

# Horse Stable Flooring Materials and Drainage

G-96

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The importance of good flooring becomes more evident as a horse spends more time in his stall. The fitness of a horse's legs and feet can be greatly affected by the type of stall flooring chosen. The most suitable floor is highly dependent on management style while personal preferences can have a strong influence. Fortunately, there are many options for suitable floors in a horse facility. The objective of this fact sheet is to provide information on stall and stable flooring materials. Information includes flooring material attributes and options for overcoming some shortcomings. Sub-floor construction and drainage features are presented as these strongly influence floor integrity.

## Two Major Types of Horse Stable Floors

There are two major categories of stable flooring materials that depend on whether the material is porous or impervious to wetness (Figure 1). Floor construction, from the ground up, will depend on what type of material is chosen. Porous floors will have an

underlying foundation of sand and/or gravel to aid water movement down into the ground below the stable. Impervious floors may be sloped toward a drain so that urine and water can run out of the stall. Even impervious floors have a few inches of sand or fine gravel underneath for material stability and drainage of sub-surface water. With either type of stall flooring, often enough bedding is used to absorb excess water and urine so actual liquid runoff is minimal except after a stall washdown.

## Stall Floor Materials

Opinions differ on which type of stall flooring material is the best, but one thing most people agree upon - a good floor is important to the horse's well being. No one type of material seems to offer all the attributes of an ideal floor. Material selection will depend on which disadvantage one is willing to work with. For example, concrete may meet most of your stall flooring criteria but more bedding or solid rubber mats will be needed to protect the horse's legs. Table 1 provides a summary of the attributes of common flooring materials that will be described in more detail.

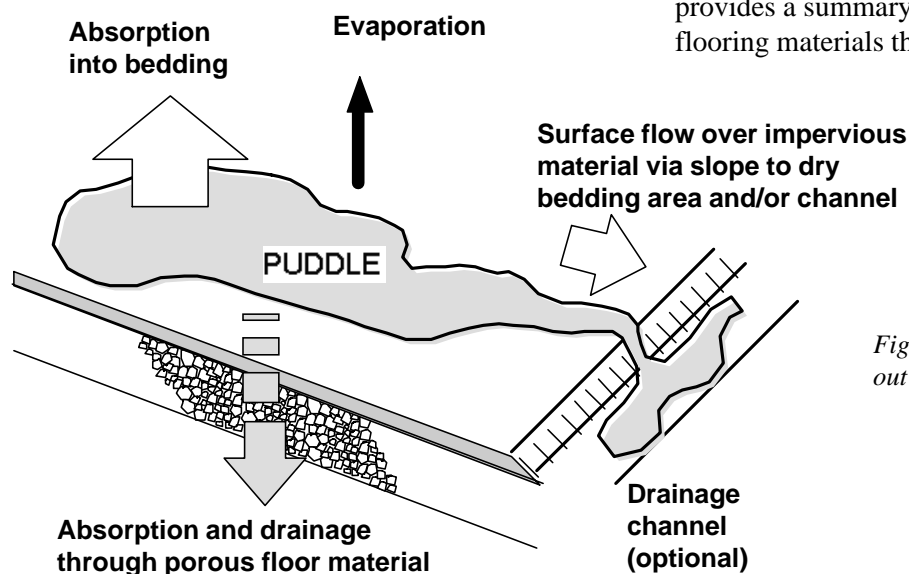


Figure 1. Water flow paths within and out of a stall.

## Characteristics of the ideal floor

These are ranked in importance from the horse's interest followed by horseman's interest.

- Easy on Legs: has some “give” to decrease strains on tendons and feet
- Dry
- Non-Odor Retentive
- Provides Traction: non-slippery to encourage the horse to lie down
- Durable: stays level; damage proof from horse's pawing; long-lived
- Low Maintenance
- Easy to Clean
- Affordable

*Table 1. Characteristics of stall floor materials based solely on the material itself, with no base or drains.*

	Easy on Legs	Absorbs wetness	Does not retain odors	Non-slip	Durability (stays level)	Ease of cleaning and disinfecting	Low maintenance	Approximate cost per 12'x12' stall <sup>1</sup>
Topsoil	+	+	?	+	x	x	x	<\$50
Clay	+	?	?	+	x	x	?	<\$50
Sand	+	+	+	+	x	x	x	\$ 50 - \$100
Concrete	x	x	+	?	+	+	+	\$100 - \$200
Asphalt	x	x	+	?	+	+	+	\$100 - \$200
Road Base Mix	?	+	+	+	?	+	?	\$ 50 - \$100
Solid Rubber Mats	+	x	?	+	+	+	?	\$200 - \$400
Grid Mats	+	+	+	+	+	?	+	\$300 - \$400
Wood	+	?	x	x	+	+	+	

+ = good to excellent; ? = highly dependent on other factors; x = poor

<sup>1</sup> 1996 Costs. Adapted from table in flooring article in *Equus* 226 (Gaithersburg, MD)

