Description of Work

**Job Name:** The Lands at Hillside Farms– Proposed Compost Bedded Pack Facility  
Structural Engineer: R&R Engineering, LLC (Michael M. Rubano, P.E.)  
Site Planning and Stormwater Engineer: Barry Isett & Associates, Inc. (Tom DeAngelo, P.E.)

**Project Location:**  
65 Hillside Road, Shavertown, PA 18708 (Luzerne County)

**Description:**  
This project is divided into two contracts which are more fully described below and also in the enclosed drawings:

- Concrete Contract – C-1
- Excavation Contract – E-1

The successful contractors will be involved in the installation of an 83’-2” x 184’ compost bedded pack facility (for dairy cows) and related Best Management Practices (BMPs). Other BMPs include but are not limited to: access lanes, waterline, stormwater pipes, stormwater basin/rain garden, manure reception pit and wastewater transfer pipes. The proposed BMPs are to be constructed in the areas shown on the plans. The Concrete Contractor will be asked to sign a statement certifying that the installed components meet or exceed the Natural Resource Conservation Service (NRCS) standards and specifications. The proposed facility is to be installed on property owned by The Lands at Hillside Farms, in this document referred to as “The Landowner”.

The intended purpose of the project is to provide a stabilized area on which to feed cattle during winter months when the animals can not be out on pasture. The proposed building will also provide a protected area to store manure when crops can not utilize the nutrients from the manure. This will allow The Landowner to spread manure during appropriate times of the year when weather is favorable, when field conditions are good, and when crops can best utilize the nutrients in the manure. A compost bedded pack barn requires excellent ventilation, addition of fresh bedding daily, and aeration of the cow bedding twice daily. Microbial activity in the bedded pack breaks-down manure and bedding and reduces odors. Cow comfort, cow longevity and odor control are major reasons to adopt this alternative housing system. Confining livestock within the proposed building during the winter reduces manure, nutrients, and sediment entering surface waters of the Commonwealth of Pennsylvania.

The dairy is owned and run by a non-profit 501(c)(3) organization. “The Lands at Hillside Farms” is a historic and educational dairy farm. Their mission is to teach life choices that are healthy, logical, and sustainable so that those born 200 years from now will have access to the same or better opportunities and resources. Students work side-by-side with educators and farm animals to learn about science, agriculture, ecology, history, nutrition, animal husbandry, land conservation, sustainable living, and community service. The Lands at Hillside Farms Dairy Store is not a place, it is an experience. The store sells over 100 products such as artisan cheese, “true local” raw honey, certified organic vegetables, fresh baked goods, jellies, jams, salsas, syrups, and hand crafted chocolates. They are proud to sell their own high-quality, wholesome items such as pastured 100% grass fed beef, pastured eggs, pastured pork, ice cream, and Hillside Gold pastured dairy.
Contractor Selection Criteria

The winning Concrete Contractor shall meet the following criteria:

1. Demonstrate experience by providing examples of at least three (3) similar projects in Pennsylvania. The name of the project must be identified and a brief description provided. At least one (1) of the project examples should include installing Best Management Practices (BMPs) that met or exceeded Pennsylvania Technical Guide Standards and Specifications. More than 3 examples of similar projects are allowed. This information shall be submitted with the bid.
2. Bid Price.
3. Able to complete work before November 1, 2018
4. Contractor must complete and return the “Contractor’s Response Form” with bid.

The winning Excavation Contractor shall meet the following criteria:

1. Able to begin construction within 45 days of contract being awarded.
2. Bid Price.
3. Demonstrate experience by providing examples of at least three (3) similar projects in Pennsylvania. At least one (1) of the project examples should include installing Best Management Practices (BMPs) that met or exceeded Pennsylvania Technical Guide Standards and Specifications. More than 3 examples of similar projects are allowed. This information shall be submitted with the bid.
4. Able to complete work before December 1, 2018
5. Contractor must complete and return the “Contractor’s Response Form” with bid.

Bids Due/Bid Opening: 3:00 pm on Tuesday, May 8, 2018.

All bids shall be sent or delivered to:
   Luzerne Conservation District
   “Bid Enclosed”
   325 Smiths Pond Road
   Shavertown, PA 18708
Contractor Response Form for Concrete Contract C-1

Job Name: The Lands at Hillside Farms—Proposed Compost Bedded Pack Facility

Location:
65 Hillside Road, Shavertown, PA 18708 (Luzerne County)

The following bid is submitted in response to the invitation for bids on the project identified above. The price is based on my knowledge of the plans and specifications provided by R&R Engineering, LLC and Barry Isett & Associates, Inc. This bid will remain valid for 90 days after the bid opening.

1. Total price to supply materials, labor, and equipment for performing the work included in Concrete Contract C-1 and as described in the Description of Work is:

$__________________________________.

2. We plan to use the following other subcontractors in order to perform parts of this project:

___________________________________________________________________________________________

___________________________________________________________________________________________

3. The following three references are provided with telephone numbers of projects completed of similar scope and size:

_______________________________________________ Telephone: _________________________________

_______________________________________________ Telephone: _________________________________

_______________________________________________ Telephone: _________________________________

4. Date on which construction can be started:____________________________________________________

Company Name/Address:___________________________________________________________________

Signature: _______________________________ Title:____________________ Date:_____________________

Phone/Fax/Email: _________________________________________________________________________

Company EIN #: ____________________________________________________________________________
Contractor Response Form for Excavation Contract E-1

Job Name: The Lands at Hillside Farms–Proposed Compost Bedded Pack Facility

Location:
65 Hillside Road, Shavertown, PA 18708 (Luzerne County)

The following bid is submitted in response to the invitation for bids on the project identified above. The price is based on my knowledge of the plans and specifications provided by R&R Engineering, LLC. This bid will remain valid for 90 days after the bid opening.

1. Total price to supply materials, labor, and equipment for performing the work included in Excavation Contract E-1 and as described in the Description of Work is

$__________________________________________.

2. We plan to use the following other subcontractors in order to perform parts of this project:

___________________________________________________________________________________________
___________________________________________________________________________________________

3. The following three references are provided with telephone numbers of projects completed of similar scope and size:

_______________________________________________ Telephone: _________________________________
_______________________________________________ Telephone: _________________________________
_______________________________________________ Telephone: _________________________________

4. Date on which construction can be started:____________________________________________________

Company Name/Address:___________________________________________________________

Signature: _______________________________ Title:____________________ Date:_____________________

Phone/Fax/Email: _______________________________________________________________________

Company EIN #: _______________________________
Description of Contracts

Concrete Contract – C-1 to include, but not limited to, the labor and installation of the following items as shown in the attached design drawings titled, “Proposed Compost Bedded Pack Facility” in this document referred to as “The Design”.

- The Concrete Contractor is responsible for placing all concrete slabs shown in The Design, including: feed alley slab, feed table slab, box pen slab, holding area slab, concrete apron outside of sawdust shed, reception pit slab, cow return slab, cross-over slabs.
- The Concrete Contractor is responsible for placing all concrete walls shown in The Design, including: manure reception pit walls, 3’ exterior walls, feed curb, 6’ bedded pack area walls, box pen walls, 4’ exterior walls, wall between truck bay and milking parlor.
- Supply and install 2-rows of ceramic tile on feed table slab.
- Concrete testing is required; (2) testing events are expected. See The Design for requirements.
- The Concrete Contractor is responsible for supply and installation of the galvanized posts, slant rails, and headlocks as shown in The Design.
- The Concrete Contractor is responsible for final grading of #57 stone under concrete slabs.
- The Concrete Contractor is not responsible for installing the post-frame roofed structures including all posts, beams, trusses, bracing, post brackets, gates.
- The Concrete Contractor is not responsible for constructing the post-frame roofed structures in the milking parlor or milking pit.
- All concrete must be placed to the Pennsylvania Technical Guide Standards and Specifications.
- All materials to install or construct the items listed in the “Estimated Quantities” in this document, under Contract C-1, must meet or exceed Pennsylvania Technical Guide Standards and Specifications.
- All concrete slabs for livestock must have a grooved surface finish. All grooves must be cut into the concrete 1-week or more after the concrete was poured. The Feed Alley shall be grooved in at least one direction. The holding area shall be grooved in 2-directions.
- The winning contractor must be able to produce insurance policies, upon request, covering worker’s compensation and comprehensive general liability to protect against any loss or damage of persons or property resulting from construction of the project.
Description of Contracts

Excavation Contract E-1, to include, but not limited to, the labor and installation of the following items as shown in the attached design drawings titled, “Proposed Compost Bedded Pack Facility” in this document referred to as “The Design”. The bid also includes installation of stormwater management and erosion and sediment control measures as shown the drawings provided by Barry Isett & Associates, Inc. in this document referred to as the “Site Plan”.

