

RESIDENT'S GUIDE TO NEIGHBORHOOD TRAFFIC ISSUES



A PROJECT OF CAPS
Columbus Area Pedestrian Safety Committee



THE CITY OF
COLUMBUS
MICHAEL B. COLEMAN, MAYOR

COLUMBUS
PUBLIC HEALTH



Franklin County
Safe Communities

www.fcasafecommunities.com

ABOUT CAPS: Columbus Area Pedestrian Safety Committee

Mission

To increase walking and reduce pedestrian-related injuries and fatalities in the Columbus area.

Members

Asian American Community Services
City of Columbus, Department of Public Service
City of Columbus, Division of Police
Columbus Public Health
Columbus Public Schools Transportation
Community Pedestrian Safety Advocates
Consider Biking
Franklin County Safe Communities
Grant Medical Center
Mid-Ohio Regional Planning Commission
Mount Carmel
Ohio State Highway Patrol
Pedestrian Safety Advocates
Safe Kids Central Ohio
Safe Routes to School
The Ohio State University Medical Center, Central Ohio ThinkFirst



Resource guide developed by Franklin County Safe Communities at Columbus Public Health and revised by the Healthy Places Program.

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INTRODUCTION

Many communities are faced with concerns about speeding on their local streets. In fact, speeding in residential neighborhoods is the biggest complaint given to police departments and city council representatives throughout the U.S.

This guide outlines steps residents can take to educate about and promote safer streets. These neighborhood-based projects are the best first step, followed then by solutions that involve engineering. Engineering solutions are those that change the physical structure of a road's layout or appearance to slow traffic.

Because resources are limited, fewer streets will receive engineering solutions than are requested, so it is best to be proactive with simpler, less costly steps first.

This guide shows residents how to foster a culture of safe driving in their community by encouraging drivers to slow down and be more aware of other road-users (cyclists, pedestrians, children, etc.). For most neighborhoods, the speeding that occurs is from local residents. In these cases, neighborhood education is the best solution, not engineering changes.



LOCAL REPRESENTATIVES

These local contacts work in Franklin County with residents who have identified a traffic issue, helping them to seek the best solutions.

Bexley - Police Non-Emergency: 614-559-4444 | <http://www.bexley.org/police-department/>

Columbus - 311 Call Center: 614-645-3111 | <http://311.columbus.gov/>

Dublin - Division of Engineering: 614-410-4600 | <http://dublinohiousa.gov/engineering/>

Gahanna - Service Department: 614-342-4212 | <http://www.gahanna.gov/police/TrafficSafety.aspx>

Grandview Heights - Division of Police: 614-488-7901
<http://oh-grandviewheights.civicplus.com/index.aspx?nid=89>

Grandview Heights - Service Department: 614-488-4728
<http://oh-grandviewheights.civicplus.com/index.aspx?nid=90>

Grove City: 614-277-1710 | <http://police.grovecityohio.gov/traffic/survey/>

Hilliard - The Hilliard Service Request Center (SRC): 614-876-7361 | <http://src.hilliardohio.gov/>

Pickerington - The Service Department: 614-833-2292
<http://ci.pickerington.oh.us/Pages/Departments/Engineering/>

Reynoldsburg Division of Police: 614-866-6622 | <http://ci.reynoldsburg.oh.us/departments/police-department.aspx>

Reynoldsburg Street Department: 614-322-5800 | <http://ci.reynoldsburg.oh.us/departments/street-department.aspx>

Upper Arlington - Traffic Safety Coordinating Committee (TSCC): 614-583-5009
<http://www.uaoh.net/publicservices/index.php?fDD=52-0>

Westerville - Traffic Engineering: 614-901-6665 | <http://www.westerville.org/index.aspx?page=153>

Whitehall - Public Safety Department: 614-237-0831 | <http://www.whitehall-oh.us/index.aspx?NID=147>

Worthington: 614-885-4463 | <http://www.worthington.org/index.aspx?nid=286>

FIRST STEP: EDUCATION, ENFORCEMENT, AND ATMOSPHERE

Education

Before submitting a request to local representatives for a traffic calming engineering study, where engineers conduct field visits to the neighborhood, gather data, and determine what the problem is and what possible solutions to implement, residents should take the following steps to reduce speeds and encourage safe driving behavior.

Tell your neighbors about your efforts

Most drivers who speed in your neighborhood actually live in your neighborhood. Remind your neighbors to drive the speed limit and set a good example. It may be helpful to partner with civic or neighborhood associations, block watches, area commissions, and other local organizations in order to get the word out. Talk to your neighbors or neighborhood association to find out who else is concerned about speeding in your neighborhood. If possible, organize a neighborhood safe street committee. Keep Kids Alive offers a great reference on how to do this at www.keepkidsalivedrive25.org.

More information about organizing a community group can be found under the Enforcement section.

Sometimes it is teenage drivers who pose a threat on residential streets. They have high crash rates and can be aggressive drivers. When this is the case, parents who model good driving behavior can be the best solution. The Parents Are The Key program from the Centers for Disease Control and Prevention (CDC) is a great resource to help parents educate their teenagers. More information can be found at www.cdc.gov/parentsarethekey/.

Talk to your neighbors about their walking and parking habits

A street that is active with pedestrians and cyclists signals to motorists the need to slow down, be alert, and share the road. Getting more people out walking can have a dramatic impact on motorist speeds and neighborhood safety in general.

Depending on the neighborhood, most residents may park in driveways or garages. If possible, encourage your neighbors to park on-street. On-street parking narrows the road and cues drivers to slow down. It also acts as a buffer between sidewalk-users and traffic.

Model and Teach Safe Walking

Teach children to be safe pedestrians by modeling safe behaviors:

- Use traffic signals and crosswalks whenever possible
- Cross when the street is clear, and keep looking both ways while crossing
- Be alert at intersections
- Watch for backing vehicles
- Make eye contact with drivers prior to crossing in front of them

In addition:



- Don't allow little children to cross streets alone
- Always supervise your child when crossing the street.
- Make sure your child is visible when walking and add reflective materials to clothing when needed.
- Teach your child to "always look all ways" before crossing the street.

More information at www.safekids.org.

Model and Teach Safe Biking

- Ride in the street, not on the sidewalk, which creates hazards for pedestrians
- Obey all traffic laws
- Make eye contact
- Keep your eyes and mind on the road
- Wear a properly fitting helmet
- Keep your bike in working order
- Ride predictably and respectfully
- Ride outside the "door zone."
- Be visible. Use a bicycle headlight and taillight at night.

More information at <http://columbus.gov/sharetheroad/>.

Remember: on **W**heels, **W**ith traffic, on **F**eet, **F**ace traffic



Know the law...

For motorists:

- In most cases, a driver must yield the right-of-way to a pedestrian when that person is in a crosswalk or on a sidewalk.
- When a vehicle is stopped at a marked crosswalk or intersection where pedestrians may be crossing, other drivers are not allowed to pass that stopped vehicle.
- In Columbus, the first offense is a minor misdemeanor:
 - If the person is found guilty of this same offense within one year, the second offense is a 4th degree misdemeanor
 - If the person is found guilty of two or more past offenses within one year of the offense, it is a 3rd degree misdemeanor
- In the City of Columbus, motorists must maintain at least a three foot distance while passing cyclists in the roadway.

