

## Chapter 7 – Engineering Activities

Safe Routes to School engineering activities provide physical infrastructure improvements that help to create walk-able and bike-able school communities. They are intended to create safer conditions by providing new infrastructure or by improving existing infrastructure, such as:

- Sidewalks
- Bike lanes or road shoulders
- Marked crosswalks
- Curb ramps
- Signage
- Traffic signals
- Bike racks
- Street lane modifications
- Street lighting
- Removal of physical safety hazards

Engineering activities can range from very large and expensive public works projects to quick low-cost improvements. This “E” is often the most expensive of all of the 5 “E”s, and requires a great deal of assessment and consideration before large quantities of money are spent. Sometimes, the problem can be addressed with low-cost measures, achieving safety results more quickly than long-term high-cost projects. For example, a high-trafficked pedestrian crossing may at first seem to call for the installation of a traffic light. However, closer evaluation may show that high visibility signage, combined with a crossing guard will be effective in providing a safe crossing point sooner and for much less cost. Alternatively, another “E” may effectively solve the problem. Education of the school children to cross at an existing safe crossing point may also address the issue more quickly and at no significant cost. These quicker fixes, if effective, will allow safer conditions to be in place more readily, and will create a real sense of progress among school community members.



Some Engineering measures may be implemented on the school property, such as a bike rack or signage directing proper movement of vehicles and children. However, most engineering measures will take place on local streets, requiring action by the local government that has responsibility for them.

The following is a “toolkit” of engineering strategies that have been successfully used in SRTS programs in Georgia and across the country. It is not intended to be a complete technical guide for infrastructure solutions, but an introduction to familiarize SRTS program implementers with the overall



Low-cost and effective safety measures shown here include crosswalk striping, signage, and curb ramps.

## Safer Infrastructure – It Takes More than the Engineers!

### Seeing the Problems:

At a school in urban Atlanta, the SRTS team identified a number of hazards that constituted real dangers to walkers and bicyclists along a major route to school. Due to the lack of street lighting along the route, teachers and children were walking to school literally in the dark. Along the dark stretch of road, shrubbery grew adjacent to the sidewalk and, in places, actually blocked parts of the sidewalk. It also provided spaces where potential predators could hide.

There were other hazards as well. A bridge across a major creek had a large drop-off from the sidewalk to the creek below, and there was no railing to prevent children from falling over the edge. The sidewalk was right next to the heavily trafficked road, with only two feet of grass separating the walking children from moving vehicles. Furthermore, traffic on the road was known to regularly travel in excess of the speed limit.

Due to the perceived hazards, the school principal would not approve school-sponsored walking groups (Walking School Buses) along this road.

### Getting to the Solutions:

It took a coordinated team effort to make changes happen. With the SRTS



Above: Prior to safety improvements, children walked to school in the dark with no street lights next to fast moving traffic.



Left: This hazardous drop-off was discovered on a major walking route to school.

Team's diligent effort, phone calls, and meetings, the county transportation office took strong interest in assuring a safer walking and bicycling environment, and assisted in coordinating with the agencies responsible for lighting and shrubbery. Citizen interest in the local civic association aided the positive government response. The neighborhood leadership was actively supportive of safer conditions for school journeys, but was also acting on behalf of adults in the neighborhood who needed better lighting and safety along the road. A local bicycle expert, showing that the road was part of a bicycle plan, documented the benefits of striping shoulders on the road. Members of the school community, lead by the art teacher, also got involved in developing creative signs to encourage slower driving.

The end result was a road with multiple highly visible improvements and a much

safer route for walking and bicycling to school. New street lights were installed.

Sidewalks were improved and crosswalks painted. Shrubbery was trimmed back and thinned to prevent obstruction of sidewalk use, and to reduce opportunities for hiding. A guard rail was installed along the creek crossing and along the shrubbery stretch, preventing falls and providing further separation to help deter potential predators. (The rail had the added benefit of protecting drivers who were also endangered by the drop-off into the creek.) A shoulder was striped onto the roadway edge, providing five feet of additional separation between moving cars and walking children. It also provided a safer space for bicycling to school on that route. Vehicle speeds on the road were observed to be reduced after the shoulder was installed, attributed to the resulting narrower vehicular lane. In addition, colorful creative signs using the school mascot were installed next to the roadway on school property as a further reminder to "Slow Down".



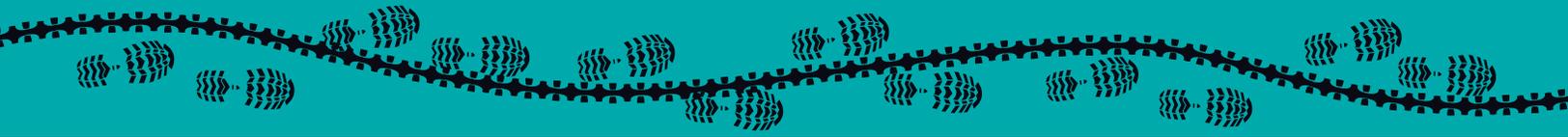
A view of the road following safety improvements. Note the new guard rail, bicycle-friendly shoulder, and the new street lights.

After seeing the changes, the school principal approved the first "Walking School Buses" along this road; this resulted in an immediately visible presence of children and adults walking to school on the improved route. All of these changes in a concentrated area drew people's attention, which in turn spurred community-wide awareness and support for additional efforts toward safer routes to school.

concepts. It includes references to additional technical sources that can assist you in assessing and planning a particular engineering option.

For more detailed information on infrastructure measures related to walking and bicycling safety, here is a summary of some of the available resources:

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Bike Sense, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Designing Sidewalks and Trails for Access: Part Two — Best Practices Design Guide, U.S. Department of Transportation (<http://www.dot.gov.safety.html>)
- Development Manual, Transportation Department, Parks & Community Services Department, City of Bellevue ([www.bellevuewa.gov](http://www.bellevuewa.gov))
- Americans with Disabilities Act (ADA) Federal Requirements ([www.usdoj.gov/crt/ada](http://www.usdoj.gov/crt/ada))
- Road Diets, Dan Burden and Peter Lagerwey ([www.walkable.org/library.htm](http://www.walkable.org/library.htm))
- Manual on Uniform Traffic Control



- Devices, Federal Highway Administration, USDOT (<http://mutcd.fhwa.dot.gov>)
- A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO) (<https://bookstore.transportation.org>)
- Design and Safety of Pedestrian Facilities, ITE ([www.ite.org](http://www.ite.org))
- Guide for Planning, Design, and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)

- Guide for the Development of Bicycle Facilities, AASHTO (<https://bookstore.transportation.org>)

To implement complete and successful engineering assessments and plans, you will need to call on the knowledge and experience of engineers and other technical professionals. These experts will also be able to address the local requirements and practices which vary from jurisdiction to jurisdiction.

