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Kevin L. Reichard, PE
BioMost, Inc.

(Seal)

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Date

TECHNICAL SPECIFICATIONS

SCOPE OF PROJECT

The intent of this project is to construct a passive treatment system for an existing acid mine discharge in accordance with the Drawings and these Technical Specifications.

The work involved essentially consists of: limited clearing and grubbing, ditch excavation, construction of a passive treatment system with pond and wetland construction, including lining with onsite clay material, installing PVC pipe, furnishing and placing aggregate and compost, maintaining/improving/relocating existing dirt access roads, and general site revegetation. (Removal and onsite disposal of mine drainage sludge from existing treatment Pond D is to be provided by the successful bidder as a separate payment item.)

Directions to the project area are:

From Osceola Mills

At the intersection of Stone Street and Curtin Street (PA SR0053 & SR0970) continue southeast on Curtin Street/PA SR0970 about 0.4 miles; bear right onto State Street and continue on PA SR0970 about 0.9 miles; turn right onto Spike Island Road crossing Trout Run and travel about 0.1 mile to a "T" intersection with Penn Five Road; turn left onto Penn Five Road and travel south about 0.5 miles; from the community of Penn Five two dirt & gravel roads access the Dugan #2 site:

Option 1: continue along Penn Five Road through the community of Penn Five about 0.6 miles; from Penn Five Road continue through a gated private access road to the top of the hill and along the crest about ½ mile; turn left and go southwest down the hill about ½ mile to the Dugan #2 site;

Option 2: turn left at the community of Penn Five traveling south on a private access road roughly parallel to Trout Run for about 1 mile to the Dugan #2 site. (The access is gated prior to reaching the Dugan #2 site.)

MEASUREMENT AND PAYMENT

Payment will be made at the established contract lump sum price.

Invoices may be submitted monthly to the Department based on approximate percentage of project completion.

Progress payments shall be based on satisfactory completion of the following items, unless otherwise approved by the Department's Representative:

- 10% Mobilization
- 10% Erosion and Sediment Control facilities
- 5% Channels 1 & 2
- 5% Anoxic Limestone Drain (**ALD**)
- 30% Vertical Flow Pond (**VFP**)
- 15% Constructed Wetland (**WL**)
- 10% Seeding
- 5% Demobilization & Site Cleanup
- 10% Final Project Acceptance

Other required items completed shall be considered as part of the above listed items or shall be considered incidental.

Ten percent (10%) of the total contract lump sum price bid shall be withheld until final project acceptance by the Department. Final project acceptance includes completion of all contract items, including removal of all equipment and all temporary E & S Controls and satisfactory completion of cleanup operations. Flow through all components of the passive treatment system shall also be documented, including the final system discharge from the Constructed Wetland. Valves shall also be determined to be operational by fully opening and fully closing each valve.

Documentation of all project work is required and shall include digital progress photographs displaying the time and date stamp on the recorded image. Photographs are to be taken DAILY whenever activities are conducted onsite by the Contractor or his agents to provide a detailed log of project work, including placement of each of the three (3) safety signs. All photographs shall be submitted to the Department's Representative. Form and frequency of submission shall be as approved by the Department's Representative.

Receipts for material delivered to the site shall include date and time of delivery, identification of quantity and type of material delivered with name and contact information (including mailing address) of the responsible party delivering the materials.

Separate Payment Item - Pond D Cleaning (UP TO \$10,000): Plan to be developed by Contractor and approved by the Department's Representative. Plan will be developed by the successful bidder, reviewed and approved by the Department.

DELIVERED MATERIALS SPECIFICATIONS

Other materials may be needed for access road maintenance/improvement, minor features, etc.; which are not identified in the following table.

LIST OF MATERIALS WITH SELECTED SPECIFICATIONS

Materials	Selected Specifications (See notes and Drawings for further description.)	Use
Safety Sign		At existing 3 access road entrances to CWA
Silt Fence with hardware	Class 3, Type B; straw/hay bale reinforcement	E & S Control
Erosion Control Mulch Blanket and Anchoring Devices	Organic Mulch Material or Reprocessed Wood Fiber	Diversion Ditch; areas identified on Drawings
Stone		
AASHTO #1 limestone	≥85% CaCO ₃	ALD treatment medium
AASHTO #57 limestone	≥85% CaCO ₃	VFP treatment media
AASHTO #8 limestone	≥85% CaCO ₃	VFP treatment media
AASHTO #57	Non-calcareous or calcareous (preferred)	VFP underdrain bedding/filter stone; valve boxes; ALD manifold bedding
R-3, R-4 riprap	Non-calcareous or calcareous (preferred)	Channels 1 & 2; spillways; level spreader; check dam
Geotextile with Anchoring Devices	Class 2, Type A	Channels 1 & 2; spillways; VFP; ALD; level spreader
Spent Mushroom Compost	Byproduct of commercial mushroom grower	VFP treatment media
Wood Chips	Single-shredded	VFP treatment media
Valves	4" slide-gate	VFP outlet
Valve Box with PVC drain pipe	Prefab vault with bolted top; 1-inch perforated PVC pipe	VFP outlet
Pipe		
Sch40 PVC pipe, fittings, risers, anti-seep collars, etc.	VFP 4" solid pipe; anti-seep collars with watertight connection; ALD 6" solid pipe; VFP/ALD custom-perforated pipe	VFP underdrain and outlet; ALD manifold/outlet
PE pipe, fittings, bar guard, etc.	15", Type S, watertight joints; tee; bar guard	Existing Pond D to VFP
PE culvert	24", Type S, soiltight joints	Diversion Ditch to level spreader
Baffle curtain and appurtenances	18 oz. UV-stabilized vinyl "brattice" cloth; SDR35 PVC pipe; nylon ropes; steel stakes & weights	Existing Pond D
Seeding		
Temporary with amendments	Formula E seed mix	Disturbed areas
Permanent with amendments		Disturbed areas

In the above table, material sizes, types, and locations of use are provided as general information only. All material types, sizes, quantities are identified on the plans. In the case of conflict information, the plans take precedence.

DETAILED SPECIFICATIONS FOR MATERIALS

Safety Sign

- All safety/warning signs shall be constructed of and posted on material that will not deteriorate during the life of the project. The background shall be yellow with black, bold, block lettering, having a 1" minimum spacing between lines. Capital letters shall be, at a minimum, 4" inches high. Safety signs shall be visible by vehicular traffic on the existing access roads. Each safety sign shall be printed with the following:

ACTIVE CONSTRUCTION AREA
PROCEED AT YOUR OWN RISK
STAY IN VEHICLE

Silt Fence

- All silt fence shall be installed to a minimum height of 30" and shall comply with PennDOT Pub. 408, Section 735, "Geotextiles" for Construction Class 3, Sediment Control, Type B. Straw and/or hay bales shall be used for reinforcement and shall be tightly baled.

Erosion Control Mulch Blanket

- All Erosion Control Mulch Blankets and Anchoring Devices shall meet the applicable requirements in PennDOT Pub. 408, Section 806, "Water Course and Slope Erosion Protection", Subsection 806.2, "Material".

Stone

- All stone shall conform to the specifications provided in the current PennDOT Pub. 408 and shall meet, at a minimum, the PennDOT Type C Coarse Aggregate Quality Requirements.
- All stone shall be provided by PennDOT-approved aggregate producer(s) listed in the current PennDOT Pub. 34, Bulletin 14 "Aggregate Producers".
- A certificate or affidavit for all stone shall be provided by the aggregate/riprap producer attesting that the stone is in compliance with current PennDOT Pub. 408 specifications. The Contractor shall provide all certificates or affidavits to the Department's Representative. For AASHTO #1, #8, and #57 limestone, the aggregate producer shall provide a certificate or affidavit attesting that the calcium carbonate content is 85% or greater.

