

AGRICHEMICAL HANDLING FACILITY CONSTRUCTION SPECIFICATIONS

SCOPE

This specification consists of the clearing, grubbing, excavation, backfill, concrete, forms, reinforcing steel, timber, trusses, sheet metal, fasteners, other appurtenances and services required for the construction of agrichemical handling facilities and the disposal of all cleared and excavated materials. Conduct construction 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.

Construct all structures 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 and current industry standards. Obtain approval from the design engineer before making any deviation from the approved drawings and specifications.

SPECIFICATIONS

Clearing and Grubbing

Remove all trees, brush, stumps, boulders, and rubbish from the foundation and spoil area(s) before excavation is performed. Dispose of all material cleared from the area by burning or burying on-site or hauling to an appropriate landfill. Conduct all burning in conformance with state and federal laws and regulations. Cut trees and other cleared vegetation flush with the ground surface in spoil areas. Remove all stumps, roots, and vegetation from the foundation area. The general area around the building 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

Stockpile topsoil excavated from the site for later placement around the completed structure. Remove soils containing excessive organic material from the foundation area. Complete the completed excavation and placement of spoil material 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, place and spread spoil to blend with the existing terrain of the spoil area. Divert runoff from outside drainage areas from the excavation area.

Support as necessary excavated surfaces too steep to be safe and stable to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. Increase the width of the excavation as necessary to provide space for sheeting, bracing, shoring, and other supporting installations. When the work is completed, remove such supporting installations.

Fill

Placement – Use sandy clay or clayey sands and gravels free of detrimental amounts of sod, roots, large stones, and other objectionable material for earth material placed for pads, flooring, or foundations. Avoid using highly plastic clay soils.

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-inch loose thickness unless otherwise specified. Place these layers in reasonably uniform thickness 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.

Moisture Control - Use fill material with a moisture content sufficient for the required compaction. Moisten fill material, which is too dry, by adding water or by thoroughly mixing with moist fill until an acceptable moisture level is obtained. Dry fill material, which is too wet, by allowing it dry naturally or by disking or thoroughly mixing with dry fill material until an acceptable moisture level is obtained.

Maintain the moisture content of the fill within the limits to:

1. Prevent bulking or dilatence of the material under the action of the hauling or compacting equipment.

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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

Construct the agrichemical handling facility 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 25-year 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. Construct all framing to be true and exact. Accurately cut timber \ and assemble to a close fit.

Use appropriate bracing for safety and structural stability during construction.

Wood and Timber – Use new, sound wood, free from decay. Use dense, structural quality timber beams graded in accordance with the Standard Grading Rules for Southern Pine Lumber. Unless otherwise specified, furnish all timber and lumber in American Standard dressed sizes. All sizes specified are nominal sizes.

Use pressure treated material for all structural timber, posts, poles, and lumber, except roof girders, rafters, purlins, trusses, knee braces, and attic bracing. Use treated timber and lumber impregnated with the specified type and quantity of preservative and conforming to Federal Specification TT-W-571i. Use a minimum net retention of the common preservative, chromated copper arsenate, of 0.4 lbs/cf (pcf) for dimension lumber used above ground and 0.6 pcf for structural posts or timbers in contact with the ground. Lumber used for walls storage areas may be treated to a 0.25 pcf level.

Set posts and poles plumb and to the depths shown on the drawings. Backfill around posts/poles using concrete or hand tamped earth as shown on the drawings. Temporarily brace posts/poles until girders, plates, or other

members are installed to maintain plumb alignment.

Handling and Storing – Neatly stack all timber and lumber stored at the work site on supports at least 12 in. above the ground surface and protect the material from the weather by suitable covering. Stack and strip untreated material to permit free circulation of air between the tiers and courses. Treated timber may be close-stacked. Clear the weeds and rubbish from the ground underneath and in the vicinity of all stacks. Do not use cant hooks, peaveys, or other pointed tools, except end hooks, in the handling of structural timber or lumber. Handle treated timber 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 must be added as soon as practicable, before the building is declared structurally sound, and before being accepted as complete. Drive nails and spikes with just sufficient force to set the heads flush with the surface of the wood. Bore holes for machine bolts with a bit of the same diameter as the bolt. Use appropriately sized washers in contact with all bolt heads and nuts that would otherwise be in contact with the wood.

