PROJECT DESCRIPTION

Roofed Waste Storage Facility

A post framed gambrel over-shot style roof with reinforced concrete walls and floor is to be constructed for 120 days manure storage. Gutters, downspouts, underground outlets, and perimeter drains are required. The facility is to be located west of the existing hoop livestock building as shown on the construction drawings. There is an existing concrete pad with 3ft walls at this location. The walls and footers shall be saw cut and removed. This waste concrete shall be buried in the exiting earthen manure lagoon that is being decommissioned. The remaining flatwork concrete shall be left in place, doweled into, and additional flatwork concrete will be added on for the new structure.

Access Road

An access road shall be installed according the location on the drawings.

Waste Facility Closure and Decommissioning of Existing Precast Transfer Structures

An existing earthen manure storage lagoon with concrete ramp and floor shall be decommissioned at the location shown on the plan view. One 4ft. diameter precast manhole structure shall have its lid and riser removed and then have backfill installed to grade.

The farm is located at:
33 Meadow Lane
Wapwallopen, PA 18660 Luzerne County, PA.

CONTRACTOR'S NOTIFICATION LIST

Following is a list of key steps in the construction of the above listed practice(s) and supporting practices at which the Natural Resources Conservation Service (NRCS) Field Office must be notified before proceeding. Failure to notify the NRCS may result in inadequate inspection of construction and the inability to certify that installation meets the standards and specifications.

Notify NRCS 24 hours before:

1. Starting construction
2. Excavation begins
3. Setting of posts
4. Setting any concrete forms
5. Placing any concrete
6. Construction of roof
7. Closure of existing waste storage lagoon
8. Final grading

Responsibility for notification will be reviewed and individual responsibilities will be assigned at the pre-construction meeting.

Prior to the purchase of any materials, certification of their compliance to the specification shall be provided. Certification can be in the form of a signed statement that materials conform or form the markings on the materials themselves. Material literature supplied by manufacturer usually satisfies the certification requirement. The documentation for material certification shall be provided to the quality assurance representative.
OPERATION AND MAINTENANCE

313 Waste Storage Structure
The waste storage structure design is intended to resolve specific environmental concerns associated with the farm. No storage area may be established outside the approved area included in the contract. Any expansion or relocation of the facility must be implemented to the same degree of environmental benefits.

Landowner concurrence: 
锭 (Signature)

This project was designed specifically for your farm operation. As with any other aspect of your farm, a certain level of maintenance is required to keep the system operating properly.

Management Practice 313: Waste Storage Facility and 561 Heavy Use Area
The portion of this project is the roofed stacking structure with reinforced concrete walls and reinforced concrete floor. This area will provide a protected stacking area to store the manure. The structure should have the capacity to handle the quantity of manure based on the on-site evaluation of the manure quantity and consistency. The design volume for the storage structure is based on 4 months of storage with a 1:1 manure slope above the walls to a height of 5 feet. Care should be taken not to exceed the stackable limits of the material in order to prevent spillage over the walls and around the facility.

In order to protect the structural aspects of the stacking area, and heavy use area periodic inspections for cracking or other damage to the concrete should be done. Repair cracks by opening the crack up to approximately \( \frac{1}{4} \) - \( \frac{1}{2} \) using a concrete saw or chisel. Clean the area with water and a steel brush and treat with a joint sealer labeled as conforming to ASTM C-920.

Heavy equipment should be limited to the designated areas whenever possible. In addition these areas should be scraped clean of any excess material that may be present after clean-outs or transportation of manure over these surfaces.

Inspect structural components of the roofed structures frequently and immediately replace any broken or damaged components.

Martin Smith
Luzerne County
Access Road
Inspect the reinforced gravel areas for damage a minimum of twice per year, in the spring and fall. Use a compacted layer of PaDOT Dirt and Gravel Road Mix, or 2RC in damaged areas. These gradations have a maximum size of less than 2” and contain sufficient fines to tightly compact into the base material. Inspect culverts, water bars and outlets after each major runoff event and restore flow capacity as needed.

Roof Runoff Structure
Inspection of gutters, downspouts and underground outlets should be performed annually in the spring and after major storms. Damage shall be repaired promptly. Animal guards should be maintained in good working order and outlets kept stable to prevent erosion.

Critical Area Seeding & 382 Fencing
A good vegetative cover of recommended grasses should be maintained on earth berms and embankments. If the vegetative cover is damaged, it should be re-established as soon as possible. The vegetative cover should be mowed 3 times a year to stimulate growth. Check frequently for burrowing animals around the structure and in the berms and embankments. Remove them when they are found and repair any damage. Keep all fences in good shape around the heavy use area.

SAFETY
During the operation and maintenance of the components in this system, safety shall be given a high priority at all times.

When excavating a trench to install or repair any underground pipes and outlets, dig with sloping sides to prevent cave-ins. Cave-ins can entrap people, which can be fatal. The Conservation District and/or Natural Resources Conservation Service can assist on the proper slope of trench sides. Be careful when working around underground and overhead utilities.

Before digging occurs, the landowner or excavator should call the Pennsylvania One Call System, Inc. @ (1-800-242-1776) to assist in the prevention of accidental damage to underground public utilities.

Martin Smith
Luzerne County
EMERGENCY RESPONSE
During the operation and maintenance of this system there may be an accidental spill as a result of equipment or component failure or other means. Immediate action is needed to contain any spilled waste and keep it from becoming a hazard to water quality or causing off site problems. This could be done by plowing or digging a ditch down slope of the problem. Any spills associated with unloading equipment should be contained or diverted in a similar fashion.

If there is an uncontrolled spill you are to notify the Luzerne County Conservation District in Shavertown, PA at (570) 674-7991. Also, call the PA Department of Environmental Protection (DEP) North East Regional Office in Wilkes-Barre, PA at (570) 826-2511 (24 hours/day). When calling, request guidance and assistance.

DISCLAIMER
This plan is not a substitute for any local, state or federal permits that might be required and any laws or regulations that may apply. It is the landowner's responsibility to comply with any and all such laws and regulations. This plan was prepared upon the landowner's request. All work is expected to be designed and to be implemented in compliance with the applicable standards and specifications of the Pennsylvania Natural Resources Conservation Service Field Office Technical Guide.

Martin Smith
Luzerne County
CDC 00000 POCs MM/DD/YY TT:TT:TT 20161971769-000 NEW XCAV DSGN

============== PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST ===============
Serial Number--[20161971769]-[000] Channel#--[1300WEB][1083]
Message Type--[NEW][EXCAVATION][PRELIMINARY DESIGN]

County--[LUZERNE] Municipality--[HOLLENBACK TWP]
Work Site--[33 MEADOW LANE]
   Nearest Intersection--[SR 3011]
   Second Intersection--[CRAGLE DR]
Subdivision--[] Site Marked in White--[N]

Location Information--
[SITES ARE 2 DAIRY OPERATIONS LOCATED ON THE WEST AND EAST SIDE OF SR 3011. MEADOW LANE IS A DRIVE WAY LEADING TO THE SITE ON THE EAST SIDE. CRAGLE DR IS NORTH OF THE SITES AND SHADY LANE IS SOUTH OF THE SITES. BETWEEN TWO INTERSECTIONS]
Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
   [41.067677/-76.079976,41.069500/-76.071981,41.068309/-76.071512,
   41.066449/-76.079557]

Type of Work--[LIVESTOCK WASTE FACILITY] Depth--[4FT]
Extent of Excavation--[22X36 AND 60FTD] Method of Excavation--[DIGGING]

Lawful Start Dates--[ ] thru [ ] Response Due Date--[29-Jul-16]
   Scheduled Excavation Date--[DESIGN]

Caller--[ANDY WODEHOUSE]
Caller Phone--[570-784-1062] Caller Ext--[129]
Excavator--[CHESAPEAKE BAY FOUNDATION (CBF)]
Address--[702 SAWMILL RD]
City--[BLOOMSBURG] State--[PA] Zip--[17815]
FAX--[570-387-7715] Caller Type--[B]
Email--[ANDY.WODEHOUSE@PA.USDA.GOV]
Work For--[MARTIN SMITH]

