School Safety Crossing Analysis

Final Report

December, 2010

CHATHAM COUNTY - SAVANNAH
METROPOLITAN PLANNING COMMISSION
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This report is available at: http://www.thempc.org/Transportation/Transportation_Studies.htm

NOTE:
Recommendations in this report were developed by a licensed Professional Engineer and reviewed by a licensed Professional Engineer and Professional Traffic Operations Engineer for Quality Assurance and Quality Control.

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1.0 Introduction

The Chatham County-Savannah Metropolitan Planning Commission (MPC) wishes to provide state-of-the-practice guidance for school zone crossing treatments throughout the Chatham County-Savannah region. This report has been developed in response to concerns brought before the Chatham County Commission about a particular school crossing on Montgomery Cross Road at St. James Catholic School. With the understanding that other school crossing locations in the county may also need safety enhancements as traffic has increased over the years, the MPC is providing in this report crossing templates in addition to recommendations for the St. James Catholic School location.

In order to develop the specific recommendations for the crossing at St. James Catholic School, an existing conditions analysis was conducted and the results are documented in Appendix A. This analysis included an inventory of roadway characteristics, existing roadway signage and striping, pedestrian and bicycle facilities, available traffic and safety data, and school-related traffic patterns. The Existing Conditions Report identifies short-term improvements for the St. James pedestrian crossings that can be implemented prior to the start of the 2010 school year on August 16.

To inform the development of recommendations for treatments within the region in addition to those at St. James Catholic School, this study provides an overview of practices used throughout the United States as well as the current standards that are used at school pedestrian crossings. Through an analysis of these measures, this study presents a toolbox of implementable crossing treatments and templates that can be utilized at school crossings throughout the Chatham County-Savannah area. This study also provides long-term recommended improvements for the pedestrian crossings located at the St. James Catholic School in Chatham County.

2.0 Current Requirements

The Manual on Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA) of the United States Department of Transportation serves as the primary source for standard signage, striping, and signalization on all public roadways in the United States. It also provides guidelines for the treatment school zones, and is recognized as the industry standard for traffic control measures in these areas. This section outlines typical pedestrian crossing treatments within school zones as set forth by the MUTCD. All applications of signage, striping, and signalization should meet or exceed the standards presented by the MUTCD.

The figure below shows example signing for a school zone. Signs should be placed at the start and end of school zones so that motorists are aware of reduced speed limits through the school zone as well as pedestrian presence in the area. The start of a school zone should be at least 200 feet in advance of the school grounds, a school crossing, or other school-related activities.

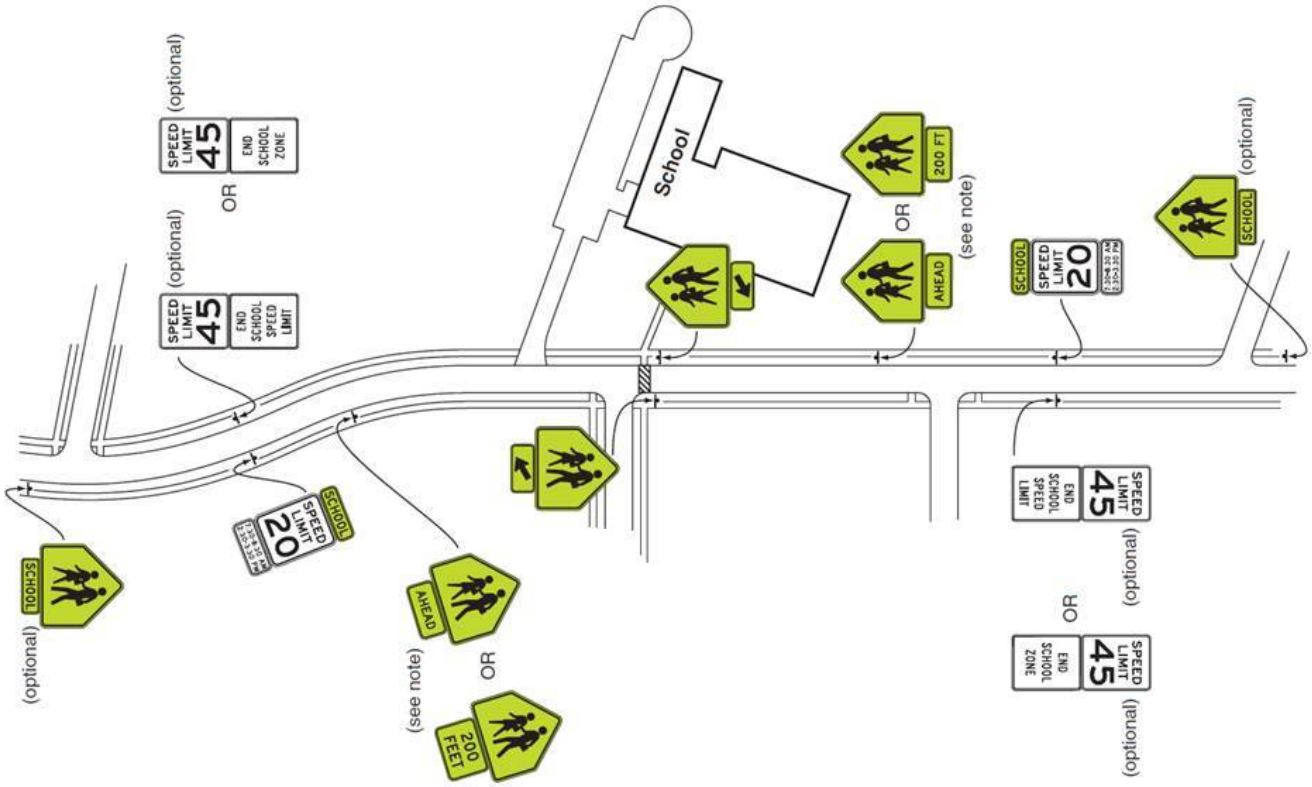
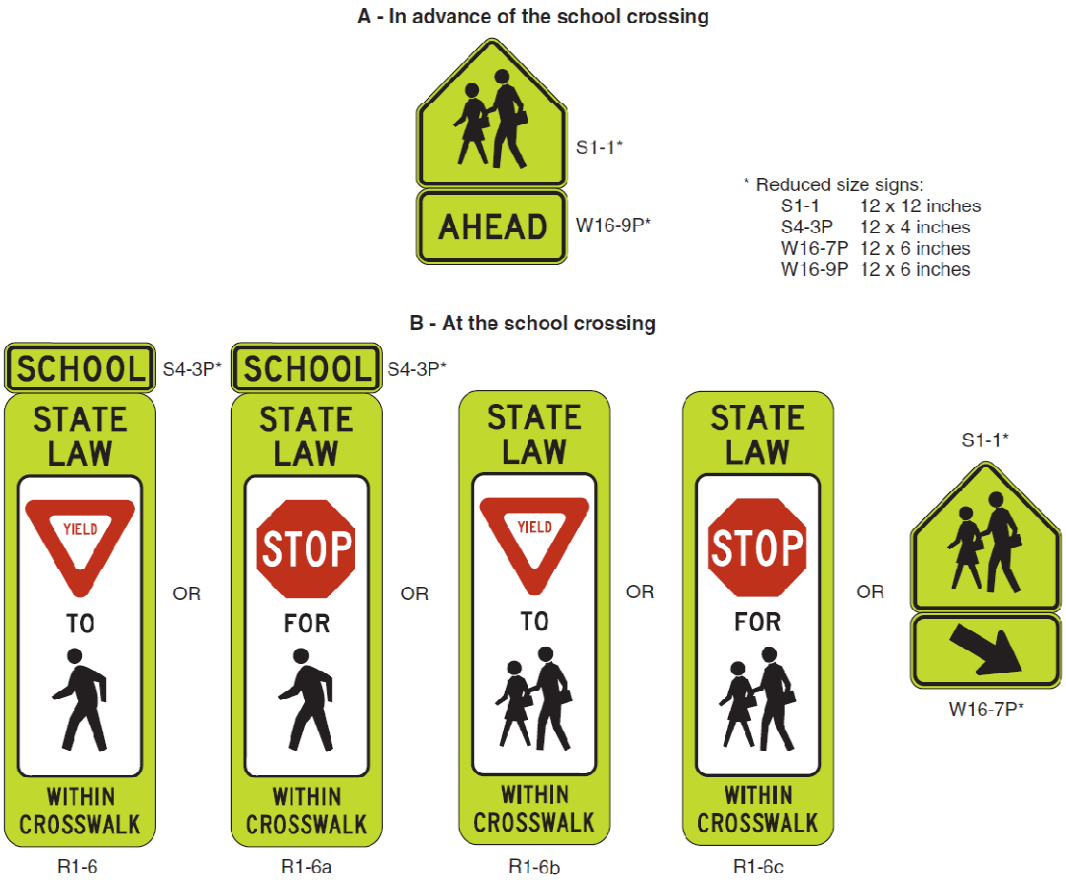


Figure 1: MUTCD (2009) Typical School Zone Signage

Treatments for pedestrian crossings are also included in the MUTCD. Crossings within a school zone should be accompanied with advance warning and school crossing signage, shown in the following figure.



Notes:
1. The use of the STATE LAW legend is optional on the R1-6 series signs (see Section 7B.12).
2. The use of the SCHOOL plaque above the R1-6 and R1-6a signs is optional.

Figure 2: MUTCD (2009) School Crossing Signage

The in-street State Law sign shown above should only be used along the center line or other lane lines at unsignalized locations, not post-mounted along the side of the roadway.

The overhead pedestrian crossing sign, shown at right, may also be used in school zones to remind road users of laws regarding right of way at unsignalized pedestrian crossings. This sign should be placed over the roadway at the crosswalk location and may replace the standard sign with schoolchildren symbol (S1-1) at unsignalized crossings, shown in Figure 2.

R1-9a

Figure 3: MUTCD (2009) Overhead Pedestrian Crossing Sign

Crosswalk markings provide guidance for pedestrians as they cross the roadway by delineating the designated crossing area, and they should be solid white. The 2009 edition of the MUTCD states that new crosswalks should not be installed without other measures to lower vehicle speeds across roadways with a speed limit above 40 mph and that are uncontrolled and either:

A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an average daily traffic (ADT) of 12,000 vehicles per day or greater; or
B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.[1]

Crosswalks should consist of two transverse stripes spaced no less than six feet apart, extending the full width of the pavement and at least 6 inches and no more than 24 inches in width (12 inches preferred). The area of the crosswalk may also be marked with white lines parallel to the traffic flow or at a 45-degree angle to the line of the crosswalk. Lines should be 12 to 24 inches wide, separated by gaps of 12 to 60 inches. Gaps between lines should be less than 2.5 times the width of the lines, and they should avoid the wheel paths of vehicles.

In order for crosswalks to be fully accessible for impaired pedestrians in accordance with the Americans with Disabilities Act (ADA), curb ramps should be located at both ends of crosswalks and should include detectable warning surfaces for easy detection by those with visual impairments. If there is no raised curb, detectable warning surfaces should be used to mark the boundary between the pedestrian and vehicle travelways.

An additional optional striping treatment within school zones given by the MUTCD is the "SCHOOL" or "SCHOOL XING" word marking, used on roadways with four lanes or more at the start of the school zone to supplement the school signage. This marking should extend the width of two lanes and be 10 or more feet in height.

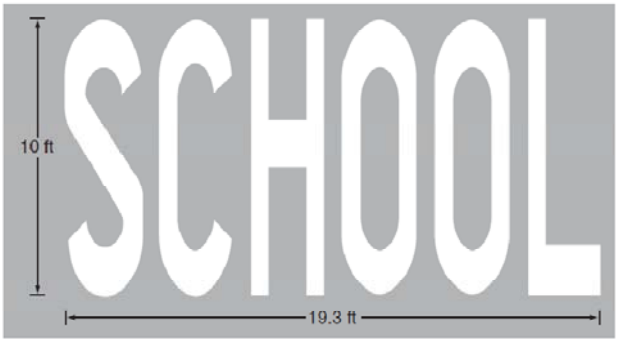


Figure 4: MUTCD (2009) SCHOOL Word Marking

[1] *Manual on Uniform Traffic Control Devices*, Federal Highway Administration, 2009.

3.0 School Crossing Models

As part of this study, a peer review of other school areas was conducted to identify other practices and professional standards that are used in addressing the safety of school zones and school crossings. Charlotte, North Carolina, Phoenix, Arizona and St. Petersburg, Florida have been examined in detail because of the various approaches they have used in successfully addressing pedestrian safety. Each of these programs is described in the following sections.

3.1 Charlotte, North Carolina

The City of Charlotte has created a comprehensive Pedestrian Program that manages sidewalk installation and upkeep as well as public outreach for pedestrian issues to help comply with and exceed requirements of the ADA. The program was created as a centralized and organized structure for advancing pedestrian needs in the city through various initiatives to improve pedestrian safety. One of these includes a School Speed Zone and School Crossing Program, which establishes guidelines for the implementation of school zones and school crossings. The Pedestrian Program also adopted *Urban Street Design Guidelines* (USDG) as an implementation tool for planning and designing Charlotte's streets and for providing viable transportation options.

School Speed Zone and School Crossing Program

The Charlotte Department of Transportation's (CDOT) School Speed Zone and School Crossing Program sets forth guidelines for the establishment of school zones and school crossings. For this program, educational institutions with enrollment of 200 or more students in grades 12 and under may apply to CDOT to be evaluated for a school speed zone or for a school crossing. The inspection is typically evaluated on, but not limited to, the following:

- Physical conditions of the area
- Vehicular volume, speed and other conditions pertaining to roadway traffic
- Use of a pedestrian walk plan for the area served by the crossing or speed zone (prepared by the school).

