

Circular sheep yard design and construction

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Circular sheep yards can be operated by one person and a dog so this type of yard is recommended as the labour needed on farms is much reduced.

Sheep yards are the main sheep handling complex on a farm and need to be designed and built to provide efficient sheep handling. Sheep need to move well in the yards and the operator needs to conduct handling and husbandry on the sheep safely.

Good sheep yards confine and control the movement of sheep. They achieve a high quality work rate with a minimum of physical effort by enabling a free flow of sheep along movement pathways from the holding to the handling areas. This should be done in a pleasant and safe working environment for humans and animals alike so that a high standard of work can be maintained throughout the mob.

Well designed sheep yards can incorporate the tools for precision sheep management that allow increasing on-farm profitability by measuring, managing and marketing sheep on individual merit while easing the requirement for labour. Using auto-drafting machines in sheep yards helps facilitate the capture of accurate data on individual animals and significantly reduces the labour and cost required to process animals through yards for management purposes.

Occupational health and safety

A well designed and built set of yard facilities will remove the work hazards and risks by engineering solutions to many of the OH&S risks identified

in the audit of your old sheep yards. Operator and animal safety is the aim of good yard design so that a high work rate can be safely achieved. Conduct a workplace hazard assessment in the existing sheep yards and identify the OH&S risks in that design. Then start the design process for a new set of sheep yards and at the same time engineer solutions to the identified risks and provide simple and safe work methods statements for the new yard once constructed.

Site selection

Consider these factors:

- ease of access from all parts of the property;
- position of the shearing shed, dip and truck access;
- slope of land to assure good drainage;
- ease of building yards – materials, natural slope, and soil texture;
- effect of prevailing winds on working conditions and dust control;
- situation of the yards in relation to existing trees which can provide shade and protection;
- access to a water supply for livestock drinking, dust control, and cleaning.

Yard size

The main yards should be large enough to handle the biggest mob on the property. Yard size is determined by a combination of the selected design, the capacity of the working race and the size of the mob to be handled. The holding yards should be large enough for mobs of ewes and lambs at weaning. Adjoining mini-paddocks of about half a hectare including a water point



increase the number of mobs that can be handled in a set of yards.

Provide 1 m² per three sheep in forcing areas and at least 1 m² per sheep in holding areas.

Design

When designing sheep yards keep the following points in mind:

- Sheep have wide angled vision – they can detect movement behind them without moving their heads.
- Sheep should have a clear, unobstructed view towards where they are meant to move.
- Whenever possible use wide gates to maintain good sheep flow.
- Ideally sheep should take a familiar route and direction through the yards for all handling operations.
- Entrances to sheds, loading ramp, and dip should be placed along the route sheep usually take through the yards.
- Sheep move better on the flat than up or down hill. If the land slopes, the direction of movement should be across the slope rather than up or down hill.
- Sheep can cope well with one change of status at a time – go up a ramp; go onto the flat landing; go through a gate; go around a corner; go into a shed or a truck. Do not try to get sheep to do more than one change of status at a time or they will have trouble and cause a blockage in movement pathways.
- Sheep move readily towards light and avoid dark areas, shadows and dead ends.
- Sheep move willingly around curves and corners into narrow races.
- Sheep follow one another, and the use of see-through panels may encourage them to move.
- Take sheep behaviour into account when positioning handling facilities – generally sheep will move towards the receival yards in anticipation of escape or release to their paddock.
- Oncoming sheep must not see the operator. Closed and slightly higher panels on the operator's side of the force obscure the view of other sheep moving in the yards and the operator. The sheep in the force focus on the sheep in front of them and in the direction of movement without distraction.

- Sheep in the force should not be able to see behind them. Closed panels on the back of the bugle-shaped force achieve this.

Layout

The overall layout of a sheep yard should have some separation between holding areas and movement pathways. The drafting race is led to by a curved force in a U-bugle, Y-bugle, D-shape or half circle yard. These are variants on the theme that sheep move in a circular motion in response to attack by a predator. The sheep flow patterns are similar in these curved designs using a curved force leading from the holding area to the handling area. Sheep enter a separate race or a combined drafting and working race through a common bugle entry, as shown in Figure 1.

A major advantage of circular yards is the continuous flow of sheep through the main handling area. The design uses the natural circling instinct of sheep to encourage them to keep moving. The bugle entry takes advantage of this and the operator uses less labour moving about the yards. The curve of the bugle and the placement of the drafting and working races allow the operator to be close to the sheep at all times.

Sheep move better if they always travel through the yards along a familiar route and in the same direction from their paddock, through the yards and return to their paddock. Sheep learn the pathway and are happy to move along it as a mob. The common force can be used to deliver sheep to the scales, a handling machine, the drafting race, the working race, the dip or the shearing shed. The circular design also delivers sheep back to an exit yard.

Circular yards do not need as much heavy duty fencing as rectangular yards and substantial cost savings result due to the use of lighter materials for the holding and receival areas. Heavy construction is required in the force and main handling areas where sheep pressure is high.

Construction

Planning

Select the best available site, and then choose a plan that suits it. Estimate the materials required, measure and list the types and lengths of posts and panels needed for the yards, races, gates and loading ramp. Cost all materials and allow for concrete where appropriate in the main sheep handling areas.

