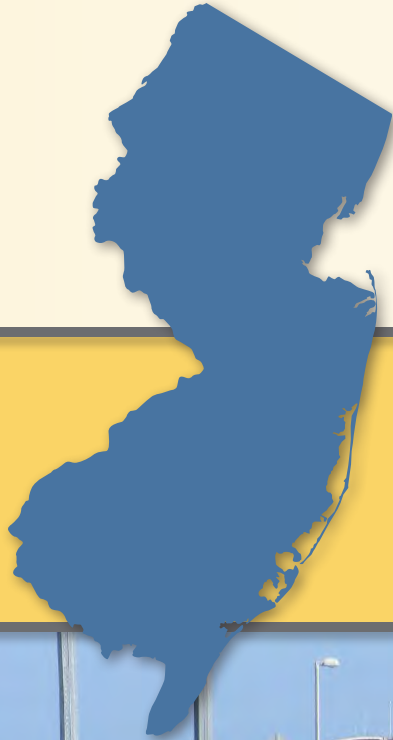


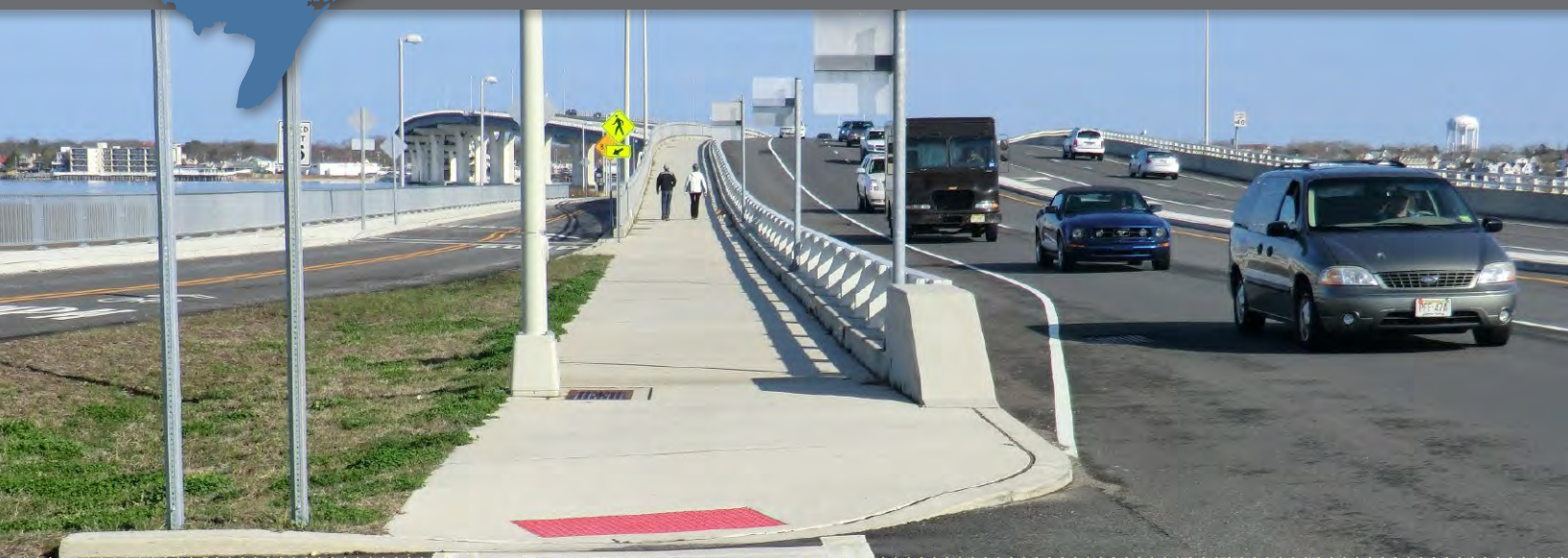
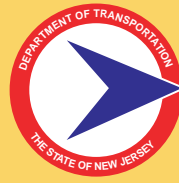
NEW JERSEY



Pedestrian Safety

Action Plan Toolbox

March 2014



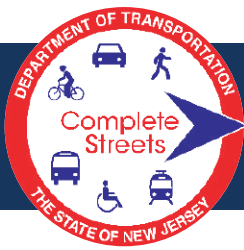
New Jersey Department of Transportation

www.nj.gov/transportation



TABLE OF CONTENTS

1. Complete Streets
2. Intersection Treatments
3. Mid-block Crossings
4. Safe Access to Transit
5. Safety Assessment Tools
6. Pedestrian Lighting
7. Enforcement
8. Safe Routes to School
9. Senior Mobility
10. Municipal Planning and Pedestrian Safety



COMPLETE STREETS

Complete Streets are designed for everyone – all users, modes, and ability levels – balancing the needs of drivers, pedestrians, bicyclists, transit vehicles, emergency responders, and goods movement.

Complete Streets initiatives support and advance the goals of the *New Jersey Pedestrian Safety Action Plan* through planning, design, construction, operation, and maintenance of safe multimodal streets, designed to accommodate all roadway users and that fit the local context. By applying Complete Streets as a core, guiding principle, a robust, multi-modal network with facilities for all users can be implemented over time.

Implementing Complete Streets does not mean that every street should have sidewalks, bike lanes, and transit. There is no universal, prescriptive design. Instead the concept of Complete Streets is driven by understanding local context, need, and demand. All streets should be designed to fit the context, provide for adequate mobility, and balance among competing needs for access, safety, economic development, and vehicular travel.

Travel needs can vary considerably from an urban arterial, to a main street, a suburban residential street, or a rural byway. So while the underlying goal of balancing the needs of all users remains paramount, the implementation of Complete Streets should vary accordingly.



Street with bike lane in Wildwood, NJ

Why Complete Streets?

There are a host of benefits associated with following the principle of Complete Streets, including:

- Mobility and safety for all users
- Equity, particularly those without an automobile
- Health through supporting active modes of transportation
- Quality of life by supporting livable, walkable communities
- Economic vitality
- Reduced environmental impact
- Eligibility in applying for Local Programs, such as NJDOT Local Aid grants and Sustainable Jersey

Communities without Complete Streets sacrifice safety, mobility, health and quality of life. Many residents are underserved by our incomplete streets: children, seniors and others who no longer drive, households without a car, persons with disabilities, and those who walk, bike or take transit for work and other trips. Nationwide, about one-third of the U.S. population does not drive.

Complete Streets and Safety

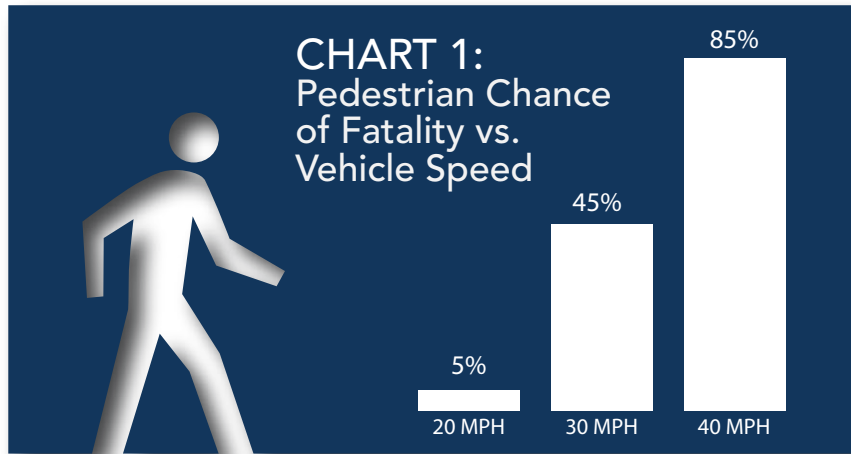
High travel speeds, heavy traffic volumes, and busy intersections expose both pedestrians and bike riders to risk. New Jersey, in fact, experiences an average of about 140 pedestrian and 18 bicycle fatalities each year and thousands more are injured.

Complete Streets integrate transportation and land use by designing for the local context and all roadway users. Appropriate vehicle speeds are a critical component of ensuring that the street fits the context. Studies show that





Complete Streets



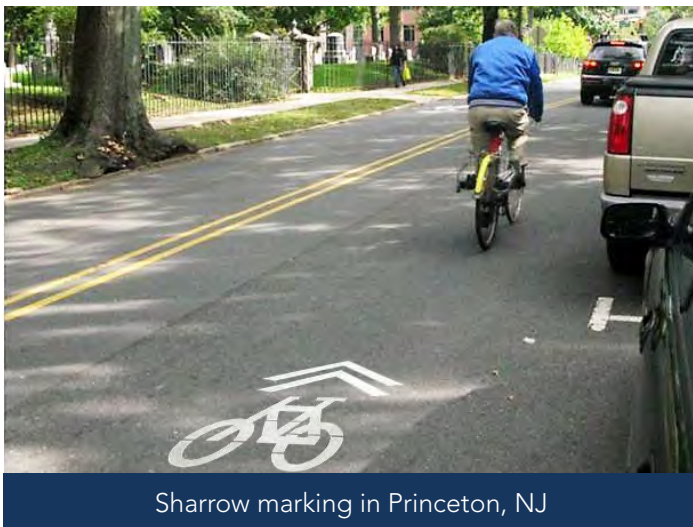
small increases in speed have a large impact on pedestrian safety. Complete Streets can utilize traffic calming tools such as appropriate lane widths, curb extensions, raised crosswalks, chicanes, etc; to encourage safe travel speeds for all users. Adequate sidewalks and crosswalks safely accommodate pedestrians. On-road bicycle lanes have been shown to reduce crash risk rates by about 50%.

multimodal streets that reflect local travel needs, priorities, and community context. Implementation makes Complete Streets an integral part of community planning and project design and delivery.

Complete Streets principles are typically adopted through a written policy or resolution by a governmental jurisdiction or agency, such as a municipality, county, state, or transportation agency. These written policies define the purpose of Complete Streets, the users and modes they accommodate, types of improvements that should follow Complete Streets principles, reasonable exemptions to the policy, and how the policy will be implemented.

Most importantly, the policy effectively ingrains the concept of Complete Streets into the everyday way of doing business.

New Jersey is a national leader in advancing Complete Streets implementation. The New Jersey Department of Transportation's (NJDOT) policy has been recognized as the strongest state policy in the nation three straight years (2010-2012) by the National Complete Streets Coalition. Following NJDOT's lead in New Jersey, 6 counties and 90 municipalities have adopted their own Complete Streets policies (as of April 2014), which represents approximately 10% of all Complete Streets policies nationally.



Implementation

Implementation means translating policy into action: taking the municipal Complete Streets Policy and using it as a roadmap for implementing strategies, procedures, plans, and projects in ways that create networks of safe,





Key components of an effective Complete Streets Implementation Plan include:

- I. Update plans, policies, and procedures to incorporate Complete Streets principles
- II. Incorporate Complete Streets into the development review process
- III. Build institutional capacity through training, communication, and monitoring
- IV. Create partnerships to advance the policy
- V. Initiate pilot projects to build support and demonstrate the value of Complete Streets
- VI. Integrate Complete Streets into the earliest stages of project delivery and throughout the project life cycle
- VII. Utilize available tools and resources to support implementation

Complete Streets do not require significant additional costs or new funding sources. Simple solutions, such as using paint to restripe a roadway and alter its layout, can be implemented during routine maintenance and repairs. The construction costs of Complete Streets elements make up a very small portion of a project's total costs.

