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City of La Crosse
Traffic Calming Policy

City of La Crosse, Engineering Department

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I. INFORMATION

Introduction

> As transportation professionals, we have long understood that it is not our role to forcibly "shape" communities to meet transportation objections. Rather, it is our responsibility to provide the safest and most efficient transportation system that conforms with what a community wants to be. And what a community wants to be can sometimes change over time.[1]

What traffic calming is and is not...

> Traffic Calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users.
>
> Traffic calming [is further distinguished] from route modification, traffic control devices, and streetscaping. Traffic control devices, notably STOP signs and speed limit signs, are regulatory measures that require enforcement. By contrast, traffic calming measures are...self-enforcing.
>
> Traffic calming measures rely on the laws of physics, rather than human psychology to slow down traffic. Street trees, street lighting, street furniture, and other streetscape elements, while complementary to traffic calming, do not directly compel drivers to slow down. [2]

The subject of traffic calming is not new. Its history began approximately 80 years ago in Europe. Countries there began widespread implementation of traffic calming, based on grassroots movements by residents wishing to reclaim their streets from vehicular use. Traffic calming spread throughout the 20th century to the U.S., Canada, Australia, New Zealand, Japan, and the Middle East. Some U.S. cities have now had traffic calming policies and practices in place for over 30 years. Many measures have been tried and observed. Much can be learned from the pioneering communities, to take advantage of the proven effects and benefits of properly applied traffic calming measures.

The City of La Crosse is like other communities, with streets of assorted classification being used by a variety of public traffic—vehicular, bicycle, and pedestrian. Streets are shared by personal, transit, and emergency vehicles and accommodate a mix of residential, commercial, and industrial needs. A logical, consistent approach must be taken to evaluate facilities and apply appropriate measures. Any policy should be comprehensive and adaptable to the state of the practice, applying lessons learned.

This background provides the background for the formation of policy and procedures for implementing traffic calming measures on its streets. The benefit of a policy with foresight is to eliminate or minimize wasted time, materials, and costs spent demolishing and rebuilding newer facilities.

Purposes and Objectives

> The immediate purpose of traffic calming is to reduce the speed and volume of traffic to acceptable levels ("acceptable" for the functional class of a street and the nature of bordering activity). Reductions in traffic speed and volumes, however, are just means to other ends such as traffic safety and active street life. [2]

Safety

Safety shall be the primary basis for all traffic calming. Measures shall be selected and applied with the direct intent to improve safety for vehicular, bicycle, and pedestrian traffic. Enhancements can provide safer pedestrian conditions, reduce vehicular speeds, and even eliminate intersection conflict points, which can reduce the numbers and types of crashes. They can increase visibility between vehicles, pedestrians, and bicycles.

The existence of any safety issues that are subject to correction with traffic calming measures shall be determined by traffic engineering study. For the safety improvements commonly associated with the various types of devices, see the MEASURES section.

Speed reduction

Traffic calming measures can reduce traffic speeds to varied degrees intersections and midblock. This is accomplished with physical elements that cause horizontal deflections or vertical displacements that utilize the laws of physics to impede high speed movements. These measures are self-enforcing and do not require additional monitoring.

Aesthetics & Beautification

Some traffic calming measures have inherent opportunities to create landscaping or green space and improve aesthetics or provide beautification for a neighborhood. Some aesthetic applications are complementary to safety and speed reduction efforts by drawing extra attention to the facility. They replace paved driving area with natural surfaces and decrease the amount of impervious surface. This provides reduction in the volume and velocity of storm runoff.

Encouraging Development & Revitalizing Neighborhoods

Streets with traffic calming can welcome and spur pedestrian traffic, be more pleasing to the eye, reduce traffic noise, and make streets and neighborhoods more livable. This can be shown objectively with measured differences, such as a crash reduction, or subjectively with attitudinal changes, such as making the street feel slower or more pedestrian friendly.

Some cases have shown that extensive traffic calming measures have even reduced crime levels within neighborhoods. Further, some cases have shown that redevelopment and revitalization can be supported by aiding in the desire for re-investment activity and creating a sense of pride within an area.

Environmental Improvements

Some traffic calming measures provide opportunity to reduce traffic noise and improve drainage conditions. Noise can be reduced by two means: reducing vehicle acceleration and slowing overall speeds. Drainage conditions can be improved by two means: decreasing the area of impervious surface in a street or intersection and utilizing natural surfaces for absorption and filtration of runoff prior to overflow into the storm sewer systems.

Primary Objectives

1. To improve safety for vehicles, bicycles, and pedestrians;
2. To reduce crashes;
3. To reduce speeds; and
4. To discourage cut-through traffic.

Secondary Objectives

1. To increase the livability of streets and neighborhoods;
2. To create safe and attractive streets; and
3. To promote the safest access for all modes of transportation.

Limitations and Proprieties

Diversion

Diversion is not traffic calming. Diversion utilizes permanent changes to eliminate traffic movements or close access. This results in shifting traffic to adjacent streets, creating new problems. Traffic calming makes local streets less desirable for speeding or shortcuts, keeping cut-through traffic on major streets, not shifting it to different local streets.

Such means of traffic management are more in line with access management. They are measures of last resort to deal with severe issues, such as extreme volumes of cut-through traffic, intersections with safety hazards created by poor geometry, harsh angles, and poor line of sight, or layouts with multiple closely-spaced intersections that create conflicting turn movements. Haphazardly closing streets or intersections can negatively affect local accessibility and traditional neighborhood development.

Temporary measures

Temporary traffic calming measures are generally ineffective. Study and experience have shown that their construction, operations, and appearances are not the same as with permanent traffic calming measures. The ultimate configuration is not achieved with temporary measures. Implementing traffic calming measures on a temporary basis for observation may be tempting, but the reality is that impacts and observed conditions are not the same as with permanent measures. Temporary measures can add wasteful costs and are not a substitution for thorough analysis, education, design, and construction.

Enforcement

Traffic calming measures are self-enforcing. Permanent, physical elements in a street or intersection cause horizontal deflections or vertical displacements in the paths of vehicles. Such devices utilize the laws of physics and, if properly designed and constructed, cannot be navigated in such a way that circumvents their purposes. Such means inherently do not require monitoring by law enforcement.

In contrast, standard signing and marking require voluntary compliance by drivers or continued enforcement. Lowered speed limits and excessive STOP signs must be enforced because they may be disregarded or ignored by drivers. Regulatory or warning signs tend to "fade into the background" and lose their initial impact and effectiveness. Signing and marking may be required in conjunction with traffic calming devices, but they are not traffic calming measures on their own.

Wisconsin State Statutes do not currently allow for photo enforcement of red light-running violations and specifically prohibit the use of photo enforcement for speed enforcement.[3] This precludes the possibility for the use of cameras to enforce such violations. Therefore, any current enforcement for traffic violations or additional efforts to attempt to calm traffic must be made by the Police Department. This places a strain on already limited resources and creates an impossible situation for consistency.

II. REVIEW PROCESS

Instigation (Step 1)

The first step of the traffic calming review shall be instigation. This may happen via four different avenues: a direct request from the public, as part of private development, by an adopted Common Council Resolution, or with annual street programming (including Engineering Department design or study). A flowchart is on page 11.

Public Requests

Public requests for traffic calming shall be submitted in writing to the Engineering Department. They shall only be considered by residents of the City of La Crosse or owners of property occupied by an active residence or business in the City of La Crosse. Requests shall only be considered from property abutting a street of request or within a one block radius of an intersection of request. Requests shall be handled in the order received. Public requests do not necessitate studies, only that the City Traffic Engineer shall consider them.

Private Development

Traffic calming may be considered as part of a private development or construction project. A written request shall be made to the Engineering Department and shall be subject to survey, study, and selection criteria.

Council Resolution

Reviews for traffic calming shall be considered if directed by an adopted Council Resolution. This would not necessitate a project, only that survey and study will be conducted.

Annual Street Programming

For the City of La Crosse to implement a truly progressive traffic calming policy, to improve aesthetics, revitalize neighborhoods, beautify areas of blight, and remake the feel and appearance of its streets to be more welcoming, unique, and friendly for bicycles and pedestrians, the most efficient and effective method is to utilize the annual reconstruction process. This provides annual opportunity to evaluate facilities and implement appropriate measures on neighborhood streets. Because traffic calming projects are coordinated with annual construction, this is a proactive approach.

The annual street repaving list is updated biennially. When a neighborhood street is listed for repaving via the standard method of pavement rating, the City Traffic Engineer may review the street for traffic calming need/benefit. If reasonable, a study would be initiated to determine warrant. The benefit would be constructing traffic calming measures as part of larger projects, not separate efforts.

Survey (Step 2)

The second step of the review process shall be a survey to gauge public sentiment. This shall be conducted by City staff and kept on file. For streets, the survey shall inquire with parcels abutting that block. For intersections, the survey shall inquire with parcels abutting the streets of a one block radius. For each parcel or household surveyed, *for whichever there are fewer*, one opinion shall be taken. Replies must be received within 30 calendar days to be considered. A sample form is on page 12.

If a survey initiated by public request does not yield a favorable majority to initiate a study, no new public requests shall be considered for three (3) years from the date of the compiled survey, or unless significant development changes occur.

For requests made by a private development or construction project, a survey is not needed if a majority of the appropriate abutting property is owned by the requestor.

Recommendations of measures may still be made for reasons of public safety, as long as public input is gathered and every reasonable attempt is made to accommodate concerns.

Study (Step 3)

The third step of the review process shall be a study. The study includes data collection and analysis, both quantitative and qualitative. This approach considers measurable parameters in the field, as well as matters of perception by residents.

The study will determine if traffic calming measures warrant priority and recommendation. This includes merit based on if volumes, speeds, or crash patterns on a street or at an intersection exist and are subject to correction. It also determines if enhancements can be made for aesthetic, beautification, or multi-modal reasons.

The study shall include field visits to document existing conditions of the facility. All studies—including data collection and analysis—shall be completed by the Engineering Department or professional engineering consultant, with final approval by the City Traffic Engineer. Required data is listed below, and example forms are on pages 13-14.