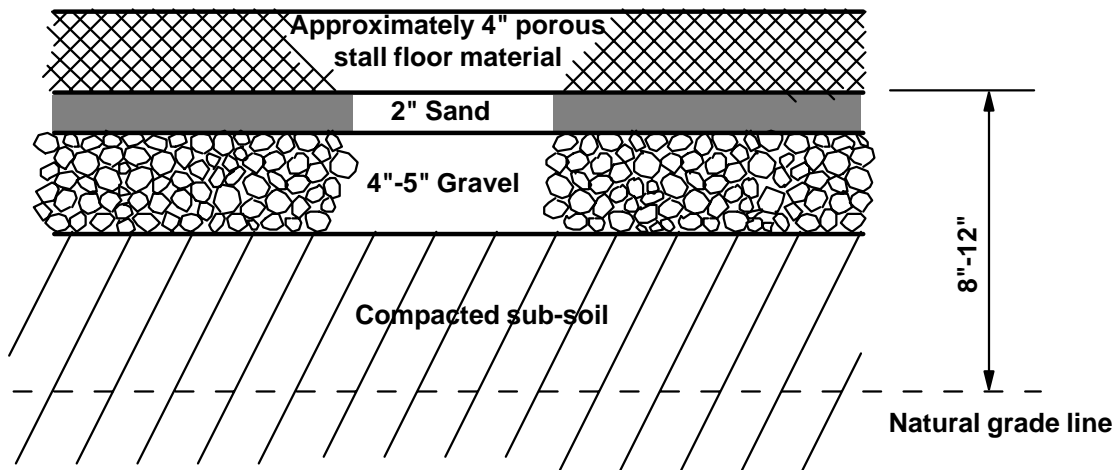
## Stable management related to stall floors

Consider management of manure and urine when selecting the stall flooring material. On average, a horse produces 0.5 oz feces and 0.3 fluid oz urine per pound of body weight every day. So a 1000 pound horse produces about 31 pounds of feces and 2.4 gallons of urine daily. Floors that allow urine to be absorbed and travel down through the flooring material layers can suffer from odor retention. A well-bedded stall will have less odor problem since the urine is more readily absorbed into the bedding. Impervious floors depend on slope for drainage and/or bedding to soak up urine.

Stall floors must be durable but they also play an important role in the overall health of the horse. Leg soundness and fatigue are affected by the flooring material with more forgiving floors generally being preferred over hard floors. A horse needs to be able to lie down and get back up with confidence and without injury so traction of the flooring material is necessary.

Stall floors that retain odors can deteriorate the respiratory system of the horse. Since horses spend a great deal of time with their heads down, high ammonia concentrations at the floor level can damage the lining of the throat and lungs. A good floor can inhibit the survivability of internal parasites in the stall environment.

Horse behavior patterns result in uneven wetting and use of the flooring. A wet porous material, such as soil or clay, is less capable of bearing weight. Wet material will work its way into adjacent areas through hoof action creating holes and high spots. In addition, horses often paw near the stall door or feed bucket as a result of impatience, boredom, or out of habit. This creates low spots. Most horses are good housekeepers, if given enough space. Often, a mare will urinate and defecate in one spot in her stall, away from the resting and feeding areas. Geldings are more limited in how they utilize their stalls but typically defecate in one area and urinate in the center.



**Figure 2. Porous Floor Cross Section** (Includes topsoil, clay, sand, road base mix, grid mats)

- Porous floors will have underlying sand, gravel or crushed stone foundation to allow urine and water to drain away from the floor and the stable as well.

## Porous Flooring Materials

**TOPSOIL**—At first this seems the most natural as it resembles pasture footing. Drainage and durability properties depend on the type of soil. Some soil types can resist drainage and result in mud or puddles while others may become dry and dusty. Sandy topsoil is often damp in cold climates and will shift from use, creating uneven footing. A concrete or asphalt apron can be used at the stall door to discourage “digging.”

### *Advantages*

- Highly absorbent
- Non-slip
- Easy on legs
- Inexpensive
- Drainage variable

### *Disadvantages*

- Porosity can retain dampness and odor
- Needs to be leveled and replaced often
- Can be difficult to muck out
- May freeze hard
- Difficult to disinfect

**CLAY**—This is traditionally the horseman’s favorite flooring. The types of clay locally available will vary. Pure clay tends to pack too tightly and become impervious to drainage. Pure packed clay is slick when wet. It is recommended to mix clay with other soils. A mix of 1/3 fine stone dust, 2/3 clay is common over a sub-layer of gravel to aid drainage. Areas of frequent urination are most likely to see dips and holes developing. Wetness, from urination softens the clay and reduces compaction. As the horse steps in these areas, the clay is pushed towards the drier area, creating a pit or hole. Drainage can be assisted by sloping the floor (1-inch per 5-feet) toward an alley channel, although maintaining an even slope is difficult. If pawing at the stall door is a problem, a concrete or asphalt apron can be a deterrent.

### *Advantages*

- Closest to a natural tread
- Easy on legs
- Noiseless
- No dust
- Keeps hooves moist
- Highly absorbent
- Relatively warm
- Resists wear when dry and compacted
- Affords a firm footing unless wet
- Inexpensive

### *Disadvantages*

- Can be difficult to keep clean and level
- Needs re-leveled and repacked each year
- Needs replacement every few years under constant-pawing due to holes and pockets
- Remains damp longer than desirable
- May retain odor

**SAND**—Sand is one of the most forgiving floor materials for a horse’s legs and has excellent drainage. However, pure sand does not compact and will move easily creating tracks and pockets with repeated use. The uneven surface should be raked smooth daily. Sand can become mixed with bedding materials (especially shavings and sawdust), making cleaning difficult and creating a need for frequent replacement. If sand is used, horses should be monitored for signs of intestinal impaction and colic. New horses and those fed off the floor may be especially prone to ingesting the sand. Sand may have a drying effect on horse hooves with more hoof wall cracks and splits.

