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Agricultural Structures – Lairage – Ruminants

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Foreword

With the endorsement of the Philippine Agricultural Engineering Standards (PAES) Task Force, the Bureau of Agriculture and Fisheries Standards (BAFS) undertook the revision of the PAES Agricultural Structures – Lairage for Swine, Small and Large Animals (PAES 410:2000) in 2017. Technical Working Groups (TWG) were created through Special Order (SO) No. 487, series of 2017 (Creation of the Technical Working Group for the development of PNS for Cattle Restrainer and for the revision of PAES for Slaughterhouse and Lairage) and SO No. 322, series of 2019 (Creation of Technical Committee and Technical Working Group for Agriculture and Fishery Products and Machinery Tools and Equipment). These TWGs were composed of representatives from the government agencies, academe, and private sector. The revised PAES, which is now a BAFS PNS, is divided into two (2) parts: Swine and Ruminants. The PNS for Agricultural Structure – Lairage – Ruminants aimed to provide guidance to national and local authorities, engineers and other technical personnel, traders, processors, and other relevant stakeholders on the design of lairage for slaughterhouse of ruminants intended for human consumption. The final draft standard was reviewed through a series of stakeholder consultations and TWG meetings conducted via online platforms.

This BAFS/PNS edition includes the following significant changes relative to the previous PAES 410:2000:

1. Revision on the scope of the standard to focus on ruminants;
2. Removal of the provisions in the standard pertaining to swine;
3. Inclusion of additional terms and definitions in Clause 3 – Terms and Definitions;
4. Deletion of “tie-up” and “loose type” from the terms and definitions and throughout the standards;
5. Inclusion of Clause 7 - Construction and Structural Requirements;
6. Amendment of provisions for space requirements, drinking facilities, unloading area, lighting, drainage, fences, gates and dividers, chute, storage of supplies, and waste disposal;
7. Amendment of Annex A;
8. Inclusion of typical lairage drainage design attached as Annex B;
9. Inclusion of sample concrete cover for drainage canal attached as Annex C; and
10. Inclusion of Occupational Safety and Health Standard (OSHS) Rule 1074.01-1074.03 requirements attached as Annex D.

This Standard cancel and replaces the provisions for ruminants recommended by PAES 410:2000 – Agricultural Structures Lairage for Swine, Small and Large Animals.

This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2.

Contents

1 Scope

This standard specifies the general requirements of lairage for ruminants. This standard shall provide:

1.1 general requirements for site selection, design and construction;

1.2 essential requirements for the its eventual operation;

1.3 protection and convenience of the slaughterhouse personnel; and

1.4 protection and promotion of animal welfare.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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3 Terms and Definitions

For the purpose of this standard, the following terms and definitions shall apply.

3.1
chute
passageway for the animals that connects the lairage to the slaughtering area

3.2
downer
animal that is unable to move/stand

3.3
emergency slaughter
killing as soon as possible to prevent further suffering of the animals like downers

3.4
finished floor line
uppermost surface of a floor once construction has been completed

3.5
isolation pen
designated compartment in the lairage used to separate sick and injured animal identified at the unloading area and ante mortem inspection

3.6
lairage
place where the animals can rest prior to slaughter

3.7
large ruminant
refers to cattle, carabao and buffalo

3.8
live weight
weight of the live animal prior to slaughter

3.9
slaughterhouse
abattoir
premises that are approved and registered by the competent authority or official agency having jurisdiction in which food animals are slaughtered for human consumption

3.10
small ruminant
refers to sheep, goat, and deer

3.11
suspected animal
any animal presented for slaughter showing physical or physiological abnormalities that may lead the authority to pass or condemn until final judgement can be ascertained and therefore requiring further inspection and/or examination

3.12
transport vehicle
means of transporting animals, including but not limited to trucks, tractors, trailers, or utility vehicles

4 Location

4.1 As an integral part of the slaughterhouse, the same location requirements stated in PNS/BAFS/PABES 306:2020 Agricultural Structure – Slaughterhouse for Ruminants shall apply to the lairage.

4.2 The lairage shall be constructed at least 10 m away from the slaughterhouse.

5 Space Requirements

In general, the space requirements based on live weight of the ruminants are shown in Table 1.