Quantitative approach

Geometry:

- street widths and block lengths
- horizontal alignments
- vertical grades

Conditions:

- extent and type of curb & gutter
- flow line grades
- extents of sidewalks
- presence of ADA ramps
- boulevard widths and materials
- on-street parking
- existing traffic control

Traffic:

- average daily traffic volumes
- representative traffic speeds
- truck percentages
- crash history (3 previous years)

Qualitative approach

Aspects of the qualitative approach shall be: aesthetics; local street layout (microscopic and macroscopic traffic patterns); and a survey of residents' perceptions of pedestrian and bicycle appeal, frequent reckless driving, and desire for revitalization improvements. This may be fulfilled by the survey initially gauging public sentiment.

Because some aspects can be subjective, the approach to reviewing qualitative issues must be consistent and consider local opinions. The existing conditions shall be photographed and documented, and engineering judgments shall be recorded. This will ensure a non-arbitrary process and can aid in the building of public consensus. If a study is conducted and a determination is made that traffic calming measures are not warranted or are non-priority, no new traffic studies shall be conducted for six (6) years from the date of the study, or unless significant development changes occur.

Additional aspects

Deadlines

A request for a traffic calming study during that same calendar year must be submitted and received by July 31st. All requests made on or after August 1st will be prioritized for study the following year.

A study and recommendation must be completed and introduced to Council by the May cycle of the current year for a project to be included for funding consideration beginning the following year. Any study completed after that may be submitted the following year.

Inclusion in the process for funding consideration does not necessitate a funded or a fully-designed or project, only that a consideration for funding will take place. Only upon final approval and adoption by the Council of funding will final design and construction of a project commence, as with every construction project.

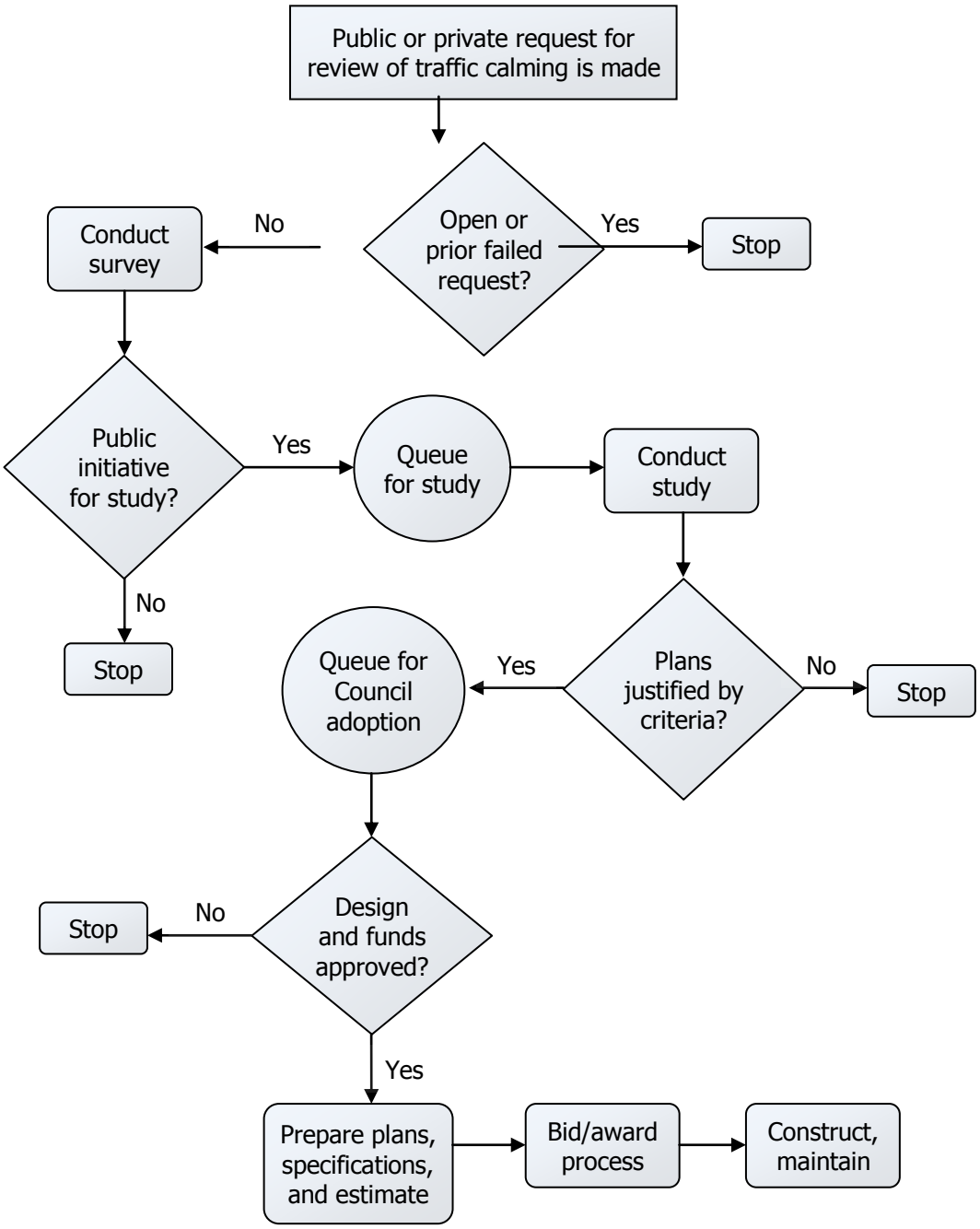
Timeframe

Due to the unique circumstances of every traffic calming request, even the best case scenario may require more than one calendar year to implement. The process requires adequate time for data collection, consideration of alternatives, public information and education, design and cost estimate preparation, annual funding cycles, and balance with existing workload. Given these aspects, a realistic expectation for average time to implement traffic calming measures is three (3) years after the request.

Coordination

The consideration of traffic calming measures shall take into account the ratings for pavement condition of a street block or intersection, as well as major utility projects. This shall then be weighed against current listing of streets for future reconstruction to determine the likelihood that a block or intersection might be under construction within the next three to five years.

Traffic Calming Review Process



Notes:

1. Instigation by adopted Council Resolution or begun under Annual Street Programming (including Engineering Department investigation) shall begin at the "Queue for study" phase of the process.
2. Council adoption of a recommendation shall be for both an approval of funds and a direction to staff to complete the design and construction.

Neighborhood Traffic Calming Survey

Street/Intersection requested for traffic calming: _____

Your street address: _____
Your building type (single family, multi-unit, business): _____

Are you in favor of a traffic engineering study for the above-named street or intersection to determine if traffic calming measures are warranted and what the appropriate traffic calming measures may be?

When answering this question, please consider the following. While traffic calming does have many safety benefits, it may have additional impacts:

- Some traffic calming measures may cause small increases in delay for emergency response, on average 5 seconds per traffic calming measure.
- Many traffic calming measures include landscaping or green space that is legally designated "boulevard" area, whose maintenance is the responsibility of the abutting property owner(s).
- Most traffic calming measures result in a reduction of available on-street parking spaces and may complicate snow removal efforts.

☐ **NO — thank you for your time, the survey is complete.**
☐ **YES — please take a minute to complete the section below.**

Based on your *perceptions* of the above-named street or intersection, what reasons or needs for improvement would you suggest as a basis for traffic calming?

☐ Vehicular collisions
☐ Pedestrian safety
☐ Cut-through traffic
☐ Neighborhood revitalization
☐ Encouraging development
☐ Speeding or reckless driving
☐ Bicycle encouragement
☐ Trucks (larger than delivery vehicle or bus)
☐ Aesthetic improvement (beautification)
☐ Others (please specify): _____

_____

_____

NOTE: to be considered, all replies must be returned within 30 days to:

City of La Crosse – Engineering Department
400 La Crosse Street
La Crosse, WI 54601

Traffic Calming Review Data – Street

	North- / Eastbound	South- / Westbound
Street name		
Hundred block		
State highway (Y/N)		
Speed limit (mph)		
Geometry:		
Street width* (ft.)		
Block length (ft.)		
Horizontal alignment (tangent, curve, varied)		
Vertical grade (%)		
Existing conditions:		
Curb & gutter (Y/N, type)		
Drainage (flows, grades)		
Boulevard (width, type)		
Sidewalk (Y/N)		
ADA curb ramps		
On-street parking (Y/N, type)		
Existing traffic control		
Traffic:		
Volumes (vpd)		
85th percentile speed (mph)		
Truck traffic (%)		
Crashes (3-year total)		
Crashes (average per year)		
Crash types		
Pedestrian/vehicle collisions (Y/N)		

*Street width measured face-of-curb to face-of-curb.

Traffic Calming Review Data – Intersection

	North approach	South approach	East approach	West approach
Street names				
Hundred blocks				
State highways (Y/N)				
Speed limits (mph)				
Geometry:				
Street width* (ft.)				
Block length (ft.)				
Horizontal alignment (tangent, curve, varied)				
Vertical grade (%)				
Intersection sight distance (ft.)				
Critical approach speed (mph)				
Existing conditions:				
Curb & gutter (Y/N, type)				
Drainage (flows, grades)				
Boulevard (width, type)				
Sidewalk (Y/N)				
ADA curb ramps				
On-street parking (Y/N, type)				
Existing traffic control				
Traffic:				
Volumes (vpd)				
85th % speed (mph)				
Trucks (%)				
Crashes (3-year total)				
Crashes (avg per year)				
Crash types				
Pedestrian/vehicle collisions (Y/N)				

*Street width measured face-of-curb to face-of-curb.

III. MEASURES

Traffic calming measures vs. traffic control devices

Traffic control devices shall not be used as traffic calming measures. Traffic control devices are designed to accommodate demand. Traffic control devices have specific procedures based on consistent application, professional standards, and national and state and laws. They are regulated and mandated by the legally adopted Manual on Uniform Traffic Control Devices (MUTCD).

Arbitrary, inconsistent, or extraneous installation of traffic control devices diminishes their intended uses and reduces their overall effectiveness. This has been documented with study. There may be legal consequences associated with the use of traffic calming devices for traffic control.[2] Further discussion is on page 32 in the Traffic Control subsection.

Categories

> Measures fall into three categories: those that *preclude* through traffic, which will be referred to as class I measures; those that *discourage* but still allow through traffic—class II measures; and those that *are neutral* with respect to through traffic other than to slow it down—class III measures. Where individual measures fit into this scheme will...be case specific. It will depend on geometrics and spacing, quality of alternative routes, and other factors.[2]

Therefore, most measures fitting the definition of traffic calming, and all measures considered traffic calming in this report, are either class II or class III. Class I measures are for more severe needs, such as proactive access control or traffic management.

