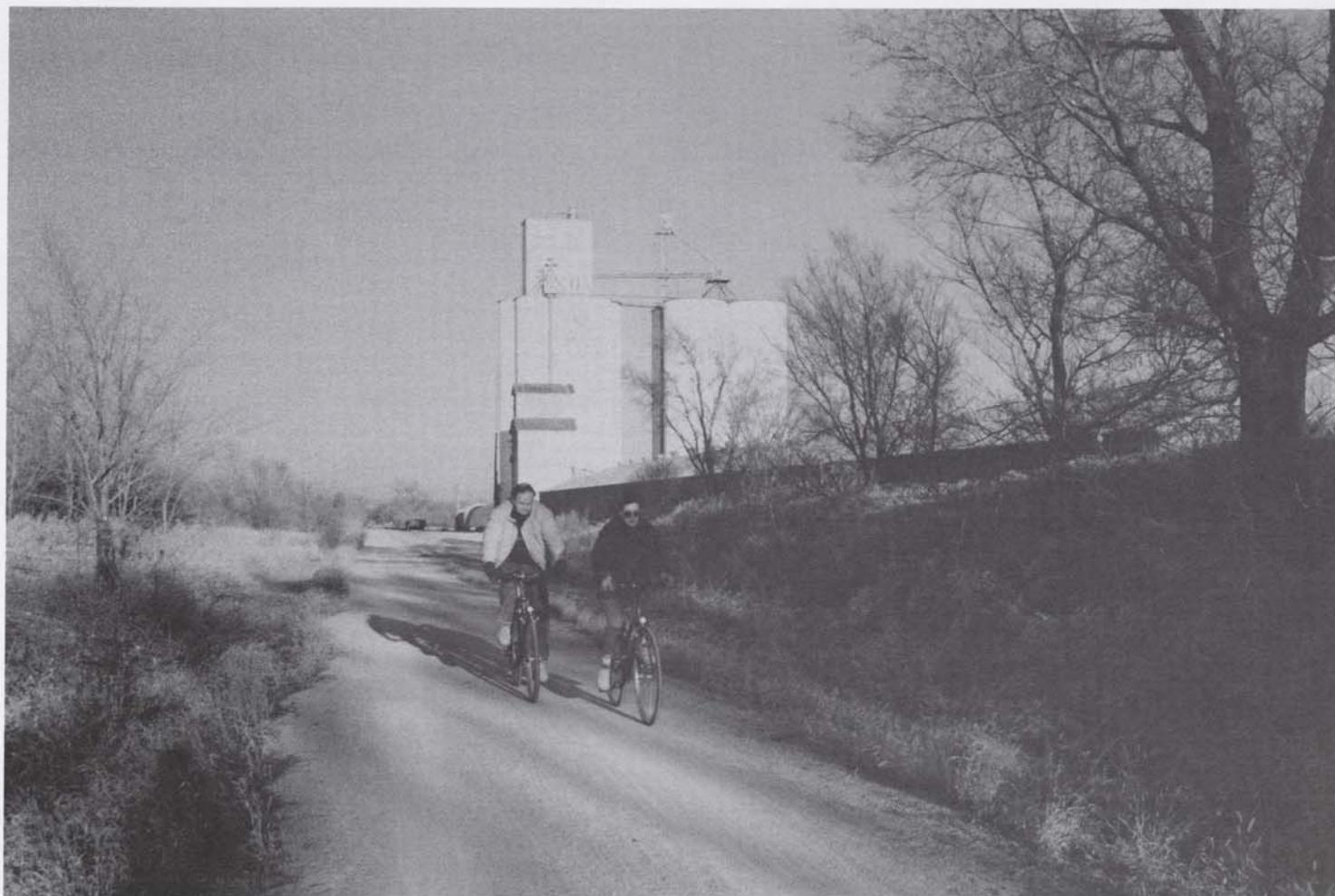




Constituencies and Trail Types

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*Above: The Mo Pac East Trail
near Walton.*

*Previous page: The Keystone
Trail in northwest Omaha.*

Constituencies and Trail Types

A Nebraska Trails Network has many constituencies whose needs must be met to provide an effective system. These groups include recreational users, neighboring landowners, tourism and development professionals, and conservationists, among others. This chapter considers the nature and needs of these trails constituencies. These issues help define types of trails which form the detailed Trails Corridor Plans, presented in the next chapter. This chapter provides a basic foundation for the state's trails development program.

The recreational constituencies whose needs are considered in this section include:

- Bicyclists, including road, hybrid, and all-terrain bicyclists,
- Pedestrians, including hikers, runners and joggers, and walkers,
- Equestrians, including riders and drivers,
- In-line skaters and other "wheeled" users,
- Cross-country skiers,
- Off-Highway Vehicle (OHV) Users,
- Snowmobilers, and
- Canoeists.

In addition, non-recreational constituencies also have vital interests in the character of trails development. These groups include:

- Landowners who own property near proposed trail corridors,
- Economic development and tourism professionals, and
- Conservationists.

This section considers the needs of each trail constituency and incorporates this into policies for development. The discussion of each constituency will include:

- A description of the character or interest of each user group or constituency in development of the trails system,
- A general description of the needs of each constituency and the type of facilities needed to accommodate these needs,
- A general description of design features necessary to meet the group's needs, and
- A presentation of major issues that the design of facilities must address.

■ Bicyclists

Bicyclists represent one of the core recreational user groups of a trail system and are some of the most frequent users of trails. However, bicyclists include a variety of user types, each of which has specific demands on the network.

Character

Bicyclists represent one of the most active constituencies for trails development. However, there are different types of bicyclists, each with different requirements. Bicyclists can be grouped by function, type of equipment, and level of experience.

Functionally, bicycles represent both recreation and a form of transportation. Thus, bicyclists include commuters who use their vehicles for work trips and intra-urban travel, long-distance tourists who travel between communities, shorter-distance recreationalists and fitness riders, and off-road mountain bicyclists. This diversity extends to equipment. Long-distance tourists or road bicyclists use narrow-tired touring or racing bicycles, which generally require paved or other smooth hard surfaces. Commuters and recreational riders travel short to moderate distances and often use mountain or hybrid bicycles which travel safely over a number of surfaces. Mountain bicyclists utilize fat-tired all-terrain bicycles, some with suspension frames, that can operate in a variety of settings.

Bicyclists can also be grouped by level of experience. A 1992 study by the Bicycle Federation of America and Center for Applied Research of Great Falls, Virginia groups cyclists into three categories, each with distinct facility needs. Group A riders include experienced riders who operate under most traffic conditions. These bicyclists require "bicycle-friendly" access to street and road systems that provide safe shared use with other vehicles. Group B cyclists are more casual riders and recreationalists who and prefer exclusive trails separated from motorized traffic. Group C bicyclists include children who generally ride near home or with adult supervision on longer outings. Group B and C riders are viewed as natural constituencies for separated bicycle facilities and identification of key bicycle travel corridors.

General Needs

Road cyclists frequently use narrow-tired bicycles travelling relatively long distances and include a large percentage of experienced riders. This group generally desires:

- Paved or highly compacted, smooth trail or road surfaces,
- Linear paths that connect communities and points of interest,
- Paved, well-maintained surface shoulders on highways with moderate to high levels of traffic,
- Shared right-of-way on lightly travelled paved roads, and
- Support facilities, including trailheads, travel guides, restaurants, lodging and other tourism support, campgrounds, and trail signage.

General recreational and commuter bicyclists often use hybrid or wide-tired bicycles travelling short to moderate distances. Priorities for these groups include:

- Paved or improved trail or road surfaces, including granular stone,
- Exclusive linear paths that connect activity centers, communities, and points of interest, as well as provide for shorter recreational trips,
- Paved surface shoulders on roads with moderate to high levels of traffic, and
- Support facilities similar to those for road cyclists.

Mountain bicyclists ride wide-tired vehicles capable of operating in a variety of settings. Priorities for this group include:

- Shared use with other bicycle facilities,
- Designated paths and trails in natural environments, free from conflicts with other users, and
- Support facilities similar to those for other cyclists.

General Design Features

The following general standards should apply to multi-use trails accommodating all bicycles:

- *General design should follow American Association of State Highway and Transportation Officials (AASHTO) standards.*
- *Width:*
 - 8 feet in rural or small town settings with relatively low traffic, infrequent pedestrian use, good horizontal and vertical alignments to expedite passing, and no use by heavy maintenance vehicles.
 - 10 feet as a standard, with 2-foot minimum shoulders desirable on either side.
 - 12 feet in heavily travelled, mixed use areas.
- *Surface:* Paving or fine granular stone on compacted base.
- *Vertical Clearance:* 8-foot minimum; 10 feet for overpasses and tunnels.
- *Design speed:*
 - For paved or improved surface trails, 20 mph for level surfaces; 30 mph for grades up to 5%.
 - For slower, unpaved trails, 15 mph.
- *Minimum sight distance:* 150 feet.
- *Ideal Grades:* 8% maximum, 3% preferred for general longitudinal slopes, 2% to 4% for cross slopes.
- *Conflicts:* Bicycles yield to pedestrians and equestrians.
- *Trail Support Facilities:* Signage, trailheads with parking, racks, map and information kiosks, rest areas, drinking fountains, restrooms, telephone, and security.

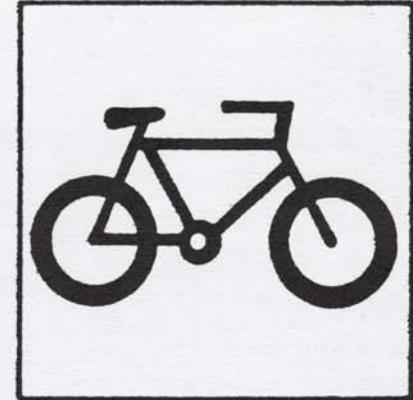
General Design Features

These previous standards may not apply to trails designed only for use by mountain bicyclists, who may use softer surfaces and steeper grades. Needs specific to mountain bicyclists include:

- Designation of trails with adequate sub-base conditions to prevent erosion.
- Educational programs and trail signage on "soft" cycling practices, including yielding to other users; management of trail boundaries to prevent straying.
- Effective trail signage and mapping in wilderness areas.
- Sight distances, vertical and horizontal clearances, and support facilities as for other cyclists.
- Bicycle racks that accommodate wide tires.