A recent study by the Charlotte Department of Transportation (CDOT) found that the combined increased construction cost of installing sidewalks and bike lanes was not more than 8.5% of the baseline project cost. Furthermore, the study found that the overall market fluctuations in construction costs has a more significant impact on overall construction costs than adding Complete Streets elements.

Success Stories

As Complete Streets principals are being integrated into transportation planning and design across the state, there are numerous examples of implementation.

In Ocean City, NJDOT's Route 52 bridge replacement project is an example of synergy between local and state Complete Streets policies to create a more robust, complete network. The new bridge project links Ocean City with its mainland neighbors and features a separated lane for pedestrians and bicyclists. Connections are provided to the Linwood Bikeway, Ocean City's Haven Avenue bicycle boulevard, and other pedestrian amenities that complement the city's own Complete Streets efforts.



Incomplete streets (such as the example above) inhibit mobility and cause dangerous conditions for all users, particularly pedestrians and those without access to an automobile. A complete street, such as that pictured to the right, provides a safe and accessible environment for all users.





Complete Streets

On New Jersey Route 27 in Woodbridge, NJDOT recently installed a pedestrian hybrid beacon to improve pedestrian safety across a busy four-lane roadway. The pedestrian hybrid beacon is an innovative tool designed to improve pedestrian safety at mid-block crossings of high-volume roadways. It is among the Federal Highway Administration's proven safety countermeasures. The crossing is an important connection between a residential area and the busy Metropark NJ Transit rail station on the Northeast Corridor. Approximately 800 pedestrians cross at the location daily.

The Lawrence Hopewell Trail (LHT) is an example of public-private partnership to develop a 22-mile trail for pedestrians and bicyclists. Through the collaborative work of Lawrence and Hopewell Townships, NJDOT, Mercer County, corporate sponsors, and others, the LHT connects employment centers, schools, parks, downtown destinations, and on-street pedestrian and bicycle facilities in the two communities. As the LHT continues to expand, it provides regional connectivity to complement the roadway network and create a regional Complete Streets network.

Numerous other projects have been constructed throughout the state that reflect Complete Streets principles. These include sidewalk improvements to repair deteriorated sidewalks or fill gaps in the network; streetscape improvements to enhance the pedestrian environment with wider sidewalks, street trees, street furniture, and/or green stormwater management; resurfacing a rural arterial with striped shoulders and sustainable stormwater management; and improving pedestrian safety by upgrading busy crossings with enhanced measures such as high-visibility striping, refuge islands, or traffic calming.

Resources

- ❑ NJDOT Complete Streets homepage <http://www.state.nj.us/transportation/eng/completestreets/>
- ❑ New Jersey Bicycle and Pedestrian Resource Center <http://njbikeped.org/overview-3/>
- ❑ National Complete Streets Coalition <http://www.smartgrowthamerica.org/complete-streets>
- ❑ NACTO <http://nacto.org/>
- ❑ AASHTO <http://www.transportation.org/Pages/default.aspx>



Bridge with bike lane in Highlands, NJ





INTERSECTION TREATMENTS

While the majority of New Jersey's pedestrian crashes occur away from intersections, they can none the less be major points of conflict and are frequently the site of injuries and fatalities.

Although intersections represent a small percentage of road mileage, over a third (37%) of all pedestrian crashes, and a quarter (28%) of all severe and fatal pedestrian crashes in New Jersey from 2006-2011 occurred at intersections.

Factors that impact the mobility and safety of pedestrians include traffic volume, traffic speed, number and configuration of lanes, width of roadway/crossing distance and signal timing. This Toolbox highlights several design treatments that can be utilized to enhance safety at intersections for all road users. These tools can assist your municipality improve and expand pedestrian infrastructure. Developing an environment conducive to pedestrian safety is one of the goals of the *New Jersey Pedestrian Safety Action Plan*. By enhancing pedestrian safety at intersections, local governments can help facilitate achievement of the Plan's mission – reduction of pedestrian fatalities and serious injuries by 20% in five years.

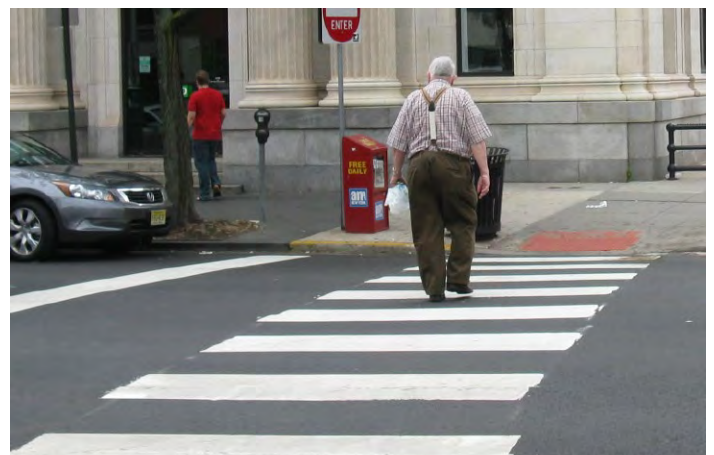
Marked vs. Unmarked Crosswalks

Crosswalks exist at all legs of all intersections unless signs are posted prohibiting pedestrians from crossing. Not every crosswalk is marked with painted lines. In fact, most are unmarked. In New Jersey, the driver of a vehicle must stop and stay stopped for a pedestrian crossing the roadway within any marked crosswalk, and they shall yield the right-of-way to a pedestrian crossing the roadway within an unmarked crosswalk at an intersection (New Jersey Statute 39:4-36)

Marked Crosswalks

While marked crosswalks are an essential tool for channeling pedestrian movement in a predictable manner across roadways, they do not, in and of themselves, slow traffic or reduce pedestrian crashes. In fact, in New Jersey between 2006-2011, 12% of crashes where the pedestrian was killed or seriously injured occurred when the pedestrian was crossing at a marked crosswalk. In most cases, marked crosswalks should be used in conjunction with other pedestrian safety devices, such as traffic calming techniques, to increase visibility and driver awareness.

Some traffic calming techniques and countermeasures that can be used to supplement standard pedestrian crossing warning signs and markings and improve pedestrian safety and mobility at intersections are described below.



High-visibility crosswalks (as shown above) have been shown to increase motorist yielding and channelization of pedestrians, leading the FHWA to conclude that high-visibility pedestrian crosswalks have a positive effect on pedestrian and driver behavior.





Intersection Treatments

Signal Timing Options

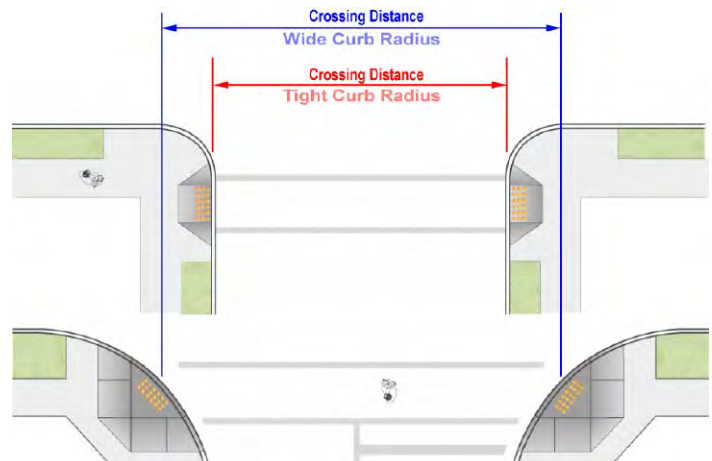
- ❑ **Pedestrian signal timing** is designed to give pedestrians sufficient time to cross the roadway based on the width of the roadway and an assumed pedestrian walking speed. The MUTCD assumes a walking speed of 3.5 feet per second. However, for slower pedestrians, such as those in wheelchairs or who are visually impaired, a slower walking speed of 3 feet per second may be assumed.
- ❑ A **Leading Pedestrian Interval (LPI)** provides pedestrians an advanced walk signal, giving pedestrians several seconds to start and establish their place in the crosswalk before motor vehicles start their advance. Pedestrians are made more visible particularly to right turning motorists who are thereby more likely to yield to pedestrians in the crosswalk.
- ❑ A **Pedestrian Scramble**, also known as a diagonal crossing or a Barnes Dance, is a crossing system that stops all vehicular traffic allowing pedestrians an exclusive interval to cross an intersection in every direction, including diagonally, at the same time. The pedestrian scramble virtually eliminates pedestrian-vehicle conflicts and makes sense where large numbers of pedestrians are expected, and where there is enough space to enable pedestrians to gather on the sidewalks in larger numbers.
- ❑ **Pedestrian countdown timers** are designed to enhance the effectiveness of pedestrian signals in clearing the crosswalk by showing the number of seconds remaining until the signal changes. Surveys show that most people misinterpret the meaning of the flashing hand of the traditional pedestrian signal. Providing the pedestrian countdown device helps pedestrians better interpret the pedestrian signals. Countdowns also enable pedestrians to stop on a median refuge, where provided, and wait for the next signal phase if they believe that there is insufficient time for them to complete their crossing. The use of pedestrian countdown timers are important when signal timing is complex (e.g., there is a dedicated left-turn signal for motorists), at established school zone crossings, when an exclusive pedestrian interval is provided, and where streets are wide.



A pedestrian scramble in Pasadena, CA.

Reduced Curb Radii

Curb radii should be designed to be as small as possible considering all intersection users, rather than designing for the largest possible vehicle. Smaller turning radii require vehicles to turn at lower speeds and decrease pedestrian crossing distance. Both factors improve pedestrian safety and comfort. This also improves sight distance between pedestrians and motorists.



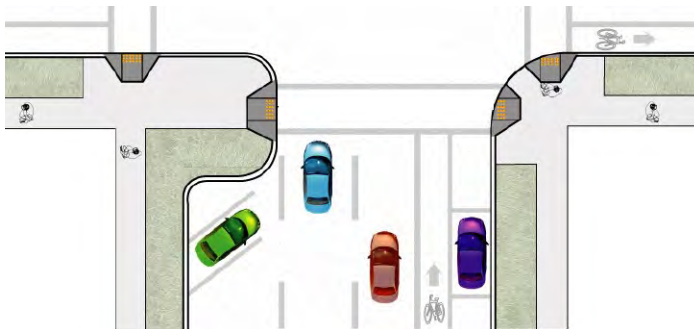
Tighter curb radii reduces the speed of turning vehicles and severity of crashes if they occur.





Curb Extensions

Curb extensions are extensions of the curb line into the street, reallocating a portion of street space to pedestrians or ancillary uses. Curb extensions are one of the most effective traffic calming tools, and can be used in a variety of ways, both at corners and mid-block.



Curb extensions are one of the most effective traffic calming tools.

Also known as bulbouts or neckdowns, curb extensions narrow the roadway, slow turning vehicles, prevent drivers from parking on or near a crosswalk, reduce crossing distances and pedestrian exposure to conflicts with motor vehicles. This design also enables pedestrians to stand out from behind parked motor vehicles, helping pedestrians and drivers to better see each other. Smaller children who are often invisible behind parked motor vehicles and who may take longer to cross the street would particularly benefit from curb extensions.



This curb extension on Dune Drive in Avalon, NJ created space for landscaping, seating and a trash can.

Right Turn on Red (RTOR) Restrictions

Unless a No Turn on Red sign is posted, New Jersey law authorizes a motorist to make a right turn on a red light after they have come to a full stop and checked for traffic. A motorist must yield to all crossing traffic and stop for pedestrians before turning right at a red light. RTOR prohibitions can be an important tool for increasing pedestrian safety at certain intersections. Under some circumstances, prohibiting RTOR can reduce conflicts and collisions, and it deters motorists from blocking the perpendicular crosswalk while they inch forward to turn.