Geotextile

- All geotextile shall meet the requirements of the current PennDOT Pub. 408, Section 735, "Geotextiles".
- A certificate or affidavit for all geotextile shall be provided identifying the PennDOT-approved manufacturer(s) as listed in the current PennDOT Pub. 35 Bulletin 15 "Approved Construction Materials" and certifying to compliance with PennDOT Pub. 408 for Class 2, Type A geotextile and shall be submitted by the Contractor to the Department's Representative.

Spent Mushroom Compost

- All spent mushroom compost shall be a mixture of horse manure (straw bedding collected from stables), hay, corn cobs, poultry manure, gypsum, and other ingredients which have been used for commercial mushroom production. All spent mushroom compost shall be reasonably free from rocks, litter, and trash.

- A certificate or affidavit for all spent mushroom compost shall be provided by an authorized representative of the source and shall list the components with quantities and shall be submitted by the Contractor to the Department's Representative.

Wood Chips

- All wood chips used in the Vertical Flow Pond treatment media shall be single shredded (general size range ½" to 2" in any dimension) and shall conform to PennDOT Pub. 408, Subsection 805.2.f "Wood Chips". Double-shredded wood chips shall not be approved.
- A certificate or affidavit for all wood chips used in the Vertical Flow Pond treatment media shall be signed by a responsible official from each offsite source attesting to conformance with specifications and shall be submitted by the Contractor to the Department's Representative. Any wood chips produced onsite to be incorporated into the Vertical Flow Pond treatment media shall be approved by the Department's Representative prior to use.

Valves

- Valves shall be slide-gate type manufactured by Valterra, Mission Hills, CA for use with 4", SCH40, PVC pipe as specified on the Drawings. Alternative valves may be used upon approval by the Department's Representative.

Valve Box

- High density polyethylene (HDPE) prefabricated vaults with bolted tops conforming to ASTM D4976 shall be commercially manufactured and of the size specified on the Drawings. The Contractor shall provide product data to the Department's Representative prior to installation for approval. The 1-inch PVC drain pipe does not require a pressure rating.

Pipe

- Schedule 40 PVC pipe (4", 6") and fittings shall conform to ASTM D1784 or D4396. Pipe shall be Schedule 40 and conform to ASTM D1785 (pressure) or D2665 (drain, waste, vent) or F891 (drain, waste, vent) with fittings conforming to ASTM D2466 (pressure) or D2665 (drain, waste, vent). All PVC pipe shall be unperforated, solid or foam core. Custom perforations shall be completed in accordance with the Drawings. Pipe Cement and Cleaner for solvent welds shall conform to ASTM D2564 and ASTM F656. Flexible couplings shall conform to ASTM D5926. Adjustable outlet risers for the Vertical Flow Pond shall conform to the specifications provided on the Drawings. The anti-seep collar included on the Drawings is manufactured by Agri Drain Corp., Adair, IA; equivalent or better anti-seep collar compatible with the pipe material may be substituted upon approval by the Department's Representative. Anti-seep collars shall be installed using fittings, materials, and methods recommended by the manufacturer to insure a watertight connection to the pipe. Concrete anti-seep collars shall not be used.
- SDR35 Pipe and fittings shall conform to ASTM D1784 and ASTM D3034. All pipe shall be solid non-perforated bell-end pipe.
- PE pipe (15") shall be corrugated, unperforated, polyethylene pipe, Type S and shall be manufactured from high density polyethylene virgin compounds and shall conform to AASHTO M294. The pipe wall shall be corrugated exterior construction with a smooth inner liner. Watertight joints for dual-wall pipes shall conform to ASTM D3212. Watertight joint fittings shall be integral built-in bell with factory-installed rubber gaskets or as approved by the Department's Representative. Rubber gaskets shall conform to ASTM F477.
- PE pipe (24") shall be corrugated, unperforated, polyethylene pipe, Type S and shall be manufactured from high density polyethylene virgin compounds conforming to AASHTO M294.

Pipe wall shall be corrugated exterior with a smooth inner liner. Soiltight joints shall be made with split couplers, or as otherwise approved by the Department's Representative.

Baffle Curtain

- Baffle material shall be UV-stabilized vinyl laminate material (brattice cloth). Curtain and weights to be fastened using UV-stabilized, commercially-available, nylon rope. Weights shall be commercially-available bricks with holes to readily accept rope. Steel stakes shall be 3/4" concrete reinforcing bar (#6 rebar) or other 3/4" diameter solid steel stake.

Seeding

- Temporary seeding shall use PennDOT Formula E (Annual Ryegrass; 88% min. pure live seed) with application rate of 48 lbs/ac. Hay/straw mulch application rate shall be 2.5 tons/ac.
- Permanent seeding shall apply the seed mix and amendments of the type and rate shown on the Drawings. The seed mix and application rate shall be Birdsfoot Trefoil @ 10 lbs/ac; White Dutch Clover @ 4 lbs/ac; Kentucky Bluegrass @ 10 lbs/ac; Perennial Rye @ 6 lbs/ac. All species shall have 90% min. purity with 80% min. germination. Commercial fertilizer shall be 10-20-20 (nitrogen-phosphate-potash) @ 400 lbs/ac. Lime @ 4 tons/acre shall be ground agricultural limestone (minimum 86% calcium carbonate equivalent) with at least 95% passing a 20 mesh sieve. Hay/straw mulch application rate shall be 2.5 tons/ac. For consideration of revision to the type and rate of application for soil amendments, the Contractor shall submit soil samples to an approved lab for analysis. All analyses shall be submitted to the Department's Representative. At the discretion of the Department's Representative, the type of amendments and rate of application may be revised based on the soil analyses.

REFERENCE LIST FOR MATERIALS AND PROCEDURES

Am. Assn. of State Highway & Transportation Officials,
2007, Corrugated Polyethylene Pipe, 12" to 48" Diameter (AASHTO M294)

ASTM International

- 2007, Rigid PVC Compounds and CPVC Compounds (ASTM D1784)
- 2006, Rigid PVC Compounds and CPVC Compounds (ASTM D4396)
- 2006, PVC Plastic Pipe, Schedules 40, 80, and 120 (ASTM D1785)
- 2008, PVC Plastic Pipe Schedule 40 (ASTM D2665)
- 2007, PVC Plastic Pipe Schedule 40 (ASTM F891)
- 2006, PVC Plastic Pipe Fittings, Schedule 40 (ASTM D2466)
- 2008, Type PSM PVC Sewer Pipe and Fittings (ASTM D3034)
- 2004, Solvent Cements for PVC Plastic Piping Systems (ASTM D2564)
- 2007, Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals (ASTM D3212)
- 2006, Polyethylene Plastics Molding and Extrusion Materials (ASTM D4976)
- 2004, PVC Gaskets for Drain, Waste, and Vent, Sewer, Sanitary, and Storm Plumbing Systems (ASTM D5926)
- 2007, Elastomeric Seals (Gaskets) for Joining Plastic Pipe (ASTM F477)
- 2002, Primers for Use in Solvent Cement Joints of PVC Plastic Pipe Fittings (ASTM F656)

PA Department of Transportation,

- 05/01/08, Aggregate Producers: Bulletin 14, Publication 34 (PennDOT Pub. 34, Bulletin 14)
- 04/30/08, Approved Construction Materials: Bulletin 15, Publication 35 (PennDot Pub. 35, Bulletin 15)
- 04/02/08, Specifications, Publication 408 (PennDOT, Pub. 408)

OPERATION SPECIFICATIONS

OPERATION SPEC. #1 - MOBILIZATION AND DEMOBILIZATION

1.1 SCOPE

The work consists of: contacting PA One-Call prior to mobilization and prior to any earth disturbance within the CWA; improving, as necessary, access roads used by the Contractor for mobilization/demobilization; delivery to the project site and preparation/assembly of all plant, equipment, materials, and supplies; removal of all such furnishings; removal of temporary E&S Controls; and cleanup of disturbed areas upon project completion.

