Foreword

The formulation of this National Standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Enhancing the Implementation of the AFMA Through Improved Agricultural Engineering Standards" which was funded by the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).

This standard was reviewed by the Technical Committee for Study 3 – Development of Standards for Agricultural Structures and was circulated to various private and government agencies/organizations concerned for their comments and reactions. This standard was presented to the Philippine Society of Agricultural Engineers (PSAE) and subjected to a public hearing organized by the National Agriculture and Fisheries Council (NAFC). The comments and reactions received during the presentation and public hearing were taken into consideration in the finalization of this standard.

This standard has been technically formulated in accordance with PNS 01: Part 4:1998 – Rules for the Structure and Drafting of Philippine National Standards. This standard provides the general requirements for the construction of lairage for swine, small and large animals.

In the preparation of this standard, the following references were considered:

Abattoirs Act, 1988 (Abattoirs) Regulations. Northern Ireland, 1989.

Abattoirs. Environment Protection Authority, Australia, 1995.

Abattoirs Designs and Design Concepts for ASEAN. ASEAN Food Handling Bureau. Malaysia, 1981.

Grandin, T. Improving Animal Movement, updated July, 2000.

Meat Hygiene, 9th ed. London, 1992.

Meat Hygiene, Inspection and Preservation. NMIC. January, 1977.

Meat Manual of Procedure. Canadian Food Inspection Agency.

Operational Guidelines for the Welfare of Animals at Abattoirs and Slaughterhouses, 2nd ed. Canberra, 1995.

PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PAES 410:2000

Agricultural Structures - Lairage for Swine, Small and Large Animals

1 Scope

This standard specifies the general requirements of lairage for swine, large and small animals. This standard shall:

1.1 provide receiving, handling and holding of livestock prior to slaughter,

1.2 provide the essential requirements for water, food, comfort, security and protection of the animals in the lairage, and

1.3 provide protection and convenience for the slaughterhouse personnel.

2 Reference

The following normative document contains provisions which through reference in this text constitute provisions of this National Standard:

PAES 414:2002 Agricultural Structures - Waste Management Structures

3 Definitions

For the purpose of this standard, the following definitions shall apply:

3.1
lairage
any premise or yard used for the confinement of animals awaiting to be slaughtered which include unloading ramp, pens and detention pens

3.2
small animals
refers to sheep, goat, and deer

3.3
large animals
refers to catlle and carabao

3.4
detention pen
separate compartment in the lairage used to confine sick or suspected animals

3.5
loose type
animals are free to move in a pen while awaiting to be slaughtered

3.6
tie-up type
pugnacious animals are tied within the pen while awaiting to be slaughtered

3.7
slaughterhouse
any building or place used for killing of animals where the flesh is intended for human consumption

4 Location

4.1 Lairage shall be constructed at least 10 m away from the slaughterhouse.

4.2 It shall be positioned in the downwind and downhill of the slaughterhouse.

5 Space requirement

5.1 For large animals, the space requirement for loose type should be 2.23 m^2 per animal and 3.30 m^2 animal for tie-up type.

5.2 For swine, the space requirement should be 0.7 m^2 per animal (if the weight is more than 100 kg) and 0.6 m^2 per animal (if the weight is less than 100kg).

5.3 For small animals, 0.56 m^2 per animal should be provided.

6 Functional Requirements

6.1 Livestock Unloading Area

6.1.1 There shall be provision for impervious and properly drained unloading area.

6.1.2 Access, turning circles and parking shall be provided for vehicles bringing animals to the slaughterhouse.

6.1.3 The maneuvering area for vehicles shall be clear of “through traffic” roads and shall enable livestock truck to reverse straight back to the unloading ramp.

6.1.4 Truck area shall be leveled, surfaced, and sloped slightly towards the ramp.

6.1.5 There shall be provision for washing and disinfecting of vehicles.

6.2 Unloading Ramps

6.2.1 Unloading ramps shall be at a similar height to the floor of the deck of the transport vehicle from which the animals are to be unloaded. Its width shall be as wide as the exit gate of the transport vehicle.

6.2.2 Unloading ramps shall have a level surface at the truck tray height (approximately 1.5 m), with a distance of 2-3 m from the truck before sloping down the ground level.

6.2.3 Ramps should be either a permanent ramp for each level of multi-tired vehicle or an adjustable ramp that can be aligned with all levels of the vehicle.