School Speed Zones

School speed zones in Charlotte are set at 25 miles per hour. Unless otherwise determined by CDOT, the zones operate 45 minutes before school beings in the mornings until 15 minutes after, and again 15 minutes before school is out in the afternoon until 30 minutes after.

School speed zones are designated into four categories, as follows:

- **Background:** On local streets, the school speed zones are designated as "background" speed zones. The base speed limit of the roadway is reduced to 25 miles per hour surrounding the school.
- **Standard:** On non-local streets on which elementary and middle schools are located, the school speed zones are designated as "standard" school speed zones. A standard school speed zone is

established along the entire property frontage of elementary and middle schools on streets other than local streets. These zones begin 100 feet in advance of each property line. When an elementary or middle school has no street frontage but has a driveway directly onto a street other than a local street, the standard school speed zone will begin at the projection of the property line.

- **Reduced:** "Reduced" school speed zones are designated 200 feet in advance of all Type I school crossings (as described in the following section), with the exception of local streets outside of standard zones.
- **High Schools:** Typically, high schools do not warrant school speed zones, but if an engineering evaluation reveals the need, school speed zones may be installed along the frontage of high schools with any of the following characteristics:
    - School fronts a street with six or more through lanes
    - School fronts a street with a speed limit in excess of 35 miles per hour
    - More than 40 students use a street other than a local street to walk to and from the school and/or must wait for a City bus

However, if a school traffic signal is in place along the frontage of the school in question, every effort should be made to address all issues with that method of traffic control before installing a designated speed school zone.

As a standard, the SCHOOL pavement marking as presented by the MUTCD should be used at the beginning of every school speed zone. In the case of local streets and high schools, the SCHOOL pavement marking may be used where the speed zone would begin if it existed.

School Crossings

In many instances, schools that are located along roadways with high vehicular volumes, high speeds, or excessive street width require more than just a 25 mile per hour speed zone to aid in safe pedestrian crossings to reach schools. The City of Charlotte uses three different types of school crossing designations, which are described below. For all three school crossing types, there should be a minimum of five school-age pedestrians who would use each crossing. If fewer than five school-age walkers would be expected, other measures such as extending bus routes to serve the very few walkers would be more appropriate.

- **Type 1 - School Crossing with Speed Zone:** The Type 1 school crossing consists of a marked crosswalk and an adult crossing guard to assist crossings during school hours. As noted above, the establishment of the school speed zone surrounding Type 1 crossings should be at least 200 feet from the crossing, on both approaches. Providing this type of school crossing addresses high vehicular traffic volumes, high speeds, and excessive street width, each of which hinders safe pedestrian crossings.

- **Type 2 - School Crossing without Speed Zone:** The Type 2 school crossing consists of a marked crosswalk and an adult crossing guard. The Type 2 school crossing does not include a school speed zone. Similar to a Type 1 crossing, providing this type of school crossing addresses high

vehicular traffic volumes, high speeds, and excessive street width, which hinder safe pedestrian crossings.

- **Type 3 - School Crossing with Pedestrian Traffic Signal:** The Type 3 school crossing consists of a marked crosswalk, an adult crossing guard, and an actuated pedestrian signal which is in operation during school arrival and dismissal only. In order for a crossing to be designated as Type 3, a minimum of five school-age pedestrians should be expected to make use of the crossing, and a base 85th percentile speed of 35 miles per hour (not considering the standard school speed zone) or where there is less than one acceptable gap in traffic per minute at the crossing location.

Restrictions on Establishing and Operating School Crossings

According to the CDOT, there are instances in which a school crossing could cause more harm than good. Therefore, there are some instances in which school crossings should not be employed in Charlotte:

- At no time should a school crossing be used as a device to control vehicular speed except as stated in the North Carolina Motor Vehicle Code.
- Unless protected by a school pedestrian traffic signal, school crossings should not be installed between intersections (i.e., midblock). Unsignalized, midblock crossing locations present the driver with an unexpected situation for which he or she is not prepared for pedestrian presence. Furthermore, operation of an unsignalized, midblock school crossing could cause the operation of adjacent intersections to decrease on quality.
- School crossing signs and markings should not be installed on approaches where traffic is controlled by a stop sign.
- School crossing signs and markings shall not be installed within 600 feet of a signalized intersection, a four-way stop, or another school crossing when located on the same street.
- A school crossing shall not be established at a location leading to an unprotected railroad track except at an established grade crossing.
- A school crossing shall not be established at locations with inadequate sight distance.
- School crossing guards shall be adults or school safety patrol. Adult guards are currently employed, trained, and supervised by the Charlotte-Mecklenburg Police Department.
- The legal obligation of the crossing guard is to choose adequate gaps in traffic to enforce the proper use of the crossing by school children. Therefore, guards shall not direct vehicular traffic unless authorized by the Charlotte-Mecklenburg Police Department to do so. The guard should concentrate his or her attention on controlling the students and choosing adequate gaps in traffic in which to cross them.
- Neither school crossings nor crossing guards should be used at high schools.

Other Traffic Control in School Areas

Where the guidelines for school speed zones or school crossings are not met, other forms of traffic control may be appropriate. Where a school crossing is not warranted, but young students grades Kindergarten through 4th use a crossing location and conditions exist that would create a hazard should a child select an unacceptable gap in traffic in which to cross, a crossing guard may be assigned to the crossing location and a Type 2 crossing installed. This also applies to signalized intersections at which young students might misinterpret the pedestrian signals and need assistance. No special signs and markings are required at a signalized intersection at which a guard is assigned to help young children and there are crosswalks and pedestrian signals.

At high schools or at elementary and middle schools without a Type 3 crossing, a school traffic signal may be installed if the MUTCD signal warrant 1 (eight-hour vehicular volume) is met for one hour either before school arrival or after dismissal. The signal should operate 6 a.m. to 11 p.m.

Off-duty police officers may be employed by a school to control traffic at the school, with a permit from the City of Charlotte. The permit process is administered by CDOT.

Urban Street Design Guidelines

The City of Charlotte implemented the *Urban Street Design Guidelines* (USDG) as a tool for planning and designing Charlotte's streets and for providing viable transportation choices for residents. The USDG is intended to create "complete" streets that provide adequate capacity and mobility for motorists as well as a safe and comfortable environment for pedestrians and cyclists. As a result of the USDG, the CDOT developed a Level of Service (LOS) methodology to assess the important design features that affect pedestrians and bicyclists crossing signalized intersections. This methodology identifies and evaluates features according to their influence on the comfort and safety of pedestrians and bicyclists. Among the features identified and used for obtaining the LOS are crossing distance, corner radius dimensions, and traffic signal characteristics. The methodology can be used as a diagnostic tool to assess and improve pedestrian and bicyclist levels of comfort and safety in school zones and throughout the Charlotte area.

3.2 Phoenix, Arizona

City of Phoenix

The Phoenix School Safety Program was developed by a task force following a traffic collision involving a student who ran into a busy street against a traffic signal. The task force included a local parent; individuals from the local police, transportation, highway safety, and law departments; and representatives from local schools. The task force recommendations yielded eleven major changes in school crossing safety. The solution was a combination of education, enforcement, and facilities improvement.

A school crossing safety auditing program was developed to help identify areas of a school that are most in need of improvement. An auditing worksheet walks the reviewer through the process by assessing school crossings noting crossing characteristics, numbers of students utilizing the crossing, traffic conditions, adult supervision, and the number of crashes at the crossing location. The number of points assigned to a crossing through the auditing worksheet is used to assess the safety of the crossing.

The City also equipped schools with radar-controlled cameras mounted to vans to aid in enforcing the speed limit during school start and dismissal times. Other improvements throughout the school system included the installation of "SCHOOL" pavement markings on roads approaching school areas, fluorescent yellow-green warning signs, safety vests for guards, staggered crosswalks, and two trial active speed monitors that flash when a driver's speed exceeds the speed limit during school operating hours. An experimental in-pavement flashing crosswalk was installed at a local high school. Once activated by a pushbutton, the device issues verbal warnings to pedestrians as they make the crossing, to be aware that cars may not stop for the crossing. Additionally, school staff developed a set of guidelines for drop-off and pick-up times to reduce congestion and spillover onto the street in front.

At Sunnyslope High School, several measures were implemented to improve the safety of the school zone. This school is located along Dunlap Avenue, a six-lane arterial road (three lanes westbound, two eastbound, and a center two-way left turn lane) where the 15 mile per hour school speed limit had little effect on slowing vehicles through the school area. The roadway had an average of 32 pedestrian collisions per year for the three year period prior to the start of the project. Solar-powered driver feedback speed monitors were installed at each end of the school campus to alert drivers of their speeds. The monitors flashed the driving speed and a bright LED strobe light when the vehicle's speed exceeded the posted speed limit of 35 miles per hour by at least five miles per hour. A staggered crosswalk with a median safety island was installed on Dunlap Avenue to replace one standard crosswalk, because staggered crosswalks make a strong visual impression on drivers and improve pedestrian safety. The staggered crosswalk forces pedestrians to turn towards oncoming traffic once they traverse the first side of the roadway prior to traversing the second, and it provides refuge in the center of the roadway while waiting to cross the second leg of traffic. In addition to the striping at the crosswalk, "SCHOOL" pavement markings were installed in the lanes approaching the crossing. The pedestrian warning signs were converted to brighter fluorescent yellow-green warning signs, and signs were posted at the crosswalk instructing students to "Use Caution When Entering the Street". As a result, compliance with the posted speed limited improved, particularly during school hours when the feedback monitors are operational. Only one school-related collision was reported in the six months following the project, and none occurred in the new staggered crosswalk. Crossing at unmarked crossings dropped dramatically, and pedestrian use of the staggered crosswalk with the safety island dramatically increased.

3.3 St. Petersburg, Florida

A team from the Center for Urban Transportation Research (CUTR) at the University of South Florida completed a study to review a multidisciplinary program implemented in St. Petersburg, Florida to increase motorists yielding to pedestrians in crosswalks, reduce pedestrian-motor vehicle

conflicts in crosswalks, and to increase pedestrians' feelings of comfort and safety while crossing the street. The report *Making Crosswalks Safer for Pedestrians: Application of Multidisciplinary Approach to Improve Pedestrian Safety at Crosswalks in St. Petersburg, Florida* documented the steps involved in assessing pedestrian safety in the community; prioritizing and selecting countermeasures to improve pedestrian safety through engineering, education and enforcement interventions; and evaluating the effectiveness of the program. The results provide insight into the challenges of implementing a pedestrian program with this multidisciplinary approach, or "Triple E".

The objectives of the study included implementing a multidisciplinary program to improve pedestrian safety at crosswalks and evaluating the effectiveness of the program. Several goals of the study included:

- Increasing citywide motorists yielding behavior from single digit levels to over 70 percent
- Reducing conflicts and crashes in crosswalks by 50 percent
- Increasing pedestrians' feelings of comfort and safety while crossing the street.

Implementation

Researchers implemented several engineering, education, and enforcement interventions at varying times throughout the study period. Engineering efforts ranged from relocating advance stop lines, installing devices that give pedestrians a head start in crossing the street, or the complete redesign of crosswalks. Below is a list of engineering interventions that were implemented during the study. Many crosswalks received a single intervention, while some received multiple pedestrian safety improvements.

- Advance stop lines: Notify vehicles of the appropriate stopping location in advance of a crosswalk.
- Lead pedestrian intervals at signals: Allows pedestrians to have a head start in crossing the street through a special phase of the signal, prior to vehicles receiving a green signal.
- Scanning eyes on pedestrian signal heads: Reminds pedestrians to assess oncoming traffic at the crossing location.
- Intelligent Transportation System (ITS) crosswalk warning system: Detects pedestrians at midblock crosswalks.
- Half signal: Stops traffic at midblock crosswalks.
- Flashing yellow beacons with pedestrian pushbuttons: Warn motorists to yield to pedestrians crossing the roadway.
- Staggered crosswalk: Provides a refuge in the center of the roadway and helps pedestrians to better assess conditions prior to crossing the second leg of traffic.

Education was also an important component of the study. Various methods were used to inform pedestrians, motorists, and other members of the general public about pedestrian safety. Education efforts included:

- Installation of electronic message signs
- Distribution of pedestrian safety brochures and posters

- Crossing guard workshops
- Development of radio and television public service announcements
- Water bill inserts
- School kits and lesson plans with crossing information

Enforcement campaigns concentrate law enforcement to address a specific transportation or traffic issue, in this case, motorists failing to yield to pedestrians in crosswalks. Researchers worked closely with the St. Petersburg Police Department and a "Triple E" committee to design and implement two enforcement programs. The first program consisted of intense distribution of informational flyers and bumper stickers, as well as issuing warning tickets. The second enforcement program coincided with the national "Walk Our Children to School" day and involved intensified enforcement of traffic violations and high visibility of officers. The goal of these enforcement measures was to deter people from repeating the offense and the rest of the general public from making the same offense.

Conclusions and Recommendations

The results of this St. Petersburg study demonstrate that strategies combining the "Tripe E's" of engineering, education, and enforcement are effective in increasing motorist awareness of yielding to pedestrians in crosswalks and in reducing conflicts between motorists and pedestrians. The results suggest that multiple engineering interventions at crosswalks are more effective at achieving program goals than single interventions. This highlights the value of using a multidisciplinary approach to address community traffic safety issues and can be used as a tool for communities to design an effective program targeting traffic safety issues. The study recommends that interventions such as advance stop lines and lead pedestrian intervals be installed at intersections with high pedestrian crash rates. In addition, efforts should be made to implement intervention methods at crosswalks directed toward both motorists and pedestrians.

4.0 Pedestrian Crossing Toolbox

The following section provides a "toolbox" of treatments that are currently used successfully at pedestrian crossings to enhance safety, particularly in school areas. These treatments include signage, striping, signalization, and other innovations. Recommendations for improvements to school crossings in the Savannah-Chatham County region were selected from this toolbox.