Potential Issues

- Speed differences and conflicts with other user groups, including hikers, equestrians, and passive users.
- Environmental impact of mountain bicyclists in environmentally vulnerable areas.
- Need to provide support facilities to address trash and security issues.
- Screening and privacy for adjacent property owners.



■ Pedestrians

Pedestrians include a variety of users, including hikers, walkers, and runners. Generally, pedestrians make the fewest specific design demands on trails.

Character

Pedestrians are another of the primary constituencies for trail development. As with bicyclists, different types of pedestrian users have distinct needs and use profiles.

Pedestrian users range from people out for a stroll to "power walkers" who move at much faster speeds. Use of trails by walkers is often, but not exclusively, focused on trails within or near cities and towns. In some cases, trails may also be used by commuters walking to work.

Hikers include people who carry self-contained supplies and are often walking significant distances. Hikers may take both day and overnight trips. They are frequently, although not exclusively, oriented toward rural, park, or wilderness areas. Hikers are tolerant of and seek out relatively rugged terrain, making the fewest design demands of any user on trail systems.

Runners and joggers are frequent trail users, also generally concentrated in or near cities and towns. "Runners" cover a mile in 9 minutes or less.

Pedestrians pushing wheeled vehicles, such as baby strollers, make up another class of trail users. Trails provide safe and potentially barrier-free places for these users.

General Needs

Walkers, including both recreational and fitness walkers, generally desire:

- Well-maintained surfaces,
- Good drainage to prevent pooling of water,
- Gentle grades, and
- Support facilities, including trailheads, water, restrooms, and telephones.

Hikers make few demands on trails. Priorities for hikers include:

- Well-marked and mapped trails,
- A variety of environments, including challenging and scenic settings, and
- Support facilities, including trailheads and camping facilities.

Runners and joggers have requirements that are similar to walkers in community settings. Priorities for this group include:

- Good trail surfaces with a degree of "give", free of holes or other irregularities that can cause injury,
- Good drainage to prevent pooling of water, and
- Gentle grades.

Pedestrians walking strollers or using other wheeled vehicles generally require:

- Paved surfaces and
- Ramped and barrier-free crossings and intersections.

General Design Features

The following general standards should apply to pedestrian trails:

- *Width:* 4 feet in rural area; 5 feet in urban areas. Wilderness hiking trails may be narrower.
 - *Surface:* Paving or compacted granular stone in cities or towns; wood chips or other soft surface in natural environments.
 - *Vertical Clearance:* 7-foot minimum.
 - *Minimum sight distance:* 50 feet.
 - *Ideal Grades:* 10% maximum for extended slopes; 15% for short slopes.
 - *Conflicts:* Pedestrians have right-of-way over bicycles, but yield to equestrians.
 - *Trail Support Facilities:* Signage, trailheads with parking and information, rest areas, drinking fountains, restrooms, telephone, security, and camping facilities on long-distance hiking trails.
- On multi-use trails, required bicycle trail material should be used.

Potential Issues

- Potential safety conflicts on high-density trails with bicycles and other wheeled vehicles.
- Potential conflicts with mountain bicycles in natural settings.
- Need to provide support facilities to address trash and security issues.
- Screening and privacy for adjacent property owners.



■ Equestrians

Equestrian users include both riders and, increasingly, carriage drivers. Equestrians are frequently excluded from multi-use corridors. A well-designed system should provide for their specific needs.

Character

Principal equestrian activities include both horseback riders and carriage drivers. Both equestrian groups travel at relatively slow speeds, in the range of 4 to 6 miles per hour. Perceived and real incompatibilities with other user groups have restricted equestrian use of multi-use trails. Proper trail design and inclusive use of corridors can help to remedy these problems in Nebraska.

Riders require narrower trail tracks than wheeled carriages and are somewhat more versatile in terms of settings and grades.

General Needs

Equestrians are versatile users who make relatively minor capital demands on a trail system. Their most important priorities include:

- Stable, well-maintained, and unpaved trail surfaces, avoiding hard surfaces which injure horses' hooves,
- Well-prepared and stable sub-bases for trails,
- Adequate vertical clearances and clearing of debris from the trail,
- Precautions that provide right of way to equestrians in multiple use situations,
- Provision of water crossing alternatives to narrow bridges,
- Support facilities that include parking and staging areas, rest stops with hitching posts, and water for horses, and
- Parking lot design providing adequate turning space for horse trailers and vans.

Carriages require a wider track and more elaborate trail surfaces and crossing provisions than riders.

Equestrian trails can be accommodated within a variety of settings. These include:

- Multi-use trail corridors, either on shared surfaces, unpaved shoulders of trails, or separate trail tracks.
- Greenway trails or paths in rural areas that are generally not suitable for bicycle or other vehicular use.
- Unpaved county roads or "districts" of roads that are designated for equestrian use.

General Design Features

The following general standards should apply to equestrian trails:

- *Width/Turnaround:*
 - 5-foot tread width; 8-foot shoulder width for riders;
 - 10-foot tread to accommodate carriages.
 - Turn-around space for carriages every 5 miles.
- *Surface:* Paving and hard-surfacing should be avoided. Preferred surfaces include dirt, grass, wood chips, or gravel. Trail surfaces should be clear of debris and protrusions.
- *Vertical Clearance:* 10-foot minimum.
- *Minimum sight distance:* 100 feet.
- *Ideal Grades:* 10% maximum for extended longitudinal slopes; 15 to 20% for short slopes; 4% maximum cross slope.
- *Conflicts:* In shared-use situations, equestrians have right-of-way over pedestrians and bicyclists. Trail etiquette signage should be included in shared-use situations, including notice to provide advance warning of approach to equestrians.
- *Erosion Control:* Trails require well-prepared subgrades. Erosion control measures are critical to good equestrian trail design.
- *Road Crossings :* Grade separations at road crossings are preferable, but not always possible. At-grade crossings should provide warning signs for both trail and road and maintain adequate minimum sight distance. When tubes are used to cross beneath roads, 9-10 foot clearance is required for riders.

General Design Features

- *Water Crossings:* In many situations, gabion stone crossings constructed with proper stream bank approaches should be considered if not harmful to the environment. When gabion stone crossings are not practical, bridges should be constructed with 8-foot railings. Provide mounting blocks at either end to permit riders to dismount and lead animals across bridge.
- *Trail Support Facilities:*
 - Parking lots and staging facilities should accommodate trailers and provide for maneuvering.
 - Facilities for equestrians are similar to those for other trail users and include signage, trailheads, rest areas, drinking water, restrooms, telephone, and security. Hitching posts are required at rest areas.
 - Water for horses should be provided at approximately 5- to 10-mile intervals. Water facilities at trailheads should accommodate individual water buckets.
 - In equestrian "districts," where riders will use a network of county roads, signs identifying equestrian use should be posted.

Potential Issues

- User conflicts, including the possibility that horses may be scared by rapidly approaching vehicles.
- Incompatibilities between trail surface demands by equestrian and other users, requiring parallel development in multi-use corridors.
- Need to provide support facilities to accommodate equestrian use, including watering facilities.
- Trail maintenance requirements created by equestrian users.



■ Cross-Country Skiing

Cross-country skiing is an ideal winter activity for multi-use trails. Trails designed for other users are generally highly adaptable to skiers.

Character

Cross-country skiing is an increasingly popular activity that is an excellent wintertime use for multi-use trails. The general trail design guidelines that pertain to other trail users are also relevant to cross-country skiers. Cross-country skiers also use other recreational facilities, including parks, recreation areas, and golf courses, that do not require formal trails development.

Skier profiles vary in level of skill and in distance. Short outings will range from short distances up to 8 miles. Day trips may extend up to 40 miles for advanced skiers. Typical speeds range from 2 to 8 mph.

General Needs

Cross-country skiers can use a variety of recreational facilities during winter months and cause little environmental impact. The activity is compatible with other multi-use trail standards. Skiers have the following additional priorities:

- Trail routes that permit the accumulation of snow,
- Provision of adequate vertical clearances and clearing of debris or other hazards from the trail track,
- A variety of landscapes and trail settings, mixing grades with flat areas,
- Reasonably gentle curvatures,
- Adequate sight distance and deceleration areas at intersections with roads, and
- Support facilities including parking and racks at trailheads.

General Design Features

The following general standards should apply to cross-country ski trails:

- *Width:* 4-foot minimum for a one-way trail; 7-foot minimum for two-ways. Additional width is necessary to accommodate a "skating" ski style.
- *Surface:* Surfaces and trail layout should hold snow. Alignments should avoid tree canopies, which prevent snow accumulation on trail surface. Trails should generally avoid south-facing slopes.
- *Vertical Clearance:* 10-foot minimum.
- *Minimum sight distance:* 100 feet.
- *Ideal Grades:* Varies depending on level of difficulty. Trails should have a maximum longitudinal slope of 5% and a preferred cross slope of 2%. Easy courses have a maximum grade of 10%, while difficult courses or trails may range up to 40%.
- *Conflicts:* Potential conflict with snowmobiles on snow trails.
- *Crossings :*
 - Approaches to intersections should have grades of less than 5% to provide for deceleration.
 - Bridges and crossings should allow skiers to stop safely before entering the crossing.

Potential Issues

- Conflicts with motorized vehicles.
- Definition of trails to prevent trespassing.

■ In-line Skaters and Other Wheeled Users

New recreational uses, including in-line skating, have added new users and demands to trail systems. New trails activities will continue to appear in the future.

Character

New recreation uses create additional constituencies for trails development and have important implications for trails planning. In-line skaters have become such a new user group. Skaters generally operate at moderate speeds (from 8 to 12 mph) and distances. Skating requires adequate space for lateral movements, resulting in conflicts with other user groups on narrow trails. Skaters range in age and experience from children to adults and from people with relatively little lateral control to highly experienced and controlled experts.

New forms of "wheeled" recreation are also likely to evolve with demographic change. For example, an aging population may demand new recreational vehicles, such as recumbent tricycles, that offer a comfortable seating position and a high degree of stability. Generally, these vehicles tend to require greater trail width, more moderate grades, and larger staging areas.