6.2.4 If permanent ramp is used, catwalk should be provided. All catwalks that are 610 mm off the ground shall be provided with 1.07 m high handrail. Detail of a typical permanent ramp is shown in Annex B.

6.2.5 If steps are used, the distance between steps should be approximately 600 mm with a rise of not more than 150 mm for cattle while for swine, it should be approximately 300 mm with a rise of not more than 90 mm. Refer to Annex C for concrete step detail.

6.2.6 The slope of the ramp shall not be greater than 25^{o} from the horizontal.

6.2.7 The sides of any ramp shall be high enough and the landing area at the unloading dock shall be level.

6.2.8 Ramps and steps shall be made of non-slip material.

6.3 Pens

6.3.1 Number of pens should be sufficient for at least the number of animals to be slaughtered for one day. There should be separate pens for swine and large animals.

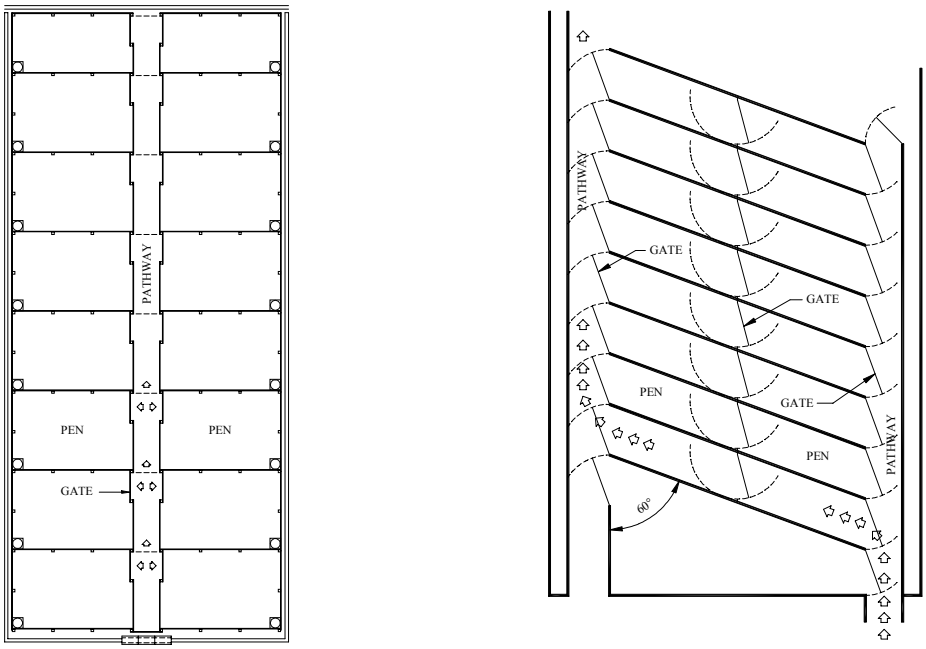
6.3.2 There shall be provision for separate pen for suspected or for animals requiring further observation. For each class of animals, separate pen shall be provided.

6.3.3 Type of pens should be either elongated or typical (Figure 1). If elongated pen is used, it should be set at an angle of 60 degrees with the pathway.

6.3.4 Walling

6.3.4.1 For cattle pens, G.I. pipes (50 mm in diameter) should be used. It should be set 400 mm apart on a concrete or galvanized steel post. The diameter of the steel post shall be within 100 – 115 mm. The minimum height of the pen shall be 1.5 m.

6.3.4.2 For hog pens, G.I. pipes (50 mm in diameter) should be used. The spacing between pipes should be 150 mm apart and the height shall be at least 1 m.



a) Typical pen b) Elongated pen

Figure 1 – Types of pens

6.3.4.3 For small animals, the walling (Figure 2) should be galvanized welded or woven mesh with a maximum mesh dimension of 100 x 100 mm. The post should be made up of galvanized steel (70 mm in diameter) with a height of 1.2 m.

