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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 nonmotorized facilities (sidewalks, paths and trails) with an increasingly diverse range of potential users, including various mechanical Personal Mobility Devices (PMDs) such as scooters, bicycles, and Segways. These devices can provide benefits by increasing people's mobility and substituting for automobile travel, but they also create new problems such as congestion and risks on nonmotorized facilities. PMDs are increasingly common, resulting in new conflicts. This paper examines the broader context of these issues, discusses general principles and guidelines for managing use of nonmotorized facilities, and describes appropriate planning, management and education strategies. It also includes results of a survey concerning the legal status of PMDs in various jurisdictions.

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Introduction

In theory, managing transportation facilities is simple: Pedestrian should use nonmotorized facilities (walkways, sidewalks, paths and trails), and wheeled vehicles should use roadways. But in practice, it can be difficult. An increasing variety of wheeled *Personal Mobility Devices* (PMDs) such as wheelchairs, skates and skateboards use both roads and nonmotorized facilities. Recently, various *Electric Personal Assistive Mobility Devices* (EPAMD) have become available, such as those illustrated in Figure 1. These devices can provide benefits by increasing people's mobility and substituting for automobile travel, but they also create new problems such as congestion and risks to other nonmotorized facility users.¹ As a result there is a growing debate over where PMDs should be used and the rules they should follow.²

Figure 1 Electric Personal Assistive Mobility Devices



Sidewalks and paths, by custom and law, already accommodate certain wheeled devices, including wheelchairs, skates and sometimes bicycles. It can be difficult to determine exactly which devices should be allowed since some have features of both pedestrians and vehicles. For example, there are numerous incremental steps from a pedestrian, to a pedestrian using a walker, 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 are becoming more numerous, diverse, and powerful. An increasing portion have mechanical propulsion, and new facility design practices to accommodate wheelchairs allow PMDs to attain higher speeds. As a result, the number and complexity of conflicts among nonmotorized facility users is growing. The recent introduction of the Segway and lobbying by its manufacturer to allow it on sidewalks has raised concerns by many nonmotorized facility users and advocacy groups that PMDs will crowd out or endanger more vulnerable users, reducing nonmotorized travel overall.

It is therefore increasingly important to how nonmotorized facilities should be managed with regard to PMDs. This paper investigates the role that PMDs play in the transport system, and their performance and design features. It identifies principles and strategies suitable for managing nonmotorized facilities and use of PMDs.

Defining PMDs and Nonmotorized 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 they are often defined as vehicles.

There are many types of *nonmotorized facilities*, including some that 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 users, including some that can be considered “pedestrians” and some that are considered PMDs, as summarized in Table 2. Nonmotorized facility users can be categorized in various ways, such as by factors such as by mode (walker, cyclist, scooter user), age (children, elders, etc.), and ability (people with disabilities and special needs). For some analysis the type of trip is important. For example, trips that provide basic mobility, such as access to essential services or commuting to school and work, may be considered more important than purely recreational trips. The next section of this paper discusses some principles that can be used to evaluate and prioritize nonmotorized use.

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.

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 public facility use is the relative value that an activity provides to society. By this principle, higher value activities are given priority over lower value activities. In general, transportation that provides “basic mobility” (access to socially valuable activities, such as essential services, school and work, particularly by disadvantaged populations) is considered to have higher social value than more discretionary and recreational travel.³

PMD’s range from those that 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 appropriate to consider the *use* and *user* as well as the device when evaluating their value. For example, Segway use by people with disabilities may provide high social value and so would be allowed on a nonmotorized facility, but the same device used by physically able people for recreation may be considered to provide less value, and so could be legitimately prohibited in the same situation. Similarly, society may place a high value on bicycle commuting, particularly for nondrivers who have few alternatives, or where it 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.

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.⁴ 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. This implies that in some cases PMD use may be restricted to certain classes of users or uses, such as service workers or people with disabilities similar to requirements for use of special parking spaces.

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 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 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 because they are physically larger and faster, and so require more “shy distance” between other facility users. PMDs also tend to be heavier and harder (most have hard metal or plastic frames) than pedestrians, and so impose greater 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 the pedestrian is most likely to be injured.

User Payment

People sometimes argue that public facility use should be prioritized based on the amount that an individual or group pays toward its costs. For example, many motorists assume their fuel taxes pay for roads, so they should have priority in roadway management and travel over nonmotorized travelers. Some groups may claim priority use of a public path or trail they help built and maintained. Businesses may claim use of the sidewalk in front of their shop on their grounds that they are taxpayers and property owners.

However, by definition public facilities are for public use and should generally be managed to accommodate the largest range of possible users. Basing user priority on payment violates fairness principles, which mean that society should protect the interests of disadvantaged people. The arguments used to claim priority for a particular group are often biased and inaccurate. For example, local roads and sidewalks are primarily funded by local taxes that residents pay regardless of how much they drive,⁵ 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 3 compares 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 3 Nonmotorized Facility Users Compared (Authors' Subjective Assessment)

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 support or opposition to PMD use on nonmotorized facilities. Supporters could point out that PMDs are faster and more convenient than walking, and are used by people with mobility constraints, and so provide transportation benefits. They require only a little more space than walkers and far less than automobiles. Many nonmotorized facilities, particularly away from major activity centers, are usually uncongested and can accommodate pedestrians and PMDs with minimal conflict.

Opponents can point out that most PMDs are used primarily for recreation rather than transport, and most PMD users have other travel options available if needed. 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.

A key factor in evaluating PMDs impacts is their effects on total 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.

Table 4 Fatalities per 100 Million Passengers in Britain⁶

	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 also difficult to predict the overall safety impacts of increased PMD travel.⁷ Nonmotorized modes tend to have relatively high per-mile crash rates, indicated in Table 4, 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.⁸

Nonmotorized Facility Management⁹

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 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.^{10, 11, 12} This helps protect other nonmotorized facility users while maximizing PMD benefits.

Put another way, rather than focusing on evaluating each *mode* and *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 better to determine when and where they should be prohibited, whether they should be limited to certain users, which mode should yield when they meet, what maximum speeds are 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 some mobility devices 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 PMDs 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, and the rules enforced as needed. Whenever officials provide information on where a particular mobility device or activity is prohibited (“You cannot bike here”) try to provide information indicating where it is allowed (“You may bike there”). If PMD prohibitions are unjustified or users lack adequate 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 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 with disabilities that justify their use, or who are trained, tested and licensed.

Hierarchy of Uses

Traffic on a road or path is a complex dance regulated by a set of rules that 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, 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 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.

Figure 2 “Share The Trail” Signage Examples



These signs indicate who should yield to whom.

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.

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.

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.

Sidewalk and path rule enforcement is particularly important at locations and during times where nonmotorized facilities are crowded and congested, such as downtown sidewalks and recreational paths during holiday weekends.

Regulations and enforcement practices should give mobility (walking and other transport modes) priority over other activities. For example, it is important to insure that pedestrian traffic flow is not unnecessarily hindered by street furniture (signposts, mail boxes, garbage cans, bike racks, etc.), café tables, or panhandlers. A useful first step is to establish a policy which defines minimum acceptable functional widths for pedestrian traffic flow. For example, this policy might state that sidewalks in business districts should be kept wide enough to 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.

Enforcement requires community education concerning these rules and how to report violations. For example, it may be appropriate to distribute a brochure to downtown businesses and community groups which describes acceptable uses of public sidewalk space (e.g., where signs and tables are prohibited), acceptable user behavior (where skating or cycling is prohibited), and how to report violations.

Special consideration may be required to determine appropriate legal controls on constitutionally-protected activities, such as distributing flyers or panhandling that block sidewalk traffic. For example, some communities prohibit panhandling in certain areas, such as near ATMs, and have programs intended to reduce panhandling activity. Special consideration may also be required to deal with pedestrians walking pets, people with push carts, and other activities that may hinder pedestrian flows.

Figure 4 Managing Crowded Sidewalks and Paths



Sidewalks should be managed to insure adequate space for pedestrians.

Legal and Legislative Status of PMDs

A survey was performed in late 2003 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 (one horsepower), 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 5 Selected PMD Legal Status As Of Late 2003

Jurisdiction	Status	Special Features	Allowed on sidewalks & paths	Allowed on Roads	Helmets Required	Min. Age
European Union	Uncertified and therefore illegal as a vehicle. ¹³	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
Jurisdiction	Status	Special Features	Allowed on sidewalks & paths	Allowed on Roads	Helmets Required	Min. Age
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

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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	A 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
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.	<i>Proposed ordinance:</i> 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	The 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 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.

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.¹⁴

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 Cycling 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 roads and nonmotorized facilities, including Personal Mobility Devices (PMDs) 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 travel. However, they can also create conflicts, particularly when used on crowded nonmotorized facilities, or when users fail to observe proper riding etiquette.

Some people want to ban categories of PMDs from nonmotorized facilities. However, in most communities there are many uncongested sidewalks and paths where such devices presents little problem. It is unfair and inefficient 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, and if possible, to offer reasonable alternatives. Whenever officials provide information to users indicating that a mobility device or activity is prohibited (“You cannot bike here”), they should try to also provide information indicating where it is allowed (“You may bike there”).

Table 6 summarizes various types of regulations that may be applied on nonmotorized facilities. These can be applied in various combinations. 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 use information and education to encourage responsible behavior, and help users find appropriate location and times for their activities. Examples exist of nonmotorized facility management and user education and enforcement programs that encourage responsible sharing and reduce conflicts.

Table 6 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.).
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.

Resources For More Information

ADONIS, *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), 1999. 300-page catalogue describes numerous ways to improve walking and cycling conditions.

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

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

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

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

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

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

Roger L. Moore, *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), 1994.

NHTSA, *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).

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

VTPI, *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org), 2005.

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

Endnotes

¹ Steven G. Goodridge, Ph.D., *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), 2003.

² ADONIS, *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), 1999.

³ VTPI, “Basic Access and Mobility,” *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm), 2003.

⁴ Todd Litman, *Quantifying the Benefits of Non-Motorized Transport for Achieving TDM Objectives*, Victoria Transport Policy Institute (www.vtpi.org), 2000.

⁵ Todd Litman, *Whose Roads: Evaluating Bicyclists’ and Pedestrians’ Right to Use Public Roadways*, Victoria Transport Policy Institute (www.vtpi.org), 2004.

⁶ RSPC (Royal Society of the Prevention of Accidents), Cited in “Fasten Your Safety Belts,” *The Economist*, 11 January 1997, p. 57. Also see Todd Litman, *Safe Travels*, VTPI (www.vtpi.org), 2005.

⁷ VTPI, “Safety Evaluation,” *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm), 2003.

⁸ John Pucher and Lewis Dijkstra, “Making Walking and Cycling Safer: Lessons from Europe,” *Transportation Quarterly*, Vol. 54, No. 3, Summer 2000, available at www.vtpi.org. Peter L. Jacobsen, “Safety In Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling,” *Injury Prevention* (<http://ip.bmjournals.com>), Vol. 9, 2003, pp. 205-209.

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¹² Rongfang (Rachel) Liu and Rohini Parthasarathy, *Urban Street: Is There Room for Segway Human Transporter (HT)?*, 2nd Urban Street Symposium, Anaheim, Ca. (<http://gulliver.trb.org/conferences/USS2/default.htm>), 2003.

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