

Fence Planning for Horses

Horse fence can be one of the most attractive features of a horse facility. But not all fence is suitable for horses. Fencing is a major capital investment that should be carefully planned before construction. A fence should keep horses on the property and keep away nuisances such as dogs and unwanted visitors. Fences aid facility management by allowing controlled grazing and segregating groups of horses according to sex, age, value, or use.

Well-constructed and maintained fences enhance the aesthetics and value of a stable facility, which in turn complements marketing efforts. Poorly planned, haphazard, unsafe, or unmaintained fences will detract from a facility's value and reflect poor management. Good fences can be formal or informal in appearance, yet all should be well built and carefully planned. Many experienced horse owners will relay stories about the savings for cheaper, but unsafe, horse fence (barbed wire, for example) eventually being paid for in veterinary bills to treat injured horses.

Often, more than one kind of fence is used at a facility. Different fences might be installed for grazing pastures, exercise paddocks, riding areas, or for securing property lines. Land topography influences the look, effectiveness, and installation of fencing. Consider different horse groups.

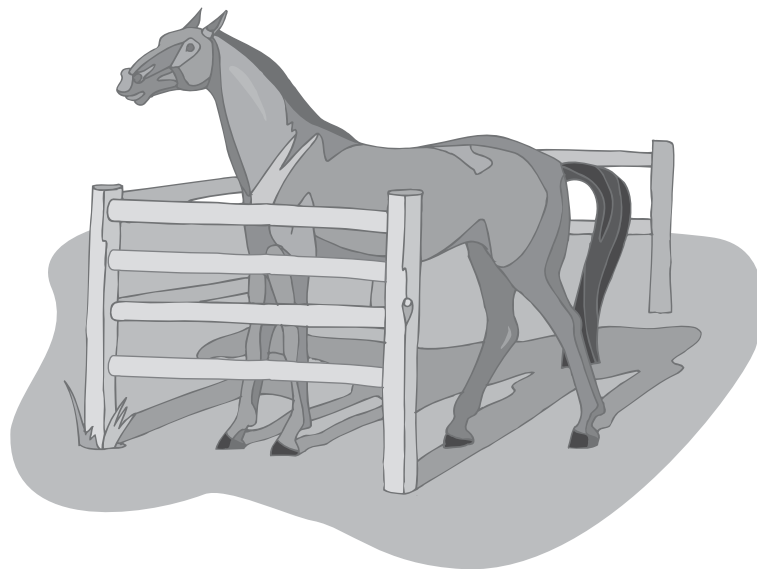
Stallions, weanlings, mares, mares with foals, and geldings all have different fencing requirements.

Pasture use may range from exercise paddocks (corrals) to grazing or hay production. Paddock layout should allow for ease of management, including movement of horses, removal of manure, and care of the footing surface. Pasture design should allow field equipment, such as mowers, manure spreaders, and baling equipment, to enter and maneuver easily. This will reduce fence damage by machinery and the time needed to work in the field.

This bulletin presents information useful in planning fences for horse facilities. The emphasis is on sturdy, safe horse fence typically used in the eastern United States and Canada.

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The Best Fence

Understand the purpose of a fence. The true test of a fence's worth is not when horses are peacefully grazing, but when an excited horse contacts the fence in an attempt to escape or because he never saw it during a playful romp. How will the fence and horse hold up under these conditions? A horse's natural instinct to flee from perceived danger has an effect on fence design. Like other livestock, horses will bolt suddenly, but since they are larger and faster, they hit the fence with more force. Also, horses fight harder than other livestock to free themselves when trapped in a fence. There are many types of effective horse fencing, but there is no "best" fence. Each fencing type has inherent tradeoffs in its features.

A "perfect" fence should be highly visible to horses. Horses are far-sighted and look to the horizon as they scan their environment for danger. Therefore, even when fencing is relatively close, it needs to be substantial enough to be visible. A fence should be secure enough to contain a horse that runs into it without causing injury or fence damage. A perfect fence should have some "give" to it to minimize injury upon impact. It should be high enough to discourage jumping and solid enough to discourage testing its strength. It should have no openings that could trap a head or hoof. The perfect fence should not have sharp edges or projections that can injure a horse that is leaning, scratching, or falling into it. It should be inexpensive to install, easy to maintain, and last 20 years or more. And finally, it should look appealing.

Unfortunately, no type of fence fits all the criteria for the perfect fence. Often there is a place for more than one type of fence on a horse facility. Stable management objectives and price ultimately determine which fencing is chosen. Many new fence

materials and hybrids of traditional and new materials are now available. Details of fence materials and construction may be found in other publications (see Additional Resources).

Features That Apply to Any Fence Type

Good Planning Attributes

Planning includes more than selecting a fence type. It is best to develop an overall plan where the aesthetics, chore efficiency, management practices, safety, and finances are considered. The best planning involves a layout drawn to scale that shows proposed gates, fence lines, where fences cross streams or other obstacles, irregular paths along a stream or obstacle, traffic routes for horses and handlers, routes for supplies and water, vehicle traffic routes, and access for mowing equipment. All these should be in relation to buildings and other farmstead features.