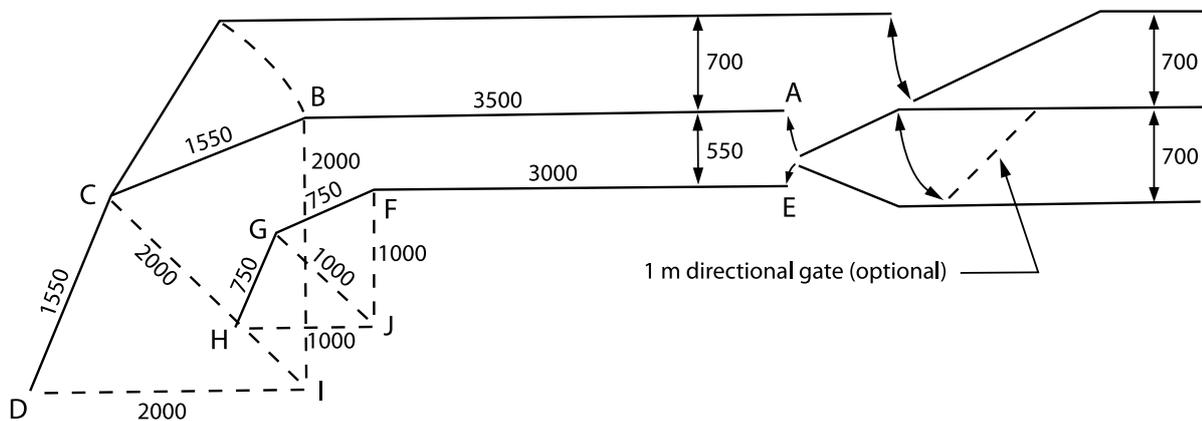


Figure 1. Bugle entry to drafting and working race showing dimensions for laying out the bugle. Dimensions in mm.

Pegging out

Yards must be completely pegged out before construction begins. Peg all key structures according to the plan in the following order:

- drafting race and bugle entry;
- working race and forcing area;
- main holding and receival yards;
- gateways.

Position the key pegs first, and use a tape to measure, square and string line to place the rest of the pegs. Start pegging from the drafting gates and use Figure 1 to lay out the drafting race and bugle entry; then add the working race, the holding and receival yards. Peg out the forcing, holding and receival yards and all gateways before construction begins.

Now walk through the yards to confirm that sheep will be able to do so when construction is complete. It may be useful to squat down to get a sheep's eye perspective on the yard's pathways to determine if closed or open panels are best used depending on the view and movement of humans and sheep adjacent to that area. Think about how a sheep will react to what you can see when the yards are built and design yards that will facilitate good sheep behaviour.

Building

Commence building with the sheep handling areas and then add the forcing pathways and the holding and receival yards. Any mini paddocks and laneways can then be built to suit your farm plan.

Drafting race

Good drafting races allow sheep to be identified and separated with a minimum of error and effort. Continuous single-file movement of sheep is essential and three-way drafting is adequate for

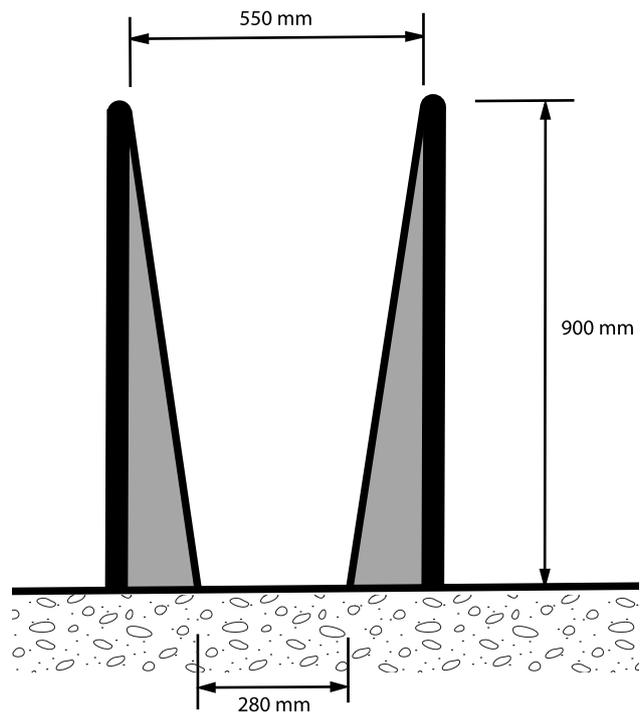


Figure 2. Cross section of a drafting race with inclined sides. The design encourages smooth sheep flow.

most properties. The following guidelines are provided for building good drafting races.

- A drafting race is a straight run length of 3–3.5 metres before the drafting gates, with closed panels on both sides.
- Inclined sides in a 'V' shape works well with a range of sheep sizes and prevent sheep turning as their feet are close together. The race should be 280 mm wide at the base, 550 mm wide at the top and 900 mm high (Figure 2). A vertical sided race would be 450 mm wide.
- The floor should be of a durable surface like concrete or brick and drain water runoff to a point well away from the working area.
- The direction of the drafting race should minimise the effects of sun and shade on the operator and

the sheep. A south to north direction with a flat or slightly uphill grade works well. Races running east or west should be avoided due to the effects of shadows.

- Drafting gates should be 1.2 m long with open rails as they allow better vision and are light, quick and easy to use.
- Set the handles on drafting gates 150 mm back from the front of gates so that the operator's knuckles are free as the gates come together.
- A hand-guard (150 mm pipe) welded at the very front of the gate will help prevent collisions between exuberant sheep and the operator's knuckles.
- The width between the drafting gates ranges between 450 mm with a non adjustable race and 520 mm with an adjustable race.

In circular yards with a bugle entry to the drafting race, use closed panels to prevent sheep from seeing the operator. It is advantageous to have the back of the forcing area made of a closed panel to encourage sheep to move forward through the draft.

The various circular designs use the principle of circular sheep flow:

'U' bugle design (Figure 5)

'Y' bugle design (Figure 6)

'D' bugle design (Figure 7)

Bugle with curved working race (Figure 8).

These are compared with the traditional rectangular sheep yard design (Figure 9) on page 10.

Working race

The working race is used frequently and is the focal point of many sheep handling activities. A well built race will have a long life and provide for a safe and comfortable working environment.

Use the following guidelines when building a working race:

- Roofing or shade from trees provides better conditions for the conduct of physical labour and eliminates the contrasts of light and shadow (Figure 4).
- The installation of a two-way drafting gate at the end of the working race facilitates drafting after handling such as classing, mouthing, wet/dry/lambled and lost.
- Ideally the working race should be located so that sheep are moving away from structures such

as the shearing shed or dip and on a north-south axis to minimise the effects of shadows.

