Section 3:

Quality Assurance Plan

Certification of Conformance Sheets

PA NRCS Safety Fact Sheet #9

Soil Cave-In Fact Sheet

Cold Weather Concreting Fact Sheet

Cold Weather Concrete Guidelines

Hot Weather Concrete Guidelines

NRCS Construction Specifications (313, 367, 620)

Survey Points

PA One Call for Design

TOM VENESKY
Roofed Heavy Use Area & Manure Stacking Structure & Supporting Practices
Quality Assurance Plan

Landowner/Operator: Tom Venesky
Location: Luzerne County, Pa

Estimated Performance Time: 32 work days

Critical Items of Work and Timing of Inspection	Work Days	Inspection Req'd
Pre-construction meeting	0.5	**full time**
E&S measures installation	0.5	daily as needed
Excavation	4	daily as needed
Perimeter drain	1	daily as needed
Compacted fill and stone to reach subgrade elevations	3	daily as needed
Concrete Prep-Footers (Stone/Steel/Forms)	2	daily as needed
Concrete footer placement	1	**full time**
Concrete prep-walls/curbing	4	**full time**
Concrete wall/curbing placement	2	**full time**
Concrete Prep-Floor (Stone/Steel/Forms)	1	daily as needed
Concrete flatwork placement	1	**full time**
Construct roof	5	daily as needed
Drop Inlet Box/Surface Water Controls	1	daily as needed
Access road installation	1	daily as needed
Roof Runoff Items	1	daily as needed
All Outlet Pipes	2	daily as needed
Complete Final Grading	1	daily as needed
Seed all disturbed areas	1	once when done

General Items

1. The site will be checked at least once a day during the construction period when the contractor is working, expected to work, or could work. These visits should be unannounced and at random times.
2. Materials should match the specifications or values referenced within the construction package. A substitution should not be made without prior approval by the design engineer. If the contractor expects that a different product will be used, they will need to provide pertinent material information in order to provide adequate comparison.
3. All visits must be documented on SCS-CPA-6 or job diary. It is required that a continuous record of construction assistance be kept from the pre-construction conference to the final inspection. OSHA standards for trenches and other excavation must be followed. If safety violations are observed, notify the contractor and contact the NRCS supervisor or engineer assigned to the job.
4. **If the primary inspector can't meet the inspection responsibilities day to day or otherwise, they should contact the backup inspector and be sure the site is adequately inspected. It is the responsibility of the primary inspector to be sure there is adequate and continuous inspection throughout the project.** If a backup inspector agrees to inspect a project during a period of time when the primary inspector will be absent, it is then the backup's responsibility to find an inspector if they can't inspect the site.

Specific Items to be Checked:

1) Preliminary Information
   a) Document contractor names and associated work items
   b) Ensure that a PA-One Call Construction request has been submitted and that all lines are marked prior to beginning excavation

2) Erosion and Sedimentation Controls
   a) Document these practices

3) Excavation
   a) Check for seep locations during excavation and ensure all sub-bases are free of seeps or unstable soils

4) Timber Structures
   a) Document post size, material, and brackets. Report inadequate materials to the design engineer.
   b) Materials to be checked – lumber quality and dimensions, post spacing, required bracing, nail and bolt sizes and patterns
   c) Trusses should be PE approved and should be approved by the design engineer prior to ordering.

5) Footer Drain and Outlet
   a) Document diameter, ASTM, elevations and length
   b) Verify animal guard is installed

6) Surface Water Controls/Drop Inlet Box
   a) Document Dimensions and slopes
   b) Document outlet conditions

7) Reinforced Gravel Placement
   a) Verify dimensions and grades of reinforced gravel areas
   b) Document material types and amounts for each area
   c) Verify surface water controls if needed

8) Concrete Placement
   a) Document foundation.
   b) Obtain concrete design mix prior to contractor ordering concrete and placement; send the mix design to the design engineer for acceptance and approval well in advance of placing the concrete; work with the contractor/concrete supplier to make sure revisions are made to the concrete design, if found not adequate, and forward any revised concrete designs to the design engineer for final acceptance and approval.
   c) Verify subgrade, steel, and forms before concrete arrives.
   d) Obtain batch tickets with pertinent information for concrete delivered.
   e) Document any on-site testing of concrete materials.
   f) Ensure that weather precautions and curing procedures are followed.
   g) Make sure contractor has enough waterstop on-site prior to concrete placement
   h) If cold or hot weather concreting is necessary; consult with the design engineer.

9) Seeding
   a) Document materials and locations

10) Final Documentation
   a) Make daily inspection documentation.
   b) Sufficient information should be taken to document against the original construction drawings.
   c) Final documentation of the completed project must be shown in red on the construction drawings.
   d) Take photos and include in the as-built plans, as needed, to show installation procedures or materials used.
   e) Make notes of verifications and/or any changes in red as well.

This inspection plan was developed to ensure the designer's objectives are met and quality workmanship is performed. This plan sets forth the minimum, but not necessarily all the inspection items and time needed. If additional inspection is needed, the assigned inspector shall inform the supervisor and note it on the SCS-CPA-6.

CERTIFICATION OF CONFORMANCE

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

Farmer's Name:_____
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:_____
Address:_____
City/State/Zip:_____
Type of Storage:_____ Timber 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.

USDA

United States Department of Agriculture

Fact Sheet #9

January 2016

Agriculture Construction Safety

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 regulations in 29 CFR Parts 1910 for General Industry and 1926 for the Construction Industry apply to agricultural construction.
- 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.