For pedestrians:

- In most cases, no pedestrian can suddenly leave a curb or other safe place to walk or run into the path of a motor vehicle that is close enough to be dangerous.
- In Columbus, first offense is a minor misdemeanor:
 - If the person is found guilty of this same offense within one year, the second offense is a 4th degree misdemeanor
 - If the person is found guilty of two or more past offenses within one year of the offense, it is a 3rd degree misdemeanor
- Jaywalking: when there is a usable sidewalk available, a pedestrian cannot walk in the roadway.
- If there is no sidewalk available, any pedestrian walking along a road can only walk on the shoulder, as far away from vehicles as possible. If it is a two-way road, the pedestrian should walk on the left side, facing traffic.
- A pedestrian can only cross the road at a crosswalk, unless the crosswalks are an unreasonable distance apart.
- In most cases, a pedestrian should give right-of-way to motorists.
- In Columbus, first offense is a minor misdemeanor:

- If the person is found guilty of this same offense within one year, the second offense is a 4th degree misdemeanor
- If the person is found guilty of two or more past offenses within one year of the offense, it is a 3rd degree misdemeanor

For cyclists:

- Cyclists have the same rights and responsibilities as motorists. Cyclists must obey all traffic laws and traffic control devices (traffic lights, stop signs, etc.).
- Cyclists must ride in the roadway with vehicular traffic or they may use a designated bicycle facility if one exists (eg. bike lane). Cyclists over the age of 12 cannot ride on the sidewalk.
- Cyclists must pull over and yield to emergency vehicles.
- In the City of Columbus, it is illegal to send, read, or write a text message or access the internet while bicycling.

Enforcement

The Police Department may respond with increased enforcement in neighborhoods where there are perceived traffic safety issues. Residents should be specific regarding the days and times that traffic issues occur and help determine when enforcement is needed. This step should be implemented in conjunction with the other measures in this section, as a heightened police presence will only be a temporary solution.

Request a speed-monitoring trailer

These radar-equipped trailers display the speed limit and show drivers how fast they are going.

Organize a Neighborhood Speed Watch

This program allows residents to take responsibility for an issue by providing safety reminders to speeding drivers. It relies on peer pressure and community involvement to foster a culture of safe driving. Contact your local police department and ask if they can provide you the means to record speed data of motorists traveling on your streets. The recorded data can then be forwarded to the police, who will send reminder notices regarding speed limits to those motorists identified as violators by the Neighborhood Speed Watch. The notices are unofficial warnings and will not affect a violator's driving record, but will hopefully encourage them to respect the posted speed limit and the community's concern for safety.

Atmosphere

Change Your Neighborhood Atmosphere

Traffic calming devices typically cost money, but some low-cost changes to your street's atmosphere can help to slow traffic as well. If you do not have funds for more costly traffic calming devices, suggest your community try starting with paint. Painting speed limits or "SLOW" on the road surface, in combination with posting roadside signs, may help reduce speeds.

Narrower streets or travel lanes will usually slow things down. Motorists will have difficulty speeding on a 25-foot residential street with parking on both sides. Lanes can be narrowed by installing a painted bike lane or striped shoulder along the street. This technique may also be used to create a separation between pedestrians and motor vehicles. With guidance from your local traffic office, painted versions of other engineering measures may be another option.



Are there street trees on your block? Planting trees along the road can visually narrow the roadway which can reduce speeds. Research the best trees to plant in your location and consult with the proper authorities before planting. Additional landscaping, as well as other low-cost changes involving painting and signage are described later in this guide under engineering solutions.

Local government is needed for changes to streets including street signs and street markings. These may require local and possibly state government approval depending on the type of change and where the street is located.

Psychological Traffic Calming

Psychological traffic calming developed in the Netherlands in the 1980's. Rather than relying on costly engineering solutions such as speed bumps that many drivers resent or ignore, Dutch engineers began using "mental speed bumps" that forced drivers to slow down without even realizing it. Social cues from the environment indicate that a slower speed is appropriate. Such cues could be anything from a child's bike placed on the side of the road to a piece of public art. These unexpected sights make drivers nervous, which in turn makes them slow down and stay alert.

Below is a list of mental speed bumps that you can implement in your neighborhood at little or no cost. These examples rely on intrigue, uncertainty, and humor to slow drivers down and help reclaim the street as a social environment instead of a traffic one.

- Sit in lawn chairs close to the street and wave at passing drivers
- Organize block parties
- Install flags, banners, or homemade signs that identify your street as a social space
- Supervised children's play in the front yard or on the sidewalk
- Move your activities from the back yard to the front yard
- Encourage your children to walk or bike to school
- Make chalk art in the street

SECOND STEP: STUDY THE PROBLEM

Request a traffic engineering study

If speeding motorists and traffic safety is still a problem in your neighborhood after you have taken all of the above measures, then an engineering solution may also be needed. Before traffic-calming infrastructure can be considered for any neighborhood, a study needs to be done by your city's transportation, engineering, or public works department. This study looks at driving patterns, speeding, crashes and other factors to identify what exactly is causing the problem.

It also determines which traffic calming measures would be most effective in managing speed, volume, and cut-through traffic. When considering traffic calming measures on a particular street, traffic engineers will look at the neighborhood as a whole, because changes on one street can impact surrounding streets.

Most municipalities require that a street have certain characteristics to qualify for engineering solutions to traffic calming, to ensure that the street is residential in nature and that the measures will be effective. These characteristics may include:

- The street must have a posted speed limit of 25 MPH or less
- The street is classified as a local street on the City's thoroughfare plan
- The street is not along a COTA bus route
- The street is not commonly used as an emergency response route
- The street meets certain dimensional requirements in terms of length and width

More information at: <http://www.westerville.org/modules/showdocument.aspx?documentid=357>

Determine what you want to achieve

After data has been collected, analyzed, and presented to the community, residents should have a clear idea of what the problem is. They then need to determine why they want to solve this problem and how solving this problem will be beneficial. Frame your goals in terms of solving the problems on your street, such as:

- Slow vehicular travel speeds
- Fewer traffic crashes, with less damage
- Enhance the street environment
- Increase safety for walking and biking
- Less need for police enforcement
- Fewer cars cutting through neighborhood

Outline the benefits and obstacles associated with each possible solution so that you may propose the most effective and feasible one for your neighborhood.

Develop a plan and follow through

Decide how, when, where and with whom you are going to implement your solution and how to overcome any obstacles.

Possible sources of support:

- Local residents
- Local business people
- Central Ohio Transit Authority (COTA)
- Representatives of people with disabilities
- Community Board
- Commissioners
- Tenant associations
- Chamber of Commerce
- City traffic, engineering, or public works department
- Local bicycle or pedestrian advisory committee
- Elected officials
- Civic groups

Invite the sources of support to come and see the problems themselves. If the problems are periodic, set up a "field visit" where people can come at a specific time to see the problems. Work with your neighbors and the interested sources to come up with traffic calming solutions that may need to be installed. List how each measure will help solve the problem. Anticipate concerns and prepare responses. Determine the agency/organization(s) most responsible for making improvements to address specific problems in your community. Document common problems with photos, video, or written descriptions. Develop support to implement and maintain your plan.