Table 1 - Lairage Densities for Ruminants

Large Ruminant		Small Ruminant	
Weight (kg)	**Area (m^2/head)**	**Weight (kg)**	**Area (m^2/head)**
30-50	0.21-0.35	30-50	0.21-0.32
50-100	0.35-0.58	50-100	0.32-0.54
100-150	0.58-0.80	100-150	0.54-0.71
150-200	0.80-0.97	>150	>0.71
200-300	0.97-1.26		
300-400	1.26-1.51		
400-500	1.51-1.74		
500-600	1.74-1.96		
600-700	1.96-2.16		
>700	>2.16		

5.1 The pen width should from 3.5 m to 4.2 m while the alley width should be 0.80 m.

6 Functional Requirements

6.1 Unloading Area

6.1.1 Unloading area shall be impervious and properly drained.

6.1.2 Parking shall be provided for vehicles transporting ruminants to the lairage.

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

6.1.4 Area for washing and disinfecting of vehicles shall be provided.

6.1.5 There shall be equipment for injured/downer ruminants to facilitate emergency slaughter.

6.2 Unloading dock and ramp

6.2.1 Floor ramp extensions or tailgate shall be provided in such a way that there shall be no gap between the truck and the unloading dock.

6.2.2 The unloading dock length shall be at least 2 to 3 m.

6.2.3 The unloading dock shall be made of solid side fences with at most 50 mm gap at the bottom for easy washing of the concrete flooring.

6.2.4 There shall also be a separate entrance gates or ramps for ruminant that cannot be unloaded directly to the dock.

6.2.5 The maximum recommended angle for ramps should be 20°.

6.2.6 For single-file unloading, the width of the ramp shall be 0.35 m to 0.43 m. For double-file unloading, the width shall be doubled and constructed with a middle partition.

6.2.7 The partition and the side fences shall be made of solid material.

6.2.8 There shall be a 0.61 m catwalk for the human handler at both sides of the dock and ramp.

6.2.9 The recommended ramp and dock configuration attached to the lairage are the following:

6.2.9.1 Permanent dock and ramp

A separate dock and a separate ramp should be permanently built to the elevated lairage. The dock is an elevated area for unloading ruminants carried by larger transport vehicle/s, while the ramp is an inclined area for unloading ruminants carried by smaller transport vehicle/s. The illustration of permanent dock and ramp is shown in Figure 1.

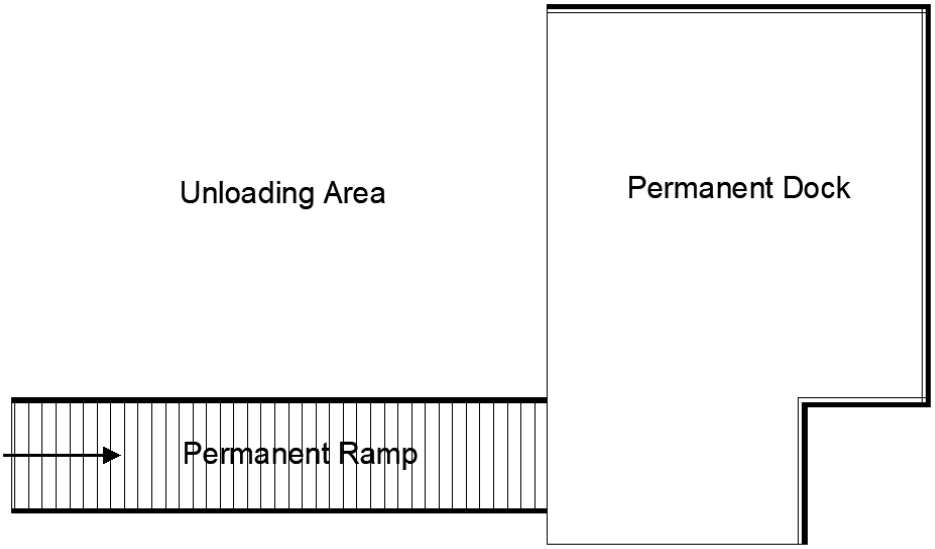


Figure 1 – Permanent dock and ramp

6.2.9.2 Permanent multilayer dock with ramp

A permanent dock should have at least two height levels connected to a single permanent ramp. The illustration of permanent multilayer dock and ramp is shown in Figure 2.

