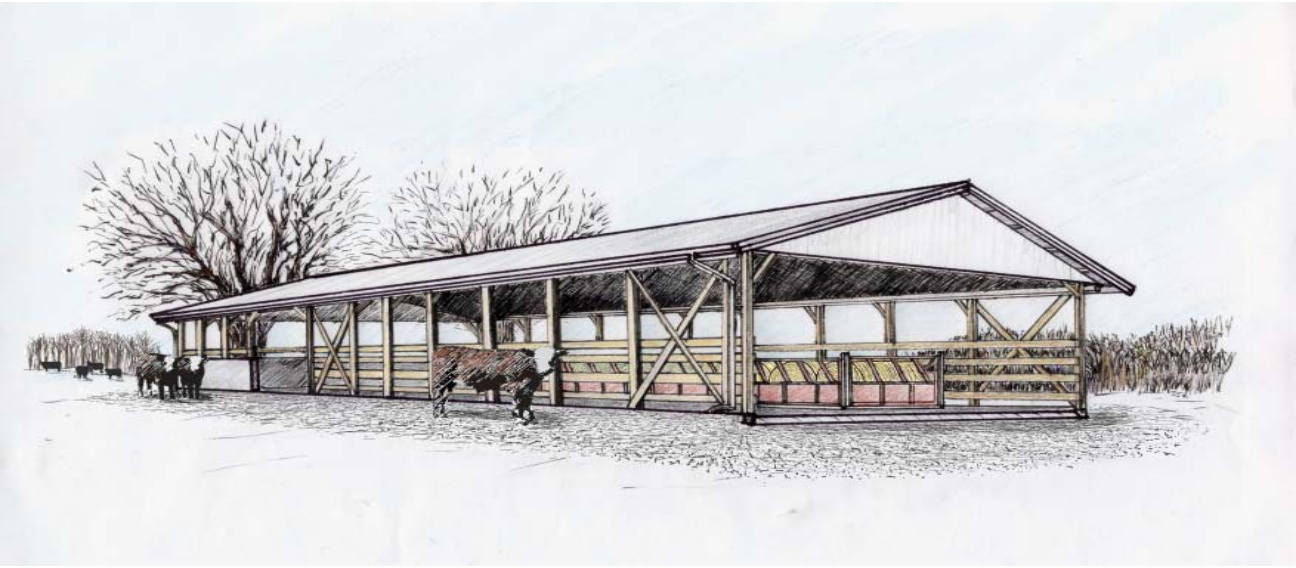
Livestock Winter Feeding Stations



A FEED AND WASTE MANAGEMENT STRUCTURE DESIGNED TO IMPROVE WATER QUALITY

2004

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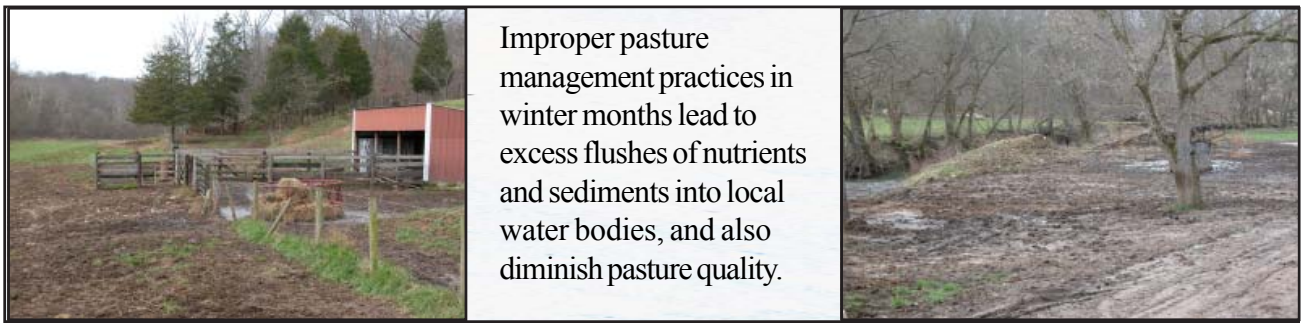
Funding for this project has been provided by the Illinois Environmental Protection Agency, Bureau of Water; Section 319 program, agreement number 3190203. Technical assistance provided by USDA NRCS. Document prepared by the Southwestern Illinois RC&D, Inc. The Southwestern Illinois RC&D, Inc./NRCS is an equal opportunity provider and employer. Document printed on recycled material. Cover drawing sketch: Jenny Reiman

Winter Feeding Stations Overview

" Feed and waste management structures, specially designed to reduce sedimentation and nutrient runoff."

Snow, ice and frequent freeze thaw cycles provide a special challenge to Illinois livestock producers. These factors often severely impact access around a farm in winter and early spring months, forcing farmers to feed livestock in more confined areas. The resulting impact on vegetation increases the opportunity for soil erosion, while also increasing the concentration of manure within specific areas of the farm.

Snowmelt and heavy spring rains often compound erosion issues caused by concentrated livestock, and also flush build-ups of manure, which has accumulated over the winter, into local water bodies. Both sedimentation and high levels of nutrients are potentially harmful to aquatic life in the water bodies and also to human users of the water.



Improper pasture management practices in winter months lead to excess flushes of nutrients and sediments into local water bodies, and also diminish pasture quality.

Winter feeding stations are facilities specially designed to allow for the feeding of livestock in combination with the safe storage of manure. When implemented with properly developed nutrient management plans, grazing management plans as well as overall operation plans for the facility, livestock producers can significantly reduce the amount of sediment and excess nutrients entering local water bodies.

Through the use of heavy use perimeters (geotextile fabric, aggregate) in combination with concrete floors in the feeding and manure storage areas, erosion is significantly reduced. In addition, manure is stored "under roof", so that it can be safely applied to fields in times that it can best be utilized by forages or crops.

Units are available in two sizes, 30-head and 60-head, to meet the needs of your particular farm. Facilities in excess of 60-head are encouraged to construct multiple units rather than increase the size of existing plans. Other details include:

- Holds 5-7 days of feed (both 30 & 60 head units)
- 20% reduction in wasted hay
- Stores 90-120 days of waste (both 30 & 60 head units)
- Gutters and downspouts reduce stormwater runoff & directs it away from unit
- Capable of holding watering facilities
- Better herd health

This facility can be cost-shared through the federally funded Environmental Quality Incentives Program (EQIP) when included as a component of a comprehensive grazing plan. Please visit with staff at your local Soil & Water Conservation District/NRCS field office, regarding the development of a winter feed station on your farm.

