THE USES, PLANNING, AND MANAGEMENT OF HORSE TRAILS IN THE UNITED STATES

By

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ABSTRACT

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Horseback riding is one of the most controversial uses of trails because of the great impact horses have on the environment. In a state such as Wisconsin where few horse trails exist, the heavy use of those trails exhibits a need for a sound planning, construction, and maintenance program. This report gives a basic outline for the management of horse trails. The concepts presented here can be used when planning for other trail uses as well.

ACKNOWLEDGEMENTS

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Chapter 1

Horseback riding is a controversial trail use. In Wisconsin only 10 percent of the outdoor participants ride (Cohen, 1971). Other more popular trail uses are hiking, bicycling, and off-road vehicle driving (Hammet, May 1971). The various users would prefer their own special use trails even though each has similar needs for facilities. A major problem is the lack of open space for separate trail use development.

One means of easing the need for many different trails is to place more than one use on a path. To do this, conflicts must be resolved through careful planning. Such a project would need input from each use group concerned. Horseback riding needs more attention than other trail uses because horses have greater impact on soil and vegetation (Vogel, 1968).

This report covers bridlepaths. The planning, construction, and management of information such as this may provide a basis for future research on horse trails and trail planning.

Chapter 2

There are two types of horseback riders, the horse renters and the horse owners. Each has different requirements for horse trails.

Horse Renters

Horse renters are tourists who hire mounts on a temporary basis. Rental period ranges from an hour ride to two weeks depending on the activity. The renter differs from the owner in that the renter will go to the stable and riding area whereas the owner uses his own mount and either his land or public trails near his home. Horse owner needs are addressed later in this chapter.

The best known horse renters are tourists who hire horses for an hour ride. Users look for rental stables located near their vacation "spot." Therefore, most rental stables are found near or as part of a resort (Cohee, 1971).

On an hour trail ride, the stable provides horse, riding gear, and guide for a fee of $3.00 to $6.00 per hour. The trail ride usually covers three to five miles and requires 45 to 60 minutes to complete (Cohee, 1971). A single horse may make this trip on the average of 1.7 times per day (Table 1).

The sizes of rental enterprises vary (Table 2). Each stable studied by Cohee has close to the same amount of participant days per horse when this was compared to total participant days per enterprise.

Table 1: Number and Use of Riding Trails for Private Enterprise in Wisconsin[a]

	Avg. for all enterprise	No. of Trails per Enterprise		
		One	Two or Three	Four or More
No. of Enterprises (21)	-	6	12	3
No. of Trails/Enterprises	2.6*	1	2.7	4.7
Miles per Trail**	3.0	3.3	3.2	1.7
Miles of Trail/Enterprise	7.1	3.3	8.5	9
No. Horses:				
Per Enterprise	15.1	12.5	13.8	28
Per Mile of Trail	2.1	3.8	1.6	3.1
Avg. Per Weekend Day:				
No. Riders/Mile of trail**	4.2	7.5	2.6	3.4
No. Trail Trip/Horse	1.7	1.7	1.8	.9
No. Riders	24.5	24	23.7	28.3
No. Participants/Year	2.077	1,670	1,150	1,600

* There were a total of 55 trails used by the 21 enterprises.

** Weighted average.

*** These data are averages over the entire season; on some weekend days, number of riders and trail trips per horse are much larger.

[a] Table is from Cohee, Melville H. Private outdoor recreation businesses: Horseback riding enterprises. Department of Natural Resources, Madison, Wisconsin, 1971.

Table 2: Size of Horseback Riding Enterprise in Wisconsin[a]

	All Enterprises	No. of Horses 4-11	12-19	20+
No. of Enterprises	21	7	8	6
No. Horses Per Enterprise	15.5	7.7	15.1	25
No. Horse-Availability-Days				
Per Enterprise	2,642	821	2,028	5,583
Per Horse	171	106	134	223
No. Annual Participant Days				
Per Enterprise	2,077	1,002	2,262	3,083
Per Horse	134	130	150	123
Percentage Equivalent Use of Horses	79	122	104	55
No. Acres Owned Per Enterprise	243	330	208	187
No. Recreation Acres Per Enterprise	111	108	128	93

[a] Table from Cohee, Melville H. Private outdoor recreation businesses: Horseback riding enterprises. Department of Natural Resources, Madison, Wisconsin, 1971

An average acreage of 243 acres was figured per enterprise (Table 2). Trails mileage totaled 149.5 with 35.5 miles on private land and 43.2 miles on public land (Table 3).

Most rental stables remain open 152 days per year (Cohee, 1971). This covers the summer months and early fall (Table 4). The stables experience an average of 2,077 participant days while open. An average of 24.5 participant days occurred per weekend day. This when divided equals 3.44 days per mile of trail during the peak use months (Table 4).

A second type of trail use by horse renters is the pack trip. Pack trips are popular as they allow people access to the country for camping and hunting. These trips are offered mainly in the Western states and in parts of the Appalachians.

The first type is the "self-packer." An outfitter provides horses and riding gear. Experience in handling stock and packing is necessary. Cost is $10.00 - $15.00 per day per horse (Greer, 1973).

A second type is "drop" or "spot" packing. Hunters and fishermen use this type to get to isolated areas. Horses and gear are provided by the outfitter. The guide takes the party to a site and leaves them, returning in a week or ten days to guide the party back. Cost for the guide ranges from $35.00 - $40.00 per day; stock rents for $10.00 - $15.00 per day per horse (Greer, 1973).

Extended packing trips are a third type. The guide remains with the party for the entire trip. Food and cooking are provided by party members. Stock is cared for by the guide (Sunset, 1976).

A more elaborate form of the extended packing trip is the all-expense wilderness trip. Horses, gear, food, cook, and guide are

Table 3: Land Ownership of Riding Trails, Wisconsin Private Enterprise Only[a]

Type of Ownership ship Lands	No. Enterprises	Miles of Trails Total	Miles of Trails Per Enterprise	Miles of Trails Per All 21 Enterprises
All Types	21	149.5	-	7.11
Enterprise	19*	70.8	3.7	3.37
All Other	16	78.7	4.9	3.74
Private	7**	35.5	5.1	1.69
Public	12**	43.2	3.6	2.05
County	5	6.2	1.2	0.29
Township	3	8.0	2.7	0.38
State	3***	16.0	5.3	0.76
Federal	2**	13.0	6.5	0.62

* Two enterprises had no trails on their ownerships -- one used state lands only and the second used other private and township owned lands.

