

CITY OF ROCHESTER

Neighborhood Traffic Management Program

APPENDIX

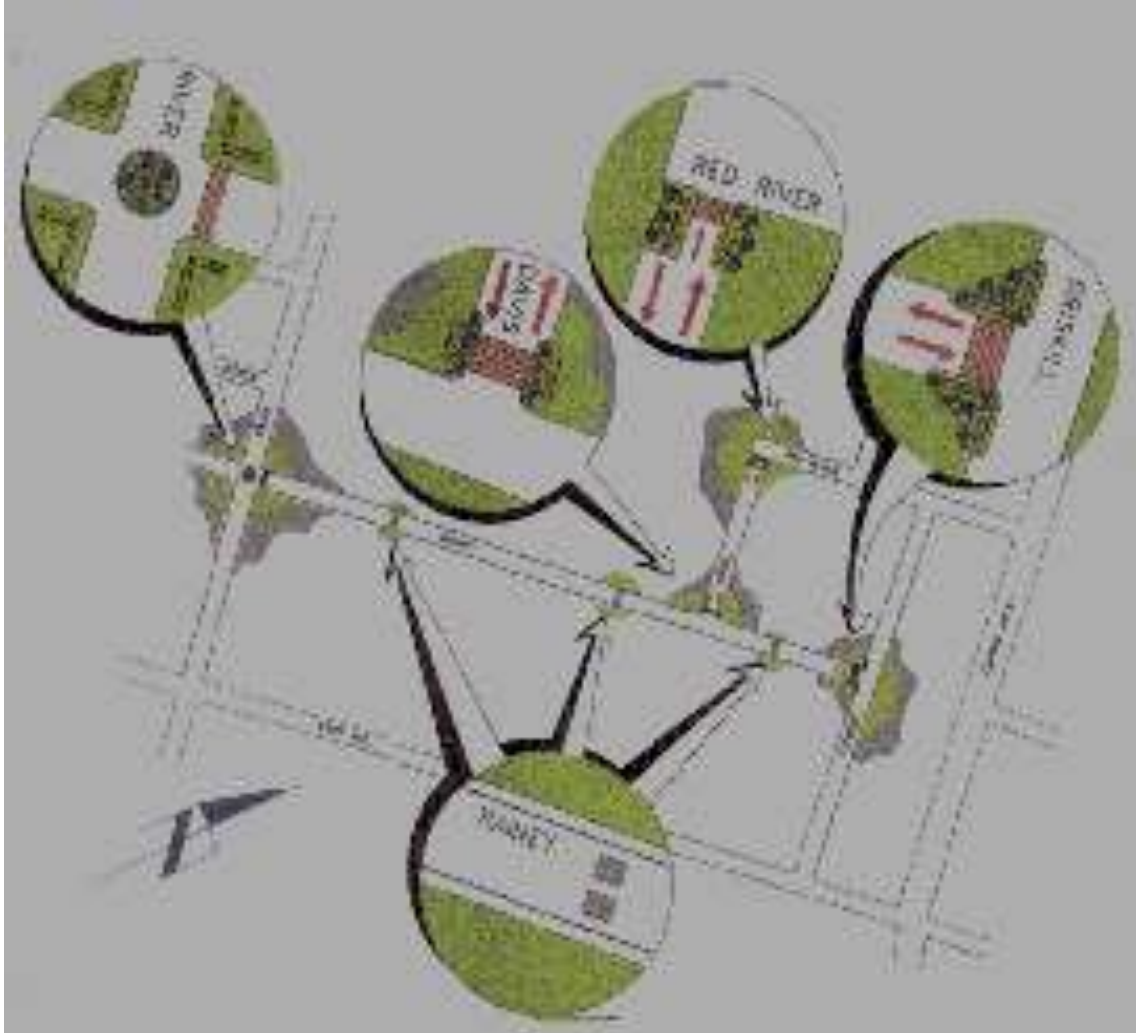


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APPENDIX A
CITY OF ROCHESTER

PETITION TO INITIATE A NEIGHBORHOOD TRAFFIC MANAGEMENT STUDY

1. CONTACT INFORMATION

Name: _____

Address: _____

Phone Number: _____ Email: _____

2. Please describe the location of the traffic concern. Attach a map or picture if necessary:

3. Please describe the nature of the neighborhood problem you are concerned with. You may attach additional sheets if necessary. *(Please print or type attached sheets)*

4. Please list possible solutions to the problem you would like the City of Rochester to consider:

PETITIONER’S SIGNATURES: The petition requesting preparation of a Neighborhood Traffic Management Plan must be signed by owners of at least ten (10) different properties in the study area. Those signing the petition certify that they reside within the area impacted by the problem described in #2 above and agree that the description in Item #3 accurately reflects the concerns of the neighborhood. Persons signing the petition acknowledge it is the City’s policy that they will be required to participate in the costs directly associated with any physical changes to the street system implemented as part of the petition. Financial participation typically includes property tax special assessments. Before any permanent construction, there would be neighborhood meeting(s), neighborhood ballot(s), and a city council hearing prior to levying any special assessments.

FACILITATORS: All persons signing this petition agree that the contact person indicated in item 1 above may represent the neighborhood as a facilitator between the neighborhood residents and the City of Rochester in matters pertaining to this petition described in items 2 and 3 above.

	Printed Name	Signature	Address	Phone or Email
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

RETURN THE COMPLETED PETITION TO

City Traffic Engineer
Rochester Public Works Department
201 4th St SE, Room 108
Rochester, MN 55904

APPENDIX B
CITY OF ROCHESTER

NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM
Ballot for Implementing the Proposed Plan and To Proceed with the Trial Installation

INSTRUCTIONS: Residents within your neighborhood have identified traffic problems that they feel should be addressed, and have worked with city staff to develop a traffic management plan. These concerns are described briefly below. Please check the appropriate boxes below. Only ONE person per household (per street address) should submit this ballot. If there is permanent construction to solve traffic problems in your neighborhood, you may be asked to help pay for the solutions. There would be an additional neighborhood ballot, and a city council hearing prior to levying any special assessments. The deadline for returning this ballot is _____.

