AMATS Mid-Block Crossing Analysis

December 2014

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Introduction

Like any form of transportation, walking generates both positive and negative effects. On the positive side, walking provides great exercise, it allows one to experience and interact on a deeper level with the local community, it is free and in highly congested areas or for short trips, it can be the fastest way to arrive at one's destination. There are downsides too: walking exposes an individual to extreme weather conditions, it can be difficult for the elderly or those with disabilities, and perhaps most importantly, conflicts with motorists can make it downright dangerous.

To avoid some of the inconveniences associated with walking, pedestrians will often take the most direct route to their destination, regardless of whether the shortest route is completely legal or safe. For example, pedestrians in the middle of a long block who need to cross a street to get to the opposite side are unlikely to walk to the end of that block to cross at a legal, signalized intersection. More likely, they will instead cross the street directly in front of their intended destination – particularly those who are pressed for time, those who find walking particularly strenuous or anyone caught in the middle of a rain or snow storm.

As the transportation planning agency for the greater Akron region, the Akron Metropolitan Area Transportation Study (AMATS) is committed to partnering with our member communities to provide safe, comfortable and legal rights-of-way for pedestrians to reach their intended destinations. For this analysis, AMATS analyzed the entire region to identify locations at which mid-block pedestrian crossings are either common or very likely based on a number of factors (see *Methodology* section). The analysis will also identify several planning/engineering solutions to create safe, legal mid-block pedestrian crossings, and will identify the effectiveness of each of these solutions. By providing safe, convenient mid-block crossing locations, pedestrians are channeled to specific crossing points, minimizing random "darting" across busy streets and allowing motorists to be made more aware of their potential presence.

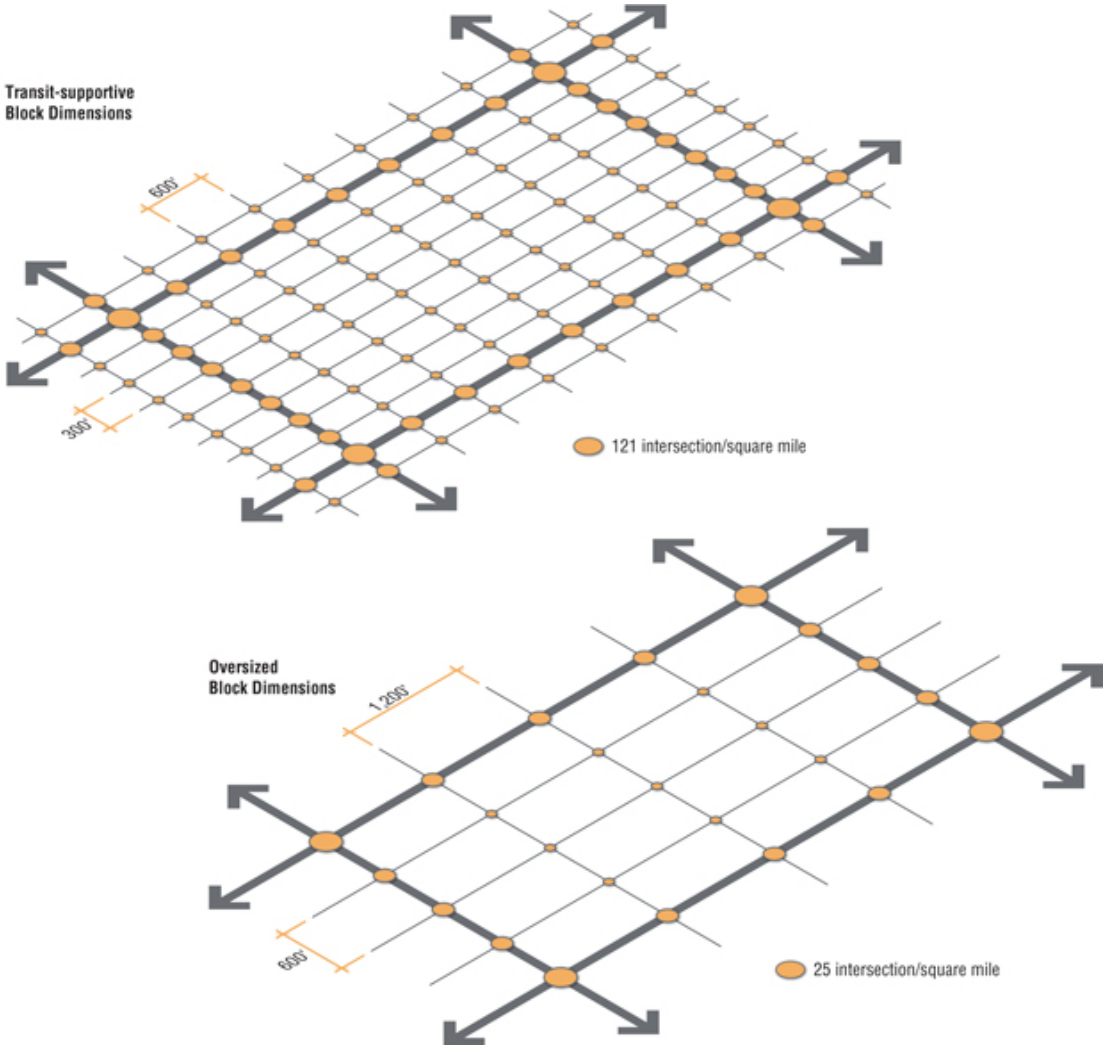
Severity of the Problem

According to the *AMATS 2010-2012 Pedestrian Crashes* report, of the 459 total vehicle/pedestrian crashes in the AMATS area between 2010 and 2012, 20.3% occurred at mid-block locations. As one can imagine, pedestrian collisions with vehicles typically end in injury (86% of crashes) and sometimes death (11% of all crashes). The frequency and severity of mid-block pedestrian crashes is the primary purpose AMATS has undertaken this mid-block crossing analysis of our region.

A Problem Compounded by Decentralization

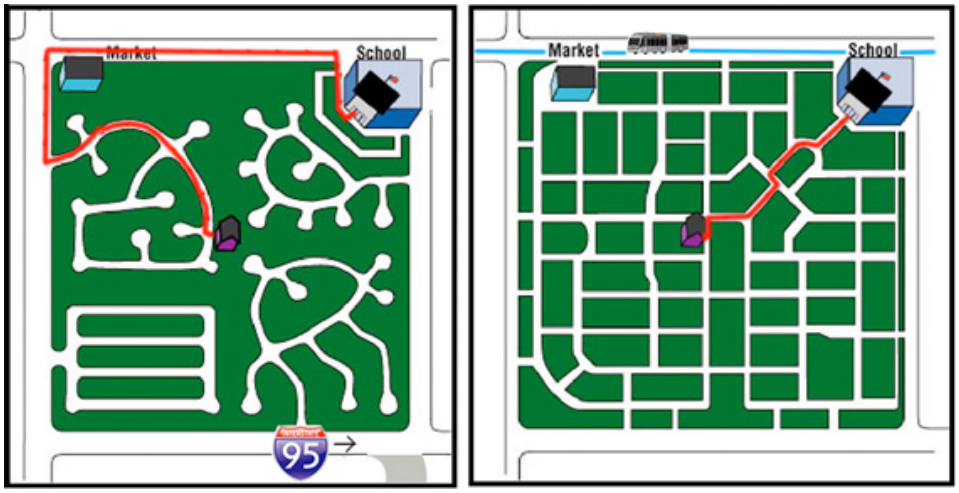
Although pedestrians can be found darting mid-block across the street in urban areas (in a hurry to catch the bus, late for work or school, etc.), urban areas generally have short blocks and a grid system that pedestrians are more willing to utilize to cross at a standard intersection. As land development has become more decentralized through suburbanization, the resulting affect on roadway, traffic and development patterns has compounded the problem in four major ways:

1. Blocks are Longer – since suburban areas are developed with the car, and not typically the pedestrian, in mind, small blocks are considered a barrier to smooth traffic flow. To accommodate vehicles and land-intensive automobile-oriented land uses (ex. car dealerships, big-box retail centers, drive-through services, etc.), roadways, and therefore intersections, are spaced much farther apart than in traditional town centers, whose development predates the dominance of the automobile. Long blocks create a great disincentive for any area pedestrians to walk long distances to cross at legally marked intersections, encouraging them, instead, to cross at a mid-block location closest to their intended destination.



Example of smaller, traditional blocks vs. larger suburban "blocks" *(Image courtesy of www.PACEBus.com)*

2. <u>Blocks are Irregular and Disconnected</u> – As automobile use increased in America, planners and engineers recognized the need to slow down traffic through residential areas. They typically accomplished this by creating curvy, disconnected streets, discouraging non-local automobile access through the use of dead-end cul-de-sacs and limited neighborhood access points. Ironically, these development patterns, which were created to buffer the pedestrian from high-speed, "through" traffic actually *discourage* pedestrian travel. Because streets are disconnected, the most direct path might involve an intolerably out-of-the-way walk. In response, most potential pedestrians simply opt to make their trip by car. Those who *do* walk will generally find or create shortcuts, whether safe and legal or not.



Suburban street patterns vs. traditional urban street grid *(Image courtesy of www.streetsblog.org)*

3. Traffic Speeds are Higher – The automobile-oriented development patterns found in most suburban areas incorporate roadways engineered to move traffic quickly and efficiently. In addition to less-frequent intersections (as previously described), these roadways often include more lanes, wider lanes, synchronized traffic lights to maximize traffic flow and the intentional omission of potential obstacles (ex. street trees) – all of which contribute to higher average traffic speeds. The frequent intersections and small blocks prohibit the rapid acceleration of automobiles in urban areas, resulting in slow traffic and pedestrian safety. The high speeds in more suburban commercial areas (often 35 to 45 mph) are very dangerous for pedestrians and require large gaps in the traffic flow to safely cross a street – gaps that are not likely to occur during business hours.

4. Drastically Shifted the Motorist to Pedestrian Ratio – In all but the most densely populated urban areas (Manhattan, the Chicago Loop, large university campus areas, etc.), vehicles greatly outnumber pedestrians. Where pedestrians are not anticipated or in the minority, motorists tend to give the occasional pedestrian very little regard and often assume he or she has the right-of-way, demonstrating an unwillingness to yield to pedestrian activity.

Methodology

For this mid-block crossing analysis, AMATS internally developed a methodology to identify locations at which to propose mid-block crossing treatments. The methodology and assumptions used for this analysis are as follows:

Preliminary Mid-Block Crossing Location Identification – using satellite-based images of the AMATS area, combined with the use of street-level field observations, the following variables were used to identify potential mid-block crossing locations:

- Locations where land uses are expected to generate high levels of pedestrian activity
    - Grade schools, universities, civic/government facilities, commercial areas, transportation nodes, recreational attractions, parks/trails, high-density residential, large faith-based facilities, etc.

- Parking lots/garages located across the street from an important destination
    - Hospitals, university buildings, government buildings, sports facilities, etc.

- Transit presence – identified stops located across the street (at mid-block) from areas expected to generate high pedestrian activity
    - Especially high-density student and low-income housing communities

- Cross reference other existing AMATS plans, reports and/or analyses
    - Latest pedestrian crashes report, pedestrian plan, transit plan, etc.
    - Identify areas where pedestrian/vehicle crashes occurred at mid-block locations

- Input from local communities, especially from Safe Routes to School or similar pedestrian analyses

Characteristics of Mid-Block Crossing Locations – once the above criteria initially identified a potential mid-block crossing location, the local area was analyzed for the following characteristics. If most of the characteristics were present, the location was generally added to the list of recommendations presented later in this analysis.

- Long blocks were present (typically > 400 feet in length)
- Significant levels of anticipated pedestrian activity
- High posted speed limits (>25 mph)
- Traffic volumes making street crossings difficult/dangerous
- Unsignalized intersections – even the existence of intersections (particularly “T” intersections or off-set roadway intersections) were assumed as equivalent to mid-block crossings if they were unsignalized and cross major arterials. Although legal intersections exist, they are highly unsafe across high-speed/volume roadways and often connect major pedestrian attractions

Areas Where Mid-Block Crossings may NOT be Warranted – Areas may have been identified using the initial criteria, but if any of the following characteristics were present, they were generally NOT recommended as potential mid-block crossing locations.

- Urban areas with frequent intersections and crosswalks – it would be safest and most cost effective to simply encourage pedestrians to use existing infrastructure
    - In these locations, block sizes were small and a well-established street grid allows for frequent pedestrian crossing locations

- Low traffic volumes
    - Streets functionally classified as local roadways frequently do not carry traffic or pedestrian volumes warranting enhanced mid-block crossing infrastructure

- Low traffic speeds – particularly residential areas

- Infrastructure undesirable – in some residential or historic district areas, the addition of pavement markings, bright signage, flashing beacons, etc. may actually create clutter and undesirable visual "noise"

Areas Omitted from Analysis – Locations where major, pedestrian-oriented projects are currently (or soon to be) underway were omitted from this analysis, as they are already carefully considering enhanced pedestrian infrastructure in their final designs. Areas include:

- Portage Crossing in Cuyahoga Falls (the intersection of State Rd and Portage Trail)
- East Summit Street redevelopment in Kent, near Kent State University

Key Pedestrian Statistics and Technical Considerations

The Transportation Research Board (TRB) has conducted advanced engineering studies to derive many useful statistics to consider prior to implementing any local pedestrian improvements. The following data is presented in the TRB's *Improving Pedestrian Safety at Unsignalized Crossings* report, located at:

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf

Average Walking Speed

The average walking speed of pedestrians is vital to understanding how mid-block crossing solutions should be implemented. A typical rule-of-thumb industry standard is that the average pedestrian walks 4.0 feet per second. Therefore, it would take the average pedestrian approximately 15 seconds to cross a 60 foot wide arterial roadway. Clearly, however, older and/or disabled pedestrians would need additional time to cross. According to the TRB's analysis, average walking speeds for different types of pedestrians are as follows:

Average Intersection Crossing Speed by Pedestrian Classification

Pedestrian Classification	Average Crossing Speed (in feet per second)
Pedestrians without walking difficulty	5.58
Pedestrians with walking difficulty (all types)	4.42
Cane or crutch	2.62
Walker	2.07
Wheel chair	3.55
Immobilized knee	3.50
Below knee amputee	2.46
Above knee amputee	1.97
Hip arthritis	2.24 to 3.66
Rheumatoid arthritis (knee)	2.46

Source: Transportation Research Board

Walking Characteristics by Group

Another useful resource available in the Transportation Research Board's analysis is a compilation of different pedestrian groups and characteristics commonly expressed by each particular group. A community's understanding of its local pedestrian mix should consider these characteristics when determining the most appropriate mid-block crossing treatment to implement in a particular area. The TRB's categories and characteristics are as follows:

Young Children – At a young age, children have unique abilities and needs. Since children this age vary greatly in ability, it is important for parents to supervise and make decisions on when their child is ready for a new independent activity. Young children:

- Can be impulsive and unpredictable
- Have limited peripheral vision and sound sources are not located easily
- Lack experience and/or instruction on properly crossing roadways
- Have poor gap/speed assessment
- Think grown-ups will look out for them
- Think close-calls are fun

- Are short and difficult for motorists to see
- Want to run and desire to limit crossing time
- Like to copy the behavior of older people

Pre-Teens – By their middle school years, children have many of their physical abilities but still lack experience and training. They willingly engage in higher levels of risk taking. Pre-teens:

- Lack experience
- Walk and bicycle more frequently and at different times (higher exposure)
- Ride more frequently under risky conditions (higher traffic)
- Sometimes lack positive role models
- Walk across more risky roadways (collectors and above)
- Are willing to take chances

High-School/College Age – By high-school and college age, exposure changes and new risks are assumed. Many walk and bicycle under low-light conditions. These children:

- Are very active and can go long distances and to new places
- Feel invincible
- Still lack life experience and instruction
- Are capable at traveling at higher speeds
- Will overestimate their abilities on hills, curves, etc.
- Attempt to use bicycles, in-line skates and skateboards based on practices carried over from youth
- May be willing to experiment with alcohol and drugs

Novice Adults – Adults who have not walked and bicycled regularly as children and who have not received training are ill-prepared to take on the challenges of an unfriendly urban environment. For novice adults:

- 95% of adults are novice bicyclists
- Many are unskilled in urban walking
- Drinking can influence their abilities
- Many assume higher skills and abilities than they actually possess
- Most carry over sloppy habits from childhood

Proficient Adults – Proficient adults can be of any age. They are highly competent in traffic and capable of perceiving and dealing with risk in most circumstances. Some use bicycles for commuting and utilitarian trips, while other use bicycles primarily for recreation. Proficient adults:

- Comprise only 1 to 4% of the bicycling population in most communities
- Tend to be very vocal and interested in improving conditions
- May be interested in serving as instructors and task force leaders

Senior Adults – Senior adults, ages 60 and up, begin a gradual decline in physical and physiological performance, with a rapid decline after age 75. Many are incapable of surviving serious injuries. These changes affect their performance. For seniors:

- They walk more in older years, especially for exercise/independence
- Many have reduced income and therefore no car
- All experience some reduction in vision, agility, balance, speed and strength
- Some have further problems with hearing, extreme visual problems and concentration
- Some tend to focus only on one subject at a time
- All have greatly reduced abilities under low-light, nighttime conditions
- They may overestimate their abilities

Those with Disabilities – Of those who live to an older age, 85% will have a permanent disability. Disabilities are common through all ages, and people with permanent disabilities constitute at least 15% of the population. Individuals with permanent physical disabilities, often kept away from society in the past, are now walking and bicycling regularly. Many others have temporary conditions, including pregnancy and broken or sprained limbs that may restrict their mobility. This group may include:

- Individuals with visual, hearing, mobility, mental/emotional and/or other impairments
- Many older adults with reduced abilities
- Many who were previously institutionalized and are not trained to be pedestrians
- Those dependent on alcohol or drugs, who may be hard to recognize

Ethnic/Cultural/Diversity/Tourism – America is rapidly becoming a nation with no clear majority population. All groups need access and mobility in order to fully participate in society. Transportation officials must pay close attention to communication, the creation of ethnic communities and sub-cultural needs and practices. Most of these people depend heavily on walking and transit to get around. They include:

- Some newly arriving groups who lack urban experience
- Many who are used to different motorist behavior

MUTCD Signalized Intersection Warrants

To avoid excess traffic signalization and keep roadways running smoothly, the Federal Highway Administration (FHWA) publishes the Manual on Uniform Traffic Control Devices (MUTCD), which provides traffic engineers and planners with eight factors to determine whether a traffic signal is warranted in a particular area. Although most are motor vehicle-oriented, two of the eight warrants relate directly to pedestrians and/or mid-block crossings:

MUTCD Warrant #4: Pedestrian Volume (Section 4C.05)

Support: The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Standard: The need for a traffic control signal at an intersection or mid-block crossing shall be considered if an engineering study finds that *both* of the following criteria are met:

A. The pedestrian volume crossing the major street at an intersection or mid-block location during an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour; and

B. There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic.

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads conforming to requirements set forth in Chapter 4E.

Guidance: If this warrant is met and a traffic control signal is justified by an engineering study, then:

A. If at an intersection, the traffic control signal should be traffic-actuated and should include pedestrian detectors
B. If at a non-intersection crossing *(i.e. a mid-block crossing)*, the traffic control signal should be pedestrian-actuated, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk, and the installation should include suitable standard signs and pavement markings
C. Furthermore, if installed within a signal system, the traffic control signal should be coordinated

Option: The criterion for the pedestrian volume crossing the major roadway may be reduced by as much as 50% if the average crossing speed of pedestrians is less than 4 feet/second.

A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street, even if the rate of gap occurrence is less than one per minute.

MUTCD Warrant #5: School Crossing (Section 4C.06)

Support: The School Crossing signal warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.

Standard: The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20 students during the highest crossing hour.

Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards or a grade-separated crossing.

The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Guidance: If this warrant is met and a traffic control signal is justified by an engineering study, then:

A. If at an intersection, the traffic control signal should be traffic-actuated and should include pedestrian detectors
B. If at a non-intersection crossing *(i.e. a mid-block crossing)*, the traffic control signal should be pedestrian-actuated, parking and other sight obstructions should be prohibited for at least 100 feet in advance and at least 20 feet beyond the crosswalk, and the installation should include suitable standard signs and pavement markings
C. Furthermore, if installed within a signal system, the traffic control signal should be coordinated

Summary of MUTCD Warrants

It should be noted that the above warrants apply only to the consideration of fully-signalized mid-block crossing locations. Failure to meet the minimum criteria established within these warrants does NOT mean that mid-block crossings cannot be created – there are a number of other ways to implement mid-block crossings without using traffic signals, which will be discussed later in this analysis. Nevertheless, few treatments are as effective at achieving motorist yield compliance as traffic signals, and AMATS encourages their use whenever warranted along our busiest, most pedestrian-unfriendly regional roadways.