RTOR is prohibited during school hours at this intersection.

The MUTCD and the Institute of Transportation Engineers suggest considering the prohibition of RTOR under the following circumstances:

- Inadequate sight distance to vehicles approaching from the left (or right, if applicable);
- Geometrics or operational characteristics of the intersection that might result in unexpected conflicts;
- An exclusive pedestrian phase;
- An unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers;
- Heavy volume of pedestrian crossings;
- Request from pedestrians with disabilities using the intersection;
- School crossings;
- Railroad crossings; and
- Traffic signals with three or more phases.



Intersection Treatments

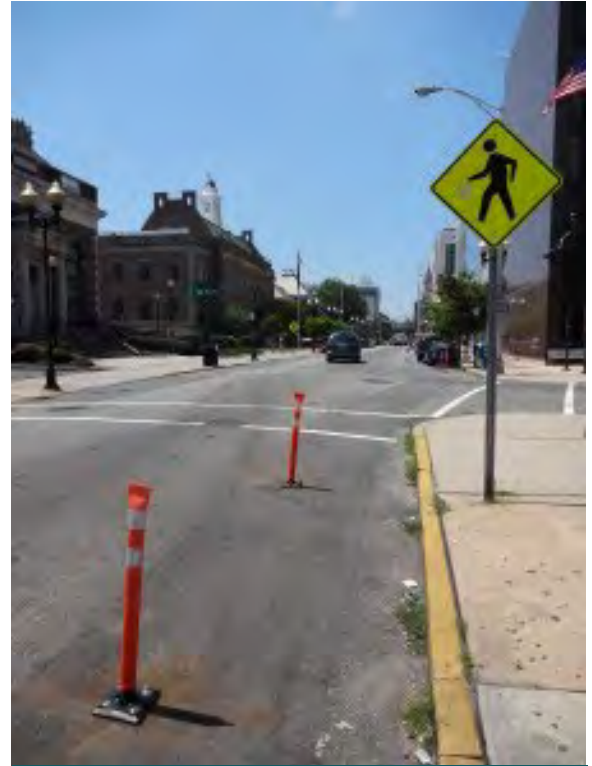
Success Story - New Brunswick Improves Pedestrian Safety by Daylighting Intersections

Source: Together North Jersey

Full text is available at: <http://goo.gl/9ITq6Y>

Under New Jersey law, parking within 25 feet of the intersection (and within 50 feet of a stop sign) has always been illegal, and had previously been marked with the use of yellow paint and signage. However, the wide open spaces had proven to be too much of a temptation for motorists seeking a short-term stay. While many who used the space to park or idle for a minute or two did not see their transgression as serious, the fact is even a short term use of that area would block visibility and make life more dangerous for pedestrians.

To prevent this type of behavior, the city has begun installing plastic pylons in the no-parking area, a practice called “daylighting.” For the city, the cost of purchasing and installing the standard-use pylons is minimal. Further, the process can be done in-house with little delay, because no parking rules are being changed – all the pylons are being installed where parking has never been allowed. The benefits also extend beyond pedestrians to motorists. Besides clearing the visibility of the crosswalk, keeping the corner clear also makes it easier for motorists to spy oncoming traffic. Turns also become easier for trucks, as they are assured the corners are clear. The city also benefits because it lessens the pressure to devote enforcement time and money to ticketing.



Daylighting on Bayard Street in New Brunswick, NJ

Resources

- ❑ FHWA, 2009 Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways mutcd.fhwa.dot.gov/htm/2009r1r2/html_index.htm
- ❑ FHWA, PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System www.pedbikesafe.org/PEDSAFE/
- ❑ American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st Edition* (2004)
- ❑ NJDOT, *Pedestrian and Bicycle Compatible Design Guidelines* www.state.nj.us/transportation/commuter/pedsafety/planning.shtm
- ❑ Institute of Transportation Engineers (ITE), *State of the Practice Traffic Calming Guide* www.ite.org/traffic/tcstate.asp
- ❑ California Dept. of Transportation, *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians*, www.dot.ca.gov/hq/traffops/survey/pedestrian/





MID-BLOCK CROSSINGS

Pedestrians are at their most vulnerable when crossing major streets without the protection of a traffic signal. Nearly three-quarters of fatal or severe pedestrian crashes in New Jersey occur away from intersections.

Yet there are many situations that require people to cross at unsignalized or mid-block locations:

- ❑ Bus passengers typically need to cross the road on one leg of their trip, and there may not be a signalized crosswalk available.
- ❑ Students, employees and shoppers may need to access locations on the other side of the street from their school, business or residence.
- ❑ When intersections are far apart, those who rely on walking (or a wheelchair) for basic transportation may be unable to walk to the nearest signal. And while desirable, it is not always practical to provide regularly spaced intersections on major roads.

For all of these reasons, it is important to be able to provide safe mid-block crossings where the need is greatest.

Creating Safe Mid-Block Crossings

An effective mid-block crossing is one that: 1) encourages pedestrians to cross at the safest locations, 2) makes them visible to drivers both day and night, and 3) allows drivers to see and react to pedestrians in time to stop safely.

Simply marking a crosswalk, with no other action to slow traffic or draw attention to pedestrians, may do little to increase safety—in fact, it may increase pedestrian risk. Features that may enhance motorist attention and compliance with crosswalks include:

- ❑ Traffic calming, including pavement markings and other visual cues that encourage lower speeds near crosswalks;
- ❑ Crosswalk lighting that makes pedestrians clearly

visible to motorists at a distance;

- ❑ Advance signing, centerline signs, and/or lighted overhead warning signs or beacons that draw attention to the crosswalk.

Suitable Locations for Mid-Block Crossings

Mid-block crosswalks should be located where pedestrian demand exists—typically on a walking route that pedestrians use regularly, where motorists are more likely to expect pedestrians. They should be located where drivers will have sufficient time to react and stop for a pedestrian. Depending on roadway conditions and visibility, this may mean limiting mid-block crosswalks to areas with a speed limit of 30 mph or less. If prevailing speeds exceed this amount, it may be necessary to take extra steps:

- ❑ Slow traffic approaching on either side of the crosswalk with traffic calming measures;
- ❑ Shorten the crossing distance with a curb extension or crossing island;
- ❑ Enhance the visibility of the crosswalk with measures such as extra signage, lighting, or a raised crosswalk, and/or
- ❑ Provide extra protection through the use of a special beacon (described below).

Special attention should be paid to providing safe crossings between bus stops, which are generally placed in pairs, one on each side of a roadway. If the bus stops are not near a signalized intersection, an effective mid-block crossing should be designed. Remember that during the winter months, commuters using these bus routes may need to cross in the dark and the crosswalk will need pedestrian-scale lighting.





Mid-Block Crossings

High-Visibility Designs

Crosswalk designs can vary to suit the type of roadway and adjacent land uses. Designs suitable for a local “Main Street” shopping area may differ from those on a rural highway. Factors to consider are the striping pattern to be used, signage, lighting, parking buffers, accessibility, and methods for enhancing pedestrian protection.

Striping Pattern

Striping patterns and materials affect a crosswalk’s visibility and effectiveness. A “piano key” pattern of longitudinal white stripes, parallel to the travel lanes and the driver’s field of vision, and made of retroreflective thermoplastic, enhances crosswalk visibility.

Many towns in New Jersey have experimented with textured crosswalk treatments, such as brick pavers. While these may enhance the appearance of a streetscape, they are not as visible to drivers as longitudinal white stripes. Existing textured crosswalks can be enhanced by adding white stripes along each edge.



“Piano key” crosswalk pattern, “stop for pedestrian sign,” and “pedestrian warning sign” in Glassboro, NJ

Signage

Mid-block crossings should be accompanied with signs or markings to alert drivers that a crosswalk is ahead.

- Fluorescent yellow-green pedestrian warning signs (MUTCD number W11-2) and arrow placards (MUTCD number W16-7p) placed on each approach to a crosswalk help make motorists aware of a mid-block crossing. Advance pedestrian warning signs (MUTCD number W11-2 with W16-9p) are also useful in locations where motorists may not expect pedestrians.

- On lower speed roadways, centerline “stop for pedestrian” signage (MUTCD number R1-6a) can help alert drivers to a crosswalk.
- On higher speed, multi-lane highways, more prominent signage treatments may be needed, such as lighted flashing beacons.

Lighting

- Lighting is one of the most overlooked features needed for effective crosswalks, yet it is critical for pedestrian safety. Standard roadway lighting often fails to illuminate pedestrians effectively, and decorative sidewalk lighting is often insufficient to light up the crosswalk area.

Crossing lighting should be installed at least 10 feet ahead of the crosswalk rather than overhead. This design will light the side of the pedestrian facing the driver, increasing contrast and enhancing visibility. (See *lighting toolkit*)

Parking Buffers

Crosswalks should be free of visual obstructions, including parked cars and vegetation. According to New Jersey law, on-street parking is not permitted within 25 feet of a crosswalk. When parking encroaches on a crosswalk, drivers have much less time to react to a pedestrian entering the crosswalk. In downtown areas, curb extensions can be used to prevent parking encroachment at crosswalks, make pedestrians more visible, and shorten crossing distances.



Pedestrian warning sign (above)
“Stop for pedestrian” sign (right)





Accessible Design

Mid-block crosswalks should fully accommodate persons with disabilities:

- ❑ Walking surfaces should be smooth.
- ❑ A level landing should be provided at the top of each ramp, and a flush transition at street level.
- ❑ Curb ramps should lead directly into the crosswalk and toward a ramp on the other side. If crossing islands are used, these must also be compliant with the Americans with Disabilities Act (ADA).
- ❑ Detectable surfaces should be used to accommodate pedestrians with vision restrictions.

Providing Additional Protection

For crosswalks on wide or high-speed roadways, or on corridors with a history of pedestrian crashes, additional measures may be used to enhance pedestrian protection. These include crossing islands, raised crossings, and two newer types of pedestrian beacons.

Crossing Islands

On wide streets, pedestrian safety and comfort can be greatly enhanced by installing crossing islands that allow a road to be crossed in two stages. Also known as median refuge islands, they shorten the time that a pedestrian is exposed to conflicts with vehicles. Crossing islands have been demonstrated to reduce pedestrian-vehicle incidents significantly.

Raised Crossings

A raised pedestrian crossing elevates the crosswalk to the height of the sidewalk, with sloped sides that function much like a speed table. Raised crossings serve as a traffic calming device, forcing motorists to slow down as they approach the crosswalk; they also increase pedestrian visibility. Studies have found that raised crossings increase driver compliance with crosswalk laws.



High visibility crosswalk and crossing island
Image: pedbikeimages.org

Pedestrian Hybrid Beacon (PHB)

Pedestrian Hybrid Beacons, also known as HAWK signals, are overhead beacons that are dark until activated (by a push button or detector), then function somewhat like a traffic signal with a sequence of flashing yellow, steady yellow and red light. They include an overhead sign labeled “CROSSWALK STOP ON RED” and countdown pedestrian signal heads to control pedestrian crossings. The Manual on Uniform Traffic Control Devices (MUTCD) provides guidance on the use of PHBs. An FHWA study found PHBs highly effective in reducing pedestrian crashes.



An NJDOT study found that motorists were much more likely to stop for pedestrians following the installation of this hybrid beacon on Route 27 in Woodbridge.