Structure Development – Engineering

In general, winter feed stations are semi open-sided, covered structures with concrete floors. Livestock has access to one end, which is fitted with a frost-proof water tank and hay panels. The center section is open to allow for manure load out, and the remaining end is enclosed on three sides with a four-foot (above-grade) concrete wall for manure storage. The perimeter of the unit is protected with a heavy use area, and gutters, downspouts and drain tile are utilized to properly drain stormwater away from the structure.


60-head Unit

When correctly designed and developed on a site, winter feed stations will reduce contamination of nearby water bodies. The concrete floors in conjunction with the heavy-use protection area reduce erosion and sedimentation, which are common occurrences in the winter feeding of livestock. In addition, the design of the unit retains manure, while shedding rainfall, thereby reducing the amount of nutrients that are flushed into local water bodies.


30-head Unit with concrete heavy-use area

The initial step in the development of a winter feeding station for your facility is to contact staff at your local Soil & Water Conservation District/ NRCS field office, who will assist in locating the structure on your property, in accordance with approved grazing management practices, and will also assist, when applicable, in applying for cost-share matching funds through an appropriate program, such as “EQIP”.

The Illinois state office of USDA NRCS has developed an approved set of plans for these structures, as depicted on pages nine (9) through nineteen

(19) of this document. However, as periodic updates to the plans are anticipated, landowners should seek guidance as to the most current design. **Landowners should NOT construct units based solely on the enclosed drawings!**

Unlike other structures designed specifically for waste storage, due to the seasonal nature of these facilities, state permits are often not needed. However this topic should be fully researched prior to beginning construction of the unit(s). Local or county permits are generally required for the building of these structures and should be obtained prior to construction. Please note that a truss design, prepared by a Certified Truss Manufacturer, is normally required to obtain a local or county permit.

Working plans have been developed for two sized units, 30-head (32' x 54') and 60-head (32' x 98'), or approximately 50 square feet of structure per animal unit (1,000 pounds of live weight). Producers should use the size most closely matching the maximum size of their herd. In the event that their herd exceeds 60 animal units, multiple structures should be constructed rather than attempting to enlarge existing plans.

Components necessary to fabricate the winter feed station include: trusses, girders, posts, purlins, bolts, nails, bracing, roofing materials, guttering, siding for gable ends, steel reinforcement bars and concrete. In addition, the heavy-use protection area, which surrounds entrances to the unit, requires geotextile fabric as well as course and fine aggregate.

Placement of Structures

As with the development of any structure, proper placement on the landscape will help ensure future success. When considering where to place a winter feed station, a number of factors must be taken into consideration, including:

- Grazing Management Plan
- Utilities
- Surface Water Flow
- Winter Access

NRCS will assist you in developing a Prescribed Grazing Plan (528A), which in addition to assisting in locating a site for your winter feed station, will also meet one or more of the following purposes:

1. Improve or maintain the health and vigor of key plant species and to maintain a stable and desired plant community.
2. Provide or maintain food and shelter for animals of concern.
3. Improve or maintain animal health and productivity.
4. Maintain or improve water quality and quantity through manure management and erosion control.
5. Reduce accelerated soil erosion and maintain or improve soil condition for sustainability of the resource.

Utilities to the facility are generally NOT cost-shared under programs such as EQIP, and fall to the responsibility of the producer. Although not depicted on the enclosed plans, producers should install a frost-proof water tank adjacent to the feeding area. This item has been intentionally omitted from the enclosed plans as it is recommended that producers follow manufacturers instructions for installation. Posts and planking should be in-place to keep livestock from accessing the tank from the heavy –use protection area. Electricity to the unit is generally not required, however if readily available, could be useful in keeping livestock from accessing and bedding in the manure storage area.

It is important to have surface water flow away from these units; so placement on a low ridge is preferable, if available. Your NRCS staff will be able to review your site and advise of additional practices that might complement your winter feed station, including fencing, berms, filter strips and stream crossings. By addressing the general landscape as a whole, rather than just the immediate site, a greater benefit will be achieved in both water quality and environmental stewardship. Additional practices may be a requirement for eligibility for cost-share funds.

A final, and very critical concern when considering locations for a winter feed station is accessibility in the winter. Typically these units can be "stocked up" with feed prior to a storm, but access will still be required every few days. A hard-surfaced road will therefore be required to the unit. This road will also become important in the spring as you work to distribute manure that has been stored over the winter months.

Construction

It is again important to reiterate that these units should be built following guidelines provided in approved construction plans for your facility provided by USDA NRCS. The attached construction plans have been developed in accordance with USDA NRCS Code 313 *Construction Specifications for Waste Storage Facility*, and will ensure that the end product will be beneficial to your operations, as well as the environment.

In 2002, Southwestern Illinois RC&D, Inc. received a grant through the Illinois Environmental Protection Agency, Bureau of Water; Section 319 program, (agreement number 3190203), to develop a demonstration project within Southwestern Illinois. Over the next 18-months a total of three units were constructed within the region, including two 60-head units and one 30-head unit. In each case the producers chose to construct their own units, as a mechanism for meeting the grant's matching requirements, rather than paying a contractor to construct the unit. Figures for both labor and materials that are included within this document are reflective of costs associated with the project in years 2003 and 2004 in Southwestern Illinois.

In general, producers wishing to construct one of these units would require some degree of construction knowledge if taking the project on without the assistance of a professional contractor. Equipment required for the project would include a highlift or dozer, backhoe, front-end or skid loader, power

compactor, concrete forms, concrete finishing tools, rebar bending equipment, framing tools, boom lift and rolling scaffolding.

USDA NRCS Code 313 *Construction Specifications for Waste Storage Facility* as well as the construction plans for the winter feed station provide much of the guidance required for constructing these units. Features that are not found on the plans, which should be considered, are the watering unit, manure storage area exclusion (keeping livestock from entering the manure storage area) and the hay panels. The first two issues have been addressed on page 5 & 6, and the third issue, the hay panels will be addressed here.

For this project, panels specifications included, 14-gauge, 2" diameter steel with a powder coat finish, with a “z” bar design that keeps calves out of the feeders. Panels should connect together. Producers either placed 4" x 4" pressure-treated posts into the concrete to keep the gates from shifting, or screwed flanges to the floor to secure the posts.

Producer has added a feeder at the end of the hay panels. The facility will hold 5-7 days worth of hay, and having the hay under-cover results in up to a 20% reduction in hay loss.

Producer has raised the feeding area to keep manure out of the hay.

Left - Posts secured to the concrete keep panels from shifting.

