

Manure Storage and Compost Facilities

for operations with limited numbers of livestock



Structure similar to lean-to design shown on pages 7-8

Inside you'll find:

- three design blueprints
- materials list for designs
- manure composition chart
- step-by-step calculations to estimate your manure storage needs

By properly storing animal waste you can:

◆ Keep water clean and safe to drink

When rainwater, snow melt, or other water contacts manure, the water is contaminated with the nutrients phosphorus, nitrate, and ammonia, and with harmful bacteria and organic matter.

◆ Protect salmon and trout habitat

Salmon and trout need oxygen in the water to survive. Nutrients from manure make algae grow which results in inadequate dissolved oxygen in streams. This can kill fish, especially young ones. Preventing runoff from livestock waste will protect fish, wildlife, our economy, and your health.

◆ Avoid fines and liabilities

Many streams have problems listed with excessive nitrogen, phosphorus, bacteria, sediment, and heat in the streams. Where animal manures contact public waters, livestock owners are subject to fines. Many Oregon watersheds have or are developing water quality management rules under Senate Bill 1010. Landowners who are managing wastes under farm plans approved under SB1010 through their Conservation District are provided safe haven.

◆ Reduce odor

Confining manure will significantly reduce odor. By storing manure properly, your facilities will be more pleasant for you and your neighbors.

◆ Produce a good quality fertilizer with lower costs

By accounting for fertilizer values in manure spread at the proper time and rates, you can produce excellent soils, reduce fertilizer costs, & avoid runoff. Manure is best spread from April to July when plants are actively growing, though limited volumes may be spread from March to October if managed carefully and incorporated into the soil. Avoid spreading when runoff is likely.



MANURE IS GOOD FERTILIZER

Total Nutrient Values for 6 Months Manure Accumulation Stored under Roof

Animal	Animal Size lbs.	Lbs. Fresh Manure	Organic Matter	Nitrogen N lbs.	Phosphate P lbs.	Potassium K lbs.	NPK% Rating as excreted
BEEF	1000	10,740	84%	33	15	28	1.0-0.3-0.5
SHEEP	100	730	77%	5	1	5	1.2-0.3-0.6
HORSE	1000	9,100	82%	35	8	31	1.5-0.7-0.9
ALPACA	130	910	1%	6	2	4	1.4-1.0-1.2

*Nutrient values vary greatly with the feed used. Testing of manure is recommended at a certified lab. The values above are for manure only. Adjust for bedding. Nutrients are leached by rain if pile is uncovered.

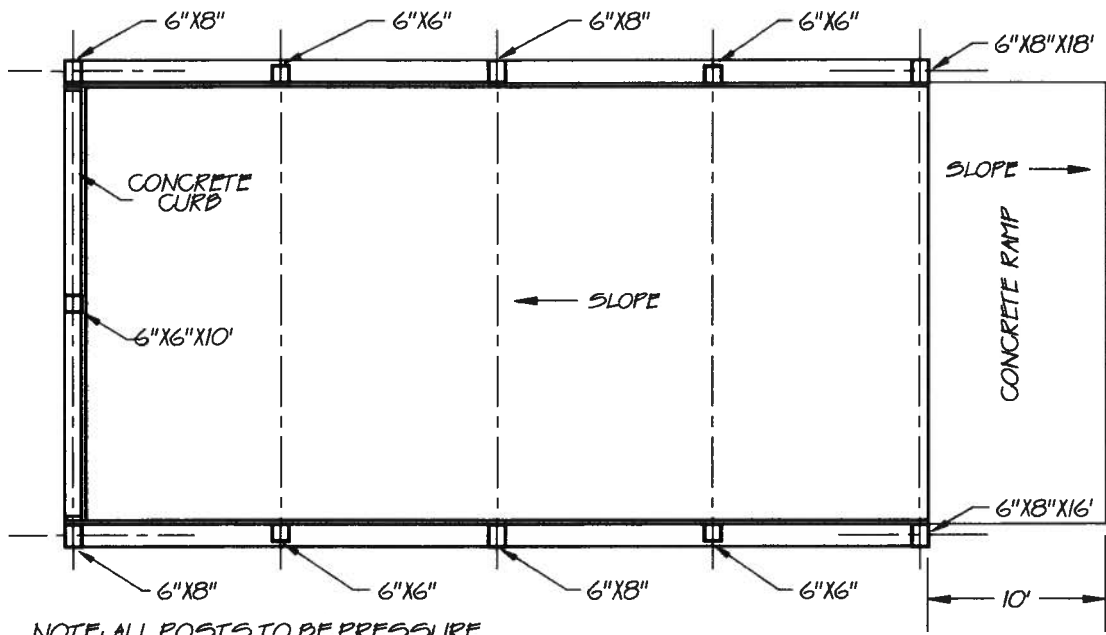
Manure Storage Tips

Site storage on higher ground, away from drainage ways, above flood levels and

- At least 100 feet from wells and streams.
- Place on concrete floor with curbing, or store on dry ground.
- Cover with roof or tarp.
- Use roof gutters and downspouts to carry clean water away from pile.