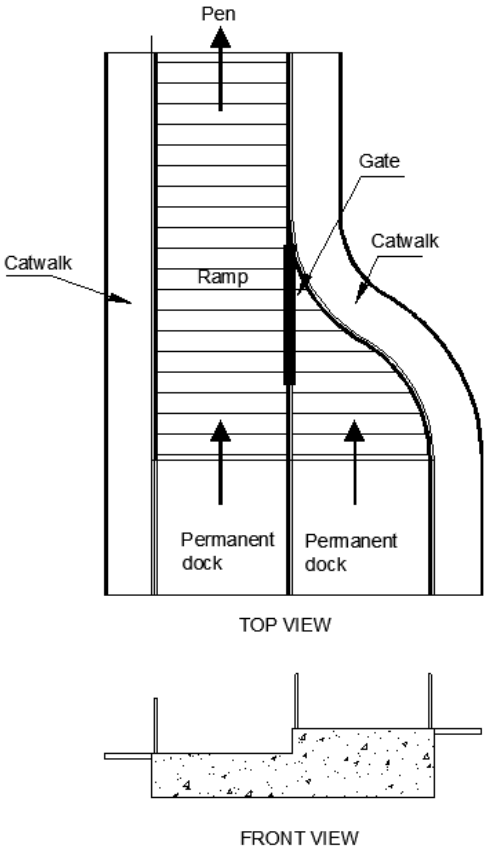


Figure 2 – Permanent multilayer dock with ramp

6.2.9.3 Permanent dock and adjustable ramp

A permanent dock with adjustable ramp attachment/provision should be built to cater to any vehicle height. The illustration of permanent multilayer dock and ramp is shown in Figure 3.

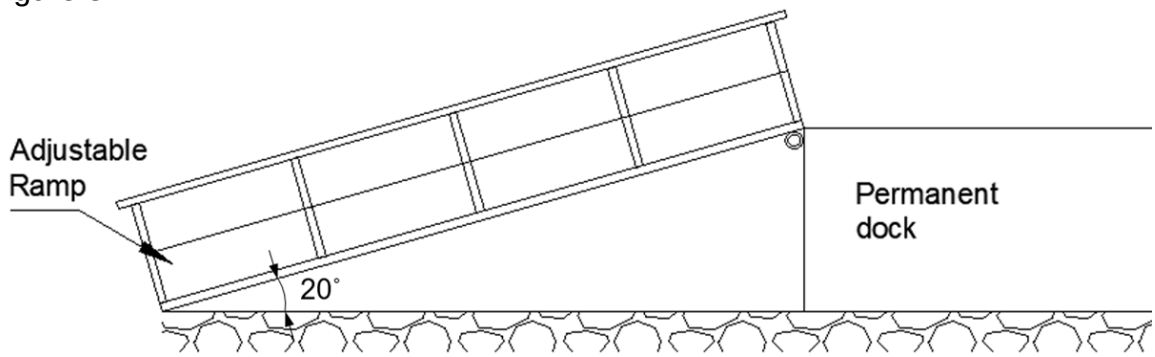


Figure 3 – Permanent dock and adjustable ramp

6.3 Pens and Alleys

6.3.1 When a holding facility is designed, space shall be allocated for specialized functions such as weighing, sorting, washing, or checking animal identification.

6.3.2 The number of pens should be sufficient for at least the number of ruminants to be slaughtered for one day. There should be separate pens for small and large ruminants. Sample pen layouts are shown in Annex A.

6.3.3 The alleys shall have solid sides to facilitate handling as they eliminate visual distractions.

6.3.4 All gates and walls shall be uniform. The contrast in color and texture for all gates and walls and lighting shall be avoided.

6.3.5 There shall be a provision for a separate isolation pen for suspected ruminants or ruminants requiring further observation. Separate isolation pens shall be provided for large and small ruminants.

6.3.6 There shall be wall dividers separating the ruminants not of the same batch or group with a minimum height 1.5 m for large ruminants and 1.2 m for small ruminants.

6.4 Chute

6.4.1 There shall be provision for a shower area before entering the chute.

6.4.2 The chute shall be made of a solid concrete wall and shall follow a curved path leading to the slaughterhouse.

6.4.3 The width of the chute should be enough to facilitate the forward movement of the ruminant but not large enough that will enable backing. Typical dimension of chute for small and large ruminant is shown in Figure 5 and 6, respectively.