General Needs

In-line skaters generally use trails that accommodate bicycles. Their major priorities include:

- Paved surfaces,
- Greater trail width to accommodate lateral movements,
- Gentle maximum grades at crossings, bridges, and intersections to provide for speed control, and
- Support facilities similar to those required by bicyclists and pedestrians.

New user groups are likely to have similar general requirements. Vehicles such as recumbents have a wider track, requiring additional trail width.

General Design Features

The following general standards should apply to trails accommodating in-line skaters and other uses:

- *Width:* 10-foot minimum; 12-foot minimum in high use intensity areas. 8-foot trails may be adequate in low-density rural and small-town settings. In extreme situations, parallel trail tracks may be necessary.
- *Surface:* Paved surfaces are generally required by in-line skaters. Recumbents can use any surface suitable for bicycles.
- *Vertical Clearance:* 8-foot minimum.
- *Minimum sight distance:* 100 feet.
- *Ideal Grades:* 8% maximum; 3% preferred for general longitudinal slopes; 2% to 4% for cross slopes.
- *Conflicts:* In-line skaters should yield to pedestrians and bicyclists.
- *Crossings:* Approaches to intersections and crossings should have grades of less than 3% to provide for deceleration.
- *Support Facilities:* Similar to those for bicyclists and pedestrians.

Potential Issues

- User conflicts with pedestrians and bicyclists.
- Space intensiveness of uses, requiring wider and more expensive trails.
- Non-parallel grate design at catch basins.

■ Off-Highway Vehicles

Off-highway vehicle users represent a significant trail constituency. However, their requirements are different from those of linear trail users. When OHV needs are not met, users tend to create their own trails, resulting in conflicts with other users and with landowners.

Character

In 1993, an estimated 26,300 Nebraskans owned off-highway vehicles (OHVs). These vehicles include highly maneuverable off-road motorcycles and larger 3- and 4-wheeled all-terrain vehicles (ATVs). Users seek challenging settings that include steep slopes, natural settings, and a variety of riding experiences. As a rule, they do not desire linear multi-use trails.

To date, facilities for OHV users are scarce. As a result, some users may create their own trails in areas that present conflicts with other recreationalists, neighboring landowners, or the environment. The development of facilities specifically designed for OHV users in strategic parts of the state can help eliminate these conflicts.

OHV users are currently working with the Forest Service to open additional trails in the Pine Ridge and Bessey Divisions of the Nebraska National Forest. Facilities are also needed in the more heavily populated eastern part of the state.

General Needs

Off-road motorcycles and ATVs have slightly different design requirements because of differences in size and maneuverability. General priorities for OHV groups include:

- Development of specific OHV facilities offering a variety of riding experiences in place of accommodations along linear trail corridors,
- Locations with attractive natural landscapes and adequate control to prevent environmental damage,
- Distribution of facilities around the state, including development of facilities serving eastern and central Nebraska,
- Creation of looped trails within a riding facility, designed to accommodate a variety of skill levels,
- Support facilities, including services and staging areas, and
- An effective program to market facilities on a regional basis.

General Design Features

The following general standards should apply to OHV facilities.

- *Facility Distribution and Area:* New facilities, serving eastern, central, and western Nebraska. Typical riding area should be about 30 acres.
- *Design:* Riding area should provide looped trails from a trailhead. Loops may provide separate routes for motorcycles and ATVs, and differentiation by skill level. Detailed design plan must be individualized to sites.
- *Width:*
 - 50 foot minimum corridor width.
 - Clearing width in wooded areas: For off-road motorcycles, 6-foot one-way or 10-foot two-way treads. For all OHVs, 8-foot one-way or 12-foot two-way treads.
 - Clearing width in open areas: For off-road motorcycles, 4-foot one-way or 8-foot two-way treads. For all OHVs, 6-foot one-way or 10-foot two-way treads.
 - Tread Width: For off-road motorcycles, 4-foot one-way or 8-foot two-way treads. For all OHVs, 6-foot one-way or 10-foot two-way treads.
- *Surface:* Existing natural material or grass.
- *Vertical Clearance:* 9 feet recommended.
- *Minimum sight distance:* Varies depending on trail design.
- *Ideal Grades:* 8% maximum for extended longitudinal slopes; 12% maximum for motorcycle use only; 15% for short slopes; 30% for all uses; up to 55% for special designated climbs.

General Design Features

- *Trail length:* 5 miles minimum for a loop segment.
- *Erosion Control:* Trails require well-prepared subgrades. Erosion control measures are critical to OHV trail design.
- *Crossings :*
 - For roads, provide proper warning and sight distance.
 - For streams, provide bridges only if water is in excess of 18 inches. Provide for bank stabilization.
- *Sound Control:* Because of high sound levels, riding areas should be acoustically isolated and should take advantage of natural features for sound control.
- *Signs and Directions:* Provide trail designations, distances, and rules at major access points; mileage markers, directions at junctions, and trail designations throughout. Stress riding principles which minimize environmental impact. Posted requirement for US Forest Service-approved spark arresters on all vehicles.
- *Support Facilities :*
 - Parking and loading area, bulletin board, signs, trash receptacles, maps, registration box, telephone, restrooms, and water at trailhead.
 - Camping areas near trailhead.

Potential Issues

- Reduction of user conflicts through development of special facilities and agreed-upon trail rules.
- Directing of OHV users to specialized riding areas.
- Financing of facilities by and for specialized user groups.



■ Snowmobilers

Snowmobiling is a natural winter use for recreation trails. However, the activity should be directed toward designated areas that minimize environmental effects.

Character

Snowmobiling is a logical wintertime activity for multi-use trails. It lends itself to both linear, medium distance outings and to dedicated riding areas similar to those proposed for OHV use. Snowmobiles operate at relatively high speeds, ranging up to 30 mph.

However, like OHV use, snowmobiling can have a high impact on the environment. The high operating speed of the vehicles conflicts with slower, low impact winter sports like cross-country skiing. In addition, snowmobiles are relatively noisy, although somewhat less so than OHVs. As a result, they can have an adverse impact in populated, rural, and wilderness areas.

Snowmobilers are an important constituency for an inclusive trail system. Generally, a failure to plan for the activity causes people to create their own trails or to operate in potentially incompatible areas.

General Needs

Snowmobiles can operate both along linear trails and in designated riding areas. General priorities for this recreational user group include:

- Groomed snow surfaces, free of obstructions and hazards,
- Location at sites or along trail segments with attractive natural landscapes and adequate control to prevent environmental damage,
- Avoidance of sensitive environments and wildlife habitats,
- Adequate sight distances and long turning radii,
- Adequate maintenance and trail grooming, preventing hazards, such as damaged trees, that could fall or drop branches into the trail, and
- Support facilities and marking of trails to prevent encroachments on private property.

General Design Features

The following general standards should apply to trail facilities accommodating snowmobiles:

- *Location:* Locations should avoid environmentally sensitive areas, sites which could negatively affect surrounding property or pass through private areas, and wetlands or low-lying terrain.
- *Width:* 8-foot minimum, 10-foot preferred tread for one-way traffic; 10-foot minimum, 14-foot preferred tread for two-way traffic.
- *Surface:* Groomed snow with a minimum coverage of 3 inches. Surfaces must be free of rocks and debris.
- *Vertical Clearance:* 10-foot minimum to accommodate maintenance equipment.
- *Minimum sight distance:* 400 feet. If this is impossible, warning signs should be posted at least 100 feet in advance of a problem area. Provide desirable turning radius of 100 feet; minimum radius is 50 feet.
- *Ideal Grades:* 12% maximum for general longitudinal slopes; 25% maximum for shorter slopes. Grades at intersection approaches should not exceed 5%.
- *Conflicts:* Ski and snowmobile use over same segments are usually incompatible. Management techniques such as separation of trail segments or alternate day use should be considered.
- *Crossings :* Roadway crossings should be avoided if possible. Where necessary, intersections should be at right angles and should be adequately signed in both directions. Bridges should maintain 8-foot clearance and have a minimum 5-ton carrying capacity.

General Design Features

- *Sound Control:* Because of high sound levels, riding areas should be acoustically isolated and should take advantage of natural features for sound control.
- *Signs :*
 - Provide trail designations, distances, and rules at major access points, mileage markers and directions at junctions, and trail designations throughout.
 - Provide warning and regulation signs.
 - Reflectorize signs for visibility in darkness or poor weather.
 - Place signs over 40 inches above height of typical snow accumulation.
- *Support Facilities :*
 - Parking and loading area, information board, signs, trash receptacles, maps, registration box, telephone, restrooms, and potable water at trailhead.
 - Provide camping areas near trailhead.
- *Maintenance:*
 - Grooming is generally required on a weekly basis.
 - Pre-season maintenance is required annually.

Potential Issues

- Reduction of user conflicts through development of special or segmented facilities.
- Financing of relatively high cost maintenance.
- Minimizing conflicts with neighboring owners through siting of facilities.



■ Canoeists

Canoeing is an increasingly popular activity on Nebraska's rivers. It can provide a unique appreciation for the State and furnish unusual perspectives on its landscape.

Character

Canoeists and participants in similar water sports are another important recreational group. These users of Nebraska's rivers travel through areas that are frequently in private ownership. As a result, their ability to use a corridor is dependent on the character of the stream and access to adjacent riverbanks.

Access to banks is particularly important, because canoeists are frequently on overnight expeditions that involve camping. An otherwise navigable river that provides no opportunities for camping cannot qualify as a canoe trail. In response to this requirement, the Nebraska Game and Parks Commission maintains access arrangements with communities and private landowners along its five designated canoe trails. Along other canoe routes, most notably the Niobrara, private owners and outfitters provide camping facilities without State assistance.

Canoeing can reinforce the development of land trails by adding another dimension to the trail experience. As such, corridors that offer both facilities are especially valuable.

General Needs

The following criteria should guide the designation and development of a canoe trail:

- The route should be free of natural and man-made obstacles and safety hazards. The stream should have an adequate flow to be canoeable for at least two months during the canoeing season.
- Camping facilities should be available at strategic locations along the river's banks. These facilities may be privately or publicly owned, but must be reliably available to users.