Pressure treated lumber does not hold nails as well as untreated lumber because the preservatives act as a lubricant. Use spiral or annular ring shank nails in these connections because they have a higher withdrawal resistance. Use 20d to 40d size or as specified on the drawings nails to fasten rafters, girders, cleats, scabs, wooden sidewalls, and/or braces to the pressure treated poles. Fasten untreated framing members 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. Use galvanized bolts, washers, nuts, nails, and other hardware, where the hardware will be exposed to rain or chemicals unless otherwise specified.

Trusses – Design trusses to handle the roof loads specified in the construction details and install them on the spacing compatible with the design. Require a minimum of 12 in. of overhang for all trusses. 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.

Install manufactured trusses in accordance with the manufacturer's instructions. Use only trusses with a design approved by a registered professional engineer. Provide a copy of the truss certification to the NRCS approving authority prior to truss installation.

Use truss anchorage and associated supports as shown on the drawings or other acceptable methods as approved by the engineer.

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

Steel Reinforcement

Use new, clean reinforcing steel and welded wire fabric which is free of oil, grease, paints, and flaky rust. Use deformed billet-steel bars, conforming to ASTM Specification A-615, Grade 40 or 60 for concrete reinforcement. Use welded wire fabric which conforms to the requirements of ASTM Specification A-185.

Accurately place reinforcing steel as specified and secure the steel in position in a manner which will prevent its displacement during placement of the concrete. If reinforcing steel is spliced, provide splices with an overlap equal to 30 times the diameter of the smaller bar in the splice and tie at both ends of the splice. Tie steel reinforcement in concrete block walls 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. Tack welding of steel will not be permitted.

Suspend reinforcing steel and welded wire fabric off the ground and other concrete contact surfaces by using supports of concrete bricks, concrete blocks or pieces of concrete blocks, wire stands, or other approved method prior to the placement of concrete. Supports of stones, wood materials, earth, earth clods, clay bricks, scrap metal and other unapproved materials are not acceptable. During concrete placement, pull welded wire reinforcement into the middle of the concrete or the position shown in the drawings. Unless otherwise specified, splice welded wire fabric in the following manner:

Splice adjacent sections by overlapping a minimum of six inches, or one full mesh plus two inches, whichever is greater. Measure the splice length 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 – Use a concrete mixture that meets the following requirements:

- no less than five bags of cement per cubic yard of concrete.
- water content that does not exceed 6 gallons per bag of cement in the mixture.
- a designed minimum 28-day compressive strength of 4,000 pounds per square inch (psi).
- a standard brand of portland cement that meets the requirements of ASTM C 150.
- Fly ash may be used as a partial substitution for portland cement in an amount of no more than 25 percent (by weight) of the cement in the concrete mix, unless otherwise specified. Fly ash shall conform to the requirements of ASTM C 618, Class C or F.
- Fine and coarse aggregates that are clean and free of any deleterious substances in amounts in excess of those allowed by ASTM C 33.
- Clean water

- Set retarding admixtures meeting the requirements of ASTM C 494 in amounts as recommended by the manufacturer to retard the setting time for use in hot weather.
- Do not use calcium chloride and other chemical admixtures for concrete, unless expressly specified in the drawings or specifications.

Consistency – Use the minimum amount of water in the concrete necessary to obtain the required workability. Use concrete with a consistency such that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting the materials to segregate or excess free water to collect on the surface. Use concrete with a slump between 2 and 5 inches as tested by "The Test for Slump for Portland Cement Concrete", ASTM Specification C-143.

Fiber Reinforced Concrete – Use fiber that consists of 3/4" length virgin homopolymer polypropylene fibers, either the collated fibrillated or monofilament type. Use a minimum rate of application of 1.5 lbs. of fiber per cubic yard of concrete.

