

Gastonia Comprehensive PEDESTRIAN PLAN

SOUTHERN RAILWAY

Final Report



Division of
Bicycle &
Pedestrian
Transportation



Gastonia Comprehensive Pedestrian Plan

Final Report

May 2014

prepared for



prepared by



Gastonia Comprehensive Pedestrian Plan

Final Report

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Executive Summary

The City of Gastonia desires to be a city where walking is safe, convenient, and a desirable mode of transportation for residents and visitors of all ages and abilities. Walking is an essential part of every trip; whether walking in your neighborhood, traveling between your car and the front door of a business establishment, or going to the corner convenience store, at some point we are all pedestrians.

The Vision of the Gastonia Comprehensive Pedestrian Plan is to improve the health, safety, and quality of life in Gastonia.

ES.1 Why a Plan?

The Gastonia Comprehensive Pedestrian Plan has been developed to realize the vision of improved health, safety, and quality of life in Gastonia. The City understands that walking is critical to having a diverse transportation network and making its streets more vibrant and attractive. For people to choose walking over other modes of transportation, sidewalks and other pedestrian spaces need to be safe, comfortable, and aesthetically pleasing, while also connecting logical desire lines between recognized origins and destinations. Pedestrian zones must be designed to accommodate all users, regardless of age or ability, allowing for person-to-person interaction, patronage of businesses, and the pursuit of active, healthy lifestyles.

The Gastonia Comprehensive Pedestrian Plan was a collaborative effort of the City of Gastonia, the Gaston-Cleveland-Lincoln Metropolitan Planning Organization (MPO), and the North Carolina Department of Transportation (NCDOT). The Plan identifies policies, programs, and physical infrastructure improvements to make Gastonia a safer and more comfortable place to walk.

ES.2 Public Participation

The Gastonia Comprehensive Pedestrian Plan was formulated through a robust public participation plan. Specific methods and techniques included:

- Steering Committee composed of a range of City departments, Gaston-Cleveland-Lincoln MPO staff, NCDOT staff, Gaston County representatives, advocacy groups, and business and community leaders.
- Walking tour where Steering Committee members observed and discussed pedestrian-related issues and opportunities throughout the community.
- Van tour that allowed stakeholders to both verbally and visually communicate pedestrian issues to the project team from all areas of Gastonia.
- Interactive online map that offered the opportunity for the public to identify various relevant items, including: places they walk to and from often; difficult crossings; missing sidewalks; and other conditions that impact their experience walking in Gastonia.
- Public meetings to present existing conditions, receive input on pedestrian issues, and present the Draft Plan for review and feedback.

Goals of the Plan

- Improve safety by reducing the number and severity of crashes involving pedestrians
- Develop practical and implementable solutions
- Support local businesses and foster economic growth
- Support existing transit
- Enhance neighborhood connectivity and make linkages
- Promote social equity
- Improve enforcement
- Inform and educate the public
- Assess existing infrastructure while implementing retrofits and filling gaps
- Enhance coordination between Gastonia, the Gaston-Cleveland-Lincoln MPO, and NCDOT
- Enhance the character of downtown
- Ensure that new development contributes to pedestrian access and connectivity
- Address difficult intersections and other barriers
- Identify performance measures
- Improve pedestrian outcomes on all roadway improvement and reconstruction projects
- Improve health

ES.3 Existing Context and Pedestrian Issues

The existing pedestrian context was established through the documentation of existing infrastructure, land use, and safety conditions pertaining to pedestrian travel and comfort in the City of Gastonia. As a complement to this, the pedestrian planning context was also considered through the review of demographic information and relevant previous planning documents. Finally, pedestrian issues were identified.

Specific areas that were documented include:

- Geography and development history of the City of Gastonia and how these have both positively and negatively impacted the pedestrian planning and implementation processes.
- Overview of the City's existing pedestrian environment, including barriers, constraints, and opportunities for pedestrian travel.
- Current socioeconomic characteristics of the City of Gastonia and associated implications for potential pedestrian conditions.
- Public health conditions within the City's population, including a high prevalence of high risk health conditions that could be remedied with greater physical activity.
- Inventory of existing sidewalks and sidewalk needs.
- Account of existing and proposed greenways and trails.

Pedestrian Issues

- Too many curb cuts and driveways
- Excess underutilized pavement
- Overbuilt roads
- High speed traffic
- Americans with Disabilities (ADA) issues
- Not enough time for pedestrians to cross large arterial roads
- Sidewalks in poor condition
- Lack of buffers between the sidewalk and the road
- Large arterial roads with a sidewalk on only one side
- Bridges with narrow or missing sidewalks
- Deteriorated crosswalks
- Pedestrian median islands that don't provide a physical separation from traffic
- Intersections without four crosswalks
- Gaps in the pedestrian network that inhibit connectivity
- Of the existing and planned greenways, it's unclear which ones serve (or could serve) a pedestrian transportation purpose
- Pedestrian access to transit is limited by a lack of surrounding sidewalks and amenities such as benches and shelters, as well as difficult crossing conditions
- Pedestrian safety in parking lots
- Poor lighting conditions
- Pedestrians jaywalking and/or crossing at unmarked mid-block locations
- Limited sight distance
- No sidewalks at all on some collector streets

- Availability of and access to public transportation by pedestrians in Gastonia.
- Potential destinations throughout Gastonia that should generate pedestrian trips, including civic buildings and services, commercial and retail establishments, schools, and parks and recreational amenities.
- Pedestrian crash locations and severity.
- Previous planning documents that have a direct influence on pedestrian transportation and recreation.

ES.4 Programs, Policies, and Design Guidelines

Existing Programs and Policies

The City of Gastonia has several existing programs regarding pedestrians:

- The Engineering Department maintains a database of sidewalk requests from citizens along with sidewalks identified in previous planning efforts. These sidewalk projects are constantly evaluated as funding becomes available.
- The City also has a more formal Sidewalk Request Petition program whereby the City installs new concrete sidewalk by request, in the form of a petition, from the majority street's property owners that own a majority of the street frontage. All property owners that are benefited by the project will be assessed an amount, based on street frontage, sufficient to cover 100 percent of the total cost of the project.
- The City also occasionally issues bonds for infrastructure, including pedestrian infrastructure like sidewalks. The most recent municipal bonds, approved in 2010, have resulted in the installation of sidewalks along many collector and arterial roads in the City.
- Gastonia Transit and the Department of Public Works and Utilities have less formal, annual programs that address deficiencies in the City's pedestrian system.

Policies and programs complement and support physical improvements and ongoing maintenance to the pedestrian network.

Recommended Programs and Policies

Members of the Steering Committee were active in determining the most appropriate programs and policies for the Plan. Potential education, encouragement, enforcement, and maintenance policies and programs were provided to the Steering Committee for review and comment. Steering Committee members provided feedback on the most appropriate programs and policies as well as direct comments on appropriate applications to the City of Gastonia. The final set of programs and policies is the result of an interactive process and is informed by best practices in other cities. Recommended programs and policies are presented in **Table ES-1** and **Table ES-2**.

Table ES-I: Recommended Education, Encouragement, Enforcement Programs and Policies

PROGRAM/POLICY	DESCRIPTION
Update/Maintain Existing GIS Sidewalk Inventory	<ul style="list-style-type: none"> • Maintaining the City’s GIS-based sidewalk inventory is an important tool for tracking the location of existing sidewalks. • Updating the inventory to include curb ramps and condition information would make the dataset useful for asset management.
Web/Mobile Reporting App	<ul style="list-style-type: none"> • Provide a web/mobile app that allows citizens to report non-emergency physical and infrastructure issues. • This would include any issues that impact pedestrian safety, access, and comfort. • Interdepartmental communication would increase the effectiveness of such a system (e.g., police and engineering). • Marketing would be needed to make the public aware of the reporting app.
“Near Miss” Reporting System	<ul style="list-style-type: none"> • A near miss reporting system would allow travelers to identify locations and operations that may create a safety risk before an incident occurs. • This can be used as a complement to a web/mobile reporting app – evaluation of maintenance needs and involvement of police and engineering departments. • Coupling and comparing actual crash data with near miss locations would assist in determining accident-prone areas. • Marketing would be needed to make the public aware of the reporting system.
Pedestrian Counts	<ul style="list-style-type: none"> • Regular pedestrian counts are a means of measuring the effect of physical, operational, and programmatic changes on walking rates. • Existing pedestrian counts demonstrate areas of demand and can be used to help support investment in pedestrian network improvements. • Conducting pedestrian counts in the years following network investments can assist in demonstrating the impact improvements have on increasing pedestrian travel. • The City should coordinate with NCDOT’s emerging pedestrian and bicycle count program.
Staff Training	<ul style="list-style-type: none"> • Establish a program to train City staff whose jobs affect pedestrian safety (i.e., planning, engineering, parks and recreation, police department, etc.). “Watch For Me NC” training materials could be utilized (http://www.watchformenc.org/). • Such training will not only educate staff on pedestrian issues and concerns but will assist in implementation of the Plan.
Walking Encouragement	<ul style="list-style-type: none"> • Walking route maps are an encouragement strategy for getting more people walking while indicating the most comfortable and safe routes that link residents to key destinations and areas of interest. • As part of walking route maps, including distance and terrain information will allow user to select the most appropriate routes for their skill level. • Organized neighborhood and company walking and running groups can be a popular way for people to get exercise and build social networks.
Media Collaboration	<ul style="list-style-type: none"> • Work with local print and television media to develop a series of educational pieces that address both safe driving and walking behaviors; these pieces could also cover the rules applicable to all users of public roadways and should be in compliance with North Carolina law (http://www.ncdot.gov/bikeped/lawspolicies/). • The Government Access Channel (cable channel 16) could be an excellent format for providing instruction on appropriate walking and driving behaviors. Utilizing “Watch For Me NC” materials could be an easy starting point for public service announcement content (http://www.watchformenc.org/). • Evaluate media methods for reaching those without access to newspaper and cable television.
Child Pedestrian Safety Curriculum	<ul style="list-style-type: none"> • Collaborate with Gaston County Schools to implement the National Highway Traffic Safety Administration (NHTSA) Child Pedestrian Safety Curriculum, which teaches and encourages pedestrian safety for students grades Kindergarten through 5th Grade (http://www.nhtsa.gov/ChildPedestrianSafetyCurriculum). • This NHTSA curriculum is organized into five lessons: walking near traffic, crossing streets, crossing intersections, parking lot safety, and school bus safety. Each lesson builds upon a previous set of skills learned. • Another resource to consider is NCDOT’s “Let’s Go NC!, A Pedestrian and Bicycle Safety Skills Program for Healthy, Active Children” (https://connect.ncdot.gov/projects/BikePed/Pages/LetsGoNC.aspx).
Speed Limits	<ul style="list-style-type: none"> • Consider lowering the standard speed limit (35 mph) and/or implementing targeted speed limit reductions in areas of high pedestrian demand/potential. • Regarding residential areas, the City already will grant a speed limit reduction if requested by residents.

Table ES-2: Recommended Maintenance and Improvement Programs¹

PROGRAM/POLICY	DESCRIPTION
Maintenance and Repair	<ul style="list-style-type: none"> • Fund the maintenance of sidewalks and other pedestrian infrastructure on an ongoing basis. • Maintaining and repairing sidewalks is a way to protect the City’s investment in the pedestrian network and can help the City’s overall walkability.
ADA Curb Ramps	<ul style="list-style-type: none"> • Begin a program to install and retrofit curb ramps at all intersections within the City. • Set a per year goal. • Ensure that new curb ramps follow Americans with Disability Act (ADA) guidance.
Crosswalks	<ul style="list-style-type: none"> • Establish a citywide crosswalk improvement program. • Implement it in pilot locations, then set a per year goal. • As part of the program, establish as a baseline default that crosswalks will be marked on all four legs of an intersection.
Pedestrian Countdown Signals	<ul style="list-style-type: none"> • Create a proactive pedestrian countdown signal improvement program to install pedestrian countdown signals at new locations on an ongoing basis. • Set a per year goal.
Pedestrian Refuge	<ul style="list-style-type: none"> • Where existing painted center medians exist in proximity to intersections, seek opportunities to construct raised medians in their place to provide pedestrian refuge.
Transit Access	<ul style="list-style-type: none"> • Establish a program to provide better crossing opportunities at bus stops, especially at uncontrolled mid-block locations. • If existing crossing locations can’t be improved, consider moving the bus stop to a location where better crossing conditions can be accommodated. • Consider implications to transit operations prior to relocating bus stops.
Midblock Crossings	<ul style="list-style-type: none"> • Consider midblock crossing improvement opportunities along corridors where signals are currently spaced far apart. • Improvements may include advanced warning signage and pavement markings, Rectangular Rapid Flash Beacons, and/or HAWK signals.
Street “Right Sizing”	<ul style="list-style-type: none"> • Evaluate opportunities to implement lane diets, road diets, curb extensions, and other reallocations to “right size” existing roads so that they function better for all modes. • Reclaimed pavement areas can be utilized for buffers/greenstrips, sidewalk widening, bike lanes, and/or curb extensions. • In all cases, sufficient traffic analysis should be performed to ensure functionality and appropriateness of treatments.

¹ Design guidelines specific to these areas of maintenance and improvement are included in Appendix D of the Plan.

ES.5 Design Standards

Existing Standards and Details

A review of current standards and details that apply to pedestrian related facilities in the City of Gastonia was performed. A number of details were provided by the City of Gastonia and encompass standards and typical sections from the City of Gastonia, Gaston-Cleveland-Lincoln MPO, and NCDOT. A detailed documentation of this review is included in Appendix C of the Plan.

Preferred Design Standards and Policies

As with policies and programs, members of the Steering Committee were active in determining preferred design standards and policies for the Plan. Potential design standards and policies were provided to the Steering Committee for review and comment. Comments were received during a Steering Committee meeting, including how such should be applied in Gastonia. **Table ES-3** presents preferred design standards and policies for the City of Gastonia, which are the result of an interactive process and are informed by best practices in other cities.



ES.6 Network Recommendations

Chapter 4 of the Plan presents recommendations for improving Gastonia's pedestrian network. Best practices were incorporated into the recommendations and strategies are intended to assist in reducing barriers to pedestrian travel by improving safety, convenience, and comfort.

Pedestrian Environment

The pedestrian environment can be defined by two primary areas of activity: 1) Along the Roadway; and 2) Across the Roadway. Consideration should be given to both of these areas of activity when implementing recommended improvements and determining new improvements moving forward.

- Along the Roadway – Providing a quality walking experience for pedestrians along the streets and roadways of Gastonia is influenced by a variety of factors, including: sidewalks, buffers, obstructions, access to transit, vehicular intrusions, bridges, and access to trails.
- Across the Roadway – In addition to providing continuous and safe facilities adjacent to roadways, safe street crossings are a critical component of an accessible and complete pedestrian network. Essential factors in determining the quality of a pedestrian's experience crossing a roadway include: intersection geometry, crosswalks, pavement conditions, curb ramps, width and number of lanes, pedestrian crossing islands, curb extensions, traffic signals and stop signs, signal timing, lighting, and signing and striping.

Table ES-3: Preferred Design Standards and Policies

STANDARD/POLICY	DESCRIPTION
Complete Streets Policy	<ul style="list-style-type: none"> Develop and adopt a recommended complete streets policy in accordance with the National Complete Streets Coalition’s 10 ideal elements of a complete streets policy, including a vision, applicability to all users and all projects, specific exceptions, connectivity of the network for all modes, design criteria, context sensitivity, performance standards, and next steps.
Design Details	<p>The following modifications or additions to current design details are recommended:</p> <ul style="list-style-type: none"> 5-foot minimum sidewalk width on collector streets and higher; 4-foot minimum sidewalk width on residential streets provided the entire sidewalk width is maintained “free and clear” of obstruction. Where feasible, 5- to 6-foot minimum buffer (greenstrip) widths between road and sidewalk on collector streets and higher. Allow 11-foot lane widths on all streets. Maintenance of sidewalk slope and grade across driveways. Two curb ramps per intersection corner; if constrained, utilize depressed corner (i.e., don’t point pedestrians into middle of intersection); ensure that new curb ramps follow Americans with Disability Act (ADA) guidance, specifically with regard to the width and depth of the landing area provided at the top of the curb ramp. In addition to signage for a shared street, shared lane pavement markings should be shown and denoted in plan view where feasible. Placement and marking of crosswalks. Typical signage for pedestrians at intersections and midblock crossings. Encourage pedestrian countdown signals as part of all new and existing signalized intersection improvement projects. Placement and access of bus stops. Traffic calming treatments that benefit pedestrians, including raised crosswalks, curb extensions, and pedestrian refuge islands.
Signal Timing Policy	<ul style="list-style-type: none"> Ensure that the City’s official policy is to time all signals using the guidance for pedestrian crossing time (i.e., walking rate of travel of 3.5 feet per second) included in the latest Manual on Uniform Traffic Control Devices (MUTCD).
Unified Development Ordinance	<p>Evaluate Gastonia Unified Development Ordinance to determine:</p> <ul style="list-style-type: none"> Potential to amend existing access management policy (Section 9.23). In addition to frequency and spacing of driveways, this policy should address driveway design, inter-parcel connectivity, access from side streets, and right-in/right-out access strategies. Potential inclusion of crosswalk requirements along public roads and within private developments. Potential inclusion of pedestrian signal requirements along public roads and within private developments.
NCDOT Resolution	<ul style="list-style-type: none"> The City should adopt a resolution requesting pedestrian accommodations (i.e., sidewalks, ADA curb ramps, crosswalks, pedestrian signals at signalized intersections, etc.) be funded on all non-interstate NCDOT road and bridge projects within the municipal boundaries.

Toolbox of Effective Treatments

A toolbox of effective treatments is presented in Chapter 4 of the Plan to assist in planning and design of future improvements. Recommended treatments are categorized as follows:²

- **Signalization** treatments use traffic signals to increase the safety and comfort of pedestrians crossing the street. Example treatments include pedestrian signals, improving signal timing, and modifying signal phasing to provide a Leading Pedestrian Interval (LPI).
- **Geometric** treatments add or adjust existing physical features in the pedestrian network. Example treatments include installing pedestrian refuge and curb extensions.
- **Signs/Markings/Operational** treatments are those that do not fit within the other two categories. Example treatments include pavement markings, lighting, turn restrictions, and enforcement.



Recommended treatments in each of these categories address both “across the roadway” and “along the roadway” needs. Depending on the exact location and desired outcome, a single treatment or a combination of several may be appropriate. In all cases, careful consideration and review of travel patterns for all modes is recommended. This toolbox can be used by the City of Gastonia to program roadway improvement projects and standalone pedestrian projects, as well as influence the private development process.

Pedestrian Demand

While all parts of the City of Gastonia would benefit from improved pedestrian facilities, it is important to understand and recognize that some areas are more attractive to pedestrian travel and some citizens are more dependent on walking as a mode of transportation. To this end, a GIS-based demand analysis was developed that incorporates the City’s existing demographic data to prioritize areas where more people have limited mobility, in combination with the locations of pedestrian generators such as transit stops, parks, and schools. Locational data was assigned appropriate weights based on the amount of pedestrian activity that each location would likely generate. Variables included destinations, generators, bus stops, greenways, crash locations, demographics, and recommendations from previous plans. The variables utilized and their weighting factors are included in Chapter 4 of the Plan, along with a “heat map” that identifies pedestrian

² http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/index.cfm

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demand hotspots. While all areas of the City were considered in the final determination of recommendations, the identified hotspots became focus areas for detailed field analysis because it was understood that these areas have a higher need for pedestrian infrastructure.

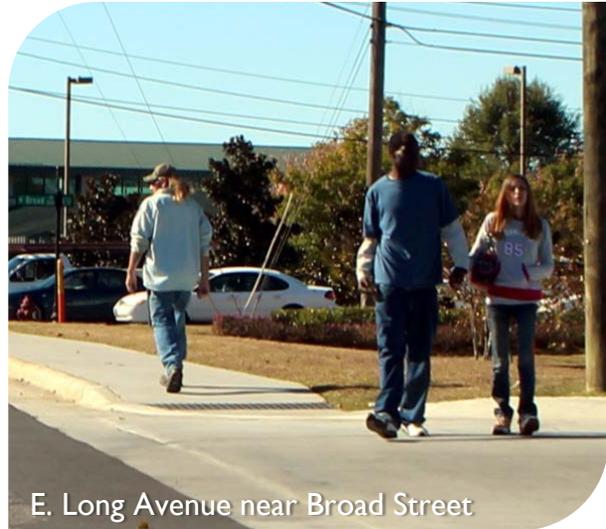
ES.7 Network Improvements

Improvement recommendations are presented in Chapter 4 and are primarily capital improvements to the physical pedestrian network. In some instances, further study is recommended to best define future improvements. All recommendations were compiled from a number of sources and vetted through the Steering Committee and the general public.

Project Lists

Specific improvement projects were identified and are presented in both tabular and map format in Chapter 4 of the Plan. Improvement projects were categorized into two distinct groups:

- **Spot Improvements**, including intersection improvements, pedestrian bridges, and midblock crossings. A total of 62 spot improvements were identified.
- **Corridor Improvements**, including sidewalks, multiuse paths, and greenways. A total of 124 corridor improvements were identified.



E. Long Avenue near Broad Street

ES.8 Implementation

To ensure that recommendations made in the Plan move toward realization, a framework for implementation was established.

Action Strategies

The Gastonia Comprehensive Pedestrian Plan recommends a variety of programs, policies, and design standard revisions. However, without action these recommendations will not be realized. Therefore, a number of action strategies were developed relevant to these recommendations. These strategies complement the recommendations made earlier in this document and are intended to act as the “spark” to move these recommendations forward. Specific action strategies are located in Chapter 5 of the Plan and include: global strategies; education, encouragement, and enforcement strategies; maintenance and improvement strategies; and design standards and policies strategies.

Project Prioritization

The Gastonia Comprehensive Pedestrian Plan is envisioned to have a 10-year horizon; however, with over 180 projects identified, it is clear that not all projects can be implemented within the 10-year period of the Plan. Additionally, it is important to gain some understanding of which projects will provide the most benefit. For these reasons, a prioritization methodology was devised to score projects comparatively. This methodology blended the NCDOT prioritization process and understanding of local needs.



A number of variables were used to “score” each recommended project, including access, constructability, safety, demand/density, and benefit/cost variables. The variables utilized are primarily quantitative in nature and do not account for qualitative input such as perceived connectivity, public preference, and observed need. The potential use of such qualitative variables was presented during the final public meeting and received positive feedback. Therefore, it is recommended that the City consider incorporating some level of qualitative criteria as the project prioritization process is refined in future years. The exact composition of the prioritization methodology is included in Chapter 5 of the Plan.

Project Tiers

Included in Chapter 5 of the Plan are tables presenting all network improvement recommendations as detailed in Chapter 4 along with opinions of probable cost, prioritization scoring, and suggested tiers for implementation. To provide some level of qualitative consideration, tiers are not direct rankings based solely on score, but rather balance scores with public comments regarding connectivity, preference, and need. In constructing the tiers logical scoring breakpoints were considered to provide a manageable number and cost of projects in the two tiers that comprise the 10-year horizon of the Plan. As individual projects are evaluated in greater detail, it is highly recommended that additional public input be received to assist in determining comprehensive need and desire for the project.

Improvements were categorized by the following tiers:

- **Tier I (0-5 years)** – These are projects that scored well (i.e., 35 points or higher for Spot Improvements; 40 points or higher for Corridor Improvements) or received moderate scores (i.e., 30 points or higher) coupled with strong public support. They are critical to establishing early momentum, resolving key issues, and setting the foundation for the success of future improvements.
- **Tier II (5-10 years)** – These are projects that received moderate scores (i.e., 30-34.5 points for Spot Improvements; 35-39.5 points for Corridor Improvements) or were middling in scoring (20-29.5 points) coupled with strong public support. Planning, building of support, and

identification of funding sources should begin now for these projects so they are on track for implementation within this period.

- Tier III (10+ years)** – These are projects that received lower scores (less than 30 points for Spot Improvements; less than 35 points for Corridor Improvements) and did not receive significant public support. While identified as part of the planning process that has produced this document, these projects fall outside the 10-year horizon of the Plan. However, these projects do address pedestrian needs within the City of Gastonia and should be implemented in the long-term. Once earlier-tiered projects have been realized, further analysis and reevaluation should be conducted. Additionally, as these projects receive greater attention, public support may increase.

Although the above tiers have been established, these designations are for planning purposes only; improvements should be implemented as soon as opportunities arise. For example, if circumstances provide an opportunity to complete a Tier II project two years after the Plan is adopted, the improvement should be made, regardless of its designation as “Tier II.”

Capital Cost Breakdowns

The breakdowns of capital cost by tier and project type are outlined in **Table ES-4**.³ In years 0-5 nearly \$1.8 million dollars is needed to implement Tier I; when broken down over the five-year period this averages \$360,000 per year. Tier II projects account for roughly \$5.0 million, but have the benefit of more time for planning, securing of funding, and building public and political support in the 5-10 year period. Tier III projects total at \$27.3 million and are outside the implementation scope of the Plan.

Table ES-4: Capital Cost by Tier and Project Type

PROJECT TYPE	TIER I (0-5 years)	TIER II (5-10 years)	TIER III (10+ years)	TOTAL
Spot Improvements	\$692,000	\$1,590,000	\$1,476,000	\$3,758,000
Corridor Improvements	\$1,084,500	\$3,458,880	\$25,783,405	\$30,326,785
TOTAL	\$1,776,500	\$5,048,880	\$27,259,405	\$34,084,785

³ Unit costs utilized in calculating individual project cost estimates are included in Appendix G of the Plan, while a listing of potential funding sources is included in Appendix H.

NCDOT Complete Streets and Incidental Pedestrian Improvements

The North Carolina Board of Transportation adopted a Complete Streets policy in July 2009. The policy directs the North Carolina Department of Transportation (NCDOT) to consider and incorporate all modes of transportation when building new projects or making improvements to existing transportation infrastructure. Under the new policy, NCDOT will collaborate with cities, towns, and communities during the planning and design phases of new streets or improvement projects. Together, they will decide how to provide the transportation options needed to serve the community and complement the context of the area.

Gastonia, like many municipalities in North Carolina, has aggressively annexed areas around its periphery as development has occurred in these places. As a result, approximately 80 percent of the area within the City Limits is now considered urbanized by the U.S. Census Bureau. The remaining rural area is primarily comprised of parkland, waste facilities, underdeveloped industrial parks, and satellite annexations for proposed mixed-use developments. As new residential and industrial development continues, the City will likely become more urbanized.

As an urbanized community, the City of Gastonia experiences high demand for pedestrian facilities. Since the intended scope of this plan is limited to ten years, not all facilities needed or desired by the community are included in this plan. However, as NCDOT constructs new transportation projects or improves existing transportation infrastructure in the City, there is great potential for the construction of incidental pedestrian facilities. The City will continue to advocate for NCDOT to include pedestrian facilities in the construction of new transportation projects or in improvements to existing transportation infrastructure. A map is included in Chapter 5 of the Plan that depicts these potential opportunities for NCDOT incidental improvements to the pedestrian network.

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West Main Avenue near Marietta Street

I Introduction

The City of Gastonia desires to be a city where walking is safe, convenient, and a desirable mode of transportation for residents and visitors of all ages and abilities. Walking is an essential part of every trip; whether walking in your neighborhood, traveling between your car and the front door of a business establishment, or going to the corner convenience store, at some point we are all pedestrians.

The Vision of the Gastonia Comprehensive Pedestrian Plan is to improve the health, safety, and quality of life in Gastonia.

1.1 Why a Plan?

The Gastonia Comprehensive Pedestrian Plan has been developed to realize the vision of improved health, safety, and quality of life in Gastonia. The City understands that walking is critical to having a diverse transportation network and making its streets more vibrant and attractive. For people to choose walking over other modes of transportation, sidewalks and other pedestrian spaces need to be safe, comfortable, and aesthetically pleasing, while also connecting logical desire lines between recognized origins and destinations. Pedestrian zones must be designed to accommodate all users, regardless of age or ability, allowing for person-to-person interaction, patronage of businesses, and the pursuit of active, healthy lifestyles.

The Gastonia Comprehensive Pedestrian Plan was a collaborative effort of the City of Gastonia, the Gaston-Cleveland-Lincoln Metropolitan Planning Organization (MPO), and the North Carolina Department of Transportation (NCDOT). The Plan identifies policies, programs, and physical infrastructure improvements to make Gastonia a safer and more comfortable place to walk.

Benefits of Walking¹

Improving a city's walking environment can have significant positive impacts to a variety of important benefit categories, including health, safety, economics, and the general quality of life of a community. In recent years, much research and attention has been paid to the benefits of walking; the following sections showcase some of the more compelling arguments for increasing the attractiveness, convenience, and safety of walking.

Health Benefits

Walking is the most basic form of physical activity and provides substantial health benefits. The American Medical Association (AMA) and Center for Disease Control (CDC) both recommend adults participate in at least 150 minutes of physical activity per week (i.e., about 20 minutes a day).² Numerous health advocacy organizations recommend walking for physical activity, as it is easy, widely accessible, relatively low impact, and requires no specialized equipment. Walking also does not require a dedicated time and place for physical activity as do going to the gym, swimming, or other methods of physical activity; it can also be easily incorporated into daily activities as a means of transportation or recreation.

Walking is the most commonly reported physical activity among U.S. adults over all and also the most frequently reported activity among adults who meet physical activity guidelines. However, as of 2012, less than half of adults living in the U.S. reported meeting the recommended physical activity and a third reported being physically inactive.³

Increased walking can help remedy a number of common health issues and concerns. The Mayo Clinic encourages regular walking as a healthy activity, stating that walking can help an individual:

- Maintain a healthy weight;
- Prevent or manage various conditions, including heart disease, high blood pressure, and type 2 diabetes;
- Strengthen bones;
- Lift mood; and
- Improve balance and coordination.



¹ For additional information on the benefits of walking, please reference the *North Carolina Statewide Pedestrian and Bicycle Plan*: <http://www.ncdot.gov/bikeped/download/WalkBikeNCPlanAppendixlowres.pdf>

² Centers for Disease Control and Prevention

³ Centers for Disease Control and Prevention

Walking also has particular benefits for senior citizens and children:

- Exercise on a regular basis has been shown to help prevent dementia.⁴
- Walking is an excellent way for seniors, especially those who don't drive, to socialize with friends and access local services.
- In 2010, over one third of children and adolescents were considered overweight or obese. At the same time, there has been a significant decline in walking to school: Only 13% of children walk to school, down from 66% in 1970.⁵ While a decrease in walking to school is not the direct cause of childhood obesity, regular exercise in the form of walking to school could help reverse this trend.

Economic Benefits

Improving a community's walking environment can also have positive impacts on that community's local economy. More people are expressing a preference to live in compact, walkable, mixed use neighborhoods. The National Realtors Association 2013 Community Preference Survey revealed that 60% of adults favor walkable, mixed use neighborhoods, and almost two thirds of adults between 18 and 35 report a desire to drive less if alternative transportation options were available. Additionally, property values have shown increases of \$700 to \$3,000 for each additional point on WalkScore, a widely used tool to measure a community's walkability.⁶

When individuals and families can choose to walk instead of drive, it can make a significant impact to a household's expenses and can increase job opportunities. Cost savings from driving less or not needing to own multiple or even a single vehicle provide additional income which can be used for other necessities and discretionary purchases. Also, through its ability to improve health, walking has been shown to reduce health care costs. In addition:

- Walkable communities that connect jobs to residential areas provide greater access to jobs for people without a vehicle and can improve upward economic mobility.⁷
- Providing transportation options for all people is important, especially as 13% of people over the age of 15 do not drive.⁸
- Costs associated with obese and overweight adults in the United States and Canada are estimated to be approximately \$300 billion.⁹
- The nation could save \$5.6 billion in health care costs related to obesity if one of every 10 adults started a regular walking program.¹⁰

⁴ Genetics and Aging Research Unit at Massachusetts General Hospital

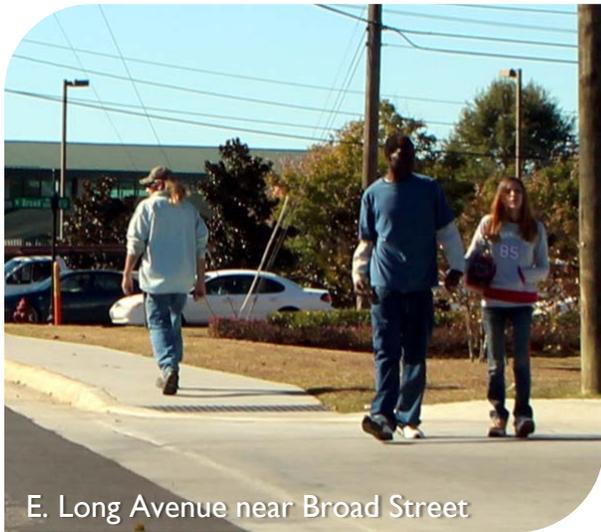
⁵ Centers for Disease Control and Prevention

⁶ Cortright, Joe. "How Walkability Raises Home Values in U.S. Cities." CEOs for Cities. 2009

⁷ Chetty, Raj, et al. "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States." Harvard University and the National Bureau of Economic Research. 2014.

⁸ National Household Travel Survey

⁹ Behan, D. and Cox, S. "Obesity and its Relation to Mortality and Morbidity Costs." Society of Actuaries. 2010.



Safety Benefits

No matter who you are, everyone is a pedestrian at some point in their journey, and walking is an essential means of transportation for people who cannot drive or do not own a vehicle. Pedestrians are also the most vulnerable road user and at the highest risk for injury in the event of a crash. People may lack access to a vehicle due to age (i.e., children and seniors), disability, or financial limitation. Providing safe transportation options for everyone allows citizens to independently navigate between their homes and important destinations such as schools, shopping centers, grocery stores, and public services.

Safe walking environments result in safer overall transportation networks. Design changes that facilitate safe walking improve the safety of all road users, such as improved visibility and reductions in speeding. Traffic safety has positive financial impacts as well. The National Safety Council estimates an average cost of \$57,400 (i.e., 2011 dollars) for a nonfatal injury resulting from a motor vehicle crash. In addition to improved traffic safety, a culture of walking increases “eyes on the street,” which can help reduce crime.

Quality of Life Benefits

Walkable communities are more vibrant communities because their streets are active and dynamic with people engaging one another on a personal level. Focus on improving connectivity, accessibility, and safety of pedestrians results in environments that encourage strong economies and a healthy populace.

Nationally, almost half of trips made daily are three miles or less in length, not an unreasonable walking distance.¹¹ When communities work to embrace walking as a means of transportation and recreation, they increase the choices their citizens have for these shorter trips. Whether out of necessity or choice, living in a community where walking to the store, work, or church is a viable option makes life easier and more enjoyable.

Communities who work to improve walkability also see an improved public realm and quality of development. Working with developers to facilitate a connected system of shared-use paths and sidewalks, walking becomes a way of life rather than a choice. Encouraging a mix of land uses to create nodes of neighborhood conveniences in relatively close proximity to residential areas provides local options for shopping, eating, and socialization. Development patterns that support a

¹⁰ National Governor’s Association Report on Healthy Living. 2011.

¹¹ Federal Highway Administration. *University Course on Bicycle and Pedestrian Transportation (FHWA-HRT-05-085)*. <http://www.tfhr.gov/safety/pedbike/pubs/05085/index.htm>

variety of destinations within a compact area are not only positive for walking but will also reduce automobile dependency, alleviate roadway congestion, reduce parking demand, and improve the community's overall quality of life.

1.2 Plan Overview

The Plan is divided into five sections. This **Introduction** provides information regarding the purpose of the Plan and public participation process. **Existing Context and Pedestrian Issues** summarizes baseline conditions, previous planning efforts, and pedestrian issues. Next, **Programs, Policies, and Design Standards** reviews recommended education, encouragement, and enforcement policies and programs and design standard revisions. **Network Recommendations** describes the demand analysis, as well as listing and mapping recommended improvements. The final chapter, entitled **Implementation**, provides action strategies for moving recommendations forward, prioritization methodology, and project tiers and cost estimates.

1.3 Public Participation

The Gastonia Comprehensive Pedestrian Plan was formulated through a robust public participation plan. Specific methods and techniques are outlined in the sections that follow.

The planning process was guided by a Steering Committee composed of a range of City departments, Gaston-Cleveland-Lincoln MPO staff, NCDOT staff, Gaston County representatives, advocacy groups, and business and community leaders. Members of the Steering Committee are listed on the title page of this report.



Steering Committee Meeting

Goals of the Plan

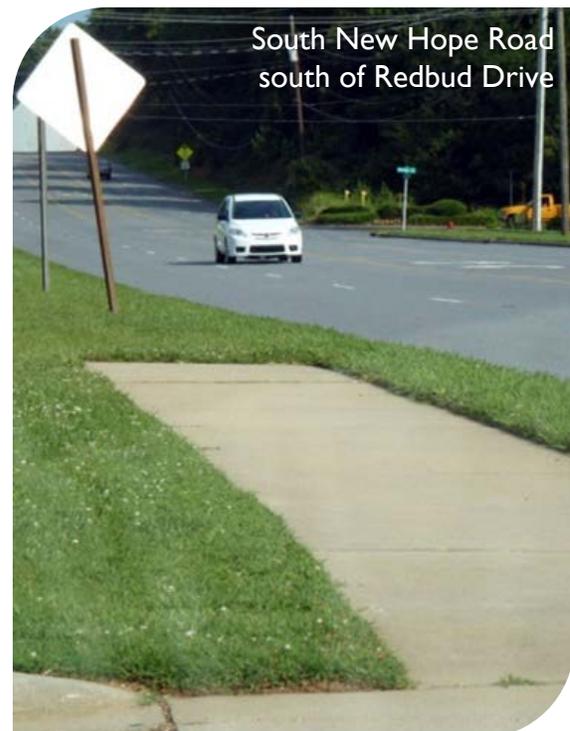
- Improve safety by reducing the number and severity of crashes involving pedestrians
- Develop practical and implementable solutions
- Support local businesses and foster economic growth
- Support existing transit
- Enhance neighborhood connectivity and make linkages
- Promote social equity
- Improve enforcement
- Inform and educate the public
- Assess existing infrastructure while implementing retrofits and filling gaps
- Enhance coordination between Gastonia, the Gaston-Cleveland-Lincoln MPO, and NCDOT
- Enhance the character of downtown
- Ensure that new development contributes to pedestrian access and connectivity
- Address difficult intersections and other barriers
- Identify performance measures
- Improve pedestrian outcomes on all roadway improvement and reconstruction projects
- Improve health

Walking Tour

Members of the Steering Committee and other interested parties participated in a walking tour of Gastonia on June 24, 2013. During the walk, participants observed and discussed pedestrian-related issues and opportunities throughout the community. Information gathered during this tour is reflected in the list of existing issues included later in this report and were considered as recommendations were crafted later in the planning process.

Stakeholder Van Tour

A van tour was conducted on June 25, 2013. The van tour allowed stakeholders to both verbally and visually communicate pedestrian issues to the project team from all areas of Gastonia. Similar to insight received during the walking tour described above, information gathered during the van tour is reflected in the list of existing issues included later in this report and were considered as recommendations were crafted later in the planning process.



Online Map

An interactive online map was provided July to mid-September 2013 that offered the opportunity for the public to identify various relevant items, including: places they walk to and from often; difficult crossings; missing sidewalks; and other conditions that impact their experience walking in Gastonia. Members of the public could add new items to the map or comment on input others had already added to the map. Input received was incorporated into the planning process moving forward. The categories of information that were collected are highlighted below.

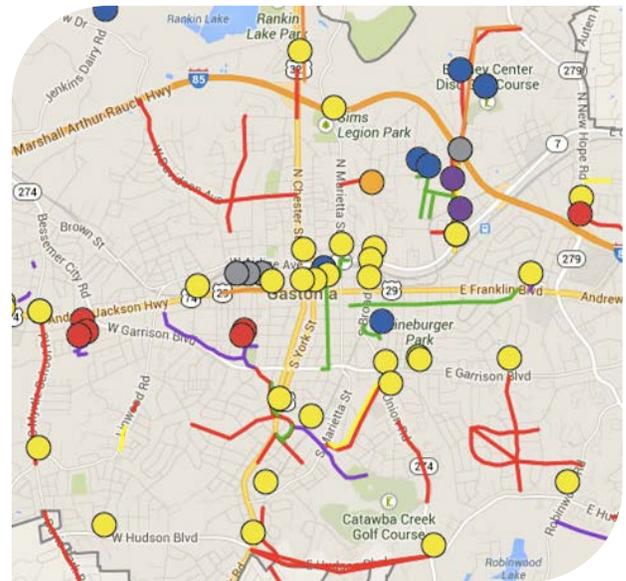
Route Comments

- Place I walk often
- Missing sidewalk
- Uncomfortable place to walk
- Off-street connection needed
- Existing worn path

Point Comments

- Place I walk to/from
- Bus stop I walk to/from
- Difficult crossing
- Sidewalk needs repair
- Barrier to walking
- Pedestrian crash near miss

In addition to collecting data on walking conditions, the online map’s “Welcome Survey” allowed for the collection of information pertaining to respondents’ residency, work location, transportation preferences, and walking habits. The Welcome Survey is shown in **Figure I-1**.



Welcome - Survey

Where do you live?*

In Gastonia Outside of Gastonia

Where do you work?*

In Gastonia Outside of Gastonia

What is your primary mode of transportation?*

Walking Biking

Transit Driving

How often do you walk in Gastonia?*

Every day

A few times a week

A few times a month

A few times a year

Never

For what reasons do you typically walk? Check all that apply:*

To/from school

To go shopping or other errands

To/from work

For exercise

Other

Figure I-1: Online Map Welcome Survey

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A total of 75 unique users visited the online map, with 72% living within the city limits of Gastonia and 83% working in Gastonia. Information specific to respondents walking habits is presented in **Table I-1**, **Table I-2**, and **Table I-3** (for additional detail regarding information collected in the Online Map Welcome Survey, please see **Appendix A**). While 93% indicated that driving is their primary mode of transportation, 72% said that they walk either every day or a few times each week. Top reasons for walking included exercise and shopping/errands.

Table I-1: Welcome Survey Responses – Primary Mode of Transportation

ANSWER CATEGORY	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Driving	70	93%
Walking	4	5%
Biking	1	1%
TOTAL	75	99%*

*Does not equal 100% due to rounding

Table I-2: Welcome Survey Responses – Frequency of Walking

ANSWER CATEGORY	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Every day	24	32%
A few times a week	30	40%
A few times a month	8	11%
A few times a year	11	15%
Never	2	3%
TOTAL	75	101%*

*Does not equal 100% due to rounding

Table I-3: Welcome Survey Responses – Reasons for Walking

ANSWER CATEGORY	NUMBER OF RESPONSES*	PERCENTAGE OF RESPONDENTS
Exercise	63	84%
Shopping/errands	25	33%
To/from work	6	8%
To/from school	4	5%
Other	13	17%

*Multiple responses per respondent were allowed

While 75 people logged into the online map and completed the welcome survey, only 26 of those respondents went on to actually add data to the map itself. Additionally, nearly 50% of the data was added by two respondents. Because of the lower rate of map usage, data collected through the online map was weighed against additional public input and institutional knowledge of other stakeholders to ensure that the most accurate picture of pedestrian needs was communicated in the Plan. Citizens from the Modena Street area also provided written comments regarding pedestrian needs in their community. In most instances, information included in the online map proved to be indicative of general public opinions about pedestrian needs in Gastonia.

Figure I-2 shows the online map with all input received. The most predominate data types entered into the online map were missing sidewalks and difficult crossings. Table I-4 relates specifics about these two data types. Streets with requests for sidewalks varied in character, but many were wider, higher volume arterials. Fewer comments were received regarding neighborhood streets, which could indicate that these streets are already considered walkable. Some comments were not from pedestrians themselves, but rather were from concerned drivers who see pedestrians walking on the side of the road or in the median.

Table I-4: Online Map Predominate Data Type Characteristics

MISSING SIDEWALKS	DIFFICULT CROSSINGS
Students walking to school	No crosswalks
Accessing retail destinations	Traffic too fast
Concerned drivers	Too much traffic
Varied street types	Road too wide

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Specific information collected from the online map included:

- Modena Street had the highest concentration of data, including being a difficult area to walk, numerous desire lines and destinations, missing sidewalks, difficult crossings, and presence of bus stops;
- Desire for sidewalks between all elementary and middle schools and their surrounding neighborhoods;
- Difficult crossings were clustered along Franklin Boulevard and then scattered throughout the City;
- Highest reported concentration of pedestrian near misses is along Franklin Boulevard between Highland and Firestone Streets;
- Areas that were specifically cited for being an uncomfortable place to walk included US 321 north of I-85, Modena Street, Cox Road, and Hoffman Road;
- Majority of requested off-street connections directly mirror the City's greenway plan;
- Bus stop accessibility was only mentioned twice with both comments located along the Modena Street corridor; and
- Needed sidewalk repair was only cited in one location, Broad Street south of Davidson Avenue.

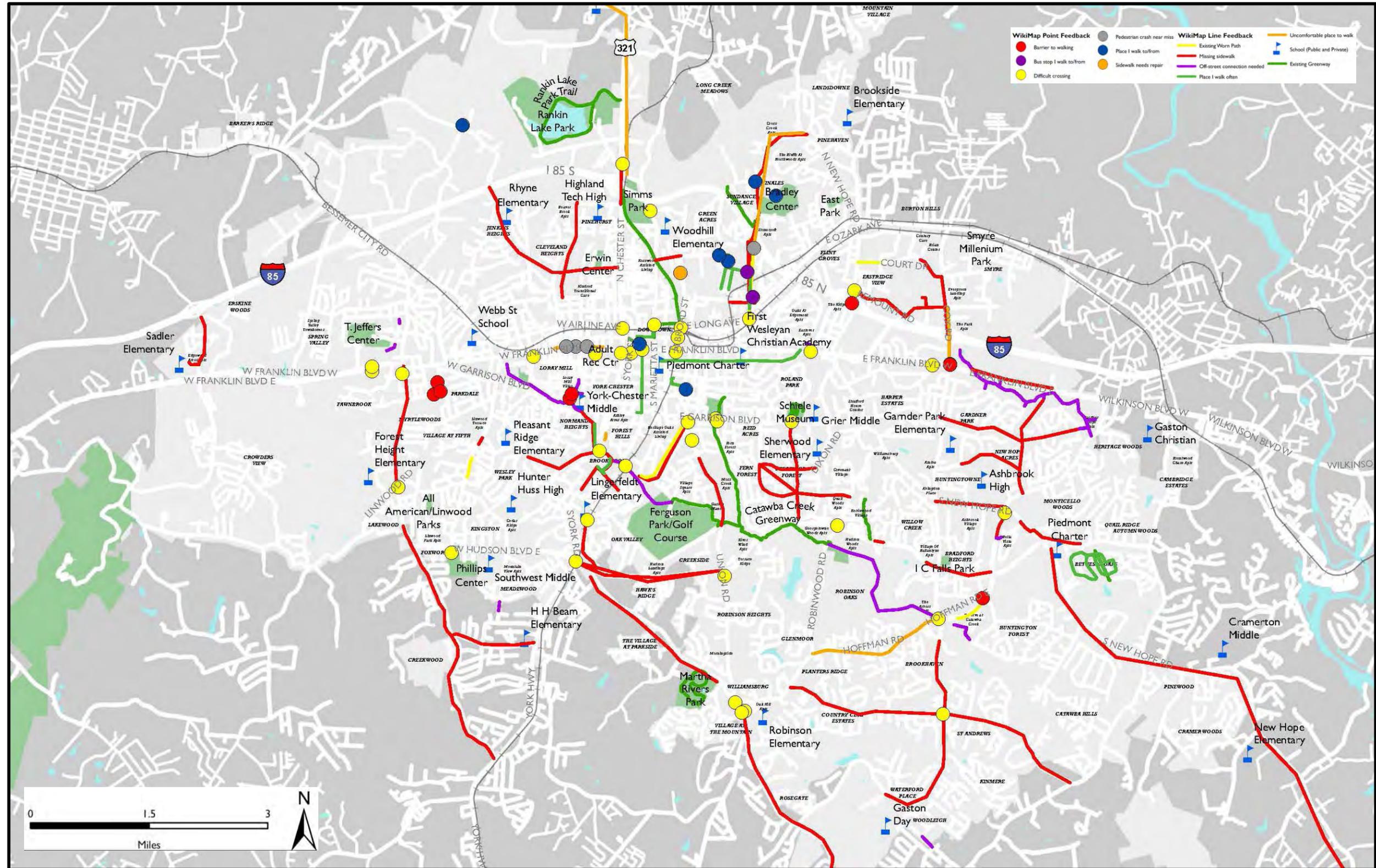


Figure I-2: Online Map Public Input

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Public Meetings

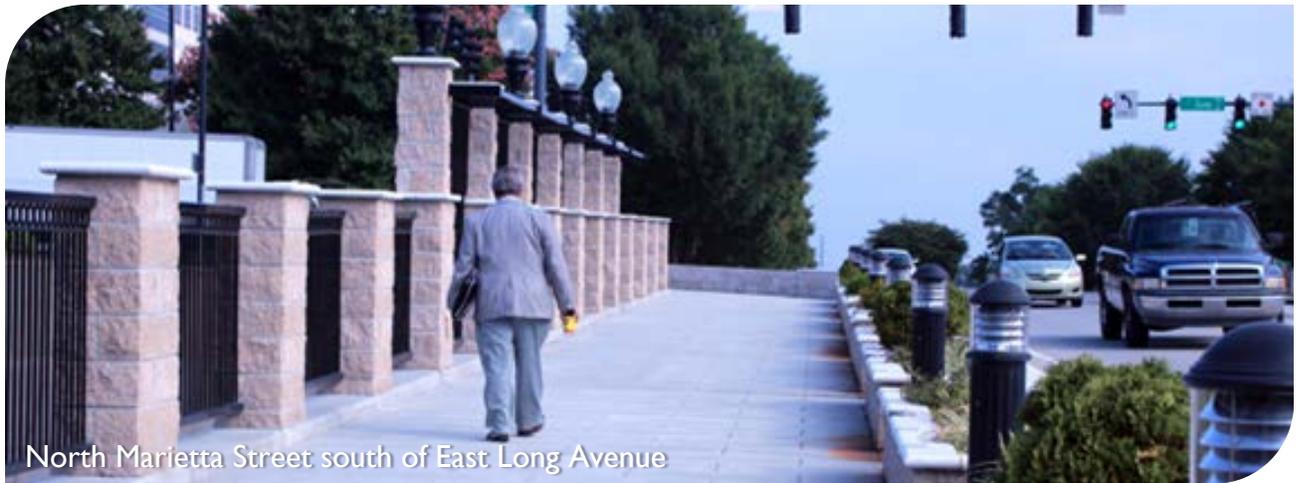
Two public meetings were included as part of the planning process for the Gastonia Comprehensive Pedestrian Plan. The first public meeting was held on June 25, 2013 at the Gastonia Police Department on Long Avenue. Ample notification was provided to the public through the use of newspaper advertisements, email blasts to community organizations (i.e., churches, Rotary, neighborhood organizations, etc.), a newspaper article in the Gaston Gazette. The meeting afforded an opportunity for citizens to provide input on existing conditions, barriers and obstacles, and pedestrian needs. A series of existing conditions maps were displayed for review and an opportunity for participants to vote on the most important pedestrian issues in Gastonia was provided.

The second public meeting was held on December 16, 2013. Again, a variety of methods were utilized to inform the public of this meeting, including newspaper advertisements, email blasts to community organizations, distribution of flyers and posters throughout the city, and posting of the draft report to the MPO webpage for review. This meeting presented the Draft Plan. Feedback received was utilized to assist in refinement of priorities for recommended actions and confirming a roadmap for implementation.



Steering Committee Members
Reviewing Draft Projects

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2 Existing Context and Pedestrian Issues

The existing pedestrian context was established through the documentation of existing infrastructure, land use, and safety conditions pertaining to pedestrian travel and comfort in the City of Gastonia. As a complement to this, the pedestrian planning context was also considered through the review of demographic information and relevant previous planning documents. Finally, pedestrian issues were identified.

Existing conditions provide a baseline for understanding pedestrian issues.

2.1 Overview

Geography and Development History

The City of Gastonia's geographic and demographic characteristics have an overarching impact on the pedestrian planning process. They significantly affect transportation, the environment, local ordinances, and everyday decisions by motorists and pedestrians.

The City of Gastonia is the political, economic, and cultural center of Gaston County, North Carolina and is the third most populous city in the fast-growth Charlotte-Concord-Gastonia, NC-SC Metropolitan Statistical Area with 72,723 residents (U.S. Census Bureau, 2012 Population Estimates Program). The land area of the City is just over 50 square miles and consists of gently rolling hills and elevated ridges such as Crowders Mountain. There are many streams and floodplains which feed into the South Fork and Catawba rivers and several small ponds and lakes. The population density of the City is approximately 1,440 persons per square mile, similar to that of other satellite cities in the region, such as Concord, NC and Rock Hill, SC but nearly half as



dense as the City of Charlotte. The City is also home to approximately 6,000 business firms that employ about 40,000 workers (U.S. Census Bureau, 2007 Economic Census and 2008-12 American Community Survey). The City is almost exclusively classified as “urban” by the United States Census Bureau, with the remaining rural area primarily consisting of parkland, developing industrial areas, and satellite annexations for future development.

The City’s early development is typical of older municipalities in the Piedmont region of the Carolinas in that its initial growth was fueled by proximity to the railroad and the manufacturing industry, especially of textiles. During this period, the City’s population and economy grew rapidly and over time, the City annexed several surrounding mill villages. The pedestrian-oriented development of these areas that occurred from the late 1800’s to early 1900’s is

in marked contrast to areas of the City that were developed after World War II and the proliferation of the automobile in American households. Many of these historic, pedestrian-oriented areas, such as Downtown and Loray Mill, are being revitalized as American housing preferences have begun to once again favor walkable, mixed-use communities with a sense of place.

Much of the post-war, suburban growth of the City was built on greenfield sites at the City’s periphery, in virtually every direction. These areas were attractive to the City’s middle and high income families seeking larger lots and modern housing. However, the gradual decline of the manufacturing industry and availability of desirable and developable greenfield sites has reoriented residential growth in Gastonia. In recent decades, higher-end residential growth has mostly occurred towards Charlotte as the City has become more dependent on Charlotte for white-collar jobs for new and existing residents. While undeveloped land at all edges of the City has continued to be developed and annexed by the City, the growth of the eastern part of the City has been much more rapid.

With the exception of industrial uses, the most intensive non-residential land uses are along Franklin Boulevard (US 29/US 74), which runs east-west and serves as the new “Main Street” for Gastonia. Other major thoroughfares are home to much of the remaining non-residential uses, such as York Highway (US 321), Garrison Boulevard, Union Road (NC 274), and New Hope Road (NC 279). Commercial growth has been more even in the City than residential growth, but most big-box retail stores and regional-scale commercial developments have been built east of downtown, forming a sort of secondary central business district that includes regional-scale commercial, hotels, and medical facilities and offices. The existing land use patterns are evident in the City’s zoning map, provided in **Figure 2-1**.

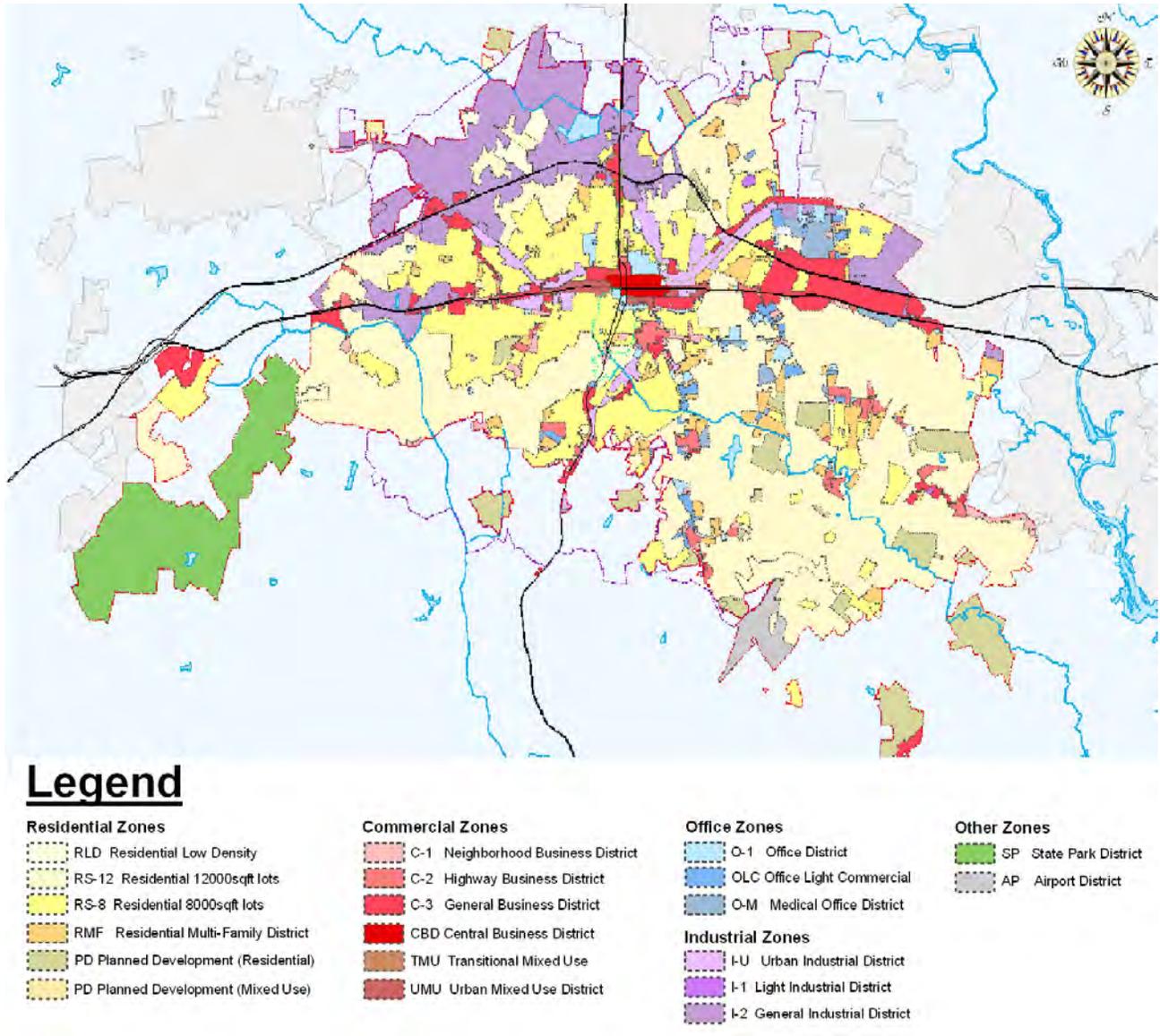


Figure 2-1: Gastonia Zoning Map

Pedestrian Environment

Gastonia’s geography and development history impact the City’s pedestrian environment in both positive and negative ways. These impacts, natural or man-made, translate into barriers and opportunities for pedestrian travel. Though the City of Gastonia does not conduct regular pedestrian counts at this time, anecdotal evidence and experience of City staff indicates that the highest pedestrian traffic is in areas with higher concentrations of low-income households and a more diverse mix of land uses. Downtown likely has the highest pedestrian traffic, but this is primarily limited to normal business hours, as downtown still lacks the residential density and mix of uses to sustain a full 24-hour/7-day a week pedestrian environment. In more suburban areas

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where the landscape is predominantly single-family residential, pedestrian traffic is almost exclusively recreational or social.

Barriers to pedestrian travel are both natural and man-made. In Gastonia, the rolling and occasionally rugged terrain and prevalence of streams and floodplains has caused some development to neglect street and sidewalk connectivity where it would be very expensive or even cost-prohibitive. Certain elements of the transportation system, such as at-grade railroads and I-85 pose similar problems for connectivity. Many man-made barriers to pedestrian travel are the collective result of typical post-WWII, automobile-oriented development patterns. These include overbuilt and automobile-oriented thoroughfares, a lack of adequate pedestrian infrastructure and accommodations, automobile-orientated site plans, excessive cul-de-sac development and poor connectivity between developments, and segregation of land uses.

Many thoroughfares in Gastonia are excessively wide and lack sidewalks, pedestrian refuges, and/or pedestrian signalization. Wider travel lanes encourage higher speeds which can discourage pedestrian travel, even when pedestrian infrastructure is present. This is especially true for many of the thoroughfares where sidewalk is directly adjacent to the roadway, lacking a planting strip or some type of buffer that would serve as a physical and/or psychological separation for pedestrians.

Another man-made barrier is the high number of gaps in the pedestrian network. While this may only be a minor inconvenience for some, it limits the mobility-impaired population and can be unattractive and dangerous to any pedestrian during wet weather. Worn paths made by frequent pedestrian traffic can be found along thoroughfares throughout the City. But sidewalks are only part of the pedestrian infrastructure. In some instances where sidewalk is present, ADA-compliant ramps have yet to be installed. And in many locations where pedestrians can and do cross major thoroughfares, at intersections or at mid-block, there is often inadequate accommodation for this crossing. While pedestrian signalization at major intersections is more common than the provision of mid-block crossings or pedestrian refuge islands, many areas still lack adequate pedestrian signalization.



Land use and subdivision regulations also have played a large role in the pedestrian environment. While these regulations have changed over time, the impact of previous regulations on residential development has been the development of single-family and multi-family developments that have poor connectivity to surrounding developments, either residential or non-residential. This style of residential development, characterized by cul-de-sacs and gated apartment complexes, can make the actual path to neighborhood commercial areas much longer than the distance “as the crow flies.” On the other hand, for non-residential development, land use regulations have

historically been detrimental to the pedestrian environment by promoting an excessive number of parking spaces and curb cuts and requiring little pedestrian accommodations.

Unfortunately, many of the man-made barriers are the result of pre-existing constraints. The topography and presence of at-grade railroads do limit the feasibility of providing adequate street and pedestrian connectivity in many areas. At the same time, availability of right-of-way is a major problem for sidewalk and multi-use path construction along thoroughfares and streams. In many cases, the right-of-way backs up to street curbs and/or slope issues require temporary easements to construct pedestrian facilities. In the case of greenways along streams and floodplains, right-of-way must often be acquired from adjacent landowners, which is sometimes met with resistance.

Aside from topographical and right-of-way constraints, existing land use patterns are another constraint in improving the pedestrian environment. Human-scale neighborhoods with a mix of land uses, either vertical or horizontal, encourage pedestrian travel. While many parts of the City already have this mix of uses, there are still areas where single-family residential developments dominate the landscape. Some commercial and office areas can be found at major intersections, but there are still many neighborhoods which lack neighborhood commercial areas within walking distance.

Still, there are some easy opportunities for the City of Gastonia to improve the pedestrian environment. While streams and floodplains have discouraged connectivity in some instances, they can also make for attractive greenway alternatives, depending on right-of-way situations and surrounding land uses. “Paper Streets,” or public rights-of-way that were planned for streets that were never built, are another opportunity for the City. Such are more common in older parts of the City and present opportunities for improved pedestrian connectivity. Another opportunity for Gastonia is its moderately high population and employment growth rate. This will allow for additional development, especially infill development and redevelopment, to improve the pedestrian environment as they are built.

Demographics

The current socioeconomic characteristics of the City of Gastonia imply many things for existing and potential pedestrian conditions. These statistics, illustrated in **Table 2-1** and **Figure 2-2**, indicate that the City of Gastonia:

- Has a high percentage of households with no regular access to a vehicle relative to the Charlotte Metropolitan Statistical Area (MSA) and North Carolina as whole;
- Has an aging population higher than the Charlotte MSA but similar to that of North Carolina and the United States;
- Has a high percentage of residents with a disability; and
- Has a high percentage of households living below the federal poverty line and earning less than 80% of the Area Median Income (AMI) for the Charlotte MSA.

Table 2-1: Socioeconomic Characteristics

CATEGORY	GASTONIA	CHARLOTTE MSA	NORTH CAROLINA	UNITED STATES
Under 18 years	25.8%	26.2%	23.8%	23.9%
65 years and over	12.7%	10.2%	13.1%	13.2%
Zero Vehicle Households	8.6%	5.9%	6.5%	9.0%
Disabled Population	15.2%	9.8%	13.1%	12.0%
Population in Poverty	21.4%	13.9%	16.8%	14.9%
Households Earning Under 80% of AMI	54.2%	41.7%	N/A	N/A

Note: 80% of AMI is \$43,322 (2012 dollars) but is rounded to \$45,000 because of data limitations.

Source: 2008-12 American Community Survey, Tables DP02, DP03, DP04, DP05, and B19001.

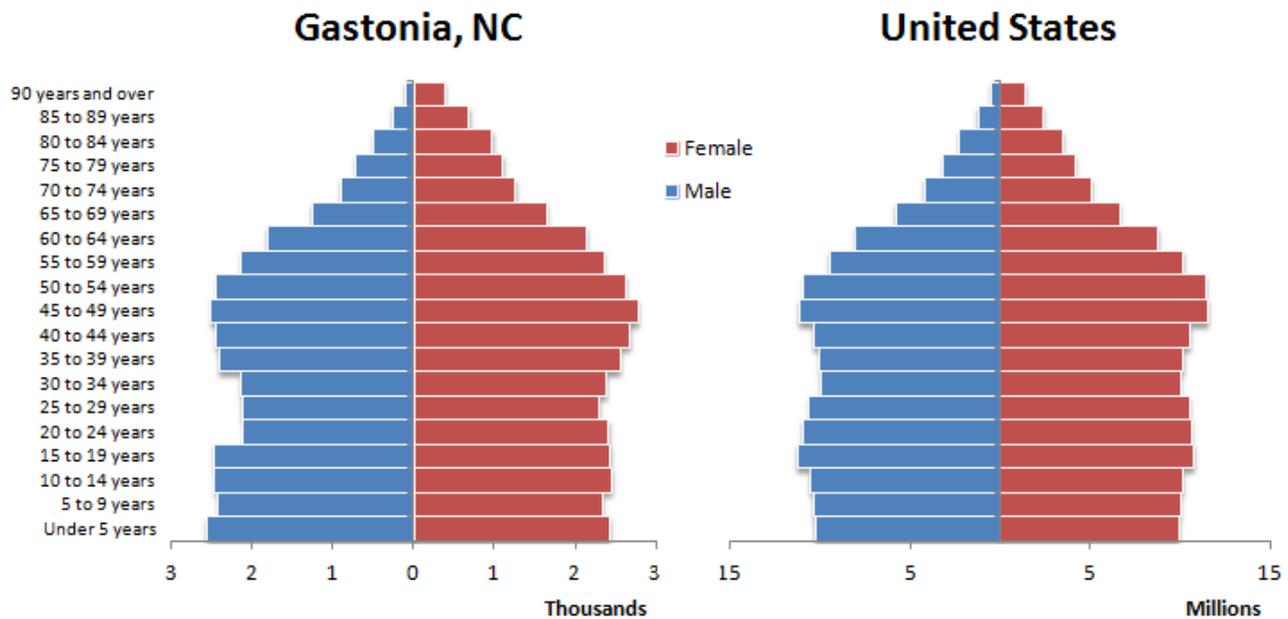


Figure 2-2: 2010 Population Pyramids for Gastonia and United States
Source: 2010 U.S. Census, Table QT-PI

It should be noted that the distribution of low-income and carless households is not even throughout the City. The central and western parts of the City have the greatest concentrations of these populations, though there are pockets in other areas, typically in areas with affordable rental housing in close proximity to commercial areas and public transit service. Still, the socioeconomic

trends above are to be expected for urban areas, where low-income, carless, and disabled persons are better accommodated by more public services, such as public transit, and a concentration of major destinations and employment opportunities.

These socioeconomic figures for Gastonia likely mean that there is a good amount of pedestrian travel occurring in the City by necessity versus by choice. Interestingly though, when looking at the means of transportation that Gastonia residents use to commute to work, a very small percentage actually commute to work by walking, biking, or riding public transportation. Instead, Gastonia has a very high percentage of commuters that travel to work by driving alone (see **Table 2-2**).

Table 2-2: Means of Transportation to Work

CATEGORY	GASTONIA	CHARLOTTE MSA	NORTH CAROLINA	UNITED STATES
Drove alone	83.3%	79.6%	80.9%	76.1%
Carpooled	11.8%	10.7%	10.7%	10.0%
Public transportation	1.0%	2.1%	1.1%	5.0%
Walked	0.7%	1.5%	1.8%	2.8%
Bicycle	0.1%	0.1%	0.2%	0.6%
Other	0.7%	0.8%	1.0%	1.2%
Worked at home	2.6%	5.2%	4.3%	4.3%

Note: Other includes taxicab, motorcycle, and other means.

Source: 2008-12 American Community Survey, Table B08301.

It is important to note that while Gastonia has a low pedestrian mode share for work commutes, work commute trips are only estimated to account for approximately five percent of all pedestrian trips at the national level, as shown in **Figure 2-3**. Most pedestrian trips are social, recreational, or for personal errands. Unfortunately, existing federal, state, and regional surveys and other data collection efforts do not provide detailed information for non-work pedestrian trips at the local level. Because of this lack of information, many local governments have begun counting pedestrians at select locations to better understand their pedestrian travel patterns.

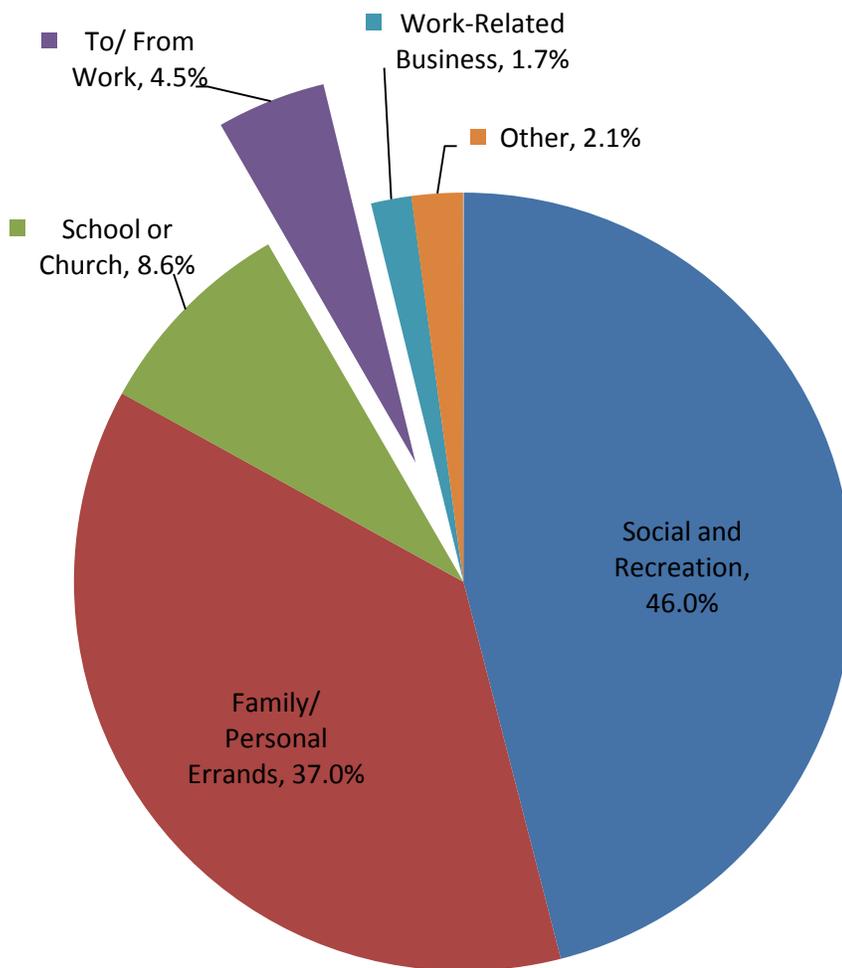


Figure 2-3: National Pedestrian Trips by Trip Purpose

Source: 2009 National Household Travel Survey

Public Health

Pedestrian activity is very important for the public health of a community. Walking, like most forms of regular physical activity, has been associated with many health-related benefits, including: lower low-density lipoprotein (LDL) cholesterol; higher high-density lipoprotein (HDL) cholesterol; lower blood pressure; reduced risk and management of type 2 diabetes; reduced risk of heart attack; improved mood; and feeling strong and fit. As indicated in **Table 2-3**, the prevalence of these types of health issues tends to be higher in Gaston County than North Carolina as a whole.

Table 2-3: Gaston County Public Health Indicators

CATEGORY	GASTON COUNTY	NORTH CAROLINA
In excellent or very good health	44%	50%
Percent with high cholesterol	46%	39%
Diabetes	18%	11%
Overweight/obese	75%	65%
Achieving recommended amount of physical activity	45%	47%
Poor mental health	24%	25%

Source: 2011 Behavioral Risk Factor Surveillance System.

In the *Gaston County 2012 Community Health Assessment Report*, one of the top priorities for the County was to “reduce the incidence of obesity by increasing programming to promote physical activity and improved nutritional practices.” When survey respondents throughout the County were asked to rank perceived community health problems, the most popular response was obesity. And when asked about built environment issues, the most popular response was sidewalks, followed by parks and recreation, and walking and biking trails.

2.2 Existing Sidewalks

The sidewalk inventory included in **Figure 2-4** depicts existing sidewalks in Gastonia as well as locations where sidewalks are not present but are needed. The “sidewalk needed” category is compiled from a database maintained by the City’s Engineering Department that consolidates addressed sidewalk need from citizen requests and previous planning studies, such as Safe Routes to School efforts. The total linear miles of existing and needed sidewalks, according to the data provided, is summarized in **Table 2-4**.