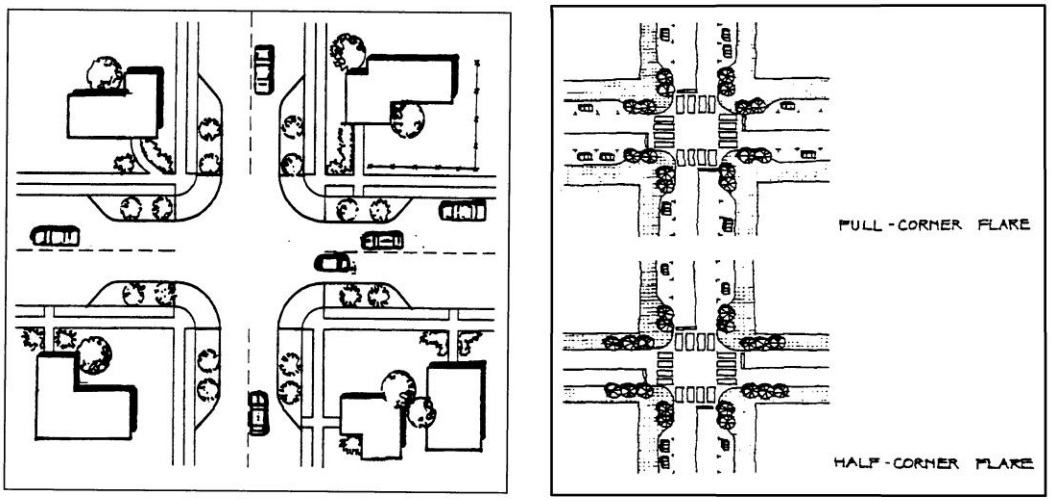
Traffic Calming

The following are traffic calming, by definition, and shall be the only measures considered by the City of La Crosse specifically for the purpose of traffic calming. Traffic calming measures shall be designed, per location, to best accommodate and complement existing conditions. They shall be designed for appropriate traffic, as determined by study.

Measures are labeled with their classes, as noted above, as well as being grouped by their types: narrowing horizontal, or vertical. Horizontal measures use forces of lateral deflection, vertical measures use vertical displacement, and narrowing measures use a psycho-perceptive sense of enclosure.

Graphic depictions[4] in this report are presented mostly for general characteristics. Specific and standard details for design and construction shall be developed by the Engineering Department. The guidelines and restrictions for recommendation and implementation of each measure are presented in the RECOMMENDATION section of this report.

Neckdowns (intersection narrowings, bulbouts)
(Narrowing – Class III)



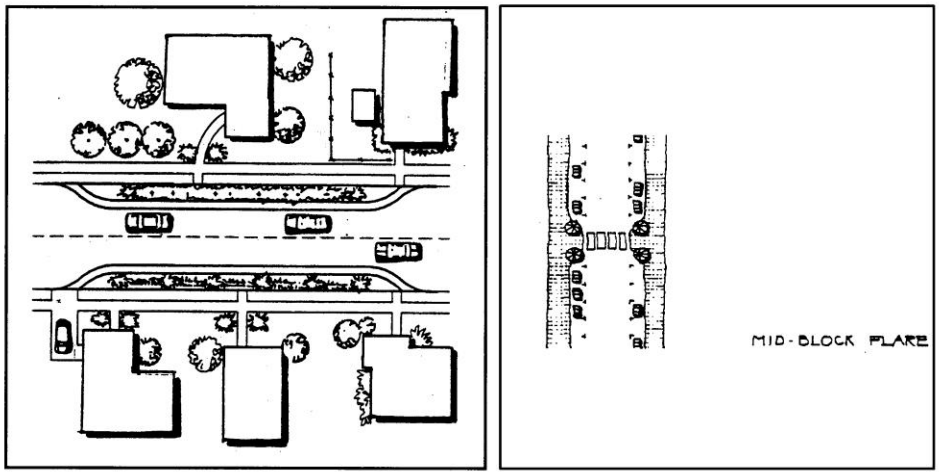
Full intersection neckdowns (left); partial and combined with painted crosswalks (right)

Neckdowns are curb extensions at intersections. They do not have a pronounced horizontal deflection of the path of traffic, but rather they serve to shorten the crossing distances for pedestrians, increase visibility, and call attention to crosswalk areas. They are a good means to "pedestrianize" an area, and when used in combination with marked and signed crosswalks they are referred to as *safe crosses*. [2]

Additional appurtenances, such as street furniture, landscaping, and signing, are recommended, as they provide a vertical element to call additional attention of drivers to the areas.

Neckdowns require additional effort and attention for snow removal, requiring large snow plows to follow tight changes in the curb line. They also require assiduous consideration of drainage measures that may involve relocation of inlets, catch basins, or manholes.

Chokers (midblock narrowings, pinch points)
(Narrowing – Class III)



Extended choker (left); with midblock Crosswalk (right)

Chokers are curb extensions at midblock. They do not have a pronounced horizontal deflection of the path of traffic, but rather they serve to narrow the driving surface and create a heightened sense of "closeness" for vehicles.

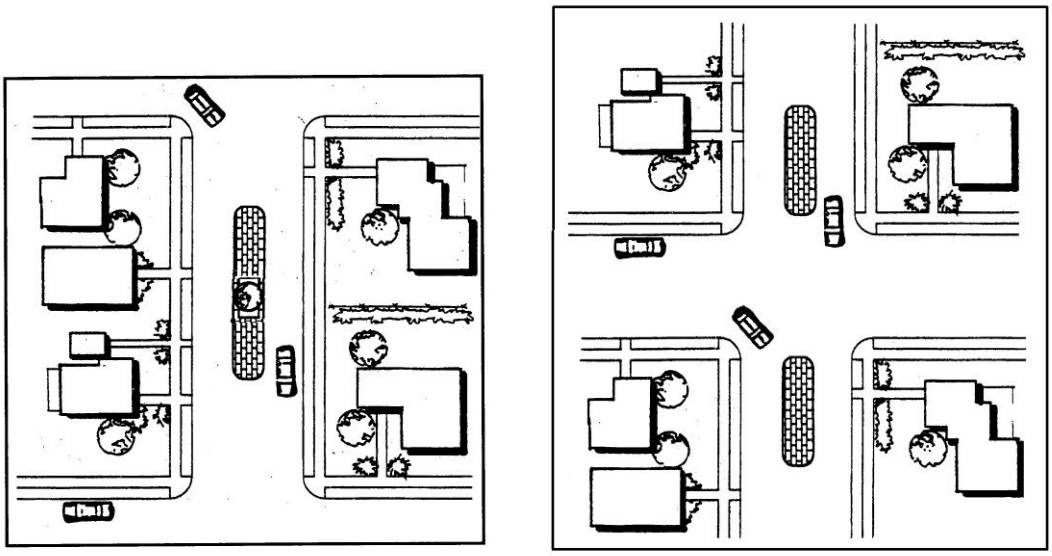
In combination with marked and signed midblock crosswalks, they are a good way to draw attention to otherwise unexpected midblock treatments. In such cases, they reduce the crosswalk crossing distance and improve visibility for pedestrians, and are also referred to as *safe crosses*. [2]

Additional appurtenances, such as street furniture, landscaping, and signing, are recommended, as they provide a vertical element that can call additional attention of drivers to the situation.

Chokers require additional effort for snow removal, requiring large snow plows to follow tight changes in the curb line. They also require assiduous consideration of drainage measures that may involve relocation of inlets, catch basins, or manholes.

It should be noted that when midblock crossings are created, the MUTCD mandates that on-street parking shall be prohibited for 50 feet prior to the crosswalk in each direction. This may dramatically reduce available on-street parking.

Median islands (center island narrowings)
(Narrowing – Class III)



Midblock (left); Intersection (right)

Median islands are non-mountable, raised areas in the roadway. When used to slow speed, they are more effective as short interruptions on otherwise open stretches of roadway, and not long sections that channelize traffic.

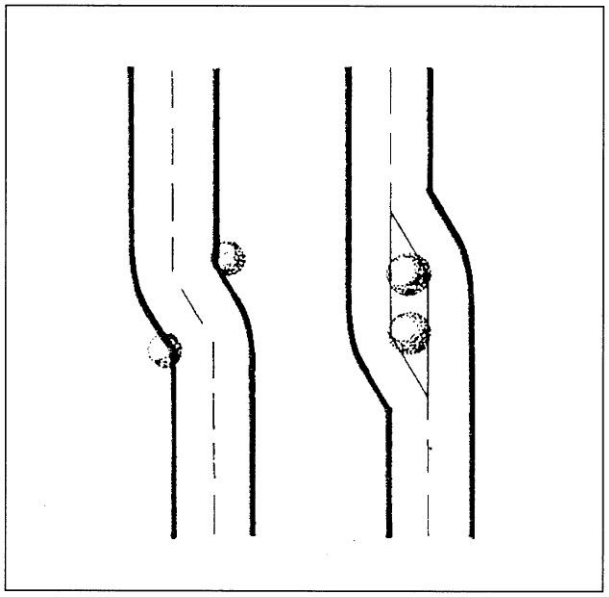
They can be used effectively on curves, to prevent traffic from encroaching into the opposing lane. When placed midblock they deflect traffic to the outside of the roadway rather than to the center. Medians afford opportunities for pedestrian refuge, at intersections or at midblock crossings, and shorten the crossing distance. They also provide areas for landscaping

They may be used in combination with textured pavements, speed tables, and chokers (either together or offset). They require appropriate signage, to warn drivers that there are barriers in the roadway. However, there are typically no drainage impacts, as all water flows to the outsides of the roadway.

Medians do cause a reduction of on-street parking, in the vicinity of the narrowed driving lanes. Additional effort must be made with snow plowing efforts, to clear around them. They are a possible hindrance for large truck turning movements.

It should be noted that when midblock crossings are created, the MUTCD mandates that on-street parking shall be prohibited for 50 feet prior to the crosswalk in each direction.

Lateral shifts, curvilinear alignments
(Horizontal – Class III)



Shifts that encourage (left) or discourage (right) shortcuts.

