

CONSTRUCTION SPECIFICATIONS

NATURAL RESOURCES CONSERVATION SERVICE

WASTE STORAGE FACILITY

SCOPE

This specification shall consist of the clearing, grubbing, excavation, backfill, concrete, forms, reinforcing steel, timber, trusses, sheet metal, fasteners, other appurtenances and services required for the construction of waste storage or waste conveyance structures (i.e., waste storage ponds, dry stacks, composters, tanks, flumes, etc.) and the disposal of all cleared and excavated materials. Construction shall be conducted in such a manner that erosion, water, air, and noise pollution will be minimized and held within legal limits as established by state and federal regulations, including NPDES permits. Where a [construction best management practices plan \(CBMPP\)](#) is prepared for the site, the provisions of the plan shall be followed.

All structures shall be constructed according to plans furnished by the Natural Resources Conservation Service (NRCS) and in accordance with the NRCS's engineering standards for these practices, as well as local building codes, state laws and regulations and current industry standards. Any deviation from the approved drawings and specifications must be approved by the engineer prior to construction.

SPECIFICATIONS FOR WASTE STORAGE PONDS

Clearing. All trees, brush, and stumps shall be removed from the site and spoil areas before excavation is performed. All material cleared from the area shall be disposed of by burning or removing from the site and stacking. All burning shall conform to regulations of Alabama state law.

Excavation. The completed excavation, berms, and placed banks (spoil disposal) of unsuitable material shall conform to lines, dimensions, grades, and slopes shown on the plans or staked on the site to the degree that skillful operation of the excavating equipment will permit. Runoff from outside drainage areas will be diverted from the waste storage pond.

Borrow material shall be obtained from within the storage pond site as much as practical. The bottom of the pond shall be as uniformly flat as possible. Any changes in slope of the pond bottom will be approved by the engineer responsible for design. Any excess borrow material will be disposed of by: (1) raising the height of or widening the embankments or by flattening the slopes; (2) blending with the diversion or levee; or (3) hauling off-site.

Dike or Levee Construction. The placing and spreading of fill material shall be started at the lowest point of the foundation and shall be brought up in approximately horizontal layers of loose fill not exceeding 9 inches in thickness before compaction. These layers shall be of approximately uniform elevation and shall extend over the entire area of fill. Construction equipment will be operated over the area of each layer in a manner that will result in the specified degree of compaction and a sufficiently watertight structure. Special construction equipment will be used when the required compaction cannot be obtained by routing of the construction equipment. Construction of the fill shall be undertaken only at such times that the moisture content of the fill material will permit satisfactory compaction. If the material is too dry or too wet, the fill material shall be manipulated (adding water, drying, disking, etc.) to obtain the desirable moisture content.

Liner Construction. Detailed specifications for liner construction will be specified in the plan by the design engineer.

Inlet and Outlet Structures. Inlet and outlet pipes, flumes, and troughs shall be placed to the lines and grades shown on the plans.

Ramp Installation. When used, an inlet ramp shall be constructed to the dimensions, lines, and grades shown on the plans or as otherwise specified.

Materials. All of the component parts of the inlet and outlet pipes and supports, ramps, fences, and other materials shall be specified on the plans and shall be installed in a workmanlike manner. Concrete for flumes shall be as specified below.

Concrete. This work shall consist of furnishing, forming, placing, finishing, and curing Portland cement concrete as required in the construction of the work. When concrete is used, the mixture shall be no less than a 5-bags-per-yard mix. Water content shall not exceed 6.0 gallons per sack. Concrete will be thoroughly rodded or vibrated to remove voids and consolidate the concrete.

For small batches the mixture shall consist of a standard brand of Type 1 Portland cement, washed sand and gravel, and clean water (suggested ratio of aggregates in mix: 94 pounds cement (1 bag), 6 gallons water, 170 pounds clean dry sand, 315 pounds dry gravel). Smaller batches shall consist of 1 part cement, 2 parts sand, 3 parts gravel, and water at the rate of 1 gallon per 16 pounds of cement.

Concrete shall not be placed when the atmospheric temperature may be expected to fall below 40°F at the time concrete is delivered and placed at the work site.

All exposed surfaces of concrete shall be protected from the direct rays of the sun for at least the first 7 days. All concrete shall be cured by keeping it continuously moist for at least 7 days after placement. This moist curing can be accomplished by spraying with two coats of curing compound when other concrete will not be bonded to the treated surface.

