GENERAL CONSTRUCTION NOTES

1. PA ONE CALL – It is the responsibility of the Excavating Contractor to comply with the provisions of the Pennsylvania One-Call Act (Utility Act) to check for underground utilities before performing any excavation work. The PA One Call report included in the design package is for DESIGN only and is included so the Contractor may reference the serial number when doing their EXCAVATION PA One Call.

2. A Pre-Construction Meeting between the landowner, NRCS representatives, contractor(s), and applicable suppliers is required prior to starting work.

3. All critical work that is indicated in the specifications or on the drawings shall be done Monday through Friday between the hours of 7:00 am and 4:30 pm unless previously cleared by the NRCS inspector.

4. Refer to the Contractor's Notification list for required notification of the NRCS inspector during construction.

5. It is the responsibility of the contractor to implement all measures necessary to protect work in progress from environmental conditions such as temperature extremes, surface and ground water, etc.

6. Prepare the site, supply, and install all components to the locations, dimensions, elevations, and specifications shown on the drawings. The project includes, but is not limited to, the following:
   a. All labor, equipment, tools, and other items necessary and incidental to the project.
   b. All erosion and sedimentation measures as required by the E&S Plan to protect the site
   c. All excavation and backfilling as required by the design drawings to install all components
   d. All seed, lime, fertilizer, and mulch as required for all disturbed areas

7. A copy of the specifications and drawings shall be on site during all phases of construction.

8. The contractor is responsible for the security of the job until the work has been certified by the NRCS.

9. OSHA regulations shall be followed at all times.
PRE-CONSTRUCTION CHECKLIST

A meeting of the NRCS representative, Landowner, and the selected Contractors is required before any construction commences. The Contractor(s) must be represented by the individual who has authorization to make decisions on the job site of this project.

Ensure that the Landowner and Contractor(s) each have a copy of:

- Design Drawings
- E&S Plan
- Practice Specifications

Topics to be covered:

- Review above items with landowner and contractor(s).
- Discuss contractor site accessibility.
- Review all pertinent site specific safety issues, i.e. small children on the farm, electric lines, etc.
- Review OSHA guidelines for construction safety.
- Discuss coordination of a targeted start date.
- Emphasize communications between involved parties.
- Have all involved parties exchange phone numbers, contact information, etc.
- Inform contractors of program specifics, such as payment schedule, certificate(s) of conformance, etc.
- Contractor must give NRCS representative at least a 24 hour notice prior to starting work.

The Landowner and Contractors agree on the target start of construction date of: ________

Landowner’s Signature: ___________________________ Date: ________________

Contractor’s Signature: _________________________ Date: ________________
Company: ______________________________________________________________________

NRCS Technician Signature: ______________________ Date: ________________
Title: ______________________________________________________________________
Compliance with safety regulations on agricultural projects is required by OSHA and by all construction insurance/liability companies. 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 and implementation of safety regulations is their responsibility. Those with more than ten employees must have written safety procedures and document implementation.

Imminent danger situations (hazards that could cause death or serious physical harm) require immediate action, including work stoppage. When NRCS and/or partner personnel observe or become aware of an imminent danger on the work site they will alert the contractor and landowner. They will also advise the landowner that funding and/or technical assistance will be withdrawn if the situation is not corrected. Work may continue after the imminent danger is resolved.

Effective January 1, 2015, all employers must report work-related fatalities, hospitalizations, amputations, and losses of an eye. They can contact the 24-hour OSHA hotline at 1-800-321-OSHA (6742) or their regional OSHA office. See OSHA standards 29 CFR 1904.39 for more information.

**Soil Cave-In Protection**

- Applies to all excavation over five 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 29 CFR 1926 subpart L deals with scaffolds and 29 CFR 1926 Subpart M deals with overall fall protection, including but not limited to cast-in-place concrete work, leading edge work, pre-cast concrete erection, tying reinforcement steel, truss installation, and roof construction.
- Options include: warning line system, safety monitors, mechanical equipment, controlled access area, covers, safety nets, scaffolding, guardrail system, and personal fall arrest.
- Selected method(s) shall be implemented at the start of construction.

**Underground and Overhead Utility Protection**

- Contractor is required to do their own utility check via PA-ONE Call system (811).
- Landowner and/or contractor shall contact any overhead utilities and prepare a procedure to avoid contact and/or schedule work with utility oversight.
- Landowner is to mark and locate any known private buried utilities within the work area.

