



SITE AND BUILDING PLANNING FOR SWINE PRODUCTION

COMPLETE INSTRUCTIONS

NEW 87:06

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This plan deals with site planning, pig populations, room arrangements and building layouts. Recommended pen space for pigs of all ages is summarized in Plan M-3000. Plan M-3003 covers construction and services for pig buildings.

SITE SELECTION

When considering new barns or just expansion and renovation of existing facilities, one of the most important steps is the selection of your best site. Bad planning can result in continuing dissatisfaction at home and at the neighbor's, over the life of the facility. Any odors, flies or water pollution caused by your unit may result in neighborhood protests, petitions and even lawsuits. Important site requirements include:

- Essential services
 - feed
 - water
 - electricity
 - heating fuel
 - driveways
- Sufficient area for
 - barns
 - feed and manure storage
 - control of snow, wind and runoff
 - manure application on productive land
 - expansion
- Suitable surroundings - topography and drainage natural screening far enough and downwind from home and neighboring residences compatibility with land uses nearby compliance with local zoning and environmental separation distances

ZONING AND PERMITS

Before starting construction, obtain any required municipal or building permits. In addition, some provinces require an environmental permit or code of practice compliance certificate.

These permits will commit you to specific separation distances from wells, watercourses, highways, neighboring properties and lands zoned for uses other than farming. In all likelihood the code of practice will also limit the number of animals on your farm in relation to your land base available for spreading manure.

If your region has a prevailing wind (in particular during the summer and fall), use it to advantage to carry unavoidable odors away from neighbors and your own farmhouse. Also, locate swine buildings and manure storages as far as possible from neighboring dwellings to maximize dilution of odors and to minimize nuisance from noise and flies.

Before starting construction, obtain any required municipal or building permits. In addition, some provinces require an environmental permit or code of practice compliance certificate.

Manure and wastewater production calculations should be carefully checked. Plan your manure storage capacity to handle all the wastes produced during periods when manure spreading is dangerous to the environment, for example from late fall through to spring when snow, frozen soil or waterlogged soil will cause manure runoff.

Choose manure storage, transport and field spreading equipment wisely to ensure that they compliment your buildings and manure system. Field spreading equipment should be sized to your tractor power, your soils and their drainage capabilities. The storage period may have to be lengthened to go with your cropping plans and rainfall conditions; storage capacity for at least 6 months' production is desirable in most of Canada's pig-growing areas. In fact many are now increasing to 1 year's storage to minimize spreading costs and maximize fertilizer value.



The Canada Plan Service prepares detailed plans showing how to construct modern farm buildings, livestock housing systems, storages and equipment for Canadian agriculture.

To obtain another copy of this leaflet, contact your local provincial agricultural engineer or extension advisor.

SITE CONSIDERATIONS

ACCESSIBILITY Confirm the availability and cost of electrical power to the site. Discuss also the availability of three-phase power if you plan to use larger motors for feed processing, grain drying, manure pumping, etc.

An all-year driveway with the strength and width to handle large tractor trailer trucks must be planned at the drawing board stage for reliable feed delivery and hog shipping.

Drilled wells must be capable of yielding good quality water at reasonable depths. For a new site the first expense may be to drill your well and establish your water supply prior to any other site work. If there are any surprises with your new well, like low flow, sand or other problems, it may be best to cut your losses at this stage and move to another site.

APPEARANCE Pay attention to the appearance of your buildings and the manure storage. Consider, for example, the option of a longer laneway to take advantage of a wooded site or a well-placed knoll. Clean, well-kept lawns and driveways also create a feeling that you are doing the best possible job to compliment your environment. Border your buildings with crushed stone strips to catch roof runoff (cheaper and more foolproof than eavestroughing) and to discourage rodents.

When it comes to neighbors, it is fair to say out of sight, out of mind. The manure storage-especially should be out of sight behind the barns and, if possible, concealed by trees. Don't overlook your obligation to build a child-proof safety fence or a permanent cover for the manure storage.

FUTURE EXPANSION During the planning stage, consider the possibilities of a future expansion. Manure storages, feed storage and pig-loading areas must be located along the sides of the main barns (not at the ends) so that the animal housing can be expanded. Dead-end planning can lead to costly relocations later. When considering expansion don't forget that remodeling an old barn may be less expensive, but a new barn allows easier incorporation of new ideas. These new ideas should include short manure retention time in the barns, complete manure removal from gutters under slotted floors and general improvements that all lead to minimum odor except during cleanout time.

PREVAILING WINDS Few provinces adjust the separation distance to the nearest neighbors on the prevailing downwind side. Nevertheless, increased distance dilutes the livestock smells before they reach the neighbors. There is no simple scientific test to rate a person's reaction to objectionable odors; however, it is known that reduction of the odor concentration makes the smell more bearable. So, if the opportunity is there, try to exceed the minimum guideline distances to help establish your own good neighbor policy.

When considering wind also keep in mind another seasonal problem associated with it - snow. The building entrance, loading dock and parking area should be planned to minimize snow drifts where frequent winter access is essential, as well as giving snow blades and blowers a good straight run.

TOPOGRAPHY AND SLOPE Most modern swine barns don't have basements, so it is relatively easy to use compacted sand or gravel fill to raise your final floor level above the surrounding ground. Diversion of field runoff by grassed waterways, combined with surface grading away from the perimeter of the buildings, can handle most surface water or ice problems. On sloping sites, consider locating the loading ramp where the natural grade is lower, thus permitting a reduced or zero slope on the ramp.

Gravity flow manure transfer systems are the least costly and most reliable as they avoid pumping. Use a transfer pump as an alternative if the safest storage site is level with or uphill from the barns. With gravity flow, pay strict attention to the total elevation difference in your manure handling system. Adding the walkway height, pen floor slope, gutter depth and slope, transfer pipe slope and manure storage depth gives the total fall down to the floor of the manure storage. This puts the bottom of the manure storage considerably below the barn floor, as much as 7 m (24 ft) where the storage is some distance from the barns. It is absolutely essential at this initial planning stage to have a backhoe dig a test hole to this elevation at the proposed storage site. Surprises such as high groundwater, unstable soils (quicksand, etc.), very porous soils (gravel, sand) or cracked leaky bedrock can then be planned for in advance.