Table 2-4: Existing Sidewalks and Sidewalk Needs

CATEGORY	LINEAR MILES
Total Existing Sidewalks	174.2
Total Identified Sidewalk Needs	25.7

No analysis of the condition of existing sidewalks has been performed by the City of Gastonia. However, City staff has inventoried existing sidewalks in GIS, as illustrated in Figure 2-4. As this map indicates, sidewalk infrastructure is the densest around downtown Gastonia and in new subdivisions developed in the early 2000’s and later. Outside of these areas, sidewalk infrastructure

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is mostly limited to arterials and collectors, though there are still gaps in connectivity of sidewalks along such streets.

The presence and condition of sidewalks throughout Gastonia is closely linked with the time period in which any given area was developed. Because much of the area around downtown Gastonia and the surrounding mill villages were developed before the proliferation of the automobile in American society following World War II, these areas tend to have a highly connected street grid and better sidewalk network, with sidewalks often provided on both sides of the street. However, some areas, such as the Highland Community, were developed less comprehensively and lack this infrastructure. Furthermore, in some instances, sidewalks in older neighborhoods are much narrower than the preferred 5- to 6-foot width of today and were designed before the Americans with Disabilities (ADA) Act of 1990. Only through recent retrofitting has this existing



Historic Street Name Tiles

infrastructure been addressed and equipped with ADA-compliant curb ramps. Still, these sidewalks are often separated from the street by a narrow planting strip, providing a physical and psychological separation between pedestrians and automobiles. In some of the older areas of the City, sidewalk tiles can also be found from an era when pedestrian wayfinding superseded that of the automobile. This pedestrian-friendly design, when combined with an intact, small-block street grid and mix of nearby land uses, makes these areas arguably the most walkable neighborhoods in the City.

On the opposite end of the spectrum are the many subdivisions that were developed within the City from the 1980's through the early 2000's. While some of these subdivisions have sidewalk on one or both sides of the street, land use patterns and demographics translate into the use of these sidewalks as primarily for recreational uses and exercise.

In between the historic neighborhoods and new subdivisions are the mid-century subdivisions, such as Gardner Park. These are similar to their modern counterpart but differ in their higher street connectivity and extraordinarily wide streets, which are utilized by pedestrians because of the lack of sidewalks. Because these subdivisions were developed alongside schools, some of these areas have benefited from sidewalks and pedestrian signals that have been installed around elementary and middle schools.

The presence of sidewalk along non-residential corridors and nodes is inconsistent throughout the City. While some of the older areas have had sidewalks for decades, much of the sidewalk along arterials and collectors has been installed recently as roads have been widened, new development has occurred, and the City has issued bonds or used other revenue to construct sidewalks.

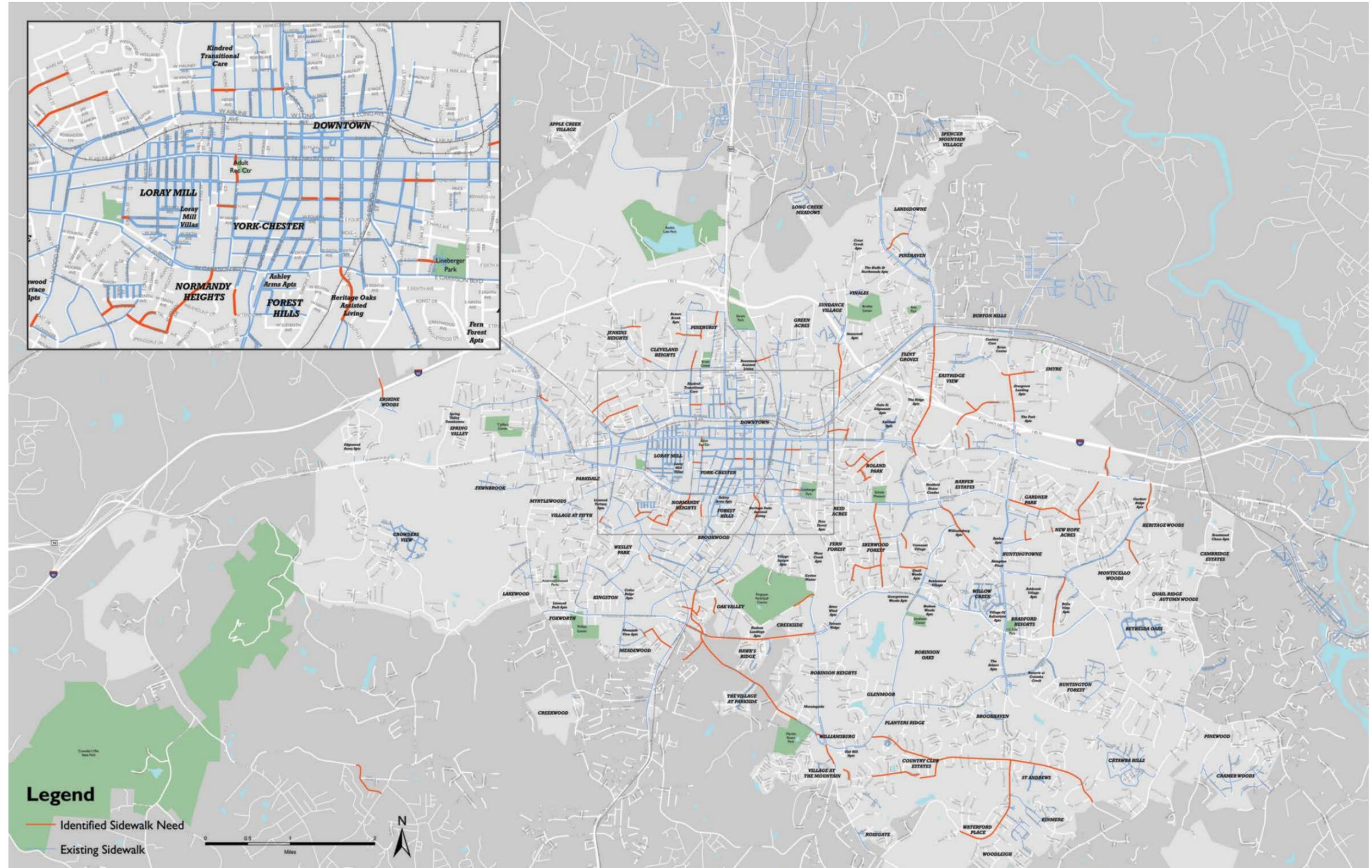


Figure 2.4: Sidewalk Inventory

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2.3 Existing and Proposed Greenways and Trails

A map of existing and proposed greenways and trails was developed and is presented in **Figure 2-5**. This map highlights existing multi-use trails such as the Highland Rail Trail, as well as trails that have been recommended as part of the City’s *Vision for a Healthy Community* planning process (see below for more information). **Table 2-5** summarizes the number of miles of existing and proposed greenways and trails.

Table 2-5: Existing and Proposed Greenways and Trails

CATEGORY	LINEAR MILES
Total Existing Greenways and Trails	8.3
Total Proposed Greenways and Trails	60.6

Through its *Vision for a Healthy Community, A Plan for Parks, Recreation and Open Spaces, 2005-2020*, the City has laid out a plan for developing greenways with the goals of ultimately interconnecting the entire City and making joining connections to County and regional trails. Specific priorities identified in the document include expanding the Avon/Catawba Creek Greenway system, interconnecting City parks, and connections to Daniel Stowe Botanical Garden, Crowders Mountain State Park, and Gaston College. As an initial step in achieving this vision, multiple opportunities and alternatives were identified in the *Vision for a Healthy Community* document, with the intent to move projects forward strategically, recognizing that not all alternatives will need to be implemented.

Currently, the Avon/Catawba Creek Greenway and Highland Rail Trail form the backbone of the multi-use path system in the City. Though there are several miles of multi-use paths within City and State parks in Gastonia, these park paths are primarily for recreation and are not as well connected to the City’s overall pedestrian network. Both the Avon/Catawba Creek Greenway and Highland Rail Trail, on the other hand, are more linear and have many existing and future connections to surrounding neighborhoods. These wide, asphalt paved paths are in good condition, having been constructed incrementally or in whole over the past fifteen years. These paths are closed to the public from dusk to dawn and as such, there is minimal lighting provided.

Both the Avon/Catawba Creek Greenway and Highland Rail Trail come short of reaching downtown, but through incremental improvements, the City is working to realize this important connection. The pedestrian retrofitting of the Marietta Street Bridge and widening of the sidewalk on Long Avenue, from Marietta Street to the terminus of the Highland Rail Trail, exemplifies these efforts. The City is also currently in the planning stages of bringing bicycle and pedestrian improvements to Second Avenue and Chestnut Street to connect the Avon/Catawba Creek Greenway with downtown. Barriers to expanding the existing multi-use path system are mostly related to cost and right-of-way constraints. Extending the Highland Rail Trail north to connect to Rankin Lake Park and eventually Gaston College is a major priority of the City and County and projects to achieve this expansion are in the planning stages. The City is also currently planning the

extension of the Avon/Catawba Creek Greenway to Marietta Street to tie into the City's sidewalk system. Westward expansion from Marietta Street is complicated because of topography and right-of-way but eastward expansion of the greenway, towards Daniel Stowe Botanical Gardens will likely happen as development occurs in the area.

Also of concern to the City of Gastonia and Gaston County is their role in the realization of the Carolina Thread Trail (also known as "The Thread"). As envisioned, the Carolina Thread Trail is a "green interstate system" of major trails and conservation lands connecting 15 counties and over 2.3 million people. Facilities in the City of Gastonia and Gaston County that are part of The Thread are the Catawba Creek Greenway, Highland Rail Trail, Riverside Greenway, and Spencer Mountain/McAden Blueway. Additionally, The Thread seeks to link attractions in the region, including Belmont Abbey College, Crowders Mountain State Park, and Daniel Stowe Botanical Garden.

2.4 Access to Transit

Gastonia Transit, the City's bus service, operates seven transit routes (see **Figure 2-6**) with six buses running on a "pulse" schedule in which all buses regularly converge at Bradley Station simultaneously to facilitate easy transfers between routes. Transit service runs Monday through Saturday and coverage is provided to the majority of the transit-dependent population; however, there is little coverage in other areas, such as the southeastern part of the City. Bus stops are marked with unique Gastonia Transit signs and all buses are wheelchair accessible.



Pedestrian access to bus stops varies by route, and generally speaking is better on higher ridership routes. Typically, it is assumed that a quarter-mile is the distance pedestrians are willing to travel to reach a bus stop. Though not a perfect measure, the ratio of sidewalk length to roadway length within a quarter-mile of a transit route is helpful in understanding the current state of pedestrian access to transit. A ratio closer to 2.00 would indicate that sidewalk is almost always provided on both sides of the street within a quarter-mile of a route while anything significantly under 1.00 indicates that there are sidewalk gaps within a quarter-mile of a route.

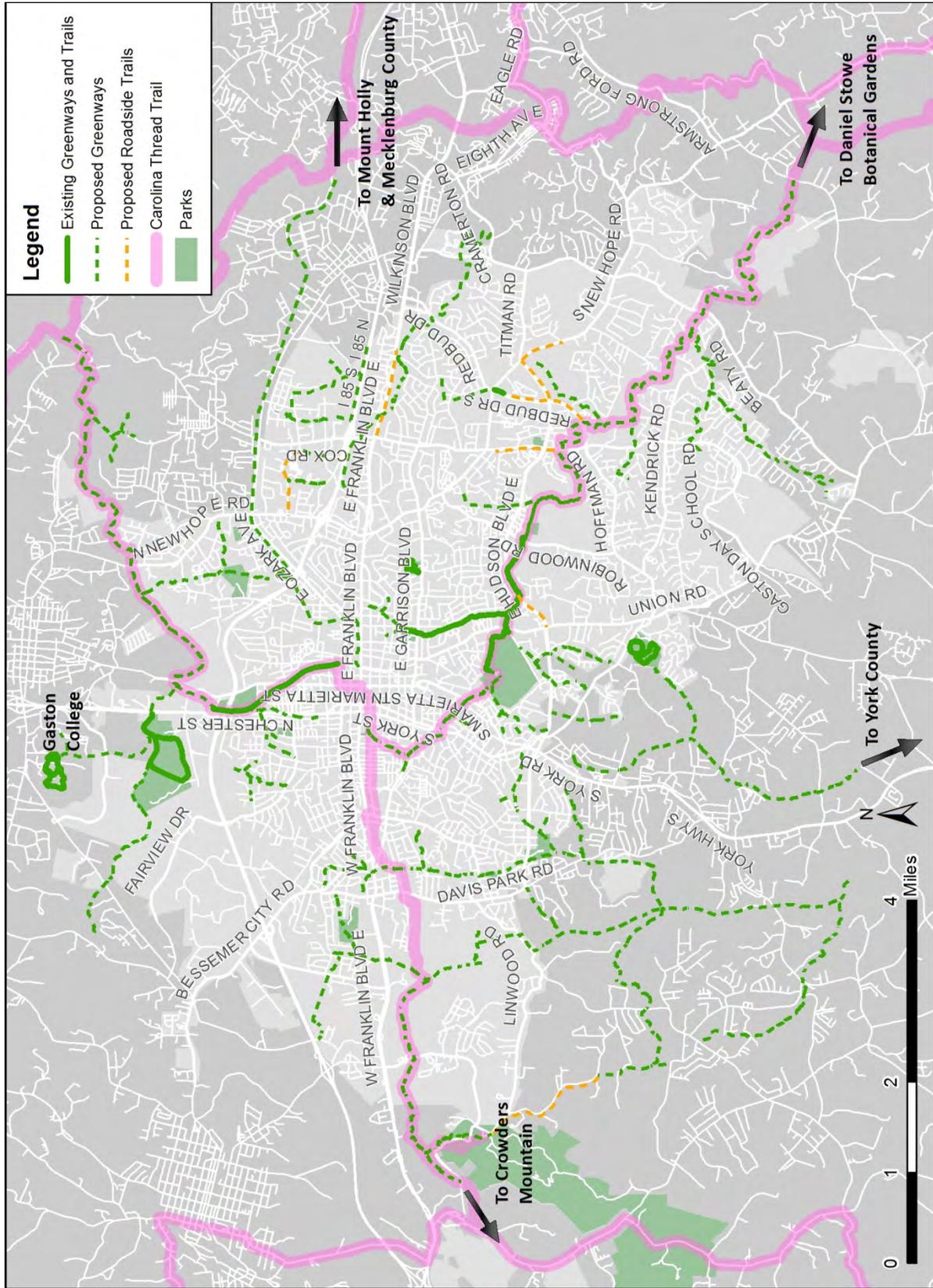


Figure 2-5: Proposed System of Public Greenways and Trails

Table 2-6 shows these “pedestrian access” ratios and the average weekday ridership figures in 2013 for the different Gastonia Transit routes. The #2 South New Hope and #3 South Marietta routes are combined because these routes are served by one bus and the ridership data cannot be disaggregated. As can be seen, all routes have a ratio under 1.00, indicating that sidewalk gaps do exist throughout the network. The City of Gastonia does not currently inventory its bus shelters, but most of the high volume bus stops have covered bus shelters with seating.

Table 2-6: Transit Ridership and Pedestrian Access Ratio by Route

ROUTE	AVG. 2013 WEEKDAY RIDERSHIP	SIDEWALK TO ROADWAY LENGTH RATIO*
#1 Franklin Boulevard	216	0.74
#5 Edgewood	175	0.67
#4 South York	166	0.58
#2 South New Hope & #3 South Marietta	177	0.47
#8 Hospital	159	0.43

*Excludes limited-access freeways

2.5 Potential Trip Generators

Potential pedestrian generators were identified and incorporated into a land-use based map as presented in **Figure 2-7**. This information was incorporated into the prioritization methodology that is presented in Chapter 4 of the Plan.

As the political center and largest city of Gaston County, Gastonia is home to many social and cultural services which are pedestrian generators. However, unlike some small cities, these services are dispersed throughout the City. While political and administrative facilities, such as City Hall and the County Courthouse, are still located downtown, other facilities, such as the Gaston County Health Department, the Main Branch of the Gaston County Library, the Schiele Museum, and the CaroMont Regional Medical Center are located in other parts of the City. At the same time, regional-scale commercial developments have increasingly located east of downtown along Franklin Boulevard. Today, the area between Eastridge Mall and Franklin Square serves as a secondary central business district, including regional-scale shopping, hotels, and medical facilities.

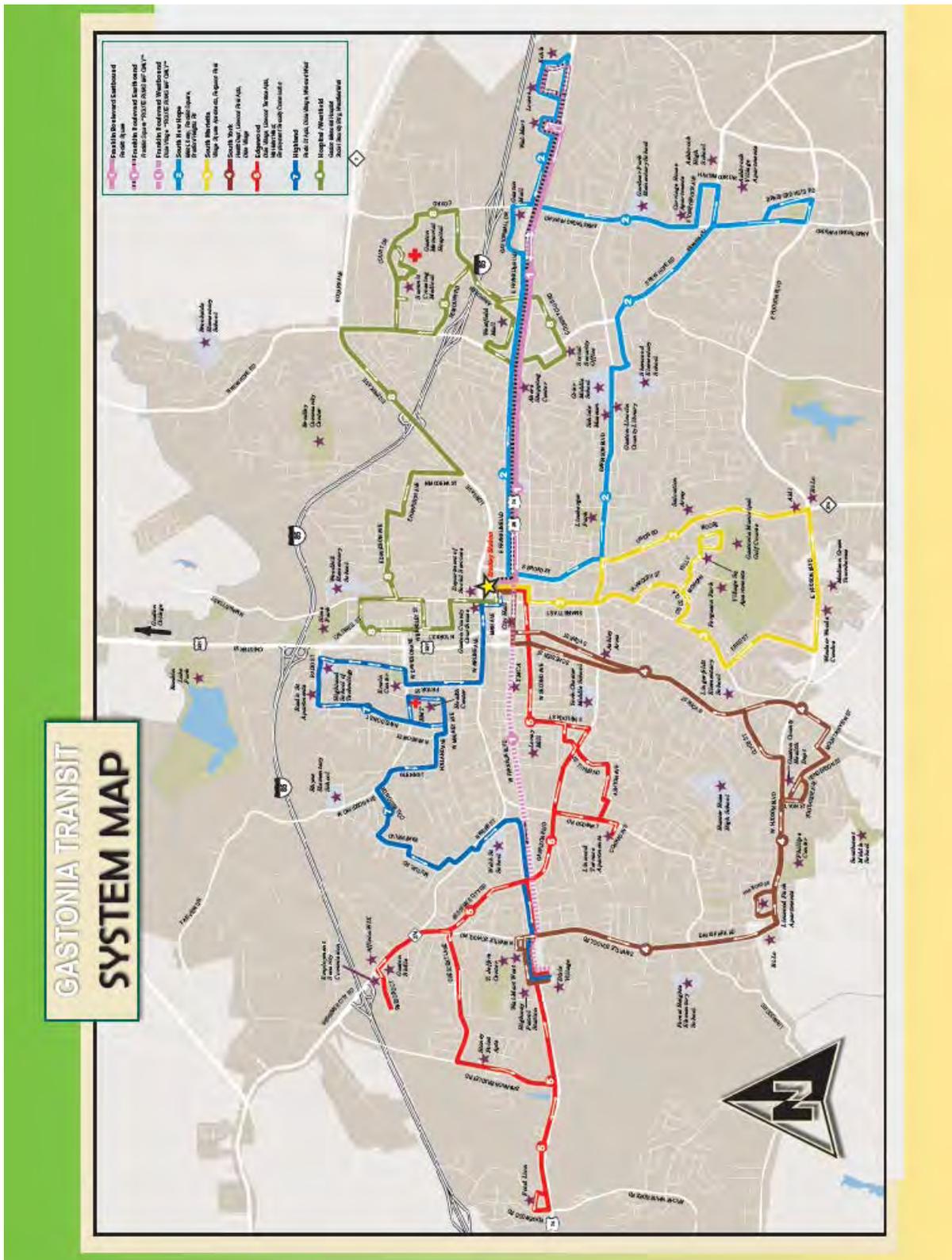


Figure 2-6: Gastonia Transit System Map

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Downtown is home to many pedestrian generators and has a good network of sidewalks and pedestrian signals at intersections. In addition to City Hall and the Gaston County Administrative building, there is also the Bradley Station terminal for Gastonia Transit buses. The Salvation Army and other social services are also located downtown and attract many pedestrians. Just north of the Downtown Historic District are the Gaston County Courthouse and Gaston County Human Services Center. While below-grade railroad tracks separate these two major pedestrian generators from the rest of downtown, these facilities are well connected by wide sidewalks and pedestrian signals. The Marietta Street Bridge, the main bridge between these facilities and downtown, was recently redesigned to be more pedestrian friendly.

The Gaston County Health Department is another generator, especially when its surrounding uses, including public housing, two schools, a park, and a grocery-anchored strip mall, are considered. This cluster of pedestrian activity is located in the southwestern part of the City on Hudson Boulevard. Many residents arrive here by public transit, and while there are sidewalks on the main streets, sidewalk is still missing in some areas. Pedestrian signals are present at the intersection of Hudson Boulevard and Lynhaven Drive/Lyon Street, where most pedestrians cross the 4-lane divided Hudson Boulevard.

The Schiele Museum and Main Branch of the Gaston County Library are located across the street from each other on Garrison Boulevard southeast of Downtown. Also nearby are Grier Middle School and a mix of offices and retail. The internal sidewalk networks for these pedestrian generators are good and there is sidewalk along Garrison Boulevard for most of the immediate area. There is also pedestrian signalization at the intersection of Garrison Boulevard and Churchill Drive; however, there is currently no sidewalk down Churchill Drive or other streets that lead into the relatively dense residential areas behind these pedestrian generators.

Some recreation facilities, such as Erwin Center, Bradley Center, Lineberger Park, Martha Rivers Park, and the City's greenway system are also major pedestrian generators in the warmer months. These facilities are scattered throughout the City and most have been integrated into the surrounding sidewalk network. In many cases, recreational facilities at schools are also open to the public after school hours.



Schools themselves are another type of pedestrian generator, especially those located in the more urbanized areas. The City has historically made many efforts to better connect schools to their surrounding neighborhoods, often through the Safe Routes to School program. While this has resulted in many improvements, including sidewalks, trails, and pedestrian signals, there are still some elementary and middle schools that lack adequate sidewalk facilities, particularly in areas more recently annexed by the City.

Commercial areas in general were recognized as high pedestrian generators, as illustrated in Figure 2-6. These ranged from large shopping centers, such as the Walmart and Dixie Village on West Franklin Boulevard, to convenience stores that attract many pedestrians from surrounding neighborhoods. Most shopping centers have adequate internal sidewalk systems but lack sidewalk on the frontage street, thus missing a critical connection to surrounding neighborhoods and bus stops. Convenience stores are often well integrated into the sidewalk network but have a considerable amount of curb cuts and high-traffic roadways along their frontage, which can be intimidating and unsafe for pedestrians.

As with commercial areas, high-density residential areas were also recognized as major pedestrian generators. In addition to a higher concentration of residents, those living in high density residential areas tend to have lower rates of vehicle ownership and are more likely to walk places. As with shopping centers, many apartment complexes have good internal sidewalk connectivity but lack adequate connectivity to surrounding properties. In fact, many newer apartment complexes are gated and restrict pedestrian access to one or two locations.

2.6 Pedestrian Crashes

A pedestrian crash map was also developed (see **Figure 2-8**), which captures all police reported crashes involving pedestrians in Gastonia for the years 2007 to 2011. The map also highlights the severity of injury to the pedestrians. At the first public meeting, participants were asked to review the map and assist in the process of identifying locations where pedestrian crash clusters appeared to exist.

From the map, the following can be understood:

- Three of the five fatal injuries from 2007-2011 occurred along Franklin Boulevard and the other two were in residential areas.
- Crashes appear more prevalent along commercial corridors where wider roads and higher traffic speeds are common, such as Franklin Boulevard, Cox Road, and New Hope Road.
- The majority of neighborhood crashes resulted in “possible injury,” indicating slower speeds and less severe crashes.
- Most crashes are within close proximity to intersecting streets where greater potential for vehicular and pedestrian conflicts exist.

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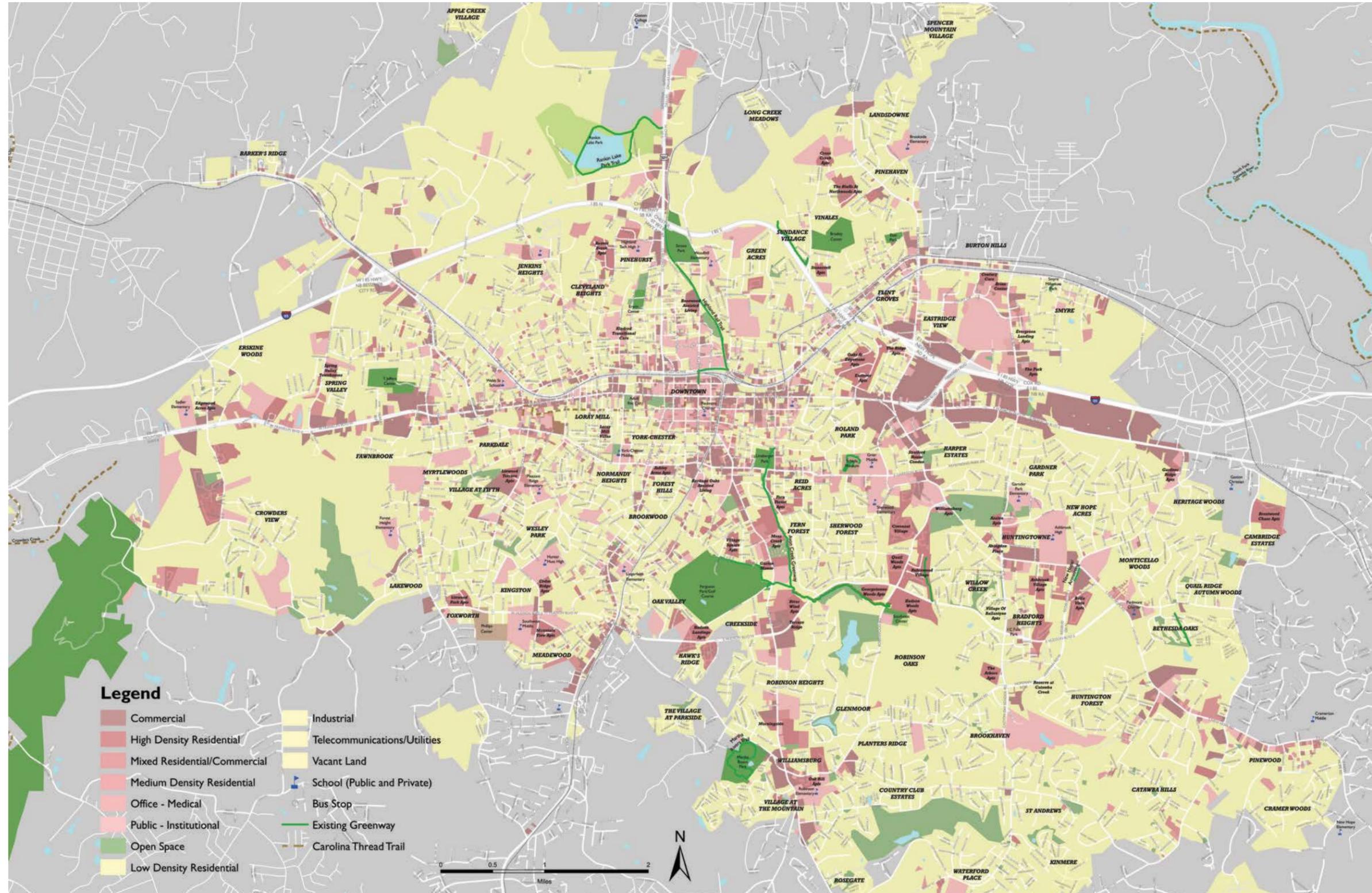


Figure 2-7: Potential Trip Generators

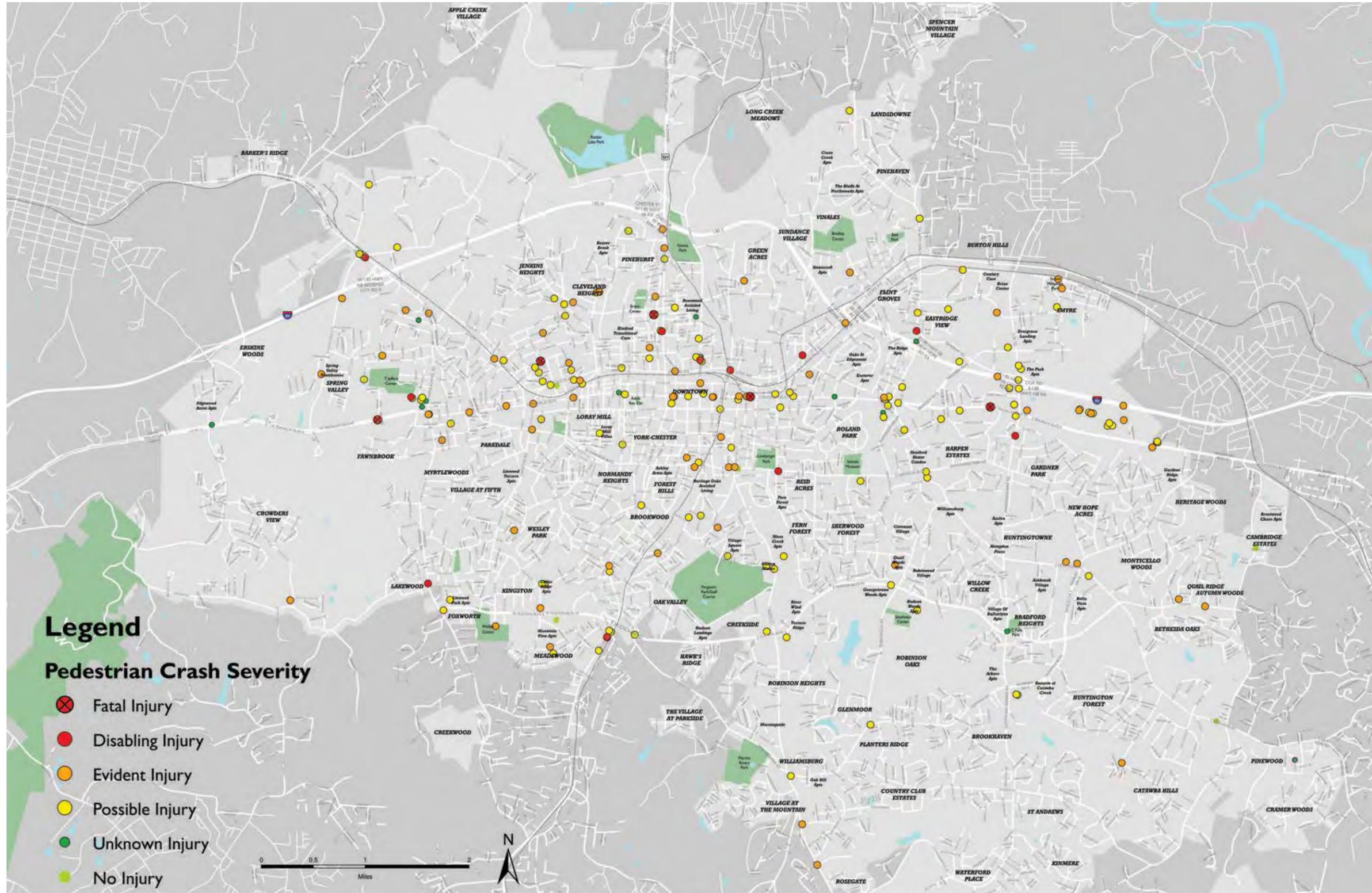


Figure 2-8: Pedestrian Crashes (2007-2011)

Table 2-7 presents types of crashes and associated numeric data. This data was obtained using the online North Carolina Pedestrian and Bicycle Crash Data Tool provided by NCDOT’s Division of Bicycle and Pedestrian Transportation. This tool allows the user to access an online database of police reported bicycle and pedestrian crashes.¹²

Table 2-7: Pedestrian Crashes (2007-2011)

CRASH SEVERITY	YEAR					TOTAL
	2007	2008	2009	2010	2011	
Fatal Injury	2	0	1	0	2	5
Disabling Injury	5	4	2	0	1	12
Evident Injury	19	12	9	11	13	65
Possible Injury	24	21	21	24	22	110
Unknown Injury	5	1	2	1	5	4
No Injury	1	0	3	3	1	19
Total	56	38	38	39	44	215

Source: North Carolina Pedestrian and Bicycle Crash Data Tool (http://www.pedbikeinfo.org/pbcats_nc/index.cfm)

2.7 Planning Context

A number of planning documents have been developed at the local, regional, and state levels in recent years that have applicability to or influence on the Gastonia Comprehensive Pedestrian Plan. Content was reviewed to gain understanding of previous recommendations and determine methods for building on previous efforts. Documents that were reviewed are listed below and portions of each document that have bearing on pedestrian travel in Gastonia are summarized in **Appendix B**.

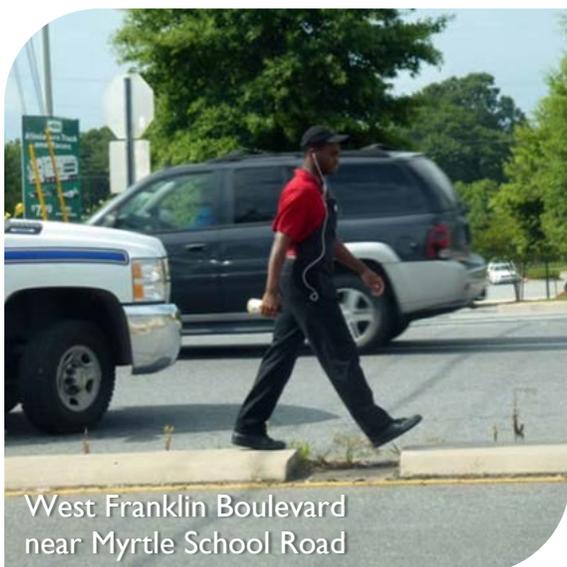
- Keep It Movin’ Gaston: Gaston-Cleveland-Lincoln MPO 2035 Long Range Transportation Plan
- Downtown Streetscape & Public Realm Plan
- Franklin Boulevard Corridor Master Plan

¹² http://www.pedbikeinfo.org/pbcats_nc/index.cfm

- Gastonia 2025 Comprehensive Plan
- Vision for a Healthy Community: Parks and Recreation Long Range Plan
- Franklin/Myrtle School Small Area Plan
- Highland Master Plan
- Downtown to Lineberger Pedestrian and Bicycle Connection
- Creating Opportunities for Active Living, North Carolina Department of Health and Human Services (NC DHHS) Grant-Supported Effort
- NCDOT Complete Streets Planning and Design Guidelines
- WalkBike NC

2.8 Pedestrian Issues

Steering Committee engagement, walking and van tours, public input, review of the existing context, and field analysis revealed a number of concerns regarding pedestrian conditions in Gastonia. These issues are listed at right. Recommendations presented in Chapter 4 of the Plan seek to alleviate or completely remedy these issues.



Pedestrian Issues

- Too many curb cuts and driveways
- Excess underutilized pavement
- Overbuilt roads
- High speed traffic
- Americans with Disabilities (ADA) issues
- Not enough time for pedestrians to cross large arterial roads
- Sidewalks in poor condition
- Lack of buffers between the sidewalk and the road
- Large arterial roads with a sidewalk on only one side
- Bridges with narrow or missing sidewalks
- Deteriorated crosswalks
- Pedestrian median islands that don't provide a physical separation from traffic
- Intersections without four crosswalks
- Gaps in the pedestrian network that inhibit connectivity
- Of the existing and planned greenways, it's unclear which ones serve (or could serve) a pedestrian transportation purpose
- Pedestrian access to transit is limited by a lack of surrounding sidewalks and amenities such as benches and shelters, as well as difficult crossing conditions
- Pedestrian safety in parking lots
- Poor lighting conditions
- Pedestrians jaywalking and/or crossing at unmarked mid-block locations
- Limited sight distance
- No sidewalks at all on some collector streets



3 Programs, Policies, and Design Standards

Programs, policies, and design standards affecting pedestrian travel in the City of Gastonia were reviewed. Recommendations for revisions and additions have been made and are presented in this chapter of the Plan.

Policies and programs complement and support physical improvements and ongoing maintenance to the pedestrian network.

3.1 Programs and Policies

Existing Programs and Policies

The City of Gastonia has several existing programs regarding pedestrians. As previously mentioned, the Engineering Department maintains a database of sidewalk requests from citizens along with sidewalks identified in previous planning efforts. Cost estimates are developed for these sidewalk projects and other attributes are noted, such as the presence of a worn path or proximity to schools and parks. These sidewalk projects are constantly evaluated as funding becomes available. The City also has a more formal Sidewalk Request Petition program whereby the City installs new concrete sidewalk by request, in the form of a petition, from the majority street's property owners that own a majority of the street frontage. City Engineering staff will assist in determining the most feasible limits of the project, design the project, and bid and administer the construction of the curb and gutter or sidewalk. All property owners that are benefited by the project will be assessed an amount, based on street frontage, sufficient to cover 100 percent of the total cost of the project.

The City also occasionally issues bonds for infrastructure, including pedestrian infrastructure like sidewalks. The most recent municipal bonds, approved in 2010, have resulted in the installation of sidewalks along many collector and arterial roads in the City.

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Gastonia Transit and the Department of Public Works and Utilities have less formal, annual programs that address deficiencies in the City's pedestrian system. Each year, Gastonia Transit addresses the lack of bus shelters by installing, on average, two shelters a year at high volume bus stops. Similarly, each year, the Department of Public Works and Utilities dedicates a certain amount of funding to installing, repairing, and replacing ADA-compliant sidewalk ramps.

A number of state and federal policies also exist that directly pertain to pedestrian safety and accommodations:

- North Carolina Complete Streets Policy
<http://www.completestreetsnc.org/>
- NCDOT Pedestrian Policy Guidelines
http://www.ncdot.gov/bikeped/download/bikeped_Ped_Policy.pdf
- NCDOT Greenway Policy
http://www.ncdot.gov/templates/download/external.html?pdf=http%3A//www.ncdot.gov/bikeped/download/bikeped_laws_Greenway_Admin_Action.pdf
- NCDOT Board of Transportation Resolution for Bicycling and Walking
http://www.ncdot.gov/bikeped/download/bikeped_laws_BOT_Mainstreaming_Resolution.pdf
- NCDOT Bridge Policy
<https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Bridge%20Policy.pdf>
- United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations (March 2010)
http://www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

Recommended Programs and Policies

Members of the Steering Committee were active in determining the most appropriate programs and policies for the Plan. Potential education, encouragement, enforcement, and maintenance policies and programs were provided to the Steering Committee for review and comment. Steering Committee members provided feedback on the most appropriate programs and policies as well as direct comments on appropriate applications to the City of Gastonia. The final set of programs and policies is the result of an interactive process and is informed by best practices in other cities.

Recommended programs and policies are presented in **Table 3-1** and **Table 3-2**. In addition to these, the North Carolina Statewide Pedestrian and Bicycle Plan identifies a number of programs the City of Gastonia may want to consider.¹³

¹³ <http://www.ncdot.gov/bikeped/download/WalkBikeNCPlanChapterslowres.pdf>

Table 3-1: Recommended Education, Encouragement, Enforcement Programs and Policies

PROGRAM/POLICY	DESCRIPTION
Update/Maintain Existing GIS Sidewalk Inventory	<ul style="list-style-type: none"> • Maintaining the City’s GIS-based sidewalk inventory is an important tool for tracking the location of existing sidewalks. • Updating the inventory to include curb ramps and condition information would make the dataset useful for asset management.
Web/Mobile Reporting App	<ul style="list-style-type: none"> • Provide a web/mobile app that allows citizens to report non-emergency physical and infrastructure issues. • This would include any issues that impact pedestrian safety, access, and comfort. • Interdepartmental communication would increase the effectiveness of such a system (e.g., police and engineering). • Marketing would be needed to make the public aware of the reporting app.
“Near Miss” Reporting System	<ul style="list-style-type: none"> • A near miss reporting system would allow travelers to identify locations and operations that may create a safety risk before an incident occurs. • This can be used as a complement to a web/mobile reporting app – evaluation of maintenance needs and involvement of police and engineering departments. • Coupling and comparing actual crash data with near miss locations would assist in determining accident-prone areas. • Marketing would be needed to make the public aware of the reporting system.
Pedestrian Counts	<ul style="list-style-type: none"> • Regular pedestrian counts are a means of measuring the effect of physical, operational, and programmatic changes on walking rates. • Existing pedestrian counts demonstrate areas of demand and can be used to help support investment in pedestrian network improvements. • Conducting pedestrian counts in the years following network investments can assist in demonstrating the impact improvements have on increasing pedestrian travel. • The City should coordinate with NCDOT’s emerging pedestrian and bicycle count program.
Staff Training	<ul style="list-style-type: none"> • Establish a program to train City staff whose jobs affect pedestrian safety (i.e., planning, engineering, parks and recreation, police department, etc.). “Watch For Me NC” training materials could be utilized (http://www.watchformenc.org/). • Such training will not only educate staff on pedestrian issues and concerns but will assist in implementation of the Plan.
Walking Encouragement	<ul style="list-style-type: none"> • Walking route maps are an encouragement strategy for getting more people walking while indicating the most comfortable and safe routes that link residents to key destinations and areas of interest. • As part of walking route maps, including distance and terrain information will allow user to select the most appropriate routes for their skill level. • Organized neighborhood and company walking and running groups can be a popular way for people to get exercise and build social networks.
Media Collaboration	<ul style="list-style-type: none"> • Work with local print and television media to develop a series of educational pieces that address both safe driving and walking behaviors; these pieces could also cover the rules applicable to all users of public roadways and should be in compliance with North Carolina law (http://www.ncdot.gov/bikeped/lawspolicies/). • The Government Access Channel (cable channel 16) could be an excellent format for providing instruction on appropriate walking and driving behaviors. Utilizing “Watch For Me NC” materials could be an easy starting point for public service announcement content (http://www.watchformenc.org/). • Evaluate media methods for reaching those without access to newspaper and cable television.
Child Pedestrian Safety Curriculum	<ul style="list-style-type: none"> • Collaborate with Gaston County Schools to implement the National Highway Traffic Safety Administration (NHTSA) Child Pedestrian Safety Curriculum, which teaches and encourages pedestrian safety for students grades Kindergarten through 5th Grade (http://www.nhtsa.gov/ChildPedestrianSafetyCurriculum). • This NHTSA curriculum is organized into five lessons: walking near traffic, crossing streets, crossing intersections, parking lot safety, and school bus safety. Each lesson builds upon a previous set of skills learned. • Another resource to consider is NCDOT’s “Let’s Go NC!, A Pedestrian and Bicycle Safety Skills Program for Healthy, Active Children” (https://connect.ncdot.gov/projects/BikePed/Pages/LetsGoNC.aspx).
Speed Limits	<ul style="list-style-type: none"> • Consider lowering the standard speed limit (35 mph) and/or implementing targeted speed limit reductions in areas of high pedestrian demand/potential. • Regarding residential areas, the City already will grant a speed limit reduction if requested by residents.

Table 3-2: Recommended Maintenance and Improvement Programs¹⁴

PROGRAM/POLICY	DESCRIPTION
Maintenance and Repair	<ul style="list-style-type: none"> • Fund the maintenance of sidewalks and other pedestrian infrastructure on an ongoing basis. • Maintaining and repairing sidewalks is a way to protect the City’s investment in the pedestrian network and can help the City’s overall walkability.
ADA Curb Ramps	<ul style="list-style-type: none"> • Begin a program to install and retrofit curb ramps at all intersections within the City. • Set a per year goal. • Ensure that new curb ramps follow Americans with Disability Act (ADA) guidance.
Crosswalks	<ul style="list-style-type: none"> • Establish a citywide crosswalk improvement program. • Implement it in pilot locations, then set a per year goal. • As part of the program, establish as a baseline default that crosswalks will be marked on all four legs of an intersection.
Pedestrian Countdown Signals	<ul style="list-style-type: none"> • Create a proactive pedestrian countdown signal improvement program to install pedestrian countdown signals at new locations on an ongoing basis. • Set a per year goal.
Pedestrian Refuge	<ul style="list-style-type: none"> • Where existing painted center medians exist in proximity to intersections, seek opportunities to construct raised medians in their place to provide pedestrian refuge.
Transit Access	<ul style="list-style-type: none"> • Establish a program to provide better crossing opportunities at bus stops, especially at uncontrolled mid-block locations. • If existing crossing locations can’t be improved, consider moving the bus stop to a location where better crossing conditions can be accommodated. • Consider implications to transit operations prior to relocating bus stops.
Midblock Crossings	<ul style="list-style-type: none"> • Consider midblock crossing improvement opportunities along corridors where signals are currently spaced far apart. • Improvements may include advanced warning signage and pavement markings, Rectangular Rapid Flash Beacons, and/or HAWK signals.
Street “Right Sizing”	<ul style="list-style-type: none"> • Evaluate opportunities to implement lane diets, road diets, curb extensions, and other reallocations to “right size” existing roads so that they function better for all modes. • Reclaimed pavement areas can be utilized for buffers/greenstrips, sidewalk widening, bike lanes, and/or curb extensions. • In all cases, sufficient traffic analysis should be performed to ensure functionality and appropriateness of treatments.

¹⁴ Design guidelines specific to these areas of maintenance and improvement are included in Appendix D.

3.2 Design Standards

Existing Standards and Details

A review of current standards and details that apply to pedestrian related facilities in the City of Gastonia was performed. A number of details were provided by the City of Gastonia and encompass standards and typical sections from the City of Gastonia, Gaston-Cleveland-Lincoln MPO, and NCDOT. A detailed documentation of this review is included in **Appendix C**.

In general, existing details did not include the following best practices:

- Crosswalks
 - Placement and markings
- Typical signage for pedestrians at intersections and midblock crossings
- Bus Stops
 - Placement and access
- Traffic Calming
 - Raised Crosswalks
 - Curb Extensions

Preferred Design Standards and Policies

As with policies and programs, members of the Steering Committee were active in determining preferred design standards and policies for the Plan. Potential design standards and policies were provided to the Steering Committee for review and comment. Comments were received during a Steering Committee meeting, including how such should be applied in Gastonia. **Table 3-3** presents preferred design standards and policies for the City of Gastonia, which are the result of an interactive process and are informed by best practices in other cities. A library of pedestrian facility design guidelines is included in **Appendix D**. NCDOT specifically adheres to the American Association of State Highway and Transportation Officials (AASHTO) design guidelines and the Manual on Uniform Traffic Control Devices (MUTCD), as well their own NCDOT Complete Streets Planning and Design Guidelines, when considering pedestrian facility design.

Table 3-3: Preferred Design Standards and Policies

STANDARD/POLICY	DESCRIPTION
Complete Streets Policy	<ul style="list-style-type: none"> Develop and adopt a recommended complete streets policy in accordance with the National Complete Streets Coalition’s 10 ideal elements of a complete streets policy, including a vision, applicability to all users and all projects, specific exceptions, connectivity of the network for all modes, design criteria, context sensitivity, performance standards, and next steps.
Design Details	<p>The following modifications or additions to current design details are recommended:</p> <ul style="list-style-type: none"> 5-foot minimum sidewalk width on collector streets and higher; 4-foot minimum sidewalk width on residential streets provided the entire sidewalk width is maintained “free and clear” of obstruction. Where feasible, 5- to 6-foot minimum buffer (greenstrip) widths between road and sidewalk on collector streets and higher. Allow 11-foot lane widths on all streets. Maintenance of sidewalk slope and grade across driveways. Two curb ramps per intersection corner; if constrained, utilize depressed corner (i.e., don’t point pedestrians into middle of intersection); ensure that new curb ramps follow Americans with Disability Act (ADA) guidance, specifically with regard to the width and depth of the landing area provided at the top of the curb ramp. In addition to signage for a shared street, shared lane pavement markings should be shown and denoted in plan view where feasible. Placement and marking of crosswalks. Typical signage for pedestrians at intersections and midblock crossings. Encourage pedestrian countdown signals as part of all new and existing signalized intersection improvement projects. Placement and access of bus stops. Traffic calming treatments that benefit pedestrians, including raised crosswalks, curb extensions, and pedestrian refuge islands.
Signal Timing Policy	<ul style="list-style-type: none"> Ensure that the City’s official policy is to time all signals using the guidance for pedestrian crossing time (i.e., walking rate of travel of 3.5 feet per second) included in the latest Manual on Uniform Traffic Control Devices (MUTCD).
Unified Development Ordinance	<p>Evaluate Gastonia Unified Development Ordinance to determine:</p> <ul style="list-style-type: none"> Potential to amend existing access management policy (Section 9.23). In addition to frequency and spacing of driveways, this policy should address driveway design, inter-parcel connectivity, access from side streets, and right-in/right-out access strategies. Potential inclusion of crosswalk requirements along public roads and within private developments. Potential inclusion of pedestrian signal requirements along public roads and within private developments.
NCDOT Resolution	<ul style="list-style-type: none"> The City should adopt a resolution requesting pedestrian accommodations (i.e., sidewalks, ADA curb ramps, crosswalks, pedestrian signals at signalized intersections, etc.) be funded on all non-interstate NCDOT road and bridge projects within the municipal boundaries.



Avon/Catawba Creeks Greenway near Fern Forest Drive at Holly Drive

4 Network Recommendations

This chapter presents recommendations for improving Gastonia's pedestrian network. Best practices have been incorporated into the recommendations and strategies are intended to assist in reducing barriers to pedestrian travel by improving safety, convenience, and comfort.

Recommendations have been formulated to reduce barriers while improving safety, convenience, and comfort.

4.1 Pedestrian Environment

The pedestrian environment can be defined by two primary areas of activity: 1) Along the Roadway; and 2) Across the Roadway. Consideration should be given to both of these areas of activity when implementing recommended improvements and determining new improvements moving forward.

Along the Roadway

Providing a quality walking experience for pedestrians along the streets and roadways in Gastonia is influenced by a variety of factors, including:



South New Hope Road at Redbud Drive

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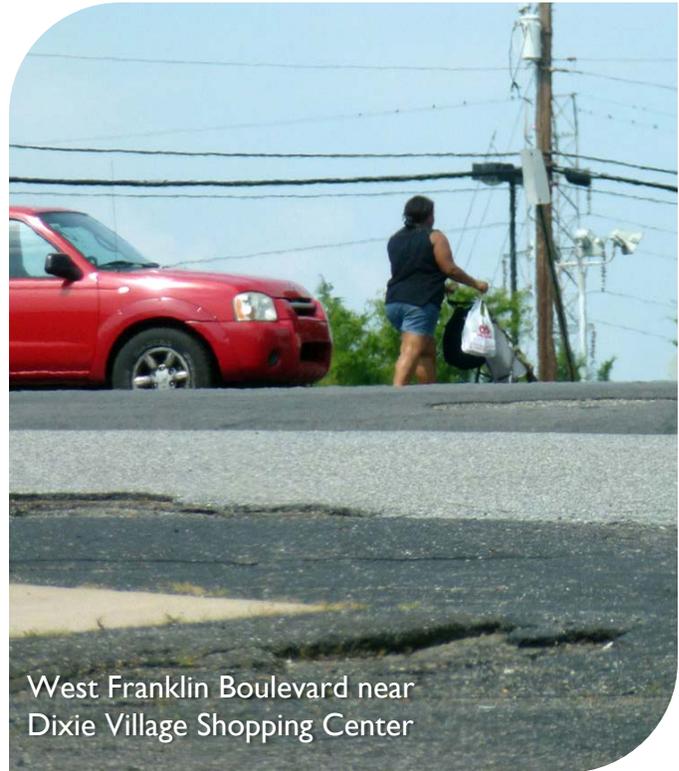
- **Sidewalks:** Sidewalks are the central component of the pedestrian network. Sidewalks and walkways should provide a continuous system of accessible paths for pedestrians.
- **Buffers:** A pedestrian's safety and comfort in the roadway environment is significantly affected by the width and quality of the buffer between the sidewalk and the roadway on streets with heavy traffic volumes. Buffers such as on-street parking, street trees, bike racks, and landscaping (or greenstrips) can enhance the pedestrian experience by separating the vehicular traffic lanes from the pedestrian space on the sidewalk.
- **Obstructions:** Items reducing the clear width for pedestrian travel along sidewalks affect sidewalk functionality. While necessary, utility poles, signs, mailboxes, and fire hydrants should be placed outside a minimum 48-inch clear width zone on the sidewalk. Additionally, street trees, planters, café tables and retailers' merchandise can contribute to a lively and attractive pedestrian environment, but appropriate space for these items is needed.
- **Access to Transit:** Sidewalk connectivity in the proximity of bus stops provides access to these stops for all riders, especially important to older residents and those with disabilities. Further, the provision of benches, shelters, and other amenities improve pedestrian comfort and safety while also increasing transit ridership.
- **Vehicular intrusions:** Sidewalks are often interrupted by driveways, introducing conflict zones into the sidewalk. Illegal sidewalk parking can force walkers into the street.
- **Bridges:** Bridges can serve as either connections or barriers in the pedestrian network.
- **Access to Trails:** There are currently over 8 miles of multi-use trails in Gastonia, with another 60 miles planned. Pedestrian access to trails is predominantly provided via street crossings and at trailhead locations.



Across the Roadway

In addition to providing continuous and safe facilities adjacent to roadways, safe street crossings are a critical component of an accessible and complete pedestrian network. Essential factors in determining the quality of a pedestrian's experience crossing a roadway include intersection geometry and the character of the road. The following is an overview of intersection considerations that affect pedestrians.

- **Intersection Geometry:** Intersection geometry is a critical element affecting accessibility and pedestrian comfort crossing streets. Skewed intersections that result in obtuse angles (larger than 90 degrees) allow motorists to make right turns across the pedestrian travel way at higher speeds, while often interfering with pedestrians' ability to see turning traffic.
- **Crosswalks:** Crosswalk markings are used to alert motorists to locations where they should expect pedestrians and to identify a designated crossing location for pedestrians. While it is preferred that crosswalks be marked, a crosswalk may be marked or unmarked since, legally, crosswalks exist at all intersections, unless specifically prohibited.
- **Pavement Condition:** The pavement condition of crosswalks, curb ramps, and corners also affect pedestrian safety and comfort. All pavement areas should be ADA-compliant, using PROWAG recommended standards.
- **Curb Ramps:** ADA-compliant curb ramps ensure the pedestrian network is accessible for all users and creates a more useful network for pedestrians traveling with strollers or carts.



- **Width and Number of Lanes:**

The wider the road that must be crossed, the longer the pedestrian is exposed to the possibility of being hit while crossing. Multiple travel lanes create the possibility of “multiple threat” crashes, where one vehicle yields but blocks the view of another vehicle that then hits the pedestrian.

- **Pedestrian Crossing Islands:**

In locations with longer crossing distances (i.e., more than two lanes) and/or higher vehicle speeds, pedestrian crossing islands benefit pedestrians by providing a refuge. In particular, pedestrian crossing islands have been shown to increase safety for pedestrians crossing multi-lane roadways at un-signalized crossings.



- **Curb Extensions:** Curb extensions (or curb bumpouts) shorten the distance pedestrians must cross, while at the same time increasing their visibility to motorists. By narrowing the curb-to-curb width of a roadway, curb extensions help reduce motor vehicle speeds and improve pedestrian safety.

- **Traffic Signals and Stop Signs:** Traffic controls have a significant impact on a pedestrian’s experience crossing the roadway. Particularly important is the distance between controlled intersections, since few pedestrians will walk very far to reach an official crosswalk.

- **Signal Timing:** It is essential to provide signals that are phased and timed to allow pedestrians of all abilities to cross the roadway, including those who are typically slower (children, senior citizens, people with limited mobility). At the same time, signal delay must be minimized in order to reduce the amount of illegal and unsafe crossing that occurs when pedestrians get impatient waiting for the signal to change.

- **Lighting:** Pedestrians can be adversely affected by low-light conditions. In fact, two-thirds of pedestrian fatalities occur between dusk and dawn. Lighting is important at intersections and mid-block crossings, particularly in locations near transit stops.

- **Signage and Striping:** Signage and striping support other infrastructure and signal elements of the pedestrian’s travel across the roadway. They inform pedestrians of the

crossing location and alert motorists of the presence of pedestrians. Stop bar placement is intended to create appropriate space between motor vehicles stopped at a controlled intersection and pedestrians walking in the crosswalk. Overall, signage and striping should be well-placed and conform to current MUTCD standards.

4.2 Toolbox of Effective Treatments

A toolbox of effective treatments is presented in **Table 4-1** to assist in planning and design of future improvements. Recommended treatments are categorized as follows:¹⁵

- **Signalization** treatments use traffic signals to increase the safety and comfort of pedestrians crossing the street. Example treatments include pedestrian signals, improving signal timing, and modifying signal phasing to provide a Leading Pedestrian Interval (LPI).
- **Geometric** treatments add or adjust existing physical features in the pedestrian network. Example treatments include installing pedestrian refuge and curb extensions.
- **Signs/Markings/Operational** treatments are those that do not fit within the other two categories. Example treatments include pavement markings, lighting, turn restrictions, and enforcement.

Recommended treatments in each of these categories address both “across the roadway” and “along the roadway” needs. Depending on the exact location and desired outcome, a single treatment or a combination of several may be appropriate. In all cases, careful consideration and review of travel patterns for all modes is recommended. This toolbox can be used by the City of Gastonia to program roadway improvement projects and standalone pedestrian projects, as well as influence the private development process.

¹⁵ http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/index.cfm

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Table 4-1: Toolbox of Effective Treatments

	ISSUE	DESCRIPTION	INFRASTRUCTURE ELEMENTS	TYPES OF RECOMMENDATIONS
ACROSS THE ROADWAY	Inadequate or missing crossing facilities	Pedestrians are encouraged to cross the street at intersections, especially where some type of traffic control is present (i.e., stop signs or signals). Where traffic control and crosswalks are missing or in disrepair, the effectiveness of the pedestrian network is diminished. Signals and geometric treatments work in concert with signage and pavement markings at intersections to improve pedestrian safety and comfort. Mid-block crossings also require adequate crossing facilities.	Signalization <ul style="list-style-type: none"> Traffic signals Pedestrian signals Signal timing and sequencing Geometric <ul style="list-style-type: none"> Pedestrian refuge islands Curb extensions Signs/Markings/Operational <ul style="list-style-type: none"> Crosswalks Lighting Signage 	Signalization <ul style="list-style-type: none"> Add pedestrian signals where missing Signalize currently uncontrolled intersections as warranted Install second pedestrian signal in medians at wide crossings Geometric <ul style="list-style-type: none"> Install pedestrian refuge islands Install curb extensions to decrease crossing distance and slow turning vehicles Signs/Markings/Operational <ul style="list-style-type: none"> Add crosswalks or upgrade to high visibility crosswalks to increase motorists' awareness of crossing pedestrians and highlight desired crossing locations Add stop signs as warranted Install Rapid Flash Beacon at select locations
	Insufficient time to cross intersection	Pedestrians may feel that they do not have enough time to cross at signalized intersections. The 2009 Manual on Uniform Traffic Control Devices calls for signal timing to be based on a walking rate of travel of 3.5 feet per second.	Signalization <ul style="list-style-type: none"> Signal timing Pedestrian signals Geometric <ul style="list-style-type: none"> Curb to curb distance, based on intersection geometry Curb extensions Pedestrian refuge islands 	Signalization <ul style="list-style-type: none"> Increase the length of time a walk signal is provided Program a leading pedestrian interval into the signal cycle Geometrics <ul style="list-style-type: none"> Reduce the crossing distance with curb extensions and pedestrian refuge islands Reduce turning radii at intersections to accommodate curb extensions and pedestrian refuge islands where possible
	Wide or diagonal intersections	Regardless of the intersection size or shape, the shortest pedestrian crossing distance typically offers the safest crossing for pedestrians (i.e., reducing the likelihood of a crash with a motor vehicle). Streets that intersect at angles other than 90° create either wide or narrow corners. Wide corners allow motorists to turn without slowing down. When making a right-hand turn, motorists must look back and over the left shoulder – a maneuver that is difficult to execute and diverts a motorist's attention from potential pedestrians in the crossing just ahead. When making left-hand turns, motorist may also fail to observe pedestrians as they move easily through a wide turn.	Signalization <ul style="list-style-type: none"> Pedestrian signals Signal timing and sequencing Geometric <ul style="list-style-type: none"> Intersection geometry Pedestrian refuge islands Signs/Markings/Operational <ul style="list-style-type: none"> Crosswalks Signage 	Signalization <ul style="list-style-type: none"> Program a leading pedestrian interval into the signal cycle Geometric <ul style="list-style-type: none"> Create intersections with 90° angles Install pedestrian refuge islands Consider feasibility of a modern roundabout Signs/Markings/Operational <ul style="list-style-type: none"> Stripe high visibility crosswalks Narrow travel lanes to calm traffic
	Complex intersections	Intersections where three or more streets come together create challenges for all modes. Many of the challenges of wide or diagonal intersections may also be present at complex intersections. Another type of complex intersection is an offset intersection. Pedestrians may find it difficult to travel through complex intersections comfortably and safely. Pedestrians may need to cross more streets and be aware of more motor vehicles approaching from a number of different directions, especially at crossings without traffic controls that are synchronized with the whole intersection.	Signalization <ul style="list-style-type: none"> Signal timing and sequencing Geometric <ul style="list-style-type: none"> Intersection geometry Number of streets to cross Pedestrian refuge islands Signs/Markings/Operational <ul style="list-style-type: none"> Crosswalks Turning restrictions Signage 	Signalization <ul style="list-style-type: none"> If more than two phase signal, allow pedestrians to cross on all phases where crossing is safe Consider separate pedestrian phase for offset intersections Geometric <ul style="list-style-type: none"> Evaluate closing approaches Install medians to channelize traffic and provide pedestrian refuges Signs/Markings/Operational <ul style="list-style-type: none"> Stripe high visibility crosswalks with signage alerting motorists to the presence of pedestrians Change two-way streets to one-way streets to reduce confusion at intersections Prohibit right turn on red
	Excessive auto-orientation	Excessively auto-oriented streets are any streets where the speed or volume of traffic is inappropriate for the adjacent land use(s). These streets often have 4 or more travel lanes, traffic volumes over 10,000 per day, and posted speeds of 35 mph or more. Motorists may travel at speeds greater than the posted speed limit. In general, pedestrians crossing streets with excessive auto-orientation do not feel comfortable or safe because of the width of the crossings and the speed and volume of traffic. Motorists often fail to yield to pedestrians in crosswalks, especially when turning. Signalized intersections providing traffic control for pedestrian crossings often are too far apart, forcing pedestrians to walk excessively long distances to a protected crossing.	Signalization <ul style="list-style-type: none"> Traffic signals Pedestrian signals Geometric <ul style="list-style-type: none"> Pedestrian refuge islands Curb extensions Signs/Markings/Operational <ul style="list-style-type: none"> Crosswalks Turn restrictions Cameras 	Signalization <ul style="list-style-type: none"> Create midblock crossings with appropriate warnings for motorists and protections for pedestrians – may require pedestrian-activated signal Geometric <ul style="list-style-type: none"> Reduce turning radii where possible Install pedestrian refuge islands Signs/Markings/Operational <ul style="list-style-type: none"> Stripe high visibility crosswalks with signage alerting motorists to the presence of pedestrians Install enforcement cameras calibrated for pedestrian safety needs Prohibit right turn on red
ALONG THE ROADWAY	Excessive auto-orientation	Streets with heavy traffic volumes, high speeds, or excessive widths are uncomfortable for pedestrians to walk along, particularly if the sidewalks are directly adjacent to the roadway instead of buffered by a planting strip, parking lane, bike lane, etc. The intrusion of frequent driveways is another problem typical of such streets, forcing pedestrians to be alert for vehicles turning across their path. Where speeds are high and driveways are wide, turning motorists are unlikely to yield to pedestrians.	Geometric <ul style="list-style-type: none"> Sidewalks Buffers Access management Signs/Markings/Operational <ul style="list-style-type: none"> Signage Cameras 	Geometric <ul style="list-style-type: none"> Widen sidewalks Install buffers between sidewalk and travel lanes Use traffic calming treatments Identify appropriate opportunities for access management (i.e., reducing the number, width, and placement of driveways) Signs/Markings/Operational <ul style="list-style-type: none"> Re-strip curb lane to allow parking, if demand exists Install speed cameras and/or permanent speed feedback signs
	Insufficient sidewalk capacity	Missing, undersized, or blocked sidewalks may force pedestrians to walk in the roadway, at great risk to themselves, and disrupting traffic flow.	Geometric <ul style="list-style-type: none"> Sidewalk presence and width Transit stops Signs/Markings/Operational <ul style="list-style-type: none"> Minimum clear width walking zone (i.e., control of encroachments) 	Geometric <ul style="list-style-type: none"> Resolve sidewalk gaps, especially near schools, transit stops, and park entrances Extend the sidewalk at transit stops to provide additional space for transit rider alighting and boarding Signs/Markings/Operational <ul style="list-style-type: none"> Maintain minimum clear width standards through encroachment enforcement program Require sufficient capacity through redevelopment process

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4.3 Pedestrian Demand

While all parts of the City of Gastonia would benefit from improved pedestrian facilities, it is important to understand and recognize that some areas are more attractive to pedestrian travel and some citizens are more dependent on walking as a mode of transportation. To this end, an approach for quantifying potential pedestrian demand was developed in consultation with City staff and the Steering Committee.

A GIS-based demand analysis was developed that incorporates the City's existing demographic data to prioritize areas where more people have limited mobility, in combination with the locations of pedestrian generators such as transit stops, parks, and schools. Locational data was assigned appropriate weights based on the amount of pedestrian activity that each location would likely generate. Variables included destinations, generators, bus stops, greenways, crash locations, demographics, and recommendations from previous plans. **Table 4-2** presents the variables utilized and their weighting factors.

Figure 4-1 provides a “heat map” that blends the variables presented in Table 4-2 to demonstrate potential geographic demand for pedestrian facilities. Areas that appear “hotter” (signified by orange to red colors on the map) tend to have a higher concentration of the various variables utilized, while areas appearing “cooler” (signified by green to yellow colors on the map) have lower concentrations of the same variables. While all areas of the City were considered in the final determination of recommendations, the identified hotspots became focus areas for detailed field analysis because it was understood that these areas have a higher need for pedestrian infrastructure.

Detailed analysis of hotspots was conducted by a team of planning and design professionals. In-field data collection surrounding hotspot locations was performed, including photography, observation of pedestrian behaviors, and documentation of challenges to pedestrian improvement. Additionally, recommendations were formulated in the field and have been included in the network recommendations presented in Section 4.4 of the Plan. A sampling of hotspot characteristics are provided below.

- **Franklin Boulevard/Cox Road Hotspot** – This area is characterized by automobile oriented suburban style shopping centers that are set back from the road with large parking lots along their frontages. A level of pedestrian infrastructure does exist within individual shopping centers, but connectivity between centers and along roadways is lacking. Roads and driveways are wide and do not have proper crosswalks, curb ramps, or pedestrian signalization, making crossing difficult. Topography, open drainage ditches, and a crossing of Duharts Creek make improvements challenging.
- **Downtown Hotspot** – This area is defined by traditional downtown, mixed use development; buildings are built to the lot line and create a street wall in many areas. Street cross sections range from very wide along Franklin Boulevard to quite intimate along Second Avenue. Some streets have been enhanced for pedestrian travel including Main Avenue and Marietta Street. Most intersections are not complete in their accommodating of pedestrians, missing crosswalks, curb ramps, and/or pedestrian signals. Sidewalk gaps exist throughout this area and the speed of vehicular travel is a concern.

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- **Hudson Boulevard/Lyon Street/Lynhaven Street Hotspot** – This area has a complete array of pedestrian-oriented land uses, including a grocery store, Gaston County Health Department, Hunter Huss High School, Southwest Middle School, skilled nursing facility, and several residential areas. Some pedestrian improvements have been made to this intersection, but Hudson Boulevard still presents a challenge to cross because of its wide cross section and the speed of traffic. Sidewalk gaps along Lyon and Lynhaven Streets make connecting through the community difficult.
- **Franklin Boulevard/N. Myrtle School Road Hotspot** – This intersection is particularly challenging to pedestrians. The signal timing does not allow for adequate crossing time, crosswalks and pedestrian signals are not provided on all legs, curb ramps are not ADA-compliant, and motorists are highly aggressive. This area has some of the most sought after pedestrian destinations, including Walmart, Dixie Village Shopping Center, pharmacies, hair salons, and restaurants, but is very inhospitable and dangerous for pedestrian travel.
- **Pinehurst/Cleveland Heights Hotspot** – This area has a strong confluence of pedestrian demand generators, including Simms Park, Highland Tech High, Erwin Center, Highland Rail Trail, skilled nursing facilities, convenience stores, and residential land uses. The existing sidewalk network is robust. Targeted key connections and intersection improvements are needed. N. Chester Street (US 321) is a challenge for this area, as it is a five-lane highway with limited safe crossing opportunities.
- **S. New Hope Road/Redbud Drive Hotspot** – This is another area where a number of pedestrian demand generators exist in close proximity, including a grocery store, pharmacy, Ashbrook High School, convenience stores, fast food restaurants, I.C. Falls Park, residential subdivisions, and several apartment complexes. Both S. New Hope Road and Redbud Drive present crossing challenges, as they have wide cross sections, high-speed vehicular traffic, and very few pedestrian accommodations at their intersection. Sidewalks are incomplete, stopping short of the intersection and large sidewalk gaps exist along all streets in the area.



Highland Rail Trail at North Marietta Street and East Davidson Avenue

Table 4-2: Pedestrian Demand Variables

FACTOR	MEASURE	MEASURE NOTES	BUFFER/ GEOGRAPHY	WEIGHT	WEIGHTING NOTES
Pedestrian Demand	Existing Land Use	High density residential, mixed use commercial, etc.	All properties within specified categories, no buffer	6.67%	-
	Major Destination	Parks, social services, medical facilities, government buildings, etc.	¼ mile	6.67%	-
	Schools and Recreation Centers	All schools (K-12)	¼ mile	13.33%	x2
Multimodal Accommodations	Bus Stops and Greenways	All bus stops and trails/greenways (existing and proposed)	¼ mile	13.33%	High volume bus stops and existing greenways x2
Safety	Pedestrian Crashes (2007-2011)	Crash severity incorporated into weighting	¼ mile	13.33%	Fatal injury, disabling injury, and evident injury x2
Equity	Limited Mobility Population	Density of households with no access to a motor vehicle	Census block group	33.33%	-
		Per capita income			
		Density of residents under 15			
		Density of residents over 65			
Previous Plans and Studies	Franklin Boulevard Corridor Study	-	Include entire corridor	13.33%	Only give credit for being in one plan; Franklin Blvd. Corridor nodes x2
	Loray Small Area Plan	-	Include entire study area		
	Public Realm Design Plan	-	Include primary grid downtown		

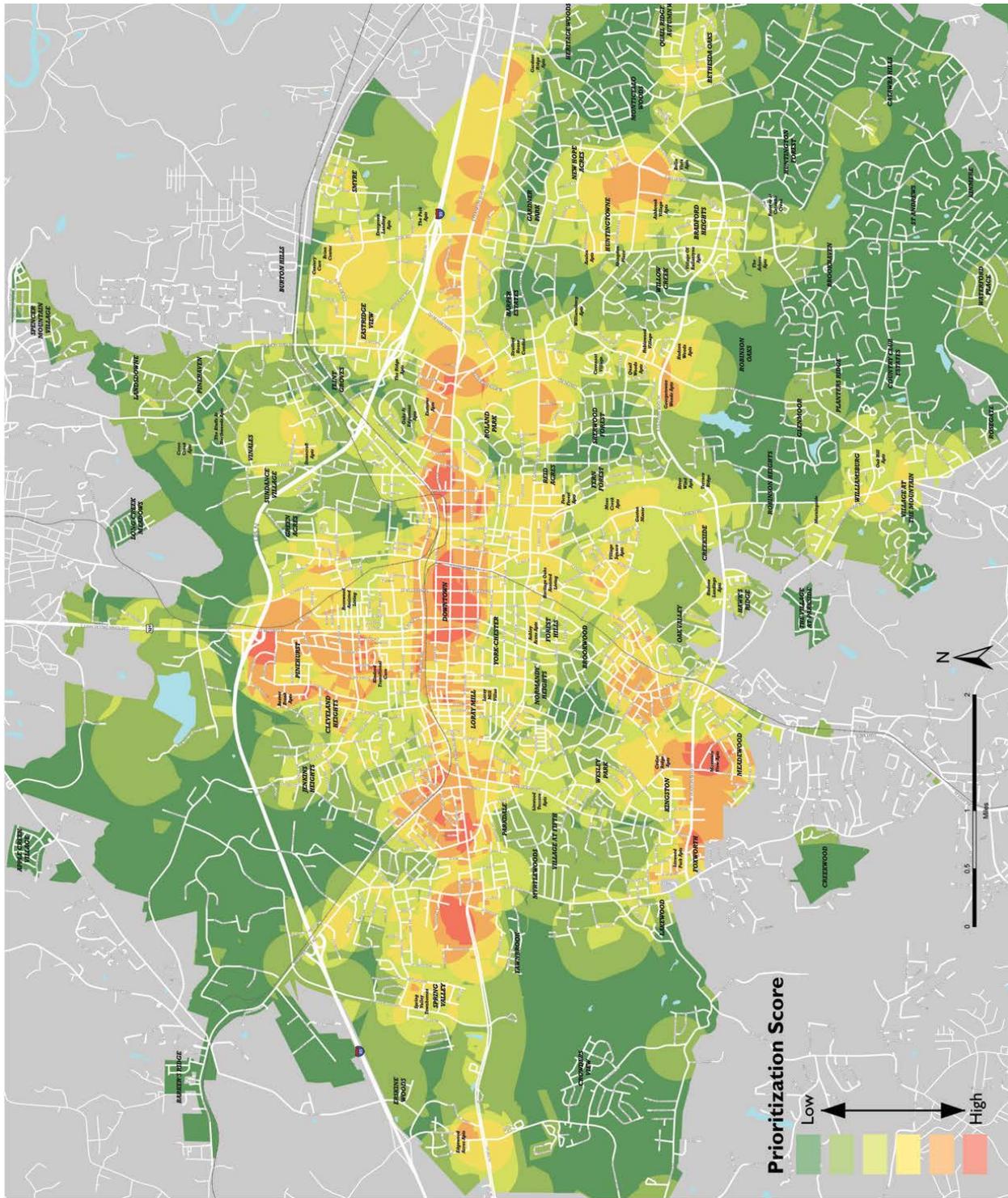


Figure 4-1: Pedestrian Demand Heat Map

4.4 Network Improvements

Recommendations presented in this section are primarily capital improvements to the physical pedestrian network. In some instances, further study is recommended to best define future improvements. The presented recommendations were compiled from a number of sources and vetted through the Steering Committee and the general public.



