road Rehabilitation", per ton.

Item 4.3, "Gravel Drive Rehabilitation", per ton.

Item 4.4, "Stabilization Fabric", per square yard.

Item 4.5, "Permanent Fencing", per linear foot.

Item 4.6, "Temporary Fencing", per linear foot.

Item 4.7, "Farm Gate", per each.

Item 4.8, "Pipe Gate", per each.

5.0 EROSION & SEDIMENT CONTROL

5.1 Description

This item shall consist of furnishing all materials, equipment, labor and incidentals necessary for the installation of Straw Wattles, Sediment Control Barrier (e.g. silt fence or super silt fence) structures, and Stabilized Construction Entrances as designated in the Drawings. Sediment control shall be placed on regraded outslope areas concurrent with construction and prior to revegetation. Additional quantities may be added at the discretion of the WVDEP.

The CONTRACTOR shall be given a NPDES Permit with an approved erosion and sediment control plan at the pre-construction meeting. This plan shall include measures to be utilized for temporary and permanent sediment and erosion control. This plan shall also include the measures as outlined herein. The NPDES approved plan **does not** relieve the CONTRACTOR of his/her responsibility to be in compliance with any and all permits. All costs associated with meeting the federal and/or state regulations shall be the sole responsibility of the Contractor.

NOTE: Sediment Control Measures shall be required on the perimeter of the project site for sediment control in accordance with the NPDES requirements. The silt fence for sediment control shall be place before any construction work begins. This fence shall remain and be maintained during the entire construction process.

The following are the minimum requirements of the NPDES Permit and/or the NPDES BMP Manual.

VEGETATIVE PRACTICES

- Except as noted below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days after the construction activity in that portion of the site has permanently ceased.
- Where the initiation of stabilization measures by the fourth day after construction activity temporarily or permanently ceases is precluded by snow cover, stabilization measures shall be initiated as soon as conditions allow.
- Where construction activity will resume on a portion of the site within 14 days from when activities ceased, (e.g., the total time period that construction activity is temporarily halted is less than 14 days) then stabilization measures do not have to be initiated on that portion of the site by the seventh day after construction activities have temporarily ceased.
- Areas where the seed has failed to germinate adequately (uniform perennial vegetative cover with a density of 70%) within 30 days after seeding and mulching must be reseeded immediately, or as soon as weather conditions allow.
- Diversions must be stabilized prior to becoming functional.

EROSION & SEDIMENT CONTROL CONSTRUCTION SEQUENCE

- Install stabilized construction entrance as shown on site plans.
- Install perimeter sediment control devices as shown on site plans.
- Clear and grub site.
- Provide sediment control for any topsoil stockpiles.
- Commence rough grading of site. Continue to maintain and inspect all erosion and sediment controls.
- Install additional erosion and sediment controls as shown on site plans.
- Fine grade site.
- Permanently seed and mulch all disturbed areas within 7 days of reaching final grade and install erosion control wattles.
- Upon completion of project including adequate stabilization, remove all remaining erosion and sediment controls.

5.2 Materials

5.2.1 Sediment Control Barriers: silt fencing and super silt fencing materials and installation shall meet all applicable requirements of the manufacturer's specifications.

Even with the specific prior approval of the WVDEP, the use of silt fence shall be limited to relativity flat areas and the toe of selected slopes.

5.2.2 Stabilized Construction Entrances shall consist of coarse 3-6 inch stone over a geotextile fabric.

5.2.3 Silt Dikes – Temporary Silt Dikes shall be triangular-shaped, having a height of at least eight to ten inches (8" - 10") in the center with equal sides and a sixteen- to twenty-inch (16" - 20") base. The triangular-shaped inner material shall be urethane foam. The outer cover shall be a woven geotextile fabric placed around the inner material and allowed to extend beyond both sides of the triangle two to three (2' - 3') feet. Standard length of each dike will be seven feet (7') unless otherwise indicated on the plans.

5.2.4 Erosion Control Wattles: Straw wattles or approved equals, shall be installed at locations shown on the plans. Straw wattles shall be 12 inches in diameter and 25 feet in length. Straw wattles shall consist of an internal fill material of straw and an exterior encasement of a heavy duty biodegradable knitted cylindrical tube.

5.2.5 Rolled Erosion Control Product (RECP): The erosion control blankets for slope stabilization, Rolled Erosion Control Products, shall consist of Excelsior Type I Curlex lining or an approved equal.

5.2.6 Rock Check Dams: Rock check dams shall be required at the locations as shown on the plans. The rock check dams shall be constructed with 3"-6" stone.

5.2.7 Modified Super Silt Fence: Priority One Silt Saver Silt Fence. The BSRF® Priority 1 green band or equal is a 36" wide, non-woven spun-bond polyester fabric with an internal scrim. The system utilizes wood stakes and a specific method of attachment.

5.3 Maintenance

5.3.1 During the course of the project, sediment control barriers shall be maintained in sound condition and accumulations of silt which may threaten their effectiveness shall be removed. Silt removed from the sediment control structures shall be taken to an approved disposal area.

5.3.2 The Stabilized Construction Entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

Wheels on all vehicles shall be cleaned to remove sediment prior to entrance onto public rights-of-way. If washing is required, it shall be done on an area stabilized with stone and which drains into approved sediment trapping device. If the street is washed, precautions must be taken to prevent muddy water from running into waterways or storm sewers.

- At a minimum, all erosion and sediment controls on the site will be inspected at least once every seven calendar days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24-hour period.
- All controls should be cleaned out when sediment reaches one half the sediment capacity of that control.
- Inspection and maintenance records must be kept onsite.

5.4 Installation

5.4.1 Sediment Control Barrier:

Silt Fence: Fence posts shall be a minimum of 48" long driven 16" minimum into the ground. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

Super Silt Fence: Chain link fence shall be constructed in accordance with manufacturer's specifications. Chain link fence shall be fastened securely to the

posts with wire ties or staples. Posts need not be set in concrete. The filter fabric shall be fastened to the chain link fence with ties every 24" at the top and mid-section. Fabric and fence shall be embedded 12", minimum, into the ground. A 6" minimum overlap shall be provided where two sections of fabric adjoin. The overlapped fabric shall be folded together and attached to the chain link fence. 4" by 4" pressure treated posts may be substituted for metal fence posts with the approval of the engineer.

5.4.2 Stabilized Construction Entrance: A stabilized construction entrance shall be required at the access point of the construction site. The stabilized construction entrance shall consist of filter fabric and a minimum of six (6) inches of 3" to 6" stone. The stone entrance shall be a minimum of seventy (70) foot long and twelve (12) foot in width. This stone construction access must conform to the detail drawings shown in the plans.

5.4.3 Triangular Silt Dikes shall be installed according to the manufacture's specification and at the location shown on the plans. The Dikes shall be attached to the ground with Wire Staples. The Staples shall be No. 11 gauge wire and be at least six to eight (6" - 8") inches long. Staples shall be placed as indicated on the installation detail.

The Contractor shall inspect all dikes after each rainfall event of at least 0.5 inches or greater. Any deficiencies or damage shall be repaired by the Contractor. Accumulated silt or debris shall be removed and relocated as directed by the Engineer. If the Dikes are damaged or inadvertently moved during the silt removal process, the contractor shall immediately replace Dikes after damage occurs.

5.4.4 Rock Check Dams w/Optional Sediment Trap: Shall be installed in constructed channel per the sequence of construction. The top of dam shall have a low center section and with the same width as the channel bottom and 6" lower than the outer edges. Rock Check Dams w/ Sediment Traps consist of over excavating the channel behind (up-slope) from the rock check dam and shall be constructed per the typical section on Plans. The rock check dams with sediment traps shall have the upstream side of the rock covered in filter fabric. The filter fabric shall be Mirafi 140 N or equal. Standard rock check dams and rock check dam w/sediment traps shall be removed after the first growing season and the channel brought up to the lines and grades as depicted in the channel profile and stabilized with erosion control matting per the typical detail for vegetated channels.

5.4.5 Wattle Installation: A trench shall be excavated to a depth of 1/3 of the diameter of the wattle. Lay the first Straw Wattle snugly in the excavated trench. **No daylight should be seen under the Wattle.** Pack soil from trenching against the Wattle on the uphill side. When installing running lengths of Straw Wattles, butt the second Wattle tightly against the first. **DO NOT overlap the ends.** Stake the Straw Wattles at each end and four foot on center. For example:

A 25 foot Wattle uses 6 stakes

A 20 foot Wattle uses 5 stakes

A 12 foot Wattle uses 4 stakes

Stakes should be driven through the middle of the Wattle, leaving 2 - 3 inches of the stake protruding above the Wattle. A heavy sediment load will tend to pick the Wattle up and could pull it off the stakes if they are driven down too low. It may be necessary to make a hole in the Wattle with the pick end of your maddox in order to get the stake through the straw. When Straw Wattles are used for flat ground applications, drive the stakes straight down; when installing Wattles on slopes, drive the stakes perpendicular to the slope.

Drive the first end stake of the second Wattle at an angle toward the first Wattle in order to help abut them tightly together. If you have difficulty driving the stake into extremely hard or rocky slopes, a pilot bar may be needed to begin the stake hole.

5.4.6 Rolled Erosion Control Products (RECP): At the top of slope, anchor the RECP's according to manufacturer's recommendation. Securely fasten all RECP's to the soil by installing stakes/staples at a minimum rate as shown by manufacture's recommendation. For the most effective RECP installation use stake/staple patterns and densities as recommended by the manufacturer. For adjacent and consecutive rolls of RECP's follow seeming instructions detailed in the Plan or by manufacturer's recommendations. Additional wooden stakes and varying patterns may be required and must be approved by the WVDEP.

5.4.7 Priority One Silt Saver Silt Fence installation specification: Four foot stakes are driven to a depth which allows 24" of fabric to be above ground. The fabric is stretched along the perimeter of the stakes and pulled tightly and held in place with boding strips. The bonding strips (typically 1"x3/8"x 24") are attached to the stake with staples. The remaining fabric is now tucked into the trench forming a "J" and when filled with dirt create a ground bite. With its firm attachment to each post, the load is now spread to the total linear strength of all posts within the system.

5.5 Removal

Upon completion of the project (as determined by the Regional Engineer) including adequate stabilization, all temporary erosion and sediment controls shall be removed from the site, including but not limited to water breaks, water break outlet protection, check dams and silt fencing. The site should be left with a clean/neat appearance and any disturbed areas shall be revegetated. Rock outlet protection for permanent drainage structures shall not be removed once the project is complete.

5.6 Method Of Measurement

5.6.1 The method of measurement for "Super Silt Fence" installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on a per linear foot basis to include stakes, all necessary materials, supplies, labor and equipment for installation and maintenance including sediment removal and disposal.

5.6.2 The method of measurement for "Silt Fence" installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on a per linear foot basis to include stakes, all necessary materials, supplies, labor and equipment for installation and maintenance including sediment removal and disposal.

5.6.3 The method of measurement for "Straw Wattles" installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on a per linear foot basis to include all stakes/staples, all necessary materials, supplies, labor and equipment for installation and maintenance including repairing any damaged slopes as described under the maintenance section.

5.6.4 The method of measurement for "Rolled Erosion Control Products" installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on a per square yard basis to include all stakes/staples, all necessary materials, supplies, labor and equipment for installation and maintenance including repairing any damaged slopes, rills and replacing matting, as described under the maintenance section.

5.6.5 The method of measurement for "Stabilized Construction Entrance" installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on per ton and shall be based upon weigh tickets from the commercial supplier of the stone that is delivered and placed at the locations identified on the plan drawings. This item shall include all necessary materials, stabilized fabric, supplies, labor and equipment for installation and maintenance including periodic top dressing with additional stone and removal at completion of the project work.

5.6.6 The method of measurement for "Rock Check Dam" (w/optional sediment trap) installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on per each and shall include all necessary materials, supplies, labor and equipment for installation and maintenance including sediment removal/disposal and removal of rock check dams and rock check dams with sediment traps after the first growing season.

5.6.7 Any additional sediment control, i.e. sumps etc., installed by the contractor to meet any applicable State or Federal Law or Regulation shall be the Contractor's

sole responsibility and all costs pursuant thereto shall be born fully by the Contractor. This also includes the removal and disposal of sediment from the existing Sediment Basins. However, any additional sediment control approved by the WVDEP prior to placement shall be included for measurement.

5.6.8 The Silt Dike will be measured by the linear foot in place as directed by the Engineer.

5.6.9 The method of measurement for "Priority One Silt Saver Silt Fence" or approved equal installation and maintenance in conformance with the specifications and accepted by the WVDEP shall be on a per linear foot basis to include stakes, all necessary materials, supplies, labor and equipment for installation and maintenance including sediment removal and disposal.

5.7 Basis Of Payment

5.7.1 Super Silt Fence payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, sediment removal and disposal.

5.7.2 Silt Fence payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, sediment removal and disposal.

5.7.3 Straw Wattles payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, slope repair and disposal.

5.7.4 Rolled Erosion Control Products payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, slope repair, matting replacement and disposal.

5.7.5 Stabilized Construction Entrances payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance including periodic top dressing with additional stone and removal at completion of the project work.

5.7.6 Rock Check Dams (w/optional sediment trap) shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, sediment removal/disposal and removal of rock check dams and rock check dams with sediment traps after the first growing season.

5.7.7 Triangular Silt Dike, measured as provided above, will be paid for at the contract unit price bid for Silt Dike. Price bid will include the cost of furnishing the Dikes, installation, maintenance, and removal.

5.7.8 Priority One Silt Saver Silt Fence or equal payment shall be based on the contract unit price bid for the following items, which price and payment shall be full compensation for all materials, labor, equipment and incidentals necessary to perform the work. Additionally, payments shall constitute full compensation for any required maintenance, sediment removal and disposal.

5.8 Pay Items

Item 5.1, “Super Silt Fence”, per linear foot.

Item 5.2, “Silt Fence”, per linear foot.

Item 5.3, “Straw Wattles”, per linear foot.

Item 5.4, “Rolled Erosion Control Product”, per square yard.

Item 5.5, “Stabilized Construction Entrance”, per ton.

Item 5.6, “Silt Dike”, per linear foot.

Item 5.7, “Priority One Silt Saver Silt Fence or equal”, per lineal foot.

Item 5.8, “Rock Check Dam”, per each.

Item 5.9, “Rock Check Dam w/Sediment Trap”, per each

6.0 REVEGETATION

6.1 Description

This work shall cover all operations incidental to the establishment of vegetation within the limits of construction as shown on the Drawings and any other areas as approved by the WVDEP. This work also includes the furnishing and the application of fertilizer, agricultural limestone and mulch and the furnishing and sowing of seed, all in accordance with these Specifications and as designated herein.

No areas outside the limits of construction shall be disturbed without prior approval from the WVDEP in order to ensure that Right-of-Entry has been obtained.

Any areas outside the limits of construction, disturbed by the Contractor shall be re-vegetated by the Contractor at no expense to the WVDEP.

6.2 Materials

6.2.1 Fertilizer

The commercial fertilizer to be used shall consist of 10-20-20 grade of uniform composition and furnished in standard containers. These containers, in accordance with applicable state and federal laws, must be clearly marked with the following information:

a. Weight
b. Name of Plant Nutrients
c. Guaranteed Nutrients Percentages

Fertilizer shall be applied at a minimum rate of 1,000 lbs./acre. Fertilizer shall be applied immediately to all areas reaching final grade.