FIRE SAFETY Plan your swine barns to prevent total loss in case of fire. This may be done either by adding firewalls and fire doors between connected buildings, or by separating the buildings by open space (in the severe Canadian climate, swine producers definitely prefer connected buildings). Your fire insurance company may give preferred rates for buildings separated to stop fire - check first.

The *Canadian Farm Building Handbook* gives recommended minimum fire separation distances between farm buildings, based on their size, window area and the combustibility of the construction.

CPS Plan M-3003 gives construction practices for swine barns, including fire and rodent stops in walls and attics, based on the *Canadian Farm Building Code*.

DISEASE CONTROL

ISOLATION FROM OTHER HERDS If you have a choice of farms for locating your new swine operation, first choice is as far away as possible from neighboring swine herds.

Secure the farmstead to keep out unescorted visitors. Keep all outside doors locked. Provide a doorbell at the

front entrance, connected to sound throughout the barns. Having a telephone in the herd office encourages visitors to make an appointment before coming to the farm, and it gives the manager a more diplomatic opportunity to say 'no visitors, please'.

Visitors posing the greatest risks are salesmen, feed and livestock truckers and other swine farmers. For feed deliveries, plan so that bulk feed can be transferred into bulk tanks without the trucker entering the barn. For shipping; some producers truck their own market pigs to assembly yards-this poses some risk of bringing home new infections. Others transport their market pigs to a loading station at the farm entrance, ready for pickup by the driver. This of course requires sortie protection for the pigs in winter.

Depending on the level of health security, visitors may be admitted to an inside vestibule, usually the office. From here, non-opening windows let the visitors see into adjacent pig rooms without proceeding any further. From the herd manager's point of view, the breeding area would have the highest priority for a window to the office; next priority would be the furrowing room.

Some visitors will arrive with clean coveralls and disposable plastic boots, but it's probably safer to keep a supply of coveralls and rubber boots at the barn for visitors to wear. Otherwise a strict 'no visitors' policy is best.

Another inexpensive safeguard is a disinfecting footbath just outside the entrance to the animal space. To be effective, the footbath must be regularly washed and replenished with disinfectant. A shallow plastic or metal floorpan with a fitted cocoa-mat inside is easier to maintain than a floor pit.

A washroom and shower is more a convenience to the farm staff than an aid to herd isolation. If you have a shower, eliminate the troublesome shower curtain. Make the shower stall oversized and define the shower floor with a floor curb to control overspray and drainage. Put a plastic gridmat in the shower at the entrance end (opposite the shower-head, for easier dressing without walking on wet floors.

Do not overlook birds as potential carriers of disease. They fly easily from farm to farm, and they have free access to the neighbors' manure sites, dead animals, etc. Attics, feed rooms, grain bins, silos and pig rooms should all be screened bird-tight. Naturally ventilated pig barns are at a disadvantage in that it is not generally practical to screen large ventilation openings.

ISOLATION BETWEEN AGE GROUPS All-in/all-out furrowing and weanling housing is described later, as an aid to disease control within the herd. In some laboratory facilities, all-in/all-out implies complete isolation of each and every animal room. Such absolute isolation is not feasible on practical farms. Firstly, air-

borne dust particles that carry disease organisms are extremely small (less than 5 microns, or 0.005 mm diameter) and can easily drift between barns, even with very little wind. Secondly, where pigs are moved from room to room as they grow, it is not desirable that the rooms be immunologically different.

Nevertheless, avoid locating exhaust fans so that they discharge close to air inlets, especially those supplying a younger group of pigs. Also, avoid drawing ventilation air from the trapped spaces between U-shaped buildings where summer heat can accumulate.

Another good practice is to plan doorways, walkways, etc. so that they discourage traffic between the manure storage end of the complex and the feed storage and preparation area. Do not arrange the areas so that weaners must be taken through adult areas.

BUILDING LAYOUT PLANNING

BASIC REQUIREMENTS Modern confinement pig production in the severe Canadian climate requires well-insulated buildings with controlled ventilation, either fan-powered or naturally-ventilated. Pig buildings are divided into different rooms for each phase of the production cycle, and it is important to size the rooms and pens according to the expected numbers of pigs in each production phase.

THE BREEDING CYCLE At weaning time, sows are generally moved to group pens in the breeding-gestation barn. Here they usually come into heat 5-7 days after weaning. After breeding they are moved to gestation pens or single stalls, often but not necessarily in the same room as breeding. Some managers delay this move to 4 weeks after first breeding, in case the sows don't conceive the first time. This leaves the bred sows and gilts in the breeding area until another heat cycle (21 days) has passed. A routine ultrasonic pregnancy check can be done at 28-31 days after first breeding.

Sows confirmed pregnant are housed either in small group pens (5-6 sows/pen), or in single pen stalls (Plan M-3843) that prevent fighting and competition for feed. An alternative to the pen stalls is a controlled electronic feeding stall in each group gestation pen. Each sow in a pen-group wears a unique identifying neck-tag that signals an electronic microprocessor, to record her visits to the feeding stall. The microprocessor also controls the metering of her allotted daily ration.

Expect some problems with sows during gestation. These problems include failure to conceive (seasonal infertility in hot weather, disease, etc.), abortions, physical deterioration (bad feet and legs, prolapses, etc.) and sows not-in-pig- (NIP sows) even though they pass the pregnancy check and do not come back into heat.

that 'growers' simply graduate to 'finishers' when half of each grower group is moved to an empty pen. This results in a doubling of the pen-space per pig, a step that temporarily wastes some barn space, but ensures adequate pen-space for market-weight hogs later. To use pen-space more efficiently, some managers with bigger herds use two pen sizes and relocate entire groups of pigs to a separate finishing section.

SIZING SWINE FACILITIES Most swine breeders like to organize their chores on a repeating weekly schedule. For example, they may move nursery pigs on Wednesdays, wean sows on Thursdays (to avoid weekend breedings) and sort and ship market pigs on the same day each week. The objective is to maintain a smooth weekly flow of pigs from stage to stage.

To determine the number of pigs within each group and in the complete herd, start with the number of farrowings 'N' wanted each week. Based on the 'growing cycle' and 'breeding cycle' periods outlined above, the herd makeup would be as shown in Table 3.

If, from Table 3, you are planning to farrow six litters per week ($N = 6$), the total number of farrowing pens needed for the herd will be $5N = 5 \times 6 = 30$ pens, with a farrowing pen cycle time of 5 weeks. If you revise the nursing period to 5 weeks instead of 4, this increases the farrowing pen cycle time to $5 + 1 = 6$ weeks. Therefore more farrowing pens are needed, increasing to $6N = 6 \times 6 = 36$ pens.