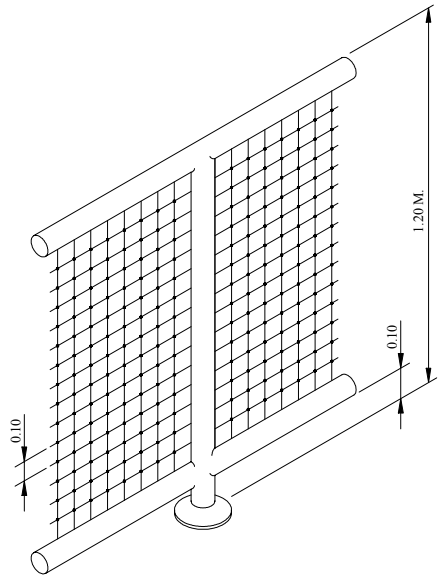


Figure 2 – Walling for small stock pen

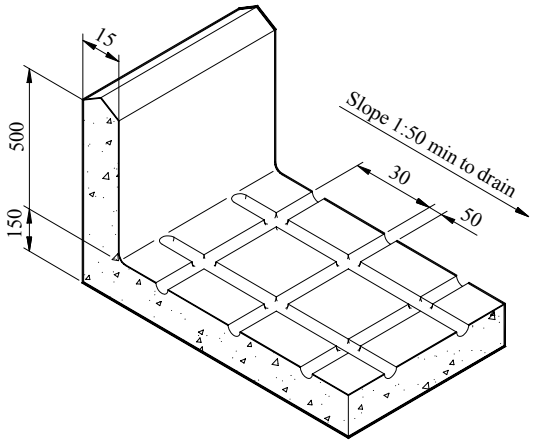
6.3.4.4 Sharp corners and projections of any kind shall be avoided.

6.3.5 Flooring

6.3.5.1 The floor shall be made of concrete and it shall be firm, non-slip, acid resistant, easy to clean and well drained.

6.3.5.2 For cattle pens, floor slope shall not be less than 3^{o}, and for hog pens, it shall not be less than 2.4^{o}.

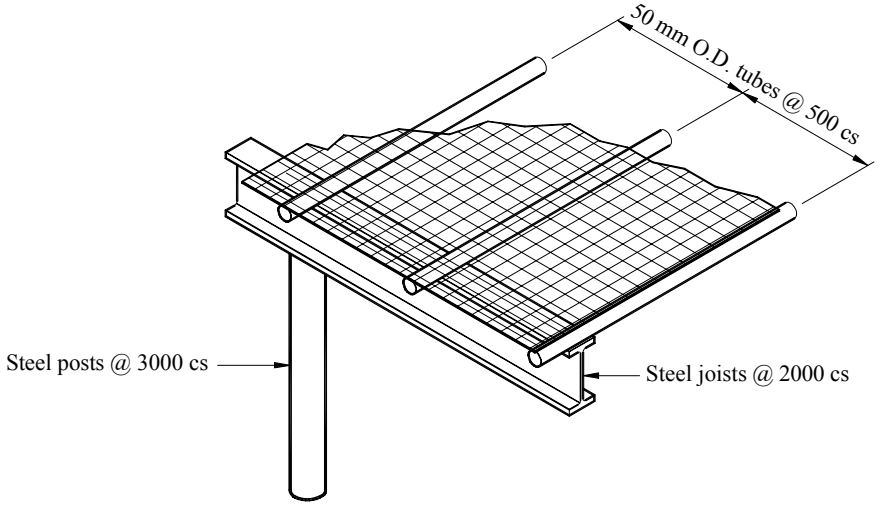
6.3.5.3 Concrete floors for large animals and swine should preferably have a 30 cm maximum diamond or square pattern (Figure 3) with 50 mm V grooves using class A concrete mixture.



Note: Dimensions are in millimeter

Figure 3 – Large animals and swine pen floor

6.3.5.4 For small animals, flooring shall provide adequate space to allow the droppings to fall (Figure 4). It should be made of galvanized welded mesh. The diameter of the wire should be 5 mm and the mesh spacing shall be 20 mm.