6.2.2 Lime

The lime to be used will be an agricultural grade pulverized limestone containing a minimum of 75% total carbonates or calcium carbonate equivalent. Fineness will be such that no less than 70% will pass through a #100 sieve and 100% will pass through a #20 sieve.

Lime shall be applied immediately to all areas requiring seeding reaching final grade by 1 of the 2 methods listed in Section 6.2.1, “Fertilizer”.

6.2.3 Seed Mixtures

The variety of grass and legume seed furnished for the project shall bear a tag, in accordance with applicable state and federal laws, with the following information

listed:

1. Lot Number
2. Seed Producers Name
3. Percent Purity
4. Percent Germination
5. Date of Germination Testing
6. Weed Seed Content (should be <0.25% by weight)

All leguminous seed shall be inoculated with the specified strain of rhizobia which shall be a pure culture of bacteria selected for maximum vitality. No rhizobia shall be used which has passed the expiration date on each package. The inoculant shall be applied at five times the recommended rate except when used in a hydro seeding mixture when the rate will be ten times the recommended rate.

6.2.3.1 Temporary Seed Mixture

All stockpiles or other disturbed areas which will require further disturbance in which the additional disturbance will be delayed for a period of two (2) weeks or longer shall be vegetated according to the following guidelines.

Variety of Seed	SPRING 3/15-5/15	SUMMER 5/15-8/15	FALL 8/15-10/15	WINTER 10/15-11/15
	----------lbs/acre----------			
Annual Ryegrass (Lolium multiflorum)	40	40		
German Millet * (Setaria italica)	40			
Cereal Rye (Secale cereale)			170	

*Do not use Japanese Millet

All areas to be temporarily seeded which are to be re-disturbed shall be fertilized with 500 lbs./acre of 10-20-20. All areas reaching final grade to be temporarily seeded shall be fertilized according to Section 6.2.1. Lime shall be applied according to Section 6.2.2 and mulched according to Section 6.2.4.

6.2.3.2 Lawn Seed Mixture

Existing lawn areas disturbed by construction shall be reseeded using the

following mixture:

Rate lb/1000 sq. ft.	Seed Variety	Minimum Specifications 0% Purity	%Total Germination
0.45	Red Fescue (Pennlawn)	98	85
0.90	Kentucky Bluegrass	85	75
0.70	Merion Bluegrass	90	75
0.20	Annual Ryegrass*	95	85

*Use Annual Ryegrass only in mixtures seeded after August 1 and prior to May 15.

6.2.3.3 Permanent Seed Mixture

Permanent vegetation shall be established on all areas reaching final grade or other areas not likely to be destroyed by further construction activities. Any areas which reach final grade between March 15 - May 15 or August 15 - October 15 shall be seeded with the appropriate temporary seed mixture according to Section 6.2.3.1. These areas shall then be reseeded with a permanent seed mixture, without Annual Ryegrass, during the next defined seeding period according to this section. The actual date of permanent seeding will require the Engineer's approval.

Variety of Seed *	SPRING 3/15 - 5/15	FALL 8/15 - 10/15
	----------lbs/acre----------	
Orchardgrass (Dactylis glomerata)	30	30
Birdsfoot Trefoil (1) (Lotus corniculatus)	15	15
Red Clover (Trifolium pratense)	10	10
Annual Ryegrass (2) (Lolium multiflorum)	25	25
Spring Oats or Winter Wheat	35 0	0 90

(1) Herbaceous legumes must be treated with the appropriate bacterium before seeding. On areas which are steeply sloping (steeper than 1.7:1) or

slide prone, substitute Crown vetch (Coronilla varia) at 20 lbs./acre for Birdsfoot Trefoil.

(2) Use Annual Ryegrass only in mixtures seeded after August 1 and before May 1.

*Use only certified "blue tag" seed. Seed-rate suggested is for pure live seed (PLS) in lbs/acre.

***For shaded areas add the following quantity of seed to the standard mix:**

Lawn Seed Mixture Add 4 lbs/1000ft^2 of Red Fescue.

Permanent Seed Mixture Add 3 lbs/acre of White Clover
Add 10 lbs/acre of Perennial Rye
Add 10 lbs/acre of Blue Grass
Add 50 lbs/acre Cover Grain (Wheat or Rye)

6.2.4 Mulch Material

Mulching procedures shall take place immediately following seeding. Mulch material shall consist of erosion matting, straw, or wood cellulose fiber.

6.2.4.1 Straw

Straw mulch shall include baled wheat or oats straw, or baled grass hay. Straw mulch shall be dry and reasonably free of weed, seeds, sticks, or other foreign material. Straw mulch shall be applied at a rate of 2 tons/acre. **(No baled grass hay shall be used in yard areas.)** The straw mulch shall be anchored with 100 gallons/acre asphalt emulsion or 750 lbs./acre wood cellulose fiber.

6.2.4.2 Wood Cellulose Fiber

Wood cellulose fiber may be used only on slopes steeper than 2H:1V at a rate of 1,500 lbs./acre. A mulch for use with the hydraulic application of seed, fertilizer, and lime shall consist of wood cellulose fiber. It shall be processed in such a manner that it will contain no growth or germination inhibiting factors and shall be dyed green. It shall be manufactured in such a manner the (1) after addition and agitation in slurry tanks with fertilizers, lime seeds, and water, the fibers in the material will become uniformly suspended to form a homogeneous slurry and (2) the material, when hydraulically sprayed on the ground, will form a blotter-like ground cover impregnated uniformly with seed, will allow rainfall to percolate to the underlying soil. Wood cellulose shall only be used on areas that have

been approved by WVDEP.

The wood cellulose fiber shall be supplied in packages having a gross weight not to exceed 100 pounds. Weight specifications of this material from suppliers, and for all applications, shall refer only to air dry weight of the fiber material. Air dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for Wood Cellulose and is considered equivalent to 10 percent moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content.

6.2.5 Water

Water shall be reasonably free of injurious and other toxic substances harmful to plant life. The source of water is subject to the approval of the WVDEP.

6.3 Construction Methods

6.3.1 All revegetation activities shall be conducted immediately following completion of final grading so as to utilize the fine soil material as a seedbed before this material is lost via subsequent rainfall.

6.3.2 On sites where appropriate equipment can operate the seedbed shall be prepared by breaking up surface crusts and loosening the soil material to a minimum of three (3) inches. Disking, harrowing, cultipacking or other acceptable tillage operations may be used to prepare the seedbed. On sites where appropriate equipment cannot operate, the seedbed shall be prepared by "tracking in**"** with a dozer with a minimum of 1 ½"grouser depth or scarifying by other approved methods.

6.3.3 Seedbed preparation and seeding shall take place progressively as various re-graded areas are brought to final grade.

6.3.4 All seeding operations shall be performed immediately following seedbed preparation in such a manner that the seed is applied in the specified quantities uniformly on the designated areas.

6.3.5 Seed Application shall consist of approved hydro seeding methods where feasible. Any seed left in hydro seeder overnight shall be re-inoculated before that seed shall be applied. Other methods of seed application may be utilized for site-specific reasons when approved by the WVDEP.

a. Apply and incorporate fertilizer during seedbed preparation.
b. Apply fertilizer in hydro seeding mixture following seedbed preparation.

6.3.6 Any area failing to establish a vegetative stand due to weather or adverse soil conditions shall be reseeded, re-limed, re-fertilized and re-mulched as approved by the WVDEP.

6.3.7 The Contractor shall maintain all seeded areas until final acceptance of the project. All areas shall be protected from any further equipment traffic and any damaged areas shall be repaired and reseeded. Maintaining seeded areas shall consist of watering, refilling, re-fertilizing, re-liming, re-seeding, and re-mulching erosion gullies and all bare areas.

6.3.8 Lime rate shall be formulated from soil test results. In the absence of soil testing, a rate of three (3) tons per acre will serve as a preferred minimum.

6.3.9 Satisfactory soil is considered to be reasonably free of subsoil, clay clumps, stones and other objects over four (4) inches in one dimension, and shall be free of objectionable material.

6.3.10 A second and third seeding will be applied as needed, or as approved by the WVDEP.

6.3.10.1 Second Step Seeding

The second step seeding will take place during the first defined seeding period following the initial seeding. No payment shall be made for second step seeding, this work is part of the contract if completed before the final inspection or shall be considered warranty if completed after the final inspection. The following shall be used as a guide for second step application.

a. For areas with less than a 50 percent stand or subject to severe erosion, apply the complete amount of seed, fertilizer, lime much as specified.

b. For areas with over 50 percent stand apply one half the original fertilizer, lime and seed. If erosion is a problem, apply one half of the original mulch specified in Section 6.2.4.

6.3.10.2 Third Step Seeding

The third step seeding shall consist of spot applications on areas not showing a satisfactory stand. The seeding shall take place at the next defined seeding period following the second step application. The quantity of material to be used shall be determined on the same basis as the second step application in Section 6.3.10.1.

6.4 Method of Measurement

The method of measurement for re-vegetation will be per plan view acre. Payment to include all temporary seeding, lime, fertilizer, seed and mulch for the first seeding only. Subsequent seeding will not be measured or paid for but will be considered incidental to initial seeding.

The Contractor shall be paid only for those areas disturbed and re-vegetated during operations necessary for completion of the work. The quantity shall not include areas disturbed for storage facilities and staging areas unless prior approval was obtained from the WVDEP. No payment shall be made for any seeding conducted after the final inspection; this work is considered warranty.

6.5 Basis of Payment

6.5.1 Payment will be made at the contract per acre bid for these items, which price and payment shall be full compensation for doing all the work herein described in a workmanlike and acceptable manner; including the furnishing of all labor, materials, tools, equipment, supplies and incidentals as necessary to complete the work. Payment for seeding includes all seeding (i.e. – temporary, first and second seeding). No additional payment will be made for second or third seeding.

6.5.2 Temporary seeding will be incidental to the seeding item and no separate measurement or payment will be made for temporary seeding. There will be no separate payment for maintaining seeded areas. No payment will be made for seeding after the final inspection. All work performed after the final inspection will be done under warranty.

6.6 Pay Items

Item 6.0 "Revegetation", per plan view acre.

7.0 DRAINAGE STRUCTURES

7.1 Description

This work shall consist of furnishing all labor, equipment and materials necessary to construct the drainage structures shown on the drawings and as specified herein. The work shall include, but not be limited to, the following:

Channels, culverts, pipes, bore and jack, junction boxes, splash pads, manholes, drop inlets, underdrains, cleanouts, horizontal boring, stream bank protection, road crossings, anchors, wingwalls, headwalls, grouted bench drains, seep collector, and cisterns.

7.2 Materials

7.2.1 Excavated Materials shall consist of in place natural ground and rock. All excavation shall be considered incidental to placement of drainage structures.

7.2.2 Riprap for Ditches shall consist of sound, non-acid producing, durable limestone or sandstone from a WVDEP approved source. Shale is not acceptable. All rock riprap used throughout the project site shall consist of commercially purchased calcareous stone (except as noted otherwise) meeting the following requirements. The rock riprap shall have a maximum weighted loss of thirty percent when subjected to five (5) cycles of the Sodium Sulfate Soundness Test – ASTM C88 (ASTM C88-05 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate), as modified by the American Association of State Highway and Transportation Officials (AASHTO) T-104. The use of on-site rock materials for riprap, must have approval from the WVDEP and meet all standard for the riprap installation. The use of on-site stone shall be determined by the Engineer.

Limestone riprap stone required for the drainage channels shall be commercially supplied and have a calcium carbonate equivalency of 70% or greater. A certification on calcium carbonate equivalency shall be submitted to the WVDEP prior to delivery.

The sandstone rock for riprap shall consist of sound, durable non-calcareous sandstone. The sandstone shall consist of particles of clean, hard, tough, durable rock, free from adherent coating. Sandstone must be certified to be non-acid producing material. A laboratory certification of soundness and acidity shall be submitted to the WVDEP prior to delivery.

7.2.3 Grout to be used in the grouted riprap ditches shall consist of a mixture of one part Sulfate Resistant Type II Portland Cement and three parts sand, using water to produce a workable consistency. The amount of water shall be as approved or as designated by the WVDEP. The mortar shall be Type II sulfate resistant non shrink Portland cement meeting the requirements of ASTM C150. Admixtures

and/or pozzolon may be used with the approval of the Engineer

The minimum required compressive strength of the grout shall be 2000 psi @ 28 days. All testing shall be the responsibility of the contractor as part of Section 3 of these specifications. Two sets (4 cylinders) of test cylinder per day shall serve as a minimum. Grout test cylinders shall be made and tested in general accordance with ASTM C-31 and C-39 respectively. One cylinder shall be tested at 7 days age, one test cylinder shall be tested at 14 days age, one test cylinder shall be tested at 28 days age and one cylinder shall be held as a spare. Minimum testing shall be one test per day and every fifty (50) cubic yards thereafter.

7.2.4 The Tied-concrete block erosion mat shall be Flexamat Channel Liner as manufactured by Motz Enterprises, Inc. or Engineer approved equal.

7.2.5 The grout filled fabric ditch lining shall consist of a six (6) inch thick Unimat revetment. The fabric shall be as manufactured by Construction Techniques, or an approved equal. The cement/sand grout for the Unimat Channel shall have a minimum 28-day compressive strength of 2500 psi when made and tested in accordance with ASTM C-31. Cement and sand for the grout mix shall respectively be Portland cement and natural sand.

7.2.6 HDPE Pipes: The HDPE pipes shall consist of corrugated high density polyethylene pipe, such as ADS's Hi-Q pipe, or approved equal unless otherwise noted on the plans.

7.2.7 Bore and Jacking shall require steel casing for the conveyance pipe to pass through. The steel casing that is to be bored and jacked under the roadway will need to meet the requirements of the MM-109.

7.2.8 Backfill for the pipes extending beneath the paved roads shall be Controlled Low Strength Material (Flowable Fill) in accordance with **Section 219** of the WVDOT **Standard Specifications for Roads and Bridges**, Adopted 2010. The Controlled Low Strength Material composition and mixture shall also comply with **Section 219** of the WVDOT Specifications. The Controlled Low Strength Material shall have a minimum 28 day compressive strength as specified in the MM-109.

7.2.9 Pipe bedding shall consist of fine aggregate meeting the requirements of Section 704.6 of the WVDOH **Standard Specifications for Roads and Bridges**, Adopted 2010, except that the gradation shall meet the requirements of Section 702.6 of the WVDOH **Standard Specifications for Roads and Bridges**, Adopted 2010. Select aggregate bedding and backfill for HDPE culverts beneath gravel road shall consist of Class I crusher run.

7.2.10 If concrete junction boxes are constructed with cast in place concrete then the concrete used shall be 3000 psi.

After placement, all concrete shall be rodded and tamped to reduce the risk of honeycombing and to insure proper placement. Four concrete test cylinders shall be made and tested in general accordance with ASTM C-31 and C-39 respectively. One test cylinder shall be tested 7 days age, one test cylinder at 14 days age, one test cylinder shall be tested at 28 days age, and one cylinder shall be held as a spare.

7.2.11 The reinforcing steel used in the concrete junction box shall be minimum yield strength of 60,000 psi. Reinforcing bars shall be cold bent. No bars partially embedded in concrete shall be field bent. The minimum radius of bends shall be 2 ½ bar diameters. All reinforcing steel shall be tied and secured in a manner which will prevent movement during concrete placement.

7.2.12 Rock for splash pads shall consist of rock with a sufficient quantity of smaller gradations to choke off the voids and as specified on the plans. Rock for splash pads shall consist of hard durable limestone or approved sandstone and shall have a D_{50} of 12 inches unless otherwise shown on the plans.. The rock shall range in size from 6 inches minimum to 18 inches maximum diameter with no more than 15 percent by weight less than 6 inches. The use of sandstone or limestone will be determined by the plans.