**Advantages**

- Highly absorbent
- Soft surface
- Noiseless
- Good drainage
- Non-slip

**Disadvantages**

- Does not pack well
- Damp in a cold climate
- Drying effect on hooves
- Mixes with bedding so harder to clean stall
- Must frequently replace what is discarded during stall cleaning
- Sand colic can be a problem as horses eat sand with dropped food or as a habit.

**ROAD BASE MIX**— Road base mix is known by many names depending on the region of the country. It has been called limestone dust, washed sand, quarry waste, and stone dust just to name a few. Road base mix is usually decomposed granite mixed with a small amount of clay or other binding material that results in a well-graded, compactable material used for road building. The exact mix depends on the area and types of rock and binding agents available. Different grades of road mix are available, ranging from course, large particles to very fine. Road mixes with the fewest and smallest rocks are recommended. This material is easily compacted but if compacted too much, can be as unforgiving to a horse’s legs as concrete. If the floor is not compacted properly, it will be easily dredged and mixed with bedding by the digging horse. As a floor material that is easy to level and offers some drainage through it, road base mix is often used as a sub-floor for rubber mats. Road base mix flooring material should be 4 to 5-inches thick over a 6 to 8-inch base of sand or small gravel for drainage.

**Advantages**

- Packs well few problems after this
- Good drainage
- Easy to level

**Disadvantages**

- Small rocks on surface are undesirable but they can be raked up once it is packed.
- If not compacted well enough, holes develop, mixes with bedding

**WOOD**—Once a common flooring in the era of horse-drawn transportation, it is utilized less in modern horse facilities due the relatively high initial expense of hardwood boards. In addition, concrete and asphalt have become more available over this timeframe. Wood provides a low maintenance, level floor that aids in stall mucking. Planks should be at least 2-inch thick hardwood (often oak) with preservative treatment. Gaps between boards allow urine drainage and should be packed with sand, road base mix, or clay (Figure 3). Planks are placed over a level surface of 6 to 8-inches of sand or small gravel to aid drainage or set into asphalt or concrete. A wood floor helps alleviate stiffness in the muscles and joints by insulating the horse from the cold ground. It offers a softer footing than concrete or asphalt, but may become slick with wetness and is difficult to disinfect due to wood’s porous nature. Gaps between planks create holding spaces for spilled grain, inviting insects and rodent infestation. Correct construction and adequate bedding can minimize rodent and wetness problems.

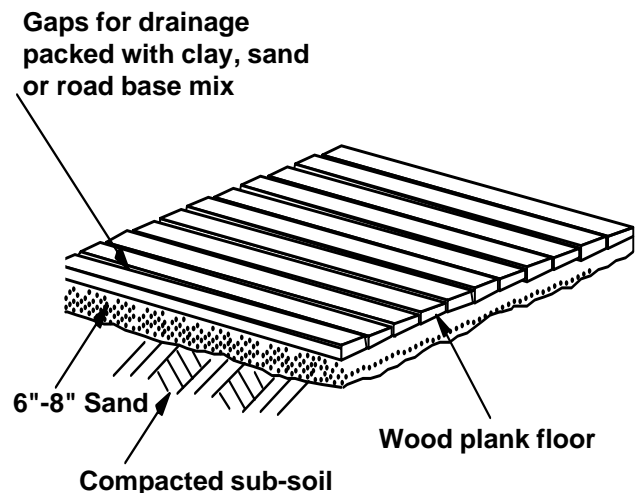


Figure 3. Wood floor construction.

### ***Advantages***

- Easy on the legs- springy
- Warm to lie upon
- Rough wood has good tractor
- Low maintenance
- Durable

### ***Disadvantages***

- Porous-difficult to clean and disinfect
- Retains odors
- Slippery when wet
- Check often for signs of wear
- With poor construction is prone to damage by insects and rodents
- High initial expense