1.2 PROCEDURE

Mobilization - This work includes compliance with all local, state, and federal laws and regulations in reference to delivery and assembly of all plant and equipment required to complete the Contract and the storage of all materials and supplies. Plant shall include shops, storage areas, and sanitary or other required facilities. Prior to commencement of any work, the Contractor's plant and equipment shall be inspected for Contract compliance and for complete set-up in proper working order and shall be subject to the approval of the Department's Representative.

The work also includes improving any access roads, as necessary, for adequate access of equipment, materials, and personnel.

The Contractor shall contact the PENNSYLVANIA ONE-CALL SYSTEM prior to mobilization and not less than three (3) working days prior to any improvement to the access roads or any excavation or construction activities in the CWA. The PA One-Call request shall include all private access roads to be utilized by the Contractor. The Contractor shall also contact all utilities listed on the Drawings. During the design phase, PA One-Call was notified on 02/25/08 (Serial Number 0496213). Attached is a portion of a plan provided by PA American Water identifying a Raw Water Transmission Pipe crossing and along an existing access road (Site Access Option #2) near the intersection with Penn Five Road (T-314).

The work also includes obtaining the required permits, insurance, bonds, and any other initial items required for the start of work.

- A. Demobilization - The work refers to the removal of all plant and equipment from the project site upon project completion.

The work also includes cleanup and restoration of all work areas or any other areas disturbed as a result of the project. The Contractor shall be required to restore any disturbed areas to a condition equal to or better than that which existed prior to the work being done, such as repairing or replacing any improvement to the land, including but not limited to: access roads used as part of the project, gates, driveways, structures, fences, walls, culverts, channels, landscaping, and other similar items which may have been removed by or damaged by or as a result of the work. The work also includes removal of temporary E&S controls.

OPERATION SPEC. #2 - SAFETY SIGN AND ACCESS ROAD RELOCATION

2.1 SCOPE

Existing gates with locks and earthen barriers across private dirt roads currently limit site access. Access by individuals authorized to utilize the property will continue throughout the life of the project. Contractor shall implement reasonable measures to help assure public safety. The work consists of making and installing safety signs and maintaining and relocating existing access roads.

2.2 PROCEDURE

- A. Safety Sign - At the time of initial mobilization and prior to commencement of any work, the Contractor shall install a safety sign near the limits of the Contractor's Work Area (CWA) for each of the existing 3 private access roads to the project site at the locations shown on the plans. All safety signs shall be mounted to be readily visible to vehicular traffic on the existing private access roads. Safety signs shall be maintained by the Contractor until demobilization and final project acceptance by the Department's Representative.

Alternative measures may be implemented with approval by the Department's Representative.

- B. Access Road - When project excavations of over 6" extend to within less than 10' from the edge of any existing or relocated private access road, an earthen safety berm (min. 1.5' high) shall be constructed along the near edge of the access road for a distance of 15' in either direction from the maximum extent of the excavation. Access roads shall be relocated as shown on the plans and as otherwise necessary to facilitate safety berm installation. All relocated roads shall be constructed to the dimensions and conditions of the existing access road. All existing and relocated access roads within the CWA shall be maintained during construction by the Contractor until final project approval.

OPERATION SPEC. #3 - EROSION & SEDIMENT CONTROL

3.1 SCOPE

The work consists of furnishing all plant, labor, equipment, and materials and of performing all operations in connection with the installation and maintenance of all permanent and temporary erosion and sediment pollution (E&S) controls as shown on the applicable Drawings. E&S measures include, but are not limited to, installation of temporary silt fence and permanent grass-lined diversion ditch. Work includes seeding and installation of an erosion control mulch blanket, a culvert for a private access road, and a rock-lined level spreader as part of diversion ditch construction. Temporary E&S measures shall be removed during project cleanup as part of demobilization, unless otherwise directed by the Department's Representative.

In the event of deviation from the requirements provided in the E&S plan, which includes modifications, additions, and deletions, the subsequent revisions will require approval of the Department's Representative.

3.2 PROCEDURE

- A. General - The Contractor shall follow the sequence of work and maintenance requirements shown on the Drawings.

E&S controls shall be installed prior to commencing construction of the passive treatment system.

Any clearing and grubbing, necessary for construction of E&S controls shall be performed in accordance with the Operation Spec., "Clearing and Grubbing".

- B. Diversion Ditch (permanent) - Contractor shall construct the diversion ditch as shown on the applicable details and at the locations shown on the Drawings. The ditch shall not be constructed by the Contractor until the location is approved by the Department's Representative. Subject to the approval of the Department's Representative, the extent and location of the diversion ditch may deviate from that shown on the Drawings depending on field conditions.

To avoid developing concentrated flow without suitable outlet conditions, the diversion ditch, level spreader and culvert shall be installed "from the bottom up". That is, the level spreader shall be excavated and rock lined and the area immediately below the level spreader shall be graded, seeded and stabilized with mulch blanket prior to installation of the culvert; the culvert shall be installed and the access road restored prior to installing the diversion ditch; and diversion ditch installation shall begin at the downgradient terminus and extend upslope.

The ditch shall be maintained to the required cross section and shall be kept free from debris or obstructions until final project acceptance.

1. Excavation - All material excavated shall be defined as unclassified excavation; that is, ditch excavation shall include excavation of all material encountered. All excavated material from the diversion ditch shall either be placed on the low side of the ditch or incorporated into the Excess Fill Placement Area in accordance with the details on the Drawings or as directed by the Department's Representative.
2. Seeding - After the diversion ditch has been graded, apply seed and soil amendments specified for permanent revegetation. Immediately prior to the sowing of seed, the planting areas shall be scarified to an approximate minimum depth of about $\frac{3}{4}$ ". If possible, sow the plant seed during the periods from April 1 through June 15 or from August 1 through December 1. The seed mixture shall be sown on a still day. The seed shall be either sown by hand, broadcast spreader, or approved sowing equipment.
3. Erosion Control Mulch Blanket - The erosion control mulch blanket shall be installed as per the applicable requirements of PennDOT Pub. 408, Subsection 806.3, "Construction". Install the blanket with the mesh side on top. Unroll, place, and anchor mat evenly and smoothly, without stretching, to maintain contact with mulch surface at all points. Follow manufacturer's installation instructions. Drive

any staples used flush with the top of the mulch blanket so that the staple does not extend above the mulch blanket.

4. Culvert - Trench excavation for installation of the 24", PE, Type S for the existing private access road shall be in the area shown on the Drawings.

Trench walls which are cut back shall be excavated to at least the angle of repose of the soil or not steeper than 1.5 horizontal to 1 vertical. Vertical trench walls more than 4' high shall be shored. Special attention shall be given to slopes which may be adversely affected by weather or moisture content.