7.2.13 Pre-manufactured drainage structures.

7.2.13.1 A Type "A" Manhole shall be pre-cast and the manhole requires Neenah lid number 1915-S1, or approved equal.

7.2.13.2 A Type "B" Drop Inlet shall be precast and the grate will be determined by the plans.

7.2.13.3 A Type "G" Drop Inlet shall be precast and the grate will be determined by the plans.

7.2.14 The erosion control matting for the "Rehabilitated Roadway Ditch", Fill Bench Drains and Grass Lined Channels with matting shall consist of Excelsior Type I Curlex lining or an approved equal.

7.2.15 The stone for underdrain shall consist of sound, durable 3" to 6" non-calcareous sandstone or River Gravel**.** The stone shall consist of particles of clean, hard, tough, durable rock, free from adherent coating. Stone shall have a maximum weighted loss of twelve (12) percent when subjected to five (5) cycles of the Sodium Sulfate Soundness Test – **ASTM C88** (ASTM C88-05 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate), as modified by the American Association of State Highway and Transportation Officials **(AASHTO) T-104**. Non-calcareous stone shall have an acid base accounting test to show the potential for acid producing material in the

stone. A laboratory certification of soundness and acid base shall be submitted to the WVDEP prior to delivery.

Filter fabric for the underdrain shall be non-woven type, meeting the requirements of Section 9.2.2 of these specifications.

Pipe shall consist of perforated 12-inch diameter PVC SDR 35 grade within the underdrain. Cleanouts shall be required at the locations as shown on the plans.

7.2.16 Horizontal Boring for Mine Drains

7.2.16.1 Mine Drain Pipes: 12-inch diameter PVC pipe, caps and fittings, SDR-35, perforated and non-perforated as shown. A minimum of 26 feet on its inby end shall be perforated.

7.2.16.2 Casing Pipe: Pipe for the 16-inch diameter casing shall be schedule 40 carbon steel, perforated as a minimum 20 feet on its inby end and/or as determined by pilot hole drilling data.

7.2.16.3 Grout: A suitable grout mix (one part cement and two parts fly ash with sufficient water to produce a workable consistency) to grout the annular space between non-perforated portion of the 12-inch mine drain pipe and the 16-inch casing. This grout seal shall extend 20 lf from the outlet end of the boring toward the inlet end of the boring.

7.2.17 Equipment for Horizontal Boring for 12" PVC SDR-35 Mine Drain Pipes

7.2.17.1 A suitable boring machine capable of drilling a minimum of 4-inch and a maximum of 18-inch diameter holes horizontally maintaining the alignment and grade as shown on the project plans. The actual size of the boring will be determined by plan requirements.

7.2.17.2 A suitable self-leveling laser or similar equipment to check the line and grade of the drill hole for mine drain pipe.

7.2.17.3 Suitable drill bits and stabilizer that provide a full diameter, straight hole whether horizontal or inclined.

7.2.17.4 Such casing (standpipes), valves, fittings, and other accessories as may be necessary to provide a safe drilling of the pilot holes for dewatering the mine pool in a controlled manner, capable of shutting off the mine pool discharge whenever deemed necessary by the WVDEP.

7.2.17.5 Suitable grout pump, pipes or tubes for grouting the annular space between the drill hole and the mine drain pipe.

7.2.18 Stream Bank Protection rock shall consist of hard durable angular sandstone or limestone. The rock shall range in size as shown on the plan detail. Stone from the stream bed shall not be used.

7.2.19 Road Crossing shall consist of hard durable limestone and have a calcium carbonate equivalency of 70% or greater. A certification on calcium carbonate equivalency shall be submitted to the WVDEP prior to delivery. The rock shall be sized as shown on the plans. The rock shall be clean and free of debris and any adherent material. Grout may be required if shown on the plans.

7.2.20 Wingwalls and Headwalls shall consist of pre-cast or cast in place structure. The structure shall use rebar and 2500 psi concrete. Concrete shall meet the following requirements:

28 day compressive strength 3000 psi minimum. Coarse aggregate (AASHTO M43) No. 57 or No. 67. Slump 3 ½ in. ± 1. Concrete shall be air entrained 5 to 7 percent. Rebar shall meet the requirements of the plans and details.

7.2.21 Grouted Bench Drains shall consist of riprap size as shown on the plans and grout as shown in Section 7.2.3.

7.2.22 The stone for Seep Collector shall consist of sound, durable AASHTO #1 non-calcareous sandstone or graded river gravel**.** The stone shall consist of particles of clean, hard, tough, durable rock, free from adherent coating. Stone shall have a maximum weighted loss of twelve (12) percent when subjected to five (5) cycles of the Sodium Sulfate Soundness Test – **ASTM C88** (ASTM C88-05 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate), as modified by the American Association of State Highway and Transportation Officials **(AASHTO) T-104**. Non-calcareous stone shall have an acid base accounting test to show the potential for acid producing material in the stone. A laboratory certification of soundness and acid base shall be submitted to the WVDEP prior to delivery.

Filter Fabric shall be non-woven as specified in the table below and approved by the Regional Engineer:

PROPERTY	TEST METHOD	ENGLISH	METRIC
Weight - Typical	ASTM D-5261	NA	NA
Tensile Strength	ASTM D-4632	120 lbs	500 N
Elongation @ Break	ASTM D-4632	50%	50%
CBR Puncture	ASTM D-6241	310 lbs	1,380 N

Trapezoidal Tear	ASTM D-4533	50 lbs	200 N
Apparent Opening Size	ASTM D-4751	70 US Sieve	.212 mm
Permittivity	ASTM D-4491	1.7 Sec-1	1.7 Sec-1
Water Flow Rate	ASTM D-4491	135 g/min/sf	5,550 l/min/sm
UV Resistance @ 500 Hours	ASTM D-4355	70%	70%

Pipe shall consist of perforated 8-inch diameter PVC SDR 35 grade within the Seep Collector. Cleanouts (if required) shall be at the locations as shown on the plans.

7.3 Construction Methods

7.3.1 The channels shall be constructed to the approximate line, grade, and templates as shown on the plans or as directed by the WVDEP. Excess material from channel and pipe trench excavation that is suitable for soil cover may be segregated, stockpiled and utilized to supplement "Revegetation" operations. Otherwise, excess material from ditch and pipe trench excavation will be required to be disposed of by the Contractor in an offsite disposal area obtained by the Contractor in accordance with Section VIII of the Special Provisions for these specifications. Sections of channels that are cut to rock shall not require lining but shall be paid the appropriate size channel. The rock placement in the backfilled channel shall be uniformly graded and placed in the depths that are shown on the plans. It is not the intent of the rock placement to fill all voids in the riprap fill with small stone but to leave the rock face irregular to provide splash points to slow the water down as it flows through the channel.

7.3.2 Grouted Riprap, Riprap, Tied Concrete Block or approved equal, and Grout Filled Fabric or approved equal shall be placed and constructed as shown on the plans.

7.3.3 Grout, where required to be placed on riprap, shall be applied as soon as possible after placement of riprap. The stone shall be thoroughly wet immediately before grout is applied. As soon as grout is deposited on the surface it shall be thoroughly worked into the joints to achieve 100 percent penetration. The stones shall then be brushed so that their top surfaces are exposed. The grout shall be protected from running water to prevent damage until sufficiently cured.

Cure the grout for at least 3 days by keeping it continuously wet, or applying a transparent membrane curing compound.

A set of four (4) compressive strength test cylinders shall be taken in AM and PM during installation or as directed by the engineer. One seven-day, one fourteen day, one twenty-eight day and one reserve cylinder are required. The sampling for strength tests shall be in accordance with ASTM C 172.

Cylinders for acceptance tests shall be molded and cured in accordance with ASTM C 31. Cylinders shall be tested in accordance with ASTM C 39.

The acceptability of the grout will be determined by laboratory tests and/ or visual inspection as required by the WVDEP. Grout specified on the basis of compressive strength will be considered satisfactory if the average of all strength test results equal or exceed the specified strength and no individual strength test falls below the required strength by more than 200 psi.

A grout key shall be installed at the upstream end of each of the grouted riprap channels, bench aprons or on a cold joint to direct the flow of water into the channel and prevent undercutting of the grouted riprap. The grout key shall be installed to the dimensions depicted by the typical detail in the plans. The grout keys required on the grouted channel or bench aprons shall be incidental to the channel construction.

7.3.4 Tied-Concrete Block erosion mat shall be placed in the ditch at the location as shown on the plans. It shall conform to the template of the ditch as shown on the plans.

7.3.5 Grout Filled Fabric Lining shall be placed in the ditch at the location as shown on the plans. It shall conform to the template of the ditch as shown on the plans.

7.3.6 Pipe backfill for HDPE culverts extending beneath the paved roads shall be Controlled Low Strength Material according to Specification 7.2.9. The Controlled Low Strength Material backfill shall extend 5.0 feet, minimum, upstream and downstream from existing edge of pavements.

7.3.6.1 For every ten (10) cubic yards of Controlled Low Strength Material placed to backfill Pipe, a set of cylinders (4 Cylinders) shall be prepared for unconfined compression testing according to AASHTO T-22 and determination of the flow mixture shall be made. At a minimum, one flow mixture and sample will be prepared for Controlled Low Strength Material placed on each side of the pipe for material over 500 psi. Material below 500 psi will not require test cylinders to be taken. The samples shall be field cured in accordance with AASHTO T-23 and shall meet or exceed a 28 day break of the psi shown on the MM-109 or as shown on the plans.

7.3.6.2 Drop height of the Controlled Low Strength Material shall be limited to the minimum necessary by using chutes or other devices. The Controlled Low Strength Material shall be placed equally along both sides of the pipe to avoid pipe displacement. Prior to placement of successive lifts, the Controlled Low Strength Material shall be allowed to cure until self-supporting.

7.3.6.3 A minimum of two inches compacted of Type I Wearing Hot Mix Asphalt (HMA) shall be placed atop the Controlled Low Strength Material. The HMA shall be placed to blend into existing asphalt grades surrounding the open cut trench. See Section 11 of these specifications.

7.3.7 The SDR-35 pipes shall be installed at the locations shown on the plans. The trench for the pipes shall be excavated in accordance with the detail provided in the plans. Pipe bedding shall conform to the details. Fine aggregate shall be placed in the bottom of the trench to the dimensions indicated by the details for leveling purposes. The outlet end of all conveyance pipes shall have animal guards installed as shown on the plans.

7.3.7.1 Trench width for the pipe shall not be less than the outside diameter of the pipe plus one half of the diameter (with a minimum of one foot) on each side of the pipe measured to the face of the trench or to the sheeting when used, and shall be excavated to depth, line and grade, as shown on the Construction Drawings. Trenching will involve excavation of in place material including soil. Trench bottom shall be thoroughly cleaned of any rock debris prior to the placement of the pipe. If the pipe is placed at a road crossing see specification section 7.3.5.3.

7.3.7.2 Trench excavation exceeding 5 feet in depth shall be supported with suitable shoring or sides of the excavation shall be cut to stable slopes as recommended in the OSHA Publication "Excavating and Trenching Operations", OSHA 1926 to prevent caving, slipping or cracking of the sides to protect workmen from any injury. Any shoring installed shall be removed following backfilling the trench.

7.3.7.3 Pipe bedding and trench backfilling for at least one foot above the top of the pipe and shall be Class B bedding (stone or acceptable onsite material). The bedding shall be placed at the bottom of the trench and shall be properly shaped to receive the pipe providing a minimum of four (4) inches of bedding for the pipe. The trench shall be kept dry during installation of the pipe.

7.3.7.4 When the bedding is in place, the pipe shall be positioned in the trench, as shown on the Construction Drawings, and all joints (if any) sealed, as per manufacturer's recommendations.

7.3.7.5 After the pipe is placed, the trench shall be backfilled as shown on the Construction Drawings. The backfill material shall be placed in maximum six (6) inch lifts and shall be compacted using a tamper. The 1 ½" aggregate backfill shall extend to at least one (1) foot above the top of the pipe as shown on the Construction Drawings. The remainder of

the trench may be backfilled with in place material as approved by the Engineer. Compaction of the backfill material shall be at least 95 percent of the maximum dry density obtained by ASTM Method D698 (Standard Proctor). Field density testing and testing frequency shall be directed by the WVDEP.

7.3.6 The HDPE culvert shall be installed at the location shown on the plans. The trench for the culvert shall be excavated in accordance with the detail provided in the plans. Pipe bedding shall conform to the details. Fine aggregate shall be placed in the bottom of the trench to the dimensions indicated by the details for leveling purposes.

7.3.6.1 Trench width for the pipe shall not be less than the outside diameter of the pipe plus one half of the diameter (with a minimum of one foot) on each side of the pipe measured to the face of the trench or to the sheeting when used, and shall be excavated to depth, line and grade, as shown on the Construction Drawings. Trenching will involve excavation of in place material including soil. Trench bottom shall be thoroughly cleaned of any rock debris prior to the placement of the pipe.

7.3.6.2 Trench excavation exceeding 5 feet in depth shall be supported with suitable shoring or sides of the excavation shall be cut to stable slopes as recommended in the OSHA Publication "Excavating and Trenching Operations", OSHA 1926 and approved by the Engineer to prevent caving, slipping or cracking of the sides to protect workmen from any injury. Any shoring installed shall be removed following backfilling the trench.

7.3.6.3 Culvert bedding and trench backfilling for at least one foot above the top of the culvert shall be 1 ½" Crusher Run aggregate. The bedding shall be placed at the bottom of the trench and shall be properly shaped to receive the culvert providing a minimum of four (4) inches of bedding for the culvert. The trench shall be kept dry during installation of the culvert.

7.3.6.4 When the bedding is in place, the culvert shall be positioned in the trench, as shown on the Construction Drawings, and all joints (if any) sealed as per manufacturer's recommendations.

7.3.6.5 After the culvert is placed, the trench shall be backfilled as shown on the Construction Drawings. The backfill material shall be placed in maximum six (6) inch lifts and shall be compacted using a tamper. The aggregate backfill shall extend to at least one (1) foot above the top of the culvert as shown on the Construction Drawings. The remainder of the trench may be backfilled with in place material as approved by the Engineer. Compaction of the backfill material shall be at least 95 percent of the maximum dry density obtained by ASTM Method D698 (Standard

Proctor). Field density testing and testing frequency shall be as directed by the WVDEP.

7.3.7 A plan for the bore and jack operation must be submitted to the Engineer prior to any work being started. The bore pits and location of the track must be shown on the plan and must be placed in a location that will allow control of drilling water.

The equipment used in boring and jacking casings shall be of adequate commercial size and satisfactory working condition for safe operation, and may be subject to approval by the WVDEP at the discretion of the Engineer. Such approval, however, shall not relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein. Only workmen experienced in boring and jacking operations shall be used in performing the work.

When multiply joints of pipe are required to make the crossing the steel casing shall be butt welded to ensure that the pipes do not separate.

Provide all structures, safety equipment, and professional services required to provide for the health and safety of the general public and of personnel involved in pipe boring and jacking work in accordance with the requirements of the regulatory agencies having jurisdiction.

Take all measures necessary to protect surrounding public and private property, adjacent buildings, roads, drives, sidewalks, drains, sewers, utilities, trees, structures, and appurtenances from damage due to pipe boring and jacking work. Responsibility and payment for correction of such damage shall be the sole responsibility of the Contractor.