Mid-Block Crossings

Rectangular Rapid Flashing Beacon (RRFB)

RRFBs are warning devices that supplement pedestrian warning signs at mid-block crossings. They are placed on both sides of a crosswalk and are activated by pedestrians manually, using a push button, or passively by a pedestrian detection system. When activated, an amber LED light flashes rapidly. Studies show that RRFBs at crosswalks are dramatically more effective at increasing driver compliance rates than traditional overhead beacons. NJDOT recently installed an RRFB on Route 4 in Elmont Park to help commuters cross between a parking lot and the train station. Guidance on the use of RRFBs is provided in FHWA's Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons, issued July 16, 2008.



Rectangular Rapid Flashing Beacon (RRFB) *Image: www.co.washington.or.us*

Enforcing Crosswalk Compliance

Both traffic and parking enforcement are important in establishing safe mid-block pedestrian crossing areas. Many drivers are unaware of the state law requiring them to “Stop and Stay Stopped” for pedestrians in a crosswalk.

- ❑ Compliance with the law can be increased significantly through a well-designed enforcement campaign. The Pedestrian Safety Enforcement topic sheet explains how municipalities can launch a successful enforcement program and improve safety at crosswalks throughout the community.
- ❑ In urban areas, such as town centers, parking enforcement is also key to preventing drivers from parking on or too close to the crosswalk and obstructing pedestrian visibility to drivers.

FHWA Resources for Midblock Crossing Locations

The Federal Highway Administration (FHWA) has identified a number of countermeasures that have proven effective in addressing midblock pedestrian issues. Information on selecting and using pedestrian countermeasures and typical costs is available in the recently updated Pedestrian Safety Guide and Countermeasure Selection System, **PEDSAFE**. Relevant countermeasures explained in the PEDSAFE guidance include:

- ❑ **Marked Crosswalks and Enhancements**
- ❑ **Crossing Islands**
- ❑ **Pedestrian Hybrid Beacons**
- ❑ **Rectangular Rapid Flashing Beacon**
- ❑ **Lighting and Illumination**
- ❑ **Parking Restrictions (at Crossing Locations)**
- ❑ **Raised Pedestrian Crossings**
- ❑ **Signing**

Resources

- ❑ Pedestrian Safety Guide and Countermeasure Selection System <http://www.pedbikesafe.org/PEDSAFE/>
- ❑ Manual on Uniform Traffic Control Devices <http://mutcd.fhwa.dot.gov/>
- ❑ Reid Ewing and Steven J. Brown, U.S. Traffic Calming Manual, APA Planners Press, 2009, available from American Planning Association
- ❑ ADA Best Practices Tool Kit for State and Local Governments <http://www.ada.gov/pcatoolkit/chap6toolkit.htm>
- ❑ AASHTO, Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004
- ❑ NJTPA Pedestrian Safety at and Near Bus Stops Study <http://www.njtpa.org/Planning/Regional-Studies/Current-Studies/Recently-Completed-Studies/Pedestrian-Safety-at-Bus-Stops-Study.aspx>





SAFE ACCESS TO TRANSIT

Walking and transit are complementary modes – all transit passengers are also pedestrians at some point on their journey, whether it is walking from their home or parked car to the transit station or from the station to their final destination.

In New Jersey, approximately 11% of residents take public transportation to work, more than twice the national average (5%), making the link between walking and transit usage particularly pertinent. Research shows that people are generally willing to walk $\frac{1}{4}$ - $\frac{1}{2}$ mile in order to access a transit stop, and even farther to reach commuter rail stations. Therefore, providing safe and convenient pedestrian access to transit is important for almost all New Jersey municipalities. Creating safe access often requires collaboration between local governments, transit operators, and property owners along the walking routes to bus stops and rail stations.

Bus Access

Bus ridership accounts for two-thirds of all transit passengers in New Jersey, with approximately 600,000 daily trips boarding at over 20,000 marked bus stops. Numerous factors impact safe pedestrian access to each bus stop, including the directness of the walking route, safety and security, and pedestrian friendly design.

Bus stop location itself is an important factor. Passenger demand, transit operations, traffic operations, and pedestrian safety are all considered when locating a bus stop. Towns may work with NJ TRANSIT to address safety concerns at existing stops by improving the infrastructure around the bus stop or evaluating suitable alternative bus stop sites.

A complete sidewalk network should be provided to bus stops within the approximately $\frac{1}{2}$ mile radius catchment area. Along walking routes, the number of driveways should be minimized to reduce the number of conflict points between pedestrians and motorists, particularly in the vicinity of

bus stops; NJDOT recommends driveways no closer than 100 feet from signalized intersections. At driveways, the sidewalk should continue through the driveway rather than being segmented by the driveway opening.

Bus stops are often placed in pairs (i.e. northbound/southbound or eastbound/westbound), generating pedestrian crossing activity on one leg of a passenger's round trip. Pedestrian crossing facilities should be provided to link the bus stop pair, including a marked crossing and enhancements such as high-visibility striping, curb extensions, pedestrian refuge islands, signage, beacons, or traffic signals, as appropriate. Near transit stops, pre-timed signal timing with a walk phase is preferred over a pedestrian activated walk phase, because the automatic walk signal alerts drivers to expect pedestrians in the area. Depending on the roadway, traffic calming measures may also be appropriate. A variety of resources from FHWA, AASHTO, NJDOT, and others provide guidance on design of pedestrian crossing facilities and traffic calming (see Resources section).



Bus stop in New Brunswick, NJ





Safe Access to Transit

Bus stops must follow “universal design” guidelines, as required by the Americans with Disabilities Act (ADA), enabling access by the mobility impaired, as well as those with strollers, children, seniors, and others.

Pedestrian amenities such as bus shelters and benches can further enhance access. Upon request, NJ TRANSIT will install the bus shelter, while the requesting agency assumes responsibility for maintenance and liability. Street furniture, such as benches, can be a part of a municipality’s master plan or streetscape design. Adequate lighting is also critical to enhance the visibility of waiting passengers and crossing pedestrians, as well as to improve security and comfort.

The North Jersey Transportation Planning Authority recently completed a study of pedestrian safety at and near bus stops. This included publication of a toolbox with more detailed information. (<http://www.njtpa.org/Planning/Regional-Studies/Recently-Completed-Studies/>)

Rail Access

Many of the same principles from ensuring safe pedestrian access to bus stops also apply to rail access, such as adequate sidewalk and crossing facilities, universal design, lighting, and education and enforcement strategies. Designing, constructing, and maintaining sidewalk networks, pedestrian crossings, and other infrastructure to support safe access to rail transit should consider the larger catchment area, potentially greater than a ½ mile radius, that a rail station may draw from.

Rail stations in more suburban environments are often constructed with large park-and-ride lots to accommodate passengers who live farther from the station. These parking lots can create challenges for pedestrians walking to the station. The pedestrian route through the parking lot should provide as direct a route as possible between the station and adjacent street sidewalk and major destinations.



Bus stop with no pedestrian facilities along NJ 42 in Turnersville (pictured left) was improved with sidewalk connections, bus stop pull off, and bus shelter (pictured above).





Pedestrian routes should be clearly delineated. Sidewalks can be constructed between rows of facing cars so that pedestrians do not walk in the aisles between parked cars, which creates conflicts with turning and backing vehicles. Pedestrian crossings within the parking lot and at driveway locations should also be clearly delineated and appropriate design treatments used to create a comfortable environment for pedestrians.

Traffic signal design and operation in the vicinity of the station should include pedestrian signal heads with countdown timers and adequate pedestrian clearance time. Other enhancements such as leading pedestrian intervals or exclusive pedestrian phases might also be considered.

Another challenge to safe pedestrian access to rail stations is any at-grade crossing of the rail line itself in the vicinity of the station. In 2010 and 2011, there were a total of 27 incidents involving NJ TRANSIT trains and pedestrians at at-grade crossings, resulting in 7 fatalities that were accidental in nature. In response, NJDOT and NJ TRANSIT worked together to evaluate these types of incidents and develop a short-term action plan incorporating engineering, education, and enforcement strategies, which are detailed in their February 2012 report - New Jersey Safety along



Pedestrian hybrid beacon provides improved pedestrian access across NJ 27 to Metropark rail station, where hundreds cross each day.



Pilot gate skirt improvements in Matawan, NJ aim to improve pedestrian safety at grade railroad crossings.

Railroads, Short-Term Action Plan. The plan calls for enhanced engineering safety treatments at-grade crossings and integrating educational cues into the grade crossing infrastructure.

Enhanced treatment options for rail crossings include gate skirts to deter pedestrians from ducking the gates, second train coming signs to warn of multiple trains, improved signage, and targeted educational and enforcement efforts.

Interagency Coordination

Interagency coordination is essential to creating and maintaining safe pedestrian access to transit. The bus stop or rail station is typically owned and operated by NJ TRANSIT or another transit agency, while pedestrian connections to the surrounding area will be constructed and maintained by state, county, local, and/or private organizations. The agencies should work together and coordinate efforts in order to develop a complete pedestrian network; consistent design treatments; and safe, comfortable, and convenient pedestrian access.



Safe Access to Transit

Resources

- ❑ NJTPA Pedestrian Safety at and Near Bus Stops Study <http://www.njtpa.org/Planning/Regional-Studies/Recently-Completed-Studies/>
- ❑ FHWA Pedestrian Safety Guide for Transit Agencies http://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/transit_guide.pdf
- ❑ FHWA Bus Stop Checklist http://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/ch1.cfm
- ❑ Transit Cooperative Research Program (TCRP) Report 19: Guidelines for the Location and Design of Bus Stops <http://www.trb.org/Main/Public/Blurbs/153827.aspx>
- ❑ Transit Cooperative Research Program (TCRP) Report 153: Guidelines for Providing Access to Public Transportation Stations http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_153.pdf
- ❑ Manual on Uniform Traffic Control Devices <http://mutcd.fhwa.dot.gov/>
- ❑ New Jersey Safety along Railroads – Short-Term Action Plan <http://katana.hsrrc.unc.edu/cms/downloads/NewJerseySafetyAlongRailroads.pdf>





SAFETY ASSESSMENT TOOLS

Safety Assessment Tools assist with the evaluation of the existing conditions for pedestrians in your municipality.

With a thorough analysis of existing conditions, communities can evaluate their strengths and weaknesses and begin to identify opportunities and remove constraints and barriers to pedestrian safety and mobility. Establishing an inventory of your municipality's existing pedestrian accommodations provides the framework for improving and expanding the transportation infrastructure for pedestrians

This toolbox item highlights a few of the Safety Assessment Tools available to communities in New Jersey including the Plan4Safety crash data analysis tool, road safety audits and walkability audits/pedestrian safety assessments. These tools can assist your municipality in establishing data-driven priorities for pedestrian safety capital improvements, one of the recommendations of the *New Jersey Pedestrian Safety Action Plan*.

Plan4Safety

Plan4Safety is a decision support tool created for the New Jersey Department of Transportation (NJDOT) by the Rutgers Center for Advanced Infrastructure and Transportation (CAIT). The web-based platform integrates statewide crash data from January 1, 2003, to the latest released with roadway characteristic data, calculates statistical analyses, incorporates network screening layers and models, and includes visual analytical tools (GIS).

Plan4Safety assists engineers and planners in identifying problem locations and trends, which can then be addressed with engineering improvements and enforcement efforts. Currently, public agency engineers, planners, researchers, and police officers are able to obtain full access to Plan4Safety and use the system for free. Training and support is also part of the services offered for free. Private agency engineers are not currently able to obtain a user account, but can access the system by contacting CAIT at 848-445-3113.