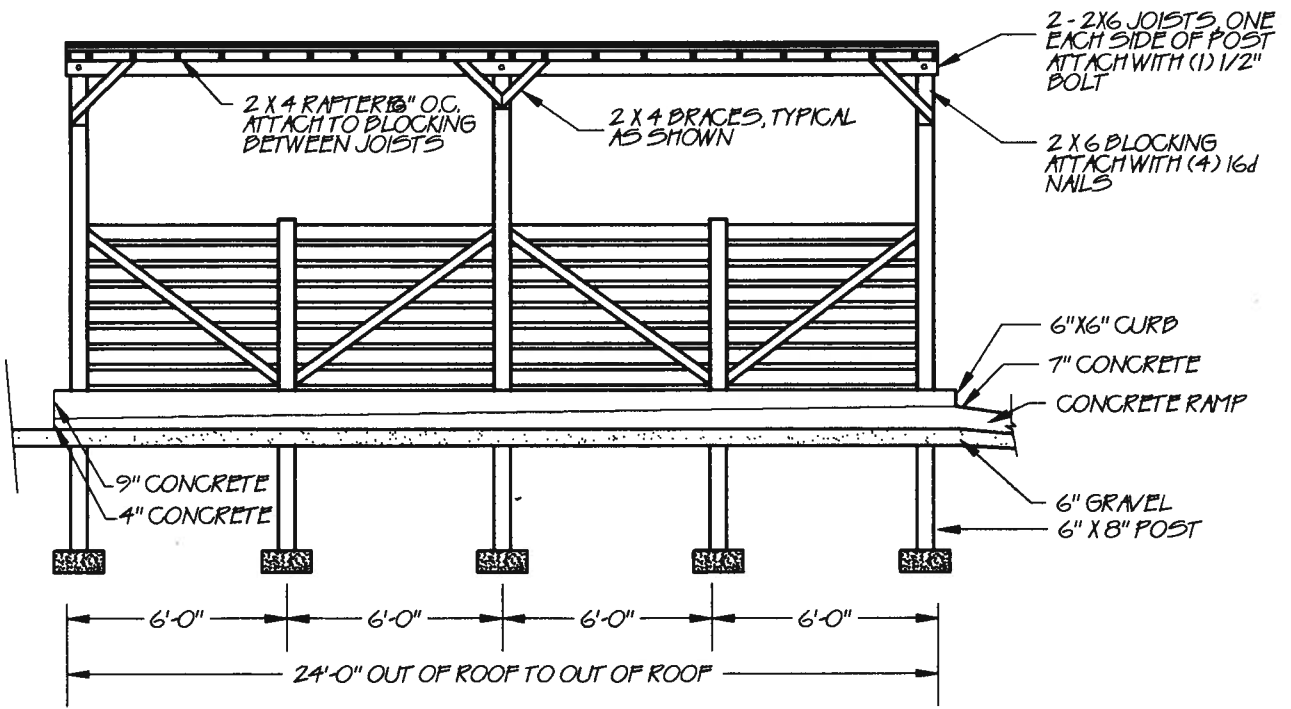
Before you build consider:

1. What facilities do you currently have available for storage? Complete "Estimating Manure Storage Needs" pg. 10 to see what your needs are.
2. Can you add on to an existing building, or would you need to build a separate new structure?
3. Will manure be used by or for?
 - ___ Pasture or field crop fertilization. Manure costs less, and improves soil structure better than commercial fertilizer. However, repeated spreading on small acreage can build excessive levels of phosphorus and potassium. Test soils in each field at least every 36 months.
 - ___ Home garden - Adds nutrients, improves tilth.
 - ___ Selling or giving away - Many nurseries and home gardeners will use a dry consistent product.
 - ___ Hauling waste to composting facility.
4. Will you compost or use fresh manure? Compost is more easily used and is in greater demand.
5. Is manure collected for all day, or only part of the time? - ("Estimated needs" pg. 10 is for total manure produced by the animal)



NOTE: ALL POSTS TO BE PRESSURE TREATED TO 0.6 LB. DENSITY

PLAN VIEW
N.T.S.

