Chapter 9

Trailheads and Campgrounds

Gene W. Wood

This chapter offers a brief introduction to some considerations in the design, construction, and maintenance of trailheads and campgrounds that accommodate horses. As with all aspects of trails, trailheads and campgrounds must be user-safe, environmentally sound, and economically affordable and sustainable.

Location and Siting

Selection of trailhead and campground sites should be based on topography that will provide surface water drainage away from the site, soils that provide good vertical drainage, and, if available, possibilities for environmentally sound use of streams in close proximity to the site.

Trailheads and campgrounds have occasionally been located in topographical "bowls" that have surface waters collecting on the site during rainstorms and in rainy periods. The result is at best a site that is highly user-unfriendly during these times, and at worst, a situation where the parking area is highly rutted and non-hardened portions of campsites are quagmires. These same circumstances can develop when camps are located in floodplains, particularly narrow floodplains, and at the bases of steep slopes. Sites on slight ridges or knolls will almost always be preferred.

Even when the topographical conditions look good, the soils should be checked for drainage characteristics as described in Chapter 1. The drainage classification should be at least "well drained."

Campgrounds near streams have great aesthetic value and, if properly designed and used, may have value in the care of horses. However, horse tying sites and manure storage sites must be located such that surface water runoff does not pollute surface waters. These sites should be located at least 200 ft. from streams.

Trailhead and campground locations should optimize access to roads and trails.

Two-way traffic roads that lead to the trailhead or campground should have roadbeds that are at least 30 ft. wide. In today's world, large trailers are the norm. Trailers pulled by dual-wheeled pickups or larger trucks are common. Roads should be sufficiently wide to accommodate traffic going in opposite directions. This is particularly an issue in mountainous areas where backing a trailer on a winding road to the nearest pull-off can be a major problem.

Access to the trail system should be directly from the trailhead or camp. Horses should not have to travel along roads with vehicular traffic to access the trail. In some cases, in order to connect the trailhead or campground to the trail system, a connector trail may have to be constructed. This is a rider safety issue.

Parking and Travelways

Trailhead parking and campground travelways should be hardened but not paved.

Bare soil parking areas and driveways may be acceptable in arid environments or where the soil is highly stony. However, in humid environments where the soil is not stony, hardening is essential. Hardening will prevent major problems for users that would otherwise mire their trucks into the mud and have to contend with extraction of the vehicle while simultaneously securing one or more horses. Furthermore, episodes such as this degrade the trailhead or campground area.

A paved road provides hazardous footing for a horse whether shod or unshod, with the former being the worse of the two cases. (To cope with paved surfaces, parade horses are typically shod with borium bars or studs on their shoes, as are Amish buggy horses.) Pavement surfaces that are wet or have a frost or ice covering are particularly hazardous. Paving of travelways over which a horse must move to gain access to a trail should be avoided to the extent practical.

Organized parking is preferable to a haphazard approach.

An organized design for parking is shown in Figure 9.1. The pull-in parking spaces are 15 ft. wide and 50 ft long. (A 20-ft. width would be better, but not essential.) This should accommodate most, but not all, rigs. It assumes that users will unload their stock and take them to the hitching rail in front of the rig for saddling. This process

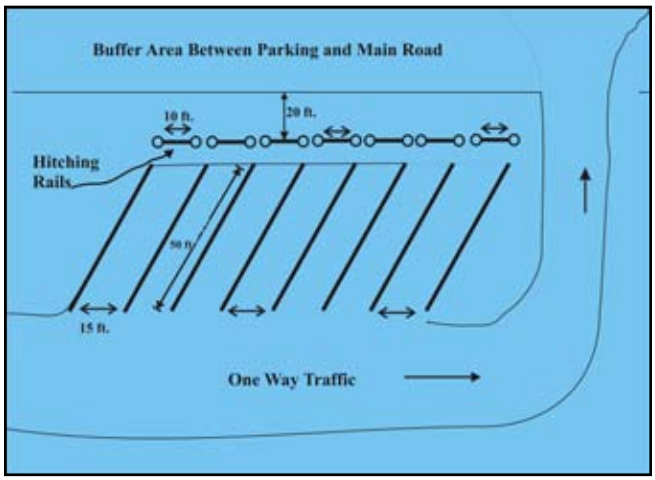

Figure 9.1. A pull-in parking design that maximizes efficiency in utilization of space, but depends on users being willing to tie horses to hitching rails to minimize interference with driveway traffic and interference with neighboring trailers.