Person to Contact--[WILLIAM ANDREW WODEHOUSE]
Contact Phone--[570-784-4401] Contact Ext--[119]
Best Time to Call--[6 AM TO 1 PM]

Prepared--[15-Jul-16] at [1318] by [AWODEHOUSE]
Remarks--
[SITES ARE ACTIVE LIVESTOCK OPERATIONS. BIOSECURITY IS A HIGH PRIORITY FOR LIVESTOCK OPERATIONS. PLEASE CONTACT THE LANDOWNER BEFORE ENTERING THE FARMS. MARTIN SMITH 570 336 7315]

PUD0 PUD=PPL ELEC DESIGN RG 0 RG =FRONTIER COM SO SP 0 SP =SUNOCO PIPELINE
UJ 0 UJ =UGI LEHIGH

Serial Number--[20161971769]-[000]
============== Copyright (c) 2016 by Pennsylvania One Call System, Inc. ===============

Design Contact Information

COMPANY: PPL ELECTRIC UTILITIES CORPORATION
ADDRESS: 4810 LYCOMING MALL
    MONTOURSVILLE, PA. 17754
CONTACT: PAMELA SEITZER
    EMAIL: pdseitzer@pplweb.com

COMPANY: FRONTIER COMMUNICATIONS OF PA INC
ADDRESS: 67 S MAIN ST
    SHICKSHINNY, PA. 18655
CONTACT: JOHN BUGDONOVITCH
    EMAIL: John.Bugdonovitch@frt.com

COMPANY: SUNOCO PIPELINE LP
ADDRESS: 525 FRITZTOWN RD
    SINKING SPRING, PA. 19608
CONTACT: ONE CALL DEPARTMENT
    EMAIL: sxldesignreviews@sunocologistics.com

COMPANY: UGI UTILITIES INC
ADDRESS: 2121 CITY LINE ROAD
    BETHLEHEM, PA. 18017
CONTACT: LUKE LICHTENWALNER
    EMAIL: llichtenwalner@ugi.com
QUALITY ASSURANCE (QA) PLAN

Customer: Martin Smith, Luzerne County
Project: Roofed Waste Storage Facility

Critical Items of Work and Time of Inspections

<table>
<thead>
<tr>
<th>Item</th>
<th>Workdays Inspection Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Layout excavation limits and install E&amp;S control</td>
<td>0.5 Duration</td>
</tr>
<tr>
<td>2. Excavate and establish subgrade for practices</td>
<td>1 Once</td>
</tr>
<tr>
<td>3. Set posts</td>
<td>1 Duration</td>
</tr>
<tr>
<td>4. Set forms and place concrete for pad</td>
<td>2 Duration</td>
</tr>
<tr>
<td>5. Set forms and place concrete for walls</td>
<td>2 Duration</td>
</tr>
<tr>
<td>6. Construct roof</td>
<td>3 Duration</td>
</tr>
<tr>
<td>7. Install roof runoff controls and outlets</td>
<td>2 1 x per day</td>
</tr>
<tr>
<td>8. Waste facility closure</td>
<td>1 Duration</td>
</tr>
<tr>
<td>9. Redress Topsoil, Lime, fertilizer, Seed &amp; Mulch</td>
<td>0.5 At Completion</td>
</tr>
</tbody>
</table>

General Items
1. OSHA standards must be followed. If safety violations are observed, the landowner, contractor, and NRCS supervisor or engineer assigned to the job must be notified.
2. The site shall be checked randomly during the construction period when the contractor is working, expected to work, or could work. These visits shall be unannounced and at random times.
3. All visits shall be documented on the SCS-CPA-6 or in the Job Diary.

Specific Work Items to be Checked
1. Ensure E&S measures are installed
2. Check for seep locations during excavation and ensure all sub-bases are free of seeps or unstable soils.
3. Ensure vegetation is well established and adequate for filter
4. Concrete mix design shall be obtained from the contractor and submit to design engineer for approval
5. Trruss design shall be obtained from contractor and submit to design engineer for approval

Specific As-Built Documentation Required
1. Elevations of the top of the pad at each corner
2. Elevations of original ground and finished grade to document amount of cut and fill
3. Locations of control joints
4. Dimensions of the pad
5. Fasteners and amount installed meet design requirements

The following concur in the content of this plan and the inspection requirements and obligations:

Signature of Designer

Date

Signature of Engineer for Approval

Date

This Quality Assurance Plan was developed to ensure the designer's objectives are met and quality workmanship is performed and sets forth the minimum, but not necessarily all, inspection requirements. If additional inspection is necessary, the inspector shall inform his/her supervisor and document the additional conditions on the SCS-CPA-6.
CERTIFICATION OF CONFORMANCE

The undersigned primary manufacturer/supplier has furnished to:

Farmer’s Name: Martin Smith

Address 33 Meadow Lane

City/State/Zip Wapwallopen, Pa. 18660

Type of Storage: Roof

and hereby states that the quality of work and materials meets the requirements as set forth on NRCS contract drawings and Specifications No. 367 all as approved by the Natural Resources Conservation Service.

Name of Manufacturer/Supplier:

Signature/Title/Date:

Description of items completed:

Construction of Roofed Manure Storage

In addition, the landowner and/or the following subcontractors were also involved in the installation and they hereby certify their work meets the requirements of the drawings and/or specifications as stated previously.

Landowner
Signature/Date:

Description of items completed:
Subcontractor
Signature/Date:

Description of items completed:
Received By:

<table>
<thead>
<tr>
<th>Signature</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
</table>

Note: It is the primary manufacturer/supplier’s responsibility to obtain and furnish all required signatures.
CERTIFICATION OF CONFORMANCE

The undersigned primary manufacturer/supplier has furnished to:

Farmer’s Name: Martin Smith

Address 33 Meadow Lane

City/State/Zip Wapwallopen, Pa. 18660

Type: __Concrete work__

and hereby states that the quality of work and materials meets the requirements as set forth on NRCS contract drawings and Specifications No. 367 all as approved by the Natural Resources Conservation Service.

Name of Manufacturer/Supplier:

Signature/Title/Date:

Description of items completed:

**Construction of Manure Storage**

In addition, the landowner and/or the following subcontractors were also involved in the installation and they hereby certify their work meets the requirements of the drawings and/or specifications as stated previously.

Landowner
Signature/Date:

Description of items completed:
Subcontractor
Signature/Date:

Description of items completed:
Received By:

<table>
<thead>
<tr>
<th>Signature</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
</table>

Note: It is the primary manufacturer/supplier’s responsibility to obtain and furnish all required signatures.
PRE-CONSTRUCTION CHECKLIST

A meeting between the farmer, contractor, and assigned NRCS or Conservation District Technician is required to review the following checklist before construction begins. The contractor must be represented at the meeting by the foreman who will have authority to make decisions for the contractor on the job site, or by the foreman's immediate supervisor. Both individuals must be identified below and those in attendance must sign.

Farmer and Contractor each have a copy of:

____ Plan view.
____ Cross-sections.
____ Installation sequence.
____ Construction E & S Plan.
____ Construction Specifications.
____ Construction master package.
____ Contractor's notification list.
____ Dimensions and/or quantities of needed materials.
____ Other pertinent plans and designs.
____ Reviewed above items with the contractor and farmer.
____ Went over site and problem area(s) with contractor and farmer.
____ Laid out structure with proper cuts and fills.

The contractor and the farmer agree with the above checklist.

Construction will start on _____________.

(date)

Farmer's Signature: ___________________________________________ Date: ________.