- Good drainage away from the working race is important.
- Use a working race length of 10–15 m. Where a larger capacity is required consider a dual race.
- The width depends on whether the operator prefers to work inside (narrower) or outside (wider) the race. Fixed races are built 500–700 mm wide; adjustable races vary from 500–800 mm wide.
- Rails should be 850–900 mm high. An open construction of pipe timber or metal rails is recommended (Figure 4).
- The floor should have a durable surface of concrete or brick 75–100 mm thick and a slight slope for drainage at ground level; or a raised timber or metal mesh grating 250 mm above ground level.
- The floor should extend at least 300 mm beyond the width of the race to provide a walkway for the operator.
- A drafting gate at the end of the working race enables drafting after working on the sheep which can be an advantage.



Figure 3. A working race for handling rams with horns. Note: top rail design and drafting gates at the head and tail of the working race.

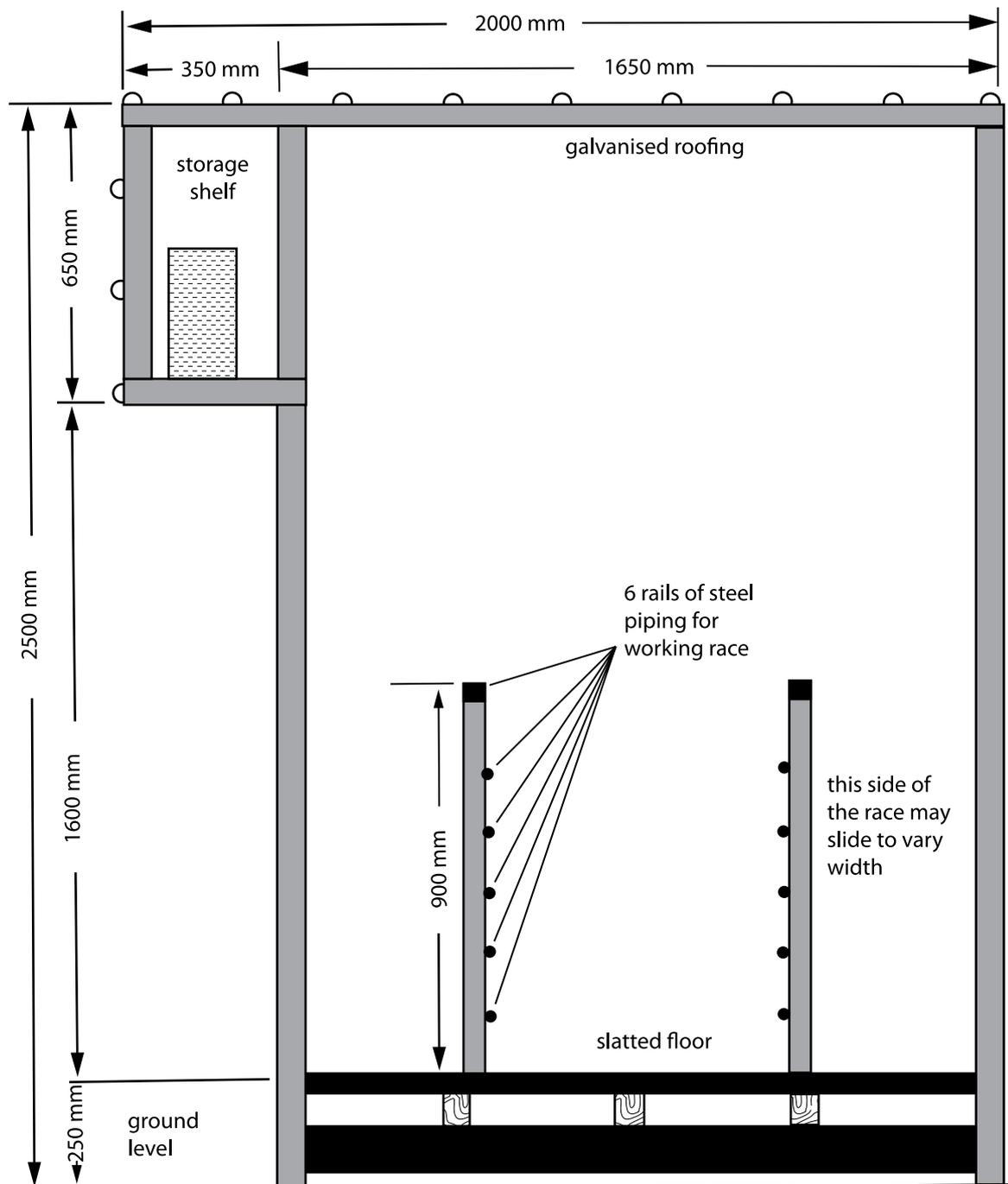


Figure 4. Cross section of a working race. Roof creates pleasant conditions and eliminates contrasts of light and shadow.

In circular-design yards with a separate working race, the same bugle entry is used to fill all handling races from the one forcing area. This is efficient as sheep take the same route and direction for all principal handling activities.

Materials

The materials you select will depend upon availability, cost on site, ease of erection, availability of construction labour and likely maintenance problems. The most common materials used are timber and steel. Fences may be made entirely of timber, especially if durable species are available on the property. Alternatively they may be made

entirely of steel or various combinations of timber and steel. Conveyor belting is a useful fence in high pressure areas as it is quiet during operation.

Fence height is a compromise between confining sheep and providing convenient access for operators and their dogs. Perimeter fences are generally 1 m high and internal fences are 900 mm high. Gates for operators provide convenient access along movement pathways when higher fences are used.

The ability of the fence to withstand the pressure of sheep in the yards depends mainly on the materials used and how they are assembled. The stability of the fence posts depends on the soil's resistance

Figure 5.