7.3.8 Concrete Junction Boxes shall be placed at the locations as shown on the plans.

7.3.9 Rock for splash pads shall be placed in conformance to the details in the Plans or as directed by the Engineer.

7.3.10 The pre-manufactured Type "A" Manholes, Type "B" and Type "G" Drop Inlets and the Concrete Junction Boxes shall be installed at the locations shown on the Plans.

7.3.10.1 Pre-manufactured drainage structures shall be placed on a level, prepared and compacted subgrade as directed and approved by the Engineer. Pre-manufactured structures shall have lifting hooks that will be out of sight after placement and sufficient reinforcement to resist handling stresses.

7.3.10.2 Pipe sections shall extend through the inside of the structure wall sufficiently to allow for proper grouting of the annular space and extend

outside of the structure sufficiently to allow for proper connection with the next pipe joint. Masonry shall fit neatly and tight around the pipe both on the inside and outside. The backfill of the structure will not be permitted until the grout has been applied to both the inside and outside an allowed sufficient time to cure. The flow line of the outlet pipe section shall match the bottom elevation of the inlet or manhole. Inlet pipes shall be higher from the structure bottom and as shown on the Plans. Sufficient mortar shall be placed in the Inlet bottom of the manhole to create a smooth flow line from the inlet pipes to the outlet pipes.

7.3.10.3 Backfilling around pre-manufactured drainage structures shall be select, suitable on site material resulting from excavation operations and as directed and approved by the Engineer. Care shall be taken not to displace or disturb the drainage structure from the intended installation site or elevation. Backfilling shall be brought up uniformly around the structure to avoid distortional stress. If in the opinion of the Engineer backfilling operations have caused damage or displaced the drainage structure, the Contractor shall remove the drainage structure, re-prepare the subgrade, and reset the structure and complete backfilling operations to the satisfaction of the Engineer and at no cost to the State. The pre-manufactured drainage structures shall be set flush with the surrounding surfaces as shown on the Plans.

7.3.11 Existing ditches located within the project limits shall be cleaned to conform to the template provided in the plan details to provide positive drainage to the inverts of the downstream structures and ensure free flowing conditions within the ditch as directed by the Engineer, at the locations identified on the plans. The ditch cleanings shall be disposed of on site in a location approved by the Engineer or off site in accordance with Sections VII and VIII of the Special Provisions of these Specifications. The erosion control matting for the ditch shall be installed in accordance with the manufacturer's recommendations.

7.3.12 The underdrains shall be constructed at the locations and to the lines, grades, and cross-section or as directed by the Engineer based on the field conditions encountered. Cleanouts shall be incidental to the cost of the underdrain. Cleanouts must be installed on mine drainage pipe and conveyance pipes every 150 LF. This will be required on all pipe systems

Trench width for the underdrain shall be not less than four (4) feet, measured at the bottom of the trench for the underdrain. Trenching will involve excavation of in-place material including soil and rock. The stone for the underdrain will be filled to a depth of four (4) feet. This will allow a minimum of one (1) foot soil cover over the completed underdrain.

Trench exceeding 5 feet in depth shall be supported in compliance with the OSHA requirements. Trench bottom shall be cleared of any loose debris and any standing water.

7.3.13 Horizontal Mine Drainage System: Prior to installing permanent mine drains, the existing mine pool shall be drained completely in a safe and controlled manner through two (2), 6-inch diameter pilot holes drilled from a boring pit to facilitate the horizontal drilling activities. The pilot holes shall be drilled about four feet apart at the approximate alignment and grades shown on the plans. A drilling log shall be completed and kept at the site during all phases of the pilot hole installation. Depending on the results of the drilling for the first pilot hole, the drilling of the second pilot hole may be waived or altered as directed by the WVDEP.

The drilling sites will require excavation to provide access for the drilling assembly. Measures must be employed to assure that site preparation is conducted in a safe manner. All appropriate accessories for the drill to function properly including motor controls, wiring, and three phase power shall be properly installed and provided with safety measures to prevent electrocution hazards to all persons who may visit the site. All material common to the operation must be stored and maintained properly.

The mine workings to be dewatered were located by the exploratory borings. The existing bore logs may be used as a guide to intercept the mine workings. There are piezometers that may be used for monitoring the mine water level. The Contractor shall monitor the water level within the mine and perform the dewatering work in the safest manner possible. Any damages due to improperly controlled flows from the proposed borings shall be the sole responsibility of the Contractor. The Contractor will be required to submit surveying information, proposed hole alignment and other relevant information to the WVDEP for approval before drilling.

Pilot holes for dewatering the mine pool shall be drilled through proper standpipe casing and valves so that once the pilot holes encounter water, the outflow can be controlled and/or, if required, can be shut off. Adequate piping is to be installed, or other arrangements shall be made that are previously approved by the engineer, so that water discharging from the pilot holes can be safely drained and the boring pit can be maintained relatively dry, and soil erosion can be minimized.

The Contractor shall use a self-leveling laser or similar instrument to check the line and grade elevation during drilling operations. At every 20 feet of drilling advancement, and at the beginning of each work shift, the Contractor shall remove the drilling tool from the hole, "defog" the casing pipe and check the line and grade elevation. If misalignment occurs during the operations, the Contractor shall be responsible for abandoning the hole, backfilling and sealing the

misaligned hole with grout, and drilling a new hole at the desired alignment and grade. No payment shall be made for a misaligned hole.

Advancement of the pilot holes (and subsequent construction of the permanent mine drains) beyond the limits shown on the plans may be required if significant water volumes are not encountered. Following the completion of the pilot hole drilling, the Contractor shall allow the existing mine pool to drain while periodically measuring the mine pool elevation through the piezometers. Discharged mine water shall be tested for pH throughout the dewatering process and may have to be treated with soda ash briquettes (i.e. a pH between 6.0 and 9.0 should be maintained for discharged mine water).

All excess material generated by the work involved in this section may have to be placed into a temporary waste area within the construction limits and may be used as random backfill. On-site waste areas must be approved by the engineer. If an off-site waste area is utilized, the provisions of Section VII will be utilized.

After the existing mine pool is drained, the Contractor shall enlarge the pilot holes by reaming to sufficient diameter so that 16-inch diameter steel casing can be installed. Pipe sections shall be welded together as drilling advances. The pipe shall be field perforated with 2-inch diameter holes on the inlet end for a minimum of 20 feet and/or as determined by the WVDEP from information obtained from the pilot hole drill log.

A permanent 12-inch diameter PVC drain pipe shall be installed inside the 16-inch steel casing as directed by the WVDEP.

Each permanent 12-inch PVC mine drain at its outlet end shall be provided with stainless steel rod guards to prevent entry of obstructions into the mine drain.

After the permanent mine drain pipes are installed, the annular space between the 12-inch diameter PVC pipe and the 16-inch diameter steel casing shall be filled along the non-perforated section with grout. This will extend into the casing 20 lf from the outlet end of the 16" casing. Mine drainage conveyance pipes shall be attached to the end of the mine pipes to take the mine drainage from borings to the receiving drainage structure.

Trenches and excavation for the boring pit exceeding 5 feet in depth shall be adequately supported with suitable temporary shoring/bracing or other means, with all trenching and excavation activities being performed in accordance with OSHA Regulations 29 CFR Part 1926 to prevent caving, slipping or cracking of the sides and to protect workmen from injury. Any temporary shoring installed shall be removed promptly following backfilling of the trench and excavation. It shall be the responsibility of the Contractor to design the shoring or other means of supporting the trench and excavation sides to prevent failure. Excavation stability and safety, as with all other safety aspects of this project, are the

Contractor's responsibility, with the WVDEP and Engineer accepting no responsibility or liability for damages or injuries arising from the work described herein.

At the completion of the dewatering system installation, all excavated areas shall be backfilled in twelve inch loose lifts, and compacted. Backfill material shall be suitable on-site material which is dry to damp and free of organic material. Any material planned for use as backfill material shall be approved by the engineer before use. If off-site material is utilized, the Contractor will be required to obtain an agreement from the borrow area landowner as indicated in Section VII.

All remaining disturbed areas shall be re-graded as directed by the WVDEP, including the drilling access roads, and revegetated in accordance with Section 6.0.

7.3.14 Stream Bank Protection shall be rock riprap lined at the areas shown on the plans. The subgrade under the riprap shall be excavated to the proper depth necessary to ensure that the finished grade of the riprap meets the flowline grade as shown on the plan detail. If refuse is located near the Stream Bank Protection top soil shall be placed between the regraded refuse and the riprap. The riprap shall be placed to the template shown on the plans.

7.3.15 The Channel Road Crossing shall be installed as shown on the plans.

7.3.16 Wingwalls and Headwalls for pipe culverts shall be constructed from Class B (2500 psi) concrete and reinforcing steel according to the plans and details. All materials shall be new and free from defect. After concrete placement in forms, all concrete shall be rodded and tamped to reduce the risk of honeycombing and to insure proper placement. Four concrete test cylinders shall be made and tested in general accordance with ASTM C-31 and C-39 respectively. One test cylinder shall be tested at 7 days age, one test cylinder at 14 days of age, one test cylinder shall be tested at 28 days age, and one test cylinder shall be held as a spare.

7.3.17 Grouted Bench Drains shall be installed at the location on the plans. The Grouted Bench Drains shall be placed as a transition from the bench drain to the main drainage channel.

7.3.18 Seep Collector shall be placed in the location as shown on the plans. The seep collector shall be installed with stone to the surface. The stone will allow surface drainage to collect into the drainage system as well as subsurface drainage.

7.3.19 Piezometer Abandonment: Temporary piezometers which have been installed for Contractor use, must be removed and abandoned by a person who has been certified by the State of West Virginia in accordance with 47CSR59 "Monitoring Well Regulations". This certification is necessary for any person to operate in the State of West Virginia and includes construction, installation, alteration and/or

abandonment of any monitoring wells and select boreholes.

7.4 Method of Measurement

7.4.1 The method of measurement for the grouted riprap channels shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, purchase and placement of rock, grout and all equipment and labor necessary for their installation. The grout keys shall be considered part of the channel in which they are located and not as a separate item.

7.4.2 The method of measurement for the riprap channels shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, purchase and placement of rock and all equipment and labor necessary for their installation.

7.4.3 The method of measurement for the Tiled Concrete Block Channels shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, purchase and placement of Tiled Concrete Block as per the manufacture's installation method and all equipment and labor necessary for their installation.

7.4.4 The method of measurement for the Grout Filled Fabric Channels shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, purchase and placement of fabric, installation of grout and all equipment and labor necessary for their installation. The grout keys shall be considered part of the channel in which they are located and not as a separate item.

7.4.5 The method of measurement for the grass lined channels shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, seed, lime, fertilizer, purchase and placement of matting if required and all equipment and labor necessary for their installation.

7.4.6 The method of measurement for installation of the HDPE Culvert shall be on a linear foot basis measured on the top of the pipe. This unit price shall include the cost of trench excavation and backfilling, including Controlled Low Strength Material (where required), asphalt repair, waste disposal, furnishing and placement of select aggregate bedding, HDPE pipe, culvert outlet riprapped where required and all other items necessary for construction.

7.4.7 The method of measurement for the bore and jacked Steel Casing Pipe shall be on a lineal foot basis measured in place. The unit price shall include bore and jack of the casing pipe, purchase and placement of the casing pipe, grouting of the annulus and all equipment and labor necessary for the installation of the casing pipe.

7.4.8 The method of for the "Concrete Junction Boxes" shall be on a per each basis. The unit price shall include the excavation and placement of the cast in place or pre-cast concrete Junction Box and all the material and equipment necessary to complete the installation.

7.4.9 The method of measurement for the splash pads shall be per each installed, and approved by the engineer.

7.4.10 The method of measurement for pre-manufactured drainage structures shall be per vertical foot purchased, installed, and approved by the engineer. The unit prices for the Type "A" Manholes shall include the cost for the manhole cover and frame. The unit price bid for Type "B" and Type "G" Drop Inlets shall include the cost of the grate and frame. The measurement shall be from the top of the inside structure floor to the top of finished grate or lid for payment.

7.4.11 The method of measurement for constructing underdrain shall be on a linear foot basis measured along the centerline of the underdrain. Excavation necessary to construct the underdrain; furnishing and placement of the 3" to 6" non-calcareous sandstone, filter fabric and all other work necessary for the acceptable installation of the underdrain will not be measured but shall be considered incidental to the construction of the respective underdrains. The cost of these incidental items shall be included in the unit price bid for the underdrain.

7.4.12 The method of measurement for the construction of the un-perforated PVC SDR-35 underdrain conveyance pipe shall be on a linear foot basis of the un-perforated pipe as measured from the end of the last joint of perforated pipe. Trench excavation, furnishing and placement of the pipe and fittings, compacted on-site backfill, minor grading, including all ancillary materials and operations required to construct the drainage conveyance pipes, will not be measured, but shall be considered incidental to this construction.

7.4.13 The method of measurement for cleaning existing ditches within the project limits shall be per linear foot and shall be paid as "Ditch Rehabilitation."

7.4.14 The method of measurement for installation of "Pilot Holes" shall be per the linear foot, properly installed. This shall include the cost of furnishing all labor, materials, tools and equipment required for installing the holes, removing all cuttings and maintaining the holes open and clean until enlarged and incidental work connected therewith.

7.4.15 The method of measurement for installation of "12-inch Diameter Mine Drains" shall be per the linear foot, properly installed. This shall include the cost of furnishing all labor, materials, tools and equipment required for installing the drains, including the removal and disposal of all cuttings, proper installation of the 16-inch diameter casing, 12-inch diameter SDR-35 pipe, grouting and all incidental work connected therewith.

7.4.16 The method of measurement for the Horizontal Boring Conveyance Pipe shall be on a linear foot basis

7.4.17 Stream Bank Protection shall be measured on a linear foot basis and shall include all work materials required for sloping, stabilization, installation of liner if required and riprap rock to the lines and grades shown on the plans.

7.4.18 The method of measurement of the Road Crossing shall be per each.

7.4.19 The method of measurement for constructing the concrete wingwall and Headwall at the end of the HDPE pipe culverts shall be on a unit basis. The unit price shall include cost of any excavation, foundation preparation, furnishing and placement of concrete, reinforcing steel, form work, and all other incidental items necessary to construct the wingwall.

7.4.20 Grouted Bench Drains shall be on a linear foot basis measured along the flowline of the channel. The unit price shall include excavation, purchase and placement of rock and all equipment and labor necessary for their installation.

7.4.21 The method of measurement for constructing Seep Collector shall be on a linear foot basis measured along the centerline of the Seep Collector. Excavation necessary to construct the Seep Collector; furnishing and placement of the AASTO #1 non-calcareous sandstone, 8" PVC SDR-35 pipe, filter fabric and all other work necessary for the acceptable installation of the Seep Collector will not be measured but shall be considered incidental to the construction of the respective Seep Collector. The cost of these incidental items shall be included in the unit price bid for the Seep Collector.

7.4.22 The method of measurement for the Piezometer Abandonment shall be per each.

7.5 Basis of Payment

7.5.1 The unit price for the "Grouted Riprap Channel" shall include excavation, purchase and placement of rock and grout, grout key and all equipment, material and labor necessary for their installation.

7.5.2 The unit price for the "Riprap Lined Channel" shall include excavation, purchase and placement of rock and all equipment, material and labor necessary for their installation.

7.5.3 The unit price for the "Tied Concrete Block Lined Channel" shall include excavation, purchase and placement of lining, and all equipment, material and labor necessary for their installation.