Keep in mind that to farrow, say, six litters per week, and assuming 85% of the breedings result in conception, you should breed at least seven sows and gilts 'per week. Any week that breedings fall short, you may be sure that 16 weeks later there will be empty pens in farrowing.

Do not hesitate to make other adjustments as necessary to suit your particular management system. For example, if your sows don't average nine weaned pigs per litter, but only eight, the number of nursing piglets will drop from $36N$ (or 216) to only $8 \times 4N = 192$ nursing piglets; with a corresponding reduction of the pig population all the way to market.

CONTINUOUS VS ALL-IN/ALL-OUT FARROWING The $5N$ farrowing pens given in Table 3 and the above example may all be in one room (continuous farrowing) or they may be divided between several smaller rooms (all-in/all-out).

On average, 25% of pigs born alive in Canada never reach market. A major part of this costly loss is due to disease and parasites transmitted to the newborn piglets and young weavers from unwashed sows and dirty rooms.

With continuous farrowing it is inevitable that pens emptied and ready for cleaning will be beside some

TABLE 3 TYPICAL SWINE HERD MAKEUP BASED ON 'N' FARROWINGS PER WEEK

Herd group	Period	No. of pigs
Breeding herd		
Sows in farrowing pens	1 wk clean/fill, 4 wks nurse	5 N
Open sows in breeding	1 wk post-weaning	*1 N
Gilts (40% replacement/year)		**3 N
Pregnant sows in gestation	15 wks post-breeding	*15 N
Boars (+1, replacement)	continuous	<u>1 N + 1</u>
Total breeding herd		25 N + 1
Suckling piglets		
9 piglets/litter weaned	4 wks nursing	36 N
Weanlings		
Young (4-7 wks of age)	3 wks weanling	27 N
Older (7-10 wks of age)	3 wks weanling	<u>27 N</u>
Total weanlings		54 N
Growing-finishing		
Growers (10-18 wks of age)	8 wks growing	72 N
Finishers (18-26 wks of age)	8 wks finishing	<u>72 N</u>
Total growing-finishing		<u>144 N</u>
Total herd		259 N + 1

*If sows after first breeding are left in the breeding pens for another 28 days for a pregnancy check, increase breeding to 5 N sows and decrease gestation to 11 N sows.

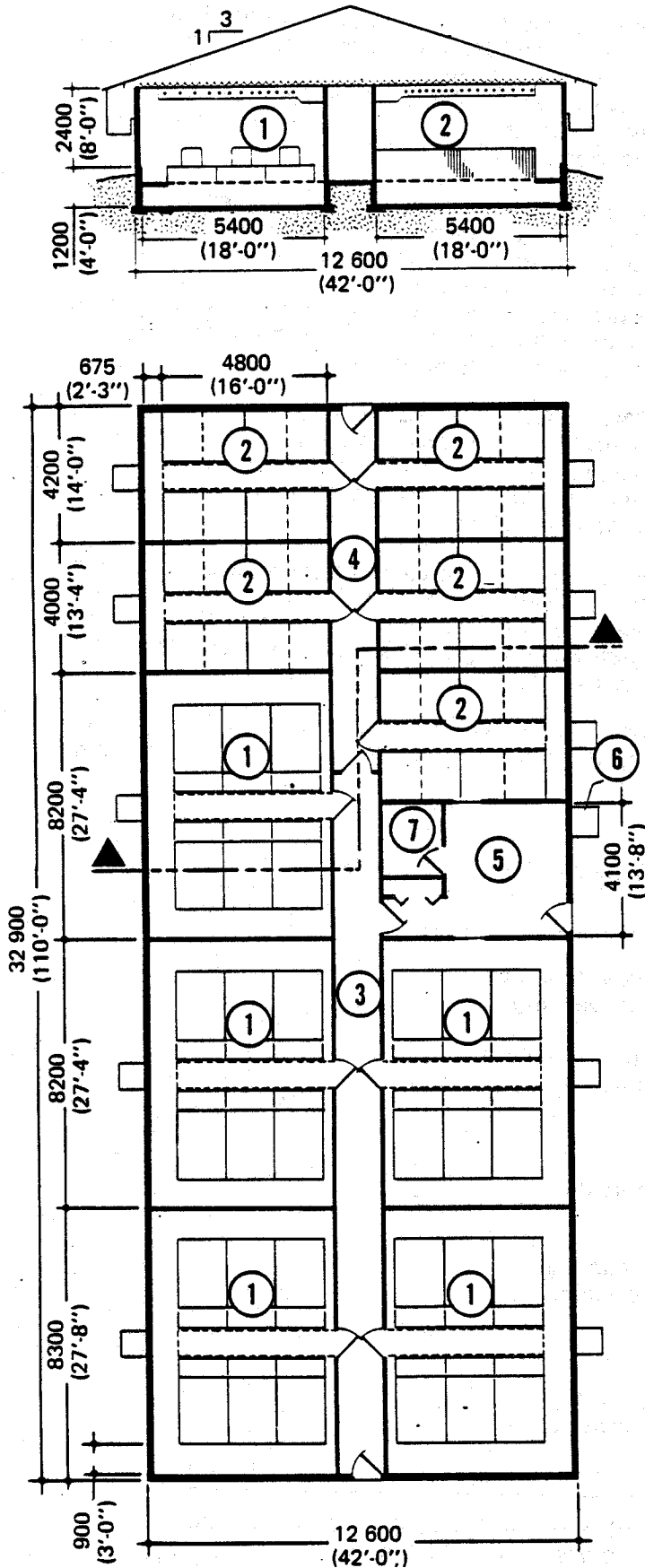
**This number includes 10% extra dry sow accommodation to allow for typical breeding and gestation problems.

pens still occupied by sows and piglets. Thus with continuous furrowing, even the keen and careful manager will find it next to impossible to do the thorough pen scrubbing and sanitizing necessary to prevent disease buildup without putting nearby piglets at risk.

The ideal is an all-in/all-out furrowing and weaning system. This way each room can be emptied in rotation, *thoroughly scrubbed* with high-pressure water or stiff brushing and completely disinfected (including pens, floors, walls, ventilation recirculation ducting, .etc.). Then each room can be dried in readiness for the next batch of pigs. Another advantage of all-in/all-out is that each room holds pigs of the same age group, allowing closer fitting of the temperature to the pigs' needs. The same applies to weaning facilities.