Potential Mid-Block Crossing Locations

After a thorough analysis of the AMATS region, based on the aforementioned methodology and other considerations, AMATS recommends the following locations as having a high potential for the successful and effective implementation of mid-block crossing treatments:

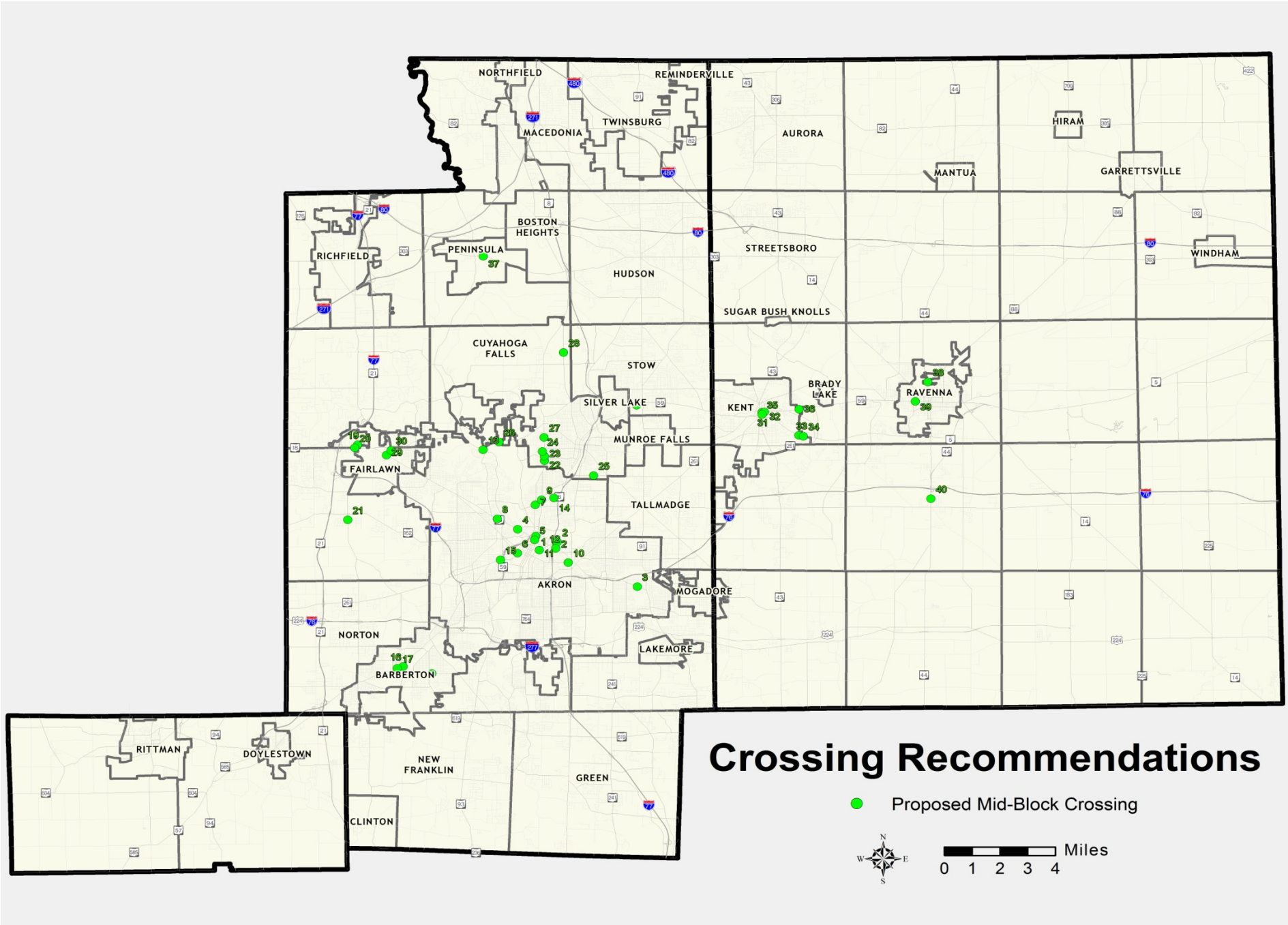
Location #	Street and/or Approximate Address (When applicable)	Additional Location Details	Community	Avg Daily Traffic	Reason for Selection / Comments
1	N High St	Between MLK/SR 59 and Market St/SR 18	Akron	6,020	Significant observed ped activity - most related to ODJFS; long block
2	124 and/or 169 N Forge St	Between SR 8 and Arch St	Akron	2,500	Connects major parking area to Summa City Hospital; very long block
3	2333 E Market St	Between Highpoint Ave and Emmons Ave	Akron	10,920	Connects large high-density housing tower to school and transit across busy, street segment with long distance between signalized intersections
4	310 W Market St	Between Goodwin and N Valley St	Akron	20,590	Connects related businesses located across the street from each other. Transit stop available. Signifant levels of existing ped crossing activity.
5	40 S High St	Between Market St/18 and E Mill St	Akron	8,420	Significant observed ped activity; long block; library, garage, art museum and JSK Center attractions; important transit stop
6	411 Locust St	Between W Cedar St and Wooster Ave	Akron	3,150	Connects low income, senior housing and transit stop to large parking lot across the street
7	638 N Howard St	North of Tallmadge Ave	Akron	7,180	Long segment with no traffic signals and much pedestrian activity. Connects residential to shopping, park and school; location listed in AMATS ped crash report. High level of transit activity.
8	750 W Market St/SR 18	Highland Square near Dodge Ave	Akron	15,360	Connects multiple high-density housing buildings and surrounding neighborhood to mixed-use commercial area on other side of busy arterial street. Long distance between signalized intersections.
9	765 N Main St	Between Cuyahoga Falls Ave and Frances Ave	Akron	13,170	Connects two sides of mixed-use, commercial area with increasing pedestrian traffic
10	850 E Exchange St	Between Cleveland St and S Arlington St	Akron	9,970	Long block creates barrier between neighborhood and Dave's Market grocery store & plaza. Transit station also draws ped activity along busy, high-speed arterial
11	E Buchtel Ave	University of Akron - between Hill St and S College St	Akron	N/A	Existing UA ped path (includes ADA ramps) but unmarked; connects large parking facilities to several academic buildings; approximate area listed in AMATS ped crash plan
12	E Market St	Between Adolph Ave and Arch St	Akron	17,940	Long block creates barrier between Summa City Hospital and housing/ transit on other side of street. Also affects YMCA
13	Merriman Rd	Between Weathervane Ln and N Portage Path (west of First Merit bank)	Akron	16,230	Very long segment between signalized intersections and many attractions on both sides of road. Would allow Towpath traffic to safely visit businesses on south side of Merriman Rd
14	Patterson Ave	Between Perdue Ave and Ontario St	Akron	N/A	Connects low income housing to large park. Flashing light exists in area but walkways could be more distinct