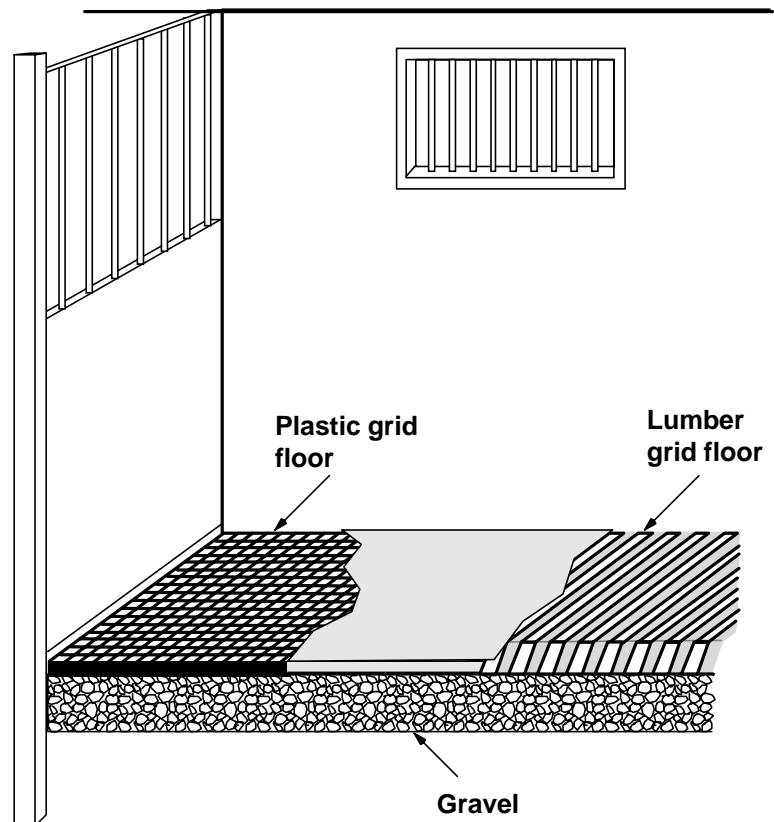
**GRID MATS**— This flooring style is an open grid pattern designed to support another type of flooring material (Figure 4). Grid mats may be manufactured from rubber or plastic (polyethylene). By design, the mat is placed over a compacted, level, sub-floor and topped with another flooring material such as clay, soil or road base mix. The open spaces aid in drainage and the matrix prevents holes and damage from pawing. Stall floor characteristics match the topping material characteristics but the grid mat matrix decreases material movement due to wetting and hoof action. Another option in grid stall floor design uses pressure-treated 2 x 4 lumber set on edge that span the stall width. A 1-1/2 to 3-inch gap is left between boards, so that the lumber grid is filled and topped with a porous stall flooring material (clay, soil, road base mix). This offers similar characteristics to the manufactured grid mat product in a home made design. Longevity of the lumber grid is expected to be less than rubber or plastic.

### ***Advantages***

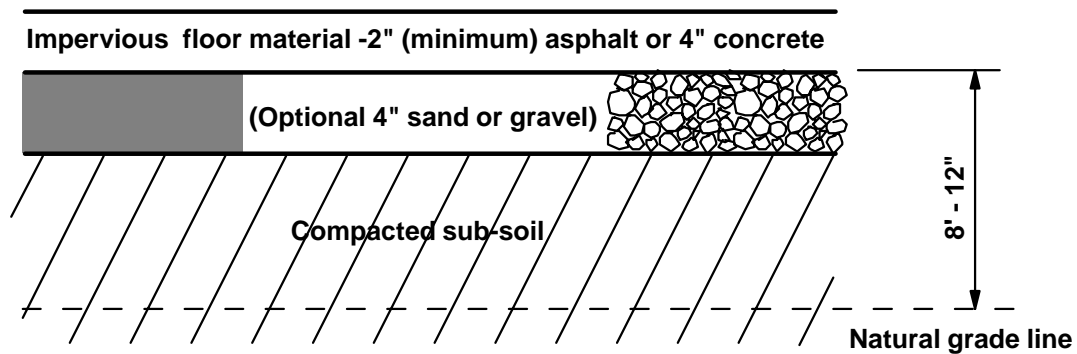
- Durable
- Easy on horse's legs
- Remains level
- Can decrease bedding usage versus concrete
- Low maintenance

### ***Disadvantages***

- Expensive



*Figure 4. Two examples of grid floor design one with a plastic mat and the second using lumber.*



**Figure 5. Impervious Floor Cross Section** (Includes concrete, asphalt, solid rubber mats and brick/tile aisle floor)

- Not all impervious stall floors are sloped to drains or channels but instead rely on deep bedding to manage urine and water removal.
- Impervious floors require a level, evenly-compacted sub-layer. Sand or fine gravel may be used for structural support and provision of drainage from underground wetness. Solid rubber mats are often laid over concrete or well-packed road base mix.

## Impervious Flooring Materials

**CONCRETE**—This type of flooring has become popular due to its durability and low maintenance. It is easier to muck out and clean a concrete floor stall than most other floor materials. Concrete has different finishing options. Steel troweling brings fine aggregate and cement to the top forming a glazed and slippery surface. Smoothed concrete is slick and horses are reluctant to lie down and get up. For this reason, it is not recommended for use in stalls although it is often suitable in a feed room where its smoothness eases cleaning. Wood float and broom finished surfaces provide better traction, however, they tend to become smooth with wear. The brushed concrete, with its small ridges that give it the appearance of being swept with a broom, can be abrasive to lying horses without a deep bedding layer. Broomed concrete with a rough finish for traction and durability would be suitable in an aisleway. Concrete is very durable but hard on horses standing in the stall all day. Some horsemen recommend that a horse be turned out at least four hours per day when housed on concrete flooring. Using a thick layer of bedding or solid rubber mats can minimize some of concrete's disadvantages. Provide a 4-inch minimum thickness for concrete floors under stalls and where vehicle use is limited. Provide 5-inches of concrete depth for drives and alleys with moderate vehicle traffic (such as heavy pickup trucks and manure spreaders). A well-drained sand or gravel base under the concrete is desirable, but not required.