Note: Dimensions are in millimeter

Figure 4 – Small animals pen floor

6.3.5.5 Flooring shall have side curbs of at least 305 mm in radius.

6.3.6 Roofing

6.3.6.1 Roof framing shall be made of timber or galvanized steel.

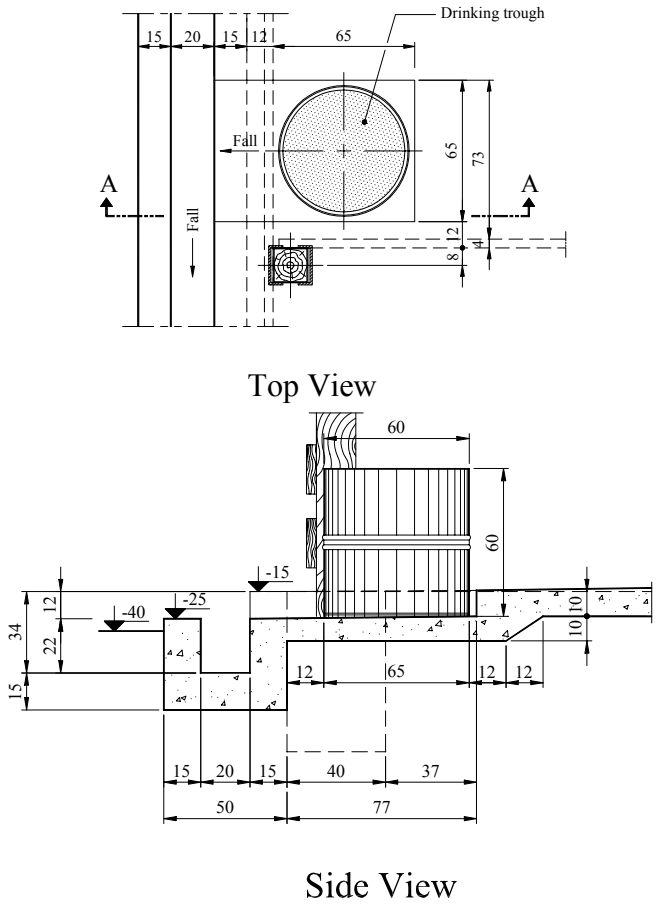
6.3.6.2 Roofing shall be made of light materials such as corrugated GI or aluminum sheets.

6.3.7 Watering and Feeding Facilities

6.3.7.1 Drinking water shall be provided and shall be available to animals. Each pen should be provided with a self-filling drinking trough.

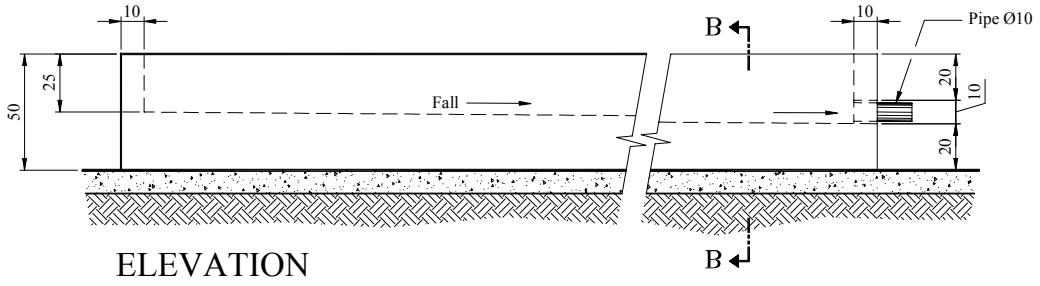
6.3.7.2 Drinking trough and feeding racks shall be constructed and positioned in such a way that they cannot be readily soiled, easy to clean, firmly fixed, shaped and located to minimize the possibility of injury to animals, and readily accessible. Detail of a typical circular and longitudinal drinking trough is illustrated in Figure 5 and 6.

6.3.7.3 Hydrant points shall be located in all parts of the lairage for adequate water supply for clean-up and washing of animals.

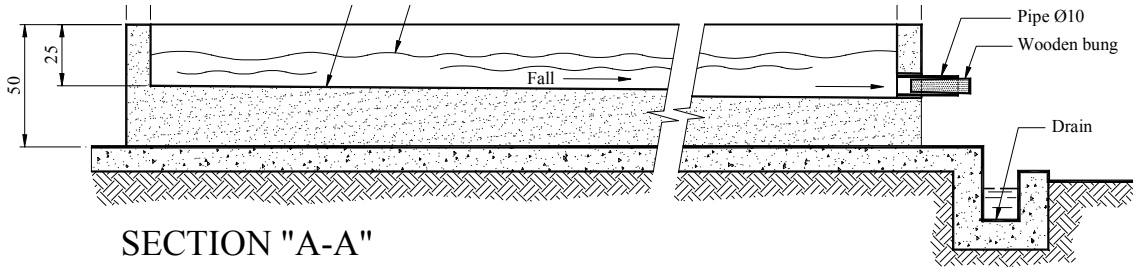


Note: Dimensions are in centimeter

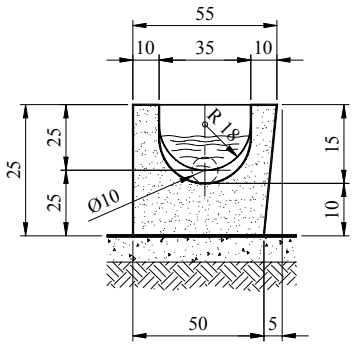
Figure 5 - Cross section of a typical circular drinking trough