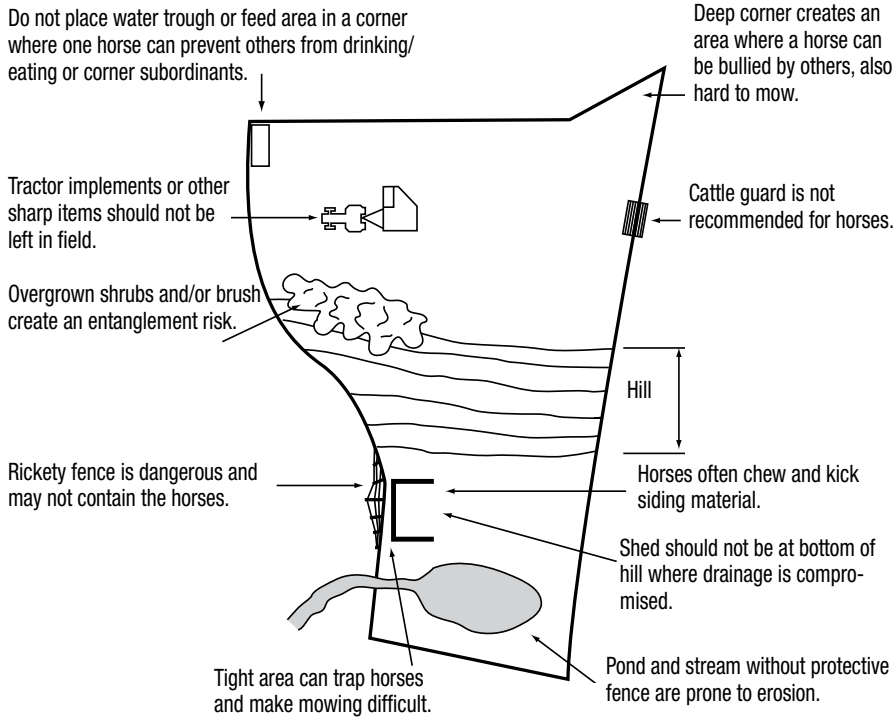
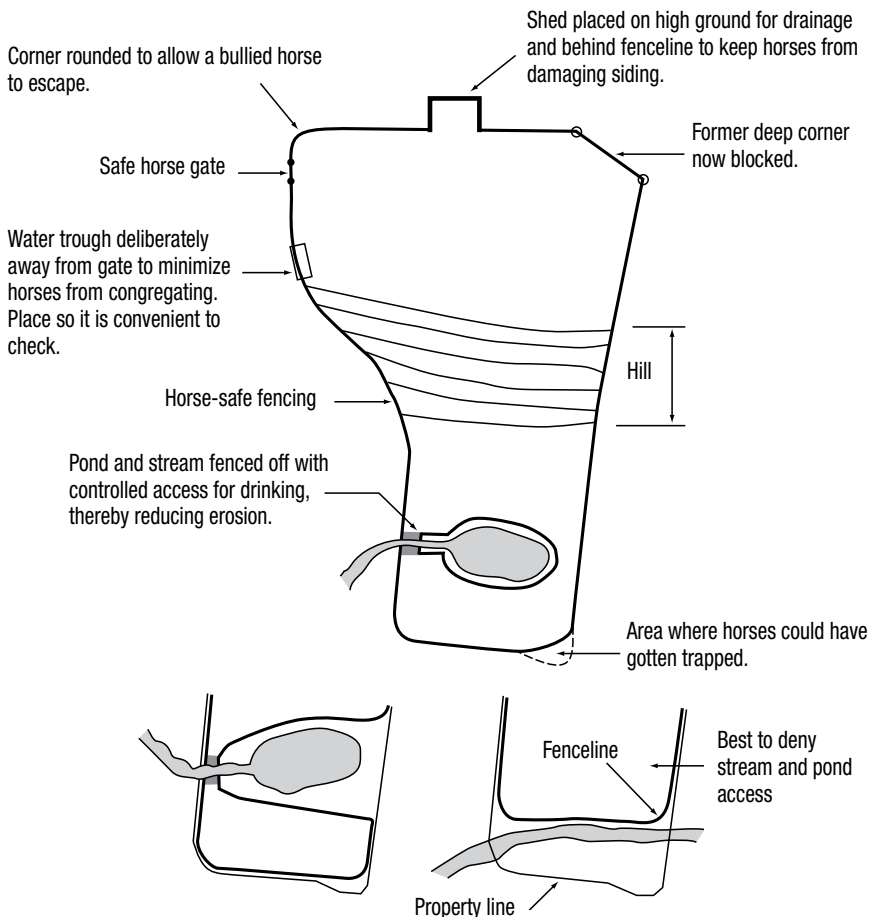
Select and install fencing that allows easy access to pastures and does not limit performance of stable chores. Gates should be easy to operate with only one hand so the other hand is free. Fencing should also allow easy movement of groups of horses from pasture to housing facilities. All-weather lanes should connect turnout areas to the stable. Lanes can be grassed or graveled depending on the type and amount of traffic that use them. Make sure they are wide enough to allow passage of mowing equipment and vehicles. Vehicles such as cars, light trucks, and tractors can be up to 8 feet wide. Farm equipment needs 12- to 16-foot-wide lanes to comfortably negotiate. Narrower lane widths are acceptable for smaller tractors or mowing equipment. Remember to leave room for snow storage or removal along the sides of lanes and roads.

It is best to eliminate fence corners and dead-end areas when enclosing a pasture for more than one horse. By curving the corners, it is less likely that a dominant horse will trap a subordinate. Round corners are especially important for board fences and highly recommended for wire fences.

Most wire fencing is installed with the wire under tension as part of the design strength of the fence. This tension may be modest, just enough to keep the wire straight and evenly spaced throughout seasonal temperature changes in wire length, or may be quite substantial, as with high-tensile wire fence. With tensioned fencing, rounded corners may not be as strong or durable as square ones. A slight outward tilt of support posts on curved corners can help resist the inward forces of the tensioned wire. Position the tensioned wire on the outside of the fence post as it travels around the curve, then back to the inside (horse side) on the straight sections. It is possible to build square corners for tension fences and use boards to prevent horses from getting into the corner. This creates areas that limit grazing, requiring regular mowing, but it is cheaper to construct than curved corners.

Good Fence Attributes

Horse fences should be 54 to 60 inches above ground level. A good rule for paddocks and pastures is to have the top of the fence at wither height to ensure that horses will not flip over the fence. Larger horses, stallions, or those adept at jumping may require even taller fences. At the bottom, an 8-inch clearance will leave enough room to avoid trapping a hoof yet will discourage a horse from reaching under the fence for grass. A bottom rail with clearance no higher than 12 inches will prevent foals from rolling under the fence. Fence clearance varies with fence types. Higher clearances allow small animals, such

Figure 1. Poor fence layout.**Figure 2. Improved fence layout.**

as dogs, to enter the pasture. Fences should be built with particular attention to fence post integrity. Several fence material manufacturers provide good detailed guides to assist in construction and material selection.