7.5.4 The unit price for the "Grout Filled Fabric Lined Channel" shall include excavation, purchase and placement of fabric, grout, grout key and all equipment, material and labor necessary for their installation.

7.5.5 The unit price for the "Grass Lined Channel" shall include excavation, purchase and placement of control matting, and all equipment, material and labor necessary for their installation.

7.5.6 The unit price for "HDPE Culvert" shall include the cost of trench excavation and backfilling, including waste disposal, furnishing and placement of select aggregate bedding, HDPE pipe and all other items necessary for construction.

7.5.7 The unit price for the "Bore and Jack" shall include the excavation of the pit, equipment and materials necessary to complete the installation of the road crossing.

7.5.8 The unit price for "Concrete Junction Boxes" shall include the excavation and placement of the cast in place or pre-cast concrete Junction Box and all the material and equipment necessary to complete the installation.

7.5.9 The unit price for the "Splash Pad" shall include the excavation, purchase and placement of rock and all equipment, material and labor necessary for their installation.

7.5.10 The unit price for the Underdrain shall include the excavation of the trench, the pipe, stone and filter fabric required to install the underdrain and all the material and equipment necessary to complete the installation.

7.5.11 The unit price for the "Underdrain Conveyance Pipe shall include the excavation of the trench, the pipe and all the material and equipment necessary to complete the installation.

7.5.12 The unit price for the "Type "A" Manhole" shall include the base stone to level the unit, the manhole unit and lid and all the material and equipment necessary to complete the installation.

7.5.13 The unit price for the Type "B" and "Type "G" Inlet" shall include the base stone to level the unit, the drop inlet and grate and all the material and equipment necessary to complete the installation.

7.5.14 The unit price for the "Pilot Holes" shall include the setup of the boring machine and all the material and equipment necessary to complete the drilling into the mine void.

7.5.15 The unit price for the "12-inch Diameter Mine Drains" shall include the setup of the boring machine, the 16" steel casing pipe, 12" PVC Mine Drain Pipe and all

the material and equipment necessary to complete the installation into the mine void.

7.5.16 The unit price for the "Horizontal Boring Conveyance Pipe" shall include the setup of the boring machine, the 16" steel casing pipe, 12" PVC Conveyance Pipe and all the material and equipment necessary to complete the installation of the conveyance pipe into the receiving drainage structure.

7.5.17 The unit price for "Ditch Rehabilitation" shall include all the material and equipment necessary to complete the installation.

7.5.18 The unit price for the "Stream Bank Protection" shall include excavation, purchase and placement of riprap rock and all equipment, material and labor necessary for their installation.

7.5.19 The unit price for the "Road Crossing" shall include excavation, purchase and placement of riprap rock and all equipment, material and labor necessary for their installation.

7.5.20 The unit price for "Concrete Wingwall" and "Headwall" shall include the excavation and placement of the cast in place or pre-cast concrete Wingwall and all the material and equipment necessary to complete the installation.

7.5.21 The unit price for the "Grouted Bench Drain" shall include excavation, purchase and placement of rock and grout, grout key and all equipment, material and labor necessary for their installation.

7.5.22 The unit price for the "Seep Collector" shall include the excavation of the trench, the pipe, stone and filter fabric required to install the underdrain and all the material and equipment necessary to complete the installation.

7.5.23 The method of measurement for the Piezometer Abandonment shall be per each. This shall include all labor, equipment and materials necessary to abandon the piezometer.

7.6 Pay Items

7.1, "Grouted Riprap Channel", per linear foot.

7.2, "Riprap Lined Channel", per linear foot.

7.3, "Tied Concrete Block Lined Channel", per linear foot.

7.4, "Grout Filled Fabric Lined Channel", per linear foot.

7.5, "Grass Lined Channel", per linear foot.

7.6, “HDPE Culvert”, per linear foot.

7.7, “Bore and Jack Under Roadway”, per linear foot.

7.8, “Concrete Junction Box”, per each.

7.9, “Splash Pad”, per each.

7.10, “Type “A” Manhole”, per vertical foot.

7.11, “Type “B” Inlet”, per vertical foot.

7.12, “Type “G” Inlet”, per vertical foot.

7.13, “Ditch Rehabilitation”, per linear foot.

7.14, “4’ x 4’ Underdrain”, per linear foot.

7.15, “Underdrain Conveyance Pipe”, per linear foot.

7.16, “Pilot Holes”, per linear foot.

7.17, “12-inch Diameter Mine Drains”, per linear foot.

7.18, “Horizontal Boring Conveyance Pipe”, per linear foot

7.19, “Stream Bank Protection”, per linear foot.

7.20, “Road Crossing”, per each.

7.21, “Concrete Wingwall”, per each.

7.22, “Concrete Headwall”, per each.

7.23, “Grouted Bench Drain”, per linear foot.

7.24, “Seep Collector”, per linear foot.

7.25, “Piezometer Abandonment”, per each.

8.0 UNCLASSIFIED EXCAVATION

8.1 Description

This work shall consist of excavating, transporting, stockpiling, placing and compacting mine spoil, soil, rock, coal refuse or other materials encountered in the re-grading, backfill and any other indicated incidental work. Rock and soil shall be classified as unclassified excavation.

8.2 Materials

On-site soil encountered in areas of proposed disturbance should be utilized for later revegetation whenever possible. The soil materials present in all areas to be excavated or filled shall be gathered and stockpiled in a suitable location, at the discretion of the WVDEP. Where required, strip soil to whatever depths encountered in a manner to prevent intermixing with underlying subsoil. Disturbance of the subsoils is to be minimized whenever possible. Remove heavy growths of grass from areas before stripping. Stockpile soil in storage piles in an area that will not create slope instability to provide free drainage of surface water. Cover stockpiles or use temporary seeding if necessary, to prevent erosion.

The regrading plan shall be conducted in a manner such that a 12- inch thick layer of soil material is uniformly spread over any areas of exposed refuse or unsuitable material resulting from the regrading operation. The soil cover shall not be compacted to the specifications stated for fill compaction, but shall be placed in a manner to allow for proper establishment of vegetation as described in the seedbed preparation portion of the Revegetation specifications. The required soil amendments are to be incorporated into this top-dressing material while it is in a loose state, to facilitate proper mixing of these materials within the soil matrix. The soil cover shall then be prepared by tracking-in with a dozer perpendicular to the slope. The WVDEP may require that the soil cover be scarified prior to seeding if compaction is considered excessive or if rills develop.

8.3 Borrow/Disposal Area

It is anticipated that the excavating and/or regrading operations for the coal refuse material will require use of the potential soil borrow areas as per Section 8.4 of these specifications. However, if off site borrow/disposal areas should be necessary to provide for material shortages or excess material disposal, then the Contractor is responsible for locating these areas, providing proof the material is acceptable for its intended use and obtaining right-of-entry agreements in which the property owner indemnifies and holds WVDEP/OSMRE harmless from any injury or damage whatsoever resulting from the Contractor's use of the property. All prospective Contractors and Bidders must obtain their own permission from the landowner for any subsurface tests, borings, or pits. The Contractor shall be held responsible for compliance with all NEPA and NPDES requirements and shall provide proof of such compliance to the WVDEP. The Contractor shall submit a reclamation plan to the WVDEP and must obtain approval for said plan

prior to any disturbance to the borrow/disposal site.

8.4 Soil Cover

This work consists of covering all areas having exposed refuse at the final grades with a 1-foot thick layer of suitable soil material. Also, any exposed refuse that is shown on the plans that is not being regraded shall be covered with a 1-foot thick layer of suitable soil material. Suitable material shall be best soil available and approved by the Regional Engineer. The soil shall be obtained in conjunction with clearing and grubbing operations, regrading, drainage feature excavation, and/or from designated or determined soil borrow areas, both on or off-site. A minimum of 12 inches of soil material shall be placed over all refuse encountered during construction. Excavation of soil cover shall be as per Section 8.5.1. It is anticipated an adequate amount of soil cover will be available on-site. However, the Contractor is responsible for securing an off-site borrow area in the event that adequate soil is not available on site at no additional cost to WVDEP. If, during the course of construction, the need for off-site borrow areas becomes evident, the Contractor shall obtain prior approval from the WVDEP for such borrowing and the borrow area must comply with the attached NEPA regulations. The Contractor shall obtain Right-of-Entry Agreements for any soil or rock borrow areas outside the construction limits which provide for entry by the WVDEP and OSM for inspection purposes, with such agreements stating that the property owner(s) indemnifies and holds the WVDEP and OSM harmless from injury or damage whatsoever resulting from the use of the property.

8.5 Construction Methods

8.5.1 Excavation

Material excavation shall consist of the required removal of materials from the areas shown and the sloping and finishing of the areas to the required lines and grades as shown on the drawings. The slopes may be varied only by permission of the WVDEP. Any excavation beyond planned grades will not be paid for unless prior authorization is obtained from the Engineer. Slopes shall be trimmed neatly to present a uniform surface, free from hollows and protrusions and loose or overhanging rocks. The tops of all slopes shall be rounded to form a smooth, uniform transition to the existing ground. Areas cut to grade in refuse are to be undercut one foot below the final grades shown on the reclamation plan with final grades achieved by placing one foot of soil cover material atop the undercut areas.

The reclamation approach described in these construction specifications is intended to provide a lasting, stable configuration. The Contractor is required to exercise care to avoid conditions which may result in unstable conditions during the construction process. The Contractor shall be responsible for protecting residences from damage.

The Contractor must utilize material removal techniques, which are generally

considered to be conducive to retaining slope stability. Additionally, disturbed slopes shall be brought to the design template as soon as practical and shall be protected in accordance with Section 6, "Revegetation".

8.5.2 Material Placement

Excavated rock, concrete, cinder blocks, and foundation ruins shall be excavated and/or removed and incorporated into the fill material. Demolished concrete, rock, cinder blocks and foundation ruins to be incorporated into the fill shall be of size less than 2 feet in any dimension. Boulders, structures, concrete pads and foundations shall be broken and buried in the deepest portion of the fill areas. Broken pieces shall not be consolidated in one area, but shall be dispersed throughout the fill areas to ensure that compaction requirements are achieved.

Excavated material shall be placed in embankments in successive layers not to exceed one (1) foot in thickness before compaction. The layers shall be constructed approximately horizontal. Each layer, before starting the next, shall be leveled and smoothed by means of power driven graders, dozers, or other suitable equipment with adequate weight, capacity, and power to do the work. Layers shall be extended across the entire fill at the level of deposition unless otherwise authorized by the WVDEP. Each layer, before starting the next, shall be compacted.

Fill materials to be used in any area of an embankment shall be free from trash, debris, frozen soil, organic material or other foreign material.

Embankment fill and embankment subgrade materials shall be compacted to at least 90% of Standard Proctor maximum dry density at a moisture content of not less than 2% below nor greater than 3% above optimum unless otherwise shown on the plans. Testing shall be at a frequency approved by the engineer. One lot (5 tests) per day during fill placement of 5000 cubic yards or more shall serve as a minimum. When material on the project has changed and compaction is no longer at 90% a new standard proctor shall be required before using the new material.

Embankment fill material which does not contain sufficient moisture to be compacted to the requirements specified herein shall receive applications of water necessary for compaction. Water shall be applied with suitable sprinkling devices and shall be thoroughly incorporated into the material which is to be compacted. Embankment fill material which contains excess moisture shall be dried prior to compaction. Sufficient disking equipment shall be continuously available at the site and shall be used to add water or remove excess moisture from fill materials.

At the close of each day's work, or when work is to be stopped for a period of time, the entire surface of the compacted fill shall be sealed by a method approved by the engineer. If, after a prolonged rainfall, the top surface of the embankments

are too wet and plastic to work properly, the top material shall be removed to expose firm material. Ruts in the surface of any layer shall be suitably filled or eliminated by grading before compaction.

8.6 Method of Measurement

8.6.1 The method of measurement for excavation shall be by the cubic yard, which shall be the material actually moved and disposed of as herein described, measured in its original location and determined from the certified cross-sections by the method of average end areas or surface to surface modeling using the tin method. No separate payment will be made for ditch, underdrain, or any other incidental work referred to under "Unclassified Excavation", or any regrading or excavation where there are no cross-sections.

8.6.2 The method of measurement for excavated material for soil cover shall be per plan view acre, which shall be the material actually moved and disposed of as herein described, measured in place and determined by actual survey of the area covered.

8.6.3 The method of measurement for liming, fertilizing, seeding and mulching soil borrow areas located within the construction limits as addressed in this item is to be included under Section 6.0, "Revegetation", as contained elsewhere in these specifications.

8.7 Basis of Payment

8.7.1 Basis of payment includes material excavated, transporting, backfilling and regarding or disposal and special handling of material excavated to achieve the final grades will be by the unit price bid for "Unclassified Excavation".

8.7.2 Basis of payment for material excavated for soil cover from on-site excavation operation shall be for segregating, transporting and placing the specified thickness to provide soil cover as necessary to achieve the final grades will be by the unit price bid for "Soil Cover".

8.7.3 Basis of payment for soil cover taken from an off-site borrow area shall be paid at the unit price for "Unclassified Excavation".

8.8 Pay Item

Item 8.1, "Unclassified Excavation", per cubic yard.

Item 8.2, "Soil Cover", per plan view acre.

9.0 MINE SEALS

9.1 Description

This work shall consist of dewatering the existing mine pool, excavating the mine opening, bedding, installing the gravel bulkhead wet mine seal, modified wet seal and bat gate seal, and backfilling the opening to near original grade. It shall be constructed in accordance with the typical details at the locations shown on the plans. Materials shall conform to those listed below. The length of the conveyance pipes and associated clean-outs may vary based on the conditions revealed at the time of construction and the final grades that are achieved. The maximum run allowable of conveyance pipe without installation of cleanouts shall be 150 feet. Dry mine seal will constructed at the location shown on the plans. In mine portal where the face up on the portal will remain untouched the recommended Bat Gate Seal will be placed on the face of the portal with no pipe installed. Bat Gate Seals or portals to receive Bat Gate seal can only be excavated and installed from May 1 to August 31.

9.2 Materials

9.2.1 Stone

The stone shall consist of sound, durable 3" to 6" non-calcareous crushed sandstone. Crushed stone shall consist of particles of clean, hard, tough, durable rock, free from adherent coating. Stone shall have a maximum weighted loss of twelve (12) percent when subjected to five (5) cycles of the Sodium Sulfate Soundness Test – **ASTM C88** (ASTM C88-05 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate), as modified by the American Association of State Highway and Transportation Officials **(AASHTO) T-104.** Non-calcareous stone shall have an acid base accounting test to show the potential for acid producing material in the stone. A laboratory certification of soundness and acid base shall be submitted to the WVDEP prior to delivery.