ELEVATION



SECTION "A-A"



SECTION "B-B"

Note: Dimensions are in centimeter

Figure 6– Cross section of a typical longitudinal drinking trough

6.3.7.4 Water trough for small animals shall be placed 250 mm from the floor to prevent fouling. Feeding through shall be provided above the level of the small animal's head.

6.3.8 Lighting

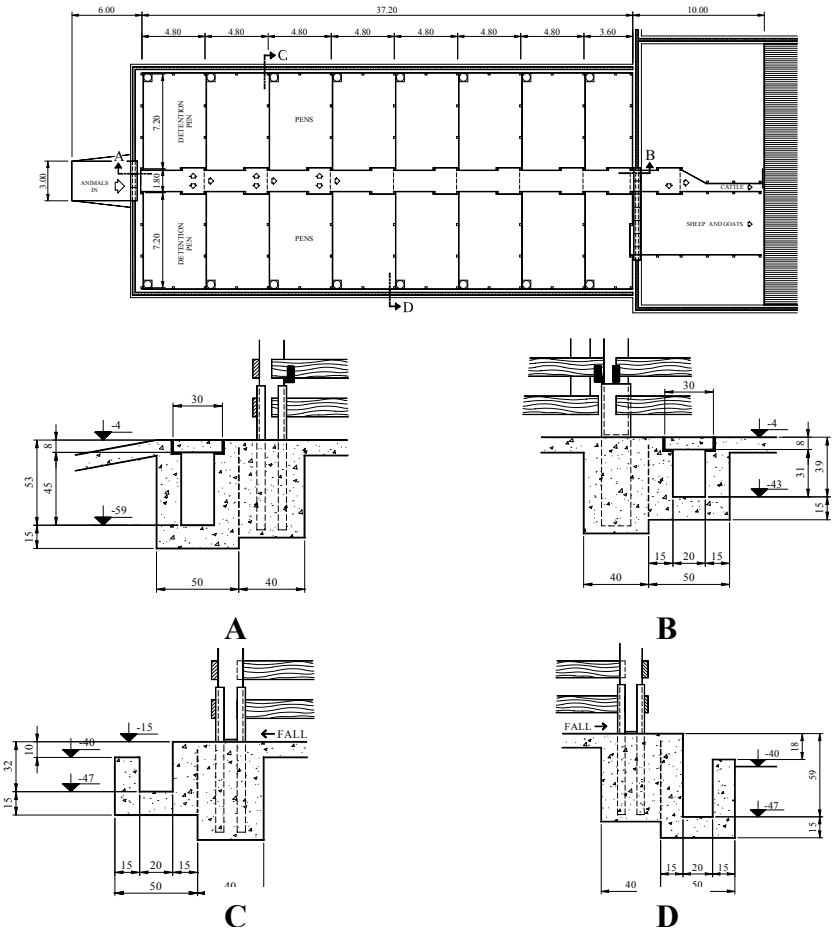
6.3.8.1 Illumination of 110 lux shall be provided within the lairage.

6.3.8.2 For all suspect pens, lighting intensity of not less than 540 lux shall be provided.

6.3.9 Drainage

6.3.9.1 Each pen shall have individual inlet connecting to the drainage line. Typical design of drainage design is shown in Figure 7.

6.3.9.2 Drainage line should be covered with iron bars (gratings). Spacing between iron bars should be 95 mm.



Note: Dimensions are in centimeter

Figure 7 – Cross section of the typical drainage line

6.3.10 Fences, Gates and Dividers

6.3.10.1 Dividers and gates shall be made of rust resistant metal pipe or tubing.

6.3.10.2 Protruding nails, bolts, angle irons, exposed pipe end, channels, etc. shall be avoided.

6.3.10.3 Round pipe posts shall have a diameter larger than 76 mm.

6.3.10.4 Gates should be preferably placed at the end or at the middle of the pen.

6.3.10.5 Vertical slide gates in chutes should be counter-weighted. The bottom of these gates shall be padded with cut tires or conveyor belting.