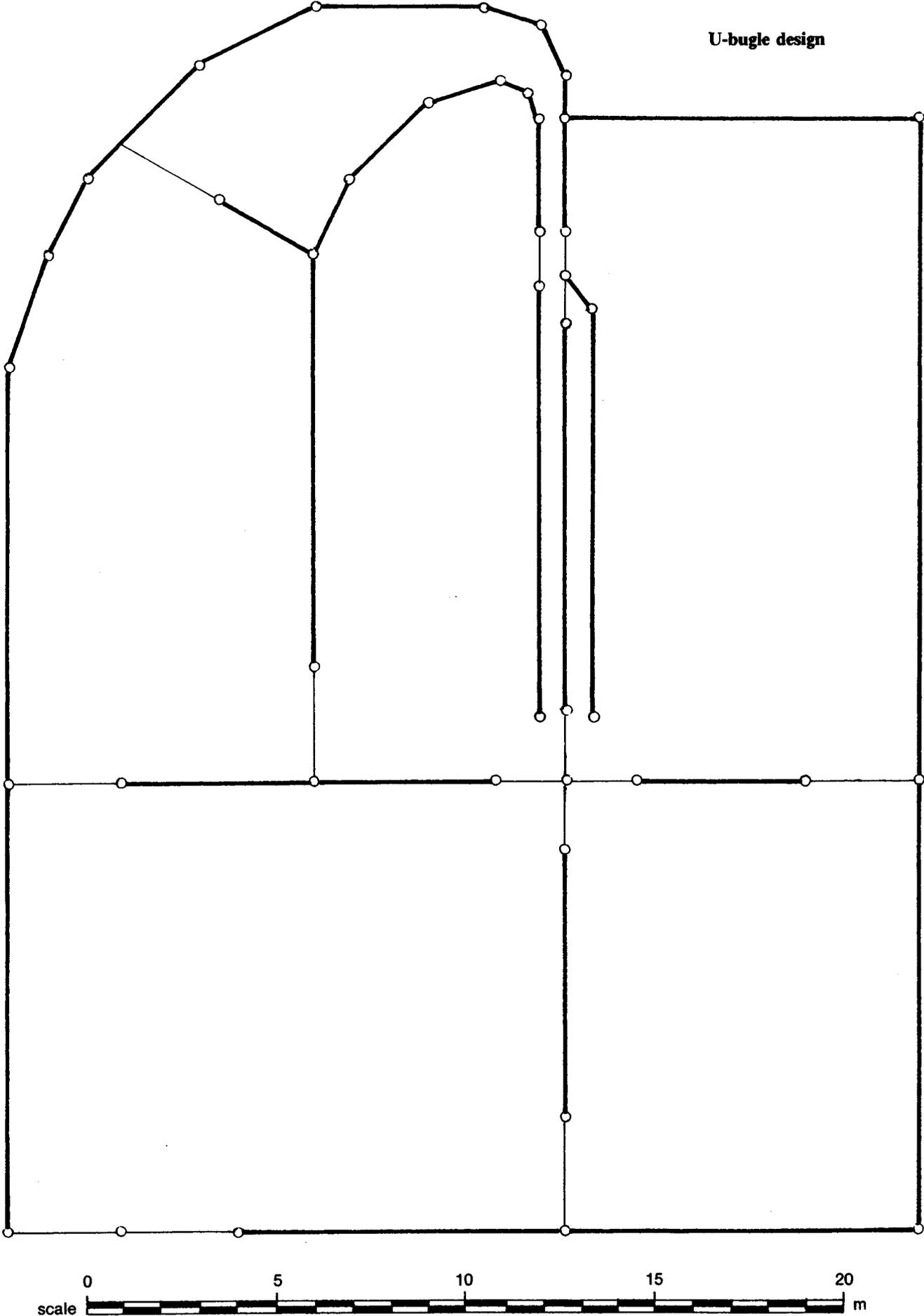


Figure 6.