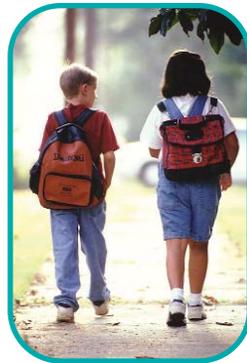
## Appropriate Sidewalk Features

### Description

Sidewalks are familiar to most people, but sidewalk safety goes much further than just having a sidewalk. The width and condition of the sidewalk are both important to safe usage, as well as the position of the sidewalk with relation to passing motor vehicles.

### Purpose and Benefits

Careful attention to providing safe sidewalk design and maintenance is extremely valuable to safe walking and, sometimes, bicycling conditions. Traffic safety issues occur at any point where children interface with motor vehicles, or even where they potentially interface with motor vehicles. These critical points occur at intersections and driveways. When sidewalks are near or adjacent to a roadway, there may also be critical safety issues along the full length of the sidewalk. In addition to the safety benefits, adding or improving sidewalks along school walk routes can be very effective in encouraging more walking to school.



### How To's

- The width of sidewalks on school walking routes should be no less than 5 feet (As recommended by the Georgia DOT).
- Attention should be given to separation of sidewalks from moving vehicles on the adjacent street. Often this separation consists only of a curb between the children and the cars. In other locations, you may have 10 or more feet of grassy berm between the street and sidewalk. Separation can also be provided by adding plantings of shrubs or trees, and by striping a shoulder or bike



The photo above shows a drainage problem corrected with the replacement of a section of sidewalk and the addition of an under-drain where the rainwater had been collecting on the sidewalk.

- lane on the edge of the road.
- Maintenance of existing sidewalks is important to retaining safe conditions. This includes replacing sections of broken or missing sidewalk, especially where this results in tripping hazards or access limits for wheel chairs and baby strollers.
- Drainage problems can make sidewalks hazardous and unusable. Such sidewalk problems should be identified and corrected as part of any sidewalk improvement program.
- Gaps in sidewalk service - In places where the sidewalk ends abruptly, walking may be seriously curtailed. Potential users in the neighborhood as well as school community members should be called upon to lend support for extending the sidewalk and filling that gap

### Challenges

- Funding is a major challenge. Miles of sidewalks can cost millions of dollars, and if they weren't installed with the original road construction, the funding is often difficult to obtain in competition with other demands for public funds.
- It may come as a surprise to sidewalk



This sidewalk ends abruptly one block from the school. Efforts are underway to extend it and fill the gap.

advocates that many of the neighbors on the streets without sidewalks oppose the installation of sidewalks. This is often because sidewalks would require removal of their mailboxes, shrubs, or other yard features currently occupying the public right of way. In addition, in many cases,

the homeowners on that street would be assessed the cost of the new sidewalk. Thus, it is very important to communicate and explore common benefits with property owners along any street where sidewalks are desired.

- Utility poles may currently exist where the sidewalk is desired. Before the sidewalk is implemented, careful consideration should be given to the extent that these poles will block sidewalk usage.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)

## Improving Intersections

### Description

Where two streets intersect, there is a special concern for the crossing paths of children and motor vehicles. Measures which can be taken to reduce the hazards are described below. Additional considerations are necessary if the intersection includes traffic signals. (See page \_\_\_\_ .)

### Purpose and Benefits

Re-designing an intersection with pedestrians and bicyclists in mind can be essential in creating safe routes to school. In many locations, the intersections are originally designed with the purpose of moving motor vehicles most efficiently. In a Safe Routes to School program, the approach is to evaluate and re-design selected intersections so as to give safety priority to walkers and bicyclists, but still retain satisfactory movement of motor vehicles through the intersection.

### How To's

- Include high-visibility crosswalks. Marked crosswalks are important on all walking and bicycling routes to school. For details



High visibility crosswalk markings like this should be installed where school walk routes cross streets. Note the ladder rung design pattern. This is the recommended standard design from the Georgia DOT.

on assessing and implementing this tool, please see page \_\_\_\_.

- Use tight corners, not wide sweeping turns. Experience shows that a vehicle must slow down to make a tight turn. However, many street corners are built with wide sweeping turns (large radius of curvature), allowing vehicles to turn at relatively high speeds. This may not allow sufficient time for a driver to see and react to children attempting to cross the street. In addition, wider corners mean that the crosswalk must be longer, expos-



The intersection on the left has tight corners which slow cars down while turning. This is much safer than the intersection on the right where vehicles can move around the corner at high speed due to the wide sweeping design of the curb.

ing the children in the street for a longer time while they cross. Assess which corners are most critical on this issue, and consider re-constructing the curb to create a tighter turn where this is needed. Measure the difference in distance the children will have to walk if the change is made. This can be shortened by 50% or more in some cases.

- Use crossing islands or medians in higher traffic situations to provide a refuge for pedestrians in the middle of the road. See page--- for details on this safety tool.
- If an intersection has traffic signals, it will require additional safety features. Signals need to be pedestrian-friendly and bicycle-friendly. See page \_\_\_ for details on these features.

### Challenges

- Cost will be a major factor in considering improvements which involve reconstruction or new construction of curbs or road edges. Keep in mind the need to give better accommodation to pedestrians and bicycle riders, even if it reduces the convenience of motorists to some degree. However, be prepared for more controversy on such significant changes, and prioritize so that the most critical safety hazards are addressed at these intersections.



This crossing is accompanied by a concrete island half-way across the street. This allows pedestrians to stand in a protected zone while waiting to cross the second half of the roadway.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)

## Marked Crosswalks

### Description

Marked crosswalks consist of visible stripes across a roadway, marking the location of a pedestrian crossing location. The simplest markings are two parallel white stripes between which pedestrians walk as they traverse the width of the road. The recommended "high visibility" crosswalk design includes cross stripes like the rungs of a ladder connecting the main crosswalk stripes at regular intervals, as shown in the photo below. In especially hazardous or high-trafficked locations, even more highly visible striping may be used, including thicker stripes or high-visibility colors, such as yellow.



### Purpose and Benefits

Crosswalk markings assist pedestrians in choosing the best locations to cross streets, and help drivers in knowing where to expect walkers to be crossing. High visibility striping designs have been proven to catch the attention of drivers more effectively than the simple two-stripe design.

### How To's

- The width of crosswalks should be no less than 8 feet (required by the Georgia DOT).
- The crosswalks should line up closely with the sidewalks on each side of the street.
- The striping design should be the Georgia DOT recommended configuration, with double cross-stripes positioned like ladder rungs between the long stripes of the crosswalk for high visibility (as shown in the photo above).
- The material used to stripe the crosswalk makes a significant difference in the durability and longevity of the crosswalk markings. Some paints are more durable than others, but the most durable is a material called thermo-plastic. It consists

of a strip of material much thicker than paint, made up of a rubbery substance which must be heated as it is applied to the roadway.