Contractor's Name/Signature: ______________________________ (foreman)

Contractor's Name/Signature: ______________________________ (supervisor)

Phone: ______________________________

Technician's Signature: ______________________________

Phone: 570-674-7991 ______________________________

Martin Smith Luzerne County

March 2016
SUPERPLASTICIZERS (HRWR)

On a trial basis, superplasticizers will be allowed for use as described herein. All concrete construction shall follow NRCS Construction specification 313 except where modified. The concrete strength must be provided as per the design. The user must ensure that the proposed HRWR product meets the requirements of ASTM C 494.

**GENERAL SPECIFICATION LIMITS FOR CONCRETE**

<table>
<thead>
<tr>
<th>Specification Requirement</th>
<th>Superplasticized Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slump</td>
<td>7 ½ inch maximum</td>
</tr>
<tr>
<td>Free Fall</td>
<td>12 feet</td>
</tr>
<tr>
<td>Structural Concrete</td>
<td></td>
</tr>
<tr>
<td>Layer Thickness</td>
<td>5 feet</td>
</tr>
<tr>
<td>Structural Concrete</td>
<td></td>
</tr>
<tr>
<td>Concrete Temperature</td>
<td>95°F -</td>
</tr>
</tbody>
</table>

Add superplasticizers to concrete with a 2-4” slump. Water may not be added to the mix after the superplasticizers.

Altered dosage of the air entrainment agent may be required to maintain air within specification.

It is recommended that a minimum amount of mixing time or revolutions on the drum be provided after the HRWR has been introduced. Usually 2-4 minutes (depending on total number of cubic yards to be mixed) is sufficient or 20-30 revolutions.

Forms must be designed to withstand full hydraulic pressure resulting from the near fluid state of superplasticized concrete often effective for the duration of placement. Tightness of forms is also critical since superplasticized concrete will leak through very small cracks.

Required dosages of superplasticizers increase as the temperature of concrete decreases. The amount can be significant at temperatures below 68°F.

The use of HRWR admixtures may slightly retard the setting of concrete depending on factors including temperature, initial slump, cement content, brand of HRWR, and the combination of other water reducing agents with the HRWR.

January 1995
Compliance with safety regulations on agricultural projects is expected on all sites receiving federal funding or technical assistance and by all construction insurance/liability companies. Requirements may vary, however the contractor is to maintain a safe working environment for themselves, their employees, subcontractors, and others who must have access to the site. Detailed knowledge of safety regulations is the responsibility of the contractor.

Agency personnel involved with the project may also provide assistance in identifying safety concerns as they recognize them. When a safety problem is identified and brought to the contractor's attention it must be resolved. If there is a safety issue the agency personnel are instructed to refer the situation to OSHA.

These are some of the major areas of concern:

**Soil Cave-In Protection**
- Applies to all excavation over four feet in depth.
- OSHA has regulations set forth in Standards 29 CFR, 1926, Subpart P.
- Options include: sloping, shoring or working from a safe distance.
- See “Fact Sheet” – SOIL CAVE IN – A FATAL SLIP for general information.

**FALL PROTECTION**
- This applies to all areas where an individual could fall six feet or more.
- OSHA has written new guidelines as detailed in Standards 29 CFR Parts 1910 and 1926.
- This new regulation adds to the requirements for scaffolding found in 29 CFR 1926/1910, Subpart L.
- Options include: warning line system, mechanical equipment, controlled access area, covers, protection from falling objects, guardrail system, and personal fall arrest.
- This system should be written into a fall protection plan.

**UNDERGROUND AND OVERHEAD UTILITY PROTECTION**
- Requirements include conducting utility check via PA-ONE Call system
- Requirements include a procedure to avoid contact with above ground utilities on the work site.
Cause of Cave Ins

Cave ins in pits and ditches cause the death of construction workers every year. Most deaths have occurred in trenches dug for utility lines. However, soil slippage can occur anywhere soil is excavated. Landslides in clay soils kill more people each year than those in sandy soils.

Most workers are careful around sand because they know it moves easily. However, many believe a thick, tough clay soil will not slip. Yet, most clay soils shrink and crack open when dry and swell when wet. This shrinkage and swelling cause slick areas to develop beneath the surface.

Some clay soils contain water-tight layers called fragipans. Water accumulating on the impervious layer lubricates the soil, increasing the probability of slippage. When a ditch or pit is dug in a soil with a fragipan or in a soil with a high shrink-swell potential, the soil will often slip, resulting in a dangerous cave in. This becomes even more likely WHEN THE SOIL IS WET.

Prevention

Occupational Safety and Health Administration (OSHA) regulations require protective action on all worker-occupied excavations unless the cut is made in stable rock, or the cut is less than five feet deep and there is no potential for a cave in to occur. Protection can be accomplished with sloping and benching, support systems, or shield systems which conform to OSHA regulations.

Sloping the sides of the excavation is the simplest protection against a cave in. If soil properties in the excavation are unknown, the excavation slopes should be no steeper than 1-1/2 horizontal to 1 vertical. If the soil can be classified as a Type A or Type B material according to the OSHA classification system (see back side), you can use a steeper slope, as shown in Figures 1 through 5.

Consult OSHA regulations when more than one soil type is exposed in an excavated slope, or when bencheted slopes are used. The regulations also provide details on support and shield requirements. Complete requirements are found in OSHA's safety and health standards (29 CFR 1926, Subpart P).

Soils Information

Soil survey publications are available for most counties. This information is useful to engineers, builders, contractors and others interested in construction hazards. The publication identifies soils with fragipans and high shrink-swell potential. Other potential construction problems, such as water table, bedrock and corrosiveness, are also containned in the reports as well as information on engineering properties of soils.

Copies of soil survey reports and other soils information are available from the local office of the USDA, Natural Resources Conservation Service, or write Soils, USDA, Natural Resources Conservation Service, Suite 340, One Credit Union Place, Harrisburg, PA 17110-2993.
OSHA Soils Classification for Excavated Slopes

Type A means cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or
(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
(iii) The soil has been previously disturbed; or
(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of 4H:1V or greater; or
(v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; or
(ii) Granular, cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam; or
(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil; or
(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
(v) Dry rock that is not stable; or
(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than 4H:1V, but only if the material would otherwise be classified as Type B.

Type C means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or
(ii) Granular soils including gravel, sand, and loamy sand; or
(iii) Submerged soil or soil from which water is freely seeping; or
(iv) Submerged rock that is not stable; or
(v) Material in a sloped, layered system where the layers dip into the excavation on a slope of four 4H:1V or steeper.

MAXIMUM ALLOWABLE SLOPES

Figure 1. Type A Soil
Simple Slope, General

Figure 2. Type A Soil
Simple Slope, Short Term

Figure 3. Type A Soil
Unsupported, Vertically Sided Lower Portion, Maximum 8 Feet in Depth

Figure 4. Type A Soil
Unsupported, Vertically Sided Lower Portion, Maximum 12 Feet

Figure 5. Type B Soil
Simple Slope

Figure 6. Type C Soil
Simple Slope
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.

WATERSTOP. 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.
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.
9. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
Construction Specification
CRITICAL AREA PLANTING

1. SCOPE

The work shall consist of furnishing and planting the plant materials as set forth in the drawings and/or Section 7.

Critical area planting specifications are divided into four subsections based on the type of vegetation to be established:

- Temporary cover
- Permanent cover – seeding grasses and legumes
- Permanent cover – sod establishment
- Permanent cover – trees & shrubs

2. TEMPORARY COVER

A. MULCHING – Unless otherwise set forth in Section 7, use if the period of soil exposure without permanent vegetation will be less than two months, temporary vegetation is not feasible, or where seeding is delayed because of weather conditions. Follow the specification for Mulching (PA484).

B. ANNUAL GRASS or CEREALE GRAIN – Unless otherwise set forth in Section 7, use on all sediment producing areas where the period of soil exposure will be more than two months, but less than 12 months.