### **Advantages**

- Durable, long life
- Easy to clean
- Possible to disinfect
- Rodent proof
- Difficult for horse to damage
- Low maintenance

### **Disadvantages**

- Hard on legs, non-cushioning
- May discourage normal behaviors, such as lying down
- Cold and damp in northern climates
- Needs more bedding or solid rubber mat to cover disadvantages
- Relatively expensive

**ASPHALT**—An alternative to concrete, asphalt provides ease of cleaning and longevity with a bit more forgiveness to the horse's legs and feet. Asphalt is a mixture of aggregate stone and sand held together with a tar compound. Asphalt needs to be applied thickly enough to prevent cracking and chipping. A 2-inch minimum thickness is needed in stalls when installed over a solid, level subsurface. For aisles with vehicle traffic, similar to driveway use, three to four inches is recommended. Under extra heavy use, asphalt may need to be replaced in several years. Asphalt can be installed as either a slightly porous or almost impervious floor material. Unsealed asphalt is relatively porous compared to concrete. Porosity can be improved by minimizing the amount of sand and small particles in the aggregate mixture. New asphalt floors are not smooth and provide adequate traction. However, repeated travel by horses will smooth out the floor, making it slick. Hot asphalt that has its surface raked rather than rolled will have more texture for traction. Likewise asphalt with larger aggregate size will provide more traction.

***Advantages***

- Less expensive than concrete to lay
- Easy to clean
- Slightly more give than concrete
- Long wearing but not as durable as concrete
- Provides traction

***Disadvantages***

- Hard and cold-but not as bad as concrete
- Surface irregularities can trap urine and create sanitation problems
- May crack and chip if not applied thickly enough
- Relatively expensive

**SOLID RUBBER MATS**—Mats are typically used over another flooring, often to cover up faults such as hardness or slipperiness. They are gaining popularity despite their expense. Mats will reduce the amount of bedding that is needed to provide cushioning or textured models can even be used alone which is one payback on their cost. Mats are installed on top of an even, compact surface such as 4 to 5-inches of road base mix or concrete. If the mat does not cover the entire area of the stall, then multiple mats should interlock or be anchored to the floor. Without a secure connection between mats, keeping multiple-piece stall mats in position can be difficult, as their smooth surface allows the mats to “walk” and bedding chaff in the cracks eventually prys mats up and apart. Horses can lift up areas that are not properly secured. It is often necessary to have multiple people to move mats because they are heavy (4' x 6' mat weighs about 100 pounds) and cumbersome but they are durable and can withstand a lot of abuse. Care should be taken with horses wearing studded shoes since the studs may damage the mat surface. A range of mat thicknesses are available, most commonly seen are thickness from 1/2 to 3/4-inch. Top surfaces should be rippled or bumped to add traction and the base of the mat should be grooved to aid in the removal of any urine that leaks through joints from the surface. Untextured mats are slippery when wet. A mat surface makes stall cleaning easy but care must be taken with forks to prevent cutting the surface. Shop around for mats and delivery costs. There are many manufacturers with good warranties.

***Advantages***

- Provides good footing for areas such as breeding shed, foaling stalls, and recovery stalls
- Long life with many companies offering warranties for 10+ years
- Easy to clean
- Eases stall cleaning
- Easy on legs
- Low maintenance

***Disadvantages***

- Not as comfortable if used instead of traditional bedding
- Expensive
- Will move unless secured by walls, interlocking pieces or anchored
- May retain odor

## Specialty Floors Around The Barn

**AISLEWAYS**—Alley floors can be of the same material as the stalls but this area has more diverse uses and often has different requirements for the floor. Horses are not housed on the aisle floor, but this area sees just as much abuse as the stall floor. Characterization of different flooring materials can be viewed in Table 2.

Alley floors should be:

- Dry
- Durable
- Easy to sweep clean
- Non-slip and skid proof
- Fire resistant

Common alley floor materials are the same as the stall floors. Compare material properties listed for stall floors, with the demands of an aisle floor in mind. Wide aisles that are used for exercising horses should have a floor of sand or a footing material suitable for use in riding arenas.

Clay is not very durable for aisleways and does not keep an even surface. Concrete and asphalt are durable yet noisy and can become slippery, especially with wear. If concrete is used, use only roughened concrete. Synthetic surfaces are resilient, have good footing but are expensive. Topsoil floors vary in desirability depending on the area but they can freeze, be dusty or very muddy. Soil floors may be suitable in smaller private stables where the aisle has limited traffic.

Unlike the stall floor, an alley floor should not absorb water, but redirect the water elsewhere. Alley floors can be sloped toward the sides if an alley gutter is provided or toward a drain. It is recommended that

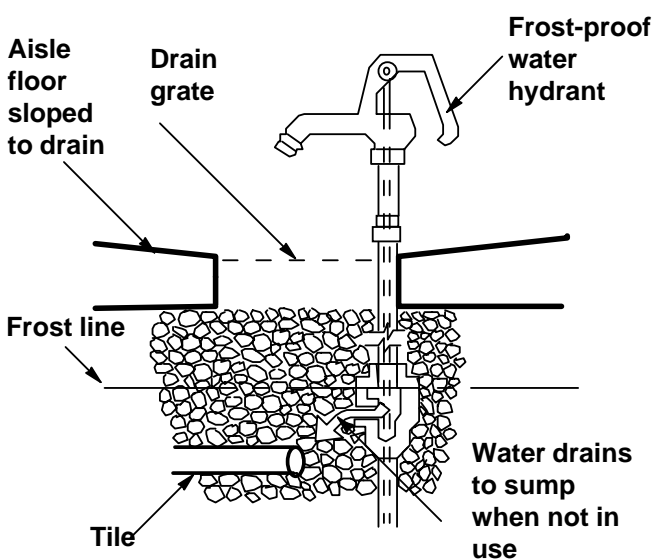


Figure 6. Drainage near water hydrant.