Pryor Street at West Davidson Avenue near Erwin Center

Project Lists

Specific improvement projects have been identified and categorized into two distinct groups:

- **Spot Improvements**, including intersection improvements, pedestrian bridges, and midblock crossings. Spot Improvements are presented in **Table 4-3** in alphabetical order. Project location and a brief description are included for each project.
- **Corridor Improvements**, including sidewalks, multiuse paths, and greenways. Corridor Improvements are presented in **Table 4-4** in alphabetical order. Project limits and project type are included for each project (see **Appendix D** for additional information).

Map IDs are included for each Spot and Corridor Improvement, corresponding to the maps that are included at the end of this chapter.

To provide a better understanding of the characteristics of the listed improvement projects several representative renderings have been prepared and are presented in **Figure 4-2**, **Figure 4-3**, and **Figure 4-4** on the following pages.

Figure 4-2: Rendering of Spot Improvement #52



S. New Hope Road at Redbud Drive – Existing



S. New Hope Road at Redbud Drive – Rendered improvement

Figure 4-3: Rendering of Corridor Improvement #36



Franklin Boulevard East of Cox Road – Existing



Franklin Boulevard East of Cox Road – Rendered improvement

Figure 4-4: Rendering of Corridor Improvement #70



Modena Street South of Spring Street – Existing



Modena Street South of Spring Street – Rendered improvement

Table 4-3: Spot Improvements

MAP ID	PRIMARY LOCATION	CROSSING	TYPE	NOTES
1	Armstrong Park Rd	New Hope Rd	Intersection	add crosswalks, pedestrian signals, pedestrian refuge
2	Broad St	Main Ave	Intersection	improve crossing conditions, potentially by adding a pedestrian refuge island or pedestrian signal
3	Broad St	Franklin Blvd	Intersection	add pedestrian signals, ADA ramps, repair sidewalks, pedestrian refuge median on franklin needed, implement access management plan
4	Broad St	Long Ave	Intersection	add pedestrian signals, ADA ramps, improve sidewalk/path interface, improve crosswalks
5	Chester St	New Way Dr	Intersection	existing crosswalks at unsignalized intersection; add advanced warning devices (eg. rapid flash beacon)
6	Chester St/ York St	Tenth Ave	Intersection	pedestrian improvements with stormwater management, improve sidewalks, fill sidewalk gaps, add crosswalk with advance warning signage and pavement markings, install raise medians for refuge
7	Cox Rd	Court Dr	Intersection	add pedestrian signals and ADA ramps
8	Cox Rd	I-85 Ramps	Intersection	sidewalk, crosswalks, ADA ramps, pedestrian refuge, pedestrian signals
9	Davidson Ave	Pryor St	Intersection	add crosswalks, ADA ramps, and advanced warning pavement markings
10	Franklin Blvd	Myrtle School Rd	Intersection	add crosswalks, improve pedestrian signals, address ADA issues
11	Franklin Blvd	Chestnut St	Intersection	add pedestrian signals, ADA ramps, high visibility crosswalks, increase signal timing for pedestrians
12	Franklin Blvd	Church St	Intersection	add pedestrian signals, ADA ramps, high visibility crosswalks
13	Franklin Blvd	Linwood Rd	Intersection	add pedestrian signals, add ADA ramps
14	Franklin Blvd	Trenton St	Study	study realignment of intersection to make 4-point intersection with full complement of pedestrian facilities
15	Franklin Blvd	Oakland St	Intersection	crosswalks, ADA ramps, pedestrian signals
16	Franklin Blvd	Marietta St	Intersection	crosswalks, ADA ramps, pedestrian signals
17	Franklin Blvd	South St	Intersection	intersection improvements to enhance pedestrian connectivity, including crosswalks, ADA ramps, pedestrian signals
18	Franklin Blvd	York St	Intersection	crosswalks, ADA ramps, pedestrian signals
19	Franklin Blvd	Church St	Intersection	crosswalks, sidewalks, ADA ramps, pedestrian signals
20	Franklin Blvd	Avon St	Intersection	install ADA ramps, pedestrian signals, crosswalks, replace damaged sidewalks, fill gaps in sidewalk network
21	Franklin Blvd	Chester St	Intersection	add pedestrian signals, replace sidewalks, consider raised pedestrian refuge in median, relocate signage away from sidewalk
22	Franklin Blvd	Cox Rd	Intersection	ADA ramps, crosswalks, sidewalks, curb, gutter, pedestrian refuge, pedestrian signals
23	Franklin Blvd	Second Ave	Intersection	add pedestrian signals, multimodal access management plan, raise painted curb extension, improve bus stop amenities, connect to Walmart sidewalk behind guardrail
24	Franklin Blvd	Firestone St	Intersection	consider unique crosswalk pattern or texture, perhaps throughout Franklin Blvd
25	Franklin Blvd	Lineberger Rd	Intersection	crosswalks, sidewalks, pedestrian refuge, ADA ramps, pedestrian signals
26	Franklin Blvd	Franklin Commons	Intersection	crosswalks, sidewalks, pedestrian refuge, ADA ramps, pedestrian signals
27	Franklin Blvd	Edgewood Rd	Intersection	crosswalk, center median refuge, and pedestrian signals crossing east side of intersection
28	Franklin Blvd	Vance St	Intersection	crosswalks, ADA ramps, pedestrian signals
29	Franklin Blvd	New Hope Rd	Intersection	crosswalks, pedestrian refuge, ADA ramps, pedestrian signals
30	Franklin Blvd	Durharts Creek	Bridge	pedestrian bridge over Durhart Creek on north side of road
31	Franklin Blvd	between Belvedere Ave and Beverly Dr	Crossing	explore midblock crossing and other pedestrian improvements, including crosswalk, pedestrian refuge, ADA ramps, RRFB

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MAP ID	PRIMARY LOCATION	CROSSING	TYPE	NOTES
32	Garrison Blvd	Churchill Dr	Study	study retiming signals to provide more pedestrian crossing time
33	Garrison Blvd	Chestnut St	Intersection	crosswalks, ADA ramps, pedestrian signals
34	Garrison Blvd	Chester St	Intersection	improve pedestrian signals, consider pedestrian refuge in median
35	Garrison Blvd	Trenton St	Intersection	crosswalks, sidewalks, pedestrian refuge, ADA ramps, pedestrian signals
36	Garrison Blvd	Vance St	Intersection	improvements at non-signalized intersection, including crosswalks, sidewalks, ADA ramps, RRFB
37	Gaston Day School Rd	Bradford Heights Rd	Crossing	explore midblock crossing, including crosswalk, ADA ramps, RRFB
38	Hudson Blvd	Robinwood Rd	Intersection	realign/remark crosswalks, add pedestrian signals
39	Hudson Blvd	Lyon St / Lynhaven Dr	Intersection	fill sidewalk gaps, complete ADA improvements, add to existing crosswalks, add to existing pedestrian signals
40	Hudson Blvd	Davis Park Rd	Intersection	add pedestrian signals, add crosswalks, add ADA ramps, provide refuge in raised median
41	Hudson Blvd	Fuller Dr	Intersection	crosswalks, ADA ramps, RRFB
42	Hudson Blvd	York St	Intersection	add sidewalks, add pedestrian signals, address ADA issues, consider pedestrian refuge islands to shorten crossing distance
43	Hudson Blvd	Union Rd	Intersection	evaluate feasibility to right-size intersection, provide refuge, add high visibility crosswalks on all sides, add pedestrian signals
44	Hudson Blvd	Hoffman Rd	Intersection	crosswalks, pedestrian refuge, ADA ramps, pedestrian signal
45	Hudson Blvd/Titman Rd	New Hope Rd	Intersection	crosswalks, ADA ramps, pedestrian signals, pedestrian refuge
46	Lineberger Park	Highland Rail Trail	Study	feasibility study to connect Lineberger Park to Highland Rail Trail
47	Long Ave/Ozark Ave	Modena St	Intersection	add pedestrian signals, ADA ramps to existing island, advance warning in slip lane to calm traffic, consider separate pedestrian signal phase
48	Marietta St	Gaston County Courthouse	Crossing	additional midblock crossing near E Page Ave, implement full advanced warning package at all existing midblock crossings
49	Modena St	Rhyme St	Intersection	reconfigure intersection and remove excess pavement to calm traffic
50	Modena St	Modena St Ext	Intersection	reconfigure intersection and remove excess pavement to calm traffic
51	New Hope	Modena/Montrose	Intersection	complete crosswalks, add pedestrian signal
52	New Hope Rd	Redbud Dr	Intersection	add crosswalks, pedestrian signals, connect sidewalks to intersection, add ADA ramps
53	New Hope Rd	I-85 Ramps	Intersection	crosswalks, sidewalks, ADA ramps, pedestrian refuge, pedestrian signals
54	Radio St	Barkley St	Intersection	crosswalks, ADA ramps
55	Remount Rd	Aberdeen BLvd	Intersection	crosswalks, pedestrian refuge, ADA ramps, pedestrian signals
56	Second Ave	Marietta St	Intersection	add pedestrian signals, add ADA ramps
57	Second Ave	Avon St	Intersection	add sidewalks, repair damaged sidewalks, install ADA ramps, consider crosswalks
58	Second Ave	South St	Study	study feasibility of full reconstruction of intersection and approaches with complete package of pedestrian improvements
59	Second Ave	York St	Intersection	add pedestrian signals
60	Second Ave	Chester St	Intersection	add pedestrian signals, ADA ramps, curb extensions
61	Union Rd	Robinwood Rd	Intersection	add crosswalks, add pedestrian signals, fill sidewalk gaps, consider pedestrian refuge islands, address ADA issues
62	US 321	Jackson Rd/Dale Ave	Intersection	crosswalks, ADA ramps, pedestrian signals

Table 4-4: Corridor Improvements

MAP ID	LOCATION	FROM	TO	LENGTH IN FEET	TYPE
1	Aberdeen Blvd	New Hope Rd	I-85	3,698	Greenway
2	Aberdeen Blvd	I-85	Remount Rd	876	Sidewalk Construction
3	Aberdeen Blvd	Remount Rd	Cox Rd	2,169	Sidewalk Construction
4	Adams Dr	Spencer Ave	Miller St	948	Sidewalk Construction
5	Archie Whiteside Dr	Food Lion Grocery Store	Selwyn Cir	1,503	Sidewalk Construction
6	Armstrong Park Rd	Franklin Blvd	Hudson Blvd	10,003	Study
7	Athenian Dr	Hillcrest Ave	W Garrison Blvd	2,249	Sidewalk Construction
8	Bradley Ave	York St	Cemetery	1,299	Sidewalk Construction
9	Bradley Center Driveway	Modena St; Farewell Dr	Bradley Center Parking Lot	1,136	Sidewalk Construction
10	Broad St	Franklin Blvd	4th Ave	1,710	Bike and Pedestrian Improvements
11	Broad St	Woodhill Dr	Boxwood Ln	1,118	Sidewalk Construction
12	Catawba Creek Greenway Extension	Ferguson Park	Marietta Street	2,717	Greenway
13	Catawba Creek Greenway Southeast Extension (Phase I)	Southeast Armory	Robinwood Rd	8,532	Greenway
14	Catawba Creek Greenway Southeast Extension (Phase II)	Gaston Day School Rd	Timberwood Dr	7,620	Greenway
15	Chestnut St	4th Ave	Garrison Blvd	966	Sidewalk Construction
16	Churchill Dr	Garrison Blvd	Buckingham Ave	4,668	Sidewalk Construction
17	Connection to Bradley Center	N. New Hope Rd	Bradley Center	4,836	Greenway
18	Clay St	Second Ave	Franklin Blvd	720	Sidewalk Construction
19	Cox Rd	I-85	Court Dr	2,609	Sidewalk Construction
20	Cox Rd	I-85	Franklin Blvd	1,707	Sidewalk Construction
21	Craig Ave	Poston Cir	Thomas St	1,513	Sidewalk Construction
22	Davidson Ave	Chester St	Falls St	1,151	Sidewalk Construction
23	Davidson Ave	Marietta St	Hanover St	837	Sidewalk Construction
24	Davidson Ave	Broad St	Avon St	2,059	Sidewalk Construction
25	Davis Park Rd	Hudson Blvd	Richland Ave	1,137	Sidewalk Construction
26	E Hudson Blvd	York Rd	Union Rd	7,370	Sidewalk Construction
27	E Second Ave	S Chestnut St	S Marietta St	3,503	Bike and Pedestrian Improvements
28	Eddie St	Dixon Rd	Dead End	866	Sidewalk Construction
29	Edgewood Rd	Food Lion Grocery Store	Oates Rd	2,988	Sidewalk Construction
30	Elm St	Tenth Ave	Adams Dr	251	Sidewalk Construction
31	Ferguson Park Greenway Connector	Existing Greenway	Ruby Ave	823	Greenway and Sidewalk Construction
32	Fern Forest Drive	Garrison Blvd	Hudson Blvd	723	Greenway Connection

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MAP ID	LOCATION	FROM	TO	LENGTH IN FEET	TYPE
33	Fourth Ave	Vance St	Fifth Ave	177	Sidewalk Construction
34	Franklin Blvd	Broad St	Avon St	1,475	General Pedestrian Improvements
35	Franklin Blvd	Cox Rd	East Club Rd	2,015	Sidewalk Construction
36	Franklin Blvd	Cox Rd	City Limits	5,461	Sidewalk Construction
37	Gardner Park Dr; Pamela St	Downey Pl; Gardner Park Dr	Pamela St; Redbud Dr	6,520	Sidewalk Construction
38	Garrison Blvd	Marietta St	Chestnut St	3,526	Sidewalk Construction
39	Garrison Blvd	New Hope Rd	Burtonwood Dr	1,687	Sidewalk Construction
40	Gaston Day School Rd	Kendrick Rd	Hoffman Rd	3,745	Sidewalk Construction
41	Gaston Day School Rd	Lincoln Lane	Kendrick Rd	6,287	Sidewalk Construction
42	Green Dr	Franklin Blvd	East Club Circle	809	Sidewalk Construction
43	Greenway Connector	Highland Rail Trail	US 321	117	Greenway
44	Greenway Connector	Highland Rail Trail	Cemetery	69	Greenway
45	Henderson St	Lyon St	Southside Ave	1,042	Sidewalk Construction
46	Henderson St	McArver St	Gail Ave	186	Sidewalk Construction
47	Highland Branch Greenway	Rankin Lake Park	Bulb Ave	5,631	Greenway
48	Highland St	Davidson Ave	Church Property	1,042	Sidewalk Construction
49	Hillcrest Ave	Miller St	Athenian Dr	1,187	Sidewalk Construction
50	Hillwood Dr	Hargrove Ave	Dead End	1,699	Sidewalk Construction
51	Holly Dr	Timberlane St	Greenway Access	1,052	Sidewalk Construction
52	Home Trail	Weldon St	Hillcrest Ave	562	Sidewalk Construction
53	Hudson Blvd	Robinwood Rd	Churchill Dr	2,180	Sidewalk Construction
54	Hudson Blvd	Armstrong Park Rd	Redbud Dr	2,567	Sidewalk Construction
55	Hudson Blvd	Windsor Woods Dr	Existing sidewalk at 951 E Hudson Blvd	2,692	Sidewalk Construction
56	Hudson Blvd E	Davis Park Dr	York Rd	8,052	Sidewalk Construction
57	Independence Way	Redbud Dr	Londonderry Dr	257	Sidewalk Construction
58	Jackson Rd	York Rd	Nineteenth Ave	3,546	Sidewalk Construction
59	Jackson St	W Eighth Ave	W Tenth Ave	682	Sidewalk Construction
60	Kendrick Rd	Robinwood Rd	East City Limits	13,519	Sidewalk Construction
61	Laurel Ln	Castlegate St	Robinwood Rd	1,550	Sidewalk Construction
62	Laurel Ln	Churchill Dr	Timberlane St	1,498	Sidewalk Construction
63	Linwood Rd	Garrison Blvd	Spencer Ave	1,657	Multiuse Path
64	Linwood Rd	East Dr	Cloninger Ave	357	Sidewalk Construction
65	Londonderry Dr	Jefferson Ave	Independence Way	1,377	Sidewalk Construction
66	Loray Greenway Connector	Linwood	US 321	7,910	Greenway and Sidewalk Construction
67	Lyon St	Hudson Blvd	2065 Lyon St Frontage	559	Sidewalk Construction
68	May Ave	Webb St	Scruggs St	1,930	Sidewalk Construction
69	McArver St	Mountainview St	Henderson St	537	Sidewalk Construction
70	Modena St	Park Ave	Spring St	2,912	Sidewalk Construction

Gastonia Comprehensive Pedestrian Plan 4 Network Recommendations

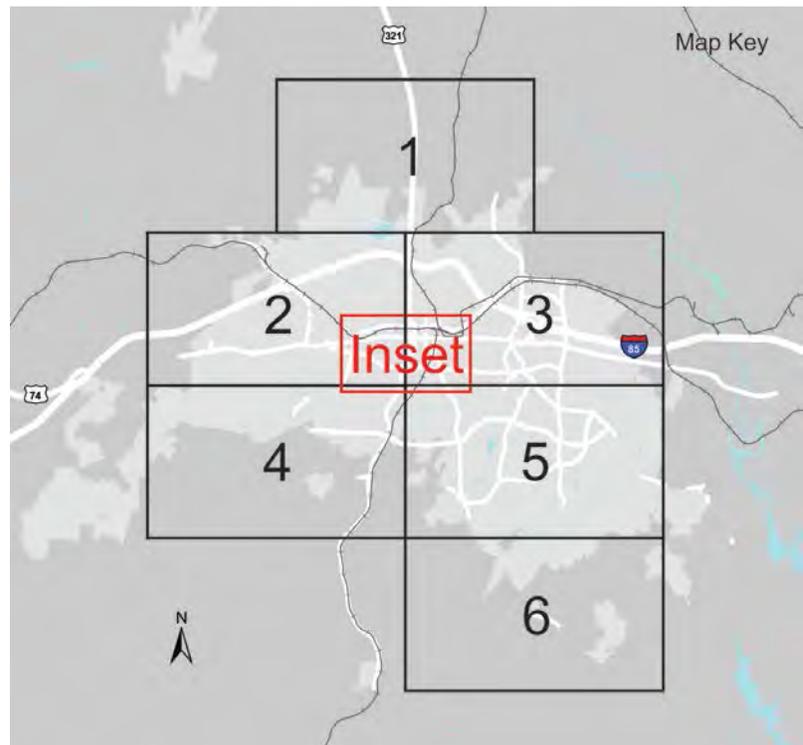
MAP ID	LOCATION	FROM	TO	LENGTH IN FEET	TYPE
71	Modena St	Rhyne St	Bradley Center Driveway	1,634	Sidewalk Construction
72	Modena St	New Hope Rd	Modena St Ext	2,102	Sidewalk Construction
73	Modena St	Modena Ext	Rhyne St	1,511	Sidewalk Construction
74	Montrose Dr	N New Hope Rd	Rhyne Carter Rd	1,611	Sidewalk Construction
75	Morris St	Doffin Ln	Radio St	723	Sidewalk Construction
76	Mountain View St	McArver St	S York St	1,495	Sidewalk Construction
77	N Oakwood St	Hillwood Dr	Davidson Ave	1,744	Sidewalk Construction
78	New Greenway	Linwood Rd	Sherman St	2,297	Greenway
79	New Hope Rd	Franklin Blvd	Ozark Ave	6,756	Sidewalk Construction
80	New Hope Rd	Burtonwood Dr	Franklin Blvd	688	Sidewalk Construction
81	New Hope Rd	Redbud Dr	Hudson Blvd/Titman Rd	2,412	Sidewalk Construction
82	New Hope Rd	Armstrong Park Rd	Redbud Dr	3,508	Sidewalk Construction
83	New Hope Rd	Lee St	Armstrong Park Rd	1,993	Sidewalk Construction
84	New Way Dr	Morris St	US 321	543	Sidewalk Construction
85	Norment Ave	Pryor St	Morris St	532	Sidewalk Construction
86	Old Redbud Dr	Redbud Dr	Franklin Blvd	1,527	Sidewalk Construction
87	Osceola St	Eight Ave	Existing Sidewalk North of Oxford Ave	627	Sidewalk Construction
88	Osceola St	Marietta St	Oxford Ave	3,276	Sidewalk Construction
89	Park Ln	Edgefield Ave	Nineteenth Ave	1,728	Sidewalk Construction
90	Pryor St	Davidson Ave	Norment Ave	551	Sidewalk Construction
91	Pryor St	Pryor St	Sycamore Ave	1,339	Greenway
92	Ramblewood Ln; Sherwood Cir; Pineridge Ln	Pineridge Ln; Forestbrook Dr; Ramblewood Ln	North Dead End; Ramblewood Ln; Union Rd	3,110	Sidewalk Construction
93	Rankin Ave	Boyce St	Chester St	289	Sidewalk Construction
94	Rankin Ave	Pryor St	Highland St	626	Sidewalk Construction
95	Ransom St Greenway Connector	Ransom St	Hillwood Dr	1,335	Greenway
96	Redbud Dr	Hudson Blvd	New Hope Rd	2,632	Sidewalk Construction
97	Remount Rd	New Hope Rd	Aberdeen Rd	2,943	Sidewalk Construction
98	Robinwood Rd	Hudson Blvd	Catawba Creek Greenway	1,013	Sidewalk Construction
99	Ruby Ave	Johnston St	York St	2,665	Sidewalk Construction
100	S Chestnut St	Lineberger Park	E Second Ave	1,722	Bike and Pedestrian Improvements
101	S Marietta St / E Hilltop Dr	Clyde St	E Hudson Blvd	2,534	Sidewalk Construction
102	S. New Hope Rd	Hudson Blvd	Beaty Rd	7,872	Sidewalk Construction
103	Second Ave	Marietta St	Linwood Rd	7,594	Bike and Pedestrian Improvements
104	Second Ave	Chestnut St	S Belvedere Ave	1,419	Bike and Pedestrian Improvements
105	Seigle Ave	Efird St	Davenport St	522	Sidewalk Construction
106	Shannon Greenway Connector	Donegal Ct	Existing greenway	314	Greenway
107	Sherwood Cir	Forestbrook Dr	Kendrick Rd	4,587	Sidewalk Construction

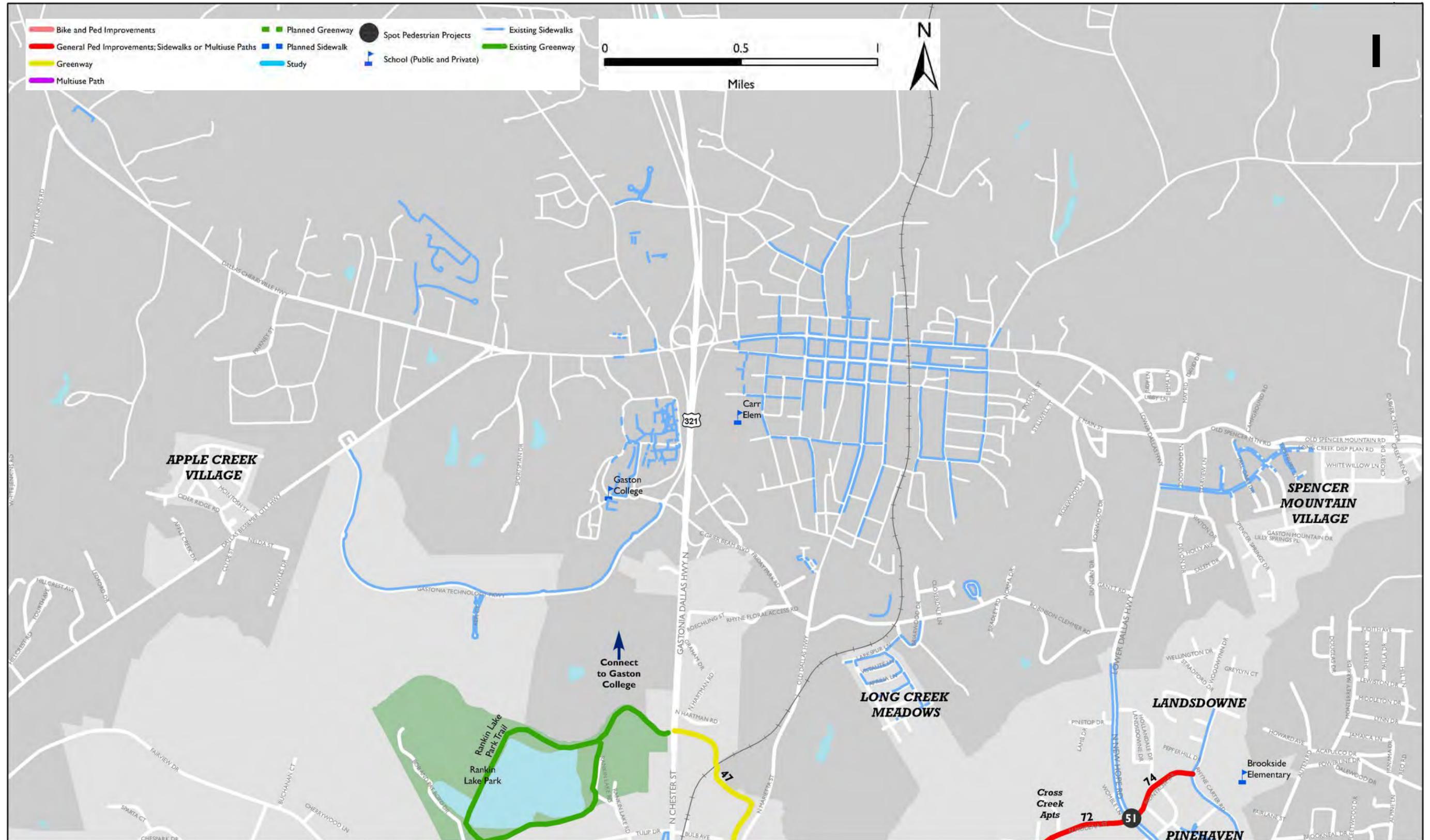
Gastonia Comprehensive Pedestrian Plan

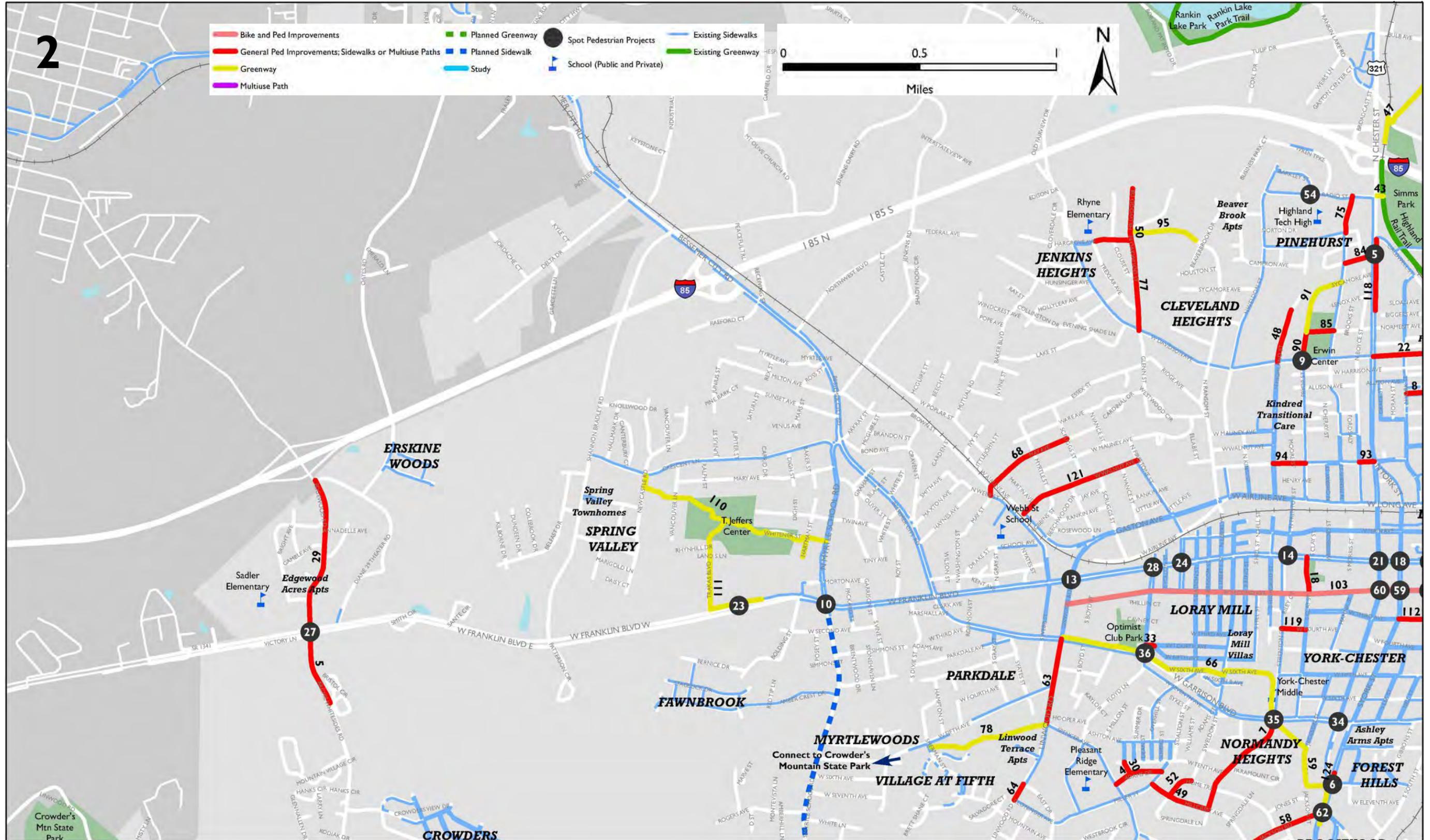
Final Report

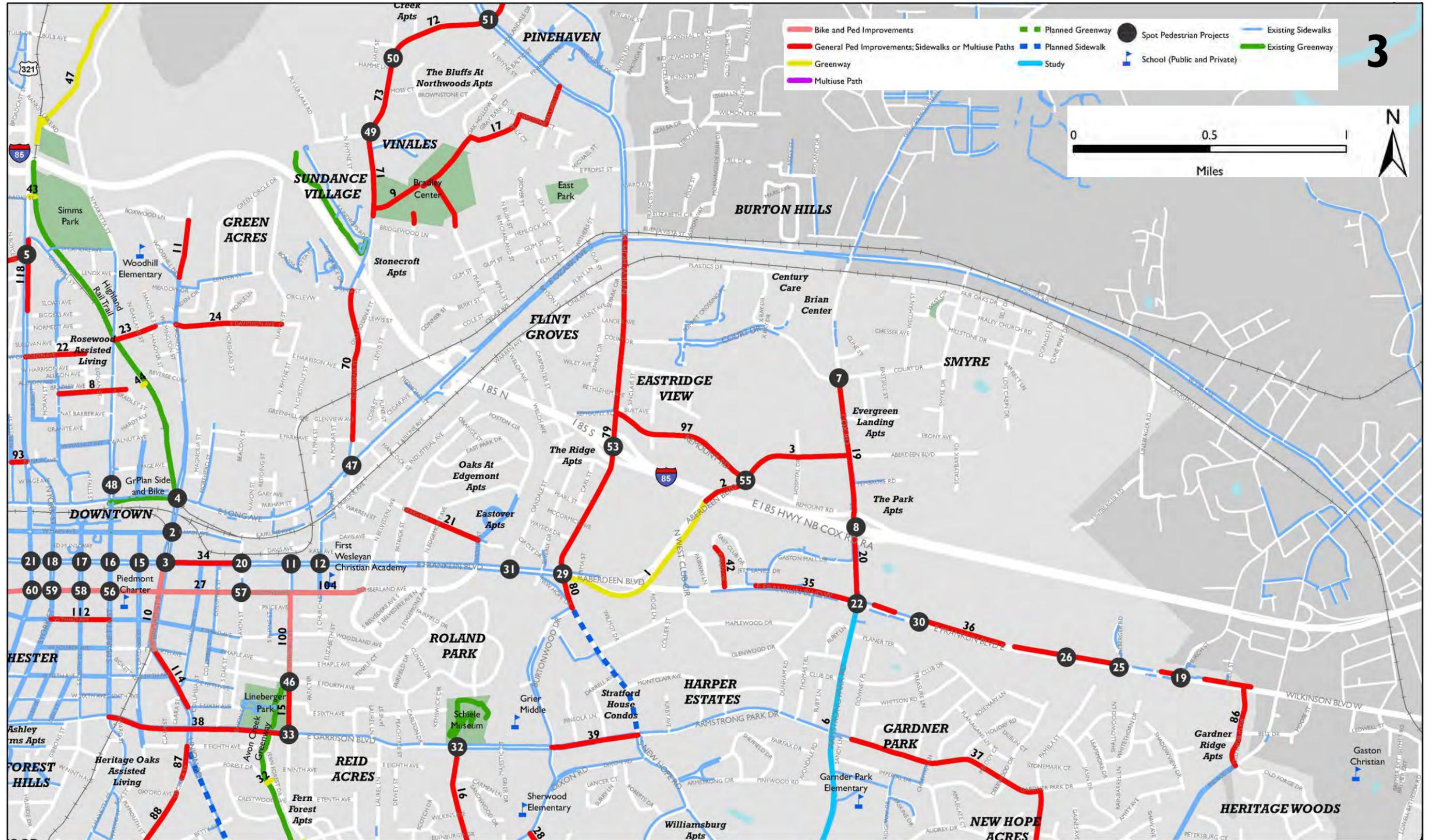
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108	Southwest Middle School	Phillips Center	Southwest Middle School	2,133	Greenway
109	Southwood Dr	S. New Hope Rd	Bellevue Ter	2,277	Sidewalk Construction
110	T Jeffers Greenway	N Myrtle School Rd	Crescent Ln	4,521	Greenway and Sidewalk Construction
111	T Jeffers Greenway Connector	T Jeffers Greenway	Walmart Parcel on W Franklin Blvd	2,865	Greenway and Sidewalk Construction
112	Third Ave	York St	Marietta St	1,140	Sidewalk Construction
113	Timberlane St	Laurel Ln	Holly Dr	861	Sidewalk Construction
114	Union Rd	Fourth Ave	Sixth Ave	1,304	Sidewalk Construction
115	Union Rd	Robinson Elementary School	Frontage of 3611 Union Rd	3,435	Sidewalk Construction
116	Union Rd	Hudson Blvd	Frontage of 2900 Union Rd (ARP Church)	4,563	Sidewalk Construction
117	Union Road	Robinson Elementary School Drive	Frontage of 2956 Union Rd	1,317	Sidewalk Construction
118	US 321	New Way Dr	Caldwell St	1,371	Sidewalk Construction
119	W Fourth Ave	Trenton St	Clay St	473	Sidewalk Construction
120	W Nineteenth Ave	Carolina Ave	Winget St	1,223	Sidewalk Construction
121	Walnut Ave	Airline Ave	Firestone St	2,458	Sidewalk Construction
122	York Rd	Hudson Blvd	Nassau Pl	4,096	Sidewalk Construction
123	York Rd	Hudson Blvd	Ruby Ave	5,157	Sidewalk Construction
124	York St	End of Existing Sidewalk	Frontage of 927 S. York St	166	Sidewalk Construction

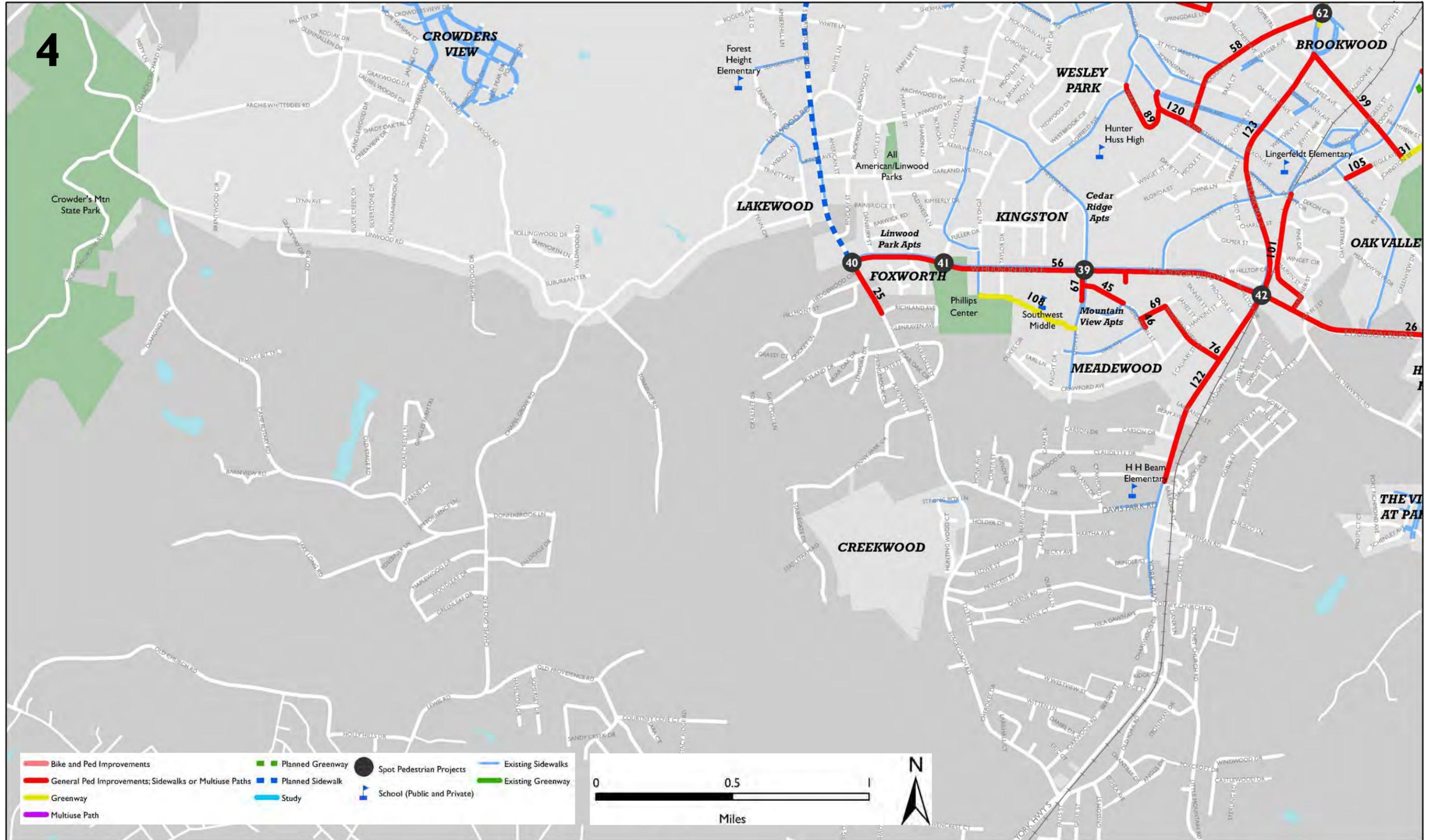
Figure 4-5:
Pedestrian Improvement Maps

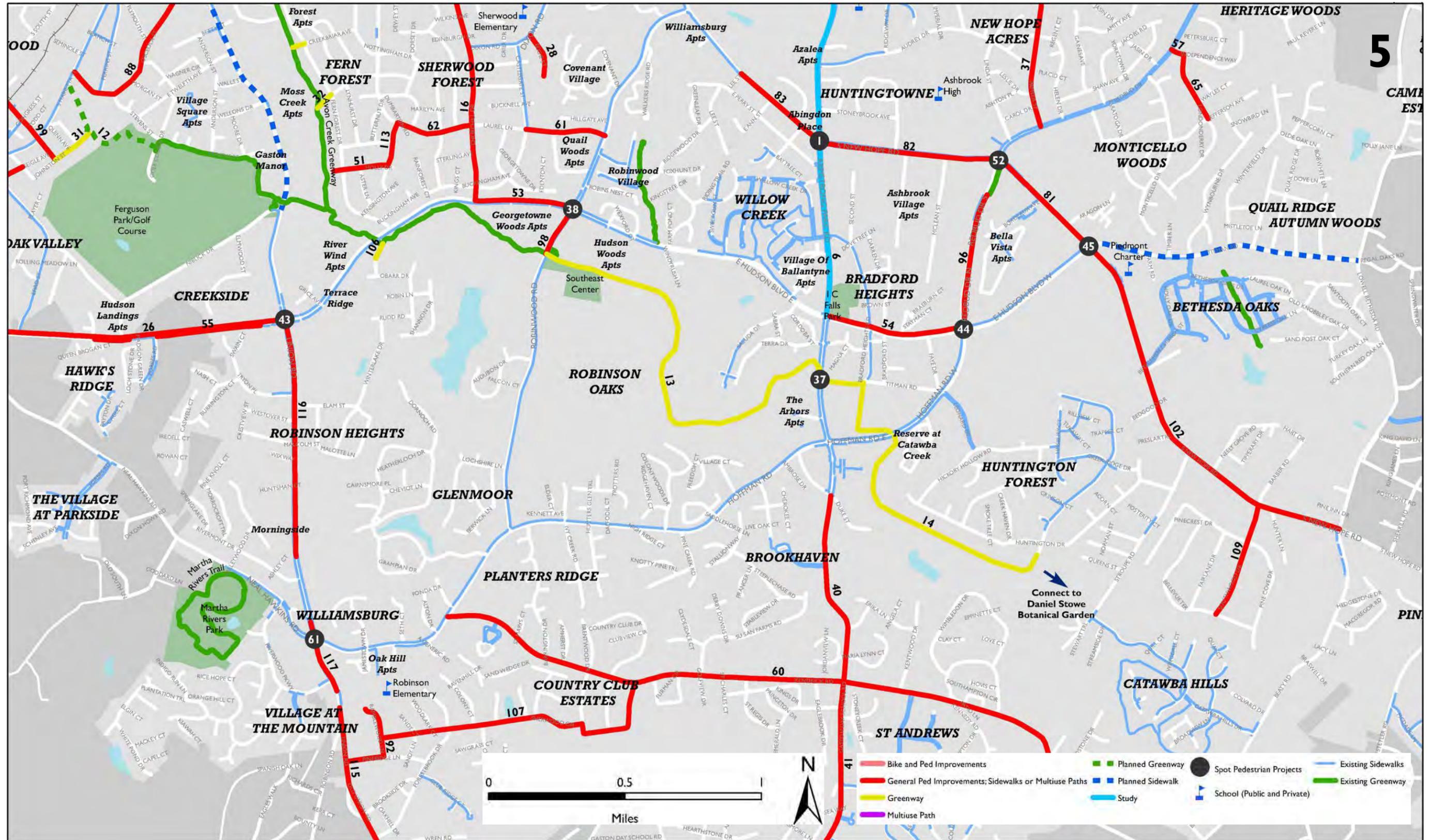




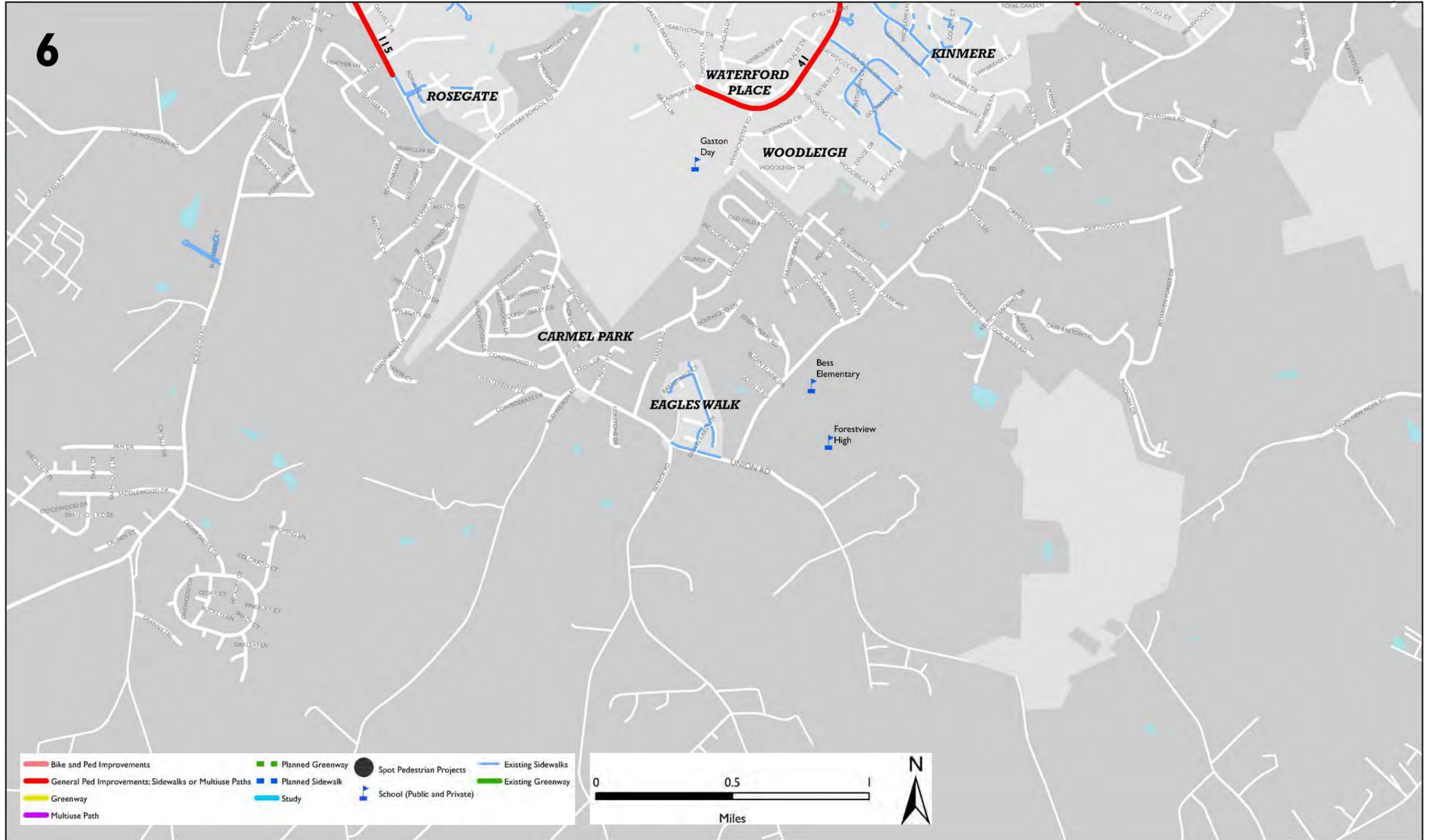


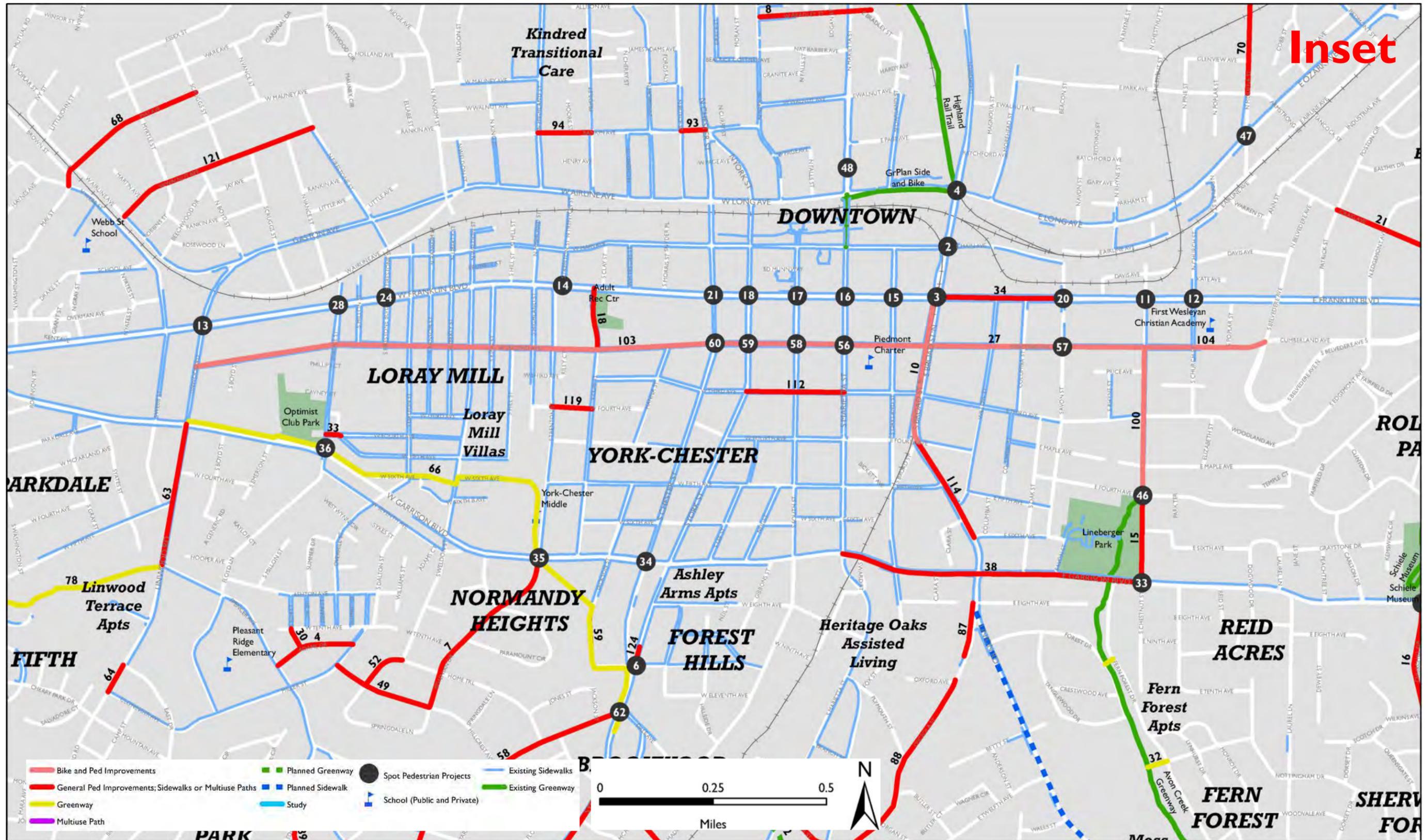






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5 Implementation

To ensure that recommendations made in this document move toward realization, a framework for implementation has been established. This chapter provides:

- Action strategies to move program, policy, and design revision recommendations forward;
- Overview of the project prioritization methodology and how it relates to NCDOT's prioritization process; and
- Defining of project tiers to establish implementation periods.

5.1 Action Strategies

The Gastonia Comprehensive Pedestrian Plan recommends a variety of programs, policies, and design standard revisions. However, without action these recommendations will not be realized. Therefore, a number of action strategies have been developed relevant to these recommendations. These strategies complement the recommendations made earlier in this document and are intended to act as the “spark” to move these recommendations forward. Action strategies are presented in **Table 5-1**.

Table 5-1: Action Strategies

RECOMMENDATION	ACTION STRATEGIES	INVOLVED PARTIES
Global Strategies		
Pedestrian Coordinator or Committee	<ul style="list-style-type: none"> To move recommendations forward, it is essential to have a single staff person or limited committee of staff who are dedicated to the advancement of walkability in Gastonia. Such a position or committee does not have to be fulltime but those involved should set aside formal time to concentrate on pedestrian issues within the City. 	At a minimum: <ul style="list-style-type: none"> Administration Planning Engineering
Establish Local Funding	<ul style="list-style-type: none"> Identify annual funding for pedestrian facilities. This funding would be available and appropriated to a number of areas, including pedestrian counters, speed limit reductions, sidewalk maintenance and repair, retrofits, and new construction. 	<ul style="list-style-type: none"> City Council Administration
Education, Encouragement, Enforcement Strategies		
Update/Maintain Existing GIS Sidewalk Inventory	<ul style="list-style-type: none"> Develop an internal tracking system that alerts GIS personnel to the construction of new sidewalks. Loop GIS personnel into the development process so they are aware when new sidewalks are constructed as part of private development. Coordinate between GIS, planning, and engineering to document sidewalk maintenance requests of citizens. Set goals for conducting a minimum amount of fieldwork annually to capture curb ramps and sidewalk conditions. 	<ul style="list-style-type: none"> Planning GIS Engineering
Web/Mobile Reporting App	<ul style="list-style-type: none"> Coordinate between planning, engineering, GIS, and IT staff to determine the feasibility of developing a web/mobile app for reporting infrastructure issues. Consider beginning with a simple web-based form for reporting and later develop a more complex system incorporating mapping and mobile applications. Once active, work with marketing staff to develop a publicity campaign to encourage use by citizens. Ask police department personnel to report pedestrian infrastructure issues they see while policing the City. 	<ul style="list-style-type: none"> Planning Engineering IT GIS Marketing Police
"Near Miss" Reporting System	<ul style="list-style-type: none"> Coordinate between planning, engineering, GIS, and IT staff to determine the feasibility of developing a near miss reporting system and if it should be integrated with the infrastructure reporting web/mobile app. Consider beginning with a simple web-based form for reporting and later develop a more complex system incorporating mapping and comparison of actual crash data to determine accident-prone areas. Once active, work with marketing staff to develop a publicity campaign to encourage use by citizens. Ask police department personnel to report near misses they see while policing the City. 	<ul style="list-style-type: none"> Planning Engineering IT GIS Marketing Police
Pedestrian Counts	<ul style="list-style-type: none"> Create an implementation plan for the strategic deployment of pedestrian counters as funding is available for purchase and installation. To supplement electronic counts, consider partnering with high schools and colleges to perform limited manual counts at key intersections. Coordinate with NCDOT's emerging pedestrian and bicycle count program. 	<ul style="list-style-type: none"> Planning Engineering NCDOT
Staff Training	<ul style="list-style-type: none"> Establish a schedule for periodic (i.e., every 6-12 months) training of City staff whose jobs affect pedestrian safety (i.e., planning, engineering, parks and recreation, police department, etc.). Training can initially be led by staff that are more knowledgeable of pedestrian issues; as training progresses, consider engaging outside resources, including "Watch For Me NC" training materials (http://www.watchformenc.org/) 	<ul style="list-style-type: none"> Planning Engineering Parks and Recreation Police
Walking Encouragement	<ul style="list-style-type: none"> Establish a walkability advisory committee composed of local walking/running groups and advocates to collaborate with City staff to identify walking routes and develop a draft walking route map (or series of maps). Encourage walking advisory committee to organize community walking and running groups. 	<ul style="list-style-type: none"> Local walking/running groups and advocates Planning GIS

RECOMMENDATION	ACTION STRATEGIES	INVOLVED PARTIES
Media Collaboration	<ul style="list-style-type: none"> Establish a City media action team composed of representatives from marketing, planning, engineering, parks and recreation, and police to work with local media outlets to get the “good word” out about walking in Gastonia. Create a strategic plan for the development of educational pieces for print, television, web, and Government Access Channel distribution. 	<ul style="list-style-type: none"> Administration Marketing Planning Engineering Parks and Recreation Police Local Media
Child Pedestrian Safety Curriculum	<ul style="list-style-type: none"> Work with City Administration to begin a dialogue with Gaston County Schools to discuss the possible implementation of the National Highway Traffic Safety Administration Child Pedestrian Safety Curriculum (http://www.nhtsa.gov/ChildPedestrianSafetyCurriculum) or the “Let’s Go NC!” Program (https://connect.ncdot.gov/projects/BikePed/Pages/LetsGoNC.aspx) 	<ul style="list-style-type: none"> Administration Gaston County Schools
Speed Limit Reductions	<ul style="list-style-type: none"> Perform an initial review of streets to determine those that are obvious candidates for speed limit reduction (e.g., neighborhood streets). Set a goal for annual replacement of speed limit signs commiserate with available funding. 	<ul style="list-style-type: none"> Engineering Streets and Traffic
Maintenance and Improvement Strategies		
Maintenance and Repair Program	<ul style="list-style-type: none"> Establish an annual goal of linear feet of sidewalk to be repaired that is tied directly to the identified funding level. Use information gathered through web/mobile reporting app to determine areas of need. 	<ul style="list-style-type: none"> Engineering Streets and Traffic
ADA Curb Ramp Program	<ul style="list-style-type: none"> Establish an annual goal of number of curb ramps or intersections to be improved that is tied directly to the identified funding level. Use recommended network improvements/prioritization included in this document and information gathered through web/mobile reporting app to determine areas of need. 	<ul style="list-style-type: none"> Engineering Streets and Traffic NCDOT (as needed)
Crosswalk Program	<ul style="list-style-type: none"> Establish an annual goal of number of crosswalks or intersections to be improved that is tied directly to the identified funding level. Use recommended network improvements/prioritization included in this document and information gathered through web/mobile reporting app to determine areas of need. 	<ul style="list-style-type: none"> Engineering Streets and Traffic NCDOT (as needed)
Pedestrian Countdown Signal Program	<ul style="list-style-type: none"> Establish an annual goal of number of signals to be installed that is tied directly to the identified funding level. Use recommended network improvements/prioritization included in this document to determine areas of need. 	<ul style="list-style-type: none"> Engineering Streets and Traffic NCDOT (as needed)
Pedestrian Refuge Program	<ul style="list-style-type: none"> Use recommended network improvements/prioritization included in this document to determine areas of need. If needed, study traffic implications of pedestrian refuge. Seek opportunities for implementation either through resurfacing projects or other planned roadway improvements. 	<ul style="list-style-type: none"> Engineering Streets and Traffic NCDOT (as needed)
Midblock Crossings and Street “Right Sizing”	<ul style="list-style-type: none"> Use recommended network improvements/prioritization included in this document to determine areas of need. If needed, study traffic implications of midblock crossings and right sizing. Coordinate and implement through crosswalk program, resurfacing projects, and/or other planned roadway improvements. 	<ul style="list-style-type: none"> Engineering Streets and Traffic NCDOT (as needed)
Transit Access Program	<ul style="list-style-type: none"> Work with Gastonia Transit to determine areas of need and craft a strategic transit access plan for the improvement of pedestrian facilities that directly access transit. Program identified improvements into the maintenance/repair, curb ramp, crosswalk, pedestrian signal, and pedestrian refuge programs listed above. 	<ul style="list-style-type: none"> Transit Planning Engineering Streets and Traffic NCDOT (as needed)

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RECOMMENDATION	ACTION STRATEGIES	INVOLVED PARTIES
Design Standards and Policies Strategies		
Complete Streets Policy	<ul style="list-style-type: none"> • Research complete streets policies to determine desired elements. • Coordinate across City departments to ensure policy is appropriate and enforceable. • Present draft complete streets policy to Planning Commission and City Council for consideration and adoption. 	<ul style="list-style-type: none"> • Planning • Engineering • Streets and Traffic • Administration • Planning Commission • City Council
Design Details	<ul style="list-style-type: none"> • Modify design details as recommended in Appendix C. • Present to Planning Commission and City Council for adoption. 	<ul style="list-style-type: none"> • Engineering • Administration • Planning Commission • City Council
Unified Development Ordinance	<ul style="list-style-type: none"> • Determine appropriate amendments to the Unified Development Ordinance in accordance with recommendations made in Table 3.3 regarding access management, crosswalk requirements, and pedestrian signals. • Present to Planning Commission and City Council for consideration and adoption. 	<ul style="list-style-type: none"> • Planning • Engineering • Administration • Planning Commission • City Council
NCDOT Resolution	<ul style="list-style-type: none"> • Research similar resolutions adopted by other jurisdictions that request pedestrian accommodations be funded on all non-interstate NCDOT road and bridge projects to determine desired elements for Gastonia resolution. • Present draft NCDOT resolution to City Council for consideration and adoption. 	<ul style="list-style-type: none"> • Planning • Engineering • Streets and Traffic • Administration • City Council

5.2 Project Prioritization

The Gastonia Comprehensive Pedestrian Plan is envisioned to have a 10-year horizon; however, with over 180 projects identified, it is clear that not all projects can be implemented within the 10-year period of the Plan. Additionally, it is important to gain some understanding of which projects will provide the most benefit. For these reasons, a prioritization methodology was devised to score projects comparatively. This methodology blended the NCDOT prioritization process and understanding of local needs.

NCDOT Prioritization Process

To direct the expenditure of available transportation construction dollars, the North Carolina General Assembly created the Strategic Transportation Investment Act (STI) which was signed into law on June 26, 2013. STI required NCDOT to develop a prioritization process to rank highway and non-highway projects.

Through an iterative and inclusive process, NCDOT develop what is now known as Prioritization 3.0 (P3.0). P3.0 provides unique scoring criteria for each type of transportation project, including highway, aviation, bicycle and pedestrian, ferry, public transit, and rail. The scoring criteria specific to bicycle and pedestrian projects is presented in **Table 5-2**.

Table 5-2: NCDOT Bicycle and Pedestrian Scoring

FUNDING CATEGORY	QUANTITATIVE DATA	LOCAL INPUT	
		Division Rank	MPO/RPO Rank
Division Needs	Access = 10%	25%	25%
	Constructability = 5%		
	Safety = 15%		
	Demand Density = 10%		
	Benefit/Cost = 10%		
TOTAL (Quantitative Data + Local Input) = 100%			

Available funding is distributed to three categories, in order of significance: 1) Statewide Mobility (40%); 2) Regional Impact (30%); and 3) Division Need (30%). Bicycle and pedestrian projects, unless incidental to a larger roadway project, are eligible for funding through the Division Need category. NCDOT is geographically broken into 14 divisions and all bicycle and pedestrian projects must compete for funding within their own geographic division. Gastonia is part of Division 12, which includes Gaston, Cleveland, Lincoln, Catawba, Alexander, and Iredell Counties. All projects in Division 12 compete for the same funds and are scored on the 0-100 point scale shown in Table 5-2. Each MPO and Rural Planning Organization (RPO) may submit 20 bicycle/pedestrian projects per funding cycle to compete within their respective district. Eligibility requirements include that projects must be identified in a local bicycle and/or pedestrian plan, have a minimum \$100,000 cost, and a local funding match of 20% of the project cost.

Gastonia Comprehensive Pedestrian Plan Prioritization Methodology

Because the City of Gastonia anticipates working with the Gaston-Cleveland-Lincoln MPO to seek NCDOT funding for some of the projects recommended in the Plan, it is important that the prioritization methodology developed have some relationship to the NCDOT prioritization process. For this reason, the methodology reflects the NCDOT P3.0 but also considers local factors through the use of unique components with each variable.

A number of variables were used to “score” each recommended project (i.e., raw scores by variable are included in **Appendix E**). The variables utilized are primarily quantitative in nature and do not account for qualitative input such as perceived connectivity, public preference, and observed need. The potential use of such qualitative variables was presented during the final public meeting and received positive feedback. Therefore, it is recommended that the City consider incorporating some level of qualitative criteria as the project prioritization process is refined in future years.

The prioritization methodology is presented in **Table 5-3**.

Table 5-3: Prioritization Methodology

VARIABLES	SCORING	NOTES
Access (miles to destination)	Max Score 10	
0.0 to 0.25 mile	10	
0.26 to 0.5 mile	7.5	
0.51 to 1.0 mile	5	
1.01 miles or more	2.5	
Constructability	Max Score 5	
No Construction Constraints	5	
Environmental or Right-of-Way Constraint	3	
Environmental and Right-of-Way Constraint	1	
Safety	Max Score 15	
Crashes	5	Project with a serious crash within 0.25 mile
Speed Limit	5	Project with an adjacent road which has a posted speed limit over 30 mph
Separated Facility	5	Project that is separated from the road (e.g., greenway, side path, etc.)
Encourages Speed Reduction	5	Project with traffic calming measures
Demand/Density	Max Score 10	
Persons per square mile – 2,251 or more	10	Using Census Block Groups
Persons per square mile – 1,501 to 2,250	7.5	2008 population per square mile
Persons per square mile – 751 to 1,500	5	
Persons per square mile – 0 to 750	2.5	
Benefit/Cost	Max Score 10	
<i>Spot Project Breakdown</i>		
93.750001 – 454.454545	10	Cost of projects were Normalized = Cost of Project/Highest Project Cost
62.500001 – 93.750000	7.5	Benefit score = (Demand/Density + Access)/Normalized Project Cost
30.487806 – 62.500000	5	
12.500000 – 30.487805	2.5	
<i>Corridor Project Breakdown</i>		
588.50001 – 5885.000000	10	Cost of projects were Normalized = Cost of Project/Highest Project Cost
272.927537 – 588.500000	7.5	Benefit score = (Demand/Density + Access)/Normalized Project Cost
87.509295 – 272.927536	5	
0.000000 – 87.509294	2.5	

5.3 Project Tiers

Table 5-5 and **Table 5-6** located at the end of this section present all network improvement recommendations as detailed in Chapter 4 along with opinions of probable cost, prioritization scoring, and suggested tiers for implementation. To provide some level of qualitative consideration, tiers are not direct rankings based solely on score, but rather balance scores with public comments regarding connectivity, preference, and need. In constructing the tiers logical scoring breakpoints were considered to provide a manageable number and cost of projects in the two tiers that comprise the 10-year horizon of the Plan. As individual projects are evaluated in greater detail, it is highly recommended that additional public input be received to assist in determining comprehensive need and desire for the project.

Improvements have been categorized by the following tiers:

- **Tier I (0-5 years)** – These are projects that scored well (i.e., 35 points or higher for Spot Improvements; 40 points or higher for Corridor Improvements) or received moderate scores (i.e., 30 points or higher) coupled with strong public support. They are critical to establishing early momentum, resolving key issues, and setting the foundation for the success of future improvements.
- **Tier II (5-10 years)** – These are projects that received moderate scores (i.e., 30-34.5 points for Spot Improvements; 35-39.5 points for Corridor Improvements) or were middling in scoring (20-29.5 points) coupled with strong public support. Planning, building of support, and identification of funding sources should begin now for these projects so they are on track for implementation within this period.
- **Tier III (10+ years)** – These are projects that received lower scores (less than 30 points for Spot Improvements; less than 35 points for Corridor Improvements) and did not receive significant public support. While identified as part of the planning process that has produced this document, these projects fall outside the 10-year horizon of the Plan. However, these projects do address pedestrian needs within the City of Gastonia and should be implemented in the long-term. Once earlier-tiered projects have been realized, further analysis and reevaluation should be conducted. Additionally, as these projects receive greater attention, public support may increase.

Although the above tiers have been established, these designations are for planning purposes only; improvements should be implemented as soon as opportunities arise. For example, if circumstances provide an opportunity to complete a Tier II project two years after the Plan is adopted, the improvement should be made, regardless of its designation as “Tier II.”

Capital Cost Breakdowns

The breakdowns of capital cost by tier and project type are outlined in **Table 5-4**.¹⁶ In years 0-5 nearly \$1.8 million dollars is needed to implement Tier I; when broken down over the five-year period this averages \$360,000 per year. Tier II projects account for roughly \$5.0 million, but have the benefit of more time for planning, securing of funding, and building public and political support in the 5-10 year period. Tier III projects total at \$27.3 million and are outside the implementation scope of the Plan.

Table 5-4: Capital Cost by Tier and Project Type

PROJECT TYPE	TIER I (0-5 years)	TIER II (5-10 years)	TIER III (10+ years)	TOTAL
Spot Improvements	\$692,000	\$1,590,000	\$1,476,000	\$3,758,000
Corridor Improvements	\$1,084,500	\$3,458,880	\$25,783,405	\$30,326,785
TOTAL	\$1,776,500	\$5,048,880	\$27,259,405	\$34,084,785

¹⁶ Unit costs utilized in calculating individual project cost estimates are included in Appendix G, while a listing of potential funding sources is included in Appendix H.