General Needs

Uses along the stream should be compatible with recreational use. In addition, the stream and its shores should be able to tolerate limited recreational uses without adverse environmental effects.

Water quality should be high enough to permit body contact without posing health problems.

The stream environment should have distinctive attributes that provide a good recreational experience.

Public access should exist at approximately five mile average intervals, although this may not be possible in some areas of the state. Portages should be kept to a reasonable minimum, preferably no more than one per mile.

Support services should be developed at trailheads, including:

- Launching ramps and facilities,
- Rest areas,
- Restrooms,
- Signs and maps of the trail route, and
- Parking.

Potential Issues

- Adequate protection for stream and shore environments.
- Recreational liability on private grounds.
- Control over litter, including provision of adequate collection facilities.
- Maintenance of access to campgrounds and connections with land-based trails.
- Need for adequate support facilities.

■ Other Major Constituent Groups

Recreational users are not the only vital constituencies for the State Trails Network. The system must meet the needs of other groups as well, including neighboring landowners, economic development and tourism professionals, conservationists, and community volunteers.

■ Neighboring Landowners

In some cases, potential trails are adjacent to public rights-of-way, as when a railroad runs directly parallel to a highway. But in other instances, potential trails are flanked on both sides by private property. In both situations, adjacent landowners have vital concerns about trail development and its effect on their properties. Often, these concerns turn into outright opposition, which can delay and even derail trail efforts. Thus, a trails development program must view adjacent property owners as a key constituency, whose needs must be addressed as surely as those of recreational user groups.

Major issues raised by landowners include:

- Concern about trespassing and lack of privacy, damage to property, littering, or noise caused by trail users;
- Fear of increased crime;
- Assumption of liability for injury to trail users; and
- Economic concerns, including a fear of loss of property value.

The trails planning process must address these significant issues. Often, these concerns stem from a fear of the unknown and disappear after a trail is developed. Indeed, national experience suggests that the negative expectations that generate opposition to trails rarely develop.

The most complete recent study on the effects of trails is *The Impacts of Rail-Trails*, a study published in February 1992 by the National Park Service. The study investigates the effects of three trails:

- *The Heritage Trail*, a 26-mile reuse of an abandoned railroad corridor between Dubuque and Dyersville, Iowa. This trail passes through agricultural areas and the Little Maquoketa River Valley in eastern Iowa. It rarely runs adjacent to highways.
- *The St. Marks Trail*, a 16-mile rail-trail south of Tallahassee, Florida. This trail passes through forests and small communities, and generally runs parallel to a state highway.
- *The Lafayette/Moraga Trail*, a 7.6-mile rail-trail in San Francisco's East Bay suburbs. This trail runs through developed suburbs.

The survey polled both adjacent and nearby property owners on the effects of trails development. Survey results indicate that the opening of the trail actually *decreased* the level of negative effects. The following table displays the percentage of land owners reporting no change or a decrease in the incidence of various trail use problems. The table reports the results of the Heritage Trail in Iowa separately, as this most nearly resembles potential trail corridors in Nebraska.

Other important results of the landowners' survey included in the study were:

- 71% of Heritage Trail adjacent landowners and 81% of vicinity landowners reported that they were either neutral or satisfied at having the trail as a neighbor.

- 90% of Heritage Trail adjacent landowners and 95% of vicinity landowners reported that the trail either had no effect or improved the quality of their neighborhood.

- Only 40% of Heritage Trail adjacent landowners were neutral or supportive of the trail when first proposed, while 45% expressed strong levels of opposition. In 1992, 61% of Heritage Trail adjacent owners said that living near the trail was better than their initial expectation. Only 6% said it was worse.

- 81% of Heritage Trail adjacent landowners and 90% of vicinity landowners said that living near the trail is either the same or better than living near the railroad right-of-way before the trail conversion.

Other work on the effect of adjacent trails agrees with these results. A 1980 study by the Minnesota Department of Natural Resources found that landowners along existing trails experienced fewer problems than those anticipated by owners along proposed trails. A 1987 study by the Seattle Engineering Department along the Burke-Gilman Trail found that property near the trail sold for up to 6% more than comparable property elsewhere, and that homes adjacent to the trail experienced lower rates of burglary and

Trail Use Impact On Nearby And Adjacent Property

These results show the % of nearby property owners reporting that they experienced **no change or a decrease** in level of various problems following opening of trail.

Problem	Heritage Trail		Combined Trails	
	All Owners	Adjacent Owners	All Owners	Adjacent Owners
Noise from trail	85	76	82	72
Loss of privacy	79	62	83	73
Illegal motor vehicle use	73	68	85	82
Loitering	89	79	86	83
Unleashed or roaming pets	90	81	89	84
Cars parked on property	81	75	87	84
Litter	91	82	90	85
Trespassing	88	81	92	89
Dog manure on property	100	100	93	90
Crops picked or damaged	96	91	94	90
Lack of maintenance	96	91	94	91
Rude users	94	91	92	91
Drainage problems	97	94	94	92
Animals harrassed	97	94	96	94
Vandalism	94	91	96	94
Users asked to use facilities	96	94	96	95
Burglary	97	94	97	95

Source:
The Impacts of Rail-Trails, National Park Service and Pennsylvania State University, 1992.

vandalism than the average for the surrounding area.

While problems experienced by landowners are substantially less than expected, they do sometimes emerge. Problems most frequently cited by landowners living adjacent to the rural Heritage Trail are cars parked on property (3.7 average annual occasions), trespassing (3.4 average annual occasions), illegal motor vehicle use (2.9 occasions), and noise (2.4 occasions).

Thus, experience suggests that most trail uses have little impact on surrounding properties and that the expectation of problems far exceeds reality. However, this does not mean that the potential for problems and the concerns of landowners should be ignored. Instead, landowners, like other constituents, have legitimate priorities and expectations from a trails planning and development program. These include:

- *Communication.* Too often, landowners and trail advocates view each other as adversaries. Instead, they must establish informal lines of communication, including one-on-one meetings where advance information is provided and concerns are shared. This process can identify and resolve landowner concerns before they harden into opposition and litigation. In addition, informal meetings can create alliances and reduce the number of people who oppose the project

based on fears which develop after receiving partial information.

- *Involvement in Trails Planning.* Trails planning processes must avoid polarization into pro- and anti-trail groups. Instead, adjacent owners should be included in trails planning groups. Many other trails development experiences suggest that potential opponents often help solve problems if they are involved in the process.

- *Problem Resolution.* Landowners deserve to have their concerns identified, addressed, and resolved. For example, if privacy is a concern, the trail design should include provisions for screening. Good project design can prevent trespassing and illegal parking problems by providing trailheads with telephone, parking, and support services. Trails that pass through sensitive areas, including pastureland with grazing cattle, should have strict controls on noise. An atmosphere of conciliation, created by good communication, can go far to resolve problems before they create chasms between groups.

- *Management and Maintenance.* The condition of trails can affect neighboring properties. Thus, landowners should expect a quality maintenance and trail management program to protect their investment. Trails development must not stop with the completion of construction.

**TRAILS OPPOSITION
TURNS TO SUPPORT IN
IOWA**

" When we first heard about the plans for the (Cedar Valley Nature Trail from Waterloo to Cedar Rapids), we were less than enthusiastic. We attended the meetings and tried to get laws passed and lawsuits initiated to stop what we felt was a real menace to our well-being. We headed up a group of farmers and took the issue to court. We fought it for a year and finally decided that it wasn't worth it and that we should negotiate.

In retrospect, it's funny, 'cause the trail is the greatest thing going. None of the fears have come to pass. There are perhaps 15,000 people using the trail every year. Many of them access the trail through our farm. We have formed many friendships with the trail users, and hear from them throughout the year and at Christmas."

*- Rick Spence, Farmer
Farmland News,
February, 1993.*

A successfully developed trail can truly be a win-win proposition for people who once saw their interests in conflict, resulting in good feelings and helping trails fulfill their function of uniting Nebraskans.

■ Economic and Tourism Development Interests and Professionals

Economic development and tourism professionals are a growing constituency for trails development. The resource corridor concept emphasizes attracting new visitors and consumers to communities and regions. The demonstrated ability of trails to generate consumer spending can become a vehicle for economic growth in Nebraska. The ability of economic development interests to work together on a regional basis can help the corridor concept achieve its potential for creating business opportunities.

Economic development interests can also form alliances with more traditional trail interests. In Scottsbluff and Gering, economic development agencies created the Twin Cities Partnership for the Environment, a private and public sector partnership. The organization identified the development of the Monument Valley Pathways trail network as its top community priority. As a result of this coordinated effort, the project has secured funding for its first phase.

Economic development and tourism interests

have two major objectives for trails and other recreational facilities:

- *Improving the "balance of trade" of communities by importing new dollars through the attraction of visitors.* Retaining Nebraska tourism dollars that might otherwise be spent out of state also improves the state's trade balance.
- *Improving the region's quality of life, giving it a competitive advantage for business and personal investment.*

Features of trails system design that help to fulfill these objectives include:

- *Developing trail links between communities and attractions.* For example, a trail connection between a state park and a neighboring "host" community will help to establish that town as a base for goods and services for visitors. This in turn creates employment opportunities for local citizens to provide needed services.
- *Establishing a marketing and promotion program as an intrinsic part of the trails network.* Trail facilities are the "hard" elements of a system. However, promotion of a trail corridor is also important to realizing economic objectives and potentials. A marketing campaign for a trail corridor must address three issues: making people aware of the trail, encouraging them to come to use it, and providing information on goods and services within the resource corridor. Thus, "soft" devices such as resource corridor and trail guides, maps, service

directories, and other promotional materials should be a part of the trails program.

- *Encouraging cooperative regional action.* The concept of resource corridors is based on the creation of visitor networks: groupings of attractions, linked by a framework of trails. This concept encourages cooperative development and marketing of trails within the corridor.

Many communities along trails have community museums and other local attractions which enrich the state and provide an additional interpretive dimension to the system. Trails, in turn, can help attract visitors to these facilities. Resource directories and trail signage can help promote these attractions.