THIRD STEP: SECURE FUNDING

Most engineering solutions are too costly for many neighborhoods to pursue. Fortunately, there are many ways that residents and local governments can secure funding for engineering projects.

Urban Infrastructure Recovery Fund

The Urban Infrastructure Recovery Fund (UIRF) was established in Columbus to address capital improvement needs in central city neighborhoods. UIRF has provided over \$60 million for 400 different projects.

Use the map to determine if your neighborhood is eligible for UIRF funding or visit the UIRF website for more information: <http://www.columbus.gov/planning/uirof/>

Mid-Ohio Regional Planning Commission (MORPC)

MORPC accepts applications for State Capital Improvements Program and Local Transportation Improvement Program Infrastructure Funding from local public agencies within Franklin County.

More information at: <http://www.morpc.org/transportation/funding-grants/index>

Local and Rural Road Safety Program

Both rural and urban communities are eligible for Federal Highway Administration (FHWA) funding through the Highway Safety Improvement Program.

More information at: http://safety.fhwa.dot.gov/local_rural/

Surface Transportation Improvement Program

This funding can be used for pedestrian and bicycle facilities.

More information at: <http://www.fhwa.dot.gov/map21/guidance/guidestp.cfm>

Transportation Investment Generating Economic Recovery

This funding can be used for pedestrian and bicycle facilities.

More information at: <http://www.dot.gov/tiger>

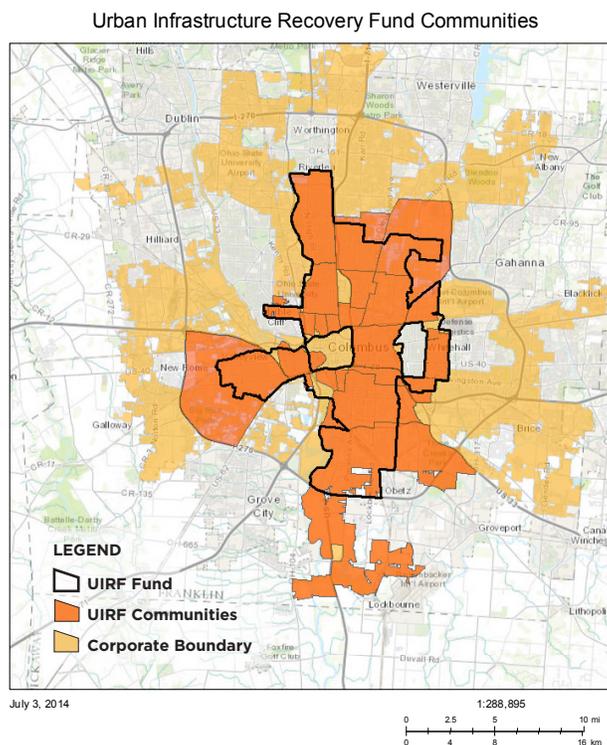
Transportation Enhancement Activities

This FHWA program provides funding for pedestrian and bicycle facilities and education, and landscaping projects. More information at: http://www.fhwa.dot.gov/environment/transportation_enhancements/

Partnerships

The following organizations and agencies may be willing to fund part of your project, depending on its nature and location.

- Universities (eg. OSU, Otterbein)
- Utility companies (eg. AEP, Columbia Gas)
- Insurance companies (eg. Medical Mutual, Grange Insurance)
- Lobbying organizations (eg. AAA, AARP)
- Private developers



Links for funding resources:

- <http://www.trafficcalmsystems.com/blog/grants-and-funding-for-municipal-traffic-calming-programs/>
- <http://trafficlogix.com/trafficcalming/grantsfunding>
- <http://www.dot.gov/livability/grants-programs>

Links for cost estimates:

- http://katana.hsrb.unc.edu/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf
- <http://www.pedbikesafe.org/PEDSAFE/countermeasures.cfm>
- <http://www.wichita.gov/Government/Departments/Planning/PlanningDocument/Appendix%20C%20-%20Planning%20Level%20Cost%20Estimator.pdf>

Average Costs for Engineering Solutions

The following chart shows average costs for many traffic calming engineering solutions and the amount of time that these projects typically take to complete. This should give you an idea of what may be feasible in your neighborhood. Keep in mind that these are only estimates; cost and time may vary significantly in your neighborhood from what is listed here.

	Near-term (0-3 months)	Mid-term (4 months-1 year)	Long-term (1+ years)
Traffic Calming			
Speed hump	\$1,500-5,500		
Speed table	\$2,000-20,000		
Rumble strip	\$7-10/linear foot		
Chicane		\$2,500-16,000	
Landscaping		variable	
Gateway		\$130-520 (per sign)	\$5,000-64,000 (per structure)
Street furniture		\$200-5,000	
Intersection Design			
Mini circle		\$5,000-12,000	
Traffic circle		\$6,000-15,000	
Roundabout			\$80,000-800,000
Modified T-intersection		\$20,000-60,000	
Reduced corner radii	\$15,000-40,000		
Raised intersection		\$50,000-200,000	
Traffic Management			
Full road closure		\$500-120,000	
Partial road closure		\$10,000-40,000	
Diverter	\$5,000-85,000		
Turn restrictions	variable		
"One way streets/ circulation changes"			variable

Average Costs for Engineering Solutions, continued

	Near-term (0-3 months)	Mid-term (4 months-1 year)	Long-term (1+ years)
Bicycle Improvements			
Sharrow	\$180		
Bicycle lane		\$1,000-50,000/mile	
Buffered bicycle lane		\$5,000-500,000/mile	
Bicycle Boulevard		\$108,800/mile	
Bike box	\$11.50/square foot		
Roadway Design			
Narrowed lanes	\$750-\$30,000/mile		
Median		\$2-44/square foot	
Traffic island		\$2,000-41,000	
Edge treatment		variable	
Road diet		\$25,000-40,000/mile	
Brick/cobblestone streets			variable
In-pavement lighting	\$17,600		
Sidewalks		\$150-200/linear foot	
On-street angled parking	variable (restriping)	\$2,000-20,000 (per curb extensions)	
Signals and Signs			
"Stationary radar signs/ speed display boards"	\$5,000-15,000		
Pavement markings	\$250-1,100		
Centerline yield signs	\$200-300		
Turn restrictions	\$200-300		
Advance yield/stop signs	\$200-800		
Transit			
Transit stop improvement		\$5,000-24,000	
Access to transit	\$5,000-20,000		
Bus bulbout		\$15,000-70,000	
At Crossing Locations			
High-visibility crosswalks	\$3,500-40,000		
Pedestrian refuge		\$2,000-41,000	
Curb extension/bulb out		\$2,000-20,000	
"Textured and colored pavement"	variable		