Table 5-5: Spot Improvement Tiers

MAP ID	TIER	SCORE (max 50)	PRIMARY LOCATION	CROSSING	TYPE	COST ESTIMATE
1	III	27.5	Armstrong Park Rd	New Hope Rd	Intersection	\$82,000
2	I	32.5	Broad St	Main Ave	Intersection	\$57,000
3	I	32.5	Broad St	Franklin Blvd	Intersection	\$93,000
4	II	30	Broad St	Long Ave	Intersection	\$71,000
5	I	35	Chester St	New Way Dr	Intersection	\$61,000
6	II	30	Chester St/ York St	Tenth Ave	Intersection	\$76,000
7	II	30	Cox Rd	Court Dr	Intersection	\$25,000
8	III	20	Cox Rd	I-85 Ramps	Intersection	\$80,000
9	I	42.5	Davidson Ave	Pryor St	Intersection	\$15,000
10	I	37.5	Franklin Blvd	Myrtle School Rd	Intersection	\$40,000
11	I	37.5	Franklin Blvd	Chestnut St	Intersection	\$40,000
12	I	37.5	Franklin Blvd	Church St	Intersection	\$40,000
13	I	35	Franklin Blvd	Linwood Rd	Intersection	\$25,000
14	II	32.5	Franklin Blvd	Trenton St	Study	\$15,000
15	II	32.5	Franklin Blvd	Oakland St	Intersection	\$40,000
16	II	32.5	Franklin Blvd	Marietta St	Intersection	\$40,000
17	II	32.5	Franklin Blvd	South St	Intersection	\$40,000
18	II	32.5	Franklin Blvd	York St	Intersection	\$40,000
19	II	30	Franklin Blvd	Church St	Intersection	\$47,000
20	II	30	Franklin Blvd	Avon St	Intersection	\$70,000
21	II	30	Franklin Blvd	Chester St	Intersection	\$106,000
22	II	30	Franklin Blvd	Cox Rd	Intersection	\$130,000
23	II	30	Franklin Blvd	Second Ave	Intersection	\$140,000
24	III	27.5	Franklin Blvd	Firestone St	Intersection	\$28,000
25	III	27.5	Franklin Blvd	Lineberger Rd	Intersection	\$55,000
26	III	27.5	Franklin Blvd	Franklin Commons	Intersection	\$55,000
27	III	25	Franklin Blvd	Edgewood Rd	Intersection	\$25,000
28	III	25	Franklin Blvd	Vance St	Intersection	\$40,000
29	III	25	Franklin Blvd	New Hope Rd	Intersection	\$49,000
30	III	23	Franklin Blvd	Durharts Creek	Bridge	\$250,000
31	III	20	Franklin Blvd	between Belvedere Ave and Beverly Dr	Crossing	\$77,000
32	I	37.5	Garrison Blvd	Churchill Dr	Study	\$10,000
33	I	35	Garrison Blvd	Chestnut St	Intersection	\$38,000
34	II	32.5	Garrison Blvd	Chester St	Intersection	\$27,000
35*	I	32.5	Garrison Blvd	Trenton St	Intersection	\$56,000
36	III	27.5	Garrison Blvd	Vance St	Intersection	\$94,000
37	III	25	Gaston Day School Rd	Bradford Heights Rd	Crossing	\$68,000

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MAP ID	TIER	SCORE (max 50)	PRIMARY LOCATION	CROSSING	TYPE	COST ESTIMATE
38	I	35	Hudson Blvd	Robinwood Rd	Intersection	\$31,000
39	I	35	Hudson Blvd	Lyon St / Lynhaven Dr	Intersection	\$39,000
40	II	30	Hudson Blvd	Davis Park Rd	Intersection	\$40,000
41	II	30	Hudson Blvd	Fuller Dr	Intersection	\$94,000
42*	II	25	Hudson Blvd	York St	Intersection	\$66,000
43*	II	22.5	Hudson Blvd	Union Rd	Intersection	\$105,000
44*	II	20	Hudson Blvd	Hoffman Rd	Intersection	\$84,000
45	III	22.5	Hudson Blvd/Titman Rd	New Hope Rd	Intersection	\$121,000
46	I	40	Lineberger Park	Highland Rail Trail	Study	\$20,000
47*	II	25	Long Ave/Ozark Ave	Modena St	Intersection	\$65,000
48	II	30	Marietta St	Gaston County Courthouse	Crossing	\$158,000
49	III	17.5	Modena St	Rhyne St	Intersection	\$41,000
50	III	17.5	Modena St	Modena St Ext	Intersection	\$48,000
51	III	27.5	New Hope	Modena/Montrose	Intersection	\$31,000
52	II	30	New Hope Rd	Redbud Dr	Intersection	\$70,000
53	III	25	New Hope Rd	I-85 Ramps	Intersection	\$76,000
54	I	40	Radio St	Barkley St	Intersection	\$11,000
55	III	17.5	Remount Rd	Aberdeen BLvd	Intesection	\$87,000
56	I	40	Second Ave	Marietta St	Intersection	\$25,000
57	I	40	Second Ave	Avon St	Intersection	\$59,000
58	I	35	Second Ave	South St	Study	\$15,000
59	I	35	Second Ave	York St	Intersection	\$17,000
60	III	27.5	Second Ave	Chester St	Intersection	\$73,000
61	III	20	Union Rd	Robinwood Rd	Intersection	\$96,000
62	II	30	US 321	Jackson Rd/Dale Ave	Intersection	\$41,000

*Strong public support expressed by public meeting participants

Table 5-6: Corridor Improvement Tiers

MAP ID	TIER	SCORE (max 50)	LOCATION	FROM	TO	TYPE	COST ESTIMATE
1	III	30	Aberdeen Blvd	New Hope Rd	I-85	Greenway	\$1,010,000
2	III	25	Aberdeen Blvd	I-85	Remount Rd	Sidewalk Construction	\$61,000
3	III	20.5	Aberdeen Blvd	Remount Rd	Cox Rd	Sidewalk Construction	\$167,000
4	III	30	Adams Dr	Spencer Ave	Miller St	Sidewalk Construction	\$140,740
5	III	22.5	Archie Whiteside Dr	Food Lion Grocery Store	Selwyn Cir	Sidewalk Construction	\$115,000
6	II	35.5	Armstrong Park Rd	Franklin Blvd	Hudson Blvd	Study	\$15,000
7	III	25.5	Athenian Dr	Hillcrest Ave	W Garrison Blvd	Sidewalk Construction	\$293,845

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MAP ID	TIER	SCORE (max 50)	LOCATION	FROM	TO	TYPE	COST ESTIMATE
8	II	35.5	Bradley Ave	York St	Cemetery	Sidewalk Construction	\$103,000
9	III	20.5	Bradley Center Driveway	Modena St; Bridgewood Ln	Bradley Center Parking Lot	Sidewalk Construction	\$91,000
10	I	50	Broad St	Franklin Blvd	4th Ave	Bike and Pedestrian Improvements	\$17,000
11	III	30	Broad St	Woodhill Dr	Boxwood Ln	Sidewalk Construction	\$52,000
12	III	27.5	Catawba Creek Greenway Extension	Ferguson Park	Marietta Street	Greenway	\$410,000
13	III	26	Catawba Creek Greenway Southeast Extension (Phase I)	Southeast Armory	Robinwood Rd	Greenway	\$2,354,000
14	III	26	Catawba Creek Greenway Southeast Extension (Phase II)	Gaston Day School Rd	Timberwood Dr	Greenway	\$2,106,000
15	I	40	Chestnut St	4th Ave	Garrison Blvd	Sidewalk Construction	\$148,000
16	III	30.5	Churchill Dr	Garrison Blvd	Buckingham Ave	Sidewalk Construction	\$266,000
17	III	25	Connection to Bradley Center	N. New Hope Rd	Bradley Center	Greenway	\$1,111,000
18	III	32.5	Clay St	Second Ave	Franklin Blvd	Sidewalk Construction	\$30,000
19	III	27.5	Cox Rd	I-85	Court Dr	Sidewalk Construction	\$80,000
20	III	25.5	Cox Rd	I-85	Franklin Blvd	Sidewalk Construction	\$87,000
21	II	35	Craig Ave	Poston Cir	Thomas St	Sidewalk Construction	\$115,000
22	II	37.5	Davidson Ave	Chester St	Falls St	Sidewalk Construction	\$75,000
23*	II	27.5	Davidson Ave	Marietta St	Hanover St	Sidewalk Construction	\$124,000
24	III	23	Davidson Ave	Broad St	Avon St	Sidewalk Construction	\$151,000
25	III	27.5	Davis Park Rd	Hudson Blvd	Richland Ave	Sidewalk Construction	\$78,000
26	III	25.5	E Hudson Blvd	York Rd	Union Rd	Sidewalk Construction	\$296,000
27	I	40	E Second Ave	S Chestnut Stq	S Marietta St	Bike and Pedestrian Improvements	\$172,500
28	III	27.5	Eddie St	Dixon Rd	Dead End	Sidewalk Construction	\$48,000
29	III	20	Edgewood Rd	Food Lion Grocery Store	Oates Rd	Sidewalk Construction	\$252,000
30	II	35	Elm St	Tenth Ave	Adams Dr	Sidewalk Construction	\$37,820
31	III	26	Ferguson Park Greenway Connector	Existing Greenway	Ruby Ave	Greenway and Sidewalk Construction	\$232,000
32	II	38	Fern Forest Drive	Garrison Blvd	Hudson Blvd	Greenway Connection	\$178,000
33	III	32.5	Fourth Ave	Vance St	Fifth Ave	Sidewalk Construction	\$6,000
34	III	32.5	Franklin Blvd	Broad St	Avon St	General Pedestrian Improvements	\$449,000
35	III	30.5	Franklin Blvd	Cox Rd	East Club Rd	Sidewalk Construction	\$117,000
36	III	25.5	Franklin Blvd	Cox Rd	City Limits	Sidewalk Construction	\$329,000

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37*	II	28	Gardner Park Dr; Pamela St	Downey Pl; Gardner Park Dr	Pamela St; Redbud Dr	Sidewalk Construction	\$105,300
38	III	33	Garrison Blvd	Marietta St	Chestnut St	Sidewalk Construction	\$203,000
39	III	27.5	Garrison Blvd	New Hope Rd	Burtonwood Dr	Sidewalk Construction	\$120,000
40	III	20.5	Gaston Day School Rd	Kendrick Rd	Hoffman Rd	Sidewalk Construction	\$269,000
41	III	18	Gaston Day School Rd	Lincoln Lane	Kendrick Rd	Sidewalk Construction	\$315,000
42	III	32.5	Green Dr	Franklin Blvd	East Club Circle	Sidewalk Construction	\$40,000
43	I	43	Greenway Connector	Highland Rail Trail	US 321	Greenway	\$34,000
44	III	32.5	Greenway Connector	Highland Rail Trail	Cemetery	Greenway	\$28,000
45	II	35.5	Henderson St	Lyon St	Southside Ave	Sidewalk Construction	\$63,000
46	II	35	Henderson St	McArver St	Gail Ave	Sidewalk Construction	\$17,000
47	III	18.5	Highland Branch Greenway	Rankin Lake Park	Bulb Ave	Greenway	\$400,000
48	II	37.5	Highland St	Davidson Ave	Church Property	Sidewalk Construction	\$60,000
49	III	30	Hillcrest Ave	Miller St	Athenian Dr	Sidewalk Construction	\$67,440
50	III	17.5	Hillwood Dr	Hargrove Ave	Dead End	Sidewalk Construction	\$195,000
51	II	35	Holly Dr	Timberlane St	Greenway Access	Sidewalk Construction	\$57,000
52	III	32.5	Home Trail	Weldon St	Hillcrest Ave	Sidewalk Construction	\$36,000
53	III	28	Hudson Blvd	Robinwood Rd	Churchill Dr	Sidewalk Construction	\$139,000
54	III	28	Hudson Blvd	Armstrong Park Rd	Redbud Dr	Sidewalk Construction	\$198,000
55	III	23	Hudson Blvd	Windsor Woods Dr	Existing sidewalk at 951 E Hudson Blvd	Sidewalk Construction	\$203,000
56	III	30.5	Hudson Blvd E	Davis Park Dr	York Rd	Sidewalk Construction	\$538,000
57	III	32.5	Independence Way	Redbud Dr	Londonderry Dr	Sidewalk Construction	\$10,000
58	III	27.5	Jackson Rd	York Rd	Nineteenth Ave	Sidewalk Construction	\$273,000
59	III	30	Jackson St	W Eighth Ave	W Tenth Ave	Sidewalk Construction	\$52,000
60	III	18	Kendrick Rd	Robinwood Rd	East City Limits	Sidewalk Construction	\$1,008,000
61*	I	33	Laurel Ln	Castlegate St	Robinwood Rd	Sidewalk Construction	\$48,000
62	III	28	Laurel Ln	Churchill Dr	Timberlane St	Sidewalk Construction	\$84,000
63	I	40	Linwood Rd	Garrison Blvd	Spencer Ave	Multiuse Path	\$125,000
64	III	27.5	Linwood Rd	East Dr	Cloninger Ave	Sidewalk Construction	\$48,980
65	III	25.5	Londonderry Dr	Jefferson Ave	Independence Way	Sidewalk Construction	\$58,000
66	III	25.5	Loray Greenway Connector	Linwood	US 321	Greenway and Sidewalk Construction	\$2,189,000
67	II	37.5	Lyon St	Hudson Blvd	2065 Lyon St Frontage	Sidewalk Construction	\$52,000

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MAP ID	TIER	SCORE (max 50)	LOCATION	FROM	TO	TYPE	COST ESTIMATE
68	II	37.5	May Ave	Webb St	Scruggs St	Sidewalk Construction	\$153,000
69	II	35	McArver St	Mountainview St	Henderson St	Sidewalk Construction	\$41,000
70*	II	25	Modena St	Park Ave	Spring St	Sidewalk Construction	\$450,000
71*	II	20	Modena St	Rhyne St	Bradley Center Driveway	Sidewalk Construction	\$116,000
72	III	18	Modena St	New Hope Rd	Modena St Ext	Sidewalk Construction	\$450,000
73	III	17.5	Modena St	Modena Ext	Rhyne St	Sidewalk Construction	\$377,000
74	III	25	Montrose Dr	N New Hope Rd	Rhyne Carter Rd	Sidewalk Construction	\$86,400
75	I	40	Morris St	Doffin Ln	Radio St	Sidewalk Construction	\$52,000
76	III	30	Mountain View St	McArver St	S York St	Sidewalk Construction	\$381,000
77	III	30	N Oakwood St	Hillwood Dr	Davidson Ave	Sidewalk Construction	\$77,000
78	III	21	New Greenway	Linwood Rd	Sherman St	Greenway	\$638,000
79	II	35	New Hope Rd	Franklin Blvd	Ozark Ave	Sidewalk Construction	\$272,000
80	III	32.5	New Hope Rd	Burtonwood Dr	Franklin Blvd	Sidewalk Construction	\$28,000
81	III	32.5	New Hope Rd	Redbud Dr	Hudson Blvd/Titman Rd	Sidewalk Construction	\$80,000
82	III	32.5	New Hope Rd	Armstrong Park Rd	Redbud Dr	Sidewalk Construction	\$234,000
83	III	30	New Hope Rd	Lee St	Armstrong Park Rd	Sidewalk Construction	\$78,000
84	I	40	New Way Dr	Morris St	US 321	Sidewalk Construction	\$44,000
85	I	42.5	Norment Ave	Pryor St	Morris St	Sidewalk Construction	\$42,000
86	III	25	Old Redbud Dr	Redbud Dr	Franklin Blvd	Sidewalk Construction	\$87,000
87	II	37.5	Osceola St	Eight Ave	Existing Sidewalk North of Oxford Ave	Sidewalk Construction	\$49,000
88	III	30.5	Osceola St	Marietta St	Oxford Ave	Sidewalk Construction	\$247,000
89	III	30	Park Ln	Edgefield Ave	Nineteenth Ave	Sidewalk Construction	\$325,000
90	I	42.5	Pryor St	Davidson Ave	Norment Ave	Sidewalk Construction	\$38,000
91	I	40.5	Pryor St	Pryor St	Sycamore Ave	Greenway	\$281,000
92	III	28	Ramblewood Ln; Sherwood Cir; Pineridge Ln	Pineridge Ln; Forestbrook Dr; Ramblewood Ln	North Dead End; Ramblewood Ln; Union Rd	Sidewalk Construction	\$30,000
93	I	40	Rankin Ave	Boyce St	Chester St	Sidewalk Construction	\$15,000
94	II	35	Rankin Ave	Pryor St	Highland St	Sidewalk Construction	\$24,000
95	III	28.5	Ransom St Greenway Connector	Ransom St	Hillwood Dr	Greenway	\$77,000
96	II	37.5	Redbud Dr	Hudson Blvd	New Hope Rd	Sidewalk Construction	\$234,000
97	III	25	Remount Rd	New Hope Rd	Aberdeen Rd	Sidewalk Construction	\$225,000

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MAP ID	TIER	SCORE (max 50)	LOCATION	FROM	TO	TYPE	COST ESTIMATE
98	II	35	Robinwood Rd	Hudson Blvd	Catawba Creek Greenway	Sidewalk Construction	\$78,000
99	III	25.5	Ruby Ave	Johnston St	York St	Sidewalk Construction	\$652,000
100	II	38	S Chestnut St	Lineberger Park	E Second Ave	Bike and Pedestrian Improvements	\$172,500
101	III	30	S Marietta St / E Hilltop Dr	Clyde St	E Hudson Blvd	Sidewalk Construction	\$420,000
102*	II	25	S. New Hope Rd	Hudson Blvd	Beaty Rd	Sidewalk Construction	\$469,000
103	I	43	Second Ave	Marietta St	Linwood Rd	Bike and Pedestrian Improvements	\$68,000
104	III	33	Second Ave	Chestnut St	S Belvedere Ave	Bike and Pedestrian Improvements	\$246,000
105	II	37.5	Seigle Ave	Efird St	Davenport St	Sidewalk Construction	\$30,000
106	III	32.5	Shannon Greenway Connector	Donegal Ct	Existing greenway	Greenway	\$84,000
107	III	18	Sherwood Cir	Forestbrook Dr	Kendrick Rd	Sidewalk Construction	\$336,000
108	III	33.5	Southwest Middle School	Phillips Center	Southwest Middle School	Greenway	\$420,000
109	III	22.5	Southwood Dr	S. New Hope Rd	Bellevue Ter	Sidewalk Construction	\$163,000
110	III	33.5	T Jeffers Greenway	N Myrtle School Rd	Crescent Ln	Greenway and Sidewalk Construction	\$760,000
111	III	31	T Jeffers Greenway Connector	T Jeffers Greenway	Walmart Parcel on W Franklin Blvd	Greenway and Sidewalk Construction	\$803,000
112	II	38	Third Ave	York St	Marietta St	Sidewalk Construction	\$43,260
113	III	30	Timberlane St	Laurel Ln	Holly Dr	Sidewalk Construction	\$50,000
114	III	32.5	Union Rd	Fourth Ave	Sixth Ave	Sidewalk Construction	\$72,000
115	III	22.5	Union Rd	Robinson Elementary School	Frontage of 3611 Union Rd	Sidewalk Construction	\$269,000
116	III	22.5	Union Rd	Hudson Blvd	Frontage of 2900 Union Rd (ARP Church)	Sidewalk Construction	\$344,000
117	III	27.5	Union Road	Robinson Elementary School Drive	Frontage of 2956 Union Rd	Sidewalk Construction	\$50,000
118	II	38	US 321	New Way Dr	Caldwell St	Sidewalk Construction	\$117,000
119	III	33	W Fourth Ave	Trenton St	Clay St	Sidewalk Construction	\$30,000
120	III	32.5	W Nineteenth Ave	Carolina Ave	Winget St	Sidewalk Construction	\$72,000
121	II	35	Walnut Ave	Airline Ave	Firestone St	Sidewalk Construction	\$198,000
122	III	32.5	York Rd	Hudson Blvd	Nassau Pl	Sidewalk Construction	\$308,000
123	III	32.5	York Rd	Hudson Blvd	Ruby Ave	Sidewalk Construction	\$477,000
124	II	35	York St	End of Existing Sidewalk	Frontage of 927 S. York St	Sidewalk Construction	\$10,000

*Strong public support expressed by public meeting participants

5.4 NCDOT Complete Streets and Incidental Pedestrian Improvements

The North Carolina Board of Transportation adopted a Complete Streets policy in July 2009. The policy directs the North Carolina Department of Transportation (NCDOT) to consider and incorporate all modes of transportation when building new projects or making improvements to existing transportation infrastructure. Under the new policy, NCDOT will collaborate with cities, towns, and communities during the planning and design phases of new streets or improvement projects. Together, they will decide how to provide the transportation options needed to serve the community and complement the context of the area.

Gastonia, like many municipalities in North Carolina, has aggressively annexed areas around its periphery as development has occurred in these places. As a result, approximately 80 percent of the area within the City Limits is now considered urbanized by the U.S. Census Bureau. The remaining rural area is primarily comprised of parkland, waste facilities, underdeveloped industrial parks, and satellite annexations for proposed mixed-use developments. As new residential and industrial development continues, the City will likely become more urbanized.

As an urbanized community, the City of Gastonia experiences high demand for pedestrian facilities. Since the intended scope of this plan is limited to ten years, not all facilities needed or desired by the community are included in this plan. However, as NCDOT constructs new transportation projects or improves existing transportation infrastructure in the City, there is great potential for the construction of incidental pedestrian facilities. The City will continue to advocate for NCDOT to include pedestrian facilities in the construction of new transportation projects or in improvements to existing transportation infrastructure.

Figure 5-1 shows potential roadway improvement projects that impact the City of Gastonia that may be funded by the State and designed and constructed beyond 2015, excluding expressway/interstate projects. These projects are identified in the Gaston-Cleveland-Lincoln MPO's 2040 Metropolitan Transportation Plan (MTP), but it is important to note that not all projects are funded and that the MTP is updated every four years. Still, these highlighted projects illustrate areas where incidental improvements to the pedestrian network in Gastonia are expected to eventually occur, given effective communication with NCDOT.

Figure 5-1 also shows all state-maintained roadways and bridges to illustrate other areas where incidental pedestrian improvements could occur as NCDOT improves existing transportation infrastructure.

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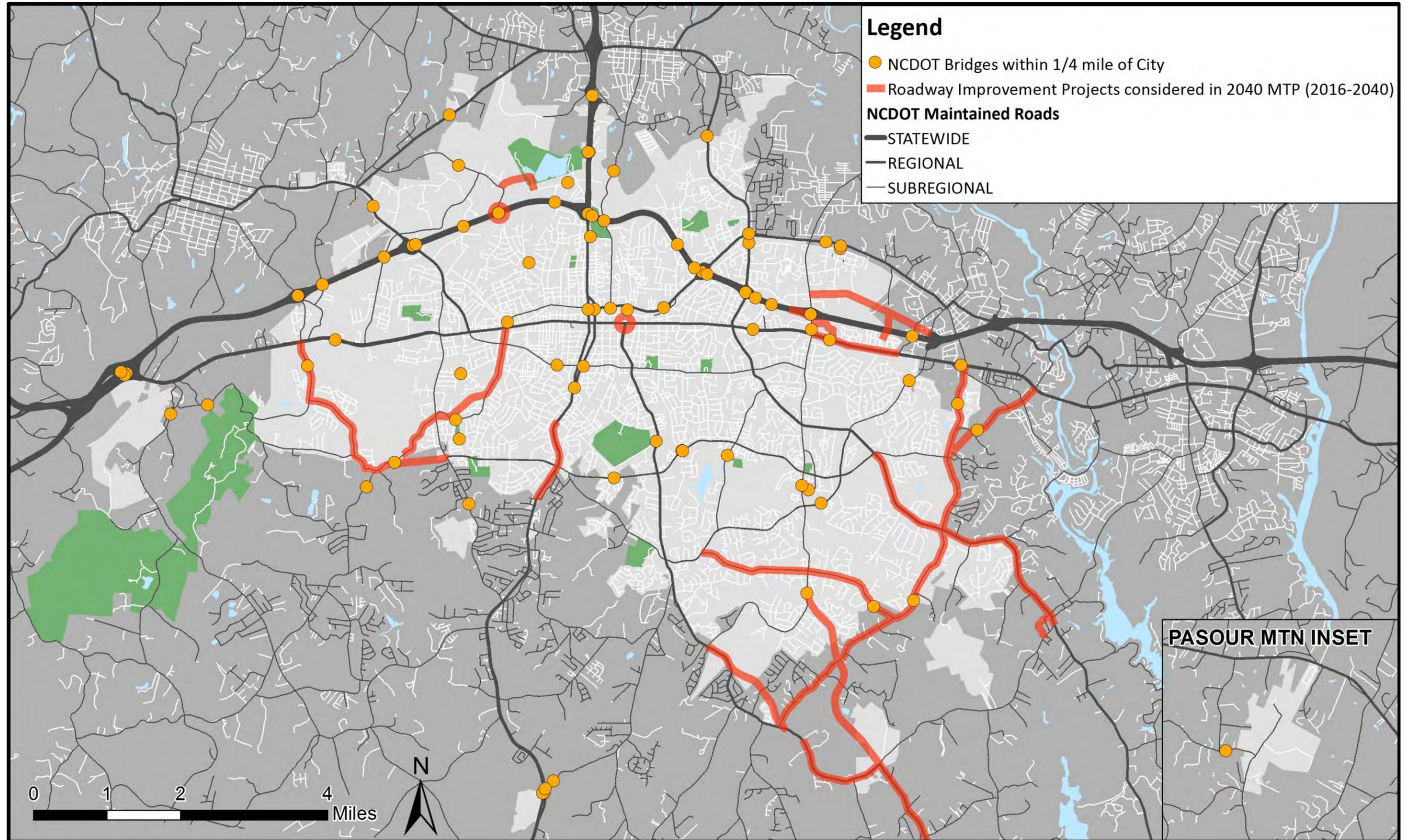


Figure 5-1: Potential Opportunities for NCDOT Incidental Improvements to the Pedestrian Network

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APPENDIX A

Online Map Welcome Survey Responses

Gastonia Comprehensive Pedestrian Plan
Online Map Welcome Survey Responses

Respondent	Where do you live?	Where do you work?	What is your primary mode of transportation?	How often do you walk in Gastonia?	For what reasons do you typically walk?				
					To/from school	Shopping/ errands	To/from work	Exercise	Other
1	In Gastonia	In Gastonia	Driving	A few times a week				X	
2	Outside of Gastonia	In Gastonia	Driving	A few times a year				X	
3	Outside of Gastonia	Outside of Gastonia	Biking	Every day		X			
4	In Gastonia	In Gastonia	Driving	A few times a week				X	
5	Outside of Gastonia	In Gastonia	Driving	A few times a week		X		X	
6	In Gastonia	In Gastonia	Driving	Every day				X	
7	In Gastonia	Outside of Gastonia	Driving	A few times a week		X		X	
8	In Gastonia	Outside of Gastonia	Driving	A few times a week		X			
9	In Gastonia	In Gastonia	Driving	Never				X	
10	In Gastonia	In Gastonia	Driving	A few times a week				X	
11	Outside of Gastonia	In Gastonia	Driving	Every day				X	X
12	In Gastonia	In Gastonia	Walking	Every day	X	X	X	X	
13	Outside of Gastonia	In Gastonia	Driving	A few times a week				X	
14	In Gastonia	In Gastonia	Driving	Every day		X		X	
15	Outside of Gastonia	Outside of Gastonia	Driving	A few times a year					X
16	In Gastonia	In Gastonia	Driving	A few times a week				X	
17	In Gastonia	Outside of Gastonia	Driving	A few times a year				X	
18	In Gastonia	In Gastonia	Driving	A few times a year				X	
19	In Gastonia	In Gastonia	Driving	A few times a week		X		X	
20	In Gastonia	In Gastonia	Driving	A few times a week		X		X	
21	In Gastonia	In Gastonia	Driving	Every day				X	
22	In Gastonia	In Gastonia	Driving	A few times a year				X	X
23	In Gastonia	In Gastonia	Driving	Every day		X	X	X	X
24	Outside of Gastonia	Outside of Gastonia	Walking	A few times a week		X		X	
25	Outside of Gastonia	Outside of Gastonia	Driving	A few times a month		X			
26	In Gastonia	In Gastonia	Driving	Every day				X	X
27	Outside of Gastonia	In Gastonia	Driving	A few times a year		X		X	
28	Outside of Gastonia	In Gastonia	Driving	A few times a week		X		X	
29	In Gastonia	In Gastonia	Driving	A few times a week	X	X		X	X
30	In Gastonia	In Gastonia	Driving	A few times a year					X
31	In Gastonia	Outside of Gastonia	Driving	A few times a week				X	X
32	In Gastonia	In Gastonia	Driving	Every day				X	
33	In Gastonia	In Gastonia	Driving	A few times a week				X	
34	In Gastonia	In Gastonia	Driving	A few times a week				X	
35	In Gastonia	In Gastonia	Driving	A few times a week				X	
36	In Gastonia	In Gastonia	Driving	A few times a year		X			
37	In Gastonia	In Gastonia	Driving	Every day				X	X
38	Outside of Gastonia	In Gastonia	Driving	A few times a month		X	X	X	
39	In Gastonia	In Gastonia	Driving	Every day	X			X	
40	In Gastonia	In Gastonia	Driving	Every day				X	
41	Outside of Gastonia	In Gastonia	Driving	A few times a month				X	
42	Outside of Gastonia	In Gastonia	Driving	A few times a week		X		X	
43	In Gastonia	In Gastonia	Driving	A few times a week		X			
44	In Gastonia	In Gastonia	Driving	Every day				X	
45	In Gastonia	In Gastonia	Driving	A few times a week				X	
46	In Gastonia	In Gastonia	Driving	A few times a week				X	
47	In Gastonia	Outside of Gastonia	Driving	Every day				X	
48	In Gastonia	In Gastonia	Driving	Every day				X	
49	Outside of Gastonia	Outside of Gastonia	Walking	Never			X		
50	In Gastonia	In Gastonia	Driving	A few times a week		X	X	X	X
51	In Gastonia	In Gastonia	Driving	Every day				X	
52	In Gastonia	In Gastonia	Driving	A few times a week				X	
53	Outside of Gastonia	In Gastonia	Driving	A few times a week		X		X	
54	In Gastonia	In Gastonia	Driving	Every day				X	
55	In Gastonia	In Gastonia	Driving	A few times a year				X	
56	Outside of Gastonia	In Gastonia	Driving	A few times a week				X	
57	In Gastonia	Outside of Gastonia	Driving	Every day				X	
58	In Gastonia	In Gastonia	Driving	A few times a week				X	
59	In Gastonia	Outside of Gastonia	Driving	A few times a year				X	
60	In Gastonia	In Gastonia	Driving	A few times a week	X			X	
61	Outside of Gastonia	In Gastonia	Driving	Every day					X
62	In Gastonia	In Gastonia	Driving	A few times a week				X	
63	In Gastonia	In Gastonia	Walking	Every day		X			
64	In Gastonia	In Gastonia	Driving	Every day				X	
65	In Gastonia	In Gastonia	Driving	A few times a year			X	X	
66	In Gastonia	Outside of Gastonia	Driving	A few times a month				X	
67	Outside of Gastonia	In Gastonia	Driving	A few times a month				X	
68	In Gastonia	In Gastonia	Driving	A few times a month		X		X	X
69	Outside of Gastonia	In Gastonia	Driving	Every day			X		X
70	Outside of Gastonia	In Gastonia	Driving	A few times a week		X			
71	In Gastonia	In Gastonia	Driving	A few times a month				X	
72	In Gastonia	In Gastonia	Driving	A few times a week		X		X	
73	Outside of Gastonia	In Gastonia	Driving	Every day				X	
74	In Gastonia	In Gastonia	Driving	Every day				X	
75	In Gastonia	In Gastonia	Driving	A few times a month		X		X	

APPENDIX B
Previous Planning Documents

1.1 Planning Context

A number of planning documents have been developed at the local, regional, and state levels in recent years that have applicability to or influence on the Gastonia Comprehensive Pedestrian Plan. Content was reviewed to gain understanding of previous recommendations and determine methods for building on previous efforts. Portions of each document that have bearing on pedestrian travel in Gastonia are summarized in the sections below.

Keep It Movin' Gaston: Gaston Area MPO 2035 Long Range Transportation Plan

- A number of the overarching goals for the plan speak to the importance of improving pedestrian transportation: ensuring choice of mode, providing transportation that's sensitive to the natural environment, making sure that equitable transportation options are available in low-income and minority neighborhoods, and supporting land use policies that shift the region toward a system of activity centers connected by transit corridors.
- The general Streets and Highways objective includes the direction to "Incorporate sidewalks and bicycle facilities into the design of roadways to accommodate and encourage pedestrian and bicycle travel," and the Pedestrian and Bicycle Transportation objective outlines a number of ways in which these modes should be integrated into projects. The objective also addresses increasing safety through public awareness programs.
- Design guidelines for pedestrian facilities are included.
- A well-connected street network is pointed to as a way to decrease transportation-related greenhouse gas emissions, and though pedestrian travel is not specifically mentioned, a connected street network would also benefit pedestrian travel.

Downtown Streetscape & Public Realm Plan

- The vision of this plan supports a pedestrian-friendly environment seeking to "ensure that there are safe, convenient and inviting facilities for pedestrian movement such as sidewalks and crosswalks."
- Pedestrians will be drawn to downtown as a multimodal transit hub, by greenspace, and because downtown will serve as a "social and cultural heart of the community."
- Pedestrian safety enhancements include realigned crosswalks, crosswalk paving and striping, pedestrian signals heads with leading pedestrian intervals, and green buffers between the sidewalk or plaza and the roadway.
- Specific facility recommendations are made for intersections and corridors on Chester Street, York Street, South Street, Marietta Street, Oakland Street, Broad Street, Long Avenue, Main Avenue, Franklin Boulevard, and Second Avenue. Detailed plans are available in the adopted plan.

Franklin Boulevard Corridor Master Plan

- One of the four plan goals of the plan is to “Create pedestrian oriented destinations and districts.” These nodes of development and redevelopment along the corridor will be connected by enhanced transit service that will extend the pedestrian’s reach.
- Plans for development along the boulevard are intended to work with the planned greenway network and add connections to these greenways that integrate them into a fully-connected corridor parallel to Franklin Boulevard.
- All four high-priority nodes include pedestrian projects in the short term: intersection improvements, greenway spur developments, and the creation of new connections through a park or through new block patterns. All of these projects speak to the plan goal of ensuring that pedestrian circulation within and into these nodes is easy.
- The plan calls out transitions at the city limits as important to setting the stage for a non-automobile dominated streetscape for the length of the boulevard.

Gastonia 2025 Comprehensive Plan

- Overall, the plan seeks to create a development pattern in Gastonia that breaks from the large-lot, single-family, suburban retail pattern that dominated in the last decades, instead focusing on infill development.
- The City sees itself in 2025 as a place where environmentally-friendly transportation connects nodes of mixed development where people can walk to a variety of uses including commercial and residential.
- Improvements to the pedestrian environment are woven into many key focus areas of the plan including: transportation and land use patterns; open space, parks and recreation; neighborhoods; the center city, and community appearance and identity.
- The transportation goal includes a specific recommendation to develop a pedestrian plan.
- Pedestrian-friendliness is also seen as part of quality of life, a key objective within the economic development goal. Greenways are integral to quality of life as well and will help Gastonia define itself as a green city, differentiating itself from others in the region.
- In the plan’s community character survey, greenways and parks and open space were two of the top three priorities for new development in the City. In the visual preference survey, locations lacking sidewalks were consistently scored among the lowest.

Vision for a Healthy Community: Parks and Recreation Long Range Plan

- This plan lays out improvements to the parks and greenways systems in the City with discussion about how to better connect residents to parks using greenways and a thorough sidewalk network.
- The plan survey found that walking was the most popular recreational activity identified for families. Greenways were chosen as the highest priority facilities to fund for construction.
- The Avon/Catawba Creek Greenway has helped spur use of Lineburger Park in central Gastonia, and this example is one of the reasons for interest in connecting parks to neighborhoods.

Franklin/Myrtle School Small Area Plan

- This small area plan addresses the intersection of Franklin Boulevard and Myrtle School Road on the western end of town where today there is a Walmart on the north side of Franklin, and an aging strip mall on the south side.
- Commercial development in this area has negatively impacted surrounding neighborhoods by drawing more automobile traffic. The plan recommends mitigating this with well-designed streetscapes that include sidewalks, street trees, adequate lighting, and, for developments under 20,000 square feet, orientation close to the street with parking to the rear.
- One plan goal is to “Provide for greater pedestrian safety and circulation,” which is supported by recommendations for crosswalks, pedestrian access through parking lots, and provision of sidewalks.

Highland Master Plan

- This small area plan for the neighborhood immediately north of downtown along State Highway 321 provides a framework for revitalization and investment.
- Highway 321 is a major barrier between the two halves of the neighborhood, and residents expressed concerns about the safety of pedestrian crossings, especially for children crossing to the Erwin Center. Consequently, the plan recommends re-envisioning the road as a boulevard that includes four enhanced pedestrian crossings.
- Additional access to the boulevard is recommended through extending existing streets, creating new intersections and connections. These have not been implemented.
- On local streets, sidewalks, curb and gutter, and street trees are recommended in response to resident concerns.
- Greenways are also integrated as a community asset and pedestrian and bicycle travel network.

Downtown to Lineburger Pedestrian and Bicycle Connection

- This CMAQ grant application requests funding for design and construction of missing sidewalk links, improved crosswalks, and the addition of bicycle facilities to provide a connection between downtown Gastonia and Lineburger Park to the southwest.
- Proposed pedestrian improvements along East 2nd Avenue and South Chestnut Street include stamped crosswalks, new sidewalks, planter strips and traffic calming through narrowed travel lanes and speed bumps.

Creating Opportunities for Active Living, North Carolina Department of Health and Human Services (NC DHHS) Grant-Supported Effort

- The project process was intended to “identify policy conflicts, practices, procedures, barriers, and value issues that exist between state and local levels of government and interfere with promoting a healthy, built environment and active life styles in the cities of Gastonia–Belmont–Bessemer City.”
- Gastonia and nearby jurisdictions experienced problems implementing streetscapes that would have improved pedestrian safety on state roads because NCDOT blocked these changes on the basis of existing engineering and design standards.
- Representatives from Gastonia, Gaston County, Bessemer City, Centralina Council of Governments (COG), and other stakeholders developed a list of possible solutions to the issue, including:
 - Amend local code to match the NCDOT Complete Streets standards
 - Develop/revise comprehensive bicycle and pedestrian plans
 - Narrow local streets
 - Build a pilot complete streets project
 - Help people make the connection between infrastructure and improved health, possibly through the use of Health Impact Assessments

NCDOT Complete Streets Planning and Design Guidelines

- Complete streets are intended to meet the needs of all roadway users and to reflect the community and context they serve.
- Planning and design of complete streets will incorporate the local jurisdiction’s vision for future land use along the corridor and so will necessitate close collaboration among NCDOT and local planners and engineers.
- The guidelines provide a planning process and specific instruction about how to consider the intersection of land use and transportation context to determine the best design for a roadway.

WalkBikeNC

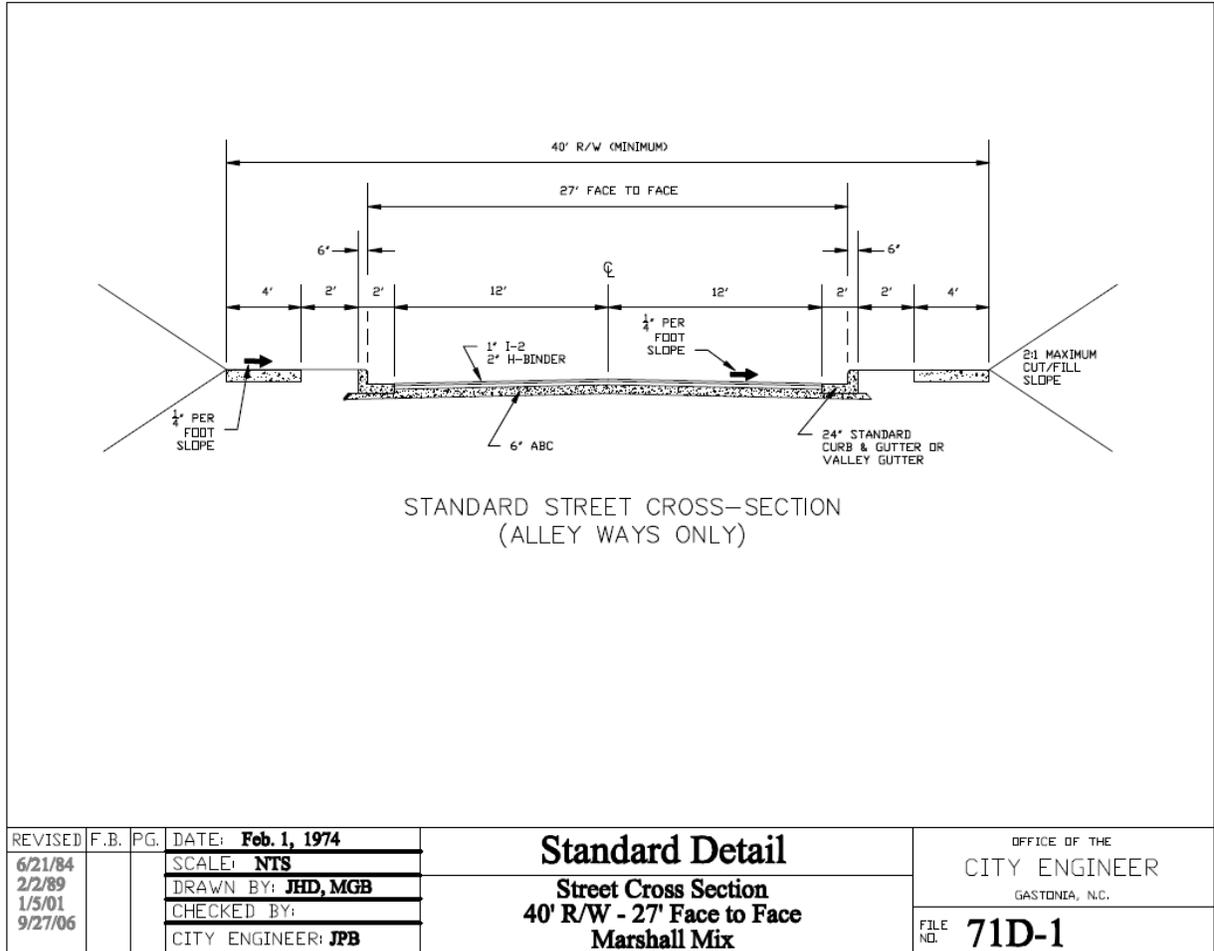
- The recently-adopted statewide bicycle and pedestrian plan reaffirms NCDOT's commitment to further projects and programs that enable people to walk and bike in North Carolina.
- Five key themes define the plan and can be incorporated into local planning efforts: safe access, mobility, health, economic development, and environmental stewardship. Arguments presented for health and economic development benefits of improving pedestrian infrastructure are included.
- Policy guidance states that locally-adopted pedestrian plans should supersede comprehensive transportation plans (CTPs) when local division staff considers project development and implementation.
- It is recommended to include health, social equity, and economic impact prioritization factors for the NCDOT prioritization process.

APPENDIX C

Recommended Modifications to Existing Design Standards

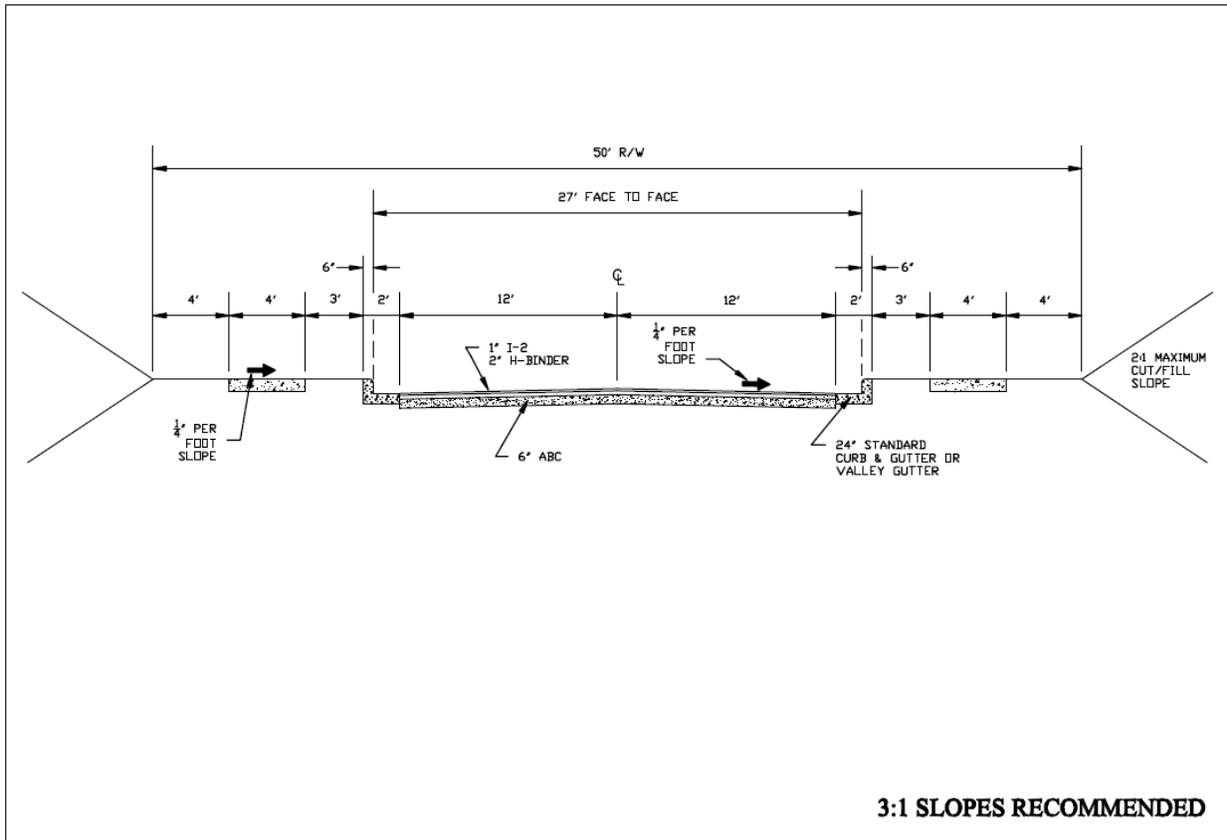
City of Gastonia Standard Details

**1) Standard Detail 71D-1 and 71D-1A (Marshall Mix and Superpave Mix, respectively)
Street Cross Section 40' R/W – 27' Face to Face – Alley Ways Only**



- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current 2' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds

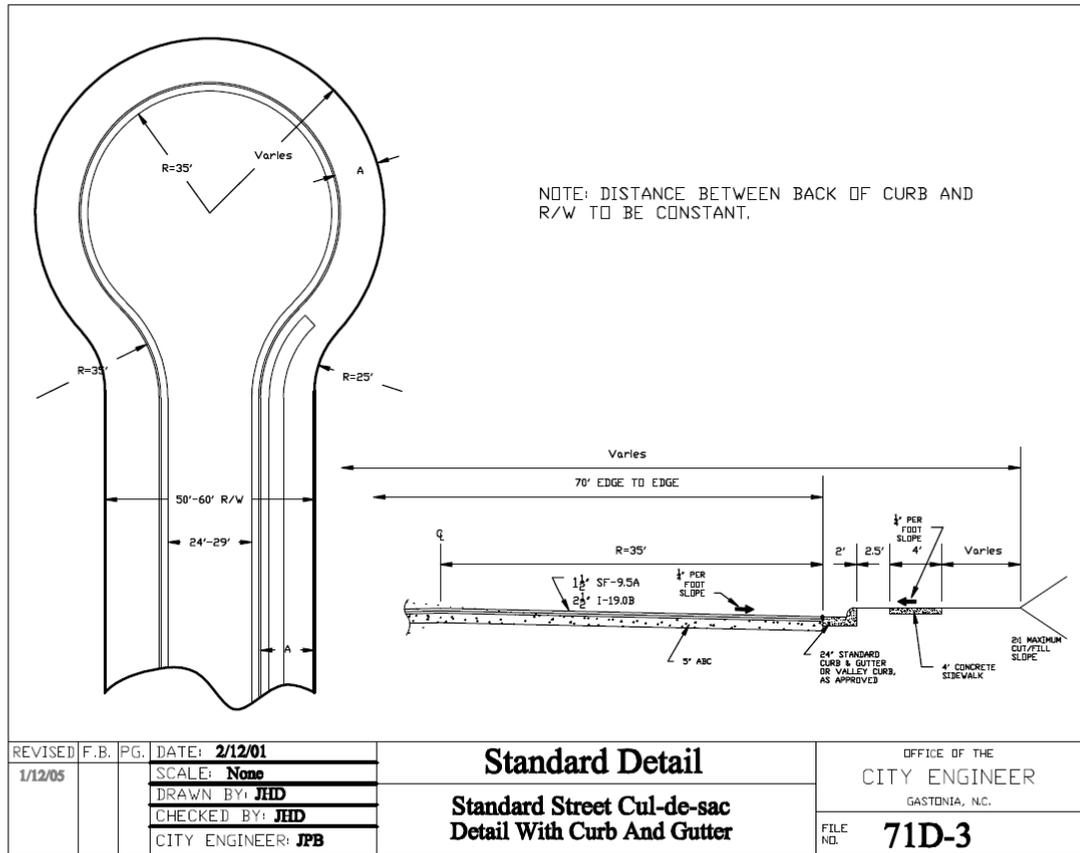
**2) Standard Detail 71D-2 and 71D-2A (Marshall Mix and Superpave Mix, respectively)
Street Cross Section 50' R/W – 27' Face to Face**



REVISED	F.B.	PG.	DATE: 6/3/84	Standard Detail	OFFICE OF THE
2/2/89			SCALE: None		CITY ENGINEER
7/22/97			DRAWN BY: KBC, DS	Standard Street Cross Section	GASTONIA, N.C.
			CHECKED BY: DCC, FAP	50' R/W - 27' Face to Face	FILE NO. 71D-2
			CITY ENGINEER: DEC, JPB	Marshall Mix	

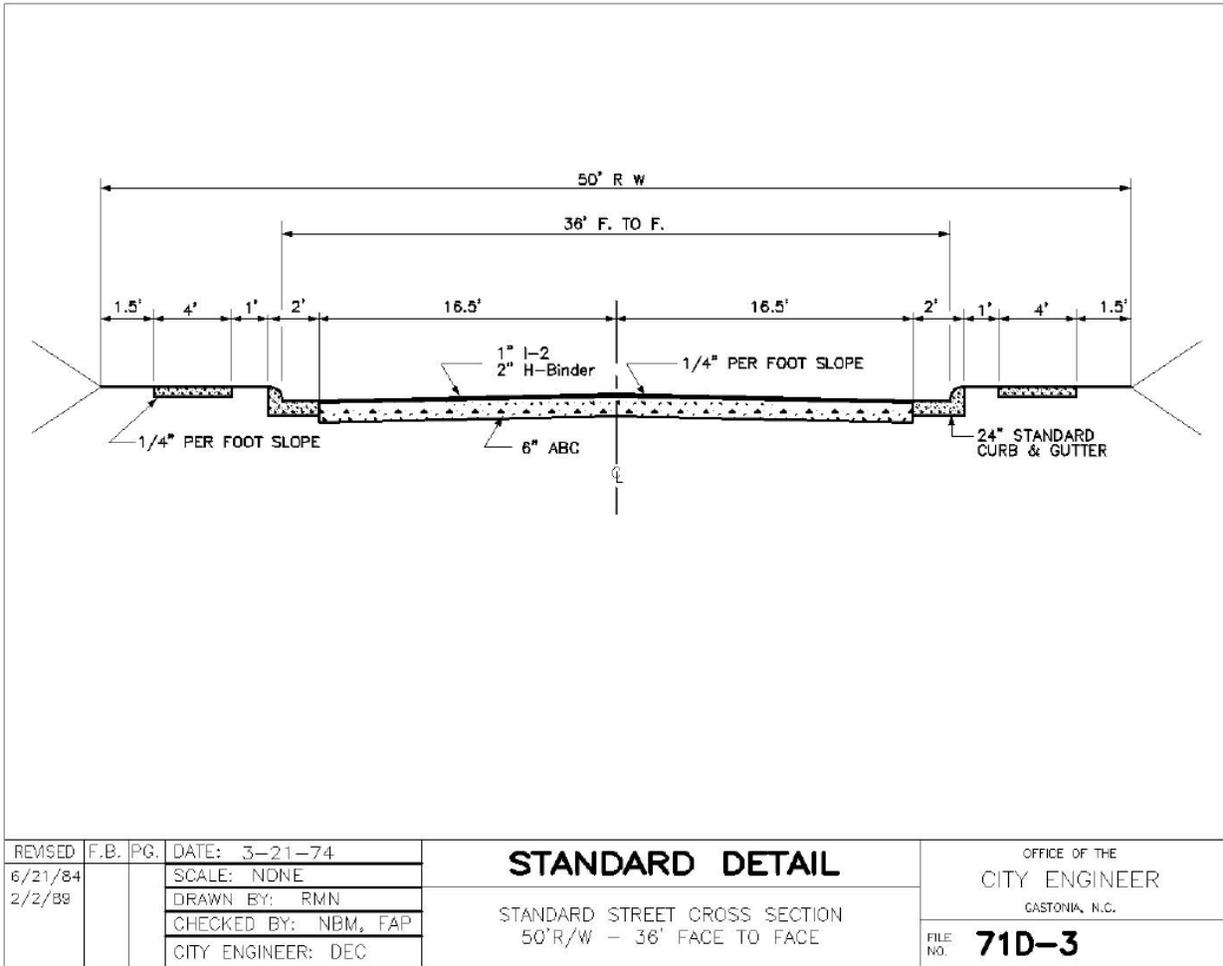
- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current 3' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 4' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

3) Standard Detail 71D-3 Standard Street Cul-de-sac Detail with Curb and Gutter



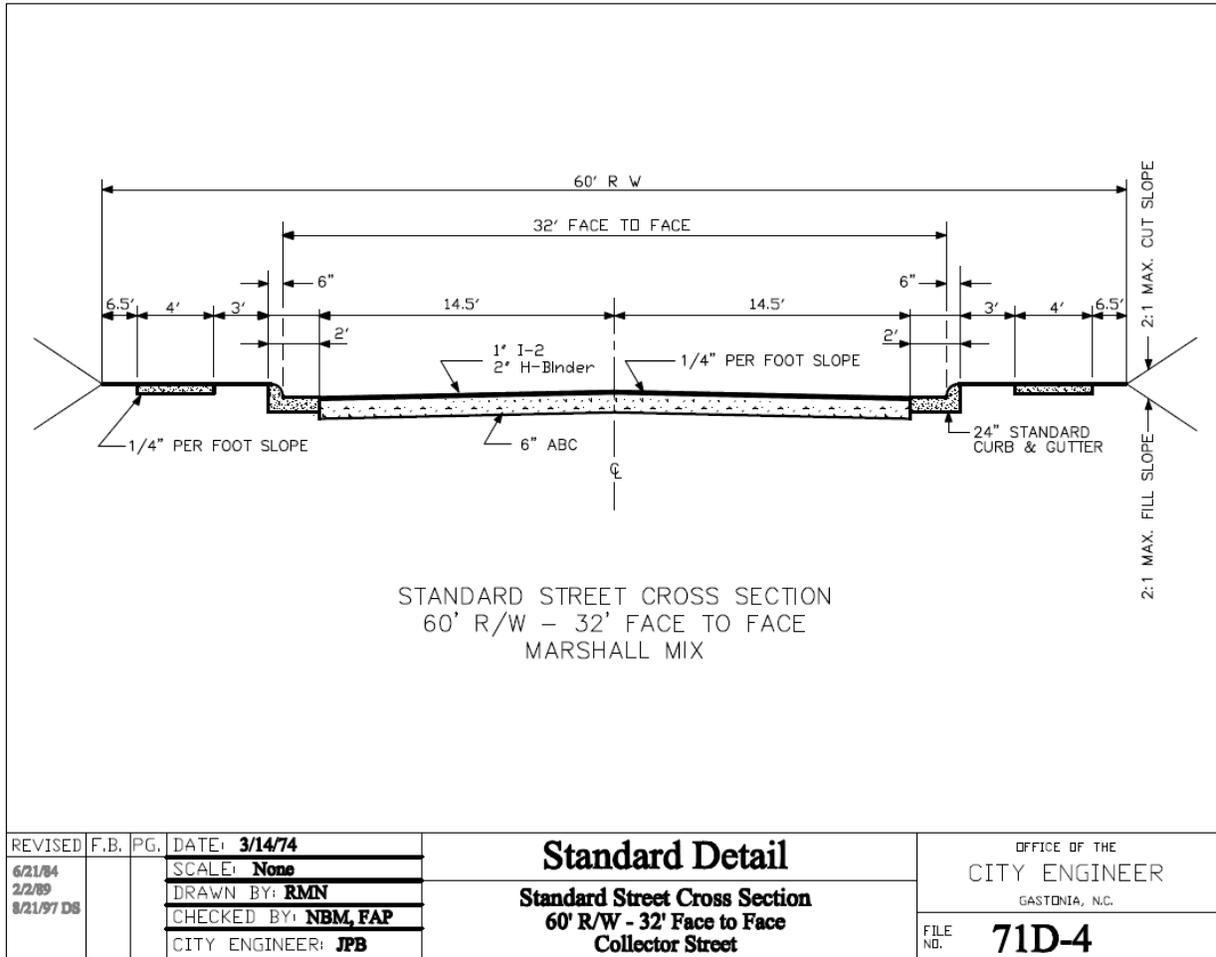
- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current 2.5' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.

4) Standard Detail 71D-3 Standard Street Cross Section – 50' R/W – 36' Face to Face



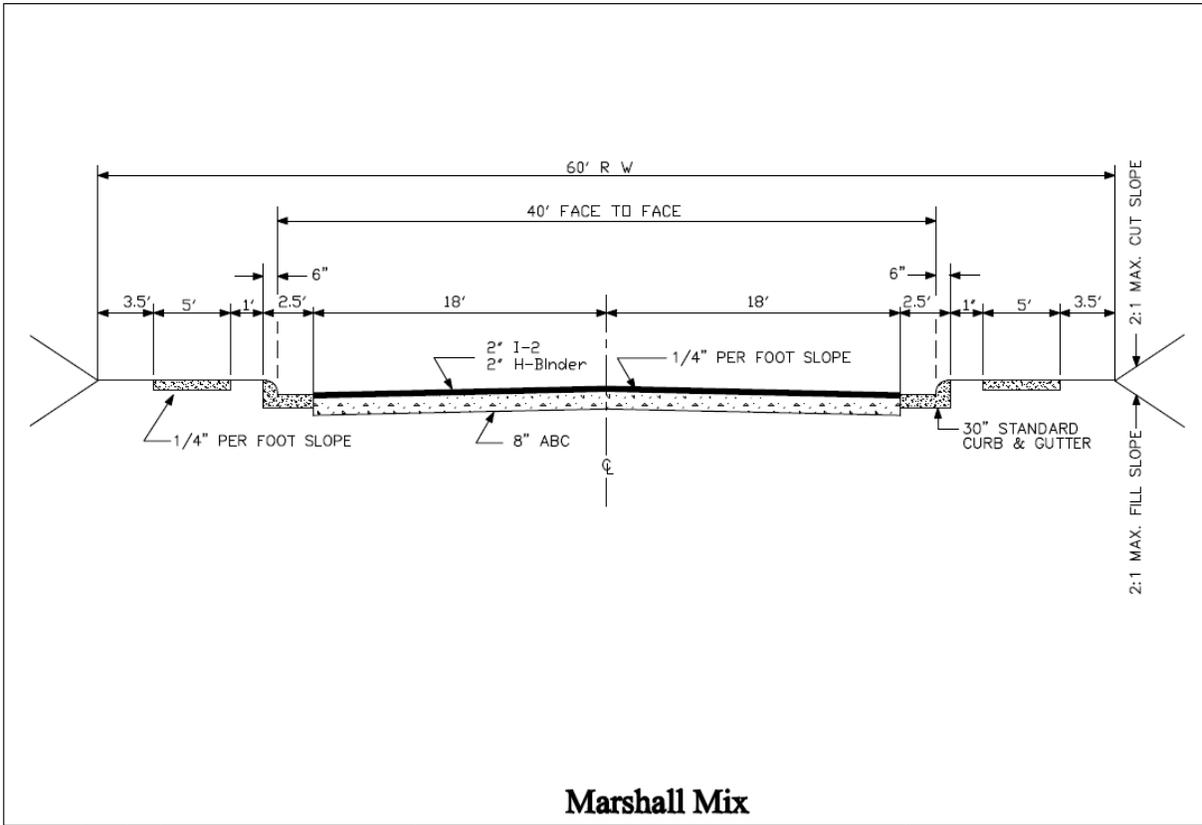
- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current 1' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.
- Current 16.5' wide travel lanes
 - Is this 16.5' feet for one travel lane? Does it include parking?
 - With the minimums attained in the above bullets for sidewalk and buffer widths (using 5' mins.) – the resulting Face to Face width would be 27'. This would dictate 13.5' wide travel lanes in each direction, inclusive of a 2' gutter pan.

5) Standard Detail 71D-4 and 71D-4A (Marshall Mix and Superpave Mix, respectively)
 Standard Street Cross Section 60' R/W – 32' Face to Face, Collector Street



- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current 3' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.
- Current 14.5' wide travel lanes
 - Is this 14.5' feet for one travel lane? Does it include parking?
- Current 6.5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

**6) Standard Detail 71D-5 and 71D-5A (Marshall Mix and Superpave Mix, respectively)
Standard Street Cross Section 60' R/W – 40' Face to Face, Minor Thoroughfare/Special Collector**



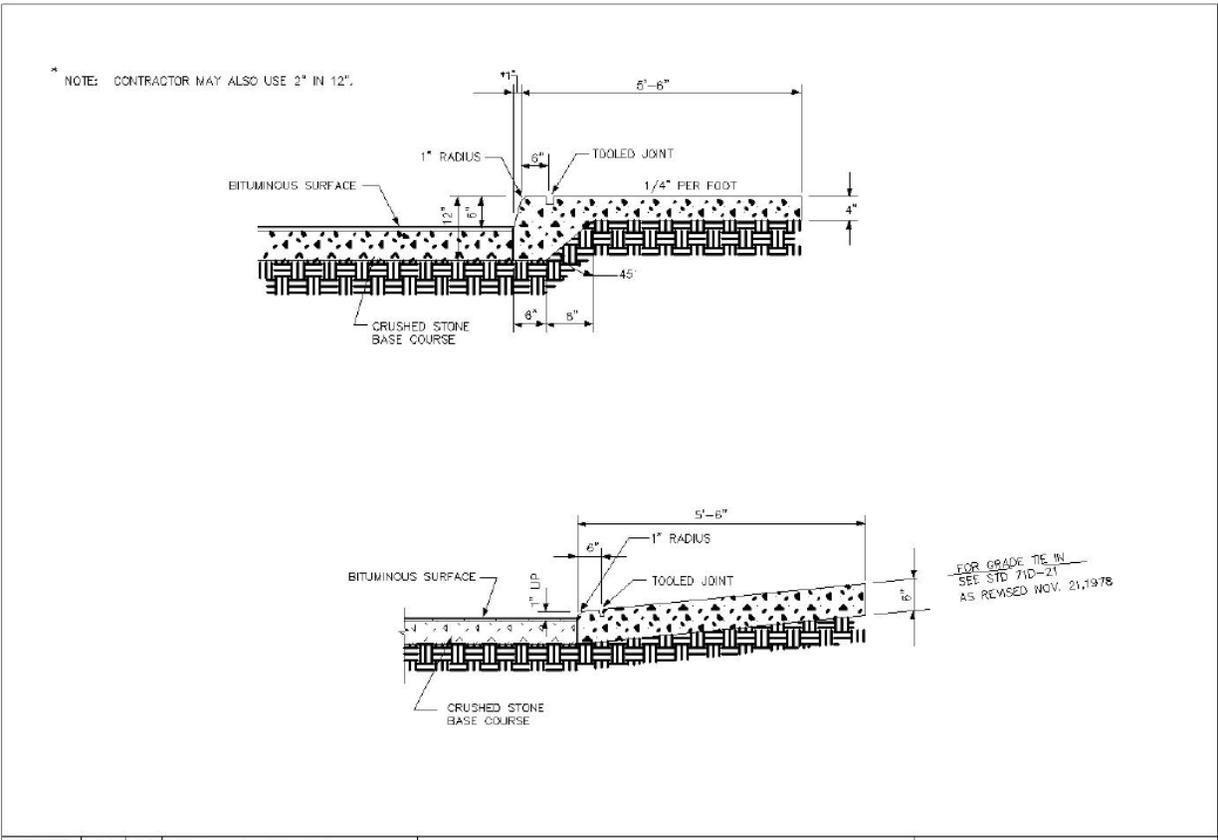
Marshall Mix

REVISED	F.B.	PG.	DATE: 3/14/74	Standard Detail	OFFICE OF THE CITY ENGINEER GASTONIA, N.C.
6/21/84			SCALE: None		
2/2/89			DRAWN BY: RMN, DS	Standard Street Cross Section 60' R/W - 40' Face to Face Minor Thoroughfare / Special Collector	FILE NO. 71D-5
8/21/97			CHECKED BY: NBM, FAP		
1/8/02			CITY ENGINEER: DEC, JPB		

- Current 5' wide sidewalk
 - Adequate – no change recommended.
- Current 1' wide inside buffer
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.
- Current 18' wide travel lanes
 - Is this 18' feet for one travel lane? Does it include parking?
- Current 6.5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

7) Standard Detail 71D-12

Monolithic Sidewalk – Curb Driveway Section

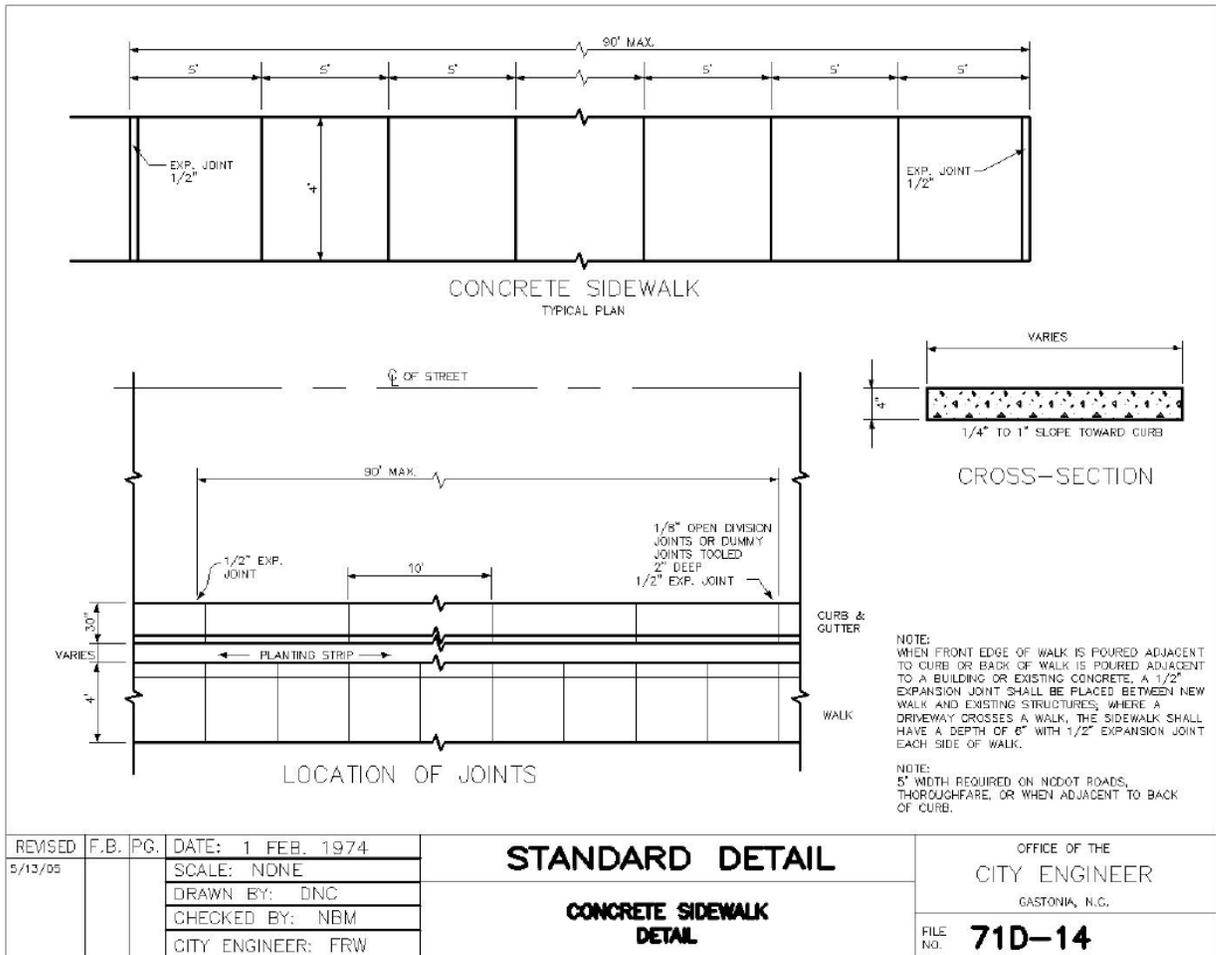


REVISED	F.B.	PG.	DATE: 2-15-74	STANDARD DETAIL	OFFICE OF THE CITY ENGINEER GASTONIA, N.C.
10-76			SCALE: NTS		
11-76			DRAWN BY: M.L.B.	MONOLITHIC SIDEWALK- CURB DRIVEWAY SECTION	FILE NO. 71D-12
11/1/81			CHECKED BY: D.C.C., F.A.P.		
1/28/82			CITY ENGINEER: D.E.C.		
1/8/02					

- General Note to be added to standard detail:
 - “Maintain sidewalk slope and grade across driveway.”

8) Standard Detail 71D-14

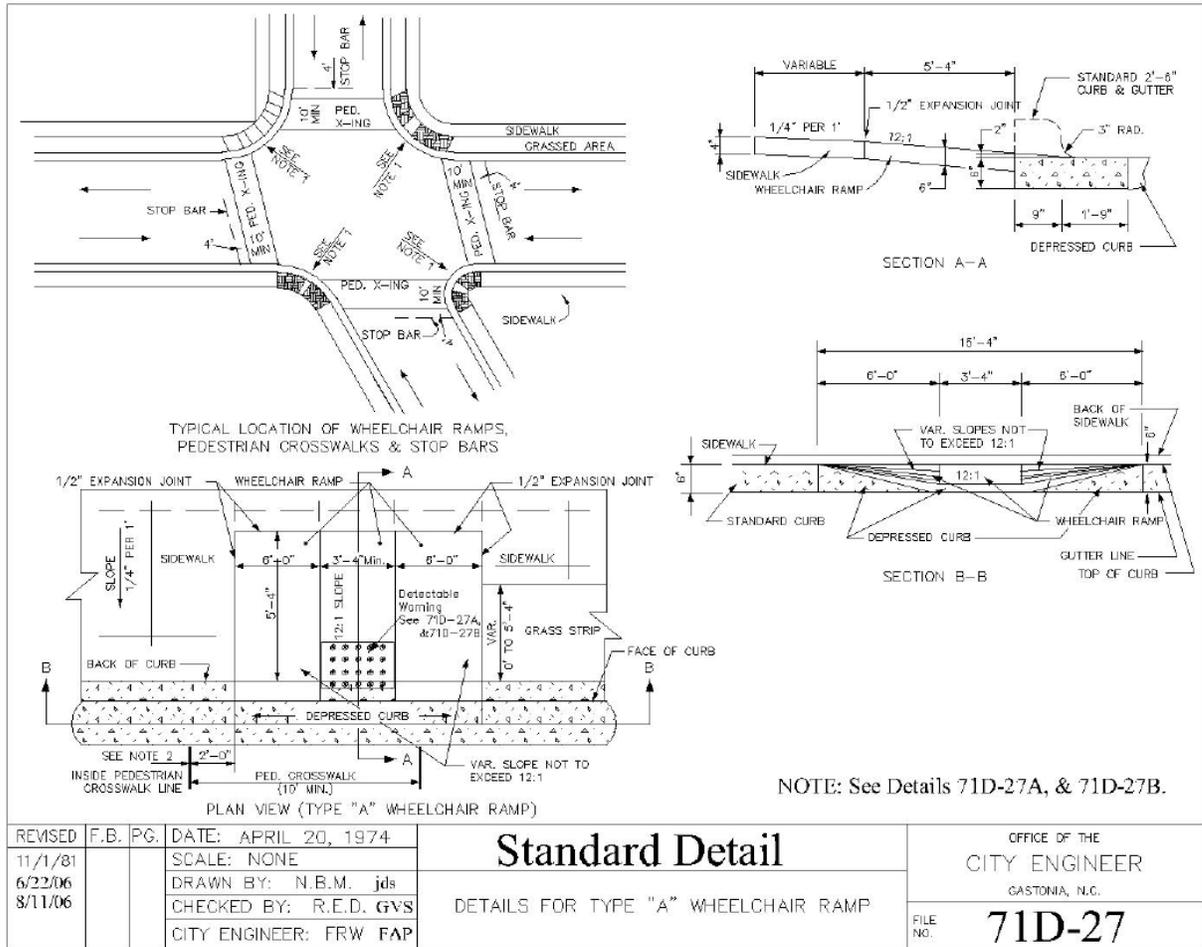
Concrete Sidewalk Detail



- Current 4' wide sidewalk
 - Sidewalk width should be 5' wide at a minimum with a preferred width of 6'.
- Current inside buffer denoted as "VARIES"
 - Buffer should be 5' wide at a minimum with a preferred width of 6'.

9) Standard Detail 71D-27

Details for Type "A" Wheelchair Ramp



- Current placement of ONE corner centered ramp in plan view (upper left)
 - Two curb ramps per corner per crosswalk is preferred.
 - If constrained, utilize a depressed corner. i.e. don't point pedestrians into middle of intersection.