Advance Warning Signage

Advance warning signage is used to notify vehicles in advance of upcoming pedestrian presence. This signage is especially helpful in situations where drivers may not expect a pedestrian crossing, and it allows them adequate time to reduce speeds. The MUTCD provides specific guidance on sign selection and location.

The "State Law Stop for Pedestrian" sign is often used in the street along the center line or lane lines to slow vehicles down in crossing areas. It also educates drivers that they are required to stop when a pedestrian is waiting to make a crossing at an unsignalized location. The MUTCD states that this signage should not be post-mounted on the side of the roadway, and if an island is available, it should be placed there. Similarly, the overhead State Law signage can be mounted overhead at the crosswalk location.

Because the above State Law signage is not recommended for post-mounting along the side of the roadway, the Georgia Department of Transportation (GDOT) has developed a standard for similar signage, shown at right, to mount alongside crosswalks on standard breakaway sign posts. It is often used at crosswalks at channelized right turns and beside other crosswalks at intersections.

Median Refuge Island

Median refuge islands are raised islands in the middle of the roadway that simplify the crossing and allow pedestrians to cross one direction of traffic at a time, allowing them to have a safe place to stop while assessing the second leg of the crossing. They also act as a traffic calming device, creating a road-narrowing effect for drivers, causing them to lower speeds.

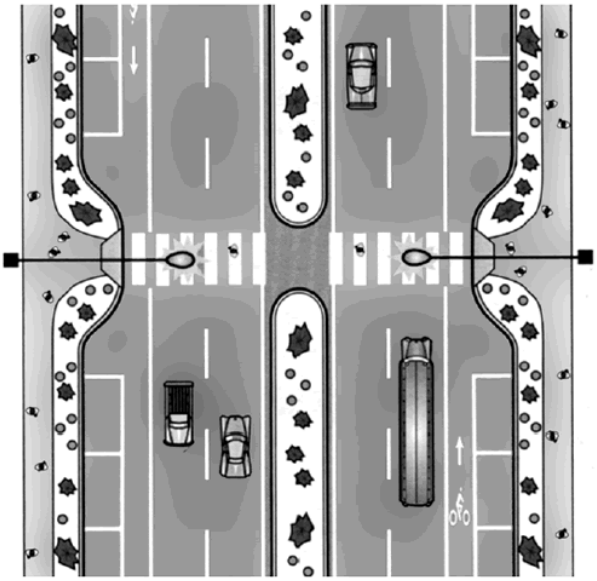
The Federal Highway Administration recommends median islands to be at least 4 feet in width, but they are preferred to be 8 feet or more for the safety and comfort of crossing pedestrians, particularly when a large volume of pedestrians is present. When determining the size of the island, the number of pedestrians using the crossing at a time should be considered so that there is sufficient space for them to wait before cross the second leg of the roadway.

Research has shown that even the presence of a small island will decrease the pedestrian crash risk. Refuge islands should be used wherever possible and in conjunction with other treatments, such as enhanced signage and striping.

Curb Extensions

Curb extensions, also known as bulb-outs or bump-outs, are a traffic calming tool that reduces the effective street width that pedestrians must cross. They are effectively an extension of the sidewalk slightly into the street, and in most cases take the place of existing on-street parking lanes. They allow for waiting pedestrians to be more visible to surrounding traffic, rather than standing behind something that may hide them from view, such as parked cars. Additionally, curb extensions create a road-narrowing effect for drivers, which in turn compel them to slow down through the pedestrian area.

Curb extensions are used both midblock and at intersections. The area on top of the extended curb can be used for a variety of purposes, such as landscaping, lighting, or benches.



HAWK (High-intensity Activated crossWalK) Beacon

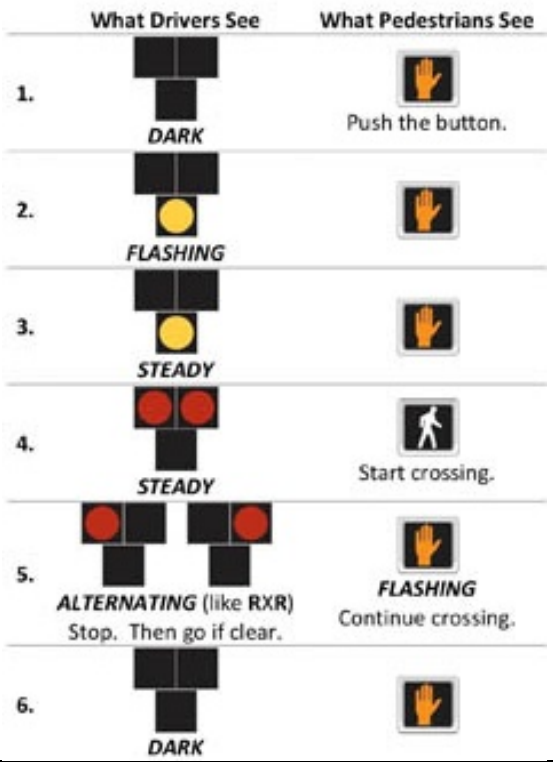
The HAWK beacon is a crossing signal used at unsignalized intersections that is activated by pedestrians and stops traffic to allow for safe pedestrian crossings. Mounted on roadside poles and mast arms, it remains dark until pedestrian activation. The HAWK beacon was originally developed for school crossings in Tucson, Arizona, and it is increasingly being used at locations that do not warrant a full traffic signal. Use of the beacon has been shown to increase motorist compliance for stopping for pedestrians at unsignalized crossings.

The sequence of the beacon is as follows:

1. Beacon is dark.
2. Pedestrian presses activation button. Beacon **flashes yellow** for approaching drivers; warns to reduce speed and prepare of pedestrians.
3. **Solid yellow** beacon.
4. **Solid red** beacons; drivers must stop at stop line. Pedestrian receives **WALK** signal with a countdown timer on a pedestrian signal head.
5. Pedestrian receives flashing **DON'T WALK** indication on pedestrian signal head; Motorists see **flashing red**, indicating that they must remain stopped until pedestrians have completed crossing.
6. Beacon goes dark.

When the beacon is dark, motorists are not required to stop as they normally are when standard signals are dark. Use of the HAWK beacon at midblock locations has recently been added to the MUTCD.

HAWK beacons cost approximately $50,000.



Pedestrian Signal Head

Pedestrian traffic signal heads are visual controls that notify pedestrians when it is safe to cross signalized intersections. Most signals consist of a red "don't walk" hand and a white pedestrian "walk" symbol mounted at either end of a crosswalk. The pedestrian activates the signal as he or she wishes to cross the street, which in turn turns the traffic signal to red and provides pedestrians with exclusive use of the roadway to cross by giving them a walk message. Some signals have a countdown timer so that pedestrians know much time remains to complete the crossing.

According to the MUTCD, one of the nine traffic signal warrants is pedestrian volume. Where pedestrian volume on a major street is so high that pedestrians experience excessive delay when crossing the street, a signal may be warranted. This should be determined through an engineering study and further assessment of standards in the MUTCD, as every application is unique.

Signal timing is an important component to the operation of signalized pedestrian crossings. The timing should consider roadway speed, volume, and amount of turning traffic. Exclusive timing can also be used, which stops traffic on all legs of the intersection to allow pedestrians to cross.

Pedestrian signals do not guarantee safety. Many people trust that when the signal turns to WALK vehicles will always stop, when pedestrians should also use good judgment in assessing oncoming traffic prior to crossing.

Pedestrian signals cost approximately $20,000 to $40,000 per intersection.

Adult School Crossing Guard

Adult crossing guards are a valuable tool in promoting safe behaviors of both pedestrians and drivers at crosswalks. They assist children in safely crossing the street by stopping traffic if necessary and overseeing pedestrians as they make the crossing, especially children with lower crossing skill levels. They also serve as a visible reminder to drivers that pedestrians are present in the area, prompting lower vehicle speeds. Parents often feel more comfortable about their children crossing with supervision rather than alone. The provision of crossing guards helps to promote the healthy pattern of children walking to school.

Crossing guards should be made aware that their legal responsibility is to choose reasonable gaps in the traffic to assist children across the roadway and to enforce proper use of the crosswalk. They should wear special uniforms, such as reflective vests. In most cases the use of a handheld stop sign is recommended. On high volume, multi-lane roadways, two crossing guards are recommended.

In order for crossing guards to be most effective, they should be trained at least annually. Training is available through the national Safe Routes to School program, as well as other local programs. In some areas, crossing guard programs are managed through the police department and in others by the school district.

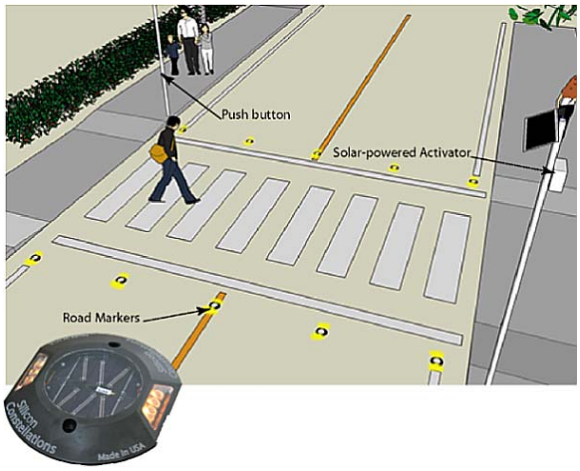
In-Roadway Warning Lights

In-roadway warning lights are installed at crosswalks, mounted flush with the pavement, and flash to warn vehicles of pedestrians and enhance the visibility of the crosswalk. The lights are imbedded in the pavement parallel with the markings of the crosswalk. They are typically activated by a pushbutton at the crossing, but can also use other technologies like passive detection. In-roadway warning lights are used to warn drivers of the presence of pedestrians and that they may need to stop or slow down to allow for crossings.

In-roadway warning lights have been shown to have positive safety effects at crosswalks because of the enhanced visibility of the crosswalk. However, they are more expensive to implement than traditional pedestrian crossing warning devices. They are particularly effective at night and times of day with low-light. They should only be installed at marked crosswalks, and after other more traditional measures have been tried first but have been unsuccessful. Situations that may be most appropriate for implementation of in-roadway warning lights include marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, and marked crosswalks at roundabouts.

The MUTCD considers in-roadway warning lights as a special type of flashing signal. Some states have begun to implement specific guidelines for installation, such as Virginia.

A significant drawback to in-roadway warning lights is the cost of installation and maintenance.

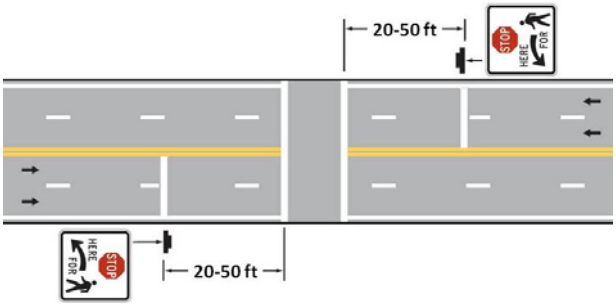


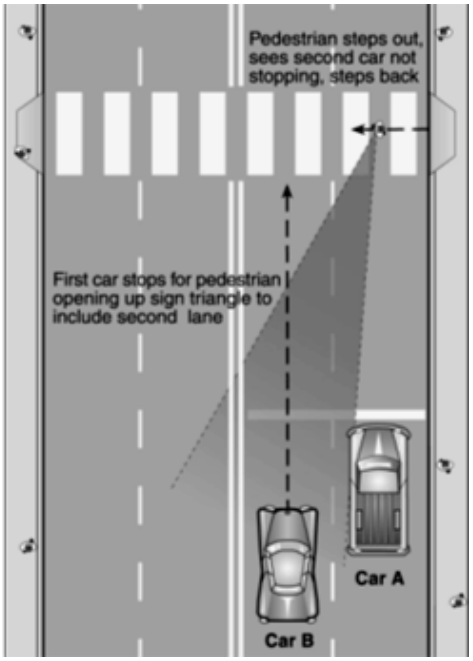
Advance Stop or Yield Lines

Stop or Yield lines are used to show drivers where the appropriate location is to stop for a pedestrian crossing, particularly on multi-lane roadways. Yield or stop lines are chosen based on the state's law regarding whether vehicles are to stop or yield for pedestrians in the crosswalk. In Georgia, vehicles are required to stop for pedestrians that are in the crosswalk or are waiting to cross. Implementation helps to reduce multi-threat crashes, where the first car stops too close to the crosswalk and masks the visibility for drivers in the second lane, posing a safety threat to pedestrians making the crossing.

This striping should be used in conjunction with the "Yield/Stop Here for Pedestrian" signage, shown to the right. The stop bar or yield lines should be placed at least 20 feet in advance of the crosswalk, 50 feet maximum. If it is placed too far in advance of the crosswalk, the stop or yield line may be ignored by motorists.

The effectiveness of this tool depends on motorist compliance with the stop or yield line.





High Visibility Signs and Markings

High visibility signs and markings are used to further raise the awareness of drivers to the presence of pedestrians. High visibility school signage and any supplemental plaques should consist of a fluorescent yellow-green background with a black legend and border, as presented by the MUTCD, unless otherwise specified. Signs should be of retroreflectorized material or illuminated.

Markings in school areas, including crosswalk striping and SCHOOL pavement lettering, should be thermoplastic as available so that all markings can be clearly seen by vehicles in school areas. Often, pavement markings are worn down in time by vehicles frequently traversing them. Those that are not properly maintained are less visible in certain light, particularly when very sunny or dark.