** Four enterprises had trails on both public and private lands, and are included in both columns but a total of only 16 enterprises are involved.

*** One enterprise used both state and federal lands.

[a] Table is from Cohee, Melville H. Private outdoor recreation businesses: Horseback riding enterprises. Department of Natural Resources, Madison, Wisconsin, 1971.

Table 4: Participant Days Trade and Horse Use In Wisconsin[a]

Features	Units
Days Open for Business*	152
Participant Days Per Enterprise*	2,077
Per Horse**	134
Per Day Open for Business	13
Participant Days Per Weekend Day	24.5
Per Horse	1.58
Per Mile of Trail	3.44
Trail Horses Per Enterprise**	15.5
Percent Equivalent Use of Horses**	79
In 90- to 100-day Summer Period	82
By Riders Under 12 Years Old	36

* Number of days are on an annual basis.

** Comparable data by size of horseback riding enterprises are shown on Table 7.

*** A weighted average including the months of June, July, and August.

[a] Table is from Cohee, Melville H. Private outdoor recreation businesses: Horseback riding enterprises. Department of Natural Resources, Madison, Wisconsin, 1971.

included in the cost. Rates begin at $45.00 per day and may be as high as $145.00. Some pack outfits even provide portable showers (Sunset, 1976).

Each type of overnight ride takes place in public parks. Packers maintain a base outside the park with trails from this land to the interior (Kewskin, 1977).

Horse Owners

Horse owners are people who own and house horses on their own land or in a nearby boarding stable. Because of this, the owner desires access to open, scenic areas near his home everyday and accomodations for his horse in vacation areas.

The horse owner engages in two types of recreation utilizing trails. These are trail events and overnight camping.

Trail events for horsemen are popular because any type of horse in good condition can be entered. There are two types of riding contests: endurance rides and competitive trail rides. Both events involve many miles of trails.

The endurance ride is a race of 50 to 60 miles in length. A course is marked with a maximum time for completion. For example, a course of 50 miles must be finished in 12 hours or the contestant is disqualified. Competitors are judged by completion time and the condition of their mounts after the race (Cardinet, 1971; Saare, 1977).

A maximum and minimum time is set for the competitive trail ride. The course is 30 to 40 miles in length and is clearly market. Riders are penalized if they finish before the minimum time. Horsemanship, the manner of horse's movement, and the horse's condition are judged (Cardinet, 1971; Saare, 1971).

Another form of recreation horse owners engage in is overnight camping. This is relatively the same as with the horse renter in most cases except instead of renting mounts, the owner uses his horse and equipment.

Horse owners require larger campsites so their mounts can be accommodated comfortably. Trails must be wider and more hardened than for hikers. (Sample areas that accommodate overnight camping with horses are covered in Chapter 6.)

A conflict occurs when access to trails on private lands and some public areas is not permitted because of heavy usage by horse renters or other trail user groups. The greatest conflict occurs between types of trail users (Hammet, May 1971).

Chapter 3

Planning

Planning is a complex procedure involving many people. It involves defining a need, obtaining authorization, forming committees and subcommittees, preparing maps, conducting research, and holding public hearings (Vogel, 1968). The final plan must then be adopted by the governing body.

Defining A Need

The first step of any planning process is to define a need through observation or more commonly, by public demand. In Santa Barbara, California, master trail plans were proposed in 1954. Trail sections were gradually closed to the public through land development, changes in ownership, and loss of license to cross private lands. In 1966, the public came to the realization that many sections of trails were closed to them (Hammet, 1977). The Parks and Recreation Commission needed to work with them to reinstitute the county trails system.

Interested organizations such as the American Forest Association Trailriders, State Horsemen's Association, and the Pacific Northwest Endurance Riders gathered public input to define the need in Santa Barbara, California (Hollander, 1977; American Forests, 1967). The Parks and Recreation Commission with these groups decided what needed to be done with the existing facilities and where expansion was needed.

Once authorization was obtained, one department was assigned the responsibility of formulating the plan. A second department, with familiarity with the available resources was appointed as advisor, in this state.

Forming Committees and Subcommittees

The Trails Committee members are selected by the county or the Parks and Recreation Commission. Members are chosen from a wide spectrum of the public. Some possibilities are Scout groups, Sierra Club, Audubon Society, State Horsemen's Associations, Wildlife Federation, Four-H-Clubs, Soil Conservation, and club members of each trail user discipline. This diversity will insure every interested group has a part in planning.

Subcommittees are formed from the members of the Trails Committee Suggested categories of committees are mapping, research, publicity and public relations, liaison, and trails rules (Vogel, 1968).

Conducting Research

The Research Committee is responsible for supplying information on available resources, existing and proposed trails, and legal concerns such as land ownership. The results of the research are used throughout the planning process by each committee.

Probably the most critical information the research committee supplies is the list of existing and proposed trails (Vogel, 1968). Existing trails are evaluated for location, condition, accessibility to the public, points of interest, and topography. Nearness to sensitive

regions such as bird sanctuaries or wilderness areas should be noted for each existing trail. If trail usage is having an adverse impact such as erosion, excessive loss of vegetation, or disturbance of nesting sites, that portion of the trail must be blocked and rerouted. Proposed trails are added to the trail system as detours, links, and routes to points of interest. Wagon and logging trails are suggested for new trails (Vogel, 1968). The list and location of existing and proposed trails is given to the Mapping Committee.

Land ownership is catalogued by township, section, and range. Owners whose land may be crossed by a trail are recorded for the Liaison Committee.

Aerial maps, air photos, land surveys, archives, and federal, state, and local records are the sources of information for the Research Committee.

Preparing Maps

Map preparation involves drawing a graphic representation of existing trails and the location for proposed trails. An expert cartographer team should be hired for this purpose. The final map must have a standard legend so it may be easily interpreted.