10) Standard Detail 71D-27A - Cast in Place Detectable Warning Surface for Type A Wheelchair Ramp

No Comments

11) Standard Detail 71D-27B - Details for Type "B" Wheelchair Ramp

No Comments

12) Standard Detail 71D-28A and 28B - Cast in Place Detectable Warning Surface for Type B Wheelchair Ramp

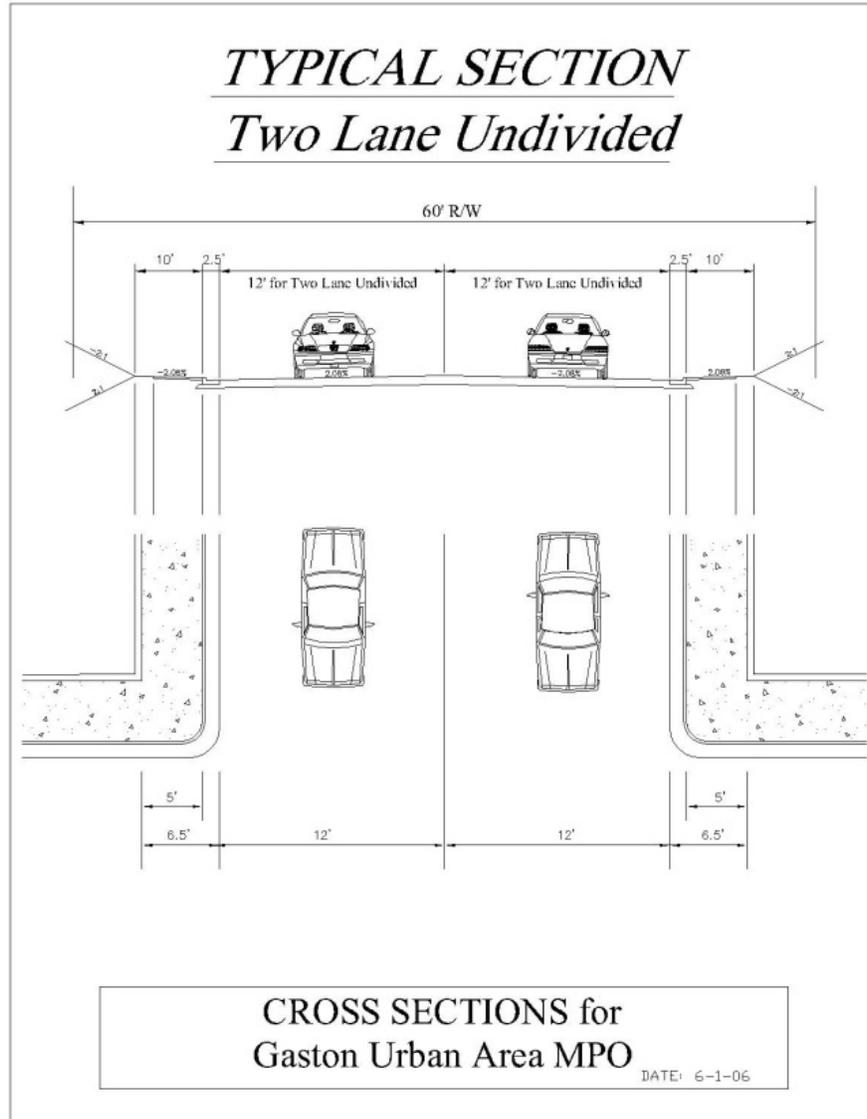
No Comments

13) Standard Detail 71D-29 - General Notes for Wheelchair Ramps

No Comments

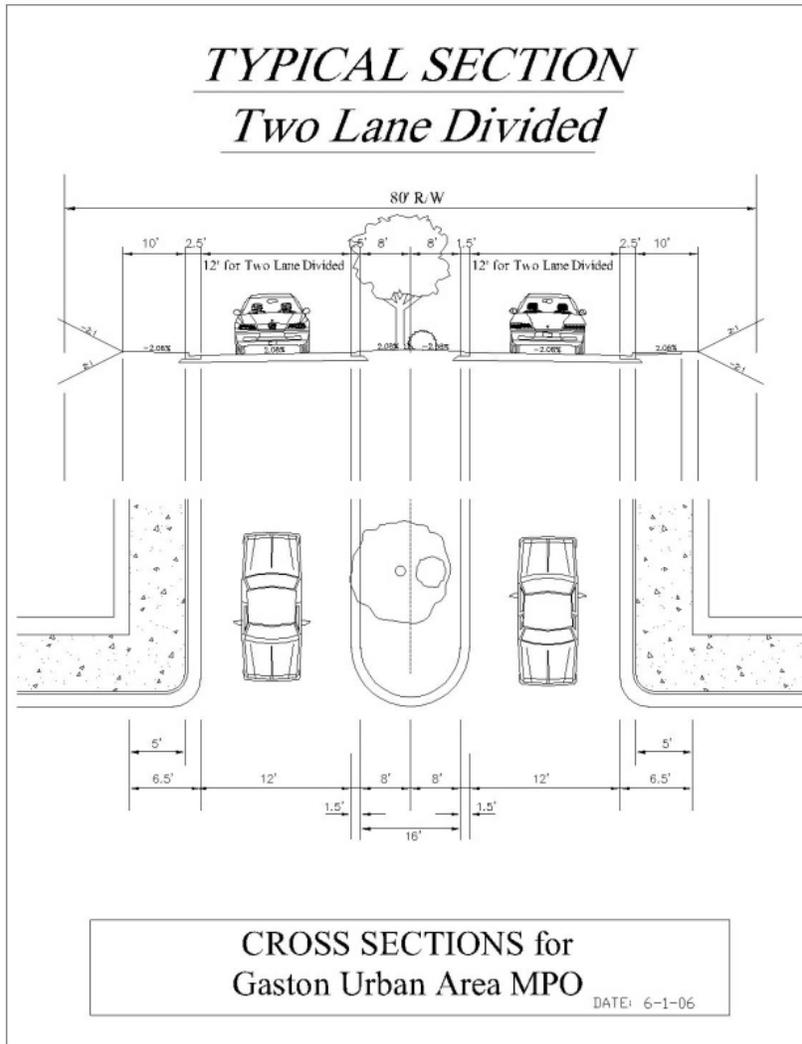
Gaston Urban Area MPO Typical Sections

1) Typical Section – Two Lane Undivided, 60' R/W



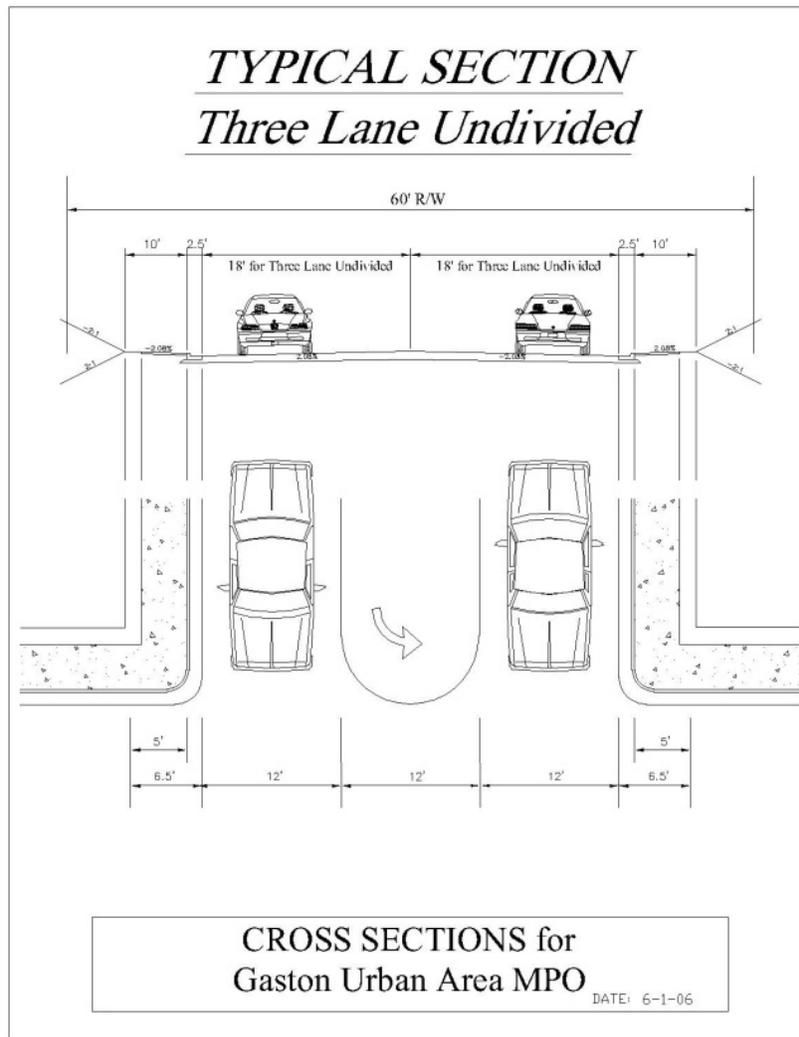
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

2) Typical Section – Two Lane Divided, 80' R/W



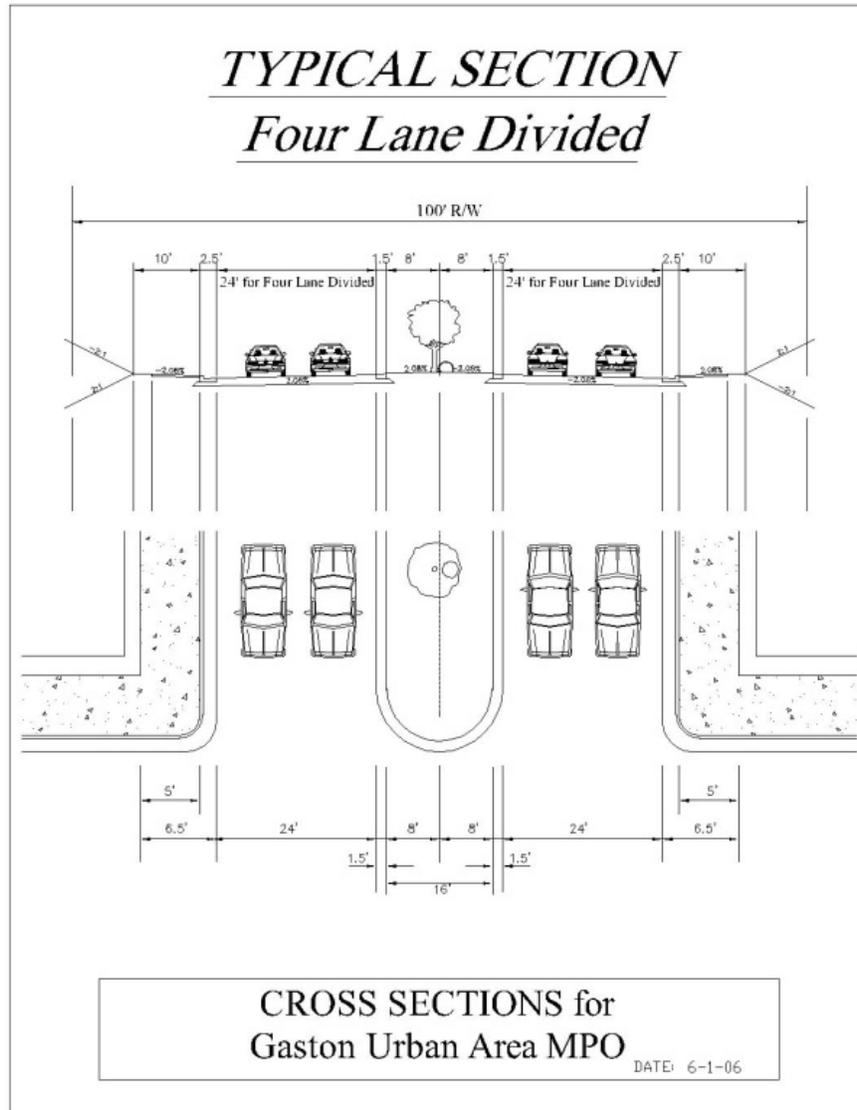
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

3) Typical Section – Three Lane Undivided, 60' R/W



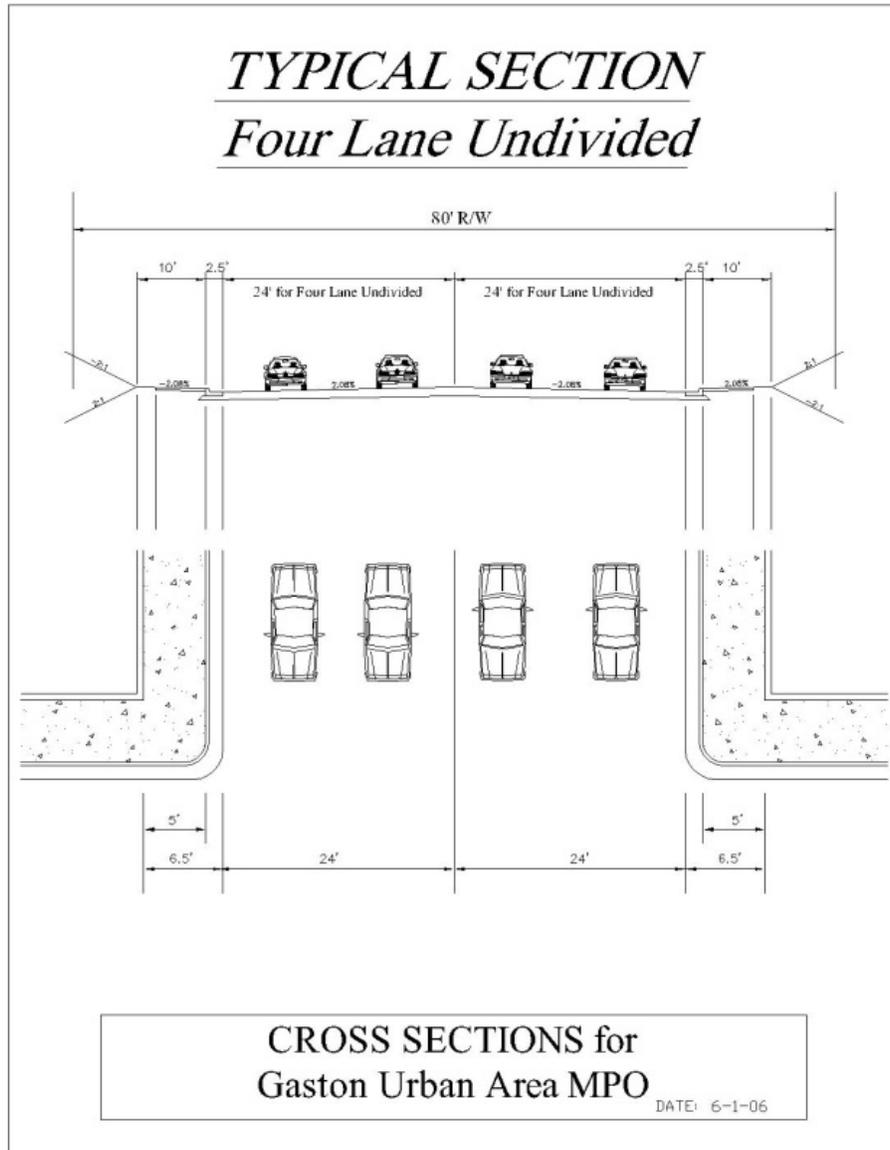
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

4) Typical Section – Four Lane Divided, 100' R/W



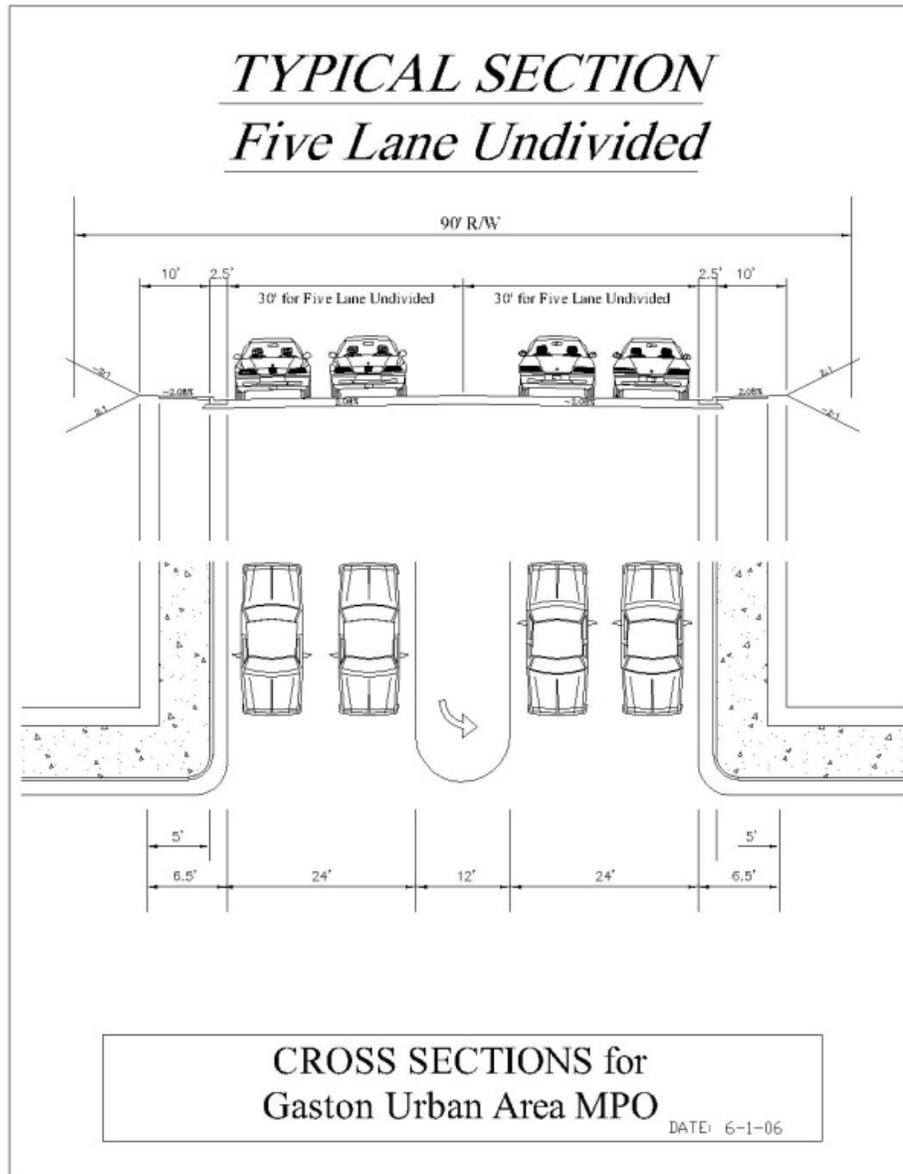
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

5) Typical Section – Four Lane Undivided, 80' R/W



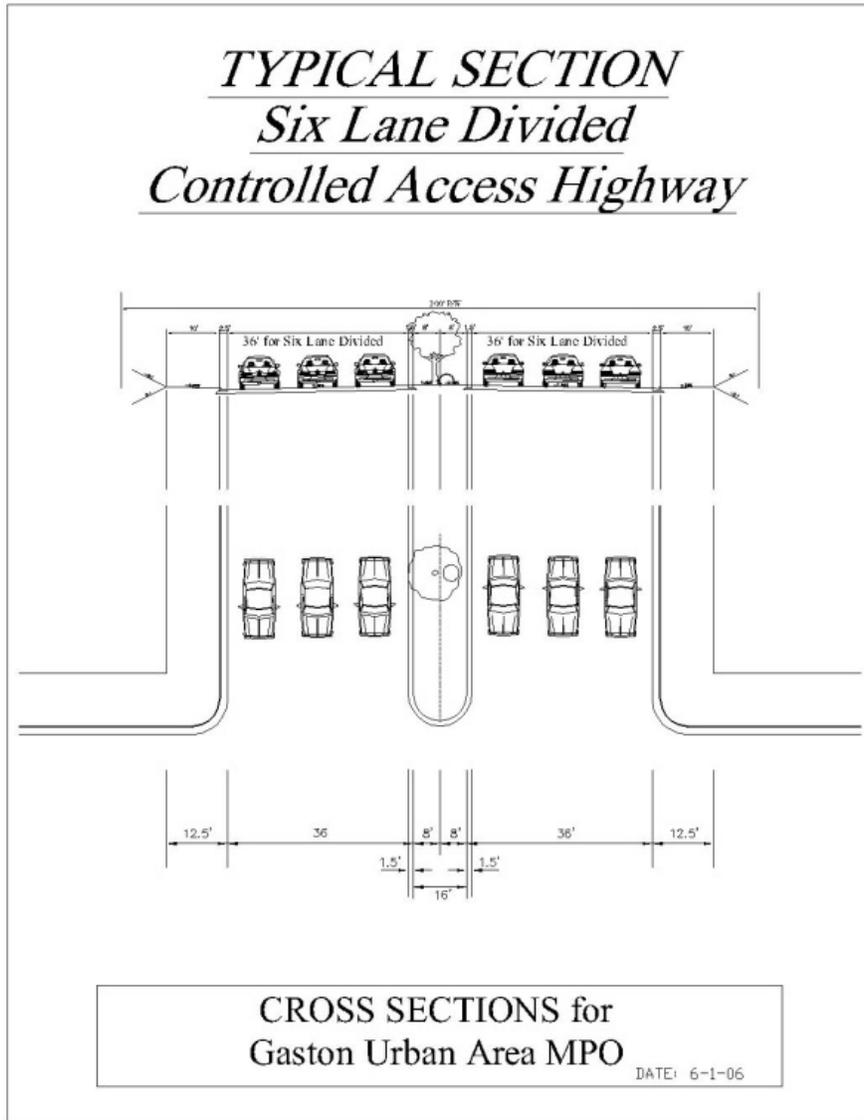
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

6) Typical Section – Five Lane Undivided, 90' R/W



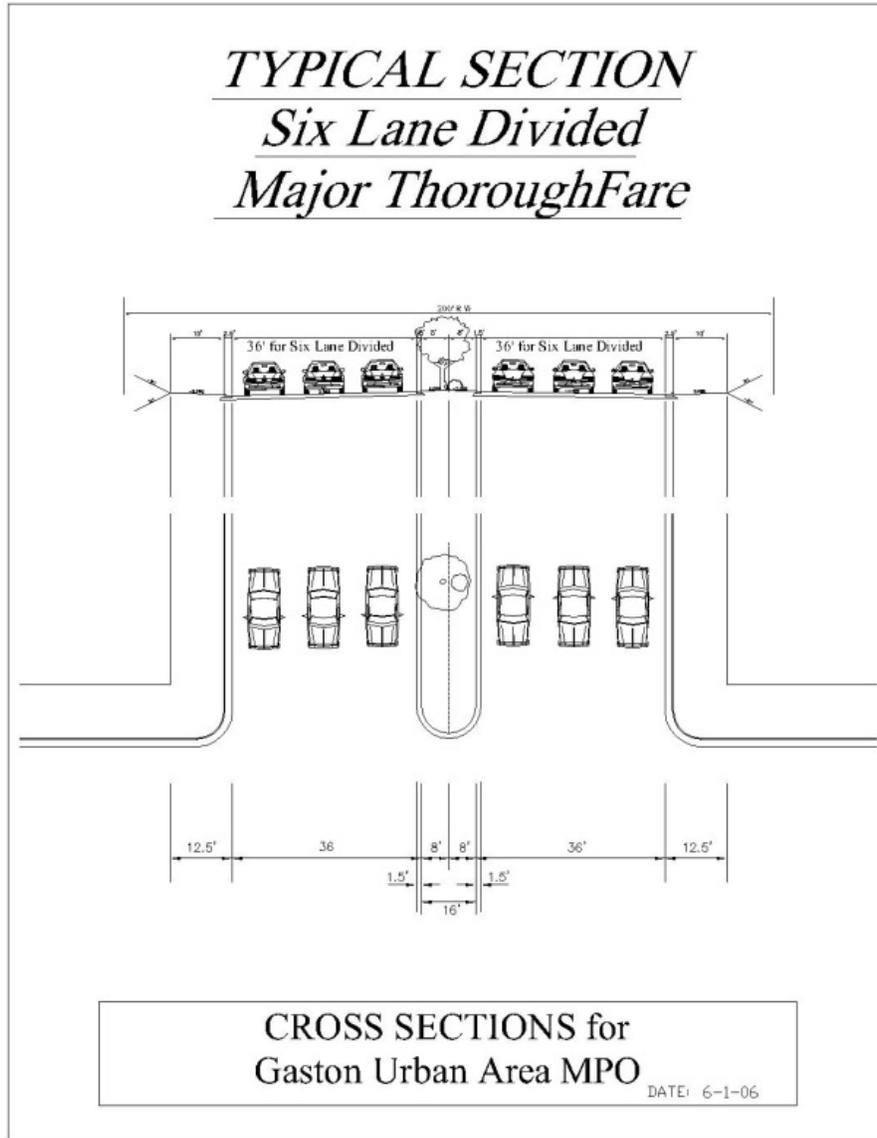
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

7) Typical Section – Six Lane Divided Controlled Access Highway, 200' R/W



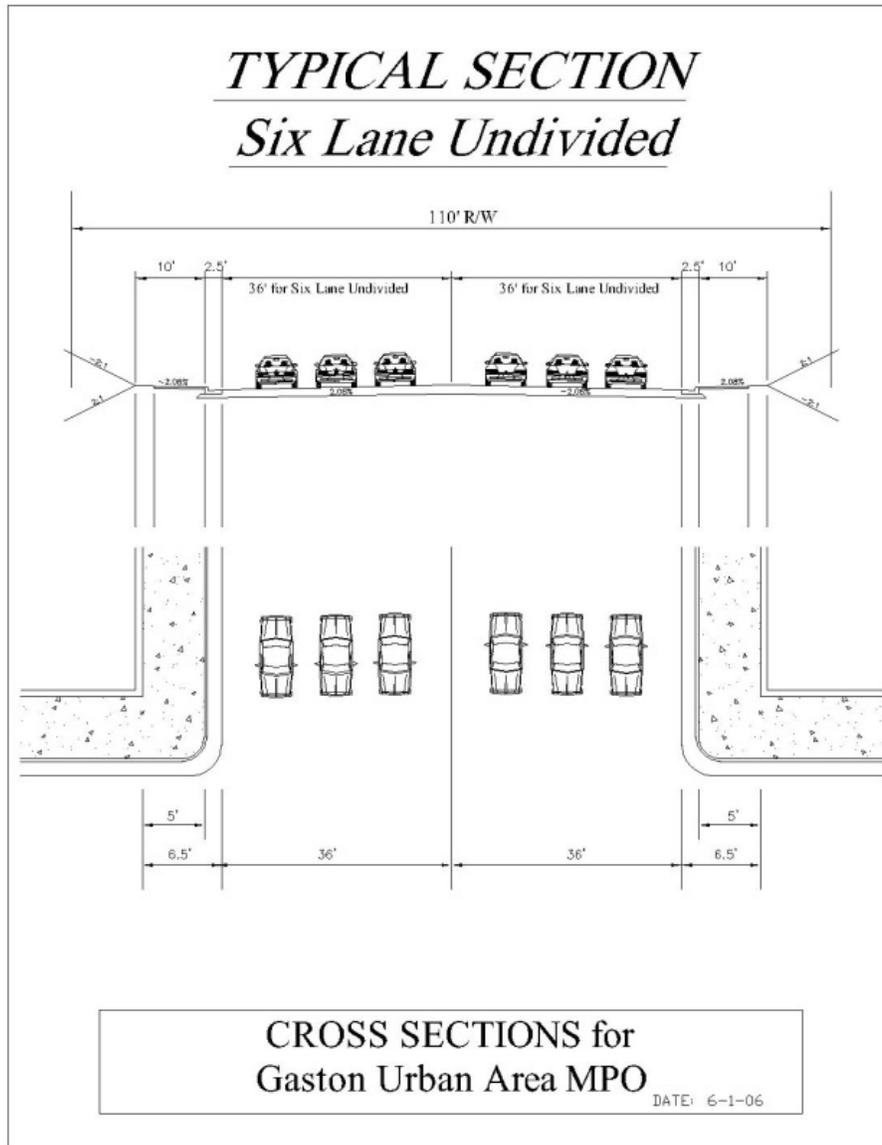
- If there are sidewalks, then a 5'-6' inside buffer should be provided
- Denote sidewalks in 10' space if supposed to be present.

8) Typical Section – Six Lane Divided Major Thoroughfare - 200' R/W



- If there are sidewalks, then a 5'-6' inside buffer should be provided
- Denote sidewalks in 10' space if supposed to be present.

9) Typical Section – Six Lane Undivided - 110' R/W



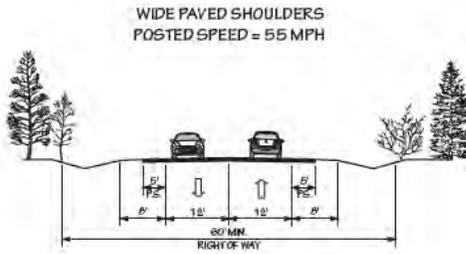
- Currently, no inside buffer shown:
 - An inside buffer should be provided and should be 5' wide at a minimum with a preferred width of 6'.
- Current 12' wide travel lanes
 - This width is not optimal for bicycles as it may promote higher speeds
- Current 5' wide outside buffer
 - The width of the outside buffer before catching grade could be less than 4'.

NCDOT Cross Sections

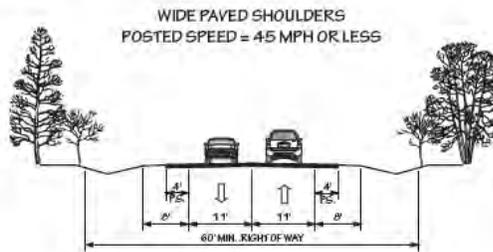
1) Typical Highway Cross Sections – Two Lanes: 2A – 2C

TYPICAL HIGHWAY CROSS SECTIONS
2 LANES

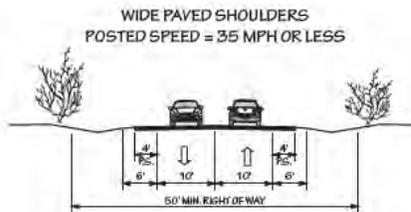
2 A



2 B



2 C



Revised 12/07/2010

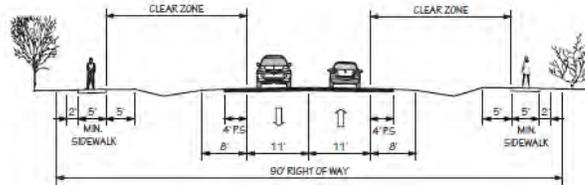
- Currently, no sidewalks, i.e. pedestrian access, are shown.

2) Typical Highway Cross Sections – Two Lanes: 2D-2F

TYPICAL HIGHWAY CROSS SECTIONS
2 LANES

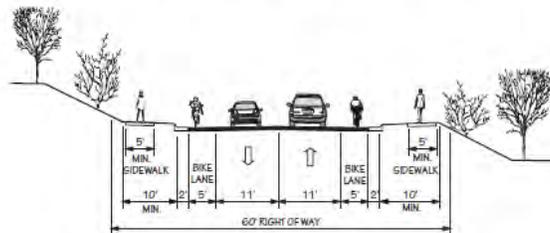
2 D

SIDEWALK PLACEMENT BEHIND A ROADWAY DITCH



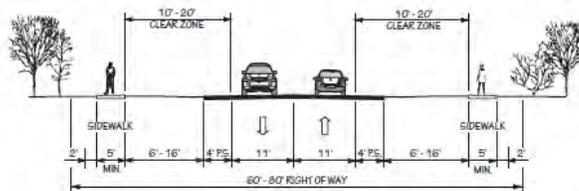
2 E

CURB AND GUTTER
WITH BIKE LANES AND SIDEWALKS



2 F

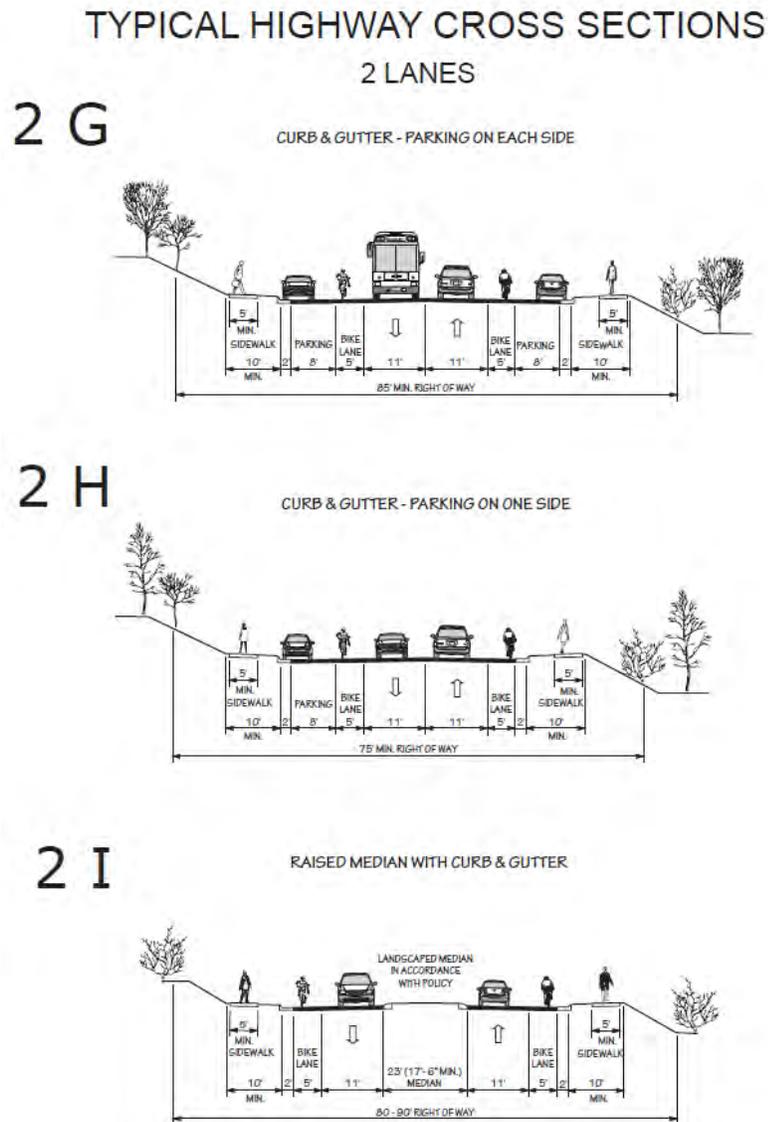
BUFFERS AND SIDEWALKS WITHOUT A ROADWAY DITCH
(20 MPH TO 45 MPH)
(TYPICALLY COASTAL AREA MANAGEMENT ACT COUNTIES)



Revised 12/07/2010

- Currently, in Section 2E, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.

3) Typical Highway Cross Sections – Two Lanes: 2G-2I



Revised 12/07/2010

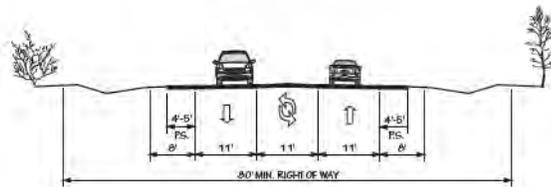
- Currently, in all Sections, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.

4) Typical Highway Cross Sections – Three Lanes: 3A-3B

TYPICAL HIGHWAY CROSS SECTIONS 3 LANES

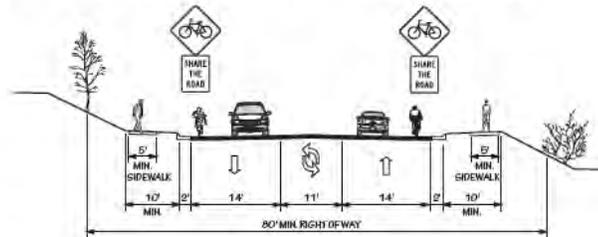
3 A

WIDE PAVED SHOULDERS



3 B

CURB & GUTTER WITH WIDE OUTSIDE LANES AND SIDEWALKS

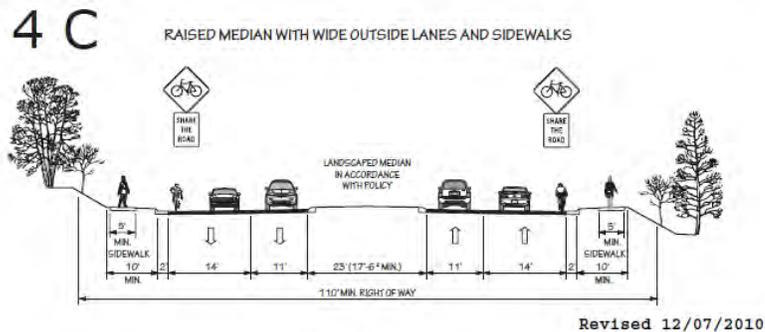
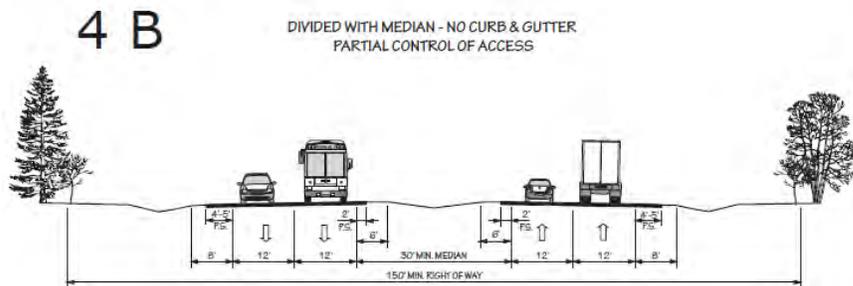
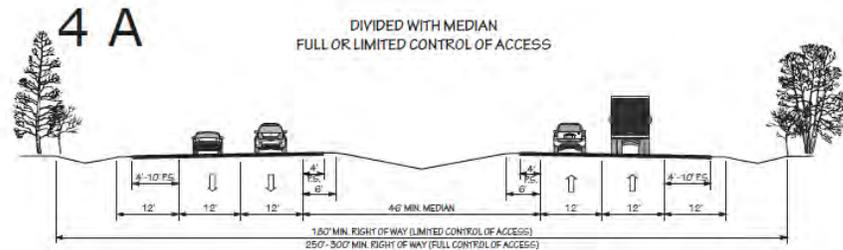


Revised 12/07/2010

- Currently, no sidewalks, i.e. pedestrian access, are shown.
- Currently, in all Sections, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.
- Currently, in Section 3B, the roadway is signed for "Share the Road":
 - In addition to signage for a shared facility, shared lane markings should be shown and denoted in plan view .
 - These symbols should be placed at 4' off the face of curb to the center of the symbol when there is no parking stall present. (When parking is present, these symbols should be placed 11' off the face of curb.)

5) Typical Highway Cross Sections – Four Lanes: 4A-4C

TYPICAL HIGHWAY CROSS SECTIONS
4 LANES



- Currently, in Section 4A and 4B, no sidewalks, i.e. pedestrian access, are shown.
- Currently, in Section 4C, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.
- Currently, in Section 4C, the roadway is signed for "Share the Road":
 - In addition to signage for a shared facility, shared lane markings should be shown and denoted in plan view .
 - These symbols should be placed at 4' off the face of curb to the center of the symbol when there is no parking stall present. (When parking is present, these symbols should be placed 11' off the face of curb.)

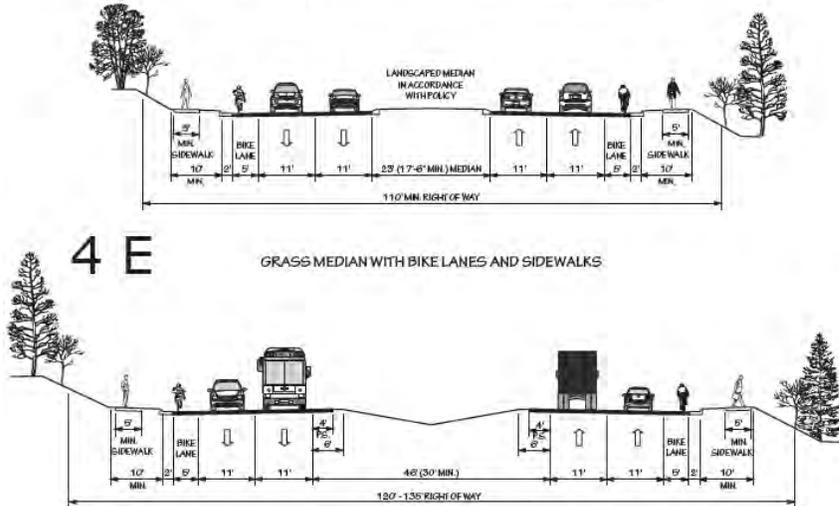
6) Typical Highway Cross Sections – Four Lanes: 4D-4E, Five Lanes: 5A

TYPICAL HIGHWAY CROSS SECTIONS

4 LANES

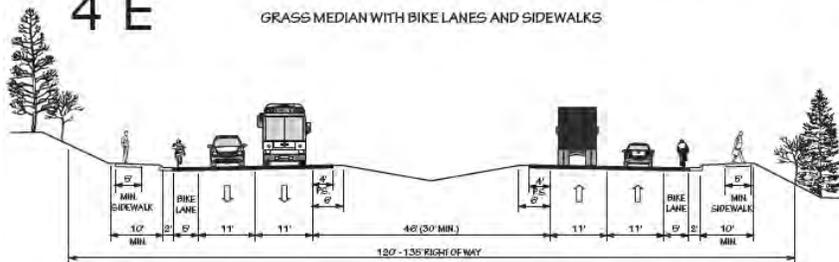
4 D

RAISED MEDIAN - CURB & GUTTER WITH BIKE LANES AND SIDEWALKS



4 E

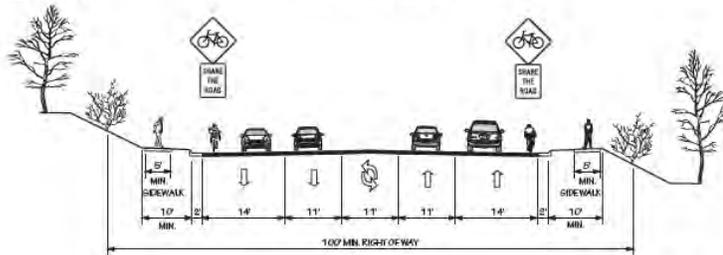
GRASS MEDIAN WITH BIKE LANES AND SIDEWALKS



5 LANES

5 A

WIDE OUTSIDE LANES



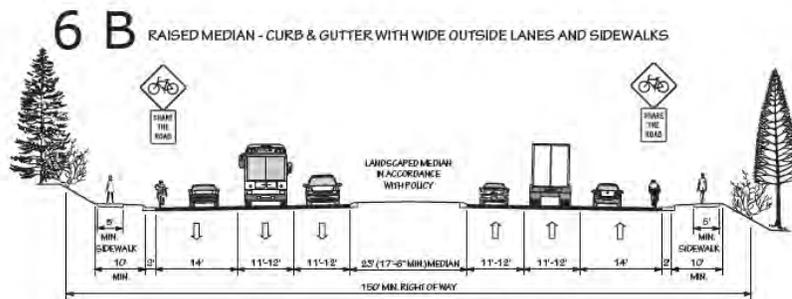
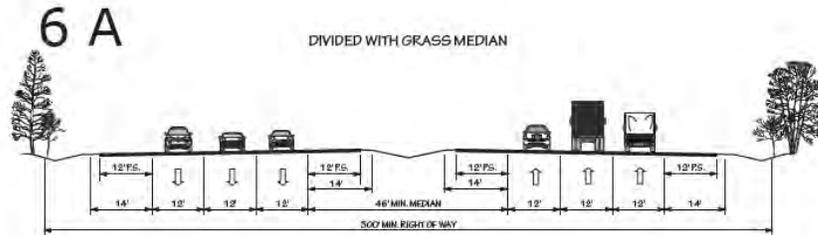
Revised 12/07/2010

- Currently, in all Sections, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.
- Currently, in Section 5A, the roadway is signed for "Share the Road":
 - In addition to signage for a shared facility, shared lane markings should be shown and denoted in plan view .
 - These symbols should be placed at 4' off the face of curb to the center of the symbol when there is no parking stall present. (When parking is present, these symbols should be placed 11' off the face of curb.)

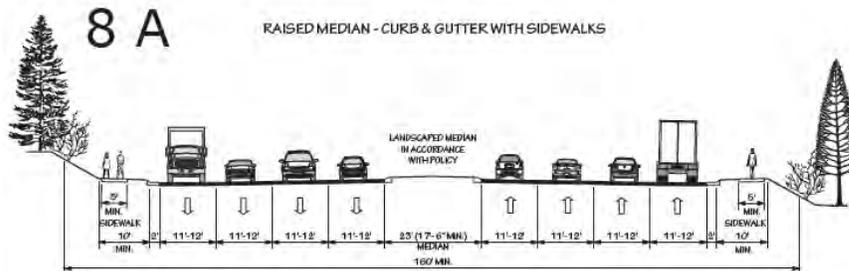
7) Typical Highway Cross Sections – Six Lanes: 6A-6B, Eight Lanes: 8A

TYPICAL HIGHWAY CROSS SECTIONS

6 LANES



8 LANES

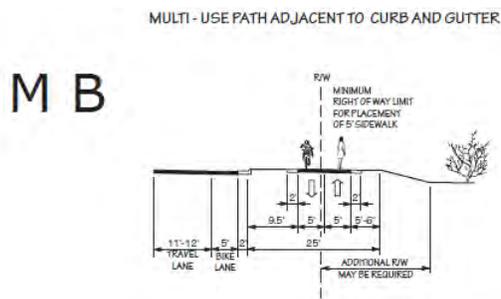
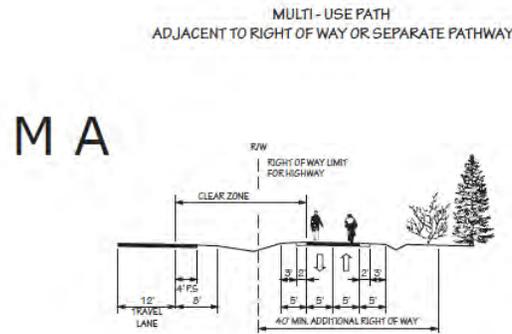


Revised 12/07/2010

- Currently, in Section 6A, no sidewalks, i.e. pedestrian access, are shown.
- Currently, in Sections 6B and 8A, it is not clear what the inside buffer's minimum width should be:
 - An inside buffer should be denoted as 5' wide at a minimum with a preferred width of 6'.
- Currently, in Section 6B, the roadway is signed for "Share the Road":
 - In addition to signage for a shared facility, shared lane markings should be shown and denoted in plan view .
 - These symbols should be placed at 4' off the face of curb to the center of the symbol when there is no parking stall present. (When parking is present, these symbols should be placed 11' off the face of curb.)

8) Typical Highway Cross Sections – Multi-Use Path: MA and MB

TYPICAL MULTI - USE PATH



Revised 12/07/2010

- Currently, in Section MA, the minimum additional right of way is denoted as 40':
 - This is high and could be lowered.
- Currently, in both Sections, the one-directional width on the multi-use path is 5' wide:
 - A width of 5' is a minimum and 6' wide per direction is ideal.
- Currently, in Section MB, the offset distance from the back of curb to the start of the multi-use path's surface is 9.5':
 - This distance is wider than what is necessary; in areas where there are vertical obstacles (trees, signs, poles etc) between the roadway and the multi-use path, a minimum of 6' offset should be provided.
 - In areas where there are no vertical obstacles present between the roadway and the multi-use path, minimum offset widths depend on curb type.
 - If there is no curb or mountable curb, a 5' minimum width is allowed.
 - If there is barrier curb, a 2' minimum width is allowed.

APPENDIX D
Design Guidelines

The design guidelines presented in this appendix are a compilation of guidance information from Toole Design Group's previous experience in the field. Sources for information included here are clearly referenced at the end of each cut sheet.

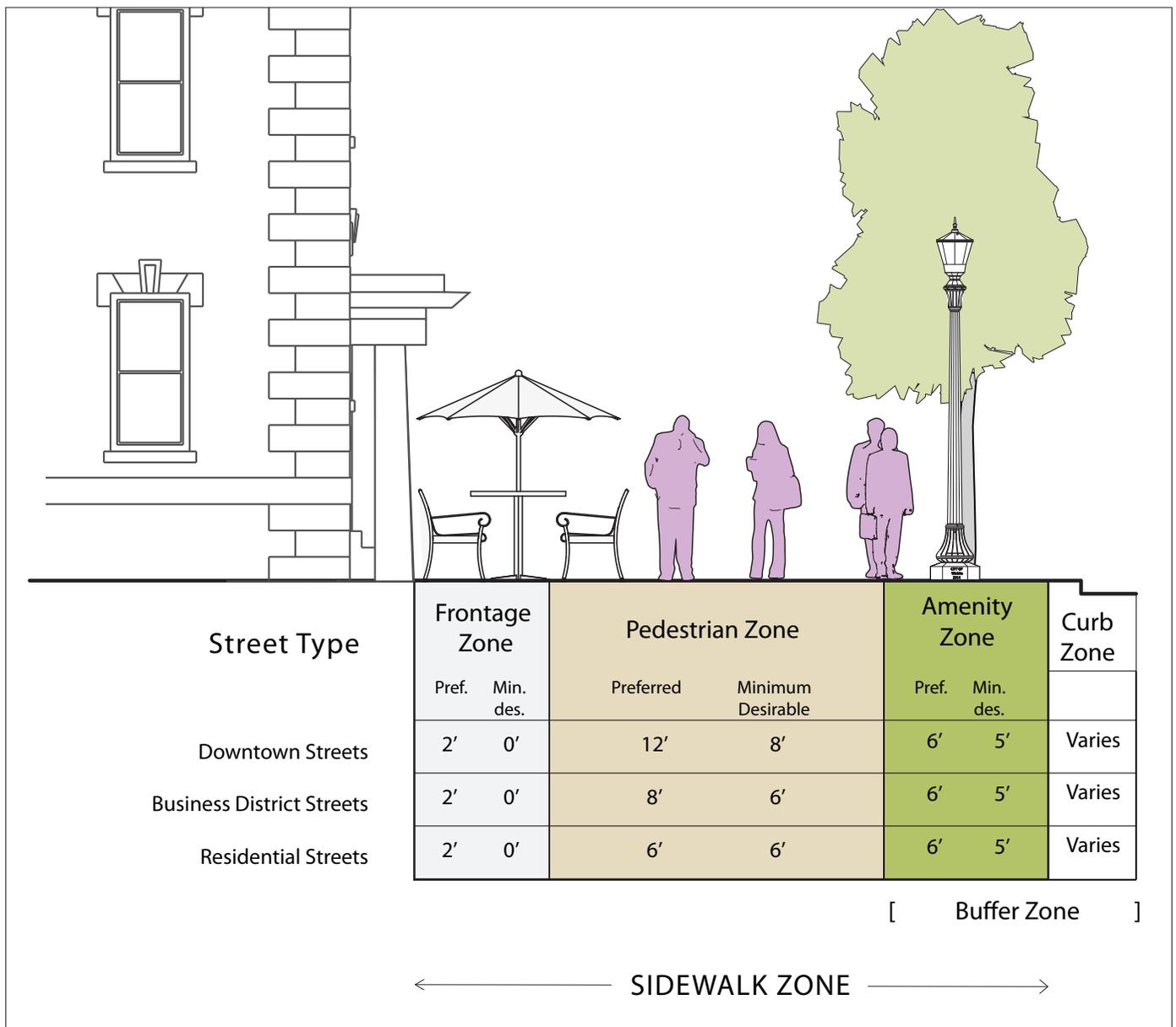
THE SIDEWALK ZONE

OVERVIEW

Sidewalks provide pedestrians with space to travel within the public right-of-way that is separated from motor vehicles. The Sidewalk Zone consists of four zones: the Frontage Zone, the Pedestrian Zone, the Amenity Zone, and the Buffer Zone – that may vary in terms of width and character depending on the adjacent land use, available right-of-way, and intended function. These zones help to organize the Sidewalk Zone and although the boundaries between the four sidewalk zones can sometimes be blurred, each zone serves a distinct purpose.

Sidewalks are not only used for transportation, but for social interaction, lingering, and people-watching. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions where people walk in the street. Excessively wide sidewalks can create feelings of being overly exposed or vulnerable, which may result in decreased pedestrian activity. The preferred widths for each Sidewalk Zone are provided below.

The following design treatments outline the specific recommendations for each of the four zones.



BUILDING FRONTAGE ZONE

DESCRIPTION

The Building Frontage Zone is the area between the Pedestrian Zone and building frontages, which may incorporate public right-of-way (where available) or private property (where building setbacks have been provided). The Building Frontage Zone provides a buffer for pedestrians and bicyclists from opening doors and architectural elements, signs and may also provide space for sidewalk cafés, store entrances, window shopping or landscaping.

BENEFITS

- The Building Frontage Zone provides room for elements that enliven the street and create visual interest for pedestrians.
- The Building Frontage Zone announces building entrances and the occasional café.

DESIGN CONSIDERATIONS

- Where buildings are located against the back of the sidewalk and constrained situations do not provide width for the Building Frontage Zone, the effective width of the Pedestrian Zone is reduced by 1 foot, as pedestrians will shy from the building edge.
- The Building Frontage Zone should be maximized to provide space for cafés, plazas, and greenscape elements along building facades, but not at the expense of reducing the Pedestrian Zone beyond the recommended minimum widths.
- The minimum width of the Building Frontage Zone necessary to accommodate sidewalk cafes is 6 feet (see Resources).
- On-site bicycle parking should be conveniently located in relation to building entrances.

POLICY CONSIDERATIONS

- Consider requiring primary building entrances to be visible and directly accessible from the sidewalk.
- Parking encroachment from adjacent parking lots into the Sidewalk Zone should be avoided with the use of appropriate set-backs or barriers such as wheel stops or curb on private property, or by requiring a widened Frontage Zone as a revision to the building code or Wichita Municipal Code.





Street Type	Frontage Zone		Pedestrian Zone		Amenity Zone		Curb Zone
	Pref.	Min. des.	Preferred	Minimum Desirable	Pref.	Min. des.	
Downtown Streets	2' - 6'	0'	12'	8'	8' - 12'	6'	Varies
Business District Streets	2' - 6'	0'	8'	6'	6' - 8'	6'	Varies
Residential Streets	2'	0'	6'	6'	6'	5'	Varies

[Buffer Zone]

← SIDEWALK ZONE →

THE PEDESTRIAN ZONE



BENEFITS

- Sidewalks make walking an easy choice between destinations, they create a network for pedestrian travel throughout the city.
- Sidewalks make access to transit possible since the majority of transit users walk between their destination and transit stops.
- Sidewalks provide public social space.
- Sidewalks provide space for utilities, signs, and amenities such as bus shelters or waiting areas, bicycle parking, public seating, public art, newspaper stands, trash and recycling receptacles, and greenscape elements.

CONSIDERATIONS

- Refer to ADA requirements for sidewalk design. All new sidewalks and curb ramps shall comply with ADA regulations.
- The Pedestrian Zone must meet load-bearing, friction, and other requirements as per relevant standard design specifications and regulations.
- The Pedestrian Zone should be clear of any obstructions including utilities, traffic control devices, trees, and furniture.
- The area within 18 inches of the face of curb should be kept free of all obstructions.
- The width and design of sidewalks will vary

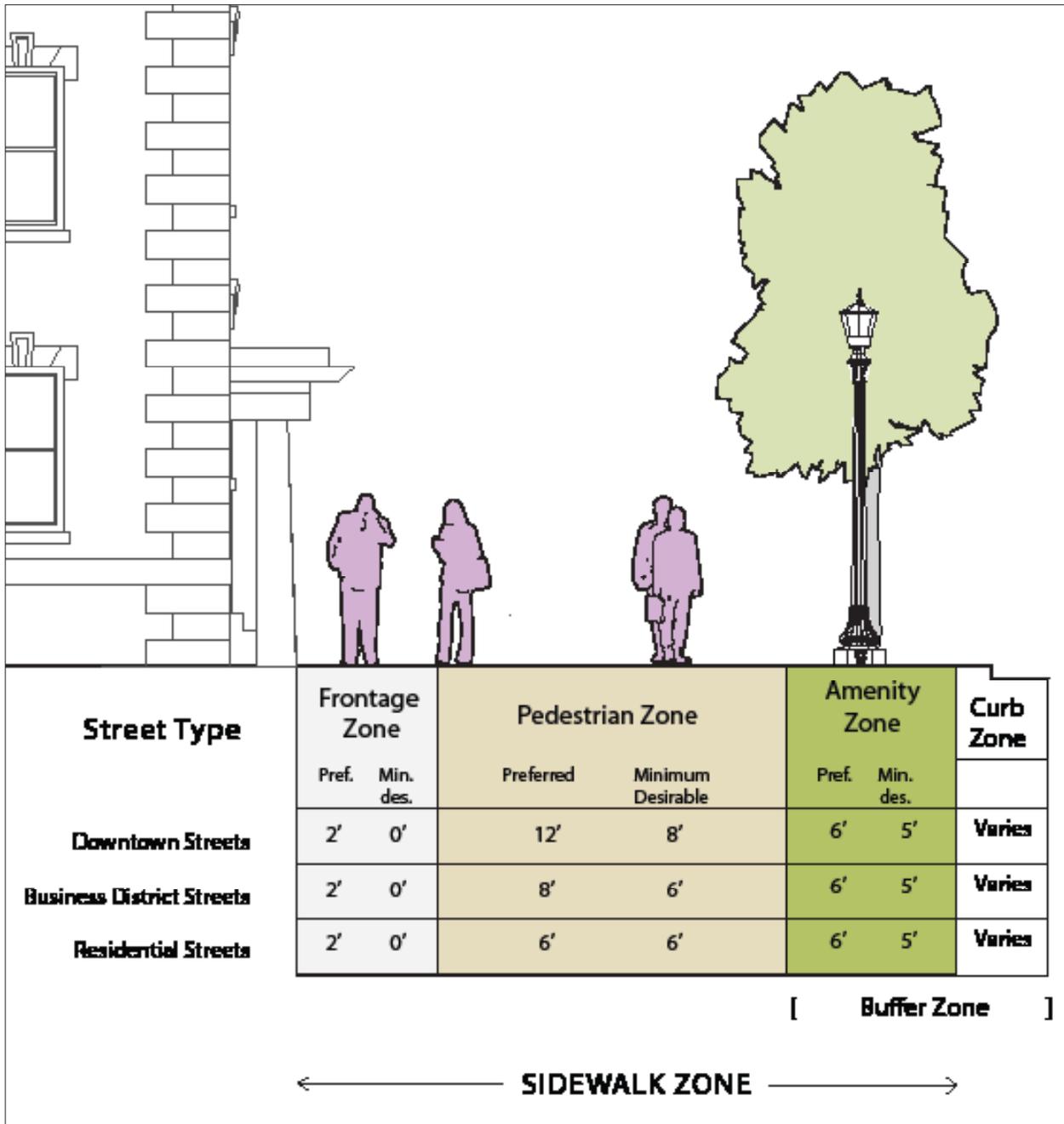
depending on street type, demand, and available right-of-way.

- The Pedestrian Zone should, as much as possible, keep to the natural path of pedestrian travel parallel to the roadway. Ideally, they will be located in a position that naturally aligns with crosswalks at intersections.
- It may be desirable in some locations for the Pedestrian Zone to curve to form a more direct route to an intersecting walkway, to preserve significant trees, or to provide a greater degree of separation between the sidewalk and the roadway.

Policy Considerations

- When reconstructing sidewalks and relocating utilities, all above ground utility access points should be relocated outside of the Pedestrian Zone, where practicable to reduce slip and trip hazards.
- In certain contexts (e.g., business districts, historic areas, major transit stops) pavement materials such as brick, stone or textured concrete may be desired. In such cases a maintenance agreement that identifies the entity responsible for ongoing maintenance will be required.
- Consider stormwater mitigation where feasible, through use of permeable paving, drainage swales and other green infrastructure.

CRASH REDUCTION FACTOR: 65-85%



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
 Designing Sidewalks and Trails for Access: Ch. 4 Sidewalk Design Guidelines and Existing Practices:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm

AMENITY ZONE

DESCRIPTION

The Amenity Zone is the area between the Curb Zone and the Pedestrian Zone. This is where vegetation, utilities, bike parking and street furniture should be located. This zone organizes objects away from pedestrian flow, and simultaneously provides a buffer for pedestrians from the roadway, space for stormwater management, and snow storage. Sidewalk cafes and public art may also be placed within this zone. A buffer between pedestrians in the Pedestrian Zone and motor vehicle traffic creates greater levels of comfort and safety. When the Amenity Zone is not present, parking and bike lanes in the Curb Zone can create an adequate buffer (See Curb Zone). Vertical objects in the Amenity Zone must be strategically placed to not obstruct sight lines, avoid damage from vehicles on the street, and to allow for access to and from parked cars and transit stops.

This zone should also be designed to accommodate winter snow storage and prevent snow from obstructing the Pedestrian Zone. Green infrastructure elements should be designed to make use of stormwater runoff from the sidewalk and/or the street.

The Amenity Zone is where street trees and additional vegetation can be planted. The dimensions of this zone should be taken into consideration when selecting trees and vegetation so that plantings are appropriately accommodated and do not damage the sidewalk as they mature.

BENEFITS

- If parking and bike lanes are absent from the street, then the Amenity Zone serves as part of the Buffer Zone. In that case, the Amenity Zone improves the comfort of pedestrians by distancing them from passing traffic, and the splash zone.
- This Zone provides space for the slope of driveway ramps so that the Pedestrian Zone remains level.
- Keeps the Pedestrian Zone free from obstructions by providing space in which to organize street amenities and utilities.





CONSIDERATIONS

- Curbside sidewalks should be provided only in extreme circumstances where right-of-way is constrained and adjacent property is built-out.
- Where minimum 6 foot Amenity Zone widths cannot be provided due to right-of-way constraints, parked cars and/or bicycle lanes can provide an acceptable buffer zone.
- Utilities, street trees, and other sidewalk furnishings should be set back from curb face a minimum of 18 inches. Allow 3.5 feet for trees
- The minimum width of the Amenity Zone necessary to accommodate sidewalk cafes is 8 feet (including 2 feet of clearance from face of curb).
- Areaways and vaults (empty space under the sidewalk) may limit the possibility of having plantings and street trees).
- To avoid sign clutter, attach new signs to existing poles where appropriate.

Policy Considerations

- For new developments in business districts and where opportunities are available to create additional width, site designs should accommodate wider sidewalks with generous Amenity Zones in the future.
- Permeable paving may be considered where appropriate. Refurbished, reused and recycled materials should be considered.

Downtown Streets

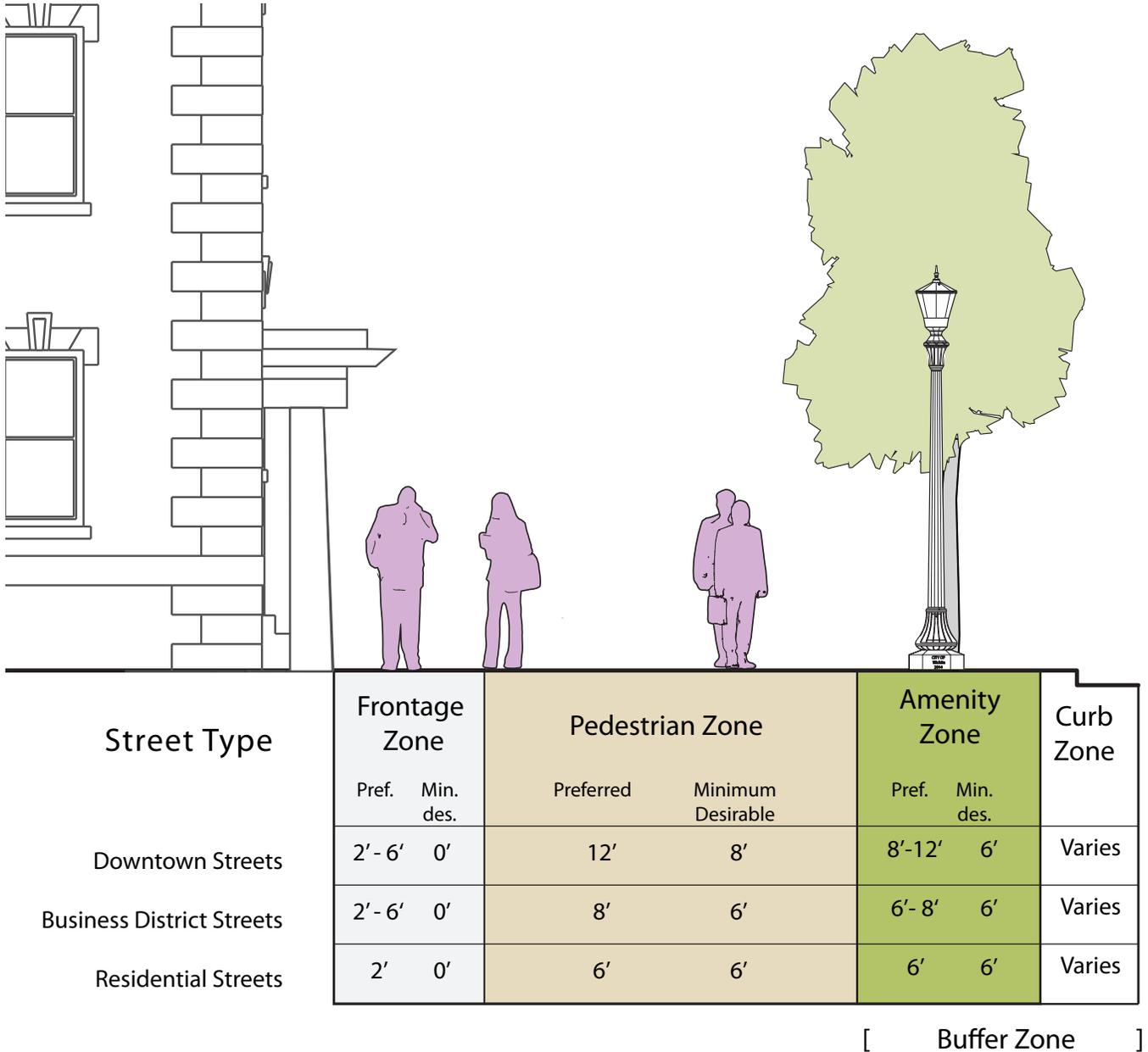
The Amenity Zone is characterized by planters and high-quality finishes. Street furniture, bike parking, public art, wayfinding, sidewalk cafes and unobtrusive utility elements are featured in the Amenity Zone.

Business District Corridors

The Amenity Zone should be as generous as possible and flexible in order to accommodate green infrastructure, public art, transit amenities, sidewalk cafes and public space that supports a variety of activities. Amenity Zone widths can range from 6 feet to 12 feet.

Minimum Lateral Clearances from Objects

From	To	Standard Clearance
Fixed object	Curb face	18 inches (except trees)
Fixed object	Pedestrian Zone	1 foot
Fixed object	Pole face, sign post, fire hydrant	5 feet
Bicycle parking	Curb when adjacent to parking	3 feet
Bicycle parking	Curb when adjacent to vehicle travel lane	2 feet
Bicycle parking	Street trees and street furniture	1 foot
Tree (Centerline)	Face of curb	3.5 feet
Tree (Centerline)	Sidewalk or sidewalk landing	2 feet
Tree (Centerline)	Driveway	7.5 feet
Tree (Centerline)	Edge streetlight poles	20 feet
Tree (Centerline)	Edge of fire hydrants	5 feet



← SIDEWALK ZONE →

CROSSWALK



DESCRIPTION

Marked crosswalks delineate optimal or preferred location for a pedestrian to cross a street, and indicate to motorists where to expect pedestrians. Crosswalk are patterned brick and/or pavement markings. Pavement markings must follow one of the styles as shown in the MUTCD. These include high visibility crosswalks (e.g. ladder style) and lower visibility (e.g. parallel bars). Markings can be installed using white paint, thermoplastic or other pavement marking material.

Brick crosswalks are standard.

BENEFITS

- Aid drivers in seeing the crosswalk, not just the pedestrian.
- Direct pedestrians to preferred crossing locations
- Define the path of pedestrian travel.

CONSIDERATIONS

General

Standard crosswalk marking



High visibility crosswalk marking



- Marked crosswalks should be aligned with the approaching sidewalk and should be located to maximize the visibility of pedestrians while minimizing their exposure to conflicting traffic. Crosswalk placement should balance the need to extend the desired pedestrian walking path with orienting the crosswalk perpendicular to the curb; perpendicular crosswalks minimize crossing distances and therefore limit the time of exposure.
- Marked crosswalks should be at least 10 feet wide or the width of the approaching sidewalk if it is greater. In areas of heavy pedestrian volumes such as downtown, crosswalks should be wider (e.g. 14 to 20 feet).
- ADA-compliant curb ramps should direct pedestrians into the crosswalk. The bottom of the ramp should lie within the area of the crosswalk (flares do not need to fall within the crosswalk).
- Standard parallel line markings are acceptable (per MUTCD), however they may be less visible to motorists.
- The design of marked crosswalks at uncontrolled locations should incorporate additional crossing treatments depending on the number of travel lanes, vehicle speed, and the volume of vehicles in a given location.
- The use of brick to identify a crossing must also include MUTCD compliant parallel markings demarcating the crosswalk extent.
- Advanced stop lines at stop-controlled and signalized intersections, when used, should be striped no less than 4 feet and no more than 30 feet from the edge of the crosswalk.
- Use crosswalk marking materials that are non-skid and retroreflective.

- High visibility (ladder) style crosswalks should be used at more prominent crossings, while parallel (two lines) can be used elsewhere.
- Implementation strategy: secure funding and establish a program to remark all crosswalk over several years per the existing maintenance protocol.

Crosswalks at uncontrolled locations

Crosswalk installation at uncontrolled locations require careful consideration. The table below contains guidelines for intersection and mid-block locations with no traffic signals or stop sign on the approach to the crossing. They do not apply to school crossings. Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing roadway geometry, substantial volumes of heavy trucks, etc. without first providing adequate design features and/or traffic

control devices. Adding crosswalks alone will not make a crossing safer, or necessarily result in more vehicles stopping for pedestrians. Whenever marked crosswalks are installed, it is important to consider other pedestrian facility enhancements, as needed, to improve the safety of the crossing (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic calming measures, bump outs).

- These are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.
- Where speed limit exceeds 40 mph, marked crosswalks alone should not be used at unsignalized locations.

Marked Crosswalks

Marked crosswalks may be installed in the following locations and may also include additional signing:

General Guidelines for Installing Marked Crosswalks and Other Needed Pedestrian Improvements at Uncontrolled Intersections*

Number of Lanes	Vehicle ADT											
	9,000 or fewer			9,000 - 12,000			12,000 - 15,000			More than 15,000		
	Speed Limit			Speed Limit			Speed Limit			Speed Limit		
	30 mph	35 mph	40 mph	30 mph	35 mph	40 mph	30 mph	35 mph	40 mph	30 mph	35 mph	40 mph
Two Lanes	A	A	B	A	A	B	A	A	C	A	B	C
Three Lanes	A	A	B	A	B	B	B	B	C	B	C	C
Four or More Lanes with Raised Median	A	A	B	A	B	C	B	B	C	C	C	C
Four or More Lanes w/o Raised Median	A	B	C	B	B	C	C	C	C	C	C	C

A = Candidate Site for Marked Crosswalk . Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to show whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volumes, vehicle speeds, sight distance, vehicle mix, etc., may be needed at other sites.

B = Possible Increase in Pedestrian Crash Risk May Occur if Crosswalks Are Added without Other Pedestrian Facility Enhancements. These locations should be closely monitored and enhanced with other pedestrian crossing improvements, if necessary, before adding a marked crosswalk.

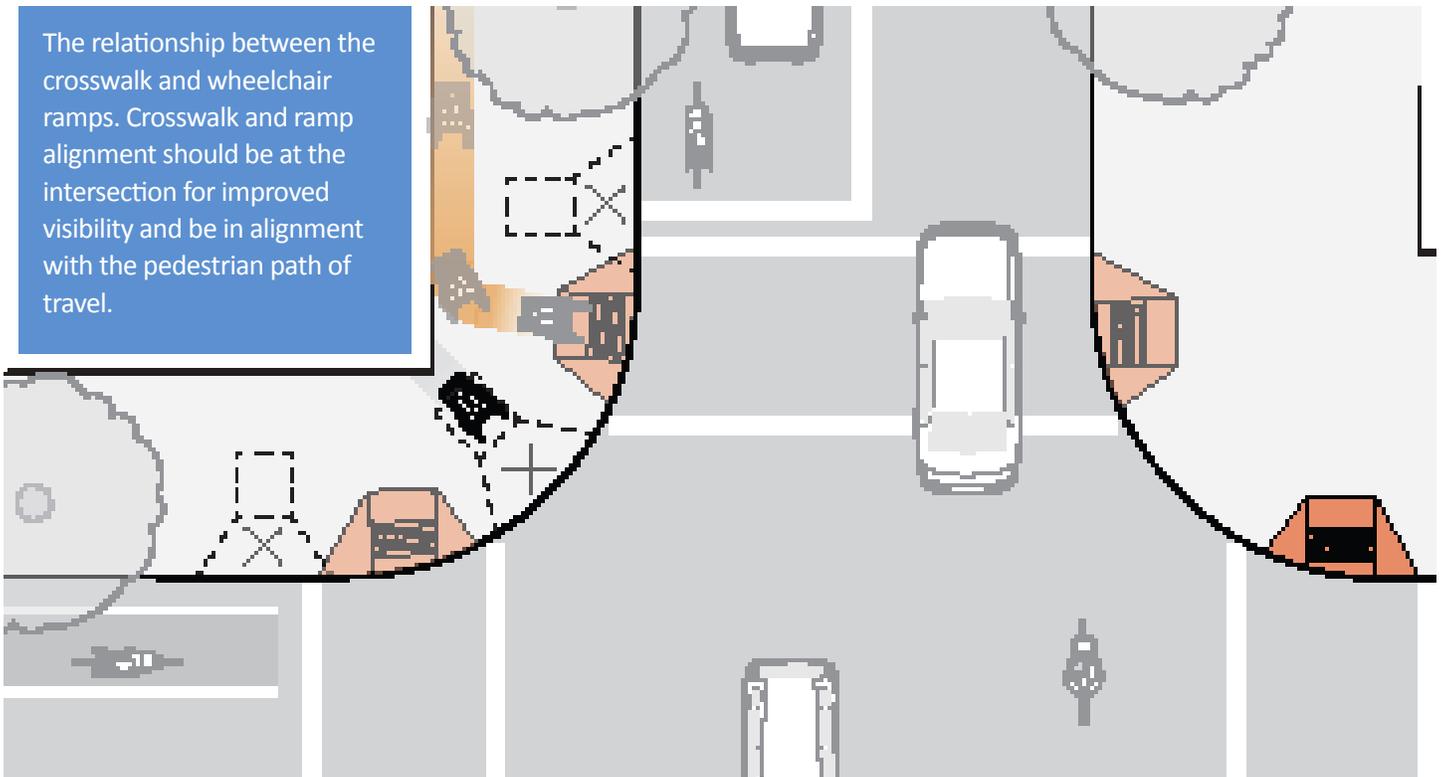
C = Marked Crosswalks Alone Are Insufficient, Since Pedestrian Crash Risk May Be Increased By Providing Marked Crosswalks Alone. Consider using other treatments, such as traffic signals with pedestrian signals, to improve crossing safety for pedestrians.

* Adapted from Zegeer, C.V., Stewart, R.J., Huang, H.H., and Lagerwey, P.A. Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines. FHWA-RD-01-075. Federal Highway Administration, Washington, D.C., 2002.

CROSSWALKS CONT.

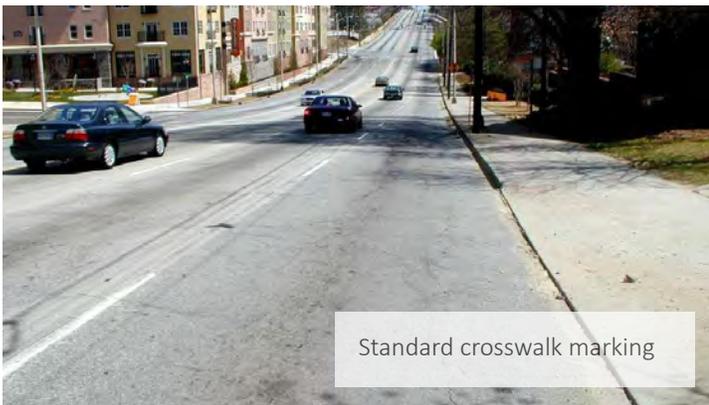
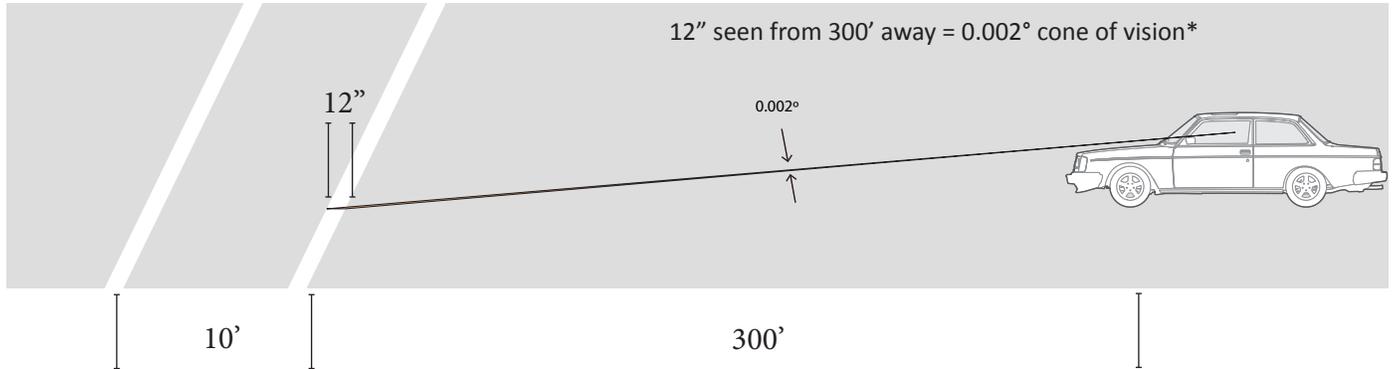
- Locations where traffic is controlled by traffic signals or signs such as a four-way stop. Signalized intersection crosswalks are typically marked at all four crossings where there are sidewalks leading to the intersection. In some cases there may be specific reasons to direct pedestrians to a particular crossing, and therefore not mark one or more legs of the intersection. At stop-controlled intersections all four legs may be marked or only two depending on whether there are reasons to direct pedestrians to a preferred crossing (e.g. poor sight-lines, slope etc.).
- At school crosswalks, which may include special school crossing signs at uncontrolled or mid-block locations to further communicate to motorists that children are likely to use the crossing.
- At crosswalk locations where there are no signs or signals to control traffic using the decision making factors described on the previous page.
- At mid-block locations, including pedestrian or off-road path crossings. These crosswalks may be accompanied by warning signs, advanced stop bars or other crossing treatments depending on the roadway traffic conditions. Mid-block locations must be marked to be a legal crossing.
- It is recommended that a higher priority be placed on the use of marked crosswalks at locations having a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians per peak hour).
- Crosswalk placement should balance the need to extend the desired pedestrian walking path with orienting the crosswalk perpendicular to the curb; perpendicular crosswalks minimize crossing distances and therefore limit the time of exposure.
- Markings may be installed so that the primary paths for vehicle tires are between crosswalk markings, which can reduce wear and maintenance.

