San Antonio-Bexar County PEDESTRIAN SAFETY ACTION PLAN

February 2012

Photo by Daquella Manera
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**EXECUTIVE SUMMARY**

The San Antonio-Bexar County Metropolitan Planning Organization Pedestrian Safety Action Plan (Plan) defines a set of actions to encourage walking and to make it safer. Increasing support for walking will make the transportation system more socially, environmentally, and economically sustainable. It will benefit all residents, including children, seniors, and persons with disabilities. It will enhance and encourage transit use, walking to school, and walking to other destinations such as parks and employment centers.

This plan is a visionary, yet practical, action strategy to make the San Antonio-Bexar County metropolitan area a great place to walk. Taking advantage of the latest research, national guidance, and practice throughout the United States, the Plan provides a framework for making decisions about facility design and allocating resources necessary to make walking a viable choice for a wide variety of trips. Improving the convenience and safety of walking will increase social interaction on the street, offer alternatives to driving on congested roadways, and reduce pollution – benefits that will make the San Antonio-Bexar County Metropolitan Area an even better place to live and work.

There are legitimate pedestrian safety concerns and crash history in the Bexar County region. The national average of pedestrian fatalities in all roadway fatalities is 12%. In Bexar County, pedestrians account for an average of 20% of roadway fatalities. This means one in five roadway deaths is a pedestrian, a number that is holding steady as the total number of roadway fatalities decreases. This signals the high degree of need for enacting measures that improve the safety of vulnerable roadway users. The following table summarizes pedestrian fatalities in Bexar County over the last three years.

<table>
<thead>
<tr>
<th>Bexar County Roadway Fatalities*</th>
<th>Pedestrian fatalities</th>
<th>Total highway fatalities</th>
<th>Percent pedestrians</th>
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<tbody>
<tr>
<td>2008</td>
<td>29</td>
<td>161</td>
<td>18%</td>
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<tr>
<td>2009</td>
<td>34</td>
<td>151</td>
<td>23%</td>
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<tr>
<td>2010</td>
<td>29</td>
<td>146</td>
<td>20%</td>
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<tr>
<td>Average</td>
<td>31</td>
<td>153</td>
<td>20%</td>
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*Source: Federal Highway Administration, Fatality Analysis Reporting System
Implementing this Plan is critical for the following reasons:

- Implementing pedestrian improvements will increase the number of people walking while reducing the number of crashes involving pedestrians.
- Walking is an affordable mode of transportation that produces no pollution and supports social interaction.
- Walking provides physical activity and supports healthy lifestyles (67% of Bexar County adults are overweight).
- Although there are pedestrian facilities throughout the region, people walking face barriers where sidewalks are in disrepair or are missing and where it is difficult to cross busy arterials.
- Walking is a very efficient use of public space.
- There is a growing amount of support for more and improved pedestrian facilities. Existing and emerging policies support improving and connecting pedestrian facilities, such as:
  - The recent adoption of a Complete Streets resolution by the San Antonio-

### Create a Continuous Sidewalk Network

Providing a connected network of safe and accessible sidewalks is fundamental to achieving the goals of this Plan. A continuous sidewalk network will help connect people to transit, shopping, jobs, schools, parks, and other destinations, as well as tie together the region's ever-growing system of greenways and multi-purpose trails.

- Bexar County Metropolitan Planning Organization (MPO)
- The MPO's Walkable Community Program to provide walkable community workshops, safe routes to school workshops, bicycle safety classes and bicycle rodeos
- The City of San Antonio's Americans with Disabilities Act (ADA) Transition Plan and city-wide sidewalk inventory (2008)
- The adoption of the Bicycle Master Plan (2011) and the completion of the MPO Bicycle Travel Patterns Survey for the region
- The successful MPO-sponsored Walk & Roll program to encourage more bicycling and walking
- Schools throughout the region working toward safer routes for walking and bicycling students
- “Texas Department of Transportation is committed to proactively planning, designing, and constructing facilities to safely accommodate bicyclists and pedestrians.”
- SA 2020 Plan encourages tripling the miles of complete streets.

### Vision of the Plan

The Vision of this Plan is to be a reference, developed per Federal Highway Administration and National Highway Traffic Safety Administration guidelines, for improving safety

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1 Memorandum, March 23, 2011 to District Engineers
through street redesign and the use of engineering techniques as well as other safety-related treatments and programs that involve the entire community.

**Goals for Plan**
This Plan was initiated in December of 2010 with a meeting between the Study Oversight Committee (SOC), the San Antonio-Bexar County Metropolitan Planning Organization, and the Consultants. At the first meeting, the Plan’s goals were developed through an interactive exercise with the SOC as well as information provided through the Request for Proposal (RFP). For the members of the SOC, there was an overarching desire to have a Plan that is both clear with regards to what needs to be done to improve pedestrian safety and access, as well as concrete in terms of defining how the Plan will be implemented over time. The Plan and how it is structured reflects this desire.

**Goal 1:** Institutionalize this Plan through the Unified Development Code, Complete Streets policies, and other regulations to improve pedestrian access.

**Goal 2:** Establish measurable and incremental goals to achieve accessible sidewalks, bus stops, street crossings.

**Goal 3:** Increase connectivity between pedestrian networks and mass transit.

**Goal 4:** Commit resources to maintain existing infrastructure (sidewalks, pavement markings, signs etc).

**Goal 5:** Educate the walking and driving public regarding pedestrian behavior and safety.

**Goal 6:** Recognize and incorporate the interrelated goals and initiatives of area transportation agencies and organizations. Agencies and organizations should cooperate to incorporate interrelated goals and initiatives such as Complete Streets and promoting public health.

**Goal 7:** Provide pedestrian accessibility within a quarter-mile of all VIA bus stops. This should include five-foot sidewalks, audible signals at intersections, and changes in pavement

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**Public Involvement in the San Antonio-Bexar County Metropolitan Planning Organization Pedestrian Safety Action Plan**

- More than 150 people responded to an on-line interactive map asking for their input regarding challenges and opportunities at specific intersections and corridors.
- More than 300 people responded to the on-line Plan survey.
- Focus groups were held with: 1) area planners and developers; 2) the senior citizen community; 3) school health advisory committee representatives; 4) fire marshals and emergency services representatives; 5) citizens with disabilities; and 6) neighborhood association representatives.
- More than 150 comments were provided on the draft Plan.
- A “Roundtable Workshop” involving citizen stakeholders and various agencies was convened to develop prioritization criteria for implementing the Plan.
textures at bus stops and curb ramps.

**Goal 8**: Develop incentives to retrofit pedestrian infrastructure.

**Goal 9**: Give pedestrians priority in new developments.

**Goal 10**: Clearly mark crosswalks with appropriate signage, signals, and pedestrian indicators.

**Public Outreach**

The Pedestrian Mobility Advisory Committee (PMAC) advises the San Antonio-Bexar County Metropolitan Planning Organization’s Transportation Policy Board on pedestrian issues for the metropolitan area. PMAC is comprised of citizen and partner agency representatives. Citizen representation is at-large, representation is from the Greater Bexar County Council of Cities, Bexar County Technical Advisory Committee for Persons with Disabilities and from neighborhood walking groups. Agency representatives are from Alamo Area Council of Governments Bexar County, City of San Antonio, the San Antonio Utilities Council, Texas Department of Transportation, and VIA Metropolitan Transit.

PMAC served as the Study Oversight Committee (SOC) for this Plan to ensure that the Plan would address the most critical pedestrian issues both within the City of San Antonio and the greater Bexar County region. The SOC was convened in December 2010 and met eight times to provide input at each stage in the Plan development process. This included development of project goals and objectives, priorities, locations for recommended improvements, and a thorough review of this document.

**Characteristics of the Pedestrian Facility Recommendations**

This Plan contains profiles for 43 recommended treatments (countermeasures) for improving pedestrian safety. Each profile provides a definition of the recommended treatment, why and where it is used, and to what degree it is currently being implemented in the region. Where available the Crash Reduction Factor (CRF) is also provided. References and examples are provided for each countermeasure.

The second page of each countermeasure profile contains recommendations for specific locations within the San Antonio–Bexar County region where the recommended treatment could be implemented in order to address issues that are likely contributing to crashes. These recommended locations were derived from an analysis of crash data, field observations, and input from the stakeholder process, including the Study Oversight Committee, focus groups, and roundtable discussions.
Prioritization Criteria

The prioritization criteria in this Plan are intended to assist the various public agencies involved in Plan implementation to prioritize projects and programs. A Stakeholder Roundtable Workshop and Discussion was held in February of 2011. Among those present included representatives from the Texas State Department of Transportation (TxDOT), VIA Metropolitan Transit, San Antonio’s Public Works and Planning Departments, the Metropolitan Health District, Bexar County, the MPO’s Pedestrian Mobility Advisory Committee, and other pedestrian-related invitees. An interactive process was used to establish priorities, and a consensus to focus the Plan on pedestrian safety and access was reached during this workshop. The prioritization criteria developed at the Workshop and that are used to guide this Plan are as follows:

Priority 1: Schools
There is a growing interest in Safe Routes to School (SRTS). More children are walking and bicycling to school as budget issues force cuts in school busing and more children are assigned to neighborhood schools. Walking and bicycling to school are also recognized as important strategies for reducing childhood obesity.

Priority 2: Transit
Pedestrians using transit must be able to access the transit stops. While seemingly obvious, crossing the street to access stops can be challenging, especially if there is high speed turning traffic, ramps are non-existent or in poor repair, and crosswalk markings are difficult to see. Access to transit stops can also be challenging if sidewalks are missing or in poor repair.

Priority 3: Crashes/Safety
Pedestrian crashes, when plotted on a map and analyzed, demonstrate patterns that can help determine where to focus resources. They include:

1. Spot locations with high numbers of crashes,
2. Corridors with high numbers of crashes along the entire corridor (often a corridor with high transit ridership),
3. Neighborhoods with high concentrations of crashes (e.g. area around a major university), and
4. Crashes related to a particular traffic tool or treatment (e.g. old style pedestrian indicators when replaced by newer countdown indicators will reduce crashes across an entire system).
**Priority 4: High Density Neighborhoods**
Greater levels of pedestrian activity are typically found in high-density neighborhoods, along with a corresponding level of pedestrian exposure to both motor vehicle and bicycle traffic. Focusing resources to accommodate multiple modes of transportation within a tight spatial framework through facility improvements will result in significant benefits.

**Priority 5: Downtown**
As the region’s major employment center and tourist destination, downtown San Antonio has a high level of pedestrian activity. Investing in downtown’s pedestrian infrastructure will greatly contribute to both pedestrian safety and the area’s overall economic vitality.

**Priority 6: Underserved Areas**
Areas with concentrations of low-income households may have a low percentage of car ownership. Existing transit and walking amenities may not be meeting area’s current demand.

**Priority 7: Employment Centers**
Employment centers tend to have higher levels of pedestrian activity, especially near transit stops. There are often congestion issues around employment centers that can be partially addressed by providing pedestrian infrastructure that facilitates walking.

**Land Use, Zoning, and Site Design Issues**
The City of San Antonio’s Unified Development Code and other applicable regulatory documents such as the Sidewalk and Driveway Design and Construction Guidelines were analyzed to determine how well the standards address the key issues identified by the Study Oversight Committee and by field observations. The Plan identifies where topics such as sidewalks, sidewalk buffers, street trees, driveway placement and design, and site design are addressed in existing City of San Antonio code provisions; provides an assessment of how well these provisions promote walking; and offers recommendations for how provisions may be modified to better address pedestrian safety. In addition, best practices from other cities both within and outside the Bexar County region have been identified to illustrate alternative regulatory methods for insuring that new development enhances pedestrian safety and comfort.

**Implementation - How to Use This Plan**
This Plan is designed to be implemented. The recommendations are realistic and achievable because they are based on the latest best practices, detailed field work, and close coordination with the Study Oversight Committee. The recommended design treatments are designed to be built as part of the construction, reconstruction, and retrofitting of new and existing roadways.

It is recommended that the design guidance in the 43 recommended treatments be incorporated into design guidelines and standards. Referred to as “institutionalization”, this approach is intended to insure that pedestrian safety and access are automatically included in all policies, programs and projects.

While the 43 recommended treatments are presented separately, it is also recognized that they work best when combined together at an intersection, along an entire corridor, or throughout a neighborhood. Consequently, the Plan also provides recommended improvements along
two corridors and in two neighborhoods as examples of how to combine treatments. Additionally, many of recommended pedestrian treatments, especially those that moderate motor vehicle speeds, will also benefit bicyclists.

The Plan also includes recommended locations for making improvements. Near-term recommendations focus on high crash locations, medium-term on high crash corridors, and long-term on systematic changes to design practices based on the potential to reduce crashes. Additionally, there are recommended locations accompanying each of the 43 templates. They are intended to provide an example of where the treatments could be applied. There will be many other equally valid locations where countermeasures can be implemented.

**Performance Measures – Measuring Success**

There are two long-term performance measures that should be monitored over time: 1) regular pedestrian counts should be taken to measure success in encouraging more walking, and 2) number of reported pedestrian crashes should be compared to the total number of pedestrians observed during the bi-annual pedestrian count and annual traffic volumes. The Plan provides specific guidance on how to complete the counts.

**Looking Ahead**

This Plan not only establishes the vision, but also identifies the steps required to ensure that the San Antonio-Bexar County metropolitan area becomes a great place to walk. This Plan is an important first step – much work lies ahead. Providing the necessary human and financial resources to this plan increases the opportunity for walking and improves pedestrian safety by reducing crashes.
CHAPTER 1: PROJECT MANAGEMENT AND COORDINATION

Introduction
Walking is our oldest and most basic form of transportation — one that we have come to realize is essential not only to our individual health, but also to the overall livability of our cities and towns. The San Antonio-Bexar County Metropolitan Planning Organization Pedestrian Safety Action Plan comes at a pivotal time for the region. Several concurrent initiatives make this an opportune time to address pedestrian issues. According to the 2008 San Antonio-Bexar County Regional Transportation Survey, only 25% of respondents were satisfied with walking conditions, and the top non-automobile transportation priority was increasing the availability of sidewalks and other pedestrian facilities.

Health experts nationwide are pushing their message to Americans to get out and walk more, and the San Antonio Metropolitan Health District has several infrastructural and programmatic initiatives aimed at reducing obesity (67% of Bexar County adults are overweight1) and related diseases through healthy lifestyles and active transportation. The initiatives include implementation of a Sidewalk Transition Plan development of Healthy Nutrition Policy and establishment of an Active Living Council. San Antonio attracts visitors from around the world, and walking the City’s historic streets and trails is a top attraction. Added to this are various related initiatives in the Greater San Antonio Region including, but not limited to:

- The recent adoption of a Complete Streets resolution by the San Antonio-Bexar County Metropolitan Planning Organization (MPO)2
- The MPO’s Walkable Community Program to provide walkable community workshops, safe routes to school workshops, bicycle safety classes and bicycle rodeos 3
- The City of San Antonio’s Americans with Disabilities Act (ADA) Transition Plan4 and city-wide sidewalk inventory (2008)
- The adoption of the Bicycle Master Plan (2011)5 by the City of San Antonio
- Bicycle Travel Patterns Survey conducted by the MPO
- The very successful MPO-sponsored Walk & Roll program to encourage more bicycling and walking 6
- Schools throughout the region working toward safer routes for walking and bicycling students7
- “Texas Department of Transportation is committed to proactively planning, designing and constructing facilities to safely accommodate bicyclists and pedestrians”8

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4 http://www.sanantonio.gov/ada/ADATransitionPlanFinalSummary.asp?res=1600&ver=true
5 http://www.sanantonio.gov/oep/sabikes/bicycleMP.aspx
6 http://www.walkandrollsa.com/
7 http://www.txdot.gov/safety/safe_routes/default.htm
8 Memorandum, March 23, 2011 to District Engineers
Pedestrian Mobility Advisory Committee acting as the Study Oversight Committee

The Pedestrian Mobility Advisory Committee (PMAC) advises the San Antonio-Bexar County Metropolitan Planning Organization's Transportation Policy Board on pedestrian issues for the metropolitan area. PMAC is comprised of citizen and partner agency representatives. Citizen representation is at-large, positions and representation are from the Greater Bexar County Council of Cities, Bexar County Technical Advisory Committee for Persons with Disabilities, and from neighborhood walking groups. Agency representatives are from Alamo Area Council of Governments Bexar County, City of San Antonio, the San Antonio Utilities Council, Texas Department of Transportation, and VIA Metropolitan Transit. (See Appendix A for a full listing of the PMAC).

The PMAC served as the Study Oversight Committee (SOC) for this Plan to ensure that the Plan would address the most critical pedestrian issues both within the City of San Antonio and the greater Bexar County region. The SOC was convened in December 2010 and met eight times to provide input at each stage in the Plan development process. This included development of project goals and objectives, priorities, locations for recommended improvements, and a thorough review of this document.

Project Management Plan and Schedule

In the fall of 2010, the San Antonio-Bexar County Metropolitan Planning Organization hired Toole Design Group and Halff Associates (Consultant) to develop a Pedestrian Safety Action Plan (PSAP) over a period of 14 months. The Consultant worked closely with the SOC, soliciting input at the beginning of the process of Plan development. Table 1-1 shows the schedule that was followed in developing the PSAP. This schedule was approved by the SOC and was used to update the SOC on Plan progress.
### Table 1-1: Project Timeline

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<th>Jan '11</th>
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<th>Mar '11</th>
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CHAPTER 2: PROJECT INITIATION

I. Study Oversight Committee Work Session: Establishing Goals and Objectives

This Plan was initiated in December of 2010 with a meeting between the Study Oversight Committee (SOC), the San Antonio-Bexar County Metropolitan Planning Organization, and the hired Consultants. At the first meeting, the Plan's goals were developed through an interactive exercise with the SOC as well as information provided through the Request for Proposal (RFP). For the members of the SOC, there was an desire to have a Plan that is both clear with regards to what needs to be done to improve pedestrian safety and access, and concrete in terms of defining how the Plan will be implemented over time. The Plan and how it is structured reflects this desire.

Specific actions for achieving the Plan's goals are identified in Chapter 6. The actions relate to policy, program and facility improvements, and additions that will facilitate successful implementation of this Plan. Each of the Plan's goals also has a corresponding performance measure so that the progress of Plan implementation may be tracked over time.

Vision (from RFP)
The product of this effort will be a go-to reference, developed per Federal Highway Administration and National Highway Traffic Safety Administration guidelines, for improving safety through street redesign and the use of engineering techniques as well as other safety-related treatments and programs that involve the entire community.

Create a continuous sidewalk network
Providing a connected network of safe and accessible sidewalks is fundamental to achieving the goals of this Plan. A continuous sidewalk network will help connect people to transit, shopping, jobs, schools, parks, and other destinations, as well as tie together the region's ever-growing system of greenways and multi-purpose trails. This includes the building of sidewalks in developed areas where sidewalks do not currently exist.

Goals for Plan (developed by the SOC)

Goal 1: Institutionalize this Plan through the Unified Development Code, Complete Streets policies, and other regulations to improve pedestrian access.
Implementation of the Plan will require all public and private projects to implement pedestrian improvements. Therefore, institutionalizing pedestrian improvements into all levels of government will be essential for successful implementation of this plan. Complete Streets are streets that provide for the needs of drivers, public transportation vehicles and patrons, pedestrians, and bicyclists.
**Goal 2: Establish measurable and incremental goals to achieve accessible sidewalks, bus stops, street crossings.**

Implementation of this Plan will require the establishment of measurable and incremental goals. This allows progress to be measured over time. These are enumerated in Chapter 6.

**Goal 3: Increase connectivity between pedestrian networks and mass transit.**

Increasing safety and access will require greater coordination between VIA Metropolitan Transit, the City of San Antonio, and other area jurisdictions. Bus stop locations must be located where there are sidewalks and opportunities to cross the street safely. The result should be a seamless system where pedestrians have safe access to all transit stops.

**Goal 4: Commit resources to maintain existing infrastructure (sidewalks, pavement markings, signs, etc).**

Uneven surfacing, obstructions, and inadequate, substandard, or damaged signage and pavement markings often compromise pedestrian safety along and across public roadways. Continued maintenance of pedestrian infrastructure benefits all pedestrians including disabled users and promotes preservation and longevity of existing facilities. Well maintained facilities also aid motorists in notification of where to expect pedestrians.

**Goal 5: Educate the walking and driving public regarding pedestrian behavior and safety.**

Efforts in outreach and education are essential to foster the respect and civility necessary for both motorists and pedestrians to use public roads safely.

**Goal 6: Recognize and incorporate the interrelated goals and initiatives of area transportation agencies and organizations.**

Agencies and organizations should cooperate to incorporate interrelated goals and initiatives such as Complete Streets and promoting public health. Cooperate among the region’s transportation stakeholders and coordinate on various policies and projects such as Complete Streets, Walkable Communities, and Safe Routes to School. Coordination on these issues is critical to the successful implementation of the Plan.

**Goal 7: Provide pedestrian accessibility within a quarter-mile of all VIA bus stops. This should include five-foot sidewalks, audible signals at intersections, and changes in pavement textures at bus stops and curb ramps.**

Pedestrian accessibility to bus stops is essential for all persons using public transit. Providing accessibility within a quarter-mile of all VIA bus stops including pedestrian elements such as compliant intersections, bus stop, and curb ramp design are necessary for all transit users. Provision and maintenance of these items will require cooperation and coordination between VIA, the City of San Antonio, and other area jurisdictions.
**Goal 8: Develop incentives to retrofit pedestrian infrastructure.**
Pedestrian infrastructure such as sidewalks, curb ramps, and audible pedestrian countdown signals can often be retrofitted in conjunction with re-development. Ways to accomplish this are enumerated in Chapter 5.

**Goal 9: Give pedestrians priority in new development.**
Pedestrian infrastructure such as sidewalks and curb ramps can often be installed in conjunction with new development. Ways to accomplish this are enumerated in Chapter 5.

**Goal 10: Clearly mark crosswalks with appropriate signage, signals, and pedestrian indicators.**
Clearly marked crosswalks with appropriate signage, signals and pedestrian indicators help pedestrians cross the street and alert motorists to the presence of pedestrians. Guidance on crossings and warning signs are enumerated in the countermeasures in Chapter 4.

**II. Stakeholder Roundtable Discussion: Establishing Priority Improvement Criteria**

Initiation of the plan continued with a Stakeholder Roundtable Workshop and Discussion held in February of 2011. Among those present included representatives from the Texas State Department of Transportation (TxDOT), VIA Metropolitan Transit, San Antonio’s Public Works and Planning Departments, the Metropolitan Health District, Bexar County, the MPO’s Pedestrian Mobility Advisory Committee, and other pedestrian-related invitees. An interactive process was used to establish priorities, and a consensus to focus the Plan on pedestrian safety and access was reached during this workshop.

The prioritization criteria guide the recommendations in this Plan and are intended to assist the various public agencies involved in Plan implementation to prioritize projects and programs. Recommended locations for making improvements are found in Chapter 4. The locations were selected based on the prioritization criteria developed at the Stakeholder Roundtable Workshop. Additionally, Chapter 6 contains a section on near, medium, and long-term implementation recommendations based on the prioritization criteria.

The prioritization criteria developed at the Workshop and used to guide this Plan are as follows:

**Priority 1: Schools**
There is a growing interest in Safe Routes to School (SRTS). More children are walking and bicycling to school as budget issues force cuts in school busing and more children are assigned to neighborhood schools. Walking and bicycling to school is also recognized as an important strategy for reducing childhood obesity.
**Priority 2: Transit**
Pedestrians using transit must be able to access the transit stops. While seemingly obvious, crossing the street to access stops can be challenging, especially if there is high speed turning traffic, ramps are non-existent or in poor repair, long distances between crosswalk locations, and crosswalk markings are difficult to see. Access to transit stops can also be difficult if sidewalks are missing or in poor repair.

**Priority 3: Crashes/Safety**
Pedestrian crashes, when plotted on a map and analyzed, demonstrate patterns that can help determine where to focus resources. They include:

1. Spot locations with high numbers of crashes,
2. Corridors with high numbers of crashes along the entire corridor (often a corridor with high transit ridership),
3. Neighborhoods with high concentrations of crashes (e.g. area around a major university), and
4. Crashes related to a particular traffic tool or treatment (e.g. old style pedestrian indicators when replaced by newer countdown indicators will reduce crashes across an entire system).

**Priority 4: High Density Neighborhoods**
Greater levels of pedestrian activity are typically found in high-density neighborhoods along with a corresponding level of pedestrian exposure to both motor vehicle and bicycle traffic. Focusing resources to accommodate multiple modes of transport within a tight spatial framework through facility improvements will result in significant benefits.

**Priority 5: Downtown**
As the region’s major employment center and tourist destination, downtown San Antonio has a high level of pedestrian activity. Investing in downtown’s pedestrian infrastructure will greatly contribute to both pedestrian safety and the area’s overall economic vitality.

**Priority 6: Underserved Areas**
Areas with concentrations of low-income households may have a low percentage of car ownership. Existing transit and walking amenities may not be meeting area demand.

**Priority 7: Employment Centers**
Employment centers tend to have higher levels of pedestrian activity, especially near transit stops. There are often congestion issues around employment centers that can be partially addressed by providing pedestrian infrastructure that facilitates walking.
CHAPTER 3: DATA COLLECTION AND ANALYSIS

Data collection and analysis is needed to determine where deficiencies exist, the extent of the safety problem, and what projects, programs, and policies can provide the biggest safety benefit for pedestrians. The public is a great resource to provide data on safety concerns, deficiencies, and barriers to walking. Crash data provides information on where and, to some extent, why crashes occur. Taken together, they form a more complete picture for determining where to focus resources to improve pedestrian safety.

I. Community Outreach

An on-line interactive mapping tool using the CommunityWalk platform and a public survey using SurveyMonkey were developed to gather data on specific issues and conditions related to walking in the San Antonio-Bexar County region. This was augmented by a series of focus groups to make sure the concerns of critical stakeholder groups such as school administrators and persons with disabilities were heard. The final results were used to:

- Select locations for field work
- Inform development of policy recommendations
- Inform identification of locations to implement 43 different countermeasures, e.g. install curb bulb, change signal timing, install section of sidewalk, etc. (see Chapter 4).
- Prioritize pedestrian safety projects, including facilities types and spot locations (see Chapter 6).

It is important to note that the interactive map and the survey were self-selected; therefore, the results are not statistically significant. The main purpose of the interactive map and survey was to broaden the reach of public comment by providing a venue for people to provide input supplemental to the PMAC and focus group meetings that were held throughout the plan development process.

CommunityWalk (Online Interactive Map) Results

Members of the public were encouraged to add markers, paths, and descriptive comments to an on-line interactive map in fourteen (14) preselected category areas. Between February 2011 and April 2011, the map was viewed 463 times and 152 markers and 38 paths were added by users.

Figure 3.1 shows a ranking of the category areas placed by map users. Figure 3.2 shows a screen shot of the online mapping tool with the markers and paths added by the public. Complete results including all of the write-in responses can be found in Appendix B.
### Figure 3-1: Interactive Map Category and Number of Markers

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<thead>
<tr>
<th>Category</th>
<th># of Markers (locations)</th>
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<tr>
<td>Barrier in sidewalk zone</td>
<td>23</td>
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<tr>
<td>Need sidewalk or path connection</td>
<td>23</td>
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<tr>
<td>Route I use frequently</td>
<td>16</td>
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<tr>
<td>Route I would like to see improved for pedestrians</td>
<td>13</td>
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<tr>
<td>Better access to bus needed</td>
<td>11</td>
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<tr>
<td>I take the bus (on &amp; off points)</td>
<td>11</td>
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<tr>
<td>Unappealing pedestrian environment</td>
<td>10</td>
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<tr>
<td>Personal safety concerns</td>
<td>9</td>
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<tr>
<td>Difficult intersection</td>
<td>9</td>
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<tr>
<td>Need pedestrian crossing</td>
<td>6</td>
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<td>Pedestrian-vehicle accident location</td>
<td>4</td>
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<tr>
<td>Traffic is uncomfortable</td>
<td>4</td>
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<tr>
<td>Bridge improvement needed</td>
<td>3</td>
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<tr>
<td>Adjust pedestrian signal</td>
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<td><strong>TOTAL</strong></td>
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### Figure 3-2: Screen Shot of the Interactive Map
Comments received through the online mapping tool were imported into ArcGIS for improved display of the data and to conduct analysis of the data. Based on analysis of the data, the locations and areas of concentration were identified and are listed in Chapter 6 under “early implementation”.

**Observations**

- The number of comments indicates a high level of interest in walking issues.
- Removing barriers and maintaining existing sidewalks is the highest priority of those responding.
- There is a high demand for better access to transit. “Connectivity” to transit was often mentioned within the context of expressing a desire for more sidewalk maintenance, new sections of sidewalks, upgrades/additions of curb ramps, and improved crossings.
- Respondents often identified the same set of intersections when indicating locations that need improvements.

**Online Survey Results**

An online survey was developed in the spring of 2011 with input from the Pedestrian Mobility Advisory Committee (PMAC) and San Antonio-Bexar County Metropolitan Planning Organization staff. The survey was available online for two months from March 1, 2011 through May 6, 2011. The survey was publicized on the San Antonio-Bexar County Metropolitan Planning Organization website, through various stakeholder group email lists, the project newsletter, and through local media coverage. Three hundred and twenty-seven (327) responses to the Pedestrian Safety Action Plan online survey were received.

Demographic information was collected as part of an optional section of the survey. Approximately one-third of survey respondents skipped this section. Responses to these optional questions suggest that the survey respondents were well balanced in terms of age and gender. A small minority of the respondents indicated that they have mobility impairments.

Listed below are highlights gathered from the survey results. Following the highlights are summary tables and charts illustrating the results of selected survey questions. Complete survey results including all of the write-in responses can be found in Appendix B.