Potential Mid-Block Crossing Locations *continued*

Location #	Street and/or Approximate Address (When applicable)	Additional Location Details	Community	Avg Daily Traffic	Reason for Selection / Comments
15	Vernon Odom Blvd	At Edgewood Ave	Akron	7,280	Connects large, low-income, high-density residential to Akron Urban League/community learning center and transit
16	143 2nd St NW	Between W Paige Ave and W Park Ave	Barberton	2,310	Long block with pedestrian, mixed-use development on each side of street
17	150 5th St NW	Between W Park Ave and W Tuscarawas Ave	Barberton	2,240	Connects library to parking and other civic buildings
18	492 Robinson Ave	In line with Giant Eagle entrance	Barberton	9,330	Provides more direct connection for local residential to grocery store and medical services
19	60 N Cleveland Massillon Rd	Between Montrose Ave and SR 18	Bath	10,440	Addresses potential key crossing point across major road connecting important retail areas.
20	Medina Rd/SR 18	Brookmont Rd intersection	Bath/Copley	37,890	Very long stretch of SR 18 w/ no pedestrian crossing points. This is the most centralized location between signalized intersections, and connects multiple plazas at primary entrance points
21	S Cleveland Massillon Rd	At township hall/middle school	Copley	7,920	Long segment, creates safe crossing between public assets
22	1648 State Rd	Midway between Chestnut Blvd and Grant Ave	Cuyahoga Falls	14,110	Connects neighborhood and businesses on one side of road to ped-oriented plaza on east side of State Rd. Very long segment between signalized intersections
23	1740 State Rd	Midway between Sackett Ave and Chestnut Blvd	Cuyahoga Falls	15,370	Connects neighborhood and businesses on one side of road to ped-oriented plaza on east side of State Rd. Very long segment between signalized intersections
24	23rd St	Between Broad Blvd and Sackett Ave	Cuyahoga Falls	N/A	At various points along hospital, create safer crossings between hospital and multiple parking lots
25	Howe Ave	Between Taco Bell drive and McDonald's drive	Cuyahoga Falls	22,870	Very long segment between signalized intersections; busy transit corridor and many commercial/restaurant attractions on each side
26	Portage Trail	At Treetop Trail	Cuyahoga Falls	15,320	Creates safer crossing point between two modest income, high-density residential communities and connects them to transit
27	State Rd	Between Valley Rd and Phelps Ave	Cuyahoga Falls	16,070	Long block of high-density housing with no crossing point to many businesses across the street
28	Wyoga Lake Rd	Between American Dr and Hardman Dr	Cuyahoga Falls	4,220	Connects low income housing to transit location; goat trails in area. Site listed on AMATS ped crash report
29	3227 W Market St	Between Morewood Rd and Ghent Rd	Fairlawn	20,810	Connects multiple hotels and offices to regional shopping mall
30	Ghent Rd	At Sand Run Pkwy	Fairlawn	9,630	Connects numerous residential/commercial locations to regional shopping mall. Large, out-of-the-way distance between signalized intersections.

Potential Mid-Block Crossing Locations *continued*

Location #	Street and/or Approximate Address (When applicable)	Additional Location Details	Community	Avg Daily Traffic	Reason for Selection / Comments
31	100 S Water St	Between E Main St and E Erie St	Kent	9,440	Continues an alleyway all the way through downtown, breaking up a long block and connecting to Franklin Ave and the riverfront area; location listed on AMATS ped crash report
32	150 S Depeyster St	Between E Main St and E Erie St	Kent	2,610	Connects main downtown alleyway to PARTA Central Gateway
33	1798 E Summit St	Whitehall Terrace Apartments	Kent	14,300	Connects a large student housing complex to transit, bike and ped connections to KSU; site listed on AMATS ped crash report
34	1880 E Summit St	PARTA bus shelter	Kent	14,300	Connects a large student housing complex to transit, bike and ped connections to KSU
35	248 S Water St	Between E Erie St and SR 59	Kent	9,440	Connects Franklin Ave parking to new development in downtown; location listed in AMATS ped crash plan
36	SR 59	Near Kent ACME grocery store	Kent	19,940	Very long segment between signalized intersections. Would connect large apartment complex to grocery store and other attractions on other side of a busy, wide thoroughfare; enhances transit connections; site listed on AMATS ped crash report
37	1625 W Streetsboro Rd	Near Cuyahoga Valley Scenic Railway	Peninsula	8,480	Creates a safer crossing point to most attractions in Peninsula
38	6569 N Chestnut St	Between high school and Chestnut Hill Dr	Ravenna	8,420	Connection between high school and large city park; location listed in AMATS ped crash plan
39	W Main St/SR 59	Between Oakwood St and N Diamond St	Ravenna	2,650	Long segment between signalized intersections; connects large neighborhood to plaza with groceries
40	Ravenna Louisville Rd/SR 44	Between NEOMED and grocery plaza	Rootstown	16,300	Connects higher education institution to shopping; long segment with no traffic signals
41	3287 Kent Rd/SR 59	Between Sycamore Dr and Elm Rd	Stow	18,620	Connects two sides of mixed-use, commercial area. Transit in area. Long distance between signalized intersections.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RICHFIELD
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STREETSBORO
WINDHAM
HUDSON
SUGAR BUSH KNOLLS
CUYAHOGA FALLS
STOW
BRADY LAKE
RAVENNA
SILVER LAKE
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Crossing Recommendations
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Mid-Block Crossing Solutions

Numerous options are available to create safe mid-block crossing locations for pedestrians. Not all mid-block crossings are equal – solutions used on broad arterial roadways with fast-moving traffic will differ greatly from those used on narrow streets carrying lower volumes of vehicular traffic. Regardless of the type of crossing treatment used, all mid-block crossings should exhibit the following characteristics: *(source: transportation research board)*

- The act of crossing the street is made simple and convenient for pedestrians
- The crossing location and any waiting or crossing pedestrians have excellent visibility
- Vehicle speeds are slowed or controlled in the area of the pedestrian crossing
- Vehicle drivers are more aware of the presence of the crossing location
- Vehicle drivers yield the right-of-way to legally crossing pedestrians
- Pedestrians use designated crossing locations and obey applicable state and local traffic laws