1) Site Preparation
   a) Install all required water control measures (temporary and permanent) prior to cover application.
   b) Perform all cultural operations at right angles to the slope on slopes 3:1 or flatter.
   c) Apply agricultural lime according to the soil test. If no test results are available when ready to seed, apply at the rate of 8000 pounds per acre (200 pounds per 1000 square feet) on a 100 percent calcium carbonate equivalent basis as a preliminary application. Apply the balance recommended by the test when the results are received. If lime is to be worked into a depth of five inches or deeper, use the amount full recommended in the soil test report. Apply no more than 8000 pounds per acre at one time if the limestone is to be worked into less than five inches. Apply the balance of the recommendation as the lime dissolves and infiltrates into the soil.

Where pH levels are extremely low, it may not be feasible or practical to apply the lime all at once. In these cases, apply 6,000 pounds per acre (150 pounds per 1,000 square feet) on a 100 percent calcium carbonate equivalent basis for the temporary cover, and the balance of the test recommendation with the permanent cover.

d) Apply fertilizer according to the soil test. If the test results are not available prior to seeding, apply 40 pounds each of actual N. P₂O₅, and K₂O per acre (1 pound each per 1000 square feet) as a preliminary application. Apply any balance recommended by the test when the results are received.

2) Materials
   a) Seed using the species or mixtures for the appropriate site type in Table 1 Temporary Cover or Nurse Crop unless otherwise set forth in Sections 7.
   b) All seed shall conform to the certifications of the PA Dept. of Agriculture and in addition, be labeled in accordance with the USDA Federal Seed Act in effect at the time of planting.
   c) No seed will be accepted with a test date more than 9 months before delivery to the site. Seed that is moldy or otherwise damaged will not be accepted.

3) Establishment
   a) Seeding rates shall be at the rates set forth in Table 1 Temporary Cover or Nurse Crop, unless otherwise set forth in Section 7.
b) Cover grass seeds with ¼-inch, and small grains with 11/2-inches of soil by drilling, cultipacking, harrowing, or other suitable method when the site conditions permit; cultipack or track hydrosseeded area where slopes will allow safe equipment operation.

c) Mulch all seeded areas according to the construction specification for Mulching (PA484).

3. PERMANENT COVER – SEEDING GRASSES AND LEGUMES

A. SITE PREPARATION

1) Install all required water control measures (temporary and permanent) prior to cover application.

2) Perform all cultural operations at right angles to the slope on slopes 3:1 or flatter.

3) Where site conditions permit, prepare a seedbed by loosening the soil to a depth of 2 to 6 inches with suitable equipment. Where site conditions do not permit such normal seedbed preparation, loosen the soil surface by dragging a heavy chain or other suitable devices over the area to be seeded. Where possible on mined land, the surface should be left furrowed (as typically left by ripper teeth spaced 12 to 18 inches apart) when seeding herbaceous plants.

4) Apply agricultural lime according to the soil test. If no test results are available when ready to seed, apply at the rate of 8000 pounds per acre (200 pounds per 1000 square feet) on a 100 percent calcium carbonate equivalent basis as a preliminary application. Apply the balance recommended by the test when the results are received. If lime is to be worked into a depth of five inches or deeper, use the amount full recommended in the soil test report. Apply no more than 8000 pounds per acre at one time if the limestone is to be worked into less than five inches. Apply the balance of the recommendation as the lime dissolves and infiltrates into the soil.

Where pH levels are extremely low, it may not be feasible or practical to apply the lime all at once. In these cases, apply the lime in increments of 6,000 pounds per acre (150 pounds per 1,000 square feet) on a 100 percent calcium carbonate equivalent basis and incorporate it before the next increment.

5) Apply nitrogen only when the plants will be actively growing during the period immediately following the application (March to May and August to October for cool-season grasses, June to August for warm-season grasses). On remote sites with poor access for standard fertilization (e.g., mine reclamation), apply all nitrogen as slow release compounds (e.g. ureaformaldehyde, sulfur-coated urea, other slow release formulation, animal manure, or sewage sludge), and at a rate of not greater than 80 pounds of actual nitrogen per acre (2 pounds per 1000 square feet) in any one application. On sites with good access (e.g. agricultural fields), apply 40% of the required nitrogen as slow release compounds, and no more than 40 pounds of actual nitrogen per acre (1 pound per 1000 square feet) in any one application.

6) Apply fertilizer according to a soil test. If test results are not available prior to seeding, apply as follows:

   a) Where a seedbed can be prepared, apply 100 pounds each of actual P₂O₅ and K₂O per acre (2.5 pounds each per 1000 square feet) during seedbed preparation and at time of seeding. Apply 100 pounds of actual P₂O₅ and 100 pounds actual K₂O per acre (2.5 pounds of actual P₂O₅ and 2.5 pounds of actual K₂O per 1,000 square feet) as a preliminary application.

   Apply 40 pounds of actual N per acre (1 pound per 1,000 square feet) during the first period of active growth following the seeding. (Cattle manure or sewage sludge can be used to meet the nutrient requirements and will add needed organic matter when they can be incorporated into the soil. Heavy metal content of sewage sludge should not exceed that allowed on agricultural lands.) Test the soil before application and apply any balance recommended by the test when the results are received. Apply maintenance fertilizer the following growing season according to a soil test.

   b) Where seedbed cannot be prepared, 80 pounds of actual P₂O₅ and K₂O per acre (2 pounds of actual P₂O₅ and 2
pounds of actual K<sub>2</sub>O per 1,000 square feet) at time of seeding. Apply 40 pounds of actual N per acre (1 pound per 1,000 square feet) during the first period of active growth following the seeding.

c) If legumes are hydroseeded alone or in a mixture, use four times the normally recommended amount of inoculants to the slurry just before seeding, and apply lime and fertilizer by any method that will provide a uniform distribution.

B. MATERIALS

1) Apply seed species or mixtures as set forth in Section 7 and at the rates in Table 2 Permanent Cover Grass and Legume Seeding Rates for the permanent cover. Also apply a nurse crop seed mixture at the rates in Table 1 Temporary Cover or Nurse Crop unless otherwise set forth in Section 7.

2) All seed shall conform to the certifications of the PA Dept. of Agriculture and in addition be labeled in accordance with the USDA Federal Seed Act in effect at the time of planting. No seed will be accepted with a test date more than 9 months before delivery to the site. Seed that is moldy or otherwise damaged will not be accepted.

C. ESTABLISHMENT

1) Where the seedbed is prepared:

a) Smooth and firm the seedbed with a cultipacker or other similar equipment prior to seeding.

b) Apply seeds uniformly by drilling, broadcasting, or hydroseeding. When broadcast or drilled, cover grass and legume seeds with 1/4-inch of soil.

c) Cultipack or track with a tracked-vehicle where slopes allow.

d) Mulch all areas according to construction specification for Mulching (PA484).

2) Where seedbed is not prepared:

a) Apply seed species or mixtures as set forth in Section 7 and at the rates in Table 2 Permanent Cover Grass and Legume Seeding Rates for the permanent cover. Also apply a nursery crop seed mixture at the rates in Table 1 Temporary Cover and Nurse Crop, unless otherwise set forth in Section 7.

b) All seed shall conform to the certifications of the PA Dept. of Agriculture and in addition be labeled in accordance with the USDA Federal Seed Act in effect at the time of planting. No seed will be accepted with a test date more than 9 months before delivery to the site. Seed that is moldy or otherwise damaged will not be accepted.

c) Apply seeds uniformly by drilling, broadcasting, or hydroseeding.

d) Cultipack or track with a tracked-vehicle where slopes allow.

e) Mulch all areas according to construction specification for Mulching (PA484).

4. PERMANENT COVER – ESTABLISHING SOD

A. SITE PREPARATION

1) Prepare the area, including lime and fertilizer, as set forth for Permanent Cover-Seeding in Section 3.A.

2) Till the soil surface to a depth of three inches and dampen immediately prior to laying sod.

B. MATERIALS

1) Sod shall be of the species set forth in Section 7.

2) Sod shall be grown from certified seed of adapted varieties, tested and approved by the PA Experiment Station, and under the cultural practices conducive to high quality sod that is free of any significant thatch, weeds, insects, and disease.