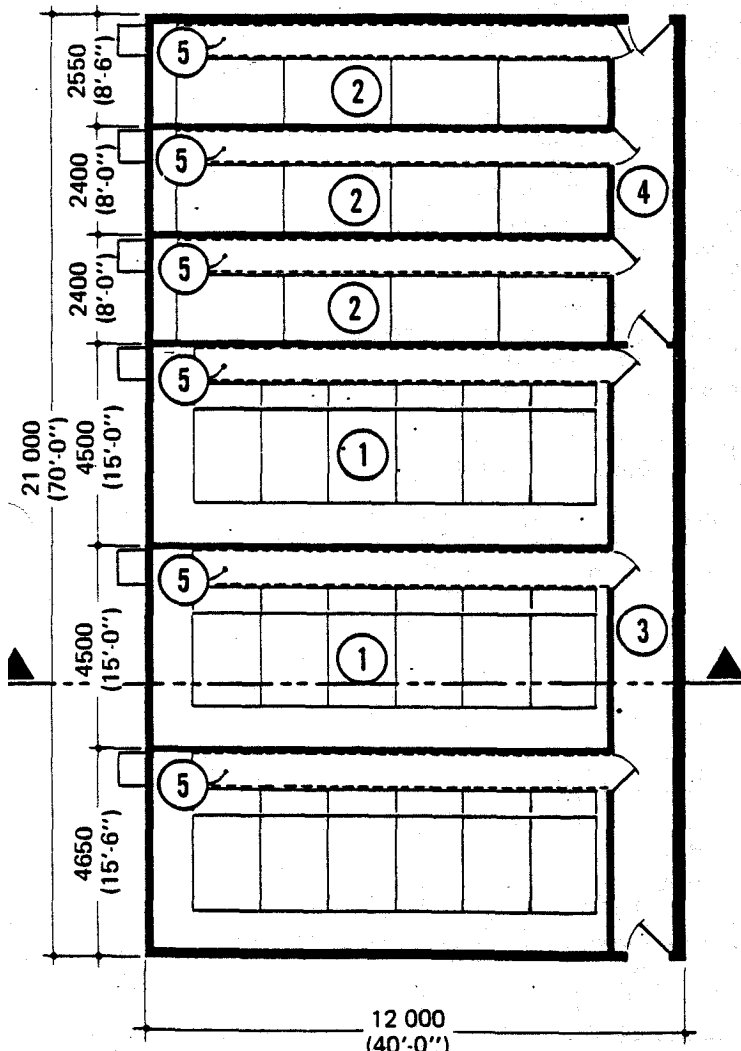
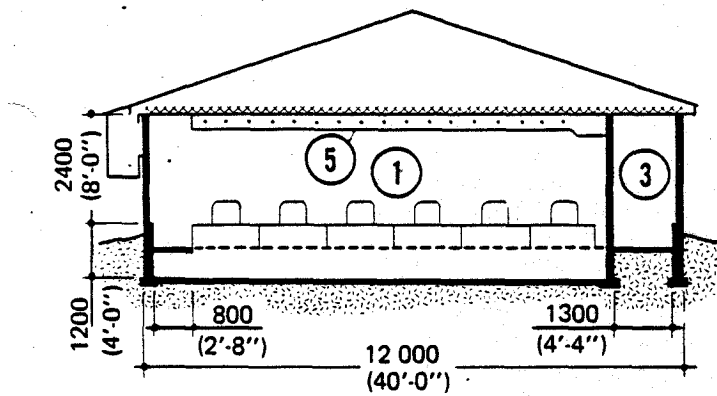
Planning for all-in/all-out furrowing and weaning is easy when you start from the weekly farrowings, N. Assuming each furrowing room requires 1 week to clean and refill with sows, followed by 4 weeks nursing, the furrowing room cycle time will be 5 weeks. Therefore, to maintain a weekly chore schedule, five furrowing rooms are required, with N pens in each room. Similarly, five weaning rooms can cycle in step with furrowing, as long as the weaning period is adjusted to a 5-week pen cycle time. In practical terms this means 4 weeks and 5 days weaning period, plus 2 days to empty, clean and refill each weaning room. If the weaning period is, say, 6 weeks, then six weaning rooms are required and so on. Plan M-3304 (Figure 11 shows five-room furrowing plus five-room weaning to handle N = 6 farrowings/week, 5 weeks weaning period, corresponding to a total breeding herd of 25N + 1=151 sows, gilts and boars.

For a smaller production herd it is impractical to divide the furrowing-weaning barn into 10 rooms like Plan M-3304. Each room requires its own walls, doors, ventilating fans, supplementary heaters and manure system.



- 1 five furrowing rooms at 5.5 x 8.1 m (18'-4" x 27'), six pens/room
- 2 five weaning rooms at 5.5 x 4.0 m (18'-4" x 13'-4"), four pens/room, pens 1.5 x 2.4 m (5' x 8'), 12 weaner pigs/pen at 0.3 m²/pig
- 3 furrowing area preheat hallway 1.1 x 21.4 m (3'8" x 71'-4")
- 4 weaning area preheat hallway 1.1 x 10.9 m (3' x 36'-4")
- 5 service area/office 3.6 x 4.1 m (12 x 13'-8"), viewing windows to 1 and 2
- 6 outside gas furnace, optional
- 7 washroom and shower (optional)

Figure 1 Large multiple-room farrowing/weaning unit (from Canada Plan Service, plan M-3304). Designed for six farrowings/week, 4 weeks nursing period, 150 sows



- 1 three farrowing rooms 10.05 x 4.4 m (33'-8" x 14'-8"), six pens/room
- 2 three weaning rooms 10.05 x 2.35 m (33'-6" x 7'-10"), four pens/room at 2.4 x 1.5 m (8' x 5'), 12 weaver pigs/pen
- 3 side hallway 1.5 x 13.4 m (5' x 44'-8"); preheated air supply to 1
- 4 side hallway 1.5 x 7.23 m (5' x 24'1. preheated air supply to 2
- 5 air inlet duct and recirculation, from 3 or 4

Figure 2 Three-room farrowing/three-room weanling unit, from Canada Plan Service, Plan M-3303. Designed for three farrowings/wk, 4-wk nursing period, 75 sows

A workable compromise is a three-room farrowing, three-room weanling barn, like Plan M-3303 (Figure 2). This works best on a 6-week farrowing pen cycle time (2 weeks clean/fill, 4 weeks nursing), with half the pens in a farrowing room filled the first week (A group) and the other half filled the next week (B group). In other words, each half of a farrowing room is scheduled as if it were one of six rooms on a 6-week room cycle. The main difference is that the piglets born the first week (the A group) can stay in the farrowing pens an extra week after weaning, whereas the younger B group is moved to the weanling room immediately after weaning.

