CHAPTER 3
PEDESTRIAN ANALYSIS AND REVIEW
INTRODUCTION

All persons, at some time throughout the day, are pedestrians. Facilities designed to be safe and intuitive in use are essential to providing an atmosphere conducive to high levels of pedestrian activity. For purposes in this document, the term pedestrian refers to any person traveling by foot or wheelchair, whether operated manually or motorized.

Knowledge of facility types and their appropriate application does not suffice for improving pedestrian conditions in the region. Jurisdictions must also be aware of the locations and routes where need is greatest. Following the facility guidelines, the plan presents an analysis of the existing pedestrian network as well as recommendations for network priorities.

ACCOMMODATING PEDESTRIANS

On-street facilities catering to the specific needs and nature of pedestrians are essential to providing safe and efficient connections throughout the Memphis MPO region. Consistency in definition and design will help to maintain continuity and safety as people traverse multiple jurisdictional boundaries along their route.

A walkway is a generic term for any road, street, path, or way which in some manner is specifically designated for pedestrian travel, regardless of whether such facilities are designated for the exclusive use of pedestrians or are to be shared with other transportation modes. Walkways include on-street facilities that accommodate pedestrians within the road right-of-way. Table 3.1 provides an overview of pedestrian facility types. The following facility definitions describe the basic categories of pedestrian facilities.

These guidelines are based primarily on the national guidelines established by the American Association of State Highway and Transportation Officials’ (AASHTO) 2004 Guide for the Planning, Design, and Operation of Pedestrian Facilities and the U.S. Department of Transportation Federal Highway Administration’s 2009 edition of the Manual on Uniform Traffic Control Devices (MUTCD). Additional documents, such as the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design and the National Association of City Transportation Officials (NACTO) Urban Street Design Guidelines, were also used in the development of these definitions.

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**SIDEWALK**

Whether for transportation or recreation, sidewalks provide people with space to travel within the public right-of-way that is separated from roadway vehicles. While sidewalks are a common feature throughout the Memphis MPO area, these facilities come in a variety of forms and styles, each best suited for specific conditions. A sidewalk corridor consists of a buffer zone (the inside edge along a curb) as well as a frontage zone (the outside edge along the adjacent property line).

1. Residents of the Memphis area are likely most familiar with a standard 5-foot wide sidewalk, which includes a 2-foot buffer zone typically used for lawn space or small landscaping.

2. In more urban settings or along busy roadways, sidewalks should include a wider buffer zone that further separates pedestrians from motor vehicles and offers room for street trees and furniture.

3. Areas of heavy pedestrian traffic or dense development often feature wide frontage zones in addition to wide buffer zones. The added space provides room for restaurant seating areas, public art, bicycle end-of-trip facilities, or other amenities.

4. Street trees, utility poles, and signs should only be sited in buffer zones (at least 4 feet wide for trees). Not only does this placement maintain an unobstructed travel path on the sidewalk, but it also provides an additional physical and mental barrier to the adjacent vehicular traffic. When no buffer zone is present, placement must be coordinated to ensure at least 36 inches of clear, unobstructed walkway is present for persons using wheelchairs to pass.

**PROS/CONS**

- Provides an essential travel corridor for people on foot or using a wheelchair.
- Safely separates pedestrian traffic from vehicular traffic.
- May offer space for public and private amenities like outdoor restaurant seating, benches, decorative lighting, and so on.
- Requires regular (though not necessarily frequent) maintenance to remove debris, snow, ice, etc. and to repair cracks.
- May necessitate the acquisition of additional right-of-way.

1. MEMPHIS, TN

2. SAUGATUCK, MI

3. HOLLAND, MI

4. BOSTON, MA
CROSSWALK

Crosswalks indicate optimal or preferred locations for pedestrians to cross and help designate right-of-way for vehicular traffic to yield to pedestrian traffic. In the Memphis MPO area, crosswalks appear at many street intersections and, increasingly, at mid-block locations.

1. A crosswalk extends across the roadway, from curb to curb, ideally at a 90-degree angle to the roadway itself, thereby creating the shortest crossing distance. Two parallel stripes are the typical on-street markings.

2. At crossings with higher than average traffic or with a disproportionate amount of vulnerable people on foot (i.e. children and the elderly), more visible crosswalk patterns like this zebra, or continental, striping are used.

3. Warning signs for vehicular traffic may supplement the crosswalk, but care must be taken in their placement so as not to create visual clutter.

4. Raised crosswalks force cars to slow down and create an even safer crossing.

5. Colored or decorative crosswalks, such as this one, can enhance the street’s visual appeal and place-setting.

6. At intersections with signalized stop controls or with stop signs, vehicle stop bars should be installed 2 feet from the crosswalk to indicate that drivers are required to provide a safe pathway for pedestrians using the crosswalk.

PROS/CONS

+ Alerts vehicular traffic to the potential presence of people on foot.
+ Provides dedicated space for pedestrian traffic when crossing a roadway.

− May require regular re-application depending on how quickly vehicular traffic wears down the on-street markings.
ENHANCED ON-STREET CROSSING FACILITY

In certain locations along a roadway, a marked crosswalk may not suffice for that area’s high level of pedestrian activity, or perhaps the roadway’s high level of vehicular traffic. These crossings require an enhanced treatment to improve safety. Two examples of such facilities are curb extensions (also known as bulb-outs) and refuge islands. Examples of these already exist in the City of Memphis and couple other municipalities in the region.

1. Curb extensions widen the sidewalk—typically at the corners of intersections but occasionally at mid-block crossings—thereby reducing the pedestrian crossing distance, ensuring proper sight lines are maintained with vehicular traffic, and providing additional visual cues to drivers that a pedestrian crossing is present.

2. The effect of curb extensions is two-fold: the crossing distance is reduced and vehicular traffic moves through the intersection slower due to the narrower lane width.

3. Refuge islands, also called center islands, provide a safe, physically-separated waiting space for people crossing a roadway.

4. When using a refuge island, an individual need only half-cross an otherwise wide roadway and then wait for vehicular traffic on the latter half to clear.

5. Refuge islands in areas of heavy pedestrian activity may include a zigzag path, which not only forces individuals to look towards on-coming vehicular traffic by design but also increases the island’s capacity to safely hold people.

PROS/CONS

+ Offers a solution where a signalized crossing may be cost-prohibitive or impractical.
+ Creates a safer crossing for pedestrian traffic by shortening the crossing distance and slowing down cars.
+ Often provides room for additional landscaping or public space.

– May, depending on the facility’s design, carry a high implementation cost.
CURB RAMP

Curb ramps (wheelchair ramps) provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, hand carts, and for individuals with mobility impairments that limit their ability to step up and down high curbs. Federal legislation requires the installation of curb ramps at all intersections and mid-block locations where pedestrian crossings exist.

1. A separate curb ramp for each crosswalk at an intersection should be provided, as opposed to a single ramp at a corner serving both crosswalks. Not only does this improve orientation for visually-impaired individuals, but it also minimizes the risk of a motor vehicle invading the pedestrian space when taking in tight right-hand turn at the corner.

