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"Efficiency - Equity - Clarity"

Managing Personal Mobility Devices (PMDs) On Nonmotorized Facilities

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Abstract

This paper explores the appropriate way to manage the diverse range of transport modes on nonmotorized facilities, particularly *Personal Mobility Devices* (PMDs) and *Electric Personal Assistive Mobility Devices* (EPAMD) such as the Segway Human Transport. PMDs are becoming increasingly common, resulting in new conflicts and opportunities. This paper examine the broader context of these issues, includes results of a recent survey of the legal status of EPAMDs, and develops general principles and guidelines for managing PMD use on nonmotorized facilities.

For additional information see "Managing Nonmotorized Facilities," *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm), 2004.

Introduction

In theory, managing transportation facilities is simple. Wheeled vehicles should use roadway and pedestrian should use nonmotorized facilities, including walkways, sidewalks and paths. But in practices these categories don't always work. An increasing variety of wheeled *Personal Mobility Devices* (PMDs) such as wheelchairs, skates and skateboards may use both roads and non-motorized facilities. Recently, several new types of *Electric Personal Assistive Mobility Devices* (EPAMD) have entered the market, such as those illustrated in Figure 1. These are technically innovative, energy efficient and attractive to many people. Proponents have lobbied to allow their use on sidewalks and other nonmotorized facilities. This has generated considerable debate.

Figure 1 **Electric Personal Assistive Mobility Devices**

Seated Electric Scooter **Standing Electric Scooter** **Segway Human Transporter**

Sidewalks and paths, by law or custom, accommodate various types of wheeled devices, including wheelchairs, skates and often bicycles. It can be difficult to determine exactly which devices should be allowed or prohibited since some mobility devices have features of both pedestrians and vehicles. For example, there are numerous incremental steps from a pedestrian with a cane, to a pedestrian with a walker ("rollator"), to a human powered wheelchair, to an electric powered wheelchair, to an electric scooter, to an electric cart, to a gasoline-powered cart, to a small car.

PMDs provide can provide a variety of economic, social and environmental benefits, but they also create new problems, including congestion and risks to other nonmotorized facility users. They raise questions about which use should have priority.[1] It is therefore increasingly important to define the role of PMDs and the rules they must follow. This paper explores various planning issues presented by PMDs. It investigates the role that PMDs play in the transport system, and their performance and design features. It identifies general principles that planning professionals can use when developing specific policies, management practices and guidelines concerning the use of PMDs on public facilities intended primarily for pedestrians.

Defining PMDs and Pedestrian Facilities

A *Personal Mobility Device* (PMD) is any relatively small, wheeled device that provides personal mobility and can operate on nonmotorized facilities. PMDs include skates, skateboards, wheelchairs, powered scooters, and Segway-type scooters. For the purposes of this paper, PMDs also include bicycles, although many jurisdictions define them as vehicles and prohibit their operation on sidewalks. *Nonmotorized facilities* include hallways, store aisles, walkways, courtyards, sidewalks, bicycle and multi-use paths, trails, and pedestrian streets. There are many types of potential nonmotorized facility users, including some that can be considered "pedestrians" and some that are considered PMDs, as summarized in Table 1.

Table 1 **Nonmotorized Facility Users**

Pedestrians	Personal Mobility Devices
Human	*Human-powered:*
People standing (viewing, talking, etc.)	Hand-powered wheelchairs
Sitting on benches and sidewalk café tables	Skaters and roller blades
Individuals walking (transportation or recreation)	Skateboards
Groups walking	Push scooters
People playing games	Bicycles
People using mobility aides ("walkers" and "rollators")	Bicycles with trailers
Pedestrians with strollers	Pogo sticks
Joggers	
	Motorized:
Multi-Species	Electric powered bikes
Pedestrians with pets	Motorized wheelchairs
Equestrians	Electric powered scooters
	Gasoline powered scooters
Other Sidewalk Activities	Segway-type scooters
Sidewalk vendors	
Panhandling	

This table shows various types of nonmotorized facility users.

These various users can be categorized in many different ways. For some types of analysis they type of user or trip is important. For example, for equity and social analysis, trips that provide basic mobility or substitutes for automobile travel provide more benefit than purely recreational use. Similarly, from a physical function perspective, people sitting on a bench or at a sidewalk café table are similar, but from an economic development perspective they are very different, since people sitting at a sidewalk café directly contribute to local employment and tax revenues.

In the past PMDs had relatively few conflicts with other nonmotorized facility users primarily because they were rather uncommon and slow. But PMDs are increasingly diverse, numerous, faster, more agile and more powerful. Many can travel significantly faster than normal pedestrian flow. An increasing portion have mechanical propulsion (electric or gas). Design standards to accommodate wheelchair use, such as the Americans with Disabilities Act (ADA), have resulted in nonmotorized facilities that better accommodate PMDs, and allow them to obtain higher speeds. PMDs are becoming an increasingly large portion of nonmotorized facility traffic in many areas. For example, some large retailers now offer customers the use of electric powered scooters with shopping baskets, and some people commute by skateboard or scooter. Los Angeles area transit planners estimates that 0.2% of daily users, more than 1,000 riders, access transit by PMDs such as skateboards, scooters and roller blades (not including wheelchair users).

As a result, the number and complexity of conflicts between different types of nonmotorized facility users is also growing. The recent introduction of the Segway, and lobbying by its manufacturer to allow its use on sidewalks, has raised concerns by many nonmotorized facility users, and objections from some pedestrian advocacy groups. Pedestrian advocates have worked hard to gain professional respect and political support for walking improvements, and many are concerned that PMDs such as Segways may crowd out or endanger pedestrians.

Transport Planning Principles

Below are some basic principles that can be used to help determine the role and management practices for a particular PMD in a particular facility.

Social Value

One principle used to prioritize the use of public facilities is the relative value that an activity provides to society. By this principle, facility management should give higher value activities priority over lower value activities. In general, transportation that provides "basic mobility" (access to essential services such as health care, basic shopping, employment and education, and a certain amount of social activities, particularly if users are physically, economically or socially disadvantaged, and have few viable transport alternatives) is considered to have higher social value than discretionary and purely recreational travel.[2]

PMD's range from those that clearly provide basic mobility, such as wheelchairs and electric scooters, to those mainly used for recreation, such as skateboards and pogo sticks. Many PMDs serve both transport and recreation functions, so it may be important to consider the *use* and *user* as well as the device when evaluating their value to society. For example, Segway use by a person with disabilities may provide high value to society, and so would be allowed on a particular nonmotorized facility, but the same device used by physically able people for recreation or sport may provide less value, and so could be legitimately prohibited in the same situation. Similarly, society may place a high value on bicycle commuting, particularly when users have few alternatives (providing basic mobility) or it substitutes for automobile travel (and so reduces problems such as traffic congestion, parking costs and pollution emissions), and a lower value on purely recreational cycling.

This may require that PMD users be licensed, based on some definition of need, such as being physically disabled. Some users may be offended that they must prove that they are sufficiently disabled to be allowed a license to use a PMD on a particular facility. However, this is no different from the requirements for use of special parking spaces.

Personal Mobility Devices tend to be faster and require less effort than walking. In many situations they allow non-drivers to travel several times farther than is possible with just walking. PMDs can therefore increase transport system efficiency by providing mobility to non-drivers and substituting for automobile travel.[3] This suggests that it is appropriate to accommodate PMDs as much as possible, as with other travel modes. For example, there is no obvious reason that society should spend less to allow somebody to access transit by skating or Segway than would be spent on a park & ride facility.

External Costs (Negative Impacts On Other Facility Users)

Another principle for managing public facilities is that users should not impose undue negative impacts on others. By this principle, activities that impose lower external costs should have priority over those with smaller external costs.

When PMDs substitute for automobile travel they tend to reduce many external costs, such as roadway traffic congestion, road and parking facility costs, accident risk imposed on others, and pollution emissions. But shifts from nonmotorized travel (walking and cycling) to motorized PMDs (scooters and powered bicycles) may increase some external costs, such as sidewalk congestion, and reduce users' physical activity and fitness. PMD's tend to require more space than pedestrians, in part because they are physically larger, and in part because they are faster and so require more "shy distance" between other facility users. PMDs also tend to be heavier and harder (most have a hard metal or plastic frame) than pedestrians, and so impose injury risk to others. A crash between a scooter and a pedestrian is more likely to cause injury than a crash between two pedestrians, and in such a collision, the pedestrian is most likely to be injured.

Summary

Table 2 summarizes a subjective attempt to compare some of the key features of various nonmotorized facility users. Of course, actual social values and external impacts will vary depending on specific circumstances. For example, cycling for transportation by people who have no alternatives has higher social value than purely recreational cycling, and a cautious, low speed cyclist imposes less congestion and risk than one who takes risks and rides fast. As a result, it may be useful to disaggregate these into subcategories for more detailed analysis. For example, it may sometimes be appropriate to have separate categories for commuter and recreational cycling, or children and adult scooter users.

Table 2 **Nonmotorized Facility Users Compared**

User Type	Social Value	Speed Range	Congestion Impacts	Risk to Others
People standing	High-Medium	0	Minimal	None
People sitting, on benches & cafes	Medium	0	Minimal	None
Vendors with cars and wagons	Medium	0	Medium to large	Low
Individual walkers	High	2-5 mph	Minimal	Low
Walkers in groups	High	2-4 mph	Medium	Low
Walkers with children	High	1-3 mph	Medium	Low
Children playing	Medium	2-4 mph	Medium	Medium
Walkers with pets	Medium	2-4 mph	Medium to large	Low
Human powered wheelchairs	Very High	2-4 mph	Medium	Low
Motor powered wheelchairs	Very High	3-6 mph	Medium	Medium to high
Joggers and runners	Medium	5-12 mph	Medium	Medium
Skates, skateboards and push-scooters	Low	5-12 mph	Medium	Medium
Powered scooters and Segways	Medium	5-15 mph	Medium	Medium
Human powered bicycle	Medium	5-15 mph	Medium to large	Medium to high
Motorized bicycle	Low	5-15 mph	Large	High
Equestrians	Low	5-10 mph	Large	Medium to high
People with hand carts and wagons	Medium	1-3 mph	Medium to large	Low to medium

This table compares various nonmotorized facility users. Social value reflects the degree to which it provides basic mobility or other external benefits. Congestion impacts reflect size and travel speed. Risk to others reflects ease of control, size, speed, mass and hardness.

Evaluation

The principles described above can justify both opposition and support of PMD use on nonmotorized facilities. Opponents can point out that most PMDs are primarily used for recreation rather than transport, and people who commute by a PMD usually have other travel options, such as walking, cycling on roadways, public transit, or driving. PMDs generally impose more congestion costs and risks than other nonmotorized facility users. Increased PMD use on nonmotorized facilities will almost certainly cause some conflicts and crashes.

Supporters could point out that PMDs are faster and more convenient than walking, and so provide transportation benefits. They generally require only a little more space than walkers, and far less than automobiles. Nonmotorized facilities are usually uncongested and can accommodate pedestrians and PMDs with minimal conflict. PMDs can substitute for driving and support public transit use. By substituting for automobile travel, increases in congestion and risks on nonmotorized facilities may be offset by reduced roadway congestion and risks. Increased PMD travel may increase public support for nonmotorized facility improvements, and more emphasis on alternative modes in transportation planning and traffic management.

Table 3 **Fatalities per 100 Million Passengers in Britain[4]**

	Per Km	Per Trip	Per Hour
Motorbike	9.7	100	300
Foot	*5.3*	*5.1*	*20*
Pedalcycle	*4.3*	*12*	*60*
Car	0.4	4.5	15
Bus	0.04	0.3	0.1

Relative crash risk depends on the unit of measure. Faster modes rank low in crash rates per unit of distance, but not so low when measured by trips or hour of travel.

It is difficult to predict the overall safety impacts of increased PMD travel.[5] Nonmotorized modes tend to have relatively high per-mile crash rates, indicated in Table 3, and PMDs probably have similar or higher crash rates. However, such figures do not indicate total risk because:

- Nonmotorized trips tend to be shorter than motorized trips, and so can reduce total person-miles.
- High casualty rates for pedestrians and cyclists result, in part, because people with higher risk factors tend to use these modes, including children and elderly people. A skilled and responsible adult who shifts from driving to these modes is likely to face less additional risk than average values suggest.
- Communities with higher rates of non-motorized travel tend to have lower total traffic fatalities, apparently due to safer facilities and greater care by operators. Pedestrian fatalities per billion km walked are less than a tenth as high, and bicyclist fatalities are only a quarter as high, in the Netherlands and Germany as in the United States.[6]

A key question in evaluating PMDs relative benefits and costs is their travel impacts, specifically their net impacts on the total amount of motorized and nonmotorized travel that occurs. Critics argue that PMD's will reduce walking, directly by substituting for walking trips, and indirectly by creating less pedestrian-friendly facilities (for example, one PMD user could discourage two walkers). At this point, it is difficult to predict what these impacts are likely to be.

Nonmotorized Facility Management[7]

Much of the debate about PMDs attempts to determine whether they should be considered good or bad, acceptable or unacceptable, legal or illegal on nonmotorized facilities. Another approach, and one that is probably more productive, is to assume that at least some PMDs will be allowed on at least some nonmotorized facilities, and so the emphasis should be on determining when, where and how this should occur.[8, 9] This helps insure that PMDs do not displace other nonmotorized travel.

Put another way, rather than focusing on evaluating each mode or device, it may be more helpful to focus on user behavior. For example, rather than debating whether or not skates, Segways and bicycles should be allowed or prohibited on all sidewalks, it is often more better to determine when and where they should be prohibited, which mode or device must yield when they meet, what maximum speeds are allowed, which types of users may be allowed, and what education and enforcement practices should be applied. These issues are explored below.

When, Where and Who

On crowded facilities, PMDs tend to impose congestion and risk on other users. As a result, it may be appropriate to limit use of discretionary PMDs (i.e. excluding wheelchairs and other aides for people with physical disabilities) on certain nonmotorized facilities at certain times, such as central business district sidewalks when crowded, and recreational paths during busy weekends. Similarly, it may be appropriate to limit them to certain users, either people with physical disabilities who need them for basic mobility (as opposed to purely recreational users, who have other mobility options), or to people who are trained and tested for responsible use.

Information on such restrictions should be clearly posted, and the rules enforced as needed. If PMD prohibitions are not really justified, these rules will often be ignored by users and law enforcement officials. This is common with bicycles. The result is ambiguity, inconsistent enforcement, and reduced value from, or respect for such laws.

Below are some possible guidelines for determining under what conditions PMDs should be allowed on nonmotorized facilities.

- When and where there is adequate space and minimal risk. For example, PMDs with low social value and high congestion costs or risk to others, such as skateboards and electric bicycles, may be allowed during off-peak periods but prohibited on crowded facilities.
- When and where PMD operating speeds are controlled to protect other users. For example, maximum speeds might be set for cycling or Segway use on a particular trail.
- When and where there are not reasonable, comparable alternative routes for high value users. For example, cycling may be allowed on a path or sidewalk where there is no suitable route on the roadway (this tends to be particularly important on bridges and parallel to busy highways).
- When and where reasonable safeguards can be demonstrated to minimize conflicts. For example, cycling or Segway use may be allowed on trails if there is adequate education and enforcement of traffic rules.
- For users who are certified as physically disabled, or who have taken a knowledge and skill test of their ability.

Hierarchy of Uses

Traffic on a road or path is a complex dance regulated by a set of rules which indicate who should yield. Although these rules are well defined and enforced for roadway traffic, they are less clear on nonmotorized facilities. Nonmotorized facility management therefore requires defining who should yield under particular conditions, with education and enforcement. Possible hierarchy guidelines are listed below.

- Modes that provide basic mobility (such as walking and wheelchairs) and public services (police, postal personnel, etc.) should have priority over other modes if conflicts exist.
- Users with physical disabilities should have priority over able-bodied users.
- Lower-speed, smaller modes should have priority over higher-speed, larger modes. For example, bicycles should yield to scooters, and scooters should yield to walkers.
- If facilities cannot accommodate all potential modes, higher-priority modes should be allowed and lower-priority modes should be required to use roadways. For example, cycling, skating and equestrians may be allowed on pedestrian facilities at uncrowded times and locations, but not at busy times and locations.
- Special efforts should be made to accommodate a wide range of users (including cyclists, skaters and runners) where there are no suitable alternative routes (e.g., adjacent roadways are unsuitable for such modes)
- All facility users should take extra caution when passing children and pets.
- Special consideration may be given to equestrians where permitted, since horses are easily frightened and difficult to maneuver.
- At least some public trails should be designed to accommodate people with physical disabilities, including people in wheelchairs. These should have washrooms and drinking fountains that meet accessibility standards.

Figure 2 "Share The Trail" Signage Example

This sign indicates who should yield to whom, and that horses are prohibited on this particular stretch.

Maximum Allowable Speeds

Because space requirements and risk increase with speed, speed regulation is an important part of PMD facility management. Below are some possible guidelines.

- Maximum speeds should be established for each mode, based on the physical design of the facility (i.e., some facilities may only accommodate 10 mph cycling but others 15 mph cycling). Maximum allowable speeds should decline as a pedestrian facility becomes more crowded or narrower.
- Cyclists, skaters and motorized modes should reduce their speed when using mixed use paths (6-12 mph maximum, depending on conditions) and yield to nonmotorized modes. Faster travelers should use roadways.
- If enforcement of maximum speeds is not a realistic possibility, PMDs that have the capability of moving faster must be prohibited from pedestrian facilities where they might endanger other users.

Education and Enforcement

Effective education and enforcement activities are likely to be important for effective sharing of nonmotorized facilities among diverse users. Signs, brochures and maps with additional information can help educate users concerning how to share facilities.

An effective enforcement program must overcome various barriers. Police officers may be unfamiliar with traffic rules and laws as they apply to bicycles, cyclists' rights to use the roadway, or how to effectively enforce bicycle traffic laws. Nonmotorized traffic violations, particularly by children, tend to be considered a low priority by officials and the general community. Standard traffic fines may appear excessive for children. Cyclists and pedestrians may ignore citations unless police departments develop a suitable processing system. In some locations, traffic enforcement in general is a very low priority for the police. This must be taken into consideration before a management system that depends heavily on enforcement is adopted.

Figure 3 Trail User Information Signage Examples

This sign indicates rules for dogs.

This kiosk provides information to trail users.

Legal and Legislative Status

A survey was performed concerning the legislative and legal status of PMDs in various U.S. jurisdictions. Some of this information was readily accessible through the Internet (www.segwaychat.com/forum/legal_states.asp and www.segway.com/general/regulatory.html), and in other cases planning staff were contacted by telephone. Forty states and several municipal governments have passed legislation regulating PMD use. Most state laws include a definition of EPAMDs, and allow their use on sidewalks, reflecting Segway lobbying efforts. Some include special provisions and restrictions, such as helmet requirements, or restrictions on operating speed and age. This is a typical definition: *An Electric Personal Assistive Mobility Devices (EPAMD) is a self-balancing two non tandem wheeled device designed to transport only one person with an electric propulsion system with an average power of 750 watts (1 h.p.), whose maximum speed on a paved level surface is less than 20 m.p.h.* The table below highlights legislative and legal status in selected jurisdictions.

Table 4 **Selected PMD and EPAMD Legal Status**

Jurisdiction	Status	Special Features	Allowed on sidewalks & paths	Allowed on Roads	Helmets Required	Min. Age
European Union	Uncertified and therefore illegal as a vehicle.[10]	Allowed on sidewalks up to 6 km/hr. Will require certification as a vehicle (probably as a moped) to be allowed on roads. Segway organization is trying to change the classification system.	If less than 6 km/hr.	No		
France and Italy	Allowed on sidewalks, not roads.	May be used on sidewalks at 6 kilometer-per-hour maximum.	If less than 6 km/hr.	No		
States						
Alabama	HB128	Municipalities may prohibit EPAMD use on public highways where the speed limit is greater than 25 mph, but shall not otherwise restrict the operation.	Yes	Yes	No	No
Arizona	Senate Bill 1193	A person who uses an electric personal assistive mobility device or a manual or motorized wheelchair is considered a pedestrian unless the manual wheelchair qualifies as a bicycle.	Yes	Yes	No	16
California	SB 1918, signed into law September, 2002.	Requires a sound-making device, reflectors and use of lights during night. EPAMD use may be restricted by local ordinance.	Yes	yes	No	No
Florida	Chapter 316.2068	A person who is under the age of 16 years is required to wear a bicycle helmet while operating an EPAMD. A county or municipality may prohibit the operation of EPAMD on any road, street, or bicycle path under its jurisdiction if the governing body determines that such a prohibition is necessary in the interest of safety.	Yes	Yes	Yes	16
Georgia	Senate Bill 37, passed 2003	Electric personal assistive mobility devices may be operated on highways and on sidewalks where a 48 inch clear path is maintained for access for persons with disabilities, provided that any person operating such a device shall have the same rights and duties as prescribed for pedestrians.	yes	yes	no	16
Illinois	Public Act 92-0868	Every person operating an electric personal assistive mobility device upon a sidewalk or roadway has all the rights and is subject to all the duties applicable to a pedestrian. Allows local governments to regulate use.	8 mph on sidewalks.	Yes	No	No

Maryland	HB 869, effective Oct. 2002	A person may not operate an EPAMD on any roadway where there are sidewalks adjacent to the roadway or the posted maximum speed limit exceeds a certain speed.	Yes	Yes	No	No
Michigan	Act 494, effective July 2002	Local governments may require EPAMDs to use a designated bike path if adjacent to the roadway.	Yes	Yes	No	
New Mexico	HB 298	An operator of an EPAMD traveling on a sidewalk, roadway or bicycle path shall have the rights and duties of a pedestrian, shall exercise due care to avoid colliding with pedestrians, and shall yield the right of way to pedestrians.	Yes	yes	No	No
New York	No specific law currently exists.	Bicycle organizations are pressuring state and local officials to regulate use of Segway on streets and roads. The State already regulates bicyclists, pedestrians and motor vehicles, no regulations regarding Segway use are in place				
Oregon	SB 787, 2003	An EPAMD is not a motor vehicle for purposes of the Oregon Vehicle Code, except when specifically provided by statute.	Yes	Yes	No	16
Pennsylvania	SB 1225, 2001	Allows use of EPAMD on sidewalks for people with physical disabilities and government or utility employees. Allows municipal governments to impose restrictions to protect the safety of pedestrians.	Unless locally prohibited	Yes but not on a freeway		age of 12
Texas	H.B. No. 1997, passed 2003.	Allows EPAMD on a residential street, roadway, or public highway with a speed limit of 30 miles per hour or less only while making a direct crossing of a highway in a crosswalk or where no sidewalk is available.	Yes	If no sidewalk is available	No	No
Cities						
Los Angeles	Los Angeles Commission on Disability is conducting research to establish appropriate policies.	*Proposed ordinance*: No person shall operate an EPAMD or motorized toy upon a sidewalk, bikeway, boardway, or highway at a speed greater that is reasonable or prudent having due regard for weather, visibility, pedestrians and other conveyance traffic, and shall yield the right-of-way to all foot pedestrians.	yes			
New York	No current law. Active lobbying for and against.	"Not authorized for public use on the streets or sidewalks" according to city police chief. Some current use and no current enforcement.	No	No		
San Francisco	Passed November 2002 by San Francisco Board of Supervisors.	Section 104, Article 5 of the San Francisco Traffic Code: "It shall be unlawful to operate an EPAMD on any sidewalk in the City and County of San Francisco."	No			
Seattle	The Seattle Pedestrian Advisory Board (SPAB) is concerned about conflicts.	*SPAB recommendations:* Ban Segway operation on Downtown sidewalks. Ban Segway operation on certain specific roads and parks at certain times.				
Washington DC (http://dc-segways.com)	Department of Public Works and shall promulgate rules to exempt EPAMDs from motor vehicle requirements.	No operator's permit shall be required for the operation of a EPAMD. EPAMDs upon a sidewalk or while crossing a roadway in a crosswalk shall have all the rights and duties applicable to a pedestrian under the same circumstances, except that the EPAMD operator must yield to pedestrians on the sidewalk or crosswalk.	Yes. Speed limited to 10 mph or less.	yes		age of 16

This table summarizes the legislative and legal status of Electric Personal Assistive Mobility Devices (EPAMDs) in selected U.S. jurisdictions.

Planning Guidelines for Sharing Nonmotorized Facilities

The report *Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice* provides guidelines for developing trail sharing programs, which are summarized below.[11] Although primarily concerned with recreational, off-road trails, the guidelines are generally appropriate for managing other nonmotorized facilities, including sidewalks and bicycle paths.

Twelve Principles For Minimizing Conflicts On Multiple-Use Trails

1. *Recognize Conflict as Goal Interference* - Do not treat conflict as an inherent incompatibility among different trail activities, but goal interference attributed to another's behavior.

2. *Provide Adequate Trail Opportunities* - Offer adequate trail mileage and provide opportunities for a variety of trail experiences. This will help reduce congestion and allow users to choose the conditions that are best suited to the experiences they desire.

3. *Minimize Number of Contacts in Problem Areas* - Each contact among trail users (as well as contact with evidence of others) has the potential to result in conflict. So, as a general rule, reduce the number of user contacts whenever possible. This is especially true in congested areas and at trailheads. Disperse use and provide separate trails where necessary after consideration of the additional environmental impact and lost opportunities for positive interactions this may cause.

4. *Involve Users as Early as Possible* - Identify the present and likely future users of each trail and involve them in the process of avoiding and resolving conflicts as early as possible, preferably before conflicts occur. Possible conflicts and their solutions should be addressed during planning and design stages, with involvement of prospective users. New and emerging uses should be anticipated and addressed as early as possible with the involvement of participants. Likewise, existing and developing conflicts on present trails need to be faced quickly and addressed with the participation of those affected.

5. *Understand User Needs* - Determine the motivations, desired experiences, norms, setting preferences, and other needs of the present and likely future users of each trail. This "customer" information is critical for anticipating and managing conflicts.

6. *Identify the Actual Sources of Conflict* - Help users to identify the specific tangible causes of any conflicts they are experiencing. In other words, get beyond emotions and stereotypes as quickly as possible, and get to the roots of any problems that exist.

7. *Work with Affected Users* - Work with all parties involved to reach mutually agreeable solutions to these specific issues. Users who are not involved as part of the solution process are more likely to be part of the current problem and also in future conflicts.

8. *Promote Trail Etiquette* - Minimize the possibility that any particular trail contact will result in conflict by actively and aggressively promoting responsible trail behavior. Use existing educational materials or modify them to better meet local needs. Target these educational efforts, get the information into users' hands as early as possible, and present it in interesting and understandable ways.

9. *Encourage Positive Interaction Among Different Users* - Trail users are usually not as different from one another as they believe. Providing positive interactions both on and off the trail will help break down barriers and stereotypes, and build understanding, good will, and cooperation. This can be accomplished through a variety of strategies such as sponsoring "user swaps," joint trail-building or maintenance projects, filming trail-sharing videos, and forming Trail Advisory Councils.

10. *Favor "Light-Handed" Management* - Use the most "light-handed approaches" that will achieve area objectives. This is essential in order to provide the freedom of choice and natural environments that are so important to trail-based recreation. Intrusive design and coercive management are not compatible with high-quality trail experiences.

11. *Plan and Act Locally* - Whenever possible, address issues regarding multiple-use trails at the local level. This allows greater sensitivity to local needs and provides better flexibility for addressing difficult issues on a case-by-case basis. Local action also facilitates involvement of the people who will be most affected by the decisions and most able to assist in their successful implementation.

12. *Monitor Progress* - Monitor the ongoing effectiveness of the decisions made and programs implemented. Conscious, deliberate monitoring is the only way to determine if conflicts are indeed being reduced and what changes in programs might be needed. This is only possible within the context of clearly understood and agreed upon objectives for each trail area.

Though it well understood that the developers of PMD's have sought access to sidewalks and not bicycle paths, the hierarchy established for sharing bicycle paths has application to the PMD sidewalk discussion. A bicycle path "etiquette" has been developed that appropriately establishes proper user behavior on the bike path. Educating the users of rights and responsibilities has been a key component in making these sharing the path guidelines useful. The boxes on the next two pages illustrate examples of this type of public education.

Sharing the Path
From the League of American Bicyclists' "Sharing the Path Better Bicycling Fact Sheet" (www.bikeleague.org/educenter/factsheets/sharingthepath.htm).
1.Courtesy
Respect other trail users; joggers, walkers, bladers, wheelchairs all have trail rights.
Respect slower cyclists; yield to slower users.
Obey speed limits; they are posted for your safety.

2.Announce when passing.
Use a bell, horn or voice to indicate your intention to pass.
Warn other well in advance so you do not startle them.
Clearly announce "On your left" when passing.

3.Yield when entering and crossing.
Yield to traffic at places where the trail crosses the road.
Yield to other users at trail intersections.
Slow down before intersections and when entering the trail from the road.

4.Keep right
Stay as close to the right as possible, except when passing.
Give yourself enough room to maneuver around any hazards.
Ride single file to avoid possible collisions with other trail users.

5.Pass on left
Scan ahead and behind before announcing your intention to pass another user.
Pull out only when you are sure the lane is clear.
Allow plenty of room, about two bike lengths, before moving back to the right.

6.Be predictable
Travel in a straight line unless you are avoiding hazards or passing.
Indicate your intention to turn or pass.
Warn other users of your intentions.

7.Use lights at night
Most trail users will not have lights at night; use a white front and red rear light.
Watch for walkers, as you will overtake them the fastest.
Reflective clothing does not help in the absence of light.

8.Do not block the trail
For group rides, use no more than half the trail; don't hog the trail.
During heavy use periods (holidays and weekends) stay single file.
Stop and regroup completely off of the trail.

9.Clean up litter.
Pack out more than you pack in.
Encourage others to respect the path.
Place all litter in its proper receptacle.

10.Limitations for transportation.
Most paths were not designed for high-speed, high volume traffic.
Use paths keeping in mind their recreational nature.
It might be faster to use roads and avoid the traffic on the paths during heavy use.

Trail Etiquette (From the *Seattle Bicycling Guide Map* (www.seattle.gov/transportation/bikemaps.htm)

All Users

- Show Courtesy to other trail users at all times.
- Use the right side of the trail except when otherwise designated.
- Always pass on the right.
- Keep dogs on leash (maximum length 8 feet) and remove pet feces from trail.

Bicyclists

- Yield to pedestrians.
- Give audible warning when passing pedestrians or other cyclists.
- Ride at a safe speed. Slow down and form a single file in congested conditions, reduced visibility, and other hazardous conditions.

Pedestrians

- Stay to the right side of the trail except when otherwise designated.
- Watch for other trail users.
- Listen for audible signals and allow faster trail users (runners and bicyclists) to pass safely.

(This map also includes the text of state and local traffic laws related to bicycling, and other helpful cycling information.)

Conclusions

An increasing variety of transport modes are using roads and nonmotorized facilities, including Personal Mobility Devices such as powered wheelchairs, scooters and Segways. PMDs can provide a variety of benefits to users and society, particularly when they provide mobility for people who are physically or economically disadvantaged, or when they substitute for automobile trips. However, they can also create conflicts, particularly when used on nonmotorized facilities.

Some people want to ban categories of PMDs from nonmotorized facilities. However, in most communities there are many uncongested sidewalks and paths, where use of such devices presents little problem. It is inefficient and unfair to impose unnecessary restrictions on new modes. Any prohibition should be based on actual problems resulting from use. Where prohibition is not really justified, rules will often be ignored.

It is important for nonmotorized facility managers to develop clear policies with regard to PMDs. In many cases it is appropriate to prohibit a particular type of PMD from using a particular nonmotorized facility, at least at during busy times when conflicts are likely to occur with other facility users. However, it is best to avoid excessive restrictions. Facility managers should consider alternative strategies that may involve regulations on their use at specific times and locations, education and enforcement of rules for responsible PMD operation. Examples exist of nonmotorized facility management programs that encourage users to share and avoid conflicts.

Endnotes

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