SUMMARY OF CONCERNS:

PLEASE CHECK THE APPROPRIATE BOXES:

- YES, I support the *Neighborhood Traffic Management Plan* to address problems in my neighborhood, and I support proceeding with the trial installation.

- I would not want a traffic calming device such as a speed table adjacent to my property.

- NO, I do not support the *Neighborhood Traffic Management Plan*.

Your Name: _____

Your Address: _____

Please return this ballot to:

City Traffic Engineer
Rochester Public Works Department
201 4th St SE, Room 108
Rochester, MN 55904

APPENDIX C
CITY OF ROCHESTER

NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM
BALLOT FOR APPROVING OR NOT APPROVING A FINAL ACTION PLAN

INSTRUCTIONS: Several months ago with the support of your neighborhood, residents in your neighborhood formed a Neighborhood Task Force for the purpose of preparing a plan to address traffic problems. The task force has completed a plan that is attached to this ballot. Please carefully review the plan (including provisions that describe how the facilities will be paid for) and check the appropriate boxes below to reflect your position on the proposal. If approved by the neighborhood, the plan will be forwarded to the City Council for inclusion in a future year's Capital Improvement Program for construction. There would be a City Council public hearing prior to levying any property tax special assessments. The deadline for returning this ballot is _____.

PLEASE CHECK THE APPROPRIATE BOXES:

- YES, I support the plan as presented.

- NO, I do not support the plan as presented.

- NO, I do not support the plan as presented. However, I would support it if the following changes were made (please print clearly or attach a typed response with as many pages as needed).

Your Name: _____

Your Address: _____

Please return this ballot to:

City Traffic Engineer
Rochester Public Works Department
201 4th St SE, Room 108
Rochester, MN 55904

APPENDIX D: Phase I Toolbox

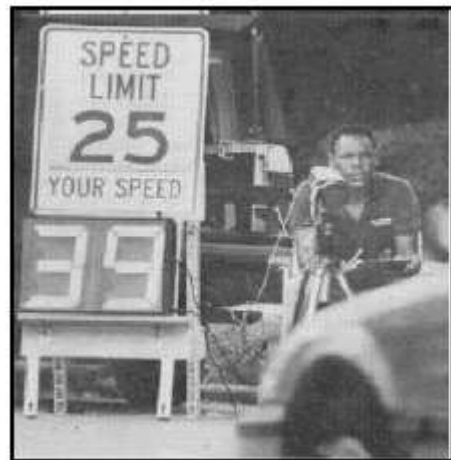
PHASE I EDUCATION MEASURES

Neighborhood Traffic Watch

Description:

Residents volunteer to observe violations and are trained to use radar units to record and report habitual speeds. Courtesy letters may be sent by police.

Neighborhood residents are loaned a radar gun. The City sends warning letters to drivers exceeding the posted speed limit. A speed display trailer and selected enforcement are used.



Potential Advantages:

- o May have long-term effects as neighbors become more aware of who is speeding then interact with each other.
- o Effect on speeders is limited to within sight distance of the radar gun.
- o Speeds may be reduced during short intervals when the radar gun is in use.
- o Can be an effective public relations and educational tool.
- o Residents feel they are part of the solution.

Potential Disadvantages:

- o Requires extensive volunteer citizen involvement.
- o Not an enforcement tool (except when used in conjunction with police enforcement).
- o Can cause conflicts between neighborhood residents.
- o Can require inordinate staff and financial resources in order to be effective.

Cost:

Low to Moderate

Where to Apply:

Residential streets with speeding concerns and willing, active neighbors

Speed Monitoring Trailer

Description:

This program involves the placement of speed display trailers on designated streets. Vehicle speed is visually displayed to drivers as they approach the trailer. Speed enforcement generally follows use of these trailers boards. Also may collect speed data.

Potential Advantages:

- o Effective speed control while in use
- o Educates drivers on speeds
- o A very good public relations tool



Potential Disadvantages:

- o Duration of effectiveness limited – some residual benefit noted
- o Not self enforcing in long run
- o Requires periodic enforcement to maintain beneficial effect

Cost:

Low to moderate cost due purchase price and to staffing requirements

Where to Apply:

Any local/residential street where speeding is a problem

ALTERNATIVE: (Higher Cost) Permanent Driver Feedback Speed Limit Sign

Driver feedback speed limit signs show the posted speed as well as the speed at which the coming traffic is traveling. Reminds motorists of their speed and these signs help educate the residents to the speed of traffic in their neighborhood.

Estimated cost of \$8,000 to \$12,000 per sign; could possibly be considered as a Phase II improvement.

Potential Advantages

- o Constant reminder to motorists to drive the posted speed
- o Educational tool for motorists and residents

Potential Disadvantages

- o Not everyone will see permanent signs as a positive influence in their neighborhood
- o May not slow traffic long-term after the novelty wears off.

Driver Feedback Speed Limit



PHASE I ENFORCEMENT MEASURES

Enhanced Police Enforcement

Increased enforcement of speed limits on problem local streets to reduce traffic speed and increase safety.



Advantages:

Visible enforcement could reduce speed by increasing driver awareness about speeding on residential streets and safety.

Effective while officer is present and monitoring speeds

Can be implemented in almost any location at short notice.

Disadvantages:

Not self enforcing; temporary measure; Long-term benefits of speed reduction are unsubstantiated without periodic enforcement.

The portion of the fines the city receives does not cover cost of enforcement.

Short “memory effect” when enforcement officer no longer present.

Enforcement is an expensive tool.

Special Considerations:

Often helpful in school zones.

May be used during “learning period” when new devices or restrictions first implemented.