9.2.2 Filter Fabric

Filter Fabric shall be non-woven as specified in the table below and approved by the Regional Engineer:

PROPERTY	TEST METHOD	ENGLISH	METRIC
Weight - Typical	ASTM D-5261	NA	NA
Tensile Strength	ASTM D-4632	120 lbs	500 N
Elongation @ Break	ASTM D-4632	50%	50%
CBR Puncture	ASTM D-6241	310 lbs	1,380 N

Trapezoidal Tear	ASTM D-4533	50 lbs	200 N
Apparent Opening Size	ASTM D-4751	70 US Sieve	.212 mm
Permittivity	ASTM D-4491	1.7 Sec-1	1.7 Sec-1
Water Flow Rate	ASTM D-4491	135 g/min/sf	5,550 l/min/sm
UV Resistance @ 500 Hours	ASTM D-4355	70%	70%

9.2.3 Pipe

Wet Mine Seal outlet pipes shall consist of custom perforated 12 inch diameter PVC SDR 35 pipe, unless otherwise shown on the plans, extending a minimum of two (2) joints into the mine and through the stone bulkhead as shown on the Plans. The riser component for two (2) of the seal components (with 18 inch diameter custom perforated end cap) and perforated stub (with 12" diameter custom perforated end cap) and for the other component shall also be custom perforated 12 inch diameter PVC SDR 35. Wet Mine Seal Outlet pipes shall extend from one foot (1.0') inside the downstream edge of the stone bulkhead to the receiving outlet ditches surrounded by the "best on site clayey material" from subgrade to the bottom of the mine seal. A bat gate shall be installed at the end of the bat gate pipe as detailed on the Plans. Animal guards shall be constructed and installed on the downstream end of each of the outlet pipes as detailed on the Plans. Clean outs, if required, shall be installed along the two (2) outlet pipe alignments and shall consist of necessary wye fittings and connections compatible with SDR 35 PVC pipe and extending from the outlet pipe to final grades shown on the Plans.

9.2.4 Bat Gate

The bat gates shall conform to the detail drawings as shown on the plans. The bat gates can be made of structural steel or HDPE hot welded material. Contactor will submit shop drawings for approval by WVDEP prior to installation. There are several suppliers that can supply either steel or the HDPE gates. The use of steel or HDPE for the bat gate will be determined by the plan requirements. If steel material is used for the bat gate a marine grade paint shall be used on all of the steel gate.

9.2.5 Bat Gate Pipe

The bat gate pipes shall be HDPE corrugated, smooth wall interior high density polyethylene pipe, such as ADS's Hi-Q pipe, or approved equal.

9.3 Construction Methods

9.3.1 Excavation of the mine opening shall proceed in a manner which will control the release of the mine pool. The opening shall be cleaned of debris to the

satisfaction of the Engineer. Once the opening has been cleaned, a 6" layer of stone shall be placed as pipe bedding. The pipes with risers shall be attached to steel plates and placed in the openings as shown on the attached Plans. The Gravel Bulkhead will be constructed and covered with one layer of Filter Fabric and compacted clay and soil cover as shown on the Plans. Solid pipe shall extend from the mine seal to a drainage system as shown on plans with pipe discharging water placed one foot above the invert of the invert of the drainage system. All pipes shall have a minimum grade of 2 percent.

The Contractor shall be solely responsible for any damages caused by dewatering activities.

9.3.2 A Dewatering Plan shall be submitted and approved by the engineer prior to any work taking place. The Contractor shall install and operate a water treatment system utilizing soda ash briquettes in a manner approved by the engineer to maintain a pH between 6.0 and 9.0 in all water above base flow while dewatering mine. Anytime a mine portal is being dewatered a call must be made to the spill hotline at 1-800-642-3074 to advise of the work being performed. Contractor must get either a confirmation number or a name of the person taking the call.

The contractor is also advised that abandoned mine workings could contain dangerous gases such as methane and blackdamp. The contractor shall be responsible for worker safety when working around mine openings.

9.3.3 The wet mine seals, modified mine seals and bat gate seals will require excavation into the mine entries/collapsed portals for proper installation. The Contractor shall perform this work after taking all necessary precautions with regard to control and treatment of the impounded water, with all work being performed at the risk of the Contractor. The WVDEP accepts no responsibility or liability for any related construction activities. A dewatering plan shall be submitted to the WVDEP for approval prior to seal construction, with pool reduction possibly being provided from above with a well-point system or a similar dewatering scheme.

Construction of wet mine seals, modified mine seals and bat gate seals shall be in accordance with the plan details. Filter fabric shall separate all aggregate/soil interfaces. The clay seal and pipe outlet trenches shall be compacted to 90%. The Contractor shall adhere to OSHA Regulation 29 CFR Part 1926 during all excavation and trenching activities.

9.3.4 Dry mine seals shall be excavated to solid material and then backfilled with compacted material to conform to the surrounding contours.

9.4 METHOD OF MEASUREMENT

9.4.1 Wet Mine Seals shall be measured per mine seal installed and shall include all excavation, dewatering, stone, filter fabric, and pipe necessary to complete the seal. The end of the mine seal shall be considered to be at the end of the outlet pipe where it outlets from the clay seal barrier. If solid pipe is required to convey the mine discharge to the collection channel, then it shall begin at the end of the mine seal and shall be considered to be conveyance pipe.

9.4.2 Modified Mine Seals shall be measured per modified seal installed and shall include excavation, dewatering, stone, filter fabric, and pipe necessary to complete the seal. The mine seal shall be considered to end at a point extending for a length of two (2) pipe joints from where the SDR 35 pipe that lies within the mine seal connects to the 90 degree elbow. Solid pipe extending from the end of the mine seal to the drainage channel shall be considered to be conveyance pipe and shall begin where identified on the plan drawings or as approved by the engineer in the field if field adjustments are necessary.

9.4.3 Bat Gate Mine Seals shall be measured per each installed and approved at the unit price bid per each and shall include all excavation, stone, filter fabric necessary to complete the seal as shown on the Plans and detailed in these Specifications.

9.4.4 Bat Gate Pipe and Bat Gate shall be measured as linear feet of HDPE Pipe installed at each seal. Bat Gate will be incidental to the HDPE Pipe.

9.4.5 Dry Mine Seals shall be measured per each installed and approved at the unit price bid per each and shall include all excavation, (stone and filter fabric if needed) necessary to complete the seal as shown on the Plans and detailed in these Specifications.

9.4.6 The method of measurement for the construction of the PVC SDR-35 drainage conveyance pipe shall be on a linear foot basis of the un-perforated pipe as measured from clay cut-off to the downstream pipe outlet acceptably installed and measured in place per single run of pipe. Trench excavation, furnishing and placement of the pipe and fittings, any necessary cleanouts, compacted on-site backfill, riprap apron where required at pipe outlet or ultimate drainage discharge, and minor grading, including all ancillary materials and operations required to construct the drainage conveyance pipes, will not be measured, but shall be considered incidental to this construction.

9.4.7 Soda Ash Briquettes shall be measured per 50# bag used.

9.5 Basis of Payment

9.5.1 The unit price for Wet/Modified Mine Seal with foam backfill shall include the excavation, stone, filter fabric and all equipment, material and labor necessary for their installation.

9.5.2 The unit price for Bat Gate Mine Seal with stone backfill shall include the excavation, stone, filter fabric and all equipment, material and labor necessary for their installation.

9.5.3 The unit price for HDPE Bat Gate Pipe with Bat Gate attached shall include the HDPE pipe, Bat Gate and all equipment, material and labor necessary for their installation.

9.5.4 The unit price for Dry Mine Seal shall include filter fabric and all equipment, material and labor necessary for their installation.

9.5.5 The unit price for the "Mine Seal Conveyance Pipe shall include the excavation of the trench, the pipe and all the material and equipment necessary to complete the installation.

9.5.6 The unit price for Soda Ash Briquettes shall be for each 50 pound bag used.

9.6 PAY ITEMS

Item 9.1 "Wet/Modified Mine Seal", per each.

Item 9.2, "Bat Gate Mine Seal w/Drainage System", per each.

Item 9.3, "HDPE Bat Gate Pipe", per linear foot.

Item 9.4, "Bat Gate", per each.

Item 9.5, "Dry Mine Seal", per each.

Item 9.6 "Mine Seal Conveyance Pipe", per linear foot.

Item 9.7, "Soda Ash Briquettes (50 lb bag)", per each.

10.0 UTILITIES

10.1 Description

This work shall consist of all necessary measures to relocate, maintain and protect all utilities within the limits of work specified herein and on the construction drawings.

The contractor shall notify the utility in writing at least fifteen (15) but preferably thirty (30) days prior to the time work within the area will be done.

The Contractor shall be responsible for making all necessary arrangements and/or performing all necessary work to the satisfaction of the affected utility company and/or the West Virginia Department of Highways in connection with any disturbances within their right-of-way or services.

The Contractor shall be solely responsible for locating all utilities within the limits of work. All damage made to existing utilities by the Contractor shall be the sole responsibility of the Contractor. In the event damage does occur, the Contractor shall notify the affected utility and the WVDEP immediately and make or have made all necessary repairs and bear the expenses thereof and resulting damage caused thereby.

The Contractor shall obtain right-of-entry and/or any necessary permits for repairs or relocation.

Utility Companies Contacts
Miss Utility of West Virginia 1-800-245-4848

10.2 Materials

All materials used for utility related disturbance shall be in accordance with these specifications or as indicated by the affected utility.

10.3 Construction Methods

All work shall be in accordance with these specifications or in accordance with those methods as indicated by the affected utility.

10.4 Method of Measurement

The Contractor will not bid on utility work but will be reimbursed the actual approved payed invoice cost. The Contractor shall submit an estimate for utility relocation to the WVDEP for approval from the utilities affected by the proposed reclamation will be reimbursed.

11.0 Asphalt Pavement Wearing Course

11. 1 Description

Bituminous paving materials for repair of streets, parking lots, or driveways in accordance with the plans shall be provided in accordance with this Section.

11.2 Materials

11.2.1 Asphalt Pavement Wearing Course shall meet the requirements for Type I Wearing Course as per Section 401 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010. The materials provided shall meet the requirements of Item 401002 hot-mix asphalt wearing course in Table 401.14 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010.

11.2.2 Asphalt Base Course shall meet the requirements for Type IV Wearing Course as per Section 401 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010. The materials provided shall meet the requirements of Item 401002 hot-mix asphalt wearing course in Table 401.14 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010.

11.2.3 Base stone shall consist of AASHTO No. 1 stone as per Section 703 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010. The materials provided shall meet the requirements of Item 401002 hot-mix asphalt wearing course in Table 401.14 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010.

11.3 Method of Construction

Site preparation and placement of asphalt pavement will be in accordance with the requirements of Section 401.10.1 of the WVDOT **Standard Specifications for Roads and Bridges,** Adopted 2010.

11.4 Method of Measurement

11.4.1 The method of measurement for Asphalt Pavement Wearing Course shall be on a per ton basis based on weigh tickets. There will be a 2" compacted Type I Wearing course required on all areas designated on the plans. The unit price bid per ton shall include all asphalt, site preparation, placement, and compaction. Only areas designated on the Plans for pavement repairs shall be included for payment. Other areas requiring repair as a result of the Contractors use and actions as determined and directed by the Engineer shall not be included for payment, rather all costs associated with these repairs shall be borne by the Contractor.

11.4.2 The method of measurement for Asphalt Base Course shall be on a per ton basis based on weigh tickets. There will be a base course required on all areas designated on the plans. The unit price bid per ton shall include all asphalt, site preparation, placement, and compaction. Only areas designated on the Plans for pavement repairs shall be included for payment. Other areas requiring repair as a result of the Contractors use and actions as determined and directed by the Engineer shall not be included for payment, rather all costs associated with these repairs shall be borne by the Contractor.

11.4.3 Shoulder Stone

Should stone shall be placed along the outer edges of the newly laid asphalt. The stone shall be Class I Aggregate and shall be placed to the width as shown on the plans. The stone shall be compacted with a rubber tire roller. The stone will be paid the tonnage taken from the weigh tickets.

11.5 Basis of Payment

11.5.1 The basis of payment for the area of asphalt material (base and wearing) placed at the site and as directed and approved by the Engineer shall be full compensation for all work as described in the specifications and detailed on the Plans in a workmanlike and acceptable manner, including all labor, equipment, tools, materials, and all incidentals required to complete the work and shall be at the unit price bid per ton.

11.5.2 The basis of payment for the area of shoulder stone placed at the site and as directed and approved by the Engineer shall be full compensation for all work as described in the specifications and detailed on the Plans in a workmanlike and acceptable manner, including all labor, equipment, tools, materials, and all incidentals required to complete the work and shall be at the unit price bid per ton.

11.6 Pay Item

Item 11.0, “Asphalt Pavement Wearing Course”, per ton.

Item 11.1, “Asphalt Pavement Base Course”, per ton.

Item 11.2, “ Shoulder Stone”, per ton.

12.0 INJECTION HOLE DRILLING

12.1 Description

This work consists of drilling all injection holes (boreholes or holes) from the ground surface to one (1) foot below the base of the mined coal seam and installing casing as directed by these Specifications. Prior to beginning any work on drilling the injection holes, a pre-drilling survey must be completed by a third party company on all structures within the project limits. The survey will include pictures and video both inside and out of all structures. Special attention shall be given to doorways, window and foundations for existing crack or failures.

12.2 Equipment

Standard rotary type drilling equipment can be used. The drilling equipment must be capable of drilling vertical and angled injection holes as indicated on the Drawings to the required diameter and depth.

The drilling equipment must be equipped with dust collection and/or control devices capable of minimizing fugitive dust emissions during the drilling operations. All drills utilized on this project should be at a minimum, equipped with dust skirts on the drill table, an exhaust system meeting the original manufacturers recommendations or equipment, dust collars which fit around the drill steel as it passes through the drill table (regardless of top or bottom drive), and water spray bars. Drills shall also be equipped with pressure gauges, which indicate the down hole drilling pressure.

12.3 Procedures

12.3.1 All boreholes drilled for injection purposes shall be drilled to a point 1 foot below the base of the mined coal seam and shall have a diameter of sufficient size to permit the installation and removal of required casing and supply pipe. The boreholes shall have a nominal diameter in rock of no less than 6 inches for both vertical and angled holes, Holes locations depicted on the Drawings may be modified by WVDEP as particular site conditions warrant.

Drilling of grout injection holes in yard areas shall be limited to track rigs only, unless prior approval is obtained from the WVDEP. Drilling shall be performed in such a manner as to minimize mine roof collapse, such as reducing down pressure, etc., directly above the mine. The Contractor will be responsible for drilling holes as needed to reach the desired point in the mine and as shown by injection hole locations depicted on the Drawings. The holes shall be drilled with bits and stabilizers or collars (as required) to provide full-diameter, straight holes. Any drilling or associated activities that are performed on a lawn area will have ¾" plywood placed on the ground so that the equipment will not destroy the vegetation.

Vertical holes shall have a maximum deviation from the vertical of 2 percent of the hole's length. Inclined holes shall be started within 2 degrees of the specified angle. All holes are planned to be vertical unless indicated as angled holes on the Drawings.

12.3.2 Special provisions or plans needed to avoid existing structures, utilities, etc., shall be approved by the WVDEP prior to the Contractor utilizing these provisions or plans to drill the associated boreholes.

12.3.3 The Contractor shall be responsible for removing and replacing, at his/her expense, any fencing, trees, shrubs, lawns, etc., which are damaged as a result of the drilling. The Contractor shall, at his/her expense, also correct any damage to sidewalks, driveways, pavements, patios, overhangs, buried utilities, overhead utilities, etc., attributable to drilling operations. Also, maintenance of existing streets, roads, and driveways, both paved and graveled, shall be the responsibility of the Contractor. All roads disturbed by the Contractor's work shall be repaired and maintained in a condition equal to or better than existing prior to the Contractor's activities and in accordance with the following requirements:

12.3.3.1 The Contractor shall be responsible for repairing any damage to roads, streets, sidewalks, curbs, driveways, etc., resulting from drilling or construction activities. Damages to streets include damage resulting from heavy construction/delivery vehicles and/or numerous cycles of equipment over streets. The WVDEP shall be the sole judge of the extent of damage requiring repair.