**Highlights**

- The majority of the respondents walk in the City of San Antonio (271, 82.9%)
- Most of the respondents appear to walk for reasons of enjoyment. When asked for what purpose their walking trips are, exercise and fitness was the most popular choice (235) followed closely by leisure (221).
  - These trips for pleasure are made often. Of those who walk for exercise and fitness, 110 of the respondents indicated that they make these trips frequently (three or more times per week).
  - It is likely that these results indicate that places where people live are inviting and comfortable for walking.
- Although the trips received the lowest number of responses a significant number of respondents indicated that they walk to work (136) or school (126).
- The frequency of trips made to work and school are also low. Most of the respondents, who indicate that they walk all the way to work (136) only make that trip 1-2 times per month (108). This is also the case for those who walk to school (126), as 107 of those respondents said that they only walk to school 1-2 times per
When asked what factors make walking in the San Antonio-Bexar County region difficult, the most common choice was a lack of sidewalks (139). The other choices in the top five were:

- Poor sidewalk quality (89)
- Travel time (takes too long to get to the destination) (87)
- Dangerous/difficult road crossings (67)
- Insufficient separation between sidewalks and traffic (65)
- Common write-in responses for “other included”
- Loose or stray dogs
- High temperatures/uncomfortable weather

When asked what factors make walking in the region difficult, the top 3 least common choices were:

- Physical ability (14)
- Inadequate lighting (along roadways or at roadway crossings) (19)
- Other travel modes are safer or more comfortable (25)

It is interesting that the most common challenge for walking in the San Antonio-Bexar County region identified by the respondents was sidewalks, as most of the respondents live near sidewalks (239, 84%). Combined with the fact that most people walk for exercise or leisure, it’s possible that the neighborhoods have comfortable and adequate sidewalks, but they are self-contained and may lack connections into destinations elsewhere in the San Antonio-Bexar County region.

When asked if the respondents use the sidewalks, 226 (79%) of the respondents indicated that they do use them.

When asked what areas of the San Antonio-Bexar County region are most in need of improvements such as new sidewalks, safer crossings, better lighting, etc, the most common selection among the respondents was neighborhood streets (235). Other commonly selected answer choices were:

- Near parks and other recreation destinations (205)
- Near bus stops (204)
- On major street corridors (example: SW Military Dr, Huebner Rd, Evans Rd) (198)
- Near retail/shopping centers (194)

The most frequently cited concerns expressed by survey respondents regarding walking in the region were similar to concerns expressed on the Online Interactive Map. They included:

- Lack of sidewalks, lack of sidewalk connectivity
- Difficult street crossings/intersections
- Lack of safe walking pathways to bus stops
Graphic Representation of Selected Survey Results

Q. I do not walk in the City

Q. If you walk in the City of San Antonio or other areas within Bexar County, please tell us why and how often. Choose a frequency for each walking activity. Respondents could select multiple answer choices.
Q. Which of the following factors make it more difficult or unpleasant for you to walk in the City of San Antonio or other areas within Bexar County? Please rank, e.g., Choice #1 = most deterring factor. Respondents could select up to three answer choices.

![Graph showing factors affecting pedestrian safety.](image1)

Q. Is there a sidewalk or trail near your home?

![Pie chart showing the presence of sidewalks or trails near homes.](image2)
Q. Do you walk on the sidewalk or trail near your home?

Q. Which areas within San Antonio-Bexar County need the most improvements (such as new sidewalks, safer crossings, better lighting, etc) For each area, choose the level of improvement needed.
Focus Group Results

In April 2011, the Planning Team met with representatives from six focus groups of the San Antonio region to discuss knowledge and thoughts on pedestrian conditions in the City of San Antonio and the greater Bexar County area. These discussions helped inform the development and implementation of the Pedestrian Safety Action Plan. The six focus groups included: 1) area planners and developers; 2) the senior citizen community; 3) school health advisory committee representatives; 4) fire marshals and emergency services representatives; 5) citizens with disabilities; and 6) neighborhood association representatives. Below is a description of the key highlights of each meeting, and common themes throughout all the focus groups.

Planners & Developers

Representatives from this focus group felt strongly that the built environment affected the pedestrian realm; specifically, they mentioned bringing buildings up to the street and moving parking next to and behind buildings as a way to encourage pedestrian activity. This group also touched on the need for connectivity beyond master planned subdivisions, giving residents a destination to which to walk. They felt that development codes used by area cities were the key to ensuring good urban design that promotes walkability. They noted that sometimes there is a need for flexibility in applying the codes, especially when it comes to locating sidewalks.

Senior Citizens

This focus group touched primarily on the need for pedestrian facilities to facilitate social interaction, especially for the growing number of seniors who do not drive. Meeting attendees touched on the imminent need of addressing mobility for senior citizens as the “baby boomer” population ages and more and more citizens will need to find an alternative to driving. Critical for seniors is the ability to walk to transit, highlighting the need to have good access to bus stops and transit centers across the region. Of particular concern were sidewalk maintenance, curb maintenance, and gaps in the sidewalk network.

School Health Advisory Committee (SHAC) District Facilitators

District representatives of the SHAC indicated that pedestrian facilities have significant influence on the levels of walking and bicycling to school among the region’s youth. A component of this is educating the parents in surrounding neighborhoods on walking and bicycling routes. This group also touched on the need to include walkability into the criteria for school site selection and school design. Finally, it was noted that there will be more demand for safe routes to school as school districts cut back on funding for buses.
Fire Marshals and Emergency Services

The discussion with the representative of fire marshals and emergency services of the region revolved primarily on the relationship that pedestrian infrastructure has on their ability to maintain a high level of emergency services. There was support for designing safe, walkable streets and a willingness to work with area engineers to design infrastructure that met the goals of pedestrian safety with little impact on their ability to respond to emergencies. Mini circles were provided as an example of a neighborhood traffic calming tool that works well for emergency responders.

Citizens with Disabilities

Representatives of the citizens with disabilities community highlighted many of the challenges of the pedestrian environment that affect their safety. Sidewalk condition, the presence of obstacles in the sidewalk (such as poles and fire hydrants), and availability of ramps to the sidewalk impact the ability for these users to access and use a sidewalk. Another key safety issue among these pedestrians in wheelchairs is right-turning vehicles, who often don’t see them because they are below the visibility of the turning vehicle.

Neighborhood Associations

The neighborhood group representatives highlighted the ability of the region’s neighborhoods to work together to influence change. There was a strong sense of collaboration among these representatives as they shared how their efforts had effected desired improvements in their neighborhood. They indicated that the role of neighborhoods and citizen activism will be instrumental in implementing the Pedestrian Safety Action Plan. They identified the need for better connectivity between neighborhoods and across arterial streets.

Common Theme

A strong willingness for collaboration to make the San Antonio region a walkable community was a common theme repeated throughout all of the focus group meetings. This theme of willingness will support implementation of the Pedestrian Safety Action Plan and future efforts to improve walkability and pedestrian safety across the San Antonio region.

II. Existing Data – Review and Analysis using GIS

To better identify and understand pedestrian safety and access issues, a wide range of data was reviewed and mapped. This included data on the following:

- Pedestrian crashes
- Major corridors
- Existing and proposed bicycle facilities
- Future land use
- Registered neighborhood associations
- Community centers
- Population density
- Economically stressed areas

Walkability has become very important to me as I age, as the economic situation drags on and as the cost of gas goes up and up. Being able to walk safely to work, to shop and for recreation has become something I expect from where I have choosen to live.

-Survey Respondent

I am handicapped and require a wheelchair to get around my neighborhood. There are too many uneven sidewalks and they are not wide enough. There are minimal if any sidewalk ramps.

-Survey Respondent
Crash data was further broken down to identify the following:

- High crash blocks
- High crash bus stops
- High crash signals
- Geographic clusters of crashes

Also mapped were the responses to the CommunityWalk interactive map. Chapter 6 provides guidance on how to use these maps for prioritizing projects and selecting locations to make improvements.

Pedestrian crash data was also placed on a map of the San Antonio-Bexar County metropolitan region and organized as recommended in FHWA’s *How to Develop a Pedestrian Safety Action Plan*:

- **Spot locations** - problem is unique to one location; maps identify locations with two, three, four to five, and six to seven pedestrian crashes. This included intersections and non-intersections.
- **Corridors** - locations with high numbers of crashes involving pedestrians along the entire corridor, but not necessarily concentrated at a few locations (typically one-half to five miles in length).
- **Targeted areas** - may be a single neighborhood, university campus or business district (e.g. Downtown) where pedestrian crashes are disproportionally high.

Figure 3-3 shows the results of placing the pedestrian crash data on a map of the San Antonio-Bexar County metropolitan region.

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Observations Regarding Crash Patterns

- **Spot Locations**: In general, pedestrian crashes, unlike motor vehicle crashes, were not overly concentrated at spot locations. The vast majority of locations had only one or two pedestrian crashes. There were 14 locations with four to five crashes and only six locations with six to seven crashes.

- **Corridors**: Corridor problems were evident at 18 corridors throughout the region. Problems were identified at sequential intersections and along the roadside of corridors. To successfully reduce crashes, countermeasures will need to be applied throughout the corridor, not just at a single location.

- **Targeted areas**: Several areas with disproportional crash rates were identified. In many cases, problems such as speeding on residential streets repeated itself where conditions were similar throughout. Solutions are very likely to be the same all around a target area.

- **Given the above patterns**, strategies to reduce the number of pedestrian crashes should include a focus on high crash spot locations, high crash corridors, and neighborhoods with high concentrations of crashes (see Chapter 6 for full discussion).
National Guidance Regarding Crash Data
Completing a detailed analysis of individual crashes was beyond the scope of this Plan. However, national data strongly suggests that some types of crashes are frequent, but are scattered throughout an entire region (i.e. they are not a spot or corridor location or area specific). They are often caused by an undesirable practice such as failing to routinely provide opportunities to cross arterial streets near transit stops. Fortunately, recent research has identified Crash Reduction Factors (CRF) for on specific countermeasures. Communities can take advantage of this research, without necessarily completing costly crash analysis, by focusing resources on system wide changes with high crash reduction factors. This approach is reflected in the recommendations in Chapter 6.

III. Recommendations to Study Oversight Committee: Countermeasure Templates

The map of the San Antonio-Bexar County metropolitan region with the pedestrian crash data (Figure 3-3) was presented to the Study Oversight Committee on June 15, 2011. Also presented was a list of countermeasures that could be used to improve pedestrian safety and access along with sample template (curb extensions) for presenting the information. It was recognized that completing a detailed analysis of high crash locations, corridors, and neighborhoods was beyond the scope of this Plan. However, it was also recognized that a strategy was needed to address both the concerns raised by citizens and the pedestrian crashes occurring throughout the region. From the discussion, three strategies emerged:

1. Use the data collected regarding crashes, demographic, etc. along with the information collected from the survey and interactive map to make recommendations regarding priorities for making pedestrian improvements (see Chapter 6).

2. Use known CRFs to make recommendations regarding system-wide changes (see Chapters 5 & 6).

3. Develop best practices templates for guiding future pedestrian infrastructure improvements. Included should be suggested locations for implementing each of the recommended best practices (also referred to as countermeasures).

**Countermeasure Templates (expanded discussion)**

The sample best practices template was reviewed at the June 15, 2011 meeting. The list of countermeasures was subsequently updated and 43 templates were developed. These were reviewed by SOC members in October and November of 2011 and appear in Chapter 4. It was determined that countermeasure templates would include the following elements:

- Countermeasure description
- Current use in the City of San Antonio-Bexar County region
- Recommendations for the City of San Antonio-Bexar County region
- Crash Reduction Factor if available
- Reference/guidance for further information
- Examples from other communities
- Recommended locations for implementation

The list of 43 countermeasures was also reviewed and organized in topic areas:

- Along the Roadway
- Channelization
- Crossing
- Curbside Management
- Driveways
- Intersection Geometry
- Illumination
- Regulatory Signs
- Signals
- Transit
- Warning Signs
- Traffic Calming
CHAPTER 4: PEDESTRIAN SAFETY ACTION PLAN RECOMMENDATIONS

This chapter of the Pedestrian Safety Action Plan (PSAP) contains profiles for 43 different treatments (countermeasures) for improving pedestrian safety (see Table 4-1 for a complete list of recommended treatments). Each profile provides a definition of the recommended treatment, why and where it is used, and to what degree it is currently being implemented in the region. Where available the Crash Reduction Factor (CRF) is also provided. This factor is based on research that has been done on the effectiveness of specific treatments to reduce pedestrian-vehicle crashes. CRFs are available for about half of the profiled treatments. Additional information and case study examples are available for many of the recommended treatments; these resources are also noted.

References and examples are provided for each countermeasure. PedSafe\(^1\) is a Pedestrian Safety Guide and Countermeasures Selection System sponsored by the United States Department of Transportation, Federal Highway Administration. The PedSafe Guide is an important resource for pedestrian crash statistics, guidance on the selection of pedestrian improvements, countermeasures, case studies, and implementation resources. PedSafe is referenced throughout Chapter 4 and can be reviewed for additional information on countermeasures. PedSMART\(^2\) is another resource referenced throughout Chapter 4. PedSMART, another U.S. Department of Transportation, Federal Highway Administration resource, provides additional information for pedestrian related Intelligent Transportation Systems (ITS).

The second page of each countermeasure profile contains recommendations for specific locations within the San Antonio–Bexar County region where the recommended treatment could be implemented in order to address issues that are likely contributing to crashes. These recommended locations were derived from an analysis of crash data, field observations, and input from the stakeholder process, including the Steering Oversight Committee, focus groups, and roundtable discussions.

Several corridors and neighborhoods were identified as good candidates for multiple treatments due to a high number of crashes in these areas. These corridors and neighborhoods are featured at the end of this chapter with profiles that include a definition of the pedestrian safety issues and a “package” of recommended treatments for addressing these issues. For the most part, the characteristics of these areas and the package of recommended treatments are directly transferable to other areas of the region, and it is recommended that such a systematic approach is taken.

Table 4-1: List of Recommended Pedestrian Safety Countermeasures

<table>
<thead>
<tr>
<th>Number</th>
<th>Signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pedestrian Indicator- Countdown Signal and Timing</td>
</tr>
<tr>
<td>2</td>
<td>Push Button</td>
</tr>
<tr>
<td>3</td>
<td>Leading Pedestrian Interval (LPI)</td>
</tr>
<tr>
<td>4</td>
<td>Protected Left Turn Phase</td>
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<tr>
<td>5</td>
<td>Mid-Block Signal</td>
</tr>
<tr>
<td>6</td>
<td>Mid-Block Staggered Signal</td>
</tr>
<tr>
<td>7</td>
<td>Intelligent Transportation Systems—Crossing Time</td>
</tr>
<tr>
<td>8</td>
<td>Rectangular Rapid Flash</td>
</tr>
</tbody>
</table>

\(^1\) http://www.walkinginfo.org/pedsafe/
\(^2\) http://www.walkinginfo.org/pedsmart/home.htm
<table>
<thead>
<tr>
<th>Topic</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crossing</strong></td>
<td></td>
</tr>
<tr>
<td>9 High Visibility Crosswalk</td>
<td></td>
</tr>
<tr>
<td>10 Marked Crosswalk Location</td>
<td></td>
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<tr>
<td>11 Crossing Island</td>
<td></td>
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<tr>
<td>12 Marked Crosswalk Alignment</td>
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<tr>
<td>13 Medians</td>
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<tr>
<td><strong>Lighting</strong></td>
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<tr>
<td>14 Illumination at Pedestrian Crossings</td>
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<tr>
<td>15 Illumination along Corridors</td>
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<tr>
<td><strong>Intersection Geometry</strong></td>
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<tr>
<td>16 Curb Ramps</td>
<td></td>
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<tr>
<td>17 Curb Extensions/Bulb Outs</td>
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<tr>
<td>18 Curb Radius</td>
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<tr>
<td>19 Skewed Intersection</td>
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<tr>
<td>20 Right Turn Slip Lane with Directional Island</td>
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<td><strong>Along the Roadway</strong></td>
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<td>21 Sidewalks</td>
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<td>22 Sidewalk Buffers</td>
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<td>23 Clearance (from Obstructions)</td>
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<td>24 Street Trees</td>
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<tr>
<td>25 Sidewalk Separation from Off-Street Parking</td>
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<tr>
<td><strong>Regulatory Signs</strong></td>
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<td>26 Right Turn on Red Restrictions</td>
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<td><strong>Warning Signs</strong></td>
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<td>27 Pedestrian Crossing Warning Signs</td>
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<td>28 Advanced Yield Lines with “Yield Here to Pedestrian” Signs</td>
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<td>29 In-street Pedestrian Crossing Sign</td>
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<td><strong>Transit</strong></td>
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<td>30 Transit Stop Location</td>
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<tr>
<td>31 Sidewalk Connections to Transit Stops</td>
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<tr>
<td>32 Crossing Near Transit Stop</td>
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<td>33 Sidewalk Capacity at Transit Stops</td>
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<td><strong>Driveways</strong></td>
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<td>34 Driveway Design</td>
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<td>35 Driveways Near Intersections</td>
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<td>36 Driveway Consolidation</td>
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<td>37 Right In Right Out Driveways and Minor Roadways</td>
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<td><strong>Channelization</strong></td>
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<td>38 Road Diet</td>
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<td>39 Lane Diet</td>
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<tr>
<td><strong>Curbside Management</strong></td>
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<tr>
<td>40 Parking Restrictions at Intersections</td>
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<tr>
<td>41 Back-In Angle Parking</td>
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<tr>
<td><strong>Traffic Calming</strong></td>
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<tr>
<td>42 Chicane</td>
<td></td>
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<tr>
<td>43 Mini Traffic Circle</td>
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</table>
PEDESTRIAN INDICATOR—COUNTDOWN SIGNAL AND TIMING

Pedestrian signal indicators ensure pedestrians will know when the signal phasing allows them to cross and when they should not be crossing. Countdown pedestrian signals inform pedestrians of the amount of time in seconds that is available to safely cross during the flashing “DO NOT WALK” phase. This device is particularly useful at crosswalks with long crossing distances. The walk phase should allocate enough time for pedestrians of all abilities to safely cross the roadway. Walk phase timing should accommodate crossing speeds in the range of 2.5 to 3.5 '/second. Where there are high concentrations of children, seniors, or disabled pedestrians (e.g., near schools or hospitals), signals should be timed to accommodate slower pedestrian crossing speeds.

Pedestrian indicators are particularly important on one-way roadways where a pedestrian approaching from the opposite direction cannot see the vehicle signal heads and may not realize an intersection is signalized or know when it is safe to cross.

Current Use in the City of San Antonio/Bexar County Region: Pedestrian Indicator-countdown signals have been, and continue to be, installed in many locations throughout the City of San Antonio and Bexar County Region.

Recommendations for the City of San Antonio/Bexar County Region: Audible pedestrian countdown signals should be provided at all signalized intersections with priority given to major arterials and locations with high pedestrian volumes. Efforts to install countdown signals should be continued.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Where countdown indicators are installed CRF = 25% | PedSafe - Pedestrian Signals | PedSafe - Monterey, CA  
PedSafe - San Francisco, CA |

Pedestrian countdown signal should allocate enough time for pedestrians of all abilities to safely cross the roadway.
### Location # 1

San Pedro Ave and E Ramsey Rd

Also see “High Visibility Crosswalk” countermeasure profile

This intersection lacks pedestrian signals on the E Ramsey Rd approaches. Countdown signals would:
- Inform pedestrians when it is safe to cross the street.
- Reduce vehicle delay and potential for pedestrian crashes resulting from pedestrians crossing the street during a green phase.

### Location # 2

San Pedro Ave and Basse Rd

Existing signal heads do not have countdown signals. Installing countdown signals at this location would:
- Inform pedestrians when it is safe to cross the street.
- Reduce vehicle delay and potential for pedestrian crashes resulting from pedestrians crossing the street during a green phase.

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**Note:** This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements.
PUSH BUTTON

Pedestrian push buttons are electronic buttons used by pedestrians to change traffic signal timing and receive a pedestrian crossing phase. Pedestrian signal phases can be programmed to automatically recall during an intersection phasing cycle or be actuated using push buttons. The installation of push buttons improves pedestrian travel time and compliance; push buttons can also reduce delay to vehicular traffic when pedestrians are not present. Pedestrian push buttons are typically installed at locations where pedestrians are expected intermittently. Automatic pedestrian phases (no push button) are preferred and used in high pedestrian volume areas such as downtown/central business districts where the pedestrian phase is needed during nearly every signal cycle due to high pedestrian volumes. A signal may have both automatic and actuated pedestrian phases depending on time of day. For example, signals can be put in automatic pedestrian “recall” for key time periods of day such as school crossing times, but return to an actuated phase during off-peak times. If used, push buttons should be clearly visible and within easy reach for people in wheelchairs. Only about 50 percent of pedestrians actually push the buttons based on a FHWA research project, which indicates that push buttons need to be well signed, easily locatable and within reach of all pedestrians. Push buttons need to be checked periodically to assure that they are working and placing a call into the signal.

Current Use in the City of San Antonio/Bexar County Region: Push buttons are present at most signalized crossing locations. However, they are not used in downtown areas with high concentrations of pedestrians.

Recommendations for the City of San Antonio/Bexar County Region: Push buttons are not appropriate at all crossing locations. When installing push buttons the following should be considered:

- Install push buttons at locations where they are needed to aid vehicular flow and pedestrian volumes are relatively low
- Install illuminated buttons that indicate when the button has been actuated
- Do not install push buttons at locations where pedestrians are expected to be present during the majority of signal cycles
- Ensure that existing and new push buttons are well signed, easily locatable, and within reach of all pedestrians, particularly people in wheelchairs; locator tones (different from audible signals) should be used to assist visually impaired pedestrians to find the push button
- Buttons for crosswalks at the same corner should be located at least 10 feet from each other

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>MUTCD - Section 4E.09 Accessible Pedestrian Signal Detectors</td>
<td>PedSafe Case Studies</td>
</tr>
<tr>
<td></td>
<td>NCHRP – Guidelines for Accessible Pedestrian Signals</td>
<td></td>
</tr>
</tbody>
</table>
Location # 1
Fredericksburg Rd
8300 block, near Las Almas Apartments and transit stops
Also see “Mid-block Staggered Signal” countermeasure profile

Using push buttons for a new mid-block staggered signal at this location would provide:
- Signal service correlating to when pedestrians are present
- A reduction in vehicle delay

Location # 2
S Flores St at Commerce St and Dolores St and other locations within the downtown core (Remove push buttons)

Because pedestrians are present at crossings during the majority of signal cycles in the downtown core, push buttons should be removed, and signal phasing should include an automatic pedestrian signal cycle. This would:
- Create a more predictable pedestrian phase and improve compliance of pedestrians crossing the road only during pedestrian phase

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements
LEADING PEDESTRIAN INTERVAL (LPI)

The Leading Pedestrian Interval (LPI) is a signal phasing strategy to improve pedestrian visibility in locations with heavy volumes of turning traffic and frequent pedestrian crossings. During the LPI, motor vehicles expecting the next green phase are stopped for four to seven seconds while 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. LPIs can be complemented by geometric design changes to the intersection that shorten crossing distances and reduce the required duration for the WALK phase.

Current Use in the City of San Antonio/Bexar County Region: LPIs are used in select locations.

Recommendations for the City of San Antonio/Bexar County Region: Use Leading Pedestrian Intervals at the following types of signalized locations:
- Locations where there are heavy vehicle turning movements and concurrent heavy pedestrian volumes
- Locations with heavy transit use
- High crash locations where crashes are due to right and left turning vehicles
- School crossing locations
- Locations with high use by populations over represented in the crash data such as seniors and persons with disabilities
- Locations with high levels of citizen complaints about aggressive driving

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Leading Pedestrian Signal CRF = 5% | PedSafe – Pedestrian Signal Timing | PedSafe, Leading Pedestrian Interval, Orlando, FL
| | | PedSafe, Leading Pedestrian Interval, St. Petersburg, FL |

Leading pedestrian intervals provide pedestrians a head start. The walk signal is given when motorists in the same direction of travel have a red light.
<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Culebra Rd at TX-421 Spur</th>
<th>LPI signals at this intersection would:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>▪ Allow pedestrians accessing retail uses and multiple transit routes to be present in crosswalk before, and more visible to, turning motorists</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location # 2</th>
<th>San Pedro Ave at San Antonio College</th>
<th>LPI signals at this intersection would:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>▪ Allow pedestrians accessing the College and transit stops on either side of San Pedro Ave to establish presence in the intersection and be more visible before vehicles are allowed to turn</td>
</tr>
</tbody>
</table>

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements
PROTECTED LEFT-TURN PHASE

Turning movements at signals, particularly left turning movements, account for a high percentage of pedestrian crashes. A protected left-turn phase (red signal arrow followed by a green signal arrow followed by a red signal arrow) provides a dedicated left turn and eliminates the need for motorists to wait for gaps in on-coming traffic. 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 or flashing yellow (i.e. protected/permissive left-turn). 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, countermeasures such as protected right-turn phases, RIGHT-TURN-ON-RED restrictions, or leading pedestrian intervals should be considered.

Current Use in the City of San Antonio/Bexar County Region: It is common practice to have a protected left turn phase followed by a permissive left turn phase (protected/permissive). This is true throughout the region.

Recommendations for the City of San Antonio/Bexar County Region: Priority should be given to eliminate the permissive left-turn cycle of a protected/permissive left-turn signal cycle. A disproportional number of pedestrian crashes occur at signalized intersections. With a 70 to 80 percent crash reduction factor, this countermeasure should be pursued wherever possible, especially where there is a pedestrian crash problem or high concentration of vulnerable populations.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected left-turn phases</td>
<td>▪ MUTCD - Section 4D.06 Application of Steady Signal Indications for Left Turns</td>
<td>▪ PedSafe Case Studies</td>
</tr>
<tr>
<td>CRF = 70% to 80%</td>
<td>▪ FHWA-HRT-04-091: 4.2.2 “Protected-Only” Left-Turn phasing</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Photo of Location</td>
<td>Issue/Condition Addressed by Countermeasure</td>
</tr>
<tr>
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<td>------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| **Location # 1** | ![Location # 1 Photo](image1.jpg) | Modifying this “protected-permissive” left-turn to be a protected left-turn phase would provide:  
- Improved safety for pedestrians crossing the street |
| E Duran Blvd and S Flores St | | |
| **Location # 2** | ![Location # 2 Photo](image2.jpg) | Replacing the permissive “yield on green” with a protected left turn phase would provide:  
- Improved safety of crossing by reducing conflicts between pedestrians and left-turning vehicles |
| W Hildebrand Ave and San Pedro Ave | | |
| **Location # 3** | ![Location # 3 Photo](image3.jpg) | Replacing the permissive “yield on green” with a protected left turn phase would provide:  
- Improved safety of crossing by reducing conflicts between pedestrians and left-turning vehicles |
| S Zarzamora and Ceralvo St | | |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
MID-BLOCK SIGNAL

Traffic signals may be necessary at mid-block pedestrian crossing locations where there are high volumes of crossing pedestrians and insufficient gaps in motor vehicle traffic for crossing. The best signal set-up for a mid-block crossing is a hot (nearly immediate) response. As soon as the pedestrian call button is pushed, the clearance interval should be activated. If a signal is holding a pedestrian back from crossing when there is an ample gap, they can feel frustrated. Many will choose to cross away from the crossing, while others will dutifully push the activator button, not get an immediate response, and cross when there is a sufficient gap. A few seconds later, the approaching motorists must stop at a red signal for no reason, which can encourage motorist disrespect for the signal in the future. Hot responses can often be used if the nearby signals are not on progression, or else a hot response may be permitted in off-peak hours. If a mid-block signal system is used with a median, it is important to place pedestrian push buttons in the median; there will be times when some pedestrians start too late or when older pedestrians lack time to cross in one phase.

Current Use in the City of San Antonio/Bexar County Region: Mid-block signals can be found throughout the region though it is not common practice to routinely install them unless there is a specific or compelling reason (e.g. only school crossing option).

Recommendations for the City of San Antonio/Bexar County Region: Use this treatment sparingly. When used, focus on the following types of locations:
- Locations with high pedestrian volumes
- High crash locations
- Locations with high use by populations over represented in the crash data such as children, seniors, and persons with disabilities
- Locations that provide a better alternative to nearby intersections which are complex, high speed, and/or have a history of pedestrian crashes

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>FHWA University Course on Bicycle and Pedestrian Transportation—Lesson 11: Pedestrian Design at Intersections</td>
<td>See PedSafe</td>
</tr>
</tbody>
</table>

Mid-block signals are used where there are high volumes of pedestrians and insufficient gaps. A sign informs the pedestrian that the push button provides a “hot response”
### Location # 1

S W.W. White Rd south of Boxwood Rd where opposing transit stops are located.

Also see “ITS” countermeasure profile

This location consists of opposing transit stops in the middle of a long block where vehicle operating speeds tend to be high. A mid-block signal with ITS technology would:

- Ensure that pedestrians of all abilities are able to cross the street safely while minimizing vehicle delay.
- Provide pedestrian access to transit stops

### Location # 2

Fair Ave west of Nopal St

Also see “ITS” countermeasure profile

There is a school and senior apartments in the vicinity of this street crossing. Upgrading the existing warning signal to a mid-block signal with ITS technology would provide:

- Ensure that pedestrians of all abilities are able to cross the street safely while minimizing vehicle delay

---

**Note:** This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements.
MID-BLOCK STAGGERED SIGNAL

A mid-block, staggered, two-stage traffic signal at a crossing island (also known as a Z-crossing) can reduce impacts on motor vehicle flow while helping pedestrians cross multi-lane roadways. The two crossings are separated by a fenced median that provides a walk/wait area and a pedestrian stops one direction of traffic at a time. An issue with staggered crosswalks is that they may present a challenge for visually impaired pedestrians who can be disoriented by changes in the direction of the walkway leading to the road. A solution is to provide detectable warnings and/or railings to help realign the pedestrian perpendicularly to the roadway just before the second crossing. A two-stage traffic signal should not be installed without the staggered (Z) crossing since a pedestrian may look at the wrong pedestrian indicator causing them to “WALK” when they should be stopped for traffic.

Current Use in the City of San Antonio/Bexar County Region: Mid-block staggered signals have not been implemented.

