NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE GENERAL SPECIFICATION

WASTE STORAGE FACILITY

ROOFED SOLID WASTE STORAGE STRUCTURE

(No.)

CODE 313

SCOPE

This specification shall consist of the clearing, grubbing, excavation, backfill, other appurtenances and services required for the construction of roofed waste storage structure including 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 AgPDES and NPDES permits.

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.

PUBLIC AND PRIVATE UTILITIES

Utilities are defined to be public or private, overhead and underground power or communication lines, and any pipelines The landowner\operator\contractor shall conduct their own search and discovery for utilities in order to lessen or avoid potential damages, injuries or loss of life. During planning, the owner\operator should complete an OK-ENG-45 UTILITIES INVENTORY FORM to document known utilities in order to comply with State law prior to any ground disturbance and return it to a USDA-NRCS representative.

QUALITY CONTROL

Quality Control of all materials and construction procedures is the responsibility of the landowner and contractor. NRCS will make periodic review(s) of the work for the benefit of the agency which will include the final construction check.

FOUNDATION PREPARATION

The foundation area shall be cleared of all trees, logs, stumps, roots, brush, boulders, sod, and rubbish. All stumps, roots, and root clusters having a diameter of one inch or larger shall be grubbed out to a depth of at least two feet below subgrade elevation. The topsoil and sod shall be removed from all borrow and earthfill areas and stockpiled during construction to be spread on the completed dam, spillways and other disturbed areas.

Foundation surfaces shall be sloped no steeper than a ratio of 1-1/2 horizontal to 1 vertical. The foundation area shall be prepared to adequate moisture content and density, and the surface shall be thoroughly scarified, to allow for proper compaction and bonding of the first layer of fill material to the foundation.

All required excavations shall be dug to the lines and grades shown on the drawings. If they are suitable, excavated material may be used in the permanent fill.

Foundation areas shall be kept free of standing water prior to and during earthfill placement.

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.

EARTHFILL

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 workmanlike condition. The outer edges and slopes of the fill shall blend with the surrounding landscape and complement the structure built upon it.

Moisture Control. The moisture content of the fill material shall be adequate for obtaining 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.

As a minimum, the fill material shall contain enough moisture to be able to form a ball when squeezed in the hand that will not separate when tapped with a pencil. Dry foundation materials shall have moisture added to the top six inches to meet that required for fill material prior to placement of the first layer of fill.

CONCRETE

Design Mix. The concrete shall be good quality using sound and clean aggregates. A job or ready-mix concrete shall consist of approximately 1 part cement, 2 parts sand, and 4 parts coarse aggregate (1 ½ inch maximum size). The concrete shall contain a standard known brand of Portland cement with washed sand and gravel. Clean water shall be used in the mix. The water-cement ratio shall be no

more than 6 gallons of water to 1 - 80 pound sack of cement when dry aggregates are used. If the sand and gravel used is moist, the water shall be reduced to no more than 5 gallons per sack of cement. The design mix shall have a designed minimum 28 day compressive strength of 3,000 pounds per square inch (psi).

Consistency. All concrete is to consist of a workable mix that can be placed and finished in an acceptable manner. The concrete shall be delivered to the site and discharged completely into the forms within 1 ½ hours or before the drum of truck has revolved a total of 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates unless the concrete mix is designed with set retarder and is approved for use by the technician. 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.

Reinforcement. Reinforcement shall be placed as shown on the plans and shall be free of oil and other foreign matter such as loose coatings of rust, scale, or dirt. 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 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. 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. The reinforcement shall be tied in place so that it is no closer than 2 to 2½ inches from the finished surface of the concrete. Slab reinforcement shall rest on the horizontally projecting legs of the vertical bars.

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.

Welded wire or fiber reinforcement can be used for concrete pads or floors as shown on the standard drawing when applicable. See the Fiber Reinforced Concrete section below for more details.

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 the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the 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.

Slabs and Floors. When specified, a layer of sand or fine gravel shall be placed between the bottom of concrete slabs and subgrade. On moderately to high shrink/swell soils a minimum of a 4” layer of 3/8 inch crushed rock or concrete sand may be specified under concrete slabs for a base, it shall be saturated to consolidate the sand or crushed rock base. The material shall be free of organic material, excess fines, and rock larger than 3/8 inch in size.

Isolation or expansion joints shall be installed when a concrete slab is poured against something that could be affected by shrinkage or swelling of the concrete slab. Examples include but are not limited to water tanks and troughs, existing slabs, building walls, support columns or conduits. Isolation joints are formed by placing preformed joint material next to the column or wall or standpipe prior to pouring the slab. Isolation joint material should go all the way through the slab, starting at the sub-base, but should not extend above the top. Isolation Joint materials range from inexpensive asphalt-impregnated fiberboard to cork to closed cell neoprene. For a cleaner looking isolation joint, the top part of the preformed filler can be cut off and the space filled with elastomeric sealant.

Concrete floor slabs may be placed at one time or may be poured in sections at different times. When the entire area to be surfaced can’t be poured at one time, construction joints shall be used. When the slab will have no significant traffic crossing the joint, a plain butt joint, with no reinforcement crossing the joint, is acceptable. For a plain butt joint the bond area between the separate pours shall be left un-troweled and shall be thoroughly cleaned to insure a good bond between the two pours. When the slab is design to handle vehicular traffic, equipment or other non-foot traffic loading, a construction joint with load transfer capabilities will be required.

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 specification. 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.

Contraction or crack control joints shall be required in all concrete slabs greater than 100 square feet, greater than 10 feet in length or as specified on the drawings. Contraction joint spacing shall be no more than 10 feet. Cut the control joints to a depth of 25% of the depth of the slab. Contraction joints

may be cut into fresh concrete using a grooving tool or zip strip. Contraction joints can also be saw cut into hardened concrete as soon as possible after the concrete hardens. In hot weather the concrete may crack if joints are not cut within 6 – 12 hours after finishing.

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 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.

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.

FABRICATION AND INSTALLATION

Above ground timber structures, shall be constructed on a firm foundation to the lines and grades shown on the plans. Dimensions and spacing shown on the plans and drawings are minimum requirements for the wind and snow loads. These dimensions and spacing may be altered if the result is a stronger structure, with prior approval of the engineer. In no case will the dimensions and spacing 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. 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 must be pre-fabricated, manufactured trusses.

Manufactured trusses will be installed in accordance with the manufacturer's instructions. All trusses will be of a design approved by a professional engineer registered in Oklahoma. 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 new material. 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.

COMPACTED EARTH FLOOR

Suitability. Compacted earth floors are suitable in roofed waste storage facilities if the soil is relatively impervious layers of compacted soil that will reduce seepage losses to an acceptable level. A compacted earth floor for a roofed waste storage facility can be constructed in several ways. A simple method of compacted earth floor for a waste storage structure is to improve a layer of the soils at the excavated grade by disking, watering, and compacting the soil to a thickness indicated.

Compaction. Compaction is often the most economical method for constructing the earth floor if suitable soils are available nearby or if soil in place at finish grade of the floor can be reused to construct an impervious earth floor. If the available soils cannot be compacted to a density and water content that will produce an acceptably low permeability, several options are available.

When constructing a compacted earth floor with imported soil material the construction equipment shall be operated over each layer of fill to insure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction.

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.