Vegetation. Vegetative treatment shall be established as specified or as shown on the plans. Vegetation shall be applied as critical area planting and will include seedbed preparation, seeding, liming, fertilizing, and mulching.

Fencing. The waste storage pond shall be fenced when all construction work is completed. Permanent fencing shall be installed as specified in the plan with safety as the objective. A warning sign (90 in² minimum) shall be placed on each straight section of fencing, not to exceed a spacing of 300 feet, to alert the public to the hazards of the waste storage pond.

SPECIFICATIONS FOR WASTE STORAGE STRUCTURES

Clearing and Grubbing. All trees, brush, stumps, boulders, rubbish, and manure shall be removed from the foundation, storage, and spoil area(s) before excavation is performed. All material cleared from the area shall be disposed of by burning or burying on-site or hauling to an appropriate landfill. All burning shall conform to state and federal laws and regulations. Trees and other cleared vegetation will be cut flush with the ground surface in spoil areas. The foundation and/or storage area will have all stumps, roots, and vegetation removed. The general area around buildings will also require grubbing as necessary to complement the use intended for the structure. The limits of this grubbing will be staked by the engineer or his/her agent.

Excavation. Top soil excavated from the site will be stockpiled for later placement around the completed structure. Soils containing excessive organic material will be removed from the foundation area. The completed excavation and placement of spoil material shall conform as nearly to lines, dimensions, grades, and slopes shown on plans or staked on the ground as skillful operation of the excavating equipment will permit. Generally, spoil will be placed and spread to blend with the existing terrain of the spoil area. Runoff from outside drainage areas will be diverted from the excavation area.

Excavated surfaces too steep to be safe and stable if unsupported shall be supported as necessary to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. The width of the excavation shall be increased as necessary to provide space for sheeting, bracing, shoring, and other supporting installations. When the work is completed, such supporting installations shall be removed.

Fill

Placement. Earth material placed for pads, flooring, or foundations shall be good sandy clay or clayey sands and gravels free of detrimental amounts of sod, roots, large stones, and other objectionable material. Highly plastic clay soils should be avoided.

Begin placing and spreading the fill material at the lowest point of the foundation and construct the fill in approximately horizontal layers not exceeding 9 inches of loose thickness unless otherwise specified. These layers shall be reasonably uniform in thickness and shall extend over the entire area of the fill. Operate the earth hauling or compacting equipment over each layer so that reasonable compaction of the fill material will be obtained. A minimum of two complete passes over each layer by the compacting equipment is required to obtain adequate compaction.

If a minimum required density is specified, each layer of fill shall be compacted as necessary to obtain that density. Special equipment shall be used if needed to obtain the required compaction.

All finished work shall be left in a neat and sightly condition. The outer edges and slopes of the fill shall blend with the surrounding landscape and complement the structure built upon it.

Moisture Control. All fill material shall have a moisture content sufficient for the required compaction. Fill material which is too dry shall be moistened by adding water or by thoroughly mixing with moist fill until an acceptable moisture level is obtained. Fill material which is too wet shall be allowed to dry naturally or shall be dried by disking or shall be thoroughly mixed with dry fill material until an acceptable moisture level is obtained.

The moisture content of the fill shall be maintained within the limits to:

1. Prevent bulking or dilatence of the material under the action of the hauling or compacting equipment.
2. Prevent adherence of the fill material to the equipment.
3. Ensure the crushing and blending of the soil clods and aggregation into a homogeneous mass.
4. Contain adequate moisture so that a sample can be hand molded without the mold oozing through the fingers or squeezing out any water.

Timber Fabrication and Installation

Above ground timber structures, such as litter dry stack facilities, shall be constructed on a firm foundation to the lines and grades shown on the plans. Dimensions and spacings shown on the plans and drawings are minimum requirements for the wind and snow loads. These dimensions and spacings may be altered if the result is a stronger structure, with prior approval of the engineer. In no case will the dimensions and spacings be modified in a way which would reduce the strength of the structure. All framing shall be true and exact. Timber shall be accurately cut and assembled to a close fit.

Appropriate bracing for safety and structural stability during construction shall be used.