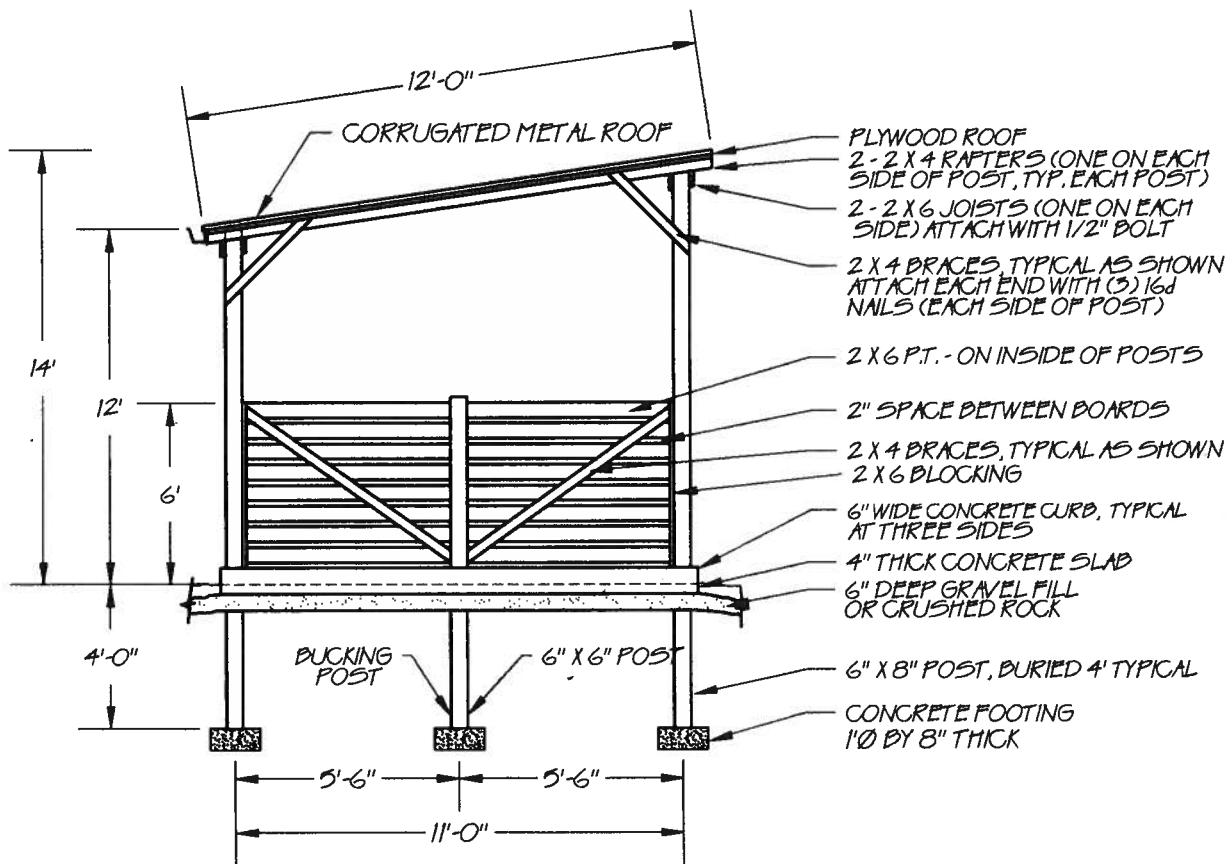


SIDE VIEW
N.T.S.

NOTE: LANDOWNER ASSUMES RESPONSIBILITY FOR MATERIALS AND WORKMANSHIP.

COMMENTS:

- 1) CONCRETE PAD SLOPES TOWARDS BACK 1/8":1 (4" THICK AT BACK, 7" AT FRONT).
- 2) CONCRETE CURB IS 6" X 6" AT FRONT AND 9" X 6" AT BACK TO COMPENSATE.
- 3) CONCRETE RAMP AT END SLOPES 4":10'.
- 4) CONCRETE CURB SURROUNDS POSTS BUT IS 15" THICK ON INSIDE OF POST.
- 5) CONCRETE CURB IS FLUSH WITH INSIDE OF 2X6 RAILS.
- 6) THE 2X6 RAILS ARE ON THE INSIDE OF THE POSTS.
- 7) CONCRETE REINFORCED WITH #4 BARS AT 16" O.C. EACHWAY.
- 8) BACKFILL POST HOLES WITH CRUSHED, WELL COMPACTED GRAVEL.