Two other work routines for a three-room farrowing/three-room weanling system are also described in leaflet M-3303.

BUILDING LAYOUTS First, make your basic decisions on size of operation, farrowing-weanling or farrow-to-finish, remodeling or new construction, continuous farrowing or 'all-in/all-out' and so on. Then, begin to plan in detail.

On paper one can assume no previous buildings exist. This is probably the best way to begin, so that idealized layouts can be developed and compared. Then modify the idealized layouts as required to accommodate your site conditions, as discussed above. The following discussion assumes first that there are no external factors to consider.

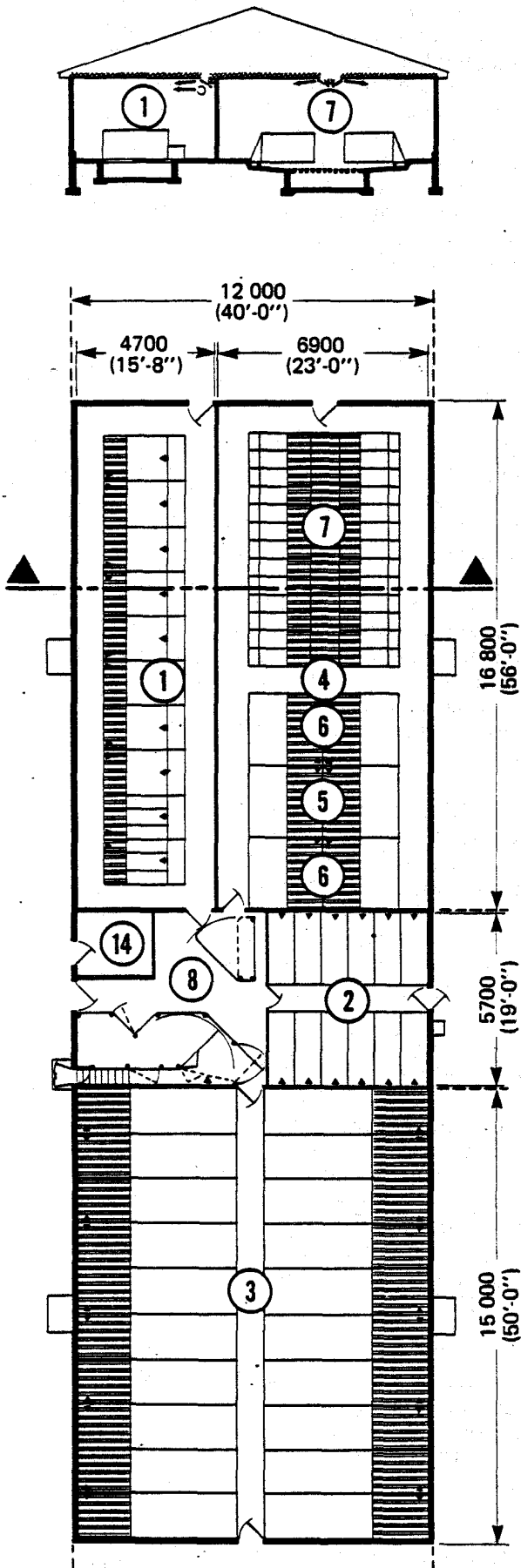
Canada Plan Service series 3000 includes many component buildings and pen details needed to make up a complete swine production system. The following discussion outlines how these components might be combined to optimize chore operations, pig transfers, heating and electrical energy distribution, washing and sanitary requirements, feed delivery, loading and shipping to market, and visitor control.

SMALL FARROW TO-FINISH Continuous farrowing is the usual choice for herds of up to 50-60 sows.

Figure 3 shows a simple rectangular plan, with farrowing and breeding sections fitted into one end and growing-finishing into the other. Each pig area (farrowing/nursing 1, weanling 2, growing/finishing 3 and breeding/gestation 4) is sized for a 50-sow breeding herd, according to pig populations calculated from Table 3 and space requirements according to Plan M-3000.

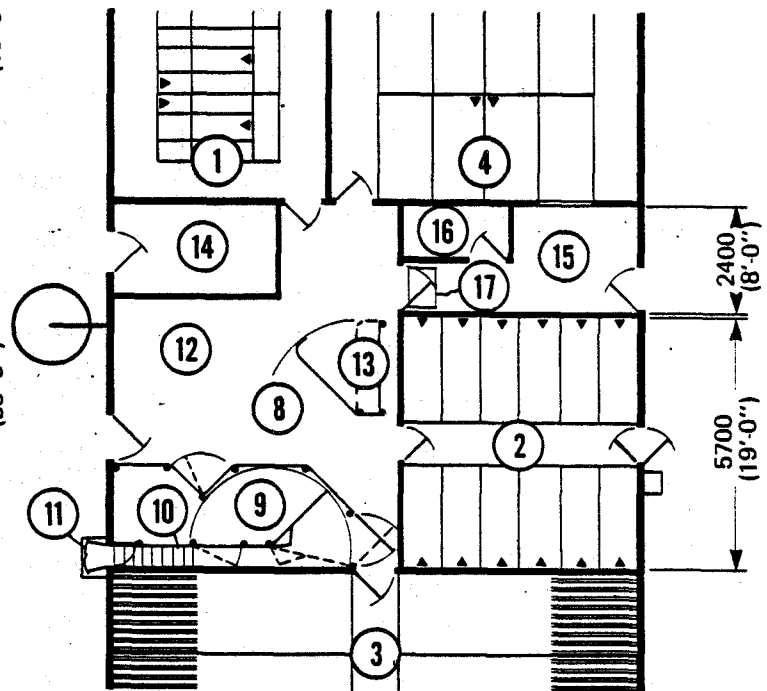
This rectangular plan has space at both ends, for possible expansion of areas 1,3 and 4. Expansion of the weanling area 2 would require addition of a T-section at one side. Advantages of the rectangular plan are minimum length of outside walls (lowest cost, reduced heat loss) and the simplest framing for walls and roof.