6.3.10.6 Gates in drive alleys should be equipped with tie backs.

6.3.10.7 Gates shall be positioned that it will ensure smooth traffic flow. Animals shall enter at one end of the building and leave at another end.

6.3.11 The aisles shall be 1.5 m wide and a side corridor shall be used, if necessary.

6.4 Chute

6.4.1 Cattle

6.4.1.1 Chute should be gently curved (Figure 8) or straight race. It may be single or double lane.

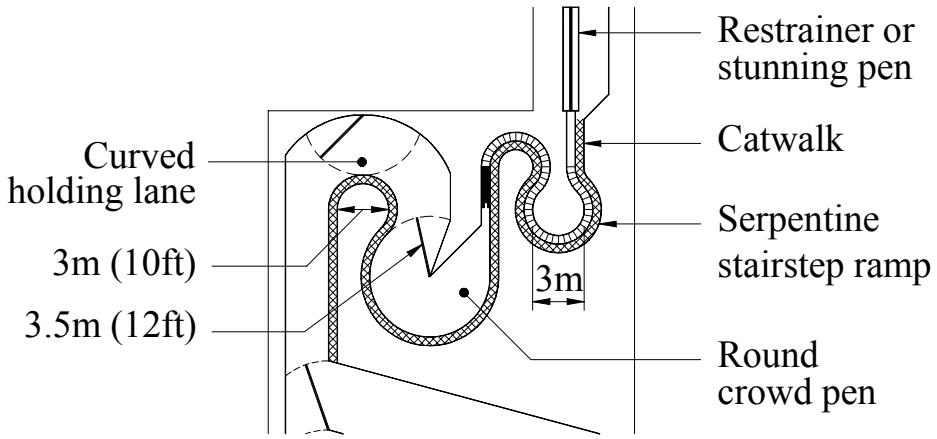


Figure 8 – Typical chute for cattle

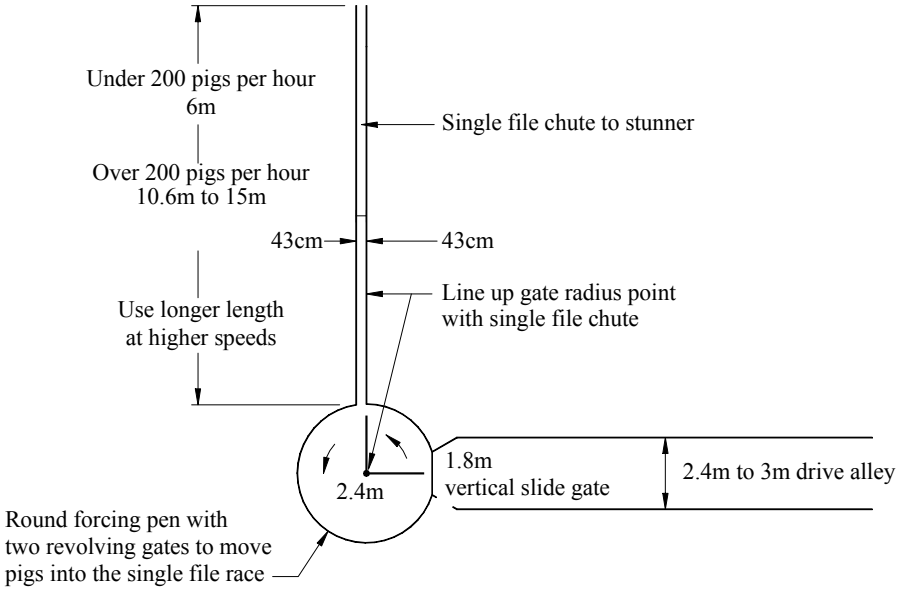
6.4.1.2 Sides of chute shall be concrete.