The relationship between the crosswalk and wheelchair ramps. Crosswalk and ramp alignment should be at the intersection for improved visibility and be in alignment with the pedestrian path of travel.

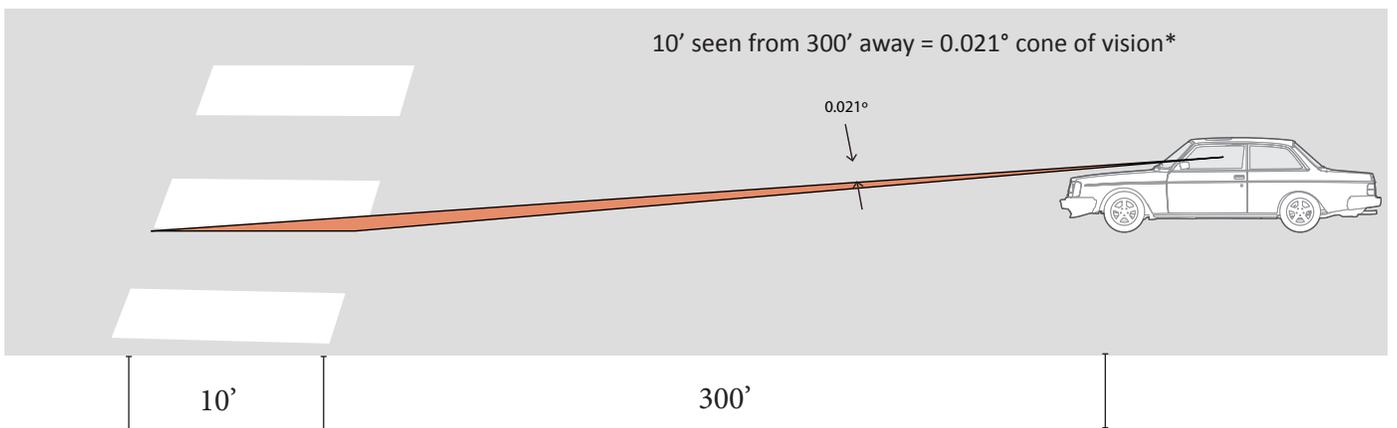




Standard crosswalk marking



High visibility crosswalk marking



*Assumes a constant grade

RESOURCES:

Manual on Uniform Traffic Control Devices Section 3B.18 Crosswalk Markings <http://mutcd.fhwa.dot.gov/pdfs/2009/part3.pdf>
 PedSafe—Marked Crosswalks and Enhancements
 FHWA—Designing Crosswalks and Trails for Access

CROSSING ISLAND



DESCRIPTION

Crossing islands (also known as center islands, refuge islands, pedestrian islands, or median slow points) are raised islands placed in the center of the street at intersections or mid-block.

BENEFITS

- Crossing islands allow pedestrians to deal with only one direction of traffic at a time by enabling them to stop partway across the street and wait for an adequate gap in traffic before crossing the second half of the street.
- Crossing islands are effective at reducing crashes at uncontrolled locations on busy multi-lane roadways where gaps are difficult to find, particularly for slower pedestrians, such as pedestrians with disabilities, older pedestrians and children.

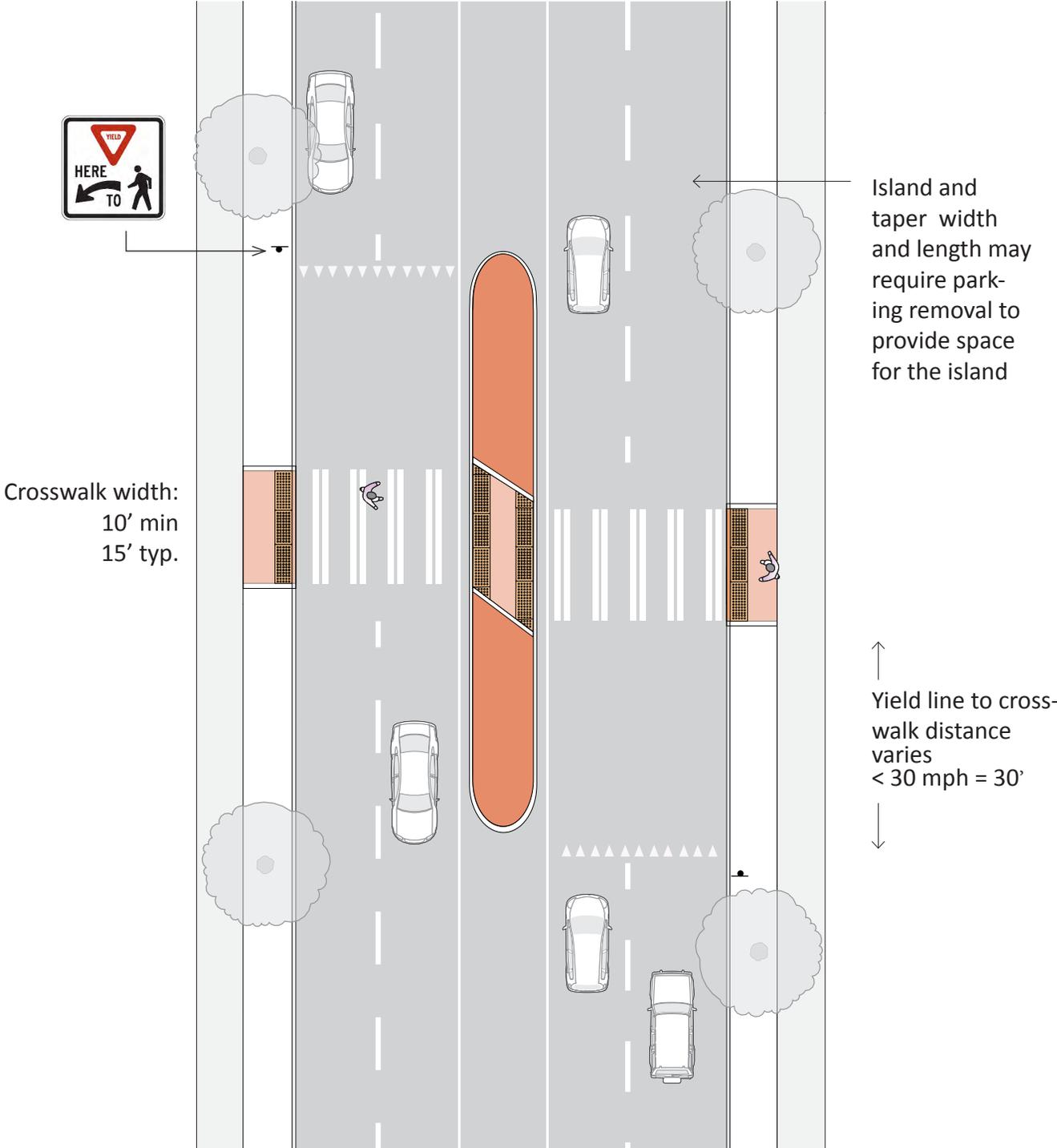
CONSIDERATIONS

The design of crossing islands and incorporation of additional crossing treatments depends on the number of travel lanes, vehicle speed, and the volume of vehicles in a given location.

- Crossing islands should be a minimum of 6' wide to accommodate the typical width of a bicycle; however, the recommended width is 10' to accommodate bicycles with trailers.
- Crossing islands should be aligned directly with marked crosswalks and provide an accessible route

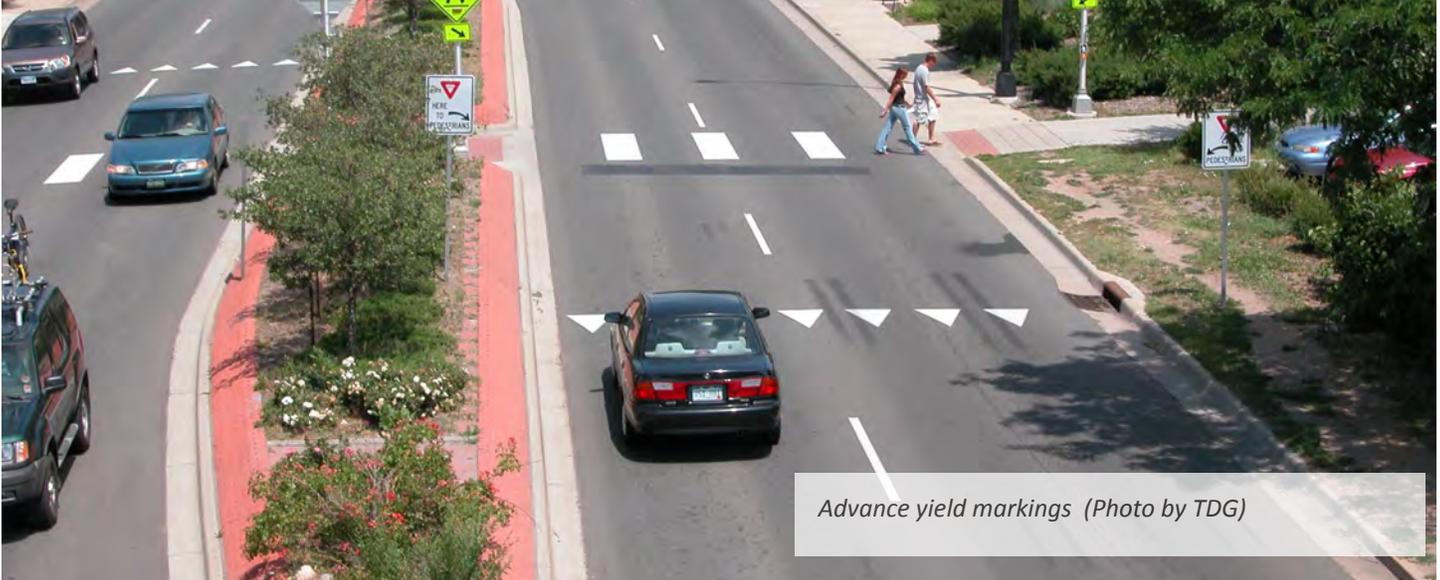
of travel (per current accessibility guidelines).

- Where mid-block or intersection crosswalks are installed at uncontrolled locations (i.e., where no traffic signals or stop signs exist), crossing islands should be considered as a supplement to the crosswalk, and should be designed with a stagger forcing pedestrians to face oncoming traffic before progressing through second phase of the crossing.
- They are appropriate at signalized crossings and may improve safety for vehicles by dividing traffic streams.
- The crossing should be outside the functional area of adjacent intersections.
- The crossing should be high visibility to both road users and sidewalk/pathway users.
- Sight lines should be maintained to meet the needs of the traffic control provided.
- The crossing and approaches should be on relatively flat grades.
- The crossing should be as close to a right angle as practical, given the existing conditions.
- The least traffic control that is effective should be selected. MUTCD signs R1-6a, R1-6b, R1-9a, and R1-9b may be used.
- If there is enough width, center crossing islands and curb extensions can be used together to create a highly visible pedestrian crossing and effective traffic calming.



RESOURCES: AASHTO Guide for Development of Bicycle Facilities
AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
2009 MUTCD
FHWA Proven Safety Countermeasures: http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_011.htm

ADVANCE YIELD LINES



DESCRIPTION

Advance stop lines and yield markings improve the visibility of pedestrians to motorists, and can prevent multiple-threat crashes.

BENEFITS

The multiple-threat crash risk usually occurs at crosswalks on multi-lane roadways if motorists yielding to pedestrians block the view of the pedestrian attempting to cross the roadway from other motorists in the adjacent travel lane. The motorist proceeding in the adjacent lane doesn't notice the first car has stopped to let a pedestrian cross, and the pedestrian continues to cross without seeing the other car coming. This situation can result in a high-speed crash, which usually leads to fatalities or very severe injuries. Stop and yield lines provide space between stopped vehicles and the crosswalk to improve visibility.

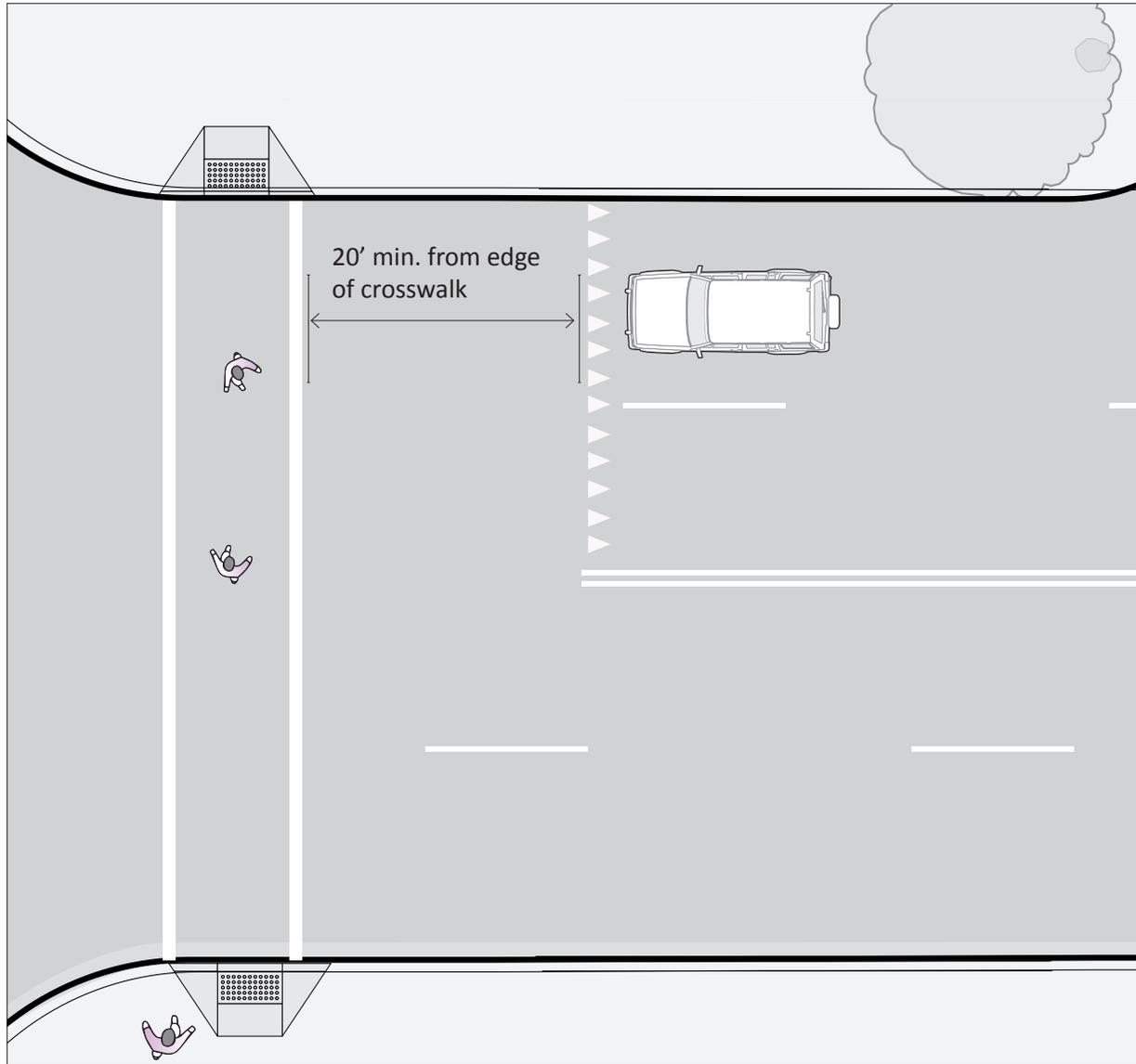
CONSIDERATIONS

An advance stop or yield line placed 20 to 50 feet ahead of the crosswalk can greatly reduce the likelihood of a multiple-threat crash at unsignalized midblock crossings, as the line encourages drivers to stop back far enough so a pedestrian can see if a second motor vehicle is not stopping and be able to take evasive action. A setback of 30 feet for the line has been found

to be a good distance for most purposes.

- Parking should be restricted between the stop or yield line and the crosswalk to allow for better visibility.
- The advance stop or yield line should be supplemented with "Yield Here For Pedestrians" signs (R1-5 or R1-5a) to alert drivers where to stop to let a pedestrian cross. One study found that use of a "sign alone reduced conflicts between drivers and pedestrians by 67 percent, and with the addition of an advanced stop or yield line, this type of conflict was reduced by 90 percent compared to baseline levels." The decision to use an advance stop or yield line depends on state law. Most states require drivers to yield to pedestrians; about a dozen states require drivers to stop for pedestrians. Kansas is a yield state.
- Studies have found that advance yield markings at midblock crossings can be particularly useful when combined with signs and beacons, such as the Pedestrian Hybrid Beacon or rectangular rapid flash beacon (RRFB).

CRASH REDUCTION FACTOR: RESEARCH INCOMPLETE



AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
RESOURCES: 2009 MUTCD

CURB RAMPS

Curb ramp (Photo by TDG)



DESCRIPTION

A curb ramp is a cut in the curb that grades down from the sidewalk to the surface of the street. The combined ramp and landing provide pedestrians a smooth transition from the sidewalk to the street. Appropriately designed curb ramps are critical for providing access across intersections and at designated midblock crossing locations for people with mobility and visibility disabilities, as well as people pushing strollers, grocery carts, suitcases, or bicycles. The Americans with Disabilities Act (ADA) guidelines require all pedestrian crossings be accessible to people with disabilities by providing curb ramps where there are curbs.

BENEFITS

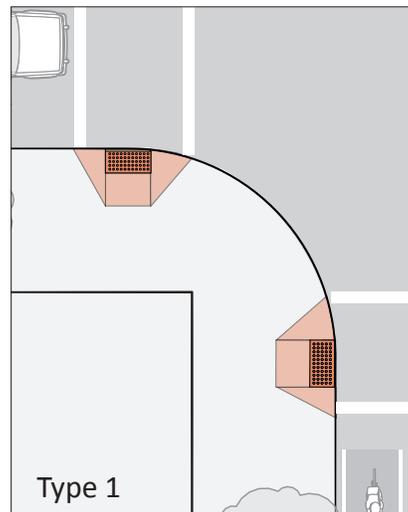
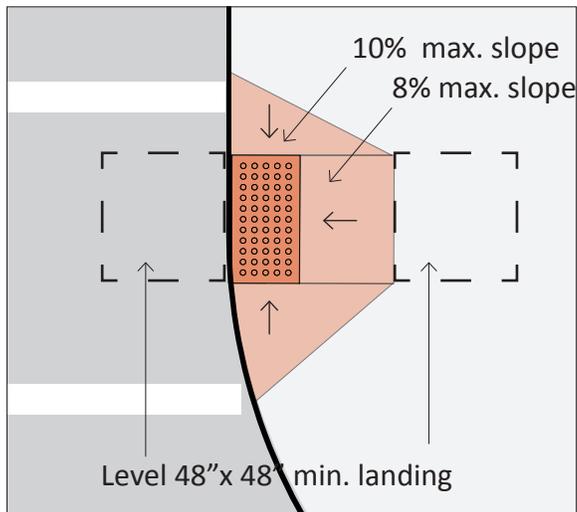
- Make sidewalks and street crossings accessible to wheel chair users, and others who rely on wheels for mobility.
- Curb ramps provide guidance for visually impaired people who use curb ramps for information about where to safely cross the street.

DESIGN CONSIDERATIONS

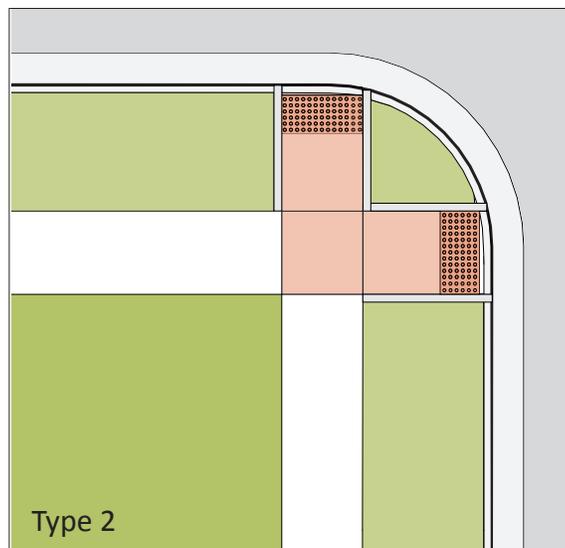
- A curb ramp (not including the flares) must be totally contained within the marked crosswalk where a marked crosswalk is provided.
- Detectable warning strips must be installed at all roadway crossings, regardless of whether there is a grade separation.
- Detectable warning strips must ensure a 70% contrast in color with the surrounding pavement.

- Raised crossings or intersections or the absence of curbs eliminate the need for curb ramps, but does not eliminate the need for detectable warning strips.
- In areas with high pedestrian volumes, curb ramps should generally be as wide as the Pedestrian Zone on the approaching sidewalk.
- Wherever feasible, curb ramp locations should reflect a pedestrian's desired path of travel through an intersection. This means providing two separate curb ramps at a corner instead of a single ramp that opens diagonally at the intersection. A single ramp should only be considered where physical constraints (e.g. lack of right-of-way) make the installation of two ramps cost prohibitive.
- Flares are required when the surface adjacent to the ramp's sides is walkable (See Type 1 on the following page). Flares are unnecessary when this space is occupied by a landscaped buffer. A curb may be used if a flare is not used (See Type 2 on the following page).
- Design curb ramps to avoid the accumulation of water or debris. One strategy for preventing water accumulation is to locate drainage inlets on the uphill side of the ramp. During winter, snow must be cleared from curb ramps to provide an accessible route.
- A curb bulb may provide additional space to optimize curb ramp locations.

CRASH REDUCTION FACTOR: NOT AVAILABLE



Curb ramps should be perpendicular to the curb to direct pedestrians properly into the crosswalk. Multiple styles of curb ramp can be used to meet ADA curb ramp requirements. Two perpendicular ramp styles are pictured (Type 1 & 2). Additional styles and guidance can be found below within in the Resources.



RESOURCES:

Designing Sidewalks and Trails for Access: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks207.cfm
US Access Board Proposed Rights of Way Guidelines: <http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines/chapter-r3-technical-requirements>
City of Wichita Detail Sheet: Curb Ramp

PEDESTRIAN SIGNALS



Pedestrian signal (Photo by TDG)

DESCRIPTION

The federal Manual for Uniform Traffic Control Devices (MUTCD) establishes warrants for the use of most traffic control devices. Within the parameters of the MUTCD, a pedestrian inclusive approach to signalized intersection design includes good geometric design, convenience and ease of use of pedestrian push-button actuators, signal timing techniques that favor pedestrians and other users, as well as techniques that reduce conflicts with turning vehicles. This can help address safety for all modes and ensure Americans with Disabilities Act (ADA)-compliance as part of a street design that is balanced with the conditions of the location.

BENEFITS

- Tools that make crossing streets easier, safer, and more convenient removes barriers to walking and increases connectivity.

CONSIDERATIONS

Pedestrian Signal Timing Standards

- Calculating pedestrian crossing times and programming signals in a way that accommodates all users is an important way to make signalized intersections more accessible. In all cases, pedestrian crossing times shall meet the minimum standards in the most current MUTCD.
- Providing additional time should be considered on a case by case basis, depending on pedestrian and vehicular volumes, user type and other safety factors as may be appropriate.

Pedestrian push-button actuators

Pedestrian push-button actuators are electronic buttons used by pedestrians to provide a walk interval during a signal phase. If they are present, pedestrians must push the button to get a walk interval; otherwise a walk interval will not be included in the next signal phase.

- Push-button actuators may be needed at some crossings, but their use should be based on best device applicability for conditions.
- In typical downtown, neighborhood centers and other areas of high pedestrian activity, pedestrian push-button actuators can be set to a fixed time and a push-button actuation is not necessary; pedestrians expect and should get a pedestrian cycle at every signal phase.
- At more complex intersections (e.g., where there are more than one signal phase for each direction) or where pedestrian volumes are lower, push buttons should be considered.
- Buttons must be properly placed so that they are convenient and conspicuous to pedestrians and follow MUTCD and ADA placement requirements.

Accessible Pedestrian Signals

Accessible Pedestrian Signals (APS) provide pedestrian signal information in audible and vibrotactile formats for hearing- and sight-impaired people. They benefit all pedestrians by providing redundancy and are useful to a wider range of the population – people with cognitive impairments, children, and the elderly.

CRASH REDUCTION FACTOR: VARIES

- APSs locations should be evaluated on a case by case basis against standard engineering practice.
 - The location of the APS is critical to the proper functioning.
 - APS can be used during exclusive pedestrian phases of leading pedestrian intervals (LPI).
 - Place accessible pedestrian push-button assemblies within 10 feet from the center of the curb ramp, measured from the front of the curb or per MUTCD section 4E.08. Orient the face of the push-button parallel to the crosswalk.
- Some key features of APS, which are integrated into the push button:
- Speakers at the push-button actuator with automatic volume adjustment so that tones are audible within 6 feet minimum to 12 feet maximum of the button
 - A push button locator tone or street name
 - Audible WALK indications that feature a tone or speech message during WALK
 - Vibrotactile WALK indications that feature a tactile arrow or other surface on the button that vibrates during the WALK phase.

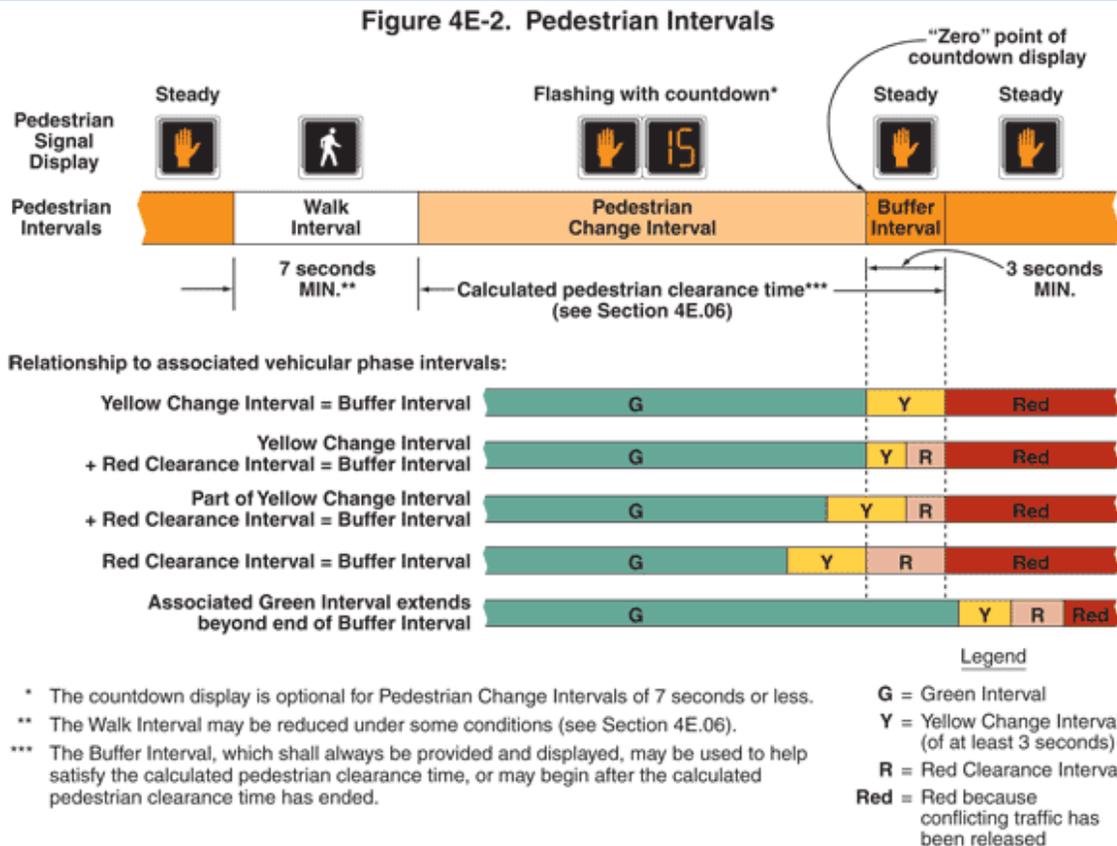
Protected and Permissive Phase

See Protected Left Turn Phase

Pedestrian Phase Signal Timing Standards

The MUTCD provides guidance on options for signal timing. Some state law allows cities to designate, by ordinance, specific pedestrian safety crossings where signal timing may be increased to be consistent with signal timing recommended in MUTCD for senior citizen and disabled pedestrian crossings. Consider using a walking speed of less than 3.5 to accommodate slower pedestrians.

Figure 4E-3 from the MUTCD outlines the intervals for pedestrian signal phasing and the relationship with traffic signals.



RESOURCES:

PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=51
 AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
 2009 MUTCD: <http://mutcd.fhwa.dot.gov/htm/2009/part4/part4e.htm#figure4E02>

LEADING PEDESTRIAN INTERVAL



DESCRIPTION

A Leading Pedestrian Interval (LPI) is a signal phasing strategy to improve visibility of pedestrians crossing at signalized locations and reduce conflicts between turning vehicles by giving pedestrians entering the crosswalk area a head start. During the LPI, motor vehicles expecting the next green phase are stopped for three to seven additional seconds while parallel-traveling pedestrians are given the WALK signal. This is designed to allow pedestrians to begin crossing in advance of vehicular turning movements, which allows them to clearly establish themselves in the crosswalk in a position that is more visible to the motorist. In many cases, an LPI is a simple, inexpensive treatment because the signal controller can be retimed relatively easily or programmed to operate only during peak pedestrian demand times.

BENEFITS

- LPIs increase yielding to pedestrians by motorists.
- LPIs are simple, inexpensive treatment that can be used with minimal disruption to traffic flow if it is programmed to operate during peak pedestrian demand times

CONSIDERATIONS

- LPIs should be considered in locations with heavy volumes of turning traffic and frequent pedestrian crossings, particularly where there have been collisions between turning vehicles and pedestrians in the crosswalk.
- An LPI should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic.
- Accessible pedestrian signals should be considered where an LPI is used.
- In the case of a large corner radius, the duration should be timed to allow pedestrians to travel far enough to establish their position ahead of the turning traffic before the turning traffic is released.
- An LPI is particularly useful for intersections where school children and seniors cross the street.
- An LPI could be considered at intersections with counter-flow bicycle lanes, especially where the through movement of counter-flow bicycles is concurrent with left-turning vehicles.
- LPIs can be complemented by geometric design changes to the intersection that shorten crossing distances and reduce the required duration for the WALK phase of the signal.
- The LPI is most effective when accompanied by a No Turn on Red restriction for right-turning traffic on adjacent streets.
- The LPI is more effective when used with a high visibility crosswalk.

Right turn restrictions can be important to enforce with the use of LPIs. The following standard MUTCD signs can be used both low near the turning motorist and on the mast arm next to the signal to remind drivers of the restriction.



R10-11

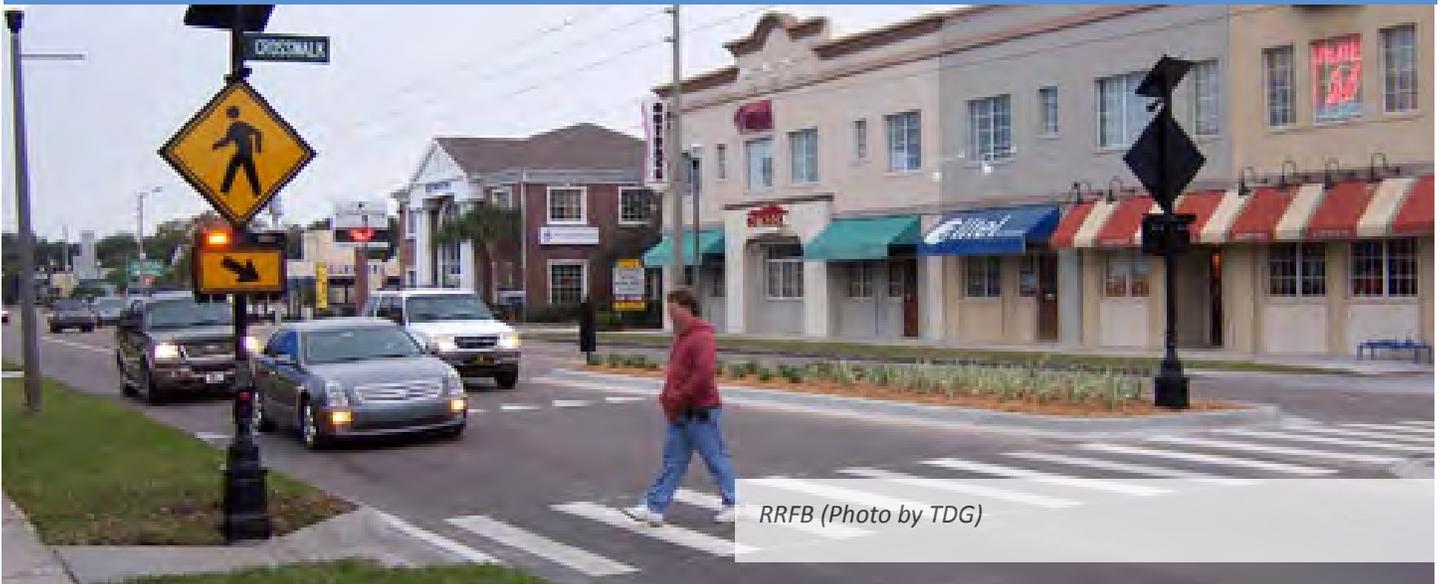


R10-7

RESOURCES:

PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=12
AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
2009 MUTCD

RECTANGULAR RAPID FLASH BEACONS



RRFB (Photo by TDG)

DESCRIPTION

A Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian warning signal consisting of yellow LED lights in two rectangular clusters, or beacons, that employ a stutter-flash pattern similar to that used on emergency vehicles. The beacons are often mounted below a standard pedestrian crossing warning sign and above the arrow plaque used to indicate the crossing location. RRFBs are pedestrian actuated either by a push-button or passive detection.

BENEFITS

- Increased yielding behavior by motorists at pedestrian crossings.

CONSIDERATIONS

- Beacons must be placed on either side of roadway and visible from both directions of traffic. If a median exists at the crossing location, a third beacon may be placed in the median, which studies show, significantly increases motorist yield rates. RRFBs may be used at uncontrolled intersections and mid-block crossings.
- RRFBs should be accompanied by pedestrian crossing signs (MUTCD W11-2) both at the signal and in advance of the crosswalk location. The

assembly approaching the crossing should include a plaque that says AHEAD. The assembly at the location should include a downward arrow plaque (MUTCD W16-7P) placed at the crosswalk location.

- A STOP HERE FOR PEDESTRIANS (MUTCD R1-5b/R1-5c) sign with advanced yield bars should be placed a minimum 30 feet from the crosswalk then the distance should be based on roadway speed and should be considered where RRFBs are installed. A Pedestrian Crossing (MUTCD W11-2) sign with an AHEAD or a distance supplemental plaque may be used in conjunction with and in advance of a MUTCD R1-5b/R1-5c sign.
- RRFBs should be considered at uncontrolled intersections or at mid-block crossings where additional measures are needed due to high volumes and speeds.
- They should be considered where there are high volumes of pedestrians, a high number of vulnerable pedestrians (e.g., near schools, senior centers), or at off-street path crossings.
- In order to encourage pedestrians to enter crosswalk while the RRFB is active, passive or active actuation should trigger an immediate response.



R1-5

If a rectangular rapid flash beacon is placed at an uncontrolled location, an advanced yield line should be installed with the appropriate R1-5 sign. This provides adequate yielding distance for pedestrians in the crosswalk.



W11-2 and W16-7p

A rectangular rapid flash beacon should be placed with a pedestrian crossing warning sign. A fluorescent yellow color is preferred for optimum visibility.

RESOURCES:

PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=54
FHWA: <http://safety.fhwa.dot.gov/intersection/resources/techsum/fhwasa09009/>
2009 MUTCD: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm

PROTECTED LEFT TURN PHASE



Left turn signal (Photo from safety.fhwa.dot.gov)

DESCRIPTION

At signals, turning movements account for most pedestrian crashes, and the ratio of crashes for left/right turns is roughly 2:1. Permissive left-turns allow vehicles to make a left turn on green when oncoming travel lanes are clear. Often pedestrians are given a walk signal at the same time that vehicles are permitted to turn left on a green light. Left-turning motorists are often focused on watching for oncoming traffic and commonly don't look for pedestrians, which results in the potential for collisions pedestrians in the crosswalk.

A protected left-turn phase (red ball followed by a green signal arrow followed by a green ball) provides a dedicated left turn and then a permissive left turn if pedestrians are not present and eliminates the need for motorists to wait for gaps in on-coming traffic. For double left turns a permissive left with a pedestrian walk signal is not allowed.

Protected left-turn phases make it clear to drivers they must wait before turning, thus allowing pedestrians to cross during the red arrow signal phase. Pedestrians will get a DONT WALK during the green arrow, protected left-turn phase. Sometimes a protected left-turn phase is followed by a permissive green. The permissive left-turn phase is concurrent with the Walk phase and often results in a higher number of pedestrian crashes. Right-turns are virtually always permissive but typically do not result in higher crash rates. However in locations where pedestrian collisions involving right-turning vehicles are reported, tools such as protected right-turn phases, RIGHT-TURN-ON-RED restrictions, or leading

pedestrian intervals should be considered.

BENEFITS

- Protected left turns, are safer for pedestrians, because they cross the street after left-turning cars have moved through the intersection.
- Protected left turns can also help to reduce vehicle-vehicle collisions.

CONSIDERATIONS

In addition to protected turn phases, the MUTCD has some signing applications that can be used in conjunction with traffic signals to enhance pedestrian crossing.

- Combination protected-permissive phasing should be provided by default, but should revert to protected-only when pedestrian push buttons are pushed, or based on the time of day.
- Manual for Uniform Traffic Control Devices sign R10-5, with a yield and a pedestrian symbol, can be used to remind drivers to yield to pedestrians. Signs should be placed where drivers will see them.
- A flashing yellow arrow during the steady green light can be provided to warn drivers to yield to pedestrians and oncoming vehicles. However, a red arrow is preferred for pedestrian safety because drivers may not be as attentive to pedestrians crossing.
- Because they add an additional signal interval, protected left turns may add delay to all movements.
- Additional engineering judgement is required for locations with high on-coming volumes of traffic.



R10-9



R10-5

These MUTCD signs are often mounted on the mast arm next to the left turn signal.

RESOURCES:

PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=51
AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
2009 MUTCD

CURB EXTENSION

DESCRIPTION

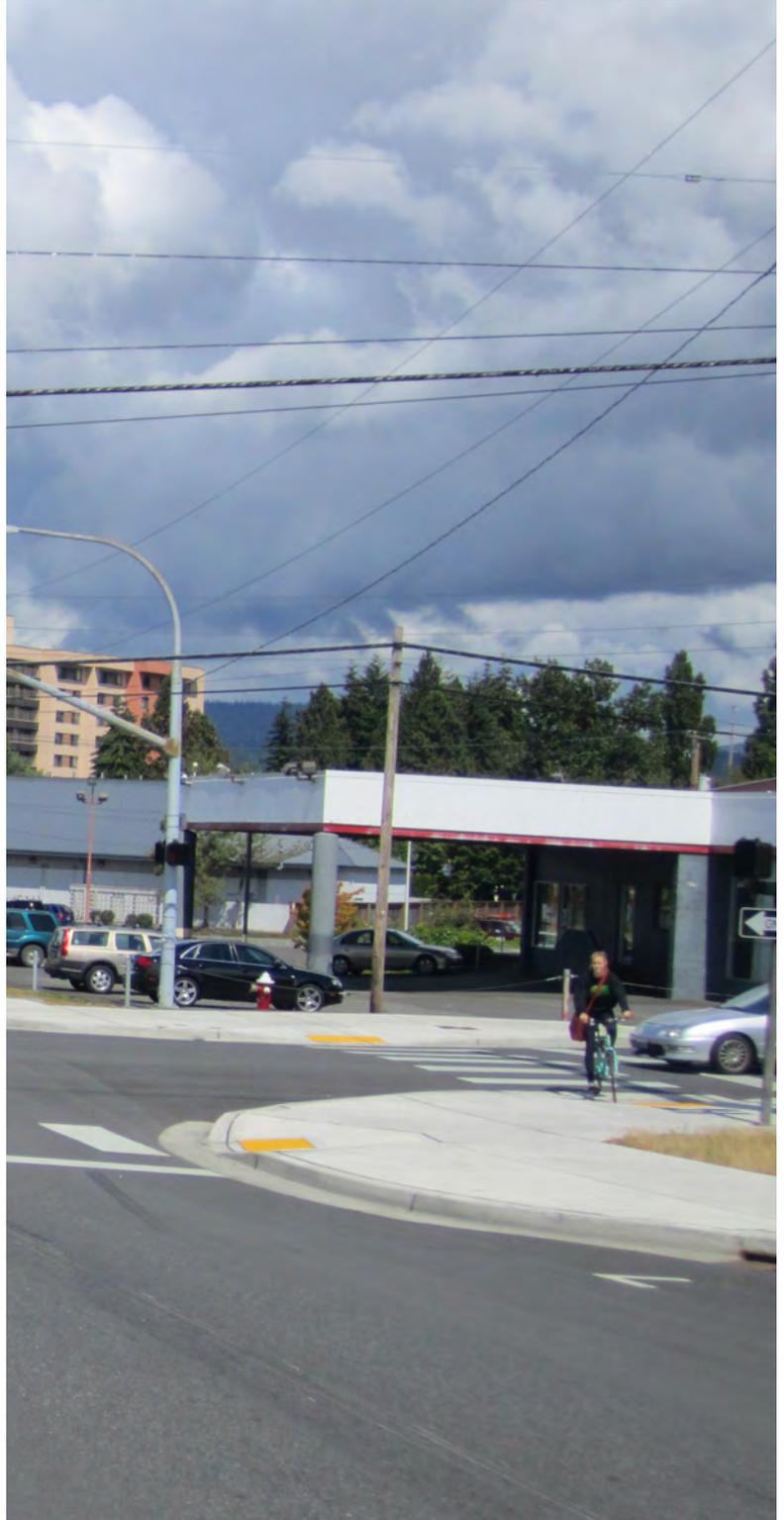
Curb extensions are created by extending the sidewalk or curb line into the roadway. Curb extensions are intended to increase safety, calm traffic (particularly right-turning vehicles), and provide extra space along sidewalks for users and amenities.

BENEFITS

- Curb extensions shorten crossing distances (exposure time) and increase visibility between roadway users: as the waiting pedestrian can better see approaching traffic and drivers can better see pedestrians waiting to cross the road.
- This treatment is particularly valuable in locations with high volumes of pedestrian traffic or where there are demonstrated pedestrian safety issues.
- May provide space for Americans for Disabilities Act (ADA) compliant, directional curb ramps where sidewalks are narrow.
- Curb extensions may provide space for utilities, signs, and amenities such as bus shelters or waiting areas, bicycle parking, public seating, public art, street vendors, newspaper stands, trash and recycling receptacles, and greenscape elements.

DESIGN CONSIDERATIONS

- Curb extensions should only be considered where on-street parking is present.
- Curb extensions can be located at intersections, midblock or at unsignalized pedestrian crossings.

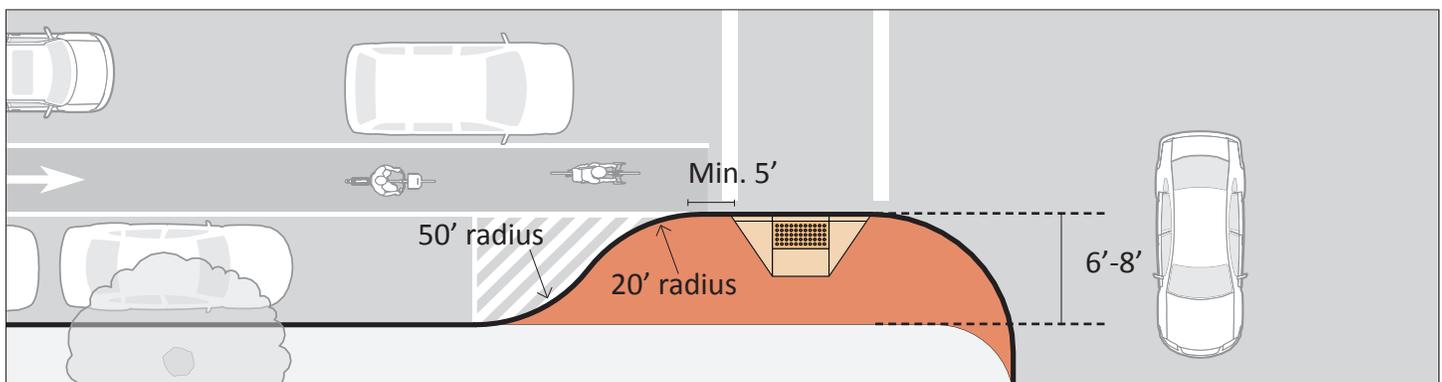
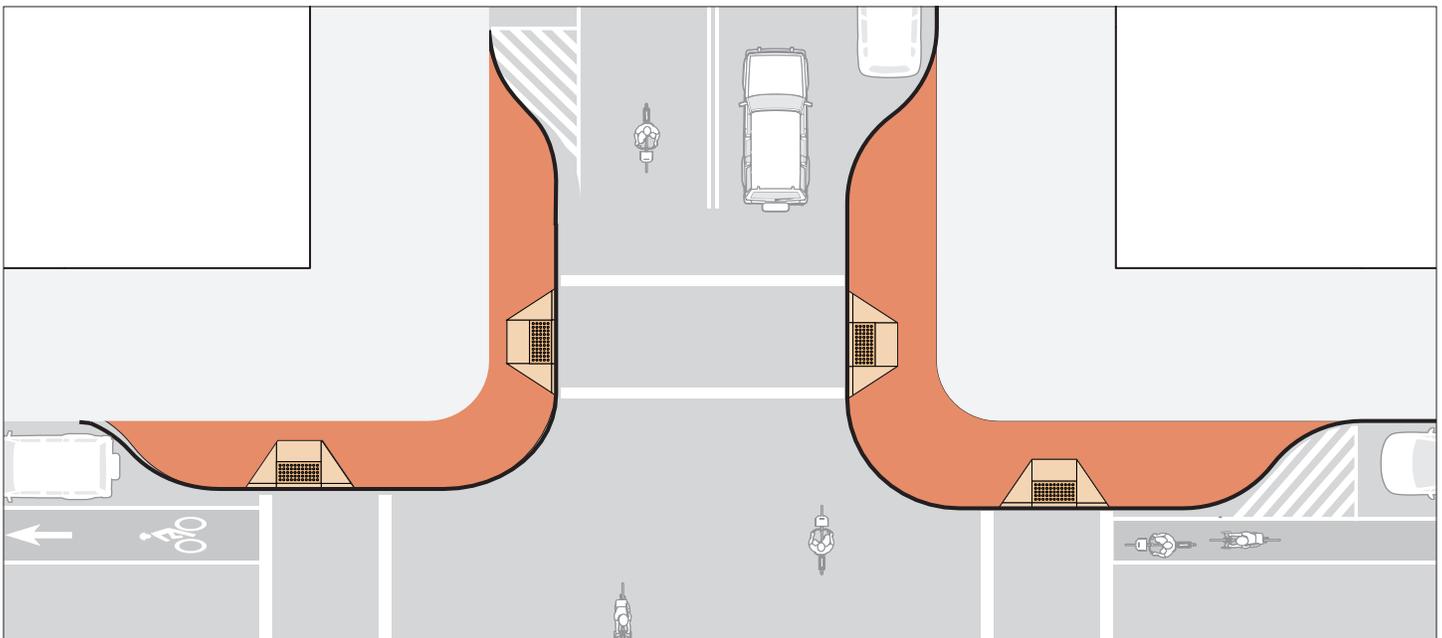


Curb -xtension

CRASH REDUCTION FACTOR: NOT AVAILABLE

- Take into consideration the turning needs of larger vehicles, bicycle needs approaching the curb extension, drainage, snow removal and street sweeping, restricting parking, and matching the width of the crosswalk.
- When a bike lane is present, curb extensions should be designed to be 1 foot less than the adjacent parking lane to provide enough shy distance for bicycle pedals.
- When there is no bike lane curb extensions can be 6 inches less than the adjacent parking lane width.
- For a 7-8 foot wide parking lane with bike lane, build the curb extension to 6 feet in width. This way there is adequate space for the bike lane line stripe and clearance from the curb for bicyclists. If there is no bike lane the curb can be built at 6.5 feet.
- The distance between the crosswalk and the tangent of the curb should be a minimum of 5 feet.

Below is a roadway improved with curb extensions on each corner.



RESOURCES:

PEDSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=5
NACTO: <http://nacto.org/usdg/street-design-elements/curb-extensions/>
AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities

CURB RADIUS



Curb radius (Photo by Michael Hintze)

DESCRIPTION

Curb radii are the curved connection of curbs at the corners formed by the intersection of two streets, which guide vehicles in turning corners. The shape of a curb radius has a significant effect on the overall operation and safety of an intersection.

The curb radius is the actual radius of the curb line at an intersection. The effective radius is the radius available for the design vehicle to make the vehicle turn, accounting for the presence of parking, bike lanes, medians, or other features.

BENEFITS

- A tighter curb radius creates a sharper turn for motor vehicles and reduces turning speeds, shortens the crossing distance for pedestrians and also improves sight distance between pedestrians and motorists.
- Reconstructing curb radii also creates the opportunity to expand pedestrian space at the curb and provides greater flexibility in the placement of curb ramps.

DESIGN CONSIDERATIONS

The shape and dimensions of curb radii vary based on street type, transportation context, and design vehicle (vehicle type used to determine appropriate turn radius at an intersection). Smaller curb radii provide better geometry for installing perpendicular curb ramps, resulting in simpler, more appropriate crosswalk placement, in line with the approaching sidewalk.

- When designing curb radii, factor in both the curb radius and the effective radius.
- Curb radii can allow for the selected design vehicle to complete a turn fully within its designated travel lane or lanes or can accommodate a vehicle turn by allowing for a particular vehicle type to complete a turn with latitude to use adjacent or opposing lanes on the origin or destination streets.
- The effective turning radius (rather than the actual curb radius), should always be used to determine the ability of vehicles to negotiate a turn. Determination of the design vehicle should consider and balance the needs of the various users of a street--from pedestrians and bicyclists to emergency vehicles and large trucks--considering the volume and frequency of these various users.
- The design vehicle should be selected according to the types of vehicles using the intersection with considerations to relative volumes and frequencies. The designer should distinguish between

CRASH REDUCTION FACTOR: NOT AVAILABLE

“designing for” and “accommodating” the needs of large vehicles, which may not require design modifications.

If these conditions are present for non-arterial streets the typical curb radius of 20 feet or less is preferred especially where there are:

- Higher pedestrian volumes
- Low volumes of large vehicles
- Bicycle and parking lanes create a larger effective radius.

Factors that may affect the curb radii should be taken into consideration:

- The street type
- The angle of the intersection

- Curb bulbs
- The number and width of receiving lanes
- Large vehicles
- Effective turning radius
- Where there are high volumes of large vehicles making turns- inadequate curb radii could cause large vehicles to regularly travel across the curb and into the pedestrian waiting area.

See the table below for guidance on the location and

Vehicle Type	Location	Design Vehicle	Potentially Allowable Exceptions
Transit Vehicles ¹	Corners with turning buses on bus routes or where buses start run or return to base. In locations where traffic volumes influence effective turning radii with lane encroachment.	CITY-BUS or WB-40 A-BUS, articulated bus	Turn partially from adjacent lane
	Corners with potential occasional turning buses due to detours	CITY-BUS or WB-40	Turn partially from adjacent lane
Emergency Vehicles ²	All intersections	Fire Vehicle Hook and Ladder with Outriggers	Turn partially from adjacent lane; turn fully from adjacent lane, turn from opposite lane, turn into opposite lane
Freight Vehicles ³	Per Comprehensive Plan	WB-50	Turn partially from adjacent lane

design vehicle for different street types.

¹On corners along bus routes, where buses may have to make occasional detours, turns should accommodate a transit vehicle using the entire roadway, similar to an emergency vehicle. Other transit vehicles, such as articulated buses, bus rapid transit (BRT), etc. may have a larger design vehicles.

²Because emergency vehicles have sirens and flashing lights and other vehicles must pull over, they can typically use the full right-of-way without encountering opposing vehicles. On busier streets, the ability of emergency vehicles to swing wide may be limited by queued traffic

which may not be able to pull over.

³Freight corridors should be designed for WB-50 trucks. Larger WB-60 trucks may also be present on City streets, particularly on designated state highways, truck routes and in industrial areas. These may need to be accommodated in certain instances, though they are not practical

CURB RADIUS CONT.

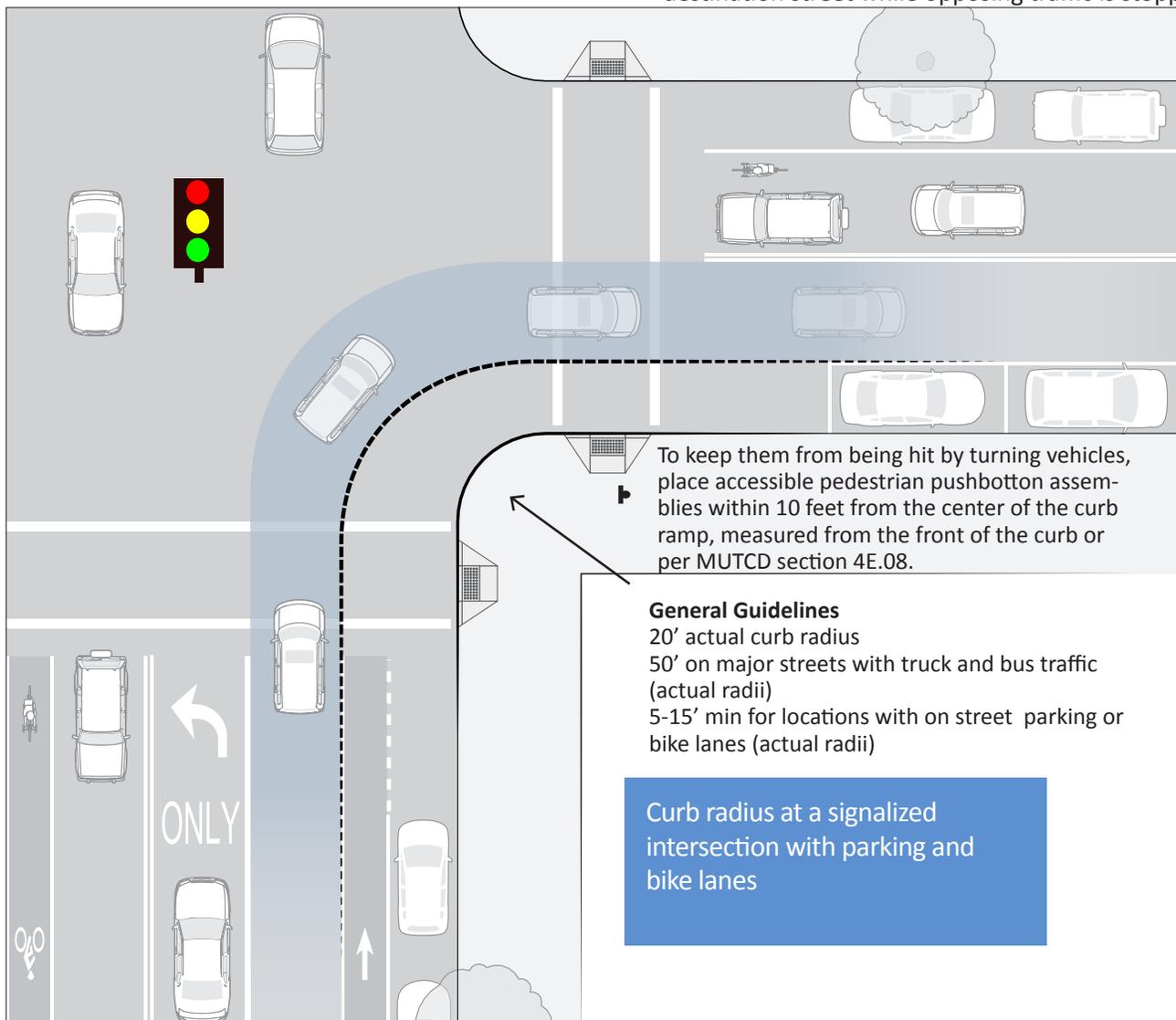
in most city streets.

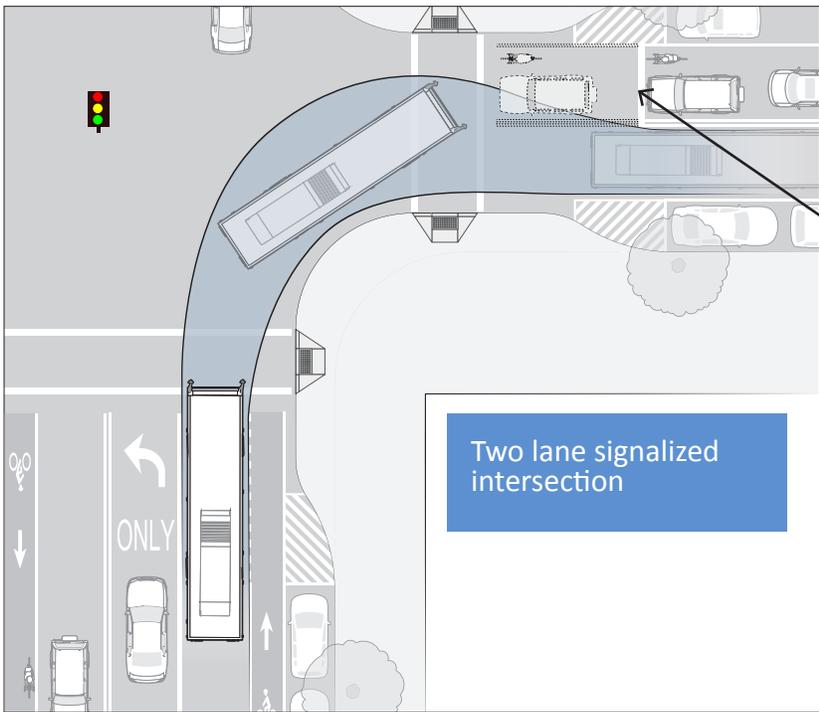
A variety of strategies can be used to maximize pedestrian safety while accommodating large vehicles including:

- Adding parking or bicycle lanes to increase the effective radius of the corner.
- Varying the actual curb radius (i.e., compound curb radii) over the length of the turn so that the radius is smaller as vehicles approach a crosswalk and larger when making the turn. Compound radii effectively shorten crossing distances and make pedestrians visible while accommodating larger vehicle turns; because they allow more sweeping turns and they

do not slow turning vehicles.

- Painting a median: Where there is sufficient lane width on the destination street, a painted median can enable a large vehicle to complete a turn without turning into opposing traffic.
- Restricting access: Where there is a desire to keep curb radii small, restrictions on large vehicles making the turn may be considered. This should be considered in light of the overall street network.
- Installing advance stop lines on the destination street to increase the space available for large vehicles only where necessary to make a turn by enabling them to swing into opposing lanes on the destination street while opposing traffic is stopped.





AASHTO Pedestrian Guide

RESOURCES: PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=28

RIGHT TURN SLIP LANE



Right turn slip lane

DESCRIPTION

Right turn slip lanes (also known as ‘pork chop’ islands) are dedicated turning lanes that allow vehicles to make quick and easy right turns. Typically, they are not signal controlled but drivers must yield to pedestrians and on-coming traffic. The City of Wichita discourages the use of slip lanes because they can increase the speed of turning vehicles.

Right turn slip lanes, when designed correctly, can reduce crossing distances for pedestrians, improve signal timing and reduce crashes involving motorists and pedestrians.

DISADVANTAGES

- They may result in uncomfortable and unsafe crossing conditions for pedestrians if they are designed with large turning radii that encourage high-speed turns.
- They can also present a challenge to through bicyclists since motorists will need to cross their line of travel to access the right turn slip lane.
- The older design makes it difficult for drivers who cannot easily turn their heads to look behind them to see on-coming traffic or pedestrians (see following page).

BENEFITS

- Increased visibility of pedestrians through improved motorists approach angles.
- Reduced crossing distance and pedestrian exposure time.
- Can lead to slower motor vehicle turning speeds.

DESIGN CONSIDERATIONS

Right turn slip lanes should be considered at intersections with high volumes of right-turning trucks and buses. A right turn slip lanes is often used in lieu of a large curb radius.

- New designs for right turn slip lanes make them function more like a conventional perpendicular intersection, while still enhancing efficiency for motorists. The new design has also been shown to reduce motor vehicle and pedestrian crashes.
- Traditional yield-controlled right turn slip lanes may be more difficult for vision-impaired people to navigate because they are not able to easily assess whether or not a vehicle has yielded and because of non-standard intersection geometry.

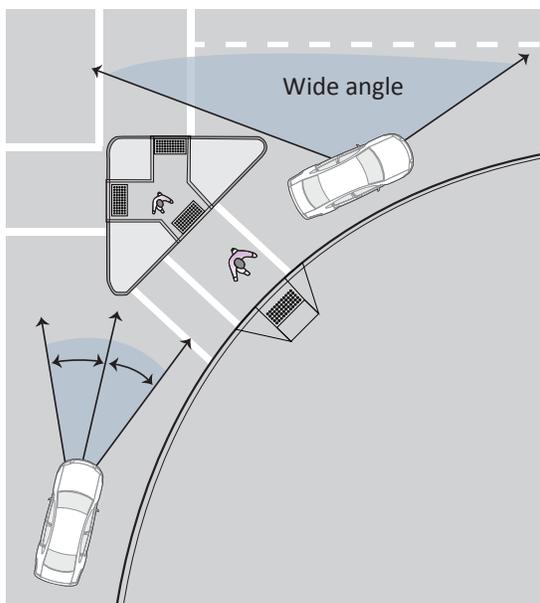
Evaluate whether a right turn slip lane is truly necessary. As a rule of thumb, ‘pork chop’ islands with long tails on the approaches will be more pedestrian friendly than the older designs with the short, stubby tails on the approaches.

- Curb radii should be revised to create one long radius entering the channelized right turn lane followed by a short one of 25-40 feet maximum exiting the channelized right turn lane to slow turns and improve lines of sight, particularly for pedestrians and vehicles approaching from the driver’s left.
- Triangular ‘pork chop’ islands should be lengthened at a 2:1 ratio, with the tail pointed toward approaching traffic.
- Islands should be long enough to allow a car to wait

CRASH REDUCTION FACTOR: NOT AVAILABLE

- for a gap in traffic without blocking the crosswalk.
- Crosswalks should be relocated for maximum visibility to a spot where the driver is looking ahead, at least one car length back from the intersecting roadway. Crosswalks should also be oriented at a 90 degree angle to the right turn lane to improve sight lines and reduce crossing distance.
- Painted buffers can be used to narrow the perceived width of the right turn slip lane while still accommodating larger vehicles.
- Raised crosswalks may be used to improve yield compliance at the pedestrian crossing.

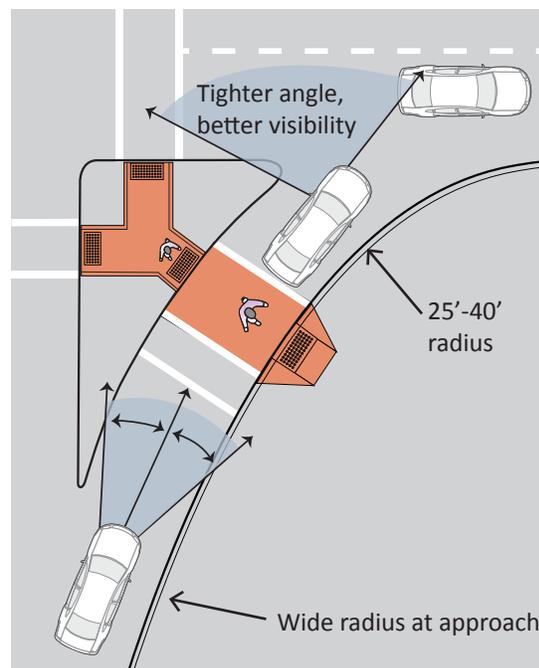
NOT PREFERRED



Traditional Slip Lane (short tail)

Larger turn radius results in faster turns and less visibility of pedestrians waiting to cross

PREFERRED



New Style Slip Lane (long tail)

Smaller curb radius results in slower turns, the need for vehicles to slow to enter traffic, and improved visibility of pedestrians and on-coming traffic

RESOURCES:

AASHTO Pedestrian Guide

PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=24

Designing Sidewalks and Trails for Access: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm

2009 MUTCD

NCHRP 03-78: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities

MODIFY SKEWED INTERSECTIONS



Skewed Intersection (Photo by TDG)

DESCRIPTION

Skewed intersections occur when streets intersect at angles other than 90 degrees. Skewed intersections are generally undesirable and introduce the following complications for all users:

- The travel distance across the intersection can be greater, which increases exposure to conflicts and lengthens signal phases for pedestrians and motorists.
- Skews require motorists and pedestrians to crane their necks to see other approaching users, making it less likely that some users will be seen.
- Skews generally reduce visibility for all users on all approaches.
- Obtuse angles encourage high speed vehicle turning movements.
- Acute angles may cause complications for turning vehicles, particularly larger vehicles.

BENEFITS

- Increased visibility and better sight lines for motorists facilitates safer turning movements.
- Lower speed turning movements.
- Shorter crossing distance reduces exposure time for pedestrians crossing the street.

DESIGN CONSIDERATIONS

- Effort should be made to design or redesign the intersection closer to a right angle.
- Discourage the building of new skewed intersections.

- If major alterations are being done to an existing skewed intersection, consider whether it is possible to reconfigure the intersection so that the crossings are closer to perpendicular.
- In some cases, consideration should be given to acquiring right-of-way to allow for a redesign that results in a less complicated intersection. It may be possible to offset costs by selling back or swapping those portions of the right-of-way that are no longer needed for the intersection, or repurpose this area for a pocket park or other streetscape enhancing feature.

Where it is not possible to reconfigure a skewed intersection due to placement of buildings or other constraints, the following design strategies can be considered:

- Adjusting signal timing to allow for longer pedestrian crossing times.
- Providing high visibility crosswalks, as appropriate. Crosswalks should align with the pedestrian zone of the sidewalk and should never be pulled back from the intersection as a means to shorten the pedestrian crossing distance – such a strategy is counter to pedestrian or motorist expectations, and it can create problems for visually impaired pedestrians.
- Pedestrian refuges should be considered if the crossing distance exceeds approximately 40 feet.

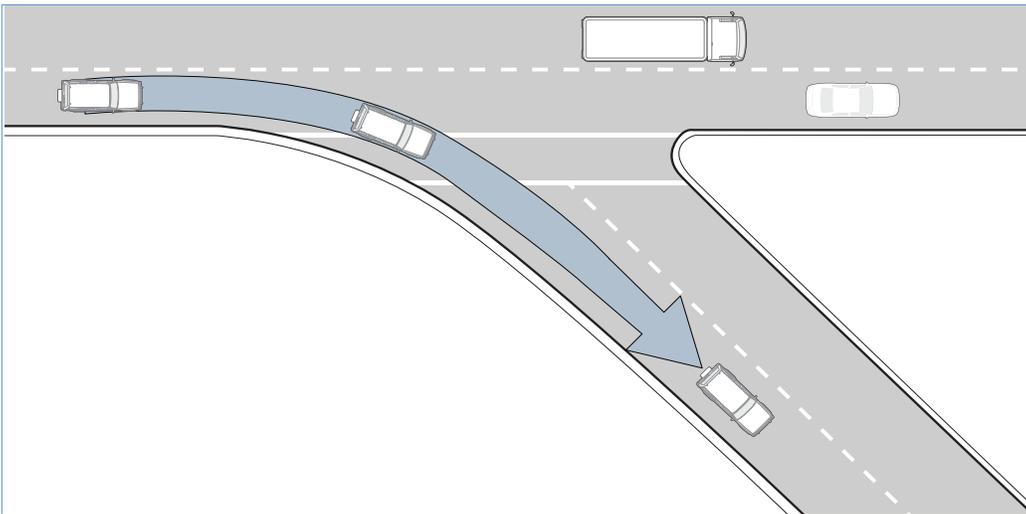
CRASH REDUCTION FACTOR: VARIES

- General-use travel lanes and bike lanes may be striped with dashes to guide bicyclists and motorists through the large undefined area that results from intersection skew.
- Installation of a curb extension on the obtuse side of the intersection can reduce the corner curb radius and reduce the amount of undefined space,

thus reducing high speed turning movements. Curb extensions also reduce pedestrian crossing distance and may accommodate vegetation.

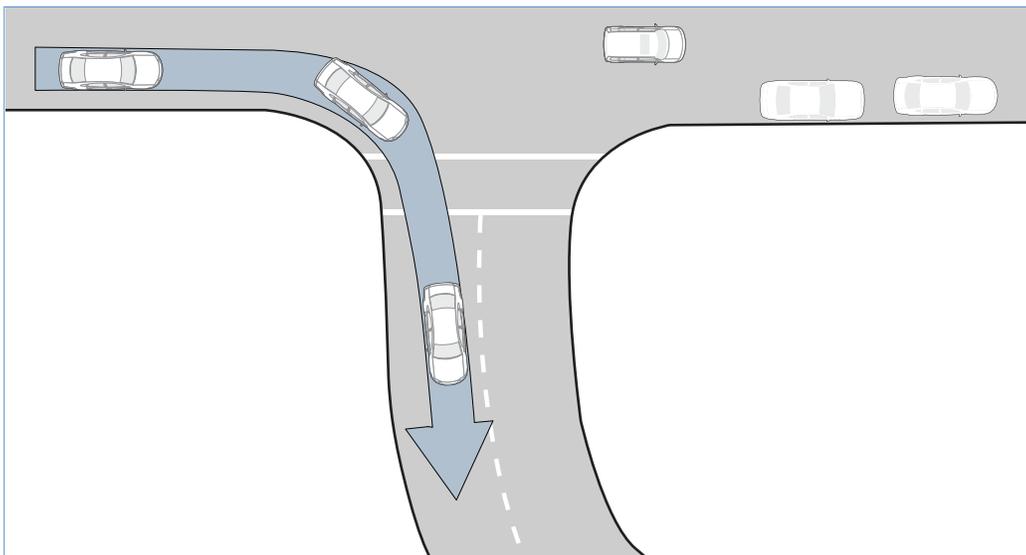
POLICY CONSIDERATIONS

- Priority should be given to intersections with identified crash problems, on school walking routes, near transit stops, or with high pedestrian use.



Existing

Typical skewed intersection: Wide turning radius results in higher speed turns and longer pedestrian crossing time/exposure



Proposed

Realigned intersection: Narrower turning radius encourages slower turns, shortens pedestrian crossing distance and improves sight triangles for all modes

RESOURCES:

AASHTO Pedestrian Guide
PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=29
Designing Sidewalks and Trails for Access: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm#ske
2009 MUTCD

PEDESTRIAN CROSSING WARNING SIGNS



Pedestrian Crossing Warning Sign (Photo by TDG)

DESCRIPTION

Crossing warning signs are placed in advance of and directly adjacent to marked crosswalks to increase driver yielding compliance.

BENEFITS

Pedestrian crossing warning signs at uncontrolled, marked crosswalks increases the driver's awareness of a pedestrian crossing.

CONSIDERATIONS

Best practice includes tandem installations with the primary location being in advance of the crosswalk location (W11-2) and including a plaque that says AHEAD, and the supplemental location with downward arrow plaque (W16-7P) placed at the crosswalk location.

A Pedestrian Crossing (W11-2) sign with an AHEAD or a distance supplemental plaque may also be used in conjunction with a YIELD HERE TO PEDESTRIANS sign (R1-5 or R1-5a) where advanced yield pavement markings are installed at multi-lane uncontrolled crossings.



W11-2 sign at marked crosswalk



R1-5 with advance yield line



School crosswalk advance warning sign



W11-2*



R1-5*



R1-5a*

ILLUMINATION ALONG CORRIDORS

CRASH REDUCTION FACTOR: 17-73%



Illumination (Photo by TDG)

DESCRIPTION

Street lighting is intended to prevent crashes and increase safety by improving visibility of roadways, intersections, and other important activity zones in order to facilitate safe movement of motor vehicles, pedestrians and bicyclists during nighttime or low light hours. Illumination along corridors is intended to greatly increase motorists' ability to see and react to pedestrians walking along the roadway in low light conditions.

BENEFITS

- Increased safety and visibility of pedestrians, bicycles, and other roadway users by motorists.

CONSIDERATIONS

- Illumination should be targeted at intersections and mid-block crossings; and secondarily along roadways.
- The amount of illumination required should be proportional to the width and classification of the roadway or intersection.
- Light poles should be placed in the boulevard zone so as not to be blocked by tree canopies.
- Street light poles should be aligned with pedestrian scale lighting unless sidewalks are very wide.
- Light poles should be paired on arterials to provide a formal look, to reinforce the direction of travel, and to provide visibility of pedestrians crossing at

non-intersection locations.