2. Tactile warnings on the ramp alert individuals to the sidewalk’s edge and provide increased resistance on the sloped surface.

PROS/CONS

+ Provides safe access across a roadway that complies with the requirements of the Americans with Disabilities Act.

+ May, if designed properly, reduce the speed with which vehicles make a right-hand turn at an intersection.

- May, if designed poorly, facilitate illegal access by motor vehicles onto the sidewalk.
OVERPASS/UNDERPASS

Pedestrian overpasses and underpasses allow pedestrian traffic to cross unusually high-speed or high-volume roadways unimpeded. Due to the associated high implementation costs and visually intrusive nature of these facilities, however, jurisdictions should apply them only in cases of extreme circumstances where traffic-calming measures or pedestrian-activated crossing signals are not feasible. Examples of pedestrian overpasses exist in the City of Memphis.

1. These facilities are best applied as connections between two areas of high pedestrian traffic divided by a limited-access highway, major arterial road, or a high-volume railroad. A pedestrian overpass may also be an appropriate treatment when the roadway is quite wide (8 lanes or more with no refuge island).

2. The Americans with Disabilities Act requires access to these facilities by ramps or elevators in order to accommodate all persons, which often results in extensive ramp structures that in turn create longer crossing distances and discourage use.

3. Overpasses and underpasses should, wherever possible, take advantage of existing topography or grade separation in order to minimize the need of ramps or elevators.

4. If individuals perceive an underpass as dark and cramped, they will likely further perceive a risk to their personal safety and security. Underpasses, therefore, should have ample width and ceiling height as well as extensive lighting. Public art in the underpass makes the facility even more inviting.

5. Overpasses with high-quality design can double as civic landmarks and community gateways.

PROS/CONS

Discourages or even prevents dangerous or illegal crossings of roadways and railroads.

Allows an unimpeded flow of pedestrian traffic between areas of high activity.

May act as a civic landmark or community gateway.

Requires significant funding to implement.

May, if designed or located poorly, receive little use and/or reduce a neighborhood’s aesthetics.
CHAPTER 3

TRANSIT STOP

Almost all transit trips begin or end with walking for the traveling individual. Well-designed transit stops, therefore, are not only essential to an effective transit system, but also act as pedestrian facilities. Presently, one can find transit stops throughout the City of Memphis, in some suburban Shelby County locations, and in West Memphis, AR. Communities considering public transit in the future, should prioritize coordination of where they might provide transit stops and how they would like those stops to interface between roadways and pedestrian pathways.

1. At a minimum, transit stops should provide signs with route numbers and transit schedules. Additionally, where possible, transit stops should provide seating, a covered shelter, and adequate lighting.

2. Additional beneficial facilities include trash receptacles, bicycle parking, neighborhood wayfinding signage or maps, and heating/cooling features.

3. Transit stops cannot exist as islands. Well-maintained sidewalks and crosswalks must connect the stop with the surrounding neighborhood.

4. Placing transit stops on the far side of an intersection, that is, away from the corner and crosswalk, encourages people to cross the road behind the bus (which thereby eliminates sight restrictions between those individuals and on-coming vehicular traffic) and improves the flow of motor vehicle traffic in the roadway.

5. A transit stop should be sited so as to maintain a clear travel path on the sidewalk and room to operate a bus’ wheelchair lift.

6. On major arterial roadways, vehicular capacity and delay may be improved with the addition of bus turnouts, allowing a bus to exit the travel lanes while unloading/loading.

PROS/CONS

- Enhances the travel experience for individuals who use transit.
- Provides public facilities that benefit all users of the street and sidewalk.
- Supports an intermodal transportation network.
- May, with good design, beautify an intersection.
- Requires a regular, though likely infrequent, schedule of maintenance and cleaning.
PEDESTRIAN SIGNALS

In general, all pedestrian signals perform the same function – establish a period of time when it is safest to cross a roadway – but various types of signals do so differently. All signals improve both the safety of pedestrian traffic and the flow of vehicular traffic. When people are aware that a designated crossing time is imminent, they are less likely to dart into the roadway and cross at, both, their own risk and the risk of approaching motorist.

1. The standard pedestrian signal, and the type most familiar to Memphis-area residents, provides a “WALK” and “DON’T WALK” signal phase. A blinking don’t-walk phase alerts people that the safe crossing time is ending.

2. Pedestrian signals always come in pairs, with one signal at either end of a designated street crossing. The signals should directly face the approaching pedestrian traffic; this applies especially to corners with multiple signals.

3. Count-down signals take standard signals one step further by including a timer that displays the remaining seconds in the walk phase. Providing this extra information allows people to better assess if they should cross immediately, wait for the next signal, or wait at a refuge island.

4. A Rectangular Rapid Flash Beacon (RRFB) warns approaching vehicular traffic that people are entering the roadway at the crosswalk ahead. When the signal is activated by a person waiting to cross, the signal’s lights flash rapidly to capture the attention of motorists.

5. A High-Intensity Activated Crosswalk (HAWK) signal permits a safe crossing of pedestrian traffic at crosswalks with irregular activity and ones located away from standard traffic signals, such as mid-block crossings. A series of flashing or steady and red or yellow lights indicate when vehicular traffic should slow down, stop and wait at the line, and proceed over the crosswalk.

PROS/CONS

+ Indicate safe, designated times to cross the roadway.
+ Improve the flow of all traffic types along the roadway.
+ Reduces, if not prevents, illegal street crossings.

- May have relatively high implementation costs.
- May require educational outreach to the public regarding the proper use of and response to the signals.
PEDESTRIAN AMENITIES

Facilities that improve the walking experience and that encourage increased levels of walking are known as pedestrian amenities. Such facilities may address the goal of creating a pleasant and enjoyable walk through better aesthetics, while others may target convenience. Still other amenity types improve personal security. Best examples of these facilities in the Memphis area exist in the downtowns and historic town centers of the region’s communities, as well as on college campuses.

1. General landscaping along a sidewalk improves aesthetics, but street trees specifically offer a myriad of benefits. For example, trees offer shade and reduce storm water runoff. If spaced at regular intervals along the roadway, trees induce slower vehicular traffic and act as protective barriers between the sidewalk and street.

2. Benches provide space for rest and conversation. These can be provided in conjunction with trash receptacles and water fountains. Placement under trees or shelters shields users from the elements.

3. Newspaper stands and advertisement kiosks engage passers-by with information.

4. Wayfinding signage orients individuals in their surroundings.

5. Pedestrian-scale lighting primarily improves perceptions of safety and security, but can also enhance an area’s nighttime aesthetics if designed creatively.