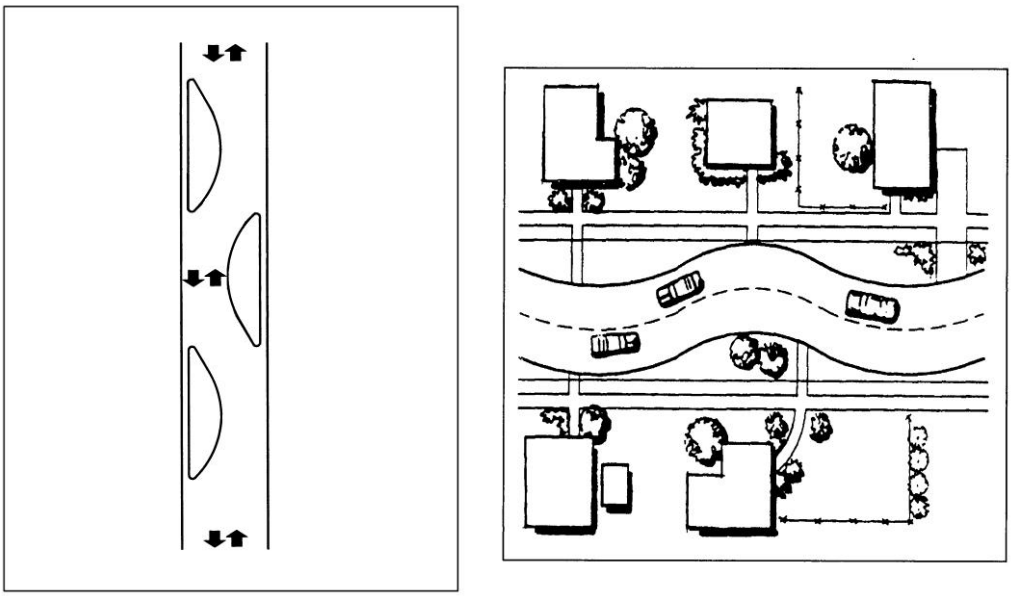
Lateral shifts are curb extensions on otherwise straight streets. They direct the flow of traffic to maneuver, or "bend" with them. They are typically designed to shift one way and then shift back again to the original alignment. With the correct degrees of deflection in place, lateral shifts are one of the few measures that may be used effectively on major thoroughfares, such as collectors and even arterials. [2]

They can also be used in combination with median islands, to prevent vehicles from cutting straight paths across the center line (see above, right). They may require appropriate signage, to warn drivers that there are barriers in the roadway.

Lateral shifts cause a reduction of on-street parking. Additionally, extra effort must be made with snow plowing to follow changes in curb lines. They require consideration of drainage that may involve relocation of inlets, catch basins, or manholes.

Shifts that create usable median space may be used as refuge for pedestrian movements crossing at midblock crosswalks. Such configurations are beneficial because they shift pedestrian traffic, causing them to look both ways.

Chicanes (reverse curves, serpentines)
(Horizontal – Class III)



Chicanes with (left) or without (right) separate drainage grooves.

Chicanes are curb extensions that alternate from one side of the roadway to the other, forming S-shaped curves. Two lanes of traffic are maintained, as they shift over the equivalent of one lane width. They may be combined with center islands to prevent vehicles from cutting through on straight lines.

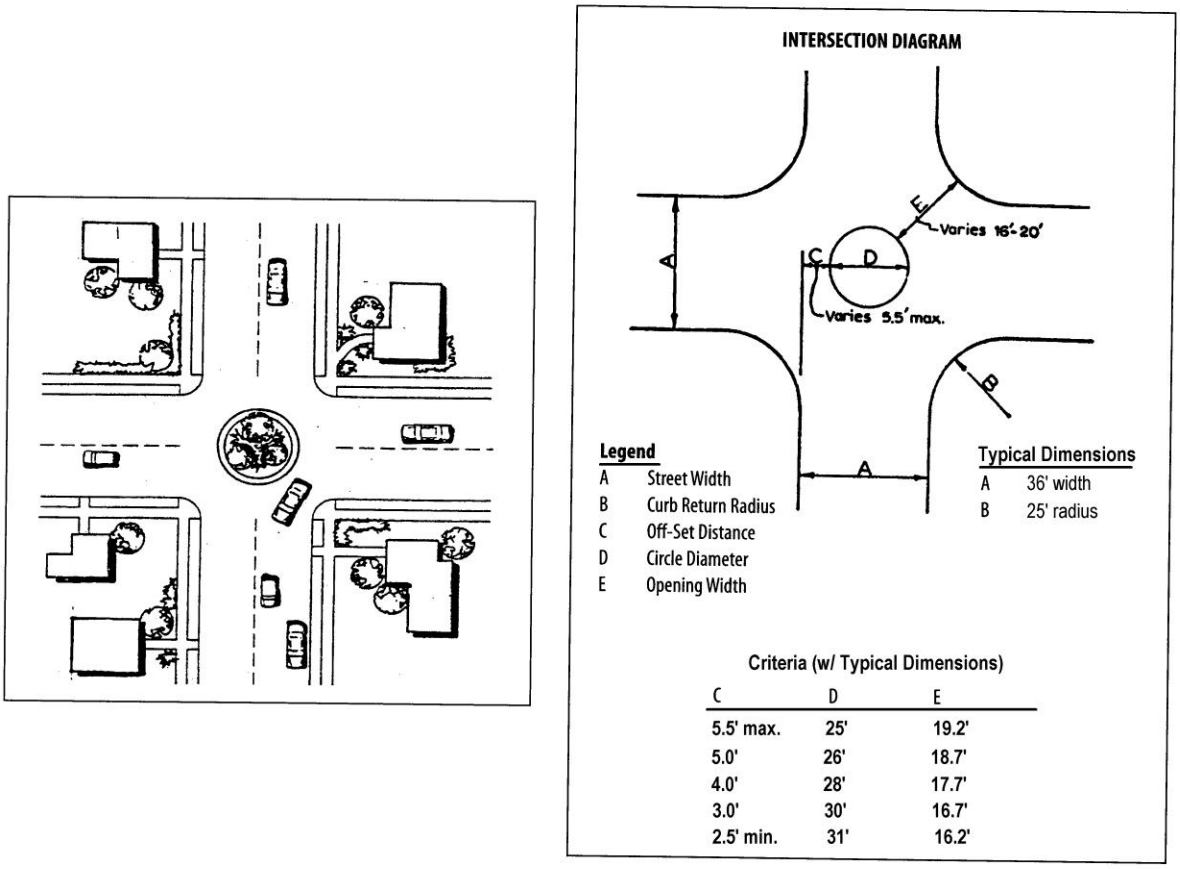
With adequate deflection angles, chicanes serve to slow traffic down and do not cause significant discomfort if driven at low speeds. They are also an effective measure for heightening driver awareness and can reduce crashes.

The extensive raised areas provide opportunities for landscaping improvements. The reduction in pavement area helps to lower the volume and speed of runoff into the storm sewer system.

If extensive new curb work is needed, chicanes can be costly. However, chicane islands can be retrofit onto streets with existing curb and gutter, leaving drainage channels for water to flow to inlets. This retrofit approach may even provide adequate width for bicycles to pass through on a straight path.

Chicanes require a reduction of on-street parking. Additionally, extra effort must be made with snow plowing efforts to follow tight changes in curb lines. They require consideration of drainage measures that may involve relocation of inlets, catch basins, or manholes.

Traffic circles (neighborhood traffic circles, intersection islands)
(Horizontal – Class III)



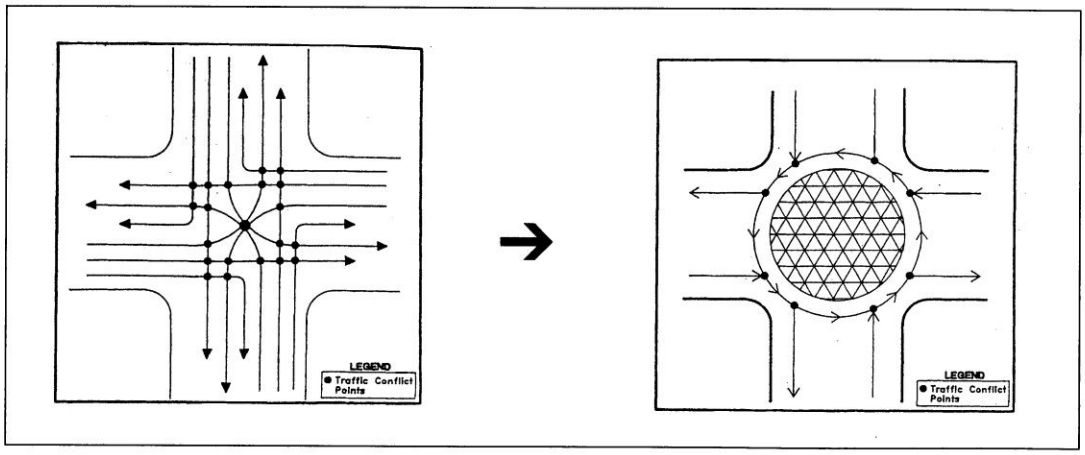
A typical neighborhood traffic circle (left); criteria for traffic circle design (right).

Traffic circles are the most common horizontal measure for traffic calming. They are raised islands within intersections, around which traffic circulates. They are typically circular in shape. Intersections with traffic circles typically have all-way YIELD control. They are less controversial than speed humps and provide excellent opportunity for landscape and beautification.

Traffic circles are not roundabouts. Their all-way YIELD control and circular islands make them similar, but traffic circles do not require splitter islands to channelize approaching traffic, have smaller island radii, and are not designed to provide specific capacity. A traffic circle may be retrofit in an existing intersection, while a true modern roundabout requires extensive reconstruction for new curb and gutter on approaches and exits.

A traffic circle requires no additional street lighting beyond safety standards, while a roundabout generally includes street lighting on all four approaches like a traffic signal. Traffic circles therefore do not require additional power consumption and are in line with sustainability practices.

Traffic circles, continued...



Standard intersection (left) with 21 conflict points; traffic circle (right) with 8 conflict points.

Traffic circles prevent vehicles from driving straight paths through an intersection, requiring horizontal deflection around the circular island, thereby reducing intersection speeds. They also simplify the conflict points within an intersection from 21 points down to 8 points, inherently reducing the opportunities for, and eliminating some types of, vehicular collisions. These effects are the basis for the great improvement of safety within an otherwise completely open intersection.