- Positioning the cross stripes of the crosswalk markings so as to avoid the normal wheel tracks of passing vehicles will help in extending the length of service of these markings. These are the stripes that run parallel to vehicle travel, and can easily be positioned with careful planning.
- School route crosswalks should be placed at locations with good site distance for drivers. This means avoiding locations near blind curves or blind hills, or where vegetation blocks the view of drivers approaching the intersection.
- Give special attention to "T" intersections (three street branches coming together). If a walking or biking route crosses such an intersection, a marked crosswalk is necessary to assure legal requirements for motorists to stop for pedestrians.

### Challenges

- Local jurisdictions sometimes do not stripe crosswalks at intersections where there are no sidewalks approaching the intersection. This policy makes it less safe for pedestrians crossing that intersection. It also leaves the children less protected legally, as drivers are not technically required to stop for pedestrians crossing at such un-striped intersections.

- Crosswalks are often found in deteriorated condition, making them much less visible to drivers. Periodic maintenance and re-striping is important to retain a safe crosswalk.

- *Guide for the Planning Design and Operation of Pedestrian Facilities*, AASHTO (<https://bookstore.transportation.org>)

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The *Georgia Guidebook for Pedestrian Planning*, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The *Georgia Pedestrian and Streetscape Guide*, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))

## High-visibility Crosswalks

The importance of high visibility crosswalks was highlighted at one metro Atlanta school when the crosswalk striping was removed completely! The local government removed the stripes as part of a re-paving project. For many days following, the crossing guard and scores of children made the crossing as best they could, guided only by a sea of black asphalt. It was particularly confusing because the streets and sidewalk came to the intersection at a sharp angle instead of a normal square corner.

When this problem was identified by the SRTS team, they contacted the local government to ask for the crosswalk to be marked as soon as possible. Finally, the striping crew came out

and installed two thin white stripes between which the children could walk. This was much better, but not nearly as visible to drivers as the high-visibility markings recommended by the Georgia DOT. So, the SRTS team asked the local government to take further steps, installing the "ladder rungs" on the crosswalk to make it more visible to motorists. After some time, the additional markings were added to the crosswalk, and it looked and felt much safer.

This illustrates the importance of persistence in communication to achieve safety measures. It also demonstrates the need for attention to details when projects are implemented.



## Curb Ramps

### Description

Curb ramps are sloped pavement connecting from sidewalks to crosswalks at intersections. They provide a break in the curb to facilitate the rolling of wheelchairs, baby strollers, book bags on wheels and bicycles from the street to the sidewalk. They are required as a standard feature at intersections by the Americans with Disabilities Act (ADA), but are still missing from many older existing intersections.

### Purpose and Benefits

Curb ramps make it easier to move things on wheels. Clearly, the addition of curb ramps will help a child or adult in a wheel chair to participate in transporting themselves to school without a motor vehicle. But large numbers of other school community members will also benefit, whether wheeling a bicycle, pulling a book bag on wheels, or pushing a baby stroller while walking with a student to school.

Curb ramps are relatively inexpensive to add in a retrofit project, and can be a highly visible signal of early success for a Safe Routes to School project, helping to build enthusiasm in the school community for more extensive infrastructure improvements.

### How To's

- All intersections on potential walking and bicycling routes to school should be included in the infrastructure assessment, and missing curb ramps identified for correction.
- Extra care should be taken to include textured surface and color in the curb ramp installation to accommodate the visually impaired.
- Users are best served by two curb ramps at each corner of an intersection, perpendicular to each other, lining up with the crosswalk markings.



These curb ramps exemplify effective accommodation of pedestrians and wheelchair users. The ramps line up well with the crosswalks, and have a high curb at the corner to discourage motorists from cutting the corner too sharply. The red textured area helps visually impaired pedestrians.

- Avoid ramp placement that makes it easier for motorists to cut across the corner of the sidewalk to make a sharper turn. Retain a high curb at the corner, and build your ramps to either side of it.

### Challenges

- Some officials may omit the need for curb ramps because they are not aware of any wheelchair use on the school routes. Keep in mind that wheelchair use can be needed anywhere at any time, and follow the ADA legal requirements. Also be aware of the benefits to other sidewalk users.
- It is easier and quicker to make a single ramp at each corner instead of two individual ramps lined up with the crosswalks. Such a short-cut makes it much harder and more dangerous for wheelchair users, and it gives drivers a ramp for cutting across the path of pedestrians on the sidewalk.

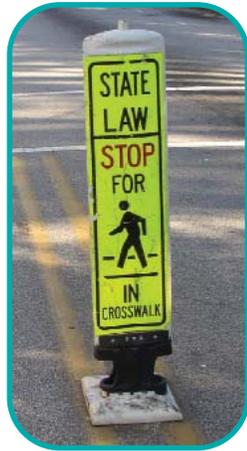
### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))

## In-Street Crosswalk Signs

### Description

In-street crosswalk signs are unique signs, installed directly in the middle of the street, on the centerline, to warn motorists of the state law requiring them to stop for pedestrians in the crosswalk. (See photo.) They are intentionally short (3 feet tall), placing them directly in the driver's line of sight when approaching a crosswalk. The mounting system for the sign is designed to allow the sign to give way if struck by a vehicle. When struck, the signs pivot on a flexible hinge at the bottom, and then spring back to a vertical position.



### Purpose and Benefits

In-street crosswalk signs are intended to catch the attention of drivers as they approach a crosswalk. Unlike signs along the side of the road, these little signs are impossible to miss. They make it clear that a crosswalk is located there, and that there are legal consequences for not stopping for pedestrians. They have been proven to be very effective in improving driver compliance in stopping for pedestrians, and in slowing vehicle traffic in pedestrian zones. (See *Traffic Calming*, page \_\_\_\_)

### How To's

- Consider installing these signs in locations where significant numbers of walkers and bicyclists cross streets with traffic.
- Generally two signs should be used at a crosswalk so that drivers will see the sign in advance of the crosswalk when approaching from either direction.
- When ordering signs, it is important to

note that some states only require drivers to "yield" to pedestrians, whereas in Georgia, the law requires them to "stop" for pedestrians. Be sure to order the signs with the correct wording.

- Three types of installation methods are available.
  - The sign can be mounted on a heavy rubber base and set in the roadway without any hardware being permanently attached to the roadway.
  - The sign can be permanently mounted on a metal bracket which is permanently installed in the roadway.
  - The sign can be temporarily mounted on a metal bracket in the roadway. This allows the sign to be placed during selected school travel hours, and easily removed until needed again, leaving only a small metal bracket permanently attached to the roadway.