PROS/CONS

• Increase pedestrian activity.
• Enhance a street’s aesthetics and security.
• May increase public revenues (i.e. usage fees associated with advertisement kiosks and newspaper stands).
• Require additional maintenance and cleaning, especially with landscaping and trees.
CHAPTER 3

SHARED-USE PATH

Commonly referred to as greenways, greenlines, or even greenbelts, shared-use paths offer a travel route for individuals on foot or on a bicycle that is physically separated from a roadway. These paved paths typically range from 10 to 14 feet in width. While shared-use paths may pass through large swaths of open space, they can also utilize wide utility and rail easements or even parallel roadways, granted that a physical buffer exists between the path and roadway. Almost all local jurisdictions within the MPO area boast shared-use paths.

1. Shared-use paths often traverse scenic routes along waterways or through natural areas, but always remain separated from automobile traffic.

2. As these facilities accommodate users on foot or bicycle, the path’s design features should minimize conflict between these groups. Signs, such as this example, instruct pedestrian traffic to remain on the left and bicycle traffic on the right.

3. Where the path must cross a roadway at-grade, signage instructs automobile traffic to yield to path users, or vice-versa.

4. Bollards or other physical barriers at the path’s entrance areas not only encourage bicycle traffic to slow down as it approaches the crossing, but also prevents automobile traffic from entering the path.

5. Wide roadway crossings may require traffic signals, “HAWK” beacons, and/or medians to allow a safe flow of all traffic types through the intersection of the path and roadway.

6. Pedestrian amenities along the path and at its entrance points, such as benches and wayfinding signage, improve the users’ experience.

PROS/CONS

+ Often, though not always, utilizes existing rights-of-way or property easements.
+ Can repurpose abandoned railroad corridors into community assets.
+ Can provide cut-through connections at the end of coves or through long blocks.
+ May connect key regional destinations more directly than on-street facilities

- Creates conflict potential between contrasting user groups as all occupy the same space (i.e. bicycle and pedestrian traffic, and transportation and recreational traffic).
- May require expensive acquisition of rights-of-way to fully extend the corridor.
UNIVERSAL DESIGN

Universal design refers to pedestrian infrastructure that accommodates all users, including those with disabilities, limited mobility, impaired vision, and so on. The Americans with Disabilities Act (ADA) requires all public facilities, including pedestrian infrastructure, to comply with the essential principles of universal design. Many of the benefits of these accommodations are also realized by individuals with baby strollers, small children, and senior citizens.

1. Curb ramps, discussed in more detail on page 61, are essential features wherever sidewalk and paths intersect with streets. These allow easy and safe transition to the roadway surface from the pedestrian pathway.

2. Impassable or obstructed sidewalks, such as this example, present significant barriers to individuals in wheelchairs and pose safety hazards to individuals with impaired vision. Regular maintenance of sidewalks is necessary to repair tree up-rooting and general cracks.

3. Temporary sidewalk obstructions can also be a significant problem. Design of the pedestrian realm should give consideration to temporary obstructions that occur on a routine basis including newspaper stands, trash receptacles, leaves and yard debris, and maintenance vehicles.

4. Impassable or obstructed sidewalks can also result from poor design or implementation, as seen in this example. The ADA requires an unobstructed width of at least 36 inches along a public pedestrian path. Sign posts, utility poles, fire hydrants, and other objects must be sited so as to comply accordingly.

5. In areas of heavy pedestrian activity, special consideration should be given for individuals with impaired vision. Special crosswalk treatments, such as audible crossing signals or tactile lanes on the sidewalk may be necessary to assist those individuals move more safely and independently.

PROS/CONS

Accommodates all users of pedestrian infrastructure.

Improves safety for individuals with disabilities or limited mobility.

May increase maintenance schedules.
SAFETY AND COMFORT

This section reviews data for five years (2009-2013) of pedestrian-involved crashes in the Memphis MPO study area, as reported by the Tennessee and Mississippi Departments of Transportation. No crash data was provided for Fayette County, TN and only a partial data set was provided for non-Memphis communities in Shelby County. Based on the crash analysis, questionnaire responses, and stakeholder comments, this review describes safety issues for pedestrian travel and identifies potential strategies to improve pedestrian safety through infrastructure improvements and programs.

This analysis is divided into two sections:

- **Quantitative Crash Analysis** – A summary of historical pedestrian crash data in the Memphis MPO study area.
- **Qualitative Pedestrian Comfort Analysis** – A summary perceptions and experiences related to pedestrian safety and comfort as recorded through public questionnaires, focus groups, and public input meetings.

**Quantitative Crash Analysis**

Historic crash data can be useful for revealing patterns and possible causes of pedestrian safety issues. This section begins this analysis by recording conditions at high crash locations and examines the what, when, why, where, and who of pedestrian crashes in the Memphis MPO study area.

**What Patterns of Crashes Are Occurring?**

The term “crash event” is used to describe a crash in one location at one point in time involving one or more pedestrians. Over 2,300 pedestrians were involved in crashes in the Memphis MPO study area during this five-year study period. On average, 4,212 crash events involve 462 pedestrians in crashes each year.

**Frequency of Crashes Involving Pedestrians**

The following crashes, crash events, and crash locations were recorded for the five-year period. The term “crash location” is used to describe a geographic location where at least one, and sometimes, more, crashes occurred over the five-year period. Figure 3.1 displays the location and frequency of pedestrian crashes in the Memphis MPO study area.

Between 2009 and 2013 in the Memphis MPO study area:

- 2,311 pedestrians were involved in a crash
- 2,062 unique crash events occurred
- 1,665 unique crash locations were identified

**Crash Events Per Square Mile**

It can be useful to look at crashes relative to the communities in which they are happening. This helps to answer the question of whether crashes are happening disproportionately across the region or in specific geographies. The figures below compare the relative number of collisions per square mile and per person, within US Census Blocks.

Figure 3.2 displays the density of crashes across the Memphis MPO study area, in crashes per square mile. The highest density of crashes occurs in downtown and medical district areas of Memphis. This concentration is expected due to high levels of pedestrian activity and strong densities of destinations by which people will travel to. Concentrations of crashes also occur inside the I-240 of Memphis as well as in the Whitehaven and Hickory Hill neighborhoods of Memphis. Crash density is notably low in suburban and rural areas, except for a pocket of concentration in Southaven, MS.

**Crash Events Per 1,000 Residents**

Figure 3.3 displays crashes normalized by population (residents) across the Memphis MPO study area. High pedestrian-involved crash densities relative to the population occur inside the I-240 loop, with a high concentration in the medical district area of Memphis. Using these parameters, the density of crashes is more evenly distributed than observing crashes per square mile alone.