Bottom of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavation shall accommodate each joint or coupling to eliminate point bearing. Stones of 3" or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

Where unyielding material or rock, in either ledges or as boulders, is encountered in the bottom of the trench, such material shall be removed 4" below the required grade. Where wet or otherwise unsuitable material is encountered in the bottom of the trench, such material shall be removed. Unyielding and unstable material removed from the bottom of the trench shall be replaced with compacted satisfactory fill material.

Pipe sections shall be joined as recommended by the manufacturer. Jointing materials shall be as recommended by the manufacturer. Surfaces to receive jointing materials shall be clean. Soiltight joints shall be made with split couplers, or as approved by the Department's Representative.

Pipe shall not be laid in excessive water and shall not be laid when trench conditions or weather are unsuitable. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

Pipe embedment, including bedding, haunching, and initial backfill, shall be satisfactory fill material. Haunching to the spring line and initial backfill to the crown shall be brought up evenly on both sides for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Initial backfill shall be placed and compacted and extend 6" above the pipe crown. Final backfill shall be placed and compacted by hand in 4" lifts above the pipe crown. Satisfactory fill material shall continue to be placed and compacted to final grade.

5. Level spreader - A level spreader shall be installed at the terminus of the Diversion Ditch at the outlet of the culvert. The level spreader shall be constructed to the lines and grades shown on the Drawings.
 - a. *Geotextile* shall be placed on the prepared subgrade. Whenever more than one section of geotextile is required, the geotextile shall be overlapped approximately 1' to assure continuity. Geotextile shall be anchored in place

in a satisfactory manner to prevent displacement. Special care shall be exercised in placing rock on the geotextile. If the geotextile is damaged prior to or during placement of the rock lining, all material shall be removed from the damaged area and a patch of geotextile large enough to cover the damaged section, including a 1' overlap, shall be placed on top of the damaged section.

- b. *Rock lining* shall be placed to the full course thickness in one operation and in such a manner as to avoid displacing the geotextile. Placing rock in layers will not be permitted. The larger stones shall be well distributed. The finished rock lining shall be free from objectionable pockets of small stones and clusters of larger stones. Hand placing to a limited extent may be required, but only to the extent necessary to secure the results specified.

The use of a tractor equipped with a bulldozer blade, stone rake, or similar equipment will not be acceptable for placement of rock.

The rock lining shall have the placement thickness indicated on the Drawings. The finished surface shall be in accordance with the lines and grades shown on the Drawings. Any material displaced through the fault of negligence of the Contractor shall be replaced at his expense. Passage of equipment over the finished surface will not be allowed without specific approval of the Department.

- C. Silt Fence (temporary) - The silt fence shall be installed in compliance with PennDOT Pub. 408, Section 865, "Silt Fence Barrier". Installation shall be reinforced by tightly-bound hay/straw bales placed end-to-end (without gaps) along the entire length of the installed silt fence, as shown on the Drawings.

OPERATION SPEC. #4 - CLEARING AND GRUBBING

4.1 SCOPE

The work consists of furnishing all plant, labor, equipment, and materials and of performing all operations in connection with removal and disposal of all woody growth, trees, brush, and trash within the designated grading areas.

Limits for clearing and grubbing shall be marked in the field by the Contractor and approved by the Department's Representative before commencing the work.

4.2 PROCEDURE

- A. Clearing and Grubbing - Clearing and grubbing shall consist of the removal and disposal of all natural growth and debris encountered.
- B. Disposal - A DEP-permitted disposal area shall be used for all materials disposed of off-site. It shall be the Contractor's responsibility to identify and confirm the appropriate DEP-permitted disposal area.

Cleared and grubbed material may be disposed in brush pile windrows within the CWA for wildlife habitat. The size, content, and concentration of the windrow must be approved by the Department's Representative. If the Department's Representative finds the size, content, or concentration of brush, trees, and/or stumps in brush pile windrows to be objectionable or excessive, the Contractor shall be required to use an alternate manner of disposal.

Disposal of woody material may be accomplished by chipping and shredding within the CWA. The type, amount, and placement of chipped and shredded wood shall be at the discretion of the Department's Representative. Upon approval by the Department's Representative, on-site woody material may be single-shredded and incorporated in the treatment media for the Vertical Flow Pond, as described in the Operation Spec., "Vertical Flow Pond Treatment Media".

If burning is permitted, it shall be performed in compliance with all applicable laws and regulations and in a manner approved by the Department's Representative. At no time shall a fire be left unattended and the Contractor will be held responsible for any damage resulting from such fires. No burning shall be performed near coal seams, coal refuse, or ANY other combustible material.

OPERATION SPEC. #5 - EXCAVATION AND EARTH MATERIAL HANDLING

5.1 SCOPE

The work consists of performing all excavation to the lines and grades shown on the Drawings. The work includes all required excavation for the Vertical Flow Pond, Constructed Wetland, Anoxic Limestone Drain, Channels 1 & 2, and other features shown on the Drawings. The work shall include segregation and stockpiling of selected onsite material encountered during required excavation including: topsoil/subsoil for use in site revegetation; vegetation and topsoil from existing wet areas for use in the Constructed Wetland; satisfactory fill material for use in earthen embankments and other fill; and clay material for use in constructing the impervious lining in the Vertical Flow Pond and Constructed Wetland and low-permeability hydraulic-type barrier for the Anoxic Limestone Drain. The work also includes all operations necessary to remove and to dispose of any unsatisfactory earth materials, including potentially acid-producing materials in the Excess Fill Placement Area shown on the Drawings.

The work also includes the requirement that the Contractor keep water, including surface water, subsurface (groundwater) water, and seepages out of the work area until after completion of the facilities.

5.2 PROCEDURE

- A. Water Handling - Contractor shall use pumps, pipes, siphons, or other suitable methods to provide diversion of water. All diverted water shall be directed to existing drainage ways or existing stable well-vegetated areas. Diversion of water shall be performed at a controlled rate which will prevent: (1) downstream flooding; (2) erosion of the existing drainage ways/vegetated areas; (3) transportation of sediment outside the project area; and (4) damage to the aquatic life habitat. Any temporary ditches constructed for the purposes

of water diversion shall be backfilled, compacted and revegetated after water diversion has ceased.

- B. General Excavation and Grading - All excavation is unclassified and all material encountered, regardless of character, shall be removed to the lines and grades shown on the Drawings. Excavation of bedrock or similar strata that, in the opinion of the Department's Representative, requires blasting is not intended. If these conditions are encountered, the Contractor shall obtain from the Department's Representative, grade modifications necessary to avoid such operations. The Contractor shall not be separately compensated for ripping and/or blasting.

Any area below the design water level of the Vertical Flow Pond or Constructed Wetland having potentially acid-forming material exposed at the proposed grade line shall be over-excavated a minimum of 1' and backfilled with compacted onsite clay material.

All grading shall be controlled so that the graded areas will blend into the adjacent topography. Topsoil/subsoil shall be re-spread to form the final grade surface in areas to be revegetated. The final grade shall have no depressions to accumulate water or other areas of poor drainage. Positive drainage shall be provided on the final grade within the entire grading area unless indicated otherwise on the Drawings. Erosion gullies shall be backfilled to the adjacent ground elevation and compacted by making the maximum practical use of available hauling and spreading equipment. The final grade shall be approved by the Department's Representative before performing subsequent operations.

- C. Satisfactory Earth Materials - Selected earth materials encountered during the required excavation operations are to be segregated and immediately used or temporarily stockpiled within the CWA for project use. Unneeded satisfactory material shall be placed in the Excess Fill Placement Area.