Cost:

High cost primarily due to the staffing requirements

Where to Apply:

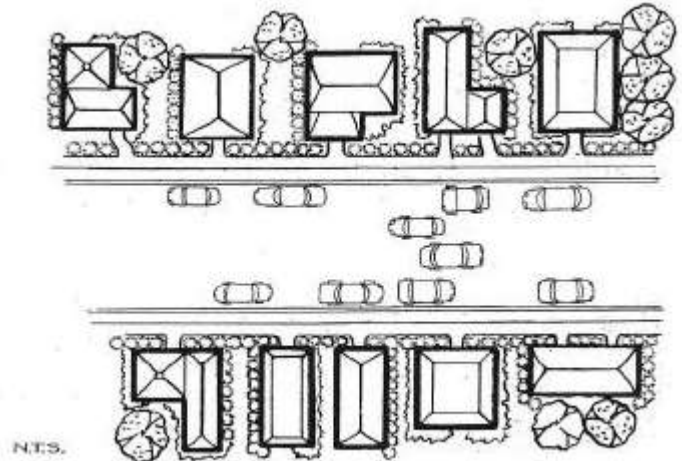
All residential streets where speeding is a concern

PHASE I TRAFFIC MEASURES

PROMOTING ON-STREET PARKING

Parking on one or both sides of the roadway helps to reduce vehicle speeds by reducing the effective width of the roadway. By law, on-street parking is permitted unless otherwise prohibited.

The most pronounced effect on speed occurs on narrow two-way streets with parking on both sides. If parking is sufficiently occupied, and street width is less than 30 feet, there is a “chicane” effect as vehicles may occasionally have to pull over to permit opposing vehicles to pass. Creating this chicane effect is appropriate only on local streets. Even for streets wider than 30 feet, on-street parking may serve to reduce speeds slightly by narrowing the effective roadway width.



Potential Advantages:

- o May reduce travel speeds, depending on extent of use of on-street parking.
- o Parked vehicles provide a buffer between traffic and pedestrians on sidewalks. This provides a comfort level for pedestrians that can be particularly important in downtown commercial areas.

Potential Disadvantages:

- o On-street parking can reduce the visibility of pedestrians and vehicles to each other.
- o Increased risk of suddenly opened doors hitting cyclists where the adjacent travel lane is narrow.

Other Considerations:

- o As a Phase II intersection bulb-out or mid-block narrowing project, on-street parking can be protected by a landscaped island that projects out from the curb.
- o Angle parking has the potential to cause more crashes than parallel parking, and is generally not recommended to achieve speed reduction.
- o If half or more of the block face is not parked out, on-street parking is not likely to result in reduced travel speeds.

Potential Costs

The cost for changing on-street parking restrictions is relatively modest.

Role of Signage in Neighborhood Traffic Management

Speed limit signs are often requested as a means to reduce speeds in residential neighborhoods. According to Minnesota Statute 169.14, the speed limit in urban areas is 30 mph unless otherwise posted. Speed limit signs are generally not effective at reducing speeds; if they were we would put up more signs and speeding problems would be gone. For this reason speed limit signs are not normally installed on every street, but they may be installed at main entrances to neighborhoods coming off a higher-speed roadway where the speed limit may not be apparent to motorists.

Warning signs are used to alert drivers to unexpected conditions on or adjacent to a roadway and to situations that might not be readily apparent to road users. Stop ahead or yield ahead warning signs are used to warn drivers at locations where such signs are not easily visible due to the geometry of the road or sight obstructions.

The City of Rochester does not use “Slow Children at Play” warning signs. No evidence exists to prove that these signs help reduce pedestrian accidents or lower speeds. Worse yet, the signs can give a false sense of security and imply it’s OK to play in the street. Children live on nearly every residential block, so if used, the signs would have to be placed on each street. Blocks with no signs might imply that no children live there, so it is all right to speed.

Regulatory signs (such as speed limit signs) and warning signs are used conservatively because these signs, if used to excess, tend to lose their effectiveness and breed disrespect for all signs.

Stop Signs as a Neighborhood Traffic Control Measure

All-way stop sign control is frequently requested by citizens in order to control speeds on residential streets. The Manual on Uniform Traffic Control Devices describes warrants for installing all-way stop signs. Numerous studies have shown the problems caused by the installation of unwarranted all-way stop signs in an attempt to control speeds. Speed reductions are observed only in the immediate vicinity of the intersection in question, and motorists often increase their speeds between stop signs to make up the time lost at the perceived “unnecessary” stop sign. Motorists tend to lose respect for all-way stop signs where little traffic exists on cross streets, and compliance is poor. Pedestrian safety is decreased at unwarranted all-way stops, especially for small children. Pedestrians expect vehicles to stop at the stop signs, but drivers have gotten in the habit of running the “unnecessary” stop sign. Noise is increased in the vicinity of the intersection. Due to these concerns, all-way stop signs are not used as a tool for neighborhood speed control.

APPENDIX E: Phase II Toolbox*

Phase II Speed Control Measures

- o Neighborhood Entry Island– Gateway
- o Speed Table
- o Raised Median Islands
- o Intersection Bulb-Outs
- o Traffic Circles
- o Mid-Block Narrowing
- o Use of Street Trees as a Traffic Calming Strategy

Phase II Volume control Measures

- o Half Closure / Semi-Diverter
- o Diagonal Diverter
- o Street Closure

Targeted Pedestrian Safety Improvements

- o Raised Median Islands
- o Curb Extensions
 - o Mid-Block Narrowing
 - o Intersection Bulb-Outs
- o Raised Crossings
 - o Raised Crosswalks (Mid-Block)
 - o Raised Intersections
- o Other Pedestrian Safety Improvements

* For additional information, see Traffic Calming: State of the Practice available at <http://www.ite.org/traffic/tcstate.htm#tcsop>

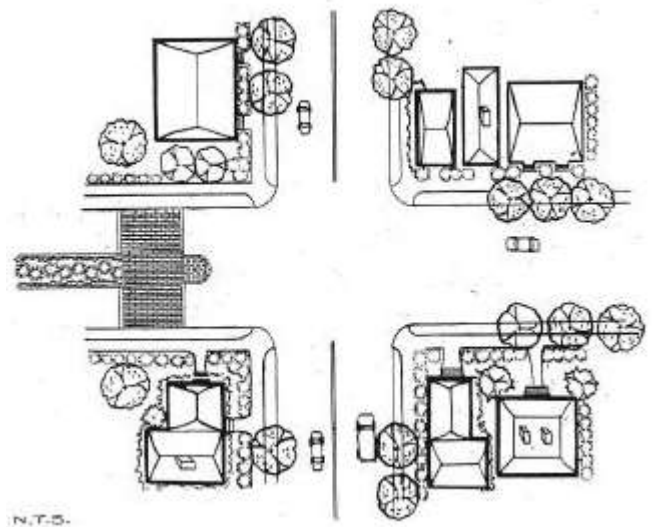
PHASE II SPEED CONTROL MEASURES

Neighborhood Entry Island / Gateway

Description

Entry Island / Gateway treatments are used at entrances to residential neighborhoods to define the transition from the major collector / arterial road system to the local neighborhood street system, increasing driver awareness that the physical environment in which they are traveling has changed. Features typically used include a combination of physical and textural features and may include

- o Signage
- o Landscaped medians
- o Textured pavement surfaces such as brick
- o Archways or other large, decorative gateways with narrow driveways to slow motorists upon entry



Generally, features such as landscaping or textured pavements will not have much impact on speed unless combined with physical features such as median islands or bulb-outs at the intersection. Landscaping within the raised island should not restrict sight distance, and the final design will need to take into account potential conflicts such as driveway locations.