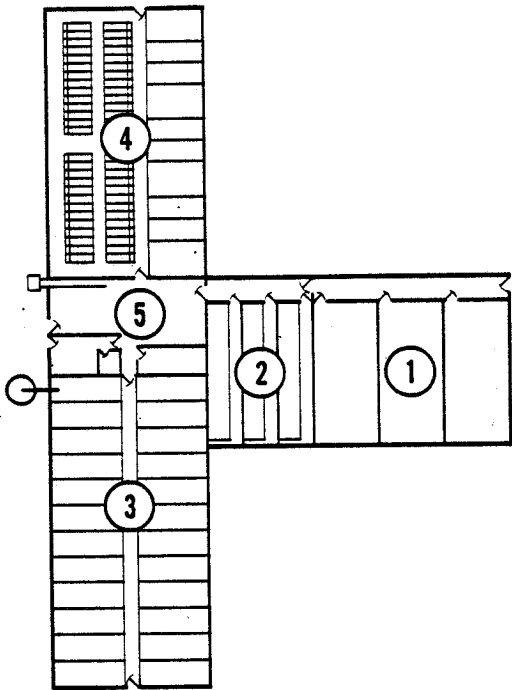
The central service area includes a pig sorting area 9, a small feed area 12, a sow wash stall 13 and an equipment room 14. This equipment room houses the electrical service, water medicating system and the heating furnace (if used). If there is a furnace, this room has access only from outside so that fire-



- 1 farrowing room 4.6 x 16.8 m (15'-4" x 56'), 10 pens at 1.5 x 2.7 m (5' x 9')
- 2 weaning rooms 5.2 x 5.7 m (17'-4" x 19'), 12 pens at 2.4 x 0.9 m (8' x 3') (perforated floors), 10 pigs/pen, 0.21 m²/ pig
- 3 growing and finishing room, 20 pens at 1.5 x 5.4 m (5' x 18'), 20 growers/pen, 0.4 m²/pig; 10 finishers/pen, 0.8 m²/pig
- 4 breeding-gestation room
- 5 boar/breed pens 2.4 x 2.4 m (8' x 8')
- 6 group pens 2.4 x 2.4 m (8' x 8'); four sows or six gilts/pen
- 7 gestation pen stalls, 26 at 2.05 x 0.6 m (6'-10"
- 8 service area
- 9 crowding pen and gate 1.8 m (6') wide, solid plywood panels 1.2 m (4') high
- 10 loading ramp 430 mm (17") wide, concrete steps 250 x 75 mm (10" x 3")
- 11 truck dock 1.0 m (40") wide, wing doors each side
- 12 feed room
- 13 sow wash stall
- 14 equipment room (heating, electrical panel, water medication, etc.)
- 15 office 3.0 x 2.4 m (10' x 8'), viewing windows to 2 and 4
- 16 washroom 2.1 x 1.2 m (7' x 4')
- 17 disinfecting footbath in floor

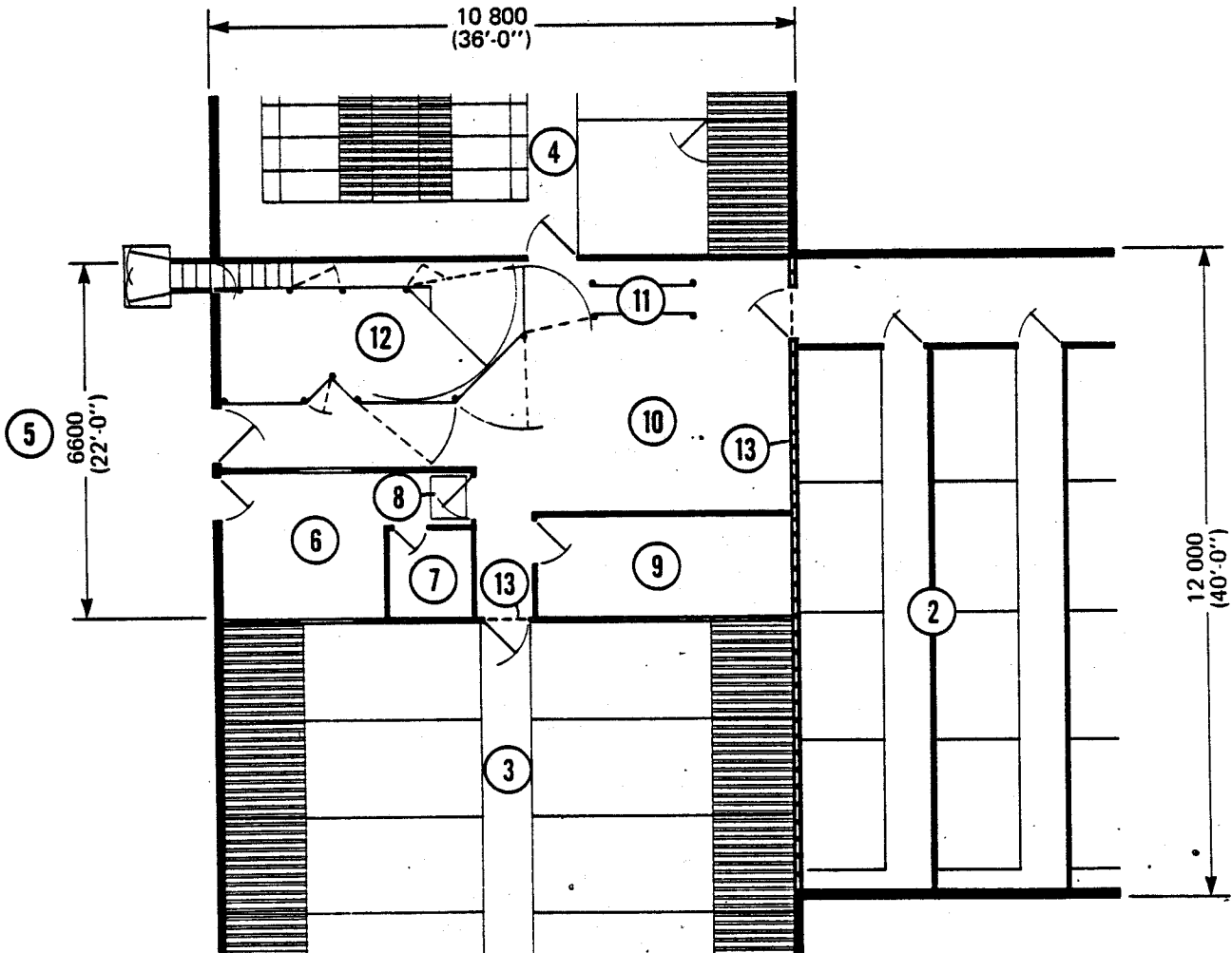
Figure 3. Rectangular plan, farrow-to-finish pig production unit, 50-sow herd, two farrowings per week, 4 weeks nursing period