■ Conservationists

Trails development efforts include both development interests and conservationists, groups who are sometimes at odds, as partners with common objectives. For development interests, trails are a way of using special environments for economic growth by attracting visitors and investment. Environmental interests, on the other hand, are largely concerned with the ability of trails to preserve these same settings.

The conservationist agenda for a trails program includes:

- *Preserving the quality and integrity of sensitive environments and ecosystems.*
- *Providing carefully controlled access to environmentally important areas, building awareness and appreciation of natural areas.*
- *Using a trails network as a tool for environmental education through interpretive programs.*

Design features of a trails program that address these objectives include:

- *Minimizing disturbance of landscapes.* The trail should make as little impact on the land as possible. Thus, grading and disturbance to vegetation should be kept to a minimum. In sensitive areas like wetlands, structures such as boardwalks provide a path for users which minimizes environmental impact.
- *Using low-impact trail surfaces in sensitive areas.* While paving is desirable in many high-use areas, permeable surfaces such as granular stone have less environmental impact.
- *Discouraging diversions off the trail in inappropriate areas.* Trail design can channel users, preventing encroachments into sensitive areas. Grading, landscaping, signs, and barriers are techniques that can define the trail.
- *Developing joint trail and wildlife habitat projects.* Trails corridors are important habitats in their own right and preserve corridors for wildlife movement through developed areas.

*here in eastern Nebraska
the nuance known as tallgrass
prairie
in its rooted subtlety
lifts us up
travelers, we pass briefly*

*in its constancy
this fragment, this ancient
nuance
goes on
goes on yielding its unsung hay*

*From "Nuance"
by Twyla Hansen in
How to Live in the Heartland
Lincoln: Flatwater Editions,
1992*

Right: The Bessey Ranger District of the Nebraska National Forest, near Halsey.

Below: South Park in Schuyler. Schuyler's new comprehensive plan makes extensive use of trails as elements of the town's transportation and open space systems.



Partners in habitat preservation efforts include the U.S. Forest Service, the National Park Service, the U.S. Army Corps of Engineers, and the Nebraska Game and Parks Commission.

- *Grouping high impact uses at trailheads, located away from sensitive environments.* Providing adequate support facilities reduces the potential for environmental damage. High impact trail components, such as parking areas, restrooms, and other visitor facilities, should be located away from sensitive settings and should adequately provide for waste disposal.

- *Providing special facilities for high impact trail uses.* The highest impact uses are OHV and snowmobiling activities. If not accommodated in the system, these recreationalists may create their own trails. The development of quality facilities for these important user groups will help to prevent conflicts with other users as well as the natural environment.

- *Including knowledge and respect for the environment as an integral component of trails planning and development.* The environment is a major interpretive theme of the resource corridor concept. Signs, written materials, overlooks, and viewpoints are all elements of this interpretive program. Informational signage should also stress environmentally responsible use.

Trail Types

The previous discussion examined trail constituencies and described many of their requirements for trail networks and facilities. The specific design of trails should incorporate the features necessary for each user group and non-recreational constituency.

Except for specialized, high-impact users, trails will generally not be segregated by user group. This section, then, presents a hierarchy of trail types that will be the basic building blocks of the trails network. In the following chapter, which includes detailed maps of the resource corridors, these trail types will be adapted to specific areas and routes.

The proposed trail types include:

■ **Exclusive Multi-Use Trails and Trail Corridors.** These will be the state's principal multi-use facilities, accommodating a wide variety of users, including bicyclists, walkers, hikers, runners and joggers, equestrians where soft surfaces are provided, cross-country skiers, and others.

Multi-use trails may include either paved surfaces (generally concrete or asphalt) or improved surfaces (such as granular stone). Hard surfaces are generally most appropriate in urban or major tourist areas with high user volumes.

■ **Primary Bicycle Shoulders.** These shoulders, designed for shared roadway use by bicycles, provide wider, well-defined spaces along non-Interstate, non-freeway, heavily travelled roads, including segments of the Priority Commercial Network. Bicycles are preferably separated from motor vehicles by green space, rumble strips, or other well-defined separations.

■ **Secondary Shoulders.** These shoulders are highway enhancements, safely accommodating bicyclists on moderately travelled highways. They generally apply to segments of the network with volumes between 1,000 and 3,000 vehicles per day (VPD).

■ **Designated Paved Route.** These segments include designated bicycle routes on lightly travelled paved roads, generally under 1,000 vehicles per day. Pedestrians and hikers may be accommodated off the paved surface within the right-of-way.

■ **Designated Unpaved Route.** These segments utilize parts of county road systems that would be maintained to certain standards for recreational use. Gravel routes may include "districts" of roads within a contiguous area, appropriate for equestrian use.

■ **Greenways.** Greenways are low-impact, generally narrow paths, typically with soft surfaces. They may occur on public lands or on easements through private lands.

Greenways accommodate hikers and other, higher-impact users in selected areas.

■ **Canoe Trails.** Canoe trails include water routes that accommodate canoes and rafts, along with access to adjacent campsites.

■ **Special Facilities.** These include distinct facilities for specialized user groups, such as OHVs and snowmobiles, distributed

strategically around the state.

The following table matches each trail type with the recreational user groups that it serves. Succeeding pages review general guidelines to use in planning each trail type. Specific design features depend on the individual character of each trail corridor. Requirements for special facilities are included in the previous discussion of trail constituencies.

Trail Types: Application to Recreational User Groups

Trail Type	Recreational Constituency										LEGEND
	Road Bicyclists	Hybrid Bicyclists	All-Terrain Bicyclists	Pedestrians	Equestrians	In-line Skaters	Cross-country skiers	OHV's	Snowmobiles	Canoeists	
Exclusive Multi-Use Trails (paved)	●	●	●	●	▲	●	●		*		● Primary User ○ Depends on maintenance of surface ▲ With separate tread * Only where specifically permitted
Exclusive Multi-Use Trails (improved)	●	●	●	●	●		●		*		
Primary Shoulders	●	●	●								
Secondary Shoulders	●	●	●								
Designated Paved Route	●	●	●								
Designated Gravel Route		○	●		●						
Greenways			*	●	●						
Canoe Trails										●	
Special Facilities								●	●		



Top: The Keystone Trail in Omaha, an example of a paved multi-use trail.

Bottom: US Highway 26 between Scottsbluff and Mitchell in the Monument Valley Resource Corridor. Primary bicycle shoulders can accommodate experienced bicyclists along these these relatively heavily travelled roads. Preferably, shoulder design should separate bicyclists from motor vehicles.



Top: Robidoux Pass Road south of Gering in the Monument Valley Resource Corridor. Unpaved county roads are lightly travelled and provide access to many scenic and historic areas. Maintenance standards should permit use of these designated routes by recreational groups.

Bottom: The Republican River Canoe Trail in Southeast Nebraska.

■ Paved Multi-Use Trails

Paved multi-use trails provide for a variety of recreational uses. Generally the most expensive of all trail types to develop, they are most applicable to high-intensity use areas, including cities and towns and busy tourist destinations.

Applications And Users

APPLICATIONS

- Community trails, especially in urban settings.
- Connecting links between communities and major, nearby attractions.
- Areas with a high concentration of tourists and children.

LEADING DEVELOPMENT OPPORTUNITIES

- Railroad corridors proposed for abandonment.
- Trail-with-rail facilities in lightly travelled corridors.
- Waterways, including levees.
- Canal rights of way.
- Street and highway corridors, as part of an intermodal design approach.

PRINCIPAL USER GROUPS

- All bicyclists
- Pedestrians
- Equestrians when soft surfaces are provided in the corridor.
- In-line skaters and other wheeled vehicles.
- Cross-country skiers.

Design Standards

General Design Standards: Trails should comply with American Association of Street and Highway Transportation Officials (AASHTO) standards and Uniform Federal Accessibility Standards and the "Americans with Disabilities Act Accessibility Guidelines."

Surface: Concrete or asphalt as standards.

Width:

- Varies depending on situation. Typical standard should be 10-foot minimum. In intensively used areas, 12-foot or wider may be required. In lighter use rural or small town settings, 8-foot width may be adequate.
- Consider a parallel 5- to 8-foot soft surface trail in congested areas or for equestrian uses. If possible, divide hard and soft-surfaced parts of the trail.
- Maintain a three-foot minimum clear recovery zone adjacent to trails with bicycle uses.

Grades and Grade Changes:

- Establish a 5% overall maximum ruling grade.
- Individual segments may include grades up to a maximum of 8.33%. Design grades between 5% and 8.33% are considered ramps.
- For ramps, a level rest area must be provided for every 30 inches of rise. Ramps, bridges, and landings adjacent to abrupt grade changes must include 32-inch high handrails, designed to meet AASHTO recommendations. 2-inch curbs on both sides of a ramp are advisable. Ramp surfaces should be slip-resistant.

Design Standards

Subsurface and Drainage:

- Typically 4 to 8-inch compacted, smooth, and level. Individual conditions, such as Sandhills environment, may require special design.
- Trail cross-section should provide adequate cross-drainage and minimize debris deposited by run-off.
- Emphasize use of open drainage solutions whenever possible.

Sight Distance and Intersection Design:

- Provide 150-foot sight distance standard. On trails permitting snowmobiles, a 400-foot sight distance is required. Provide 20 mph minimum design speed for bicycle use.
- Provide intersection design with gravel roads that prevent coarse gravel from encroaching on trail surface.
- Align or widen trail at railroad intersections to permit perpendicular crossing of tracks.
- Avoid the use of bollards or obstacles at grade-level intersections unless operations indicate they are needed. If necessary, use entrances with a median separating directional movements in place of bollards. Provide bollards only at approaches to bridges longer than ten feet.

Vertical Clearance : 10 feet for all user groups.

Design for Maintenance:

- Provide adequate turning radii and trailhead access to maintenance and emergency vehicles.

Design Standards

- Provide for regular winter plowing in urban areas; in rural areas, maintain a surface usable for winter recreation. Prior to facility development, ensure that an appropriate agency will provide for ongoing maintenance and plowing.