6.4.1.3 The final drive of the laneway shall be V-shaped with 800 mm wide at the top and 500 mm wide at the floor.

6.4.1.4 Catwalks shall be provided alongside the V-race.

6.4.2 Swine

6.4.2.1 Chute for swine shall be either double or single race (Figure 10a and 10b).



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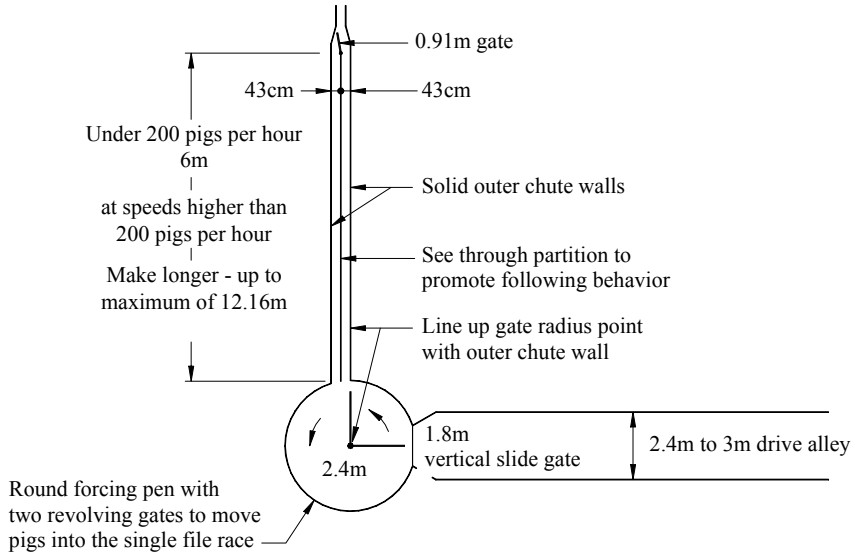

B

Figure 10 – Typical chute for swine

6.4.2.2 Sides of chute shall be concrete. For the double lane, inner side should be made of tubular or "see through" partition.

6.4.2.3 The chute and forcing pens shall be roofed and well ventilated.

6.4.2.4 Gates located in the chute shall be made of expanded metal or closely spaced bars.

6.4.2.5 Floor drains shall not be located in such a way that the need to cross the floor drains by animals is minimized.

6.5 Storage of supplies

A small rust-resistant metal cabinet for the storage of supplies such as ear tags, pliers and ante-mortem inspection cards shall be provided.

6.6 Waste disposal

For waste disposal requirement, refer to PAES 414:2002 Agricultural Structures - Waste Management Structures