The base map is drawn first. It depicts existing trails, developed areas, and the topography. This map is transferred to a set of transparencies. Next, critical points such as wetlands, steep terrain, and nesting areas are highlighted. A preliminary map of proposed trails is then drawn. Porposed trails link existing trails, provide access to new points of interest or provide control points. Overlays are

prepared depicting critical areas and proposed trails. These are placed over the basemap.

Enlarged district maps are made from the final preliminary map. Experienced personnel take the district maps to aid on-site evaluation of existing and proposed trails in their respective area (Vogel, 1968). The preliminary map is presented at public hearings and planning meetings. The final map is drawn once present and proposed trails are approved by the governing body.

Liaison

The legal aspects of forming the trails system are the concern of the Trails Committee.

One priority is to obtain rights-of-ways for new trails that cross private land. Some methods are by direct purchase, easements, lease, or license. Direct purchase involves a transfer of title for an amount of money. The easement is a change in the deed allowing passage across land in exchange for agreements such as allowing only one type of trail use, and fencing the trail from other land. Renting land is termed a lease. A license is a permit to cross the land (Platt, 1972). A direct purchase involves an exchange of title.

Liability is of concern to private landowners. Laws vary in each state. In most states, the owner must correct or warn of any hazards on the land (Platt, 1972). Three kinds of liability laws are: statutory immunity, individual waiver, and insurance. Statutory immunity states that the owner is not liable for accidents or injuries on his land if it is not an incorporated area. An individual waiver is

signed by each trail user to release the owner from liability. Waivers are not legal if minors use the trail (Platt, 1972). Insurance coverage through payment of a premium is too costly a method of protection.

Conferences with federal and state departments in charge of parks, recreation, and trails and with adjacent counties are also conducted by the liaison committee. When one county establishes a public trails system, that often is the start of a state-wide trails system.

Publicity and Public Relations

The Publicity and Public Relations Committee is in charge of public hearings. Informal hearings are held to organized the Trails Committee, to review the base and preliminary maps and text, and to decide on the administrative organization (Vogel, 1968) (Table 5). Formal hearings are for discussion of the official trails map, the text of reports, and ordinances.

Formal hearings are attended by others outside the committee. They are organized with a presentation of the subject at the start of the hearing and followed by a question and answer period. Informal hearings are meetings of the Trails Committee and the subcommittees. The public does not normally attend.

Trails Rules

Setting standards for design, construction, and maintenance is the responsibility of the Trails Rules Committee. Minimum trail tread, maximum grade, clearing practices, trail widths, signs, and structures are decided.

Table 5: Preparation Phase Hearing for a Master Trail Plan

No.	Subject and Purpose	Group/ Type Hearing
1.	Organization Meeting and assignment of work loads, basic discussion re: Base Map, Objectives, Substance and Procedures of Plan, Appoint Sub-Committees.	S TC PCR INF R-P
2.	(a) Map	
	1. Review and approve Base Map	S
	2. Discuss and determine general trail routes, terminii, laterals, control points, areas to be served.	TC PCR
	3. Report of Map Sub-Committees	R-P
	(b) Text	
	1. Report of Text Sub-Committee	S
	a. Research	TC
	b. Standards and Specifications	PCR
	c. Framework of Ordinance	INF
	d. Substance and Procedure	R-P
3.	(a) Map	
	1. Present, review, and approve Preliminary Map and Working Map Only	S TC
	2. Outline and define boundaries of Trail Districts	PCR
	3. Appoint Trail District Sub-Committee to prepare route feasibility study and condition report	PCD INF R-P
	4. Specially determine Secondary and Primary Lateral Trail Routes in Trail Districts	
	(b) Text	
	1. Report of Sub-Committee Readings, review and adoption of format and substance of reports	S TC
	a. Research	PCR
	b. Standards and Specifications	PCD
	c. Framework of Ordinances	INF
	d. Substance and Procedures	R-P
	2. Administrative Organizations	
	a. Chart	
	b. Personnel	

Table 6: Continued

No.	Subject and Purpose	Group/ Type Hearing
4.	(a) Preliminary Map	S
	1. District Trail Sub-Committee - receive, review and approve reports and Maps as parts of Preliminary Map	TC PCD PCM
	2. Instruct Staff to incorporate data from District Trail Maps and Reports as approved into Preliminary Maps - to become The Official Trail Map	P INF R-P & R-C
	(b) Text	
	1. Receive and approve final draft of Sub-Committee reports on:	S TC
	a. Research	PCD
	b. Standards and Specifications	PCM
	c. Ordinance	P
	d. Substance and Procedure	INF
	2. Approve Outline of Administrative Organization for Trail System	R-P & R-C
5.	(a) Official Trail Map	
	1. Exhibit, explain, and describe use and objectives by Staff and Committee	S TC
	2. Invite Public to be heard	PCD
	3. Close the hearing	PCR
	4. Approve and recommend to Planning Commisson of Governing Body for Formal Hearing and Adoption	P F R-C
	(b) Text of Reports and Ordinance	
	1. Reading of Reports on:	S
	a. Research	TC
	b. Standards and Specifications	PCD
	c. Ordinance as proposed	PCR
	d. Substance and Procedure	P
	e. Administrative Organization	F
	2. Invite Public to be heard	R-C
	3. Close the hearing	
	4. Approve and recommend to Planning Commission of Governing Body for adoption	

CLOSE HEARING

Table 5: Legend to Letters

Group

S - Staff
TC - Trails Committee
PCR - Planning Commission Representative
PCD - Planning Commission Director
PCM - Planning Commission Members as Observers
P - Public

Type of Hearing

INF - Informal
F - Formal
R-P - Results Progressive
R-C - Results Conclusive

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[a] Table is from Vogel, Charles. Trails Manual. Equestrian Trails, Hollywood, California, 1968.

Once the trail system is complete, this committee writes the rules for the users. Specific types are listed in Chapter 5.

Adoption

After the public hearings are closed and the subcommittees have finished reporting to the Trails Committee, the final trails plan is brought before the governing body for approval.

The governing body meets informally with either the County Planner, Director of Parks and Recreation, or the Trails Committee to make any last minute modifications of the Trail Plan. Public Hearings are held to present the final plan to the public through maps and slides depicting trails and users. Any modifications the public desires should be justified by the party who proposes them. This insures that unnecessary concessions are not made.