Signing:

- Provide regulatory and warning signs consistent with the *Manual on Uniform Traffic Control Devices (MUTCD)*.
- Provide a consistent informational sign system consistent with the MUTCD including:
 - A state trail system logo, along with a numerical designation for the trail if required.
 - An identifying trail name and/or logo.
 - Pictographs identifying permitted uses.
 - Trail maps at regular intervals.
 - Mileage markers.
 - An interpretive sign system, coded according to the interpretive themes provided in the plan.
 - Directional indicators with distances to towns, parks, campsites, services, and points of interest.
 - Safety rules, including advisories on helmets, right-of-way rules, passing and announcement etiquette, and prohibition of motor vehicles except as permitted.
 - Use regulations and prohibitions.
 - Recreation liability warnings and disclaimers.

Support Facilities: Provide periodic minor rest stops, including benches, shaded areas, picnic areas, and informational signing. Provide trailheads at major access points and periodic major rest areas, incorporating parking facilities, maps and trail information, water, restrooms, telephone, and shelter. As a general standard, major support facilities should eventually occur at ten-mile intervals.

■ Improved Multi-Use Trails

Improved multi-use trails provide for a variety of recreational uses. They provide good surfaces at a substantially lower cost than paving. Properly designed, they become the trail type of choice for long distance trails through rural areas.

Applications And Users

APPLICATIONS

- Point-to-point trails through rural areas.
- Connecting links between communities and major, nearby attractions where demand does not require hard-surfacing.
- Natural areas where a paved surface is inappropriate.
- Long distance trails.

LEADING DEVELOPMENT OPPORTUNITIES

- Railroad corridors proposed for abandonment.
- Trail-with-rail facilities in lightly travelled corridors.
- Waterways, including levees.
- Canal rights of way, including maintenance roads.
- Street and highway corridors, as part of an intermodal design approach.

PRINCIPAL USER GROUPS

- Bicyclists, with greatest usability for "hybrid" and mountain bicyclists.
- Pedestrians.
- Equestrians.
- Cross-country skiers.
- Snowmobiles in specifically defined areas.

Design Standards

General Design Standards: Trails should comply with American Association of Street and Highway Transportation Officials (AASHTO) standards and Uniform Federal Accessibility Standards and the "Americans with Disabilities Act Accessibility Guidelines."

Surface:

- Crushed or chipped stone is the probable surface of choice. Other surfaces include soil cement, native soil, wood chips, and recycled materials.
- Provide concrete or asphalt paving at erosion-prone areas, including intersections and segments at the base of a drainage pattern or swale.

Width:

- Varies depending on situation. Typical standard should be 10-foot minimum. In rural areas, 8-foot width may be adequate. For joint use trails with equestrians, a 12- to 14-foot width should be considered.
- Use a separate tread or wider trail to accommodate equestrian uses. A separate tread for equestrians should be 5 feet for single riders and 10 feet for drivers.
- Maintain a three-foot minimum clear recovery zone adjacent to trails with bicycle uses.

Grades and Grade Changes:

- Establish a 5% overall maximum ruling grade.
- Individual segments may include grades up to a maximum of 8.33%. Design grades between 5% and 8.33% are considered ramps.

Design Standards

- For ramps, a level rest area must be provided for every 30 inches of rise. Ramps, bridges, and landings adjacent to abrupt grade changes must include 32-inch high handrails, designed to meet AASHTO recommendations. 2-inch curbs on both sides of a ramp are advisable and may require special design.
- Trail cross-section should provide adequate cross-drainage and minimize debris deposited by run-off.
- Emphasize use of open drainage solutions whenever possible.

Sight Distance and Intersection Design:

- Provide 150-foot sight distance standard. On trails permitting snowmobiles, a 400-foot sight distance is required. Provide 20 mph minimum design speed for bicycle use on level trails.
- Provide intersection design with gravel roads that prevent coarse gravel from encroaching on trail surface. Align or widen trail at railroad intersections to permit perpendicular crossing of tracks.
- Avoid the use of bollards or obstacles at grade-level intersections unless operations indicate they are needed. If necessary, use entrances with a median separating directional movements in place of bollards. Provide bollards only at approaches to bridges longer than ten feet.

Vertical Clearance : 10 feet for all user groups.

Design for Maintenance:

- Provide adequate turning radii and trailhead access to maintenance and emergency vehicles.

Design Standards

- Provide for regular winter plowing in urban areas; in rural areas, maintain a surface usable for winter recreation. Prior to facility development, ensure that an appropriate agency will provide for ongoing maintenance and plowing.

Signing:

- Provide regulatory and warning signs consistent with the *MUTCD*.
- Provide a consistent informational sign system, complying with *MUTCD* principles and including:
 - A state trail system logo, along with a numerical designation for the trail if required.
 - An identifying trail name and/or logo.
 - Pictographs identifying permitted uses.
 - Trail maps at regular intervals.
 - Mileage markers.
 - An interpretive sign system, coded according to the interpretive themes provided in the plan.
 - Directional indicators with distances to towns, parks, campsites, services, and points of interest.
 - Safety rules, including advisories on helmets, right-of-way rules, passing and announcement etiquette, and prohibition of motor vehicles except as permitted.
 - Use regulations and prohibitions.
 - Recreation liability warnings and disclaimers.

Support Facilities: Provide periodic minor rest stops, including benches, shaded areas, picnic areas, and informational signing. Provide trailheads at major access points and periodic major rest areas, incorporating parking facilities, maps and trail information, water, restrooms, telephone, and shelter. As a general standard, major support facilities should eventually be placed at ten-mile intervals.

■ Primary and Secondary Shoulders

Shoulders along major roads are an important part of a statewide bicycle system. Primary shoulders provide links that travel along the state's Priority Commercial Highway System. State highway design standards call for the development of paved surface shoulders along these roads. Secondary shoulders provide a refuge for bicyclists along other heavily travelled routes.

Applications And Users

APPLICATIONS

■ Trail corridor segments that follow Nebraska's Priority Commercial Highway System and other heavily travelled highway routes.

DEFINITIONS

■ Primary shoulders apply to highway segments on the state's Priority Commercial System or segments off the system that have traffic volumes over 3,000 vehicles per day. State design standards call for paved surface shoulders on these highway segments.

■ Secondary shoulders apply to other highway segments with traffic volumes over 1,000 vehicles per day. State design standards call for paved surface shoulders on these highway segments. Under current policy, construction of these shoulders is considered an "enhancement."

■ Safety accommodations should be developed where appropriate on bridges, new construction, or road rehabilitation projects.

LEADING DEVELOPMENT OPPORTUNITIES

■ Priority Commercial System.

■ Heavily travelled corridors in urban and suburban areas.

■ Highways with traffic volumes exceeding 1,000 vehicles per day.

PRINCIPAL USER GROUPS

■ Bicyclists.

Design Standards

Surface: Concrete or asphalt.

Width:

- Primary Shoulders: 8-foot minimum width in each direction from inside roadway boundary to shoulder edge.
- Secondary Shoulders: 6-foot minimum width in each direction from inside roadway boundary to shoulder edge in any planned road improvement.

Shoulder Definition:

- For Primary Shoulders, provide a recessed "rumble strip" near the boundary line of shoulder and road to provide visual and auditory cues to motorists.
- Provide a minimum clear tread of 5 feet for bicycles, unencumbered by rumble strips, reflectors, or other obstructions.

- Recommended design provides a clear method of separation between motorized and bicycle traffic.

Intersection Design:

- Provide intersection design with gravel roads that prevent coarse gravel from encroaching on shoulder.
- Widen shoulders at railroad intersections to permit perpendicular crossing of tracks without requiring bicycles to encroach on roadway.

Maintenance: Maintain bicycle shoulders to same standard as adjacent roadway. Do not permit surface to deteriorate or crumble, requiring bicyclists to go into roadway to avoid hazards.

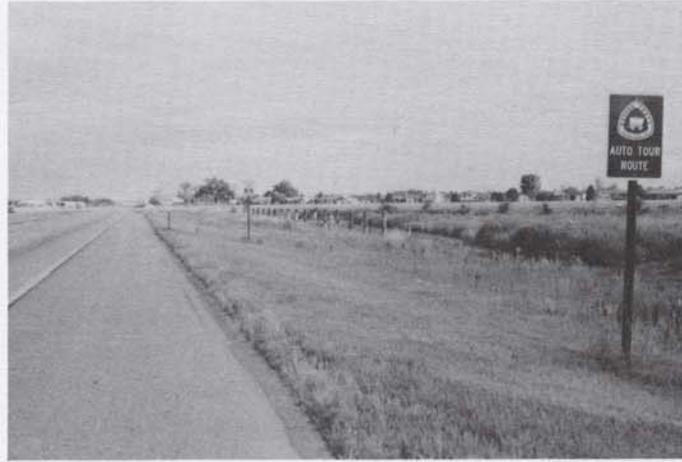
Design Standards

Signing:

- Provide standard BICYCLE ROUTE signing and/or warning to motorists of bicycles in area signing.
- Provide a consistent informational sign system complying with principles of *Manual of Uniform Traffic Control Devices* and including:
 - A state trails system logo, along with a numerical designation for the trail if permitted by *MUTCD*.
 - An interpretive sign system, coded according to the interpretive themes provided in the plan.
 - Directional indicators with distances to towns, parks, campsites, services, and points of interest.
 - Safety rules, including advisories on helmets.
 - Recreational liability warnings and disclaimers.

Support Facilities:

- Provide periodic minor rest stops, including benches, shaded areas, picnic areas, and informational signing. Provide periodic major rest areas, incorporating parking facilities, maps and trail information, water, restrooms, telephone, and shelter. As a general standard, major support facilities should eventually occur at twenty-mile intervals within wayside areas. Alternatively, facilities or sites within communities may be utilized.