3) Sod shall be at least one-year old and no older than three years. Cultivated turfgrass shall be considered ready for harvest when a cut portion of sod three feet in length and about 1-1/2 feet wide will support its own weight.

4) Cut sod of a width and length suited to the equipment and site, or as otherwise set forth in Section 7. Sod shall be cut, folded in the middle or rolled, and stacked on pallets. Folded sod shall be between 3 and 4 feet in length, unless otherwise allowed in Section...
7. Sod shall be cut with a ½- to 1-inch layer of soil.

5) Have sod delivered to the site as soon as possible after harvesting. During hot weather, delivery shall be made within six hours. During cooler weather, when allowed in Section 7, delivery time may be extended up to 48 hours. Unless allowed in Section 7, sod shall not be planted during July and August, and when allowed shall be cut with at least 1-1/4 inch of soil and irrigated as necessary to ensure survival.

C. ESTABLISHMENT

1) Lay sod strips at right angles to the direction of water flow (slope), starting at the lowest elevation. Wedge the edges and ends of the sod strips together and tamp or roll. Stagger all end joints. Score the adjacent undisturbed ground so that the sod edges are flush and embedded (i.e. do not allow feathered edges).

2) On steep slopes or where required by Section 7, use wire or starch staples, fine mesh, or wooden pins and bale twine to secure the sod in place. When required in Section 7, remove wire and wooden stakes after the sod has rooted sufficiently to be secure.

3) Irrigate sod when dry conditions prevail to ensure survival. If required in Section 7, irrigate the sod to be lifted prior to harvesting.

5. PERMANENT COVER – TREES & SHRUBS ON HIGHLY DISTURBED AREAS

A. SITE PREPARATION

1) For seedings:
   a) Site preparation shall be the same as set forth in Sections 3.A. (1 through 3).
   b) Apply lime at the rate of 4000 pounds per acre on a 100-percent calcium carbonate basis over the area to be planted.
   c) Apply fertilizer at the rate of 40 pounds of actual P2O5 and 40 pounds of actual K2O per acre (1 pound per 1000 square feet) at the time of seeding. Apply 40 pounds of actual N per acre (1 pound per 1000 square feet) during the first period of active growth following the seeding. When strip-seeding, apply all of the fertilizer in the herbaceous strips.

2) For individual plantings:
   a) Prepare the area by clearing and mowing to allow access for planting and plant growth, or as otherwise set forth in Section 7.
   b) Planting pits in confined spaces or other harsh environments shall be excavated as recommended in A guide to: Conservation Plantings in Critical Areas for the Northeast (http://plant-materials.nrcs.usda.gov/nypmc/) unless otherwise set forth in Section 7.

B. MATERIALS

1) Plant species shall be as set forth in Section 7. Plant names required under this contract shall conform to those set forth in Standardized Plant Names, 1942 Edition, prepared by the American Joint Committee on Horticulture Nomenclature. Names not included therein shall conform to names generally accepted in the nursery trade.

2) All seed shall conform to the certifications of the PA Dept. of Agriculture and in addition be labeled in accordance with the USDA Federal Seed Act in effect at the time of planting. No seed will be accepted with a test date more than 9 months before delivery to the site. Seed that is moldy or otherwise damaged will not be accepted.

3) Plant materials shall be of the size and quality set forth in the rules adapted by the American Association of Nurserymen, Inc. and conform to the “American Standard for Nursery Stock”. All plants shall be supplied from plant hardiness zones 5 or 6, as described in Plant Hardiness Zone Map, USDA-ARS, Miscellaneous Publication No. 614.

4) All plant materials shall be full, well-branched and proportioned, particularly with respect to width and height. Plants shall have well developed branches and vigorous fibrous roots (except unrooted cuttings). Plants shall be free of defects, decay, injury, disease, insect infestation, or objectionable disfiguration.

5) The source(s) of plant materials shall be made known and available for inspection at
least one week prior to planting. Plant identification and information labels shall be securely attached to each plant. Plants rejected shall be replaced with acceptable materials.

C. ESTABLISHMENT

1) Plant vegetation at the locations set forth in Section 7.

2) For seeds, where both are required, seed the herbaceous species in strips, with woody species between each strip. Orient strips on the contours, unless otherwise set forth in Section 7. Apply seeds uniformly by drilling, broadcasting, or hydroseeding. Cultipack or track with a tracked-vehicle where slopes allow.

3) For trees and shrubs, follow recommendations in A guide to:

Conservation Plantings in Critical Areas for the Northeast (http://plant-materials.nrcs.usda.gov/nypmc/)

Unless otherwise set forth in Section 7, plant conifers at the rate of 680 per acre, deciduous trees at the rate of 435 per acre (spacing 10' x 10'), shrubs at the rate of 2,700 per acre (spacing 4' x 4').

4) For bare root plants, protect the root systems from drying by treating roots with a moisture-retaining gel immediately upon arrival at the planting site.

6. TABLES

See Attached

7. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
WASTE FACILITY CLOSURE
CONSTRUCTION SPECIFICATION

1. SCOPE

The work shall consist of furnishing and installing materials and removing existing facilities and materials as outlined in this specification and the drawings.

2. MATERIALS

FILL MATERIAL - Soil that is free from stumps, wood, brush, roots, sod, rubbish, matter that may decay, and other objectionable materials.

MANURE LADEN SOIL - Soil that has been visibly color stained by manure or mixed with manure or sludge.

SLUDGE - Thick manure and other settled solids that are too thick to be pumped, and is deposited on the sides and bottom of the waste impoundment.

3. WASTE REMOVAL

Empty the impoundment. Waste material shall be utilized by spreading on crop fields or pastures as set forth on the plans or Section 10.

a. Every effort should be made to remove as much of the waste material as possible.

b. Waste should be thoroughly agitated and pumped into a manure spreader or irrigation system.

b. Impoundments shall be further emptied by pushing or flushing the remaining waste material to an unloading point.

4. LINER REMOVAL

When required in Section 10, an existing concrete, geomembrane, soil liner or biological film or fibrous mat shall have 25% of the surface area, at the lowest elevation, removed to allow for free drainage. Liner removal shall only occur after all waste material has been removed.

5. EARTH STRUCTURE REMOVAL

The embankment shall be breached or removed as shown on the drawings or as specified in Section 10. The embankment shall be left in place until all waste has been removed, unless it is necessary to remove part of the embankment to provide access for waste removal. The breach shall not permit any remaining liquid manure, sludge or manure laden soil to leave the impoundment. A depth of storage, as specified in Section 10 or the drawings, shall be maintained until after all waste material and manure laden soil is removed from the impoundment.

If the area within the breached embankment is to be filled, or if the impoundment is an excavated pond, the impoundment shall be filled and shaped using fill material from the designated borrow area.

Frozen material shall not be placed in the fill, nor shall the fill material be placed on a frozen foundation.

Fill shall be placed in 9 inches lifts. Fill material shall be compacted by routing construction equipment over the fill area.

Fill material shall contain sufficient moisture so that it can be formed into a ball without crumbling. If water can be squeezed out of the ball, it is too wet to compact properly.

The backfill height shall exceed the design finished grade by 5% to allow for settlement. The top one foot of the backfill shall be constructed of the most clayey material available and graded to provide positive drainage. Incorporate available topsoil where feasible to aid establishment of vegetation.
6. STEEL AND CONCRETE STRUCTURE REMOVAL

Identified structures shall be disassembled as specified in Section 10.

Below ground structures shall be demolished, completely removed, or left in place with the top removed to the extent that fill material can be placed and compacted to fill all voids. Compaction inside of structures not accessible to equipment shall be compacted by manually operated compactors in 6" lifts. Below ground structures that will remain in place shall have 25% of the floor or bottom removed to allow for free drainage. Floor or bottom removal shall only occur after all waste material has been removed.

Excavations, depressions and all voids shall be filled with fill material as specified in Section 5.