Fence openings should be either large enough to offer little chance of foot, leg, and head entrapment or so small that hooves cannot get through. Small, safe openings are less than 3-inches square, but can depend on the size of the horse. Tension fences, such as the types that use high-tensile wires, usually have diagonal cross-bracing on corner assemblies. These diagonal wires or wood bracing provide triangular spaces for foot and head entrapment. Good fence design denies horse access to the braced area or at least minimizes hazards if entrapment occurs.

Horses will test fence strength deliberately and casually. Horses often reach through or over fences for attractions on the other side, thus, sturdy fences are essential. Fences that do not allow this behavior are the safest. Keep open space between rails or strands to 12 inches or less. For electric fences, this open distance may be increased to 18 inches since horses avoid touching the fence. With most fence, and particularly with paddock and perimeter fence, a single strand of electric wire can be run 4 to 6 inches above or just inside the top rail to discourage horses who habitually lean, scratch, or reach over fences.

The fence should be smooth on the horse side to prevent injury. Fasten rails and wire mesh to the inside (horse side) of the posts. This also strengthens the fence. If a horse leans on the fence, its weight will not push out the fasteners. Nails and other fasteners should be smooth without jagged parts that can cut the horse or catch a halter.

Visible fences will prevent playful horses from accidentally running into them. A frightened horse may still hit a visible fence while he is blinded with fear. A forgiving fence that contains the horse without injury is better than an unyielding brick wall. Wire fences are the least visible, so boards or strips of material are often added.

Fence Post Selection

The fence post is the foundation of the fence, so its importance cannot be overemphasized. The common element in virtually all successful horse fences is a wooden post. Setting posts represents the hardest work and the most time-consuming part of fence building and is absolutely the most critical to the long-term success of the fence.

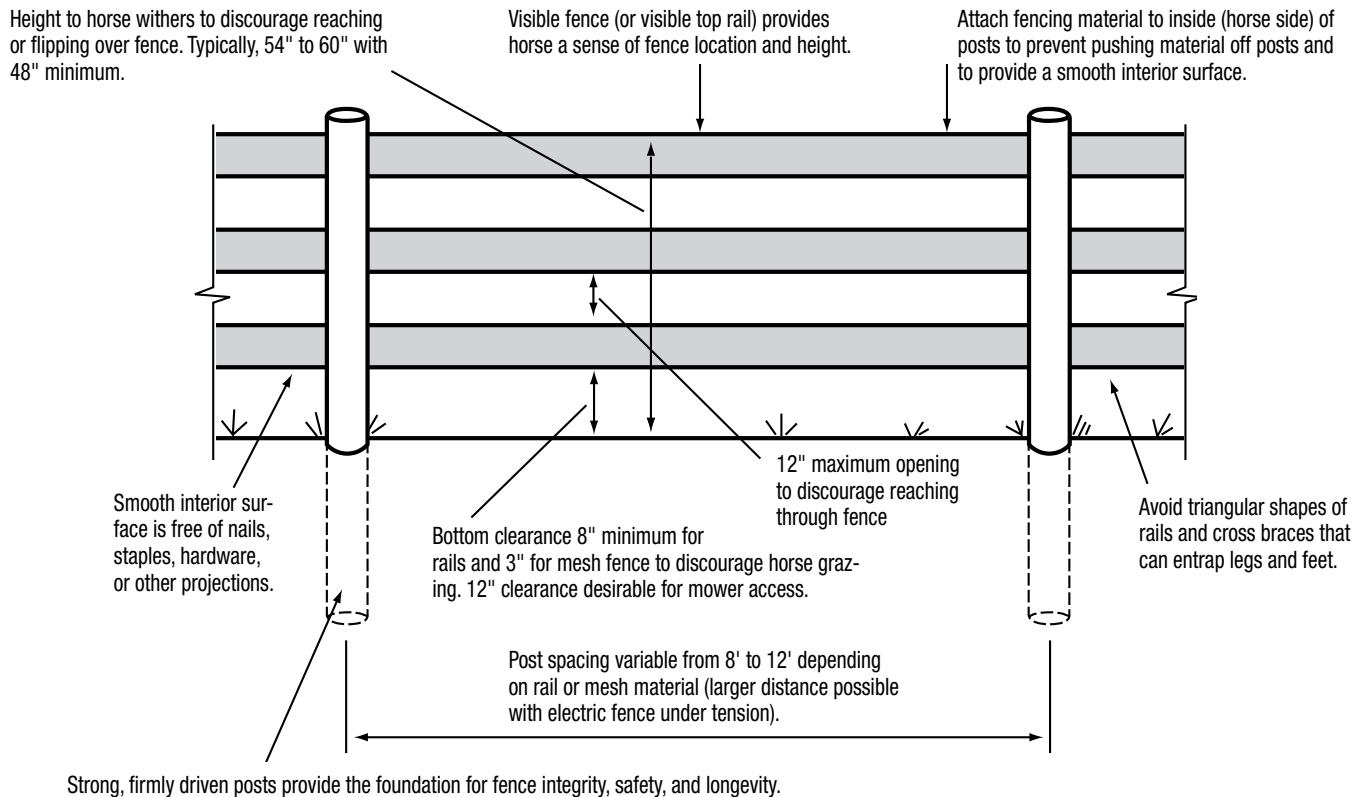
Driven posts are more rigid and therefore recommended over hand-set posts or those set in predrilled holes. Driven posts are pounded into the ground through a combination of weight and impact by specialized equipment. The principle behind driven posts that makes them so secure is that the displaced soil is highly compacted around the post, resisting post movement. Even for

do-it-yourself projects, you should contract the job of driving posts. Post-driver equipment is nearly impossible to rent due to liability concerns. Under some dry, hard, or rocky soil conditions, a small-bore hole will be necessary for driven posts.