Unless otherwise noted, cost is per item

Timeline estimate is from project conception to installation

Cost does not include ongoing maintenance

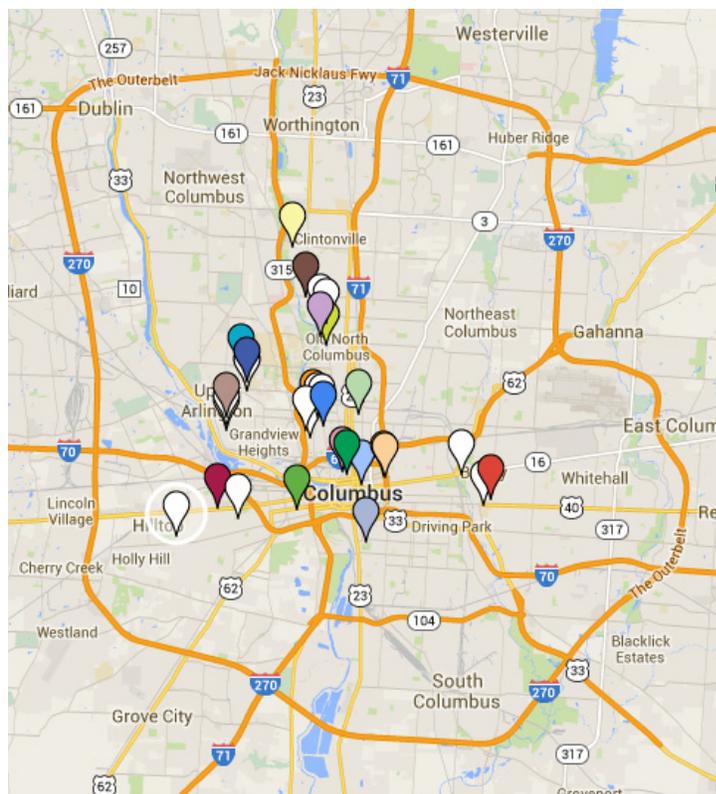
FOURTH STEP: ENGINEERING SOLUTIONS

LOCAL EXAMPLES

Some jurisdictions may have policies that discourage or prohibit the use of certain traffic calming measures described herein. Check with your local authorities to determine which traffic calming measures are approved for use in your area. The map shows 33 examples of local traffic calming measures that are featured in this section. You can access the map online at: bit.ly/CBusTrafficCalming

Listing of featured local traffic calming measures:

- Chicane at Beaumont Rd and Ashdowne Rd
- Gateway treatment at Long Street Bridge
- Street furniture at Weber Rd and High St
- Mini circle at 7th Ave and Grant Ave
- Traffic Circle at 6th Ave and Pennsylvania Ave
- Roundabout at Northstar Rd and Kinnear Rd
- Modified T-intersection at Cooke Rd and Olen-tangy Blvd
- Raised intersection at Crestview Rd and East Ave
- Full road closure at 7th Ave and Batelle Blvd
- Partial road closure at Lechner Ave and Floral Ave
- Circulation change--Gay Street was converted from one-way to two-way traffic
- Sharrows at 3rd Ave and Cambridge Blvd
- Bicycle box at North Broadway and Milton Ave
- Buffered bike lane between Long St and Spring St on Lester Dr
- Bicycle Blvd sign on Wheatland Ave
- Narrowed Lane on Neil Ave
- Traffic Island at 6th Ave and Neil Ave
- New CBUS circulator stop on High St
- High visibility crosswalk at Guilford Rd and North Star Rd
- Advanced yield sign on Front St
- Pedestrian refuge at 3rd Ave and Olentangy Trail
- Bulbout at Town St and Hawkes Ave
- Speed hump at Westgate Park
- On-street angled parking at North St and Neil Ave
- Sidewalk at Kinnear Rd and North Star Rd
- Median on Northwest Blvd
- Median on Bryden Ave
- Textured crosswalk at Main St and Drexel Ave
- Bus shelter at Hudson St and High St
- Speed display board on Broad St by Wolfe Park
- Landscaping at Cambridge Blvd east of 5th Ave
- Mohawk St--Brick streets in German Village have a latent traffic calming effect
- Bicycle lane on Cambridge Blvd



FOURTH STEP: ENGINEERING SOLUTIONS

TRAFFIC CALMING

Speed Humps

Speed humps are rounded raised areas placed across the roadway to force motorists to travel at reduced speeds. They are generally 10 to 14 feet long (in the direction of travel), making them distinct from the shorter “speed bumps” found in many parking lots, which are 3 to 4 inches high.

Cost: \$1,500-\$5,500

Pros:

- Speed reduction.
- Relatively low cost.
- Easy to test.

Cons:

- Increased roadway noise.
- Maintenance costs.
- Required signage costs and aesthetics.
- Slower emergency vehicle response times.
- Extra care required when snow plowing.



Speedhump at Westgate Park

Speed Table

Speed tables are similar to speed humps; however, they include a flat section on top. When marked as a pedestrian crossing, speed tables are called raised crosswalks. Combined with gently sloped ramps, speed tables permit slightly higher motorist speeds and smoother transitions than speed humps.

Cost: \$5,000-\$15,000

Pros:

- Speed reduction.
- Relatively low cost.
- Easy to test.

Cons:

- Increased roadway noise.
- Maintenance costs.
- Required signage costs.
- Slower emergency vehicle response times.
- Not as effective as speed humps in slowing traffic.



Image Source: PBIC Image Library

FOURTH STEP: ENGINEERING SOLUTIONS - TRAFFIC CALMING, *continued***Rumble Strip**

Rumble strips are raised buttons or grooves closely spaced on the roadway surface to create noise and vibration. They are typically installed to alert drivers of an upcoming curve or speed change.

Cost: \$7-10 per foot

Pros:

- Permanent method to alert motorists they are entering an area with high pedestrian activity or other safety concerns.
- Installation does not disrupt existing traffic patterns.
- Inexpensive.

Cons:

- Only create noise and vibration.
- Drivers can more easily ignore them.
- May startle motorists without proper signage, a potentially hazardous condition.
- Require increased maintenance.
- May be difficult for bicyclists to negotiate.

**Chicane**

Chicanes are a set of two or more alternating curb bulbs or extensions that narrow and realign the roadway for short segments making drivers slow down to negotiate the roadway. Two-way traffic and full access for larger vehicles and emergency services can be maintained. A chicane effect can be created using various methods, including concrete curbs, landscaped areas or alternating diagonal and parallel parking.

Cost: \$10,000 - \$30,000

Pros:

- Reduce vehicle speeds and discourage cut-through traffic.
- Improve the appearance and function of the street.

Cons:

- Complicate street maintenance and storm water drainage.

**Landscaping**

Landscaping is used in conjunction with other traffic calming measures to improve the pedestrian environment, define pedestrian and vehicle areas, and provide horizontal separation between motor vehicles and pedestrians.

Cost: Varies depending on scale and materials/plantings

Pros:

- Increases motorists' awareness.
- Can help define a neighborhood identity.
- Installation is long term and increases the quality of life of a community.

Cons:

- Installation and maintenance costs can be high.
- Right-of-way impacts may be significant.



FOURTH STEP: ENGINEERING SOLUTIONS - TRAFFIC CALMING, *continued***Gateways**

A signing and/or landscaping treatment to alert motorists they are entering a special area can be used at entrances to neighborhoods, commercial areas, town centers, or busy places of activity. Gateways are typically supplemented with other traffic calming measures.