1. Topsoil/subsoil for Site Revegetation - Material from the required excavation that is best suited for vegetative growth shall be used as topsoil material. The material shall be free of stones larger than 6" in any dimension and debris which would be detrimental to the application of seed or soil supplements. After clearing and grubbing, where applicable, the upper 12", at a minimum, of soil material encountered during preparation of the Excess Fill Placement Area and at all areas for excavation shall be saved for later re-spread.
2. Vegetation and Topsoil from Existing Wet Areas - When encountered during required excavation, vegetation, as feasible, and 6", at a minimum, of topsoil shall be segregated and separately stockpiled, as needed, for later placement in the Constructed Wetland. This material may contain some woody debris, as present, in the existing wetland area shown on the Drawings.
3. Satisfactory Fill Material for Earthen Embankments and Earth Fill - All earth fill for Vertical Flow Pond and Constructed Wetland embankments and for other features identified on the Drawings, shall be provided from the required excavation areas. See Operation Spec. "Vertical Flow Pond and Constructed Wetland Embankments".

These materials shall be soil that is neither too sandy nor too rocky. The soil shall have a high proportion of silt and/or clay which will hold water well. A field "method spec" shall be used to generally identify satisfactory fill material: Take a handful of moist soil material and squeeze it into a ball. Throw the ball into the air about 20" and then catch it. If the ball falls apart, it has too much sand. If the ball sticks together, the soil is satisfactory for embankment construction.

The materials encountered in the excavation may require sorting to remove objectionable material and may require drying or other treatment before use. The materials shall be free from stones greater than 6" in any dimension, organic material, or clods larger than 3". Approval of the material from the Department's Representative is required.

4. Clay Material for VFP and Constructed Wetland Impervious Liners and ALD Hydraulic-Type Barrier - Clay material free from stones over 1/4" inch in any dimension encountered during required excavation within the CWA shall be stockpiled separately or used immediately in the construction of the impervious lining for the Vertical Flow Pond and Constructed Wetland, as needed, and for installation of an hydraulic-type barrier at the outlet end and along portions of the sides of the Anoxic Limestone Drain. The clay material shall be dried, as needed, prior to placement. All material shall be visually inspected and approved by the Department's Representative prior to placement.
- D. Unsatisfactory Earthen Material - All earth material unsuitable in the implementation of the project shall be placed in the prepared Excess Fill Placement Area, or other areas as directed by the Department's Representative. As the quantity of material to be excavated significantly exceeds the quantity of material needed for fill, unneeded satisfactory material is to be disposed in the Excess Fill Placement Area.
1. Unyielding/Oversized Material - Boulders or rocks greater than 6" in any dimension that are encountered during the excavation shall be removed and placed in the Excess Fill Placement Area as shown on the Drawings. Alternative rock disposal or placement areas within the CWA may be approved by the Department's Representative.
 2. Wet or Soft Material - Excessively wet or soft material shall be disposed of in the Excess Fill Placement Area. Alternatively, excessively wet material, if suitable, may be dried and used for satisfactory material.
 3. Potentially Acid-Producing Material - Any potentially acid-producing material (coal, coaly material, carbonaceous shale, etc.) encountered in the excavation shall be removed and buried in the Excess Fill Placement Area as shown on the Drawings. The potentially acid-producing material shall be covered with a minimum of 2' of clean fill material.
 4. Mine Drainage Sludge - Mine drainage sludge is unsatisfactory for use on this project. Mine drainage sludge is to be disposed of in the Excess Fill Placement Area or as otherwise approved by the Department's Representative.

OPERATION SPEC. #6 - VFP AND CONSTRUCTED WETLAND EMBANKMENTS

6.1 SCOPE

The work consists of furnishing all plant, labor, equipment, and materials and of performing all operations in connection with constructing earth fill embankments to the lines and grades shown on the Drawings.

6.2 PROCEDURE

- A. Subgrade Preparation for Earthen Embankments - Remove any organic debris and trash and any soft, wet, unyielding, coaly (potentially acid-producing), or otherwise unsuitable material. Excavate 1' below unsatisfactory material and replace with compacted satisfactory fill material. Compact subgrade. Excavate key trench at the locations and dimensions shown on the Drawings. Key trenches are to be excavated for the Vertical Flow Pond and Constructed Wetland embankments, as shown on the Drawings. Scarify subgrade prior to placement of embankment fill.
- B. Embankment Construction - Place, spread, and compact embankment material using approved equipment and methods. The material previously determined to be satisfactory fill shall be field tested prior to placement using a "method spec" to determine suitable moisture content: Take a handful of material and squeeze it into a ball. The fill material should contain sufficient moisture to be formed into a ball without crumbling. If the ball crumbles, then the material is too dry to be used as fill and moisture must be added prior to placement. If water can be squeezed out of the ball, then the material is too wet to be used as fill and the material must be dried prior to placement.

Contractor shall plan and conduct operations to prevent over-drying of compacted lifts. At the beginning of each day, Contractor shall scarify or roughen the previously placed lift to promote bonding to the material to be placed above it. Do not place material on wet or frozen ground. Contractor shall finish each day's work with a smooth surface to minimize moisture penetration.

- C. Compaction - Compaction shall be accomplished by routing appropriate equipment so that all parts of each layer are equally compacted. If sheepsfoot rollers are to be used, the thickness of each layer of fill (lift thickness) prior to compaction shall be not greater than 8" and at least 3 passes are required. When rubber-tired compaction equipment is to be used, the thickness of each layer of fill prior to compaction shall be no greater than 6" and at least 5 passes are required. When track-type compaction equipment is to be used, the thickness of each layer of fill prior to compaction shall be not greater than 4" and at least 3 passes are required.

Crawler-type tractors used for compaction shall weigh not less than 20,000 pounds, shall exert a unit tread pressure of not less than 6 pounds per square inch, and shall not be operated at a speed exceeding 3.5 miles per hour.

At the option of the Department's Representative, acceptance of completed lifts may be based upon non-movement of compaction equipment operating on the lift surface.

The Contractor shall provide hand or manually directed compaction in areas of pipe placement and at any confined area not accessible to normal equipment. Fill within 2' of pipe shall be placed in layers not thicker than 4" and compacted by hand tamping or by using manually directed power tampers or plate vibrators.

- D. Impoundment Certification - Upon completing the earthwork and installation of the underdrain aggregate (pipe bedding) and underdrain pipe including the outlet pipes through the embankment, and prior to installation of any aggregate above the underdrain pipes in the VFP and upon completion of the earthwork and installation of the spillway from and prior to installation of the substrate in the WL and prior to directing water into either the VFP or WL, the Contractor shall contact the Department. The Department's Representative, specifically a Professional Land Surveyor or Professional Engineer licensed in the Commonwealth of Pennsylvania, shall inspect and certify construction of the impoundments in accordance with the plans. If deficiencies are found, the Contractor shall be directed to make the necessary corrections. The Department reserves the right to withhold payment until the impoundments have been certified.
- E. Water Retention Test - After the Impoundment Certification inspection has been completed by the Department's representative and prior to installation of any aggregate above the underdrain pipes, the Contractor shall perform a water retention test on the VFP. The Contractor shall close the drain valves and set the invert of the adjustable outlet risers 0.5' above the design water elevation. The VFP shall be filled with water from the discharge(s), Pond D or other approved source to the design water elevation or higher. Inflow from Pond D shall be blocked or otherwise diverted away from the VFP. The water level in the VFP shall then be marked by the Department's representative. The water elevation shall not decrease more than 0.2' in 48 hours.
- F. Demonstration of Embankment Function - After the water intended to be treated has been directed into the Vertical Flow Pond and the Constructed Wetland and the design water level established, the Contractor shall demonstrate that the constructed facilities will maintain the water levels designated on the Drawings without experiencing leakage through the constructed earthen embankments. If the design water levels cannot be reached or cannot be maintained or if levels are reached but appreciable leakage occurs, the Contractor shall take measures to reduce leakage through the embankments to the extent that the above criteria can be met. The Contractor is ultimately responsible to ensure embankment stability and will be held liable for any damage caused by embankment failures.