Wood is recommended for all horse fence posts. The best buy is a pressure-treated post from a reputable dealer. The preservative must be properly applied to be fully effective. Initially, treated posts are more expensive than untreated ones, but they last four times as long as untreated ones. Depending on soil conditions and preservative treatment quality, a pressure-treated post can last 10 to 25 years.

Suitable wooden fence posts are similar for board and mesh fences. High-tensile wire and other strand-type fences require similar posts, but

Figure 3. Attributes of a good horse fence (nonelectric). No matter what fence rail material is used, horse safety and fence sturdiness are important.



distances between posts are often much longer than for board or mesh fence. Post distance on high-tensile wire fence depends on wind influences and topography. Round wood posts are stronger and accept more uniform pressure treatment than square posts of similar dimension. Attachment of wooden rail boards to round wood posts is improved when one face of the post is flat.

Exceptions to wood posts are allowed for horse-safe steel posts typically used on chain link fences, pipe posts from welded fences, and rigid PVC fence post. Hollow posts require top caps to cover the ragged top edge, or should be designed that the top fence rail covers the top of the post. Recycled plastic, 4-inch-diameter solid posts are suitable for horse fence, but require a small-bore pilot hole before driving. Metal and fiberglass T-posts are slightly cheaper but pose a serious risk of impalement and are not recommended. They are also not strong enough to withstand horse impact without bending. With a plastic safety cap installed on the top, T-posts may be cautiously used in very large pastures where horse contact is rare.

How deep to set the post for structural stability varies considerably with soil conditions. Soil characteristics play a major role in determining the longevity and maintenance requirements of a fence. Some soils remain wet and can quickly rot untreated wooden posts. Posts in sandy or chronically wet soil will need to be set deeper and perhaps supported by a collar of concrete casing. Other soils tend to heave with frost and can loosen posts that are not driven deep enough. Fences under tension, such as wire strand or mesh materials, will require deeply set posts to offer long-term resistance against tension. A typical line post depth is 36 inches. Corner and gateposts are required to handle greater loads and are about 25% larger in diameter and are set deeper, often to 48 inches.

Gates

Gate Design. Gates should have the same strength and safety as the fence. Gates can be bought or built in as many styles as fence but do not have to be the same style as the fence. The most common and recommended materials are wood and metal tubes. Easy-to-assemble kits for wooden gates with all the hardware, including fasteners, braces, hinges, and latches, can be bought from farm, lumber, or hardware stores. Horse-safe tubular pipe steel gates (often 1 $\frac{3}{8}$ -inch outer diameter pipes) have smooth corners and securely welded cross pipes to minimize sharp-edged places for cuts and snags. By contrast, channelsteel or aluminum stock livestock gates are not recommended for horse use due to their less-sturdy construction and numerous sharp edges.

Avoid gates with diagonal cross bracing. Although this strengthens the gate, the narrow angles can trap legs, feet, and possibly heads. Cable-supported gates offer a similar hazard to horses congregating around the gate. If gate supports are needed, a wooden block called a short post can be placed under the free hanging end of the gate to help support its weight and extend hardware life. The use of a cattle guard (rails set over a ditch) instead of a gate is not recommended since horses do not consistently respect them. Horses have been known to jump them or try to walk over them, which results in tangled and broken legs.

Gates should be as tall as the fence to discourage horses from reaching over or attempting to jump over the gate. Gates can be up to 16-feet wide, with a minimum of 12 feet to allow easy passage of vehicles and tractors. Horse and handler gates should be no less than 4-feet wide, with 5 feet preferred. Human-only passages are useful for chore time efficiency.

Fencing near gates needs to withstand the pressures of horses congregating

around the gate, which means it needs to be sturdy, highly visible, and safe from trapping horse feet and heads. Some paddock gates are positioned to swing into the pressure of the horse to prevent horses from pushing the gate open and breaking latches. On the other hand, gates that are capable of swinging both into and out of the enclosure are helpful when moving horses. Additional latches are recommended to secure the gate in an open position, fully swung against the fence, not projecting into the enclosure.

Gates are hung to swing freely and not sag over time. The post holding the swinging gate maintains this free-swinging action, necessitating a deeply set post with a larger diameter than fenceline posts. Gate hardware must withstand the challenges of leaning horses and years of use. A person should be able to unlock, swing open, shut, and lock a properly designed gate with only one hand so that the other hand is free to lead a horse or carry a bucket, for example.

Gate Location. In most horse operations, gates are positioned toward the middle of a fenceline because horses are individually moved in and out of the enclosure. This eliminates trapping horses in a corner near a gate. On operations where groups of horses are herded more often than individually led, gates positioned at corners will assist in driving horses along the fenceline and out of the enclosure. Place pasture gates opposite each other across an alley. Gates that open to create a fenced chute between the two pastures will aid horse movement.

Fencing along driveways and roads has to provide room to maneuver vehicles to access gates. Entry driveway surfaces are often 16-feet wide with at least 7 feet on each side for snow removal, snow storage, and clearance for large vehicles. Remember

that when driving through a gate while towing equipment, substantial room may be needed to turn between fencelines. A tractor towing a manure spreader or hay wagon will use 16 to 25 feet, respectively, to make a 90-degree turn. The easiest option is to position gates so that machinery can drive straight through the gate. Position gates where good visibility along a road will provide safety for slowly moving horse trailers and farm equipment that are entering and exiting the road. Place gates 40 to 60 feet from a road to allow parking off the road while opening the gate.

Special Fence Areas

Crowded Areas. Strong, safe fencing should be used where many horses congregate or crowd each other, such as near gates, feed/water stations, or shelters. In areas where horses are not often in contact with the fence, such as in very large pastures, a less substantial fence can suffice. Stronger fencing is needed when there are attractions on the other side, such as better grass or equine companions.