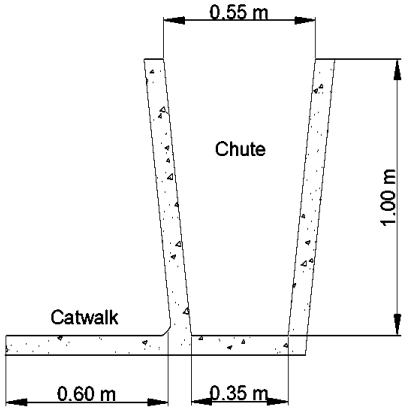


Figure 5 – Small Ruminants Chute

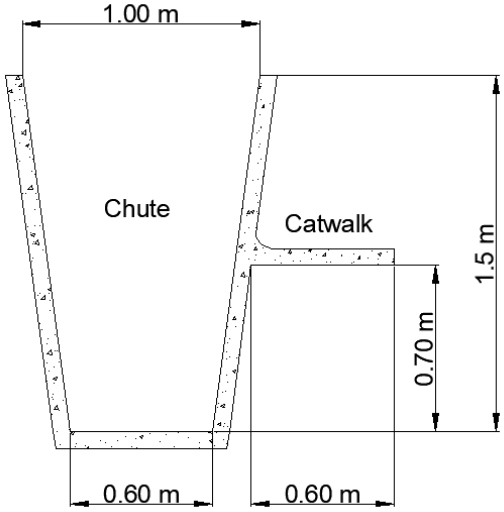


Figure 6 – Large Ruminants Chute

6.4.4 The chute for small ruminants shall be either double or single lane.

6.4.5 For the double lane, the inner side should be made of pipes or a “see-through” partition.

6.4.6 Catwalks shall be provided alongside the chute. The catwalk and chute shall be roofed and well ventilated.

6.4.7 Gates located in the chute should be made of expanded metal or closely spaced bars.

7 Construction and Structural Requirements

The provisions for the design, construction and structural requirements shall conform with the existing National Structural Code of the Philippines and National Building Code of the Philippines.

7.1 Floor

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

7.1.2 For large ruminant pens, the floor slope shall be at least 3^{o} toward the open canals.

7.1.3 The pen floor should either be any of the following:

a) concrete slats oriented perpendicular to the walk-way direction without light or reflections from the water under the slab; or

b) deep 2.5-cm "V" grooves in a 20 cm square or diamond pattern in the alley.

7.1.4 The flooring material from the chute to the restrainer box shall be of similar color or material to prevent balking.

7.1.5 All angles between the floors and walls shall be concaved to a height of at least 7.62 cm from the floor.

7.1.6 The drainage grids should be placed at the sides of pens and passageways and not where ruminants may cross them.

7.2 Wall (divider)

7.2.1 For cattle pens, Galvanized Iron (G.I.) pipes of 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 for large ruminants and 1.2 m for small ruminants.

7.2.2 The design of facilities should take into account the protection of the ruminants from extreme weather conditions and should provide effective ventilation.

7.2.3 Sharp corners and projections/protrusions of any kind in the wall (divider) shall be avoided.

7.3 Roofing

7.3.1 The roof shall be designed to provide effective ventilation.

7.3.2 The roof framing shall be made of timber or galvanized steel.

7.3.4 The roofing materials should be made of galvanized steel or other forms of corrosion resistant sheeting.

7.4 Watering Facilities

7.4.1 Drinking water shall be provided and made available to the ruminant. Each pen should be provided with a self-filling drinking trough.

7.4.2 The drinking trough/open tank drinking system shall be constructed and positioned in such a way that it is readily accessible, easily to clean, firmly fixed and shaped, cannot be readily soiled, and located where the possibility of injury to ruminants is minimized. Detail of a typical circular and longitudinal drinking trough for large and small ruminants is illustrated in Figure 7 and 8, respectively.

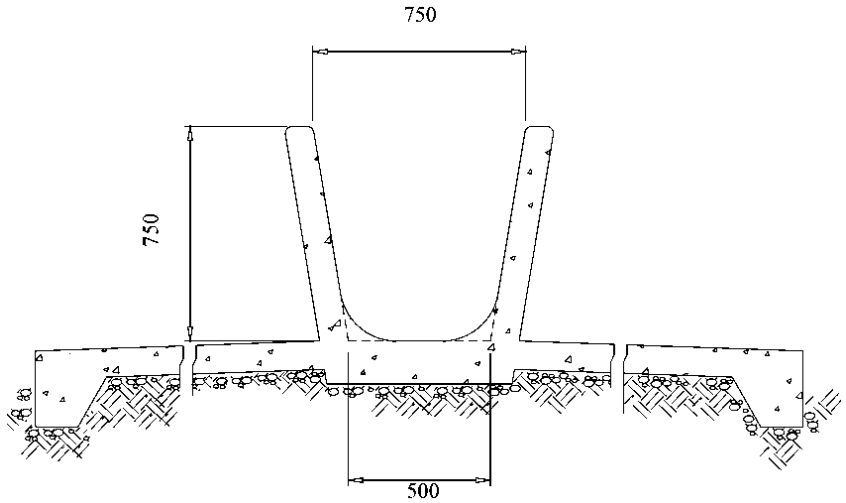


Figure 7 - Large Ruminants typical cross section of a water trough, (in mm)

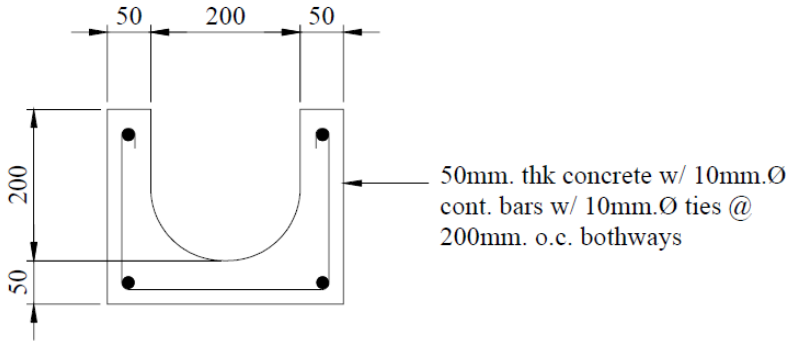


Figure 8 – Small Ruminants Concrete Water trough

7.4.3 For the open water tank, 2-m long, 750 mm wide tank shall be provided for eight (8) to ten (10) heads large ruminants, while 300 mm wide tank shall be provided for 15 to 25 heads small ruminants.