Recommended high-visibility crosswalk striping consists of two transverse stripes spaced no less than six feet apart. They should extend the full width of the pavement and be at least 6 inches and no more than 24 inches in width, preferably 12 inches. The area between the transverse lines should be marked with diagonal lines at a 45-degree angle or lines parallel to the traffic flow, sometimes known as “zebra” striping. These lines should be 12 to 24 inches in width, separated by gaps of 12 to 60 inches. The gap between lines should be no more than 2.5 times the width of the line itself. Wherever possible, these lines should avoid the wheel paths of vehicles so that the life of the marking is extended.

Staggered Crosswalk

Staggered crosswalks are used to break up the length of a crosswalk, particularly on streets of excessive width, and they make a strong visual impression on drivers. They allow pedestrians to cross one leg of traffic at a time, providing a refuge island where they may safely wait and assess traffic along the second leg of the crossing prior to beginning crossing. Staggering the crosswalk requires that pedestrians turn and face the oncoming traffic as they walk to the edge of the next crossing.

Often the staggered crosswalks are connected by a channelizing fence across the island, preventing pedestrians from crossing in any location other than the designated crosswalk. If signalized, the two legs of the crosswalk can function on the same pedestrian signal or on two individual signals.

Raised Crosswalk

Raised crosswalks, also known as speed tables, are used to physically slow traffic and raise visibility of pedestrians by physically raising the level of the crosswalk. They are the same width as traditional crosswalks and effectively extend the sidewalk across the roadway and allow pedestrians to cross at a constant grade, without the need for curb ramps. Often contrasting paving materials are used, such as stamped colored concrete.

Raised crosswalks, typically ranging between 3 and 4 inches in height, act as a traffic calming measure, requiring drivers to reduce speeds through the crossing area. They are most appropriate on roadways where there is only a moderate amount of traffic, less than 1,000 trips per day, and are most appropriate on two-lane roadways.

Standard crossing signs are located at raised crosswalks, often in addition to a warning sign in advance of the crosswalk. Curb extensions often supplement raised crosswalks. These two

Raised crosswalks are estimated to cost approximately $4,000.

5.0 School Crossing Recommendations

Recommendations to improve school crossings in the Savannah-Chatham County area are presented below. First, improvements to the existing St. James School crossing on Montgomery Cross Road at Laberta Boulevard are made. Those recommendations are followed by more generalized improvements that should be implemented throughout the school district. These recommendations were carefully selected from the previous toolbox, taking into account the current conditions in this area.

The recommendations included in these templates are all engineering solutions, but the success of these measures will be greatly increased if adequate education and enforcement programs are included with their implementation. Vehicle speeds and compliance with stopping at crosswalks should be enforced by warnings and citations if necessary. Quite often, driver behavior is more easily altered if there is a monetary consequence involved. Efforts should be made to ensure that schools and the general public are made fully aware of what is expected of drivers and pedestrians alike at crossing locations, through the use of methods such as public service announcements through both standard and nontraditional media outlets and fliers sent home with students from schools.

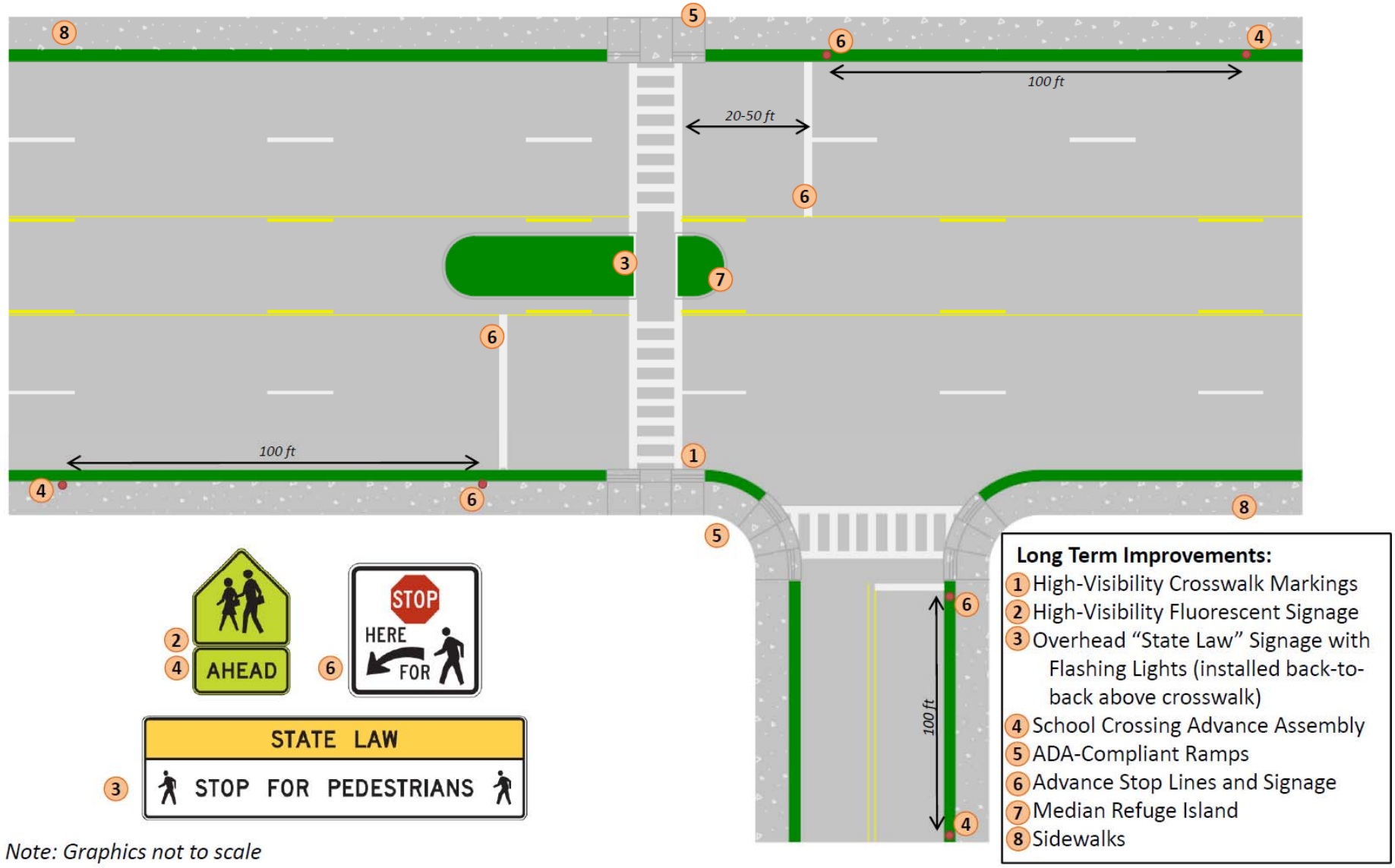
5.1 Recommended Crossing Improvements at St. James Catholic School

The template shown in the figure on the following page is recommended to improve crossing safety at the existing crosswalk on Montgomery Cross Road at Laberta Boulevard. In addition, the short-term improvements established through the existing conditions analysis should be maintained as well, including cleared brush in front of signage, two adult crossing guards, and set crossing times in the morning and afternoon. Recommendations include:

- Sidewalks along both sides of the roadway
- High-visibility crosswalk markings and signage
- Overhead “State Law” signage, accompanied by yellow flashing lights
- Ramps compliant with the Americans with Disabilities Act (ADA)
- Advance stop lines and accompanying signage
- Median refuge island or roadway median

Because of the high speeds along Montgomery Cross Road, it is especially crucial to install a median refuge island or a median for an extended length of the roadway in order to allow for a safe crossing for students traveling to St. James Catholic School. As indicated by the MUTCD and discussed in Section 2.0 of this Report, crosswalks should not be installed on roadways without other methods to reduce speeds, if the speed limit exceeds 40 miles per hour and if it is at an uncontrolled location. Montgomery Cross Road has a posted speed limit of 45 miles per hour, greatly placing the crossing students in danger at this location.

Additionally, a modified traffic pattern is recommended for internal circulation within the school. Because of the large number of vehicles exiting the school onto Laberta Boulevard and turning left onto Montgomery Cross Road (as assessed in the existing conditions analysis), this modified school drop-off pattern will allow for safer crossings of Montgomery Cross Road at Laberta Boulevard with a decreased threat of vehicles exiting the school onto westbound Montgomery Cross Road. Further, signage on Laberta Boulevard stating that no left turns can be made during the school zone hours could also be implemented.



Note: Graphics not to scale

Figure 5. Montgomery Cross Road at Laberta Boulevard Long-Term Crosswalk Improvement Recommendations

Figure 6. St. James Catholic School Recommended Internal Traffic Pattern

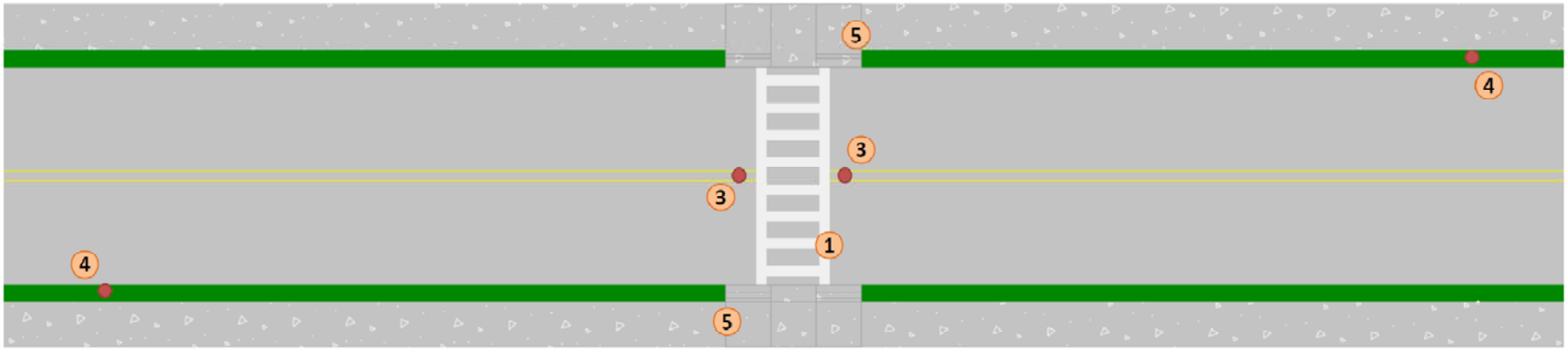
5.2 Recommended Crossing Templates

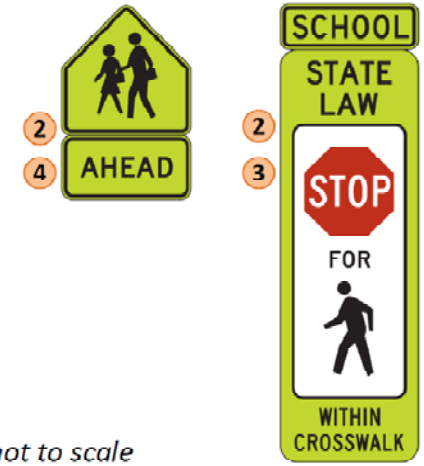
On the following pages, templates are presented to provide guidance for the appropriate treatment of pedestrian crossings in school locations, to maximize the safety of pedestrians. These templates should be used throughout the Savannah-Chatham County Public School System, as well as at other private school locations. The use of these templates throughout the school system will provide consistency to school crossings across the region, which contributes to the safety of individual crossings as drivers and pedestrians alike become familiar with standardized treatments that are used in multiple locations.

Five templates are presented, differentiated by the type of roadway on which a school crossing is located. The templates are:

1. Midblock Crossing on Two-Lane Roadway
2. Crossing at Intersection of Two Two-Lane Roadways
3. Midblock Crossing on Four-Lane Roadway
4. Crossing at Intersection of Two Four-Lane Roadways
5. Midblock Crossing on Five-Lane Roadway

Regardless of the type of roadway on which a crossing is located, several measures should be implemented at all school crossings for increased safety. Adult crossing guards should always be utilized during school zone hours to assist in safe crossings for students. On higher volume roadways or where a large number of pedestrians are expected, more than one guard should be present. Guards should be properly trained, at least on an annual basis. Additionally, at all pedestrian crossings where on-street parking is present, curb extensions should be installed in place of the parking at the crossing location to increase visibility of the pedestrians and create a road-narrowing effect for drivers, resulting in lower vehicle speeds. All school speed zones should begin 200 feet in advance of school property.