The final trail plan is brought before the governing body for adoption. Once the proposal is accepted, responsibility for the trail system is given to a department capable of completing the trails such as the Parks and Recreation Committee.

Chapter 4

Once the master trail plan is adopted, it needs to become a physical reality. A starting point should be defined with the aid of the data collected by the Trails Committee. Physical development, trail maintenance, budget, and public relations are supervised by an administrator and staff. Reconditioning and construction of each trail section are given priority according to general condition and critical points.

Funds

Funds are often limited during the first year until part of the fiscal budget is delegated to trails. There are other sources of funds. The Haywood Trails of California received a grant from the Department of Housing for their trails system and used the services of the Department of Natural and Economic Resources (Hammet, 1977). California obtained $4,000,000 from a state abandoned vehicle trust fund. Of this, $354,000 were specifically given to the Santa Barbara County Trails System (Obern, 1977). The Crater Trails System was constructed by volunteer groups and the 1249th Combat Engineer Battalion of the National Guard, a saving of $153,000 (Austermann, 1977).

The Administration should use the trails plan as a guide when delineating costs, amount of existing and expected use and possible expansion due to user demand. The most economic and efficient means of construction and maintenance is decided by the administrator and

his staff. A flexible planning process that allows new methods and reevaluation is essential to success.

Trail Classification

Trails should be classified according to type, use, purpose, and traffic volume. Three general types are:

1. The general purpose trail is used by the public and by administration for maintenance.

2. Administrative trails are to be used only by authorized personnel.

3. Special purpose trails are used for fire control, hikers, and as access to private or underdeveloped lands.

Use volume is established with the aid of a Traffic Index. This index is based on past use of existing trails which were surveyed by a competent trail personnel. The purpose and use of trails are found in the Area Type Index. Such items as archeological, geological, and historic sites; water-sheds; timber stands; parks, beaches, and scenic vistas are listed.

Crew Selection

The administrator, a member of the Parks and Recreation Commission selects crews, is the crew supervisor, and is trail inspector.

Funds are allocated well in advance of the beginning of construction to allow the district ranger sufficient time to hire crews and plan work programs. The crews should consist of skilled persons in good physical condition working under a competent foreman. The crew

receives training before and during the job to prevent costly errors and accidents. Work programs are outlined in detail by the district manager to eliminate confusion, costly errors, and delays. Such items as job duration, time of year, cost, crew size, integration with other workers, tools, and supplies are provided by the district ranger. Construction, trail maintenance, and trail betterment each are placed in a separate job category. Each crew foreman keeps an accurate log of trail conditions along with a log listing name, number, fiscal year, length of trail section, property status, right-of-way status, condition, design classification, use index, traffic index, and a responsibility index (See Figure 1) (Vogel, 1968).

Crew Surveys

The construction of new trails requires the completion of three surveys: reconnaissance, location, and right-of-way.

In the reconnaissance survey, U.S. Geological Survey sheets and plat maps are used to determine contours, control points, and property lines. Aerial photos, if available, can supplement the contour map. Control points are physical features such as passes, saddles, fords, ledge outcrops, and marshes. These are marked on the reconnaissance map. The grade connecting these points should be kept 9 percent, remain at a steady 8 percent for elevation gain with points 300 to 500 feet in length of 5 percent as resting points (Vogel, 1968). Steeper grades are not desirable because of possible erosion and costly maintenance. If steeper grades must occur, the trail tread must be firm and its condition should be carefully noted. New trails are located to provide

Figure 1: Administrative Trail Log Sheet Example

ADMINISTRATIVE TRAIL LOG — Fiscal Year: ____________

Trail Name: ______________________ District No. ____________ Trail No.: ____________

minii Begin: ____ Length: ____________

End: ____ Date: ____________

e	Sta.	Property Status	Right of Way Status	Right of Way Condition	Design Classification	Use Index	Traffic Index	Area Type Index	Responsibility Index	Remarks

access to camp sites, historic sites, hunting and fishing. They bypass points of interest to prevent the impact of heavy through traffic. A spur trail provides access.

Once the reconnaissance is complete, a location survey is made by a two or three man crew using a map, abney level, altimeter, compass, camera, pedomater, tape, slope rule, hand axe, and flagging. A careful record is kept by the location crew.

The location crew sets out the centerline stakes. The trail centerline is described in detail by courses, distances, accurate field trips to property corners, and section lines. Each stake must be visible from the preceding stake. Slope stakes are placed on all trail portions requiring a plow or grader (Vogel, 1968). Graders must not exceed the percent slope on which tread gullying can be prevented by construction methods. The prevention of gullying depends on the amount of use, season of use, types of use, and soils. Level trails can have more than one use.

Right-of-way survey is concerned with obtaining permission to cross over private land. Accurate records of the right-of-way and instruments used to obtain permission are filed with the Public Surveys and Recreations Commission. Fifteen feet is the recommended minimum trail width on private land.

Clearing

Clearing starts after the trail centerline is staked. Width and height of the trail depends on its type and use. All purpose trails should be cleared of tree limbs, snags and brush so the clearance is

at least ten feet high and eight feet wide (Figure 2) (Vogel, 1968).

As many trees as possible are preserved to maintain the scenery along the trail. Wide, cleared areas are provided at look-out points, turnouts, and rest points to accommodate large groups.

Administrative trails used for maintenance purposes are indicated on work crew maps only. Special purpose trails are cleared according to use. Examples are narrower trails for hikers or wider trails for off-road vehicle drivers (Vogel, 1968).

Trail Tread

All cleared wood is saved for construction of trail treads, berms, water-breaks, and corduroys.

The trail treads should remain in natural sod and vegetation to prevent erosion. On hillsides, a shelf is constructed by clearing, building the trail up, and recovering with plant litter to prevent erosion. Figure 3 gives the advised practices when locating trails along slopes and the placement of log berms. Grading may be done by hand, tractor, or mechanical graders. The upper limits of the slope is marked and the tread worked downward to the proper elevation.