- Street lighting can be used to create an environment that feels safe and secure for pedestrians. Areas where personal security is an issue should be considered for additional lighting.
- Above-standard illumination may also be targeted in areas with higher volumes of pedestrian traffic and land uses that generate pedestrian trips during evening hours. Examples include transit stops, major transfer points and routes, community facilities, and commercial areas. Costs are typically assessed to adjacent property owners.
- The use of consistent luminaire types creates a cohesive visual vocabulary and facilitates maintenance and replacement.
- A double lantern style light may be considered for above-standard lighting and would require special assessment and a maintenance agreement with adjacent property owners and/or business association. Other standards may be considered in special lighting districts such as a historic district.
- Large fluctuations between dark and light must be avoided as drivers' vision must continually adjust to varying light levels, thereby impairing vision.
- Light poles may be staggered on other street types, but spacing must be consistent with regard to trees and other street poles.

PedSafe: Lighting and Illumination: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=8

RESOURCES: Downtown Wichita Streetscape Design Guidelines: <http://www.wichita.gov/Government/Departments/Planning/NR/NR%20Documents/Downtown%20Wichita%20Streetscape%20Design%20Guidelines.pdf>

TRANSIT STOP LOCATION



Transit Stop (Photo by Michael Hintze)

DESCRIPTION

The placement of a transit stop depends on the operational characteristics of both the street and the transit system, and should provide comfort, convenience, safety and sufficient space for all transit users, including pedestrians, cyclists and people with mobility impairments.

- Near side bus stops are bus stops placed on the approach to an intersection.
- Far side bus stops are where buses stop after having traveled through the intersection.

BENEFITS

- Thoughtful placement of transit stops is important for the convenience and safety of transit users.
- Transit stop placement affects traffic flows and should be placed to minimize disruption to traffic patterns.

CONSIDERATIONS

Stops are typically placed curbside, but may be placed within the center of the street where there are center-running transit lanes or streetcars.

Stops should be located in an area that is well-lit, with good sight distance in close proximity to crosswalks. Stops should be located at intersections wherever possible because intersections are generally more

convenient for passengers intercepting other transit connections, accessing crosswalks, and connecting to pedestrian routes and building entrances.

At signalized intersections, transit stops should typically be located at the far side of intersections to facilitate bus operations, transit signal priority, and pedestrian movement. At stop controlled intersections, transit stops should typically be located near side. The table on the following page summarizes the advantages and disadvantages of near side, far side and mid block stop placement.

At uncontrolled locations crossing enhancements such as high visibility crosswalks, rapid flashing beacons, center crossing islands, or mid-block pedestrian signals may be considered. At mid-block transit stop locations the crosswalk should be placed behind the stop.

Where it is possible to still meet minimum stop spacing requirements, consider moving transit stops located at mid-block locations on multi-lane roads to signalized locations. If this is not possible, consider additional crossing treatments at these locations.

Transit stops should not be located at driveways. New driveways should be discouraged at transit stops (and generally along major transit routes).

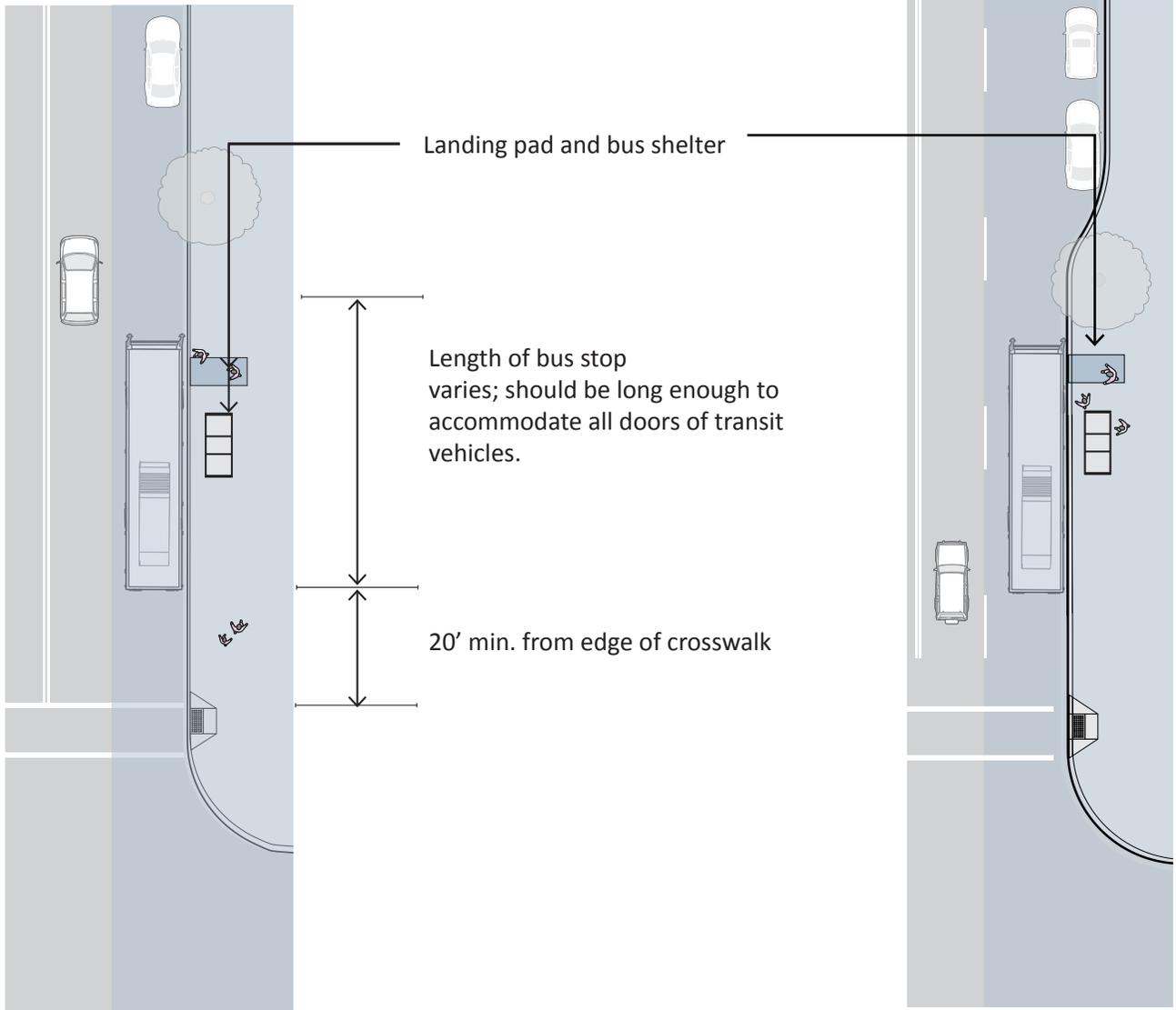
CRASH REDUCTION FACTOR: RESEARCH INCOMPLETE

Location	Advantages	Disadvantages
Near Side	Minimizes interference when traffic is heavy on the far side of an intersection	Increases conflicts with right-turning vehicles
	Minimizes the number of stops for buses	Stopped buses may decrease sight distance of passing traffic, obscuring curb-side traffic control devices, and pedestrians crossing in front of bus
	Allows passengers to board and disembark while the bus is stopped at a red signal phase	Obscures sight distances for vehicles crossing the intersection from the right of where bus is stopped
	Allows for convenient access during winter months, as snow is already cleared at boarding points	Decreases roadway capacity during peak periods due to buses queuing in what may function as a right-turn lane
		Can delay buses that arrive during the green signal phase and finish boarding during the red phase
Far Side	Minimizes conflicts between right-turning vehicles and buses	Stacking buses may block the intersection during peak periods
	Optimal location for traffic-signal synchronized corridors	Stopping both at a signalized intersection and a far-side stop may delay bus operations, particularly where buses don't have signal priority
	Provides additional right-turn capacity by allowing traffic to use the right lane	
	Signalized intersections create traffic gaps for buses to reenter traffic lanes	
	Improves pedestrian safety as passengers cross in back of the bus	
Mid-Block	Boarding areas experience less congestion and fewer conflicts with pedestrian travel paths	Decreases on-street parking supply (may be partially mitigated with a bus bulb-out)
	Can be located adjacent to or directly across from a major transit use generator located midblock	Increases walking distance to intersections and encourages passengers to cross street at midblock (jaywalking)
		Stopping buses and mid-block pedestrian crossings may disrupt mid-block traffic flow
		May be less convenient for transit transfers



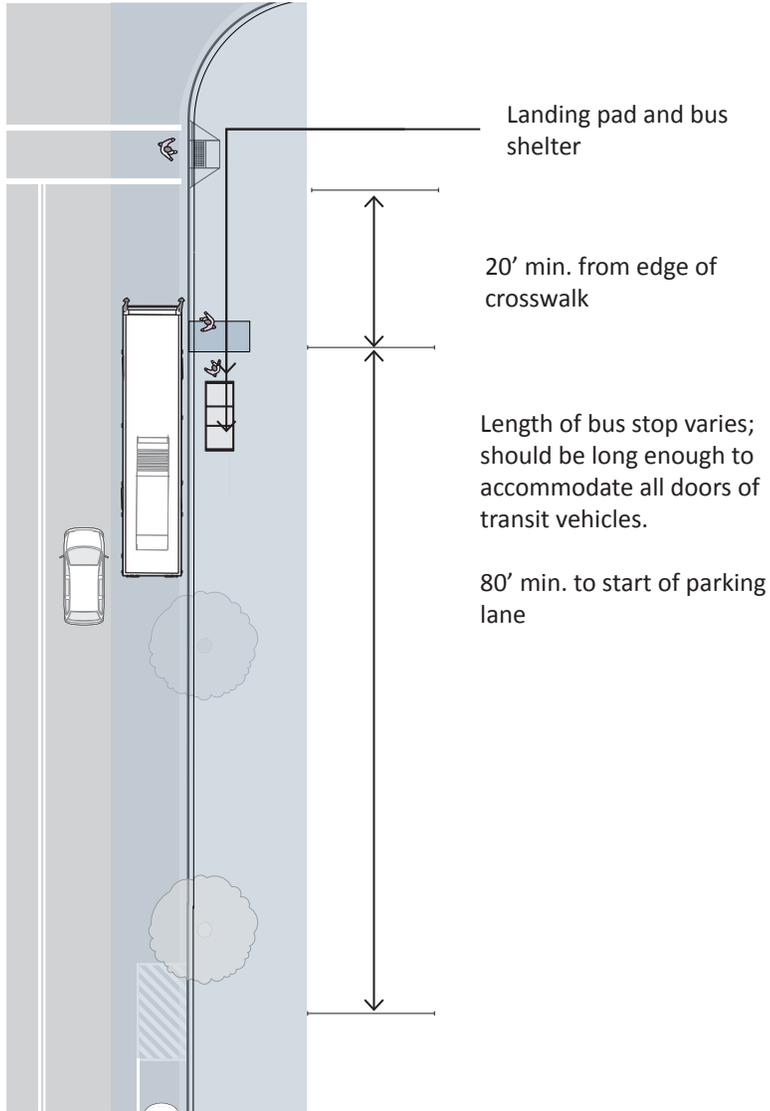
**Far Side In-Lane Stop,
1 Lane with Parking**

**Far Side Bus Bay,
2 lanes with parking**

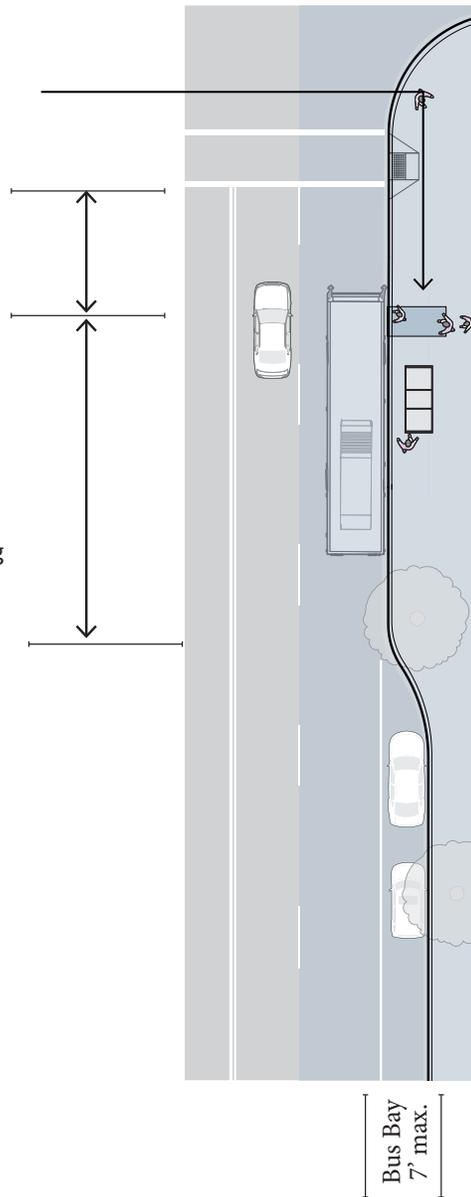




**Near Side In Lane Stop,
1 Lane with Parking**

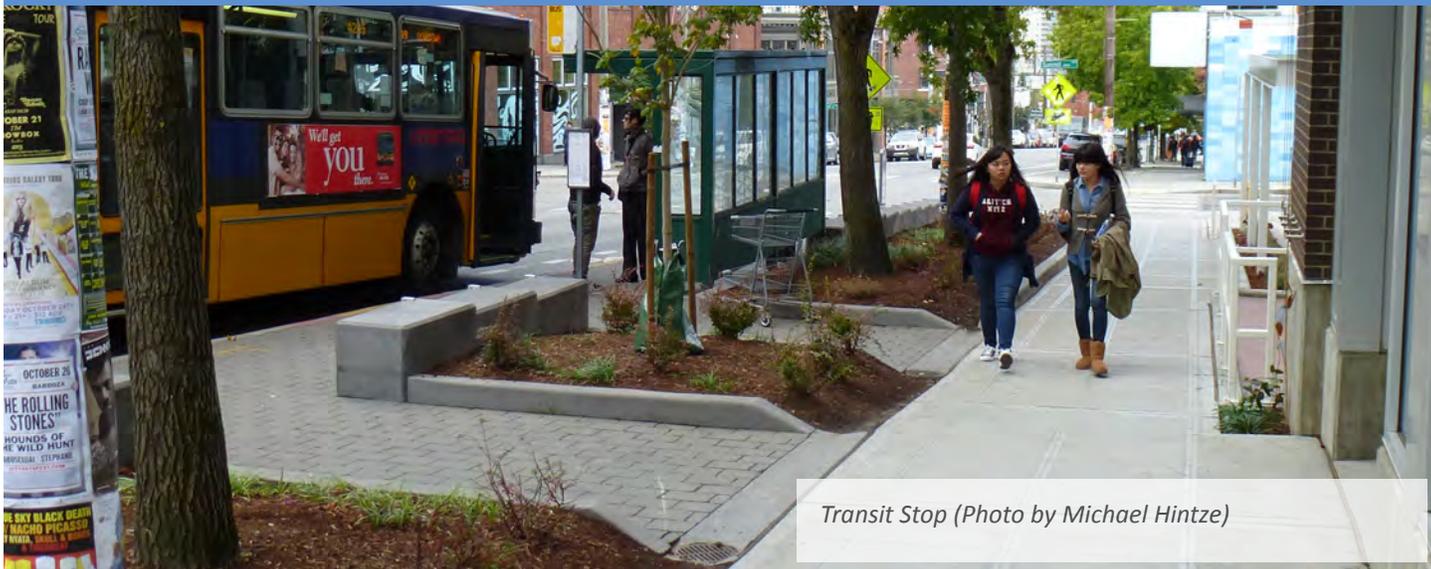


**Near Side Bus Bay,
2 Lanes with Parking**



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
 FHWA Pedestrian SAFETY Guide for Transit Agencies 2009: http://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/transit_guide.pdf

TRANSIT STOP CONNECTIONS



Transit Stop (Photo by Michael Hintze)

DESCRIPTION

Sidewalk connections to transit stops allow pedestrians and wheel chair users access.

BENEFITS

- Sidewalks provide an accessible surface on which to access transit and adjacent street crossings and sidewalks.
- Provision of landing pads provide an extension of the sidewalk to the transit loading area.

DESIGN CONSIDERATIONS

Good layout of a transit stop includes:

- Visual cues on where to wait
- A clearly defined transit stop
- Ease of access between the sidewalk and the transit vehicle
- Unobstructed path of travel on the adjacent sidewalk

Transit stops should be accessible. Americans with Disabilities Act (ADA) considerations will be given top priority in the siting and design of new and existing transit zones.

Transit stops deserve a higher than average level of streetscape amenities to serve waiting passengers.

Transit stop improvements may include:

- Transit signs – provided at all stops and located at the preferred boarding location.
- Transit shelters—provide where existing sidewalk

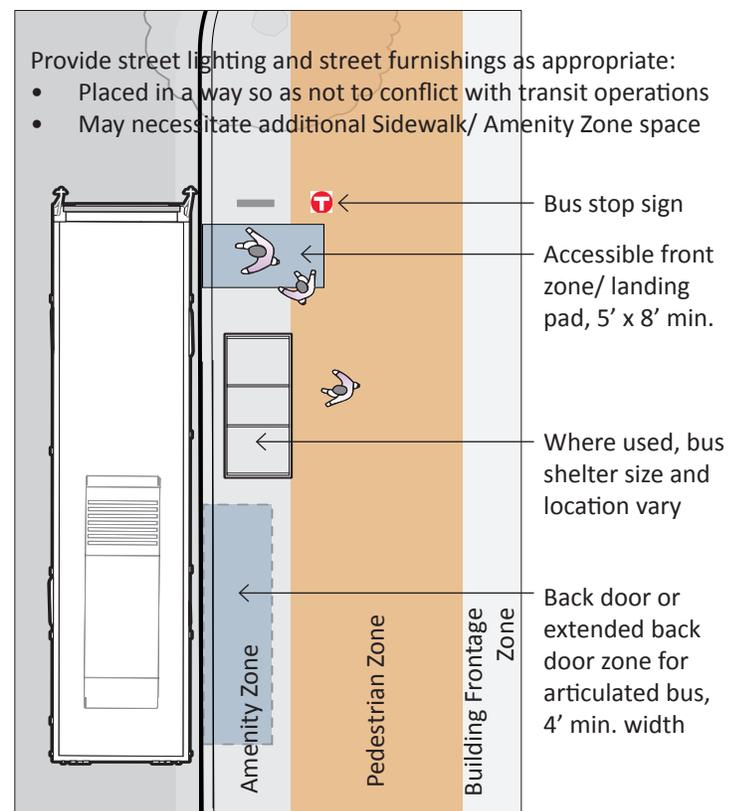
space allows or where a curb extension can be added to provide sufficient space, and demand warrants. Transit shelters should not be provided where sidewalk width is insufficient to accommodate a shelter and at least the minimum required clear path of travel around the shelter or the ability to carry expected pedestrian volumes.

- Lighting—located to illuminate the transit stop area, particularly the front of the stop and the transit shelter (where present). Lighting may be integral to the transit shelter, or may be provided by standard pedestrian or roadway lighting, where sufficient.
- Special paving—may be provided to distinguish the transit stop area from the adjacent sidewalk. Special paving may include a unique scoring pattern, a contrasting paving material, or a paving edge treatment delineating the edge of the transit stop. Special paving may be expensive, and is most appropriate at major stops or major transfer points.
- Seating—located within the transit shelter (where present). Additional seating, either formal (benches, seats with armrests) or informal (bollards, low seat walls, leaning bars), may be placed outside of the shelter, provided it allows access to and from the transit shelter and boarding area.
- Trash cans—placed adjacent to the transit shelter (where present).
- Bike racks—where provided, racks should be placed to not conflict with the boarding areas of a transit stop.

- Wayfinding information may be located within the transit stop, particularly in downtown and in neighborhood centers.
- Electronic real-time schedule information and other premium elements should be added where demand and funding exist.
- Overhangs, canopies, and arcades on buildings adjacent to transit zones may be used/designed to provide weather protection for transit patrons, including benches and pedestrian-scaled lighting.
- All transit zone amenities must be consistent with Wichita Transit standards.
- Minimum clearance – While a 5 feet wide by 8 feet deep sidewalk area meets minimum ADA standards, a larger clear transit zone or bump-out is preferred to ensure front and rear door access and egress for most buses (30 feet of curb clearance is needed for rear door access of a 40 foot bus, 50 feet clear space is needed for a 60 foot articulated bus).
- The clear loading area should be where the bus doors typically open and be accessible from the transit shelter (where present) and adjacent sidewalk. If a zone is designed for more than one bus, a clear loading area should be provided for each vehicle.
- The clear loading area should have a maximum 2% cross-slope.
- A 30 inch by 48 inch clear floor wheelchair space should be provided within the transit shelter (where present). This space must be accessible from the sidewalk and the loading area. In some cases, this may necessitate modifying the transit shelter.
- Where boarding platforms are not level with the sidewalk, an accessible ramp must be provided from the sidewalk to the platform.
- Shelters should be located in the Amenity Zone wherever possible. They should be located to provide at least 4 feet of clear space between the edge of the curb and the front edge of the shelter, where possible, or another accessible path to the

shelter should be provided. Alternately, shelters can be placed in the Building Frontage Zone. In all cases, shelters must be placed to leave the minimum required clear sidewalk width.

- Transit shelters should be located toward the front of the stop to indicate where customers should wait to board the vehicle. The shelter should be placed approximately 25 feet behind the front of the stop to allow for an accessible boarding area (5 feet by 8 feet) and for the bus to pull out of the stop (approximately 20 feet). Where there is a bus bay or boarding island, the first 20 feet of setback is not necessary.
- The shelters and other street furniture should not impede sightlines for pedestrians waiting to cross at a crosswalk.



AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities. Designing Sidewalks and Trails for Access: Ch. 4 Sidewalk Design Guidelines and Existing Practices: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm

RESOURCES:

FHWA Pedestrian Safety Guide for Transit Agencies 2009: http://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/transit_guide.pdf

CROSSING NEAR TRANSIT STOP



DESCRIPTION

It is often necessary for pedestrians to cross roadways when traveling to and from transit stops. The placement and design of crossings near transit stops is a critical safety and convenience issue for transit users.

BENEFITS

Well design crossings near transit stops provide:

- Increased visibility for pedestrians and motorists.
- Assistance for pedestrians in making safe crossings.
- Placement that allows transit vehicles to safely maneuver into and out of traffic without coming into conflict with pedestrians.

DESIGN CONSIDERATIONS

Where bus stops are located mid-block on a long block (greater than 1,000 feet), a mid-block crossing should be considered in order to increase the visibility of transit-riding pedestrians that are likely to cross the street at unmarked mid-block locations.

Where a signal is not warranted, pedestrian crossings near transit stops should incorporate other treatments such as crossing islands, rapid flash beacons, and warning signage.

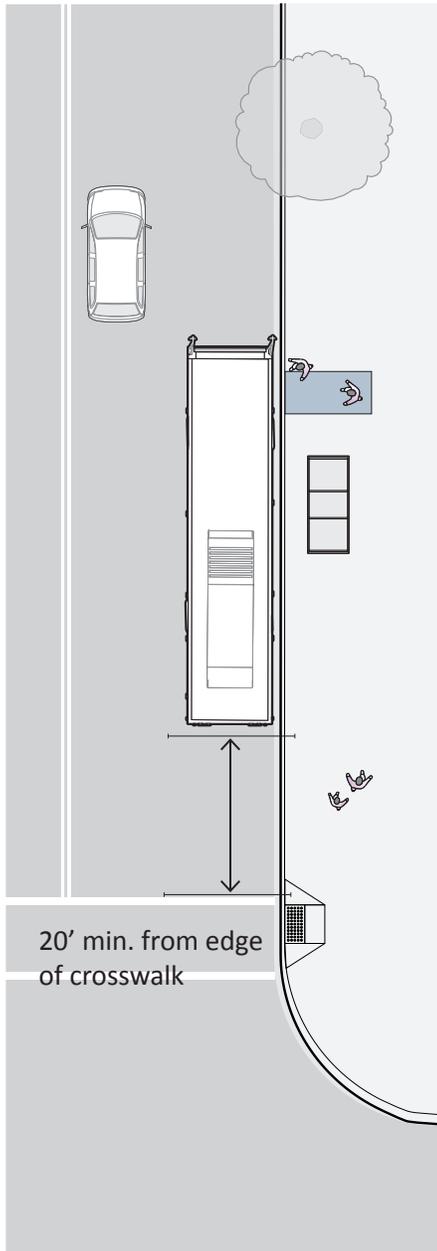
Crosswalks at mid-block transit stops should be placed behind the bus stop so pedestrians cross behind the bus where they can see oncoming traffic.

Far side placement of transit stops at intersections also

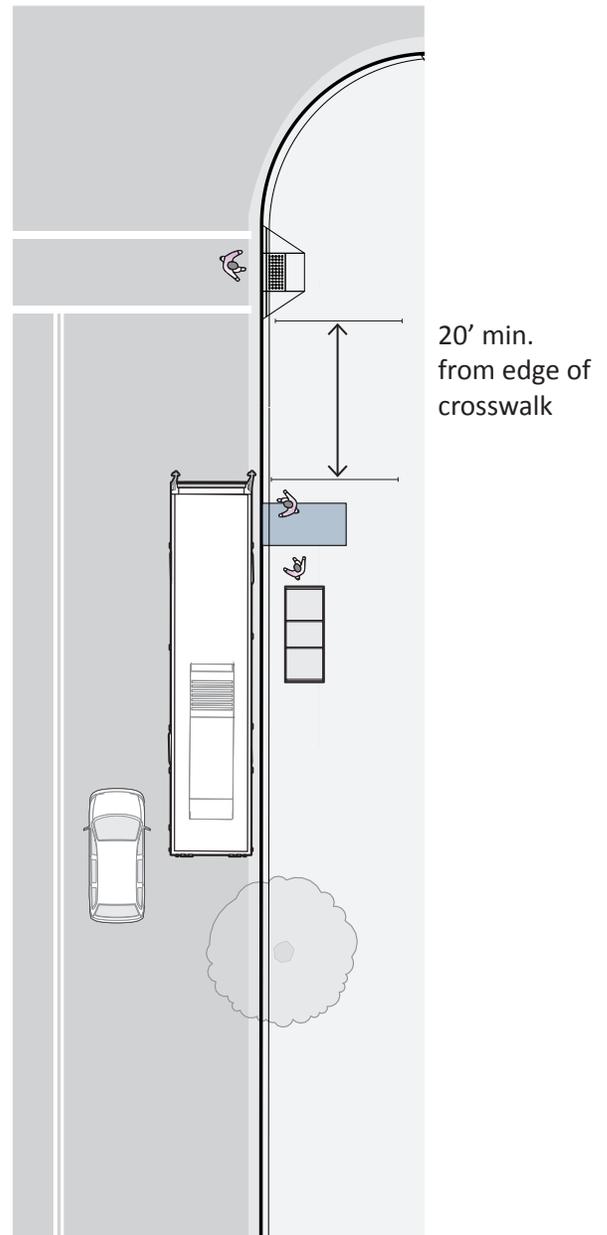
allows pedestrians to cross behind the bus where they are more visible to passing traffic. This placement also enables the bus driver to pull away without endangering pedestrians. Bus stops should be set back a minimum of 5 feet from crosswalks. Where feasible, a 10 foot setback is preferred.

CRASH REDUCTION FACTOR: RESEARCH INCOMPLETE

Far Side Bust Stop



Near Side Bus Stop



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
FHWA Pedestrian Safety Guide for Transit Agencies 2009: http://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/transit_guide.pdf

ROAD DIET



Road) (Photo by TDG)

DESCRIPTION

Road diets are a reduction in the number of travel lanes on a multi-lane roadway.

The most common road diet is the 4- to 3-lane reduction, which results in two travel lanes and a center turn lane/median. Depending on roadway width, such a conversion may allow for bike lanes, the addition of on-street parking (where there is demand), and other features that improve the pedestrian environment such as curb extensions, sidewalks, and sidewalk buffers.

BENEFITS

Numerous studies of road diets have shown that they provide safety benefits for all roadway users by:

- Reducing motor vehicles speeds
- Making it easier for pedestrians to cross the street.
- Road diets can reduce severity and frequency of automobile crashes
- Road diets create room for left turn lanes and bike lanes
- When the number of vehicle lanes is reduced and features such as curb extensions and crossing islands are installed, the time pedestrians are exposed to traffic while crossing the street is greatly reduced.
- Road diets also reduce the multiple lane threat risk. A multiple-threat pedestrian crash is a crash type that occurs when a motor vehicle in one lane

stops and provides a visual screen to the motorist in the adjacent lane. The motorist in the adjacent lane continues to move and hits the pedestrian.

DESIGN CONSIDERATIONS

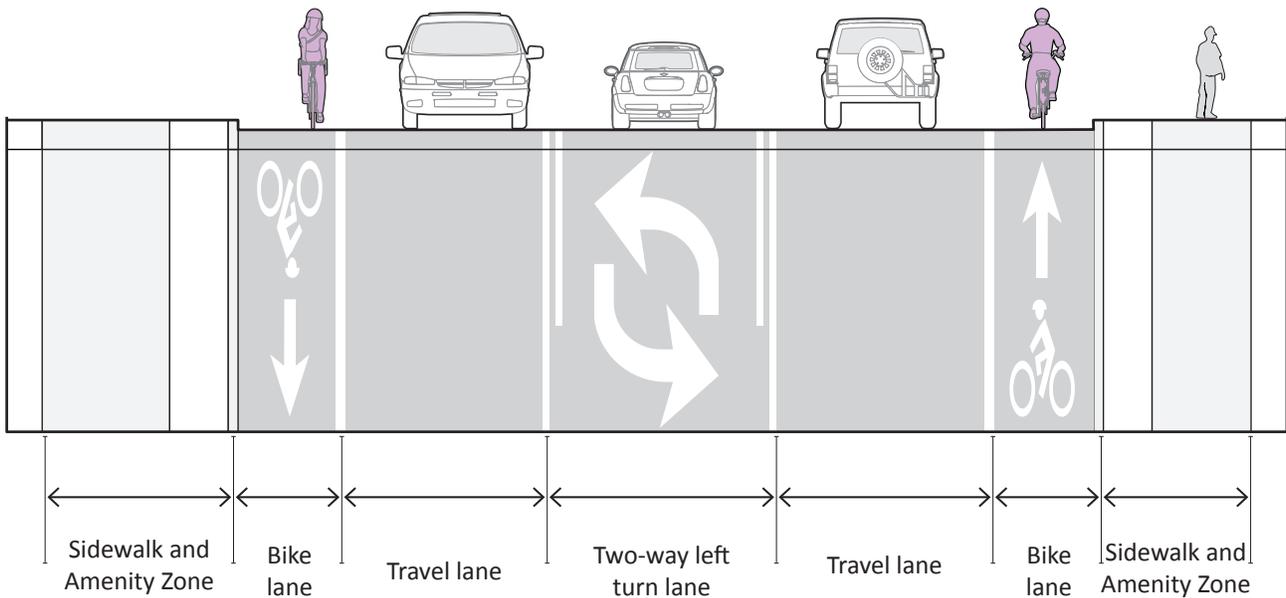
- There are a number of factors to weigh in determining the appropriateness of a road diet, including number of driveways, roadway width, sight distance, and the volume and type of traffic.
- Road diets should be considered on streets where capacity exceeds demand.

When analyzing the potential for a road diet:

- Identify corridors with high levels of pedestrian crashes.
- Conduct a level-of-service (LOS) analysis to determine whether the number of lanes on a roadway is appropriate and how alternative routes will be impacted by a road diet.
- Consider other factors besides LOS and be willing to accept a lower LOS in exchange for other benefits; other factors may include the importance a particular street plays in the pedestrian or bicycle network and the relationship between creating more livable streets and economic development (traffic slows, easier to make left turns into business parking lots).

- During reconstruction projects, space reallocated from vehicle lanes can be used to widen sidewalks, create bump outs, plant street trees or greenscape elements, install street furniture, implement bicycle lanes or cycle tracks, or provide on-street parking lanes through a lane diet.
- During resurfacing or restriping projects, installing minimum lane widths can provide additional space to install bicycle lanes or cycle tracks. On roadways with on-street parking, it is advantageous to provide additional width to either the parking lane or the bicycle lane, particularly in areas with high parking turnover, to reduce the likelihood that a bicyclist will be struck by a motorist opening a car door.
- Successful road diets include an analysis of the entire affected area in order to identify and mitigate potential traffic spill over into other areas or cut-through traffic.

Road Diet



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
 Road Diet Handbook: Setting Trends for Livable Streets. Jennifer Rosales. ITE September 2006
 Road Diet: Proven Safety countermeasures. FHWA: http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_013.htm

WIDTH OF LANES



O) (Photo by TDG)

DESCRIPTION

Lane diets reduce vehicle lane widths. Reduced lane widths encourage slower vehicular speeds and reduce crossing widths, improving conditions for pedestrians. Existing vehicle lane widths can be wider than needed.

BENEFITS

On roadways where vehicle lane widths are greater than needed, a lane diet may be a good solution that results in improved conditions for pedestrians, and may also provide sufficient space for installing a bicycle lane or widening sidewalks.

DESIGN CONSIDERATIONS

- Minimum lane widths vary from 10 to 12 feet depending on the functional classification of the street and local conditions. A width of 10 feet may be acceptable for local, collector, and even some arterial streets. However, for most urban arterials 11 feet is an acceptable width. Lane diets may not be achievable on roadways with heavy truck or bus traffic. A minimum preferred width for center turn lanes, where used, should be 10 feet, and in a neighborhood context, can be as narrow as 9 feet.
- Lane diets are often implemented to allocate more space for the installation of bicycle lanes, which can act as buffers between the roadway and the sidewalk where planted buffers are not present. On streets where bicycles are intended to share lanes with cars side by side, vehicle travel lanes should not be narrowed to less than 14 feet.

- During resurfacing or restriping projects, installing minimum lane widths can provide additional space to install bicycle lanes or cycle tracks. On roadways with on-street parking, it is advantageous to provide additional width to either the parking lane or the bicycle lane, particularly in areas with high parking turnover, to reduce the likelihood that a bicyclist will be struck by a motorist opening a car door.
- Reevaluate roadway standards, and narrow standard vehicle lane widths that exceed new AASHTO Green Book guidelines.
- Reallocate a portion of the roadway to bike lanes where appropriate.

Consider lane diets on existing roadways where the following conditions exist:

- Collector and local streets with lane widths greater than 10 feet.
- Arterial streets with lane widths greater than 12 feet; heavy truck and bus volume should be a consideration but not preclude a lane diet.
- Streets near schools and other uses that generate high volumes of pedestrian traffic where there is excess lane width.

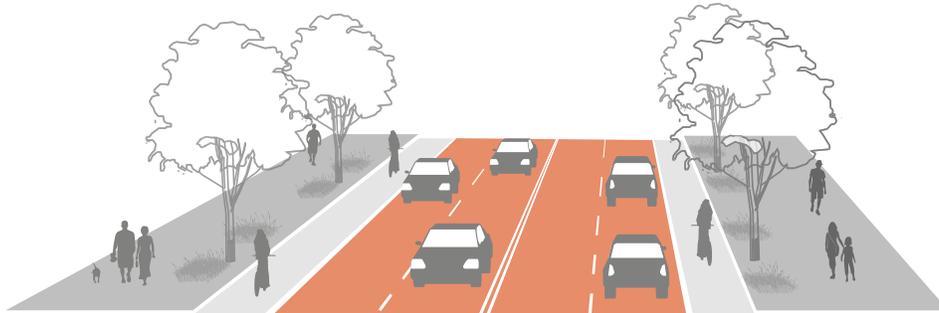
CRASH REDUCTION FACTOR: RESEARCH INCOMPLETE

A lane diet is a reduction in the travel lane width. Excess width can be used at the margins of the roadway to widen the sidewalks Amenity Zone , parking lanes or install bike lanes which all results in lessening pedestrian exposure to vehicular traffic.

Wide travel Lanes



Reduced lane widths



Graphic: City of Boston

RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=18
Designing Walkable Urban Thoroughfares: A context Sensitive Approach. <http://www.ite.org/css/RP-036A-E.pdf>

MINI TRAFFIC CIRCLE



DESCRIPTION

Mini-traffic circles are circular islands that are installed in the center of appropriate residential street intersections to reduce traffic speeds and collisions. Traffic circles require vehicles to reduce speed while allowing continuous traffic flow. Mini-traffic circles should be accompanied by tight curb radii on the adjacent corners to reduce right turning vehicle speeds. Larger vehicles such as school buses that make wider turns can be accommodated by building traffic circles with mountable curbs. Traffic circles may be designed to accommodate transit vehicles using a mountable curb (or truck apron), however, in general, streets with transit routes should not be considered for traffic circles.

BENEFITS

- Mini-circles are an intersection improvement as well as a traffic-calming device.
- Mini-traffic circles can be installed in lieu of signals or stop signs.
- In order to benefit pedestrians and bicyclists mini-circles must be properly designed to slow vehicles because right-turning vehicles are not controlled at an intersection with a mini-circle, potentially putting pedestrians and bicyclists at risk.

DESIGN CONSIDERATIONS

As with all traffic calming measures, the context of the street must be considered, including the following characteristics:

- Street classification
- Traffic operational analysis
- Mix of traffic, including consideration of bus, bike or truck routes
- Adjacent land uses
- First responder vehicle needs

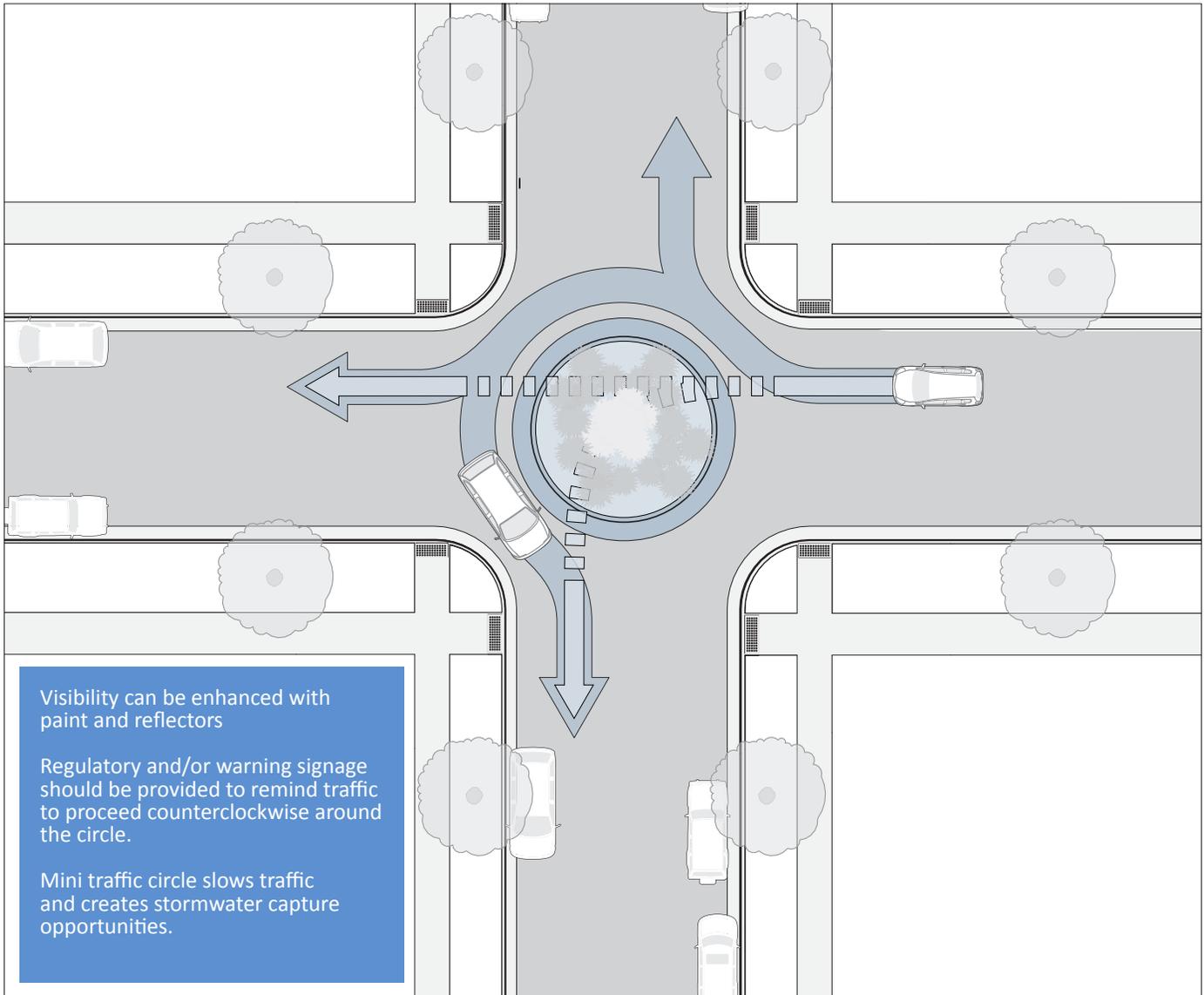
Consider installing mini-traffic circles on:

- Intersections of residential streets with high design speeds where there is a history of crashes.
- Bicycle routes (residential streets that are signed or otherwise designated as bicycle routes).

Traffic circles:

- Should be sized according to street width and allow for the passage of emergency vehicles and snow plows.
- Regulatory or warning signage should be provided to remind traffic to proceed counterclockwise around the circle.
- Design traffic circles with mountable curbs to allow for emergency vehicle access.
- Keep landscaping in the circle below 36 inches and above 8 feet to maintain clear visibility through the intersection.
- Visibility of the circle can be enhanced with paint and reflectors.
- By local ordinance, fire and emergency vehicles, buses and other large vehicles may make left turns without going around the circle.
- Mini-traffic circles can be landscaped or paved.

- Vegetation should be maintained so that it does not block visibility.



PASSIVE TRAFFIC CALMING



DESCRIPTION

The term traffic calming is used to describe a range of strategies to slow vehicular traffic in order to enhance the safety, comfort and livability of streets for all users. Higher vehicle speeds decrease drivers' peripheral vision and their overall awareness of, and their ability to react to, the movement of all roadway users including pedestrians on roadways. While engineering strategies are the most visible, they are most effective when combined with strategies that incorporate education, enforcement, and encouragement elements.

Engineering approaches focus on physical measures—typically altered roadway geometry or devices that create vertical or horizontal deflection—to slow or limit a vehicle's path of travel. Treatments include:

- Curb bulbs
- Chicanes
- Speed bumps

Passive traffic calming measures include slower speed limits, e.g., neighborhood speed zones, signage, and visual elements. Visually narrowing a street or changing its aesthetics can be effective traffic calming techniques, and can be more widely applicable than geometric measures. Treatments include:

- Curb and gutter, which defines the traveled part of the roadway.
- Sidewalks, in particular buffered sidewalks, which define the walkable area of the roadway and

Signage (Photo by TDG)

indicate that

motorists should expect to see pedestrians.

- Radar speed display signs that provide driver feedback on speed of travel and effectively reduce speeds on the section of roadway on which they are placed.
- Outdoor cafes or other activities in the Pedestrian and Amenity Zones, such as street furniture.
- Street trees, and other landscaping which create a sense of enclosure.
- On-street parking, which creates an activity zone to which drivers must pay attention.
- Pavement type and road striping. Buildings that are closer to the street (i.e., no parking or drive-through between the street and adjacent buildings).
- Signage and flexible knock-down bollards
- "Intersection Repair" and other neighborhood signage and public art programs.

Engineering-based traffic calming changes require a review of street conditions and possible traffic study to ensure that proposed changes are appropriate. Passive traffic calming methods may be easier to implement without major studies, extensive public outreach, and design efforts.

BENEFITS

- Visual definition of the roadway and pedestrian travelway, definition of areas in which pedestrian use can be expected
- Reduced speeds
- More attentive driving
- Greater tendency to yield to pedestrians
- Increased aesthetic value

DESIGN CONSIDERATIONS

As with all traffic calming measures, the context of the street must be considered, including the following characteristics:

- Street classification
- Traffic operational analysis
- Mix of traffic, including consideration of bus, bike or truck routes
- Adjacent land uses
- First responder vehicle needs.

Structural elements are the first choice to define the streetscape - wherever possible sidewalks and curb and gutter should be used to establish a hierarchy between drivers and pedestrians.

Creation of a sense of enclosure should also be employed through structural elements such as buildings set closer to the street, or created through the introduction of street trees, landscaping, or other vertical elements in the amenity zone, such as light standards, street furnishings, and the like.

Activity, though temporal, is the third most effective strategy to slow traffic. Where the previous strategies are not possible or not effective, elements like signage, flexible knock-down bollards, and pavement markings can be employed to increase awareness and encourage slower speeds by drivers.



Examples of Passive Traffic Calming:
Upper Left: Sidewalk cafe, *Lower Left:* Bulb out and vegetation, *Below:* "Intersection Repair" mural, *Upper Right:* flexible knock-down bollard, *Lower Right:* Radar speed display sign.



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
 Designing Sidewalks and Trails for Access: Ch. 4 Sidewalk Design Guidelines and Existing Practices:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm
 City Repair: <http://cityrepair.org/>
 MUTCD 2009

CHICANES



Chicanes (Photo by TDG)

DESCRIPTION

Chicanes are a traffic calming measure that divert the path of travel along a roadway causing drivers to slow in order to make lateral shifts and/or pass through a narrowed section of roadway. Chicanes can take the form of curb extensions, center islands, or staggered on-street parking. On lower speed and lower volume residential streets, chicanes are often mid-block curb extensions used to slow traffic by narrowing the roadway to the width of one lane (choker).

BENEFITS

- Chicanes require drivers not only to reduce their speed but to share and negotiate the shared space with other drivers and roadway users.
- Chicanes can also be planted to provide additional landscaping or to incorporate stormwater treatment such as rain gardens, thereby providing secondary benefits.

DESIGN CONSIDERATIONS

As with all traffic calming measures, the context of the street must be considered, including the following characteristics:

- Street classification
- Traffic operational analysis
- Mix of traffic, including consideration of bus, bike or truck routes
- Adjacent land uses
- First responder vehicle needs

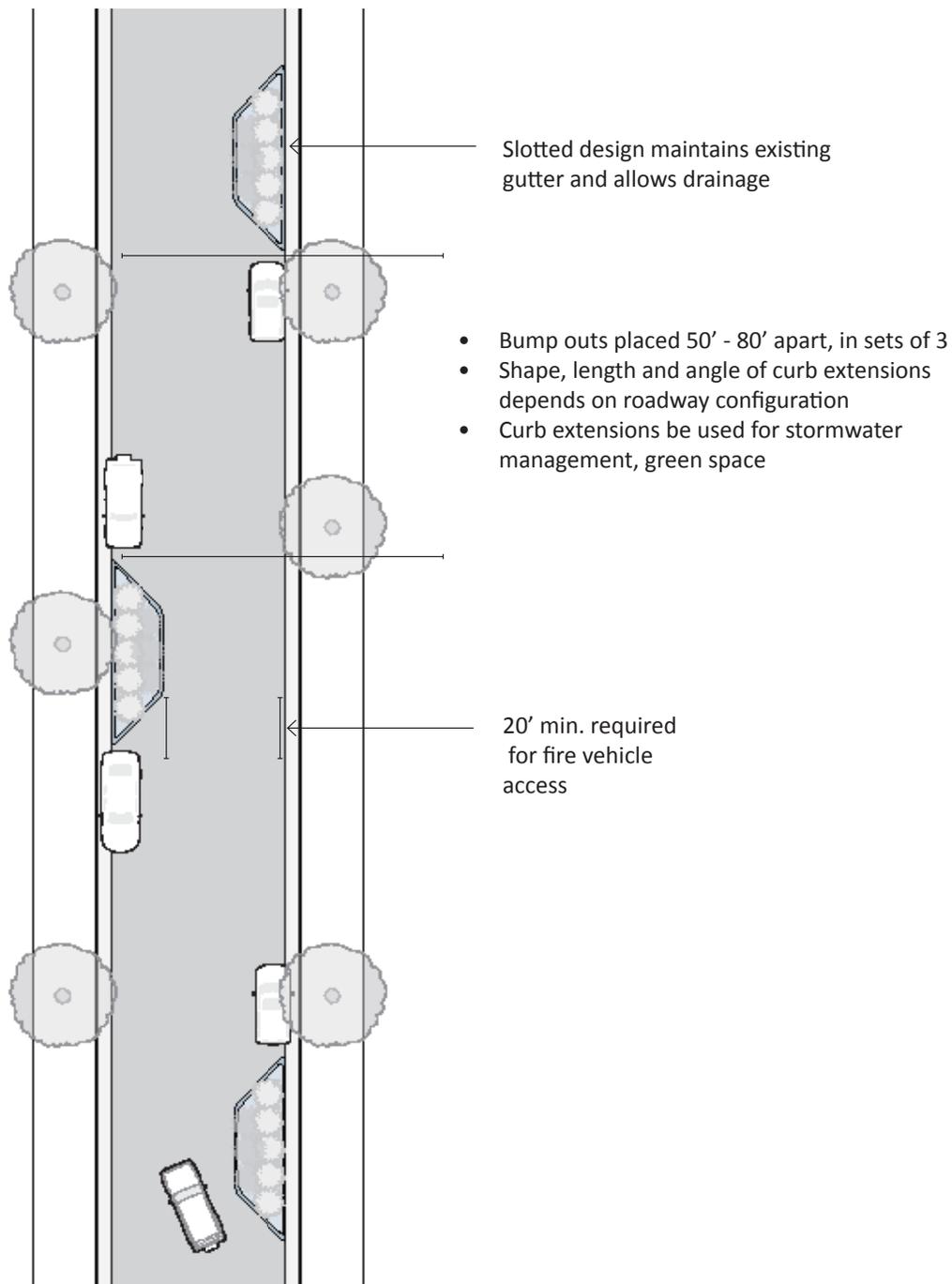
Streets that are good candidates for traffic calming through the application of chicanes are residential streets where:

- There is a high volume of high speed cut through traffic.
- On routes that are frequented by children walking/ biking to and from school.
- As part of a comprehensive neighborhood traffic calming program, particularly in neighborhoods
- Where other traffic calming measures have been implemented.

Consider the following for placement of chicanes in the right-of-way:

- The placement of curb extensions should alternate from one side of a street to the other, and are typically placed in groups of three.
- Removal of on-street parking may be required for chicane installation.
- The size of chicanes will vary based on the targeted design speed and roadway width, but must be 20 feet wide curb to curb at a minimum to accommodate emergency vehicles.
- On collector or arterials where lane width cannot be narrowed, staggered areas for parking can create a chicaning effect.
- Chicanes can be used on both one-way and two-way streets.

CRASH REDUCTION FACTOR: RESEARCH INCOMPLETE



RESOURCES: AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities.
PedSafe: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=33

BUFFER ZONE



Sidewalk with Buffer Zone

DESCRIPTION

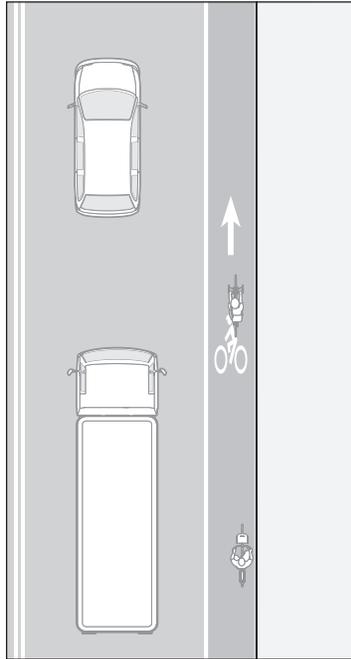
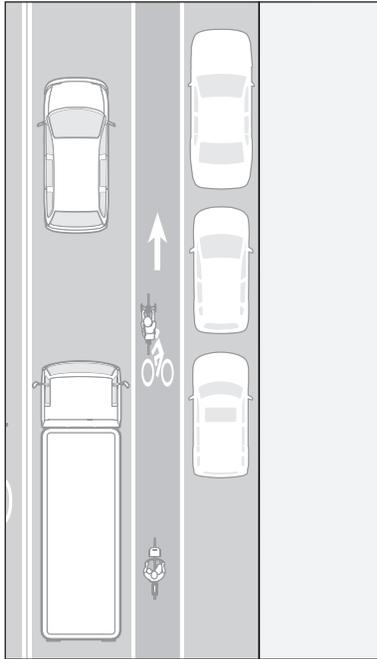
The Buffer Zone is the area between the motor vehicle travel lane and the Pedestrian Zone. The Buffer Zone can be created by the Curb Zone, the Amenity Zone or both. It provides a buffer to the Pedestrian Zone from moving motor vehicle traffic. The Buffer Zone is frequently created by the presence of street trees, planting strip, parking lane or bike lane.

BENEFITS

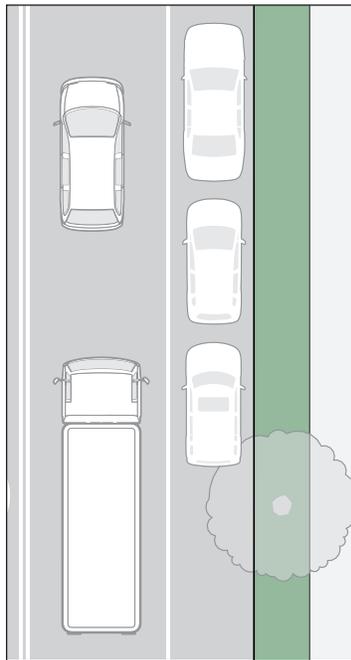
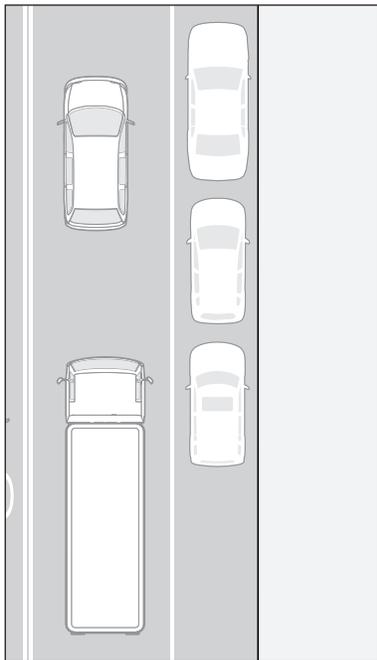
- A buffer from moving motor vehicle traffic makes the sidewalk a more pleasant place to walk.
- On Downtown streets and within business districts buffers allow for more activity on the sidewalk such as sidewalk cafes, benches and other pedestrian amenities.
- The Buffer Zone eliminates the “splash zone”, buffering pedestrians from the likelihood of getting splashed by puddled water or snow that can collect in the gutter.
- For roadways without an Amenity Zone the Curb Zone can improve the comfort of the sidewalk by creating space between moving motor vehicles and pedestrians with parking or bike lanes.
- Parking lanes provide a physical barrier between motor vehicle traffic and the sidewalk.

DESIGN CONSIDERATIONS

- Downtown and Business District streets or streets with higher pedestrian volumes benefit from both an Amenity Zone and a Curb Zone to increase the comfort of the sidewalk and sidewalk activities such as sidewalk cafes.
- Parking in the Curb Zone may be parallel, perpendicular, angled or back-in angle parking. The parking configuration should be determined based on the characteristics of the street. Back-in angle parking is preferred over perpendicular or angled parking in business districts for multiple reasons (see Back-in Angle Parking).
- Additional uses of the Buffer Zone include in-street bike parking, seating and parklets.



Parking and bike lanes can function as Curb Zone buffers to comfortably distance pedestrians and the sidewalk from moving vehicles. The combination of bike lanes and parking as buffer to the street is the most comfortable for pedestrians. This buffering is effective on high volume pedestrian streets or where there are sidewalk cafes.



Any of the Curb Zone buffers combinations can be paired with an Amenity Zone to provide an additional buffer to the sidewalk.

RESOURCES:

Wichita Bicycle Master Plan: <http://www.wichita.gov/Government/Departments/Planning/Pages/Bicycle.aspx>
 Downtown Wichita Streetscape Design Guidelines: <http://www.wichita.gov/Government/Departments/Planning/NR/NR Documents/Downtown Wichita Streetscape Design Guidelines.pdf>

CONNECTOR TRAILS



Connector Trail

DESCRIPTION

Connector Trails are short off-road segments of trail that provide bicycles and pedestrians access between subdivisions, neighborhoods, parks, schools, and business.

There are several strategies for providing connector trails in new and established developments. Several ways to create them are through policy, ordinance, easements, or for existing developments through written agreement with adjacent property owners.

BENEFITS

- Connector Trails can provide a more direct route between subdivisions when the street system is circuitous or walking long distances on collector arterials is required.
- Encourage walking between neighborhoods or along walking routes to schools or parks.
- Connector trails shorten distances for pedestrians.
- Exposure to traffic is limited or reduced when residential streets and trails are used rather than arterial streets.
- Connector trails offer more walking route choices within a subdivision.

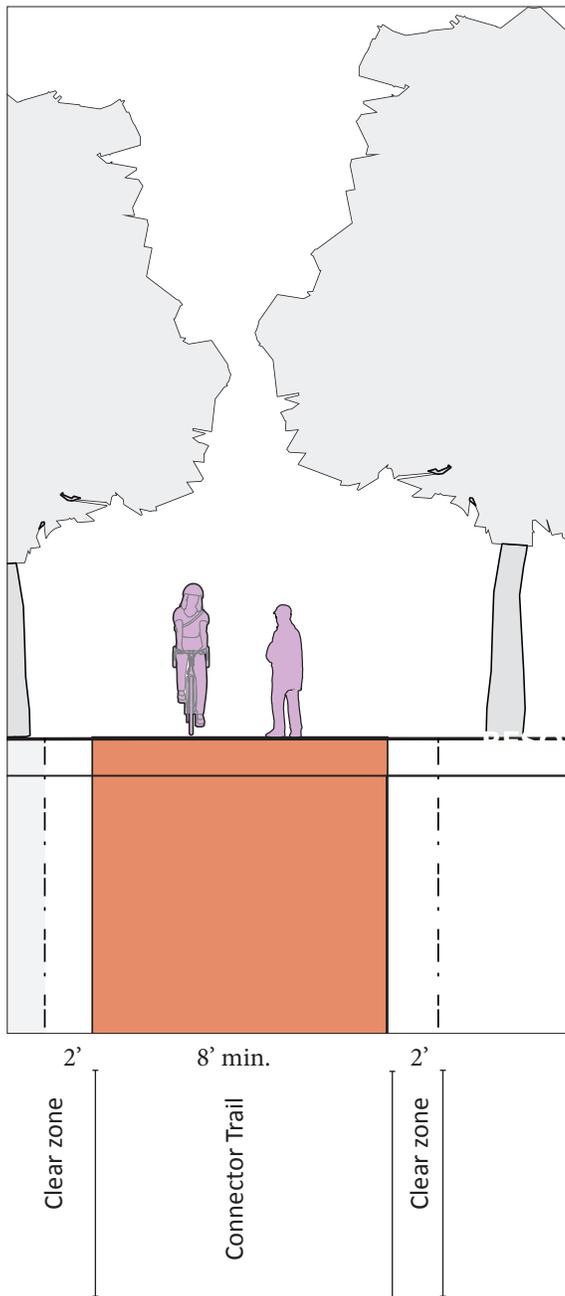
CONSIDERATIONS

- Connector Trails intended for use by bicycles should be designed to meet adopted guidelines. This includes widths, clearance, design speed, stopping and sight distance.
- Connector Trails intended for use by pedestrians must meet accessibility requirements under the Americans with Disabilities Act (ADA).
- If parallel to a roadway the grades may meet but not exceed the grade of the adjacent roadway.
- If not next to a roadway, the grade should not exceed 5 percent (see resources).
- Trail entrances and exits should take roadway conditions into consideration and if possible located near enhanced street crossings.
- Connector trails should be a minimum of 8 feet wide.
- Connector trails should be tied into the existing sidewalk or pathway network.
- Connector Trails can be marked with wayfinding or bollards for easy identification.

Policy Considerations

Connector trails can be established through various policy mechanisms in existing and new developments:

- Voluntary easement
- Easement required at time of property sale
- Development regulations
- Utility easements (may be included in easement for utility access).



REFERENCES:

RESOURCES:

AASHTO Pedestrian Guide for the Planning, Design, and Operation of Pedestrian Facilities. Designing Sidewalks and Trails for Access: Ch. 4 Sidewalk Design Guidelines and Existing Practices: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm

DRIVEWAY DESIGN



Driveway design that provides a continuous, even sidewalk

DESCRIPTION

Driveways provide access to businesses and residences from public streets, and in doing so often intersect with sidewalks creating occasions for conflict between pedestrians and vehicles.

BENEFITS

When driveways are properly designed, they:

- Reinforce the law that pedestrians have the right of way.
- Provide an even, continuous walking surface for comfortable pedestrian travel particularly for those with disabilities and wheelchair users.

DESIGN CONSIDERATIONS

Driveways occur wherever there are land uses that require vehicle access from the street network. Changes to the To the extent possible:

- Minimize the number of driveways particularly along commercial corridors, in order to minimize sidewalk conflicts.
- As an access management principle, avoid locating driveways within the functional area of an intersection to reduce the potential for conflicts with turning vehicles and pedestrians in the crosswalk.
- As a general rule, design driveways to look like driveways, not roadway intersections, and incorporate the following design principles:
 - » Clearly delineated the pedestrian zone across the driveway.
 - » The pedestrian zone should be a minimum 6' feet clear width.

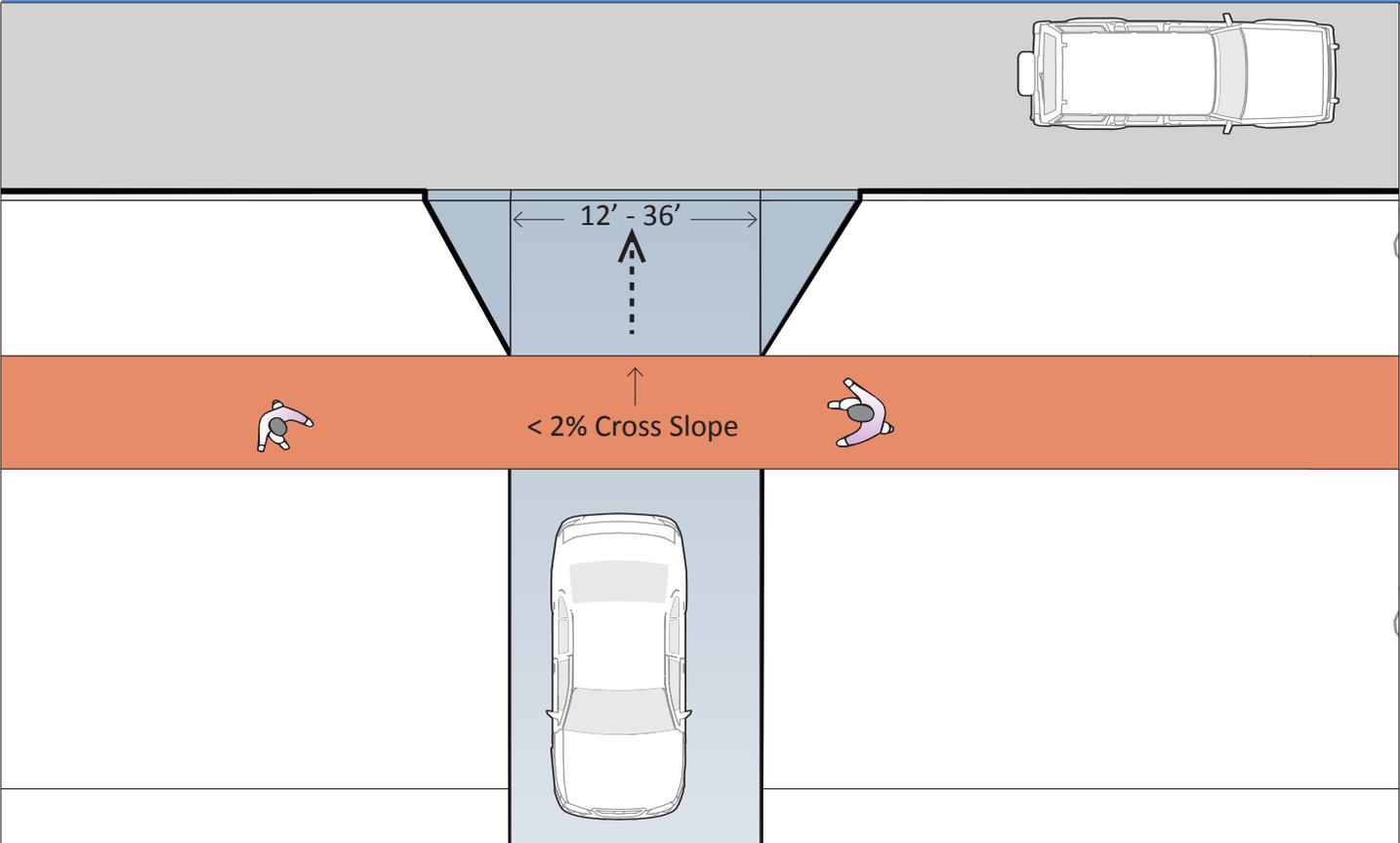
- » The pedestrian zone should be consistent with current standards and have a 1% cross slope (no more than a 2%) to ensure that all pedestrians using wheeled mobility devices can safely cross the driveway.
- » Turning radii should be minimized (5 to 15 feet) to the extent feasible to prevent high speed turning movements. Ramp style driveway designs are preferred over full curb radii designs.
- » Consider minimizing driveway widths (12 to 16 feet for one-way, 20 to 24 feet for two-way, 24 to 36 feet for heavy trucks).
- » Driveway distance should be set back 75 to 100 feet minimum from intersections in commercial corridors and 40 to 60 feet in neighborhood corridors.
- » Sidewalks should be continuous across driveways at a continuous grade and cross-slope and driveway ramps should be contained within the planting strip space and not intrude on the pedestrian travel way.
- In locations where a driveway must function as an intersection, it should be designed with pedestrian safety features such as crosswalks, small corner radii, and pedestrian signal heads if part of a signalized intersection.
- Truncated domes should not be used where driveways cross the sidewalk zone unless the driveway is functioning as a leg of an intersection, i.e. curb ramps are present.

- Site obstructions (signs, landscaping, building appurtenances) should be minimized to improve visibility between turning motorists and pedestrians.

POLICY CONSIDERATIONS

- Update the city of Wichita Driveway Design Standards Plates
- Update the City of Wichita Building Code for driveway placement in relation to intersections

Clearly maintain the sidewalk through driveway crossings. This messages to motorists that pedestrians have the right-of-way. Where feasible, design driveways with ramps rather than curb radii to look and function less like roadway intersections.



RESOURCES: FHWA Designing Sidewalks and Trails for Access, http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm
 AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities

DRIVEWAYS NEAR INTERSECTIONS



DESCRIPTION

As an access management principle, driveways should be avoided within the functional area of an intersection to reduce the potential for conflicts associated with turning vehicles.

BENEFITS

- Distancing driveways from intersections improves visibility of pedestrians and limits conflicting turn movements.

DESIGN CONSIDERATIONS

- Review Access Management Guidelines for Driveway Placement, Right-of-way & Easement Requirements and Traffic Impact Studies (See Resources).
- Measure the distance of the driveway from the point at which the street rights of way intersect.

Intersection Major Arterial Intersections:

- For right-in/right-out driveways provide a minimum of 200 feet from the intersection.
- For full turn movement driveways provide a minimum of 400 feet from the intersection

Residential Driveways:

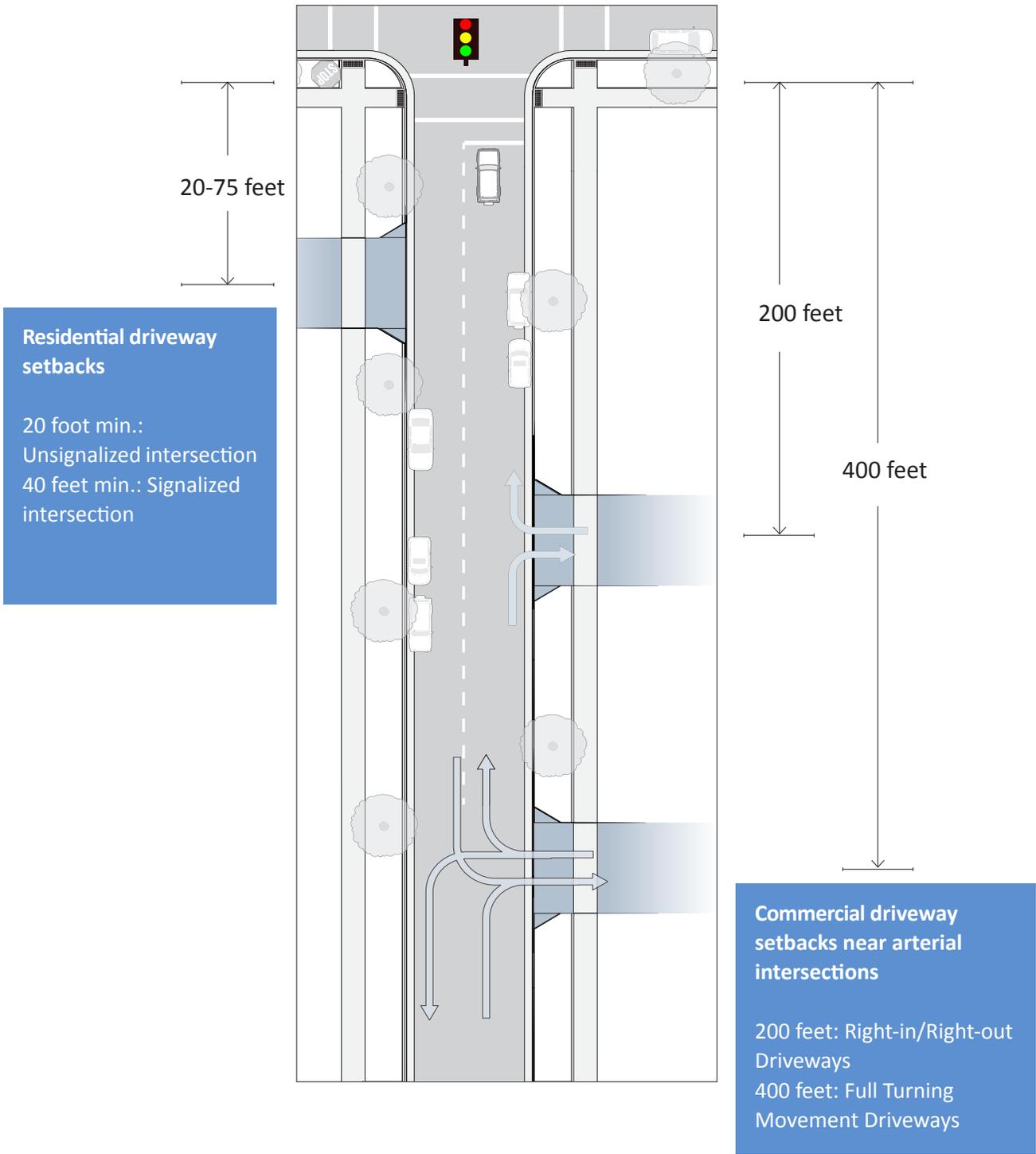
- Provide a minimum of 20 feet between uncontrolled

intersections and adjacent residential driveways.

- In locations where a driveway functions as part of an intersection, it should be designed with pedestrian safety features such as crosswalks, small corner radii, and pedestrian signal heads if signalized.
- For driveway spacing see Access Management.

POLICY CONSIDERATIONS

- Systematically review and remove redundant driveways at locations with high levels of pedestrian use such as downtown and neighborhood commercial areas.
- Review all public and private projects to ensure that driveways are either removed or relocated from close proximity to intersections.
- If driveway consolidation is possible, remove the driveway entrances closest to the intersection.



RESOURCES:

A Guide for Including Access Management in Transportation Planning. NCHRP Report 548: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_548.pdf
PEDSAFE: Driveway Improvements. http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=20
Access Management: Guidelines for Driveway Placement, Right-of-Way & Easement Requirements, And Traffic Impact Studies: <http://www.wichita.gov/Government/Departments/PWU/>

ACCESS MANAGEMENT



Painted Traffic Diverter

DESCRIPTION

Access management strategies include restricting turning movements, particularly left-turns, through median installation, interconnecting parcels with service roads or internal connections, and reducing the number and size of driveways (Driveway Consolidation), particularly near intersections.

Access management reduces crashes by reducing the number of motor vehicle turning movements across travel lanes, bike lanes and the sidewalk. Multi-lane roadways without medians present particular challenges to both pedestrians and motorists as motorists turning left into a driveway are focused on finding gaps in on-coming traffic. While focusing on gaps in traffic, the motorists' sight lines of potentially conflicting pedestrians are blocked by the approaching vehicles. Motorists often accelerate rapidly to clear a gap on multi-lane roadways which puts the pedestrian at risk when walking along the roadway.

Access management should be employed with sensitivity to the character and social function of the street. Access management can improve the safety and character of wide streets that benefit from the installation median trees to soften and visually narrow the roadway. On main streets with business and pedestrian activity on both sides, the installation of medians should be carefully assessed to maintain visual connections between both sides of the street.

BENEFITS

- Crash rates decrease as driveway density decreases on a roadway (i.e., number of driveways per mile).
- Limiting and consolidating vehicle access points by installing medians and reducing the number of driveway entrances benefits pedestrians and bicyclists and can also improve traffic operations by redirecting motor vehicles to make turns at intersections with appropriate traffic control devices.
- Distancing driveways from intersections improves visibility of pedestrians and limits conflicting turn movements (see Driveways Near Intersections).
- Medians reduce potential conflicts associated with turning vehicles.
- Medians can provide a refuge for pedestrians at crossing locations (see "Crossing Island" treatment).
- They can provide space for trees and other landscaping that, in turn, can help change the character of a street and reduce vehicle speeds.
- Medians also have benefits for motorist safety when they replace center turn lanes.