**Severity of Crashes Involving Pedestrians**

Table 3.2 summarizes pedestrian crashes by severity. Eighty-nine crashes, or 4.5%, resulted in a fatality. The severity of the crash was not indicated on 943 crash records. Over the five year period, there have been on average 399 crashes per year, or a little more than one crash per day. 56% of pedestrians had a confirmed injury on reported crash events while another 41% of pedestrians had a possible injury on reported crash events. On average, 18 pedestrians are killed each year in the Memphis MPO study area when involved in a crash.
Figure 3.1 - Pedestrian Crash Events, 2009 - 2013

2009-2013
Pedestrian Crash Events
Memphis MPO Region

- >5
- 5
- 4
- 3
- 2
- 1

Sources: Tennessee Department of Transportation, Mississippi Department of Transportation
Figure 3.2 - Pedestrian Crash Event Density per Square Mile by Census Tract, 2009 - 2013

2009-2013
Pedestrian Crash Density
Events per Square Mile
Memphis MPO Region

Sources: Tennessee Department of Transportation, Mississippi Department of Transportation
2009-2013 Pedestrian Crash Density Per 1,000 Residents
Memphis MPO Region

- 0 - 0.4
- 0.4 - 1.25
- 1.25 - 2.5
- 2.5 - 5
- 5 - 11

Figure 3.3 - Pedestrian Crash Event Density per 1,000 Residents by Census Tract, 2009 - 2013
Sources: Tennessee Department of Transportation, Mississippi Department of Transportation
When Are Pedestrian Crashes Occurring?

It can be useful to analyze crash events based on their frequency and time of occurrence to understand if specific dates or times should be targeted for enhanced enforcement or awareness campaigns. This analysis also allows for an understanding of environmental factors that may contribute to unsafe conditions for pedestrian activity.

Crashes: Time of Day

Pedestrian crash events in the Memphis MPO study area peak in the afternoon and evening (Figure 3.4). Sixty-six percent of crash events occur between 2pm and 9pm. A smaller peak occurs in the morning primarily between 7am and 8am.

Crashes: Day of Week

Pedestrian crashes happen throughout the week, likely indicating that people walk for both recreational and utilitarian purposes (Figure 3.5). Crashes are lowest on Sundays and highest on Fridays.

Crashes: Month of Year

Across the Memphis MPO study area, crashes occur throughout the year with some peaking in April and October (Figure 3.6). This is likely indicative of greater pedestrian activity during pleasant weather of the spring and fall.

Who Is Involved in Pedestrian Crashes?

It can be useful to analyze crash events based on who is involved in the crash. The age and demographics of victims can help to establish targeted programs and policies towards the most vulnerable user groups. This analysis also allows for an understanding of environmental factors that may contribute to unsafe conditions for pedestrian activity.

Crashes: Age

Figure 3.7 illustrates the age distribution of residents of the Memphis MPO study area as well as the age distribution of pedestrians involved in crashes with motorists. Key findings include:

- Adults age 18-44 are overrepresented in pedestrian crashes. Crashes involving this age group represent 42% of pedestrian crashes.
- The 65 and over population is underrepresented in crashes. This may be a result of less walking in this age group and/or greater exercise of caution by this group.

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### Table 3.2 - Crash Events by Severity

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<tr>
<td>Incapacitating Injury</td>
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<tr>
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<td>355</td>
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<td>Possible Injury</td>
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<td>943</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>2062</strong></td>
</tr>
</tbody>
</table>

Sources: MDOT & TDOT, 2009 - 2013
Where Do Pedestrian Crashes Occur?

An understanding of the location of crash events can lead to more insightful recommendations and countermeasures that will prevent similar crashes from occurring in the future. This analysis also allows for an understanding of environmental factors that may contribute to unsafe conditions for pedestrian activity.

Intersection vs. Midblock

Table 3.3 shows the share of crashes occurring at intersections, near intersections (within 10-50 feet), and at midblock locations (more than 50 feet from an intersection). Key findings include:

- Intersections – 36% of pedestrian crashes occur at intersections and represents the second most likely place for a pedestrian crash to occur, but with near identical results at the number one location.
- Near intersections (but not within them) – 27% of pedestrian crashes.
- Midblock (between intersections) – 38%

### QUALITATIVE CRASH ANALYSIS

This section describes key safety issues for pedestrians in the Memphis MPO Study Area based on the results of the public questionnaire and input received during the focus groups and public meetings.

Roadway Barriers

Arterial roadways in the Memphis MPO Study Area experience a disproportionate number of crashes along them in comparison to their proportion of the full roadway network. With multiple travel lanes (4 or more lanes) and high posted speeds limits (over 80% of arterial mileage is posted at 40mph or greater), many of these roads have excess vehicle capacity as well. These conditions encourage speeding, which increases collision severity and can make it difficult for pedestrians to cross.

Signalized Intersections

Intersections along these major corridors often contain pedestrian accommodations like striped crosswalks, pedestrian signals, and curb ramps. Still, many crashes occur at these intersections. The following safety issues remain at signalized intersections:

- Faded Crosswalks: A majority of crosswalks in the region consist of two parallel stripes and are often faded, making them difficult for motorists to see.
- Insufficient Crossing Time: Crossing distances at major roadway intersections are long with few refuges, and pedestrian signal heads in many locations do not appear to provide sufficient time for pedestrians to cross.
- Slip Lanes: Many intersections contain slip lanes, which allow turning vehicles to yield rather than stop, endangering pedestrians crossing this lane.
- Permissive Left Turns: Many major intersections allow left turns across signalized pedestrian movements. This creates a conflict and can result in a crash when the motorist is focused on oncoming traffic and not looking out for pedestrians in the crosswalk.
- Missing Facilities: Many multi-lane intersections of arterials and collectors do not
contain crosswalks, further reducing visibility of pedestrians, including locations where pedestrian activity is highest.

**Unsignalized Crossings**

In addition to challenges at signalized intersections, major roadways are unsafe to cross between intersections. Since major roadways in the Memphis MPO study area often have long distances between signalized intersections, many pedestrians cross at unsignalized intersections or midblock between intersections. These crossings require pedestrians to navigate several lanes of fast-moving traffic, typically with no refuge or warning signage.

- **Insufficient Marked Crosswalks**: Best practice suggests that pedestrians should not have to cross more than two lanes of high speed traffic without enhanced crossing treatments to supplement the marked crosswalk.

- **Long Distances Between Marked Crosswalks**: Pedestrians often cross busy roadways outside of signalized intersections because of the long distances between crossings, particularly on commercial corridors.

- **Crosswalk Visibility**: Midblock crosswalk markings should use a high visibility treatment, such as a continental or zebra crosswalk, including near schools.

**Walkways**

Missing or degrading sidewalks create challenges for pedestrians traveling along corridors, in addition to the crossing challenges they face. Infrastructure challenges along corridors are summarized below.

**Sidewalks**

Not all communities in the Memphis MPO Study Area have a comprehensive sidewalk network in place. In the communities that do have extensive sidewalks, many are damaged and in need of repair. Several other issues reduce the safety and usefulness of sidewalks:

- **Tree Uprooting**: Trees in older communities have uprooted many sidewalks, causing uneven surfaces that are difficult to maneuver.