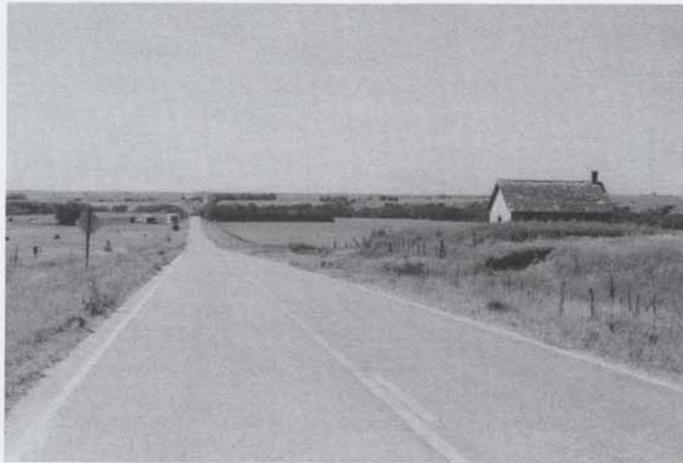


Left: A designated motor route along the Oregon National Historic Trail in western Nebraska. These signed routes permit motorists and road bicyclists to follow historic trail routes.

■ Designated Paved Routes

The state's network of paved state highways and county roads and rights-of-way are important components of the trail system. Lightly travelled roads can provide key connections for certain types of recreational users.

Applications And Users



APPLICATIONS

■ Trail corridor segments that follow paved county roads or relatively low-volume state highways. These segments will generally lack surface shoulders and will experience average traffic volumes below 1,000 vehicles per day.

LEADING DEVELOPMENT OPPORTUNITIES

■ Paved state highways and county roads with low traffic volumes.

■ Recreation access road projects.

PRINCIPAL USER GROUPS

■ Bicyclists, particularly riders with adequate experience to use shared rights-of-way.

Design Standards

Surface: Concrete or asphalt roadway surface.

Width: Typical two-lane highway width of 25 feet.

Maintenance: Good roadway maintenance and aggressive repair of pavement break-up and deterioration.

Signing:

- Provide standard BICYCLE ROUTE signing and/or warning to motorists of bicycles in area signing.
- Provide an informational sign system consistent with principles of the *Manual of Uniform Traffic Control Devices* and including:

- A state trail system logo, along with a numerical designation for the trail if permitted by *MUTCD*.
- An interpretive sign system, coded according to the interpretive themes provided in the plan.
- Directional indicators with distances to towns, parks, campsites, services, and points of interest.
- Safety rules, including advisories on helmets.
- Recreational liability warnings and disclaimers.

Support Facilities

- Provide periodic major rest areas, incorporating parking facilities, maps and trail information, water, restrooms, telephone, and shelter. As a general standard, major support facilities should eventually occur at twenty-mile intervals within wayside areas. Alternatively, facilities or sites within communities may be utilized.

■ Designated Unpaved Routes

Unpaved county roads and maintenance ways can provide traffic-free trail links for certain types of recreational uses. In some areas, the county road system offers the safest access to major recreational and historic features.

Applications And Users



APPLICATIONS

- Trail corridor segments that follow unpaved county, park, or maintenance roads, including canal maintenance routes. These are characterized by very low traffic volumes.

LEADING DEVELOPMENT OPPORTUNITIES

- Network of unpaved, rural roads.

PRINCIPAL USER GROUPS

- Bicyclists, particularly all-terrain bicyclists.
- Pedestrians.
- Saddle and carriage equestrians.

Design Standards

Surface: Gravel or graded, compacted dirt.

Maintenance: Good roadway maintenance with periodic blading to maintain rideability. Ongoing repair of ruts or gullies.

Signing:

- Provide standard BICYCLE ROUTE signing and/or warning to motorists of bicycles in area signing.
- Provide an informational sign system consistent with principles of the *Manual of Uniform Traffic Control Devices* and including:

- A state trails system logo, along with a numerical designation for the trail if permitted by *MUTCD*.
- An interpretive sign system, coded according to the interpretive themes provided in the plan.
- Directional indicators with distances to towns, parks, campsites, services, and points of interest.
- Safety rules, including advisories on helmets.
- Recreational liability warnings and disclaimers.

Support Facilities:

- Provide periodic major rest areas, incorporating maps and trail information, sufficient parking for equestrians, water, and shelter. As a general standard, major support facilities should eventually occur at twenty mile intervals within wayside areas. Alternatively, facilities or sites within communities or offered by adjacent landowners may be utilized.

■ Greenways

Greenways are the lowest impact and lowest cost trail type. They include paths through environmentally important places and may be developed in either public areas or on private lands through easements.

Applications And Users



APPLICATIONS

- Paths for a variety of recreational uses within natural areas.

LEADING DEVELOPMENT OPPORTUNITIES

- Natural areas, national parks and forests, and state and local parks and recreation areas.
- River and stream corridors, and lakes.
- Private easements where major trail development might be inappropriate to surrounding land uses.

PRINCIPAL USER GROUPS

- Pedestrians
- Saddle and some carriage equestrians.
- All-terrain bicyclists where permitted.
- OHV's within planned facilities.

Design Standards

Surface: Cleared, soft-surfaced trails or paths. Surfaces include granulated stone, natural soil, wood chips, and other natural materials.

Width :

- Width depends on user groups to be accommodated by greenway.
- Mowing of adequate areas to provide separation from wildlife, particularly in areas with rattlesnake populations.

Maintenance: Trail maintenance, including clearing of brush and control of adjacent vegetation.

Signing: Provide a consistent informational sign system including:

- A state trails system logo.
- An information display at approximately two-mile intervals, including a trail map and directional indicators with distances to towns, parks, campsites, services, and points of interest.
- Mileage markers.
- An interpretive sign system, coded according to the interpretive themes provided in the plan.
- Posting of International Yield sign, giving right-of-way to equestrians, pedestrians, and bicyclists, in order of priority.
- Safety rules.
- Recreational liability warnings and disclaimers.

Design Standards

Support Facilities:

- Provide marked trailheads with maps, parking facilities, adequate parking, staging area for equestrian users, water, telephone, restrooms, and information including trail and tour guides.
- If possible, provide maps, locational and trail information, and water at ten-mile intervals. In some areas, this may not be feasible.

Trail Development Issues

This section has defined trail types that meet the needs of various user groups and constituencies. These in turn become the building blocks for the trails network. It has further established general design standards for each one of these trail types.

Within this presentation of trail types and standards, several specific areas require further elaboration. These areas include:

- Trail Surfaces
- Accessibility to People with Disabilities
- Signs
- Security
- Special Places
- Support Facilities

A full discussion of these and other trail design and management issues is found in the Rails-to-Trails Conservancy's superb guide to the development of multi-use trails, *Trails for the Twenty-First Century* (Washington, D.C.: Island Press, 1993). A shorter discussion of these issues is presented here.

■ Trail Surfaces

Multi-use trails can use a variety of different surfaces, each of which displays advantages and disadvantages. Potential trail surfaces in Nebraska include:

- *Concrete.*

- *Asphalt.* Eight Nebraska communities have asphalt plants, including Scottsbluff, North Platte, Grand Island, Norfolk, Hastings, Elm Creek, Lincoln, and Omaha.
- *Crushed or granular limestone.* Limestone quarries are located in Weeping Water, Fort Calhoun, and Cheyenne, Wyoming.
- *Fly ash soil cement.* Fly ash is a by-product of coal-burning power plants and can be compacted into a suitable trail surface. It is produced by plants in Omaha, Nebraska City, Sutherland, Fremont, and Grand Island.
- *Recycled solid waste.* South Sioux City has developed a demonstration trail segment using recycled materials.
- *Brick.*
- *Ballast.* Ballast would be ground and compacted to accommodate most uses.
- *Wood planking.* This material is cost-effective only for bridge decking and similar applications.
- *Wood chips.*
- *Native soil.*

The table on the opposite page presents the relative merits of trail surfaces. The Nebraska Department of Roads completed a survey of potential costs of trail materials in

November, 1993. Costs per mile for a typical 10-foot wide trail of various surfaces are presented below. The lower end of the cost range reflects the use of an existing, abandoned railbed, which significantly reduces grading and sub-base preparation. Costs do not include embankments or drainage structures.

Comparison of Estimated Trail Surface Costs Per Mile in Nebraska

TRAIL SURFACE	LOW RANGE	HIGH RANGE
6" Concrete	\$162,000	\$191,500
Asphalt	77,122	118,000
Granular Limestone	58,000	80,000
Fly Ash Soil Cement	41,000	70,000
Soft-Set Brick	90,000	136,600
Recycled Solid Waste	82,000	125,000
Wood Planks	104,000	160,000
Grass Pavers	129,000	159,000

Source:
Nebraska Department of Roads, November, 1993.

Comparison of Trail Surfaces: Multi-use Trail Surfaces

SURFACE MATERIAL	ADVANTAGES	DISADVANTAGES	TYPICAL APPLICATIONS
Concrete	<ul style="list-style-type: none"> • Hardest, most long-lived surface. • Easy to form on-site. • Supports many uses. • Lowest maintenance. • Best cold weather surface, resists breakup caused by freeze-thaw cycles. • Works well in sandy soils. 	<ul style="list-style-type: none"> • Expensive • Costly to repair. • Not a natural surface. • Construction vehicles need trail access. 	<ul style="list-style-type: none"> • Community trails. • Trails with high use levels and diverse user types. • Trails with challenging sub-grade conditions.
Asphalt	<ul style="list-style-type: none"> • Hard surface, offers little rolling resistance when new. • Supports many uses. • Does not erode. • Low maintenance. 	<ul style="list-style-type: none"> • Relatively high cost, although less than concrete. • Costly to repair. • Not a natural surface. • Construction vehicles need trail access. 	<ul style="list-style-type: none"> • Community trails. • Trails with high use levels and diverse user types.
Crushed or granular limestone or ballast	<ul style="list-style-type: none"> • Soft but firm surface. • Natural material with reasonable cost. • Smooth surface. • Supports many uses. 	<ul style="list-style-type: none"> • Heavy rainfall can cause ruts and erosion. • Regular maintenance is required to sustain smooth surface. • Not good for steep slopes. • Not uniformly available across the state, requiring transportation. • Installation in sandy soils may require a filter fabric. 	<ul style="list-style-type: none"> • Long-distance trails. • Trails through rural settings. • Community trails.
Fly Ash	<ul style="list-style-type: none"> • Smooth surface if compacted. • Productive use of a waste product. • Relatively low cost. 	<ul style="list-style-type: none"> • Uneven surface wear, stressed by bicycles and equestrians. • Vulnerable to erosion. • Requires transportation to some areas. 	<ul style="list-style-type: none"> • Long-distance trails. • Trails through rural settings with relatively little erosion potential.
Recycled Solid Waste	<ul style="list-style-type: none"> • Good use of recyclables. • Surface can vary depending on application. 	<ul style="list-style-type: none"> • Unknown long-term effects or durability. • Relatively expensive. 	<ul style="list-style-type: none"> • Experimental use.
Brick	<ul style="list-style-type: none"> • Hard, low maintenance material. • Very resistant to freeze/thaw. • Readily available in eastern part of state. • Visually attractive. 	<ul style="list-style-type: none"> • Subject to differential settlement if soft-set. • Hard-set is extremely expensive. • Uneven brick paving can be difficult for some users to negotiate. 	<ul style="list-style-type: none"> • Visual or textural accent . • Community trails or walks.