Controlled Grazing. Controlled, or rotational, grazing of pasture grasses demands that some areas periodically remain without grazing for regrowth of the grass. If temporary or cross fencing is used to designate controlled sections, it should be just as safe for the horses as the permanent perimeter fence. Temporary fence does not have to be quite as impenetrable because the perimeter fence will eventually contain a loose horse (Figure 4). A younger or inexperienced horse will need to be introduced to electric fence used in a controlled grazing system.

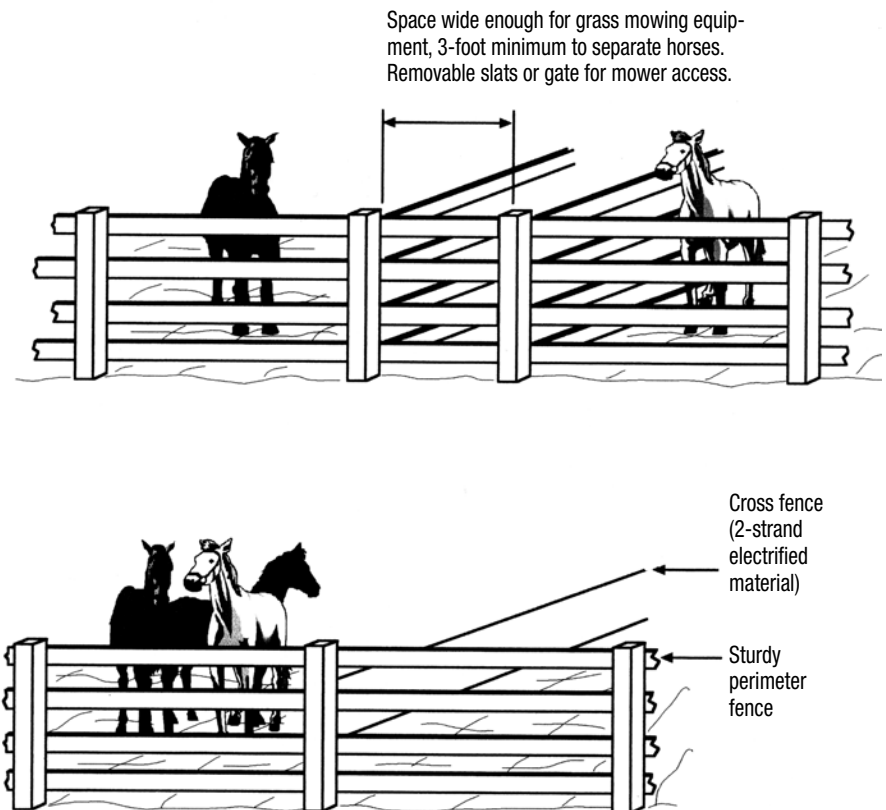
All-Weather Paddock. A good management tool for horse facilities on limited acreage is to provide at least one all-weather paddock for foul weather turnout. Also known as a rainy day or sacrifice paddock, this

paddock takes the worst wear during unfavorable weather conditions while attempting to preserve the grass of the remaining paddocks. Because turf is easily destroyed during wet conditions, the unfortunate paddock will not be expected to maintain grass and should have an all-weather footing. It is to be used for those horses that have to be turned out of their stalls despite the weather. This paddock should have safe, sturdy fencing and should be located on well-drained high ground accessible to the stable. Since it will be an ungrassed exercise lot, it is beneficial to locate or screen it away from the more public areas of the stable. Horse contact with the paddock fence is more likely since it is smaller and horses are more likely to be running and playing in it.

Perimeter Fence. Many farms make sure that any loose horse cannot leave the property through the use of perimeter fencing around the entire complex. This fence (and/or gates) fills the gaps at the end of access lanes and often surrounds the public entry side of the facility. Containment of loose horses becomes more important as traffic and neighbors increase around the horse facility. Sometimes the perimeter fence functions to keep human and canine intruders away from the horses. Perimeter fence does not have to be of the same construction as paddock or pasture fence since it should have limited contact with unsupervised horses, but it should be visible and strong.

Double Fence. An alternate fencing scheme favored by some farms is to double fence so that each pad-

Figure 4. Double fence to discourage horse activity through and over fence in adjoining paddocks (top). A simple cross fence is often suitable for adjacent paddocks used for controlled grazing (bottom).



dock has its own fence with an alley between. Double fencing is almost always used with stallions and particularly valuable stock. Other applications include boarding or training facilities where horses are worked and stabled individually so they are not allowed to socialize. Social and antisocial activity over the fence may be virtually eliminated with double fencing. A combination double fence and perimeter fence may be used where human contact with horses is discouraged, such as along public roads and residential boundary lines. The first fence keeps the horse in, and the second fence keeps unwanted visitors away from direct horse contact.

Terrain. Some sections of the site may be too steep or rocky for pasture use, or the soil may be unsuitable for adequate grass growth. Soils that do not drain readily will cause wet areas that become eyesores. It is suggested to fence horses out of unsuitable sites, including swampy areas and streams. Contact the U.S. Natural Resources Conservation Service or your local Cooperative Extension office for soil information on your acreage and recommendations for types of pasture vegetation to use on the site. *Pasture and Hay for Horses* provides good information and recommendations (see Additional Resources).

Trees. Trees should be fenced off. Horses usually strip off tree bark left within their reach, and dead branches pose a safety hazard. Some trees are poisonous to horses, while dead limbs can impale them.

Common Fencing Questions

How Much Area Needs to Be Enclosed?

Horses may be kept inside most of the time and only turned out for exercise a few hours daily. In some cases, horses are turned out individually rather than in groups. This means more, and perhaps smaller paddocks, are required which increases the amount of fencing. An all-weather paddock may serve to exercise several horses, in succession, each day. Moving horses between turnout and stable should be convenient.