Potential Advantages:

- o Notifies motorists of a change in roadway character
- o Help identify neighborhood
- o Creates an opportunity to provide additional streetscape area for landscaping and aesthetic improvements
- o Can discourage truck entry, depending on the extent of narrowing and inclusion of median islands at the intersection.

Potential Disadvantages

- o Need for maintenance (and irrigation)
- o If textured pavements are used, some noise will result.

Cost:

Cost can vary widely, from \$5,000 to \$20,000+.



Speed Table

Description

Speed tables are a raised mound with a flat platform that can be used as a raised crosswalk as well as to slow traffic on a street. They are raised approximately 3 to 4 inches above the street level over a 15-20 foot length along the direction of travel.



Potential Advantages

- o Can be very effective in slowing traffic on residential streets.
- o Self-enforcing
- o May reduce volumes by discouraging non-resident traffic
- o Should not pose problems for bicyclists or motorcyclists except at high speeds.

Potential Disadvantages

- o May increase speed between tables
- o May slow emergency response times
- o Increases maintenance costs.
- o Drainage could be a concern.
- o Increases traffic noise in vicinity of hump
- o Aesthetics – some residents may perceive them to be unattractive
- o May result in shifting volumes to a parallel residential street

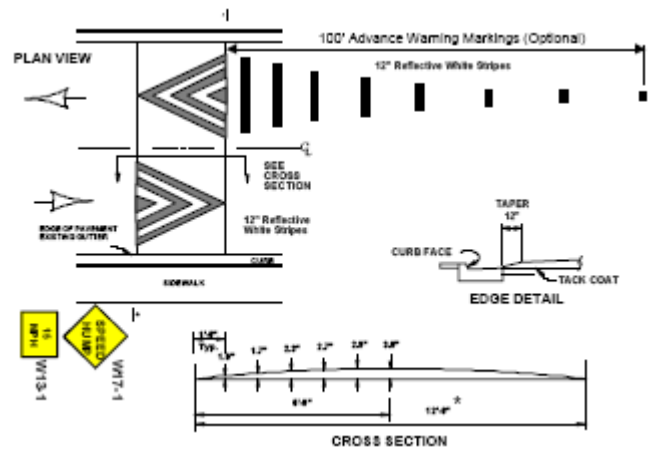
Cost

\$15,000-\$25,000

Other Considerations

Spacing should be about 300- 500 feet, clearly visible for 200 feet, and placed at least 200 feet from intersections. Speed tables should generally not be used on curves or steep grades. Ideally, tables should extend across the roadway to prevent motorists from driving with one wheel off the device. Installations should include warning signs.

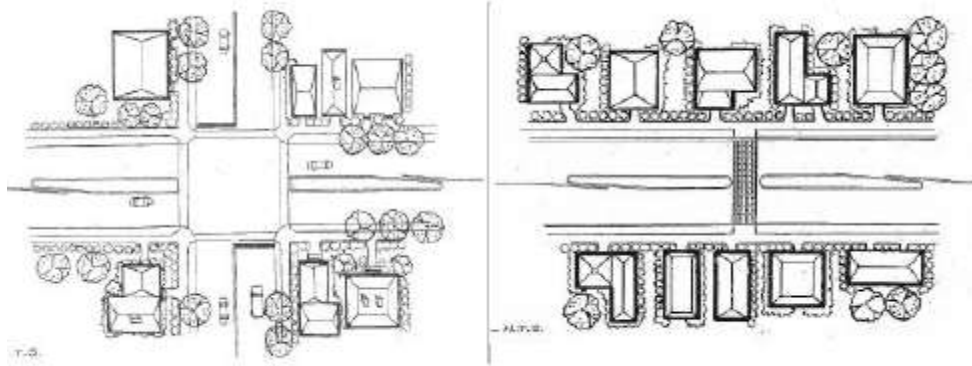
1: Advance Warning for Speed Tables



Raised Median Island

Description

Median islands are narrow islands between travel lanes that can be designed with breaks in landscaping and curbing for pedestrians.



Potential Advantages

- o Separate opposing vehicle travel lanes and prevent passing movements.
- o Can be designed with breaks for pedestrian refuges and may reduce vehicle-pedestrian conflicts; shortens required minimum pedestrian crossing time since it allow pedestrians to cross half of the street at a time.
- o May visually enhance the street, if landscaped.
- o Vehicle speeds may decrease.
- o Can be used on curves to prevent vehicles from swinging wide at excessive speeds.

Potential Disadvantages

- o May require removal of on-street parking to create room for median.
- o May restrict access to driveways from one direction.
- o Added maintenance costs

Cost

\$5,000 - \$15,000 per island

Other Considerations

- o Islands should be at least 12 feet, and preferably 20 feet, in length.
- o The maximum length of median islands will be affected by driveway and intersection locations.
- o Median islands should be 6 to 8 feet wide to comfortably accommodate pedestrians

Intersection Bulb-Outs

Description

Intersection bulb-outs, also known as curb extensions or neckdowns, are achieved at intersection locations by extending curb corners towards the center of the roadway for a distance of usually 6 to 8 feet. Curb extensions reduce crossing distance for pedestrians and may slow motorists.