7. APPURTENANCE REMOVAL

Waste transfer pipes shall be flushed clean of manure and either be removed for their entire length and properly disposed, or be plugged. Pipes shall be plugged as specified in Section 10 or on the drawings.

Where pipes are removed, the trench shall be filled with fill material as described in Section 5. Other appurtenances or structures shall be removed as described in Section 10 or on the drawings.

8. CONVERT TO FRESH WATER USE

Any existing concrete, geomembrane or soil liner and foundation drainage system shall remain in place. Any damaged to a seepage control liner shall be repaired as directed by the Engineer.

If the impoundment is to be converted to fresh water use, the bottom and sides of the impoundment shall be further cleaned as specified in Section 10. As a final step the impoundment shall be filled with clean water and emptied twice before being put into use as a fresh water impoundment. The water from this procedure shall be applied to land with vegetative cover at rates that will prevent surface runoff and deep percolation.

9. DISPOSAL

Manure laden soil, sludge or fibrous mat shall be spread evenly on cropland. After spreading, the manure laden soil, sludge or fibrous mat shall be incorporated using conventional tillage equipment.

Demolished materials including seepage control liner, pipe and other appurtenances shall be buried on site at the designated location(s) as shown on the drawings or removed from site and disposed of in an acceptable manner.

10. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
CONSTRUCTION SPECIFICATION
367. ROOFS and COVERS

1. SCOPE

The work shall consist of furnishing materials and installing all components of the roof or cover, 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 8, 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 8. 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 8.

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 8. 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 roofs and covers shall be stainless steel and/or galvanized in accordance with ASTM A153, and/or A653 Class G185, and Type 304 or 316, or otherwise protected from corrosion due to contact with moisture, manure and associated gasses. All fasteners, connectors, and any other metal contacting ACZA, ACQ or CA treated wood shall be stainless steel, in accordance with Supplement A below.

GEOMEMBRANES shall comply with the requirements of Construction Specification PA521A-PE/PP, as applicable.

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.

Drain fill 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 8. 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 tampering. 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 converying. Exposed surfaces shall be continuously moistened by means of flood 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. GEOMEMBRANE STRUCTURES

Semi-rigid and flexible covers which utilize geomembranes shall be installed as required by the manufacturer, and as otherwise set forth in Section 8 and Construction Specification PA521A-PE/PP.

7. 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.

8. **ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:**
Supplement A – “Guidelines for Selecting Corrosion-Resistant Fasteners for Use with Preservative-Treated Wood”

Based on a review of technical information posted by the major U. S. preservative manufacturers and selected fastener and connector manufacturers, the following guidelines summarize the current state-of-practice regarding the selection of metal fasteners and connectors for use with ACQ and copper azole (CA) preservative-treated wood:

<table>
<thead>
<tr>
<th>AWPA Use Category and Description</th>
<th>Appropriate Fastener/Connector Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC 3A or B – Exterior Construction, Above Ground</td>
<td></td>
</tr>
<tr>
<td>UC 4A – Ground Contact or Fresh Water, Non-critical components</td>
<td></td>
</tr>
<tr>
<td>Fasteners</td>
<td></td>
</tr>
<tr>
<td>Hot-Dipped (HD) Galvanized per ASTM A153 or</td>
<td></td>
</tr>
<tr>
<td>Stainless Steel (SS), Type 304 or 316</td>
<td></td>
</tr>
<tr>
<td>Connectors</td>
<td></td>
</tr>
<tr>
<td>HD Galvanized per ASTM A653, Class G185 or</td>
<td></td>
</tr>
<tr>
<td>Stainless steel, Type 304 or 316</td>
<td></td>
</tr>
<tr>
<td>UC 4B - Ground Contact or Fresh Water, Critical components or difficult to replace</td>
<td></td>
</tr>
<tr>
<td>Stainless steel, Type 304 or 316</td>
<td></td>
</tr>
</tbody>
</table>

Other Preservatives:

1. For CCA-treated wood, HD galvanized fasteners and connectors as specified above are recommended. CCA is less corrosive than ACQ and CA.
2. For ACZA-treated wood, SS fasteners and connectors as specified above are recommended. ACZA contains ammonia and is significantly more corrosive than ACQ and CA.
3. For other preservatives, the more stringent of the preservative manufacturer’s recommendations and the fastener/connector manufacturer’s recommendations should be followed.

Notes regarding NRCS-type structures:

1. Use Category UC 3A and B include railings, decking, bracing, and slats on composter bins.
2. Use Category UC 4A includes posts such as those used in composter bins.
3. Use Category UC 4B includes structural building poles and permanent wood foundations.
SCOPE
Fences are constructed as barriers to control the movement of animals and people, including vehicles. Fences may be designed or installed as permanent or temporary use.

Permanent fencing is intended to be in place for long periods of time with minimum maintenance requirements; therefore, it should be built with durable materials and constructed to endure a longer life span. Permanent fences are most often used for exterior grazing or property boundaries and/or where animals or humans are prohibited. This can include fencing associated with Waste Storage Facilities (WSF), Waste Transfer (WT), and Heavy Use Areas (HUA).

Temporary or moveable fences are designed to be in place for short periods of time. Temporary fences are best used as subdivision fences for frequent movement or control of animals and where the exact location of the fence may not be the same from time to time. This fencing offers maximum flexibility in rotational stocking systems for subdividing pastures to enhance grazing efficiency, livestock movement, and afford temporary stream and riparian protection.

FENCE TYPE OR STYLE (SEE Table 1)
Barbed wire fence is commonly used as multi-strand permanent fencing material for perimeter fences, land use boundaries, exclusion, livestock containment and isolation areas as well as interior crossfencing to facilitate grazing management. Barbed wire fence is generally not recommended for horses, sheep, goats and hogs.

Woven, net and mesh wire fences are used as permanent fences for both perimeter and subdivision fences. Wire spacing and height varies depending on the type of livestock or animals being controlled.

Woven wire fences consist of a series of horizontal (line) wires and vertical (stay) wires, and are offered in two main types including "hinge joint" and "continuous stay fixed knot."

In a hinge-joint woven wire fence, the vertical stays actually wrap around the line wires. In a continuous stay fixed knot fence, the vertical stay wires are fixed with a separate wire to the line wire. Both of these main types come in various designs (line and stay spacing), tensile strength grades and metallic coating types and grades. High-tensile continuous stay fixed knot woven wire at 12.5 gauge may be used for all animals as specified by manufacturer.

High tensile smooth wire fence is commonly used as a multi-strand permanent fence for both perimeter and subdivision purposes. It can be used to control almost all animals when properly spaced. Smooth wire may be steel, aluminum or vinyl coated and electrified or non-electrified.

Electric fences may be permanent or temporary. The electrical power source can be from 110 or 220 electrical current or battery. Batteries may be re-charged by solar or electrical power. Livestock must be trained to respect electric fence.

Board fences are usually wood or some composite material used for permanent and subdivision purposes. Board fence is used primarily where aesthetics or animal safety is a concern and most often used around horses or for working facilities.

Other fence types may include chain link, pipe, vinyl, galvanized panel, guard rail, and cable fences. These are commonly used around homesteads, waste storage facilities and in corrals. They may be used to restrict access to unsafe or prohibited areas.
Heavy use area containment fencing is used to control access into and out of feed areas to minimize damage to soil and pasture around these permanent feed sites. This fencing is usually constructed of board, pipe, guard rail, cable or high tensile smooth wire built to sustain heavy use by high numbers of livestock around a confined feed area.

Non-conventional fencing includes variations of alternative fence systems that may be acceptable when installed according to manufacturer’s recommendations and pre-approved by the PA NRCS State Grassland Conservationist. Alternative fence systems are often applicable for horses and other animals having special needs.

MATERIAL SPECIFICATIONS
Acceptable fencing criteria for various fencing needs may be selected from Tables 1 and 2, except when fencing requirements are shown in a set of Engineering Drawings and Specifications associated with WSF, WT, and HUA. Install as per details included; variations must be approved by the Engineer of Record.