Rectangular areas are more relaxing for a group of horses. Square pastures take less fencing. For example, 800 feet of fencing is needed for a 200-foot square area, versus 1,000 feet of fencing needed for a 400-foot by 100-foot enclosure of the same area. Straight fences on level ground are faster to build and easier to maintain than fencing covering rough terrain.

Plan an average of 2 to 3 acres per horse for grazing without supplemental feed. This prescription works well during the grass-growing season of the northeastern United States. Most horses kept in the northeast are provided supplemental feed and do not depend entirely on pasture grazing, so acreage per horse becomes less relevant. Acreage needed then depends on the size of turnout paddocks for exercise, and space for riding areas and stables.

In overstocked and overgrazed pastures, topsoil erodes as the vegetation is trampled away. Additionally, horse manure is easily transported into nearby areas via water runoff. It is important to contain this runoff so that it does not cause pollution. If topography permits, vegetated areas around the perimeter of ungrassed paddocks may be enough to filter and absorb runoff. Substantial grading of the site will be needed to divert, and possibly store, runoff from large,

ungrassed lots. Daily manure removal from the site for storage elsewhere will reduce the concentration of potential pollutants in the runoff.

Why Is the Horse Outside the Fence?

Horses are herd animals, usually desiring other equine companions. They can test fence strength in an attempt to join neighbors, especially when a horse is kept alone. Other social pressures and overstocking instill a similar desire to get to the other side of the fence. If the grass really is greener on the other side, expect horse attempts to get to it. Strong, solid-looking fences usually provide adequate protection. Make sure the horse cannot climb the fence, and social and antisocial activity over the fence will not lead to injuries. Preventing this activity is recommended but realize that most fence will suffer damage from even innocent horse pastimes such as scratching, chewing, pawing, and playing. Loose wires or boards make it easier for a horse to escape. Maintenance should be factored into the total cost of a fence installation. When electric fencing is chosen, make sure that horses are safely contained during times when the current is off.

How Much Is Reasonable to Spend on Fencing?

Attractive fences tend to be more expensive. In general, safer fencing is also higher in cost. Some types of fence have a higher initial cost but significantly less maintenance cost and a long lifetime. Some savings are gained by placing the aesthetically pleasing fencing along the public side of the property while less attractive, yet equally functional, fencing can be used in more remote locations.

Save costs by installing fence yourself, buying fence materials in large lot sizes, or shopping for reasonably priced and locally available materials. Availability and prices for

materials vary widely. Keep in mind that some types of fencing are difficult to install properly without specialized equipment, such as wire stretchers and post drivers. Books and fence material manufacturers' literature are available to explain details of construction.

New fencing materials are appearing on the market every year. Price and warranty can vary among manufacturers and installers. Shop around to learn the benefits and drawbacks of different fences. Ask for references from both fence dealers and installers to determine whom to contact for future fence problems. Visit farms with different types of fencing, and talk with the manager about impressions and concerns. A well-designed and carefully selected fence will increase the amount of time you spend with your horse versus time spent mending the horse and fence.

Fence Layout Example

Start fence layout planning with a scaled drawing of the farm and its current features. Include overall distances and special features that need to be fenced around. An affinity diagram allows a perspective on what features need to be near other features at the facility (Figure 5). This part of the planning process is not concerned with exactly where fences and gates will be, but emphasizes general areas of use on the site. In the figure, note that turnout paddocks are conveniently located near the stable, while larger pastures may be farther away. Include a service area that contains manure storage and other features that are not generally considered attractive. Locate the service area away from public view, if possible, and close to the stable for chore efficiency.

Private and public stables have different fence layout objectives particularly in relation to vehicle traffic flow and access to the residence. Figures 6 and 7 take the features from Figure 5 and provide a layout appropriate for public and private stable sites, respectively. Both figures show fence-line positions and gate locations for convenient access to the stable.

Figure 5. An affinity diagram is used to plan location of features that need to be near each other for efficient stable function.