Drainage

Drainage is essential to prevent the trail tread from eroding into a gully. Some methods are water-breaks, grade dips, and outsloping. water-breaks are stones or logs anchored firmly at 20^{o} to 30^{o} from the normal tread angle to channel water runoff. Below the water bar,

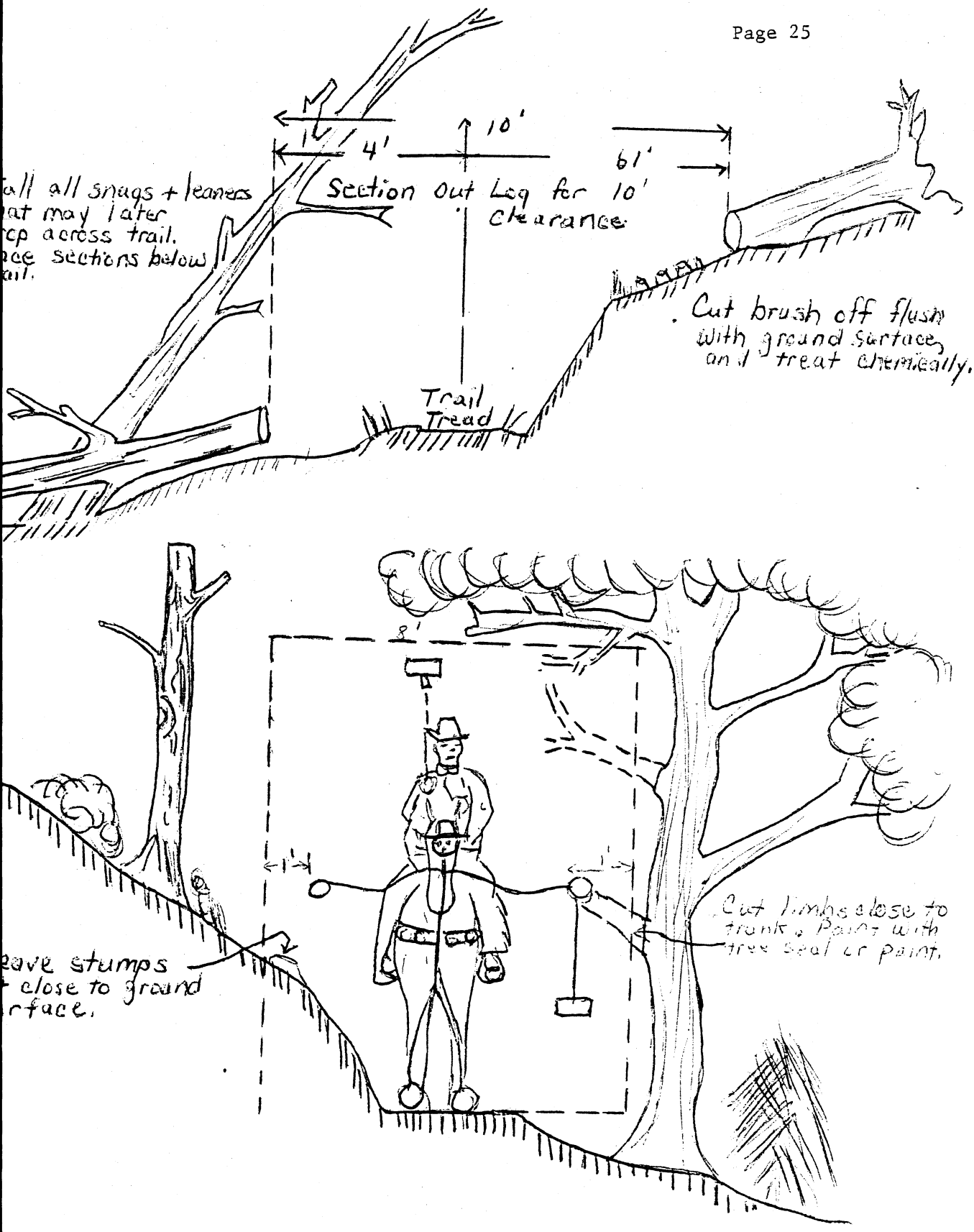
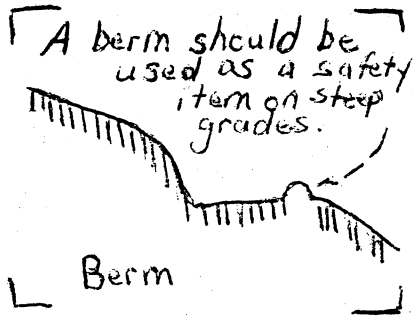
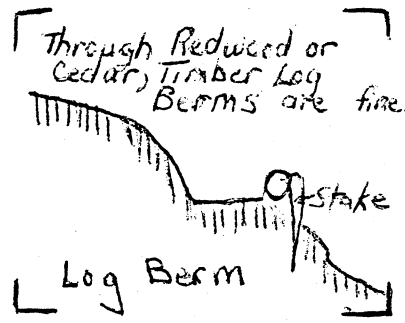
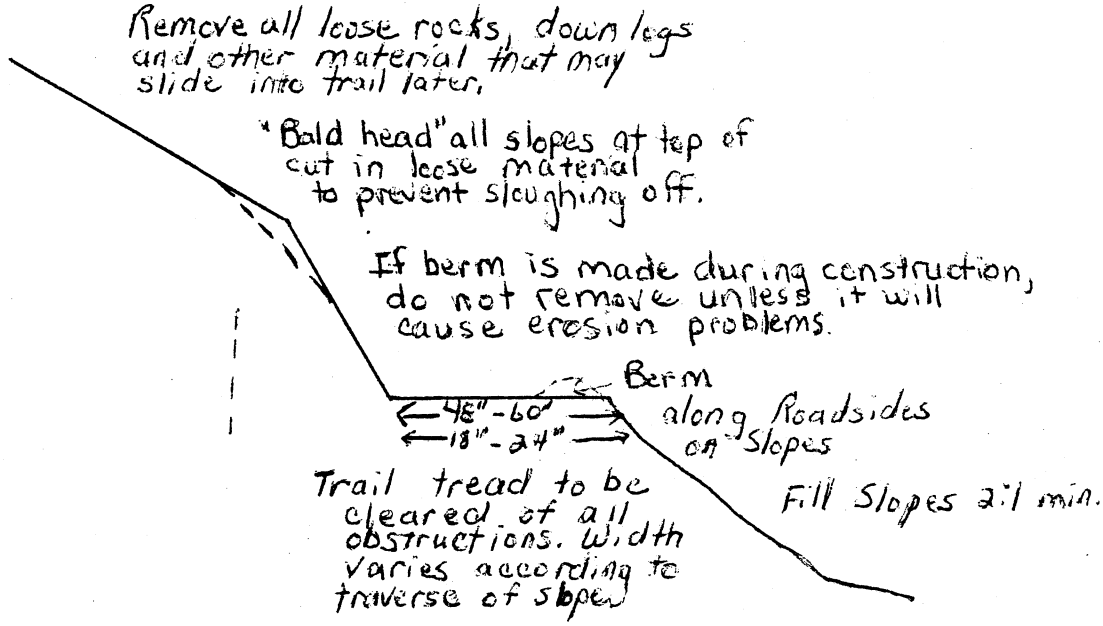
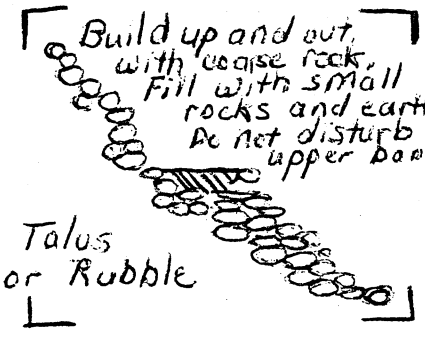