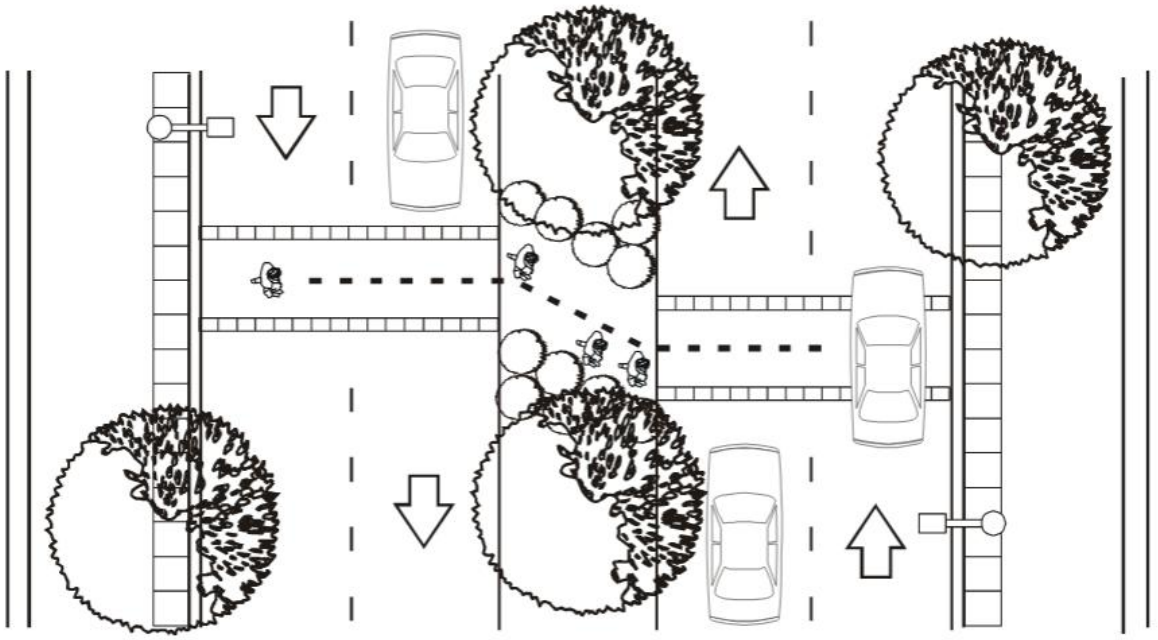
Rarely is only one pedestrian solution used at a crossing location; most often, two or more improvements are combined to maximize visibility, motorist yielding and pedestrian comfort. Although this list shouldn't be considered all-inclusive, the following represent a number of the solutions available to create safe mid-block crossings in the AMATS area.

Pedestrian Islands

Pedestrian islands, also known as "refuge islands", are protected pedestrian waiting areas located in the median of a roadway. They are generally used to aide in crossing wide roadways of four or more lanes (60 feet or greater in width). In addition to offering some level of separation and protection from surrounding vehicular traffic, pedestrian islands allow pedestrians to cross only one half of the roadway at a time. Safety is improved since pedestrians only have to watch for traffic coming in one direction. Gaps in the traffic flow of sufficient size to safely cross one-half of the roadway are much more common than when a pedestrian must cross the entire roadway in one attempt.

Pedestrian islands can vary widely in size and design – from simple raised, concrete pads to large, lushly landscaped waiting areas offering amenities such as benches, bus shelters or public art.

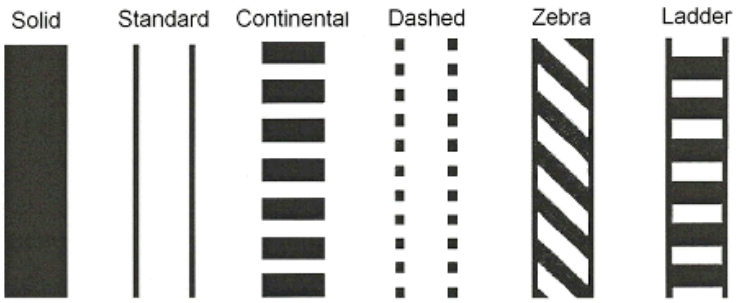
One strategy used in the design of pedestrian islands is to stagger the approaches in a way that forces the pedestrian to face the general direction of oncoming traffic, aiding him or her in identifying a safe gap to cross the second half of the roadway. It should be noted that a change of direction in the walkway can cause difficulty for visually impaired pedestrians. To better accommodate these pedestrians, fencing or other guideways can be installed to channel pedestrians in the proper direction.



Staggered pedestrian walkway guiding pedestrians to face oncoming traffic, including landscaping to channel pedestrians properly *(Source: FHWA)*

High-Visibility Materials

Whatever form a mid-block crossing might take, safety can increased by using high-visibility materials and patterns in its design. Attention-grabbing striping patterns, the use of color and different patterns that contrast with the roadway pavement are all methods of increasing the safety and appeal of mid-block crossing locations.



Crosswalk striping pattern alternatives (*Source: FHWA)*

Examples of highly visible (and visually appealing) crosswalks

Bulb-Outs

Bulb-outs, also known as curb extensions, are protrusions of the sidewalk into the roadway. They serve multiple purposes, including:

- Narrowing the physical distance of roadway that pedestrians must cross
- Allow for better visibility of pedestrians by motorists, and conversely, allow pedestrians to view oncoming traffic more clearly and without obstruction
- Provide traffic calming benefits by narrowing the vehicular right-of-way, facilitating on-street parking, etc.

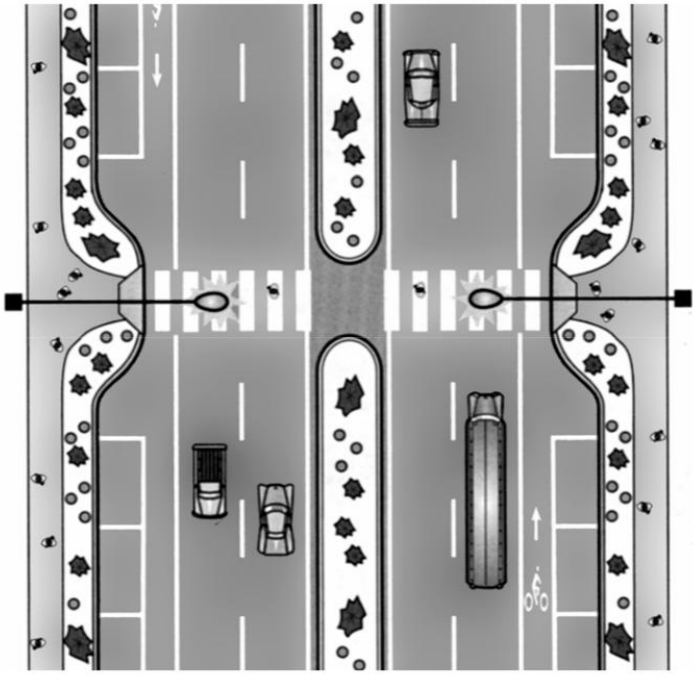


Diagram of pedestrian bulb-outs *(Source: FHWA)*

Raised Crosswalks

As their name implies, raised crosswalks are slightly elevated above the roadway surface, providing two primary benefits to pedestrians using them:

- Increases visibility of pedestrians by motorists, and allows pedestrians to have a better view of oncoming traffic to judge for sufficient crossing gaps
- The raised surface creates a speed bump, causing regular drivers in the area to naturally reduce their speed in anticipation, thus calming the local traffic and resulting in flows more conducive to pedestrian activity

Of concern in Northeast Ohio is how raised roadway features, such as raised crosswalks, will affect snow plows. A study conducted by Fairfax County, VA (http://www.gfca.us/Map%20and%20FAQs.pdf) states that if gradual sloping is incorporated into raised crosswalks and the maximum height is no greater than three inches above the roadway surface, snow plows should pass easily over the crosswalk without causing damage. The study also confirms that the impact on emergency response times is minimal when such designs are incorporated into a raised crosswalk.