Fact Sheet

SOIL CAVE IN-A FATAL SLIP

United States Department of Agriculture

Natural Resources Conservation Service

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 benched 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 ona 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

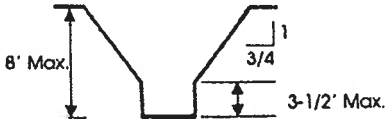


Figure 4. Type A Soil
Unsupported, Vertically Sided Lower Portion, Maximum 12 Feet

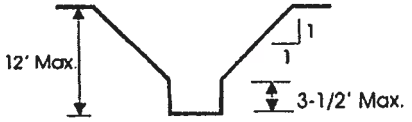


Figure 5. Type B Soil
Simple Slope

Figure 6. Type C Soil
Simple Slope

Fact Sheet

COLD WEATHER CONCRETING
(ACI-306R-88 Summary)

USDA
Natural Resources
Conservation Service

Definition of Cold Weather (1.1)

As per ACI-306R report, cold weather is defined as: a period for more than 3 consecutive days the average daily air temperature is less than 40^0 F, and the air temperature is not greater the 50^0 F for more than half (12hrs.) of any of the 3 days. *"The average daily air temperature is the average of the highest and the lowest temperatures occurring during the period from midnight to midnight."*

-Objectives (1.3)

The objectives for cold weather concreting are to;

- prevent damage to concrete from early stage freezing. As concrete gains maturity the mixing water combines with the cement during hydration decreasing the degree of saturation below the critical level. The critical level is the degree of saturation where a single cycle of freezing could cause damage to the concrete.
- assure that the concrete develops essential strength for safe removal of forms and safe loading of the structure during construction and after.
- limit rapid changes of temperature before the concrete has obtained sufficient strength to withstand induced thermal stresses.
- provide protection that warrant normal strength development and the intended serviceability of the structure.

"Short-term construction economy should not be obtained at the expense of long-term durability."

-Principles (1.4)

Concrete that has attained a compressive strength of at least 500-psi will not be damaged by exposure to a single freezing cycle. Concrete that is protected will obtain its potential strength despite subsequent exposure to cold weather. Except within heated enclosures little or no external supply of moisture is required. Calcium chloride should not be used to accelerate setting because of increased chances of corrosion to re-enforcing metal.

-Economy (1.5)

The owner must decide whether the extra costs in cold weather concreting are more profitable or cost effective than waiting for milder weather. Neglect of protection against freezing in the early stages can cause immediate destruction or weakening of the concrete.

-Planning (2.1)

Plans to prevent early freezing of fresh concrete and maintaining temperatures above the recommended minimums should be made well before freezing temperatures are expected to occur. The necessary equipment and materials should be at the work site before cold weather is likely to occur, not after the fresh concrete begins to approach the freezing point.

-Protection during fall and spring (2.2)

During Fall and Spring when temperatures are not defined as cold weather, all concrete surfaces should be protected from freezing, for at least the first 24-hours after placement, when heavy frost or freezing is forecast at the job site.

-Concrete temperature (2.3)

The concrete temperature at the time of placement should not be lower than the values given in Table 3.1, also the concrete temperature should be maintained at the recommended placement temperature for the required protection period.

Air Temperature	Concrete Temperature
Minimum concrete temperature as placed and maintained	
ALL	**55 F**
Minimum concrete temperature as mixed for indicated air temperature	
Above 30F	60F
0-30F	65F

Table 3.1- Recommended concrete temperatures

-Preparation before concreting (4.1, 4.3, 4.4)

Preparation for concreting primarily consists of insuring that all surfaces that will be in contact with the freshly poured concrete are at temperatures that will not cause freezing or prolonged setting. All snow, ice and frost must be removed prior to placement of the concrete. Concrete will not be placed on frozen subgrade. The subgrade can be thawed, sometimes, by covering it with insulating material for a few days prior to concrete placement.

-Protection to prevent early-age freezing (5.1)

Prevention of early-age freezing must be provided immediately after concrete placement. Arrangements for covering, housing or heating of newly placed concrete should be made before placement. Protective materials must be on-site ready for installation to prevent corners and edges from freezing. In cold weather, the temperature of newly placed concrete should be kept as close to the values given in Table 3.1 and the corners and edges are more vulnerable to freezing and are more difficult to maintain at the optimal temperature.

-Length of protection period (5.3)

The length of the required protection period depends on the type and amount of cement used and whether an accelerator is used. The length of protection may be reduced by: (1) using Type III cement; (2) using an accelerating admixture **(non-chloride)**; or (3) using 100 lb/yd^3 of cement in excess of the design cement content. Table 5.3 gives the minimum length of protection, in days at the temperatures given in Line 1 of Table 3.1.

Fact Sheet

USDA
Natural Resources
Conservation Service

Line	Service category	Type I or II cement	Type III or 100lb/yd^3 of additional cement
1	No load not exposed	2	1
2	No load, exposed	3	2
3	Partial load, exposed	6	4

Table 5.3- Length of protection period for concrete placed during cold weather (Days)

-Stripping forms (5.4)
The protection afforded by forms may require that the forms remain in-place for the full length of the protection period recommended in Table 5.3. The minimum time before stripping the forms is best determined by past experiences and current job conditions. If the newly placed concrete is in a heated enclosure, form removal and exposure to low daily temperatures may cause damage to corners and edges. Also, in the case of structures subjected to hydrostatic pressure, hasty removal of forms may dislodge the form ties creating water channels.

-Temperature drop after removal of protection (5.5)
Concrete should be cooled gradually to reduce differential strains between the interior and exterior of the structure. This can be accomplished by slowly reducing the applied heat or by leaving the insulation materials until the concrete has reached equilibrium with ambient temperatures.