Figure 2: Trail Clearing Practices as illustrated in Vogel, Charles, Trail Manual, Hollywood Trails, California, 1968, p. 40.









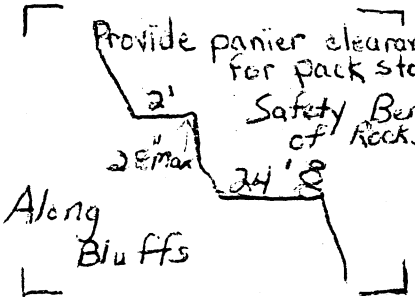


Figure 3: Trail Sections on Slopes, as illustrated by Vogel Charles, Trail Manual, Hollywood Trails, California, 1968, p. 47.

the tread shoud be flush with the top of the log or stone. Grade dips are five to eight foot trail sections below the prevailing grade line forming an adverse grade line allowing water to flow across, not down, the trail. Outsloping is the recommended method. Ditches are located above the tread leading to a water outlet. Subsurface points should be avoided or diverted to watering points (Vogel, 1968).

Trail Structures

While constructing the trail, the crew must consider if surfacing and/or structures are required. Both are expensive. Surfacing is used when the natural trail tread is not sound enough for heavy traffic. Some types are woodchips, gravel, corduroys, and puncheons.

Before being built, structures must be authorized by the Director of the Parks and Recreation Commission, County Planner, Reconnaissance Chief, Locator Chief, Design Engineer, and Construction Supervisor (Vogel, 1968). Structures should be kept to a minimum.

Structures include shelters, bridges, fences, fords, ferries, and bulkheads. Shelters are used for storage and protection of crews and equipment. The buildings should be vandal-proff. Fences and gates are built if they are required by property owners. Bridges are built where fords are not possible and can provide a separate crossing for horses and hikers along highways.

Fords are filled for better footing but should not impede stream flow. Ferries are utilized at wide rivers whose fact velocity does not allow a safe ford. Bulkheads prevent landslides above or below the trail tread (Vogel, 1968).