Recommendations for the City of San Antonio/Bexar County Region: Use this treatment sparingly. When used, focus on the following types of locations:
- Locations with high pedestrian volumes
- High crash locations
- Locations with high use by populations over represented in the crash data such as children, seniors, and persons with disabilities
- Locations that provide a better alternative to nearby intersections that are complex, relatively high speed, and/or have a history of pedestrian crashes

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>CRF=54%</td>
<td>Safe Routes to School Guide – Tools to Reduce Crossing Distances for Pedestrians</td>
<td>PedSafe – Staggered Median</td>
</tr>
<tr>
<td></td>
<td>PedSafe – Case Study No. 34</td>
<td>Bellevue, WA</td>
</tr>
</tbody>
</table>

Diagram of mid-block staggered signal

Mid-block staggered signal for arterial crossing
<table>
<thead>
<tr>
<th>Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1**<br>Fredericksburg Rd 8300 block, near Las Almas Apartments and transit stops | Apartments and mid-block transit stops are generators of pedestrian traffic. A mid-block staggered traffic would provide:  
- A safe crossing opportunity  
- A reduction in the number of pedestrians crossing the street at unmarked mid-block locations |
| **Location # 2**<br>S W.W. White Rd at Lord Rd | This location is a long block (approximately a quarter mile between crossings) with retail and transit stops along its length. A staggered mid-block crossing would:  
- Reduce potential for mid-block crashes associated with pedestrians crossing the roadway at unmarked locations  
- Allow pedestrians to cross a 4-lane roadway in two stages |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
INTELLIGENT TRANSPORTATION SYSTEMS – CROSSING TIME

The term Intelligent Transportation Systems (ITS) refers to the application of information and communications technology to improve transportation outcomes. Passive video detection and microwave sensors can be used to extend the pedestrian signal phase, which benefits pedestrians and lessens motor vehicle delay. The controller adds time if a pedestrian has not finished crossing. Typically it can be expected that the walk phase is prolonged in about 20% of crossings, reducing unnecessary traffic delay for the other 80% of crossings.

Current Use in the City of San Antonio/Bexar County Region: ITS systems have not been implemented.

Recommendations for the City of San Antonio/Bexar County Region: ITS technology should be considered at the following signalized locations:
- Locations with high use by populations over represented in the crash data such as seniors and persons with disabilities
- School crossing locations
- Locations with high levels of citizen complaints about insufficient time to cross the street
- Arterial roadways

<table>
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<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
</thead>
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<tr>
<td>Research incomplete</td>
<td>PedSMART—Intelligent Transportation Systems</td>
<td>PedSMART - Portland, OR&lt;br&gt;PedSMART - Los Angeles, CA&lt;br&gt;PedSMART - Clearwater, FL</td>
</tr>
</tbody>
</table>

Signal with microwave sensors at intersection in Portland, OR. Source: Designing for Pedestrian Safety

Microwave sensors are aimed at the crosswalks to track pedestrians. Source: Designing for Pedestrian Safety
<table>
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<tr>
<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Fair Ave (mid-block crossing with flashing signal just west of Nopal St) | ![Image](image1.png) | ITS at this location would provide:  
- Additional time to the flashing phase of the pedestrian warning signal for vulnerable populations that are crossing the street at this location  
- Improved safety for pedestrians from the school and senior apartments in the vicinity of this street crossing |
| Also see “Mid-block Signal” and “Marked Crosswalk Location” countermeasure profiles | |

<table>
<thead>
<tr>
<th>Location # 2</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| S.W.W. White Rd south of Boxwood Rd where opposing transit stops are located | ![Image](image2.png) | Using ITS technology in combination with a new mid-block signal would provide:  
- A reduction in vehicle delay while ensuring that pedestrians of all abilities are able to cross the street safely |
| Also see “Mid-block Signal” and “Marked Crosswalk Location” countermeasure profiles | |

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements.
**RECTANGULAR RAPID FLASH BEACON**

Rectangular rapid flash beacons (RRFB) have proven to be effective devices at uncontrolled intersections for increasing motorist yielding rates and reducing pedestrian-vehicle crashes at crosswalk locations. The rapid flash beacon device consists of a pair of rectangular, yellow LED 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. The beacons are pedestrian activated (push button or passive detection) and placed on both sides of the street. 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. Advanced pedestrian warning signs can also be used with the rapid flash beacon. If traffic volumes are too high or there are too many lanes (generally more than 4 travel lanes) a HAWK (High Intensity Activated Crosswalk) or full signal may be warranted. Research has shown higher motorist yielding rates for RRFBs versus standard flashing beacons; since these devices have been granted interim approval by FHWA, they will likely be included in the edition of the MUTCD.

**Current Use in the City of San Antonio/Bexar County Region:** The rapid flash beacon has not been implemented.

**Recommendations for the City of San Antonio/Bexar County Region:** Priority should be given to installing rectangular rapid flash beacons. With a 80 to 88 percent crash reduction factor, this countermeasure should be pursued at uncontrolled pedestrian crossing locations wherever there is a pedestrian crash problem, high use by vulnerable populations, and pedestrians are crossing busy roads.

- Near schools or other generators with vulnerable pedestrians
- On relatively busy multi-lane roads
- At shared use trail crossings
- Note The rapid flash beacon is not in MUTCD but has interim Federal Highway Administration approval

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<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>RRFB at uncontrolled crossings CRF = 80% to 88%</td>
<td>FHWA - Efficacy of Rectangular-shaped Rapid Flash LED Beacons</td>
<td>Pinellas Trail Crossing – St. Petersburg, FL</td>
</tr>
</tbody>
</table>

Rectangular Rapid Flash Beacon with median

Push button activated Rectangular Rapid Flash Beacon
### Location # 1

Stahl Rd at Stormy Meadows

A Rectangular Rapid Flash Beacon at this location would provide:
- A complement to the existing crossing island
- Increased safety for children walking from the neighborhood to Stahl Elementary School and needing to cross Stahl Rd, a 5-lane arterial

### Location # 2

S St. Mary’s St (mid-block) at Bonham Elementary School

A Rectangular Rapid Flash Beacon at this location would provide:
- A complement to the existing crossing
- Improve safety of children walking to/from Bonham Elementary school

### Location # 3

W Theo Ave and Buffalo St

A Rectangular Rapid Flash Beacon at this location would provide:
- More awareness of the crosswalk to motorists when pedestrians are present
- Increased safety for children walking to/from school

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
HIGH VISIBILITY CROSSWALK

High visibility crosswalk markings aid drivers in seeing the crosswalk, not just the pedestrian. Two parallel lines indicating a marked crosswalk are less visible to the motorist. Ladder style (also known as piano keys) markings should always be used at locations without positive traffic control (signals, stop signs) and are advised at locations with positive traffic control. Crosswalks should not be slippery, create tripping hazards, or be difficult to traverse by those with diminished mobility or visual capabilities. One of the best materials for marking crosswalks is inlay tape, which is installed on new or repaved streets. It is highly reflective, long-lasting, and slip-resistant, and it does not require a high level of maintenance. Although initially more costly than paint, both inlay tape and thermoplastic are more cost-effective in the long run. Inlay tape is recommended for new and resurfaced pavement, while thermoplastic may be a better option on rougher pavement surfaces. Both inlay tape and thermoplastic are more visible and less slippery than paint when wet.

Current Use in the City of San Antonio/Bexar County Region: San Antonio/Bexar County region routinely installs high visibility crosswalks markings; however, many of these crosswalks are faded and are not visible.

Recommendations for the City of San Antonio/Bexar County Region: Determine the cause of crosswalk fading and identify solution that lowers the maintenance costs of keeping crosswalks highly visible. Focus on installing high visibility crosswalk markings at the following types of locations:
- Skewed intersections that allow for higher speed turns
- School crossings
- High crash locations
- Locations with high use by populations over represented in the crash data such as children, seniors, and persons with disabilities

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<tr>
<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>CRF = 20 to 29%</td>
<td>MUTCD- Section 3B.17 Crosswalk Markings</td>
<td>FHWA, Pedestrian Crosswalk Case Studies, Sacramento, CA, Stillwater, MN</td>
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<tr>
<td></td>
<td>PedSafe -Marked Crosswalks and Enhancements</td>
<td>PedSafe, Double Ladder Crosswalks, Salt Lake City, UT</td>
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<td>PedSafe, Zebra Crosswalk Markings, New York, NY</td>
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Longitudinal lines offer more surface area to be seen by the driver. High visibility crosswalks indicate to motorists where to expect pedestrians and direct pedestrians across the roadway.
<table>
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<tr>
<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</table>
| N Flores St at N Laredo St | ![Photo](image1.jpg) | Repainting the ladder style crosswalk at this location would:  
- Provide better visibility of the crosswalk |

<table>
<thead>
<tr>
<th>Location # 2</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</table>
| Fredericksburg Rd at W Hildebrand Ave | ![Photo](image2.jpg) | Replacing (or painting over) stamped “brick” crosswalk with a high visibility crosswalk would:  
- Provide better visibility of the crosswalk and reduce the likelihood of encroachment into the crosswalk |

<table>
<thead>
<tr>
<th>Location # 3</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</table>
| San Pedro Ave and E Ramsey Rd | ![Photo](image3.jpg) | Providing a high visibility crosswalk at this location would:  
- Indicate to both motorists and pedestrians where pedestrians are expected to cross the street |

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MARKED CROSSWALK LOCATION

Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help delineate where vehicles are to stop so as not to interfere with the pedestrian crossing. Marked crosswalks should only be installed where there is an expectation of a significant number of pedestrians such as near a school, park or other generator. 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). High visibility (ladder) style crosswalks (see countermeasure profile on high visibility crosswalks) should be used at more prominent crossings, while parallel (two lines) can be used elsewhere.

Current Use in the City of San Antonio/Bexar County Region: San Antonio/Bexar County Region routinely installs crosswalks at signalized crossings and in certain situations at unsignalized crossings of 2-or 3-lane roadways, such as near schools. In some situations where block lengths are long and the roadway has four or more lanes, the spacing between marked crosswalks can range from a quarter to half-mile, which results in pedestrians crossing at unmarked and uncontrolled locations.

Recommendations for the City of San Antonio/Bexar County Region: Consider installing additional marked crosswalks where:

- There are transit stops or other pedestrian generators located on long blocks and distance between existing marked crosswalks is greater than 1,000 feet.
- On multilane roadways, it is recommended that additional countermeasures are used at the crosswalk location, including: mid-block signals, half signals, rectangular rapid flash beacons, and crossing islands.

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<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>Research incomplete</td>
<td>MUTCD—Section 3B.17 Crosswalk Markings</td>
<td>East Capitol Street Pedestrian Safety Project, Washington, DC</td>
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<td></td>
<td>PedSafe—Marked Crosswalks and Enhancements</td>
<td>Connecticut Avenue Pedestrian Safety Action, Pedestrian Safety Audit, Washington, DC</td>
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<td>FHWA—Designing Crosswalks and Trails for Access</td>
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Midblock crossings on multilane roads should incorporate other countermeasures such as crossing islands, rapid flash beacons, and in some cases, a signal.

Marked crosswalk at an unsignalized crossing near a medical center.
# Chapter 4: Pedestrian Safety Action Plan Recommendations

<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</table>
| Fredericksburg Rd near Santa Anna | ![Location # 1 Photo](image1.jpg) | Long block lengths and distances between marked crosswalks along portions of Fredericksburg Rd encourage pedestrians to cross at unmarked locations. Additional crosswalk locations would provide:  
- More convenient and safe crossing opportunities  
- Reduced potential for pedestrian crashes |
| Also see the “Crossing Island” countermeasure profile |

<table>
<thead>
<tr>
<th>Location # 2</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</table>
| Commerce St at Lincoln Center/Park | ![Location # 2 Photo](image2.jpg) | A marked crosswalk and crossing island at this location would provide:  
- Improved safety for pedestrians accessing Lincoln Park from the bus stop and neighborhoods to the south |
| Also see the “Crossing island” countermeasure profile |

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements
CROSSING ISLANDS

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. 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. They are especially 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. 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 crossing. They are also appropriate at signalized crossings and may improve safety for vehicles by dividing traffic streams. 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. Crossing islands should be a minimum of 6’ wide to accommodate the typical width of a bicycle; however, the recommended width is 10’. Crossing islands should be aligned directly with marked crosswalks and provide an accessible route of travel (per current accessibility guidelines).

Current Use in the City of San Antonio: Crossing islands are often installed near schools and occasionally in other locations.

Recommendations for the City of San Antonio: Crossing islands should be considered with other crossing treatments such as high visibility crosswalks, crosswalk warning signs, rectangular rapid flash beacons, or pedestrian signals, where appropriate, and at the following types of locations:

- Multi-lane roads with medians or center turn lanes or where lane/road diets are possible
- Near schools, community facilities, transit stops, and other uses that generate pedestrian traffic

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<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
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<tbody>
<tr>
<td>At marked crosswalks</td>
<td>PedSafe – Crossing Islands</td>
<td>Portland, OR</td>
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<tr>
<td>CRF=46%</td>
<td>City of Seattle – Tools to Improve Marked Crosswalks</td>
<td>Cathedral City, CA</td>
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<td>At unmarked crosswalks</td>
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<td>Las Vegas, NV</td>
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<td>CRF= 60%</td>
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Crossing island concept

Crossing islands allow a two stage crossing of roadway.
### Location # 1

S New Braunfels Ave – east side, south of Koehler Ct

Also see “Road Diet” countermeasure profile

Crossing island at this location would:
- Improve safety for pedestrians accessing Charles C Ball Elementary and Connell Middle School by providing a two-stage crossing and traffic calming benefits

### Location # 2

Fredericksburg Rd near Santa Anna (also near Gardina St)

Also see the “Marked Crosswalk Location” and “Crossing Near Transit Stop” countermeasure profile

A crossing island at this location would:
- Improve safety for pedestrians wanting to access transit stop and businesses on east side of road by creating a two-stage crossing and traffic calming benefits

### Location # 3

Commerce St at Lincoln Center/Park

Also see “Marked Crosswalk Location” countermeasure profile

A marked crosswalk and crossing island at this location would:
- Improve the safety of pedestrians accessing Lincoln Park from neighborhoods to the south and the bus stop

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*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
MARKED CROSSWALK ALIGNMENT

Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help delineate where vehicles are to stop so as not to interfere with the pedestrian crossing. Typically it is best to align the crosswalk at the intersection rather than set it back from the intersection so that pedestrians in the crosswalk are more visible to turning vehicles. Pedestrian convenience must also be kept in mind when aligning the crosswalk. Pedestrians are generally reluctant to travel out of their way when crossing the street even if it is a short distance and will choose their path of travel based on directness and convenience. It is important to align marked crosswalks with the path of travel, which typically means aligning the crosswalk with the sidewalk on either side of the street. Crosswalks should also align with, and fully contain, the curb ramp at all curb ramp locations. Skewed crossings are less desirable; they often increase crossing distance and pedestrian’s exposure to traffic. Tighter curb return radii at intersections often make it easier to align crosswalks with the path of travel and curb ramps.

Current Use in the City of San Antonio/Bexar County Region: San Antonio/Bexar County Region routinely installs crosswalks at signalized crossings, and in most cases the crosswalks are properly aligned with curb ramps.

Recommendations for the City of San Antonio/Bexar County Region: Explore policies to specify that crosswalks should align with curb ramps, which should generally be aligned with the path of travel, i.e. not offset any considerable distance from the approaching sidewalk.

- Review high crash intersections to ensure that crosswalks alignment is not encouraging pedestrians to stray out of the crosswalk area positioning them where motorists are not expecting them.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<td>MUTCD—Section 3B.17 Crosswalk Markings</td>
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<td>PedSafe—Marked Crosswalks and Enhancements</td>
<td>Connecticut Avenue Pedestrian Safety Action, Pedestrian Safety Audit, Washington, DC</td>
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<td>FHWA—Designing Crosswalks and Trails for Access</td>
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</tbody>
</table>

A well-aligned, marked crosswalk in San Antonio.
### Location # 1

**Eagleland Dr and E Guenther St**

Aligning the crosswalk with the path of travel would:
- Improve pedestrian compliance with crossing the roadway within crosswalk area

### Location # 2

**Navarro St at Houston St**

There are numerous locations in the downtown core where the edge of crosswalk nearest the intersection could be moved closer to the intersection. This would:
- Improve pedestrian compliance with crossing the roadway within crosswalk area
- Reduce ability of motor vehicles to accelerate through turning movement before encountering crosswalk

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MEDIANS

Medians are raised barriers in the center portion of the roadway used to manage vehicle access to adjacent land uses and associated parking in order to reduce potential conflicts associated with turning vehicles. Medians can also provide a refuge for pedestrians at crossing locations (see “Crossing Island” counter measure). 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. Desired turning movements, however, need to be adequately provided so that motorists are not forced to travel on inappropriate routes, such as residential streets or make unsafe U-turns. Continuous medians may not be the most appropriate treatment in every situation; separating opposing traffic flow and eliminating left-turn friction can increase traffic speeds by decreasing the perceived friction of the roadway. Medians may also take up space that can be better used for wider sidewalks, bicycle lanes, sidewalk buffers, or on-street parking and can cause problems for emergency vehicles. In some environments, medians can be constructed in sections, creating an intermittent rather than continuous median. Signalized intersections with medians should be designed to allow pedestrians to cross the entire roadway during a single signal cycle.

Current Use in the City of San Antonio/Bexar County Region: Medians can be found throughout the region. Recommendations for the City of San Antonio/Bexar County Region: Install continuous or intermittent medians as part of a pedestrian safety and access management strategy for a corridor with high traffic volumes and high number of pedestrian crashes. The following factors should be considered when installing medians:

- Sidewalks should not be reduced in width or bike lanes eliminated or precluded in order to provide space for a median.
- The potential for installing pervious pavement, street trees, and/or drought resistant plant materials.
- Establishing maintenance responsibilities.

### Crash Reduction Factors

<table>
<thead>
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<th>CRF = 25%</th>
<th>Reference/Guidance</th>
<th>Examples</th>
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<td>PedSafe - Raised Medians</td>
<td>PedSafe, Solutions from Public Input, Grand Junction, CO</td>
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<td>FHWA—Designing Sidewalks and Trails for Access, Chapter 8, Section 7</td>
<td>PedSafe, High Volume Pedestrian Crossings, Las Vegas, NV</td>
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<td></td>
<td>City of Seattle – Tools to Improve Marked Crosswalks</td>
<td>PedSafe, Bridgeport Way Corridor Improvements, University Place, WA</td>
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Example of a median installed within a center turn lane and with an integrated pedestrian crossing.  
Example of an intermittent median with a pedestrian crossing island on a 4-lane road.
Chapter 4: Pedestrian Safety Action Plan Recommendations

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<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</thead>
</table>
| Fredericksburg Rd between I-410 and Vance Jackson Rd | ![Location # 1 Photo](image1.png) | This segment of Fredericksburg Rd has long blocks and a number of commercial and other uses that generate pedestrian traffic. Installing a median would provide:  
- Opportunities for mid-block crossing islands  
- A reduction in conflicts involving left-turning vehicles |
| Also see “Driveway Consolidation” countermeasure and other Fredericksburg Rd corridor recommendations |

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<thead>
<tr>
<th>Location # 2</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
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</table>
| W.W. White Rd between Lavender Ln and Lord Rd (at HEB) | ![Location # 2 Photo](image2.png) | The distance between marked crosswalks on this segment of W.W. White road is approximately a quarter mile. Given the presence of transit stops and retail land uses there are likely many pedestrians crossing the roadway at unmarked locations. Installing a median would:  
- Provide an opportunity to install a mid-block marked crosswalk with crossing island  
- Potentially have a traffic calming effect  
- Reduce number of pedestrians darting across street mid-block |

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements.
ILLUMINATION AT PEDESTRIAN CROSSINGS

Good quality and placement of street lighting can enhance an environment as well as increase comfort and safety. Pedestrians often assume that motorists can see them at night; they are deceived by their own ability to see the oncoming headlights. Without sufficient overhead lighting, motorists may not be able to see pedestrians in time to stop. Crosswalks at un-signalized, and especially at uncontrolled locations, present special cases where pedestrians may be unexpected and higher levels of lighting are critical. A 2008 research report by FHWA Information Report on Lighting Design for Midblock Crosswalks (FHWA-HRT-08-053) recommends that white light be used at intersections to improve pedestrian perception and sense of safety and that light poles be located on the approach side of the crosswalk to enhance visibility of pedestrians by oncoming vehicles. The amount of light provided at an intersection should be proportional to the classification of the intersecting routes and equal to the sum of the values used for each separate street.

Current Use in the City of San Antonio/Bexar County Region: Standard intersection lighting is designed to meet pedestrian lighting requirements along corridors.

Recommendations for the City of San Antonio/Bexar County Region: Priority should be given to providing enhanced pedestrian lighting at intersections. A disproportional number of pedestrian crashes occur during dusk/dawn and at night. With a 42 to 54 percent crash reduction factor, this countermeasure should be pursued wherever there is a pedestrian crash problem.

- Use state-of-the art technology when appropriate to provide effective, energy efficient lighting that minimizes light trespass and is dark sky compliant.
- Target areas with higher pedestrian crash rates and volumes of pedestrian traffic, e.g. near schools and community facilities, commercial areas, major transit routes, and transfer points.

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<tr>
<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>At intersections CRF fatal = 78%</td>
<td>PedSafe- Roadway Lighting Improvements</td>
<td>See PedSafe – Roadway Lighting Improvements</td>
</tr>
<tr>
<td>At intersections CRF injury = 42%</td>
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<td></td>
</tr>
<tr>
<td>At midblock crossings CRF = 42%</td>
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</table>

Diagram of pedestrian lighting at intersections. Source: FHWA

Crosswalk with adequate illumination.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location Photo](https://example.com/location1.jpg) | Enhanced night time illumination at this mid-block crossing would:  
- Improve the visibility of pedestrians crossing mid-block  
- Provide direct benefits to seniors and children present in the area |
| Fair Ave (mid-block crossing with flashing signal just west of Nopal St) | ![Location Photo](https://example.com/location1.jpg) | **Location # 2** | ![Location Photo](https://example.com/location2.jpg) | Enhanced night time illumination at this intersection would:  
- Improve the visibility of pedestrians crossing the street and using the transit stop |
| Rigsby Ave and S Gevers St | ![Location Photo](https://example.com/location2.jpg) | | |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
# ILLUMINATION ALONG CORRIDORS

Pedestrians often assume that motorists can see them at night; they are deceived by their own ability to see the oncoming headlights. Illumination along corridors that is intended to greatly increase motorists’ ability to see pedestrians walking along the road at night is particularly important on arterial streets where there is transit service or land uses that generate pedestrians during evening hours. Without sufficient overhead lighting, motorists may not be able to see pedestrians in time to stop. In commercial areas with night time pedestrian activity, streetlights and building lights can enhance the aesthetics of the area and the visibility of pedestrians. In commercial areas or in downtown areas, specialty pedestrian-level lighting may be placed over the sidewalks to provide added pedestrian comfort, security, and safety. It is best to place light poles along both sides of arterial streets in opposing pairs in order to provide a consistent level of lighting along the roadway, but lights may also be staggered. Staggered arrangement of light poles provides a less formal look that may allow for fewer lights, while paired alignment of light poles across a street provides a formal look that reinforces the direction of travel. Paired alignment lighting is the preferred approach along wide arterial roadways because it enables drivers to better see pedestrians who may decide to cross at non-intersection locations.

**Current Use in the City of San Antonio/Bexar County Region:** There are a limited number of locations where enhanced corridor illumination has been implemented.

**Recommendations for the City of San Antonio/Bexar County Region:** While implementation and maintenance costs can be high, it may be desirable to have enhanced lighting in some areas. When used, focus on the following:

- Use state-of-the art technology when appropriate to provide effective, energy efficient lighting that is dark sky compliant and minimizes light trespass
- Target areas with higher volumes of pedestrian traffic, e.g. near schools and community facilities, commercial areas, major transit routes, and transfer points
- Consider targeting areas where personal security is an issue

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>PedSafe- Roadway Lighting Improvements</td>
<td>PedSafe- Roadway Lighting Improvements</td>
</tr>
</tbody>
</table>

Pedestrian scale lighting along the roadway.

Illumination along the roadway.
### Location # 1

Fair Ave (mid-block crossing with flashing signal just west of Nopal St)

Enhanced night time illumination along this corridor and at this mid-block crossing would:
- Improve the visibility of pedestrians crossing mid-block
- Provide direct benefits to seniors and children present in the area and accessing transit

### Location # 2

Rigsby Ave and S Gevers St

Enhanced night time illumination along this corridor at this intersection would:
- Improve the visibility of pedestrians walking along, crossing the street and/or using the transit stop

---

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CURB RAMPS

A curb ramp is a short ramp that provides a smooth transition from the sidewalk to the street at intersections and mid-block crossings, thus facilitating street crossing for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs. Proper curb ramp placement and design ensures that pedestrians cross in crosswalks, close to the intersection where drivers can see them, and without undue delay. Poorly placed or oriented ramps may force wheelchair users to make long detours and they may not cross in the allotted time at a signalized intersection or they may be crossing outside the crosswalk lines where drivers do not expect them. Curb ramps should be aligned with the crosswalk direction of travel; this is typically achieved with two ramps at each corner. Ramps (flares not included) must be wholly contained within the marked crosswalk. Curb ramps should have a slope of no more than 1:12 (8.33% grade), a minimum 2 foot warning strip and landings at the top and bottom of the ramp. While curb ramps are needed for use on all types of streets, priority locations are in downtown areas and at crossings near transit stops, schools, parks, medical facilities, shopping areas, and residences with people who use wheelchairs and other mobility devices.

Current Use in the City of San Antonio/Bexar County Region: Curb ramps are commonly found at intersections throughout the region. Recently installed curb ramps are typically perpendicular to the roadway, aligned well with crosswalks, and meet ADA guidelines. There are older curb ramps that do not meet current standards and guidelines.

Recommendations for the City of San Antonio/Bexar County Region: Install two ramps per corner wherever possible. Replace out of date ramps whenever a roadway is reconstructed. Proactively install new ramps in locations where there are high numbers of people with disabilities.

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<thead>
<tr>
<th>Crash Reduction Factors</th>
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</tr>
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<tbody>
<tr>
<td>Research incomplete</td>
<td>• PedSafe – Curb Ramps</td>
<td>• Austin, TX</td>
</tr>
<tr>
<td></td>
<td>• FHWA – ADA Memo</td>
<td>• Albany, NY</td>
</tr>
<tr>
<td></td>
<td>• Access Board Public Rights of Way</td>
<td></td>
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</tbody>
</table>

Tight curb radii better allow for two parallel ramps per corner (8 total for intersection). The curb ramp must be fully contained within the crosswalk.
## Pedestrian Safety Action Plan Recommendations

<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Image](image1.png) | Curb ramp should be redesigned to:  
- Provide additional space for pedestrians, particularly those in wheelchairs, waiting to cross the street |
| Henderson Pass at Thousand Oaks Dr – southwest corner | ![Image](image2.png) | Providing a curb ramp at this location would:  
- Allow pedestrians using wheelchairs, strollers, handcarts, etc. to safely enter the crosswalk |
| **Location # 2** | ![Image](image3.png) | Providing a curb ramp at this location would:  
- Allow pedestrians using wheelchairs, strollers, handcarts, etc. to safely enter the crosswalk  
- Improve neighborhood access to Riverwalk Trail (bridge crossing is within 150’) and Brakenridge High School |
| Perrin Beitel Rd at Perrin Central Blvd | ![Image](image4.png) | Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements |
CURB EXTENSION/BULB-OUT

Curb extensions minimize the “exposure time” of pedestrians crossing the street by reducing the total crossing distance. They also increase visibility between roadway users; the waiting pedestrian can better see approaching traffic and drivers can better see pedestrians waiting to cross the road as their view is not obstructed by parked cars. Curb extensions may be installed at intersections as well as at mid-block crossings on roadways with well-utilized on-street parking, and should generally not extend more than six feet from the curb to avoid conflicts with bicycles or motorists. By constricting the roadway and reducing curb radii (at intersections) curb extensions are effective at slowing through and turning vehicles. Installed mid-block, curb extensions can break up the visual continuity and narrow the street. Curb extensions may also provide an opportunity to plant a street tree where the lack of a planting strip between the sidewalk and curb otherwise precludes street trees. Plantings, however, should not obstruct sightlines. Curb extensions are also commonly referred to as curb bulbs or bulb-outs, and when used at a bus stop they are sometimes called “bus bulbs.”

Current Use in the City of San Antonio/Bexar County Region: Curb extensions are used on many arterial streets, both mid-block and at intersections.

Recommendations for the City of San Antonio/Bexar County Region: Continue to install curb extensions with a focus on the following types of locations:
- Marked crosswalks that do not have positive traffic control (no signal or stop sign), including both intersection and mid-block locations
- Residential streets where there are high speed cars
- Install where on-street parking is present on downtown streets

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</tr>
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<tbody>
<tr>
<td>Research incomplete</td>
<td>Walkinginfo.org - The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior</td>
<td>PedSafe, Granite Street Traffic Calming, Cambridge, MA</td>
</tr>
<tr>
<td></td>
<td>Oregon DOT - Pedestrian Safety Impacts of Curb Extensions: A Case Study</td>
<td>NYC DOT – Pedestrian Projects</td>
</tr>
<tr>
<td></td>
<td>Walkinginfo.org – Curb Extensions</td>
<td>FHWA, Bulb-outs in Davis, CA</td>
</tr>
</tbody>
</table>

Curb extensions allow pedestrians to see around parked cars and they reduce the time the pedestrian is in the crosswalk.