Cost: Varies

Pros:

- Aesthetically pleasing
- Defines neighborhood identity

Cons:

- Generally expensive and can require routine maintenance.

**Street Furniture**

Poles, signposts, newspaper racks, public art, benches, water fountains, bicycle parking racks, and transit shelters are all types of street furniture. When placed properly on the sidewalk between the curb and the walking zone, they provide a barrier between pedestrians and traffic and can also visually narrow the roadway for motorists, prompting them to slow down.

Cost: \$200-5,000

Pros:

- Beautifies the pedestrian environment and fosters sidewalk activity.
- Can be tailored to reflect neighborhood character.

Cons:

- When done improperly, street furniture can obstruct pedestrians' paths and clutter the streetscape.



FOURTH STEP: ENGINEERING SOLUTIONS INTERSECTION DESIGN

Mini Circle

Mini circles are used for traffic calming on residential streets with low traffic volumes. They cause left-turning vehicles to circumnavigate the circle and slow down in the process. They can be used in place of a four-way stop sign.

Cost: \$5,000-15,000

Pros:

- Can be more effective at traffic calming than four-way stop signs.
- Landscaping in the circle can beautify the intersection.

Cons:

- Can hinder emergency vehicle and bus operations.
- Not effective in slowing right-turning vehicles.



Mini circle at 7th Ave and Grant Ave

Traffic Circle

Traffic circles are used to slow driving speeds approaching intersections with high crash rates. Motorists must reduce speed to maneuver around the circle, which helps reduce the frequency and severity of crashes.

Cost: \$6,000 - \$12,000 each

Pros:

- Permanent installation forces reduced speeds at subject intersection.
- Can be retrofitted to existing intersections without costly roadway re-alignment.
- Can provide gateway or identity to a neighborhood.

Cons:

- A single roundabout used in isolation will not significantly calm traffic.
- Needs a coordinated system of multiple traffic circles or other calming measures.
- May interfere with snow plowing.



Traffic Circle at 6th Ave and Pennsylvania Ave

Roundabout

A modern roundabout is a traffic control device that includes a raised island in the center of an intersection. Roundabouts are used on higher volume arterial streets to allocate right-of-way between drivers and provide a cost-effective alternative to traffic signals.

COST: \$80,000 - \$800,000 each

Pros:

- Can increase level of service and improve safety at intersections with high crash rates.

Cons:

- Require more right of way than traditional intersections.
- Increase crossing distance for pedestrians.
- May make it more difficult for large vehicles to negotiate.



Roundabout at Northstar Rd and Kinnear Rd

FOURTH STEP: ENGINEERING SOLUTIONS - INTERSECTION DESIGN, *continued***Modified T-intersection**

This treatment is used to calm traffic at T-intersections. It is best suited for low-volume residential streets where drivers may be tempted to speed. The intersection's geometry is altered with a traffic island or other barrier that restricts or slows certain traffic movements.

COST: \$20,000-\$60,000

Pros:

- Can deter cut-through traffic.
- Provides a safer environment for cyclists and pedestrians.

Cons:

- May be confusing for roadway users, especially if not properly signed.
- Can hinder emergency vehicle and bus operations.
- In some cases, a traffic circle may be equally effective and less costly.



Modified T-intersection at Cooke Rd and Olentangy Blvd

Reduced Corner Radii

Reduced corner radii are used at intersections to make turning movements tighter. It typically is used in conjunction with other calming techniques like bulb outs and raised crosswalks.

Cost: \$15,000-\$40,000

Pros:

- Slows turning vehicles.
- Promotes pedestrian safety.
- Improves motor vehicle and pedestrian sight distances.
- Shortens crossing distance.

Cons:

- Slows emergency vehicles and large transit vehicles.



Image source: www.saferoutesinfo.org

Raised Intersection

A raised intersection refers to a roadway intersection that is entirely elevated to the sidewalk level. Raised intersections are designed with ramps for the motorist and often include decorative surface materials on the flat raised section. Raised intersections are usually the same height as the sidewalk creating an area for people walking that includes the sidewalk and crosswalks.

Cost: \$50,000-\$200,000

Pros:

- Speed reduction at locations with vehicle-vehicle and vehicle-pedestrian conflicts.
- Improved safety.

Cons:

- Increased roadway noise.
- Maintenance costs.
- Costs of required signage and aesthetics.
- Slower emergency vehicle response times.



Raised intersection at Crestview Rd and East Ave

FOURTH STEP: ENGINEERING SOLUTIONS

TRAFFIC MANAGEMENT

Full Road Closure

Full-street closures are often reserved for locations where all other calming attempts have failed. They may be located adjacent to intersections, creating cul-de-sacs and dead ends, or located mid block, creating two stub streets. These closures completely close the street to through-traffic, usually leaving only pathways open for bicyclists and pedestrians.

Cost: Low, varies depending on materials, landscaping, etc

Pros:

- Stop cut-through traffic from neighborhoods and effectively convert through streets into low volume dead end roads.
- Can be used to add landscaping and aesthetic improvements to public right of way within a neighborhood.

Cons:

- Street closures require strong community support since they restrict access for neighborhood residents.



Full road closure at 7th Ave and Batelle Blvd

Partial Road Closure

A partial road closure uses a diverter to physically close or block one direction of motor vehicle travel into or out of an intersection; it could also involve blocking one direction of a two-way street. The design of this measure should allow for easy access by cyclists and pedestrians.

Cost: \$10,000-40,000

Pros:

- A partial closure provides better emergency access than a full closure.

Cons:

- May be inconvenient for residents and put additional traffic on other streets.
- Will not address speeding issues, which may increase on a one-way street



Partial road closure at Lechner Ave and Floral Ave

Diverter

Diverter are used to channelize or restrict traffic flow at intersections by preventing through movements and interrupting the traffic grid.

Cost: 15,000 - \$45,000

Pros:

- Limit access and reduce through traffic, while increasing pedestrian access.
- Can be designed to favor bicycle travel, creating quiet, efficient bicycle boulevards through neighborhoods.

Cons:

- May create frustration for motorists confused by the irregular traffic pattern.
- May impede transit and emergency vehicle operations.
- Shift in traffic patterns may send more traffic to other nearby residential streets.



Image Source: www.iadpw.org

FOURTH STEP: ENGINEERING SOLUTIONS - TRAFFIC MANAGEMENT, *continued***Turn Restrictions**

Restricting certain turns at intersections to influence travel patterns.

Cost: Variable

Pros:

- Generally low cost.
- Reduces cut-through traffic.

Cons:

- Can be inconvenient for residents.
- Can create circuitous traffic patterns.
- Can be hard to enforce.

**Circulation Changes**

Depending on the situation, changing a road from either one-way to two-way or from two-way to one-way traffic can have a calming effect. Changing residential streets to one-way traffic discourages cut-through patterns. Changing a major thoroughfare that bisects a residential area from one-way to two-way traffic can decrease speeds, noise, and reconnect the neighborhoods on either side of the road.