Sources: Rails-to-Trails Conservancy, *Trails for the Twenty-First Century*, Washington: Island Press, 1993.
 Nebraska Department of Roads, "Surface Alternatives for Bikepaths," November, 1993.

Comparison of Trail Surfaces: Multi-use Trail Surfaces

SURFACE MATERIAL	ADVANTAGES	DISADVANTAGES	TYPICAL APPLICATIONS
Wood Planking	<ul style="list-style-type: none"> • Natural material. • Capable of spanning distances. 	<ul style="list-style-type: none"> • Expensive • Vulnerable to insects and weather. 	<ul style="list-style-type: none"> • Decks for bridges. • Boardwalks over wetlands, virgin prairies, and other sensitive areas.
Wood Chips	<ul style="list-style-type: none"> • Soft, spongy surface, forgiving for pedestrians. • Moderate cost. • Natural material. 	<ul style="list-style-type: none"> • Decomposes in high temperature and moisture. • Requires frequent replenishment and upkeep. • Not accessible. • Availability can be limited. 	<ul style="list-style-type: none"> • Park trails for pedestrians. • Other greenways.
Native Soil	<ul style="list-style-type: none"> • Natural material. • Lowest cost. • Easiest for volunteers to develop and maintain. 	<ul style="list-style-type: none"> • Dusty. • Impassable in wet conditions. • Subject to erosion. • Limited use. • Subject to irregularities. 	<ul style="list-style-type: none"> • Park trails. • Surface for OHV facilities. • Greenways.

Sources: Rails-to-Trails Conservancy, *Trails for the Twenty-First Century*; Washington: Island Press, 1993.
 Nebraska Department of Roads, "Surface Alternatives for Bikepaths," November, 1993.



■ **Accessibility**

To the maximum degree possible, multi-use trails should be accessible to people with disabilities. Accessibility requirements are built into the design standards presented in this chapter.

■ **Signs**

Signs constitute the trails network's information system. They fall into three categories: regulatory signs which establish rules of the trail, warning signs which point out potential hazards, and informational signs which provide identification and guidance to the trail user.

Regulatory and warning signs utilize standard signs and sizes established for bicycle facilities in the Federal Highway Administration's *Manual on Uniform Traffic Control Devices (MUTCD)*. A good risk management program requires a complete assessment of potential hazard situations, along with adequate precautionary signing, and a thorough understanding of Nebraska's recreational liability statutes.

Informational signs present greater opportunities for creativity and can be important to fulfilling the concept of a multi-dimensional trails network. The state network, as well as individual community trails, should include the following elements:

- *Trail Identification.* A distinctive logo for the state trails system should be developed and used on exclusive trails and greenways that are part of the system. The MUTCD further requires an identification of trails by number. The Nebraska Department of Roads will develop a policy for signing where trails coincide with shoulders on road surfaces.

Individual trails should also be identified through a distinctive name and logo within themes and standards established for the statewide system. This combination reinforces the continuity of the network while recognizing the special quality of individual components.

- *Directional and Guidance Information.* These signs orient the user and provide directions to services, points of interest, and other trailside features. Directional graphics should be consistent throughout the trail system. However, some individual features may be used. For example, on rail-trails, the use of traditional railroad mileposts can help to recall the original history of the corridor.

- *Interpretive Signs.* These signs help the network fill its educational and awareness-building roles. In the Nebraska system, interpretive signs should relate to the interpretive themes discussed in the Trail Resources section of the plan. Other signs, including the Nebraska State Historical Society's Historic Markers Program, should also be part of the development of the network.

UNIVERSAL ACCESS TO OUTDOOR RECREATION

An innovative approach to access of facilities for people with disabilities has been developed by Project Play and Learning in Adaptable Environments, Inc. (PLAE) with the U.S. Forest Service. This approach establishes a range of access standards, depending on the context of a recreational facility. Universal access substitutes a variety of challenges for a single, uniform standard.

The universal access approach relates recreational settings to expectations of accessibility in establishing design standards. The concept establishes four categories in a Recreational Opportunities Spectrum: urban/rural, roaded natural, semi-primitive, and primitive. Accessibility expectations are then paired to these settings, with appropriate standards. Urban areas should offer "easy" accessibility, while primitive areas on the other end of the spectrum evoke expectations of "most difficult" accessibility.

PLAE's recent publication, Universal Access to Outdoor Recreation (Berkeley: MIG Communications, 1993) offers a complete presentation of the Universal Access concept.

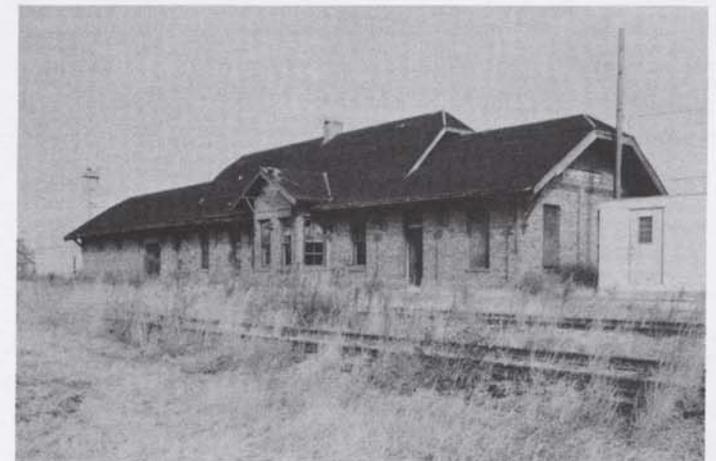
Top right: First Street in Norfolk. This historic commercial district developed across the street from the Chicago and North Western Railroad depot. It will form part of the trailhead for the Norfolk to Chadron Cowboy Trail. Development of the trail can encourage reinvestment in the district and the creation of a unique retail and service district.

Bottom right: The historic Chicago and North Western depot in O'Neill. Restoration of this depot can be encouraged by adjacent trail development. Restoration of historic transportation structures is an eligible use for ISTEA Enhancement funds.

■ Security

The design of individual trails should address issues of user security. Good trail design can help to minimize security problems. Some issues that the design process should consider include:

- Parking lot security.
- Provision of telephones or emergency call-boxes. Telephones should be available at major trailheads and access points, and at strategic locations along multi-use trails. They are particularly important in areas where a trail diverges from a highway.
- Security lighting at trailheads and major intersections and points of activity. However, lighting of trails is generally not recommended. Lighting is expensive and is of questionable value in actually reducing crime. Indeed, lighting may give a user a feeling of false security, encouraging night-time use of trails that may be inadvisable.
- Landscaping design that avoids providing hiding places to offenders, and adequate accommodation for emergency and security equipment.
- Creation of a volunteer trail patrol in certain situations. Volunteer patrols can help to distribute information, provide assistance, and monitor trail use.



Ultimately, the most effective way to create a secure environment is to have a well-maintained, heavily used trail. Effective marketing and good trail management can help achieve this objective.

■ Special Places

Nebraska's unique places and features will make the state's trails system much more than

a series of linear pathways. Thus, the design of a trail should be holistic, addressing surrounding features and opportunities. These opportunities can include historic railroad stations that can become locations for new businesses or support facilities, trailside parks in communities, town squares, unique bridges, waterfront environments, and community business districts. The enhancement of these features can help create special places along the trails system, increasing the value of the user's experience and strengthening the emergence of a *Network of Discovery*. The Intermodal Surface Transportation Efficiency Act (ISTEA) provides possible funding for the restoration of historic transportation structures, further encouraging their reuse.

■ Support Facilities

Support facilities increase the trail user's level of enjoyment and comfort. They indicate that the designers and sponsors of the trail thoughtfully considered user needs. In general, support facilities include minor "rest stops," located along the trail, and facilities at major access points and trailheads. Support facilities should be coordinated with communities and businesses along the way. For example, a trailside rest area may be located in a community park, reinforcing services that are provided by a business in town.

Minor rest stops may include benches, shaded areas, picnic tables, and informational signs.

Relatively closely spaced facilities can provide a welcome place for rest, reflection, or conversation for all users.

Major facilities may include accommodations for vehicles such as parking areas and staging areas for users with loading requirements, accessible restrooms, water, seating areas and shelter, trail information and maps, picnic areas, bicycle racks, and hitching posts.

■ Summary

This chapter has investigated the citizen constituencies for the trails network and established their requirements for the system. These requirements generate a hierarchy of trail types, ranging from paved, multi-use trails to greenways, forming the building blocks of the system. Each of these trail types has specific design guidelines, which will be designed to fit local conditions and needs. Guidelines should be flexible and responsive to the individual situations of trail developers.

The next chapter of the plan applies these building blocks and guidelines to the resource corridors themselves, generating the physical development plan for the system.

A PICTURE IS WORTH A THOUSAND WORDS

"By developing simple graphic images, rail-trail advocates across the country have tapped into one of the most powerful trail-promotion tools: the logo.

At first glance, a logo may not seem very important,' said Karen-Lee Ryan, RTC's director of publications, 'but it is one of the most effective ways to spread the word about a trail and to highlight the uniqueness of your project.

When creating a logo, select dominant landscape elements, such as rivers and valleys. They make excellent images for logos as do footprints, bicycle tires and other trail-evoking images."

*- The Trailblazer
Rails-to-Trails Conservancy
News
April-June, 1994*