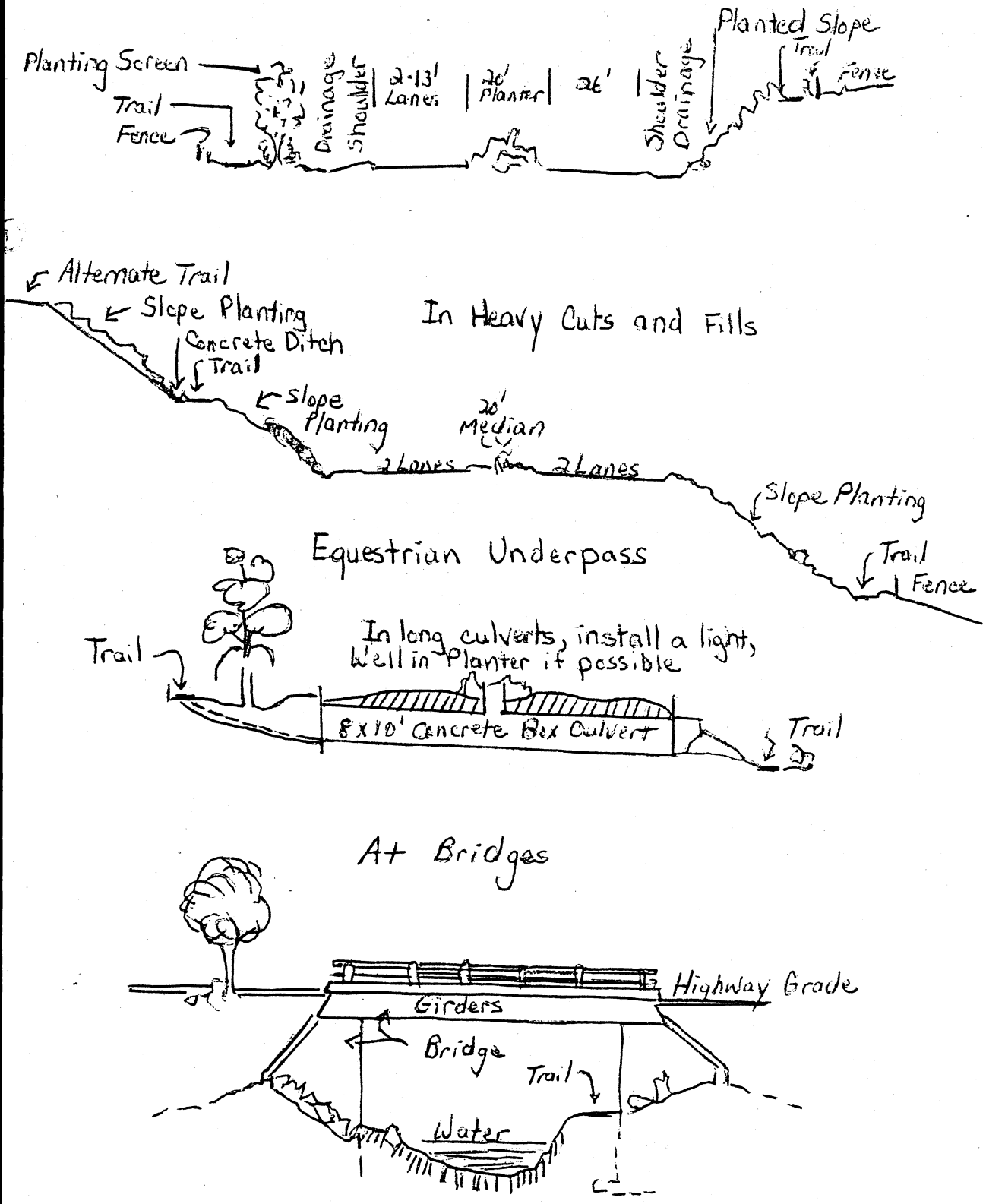


Figure 5: Trail Sections Along Roads, taken from Charles Vogel, 1968, p. 48.

Reports

Reports on progress, expense, time, materials, crew accidents, and meals are kept on the proper forms by the crews. A final inspection is required at each construction site. Any changes in location, type and extent of construction should be listed on the report.

Chapter 5

Maintenance is the work involved in keeping each trail, its facilities, and structures in a condition as near as possible as its state after construction or renovation (Vogel, 1968). Maintenance keeps trails safe for use. Maintenance crews are similar to construction crews because both work in the field on trails, but are separate from them.

Crews are organized by the chief ranger, or by the Director of Parks and Recreation. The district ranger is crew supervisor. Maintenance is the responsibility of the district or county. Responsibility for maintenance may cross district lines until crews are formed in each district.

Condition reports should be frequent enough to form a maintenance schedule for the fiscal year. Reports can be supplemented by user observations of deficiencies. The district or chief ranger will prepare a report on an appropriate form. A graph relating completed work to plans should be kept on a monthly basis.

There are various types of maintenance: removal of windfalls and leaning trees is the most common park of construction (Tillis, 1977). Any shrub obstructions are removed and the stumps treated to prevent resprouting. Surfacing and trail tread must be checked and repaired especially where erosion has occurred. Checking structures is the job of a specialized construction crew (Vogel, 1968). Bridges can be

built to cover the ruts on worn trails. Trail makers or "blazes" should be remarked if not visible (Tillis, 1977).

Prevention of Misuse

Educating the public to the offerings of the trails and proper use eliminates the costs of repairing vandalism, cleaning up litter, and rescuing stranded parties. The following are safety hints by experienced horsemen (Vogel, 1968):

1. Private stock should not be used on extended pack trails unless conditioned properly;
2. File itinerary with local ranger, in case of accident;
3. Use equipment of good quality and condition;
4. Keep uniform speed with the party according to conditions;
5. Wear proper riding clothing for the weather;
6. Lead horses in traffic;
7. Ride horses that suits your riding ability;
8. Condition yourself for long periods of riding;
9. Know laws governing grazing; you may need to confine your horses;
10. Keep campfires in designated areas;
11. Leave the site in better shape than you found it by padding ropes tied to trees, burying manure, burning paper, packing out glass and metal, and spreading leaves over trampled areas.

Chapter 6

There are horse trails throughout the United States. Many are located in and around metropolitan areas. Others lead into wilderness, state, and national parks and forests. Some follow roads and cross city streets. This chapter gives examples of trail systems which used some of the planning and management methods outlined in this study.

Santa Barbara County, California

In 1954, Santa Barbara County passed the County Master Plan of Riding and Hiking Trails. Only one trail was completed due to lack of public interest (Obern, 1977). The first trails were opposed by the Cattlemen's Association and Farm Bureau because they crossed grazing land.

County trails became a requisite part of recreational planning by state law in 1974. The state set aside $4,000,000 from the Abandoned Vehicle Trust Fund for county trails. Santa Barbara obtained $354,000 for this fund to begin constructing its trails system (Obern, 1977). First, each county had to write and adopt a trails plan in order to obtain funds.

The Trails Council planned that trails would provide public access to county parks in heavily populated areas. Easements were acquired for triple use (bikers, hikers, and horsemen) along dry creek beds (Obern, 1977). This plan was approved since it followed the goals of the overall state trails plan.

Further route selection was based on expected public demand, connections to existing trails, environmental quality, cooperation with city and federal agencies, and early implementation potential (Obern, 1977). Once approved, easements or condemnation were taken to obtain right-of-way across private lands. These efforts were aided by the 1976 California Civil Code which exempts property owners from liability if trails cross their property (Obern, 1977). Expansion is continuing in this state.

Maricopa County, Arizona

Maricopa County is noted for its metropolitan trails system which connects the suburbs to citrus groves, old estates, industries, and to the beauty of the desert (Sunset, October, 1977).

The county planned the trails system. It was implemented by volunteers. The system was to preserve open space and to provide public access to areas of interest. Negotiations cut costs since they permitted dirt roads along canals and dry flood control channels to be used (Sunset, October, 1977). Any trails that were constructed were kept simple and cheap.

Volunteers rode horses along new routes to trample a path. Rocks and brush were then cleared to the desired width. The paved bikeway along canals cost $300,000. Trail markers and water sports cost an additional $130,000 (Sunset, October, 1977).

The complete trails system will cover 720 miles. At present, 300 miles are complete and open to public use.

Newberry Crater Trails System, Oregon

The problem of conflicting trails use was addressed in Oregon by Rexford A. Resler, at the time, Associated Chief, U.S. Forest Service. He said trails could accommodate hikers, snowmobilers, ski tourers, and horsemen. His ideas and those of District Ranger Vern Pritchard were the basis for the Newberry Crater Trails System (Austermann, 1977).

Vern Pritchard and the Oregon Equestrian Trails Council consolidated the efforts of volunteer groups in 1970 to plan a trails system for summer use by horses and winter use by snowmobilers. Equipment, facilities, time, and money were donated by groups and individuals to construct the trails and campsites. Only $12,000 was needed in federal funds (Austermann, 1977).