-Form removal requirements (6.10)
Recommendations made are based on job conditions that meet the following requirements:

- Concrete internal temperature is at least 50 F after placement.
- Facilities are available to maintain the concrete temperature at 50 F throughout the structure.
- Reshores are left in place as long as necessary to safeguard all members of the structure.
- The concrete is made of Type I or II Portland cement.
- Proper curing is used to avoid drying in heated enclosures.

-Materials and methods of protection (7.2)
In some cases the use of natural heat of hydration may only require the use of insulating material. In extreme cases, it may be necessary to us enclosure and heating units to maintain the required temperature.

The heat of hydration is mostly generated during the first 3 days. The heat may be retained on unformed surfaces using insulating blankets and by using insulated forms. The insulation must be kept in close contact with the concrete or the form surface. Suitable protection from wind, moisture and heat loss are required. Corners and edges are particularly vulnerable, therefore the thickness of the insulation should be about three times the thickness used for walls or slabs. Commonly used insulating materials follow, definitions are listed in Chapter 7 ACI-306R:

- Polystyrene foam sheets
- Urethane foam
- Foamed vinyl blankets
- Mineral wool or cellulose fibers
- Straw
- Blanket or batt insulation

The heat of hydration will gradually decrease with age. It may be necessary to use enclosures and heating units to maintain the required temperature for the required protection period. Enclosures conserve heat, keep out cold air, and if secured properly block the wind. They can be made with any suitable material such as wood, canvas or plastic sheet. Enclosures must capable of withstanding wind and snow loads and be reasonably air tight. Sufficient space between the concrete and the enclosure to allow circulation of warmed air. If combustion heaters are used, venting is required to prevent reactions between exhaust gasses and exposed concrete surfaces that will result in a weak concrete surface. Also, heaters and vents should be placed so as not to cause overheating or drying of concrete. The operation of combustion heaters should be supervised continuously and fire fighting equipment should be available at the job site at all times. **Warning, exhaust gasses poses a serious health threat in an enclosed structure. Never enter without properly venting before hand.**

-NOTE:
This fact sheet does not include all information set forth in the ACI-306. Consult the latest edition for further details. A complete catalog of all ACI publications is available from:

American Concrete Institute
Box 19150, Redford Station
Detroit, Michigan 48219

RGD
Revised 9/19

GUIDELINES FOR COLD WEATHER CONCRETING

This document is to be used as a supplement to the current PA Fact Sheet #2—Cold Weather Concreting—ACI 306R-16. This document is intended to provide additional guidance, for cold weather concreting procedures, in the Northeast Counties that receive engineering guidance from the NRCS Bloomsburg Technical Office. This document is only to be used for Heavy Use Area and Stacking Structure type of construction. This document does not apply to "liquid" storage structures (Tanks or Paint Tray Style Storages). Cold weather concreting on "liquid" structures is discouraged and shall be discussed with the NRCS engineering staff in Bloomsburg in detail prior to planning construction.

Cold Weather Concreting shall be discussed at the preconstruction meeting, no matter what time of year the meeting is held and discussed again 2 weeks prior to concrete placement. The landowner shall be involved in these conversations to help make a decision if it is worth the extra expense and effort to provide the added level of protection during cold weather concrete procedures or wait until milder weather.

Roles & Responsibilities:

It is the contractor's responsibility to submit a "Cold Weather Concrete Plan" to the assigned primary inspector for the given project. This plan shall be provided to the inspector at least 2 weeks prior to the concrete placement. The concrete mix design shall also be submitted to the inspector at this time. The primary inspector shall review the submitted Cold Weather Concrete Plan and also the Concrete Design Mix. If revisions to the Cold Weather Plan are required, then the contractor will do so. If changes to the design mix are required, the contractor shall work with the concrete plant to make the needed changes. The revised documents shall be resubmitted to the inspector for further review. Concrete cannot be ordered and construction cannot begin until the inspector approves all submitted documents.

Design Mix:

Concrete with a slump lower than normal (less than 4") is particularly desirable in cold weather for flatwork; bleeding of water is minimized and set occurs earlier. Bleed water, during cold weather, could affect the concrete surface strength. It is assumed that concrete with at least 600 #/cu.yd of cement content is being used for cold weather placement.

Conditions of Subgrade & Reinforcement:

Concrete shall not be placed on "frosty" or frozen subgrade material or reinforcement. The subgrade and reinforcement shall be covered with insulating material for a few days before the concrete placement. In some cases, external heat must be applied. Steel forms for walls, especially, shall be heated by some means prior to concrete placement. There shall not be any snow or ice on the forms prior to placement of concrete. Tops of wall forms shall be covered to prohibit snow and ice from occupying space intended for concrete. Snow and ice at the bottom of the forms will also expose the freshly placed concrete to low temperatures.

Protecting Concrete During Cold Weather:

TABLE 1 shall be used to determine if the Contractor's Cold Weather Concrete Plan is sufficient for the forecasted weather conditions. The table shows what thermal resistance value (R-Value) is required at expected low air temperatures, for any of the first 3 days of the curing period; However, Concrete shall be protected for a minimum of 7 days. It is assumed that the ground (subgrade) temperature is well above freezing.