Wood and Timber. All material shall be sound wood, free from decay, and of new quality. Good quality, used, pressure-treated lumber may be utilized for walls of composter bins and dry stack storage areas. All timber beams shall be dense, structural quality, and graded in accordance with the Standard Grading Rules for Southern Pine Lumber. Unless otherwise specified, all timber and lumber shall be furnished in American Standard dressed sizes. All sizes specified are nominal sizes.

All structural timber, posts, poles, and lumber, except roof girders, rafters, purlins, trusses, knee braces, and attic bracing shall be pressure treated. Treated timber and lumber shall be impregnated with the specified type and quantity of preservative as specified in AWPA Standard C16: Wood Used on Farms – Preservative Treatment by Pressure Processes.

Posts and poles shall be set plumb and to the depths shown on the drawings. Backfill around posts/poles shall be concrete or hand-tamped earth as shown on the drawings. Posts/poles shall be temporarily braced until girders, plates, or other members are installed to maintain plumb alignment.

Handling and Storing. All timber and lumber stored at the site of the work shall be neatly stacked on supports at least 12 inches above the ground surface and protected from the weather by suitable covering. Untreated material shall be so stacked and stripped as to permit free circulation of air between the tiers and courses. Treated timber may be close-stacked. The ground underneath and in the vicinity of all stacks shall be cleared of weeds and rubbish. The use of cant hooks, peaveys, or other pointed tools, except end hooks, will not be permitted in the handling of structural timber or lumber. Treated timber shall be handled with rope slings or other methods which will prevent the breaking or bruising of outer fibers, or penetration of the surface in any manner.

Fasteners. Connections between wood members requiring bolts may be initially done with appropriately sized nails until such time as it is expedient to add the bolts, unless specified otherwise in the drawings. Bolts shall be added as soon as practicable, before the building is declared structurally sound, and before being accepted as complete. Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood. Holes for machine bolts shall be bored with a bit of the same diameter as the bolt. Appropriately sized washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with the wood.

Pressure treated wood does not hold nails as well as untreated because the preservatives act as a lubricant. Spiral or annular ring shank nails shall be used in these connections because they have a higher withdrawal resistance. Nails to fasten rafters, girders, cleats, scabs, wooden sidewalls, and/or braces to the pressure treated poles shall be 20d to 40d size or as specified on the drawings. Untreated framing members shall be fastened to each other with 16d to 20d nails. Examples include roof purlins to rafters, and tie-down cleats or braces to rafters or girders. Various galvanized metal fasteners, with appropriate joist or deck nails, may be used to facilitate assembly, as approved by the engineer.

Due to the corrosive nature of preservatives required after December 31, 2003, all bolts, washers, nuts, nails, and other hardware used in contact with treated wood shall be galvanized to meet ASTM Specifications A153 for fasteners and A653 Class G185 sheet metal for connectors, Type 304 or 316 (stainless) steel, or other type of material or coating as approved by the preservative manufacturer. Current information on specific fastener materials is available through links to the preservative manufacturers on the AWPA website at awpa.com. Aluminum should not be used in direct contact with treated wood.

Trusses. Trusses may be metal or wood and shall be designed to handle the roof loads specified in the construction details and shall be installed on the spacing compatible with the design. Trusses shall have a minimum of 12 inches of overhang, and more is advisable. Trusses may be pre-fabricated, manufactured trusses. Used wooden trusses will not be allowed unless a new truss certification is provided by a registered professional engineer.

Manufactured trusses will be installed in accordance with the manufacturer's instructions. All trusses will be of a design approved by a registered professional engineer. A copy of the truss certification shall be provided to the NRCS approving authority prior to truss installation.

Truss anchorage and associated supports shall be as shown on the drawings or other acceptable methods as approved by the engineer.

Roofing. Roofing shall be galvanized metal in standard lengths and widths and shall be of new quality (without holes, rust, etc.). Roofing material shall be minimum 29 gauge and be ribbed for strength. Roofing shall be installed in accordance with manufacturer's recommendations. If any other type of roofing material is desired, it must first be approved by the engineer. Nails used to attach roofing material to the purlins shall be lead-headed nails, aluminum nails with neoprene washers, or other type as approved by the NRCS approving authority.

Steel Reinforcement

Reinforcement steel and welded wire fabric shall be new, clean, and free of oil, grease, paints, and flakey rust. Steel bars for concrete reinforcement shall be deformed billet-steel bars, conforming to ASTM Specification A615, Grade 40 or 60. Welded wire fabric shall conform to the requirements of ASTM Specification A185.