For more on Plan4Safety, visit cait.rutgers.edu/tsrc/plan4safety



Screenshot from Plan4Safety showing Pedestrian Crash Locations in Newark, NJ





Safety Assessment Tools

Pedestrian Safety Road Audits

A Pedestrian Safety Road Audit (PSRA) is a safety performance examination by an independent, multidisciplinary team. The team identifies and evaluates any potential road safety issues that may be hazardous to all potential road users, including pedestrians. Road safety audits can be used in any phase of project development from planning and preliminary engineering, design, and construction. PSRAs can also be used on any sized project from minor intersection and roadway safety retrofits to mega-projects. NJDOT's Pedestrian Safe Corridor Program uses PSRAs in the development of pedestrian-related countermeasures. NJDOT's experiences with PSRAs (aka Safety Impact Teams) have resulted in the implementation of over 100 low-cost, quick-fix countermeasures during the last 5 years. These measures included upgraded and/or new signing and pavement markings, upgraded and/or new traffic signals including pedestrian enhancements, minor geometric improvements, and lighting.

Resources and Helpful Link on Road Safety Audits:

- ❑ **FHWA Road Safety Audits Webpage** explains the RSA process, provides guidelines, prompt lists and case studies. Local municipalities can also request peer assistance through the Roadway Safety Peer-to-Peer (P2P) Program - safety.fhwa.dot.gov/rsa
- ❑ **CAIT's New Jersey Local Technical Assistance Program (NJLTAP) and Transportation Safety Resource Center (TSRC)** offer a statewide Road Safety Audit service free to New Jersey towns and counties. For more, visit cait.rutgers.edu/tsrc/audits. CAIT's 'Conducting Road Safety Audits' course is offered periodically during the year. Check their main Training page (cait.rutgers.edu/cait/training) to see when the next session of this course is scheduled.
- ❑ The state's three **Metropolitan Planning Organizations (MPO's)** provide technical assistance on Road Safety Audits - NJTPA - www.njtpa.org; DVRPC — www.dvrpc.org; SJTPO - www.sjtpo.org



Road Safety Audit along Route 46 in Dover, NJ

Walkability Audits/ Pedestrian Safety Assessments

A walkability audit or pedestrian safety assessment is an unbiased examination/evaluation of the walking environment. The general purpose of an audit is to identify concerns for pedestrians related to the safety, access, comfort, and convenience of the walking environment. In addition to identifying problem areas, an audit can be used to identify potential alternatives or solutions (such as engineering treatments, policy changes, or education and enforcement measures). Walkability audits can be geared toward examining one or many specific types of facilities (e.g., an audit focusing on crosswalks, intersections, bus stops, school zones, sidewalks, etc.).

Informal audits can be performed by any individual or community group. It may be initiated by a pedestrian advocacy group, a municipal committee, recreation committee, or other group of residents such as a faith-based, neighborhood association or school-based group, or it may





be led by the municipal engineer, planner or public works director. The best audits include input from a variety of people including youth, seniors, people with disabilities and those that use transit. More formal audits (i.e., those that follow a standardized set of audit procedures) can also be conducted; these are usually performed by a multidisciplinary team of trained professionals, including engineers, planners, transportation researchers, pedestrian and bicycle specialists, and others.

Resources and Helpful Links on Audits and Assessments:

- ❑ **North Jersey Transportation Planning Authority Walkable Community Workshops** - These half-day workshops train participants to identify barriers to walking and ways to improve pedestrian safety. Workshop locations are selected by NJTPA staff in consultation with county and city officials throughout the region. www.njtpa.org/Planning/Regional-Studies/Bicycle-Pedestrian.aspx
- ❑ **NJ Safe Routes to School Resource Centers Walk/Bike Assessments** - Walk and bike assessments are tools to help schools, parents, students, and the community identify barriers that may make it difficult or dangerous for children to walk or bike to school. These assessments evaluate the sidewalk, road and neighborhood conditions around the school, and will identify key safety improvements that can make walking and biking a safer and easier way to

get to school. www.saferoutesnj.org/resources/stp/walkbike-assessments/

- ❑ **Pedestrian and Bicycle Information Center (PBIC) Walkability Checklist** — Basic checklist developed to determine the walkability of an area and provide ideas for improving pedestrian conditions. katana.hsrc.unc.edu/cms/downloads/walkability_checklist.pdf
- ❑ **AARP’s Sidewalks and Streets Survey** — Adapted from PBIC’s Walkability Checklist and focusing on older pedestrians, this toolkit is designed so that communities can make walking safer by teaching small groups to take simple “walkability” surveys and to take recommended actions for community improvements. www.createthegood.org/toolkit/sidewalks-and-streets-survey-1
- ❑ **Pedestrian Mobility and Safety: Audit Guide** — This guide, co-developed by AARP and the Institute of Transportation Engineers (ITE), explains issues related to pedestrian safety and mobility and provides examples of audits in four jurisdictions. www.ite.org/PedAudits/
- ❑ The **Walkability Workbook** is a free set of documents and slide presentations providing guidance on everything needed to organize community walkability workshops, conduct walkability audits and prioritize changes for a better built environment. The workbook was developed by the Walkable and Livable Communities Institute, with support from the U.S. Environmental Protection Agency. www.walklive.org/project/walkability-workbook/



Walking audits and assessments guide communities in assessing the pedestrian environment and forming a vision for short- and long-term improvements.





Spotlight: NJAIM Participates in Elizabeth Walkability Audit

By: Andrew Bomberger

Date: June 18, 2013

Link to full article: njbikeped.org/njaim-participates-in-elizabeth-walkability-audit/

On Thursday, May 23rd, NJ Ambassadors in Motion (NJAIM) attended a walkability audit of six selected corridors in Elizabeth. This examination was conducted by the YMCA of Eastern Union County, Elizabeth Branch and Michael Baker Jr., Inc., with assistance from the Alan M. Voorhees Transportation Center. Also participating in the audit were New Jersey Department of Health (NJDOH), New Jersey Department of Transportation (NJDOT), North Jersey Transportation Planning Authority (NJTPA), Meadowlink TMA, Groundwork Elizabeth, the City of Elizabeth, and the Elizabeth Police Department. A ShapingNJ grant, awarded to the YMCA of Eastern Union County, funded the audit in an effort to promote physical activity in New Jersey through healthier lifestyles. The audit sought to identify deficiencies and barriers that limit walkability in the study area and highlight opportunities to enhance connectivity, mobility, and safety.

A total of 16 people (split into 3 groups) audited the six major transportation corridors. These corridors were selected through a comprehensive process that included public participation and data collection and analysis. Each group walked their designated corridors and observed sidewalk conditions, road widths, driver habits and the general surroundings. Auditors also noted the presence of ADA-compliant curb ramps, marked crosswalks and pedestrian signals at intersections. Special attention was paid to complex intersections and other barriers to pedestrian movement. After the audit was complete, each group discussed the issues that they encountered and determined a rating for each corridor. A score (1 – 6) was determined for each of the following five categories to produce a total walkability score, with 30 being the maximum attainable: Did you have room to walk? Was it easy to cross the streets? Did drivers behave well? Was it easy to follow safety rules? Was your walk pleasant?



Bushes obstructed a sidewalk along the audit route.
Image: Michael Baker Jr., Inc.

Each team presented their findings and summarized the major issues present in each corridor. Following the presentation of the individual corridors, the entire group discussed common themes and conditions present throughout the city. Among these were a lack of crosswalks and pedestrian signals, inadequate sidewalks, illegally parked vehicles, and unnecessarily wide streets. These issues and deficiencies will be formally summarized in a report by Michael Baker Jr., Inc., which will be presented to the YMCA of Eastern Union County. The recommendations in the report can be used to improve the pedestrian environment in these corridors, enhance walkability, and reduce the likelihood of pedestrian-vehicle crashes in the City of Elizabeth.



Ambassador Andrew Bomberger presented his group's walkability audit findings.





PEDESTRIAN LIGHTING

Darkness is a well documented factor correlated with more severe pedestrian crashes. It significantly reduces pedestrian visibility to motorists, and hence reduces driver reaction time in a crash event.

In New Jersey, nearly three-quarters of all fatal pedestrian crashes occur during dark, dawn, or dusk conditions. Therefore, providing appropriate lighting is an important pedestrian safety countermeasure and one of the focal points of the *New Jersey Pedestrian Safety Action Plan*. Local governments have a vital role in ensuring adequate pedestrian lighting, along with roadway owners and utility companies.

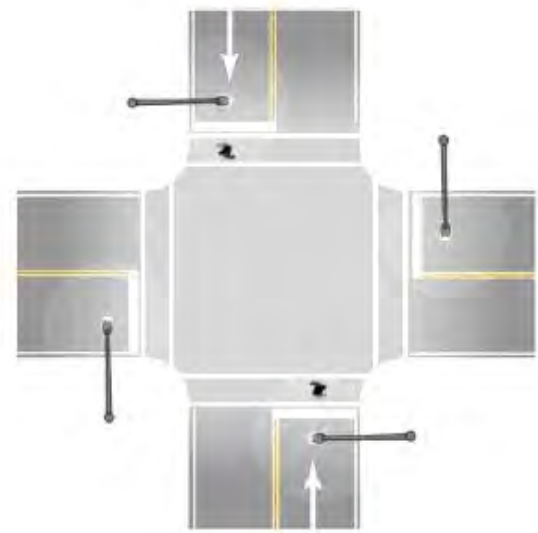
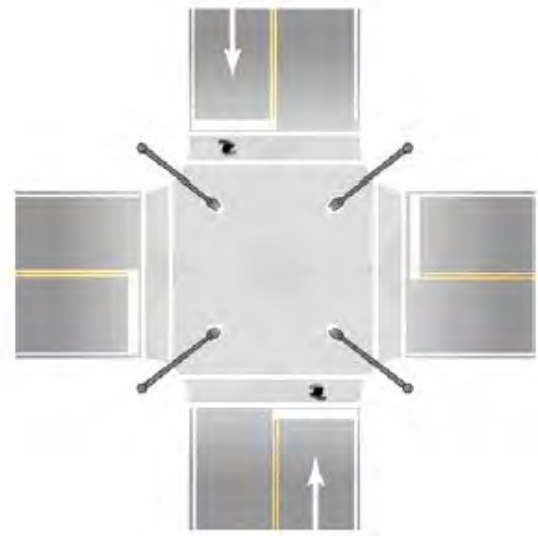
When to Install

In general, lighting should be provided wherever pedestrians are present during nighttime hours. Lighting falls into two of categories: pedestrian crossings and corridor lighting.