Curb extensions (at intersections or mid-block) narrow the roadway, provide effective traffic calming, shorten crossing distances for pedestrians, and provide a more visible place to install a crossing sign.
<table>
<thead>
<tr>
<th>Location</th>
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<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Location # 1| ![Location Photo](S Alamo St and S Cedar St) | Providing curb extensions at this location would:  
- Reduce exposure time for pedestrians crossing the street  
- Calm traffic within an area with high pedestrian volumes, i.e. school  
- Provide for a more conspicuous placement of crossing warning signs |

**Location # 2**

W Theo Ave and Buffalo St (south side)

Providing curb extensions at this location would:  
- Reduce exposure time for pedestrians crossing the street  
- Provide for a more conspicuous placement of crossing warning signs

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
## CURB RADIUS

A large corner curb radius typically results in high-speed turning movements by motorists, which may result in increased risk of pedestrians being struck by right-turning vehicles. Reconstructing the curb radius to create a sharper turn reduces turning speeds, shortens the crossing distance for pedestrians, and also improves sight distance between pedestrians and motorists. Other benefits of smaller curb radii include the ability to increase the size of pedestrian waiting areas, greater flexibility in the placement of curb ramps, and improved signal timing by reducing pedestrian crossing distances. The volume of large vehicles such as buses, delivery trucks, and fire trucks needs to be considered since these vehicles may ride over the curb, placing pedestrians in danger if the curb radius is made too small. Where there is a parking and/or a bicycle lane, curb radii can be even tighter because the vehicles will have more room (greater effective radius) to negotiate the turn. A greater effective turning radius may also be achieved by placing the stop bar further back on the opposing lanes on the destination street, thus allowing larger vehicles to swing into the opposing lane during the turning maneuver. An appropriate turning radius in an urban context is 15’ to 20’, and 25’ to 30’ for arterial streets with a substantial volume of turning buses and/or trucks.

### Current Use in the City of San Antonio/Bexar County Region:
Many intersections in the San Antonio region have small curb radii, especially in the older neighborhoods and Downtown San Antonio.

### Recommendations for the City of San Antonio/Bexar County Region:
Consider the following when constructing new intersections or improving pedestrian safety at high crash intersections:

- Avoid designing curb radii based on the largest design vehicle by considering the effective turning radius, which may include a parking lane, bicycle lane, and opposing lanes on the destination street.
- Place the stop bar on the destination street further back to enable large vehicles to make the turn by swinging into the opposing lane.
- Tighten the curb radius on the obtuse corners of skewed intersections.
- Consider varying the curb return radius over the length of the turn so that the radius is smaller as vehicles approach a crosswalk and larger as they make the turn.

### Crash Reduction Factors

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>PedSafe — Curb Radius Reduction</td>
<td>PedSafe, Leland Street Redesign, Bethesda MA</td>
</tr>
<tr>
<td></td>
<td>FHWA - Signalized Intersections: Informational Guide, 9.1.1, Reduce Curb Radius</td>
<td>BIKE SAFE:#20 -Seattle WA</td>
</tr>
</tbody>
</table>

The effective radius calculation should include the width of parking lanes and bicycle lanes on both streets.

Large turning radii increase pedestrian crossing distance and enable higher speed motor vehicle turns.
<table>
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<tr>
<th>Location</th>
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</thead>
</table>
| **Location # 1** | | Reducing the curb radius at this location would:  
- Reduce the crossing distance for pedestrians  
- Reduce the speed of vehicles turning from Jackson-Keller Rd on to Vance Jackson Rd. |
| Vance Jackson Rd at Jackson-Keller Rd (northeast corner) | ![Location Photo](image1.jpg) |  |

| Location # 2 | | Consider tightening curb radii by removing right-turn slip lanes on all intersection approaches. This action would:  
- Reduce speeds of turning vehicles  
- Improve safety of transit users and any children that may be walking to Davis Middle School  
- If removing right-turn slip lanes is not possible, then directional islands should be redesigned (see countermeasure profile on right-turn slip lanes and directional island design) |
| W.W. White at E Houston St | ![Location Photo](image2.jpg) |  |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
### SKEWED INTERSECTION

Skewed intersections occur when streets cross at angles other than 90 degrees and can create complicated scenarios for both pedestrians and drivers. Skewed intersections should be avoided whenever possible during the planning stages of a project development process. When skewed intersections are unavoidable, the intersection should be designed so that the angle between intersecting streets is as close to 90 degrees as possible. In addition, if major alterations are being done to an existing skewed intersection, transportation agencies should consider whether it is possible to reconfigure the intersection so that the crossings are more perpendicular. Strategies for improving pedestrian safety at skewed intersection crossings include installing curb ramps perpendicular to the curb, providing longer crossing times, providing marked crosswalks, tightening curb radii, adding medians or channelization islands to reduce crossing distance, and in some cases, intersection guide strips for pedestrians with vision impairments. Moving crosswalks back from the intersection to shorten crossing distances is generally not a preferred strategy because it is counter to pedestrian or motorist expectations, and it can create problems for visually impaired pedestrians.

**Current Use in the City of San Antonio/Bexar County Region:** While there are skewed intersections throughout the region, there are fewer in newly developed areas and design guidelines and policies discourage them.

**Recommendations for the City of San Antonio/Bexar County Region:** Straightening skewed approaches should be a priority for all streets since it consistently reduces all types of crashes. However, it is also recognized that this can be relatively expensive. Policy objectives that should be pursued include the following:

- Systematically identify and review skewed intersections; prioritize which ones should be straightened based on pedestrian use and crash levels.
- Review all public and private projects for opportunities to straighten skewed intersections.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Incomplete</td>
<td>- FHWA, Designing Sidewalks and Trails for Access</td>
<td>- BikeSafe case study – Portland, OR</td>
</tr>
</tbody>
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Straightening skewed approaches creates better visibility for drivers and reduces pedestrian crossing distances.

An island is used to create a 90 degree intersection and 2-stage pedestrian crossing.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
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</thead>
</table>
| **Location # 1** | | Moving the curb to eliminate the obtuse angle would result in:  
  ▪ Intersecting streets closer to 90 degrees  
  ▪ Slower right turns  
  ▪ Shorter crossing distance for pedestrians |
| Surrey Ave at Nogalitos St | | |
| **Location # 2** | | Both W Gramercy Pl and S Zarzamora meet Fredericksburg Rd at skewed angles. Reconstructing entire intersection, and possibly closing the W Gramercy approach, would result in:  
  ▪ Intersecting streets closer to 90 degrees  
  ▪ Slower right turns  
  ▪ Shorter crossing distance for pedestrians |
| Fredericksburg Rd at S Zarzamora and W Gramercy Pl | | |
| **Location # 3** | | Moving the curb to eliminate the obtuse angle would result in:  
  ▪ Intersecting streets closer to 90 degrees  
  ▪ Slower right turns  
  ▪ Shorter crossing distance for pedestrians |
| Austin Hwy and Eisenhauer Rd | | |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
RIGHT TURN SLIP LANE WITH DIRECTIONAL ISLAND

Installing directional islands (also known as pork chops) in right-turn slip lanes can shorten crossing distances, reduce pedestrian exposure, and can improve overall signal timing of the intersection. The island enables pedestrians and drivers to negotiate one conflict point separately from others. The island should have the longer tail pointing upstream to the approaching right-turn driver, and be designed so drivers approach the pedestrian crossing at a nearly 90-degree angle. The crosswalk is placed one car length back from the intersecting roadway so the driver can move forward and wait for a gap in oncoming traffic once the pedestrian conflict has been resolved. This design puts the crosswalk in an area where the driver is still looking ahead. Older designs place the crosswalk too far down stream, where the driver is already looking left for a gap in the traffic. Since traffic signals are timed based on the shorter crossing, the pedestrian crossing phase has a much smaller influence on the overall timing of the signal.

Current Use in the City of San Antonio/Bexar County Region: Right turn slip lanes are used in a number of locations throughout the region. However, in many cases the raised directional island component of the slip lane is undersized and lacking a long tail which results in vehicles not approaching the crosswalk at close to 90 degrees and inadequate room for pedestrians. Some of the newer installations are closer to “best practice” design.

Recommendations for the City of San Antonio/Bexar County Region: Use this treatment sparingly. When used, focus on the following types of locations:
- Intersections with high volumes of right-turning buses and trucks (e.g. bus and/or truck route)
- Intersections that require a curb radius of more than 30 feet and have high pedestrian volumes
- Obtuse corners of skewed intersections

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</thead>
<tbody>
<tr>
<td>Research Incomplete</td>
<td>PedSafe — Improved Right Turn Slip Lane Design</td>
<td>PedSafe - St. Petersburg, FL</td>
</tr>
</tbody>
</table>

Diagram of a pedestrian slip lane with directional island.

An example of a directional island that provides adequate space for crossing pedestrians and accommodates wheelchairs.
<table>
<thead>
<tr>
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<th>Issue/Condition Addressed by Countermeasure</th>
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</thead>
</table>
| Location # 1  | ![Location # 1](image1.png) | Update the existing slip lane and directional island in order to provide:  
- Sufficient space for waiting pedestrians, and allow wheelchair access  
- A long tail directing right-turning vehicles to approach the crosswalk at close to 90 degrees  
- Alternatively, consider reducing the curb radius by eliminating right-turn slip lane. |
| S St. Marys St and S Alamo St |                     |                                             |
| Location # 2  | ![Location # 2](image2.png) | Update the existing slip lane and directional island in order to:  
- Improve wheelchair access  
- Direct right-turning vehicles to approach the crosswalk at close to 90 degrees  
- Alternatively, consider reducing the curb radius by eliminating right-turn slip lane. |
| S W.W. White Rd and E E Houston St |                     |                                             |

Also see “curb radius” countermeasure profile

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements.
Current Use in the City of San Antonio/Bexar County Region: The San Antonio/Bexar County region has a fairly complete sidewalk network; however, in many areas sidewalks are relatively narrow, are not buffered from traffic, have obstructions, or are in disrepair. While there are sidewalks along most streets in San Antonio there are many areas where short gaps exist. In other areas of Bexar County there are more significant gaps in the sidewalk network.

Recommendations for the City of San Antonio/Bexar County Region: The following should be focus areas for expanding/repairing the sidewalk network:

- Create an annual program that applies a systematic approach to retrofitting deficient sidewalk locations; prioritization should be given to filling gaps connecting transit stops, schools, parks, and other key destinations.
- Ensure that sidewalk widths are proportional to the demand for pedestrian activity; areas with higher levels of pedestrian activity, e.g. transit stops, commercial areas should have wider sidewalks.
- Ensure that development codes require minimum 5-foot sidewalks as part of new development and major re-development and that there are provisions requiring wider sidewalks where higher concentrations of pedestrians are expected.
- Discontinue the construction of rolled curbs by making changes to design standards documents.

Crash Reduction Factors | Reference/Guidance | Examples
--- | --- | ---
CRF = 88% FHWA RD-01-101 | PedSafe —Sidewalks and Walkways | PedSafe, 54th Street Corridor Improvements, Boulder, CO
AASHTO—Guide for the Planning, Design, and Operation of Pedestrian Facilities, Section 3.2 | | PedSafe, Bridgeport Way Corridor Improvements, University Place, WA
FHWA – Designing Sidewalks and Trails for Access | | 
City of Seattle—Sidewalk Prioritization Policy | | 

A minimum five feet clear width is necessary for two people to walk comfortably.

Sidewalks in commercial areas should provide a minimum 5 foot wide path clear of obstructions.
### Location # 1

**S New Braunfels Ave**  
– east and west sides,  
south of Koehler Ct

Providing sidewalks at this location would:  
- Improve safety of pedestrians accessing Charles C Ball Elementary and Connell Middle School

### Location # 2

**N Zarzamora**  
– east side just north of W French Pl

Providing sidewalks at this location would:  
- Improve safety for pedestrians accessing transit and businesses

### Location # 3

**Fredericksburg Rd**  
between Crossroads Blvd and Balcones Heights Rd (west side)

Providing sidewalks at this location would:  
- Provide improved access to the bus stop  
- Improve safety for pedestrians accessing businesses

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SIDEWALK BUFFERS

Buffers between pedestrians and motor vehicle traffic create greater levels of comfort, security, and safety to pedestrians. A buffer zone of 4’ to 6’ is desirable and should be provided to separate pedestrians from the street. The buffer zone will vary according to the street type; in downtown or commercial districts, a street furniture zone (street signs, trees, newspaper boxes, trash receptacles, etc.) is usually appropriate. In more suburban or rural areas, a landscape strip is generally most suitable. Where sidewalk buffers cannot be provided due to right-of-way constraints, parked cars and/or bicycle lanes can provide an acceptable buffer zone. In addition to buffering pedestrians from traffic, sidewalk buffers provide a space for poles, signs, and other objects that may otherwise be obstructions within the sidewalk; and they protect pedestrians from splashing caused by moving vehicles. Buffers also provide the added space to help make curb ramps and landings accessible. With a landscaped buffer between the sidewalk and the street, care must be taken to ensure that bus stops are fully accessible to wheelchair users and have connections to the sidewalk.

Current Use in the City of San Antonio/Bexar County Region: Many sidewalks are directly adjacent to the roadway or lack adequate buffers. There are, however, many examples of sidewalks with buffers.

Recommendations for the City of San Antonio/Bexar County Region: Providing buffers should be a priority for all sidewalks.
- Streets that do not have adequate sidewalk buffers should be targeted for lane diets, road diets, bicycle lanes, and sidewalk widening in order to provide greater separation between the sidewalk and traffic lanes.

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<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>Research incomplete. See “Sidewalk” countermeasure</td>
<td>PedSafe- Sidewalks and Walkways</td>
<td>PedSafe-Hendersonville, NC</td>
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</table>

On-street parking and/or bike lanes can help buffer pedestrians from traffic. A buffer zone provides space for street trees and other vegetation, enhancing the comfort of sidewalk.
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<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</thead>
</table>
| **Location # 1** | ![Location # 1 Photo](image) | The addition of a sidewalk buffer would provide:  
- A more comfortable and safer pedestrian experience  
- A potential reduction in vehicle speeds by visually constricting the roadway |
| S St Mary’s St – west side, just north of S Alamo St | ![Location # 1 Photo](image) |  |
| **Location # 2** | ![Location # 2 Photo](image) | Providing a sidewalk buffer would provide:  
- A more comfortable and safer pedestrian experience  
- A potential reduction in vehicle speeds by visually constricting the roadway |
| Callaghan Rd – south side just east of Fredericksburg Rd | ![Location # 2 Photo](image) |  |
| **Location # 3** | ![Location # 3 Photo](image) | Providing a sidewalk buffer would provide:  
- A more comfortable and safer pedestrian experience  
- A potential reduction in vehicle speeds by visually constricting the roadway |
| Crestway Dr – south side just east of Millers Ridge | ![Location # 3 Photo](image) |  |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
CLEARANCE (FROM OBSTRUCTIONS)

A sidewalk with a clear width of at least 5 feet and a clear height of at least 8 feet ensures access for all sidewalk travelers. The clear width area of a sidewalk (sometimes referred to as the pedestrian zone) should be clear of obstructions such as poles, fire hydrants, street furniture, signposts, newspaper racks and other obstacles that could block the path, obscure a driver’s view or pedestrian visibility, or become a tripping hazard. Where it is cost prohibitive to remove obstructions at spot locations, such as utility poles, then the ADA minimum standard of 3 foot clearance should be provided around the obstruction. Temporary construction and other portable signs should never obstruct a sidewalk. Where sidewalks must be temporarily obstructed due to construction activity or other reasons, a clearly marked alternative route that does not take pedestrians too far out of direction should be established.

Current Use in the City of San Antonio/Bexar County Region: There are many locations where obstructions (utility poles, traffic signal poles, transit shelters, and benches) are found in sidewalks throughout the region, but particularly within the City of San Antonio, largely due to constrained right-of-way. In some cases, additional sidewalk clearance has been provided around obstructions (see photograph below).

Recommendations for the City of San Antonio/Bexar County Region: Clearing sidewalks of obstructions or providing additional sidewalk width around obstructions should be a high priority. Policy objectives that should be pursued include the following:

- Get buy-in and coordinate with CPS Energy as well as other utilities and agencies (including TxDOT) to systematically review and remove obstructions or provide additional sidewalk width around obstructions at spot locations that do not meet ADA minimums; agencies and utilities should agree that new poles and control boxes will not be placed in the pedestrian zone or in such a way as to cause sight obstructions at intersections.
- Explore various strategies, including negotiating easements with private property owners, reducing roadway widths (and widening sidewalks) during road reconstruction, and undergrounding overhead utilities in conjunction with major developments.
- Enforce rules that prevent temporary construction signs from being placed in the pedestrian zone.

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<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>PedSafe: Recommended Guidelines/ Priorities for Sidewalks and Walkways</td>
<td>PBIC CASE STUDY, Local Street Improvements Make Walking Safer and Easier, Seattle, WA</td>
</tr>
</tbody>
</table>

In commercial areas, a minimum 5’ path should be clear of obstructions such as sandwich boards and street furniture.

Where obstructions in the sidewalk cannot be removed, additional sidewalk width should be provided.
### Location # 1

S Flores St – east side, just north of SW Military Rd

Removing/relocating obstructions to provide a minimum 5’ clear path would:
- Provide improved access for people in wheelchairs
- Improve access to the transit stop

### Location # 2

Thousand Oaks Dr – south side, just east of Henderson Pass

Removing/relocating obstructions to provide a minimum 5’ clear path would:
- Provide improved access for people in wheelchairs
- Address potential safety issue with wheelchair users entering street when bypassing obstruction on street side

### Location # 3

Henderson Pass – east side, just south of Thousand Oaks Dr

Removing/relocating obstructions to provide a minimum 5’ clear path would:
- Provide improved access for people in wheelchairs
- Improve sight lines for motorists entering/Exiting driveway

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
Current Use in the City of San Antonio/Bexar County Region: Many streets within the San Antonio/Bexar County region lack street trees. In many cases this is due to insufficient right-of-way; in other cases there is ample room and excellent opportunities to plant trees.

Recommendations for the City of San Antonio/Bexar County Region: Providing street trees should be a priority for all streets in the region in order to improve pedestrian comfort and environmental quality. Policy objectives that should be pursued include the following:

- Consider street trees as part of all street design projects including annual repaving projects.
- Require all new private development to provide streets trees as a component of street frontage improvements.
- Target streets with no sidewalk buffers and low parking utilization and/or excess vehicle capacity to create bulb outs with tree wells between travel lanes and the sidewalk.
- Review applicable tree planting policy and standards to ensure that it addresses sight lines, personal security and visual access to transit stops.

### Crash Reduction Factors

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Incomplete</td>
<td>▪ ITE Journal on the Web—The Street Tree Effect on Driver Safety</td>
<td>▪ Denver Avenue Streetscape Design Project, Streetscape Case Studies</td>
</tr>
<tr>
<td></td>
<td>▪ TRB, NCHRP 612: Safe and Aesthetic Design of Urban Roadside Treatments</td>
<td></td>
</tr>
</tbody>
</table>

Street trees were planted as part of a corridor enhancement project in Shoreline, WA.
Chapter 4: Pedestrian Safety Action Plan Recommendations

<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Location # 1 | Perrin Beitel Rd – west side, south of Perrin Central Blvd | Providing street trees adjacent to the sidewalk at this location would provide:  
  ▪ Shade and improve pedestrian comfort  
  ▪ A reduction in vehicle speeds by visually constricting roadway  
  Care should be taken in selecting an appropriate species that will not interfere with overhead utilities. |

| Location # 2 | Thousand Oaks Dr – south side, east of Tavern Oaks | Planting street trees adjacent to the sidewalk or relocating sidewalk to provide a planted buffer (see “Sidewalk Buffer” countermeasure) at this location would provide:  
  ▪ Shade and improve pedestrian comfort  
  ▪ A reduction in vehicle speeds by visually constricting roadway |

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SEPARATION OF SIDEWALKS FROM OFF-STREET PARKING

Buffers along property lines to separate parking areas from the sidewalk provide added safety and comfort for pedestrians walking along the road. A variety of treatments may be used depending on available space and cost factors. Low cost treatments include painting a solid white line that demarcates the sidewalk from the parking area. Installing an extruded curb or pre-cast wheel stops along the edge of the sidewalk is a more effective, if higher cost, treatment. A railing, bollards, or landscaped buffer are effective treatments that can also enhance aesthetics. In some cases, reorienting parking to be parallel to the sidewalk rather than perpendicular may provide additional room to implement some of these treatments; however, this may reduce off-street parking supply. In this case, on-street parking should be considered in situations where additional parking is needed to meet demand.

Current Use in the City of San Antonio/Bexar County Region: In many commercial areas within the region, the sidewalk is not delineated from the parking area or driveway which creates an ambiguous and uncomfortable pedestrian condition. Some area development codes, however, require a buffer be provided between the sidewalk and adjacent parking.

Recommendations for the City of San Antonio/Bexar County Region: Revising development codes to prohibit parking from being placed between building and the street will improve the comfort and safety of the sidewalk. For existing development, work with commercial property owners and businesses to implement the following treatments:

- Where parking supply is fully utilized and there are no opportunities for providing on-street parking within close proximity of the business, focus on better defining the sidewalk through use of paint and other markings.
- Where appropriate, install wheel stops or extruded curb along the edge of the sidewalk area to prevent vehicles from intruding on sidewalk area.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<tbody>
<tr>
<td>Research incomplete</td>
<td>None</td>
<td>Aurora Corridor Project – Shoreline, WA</td>
</tr>
</tbody>
</table>

The sidewalk is clearly delineated from adjacent parking using distinct materials and a railing.

Motor vehicles are physically separated from the sidewalk.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location Photo](image1) | Better defining the sidewalk using including paint or reorienting parking and incorporating wheel stops, extruded curb, or other kind of barrier to separate parking would provide:  
- A reduction in conflicts between pedestrians and vehicles entering/exiting parking  
- A reduction in encroachment by parked vehicles into sidewalk area |
| S St Mary’s St – west side, north of Perieda St | ![Location Photo](image2) |  |
| **Location # 2** | ![Location Photo](image3) | Better defining the sidewalk using including paint or reorienting parking and incorporating wheel stops, extruded curb, or other kind of barrier to separate parking would provide:  
- A reduction in conflicts between pedestrians and vehicles entering/exiting parking  
- A reduction in encroachment by parked vehicles into sidewalk area |
| W Hildebrand Ave – north side, just west of Breeden St | ![Location Photo](image4) |  |

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RIGHT TURN ON RED RESTRICTIONS

A permissible right-turn-on-red (RTOR) can have detrimental effects on pedestrians. While the law requires motorists to come to a full stop and yield to cross-street traffic and pedestrians prior to turning right on red, many motorists do not fully comply with the regulations, especially at intersections with wide turning radii. Motorists are often so intent on looking for motor vehicle traffic approaching on their left that they may not be alert to pedestrians approaching on their right. In addition, motorists may pull up into the crosswalk to wait for a gap in traffic, blocking pedestrian crossing movements.

Prohibiting RTOR should be considered where and/or when there are high pedestrian volumes or where there are sight line obstructions. Part-time right turn on red restrictions during the busiest times of the day may be sufficient in some locations. For improved effectiveness, a large 30” by 36” NO TURN ON RED sign can be used. A variable-message “NO TURN ON RED” sign may also be used.

Current Use in the City of San Antonio/Bexar County Region: The City of San Antonio has restricted right-turn-on-red using signage at a number of locations, including near schools. In some cases the restriction only applies during specific times of the day such as when children are going to and leaving school.

Recommendations for the City of San Antonio/Bexar County Region: Use this treatment sparingly. When used, focus on the following types of locations:

- Intersections with high pedestrian volumes or where sight distance is poor due to an obstruction
- High crash locations where cause is due to vehicles turning right on red
- Locations with high use by populations over represented in the crash data such as children, seniors and persons with disabilities
- Consider combining right-turn-on-red prohibitions with a Leading Pedestrian Indicator (LPI) at extremely problematic intersections

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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</tr>
</thead>
<tbody>
<tr>
<td>“No Turn On Red” installation CRF= 10%</td>
<td>PedSafe – Pedestrian Signal Timing</td>
<td>PedSafe - Orlando, FL</td>
</tr>
</tbody>
</table>

“No Turn On Red” variable message sign so that it is activated during selected times only

“No Turn On Red” sign at location with blocked sight lines
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Location # 1 | ![Location # 1 Photo](image1.jpg) | Right-turn-on-red restrictions at intersections in the downtown area where there are high pedestrian volumes, e.g. near transit stops, tourist areas, etc. would provide:  
- Potential reduction of collisions between pedestrians and motorists |
| W Market St and N St Mary’s St | ![Location # 1 Photo](image1.jpg) | This intersection has a pedestrian scramble phase. A right turn on red restriction at all legs of this intersection would:  
- Reduce conflicts between turning vehicles and pedestrians and improve safety of pedestrians crossing the roadway during the scramble phase |
| Location # 2 | ![Location # 2 Photo](image2.jpg) | Also see “Push Button” countermeasure profile |
| S Flores St at W Commerce St | ![Location # 2 Photo](image2.jpg) | Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements |
**PEDESTRIAN CROSSING WARNING SIGNS**

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

**Current Use in the City of San Antonio/Bexar County Region:** Pedestrian crossing warning signs are used at numerous marked crosswalk locations throughout the region, including some signalized locations.

**Recommendations for the City of San Antonio/Bexar County Region:** Continue to use pedestrian crossing warning signs for marked crosswalks in areas where there are high volumes of pedestrian traffic or where motorists may not expect pedestrians to be crossing. Also consider the following:

- Establish a program for replacing older signs (showing two lines representing a crosswalk) with new signs.
- Install advanced yield lines and YIELD HERE TO PEDESTRIANS sign at multi-lane uncontrolled crossings; this treatment is in the MUTCD and being increasingly used in many communities.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
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</table>
| Research incomplete     | - PedSafe – Signing
                        | - MUTCD Chapter 2B | - PedSafe Case Studies |

**Crash Reduction Factors Reference/Guidance Examples**

- PedSafe – Signing
- MUTCD Chapter 2B
- PedSafe Case Studies

Primary pedestrian crossing warning sign with distance plaque.

Supplemental pedestrian crossing warning sign with downward arrow plaque at crosswalk location.
<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Location # 2</th>
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</thead>
<tbody>
<tr>
<td>S New Braunfels Ave and Koehler Ct, Also see In-street Pedestrian Crossing Sign and Transit Crossing Location countermeasures</td>
<td>Sims Ave across from Charles Graeber Elementary (south side)</td>
</tr>
</tbody>
</table>

Pedestrian crossing warning signs (south and north of Koehler) at this location would:
- Draw more attention to the crosswalk
- Improve safety for students crossing the street to/from three schools

Pedestrian crossing warning signs at this location would:
- Draw more attention to the crosswalk
- Improve safety for students crossing the street to/from three schools

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**ADVANCED YIELD MARKINGS WITH “YIELD HERE TO PEDESTRIAN” SIGNS**

Advanced yield markings in conjunction with “Yield Here To Pedestrian” signs have proven to be effective at reducing multiple threat crashes at uncontrolled, marked crosswalk locations. A multiple threat crash results when a car in one lane stops to let the pedestrian cross, blocking the sight lines of the vehicle in the other lane of a multi-lane approach which advances through the crosswalk and hits the crossing pedestrian(s). The MUTCD (2009) requires the use of “Yield Here To Pedestrians” (R1-5, R1-5a) sign if yield lines (shark’s teeth) are used in advance of a marked crosswalk that crosses an uncontrolled multi-lane approach. “Yield Here To Pedestrians” signs may also be used without the installation of advanced yield lines. If yield lines and “Yield Here To Pedestrians” signs are used in advance of a crosswalk, they should be placed together and 20 to 50 feet before the nearest crosswalk line; parking should be prohibited in the area between the yield line and the crosswalk. “Yield Here To Pedestrian” signs may be used in conjunction with the “Pedestrian Crossing” (W11-2) warning sign but must be on a preceding post and not block the road user’s view of the W11-2 sign.

**Current Use in the City of San Antonio/Bexar County Region:** Yield lines are not typically used in advance of marked crosswalks, but there are a few examples in San Antonio.

**Recommendations for the City of San Antonio/Bexar County Region:** Consider using advanced yield lines in conjunction with “Yield Here To Pedestrian” signs at the following locations:
- Multi-lane roads where no other treatments (e.g., crossing islands signals) are present
- In areas where better yielding compliance is desired such as near schools or other areas with high volumes of pedestrian traffic

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<tr>
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<tr>
<td>Research incomplete</td>
<td>PedSafe – Signing</td>
<td>See PedSafe – Case Study # 69</td>
</tr>
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<td></td>
<td>MUTCD Section 2B.11</td>
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</tbody>
</table>

“Yield Here To Pedestrian” sign (R1-5, R1-5a).

“Yield Here To Pedestrian” sign with advanced yield lines.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</thead>
</table>
| **Location # 1** | ![Location Photo](image1.png) | Advanced yield lines and a “Yield Here To Pedestrians” sign at this location would:  
- Draw motorists’ attention to the crossing location  
- Encourage motorists to yield in advance of the crossing location, reducing the potential for crashes related to delayed motorist response |
| S St Mary’s St near Bonham Elementary |  |  |
| **Location # 2** | ![Location Photo](image2.png) | Advanced yield lines and a “Yield Here To Pedestrians” sign at this location would:  
- Draw motorists’ attention to the crossing location  
- Encourage motorists to yield in advance of the crossing location, reducing the potential for crashes related to delayed motorist response |
| Ellana Claire Ct and S Zarzamora |  |  |
| Should be considered at other unsignalized intersections along S Zarzamora and Nogalitos St |  |  |
| **Location # 2** | ![Location Photo](image3.png) | Advanced yield lines with R1-5 signage at this crossing location would:  
- Draw more attention to pedestrians crossing the street to access nearby schools (Fox Tech High School, Southwest School of Art) and other pedestrian generators in the area.  
- Increase compliance of drivers yielding to pedestrians crossing the roadway. |
| N Main Ave at Giraud St |  |  |

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IN-STREET PEDESTRIAN CROSSING SIGN

Flexible in-street pedestrian crossing signs may be used to remind road users of laws regarding right of way at unsignalized pedestrian crossings and increase motorists’ awareness of a pedestrian crossing. They are often used at school crossings and other locations with vulnerable populations or where high pedestrian volumes occur where they may not be expected such as between a parking facility and a major destination (e.g., employer or college campus). In-street signs are usually used on two-lane streets with lower traffic speeds and volumes due to potential impacts. They can be used in conjunction with advanced warning and at crosswalk signs, as well as with curb extensions.

**Current Use in the City of San Antonio/Bexar County Region:** In-street pedestrian crossing signs have been implemented on a limited basis.