Signage

Although signage alone is unlikely to provide adequate protection for pedestrians at mid-block crossings, it can be used to enhance motorist awareness when combined with other pedestrian solutions. A wide variety of signage is available, and the determination of what is most appropriate would depend on the context of the local area. In addition to raising motorist awareness that pedestrians are likely to be encountered in an area, signage can also be used to communicate local and state laws requiring the yielding of any vehicle to pedestrians located in a crosswalk.

Signage placed in the middle of a roadway at a crosswalk can dually serve as a warning and a traffic-calming impediment to motorists. The presence of these signs prevents dangerous lane-changing within the mid-block crossing area. Combined, this form of sign placement can result in heightened driver awareness and safer pedestrian environments.

Flashing Yellow Signals

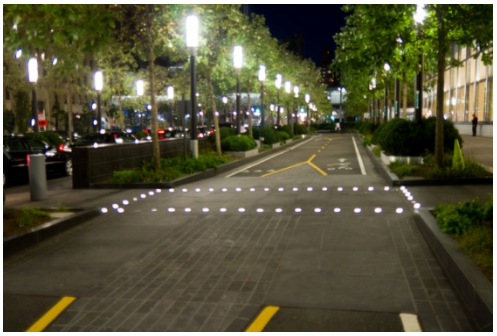
Flashing yellow signals are commonly used to increase motorist awareness of pedestrians. These signals function in one of two ways:

- Passive Signals – constantly flash, around the clock
- Pedestrian Activated Signals – will not flash until a button is activated by a pedestrian

Pedestrian activated signals are likely to be more effective than passive ones, as frequent local drivers eventually learn to "tune-out" signals that flash constantly. As will be illustrated later in this analysis, flashing lights alone – whether passive or pedestrian activated – are only mildly effective at producing driver yielding. Flashing signals should always be used in conjunction with other pedestrian safety measures.

In-Pavement Flashers

In-pavement flashers are flashing lights embedded into the roadway at a pedestrian crossing location that capture the attention of motorists. They are particularly effective at nighttime. In-pavement flashers are activated by the pedestrian prior to crossing, and would be timed to flash according to the width of the roadway and estimated average pedestrian crossing time.



Fully Signalized Crossings

In locations where a high demand for mid-block pedestrian crossings exist, yet where streets are broad, speeds are high (greater than 35 mph) and gaps in traffic are infrequent, fully signalized mid-block crossings may be necessary (see *MUTCD Signalized Intersection Warrants* section on pages 10-12 for complete details). Fully signalized crossings completely stop vehicular traffic, allowing for the maximum level of pedestrian safety. These signals are pedestrian activated, so they do not impede the progress of traffic unless an actual pedestrian is present. Studies show that full signalization is the only pedestrian safety device that achieves nearly 100% motorist yielding compliance. However, fully signalized crossings dramatically affect vehicular traffic flow on busy streets and often result in higher rates of rear-end collisions, so they should be used sparingly.

There are essentially two traffic signal options available for fully signalized mid-block crossings:

1. Traditional Traffic Signals
2. High Intensity Activated Crosswalk (HAWK) Signals

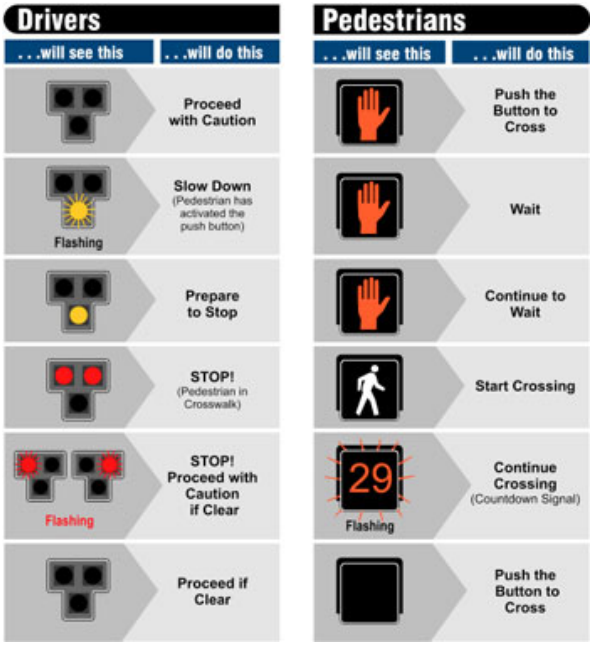
Traditional Traffic Signals

As the name implies, traditional traffic signals are the same three-phase signals found at most busy intersections. Driver familiarity with these signals results in extremely high rates of compliance, which increases pedestrian safety. These signals remain on the "green" phase until a pedestrian approaches the crossing and activates a push-button. These signals are often "hot", meaning that they enter the "yellow", followed by the "red" phase immediately upon the pedestrian's activation of the signal. Fully signalized pedestrian crosswalks can be found in downtown Akron on Main Street and at the S Broadway St entrance to the Summit County Courthouse.

High Intensity Activated Crosswalk (HAWK) Signals

HAWK signals were first used in the city of Tucson, AZ and are currently not commonly found elsewhere around the nation. However, they possess certain advantages over traditional traffic signals when used at mid-block pedestrian crossings, causing many communities to take a serious look into implementing them. The first advantage of installing a HAWK signal is that it is as effective at stopping traffic as a traditional traffic signal, yet is not subject to the same strict federal pedestrian volume requirements. Secondly, HAWK signals include a phase during which vehicles may proceed through a red light after they have made a complete stop (much like a stop sign), given that all pedestrians have cleared the crosswalk.