Required:
1. High-Visibility Crosswalk Markings
2. High-Visibility Fluorescent Signage
3. "State Law" Signage if less than 35 mph
4. School Crossing Advance Assembly
5. ADA-Compliant Ramps

Optional:
Raised Crosswalk
In-Roadway Warning Lights

Note: Graphics not to scale

Figure 7. Template 1: Midblock Crossing on Two-Lane Roadway

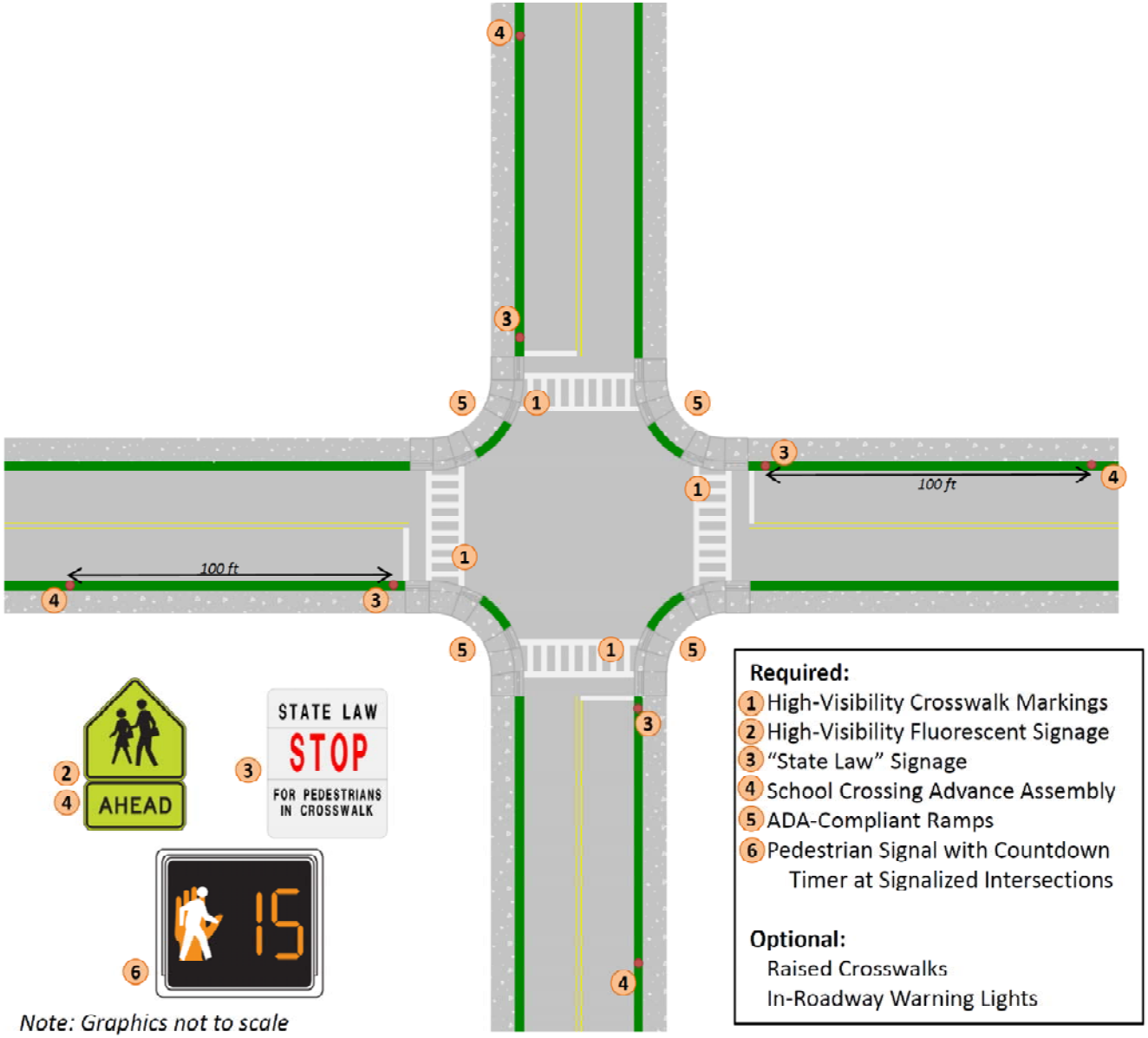
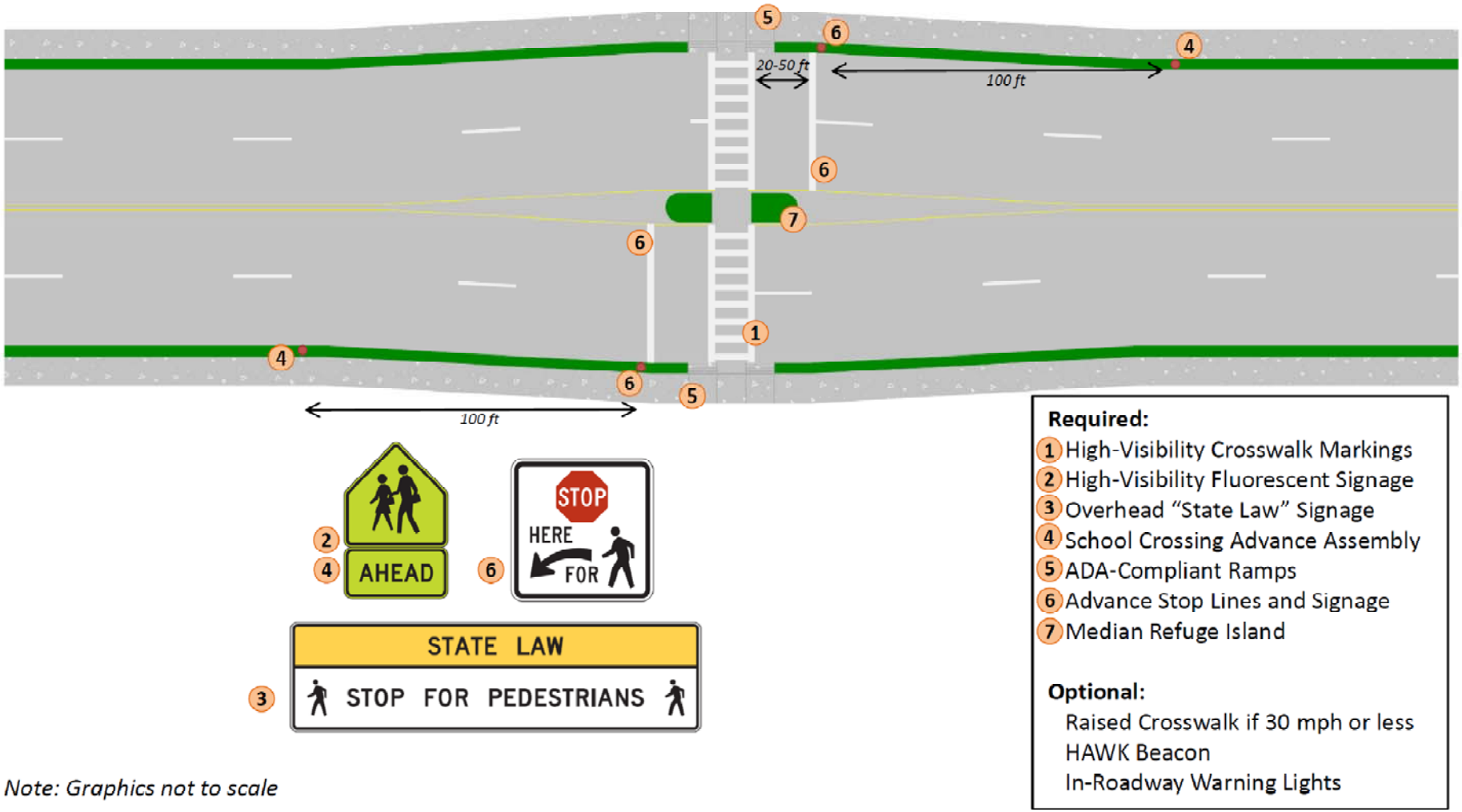


Figure 8. Template 2: Crossing at Intersection of Two Two-Lane Roadways



Note: Graphics not to scale

Figure 9. Template 3: Midblock Crossing on Four-Lane Roadway

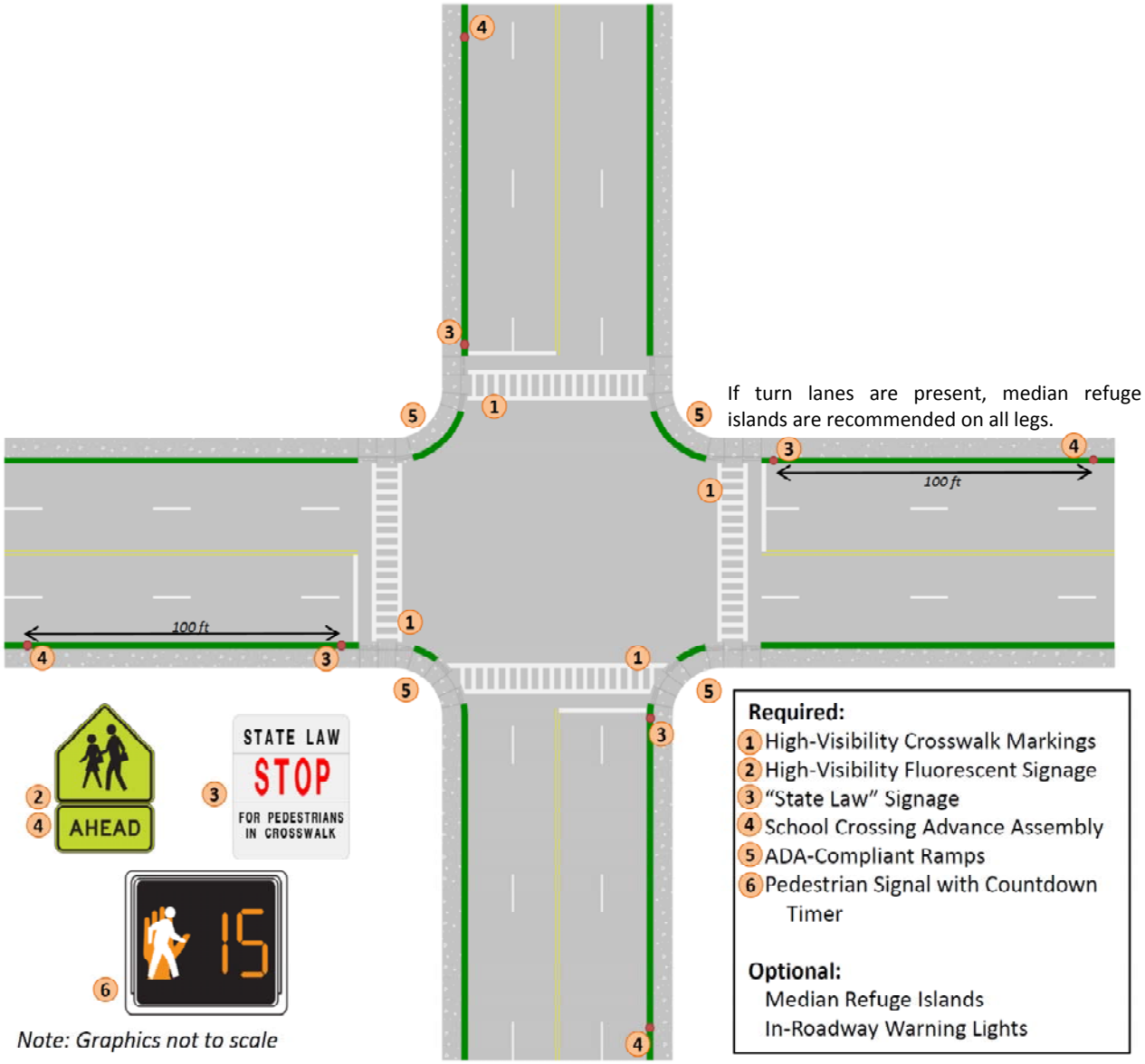
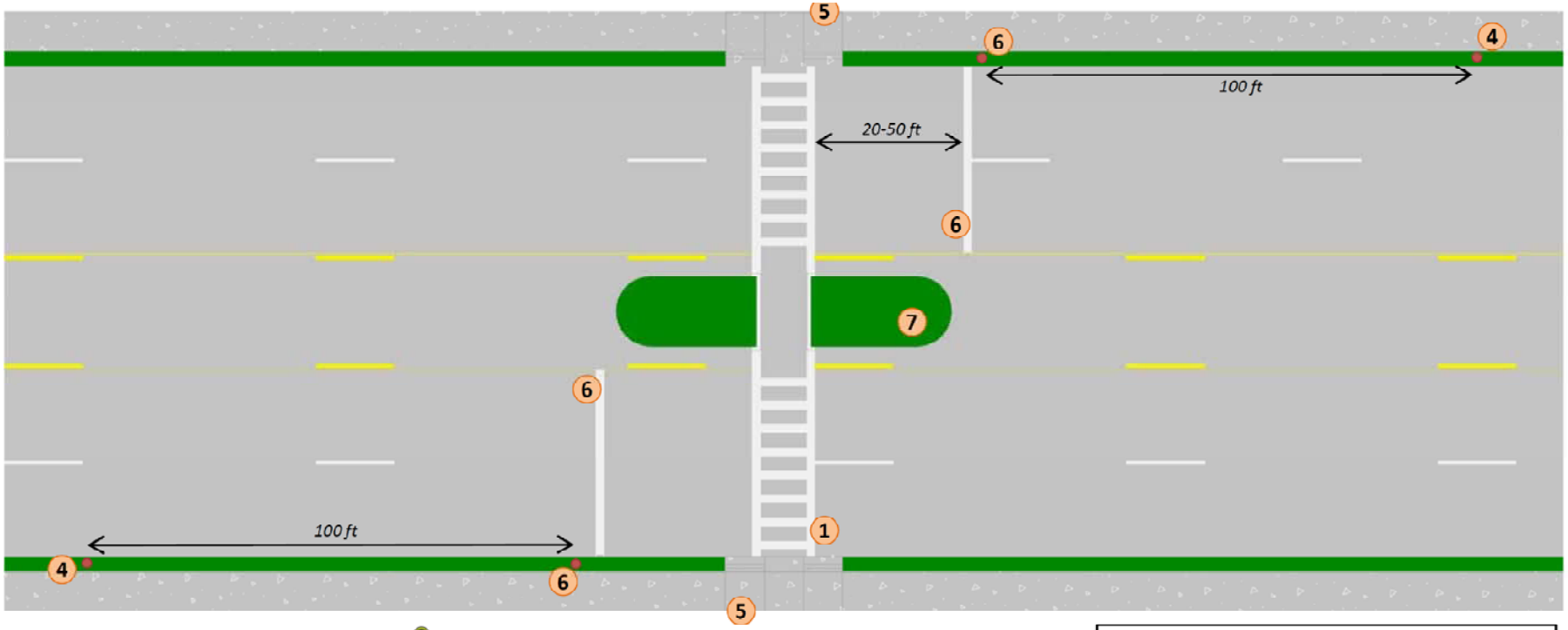


Figure 10. Template 4: Crossing at Intersection of Two Four-Lane Roadways



Note: Graphics not to scale

Long Term Improvements:

1. High-Visibility Crosswalk Markings
2. High-Visibility Fluorescent Signage
3. Overhead "State Law" Signage with Flashing Lights
4. School Crossing Advance Assembly
5. ADA-Compliant Ramps
6. Advance Stop Lines and Signage
7. Median Refuge Island
   Sidewalks

Figure 11. Template 5: Midblock Crossing on Five-Lane Roadway

Appendix

Existing Conditions Report

School Crossing Safety Analysis

Existing Conditions Report

CHATHAM COUNTY - SAVANNAH
METROPOLITAN PLANNING COMMISSION
110 EAST STATE STREET, P.O. BOX 8246, SAVANNAH GEORGIA 31412 - 8246

CORE
COASTAL REGION MPO

December, 2010

RS&H
Reynolds, Smith and Hills, Inc.