OPERATION SPEC. #7 - CHANNELS 1 & 2 AND ROCK-LINED SPILLWAYS

7.1 SCOPE

The work consists of furnishing all plant, labor, equipment, and materials and of performing all operations in connection with constructing rock-lined Channels 1 & 2 and spillways as shown on the applicable details and at the locations shown on the Drawings. The Contractor shall maintain and make all necessary repairs to the rock lining for the duration of the contract. The channels and spillways shall be maintained to the required cross section and shall be kept free from debris or obstructions until final project acceptance.

7.2 PROCEDURE

- A. Excavation of Channels 1 & 2 and Spillways - All material excavated shall be defined as unclassified excavation; that is, including excavation of all material encountered. All material excavated in construction of the channels shall either be placed and compacted on the low side and or incorporated into the fill areas, in accordance with the details on the Drawings or as directed by the Department's Representative.

Remove any organic debris and trash and any soft, wet, unyielding, coaly (potentially acid-producing), or otherwise unsuitable material. Excavate 1' below unsatisfactory material and replace and with compacted satisfactory fill material.

- B. Geotextile - Geotextile shall be installed longitudinally along the direction of flow. Whenever more than one section of geotextile is required, the geotextile shall be overlapped approximately 1' to assure continuity. The geotextile shall be anchored in place in a manner to prevent displacement. Special care shall be exercised in placing rock on the geotextile. If the geotextile is damaged prior to or during placement of the rock lining, all material shall be removed from the damaged area and a patch of geotextile large enough to cover the damaged section, including a 1' overlap, shall be placed on top of the damaged section.

- C. Rock Lining - Rock lining shall be placed to the full course thickness in one operation and in such a manner as to avoid displacing the geotextile. Placing rock in layers will not be permitted. The larger stones shall be well distributed. The finished rock lining shall be free from objectionable pockets of small stones and clusters of larger stones. Hand placing to a limited extent may be required, but only to the extent necessary to secure the results specified.

The use of a tractor equipped with a bulldozer blade, stone rake, or any similar equipment shall not be acceptable for placement of rock.

The rock lining shall have the placement thickness indicated on the Drawings. The finished surface shall be in accordance with the lines and grades shown on the Drawings. Any material displaced through the fault of negligence of the Contractor shall be replaced at his expense. Passage of equipment over the finished surface will not be allowed without specific approval of the Department.

OPERATION SPEC. #8 - VFP AND CONSTRUCTED WETLAND CLAY LINER

8.1 SCOPE

The work consists of furnishing all labor, equipment, and materials and performing all operations in connection with foundation preparation, placement and compaction of onsite clay material as impervious liner for the Vertical Flow Pond and Constructed Wetland. It is intended that the clay liner be placed on an "as needed" basis where unsatisfactory materials are encountered below the design water level during excavation of the VFP and Constructed Wetland; however, the Contractor may choose to install a liner along the extent of the bottom and sides to the design water level in both the VFP and Constructed Wetland.

8.2 PROCEDURE

Placement of Clay Liner in VFP and Constructed Wetland - Remove any organic debris and trash. Remove any soft, wet, coaly (potentially acid producing), or otherwise unsuitable material. Upon removal of unsatisfactory material, restore the foundation with compacted satisfactory material to within 1' of the lines and grades shown on the Drawings. Place and compact onsite clay material to the required 1' thickness directly on the prepared foundation to the lines and grades shown on the Drawings. Where the proposed grade shown on the Drawings of the Vertical Flow Pond and Constructed Wetland is completed in in-place clay material, additional placement of clay liner material is not required.

OPERATION SPEC. #9 - VERTICAL FLOW POND TREATMENT MEDIA

9.1 SCOPE

The work consists of furnishing all labor, equipment, and materials and performing all operations in connection with the installation of geotextile, bedding/filter stone, and underdrain pipes with valves and valve boxes and the mixing and placement of the treatment media for the Vertical Flow Pond. The treatment media is to be a mixture of limestone aggregate, spent mushroom compost, and wood chips.

9.2 PROCEDURE

- A. Geotextile - Geotextile shall be installed on the bottom and along all sides of the Vertical Flow Pond to the design elevation at the top of the treatment media. Sections of geotextile shall be overlapped approximately 1' to assure continuity. The geotextile shall be anchored in place in a satisfactory manner to prevent displacement. Special care shall be exercised in placing bedding stone on the geotextile. If the geotextile is damaged prior to or during placement of the bedding stone, all material shall be removed from the damaged area and a patch of geotextile large enough to cover the damaged section, including a 1' overlap, shall be placed on top of the damaged section.
- B. Bedding/Filter Stone - Bedding/filter stone shall be clean and free from soil and foreign materials. Bedding stone of the type and thickness identified on the Drawings shall be carefully placed directly on the geotextile lining to the design thickness for installation of the underdrain pipes. Any damage to the geotextile or subgrade during placement of the bedding shall be repaired before proceeding with the work. Compaction of the bedding will not be required but the bedding shall be finished to an even surface, free from mounds or windrows. The installed underdrain pipe shall then be further bedded (creating filter envelope) in the stone to the full design thickness and to the design elevation for placement of the treatment media.
- C. Underdrain Pipe - Pipe shall be installed as shown on the Drawings and Details.

Laterals for the underdrain shall be custom perforated as specified on the Drawings. Perforations shall have uniform spacing over the entire length of the pipe along each of the laterals as shown on the Drawings. The perforations shall be arranged in rows parallel to the longitudinal axis of the pipe. All perforations shall be free of burrs.

Each pipe shall be carefully inspected before placement. Any defective or damaged pipe shall be rejected. No pipe shall be laid when the conditions or weather is unsuitable. Pipes shall be laid to the alignment as indicated on the Drawings. Pipes shall be inspected and approved by the Department's Representative.

Anti-seep collars shall be installed using the materials and methods recommended by the manufacturer to assure a watertight connection to the pipe. Adjustable pipe risers for the outlets shall conform to the Drawings and Details.

D. Treatment Media

1. Mixing Treatment Media - The treatment media is a mixture of 850 tons of AASHTO #57 limestone (minimum calcium carbonate content of 85%), 850 tons of AASHTO #8 limestone (minimum calcium carbonate content of 85%), 630 CY of spent mushroom compost, and 630 CY of single-shredded wood chips.

The AASHTO #57, AASHTO #8, spent mushroom compost, and single-shredded wood chips SHALL BE THOROUGHLY AND EVENLY MIXED. The following method, or alternative approved by the Department's Representative, shall be used: An area within the CWA shall be leveled and compacted to form a mixing pad. The AASHTO #57, AASHTO #8, spent mushroom compost, and single-shredded wood chips shall be stockpiled in 4 separate piles. Utilizing a track loader, excavator, or other equipment with a bucket, create a single pile by placing alternating buckets of compost, wood chips, AASHTO #57, and AASHTO #8. This pile shall then be pushed using a dozer or similar equipment a sufficient distance (at least 1 pile width) so that the material is well mixed.