- Strip any topsoil and/or soft soil from the footprint of the proposed structure and associated concrete pads.
- Excavate and prepare the building pad, including supplying and placing clean #57 stone underneath all concrete slabs to within +/- 1” of planned elevation. A supply of #57 stone shall be maintained on site for final grading beneath concrete slabs.
- Any fill underneath concrete pads must be installed and compacted as per The Design.
- Excavate and prepare the pad for the manure reception pit; including supplying and placing clean #57 stone underneath concrete slabs to within +/- 1” of planned elevation. Backfilling walls to final grade.
- Supply, procurement, and installation of the 4” perimeter drain, #57 stone, and drain outlet pipe for the manure reception pit.
- Excavate for the footers for all concrete walls to the dimensions specified in The Design.
- Supply, procurement, and installation of waterlines.
- Supply, procurement, and installation of (2) frost free hydrants.
- Supply, procurement, and installation of wastewater and manure transfer pipes.
- Supply, procurement, and installation (1) electric Vertical Liquid Manure Pump, 8” Impeller Diameter, 10HP Motor, 12’ deep. Jamesway or Equal.
- Supply, procurement, and installation (1) submersible sewage pump capable of pumping 100 gpm at 30’ total dynamic head, Goulds 3887 WS1012-BHF or equal.
- Excavation Contract does not include wiring pumps at main building electric panel or supplying electric to the point of pump installation.
- Excavation Contract does not include finished plumbing, installation of floor drains, sinks.
- Install access roads and gravel reinforced areas and geotextile as per The Design and Site Plan.
- Supply, procurement, installation and maintenance of erosion control measures indicated in the Site Plan.
- Supply, procurement, and installation of material necessary to construct stormwater facilities as shown in the Site Plan.
- Final grading and seeding of all earth disturbed earth during construction as shown in the Site Plan.
- The winning contractor must be able to produce, upon request, insurance policies covering worker’s compensation and comprehensive general liability to protect against any loss or damage of persons or property resulting from construction of the project.
**Estimated Quantities** – Contractor Responsible for Verifying Quantities

<table>
<thead>
<tr>
<th>EXCAVATION BID - Prepared 4/5/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM</td>
</tr>
<tr>
<td>UNIT</td>
</tr>
<tr>
<td>EXCAVATION</td>
</tr>
<tr>
<td>Excavation - Cut</td>
</tr>
<tr>
<td>Excavation - Fill</td>
</tr>
<tr>
<td>Dig Wall Footer Trenches. Backfill to Subgrade.</td>
</tr>
<tr>
<td>3&quot; Layer of #57 Stone Under All Concrete Slabs</td>
</tr>
<tr>
<td>8&quot; Layer of 2a Mod. Stone in Bedded Pack Area</td>
</tr>
<tr>
<td>Geotextile, Class IV Type A, Bedded Pack Area</td>
</tr>
<tr>
<td>27' x 13' x 12' Wastewater Pit - Excavation/Cut</td>
</tr>
<tr>
<td>#57 Stone Under Slab</td>
</tr>
<tr>
<td>WATERLINE - 1&quot;, 200 psi. Include Conduit Under Slabs, 2 Shutoff Valves</td>
</tr>
<tr>
<td>8' Frost Free Hydrant</td>
</tr>
<tr>
<td>ACCESS LANE &amp; ANIMAL TRAIL</td>
</tr>
<tr>
<td>Stone Base (#4s)</td>
</tr>
<tr>
<td>Stone Topper (2A Modified or 2RC)</td>
</tr>
<tr>
<td>Geotextile, Class IV Type A</td>
</tr>
<tr>
<td>UNDERGROUND PIPES - Includes Installation</td>
</tr>
<tr>
<td>4&quot; SDR PVC PIPE - Perimeter Drain Outlet</td>
</tr>
<tr>
<td>4&quot; Perforated Drain Pipe (Perimeter Drain) + #57 Stone</td>
</tr>
<tr>
<td>WASTEWATER PIPES - Includes Installation</td>
</tr>
<tr>
<td>2&quot; Sch.40 PVC Pressure Pipe + (2) Shutoffs</td>
</tr>
<tr>
<td>4&quot; SDR PVC PIPE</td>
</tr>
<tr>
<td>6&quot; SDR PVC PIPE</td>
</tr>
<tr>
<td>24&quot; SDR35 PVC Waste Transfer Pipe &amp; In Cross Gutter</td>
</tr>
<tr>
<td>PUMP: Supply and Installation</td>
</tr>
<tr>
<td>1 HP Submersible Sewage Pump: Goulds 3887 or equal. Includes Float Switches, Control Panel, Alarm</td>
</tr>
<tr>
<td>Electric Vertical Liquid Manure Pump, 8&quot; Impeller Diameter, 10HP Motor, 14' deep, Jamesway or Equal.</td>
</tr>
<tr>
<td>Seed and Mulch disturbed areas</td>
</tr>
<tr>
<td>Stormwater Management Basin/Swales and Controls</td>
</tr>
<tr>
<td>Erosion and Sediment Controls (Silt-Sock, etc.)</td>
</tr>
</tbody>
</table>

Contractor to use plans by Barry Isett & Associates, Inc for Stormwater and Erosion and Sediment Control Requirement and Details
**Estimated Quantities** – Contractor Responsible for Verifying Quantities

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE - Feed Alley, Feed Table, Holding Area, Box Pens, Crossover Pads, Concrete Apron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete - All Flatwork As Shown In The Design</td>
<td>sq.ft</td>
<td>7,263</td>
</tr>
<tr>
<td>Concrete Wall Footers</td>
<td>lin.ft</td>
<td>965</td>
</tr>
<tr>
<td>3' High Feeding Curb Wall - formed</td>
<td>lin.ft</td>
<td>184</td>
</tr>
<tr>
<td>6' High Concrete Walls - formed</td>
<td>lin.ft</td>
<td>390</td>
</tr>
<tr>
<td>4' High Concrete Walls - formed</td>
<td>lin.ft</td>
<td>202</td>
</tr>
<tr>
<td>3' High Exterior Walls - formed</td>
<td>lin.ft</td>
<td>187</td>
</tr>
<tr>
<td>Concrete Testing: 2 Events Minimum</td>
<td>each</td>
<td>2</td>
</tr>
<tr>
<td>Supply and Install Headlocks - Sturdy Built or equal</td>
<td>ft</td>
<td>40</td>
</tr>
<tr>
<td>Supply and Install Slant Rails - Sturdy Built or equal</td>
<td>ft</td>
<td>140</td>
</tr>
<tr>
<td>Manure Cross Gutter (includes floor and sidewalls)</td>
<td>lin.ft</td>
<td>48</td>
</tr>
<tr>
<td>4”x8’ Slats (on top of cross gutters)</td>
<td>each</td>
<td>6</td>
</tr>
<tr>
<td>CONCRETE RECEPTION PIT WITH SLATTED TOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete-Flatwork with Monolithic Footer</td>
<td>sq.ft</td>
<td>405</td>
</tr>
<tr>
<td>Precast Solid Panels - 4’ x 12’ and pumpout solid panel</td>
<td>each</td>
<td>6</td>
</tr>
<tr>
<td>12’ High Concrete Walls - formed</td>
<td>cu.yds</td>
<td>30</td>
</tr>
</tbody>
</table>

The Barn-Builder and Milk Equipment Portion is NOT part of the Bid

<table>
<thead>
<tr>
<th>Building/Milking Parlor – Not Bid Portion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOFED STRUCTURE - 83’-2”x184’-5” Barn and 16’x40’ Sawdust Shed:</td>
<td>sq.ft</td>
</tr>
<tr>
<td>Includes Posts, Beams, Trusses with Overhang, Metal Roofing, Bracing, Post Brackets, Fasteners and Hardware, Bracing, Doors, Siding, Finish Plumbing, Electrical, Gates, Galv. railings, Curtains, <strong>Water troughs</strong>, Rain Gutters and all Flat Concrete in the utility room, milkhouse, truck bay, and milking parlor.</td>
<td></td>
</tr>
</tbody>
</table>

| Milking Parlor - Double 4 Herringbone, 8 Stalls Total - Includes concrete, stalls, and equipment    | each | 8      |
WASTE STORAGE STRUCTURE
CONSTRUCTION SPECIFICATION

1. SCOPE

The work shall consist of furnishing materials and installing all components of the waste storage structure as outlined in this specification and the drawings.

Construction work covered by this specification shall not be performed between December 1 and the following March 15 unless the site conditions and/or the construction methods to be used have been reviewed and approved by the Engineer or his/her designated Representative.

2. MATERIALS

All materials used shall conform to the quality and grade noted on the drawings, set forth in Section 9, or as otherwise listed below:

PORTLAND CEMENT shall be Type I, IA, II or IIA and conform to ASTM-C150, unless otherwise set forth in Section 9. If Type I or II is used, an air-entrainment agent shall be used.

CONCRETE AGGREGATE shall meet the requirements and gradation specified in ASTM-C33. Coarse aggregate shall meet the gradation for size numbers 57 or 67.

WATER used in mixing or curing concrete shall be clean and free from injurious amounts of oil, acid, salt, organic matter or other deleterious substances.

REINFORCEMENT BARS shall be grade 40 or higher, and shall conform to ASTM-A615, A616, or A617. Welded wire fabric reinforcement shall conform to ASTM-A185 or A497. Reinforcement shall be free from loose rust, oil, grease, curing compound, paint or other deleterious coatings.

CONCRETE ADMIXTURES shall conform to ASTM-C260 for air-entrainment, and ASTM-C494, type A, D, F or G, for water-reduction and set-retardation, and type C or E for non-corrosive accelerators.

POZZOLAN shall conform to ASTM-C618, Class F, except loss of ignition shall not exceed 3.0 percent.

CURING COMPOUND shall meet the requirements of ASTM-C309, Type 2, Class A or B or as otherwise required in Section 9.

MASONRY COMPONENTS shall meet the requirements of ASTM-C90 & C270, and placed in accordance with ACI-530.

PRECAST CONCRETE units shall comply with ACI-525 and 533.

PREFORMED EXPANSION JOINT FILLER shall conform to the requirements of ASTM-D1752, Type I, II, or III, unless bituminous type is specified, in which case it shall conform to ASTM-D994 or D1751.

JOINT SEALERS shall conform to the requirements for ASTM-C920, Federal Specification SS-S-210A, or Federal Specification TT-S-227, as appropriate for the specific application.

WATERSTOPS. Vinyl-chloride polymer types shall be tested in accordance with Federal Test Method Standard No. 601, and shall show no sign of web failure due to brittleness at a temperature of -35 degrees Fahrenheit. Colloidal (bentonite) waterstops shall be at least 75 percent bentonite in accordance with Federal Specification SS-S-210A. Non-colloidal waterstops shall only be used if approved by the Engineer.
METALS shall conform to the following standards:
   Structural steel - ASTM-A36
   Carbon steel - ASTM-A283, grade C or D; or A611, grade D; or A570, grade C or D
   Aluminum alloy - ASTM-B308, B429, B221, B210, B211, or B209
   Screws - wrought iron or medium steel
   Split or tooth-ring connectors - hot-rolled, low carbon steel conforming to ASTM-A711, grade 1015

WOOD shall be graded and stamped by an agency accredited by the American Lumber Standards Committee as meeting the required species, grade, and moisture content. In the absence of such a stamp, the Contractor or material supplier shall provide written certification that the wood products meet the designated quality criteria.