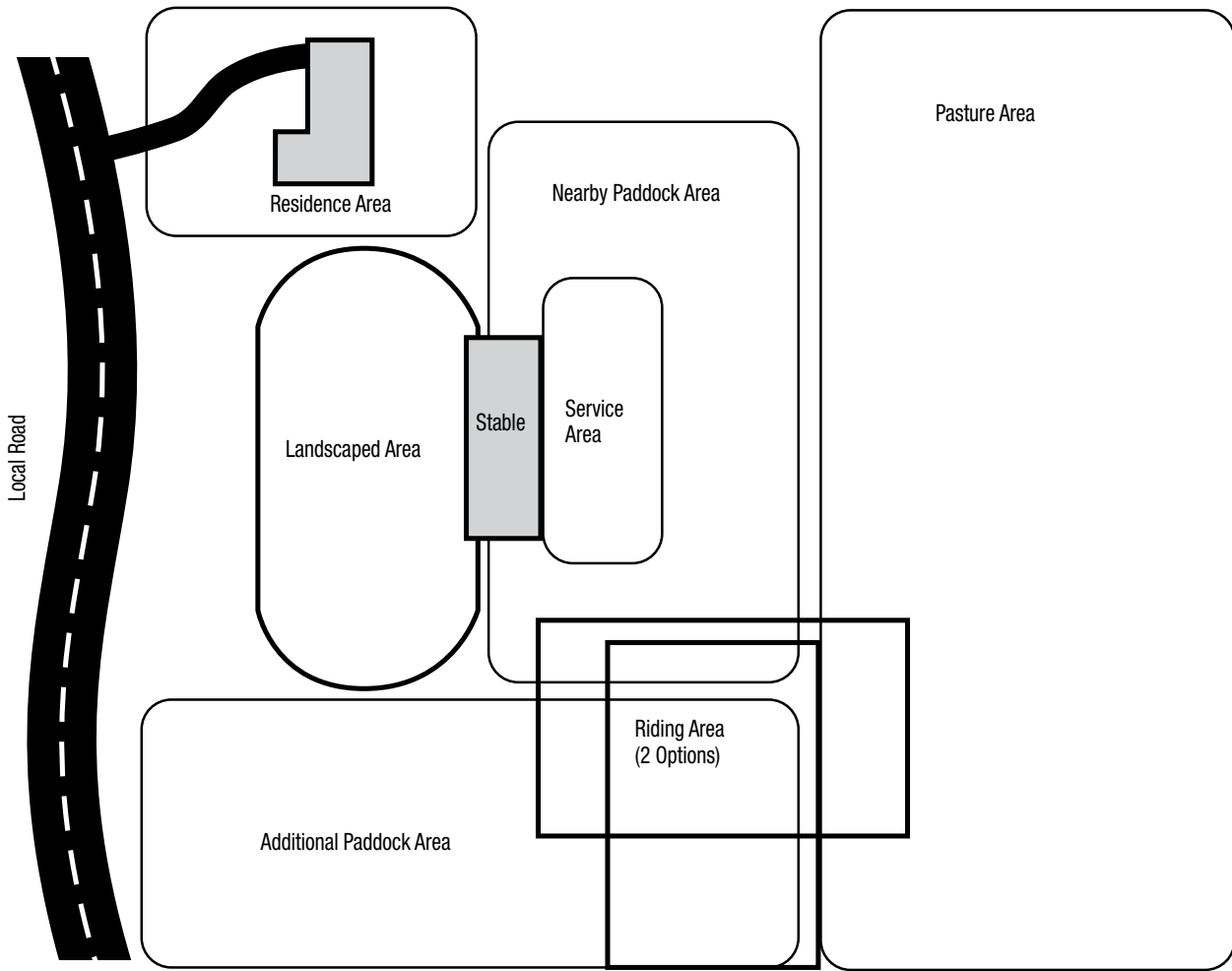


Figure 6. A public stable fence layout may include an option for perimeter fence and plenty of space for visitors' vehicle access.

Since the horse population may change frequently, fencing should keep horses that are unfamiliar with each other in separate paddocks and uses double fencing where horses will be kept in adjacent paddocks. Typically, a residence is separated from the commercial facility for enhanced privacy.