Right – Rolled curbing at entrances keeps manure from leaving the building.

Gates are utilized to restrict access at certain entrances.

Budget

Averaged construction costs for the demonstration project include:

	Actual
30-Head Unit	
Building Materials	$7,000
Concrete	$3,020
Aggregate Material	$800
Hard Goods	$1,200
Labor	$9,980
Total 30-Head Unit	**$22,000**
60-Head Unit	
Building Materials	$8,500
Concrete	$7,200
Aggregate Material	$900
Hard Goods	$2,000
Labor	$13,400
Total 60-Head Unit	**$32,000**

* Amounts indicated are reflective of material costs in 2003/2004, some of which are inflated due to the price of metal.

* Most labor was performed “in-kind” by landowners at the following rates: Foreman - $23.91/hour; laborer $20.70/hour.

This manure storage area will hold 90-120 days of waste. Gates, electric fence, or other means should be in place to keep livestock from feeding in the manure storage area.

The heavy-use area extends 10’ from entrance areas and consists of geotextile fabric, 6" of base course material and 2" of surface aggregate.

Plan Cover Sheet

LIVESTOCK WINTER FEEDING STATION

CODE 313

LANDOWNER –

COUNTY, ILLINOIS

USDA–NATURAL RESOURCES CONSERVATION SERVICE

INDEX

SHEET	DESCRIPTION
1.	Cover Sheet
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4.	Floor Plan 60 Animals
5.	Roof And Truss Details Of Covered Feeding Area
6.	Post And Floor Details Of Covered Feeding Area
7.	Roof And Truss Details Of Covered Stack Pad
8.	Post, Floor, And Wall Details Of Covered Stack Pad
9.	Nail, Bracing, And Purlin Details
10.	Optional Side Entrance Details
11.	Curb And Floor Details

Note:
Underground utilities present are the responsibility of the landowner and the contractor.

JOB CLASS _____

Sheet 1 of 11	File No. IL-ENG-190A Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION COVER SHEET	Date Designed Drawn M. QUINONES 11/04 Checked Approved

Plan View

ESTIMATED QUANTITIES			
Number Of Animals		**30**	**60**
Dimensions	Stacking Area Floor Length	12'	24'
	Feeding Area Floor Length (Includes Front Rolled Curb)	42'	74'
Posts	Stacking Area Columns 6"x 6"x 15' -0" No.	14	8
	Feeding Area 6"x 6"x 15'-0" No.	4	4
Concrete (3500 PSI)	Stacking Area Walls & Footings, Cu.Yd.	14	20
	Slab, Cu.Yd.	6	12
	Feeding Area Curb Walls & Rolled Curbs, Cu.Yd.	5	7
	Slab, Cu.Yd.	20	36
	Total Concrete, Cu. Yd. (Excludes Concrete Around Posts)	45	75
Wire Mesh	6"x 6"x 10/10 Gauge, Sq. Ft.	1600	3100
Reinforcing Steel	Entrance Footer #4 L Bar, 8"x 15" , No.	28	28
	Entrance Footer #4 Straight, 17'-6" No.	10	10
	Rolled Curb #4 Straight, 14'-6"	2	2
	Rolled Curb #4 Straight, 1'-4"	22	22
	Feeding Area Curb Walls #4 L Bar 1'-3"x 1'-6"	36	84
	#4 Straight, 7'-3", No.	18	42
	Stacking Area, Footing/Walls #5 L Bar, 7'-0"x 12", No.	72	100
	#5 Straight, 21'-6"	72	100
	Stacking Area #5 Straight In Side Walls 12'-2"	18	——
	Stacking Area #5 Straight In Side Walls 13'-0"	——	36
	Stacking Area #5 Straight In End Wall 18'-0"	18	18
Truss	Truss No.	10	25
Roofing Material	Roofing (29 ga. galv.) Sq. Ft.		
	Roof Cap Lin. Ft.		

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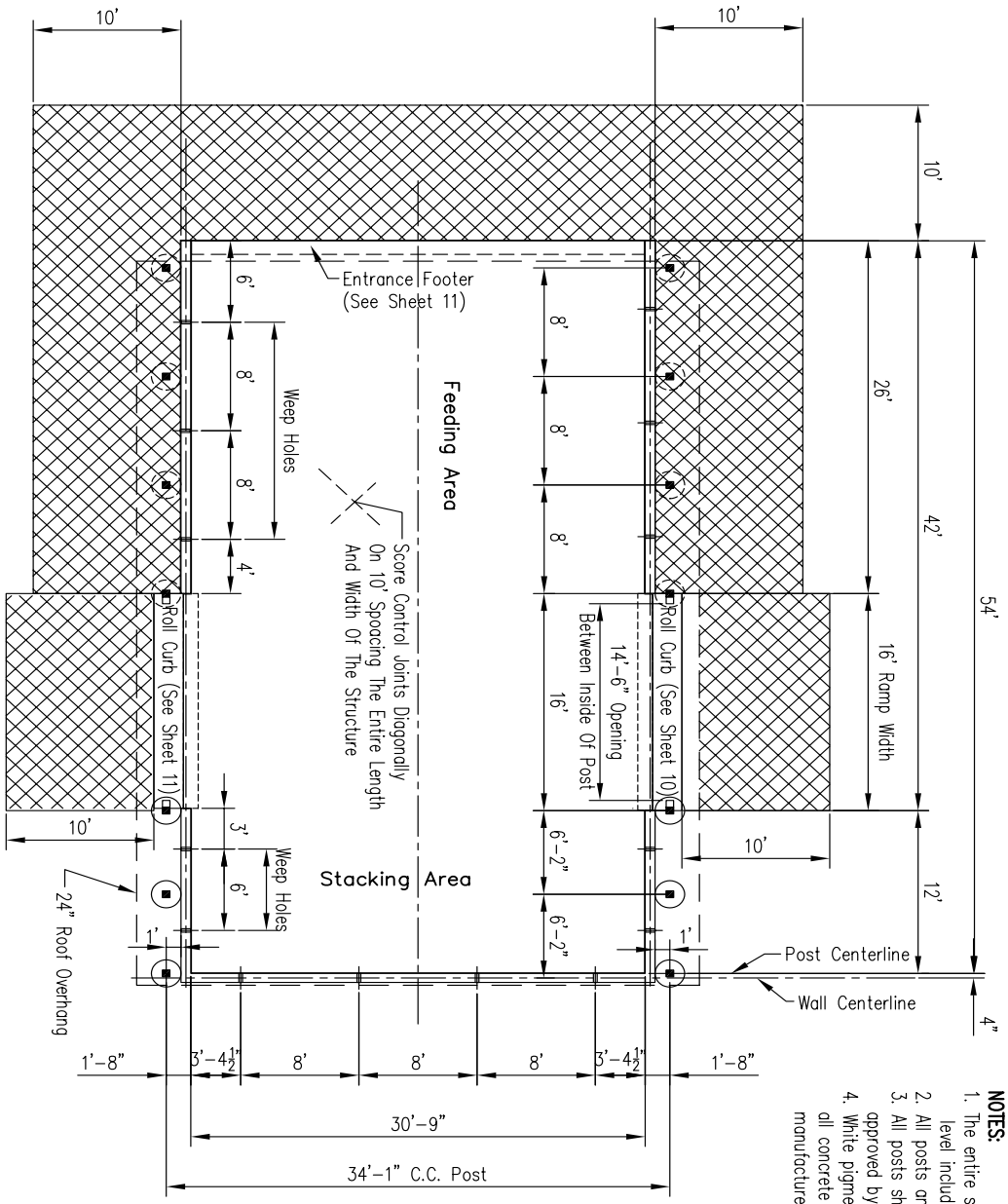
LIVESTOCK WINTER FEEDING STATION
PLAN VIEW