NOTE: Critical safety measures may be highlighted in the Project Drawings and Specifications.
Top Four Construction Hazards

The top four causes of construction fatalities are: Falls, Struck-By, Caught-In/Between and Electrocutions.

Prevent Falls
- Wear and use personal fall arrest equipment.
- Install and maintain perimeter protection.
- Cover and secure floor openings and label floor opening covers.
- Use ladders and scaffolds safely.

Prevent Struck-By
- Never position yourself between moving and fixed objects.
- Wear high-visibility clothes near equipment/vehicles.

Prevent Caught-In/Between
- Never enter an unprotected trench or excavation 5 feet or deeper without an adequate protective system in place; some trenches under 5 feet deep may also need such a system.
- Make sure the trench or excavation is protected either by sloping, shoring, benching or trench shield systems.

Prevent Electrocutions
- Locate and identify utilities before starting work.
- Look for overhead power lines when operating any equipment.
- Maintain a safe distance away from power lines; learn the safe distance requirements.
- Do not operate portable electric tools unless they are grounded or double insulated.
- Use ground-fault circuit interrupters for protection.
- Be alert to electrical hazards when working with ladders, scaffolds or other platforms.

For more complete information:

OSHA Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA
Protect Yourself

Construction

Personal Protective
Equipment (PPE)

Eye and Face Protection

• Safety glasses or face shields are worn any time work operations can cause foreign objects to get in the eye. For example, during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles). Wear when exposed to any electrical hazards, including working on energized electrical systems.

• Eye and face protectors – select based on anticipated hazards.

Foot Protection

• Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.

• Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

Hand Protection

• Gloves should fit snugly.

• Workers should wear the right gloves for the job (examples: heavy-duty rubber gloves for concrete work; welding gloves for welding; insulated gloves and sleeves when exposed to electrical hazards).

Head Protection

• Wear hard hats where there is a potential for objects falling from above, bumps to the head from fixed objects, or of accidental head contact with electrical hazards.

• Hard hats – routinely inspect them for dents, cracks or deterioration; replace after a heavy blow or electrical shock; maintain in good condition.

Hearing Protection

• Use earplugs/earmuffs in high noise work areas where chainsaws or heavy equipment are used; clean or replace earplugs regularly.

For more complete information:

OSHA
Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA
Cause of Cave Ins
Cave ins in pits and ditches cause the death of construction workers each 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 bench 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 contained 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 ton 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

20' Max. 1 3/4

**Figure 2.** Type A Soil
Simple Slope, Short Term

12' Max. 1 1/2

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

8' Max. 1 3/4 3-1/2' Max.

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

12' Max. 1 1 3-1/2' Max.

**Figure 5.** Type B Soil
Simple Slope

20' Max. 1

**Figure 6.** Type C Soil
Simple Slope

20' Max. 1 1-1/2
From: POCS Web Ticket Confirmation [mailto:Delivery@pa1call.net]
Sent: Thursday, August 10, 2017 1:13 PM
To: Wodehouse, William - NRCS-NGO, Bloomsburg, PA <Andy.Wodehouse@pa.usda.gov>
Subject: POCS 08/10/17 13:12:35 20172222025-000 WR# 187020170810 New Excavation Final Design

WEBCFM 00000 POCS 08/10/17 13:12:35 20172222025-000 WR# 187020170810 NEW XCAV DSGN

================================== PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST =============== Serial Number-- [20172222025]-[000] Channel#--[1302AWEB][0572] Message Type--[NEW][EXCAVATION][FINAL DESIGN]

County--[LUZERNE] Municipality--[KINGSTON TWP]
Work Site--[48 KRISPIN RD]
Nearest Intersection--[WILLIAMS ST]
Second Intersection--[KRISPIN]
At Intersection--[N] Between Intersections--[N]
Subdivision--[]
Location Information--
[]
Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
[41.348952/-75.916728,41.349878/-75.915358,41.349674/-75.913569,41.346896/-75.913631,41.346896/-75.916197,41.347915/-75.915852]
Attachments--[http://www.pa811.org/attachments/20172222025]
Type of Work--[LIVESTOCK MANURE FACILITY] Depth--[8FT]
Extent of Excavation--[2FT X 400FT] Method of Excavation--[DIGGING]
Equip Type--[EXCAVATOR]