Potential Advantages

- o Slow traffic by funneling it through a narrower street opening.
- o May slow right-turning vehicles.
- o Reduce the crossing distance for pedestrians and make pedestrians more visible to oncoming traffic.
- o Prevent illegal parking close to intersections.
- o Can improve neighborhood appearance with landscaping and/or textured treatments

Potential Disadvantages

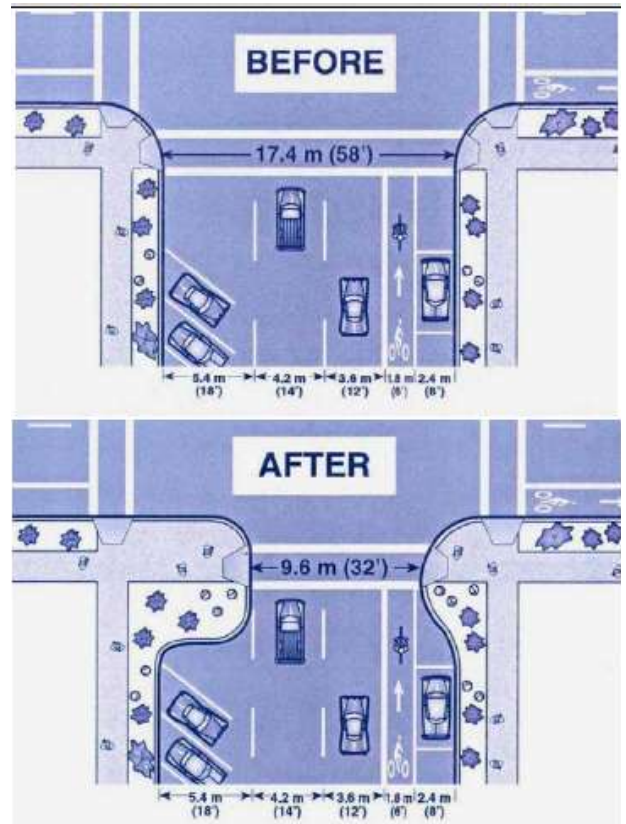
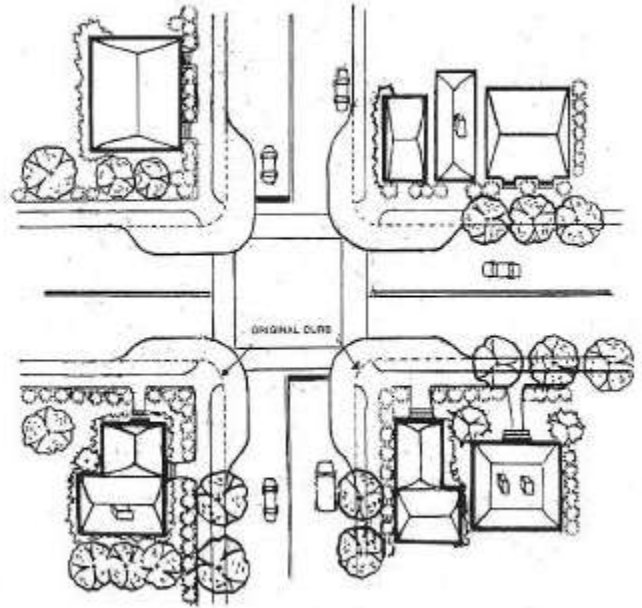
- o Can result in loss of one on-street parking space on each side of the road, though at intersections this is unlikely given statutory prohibitions of parking close to intersections.
- o May make it difficult to accommodate full bicycle lanes.
- o May be problematic for school buses, refuse trucks, moving trucks, etc. turning at the intersection.

Cost

Each pair may cost \$7,000 to \$15,000.

Other Considerations

- o Careful consideration for bicyclists is required.
- o Signage or striping may be needed to warn motorists and bicyclists of the narrowing at the intersection of a roadway and assist them in maintaining proper spacing.



Traffic Circle

Description

Traffic circles are raised island located in the center of an unsignalized intersection. Vehicles must change their travel path to maneuver around the circle.



Potential Advantages

- o Slows traffic as it drives around circle
- o Breaks up sight-lines on straight streets
- o Opportunity for landscaping in the intersection, can enhance neighborhood appearance when properly landscaped
- o Reduces left turn accidents
- o Reduces the number of potential conflict points at an intersection; can result in a reduction in left turn accidents.

Potential Disadvantages

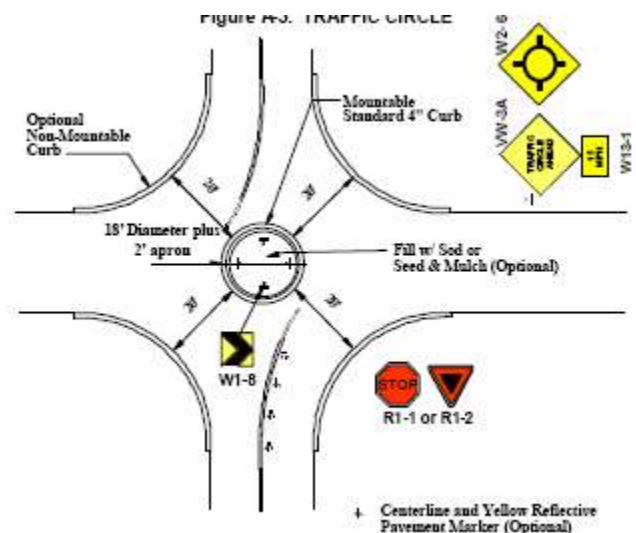
- o May impede emergency response; May make it difficult for emergency vehicles, buses, and trucks to turn left.
- o On streets with bicycle facilities, bikes must merge with traffic around circle
- o May shift traffic to parallel residential streets
- o May require some parking removal
- o May require additional right of way
- o Snow plowing will be more difficult

Cost

\$5,000 to \$15,000

Other Considerations

- o Most effective when used in series or in conjunction with other traffic calming devices
- o Should not be used on critical emergency response routes
- o May require educational campaign and learning period
- o Landscaping has the potential to add