7.4.4 If automatic waterer is used, one (1) bowl or nipple shall be provided for four (4) large ruminants placed at a height of 1 m. For small ruminants, one (1) bowl or nipple shall be provided for ten (10) small ruminants.

7.4.5 Hydrant points shall be located in all parts of the lairage to provide a water supply for clean-up and washing of animals.

7.4.6 All water lines in the working area shall be installed overhead and equipped with a hose with a nozzle which is extended 1 m above the finished floor line.

7.4.7 There shall be a power wash at the holding pen for cleaning purposes.

7.4.8 Watering devices shall be placed in an area where spilled water is easily drained.

7.5 Lighting

7.5.1 An illumination of 110 lux shall be provided within the lairage at the height of the animal level.

7.5.2 For all isolation pens, a lighting intensity of not less than 540 lux shall be provided.

7.5.3 The lighting should be adequate and uniform across the holding pens, ramps, and raceways to aid animal movement, effective handling, and inspection of livestock.

7.6 Drainage

7.6.1 Each pen shall have an individual outlet connected to the drainage line. Flooring toward the outlet shall have a 2% slope. Annex B shows the drainage flow diagram and cross-sectional area of the canals.

7.6.2 Catch basin/s shall be provided in the mainline before the wastewater enters the waste treatment facility.

7.6.3 The catch basin shall be provided with detachable corrosion-resistant strainer and shall be easy to clean.

7.6.4 Wastewater drainage canal outside the lairage to the wastewater facility shall be covered with a detachable concrete cover. The sample design is shown in Annex C.

7.7 Fences, Gates and Outside Wall

7.7.1 The gates and fences shall be made of rust resistant metal pipes.

7.7.2 The outside wall shall be made of concrete.

7.7.3 Protruding nails, bolts, angle irons, exposed pipe ends, channels, and the like, shall be avoided to prevent harm and cause accidents to ruminants.

7.7.4 Round pipe posts shall have a diameter of at least 63.5 mm.

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

7.7.6 The gates shall be positioned in a way that will ensure smooth traffic flow.

7.7.7 Ruminants shall enter at one end of the building and leave at another end.

7.7.8 The side corridors, if necessary, shall be at least 0.6 m.

7.8 Storage of Records and Supplies

A small rust-resistant metal cabinet shall be provided for the storage of records and supplies such as pliers, slap tattoo, ink, stamping pad, marker, and other documents.

7.9 Waste disposal

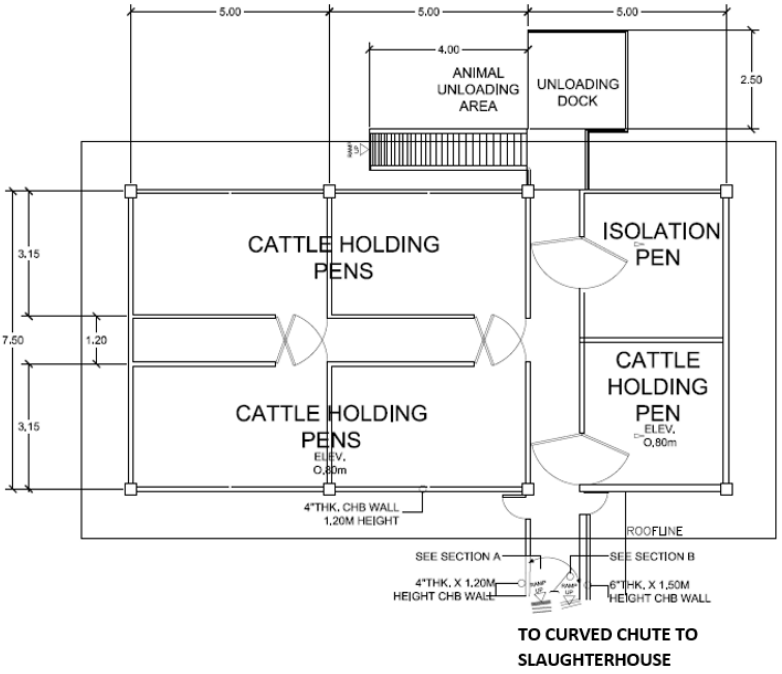
Waste disposal requirements shall conform to PAES Agricultural Structures - Waste Management Structures (PAES 414:2002). A waste disposal system shall conform to the effluent and environmental standards set by competent authorities.