Lawful Start Dates--[ ] thru [ ] Response Due Date--[24-Aug-17] Scheduled Excavation Date--[DESIGN]

Caller--[ANDY WODEHOUSE]
Caller Phone--[570-784-1062] Caller Ext--[127]
Excavator--[CHESAPEAKE BAY FOUNDATION (CBF)]
Address--[702 SAWMILL RD]
City--[BLOOMSBURG] State--[PA] Zip--[17815]
AX--[570-387-7715] Caller Type--[B]
Email--[ANDY.WODEHOUSE@PA.USDA.GOV]
Work For--[KRISPIN FARM]
Person to Contact---[ADAM WINEY]
Contact Phone---[570-784-4401]     Contact Ext---[125]
Best Time to Call---[9 AM TO 2 PM]

Prepared---[10-Aug-17] at [1311] by [AWODEHOUSE]
Remarks---
[]

AQ10   AQ1=COMCAST    DM10   DM1=DALLAS AREA MA   GJ   GJ=UGI PNG
KGS0   KGS=KINGSTON TWP  RG   RG =FRONTIER COM SO  TC   TC=TRANS CO GAS PL
UE   UE =UGI ELEC

Serial Number---[2017222025]-[000]
============ Copyright (c) 2017 by Pennsylvania One Call System, Inc. =============
EROSION & SEDIMENTATION (E&S) PLAN

- Duration of job is approximately 30 work days.
- There is 0.7 acres of earth disturbance associated with this project (maximum allowable disturbance without an NPDES permit is 1 ac). ANY deviation from the planned limit of earth disturbance (E&S Control Drawing) must be approved by the NRCS inspector.
- No Point Source Discharge to Waters of the Commonwealth
- Install approximately 300 ft. of silt fence/sock on the site and down-slope from the soil stock pile areas, in the locations shown on E&S Control Drawing.
- Correctly install silt fence/sock as shown on E&S Detail Drawing.
- Silt fence shall remain in place until grass is actively growing.
- Storage structure site will be kept de-watered, if necessary, by pumping to a grassed area away from the excavation site. After the structure floor drain stone is placed, the site may be kept de-watered by the perimeter drain outlet, provided a straw bale barrier is installed at the outlet.
- Disturbed areas will be seeded and mulched as soon as construction and final grading is completed.
  1. Use the recommended soil preparation methods and application of lime and fertilizer identified on E&S Detail Drawing.
  2. Seed the entire disturbed area using the “Seeding Recommendation” mix and mulch according to the instruction provided on the E&S Details drawing.
CONTRACTOR'S NOTIFICATION LIST

Water Management System

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. Well installation
3. Starting to place any fill material to reach sub-grade for the floor concrete
4. Completion of foundation preparation
5. Post hole excavation
6. Post installation for the roofed structure
7. Placement of any floor and wall concrete
8. Installation of foundation drain
9. Arrival of trusses
10. Starting to place backfill
11. Underground outlet installation
12. Installation of walkway
13. Job completion

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

Prior to use of any purchased materials, certification of their compliance to the specification shall be provided. Certification can be in the form of a signed statement that materials conform to the specified requirements or from 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 inspector.

Krispin Farms
Luzerne County

NRCS

July 2017
CERTIFICATION OF CONFORMANCE

The undersigned primary manufacturer/supplier/contractor has furnished to:

Farmer’s Name: ________________________ KIRSPIN FARM

Address: ____________________________________________

City/State/Zip: ________________________________________

Type of Storage: Concrete works

And hereby states that the quality of work and materials meets the requirements as set forth on the design Drawings and/or Specifications.

Name of Manufacturer/Supplier/contractor: ________________________________

Signature/Title/Date: ________________________________________________

Description of Items Completed: _______________________________________

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: _______________________________________

Subcontractor Signature/Date: ________________________________

Description of Items Completed: _______________________________________

Received By: ________________________ SIGNATURE __________ TITLE ______ DATE __________

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

The undersigned primary manufacturer/supplier/contractor has furnished to:

Farmer’s Name: ____________________________ KRISPIN FARM
Address: ____________________________________
City/State/Zip: ______________________________
Type of Storage: _____________________________ Roof Installation

And hereby states that the quality of work and materials meets the requirements as set forth on the design Drawings and/or Specifications.