Select the type of mounting method best suited for your location in close consultation with the road maintenance personnel of the local government.

### Challenges

- These signs may suffer frequent damage from impact with vehicles. Although they can usually withstand frequent impacts, be prepared to have some extra replacement signs on hand.
- The more portable signs with rubber bases will occasionally be knocked out of position by passing vehicles and need to be re-positioned back on the centerline.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)

## Road Signage – Effective and Up-to-date

### Description

Road signs affecting the safety of walkers and bicyclists on the school journey include both regulatory signs, such as speed limit signs, and warning signs, such as warnings of approaching crosswalks. These signs are an important tool in planning the overall safety for Safe Routes to School.

### Purpose and Benefits

Careful attention to the use of road signs will accomplish the important purpose of moving motor vehicles through an area safely and without driver confusion. This has added importance when the area has numerous children near or on the roadway on foot or bicycle. Proper selection and placement of these signs can have a significant effect on driver behavior and reduce the potential for hazards.

### How To's

- Include signs which meet the current



These signs are not clear to motorists regarding the speed limit. Confusing signage should be removed or replaced as necessary.



These signs are highly visible fluorescent green. The closest sign clearly indicates to drivers that there is a crosswalk ahead, and the next sign marks the exact location of the crosswalk with an arrow.

- standards, and replace those that do not. For example, warning signs depicting crosswalk locations should now be colored fluorescent green instead of the old orange/yellow. Signs should warn of crossings ahead as well as the exact location of the crossing points. (See photo above).
- Evaluate all signage along school walking and biking routes, looking for confusing or conflicting messages, whether any signs have been damaged or are missing, whether the signs are still needed or need to be replaced with clearer signs.
- Consider adding or re-painting pavement markings alerting drivers to the school zone. (See photo).
- Planners and engineers often refer to "sign clutter", meaning too many signs of different types, making it difficult or impossible for drivers to absorb all of the information. Be sure to assess for this problem in your signage evaluation.

### Challenges

- There is often a temptation to erect signs for one more thing you want motorists to keep in mind. It may be difficult to choose



which signs to limit yourself to, but it is an important decision to avoid sign clutter.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The *Georgia Guidebook for Pedestrian Planning*, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The *Georgia Pedestrian and Streetscape Guide*, Georgia DOT - Page 70 includes a detailed diagram of typical signs and locations near a school site. ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- *Manual on Uniform Traffic Control Devices*, Federal Highway Administration, USDOT (<http://mutcd.fhwa.dot.gov>)

## Flashing Signals for School Crossings

### Description

Yellow flashing beacons are often installed at or near primary crosswalks leading to a school. They may be placed on poles beside the road, or overhead, accompanied by signs warning motorists to stop for pedestrians in the crosswalk. They are usually set to be active only during morning and afternoon school journey hours.

### Purpose and Benefits

These warning signals, accompanied by other school zone signage and safety measures, make it clear to drivers that they are on a section of roadway where extra caution is necessary. Marking a key crosswalk with the extra visibility of flashing signals gives drivers more information on what to do while passing through the school zone.

### How To's

- When considering flashers at a crosswalk, assess both overhead flashers and roadside flashers. Select the more cost-efficient roadside flashers if they will be sufficient.
- Consider the high visibility of in-street crosswalk signs as an alternative to flashing signals at the crosswalk location. (See page \_\_\_\_.)
- Consider flashers that warn drivers of the crosswalk ahead as they approach it from either side.
- If flashing beacons are installed, set them to operate only during the hours that students are walking or bicycling to and from school.

### Challenges

- Overhead flashers require significant new structures to be built, including large mast arms to hold the flashing lights. It is critical that these lights be installed high



enough to allow large trucks to pass beneath, which may place them too high to be easily noticed by drivers.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO, (<https://bookstore.transportation.org>)

## Traffic Signal Features

### Description

Some walking and biking routes to school may include crossing at major streets with traffic signals. Many recent technologies are now available, along with older tried and true methods, to make it safer for walkers and bicyclists to cross at these signals. These methods are described in detail in the "How To's" below.

### Purpose and Benefits

The traffic signal features most pertinent for walking and biking routes to school are those which give specific advantage or even preference to school-bound pedestrians, bicyclists who are walking their bikes across an intersection, and on-street bicyclists crossing the intersection. Some technologies or signage may make it less convenient for motorists. That is necessary, at times, in order to address the special safety needs of children in a complicated and hazardous location.



### How To's

The following traffic signal features are important to consider in improving the safety of pedestrians and bicyclists crossing at signalized intersections:

- Pedestrian signals, sometimes called "ped heads", should be present and operating correctly at every signalized crossing on school walking routes.
- The activation buttons for pedestrian signals should be accessible within a child's reach, and the button itself should be the large type, easily accessible to those with disabilities.
- There should be clear signage at the activation button, including directional arrows.
- Signs announcing "No Turn on Red" help to avoid conflicts between crossing pedestrians and turning vehicles.
- The signal should be equipped with a "leading pedestrian interval" feature. This activates the "WALK" signal for pedestri-



This sign gives a clear message to pedestrians on how to use the pedestrian activation button. It is clear which direction the button controls. It also provides a large accessible button for those with disabilities.



ans a few seconds before the traffic light turns green for motorists. This is another means of avoiding conflict between crossing pedestrians and turning vehicles.

- “Count-down signals” are also strongly recommended. This feature provides a visible count down during the “WALK” cycle, from 10 to zero, letting pedestrians know how much time they have remaining at the end of the “WALK” period.

### Challenges

- Some of the new pedestrian-friendly technologies are unfamiliar to many engi-

neers and planners. You may encounter resistance to implementing them. Patiently requesting that the new approach be carefully looked into may produce results.

### Resources

- The National Center for Safe Routes to School Walking School Bus Guidebook ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))

## Electronic Speed Feedback Signs

### Description

Electronic speed feedback signs have a display screen that lights up to show drivers what their speed is as they pass the sign. The sign usually also has a permanent printed sign plate showing the speed limit. Solar panels are often attached to allow the sign to be placed anywhere without the need for electrical service.

### Purpose and Benefits

These devices are designed to catch drivers' attention better than regular speed limit signs, and have been proven effective in slowing down traffic where installed. They are generally comparable in size to other regulatory road signs, making them easy to install. While most drivers are familiar with the "speed trailer" placed temporarily on the roadside, these signs serve the same purpose, but they take it a step further by making it a permanent safety feature.

### How To's

- Consider using electronic signs in locations where you observe severe speeding along walking or bicycling routes to school, or where such routes must cross a road with speeding problems.



Speed Trailer



Electronic Sign

- Consider accompanying the signs with police enforcement presence in the period following installation. This will create a stronger connection of the significance of the signs in the minds of drivers.
- Work with neighbors near the school and inform them of the benefits to using such signage. They will likely provide support in your efforts to have these signs installed.