The mixture shall be reasonably free from dirt, rocks, litter, trash, etc. The Department's Representative shall require additional mixing effort if, at his discretion, the media is not well mixed.

2. Placing Treatment Media - The well-mixed treatment media shall be placed on the bedding stone (filter envelope for the underdrain). The treatment media shall not be placed when there is standing water above the filter envelope or in a condition otherwise detrimental to proper placement. The treatment media shall be placed in 1 lift and shall NOT be evenly spread. THE TREATMENT MEDIA SHALL BE PLACED LOOSELY AND SHALL NOT BE COMPACTED.

- E. Valves and Valve Boxes - Drain valves shall be installed for the Vertical Flow Pond underdrain system using the specified gate-type valves with manufacturer-recommended fittings. Valve boxes shall be installed, as shown on the Drawings, to house the drain valves. AASHTO #57 shall be smoothly spread in a 6" layer on the prepared subgrade prior to placing the valve box. A perforated 1" PVC drain pipe shall be installed in the aggregate and extended to daylight to provide positive drainage. The 1" drain pipe is not required if the 6" layer AASHTO #57 is extended to the downslope side and "daylighted". Prior to final project acceptance by the Department's Representative, all valves shall be determined to be operational by fully opening and fully closing each valve to demonstrate full pipe flow and full shut-off capacity.

OPERATION SPEC. #10 - CONSTRUCTED WETLAND SUBSTRATE AND CHECK DAM

10.1 SCOPE

The work consists of furnishing all plant, labor, equipment, and materials and of performing all operations in connection with placement of the growth medium for the Constructed Wetland. THE CONTRACTOR SHALL NOT BE RESPONSIBLE FOR PLANTING THE CONSTRUCTED WETLAND. The work also includes placement of the check dam to distribute the flow in the Constructed Wetland.

10.2 PROCEDURE

- A. Wetland Substrate Placement - The vegetation and topsoil recovered during excavation of the existing wetland shown on the Drawings shall be placed in a single lift to a minimum thickness of 6" within the Constructed Wetland in the area shown on the Drawings. The Constructed Wetland substrate shall be placed in a manner to encourage even distribution of water throughout the Constructed Wetland without channelization. THE VEGETATION AND TOPSOIL PLACED IN THE CONSTRUCTED WETLAND SHALL NOT BE COMPACTED. No vegetation or topsoil shall be placed in the Inlet Pool area west of the check dam.
- B. Check Dam Construction - R-4 riprap shall be evenly placed along the entire length of the Inlet Pool as shown on the Drawings.

OPERATION SPEC. #11 - ANOXIC LIMESTONE DRAIN CONSTRUCTION

11.1 SCOPE

The work consists of furnishing all labor, equipment, and materials and performing all operations in connection with the installation of an Anoxic Limestone Drain with pipe and hydraulic-type barrier.

11.2 PROCEDURE

- A. Hydraulic-type Barrier - Excavate a trench about 3' in width along the entire outlet end and along portions of the sides of the ALD to a depth of about 2' below the bottom elevation of the ALD, or to a depth determined in the field with the approval of the Department's Representative. Place and compact onsite clay material to the top elevation of the limestone aggregate in the ALD. Excavation for the ALD may be enlarged as necessary to accommodate hydraulic-type barrier or the hydraulic barrier may be installed between the ALD and the proposed grade.
- B. Manifold and Outlet Pipe - The manifold shall be custom perforated as specified on the Drawings. Holes shall be cleanly cut along the entire length of the manifold as shown on the Drawings. The perforations shall be arranged in rows parallel to the longitudinal axis of the pipe. All perforations shall be free of burrs.

Evenly place AASHTO #57 at the bottom elevation of the ALD along the entire length of the outlet end to the thickness shown on the Drawings to provided bedding for the manifold.

The pipe shall be extended through the hydraulic-type barrier and fitted with a 45° elbow with pipe extended to the design elevation of the outlet, as shown on the Drawings. An anti-seep collar shall be installed using the materials and methods recommended by the manufacturer to assure a watertight connection to the pipe.

- B. Limestone Treatment Medium Placement - Carefully cover the manifold with AASHTO #1 treatment medium to the required thickness for the ALD. Continue placing AASHTO #1 limestone containing 85% or more calcium carbonate to the top of the limestone design elevation in the location shown on the Drawings.
- C. Geotextile - The upper surface of the limestone treatment medium shall be evenly graded to the design elevation. Geotextile shall be installed on the upper surface of the limestone aggregate as a separation layer for the remaining backfill. Sections of geotextile shall be overlapped approximately 1' to assure continuity. Geotextile shall be anchored in place in a satisfactory manner to prevent displacement. Special care shall be exercised in placing backfill on the geotextile. If the geotextile is damaged prior to or during placement of the backfill, all material shall be removed from the damaged area and a patch of geotextile large enough to cover the damaged section, including a 1' overlap, shall be placed on top of the damaged section.
- D. Backfill – Onsite clay material shall be placed and compacted to a minimum depth of 2' above the geotextile. Satisfactory fill material shall then be placed and compacted over the clay to conform to the topography. Topsoil/subsoil shall be re-spread and the area revegetated as described in the Operation Spec., “Revegetation”.

OPERATION SPEC. #12 - UPGRADES TO EXISTING POND D INCLUDING PIPE TO VFP

12.1 SCOPE

The work consists of furnishing all labor, equipment, and materials and performing all operations in connection with upgrading earthen embankments of the existing treatment wetland, existing treatment pond, and Pond D. The work also includes the removal of outlet pipes from the existing treatment pond and Pond D and the installation of outlet pipe from Pond D to the Vertical Flow Pond and installation of a baffle curtain.

(A plan for removal and onsite disposal of mine drainage sludge from existing treatment Pond D is to be provided by the successful bidder as a separate payment item.)

12.2 PROCEDURE

- A. Upgrade of Existing Earthen Embankment of Pond D - After draining Pond D as needed, the existing earthen embankment is to be reformed to the grades and lines shown on the Drawings. Limited excavation is required to connect Pond D to Channel 2 and install a pipe from Pond D to the VFP. Limited fill is to be placed on existing embankments.

Vegetation is to be removed and the embankments scarified prior to placement and compaction of satisfactory fill material.

- B. Installation of 15" PE Type S Pipe from Pond D to Vertical Flow Pond - The inlet end of the pipe in Pond D shall be installed at the location and elevation and with a tee and bar guard as shown on the Drawings.

Trench excavation for installation of the 15-inch, PE, Type S pipe to the Vertical Flow Pond shall be in the area shown on the Drawings.

Trench walls which are cut back shall be excavated to at least the angle of repose of the soil or not steeper than 1.5 horizontal to 1 vertical. Vertical trench walls more than 4' high shall be shored. Special attention shall be given to slopes which may be adversely affected by weather or moisture content.

Bottom of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavation shall accommodate each joint or coupling to eliminate point bearing. Stones of 3" or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

Where unyielding material or rock, in either ledges or as boulders, is encountered in the bottom of the trench, such material shall be removed 4" below the required grade. Where wet or otherwise unsuitable material is encountered in the bottom of the trench, such material shall be removed. Unyielding and unsuitable material removed from the bottom of the trench shall be replaced with compacted satisfactory fill material.

Pipe sections shall be joined as recommended by the manufacturer. Jointing materials shall be as recommended by the manufacturer. Surfaces to receive jointing materials shall be clean. Watertight joints shall be integral built-in bell with factory-installed rubber gaskets or as otherwise approved by the Department's Representative.