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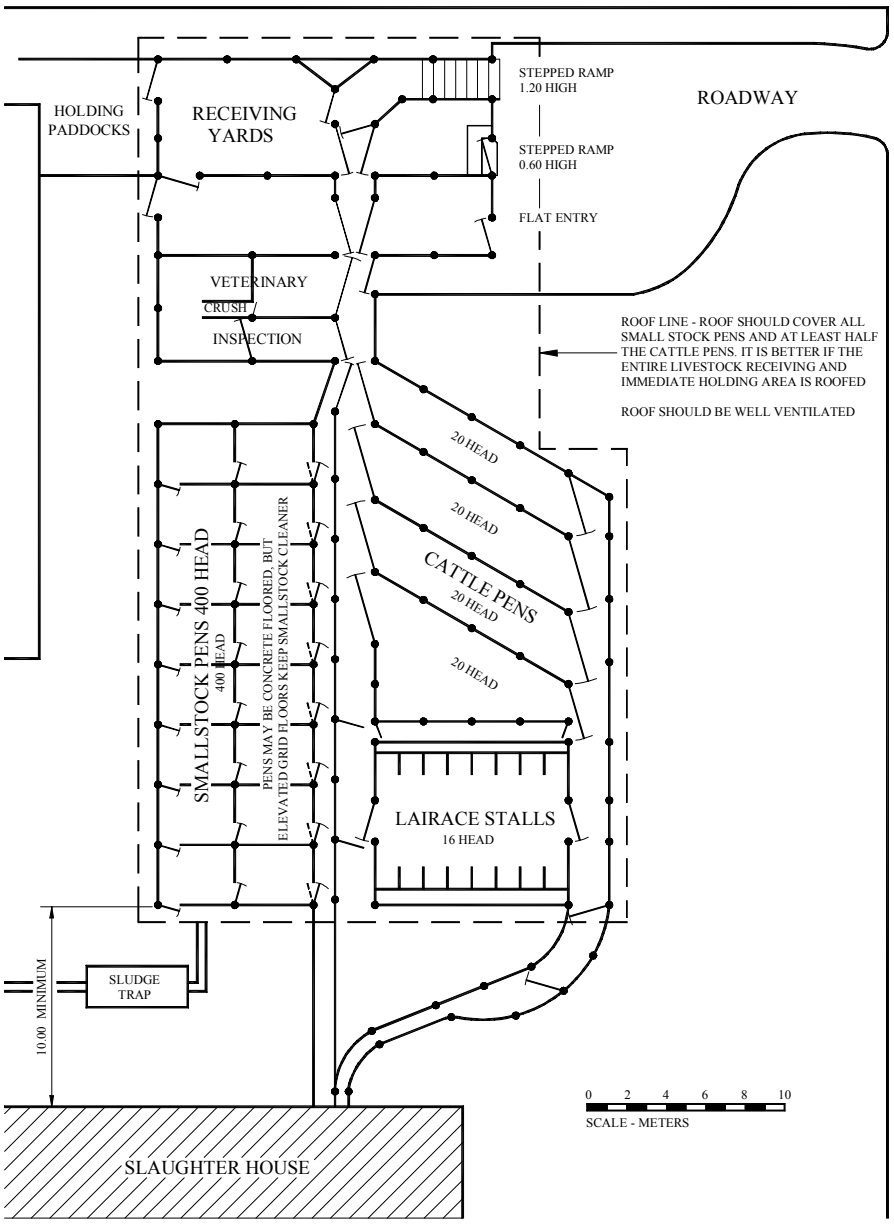
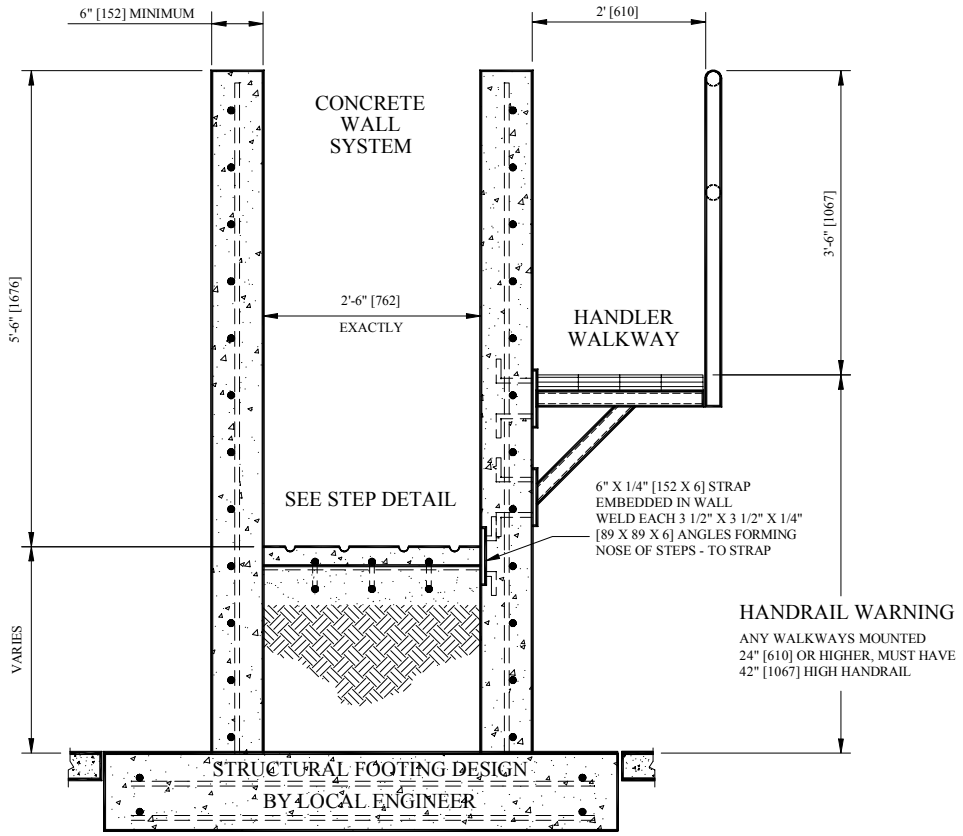
ANNEX A
(Informative)

Typical Layout of a Lairage



ANNEX B
(Informative)

Typical Layout of a Permanent Ramp



PARTIAL END VIEW

ANNEX C
(Informative)

Typical Layout of a Concrete Step Detail