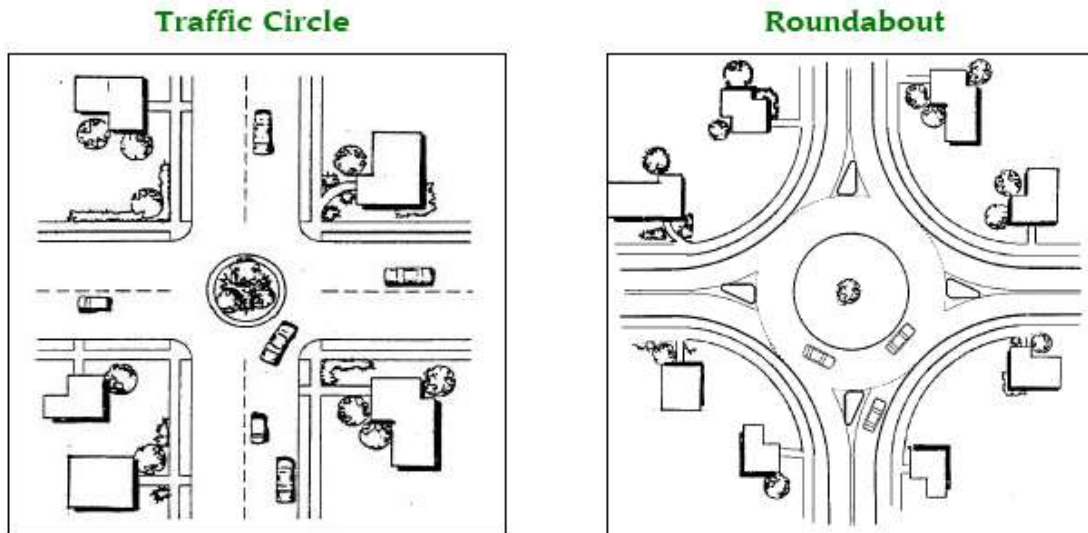
- significantly to the ongoing maintenance costs; consider delegation to the neighborhood association or to residents who have been supportive of the installation.
- o Traffic circles may require additional street lighting.
 - o Special provisions may be needed for snow and ice removal

Roundabouts versus Traffic Circles

Roundabouts are similar to traffic circles but are constructed to a higher design standard, with the following features:

- o Intersections are designed with curved entrances to permit higher travel speed and smoother merging of entering vehicles with vehicles in the roundabout
- o Yield control is used on all entries and the circulatory roadway has no control, circulating vehicles always have the right of way
- o Splitter Islands are installed on all approaches to separate entering and exiting traffic and to facilitate pedestrian crossing at the intersection
- o Will require additional right of way to accommodate the design layout

The following pictures depict the differences between a traffic circle and a roundabout.



Mid-Block Narrowing

Description

Mid-block narrowing involving the use of curb extensions that extend from both sides of the street directly across from each other, narrowing the curb-to-curb width of the roadway at that point. Areas created by the curb extensions should be landscaped, and sidewalks should continue in a straight path rather than following the path of the curb.



Potential Advantages

- o May contribute to vehicular speed reduction
- o Will provide parking protection to adjacent spaces
- o Shortens pedestrian crossing distance.

Potential Disadvantages

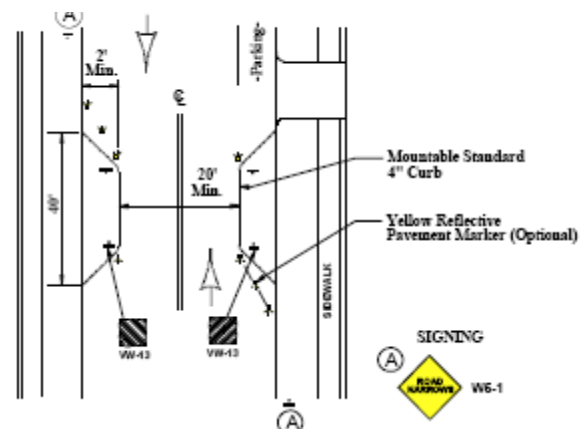
- o Creates drainage issues where curb and gutter exist
- o May create a hazard for bicyclists
- o Not appropriate for some curves and should not be used on crest of a hill
- o Will eliminate some parking

Cost

Estimated cost: \$7,000-\$15,000 per pair.

Other Considerations

Mid Block narrowing construction should not be designed to force bicyclists to merge with vehicular traffic if bike lanes are provided on the street



Use of Street Trees as a Traffic Calming Strategy

The purpose of planting trees in front of homes on a residential or collector street is to give the impression of a narrower street and thus to slow traffic. Streets with a virtual canopy formed by trees have much more residential appearance/feeling. It follows that trees become more effective as they reach maturity.

The trees act as a buffer zone between motorists and residents and also provide a visual barrier between the two. Trees have no impact on the volume of traffic but may have a minor impact on speed. To be effective, trees must be planted consistently along street frontages at a rate of about one every 30' to 50' and will need time to mature.

Tree planting has sometimes been criticized as merely a "beautification project" rather than a traffic control project. While trees most definitely improve the aesthetics of roadways, they also contribute to traffic calming.

Criteria to consider for use of Street Trees as a Traffic Management Strategy

- o Other traffic management devices are not acceptable to the emergency response services.
- o The neighborhood is opposed to other measures or other measures previously installed are not as effective as desired.
- o The neighborhood is deficient in street landscaping.
- o Existing right-of-way space allows for the installation of trees without significantly restricting the availability of on-street parking.

Other Considerations

- o It is also possible for residents to implement this alternative themselves through a concerted neighborhood effort.
- o It may take 5 to 8 years to get the full effect of this benefit.

Cost:

The cost for the City to purchase and plant balled and burlapped 2" caliper trees is about \$350 per tree (2005).

PHASE II VOLUME CONTROL MEASURES

Half Closures and Semi-Diverter

Description

Half closures are barriers that restrict turns into a street, effectively blocking travel in one direction for a short distance on otherwise two-way local streets. Half closures are generally used for locations with cut-through traffic volume problems where less restrictive measures have been unsuccessful.

A semi-diverter is two half closures opposite each other at the same intersection.