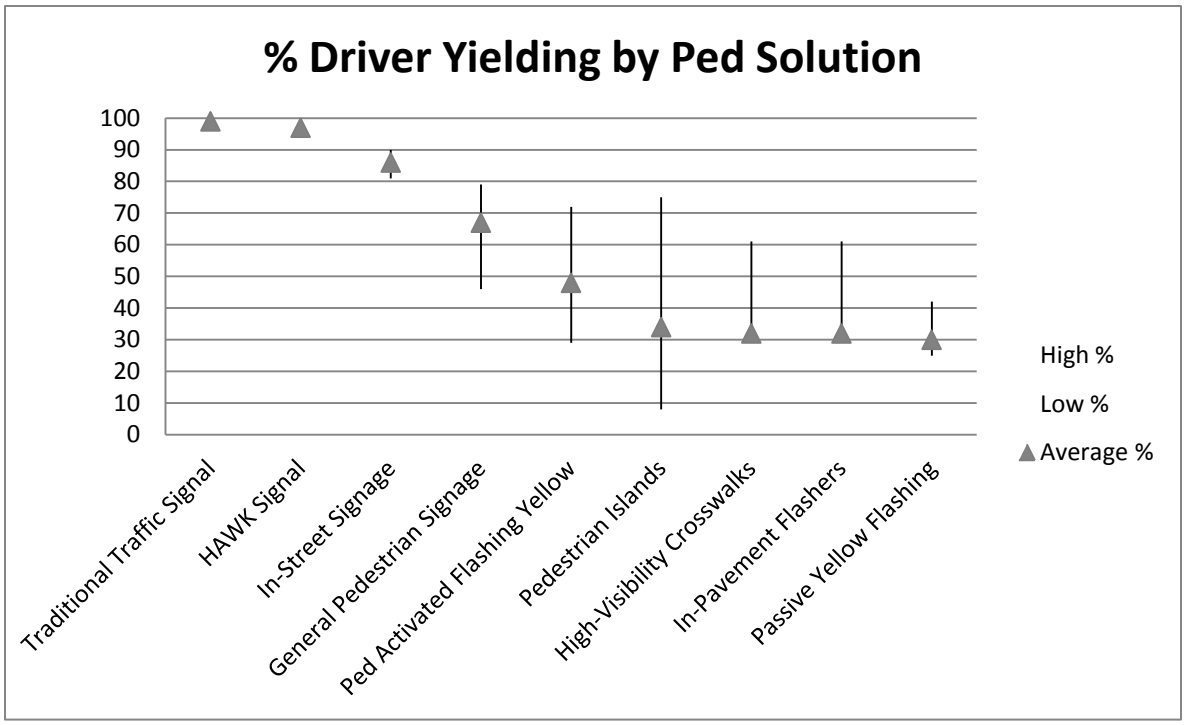
The main concern with the installation of HAWK signals is that nearly all motorists are unfamiliar with them, and a learning curve would be necessary for optimal function of the mid-block crossing. Explanatory signage and, ideally, an educational campaign would precede the installation of HAWK signals in our region.



HAWK signal phasing (*Source: AnnArborChronicle.com*)

Effectiveness

Each of the aforementioned mid-block crossing safety improvements has unique advantages and disadvantages. The solutions to use depend greatly on the width of the roadway, the speed of the traffic and the overall context of the area. An important variable in the decision-making process is the effectiveness of each solution's ability to capture the attention of motorists and influence their yielding to pedestrians. The following driver yield compliance data is the result of a nationwide research study conducted by the National Cooperative Highway Research Program: (https://www.fhwa.dot.gov/publications/research/safety/10042/10042.pdf)



Other Considerations at Mid-Block Crossings

In addition to the various pedestrians safety solutions described above, other measures must be taken to ensure that mid-block crossing locations are safe and comfortable for the use of all pedestrians.

Lighting

A wide variety of lighting, from simple to ornate, is available, and should always be included at mid-block crossing locations. In low-light conditions, lighting helps pedestrians navigate the crosswalk, helps them see oncoming traffic more clearly and perhaps most importantly, allows motorists to identify pedestrians crossing the roadway ahead.

Maintaining Clear Sight Distances

Keeping mid-block crossing areas clear of obstructions allows pedestrians and motorists clear lines of sight, greatly increasing the safety of each. Landscaping, utilities, parked vehicles, signage and other obstructions should be absent from the area, or if necessary, designed in a way that allows pedestrians a clear view of oncoming traffic and vice versa.

In addition to area infrastructure, vehicles themselves can obstruct the view of pedestrians and other motorists. Of important concern at mid-block crossings located on multi-lane roadways are "multiple threat" crashes. These crashes are often the result of placing the yield line too close to the mid-block crossing. In these crashes, the vehicle closest to the pedestrian entering the crosswalk yields very close to the actual crosswalk. The location of this vehicle blocks the view of the crossing pedestrian from vehicles in the adjacent lane, and often blocks the view of oncoming traffic in the adjacent lane from pedestrian, giving him or her a false sense of security in completing the crossing. To remedy this problem, as much distance as deemed practical should be placed between the vehicle yield line and the mid-block crossing. The effect can be bolstered by adding accompanying signage.

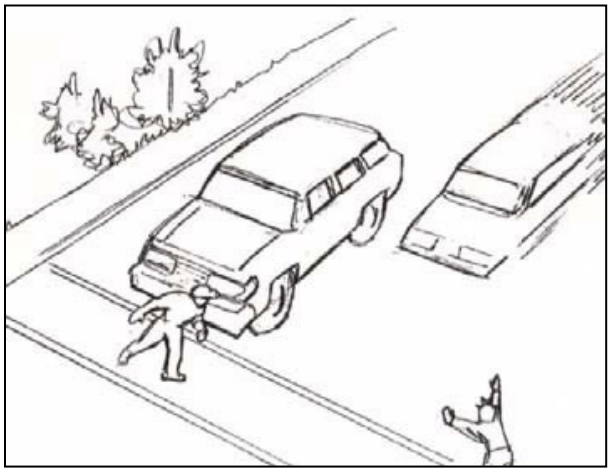


Illustration of multiple threat crash *(Source: FHWA)*

Accommodate Those with Disabilities

As appropriate, and in accordance with ADA regulations, mid-block crossings should make accommodations for pedestrians with disabilities. These solutions include adding ADA mobility device ramps, textural and/or audible clues for those with visual impairments, and similar improvements.

Conclusion

Pedestrians, who are often subject to long, exhausting trips and extreme weather, naturally seek the shortest distance possible to their ultimate destination. Although traditional crosswalks located at roadway intersections are a safe and legal way of crossing the street, pedestrians will "break the rules" and take shortcuts at unmarked mid-block locations if crosswalks are too distant in either direction. Certain combinations of land uses located across the street from one another (i.e. parking areas across from important public facilities, transit stops located across from multi-family housing, etc.) exacerbate the tendency for pedestrians to cross unsafely in the middle of a block.

Unlike traditional crosswalks located at roadway intersections, mid-block crossings are constructed in response to pedestrian demand. Transportation officials should determine areas in which mid-block crossings are common and where the factors described in this analysis point to the need for a safe, legal crossing point for pedestrians.

This analysis has studied the entire AMATS region and identified numerous locations where mid-block crossings appear to be warranted, based on combinations of land use, pedestrian crash data and general observation. AMATS recommends that each area should be analyzed by the local community to make the ultimate determination as to whether a mid-block crossing should be implemented, and which of the many available pedestrian improvements should be incorporated into its design. Through careful analysis and the effective implementation of mid-block crossings, we can greatly increase the safety and usefulness of our regional pedestrian network.