Figure 9.2. A pull-through parking design with spaces 45 ft. wide and 85 ft. long. This design offers substantial convenience to users that may tie horses to trailers for tacking, but it is very inefficient in the use of space as about 40% of the area is devoted to driveways. (Photo by G. W. Wood.)

keeps riders and stock out of the driveway through the parking area, and out of each other's way as they would be if tied to the sides of the trailers. On one hand, it is inconvenient to have to unload the horses, tie them to the hitching rail, and then make one or more trips back to the trailer or truck for brushes and tack. On the other hand, this design maximizes efficiency in the use of space and offers a safe space for tacking horses.

Pull-through parking at trailheads is a user friendly design, but it also sacrifices efficient utilization of space (Figure 9.2). The parking spaces shown in this figure could accommodate one trailer on each side. This will work best, if the users will tack their horses either behind the trailer or on the berm side.

Figure 9.3 shows two sizes of truck-trailer rigs that can be found at campgrounds. The pickup with the 4-horse trailer is a common combination found in campgrounds, although at 38 ft. (bumper to bumper), and no living quarters in the trailer, it is likely smaller and simpler than most. The larger rig is 65 ft. long and is at the upper end of the spectrum of rig sizes that would be used for camping. Such rigs have become more common.

Trash/Garbage Disposal

Trailheads and campgrounds should provide for trash/garbage disposal in containers resistant to opening by wild animals.

Almost all campgrounds provide for trash and garbage disposal. All trailheads should do the same thing. Users of the campgrounds will pay attention to cleanliness if the management agency demonstrates its concern and provides facilities for the process. However, it will be up

Figure 9.3. The truck with trailer in the left photo is 38 ft. long (bumper to bumper) and one of the smaller 4-horse rigs in use today. The right photo is a 4-horse trailer with large living quarters and truck rig that is 65 ft. long (bumper to bumper). (Photos by G. W. Wood.)

Figure 9.4. Garbage containers designed to be bear-proof (wildlife-proof) and that do not allow water to run into liners. From the stand point of the campers, strategically placing these containers in three pairs around the campground likely would have been a better approach than having all six in one location. (Photo by G. W. Wood.)

to the agency to strategically place and service containers so that their use is encouraged.

All trash/garbage containers should be animal proof. The bear-proof (wildlife-proof) containers (Figure 9.4) used by the Federal agencies in many locations will be resistant to damage and pilfering by all other scavenging wild animals. In addition, they do not collect water in the container liners, and they are highly durable. The use of this design to the extent practical is highly encouraged.

Restroom Facilities

Trailheads and campgrounds should have toilet facilities.

Toilet facilities are usually costly even at the lower end of the design spectrum. However, they are critically important in high use areas. Lack of these facilities usually ensures aesthetically displeasing sites along the trails, and often in close proximity to the trailhead.

Toilet facilities can range from the simplest transportable shell structures to permanent structures that can be blended with the environmental surroundings using simple lines and earth tones for paint colors (Figure 9.5). Sophistication of design should increase concomitantly with intensity of use of the trailhead or campground. Either sinks or outside spigots should be provided for hand washing. In high use campgrounds, shower facilities should be provided.

Water and Electric Facilities

At high use trailheads and campgrounds, water for horses should be provided from spigots to the extent practical.

A horse can go a long time without food, but it cannot last long without water. Dehydration can be a major problem in trail situations. Therefore, horses should be well hydrated before a ride begins, have opportunities to drink while on the trail, and an opportunity to drink before being transported from the trailhead or secured in the campground. Well placed water spigots (Figure 9.6) at both trailheads and campgrounds can replace or reduce the need to water horses from nearby streams. Spigots should be of the frost-free design (Figure 9.9) in most areas, particularly those open in cool and cold seasons. Sometimes it is a good idea to have unthreaded spigots to discourage connections of water hoses that might be used to shower horses. Cleaning and cooling horses can be done from buckets of water. This should reduce the drain on the water tank storage system.

Figure 9.5. Portable shell toilets (left) are the bare minimum facility for both campgrounds and trailheads. They are appropriate only at campgrounds that are classified as semi-primitive, although they may be acceptable at small- to moderate-sized trailheads. The permanent structure (right) is appropriate for high use areas, and should provide sinks and showers at campgrounds. (Photos by G. W. Wood.)

Figure 9.6. This spigot is not a frost-free design, but the facility has a good drainage system and hardened surface around the concrete slab that prevents formation of a mudhole. (See frost free design in Figure 9.9.) (Photo by G. W. Wood.)

Preferably, each spigot should be mounted on a cement slab with dimensions 36-48 in. on each side and 4 in. thick. Where practical, the slab should have a drain hole for spilled and splashed water as shown in Figure 9.6. Hardening with gravel, possibly with geosynthetics and gravel, will be critically important to preventing formation of mudholes around the spigot site.