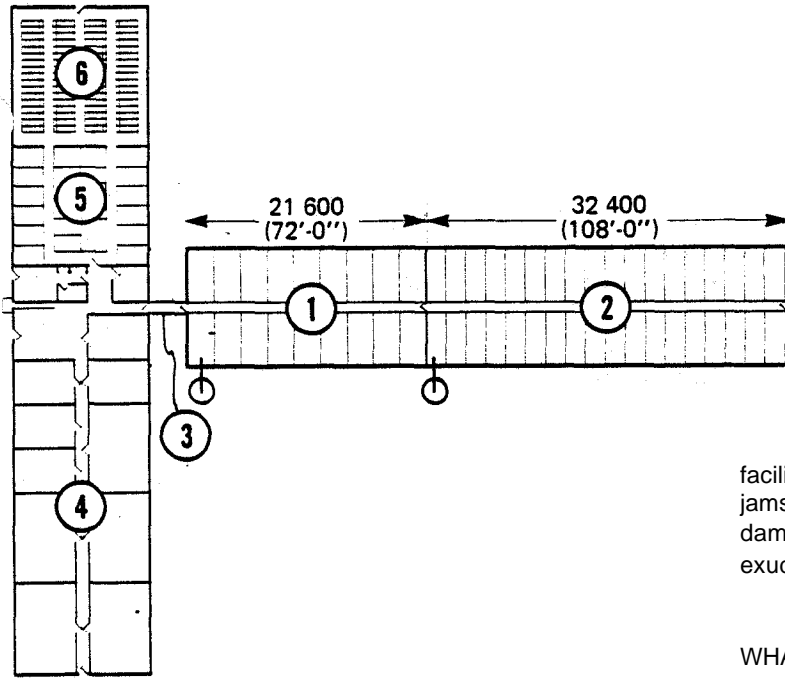




- 1 three farrowing rooms 4.4 x 10 m (14'-8" x 30'-4") (Figure 2)
- 2 three weanling rooms 2.3 x 10 m (7'-9" x 30'-4") (Figure 2)
- 3 growing/finishing room 10.5 x 21.6 m (35' x 72'), M-3434
- 4 breeding/gestation room 10.5 x 18 m (35' x 60'), plan M-3236
- 5 service area 6.5 x 10.5 m (21'-8" x 35')
- 6 office 3.0 x 2.8 m (10' x 9'-4"), viewing windows to 3 and 12
- 7 washroom 1.5 x 1.6 m (5'-4" x 5')
- 8 disinfecting footbath in floor
- 9 equipment room 4.6 x 1.8 m (15'-4" x 6') (heating, electrical, water medication, etc.)
- 10 feed room
- 11 sow wash stall
- 12 pig sorting and loading area 5.6 x 2.6 m (18'-8" x 8'-8"); crowding gate 2.1 m (7') radius; single-file chute 430 mm (17") wide
- 13 fire stop in attic

Figure 4. T-shaped plan, farrow-to-finish pig production unit; 75-sow herd; three farrowings per week; 4 weeks nursing period; all-in/all-out farrowing and weaning





- 1 18 growing pens at 2.4 x 4.8 m (8' x 16'), 24 growers per pen at 0.48 m² pig, plan M-3434
- 2 36 finishing pens at 1.8 x 4.8 m (6' x 16'), 12 finishers per pen at 0.72 m²/pig, plan M-3434
- 3 connecting walkway, unheated
- 4 farrowing and weaning wing
- 5 breeding area
- 6 gestation area

Figure 6. Alternative arrangements to the T-shaped plan shown in Figure 5

facility This can reduce excitement, panic, pileups and traffic jams, and indirectly reduce heart difficulties, body injuries and damaged meat -this can include bruises, PSE (pale soft exudative) meat and other losses.

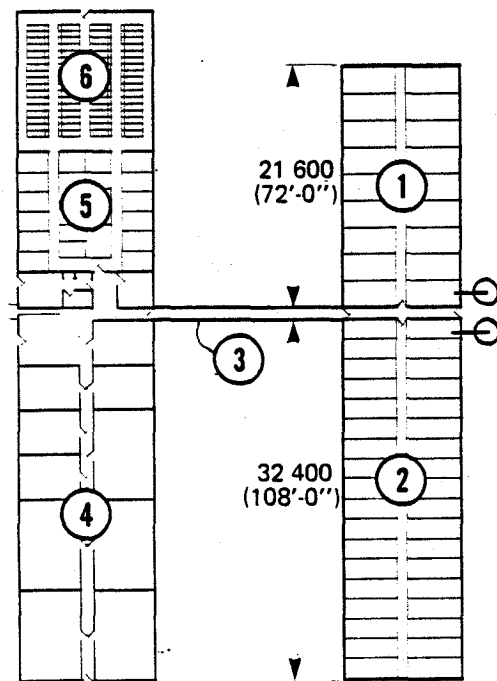
WHAT THE PIG SEES The pig has 310° panoramic vision without even turning its head and what it sees has a great influence on how it moves about. A problem is that many pigs spend virtually all of their lifetimes in semidarkness; small wonder they panic at the first glaring daylight they see when loaded onto the truck on the way to market or breeding barn.

Pigs have a strong tendency to follow each other and to maintain both visual and body contact. Use a canvas slapper in preference to an electric prod which stresses the pig and increases chances of bloodsplashed meat. If you gently encourage the leader pig to enter the handling facility, others will generally follow.

Pigs will balk at contrasting shadows, bright spots and even a shiny puddle on the floor. These sights make the leader pig reluctant to enter an unfamiliar sorting pen, scale box or loading chute. Provide uniform lighting directly over the approaches to sorting pens, single file chute and loading ramp. Avoid dazzling bright spot-lighting (either electric or sunlight) that shines directly into the pigs' faces. For example, at night it helps to floodlight the interior of the transport truck during loading, but on bright sunny days to throw a darkening canvas cover over the outside part of the loading dock. Make sure the canvas doesn't flap in the wind.