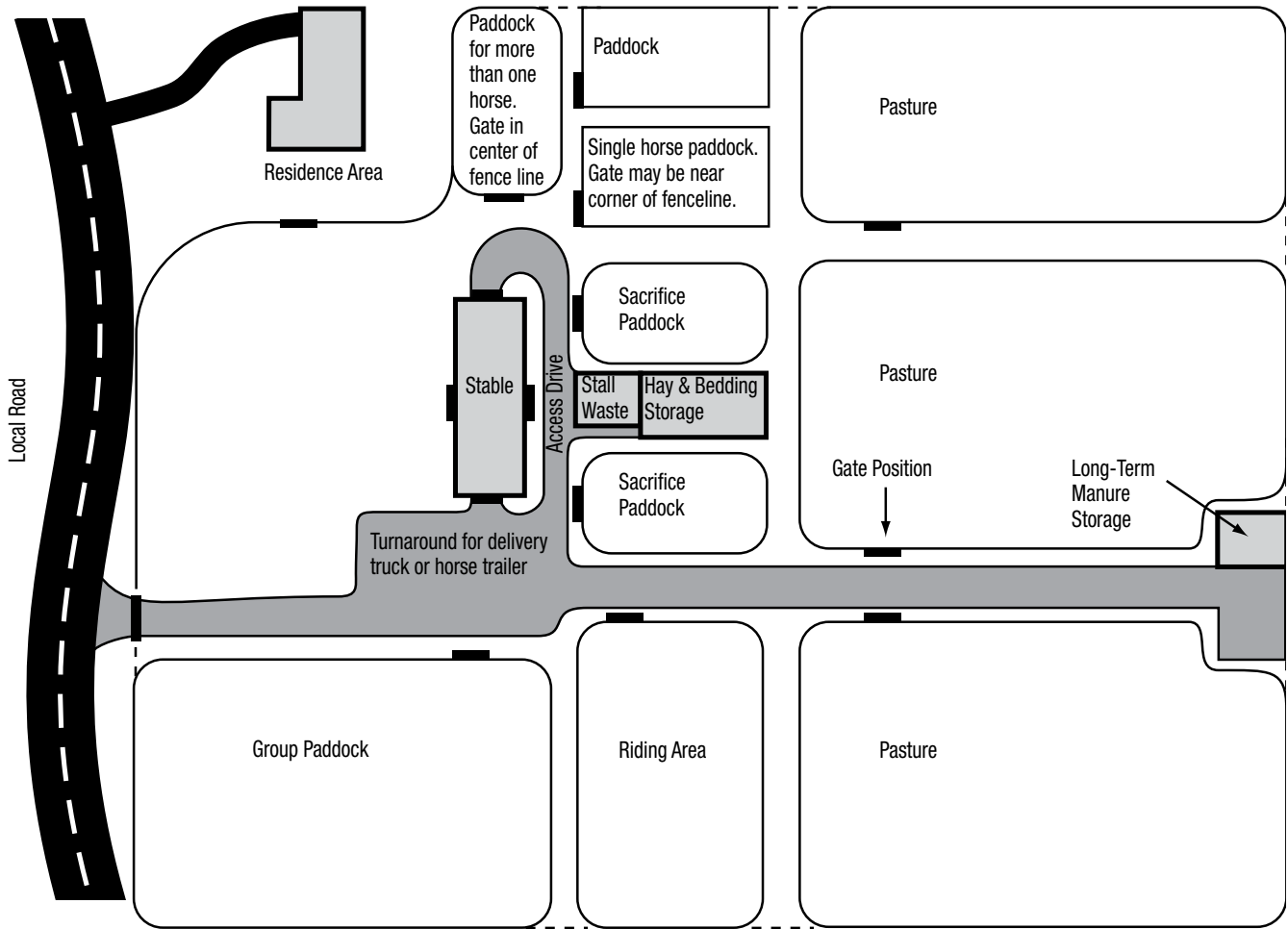
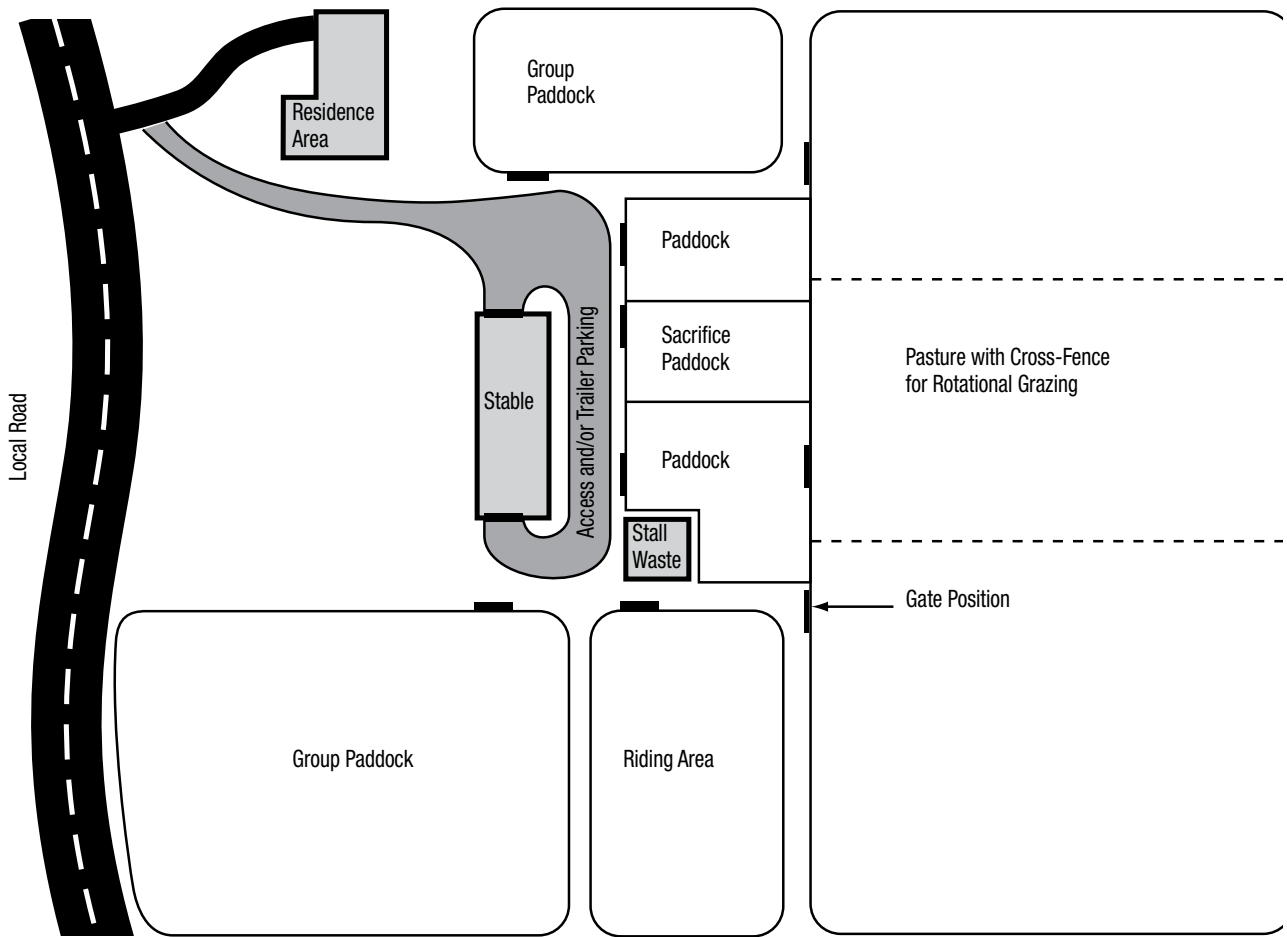


Figure 7. A private facility will often have a more stable population of horses so that horses can be turned out together.



Summary

The most time-intensive part of fence building takes place before any ground is broken. Thoughtful fence planning and layout will help make daily chores and routines more efficient. The best fence differs from facility to facility and even within a horse property; different fence types are used to meet the objectives of the enclosure. Good fence design emphasizes a proper foundation, or post integrity. By taking the time to understand a facility's fencing needs and expectations, you can provide a safe, functional fence that will provide years of service and enhance the property's value.

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Additional Resources

Pasture and Hay for Horses. Agronomy Fact Sheet 32. The Pennsylvania State University, University Park, PA. 4 pp. Available on the Internet at www.agronomy.psu.edu/Extension/Facts/agfact32.pdf

Fencing Options for Horse Farm Management in Virginia. 1999. L. A. Lawrence. Virginia Cooperative Extension. 3 pp. Available on the Internet at www.ext.vt.edu/news/periodicals/livestock/aps-99_04/aps-0050.html

High-Tensile Wire Fencing. NRAES-11. 1981. Natural Resources, Agriculture, and Engineering Service. Riley-Robb Hall, Cornell University, Ithaca, NY. 12 pp. Online catalog at www.nraes.org

Horsekeeping on a Small Acreage, Facilities Design and Management. 1990. Cherry Hill. Garden Way Publishing, Storey Communication, Pownal, VT. 179 pp.

http://www.equisearch.com/horses_care/farm_ranch/fencing/

This site provides some basic information about various types of horse fencing and an opportunity to link to material manufacturers, contractors, and the American Fence Association:

www.americanfenceassociation.com
or 800-822-4342.

Acknowledgments

Two reviewers of this bulletin offered good, detailed suggestions for its improvement: Ann Swinker, associate professor of equine science, Department of Dairy and Animal Science, and James Garthe, instructor, Department of Agricultural and Biological Engineering.

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Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

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Code # UB037 Rev1M109mpc 4502