### Challenges

- These signs are still a relatively new technology, and so may not be readily accepted by some officials and citizens.
- Siting the signs in a shaded area will require an electric power hook-up.

### Resources

- The National Center for Safe Routes to School Walking School Bus Guidebook ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))

## Median Islands

### Description

Medians are fairly familiar sights on urban streets. They consist of a raised area with curb edges in the middle of a roadway, separating the traffic moving in opposite directions.

### Purpose and Benefits

A median literally provides an island of refuge for pedestrians in the middle of the road at a crosswalk. (See photo at right). These refuge areas make crossing busy streets easier by allowing pedestrians and cyclists wheeling their bikes to concentrate on crossing one half of the street at a time, watching for traffic in only one direction. Once they reach the median, pedestrians have a safe place to wait and watch for an opening in traffic coming from the other direction. Medians are particularly helpful at unsignalized intersections or mid-block crossings where vehicle traffic volume is heavy.

### How To's

- Medians may be considered where a school walking or bicycling route crosses a high volume road. Generally, widening the road to provide for a median will not be practical, so it is important to assess the existing available width. Consideration should be given to narrowing existing vehicle lanes to accommodate the width of a median. However, sufficient space must be left for bicycle travel in the roadway without conflicting with motor vehicles.
- Since these median islands are intended for pedestrian refuge, they need to be wide enough to allow safe accommodation of numerous pedestrians. Certain types of individual pedestrians also require extra space, such as adults with baby strollers, bicycles, and bicycles with trailers. For



this reason, the median should be no less than 6 feet wide.

### Challenges

- Many roadways have very little additional width beyond current lane use. It will often be difficult or impossible to safely fit in a median without widening the roadway.
- The expense of constructing a median can be a challenge if your funding sources are limited. Generally, such major projects must be carefully prioritized and limited to available budget.
- If the road involved is in a commercial zone, be prepared for possible concerns by business owners who often see medians as restricting access to their businesses if the medians restrict cars from turning left.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)

## Improving Driveway Crossings

### Description

When driveways cross sidewalks and sidewalks cross driveways, it means potential conflict between pedestrians and motor vehicles. This is a very important concern on school walking and biking routes. The information below describes measures available to reduce the hazards associated with this situation.

### Purpose and Benefits

Just as with intersection improvements, the purpose of improving driveway crossings is to reduce conflicts between motor vehicles and children walking or bicycling. Children walking on a sidewalk are focused on what is in front of them, and may be unprepared for vehicles approaching them from the side. They don't necessarily realize they are crossing a driveway where vehicles may be moving. Therefore slowing down the vehicles entering and exiting driveways is important. It allows the driver and the children more time to react to a potential conflict. Making these locations safer for the school journey will also benefit community members who are walking and bicycling for other purposes.

### How To's

- Consider tight corners - Consider reducing the turning radius at critical driveway crossings. Driveways having tight corners require drivers to slow down when entering and exiting the driveway. Wide sweeping turns, on the other hand, allow motor vehicles to negotiate a turn at relatively high speeds. Correcting this design will give drivers more time to see and react to pedestrians on the sidewalk, and if a sudden stop is necessary, it will be easier for

them to stop when at a slower speed. (For more information and photos, see "Improving Intersections", page \_\_\_\_.)

- Address wide driveways - Evaluate driveways that are very wide, requiring children



This driveway creates a serious challenge to children walking to and from school. It is extremely wide, with sweeping fast corners for moving vehicles.

to walk across the potential path of vehicles for an extended period. The longer pedestrians take to cross a driveway, the more exposure they have to danger from motor vehicles.

- Consolidating driveways - One way to reduce the exposure of pedestrians to cars entering and leaving driveways is simply to have less driveways. Many communities have made special efforts to work with property owners, particularly businesses and public properties, to share driveways. Not only does this create a safer walking environment, but it improves traffic flow on the street.

### Challenges

- Many of the driveways involved will be owned by private individuals or companies, which will limit the ability of the school system or local government to implement changes. Working with the owners in a collaborative manner will often be the main approach to solving these safety problems.



For this reason, it may be important to select only those driveway locations that are severe safety hazards.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- The *Georgia Guidebook for Pedestrian Planning*, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The *Georgia Pedestrian and Streetscape Guide*, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- *Guide for the Planning Design and Operation of Pedestrian Facilities*, AASHTO (<https://bookstore.transportation.org>)

## Traffic Calming

### Description

Traffic calming is a set of measures designed to reduce the speed and dominance of motor vehicles. Examples include speed humps, chicanes, curb bulb-outs, and traffic diverters. In some cases, communities go so far as to close a street to through-traffic. The photos below depict some of the more common traffic calming measures. For more details and descriptions of traffic calming measures, see the resources listed below.

### Purpose and Benefits

Traffic calming is most effective on quiet low-trafficked neighborhood streets as a means of retaining their safer and more peaceful qualities for enjoyable walking and bicycling. Often these are the streets that are used by impatient drivers as cut-through routes to avoid congested larger roads. Traffic calming usually does not restrict the volume of such traffic, but assures that it keeps to the speed limit, and makes it more difficult for aggressive drivers to dominate the road.

### How To's

- Once you have decided that traffic calming is necessary for a given street, select



Traffic calming can help to retain safe walking and biking conditions on neighborhood streets such as this.



Speed humps are one of the most familiar forms of traffic calming.

an appropriate measure. Many of these measures can be expensive, and can make driving more uncomfortable and difficult, so they should be installed only if a real need is present.

- Traffic calming can be implemented in stages by installing the less costly, simpler measures first, and graduating to more complex measures only if necessary. For instance, in-street crosswalk signs have a significant effect in reducing speeds while also improving the safety of pedestrians crossing the street. You may want to install them before going to the expense of speed humps or bulb-outs.
- Measures such as bulb-outs and chicanes involve narrowing of the roadway at certain points. It is important to leave suffi-



In-street crosswalk signs can help to slow traffic in pedestrian zones and protect children crossing the street. See page \_\_\_ for details on this safety tool.

cient space on such roads for safe bicycle travel, so that more conflicts between bicycles and cars are not created. The photo at right shows a bulb-out that leaves space for bicycle travel.

### Challenges

- When cut-through traffic and speeding cars are a problem in a neighborhood, emotions can run high, and neighbors may suggest extreme measures which greatly restrict the flow of motor vehicles. In some cases, major restrictions may be appropriate, but throwing all possible traffic calming measures at the problem may actually make the streets less usable by the residents who live there. It may also be prohibitively expensive. It is important to determine solutions that will strike a balance.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org))
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))



Bicycle-friendly bulb-outs

- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- Guide for the Planning Design and Operation of Pedestrian Facilities, AASHTO (<https://bookstore.transportation.org>)



Closing a street to through traffic is sometimes done to reduce safety problems for walkers and bicyclists. Be sure to leave an opening wide enough for bicycles but not for cars to enter the street.