Y-bugle design

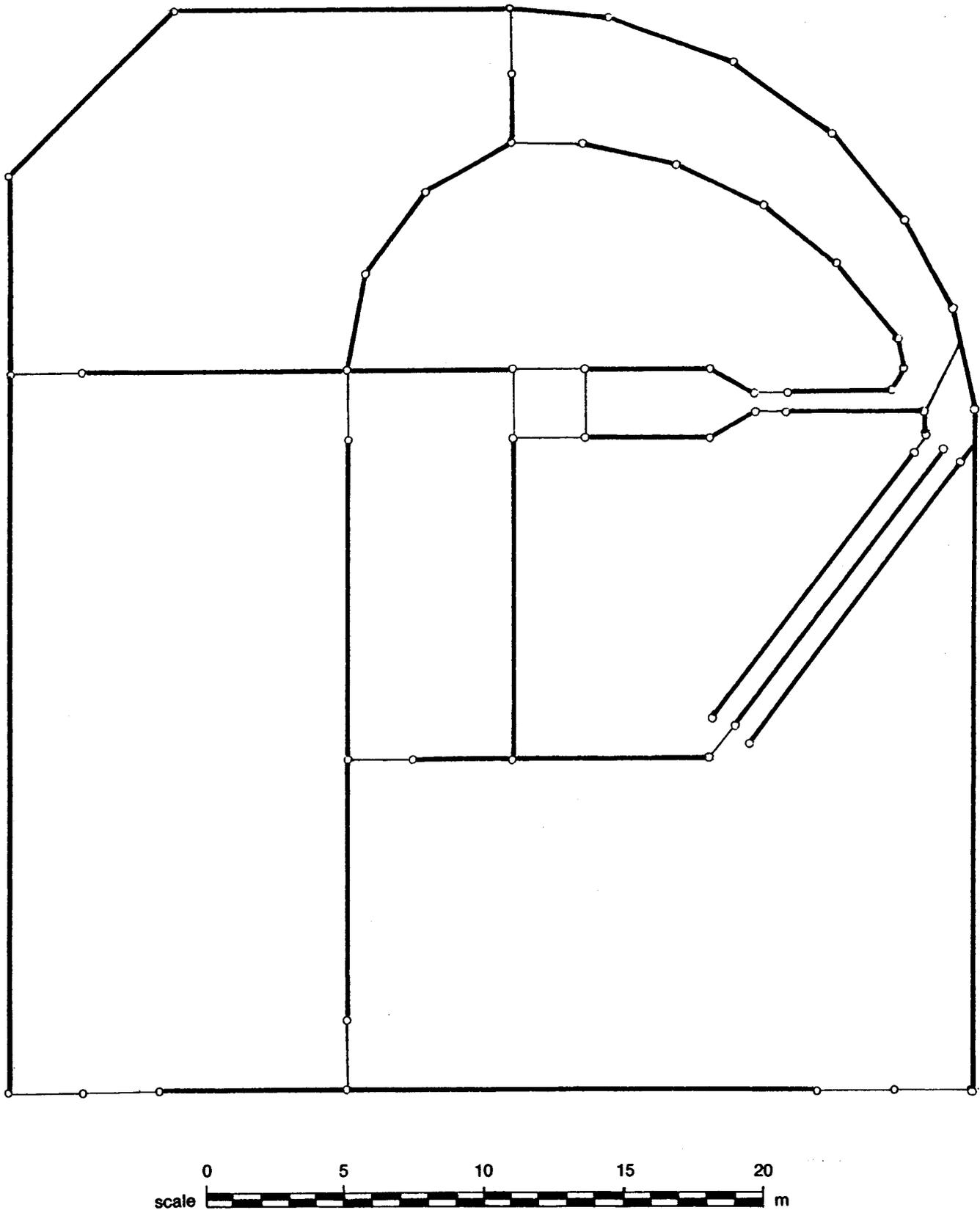


Figure 7.

D (half-circle) design

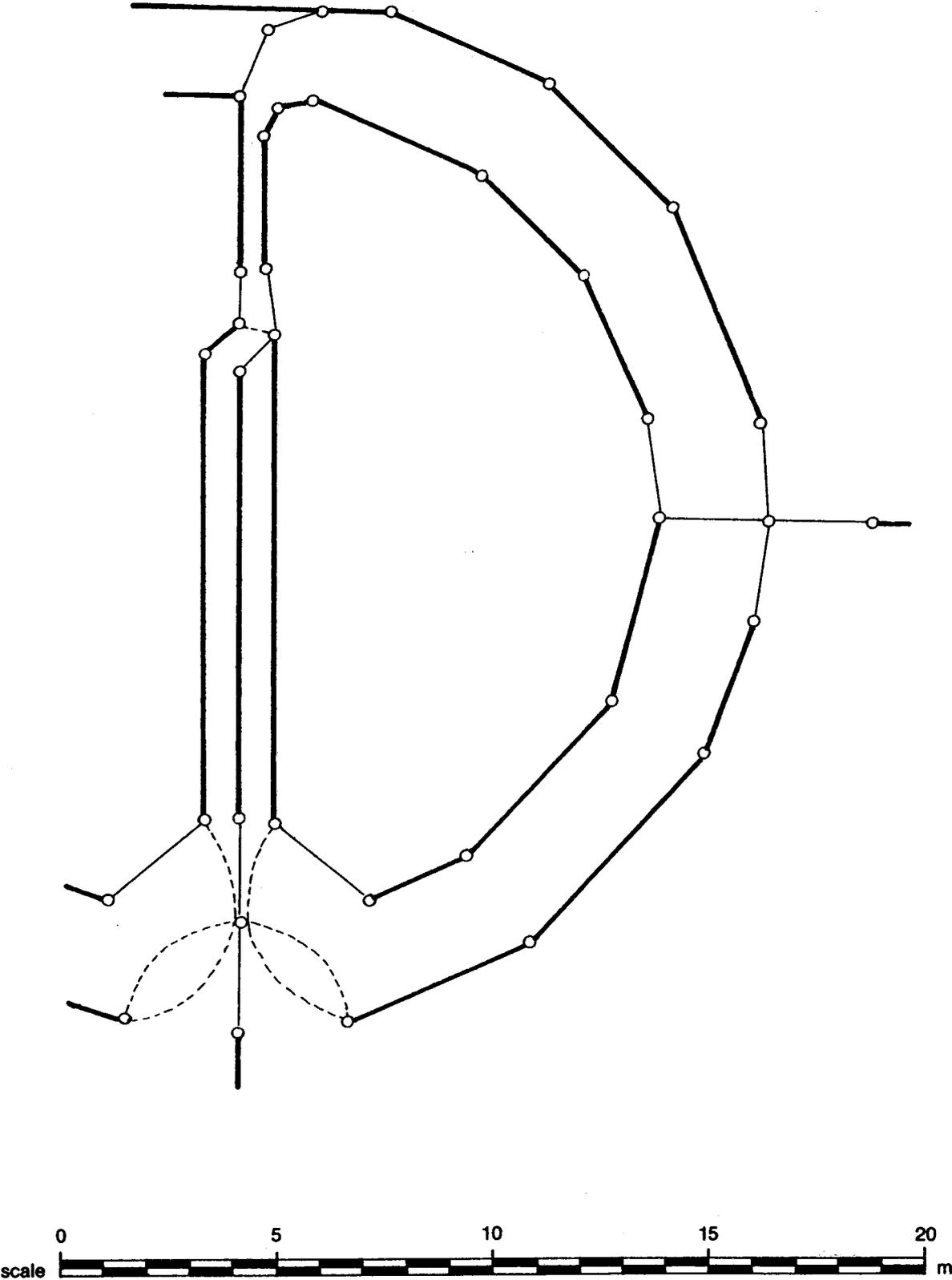


Figure 8.