The addition of fiber to a concrete mix may cause an apparent reduction in slump. However, do not add additional water to the mix to improve workability. If needed, add a suitable plasticizer meeting the requirements of ASTM C 1017 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, reduce contraction joint spacing from a maximum of 30 ft. to a maximum of 10 ft. in any direction. Saw joints 1/4 of the slab's thickness in depth. Use keyway type formed joints. 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, place it as shown.

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

Coat forms for exposed surfaces with a non-staining form release agent applied before the concrete is placed. Remove all excess release agent on the form surfaces and any on surfaces requiring bonding with concrete.

Remove all form removal 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. Leave forms for walls in place for a minimum of three days. Remove all forms before final inspection of the work. Complete all repair work immediately after removal of forms.

Timing and Temperature – Complete placement of concrete within 1-1/2 hours after introduction of water to the cement and aggregates. Do not place concrete when the outside temperature is expected to fall below 40°F at the time the concrete is delivered and placed at the work site. Do not expose concrete 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, complete placement of the concrete within 45 minutes after batching. When a set retarding admixture is used in accordance with the Design Mix section above, the time for placement may be extended, as approved by the engineer, in accordance with the manufacturer's recommendations.

Conveying and Placing – Do not place any concrete 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.

Convey concrete 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." Do not allow vertical drops greater than 5 feet.

Unless otherwise authorized, place all concrete on clean, damp surfaces free from frost, ice, standing and running water, and never on soft mud, dried porous earth, or fill that does not meet specified compaction requirements. Remove soft mud or other unacceptable foundation material and replace it with gravel or other approved material.

Deposit concrete as close as possible to its final position in the forms. Thoroughly consolidate concrete by rodding or mechanically vibrating the concrete in place and supplement the consolidation by hand-spading and tamping to remove air voids. Use vibrating equipment 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, place formed contraction joints at intervals not to exceed 30 ft. in any direction unless otherwise specified. When steel is not used, install joints as specified under Fiber Reinforced Concrete. Key the formed edges of each section to lock the edges of adjacent sections together. The edge forms may be removable metal or wood 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 – Repair defective concrete, honeycombed areas, voids left by the removal of tie rods, and unacceptable ridges left on concrete surfaces immediately after the removal of forms unless otherwise authorized and directed. Ream and completely fill with mortar all voids left by the removal of tie rods.

Repair defective concrete by cutting out the unsatisfactory material and placing new concrete, secured with keys, dovetails or anchors. Excessive rubbing of formed areas will not be permitted. Finish all unformed surfaces of concrete, exposed in the

completed work, with a wood float finish without additional mortar.

Curing – Prevent concrete from drying for a curing period of at least 7 days after it is placed. Protect all exposed surfaces of concrete from the direct rays of the sun for at least these first 7 days. Cure all concrete by keeping it continuously moist for the entire curing period, or until curing compound is applied. Maintain moisture 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. Keep wood forms (except plywood) left in place during the curing period wet. Thoroughly wet formed surfaces immediately after forms are removed and keep them wet until patching and repairs are completed. Apply water or covering in such a way that the concrete surface is not eroded or otherwise damaged.

If a curing compound is used, apply two coats of it to all concrete surfaces except construction joints and surfaces to which other concrete will be bonded. Spray the compound on the moist concrete surfaces as soon as free water has disappeared, but do not apply to any surface until patching, repairs, and finishing of that surface are completed. Use curing compound that meets the requirements of ASTM Specification C-309, Type 2, white pigmented.

Landscaping and Vegetation

Shape the area adjacent and in the immediate vicinity of the structure to blend with the natural surroundings and to complement the structure and work area around it. Perform shaping in such a way as to drain or divert all overland and roof runoff safely from the structure and surrounding work area. Vegetate or apply heavy use area treatment on all disturbed areas around the structure, including spoil areas. Vegetate spoil areas not used for farm traffic.

Establish permanent vegetation to the plant species and by methods prescribed by the approving official. Conduct all vegetation operations on disturbed areas as critical area planting and 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.

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Mulch disturbed areas regardless of seeding dates.

If farm animals have access to the vegetated area, appropriately fence the area until vegetation is well established.