Reinforcement steel shall be accurately placed as specified and secured in position in a manner which will prevent its displacement during placement of the concrete. If reinforcing steel is spliced, the splices shall provide an overlap equal to 30 times the diameter of the smaller bar in the splice and shall be tied at both ends of the splice. Steel reinforcement in concrete block walls shall be tied in place prior to laying the blocks. Dropping or placing required steel reinforcement into the holes of concrete blocks without properly overlapping and tying the steel together with the foundation steel is not acceptable. Field bending of steel will be permitted. Heating of steel for bending will not be permitted.

Reinforcement steel and welded wire fabric shall be suspended off the ground and other concrete contact surfaces by using scotches of concrete bricks, concrete blocks or pieces of blocks, wire stands, or other approved method prior to the placing of concrete. Scotches of stones, wood materials, earth, earth clods, clay bricks, scrap metal and other unapproved materials are not acceptable. During concrete placement welded wire reinforcement shall be pulled into the middle of the concrete or the position shown in the drawings. Unless otherwise specified, welded wire fabric shall be spliced by overlapping adjacent sections a minimum of six inches, or one full mesh plus 2 inches, whichever is greater. The splice length shall be measured from the center of the first transverse wire in one piece of fabric to the center of the first transverse wire in the lapped piece of fabric.

Concrete

Design Mix. The concrete mixture shall be no less than 5-bags-per-yard mix. The water content shall not exceed 6 gallons per bag of cement in the mixture; however, the concrete mixture may be a similar mix selected from the "Master Proportion" table in the "Standard Specifications for Highway Construction," 2002 Edition, State of Alabama Highway Department. Any mix selected shall have a designed minimum 28 day compressive strength of 3,000 pounds per square inch (psi). The concrete shall contain a standard known brand of Portland cement with washed sand and gravel. Clean water shall be used in the mix. Calcium Chloride and other chemical admixtures for concrete will not be accepted unless expressly specified in the drawings or specifications.

Consistency. The amount of water used in the concrete shall be the minimum necessary to obtain the required workability. The consistency of the concrete shall be such that it can be worked readily into the corners and angles of the forms and around reinforcement but without permitting the materials to segregate or excess free water to collect on the surface. The slump shall be between 2 and 5 inches as tested by "The Test for Slump for Portland Cement Concrete", ASTM Specification C143.

Fiber Reinforced Concrete. Fiber shall consist of 3/4 inch length virgin homopolymer polypropylene fibers, either the collated fibrillated type or the monofilament type. The minimum rate of application is 1.5 pounds of fiber per cubic yard of concrete.

The addition of fiber to a concrete mix may cause an apparent reduction in slump. However, no additional water shall be added to the mix to improve workability. If needed, a suitable plasticizer should be added to the concrete mix. During placement the fiber mix will generally require more effort and vibration to move the mix and consolidate it into the forms due to the lower slump nature. Properly controlled internal vibration is acceptable, but external vibration of the forms and exposed surfaces is preferable to prevent fiber segregation.

If welded wire fabric is omitted from concrete slabs and only fiber additives are used, contraction joint spacing will be reduced from a maximum of 30 feet to a maximum of 15 feet in any direction. Sawn joints shall be 1/4 of the slab's thickness in depth. Formed joints shall be of a keyway type. Smooth vertical joints through the slab are not permitted.

Fiber additives in concrete do not take the place of structural steel reinforcement. Where steel reinforcement is shown on drawings it shall be placed as shown.

Forms. Forms shall be of wood, steel, or other approved material. Forms shall be true to line and grade, mortar tight, and sufficiently rigid to prevent objectionable deformation under load. Form surfaces shall be smooth, free from irregularities, dents, sags, or holes when used for permanently exposed surfaces. Rods used for internal ties shall be so arranged that, when the forms are removed, metal will not be less than 1 inch from any concrete surface. Forms for walls and vertical sections 2 feet high and taller shall be stabilized with adequate tie rods, walers, cat-heads, and sufficient bracing to prevent shifting or movement of forms during placing of concrete.

Forms for exposed surfaces shall be coated with a non-staining form release agent that shall be applied before the concrete is placed. All excess release agent on the form surfaces and any on surfaces requiring bonding with concrete shall be removed.