Bugle with curved working race

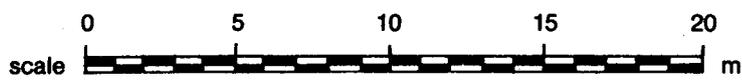
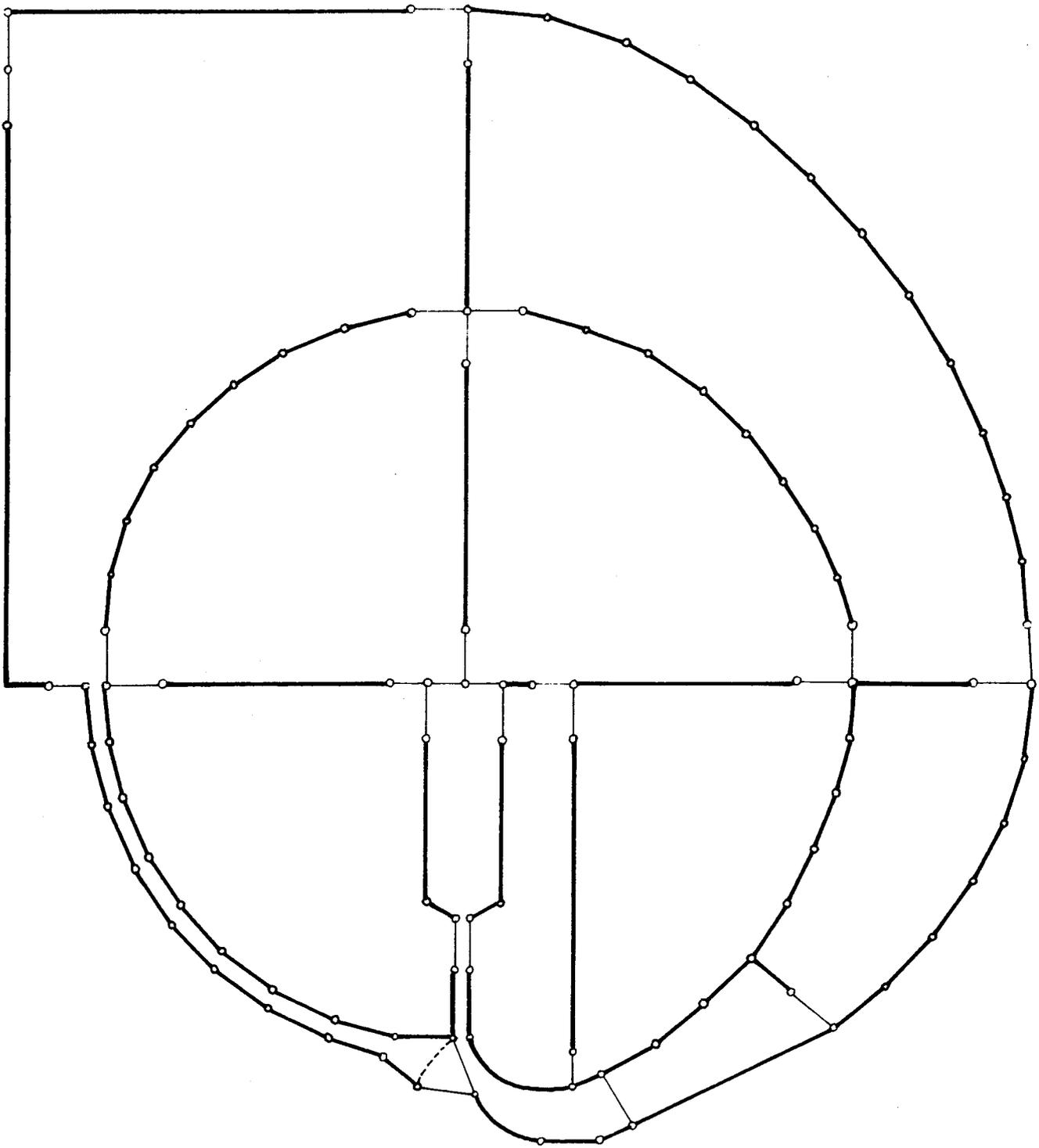
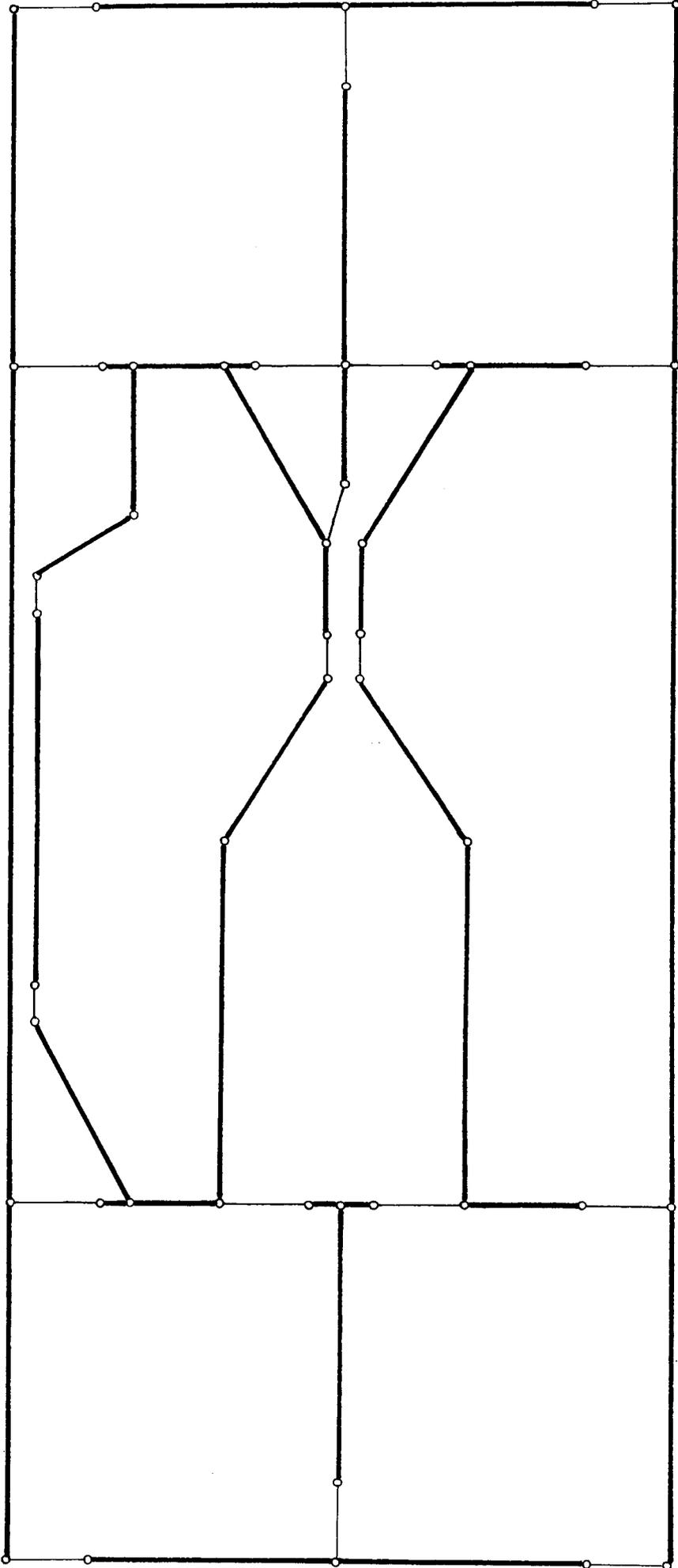