Potential Advantages

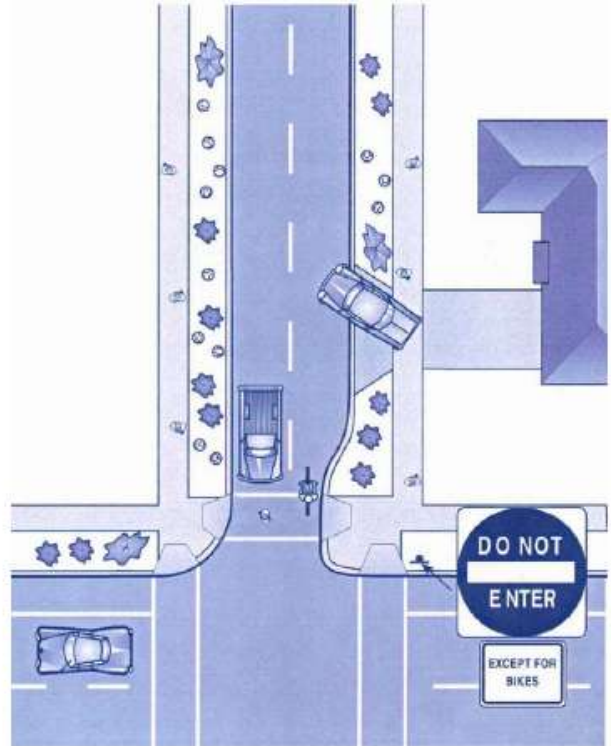
- o They are able to maintain two-way bicycle and pedestrian access, and shorten pedestrian crossing distance
- o They are effective in reducing traffic volumes
- o Reduce cut-through traffic without restricting bicycle and pedestrian access.
- o May lower travel speeds.
- o Half closures permit emergency vehicles to go around them in the wrong direction (provided there is adequate sight distance), thus allowing a higher degree of emergency access than street closures or diagonal diverters.
- o Can visually enhance a neighborhood if landscaping is included.

Potential Disadvantages

- o Depending on the design, drivers may be able to circumvent the barrier
- o Could be violated, especially in the late evening, and particularly on low volume streets.
- o May redirect traffic to other local streets
- o Reduce access for residents and may increase trip length for some drivers
- o In effect at all times; even if cut-through problem exists only at certain times

Cost

Cost of a permanent measure ranges from \$5,000 (asphalt, pre-cast curb bulb with no drainage modifications) to \$20,000 (measure fully integrated into streetscape with



poured-in-place concrete bulb-outs, sidewalks extended, landscaping and drainage modifications).

Other Considerations

- o Half closures should be used only at local road intersections with collector or arterial streets, since those roadways can best accommodate the diverted traffic.
- o Half closures intended to prevent exit are more readily violated.
- o A six to twelve-month trial period is recommended before a measure is made permanent.
- o Enforcement may be necessary to keep traffic from violating the directional closure.
- o Violations may be reduced by extending the length of the half closure.

Diagonal Diverters

Description

A diagonal diverter is a physical barrier placed diagonally across a four-way intersection to create two unconnected intersections.

Potential Advantages

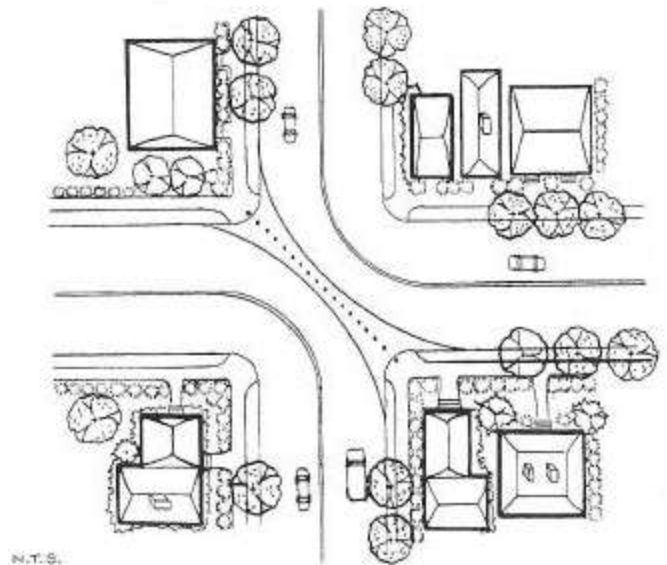
- o Reduces volumes
- o Reduce crash potential by eliminating conflicting traffic movements.
- o If landscaped, can enhance visual environment.
- o May reduce speeds.

Potential Disadvantages

- o Unless the neighborhood is confined to a limited area, installing a single diverter may merely shift through traffic to other local streets
- o Can shift problems elsewhere unless a strategic pattern of diverters is used.
- o May inconvenience local residents in accessing their homes.

Cost

Cost typically ranges from \$15,000 to \$30,000 depending on intersection width, drainage requirements, and landscaping.



Boulder, CO

Other Considerations

- o Diagonal diverters should be clearly visible at all times. Painted curbs, delineation, street lights, and advance warning directional arrow signs (W1-6) should be considered.
- o Collisions may be reduced, but some studies indicate that the collisions are shifted to the collectors or arterials that receive the diverted traffic.
- o Because of their impact on traffic patterns, diagonal diverters can be controversial and should receive strong support before their installation.
- o Diverters can be designed with gaps and curb-cuts for pedestrians, wheelchairs, and bicycles. Provisions should be made for continuity of bicycle routes around the diverter. If necessary, pedestrian crossings can be maintained with sidewalk extensions across the diverter.
- o The radius of the diagonal diverter should reflect the posted speed of the street or the speed should be appropriately modified.
- o Diverters may be modified with gates, bollards, and mountable curbs to allow emergency vehicle access.
- o Unless the neighborhood is confined to a limited area, installing a single diverter may merely shift through traffic to other local streets. As a result, diagonal diverters generally need to be installed in a group or cluster to effectively route traffic to collector and arterial roadways.

Full Street Closures

Description

Full street closures are barriers placed across a local street to completely close the street to vehicular traffic, usually leaving only sidewalks open. Full street closures are generally used for locations with extreme traffic volume problems where other measures have proven unsuccessful in reducing traffic volumes. They are also often used together throughout the internal street network of a neighborhood to make external streets more attractive, thus reducing unwanted traffic.



Potential Advantages

- o The primary advantage of full closures is that they cut off traffic volumes while maintaining pedestrian and bicycle access.