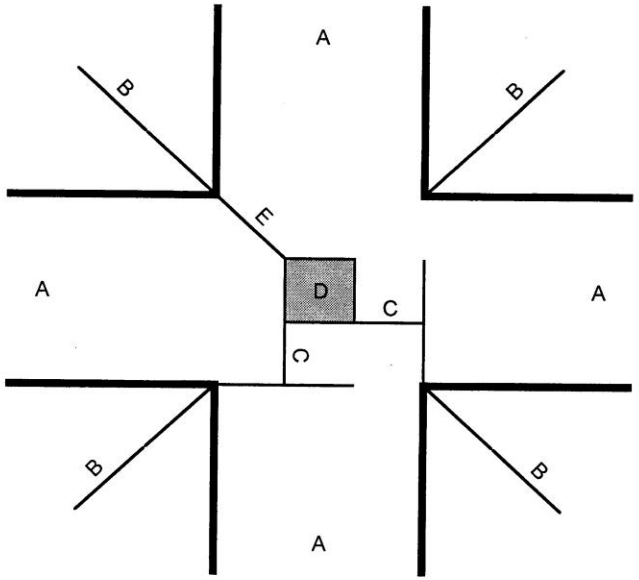
Traffic circles decrease the amount of paved, impervious surface area in an intersection, slowing the amount and speed of direct runoff into the storm sewer system. The islands offer good opportunity for green space, improving aesthetics in the intersection.

Traffic circles require very minimal loss of on-street parking when installed. They also do not require any special drainage considerations. This is because the outside curb lines of the intersection radii may not be disturbed, which would otherwise cause relocation of inlets, catch basins, and manholes. Traffic circles do require advance warning signs on their approaches, and they do require signing within the circular island itself. Traffic circles also present challenges with snow plowing operations, requiring large plows to maneuver around them.

Typically the greatest concern with traffic circles is turning vehicles with long wheelbases, such as buses and fire engines, around them. This has been handled by signing and allowing vehicles larger than a certain length to turn left in front of them, providing a larger turning radius.

More details can be found on the two following pages.

Traffic Circle Calculator



Input: (design for C and E)

A =	36	36	36	36	36	36	36	feet
B =	15	15	15	15	15	15	15	feet
D =	25	26	27	28	29	30	31	feet (26 min. - 31 max.)

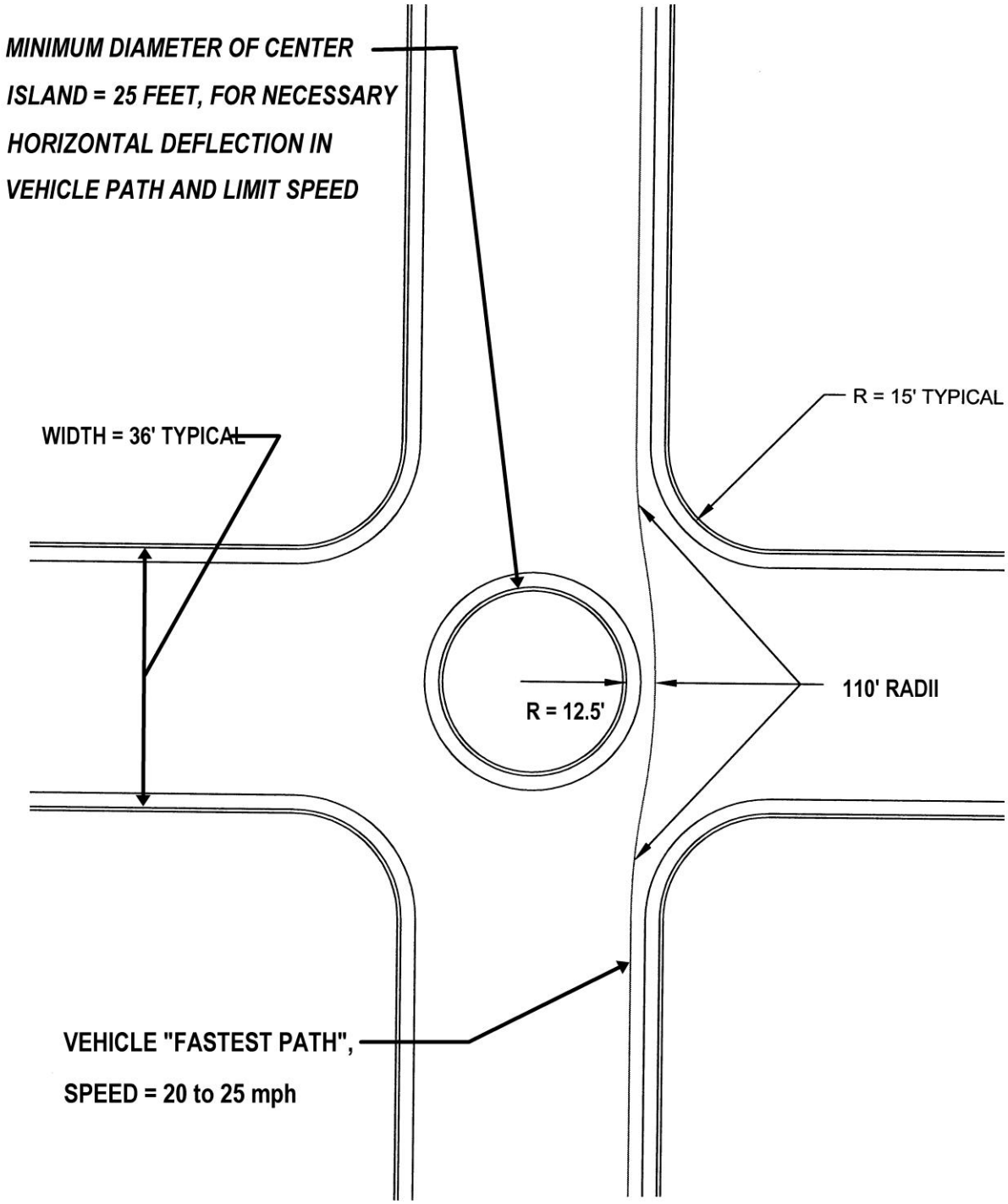
Calculated:

C =	5.5	5.0	4.5	4.0	3.5	3.0	2.5	feet (2.5 min. - 5.0 max.)
E =	19.2	18.7	18.2	17.7	17.2	16.7	16.2	feet (16 min. - 20 max.)

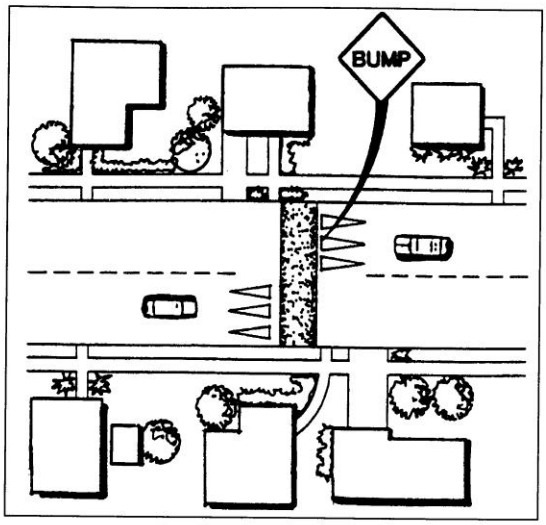
Segments:

B-A-B =	66	66	66	66	66	66	66	feet
B-E-D-E-B =	93.3	93.3	93.3	93.3	93.3	93.3	93.3	feet
E-D-E =	63.3	63.3	63.3	63.3	63.3	63.3	63.3	feet (56 min.)

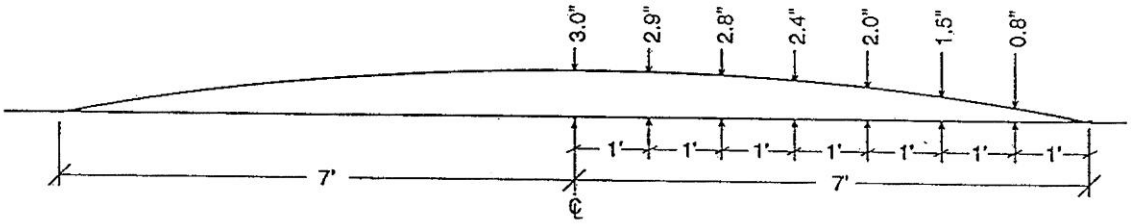
TYPICAL INTERSECTION DETAIL



Speed humps
(Vertical – Class II)



14-foot speed hump



PARABOLIC CROWN

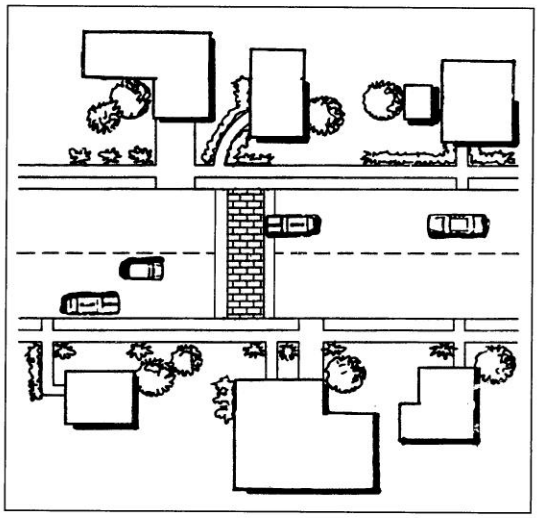
Speed humps are not bumps. They are rounded portions of raised pavement, smooth and parabolic in shape. The design with most national acceptance is 14 feet in length, with a height of 3 inches. This shall be the City of La Crosse standard. Widths vary.

Speed humps operate differently from bumps because of their shape. At low speeds they produce a gentler ride, while at high speeds the displacement is greater. This effectively reduces speed, unlike bumps which are absorbed by vehicle suspension at high speed.

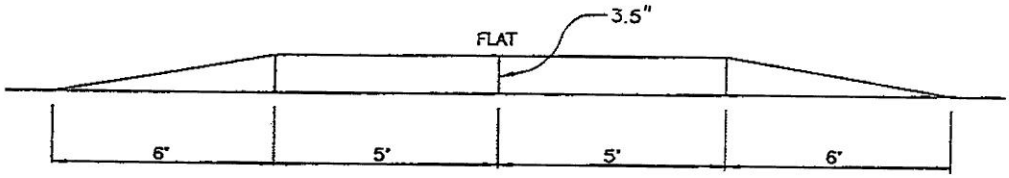
Speed humps rate as both the best and worst measure in surveys. They rate well due to low cost and high efficacy but rate very poorly for appearance and ride. With possible liability issues, they shall only be considered with extraordinary neighborhood support. Speed humps present snow plowing challenges. They must also be designed appropriately to handle drainage and consider bicycle traffic.