TABLE 1A -5" SLAB THICKNESS

EXPECTED LOW TEMP FOR 1ST 3 DAYS OF CURING (DEGREES)	REQUIRED R-VALUE (hr-sqft-F/Btu)	REQUIRED SAWDUST (INCHES)	REQUIRED STRAW (INCHES)
40	4	2	3
35	7	3	4.5
30	8	4	5.5
25	9	4.5	6.5
20	11	5	7
<20	ADDITIONAL HEAT REQUIRED ENCLOSURE REQUIRED CONSULT WITH DESIGN ENGINEER		

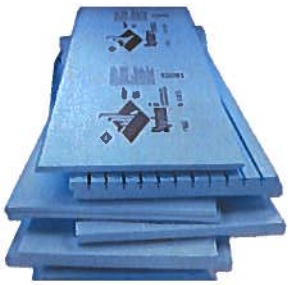
TABLE 1B -8" WALL THICKNESS

EXPECTED LOW TEMP FOR 1ST 3 DAYS OF CURING (DEGREES)	REQUIRED R-VALUE (hr-sqft-F/Btu)
40	3
35	4
30	5
25	6
20	7
<20	ADDITIONAL HEAT REQUIRED ENCLOSURE REQUIRED CONSULT WITH DESIGN ENGINEER

Insulating Materials:

A. Blankets: Concrete "Blankets" typically have an R-Value between 2 & 8; R value of blankets need confirmed prior to use.
B. Polystyrene foam or Polyurethane sheets; R value needs verified according to manufacturer data sheets.

EXPANDED POLYSTYRENE FOAM (EPS)
(Similar to the foam used for
for packing "peanuts")
R=3.6 to 4.0 per inch of thickness



EXTRUDED POLYSTYRENE FOAM (XPS)
(Blue board or pink board)
R=4.5-5.0 per inch of thickness

POLYISOCYANURATE /
POLYURETHANE BOARD
(Foil Faced)
R=7.0-8.0 per inch of thickness

C. Sawdust: Typical R-Value is 2.22 per 1" thickness
D. Straw or Hay: Typical R-Value is 1.5 per 1" thickness.

Straw, Hay, and Sawdust (Materials) need to be dry. Any moisture in the materials beyond normal may result in it freezing and providing a lesser degree of protection. If using these materials for flatwork protection; a layer of plastic shall be installed on the concrete surface prior to the material. After the required thickness of the material is placed, it needs covered with another layer of plastic or a tarp and weighted down to prevent it from blowing off. Do not install the initial layer of plastic until the concrete has set enough; otherwise the plastic will stick to the concrete.

Corners and edges are particularly vulnerable during cold weather. Therefore, the thickness of insulation for these parts shall be about 3X the thickness that is required for slabs or walls. It is recommended to extend the protection a minimum of 2' beyond the edges of footing and slabs.

Concrete placed for footings or slabs shall be covered, with the needed protection, as soon as the concrete can be walked on. Concrete placed in wall forms shall be covered, with the needed protection, immediately after concrete placement. Insulation shall be kept in close contact with the concrete form surface to be effective.

Protection Period:

All concrete (Footings, Slabs, and Walls) shall be protected for no less than 7 days for proper curing purposes. Wall forms shall remain in place for a minimum of 7 days as well. Curing compound does not need to be used during cold weather concreting, due to the insulating material being left on for a minimum of 7 days. Many curing compound manufacturers do not recommend that this product be used at cold temperatures. The use of non-chloride "accelerators" are welcome as an added measure of early set and strength gain. The use of accelerators will not decrease the protection period; 7 days is still the minimum protection period.

At the end of the protection period, concrete should be cooled gradually to reduce the risk of "thermal shock". Gradual cooling reduces the risk of cracking. This can be accomplished by allowing the insulating material to remain in place until the concrete has essentially reached equilibrium with the outside air temperature.

Consult with the design engineer for the allowable time of "loading" the concrete structures. Depending on the weather conditions; the curing time before backfilling, driving on slabs with skid steers, or allowing animal traffic may vary.

RGD
3/21

GUIDELINES FOR HOT WEATHER CONCRETING
(FOR ALL CONCRETE)

This document is intended to provide general information and guidance, for hot weather concreting procedures, in the Northeast Counties that receive engineering direction from the NRCS Bloomsburg Technical Office. Thoroughly discuss hot weather concreting during site showings so accurate bid prices can be achieved for the project. Hot weather concreting is discouraged and shall be discussed with the NRCS engineering staff in Bloomsburg in detail prior to planning construction.

If there is a chance of encountering hot weather conditions during construction; Hot Weather Concreting shall be discussed at the preconstruction meeting and discussed again 2 weeks prior to concrete placement. The landowner shall be involved in these conversations to help make a decision if it is worth the extra expense and effort to provide the added level of protection during hot weather concrete procedures or wait until more favorable weather. Proper measures need to be in place for the placement and curing of the concrete.

Definition & Concerns:

As per ACI 305R; Hot weather is any combination of the following conditions that tends to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and rate of cement hydration, or otherwise causing detrimental results:

- High ambient temperature
- High concrete temperature
- Low relative humidity
- Wind speed
- Solar radiation

Hot weather concreting is any period of high temperature in which special precautions need to be taken to ensure proper handling, placing, finishing, and curing of concrete. The exact temperature where special precautions should be taken varies. Advanced planning is required for concrete placed in ambient conditions that are at or above 75°F (Portland Concrete Association). This is generally the temperature that starts to affect the efficiency of the cementitious system. Evaporation rate is a more accurate indicator of hot weather conditions for concrete.

Hot weather can cause an increased water demand, an increased rate of slump loss and tendency to add water at the job site, faster set-up time, difficulty in maintaining air entrainment, and more shrinkage cracking. All of these can reduce long term strength, reduce durability, and increase permeability.

Roles & Responsibilities:

If there is a chance of encountering hot weather conditions during construction; It is the contractor's responsibility to submit a "Hot Weather Concrete Plan" to the assigned primary inspector for the given project. This plan shall be provided to the inspector at least 2 weeks prior to the concrete placement. The concrete mix design shall also be submitted to the inspector at this time. The primary inspector shall review the submitted Hot Weather Concrete Plan and the concrete mix design. If revisions to the Hot Weather Plan are required, then the contractor will do so. If changes to the mix design are required, the contractor shall work with the concrete plant to make the needed changes. The revised documents shall be resubmitted to the inspector for further review. Concrete cannot be ordered, and construction cannot begin until the inspector approves all submitted documents. The inspector shall work with the design engineer in making these decisions. The design engineer shall approve all concrete mix designs that have portland cement replacements, as described later in this document.