MANUFACTURED TRUSSES shall be certified as having been designed and built to Truss Plate Institute standards.

PRESSURE TREATED WOOD PRODUCTS shall be Douglas Fir, Southern Yellow Pine, or as otherwise specified on the drawings or in Section 9. They shall be treated with preservatives in accordance with the American Wood Preservers Association (AWPA) Standard C16, “Wood Used on Farms, Pressure Treatment.” Each piece shall bear the AWPA stamp of quality. In the absence of such a stamp, the Contractor or material supplier shall provide written certification that the pressure treated wood meets the designated quality criteria.

FASTENERS for wood structures shall be stainless steel, galvanized, or otherwise protected from corrosion due to contact with moisture, manure and associated gasses.

3. FOUNDATION PREPARATION AND CONDITIONS

All trees, brush, fences, and rubbish shall be cleared within the area of the structure, including any appurtenances, and borrow areas. All material removed by clearing and excavation operations shall be disposed of as directed by the Owner or his/her Representative. Sufficient topsoil shall be stockpiled in a convenient location for spreading on disturbed areas. All structures shall be set on undisturbed soil or non-yielding compacted material. Over excavation must be corrected as noted on the drawings or as directed by the Engineer or his/her designated Representative.

In addition to uniformity, the existing subgrade material must have sufficient strength to support the structure and its associated loads. Organic soil or soils with high percentages of clays and silts shall be removed. A base course (a layer of granular material placed on the subgrade prior to placement of concrete) may be used to improve the stability of the foundation. In addition, geosynthetics may be used, if approved by the Engineer, to further separate and/or stabilize the foundation.

Surface and subsurface drainage systems shall be installed and operating adequately to remove water from the foundation to allow for proper structure placement.

Drainfill upon which concrete is to be placed shall be covered with a geosynthetic that has an AOS between 20 and 100, inclusive.

Concrete shall not be placed until the subgrade, forms and steel reinforcements have been inspected and approved by the Engineer or his/her designated Representative. Notification shall be given far enough in advance to provide time for the inspection.

Prior to placement of concrete, the forms and subgrade shall be free of chips,
sawdust, debris, standing water, ice, snow, extraneous oil, mortar or other harmful substances or coatings.

Earth surfaces against which concrete is to be placed shall be firm and damp. Placement of concrete on mud, dried earth or uncompacted fill or frozen subgrade will not be permitted.

4. CAST-IN-PLACE CONCRETE STRUCTURES

a. Concrete Forms

Forms shall be of wood, plywood, steel, or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours.

Form surfaces shall be smooth and essentially free of holes, dents, sags, or other irregularities. Forms shall be coated with form oil before being set into place. Care shall be taken to prevent form oil from coming in contact with steel reinforcement.

b. Concrete Mix

Concrete for structures shall have a 28-day compressive strength of at least 4000 psi, unless otherwise specified on the drawings or in Section 9. The Contractor shall be responsible for the design of the mix and certification of the necessary compressive strength. Current certification of the design mix by Penn DOT may be accepted in lieu of additional testing.

The slump shall be 3 to 6 inches (without superplasticizers, if any); the air content by volume shall be five to seven percent of the volume of the concrete. Admixtures such as superplasticizers, water-reducers and set-retarders may be used provided they are approved by the Engineer prior to concrete placement and are used in accordance with the manufacturer’s recommendations. Superplasticizers (ASTM C494, Type F or G) may be added to concrete that has a 2 to 4 inch slump before the addition, and that is not warmer than 95°F. The slump shall not exceed 7½ inches with the addition of superplasticizer.

c. Mixing and Handling Concrete

In general, concrete shall be transported, placed, and consolidated in accordance with ACI-304, of which some specific interpretations are set forth below.

The supplier shall provide a batch ticket to the Owner or Technician with each load of concrete delivered to the site. The batch ticket shall state the class of concrete, any admixtures used, time out, and the amount of water that can be added at the site and still be within the design mix limits. Concrete shall be uniform and thoroughly mixed when delivered to the job site. The Contractor shall test slump and air entrainment as necessary to insure that the concrete meets the requirements of this specification. Variations in slump of more than one inch within a batch will be considered evidence of inadequate mixing and shall be corrected or rejected. No water in excess of the amount called for by the job design mix shall be added to the concrete.

For concrete mixed at the site, the mixing time after all cement, aggregates and water are in the mixer drum shall be at least 1-1/2 minutes.

Concrete shall be conveyed from the mixer to the forms as rapidly as practical by methods that will prevent segregation of the aggregates or loss of mortar. Concrete shall be placed in the forms within 1-1/2 hours after the introduction of cement to the aggregate unless an approved set-retarding admixture is used in the mix. During periods of hot weather, it may be necessary to reduce this time.
Concrete shall not be dropped more than 5 feet vertically unless special equipment is used to prevent segregation. Superplasticized concrete shall not be dropped more than 12 feet unless special equipment is used to prevent segregation.

Slab concrete shall be placed at the design thickness in one layer. Formed walls shall be placed in layers not more than 24-inches high, unless superplasticizer is used, in which case the maximum layer shall be 5 feet. Each layer shall be consolidated to insure a good bond with the preceding layer.

Immediately after placement, concrete shall be consolidated by spading and vibrating, or by spading and hand tamping. It shall be worked into corners and angles of the forms and around all reinforcement and embedded items in a manner that prevents segregation or in the formation of "honeycomb." Excessive vibration that results in segregation of materials will not be allowed. Vibration must not be used to make concrete flow in forms, slabs, or conveying equipment.

If the surface of a layer in place will develop its initial set, i.e., will not flow and merge with the succeeding layer when vibrated, a construction joint shall be made. Construction joints shall be made by cleaning the hardened concrete surface to exposed aggregate by sandblasting, air/water jetting, or hand scrubbing with wire brush, and keeping the concrete surface moist for at least one hour prior to placement of new concrete.

Concrete surfaces do not require extensive finishing work; however, the surface shall be smooth and even with concrete paste worked to the surface to fill all voids. The concrete surface must be watertight. Careful screeding (striking-off) and/or wood float finishing shall be required, unless otherwise shown on the drawings. Exposed edges shall be chamfered, either with form molding or molding tools.

The addition of dry cement or water to the surface of screeded concrete to expedite finishing is not allowed.

d. Reinforcing Steel Placement

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. In forms, this shall be accomplished by tying temperature and shrinkage steel or special tie bars (not stress steel) to the form "snap ties" or by other methods of tying. In slabs, steel shall be supported by precast concrete bricks (not clay bricks), or metal or plastic chairs. Except for dowel rods, placing steel reinforcement into concrete already in place shall not be permitted.

The following tolerances will be allowed in the placement of reinforcing bars shown on the drawings:

1) Maximum reduction in cover:
   from formed and exposed surfaces - 1/4 inch from earth surfaces - 1/2 inch

2) Maximum variation from indicated spacing:
   1/12th of indicated spacing

Splices of reinforcing bars shall be made only at the locations shown on the drawings, unless otherwise approved by the Engineer. Unless otherwise required, welded wire fabric shall be spliced by overlapping sections at least one full mesh dimension plus two inches. All reinforcement splices shall be in accordance with ACI 318.

Reinforcing steel shall not be welded, unless approved by the Designer. The ends of all reinforcing steel shall be covered with at least 1-1/2 inches of concrete.

e. Curing
Concrete shall be prevented from drying for at least seven days after it is placed. Exposed surfaces shall be kept continuously moist during this period by covering with moistened canvas, burlap, straw, sand or other approved material unless they are sprayed with a curing compound. Wooden forms left in place during the curing period shall be kept wet.

Concrete, except at construction joints, may be coated with a curing compound in lieu of continuous application of moisture. The compound shall be sprayed on moist concrete surfaces as soon as free water has disappeared but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Concrete shall be wet cured or remain in forms until immediately before patching, repairs, or finishing is performed. Curing compound shall not be allowed on any rebars.

Curing compound shall be applied in a uniform layer over all surfaces requiring protection at a rate of not less than one gallon per 150 square feet of surface. Surfaces subjected to heavy rainfall or running water within three hours after the curing compound has been applied, or otherwise damaged, shall be resprayed.

Any construction activity which disturbs the curing material shall be avoided during the curing period. If the curing material is subsequently disturbed, it shall be reapplied immediately.

Steel tying or form construction adjacent to new concrete shall not be started until the concrete has cured at least 24 hours. Vehicles, overlying structures, or other heavy loads shall not be placed on new concrete slabs for at least three days, unless the concrete strength can be shown to be adequate to support such loads.

f. Form Removal and Concrete Repair

Forms for walls and columns shall not be removed for at least 24 hours after placing the concrete. When forms are removed in less than seven days, the exposed concrete shall be sprayed with a curing compound or be kept wet continuously for the remainder of the curing period. Forms which support beams or covers shall not be removed for at least seven days, or 14 days if they are to support forms or shoring.

Forms shall be removed in such a way as to prevent damage to the concrete. Forms shall be removed before walls are backfilled. Columns shall be at least seven days old before any structural loads are applied.

Where minor areas of the concrete surface are "honeycombed," damaged or otherwise defective, the area shall be cleaned, wetted and then filled with a dry-pack mortar. Dry-pack mortar shall consist of one part Portland cement and three parts sand with just enough water to produce a workable paste.

g. Concreting in Cold Weather

Concreting in cold weather shall be performed in accordance with ACI-306R-88. In addition, the contractor shall provide a written plan at least 24 hours in advance of placing concrete in cold weather, and shall have the necessary equipment and materials on the job site before the placement begins.
h. Concreting in Hot Weather

Concreting in hot weather shall be performed in accordance with ACI 305, of which some specific interpretations are set forth below.