Block out distracting sights and sounds by making the sorting gates, pens and ramp sides out of solid panels (like plywood) in preference to open gates (like wire mesh). The gate and fence panels should fit close to the floor.

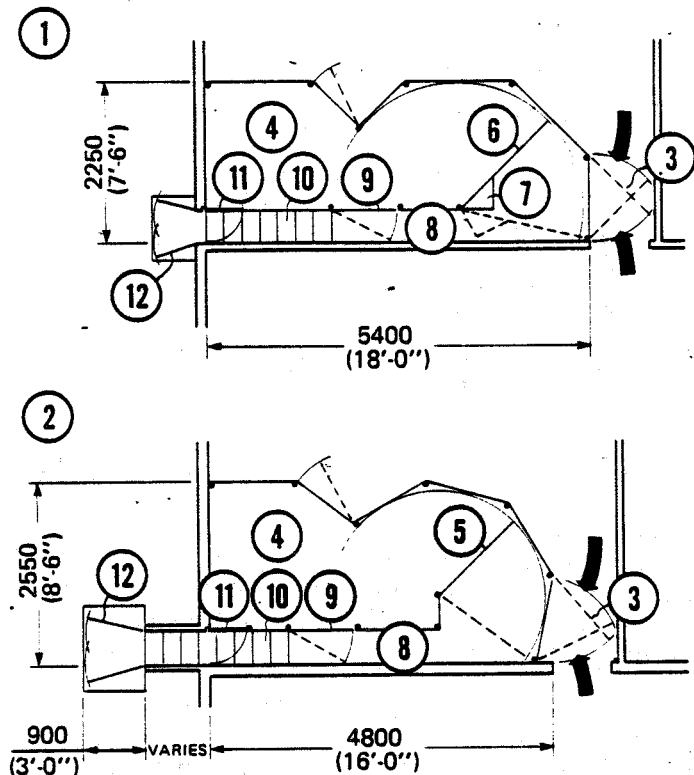
ESCAPE BEHAVIOR Pigs have a strong escape reaction. When prodded, a pig will attempt to get away, either by running forward or by turning back to shelter among the group. This is a major cause of 'jamming' and wedging at any tapered passage, such as the funnelled entrance to a single-file chute. Two or three



populated. growing-finishing wing. Closed but unheated connecting walkways as in Figure 6 provide alternatives that overcome many site limitations. The extra distance to be walked is a minor inconvenience as long as feed is stored at the point of use. In Figure 6, the growing and finishing areas are each big enough to make separated rooms practical.

PIG HANDLING

Well-designed handling facilities make it easier, quicker and more humane for you to sort, doctor and load pigs for transport. Use 'pig psychology' to design a better handling



- 1 plan similar to Figure 3
- 2 shorter, wider plan where length is limiting
- 3 two-way entrance gate 1.2 m (4') wide
- 4 sorting pen
- 5 crowding gate 1.5 m (5') radius
- 6 crowding gate 1.8 m (6') radius
- 7 triangular box 450 x 450 mm (18" x 18") on 6, prevents jamming
- 8 single-file chute 430 mm (17") inside width, scale optional
- 9 sorting gate 900 mm (3') wide
- 10 loading ramp; concrete steps with treads 250 mm (10") wide and risers up to 89 mm (3 1/2") high (max. slope 20°)
- 11 insulated door opens to fit into ramp wall
- 12 level loading dock with wing doors

Figure 7 Sorting, doctoring and loading facilities for pigs

panicked pigs will wedge into the funnel, but unlike cattle and sheep they will not back up to allow an orderly sorting-out.

CROWDING PEN, CHUTE AND RAMP DESIGN As mentioned previously, plywood panels make good sorting pens. Hang plywood gate panels on standard truck-rack hardware, or on pairs of oversized strap hinges with a loose-fitting hinge rod. Many gates should have hinges at both ends so that they can swing from either end.

Figure 7 shows the essentials of a good sorting and loading facility. As drawn, the sorting pens 4 have space to handle up to 20 pigs at a time (15, at market weight). Do not overcrowd - if pigs don't have room to manoeuvre, they will panic and pile up. For more capacity, increase the radius of the crowding gate and the corresponding width of the sorting pen.

To avoid pigs jamming into the funnel entrance, a jog in the approach forces pigs to enter the chute one at a time. One way to do this is to fasten a small three cornered box to the inside of the gate (Figure 7, item 7). Another way is to offset the crowding gatepost as shown in plan 2. Another feature of optional plan 2 is that most of the pen panels are made 1.2 m (4 ft) long, using half-sheets of plywood.

Optional plan 1 is a longer, narrower arrangement, requiring an overall length of 5.4 m (18 ft) for the handling facility. Optional plan 2 requires only 4.8 m (16 ft) of length, but the ramp is extended outside the building to gain enough height to be level with the shipping truck. In this case, close the sides and top of the ramp completely. Wing doors are necessary to close the sides of the loading dock 12. A self-aligning dock bumper is another nice feature - it closes the gap if the truck isn't quite square with the dock.

If the ground slopes steeply away from the loading ramp door, it is a good idea to lower the loading dock and truck park. This way the slope of the ramp can be reduced, preferably to flat. For sloping ramps, concrete steps are preferred as Figure 7 shows. An alternative is a cleated plank ramp with hardwood or steel angle cleats spaced at 200 mm (8 in.), but this is noisier and less durable than concrete steps. For both concrete and wood ramps, 20° is the maximum slope recommended. Using a 2 x 4 to form concrete step risers with treads 300 mm (12 in.) wide gives a good slope of 3.5/12, or 16°.

For faster loading, use a double-width ramp divided down the center by an open fence. This takes advantage of the pig's grouping and following instincts.

SUMMARY

Finally, no one expects that these plans and recommendations can be followed precisely on your own farmstead. The floor plans and building sections illustrate the principles, as a starting point for detailed planning. Remember the following basics:

- confirm your water supply;
- obtain all applicable permits and certificates of compliance;
- plan maximum separation from your neighbors for dilution of odors;
- keep manure storage time in the barns at a minimum;
- separate long-term manure storage from the barns and keep it out of sight, fenced or covered;
- dig a test hole to check the manure storage site;
- be a good neighbor when you spread manure --don't spread it upwind from the nearest neighbors (wait for a shift of wind), and quickly plow or work it under a soil cover.