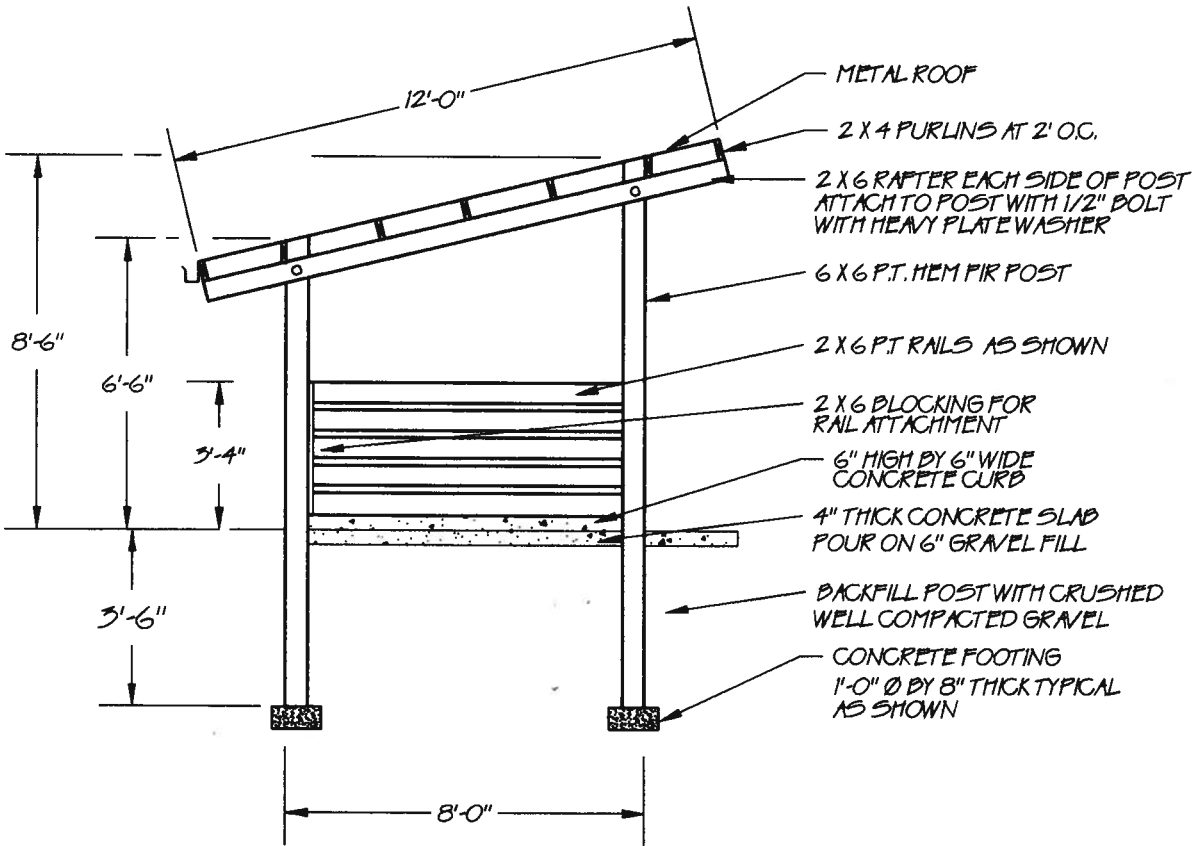
END VIEW
N.T.S.

THIS STRUCTURE WILL STORE
1480 CUBIC FEET OF MANURE
AND BEDDING

Approved: _____ Title: _____ Date: 2/95	Design: Derek Godwin Drawn: _____ Traced: Steve Ryckelsky Checked: _____	Approved: _____ Title: _____ Date: 6/94	<p>FREE STANDING MANURE COMPOST FACILITY</p> <p>WASHINGTON COUNTY SOIL & WATER CONSERVATION DISTRICT</p>
CID FILE NO. WC-FR-ST.DWG			DRAWING NO. WC-001-94
SHEET NO. 1 OF 1			

COMMENTS:

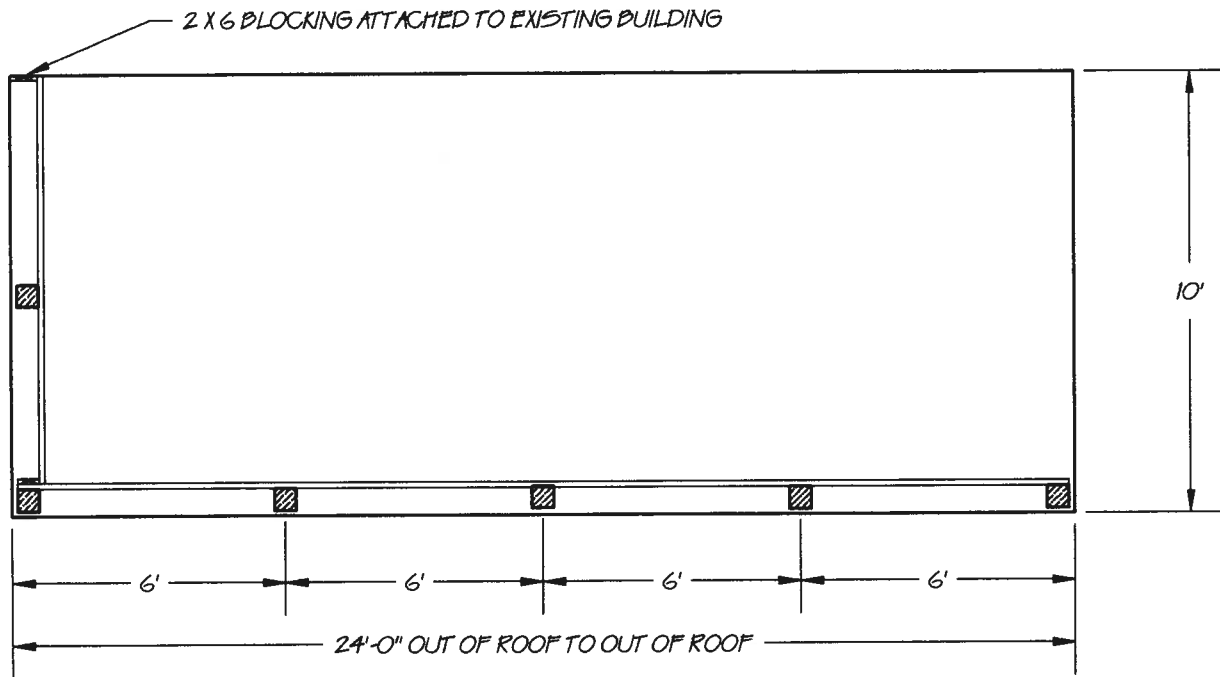
- 1) CONCRETE PAD IS LEVEL (4" THICK).
- 2) CONCRETE CURB IS 6" WIDE X 4" HIGH.
- 3) CONCRETE RAMP CAN BE ADDED AT FRONT.
- 4) CONCRETE CURB SURROUNDS POSTS.
- 5) CONCRETE CURB IS REINFORCED WITH REBAR.
- 6) THE 2X6 RAILS ARE ON THE INSIDE OF THE POSTS.
- 7) CONCRETE REINFORCED WITH #4 BARS AT 16" O.C. EACHWAY.
- 8) BACKFILL POST HOLES WITH CRUSHED, WELL COMPACTED GRAVEL.