A note on speed bumps:
Due to liability, great discomfort at low speeds, and potential damaged at high speeds [2], speed bumps shall not be considered by the City of La Crosse. Rather, speed tables shall be the preferred vertical measure, with speed humps being reserved for extreme cases.

Speed tables
(Vertical – Class II or III)



22-foot speed table



Speed tables are neither bumps nor humps. Speed tables are flat-topped, long enough for the wheelbase of a passenger car to rest on top. The longer tops and more gently sloped ramps provide a smoother and gentler ride, but higher design speeds than speed humps.

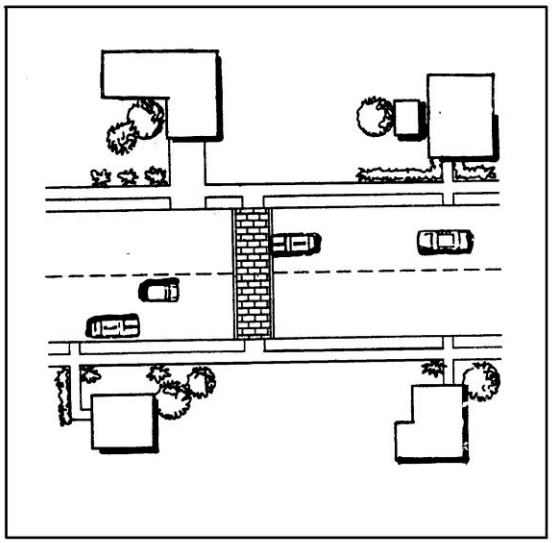
The most common design for a speed table was developed by Seminole County, FL, and is 22 feet in total length, with a height of 3.5 inches. There is a 10 foot flat section in the middle, with 6 foot ramps on either side. It has an 85th percentile speed of 25-30 mph, is less jarring than speed humps, and is considered better proportioned for aesthetics. [2]

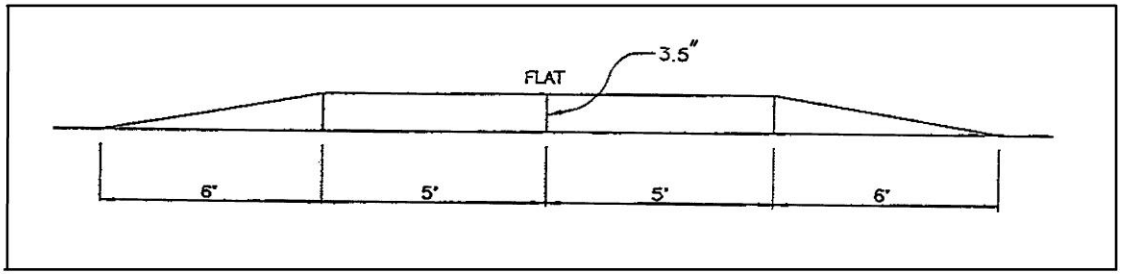
Tables are not suited for highways with high volumes and speeds but are apt for local roads. The design is flexible and may be modified to handle buses and fire engines. They are preferred because they can serve as raised crosswalks at midblock locations.

Speed humps present snow plowing challenges. Widths must be designed appropriately to handle drainage and consider bicycle traffic.

A note on speed bumps:
Due to liability, great discomfort at low speeds, and potential damaged at high speeds [2], speed bumps shall not be considered by the City of La Crosse. Rather, speed tables shall be the preferred vertical measure, with speed humps being reserved for extreme cases.

Raised crosswalks
(Vertical – Class II or III)





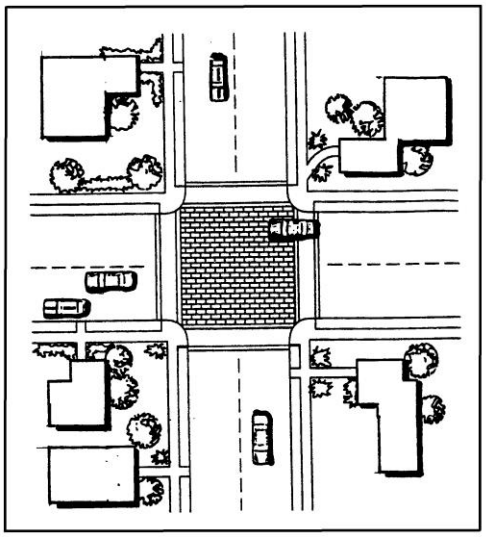
A raised crosswalk is a speed table with a marked crosswalk on it. They are ideally located midblock, as their long shape can interfere with intersection operations and drainage. They delineate a crossing area very well because of their appearance. Pavers or textured pavements may be used in the flat section to improve aesthetics further and distinguish the crossing area.

They are most effective when extended continuously from curb face to curb face. In such cases, they can also provide a more easily traversed path for ADA compliance because the approaches from the sidewalks do not need to be as steep as standard curb ramps.

Raised crosswalks do present snow plowing challenges. Widths must be designed appropriately to handle drainage and consider bicycle traffic.

A note on speed bumps:
Due to liability, great discomfort at low speeds, and potential damaged at high speeds [2], speed bumps shall not be considered by the City of La Crosse. Rather, speed tables shall be the preferred vertical measure, with speed humps being reserved for extreme cases.

Raised intersections
(Vertical – Class II or III)



Raised intersections are flat raised areas, covering entire intersections. The ramps on the approaches are more gently sloped, like a speed table. They often have textured materials or brick pavers. They are usually raised up to sidewalk level or slightly below.

They serve to "pedestrianize" an area and actually make the intersection, crosswalks and all, into pedestrian territory.[2] They are very useful in downtown, urban settings, and are most appropriate in dense areas.

While drainage concerns must be addressed, and snow plowing will be challenged, raised intersections do not reduce or hinder on-street parking. This makes them a unique measure that can accomplish traffic calming with no parking impacts that are often considered unacceptable in a downtown area. However, they are generally very expensive measures that require extensive reconstruction.

Traffic Management

The following are traffic management measures and devices are specifically neither traffic control nor for traffic calming. However, they have been included in this report as a source of information. This is an opportunity to highlight their differences and to clarify their uses.

A fully open and unobstructed four-way intersection of two two-way streets has a total of twelve (12) turning movements. Each of the four approaches may opt to go straight through the intersection or turn left or right onto the adjacent street. The following traffic management measures, all Class I, serve to reduce the number of turning movements at an intersection, thereby reducing conflict points and even restricting access to or from certain directions onto the adjacent streets.

These measures restrict access with raised areas, bound by curb and gutter, that cannot be driven over or through. They are typically augmented with landscaping or street furniture as well, to improve aesthetics.

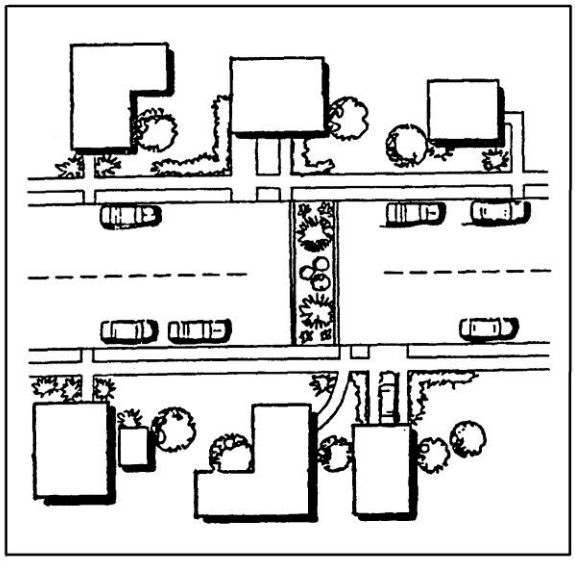
While these are not traffic calming measures, they can be used to reduce through traffic in a neighborhood by closing access. This then creates a sense of calmer streets because of volume reduction.

Because of the nature of reducing turning movements, which changes turning lane designations, or closing access, the process of implementing these measures is much more extensive than simply preparing plans and estimates and letting it for bids and construction. There must be policy and legislative action that accompanies such efforts, depending on the scope of impacts. They must all be handled accordingly, on a case-by-case basis.

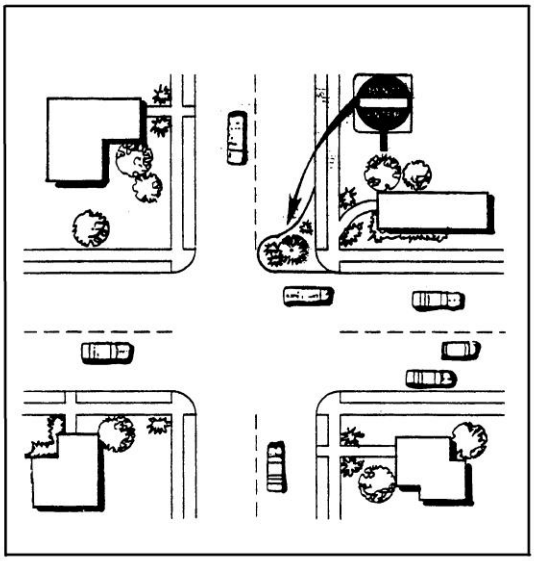
Any access management issues must also include extensive public involvement and are aided by substantial local support.

Closures
(Class I)

FULL CLOSURE



PARTIAL CLOSURE

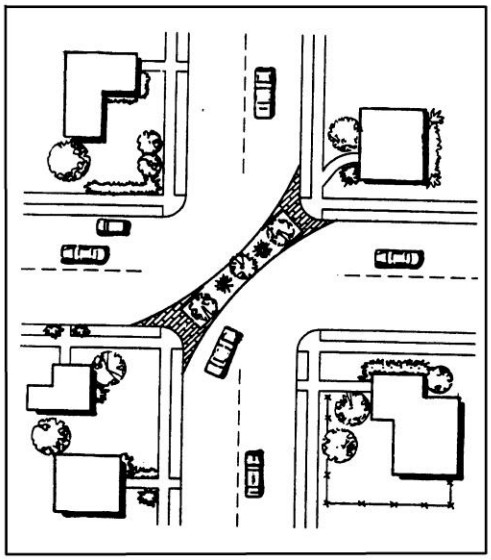


A full closure closes a street to through traffic. The configuration of the final construction may be a typical cul-de-sac, a hammerhead turnaround, or a raised area with removable barriers for emergency access. With full closures, state Statues must be followed and Council action must be taken to change the function and designation of an existing street and public property.