Pipe shall not be laid in excessive water and shall not be laid when trench conditions or weather are unsuitable. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

Pipe embedment, including bedding, haunching, and initial backfill, shall be satisfactory fill material. Haunching to the spring line and initial backfill to the crown shall be brought up evenly on both sides for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Initial backfill shall extend 6" above the pipe crown. Final backfill shall be placed and compacted by hand in 4" lifts to a thickness of 2' above the pipe crown. Satisfactory fill material shall continue to be placed and compacted to final grade.

- C. Baffle Curtain - After cleaning and grading Pond D, a baffle curtain is to be installed in accordance with the Drawings. The curtain is to be constructed using UV-stabilized vinyl laminate material (brattice cloth) or other similar heavy-duty, commercially-available, material as approved by the Department's Representative.

The curtain is to extend the entire length of Pond D and be keyed into both sides and windows are to be cut into the baffle at the size and locations shown on the Drawings. The curtain is to be equipped with the floatation mechanism shown on the Drawings or other sufficient material to ensure buoyancy and the top of the curtain is to extend at least 2" above the surface of the water. The bottom of the curtain shall be weighted with corrosion-resistant material in such a manner so that the bottom of the curtain is extended vertically below the top of the curtain. The bottom of the curtain is not to touch the bottom of Pond D and a minimum 1' gap shall exist between the top of the sludge/bottom of Pond D and the bottom of the curtain. The height of the curtain may be reduced depending on the approved plan to clean Pond D.

OPERATION SPEC. #13 - REVEGETATION

13.1 SCOPE

The work consists of furnishing all labor, equipment, and materials and performing all operations in connection with establishing permanent revegetation on earthen embankments and cut slopes of the passive treatment system, on the Excess Fill Placement Area, and on other disturbed areas.

13.2 PROCEDURE

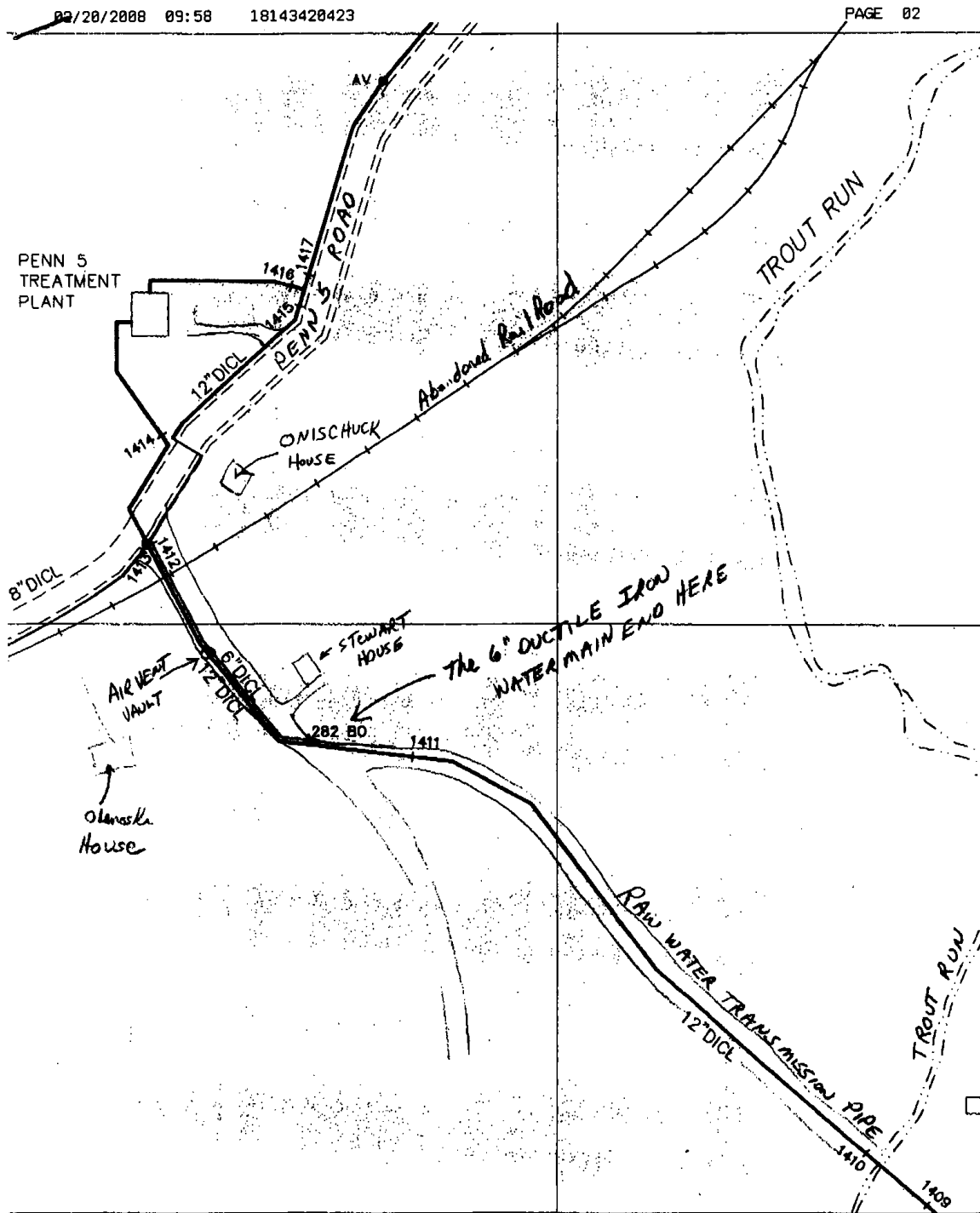
- A. Topsoil/Subsoil Placement - Earth fill or cut areas shall be scarified to a minimum depth of about 2". Topsoil/subsoil shall then be spread evenly to an uncompacted thickness of 6" on earthen embankments, or alternative as approved by the Department's Representative.

After grading the Excess Fill Placement Area to conform to the topography, scarify to a minimum depth of about 2" and spread topsoil/subsoil to a minimum uncompacted thickness of about 4", or alternative as approved by the Department's Representative.

Topsoil/subsoil shall not be spread when frozen or excessively wet or dry. Topsoil/subsoil shall not be spread when the placement area is frozen or excessively wet.

- B. Seeding - On all surfaces to be seeded, sticks, rocks, weeds, roots, or other objectionable material appearing on the surface which, in the opinion of the Department's Representative is detrimental to obtaining a satisfactory stand of vegetation, shall be removed. Lime and fertilizer shall be applied evenly on all areas to be seeded. Immediately prior to sowing seed, the soil shall be scarified to an approximate depth of about 3/4". All scarifying shall be done in a direction parallel to the contour lines on the slope and not uphill or downhill. The grass seed mixture shall be sown on a still day at the rate per acre specified. For conventional seeding applications, the seed shall be sown either by hand or by approved sowing equipment in two applications, one half while the seeder is traveling in one direction and the other half while traveling at right angles to the first direction. Within 48 hours after sowing has been completed, mulch shall be uniformly applied over the entire surface at the average rate specified and spread to a uniform depth.

PENNSYLVANIA AMERICAN WATER PLAN



ITEM MAPS SHEET N40-8581
VALLEY DISTRICT
(Map provided by PA AMERICAN WATER, Gary Kephart, 2/20/2008)

Map Provided by PA American Water 02/20/2008
Contact: Gary Kephart Phone (814) 342-0995 Fax (814) 342-0423