- **Lack of Buffer**: Many sidewalks have no buffer from the roadway, creating an uncomfortable space for pedestrians along higher speed roadways. In many cases, a buffer that previously
Lack of Accessibility for Persons with Disabilities

While the sidewalk issues above are challenging to all pedestrians, they are especially difficult for the disabled population to navigate. Wheelchair users are often forced into the roadway because of uneven sidewalks or sidewalk obstructions, endangering themselves and others. The following issues impact pedestrians with disabilities in particular:

- Sidewalk Deterioration: In addition to damage caused by trees, many sidewalks are generally deteriorating, making them impassable for pedestrians with disabilities. Sidewalk gaps also restrict movement along otherwise preserved segments of sidewalks.

- Obstructions: Better enforcement is especially needed to prevent property owners from obstructing the sidewalk and thereby violating local sidewalk ordinances.

Behaviors that Impact Pedestrian Safety

Feedback was provided that revealed behaviors by both motorists and pedestrians that impact pedestrian safety.

Motorist Behavior

Like many metropolitan regions in the US, the roadway network in the Memphis MPO study area has been designed and operated over the last 75-100 years to serve motorized traffic. This likely contributes to an observed and reported culture of deference to motor vehicles. The following behaviors were noted:

- Crosswalk Noncompliance: Feedback indicates that motorists generally do not yield to pedestrians in crosswalks, with the exception of crosswalks with pedestrian hybrid beacon signals. Stakeholders indicated in focus groups that yielding is uncommon.

- High Speeds: Motorists travel at high speeds on major corridors was a general position of consensus among stakeholders.

Pedestrian Behavior

Pedestrians are also noted as making risky movements across roadways. These behaviors may result from a lack of infrastructure provided for pedestrian mobility, as well as by the motorist behaviors described above.

- Crossing Locations: Many pedestrian crashes occur near intersections, but not within the designated crosswalks. This may result from a sense that intersection crossings are unsafe, or may occur because pedestrians do not want to wait for signals to cross.

- Walking in Roadway: Pedestrians were reported to regularly travel in the roadway next to sidewalks. This is also typical of wheelchair users and may be a result of damaged or missing sidewalk segment or the presence of obstructions in the walkway.
PEDESTRIAN COMFORT ASSESSMENT

Participants of the public input sessions held in Summer 2014 were asked to look at 10 different images of pedestrian infrastructure from throughout the Memphis MPO study area and provide feedback on how they would rate their comfort level if walking in the location shown. Participants could indicate that, based on what they observe, they would either have a positive or negative experience while walking in the location shown. Participants could also indicate that the image did not evoke a feeling one way or another and indicate a neutral experience. Combined with the written responses received during the online questionnaire, the two images receiving the most positive indications and the two images receiving the two most negative indications are below with notes about the factors of each that may play in to the perception of comfort or uneasiness.

This image displays a pedestrian environment in which a standard width sidewalk is provided with a substantial buffer (grassy area plus a bike lane) between the walkway and moving automobile traffic.

This image displays an intersection that has ADA accessible curb ramps in both directions of travel, pedestrian-scale lighting, curb extensions, and tree plantings that create a screen for pedestrians.

The driveway and obstructions in the walkway create an impeded pathway for pedestrians. Additionally, the aesthetics of the adjacent land use does not create a comfortable location for transit boarding.

This image is typical of many highway and major road crossings. While the walkway is present and in good condition, the lack of buffer between motor vehicle and pedestrian traffic was not well received.


**Connectivity**

Connectivity refers to the degree to which the various pieces or segments of a transportation network link to one another and to destinations. A network with high connectivity is one in which multiple route options that are as direct as possible exist between two points. Generally speaking, grid-like street networks offer more connectivity than those characterized by dead-ends, coves, or long blocks. For pedestrian planning, connectivity carries high importance.

The more connected a network is, the better the travelers’ experience. High connectivity leads to minimized trip distances between an origination point and a destination, as well as greater convenience for the traveler. As a pedestrian system grows more connected, these methods of travel become more attractive. New connections lead to a greater number of destinations and to reduced travel time. Conversely, gaps in the network, such as missing sidewalks, force pedestrian traffic onto roadways with potentially unsafe conditions and, furthermore, deter individuals from choosing these modes of transportation. Because of these reasons, connectivity plays a key role in this plan’s analysis of the existing network and determination of recommendations.

**Pedestrian Connectivity**

The pedestrian infrastructure network is fairly easy to define. Obvious inclusions in the pedestrian network are sidewalks, shared-use paths, and roadway crossing facilities such as crosswalks and curb ramps.

**Level of Service Analysis**

“Pedestrian level of service” is a technical term used to describe a very basic, simple concept: how supportive of pedestrian travel is the infrastructure in a given area and how well do other modes of travel interact with pedestrian travel? Areas with good pedestrian level of service (LOS) provide safe and supportive infrastructure for pedestrians.

Pedestrian Level of Service (PLOS) is a nationally-used measure of pedestrian comfort level as a function of a roadway’s geometry and traffic conditions. PLOS is in the Highway Capacity Manual. Roadways with a better (lower) score are more attractive (and usually safer) for pedestrians while roadways with higher scores are considered untenable for pedestrian travel. PLOS evaluation is useful in several ways:

- A map can be produced that provide visual guidance on which roadways may need additional infrastructure to improve conditions for pedestrians.
- The most appropriate routes for inclusion in the community pedestrian network can be identified.
- “Weak links” in the network can be determined, and sites needing improvement can be prioritized.
- Alternate treatments for improving pedestrian-friendliness of a roadway can be evaluated.

The PLOS formula provides a numeric output that is converted to an alphanumeric character representing the degree to which pedestrian travel is expected to be for a given roadway segment. Figure 3.8 displays PLOS for the Memphis MPO Study Area.

Key Findings Include:

- 84% of travelways in the Memphis MPO study area calculate a PLOS which indicate an environment supporting pedestrian travel (Level A or B).
- 99% of the travelways calculated with a PLOS A or B are local roads characterized by two-lane, neighborhood roadways with low motor vehicle traffic volumes and lot motor vehicle speeds.
- Only 1% of the travelways with a PLOS A or B are major roadways like arterials and collectors. These travelways calculating this favorable score for pedestrian travel are characterized with wide buffer areas separating motor vehicle traffic from pedestrian traffic and lower overall motor vehicle traffic volumes.
- 100% of the travelways with a PLOS E or F are major roadways like arterials and collectors. Generally speaking, these types of roadways do not provide enough buffer space between moving automobile traffic and pedestrians to compensate for the high traffic volumes and speeds.
- Roadways with bicycle lanes typically calculated a better PLOS score as the width of the bicycle lane is counted as buffer space between moving automobile traffic and pedestrians.
Pedestrian LOS Analysis
Memphis MPO Region

- **PLOS A** Extremely High
- **PLOS B** Very High
- **PLOS C** Moderately High
- **PLOS D** Moderately Low
- **PLOS E** Very Low
- **PLOS F** Extremely Low

Figure 3.8 - Pedestrian Level of Service Analysis
**Block Length Analysis**

Block length is used in a number of ways to promote or measure connectivity. Standards usually range from 300 to 600 feet and apply to every block, with some exceptions. Shorter distances (330 feet) are recommended for pedestrian and bicycle connections. Block lengths can be measured from the curb or from the centerline of the street intersection. The theory behind using block length as a standard is that shorter blocks mean more intersections and, therefore, shorter travel distances and a greater number of routes between locations. Figure 3.10 displays the comparative block length for each block in the Memphis MPO study area.