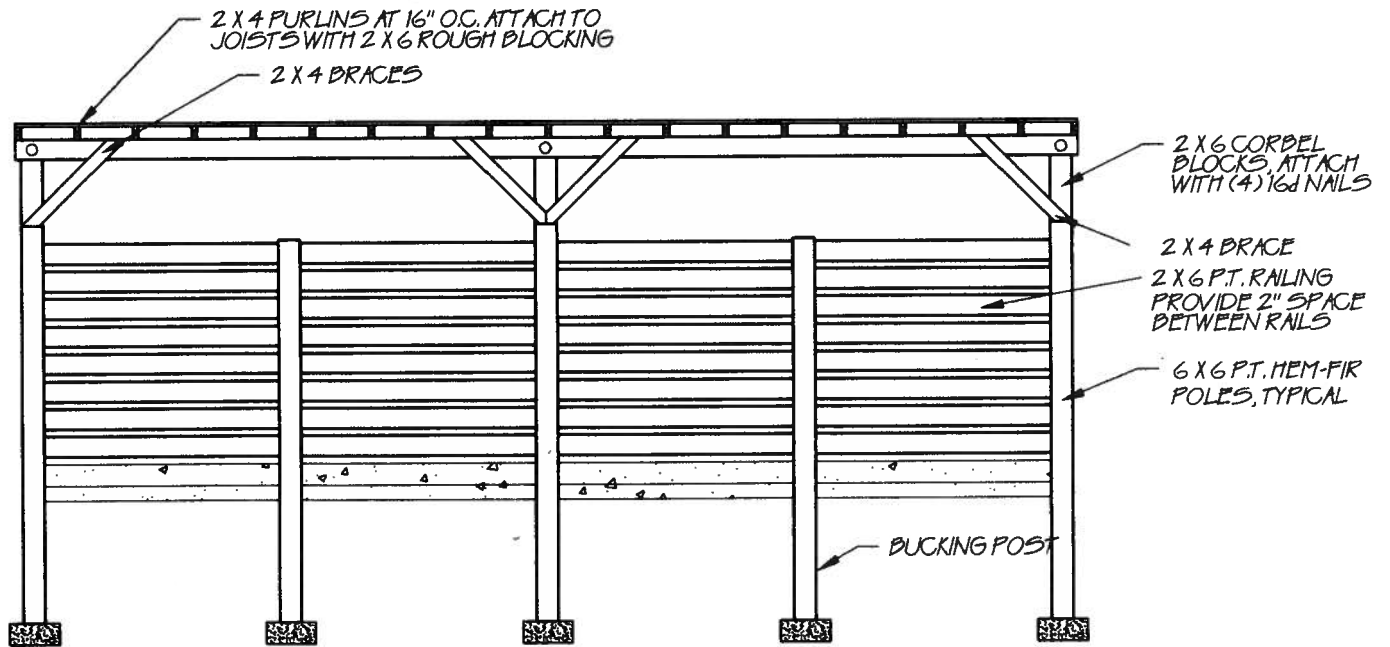
END VIEW
N.T.S.

THIS STRUCTURE WILL STORE
575 CUBIC FEET OF MANURE
AND BEDDING

DATE: 2/22 Design: Steve Kychalsky Draw: Steve Kychalsky Trace: _____ Check: _____	Approved: _____ Title: _____ Title: _____ Title: _____
<h3 style="margin: 0;">THREE BIN MANURE COMPOST FACILITY</h3> <p style="margin: 0;">WASHINGTON COUNTY SOIL & WATER CONSERVATION DISTRICT</p>	
OLD FILE NO. WC-3-BIN.DWG DRAWING NO. WC-003-94 SHEET NO. 1 OF 1	



PLAN VIEW
N.T.S.