Cost: Variable

Pros:

- One-way: prevents some cut-through patterns.
- Can free up roadway width for on-street parking.
- Two-way: Create a safer environment for pedestrians and cyclists.
- Decreases speed and noise.
- Easier access for residents.

Cons:

- One-way: creates inconveniences to neighborhood residents.
- Shifts some traffic volume to other streets.
- Two-way: can decrease level of service at intersections.



FOURTH STEP: ENGINEERING SOLUTIONS

BICYCLE IMPROVEMENTS

Note: the following examples are not currently used for traffic calming in the Columbus area, but they do have a traffic calming effect by providing a buffer zone between vehicular traffic and pedestrians and by making motorists more aware of other road-users.

Sharrow

A sharrow is a pavement marking consisting of two arrows and a bicycle symbol and should designate where cyclists are allowed to ride.

Cost: \$180

Pros:

- Low cost.
- Shows motorists where to expect cyclists

Cons:

- Can be ineffective when not connected to other bicycle infrastructure.



Bicycle Lane

A bicycle lane is usually located between the far-right travel lane and the parking lane or curb. It is marked by two stripes of paint and is designated for bicycle use only. Lane width is usually three to six feet or more.

Cost: \$1,000-11,000 per mile on existing shoulder, \$5,000 to \$50,000 per mile to retrofit using road diet or restriping

Pros:

- Creates a more predictable traffic environment.
- Increases driver awareness of cyclists on the road.
- Encourages cyclists to ride in the street instead of on the sidewalk.

Cons:

- Can be ineffective when not connected to other bicycle infrastructure.
- Can create conflict between cyclists and transit vehicles.



FOURTH STEP: ENGINEERING SOLUTIONS - BICYCLE IMPROVEMENTS, *continued***Buffered Bicycle Lane**

This type of bike lane provides a physical barrier between moving or parked vehicles and bicycle traffic. Striping, curbs, parking lanes, and bollards can all act as a buffer for bike lanes. It is useful on streets with high volumes of fast-moving traffic.

Cost: \$5,000-\$500,000/mile

Pros:

- Allows less experienced cyclists to feel comfortable on the roadway.

Cons:

- May be unfeasible if there is insufficient right-of-way.



Buffered bike lane between Long St and Spring St on Lester Dr

Bicycle Boulevard

A bicycle boulevard is a low-speed street that has been designed to give priority to cyclists as through-going traffic. They discourage cut-through traffic and provide right-of-way and traffic control to cyclists. A variety of traffic calming elements can be used to create these streets, such as diverters, curb extensions, and partial or full road closures.

Cost: \$108,800/mile

Pros:

- Can act as connectors between other bicycle facilities

Cons:

- Will not work if routed in inconvenient or circuitous ways.
- Because it utilizes quiet, less populated streets, it must be actively publicized.
- Because it avoids major roads, it does not provide direct access to business and commercial areas.



Bicycle Blvd sign on Wheatland Ave

Bicycle Box

A bicycle box consists of a painted bike lane, usually green, that starts about 20 feet from an intersection and ends in a green box at the intersection, between the stop bar for vehicular traffic and the crosswalk. Demarcating this space as a bike zone allows cyclists to travel to the front of the line while waiting for the light. Cyclists at the front are more visible and less likely to get "hooked" by turning vehicles.

Cost: \$11.50 per square foot

Pros:

- Gives priority to cyclists.

Cons:

- Without proper education and awareness, cyclists and motorists may misuse or ignore this rare traffic calming element.



Bicycle box at North Broadway and Milton Ave

FOURTH STEP: ENGINEERING SOLUTIONS

ROADWAY DESIGN

Note: the following examples are not currently used for traffic calming in the Columbus area, but they do have a traffic calming effect.

Narrowed Lanes

Narrowed lanes provide a more subtle calming effect than other physical calming methods. One solution is to visually narrow lanes using paint, while leaving a several foot shoulder that emergency vehicles can utilize—effectively providing a narrow lane for motorists and a wider lane for emergency vehicles.

Cost: \$1,000 - \$10,000/mile

Pros:

- Excess right-of-way can be shifted to provide wider sidewalks, bicycle lanes, or on-street parking.
- Narrowing travel lanes offers more calming methods such as neck downs and mid-block bulb outs. Simple roadway restriping for narrowing is inexpensive.

Cons:

- Without other provisions for bicyclists, may increase motor vehicle/bicycle conflicts.



Narrowed Lane on Neil Ave

Traffic Island

Concrete or landscaped islands typically located down the center of a roadway or at a roadway entrance.

Cost: Varies depending on length, materials and right-of-way availability

Pros:

- Can reduce speeds by narrowing drivable travel lane widths.
- Can improve pedestrian accommodation by providing a mid-block pedestrian refuge at crossings.
- Can be used to provide a visual enhancement or gateway to promote neighborhood identity.

Cons:

- May reduce parking and driveway access.



Traffic Island at 6th Ave and Neil Ave

FOURTH STEP: ENGINEERING SOLUTIONS - ROADWAY DESIGN, *continued***Edge Treatment**

Edge treatments, such as raised curbs, provide uniform cross sections with identifiable edges along an entire corridor. They often signal a lower speed to drivers. Raised curbs also allow placing roadside objects such as trees and street furniture closer to the roadway, producing a traffic calming effect. Where curbs are impractical, pavement markings or changes in pavement texture may be used to create a similar effect.

Cost: Moderate to high (varies).

Pros:

- Edge treatments define a corridor, increasing awareness.
- These treatments can also visually “narrow” a roadway.

Cons:

- Potential right-of-way impacts.
- Potential drainage impacts and costs to accommodate.

**Road Diet**

A road diet typically converts a four lane road into a three lane road with a center turn lane. It can also be used on one-way streets with excess width to install wider sidewalks, bike lanes, landscaped buffers, and on-street parking. A road diet can range from a simple, relatively inexpensive restriping to actually moving the curb lines and physically narrowing the road.

Cost: \$25,000-40,000 per mile for restriping, \$100,000 or more per mile for physical alterations

Pros:

- Improves mobility for cyclists, pedestrians, and transit-users.
- Can incorporate medians, pedestrian refuges, bicycle improvements, and other measures.

Cons:

- Immediate traffic calming concerns may not be addressed due to cost and duration.
- Reducing the number of travel lanes reduces the overall capacity of the roadway, possibly causing more congestion and reducing level of service (LOS).



FOURTH STEP: ENGINEERING SOLUTIONS - ROADWAY DESIGN, *continued***Brick/Cobblestone Streets**

While not specifically used for traffic calming in Columbus, brick and cobblestone streets can have a latent calming effect. Vibrations caused by small, constant changes in the roadway surface cue drivers to slow down. A textured street has a historical and residential quality that lends itself to neighborhood environments. It alerts passing drivers that they are likely to encounter pedestrians and other roadway users.