This figure demonstrates the relationship between block length and connectivity. Under Plan 1, each block face is the same length. In Plan 2, the same four blocks are half as wide, and twice as long. The walking distance between points A and B, located on opposite sides of the development, for Plan 1 is shorter than Plan 2.

Figure 3.10 - Pedestrian Level of Service Analysis
**Connected Node Ratio**

The Connected Node Ratio is calculated by the number of street intersections divided by the number of intersections plus cul-de-sacs. The maximum value is 1.0. Numbers closer to 1.0 indicate that there are relatively few cul-de-sacs, thus a greater level of connectivity within a given geography. Transportation networks with a Connected Node Ratio of less than 0.5 do not support a connected network. A value of 0.7 or greater is desired, with 0.7 being the lowest acceptable ratio of connectivity. Aggregating by census tracts, no community in the Memphis MPO study exhibits a value less than 0.70, but there is wide variety in the level of connectivity displayed by this analysis as shown in Figure 3.12.

*Figure 3.11*

This figure displays the difference in connectivity between two networks as demonstrated by the Connected Node Ratio. Plan 1 has a value of 0.25, indicating that it is not very well connected and Plan 2 has a value of 0.75 indicating that it is a well connected network.

*Figure 3.12 - Pedestrian Connected Node Ratio Analysis*
ACCESSIBILITY

Considered as a continued measure of connectivity, accessibility is defined as the ability for pedestrians to travel seamlessly along comfortable pedestrian routes, using the shortest paths possible, and with easy integration to complementary modes of transportation like bicycling and public transportation. Greater connectivity creates and environment in which pedestrian travel is convenient and comfortable in distance, but in order to support pedestrian activity as a mode of travel, users require infrastructure that form complete networks to connect people, as directly as possible, to their desired destinations. For this reason, gaps in the pedestrian transportation network should be eliminated to increase the accessibility of the transportation network to pedestrians.

Furthermore, the ability for a wide variety of pedestrian users to safely navigate the pedestrian network is crucial to creating a landscape that is accessible to everyone. When designing and implementing pedestrian projects, attention must be made to those pedestrians using wheelchairs or other personal mobility devices, strollers, scooters, wagons or other human-powered vehicles. Barriers to use for these pedestrian users can be present where there are no curb ramps to provide access to the roadways, uplifted sidewalk panels that inhibit wheeled vehicles from passing along the walkway, or a lack of paved surfaces necessary to board public transportation.

The following analysis of accessibility will pay particular attention to identifying and prioritizing missing network segments that inhibit accessibility. Due to a general lack of data regarding the age and condition of the existing pedestrian network, this plan cannot make specific recommendations on corridors that may need repairs or maintenance to improve accessibility. Instead, this plan will identify the existing pedestrian network, determine which pieces of the network are most likely to see the highest levels of use, and identify priority segments for review (requiring maintenance or upgrades to existing infrastructure) or a priority segment for implementation (gaps in the pedestrian network requiring new infrastructure).

Shortest Path Analysis

Shortest Path Analysis uses the assumption that a pedestrian will use the shortest pathway possible to get from one place to another. Using common destinations traveled to each day by residents of the Memphis MPO Study Area, an analysis can be formed that identifies common routes that multiple people would use if accessing a destination by the shortest means necessary. By combining the pathways of multiple users in a given geography, patterns begin to emerge on network segments identified as common points of travel within the study area. These segments can be identified as “high demand” routes and can be used as a part of prioritization for selected improvements in the Memphis MPO study area.

Common destination that were used to determine routes of travel include:

- Libraries
- Schools, Colleges, and Vocational Centers
- Hospitals
- Health Centers (Doctor’s Office and Medical Treatment Centers)
- Farmer’s Markets
- Grocery Stores
- Community Gardens
- Large Employment Centers
- Parks
- Community Centers

Figure 3.14 displays the aggregate results of the pedestrian shortest path analysis. The route segments with the most overlap between pedestrian travel along the shortest path to common destinations are indicated in red and those with relatively few overlaps are indicated in yellow. Segments in the transportation network indicated in gray contain the least amount of pedestrian demand.
due to a lack of destinations for persons to travel to. As indicated, pedestrian demand is highest inside the I-240 loop, but spreads heavily into the suburban areas of the Memphis MPO study area. Further validation of this analysis is accomplished through comparison against the pedestrian mode share calculated for work trips by the US Census (Figure 3.15).

**Route Gap Analysis**

Gaps in any transportation network can inhibit the free movement of people or goods and great care is needed to ensure acceptable levels of connectivity remain in place in order to allow the greatest level of accessibility possible. This is especially important when considering the viability of the network that allows safe and convenient pedestrian travel. The presence of gaps in the pedestrian network can discourage persons from using pedestrian travel even when their destination may be within comfortable walking distance. For those relying on pedestrian modes of travel, gaps in the pedestrian network can lead to situations where a pedestrian may be traveling in an unsafe environment, placing themselves in greater danger than should be tolerated. Furthermore, persons attempting to travel with the assistance of a personal mobility device, like a wheelchair, will find gaps in the pedestrian network to be impassible, often leading to behaviors where they are forced to utilize the street for travel instead of the separated pedestrian space.

The existing pedestrian network has been mapped for the Memphis MPO Study Area and is displayed in Figure 3.16 while Figure 3.17 contains an analysis of missing pedestrian network segments. Key findings include:

- 18% of roadways in the Memphis MPO study have an adjacent sidewalk corresponding to the same travel corridor.

- Shelby County has the greatest number of pedestrian pathways while Marshall County contains the least. A correlation may exist with existing pedestrian mode share, the predicted pedestrian demand, and the presence of sidewalks in Memphis MPO communities.

- Approximately 11,598 miles of roadways do not have corresponding pedestrian walkways adjacent to the existing corridor. These gaps identify lack of network continuity for pedestrian movement in the Memphis MPO Study Area.
Figure 3.14 - Pedestrian Shortest Path Analysis

Shortest Path Analysis
Pedestrian Demand
Memphis MPO Region

Number of Segment Overlaps

- 0 - 2
- 3 - 8
- 9 - 16
- 17 - 25
- 26 - 46
- 47 - 61
- 62 - 79
- 80 - 100
- 101 - 124
- 125 - 154
 CHAPTER 3

Pedestrian Mode Share
Commute to Work Trips
US Census, ACS
Memphis MPO Region

% Pedestrian Trips
- 0.0 - 0.3
- 0.3 - 1.8
- 1.8 - 2.6
- 2.6 - 3.6
- 3.6 - 4.6
- 4.6 - 6.0
- 6.0 - 7.8
- 7.8 - 11.3
- 11.3 - 18.8
- 18.8 - 30.0

Figure 3.15 - Current Pedestrian Mode Share by Census Tract

Sources: US Census Bureau, American Community Survey 5-year Estimates (2012)
CHAPTER 3

Existing Pedestrian Network
Memphis MPO Region

Figure 3.16 - Existing Pedestrian Network
Figure 3.17 - Pedestrian Route Gap Analysis

Route Gap Analysis
Memphis MPO Region

No Sidewalks
CHAPTER 3

MODE SHIFT

Mode shift is a transportation planning term that refers to a change in the relative reliance on one form of travel to another. In the case of this plan, the shift from motor vehicle to pedestrian travel is considered an important goal for creating a more livable and sustainable region. As the cost of infrastructure to accommodate longer trip distances using single-occupancy vehicles has increased exponentially over the past twenty years, the importance of mode shift to other forms of transportation has become more commonplace as they are both cost effective to implement and lead to other tangential benefits as described in Chapter 1.