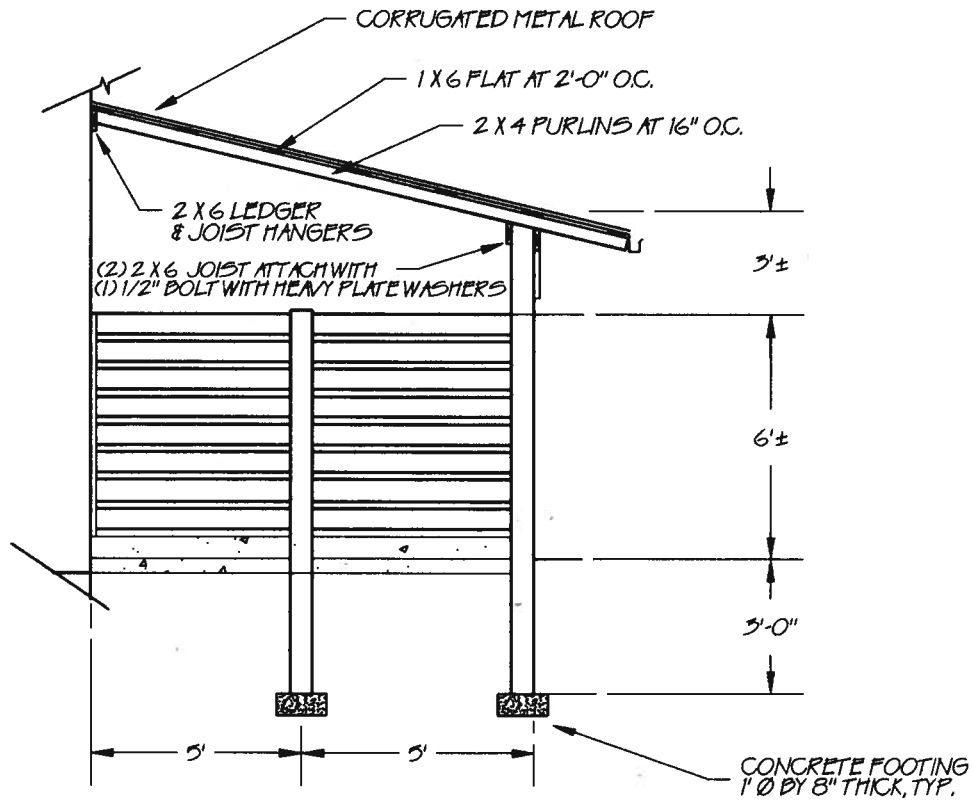


LOW SIDE VIEW
N.T.S.

NOTE: LANDOWNER ASSUMES RESPONSIBILITY FOR MATERIALS AND WORKMANSHIP.

COMMENTS:

- 1) CONCRETE PAD IS LEVEL (4" THICK).
- 2) CONCRETE CURB IS 6" WIDE X 4" HIGH.
- 3) CONCRETE RAMP CAN BE ADDED AT FRONT.
- 4) CONCRETE CURB SURROUNDS POSTS.
- 5) CONCRETE CURB IS REINFORCED WITH REBAR.
- 6) THE 2X6 RAIS ARE ON THE INSIDE OF THE POSTS.
- 7) CONCRETE REINFORCED WITH #4 BARS AT 16" O.C. EACHWAY.
- 8) BACKFILL POST HOLES WITH CRUSHED, WELL COMPACTED GRAVEL.



END VIEW
NTS.

THIS STRUCTURE WILL STORE
1340 CUBIC FEET OF MANURE
AND BEDDING

DESIGNED BY	DATE	APPROVED	TITLE
Shane Rychalsky	2/92	Shane Rychalsky	
DRAWN BY		TRACED BY	
Shane Rychalsky			
CHECKED BY			

LEAN-TO MANURE
COMPOST FACILITY

WASHINGTON COUNTY SOIL & WATER CONSERVATION DISTRICT

CGO FILE NO.
WC-LENT0.DWG
DRAWING NO.
WC-002-94
SHEET NO. 1 OF 1

MATERIALS LIST

To build the enclosed designs the following materials are needed.
Notice not all items are needed for each design.

Materials	Free Standing	Three Bin	Lean-To
6" X 6" X 10' Hem. Fir #2 pressure treated posts	5	4	3
6" X 6" X 12' Hem. Fir #2 pressure treated posts	—	4	3
6" X 8" X 16' Hem. Fir #2 pressure treated posts	3	—	—
6" X 8" X 18' Hem. Fir #2 pressure treated posts	3	—	—
2" X 6" X 8' Doug. Fir pressure treated rails	—	45	—
2" X 6" X 10' Doug. Fir pressure treated rails	—	—	8
2" X 6" X 12' Doug. Fir pressure treated rails	24	—	—
2" X 6" X 8' Doug. Fir pressure treated blocks (8@ 4')	—	4	—
2" X 6" X 12' Doug. Fir pressure treated blocks (2@6')	1	—	1
2" X 6" X 12' Doug. Fir #2 & better rafters	—	8	—
2" X 4" X 8' Doug. Fir pressure treated angle braces	10	—	—
2" X 6" X 12' Doug. Fir #2 & better joists	8	—	—
2" X 4" X 8' Doug. Fir #2 & better purlins	—	21	—
2" X 4" X 12' Doug. Fir #2 & better purlins	22	—	19
2" X 4" X 8' Doug. Fir #2 & better braces (cut to 4' long)	6	—	2
2" X 6" X 12' Doug. Fir #2 & better joist blocking (cut to 2' long)	2	—	1
2" X 6" X rough Doug. Fir purlin blocking (cut to 1' pieces)	32 ft.	20 ft.	19 ft.
2' X 12' metal roof sheets with self-drilling fasteners	12	12	12
1/2" X 12" long machine bolt with heavy plated washers	—	8	3
1/2" X 14" long machine bolt with heavy plate washers	6	—	—

Materials needed for each design:

- 1 box 16d common galvanized nails for majority of nailing
- 24 ft. of roof gutter & 1 downspout to divert rain water from manure

Other materials for Lean-To design only:

- 168 feet of 1 X 6 flat for sheeting attachment
- 300 sq. ft. build. paper for between 1 X 6 flat metal sheets
- 12d nails to attach 1 X 6 flat to purlins