**Recommendations for the City of San Antonio/Bexar County Region:**
- Use at uncontrolled marked crosswalk locations near schools or other uses that generate high pedestrian volumes
- Give priority to locations with school crossing guards

<table>
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<td>Research incomplete</td>
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<tr>
<td></td>
<td>MUTCD Section 2B.12</td>
<td>See PedSafe</td>
</tr>
<tr>
<td></td>
<td>In-street Pedestrian Crossing Signs</td>
<td></td>
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<tr>
<td></td>
<td>Walkinginfo.org – “What effect do in-street crosswalk signs have on drivers?”</td>
<td></td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td><strong>Photo of Location</strong></td>
<td><strong>Issue/Condition Addressed by Countermeasure</strong></td>
</tr>
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<td>--------------</td>
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<td>-----------------------------------------------</td>
</tr>
</tbody>
</table>
| **Location # 1** | ![Image](image1.jpg) | There is no stop control at this crosswalk location. An in-street pedestrian crossing sign would:  
- Likely be more effective than traffic cones  
- Draw motorists’ attention to crosswalk location |

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TRANSIT STOP LOCATION

All bus stop locations should be safe, convenient, well-lit, clearly visible, and accessible. Bus 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. Selecting a bus stop site depends on a variety of factors, including the available curbside space, conditions of sidewalks, width of sidewalks, Average Daily Traffic (ADT), the number and width of travels lanes, turning movements, sight distances, parking, bicycle facilities, and crosswalks. At signalized intersections, far-side placement is generally recommended; however, location selection should be done on a site-by-site basis. Advantages of locating stops on the far-side of an intersection include reduced delay for buses, encouraging pedestrians to cross the street behind the bus where they are more visible to passing traffic, minimizing conflicts between buses and right turning vehicles, and allowing buses to take advantage of gaps in traffic flow (especially with signal prioritization).

Current Use in the City of San Antonio/Bexar County Region: Transit stops are located at both near-side and far-side of intersections. It appears that some near-side stops would function better if moved to far-side.

Recommendations for the City of San Antonio/Bexar County Region:
- Identify near side transit stops and develop a strategy in cooperation with VIA Metropolitan Transit for evaluating and moving (if necessary) them to the far side.
- Consider moving stops located at mid-block locations on multi-lane roads to signalized locations (or installing additional crossing treatments at these locations) where it is possible to still meet minimum stop spacing requirements.
- Give re-location priority to high use and high crash locations and corridors.

<table>
<thead>
<tr>
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<tbody>
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<td>Research incomplete</td>
<td>PedSafe — Transit Stop Treatments</td>
<td>See PedSafe</td>
</tr>
<tr>
<td></td>
<td>Pedestrian Safety Guide for Transit Agencies (FHWA-SA-07-017)</td>
<td>Case Studies</td>
</tr>
</tbody>
</table>

Far-side transit stop location at signalized intersections is preferred in most cases

Bus stop on far side of the intersection in Boston, MA
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location Photo](image1.png) | Consider moving stop to far-side of intersection in order to provide:  
- A reduction in number of crossings for students arriving by bus from two crossings to one  
- A crossing point behind where the bus stops  
- Connections to a higher-density residential area to the east via existing sidewalk network |
| S New Braunfels Ave at Koehler Ct | ![Location Photo](image2.png) | Also see “Sidewalk Connections to Transit” countermeasure |
| **Location # 2** | ![Location Photo](image3.png) | Moving transit stop to the far-side of intersection would provide:  
- A reduction in the number of crossings for transit users accessing Highland Park from two crossings to one  
- Improved bus operations and a reduction in vehicle delay |
| Rigsby Ave at S Gevers St | ![Location Photo](image4.png) | Moving transit top to far side of intersection would provide:  
- A crossing point behind where the bus stops  
- Improved bus operations and a reduction in vehicle delay |
| **Location # 3** | ![Location Photo](image5.png) | Moving transit stop to the far-side of intersection would provide:  
- A reduction in the number of crossings for transit users accessing Highland Park from two crossings to one  
- Improved bus operations and a reduction in vehicle delay |
| San Pedro Ave and W Ramsey St | ![Location Photo](image6.png) | Moving transit top to far side of intersection would provide:  
- A crossing point behind where the bus stops  
- Improved bus operations and a reduction in vehicle delay |

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SIDEWALK CONNECTIONS TO TRANSIT STOPS

Bus stops should be highly visible locations that pedestrians can reach easily. Access to the bus stop via sidewalk connections from an adjacent intersection, sidewalk, or nearest land use should be as direct as possible. To accommodate wheelchairs, sidewalk connections should be a minimum of 4’ wide (preferably 5’ to 6’ wide) and equipped with wheelchair ramps at all street crossings. Other improvements within the vicinity of transit stops include marked crosswalks and signals at intersections. When possible, sidewalks and bus stops should be coordinated with existing street lights to provide an adequate level of lighting and improve security. Installation of a continuous sidewalk from the adjacent intersection to the bus stop is one way to achieve greater patron access to the bus stop in areas with limited or no sidewalk coverage.

Current Use in the City of San Antonio/Bexar County Region: There are numerous bus stops throughout the region not connected to the sidewalk network.

Recommendations for the City of San Antonio/Bexar County Region: In order to improve safety, comfort and accessibility at bus stops, consider:

- Focusing on those stops within high crash corridors
- Identifying transit stops that are not connected to the sidewalk network and work with VIA Metropolitan Transit to develop a funding and implementation strategy for installing connections to improve pedestrian safety and better serve bus patrons
- Reviewing development regulations, and modify where needed, to ensure new development is providing sidewalk connections to adjacent transit stops

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<tbody>
<tr>
<td></td>
<td>PedSafe - Transit Stop Treatments</td>
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<tr>
<td></td>
<td>Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions</td>
<td></td>
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</tbody>
</table>

Example of where a short sidewalk connection between the intersection and transit stop improves accessibility, safety and comfort of transit riders.

A short segment of sidewalk connects this transit stop to nearby land uses.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
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</thead>
<tbody>
<tr>
<td><strong>Location # 1</strong></td>
<td></td>
<td>A 200’ gap in the sidewalk exists between this bus stop and high density housing to the south. Filling this gap in the sidewalk network would provide:</td>
</tr>
</tbody>
</table>
| S New Braunfels Ave at Koehler Ct (see also: “Transit Stop Location Countermeasure”) | | - Improved access for pedestrians using wheelchairs, handcarts, strollers, etc.  
- Improved access to Charles C Ball Elementary located to the northwest of this stop |

| Location # 2 | | Sidewalk is absent on the east side of S New Braunfels Ave between Hot Wells Blvd and Koehler Ct. A sidewalk in this segment would provide: |
| S New Braunfels Ave across from Connell Middle School/Junior High | | - Connection to the bus stop  
- Improved access for neighborhood and students at the three nearby schools |

| Location # 3 | | Adding a sidewalk to connect the bus stop to the intersection would provide: |
| San Pedro Ave and W Ramsey St | | - Improved access for pedestrians using wheelchairs, handcarts, strollers, etc. |

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CROSSING NEAR TRANSIT STOP

It is often necessary for pedestrians to cross roadways when traveling to and from transit stops. Where bus stops are located mid-block on a long block (greater than 1,000’), 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 setback a minimum of 5’ from crosswalks. Where feasible, a 10’ setback is preferred.

Current Use in the City of San Antonio/Bexar County Region: On corridors with long blocks there are a number of transit stops located mid-block where there are no marked crosswalks or other crossing treatments. Many stops at intersections are located on the near side of the intersection.

Recommendations for the City of San Antonio/Bexar County Region:
- Identify transit stops that are not located near crossings and develop a strategy in cooperation with VIA Metropolitan Transit for either moving the transit stops or installing new crossings to the rear of where buses stop.
- Consider utilizing additional treatments such as raised crossing islands, curb extensions, and enhanced overhead lighting at crossing locations on multi-lane roads.

<table>
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<tr>
<td>Research incomplete</td>
<td>FHWA Pedestrian Safety Guide for Transit Stations</td>
<td>Intentionally left blank – no example available</td>
</tr>
</tbody>
</table>

Crossing is placed behind the bus stop and provides a pedestrian refuge for a multi-lane roadway.

Mid-block crossing located behind bus stop, Desert Springs, AZ.
## Location # 1

S New Braunfels Ave across from Connell Middle School/Junior High

Also see “Sidewalk Connection to Transit” countermeasure profile

This bus stop is directly across the street from three schools approximately mid-point on a block over 800’ in length. A mid-block signal would:
- Provide a safe way cross the street to access the transit stop and schools

## Location # 2

Fredericksburg Rd near Santa Anna (also near Gardina St)

Also see the “Marked Crosswalk Location” and “Crossing Island” countermeasure profile

A mid-block marked crosswalk with crossing island at this location would:
- Improve safety for pedestrians wanting to access transit stop and businesses on east side of road by creating a two-stage crossing and traffic calming benefits

## Location # 3

S W.W. White Rd between Lavender Ln and Lord Rd

Also see “Staggered Mid-Block Crossing” and “Median” countermeasure profiles

The distance between marked crosswalks in this segment of W.W. White Rd is approximately a quarter mile. Transit riders are likely to cross the street at unmarked mid-block locations in order to access retail uses. A mid-block crossing signal at this transit stop would:
- Reduce potential for mid-block crashes associated with pedestrians crossing the roadway at unmarked locations

---

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SIDEWALK CAPACITY AT TRANSIT STOPS

Sidewalks at transit stops should extend to the curb so that passengers may access the sidewalk directly from the bus doors. It is desirable to provide a continuous 8’ wide area (either a dedicated pad attached to the sidewalk or a continuous sidewalk) to match the length of a bus or at least the distance between the front and rear bus doors. A larger pad area or sidewalk capacity should be considered in areas with higher pedestrian volumes on the sidewalk and high transit use. Where it is not possible to provide a pad or sidewalk of sufficient width, curb extensions can provide additional space for passengers to board and alight without interfering with sidewalk flow. The width of the curb extension should generally be 6 to 8 feet, but should not be wider than the adjacent parking lane; the curb extension should be long enough to allow passengers to board and alight at all doors of the bus.

Current Use in the City of San Antonio/Bexar County Region: Sidewalk widths are insufficient at many transit stops throughout the region, and transit shelters are often placed directly within the walk zone of the sidewalk due to lack of right-of-way.

Recommendations for the City of San Antonio/Bexar County Region: Policy objectives that should be pursued include the following:
- Work in partnership with VIA Metropolitan Transit and property owners adjacent to transit stops to provide additional sidewalk capacity at stop locations or, at a minimum, to remove/relocate transit-related obstructions placed within the sidewalk.
- Priority should be given to widening sidewalks at high-use transit stops.
- Development regulations should be reviewed and modified where needed to ensure new development setbacks are adequate enough to accommodate additional sidewalk width at bus stop locations.

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<tr>
<td>Research incomplete</td>
<td>FHWA Pedestrian Safety Guide for Transit Stations</td>
<td>None</td>
</tr>
</tbody>
</table>

Sidewalks should be wider at transit stops to allow space for transit patrons and passing pedestrians.

Additional sidewalk width on the back side of the transit stop allows pedestrians to bypass the area where bus boarding/alighting occurs.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location Photo](image1.png) | Additional sidewalk capacity and/or waiting area for bus to the rear of existing stop would provide:  
- Space for pedestrians to safely navigate through stop area |
| SW Military Dr at S Flores St – northwest corner |  |
| **Location # 2** | ![Location Photo](image2.png) | Additional sidewalk capacity and/or waiting area for bus to the rear of existing stop would provide:  
- Space for pedestrians to safely navigate through stop area |
| Kitty Hawk Rd just east of intersection with Crestway Dr |  |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
DRIVEWAY DESIGN

The design of a driveway influences driver behavior and pedestrian comfort. Excessively wide and/or sloped driveways, driveways with large turning radii, multiple adjacent driveways, driveways that are not well defined, and driveways where motorists’ attention is focused on finding a gap in congested traffic may cause safety and access problems for pedestrians. Examples of driveway improvements include narrowing or closing driveways (see driveway consolidation), tightening turning radii, converting driveways to right-in only or right-out only movements, and providing median dividers on wide driveways. As a general rule, driveways should be designed to look like driveways, not roadway intersections. The sidewalk zone should be clearly delineated across the driveway (e.g. if the sidewalk is composed of concrete, the concrete surface treatment should be continuous across the driveway), and there should also be a minimum 4 feet clear width with no more than a 2% cross slope to ensure that those pedestrians in wheelchairs can safely cross the driveway. It is also important to minimize large signs and bushes at driveways to improve the visibility between motorists and pedestrians. 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 signalized.

Current Use in the City of San Antonio/Bexar County Region: In many cases the sidewalk material/design is not continued across the driveway creating a situation where the pedestrian zone is not clearly defined. There are also many examples of driveways that do not meet ADA standards in terms of providing a minimum 4 foot clear width of area and having a cross slope of 2% or less.

Recommendations for the City of San Antonio/Bexar County Region: Priority should be given to providing driveways that are properly designed. Policy objectives that should be pursued include the following:
- Systematically review and replace driveways at locations with high levels of pedestrian use such as downtown and neighborhood commercial areas.
- As an interim solution in situations where driveway entrances are not well defined by curbs and aprons, use high visibility pavement markings to define driveway aprons and the sidewalk.
- Review public works standards to ensure slope, curb return radii, taper, and material are addressed and meet applicable standards.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>PedSafe- Driveway</td>
<td>PedSafe - Portland, OR</td>
</tr>
</tbody>
</table>

The sidewalk zone should be clearly delineated across the driveway.

A driveway should look like a driveway, not a roadway.
<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Perrin Beitel Rd – west side, south of Perrin Central Blvd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location # 2</td>
<td>S Zarzamora – east side near Ceralvo St</td>
</tr>
<tr>
<td>Location # 2</td>
<td>I-410 frontage road and Nacogdoches Rd – southwest corner</td>
</tr>
</tbody>
</table>

The driveway at this location should be redesigned to:
- Continue sidewalk material/pattern across driveway
- Have a maximum 2% cross slope
- Have tighter flares to reduce the speed of turning vehicles

The driveway at this location should be redesigned to:
- Have a maximum 2% cross slope

The driveway at this location should be redesigned to:
- Have a maximum 2% cross slope

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements
**DRIVEWAYS NEAR INTERSECTIONS**

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. Minimum distances between commercial driveways and signalized or un-signalized intersections should be in the realm of 75 to 100 feet, and residential driveways should be a minimum 40 feet from signalized and 20 feet from un-signalized intersections. 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.

**Current Use in the City of San Antonio/Bexar County Region:** There are many examples of driveways located within the functional area of intersections throughout the San Antonio/Bexar County region.

**Recommendations for the City of San Antonio/Bexar County Region:** Priority should be given to ensuring that driveways are not installed close to intersections. Policy objectives that should be pursued include the following:

- Review design standards for minimum distances from signalized and unsignalized intersections.
- 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.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRF = 30%</td>
<td>FHWA CRF Desktop Reference</td>
<td>Plantation (Broward County), FL - University Dr and Peters Rd</td>
</tr>
</tbody>
</table>

Driveways should not be placed within the functional area of intersections.

Driveways can be closed to improve safety.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | S Zarzamora and Merida St – southwest corner | Removing continuous driveway accessing parking along S Zarzamora and Merida St would:  
- Improve safety of pedestrians approaching crossings  
- Improve function and safety for vehicles at the adjacent intersection |
| | |  |
| **Location # 2** | S Zarzamora and Ceralvo St – northeast corner | Each frontage of this business has two driveways. Closing the two driveways nearest to the intersection would:  
- Improve safety of pedestrians approaching crossings  
- Improve function and safety for vehicles at the intersection |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
DRIVEWAY CONSOLIDATION

Research over the past several decades has consistently shown that crash rates increase as driveway density increases on a roadway (i.e., number of driveways per mile). 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 oncoming 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. Limiting and consolidating vehicle access points (also known as access management) is a proven safety countermeasure that benefits pedestrians and bicyclists and can also improve traffic operations by redirecting motor vehicles to intersections with appropriate traffic control devices. 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. 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, particularly near intersections.

Current Use in the City of San Antonio/Bexar County Region: Each commercial parcel typically has a driveway and shared driveways are not commonly found. Where commercial frontages are small such as in neighborhood commercial areas, driveways are closely spaced together, resulting in numerous potential conflict points.

Recommendations for the City of San Antonio/Bexar County Region:

- Review public works standards and/or development codes to ensure there are minimum distance requirements (in the range of 100 to 200 feet) for driveway spacing along commercial corridors.
- Identify shared/reciprocal access opportunities for existing developments along high crash corridors and work with property owners to implement consolidation.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Varies depending on level of access management is achieved, e.g., medians, driveway closure, minimum spacing. | ▪ FHWA Access Management Publications and Resources (FHWA-SA-12-006)  
▪ NCHRP Report 548: A Guidebook for Including Access Management in Transportation Planning | ▪ Colorado DOT,  
▪ NEPA Manual, Accountable, Flexible, Efficient Transportation |
### Location # 1

Fredericksburg Rd – various locations between Wurzbach Rd and Vance Jackson Rd

Also see “Median” countermeasure

<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Fredericksburg Rd – various locations between Wurzbach Rd and Vance Jackson Rd | ![Location Photo](image) | Consolidating driveways would:  
- Reduce conflicts between turning vehicles and pedestrians  
- Reduce potential for rear-end collisions  
- Improve traffic operations |

Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements

### Location # 2

S Zarzamora between Ceralvo St and Merida St

<table>
<thead>
<tr>
<th>Location # 2</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| S Zarzamora between Ceralvo St and Merida St | ![Location Photo](image) | Consolidating driveways would:  
- Reduce conflicts between turning vehicles and pedestrians/bicycles  
- Reduce potential for rear-end collisions  
- Improve traffic operations |
**RIGHT-IN/RIGHT-OUT DRIVEWAYS (AND MINOR ROADWAYS)**

Right-in/right-out (RIRO) is an access management technique that refers to a type of driveway where only right turns are permitted, thus reducing conflict points associated with left turning vehicles. RIRO restrictions may also be applied to minor roadways. RIRO configurations improve safety by reducing the number of conflict points between all roadway users. Research suggests that approximately 72 percent of crashes at a driveway involve a left-turning vehicle. These crashes are primarily due to outbound vehicles turning left across through traffic and to inbound, left-turning vehicle conflicting with opposite direction through traffic. When turn movements are restricted at driveways, consideration must be given to the tradeoffs of possibly blocking access to driveways, shifting the turning movement to another location along the roadway. RIRO restrictions may be part of a larger access management strategy.

**Current Use in the City of San Antonio/Bexar County Region:** Right-in/right-out driveways are used at the entrances to some subdivisions and commercial developments.

**Recommendations for the City of San Antonio/Bexar County Region:** Use this treatment with caution since it has the potential to divert traffic. RIROs are best used at the following types of locations:
- Locations with high pedestrian volumes
- High crash locations
- Locations along arterial streets with speeds of 40 mph or greater
- Locations where there is a desire to limit motor vehicle traffic and encourage bicycle traffic
- Locations with driveways in close proximity to intersections or other driveways

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research on reducing pedestrian crashes is incomplete</td>
<td>FHWA Access Management Publications and Resources:</td>
<td>(left intentionally blank – do not have an example)</td>
</tr>
<tr>
<td>For motor vehicle crashes CRF = 72 %</td>
<td>“Benefits of Access Management” and “Safe Access is Good for Business”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accessmanagement.org – TRB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NCHRP Report 548: A Guidebook for Including Access Management in Transportation Planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NCHRP Report 659: Guide for the Geometric Design of Driveways</td>
<td></td>
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</tbody>
</table>

Islands used to restrict left turn movements should accommodate pedestrians.

Right-in, Right-out at City Base Landing in San Antonio.
### Location # 1

**Perrin Beitel Rd – west side, south of Perrin Central Blvd**

Right-in/right-out at this location would provide:
- A reduction in pedestrian conflicts with left-turning vehicles into business
- Improved safety at the intersection by eliminating outbound left-turns within the functional area of the intersection

Northbound (left-turning) on Perrin Beitel Rd traffic can access business via the signal and existing access on north side of property.

### Location # 2

**Henderson Pass – east side, just south of Thousand Oaks**

Right-in/right-out at this location would provide:
- A reduction in pedestrian conflicts with left turning vehicles into business
- Improved safety at the intersection by eliminating outbound left-turns within the functional area of the intersection

Additional access to business is provided from Thousand Oaks, which may be more appropriate for left-in/left-out turns.

### Location # 3

**Fredericksburg Rd at S Zarzamora and Gramercy Pl**

This driveway is within the functional area of a complex skewed intersection. Converting this driveway to a RIRO as well as second driveway providing access to the same business off of W Gramercy Pl to RIRO would provide:
- A reduction in pedestrian conflicts with left turning vehicles into business
- Improved safety at the intersection by eliminating outbound left-turns within the functional area of the intersection

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ROAD DIET

The term road diet refers to reducing the number of lanes on a multi-lane roadway. Numerous studies of road diets have shown that they provide safety benefits for all roadway users by reducing motor vehicle speeds and creating room for other amenities and safety features. 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. 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. 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. Successful road diets include an analysis of the entire affected area in order to identify and mitigate potential traffic spill over into other areas.

Current Use in the City of San Antonio/Bexar County Region: While no road diets have yet been implemented, this treatment is gaining acceptance and has been integrated into the recently adopted San Antonio Bike Plan. Studies have been conducted in the region to identify possible road diet locations. Recommendations for the City of San Antonio/Bexar County Region: 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).

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road diet CRF = 29%</td>
<td>PedSafe – Lane Reduction</td>
<td>PedSafe - El Cajon, CA</td>
</tr>
<tr>
<td>Unknown specifically for pedestrians.</td>
<td>Evaluation of Lane Reduction “Road Diet” Measures and Their Effects on Crashes and Injuries</td>
<td>City of Seattle – Tools to Improve Marked Crosswalks</td>
</tr>
<tr>
<td></td>
<td>Road Diet Handbook: Setting Trends for Livable Streets</td>
<td>FHWA – Going on a Road Diet</td>
</tr>
<tr>
<td></td>
<td>MPO Road Diet Analysis Report</td>
<td></td>
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</tbody>
</table>

Before road diet - Four lane roadway with no center turn lane or bike lanes. After road diet - Three lane roadway with two-way center turn lane and bike lanes, Seattle, WA.
### Location # 1

**S New Braunfels Rd between E Southcross Blvd and SE Military Dr**

A road diet along this segment would provide:
- Improved safety of children walking to school by reducing crossing distances and providing an opportunity to install crossing islands at numerous unsignalized crossings
- An opportunity to install bike lanes

### Location # 2

**S W.W. White Rd – I-10 to E Houston St**

A road diet in this segment would provide:
- A reduction in crossing distances for pedestrians
- An opportunity to install crossing islands where appropriate
- An opportunity to install bike lanes, which can further buffer pedestrians from vehicles

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LANE DIET

The term lane diet refers to reducing 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. 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. 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.

Current Use in the City of San Antonio/Bexar County Region: Many roads in the region already have narrow lanes – often 10 and 11 feet. Some newer streets have wider lanes that could be reduced in width.

Recommendations for the City of San Antonio/Bexar County Region: 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 recommended in the San Antonio Bicycle Master Plan or other similar plans in other areas of the county. 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

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>2011 AASHTO Green Book</td>
<td>City of Seattle, WA</td>
</tr>
<tr>
<td></td>
<td>FHWA – Evaluation of Lane Reduction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MPO Road Diet Analysis Report</td>
<td></td>
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</tbody>
</table>

![Travel lanes narrowed to create space for a crossing island and bike lanes](Image)

![Center lane narrowed to create space for bike lane](Image)
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location # 1](image) | Reducing lane widths in this segment would provide:  
  - Shorter crossing distances for pedestrians  
  - Reduction in vehicle speeds  
  - Space for bicycle lanes, which can act as sidewalk buffers |
| S Zarzamora between Fredericksburg Rd and W Martin St | ![Location # 1](image) | |
| **Location # 2** | ![Location # 2](image) | Reducing lane widths in this segment would provide:  
  - Shorter crossing distances for pedestrians  
  - Reduction in vehicle speeds  
  - Space for bicycle lanes, which can act as sidewalk buffers |
| Perrin Beitel Rd between Nacogdoches and I-410 | ![Location # 2](image) | |
| **Location # 3** | ![Location # 3](image) | Reducing lane widths in this segment would provide:  
  - Shorter crossing distances for pedestrians  
  - Reduction in vehicle speeds  
  - Space for bicycle lanes, which can act as sidewalk buffers |
| SW Military Rd between S Flores St and Presa St | ![Location # 3](image) | |

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**PARKING RESTRICTIONS AT INTERSECTIONS**

Parking on intersection approaches adjacent to turning or through lanes reduces the visibility of crossings for both motorists and pedestrians. Allowing parking up to the intersection can also cause the blocking of traffic lanes as vehicles move into and out of parking spaces. Restricting and/or eliminating parking on intersection approaches can improve visibility, reduce conflicts, and improve intersection performance. Parking restrictions can be implemented through signing, pavement markings, or restrictive channelization. Enforcement of parking restrictions, accompanied by public information and enforcement, including towing offending vehicles, is a necessary component of this strategy.

**Current Use in the City of San Antonio/Bexar County Region:** The City of San Antonio has parking restrictions at intersections throughout much of the Downtown area and uses both signage and curb paint to indicate these restrictions.

**Recommendations for the City of San Antonio/Bexar County Region:** Focus on imposing parking restrictions in some spot locations within neighborhoods and near schools and parks.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>At intersections where adjacent parking is eliminated CRF=49%</td>
<td>NCHRP Report 500, Volume 10, 2004</td>
<td>PedSafe - Bellevue, WA</td>
</tr>
</tbody>
</table>

Parking restrictions at the near side of intersections also improves visibility for turning vehicles. Restricting vehicles from parking a given distance from intersections improves sight lines and pedestrian safety at crossings.
<table>
<thead>
<tr>
<th>Location # 1</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| Spring Moon St and other spot locations within neighborhoods | ![Location Photo](image1.jpg) | Restricting vehicles from parking within 20 to 30 feet of the intersection would provide:  
- Increased visibility of pedestrians on sidewalk and entering roadway to cross |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
**BACK-IN ANGLE PARKING**

Back-in angle parking (also known as reverse angle or diagonal parking) is an alternative to parallel or front-in angle parking and has many benefits over these other parking types. It provides motorists with better vision of on-coming bicyclists, cars, and trucks as they exit a parking space and enter moving traffic. Back-in angle parking also eliminates the risk associated with parallel parking where a motorist opens his/her car door into the path of a bicyclist. Other benefits include increased parking capacity (10 to 12 feet of lateral curb per vehicle, versus 22 feet per vehicle for parallel parking), ease of loading and unloading cargo and children, and protection for children because the open car door now directs young children back to the curb or sidewalk rather than out into the street. Back-in angle parking also can create a traffic calming effect due to higher number of parking maneuvers per curb length, which can be particularly beneficial around schools and commercial areas. Angled parking should be considered only where the posted speed is 25 to 30 mph and where there is high demand for parking. As a general rule, back-in angle parking should be installed on side streets first. It should also be considered for non-arterial streets where speeding is a problem and increased parking is a need. Its use on downhill grades should be studied carefully, and it may have limited usefulness on single lane, one-way streets.

**Current Use in the City of San Antonio/Bexar County Region:** Back-in angle parking has not been implemented.

**Recommendations for the City of San Antonio/Bexar County Region:** Back-in angle parking, especially in locations with bike lanes, should be considered. Consider installing back-in angle parking on a trial basis at two or three locations. If successful, back-in angle parking could be routinely installed wherever there is currently front-in angle parking or where there are opportunities for road or lane diets and the desire for traffic calming.

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Research incomplete     | ▪ BICYCLINGINFO.ORG - Back-In Angle Parking: What is it, and When and Where is it Most Effective? | ▪ WAKINGINFO.ORG – Washington, D.C
▪ BikeSafe Case Study, Back-In Diagonal Parking, Vancouver, WA |

Back-in angle parking needs to be clearly signed.

Back-in angle parking provides a traffic calming effect and allows motorists to better see bicyclists when pulling in and out.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location # 1](image1) | Reconfiguring existing front-in angle parking to back-in angle parking at this location would:  
  - Improve safety for people, particularly children, accessing the sidewalk from a vehicle  
  - Reduce potential for collisions between vehicles pulling out of parking and vehicles in the roadway, including bicyclists |
| S Park Blvd (just west of Nogalitos St, adjacent to HEB) | ![Location # 1](image2) |
| **Location # 2** | ![Location # 2](image3) | Reconfiguring existing front-in angle parking to back-in angle parking at this location would:  
  - Improve safety for people, particularly children, accessing the sidewalk from a vehicle  
  - Reduce the potential for collisions between vehicles pulling out of parking and vehicles in the roadway, including bicyclists |
| Broadway between Grover Pl and Elizabeth Rd (where existing front-in parking) | ![Location # 2](image4) |

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CHICANES

Chicanes are a traffic calming measure that divert the path of travel along a roadway causing vehicles 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). Removal of on-street parking may be required for chicane installation. Chicanes can be planted to provide additional landscaping. On collector or arterials where lane width cannot be narrowed, staggered areas for parking can create a chicaning effect.

Current Use in the City of San Antonio/Bexar County Region: Chicanes have not been implemented in the San Antonio/Bexar County region.

Recommendations for the City of San Antonio/Bexar County Region: Consider installing chicanes on 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

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
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<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research incomplete</td>
<td>PedSafe – Chicanes</td>
<td>Seattle, WA</td>
</tr>
</tbody>
</table>

Opposing chicanes are used to narrow the roadway to one lane (also known as a choker). Staggered chicanes are used to force vehicles to slow and shift the path of travel.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1** | ![Location Photo](Avondale_Ave_between_S_Presa_St_and_Hebering_St) | Chicanes along this street would:  
- Reduce vehicle speeds  
- Improve pedestrian safety |

**Avondale Ave – between S Presa St and Hebering St**

| **Location # 2** | ![Location Photo](Stormy_Meadows_full_extent) | Chicanes along this street would:  
- Reduce vehicle speeds  
- Improve pedestrian safety, particularly along route used by children walking to school |

**Stormy Meadows – full extent**  
Also consider applying to full extent of Spring Valley  
Also see “Mini-Traffic Circle” countermeasure profile

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
MINI-TRAFFIC CIRCLES

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. They can be installed in lieu of signals or stop signs. Mini-traffic circles can be landscaped or paved. Vegetation should be planted/maintained so that it does not block visibility. 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.