The Newberry Crater Trails are now open to the public. There are sites for 13 riding groups of various sizes, from single users, to parties, to families. Since the trails are in lowland country it is hoped that horsemen will use this area and hikers will use the steeper mountain trails.

New Jersey

Horses are big business in New Jersey. Breeding farms provide jobs and are a major source of state income. Horse farms act as a means of preserving open space, since much land is needed for pastures (Alampi, 1970).

To cope with a rising horse population and demand for horse trails, the Equine Advisory Board was formed. Members were taken

from the 10,000 New Jersey residents who own, breed, or are otherwise involved with horses (Alampi, 1970). The board headed a campaign for a state wide trails system with the cooperation of the Department of Conservation and Economic Development, Division of Highways. Department of Transportation, and the Public Utilities Commission (Almandi, 1970). In addition, 552 miles of trails were located on unimproved roads and through state parks and forests.

Wisconsin

Although private horse enterprises account for most of the horse trails in Wisconsin, public trails are officially listed in four state owned areas in the southern part of the state. These are the Northern Unit of the Kettle Moraine State Forest, the Southern Unit of the Kettle Moraine State Forest, Governor Dodge State Forest, and Wildcat Mountain State Forest (Visitors Guide, 1977).

The Kettle Moraine State Forest units receive the highest number of trail users throughout the year. Both units provide over 30 miles of trails for horseback riding in summer and snowmobilers in winter. A horse corral is available for $2.25 a night. It is separate from the campsites for sanitary reasons (Adams, 1977).

No management plan exists for Wisconsin horse trails. If a trail tread needs reconstruction, it is accomplished by filling any section needing it with finely crushed rock. Daily maintenance includes mowing of grass, brush, and tree removal (Adams, 1977).

There are a total of 1,475.4 kilometers of horse trails in Wisconsin (Table 6). According to the 1977 Wisconsin Outdoor

Table 6: Wisconsin Horseback Riding Trails: Length in Kilometers by Ownership, 1975

Region / Ownership	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	State Total	% of Total
Public																	
Federal												9.7				9.7	1
State	30.6	16.1	36.2	19.3	-	-	22.5	33.0	-	-	-	-	16.1	19.3	-	193.1	13
County	40.2	-	1.6	6.4	-	22.5	3.3	-	-	-	140.0	-	32.2	NA[a]	-	246.2	17
Municipal	-	1.6	-	-	4.8	-	4.8	-	-	9.7	16.1	-	-	-	6.4	43.4	3
Subtotal	70.8	17.7	37.8	25.7	4.8	22.5	30.6	33.0	-	9.7	156.1	9.7	48.3	19.3	6.4	494.2	34
Private	25.7	177.0	29.0	27.0	83.7	178.6	4.8	NA	107.8	91.7	NA	27.3	NA	149.6	70.8	983.0	66
Total	96.5	194.7	66.8	62.7	88.5	201.1	35.4	33.0	107.8	101.4	156.1	37.0	48.3	168.9	77.2	1475.4	100

[a] NA is not ascertained.

[b] Table from Wisconsin Outdoor Recreation Plan, 1977.

Recreation Plan, 492.4 kilometers are on public land. An increase in demand for horse trails is projected (Wisconsin Outdoor Recreation Plan, 1977) (Tables 7 and 8).

Table 7: Horseback Riding Trail Needs in Kilometers by Year, Wisconsin[a]

Region / Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	State Total
1975	210	10	40	-	-	-	40	50	-	-	-	-	20	-	-	370
1980	220	20	40	-	-	-	50	60	-	-	-	-	30	-	-	420
1985	240	30	50	10	-	-	50	60	-	-	-	-	40	-	-	480
1995	280	40	60	10	20	-	60	80	-	-	-	-	50	-	-	60

[A] Table from Wisconsin Outdoor Recreation Plan, 1977.

Table 8: Horseback Riding: Number of Recreation Occasions Per Average Seasonal Weekend Day, Wisconsin Residents Only[a]

Region	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	State
1975	8,800	5,800	3,100	1,900	2,300	600	2,300	2,500	700	1,100	2,000	600	2,100	1,200	500	35,500
Percent	25	16	9	5	6	2	6	7	2	3	6	2	6	3	1	
1980	9,200	6,100	3,200	1,900	2,500	700	2,400	2,600	800	1,200	2,000	600	2,200	1,300	500	37,200
1985	9,700	6,400	3,400	2,000	2,700	700	2,500	2,800	800	1,300	2,100	600	2,400	1,400	500	39,300
1995	10,800	6,900	3,600	2,100	3,100	800	2,700	3,200	900	1,500	2,300	700	2,900	1,500	500	43,500

[a] Table from Wisconsin Outdoor Recreation Plan, 1977.

Chapter 7

The planning, construction, and maintenance of trails is becoming more essential as the number of trail users continues to increase each year. Trails, particularly in metropolitan areas where population is heaviest, provide a means of preserving open space and providing access to this open space. The average trail system consists of 25 miles of hiking, 25 miles of bicycling, and 5 miles of horse trails (Bureau of Outdoor Recreation, 1966).

Need should be determined by interest groups. In some cases, horsemen's associations were the instigators of planning. However, any trail user group can organize to plan and implement a trail system. It is best to include as wide an interest base as possible when organizing a trail planning committee.

Formal and informal hearings are one means of publicizing the trail plan and gaining the general public's input. The trail committee can obtain different viewpoints both for and against their findings.

Once the plan is implemented, care in construction and capable crews under responsible leadership will lessen future costs. A maintenance schedule should be maintained from current condition reports (Figure 7). Cooperation between user and authority will result in not only proper use and behavior but supplementary information on trail conditions.

Although horse trails are on minor importance in Wisconsin, they are used heavily where they are located. Private horse enterprises account for two-thirds of the horse riders in Wisconsin, the other one-third are private horse owners (Cohee, 1971).

A good planning and management program would allow the predicted heavier use. Proper location on suitable soils and slopes will decrease erosion problems (Vogel, 1968). If trail construction and rehabilitation are done properly, trails can withstand heavier use. Periodic maintenance will keep the trails in working condition. Different types of use can be made of the same trails. This is important in the metropolitan areas where trails are one means of preserving open space, providing a place for trail users, and giving the public access to the outdoors.

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