Table of Contents

Tables

Figures

1.0 Introduction

The Chatham County-Savannah Metropolitan Planning Commission (MPC) wishes to study the safety of school zone facilities due to inconsistent school zone treatments in the Chatham County-Savannah region. This study includes a review of one specific school zone facility and an assessment of various techniques that could be implemented to enhance safety at this location. The school zone and crossings at the St. James Catholic School, located on Whitefield Avenue at Montgomery Cross Road in Chatham County, experience many safety issues. Analysis of and recommendations for the crossings at the St. James Catholic School will serve as a pilot/model to develop school crossing templates that can be applied elsewhere across the Chatham County-Savannah school district.

This report details the existing conditions of the school zone surrounding the St. James Catholic School through an assessment of all available data. This includes:

- Inventory of roadway characteristics,
- Existing roadway signage and striping,
- Pedestrian and bicycle facilities,
- Roadway traffic and safety data, and
- School-related Traffic Patterns

Through the existing conditions analysis, key project stakeholders were also engaged so that their input could be considered as part of the development of recommended improvements. Finally, this report includes recommendations that can be implemented in the short term so that improved safety measures can be in place when St. James Catholic School returns for the new school year on August 16, 2010. Other long-term recommendations will be further assessed and proposed in a subsequent report, which is proposed for completion by the end of August 2010.

2.0 Study Area Overview

The primary study area for this project, shown in Figure 1, surrounds the St. James Catholic School on Whitefield Avenue at Montgomery Cross Road. The school is located just outside of the Savannah City Limits; however, areas immediately to the north and west of the school are located inside the City Limits.

The area immediately surrounding St. James School is primarily residential, and transitions to commercial west of the bridge over Casey Canal as well as to the east of the school. The Mayfair subdivision is located to the north of school on the northern side of Montgomery Cross Road. A residential area also surrounds the school on the southern side of Montgomery Cross Road.

The St. James Catholic School has approximately 365 students, grades kindergarten through eighth. Students who live in the Mayfair subdivision on the northern side of Montgomery Cross Road often walk to school utilizing crosswalks across Montgomery Cross Road. According to a parent representative from the subdivision, an additional 10 to 15 students who live in Mayfair are currently driven to school and would potentially walk if the conditions improved.

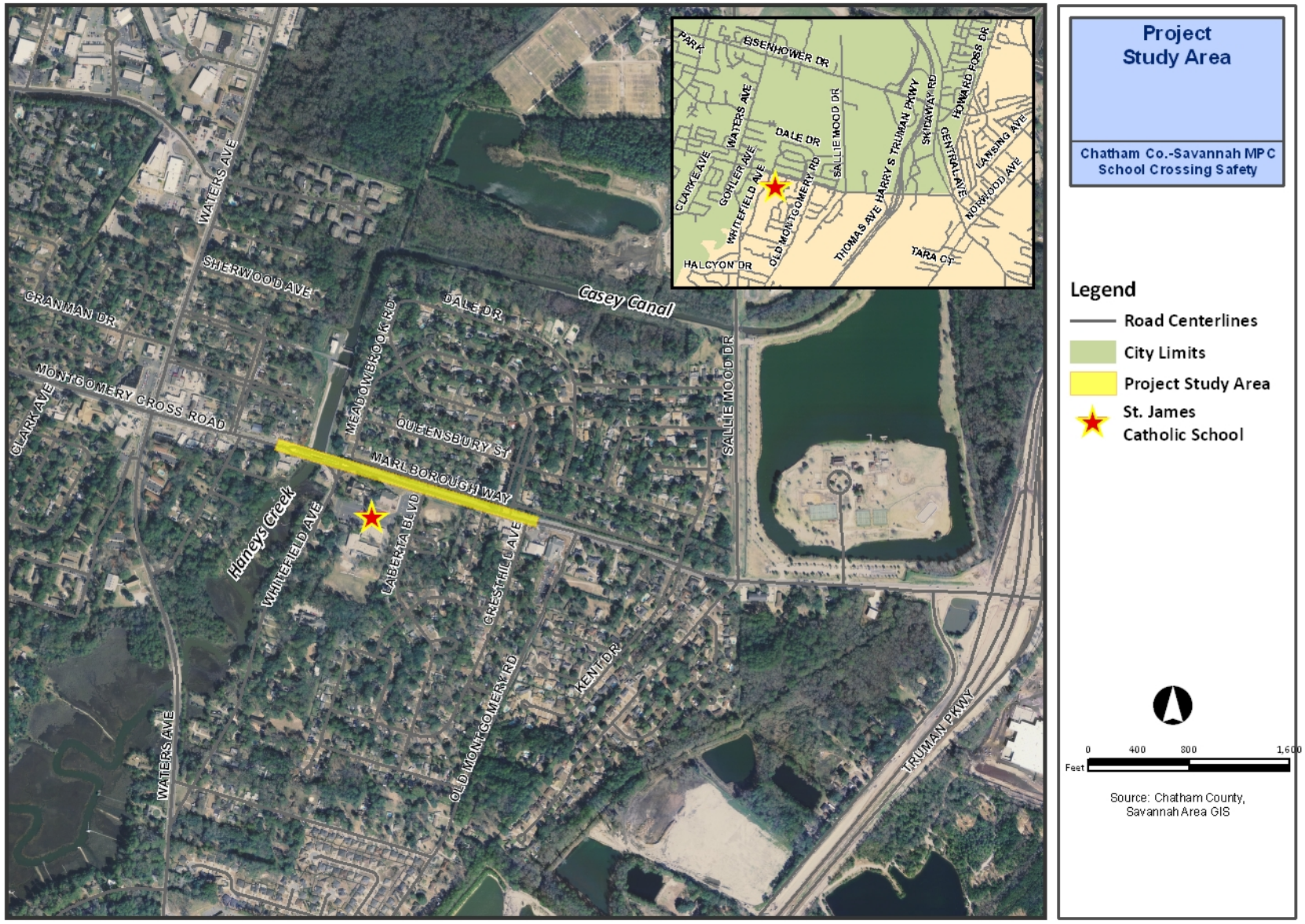


Figure 1: Project Study Area

3.0 Road Characteristics

Within the project study area, Montgomery Cross Road is a five-lane roadway, with two lanes in each direction and a center two-way left turn lane. Figure 2 below shows a typical cross section of the road in the study area. Travel lanes in both directions are 12 feet wide, and the two-way left turn lane is 15 feet wide. It is classified as an urban principal arterial.

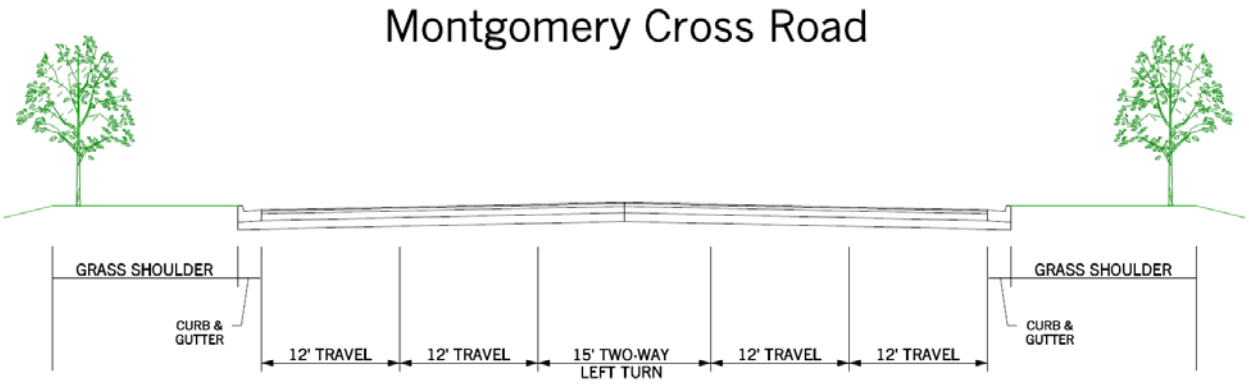


Figure 2: Montgomery Cross Road Typical Section

Eastbound on Montgomery Cross Road, the posted speed limit is 40 miles per hour, while it is posted 45 miles per hour westbound. Montgomery Cross Road is in a tangent (straight) section at this location and has almost no horizontal curvature, causing many drivers to travel at speeds much higher than that which is posted. Particularly during rush hour, this stretch of Montgomery Cross Road serves as a high speed cut-through between Waters Avenue to the west and Truman Parkway to the east.

Haneys Creek is immediately to the west of St. James Catholic Church on the southern side of Montgomery Cross Road, and Casey Canal is on the northern side of Montgomery Cross Road. Twin bridges travel over these creeks.

3.1 Signage

Within the study area, many signs have been placed along the roadside. Figure 3 provides an inventory of the road signs within the project study area. Many of these signs, particularly along the westbound side of Montgomery Cross Road, are obstructed by overgrown foliage and are therefore difficult for drivers to read.

Much of the signage along Montgomery Cross Road is associated with the school zone for St. James Catholic School. Eastbound, the school zone begins at Whitefield Avenue, and westbound, between Royal Oak Court and Laberta Boulevard, for a total length of approximately 2,000 feet. The

posted school zone speed is 25 mph. Eastbound, advance warning signage noting the decrease in speed limit during school hours from 40 miles per hour to 25 miles per hour is posted approximately 525 feet prior to the start of the school zone. Westbound, advance warning signage of the speed limit change is also posted approximately 525 feet prior to the start of the school zone. While this signage is placed in accordance with the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD), the large number of signs in close proximity to one another can cause confusion and distraction. Before the entrance to the school zone in the westbound direction of Montgomery Cross Road, the pavement is marked with the word "SCHOOL" to alert motorists. This marking is not present along the roadway when entering the school zone on the eastbound side.

Other signs present within the project study area, along with sign numbers from the MUTCD, include the following:

- School Speed Limit Assembly (S4-3p, R2-1, S4-4p),
- School Advance Speed Limit (S4-5a),
- State Law Stop for Pedestrians (R1-6a),
- Speed Limit (R2-1),
- T-Intersection Ahead (W2-4),
- School Advance Crossing Assembly (S1-1, W16-9p),
- Two-Way Left Turn Only (R3-9b),
- End School Zone (S5-2), and
- Bus Stop (local sign).

The MUTCD no longer recommends the "State Law Stop for Pedestrians Sign" (R1-6a) mounted any other way than in-street. Since these signs are currently mounted at each pedestrian crossing at St. James, they should be removed and replaced by the school crossing sign with arrow, S1-1 and W16-9p, shown below.

Figure 3. School Crossing Assembly, Located at Crossing (S1-1 and W16-9p)

Figure 4: Study Area Sign Inventory

3.2 Pedestrian and Bicycle Facilities

Along this section of Montgomery Cross Road, bicycle and pedestrian facilities are minimal. There are no bike lanes or sidewalks present, although both bicycle and pedestrian activity is evident. At the time of a field review, multiple bicycles shared Montgomery Cross Road with vehicles. A worn pedestrian path is located along portions of the northern side of the roadway, between Montgomery Cross Road and Marlborough Way in the Mayfair subdivision, with several cut-throughs across the median between the two.

There are three (3) crosswalks across Montgomery Cross Road within the school zone: one located midblock between Whitefield Avenue and Laberta Boulevard, one at Laberta Boulevard, and one at Royal Oak Drive. There are also crosswalks across Whitefield Avenue, Laberta Boulevard, and the church driveway between Whitefield Avenue and Laberta Boulevard. Each of these crosswalks is 7.5 feet in width and is delineated by non-reflective white paint. According to St. James staff, the only crosswalk used by the school is that which is located at Laberta Boulevard, with the assistance of a crossing guard. When students travel to school in the morning, the guard stops traffic as students approach to cross. After school ends in the afternoons, all students cross together at the same time as the guard stops traffic. In the afternoon, it takes approximately 30 seconds for all the students to cross Montgomery Cross Road, according to school representatives.

4.0 Roadway Traffic and Safety Data

Traffic data was obtained from Savannah Area Geographic Information System (SAGIS) and from GDOT through Georgia's State Traffic and Report Statistics (STARS) database. The table below provides a summary of two-way average annual daily traffic (AADT) between 2005 and 2009 on Montgomery Cross Road.

Table 1: 2005 to 2009 AADT

Year	Westbound AADT	Eastbound AADT	Total Two-Way AADT
2005	10,420	9,860	20,080
2006	10,040	10,040	20,080
2007	10,040	10,040	20,080
2008	NA	NA	19,760

Year	Westbound AADT	Eastbound AADT	Total Two-Way AADT
2009	NA	NA	20,100

NA = Not available.
Source: GDOT STARS

The Savannah-Chatham County Police Department provided information regarding the number of speeding citations issued on Montgomery Cross Road surrounding the school zone over the previous three year period. The table below summarizes the speeding citations that were issued surrounding the school zone over the last three years, from August 28, 2007 to August 27, 2010.