7.10 Noise Level

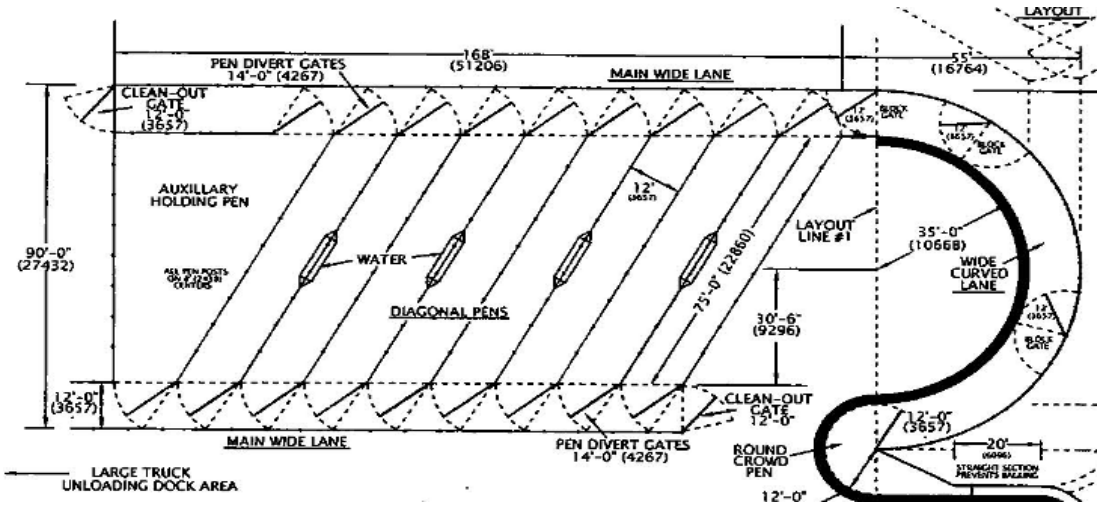
The noise level should conform with the provisions given in Annex D.

Annex A
(informative)

Typical Lairage Layout



(A)



(B)