Figure 9.8. A watering tank available for campground-wide use. These devices are typically not favored by campers out of fear of the potential for disease transmission. (Photo by G. W. Wood.)

Figure 9.7. A hardened watering site that will withstand substantial heavy use without suffering streambank or streambed degradation. (Photo by G. W. Wood.)

To the extent practical, watering of horses around camp should be done in camp and away from streams. This often is not practical, so when camp horse watering must be done in nearby streams, the streambanks and bottom need to be appropriately hardened to prevent ecological damage due to trampling and pawing (Figure 9.7). Watering devices shown in Figure 9.8 are sometimes available, but they are difficult to maintain due to natural organic matter accumulation. In addition, many horse owners to not like watering their horses at community tanks for fear of potential for disease transmission.

Heavily used campgrounds should provide a water spigot and electrical hookup at each campsite.

Other than at back country campsites, primitive camping (tent camping) is becoming increasingly uncommon. Campgrounds from which riders do day rides and return to camp each night typically have substantially more people camping in their horse trailers than in tents. To the extent practical, it is desirable to equip those sites with electrical hookups (Figure 9.9).

Manure Management

Every campground should have a manure management program.

To the extent that this principle is not served, horse confinement sites are degraded as horses grind manure and waste hay into the soil of unhardened surfaces creating a quagmire with the organics plus urine plus rainwater. On hardened sites, manure and waste hay will continuously accumulate creating a dung heap that generates hordes of flies and is highly degrading to campground aesthetics.

Figure 9.9. An electrical hookup with an adjacent concrete post to prevent damage by moving vehicles. The frost-free water spigot is located about 5 ft. downslope of the hookup device. This proximity of the water facility to the electrical facility is apparently acceptable to design standards in Virginia. This would not be a suitable place to shower a horse. (Photo by G. W. Wood.)

Vandalism

Trailheads that have one entrance/exit point will suffer fewer vandalism problems. Campgrounds usually should always have a single entrance/exit point.

Vandalism of horse trailers and vehicles that pull them happens occasionally when rigs are parked along roads and at some easily accessed trailheads. This problem appears to be suppressed at trailheads where there is a single entrance/exit point as vandals tend to show substantial concern for being trapped in such situations.

Campgrounds should always have a single entrance/exit point for control and monitoring traffic into the camp as well as making sure that campers are appropriately informed and permitted. Grayson Highlands State Park

Figure 9.11. Trailhead signage informing the users of the managing authority, basic rules governing conduct, and contact information. (Photo by G. W. Wood.)

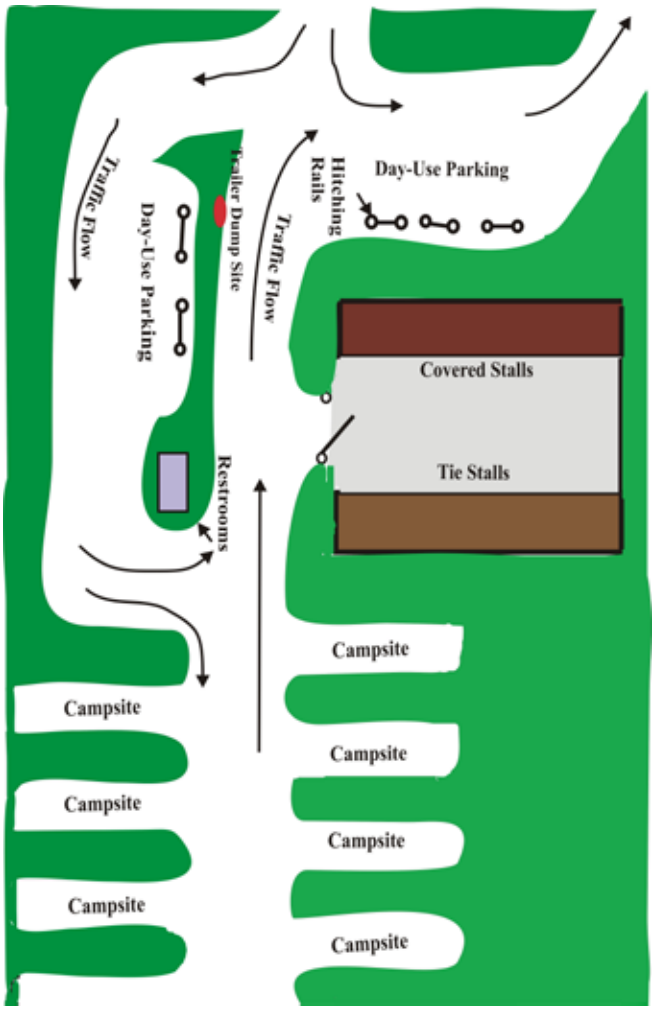

Figure 9.10. A sketch of Grayson Highlands State Park, Virginia horse camp and day-use trailhead.