Figure 9.



scale



The traditional rectangular sheep yard design

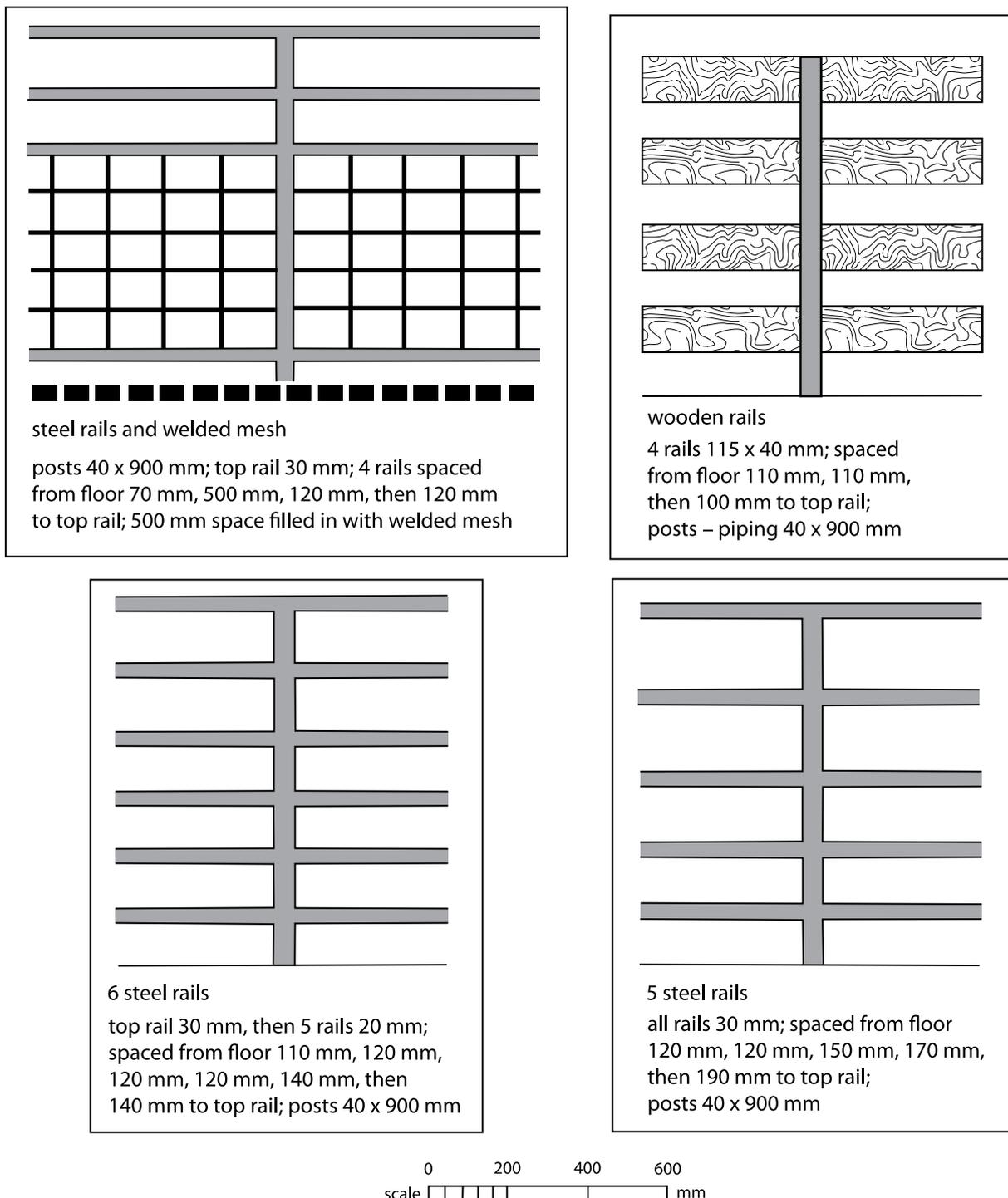
to the force applied to it; with steel posts, setting them in concrete is one way of increasing the area that is in contact with the soil. General fence posts are set into the ground to a depth of 500–600 mm. Increase the depth to 900 mm for main gate posts and posts in the forcing yards.

Post spacing is in the range of 1.8 m to 3.0 m for straight fences, however in sections of yards where there is crowding the spacing may need to be reduced. It may also be necessary to put posts closer together for correct curvature in circular yards.

Material dimensions commonly used:

- Round or split bush timber – 100 to 150 mm thick for rails and 200 to 250 mm thick for posts.
- Sawn timber 150 x 25 mm or 100 x 38 mm hardwood rails and 100 x 125 mm hardwood posts.
- Black or galvanised pipe or tube – 20NB or 25 NB rails and 40 NB or 50 NB posts set in concrete. Steel may corrode at ground level so build concrete footing up to keep posts dry.
- Steel belted rubber conveyor belting can be attached to a pipe fence 75 mm below the top rail and 100 mm above floor level.