The supplier shall apply effective means to maintain the temperature of concrete below 90 degrees Fahrenheit during mixing and conveying. Exposed surfaces shall be continuously moistened by means of fog spray or otherwise protected from drying during the time between placement and finishing and during curing. Concrete with a temperature above 90 degrees Fahrenheit shall not be placed.

i. Backfilling New Concrete Walls

Backfilling and compaction of fill adjacent to new concrete walls shall not begin in less than 14 days after placement of the concrete, except that walls that can be backfilled on both sides simultaneously may be done so within seven days.

Heavy equipment shall not be allowed within three feet of a new concrete wall. Provide compaction near the wall by means of hand tamping or small, manually-directed equipment.

5. WOOD STRUCTURES

All framing shall be true and exact. Timber and lumber shall be accurately cut and assembled to a close fit and shall have even bearing over the entire contact surfaces. Nails and spikes shall be driven with just sufficient force to set the heads flush with the wood surface. Deep hammer marks in the wood shall be considered evidence of poor workmanship and may be sufficient cause for rejection of the work.

Holes for lag screws shall be bored with a bit not larger than the body of the screw at the base of the thread. Holes for bolts shall be bored with a bit no more than 1/16” larger than the bolt diameter to achieve a snug fit without forcibly driving the bolt.

Washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with wood.

All joints shall be fastened with the number, type, and size of fasteners specified, at the locations or spacing specified.

If field cuts of pressure-treated wood expose untreated interior wood, the untreated surfaces shall be covered with two coats of a liquid preservative, as approved by the Engineer.

Roof trusses shall be handled, installed and braced according to the Truss Plate Institute’s HIB-91, “Handling, Installing and Bracing MPC Wood Trusses.”

Wood structures shall be backfilled within the limits shown on the drawings by placing material in uniform lifts not to exceed nine inches. Compaction within three feet of walls shall be accomplished by means of hand tamping or small manually-directed equipment.

6. STRUCTURES INSTALLED ACCORDING TO STANDARD DETAIL DRAWINGS PREPARED BY OTHERS

Commercially available structures shall be installed as shown on the drawings provided to and concurred in by NRCS. All materials furnished and installed shall conform to the quality and grade noted on the drawings. A site specific set of construction drawings shall be at the site during construction.

Modification of the structure outside limits shown on the drawings shall not be made without prior review and approval by the Engineer with appropriate approval authority. The Supplier or Contractor who submitted the original standard detail drawings shall be responsible for making any changes. Sufficient design
documentation to allow an adequate review of the proposed modification shall accompany any request for a change.

Within thirty (30) days of the completion of construction of the structure, the Contractor or Supplier shall furnish written certification to the Engineer that all aspects of the installation are in conformance with the requirements of the drawings and specifications.

7. BURIED TANKS

a. Tank Condition

Tanks, whether steel or fiberglass/plastic, shall have sufficient strength to withstand design loads, be watertight, and be protected from corrosion. New tanks shall have a manufacturer’s certification to this effect.

Used tanks must be inspected for pitting, corrosion, and cracks that could impair the strength or watertightness. Tanks which originally stored leaded fuels may have tetraethyl lead deposits and scale on the inside. This material should be detached from the tank’s interior, pumped out, and disposed of in a manner which will not pollute ground or surface waters. Also, if welding, handling, etc. is done, safety precautions should be taken to avoid ingesting or inhaling the lead or its fumes. (These tanks may have gasoline fumes or vapors in them and may explode from a spark, welding arc or torch.)

A tank that has been bent or dented will not be accepted unless adequate repairs have been made to restore the strength, watertightness, and corrosion protection. When inlet or outlet pipes or other type of openings are to be cut into one of these tanks, the reduced strength must be considered when the tank is put into use. The Steel Tank Institute's sti-P₃ certification procedure shall be used to evaluate the structural integrity and assure the corrosion protection of steel tanks which have been repaired or modified.

b. Installation

Underground tanks shall be handled and installed according to the manufacturer’s recommended procedures.

At a minimum, all tanks shall be set on a firm earth foundation or a full-length concrete slab covered with six inches of clean sand. The tank shall be surrounded by clean sand or well-tamped earth, free from stones and other debris. The use of saddles or "chock blocks" of any sort interferes with the proper distribution of the backfill loads and shall not be permitted.

The excavation shall be dewatered during installation and backfill operations. The backfill shall be well compacted, particularly under the tank, to provide adequate support.

Tanks shall be covered with a minimum of two feet of earth, or with not less than one foot of earth on which is placed a reinforced concrete slab not less than four inches thick.

Tank installations, which will be subjected to traffic, shall have adequate strength to withstand the anticipated overload. Tanks shall be protected against damage from vehicles passing over them by at least three feet of earth cover or by 18 inches of well-tamped earth plus either eight inches of asphaltic paving or six inches of reinforced concrete. The paving or concrete shall be placed to extend at least one foot horizontally in all directions beyond the outline of the tank.

Tanks shall not be filled or even partially filled during their installation and backfilling.

Unless high ground water levels are not expected, the site shall have a drain system to prevent ground water from flooding around the tank. Where a tank may
become buoyant due to a rise in the level of the water table or due to location in an area subjected to flooding, applicable precautions shall be taken to anchor the tank in place or dewater the site.

Openings on all underground tanks must be properly located and maintained in place during backfilling.

8. PIPES

Excavation for pipes shall be made to the grades and lines shown on the drawings or as indicated by construction stakes. Care should be taken not to excavate below the depths specified. Excavation below grade shall be corrected by placing firmly compacted layers of moist earth to provide a good foundation. If rock or boulders are exposed in the bottom of the excavation, they shall be removed to a minimum depth of eight inches below the invert grade of the pipe and any appurtenances, and replaced with firmly compacted earth to the specified grade.

Pipes shall be backfilled with horizontal lifts of moist earth not to exceed four inches in thickness, or with other material as specified in Section 9 or in the drawings. Each lift shall be compacted by hand tampers or other compaction equipment, however at no time shall driven equipment tires or tracks be within two feet of pipes or appurtenances.

All connections between pipes and structure walls and floors shall be water tight and capable of withstanding the expected operating pressures.
CONSTRUCTION SPECIFICATION

412. GRASSED WATERWAY

1. SCOPE
The work shall consist of the construction of the Grassed Waterways at locations and grades shown on the drawings, or as stated in Section 5 of the specification.

2. MATERIALS
a. The earth material used in constructing the grassed waterway shall be obtained from the grassed waterway area or other approved sources.

b. Other required materials shall be as shown in the drawings or in Section 5 of this specification.

3. FOUNDATION PREPARATION
All trees, stumps, brush and similar material are to be removed from the site and disposed of in a manner consistent with environmental concerns and proper functioning of the grassed waterway. The area shall be stripped of vegetation, topsoil, and unsuitable material. Topsoil shall be stockpiled and spread uniformly over the finished waterway, unless stated otherwise in Section 5 of this Specification.

4. INSTALLATION
Fill shall contain no frozen materials, rocks greater than 6-inches in diameter, roots or wood greater than 2-inches in diameter or 4-inches in length, sod, brush, or other objectionable material. 

The earth fill shall be compacted by routing the hauling and spreading equipment over the fill in such a manner that the entire surface of the fill will be traversed by not less than one tract tread of the loaded equipment. However, the compaction shall not be excessive so as to deter a suitable seedbed. The completed grassed waterway shall conform to the cross section(s) shown on the drawings.

When an excess of earth material results from cutting the grassed waterway to the required cross section and grade, it shall be spread adjacent to the grassed waterway without blocking surface runoff from reaching the waterway, or in another designated area where fill is needed.

Watershed runoff shall be diverted away from the waterway until vegetation is established, as shown in the drawings, or in Section 5 of this Specification. Any protective works shall then be removed, and the disturbed areas shall be seeded to permanent grass.

5. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
1. SCOPE
The work shall consist of furnishing materials and installing all components of the pipeline, as outlined in this specification and the drawings.

2. MATERIALS
All materials used shall conform to the quality and grade noted on the plans, set forth in Section 7, or as otherwise listed below:

PIPE
All pipes shall be clearly marked with the appropriate specification designation.

If the pipe is stored on site, it should be protected from sunlight.

Pipe and fittings shall meet the requirements of one of the following types or as otherwise set forth in Section 7 or on the drawings.

Steel pipe shall meet the requirements of the following specifications, as applicable:

AWWA Specification C-200.

ASTM A 53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless

Steel pipe shall have a protective coating applied and shall conform to one of the following specifications, as applicable:

AWWA C203 Coal-Tar Protective Coatings and Linings For Steel Water Pipelines- Enamel and Tape-Hot Applied

AWWA C209 Cold-Applied Tape Coatings For The Exterior or Special Sections, Connections, And Fittings For Steel Water Pipelines

Plastic pipe shall conform to the requirements of the following ASTM specifications, as applicable:

D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80

D 1785 Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40

D 2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

D 2241 Poly(Vinyl Chloride) (PVC), Pressure-Rated Pipe (SDR)

D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)

Field joints shall be installed according to the manufacturer’s recommendations. On buried pipelines, high-resistance joints between pipe lengths shall be electrically bridged with a welded, brazed, or soldered copper wire. If coated pipe is field welded, care shall be taken to avoid burning the protective coating. After joints are welded, they shall be covered with a coating equal in quality to that specified for the pipe and hardware.
D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter

D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings

D 2737 Polyethylene (PE) Plastic Tubing

D 2564 Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D 2672 Joints for IPS PVC Using Solvent Cement

D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

D 3035 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

D 3085 Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings

D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

Plastic pressure pipe fittings shall conform to the following ASTM specifications, as applicable:

D 2464 Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2466 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

D 2467 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40

D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe

D 2610 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

Solvents for solvent-welded plastic pipe joints shall conform to the following ASTM specifications, as applicable:

D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D 2855 Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Copper Pipe and appurtenances shall meet the following requirements:

Type L, Residential Use, pipe shall be used, meeting one of following ASTM specifications:

B 302 Threadless, Straight With Brazen-Joints Fittings

B 306 Seamless Drainage Tubing with Soldered Fittings

B315 Copper Alloy in Nominal or Standard Sizes, Straight Lengths for "General Engineering Purposes"

Flux shall be non-petroleum based and solder shall be a lead-free type.