(Virginia) seems to have a reasonable design that allows for good traffic flow while accommodating both a day-use trailhead and a campground with stables (Figure 9.10).

Signs

Entrances to trailheads and campgrounds should have signs adequate to quickly inform the users of the name of the facility, the management agency in authority, the fundamental rule set that will constrain manner of use, and emergency contact information.

Poor signage is a common problem at trailheads and horse campgrounds. This is a failing of the management agencies and often leads to users learning the rules by trial and error. Figure 9.11 shows signage at the entrance to a trailhead that gives most of the essential information suggested above.

Emergency contact information should include locating help without a cell phone as in many remote loca-

Figure 9.12. A campsite identification marker that is highly readable, highly durable, and blends with the surrounding aesthetics of the site. (Photo by G. W. Wood.)

tions only satellite phones are serviceable. In addition, information on contacts for emergency veterinary care, and horse rescue service should be listed if available in the local area.

Campsite identification signs should be well placed at the campsite entrance, be clearly readable from a distance of 50 ft., be durable, and blend with the aesthetics of the site.

Figure 9.12 is an example of a campsite identification marker that serves all of the requirements stated above.

Campsites

Layout Designs

Ideally, campsites in horse campgrounds will be multi-functional in providing: a) adequate parking space for rigs at least 50 ft. long, b) a raised tent pad for campers that will use tents, c) water spigot and electrical hookup, d) sturdy table for meals and meal preparation, e) a well-designed fire ring, f) a safe and secure facility for tying or corralling horses, and e) sufficient space and screening between campsites to allow some sense of privacy .

The ideal situation may exist in a number of places, but none was located for the purposes of this book. Actually, the "ideal," like beauty, may be in the eye of the beholder. That is, how close one may get to the ideal likely depends on the relative values that one places on the characteristics listed above. Two campsites, both from well managed campgrounds will be compared to demonstrate some important differences in characteristics.

Figure 9.13. Campsite at Harmons Den Campground, Pisgah National Forest, North Carolina. The site would be classified as semi-primitive as while it is well-developed, it does not have water spigots or electricity. (Photo by G. W. Wood.)

The campsite in Figure 9.13 is in a well developed, semi-primitive campground without water or electricity at campsites (Harmons Den, Pisgah National Forest, North Carolina). This site is 83 ft. long from entrance to end of hardened area. The top of the entrance is 20 ft. wide and narrows to a 15 ft. width which is adequate for convenient backing of a trailer into the site, and the allowance of a travelway once the trailer is in place.

The distance from the curbing timbers surrounding the

Figure 9.14. Fire ring hinged into post set into concrete slab. (Manufacturer: Pilot Rock Park Equipment, R. J. Thomas Mfg. Co., Cherokee, Iowa.) (Photo by G. W. Wood.)

site to the campground driveway is 54 ft., thus the site easily accommodates rigs up to 50 ft. in length. Hardening is with a crush-and-run gravel. The layout of the campsite seems ideal. Horses loaded from the back of a trailer have a travelway to the tie stalls that keeps them away from the cooking, eating, and potential tent site.

Figure 9.16. A campsite at a highly developed campground (Grayson Highlands State Park, Virginia.) (Photo by G. W. Wood.)

Figure 9.15. Manure management facility at Harmons Den Campground, Pisgah National Forest, North Carolina. (Photo by G. W. Wood.)

The curbing timbers that surround the hardened area prevent erosion of gravel away from the site thus that aspect of maintenance needs is minimized. The curbing that separates the horse travelway from the trailer to the tie stalls from the rest of the hardened area is not needed for control of gravel displacement, but it gives an excellent visual guide that delimits the travelway. The fixed position fence/bench around the cooking-eating area is an excellent amenity as it defines functionality of a certain space, while simultaneously functioning as bench.

Within the cooking-eating area the fire ring (Figure 9.14) is superb. First, the position of the fire ring is defined by a concrete slab that will facilitate efficient removal of ashes. Second, the fire ring is hinged to a post set in the concrete so that it can be easily lifted for cleaning, but remains attached in place during cleaning. (This fire ring is manufactured by Pilot Rock Park Equipment, R. J. Thomas Mfg. Co., Cherokee, Iowa.)