For pedestrian travel, mode shift is a long-term proposition, heavily dependent on density of populations located within comfortable walking distance to common destinations. Compared to bicycle infrastructure, pedestrian infrastructure has not been shown to have wide spread impacts to mode shift, even though safety, health, and economic benefits have been noted. This is largely due to the restricted geography of pedestrian travel.

Even though investment in improving or providing pedestrian infrastructure may have only limited benefits to pedestrian mode share in the short-term, long-term strategies that focus on dense developments that encourage walking between residential and commercial, civic, and employment land uses, would create a greater mode shift over time.

Expediting pedestrian mode shift can be accomplished through greater investment in public transportation. As nearly 85% of all regional public transportation trips begin and end with a pedestrian trip, the implementation of public transportation would induce a greater pedestrian mode shift in any community in which it was implemented.

Using the methodology developed in NCHRP Report 7-14, Figure 3.18 indicates the portions of the Memphis MPO Study Area most likely to produce greater shifts in pedestrian mode share, aggregated by census tracts. Key findings include:

- The highest potential for mode shift is demonstrated where population densities are highest.
- The highest potential locations for pedestrian mode shift correspond to portions of the Memphis MPO region where public transportation is currently utilized.
- As shown in Figure 3.19, areas with the highest potential use correspond with the presence of an existing sidewalk network.
- As populations densities increase in suburban communities, particularly where sidewalk networks exist or can be formed, the potential for mode shift can increase.

Non-Infrastructure Programs

Besides building infrastructure, there are a number of other ways in which communities can help support pedestrian mode shift. These programs and policies are sometimes easy to implement and require fewer resources than the design and construction of infrastructure. However, in the absence of adequate infrastructure, these programs may only achieve slight success which may lead to frustration and discouragement if the predicted mode shift does not occur. As a mechanism to support ongoing infrastructure improvements, communities should consider the following recommendations:

- Expand public education campaigns that promote the use of pedestrian travel as a viable means of transportation and include a focus on the rights and responsibilities of all road users in relation to one another in order to promote safety and respect.
- Pedestrian safety education should be expanded to be included as a routine part of the public education system. Combining safety education with encouragement activities like Walk to School Day create an environment where children are comfortable using pedestrian infrastructure and are taught from a young age the importance and benefits of using pedestrian means as a form of transportation.
- Enforcement campaigns that focus on reducing infringement into sensitive pedestrian areas, like cross walks, could help to create an environment where pedestrian travel is less intimidating, thus encouraging new users to begin forms of pedestrian travel. Examples of these focused campaigns exist throughout the country and could be focused at intersections with higher levels of historical pedestrian crashes.
- Review and revise local development guidelines that create communities where pedestrian travel is viable and convenient. Requirements could include the mandatory development of sidewalks, building codes that incentivize the provision of locker rooms and showers at places...
of employment, development guidelines that standardize connectivity and block length for new neighborhoods or roadways, street design guidelines that prioritize adequate widths of walkways and buffer areas as well as establishing standards for minimum levels of pedestrian seating and appropriately scaled lighting.
Figure 3.18 - Pedestrian Mode Shift Potential

Sources: US Census Bureau, American Community Survey 5-year Estimates (2012)
Figure 3.19 - Pedestrian Mode Shift Potential with Existing Pedestrian Network

Mode Shift Potential
Memphis MPO Region

- Extremely Low
- Very Low
- Moderate
- Very High
- Extremely High

Sidewalks

Sources: US Census Bureau, American Community Survey 5-year Estimates (2012)
PEDESTRIAN RECOMMENDATIONS

Each of the projects recommended in the plan offers its own merit, and, needless to say, is a needed piece pedestrian infrastructure. When compared side-by-side, however, some of these projects present the opportunity for greater impact than others in terms of advancing the pedestrian conditions of the Memphis MPO study area. In order to assist jurisdictions in determining where need is greatest and how to spend limited funds, the plan applies a project prioritization process.

The plan’s four themes of safety, connectivity, accessibility, and mode shift form the foundation of this prioritization process. By using the various analysis methods previously described, recommended projects received a score with which they could be ranked. This overall prioritization process consisted of three steps:

1. Assessment of the Network
2. Project Scoring
3. Project Ranking

Assessment of the Network

As outlined in the preceding pages, each theme involved its own analytical method or methods. These various methods established a corresponding numerical score, in some cases for a given geographical area and in others for segments of the network (i.e. roadway segments). Table 3.4 presents the implication of each analysis’ resulting score.

The next step involved combining these various scores into one composite score for every segment in the network. In general, the higher the score, the more in need a location is for pedestrian improvements. Each segment of the transportation network was analyzed for its proximity to each of the analyses completed for the plan’s four key planning themes. Based on the level of analysis, each segment was awarded a numeric score for each planning theme. The composite score was derived by a sum of each individual score developed from the analysis. In total, a segment could receive a maximum score of 100 points. The composite pedestrian scores for each segment of the transportation network is shown in Figure 3.20.

This composite approach ensures that diverse projects stand a fair chance against each other in the prioritization. This composite score also allows future Memphis MPO plans to access the need for additional pedestrian improvements regardless if that project corridor is specifically named in this plan or not. In this way, communities taking advantage of time-sensitive grant programs can adequately include pedestrian improvements in the project scope and receive the full scoring benefit of those improvements without need to amend and update the Regional Bicycle and Pedestrian Plan.

Project Scoring

With the composite scores by segment determined, individual projects were overlaid on their corresponding network segments. Individual project were taken from three primary sources:

1. Projects identified in the 2011 Memphis MPO Regional Bicycle and Pedestrian Plan. The previous version of this plan contained about 1,500 miles of recommended corridors for improvement. Those projects not completed since the last plan’s adoption were carried forward into this plan for assessment using the new prioritization criteria.

2. The Mid-South Regional Greenprint and Sustainability Plan contained recommendations for about 500 miles of interconnected greenways and corridors for enhanced non-motorized travel. While many of the corridors
are already present in the 2011 Memphis MPO Bicycle and Pedestrian Plan, there were some variations that warranted a review of the list of projects.