Name of Manufacturer/Supplier/contractor: ________________________________

Signature/Title/Date: ______________________________________________________

Description of Items Completed: ____________________________________________

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: ____________________________________________

Subcontractor Signature/Date: ______________________________________________

Description of Items Completed: ____________________________________________

Received By: _____________________________________________________________

SIGNATURE     TITLE     DATE

Note: It is the primary manufacturer/supplier’s/contractor’s responsibility to obtain and furnish all required signatures.
This guide was originally developed by Bruce Benton, former geologist with NRCS in Pennsylvania. The types of wells normally encountered in NRCS field work are divided into two broad categories. Wells located in bedrock and those located on unconsolidated deposits. Under each of these categories addition types are outlined along with procedures for proper closure. The reference to Figures 1 thru 6 corresponds with Standard Drawings PA-076 thru -081, respectively.

Additional information and requirements can be found in PA Standard 351 and in the current PA DEP “Ground Water Monitoring Guidance Manual”, Chapter 7 Well Abandonment Procedures, which is an upgrade from reference 3.

Unique situations may require the assistance of geologists and may be beyond the scope of this guide and NRCS activities. Refer to Conservation Practice Standard and Construction Specification PA351.

WELLS LOCATED IN BEDROCK

These are generally deep (greater than 100 ft.) wells 6 to 24 inches in diameter with steel casing seated into bedrock. Below the casing, the well is an open bore hole located within the aquifer. Wells may tap a single aquifer or multiple aquifers. The aquifer may be unconfined (water level at or below top of aquifer), confined or artesian (water level above the top of aquifer), or flowing artesian (hydrostatic head higher than the ground level). Sealing procedures are similar for wells in unconfined and confined aquifers but different for artesian flowing wells and wells in multiple aquifers.

A. Wells in an Unconfined Aquifer

Sealing Schedule (See Fig. 1 and Materials):

1. Place clean Fill Material up to within 10 ft. of the bottom of the casing.
   Note: If well has bacteria contamination (or suspected), and a well or spring is located within 50 ft., apply a chlorine treatment.
2. Place Sealing Material up to within 4 ft. of the ground surface.
3. Remove the top 4 ft. of well casing.
4. Place compacted Natural Soils to the ground surface and crown slightly.
5. Place about 0.5 ft. of Topsoil and crown the surface.
B. Wells in a Confined Aquifer

Sealing Schedule (See Fig. 2 and Materials):

1. Place clean Fill Material up to within 10 ft. of the bottom of the casing.  
   Note: If well has bacteria contamination (or suspected) and a well  
   or spring is located within 50 ft., apply a chlorine treatment.
2. Place Sealing Material up to within 4 ft. of the ground surface.
3. Remove the top 4 ft. of well casing.
4. Place compacted Natural Soils to the ground surface and crown  
   slightly.
5. Place about 0.5 ft. of Topsoil and crown the surface.

C. Wells in Multiple Aquifers – These wells draw water from more than one  
   aquifer. Generally, the casing extends from the ground surface into the top  
   aquifer with the bore hole being open within each aquifer and cased within  
   each impermeable layer between aquifers.

Sealing Schedule (See Fig. 3 and Materials):

1. Place clean Fill Material up to within 10 ft. of the bottom of the lower  
   casing.  
   Note: If well has bacteria contamination (or suspected) and a well  
   or spring is located within 50 ft., apply a chlorine treatment.
2. Place Sealing Material a minimum of 10 ft. above the bottom of the  
   lower casing.
3. Place Fill Material up to within 10 ft. of the bottom of the upper  
   casing.
4. Place Sealing Material up to within 4 ft. of the ground surface.
5. Remove the top 4 ft. of well casing.
6. Place compacted Natural Soils to the ground surface and crown  
   slightly.
7. Place 0.5 ft. of Topsoil and crown the surface.

D. Artesian Flowing Wells – These are wells which have a hydrostatic head  
   above ground level causing water to flow to the surface. These conditions  
   can be found in bedrock wells and wells in unconsolidated deposits.

The water flow may need to be lowered before sealing can begin. To stop  
the flow one of the following methods should be considered: introduce a
high-specific-gravity fluid, extend the pipe high enough above the ground surface, or pump the well or nearby wells to drawdown the water level.