The tie stalls are conveniently located for viewing the horses and monitoring feed and water consumption and behavior. The tie stall facility will be discussed later in this chapter.

Water has to be carried to the animals from a water source not at the campsite, or the horses have to be taken to a watering facility provided for the campground as a whole. As a camp horse is feeding entirely on hay and grain or pelleted feeds, its need for access to clean water is great. Meeting that need at this campsite will require significant efforts on the part of the campers unless they are equipped with their own water tanks.

Figure 9.17. Spacing of about 10 ft. between campsites is likely inadequate for privacy for most people. (Photo by G. W. Wood.)

Figure 9.18. Where tent camping is expected, campsites should offer raised, well drained tent pads. (Photo by G. W. Wood.)

Manure management is required here, as it should be at every campground. The campers must supply their own wheelbarrow or other means of manure transport to the disposal station (Figure 9.15). The disposal station design is excellent with a ramp of about 5% grade, well built, safe, and durable.

Finally, the spacing between the campsites seems to optimize the value of privacy and some sense of isolation with the need to have multiple campsites in a relatively small area.

Figure 9.16 is a campsite in a highly developed campground at a fairly remote location (Grayson Highlands State Park, Virginia). This site is 50 ft. long and 16 ft. wide (narrowest width). It has state-of-the-art water and electricity facilities. There is no accommodation for horses on the site as the campground has covered stalls and tie stalls to accommodate about 60 horses a short distance away. (That facility will be discussed later in this chapter.) The campsite design anticipates that most camping will be in trailers or accompanying trucks and has no special provision for a tent pad. The campground has a crowded appearance (Figure 9.17) with 24 campsites in a relatively small area and with little separation and buffering between sites. However, the campground (general schematic Figure 9.10) is immaculate and well managed.

Tent Pads

Where tent camping can be anticipated, tent pads should be constructed within campsites. The pads should be raised to prevent problems with surface water drainage, and the fill material should be a very fine gravel (2-4 mm) for comfortable footing and good vertical drainage (Figure 9.18.)

Horse Confinement Facilities

Tie Stalls

Camp horses must be securely confined where they will be safe, easily monitored for well being, and can be reasonably easily fed and watered, and cleaned up after in an environmentally sound manner. These requirements may have been better understood by management agencies in the West than those in the East in the past, but the East is catching up at working with its own environments and user wants and needs. Harmons Den Campground is testimony to that.

However, even at Harmons Den, improvements could be made in the horse confinement facilities. Figure 9.19 shows the typical new tie stalls at this campground. The design does a good job of anticipating that often a campsite needs to accommodate up to, but not more than, four horses for a single camping party. The design also anticipates the need to be able to frequently monitor the well being of the horses, including the availability of adequate feed and water. However, the horse confined in this situation for many hours is not going to be very comfortable. First, the stall base is a slab of concrete with a mat cut from recycled conveyor belt. The purpose of the mat is to serve as a non-skid surface, which it will do to some extent, but it does little to relieve the problem of the unforgiving concrete base. The horse needs to relax its legs, but this footing is not highly conducive to that process.

Second, the stalls are 44 in. wide, 45 in. high, and about 7 ft. long. As the average horse is about 9 ft. long (head to base of tail), there is very little room for him to change positions for resting. Furthermore, the design depends

Figure 9.19. Horse tie station at Harmons Den, Pisgah National Forest, North Carolina (left) and a modification of the design at Great Smoky Mountains National Park, Tennessee (right). (Photo by G. W. Wood.)

on the horse not being able to turn around in this space as the butt chain across the end will hold him in place without the head being tied. However, as can be seen in Figure 9.19, one horse was able to get its head under the 45 in. high stall divider pipe and bend it upward. The height of the divider is not the problem but rather the inadequacy of the 1½ -in. diameter, galvanized pipe construction material. It is unlikely that a horse can escape from these stalls, but the stalls will provide little in the way of opportunity for adequate rest, particularly to get leg rest. This problem can be substantially mitigated by replacing the conveyor belt mats with standard rubber stall mats that are at least ¾-in. thick. The pipe also should be larger and heavier.

The second photo in Figure 9.19 shows a somewhat larger tie stall (52 in. wide), square tubing construction, and a sump in the middle of the stall floor for drainage. However, the sump is not working well, and the horse remains standing on a conveyor belt material over concrete.

The hay mangers in these designs are another problem (Figure 9.20). The wide spacing between the bars allows a great deal of hay to fall beyond reach of the horses. This problem could be mitigated by placing a

Figure 9.20. Manger for 4-horse tie stall at Harmons Den Campground, Pisgah National Forest, North Carolina. (photo by G. W. Wood.)