The materials used in the construction of a chosen fence type must be new and of high quality and meet the size, strength, durability and lifespan requirements found in this specification including Tables 3 - 9.

Variations of what is presented in this document may be approved if alternatives will meet or exceed current specifications. Sufficient documentation must be presented to PA NRCS State Grassland Conservationist.

INSTALLATION
Fence-Line Clearing
Prior to construction, the fence line shall be cleared of any obstruction that would hinder fence placement and operation. Clearing along stream banks will be held to a minimum except as required for stream crossings. The soil surface along the fence line shall be relatively smooth such that placement of the bottom wire does not exceed specified maximum wire spacing from soil surface.

Setting posts
All post shall be set and maintained in a vertical position or leaning slightly (1-2° off vertical) away from direction of wire tension. Posts in curves should be set approximately 4" off vertical. Posts set with a driver have about 9 times the holding strength of hand-set posts. If hand set, holes should be at least 6" larger than the diameter of the posts and all backfilled material shall be thoroughly tamped in layers no thicker than 4 inches. The post hole shall be filled to the ground surface. Concrete backfill is not necessary when posts are driven or hand set with proper tamping; however, if used it shall be rodded into place in layers not thicker than 12 inches and shall completely fill the post hole to the ground surface. No stress shall be applied to posts set in concrete for 24 hours.

Line Posts
Specifications of line posts are found in Table 4. The maximum spacing of line posts for permanent fences is found in Table 1 and will be the same for all types of posts. Spacing will vary depending on terrain and pressure from livestock. Installation shall ensure that adequate fence height is maintained based on its purpose.

Note: Landscaping timbers should not be used for any post or brace component of a fence system.

Installing Curves
Installing curves in high tensile, woven wire, and barbed wire fences is permissible as long as the change in direction from one post to the next does not exceed 20 degrees. Posts on curves shall be 5 inch minimum top diameter for changes up to 14 degrees and 6 inch minimum top diameter for changes up to 20 degrees.

Posts on curves should be driven 48 inches deep with 4 inches of lean to the outside of the curve and spaced no closer than 4 foot apart. (In an 8-foot long section, 14 degrees is approximately 24 inches off straight line and 20 degrees is approx. 35 inches off the straight line).

Line Posts - Stream Crossing
Anchor posts are required on both sides of a stream crossing. For crossings less than 16 feet wide, standard line posts set on both sides will be adequate. For crossings wider than 16 feet, or when non-electrified heavy flood gate is used, a single H-brace assembly or other suitable brace shall be used.
• Where needed, flood gates will be attached below bottom wire and will be designed to allow water and debris to pass while still controlling livestock. Some type of hinged or breakaway floodgate works best.

Posts that are set in low areas or gullies may need to be weighted or anchored to prevent lifting out.

Stays or battens between line posts
Stays or wire spacers or battens may be used to maintain desired wire spacing between line posts; note that specifications for post spacing differs with and without stays (Table 1). Stays shall be secured sufficiently to remain in position along wire line.

Offset Brackets
Offset brackets made of galvanized high tensile spring wire with an insulator of high density polyethylene with ultraviolet stabilizer or porcelain can be attached to standard barbed wire fence or woven wire fence to provide transmission line and/or to protect a standard fence. Other corrosion resistant offset brackets with insulators that attach directly to the fence posts can also be used.

Place offset brackets up to 40 feet apart and attach to wires of standard fence next to post. If control of animals is desired, place offset brackets at 2/3 the height of the animals to be controlled. Make sure no wires of the old fence come in contact of the electric fence wire, as a short will occur. Use offset brackets that hold the electric wire at least 4 inches from the non-electrified fence material.

Post Bracing
Bracing of anchor (pull) posts is required at all corners, gates, fence ends and at definite slope and alignment changes in the fence line. The type of fence, number of fence wires, and length of span will determine type, size and spacing of bracing required to support a fence. See Table 8 for additional information.

Bracing shall withstand the forces of the fence load and transfer to the surrounding soil. They come in a number of configurations depending on the purpose and number of posts utilized. The length of braces should be at least 2 times the height of the fence fabric they are supporting. See Tables 5 and 6 for selection criteria and design specifications of single and double brace assemblies.

Corner braces are required at all points where the fence alignment has a change of 20 degrees or more from one post to the next. (In an 8-foot long section, 20 degrees is approx. 35 inches off the straight line).

End braces are required where fence ends and on both sides of gate openings and has pull from only one direction.

In-line pull post assemblies are located in straight sections of the fence line and where there are sudden changes in elevations, such as at the bottom and top of slopes. Tie off all wires at in-line pull assemblies and start new wires for the next fence section. Posts that are set in low areas or gullies may need to be weighted or anchored to prevent lifting out.

Single post braces may be used with 2-strand or less high tensile electrical wire (Table 7) if corner/end post are set 4' deep. If this cannot be accomplished, then a single H corner/end brace assembly should be used.

Brace Rails
Refer to Table 6 for Criteria and Specifications.
• Placement of the horizontal brace rail will be between the top two wires of the fence or fence fabric. This should be a minimum 3 feet above ground.
• The length of the horizontal brace shall be at least 2 times the height of the fence fabric it is supporting.
• The longer the brace rail the stronger the brace.
• The brace and anchor posts should be fastened to the compression brace using galvanized brace pins (3/8" X 9" and 3/8" X 4"), drilled through vertical post and into end of horizontal brace, 2" deep. An H-brace bracket (dacromet-coated heavy gauge steel) may be used in place of brace pins. Install with minimum 1.75" screws.
• Do not notch vertical posts (wood) for stabilizing horizontal brace support as this will increase chance of wood rot.

Note: Landscaping timbers should not be used for any post or brace component of a fence system.

Adjoining Fences
A fence adjoining an existing fence must terminate in a brace assembly as required per fence brace specifications in Table 5, 6, and 7.
Tension of Brace (Guy) Wires
For guy wires use two complete loops of 12½ gage HT wire or one loop of 9 gauge soft wire, or a single 3/16" galvanized cable with cable lock.

For horizontal braces, brace wire will be double wrapped and stapled to brace post at a height of just above the brace member and to the anchor (pull) post at a point approximately 2-3 inches above the ground level.

Brace (Guy) wire will be tightened using a wire tightening or strainer. Another suitable method is to tension the brace wire with a chain grab and splice using a double crimp or compression sleeve.

INSTALLATION OF WIRE:
Barbed and woven wire will be stretched to sufficient tension prior to being fastened to posts. Temperature variations must be considered (wire will tighten in cold weather and expand in hot weather). See wire specification requirements in Table 3.

Tensioning the wire
Woven Wire - In warm weather, wire shall be stretched until 1/3 of the height of the "tension curve" is removed. In cold weather, remove ½ of the tension curve. Fixed-Knot High Tensile Woven Wire - The tension crimp should be ½ the size of an un-tensioned crimp.

Barbed Wire - In warm weather, a 100 ft. stretch of wire should sag no more than 4 inches in the middle (prior to attaching to posts) and no more than 2 inches in cold weather.

High Tensile Wire - Tension should be 250 lbs. for cattle, horses, goats and sheep. For electrified high tensile wire the tension should be sufficient to maintain the proper average height and spacing of the fence wires.

Tension springs
In-line wire spring-tensioners are designed to indicate lbs. of tension on the line, assuming placement within the line is appropriate.

On most fences the use of one tensioner per pull will provide sufficient indication of the tension on adjacent wires.

Springs offer only 3-6 inches of elasticity therefore are of little benefit when something like a tree falls on the wire.

Staples and fasteners
Staples should be installed into post to allow free slippage of wire.

Staples shall be driven diagonally across the grain of the wood and at a slight downward angle (except in dips of landscape) and shall not be driven so tightly as to bind the wire against the post.