Figure A.1 – Sample Lairage Layout for Cattle

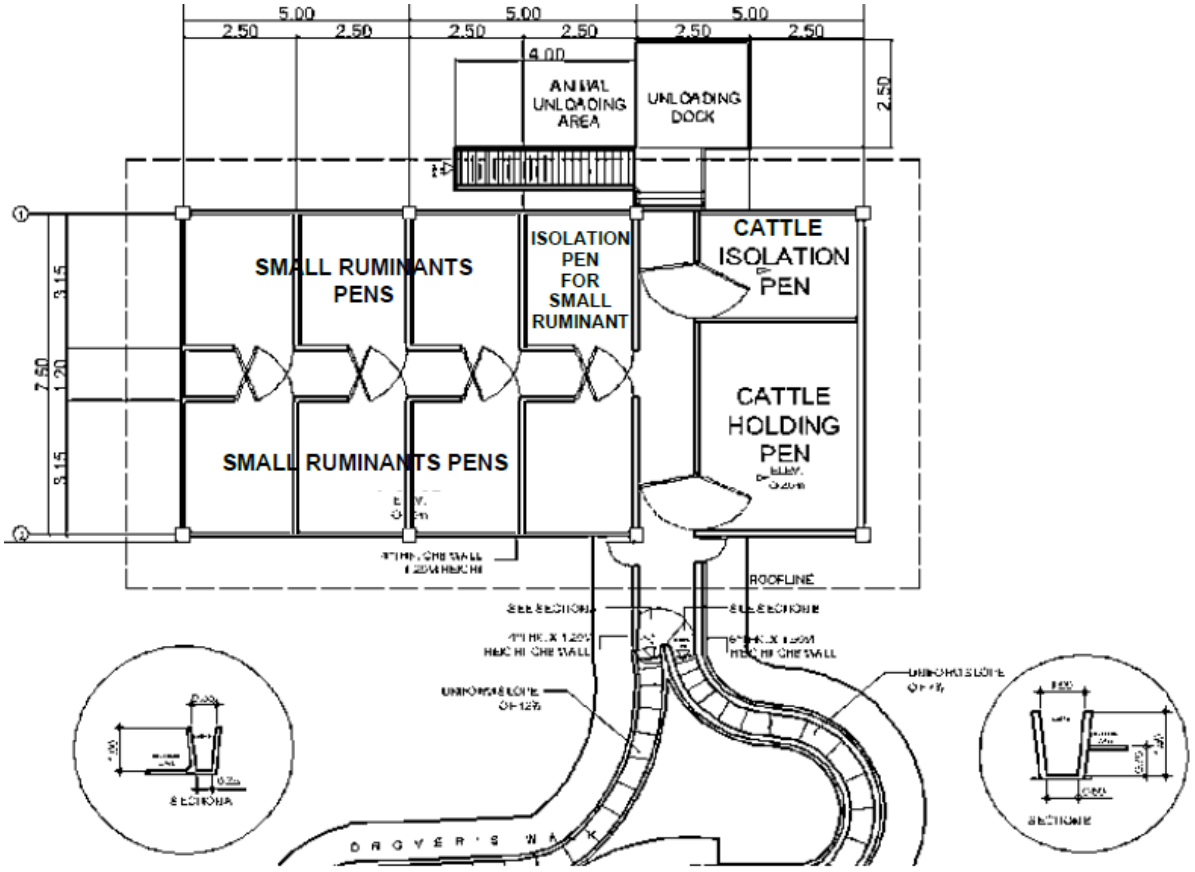


Figure A.2 Sample Lairage Layout Design for Small and Large Ruminants

Annex B
(informative)

Typical Lairage Drainage Design

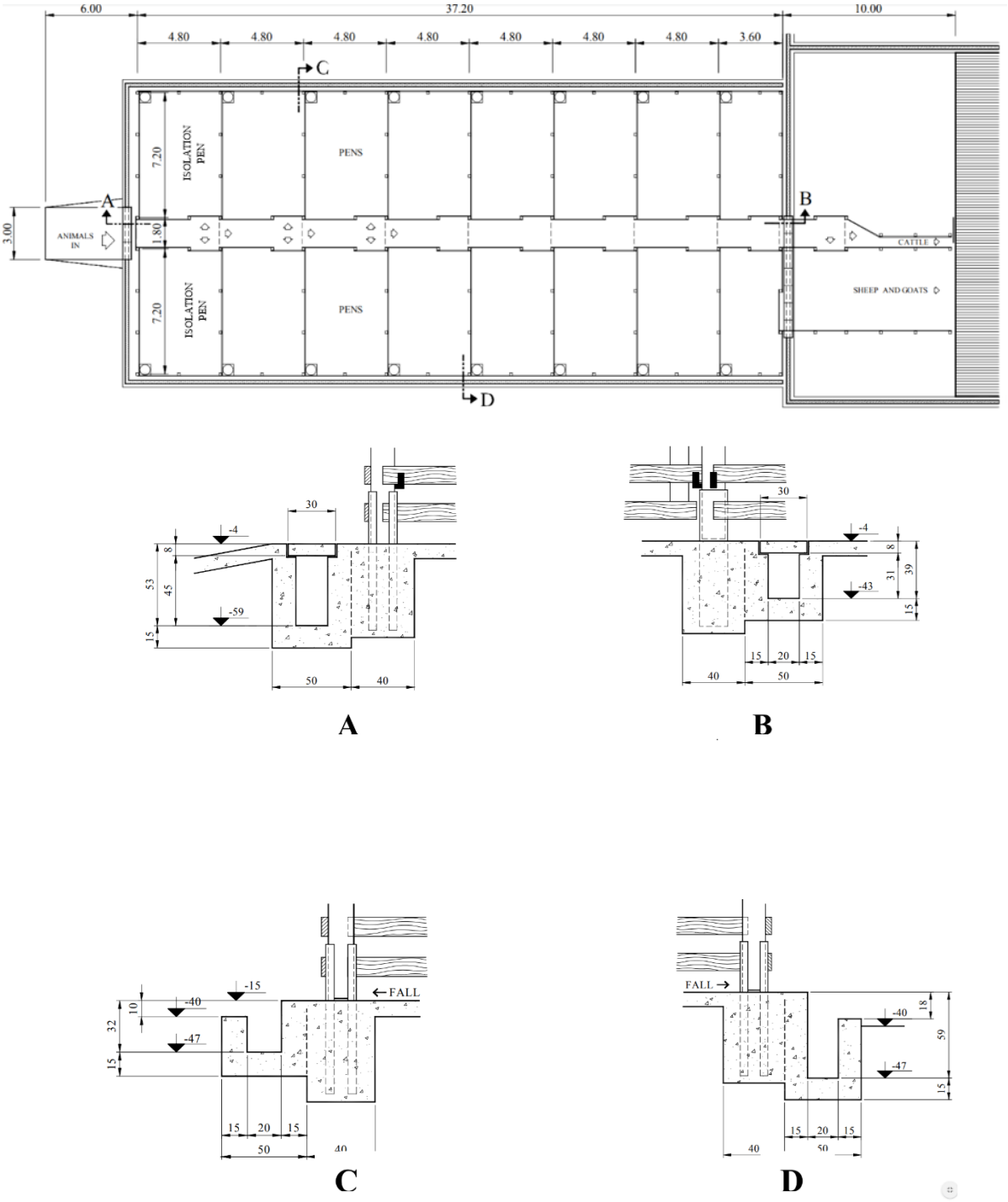


Figure B.1 – Drainage line flow and cross-sections

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Annex C
(informative)