Figure 10. Spacing of pipe rails and timber rails for sheep yard fences.



- Prefabricated galvanised mesh panels – 3 m long and 900 mm high, bolted to steel posts.
- Combination of steel mesh, steel or timber top and bottom rails and treated timber posts 75 to 100 mm diameter.

Gates

Gateways should be wide to allow smooth sheep flow and movement around yards. Gates may be built from timber or steel or combinations of the two. They should be hinged so they are quick and easy to operate.

Gate catches should be easy to maintain and simple to operate. Chain and slot, tongue and slot, chain and loop and sliding bolt are all examples of effective gate catches.

Yard surface

The yard surface needs to be solid, durable and well drained so that sheep movement is continuous on a firm surface.

Handling races may be surfaced with concrete, brick, timber or metal grating. Sheep pathways may be surfaced with concrete, brick or gravel.

Holding yards may be surfaced with gravel if the existing soil type is unsuitable. Alternatively the stability of clay soils can be increased by thoroughly mixing 3 per cent builders lime (calcium oxide in either burnt or hydrated form) with the top 15 to 20 mm of soil. The soil must then be compacted with a heavy roller, sheep's foot roller or vibrating plate compactor.

Water

Fresh drinking water must be available if sheep are to be held in yards or mini paddocks for more than a day. Water points and a sprinkler system are useful if dust is a problem and a supply of water may also be required if dipping and jetting are to be conducted in or near the yards. Water is useful for cleaning equipment used in the yards and when operators need to wash themselves or animals for a variety of reasons.

Associated handling facilities

Loading ramp

Sheep can be loaded quickly and effectively from ground level with an effective loading ramp. A forcing area is needed to simplify the handling of the sheep up the ramp; it may be the same



Figure 11. Loading ramps need to be able to suit the type of vehicle used for sheep transport.

forcing area used for drafting and working races, or another separate force used for loading.

The loading ramp can be constructed as a permanent fixture with height adjustment. It is important to have a walkway along one side to give the operator access to sheep as they are being loaded.

A suitable loading ramp is 5 m long and 450 mm wide with sides 900 mm high. It should be 1.2 metres high for single-deck livestock transports, and adjusted to 2.1 metres over 10 m for double-deck transports.

Dip

A dip can be located close to the main pathway so that sheep can easily be diverted to the dipping area. Plunge dips are thorough but labour intensive. Avoid an easterly sheep flow into the dip because the sun shining on wet concrete draining pens may balk sheep and hinder entry. A section of timber or metal grating leading up to and at the entrance of the dip will reduce contamination of the dip wash with faeces and dirt.



Figure 12. A roof will provide shade and protection from the elements for all animals and humans working in the facility, providing a safe work environment.

Shearing shed

The entrance pathway into a shearing shed may be located close to the main sheep handling area of the yards. A wide entrance where sheep can move into the shed as a mob on level footing is preferred.

It may be convenient to have shorn sheep delivered from count out pens to the sheep handling races for drafting or husbandry operations.

Shade

Working conditions in sheep yards are improved if there are trees to provide shade during summer. Yards are often built around existing trees and more trees are planted in select locations to provide shade and better working conditions. Ideally they should be fast growing and deciduous to provide shade in summer and sun in winter for warmth and to facilitate drying.

When deciding which species to use consider soil fertility, rainfall and frost incidence. Don't plant trees with large limbs which can be hazardous to livestock and operators.

Some deciduous and evergreen trees that are suitable for the purpose are:

Deciduous

Desert ash (*Fraxinus oxycarpa*)

Syrian ash (*Fraxinus syriaca*)

Thornless honey locust (*Glenditsia triacanthos* var. *Inermis*)

White cedar (*Melia azedarach*)

Umbrella cedar (*Melia azedarach* cv. *Umbraculiformis*)

Black locust (*Robinia pseudoacacia*)

Evergreen

Blue mallet (*Eucalyptus gardneri*)

Yorrell (*Eucalyptus gracilis*)

Paddy's river box (*Eucalyptus macarthurii*)

Sargent's mallet (*Eucalyptus sargentii*)

Swamp mallet (*Eucalyptus spathulata*)

Green mallee (*Eucalyptus viridis*)

Wilga (*Geijera parviflora*)

Pepper tree (*Schinus areira*)

Further information on tree species suitable for stockyards is available from NSW DPI – Forests NSW.

Shade can be provided by building a roof over some or all of the yard facility.

Dogs

The operation of a sheep yard is assisted by well trained, obedient working dogs. A good dog makes moving and handling sheep efficient in terms of time and labour. Providing access for dogs to key working areas of the yards reduces energy required and risk of injury when jumping fences. Provide plenty of cool, clean water close to the main working area to keep dogs cool and reduce the time they need to be refreshed. A kennel with shade and water at the yards provides secure accommodation for a dog.

Once dogs and sheep learn the operation of the overall yard operation, welfare and safety is vastly improved.

Summary of specifications

Sheep density

Holding area: allow 1 m² per sheep

Forcing area: allow 1 m² per 3 sheep

Dimensions

Drafting race:

Length: 3–3.5 m; inner side of bugle entry constructed with closed panels

Width: V-shaped race bottom 280 mm, top 550 mm

Width: Straight sided race 450–550 mm

Height: 850–900 mm

Working race:

Length: 10–15 m

Width: fixed race 650–700 mm

Width: adjustable race 500–80 mm

Height: 850–900 mm

Fences and gates:

Height: external 1 m

Height: internal 900 mm

Gate size: drafting 1.2 m

Gate Size: general 2–3 m

Further reading

The 'U' bugle Sheep Yard A3.E.5

<http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/yards-equipment/general/bugle-yard>

Sheep yards and equipment

<http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/yards-equipment>

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Further information

Further information can be obtained by consulting your local livestock officer.

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