Table 2. Characteristics of aisle floor materials based solely on the material itself, with no base or drains.

	Stays dry	Low Maintenance	Ease of cleaning and disinfecting	Non-slip	Wearability - Holds up under heavy use
Topsoil	x	?	x	+	?
Clay	?	?	x	?	?
Sand	+	x	x	+	?
Concrete	+	+	+	?	+
Asphalt	+	+	+	?	+
Road Base Mix	+	?	+	+	?
Solid Rubber Mats	+	+	+	+	+
Grid Mats	+	+	+	+	+
Bricks	+	+	?	?	+
Synthetic Bricks	+	+	+	+	+

+ = good to excellent

? = highly dependent on other factors

x = poor

drains be provided, especially under or near water hydrants (Figure 6). Avoid drains in the middle of alleys heavily trafficked by horses or in areas that are commonly soiled by hay, dirt, or bedding material. Grates or drain covers can minimize clogs and should be cleaned regularly to prevent back-ups.

Older and more elaborate barns use bricks or tiles for the aisle floor. These floors are very attractive, but are labor intensive and costly to install. Brick and tile come in a range of textures. The more smooth the texture, the more slippery the surface can become, especially when wet. Bricks have also been criticized as being difficult to disinfect due to their porosity. In the past few years, rubber has been used to model the look of a traditional brick floor (Figure 7). This addresses some of the disadvantages of the porous brick. An adequate base is essential to the longevity of the floor. Soil upheaval or improper installation may make the surface uneven to walk on. Figure 5, Impervious Floor Cross-Section has more detail.

**FEED ROOM**—This area receives a lot of use in a horse facility. Because it is especially vulnerable to visits from rodents, a floor that facilitates the clean up of spilled grain and dirt is recommended. A rough floor texture is not desirable in the feed room. This prevents cleanup. Four-inch thick concrete with steel trowel finish or sealed asphalt is desirable. These floors provide a long lived, rodent proof flooring which can be easily cleaned.

**TACK ROOM**—Tack room floors are usually impervious materials if it is indeed a separate room and not a tack “area.” The room can function as a lounge by adding indoor/outdoor carpeting. Concrete or asphalt has the advantage of being easy to clean and rodent proof.

**WASH AREA**—In this area, a non-slip floor impervious to water is desirable. A drain and grate will also be needed. Some of the more resilient floors include very rough or grooved concrete, textured rubber mats over concrete, and sealed, large aggregate asphalt. The floor should slope towards a drain that is located on the side or in the back of the wash area, not in an area heavily trafficked by horses. Horses may be reluctant to stand on drain covers and the drain covers themselves may become a safety hazard. Drain design should consider the need to remove clogs. Installing clean-outs and traps will add longevity to the life of the drain.

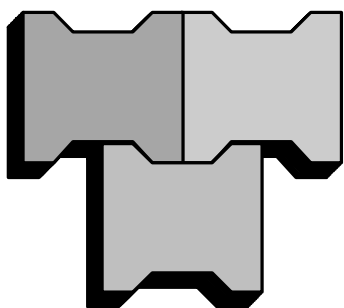


Figure 7. Example of a rubber paving brick configuration.

## Stall Floor Construction & Drainage

All stall floors need some way of handling fluids. Most often, bedding is used to soak up urine. In the absence of adequate amounts of dry bedding, the extra urine will have to drain somewhere. A water flow path is provided either along the floor surface or through the floor to sub-layers that allow the fluid to move away from the stable. Floor drains are not common within horse stalls due to frequent clogging with bedding and

stall waste materials. Many horse stall floors function well with no accommodation for drainage other than careful bedding management for urine removal. When additional drainage is desired, the floor should either be sloped toward a drainage channel or porous floor layers provided which allow liquids to flow from the stall. When water will be added to the stall, such as during disinfecting or washing functions, then drainage becomes more important than when urine alone is being managed.

### Principles of good stall floor construction

Stall floors are built from the bottom up.

- Remove vegetation, roots, stone and topsoil and compact the sub-soil below the stable site to prevent settling and cracking of the stable and flooring. Low and moderate-clay content soil are adequate for compaction. In lieu of compaction, allow subsoil to settle for several months before construction. Avoid high clay soils as subsoils.
- Slope the ground surface 5% away from the stable and divert surface and groundwater away from the stable site (Figure 8).
- To ensure adequate drainage for the stable when using any type of flooring, elevate the top of the stall floor at least 12-inches above the outside ground level. Often the compacted subsoil is covered with 4 to 5-inches of gravel plus 2-inches of sand or pea gravel for good drainage. Then 4-inches or more of stall floor material is applied on top.
- Floors benefit from some slope to move water. This will distribute urine and water spills to areas with drier bedding. A 1-1/2 to 2% [1/4 inch per foot; 1-inch in 5-feet] incline is enough slope to move water without causing a noticeable slope to the horse.
- For drains, shallow and safe open channeling is preferred to the complexity of an underground drainage system. See Stall Drainage System Design section for more information. Channeled water is taken outside the stable where a rock layer of large gravel or stones that extends well beyond the stable foundation assists drainage.
- If the ground water table is high, damp floors can be overcome by sub-draining. This is a layer of drain rock laid prior to building the normal foundation. Severe problems require tile drainage, extra fill and call for non-porous floors. See Water from Below section for more information.