The inspection staff shall provide timely inspections. Inspect steel, forms, and foundation the day before the actual placement, so the contractor has time to remedy any oversights well in advance of concrete placement. Avoid work delays caused by untimely inspections. The inspector shall get proper approval for working during early or late concrete placements. If the assigned inspector cannot be available for a concrete placement, they are responsible for finding a qualified back-up inspector. Allowing early or late starts without inspection shall not be allowed.

The inspection staff shall have a concrete thermometer and slump equipment ready in case any issues develop. The inspector shall check the delivery tickets and compare the ticket information with the mix design that has already been approved. The batch ticket shall indicate how much free water can be added; if this is not shown on the batch ticket then no water can be added on-site.

Possibilities for Avoiding or Preventing Issues:

The contractors have a lot of flexibility on how they plan to address concerns about hot weather and its effect on the final product. Some typical options include:

- Delay placement to a cooler day, especially when high winds and low relative humidity are anticipated
- Move placement start time to early morning or late evening
- Pre-wet sub-base, to reduce moisture loss
- Wet forms and steel to cool materials
- Make sure excess water drains away; concrete shall not be placed on standing water
- Have extra crew members to reduce placement time
- Schedule more equipment; have multiple pump trucks to accelerate delivery schedule
- Erect sunshades and wind barriers to protect the fresh concrete

Precautionary measures required on a windy, sunny day will be stricter than those required on a calm, humid day, even if the air temperatures are identical.

Mix Design & Placement:

Aggregates are the greatest part of the concrete mixture. Keeping the aggregates shaded and moist when being stored can be an effective means to achieving lower concrete temperature. The temperature of the water used in the concrete mixture will also play a major part in the overall concrete temperature; store water in tanks away from the sun or cool the water with ice or liquid nitrogen. If ice is used; the ice must be completely melted by the time mixing is complete.

Using slower hydrating cements will help with controlling heat development in the concrete and should result in lower peak temperatures; there will be less thermal expansion, and the risk of thermal cracking will be reduced. Concrete mixtures that obtain high strength at an early age will develop high concrete temperature during initial curing. These concrete mixtures should be provided thermal protection to ensure gradual cooling at a rate that will not cause them to crack.

Using partial replacements for the portland cement like fly ash and other pozzolans, and ground granulated blast-furnace slag is allowed. These portland cement substitutes are known for having both a slower setting rate and early strength gain to the concrete, which is desirable in hot weather concreting. Concrete containing the slower setting cements will be less likely to have plastic-shrinkage cracking. The design engineer must approve any concrete designs having portland cement replacements.

Various types of chemical admixtures have been found beneficial in offsetting some of the undesirable characteristics of concrete placed during periods of high ambient temperatures. The benefits may include lower mixing water demand or extended periods of use. Admixture effectiveness depends on the chemical reactions of the cement being used. Set retardation and water reducing admixtures can be used to reduce set time or increase slump and workability. Shrinkage reducing admixtures are also allowed. Consider adding the air entrainment admixture at the site and holding back some water to aid in the mixing of the air entrainment once in the truck. All admixtures shall be included in the mix design and have been approved by the inspector prior to placement. The concrete company shall provide a history report showing satisfactory performance, at the expected hot weather conditions, before a certain admixture can be used.

Adding water and remixing of concrete which has lost enough workability to become unplaceable, known as "retempering" is prohibited. Water additions, in excess of the mix design water cement ratio, to compensate for loss of workability is prohibited.

Discharge the concrete as soon as the concrete truck arrives at the job site. Prolonged mixing in hot weather increases the temperature of the concrete, which makes it set faster and shortens the placing and finishing time. Concrete shall also 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. In hot weather or under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85°F or above as delivered at the job site; the time between the introduction of the cement to the aggregates and completion of truck discharge shall not exceed 45 minutes. If these conditions are encountered, the concrete plant shall be notified to take the necessary precautions.

The supplier shall maintain the temperature of concrete below 90°F during transportation, mixing, and conveying. Concrete with a temperature above 90°F at the job site shall not be placed. The inspector shall have an immediate conversation with the contractor and landowner about not accepting a load of concrete and the ramifications that can take place if the concrete is placed and later found to not be acceptable for the intended purpose. The contractor and landowner need to be involved in the final decision before the load of concrete is rejected.

In hot weather, it is usually necessary to place formed concrete in shallower layers than usual, to assure vibration well into the layer below and that the elapsed time between layers be minimized to avoid cold joints.

Curing and Protection:

Proper curing of concrete, during hot weather, is critical. Early curing is critical and lack of it is increasingly detrimental as temperatures rise.

All concrete (Footings, Slabs, and Walls) shall be protected for no less than 7-days for proper curing purposes. This 7-day curing time is the same for concrete with and without pozzolans and chemical admixtures. A 7-day minimum duration of curing will often be sufficient to attain approximately 70% of the specified compressive strength. If a change in curing method is made during this period, it should be done only after the concrete is 3 days old. (ACI 305R & ACI 308R-18). At the end of the curing period (7 days), any covering that is used should be left in place without wetting for several days (4 days is suggested) so that the concrete surface will dry slowly and be less subject to surface shrinkage cracking. The effects of drying can also be minimized by applying a sprayable curing compound at the end of the moist-curing period. Strategies for achieving this shall be discussed with the contractor prior to placement.