12.3.3.2 Bituminous pavement shall be repaired by cutting out the damaged section and replacing the pavement in kind, including base stone and hot-laid bituminous pavement in accordance with the **WVDOH Standard Specifications** Section 401. Concrete pavement shall be repaired by cutting out the damaged section and replacing the pavement in kind, including base stone and concrete pavement in accordance with **WVDOH Standard Specifications** Section 501. The extent of the cut out area shall be defined by WVDEP. The patched area joint shall be sealed using a WVDOH-approved sealer.

Damaged pavement removed by the Contractor shall be deposited in a landfill approved by the State to accept this type of material.

12.3.3.3 Any portion of unpaved driveways/roads, etc., impacted by Contractor activities shall be resurfaced with 4 inches, minimum depth, of Class 2 crushed stone as directed by the engineer. Adequate access shall be maintained to nearby residences at all times.

12.3.4 Water encountered in the drilling process and carried to the surface with cuttings shall be contained and filtered by the use of straw wattles or silt fence. Straw wattles or silt fence shall be paid under Section 5.0, "Erosion and Sediment Control." Cuttings and dust sludge shall be cleaned from the hole area Drill cuttings shall be continually cleaned as

the drilling progresses and prior to injection into the hole. Water discharged from the immediate work areas shall meet all applicable federal, state and local effluent limitations.

12.3.5 It shall be the responsibility of the Contractor to protect all drilled and cleaned out holes from debris until the completion of the work at the hole. Any required cleaning of the hole after initial drilling and cleaning shall be at the Contractor's expense.

12.3.6 Each hole drilled shall be cased and otherwise protected from caving and/or becoming clogged or obstructed. Injection holes through soil shall be cased to the top of rock. All pipe fittings required for casing holes shall be furnished, handled and installed by the Contractor.

The casing must be strong enough to maintain an open hole. Metal or plastic casing may be used as approved by the WVDEP Representative and shall extend a minimum of 1 foot above the ground surface, where possible. Casing to be left in any paved area, prior to injecting, shall be flush to pavement level after capping. The casings in soil shall be of sufficient inside diameter to permit drilling the required diameter hole in rock. Casings shall be left in the hole until the completion of injection of that hole. All metal casing shall be removed completely, and plastic casing shall be removed to a minimum of 1 foot below finished subgrade.

If the casing is not removed by the Contractor, the WVDEP will have the casing removed and will deduct the cost of removal from what is owed to the Contractor.

12.3.7 The safety of the residents, public and pedestrian shall be kept in mind at all times when casings are located within the streets and/or sidewalks. Appropriate officials shall be contacted to determine what safety precautions, protection and regulations must be followed during drilling and stabilization operations and while the casings remain in place. All casing left in any paved area shall be flush to the pavement after capping. Also, the Contractor shall limit interruptions to residential access to as little inconvenience as possible.

12.3.8 The number of injection holes may vary depending on the conditions encountered in the mine workings. Conditions that would reduce the number of injection holes required are: (1) encountering solid coal, and (2) based on camera work, flow from other injections holes has stabilized an area. Some conditions, which may require the addition of injection holes are: (1) voids or broken conditions that have significant injection material takes, and (2) areas along the barrier which may require additional thickness. Injection holes shall only be added or deleted by the WVDEP and shall be approved by the Regional Engineer.

12.3.9 The contractor will be required to maintain a drill on site for the duration of the project or provide a drill at any given time at the discretion of the WVDEP to drill additional injection holes or redrill/clean existing injection holes. Additional injection holes drilled will be paid at the contract bid price on a per foot basis. Injection holes that require

redrilling or cleaning will be incidental and no compensation will be made to the contractor.

12.4 Records of Borings

12.4.1 Drilling records (logs) shall be developed by the Contractor to document all types of soil and rock encountered, the depth and changes in soil and rock types, locations of voids, fractures and water bearing zones.

In every hole, special attention shall be given to the conditions at mine level (i.e., presence of coal, gob, roof falls, voids, mud and water), and locations of abnormal loss or gain of drill water or air.

The Contractor shall note on the logs which holes, if any, are interconnected as evidence by dust or water discharge from hole(s) other than the hole being drilled. The fact that the WVDEP may be present and keeping record of the drilling shall not relieve the Contractor from the requirement of keeping an accurate log as described above.

12.4.2 Drilling records (logs) shall be provided to the WVDEP within one day of completion of the hole and prior to the injection of material.

12.5 Directives

The WVDEP reserves the right to:

- Specify the sequence of drilling;
- Terminate the drilling of any of the holes at any depth;
- Order the drilling of holes in addition to those specified herein or
- Delete the drilling of holes specified herein, and
- Change the proposed location of any of the holes;
- Stop drilling operations if adequate dust control measures are not being met;
- Stop operations if adequate sediment control measures are not being met.

12.6 Method of Measurement

12.6.1 Drilling Vertical and Angled Injection Holes

The method of measurement for drilling vertical and angled injection holes in both soil and rock will be made in linear feet from the ground surface to the actual depth drilled along the axis of the hole.

This shall include the cost of furnishing all labor, materials, tools and equipment required for drilling the holes, removing all materials from the casing and maintaining the holes open and clean until no long required, and all incidental work conducted therein.

12.6.2 Casing Vertical and Angled Injection Holes

There will be no method of measurement for casing of vertical and angled injection holes. Materials and installation required for casing of injection holes shall be in accordance with the contract plans and specifications, and shall be considered incidental to and included in the price bid for drilling vertical and angled injection holes.

This shall include the cost of furnishing all labor, materials, pipe, casing, tools and equipment required for casing the vertical and angled injection holes, maintaining the holes open and clean until no longer required, removing the casing from the hole and all incidental work connected therein.

12.7 Basis of Payment

12.7.1 Drilling Vertical and Angled Injection Holes

Basic payment shall include equipment, labor and any materials.

12.8 Pay Items

Item 12.1 "Drilling and Casing Vertical Injection Holes," per linear foot.

Item 12.2 "Drilling and Casing Angled Injection Holes," per linear foot.

Item 12.3 “Video Documentation of all Structures on Project”, per video hour.

13.0 SUBSURFACE INJECTION

13.1 Description

This work consists of purchasing, handling and delivering to the site all required materials for injection and injecting the materials as directed by these Specifications. The structural video shall be submitted to the WVDEP prior to the grout placement. Failure to submit the video will result in non-payment of injected material.

13.2 Definitions

The following definitions apply in the interpretation of these Specifications:

13.2.1 Zone: A zone is a horizontal area influenced by the injection into the hole.

13.2.2 Void: A void is any subsurface opening resulting from the removal of coal from the coal seam. Voids may be at the coal seam level or above.

13.2.3 Gob: Gob is a mixture of materials found at mine level that consists of roof shales and other rock materials that have fallen or have been placed in a void.

13.2.4 Coal Pillar: Coal pillar is an unmined block of coal remaining in the coal seam.

13.2.5 Stage: Maximum volume of grout/concrete injected per 24 hour period.

13.2.6 Gravity Injection: Gravity injection is the method used to place grout or concrete into the injection hole without pressure packers being used. The necessary materials are placed through a pipe (supply and/or tremie) at the specified interval of depth under the action of gravity (gravity flow). Pumping will be required to place concrete and grout at mine level to overcome friction in the injection hoses and pipes.

13.2.7 Overburden: Overburden includes soil and rock overlying the mined coal seam.

13.2.8 Take: Take is the total volume of grout/concrete injected into a given injection hole.

13.2.9 Mine Workings: Area(s) where the coal has been extracted from the coal seam due to underground mining activities.

13.2.10 Closure: A closure (split spacing) method for secondary injection will be used in areas as determined by the WVDEP. Closure holes will normally be located midway between holes injected previously.

13.3 Materials

Grout shall be composed of a flowable mixture of cement, fly ash and water, with the possible addition of an accelerator. Concrete shall be composed of a mixture of coarse aggregate, cement, fine aggregate, fly ash and water. Chemical admixtures may be used to obtain the required slump or to maintain the required workability or flowability if included in the design mix testing. For an on-site batch plant, sufficient quantities of material shall be stored at or near the site of the work so that grouting or concrete operations will not be delayed by shortage of materials. Any on-site storage and delivery of fly ash and cement shall be performed to minimize dust. The Contractor must maintain a record of all materials delivered to the site and provide WVDEP with a copy of all deliveries on a daily basis.

The Contractor, at his expense, will dispose of all materials unacceptable for use and all materials left after grouting is complete, in accordance with NEPA regulations, see Special Provisions Section VII.

13.3.1 Water

The water used in grout and concrete shall be clean and free from injurious amounts of sewage, oil, acid, alkali, salts, organic matter or any other foreign solids, and shall be furnished by the Contractor. Whenever the outside air temperature is below 20 F, the Contractor shall heat all water for mixing, cleaning and flushing. The final mix temperature shall range from 40 F to 80 F, with the water temperature not exceeding 140 F at the time of mixing.

13.3.2 Cement

Cement used in grout or concrete shall conform to the requirements of ASTM C 150, "Portland Cement," Type II Sulfate Resistant. The Contractor shall furnish and store cement so that it will not deteriorate from moisture, weather or other causes.

Cement that has been in storage more than two months shall not be used for concrete or grout. The use of bulk cement will be permitted provided the Contractor provides methods of hauling; transporting, storage and measuring that are satisfactory to the WVDEP.

If sacked cement is used on the project, it shall be used in the chronological order in which it was delivered on the job to prevent undue aging and delivery. Store each shipment of cement so that it may readily be distinguished from other shipments. Use only cement free from lumps due to warehouse set. No additional payment will be made for screening or for old cement which may be rejected by the WVDEP.

13.3.3 Fine Aggregate

Fine aggregate shall consist of hard, dense, durable fragments and shall meet the gradation requirements of AASHTO Number 8 (1/2-inch to #16) and conform to all requirements of ASTM C 33.

13.3.4 Coarse Aggregate

Coarse aggregate shall consist of hard, dense, durable fragments and shall meet the gradation requirements of AASHTO No. 57 stone.

13.3.5 Fly Ash

Type F fly ash resulting from combustion or pulverized coal supplied and handled by the Contractor shall meet the following requirements:

- A Maximum Loss of Ignition (LOI) of 12 percent.
- A minimum of 40.0 percent Silicon Dioxide (SI02).
- A minimum of 15.0 percent Aluminum Oxide (AI203).
- Not more than 5.0 percent Acid Soluble Sulfate (SO3).
- Not more than 3.0 percent Magnesium Oxide (MgO).

13.3.6 Accelerator

The use of an early set accelerator shall be added to mixes when directed by the WVDEP. All accelerator products shall conform to ASTM C 494.

13.3.7 Optional — High Range Water Reduce

The use of a water reducer may be added to concrete mix only with approval of the WVDEP. All water reducing products shall conform to ASTM C 494. There will not be additional payment for the use of water reducers.

13.3.8 Optional — Set Retarder

The use of a set retarder may be added to mixes only with the approval of the Engineer. All set retarding products shall conform to ASTM C 494. There will be no additional payment for the use of set retarders.

13.4 Grout and Concrete Mixes

13.4.1 Grout Mix

The water-cement-fly ash ratio of the grout mix will be determined by the Contractor with the approval of the WVDEP. The resultant grout must be flowable and have a minimum unconfined compressive strength of 350 psi after

seven days of curing and 500 psi after 28 days of curing. Testing cylinder should be taken in the am and pm during injection activities. The Contractor will be responsible for insuring that the grout mix will meet the strength requirements and also that the mix can be pumped through the injection pipe (both the supply lines from the pump to the injection hole and tremie pipe) to be utilized on this project. Grout mixes may be varied to meet particular characteristics of each boring, with WVDEP approval, but each case must meet the minimum unconfined compressive strength requirements and shall not exceed the water/cement ratio of the design mix. The grout shall have a flow cone value 45 seconds minimum as determined by ASTM C 939.

Twenty-eight-day compressive strength test specimens shall be obtained and sampled according to ASTM Test Designation C31-83 for a minimum of each 50 cubic yards or daily fraction thereof. WVDEP may require samples to be taken from any truckload of grout. The Contractor shall comply with Specifications Section 3.2.3 to obtain samples and performing testing procedure associated with grout and concrete specimens.

A written grout mix, using weights of materials shall be submitted to WVDEP for approval a minimum of five working days prior to injection operations. Even upon approval, it remains the Contractor's responsibility to ensure the minimum compressive strength requirements are achieved.

13.4.2 Concrete Mix

Concrete shall be composed of a mixture of water, cement, sand, flyash, fine aggregate and coarse aggregate. Concrete must have a mix proportioned for a 4 to 6-inch slump as measured in ASTM Test Designation C 143, or otherwise, will be directed by the Engineer. The Contractor shall be responsible for insuring that the design mix for concrete can be pumped through the injection pipes (both the supply lines from the pump to the injection hole and tremie pipe) that is to be utilized for the project. All concrete placed shall have a minimum unconfined compressive strength of 350 psi after seven days of curing and 500 psi after 28 days of curing. The water/cement rations shall not exceed those of the design mix for each design slump. Slump shall be maintained in the required range even after pumping.

13.4.3 Mix Designs

All concrete and grout mix designs to be used by the Contractor will be subject to review and approval of the WVDEP. The use of grout or concrete will be at the discretion of the Engineer. The flow rate of the grout will also be at the discretion of the Engineer. The Contractor shall submit to the WVDEP the proposed mix designs along with sufficient test data using the proposed sources of mix components to verify strength parameters prior to the initiation of injection operations. This design mix testing shall include the corresponding slump and fluidity test results for the design mixes. If**,** during injection operations, the

testing indicated that required strengths are not being achieved, the design mix proportions are not being achieved, or the required slump is not being achieved, then the Contractor shall modify the mix proportions, strengths, and slump. Contactor shall submit specific gravity of all mix materials used in the yield test.

All unconfined compressive strength requirements of this Specification are based on testing according to ASTM C 39 of cylindrical samples prepared according to ASTM C 31.

If the Contractor desires to mold and test cube samples of grout according to ASTM C 109 to assist in quality control during injection, he must also present the test results of unconfined compressive strengths of cube samples of the design mixes prior to the initiation of grouting and concrete operations. These test results will be used by the Engineer to determine if and how much the design strength measured for cube samples must be increased in order to determine that the specified unconfined compressive strength based on cylindrical samples is being achieved.

13.5 Equipment

13.5.1 All equipment required for mixing and injecting grout and concrete shall be furnished by the Contractor. The power supply and equipment and layout thereof shall meet all applicable local, state and federal requirements, regulations and codes, including those related to safety.

13.5.2 The Contractor can use a premixed grout delivery service or an on-site mixing facility. In the area of fly ash storage, a sprinkler system for dust control is required. In either case, the grout shall be well mixed and shall be free of hardened grout or foreign materials larger than would pass a Number 16 U.S. Standard screen. The Contractor shall provide all necessary pumps, mixers, compressors, tanks, meters, valves, hoses, pipes, fittings, tools and other miscellaneous items to provide a continuous supply of grout and to maintain accurate control and measurement. The grout plant must be capable of providing 50 cubic yards of grout per hour to each operating pump. The tremie pipe, when required, shall be metal or plastic, no smaller than 3 inches in diameter and stiff enough to maintain the tip below the level of grout during placement. The type and diameter of grout supply pipe to be used shall be determined by the Contractor and approved by the WVDEP. If, at any time, it is determined that the pipe is of insufficient diameter, then the WVDEP will direct the Contractor to use a larger diameter pipe.