3. Many of the communities in the Memphis MPO have developed and adopted local pedestrian plans that guide development and funding of future pedestrian infrastructure in their communities. Meetings were held in Spring 2014 with each jurisdiction to make sure the most recent infrastructure improvements were included in this plan.

MPO planners then assigned each segment’s composite score to the matching project corridors. By summing the total scores for each segment along the project corridor, and then normalizing based on project length, the resulting total became the project’s final score. Figure 3.20 displays the composite scoring for all the network segments in the Memphis MPO study area. Those network segments indicated in red received the highest numeric score (highest priority), while those in green received the lowest numeric score (lowest priority).

**Project Ranking**

After establishing the final scores, planners simply ranked all recommended projects from the highest score to the lowest. In this way, the project with the highest score addresses a location with the most need, offers the greatest opportunity for mode shift at that location, and, therefore, receives the highest priority. Table 3.5 displays the top 75 pedestrian project locations for consideration in this plan.

While this table displays projects ranked according to the analysis of this plan, it should not be considered the comprehensive project listing for this plan. Instead, the individual segments of the transportation network will be used in future MPO planning efforts to assess the need for pedestrian improvements. This exercise does allow this plan to assess the usefulness of this new prioritization technique and to address the many planned corridor improvements already identified in communities throughout the Memphis MPO study area.

<table>
<thead>
<tr>
<th>SAFETY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Crash Analysis</td>
</tr>
<tr>
<td>The higher the score, the more crashes that occur in that area (applied by Census Tract per person).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONNECTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Length</td>
</tr>
<tr>
<td>The higher the score, the higher the block lengths are in that area (applied by Census Tract).</td>
</tr>
</tbody>
</table>

| Link-Node Ratio                             |
| The higher the score, the fewer links there are to nodes in that area (applied by Census Tract). |

| Level of Service                            |
| The higher the score, the less that location supports bicycle/pedestrian travel in its current condition (applied by network segment). |

<table>
<thead>
<tr>
<th>ACCESSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortest Path</td>
</tr>
<tr>
<td>The higher the score, the more that location is used, or, alternatively, in demand (applied by network segment).</td>
</tr>
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<table>
<thead>
<tr>
<th>MODE SHIFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected Mode Shift</td>
</tr>
<tr>
<td>The higher the score, the greater potential that location offers to shift trips to bicycle or pedestrian travel (applied by census Tract).</td>
</tr>
</tbody>
</table>
Pedestrian Route Priorities
Memphis MPO Region

0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 100

Figure 3.20 - Pedestrian Composite Scoring, Transportation Network
<table>
<thead>
<tr>
<th>PRIORITY #</th>
<th>FACILITY NAME</th>
<th>BEGIN</th>
<th>END</th>
<th>TYPE OF FACILITY</th>
<th>JURISDICTION</th>
<th>ST MILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Watkins St</td>
<td>Jefferson</td>
<td>Madison</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.18</td>
</tr>
<tr>
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<td>McNeel St</td>
<td>Jefferson</td>
<td>Madison</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.18</td>
</tr>
<tr>
<td>3</td>
<td>Front St</td>
<td>Jefferson</td>
<td>Union</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.29</td>
</tr>
<tr>
<td>4</td>
<td>Jeffre Ave</td>
<td>Greer</td>
<td>Holmes</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.06</td>
</tr>
<tr>
<td>5</td>
<td>Wagner Rd</td>
<td>Union</td>
<td>Huling</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.58</td>
</tr>
<tr>
<td>6</td>
<td>Clarke Rd</td>
<td>Myers</td>
<td>Flowering Peach</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.10</td>
</tr>
<tr>
<td>7</td>
<td>Stonewall St</td>
<td>Tutwiler</td>
<td>North Parkway</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.05</td>
</tr>
<tr>
<td>8</td>
<td>Canton Dr</td>
<td>Gresser</td>
<td>Ridgewood</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.07</td>
</tr>
<tr>
<td>9</td>
<td>Young Ave</td>
<td>Coverty</td>
<td>East Parkway</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.28</td>
</tr>
<tr>
<td>10</td>
<td>Delaware St</td>
<td>Eli Crump</td>
<td>Metal Museum</td>
<td>On Street Facility</td>
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<tr>
<td>11</td>
<td>Claudette Rd</td>
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<td>Perkins</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.86</td>
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<tr>
<td>12</td>
<td>Cedar Rd</td>
<td>Oak</td>
<td>Greenleaf</td>
<td>Signed Shared Roadway</td>
<td>Bartlett</td>
<td>TN 0.20</td>
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<td>13</td>
<td>Fourth St</td>
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<td>TN 1.22</td>
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<td>Front</td>
<td>On Street Facility</td>
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<td>15</td>
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<td>Elliston</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.45</td>
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<tr>
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<td>Park Ave</td>
<td>Lamar</td>
<td>East Parkway</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.22</td>
</tr>
<tr>
<td>19</td>
<td>Sedgwick Rd</td>
<td>Levi</td>
<td>Ivan</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.14</td>
</tr>
<tr>
<td>20</td>
<td>Southdale Ave</td>
<td>Knight</td>
<td>Mendenhall</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 1.41</td>
</tr>
<tr>
<td>21</td>
<td>Homer St</td>
<td>Magnolia</td>
<td>Wayne</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.14</td>
</tr>
<tr>
<td>22</td>
<td>North Second Street (TN 3 / TN 14)</td>
<td>I-40</td>
<td>Union</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.73</td>
</tr>
<tr>
<td>23</td>
<td>Bellevue Blvd</td>
<td>Vellenette</td>
<td>North Parkway</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.78</td>
</tr>
<tr>
<td>24</td>
<td>Sharpe Ave</td>
<td>Semmes</td>
<td>Robin Hood</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 1.28</td>
</tr>
<tr>
<td>25</td>
<td>Bass Pro Dr</td>
<td>I-40</td>
<td>Riverside</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.27</td>
</tr>
<tr>
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<td>McGlory Rd</td>
<td>McClintoch</td>
<td>Mason</td>
<td>On Street Facility</td>
<td>Memphis</td>
<td>TN 0.40</td>
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<tr>
<td>27</td>
<td>Mason Rd</td>
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### DeSoto County, MS Pedestrian Corridor Improvement Priorities

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### Fayette County, TN Pedestrian Corridor Improvement Priorities

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</tr>
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<td>Walnut St</td>
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<td>71</td>
<td>Luther Rd</td>
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<td>74</td>
<td>Greenleaf Rd</td>
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<td>76</td>
<td>Deerwood Rd</td>
<td>Altruria</td>
<td>Crossing</td>
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<tr>
<td>81</td>
<td>Farmington Blvd</td>
<td>Poplar</td>
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<td>Yale</td>
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<td>Centralia Rd</td>
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<td>Poplar Estates Pkwy</td>
<td>Wynterhall</td>
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<td>North Creek Trail</td>
<td>Powell Park Trail</td>
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<td>White</td>
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<td>Cairn Ridge</td>
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*Excluding Memphis, TN