Figure 9.21. Tie stall meant to serve the entire campground in one location. (Photo by G. W. Wood.)

Figure 9.22. A semi-primitive tie stall design that is working in part because the stall floors are standard stall mats. This particular structure is made of black locust, the only wood in eastern North America sufficiently hard to withstand chewing by horses. It is also naturally rot and termite resistant. (Photo by G. W. Wood.)

Figure 9.23. A heavily chewed, pressure-treated, 4x6 pressure-treated southern pine hitching rail that has lost much of its functional integrity in terms of strength. (Photo by G. W. Wood.)

1-in. mesh, welded-wire screen over the inside walls and bottom of the manger. This screen will minimize hay wastage, and it will protect from chewing the 2x12 that apparently exists in large part for laterally stabilizing the structure. In addition, the ends should be closed to help hold hay in place. Another problem with the manger is that a sub-dominant horse stalled beside a dominant neighbor may get little to eat as his neighbor is likely to eat his feed. The manger needs dividers that go from the bottom of the manger to at least as high as the divider bars and may need to extend some distance back over the bars.

Figure 9.21 shows a community tie stall of a slightly different design but with essentially the same problems as at Harmons Den, only more pronounced. The community tie stall does not provide for convenient, frequent monitoring. When the camp is full or nearly so, horses strange to one another may have to be tied side by side and work out their differences as best they can. This problem can spill over from unfriendly relations among horses to unfriendly relations among horse owners.

Figure 9.22 shows a more primitive tie stall design that is working somewhat largely because it has a standard stall mat floor and the structure is made of black locust, the only wood in eastern North America that is naturally resistant to termites and rot, and hard enough to resist chewing by horses.

Tie stalls are an acceptable way to secure camp horses if they adequately provide for the horse's security, safety, and well-being and an opportunity for monitoring to see that these requirements are being met. Tie stalls that can be installed at individual campsites are good at meeting the monitoring requirement. The Clemson 4-horse tie stall, a design described in Appendix D, is aimed at meeting all of these goals within the constraints of still being a tie stall.

Hitching Rails

Hitching rails, while still used in some campgrounds, are largely an artifact of the past. They are not a good idea for any use other than tying for a short period of time, such as while grooming or tacking the horse. Rails typically are about 42 in. high and should be made of sturdy materials with poles (at least 8-in. diameter) preferred over sawn timbers with sharp edges. Most woods in most environments will need to be pressure-treated, but will remain highly susceptible to chewing (Figure 9.23). As pointed out earlier, black locust in the East is a wood that can serve well in this situation. Osage orange may be another in the Midwest. To resolve chewing problems, managers have occasionally put angle iron covers on rails (Figure 9.24). This is a disaster waiting to happen should a horse panic get himself up on this rail. This should never be done.

To the extent that hitching rails are used, the ground surface should be hardened as even if the rail is used only for tying a horse for short periods, pawing over time will create a depression and subsequent mudhole during rainy periods. This is particularly true on poorly drained sites in humid environments and where horses are tied for lengthy periods (Figure 9.25).

Highlines

From the standpoint of comfort of the horse, the use of highlines is likely the optimal approach. The horse can move around a great deal more than when confined to a tie stall. The device for confinement is cheaper and

Figure 9.24. A hitching rail with edges covered by angle iron for protection from chewing. If a horse should get up on this rail, a disaster is eminent. (Photo by G. W. Wood.)

Figure 9.25. A hitching rail designed and heavily used for overnight tying. This is an alluvial soil that receives 45-50 in. of precipitation annually. The timbers have held up against rot and chewing because they are black locust; however, the ground surface is a mudhole in rainy periods. (Photo by G. W. Wood.)

requires less space than corrals. On the other hand, they require more space than would a tie stall for the same number of horses.

Commonly, managers allow highlines to be tied to trees. In the back country, there is usually no good alternative. However, for more heavily used campgrounds, the staff of the Cohutta Ranger District, Chattahoochee-Oconee National Forest, Georgia has developed a user-friendly design that eliminates the need for tying to trees and prevents the usual problems of mudhole

Figure 9.26. The Cohutta Ranger District highline design to prevent problems with pawing and mudhole development. (Photo by Jeff Sprites.)