## Do not build on low ground

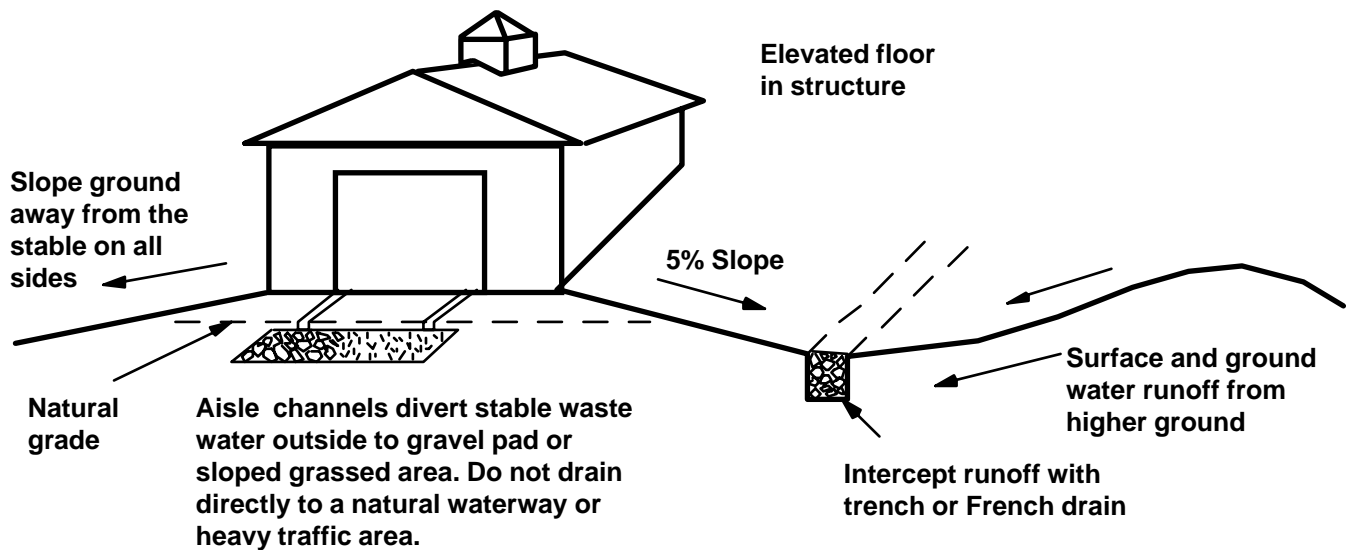


Figure 8. Proper floor drainage considers several site related features related to keeping water away from the building.

## Stall Drainage System Design

When improved stall drainage is desired, a safe open channel along the stall wall is recommended to catch surface wetness. Slope the stall floor toward that channel. Do not use a drain in the middle of the stall as it will get clogged with bedding. Underground drains with inlets protected by heavy metal grates (which support horse and light vehicle traffic) may be used but they offer the disadvantages of complexity and increased cost of construction and will almost surely clog with stall waste material. A disadvantage of the open channel is potential odor from stall waste accumulation. Proper sanitation management can minimize this. Open channels can be built with gradually sloping sides to reduce injury potential for horses and people stepping into them or they may be filled with large gravel. A heavy open grill or solid grate may be placed over the channel in areas of horse and vehicle traffic, such as at doorways. An enhanced drainage system may not be desirable if freezing will occur in the barn.

Sloped floors offer drainage advantage particularly after a stall washdown. Slope of about 1-inch per 5-feet is effective. Avoid noticeable sloping floors as this can strain tendons when horses are standing in the stalls. Stall run off is easily hosed away with a sloping floor. Three options for floor slope and drainage system are provided in Figure 9.

- The stall floor can be sloped toward a channel outside the front of the stall in the working aisle. This single slope floor is relatively easy to construct. Provision for water to escape from the stall into the aisle channel is needed along the bottom of the front stall wall. Keep any gap to less than 2-inches to minimize hoof entrapment.
- The stall floor could be sloped toward one corner where a cutout in the wall allows fluid access to the channel or drain. One drain channel can serve two stalls. Construction of the double slope floor is a bit more complex than the single slope floor. This design offers advantage for collection of stall wastewater for an underground drainage system.
- The stall floor may be sloped to the exterior wall of the stall where a sloping gutter drain is provided along the inside of that wall. Provide a small trench 2-inches wide extending from the top stall flooring material down to the gravel sub-floor layer to collect runoff. Fill the trench with small stone or large gravel to enhance water movement.

