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Managing Personal Mobility Devices (PMDs) On Nonmotorized Facilities

26 July 2006

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Abstract

This paper explores the appropriate way to manage nonmotorized facilities (sidewalks, bikelanes, paths and trails), taking into account the increasingly diverse range of potential activities and modes, including various mechanical Personal Mobility Devices (PMDs) such as scooters, bicycles, and Segways. It examines various types of activities and modes that may use nonmotorized facilities, discusses potential conflicts among these uses, describes general principles for managing nonmotorized facility use, and describes appropriate planning, management and education strategies for minimizing problems.

A version of this paper was published as,
Todd Litman, "Managing Diverse Modes and Activities on Nonmotorized Facilities: Guidance for Practitioners,"
ITE Journal, Vol. 76, No. 6 (www.ite.org), June 2006, pp. 20-27.

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Introduction

In theory, it should be simple to determine where each mode should operate: Pedestrian should use nonmotorized facilities (walkways, sidewalks, paths and trails), and wheeled vehicles should use roadways. But in practice it can be difficult. By custom and law, sidewalks and paths already accommodate certain wheeled devices, including wheelchairs, skates and sometimes bicycles, and users of an increasing variety of modes are requesting permission to operate on nonmotorized facilities, including *Personal Mobility Devices* (PMDs) (small wheeled devices that provide personal mobility such as wheelchairs, skateboards and skates) and *Electric Personal Assistive Mobility Devices* (EPAMDs), such as those illustrated in Figure 1.

Figure 1 Electric Personal Assistive Mobility Devices



It can be difficult to categorize these devices since they have diverse features and uses. For example, there are many incremental steps from a pedestrian, to a pedestrian using a walker, to a human powered wheelchair, to a powered wheelchair, to an electric scooter, to an electric cart, to a gasoline-powered cart, to a small car. It is often unclear how a particular device should be classified and the rules it should follow.

These devices provide benefits by increasing people's mobility and substituting for automobile travel, but they can create new problems such as congestion and risks to other nonmotorized facility users (Goodridge, 2003). They are becoming more numerous, diverse, and powerful. An increasing portion has mechanical propulsion, and new facility design practices to accommodate wheelchairs allow PMDs to attain higher speeds. As a result, the potential for conflicts among nonmotorized facility users is growing. The introduction of the Segway and lobbying by its manufacturer to allow its use on sidewalks has raised concerns by some advocacy groups that PMDs will endanger and crowd out other facility users. As a result there is growing debate over where such devices should be used and the rules they should follow (ADONIS, 1999).

It is therefore increasingly important for transport planners and public officials to decide how nonmotorized facilities should be managed, including where and when specific modes and activities should be allowed, the rules each should follow, and how such rules should be promoted and enforced. This paper investigates these issues and identifies principles and strategies suitable for managing nonmotorized facilities, particularly with regard to PMDs.

Defining Nonmotorized Facilities And Their Uses

Nonmotorized facilities include walkways and paths, some of which are intended primarily for pedestrians, and others that are intentionally multi-modal, as summarized in Table 1.

Table 1 Nonmotorized Facilities

Pedestrian Oriented	Multi-Modal
Hallways (inside buildings). Walkways (outside buildings). Courtyards Sidewalks Small paths.	Multi-use paths and trails. Pedestrianized streets. Bike lanes (incorporated into streets). Bicycle boulevards (streets designed to favor cycling, and limit automobile traffic volumes and speeds).

This table lists various types of nonmotorized facilities.

There are many types of nonmotorized facility modes and activities, including some that can be considered “pedestrians” and some that are considered Personal Mobility Devices, as summarized in Table 2.

Table 2 Nonmotorized Facility Users

Pedestrians	Personal Mobility Devices
<p>Human People standing (viewing, talking, etc.) People sitting on benches and sidewalk café tables. People walking (alone and in groups). People playing games (e.g., tag, ball games, etc.). People using mobility aides (“walkers” and “rollators”). Pedestrians with strollers, handcarts and baggage. Joggers and runners (alone and in groups).</p> <p>Multi-Species Pedestrians with pets. Equestrians.</p> <p>Other Sidewalk Activities Sidewalk vending. Panhandling.</p>	<p>Human-powered Hand-powered wheelchairs. Skaters and roller blades. Skateboards. Push scooters. Bicycles. Bicycles with trailers. Pogo sticks.</p> <p>Motorized Electric powered bikes. Motorized wheelchairs. Electric powered scooters. Gasoline powered scooters. Segway-type scooters.</p>

This table lists various types of nonmotorized facility users.

Legal and Legislative Status

Laws governing Personal Mobility Device use vary as summarized in Table 3. Forty states and several municipal governments have passed legislation regulating PMD use, often in response to Segway lobbying efforts. Most include a definition of EPAMDs (such as *An Electric Personal Assistive Mobility Device 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 (one horsepower), whose maximum speed on a paved level surface is less than 20 m.p.h.*), and allow their use on sidewalks. Some include special provisions and restrictions, such as helmet requirements, or restrictions on operating speed and age.

Table 3 Selected PMD Legal Status (Various Sources)

Jurisdiction	Status	Special Features	Allowed on sidewalks & paths	Allowed on Roads	Helmets Required	Min. Age
European Union	Uncertified and therefore illegal as a vehicle (Bergeijk, 2003).	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 certain speeds.	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	

Managing PMDs On Nonmotorized Facilities

Jurisdiction	Status	Special Features	Allowed on sidewalks & paths	Allowed on Roads	Helmets Required	Min. Age
New Mexico	HB 298	An EPAMD operator 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
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 conducted research to establish appropriate policies.	No person shall operate an EPAMD or motorized toy upon a sidewalk, bikeway, boardway, or highway at a speed greater than 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	Seattle Pedestrian Advisory Board (SPAB) is concerned about conflicts.	<i>SPAB recommendations:</i> 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 an 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, as of January 2004. Much of this information was readily accessible through Internet sites such as www.segwaychat.com/forum/legal_states.asp and www.segway.com/general/regulatory.html.

Principles for Prioritizing Facility Use

This section discusses various principles that can help determine the rules that should be applied to different modes and activities on nonmotorized facilities.

Basic Mobility

A principle for prioritizing modes and activities is the relative value each provides to society. In particular, transportation that provides “basic mobility” (access to socially valuable activities, such as essential services, school and work, particularly by disadvantaged populations) can be given priority over more discretionary and recreational activities (“Basic Access and Mobility,” VTPI, 2006). Some PMDs provide basic mobility while others are primarily recreational. Some serve both functions so it may be appropriate to prioritize based on the specific user. For example, Segways may provide basic mobility by people with disabilities, and for recreation by physically able people. On a crowded path or sidewalk it therefore may be appropriate to limit Segway use to people with disabilities. Similarly, society may place a high value on bicycle commuting, because it provides basic mobility for nondrivers who have few alternatives and substitutes for automobile travel (and so reduces problems such as traffic congestion, parking costs and pollution emissions), but place a lower value on purely recreational cycling.

Health And Accident Risk

Nonmotorized transportation (walking, cycling and their variants) provide physical exercise, which is important for public health. Motorized modes do not provide this benefit.

Accident risks vary depending on factors such as the mode, user and travel conditions, and how risks are measured. Pedestrians and PMD users tend to have higher per-mile crash casualty rates than driving, but less *total* risk because (Litman and Fitzroy, 2005):

- Nonmotorized modes tend to impose minimal risk on other road users. As a result, shifts from motorized to nonmotorized modes tends to reduce total per capita traffic accident rates.
- 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.

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 smaller external costs should have priority over those with larger external costs. Compared with pedestrians, PMDs tend to require more space because they are physically larger and faster, and so require more “shy distance.” They also tend to impose greater injury risks on others because they are faster, heavier and harder (most have hard metal or plastic frames). This may justify restrictions on their use, in order to avoid congestion and risk on nonmotorized facilities that may crowd out other uses, such as walking. However, compared with automobile travel PMDs tend to reduce traffic congestion, road and parking facility costs, accident risk imposed on others, and pollution emissions.

User Payment

Some people argue that they deserve higher priority based on their claimed greater contribution toward facility costs. For example, many motorists assume that they should have priority in roadway management because their fuel taxes pay for roads. Some groups may claim priority on a public path or trail they helped built or maintain. However, by definition public facilities are for public use and should generally be managed to accommodate the largest range of possible users. Certain groups’ claims about their contribution to facilities are frequently inaccurate. For example, local roads and sidewalks are primarily funded by local taxes that residents pay regardless of how much they drive (Litman, 2004), and the contribution that volunteer groups make toward trail construction and maintenance is often a small portion of the total cost of creating the facility, particularly when the value of the land is considered.

Summary

Table 4 compares key features of various nonmotorized facility modes and activities, based on my assessment. Basic mobility indicates whether an activity provides access to destinations that would otherwise not be available. Congestion impacts reflect size and travel speed. Risk to others reflects ease of control, size, speed, mass and hardness.

Table 4 Nonmotorized Facility Uses Compared (Authors’ Assessment)

Mode or Activity	Basic Mobility	Physical Fitness	Congestion Impacts	Risk to Others
People standing	NA	NA	Minimal	None
People sitting, on benches & cafes	NA	NA	Minimal	None
Vendors with cars and wagons	NA	NA	Medium to large	Low
Individual walkers	High	Yes	Minimal	Low
Walkers in groups	High	Yes	Medium	Low
Walkers with children	High	Yes	Medium	Low
Children playing	Medium	Yes	Medium	Medium
Walkers with pets	Medium	Yes	Medium to large	Low
Human powered wheelchairs	Very High	Yes	Medium	Low
Motor powered wheelchairs	Very High	No	Medium	Medium to high
Joggers and runners	Medium	Yes	Medium	Medium
Skates, skateboards and push-scooters	Low	Yes	Medium	Medium
Powered scooters and Segways	High for people with disabilities, low for recreational use	No	Medium	Medium
Human powered bicycle	Medium	Yes	Medium to large	Medium to high
Motorized bicycle	Low	No	Large	High
Equestrians	Low	Some	Large	Medium to high
People with hand carts and wagons	Medium	Yes	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.

These ratings should be adjusted to reflect specific conditions and community values. For example, planners may have an advisory committee categorize these modes and activities, and help prioritize their use of facilities. It may be useful to disaggregate some categories for more detailed analysis. For example, some cycling provides basic mobility but other cycling is purely recreational, so it can be useful to evaluate utilitarian and recreational cycling separately.

Managing Nonmotorized Facility Use

There are often debates as to which modes, particularly which Personal Mobility Devices, should be allowed on which category of facility. For example, there is considerable debate as to whether Segways and skates should be allowed on sidewalks, and whether electric bikes and scooters should be allowed on multi-use paths. Another approach, and one that is often most 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 (Boyd, 1998; Zeeger, et al, 2006; Liu and Parthasarathy, 2003). This helps protect other nonmotorized facility users while maximizing PMD benefits.

Put another way, rather than focusing on the *mode* it is often more helpful to focus on *user behavior*. For example, rather than debating whether or not Segways should be allowed on all sidewalks, it is often better to determine when and where they should be prohibited, whether they should be limited to certain users, whether they should be required to yield to other sidewalk users, what maximum speeds are allowed, and what education and enforcement practices should be applied. Similarly, since both human and electric powered bicycles require similar space and achieve similar maximum speeds, it is more important to focus on rider behavior than the manner of propulsion when managing bicycles on trails. These issues are explored below.

Figure 2 “Share The Trail” Signage Examples



These signs indicate who should yield to whom.

When, Where and Who

On crowded facilities, larger and faster modes tend to impose congestion and risk on other users. As a result, it may be appropriate to limit some modes and activities on certain facilities at certain times, such as central business district sidewalks and recreational paths during busy weekends. Similarly, it may be appropriate to limit the use of some modes to certain users, either people with physical disabilities who need them for basic mobility, or to people who are trained, tested and licensed to insure responsible use.

Information on such restrictions should be clearly posted. Signs, brochures and other information resources indicating that a particular mobility device or activity is prohibited (“You cannot bike here”) should also provide information indicating where it is allowed (“You may bike there”). If prohibitions are unjustified or there are inadequate alternatives, these rules will often be ignored by users and enforcement officials. This is common with bicycles. The result is ambiguity, confusion and reduced respect for such laws.

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

- When and where there is adequate space and minimal risk. For example, modes with low social value (they are primarily recreational) and high impacts others, such as skateboards and electric bicycles, may be allowed during off-peak periods but prohibited under crowded conditions.
- 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 alternative routes. 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 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 with special needs (such as people with disabilities or employees who use a particular mobility device for their work), or who are trained, tested and licensed.

Figure 3 Managing Crowded Sidewalks and Paths



Sidewalks should be managed to insure adequate space for pedestrians.

Hierarchy of Uses

Traffic 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, supported with adequate 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 and activities, if conflicts exist.
- Users with 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.
- Lower-priority modes may be restricted, either completely or at certain times and locations. For example, cycling, skating and equestrians may be allowed on pedestrian facilities at uncrowded times and locations, but not at busy times and locations.
- Where conflicts exist and conditions are suitable, cyclists, skaters and runners may be encouraged or required to use adjacent roads rather than sidewalks and paths.
- Special efforts should be made to accommodate a wide range of users (including cyclists, skaters and runners) if no suitable alternative routes are available (e.g., adjacent roadways are unsuitable).
- 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. These should have washrooms and drinking fountains that meet accessibility standards.

Speed Limits

Because space requirements and risk increase with speed, speed regulation is important for 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 facility becomes more crowded or narrower.
- Cyclists, skaters and motorized modes should reduce their speed when using mixed use paths (6-12 mph maximum) 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.

Summary of Management Strategies

Table 5 summarizes various types of regulations that may be applied on nonmotorized facilities. These can be applied in various combinations.

Table 5 **Types of Regulations**

	Examples
What	Certain devices (motorized PMDs, bicycles, skates, etc.) are prohibited on sidewalks or paths.
Who	People with disabilities are allowed to use PMDs on sidewalks and paths (may require some sort of certification or letter from a medical doctor). Certain PMDs require that users be trained and certified, or are only used by service workers (e.g., police).
Where	Certain PMDs are prohibited in certain areas.
When	Certain devices or activities are prohibited at certain times (hours of day, days of week, months of year, etc.).
How	Restrict certain types of behavior that create conflicts.
Design features	PMDs are only allowed if they have wheels smaller than a certain size, are nonmotorized or have less than a certain power limit, are smaller than a particular size, etc.
Speed	PMDs are not allowed to exceed a particular speed.
Yielding	Certain types of users must yield to other users, such as bicycles to pedestrians.

This table summarizes various types of regulations that can be used to manage nonmotorized facilities.

Education and Enforcement

Effective education and enforcement are important for nonmotorized facility management. Signs, brochures and maps can help educate users concerning how to share facilities, how nonmotorized traffic rules are enforced, and how to report violations.

An effective enforcement program must overcome various barriers. Police officers may be unfamiliar with traffic rules and laws as they apply to Personal Mobility Devices. Nonmotorized traffic violations, particularly by children, are often given low priority by officials and the general community, and standard traffic fines may appear excessive for children. PMD users may ignore citations unless police departments develop a processing system that can efficiently and effectively impose citations on violators who lack a drivers license. Nonmotorized facility management may therefore require the development of new law enforcement practices.

Nonmotorized facility traffic law enforcement is particularly important under crowded conditions, such as downtown sidewalks during weekdays and recreational paths during summer weekends. Regulations and enforcement practices should give basic mobility priority over other activities. Specific guidelines and rules may be required for pedestrians with pets, people with push carts, and other activities that may hinder pedestrian flows.

It may be important to insure that pedestrian traffic flow is not unnecessarily hindered by street furniture (signposts, mail boxes, garbage cans, etc.), café tables, or panhandlers. It may be useful to define minimum acceptable functional widths for pedestrian traffic flow. For example, the policy might state that commercial district sidewalks should accommodate at least two wheelchairs passing side-by-side (i.e., a minimum of seven feet of unencumbered width), and sidewalks in residential areas should be wide enough to accommodate at least two walkers passing side-by-side (i.e., a minimum of five feet of unencumbered width). Greater minimum widths may be required in areas with particularly heavy pedestrian traffic flows.

Figure 4 Trail User Information Signage Examples



Guidelines and Resources 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 (Moore, 1994). Although primarily concerned with recreational trails, the guidelines can be applied to other nonmotorized facilities, including sidewalks and bicycle paths.

Based on “Twelve Principles For Minimizing Conflicts On Multiple-Use Trails”

1. *Recognize That Conflicts Can Be Addressed* - Do not assume that conflict indicate inherent incompatibility among different trail activities, rather, treat them as conflicts due to user’s behavior.
2. *Provide Adequate Trail Opportunities* - Offer adequate trail mileage and provide opportunities for a variety of trail experiences. This helps reduce congestion and allows users to choose the conditions that best suit the experiences they desire.
3. *Minimize Number of Contacts in Problem Areas* - If possible, reduce the number of user contacts to reduce conflicts, particularly in congested areas. Disperse use and provide separate trails where necessary, taking into account environmental impacts and lost opportunities for positive interactions.
4. *Involve Users In Planning* - Identify current and likely future trail users and involve them in trail management policy planning as early as possible, preferably before conflicts occur. New and emerging uses should be anticipated and addressed as quickly as possible with the involvement of stakeholders.
5. *Understand User Needs* - Determine the motivations, desired experiences, norms, needs and preferences of current and likely future trail users.
6. *Identify the Actual Sources of Conflict* - Help users to identify the specific impacts and behaviors that contribute to conflicts.
7. *Work with Affected Users* - Work with all parties involved to reach mutually agreeable solutions to problems and management programs.
8. *Promote Trail Etiquette* - Promote responsible trail behavior. Develop suitable trail use guidelines, educational materials and outreach programs that meet local needs. Involve user groups in promoting responsible behavior, and ways to present this information in interesting and understandable ways.
9. *Encourage Positive Interaction Among Different Users* - Encourage positive interactions among user groups both on and off trails. This can be accomplished by sponsoring events and activities, maintenance projects, producing and distributing information materials, and forming Trail Advisory Councils.
10. *Favor “Light-Handed” Management* - Use the most “light-handed approaches” that will achieve area objectives. Intrusive design and coercive management may spoil a high-quality trail experiences.
11. *Plan and Act Locally* - Whenever possible, trail planning and management plans at the local level. This allows greater sensitivity and flexibility, and facilitates involvement of the people who will be most affected by the decisions and most able to assist in successful implementation.
12. *Monitor Progress* - Monitor the ongoing effectiveness of policy and program implementation. This will help determine if conflicts are actually reduced and identify changes that may be needed. This requires clearly defined objectives and performance indicators.

Figure 5 Trail Safety and Courtesy Signage



This sign indicates safety and courtesy rules to help reduce conflicts. This is just one example of information resources that can be used to promote responsible behavior by different types of trail users.

Trail Etiquette

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

1. 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.

2. 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.

3. 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.

Sharing the Path (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, bladders, 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.
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.

Conclusions

An increasing variety of transport modes are using nonmotorized facilities, including Personal Mobility Devices (PMDs) such as powered wheelchairs, scooters and Segways. These modes provide benefits to users and society, particularly when they provide mobility for people who are physically disadvantaged, or when they substitute for automobile travel. However, they can also create conflicts, particularly when used on crowded nonmotorized facilities, and when users fail to observe proper riding etiquette.

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

A key factor in evaluating PMDs impacts is their overall effect on walking and driving. Supporters argue that PMDs substitute for automobile travel and increase public support for nonmotorized facilities, and for alternative modes such as transit. By substituting for automobile travel, increased congestion and risk on nonmotorized facilities may be offset by reduced roadway congestion and risks. Critics argue that PMD's will reduce total walking, directly by substituting for pedestrian trips, and indirectly by making sidewalks and paths less pleasant for walking. At this point, it is difficult to predict what their overall impacts will be.

It is important for nonmotorized facility managers to develop clear policies with regard to different modes and activities. In many cases it is appropriate to prohibit a particular type of PMD from a particular facility, at least when and where conflicts with other users are likely to occur. However, it is best to avoid excessive restrictions. Facility managers should promote responsible behavior, and help users find appropriate locations for their activities. Whenever signs, brochures and officials indicate that a mode or activity is prohibited, they should also provide information indicating where it is allowed. Examples exist of nonmotorized facility management and user education and enforcement programs that encourage responsible sharing and minimize conflicts.

Resources For More Information

ADONIS (1999), *Best Practice to Promote Cycling and Walking and How to Substitute Short Car Trips by Cycling and Walking*, ADONIS Transport RTD Program, European Union (www.cordis.lu/transport/src/adonisrep.htm). 300-page catalogue describes numerous ways to improve walking and cycling conditions.

Bill Brunton (2006), *Electric Personal Assistance Mobility Devices” (EPAMD) I.E. Segways – Considerations Before Recognition As A Disability Device In Ontario*, Report For Ontario Ministry of Transportation, Innovative Mobility (www.segwaydisabled.blogspot.com).

Ian Boyd (1998), “Pedestrian-Oriented Environments,” in *Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers*, ITE (www.ite.org).

Pedestrian and Bicycle Information Center (www.bicyclinginfo.org) provides information on nonmotorized transport planning and programs.

DFT (2002), *Cycling Bibliography and Walking Bibliography*, Department for Transport, (www.roads.dft.gov.uk/roadnetwork/ditm/tal/index.htm).

DFT (various years), *Traffic Advisory Leaflets: Cycle Facilities*, Department for Transport (www.roads.dft.gov.uk/roadnetwork/ditm/tal/cycle/index.htm), various years.

DRD (2000), *Collection of Cycle Concepts*, Danish Road Directorate (www.vd.dk/wimpdoc.asp?page=document&objno=17291). This comprehensive guidebook provides information on how to improve and encourage cycling.

Steven G. Goodridge (2003), *The Segway Is a Vehicle: Implications for Operation and Regulation of the EPAMD in Traffic*, HumanTransport.org (www.humantransport.org/bicycledriving/library/segway/Segway.htm).

ITE (1998), *Implementing Bicycle Improvements at the Local Level*, ITE and FHWA (available online at www.bikefed.org/local.htm).

LAB (2002), “*Sharing the Path” Better Bicycling Fact Sheet*, League of American Bicyclists (www.bikeleague.org/educenter/factsheets/sharingthepath.htm).

Todd Litman (2000), et al., *Pedestrian and Bicycle Planning: A Guide to Best Practices*, VTPI (www.vtpi.org).

Todd Litman (2003), “Economic Value of Walkability,” *Transportation Research Record 1828*, Transportation Research Board (www.trb.org), 2003, pp. 3-11; available at the VTPI website (www.vtpi.org).

Todd Litman (2004), *Whose Roads: Evaluating Bicyclists’ and Pedestrians’ Right to Use Public Roadways*, Victoria Transport Policy Institute (www.vtpi.org).

Todd Litman (2006), “Managing Diverse Modes and Activities on Nonmotorized Facilities: Guidance for Practitioners,” *ITE Journal*, Vol. 76, No. 6 (www.ite.org), June 2006, pp. 20-27.

Managing PMDs On Nonmotorized Facilities

Todd Litman and Steve Fitzroy (2005), *Safe Travels: Evaluating Mobility Management Traffic Safety Impacts*, Victoria Transport Policy Institute (www.vtppi.org).

Rongfang (Rachel) Liu and Rohini Parthasarathy (2003), *Urban Street: Is There Room for Segway Human Transporter (HT)?*, 2nd Urban Street Symposium, Anaheim, Ca. (<http://gulliver.trb.org/conferences/USS2/default.htm>).

Roger L. Moore (1994), *Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice*, Pedestrian and Bicycle Information Center (www.bikefed.org/PDF/Conflicts.pdf).

NHTSA (regularly updated), *Resource Guide on Laws Related to Pedestrian and Bicycle Safety*, National Highway Traffic Safety Administration (www.nhtsa.dot.gov/people/injury/research/ResourceGuide/index.html).

Jeroen van Bergeijk (2003), "Segway Stumbles in Europe," *Wired News* (www.wired.com/news/technology/0,1282,61632,00.html/wn_ascii), 18 December 2003.

VTSP (2003), *Trail Safety and Courtesy for Bicyclists and Users of Other Wheeled Devices*, Volunteer Trail Safety Patrol (www.parkpatrol.org/safewhl.htm).

VTPI (2006), Online TDM Encyclopedia, Victoria Transport Policy Institute (www.vtppi.org).

Charles Zeeger, et al (2002), *Pedestrian Facilities Users Guide: Providing Safety and Mobility*, Pedestrian and Bicycle Information Center (www.walkinginfo.org), FHWA, Publication FHWA-RD-01-102.