Sealing Schedule (See Fig. 4 and Materials):

1. Place clean Fill Material up to the bottom of the casing.
2. Insert a Bridge Seal or wooden plug in the bottom of the casing. In a multiple aquifer well consider whether intermediate seals will be needed to prevent water passing from one aquifer to another.
3. Place Sealing Material above the upper most seal or plug up to within 4 ft. of the ground surface.
4. Remove the top 4 ft. of casing.
5. Place compacted Natural Soils to the ground surface and crown slightly.
6. Place about 0.5 ft. of Topsoil and crown the surface.

E. Sealing Wells with Voids – These are wells where the open portion of the well has penetrated limestone cavities or deep mine voids.

Sealing can be accomplished by using the sealing schedule in A. and Fig. 1. Fill Material within the void should be coarse enough to withstand the groundwater flow velocities. If the flows and/or voids are too large to fill, then consider installing a Bridge Seal and follow the sealing schedule A. and Fig. 4.

WELLS LOCATED IN UNCONSOLIDATED DEPOSITS

F. Large Diameter Dug or Bored Wells – These are typically older, shallow (less than 50 ft.) hand dug wells greater than 24 inches in diameter with steel, stone-lined or wood crib casing. The wells are generally located in alluvial or glacial deposits having an unconfined or water table aquifer.

Because of the shallow depth and large diameter, all materials can be placed in the well at the well head.

Sealing Schedule (See Fig. 5 and Materials):

1. Place clean Fill Material up to 1 ft. below the measured static water level (SWL).
   Note: If a well has bacterial contamination (or suspected) and a well or spring is located within 50 ft., apply a chlorine treatment.
2. Place a minimum of 2 ft. of Sealing Material. This material should lie about 1 ft. above and 1 ft. below the measured SWL.
3. Place and slightly compact Natural Soil to within 4 ft. of the surface Sealing Material may be substituted.
4. Remove the top 4 ft. of well casing (steel, stone wall or cribbing).
5. Place a minimum of 1 ft. of Sealing Material.
6. Place compacted Natural Soil to the ground surface and crown slightly. Sealing Material may be substituted.
7. Place about 0.5 ft. of Topsoil and crown the surface.

G. Small Diameter Bored Wells – These are typically shallow (less than 100 ft.) wells 4 to 12 inches in diameter with steel casing. The wells are generally located in alluvial or glacial deposits having an unconfined or confined aquifer.

Sealing Schedule (See Fig. 6 and Materials):

1. Place clean Fill Material up to 2 ft. below the measured SWL.
   Note: If well has bacteria contamination (or suspected) and a well or spring is located within 50 ft., consider applying a chlorine treatment.
2. Place Sealing Material up to within 4 ft. of the ground surface.
3. Remove the top 4 ft. of well casing(s).
4. Place compacted Natural Soil to the ground surface and crown slightly.
5. Place about 0.5 ft. of Topsoil and crown the surface.

H. Sealing Sandpoint Wells – These are typically shallow small diameter (1 ¼ to 2 inches) wells driven or jetted into sand and gravel deposits of alluvial or glacial origin.

By removing the casing and sandpoint from the well the hole should close. In the event the casing and sandpoint cannot be removed, the entire well should be filled with Sealing Material. The top 2 ft. of the well should be excavated and Natural Soil compacted and crowned at the surface.
MATERIALS

1. Fill Materials: clean sand and gravel, pea gravel, crushed stone. Use where sealing is not required.

2. Sealing Materials:

   Neat Cement – mix 6 gallons of water to 94 lbs of Portland cement. Pump into well through a Tremie pipe when placing below the water level or if well is less than 18 inches in diameter.

   Bentonite Clay – granular and pellet sizes. Can be placed below the water level by pouring slowly into hole and agitated to avoid bridging.

   Bentonite Slurry – mix 10% processed bentonite (by weight) and clean water (equivalent to a Marsh fluid viscosity of 70 seconds per quart using Marsh funnel viscometer). Pump into well through a Tremie pipe when placing below the water level or if well is less than 18 inches in diameter.

   Sand/Cement Grout – mix 94 lbs. of Portland cement with an equal volume of clean masonry sand and 6 gallons of clean water. Pump into well through a Tremie pipe when placing below the water level or if well is less than 18 inches in diameter.