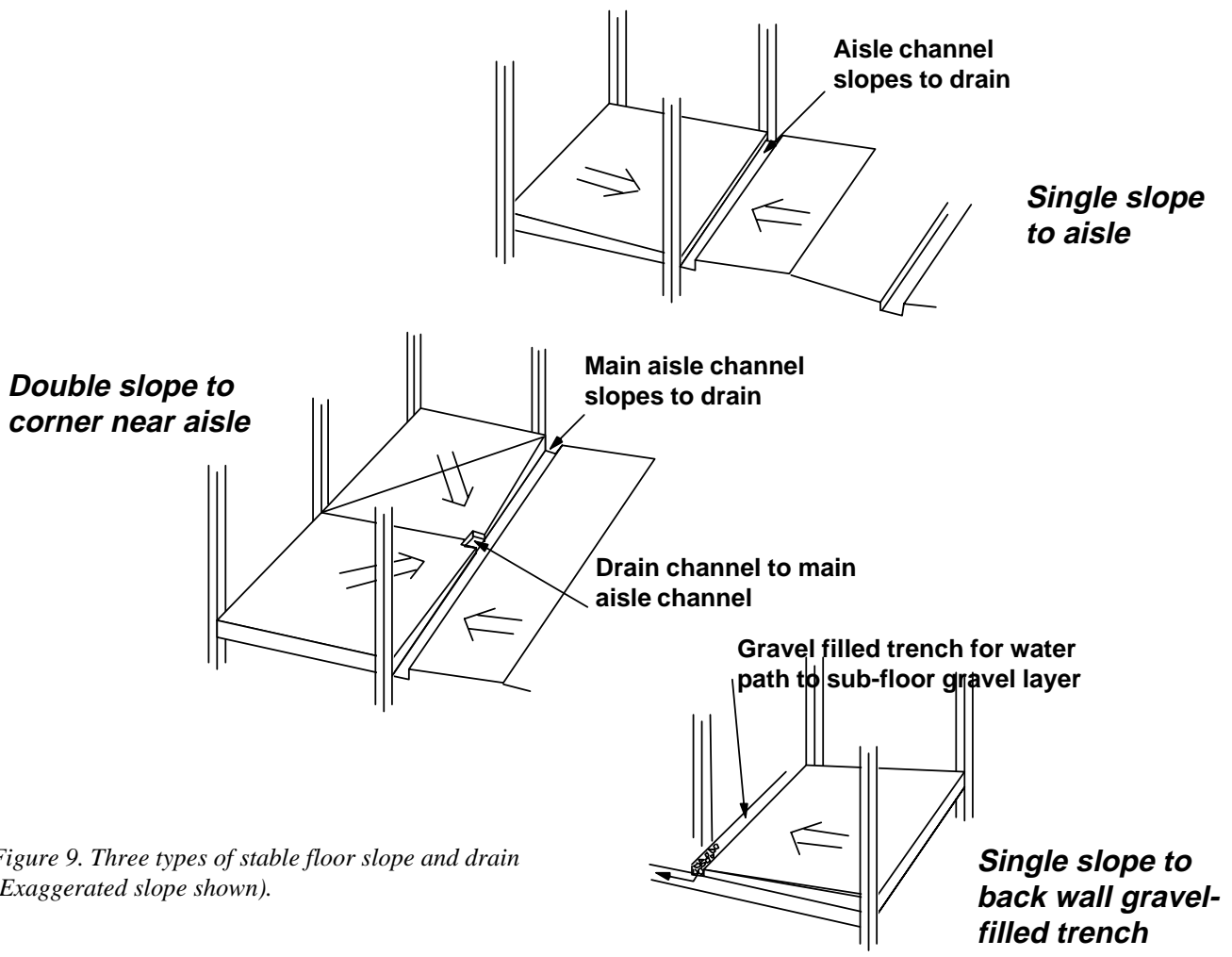


Figure 9. Three types of stable floor slope and drain (Exaggerated slope shown).

**Water from below**

Fine soils, such as clay, draw water by capillary action from a water table resulting in saturated soil conditions under the building. A high water table causes similar problems. Saturated soil has less bearing strength than dry soil. Freezing of this water can result in frost action such as heaving and odd settlement of the floor and building foundation. To prevent frost damage:

- Lower the water table with well drained subsoil or perimeter tile drains with suitable outlets.
- Provide granular fill, which has low capillary conductivity, under the flooring to break the water's upward travel. Large gravel or crushed rock, with the fines screened out is desirable. In worst case, subsoil will need to be excavated to the maximum frost penetration depth and replaced with the gravel.
- Raise the building floor to move away from the water table. Any building floor should be at least 12-inches above the surrounding grade, but it may be higher if water damage is anticipated.

**Summary**

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There are many options for suitable flooring materials in horse stables. Selection will most often depend on what characteristics are important to the stable manager and local availability of materials. Stall floors become very important to leg and foot fitness when a horse spends a lot of time confined to a stall. Proper floor materials can aid stable cleaning and manure removal. The floor is more than the top surface on which the horse stands. A properly constructed floor has layers of materials that provide suitable support, drainage, and structural integrity for the top surface layer.

## **Additional Resources**

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Other titles in the horse facilities fact sheet series include:

Horse Stall Design Features, G-95

Horse Stable Manure Management, G-97

Fences for Horses, G-98

Horse Stable Environmental Control, G-99

Fire Safety in Horse Stables, G-100

Horse Stable Fly Control, G-101

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