Other materials for Three Bin design only:

- 300 sq. ft. building paper for between metal purlins and metal sheeting

Other materials for Free Standing design only:

- (9) 4' X 8' plywood - sheeting with exterior glue
- 300 sq. ft. build. paper for between plywood and metal sheeting
- nails to attach plywood sheeting to purlins - 1' on center nailing

Manure use and application ideas:

- ◆ Arrange with a crop producing farmer to spread on their field as fresh manure and till into soil, or spread on your own pastures in the spring.
- ◆ Compost for fertilizer to sell or use on your own land.
- ◆ Spreading manure or compost on field can replace most of the commercial fertilizer you normally use, but high applications may build phosphorus and potassium to excessive levels with continuous use. Test soils periodically to determine nutrient levels.
- ◆ Continue to test manures until rates of N, P, and K become stable and predictable.

Manure Storage Capacity - Estimate Worksheet

Type	Average Lbs.	6 mon. storage needs	Type	Average Lbs.	6 mon. storage
Beef	900	150 cu.ft.	Sheep	90	10 cu.ft.
Beef	500	80 cu.ft.	Growing pig	65	13 cu.ft.
Horse	1200	175 cu.ft.	Gestating sow	275	27 cu.ft.
Poultry	7	1 cu.ft.	Alpaca	130	16 cu.ft.

Sample Calculations - Your Animals Are:

Type & average weight X # of animals X ft.³ per 6 months = _____ ft.³ storage needed

Horse - 1200 lbs. X 4 X 175 ft.³ = 700 ft.³ storage needed

_____ X _____ X _____ = _____ ft.³ storage needed

If your animals are larger or smaller than the weights listed, adjust storage accordingly. For example, if your horse weighs 600 lbs. assume it will produce ½ of 175 ft.³ or 88 ft.³ of manure.

* * * * *

Approximate Bedding Volumes -

Fresh Hay 0.24 ft.³ / lb. Fresh Straw 0.35 ft.³ / lb.
 Fresh Wood shavings 0.11 ft.³ / lb. Fresh Sawdust 0.08 ft.³ / lb.

Lbs./ month X ft.³ / lb. = ft.³ / month X 6 months = _____ X 0.5 compaction = _____

i.e. 48 lb straw /month X 0.35 ft.³ / lb. = 16.8 ft.³ / mon. X 6 mo. = 101 ft.³ X 0.5 = 51 ft.³

_____ X _____ = _____ ft.³ / mon. X 6 mon. = _____ ft.³ X 0.5 = _____ ft.³

* * * * *

Approximate Storage Needs:

Manure _____ + Bedding _____ = Total Storage Needed _____ ft.³

**When uncertain on sizes needed, it is better to build a structure a bit too large.*

Lean-To
Design
Manure
Storage
Structure





For information on facility designs, composting, livestock management, current rules, financial assistance available, or other rural resource matters, contact your local Soil & Water Conservation District or the nearest office of USDA Natural Resource Conservation Service.

More information is available from your local Conservation District and from these websites:

<http://or.nrcs.usda.gov/>
<http://www.netcnct.net/community/oacd/fs00safes.htm>
<http://www.ag.ohio-state.edu/~ohioline/agf-fact/>
<http://www.agf.gov.bc.ca/croplive/anh1th/horse/horsehome.htm>
<http://gaia.ageng.umn.edu/extens/ennotes/enwin95/manure.html>
<http://coopext.cahe.wsu.edu/infopub/eb1713/eb1713.html>
<http://eesc.orst.edu/>
<http://gaia.ageng.umn.edu/extens/ennotes/enwin95/manure.html>
<http://coopext.cahe.wsu.edu/infopub/eb1713/eb1713.html>
<http://smallfarms.orst.edu/about.htm>
<http://texnat.tamu.edu/pubs/b-5035/b-5035-1.htm>
<http://www.capital.ous.edu/oes/ruralwater.html>

Scroll down for Oregon Small Acreage Fact Sheets
Small acreage fertilizer, streams, pasture, mud, more
Pasture, Forage, Manure & Nutrient Management
Horses, pasture, arenas, environmental
Pollution potential of livestock manure
Managing Livestock on Small Acreage
OSU online publications and links
Pollution potential of livestock manure
Managing Livestock on Small Acreage
Small Farms
Small Acreage Ethics
Resource management guides

This guidebook was developed cooperatively by USDA-NRCS & Washington Co. Soil & Water Conservation District, Hillsboro, Oregon.

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