Current Use in the City of San Antonio/Bexar County Region: Mini-traffic circles have not been used in the San Antonio/Bexar County Region.

Recommendations for the City of San Antonio/Bexar County Region: All traffic calming features should be installed only after completing a thorough analysis of potential impacts on the surrounding street network. 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)

<table>
<thead>
<tr>
<th>Crash Reduction Factors</th>
<th>Reference/Guidance</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Traffic circles CFR = 90% (City of Seattle) | PedSafe – Traffic Circles  
City of Seattle Traffic Circle Program | Seattle, WA  
Portland, OR |

Mini-traffic circle combined with chicane at a ‘T’ intersection

Traffic circle with a mountable curb - Seattle, WA.
<table>
<thead>
<tr>
<th>Location</th>
<th>Photo of Location</th>
<th>Issue/Condition Addressed by Countermeasure</th>
</tr>
</thead>
</table>
| **Location # 1**  
Stormy Meadow and Stormy Hill  
(See also “Chicanes” countermeasure profile).  
A traffic circle at this location would provide:  
- A reduction in vehicle speeds on roads that otherwise provide little in the way of traffic calming  
- Improved safety along routes travelled by children walking to/from school |
| **Location # 2**  
Every other, or every third, intersection along Spring Valley Rd and Spring Mist Rd (Spring Creek Neighborhood)  
Traffic circles at these locations would provide:  
- A reduction in vehicle speeds on roads that otherwise provide little in the way of traffic calming  
- Improved safety along routes travelled by children walking to/from school  
- For the elimination of stop control at the intersection |

*Note: This information is provided for illustrative purposes only and is not intended to require any agency to implement these improvements*
SAMPLE CORRIDOR IMPROVEMENTS

The following section describes two sample corridors with attributes similar to many roadways in the region with four and seven lane cross sections. These sample corridors are representative of common existing conditions and problems along corridors that demonstrate higher numbers of pedestrian crashes. The recommendations provide rationale for example treatments to improve safety.

Sample Corridor 1

Roadway Characteristics:
- Cross Section: Seven-lane cross section that includes a continuous center turn lane, two travel lanes in each direction, and continuous right-turn lanes on either side.
- Parking: No
- Speed limit: 35 MPH
- Block Lengths: 700 to 3,000 feet
- ADT: Greater than 25,000
- Transit: 7 bus routes
- Land use: Auto-oriented retail commercial and medium-density residential.
- Pedestrian Crashes: High number of mid-block crashes associated with accessing transit stops, moderate number of crashes at many of the intersections.

Recommendations

Additional Signalized Crossings
Where there are long distances between signalized crossings the number of pedestrians crossing mid-block to access transit stops or shopping/employment destinations tends to be high. Given the land uses within this sample corridor, e.g. retail commercial, medium density residential, and the high level of transit service (existing and future), crossings should be spaced more closely, e.g. maximum 600 to 800 feet. Additional signalized crossings should be considered at:

- Major attractors such as malls or employment clusters or higher density residential uses.

See the “Mid-block Signal” countermeasure profile for more information.

Signal Synchronization
Introducing additional signals within the corridor could potentially result in motor vehicle delay, if they are spaced a quarter mile or less. Signal synchronization would allow for additional signalized crossings while also improving traffic operations. In the near-term, if it is determined that a new signalized mid-block crossing would not impact level of service to a high degree, the signal should be set up to provide a “hot response”, i.e. change to pedestrian
phase immediately upon activation. Over time, if additional signals are added, or level of service degrades to an unacceptable level, then signal synchronization is recommended. When signals are synchronized the pedestrian crossing phase is on a cycle rather than providing a hot response. The pedestrian phase should be based on a walking speed of no more than 3.5 feet per second to accommodate slower walking speeds. Where there are higher concentrations of potential users that may have slower walking speeds, longer signals cycles are recommended.

**Coordinate Transit Stop Location with Signalized Crossings**
Locating a transit stop where there are no marked or signalized crossings nearby often results in pedestrians crossing the street at random locations which is often where they are not expected by motorist. This situation creates a high potential for crashes. Simply locating transit stops at crossing locations can help reduce crashes significantly.

See the “Transit Stop Location” countermeasure profile for more information.

**Median**
Where there is a continuous center turn lane installation of a median should be considered as a means to calm traffic, manage access, reduce conflicts at driveways between left-turning vehicles and pedestrians, reduce the potential for head on collisions between vehicles, and create pedestrian crossing islands at crossing locations. Medians may be most appropriate where there are a high number of driveways within a small area. Desired turning movements need to be carefully provided so that motorists are not forced to travel on inappropriate routes, such as residential streets, or make unsafe U-turns.

See the “Median” and “Crossing Island” countermeasure profiles for more information.

**Sidewalks**
Attention should be given to installing sidewalks where they do not exist, are poorly defined (i.e. they are integrated with driveway accesses), or are very narrow. Priority should be given to filling sidewalk gaps, which not only reduce accessibility, but may also encourage pedestrians to cross the street mid-block where no formal crossing exists.

**Sidewalk Buffers and Street Trees**
Where possible, street trees should be incorporated into the sidewalk or sidewalk buffer area as a means to enhance the comfort of pedestrians and calm traffic. When sidewalks are installed with new development, buffers should be incorporated.

See the “Sidewalk Buffers” and “Street Trees” countermeasure profiles.
Summary of Recommended Countermeasures

The following is a summary of recommended countermeasures for the sample street. For more detailed information about each recommended countermeasure, please see the individual profile sheets for each countermeasure listed below.
Sample Corridor 2

Roadway Characteristics:
- Cross Section: Four general purpose travel lanes
- Parking: Yes
- Speed limit: 30 MPH
- Block Lengths: 350 to 400 feet
- ADT: Less than 20,000
- Transit: 3 bus routes
- Land use: Primarily consists of single-family residential with small pockets of commercial use. There are also several schools and a major institutional use.
- Pedestrian Crashes: High number of crashes associated with bus stop locations.

Recommendations

Road Diet
Since average daily trips are below 20,000, a road diet should be considered. In this example, the roadway could be changed from two lanes in each direction to one lane in each direction with a center turn lane. A bike lane could also be added on both sides of the street or the street could be narrowed and the sidewalks widened. Road diets can result in many positive outcomes for all roadway users including safer pedestrian crossings, improved traffic operations, and provision of bicycle lanes or other non-motorized enhancements.

Crossings
Road diets can reduce crossing distances and provide opportunities to install features that improve the safety of street crossings such as curb extensions (only if there is parking) and crossing islands. These treatments should be considered at crossings near institutional uses, schools, commercial areas, and near transit stops where there may be a higher number of pedestrians and vulnerable populations.

Sidewalks and Sidewalk Clearance
Road diets may provide additional space for sidewalks where sidewalks are narrow, poorly defined within driveway/parking areas, obstructed, or nonexistent. Areas to target include:
- Transit stops not connected to the sidewalk network.
- Sidewalks that are narrow and contain obstructions such as utility poles.
Additional clearance should be provided where there are obstructions that narrow the clear path to less than four feet.

Sidewalk Buffers (street side)
Aside from a few residential blocks where there are planting strip buffers or commercial areas where on-street parking is allowed, sidewalk buffers are largely absent along this corridor. Lack of sidewalk buffers results in an uncomfortable and unsafe walking environment. A road diet can provide additional space for creating buffers between the sidewalk and vehicle travel lanes. Buffers may be in the form of bicycle lanes, on-street parking or physical buffers, e.g., planting strips (in more residential areas) or furniture zones (in the case of commercial areas). Often bicycle lanes are installed as a component of a four-lane to three-lane roadway conversions. Aside from providing a safer condition for bicyclists, bicycle lanes work well as buffers between vehicle lanes and the sidewalk. In commercial areas where there may
be higher demand for parking, allowing on-street parking can be a low-cost solution to providing a sidewalk buffer.

**Sidewalk Separation (development side)**

Where commercial frontages contain parking and multiple driveways, and sidewalks often poorly defined, the result is ambiguity in where pedestrians and vehicles belong. The potential for conflicts between turning vehicles and pedestrians is high in these areas. Better definition and protection of the sidewalk zone is recommended. Treatments include:

- **Paint (low-cost)** - painting a line that separates the sidewalk from parking area and painting in driveway aprons would help to better define the sidewalk and provide visual cues for motorists.
- **Raised pavement markers** – can be used alone or with paint to better define the sidewalk.
- **Wheel stops or extruded curbs** – wheel stops or extruded curbs can be placed along the edge of the sidewalk to provide a physical barrier between the sidewalk and parking area.
- **Planted buffer** – where space permits, a planting buffer (either cut into the pavement or in raised planters) provide a physical barrier between the sidewalk and parking area and may also aesthetically enhance the pedestrian environment.

**Curb Ramps**

The installation of ADA-compliant, directional curb ramps should be targeted first at intersections where there are likely to be higher concentrations of vulnerable pedestrians and in commercial areas.

**Advanced Yield Lines with R1-5 Sign**

It is recommended that an advanced yield line with R1-5 signage be used at unsignalized pedestrian crossings near school and community center locations.

**Rectangular Rapid Flashing Beacon**

At unsignalized intersections where there are and uses that generate high levels of pedestrian traffic (e.g., schools, churches, or heavily used transit stops within the vicinity) a rectangular rapid flashing beacon should be considered.
Other Intersection Treatments

Focus Corridor & Arterial Cross Street Intersection. Where data indicates a high number of pedestrian-related crashes at intersection locations, the following treatments should be considered as a starting point:

- Installing visible, ADA-compliant directional curb ramps: Currently, inadequate space and lack of directional curb ramps (results in radii without curbs) creates a situation in which waiting pedestrians are in danger of being clipped by turning vehicles. Relocating utility features, would provide additional waiting space, improve sight lines, and allow better navigation for pedestrians at corners.
- Providing longer pedestrian crossing phase.
- Restriping or replacing crosswalk lines with high visibility markings.

Analysis of driver and pedestrian behaviors should be conducted in order to identify issues that may be unique to the intersection and the most appropriate treatment for addressing these issues.

Summary of Recommended Countermeasures

The following is a summary of recommended countermeasures for corridors with the characteristics listed above where crash data indicates there are significant pedestrian safety issues. For more detailed information about each recommended countermeasure, please see the individual profile sheets for each countermeasure listed below.

Advanced Warning Signs

Rectangular Rapid Flashing Beacon
San Antonio-Bexar County Pedestrian Safety Action Plan

- Crossing Island
- Road Diet
- Sidewalks
- Sidewalk buffers
- Clearance
- Sidewalk Separation
- Curb Ramp
- Curb Extensions
SAMPLE NEIGHBORHOOD IMPROVEMENTS

The following section describes a sample neighborhood with traffic patterns similar to other residential areas in the region. The sample neighborhood serves as an example of common existing conditions and factors in residential areas that demonstrate higher numbers of pedestrian crashes. The recommendations provide rationale for example treatments to improve safety.

**Neighborhood Characteristics**
- Land Uses: Primarily single-family residences, with some low density commercial development
- Transit: Four streets within the neighborhood have transit routes
- Schools: Two schools are located within the neighborhood
- Roadways: Majority of residential streets are 30 ft wide and have four foot sidewalks and four foot planting strips. North-south streets are mostly 28 ft wide with soft shoulders and no sidewalks. East-west one-way couplet collector streets bisect the neighborhood; two arterial streets-one diagonally bisects the neighborhood in a northeast-southwest direction, and the other is located along the western boundary of the neighborhood.
- Traffic Calming: There are speed humps on a number of the east-west residential streets.
- Parking: Permitted on residential streets, low to moderate utilization

**Recommendations**
In neighborhoods where there is high potential for cut-through traffic, e.g. located between two arterial streets, street network provides for direct and easy access, and there is low to moderate on-street parking utilization, traffic calming is recommended.

**Traffic Calming**
A comprehensive traffic calming program helps to address any speeding that may be occurring and improve the safety of children walking or biking to school. Traffic calming countermeasures should focus on reducing vehicle speeds rather than diverting traffic. The following traffic calming countermeasures are recommended:

**Mini traffic circles**
Mini traffic circles (not to be confused with modern roundabouts) force vehicles to reduce speeds when approaching intersections (particularly where uncontrolled) and also introduce visual termini to long, straight roadways, which provide messaging that encourages people to drive more slowly. Traffic circles can provide effective traffic calming on most residential streets. While traffic circles may be designed to accommodate transit vehicles, in general, streets with transit routes should not be considered for traffic circles. Good pilot locations may be streets that provide a short, straight cut-through between arterial streets. Installing
Traffic circles on residential streets also signals to motorists turning off of an arterial street that they are entering a residential area where slower vehicle speeds are appropriate, and may discourage cut-through traffic. Stop signs may be removed at intersections where mini traffic circles are installed and replaced with yield signs.

**Chicanes**
Chicanes are mid-block curb bulbs that introduce horizontal deflection to the roadway, thus forcing a reduction in vehicle speed. Streets with long blocks and low on-street parking utilization are good candidates for chicanes. At three-way intersections chicanes may be installed in conjunction with mini traffic circles. Chicanes may also be designed to accommodate trees and other vegetation, which can add aesthetic value to the street, as well as introduce visual friction that encourages vehicles to slow down.

**Speed Humps**
Speed humps introduce vertical deflection to the roadway, forcing vehicles to slow down. Modular rubber speed humps can be easily installed (and removed, if they are found to be ineffective), and can be spaced to allow for tires of emergency vehicles to pass through the “valleys”, thus not requiring these vehicles to slow down. Streets with long blocks and/or provide direct routes for cut-through traffic are good candidates for speed humps. Speed humps are also effective in school zones.

**Curb Extensions/Choker**
Curb extensions narrow the roadway at intersections, which shortens the crossing distance for pedestrians and encourages vehicles to slow down. Curb extensions can be installed at either controlled or uncontrolled intersections, and where there is on-street parking. Curb extensions may also be installed at mid-block locations (i.e. chokers) to narrow the roadway. Good candidate locations for curb extensions are intersection crossings of one-way roadways because one-way roads tend to encourage speeding. Streets which provide access to schools would also be good pilot locations.

**Curb Ramps**
Curb ramps should be installed at all intersections with priority given to those streets providing access to transit or access to community facilities and schools.

**Arterial Crossings**
Many neighborhoods contain commercial streets, which are most often arterial roadways.
It is important for neighborhood residents and people from outside the neighborhood to be able to safely access businesses and transit along these roadways. There are a number of countermeasures that should be considered to improve the safety of pedestrian crossings along these corridors.

Locations where a higher number of pedestrians are expected (e.g., near transit stops, grocery stores, etc.) should be considered for special treatments such as rectangular rapid flashing beacons. Curb extensions should also be considered to shorten crossings distances and improve the visibility of crossings parallel to the arterial street. Curb extensions at these locations also help to calm traffic entering the residential street from the arterial street by reducing curb radii.

Four-lane to three-lane road diets are another strategy that should be considered in some areas in order to shorten crossing distances and provide the opportunity to install safety features such as crossing islands, marked crosswalks and curb extensions, particularly at unsignalized locations.

**Summary of Recommended Countermeasures**

- **Advanced Warning Signs**
- **Rectangular Rapid Flashing Beacon**
- **Curb Ramp**
- **Curb Extensions**
San Antonio-Bexar County Pedestrian Safety Action Plan

Crossing Island

Speed Hump

Chicane

Traffic Circle

Choker
CHAPTER 5: LAND USE, ZONING AND SITE DESIGN ISSUES

Introduction and Overview of Applicable Land Use Regulations
The Pedestrian Safety Action Plan Studying Oversight Committee (SOC) identified a number of issues within the City of San Antonio and the surrounding areas that affect pedestrian safety and the overall pedestrian experience. Many of the identified issues are related to how streets and intersections are designed, while others are related to the design of development and how it relates to the street and where people walk. Specifically, the quality of street frontage improvements such as sidewalks, sidewalk buffers, street trees, as well as site design elements such as placement and design of parking areas and driveways have a significant impact on the pedestrian experience. The City of San Antonio’s Master Plan establishes a vision for a multi-modal transportation system that includes a convenient and safe pedestrian travel network and streetscapes that are “accessible, safe, stimulating, and productive public domains.” The city has several regulatory documents that are intended to implement the Master Plan vision, but chief among these is the City’s Unified Development Code (UDC). The UDC contains the City’s zoning and subdivision standards, which address the form new development takes, including elements that can significantly impact the safety and comfort of pedestrians.

The UDC and other applicable regulatory documents such as the Sidewalk and Driveway Design and Construction Guidelines were analyzed to determine how well the standards address the key issues identified by the SOC and by field observations. The analysis below identifies where topics such as sidewalks, sidewalk buffers, street trees, driveway placement and design, and site design are addressed in existing City of San Antonio code provisions; provides an assessment of how well these provisions promote walking, and offers recommendations for how provisions may be modified to better address pedestrian safety. In addition, best practices from other cities both within and outside the Bexar County region have been identified to illustrate alternative regulatory methods for insuring that new development enhances pedestrian safety and comfort.

Overall, the City's UDC provides a good framework for the development of comfortable, safe, and appealing pedestrian environments. Its usage patterns and development standards emphasize the building-street relationship, pedestrian-oriented uses, and the City’s heritage. There are several areas within the UDC where standards could be introduced or strengthened to further enhance pedestrian comfort and safety. This policy is specific to the City of San Antonio and can be used as a base line for best practices for all area cities. These are discussed in more detail in Table 5-1 below.

The following documents were reviewed as part of this analysis:
- City of San Antonio Unified Development Code (UDC) The UDC compiles the City’s zoning and subdivision standards in one place, serving as the primary implementation device of the City’s Master Plan
- September 2005 – 79th Session of Texas Legislature passes HB 1835 amending Section 212 of the Local Government Code, establishes “Rough Proportionality”
- City of San Antonio Sidewalk and Driveway Design And Construction Guidelines, 2006
- City of San Antonio Capital Improvements Management Services - Design Guidance
Manual - updated 2012

Other City regulations and documents that have applicability, but were not reviewed as part of this analysis include:

- Americans with Disabilities Act (ADA) guidelines
- Texas Accessibility Standards (TAS) adopted amendments to Texas Administrative Code 16, Chapter 68.102
- City of San Antonio Property Maintenance Code, 2011
- Suburban Community Development Regulations

Table 5-1 below is organized by the top land use and development-related issues affecting pedestrian safety and comfort. Each section is organized by 1. a description of the relevance of each issue to pedestrian travel, 2. the existing City of San Antonio code, 3. an assessment of the existing code, 4. recommendations on changing the code, and 5. examples of best practices. The following issues should be addressed by development standards and procedures. These include:

1. Rough Proportionality - specifying when and how transportation mitigation is required

2. Streetscape Design Elements
   - Sidewalk Width
   - Sidewalk Obstructions
   - Planting Strip
   - Street Trees

3. Site Design
   - Driveway Design
   - Access Management
   - Off-Street Parking & Building Entrance Orientation
Table 5-1: Existing Code and Recommended Amendments for the Development of Pedestrian Facilities in the City of San Antonio

I - Rough Proportionality

<table>
<thead>
<tr>
<th>Relevance</th>
<th>Code Citation</th>
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<tbody>
<tr>
<td>The maximum amount of transportation mitigations any development can be asked to contribute is limited to an amount that is determined to be “roughly proportional” to the identified impacts. It is essential that this process evaluate and quantify the impacts to all modes of travel and not just motor vehicle traffic impacts.</td>
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ARTICLE V - DEVELOPMENT STANDARDS. Division 2 - Infrastructure Standards.

Sec. 35-502. - Traffic Impact Analysis and Roughly Proportionate Determination Study (f) Mitigation Improvements and Roughly Proportionate Determination.

The purpose of the traffic impact analysis is to identify if any mitigation improvements are necessitated by and attributable to the proposed development. Required mitigation improvements by the city and/or county may include the following:

C. Identification of other improvements. The applicant shall propose improvement measures for the items listed in Table 502-2. Other improvements include, but are not limited to, pavement widening, turn lanes, median islands, access controls, curbs, sidewalks, traffic signalization, traffic signing, pavement markings, etc.

Sec. 35-502 (f)(3) C. ii. If the cost of the mitigation improvements is greater than the maximum amount of improvements that may be attributable to the development, then the mitigation improvements identified in the traffic impact analysis are limited to an amount roughly equal to the maximum amount of improvements that may be attributable to the development.

Sec. 35-506 (d) (9) C. 4. Minimum Construction Required. Where the roughly proportionate determination (determination study under section 35-502) has determined that the applicant’s development would not generate enough traffic to require mitigation for right-of-way dedication or improvements to the pavement cross section, the provisions of this subsection shall not apply. In such cases, sidewalk ADA standards and a minimum fourteen-feet clear pavement width within the street for emergency access are required and no building permit shall be issued for properties adjacent to paper streets until Exception 3 listed above is met.
### Assessment

Sidewalks are included in the list of potential required mitigation improvements identified in a Traffic Impact Analysis (TIA). However, they are grouped under the category of “other improvements,” whereas the mitigations for vehicular capacity impacts are explicitly defined.

The approved methodology to determine the maximum amount of mitigation improvements that may be attributable to a development is based solely on measurable vehicular impacts (Sec. 35-502 (f)(3) D). If the methodology determines that the development would not create enough vehicular traffic, then the required mitigations for “other improvements” are exempted save for minimal ADA requirements.

Allows for construction waivers for future programmed CIP projects that exceed proposed mitigation measures.

### Recommendations

<table>
<thead>
<tr>
<th>Recommendations</th>
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<tbody>
<tr>
<td>Modify the methodology to determine the maximum amount of mitigation improvements to include a measurement of the impacts on all modes of transportation.</td>
</tr>
<tr>
<td>Modify the mitigation exemptions to require all non-motorized mitigations even when there are no vehicular mitigations identified.</td>
</tr>
</tbody>
</table>

### Best Practices

- City of Seattle (South Lake Union/Northgate impact fees)
- City of Portland (multimodal system development charge)
II. Streetscape Design Elements

## Sidewalk Width

<table>
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<th>Relevance</th>
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<tr>
<td>The most basic pedestrian facility is the sidewalk - a paved pathway dedicated for pedestrian use and separated from other modes of transportation. However, sidewalks are often absent or of substandard width in many locations across San Antonio. This section reviews the various requirements for placement of sidewalks and their minimum widths.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Code Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per Unified Development Code (UDC) Section 35-506 (a)(2), if the proposed improvements are 25 percent or more of the assessed “improvement value”, as determined by Bexar County Appraisal District (BCAD), then a sidewalk shall be constructed to City and Texas Accessibility Specifications (TAS) specifications from property line to property line. If there are existing sidewalks, then they shall at least abide by the ADA specifications prior to building permit issuance.</td>
</tr>
</tbody>
</table>

Division 2. – Infrastructure Standards, Sec. 35-506-Transportation and Street Design (d) (1)A: “Tables 506-3 and 506-4 provide the standards for all existing and future streets.”

(d)(4) Bicycle Facilities. Bike paths, when required within the city limits, may be constructed with development of the abutting property at the time building permit acquired.

When identified on the city council approved bike facilities master plan roadways requiring bicycle facilities shall be constructed in accordance with the American Association of State Highway and Transportation Officials “Guide for the Development of Bicycle Facilities.”

(q)(5) Width. Except as otherwise specified in Americans with Disabilities Act (ADA) (see subsection 35-501(g) herein), sidewalks shall have a minimum unobstructed width as follows:

A. In residential areas within the city limits and ETJ the minimum width of sidewalks adjoining a planting strip shall be four (4) feet. In nonresidential areas the minimum width of sidewalks shall be six (6) feet. Sidewalk width does not include curb width.

B. The minimum width of sidewalks located within the boundaries of the “D” downtown district shall be not less than six (6) feet.

City of San Antonio Sidewalk and Driveway Design and Construction Guidelines:

SIDEWALKS AND WHEELCHAIR RAMPS GENERAL NOTES (p. C5)

1. When possible sidewalks should be placed next to the property line, allowing a minimum of 1 foot Buffer. Deviation of the pathway from a straight line is encouraged to avoid trees or other obstructions.
2. For local type “a” streets, sidewalks shall have a minimum unobstructed width of 4’ and if separated from the curb, the sidewalk shall be located a minimum of 2’ from the back of curb.

3. For other than local type “a” streets, sidewalks shall have a minimum unobstructed width of 4’ and separated a minimum of 2’ from the back of curb or as an option, the sidewalk shall have a minimum width of 6’ when located at the back of curb.

City of San Antonio Capital Improvements Management Services - Design Guidance Manual - 2008

(p. 7-3) Pedestrians — Each roadway should be evaluated for existing or potential pedestrian usage. Elements such as sidewalks, walking trails, shared use trails, and crosswalks should be investigated for appropriate inclusion in roadway plans. Pedestrian facilities should consider aesthetics and enhancements to conform to or provide improvements to the surroundings of the project site. When pedestrian facilities are anticipated for a particular project, the pedestrian elements shall be designed to accommodate requirements associated with the Americans with Disabilities Act (ADA): Revised Draft Guidelines for Accessible Public Rights-of-Way.

Assessment

Development thresholds for sidewalk installation are clearly defined and sidewalks are required on all appropriate street types for new construction. However, existing sidewalks are only required to address ADA compliance at the time of development.

The largest issue appears to be conflicting standards for sidewalk widths between roadway functional class requirements and land use based requirements.

A 4’ sidewalk is the standard minimum sidewalk width for most roadway classifications; however, this width is insufficient for many locations.

The Capital Improvement Management Services (CIMS) Design Guidance Manual established a process whereby pedestrian facilities are “investigated for appropriate inclusion” in roadway projects, rather than following the minimum design criteria laid out in the UDC by roadway functional class.

The UDC does not include provisions determining when and to what degree an abutting property owner is responsible for sidewalk repair and maintenance.
### Recommendations

1. Require existing sidewalks to be reconstructed at time of development to meet full code requirements (including width, planting strip, driveway crossings), not just be brought up to ADA minimum specifications.

2. Resolve inconsistencies in minimum sidewalk widths between roadway functional class and land use type.

3. Require additional sidewalk width at specified high intensity locations such as: transit stops, schools, universities and colleges.

4. Clarify the situations where bicycle facilities and sidewalks may be combined and the corresponding minimum design standards for such facilities.

5. Modify the CIMS Design Guidance Manual to remove the presentation of pedestrian facilities as optional and cite the minimum standards in the UDC. It is suggested that language be added to note that pedestrian facilities are essential components of complete streets in the City of San Antonio and should be considered at the design development phase rather than as optional enhancements.

### Best Practices

- **Sidewalk Width:**
  - Austin, TX City Code, Article 2, subsection 2.2.1: Overview of Roadway Types – Sidewalks along Urban and Suburban roadways in non-residential zones shall be a minimum 12 feet in width, including a 7-foot street tree/furniture zone and 5-foot clear zone sidewalk zone regardless of available right-of-way. Sidewalk Requirement where public street right-of-way is not available:

  - Charlotte Code of Ordinances Sec. 19-175. Approval of plans. Approval of sidewalk and drainage construction plans shall be obtained from the city engineering department upon application for a building permit with the county building inspection department. When sidewalk or drainage facilities are required, the city engineer will specify the locations of the required facilities. If existing public street right-of-way is not available, the city engineer may require the sidewalk to be constructed in a public easement conveyed or dedicated to the city. (Code 1985, § 19-145)

  - Tacoma, WA – Title 10-Public Works, Chapter 10.20: Sidewalks-Repairs Pursuant to Agreement. Defines “hazardous condition” and outlines the respective responsibilities of the city and owner of property abutting a public sidewalk deemed as hazardous to repair the sidewalk. Also, authorizes the use of Local Improvement Districts to repair and replace sidewalks or curbs.
## Sidewalk Obstructions

The routine obstruction of sidewalks by physical barriers such as permanent utility poles or poorly maintained vegetation greatly decreases the pedestrian experience.

<table>
<thead>
<tr>
<th>Code Citation</th>
<th>Prevention of sidewalk obstructions in new sidewalk construction is adequately addressed in the code, yet there are countless existing locations that are not in compliance.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing obstructions are not addressed in the code as long as minimum ADA specifications are met.</td>
</tr>
<tr>
<td></td>
<td>Require existing sidewalks to be reconstructed at time of development to meet full code requirements, including the removal of all obstructions, not just be brought up to ADA minimum specifications.</td>
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<tr>
<td></td>
<td>Cross reference planting strip code sections to identify acceptable locations for utilities and other typical sidewalk obstructions.</td>
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</tbody>
</table>

### Unified Development Code: Division 2. – Infrastructure Standards, Sec. 35-506-Transportation and Street Design, Table 506-3 (Conventional Street Design Standards):

Table note 8 states, “In residential areas sidewalks shall be located to provide improved safety, to improve walkway intersection alignment and to reduce sidewalk conflicts with utility poles and mail boxes.”

Subsection (q)(7)-Continuity. “Sidewalks shall not be installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/street signs, mail boxes, trees, buildings, barriers, light poles, or any other structure”

City of San Antonio Sidewalk and Driveway Design and Construction Guidelines:

Sidewalks shall not be installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/street signs, mail boxes, trees, buildings, barriers, light poles, or any other structure. When there is an existing or anticipated obstruction, it shall be relocated whenever possible. If the obstruction cannot be relocated, the sidewalk shall be installed around the object and shall provide the required sidewalk width. When utility layouts are required as part of a plat, the location and extent of sidewalks within the subdivision shall be shown on the utility layout and shall be subject to the approval of the Director of Public Works and the utility agencies.

### Best Practices

Austin, TX City Code, Article 4 - Restrictions of news racks and direct sales in a public right-of-way: Restricts installation of news racks that interfere or impede pedestrian traffic. Also has provisions for impoundment of illegal or abandoned news racks.
### Planting Strip

A buffer between pedestrians and moving vehicles is a key element determining the quality of the pedestrian environment. Therefore, particular attention should be given to the requirements for the presence, width, and qualities of the planting strips provided along San Antonio's streets.