Date
Designed
Drawn M. QUINONES 11/04
Checked
Approved

File No. IL-ENG-190B
Drawing No.

Sheet 2 of 11

Floor Plan - 30 Animals



LEGEND

- □ 6"x6"x15' Pressure Treated Entrance Post
- ■ 6"x6"x15' Pressure Treated Building Post
- Weep Hole
- Heavy Use Area (See Sheet 6)

NOTES:

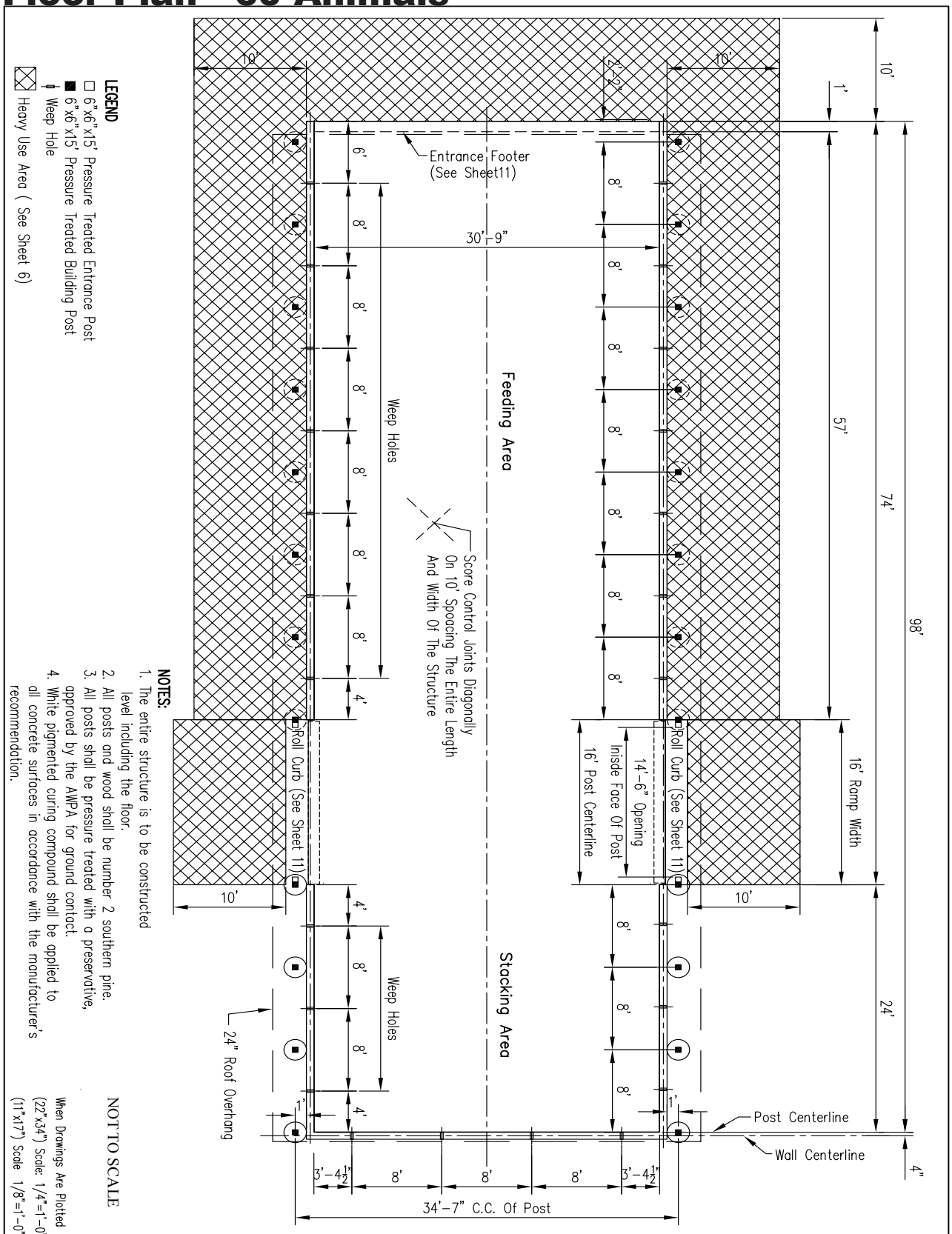
1. The entire structure is to be constructed level including the floor.
2. All posts and wood shall be number 2 southern pine.
3. All posts shall be pressure treated with a preservative, approved by the AWPA for ground contact.
4. White pigmented curing compound shall be applied to all concrete surfaces in accordance with the manufacturer's recommendation.