## Bicycle Lanes

### Description

Bicycle lanes are special lanes for the exclusive use of bicycles. They are striped on each side of the roadway to the right of motor vehicle lanes. They are generally about 5 feet wide with a bike lane symbol stenciled on the pavement periodically within the lane.

### Purpose and Benefits

Bike lanes add safety and an increased sense of security for children and adults traveling by bicycle. Many experienced bicyclists do not feel the need for special lanes when riding on the roadway with motor vehicle traffic. However, almost all bicyclists, whether experienced or not, find their ride more comfortable and enjoyable if they have their own designated space on roads with significant motorized traffic. Better riding conditions may be crucial to generating more bicycling, especially among the population who may be trying it for the first time. The bike lanes will make it safer for adults and children already biking to school, and will likely encourage more to do so.

### How To's

- Deciding whether to add bike lanes to a road involves consideration of a number of factors. A typical road suitable for bike lanes has the following characteristics:
- The road is a fairly direct route between the school and neighborhoods with large numbers of school community members.
- The road has significant amounts of traffic, but not heavy traffic, or extremely fast traffic.
- There is sufficient width of existing pavement to accommodate bike lanes on both sides of the road, or the road can be widened to provide pavement for bike lanes. (If they are installed on only one side of the road, they may foster bicycling in the wrong direction in traffic.)



- Be sure to consider the more challenging higher-trafficked roads. A large portion of the school community includes adult teachers and staff, who are also encouraged to bike to work, and need bicycle accommodations to do so. Also, group rides with trained adult supervision can include children on trafficked roads.
- The width of bike lanes should generally be no less than 5 feet (As recommended in the AASHTO Guide for Bicycle Facilities Design). Four feet is permissible if no curb is present. If sufficient width cannot be provided, striping a shoulder of at least 3 feet width on each side may still provide significant benefits to bicyclists. See "Bike-friendly Road Shoulders", page \_\_).
- A directional arrow should be stenciled on the pavement in the bike lane to encourage riding on the right side of the road.
- When a bike lane and a "right turn only" lane are both present at an intersection, the bike lane should be positioned to the left of the turn lane.
- Maintenance and cleaning of existing bike lanes is important to retaining safe and inviting conditions. This includes removal of tree limbs and debris and a regular schedule of street sweeping. Repair of pot holes or other bicycle hazards in the bike lane is also important.



### Challenges

- Often, the best direct routes for bike lanes are roads which are designed for motor vehicles only, and it is difficult to find enough road space to serve both bicyclists and motorists.
- Planners and parents may be resistant to bike lanes on a road with significant traffic, concerned that children may unwittingly ride on a road where they are not prepared to deal with traffic conditions. Parents should be encouraged to decide where and when their children ride, but the bike lanes will also benefit adult teachers and staff, as well as group rides with trained adult supervision.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- Guide for the Design of Bicycle Facilities, AASHTO, pp. 22-32 (<https://bookstore.transportation.org>)

## Road Shoulders – Bike-friendly design

### Description

Road shoulders are familiar to most road users. They are separate strips of pavement running along the outside of travel lanes, separated from the regular lanes by a white stripe. To be bicycle-friendly, the shoulders should be 3 feet wide or more, and should have a smooth riding surface. Drainage grates should be oriented to avoid hazards to bicyclists. Shoulders do not have official "Bike Lane" markings or signage.

### Purpose and Benefits

Striped shoulders are often provided on one or both sides of a road when sufficient width is not available for official bike lanes. They may also be provided when sidewalks are not available to provide a safer separated space for pedestrians. For bicyclists, the space delineated by a white line from motor vehicles gives additional assurance that motor vehicles will remain on their side of the line. This not only adds a safety factor, but allows bicyclists to feel more confident, thus encouraging more bicycling to school. If the vehicular lane is narrowed to provide space for the shoulder, this can have the extra benefit of slowing traffic somewhat.

### How To's

- On potential roads where bike-friendly shoulders would be advantageous, obtain measurements of the road width throughout the length of the road segment in mind. Determine the amount of lane width remaining if a 3 foot or wider shoulder is installed. Generally, if 10 feet of travel lane remains, further consideration of a shoulder is warranted, depending on the speed and design of a particular road. In areas with steep hills, consider providing a shoulder on the uphill side of the road if sufficient width is not available for both sides.



- If narrowing the existing lane is needed to provide a shoulder, discuss with local transportation officials their policies and practices on minimum vehicular lane width. Often, lane widths can be significantly reduced if the speed limit is low enough.
- Where existing shoulders are already in place and striped, evaluate the condition of the pavement, and seek to remove any hazards. Particularly check for "rumble strips". These are rippled indentations often placed in the pavement of shoulders, designed to warn motorists if their wheel leaves the main travel lane. These rough areas of the shoulder make it difficult or impossible to bicycle safely on the shoulder. Check on whether the rumble strips are really needed for motorist safety in that location, or if they may have been installed routinely without being warranted.

### Challenges

- Rumble strips - it's hard to get them removed once they are installed.
- Local officials may be wary of installing a "bicycle facility" that is not an official bike lane. Remind them that road shoulders are very common and do not add any liability to the local government if built properly. They have multiple benefits beyond improving bicycle use.
- Limited road width in many locations may



simply preclude adding shoulders. Don't be tempted to add narrower shoulders of 2 feet or less. They will not be a benefit for bicycle safety.

- Customary design practice often calls for 12 foot wide vehicle lanes. Although most jurisdictions are now more flexible on the width, it may be difficult to get approval for narrower lanes to make way for shoulders in some areas.

## References

- *Guide for the Development of Bicycle Facilities*, AASHTO, p.16 (<https://bookstore.transportation.org>)
- *The Georgia Pedestrian and Streetscape Guide*, Georgia DOT, p.63 ([www.dot.state.ga.us](http://www.dot.state.ga.us))

## Road Diets

### Description

A road diet project “slims” the road space devoted to motor vehicle lanes, and utilizes the pavement that is reclaimed for other purposes. The most common type of road diet converts a 4-lane road to a 3-lane road, with one of the lanes serving as a two-way left turn lane. The remaining pavement is used for bicycle lanes on each side of the road. (See photo below). In addition to the bike lanes, it may also be possible to widen sidewalks or add a median if the original lanes were 12 feet or wider, and the retrofit narrows these lanes. Depending on the situation, a car parking lane may be added to utilize the available pavement. In either case, the new road design results in less width of total travel lanes, and an easier road for children to cross.