13.5.3 The equipment used to mix grout and concrete shall have suitable metering devices to accurately, continuously measure the proportions of all components of the mix, including, water at the time of injection. The water meter shall be a non-resettable, continuous flow meter and must meet the approval of the WVDEP

13.5.4 All flow measurements and mix-proportioning equipment shall have a recent calibration and shall be field calibrated periodically during the project as directed by the WVDEP. If a grout plant is utilized during construction, calibration will be required on a weekly basis. All equipment must be in good working conditions.

13.6 Procedures

13.6.1 The Contractor shall perform periodic depth soundings during grout and concrete injection operations to determine the levels of injected materials in the holes, and to maintain the discharge points of the injection pipes below the surface level of the grout or concrete.

13.6.2 Vertical and angled holes are as defined on the Drawings and are located throughout the area to be stabilized. In general, grout is to be injected in the existing mine voids. Concrete may be injected into the voids as directed by the WVDEP Representative.

13.6.3 Injection sequences, injection materials, and injection procedures for each hole will be determined by the WVDEP. In general, grout or concrete shall be injected continuously into a hole until the hole fills to the base of the casing or until the WVDEP directs the Contractor to terminate injection. The WVDEP may terminate injection in any hole at any time that the WVDEP determines is appropriate to attempt to limit undesirable loss of injection material outside the area of stabilization. A minimum period of 24 hours shall elapse between subsequent injection stages in a given hole.

13.6.4 All injections shall be performed using the gravity injection technique described herein. Prior to injecting any material into the mine, the Contractor shall determine the presence or absence of water in the mine (void). Where injection is to occur in water, tremie-grouting using a grout or concrete supply pipe shall be used. The grout or concrete supply pipe shall be extended to the bottom of the hole, filled with grout or concrete and slowly withdrawn from the borehole.

Additional material shall be pumped into the pipe as it is withdrawn such that the pipe is always full and the bottom of the pipe is always maintained within the grout or concrete being placed. Free fall of grout or concrete through the injection stage is prohibited where injection occurs in water.

13.6.5 Grouting above the mine shall continue to the top of rock unless large takes are encountered in which case the mix may be thickened. The WVDEP will determine if large takes are encountered. If directed by the WVDEP, fine or coarse aggregate shall be placed in the hole by shoveling or other methods approved by the WVDEP while grouting continues.

13.6.6 No flushing of water down the hole or into the mine will be allowed once injection has commenced in that borehole. The Contractor shall inject material in such a way as to not coat or foul the borehole until mine-level voids are filled and the injected material backs up into the borehole.

13.6.7 Concrete shall be placed within the following time limits after the introduction of the cement:

13.6.7.1 90 minutes when the ambient air temperature is 80° F or less.

13.6.7.2 60 minutes when the ambient air temperature is over 80° F.

13.6.8 Once the injection holes have been grouted or concreted to the top of rock, the grout or concrete has been permitted to set and found not to have settled significantly, then the casing shall be removed. Concurrently with or immediately after removal of the casing, the remaining open hole in the overburden shall be filled with grout to the ground surface. If grout settlement occurs later, the hole shall be refilled to the ground surface with aggregate. Aggregate used to fill the holes shall be that specified in Section 13.3 and 13.4, "Materials."

13.6.9 The Contractor shall obtain access to the basement of the residence being stabilized to monitor the walls while grouting adjacent to the structure. In addition, the Contractor shall be responsible for monitoring every basement in the immediate vicinity during grouting operations. If any evidence of distress to the walls or inflow of injection material or water is noted, the injection shall be stopped immediately and the material permitted to set.

Depending on conditions, the WVDEP may decide that the remainder of the hole shall be filled with injection material, fine aggregate, or coarse aggregate.

If any material enters a structure, it shall be removed and the area cleaned and repaired at the Contractor's expense. The Contractor shall also be responsible and bear the expense for repair of damages to basement floors and walls, sewer lines which become damaged or clogged with injection material, etc. This monitoring and any necessary repairs or cleanup shall be considered incidental to the subsurface injection program.

13.6.10 The supply line will be cleaned at the conclusion of each day's injection with a "pig." The cleaning of the supply line by flushing with water into the injection hole will not be allowed. The material from the supply lines shall be contained and removed from the site as approved by the WVDEP.

After a hole has been drilled, all cuttings will be removed that same day and the area around the hole will be returned to the condition it was in before drilling.

13.6.11 Slickline Crossings will require the Contractor to obtain all necessary permits and approval from WVDOT, Cities and Subdivision Groups. Slickline needs to be bedded or blocked up so the pipe and clamps do not contact the surface of the roads and streets to prevent damage. Warning signs at the crossing(s) shall be installed as required by the governing body. The two types of crossings that will be allowed are steel plate and Class II (3/4" crusher run) aggregate. The steel plates shall be of sufficient thickness to carry the expected loads for the road. The plates shall run a minimum of 10 feet in both directions from the centerline of the slickline and shall cover the full width of the road. The 3/4" crusher run aggregate shall extend a minimum of 18 feet from the centerline of the steel slickline in both directions, or have a maximum slope of 12:1, whichever is greater, and cover the full with of the road. A minimum of 12" of stone will be required over the top of the slickline. The crossing installed with the 3/4" crusher run aggregate may remain during the length of the project or until it is no longer required. However, if it remains, a daily inspection will be required to insure that no safety issues exist. The crossing installed using the steel plates will be removed along with the slickline at the end of each day of production and reinstalled on the next day of production.

13.7 Testing

13.7.1 The Contractor shall prepare grout and concrete test cylinders in accordance with ASTM C 31 at a rate of four (4) for each 50 cubic yards placed or any fraction thereof as directed by WVDEP. The WVDEP reserves the right to require preparation of cylinders from any batch. The samples shall be obtained at the injection hole's location or at the batch plant as directed by the WVDEP. The Contractor shall have the cylinders tested according to the ASTM C 39 at 7 days, 14 days and 28 days cure and on cylinder held as a spare. The Contractor shall report results to WVDEP in writing within 48 hours of completion of each test. Test cylinders shall be prepared at each plant or field change of the water-cement-flyash ratio. The slump of each load or batch of concrete shall be determined according to ASTM C 939. The Contractor, upon request from the WVDEP, shall test the slump or fluidity of the mix. A record of all test results shall be made. The cost of this testing and reporting shall be the responsibility of the Contractor.

13.7.2 If the Contractor desires to test cubes of grout and has previously completed testing as discussed under Section 13.4.3, "Mix Designs," then mold and test cube samples of grout are acceptable at the frequency specified for cylinders in accordance with ASTM C 109.

13.8 Records and Forms

13.8.1 The Contractor shall maintain daily labor and material records for subsurface injection operations on forms suitable to the WVDEP. These records shall include actual measured quantities of the injection material components, including water.

13.8.2 The Contractor shall record the quantities of concrete and grout injected into each injection hole, on forms approved by the WVDEP.

13.8.3 Daily records of labor, mix proportions, slump measurements, fluidity measurements, water removed from the mine and injection quantities shall be submitted to the WVDEP within one day of injections.

13.8.4 Compressive strength test results shall be submitted within 7 days of the test date on the laboratory testing. The laboratory shall meet specifications in Section 3. The Laboratory forms shall bear the laboratory name, address, sample designation, sample date, test date, and original signature of a certified lab analyst. Sample test results which fail to meet required strength criteria, as set forth in the contract and these specifications, may be subject to nonpayment for the volume of material represented by the deficient sample, following a review by the WVDEP.

13.9 Method of Measurement

13.9.1 Purchasing, Handling, and Placing Concrete

Payment for purchasing, handling, and placing concrete, and all associated costs will be based on the number of cubic yards of concrete injected. This shall include purchase, mixing and transportation of high and low slump concrete from the batch plant or supplier to the job site and depth soundings conducted during the injection process. The volume submitted for payment cannot exceed the material dry weight(s) delivered and proportioned per cubic yard based on the mix design submitted. Concrete placed in installed monitoring wells shall be included in this measurement section. Test results from the concrete mix shall be submitted with the current pay application.

13.9.2 Purchasing, Handling, and Placing Grout

Payment for purchasing, handling and placing grout, and all associated costs will be based on the number of cubic yards of grout injected. This shall include purchase, mixing and transportation of grout from the batch plant or supplier to the job site and depth soundings conducted during the injection process. The volume submitted for payment cannot exceed material dry weight(s) delivered and proportioned per cubic yard based on the mix design submitted. Test results from the grout mix shall be submitted with the current pay application.

13.9.3 Purchasing, Handling, and Placing Fine Aggregates

Payment for supplying, handling and placing fine aggregate will be made based on the number of tons of fine aggregate placed.

This shall include the cost of all material, labor, transportation, tools and equipment and associated costs required for purchasing, handling, and placing the

fine aggregate into the borehole. Any work required to clear boreholes where fine aggregate has "bridged" or otherwise blocked the borehole is also included as part of this item. This item does not include fine aggregates used in grout or concrete mixes.

13.9.4 Purchasing, Handling, and Placing Coarse Aggregates

Payment for supplying, handling and placing coarse aggregate will be made based on the number of tons of coarse aggregate placed.

This shall include the cost of all material, labor, transportation, tools and equipment and associated costs required for purchasing, handling, and placing the coarse aggregate into the borehole. Any work required to clear boreholes where coarse aggregate has "bridged" or otherwise blocked the borehole is also included as part of this item. This item does **not** include coarse aggregates used in grout or concrete mixes.

13.9.5 Accelerator

Measurement of an accelerator will be made per pound based on the weight exhibited by the admixture in its commercial form prior to addition of water or to the injection mix. This shall include the cost of purchase, transport, storing, handling, and mixing of admixture.

13.10 Basis of Payment

13.10.1 Purchasing, Handling, and Placing Concrete

Payment will be made at the contract unit price per cubic yard.

13.10.2 Purchasing, Handling and Placing Grout

Payment will be made at the contract unit price per cubic yard.

13.10.3 Purchasing, Handling and Placing Fine Aggregate

Payment will be made at the contract unit price per ton.

13.10.4 Purchasing, Handling and Placing Coarse Aggregate

Payment will be made at the contract unit price per ton.

13.10.5 Accelerator

Payment will be made at the contract unit price per pound.

13.11 Pay Items

Item 13.1 "Purchasing, Handling, and Placing Concrete," per cubic yard.

Item 13.2 "Purchasing, Handling, and Placing Grout," per cubic yard.

Item 13.3 "Purchasing, Handling and Placing Fine Aggregate," per ton.

Item 13.4 "Purchasing, Handling, and Placing Coarse Aggregate," per ton.

Item 13.5 "Accelerator," per pound.

14.0 CONFIRMATION DRILLING

14.1 Description

The Contractor shall perform confirmation exploratory core drilling in accordance with ASTM D 2113 as may be required by the WVDEP to determine the effectiveness of the injection operations or to determine subsurface conditions. The borings shall be advanced through the soil and maintained open to the top of rock by a method selected by the Contractor and approved by the WVDEP. The drilling shall produce a core approximately 2 inches in diameter. The locations of the confirmation borings will be determined by the WVDEP.

All core drilling shall be performed with standard core drilling equipment using a double-tube core barrel capable of producing cores of the diameter specified. Coring shall utilize double-tube core barrels with a longitudinally split inner barrel of design equal to or better than "M" series for recovery of unpredictable soft or friable materials. The core barrel shall be pulled and the core removed as often as may be necessary to secure the maximum possible amount of core. The borehole shall be backfilled with grout upon completion of sampling.

14.2 Method of Measurement

The method of measurement for confirmation drilling payment will be at 95% recovery from the ground surface to the actual depth drilled as measured along the axis of the hole per lineal foot.

14.3 Basis of Payment

Payment will be made at the contract unit price per lineal foot.

All exploratory drill holes and confirmation drill holes must be removed and abandoned by a person who has been certified by the State of West Virginia in accordance with 47CFR59, “Monitoring Well Regulation”. This certification is necessary for any person to operate in West Virginia and includes construction, installation, alteration and/or abandonment of any monitoring wells and select boreholes. The cost of the abandonment and elimination of these boreholes shall be incidental. This shall include the cost of furnishing all labor, pipe, casing, tools, and equipment required for drilling, sampling, and backfilling the holes including all incidental work connected therewith.

14.4 Pay Items

Item 14.0 "Confirmation Drilling," per linear foot.

15.0 BOREHOLE PHOTOGRAPHY

15.1 Description

The Contractor shall purchase, rent, or otherwise retain the services of a qualified company with a borehole video camera. The camera shall be utilized to make and record, in CD format, horizontal and axial visual observations to determine the effectiveness of filling the mine voids, and/or to view conditions at mine level prior to injections. The Contractor shall provide these services, upon request by the WVDEP within 24 hours of said request. The name and qualifications of the company, as well as information on the camera used, shall be provided with the bid documents and approved by WVDEP prior to use of the company or the camera.

15.2 Method of Measurement

Payment will be made at the contract unit price per hour.

15.3 Basis of Payment

Measurement of borehole photography will be made on a per hour basis. This shall include all labor, materials, equipment, transportation, setup, recording, camera usage, and all other associated items and costs necessary to produce, record, and provide to the WVDEP two copies of compact discs (CD/DVD) of the conditions in the boreholes as requested. The unit of measurement shall be based on approved video length as shown by the video tape counter.

15.4 Pay Items

Item 15.0 "Borehole Photography," per video hour

16.0 TEST BORING LOGS

16.1 Description

The final exploratory boring logs for the test boring identified on the Contract Drawings are attached with this section of specifications. The exploratory borings shown on the plans or attached to these specifications, depicting subsurface conditions are thought to be representative but cannot be guaranteed accurate. In the event others make conclusions or recommendations based on the test boring data shown, such conclusions or recommendations are the responsibility of the others.

The Contractor shall have satisfied himself by personal examination or subsurface samples from test borings, by a visit to the site and by such other means as he may choose, as to the actual conditions and requirements of the work. No allowance will be made for any claim that the bid was based upon incomplete information as to the nature and character of the site, the work involved, or for materials or an unexpected characteristic found in excavations.

All Contractors and prospective bidders must receive permission from the Landowner before obtaining any subsurface samples and/or test borings holding WVDEP harmless against any injury or damage whatsoever resulting from this use of the property.

17.0 TRAFFIC CONTROL

17.1 Description

This work shall consist of all necessary measures to maintain and to protect traffic; to protect the work in progress; to protect adjacent property from excess dust resulting from the construction area, and to maintain traffic through, around, or adjacent to the construction area, in accordance with these specifications or as directed by WVDEP.

17.2 Materials

All materials used for traffic control shall be in accordance with the current WV Division of Highways Manual **"Traffic Control for Streets and Highway Construction and Maintenance Operations."**

17.3 Construction Methods

Control and protection of traffic through work areas shall comply with the current WV Division of Highways Manual **"Traffic Control for Streets and Highway Construction and Maintenance Operations".** All traffic plans must be coordinated through the WVDOH.

The Contractor shall be responsible for developing a traffic control plan that complies with the WVDOH requirements. A copy of the traffic control operational plan and WVDOH's approval of said plan shall be submitted to the WVDEP Representative for approval prior to its implementation. Access to residences shall be maintained during construction. The Contractor shall give the WVDOH seven (7) working days' notice prior to the beginning of work so the public can be made aware of forthcoming construction activities.

17.4 Method of Measurement

The method of measurement for determining the quantity of work done as described above for Traffic Control work will not be a separate pay item, but will be considered incidental to all other work associated with the construction of this Project as described in these Specifications, and as shown on the Plans.

Permit fees and other miscellaneous associated costs associated with and required for any Traffic Control work shall also be considered incidental to all other work associated with the construction of this Project as described in these Specifications, and as shown on the Plans. No separate pay item exists for Traffic Control work.