NOT TO SCALE

When Drawings Are Plotted
(22"x34") Scale: 1/4"=1'-0"
(11"x17") Scale 1/8"=1'-0"

Sheet 3 of 11	File No. IL-ENG-190C Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION FLOOR PLAN 30 ANIMALS	Date Designed Drawn M. QUINONES 11/04 Checked Approved

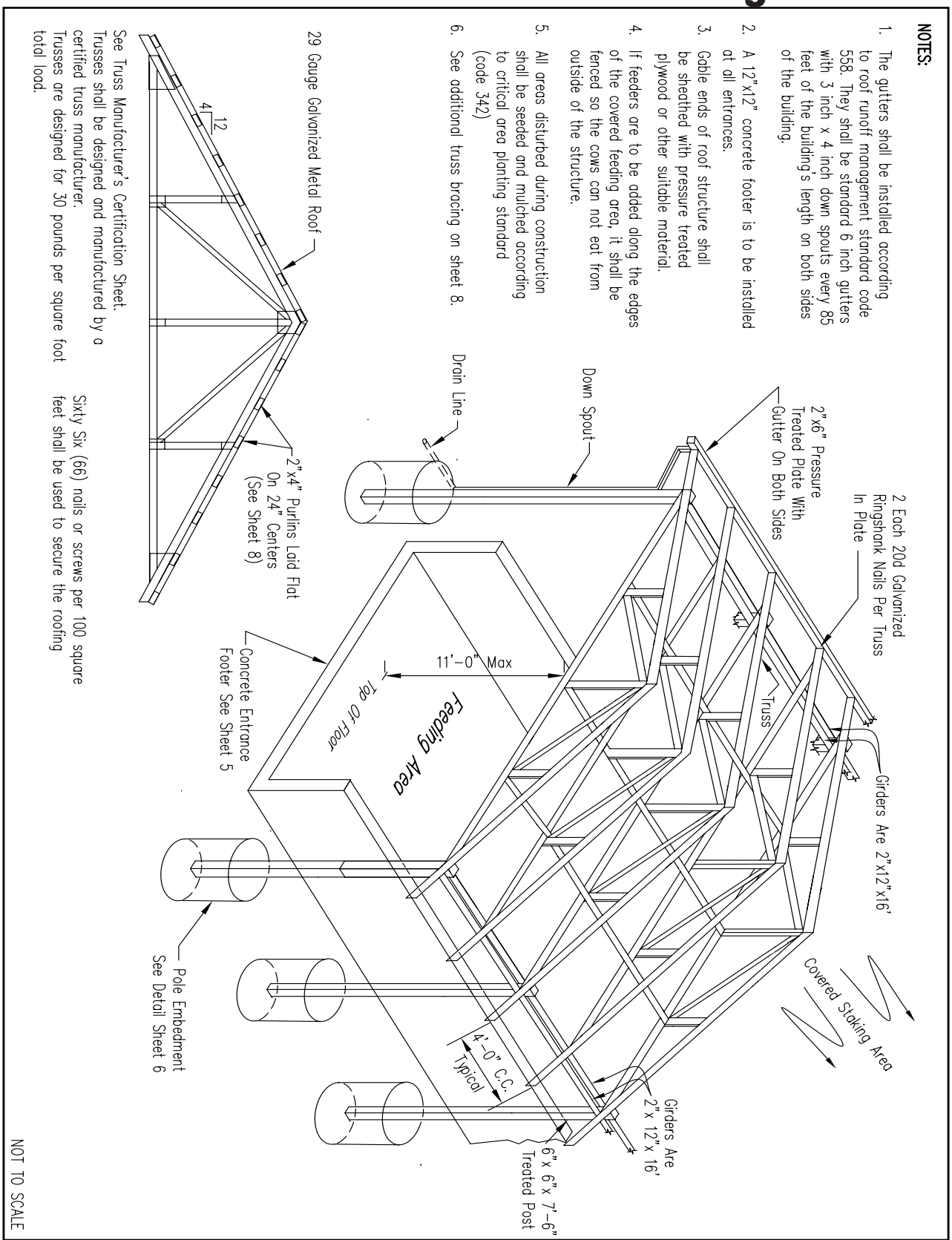
Floor Plan - 60 Animals



Sheet 4 of 11	File No. IL-ENG-190D Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION FLOOR PLAN 60 ANIMALS

	Date
Designed	
Drawn M. QUINONES	11/04
Checked	
Approved	

Roof & Truss Details - Covered Feeding Area



Sheet 5 of 11	File No. IL-ENG-190E Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION ROOF AND TRUSS DETAILS OF COVERED FEEDING AREA

	Date
Designed	
Drawn	M. QUINONES 11/04
Checked	
Approved	

Post & Floor Details - Covered Feeding Area

POST EMBEDMENT DETAIL
BELOW HEAVY USE AREA

POST EMBEDMENT DETAIL

NOTES:

1. Install footers at entrances only.
2. Fiber mesh may not be desirable in feeding area.
3. If fiber mesh is used it shall be added to the concrete at a rate of 1.5 lbs per C.Y.
4. The concrete shall be 3500 psi.
5. Fiber Mesh does not replace reinforcing steel.

SECTION VIEW OF ENTRANCE FOOTER
AND HEAVY USE AREA

NOT TO SCALE

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LIVESTOCK WINTER FEEDING STATION
POST & FLOOR DETAILS
OF COVERED FEEDING AREA

	Date
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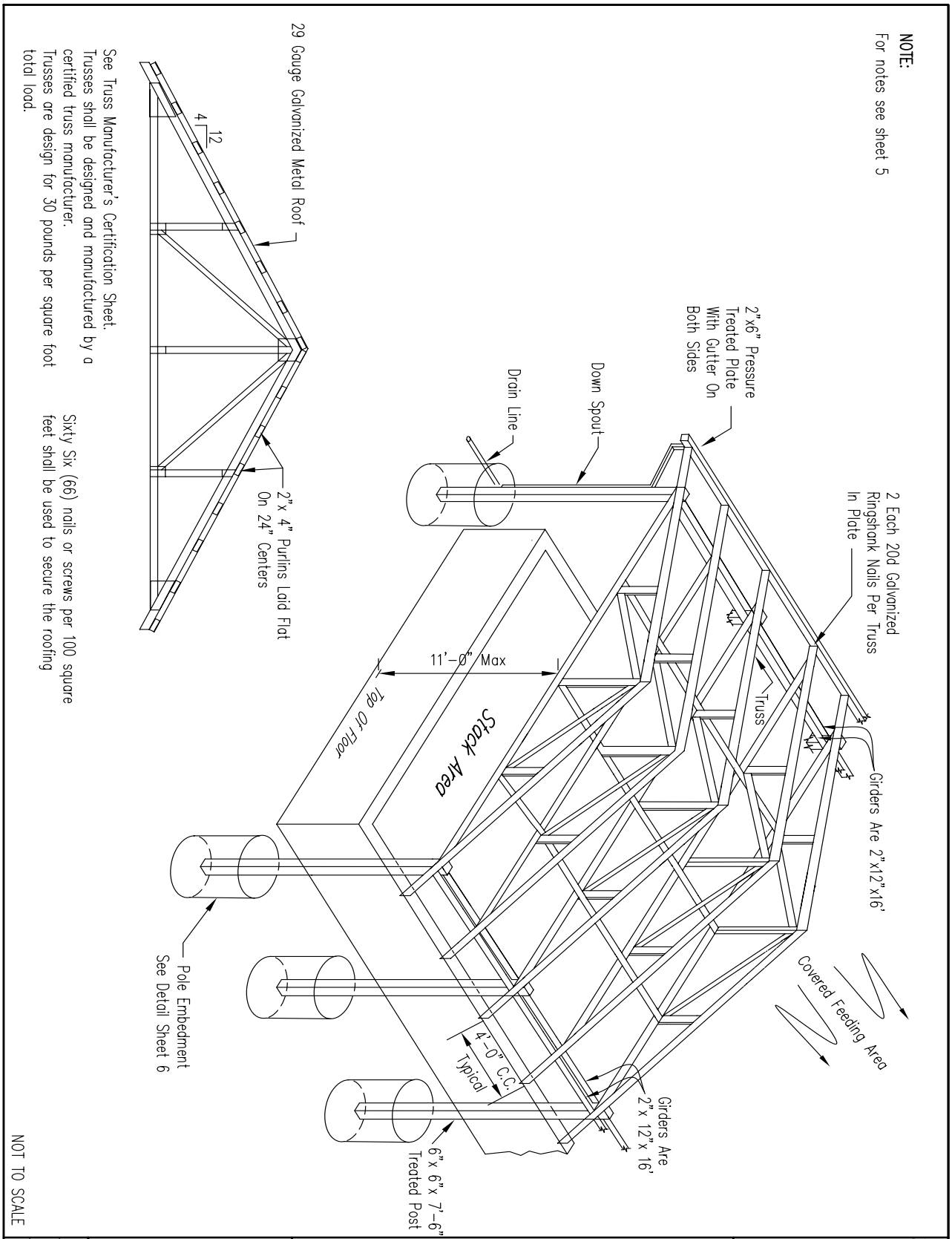
Approved	