CONCRETE

Concrete used for thrust blocks shall have a minimum compressive strength, at 28 days, of 3000 psi. If the supplier cannot show evidence that a mix will meet strength requirements, a mix with a maximum net water content of seven gallons per bag (94 lbs) of cement, and a minimum cement content of five and a half (5.5) bags per cubic yard of concrete, may be used.
The thrust block cavity shall be in undisturbed soil or previously placed compacted backfill that yields an acceptable allowable bearing pressure. The cavity shall be formed with soil or wood to hold the freshly placed concrete without displacement until an initial set has occurred.

When excavation beyond the designated trench widths and depths, as shown on the drawings or specified in section 7 of this specification, occurs at locations where installation of concrete thrust blocks is required, the contractor shall install an alternative thrust block provision.

The concrete thrust block shall have a thickness, length, and depth as shown on the drawings or specified in section 7. Backfill shall be placed on all sides of the thrust block and to the sides of the excavation.

OTHER APPURTENANCES

All other appurtenances, such as valves and valve housings, shall be made of non-corrosive material and shall be according to manufacturer’s recommendations, section 7 and/or the drawings.

3. PLACEMENT

Pipelines shall be placed so that they are protected against hazards imposed by traffic, livestock, farm operations, freezing temperatures, or soil cracking. Other means of protection must be provided if the depth required for protection is impracticable because of shallow soils over rock or for other reasons. Abrupt changes in grade must be avoided to prevent rupture of the pipe.

Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials, and the pipe shall be carefully placed to prevent damage.

Plastic pipelines may be placed by plow-in equipment if soils are suitable and rocks and boulders will not damage the pipe.

4. TESTING

The pipeline shall be pressure tested for leaks. Before pressure testing, the joints of the assembled pipeline shall be allowed to set as recommended by the manufacturer and all concrete thrust blocks shall be in place and allowed to cure for a minimum of 3 days.

Pipeline shall be pressure tested by one of the following methods:

a. Before backfilling, fill the pipe with water and test at the design working head or at a minimum head of 10 ft., whichever is greater. All leaks must be repaired, and the test must be repeated before backfilling.

b. Pressure test at the working pressure for 2 hours. The allowable leakage shall not be greater than one gallon per diameter inch per mile. If the test exceeds this rate, the defect must be repaired until retests show that the leakage is within the allowable limits, but all visible leaks must be repaired.

5. BACKFILLING

All backfilling shall be completed before the pipeline is placed in service. For plastic or copper pipe, the initial backfill shall be of selected material that is free of rocks or other sharp-edged material that can damage the pipe. Deformation or displacement of the pipe must not occur during backfilling.

Plastic pipelines installed by the plow-in method require surface compaction and shaping in addition to the normal plow-in operations.

Installation and backfilling shall be done in a workmanlike manner. Provisions shall be provided for stabilizing disturbed areas and controlling erosion, as necessary.
Construction Specification

533. PUMPING PLANT

1. SCOPE
The work shall consist of furnishing materials and installing all components of the pumping facility, as outlined in this specification and the drawings.

2. MATERIALS
All materials used shall conform to the size, type, etc. noted on the plans, set forth in Section 6, or as otherwise listed below:

a. PUMP:
The pump shall meet the required capacity, pressure, and head requirements, as specified in Section 6 or on the drawings. Pumps shall be compatible and resistant to the type of water or manure being conveyed. The contractor shall be responsible for assessing the consistency, nature, quality and quantity of the substance to be pumped, and provide the appropriate equipment. The contractor shall provide in writing, or by performance tables provided by the manufacturer, the pumps performance characteristics (discharge, head, and pressure) and the relationship to or requirements of the following:
   a) Operating power requirements
   b) Efficiency
   c) Maintenance requirements
   d) Estimated service life

b. PIPE:
Suction and Discharge pipe shall be chosen so that the type and class of pipe exceeds the systems pressure requirement. The operating pressure shall be specified in Section 6 or on the drawings, or as determined by the pump manufacturer. If the pipe is an integral part of another related planned practice or distribution system, the pipe type and class shall meet or exceed the requirements of the pipe installed in that planned system.

Fittings shall be rated equal to the pipe being specified.

The pipe and fittings, where applicable, shall be marked by the manufacturer as described in the applicable ASTM specification.

Used pipe or seconds shall not be used. Pipe shall be approved by the engineer prior to installation.

c. CONTROLS:
All check valves and directional control valves, gauges, quick disconnects, and automatic controls shall be durable and constructed with a rust resistant, non-corrosive, material able to withstand the type of water, or manure being pumped.

d. SUCTION AND DISCHARGE BAYS:
Suction and discharge bays shall be designed to conform to the hydraulic characteristics of the pump. They shall be to the dimension and capacity as specified in Section 6 or on the drawings.

Precast concrete units shall be in conformance with PennDot specifications for such units and/or comply with ACI-525 and 533. All concrete units shall have a 28-day compressive strength of 4000 psi., or greater, and all reinforcement bars shall be of grade 60 steel or higher, unless otherwise specified in Section 6 or on the drawings.

Portland cement shall be Type I, IA, II, or IIA and conform to ASTM-C150, unless otherwise set forth in Section 6. If Type I or II is used, an air-entrainment agent shall be used.
Concrete Aggregate shall meet the requirements and gradation specified in ASTM-C33. Coarse aggregate shall meet the gradation for size numbers 57 or 67.

Reinforcement bars shall conform to ASTM-A615, A616, or A617. Welded wire fabric reinforcement shall conform to ASTM-A185 or A497. Reinforcement shall be free from loose rust, oil, grease, curing compound, paint or other deleterious coatings.

All rock structures shall be of rock that is durable and resistant to weathering. The rock shall be of the type specified in Section 6 and shall be obtained from a source listed in the most current edition of PennDot Bulletin #14. The gradation of the rock shall comply with the requirements set forth by the National Crushed Stone Association.

e. HOUSING AND ACCESSORIES:

Trash racks, housings, and other devices shall be installed as shown on the drawings provided to and concurred in by NRCS. All materials furnished and installed shall conform to the quality and grade noted on the drawings. A site specific set of construction drawings shall be at the site during construction.

Wood shall be graded and stamped by an agency accredited by the American Lumber Standards Committee as meeting the required species, grade, and moisture content. All exposed or buried lumber shall be pressure treated. Pressure treated wood products shall be Douglas Fir, Southern Yellow Pine, or as otherwise specified in Section 6 or on the drawings. They shall be treated with preservatives in accordance with the American Wood Preservers Association (AWPA) Standard C16 for “wood used on Farms, Pressure Treatment”. Non-CCA preservative pressure treated lumber shall be used where aquatic life is a concern.

Roofing material shall be corrugated 29 gage galvanized steel. Equivalent or better material may be approved by the Engineer.

Sheet piling shall be of steel or vinyl type. The piling must be of the thickness and grade specified in Section 6, and as recommended by the manufacturer for the intended use. Suitable methods of installing and anchoring the piling shall be as listed in Section 6, and as recommended by the manufacturer.

3. SITE PREPERATION

All trees, brush, fences, and other debris shall be cleared so as not to interfere with construction or proper functioning of the Pumping Plant system. All material removed by the clearing and grubbing operation shall be disposed of as directed by the Owner or his/her Representative.

4. SAFETY

All positive responses from the Pennsylvania One Call System should be shown on the drawings and the Pennsylvania One Call serial number and date noted on the plans. It is the Contractor’s or Landowner’s responsibility to contact the affected utility for marking at the time of construction.

The Contractor must comply with OSHA requirements Part 1926, subpart P, for protection of workers entering trenches.

5. INSTALLATION

Pipelines shall be placed so that they are protected against hazards imposed by traffic, farm operation, freezing temperatures, or soil cracking. Other means of protection must be provided if the depth required for protection is impractical because of shallow soils over rock or for other reasons.

Trenches for pipeline shall be free of rocks and other sharp-edged materials. The pipe shall be carefully placed to prevent damage.

Before backfilling, the pipeline shall be pressure tested. To pressure test the pipe, fill the pipe with water and test at the design working head and pressure. All leaks must be
repaired, and the test must be repeated before backfilling.

All backfilling shall be completed before the line is placed in service. The initial backfill shall be of selected material that is free of rocks or sharp-edged materials that can damage the pipe.

Deformation or displacement of the pipe must not occur during backfilling.

All seeding shall be in accordance with the Critical Area Planting Standard and Specifications (PA342).

6. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
CONSTRUCTION SPECIFICATION

PA 560 – ACCESS ROAD

1. SCOPE

The work shall consist of construction of the Access Road at the location, and to the dimensions and grades, shown on the drawings and as staked in the field.

2. SITE PREPARATION

All trees, stumps, roots, brush, weeds, and other objectionable material shall be removed from the work area and disposed of as directed.

All unsuitable material shall be removed from the roadbed area prior to placing fill or surfacing materials.

The roadbed shall be graded to the required elevations. All areas which require filling will be scarified prior to placement of fill. All fill shall be compacted according to the specified method with the appropriate equipment or to the specified density.

3. SURFACING

Aggregate for the subbase shall be clean and free from deleterious substances.

Where geotextile is used, the geotextile shall meet, at a minimum, the requirements of PennDOT Publication 408 Section 735 for Class 4, Type A non-woven geotextile or as otherwise stated in Section 6.

Gradation shall be such that a stable base will be formed. Placement of the surface course shall be in accordance with sound highway construction practices.

4. SEEDING

All disturbed areas shall be revegetated as designated on the drawings.

5. EROSION CONTROL

Construction operations shall be carried out in such a manner that erosion and air and water pollution will be minimized. State and local laws concerning pollution abatement must be followed.

6. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
SUBSURFACE DRAIN
CONSTRUCTION SPECIFICATION

1. SCOPE
The work shall consist of furnishing materials and installing all components of the subsurface drain as outlined in the specification and the drawings.

2. MATERIALS
   a. DRAINFILL AGGREGATE shall meet the requirements of Penn DOT, Publication 408, Section 703, fine and coarse aggregate. The size and gradation shall be as specified in the additional conditions of this specification or on the drawings.
   b. PIPE shall meet the requirements of Table 1, and as set forth in Section 9 and/or on the drawings.
      All pipes shall be clearly marked with the appropriate specification designation. If plastic pipe is stored on site for a length of time, it should be protected from sunlight. At the time of installation, it should be kept as cool as possible to minimize elongation of the pipe during installation.
   c. Geotextile shall meet the requirements as outlined in PennDOT Publication 408, Section 735, Class 1, Subsurface Drainage.

Table 1 – Drain Pipe Requirements

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay drain tile, solid &amp; perforated</td>
<td>ASTM-C-4</td>
</tr>
<tr>
<td>Clay pipe, perforated, standard and extra strength</td>
<td>ASTM-C-700</td>
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<tr>
<td>Clay pipe testing</td>
<td>ASTM-C-301</td>
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<td>Concrete drain tile</td>
<td>ASTM-C-412</td>
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<tr>
<td>Concrete pipe for irrigation or drainage</td>
<td>ASTM-C-118</td>
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<tr>
<td>Concrete pipe or tile, determining physical properties of</td>
<td>ASTM-C-497</td>
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<tr>
<td>Concrete sewer, storm drain and culvert pipe</td>
<td>ASTM-C-14</td>
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<tr>
<td>Reinforced concrete culvert, storm drain and sewer pipe</td>
<td>ASTM-C-76</td>
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<tr>
<td>Perforated concrete pipe</td>
<td>ASTM-C-444</td>
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<td>Portland cement</td>
<td>ASTM-C-150</td>
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<tr>
<td>Pipe, bituminized fiber &amp; fitting</td>
<td>Federal Specification SS-P-1540</td>
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<tr>
<td>Styrene rubber (SR) plastic drain pipe &amp; fitting</td>
<td>ASTM-D-2852</td>
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<tr>
<td>Polyvinyl chloride (PVC) sewer pipe &amp; fitting</td>
<td>ASTM-D-2729</td>
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<tr>
<td>Polyvinyl chloride (PVC) pipe</td>
<td>ASTM-D-3034, type PSM</td>
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<tr>
<td>Corrugated polyethylene tubing &amp; fitting (3-6 inch)</td>
<td>ASTM-F-405</td>
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<tr>
<td>Corrugated polyethylene tubing &amp; fitting (8-24 inch)</td>
<td>ASTM-F-667</td>
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<tr>
<td>Pipe, corrugated (steel, polymer coated)</td>
<td>ASTM-A-762</td>
</tr>
<tr>
<td>Pipe, corrugated (steel, zinc coated)</td>
<td>ASTM-A-760</td>
</tr>
</tbody>
</table>
3. SITE PREPARATION

All trees, brush, fences and rubbish shall be cleared within the area that the subsurface drain will be installed. All material removed by the clearing and grubbing operation shall be disposed of as directed by the Owner or his/her Representative.

4. INSPECTION AND MATERIAL HANDLING

Material for subsurface drains shall be carefully inspected before the drains are installed. If applicable, clay and concrete tile shall be checked for damage from freezing and thawing before it is installed. Bituminized fiber and plastic pipe and tubing shall be protected from hazard causing deformation or warping. Plastic pipe and tubing with physical imperfections shall not be installed. Any damaged section shall be removed and replaced. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

5. SAFETY

All positive responses from the Pennsylvania One Call System should be shown on the drawings and the Pennsylvania One Call serial number noted on the plans. It is the Contractor’s or Landowner’s responsibility to contact the affected utility for marking at the time of construction.

The Contractor must comply with OSHA requirements Part 1926, subpart P, for protection of workers entering trench.

6. INSTALLATION

Flexible conduits, such as plastic pipe or tubing and bituminized fiber pipe, shall be installed, according to the requirements in ASTM-F-449, “Standard Recommended Practice for Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control.”

All subsurface drains shall be laid to line and grade and covered with approved blinding, envelope or filter material to a depth of not less than three inches over the top of the pipe. If an impervious sheet is used over the drain, at least three inches of blinding material must cover the sheet. No reversals in grade of the conduit shall be permitted.

If the conduit is to be laid in a rock trench or if rock is exposed at the bottom of the trench, the rock shall be removed below grade so that the trench can be backfilled, compacted and bedded. When completed, the tile conduit shall be not less than two inches from the rock.

Joints between drain tiles shall not exceed 1/8 inch except in sandy soils where the closest possible fit must be obtained and in organic soil where some of the more fibrous soil types make it desirable to slightly increase the space between tiles.

Earth backfill material shall be placed in the trench in a manner to ensure that the conduit does not become displaced and so that the filter and bedding material, after backfilling, meet the requirements of the plans and specifications.

If a filter is needed, no part of the conduit containing openings shall be left exposed. If a sand-gravel filter material is used, it shall be a gradation that is compatible with the base material in the trench. The trench shall be over excavated three inches and backfilled to grade with filter material. After the conduit is placed on the filter material, additional filter material shall be placed over the conduit to fill the trench to a depth of three inches over the conduit.

7. FITTINGS AND CONNECTIONS

All fitting and connections for pipe shall be made with manufacturer-supplied components made for the intended purpose.

8. CONDUIT PERFORATIONS

If perforations are specified, the water inlet area shall be at least 1 inch/foot of the pipe length. The perforations shall be either circular or slots equally spaced around the circumference of the pipe in not less than three rows. Circular perforations shall not exceed 3/16 inch in diameter and slots shall not be more than 1/8 inch wide and 1 ¼ inch long for 3, 4 and 5 inch diameter pipe, or 1 ½ inch for 6 and 8 inch diameter pipe, or 1 ¾ inch for 10 and 12 inch diameter pipe. All slots and circular perforations shall be cleanly cut.
Constitution Specification

620. UNDERGROUND OUTLET

1. SCOPE
The specification covers the fabrication, installation, and construction of underground outlets.

2. MATERIALS
The materials required for the underground outlet shall be as shown on the drawings or as otherwise required in Section 9.

   a. DRAINFILL AGGREGATE shall meet the requirements of Penn DOT, Publication 408, Section 703, fine and coarse aggregate. The size and gradation shall be as specified in the additional conditions of this specification or on the drawings.

   b. PIPE shall meet the requirements of Table 1, and as set forth in Section 9 and/or on the drawings. All pipes shall be clearly marked with the appropriate specification designation. If plastic pipe is stored on site for a length of time, it should be protected from sunlight. At the time of installation, it should be kept as cool as possible to minimize elongation of the pipe during installation.

   c. GEOTEXTILE shall meet the requirements as outlined in PennDOT Publication 408, Section 735, Class 1, Subsurface Drainage.

Table 1 – Drain pipe requirements

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay drain tile, solid</td>
<td>ASTM-C-4</td>
</tr>
<tr>
<td>Clay pipe, standard and extra strength</td>
<td>ASTM-C-700</td>
</tr>
<tr>
<td>Clay pipe testing</td>
<td>ASTM-C-301</td>
</tr>
<tr>
<td>Concrete drain tile</td>
<td>ASTM-C-412</td>
</tr>
<tr>
<td>Concrete pipe for irrigation or drainage</td>
<td>ASTM-C-118</td>
</tr>
<tr>
<td>Concrete pipe or tile, determining physical properties of</td>
<td>ASTM-C-497</td>
</tr>
<tr>
<td>Concrete sewer, storm drain and culvert pipe</td>
<td>ASTM-C-14</td>
</tr>
<tr>
<td>Reinforced concrete culvert, storm drain and sewer pipe</td>
<td>ASTM-C-76</td>
</tr>
<tr>
<td>Perforated concrete pipe</td>
<td>ASTM-C-444</td>
</tr>
<tr>
<td>Portland cement</td>
<td>ASTM-C-150</td>
</tr>
<tr>
<td>Pipe, bituminized fiber &amp; fitting</td>
<td>Fed Spec SS-P-1540</td>
</tr>
<tr>
<td>Styrene rubber (SR) plastic drain pipe &amp; fitting</td>
<td>ASTM-D-2852</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC), Sch’d. 40, 80, 120</td>
<td>ASTM-D-1785</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) sewer pipe &amp; fitting</td>
<td>ASTM-D-2729</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) pipe</td>
<td>ASTM-D-3034</td>
</tr>
<tr>
<td>Pipe, corrugated (steel, polymer coated)</td>
<td>type PSM</td>
</tr>
<tr>
<td>Corrugated polyethylene tubing &amp; fitting (3-6 inch)</td>
<td>ASTM-F-405</td>
</tr>
<tr>
<td>Corrugated polyethylene tubing &amp; fitting (8-24 inch)</td>
<td>ASTM-F-667</td>
</tr>
<tr>
<td>Pipe, corrugated (steel, zinc coated)</td>
<td>ASTM-A-762</td>
</tr>
<tr>
<td>Pipe, corrugated (steel)</td>
<td>ASTM-A-760</td>
</tr>
</tbody>
</table>
d. CONCRETE and related materials shall meet the requirements set forth in Construction Specification PA313S, Waste Storage Facility (Structure), and/or as set forth in Section 9.

All materials shall be carefully inspected prior to installation. Clay and concrete tile shall be checked for damage by freezing. Plastic pipe and tubing shall be protected from hazards causing deformation. Any damaged or imperfect pipe or tubing shall not be installed. Any pipe or tubing which is damaged during installation shall be removed and replaced.

3. SITE PREPARATION

All trees, brush, fences and rubbish shall be cleared within the area that the subsurface drain will be installed. All material removed by the clearing and grubbing operation shall be disposed of as directed by the Owner or his/her Representative.