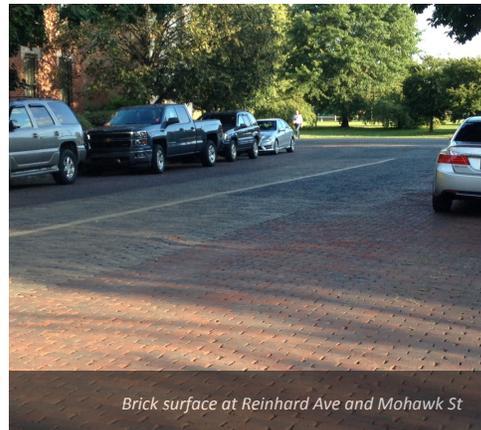
Cost: High, varies depending on materials used.

Pros:

- Attracts driver's attention visually and audibly.
- Ideal for residential and neighborhood shopping areas.
- Permanent and effective.
- Enhances a neighborhood's aesthetic appeal.

Cons:

- Cost of rebricking a paved street and of ongoing maintenance can be prohibitive.
- Extra care required when snow plowing.
- Reduces travel speeds; however, they are difficult for cyclists and some pedestrians to negotiate.



Brick surface at Reinhard Ave and Mohawk St

In-Pavement Lighting

In-pavement lights are being used at crosswalks to alert motorists to the presence of a pedestrian crossing or preparing to cross the street. When the pedestrian activates the system, either by using a push-button or through detection from an automated device, the lights begin to flash at a constant rate, warning the motorist that a pedestrian is in the vicinity of the crosswalk ahead.

Cost: Approximately \$35,000

Pros:

- Increases driver awareness of upcoming crossing.
- Particularly effective near school campuses or transit hubs with a lot of people walking in the area after dark.

Cons:

- Cost more than traditional crosswalk.
- Design must take into account snow removal.
- In-pavement light fixtures and automatic sensors can be blocked by snow or other debris.



Image Source: www.tapcosignal.com

FOURTH STEP: ENGINEERING SOLUTIONS - ROADWAY DESIGN, *continued*

Sidewalks

Sidewalks are raised surfaces adjacent to the roadway that allow pedestrians to safely travel in the public right-of-way. They are typically made of asphalt, concrete, or brick and vary in width depending on street character. Street furniture, buffers from traffic, handicap-accessible facilities, and transit stops are all located on the sidewalk.

Cost: Asphalt-\$35 per linear foot, concrete-\$32 per linear foot, Brick-\$60 per linear foot

Pros:

- Improves pedestrian mobility.
- Encourages street life.

Cons:

- Poorly designed or maintained sidewalks can inhibit pedestrian flow and accessibility.



On-Street Angled Parking

On-street parking, both parallel and angled, helps to narrow roadways and calm traffic. Angled parking should be back-in only so that drivers are facing the roadway when they exit the parking space. This allows for greater visibility and eye contact with other roadway users.

Cost: Variable (restriping), \$2,000-\$20,000, (curb extensions).

Pros:

- Creates a buffer between pedestrians and motorists, improving the walking environment.
- On-street parking in business districts is generally welcomed.

Cons:

- May impede traffic flow.



Median

Medians are any type of barrier that separates opposing traffic on a two-way street. Unless there is a break in the median at an intersection, medians block turn movements and through traffic on intersecting streets. They can be landscaped or made of concrete or other materials. Lighting and signage for pedestrian crossings can also be included.

Cost: \$2,100-40,000

Pros:

- Reduces pedestrian crossing distances and provides shelter.
- Can improve a street's residential character.

Cons:

- May actually increase speeds in some situations due to reduced turning movements.
- Can inhibit visibility if done improperly.
- May take up space that could be used for wider sidewalks, bike lanes, or on-street parking.



FOURTH STEP: ENGINEERING SOLUTIONS

SIGNALS & SIGNS

Stationary Radar Signs/Speed Display Board

Radar signs are interactive signs that draw motorists' attention to their speed and the road's legal speed limit. They work by alerting motorists when they're exceeding the speed limit. They can be used in residential areas, school zones, construction zones, or other safety zones. Radar signs can be permanently mounted on signposts or temporary installations using self-contained trailers.

Cost: \$5,000 - \$15,000 each

Pros:

- Proven to slow down traffic, even years after being installed.
- Particularly effective on high volume highways.

Cons:

- Do not slow traffic as much as physical measures.
- Motorists' compliance is voluntary.
- Enforcement is still needed.



Speed display board on Broad St by Wolfe Park

Pavement Markings/Stencils

Pavement markings are another means to alert or inform a motorist of a condition or a potential situation. Painted lines and symbols need to be selected and placed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Crosswalks can be used to alert motorists of pedestrian activity. Pavement markings are also used in conjunction with signs and other measures.

Cost: Low

Pros:

- Low cost and easy to install.
- Can increase awareness.

Cons:

- Requires regular maintenance.
- May not be considered visually aesthetic.
- Not visible with snow covered roads.



Image Source: www.pavementmarkings.com

FOURTH STEP: ENGINEERING SOLUTIONS - SIGNALS & SIGNS, *continued*

Signage

Traffic signs can be used to alert or inform motorists of a condition or a potential situation. Signs need to be selected and placed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Speed limit signs, pedestrian/bicycle/school crossing signs, and in-street pedestrian crossing signs have been used by municipalities to warn motorists of high pedestrian activity, and can help to reduce speeds. Signs are also used in conjunction with other measures such as pavement markings.

Cost: Varies, depending on type and amount of signage—see chart for details.

- | | |
|---|--|
| Pros: | Cons: |
| <ul style="list-style-type: none"> • Low cost. • Increases awareness. | <ul style="list-style-type: none"> • Can be considered to clutter the roadway especially on a residential street. |



Turn Restrictions

Restricting certain turns at intersections to influence travel patterns.

Cost: Variable

- | | |
|---|--|
| Pros: | Cons: |
| <ul style="list-style-type: none"> • Generally low cost. • Reduces cut-through traffic. | <ul style="list-style-type: none"> • Can be inconvenient for residents. • Can create circuitous traffic patterns. • Can be hard to enforce. |



Advance Yield/Stop Signs

Advance yield or stop signs are usually placed 20 to 50 feet from an unsignalized mid-block crossing. They encourage motorists to slow down in advance and be alert for pedestrians in the roadway.

Cost: \$200-2,000

- | | |
|---|--|
| Pros: | Cons: |
| <ul style="list-style-type: none"> • Have been shown to dramatically reduce conflicts between drivers and pedestrians. | <ul style="list-style-type: none"> • Yielding cars can be dangerous at multilane crossings because they obstruct pedestrians' view of adjacent lanes. • Motorists may ignore sign if it is placed too far from crossing. |



FOURTH STEP: ENGINEERING SOLUTIONS

TRANSIT

Note: the following examples are not currently used for traffic calming in the Columbus area, but they do have a traffic calming effect.

Transit Stop Improvement

Well-designed and attractive transit stops can add much to a street's character. Bus, lightrail, or other transit routes should have adequate shelters with seating, trash receptacles, lighting, and pertinent information posted. Shelters should be ADA (Americans with Disabilities Act)-accessible. Landscaping and attractive branding are also important elements to a successful transit stop improvement. Shelters should not obstruct pedestrian travel on the sidewalk.

Cost: \$5,000-24,000

Pros:

- An active transit network encourages a multimodal environment and fosters a vibrant street life.
- Well-designed transit stops can improve ridership and rider experience.