   Concrete – mix 94 lbs of Portland cement with equal volumes of sand and gravel and 6 gallons of clean water. Pump into well through a Tremie pipe when placing below the water level or if well is less than 18 inches in diameter.

3. Natural Soils: mineral soil with a USCS classification of: CL, ML; or GC, GM, SC, SM with greater than 25% fines. Use where sealing well is not required.

4. Chlorine Treatment: 1 gallon of 5% chlorine bleach (5% Na Hypochlorite) to 500 gallons of well water volume.
5. Well Capacities:

<table>
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<th>Hole Diameter (inches)</th>
<th>Volume Per Foot of Depth (gal/ft)</th>
<th>(ft³/ft)</th>
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References:


Fig. 1 Bedrock Wells in an Unconfined Aquifer
(NOT TO SCALE)

1. Fill Material
2. Sealing Material
3. Remove Top 4 ft. of casing(s)
4. Compacted Natural Soil
5. Topsoil

Casing

Bottom of casing

Open Hole

Aquifer

SWL
Static Water Level

Bottom of Well

10ft

4ft
Fig. 2 Bedrock Wells in a confined Aquifer
(NOT TO SCALE)

5. Topsoil

4. Compacted Natural Soil

3. Remove Top 4 ft. of casing(s)

2. Sealing Material

SWL
Static Water Level

Confining Layer

Bottom of casing

Open Hole

1. Fill Material

Aquifer

Bottom of Well
Fig. 3 Bedrock Wells in Multiple Aquifers
(NOT TO SCALE)

7. Topsoil

6. Compacted Natural Soil

3. Remove Top 4 ft. of casing(s)

4. Sealing Material

Upper casing

SWL
Static Water Level

10 ft

3. Fill Material

Lower Casing

Impermeable Layer

10 ft

10 ft

1. Fill Material

Sealing Material

Open Hole

Bottom of casing

Aquifer

Bottom of Well
Fig. 4 Artesian Flowing Wells
(NOT TO SCALE)

1. Fill Material
2. Bridge Seal
3. Sealing Material
4. Remove Top 4 ft. of casing(s)
5. Compacted Natural Soil
6. Topsoil

Casing

Confining Layer

Bottom of casing
Open Hole
Aquifer

SWL
Static Water Level

Bottom of Well

4 ft
Fig. 5 Large Diameter Dug or Bored Wells in Unconsolidated Deposits

(NOT TO SCALE)

7. Topsoil
6. Compacted Natural Soil
5. Sealing Material
4. Remove Top 4 ft. of casing(s)
3. Natural Soil or Sealing Material
2. Sealing Material
1. Fill Material

Casing

SWL
Static Water Level

1 ft Minimum
4 ft
2 ft Minimum

Bottom of Well

Aquifer

NEH650-EFH, PA-30, Sept. 2007
Fig. 6 Small Diameter Bored Wells in Unconsolidated Deposits

(NOT TO SCALE)

1. Fill Material

2. Sealing Material

3. Remove Top 4 ft. of casing(s)

4. Compacted Natural Soil

5. Topsoil

Well Screen

Bottom of casing

Open Hole

Aquifer

SWL
Static Water Level

4ft
2ft

Bottom of Well
1. SCOPE

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

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

2. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. FOUNDATION PREPARATION AND CONDITIONS

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

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

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

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

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

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

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

4. CAST-IN-PLACE CONCRETE STRUCTURES

a. Concrete Forms

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

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

b. Concrete Mix

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

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

c. Mixing and Handling Concrete

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

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

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

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

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

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

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

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

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

d. Reinforcing Steel Placement

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

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

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

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

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

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

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

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

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

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

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

f. Form Removal and Concrete Repair

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

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

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

g. Concreting in Cold Weather

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

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

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

i. Backfilling New Concrete Walls

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

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

5. WOOD STRUCTURES

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

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

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

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

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

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

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

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

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

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

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

7. BURIED TANKS

a. Tank Condition

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

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

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

b. Installation

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

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

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

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

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

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

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

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

8. PIPES

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

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

All connections between pipes and structure walls and floors shall be water tight and capable of withstanding the expected operating pressures.
CONSTRUCTION SPECIFICATION
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. 801, 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.

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.

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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 ensure 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