Some options for curing include:

- Spray with curing compound as soon as possible upon final finish. Consider applying a second coat of curing compound if it is windy. Curing compounds shall contain a heat reflecting white pigmented compound. Curing compound shall be applied heavier than manufacture's recommendations to ensure uniform coverage and proper curing.
- Wet curing is the most preferred method for curing concrete during hot weather.
- Exposed surfaces shall be continuously moistened by means of fog spray or otherwise protected from drying immediately prior to placement and during curing.

Curing of flatwork concrete; Of the different curing procedures, wet-curing is the best method for developing the strength of concrete and minimizing early drying shrinkage. This can be provided by ponding, covering with clean sand kept continuously wet, or continuous sprinkling. A more practical method of wet-curing is covering the prewetted concrete with impervious sheeting or absorptive mats or fabric kept continuously wet with a soaker hose or similar means. These materials shall be kept in contact with the concrete surface at all times. The temperature of water used for curing must be as close as possible to that of the concrete to avoid thermal shock.

Curing of concrete in forms; ACI 305R suggests that forms should be covered and kept continuously moist during the early curing period (first 3-days). If this idea is found to be impractical by the contractor; the contractor can cure with curing compound or shall come up with another acceptable means of curing concrete in forms. Ideas shall be discussed with the inspector.

If the curing compound option is chosen for formed concrete, the form tie holes shall be parged and curing compound applied, within 1 hour of stripping forms. Sufficient staff need to be available to be able to achieve this timeframe or strip forms in the early morning or late day, so the concrete is not exposed to the sun and hot temperatures; then parge tie holes and apply the curing compound as soon as possible.

Leaving forms on for 7-days, as a means of curing, may not be a good idea during hot weather, as forms may generate an excessive amount of heat and negatively affect the curing process. It is best to strip the forms after 24-hrs of placement and provide curing by other means.

The concrete shall also be protected against thermal shrinkage-cracking from rapid temperature drops, particularly during the first 24 hours. Early cracking due to the thermal shrinkage is generally more severe in the spring and fall. This is because the temperature differential for each 24-hour period is greater during these times of year. This is a concern when there is a wide day and night temperature difference. The contractor shall come up with a means of protecting the concrete in these circumstances.

No equipment shall be allowed on concrete slabs or floors until the concrete has cured for a minimum of 7 days. This includes any motorized material handling equipment, pallets of forms, etc. Skid loaders used for transporting concrete into forms shall not be allowed on slabs or floors for a minimum of 14 days.

Practice Specification
Waste Storage Facility (Code 313)
Structure

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

Bolts - ASTM-A307; zinc coating shall conform to ASTM-A153, B633 (cond. SC3), A165 (type TS).

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 soils 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. In hot weather or under conditions contributing to quick stiffening of the concrete, or when temperatures of the concrete is 85oF or above, the time between the introduction of the cement to the aggregates and completion of truck discharge shall not exceed 45 minutes.

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 or wire shall be supported by precast concrete bricks (not clay bricks), or metal or plastic chairs. Concrete bricks supporting steel and wire must be full and not broken (unless bricks are manufactured with creases or indentations meant to be broken). 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 – ¼ inch from earth surfaces - ½ 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-16. 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 BCSI-B1-06, "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 water tightness. 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, water tightness, 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:

Specific Site Requirements

Practice Specification
Roofs and Covers (Code 367)

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

Bolts - ASTM-A307; zinc coating shall conform to ASTM-A153, B633 (cond. SC3), A165 (type TS).

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.

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 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 applyeffective 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. 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:

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

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.

Specific Site Requirements

Practice Specification
Underground Outlet (Code 620)

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.

Table 1 – Drain pipe requirements

Type	Specification
Clay drain tile, solid	ASTM-C-4
Clay pipe, standard and extra strength	ASTM-C-700
Clay pipe testing	ASTM-C-301
Concrete drain tile	ASTM-C-412
Concrete pipe for irrigation or drainage	ASTM-C-118
Concrete pipe or tile, determining physical properties of	ASTM-C-497
Concrete sewer, storm drain and culvert pipe	ASTM-C-14
Reinforced concrete culvert, storm drain and sewer pipe	ASTM-C-76
Perforated concrete pipe	ASTM-C-444
Portland cement	ASTM-C-150
Pipe, bituminized fiber & fitting	Fed Spec SS-P-1540
Styrene rubber (SR) plastic drain pipe & fitting	ASTM-D-2852
Polyvinyl chloride (PVC), Sch'd. 40, 80, 120	ASTM-D-1785
Polyvinyl chloride (PVC) sewer pipe & fitting	ASTM-D-2729
Polyvinyl chloride (PVC) pipe	ASTM-D-3034 type PSM
Corrugated polyethylene tubing & fitting (3-6 inch)	ASTM-F-405
Corrugated polyethylene tubing & fitting (8-24 inch)	ASTM-F-667
Pipe, corrugated (steel, polymer coated)	ASTM-A-762
Pipe, corrugated (steel, zinc coated)	ASTM-A-760

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.

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 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 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 be 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:

Specific Site Requirements

1	334482	2424980	866.5535	bm2
2	334425.8	2425028	859.654	bm3
10	334571.6	2424991	873.7825	a rd
11	334557.8	2424985	873.6179	a rd
12	334539.9	2424981	872.8879	a rd
13	334525.1	2424977	871.3343	a rd
14	334511.5	2424974	869.3819	a rd
15	334496.8	2424973	868.0162	a rd
16	334482.4	2424975	867.2062	a rd
17	334470.8	2424978	866.0636	a rd
18	334456.5	2424980	865.2591	a rd
19	334444.6	2424981	864.6593	a rd
20	334431	2424982	864.701	a rd
21	334418.1	2424977	865.0913	a rd
22	334422.8	2424974	865.1497	a rd
23	334428.6	2424969	865.3776	c bldg
24	334438.6	2424971	864.8551	a rd
25	334453.1	2424971	865.2236	a rd
26	334466.9	2424968	866.0414	a rd
27	334477.6	2424964	867.3969	a rd
28	334490.2	2424963	868.3657	a rd
29	334494.5	2424962	868.2036	a rd
30	334495.6	2424963	868.091	a rd
31	334497.8	2424962	868.3692	a rd
32	334505.7	2424964	868.8478	a rd
33	334519.7	2424966	870.5463	a rd
34	334534.1	2424968	872.2315	a rd
35	334544.8	2424968	873.2347	a rd
36	334549.1	2424961	873.9852	a rd
37	334494.7	2424969	867.7883	a rd
38	334495.2	2424972	867.8753	a rd
39	334442.5	2424971	864.8772	ex pad
40	334442	2424983	864.5791	ex pad
41	334437.5	2424984	864.392	ex pad
42	334433	2424983	864.5656	ex pad
43	334427.9	2424982	864.7486	ex pad
44	334422.7	2424979	864.8823	ex pad
45	334435.5	2424945	866.7359	barn cnr
46	334395.8	2424923	867.9108	barn cnr
47	334408.4	2424911	868.6556	topo
48	334414.9	2424920	867.5858	topo
49	334424.9	2424934	866.5901	topo
50	334433.2	2424947	866.5525	topo
51	334429	2424949	865.4016	topo
52	334423.2	2424941	865.7279	topo
53	334417.1	2424931	865.928	topo
54	334411.2	2424922	866.6862	topo

55	334407	2424917	867.695	topo
56	334402.4	2424917	868.0294	topo
57	334395.2	2424922	868.4619	topo
58	334399.6	2424922	865.5212	topo
59	334403.7	2424920	865.696	topo
60	334406.7	2424919	866.0454	topo
61	334410.4	2424925	865.5664	topo
62	334416	2424933	865.5999	topo
63	334422.4	2424941	865.3919	topo
64	334428.8	2424951	865.4483	topo
65	334436.7	2424962	865.1306	topo
66	334443.1	2424970	864.9001	topo
67	334445.8	2424976	864.7383	topo
68	334480	2424984	865.0015	fence
69	334464.7	2424989	864.8231	fence
70	334463.6	2424989	864.8086	gate
71	334448.7	2424993	863.9038	gate
72	334447.8	2424994	863.894	fence
73	334435.3	2424998	862.732	fence
74	334419.9	2425003	861.6899	fence
75	334400.1	2425010	860.6017	fence
76	334381.3	2425016	858.9369	fence
77	334374.2	2425019	858.1987	fence
78	334373.5	2425010	859.7858	fence
79	334373.5	2424996	861.8765	fence
80	334371.5	2424980	863.4451	fence
81	334368.1	2424965	864.6061	fence
82	334365.3	2424958	864.9891	fence
83	334365.6	2424957	864.9886	gate
84	334366.7	2424956	865.0748	gate
85	334371.4	2424960	865.2767	topo
86	334379.5	2424972	865.2459	topo
87	334388.7	2424985	865.054	topo
88	334396.1	2424995	865.2026	topo
89	334396.8	2424995	865.0124	topo
90	334397.6	2424992	865.6416	c bldg
91	334401	2424995	865.0136	topo
92	334422.9	2424986	864.4589	topo
93	334424.9	2424994	863.3122	topo
94	334414.6	2424999	862.773	topo
95	334404.6	2425003	862.857	topo
96	334391.5	2425008	861.9469	topo
97	334378.4	2425013	859.4673	topo
98	334382.9	2425004	862.0119	topo
99	334388.7	2424997	864.0213	topo
100	334448.7	2424960	866.652	g bin
101	334444.2	2424953	866.6777	g bin

102	334455.4	2424956	866.7202	g bin
103	334450.7	2424949	867.145	g bin
104	334460.8	2424950	867.0886	opening
105	334470.9	2424943	867.7057	opening
106	334477	2424941	868.1085	topo
107	334485.6	2424951	868.2647	topo
108	334491.5	2424958	868.389	topo
109	334502.6	2424961	868.6543	topo
110	334494.4	2424944	869.1196	topo
111	334488.9	2424936	868.9278	mh crn
112	334502.2	2424924	870.5423	mh crn
113	334507.9	2424930	870.6931	topo
114	334520.4	2424949	870.9183	topo
115	334529.5	2424963	871.5417	topo
116	334541.4	2424959	873.2478	topo
117	334534.4	2424946	873.5929	topo
118	334529.2	2424938	873.1175	topo
119	334510.2	2424909	874.3111	topo
120	334496.3	2424902	876.6062	barn cnr
121	334420.1	2425021	859.8166	fence
122	334426.8	2425027	859.6054	fence
124	334437.5	2425038	858.7673	fence
125	334448.7	2425049	858.4906	fence
126	334453	2425053	858.2288	fence
127	334459.9	2425061	858.1829	fence
128	334507.6	2425025	864.7613	fence
129	334485.6	2424991	864.3065	fence
130	334473.7	2424993	864.6584	topo
131	334480.8	2425007	863.8656	topo
132	334490.4	2425021	863.8381	topo
133	334498.6	2425034	863.81	topo
134	334488.2	2425041	862.294	topo
135	334478.2	2425026	862.8104	topo
136	334467.3	2425014	862.6166	topo
137	334459.7	2425001	863.577	topo
138	334446.4	2425003	862.2892	topo
139	334453.3	2425017	861.3346	topo
140	334464.3	2425032	860.8268	topo
141	334474.6	2425045	860.6765	topo
142	334480.4	2425053	860.6263	topo
143	334467.4	2425059	859.0055	topo
144	334459.5	2425046	859.452	topo
145	334451	2425033	860.1818	topo
146	334443.4	2425023	860.6117	topo
147	334433.5	2425010	861.0262	topo
148	334428.1	2425004	861.5785	topo
149	334413.5	2425013	859.6985	topo