Table 2. Speeding Citations Issued Surrounding St. James School Zone (August 27, 2007 to August 28, 2010)

Location	2007	2008	2009	2010	Total
Montgomery Cross Rd at Whitefield Ave	10	62	59	11	**142**
Montgomery Cross Rd at Laberta Blvd	7	-	-	-	**7**
Montgomery Cross Rd at Royal Oak Dr	-	-	5	-	**5**
Montgomery Cross Rd at Old Montgomery Rd	1	9	4	1	**15**
Montgomery Cross Rd at Sallie Mood Dr	2	3	1	1	**7**
Total	**20**	**74**	**69**	**13**	**176**

Source: Savannah-Chatham County Police Department

The Police Department also provided accident information over the last three years, summarized in the table below. Accidents occurring most often in the area surrounding the school zone (approximately one-third of a mile surrounding the school) were those that occurred between two autos and resulted without any injury. The table below summarizes the accidents.

Table 3. Accidents near St. James School Zone (August 27, 2007 to August 28, 2010)

Type of Incident	2007	2008	2009	2010	Total
Accident, Auto Hit and Run	4	7	3	1	**15**
Accident, Auto with Auto, Injury	2	3	5	4	**14**
Accident, Auto with Auto, No injury	9	29	32	12	**82**
Accident, Other, Injury	1	-	1	-	**2**
Accident, Other, No Injury	4	7	6	2	**19**
Hit and Run - Private Property	1	5	3	1	**10**
Private Property Accident	6	12	10	7	**35**
Total	**27**	**63**	**60**	**27**	**177**

Source: Savannah-Chatham County Police Department

5.0 School-related Traffic Patterns

5.1 Motor Vehicle Traffic

For student drop-off in the mornings at St. James Catholic School, parents in vehicles utilize the large parking lot between Whitefield Avenue and Laberta Boulevard. From Montgomery Cross Road, the drivers turn onto Whitefield Avenue and make a left into the parking lot, travel through the lot to Laberta Boulevard, turn left onto Laberta Boulevard, and finally end back at Montgomery Cross Road where they make either a left or right turn. Because of the large number of parents driving children to school, this traffic pattern results in backup along Montgomery Cross Road beyond the bridge over the canal to the west of the school. This existing traffic pattern is shown in Figure 4.

Figure 5: St. James Catholic School Morning Traffic Pattern

In the afternoon, the parents arrive and park. The school releases the walking students first, and after the crossing guards escort that group across Montgomery Cross Road, the school staff signals parents with students in cars to exit the parking lot from either end in a coordinated manner.

One day in the second week of school, turns at Laberta Boulevard were observed to inform the development of safety recommendations. Counts of turning vehicles at Laberta Boulevard were taken during school zone hours in the morning and in the afternoon. The table below summarizes the findings.

Table 4. Laberta Boulevard at Montgomery Cross Road Turning Movements

Direction	Time Period					
	7:30 to 8:15 a.m.	8:15 to 8:30 a.m.	**Morning 1-hour total**	2:30 to 3:00 p.m.	3:00 to 3:30 p.m.	**Afternoon 1-hour total**
Vehicles from St. James, exiting Laberta onto WB Montgomery Cross Rd	63	2	**65**	5	19	**24**
Other vehicles exiting Laberta onto WB Montgomery Cross Rd	10	7	**17**	3	7	**10**
Vehicles from St. James, exiting Laberta onto EB Montgomery Cross Rd	59	2	**61**	8	19	**27**
Other vehicles exiting Laberta onto EB Montgomery Cross Rd	2	1	**3**	6	1	**7**
Vehicles entering Laberta from EB Montgomery Cross Rd, to St. James	3	2	**5**	24	1	**25**
Other vehicles entering Laberta from EB Montgomery Cross Rd	7	4	**11**	10	9	**19**
Vehicles entering Laberta from WB Montgomery Cross Rd, to St. James	2	2	**4**	27	1	**28**
Other vehicles entering Laberta from WB Montgomery Cross Rd	4	0	**4**	6	2	**8**

Note: WB = westbound; EB = eastbound

During the morning school zone period that was in effect at the time of this count (7:30 a.m. to 8:15 a.m.), approximately 150 motor vehicle turns occurred at the intersection of Laberta Boulevard and Montgomery Cross Road. An additional 20 vehicle turns occurred between 8:15 a.m. and 8:30 a.m. to make a total of 170 in one hour. The predominant movement in this time period was vehicles coming from the St. James parking lot onto Laberta Boulevard and then turning onto Montgomery Cross Road, due to the current school traffic pattern.

Of particular interest are the left turns from Laberta Boulevard. onto westbound Montgomery Cross Road, as these increase the potential for pedestrian/vehicle conflicts at the crosswalk. The count for that movement during the 45-minute school zone period was 73 vehicles, with 63 (86%) of those originating in the St. James parking lot. For the whole hour between 7:30 and 8:30, 65 out of 82 (79% of) left-turning vehicles from Laberta Boulevard. came from the St. James parking lot.

A slightly lower number of vehicles turn right out of Laberta Boulevard. during the morning school zone period and during the whole hour, but like the left turn movements, the majority of the vehicles came

from the St. James parking lot, with 59 out of 61 (97%) in the 45-minute school zone period, and 61 out of 64 in the whole hour (95%).

In the afternoon school zone hour in effect at the time of this count (2:30 p.m. to 3:30 p.m.), a total of 148 vehicle turns were made into or out of Laberta Boulevard at Montgomery Cross Road. Because classes end at 3:00, the predominant movement from 2:30 to 3:30 was vehicles turning into Laberta Boulevard from Montgomery Cross Road, while after 3:00 p.m., the majority of turns were exiting Laberta Boulevard onto Montgomery Cross Road. Unlike in the morning hours, the driving parents turning left out of Laberta Boulevard in the afternoon do not contribute to turn conflicts with students crossing on foot, due to the fact that the students have already crossed before driving parents are signaled to leave the parking lot, as mentioned above.

5.2 Students' Observed and Potential Pedestrian and Bicycle Trips

On the same day that vehicle turns were counted, a total of three students were observed arriving on foot in the morning, with two of those students coming from across Montgomery Cross Road. A total of 16 students were observed leaving on foot in the afternoon. With 15 of those crossing to the other side of Montgomery Cross Road. No students were seen arriving or departing on bicycles, although a few other bicyclists passed by on Montgomery Cross Road during school zone hours.

On the following page, a map shows the locations of student residences near of the school for the 2010-2011 school year. A total of 35 students live within a walkable or bikeable distance, with 19 of those on the north side of Montgomery Cross Road, and 16 on the south side.

Conditions on Montgomery Cross Road affect the true feasibility of walking or bicycling for many of the nearby students. Seventeen of the students to the north live in the Mayfield subdivision and Montgomery Cross Road is the primary obstacle in their walking or bicycling route, although many do make the crossing on foot in the afternoon. Lack of sidewalks and bicycle facilities on Montgomery Cross Road is a likely deterrent to another seven students within a feasible walking or bicycling distance.

The remainder of the 35 students within walking or bicycling distance access St. James School from the neighborhoods south of the school; the need for or adequacy of walking and bicycling facilities in those areas is beyond the scope of this report, but could be addressed through the school's participation in a Safe Route to School program.

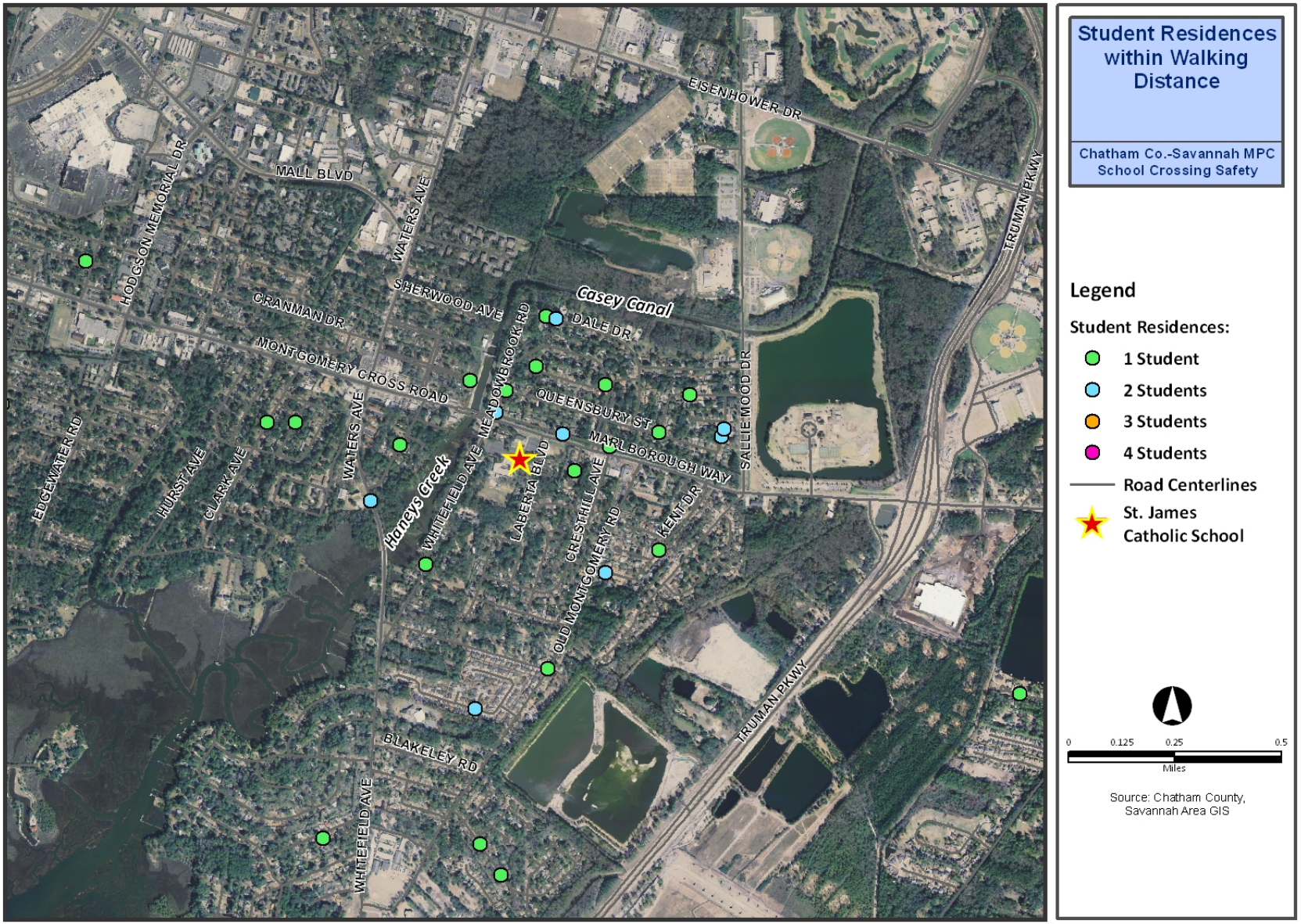


Figure 6: Student Residences within Walking Distance of St. James Catholic School

6.0 Issues

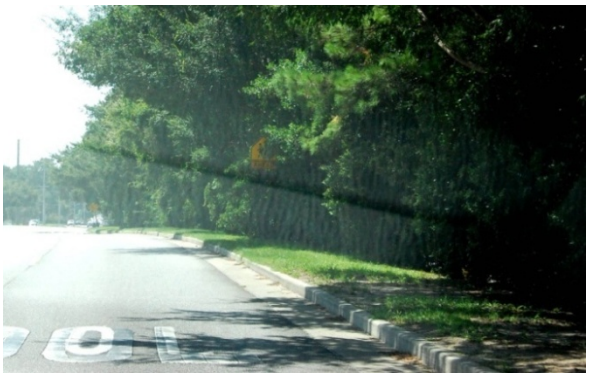
As detailed in previous sections, within the study area there are multiple issues that affect the safety of the pedestrian crossings of Montgomery Cross Road that are used to get to and from St. James Catholic School. Through this existing conditions analysis, including Stakeholder input, the following issues were identified:

- Vehicles travel at high speeds along Montgomery Cross Road.
- Vehicles fail to yield to pedestrians at multiple crosswalk locations, despite signage.
- Too many signs are located along the roadside within study area, distracting drivers from possible pedestrian presence.
- There is a lack of adequate bicycle and pedestrian facilities, i.e. sidewalk and bike provisions.
- There are multiple pedestrian crossings within close proximity of each other.
- The sun impairs drivers' visions.

7.0 Recommendations for Short-Term Improvement

The 2010-2011 school year at the St. James Catholic School begins on Monday, August 16, 2010. In order to address some of the safety issues at the school crossings prior to the start of school, this report also provides recommendations that can be implemented in the short-term. These short-term solutions are detailed below, and should be implemented in combination.

1. **Clearing of brush:** Clearing brush surrounding existing signs, particularly in the westbound direction along Montgomery Cross Road, would make the signage more visible to vehicles.



2. **Add police presence:** During school zone hours, station a police vehicle with lights flashing in the center turn lane. Often police presence alone will slow vehicles down and encourage them to stop for pedestrians in crosswalks.

3. **Increase Visibility of Crosswalks:** Because the crosswalk striping has excessively faded, repainting them would greatly increase their visibility for drivers. With fresh paint, drivers would be able to see crosswalks in advance and better prepare for the presence of pedestrians. If available, thermoplastic striping should be used.

4. **Eliminate Repetitive Crosswalks within Close Proximity:** Because the crosswalks at Laberta Boulevard and directly in front of St. James Catholic Church are located within 250 feet of each other, it isn't necessary to maintain both of them. According to Chatham County Engineering, there is a crossing located midblock to service transit riders from adjacent transit stops.