4. INSPECTION AND MATERIAL HANDLING

Material for underground outlets shall be carefully inspected before the drains are installed. If applicable, clay and concrete tile shall be checked for damage from freezing and thawing before it is installed. Bituminized fiber and plastic pipe and tubing shall be protected from hazards causing deformation or warping. Plastic pipe and tubing with physical imperfections shall not be installed. Any damaged section shall be removed and replaced. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

5. SAFETY

All positive “design” responses from the Pennsylvania One Call System are noted on the plans. It is the Contractor’s or Landowner’s responsibility to notify One Call of pending construction and to contact the affected utility for marking at the time of construction.

The Contractor must comply with OSHA requirements Part 1926, subpart P, for protection of workers entering trench.

6. EXCAVATION

Construction operations shall be done in such a manner that soil and water pollution are a minimum and all state and local erosion regulations are followed.

Unless otherwise specified, excavation for each underground outlet shall begin at the outlet end and progress upstream. The trench shall be excavated to the grades and cross sections shown on the drawings. The trench width above the conduit may increase as necessary for safe installation or for the convenience of the Contractor. Trench shields, shoring, or bracing are required whenever workers will be in a trench deeper than four feet, or as otherwise required by OSHA Regulations.

7. INSTALLATION

BEDDING. In stable soils, the conduit shall be firmly and uniformly bedded throughout its entire length as required on the drawings or Section 9. Where the underground outlet foundation is in unstable soils, the bedding shall be as shown on the drawings or as otherwise required by the Engineer. Where the conduit is to be laid in rock, or rock is exposed at the trench bottom, the rock shall be removed at least two inches below the invert grade to allow for compacted bedding under the conduit.

PLACEMENT. Debris inside of pipes and tubing shall be removed prior to installation. The conduit ends shall be protected during placement. Similarly, all appurtenances, including trash guards and animal guards, shall be protected during installation to avoid damage. All underground outlets shall be laid to line and grade, and immediately covered.
with an approved blinding, envelope, or the required depth of filter material. No reversals in grade of the conduit are permitted, no more than five percent stretch is allowed. Special precautions must be taken in hot weather to observe this stretch limit.

Flexible conduits, such as plastic pipe or tubing and bituminized fiber pipe, shall be installed, according to the requirements in ASTM-F-449, “Standard Recommended Practice for Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control.”

Earth backfill material shall be placed in the trench in a manner to ensure that the conduit does not become displaced and so that the filter and bedding material, after backfilling, meet the requirements of the plans and specifications.

8. BACKFILL

Initial backfill shall be of selected material that is free of rocks or other sharp-edged material that could damage the pipe. Earth backfill shall be placed in the trench in such a manner that the conduit is not displaced, and that the filter and bedding materials are not contaminated or displaced. Unless otherwise specified, where the underground outlet is laid under roads or at other designated locations, the backfill shall be placed in successive layers of not more than six inches, and each lift compacted before the subsequent layer. Backfill shall extend above the adjacent ground to allow for settlement, and be well rounded over the trench.

Work areas shall be restored to their pre-construction condition or as otherwise required in the plans or Section 9.

9. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
1. SCPE

This Specification covers furnishing materials and installing all components of the waste transfer systems as outlined in this specification and the drawings. Components of the systems may include reception pits, pumps, pipes, chutes, valves, or other such structures or equipment.

2. MATERIALS

All materials and equipment used shall conform to the quality and grade noted on the approved plans set forth in Section 6, or as otherwise listed. Used pipe or “seconds” shall not be used. Pipe and fittings shall be approved by the engineer prior to installation.

Reinforced concrete placement and other structures and components, including grates or covers, shall be made in conformance with the requirements of Construction Specification 313.

Equipment such as pumps, rams, chutes, chains, valves, conveyers or augers shall be new, with manufacturers' warranties, as applicable. Owner's manuals shall be provided to the operator.

The pipe and fittings, where applicable, shall be marked by the manufacturer as described in the applicable ASTM specification.

PVC Pipe for pressure flow systems shall meet the requirements of schedule 40 (ASTM-D1785) or SDR Pressure Rated Pipe (ASTM-D2241) for the operating pressure specified in Section 6, or determined by the pump manufacturer. Markings shall meet the requirements of ASTM-D1785 or ASTM-D2241 as applicable.

Fittings for pressure systems shall be rated equal to the pipe specified.

Pipe used in gravity flow systems shall conform to the following specifications:

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyvinyl Chloride (PVC)</td>
<td>ASTM F 679</td>
</tr>
<tr>
<td></td>
<td>ASTM D1785, D3034</td>
</tr>
<tr>
<td></td>
<td>ASTM D2241 (13.5 – 32.5)</td>
</tr>
<tr>
<td></td>
<td>ASTM F794</td>
</tr>
<tr>
<td>Fiberglass</td>
<td>ASTM D 3754</td>
</tr>
<tr>
<td>Polypropylene(PE)</td>
<td>ASTM F2736</td>
</tr>
<tr>
<td>Polyethylene(PP)</td>
<td>ASTM F894, F2648</td>
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<tr>
<td></td>
<td>ASTM D3035</td>
</tr>
<tr>
<td></td>
<td>AASHTO M252, M294</td>
</tr>
<tr>
<td>Steel</td>
<td>ASTM A53, ASTM A134, or ASTM A135, ASTM A139</td>
</tr>
</tbody>
</table>

Joints in PVC, PP, and PE gravity pipelines with push-on (gasketed) joints shall meet the requirements of ASTM D3212 for joint tightness.

Joints in PVC pressure flow systems shall meet the requirements of ASTM-D2672 or ASTM D3139. PVC cement shall meet ASTM-D2564.

Pre-cast concrete units shall conform to Penn DOT requirements for such units and be approved by the Engineer or his/her designated representative.

3. EQUIPMENT REQUIREMENTS

The equipment furnished as part of the waste transfer system shall be compatible with the type of manure and waste to be transferred and meet...
all the performance requirements set forth in Section 6 of this specification. The contractor shall be responsible for assessing the consistency, nature, quality and quantity of the manure and waste to be transferred and provide the appropriate equipment.

The contractor shall provide in writing the performance characteristics (discharge and head) of the transfer equipment and its relationship to or requirements of the following:

a) Operating horsepower requirements.
b) Maximum or minimum elevation or distance instructions.
c) Daily operational maintenance requirements.
d) Estimated serviceable life.

In order to confirm the operation of the equipment, the contractor shall work with the landowner during several operation cycles.

4. COMPONENT INSTALLATION

All components of the system shall be installed to the lines and grades shown on the drawings.

Openings for appurtenances, pipe, etc., shall be sealed by packing a neat cement-mortar mix bituminous caulk or other appropriate joint sealing compound between the appurtenance and the structure to form a liquid-tight seal.

a. Equipment

All transfer equipment shall be installed to the manufacturer’s recommendations. The final installation shall be certified by the installer as to meeting all the guidelines, recommendations, or requirements of the manufacturer and this specification.

b. Pipelines

All pipe shall be installed to provide watertight joints.

Pipe installed in conjunction with a pump shall meet or exceed the pump manufacturer’s recommendations.

Pipe shall be placed on undisturbed soil or non-yielding compacted material. Over-excavation must be corrected as noted on the drawings, or as directed by the responsible engineer or his designated representative.

Backfill shall be placed so as not to damage the pipe nor disturb alignment in any way.

All pipe shall be properly bedded as designated on the drawings or in Section 6.

c. GRATES

All grates or coverings shall be constructed to be removable for maintenance purposes.

d. STRUCTURES

Pre-cast structures shall have shop drawings or schematics and shall be furnished to the engineer prior to installation.

5. CERTIFICATION

The waste transfer system shall be certified by the contractor responsible for the final installation. The system shall conform to all the applicable material and construction specifications and the equipment manufacturer requirements.

6. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
CONSTRUCTION SPECIFICATION

PA 638-WATER AND SEDIMENT CONTROL BASIN

1. SCOPE

The work shall consist of furnishing materials and installing all components of the water and sediment control basin, as outlined in this specification and the drawings.

2. MATERIALS

EARTHFILL used in constructing the water and sediment control basin shall be obtained from the basin excavation areas, or other sources approved by the designer.

PIPE, pipe sizes, fittings and other necessary pipe material shall be as specified on the drawings or in Section 7 of this specification, when applicable.

OTHER required materials shall be as shown in the drawings or in Section 7 of this specification.

3. SITE ACCESS AND CLEARING

All dead furrows, ditches, or gullies shall be filled before constructing the water and sediment control basin or shall be part of the construction. All old terraces, fence rows, hedge rows, trees, and other obstructions shall be removed, as necessary, to install a farmable system. Tree and brush removal shall be done in such a manner to prevent damage to other trees and property, and to minimize erosion. Unless otherwise specified in Section 7, all cleared materials, including trash, shall be burned or removed from the site. Burning shall comply with all state and local applicable regulations.

4. GRADING

The water and sediment control basin shall be constructed according to planned alignment, grade, and cross section with the specified overfill for settlement and the channel graded to promote positive drainage. Any ditch or depression at the bottom of the back slope shall be filled and smoothed so that drainage will be away from the embankment and not parallel to it.

Surfaces which have been over-excavated shall be brought to the planned grade by replacement with soils similar to, and at a density equal to, that of the adjacent soils. Unless otherwise set forth in Section 7, fill that is required to be imported to the site shall be similar to, and placed at a density equal to, that of the adjacent soils, except that areas to be vegetated shall receive topsoil approved by the Engineer. Excess soil material shall be disposed of as set forth in Section 7 or shown on the drawings.

The surface of the finished water and sediment control structure shall have a smooth workmanlike finish. If necessary, topsoil shall be stockpiled and spread over excavations and other areas to facilitate restoration of productivity.

5. STRUCTURAL INSTALLATION

Structures shall be installed as set forth in Section 7, as shown on the drawings, and in such a manner as to minimize erosion and sedimentation.