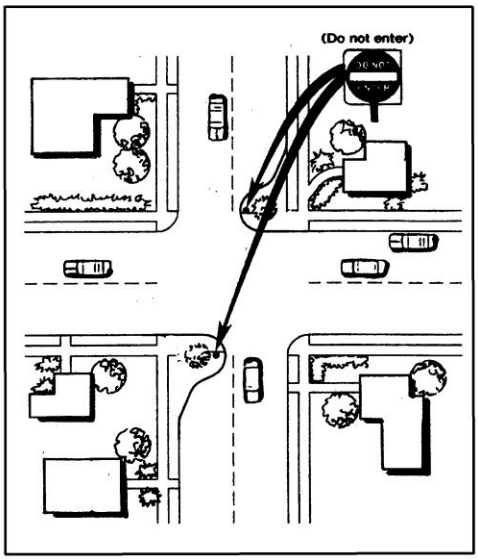
The rare cases where closures may be ideal, and have some traffic calming effect, would be if there are reasonably close alternative points of access for a neighborhood and a reduction of through access would not hinder local accessibility. Emergency response must also be carefully considered, as response route may be permanently altered or even removed.

Diverters
(Class I)

FULL DIVERTERS



HALF DIVERTERS

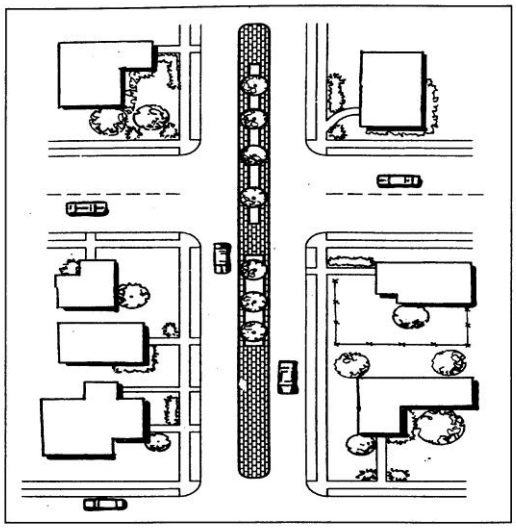


A full diverter reduced the turning movements in an intersection from twelve (12) down to four (4). This is the most severe case of restricting movement at an intersection. Its use is primarily to eliminate shortcut routes when located adjacent to arterial streets or highways.

It is possible to maintain emergency access with removable barriers, even though such an arrangement is not ideal. Typically the raised area has small passages built in to provide continuous access to bicycles and pedestrians.

Half diverters reduce intersection turning movements from twelve (12) to six (6), thereby cutting access in half. These are especially useful, like partial closures, in conjunction with one-way streets.

Median barriers
(Class I)

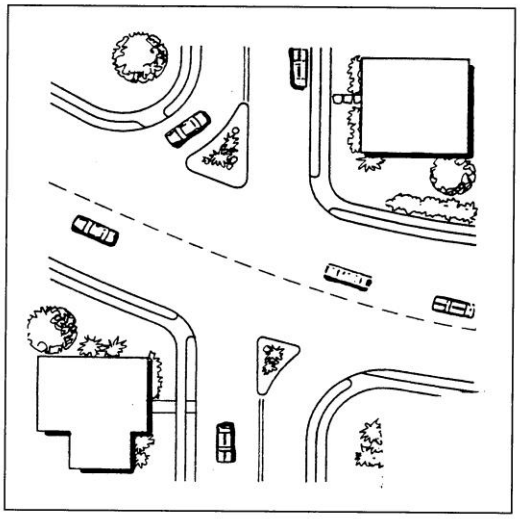


Median barriers completely eliminate through vehicular traffic on a minor cross street at an intersection. This reduces the access by half, cutting the intersection turning movements from twelve (12) down to six (6).

The raised areas can be beautified with trees and other landscaping, and they serve to reduce the amount of impervious surface. They reduce collisions by eliminating conflict points, but they can have the effect of increasing speeds on the major street.

Median barriers are typically implemented within close proximity of the intersection of two major roadways, where extensive queuing of turning traffic nearby may back up and hinder operations at adjacent intersections.

Forced turn islands
(Class I)



A forced turn island (on one approach) reduces the intersection turning movements from twelve (12) to ten (10). This is a means to control access across a major street or remove conflict points and improve level of service (reducing delay).

Forced turn islands may work to reduce volumes, having a perceived calming effect on neighborhood streets, if traffic is forced to use other access points to a major street because of limited turning movements at intersections.

Islands at intersections may present snow plowing challenges but are not uncommon. They do not typically present any drainage issues, because water flows to the outside of the intersections. They may be retrofit into existing streets.

Traffic Control

The following are traffic control and devices and are not specifically for traffic calming. However, they have been included in this report as a source of information. This is an opportunity to highlight their differences and to clarify their uses.

STOP and Yield

All STOP and Yield signs shall only be installed in accordance with the warrants and justifications set forth in the MUTCD and the already-adopted City of La Crosse criteria. STOP signs do not reduce midblock speeds on residential blocks; they typically increase them. If installed improperly, they contribute to unnecessary delay and a perception of lost time by drivers, resulting in the increased speeds midblock. Further, they are regulatory measures that require enforcement by the Police Department.

Traffic signals

Traffic signals shall only be installed based on the warrants and guidelines set forth in the MUTCD. They are regulatory measures. Signals have considerable upfront costs to install, a continual use of power, and ongoing and expensive maintenance and repair costs. Where signal warrants are met, the City of La Crosse shall require consideration and analysis of a modern roundabout as an alternative. This mirrors the current policy of WisDOT, as outlined in its Facilities Development Manual (FDM).

Roundabouts

Modern roundabouts are not neighborhood traffic circles. Modern roundabouts are traffic control measures. They are geometrically sensitive facilities that are specifically designed to function based on demand. They have regulatory control, with signed Yield on all approaches. Roundabouts shall require traffic engineering analysis with RODEL software and shall be designed only by experienced and competent engineering professionals. This is consistent with current WisDOT policy and the FDM.

Roundabouts typically have safety and operational advantages over signals and do calm traffic. Roundabouts reduce the numbers of certain types of crashes at intersections. They reduce the average delay for vehicles, especially during non-peak hours. They require no power for daytime operations and have dramatically lower maintenance costs than signals, making them an excellent consideration for sustainability.

There may be difficulty with installing roundabouts, due to public misperception and unwillingness to change. While the number of roundabouts in the state of Wisconsin has increased and they are no longer considered novel, their implementation was relatively slow over the previous decades. However, even with high initial resistance, roundabouts constructed in the state have had very favorable public results in the long term. Therefore, considerable involvement should be made to inform and educate the public.

Safety Trends

Following are summaries of the types, and relative levels of effectiveness of, traffic calming measures. These summaries are based on study and existing policies and practices with municipal traffic calming across the U.S. [2]

Their values are not meant to be a determinant of what exactly an impact of a traffic calming device may be, but rather to simply illustrate the safety trends across the various types of measures. Based on individual characteristics of any given traffic area, results will always vary.

Crashes

Average Annual Collisions				
Measure	Number of Sites	Before	After	Percent Change
Speed Hump (14')	5	25.6	-7.7	-22%
Speed Table (22')	8	30.1	-6.6	-18%
Traffic Circle	130	30.3	-3.9	-11%

Volume

Volumes Impacts of Traffic Calming Measures			
Measure	Sample Size	Average Reduction in Volume (vpd)	Percent Change
Speed Hump (14')	15	-355	-22%
Speed Table (22')	46	-415	-12%
Traffic Circle	49	-293	-5%
Narrowing	11	-263	-10%
Full Closure	19	-671	-44%
Half Closure	53	-1611	-42%
Diagonal Diverter	27	-501	-35%

Speed

Speed Impacts Downstream of Traffic Calming Measures				
Measure	Sample Size	85th percentile speed (mph)		Percent Change
		Average New Speed	Average Reduction	
Speed Hump (14')	15	25.6	-7.7	-22%
Speed Table (22')	58	30.1	-6.6	-18%
Raised Intersection	3	34.3	-0.3	-1%
Traffic Circle	45	30.3	-3.9	-11%
Narrowing	7	32.3	-2.6	-4%
Half Closure	16	26.3	-6	-19%
Diagonal Diverter	7	27.9	-1.4	-4%

Costs

Because costs vary so widely, depending on the specific design parameters of traffic calming measures, no firm estimates of each measure can be provided. However, as a very general guidance, the table below summarizes some nation experiences with costs.

Measure	Sample Cost Estimates ($)		
	Portland, OR (1997)	Sarasota, FL (1997)	Seattle, WA (1998)
Speed humps	2,000–2,500	2,000	2,000
Speed tables	—	2,500	—
Raised intersections	—	12,500	—
Traffic circles	10,000–15,000	3,500	6,000
Chicanes	—	—	14,000
Chokers	7,000–10,000	—	—
Center islands	8,000–15,000	5,000	—
Median barriers	10,000–20,000	—	—
Half closures	40,000	—	35,000
Diagonal diverters	—	—	85,000
Full closures	—	—	120,000

What also must be stressed is that there are ongoing costs with traffic calming measures, both positive and negative. Maintenance may add costs, while accident reduction may save costs. These must be considered with each unique traffic calming instance.

III. RECOMMENDATION

Selection

In choosing the most appropriate traffic calming measures, consideration shall be made of the designation and primary use of any facility. This includes: State, U.S., or National Highway System (NHS) highways; arterial, collector, or local streets, and designation by Ordinance of "through highways". Such descriptions are based on engineering data and may include designated truck routes. The Wisconsin Department of Transportation (WisDOT) may have some legal authority, thereby adding a level of coordination.

Consideration shall be made of emergency response routes, drainage facilities, street maintenance, snow removal, and transit routes. Traffic calming measures shall not obstruct these services, and selection shall accommodate them with nominal hindrance.