DESIGN CONSIDERATIONS

- Access management strategies should be considered where numerous driveways or excessively wide driveways impede pedestrian travel or create unnecessary potential conflicts between vehicles, bicycles, and pedestrians.
- Under the right conditions, medians can be constructed in sections, creating an intermittent



rather than continuous median. This can provide access management for driveways and opportunity for improved pedestrian crossings.

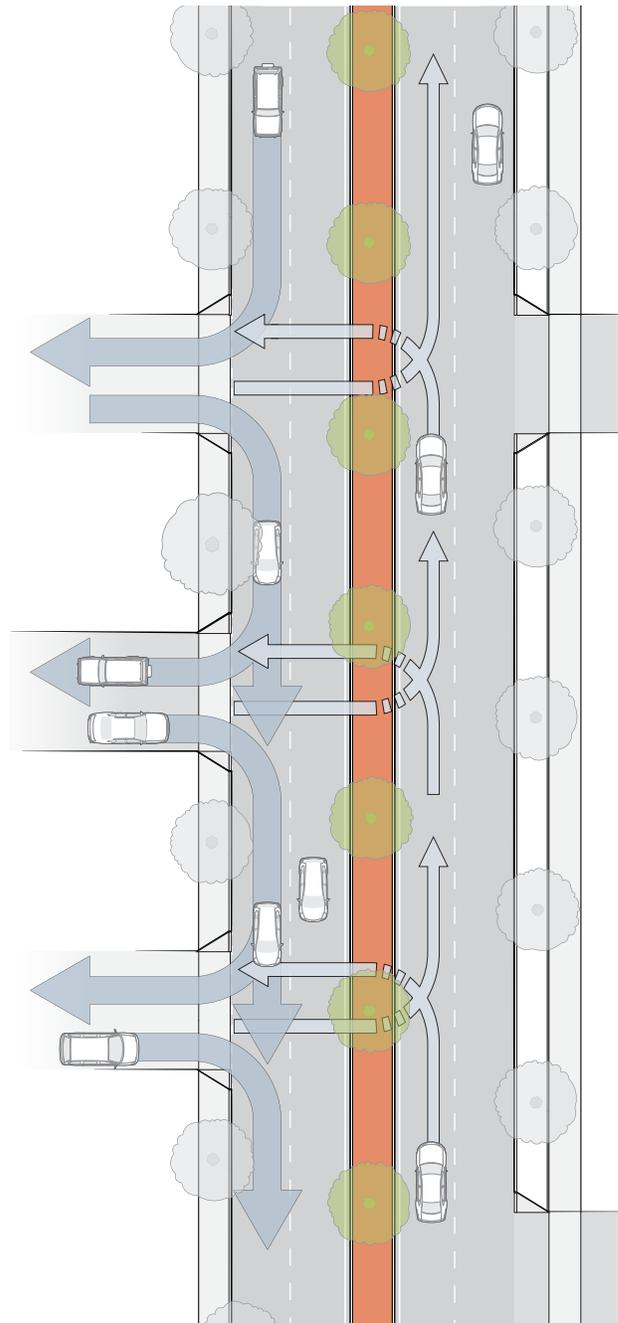
- On major arterials there are minimum driveway spacing requirements to provide sufficient distance between driveways for driver expectancy and traffic flow purposes. The following spacing standards will be required:
 - 200 feet spacing for driveways that allow right-in, right-out turns only.
 - 200 feet minimum offset for driveways not lined up on the opposite sides of arterial streets and not having conflicting left turn movements
 - 400 feet offset for driveways on opposite sides of the street
- On the approaches to major intersections, install center medians with a minimum length of 300 feet and width of 4 feet. Medians at intersection approaches require motor vehicles to turn at the signalized intersection rather than into mid-block driveways which reduces the change of collision with pedestrians walking along the side of the roadway.

POLICY CONSIDERATIONS

- Systematically review and remove redundant driveways at locations with high levels of pedestrians. Use in areas such as downtown and in business districts. (Also see Driveways Near Intersections).
- Review all public and private projects to ensure that driveways are either removed or relocated from close proximity to intersections.
- If driveway consolidation is possible, remove the driveway entrances closest to the intersection.

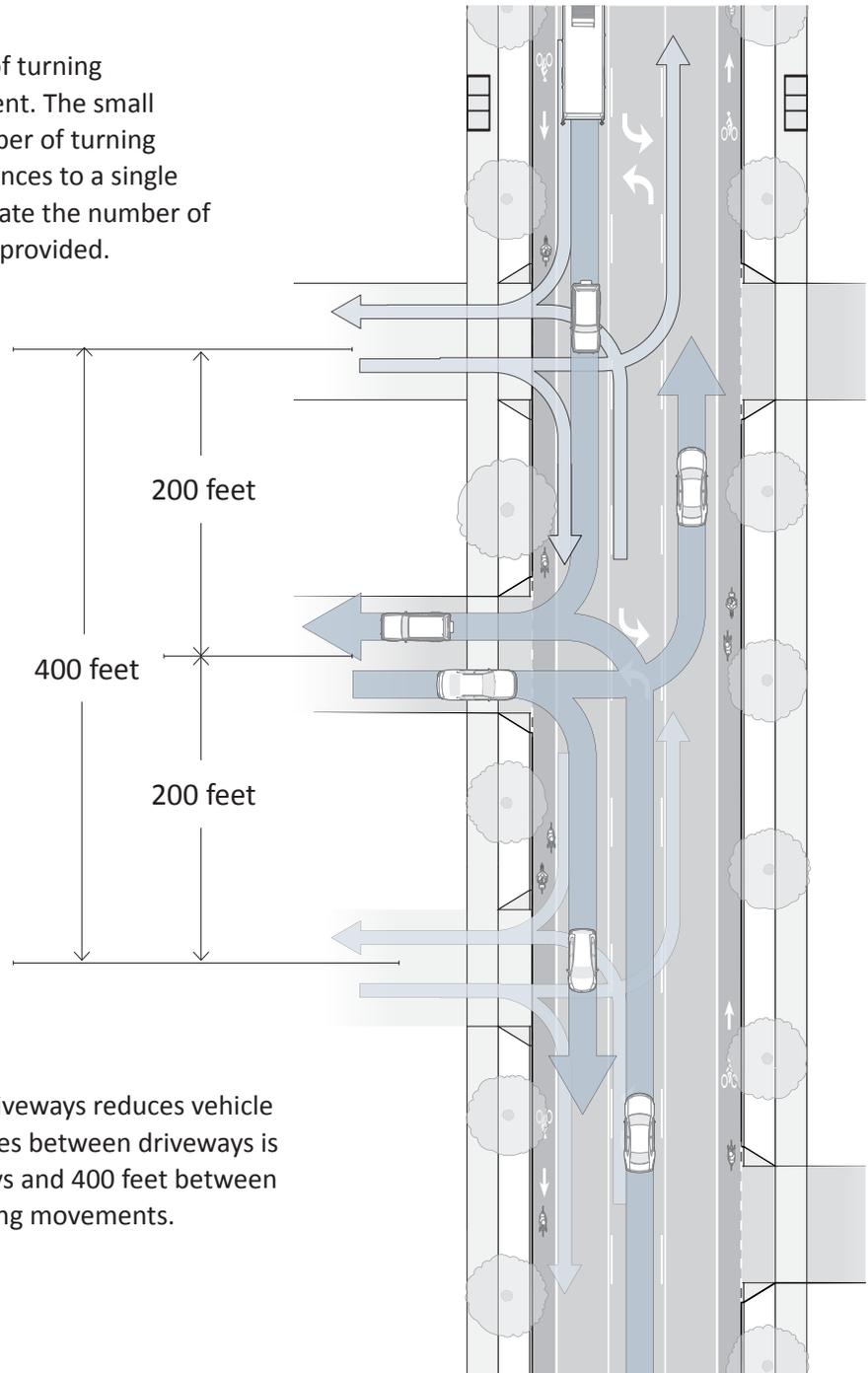
Medians:

Medians can provide access management by reduce the number of turning movements, notably left turns, across the sidewalk by concentrating turning movements at intersections. The larger arrows in the diagram below depict the turning movements with the presence of a median. Only right turns are allowed in and out of driveways.



Driveway Consolidation:

Fewer driveways reduce the number of turning movements in and out of a development. The small arrows in the diagram depict the number of turning movements with three driveway entrances to a single development. The larger arrows illustrate the number of turning movements if one driveway is provided.



Driveway Spacing:

Providing adequate space between driveways reduces vehicle turning conflicts. The required distances between driveways is 200 feet for right-in-right out driveways and 400 feet between driveways that accommodate all turning movements.

RESOURCES: A Guide for Including Access Management in Transportation Planning. NCHRP Report 548: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_548.pdf
PEDSAFE: Driveway Improvements. http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=20
Access Management: Guidelines for Driveway Placement, Right-of-Way & Easement Requirements, And Traffic Impact Studies: <http://www.wichita.gov/Government/Departments/PWU/>

APPENDIX E

Corridor Improvements Detailed Notes

Gastonia Comprehensive Pedestrian Plan
Corridor Improvements - Detailed Notes

Map ID	Location	From	To	Side	Type	Notes
1	Aberdeen Blvd	New Hope Rd	I-85	South	Greenway	greenway connection under Franklin Blvd
2	Aberdeen Blvd	I-85	Remount Rd	South	Sidewalk Construction	connect proposed greenway to commercial uses and hotels
3	Aberdeen Blvd	Remount Rd	Cox Rd	North	Sidewalk Construction	connect commercial uses and hotels to surrounding
4	Adams Dr	Spencer Ave	Miller St	North	Sidewalk Construction	Pleasant Ridge Elem SRTS, curb, gutter, and sidewalk
5	Archie Whiteside Dr	Food Lion Grocery Store	Selwyn Cir	East	Sidewalk Construction	construct sidewalks to connect residents of Woodland Acres mobile home park to Food Lion shopping
6	Armstrong Park Rd	Franklin Blvd	Hudson Blvd	-	Study	perform traffic calming study
7	Athenian Dr	Hillcrest Ave	W Garrison Blvd	West	Sidewalk Construction	connect neighborhood to commercial corridor
8	Bradley Ave	York St	Cemetery	North	Sidewalk Construction	connect trail through neighborhood to York St
9	Bradley Center Driveway	Modena St; Farewell Dr	Bradley Center Parking Lot	South	Sidewalk Construction	connection into interior of Bradley Center, address lighting issues
10	Broad St	Franklin Blvd	4th Ave	Both	Bike and Ped Improvements	wide outside lanes, consider installing bike lanes through a lane diet for traffic calming, infill sidewalk gaps
11	Broad St	Woodhill Dr	Boxwood Ln	West	Sidewalk Construction	construct sidewalk to just south of Boxwood
12	Catawba Creek Greenway Extension	Ferguson Park	Marietta Street	-	Planned Greenway	greenway connection behind residential uses on Stevens St to connect through Ferguson Park
13	Catawba Creek Greenway Southeast Extension (Phase I)	Southeast Armory	Robinwood Rd	-	Greenway	provide greenway connection between Robinwood Rd and Armstrong Park Rd as part of future development
14	Catawba Creek Greenway Southeast Extension (Phase II)	Gaston Day School Rd	Timberwood Dr	-	Greenway	greenway from Armstrong Park Rd to Timberwood Dr to connect Hunting Forest to larger greenway network
15	Chestnut St	4th Ave	Garrison Blvd	West	Sidewalk Construction	sidewalk along frontage of Lineberger Park
16	Churchill Dr	Garrison Blvd	Buckingham Ave	East	Sidewalk Construction	multi-street SRTS project
17	Connection to Bradley Center	N. New Hope Rd	Bradley Center	-	Greenway	important "backdoor" connection for residential uses north of Bradley Center
18	Clay St	Second Ave	Franklin Blvd	West	Sidewalk Construction	important downtown connection
19	Cox Rd	I-85	Court Dr	Both	Sidewalk Construction	fill in sidewalk gaps
20	Cox Rd	Franklin Blvd	Franklin Blvd	Both	Sidewalk Construction	fill in sidewalk gaps
21	Craig Ave	Poston Cir	Thomas St	North	Sidewalk Construction	important residential link to Franklin Blvd
22	Davidson Ave	Chester St	Falls St	North	Sidewalk Construction	important residential link
23	Davidson Ave	Marietta St	Hanover St	North	Sidewalk Construction	Woodhill Elem SRTS, curb, gutter, sidewalk
24	Davidson Ave	Broad St	Avon St	North	Sidewalk Construction	important residential connection to sidewalks on Chester and trail beyond
25	Davis Park Rd	Hudson Blvd	Richland Ave	East	Sidewalk Construction	connect residential to planned improvements on Davis Park
26	E Hudson Blvd	York Rd	Union Rd	North	Sidewalk Construction	sidewalk behind existing curb
27	E Second Ave	S Chestnut Stq	S Marietta St	Both	Bike and Ped Improvements	improve pedestrian and bicycle connection to Chestnut and Lineberger Park
28	Eddie St	Dixon Rd	Dead End	East	Sidewalk Construction	connect residential to existing sidewalk on Dixon
29	Edgewood Rd	Food Lion Grocery Store	Oates Rd	East	Sidewalk Construction	connect neighborhood to grocery store
30	Elm St	Tenth Ave	Adams Dr	East	Sidewalk Construction	Pleasant Ridge Elem SRTS, curb, gutter, sidewalk
31	Ferguson Park Greenway Connector	Existing Greenway	Ruby Ave	South	Greenway and Sidewalk Construction	greenway connection to Ferguson Park
32	Fern Forest Drive	Garrison Blvd	Hudson Blvd	West	Greenway Connection	connect to Avon Creek Greenway
33	Fourth Ave	Vance St	Fifth Ave	North	Sidewalk Construction	fill missing link from residential to Vance and Optimist Club Park
34	Franklin Blvd	Broad St	Avon St	Both	General Ped Improvements	evaluate potential to right-size street, raise median for refuge, investigate mid-block crossings with bus pullouts, enhanced bus stop amenities
35	Franklin Blvd	Cox Rd	East Club Rd	North	Sidewalk Construction	<Null>
36	Franklin Blvd	Cox Rd	City Limits	North	Sidewalk Construction	fill in sidewalk gaps
37	Gardner Park Dr; Pamela St	Downey Pl; Gardner Park Dr	Pamela St; Redbud Dr	North	Sidewalk Construction	Gardner Park Elem SRTS
38	Garrison Blvd	Marietta St	Chestnut St	Both	Sidewalk Construction	fill sidewalk gaps on north side of Franklin to just west of E. Club Dr
39	Garrison Blvd	New Hope Rd	Burtonwood Dr	Both	Sidewalk Construction	fill gaps in sidewalk network, repair swalks in poor condition
40	Gaston Day School Rd	Kendrick Rd	Hoffman Rd	East	Sidewalk Construction	important residential link
41	Gaston Day School Rd	Lincoln Lane	Kendrick Rd	North	Sidewalk Construction	important residential link
42	Green Dr	Franklin Blvd	East Club Circle	East	Sidewalk Construction	connect to commercial corridor
43	Greenway Connector	Highland Rail Trail	US 321	-	Greenway	residential connection to greenway
44	Greenway Connector	Highland Rail Trail	Cemetery	-	Greenway	residential connection to greenway
45	Henderson St	Lyon St	Southside Ave	North	Sidewalk Construction	sidewalks connecting to Gaston County Public Health Department
46	Henderson St	McArver St	Gall Ave	West	Sidewalk Construction	missing segment in surrounding sidewalk network
47	Highland Branch Greenway	Rankin Lake Park	Bulb Ave	-	Greenway	key greenway connection
48	Highland St	Davidson Ave	Church Property	West	Sidewalk Construction	missing segment in surrounding sidewalk network
49	Hillcrest Ave	Miller St	Athenian Dr	North	Sidewalk Construction	Pleasant Ridge Elem SRTS, curb, gutter, sidewalk
50	Hillwood Dr	Hargrove Ave	Dead End	West	Sidewalk Construction	Rhyne Elementary SRTS, curb, gutter, sidewalk
51	Holly Dr	Timberlane St	Greenway Access	North	Sidewalk Construction	multi-street SRTS Project
52	Home Trail	Weldon St	Hillcrest Ave	North	Sidewalk Construction	important residential connection
53	Hudson Blvd	Robinwood Rd	Churchill Dr	North	Sidewalk Construction	provide greater connectivity to greenway
54	Hudson Blvd	Armstrong Park Rd	Redbud Dr	North	Sidewalk Construction	connect to larger sidewalk network
55	Hudson Blvd	Windsor Woods Dr	existing sidewalk at 951 E Hudson Blvd	South	Sidewalk Construction	connect to larger sidewalk network
56	Hudson Blvd E	Davis Park Dr	York Rd	South	Sidewalk Construction	connect to larger sidewalk network
57	Independence Way	Redbud Dr	Londonderry Dr	North	Sidewalk Construction	residential connection to sidewalk network
58	Jackson Rd	York Rd	Nineteenth Ave	North	Sidewalk Construction	residential connection to sidewalk network
59	Jackson St	W Tenth Ave	York Rd	East	Sidewalk Construction	residential connection to sidewalk network
60	Kendrick Rd	Robinwood Rd	East City Limits	Both	Sidewalk Construction	residential connection to sidewalk network
61	Laurel Ln	Castlegate St	Robinwood Rd	North	Sidewalk Construction	residential connection to sidewalk network
62	Laurel Ln	Churchill Dr	Timberlane St	North	Sidewalk Construction	multi-street SRTS project
63	Linwood Rd	Garrison Blvd	Spencer Ave	West	Sidewalk or Multiuse Path	residential connection to sidewalk network
64	Linwood Rd	East Dr	Cloninger Ave	East	Sidewalk Construction	Pleasant Ridge Elementary SRTS, curb, gutter, and
65	Londonderry Dr	Jefferson Ave	Independence Way	West	Sidewalk Construction	residential connection to sidewalk network
66	Loray Greenway Connector	Linwood	US 321	-	Greenway and Sidewalk Construction	greenway connection
67	Lyon St	Hudson Blvd	2065 Lyon St Frontage	West	Sidewalk Construction	missing segment in surrounding sidewalk network
68	May Ave	Webb Street	Sruggs St	South	Sidewalk Construction	Webb Street School SRTS
69	McArver St	Mountainview St	Henderson St	East	Sidewalk Construction	residential connection to sidewalk network
70	Modena St	Park Ave	Spring St	West	Sidewalk Construction	residential connection to commercial uses, critical bus stop linkage
71	Modena St	Rhyme St	Bradley Center Driveway	West	Sidewalk Construction	traffic calming and pedestrian safety improvements
72	Modena St	New Hope Rd	Modena St Ext	North	Sidewalk Construction	traffic calming and pedestrian safety improvements, open drainage and difficult topo
73	Modena St	Modena Ext	Rhyme St	North	Sidewalk Construction	traffic calming and pedestrian safety improvements
74	Montrose Dr	N New Hope Rd	Rhyme Carter Rd	North	Sidewalk Construction	Brookside Elem SRTS, sidewalks, crosswalks
75	Morris St	Doffin Ln	Radio St	West	Sidewalk Construction	Highland School of Technology SRTS, missing link in surrounding sidewalk network
76	Mountain View St	McArver St	S York St	North	Sidewalk Construction	residential connection to sidewalk network
77	N Oakwood St	Hillwood Dr	Davidson Ave	West	Sidewalk Construction	Rhyne Elementary SRTS, multi-street SRTS project, curb, gutter, sidewalk
78	New Greenway	Linwood Rd	Sherman St	-	Greenway	residential greenway connection
79	New Hope Rd	Franklin Blvd	Ozark Ave	East	Sidewalk Construction	critical commercial corridor
80	New Hope Rd	Burtonwood Dr	Franklin Blvd	West	Sidewalk Construction	connect planned sidewalk to larger sidewalk network

Gastonia Comprehensive Pedestrian Plan
Corridor Improvements - Detailed Notes

Map ID	Location	From	To	Side	Type	Notes
81	New Hope Rd	Redbud Dr	Hudson Blvd/Titman Rd	South	Sidewalk Construction	fill sidewalk gaps, pedestrian crossings at wide driveways
82	New Hope Rd	Armstrong Park Rd	Redbud Dr	Both	Sidewalk Construction	fill sidewalk gaps on south side, add ADA ramps on north side, and sidewalk connections into school and neighborhood
83	New Hope Road	Lee St	Armstrong Park Rd	South	Sidewalk Construction	missing segment in surrounding sidewalk network
84	New Way Dr	Morris St	US 321	South	Sidewalk Construction	missing segment in surrounding sidewalk network
85	Norment Ave	Pryor St	Morris St	South	Sidewalk Construction	connection to Erwin Center, missing segment in surrounding sidewalk network
86	Old Redbud Dr	Redbud Dr	Franklin Blvd	West	Sidewalk Construction	apartment residents walking in middle of road
87	Osceola St	Eight Ave	Existing Sidewalk North of Oxford Ave	West	Sidewalk Construction	missing segment in surrounding sidewalk network
88	Osceola St	Marietta St	Oxford Ave	West	Sidewalk Construction	missing segment in surrounding sidewalk network
89	Park Ln	Edgefield Ave	Nineteenth Ave	North	Sidewalk Construction	missing segment in surrounding sidewalk network
90	Pryor St	Davidson Ave	Norment Ave	East	Sidewalk Construction	connection to Erwin Center, missing segment in surrounding sidewalk network
91	Pryor St	Pryor St	Sycamore Ave	-	Greenway	connection to Erwin Center, residential greenway connection
92	Ramblewood Ln; Sherwood Cir; Pineridge Ln	Pineridge Ln; Forestbrook Dr; Ramblewood Ln	North Dead End; Ramblewood Ln; Union Rd	East	Sidewalk Construction	Robinson Elem SRTS
93	Rankin Ave	Boyce St	Chester St	North	Sidewalk Construction	missing segment in surrounding sidewalk network
94	Rankin Ave	Pryor St	Highland St	North	Sidewalk Construction	missing segment in surrounding sidewalk network
95	Ransom St Greenway Connector	Ransom St	Hillwood Dr	-	Greenway	Rhyne Elementary SRTS, GIS linework location
96	Redbud Dr	Hudson Blvd	New Hope Rd	East	Sidewalk Construction	connect existing sidewalks to greenway
97	Remount Rd	New Hope Rd	Aberdeen Rd	North	Sidewalk Construction	connect hotels to surrounding commercial uses
98	Robinwood Rd	Hudson Blvd	Catawba Creek Greenway	West	Sidewalk Construction	connection to greenway
99	Ruby Ave	Johnston St	York St	North	Sidewalk Construction	missing segment in surrounding sidewalk network
100	S Chestnut St	Lineberger Park	E Second Ave	West	Bike and Ped Improvements	improve pedestrian and bicycle connection along Chestnut and to Lineberger Park
101	S Marietta St / E Hilltop Dr	Clyde St	E Hudson Blvd	East	Sidewalk Construction	missing segment in surrounding sidewalk network
102	S. New Hope Road	Hudson	Beaty	South	General Ped Improvements	connect residential to surrounding commercial uses
103	Second Ave	Marietta St	Linwood Rd	Both	Bike and Ped Improvements	consider installing bike lanes through a lane diet for fill in sidewalk gaps, improve ped crossings, ADA
104	Second Ave	Chestnut St	S Belvedere Ave	Both	Bike and Ped Improvements	
105	Seigle Ave	Efrid St	Davenport St	North	Sidewalk Construction	missing segment in surrounding sidewalk network
106	Shannon Greenway Connector	Donegal Ct	Existing greenway	-	Greenway	greenway connection
107	Sherwood Cir	Forestbrook Dr	Kendrick Rd	North	Sidewalk Construction	Robinson Elem SRTS
108	Southwest Middle School	Phillips Center	Southwest Middle School	-	Greenway	connection between Phillips Center and Southwest Middle School, pathway from parking lot to parking lot
109	Southwood	S. New Hope Rd	Bellevue Ter	East	Sidewalk Construction	connect residential to surrounding commercial uses
110	T Jeffers Greenway	N Myrtle School Rd	Crescent Ln	-	Greenway and Sidewalk Construction	residential greenway connection to T Jeffers Center and surrounding commercial uses
111	T Jeffers Greenway Connector	T Jeffers Greenway	Walmart Parcel on W Franklin Blvd	-	Greenway and Sidewalk Construction	residential greenway connection to T Jeffers Center and surrounding commercial uses
112	Third Ave	York St	Marietta St	Both	Sidewalk Construction	missing segment in surrounding sidewalk network
113	Timberlane St	Laurel Ln	Holly Dr	East	Sidewalk Construction	multi-street SRTS Project
114	Union Rd	Fourth Ave	Sixth Ave	East	Sidewalk Construction	missing segment in surrounding sidewalk network
115	Union Rd	Robinson Elementary School	Frontage of 3611 Union Rd	East	Sidewalk Construction	Robinson Elem SRTS
116	Union Rd	Hudson Blvd	Frontage of 2900 Union Rd (ARP Church)	East	Sidewalk Construction	connect existing sidewalks and residential uses
117	Union Road	Robinson Elementary School Drive	Frontage of 2956 Union Rd	East	Sidewalk Construction	Robinson Elem SRTS; req from visually imp. for sidewalk on east and audio assist at Union/Robinwood int.
118	US 321	New Way Dr	Caldwell St	East	Sidewalk Construction	missing segment in surrounding sidewalk network
119	W Fourth Ave	Trenton St	Clay St	North	Sidewalk Construction	missing segment in surrounding sidewalk network
120	W Nineteenth Ave	Carolina Ave	Winget St	South	Sidewalk Construction	missing segment in surrounding sidewalk network
121	Walnut Ave	Airline Ave	Vance St	North	Sidewalk Construction	Webb Street School SRTS
122	York Rd	Hudson Blvd	Nassau Pl	East	Sidewalk Construction	residential connection to sidewalk network, railroad conflicts
123	York Rd	Hudson Blvd	Ruby Ave	Both	Sidewalk Construction	residential connection to sidewalk network, potential for right sizing, reducing curb cuts
124	York St	End of Existing Sidewalk	Frontage of 927 S. York St	West	Sidewalk Construction	fill sidewalk gap

APPENDIX F
Project Scoring

Gastonia Comprehensive Pedestrian Plan
Spot Improvements Scoring

Map ID	Primary Location	Crossing	Type	Cost	Crash Score	Speed Score	Constructability	Demand Score	Access Score	Cost/Benefit Score	Final Score
1	Armstrong Park Rd	New Hope Rd	Intersection	\$82,000	0	5	5	10	2.5	5	27.5
2	Broad St	Main Ave	Intersection	\$57,000	5	5	5	5	7.5	5	32.5
3	Broad St	Franklin Blvd	Intersection	\$93,000	5	5	5	5	7.5	5	32.5
4	Broad St	Long Ave	Intersection	\$71,000	5	5	5	5	5	5	30
5	Chester St	New Way Dr	Intersection	\$61,000	0	5	5	10	7.5	7.5	35
6	Chester St/York St	Tenth Ave	Intersection	\$76,000	0	5	5	10	5	5	30
7	Cox Rd	Court Dr	Intersection	\$25,000	0	5	5	5	5	10	30
8	Cox Rd	I-85 Ramps	Intersection	\$80,000	0	5	5	2.5	5	2.5	20
9	Davidson Ave	Pryor St	Intersection	\$15,000	5	5	5	10	7.5	10	42.5
10	Franklin Blvd	Myrtle School Rd	Intersection	\$40,000	5	5	5	7.5	7.5	7.5	37.5
11	Franklin Blvd	Chestnut St	Intersection	\$40,000	5	5	5	5	10	7.5	37.5
12	Franklin Blvd	Church St	Intersection	\$40,000	0	5	5	10	7.5	10	37.5
13	Franklin Blvd	Linwood Rd	Intersection	\$25,000	0	5	5	7.5	7.5	10	35
14	Franklin Blvd	Trenton St	Study	\$15,000	0	5	5	5	7.5	10	32.5
15	Franklin Blvd	Oakland St	Intersection	\$40,000	0	5	5	5	10	7.5	32.5
16	Franklin Blvd	Marietta St	Intersection	\$40,000	0	5	5	5	10	7.5	32.5
17	Franklin Blvd	South St	Intersection	\$40,000	0	5	5	5	10	7.5	32.5
18	Franklin Blvd	York St	Intersection	\$40,000	0	5	5	5	10	7.5	32.5
19	Franklin Blvd	Church St	Intersection	\$47,000	0	5	5	7.5	5	7.5	30
20	Franklin Blvd	Avon St	Intersection	\$70,000	5	5	5	5	5	5	30
21	Franklin Blvd	Chester St	Intersection	\$106,000	0	5	5	5	10	5	30
22	Franklin Blvd	Cox Rd	Intersection	\$130,000	5	5	5	7.5	5	2.5	30
23	Franklin Blvd	Second Ave	Intersection	\$140,000	5	5	5	2.5	10	2.5	30
24	Franklin Blvd	Firestone St	Intersection	\$28,000	0	5	5	5	5	7.5	27.5
25	Franklin Blvd	Lineberger Rd	Intersection	\$55,000	0	5	5	7.5	5	5	27.5
26	Franklin Blvd	Franklin Commons	Intersection	\$55,000	0	5	5	7.5	5	5	27.5
27	Franklin Blvd	Edgewood Rd	Intersection	\$25,000	0	5	5	2.5	5	7.5	25
28	Franklin Blvd	Vance St	Intersection	\$40,000	0	5	5	5	5	5	25
29	Franklin Blvd	New Hope Rd	Intersection	\$49,000	0	5	5	2.5	7.5	5	25
30	Franklin Blvd	Durharts Creek	Bridge	\$250,000	0	5	3	5	7.5	2.5	23
31	Franklin Blvd	between Belvedere Ave and Beverly Dr	Crossing	\$77,000	0	5	5	5	2.5	2.5	20
32	Garrison Blvd	Churchill Dr	Study	\$10,000	0	5	5	10	7.5	10	37.5
33	Garrison Blvd	Chestnut St	Intersection	\$38,000	5	5	5	10	2.5	7.5	35
34	Garrison Blvd	Chester St	Intersection	\$27,000	0	5	5	10	2.5	10	32.5
35	Garrison Blvd	Trenton St	Intersection	\$56,000	0	5	5	10	5	7.5	32.5
36	Garrison Blvd	Vance St	Intersection	\$94,000	0	5	5	10	2.5	5	27.5
37	Gaston Day School Rd	Bradford Heights Rd	Crossing	\$68,000	0	5	5	7.5	2.5	5	25
38	Hudson Blvd	Robinwood Rd	Intersection	\$31,000	0	5	5	10	5	10	35
39	Hudson Blvd	Lyon St / Lynhaven Dr	Intersection	\$39,000	0	5	5	7.5	7.5	10	35
40	Hudson Blvd	Davis Park Rd	Intersection	\$40,000	0	5	5	10	2.5	7.5	30
41	Hudson Blvd	Fuller Dr	Intersection	\$94,000	0	5	5	7.5	7.5	5	30
42	Hudson Blvd	York St	Intersection	\$66,000	5	5	5	5	2.5	2.5	25
43	Hudson Blvd	Union Rd	Intersection	\$105,000	0	5	5	7.5	2.5	2.5	22.5
44	Hudson Blvd	Hoffman Rd	Intersection	\$84,000	0	5	5	5	2.5	2.5	20
45	Hudson Blvd/Titman Rd	New Hope Rd	Intersection	\$121,000	0	5	5	7.5	2.5	2.5	22.5
46	Leinberger Park	Highland Rail Trail	Study	\$20,000	5	5	5	10	5	10	40
47	Long Ave/Ozark Ave	Modena St	Intersection	\$65,000	5	5	5	5	2.5	2.5	25
48	Marietta St	Gaston County Courthouse	Crossing	\$158,000	5	5	5	5	7.5	2.5	30
49	Modena St	Rhyne St	Intersection	\$41,000	0	5	5	2.5	2.5	2.5	17.5
50	Modena St	Modena St Ext	Intersection	\$48,000	0	5	5	2.5	2.5	2.5	17.5
51	New Hope	Modena/Montrose	Intersection	\$31,000	0	5	5	7.5	2.5	7.5	27.5
52	New Hope Rd	Redbud Dr	Intersection	\$70,000	0	5	5	7.5	7.5	5	30
53	New Hope Rd	I-85 Ramps	Intersection	\$76,000	5	5	5	2.5	5	2.5	25
54	Radio St	Barkley St	Intersection	\$11,000	0	5	5	10	10	10	40
55	Remount Rd	Aberdeen Blvd	Intersection	\$87,000	0	5	5	2.5	2.5	2.5	17.5
56	Second Ave	Marietta St	Intersection	\$25,000	0	5	5	10	10	10	40
57	Second Ave	Avon St	Intersection	\$59,000	5	5	5	10	7.5	7.5	40
58	Second Ave	South St	Study	\$15,000	0	5	5	5	10	10	35
59	Second Ave	York St	Intersection	\$17,000	0	5	5	5	10	10	35
60	Second Ave	Chester St	Intersection	\$73,000	0	5	5	5	7.5	5	27.5
61	Union Rd	Robinwood Rd	Intersection	\$96,000	0	5	5	2.5	5	2.5	20
62	US 321	Jackson Rd/Dale Ave	Intersection	\$41,000	0	5	5	10	2.5	7.5	30

Gastonia Comprehensive Pedestrian Plan
Corridor Improvements Scoring

Map ID	Location	From	To	Type	Cost	Crash Score	Speed Score	Separate Facility	Traffic Calming	Constructability	Demand Score	Access Score	Cost/Benefit Score	Final Score
1	Aberdeen Blvd	New Hope Rd	I-85	Greenway	\$1,010,000	0	5	5	0	5	5	7.5	2.5	30
2	Aberdeen Blvd	I-85	Remount Rd	Sidewalk Construction	\$61,000	0	5	0	0	5	2.5	5	7.5	25
3	Aberdeen Blvd	Remount Rd	Cox Rd	Sidewalk Construction	\$167,000	0	5	0	0	3	2.5	5	5	20.5
4	Adams Dr	Spencer Ave	Miller St	Sidewalk Construction	\$140,740	0	5	0	0	5	10	5	5	30
5	Archie Whiteside Dr	Food Lion Grocery Store	Selwyn Cir	Sidewalk Construction	\$115,000	0	5	0	0	5	2.5	5	5	22.5
6	Armstrong Park Rd	Franklin Blvd	Hudson Blvd	Study	\$15,000	5	5	0	0	3	7.5	5	10	35.5
7	Athenian Dr	Hillcrest Ave	W Garrison Blvd	Sidewalk Construction	\$293,845	0	5	0	0	3	10	2.5	5	25.5
8	Bradley Ave	York St	Cemetery	Sidewalk Construction	\$103,000	5	5	0	0	3	10	5	7.5	35.5
9	Bradley Center Driveway; New path	Modena St; Bridgewood Ln	Facility; Bradley Center Parking Lot	Sidewalk Construction	\$91,000	0	5	0	0	3	2.5	5	5	20.5
10	Broad St	Franklin Blvd	4th Ave	Bike and Ped Improvements	\$17,000	5	5	0	5	5	10	10	10	50
11	Broad St	Woodhill Dr	Boxwood Ln	Sidewalk Construction	\$52,000	0	5	0	0	5	7.5	5	7.5	30
12	Catawba Creek Greenway Extension	Ferguson Park	Marietta Street	Planned Greenway	\$410,000	0	5	5	0	0	10	5	2.5	27.5
13	Catawba Creek Greenway Southeast Extension (Phase I)	Southeast Armory	Robinwood Rd	Greenway	\$2,354,000	0	5	5	0	1	7.5	5	2.5	26
14	Catawba Creek Greenway Southeast Extension (Phase II)	Gaston Day School Rd	Timberwood Dr	Greenway	\$2,106,000	0	5	5	0	1	10	2.5	2.5	26
15	Chestnut St	4th Ave	Garrison Blvd	Sidewalk Construction	\$148,000	5	5	0	0	5	10	7.5	7.5	40
16	Churchill Dr	Garrison Blvd	Buckingham Ave	Sidewalk Construction	\$266,000	0	5	0	0	3	10	7.5	5	30.5
17	Connection to Bradley Center	N. New Hope Rd	Bradley Center	Greenway	\$1,111,000	0	5	5	0	5	5	2.5	2.5	25
18	Clay St	Second Ave	Franklin Blvd	Sidewalk Construction	\$30,000	0	5	0	0	5	5	7.5	10	32.5
19	Cox Rd	I-85	Court Dr	Sidewalk Construction	\$80,000	0	5	0	0	5	5	5	7.5	27.5
20	Cox Rd	I-85	Franklin Blvd	Sidewalk Construction	\$87,000	5	5	0	0	3	2.5	5	5	25.5
21	Craig Ave	Poston Cir	Thomas St	Sidewalk Construction	\$115,000	0	5	0	0	5	10	7.5	7.5	35
22	Davidson Ave	Chester St	Falls St	Sidewalk Construction	\$75,000	5	5	0	0	5	10	5	7.5	37.5
23	Davidson Ave	Marietta St	Hanover St	Sidewalk Construction	\$124,000	0	5	0	0	5	7.5	5	5	27.5
24	Davidson Ave	Broad St	Avon St	Sidewalk Construction	\$151,000	0	5	0	0	3	5	5	5	23
25	Davis Park Rd	Hudson Blvd	Richland Ave	Sidewalk Construction	\$78,000	0	5	0	0	5	7.5	2.5	7.5	27.5
26	E Hudson Blvd	York Rd	Union Rd	Sidewalk Construction	\$296,000	5	5	0	0	3	7.5	2.5	2.5	25.5
27	E Second Ave	S Chestnut Stq	S Marietta St	Bike and Ped Improvements	\$172,500	5	5	0	0	5	10	10	5	40
28	Eddie St	Dixon Rd	Dead End	Sidewalk Construction	\$48,000	0	5	0	0	5	7.5	2.5	7.5	27.5
29	Edgewood Rd	Food Lion Grocery Store	Oates St	Sidewalk Construction	\$252,000	0	5	0	0	5	2.5	5	2.5	20
30	Elm St	Tenth Ave	Adams Dr	Sidewalk Construction	\$37,820	0	5	0	0	5	10	5	10	35
31	Ferguson Park Greenway Connector	Existing Greenway	Ruby Ave	Greenway and Sidewalk Construction	\$232,000	0	5	0	0	1	10	5	5	26
32	Fern Forest Drive	Garrison Blvd	Hudson Blvd	Greenway Connection	\$178,000	5	5	5	0	3	10	5	5	38
33	Fourth Ave	Vance St	Fifth Ave	Sidewalk Construction	\$6,000	0	5	0	0	5	10	2.5	10	32.5
34	Franklin Blvd	Broad St	Avon St	General Ped Improvements	\$449,000	5	5	0	0	5	5	10	2.5	32.5
35	Franklin Blvd	Cox Rd	East Club Rd	Sidewalk Construction	\$117,000	5	5	0	0	3	5	7.5	5	30.5
36	Franklin Blvd	Cox Rd	City Limits	Sidewalk Construction	\$329,000	5	5	0	0	3	2.5	7.5	2.5	25.5
37	Gardner Park Dr; Pamela St	Downey Pl; Gardner Park Dr	Pamela St; Redbud Dr	Sidewalk Construction	\$105,300	0	5	0	0	3	10	2.5	7.5	28
38	Garrison Blvd	Marietta St	Chestnut St	Sidewalk Construction	\$203,000	5	5	0	0	3	10	5	5	33
39	Garrison Blvd	New Hope Rd	Burtonwood Dr	Sidewalk Construction	\$120,000	0	5	0	0	5	7.5	5	5	27.5
40	Gaston Day School Rd	Kendrick Rd	Hoffman Rd	Sidewalk Construction	\$269,000	0	5	0	0	3	7.5	2.5	2.5	20.5
41	Gaston Day School Rd	Lincoln Lane	Kendrick Rd	Sidewalk Construction	\$315,000	0	5	0	0	3	5	2.5	2.5	18
42	Green Dr	Franklin Blvd	East Club Circle	Sidewalk Construction	\$40,000	5	5	0	0	5	2.5	7.5	7.5	32.5
43	Greenway Connector	Highland Rail Trail	US 321	Greenway	\$34,000	0	5	5	0	3	10	10	10	43
44	Greenway Connector	Highland Rail Trail	Cemetery	Greenway	\$28,000	0	5	5	0	5	5	2.5	10	32.5
45	Henderson St	Lyon St	Southside Ave	Sidewalk Construction	\$63,000	0	5	0	0	3	7.5	10	10	35.5
46	Henderson St	McArver St	Gail Ave	Sidewalk Construction	\$17,000	0	5	0	0	5	7.5	7.5	10	35
47	Highland Branch Greenway	Rankin Lake Park	Bulb Ave	Greenway	\$400,000	0	5	5	0	1	2.5	2.5	2.5	18.5
48	Highland St	Davidson Ave	Church Property	Sidewalk Construction	\$60,000	0	5	0	0	5	10	7.5	10	37.5
49	Hillcrest Ave	Miller St	Athenian Dr	Sidewalk Construction	\$67,440	0	5	0	0	5	10	2.5	7.5	30
50	Hillwood Dr	Hargrove Ave	Dead End	Sidewalk Construction	\$195,000	0	5	0	0	5	2.5	2.5	2.5	17.5
51	Holly Dr	Timberlane St	Greenway Access	Sidewalk Construction	\$57,000	0	5	0	0	5	10	5	10	35
52	Home Trail	Weldon St	Hillcrest Ave	Sidewalk Construction	\$36,000	0	5	0	0	5	10	2.5	10	32.5
53	Hudson Blvd	Robinwood Rd	Churchill Dr	Sidewalk Construction	\$139,000	0	5	0	0	3	10	5	5	28
54	Hudson Blvd	Armstrong Park Rd	Redbud Dr	Sidewalk Construction	\$198,000	0	5	0	0	3	10	5	5	28
55	Hudson Blvd	Windsor Woods Dr	existing sidewalk at 951 E Hudson Blvd	Sidewalk Construction	\$203,000	0	5	0	0	3	7.5	2.5	5	23
56	Hudson Blvd E	Davis Park Dr	York Rd	Sidewalk Construction	\$538,000	5	5	0	0	3	10	5	2.5	30.5
57	Independence Way	Redbud Dr	Londonderry Dr	Sidewalk Construction	\$10,000	0	5	0	0	5	10	2.5	10	32.5
58	Jackson Rd	York Rd	Nineteenth Ave	Sidewalk Construction	\$273,000	0	5	0	0	5	10	2.5	5	27.5
59	Jackson St	W Eighth Ave	W Tenth Ave	Sidewalk Construction	\$52,000	0	5	0	0	5	10	2.5	7.5	30
60	Kendrick Rd	Robinwood Rd	East City Limits	Sidewalk Construction	\$1,008,000	0	5	0	0	3	5	2.5	2.5	18
61	Laurel Ln	Castlegate St	Robinwood Rd	Sidewalk Construction	\$48,000	0	5	0	0	3	10	5	10	33
62	Laurel Ln	Churchill Dr	Timberlane St	Sidewalk Construction	\$84,000	0	5	0	0	3	10	2.5	7.5	28
63	Linwood Rd	Spencer Blvd	Garrison Blvd	Sidewalk or Multiuse Path	\$125,000	0	5	5	0	5	10	7.5	7.5	40
64	Linwood Rd	East Dr	Cloninger Ave	Sidewalk Construction	\$48,980	0	5	0	0	5	5	5	7.5	27.5
65	Londonderry Dr	Jefferson Ave	Independence Way	Sidewalk Construction	\$58,000	0	5	0	0	3	7.5	2.5	7.5	25.5
66	Loray Greenway Connector	Linwood	US 321	Greenway and Sidewalk Construction	\$2,189,000	0	5	0	0	3	10	5	2.5	25.5
67	Lyon St	Hudson Blvd	2065 Lyon St Frontage	Sidewalk Construction	\$52,000	0	5	0	0	5	7.5	10	10	37.5
68	May Ave	Webb Street	Scruggs St	Sidewalk Construction	\$153,000	0	5	5	0	5	10	7.5	5	37.5
69	McArver St	Mountainview St	Henderson St	Sidewalk Construction	\$41,000	0	5	0	0	5	7.5	7.5	10	35
70	Modena St	Park Ave	Spring St	Sidewalk Construction	\$450,000	5	5	0	0	5	5	2.5	2.5	25
71	Modena St	Rhyme St	Bradley Center Driveway	Sidewalk Construction	\$116,000	0	5	0	0	5	2.5	2.5	5	20
72	Modena St	New Hope Rd	Modena St Ext	Sidewalk Construction	\$450,000	0	5	0	0	3	5	2.5	2.5	18
73	Modena St	Modena Ext	Rhyme St	Sidewalk Construction	\$377,000	0	5	0	0	5	2.5	2.5	2.5	17.5
74	Montrose Dr	N New Hope Rd	Rhyme Carter Rd	Sidewalk Construction	\$86,400	0	5	0	0	5	7.5	2.5	5	25

Gastonia Comprehensive Pedestrian Plan
Corridor Improvements Scoring

Map ID	Location	From	To	Type	Cost	Crash Score	Speed Score	Separate Facility	Traffic Calming	Construct ability	Demand Score	Access Score	Cost/Benefit Score	Final Score
75	Morris St	Doffin Ln	Radio St	Sidewalk Construction	\$52,000	0	5	0	0	5	10	10	10	40
76	Mountain View St	McArver St	S York St	Sidewalk Construction	\$381,000	5	5	0	0	5	7.5	5	2.5	30
77	N Oakwood St	Hillwood Dr	Davidson Ave	Sidewalk Construction	\$77,000	0	5	0	0	5	7.5	5	7.5	30
78	New Greenway	Linwood Rd	Sherman St	Greenway	\$638,000	0	5	5	0	1	5	2.5	2.5	21
79	New Hope Rd	Franklin Blvd	Ozark Ave	Sidewalk Construction	\$272,000	5	5	0	0	5	7.5	7.5	5	35
80	New Hope Rd	Burtonwood Dr	Franklin Blvd	Sidewalk Construction	\$28,000	0	5	0	0	5	5	7.5	10	32.5
81	New Hope Rd	Redbud Dr	Hudson Blvd/Titman Rd	Sidewalk Construction	\$80,000	0	5	0	0	5	10	5	7.5	32.5
82	New Hope Rd	Armstrong Park Rd	Redbud Dr	Sidewalk Construction	\$234,000	0	5	0	0	5	10	7.5	5	32.5
83	New Hope Road	Lee St	Armstrong Park Rd	Sidewalk Construction	\$78,000	0	5	0	0	5	10	2.5	7.5	30
84	New Way Dr	Morris St	US 321	Sidewalk Construction	\$44,000	0	5	0	0	5	10	10	10	40
85	Norment Ave	Pryor St	Morris St	Sidewalk Construction	\$42,000	5	5	0	0	5	10	7.5	10	42.5
86	Old Redbud Dr	Redbud Dr	Franklin Blvd	Sidewalk Construction	\$87,000	0	5	0	0	5	7.5	2.5	5	25
87	Osceola St	Eight Ave	Existing Sidewalk North of Oxford Ave	Sidewalk Construction	\$49,000	0	5	0	0	5	10	7.5	10	37.5
88	Osceola St	Marietta St	Oxford Ave	Sidewalk Construction	\$247,000	0	5	0	0	3	10	7.5	5	30.5
89	Park Ln	Edgefield Ave	Nineteenth Ave	Sidewalk Construction	\$325,000	0	5	0	0	5	10	5	5	30
90	Pryor St	Davidson Ave	Norment Ave	Sidewalk Construction	\$38,000	5	5	0	0	5	10	7.5	10	42.5
91	Pryor St	Pryor St	Sycamore Ave	Greenway	\$281,000	5	5	5	0	3	10	7.5	5	40.5
92	Ramblewood Ln; Sherwood Cir; Pineridge Ln	Pineridge Ln; Forestbrook Dr; Ramblewood Ln	North Dead End; Ramblewood Ln; Union Rd	Sidewalk Construction	\$30,000	0	5	0	0	3	5	5	10	28
93	Rankin Ave	Boyce St	Chester St	Sidewalk Construction	\$15,000	5	5	0	0	5	10	5	10	40
94	Rankin Ave	Pryor St	Highland St	Sidewalk Construction	\$24,000	0	5	0	0	5	10	5	10	35
95	Ransom St Greenway Connector	Ransom St	Hillwood Dr	Greenway	\$77,000	0	5	5	0	1	7.5	2.5	7.5	28.5
96	Redbud Dr	Hudson Blvd	New Hope Rd	Sidewalk Construction	\$234,000	0	5	5	0	5	10	7.5	5	37.5
97	Remount Rd	New Hope Rd	Aberdeen Rd	Sidewalk Construction	\$225,000	5	5	0	0	5	2.5	5	2.5	25
98	Robinwood Rd	Hudson Blvd	Catawba Creek Greenway	Sidewalk Construction	\$78,000	0	5	0	0	5	10	7.5	7.5	35
99	Ruby Ave	Johnston St	York St	Sidewalk Construction	\$652,000	0	5	0	0	3	10	5	2.5	25.5
100	S Chestnut St	Lineberger Park	E Second Ave	Bike and Ped Improvements	\$172,500	5	5	0	0	3	10	10	5	38
101	S Marietta St / E Hilltop Dr	Clyde St	E Hudson Blvd	Sidewalk Construction	\$420,000	5	5	0	0	5	7.5	5	2.5	30
102	S. New Hope Road	Hudson	Beaty	General Ped Improvements	\$469,000	0	5	5	0	5	5	2.5	2.5	25
103	Second Ave	Marietta St	Linwood Rd	Bike and Ped Improvements	\$68,000	0	5	0	5	3	10	10	10	43
104	Second Ave	Chestnut St	S Belvedere Ave	Bike and Ped Improvements	\$246,000	0	5	0	0	3	10	10	5	33
105	Segle Ave	Efird St	Davenport St	Sidewalk Construction	\$30,000	0	5	0	0	5	10	7.5	10	37.5
106	Shannon Greenway Connector	Donegal Ct	Existing greenway	Greenway	\$84,000	0	5	5	0	5	7.5	2.5	7.5	32.5
107	Sherwood Cir	Forestbrook Dr	Kendrick Rd	Sidewalk Construction	\$336,000	0	5	0	0	3	5	2.5	2.5	18
108	Southwest Middle School	Phillips Center	Southwest Middle School	Greenway	\$420,000	0	5	5	0	1	7.5	10	5	33.5
109	Southwood	S. New Hope Rd	Bellevue Ter	Sidewalk Construction	\$163,000	0	5	5	0	5	2.5	2.5	2.5	22.5
110	T Jeffers Greenway	N Myrtle School Rd	Crescent Ln	Greenway and Sidewalk Construction	\$760,000	5	5	0	0	1	10	10	2.5	33.5
111	T Jeffers Greenway Connector	T Jeffers Greenway	Walmart Parcel on W Franklin Blvd	Greenway and Sidewalk Construction	\$803,000	5	5	0	1	7.5	10	2.5	31	
112	Third Ave	York St	Marietta St	Sidewalk Construction	\$43,260	0	5	0	0	3	10	10	10	38
113	Timberlane St	Laurel Ln	Holly Dr	Sidewalk Construction	\$50,000	0	5	0	0	5	10	2.5	7.5	30
114	Union Rd	Fourth Ave	Sixth Ave	Sidewalk Construction	\$72,000	0	5	0	0	5	10	5	7.5	32.5
115	Union Rd	Robinson Elementary School	Frontage of 3611 Union Rd	Sidewalk Construction	\$269,000	0	5	0	0	5	5	5	2.5	22.5
116	Union Rd	Hudson Blvd	Frontage of 2900 Union Rd (ARP Church)	Sidewalk Construction	\$344,000	0	5	0	0	5	7.5	2.5	2.5	22.5
117	Union Road	Robinson Elementary School Drive	Frontage of 2956 Union Rd	Sidewalk Construction	\$50,000	0	5	0	0	5	5	5	7.5	27.5
118	US 321	New Way Dr	Caldwell St	Sidewalk Construction	\$117,000	5	5	0	0	3	10	7.5	7.5	38
119	W Fourth Ave	Trenton St	Clay St	Sidewalk Construction	\$30,000	0	5	0	0	3	10	5	10	33
120	W Nineteenth Ave	Carolina Ave	Winget St	Sidewalk Construction	\$72,000	0	5	0	0	5	10	5	7.5	32.5
121	Walnut Ave	Airline Ave	Vance St	Sidewalk Construction	\$198,000	0	5	5	0	5	10	5	5	35
122	York Rd	Hudson Blvd	Nassau Pl	Sidewalk Construction	\$308,000	5	5	0	0	5	7.5	5	5	32.5
123	York Rd	Hudson Blvd	Ruby Ave	Sidewalk Construction	\$477,000	5	5	0	0	5	10	5	2.5	32.5
124	York St	End of Existing Sidewalk	Frontage of 927 S. York St	Sidewalk Construction	\$10,000	0	5	0	0	5	10	5	10	35

APPENDIX G
Unit Costs

UNIT COSTS

ITEM	UNIT	UNIT COST	ASSUMPTIONS
CROSSINGS AND PATHS			
Crosswalk - Standard	EA	\$800.00	
Crosswalk - Enhanced	EA	\$2,600.00	
Crosswalk - Pattern/Textured	EA	\$5,000.00	
Sidewalk w/o curb and gutter	LF	\$55.00	
Sidewalk w/curb and gutter	LF	\$180.00	
Multi-Use Trail (paved)	LF	\$200.00	constructed in open space without the need for moving curbs or installing utilities
TRAFFIC CALMING & REFUGE			
Curb Extension	EA	\$13,000.00	
Pedestrian Refuge	SF	\$65.00	
Raised Crossing	EA	\$8,200.00	
PEDESTRIAN ACCOMMODATIONS			
ADA Ramp	EA	\$800.00	
Fence/Barrier	LF	\$130.00	
Lighting	EA	\$5,000.00	
Overpass	EA	\$500,000.00	
SIGNALS			
Pedestrian Signal	EA	\$1,500.00	at previously signalized intersection; no cabinet upgrades required
Rectangular Rapid Flashing Beacon	EA	\$22,250.00	solar powered
Pedestrian Hybrid Beacon	EA	\$57,700.00	at location where electricity already exist; no utility location/relocation
SIGNS & STRIPING			
Sign	EA	\$300.00	
Striping (painted)	LF	\$3.00	
STREET FURNITURE			
Street Trees	EA	\$430.00	
Bench	EA	\$1,550.00	
Bus Shelter	EA	\$20,000.00	
Trash/Recycling Receptacle	EA	\$1,400.00	

NOTE:

Construction cost estimates were developed for individual project recommendations by identifying pay items and establishing rough quantities. The unit costs above are based on 2013 dollars and were assigned based on historical cost data from state departments of transportation and other sources. The costs are intended to be general and used for planning purposes. Construction costs will vary based on the ultimate project scope (i.e. potential combination of projects, or use of in-house forces) and economic conditions at the time of construction.

APPENDIX H

Potential Funding Sources

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
FEDERAL SOURCES			

Federal Highway Administration – Moving Ahead for Progress in the 21st Century (MAP-21)ⁱⁱ

Federal funding available for pedestrian related projects is in a state of flux until a new federal transportation bill is updated and passed. Currently, the two-year Federal Transportation Bill that was passed in 2012 – known as Moving Ahead for Progress in the 21st Century (MAP-21) – restructured and redefined eligibility for federal funding of bicycle and pedestrian projects. The bill will expire on September 30, 2014, however its basic structure is likely to be carried forward. With the advent of MAP-21, there is more local control of transportation dollars related to walking and biking as 50% of funds are allocated to the discretion of Metropolitan Planning Organizations (MPO). Another trend in the new transportation legislation is less funding specifically ear-marked for programs such as Safe Routes to School.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)	This program funds transportation projects that decrease transportation related emissions through reductions in traffic congestion and improvement in air quality. The funding also applies to access to transit.	https://www.fhwa.dot.gov/map21/factsheets/cmaq.cfm	Pedestrian and bicycle facilities that reduce automobile trips; signalization improvements; transit improvements that increase ridership
Highway Safety Improvement Program (HSIP)	This program funds safety related projects that aim to reduce serious traffic injuries and deaths on all public roads, including federal, state, county, and local roads and roads on tribal lands. This program has a broad basis for project eligibility.	https://www.fhwa.dot.gov/map21/factsheets/hsip.cfm	Bicycle and pedestrian safety improvements; traffic calming; intersection safety improvements; pedestrian crossings; Safe Routes to School; enforcement; training and education

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
National Highway Performance Program (NHPP)	Provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS. NHPP projects must be on an eligible facility and support progress toward achievement of national performance goals for improving infrastructure condition, safety, mobility, or freight movement on the NHS, and be consistent with MPO and state planning requirements.	https://www.fhwa.dot.gov/ma/p21/factsheets/nhpp.cfm	Resurfacing; widening; shoulder improvement; bicycle transportation; pedestrian walkways; highway safety improvements; transit projects that improve the level of service of the NHS; intracity and intercity bus terminals; training and education
Railway-Highway Crossings Program	Reduce the number of fatalities and injuries at public highway-rail grade crossings through the elimination of hazards and/or the installation/upgrade of protective devices at crossings.	https://www.fhwa.dot.gov/ma/p21/factsheets/rhc.cfm	Railroad crossing improvements; grade separations
Surface Transportation Program (STP)	Provides flexible funding that can be used by states or local jurisdictions for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. Half of each state's STP funding is allocated to MPOs based on population; the other 50% may be used in any part of the state.	https://www.fhwa.dot.gov/ma/p21/factsheets/stp.cfm	Most road improvement projects, bridge maintenance and construction; transit capital projects, bicycle facilities; pedestrian connections; transportation alternatives (enhancements); recreational trails;

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Transportation Alternatives Program (TAP)	MAP-21 combines SAFETEA-LU's Recreational Trails Program, Safe Routes to School, and Transportation Enhancements into a single program, the TAP. While TAP funds can be used for Safe Routes to Schools programs and improvements, there is no mandatory set aside, leaving distribution up to individual states. States can opt to transfer up to half of TAP funds to other highway programs; the remaining 50% are allocated by NCDOT through a competitive grant process.	https://www.fhwa.dot.gov/map21/factsheets/tap.cfm	On- and off-road trail facilities; streetscapes; bicycle and pedestrian facilities; Safe Routes to School; rails to trails; landscaping directly related to transportation; stormwater management

US Department of Transportation/Federal Highway Administration (Non-MAP-21 Funding Sources)

National Scenic Byways Program (NSBP)	This program recognizes roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities. NSBP funding supports projects that manage and protect these intrinsic qualities, interpret these qualities for visitors, and improve visitor facilities along byways.	http://www.fhwa.dot.gov/hep/scenic_byways/grants/	Pedestrian and bicycle facilities along a byway to enhance recreation
Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program	Now in its sixth round of funding, the TIGER Discretionary Grant program provides a unique opportunity for the USDOT to invest in road, rail, transit and port projects that promise to achieve critical national objectives. Since 2009, Congress has dedicated more than \$4.1 billion for six rounds to fund projects that have a significant impact on the nation, a region, or a metropolitan area. Applicants must detail the benefits their project would deliver for five long-term outcomes: safety, economic competitiveness, state of good repair, livability, and environmental sustainability.	http://www.dot.gov/tiger	Projects of regional, state, or national significance, including large-scale, regional bicycle and pedestrian networks

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Federal Transit Administration ⁱⁱⁱ			
Metropolitan & Statewide Planning (5303, 5304, 5305)	Provide funding to support cooperative, continuous, and comprehensive planning for making transportation investment decisions in metropolitan areas and statewide.	http://www.fta.dot.gov/documents/MAP-21_Fact_Sheet_-_Metropolitan_and_Statewide_and_Nonmetropolitan_Transportation_Planning.pdf	Planning activities that enhance accessibility, efficiency, connectivity, safety and security of the existing transportation system, including bicycle and pedestrian planning to enhance intermodal travel
Enhanced Mobility of Seniors and Individuals with Disabilities (5310)	Funding for the improvement of mobility for seniors and people with disabilities is expanded under MAP-21. The 'New Freedom' activities have been revised into the Section 5310 revenue stream. All Section 5310 projects must be initiated from locally developed, coordinated public transit-human services transportation plans. Additionally there are potential multimodal projects that may be eligible for this funding that would improve bicycle access, especially for older adults and people with mobility limitations.	http://www.fta.dot.gov/documents/MAP-21_Fact_Sheet_-_Enhanced_Mobility_of_Seniors_and_Individuals_with_Disabilities.pdf	Capital projects that support access to transportation to meet the special needs of older adults and persons with disabilities, including multimodal connections to transit for bicyclists and pedestrians

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
National Park Service			
Land and Water Conservation Fund (LWCF)	The LWCF program provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for shared federal land acquisition and conservation strategies). The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources across the United States.	http://www.nps.gov/ncrc/programs/lwcf/	Trails
Rivers, Trails, and Conservation Assistance Program (RTCA)	The RTCA program extends and expands the benefits of the National Park Service throughout the nation, helping to connect all Americans to their parks, trails, rivers, and other special places. Communities apply for technical assistance and National Park Service staff provide free, on-location facilitation and planning expertise, guiding projects from conception to completion.	http://www.nps.gov/orgs/rtca/index.htm	Planning assistance for trails (no capital funds available)
US Department of Housing and Urban Development			
Community Development Block Grant (CDBG) Program	To benefit low-and-moderate income (LMI) persons, as defined by HUD. At least 51% of the beneficiaries of each CDBG project must be LMI. They can benefit through job creation, improvement of privately owned substandard housing, and construction of community facilities.	http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs	streetscapes; bicycle and pedestrian facilities

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
STATE SOURCES			
North Carolina Department of Transportation ^{iv}			
Independent Bicycle and Pedestrian Projects	Bicycle and pedestrian projects, unless incidental to a larger roadway project, are eligible for funding through the Division Need category of NCDOT's Prioritization 3.0. NCDOT is geographically broken into 14 divisions and all bicycle and pedestrian projects must compete for funding within their own geographic division. Each MPO and RPO may submit 20 bicycle/pedestrian projects per funding cycle to compete within their respective district.	http://www.ncdot.gov/bikeped/funding/process/	Independent bicycle and pedestrian projects must be identified in a local bicycle and/or pedestrian plan, have a minimum \$100,000 cost, and a local funding match of 20% of the project cost
Incidental Bicycle and Pedestrian Projects	Bicycle and pedestrian accommodations such as bike lanes, sidewalks, intersection improvements, widened paved shoulders and bicycle and pedestrian-safe bridge design are frequently included as incidental features of highway projects. In addition, bicycle-safe drainage grates are a standard feature of all highway construction. Most pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of federal and state roadway construction funds or with a local fund match.	http://www.ncdot.gov/bikeped/funding/process/	Bicycle and pedestrian facilities incidental to a larger highway project

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Spot Safety Program	<p>As part of the North Carolina Highway Safety Improvement Program, the Spot Safety Program is used to develop smaller improvement projects to address safety, potential safety, and operation issues. The program is funded with state funds and currently receives approximately \$9 million per state fiscal year. Other monetary sources (such as Small Construction or Contingency funds) can assist in funding Spot Safety projects; however, the maximum allowable contribution of Spot Safety funds per project is \$250,000.</p> <p>A Safety and Oversight Committee (SOC) reviews and recommends Spot Safety projects to the Board of Transportation (BOT) for approval and funding. Criteria used by the SOC to select projects include, but are not limited to the frequency of correctable crashes, delay, congestion, number of signal warrants met, effect on pedestrians and schools, division and region priorities, and public interest.</p>	<p>https://connect.ncdot.gov/resources/safety/pages/nc-highway-safety-program-and-projects.aspx</p>	<p>Traffic signals; turn lanes; shoulder improvement; intersection improvements; advanced warning devices and signage; guidance devices; school safety improvements; guardrails; roadside safety</p>

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
<p>Hazard Elimination Program</p>	<p>As part of the North Carolina Highway Safety Improvement Program, the Hazard Elimination Program is used to develop larger improvement projects to address safety and potential safety issues. The program is funded with 90% federal funds and 10% state funds. The cost of Hazard Elimination Program projects typically ranges between \$400,000 and \$1 million.</p> <p>A Safety and Oversight Committee (SOC) reviews and recommends Hazard Elimination projects to the Board of Transportation (BOT) for approval and funding. These projects are prioritized for funding according to a safety benefit to cost (B/C) ratio, with the safety benefit being based on crash reduction. Once approved and funded by the BOT, these projects become part of NCDOT's State Transportation Improvement Program (STIP).</p>	<p>https://connect.ncdot.gov/resources/safety/pages/nc-highway-safety-program-and-projects.aspx</p>	<p>Larger improvement projects to address safety and potential safety issues</p>

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Powell Bill Funds	<p>Annually, State Street-Aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as provided by G.S. 136-41.1 through 136-41.4. The general statutes require that a sum equal to ten and four-tenths percent (10.4%) of the net amount after refunds that was produced during the fiscal year by the tax imposed be disbursed to the qualifying municipalities. The statutes also provide that funds be disbursed to the qualified municipalities on or before October 1st and January 1st, thereby allowing sufficient time after the end of the fiscal year for verification of information and to determine the proper allocations and preparation of disbursements.</p> <p>Powell Bill funds shall be expended only for the purposes of maintaining, repairing, constructing, reconstructing or widening of any street or public thoroughfare within the municipal limits or for planning, construction, and maintenance of bikeways, greenways or sidewalks.</p>	<p>https://connect.ncdot.gov/municipalities/state-street-aid/Pages/default.aspx</p>	<p>Planning, construction, and maintenance of bikeways, greenways, and/or sidewalks</p>

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Safe Routes to School	<p>The NCDOT Safe Routes to School (SRTS) program enables and encourages children to walk and bicycle to school; makes walking and bicycling to school a safe and more appealing transportation option; and facilitates the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of school.</p> <p>Originally a mandated program under SAFETEA-LU, SRTS is no longer mandatory under MAP-21 and its funding has been consolidated into the Transportation Alternatives Program (TAP). However, NCDOT continues the SRTS program and still has unassigned funding from SAFETEA-LU that is available and not under the competitive requirements of the Strategic Transportation Investment law.</p>	<p>https://connect.ncdot.gov/projects/bikeped/pages/safe-routes-to-school.aspx</p>	<p>Education, encouragement, enforcement, and capital infrastructure improvements that seek to increase walking and biking to/from an elementary or middle school</p>
NC Division of Parks and Recreation			
State Trails Program	<p>The State Trails Program is a section of the NC Division of Parks and Recreation. The program originated in 1973 with the North Carolina Trails System Act and is dedicated to helping citizens, organizations and agencies plan, develop and manage all types of trails ranging from greenways and trails for hiking, biking, and horseback riding to river trails and off-highway vehicle trails.</p> <p>The Secretary of the NC Department of Environment and Natural Resources (DENR) has assigned management of the federal Recreation Trails Program to the Division of Parks and Recreation and its State Trails Program.</p>	<p>http://www.ncparks.gov/About/trails_main.php</p>	<p>Recreational trails</p>

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Parks and Recreation Trust Fund (PARTF)	Provides dollar-for-dollar matching grants to local governments for parks and recreational projects to serve the public. A local government can request a maximum of \$500,000 with each application. Applicants can buy land to use as recreational projects for the public or to protect the natural or scenic resources of the property. Applicants can also request money to build or renovate recreational and support facilities. A project must be located on a single site. Sports equipment, maintenance equipment, office equipment and indoor furniture cannot be purchased with PARTF grants.	http://www.ncparks.gov/About/grants/partf_main.php	Recreational trails and related support facilities (e.g., trailhead structures, restrooms)
LOCAL SOURCES ^y			
Capital Reserve Fund	Local governments may establish and maintain a capital reserve fund for any purpose for which it may issue bonds, including pedestrian facilities. A capital reserve fund must be established by either ordinance or resolution. Such must state the purpose for the fund, period of time the funds will be collected, approximate amounts, and the sources from where the funds will be derived.	http://www.ncleg.net/gascripts/statutes/StatutesTOC.pl?bPrintable=true&Chapter=0159	Any purpose for which a local government can issue bonds, including pedestrian facilities
Capital Project Ordinance	A local government can pass a capital project ordinance to fund a particular project. The project cannot begin until a balanced project ordinance has been adopted for the life of the project. A capital project ordinance must identify the project and revenues to finance the project, and make appropriations necessary to complete the project.	http://www.ncleg.net/gascripts/statutes/StatutesTOC.pl?bPrintable=true&Chapter=0159	Capital construction projects, including pedestrian facilities

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Municipal Service District	Municipal Service Districts (also known as Business Improvement Districts) can be established by municipalities. Within the district boundary a special tax is levied in addition to the standard property tax. This tax is utilized to make capital improvements in the district.	http://www.ncleg.net/enactedlegislation/statutes/html/byarticle/chapter_160a/article_23.html	Downtown revitalization; urban area revitalization; transit oriented development
Bonds	Bonds are loan instruments that enable local governments (or their agencies) to raise capital for projects. These include revenue bonds, general obligation bonds, and special assessment bonds.	http://www.ncleg.net/gascripts/statutes/StatutesTOC.pl?bPrintable=true&Chapter=0159	Public capital improvements, including pedestrian facilities
Project Development Financing	Project Development Financing (also known as Tax Increment Financing) allows local governments to create a district where capital improvements are made with the intention of paying for those improvements with the taxes generated by increased property values attributed to the improvements. When a capital improvement is made (e.g., streetscape project), properties surrounding the improvements generally will increase in value and their property taxes will increase accordingly. This new tax revenue is utilized to pay down the debt on the capital improvements that were made in the district.	http://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_159/Article_6.html	Any capital improvements within the designated district

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
PRIVATE SOURCES			
Bank of America Charitable Foundation	In response to pressing challenges facing individuals and families across the country, Bank of America is lending, investing and giving to help create economically vibrant communities that are better places in which to live and do business. The Bank of America Charitable Foundation provides philanthropic support to address needs vital to the health of communities through a focus on preserving neighborhoods, educating the workforce, and addressing critical community needs.	http://about.bankofamerica.com/en-us/global-impact/charitable-foundation-funding.html#fbid=y2j5XNDc3TY	2014 grants focus on areas that do not directly pertain to pedestrian facilities but prior years have; so, future years may as well
BlueCross BlueShield of North Carolina Foundation	<p>Since its founding in 2000, BlueCross BlueShield of North Carolina Foundation has invested more than \$88 million into communities across the state by supporting more than 650 grants and special initiatives. Through a combination of grantmaking, multi-year initiatives, an Signature Programs, the Foundation commits the resources and time needed to support opportunities impacting the health of North Carolina.</p> <p>The Foundation’s outcomes-focused approach to grantmaking is guided by three primary focus areas: Healthy Populations; Healthy Active Communities; and Community Impact through Nonprofit Excellence.</p>	http://www.bcbsncfoundation.org/	Projects that promote healthy, active lifestyles particularly for vulnerable populations (i.e., children, elderly, low income)

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
National Trails Fund	<p>American Hiking Society’s National Trails Fund is the only privately funded, national grants program dedicated solely to building and protecting hiking trails. Created in response to the growing backlog of trail maintenance projects, the National Trails Fund has helped hundreds of grassroots organizations acquire the resources needed to protect America’s cherished hiking trails. To date, American Hiking Society has funded 182 trail projects by awarding over \$560,000 in National Trails Fund grants.</p> <p>Prerequisites for funding include: organization must be an active member of the Hiking Alliance; organization must be a non-profit; submit application by annual deadline</p>	<p>http://www.americanhiking.org/national-trails-fund/</p>	Trail building, maintenance, and preservation
Robert Wood Johnson Foundation – Active Living by Design Program	Establishes and evaluates innovative approaches to increase physical activity through community design, public policies, and communications strategies.	<p>www.activelivingbydesign.org</p>	Pedestrian connections; bicycle facilities
Surdna Foundation	<p>Foundation makes grants to non-profit organizations in the priority areas of Sustainable Environments, Strong Local Economies, and Thriving Cultures.</p> <p>Within the Sustainable Environments program, Surdna specifically cites Sustainable Transportation Networks & Equitable Development Patterns as a goal through the support of clean, affordable, equitable, high-quality, and efficient transportation and land use development that better connects critical services, jobs, schools, housing, and other regional destinations.</p>	<p>www.surdna.org</p>	Pedestrian connections; bicycle facilities; regulation revision; performance standards; affordable housing; revitalization planning

Potential Funding Sourcesⁱ

SOURCE	PURPOSE	WEBSITE	ELIGIBLE USES
Walmart Foundation State Giving Program	<p>The Walmart Foundation’s State Giving Program plays an essential role in the Foundation’s mission to create opportunities so people can live better. The Program provides grants to 501(c)(3) organizations, ranging from \$25,000 to \$250,000.</p> <p>The Program invests in all 50 states, Washington, D.C. and Puerto Rico. The Walmart Foundation has a State Advisory Council in each state, made up of Walmart associates representing local communities. Each Council helps identify local needs within its state, reviews all eligible grant applications and makes funding recommendations to the Walmart Foundation. Councils base recommendations on alignment with Foundation focus areas, state or community needs, and program eligibility criteria.</p>	http://foundation.walmart.com/apply-for-grants/state-giving	<p>Support for programs that serve unmet needs of low-income, underserved populations within the state or region for which they are applying</p>

ⁱ This list is highly comprehensive but should not be viewed as exhaustive; additional funding sources may exist.

ⁱⁱ More commonly utilized MAP-21 funding elements are listed here; for a complete list of MAP-21 categories, please visit <https://www.fhwa.dot.gov/map21/factsheets/>.

ⁱⁱⁱ More commonly utilized FTA funding sources are listed here; for a complete list of FTA funding categories, please visit <http://www.fta.dot.gov/map21.html>.

^{iv} For more information on North Carolina’s Strategic Transportation Investment law and its impact on NCDOT funding categories and eligibility, please see Section 5.2 of the Plan and visit <http://www.ncdot.gov/strategictransportationinvestments/>.

^v Local funding options may require local action through ordinance, resolution, or referendum (if not already established) and should be carefully considered to determine their applicability and appropriateness to any given jurisdiction.