File No. IL-ENG-190F
Drawing No.
Sheet 6 of 11

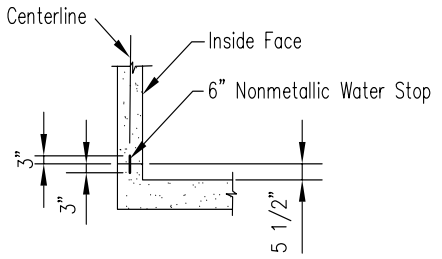
Roof & Truss Details - Covered Stack Pad



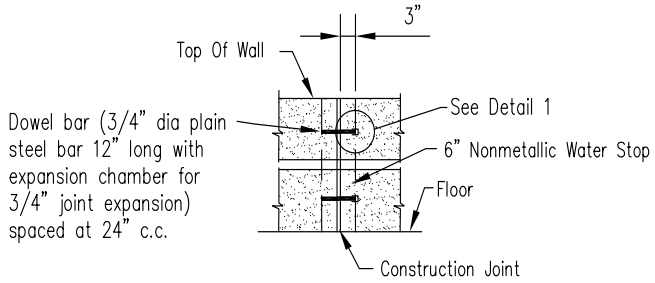
Sheet 7 of 11	File No. IL-ENG-190G Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION ROOF AND TRUSS DETAILS OF COVERED STACK PAD

	Date
Designed	
Drawn	M. QUINONES 11/04
Checked	
Approved	

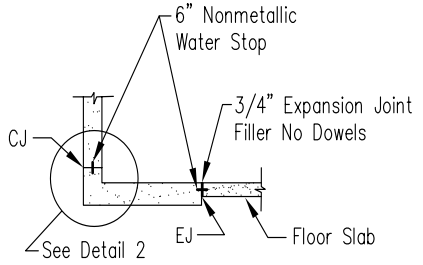
Floor & Wall Details - Covered Stack Pad



DETA1L 2
CONSTRUCTION JOINT DETAIL



EXPANSION JOINT DETAIL–WALL
Spacing Not Greater Than 30' C.C.

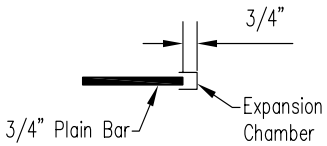


EXPANSION JOINT DETAIL–FLOOR

STEEL SCHEDULE	
A	#4 @ 12"
B	#4 @ 12"
C	#5 @ 12"
D	#5 @ 12"
E	#4 @ 12"

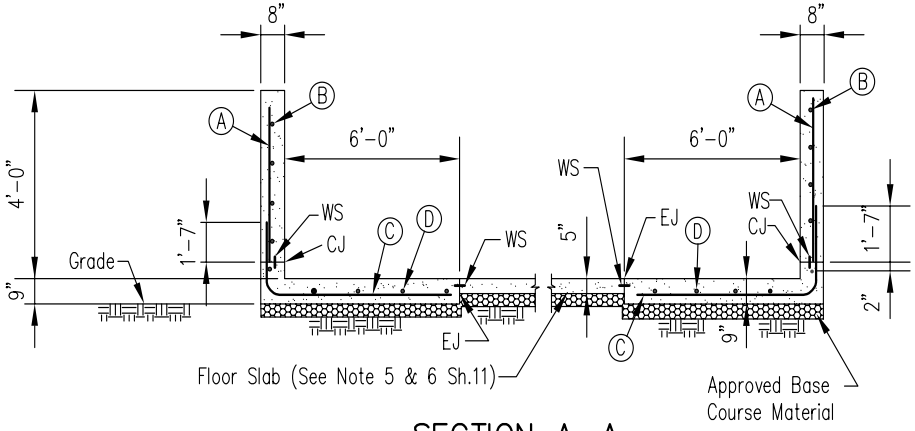
LEGEND
WALL: A – Center Vertical Face
B – Horizontal Layer
FLOOR: C – Center Face, Perpendicular To Wall
D – Parallel To Wall
CORNER: E – Corner Horizontal layer, wall

WS = 6" Nonmetalic Water Stop.
CJ = Construction Joint

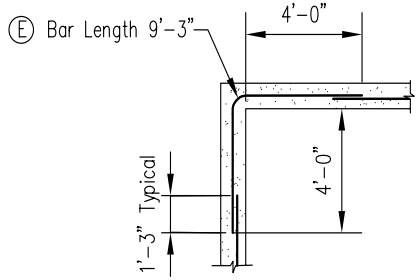


DETAIL 1

NOTE:
For General Notes see sheet 11



SECTION A–A



CORNER DETAIL– PLAN VIEW

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LIVESTOCK WINTER FEEDING STATION
FLOOR & WALL DETAILS
OF COVERED STACK PAD

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IL-ENG-190H
Drawing No.