Potential Disadvantages

- o They may divert significant traffic volumes onto other streets, potentially disrupting the street network on the whole.
- o Restricts residential access traffic.
- o Restricts access for emergency vehicles.
- o Create obstacles that motorists may run into.
- o Reduce neighborhood connectivity for service vehicles such as school buses, mail delivery, and refuse collection.



(Source: <http://www.trafficcalming.org>)

Cost

\$15,000 to \$30,000+ depending on the site conditions and extent of the construction.

Other Considerations

- o There may be legal issues that may be associated with public street closures
- o Provide pedestrian and bicycle pathways between the street closures to maintain an efficient network of walkways

TARGETED PEDESTRIAN SAFETY ENHANCEMENTS

Some of the speed control measures described above also can be used to enhance pedestrian safety, and are further described below.

Raised Median Islands

Providing raised medians or crossing islands can significantly reduce the pedestrian crash rate and also facilitate street crossing, especially on multi-lane roads. Refuge islands should be at least 6 feet wide to allow for pedestrians to stand and wait for gaps in traffic before crossing the second half of the street. When the median is landscaped it should be designed and maintained to provide good visibility between pedestrians and approaching motorists.



Curb Extensions



Mid-block narrowing or intersection bulb-outs shorten the crossing distance for pedestrians.

Raised Crossings

Raised crossings are marked and elevated pedestrian areas at mid-block locations (raised crosswalks) or intersections (raised intersection).

Raised Crosswalk

Description

A raised crosswalk is essentially a speed table that incorporates a crosswalk. Raised crosswalks are typically 3 to 6 inches above street level. In many jurisdictions, raised crosswalks are level with the curb, about 6 inches above the street.



Potential Advantages

- o Reduced vehicle travel speeds.
- o Provides improved visibility and safety for pedestrians.

Potential Disadvantages

- o Increases emergency response times and slows emergency vehicles and buses
- o Potential drainage problems
- o Potential increased noise from pavement texture and deceleration/acceleration of vehicles
- o Potential for increased maintenance costs compared to standard crosswalks
- o Icing can be a problem if snow is not properly removed.

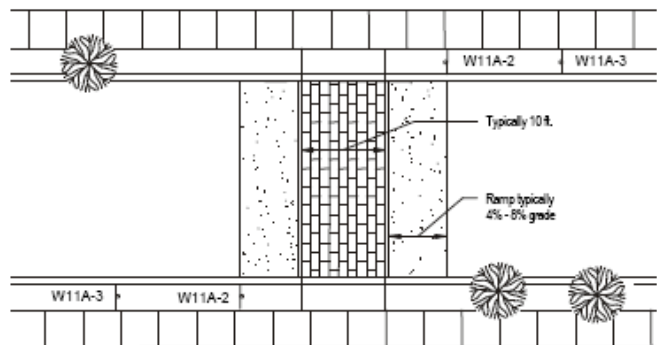
Cost

\$15,000-\$25,000 per raised crosswalk (similar to a speed table). If drainage is an issue, costs could increase considerably.

Other Considerations

- o If the raised pedestrian crossing is the same height as the curb, the edge of the raised crosswalk should be differentiated with a tactile measure to warn visually impaired people.
- o Most appropriately used at areas with significant pedestrian crossing activity.
- o Effectiveness of the measure is increased when used with textured crosswalks or curb extensions.

For typical profile, see drawings of Seminole County speed table or the Gwinnett County speed table in the "Speed Humps" section.



Raised Intersections

Description

Raised intersections are flat raised areas that cover an entire intersection, often with textured materials on the flat section. Ramps are installed on all approaches. The intersections are usually raised to the level of the sidewalk, or slightly below to provide a "lip" that is detectable by the visually impaired. The appropriate locations for a raised intersection treatment would include intersections with substantial pedestrian activity. With the whole intersection raised with a different surface, the intersection is recognized by motorists as being different than other roadway segments, or as "pedestrian territory".

Potential Advantages

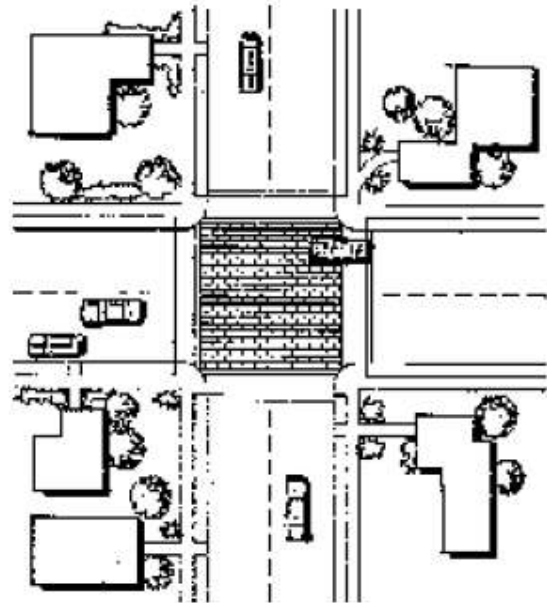
- o They can improve safety for both pedestrians and vehicles
- o If designed well, they can have positive aesthetic value
- o By calming the intersection, they can calm two streets at once.

Potential Disadvantages

- o Expensive to construct and maintain.
- o They are less effective in reducing speeds than other measures such as speed humps, speed tables and raised crosswalks
- o People with back and neck problems can experience additional pain or discomfort by the jarring effect when traveling over the raised intersection

Cost

Cost of a raised intersection typically ranges from around \$15,000 to \$60,000, but can be more, depending on the width of intersecting roadways and drainage requirements.



(Source: Institute of Transportation Engineers)



Other Pedestrian Safety Improvements

Other potential pedestrian safety measures that are outside the realm of the Neighborhood Traffic Management Program include:

- Installing traffic signals (with pedestrian signals), where warranted.
- Adequate nighttime lighting.
- Grade-separated crossings. It should be mentioned that grade-separated crossings are very expensive.
- Removing parking adjacent to the crosswalk to improve visibility between pedestrians and motorists.
- Appropriate pedestrian warning signs, flashers, and other traffic control devices to supplement marked crosswalks.