150	334403.1	2425017	858.8536	topo
151	334419	2425021	859.7261	gate
152	334415.3	2425022	859.3952	gate
153	334414.4	2425023	859.2764	fence
154	334403.2	2425027	858.4229	fence
155	334394.8	2425030	858.07	fence
156	334386.6	2425033	857.6618	fence
157	334377.4	2425037	856.7174	fence
158	334360.4	2425048	854.5313	fence
159	334352.7	2425045	854.5829	fence
160	334335.1	2425037	855.0032	fence
161	334304.9	2425023	855.7112	fence
162	334290.2	2425016	856.088	fence
163	334296.4	2425001	858.0133	fence
164	334306.2	2424985	859.8234	fence
165	334317.1	2424977	861.1351	fence
166	334347.2	2424955	864.1525	fence
167	334351.5	2424951	864.5003	gate
168	334363.6	2424957	864.5346	gate
169	334363.8	2424981	862.5682	topo
170	334347.8	2424986	861.6848	topo
171	334330.2	2424994	860.1801	topo
172	334313.3	2425004	858.3184	topo
173	334303.5	2425013	856.7211	topo
174	334320.2	2425021	856.1064	topo
175	334334	2425013	857.9391	topo
176	334352.8	2425004	859.7909	topo
177	334367.7	2425000	860.518	topo
178	334365	2425015	858.5098	topo
179	334351.8	2425019	857.7546	topo
180	334335.2	2425025	856.0972	topo
181	334425.1	2425031	858.92	topo
182	334424.6	2425036	858.0989	topo
183	334423.4	2425040	856.2378	topo
184	334420.8	2425044	854.3601	topo
185	334418.1	2425047	853.3106	water surface
186	334414.7	2425041	854.0185	topo
187	334407	2425041	853.8953	topo
188	334400.6	2425039	854.8948	topo
189	334408.9	2425035	855.745	topo
190	334416.3	2425035	857.2478	topo
191	334439.9	2425058	854.8953	topo
192	334443.1	2425056	856.4217	topo
193	334446.8	2425052	857.75	topo
194	334453.7	2425063	857.1016	topo
195	334447.5	2425068	854.257	topo
196	334458.3	2424968	865.571	s inlet

197	334457.8	2424966	865.6479	s inlet
198	334459.6	2424966	865.7052	s inlet
199	334460.1	2424968	865.912	s inlet
201	334532.3	2424989	872.2798	well
202	334531.8	2424989	874.8921	tp well

---------- Forwarded message ---------
From: **POCS Web Ticket Confirmation** <Delivery@pa1call.net>
Date: Mon, Mar 13, 2023 at 1:52 PM
Subject: POCS 03/13/23 13:52:41 20230722885-000 WR# 315020230313 New Excavation Final Design
: <MIKE@luzcd.org>

WEBCFM 00000 POCS 03/13/23 13:52:41 20230722885-000 WR# 315020230313 NEW XCAV DSGN

==========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST==========
Serial Number--[20230722885]-[000] Channel#--[1332AWEB][1197][2019-08]
Message Type--[NEW][EXCAVATION][FINAL DESIGN]

County--[LUZERNE] Municipality--[HOLLENBACK TWP]
Work Site--[450 W COUNTY RD]
Nearest Intersection--[RIDGE RD]
Second Intersection--[MAPLE RD]
At Intersection--[N] Between Intersections--[N]
Subdivision--[]
Location Information--
[CONSTRUCTION LOCATION IS BELOW WEST COUNTY ROAD (BELOW GRAIN BINS) AND
EAST OF EXISTING BARN/HEAVY USE AREA (ABOVE SMALL POND).]
Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
[41.073052/-76.094069,41.072676/-76.094836,41.072146/-76.094503,
41.072231/-76.094256,41.072506/-76.094176,41.072765/-76.093854]
Attachments--[http://www.pa811.org/attachments/20230722885]
Type of Work--[EXCAVATION] Depth--[3FT]
Extent of Excavation--[40X40] Method of Excavation--[GRADING]
Equip Type--[EXCAVATOR DOZER SKID STEER ETC]
Street--[ ] Sidewalk--[ ] Pub Prop--[ ] Pvt Prop--[X] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[X]

Project Dates--[ ] thru [ ] Response Due Date--[27-Mar-23]
Scheduled Excavation Date--[DESIGN]

Caller--[MIKE SCHLAUCH]
Caller Phone--[570-938-3018]
Excavator--[LUZERNE CONSERVATION DISTRICT]
Address--[911 W MAIN ST]
City--[PLYMOUTH] State--[PA] Zip--[18651]
FAX--[] Caller Type--[B]
Email--[MIKE@LUZCD.ORG]
Work For--[THOMAS VENESKY]
Project Contact--[MIKE SCHLAUCH]
Project Contact Phone--[570-938-3018]
Best Time to Call--[0730-1530]
Project Contact Email--[MIKE@LUZCD.ORG]

epared--[13-Mar-23] at [1352] by [MSCHLAUCH]
Remarks--
[***=== APPROVED JASHOOK WR#315020230313--SUBMITTED 3/13/2023 1332 ===***
MAPS AND ADDITIONAL DETAILS AVAILABLE UPON REQUEST.]

ET 0 ET =FRONTIER COMM PUD0 PUD=PPL ELEC DESIGN UJ 0 UJ =UGI LEHIGH HAZ

Serial Number--[20230722885]-[000]

Section 4:

Design Drawings (See Drawing Cover page for Complete List)