Typical Visual Representation of Drainage Canal Detachable Concrete Cover

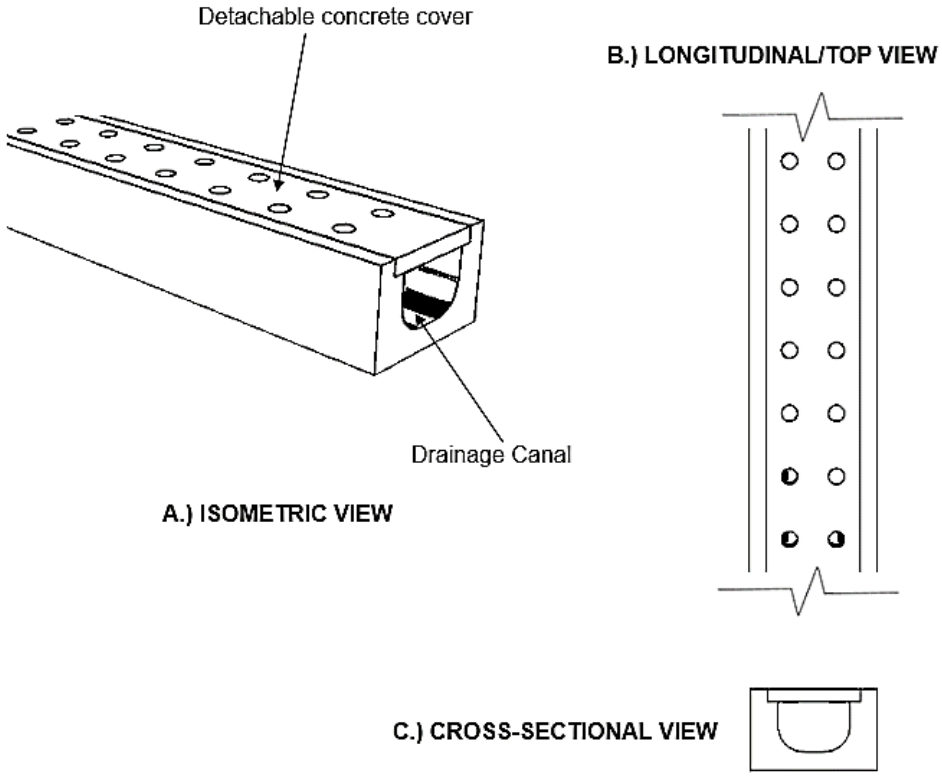

Figure C.1 - Sample concrete cover for drainage canal

Annex D
(informative)

Occupational Safety and Health Standard (Rule 1074.01 – 1074.03)

A.1 Threshold Limit Values for Noise

The threshold limit values refer to sound pressure that represents conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect on their ability to hear and understand normal speech.

Feasible administrative or engineering controls shall be utilized when workers are exposed to sound levels exceeding those specified in Table 2 hereof when measured on a scale of a standard sound level meter at slow response. If such controls fail to reduce sound within the specified levels, ear protective devices capable of bringing the sound level to permissible noise exposure shall be provided by the employer and used by the worker.

A.2 Permissible Noise Exposure

A.2.1 The values specified in Table 2 apply to total time of exposure per working day regardless of whether this is one continuous exposure or a number of short-term exposures but does not apply to impact or impulsive type of noise.

Table 2 - Permissible Noise Exposure

Duration per day, hours	Sound Levels [dB(A)], slow response
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼	115

A.2.2 If the variation in noise level involves maximum intervals of one (1) second or less, it shall be considered as continuous. If the interval is over one (1) second, it becomes impulse or impact noise.

A.2.3 When the daily noise exposure is composed of two or more periods noise exposure of different levels, their combined effect should be considered rather than the effect of each.

If the sum of Equation A exceeds one (1), then the mixed exposure should be considered to exceed the threshold limit value. However, the permissible levels found in the table shall not be exceeded for the corresponding number of hours per day allowed. Noise exposures of less than 90 dBA are not covered by Equation A.

$$X = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} \qquad (Equation\ A)$$

where: X is the sum of the ratios of C and T
C is the total time of exposure at a specified noise level
T is the total time of exposure permitted at the level

A.2.4 Exposures to impulsive or impact noise shall not exceed 140 dB (A) peak sound pressures level (ceiling value).

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