However, Chatham Area Transit (CAT) has amended routes in this area so that Montgomery Cross Road is only serviced in the westbound direction, by bus routes 20 and 31. Formerly, Route 6 traveled along Montgomery Cross Road in front of St. James Catholic Church, but this route has been modified to only extend as far east as Waters Avenue. Because of the close proximity of the crosswalk at Laberta Boulevard to the east (250 feet), it is acceptable for transit riders to utilize that crosswalk instead. The sign for the transit stop could be moved closer to the crosswalk at Laberta Boulevard. The paint delineating this crosswalk and associated signage should be removed.

5. **Reduce Number of Signs along Roadway:** The large number of signs located along the roadside can cause confusion to drivers, and divert their attention from pedestrians in the area. A reduction of this "sign clutter" will allow drivers to stay focused on the most important warning signs for the school zone and pedestrian crossings. On eastbound Montgomery Cross Road, the "Two-Way Left Turn Only" (R3-9b) sign should be removed and placed elsewhere, outside the school zone. With the removal of the midblock crossing as discussed in short-term recommendation 4 above, all associated signage for that crossing should also be removed, which consists of one "State Law: Stop for Pedestrians" (R1-6a) sign in each direction. Unnecessary transit stop signs should also be removed, since CAT has modified transit routes along Montgomery Cross Road, for a total of three transit signs. These changes would result in the removal of a total of six (6) signs within the study area.

6. **Bring Crossing Signage up to Current Standards:** The MUTCD no longer recommends the "State Law Stop for Pedestrians Sign" (R1-6a) mounted any other way than in-street. Since these signs are currently post-mounted at each pedestrian crossing at St. James, they should be removed and replaced by the school crossing sign with arrow, S1-1 and W16-9p, shown below. This sign should be placed on the roadside at the crossing location.

Figure 7. School Crossing Assembly, Located at Crossing (S1-1 and W16-9p)

7. **Deploy cones or temporary barriers:** In the center turn lane, orange cones or temporary concrete barriers could be used to surround the crosswalk during the hours that the school speed zone is in effect. This will provide pedestrians with a temporary refuge area while crossing Montgomery Cross Road, and will serve as a traffic calming tool along the roadway. It will not restrict left turning vehicles from Laberta Boulevard onto Montgomery Cross Road, but the presence of the cones will raise driver awareness that there is a crossing immediately after turning onto Montgomery Cross Road. A diagram showing the proposed configuration of these cones is shown below. To best implement this improvement, it is recommended that the school crossing guards place the cones at the crossing at the start of the school speed zone hour, both in the morning and afternoon.

Figure 8: Proposed Traffic Cone Locations at Crosswalk

8. **Install "State Law: Stop for Pedestrian" signs in center turn lane:** These pedestrian crossing signs within the center turn lane will further alert vehicles that they must stop for pedestrians within the crosswalk. The addition of these signs in the center of the roadway also act as a traffic calming measure because they make drivers feel a road-narrowing effect as they approach crosswalks. However, because of the speed limits on Montgomery Cross Road, with the exception of school zone hours, the permanent installation of these signs may not be feasible. One option is to utilize portable signage during the school zone hours when the reduced speed limit is in effect. A limiting factor to using these signs only during school zone hours would be the necessity of the crossing guards having to install/uninstall the signs.

Source: Manual on Uniform Traffic Control Devices*, FHWA, 2009.*

Figure 9: "State Law: Stop for Pedestrian" Sign (R1-6a)

9. **Deploy mobile changeable message signs or "smart signs":** Placed in advance of the school zone, changeable message signs will warn motorist of the upcoming crossings and the speed limit reduction. The message on the sign could alternate between two phases, such as, "SCHOOL ZONE 500 FT" (phase one), "25 MPH" (phase two).

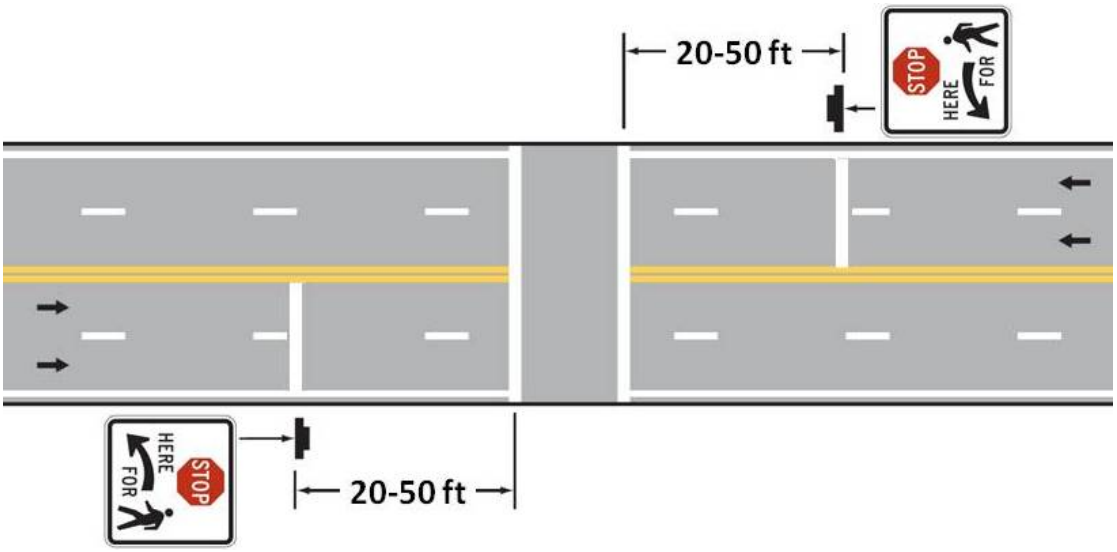
   Alternatively,"smart signs" could be used at the start of the school zone to indicate the speed at which approaching drivers are traveling, in conjunction with a mobile speed detector. The sign should read "YOUR SPEED XX MPH".

   Because the direction of the sun often impairs drivers' vision on sunny days on Montgomery Cross Road, careful consideration should be taken when selecting the location for temporary changeable message signs.

10. **Add stop lines in advance of crosswalks:** The Federal Highway Administration (FHWA) states that if drivers yield too close to a crosswalk on multi-lane approaches, pedestrians are placed at risk because other drivers' views of pedestrians are blocked.[1] Stop lines placed in advance of

[1] *Manual on Uniform Traffic Control Devices*, Federal Highway Administration, 2009.

the crosswalk will make motorists aware of the preferred stopping location as pedestrians cross the roadway. On a multi-lane highway, this striping allows for better visibility of pedestrians from all lanes of traffic, where otherwise, one vehicle stops for a crossing pedestrian and screens him from view of motorists in the adjacent lane. This striping should be used in conjunction with the "Stop Here to Pedestrian" sign so that vehicles understand the meaning of the striping. Note that according to the MUTCD, this striping should *not* be used in combination with the in-street "State Law: Stop for Pedestrian" sign.



Source: *Manual on Uniform Traffic Control Devices*, FHWA, 2009

Figure 10: Configuration of Yield Lines in Advance of Crosswalks

11. **Modify school traffic pattern:** The traffic pattern at the St. James Catholic School should be modified so that vehicles enter and exit the school along Whitefield Avenue instead of Laberta Boulevard. This will decrease the number of conflict points between vehicles exiting the school and those traveling along Montgomery Cross Road. As the turning movement counts showed in Section 5.0, the vast majority of vehicles making left turns onto Montgomery Cross Road are those coming from the St. James parking lot. A modification to the school traffic pattern would greatly reduce the number of left turns made at this intersection and will allow for safer pedestrian crossings at the intersection. Vehicles exiting the neighborhood to the south of the school along Laberta Boulevard and turning left onto Montgomery Cross Road should be redirected to exit along Cresthill Avenue to the east, to make left turns on Montgomery Cross Road. Only vehicles from the surrounding neighborhood, not the school, should be permitted to utilize Laberta Boulevard, and then only if a right turn is being made onto Montgomery Cross Road. This proposed configuration is shown in Figure 11.

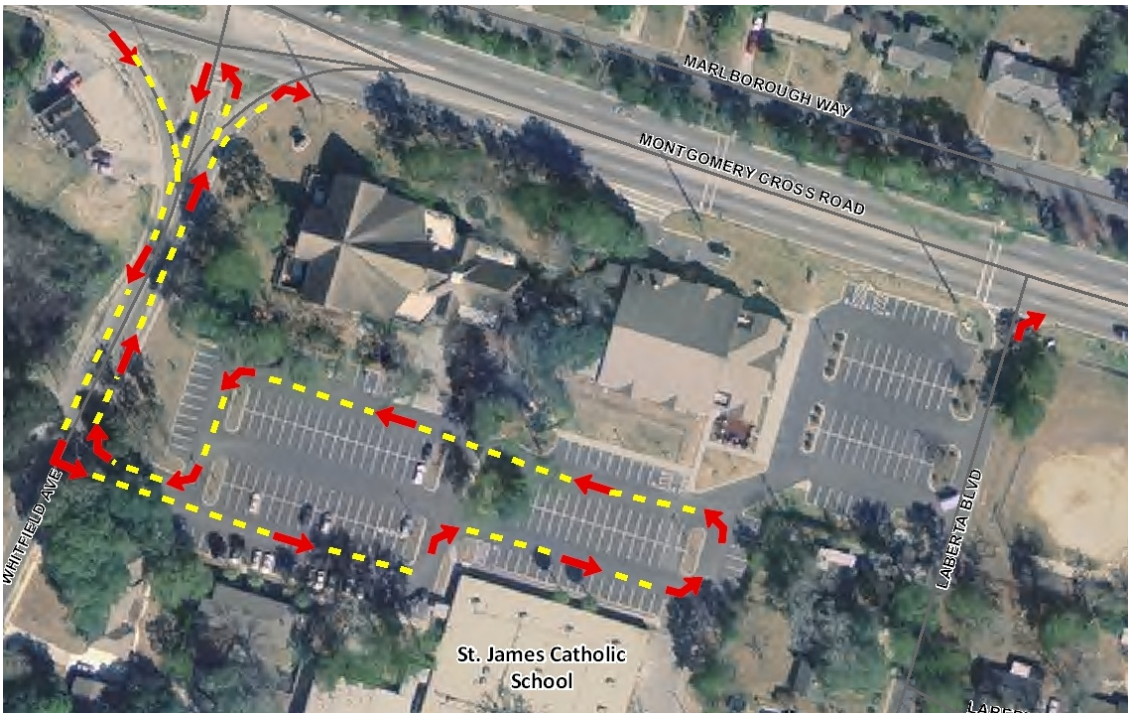


Figure 11: Proposed Modified Traffic Pattern at St. James School

8.0 Public Involvement

A crucial component to the success of the school crossing safety analysis is engaging key stakeholders throughout the study process. This insures that as the project progresses, those with a vested interest are able to provide input and feedback at various milestones. On July 29, 2010, the first stakeholder meeting for the School Crossing Safety project was held at the MPC. In addition to MPC staff and the project team, stakeholders who were in attendance for this meeting include:

- Sister Lisa Golden - Principal, St. James Catholic School
- Paula Summerlin - Parent Representative, St. James Catholic School
- Carey Brown - Chatham County Public Works
- Mike Weiner - City of Savannah Traffic Engineer
- Nathaniel Panther - Chatham County Engineering

The purpose of this first stakeholder meeting was to introduce the stakeholders to the project, discuss potential short-term improvement options that can be implemented prior to the start of school, and discuss the project's next steps. The short-term recommendations detailed in the previous section were presented, and they were discussed along with several other options put forward by various stakeholders. These other options include:

- Instead of crossing students at various times as they arrive at the crosswalk in the morning, have the crossing guard assist with all students at one designated crossing time, like the current afternoon crossing.

- For students living in the Mayfair subdivision, hold a "walking school bus" for students attending St. James. A walking school bus allows students to walk along a set route to school in a group with adult supervision

After discussion of short-term improvement alternatives, next steps to be taken by various stakeholders were discussed. The table below summarizes these action items to be taken in order to implement short-term improvements that could be made prior to the start of the 2010 school year.

Table 5: Stakeholder Meeting #1 Action Items

Responsible Party	Action Item
Chatham County Department of Engineering	1. Coordinate with Public Works Department on modification of Montgomery Cross Road so that only one crosswalk remains, that which is at the intersection of Laberta Boulevard, prior to start of school
Chatham County Department of Public Works	1. Determine inventory of orange traffic cones and their availability for purchase, if not enough in inventory, to place around crossing in center lane during school zone hours
	2. Update striping to increase crossing visibility along Montgomery Cross Road in the vicinity of St. James Catholic School, prior to start of school.
	3. Modify Montgomery Cross Road so that only one crosswalk remains, that which is at the intersection of Laberta Boulevard, prior to start of school
City of Savannah Traffic Engineering	1. Clear brush that obscures signs along Montgomery Cross Road.
	2. Verify that flashing school zone lights are set to correct timing. AM zone should be from 7:30 to 8:30; PM zone should be from 2:45 to 3:35
Savannah-Chatham County Police Department	1. Place "smart sign" on Montgomery Cross Road in advance of school zone to notify drivers of current speeds
St. James Catholic School	1. When students cross from Mayfair subdivision in mornings, have crossing guard escort them across as a group at one time as is done for the afternoon crossing
	2. Educate parents so that no left turns from Laberta Boulevard are made during school zone hours.
	3. Share data with the MPC that shows neighborhoods where St. James students reside.
	4. Modify internal traffic pattern so that for pick up and drop off, parents enter and exit the school via Whitefield Avenue instead of Laberta Boulevard