Cons:

- Transit stops can be targets for vandalism if not maintained.
- Shelter design should not clash with surrounding streetscape.



A new CBUS circulator stop on High St

Access to Transit

Transit stops should be highly visible and located in easily accessible sites for transit users. At intersections, crosswalks, walk signals, and yield signs should accompany any transit stop. At mid-block stops and busy roads, a mid-block pedestrian crosswalk, overpass, or underpass should be considered. Transit stops should be ADA-accessible and transit vehicles should be equipped to accommodate the blind, deaf, elderly, and disabled. Bike racks at transit stops and on transit vehicles will increase ease-of-access.

Cost: \$5,000-20,000

Pros:

- An active transit network encourages a multimodal environment and fosters a vibrant street life.

Cons:

- Retrofitting existing transit stops can be expensive depending on conditions.



Bus shelter at Hudson St and High St

FOURTH STEP: ENGINEERING SOLUTIONS - TRANSIT, *continued***Bus Bulbout**

A bus bulbout or curb extension allows buses to stop in the travel lane, reducing delays and conflict with other vehicles. Bus bulbouts have the same positive traffic calming effects that regular bulbouts do: they narrow the roadway and shorten the distance that pedestrians must cross at intersections, they can be designed with smaller curb radii to reduce vehicle speeds during right turns, and they make pedestrians more visible to oncoming traffic. Additionally, bus bulbouts offer the added benefit of providing extra space for transit shelters and transit users.

Cost: \$15,000-70,000

Pros:

- Decreases wait times for passengers since buses never leave the flow of traffic.
- When coupled with crosswalks, can narrow pedestrian crossing distances and make pedestrians more visible.

Cons:

- Buses that are stopped at a bus bulbout obstruct traffic and may negatively impact motor vehicle traffic flow, especially on busier streets.



Bus bulbout. Image Source: www.pedbikesafe.org

FOURTH STEP: ENGINEERING SOLUTIONS AT CROSSING LOCATIONS

Note: The following treatments can be used for midblock crossings as well as intersections.

High Visibility Crosswalks

Crossings equipped with flashing beacons, in-pavement lighting, and conspicuous signage all qualify as high-visibility crosswalks. They encourage pedestrians to cross at a designated location and make them more visible to oncoming motorists.

Cost: \$3,500-40,000

Pros:

- Increases driver yielding behavior.

Cons:

- May be unsafe at high-speed crossings.



Pedestrian Refuge

A pedestrian refuge or island is a sheltered space in the middle of a street that provides protection for crossing pedestrians. It allows pedestrians to safely stop halfway through crossing and wait for a gap in traffic to continue. They can be used at midblock crossings or intersections and can be connected to a median or stand alone.

Cost: \$3,500-40,000

Pros:

- Enhances pedestrian safety and reduces vehicle speeds.
- Can include landscaping and act as a gateway to a residential area.

Cons:

- May inhibit bicycle and handicap access if improperly designed.



FOURTH STEP: ENGINEERING SOLUTIONS - AT CROSSING LOCATIONS, *continued***Curb Extension/Bulb Out**

Neckdowns or bulb outs narrow the roadway by extending the curb at key intersections and mid block locations.

Cost: \$2,000 - \$20,000 each, depending upon size and material

Pros:

- Slow traffic, reduce turning speeds, and increase pedestrian safety by reducing crossing distance.
- Shift the focus of the street towards creating a walkable environment.

Cons:

- Relatively high initial costs.
- Loss of on-street parking.
- Increased maintenance costs.
- Complicates plowing and street sweeping operations.
- Can hinder drainage.



Bulbout at Town St and Hawkes Ave

Textured & Colored Pavement

Textured pavement is a surface material on the roadway, such as brick, concrete pavers, and stamped asphalt, which is installed to produce small, constant changes in vertical alignment. When used at crossing locations, textured pavement identifies an intersection or crosswalk as a pedestrian area.

Cost: Costs vary depending on materials used.

Pros:

- Attracts driver's attention visually and audibly.
- Ideal for residential and neighborhood shopping areas.
- Permanent and effective.
- Enhances a neighborhood's aesthetic appeal.

Cons:

- Overly bumpy surfaces are difficult for some pedestrians to navigate.



Textured crosswalk at Main St and Drexel Ave

RESOURCES

Local Resources:

Columbus Public Health, Healthy Places Program

<http://www.columbus.gov/publichealth/programs/healthy-places/>

Columbus Public Service

<http://columbus.gov/publicservice/>

The Columbus Transportation and Pedestrian Commission

<http://columbus.gov/TPC/>

The Columbus Bicycle Subcommittee

<http://www.columbus.gov/BSC/>

General Policy and Procedure for Stop Signs

http://columbus.gov/uploadedfiles/Public_Service/Transportation/Document_Library/Traffic%20Signal%20Policy%20Application%20of%20Warrants%20Scanned.pdf

Complete Streets, Mid-Ohio Regional Planning Commission

<http://www.morpc.org/transportation/complete-streets/toolkit/index>

Westerville: Neighborhood Traffic Management Program

<http://www.westerville.org/modules/showdocument.aspx?documentid=357>

Yay Bikes!

<http://yaybikes.com/>

State Resources:

Ohio Department of Transportation: Manual on Uniform Traffic Control Devices

http://www.dot.state.oh.us/Divisions/Engineering/Roadway/DesignStandards/traffic/OhioMUTCD/Pages/OMUTCD2012_current_default.aspx

Ohio Department of Transportation: General Policy and Procedure for Stop Signs School Flashers

<http://www.dot.state.oh.us/districts/D01/PlanningPrograms/trafficstudies/Pages/FlashingLights.aspx>

Ohio Department of Transportation: Traffic Control for Bicycle Facilities

http://www.dot.state.oh.us/Divisions/Engineering/Roadway/DesignStandards/traffic/TEM/Documents/Part_09_Complete_012012Revision_bookmarked_012012pdf.pdf

Full text in the Ohio Revised Code on Speed Limits

<http://codes.ohio.gov/orc/4511.21>

Ohio Bicycle Federation

<http://ohiobike.org/advocacy.htm>

RESOURCES, continued

National Resources:**Federal Highway Administration: Pedestrian Safety Guide and Countermeasure Selection System**

<http://www.pedbikesafe.org/PEDSAFE/index.cfm>

Federal Highway Administration: Recommended Approach For Accommodating Bicycle and Pedestrian Travel

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design.cfm

Federal Highway Administration: Resident's Guide for Creating Safe and Walkable Communities

<http://katana.hsrc.unc.edu/cms/downloads/residentsguide.pdf>

Federal Highway Administration; The Manual on Uniform Traffic Control Devices

<http://mutcd.fhwa.dot.gov/>

Institute of Transportation Engineers: Traffic Calming for Communities

<http://www.ite.org/traffic/index.asp>

Pedestrian and Bicycle Information Center

<http://www.pedbikeinfo.org/>

National Complete Streets Coalition

<http://www.smartgrowthamerica.org/complete-streets>

<http://trafficalming.org/>

National Association of City Transportation Officials: Urban Street Design Guide

<http://nacto.org/usdg/>