All form removal shall be accomplished in such a manner as to prevent injury to the concrete. Forms for floor slabs and such work may be removed after a minimum of 24 hours. Forms for walls shall be left in place for a minimum of three days. All forms must be removed before final inspection of the work. All repair work must be done immediately after removal of forms.

Timing and Temperature. Concrete shall be placed within 1½ hours after introduction of water to the cement and aggregates. Concrete shall not be placed when the outside temperature is expected to fall below 40°F at the time the concrete is delivered and placed at the work site. Concrete shall not be exposed to freezing temperatures during the curing period. Concrete, when deposited in the forms during hot weather, will have a temperature not greater than 90°F at the time of placement. Ice may be used as a portion of the mixing water to control temperature provided all ice is melted in the mixing process. When the outside temperature reaches or exceeds 90°F., the concrete shall be placed within 45 minutes after batching.

Conveying and Placing. No concrete shall be placed until the approving official has given approval of the in-place subgrade, forms, reinforcing steel, and any other items involved or affected by the concrete placement.

Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods which will prevent segregation or loss of ingredients by using hoppers and chutes, pipes, or "elephant trunks". There shall be no vertical drop greater than 5 feet.

Unless otherwise authorized, all concrete shall be placed upon clean, damp surfaces free from frost, ice, standing and running water, and never upon soft mud, dried porous earth, or fill that does not meet specified compaction requirements. Soft mud or other unacceptable foundation material shall be removed and replaced with gravel or other approved material.

Concrete shall be deposited as close as possible to its final position in the forms. Concrete shall be thoroughly consolidated by rodding or mechanically vibrating the concrete in place supplemented by hand-spading and tamping to remove air voids. Vibrating equipment shall be used when pouring walls and other thin sections.

Concrete floor slabs may be placed at one time or may be poured in sections at different times. When steel reinforcement is specified for the floor slab, formed contraction joints shall be placed at intervals not to exceed 30 ft. in any direction unless otherwise specified. When steel is not used, joints shall be as specified in the section "Fiber Reinforced Concrete" of this standard. The formed edges of each section shall be keyed to lock the edges of adjacent sections together. The edge forms may be removable metal or wood forms having the required keyed shape or may be thin galvanized metal designed to be left in place. Smooth vertical edged joints will not be allowed.

Finishing. Defective concrete, honeycombed areas, voids left by the removal of tie rods, and unacceptable ridges left on concrete surfaces shall be repaired immediately after the removal of forms unless otherwise authorized and directed. Voids left by the removal of tie rods shall be reamed and completely filled with mortar.

Defective concrete shall be repaired by removing the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails or anchors. Excessive rubbing of formed areas will not be permitted. All

unformed surfaces of concrete, exposed in the completed work, shall have a wood float finish without additional mortar.

Curing. Concrete shall be prevented from drying for a curing period of at least 7 days after it is placed. All exposed surfaces of concrete shall be protected from the direct rays of the sun for at least these first 7 days. All concrete shall be cured by keeping continuously moist for the entire curing period, or until curing compound is applied. Moisture shall be maintained by sprinkling, flooding, fog spraying, or by covering with materials kept continuously moist such as canvas, cloth mats, straw, sand, polyethylene, or other approved material. Wood forms (except plywood) left in place during the curing period shall be kept wet. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

If a curing compound is used, two coats of it will be applied to all concrete surfaces except construction joints and surfaces to which other concrete will be bonded. The compound shall be sprayed on the 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. Curing compound shall meet the requirements of ASTM Specification C309, Type 2, white pigmented.

Landscaping and Vegetation

The area adjacent and in the immediate vicinity of the structure shall be shaped to blend with the natural surroundings and to complement the structure and work area around it. Shaping shall be in such a way as to drain or divert all overland and roof runoff safely from the structure and surrounding work area. All disturbed areas around the structure, including spoil areas, shall be vegetated and/or surfaced with gravel, chert, or some other acceptable covering as permitted by the NRCS approving authority. Spoil areas not used for farm traffic shall be vegetated.

Permanent vegetation will be established to the plant species and by methods prescribed by the approving official. All vegetating of disturbed areas will be done as critical area planting and shall include liming, fertilizing, seedbed preparation, seeding and mulching. Temporary vegetation may be used when conditions or seeding dates are not suitable for the establishment of permanent vegetation. Disturbed areas shall be mulched regardless of seeding dates.

If farm animals have access to the vegetated area, it will be appropriately fenced until vegetation is well established.