Figure 9.27. An accumulation of muck on top of the geoweb-quarry screening fill surface. Drainage rate might be increased by increasing the size of the fill material to a 4-6mm gravel. (Photo by Jeff Sprites.)

development under highlines (Figure 9.26). This design uses 8x8x12 pressure-treated posts that are set into the ground to a 5-ft. depth and on 14-ft. centers. The D-rings are 6 ft. above-ground. The area 4 ft. to either side of the highline is slightly raised with a 4-in. depth geo-web filled with quarry screenings or a 4-6 mm gravel. This creates a surface through which the horses cannot paw, and which drains away from the area that is most likely to be damaged. This campground is located on Upper Southern Piedmont soils (see Chapter 14) that have heavy clay subsoils and experience around 50 in. of rainfall annually. This design is holding up well under a great deal of use, although as shown in Figure 9.27, drainage could be improved to some extent. Changing the fill material to a 4-6 mm gravel might increase drainage rate, but it might also be more susceptible to pawing action than are the quarry screenings, especially when the latter are wet.

Figure 9.28 shows a common highline situation that has resulted from poor design, poor construction, and no attempts at mitigation. This problem can be largely mitigated by applying the principles of the Cohutta Ranger District design.

Figure 9.28. An example of a common highline situation. This is a colluvial soil that experiences 45-50 in. of rain annually. The problems here could be adequately mitigated following the principles of the Cohutta Ranger District design. (Photo by G. W. Wood.)

Corrals

Corrals vary greatly in complexity, strength, durability, and flexibility in use. Likely the simplest and most flexible type of corral in use today is the battery or solar powered electric fence (Figure 9.29). These fences are highly useful for containing a few horses that know each other and that are not likely trying to exclude or abuse one of their number. They are susceptible to damage by running deer, elk, and bears. They can be risky in situations of very high intensity electrical storms that may greatly upset the horses. On the other hand, they are cheap, easy to install, and generally effective. They lessen the effects of trampling and pawing by spreading the impacts over a larger area than would be the case for highlines. It is also likely that horses in a corral paw less than they do when confined to a highline. Finally, these devices are becoming more widely used where agency regulations allow their use.

Figure 9.29. Electric fences used to confine horses at campsites. Notice that neither of the enclosures surround trees that horses can get to for chewing. (Photos by G. W. Wood.)

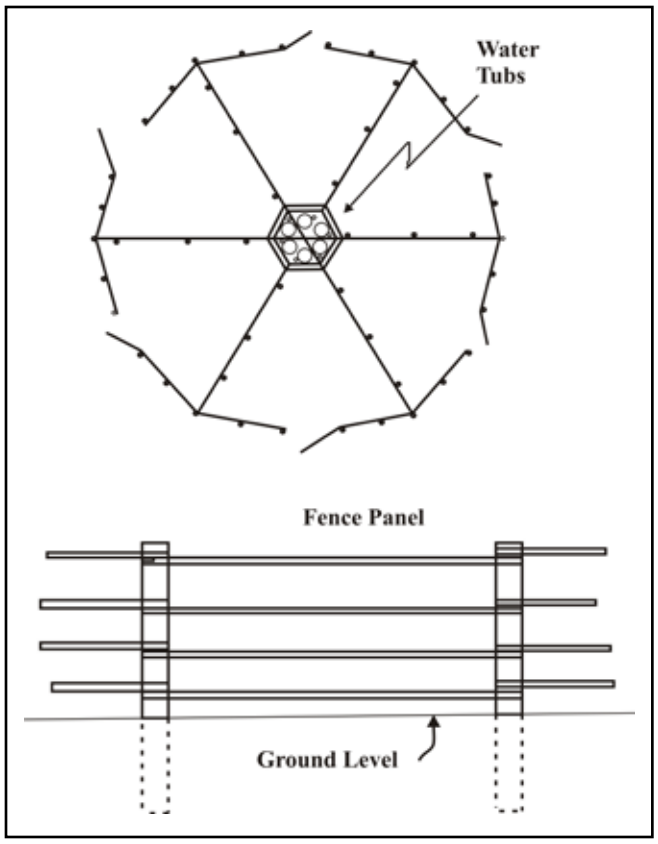

Figure 9.30. The six-unit circular corral design developed by the USDA-Forest Service that maximizes efficiency in use of space and materials for fences. The radius of the corral is 36 ft. For more information contact: Harold Edwards, hledwards2@juno.com.

Another type of corral is the small pen configured with round pen panels that are 10-12 ft. long. Often only four panels are used to configure a pen that would hold one to two horses. However, such confinement puts the impacts of trampling back into the league of highlines. Such small pens should be set only on surfaces hardened with geosynthetics and gravel, or that have naturally stony soil surfaces.