### Purpose and Benefits

The primary purpose of a road diet project in a Safe Routes to School program is to improve the safety level of children who must cross a 4-lane road on their walking or biking route to school. The safety benefits are numerous:

- The distance that the children must cross over vehicle travel lanes is greatly reduced.
- A median may be added in the middle of the road, providing a pedestrian refuge half-way across, and allowing pedestrians to only watch for traffic in one direction at a time, and only one lane of traffic at a time.
- The bike lane on each side of the new design provides additional buffer between moving motor vehicles and children walking on the sidewalk.
- The bike lane will provide additional safety for school community members bicycling to school.
- The overall vehicle accident rate is generally significantly less than the original 4-lane design.
- Trees may be planted closer to the roadway, because the bike lane provides a buffer between them and motor vehicles. This can provide additional buffer protection to pedestrians on the sidewalk.

### How To's

- Consideration of a road diet project must involve a detailed traffic study to analyze the effect on traffic flow and capacity.



This road is a former 4-lane road, converted to provide center turn lanes, medians, and bike lanes. This design is safer for pedestrians, bicyclists, and motorists.



Most successful road diet projects have involved roads with traffic volumes of 25,000 ADT or less.

- Consider utilizing the center turn lane area for median space where a turn lane is not needed or where the roadway is wide enough to accommodate both a turn lane and median.

### Challenges

- Initial reaction to road diet proposals often includes strong concerns about increasing traffic congestion. This reinforces the importance of having a traffic analysis performed before any final recommendation is made.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- Road Diets, Dan Burden and Peter Lagerwey ([www.walkable.org](http://www.walkable.org))

## Reducing Non-traffic Hazards Along the Way

### Description

Other safety issues, unrelated to traffic, may be evident when assessing the physical conditions on the way to and from school. This can include hidden areas where predators may be, bridges with inadequate railings, drainage inlets into which children could fall, and ditches or construction sights with tripping or falling hazards.

### Purpose and Benefits

A SRTS project should address both traffic safety and personal safety issues. It is important to be aware of and eliminate physical hazards which are not traffic-related, but none-the-less affect the safety of children biking and walking to school.

### How To's

- Include a general assessment of unexpected or unusual hazards when evaluating safety issues. Give these sites full status as problems to be addressed.



Drainage grates in the roadway will trap a bicycle wheel and can cause serious injury if the drain openings run parallel to traffic flow.



This drop-off hazard was noted in a safety assessment near a major walk route to school. The hazard was later addressed with the installation of a railing.

Look for the obvious and the unexpected. Some of the typical non-traffic hazards found along school routes include:

- lacking or insufficient street lighting
- hidden areas where predators may be
- bridges with inadequate railings
- drainage inlets into which children could fall
- Drainage grates unsafe for bicycle wheels
- Unsafe ditches or construction sights with tripping or falling hazards.

### Challenges

- The biggest challenge may be finding the hazard before an incident occurs. Be thorough and creative in your assessment. Put yourself in the kids' shoes!
- Funding for non-traffic remedies may be difficult to obtain. Developing relationships with government officials may help to deal with bureaucratic red tape.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- Guide for the Design of Bicycle Facilities, AASHTO (<https://bookstore.transportation.org>)

## Bicycle Parking

### Description

Bicycle Parking is more than a rusty bent scrap of metal, sitting haphazardly by the school dumpster. Secure, durable and attractive bike racks, placed at a convenient and secure location near the school entrance is an important element in accommodating children and adults who bike to school.

### Purpose and Benefits

Bicycle racks at school provide a secure structure and monitored location for children's and adults' bicycles. They not only deter theft, but also encourage more children and adults to arrive at school by bicycle. They also serve the purpose of assuring that bicycles ridden to school are out of the way of other school activities, and that the bike parking area does not detract from the positive aesthetics of the school grounds. Location of the racks is important, as well as selecting racks that are attractive and secure.

### How To's

If there is current bicycle usage at a school, or an interest in bicycling to school, a bicycle rack should be provided. It is also advisable to install a rack or two if you are trying to generate interest in bicycling to school. The number of racks can be increased if interest and bicycle numbers increase.

- Location - the rack(s) should be placed reasonably near a school entrance door, and within view of the school door or a window that allows for observation of the racks for security purposes. They should be in a location that has enough space to add more racks as necessary.
- Types of Racks - the recommended type of



rack is one that allows locking of the frame, (not just the front wheel) with a large padlock or "U-lock". The "wave" type design or "staple" racks are good choices as shown below.

- Racks that are covered to protect the bikes from the weather are definitely preferred, but not completely necessary. Consider installing the racks first and adding a simple roof covering later. Also consider installing them in a location where at least some of them are covered by an existing overhang from an existing building.



The "staple" rack



The "wave" rack

Effective bike racks provide a means of supporting and locking the bike frame. The two styles of rack shown above work well as secure and attractive additions to the schoolyard.

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- Use the installation of a new bike rack in grand openings/ribbon cuttings to bring attention to the new infrastructure, and to promote your Safe Routes to School program.
  - Consider seeking in-kind contributions for the purchase of bike racks from local bike shops or other local businesses.

### Challenges

- Proper siting of the racks can take considerable effort. Often, the first inclination is to place the racks “out of the way”. Keep them as convenient as possible to the school entrance if you want to encourage usage of the racks, still assuring that

they do not interfere with flow of pedestrians and other activities.

- School officials may not be aware of any interest in biking to school, and may therefore omit bike racks from their plan.
- Children don't necessarily understand how to securely lock a bicycle. Combine this installation with some education “how to's”.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- Bike Sense, Georgia DOT, p. 46 ([www.dot.state.ga.us](http://www.dot.state.ga.us))

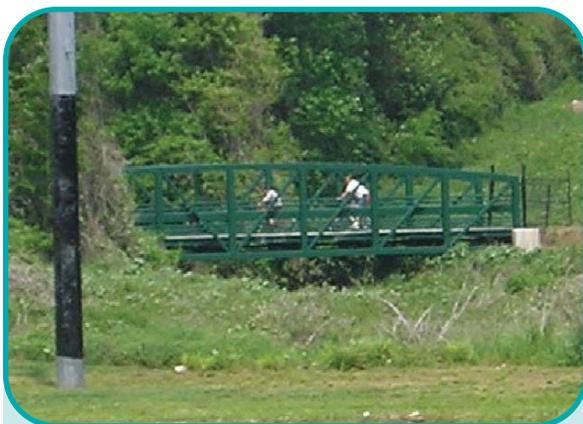
## Short-cuts for Bikes and Peds

### Description

Children themselves may find short-cuts on many routes to school. They may already be cutting across a park, over a creek, across private property, or creating other “as the crow flies” paths to school. At times, these cut-through routes may be quite hazardous, and may need to be discouraged. In other cases, the short-cut may be formalized with safety improvements, easements, etc, and utilized as a major benefit to making the school journey by foot-power shorter and more practical. In addition, many possible short cuts have probably not yet been discovered by the kids, leaving important opportunities to be investigated.