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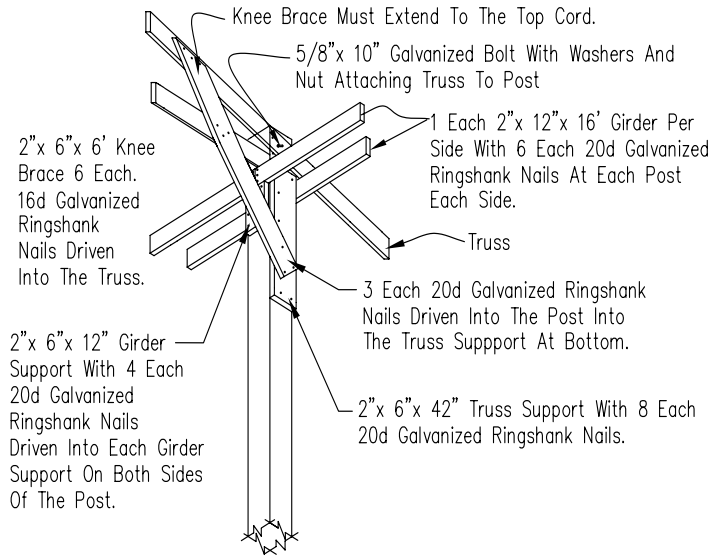
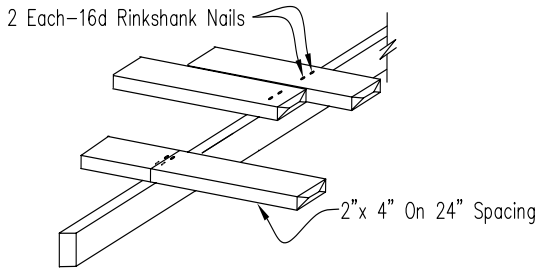
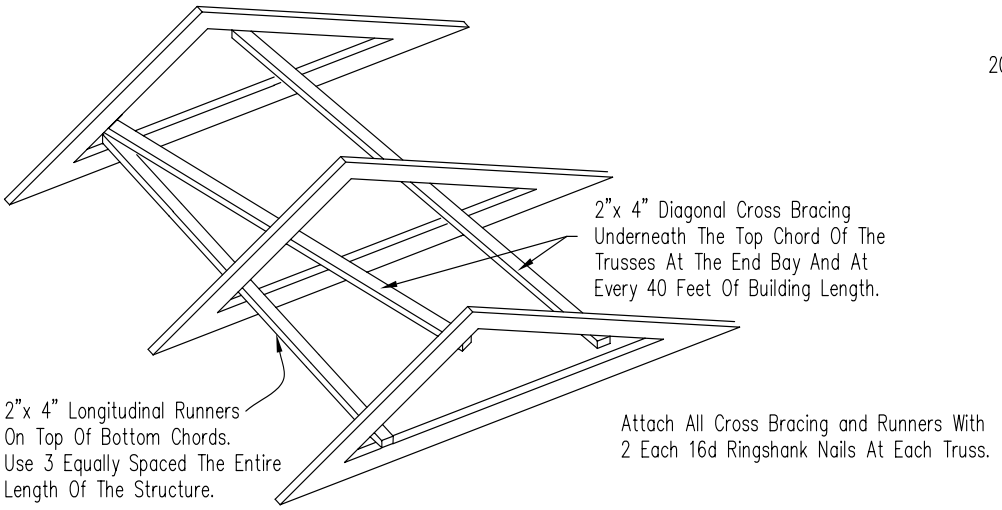
Nail Bracing and Purlin Details



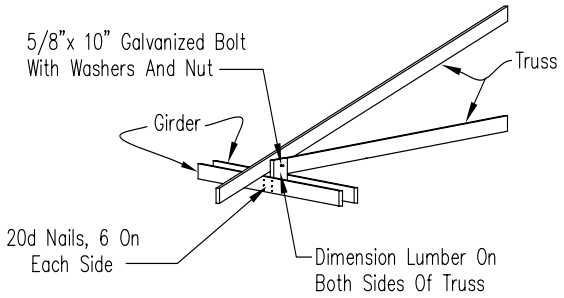
POST TRUSS DETAIL



PURLINS SPACED @ 24" CENTERS



TRUSS BRACING DETAILS



TRUSS TO GIRDER ANCHORAGE

NOTE:
The truss support, girder support and knee brace shall be pressure treated.

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Date
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LIVESTOCK WINTER FEEDING STATION
NAIL BRACING AND PURLIN DETAILS

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IL-ENG-190J
Drawing No.