Crossing Lighting

Crosswalk lighting can substantially enhance pedestrian safety. Illumination from vehicle headlights alone often does not provide sufficient reaction time for motorists to identify and react to pedestrians crossing the roadway. Crossing lighting should be provided at signalized, unsignalized, and midblock crossings, particularly at:

- Locations where the speed limit is greater than 40 mph and the roadway does not have adequate pedestrian conflict elimination
- Intersections, access points, and decision points adjacent to changes in roadway alignment and cross section
- Connections to transit
- Areas adjacent to pedestrian generators and parking lots, such as shops, schools, parks, community centers, and places of worship
- Urban areas



(Above) Traditional intersection lighting layout. (Below) New design for intersection lighting layout for crosswalks.
Image: FHWA

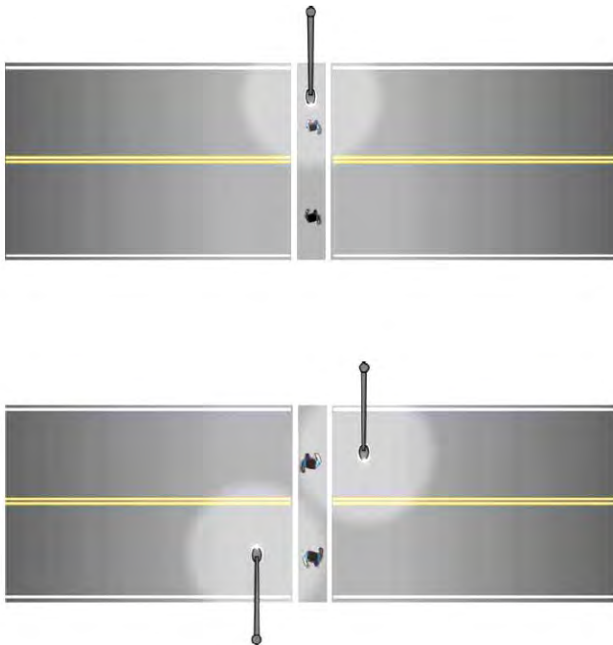




Pedestrian Lighting

- ❑ Pedestrian refuge islands
- ❑ Locations where problems with nighttime visibility have resulted in more frequent vehicle-pedestrian conflicts

Crossing lighting should be installed at least 10 feet ahead of the crosswalk rather than overhead. This design will light the side of the pedestrian facing the driver (i.e. front lit rather than back lit), increasing contrast, enhancing visibility, and facilitating facial communication between the pedestrian to the driver.



(Above) Traditional midblock crossing lighting layout.
(Below) New design for midblock crossing lighting layout.
Image: FHWA

Corridor Lighting

Street lighting should be designed to illuminate the sidewalk area as well. However, this is often insufficient. Pedestrian scale lighting supplements street lighting and improves pedestrian comfort and security, creates a sense of place, and benefits pedestrians with visual impairments. It encourages walking, improves access to transit and other services, and extends the hours that a business district is active.

Pedestrian scale lighting should be considered in shopping

districts, downtowns, and urban areas with high pedestrian volumes. Streets that connect a community to major destination points, multimodal facilities, and areas with pedestrian safety or security concerns should also be considered.

Pedestrian scale lighting should be designed to provide a continuous, uniform level of light along the corridor. Light fixtures are typically approximately 15 feet tall and have lower levels of illumination than street lights, but have closer spacing to avoid dark zones. Luminaires that create a white light, such as metal halide, are recommended, as they may provide better facial recognition and greater comfort for pedestrians.

Maintenance

Once installed, both crossing and corridor lighting need to be properly maintained. In New Jersey, 5% of fatal pedestrian crashes occurred during dark conditions in locations where there is existing lighting but it was off at the time of the crash. Regular maintenance should ensure bulbs are replaced as they approach the end of their life cycle in order to maintain the proper luminance of each lighting fixture. In addition to the lighting fixtures, trees also need to be pruned regularly in order to maintain uniform illumination along the street and sidewalk. The required clearance between the foliage and light fixture will vary by tree type and light fixture type and height. Maintenance responsibility and a maintenance program should be coordinated between the relevant municipal departments, roadway owner, and utility company.

Resources and Helpful Links

- ❑ NJDOT Pedestrian Compatible Planning and Design Guidelines, 1996 http://safety.fhwa.dot.gov/ped_bike/docs/chapter1.pdf
- ❑ AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004
- ❑ FHWA Information Report on Lighting for Midblock Crosswalks, 2008 <http://www.fhwa.dot.gov/publications/research/safety/08053/08053.pdf>





ENFORCEMENT

Consistent enforcement of traffic laws is one of the most important steps a municipality can take to keep pedestrians safe within its borders. This includes enforcing crosswalk laws, speed limits and distracted driving laws, and issuing citations to pedestrians who engage in illegal risk-taking behaviors.

Consistent enforcement of local parking regulations is also important to prevent encroachment of parked cars in crosswalks, especially in busy urban areas. When cars and trucks park—or double park—in a crosswalk area, the driver’s view of the sidewalk is blocked, making it hard to see a pedestrian emerge in time to stop. This is a frequent cause of pedestrian injuries.



Vehicle encroaching on crosswalk

Crosswalk Enforcement Operations

PSE operations focus on enforcement of driver behavior at crosswalks. They range from occasional “spot” operations that can temporarily improve compliance to sustained, structured operations that are often coordinated with media outreach and education efforts. Such structured operations can change behavior for longer periods of time, with significant safety benefits.

Municipalities can also join forces to implement PSE along major regional thoroughfares. For example, in May 2013 six police departments in Essex County conducted a joint corridor enforcement operation on Bloomfield Avenue that combined media outreach, enforcement and education. This one day, highly visible program used the tag line “Ease off the Gas, Let Pedestrians Pass.” It resulted in 570 warnings issued, 87 summonses, and 657 total motor vehicle contacts.

Pedestrian Safety Enforcement

A key resource for local police departments is the Pedestrian Safety Enforcement (PSE) program sponsored by the NJ Division of Highway Traffic Safety (DHTS) with support from NJDOT. The PSE program provides a structured approach to crosswalk compliance enforcement, with training and support for local police officers. It addresses two important contributing factors to pedestrian crashes: driver knowledge of the law and driver yielding behavior. Many drivers are unaware of their legal responsibility to stop and stay stopped for pedestrians at a crosswalk in New Jersey.

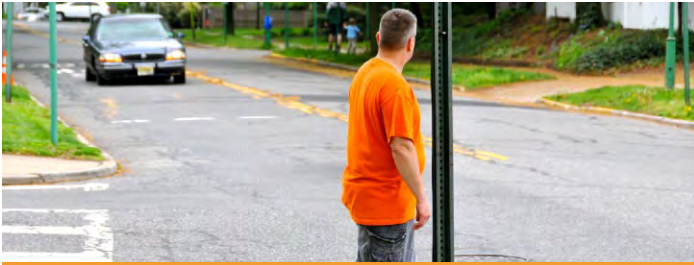


“Ease off the Gas, Let Pedestrians Pass” operation in Essex County





Enforcement



Motorist “Dilemma Zone” in PSE Operation

How it Works

The first step in a crosswalk operation is to select one or more crosswalks for enforcement. Next, a “dilemma zone” is established. The dilemma zone is defined as the point on the roadway from which the motorist has ample time to perceive a pedestrian in the crosswalk, react, and come to a stop for the pedestrian. This sets up an unambiguous and objective point from which officers can determine if motorists are granting the right-of-way to pedestrians in crosswalks.

After the dilemma zone is established, officers will enter a crosswalk when motorists are close to, but have not crossed the dilemma zone. Drivers who do not stop for the pedestrian are considered violators. A “spotter” is responsible for observing the operation and identifying violators by radio to “flagmen.” The flagmen safely flag violators into a pre-established safety zone where they are educated and either issued a warning or a citation. The flagmen also document identifying information about the vehicles in case a citation or the operation is challenged in court.

Getting Started with PSE

Training and funding support are available to help local police departments get started with PSE. DHTS and NJDOT offer regional trainings on PSE to local police departments, as well as arranging peer-to-peer trainings for neighboring communities. A refresher training film is also available. A 2012 survey of New Jersey police departments found that 71% thought PSE operations were easy to carry out.

Funding sources include DHTS pedestrian safety grants as well as supplemental funding from the New Jersey Pedestrian Safety Fund, which receives a portion of the revenue from each crosswalk violation citation.

Promoting Respect for Pedestrians

The benefits of PSE operations go beyond enforcement: they also provide an opportunity for media exposure, further promoting awareness of the law. They often result in a community dialogue about pedestrian safety, with spirited discussion on community message boards.

The communities of South Orange and Montclair carried out structured PSE operations over a six week period between June and July 2008. The average “yield to pedestrian” rate prior to enforcement was 11% in South Orange and Montclair. Following the PSE operations the average “yield to pedestrian” rate jumped to 32% in South Orange and 48% in Montclair. Operations have been carried out in these communities regularly since then and enforcement personnel and community residents have said that motorist behavior towards pedestrians has dramatically improved.

“I stop because now I’m trained that way. In Maplewood or South Orange, if you don’t stop for a pedestrian, you get a ticket. It’s just natural to me now.”

-Focus group participant in NJTPA’s Pedestrian Safety at and Near Bus Stops

Resources

- ❑ NHTSA Pedestrian Program Training and Assessment [http://www.nhtsa.gov/Driving+Safety/Pedestrians/Pedestrian+Safety+Training+for+Law+Enforcement+\(CD-ROM\)](http://www.nhtsa.gov/Driving+Safety/Pedestrians/Pedestrian+Safety+Training+for+Law+Enforcement+(CD-ROM))
- ❑ NJDHTS Police Resources <http://www.nj.gov/oag/hts/policeresources.html>
- ❑ NJDHTS Pedestrian Safety Information <http://www.nj.gov/oag/hts/pedestrian.html>
- ❑ NJDHTS Pedestrian Crossing Enforcement Warning Card http://www.nj.gov/oag/hts/downloads/Crosswalk_Warning_Palm_Card.pdf
- ❑ NJDHTS Grants <http://www.nj.gov/lps/hts/grants/>
- ❑ NJBPRC PSE Training Workshops <http://njbikeped.org/training-workshops>
- ❑ NJ Police Training - Pedestrian Decoy Operation Video (CEC) <http://vimeo.com/17448828>





SAFE ROUTES TO SCHOOL

The Safe Routes to School (SRTS) program is a means of addressing pedestrian safety within the area surrounding the school including the routes used by students accessing the school, especially by those walking or bicycling.

Using this guidance, communities can learn how SRTS projects, and activities such as improvements to sidewalks and crosswalks, construction of trails, or pedestrian and bicycle safety instruction, can provide substantial safety benefits to schoolchildren and the surrounding community.

What is the issue?

For a variety of reasons, parents have become more anxious about letting their children walk or ride bicycles to school. One way they deal with this concern is by driving their children to and from school, which only exacerbates traffic safety problems and further inhibits those who might otherwise walk or bike. As a result, fewer students are walking and biking and more parents are driving their children to school - even if they live less than a mile away. According to the Centers for Disease Control (CDC), 85 percent of children's trips to school are made by car or school bus; only 13 percent of school trips are made by walking or cycling. Ironically, it is those that drop-off and pick up their children from school that contribute to most of the traffic congestion around the school and pose the greatest risk to child pedestrians and bicyclists within the school zone and along school routes.

The condition and design of the environment surrounding the school also plays a contributing role in this issue. Roads that are "incomplete", or unsafe to travel along by walking and bicycling, pose risks to student travel and may influence parents' decisions with respect to allowing their child to walk or bike to school. Making physical improvements to correct these problems can give parents and students the confidence needed to walk or bike to school. The existence or lack of appropriate design treatments can have an effect on how children perceive and navigate the traffic environment as a pedestrian or bicyclist. In order to safely walk or bike along a street, or to cross a street along the way, children need facilities that are well-designed, well-built and well-maintained.



Morning drop-off at Sharp Elementary School in Camden, NJ.