Electrically charged smooth wires must be attached to conductive posts with an appropriate ceramic, UV resistant HDPE (High Density Polyethylene) or HDPP (High Density Polypropylene) or tube type plastic reinforced insulators.

For steel line posts, the fencing shall be fastened with either 2 turns of 14 gauge galvanized steel wire or the post manufacturer's special wire clips. For all other types of posts, attach as specified by manufacturer.

Tie off of wire or insulators: High tensile wire is tied off using the "thread through method" (a half hitch and 3 wraps) or with compression sleeves. A length of high tensile wire is fastened around the groove of the insulator then looped around the post and stapled on opposite side of post. An alternative is the tubular plastic reinforced insulator to prevent cracking of the plastic and groundings of the wire. All insulators must be rated for use with high tensile fence.

Wire attachment to posts
Attaching Fence Wire to Anchor (Pull) Post: For Barbed wire fences, wires will be attached to anchor (pull) post by one complete wrap around the post, double stapled (wood posts) or wired (steel posts) and ends tightly wrapped around stretched wire five times. Compression sleeves may be used to connect ends of brace wire.

For Woven or Mesh wire, determine amount of wire needed to fully wrap around post once then remove enough vertical stays to provide that length. The wire ends are then attached as described in previous paragraph. All lines are stapled to the post.

For High Tensile wire, the line wires are attached to each anchor post by wrapping the post and securing with a half hitch with 3 wraps, or using appropriate double crimp sleeves.
Fixed-knot woven wire fence shall be stapled to wood post or fastened to steel post at every horizontal wire using manufacturer recommended wire clips.

High Tensile electric wire that pulls through corners or bends may be suspended from the inside of posts in corners and bends using ceramic or appropriate UV resistant HDPE or HDPP donut type plastic high strain insulators. The tubular plastic reinforced high strain insulators can wrap around the outside of bends and corner posts.

Attaching Fence Wire to Line Post: Barbed wire shall be attached at each post with 1.5 inch staples driven to allow slippage. The top wire shall be at least 2 inches below the top of posts on wood posts and at least 1 inch below the top on steel posts. Wire shall be spaced no more than 10 inches apart and often closer depending on livestock controlled.

Woven wire and fixed-knot woven wire fencing shall be attached to posts at the top 3 and bottom 3 strands on every post and then alternate every other line making sure you attached to the missed lines on the next alternating line post.

HT electric wire shall be attached using ceramic or appropriate UV resistant HDPE or HDPP plastic insulators. The tubular plastic reinforced high strain insulator can be used on the outside of corners, curves or bends.

Post side wire placement: the wire shall be placed on the livestock side of line posts and on the outside of curves and bends.

Wire Splicing
There are two basic ways to splice wire:
1. Hand knot
2. Crimping or compression sleeves (per manufacturer recommendation)

Barbed wire and woven wire shall be spliced by means of a western union splice or by suitable compression sleeves applied with a tool designed for the purpose.

Gates
Gates weighing less than 100 lbs may be hung from single end post properly installed. Heavy metal or wood gates more than 6 ft. wide shall best be attached to the pull post of an H-brace or diagonal floating brace.

All gates must be substantial enough to withstand expected pressures from livestock and wildlife.

A 12 ½ gauge overhead or insulated underground transmission line will be used to carry electricity across all gate openings (including electrified gates) to charge the remainder of the fence.

Gates Over Streams and Ditches
Hanging gates should terminate approximately 6 inches above average normal water level.

Non-electric flood gates should be hinged such that gate will swing with rising water during storm events.

An electrified flood gate may be used to minimize debris problems on stream crossings. The electrified flood gate is constructed by stretching an electrified wire across the drainage above high water flow level. Attach, with compression sleeves, hanging galvanized chains or wire to the electrified wire at a spacing of 6 inches for goats, hogs and sheep or 12 inches for cattle and horses. It is advisable to connect the gate to electric fence with double insulated cable through a cut-off switch and flood gate controller.

Stream Bank Protection
Permanent fencing will be placed at least 10 feet from the top of the stream bank and should allow for more area in meanders and in areas with bank erosion to minimize corner bracing. Permanent fencing setback distance from drainage ditches should be enough to allow sufficient room for vegetation management and fence maintenance.

SAFETY
- Electrical fences shall be clearly labeled or identified with the appropriate warning signs spaced every 300 feet where the public has access. Barbed wire shall not be electrified because of safety hazard.

- Fencing operations can result in painful and serious injury. Wear heavy gauntlet leather gloves to protect hands and wrists, and boots or high-top shoes to protect legs and ankles.

- Tough, close fitting clothing will reduce risks of catching on wire. Wear safety glasses to protect eyes from injury. When stretching woven, fixed- knot, or barbed wire, stand on the opposite side of the post from the wire and stretcher unit.
• It is dangerous to use a tractor to stretch wire fencing because of potential breaking of the wire resulting in serious injury from the recoil of the clamp bar, chain, or wire. Keep chains and wire stretching clamps in good condition.

• Carry staples, nails, or other fasteners in a metal container or in an apron and not in your trouser pockets. Do not hold fasteners in your mouth which is a common but extremely dangerous habit.

• If you handle preservative treated posts, do not rub your hands or gloves on your skin, nose, eyes, or mouth. Wash your hands after handling treated posts. Minimize the inhaling of sawdust. Do not burn treated posts or apply the ash to a garden. Properly dispose of treated wood in a landfill.

Additional conditions which apply to this practice:

1. A professional fencing contractor is recommended during the planning phase of any fence system.

2. Woven wire for sheep and goats should have vertical wire wide enough (9" to 12") or narrow enough (<4") to minimize potential injury. Otherwise use an electric offset wire to keep animals away from woven wire that might "entangle" them.

3. Never use household electrical wire for any part of an electrified fence. Splicing wires of different metals often results in oxidation and corrosion which causes short circuits and poor conductivity.

4. A digital voltmeter is essential to monitoring and maintaining electrical power fences.

5. Avoid placing electrical fences parallel with telephone or commercial power lines since static field can sometimes be created.

6. It is recommended that fences be located 20 feet or more from streams with a maintenance gate to allow for emergency access to water. This distance can also lessen fence maintenance by reducing flood damage. Temporary fencing may be used to protect streambanks while using forage adjacent to the stream.
Construction Specification

500. OBSTRUCTION REMOVAL

1. SCOPE

The work shall consist of completion of removal of obstructions performed as outlined in this specification and the drawings.

2. SITE PREPARATION

All obstructions shall be removed from the work area and disposed of as set forth in Section 5. Reshape and regrade all areas disturbed by the obstruction removal so that they blend with the surrounding land features and conditions. Compact fill areas according to the requirements in Section 5.

3. VEGETATION

Vegetation, if required, shall be established at the locations shown on the drawings and/or staked in the field. Vegetation shall be of the type, species, mixture, quality, etc. as set forth in Section 5.

4. EROSION AND POLLUTION CONTROL

Construction operations will 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.

5. 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:
CONSTRUCTION SPECIFICATION

606. SUBSURFACE DRAIN

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>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
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<tbody>
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<td>ASTM-C-4</td>
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<tr>
<td>Clay pipe, perforated, standard and extra strength</td>
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<td>ASTM-C-301</td>
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<td>Federal Specification</td>
</tr>
<tr>
<td>Styrene rubber (SR) plastic drain pipe &amp; fitting</td>
<td>ASTM-D-2852</td>
</tr>
<tr>
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<td>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>
</tr>
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<td>Pipe, corrugated (steel, polymer coated)</td>
<td>ASTM-A-762</td>
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<tr>
<td>Pipe, corrugated (steel, zinc coated)</td>
<td>ASTM-A-760</td>
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</table>
3. SITE PREPERATION
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 “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. 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 1/2 inch for 6 and 8 inch diameter pipe, or 1 3/4 inch for 10 and 12 inch diameter pipe. All slots and circular perforations shall be cleanly cut.
9. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE:
Construction 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

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<td>Fed Spec SS-P-1540</td>
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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 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 “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: