

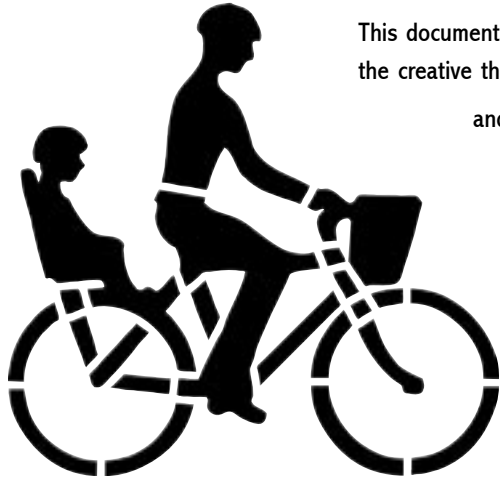


Pushing the **Design** Boundaries

Walk,
Bicycle,
In-line Skate,
& Jog



**Design
Innovations
for the Built
Environment**



This document was produced as a result of a generous contribution from an anonymous foundation and the creative thought of all the partners. The text was written and graphics were provided by Anne Lusk and Jonathan Harris and intended to **encourage the production or design of innovative elements that enable physical activity by all populations.** Rhonda Ryznar, Ph.D. with MIT, assisted in the development of the Physical Activity Design (PAD) rating system.

ANNE LUSK, PH.D., Harvard School of Public Health
JONATHAN HARRIS, The Cecil Group, Inc.

WALKBOSTON
ARLINGTON TRANSPORTATION ADVISORY COMMITTEE
ARLINGTON SAFE ROUTES TO SCHOOL

Introduction

Changes to the shape of America's landscape could perhaps change the shape of the nation's population. Physical inactivity and poor diet have caused sixty-five percent of U.S. population to be overweight. The result is a higher incidence of cancer, diabetes, stroke, and other chronic diseases. To combat these diseases and other ill effects, physical activity for 30 to 90 minutes is recommended for most days of the week. But many people do not have the leisure time to achieve these objectives. Rather than try to increase the amount of leisure time, urban forms that enable

physical activity as a routine part of the day could be built. Walking, bicycling, in-line skating, and jogging could take place near where people live, could be a form of transportation, and could provide affordable physical activity for all populations using roads, sidewalks, and shared-use paths. The question is: what urban and rural forms would enable physical activity for *all* populations.

The American Association of State and Highway Transportation Officials (AASHTO) provide design guidelines for bicycle facilities with a primary focus on facilities for bicyclists in the road. (On-road bicycle facilities include such essential provisions as paved shoulders, increased lane widths,

proper drain grates, signed shared roadways, intersection markings, and painted bike lanes.) While these provisions are very necessary, children and individuals who are less apt to engage in physical activity are probably less likely to bicycle with car traffic, at least until they learn the skills of the road. (see left) They might feel comfortable on a shared-use

path (bicycle or recreation path) but these paths are often a distance away from where they live, necessitating the leisure time to travel to the path, use the path, and travel home. Thus, recreation paths do not always provide opportunities for physical activity that is a routine part of the day such as to travel to work, school, or the store.

AASHTO also provides design guidelines for pedestrian facilities with appropriate adherence to Americans with Disabilities Act (ADA) requirements and considerations for the blind. Many communities ban bicyclists and in-line skaters on sidewalks fulfilling these requirements, but then a person can only get to community center stores if they



On most roads in the United States bicyclists must ride with cars, requiring special skills. Where do the less-skilled bicyclists ride?



Less skilled bicyclists or 'wheeled pedestrians' can ride on a sidepath as on the MIT campus in Cambridge, MA.

arrive by car, transit, bicycling in the road, or walking. Therefore, the less skilled bicyclist or the in-line skater cannot get to the stores in a community center, such as a grocery store, because they are banned from riding on the sidewalk and not skilled enough to bicycle or in-line skate in the road.

AASHTO members serve as volunteers and do not have a federal mandate, as in the Americans with Disabilities Act (ADA). Therefore, AASHTO guidelines do not have to describe equitable built environments for all skill levels that provide unilateral access to destinations. Also, while the AASHTO guidelines are intended as helpful tools, many states use them as mandated or defacto design guidelines. A bicycle facility design that is not included in the AASHTO design guidelines cannot be built using federal funds, except in specific instances and with special approval given the conditions. As one example, Vassar Street in Cambridge, Massachusetts provides European cycle tracks as smooth-surfaced paths level with the brick sidewalk on both sides of the street for in-line skaters and bicyclist who might not prefer to travel in the road. (*see previous page*) These sidepaths could not be built using federal funds because the sidepath designs are not in the AASHTO



Child friendly “Woonerfs” exist in Europe

bicycle design guidelines. Therefore, MIT paid for these innovative and physical activity-enabling sidepaths on Vassar Street.

Additionally, the U.S. Department of Transportation Federal Highway Administration has a Manual on Uniform Traffic Control Devices (MUTCD) standards that offer excellent signs used by car drivers, bicyclists, pedestrians, and children traveling to school. For understandable reasons, signs placed along or in roads must comply with MUTCD standards to provide the traveling public with a uniform sign system. The primary objectives of the MUTCD signs have been to inform car drivers in the road because that has been the largest application of signs. MUTCD also works to provide the signs with simplified graphic language and recognizable shapes.

By contrast, the design guidelines for bicyclists, walkers, pedestrians, and in-line skater’s facilities and the associated sign systems are different in other countries. For example, Europe, Canada, and China offer design guidelines for cycle tracks, sidepaths, and sideways parallel to but separate from the sidewalk that enable physical activity for slower bicyclists or in-line skaters who prefer not to be in the road. They also have implemented Woonerfs, or child supportive streets. The signage shows a child playing in the residential street alongside adjacent resident’s parked cars; in reality it is a shared street for pedestrians, cyclists, and motorized vehicles. Safety comes from the restricted speed due to the variety of transportation methods sharing the roadway. Additionally, they have crosswalk signals specifically designed at the scale and position for pedestrians and bicyclists. These examples are just a few of the solutions that are waiting for considerate designers and communities to adapt to their neighborhoods.

This booklet provides a way to begin exploring some additional physical activity designs that might be worthy of consideration in the United States. Some of these proposed designs are too expensive to test in the field but could be rendered in images. As one example, it would cost \$50,000 to build

one simulated brick jersey barrier and \$200,000 to crash test it at the Texas A & M University Texas Transportation Institute, but the simulated brick jersey barrier can be shown in an altered photograph. (*see page 15*)



Possible installation of a sidepath



*Existing Boston area street:
A car lane, a bicycle lane, and parallel parking are currently provided.*

PAD Rating: 6



*Proposed Boston area street:
A sidepath with a permanent or temporary and moveable-for-winter-plowing brick island, similar to concrete curb stops, could be provided. Skilled bicyclists could still ride in the road with other vehicles.*

PAD Rating: 8



Physical Activity Design (PAD) Rating System

In considering changes to urban and rural forms, the following Physical Activity Design (PAD) rating system is being proposed to foster innovative environments for physical activity that: 1) are not being studied because they do not yet exist; or 2) are not being considered because they are not in the American Association of State Highway and Transportation Officials (AASHTO) bicycle or pedestrian design guidelines or the Manual on Uniform Traffic Control Devices (MUTCD) selection. This point system, under the heading of “Activity Oriented Design,” is one tool to test whether a facility or design innovation is apt to increase levels of physical and be used by all populations.

This rating system is included in this booklet with three scenarios to better indicate the value of facilities in addition to the roads for bicycling and sidewalks for walking.

A. Rating based on a cross section drawing, such as a single drawing of a street with sidewalks, cars, and trees and judged on a single points system. Designs offering the opportunity to engage in physical activity accrue points if it:

1. Is free/no cost involved to participate. (by contrast, swimming or playing tennis may require membership or facility fees) (1 point)
2. Does not involve leisure time (1 point)
3. Is available to all populations (no membership fee, class/ethnic association, etcetera) (1 point)
4. Burns calories or achieves 1995 ACSM/CDC recommendations (1 point for each activity plus the accumulation of the calories burned per hour) (this might be measured based on the design – for example, if a

design includes a 2 mile walking/jogging path, for a person walking 4 MPH, this would provide 30 minutes of moderate PA)

5. Does not involve a high level of skill (for example, easy bicycling, walking, in-line skating) (1 point for each activity)
6. Is appealing (general aesthetics) (1 point)
7. Includes trees (many benefits beyond aesthetics) (1 point)
8. Has automobile parking present (minus 1 point—the goal is to incorporate human powered movement into the daily routine)

Physical activities that would not be given a point include bicycling and jogging in the road because, with skill, both can currently be achieved. All drawings by default, therefore, accommodate skilled bicyclists and joggers.

B. The rating system also includes points for the overall design (plan view) judged on a scale of 1 to 5, with 5 the highest, for each of the overall design categories.

1. *Range of Users* - On a greenway, walkers, bicyclists, and in-line skaters (of all ages) are accommodated. By contrast, a sidewalk often has an ordinance that bans users other than pedestrians and therefore only pedestrians are accommodated in the design.
2. *Careful Separation of Users* - Though engagement in physical activity by the maximum number of users is the objective, users should have separation where practical.
3. *Continuity in design elements* - For a design to “hang together” and assure the user that a level of maintenance and thus safety is provided, small details such as benches, garbage cans, lights,

etcetera should share similar design elements.

4. *Physical Activity Indicators – Maps, Guides, Signs, Etcetera* - Individuals are information processors and more apt to explore an area if they have knowledge about that area.
5. *Connectivity for all users to key destinations* - While some projects may include bicycle paths, these may be distant from community centers and shopping districts that can only be accessed by the sidewalk (only pedestrians) or the road (only skilled bicyclists). Also, while some facilities may be stand-alone projects, such as a hotel, connectivity should be provided from the hotel for all users to other destinations (beach, stores, etcetera)
6. *Leisure-based or Purposeful* - The past model has been to create leisure-based physical activity facilities and purpose-based transportation facilities. Health-responsive designs would enable physical activity for all populations that is a purposeful routine part of the day.
7. *Trip Chaining opportunities* - A design might include an isolated park space for sitting while another might have a park with an adjacent grocery store or playground. One destination feature may be more of an attraction than another but, combined, perhaps they encourage and reward physical activity to and at the destination.
8. *High rewards for physical activity to the destinations* - Often economically-driven destinations serve individuals who arrive by car, shop in the stores, and eat in the restaurants. Someone who may arrive less well-dressed, overly warmed, and thirsty may have difficulty finding a bathroom, an

appropriate fountain to fill their water bottle and, if jogging with a dog, a low water fountain for the running companion. Physical Activity Design (PAD) destinations could serve as gathering centers for individuals engaged in physical activity and may include amenities such as air for bike tires, accessible bathrooms for skaters, and vending machines with tire patch kits.

9. *“Named” landmarks at key destinations for wayfinding* - Kevin Lynch, author of *The Image of the City*, (1960), suggested that the cognitive map is made up of paths, edges, nodes, *landmarks*, and districts. William Whyte, author of *The Last Landscape* (1968), suggested that people walk farther if they can see the building to which they are headed. A good design would have a *central landmark feature* that is tall and visible or unique and singular and *several smaller node* destinations.

10. *Levels of physical activity achieved at the destinations* - Destinations that are “Prowess Plazas” include Confluence Park on the Denver South Platte River Greenway where kayakers navigate the manmade rapids and Rockefeller Plaza in New York City where citizens ice skate. By contrast, some destinations may include only a restaurant. Though these restart destinations serve as a “draw” that encourages people to walk/bike/skate to that destination, the person then does not engage in *additional physical activity at the destination*. A mid-level of physical activity could be achieved at a large chess game in which people have to move the chessmen or a sporadic fountain at which children play.

11. *Environmental Considerations* - Though facilities for physical activity are themselves environmentally responsive because they do not involve car travel, features such as phytoremediation could be incorporated in which plants, such as ferns, are selected that remove toxins from the soil.

12. *Creativity* - Additional consideration will be given for projects that are highly innovative.



Amenities along the path could improve the experience, like this integrated dog bowl in California.

Three Scenarios

The following are design innovations for consideration to enable walking, bicycling, in-line skating, and jogging under the three categories of: 1) Safe Routes to School (parents and children walking); 2) Mother commuting on a Cargo Bike to work after dropping of a young child at day care (bicycling); and 3) Sunday dedicated corridor (similar to Memorial Drive in Cambridge) (all activities). These three scenarios were selected to best portray environments that would be used by the populations currently underserved by existing facilities and/or also the populations needing opportunities for physical activity.

Each scenario will begin with a description of the user and their attire, that person's equipment, their task, and their route. The streets of Arlington, Massachusetts will be used in the simulations to suggest how the design innovation might be placed in the real world. It is acknowledged that these design innovations might not work in every envi-

ronment. For example, European cycle tracks/sidepaths/sideways would be less safe on a street with many curb cuts, due to quickly entering and exiting cars and lack of appropriate sight distances.

At the end of each scenario will be a list of design considerations that may or may not have a direct application in the built environment. For example, two reasons children are sometimes driven to school include: 1) they have too many books and thus carry a heavy backpack; and 2) it is dark. One solution could be a backpack with rollers and lights that are powered through a built in generator attached to the rollers. As the child pulls the bag, the rotation of the wheels could light the flashlight that shines ahead of the child on the sidewalk and also makes a blinker work on the back of the backpack. Battery power could supplement the generator for when a child starts walking or they are stationary.

Safe Route to School Scenario (Children walking together)

Andrew and Sam are in the 4th grade, are best friends, and walk to school together each day. They live near one another on Orchard Terrace in Arlington and attend Thompson School on North Union Street. This twosome

could walk with the walking school bus, a parent guided ensemble, but that group has more girls than boys and these two young men prefer to travel independently.

Their parents have instructed them to only walk on the designated School Route to get to school. They are not allowed to leave this travel corridor, going to school

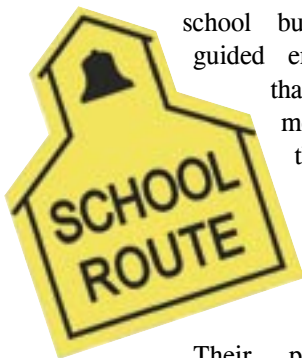
or returning from school, unless they have the permission of their parents. The parents then know their children are at home, on the designated route, or at school.

They each have on tennis shoes for comfortable walking and coats to keep them warm in the morning chill. They are each pulling book bags that light up when the wheels turn. It is 7:40 in the morning in June and somewhat overcast.

They leave their home and turn on Medford and then turn onto Coral Street. At the end of Coral Street, they turn down Park Street and then turn again at Exeter. At the end of Exeter, they turn on right River Street and then turn left on University Street where they meet many friends who are also walking on the south side of the road. They tease each other as they

walk and don't always pay attention to the people or cars around them.

Luckily for these boys, as well as other pedestrians on this route, the streets have been designed to make the route safer and accessible for all. Most crosswalks are aided with countdown crosswalks to aid in safety. Bump-outs with accessible ramps have been added at wide street crossings in order to slow traffic and reduce the distance



"School Route" test project

a person must be in the street when crossing while providing access for all abilities. Additionally, for the more highly traveled automobile routes, 3 inch raised crosswalks were installed to indicate to the drivers that they are sharing a pedestrian route.



Stencil along route sidewalks

The sidewalk has newly stenciled letters that spell SCHOOL ROUTE and have an arrow indicating the direction of the school. Also along this route are yellow signs in the shape of a schoolhouse with the words SCHOOL ROUTE inside. At a crosswalk at River Street and University and again at University and Everett Street there are yellow crosswalk signs in the shape of a schoolhouse with SCHOOL ROUTE written inside. The neighbors and people who drive through this area are very familiar with the designated SCHOOL ROUTE and are more vigilant along or crossing these corridors.

As they walk, they notice that senior citizens and dog walkers also walk this route. This has become the preferred sidewalk route for all pedestrians because this route is the safest and most accessible route in the neighborhood. Policies and community practices have meant that in the spring, flowers are planted in the public medians between the sidewalk and the curb, beautifying the route. In the winter, these are the first sidewalks to be shoveled. The neighbors on each block have organized themselves and, if they live on the other side of the street, they have agreed to work together to shovel the SCHOOL ROUTE, especially if

a senior lives along the route and is unable to shovel the snow.

Andrew and Sam run into Paul whose father has arrived by car and dropped Paul off at the end of University Street. This means that Andrew and Sam can walk the last distance with Paul to school. This also means that Paul's father doesn't need to drive in front of school where a traffic jam exists of school buses and parents dropping off children for school.

During school, Andrew, Sam, Paul and their classmates walk on a SCHOOL ROUTE arriving from a different direction. This route leads to the outdoor classroom that is a distance from the school. As a form of recess and teaching, the students walk on this corridor for the physical activity and also for the learning gained at the outdoor classroom that is planted with spring crops.

After school, Andrew and Sam walk home much more slowly than they walked to school. Along the designated route, they find snails and stop to move them around on the sidewalk. Their parents know that they will return even-

tually and that they are on the approved route between home and school. Their mother and father would rather the two were outside playing on this route than home eating and watching television. Protected by neighborhood eyes on the street, the SCHOOL ROUTE has become an informal playground that winds its way throughout the neighborhood connecting home to school. Andrew, Sam, and the other children have developed inventive ways to play along this sanctioned and visible neighborhood corridor.



School route sign based on MUTCD standards

DESIGN CONSIDERATIONS

- 1) **School Route Stencil** - On the sidewalk curb at various locations along the designated route.
- 2) **School Route Sign On Telephone Poles** - The sign would be made in yellow plastic with black letters and border in the shape of a schoolhouse with a bell on top and with letters inside that state School Route (the plastic would be sufficiently malleable in the event someone working on a telephone pole falls on the sign). The dimensions and material for this sign could be developed in cooperation with the school districts, MUTCD and also the telephone pole owners (Verizon, Boston Edison). This sign is preferable to Slow Children (which is politically incorrect) and an improvement over signs that state Crime Watch Neighborhood (this implies there is crime), and Drug Free Zone (this implies drugs are available elsewhere).
- 3) **School Route Crosswalk Sign** - A yellow plastic sign could be the same schoolhouse design as the telephone pole sign with School Route written inside. The base could be the same as a typical pedestrian crosswalk sign.
- 4) **Satellite Pod Parking Lots** - Rather than have all cars parked at the school parking lot or drop off children at the school lot, several outlying parking lots could be designated or created where children are dropped off and staff and teachers park. Together, everyone then walks to school on the School Route.
- 5) **Adopt A Corner** - Based on the adopt a road program, neighbors could adopt a corner and plant flowers, have “Look” graphics in the crosswalk, install benches, etcetera to humanize the intersection and make it safer for children.
- 6) **Lighted Sidewalk** - Combining the low level garden lights with motion sensors, a light could be developed that lit the way of children walking to school
- 7) **Lighted Crosswalk** - At a crosswalk, a motion sensor could be set up along the curb line to activate lights along the sides of the crosswalk when someone stepped from the curb. For example, if a child inadvertently walks in the crosswalk without first waiting for the signal, the lights imbedded in the asphalt along the crosswalk paint stripes could flash to indicate someone in the street. The crosswalk would not light up with cars passing overhead.
- 8) **Lighted Crosswalk School Route Sign with Movement Sensor**- The School Route sign could be lit from the base upward at the sign when someone walked into the crosswalk.
- 9) **On-Route Grocery Stores/After School Snacks** - The School Route could be located on the side of the sidewalk that passes by a healthy grocery store (and not a fast food chain) for snacks to purchase on the way home.
- 10) **Backpack With Rollers (like wheeled luggage)** - Children carry many books and some sports equipment. This backpack would reduce the strain on the child.
- 11) **Backpack with Rollers and Lights** - A wheel-generated light would shine when the child walks (similar to a generator light on a bicycle that is either in the wheel hub or has a wheel that moves around against the front tire). It would light the way forward but also power a small reflector for the rear. The backpack could also have regular reflectors sewn into the bag.



Adopt A Corner - “Look” stencil



The sign group - The “School Route” sign would replace the two people walking sign.



Minuteman bike path stencil used when the path joins city sidewalks. Though not all bicyclists will dismount, the intention is to keep bicyclists on the street side of the sidewalk.

- 12) **Backpack, Either Roller Or Regular, With Attached Tracking Device** - A parent could look on their computer and see the location of their child.
- 13) **Coordinated Flowers Planted Along The School Route** - Flowers and flower boxes could be donated by the community or by the garden club for homes along the school route. Individuals could help install the flower boxes or plant the flowers in the ground if the homeowner was not equipped to do so. A coordinated seasonal planting scheme would signal the corridor for walking and also enhance the route.
- 14) **Coordinated Pedestrian Scale Street Lights** - A community could determine what design of pedestrian scale streetlight they preferred and these could be installed along the School Route. The visible streetlight could be an indication that that corridor was for walking, and in particular, for children.
- 15) **Shoveled School Route Corridor** - As mentioned in the scenario, the neighborhood could join together to make sure that the sidewalks along the school route are the first to be shoveled. Additionally, the elderly could be helped with their duties.
- 16) **Buddy Stations To Meet Friends** - Places along the school route could be designated as Buddy Stations where friends are dropped off and walk together to school.
- 17) **School Octopus Maps** - Rather than having an isolated school and a separate map of the sidewalks to school, the school and school route could be considered an octopus with a head (School) and arms (School Routes) to the satellite parking areas. This octopus concept could be reflected in a map of the school making the school appear to be an interconnected part of the community rather than an isolated building.
- 18) **School Route, Senior Walking And Garden Club** - To encourage combining of ages, seniors could form a club and maintain the flowers along the school route. These same seniors could volunteer to walk on these routes during the hours when the children are walking to and from school to better guarantee their safety. Seniors could be given the same maps of the School Routes and the times before and after school and be asked to time a daily walk to assist children. This could allow seniors to feel useful and to have a structure in their lives. They also might befriend children and/or parents.
- 19) **Outdoor Classrooms** - In addition to parking lots on the School Routes, the routes could also have outdoor classrooms in the form of vegetable gardens, science classrooms, and etcetera.
- 20) **Satellite Pods With Amenities** - On good weather days and as a treat for a class doing well (form of encouragement), a class could walk to a satellite area on the School Route and have a picnic. A nearby building might have a bathroom that could be used if necessary.
- 21) **Press Stories About Kids Walking Or Celebrations** - A weekly column could appear in an Arlington paper that features a child's walk to school, what they encounter along the way, the conversations they had with friends, and etcetera.
- 22) **Summer Programs Could Use The Same Routes** - To embed these routes in a child's brain, the same routes could be used as part of summer programs

that could include summer camp but also special programs such as outdoor concerts, outdoor movies, or neighborhood games.

- 23) **Satellite Destinations/Parking Lots** - Parents could either drive or walk to this place where they could drop off their children on the school route, get out of their cars for a brief conversation, have a coffee, etcetera, and build social capital.
- 24) **Special Walk To School Shoes** - Though older children might not purchase such shoes, younger children might like to have graphics on their shoes that suggest the shoes are intended for walking to school.
- 25) **Self-Activated Music** - Near the locks under the Zakim Bridge in Boston, Massachusetts is a bridge railing with bars that can be pulled to activate music. A similar railing could exist along a route that children might anticipate playing as they walk (part of the cognitive map of the route).
- 26) **Selected Destinations** - The route could be selected as the most efficient and safe corridor but also as a route with fascinating destinations for children. Though this would be difficult and expensive to duplicate on a school route, a pet store with puppies in the window would be a significant reward for walking.



The school route stencil can create a walking path where there is none.

|| • Mother dressed in a skirt and riding a Cargo Bike with two children to Alewife after first dropping off children



A mother rides with her children on a Dutch made Bakfiets. www.workcycles.com/Products/Bakfiets.nl/cargobike.html

A young mother, named Sally, has two children, Molly in daycare and John in Pierce Elementary School and lives on Sunset Road in Arlington, Massachusetts with her husband Peter. She is an environmentalist and a devoted mother and prefers to bicycle to work and spend time with her children. She also has a high profile half-time job in downtown Boston for which she often wears skirts*. Though she could wear bicycling attire, there are no changing rooms at work. She could also wear pants to work but she prefers the variety of wearing pants sometimes and skirts other times. This attire presents issues such as needing a bike with a chain guard cover and a skirt guard cover over the back tire. Also, the bicycle will have a “girls bar” because with the skirt she will be unable to throw her

leg over the back of the bike. She also does not want to become overly heated since she cannot change at the office and therefore a less stressful route is necessary. This commute to work is similar to the many commutes of both men and women in Holland who travel to work in their work clothes. The one difference is this woman will be wearing a bicycle helmet.

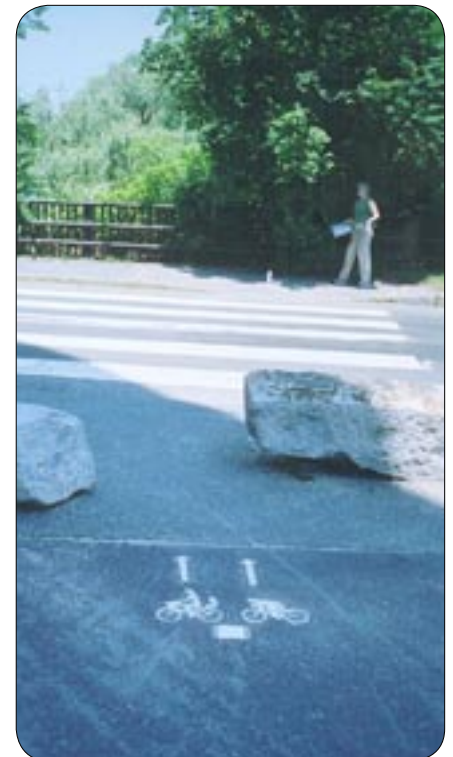
The bicycle she is riding is a Cargo Bike that has a box between the front handlebars and the front tire for her school age child, her daycare child, and her bag for work. She starts her commute, on this lovely morning in May, by putting her youngest child, Molly, in the Cargo Bike along with her bag and her children’s bags. At 7:30, she walks on Sunset Road to Blossom Street, walking her bicycle on the sidewalk with elementary school aged John walking beside her and Molly in the Cargo Bike. At Pierce Elementary School on the corner of Blossom and Park Street, she drops off John.

** We decided to depict a person with a less maneuverable attire on a bicycle, such as a woman in a skirt, in order to emphasize the necessity for a safer and slower route. The skirt also illustrates a situation whereby the woman is trying to avoid over-exertion en route to a more formal occasion and thereby needs a safer and slower route. Additionally, a heavier bicycle with a bit less maneuverability will be used in order to transport the rider, a passenger, and goods comfortably.*



Road bike stencil

With only one child and her load lightened, Sally rides her bicycle on the Park Street sidewalk slowly down the hill to the intersection of Westminster and Lowell on a sidewalk that has been approved for bicycle riding. Here, she has to very carefully cross, having dismounted to watch for traffic. Simulated brick jersey barriers have created a separate and safe path on the edge of this dangerous intersection. She takes Molly to the daycare center that is between Westminster and Lowell. From this location, she is able to get onto the Minuteman Path and ride to Alewife Station. At Alewife, she stays on the sidewalk path as indicated in the parent bicyclist stencil. The touring bicyclist stencil indicates the touring bicyclists



In some locations, differing skill levels will share the path.

should use the road. She parks her bike in a storage unit that keeps the bike dry. She also leaves her bike helmet in the bike locker so she only has to carry her work bag on the T.

After lunch when she leaves work in her half time job, reverses this commute, and near the day care picks up a few groceries. She crosses over the Minuteman Trail using the bridge on Park Avenue. Because there is only a sidewalk on the left hand side and she is on the right side of this bridge, she uses the separated and visible corridor that has been created through the use

of the Kinetic Bollards that rotate to increase visibility. She crosses the street at Lowell and Westminister to pick up Molly at day care and then starts the walk up Park Street with her bike to Peirce School to pick up John. John has more supplies from school so these materials are placed in the Cargo Bike along with Molly and the few groceries. Sally stays at school for a while to talk to parents while her children step in and out of her Cargo Bike. She walks the bicycle home to Sunset Street with Molly in the bike along with John's school supplies, her work bag, and her groceries.



A sign can provide trail directions through a community such as Arlington Center, MA.

DESIGN CONSIDERATIONS

- 1) **Unique Bike Parking At Home** - The cargo bike is slightly wider than a traditional bike and the woman could have a separate accommodation in the garage or breezeway that would make putting the children into the bike a pleasant activity. The opposite would be if she had the bike tightly placed in the garage with grease on the floor and many items stored around the bike.
- 2) **Provisions To Carry Lunch, A Computer, And Work** - The Cargo Bike could have provisions for carrying two children plus her lunch, laptop and work.
- 3) **Female Helmet And Bike/Office Clothes** - The female could have a helmet that didn't cause helmet hair (padding as a variety of strategic points on her head) and also wear clothes that are comfortable for bicycling and also appropriate for work. She may decide to change her shoes if she wanted to wear heels at work.
- 4) **Changeable Neighborhood History/Information Panel Above The Crosswalk Button** - While people wait to cross the street (as a pedestrian having pushed the button) they could read a bit about the community on a changeable panel. This could include a map of the area,



Currently a bicyclist rides from the Minuteman Path on the one-way road or sidewalk near Alewife.



Installation of bollards could better define a pathway within the road right-of-way and separate cars from bicyclists.



Rotational Bollards can provide additional safety by highlighting the movement in the bicycle path.



Bollards or delineator posts are currently used in Cambridge, MA to define a sidewalk during construction.

history of the community, upcoming events, etcetera. This sign could also list the departure time and location for the Bike/Blade Police escorted ride on Sunday. Only bike/pedestrian issues would be allowed on these signs rather than allowing them to turn into advertising venues. This information/entertainment while you wait is based on the Disney model of entertaining people so they are less anxious about waiting. This sign could have as a complement the timed pedestrian crossing so you knew whether to try to cross or stand and read the panel.

- 5) **Childcare Center With Central Area To Arrive And Park Multiple Bikes** - Rather than have cars be the dominant mode, the childcare center could have a large area to safely dismount children and have them not run into the street or in front of cars. This area could also have a standard bike rack though the mother with the Cargo Bike has her own stand built in.
- 6) **Concrete Simulated Brick Jersey Barrier** - Not all roads in the commute are safe for bicycling, especially since the skirted woman prefers to bicycle in separate shared-use paths. Therefore, a street has been made into a cycle track with the installation of a row of concrete simulated brick jersey barriers. (see simulated brick jersey barrier on page 15)
- 7) **Low Simulated Brick Island** - On some roads, cars parallel park meaning a jersey barrier couldn't be placed there because you can't open a car door. Therefore, a row of low islands has been installed that allow for the passenger door to open and to separate the bicyclist from the road and from pedestrians. (see Proposed Massachusetts Avenue inset page 3)
- 8) **Delineator Posts** - A design specific to the parallel shared-use path could provide a low cost path using the asphalt of the road. Unlike a white bike lane line, the upright delineator posts could signal to the car drivers to not use that corridor to pass or park. In the winter, these delineator posts could be taken out and the cycle track area that is painted in the road would be the location of snow.
- 9) **Specific Parking Meter System** - If a cycle track is created using the road, drivers might not know to walk across the cycle track to put money in the parking meter. Rather than use parking meters, the system could be established of numbers for parking spaces and a central machine in which you place coins and which dispenses a paper number for the car dashboard. If snow is an issue, a system of upright moveable parking meters could be created to alert drivers to the need to enter money. Grouped parking meters are already in use in many cities throughout the county including New York City.
- 10) **Planters Along A Cycle Track** - If the road is wide enough, a protective and aesthetic way to create the dedicated shared-use path on the road could be with planters. These planters could have plantings that are attractive in all seasons.
- 11) **Safe Bike Crossings Under The Road And Over The Road** - In addition to the standard pedestrian traffic crossing signals, tunnels and bridges could create a seamless way of traveling without having to interact with traffic. In order to not have sharp inclines and declines, the car road could be lowered or raised to leave the path as level as possible.

- 12) **Bike Stations At Transit Stops** - Based on the model of other bike stations in the US and around the world, this bike station could have an indoor secure place to store a bike. This area could also offer coffee and a paper. The bike station could also provide an attractive bathroom with full length and width lockable lockers in the event it is a hot day and a change of clothes is appropriate.
- 13) **Left Or Right Foot Down Or Left Or Right Hand Hold** - To stop at an intersection means you have to put a foot down or hold onto a post if you want to keep both feet on the pedals. On cycle tracks/sidepaths, both sides could provide a way to either put a foot down on a higher curb or hold onto a fence or post.
- 14) **Bike Light** - The Cargo Bike could have a generated light source that would light up both the front and back and also provide light to the children inside the seat.
- 15) **Bike Bell** - The bike could have a bell that could be rung by the rider with an additional bell to be operated by the child/children (to give them a sense of control and involvement in the ride).
- 16) **Advance Priority Signals At Crosswalks** - Rather than arrive at the intersection crossing, a button could be located farther back on the cycle track that could be pushed. By the time the rider arrived at the intersection, they would have the crossing signal.
- 17) **Sequential Music Venue** - Boise, Idaho has a series of speaker phones placed up high and motion sensors placed near the sidewalk. As the pedestrian passes by, music plays. If the pedestrian passes by quickly, the music plays more quickly. Sound artworks in the spirit of "Homage to the Pedestrian," could be commissioned along the shared paths. The rider could communicate to their children that they are preparing to pass the music.
- 18) **Telephone Pole Cues** - Small signs could be placed on the telephone poles to indicate to the rider that they are on the preferred cycle track/sidepath route to get to a major destination. In the case of a transit station, the small signs could have arrows and letters indicating the name of the station.
- 19) **Walk Bike Sidewalk Stencils** - In passing through communities, stencils on the sidewalk could alert the rider to walk their bike on the sidewalk.
- 20) **Information Signs About Bathrooms And Water** - If one of the children needed to get to a bathroom before arriving at the child care center, they could look on the information sign along the path and know that they could use the bathroom in a nearby public building.



Stencils on the sidewalk of the Minuteman walking his bicycle help guide users.

|||. Sunday Ride – Bicyclists and In-line skaters would be portrayed in the scenarios.

The Johnson family is comprised of wife Emily, husband Tony, and the two children, Wendy aged 10 and Michael aged 8. Emily's sister, Sandy, is visiting with her boyfriend Richard. It is a warm summer Sunday in August and they are all going to bike to Memorial Drive in Cambridge to in-line skate on the street that is closed to car traffic on Sunday. Everyone has a bicycle and they have varying levels of ability. The plan is to bike with their in-line skates and picnic food in baskets and panniers on their bikes. On Memorial Drive, they can in-line skate and watch the pros skate through the cones set up.

The Johnson family lives on Linwood Street near Spy Pond. They are very familiar with the Minuteman Bike Path and all are skilled bicyclists for their respective ages. The children are still a bit too young to bicycle in the road, especially on the most direct route to Memorial Drive. Therefore, they have chosen to take the new sideway, or European cycle track, that has been created on the westerly side of Massachusetts Avenue. At the end of the Minuteman Trail they wind their way over on the path extension to get to Massachusetts Avenue.

The sideway does not extend the entire way along the avenue and the Johnson family and relatives also travel beside mesh fencing that has been temporarily erected to provide a main route to get to Memorial Drive on Sunday. In another location, temporary delineator posts have been installed to create a sidepath that will be removed for regular commuting traffic during the other days. These design provisions have made the Johnson family feel safer traveling from Arlington to Cambridge because car drivers are more aware of the family's existence, given the novel design of the mesh fencing with the bike design and the revolving delineator

posts. These design features have also drawn attention to the Johnson family and their children. Children in a passing car ask their parents if they could ride on this special Sunday path next weekend. At each of the intersections, the Johnson family waits for the traffic light to change, following the traffic signals for pedestrians.

As the permanent and temporary Sunday sidepath provisions approach Memorial Drive, the crowds of bicyclists and in-line skaters widens. At these locations, the mesh fencing is moved farther out into the street to still allow cars to pass but also accommodate the many bicyclists, joggers, walkers, and in-line skaters who are merging to get to Memorial Drive. The Sunday has turned into a day of evident physical activity that is apparent through the novel designs that invite bicyclists, joggers, walkers, and skaters but also in the volume of users. Cars slow because, through these designs and people, the drivers sense that the area is no longer a straight and fast through road for cars.

The Johnson Family arrives at Memorial Drive and finds a place along the Charles River to have a picnic. They lock their bikes together at a bike rack and put on their skates to try out the smooth pavement of Memorial Drive. Other in-line skaters have arrived using the Paul Dudley White Bicycle Path, having skated a distance to get to Memorial Drive.

Around 3:00, the Johnson family decides to head back to Arlington. They use the same two directional

path they used to arrive at Memorial Drive and find, just as when they arrived in the morning, that there are more people heading in their same direction. Therefore, they tend to take up more space on the two-way path along with all the other bicyclists and skaters heading north as they did when they headed south in the morning. The softness of the mesh fencing and the delineator posts helps if they feel squeezed in some crowded places.

In the locations where a permanent low European island has been placed to create a European cycle track, they walk their bicycles on the sidewalk when the path becomes too crowded with bicyclists. As the path travels away from Memorial Drive, the crowds thin and the bicycling becomes easier. At Alewife, they follow the parent bicyclist stencils and use the sidewalk to get to the Minuteman Path. Home is a short distance away.



Faux brick jersey barriers could beautify temporary installations.

DESIGN CONSIDERATIONS

- 1) **Dedicated Sunday Routes** – Some roads are already a dedicated road for Sunday bicycling and skating but you have to drive there. In this instance, small Sunday Ride signs on posts or painted on pavement would indicate the shared-use path route to get to the final route. This also would serve as an announcement to regular bicyclists about Sunday paths and how to get there.
- 2) **Police Escort on Road** Some individuals may not feel comfortable bicycling to the Sunday route. At a designated time in a designated place with two designated times for return, police would lead a bike/skate snake on the smooth streets to the Sunday route.
- 3) **Bike/Skate Volunteer Guards** - Volunteers could wear marked vests and ride along the edge of the group of slow bicyclists and in-line skaters, offering assistance if necessary and making sure young children don't stray into oncoming traffic. Efforts could be made to have young people serve as the bike/blade guards. These bike/blade guards would be sent through training.
- 4) **Neighborhood Training Streets** - In preparation for the dedicated escorted ride, children could practice on designated streets that were deemed mini Sunday Drive streets. On certain times of the day, especially after school, neighbors could place barricades (saw horses and banner, cones, sandwich boards, etc) on lanes of certain back streets to let children practice bicycling and skating.) These streets then would be temporary but evident forms of European Woonerfs, on which only adjacent residents drive their cars and all proceed slowly.
- 5) **Newspaper Maps And Times For Dedicated Sunday Route** - The newspaper could have a section devoted to the Sunday ride and include a map of the route plus the departure time and two return times.
- 6) **Graphic Mesh Fencing** - To separate bicyclists and skaters from car traffic, cones have been placed on the road. As an alternative, orange or white plastic mesh fencing could be created that, rather than a small square design as in the orange plastic fencing, would have a pattern resembling a skate or a bike.
- 7) **Accordion X Fencing** - In addition to mesh fencing, metal or plastic X's could accordion out to create a temporary separation between automobile traffic and sidepath users.
- 8) **Cones With Caps** - Rather than have an orange cone that is the same cone used in traffic, the orange cone would have a flat graphic sign that could slip on top with a conical shaped inverse holder to announce the Sunday dedicated roadway.
- 9) **Delineator Posts With Flags On Top** - Delineator posts are narrow and easier to store than cones. Small flags on top could have a graphic about bikes or blades and also produce a waving motion to drivers in the other lane.



Bridges near Memorial Drive could have dedicated Sunday lanes that allow for bicycle passage with the addition of a moveable fence.



Safety fencing with bike graphic

- 10) **Delineator Posts With Tape Between Them** - Chrome posts exist in airports to delineate lines to ticket windows. Borrowing on that design, plastic delineator posts could have retractable tape in the top that could be pulled out and connect delineator post to delineator post.
- 11) **Telephone Poles Outfitted With Banners** - Banners could be used to identify a chosen corridor for bicyclists.
- 12) **Sandwich Boards** - A cone can be stacked, thus saving space but it is more difficult to have graphics on a cone. As an alternative, plastic sandwich boards could be placed in the middle of the closed-to-car-traffic roadway that can then also be stacked flat for storage.
- 13) **Small Moveable Jersey Barriers** - Similar to the large plastic jersey barriers that are moved with a truck along a highway to direct and move lanes of car traffic, a less wide and smaller jersey barrier could be placed on the road.
- 14) **Food Carts On Trucks** - Many streets do not have eating establishments. Therefore, food carts or small trucks would be allowed into the corridor to provide food.
- 15) **Bathrooms On Trucks** - Many streets do not have public bathrooms. Rather than place port-o-lets, a truck could be driven to the scene that would have bathrooms. One bathroom would need to be accessible so one unit would be placed on the ground.
- 16) **Water Spots Along The Way** - Trucks could provide free drinking water.
- 17) **Temporary Waste Baskets** - Waste is generated at any public occasion and a complementary method should be available to dispose of waste. A truck would be outfitted with garbage cans.
- 18) **Clinics On Wheels** - Clinics on wheels could be at key locations on Sundays and offer free blood pressure testing, hand out pamphlets about diet and exercise, etcetera.



Temporary barriers could provide safety for seasonal riders.

19) **Close Road Sign** - On many roadways, a barricade of saw horses and posts is often placed to alert drivers to the fact that the road is closed. On the post held up by the saw horses could be a banner saying “Bike/Blade” or showing a clever graphic. This would then tell the car drivers why the road is closed.

20) **Bike/Skate Rental Sunday Ride** - Specific bike shops could offer deals to rent bikes, skates, and helmets to people who wanted to participate in the ride.

21) **Loan Skates, Bikes, And Helmets Handed Out Through The School Library On Friday** - To make sure that all children and adults could make the trip on Sunday, on Friday afternoon the school library could sign out skates, bikes, and helmets for loan over the weekend.

22) **Special Logo For Guard** - A special vest or logo is available to any young person who volunteers to be a bike/blade guard, giving them status associated with physical activity at school (similar to a letter sweater).



European Models:

These examples show bicycle facilities and amenities in Europe starting with the most separated from vehicular traffic to the least separated.

Full separated sidepath with parking island



Sidepath with planted island



Street sweeper for narrow lanes



Separated sidepath



Angled curbs with protective bollards



Two-way bike traffic with well-placed bollard to stop large vehicles



Fencing and bollards for protection



Separate paths through intersections



Two-way bike traffic



Wide painted lane on less traveled streets

Separated Sidepath



Rumble strips at high use areas



Transition from island separated path to rumble strips



Moveable barrier to accomodate high weekend bicycle use

Woonerf Examples



Colored bike paths on sidewalk



Striped bike path



Bike lane directional markings





Feedback:

This document was written with design *considerations* and we would like your thoughts. Please write on this piece of paper or a separate piece of paper your comments for each page *with each page listed* to help systematize comments. As an alternative, please send your comments via email.

For example:

Page 10: Perhaps a line of School Route stencils with adequate spaces between them could be painted on the edge of the road to create a corridor in which children would walk to school.

Thank you for your assistance!

Please send these comments to:

Anne Lusk, Ph.D.
Harvard School of Public Health
655 Huntington Avenue
Building II Room 341
Boston, MA 02115