Provisions must be made to prevent piping and settlement where underground conduits are located under embankments. Backfill shall be placed in successive layers of not more than six inches, and each lift compacted before the subsequent layer wherever terraces, diversions, or other water and sediment control structures are planned.

6. VEGETATION

Vegetation, if required, shall be established at the locations shown on the drawings and/or staked in the field. Additional measures may be required to assure stability during establishment of vegetation with earthen outlets. See requirements set forth in Section 7.
SECTION 735—GEOTEXTILES

735.1 GENERAL—From a manufacturer listed in Bulletin 15 and conforming to the following requirements:

(a) Fabric. Use fabric consisting of long chain polymeric filaments or yarns such as polyethylene, polyamide, polyvinylidene-chloride, polypropylene, or polyester formed into a stable network so that the filaments or yarns retain their relative position to each other. For Class 1, Class 2, and Class 3 Geotextiles, use woven or non-woven fabric. For Class 4 Separation Geotextiles, use a needle-punched “felt-like” non-woven fabric. For Class 4 Stabilization and Reinforcement Geotextiles, use a high strength woven fabric. Use fabric inert to commonly encountered construction chemicals or substances. During periods of shipment and storage, protect the fabric from direct sunlight, ultra-violet rays, temperatures greater than 140°F, mud, dirt, dust, and debris. To the extent possible, wrap the fabric in a heavy-duty covering or shield from direct sunlight.

Geotextiles will be rejected at the time of installation if any defects, deterioration, or damage was incurred during manufacture, transportation, or storage.

(b) Physical Requirements. Table A, for the indicated construction class and type.

(c) Acceptance. Acceptance of the geotextile will be based on certified test data submitted by the manufacturer and on testing by LTS.

(d) Certification. Certify each shipment as specified in Section 106.03(b)3. Visibly label all shipments on the fabric or its container with the manufacturer’s name, fabric type or trade name, lot number, and material quantity.
### TABLE A

Geotextile Physical Requirements$^{(1)}$

<table>
<thead>
<tr>
<th>Fabric Properties</th>
<th>Test Method</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3$^{(2)}$</th>
<th>Class 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Subsurface Drainage</td>
<td>Erosion Control</td>
<td>Sediment Control</td>
<td>Separation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type A</td>
<td>Type B</td>
<td>Type A</td>
<td>Type B</td>
</tr>
<tr>
<td>1. Grab Tensile Strength, lbs.</td>
<td>ASTM D 4632</td>
<td>158</td>
<td>200</td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td>2. Grab Tensile Elongation, %</td>
<td>ASTM D 4632</td>
<td>20 min</td>
<td>15-50</td>
<td>15 min</td>
<td>15-50</td>
</tr>
<tr>
<td>3. Burst Strength, psi</td>
<td>ASTM D 3786</td>
<td>189</td>
<td>320</td>
<td>140</td>
<td>320</td>
</tr>
<tr>
<td>4. Puncture, lbs. (5/16-inch flat-end rod)</td>
<td>ASTM D 4833</td>
<td>56</td>
<td>80</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>5. Trapezoid Tear Strength, lbs.</td>
<td>ASTM D 4533</td>
<td>56</td>
<td>50</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>6. Apparent Opening Size (AOS) Sieve No.</td>
<td>ASTM D 4751</td>
<td>(3) , (4)</td>
<td>(3) , (4)</td>
<td>(3) , (4)</td>
<td>No. 20 max</td>
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<td>8. Permittivity, sec$^{-1}$</td>
<td>ASTM D 4491</td>
<td>0.2</td>
<td>—</td>
<td>—</td>
<td>0.01</td>
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<tr>
<td>9. Seam Strength, lbs. $^{(5)}$</td>
<td>ASTM D 4632</td>
<td>70</td>
<td>180</td>
<td>80</td>
<td>—</td>
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<tr>
<td>10. Ultraviolet Resistance Strength Retention, %</td>
<td>ASTM D 4355</td>
<td>70 @ 150 hrs</td>
<td>70 @ 150 hrs</td>
<td>70 @ 150 hrs</td>
<td>70 @ 150 hrs</td>
</tr>
</tbody>
</table>

(1) The numerical values indicate average minimum roll value or minimum to maximum range, except as noted.
(2) Average minimum roll value for Class 3 material in warp direction only.
(3) Soil with 50% or less particles by weight passing No. 200 sieve, AOS $\geq$ No. 30 sieve.
(4) Soil with more than 50% particles by weight passing No. 200 sieve, AOS > No. 50 sieve.
(5) Applies to both field and/or manufactured seams.
(6) Design specified.

735 – 2

*Initial Edition*
6" & 8" VERTICAL ELECTRIC PUMPS

6" VERTICAL PUMP

The 6" diameter impeller can agitate liquid at a rate of up to 480 GPM with a 5 HP electric motor. An oil-filled lower bearing assembly, with greasable seals, ensures a long operating life. The 6" manure transfer pump is available in 4' - 18' lengths.

- 5 HP electric motor
- Remote grease line for lower seals
- Oil-filled drive tube & bearing assembly
- Mounting bracket included
- Agitation nozzle rotates 270° degrees

These electric manure transfer pumps are designed to agitate and pump milking parlor wastewater and hog manure with fast results. The lower agitation nozzle will quickly agitate a small to medium-sized reception pit and will transfer manure through a 4” PVC pipe up to several hundred feet (depending on elevation).

8" VERTICAL PUMP

The 8" diameter impeller and belt drive makes this pump a great choice for more demanding wastewater pumping and for hog manure.

- 7-1/2 or 10 HP electric motor
- Mounting bracket included
- Oil-filled drive tube & bearing assembly
- Agitation nozzle rotates 270 degrees

Actual pump performance may vary depending on manure consistency.
FEATURES

**Impeller:** Cast iron, enclosed, non-clog, dynamically balanced with pump out vanes for mechanical seal protection.

**Casing:** Cast iron flanged volute type for maximum efficiency. Designed for easy installation on A10-20 slide rail or base elbow rail systems.

**Mechanical Seal:** SILICON CARBIDE VS. SILICON CARBIDE sealing faces for superior abrasive resistance, stainless steel metal parts, BUNA-N elastomers.

**Shaft:** Corrosion-resistant, 300 series stainless steel. Threaded design. Locknut on all models to guard against component damage on accidental reverse rotation.

**Fasteners:** 300 series stainless steel. Capable of running dry without damage to components. Designed for continuous operation when fully submerged.

EXTENDED WARRANTY AVAILABLE FOR RESIDENTIAL APPLICATIONS.

WS_BHF Series
Model 3887BHF
SUBMERSIBLE SEWAGE PUMP
APPLICATIONS
Specifically designed for the following uses:
• Homes
• Water transfer
• Sewage systems
• Light industrial
• Dewatering/Effluent
• Commercial applications
Anywhere waste or drainage must be disposed of quickly, quietly and efficiently.

SPECIFICATIONS
Pump
• Solids handling capabilities: 2” maximum
• Capacities: up to 220 GPM
• Total heads: up to 81 feet TDH
• Discharge size: 2” NPT threaded companion flange as standard. 3” option available but must be ordered separately. (Order no. A1-3)
• Temperature: 104°F (40°C) continuous 140°F (60°C) intermittent.

MOTORS
• Fully submerged in high grade turbine oil for lubrication and efficient heat transfer. All ratings are within the working limits of the motor.
Class B insulation on ½-1½ HP models.
Class F insulation on 2 HP models.

Single phase (60 Hz):
• Capacitor start motors for maximum starting torque.
• Built-in overload with automatic reset.
• SJTOW or STOW severe duty oil and water resistant power cords.
• ½ - 1 HP models have NEMA three prong grounding plugs.
• 1½ HP and larger units have bare lead cord ends.

Three phase (60 Hz):
• Class 10 overload protection must be provided in separately ordered starter unit.
• STOW power cords all have bare lead cord ends.
• Bearings: Upper and lower heavy duty ball bearing construction.
• Designed for Continuous Operation: Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage when fully submerged.
• Power Cable: Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. Standard cord is 20’. Optional lengths are available.
• Motor Cover O-ring: Assures positive sealing against contaminants and oil leakage.

AGENCY LISTINGS
Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549
### MOTOR AND MODEL INFORMATION

<table>
<thead>
<tr>
<th>Order Number</th>
<th>HP</th>
<th>Phase</th>
<th>Volts</th>
<th>RPM</th>
<th>Impeller Diameter (in.)</th>
<th>Maximum Amps</th>
<th>Locked Rotor Amps</th>
<th>KVA Code</th>
<th>Full Load Motor Efficiency %</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS0311BHF</td>
<td>0.33</td>
<td>1</td>
<td>115</td>
<td>3500</td>
<td>3.94</td>
<td>12.4</td>
<td>46.0 M</td>
<td>54</td>
<td>7.5</td>
<td>1.0</td>
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<td>WS0318BHF</td>
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<td>200</td>
<td>3500</td>
<td>3.19</td>
<td>8.4</td>
<td>31.0 K</td>
<td>68</td>
<td>9.7</td>
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<td>WS0512BHF</td>
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<td>3</td>
<td>230</td>
<td>3500</td>
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<td>34.5 M</td>
<td>53</td>
<td>9.6</td>
<td>4.0</td>
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<tr>
<td>WS0538BHF</td>
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<td>3</td>
<td>460</td>
<td>3500</td>
<td>3.19</td>
<td>4.9</td>
<td>22.6 R</td>
<td>70</td>
<td>-</td>
<td>3.8</td>
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<tr>
<td>WS0532BHF</td>
<td>0.5</td>
<td>3</td>
<td>230</td>
<td>3500</td>
<td>3.19</td>
<td>3.6</td>
<td>18.8 R</td>
<td>70</td>
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<td>WS0534BHF</td>
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<td>9.4 R</td>
<td>70</td>
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### DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)

**Discharge Flange:**
- 1 2” NPT standard
- 2 3” NPT optional (order an A1-3)
### PERFORMANCE RATINGS (gallons per minute)

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### COMPONENTS (for reference only)

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*For repair parts, reference repair parts book.*