The tradition of corrals still continues in the West where they are often built with poles cut on or near the site of construction. One of these configurations developed by the Forest Service is shown in Figure 9.30. This design maximizes the efficient use of space by employing a 36-ft. radius circle configuration that is subdivided into six stalls each of which might accommodate one to several head of stock. Feed and water containers are shown in the center of the configuration, but additional options exist for feeding and watering if more than one animal is in a pen. For more information on this design, contact Harold Edwards, USDA-Forest Service (retired) and Back Country Horsemen of Idaho (Harold Edwards, hledwards2@juno.com).

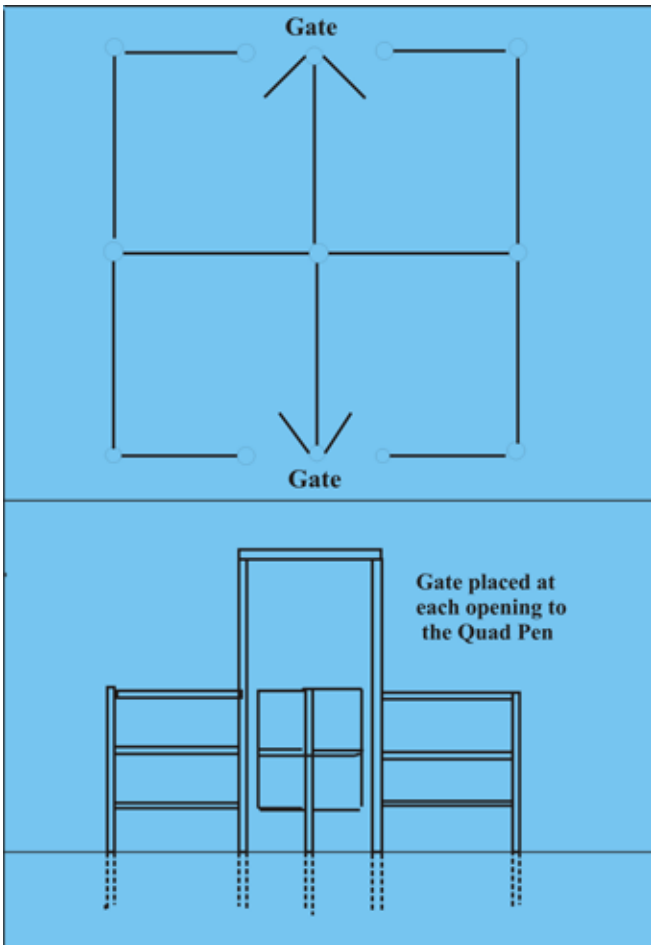

Figure 9.31. The Quad Pen corral developed by Oregon Back Country Horsemen. The individual quads are 12 ft. on each side. Individual gate widths are 46 in. and the fence height is 54 in. For more information contact: Marshall Field, marshallfield@msn.com.

A second western corral design was developed by Oregon Back Country Horsemen and is called the Quad Pen (Figure 9.31). This structure is divided into four pens that are 12 ft. on each side. Traditionally, the structure was built of cut poles or sawn timbers, but iron pipe is now preferred. For more information contact: Marshall Field, marshallfield@msn.com.

Covered Stalls

Covered stalls are sometimes offered at campgrounds. Such a facility can be important in hot climates were there is no shade and in cooler climates where horses confined to a small area may have to stand exposed to prolonged periods of cold rain, sleet, or snow. A horse, like many other terrestrial mammals, can withstand a great deal of cold if it can stay dry. It can withstand being wet in cool temperatures if it can get adequate exercise to generate additional body heat. (This assumes adequate nutrition.) However, tie stalls, highlines, and small pens usually do not provide adequate opportunity

Figure 9.32. Covered stalls on left and open stalls on right at Grayson Highlands State Park, Virginia. These hardened surfaces will not provide a good opportunity for the horse to rest its legs. (Photo by G. W. Wood.)

Figure 9.33. This covered stall is so narrow that access to a horse that was down would be both difficult and dangerous. (Photo by G. W. Wood.)

for exercise in these situations. A covered stall can keep the animal dry in cold periods or out of direct sun in very hot periods.

On the other hand, covered stalls that are well constructed are expensive to build and to maintain. Figure 9.32 shows covered stalls offered at Grayson Highlands State Park, Virginia. The facility is generally very good. Of course manure management is a clear requirement. The campers are responsible for their own stalls. They place manure at a site near the stables. The managing agency takes over from there. As the covered stall area is very clean, the system seems to work well as this is a very intensively used facility from late spring through the fall months.

Finally, the possibility that a horse may go down and not be able to get up on its own is a consideration that should be made in covered stall design. The difficulties in working in such a situation increase as the stall becomes narrower. Very narrow stalls can be hazardous for the horse as well as people who may have to care for or medically treat the horse (Figure 9.33).