<table>
<thead>
<tr>
<th>Code Citation</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 2. – Infrastructure Standards, Sec. 35-506-Transportation and Street Design Table 506-3 (Conventional Street Design Standards):</td>
<td>Min. three foot planting strips shown for Local Type B, Collector, and Arterial streets, however Table note 9 states Sidewalks shall be four (4) foot in width with a planting strip or six (6) foot in width without a planting strip, which indicates planting strips are not required</td>
</tr>
<tr>
<td>Table 506-4 (Traditional Street Design Standards-Applies to TND, TOD):</td>
<td>Min. six foot planting strip for Lane, Local, and Avenue street types Six to eleven feet for Boulevard Seven to twelve feet for Parkway Table note 7 states “Sidewalks shall be four (4) foot in width with a three (3) foot planting strip or six (6) foot in width without a planting strip”, which conflicts with what is shown in table</td>
</tr>
<tr>
<td>Table 506-4A.1 (Enhanced Street Design Standards):</td>
<td>Four foot for Enhanced Secondary and Primary Arterial</td>
</tr>
</tbody>
</table>

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City of San Antonio Sidewalk and Driveway Design and Construction Guidelines: Sidewalks shall be separated a minimum of 2 feet from the back of curb (when a minimum 4 foot sidewalk provided)

City of San Antonio Capital Improvements Management Services - Design Guidance Manual - 2008 - (p. 7-6) Horizontal Clearance and Border Widths
### Assessment

Tables 506-3 and 506-4 specify the minimum design criteria for various streetscape elements. There are inconsistencies between the various minimum sidewalk and planting strip widths for each roadway classification. For example, minimum sidewalk widths without a planting strip are given for situations where there is also a minimum required planting strip. In addition, the planting strip width minimums shown in Table 506-4 (6 to 20 feet) are in conflict with Table note 7 (3 feet) – unclear which standard applies where.

Sidewalks without planting strip buffers appear to be permitted throughout the city even in areas intended to be more pedestrian-oriented such as Downtown, Traditional Neighborhoods and Transit-oriented Development.

Sidewalk and Driveway Design and Construction Guidelines call for a 2’ buffer area between sidewalk and back of curb rather than 3’ or greater planting strips specified in the UDC.

### Recommendations

Consider requiring sidewalk buffers (planting strips or hardscape amenity zones, where appropriate) without the option of placing the sidewalk at the back of the curb, particularly for higher volume/higher speed roadway classifications.

Increase the minimum planting strip width to 6’. Four feet is the minimum width required to support healthy small to medium-sized trees, with greater widths preferred, and the CIMS Design Guidance Manual specifies a 3’ horizontal clearance between the curb and any obstructions, which is a good rule of thumb.

Make required modifications to the UDC and the Sidewalk and Driveway Design and Construction Guidelines for consistency within and between the two documents.

### Best Practices

- **City of Santa Fe, New Mexico - City Code, Article 14-9.2(E) Streets**
  
  Single table and accompanying graphical representation of the minimum required widths of streetscape elements by roadway functional class. In addition to clear definition, there is ample minimum width specified for sidewalks and planting strips (sidewalk setbacks) in each roadway functional class.

- **Austin, TX City Code, Article 2, subsection 2.2.1 - Overview of Roadway Types:**
  
  Sidewalks along Urban and Suburban roadways in non-residential zones shall be a minimum 12 feet in width, including a 7-foot street tree/furniture zone and 5-foot clear zone sidewalk zone regardless of available right-of-way.
Street Trees

Street trees provide buffer from moving vehicles as well as shade, both of which greatly improve the comfort and safety of sidewalks.

Sec. 35-512 – Streetscape Planting Standards:

- (a) Applicability
  - Streetscape planting standards shall not apply to any street classification unless street trees are required by the street improvement standards, subsection 35-506(d) (per tables 506-3 and -4 Streetscape planting is required on Collector and Arterial streets, as well as Lane, Local, Avenue, Main Street Boulevard and Parkway street classifications)
  - Expansion. When a building or parking lot is enlarged, the requirements of this section shall be applied incrementally such that landscaping shall be required in the same proportion that the enlarged building area or off-street parking area has to the existing development. For example, a ten (10) percent increase requires ten (10) percent of the required street trees, with a minimum of one (1) tree to be planted.
  - (b)(i) - As an alternative to the streetscaping requirement in the rights-of-way, requirements may be met by planting large to medium trees within the median.
  - (b)(2) - In no instance for the options established in subsection (b)(1)A, (b)(1)B, and (b)(1)C shall the distance between street trees exceed one hundred feet (100) on center.

Sec. 35-511-Landscaping, Subsection (e) (5) Street Trees - Twenty-five (25) points are awarded for the installation of large trees that meet the following requirements:

- The trees extend along a minimum of seventy-five (75) percent of the total frontage of the street yard of the parcel;
- The trees shall be spaced on average no more than fifty (50) feet apart measured from trunk to trunk provided the distance between trees does not exceed one hundred (100) feet; and
- The trees shall be located no more than seventeen (17) feet from the street right-of-way line.

Section. 35-209. – Form Based Development (only two designated form based development areas, so limited applicability.)

- Public frontages shall include street trees planted on average every 30 feet.

City of San Antonio Sidewalk and Driveway Design and Construction Guidelines:
Street trees may be located in the planting strip if trees are a minimum of three (3) feet from the curb.
Horizontal Clearance and Border Widths — Roadside obstructions should be located at or near the right-of-way lines and outside of the sidewalks to accommodate safety and sight distance requirements. Horizontal clearance to obstructions for curbed roadways should be a minimum of 1.5 feet, but desirably 3 feet or greater. Border widths can depend upon available right-of-way. Sidewalks, storm drainage, retaining walls, traffic control devices, and utilities should be accommodated in these areas.

Landscaping and Design Enhancements — Landscape and design enhancements are dependent upon the project type and, sometimes, the funding source. Plantings, architectural treatments, colors, art, etc., can enhance the roadway design to provide a finished product that users can enjoy. Along with beautification items, consideration for native plant establishing and maintaining plants through irrigation, and impact of the vegetation at maturity to the roadway, in the form of sight distance, should be included in the development of plans. In some cases, properly placed vegetation can provide a buffer and delineate travel ways for the various forms of traffic that use the public rights-of-way, such as separation between motor vehicles and pedestrians and bicyclists.

In the UDC the horizontal clearance for a tree is 3’ from curb in planting strip, but the minimum planting strip in UDC is only 3’ total thus not enough room for a tree to be planted to meet minimum clearance requirements.

Applicability is unclear – Sec. 35-512 (a)(1) states that Streetscape provisions are not applicable on existing exterior streets; however, other provisions imply otherwise.

One hundred feet maximum spacing between trees could result in sparsely planted streetscapes.

Street trees are also included in general landscaping requirements as an elective criterion. This provision allows trees to be planted up to 17 feet from the right-of-way line, which may detract from their effectiveness at visually constraining roadway (slowing vehicle speeds), or providing shade and sense of enclosure to pedestrians.

The CIMS Design Guidance Manual suggests placing all obstacles outside of the sidewalks, which would preclude the installation of street trees or other valuable buffers for pedestrians. The manual also notes that the preferred horizontal clearance between the curb and any required obstructions is 3’, which would preclude the installation of street trees where the minimum required planting strip is only 3’ in total.
### Recommendations

- Reduce average spacing for large trees from 50 feet to 30 feet. Spacing for medium and small trees should be no more than 20 feet on average.

- Reduce maximum spacing between trees from 100 feet to 75 feet, and allow this spacing only in situations where due to utility or driveway placement a tighter spacing is not feasible.

- Consider reducing maximum distance street trees can be from right-of-way line from 17 feet to 10 feet.

- Integrate sections within the CIMS Design Guidance Manual on ‘Horizontal Clearance and Boarder Width’ and ‘Landscape and Design Enhancements’ to consistently approach streetscape design for pedestrians and specifically the appropriate placement of street trees within roadway planting strips.

### Best Practices

- **Helotes** - Construction and renovation plans for commercial sites must include street tree plantings planted no greater than 15 feet on center or spacing otherwise established by the City for the street on which the plantings will be made. Trees shall be a minimum of 2 inch caliper and 8 feet in height at time of planting. Ch 94 Vegetation, 94-24(b)(1)(f)

- **Austin, TX City Code 25-2-760 – Streetscape Improvements:** A site owner shall plant trees along an adjacent street right-of-way such that upon maturity there is a contiguous tree canopy. Also tree grates shall be used when trees planted within sidewalk areas.
III. - Site Design  
**Driveway Design**

The design of sidewalks through driveways needs to clearly identify right of way and the expectation of crossings for both drivers and pedestrians. The speed of vehicles should be geometrically slowed to increase pedestrian safety at driveways.

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See 35-506 – Access and Driveways:  
Subsection (10)  
Driveway approach materials may be asphalt, concrete or other materials as approved by the development services director. Residential driveway approaches materials shall be concrete.

Sec. 35-339. – Urban Corridor Districts:  
The total width of driveways shall not exceed forty (40) percent of each street frontage, but in any event no less than one (1) driveway shall be permitted per platted lot.

City of San Antonio Sidewalk and Driveway Design and Construction Guidelines:  
CONCRETE DRIVEWAY GENERAL NOTES (p. C16)  
8. Where sidewalks cross driveways, the sidewalk cross slope shall not exceed 2%.

- Specify 2% cross slope and 1:12 maximum slope on sidewalk approaches to driveway  
- “Dummy” joints parallel to curb where sidewalk meets driveway and perpendicular to curb within boundary of the parallel joints, placed at intervals equal to the width of sidewalk.  
- Minimum/Maximum widths:  
  - Residential 10/20 feet  
  - Commercial one-way 12/20 feet  
  - Commercial two-way 24/30 feet

**Assessment**

Specifications call for sidewalk to be differentiated through driveways using joints.  
The requirement for at least one driveway per platted lot seems contrary to the provisions that provide for cross access between adjacent parcels.  
Minimum/maximum driveway widths are fairly wide.  
Curb design is not addressed.
**Recommendations**

Revise the Sidewalk and Driveway Design and Construction Guidelines, as well as add sections to UDC, to specify that continuous sidewalks should be carried through driveway openings through maintenance of sidewalk width, materials, vertical alignment, and cross-slope.

Consider reducing maximum widths for commercial driveways. Current guidelines allow maximum 30-foot width for two-way and 20-foot for one-way. These could be reduced to 24-foot and 14-foot, respectively, and still maintain access requirements.

COSA Capital Improvements Management Services - Design Guidance Manual - 2008 (p. 7-5) Include pedestrian and bicycle facility integration among the list of primary design considerations in the ‘Driveways and Intersections’ section.

Section 7 of the guidance manual may be an appropriate place to have a discussion about provision of barrier curbs (as opposed to mountable curbs) as well as reducing curb radii to the greatest extent possible while still accommodating fire vehicles and other traffic needs.

**Best Practices**

City of Seattle, Driveway Widths for Nonresidential uses: minimum 12 feet and maximum 15 feet for one-way driveways and minimum 22 feet and maximum 25 feet for two-way driveways.

City of Chicago Street and Site Plan Design Standards: Maximum driveway width is 25 feet for a two-way commercial driveway. Additional width may be granted (up to 35 feet) where there are truck turning movements or where two exit lanes are required to minimize delay and the need to signalize the exit driveway. Requires CDOT approval before permits can be issued.
## Access Management

Each driveway and curb cut is an intersection and potential point of conflict for pedestrians. The spacing and total number of driveways that pedestrians have to cross should be minimized, which also enhances overall roadway safety and traffic management.

<table>
<thead>
<tr>
<th>Code Citation</th>
<th>Section 35-506 (r) – Access and Driveways:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>(3) Commercial, Industrial and Medium or High Density Residential Developments - Lots in commercial, industrial and medium or high-density residential developments in the ETJ or in the “MF”, “NC”, “O”, “C”, “I-1”, or “I-2” zoning districts may have vehicular access from a thoroughfare. However, the number of access points permitted will be based on the following criteria:</td>
</tr>
<tr>
<td></td>
<td>(A) For lots with less than two hundred (200) feet of frontage, one (1) access point may be permitted; (B) for lots with a frontage of two hundred (200) feet or more, one (1) access point for every two hundred (200) feet of frontage will be permitted.</td>
</tr>
<tr>
<td></td>
<td>Driveway spacing will be in accordance with subsection (7) below, if applicable. All lots in “NC”, “O”, and “C” zoning districts with less than four hundred (400) feet fronting an arterial street shall provide for shared cross access with adjacent lots fronting the arterial, by means of platted common access easement across the lot or recorded deed covenant providing common access across the lot with adjacent lot(s).</td>
</tr>
<tr>
<td></td>
<td>(4) Additional Access Points - The director of planning and development services (or the Texas Department of Transportation, or county authority, if appropriate) is authorized to permit additional access points under the following conditions:</td>
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<tr>
<td></td>
<td>(A) The additional land; and access points are necessary to ensure the property owner beneficial use of the land; and</td>
</tr>
<tr>
<td></td>
<td>(B) The resulting additional ingress and egress of vehicles will not seriously disrupt the flow of traffic on the thoroughfare.</td>
</tr>
<tr>
<td></td>
<td>(5) Location of Access Points - Location of driveway shall (A) minimize conflicts with turning vehicles; (B) be located as far as practicable from intersections; (C) be not less than 50 feet from another driveway location. If this standard is not possible based upon the frontage of the property, the location shall be directed as far as practicable from the other driveway locations. Driveways along an arterial within four hundred (400) feet of a major intersection, such as the intersection of two (2) arterial streets or the intersection of a collector and an arterial street, may be restricted to right turn movements.</td>
</tr>
<tr>
<td></td>
<td>(7) Spacing and Location on Major Thoroughfares - A subdivision of land into two (2) or more lots fronting a major thoroughfare may not automatically increase the number of driveway approaches allowed over those allowed prior to the subdivision.</td>
</tr>
</tbody>
</table>

Sec 305-207.-Commercial Retrofit - Parking areas may be connected to rear parking lots on adjoining properties in order to allow customers to drive to other locations without re-entering the major roadway network and adding to traffic volumes.
### Assessment

Includes provisions for cross access with adjacent lots fronting the same arterial.

Figure 506-10 illustrates joint access concept, but there appear to be no accompanying provisions for joint access—may need to confirm with city.

Criteria for granting additional driveway access tied to impacts to traffic flow.

Minimum driveway spacing requirement could be strengthened.

Addresses placement of driveways as far as practicable from intersections.

Defines when right-in/right-out restrictions are appropriate.

Additional driveways may be allowed under Sec. 35-506 (r) (3) where there are no impacts on the thoroughfare, but there is no mention of impacts on pedestrian facilities.

### Recommendations

Criteria for granting additional driveway access should take pedestrian activity into account rather than just impacts to traffic flow.

Require joint access driveways on all lots with less than 400’ fronting an arterial street, or justification and supporting analysis for why this is not feasible.

Consider increasing minimum driveway spacing requirement from 50’ to 100’ (or greater) for two-way driveways except where not feasible due to lot frontage width. Minimum spacing for one-way driveways could remain at 50 ft.

Balcones Heights - Curb cuts onto a site’s front yard shall be minimized. Access to sites by a single mid-block entrance with cross access easements or by alleys behind buildings is required wherever feasible (Zoning Ordinance 2011, 4.3.3 (3)(a)).

Model Land Development and Subdivision Regulations that Support Access Management for Florida Cities and Counties

Ten Ways to Manage Roadway Access in Your Community, Center for Urban Transportation Research, University of South Florida

### Best Practices

Balcones Heights - Curb cuts onto a site’s front yard shall be minimized. Access to sites by a single mid-block entrance with cross access easements or by alleys behind buildings is required wherever feasible (Zoning Ordinance 2011, 4.3.3 (3)(a)).

Model Land Development and Subdivision Regulations that Support Access Management for Florida Cities and Counties

Ten Ways to Manage Roadway Access in Your Community, Center for Urban Transportation Research, University of South Florida
Off-Street Parking & Building Entrance Orientation

In addition to the discussion above about the design and frequency of driveways crossing the sidewalks, another important design consideration is how the sidewalk is connected to building entrances. Direct access must also be provided between building entrances and transit stops. This issue is linked with the design and orientation of off-street parking. The parking can present a physical barrier between adjacent building entrances depending on building placement. In addition, drivers become pedestrians upon exiting their vehicles and therefore pedestrian circulation within and through large parking lots needs to be considered.

ARTICLE V - DEVELOPMENT STANDARDS - Division 6 - Parking and Storage Standards 35-526 (k) - Rear Parking Design Standards. Parking in the rear of the principal use or principal building is encouraged. Off-street surface parking areas which are screened from the view of public streets by the principal buildings shall be exempt from the parking lot screening requirements of the landscaping standards of this chapter.

Generally not addressed in UDC except for:
Sec. 35-208. - Transit Oriented Development (applies to any use or development located within a transit-oriented development special district (“TOD”):
- A direct pedestrian connection shall be provided between the nearest transit stop and building entrances on the site.

A transit passenger landing pad accessible to disabled persons shall be provided.

Sec. 35-310.15. - “UD” Urban Development District:
A. At least one (1) direct pedestrian route shall be provided within the parking lot from the building to the furthest edge of the parking lot. The pedestrian route shall be separated from the parking stalls and drive lanes with a combination of landscaping and edging to protect pedestrians from the vehicular traffic flow in the parking lot. Where the pedestrian route crosses drive lanes the pedestrian path shall be clearly striped to warn vehicle drivers of the pedestrian crossing.

B. Direct access from the public sidewalk shall be provided into buildings, unless the building fronts a plaza, green, or courtyard.

Division 2. - Base Zoning Districts, Table 310-1:
- No minimum front setbacks for commercial zones, 10 to 15 feet for Urban Node and Mixed Residential districts.
- Establishes maximum front setbacks for some zones, including Multi-family (20 feet), Office (35 to 80 feet), Neighborhood Commercial (15 feet), Commercial-1 (20 feet), and Downtown (20 feet)
- Establishes maximum front setbacks ranging from 20 to 35 feet, and minimum front setbacks ranging from 0 to 10 for Urban Development Districts. These districts are intended to encourage compact, pedestrian- and transit-friendly commercial areas.
Sec. 35-339 – Urban Corridor Districts - Minimum building setbacks 0-30 feet for Collectors and Type A Arterials, 0-40 feet for Type B Arterials. Only two corridor districts have been designated, so this has limited applicability. Screening and permitted uses in street yard determined by base zone.

Sec. 305-206.-Commercial Retrofit
- Applicability. Existing parking lots adjoining the frontage of any site located within the “C-2”, “C-3”, “D”, “MXD” or “IDZ” zoning districts may be replaced with buildings. A density bonus may be permitted to encourage such activities pursuant to section 35-360 of this chapter.
- Maximum front setbacks on Parkways, Boulevards, and Avenues is 20 feet; Main Streets is 5 feet; Local and Lane type streets is 30 feet

Section 305-207. – Traditional Neighborhood Development - Subsection (m):
- (3) Parking lots shall be located at the rear or at the side of buildings.
- (4) Parking lots and parking garages shall not: (1) abut street intersections or civic use lots; (2) be located adjacent to parks or open space; or (3) occupy lots which terminate a street vista (see subsection (d)(3) of this section).
- (5) Parking lots shall be located in the interior of a block or shall take access from an alley.

Section 305-208.-Transit Oriented Development - Maximum front setback 15 feet.

Maximum setbacks and other provisions preclude parking from being located between building and street for majority of frontages in most districts.

No minimum setback requirements in most districts.

Requirement for at least one driveway per platted lot.

For Traditional Neighborhood Development it is clear that parking is to be located to side or rear of building. This is not explicit for other districts. Also unclear what percentage of frontage parking is allowed if to side of building.

Incentives in place for redeveloping parking lots located between existing buildings and street in commercial areas.
For all districts establish minimum standards for percent of street frontage occupied by building. A minimum of 50 percent of street frontage should contain building frontage where parking is permitted to side of building. In more pedestrian-oriented districts this percentage should be in the range of 75 to 80 percent.

Consider introducing incentives for providing pedestrian features such as additional sidewalk width, transit waiting areas, seating, and public spaces tied to setback requirements, building height, or density.

Coordinate with access management guidelines and driveway design.

Add minimum requirements and design guidance for designated pedestrian circulation through parking lots and generally connecting building entrances to sidewalks and transit stops.

Subdivision: Add provisions that discourage cul de sac development or require through-block pedestrian connections at cul de sac locations or within long blocks.

### Balcones Heights

- Any off-street parking area that directly abuts a pedestrian walkway shall incorporate landscape features along the perimeter of the parking lot. A minimum 5-foot landscape area shall be maintained between the public right-of-way and the off-street parking area. Zoning Ordinance 2011, 4.2.5(3)
- Pedestrian connections are required between parking lots on adjacent properties. Zoning Ordinance 2011, 4.3.3(c)(c)

### Cibolo

- When an off-street parking or vehicular use area abuts a public right-of-way, except a public alley, a perimeter landscape area of at least 15 feet in depth shall be maintained between the abutting right-of-way and the off-street parking or vehicular area. Landscape Ordinance, section 5.5

### Leon Valley

- Through-block connections, i.e. walkways: “Crosswalk ways six (6) to ten (10) feet in width, as determined by the city, shall be dedicated where deemed necessary by the city to provide circulation or access to schools, playgrounds, shopping centers, transportation and other community facilities, or to provide pedestrian circulation.” (Article 10.02 Subdivision Ordinance, 10.02.251(ii))
- A sidewalk, with a minimum width of six (6) feet excluding vehicular overhang, shall be provided adjacent to the parking spaces between the building and parking spaces Zoning Ordinance, Sec 14.02.441(c)(8)(E)(iv)
CHAPTER 6: DEVELOP AN IMPLEMENTATION STRATEGY AND PRIORITIES

This Plan is designed to be implemented. The recommendations are realistic and achievable because they are based on the latest best practices, detailed field work, and close coordination with the Study Oversight Committee. In most cases, the recommendations in this Plan will require additional traffic analysis and possible neighborhood involvement in order to ensure proper implementation. Implementation of this Plan will require a collaborative effort between the San Antonio-Bexar County Metropolitan Planning Organization, TxDOT, the City of San Antonio (Planning, Public Works, Metro Health, etc.), VIA Metropolitan Transit, Bexar County, municipal jurisdictions within Bexar County, PMAC, area school districts, citizens with disabilities, neighborhood associations, and others. Progress on implementing the Plan should be monitored on an annual basis with the goal of completing most of it over the next twenty years. This Chapter offers strategies to implement prioritize and monitor progress on Plan implementation.

I. Improvement Coordination

Construction and Reconstruction of Roadways
The construction of pedestrian infrastructure as part of normal public and private development, and the adoption of traffic management practices that are used to implement pedestrian infrastructure are known as “routine accommodations.” Routine accommodations are the most cost effective funding strategy for building pedestrian infrastructure. In many communities, the majority of pedestrian infrastructure is built in conjunction with other projects. The same applies to traffic management practices. All funding strategies begin with routine accommodation since it allows for significant improvements over time, even if there is no direct funding available for pedestrian improvements.

As part of routine accommodation, where new construction or reconstruction is anticipated, pedestrian facilities should always be considered at the inception of the project and incorporated from project scoping through each design phase. Additionally, certain Americans with Disabilities Act (ADA) such a curb ramps may be required as part of the project. Pedestrian facilities, as found in this Plan, would be installed as part of all public and private roadway projects. All resurfacing, repaving, and improvement projects should be evaluated to determine ADA requirements and whether it is possible to provide the pedestrian facility recommendations included in this Plan. Because roadways are built in phases, this method also requires that an interim facility be provided until all segments of the roadway are completed. This applies to both roads built with public funds and new roads built with private funds in new developments or redevelopments.
Retrofitting Existing Roadways

In many cases, there are roadways (includes sidewalks and pedestrian crossings) that need pedestrian facility improvements that are not candidates for new construction or reconstruction. In these cases, “set aside” funding for pedestrian (and bicycle) improvements will be necessary. Set asides are typically one of two types. In the first type, a percentage of a larger fund is set aside. For example, some transportation agencies set aside a percentage of their transportation funds for pedestrian projects; this may include capital funds and maintenance funds. The second set aside is typically with an independent funding source. Examples include sales tax (dedicated percentage), development funds (funds deposited by developers into a centralized fund), resource funds (taxes on extracted natural resources such as gravel or oil), and real estate excise funds (taxes on all sales of real estate). Each community will be different.

The advantage of dedicated funds is that they can provide an ongoing, dependable source of revenue for pedestrian safety improvements. The disadvantage, especially if they are a percentage of a larger fund, is that it may actually reduce the total number of dollars that are used to construct pedestrian facilities. Improvements that should be routine accommodation can be credited to set aside funds. In other words, if proper safeguards are not put in place, construction of pedestrian facilities may count as having fulfilled certain obligations under a percentage based set aside.

Institutionalize Planning and Design Guidelines and Standards

Perhaps no greater efficiencies can be gained for improving the walking environment than through institutionalization of pedestrian project and program activities. To be successful on a regional basis, processes need to be instituted for involving entire transportation agencies in promoting and looking out for the needs of pedestrians. This process has come to be called “institutionalization”. It occurs when the needs of pedestrians become part of the mission and corporate culture of a particular agency; it occurs when an entire organization is focused on reducing crashes involving pedestrians. It means that pedestrian safety and access are automatically included in all policies and projects.

Institutionalization begins with making changes to planning, design guidelines, and standards. The following is a list of documents that should be updated over time to include the policy and design recommendations found in the templates (Chapter 4), which are based on best practices found in the 2009 MUTCD and various AASHTO Guides.
**Policy documents:**
Local government agencies generally have policy documents that address transportation, land use, housing, recreation, shoreline preservation, the environment, and other topics. They articulate basic approaches to solving urban problems, setting priorities, and providing guidance for decision making. At any given time, one or more of these documents are probably being revised or reviewed. Pedestrian considerations should be integrated into these documents in conjunction with these periodic revisions. The intent is to change walking from being perceived as "alternative" activities to being treated as "mainstream" activities by including them in documents used by decision makers.

**Planning documents:**
Most local government agencies are involved in planning at some level. This could take the form of a single comprehensive plan or a decentralized plan that involves several documents. Typically, communities will have transportation, recreation, land use, and open space plans. They may also have separate transit plans. Increasingly, these documents are being taken more seriously when making funding decisions on capital projects due to Federal and State requirements. Consequently, it is critical to integrate pedestrian considerations into planning documents at the time they are revised or developed. Again, the intent is to include pedestrian considerations in the documents actually used by decision makers.

**Roadway / Street Design Manuals / Standard Plans and Specifications:**
Local street design manuals and specifications define standards for designing streets and sidewalks and are thus critical to pedestrians. Traffic control policies are also important since they guide signal timing, channelization and signing. At the minimum, they should include designs and specifications for pedestrian facilities from the 2009 MUTCD. Again, at any given time, one or more of these documents are likely being revised or reviewed. Pedestrian considerations should be integrated into these documents in conjunction with these periodic revisions.

**Maintenance Schedules/Procedures:**
Since sidewalks are where debris, vegetation, and water are most likely to collect, it is important that sidewalks with heavy pedestrian traffic receive special maintenance attention. While most local units of government have regular maintenance schedules for sweeping streets, filling potholes, cutting back vegetation, and cleaning drainage inlets, they may not be aware of the special needs of pedestrians. Additionally, they generally do not have the resources to maintain every street right-of-way at an optimal level. Working with maintenance supervisors, maintenance schedules should be developed that ensure heavily used sidewalks will receive an adequate level of maintenance.

**Curbside Management:**
Curbside management is often overlooked when considering pedestrian safety. Painting and signing curbs to indicate setbacks from crosswalks and other parking restrictions that ensure good sight distances for pedestrians crossing the street is critical. It is one of the cheapest and most cost effective ways to improve visibility of pedestrians crossing the street.

Restricting parking at the approach to an intersection improves visibility of pedestrians crossing the street.
pedestrian safety. Transportation agencies should “institutionalize” curbside management in their standard practices to ensure pedestrians always have the best possible chance of seeing and being seen when they cross the street.

**Internal & External Training:**
Providing training workshops once or twice a year on the latest AASHTO guidelines, MUTCD standards, and best practices in pedestrian facility design may be one method for assisting local agencies in identifying necessary updates to their standard specifications. Developing a checklist that can be used by local agencies to audit their specifications and identify needed changes based on the latest standards and guidelines may be another method for encouraging uniformity in design practices.

**II. Improvement Prioritization**

Developing prioritization guidelines along with specific recommendations ensures that scarce resources will be focused on those projects and programs are most likely to improve safety and accessibility for pedestrians. Priorities should be set based stakeholder input, crash data, and research that identify best practices and crash reduction factors.

**Stakeholder Priorities**

Chapters 2 and 3 describe three different forums that were used to collect stakeholder priorities: 1) a Stakeholder Roundtable Workshop, 2) an on-line interactive map, and 3) an on-line survey. Taken together, they provide an excellent place to start when determining where to focus pedestrian improvements.