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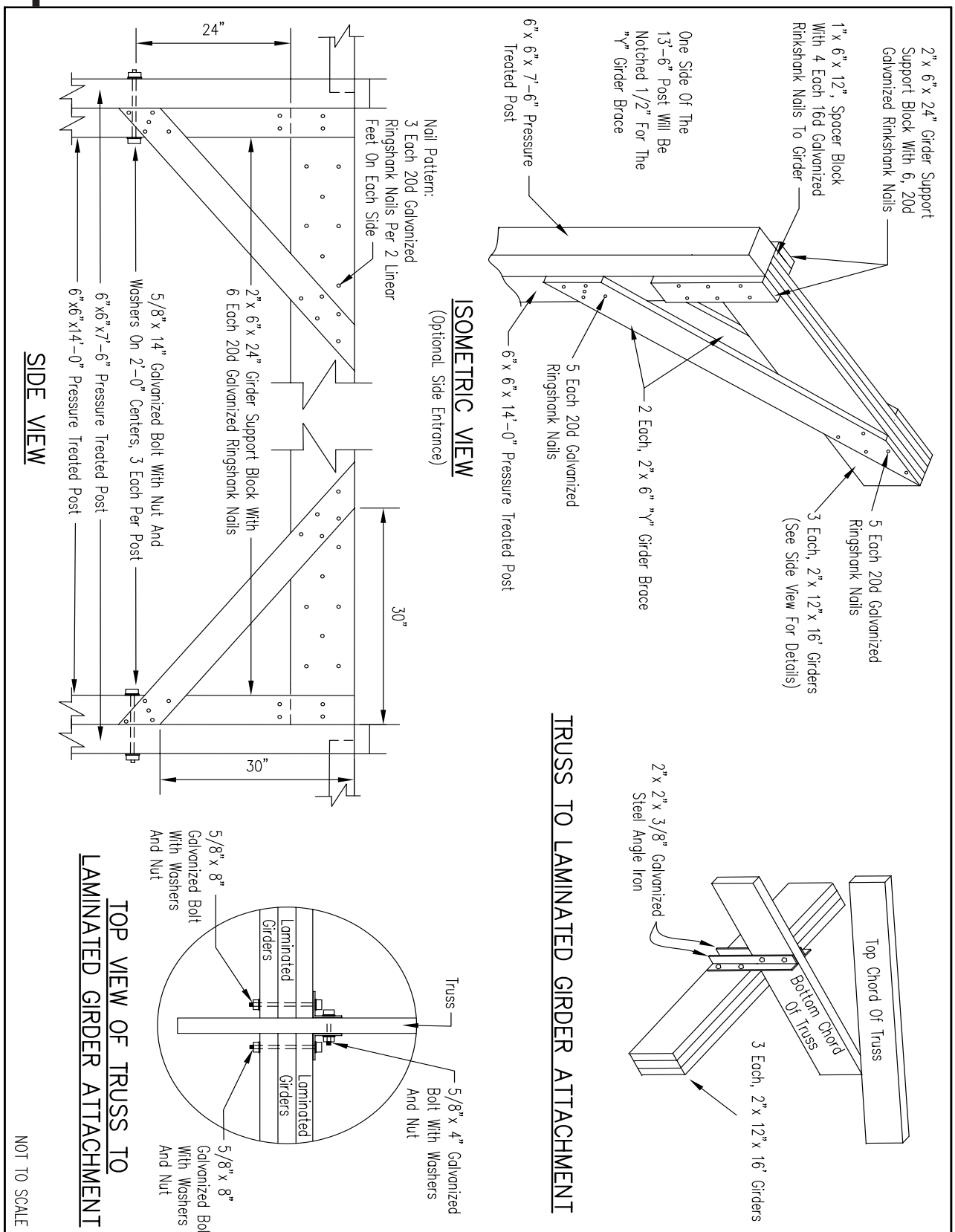
Optional Side Entrance Details



Sheet 10 of 11	File No. IL-ENG-190K Drawing No.	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION OPTIONAL SIDE ENTRANCE DETAILS

	Date
Designed	
Drawn	M. QUINONES 11/04
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Approved	

Curb & Floor Details

SECTION EXAMPLE OF ENTRANCE
FOOTER AND ROLL CURB

FLOOR DETAIL

NOTES:

GENERAL

1. f_c' = 4000 PSI fy = 60,000 PSI

STEEL

2. The 8" sidewall and 9" floor shall have one row of steel.
3. All steel placed in the 8" sidewall and 9" floor shall have a minimum concrete cover over reinforcement of two inches, except when the concrete is deposited on or against the earth, then the minimum concrete cover shall be three inches.

WALL

4. The wall will be built with expansion joints (see Expansion Joint Detail -Wall). No section of wall will be over 30' long between expansion joint.

FLOOR SLAB

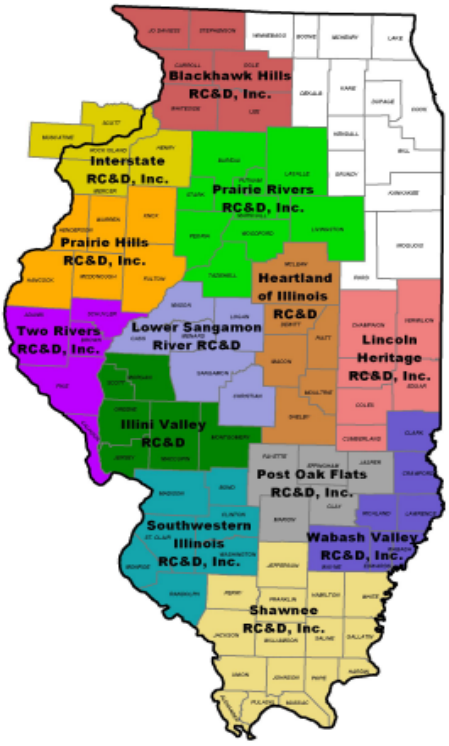
5. The 5" floor slab shall be constructed by the following method: Place concrete on top of 6 inch layer of coarse gravel or crushed rock. Use number 4 bars @ 15" spacing each way. Concrete cover for steel placed in floor slab shall be 2" minimum.
6. Where ever the floor slab exceeds 30' in length or width water tight control joints will be installed. Commercial water tight control joint material will be installed as per manufactures recommendation.

NOT TO SCALE

File No. IL-ENG-190L Drawing No. Sheet 11 of 11	NRCS Natural Resources Conservation Service United States Department of Agriculture	LIVESTOCK WINTER FEEDING STATION CURB AND FLOOR DETAILS	Date Designed Drawn M. QUINONES 11/04 Checked Approved

RC&D's in Illinois

For more information, please visit these websites:
Blackhawk Hills RC&D - www.blackhawkhills.com
Heartland of Illinois RC&D - www.illinoisrcd.org/heartland.htm
Illini Valley RC&D - www.illinoisrcd.org/illini.htm
Interstate RC&D - www.interstatercd.org
Lincoln Heritage RC&D - www.illinoisrcd.org/lincoln.htm
Lower Sangamon River RC&D - www.lowersangamonriverrcd.org
Post Oak Flats RC&D - www.illinoisrcd.org/postoak.htm
Prairie Hills RC&D - www.prairiehillsrcd.org
Prairie Rivers RC&D - www.prairieriversrcd.org
Shawnee RC&D - www.shawneercd.org
Southwestern Illinois RC&D - www.swircd.org
Two Rivers RC&D - www.2riversrcd.org
Wabash Valley RC&D - www.illinoisrcd.org/wabash.htm



Illinois RC&D Water Quality Projects

Blackhawk Hills RC&D
- Yellow Creek Watershed
- Nutrient Management Alliance Expo MWIL Nutrient Management Alliance
- Driftless Area Initiative
- Milkhouse Waste Management Systems (IEPA-319)

Prairie Hills RC&D
- Spoon River Watershed Management Plan

Prairie Rivers RC&D
- Governor's Conferences on the Management of the Illinois River System

Shawnee RC&D
- Cache Watershed Partnership Special WRP Project
- Big Muddy Watershed Project
- Kinkaid Shoreline Protection Project
- Clean Streams Initiative

Southwestern Illinois RC&D
- American Bottom River Corridor Resource Inventory
- Lake Branch Watershed Section 319 Animal Waste Project
- Kaskaskia River Water Quality Databank
- Kaskaskia River Hypoxia Analysis