How SRTS Can Help

The intention of the SRTS program is to cultivate a physical and social environment where primary and middle school students are able to walk and bicycle to school, thereby increasing both the number and safety of those who choose to do so. Proper design of the school environment as part of a comprehensive SRTS program can lead to a decrease in the number of pedestrian crashes involving school-aged children. The model for New Jersey's SRTS program is a comprehensive 5E approach intended to generate a cultural shift that makes walking and biking a safe, convenient and attractive option for parents and students to get to school. The 5E approach has been two-pronged: 1) Use the Engineering "E" as a means of providing communities with technical planning assistance and grant funding for infrastructure improvements to ensure that the two-mile area surrounding schools is safe, self-enforcing and traffic calmed; 2) Use the "E's" (Education, Enforcement, & Encouragement) to promote SRTS programmatic activities that nurture a child's cognitive and developmental skills, such as proper walking and biking behaviors, that will help reduce a child's risk of injury and enable him or her to independently navigate their way to school; and 3) Use the 5th "E", Evaluation, to track progress in achieving SRTS goals and making adjustments as needed.





Safe Routes To School

Resources to Get Started

NJDOT Safe Routes to School Program

NJ's SRTS Program is administered through the Department of Transportation and is led by the state's SRTS Coordinator. Periodically, NJDOT makes funding available for SRTS infrastructure projects to communities through a competitive grant program. Infrastructure projects may include the planning, design and construction or installation of sidewalks, crosswalks, signals, traffic-calming and bicycle facilities. Visit the NJDOT website for an overview of the SRTS program, resources, and success stories at www.state.nj.us/transportation/community/srts.

NJ Safe Routes to School Resource Center at the Alan M. Voorhees Transportation Center (VTC)

The NJ SRTS Resource Center assists communities looking to create safer and more accessible walking and bicycling environments by providing education, outreach, training, research, and information about best practices in policy and design. Through its SRTS Recognition Program, the Resource Center has developed a statewide community partnership structure that supports increased participation in education, encouragement and enforcement activities.

The NJ SRTS Resource Center is also responsible for training NJ's SRTS Regional Coordinators from each of NJ's eight Transportation Management Associations (TMAs) who then provide SRTS technical assistance services directly to New Jersey communities. For more information on NJ's SRTS Resource Center or to find your regional SRTS Coordinator, visit www.saferoutesnj.org.



Walk to school event in Tenafly, NJ



Walkability assessment led by Meadowlink TMA

SRTS National Partnership

The SRTS National Partnership is a non-profit organization that provides communities with assistance for developing safe walking and bicycling programs. New Jersey is one of the seven states participating in their Network Project which is made up of over 600 organizations, agencies, schools and professional groups. For more information on their SRTS resources related to advocacy, policy change, publications, best practices and technical assistance, visit www.saferoutespartnership.org.

Safe Kids USA

Safe Kids works globally to create safer, more walkable communities by teaching safe behavior to motorists and child pedestrians. Their "Walk This Way" program partners with FedEx to bring attention to pedestrian safety issues through awareness and advocacy activities, infrastructure improvements, research and education programs. For more information on how to bring this initiative to your community, visit www.safekids.org/walk-way. To find out about events hosted by the Safe Kids NJ Chapter visit safekidsnewjersey.com.

Other Resources and Helpful Links about SRTS:

- Brain Injury Alliance of New Jersey
www.brainybunch.info
- National Center for Safe Routes to School
www.saferoutesinfo.org
- Federal Highway Administration (FHWA) SRTS
www.fhwa.dot.gov/environment/safe_routes_to_school/





SENIOR MOBILITY

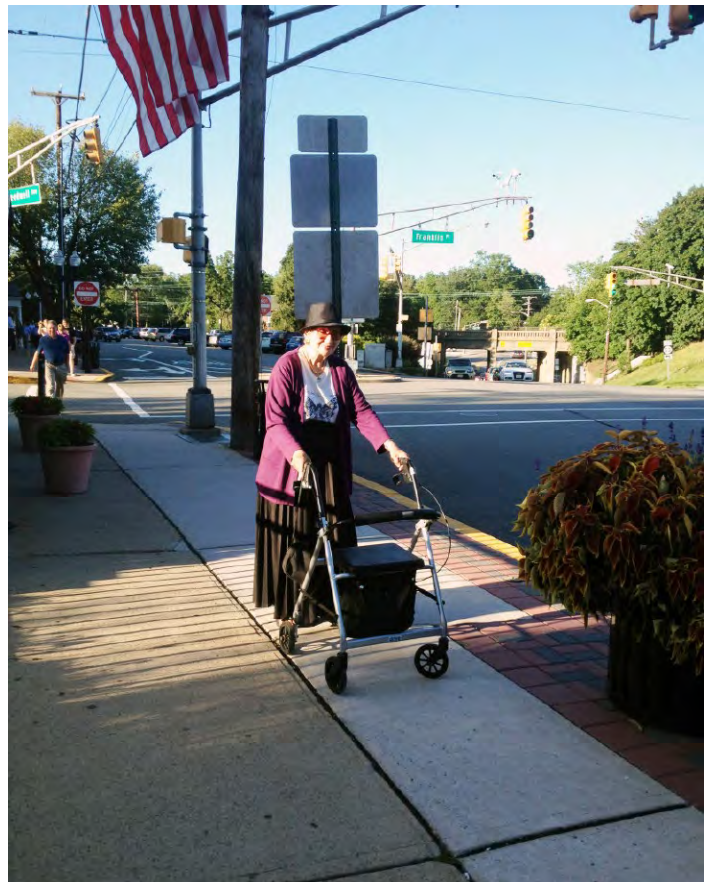
This toolbox item addresses issues related to older pedestrians and the impacts of age on pedestrian safety.

This is especially important since, as discussed in the *New Jersey Pedestrian Safety Action Plan*, those that fall within the 65 plus age category are over represented in the number of serious pedestrian injuries and fatalities in New Jersey. Communities will be able to also use this toolbox item to identify ways and resources to help them educate, plan and design for an aging population. Educating decision-makers and seniors on ways to improve mobility for seniors is an action in the *New Jersey Pedestrian Safety Action Plan*.

What's the Issue?

Aging in Place, also referred to as “Living in Place” is the ability to continue to reside in your home safely, independently and comfortably, regardless of age, income or abilities. For the aging population, there are hardships associated with this due to their lack of transportation options. According to AARP, about 20 percent of seniors today do not drive. Presently, half of all non-drivers age 65 or older—four million Americans—stay at home on any given day because they lack transportation. This can limit their ability to meet everyday travel needs such as going to the doctor, grocery shopping, visiting friends and family and attending religious institutions. According to Transportation for America, an advocacy coalition, by 2015 more than 15.5 million Americans 65-plus will live in areas where public transportation is inadequate or nonexistent. Therefore, these non-driving seniors looking to travel outside of their home must either walk or use other non-motorized modes of transportation.

For New Jersey’s aging population, walking can be risky. According to the NJ Bicycle and Pedestrian Resource Center, an average of 35 senior pedestrians (aged 65 and over) are killed in vehicular crashes in New Jersey each year. In order to address this issue, roadway designs and improvements should recognize and take into account the complexities associated with age-related changes that make senior pedestrians more susceptible to injury or fatality.



A senior pedestrian using a walker to travel along a sidewalk in Morris Plains, NJ.

These include a gradual decline in:

- Hearing
- Vision
- Balance
- Depth perception
- Physical mobility
- Gait

These factors can greatly affect the ability of senior pedestrians to safely walk their local streets, neighborhoods, and communities.





Senior Mobility

Design Considerations for Senior Pedestrians

Start at the planning stage

During the planning stage for each project involving new construction or reconstruction of an existing facility, planners and engineers should consider whether a problem that could affect the safe use of the facility by older drivers and pedestrians currently exists or may reasonably be expected based on current and projected use patterns. The Highway Design Handbook for Older Drivers and Pedestrians provides a checklist to help identify a problem by answering (YES or NO) to the following four questions:

- I. Is there a demonstrated crash problem with older drivers or pedestrians?
- II. Has any aspect of design or operations at the project location been associated with complaints to local, municipal, or county-level officials from older road users or are you aware of a potential safety problem at this location, either through personal observation or agency documentation, applying your own engineering judgment?
- III. Is this project located on a direct link to a travel origin or destination for which, in the judgment of local planning/zoning authorities or other local officials, older persons constitute a significant proportion of current users?
- IV. Is the project located in a census tract or zip code designation that has experienced an increase in the proportion of (non-institutionalized) residents age 65 and older, for the most recent period in which the population was sampled?

To answer these questions, you will need to obtain reliable crash data from your local police department or the Plan4Safety website. In compiling your crash data, you should use the three most recent years for which data are available and the data should be sorted by age, at a minimum. In order to identify problems related to an aging

population for the project location, you may need to reach beyond these sources. Additional sources include:

- Local government officials/Board of Supervisors/city council representatives.
- The New Jersey Department of Human Services Division of Aging Services or county Area Office on Aging
- The New Jersey Department of Health
- One of the Metropolitan Planning Organizations (MPOs) – NJTPA, SJTPO, or DVRPC

Consider walking speed

Walking speeds vary depending on age and ability. Senior pedestrians often have shorter strides, slower gaits, difficulty negotiating curbs and judging speeds of oncoming vehicles, and extended startup time before leaving the curb as compared to younger pedestrians. This results in a slower walking speed. In fact, many studies suggest that there is at least a 0.70-ft./sec. walking speed difference between older and younger persons. Both the MUTCD and FHWA provide guidance regarding walking speed for older pedestrians.

- The recommended walking speed for calculating Pedestrian Clearance Time is 3.5 ft/sec but a calculation of 3.0 ft./sec. (the speed prescribed by the current edition of MUTCD for slower pedestrians) can also be used as a “cross-check” to determine if there is sufficient crossing time for slower pedestrians, such as those in wheelchairs or who are visually impaired, to cross wide streets.
- FHWA’s Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians recommend an assumed walking speed of 2.8 ft/s for senior pedestrians. Mean startup time (from the start of the Walk signal to the moment the pedestrian steps off the curb and starts to cross) was 2.5 seconds for older pedestrians, compared to 1.9 seconds for younger pedestrians.





Conduct a Senior Mobility Assessment

Senior mobility workshops can help examine the challenges that may be unique to the senior pedestrian as a result of mobility, visual, auditory and cognitive impairments. Conducting these types of workshops can provide education and training to state, county and local community planners, engineers and other transportation stakeholders so that they can better accommodate seniors and arm themselves with information for future decision making.



Role playing during a senior mobility workshop, such as this one in Manchester, NJ, helps personify the challenges faced by older pedestrians with limited mobility.

Strategies for Educating Senior Pedestrians

Many senior pedestrians are in good physical condition and may feel they do not need to be educated on how to cross the street; however, providing opportunities for re-education might help them to become “defensive” walkers. The Pedestrian and Bicycle Information Center’s (PBIC) website, www.walkinginfo.org, provides general pedestrian safety messages geared towards Adult Pedestrians and suggest that messages that target senior pedestrians should include:

- The threats presented by cars making turns;
- Tips for crossing intersections slowly but safely; and
- Good choices of footwear (for better traction) and visible clothing (bright and reflective)



A senior mobility workshop was held for the Public Health Nurse Association.

In addition to these messages, PBIC suggests the following strategies for educating older pedestrians:

- Initiate campaigns to targeted settings/situations where older pedestrians may be concentrated (e.g., retirement communities, healthcare clinics/hospitals, libraries, churches, etc.).
- Contact established organizations, such as AARP, that may already have a strong network with the older pedestrian community.