Traffic calming also inherently improves conditions for pedestrian and bicycle use, and in some cases even provides for favored conditions. Selection of traffic calming measures shall always consider impacts on pedestrian and bicycle traffic with the goal of improving safety and promoting and encouraging additional use.

General Guidance for Desired Improvement

As a general guideline for which measures should be considered, based on desired improvements, the following table has been prepared. It describes what impacts might be reasonably expected, based on extensive research. However, it is not absolute.

Desired Effect / Traffic Calming Measures	Crash Reduction	Speed Reduction	Shortcut Deterrence	Pedestrian Improvement	Aesthetic Enhancement	Drainage Improvement
Neckdowns	Unlikely	Possible	Unlikely	Yes	Yes	Possible
Chokers	Unlikely	Possible	Possible	Yes	Yes	Possible
Median Islands	Unlikely	Possible	Unlikely	Yes	Yes	Possible
Lateral Shifts	Possible	Likely	Unlikely	Possible	Possible	Possible
Chicanes	Likely	Yes*	Possible	Likely	Yes	Yes
Traffic Circles	Yes	Yes**	Possible	Yes	Yes	Yes
Speed Humps	Yes	Yes	Yes	Likely	No	No
Speed Table / Raised Crosswalks	Yes	Yes	Likely	Yes	Possible	No
Raised Intersections	Likely	Possible	Possible	Yes	Yes	No

* speed reduction at intersection
** speed reduction in midblock

Parameters of Engineering Data

The following qualifications shall be determinant in the selection and elimination of traffic calming measures for a facility. Selection shall be based on data collected by an approved traffic study. Exceptions shall only be made with approval by the Board of Public Works.

Facilities and Parameters / Traffic Calming Measures	Local Streets	Collectors	Arterials	State, U.S., or NHS Highways	LCFD Primary Response Routes	MTU Routes	Street width (ft)	Vertical Grade (%)	Horizontal Curvature (deg)	Volume (vpd)[1]	85th % speed (mph)[2]
Neckdowns[3]	Yes	Yes	Yes	Yes	Yes	Yes	Any	Any	Any	Any	Any
Chokers	Yes	Yes	Yes	Yes	Yes	Yes	Any	Any	Any	Any	Any
Median Islands	Yes	Yes	Limited	No	Yes	Yes	Any	Any	Any	Any	Any
Lateral Shifts	Yes	Yes	Yes	Limited	Yes	Yes	Any	< 6	< 19°	Any	Any
Chicanes	Yes	Yes	Limited	No	Limited	Yes	≥ 36	< 6	< 19°	> 250	> 25
Traffic Circles	Yes	Yes	Limited	No	Limited	Yes	≥ 24 ≤ 48	N/A	N/A	> 250 < 5000	> 25
Speed Humps	Yes	No	No	No	No	No	≤ 42	< 6	Any	> 500 < 2500	> 35
Speed Tables / Raised Crosswalks	Yes	Yes	Limited	Limited	Limited	Limited	≤ 48	< 6	Any	> 500 < 7500	> 30
Raised Intersections	Yes	Yes	Limited	No	Limited	Limited	≤ 48	N/A	N/A	> 250 < 7500	> 25

Notes:
[1] Volumes of combined vehicles, bicycles, and pedestrians counts for all directions or approaches.
[2] Speed of calculated 85th percentile speed for any approach or direction.
[3] While neckdowns may in theory be installed on any facility, consideration shall be made of truck routes.

"Limited" applications shall require Engineering Department study and review, to determine suitability based facility type and prevailing usage, as well as design modifications for traffic calming measures.

Priority

To determine merit and priority ranking for measures, the following system shall be used to assign points based on existing conditions and operations. 35 points are possible, and a minimum of 18 points are needed for Engineering Department recommendation. The number of points shall determine priority. Projects may still be initiated regardless of points, but only with specific direction by the Common Council

Crashes
Where crash history is taken as an average of crashes per year for 3 the calendar years immediately prior to the date of study, 1 point shall be assigned for every 0.5 correctable crashes per year. Maximum 10 points.

Speed
With the 85th percentile speed calculated by the study in miles per hour, ½ point shall be assigned for every 1 mph over the posted or prima facie speed limit. Maximum 5 points.

Volume
For average daily traffic, in vehicles per day, observed by the study, ½ point shall be assigned for every 50 vehicles over 250 vpd. Maximum 5 points.

Visibility *(uncontrolled or YIELD intersections only)*
Where the critical approach speed to the intersection is calculated by the study as less than 17 mph, 1 point shall be assigned for every 1 mph below 17. Maximum 7 points.

LCFD and MTU routes
If the block or intersection of request is on a primary response route of the City of La Crosse Fire Department or a Municipal Transit Authority route, 1 point shall be taken away for each. Maximum 2 point deduction.

Drainage Improvement and Current Programming
If the block or intersection of request can have drainage conditions improved, or if it is currently programmed for repaving, 1 point shall be added for either. Maximum 1 point.

Existing Conditions
For existing conditions observed in field or gathered by survey and study, 1 point each shall be assigned, based on engineering judgment and review, for the following: proximity to a school; improving pedestrian accommodations; improving bicycle accommodations; neighborhood revitalization or aesthetic improvement; proximity to a substantial generator of pedestrian traffic; location within the downtown business district. Maximum 5 points.

Special Consideration *(unsignalized intersections only)*
If traffic control, STOP or YIELD signs, was once established at an intersection and from the study an engineering determination is made that such device is no longer warranted by standards and may be removed and replaced with a traffic calming measure, or some combination of measures, 2 points shall be assigned. Maximum 2 point.

Public involvement

All studies shall require a survey, as detailed in the REVIEW PROCESS section.

During the selection process, public involvement should be made to build consensus, gather opinions, and educate residents and owners. When alternatives for traffic calming measures have been selected by professional engineering staff, one (1) public meeting shall be held with all appropriate stakeholders to review all measures. Input and education materials shall be documented and filed with the engineering study. Upon funding of a project and completion of final design, one (1) public meeting shall be held with appropriate stakeholders to review the measure prior to construction letting.

Notices shall be mailed to appropriate stakeholders, in accordance with Engineering Department standards, at the time of construction.

V. STANDARDS

Design

Elements of design shall be prepared only by professional engineering staff or hired consultant. The design of traffic calming measures is critical not only for proper construction, but also for proper operation and to achieve the desired results. Some basic criteria have emerged from the decades of implemented and observed traffic calming measures around the country and the world.

The critical design elements for horizontal measures are the width of the traveled way and angle of deflection. If a lane is too wide, or if a deflection is too little, then the desired impact and result will not be achieved. The critical design elements for vertical measures are height and length, which directly affect vehicle displacement. If the displacement is too small, then the desired impact and result will not be achieved. However, if the displacement is too large, damage can occur.

Final plans, specifications, and estimates shall be prepared by the Engineering Department or hired consultant, and shall not be subject revision by anyone non-licensed.

National and State standards

On all State or U.S. highways, the standards of the WisDOT FDM and the AASHTO “Green Book” shall be followed.

City specifications

Detail sheets and specifications for construction shall be developed and maintained by the Engineering Department. These shall be in compliance with the above national and state standards.

Signing & Marking

Signing and marking shall be subject to specifications and regulations set forth in the MUTCD. While regulatory and warning signs and pavement markings shall not be considered traffic calming measures by themselves, they shall be considered in conjunction with all physical traffic calming projects as complimentary measures and shall be implemented as deemed appropriate by the Engineering Department.

Legal

Where appropriate local Ordinances apply, or are developed in the future, that consider raised portions of traffic calming measures, including but not limited to traffic circles, chicanes, and median islands, to be areas of "boulevard" that are subject to maintenance by the owners of the adjacent or abutting properties, restricted covenants shall be required between the City of La Crosse and all appropriate owners, prior to consideration for funding.

The City should consider instituting a policy in which, in the case of negligence of maintenance by the owners, landscaping is maintained by the City Park & Recreation Department and billed to the owners.

Costs Assessable to Owners

The policy on whether traffic calming measures should or can be made assessable to the public shall be made by the Common Council. While this report provides no guidance on the matter, it should be noted that the practice of funding participation by the public varies greatly by municipality. Some allow up to full funding by costs assessable to owners, while some prohibit it and mandate that capital improvement funds be used. The Council could consult with the Public Works and Finance Departments to determine whether or not funding options, or obligations, should exist for the public. This will not affect the engineering recommendations or standards of traffic calming.

VI. REFERENCES

Bibliography

Traffic Calming, State of the Practice*, the Institute of Transportation Engineers and Federal Highway Administration. August 1999.

*Features traffic calming programs from twenty (20) areas in the U.S., including: Austin, TX; Bellevue, WA; Berkeley, CA; Boulder, CO; Charlotte, NC; Dayton, OH; Eugene, OR; Ft. Lauderdale, FL; Gainesville, FL; Gwinnett County, GA; Howard County, MD; Montgomery County, MD; Phoenix, AZ; Portland, OR; San Diego, CA; San Jose, CA; Sarasota, FL; Seattle, WA; Tallahassee, FL; and West Palm Beach, FL

Traffic Calming Primer – published by ITE, prepared by Pat Noyes & Associates

Traffic Calming Workshop, La Crosse, WI, 2002 – course materials, handouts

Existing policies on Traffic Calming, Neighborhood Traffic Management, Traffic Circle Design, and Neighborhood Traffic Control Management, directly attained from the following communities:

Anchorage, AK; Brookline, MA; Boulder, CO; Cambridge, MA; Iowa City, IA; Madison, WI; Portland, OR; Seattle, WA; the Southwest Regional Planning Agency (SWRPA) of Connecticut; and Winton-Salem, NC.

Urban Street Design, Marquette University graduate course CEEN 272.

Facilities Development Manual. WisDOT.

Manual on Uniform Traffic Control Devices, 2003 Edition. FHWA, USDOT.

City of La Crosse, Municipal Code Book, Ordinances No. 4353, 4355.

Endnotes

[1] *Traffic Calming*, James R. Hanks, International President of ITE. The ITE Journal, July 1997.

[2] *Traffic Calming, State of the Practice*, the Institute of Transportation Engineers and Federal Highway Administration. August 1999.

[3] Wisconsin State Statutes 349.02. 2007 Assembly Bill 528, 2007 Senate Bill 530, 2007-2008 Legislature.

[4] *Neighborhood Traffic Mitigation Program Toolkit*, City of Boulder, CO.