### Purpose and Benefits

These formal short-cuts make it easier and more pleasant to walk and bicycle to school. In many actual cases, parents, children, and school personnel find it impractical to walk or bike to school even though they live fairly close, simply because the available roads take a very long and indirect route to school. At times, a short cut-through trail can bypass a mile or so of unnecessary dis-



This bridge provides a connection across a large creek from a school to a park. Trails in the park then connect to a roadway on the other side of the park.



The main sidewalk (foreground) leading to this school entrance is supplemented by a path (background) that connects to the street behind the school.

tance. Others find that they have fairly direct roads available, but the route takes them across or near heavy traffic, sometimes without sidewalks, making the route impractical for them. A short off-road trail can bypass this problem, providing for a more pleasant and safer school journey.

### How To's

- Start with a good map of the area near the school, and identify those existing or potential walking and biking routes that require a very indirect path. Look for short trail opportunities that will shorten the trip. Include consideration of the short cuts that school children are already using. Such opportunities include public park land, power line easements, sewer easements, and vacant lots. Be creative, and don't assume it is impossible despite apparent obstacles.
- Check for specific information on property ownership, field data on terrain and other opportunities.
- Look for opportunities to collaborate with other parties in seeking these trail access routes. Is the neighborhood seeking to increase green space in the area? Would a

short-cut serve other walking or biking trips in the neighborhood besides school trips?

- Be conscious of potential personal safety issues. Design the trail to retain “eyes on the trail” as much as possible, keeping the trail visible from nearby homes and businesses. You may need to plan for responsible adult presence on the trail during school journey hours.

### Challenges

- Many of these short trail opportunities may be on private property. Although this does not necessarily preclude access for a formal route to school, it may add significant complications and time to implementing a project.
- Personal safety issues will arise and must be addressed, or parents will not approve of their children using off-road trails.
- Costs may be a large factor in deciding

### Making Shorter Connections

Several hundred children attending a suburban Atlanta school couldn’t “get there from here.” They lived in a large subdivision directly behind the school, but a heavy duty fence separated them from the school grounds. By car, the journey was two miles around.

The SRTS team discovered that many children were nonetheless getting over the fence and taking a more direct route to school. Parents assisted the children in scaling the fence, and some adults had laid a makeshift bridge across a deep ravine between the fence and the school. The bridge was not well-built and had no railings.

There was a strong incentive motivating parents to get their children to school by means of this short-cut. Driving meant waiting in a long line of parent cars dropping off children at the school. Taking the bus meant getting up in the wee hours of the morning. Bicycling or walking the two mile route around to the front of the school was daunting for most, and was made extra hazardous by the major roads and traffic involved. Many of the families in the subdivision showed their interest in walking and bicycling to school by participating in special events such as the Walk



and Roll to School Days. They would drive their children part way, and then walk or bike the remaining distance to school.

The subdivision was a gated community, so a simple opening in the fence was not an acceptable option. The SRTS team discussed with the subdivision officials the possibility of a controlled access gate at the school grounds. Ideas included an electronic lock on a gate requiring a password, or an adult stationed at the gate to control access. They also considered a formal designed bridge with railings and ramps, and an all-weather trail leading to the school. A satisfactory solution was not reached during the SRTS project period. However, there remained a strong interest on the part of many parents in the subdivision to achieve this short-cut option.

Connecting these cul-de-sacs with short walking and bicycling trails could greatly reduce the distance to the nearby school. Motor vehicle cut-through would still be prevented, as in the original intent of the cul-de-sacs.



whether to proceed. Generally, the trail will need to be paved or provided with some other all-weather surfacing. A bridge or culvert may be needed if the trail crosses a creek. Clearing or excavating may also be needed to achieve a suitable trail.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org)).
- Designing Sidewalks and Trails for Access: Part Two— Best Practices Design Guide, U.S. Department of Transportation (<http://www.dot.gov/safety.html>)
- Development Manual, Transportation Department, Parks & Community Services Department, City of Bellevue ([www.bellevuewa.gov](http://www.bellevuewa.gov))
- Guide for the Development of Bicycle Facilities, American Association of State Highway and Transportation Officials AASHTO (<https://bookstore.transportation.org>)

## Trails

### Description

Bicycling and walking trails separated from traffic are often called “multi-use trails”. They are usually paved, 12-foot wide paths, and serve both transportation and recreation users. They can range from the very long trails stretching between and through multiple communities to relatively short trails a few blocks long. Or they can be very short connecting trails that provide a short-cut, allowing bicyclists and other users to continue their journey on low-trafficked streets by using a short trail between those streets.

### Purpose and Benefits

Trails can add enjoyment to the journey to and from school, as well as significant safety benefits. Children who can ride their bikes to school or walk with little or no direct interface with motor vehicle traffic will have a safer trip. This in turn, provides an incentive that will spur a likely increase in the numbers of school community members - adults and children - who will walk and bike to school.

### How To's

- Look for opportunities for short trails, or short-cuts, connecting cul-de-sacs and dead ends, using parks, power line easements, sewer easements, and vacant lots. For more details, see “Short-cuts for Bikes and Peds”, page \_\_\_\_.
- Longer trails can provide significant benefits for safer routes to school, but can also be a major transportation and recreation amenity for the broader community. If you see an opportunity for a major trail benefiting biking and walking trips to school, find ways to collaborate with the larger community. Seek the assistance of groups and individuals who are advocating for a community system of trails. Because such projects take significant funding, and



can potentially face many obstacles, it is important to have broad community support in order to achieve results.

- Because these trails generally are at premium cost, it is important to limit your efforts to one or two carefully selected trail projects.

### Challenges

- Trails can become crowded and congested, creating potential safety hazards. These include a mix of fast and slow users, walkers, bicyclists, skaters, joggers, skate boarders, and some who stand still in the trail holding a conversation. Dog leashes stretched across a trail are a particular hazard to passing bicyclists. However, this congestion is minimal during the normal hours of walking and biking to school, as recreational users are less present during those times.

### Resources

- The National Center for Safe Routes to School ([www.saferoutesinfo.org](http://www.saferoutesinfo.org))
- Guide for the Development of Bicycle Facilities, AASHTO (<https://bookstore.transportation.org>)
- Designing Sidewalks and Trails for Access: Part Two— Best Practices Design Guide, U.S. Department of Transportation (<http://www.dot.gov/safety.html>)
- The Georgia Guidebook for Pedestrian Planning, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))
- The Georgia Pedestrian and Streetscape Guide, Georgia DOT ([www.dot.state.ga.us](http://www.dot.state.ga.us))

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- *Guide for the Planning Design and Operation of Pedestrian Facilities*, AASHTO (<https://bookstore.transportation.org>)