Senior Mobility

Resources

Education

- ❑ Pedestrian and Bicycle Information Center, *Educating Older Pedestrians*, www.walkinginfo.org/education/messages-older.cfm
- ❑ National Highway Traffic Safety Administration, *Stepping Out – Mature Adults: Be Healthy, Walk Safely*, www.nhtsa.gov/people/injury/olddrive/SteppingOut/index.html

Design

- ❑ FHWA – Office of Safety’s Older Road User Program, *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*, www.fhwa.dot.gov/publications/research/safety/humanfac/01051/
- ❑ FHWA, *Pocket Guide to Improve Traffic Control and Mobility for our Older Population*, mutcd.fhwa.dot.gov/pdfs/pocketguide0404.pdf
- ❑ Pedestrian and Bicycle Information Center–*Designing for Special Pedestrian Populations*, www.walkinginfo.org/engineering/pedestrians.cfm

Planning and Development

- ❑ University of North Carolina Highway Safety Research Center, *Pedestrian Safety Workshop: A Focus on Older Adults*, www.rsa.unc.edu/psw/
- ❑ Transportation for America, *Aging in Place, Stuck Without Options*, t4america.org/resources/seniorsmobilitycrisis2011/
- ❑ AARP Public Policy Institute, *Aging in Place: A State Survey of Livability Policies and Practices*, assets.aarp.org/rgcenter/ppi/liv-com/aging-in-place-2011-full.pdf
- ❑ National Association of Area Agencies on Aging, *Livable Communities Program*, www.n4a.org/programs/livable-communities/

Many communities are interested in becoming more pedestrian-friendly. Older adults are one segment of the community who need to have the option to walk for errands, health benefits, socializing and other purposes.





MUNICIPAL PLANNING and PEDESTRIAN SAFETY

Land use patterns have an effect on pedestrian crashes. In New Jersey, it is not uncommon to find wide arterial roadways lined with shopping centers, apartment buildings, schools and office parks with signalized crossings few and far between, and minimal pedestrian accommodations, creating greater than average risk of pedestrian exposure to conflicts with motor vehicles.

While the *New Jersey Pedestrian Safety Action Plan* focuses primarily on actions to be taken by State or regional entities to address pedestrian safety, the counties and municipalities have an essential part to play by implementing a wide variety of complementary actions. These run the gamut from Engineering through Encouragement, Education, Enforcement, Emergency Services and Evaluation. As stewards of the local roadway system and with their responsibility for municipal planning, land use, zoning and site development, local governments have considerable influence over pedestrian safety. Here are some ideas to consider pursuing at the local level along with references to sources of additional information.

Policy

It is recommended that all municipalities adopt a policy statement or pass a resolution supporting improved access and safety for pedestrians. At the very least, these assertions are a recognition of need, express an intention to create pedestrian friendly places, and increase likelihood that more will be done in the future. Many municipalities in New Jersey have elected to show their commitment to all users of public rights-of-way by adopting and putting into effect a Complete Streets Policy and Implementation Plan.

As of November 2013, in addition to NJDOT's internal policy, 77 municipalities and 5 counties in NJ have adopted Complete Streets Policies.



Patterns of development that isolate housing from stores and businesses create barriers to safe walking.

Master Plan/Planning Studies

Pedestrian access and safety should be addressed in all planning activities, including the municipal master plan, redevelopment plans, the transportation element, or a stand-alone Pedestrian/Bicycle Plan or Pedestrian Plan.

These plans should:

- ❑ Identify existing and proposed elements of the pedestrian facility network including walkways and multi-use paths;
- ❑ Inventory problem locations/gaps in network including pedestrian crash locations;
- ❑ Include specific recommendations for pedestrian facilities;





Municipal Planning and Pedestrian Safety

- ❑ Incorporate or adopt by reference, standards, specifications, and design guidelines for pedestrian facilities;
- ❑ Identify funding responsibility for proposed improvements (municipality, developer, adjacent land owner); and
- ❑ Encourage the linking of residential developments with commercial areas or with other residential even when no roadway linkages are present by means of segments of multi-use paths.

If pedestrian safety is a “hot button” issue in your community, undertake the development of your own *Pedestrian Safety Action Plan*.

Parking Management

- ❑ In commercial areas, buildings should be located directly adjacent to the back of the sidewalk; do not place parking between the sidewalk and building frontages. In addition, limiting curb cuts enhances the pedestrian experience by increasing space for on-street parking, creating a buffer to street traffic, increasing space for landscaping, and reducing pedestrian and vehicle conflicts.
- ❑ Parking facilities serving multiple businesses are preferable to situations where individual stores each have their own parking facility. Allowing for shared parking can greatly reduce inefficiencies in parking supply and increase flexibility for parking requirements to be met through on-street parking or off-site facilities.
- ❑ Within large parking lots, pedestrians should be provided with well-marked pathways or corridors complete with alternate paving and/or raised crosswalks across vehicle paths.



Pedestrian access through the parking lot of the Bridgewater Commons Mall in Bridgewater, NJ.



Mixed-use development, like the Lumber Yard in Collingswood, encourages walkability with housing located near transit and businesses.
Image: NJ Future

Land Use, Site Planning & Zoning

The manner in which a municipality approaches land use planning, site development and zoning decisions is crucial to the creation and maintenance of an accommodating and safe pedestrian environment. Some of the ways municipalities can address pedestrian needs include:

- ❑ Develop a site review checklist to be used by developers to identify what is to be considered (relative to pedestrian access and safety) and what is to be included in site development and subdivision plans.
- ❑ Allow for mixed use development or suburban activity centers with requirements for a mix of land uses, connections to transit and pedestrian oriented site design in the zoning ordinance.
- ❑ Provide options in the zoning ordinance for traditional neighborhood development (TND) or neo-traditional site planning with requirements for the mix of land uses and pedestrian friendly streetscapes and roadway design requirements.
- ❑ Permit small scale development (services, restaurants) to locate within larger employment concentrations providing workers lunchtime or mid-day walking opportunities.
- ❑ Incentivize pedestrian amenities in exchange for increased Floor Area Ratio (FAR), additional square footage and reduced parking requirements.
- ❑ In shopping centers, offer incentives for architectural treatments that offer protection to pedestrians from the elements such as canopies or arcades.
- ❑ In Planned Unit Developments, require sidewalks along streets, in addition to internal pathways.
- ❑ Land Use boards should require applicants to complete missing sidewalks and crosswalks as a condition for approval.





Project Development

- Adopt state of the practice guidelines for the development and implementation of pedestrian accommodations.
- Implement an internal project review process to insure that pedestrian safety needs are addressed as a routine part of the project planning process.

Transit Access

If your community is served by transit, develop or plan for safe pedestrian access to transit centers, stations and bus stops.

- Consider pedestrian access and safety in bus stop siting.
- Develop bus stops in pairs, near intersections, across the road from one another.
- Provide crosswalks to enable transit patrons to walk to and from the stop when they get on and off the bus.



Bus Stop Safety Toolbox



NJTPA created a Bus Stop Safety Toolbox to showcase design and policy recommendations appropriate for bus stops throughout the region.



The Mayor of Montclair and Council members discuss Complete Streets with Bike Walk Montclair at their annual event.

Other

- Consider pedestrian access and safety in school siting.
- Seek the support and advice of local (pedestrian) advocacy groups; establish a formal Pedestrian Safety Advisory Committee.
- Assign staff to be responsible for coordinating the implementation of the municipality's pedestrian safety activities and evaluating their success.
- Provide professional development opportunities for local officials, planning board and zoning board members and planning, engineering and law enforcement personnel pertaining to pedestrian safety projects and programs.
- Maintain contacts with medical service providers located within or near the community; plan in advance which medical facilities will provide medical services to crash victims based on geography and apparent injury severity.
- Take advantage of planning technical assistance available through the NJDOT Office of Bicycle and Pedestrian Programs.



Municipal Planning and Pedestrian Safety

Resources

Policy

- ❑ NJDOT, *Making Complete Streets A Reality: A Guide to Policy Development*, www.state.nj.us/transportation/eng/completestreets/pdf/cspolicydevelopmentguide2012.pdf
- ❑ NJDOT, *Guide to Creating a Complete Streets Implementation Plan*, www.state.nj.us/transportation/eng/completestreets/pdf/cscreateimplementationplan.pdf

Master Plan/Planning Studies

- ❑ FHWA, *How to Develop a Pedestrian Safety Action Plan*, safety.fhwa.dot.gov/ped_bike/ped_focus/docs/fhwas0512.pdf
- ❑ PBIC, *Planning Activities*, www.walkinginfo.org/develop/activities.cfm

Parking Management

- ❑ NJDOT, *Highway Access Permits Overview*, www.state.nj.us/transportation/business/accessmgmt/
- ❑ Tri-State Transportation Campaign, *Parking Management*, www.tstc.org/reports/parking.pdf
- ❑ *Parking Matters: Designing, Operating, and Financing Structured Parking in Smart Growth Communities*, nj.gov/state/planning/publications/180-parking-matters-070106.pdf

Land Use, Site Planning and Zoning

- ❑ New Jersey Administrative Code, Title 5. *Community Affairs, Chapter 21. Residential Site Improvement Standards*, www.state.nj.us/dca/divisions/codes/codreg/pdf_regs/njac_5_21.pdf
- ❑ New Jersey Dept. of State, Office for Planning Advocacy, www.nj.gov/state/planning/
- ❑ NJDOT, *Mobility and Community Form Overview*, www.state.nj.us/transportation/community/mobility/
- ❑ Sustainability Institute at TCNJ, *Form-Based Code Implementation Workshop Materials*, si.pages.tcnj.edu/2012/12/06/form-based-code-implementation-workshop-materials/

Project Development

- ❑ NJDOT Complete Streets Checklist, www.state.nj.us/transportation/capital/pd/documents/CompleteStreetsChecklist.doc

Transit Access

- ❑ NJTPA, *Pedestrian Safety at and Near Bus Stops Study and Toolbox*, www.njtpa.org/Planning/Regional-Studies/Current-Studies/Recently-Completed-Studies/Pedestrian-Safety-at-Bus-Stops-Study.aspx
- ❑ Transportation Research Board (TRB), *Guidelines for the Location and Design of Bus Stops*, www.trb.org/Main/Blurbs/153827.aspx
- ❑ Transportation Research Board (TRB), *Transit Cooperative Research Program (TCRP) Report 153: Guidelines for Providing Access to Public Transportation Stations*, www.trb.org/Publications/Blurbs/166516.aspx
- ❑ Easter Seals Project Action, *Accessible Pathways to Bus Stops and Transit Facilities: A Process Guide; Toolkit for the Assessment of Bus Stop Accessibility and Safety; and Universal Design and Accessible Transit Systems*, www.projectaction.org/Initiatives/Livability.aspx

Other

- ❑ FHWA, *PEDSAFE - Pedestrian Safety Guide and Countermeasure Selection System*, www.pedbikesafe.org/PEDSAFE/
- ❑ FHWA, *Manual on Uniform Traffic Control Devices (MUTCD)*, mutcd.fhwa.dot.gov/hm/2009r1r2/html_index.htm
- ❑ The American Association of State Highway and Transportation Officials (AASHTO), *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004 (AASHTO Pedestrian Guide)
- ❑ Institute of Transportation Engineers (ITE), *Design and Safety of Pedestrian Facilities*, safety.fhwa.dot.gov/ped_bike/docs/designsafety.pdf
- ❑ NCHRP, *Report 500, Vol. 10, A Guide for Reducing Collisions Involving Pedestrians*, www.trb.org/Main/Blurbs/154863.aspx



NEW JERSEY