**Table 6-1: Priority Areas for Pedestrian Improvements**

<table>
<thead>
<tr>
<th>Priority Destination/Location</th>
<th>Priority Facility Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools (safe routes to school)</td>
<td>Better maintain existing sidewalks</td>
</tr>
<tr>
<td>Transit Stops – sidewalk access; street crossings</td>
<td>Remove barriers from existing sidewalks</td>
</tr>
<tr>
<td>High Density Neighborhoods</td>
<td>Install missing links in the sidewalk network</td>
</tr>
<tr>
<td>Downtown San Antonio</td>
<td>Improve difficult street crossings</td>
</tr>
<tr>
<td>Underserved Areas (see Appendix C for map)</td>
<td>Separate sidewalks from moving traffic</td>
</tr>
<tr>
<td>Employment Centers</td>
<td>Better lighting</td>
</tr>
</tbody>
</table>

**Near-Term Implementation**

Spot Locations: In general, pedestrian crashes, unlike motor vehicle crashes, are not overly concentrated at spot locations. High crash locations are infrequent. The review of crashes over a three-year period identified only twenty locations with more than four crashes. Due to the infrequent nature of pedestrian crashes there may not be a specific countermeasure that addresses all crashes at a specific high crash location. In the near term, the crash reports should be reviewed and the locations studied for possible improvements. Factors to review include curb radii and their relation to turning speeds, presence and condition of curb ramps, signal timing and the condition of marked crosswalks and signs.
**Table 6-2: Intersections with High Crash Counts**

<table>
<thead>
<tr>
<th>Intersection Locations with 6 or 7 Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guadalupe and S Zarzamora</td>
</tr>
<tr>
<td>Broadway and Burr Rd</td>
</tr>
<tr>
<td>E Commerce St and N St Mary’s St</td>
</tr>
<tr>
<td>W Commerce St and S Flores St</td>
</tr>
<tr>
<td>E Travis St and N St Marys St</td>
</tr>
<tr>
<td>Nassau Dr and West Ave</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intersections Locations with 8 or 9 Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Zarzamora and Ceralvo St</td>
</tr>
<tr>
<td>E Commerce St and Navarro St</td>
</tr>
<tr>
<td>W Commerce St and N Frio St</td>
</tr>
<tr>
<td>W Commerce St and N Zarzamora St</td>
</tr>
<tr>
<td>W Cypress St and San Pedro Ave</td>
</tr>
<tr>
<td>E Hutchins Pl and Pleasanton Rd</td>
</tr>
<tr>
<td>S New Braunfels Ave and Avondale Ave</td>
</tr>
<tr>
<td>W Durango Blvd and S Flores St</td>
</tr>
<tr>
<td>Dolorosa St and S Flores St</td>
</tr>
<tr>
<td>W Commerce St and S Panam Expressway</td>
</tr>
<tr>
<td>E Laurel St and McCullough Ave</td>
</tr>
<tr>
<td>Broadway and E Josephine St</td>
</tr>
<tr>
<td>Fredericksburg Rd and Callaghan Rd</td>
</tr>
<tr>
<td>McCarty Rd and San Pedro Ave</td>
</tr>
</tbody>
</table>

Note: This table does not differentiate between causes of crashes.

**Medium-Term Implementation**

Corridors: Higher concentrations of crashes were evident in 20 corridors throughout the region. Problems were identified at sequential intersections and along the roadside of corridors. Along corridors, there can be a relationship between the number of pedestrians present and the volume of traffic. While there are countermeasures that can address improved safety at specific locations along a corridor, more often a systematic, corridor-wide improvement approach is required. Over time, the crash reports should be reviewed and corridors studied for possible improvements. To successfully reduce crashes, a variety of countermeasures will likely need to be applied throughout the corridor, not just at a single location. Two sample corridor projects discussed in Chapter 4 and should be used as models for addressing higher crash corridors.
Corridors with Concentrations of Crashes

<table>
<thead>
<tr>
<th>Corridors with Concentrations of Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW W White Road: Farm to Market Road 1346 to Martin Luther King Dr</td>
</tr>
<tr>
<td>Perrin Beitel Rd: Wurzbach Pkwy to Longvale Dr</td>
</tr>
<tr>
<td>San Pedro Ave: Sahara Dr to NE Loop 410</td>
</tr>
<tr>
<td>San Pedro Ave: W Woodlawn Ave to I-35</td>
</tr>
<tr>
<td>Farm to Market Road 2696/Blanco Rd: Vista View St to West Ave</td>
</tr>
<tr>
<td>Broadway St: E Grayson St to Geneseo Rd</td>
</tr>
<tr>
<td>Fredricksburg Rd: I-10 to Wurzbach Rd</td>
</tr>
<tr>
<td>N Zarzamora St: Culebra Rd to Ceralvo St</td>
</tr>
<tr>
<td>Buena Vista St: W Old Us Highway 90 to S Frio St</td>
</tr>
<tr>
<td>Pleasanton Rd: W Gerald Ave to Gillette Blvd</td>
</tr>
<tr>
<td>S Flores St: Theo Ave to E Harding Blvd</td>
</tr>
<tr>
<td>SE Military Dr: Roosevelt Ave to Bynum Ave</td>
</tr>
<tr>
<td>St Marys St: El Durango Blvd to Pereida St</td>
</tr>
<tr>
<td>Basse Rd: Treeline Park to McAllister Freeway</td>
</tr>
<tr>
<td>Hildebrand Ave: Trinity University to McDermott Freeway (identified in survey only, not a high collision corridor)</td>
</tr>
<tr>
<td>Roosevelt Ave: Weaver St to Riverside Dr (identified in survey only, not a high collision corridor)</td>
</tr>
<tr>
<td>Nacogdoches Rd: Naco Perrin Blvd and Wayward Dr (identified in survey only, not a high collision corridor)</td>
</tr>
<tr>
<td>Bandera Rd: Guilbeau Rd to Huebner Rd Dr (identified in survey only, not a high collision corridor)</td>
</tr>
</tbody>
</table>

Note: This table does not differentiate between causes of crashes.

*See Crash Data Maps in Appendix D

**Long-Term Implementation**

Crash Reduction Factors: Over time, the recommendations found in the forty-three templates in Chapter 4 should be integrated into appropriate planning and design documents (see earlier discussion on institutionalization). The following is a list of countermeasures organized by their crash reduction factor (numbers correspond to numbered list of countermeasures in Chapter 4). The more effective the countermeasure, the higher it is on the list. Countermeasures with high crash reduction factors should be given priority consideration. Column three of Table 6-4 notes whether the cost of the countermeasure is low, medium, or high. This is somewhat subjective since there are some many variables involved in costing projects. However, it provides a place to start when thinking about prioritizing improvements. In general, signs and paint are low cost, minor concrete work and signal modifications are medium cost, and major traffic revisions, new signals, and substantial concrete work are high cost. It may be useful to think of implementing some low cost countermeasures in the near or medium term.
Table 6-4: Countermeasures in order of High to Low Pedestrian Crash Reduction Factors

<table>
<thead>
<tr>
<th>Corresponding Number in Chapter 4 Countermeasures</th>
<th>Countermeasures</th>
<th>Pedestrian Crash Reduction Factor (Percentage)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>Mini-Traffic Circles</td>
<td>90</td>
<td>medium</td>
</tr>
<tr>
<td>21</td>
<td>Sidewalks</td>
<td>88*</td>
<td>high</td>
</tr>
<tr>
<td>8</td>
<td>Rectangular Rapid Flash (all roadway users)</td>
<td>80 to 88</td>
<td>medium</td>
</tr>
<tr>
<td>4</td>
<td>Protected Left Turn Phase</td>
<td>70 to 80</td>
<td>medium</td>
</tr>
<tr>
<td>14</td>
<td>Illumination at Pedestrian Crossings</td>
<td>42 to 78</td>
<td>medium</td>
</tr>
<tr>
<td>37</td>
<td>Right In Right Out Driveways</td>
<td>72</td>
<td>low</td>
</tr>
<tr>
<td>13</td>
<td>Medians (un-signalized)</td>
<td>60</td>
<td>high</td>
</tr>
<tr>
<td>11</td>
<td>Crossing Island</td>
<td>56</td>
<td>medium</td>
</tr>
<tr>
<td>12</td>
<td>Marked Crosswalk Alignment</td>
<td>54</td>
<td>high</td>
</tr>
<tr>
<td>13</td>
<td>Medians (with marked xwalk)</td>
<td>46</td>
<td>high</td>
</tr>
<tr>
<td>13</td>
<td>Medians (with unmarked xwalk)</td>
<td>39</td>
<td>high</td>
</tr>
<tr>
<td>40</td>
<td>Parking Restrictions at Intersections</td>
<td>30</td>
<td>low</td>
</tr>
<tr>
<td>38</td>
<td>Road Diet</td>
<td>29</td>
<td>high</td>
</tr>
<tr>
<td>1</td>
<td>Pedestrian Countdown Signal and Timing</td>
<td>25</td>
<td>medium</td>
</tr>
<tr>
<td>9</td>
<td>High Visibility Crosswalk</td>
<td>20 to 29</td>
<td>low</td>
</tr>
<tr>
<td>15</td>
<td>Illumination Along Corridors</td>
<td>25</td>
<td>high</td>
</tr>
<tr>
<td>27</td>
<td>Pedestrian Crossing Warning Signs</td>
<td>15</td>
<td>low</td>
</tr>
<tr>
<td>26</td>
<td>Right Turn on Red Restrictions</td>
<td>10</td>
<td>low</td>
</tr>
<tr>
<td>3</td>
<td>Leading Pedestrian Interval (LPI)</td>
<td>5</td>
<td>medium</td>
</tr>
</tbody>
</table>

*Along the roadway crashes are typically very low as a percentage of all pedestrian (most pedestrian crashes occur crossing the street). Sidewalks reduce those crashes that do occur along the roadway by 88%.

Funding Criteria: There are two things that should be considered by transportation agencies when looking at prioritization and funding criteria:

1. The funding criteria should give higher scores to those projects that include pedestrian safety elements such as intersection improvements

2. The funding criteria should allow for pedestrian projects (those likely to reduce crashes) to compete for the funding independently of a larger project (all funding sources should be available for pedestrian-only projects)

Targeted Areas: Several areas with disproportional pedestrian crash rates were identified in the review of crash rates throughout the region (Appendix D). In many cases, problems such as speeding on residential streets repeated itself where roadway conditions and characteristics were similar throughout the neighborhood. Solutions are very likely to be the same all around a target area. The two example neighborhood areas discussed in Chapter 4, Palm Heights and
Spring Creek, should be prioritized along with other neighborhoods to determine the order in which they should be addressed.

School walking routes are good starting points for pedestrian improvements in targeted neighborhoods because they target safety for children and can be coupled with educational programing that promote healthy life styles and safe behavior from an early age. Funding is available for SRTS programing and infrastructural improvements through the San Antonio Bexar County Metropolitan Planning Organization (MPO).

III. Commitment to Modifications

Determining who will implement the Plan - Recommendations
To maintain momentum for the Plan, it is important to stay in touch with the people in the public and private sector that have an interest in Plan implementation. These champions of the Plan will help ensure that no opportunities for implementing the Plan are missed. The PMAC mailing list is a good start and should be expanded and maintained.

Numerous agencies and organizations (members of PMAC, the Transportation Policy Board, and others) will have a role to play in implementing the Plan. Historically, the MPO has spearheaded region-wide pedestrian planning. The MPO should continue its leadership role, working closely with the City of San Antonio, VIA Metropolitan Transit, Bexar County, TxDOT, FHWA, Alamo Area Council of Governments (AACOG), and other municipalities and the public in implementing the recommendations in this Plan. To assist with the institutionalization of pedestrian policies, projects and programs, all communities should be encouraged to have a pedestrian coordinator position. Most importantly, the City of San Antonio will need to take more responsibility for implementing some of the key provisions in this Plan. In addition, VIA’s long-range plan should integrate pedestrian facilities into implementable actions and consider pedestrian improvements as part of each transit project.

This Plan envisions a fairly aggressive pace for pedestrian facility implementation throughout the region. It will be necessary to provide appropriate staffing in order to administer programs, design projects, monitor progress, conduct public outreach, and perform other tasks related to implementation of the Plan. Expertise and commitment will be required at each implementing agency in order to implement this Plan within the timeframe identified. The City of San Antonio along with agencies and municipalities within the region may need to devote more staff time to implementing pedestrian improvements.
Establishing Performance Measures

Long-Term Performance Measures

1. **Pedestrian Counts**: Pedestrian counts should be taken at up to 30 locations throughout the region every other year to benchmark the amount of walking in the region. Count locations could include Downtown, locations near schools, arterial roadways with high volumes of buses, and intersections of arterial roadways with existing or planned pedestrian facilities. The official counts for this performance measure should be taken around the same date each year, on the same day of the week, and under similar weather conditions. In other cases, one-time before and after counts should be taken to measure increases in pedestrian use related to a specific improvement such as a new sidewalk. The National Bicycle and Pedestrian Documentation Project provides more guidance on dates, times, locations and methods to follow for consistent counts.\(^1\)

   Additional pedestrian counts may be obtained by requiring pedestrians to be included in current manual traffic counts. This data set would not represent all pedestrian activity throughout the region, but would begin to provide some basic data on the use of pedestrian facilities. Counts may also include observations of important pedestrian behaviors, such as crossing with the signal. The assistance of local pedestrian advocacy and other organizations may be required to complete these counts. Pedestrian counting technologies, such as video and infrared detection should be explored for counts in all types of locations.

2. **Pedestrian Crashes**: The number of reported pedestrian crashes should be compared to the total number of pedestrians observed during the biennial pedestrian count and annual traffic volumes. This measure would compare pedestrian crash trends (as reported in police records) in terms of pedestrian exposure. Exposure would be approximated using one or more of the following: the annual pedestrian counts at up to 30 locations throughout the city; or the total number of bus trips reported by VIA Metropolitan Transit (every transit trip is also involves a walk trip). The number of reported pedestrian crashes should also be normalized by changes in annual traffic volumes, as observed at a consistent sample of locations (such as regular traffic count locations). It should be noted that police reported crashes do not represent all pedestrian collisions.

\(^1\) [http://bikepeddocumentation.org/](http://bikepeddocumentation.org/).
Strategic Performance Measures

Strategic performance measures calculate the amount of progress that has been made toward specific 2021 performance targets. Strategic Performance Measures are not comprehensive measurements but are used as indicators of positive change.

1. Percentage of pedestrian-related intersection improvements completed (see list under “Near-Term Implementation”). This measure will track progress toward completing all the intersection improvements recommended in the Plan.

2. Percentage of pedestrian-related corridor improvements completed (see list under “Medium-Term Implementation”). This measure will track progress toward completing all the corridor improvements recommended in the Plan.

3. Percentage of pedestrian-related design improvements institutionalized (43 templates – Chapter 4). This measure will track progress toward completing all the design improvements recommended in the Plan.

4. (Recommended for VIA consideration.) Percentage increase in the number of pedestrians carried on VIA buses. This measure would include all routes served by VIA throughout the region.

5. (Recommended for area schools, pedestrian and neighborhood organizations, and organizations that put on special events.) Track the percentage increase in the number of residents participating in pedestrian or pedestrian safety education programs or events. Area pedestrian and neighborhood organizations should track the number of participants in education or encouragement activities (e.g., Bike to Work Day, pedestrian commuter classes, pedestrian safety training, pedestrian camps).

6. Percentage of targeted staff who participate in training on pedestrian planning, design, and engineering issues. This measure will help indicate the level of training that is provided on pedestrian issues. The following types of staff should receive pedestrian training: planners, designers, engineers, project managers, staff working on projects with signs and paint, staff working on signals, crew chiefs, and field crews. Local agencies should take advantage of everyday opportunities to provide these targeted staff with pedestrian training. This includes Complete Streets training, field demonstrations of products (e.g. crosswalk markings), ProWalk/ProBike conference sessions, mobile workshops, walking audits, and FHWA sponsored workshops and trainings.

7. Track the extent to which land-use recommendations (Chapter 5) are incorporated into the UDC and land-use codes of area jurisdictions.

8. In the City of San Antonio, in accordance with SA2020 Plan, track miles of Complete Streets to reach plan goals of tripling the mileage of streets meeting significant goals of Complete Streets by 2020.
Creating Accountability to Monitor Progress on Plan Implementation

The San Antonio-Bexar County Metropolitan Planning Organization should monitor overall progress of Plan implementation. This includes monitoring long-term and strategic performance measures as previously described. The Transportation Policy Board, Technical Advisory Committee, and the PMAC also have a role to play as advocates for promoting and monitoring Plan implementation with the various governmental and non-governmental organizations they represent.

There should also be a formal process of accountability for Plan implementation. PMAC is the logical choice since it is a diverse group of pedestrians and interests whose mission is to work with the San Antonio-Bexar County Metropolitan Planning Organization on related issues.

Responsibilities

PMAC: Initial responsibility is with the Pedestrian Mobility Advisory Committee members and MPO staff to educate and inform their respective departments, agencies, municipalities, and county about the existence of the plan. This is to ensure buy-in for implementation throughout the region.

Annual Work Plan: The first year’s goal is for adoption of the plan by the municipalities, county and agencies. Thereafter, the PMAC will develop a proposed work plan for the coming year. This plan will be reviewed by the Technical Advisory Committee (TAC) and adopted by the Transportation Policy Board (TPB). The work plan should be related to the implementation goals in the Plan (e.g. Improvement Coordination and Prioritization discussed earlier). For example, it might say that the MPO will work with the City of San Antonio to identify and provide expertise in studying a high crash corridor for possible improvements. Limits of what an MPO can and cannot do must be recognized. The San Antonio-Bexar County Metropolitan Planning Organization does not build things; but it can influence and facilitate funding and public policy. The work plan should be short (under ten pages) and focused, with measurable deliverables.

<table>
<thead>
<tr>
<th>Example Work Plan Schedule: 2 Year Cycle by Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Item (Responsible Party)</td>
</tr>
<tr>
<td>Work Plan Development (PMAC)</td>
</tr>
<tr>
<td>Review and Adoption of Work Plan (TAC &amp; TPB)</td>
</tr>
<tr>
<td>Work Plan Implementation</td>
</tr>
<tr>
<td>Quarterly Progress Update (PMAC)</td>
</tr>
<tr>
<td>Annual Progress Report (PMAC)</td>
</tr>
</tbody>
</table>

Examples of possible deliverables based on plan goals and performance measures:

- Development of Safe Routes to School work plans for 5 regional elementary schools
- Study and implement one Priority Corridor for Pedestrian Improvements
- Study one each: High Density Neighborhood, Underserved Area, high use transit corridor
- Create a base line by identifying the number of existing Complete Streets in the region.
Review: Once a year, the PMAC will provide the MPO’s Technical Advisory Committee and the Transportation Policy Board a review of the previous year’s accomplishments based on the goals set. This short (fewer than 5 pages) report will summarize all the work products completed in the region for the year, along with a “big picture” review of where things are in relation to completing various elements of the Plan. The report will be based on the previous year’s work plan.

In addition, since the Pedestrian Safety Action Plan is based on current concepts it should be reviewed every three to five years for content and updates.

Feedback: PMAC should provide timely review and feedback on the annual work plan and report card. Comments provided by PMAC could be provided at a monthly meeting or in a written format. The point is to establish a feedback loop that creates accountability and a mechanism for developing the next year’s work plan.
GLOSSARY OF TERMS

Accessible--meets the requirements of ADAAG (see below) in accommodating wheelchairs and other disabled users.

Accessible Pedestrian Signal (APS)--a device that communicates information about pedestrian signal timing in a nonvisual format including audible tones, verbal messages, and/or vibro-tactile information.*

Americans with Disabilities Act Accessibility Guidelines (ADAAG)--provides scoping and technical specifications for new construction and alterations undertaken by entities covered by the ADA. *

Americans with Disabilities Act of 1990 (ADA)--Federal law prohibiting discrimination against people with disabilities. Requires public entities and public accommodations to provide accessible accommodations for people with disabilities. *

Approach--section of the accessible route that flanks the landing of a curb ramp. The approach may be slightly graded if the landing level is below the elevation of the adjoining sidewalk. *

Arterial--signalized streets that serve primarily through traffic and provide access to abutting properties as a secondary function.

Audible Warning--see Accessible Pedestrian Signal. *

Barrier--an object that blocks access to, or use of an area.****

Barrier Curb—see Vertical Curb. *

Bollards--a barrier, typically a rigid post, placed in a roadway or path so as to limit access or traffic of certain widths or types****

Bulb-Out--see Curb Extension. *

Collector--surface street providing land access and traffic circulation within residential, commercial, and industrial areas. *

Commercial Facility--a facility that is intended for nonresidential use by private entities and whose operation bring about commerce. *

Complete Streets--the policy/concept where the entire right of way is planned, designed and operated for all users: pedestrians, bicyclists, transit-users, and motorists.****

Crash Reduction Factor (CRF)--Factor based on research that has been conducted on the effectiveness of specific treatments to reduce crashes.
Cross Slope—the slope measured perpendicular to the direction of travel. *

Crossing Treatment—a physical treatment of a crosswalk to make it safer and more convenient for pedestrian travel; may include such elements as crosswalk markings, median refuges, or curb extensions.***

Crosswalk—that part of a roadway at an intersection that is included within the extensions of the lateral lines of the sidewalks on opposite sides of the roadway, measured from the curbline, or in the absence of curbs from the edges of the roadway, or in the absence of a sidewalk on one side of the roadway, the part of the roadway included within the extension of the lateral lines of the sidewalk at right angles to the centerline. Also, any portion of a roadway at an intersection or elsewhere that is distinctly indicated for pedestrian crossing by lines or other markings on the surface. *

Curb Extension—a section of sidewalk extending into the roadway at an intersection or midblock crossing that reduces the crossing width for pedestrians and may help reduce traffic speeds. *

Curb Ramp—a combined ramp and landing to accomplish a change in level at a curb. This element provides street and sidewalk access to pedestrians using wheelchairs. *

Detectable Warning—standardized surface feature built in, or applied to, walking surfaces or other elements to warn pedestrians with vision impairments of hazards on a sidewalk and or loading platform, such as the curb line or drop-off. *

Diagonal Curb Ramp—curb ramp positioned at the apex of the curb radius at an intersection, bisecting the corner angle. *

Drainage Inlet—site where water runoff from the street or sidewalk enters the storm drain system. The openings to drainage inlets are typically covered by a grate or other perforated surface to protect pedestrians. *

Driveway Crossing—extension of sidewalk across a driveway that meets the requirements Of ADAAG. *

Feasible—capable of being accomplished with a reasonable amount of effort, cost, or other hardship. With regard to ADA compliance, feasibility is determined on a case-by-case basis. *

Flare—sloped surface that flanks a curb ramp and provides a graded transition between the ramp and the sidewalk. Flares bridge differences in elevation and are intended to prevent ambulatory pedestrians from tripping. Flares are not considered part of the accessible route. *

Gap—(1) an opening embedded in the travel surface. Railroad and trolley tracks and concrete joints are common gaps that pedestrians muse negotiate. Wheelchair casters and tires of road bicycles can get caught in poorly placed gap openings; or (2) a break in the flow of vehicular traffic, sufficiency long enough for a pedestrian to
cross to the other side of the street or co a place of refuge.

**Grade**--the slope parallel to the direction of travel that is calculated by dividing the vertical change in elevation by the horizontal distance covered, measured in percent.

**Grade-Separated Crossing**--a facility such as overpass, underpass, skywalk, or tunnel that allows pedestrians and motor vehicles to cross each other at different levels.

**Grate**--a framework of latticed or parallel bars that prevents large objects from falling through a drainage inlet but permits water and some sediment to fall through the slots. Wheelchair casters and tires of road bicycles can get caught in poorly placed grate openings.

**Guidestrip**--some type of raised material with grooves that pedestrians with vision impairments use for cane directional cues. For example, guide strips may be used by pedestrians with vision impairments to navigate a crosswalk, track to an emergency exit, or access the door of a light rail system.

**Gutter**--trough or dip used for drainage purposes that runs along the edge of the street and curb or curb ramp.

**Hearing Impairment**--condition of partial or total deafness.


**Intersection**--area where two or more pathways or roadways meet.

**Kinesthetic**--sensory experience derived from the movement of the body or limbs.

**Landing**--level area of sidewalk at the top or bottom of a ramp.

**Local Road**--road that serves individual residences or businesses, and/or distributes traffic within a given urban or rural area.

**Locator Tone**--a repeating sound informs approaching pedestrians that they are required to push a button to actuate the pedestrian signal. This tone enables pedestrians which vision impairments to locate the pushbutton.

**Median Island**--an island in the center of a road that physically separates the directional flow of traffic and can provide pedestrians with a place of refuge and reduce the crossing distance between safety points.
Midblock Crossing—a crossing point positioned within a block rather than at an intersection.

Minimum Clearance Width—the narrowest point on a sidewalk or trail. A minimum clearance width is created when obstacles, such as utility poles or tree roots. Protrude into the sidewalk and reduce the design width.

Mountable Curb—see sloping curb.

New Construction—project where an entirely new facility will be built from the ground up.

Obstacle—an object that limits the horizontal or vertical passage space, by protruding into the circulation route and reduces the clearance width of a sidewalk.

Parallel Curb Ramp—curb ramp design where the sidewalk slopes down on either side of a landing. Parallel curb ramps require users to turn before entering the street.

Passing Space—section of path or sidewalk wide enough to allow two wheelchair users to pass one another or travel abreast.

Path or Pathway—track or route along which pedestrians are intended to travel.

Paving Treatment—the application of materials, utilitarian and/or decorative, to mark, level and condition pathway and roadway surfaces.

Pedestrian—a person afoot or in a wheelchair.

Pedestrian-Access Route—a continuous, unobstructed path connecting all accessible elements of a pedestrian system that meets the requirements of ADAAG.

Pedestrian-Actuated Traffic Control—pushbutton or other control operated by pedestrians designed to interrupt the prevailing signal cycle to permit pedestrians to cross a signalized intersection or midblock crossing.

Pedestrian Connection—a sidewalk, pathway, trail, or other pedestrian facility not situated along a street. This may occur as a walkway within a public right-of-way where no street has been built, in a public walkway easement on private property, or as a trail in a park or other open space.

Perpendicular Curb Ramp—curb ramp design where the ramp path is perpendicular to the edge of the curb.

Ramp—sloped transition between two elevation levels.

Right-of-Way—real property rights (whether by fee-simple ownership, by easement, or by other agreement) acquired across land for a public purpose, including pedestrian use.
Routine Accommodation--the planning, design, construction, reconstruction, or operation of highways and other transportation infrastructure by local agencies which fully consider and accommodate all users of the highway as needed to provide for reasonably safe and convenient travel.****

Rural--areas outside the boundaries of urban areas. *

Safe Routes to Schools (SRTS)--a program focusing efforts on improving the paths and routes used by children to commute to and from school.

Set-back—the distance between a structure, such as a building, and the property line.

Shared Use Path—a bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. **

Shy Distance--area along sidewalk closest to buildings, retaining walls, curbs, and fences generally avoided by pedestrians. *

Sidewalk--paved pathway paralleling a highway, road, or street intended for pedestrians.*

Sight Distance--the length of roadway visible to a driver or pedestrian; the distance a person can see along an unobstructed line of sight. *

Sloping Curb—a curb with a sloping face, usually on the order of 30-to-45 degrees from vertical, that can be traversed in emergency situations. *

Street Furniture Zone--a linear portion of the sidewalk corridor, adjacent to the curb that contains elements such as street trees, signal poles, utility poles, street lights, controller boxes, hydrants, traffic signs, street signs, parking signs, parking meters, driveway aprons, planting strip, or street furniture.***

Suburban--built up area surrounding a core urban area. *

Tactile Warning--change in surface condition providing a tactile cue to alert pedestrians with vision impairments of a potentially hazardous situation. *

Touch Technique--environmental scanning method in which a blind person arcs a cane from side to side and touches points outside both shoulders. Used primarily in unfamiliar or changing environments, such as on sidewalks and streets. *
Transportation Agency—Federal, state, or local government entity responsible for planning and designing transportation systems and facilities for a particular jurisdiction.

Transportation Equity Act for the 21st Century (TEA-21)—Federal legislation authorizing highway, highway safety, transit, and other surface transportation programs from 1998 through 2003. It provides funding opportunities for pedestrian, bicycling and public transit facilities, and emphasizes intermodalism, multimodalism, and community participation in transportation planning initiated by ISTEA.

Truncated Domes—small domes with flattened tops used as tactile warning at transit platforms and at other locations where a tactile warning is needed.

Uncontrolled Intersection—an intersection without a traffic light or other traffic control device to regulate traffic flow.

Uniform Federal Accessibility Standards—accessibility standards that all Federal agencies are required to meet. Includes scoping and technical specifications.

Urban—places within boundaries set by state and local officials, having a population of 5000 or more. Urban areas are often densely populated and contain a high density of built structures.

U.S. Access Board (United States Architectural and Transportation Barriers compliance Board)—Federal agency responsible for developing Federal accessibility guidelines under the ADA and other laws.

Vertical Clearance—minimum unobstructed vertical passage space required along a sidewalk or trail. Vertical clearance is often limited by obstacles such as building overhangs, tree branches, signs, and awnings.

Vertical Curb—a steep-faced curb, designed with the intention of discouraging vehicles from leaving the roadway.

VIA Metropolitan Transit—San Antonio area transportation agency.

Vision Impairment—loss or partial loss of vision.

Visual Warning—use of contrasts in surface to indicate a change in environment, as at a curb ramp where the sidewalk changes to the street.

Walk Interval—traffic signal phase in which the WALKING PERSON (symbolizing WALK) signal indication is displayed.

Walkway—a pedestrian facility, whether in the public right-of-way or on private property, which is provided for the benefit and use of the public.
Wayfinding—a system of information comprising visual, audible, and tactile elements that helps users experience an environment and facilitates getting from point A to point B.

Width, Sidewalk—Total width of a sidewalk includes obstructions and begins at the edge of a roadway to the side of a building. Clear width is the portion of sidewalk that excludes obstructions and any attached curb. Effective width is the portion of dear width that excludes any shy distances.*

****City of Santa Rosa Pedestrian Master Plan.
REFERENCES

Chapter 1

A Resolution Supporting a “Complete Streets” Policy. San Antonio –Bexar County Metropoli-
toniompo-resolution.pdf.

Program Basics: Walkable community Program Process. San Antonio –Bexar County Metro-
politan Planning Organization. http://www.sametroplan.org/WCP/Walkable%20Commu-

City of San Antonio American’s with Disabilities Act (ADA) Pedestrian Transition Plan Sum-
mary. City of San Antonio. http://www.sanantonio.gov/ada/ADATransitionPlanFinalSum-
mary.asp?res=1600&ver=true.

sanantonio.gov/oep/sabikes/bicycleMP.aspx.


safe_routes/default.htm.

Chapter 2

How to Create a Pedestrian Safety Action Plan. C.V. Zegeer, L. Sandt, and Margaret Scully,
U.S. Department of Transportation, Federal Highway Administration, Report No. FWHA-
pdf.

Chapter 4


U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA-
page3.cfm.


Highway Research Program, Transportation Research Board, Report No. 117B, Project 3-62,

Signalized Intersections: Informational Guide. L.A. Rodegerdts. U.S. Department of Transport-


Back-in angle parking: what is it, and when and where is it most effective? Pedestrian and Bicycle Information Center. http://www.bicyclinginfo.org/faqs/answer.cfm?id=3974


Chapter 5


Texas Legislative Session 79: House Bill 1835


Transportation Mitigation Payments South Lake Union and Northgate. Seattle Department
San Antonio-Bexar County Pedestrian Safety Action Plan

Chapter 6