Neighborhood Traffic Management Program

City of Blaine, Minnesota

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Blaine Neighborhood Traffic Management Program

1.0 Introduction

Increasing traffic volumes and higher speeds have become important issues throughout the metro area and are having an increasing impact on residential streets in the City of Blaine. The City of Blaine is continually striving to strengthen and protect its neighborhoods by improving the quality of life in residential areas. A goal of the Blaine Transportation Plan is for the transportation system to address community issues and concerns while maintaining and enhancing neighborhoods, providing connectivity, and the sense of community cohesion.

Discussion with traffic engineers in cities with established traffic management programs provided insight into the need for a formal process. An established traffic management process:

- Allows the city to better respond to residents,
- Provides the opportunity for better understanding of the issues, and
- Allows consistent application across the community.

Therefore, for residents to obtain consideration for any given traffic control measures on either street or larger neighborhood area they are required to follow a process. The process will ensure that neighborhoods with demonstrated traffic issues and community support for traffic management have equal access to the neighborhood traffic process. The Neighborhood Traffic Management Program depends upon citizen involvement and may vary from year to year based upon citizen participation and available funding.

1.1 Purpose

This document was developed to guide city staff and inform residents about the processes and procedures for implementing traffic management strategies on local *residential streets* to address traffic concerns such as excessive volumes and vehicle speeds, high volumes of non-local through traffic, and vehicle crashes in neighborhoods. The document includes a summary of the City of Blaine's Policies for the Traffic Management Program, background on the history of traffic management, the City of Blaine's process for implementing strategies, and a toolbox of common traffic management measures.

2.0 Policies

The following policies are established as part of the Neighborhood Traffic Management Program for neighborhood streets:

- Compatibility with transportation goals in City of Blaine Transportation Plan.
- Implementation limited to local streets (no arterials or collectors) as identified in the Blaine Transportation Plan.
- Implementation of strategies will be funded by a combination of city funds and neighborhood participation.
- Trucks are allowed on all City streets unless otherwise posted (by State law trucks must be allowed on all State-Aided roadways.)
- The program intends to take a system-wide approach when addressing a neighborhood traffic problem. For each project, city staff will determine a logical project boundary that will

be necessary for the approval process and will help address the issue of displacement/diversion to other local streets.

- Implementation strategies will be limited to those local streets where the 85% speed exceeds 5 mph above the posted/statutory speed limit.
- Implementation of traffic management strategies will be in accordance with the procedures set forth in this document, and in keeping with sound engineering practices, as well as be within the city's available financial and staff resources.
- Implementation of any devices will be consistent with the guidelines in the Minnesota Manual on Uniform Traffic Control Devices. The basic premise of the MMUTCD is that traffic control devices are solutions to problems. If operational or safety problems do not in fact exist, the installation of sign and/or markings will not solve perceived problems, but they will unnecessarily increase the City's maintenance costs.
- Initial deployments are considered experimental and subject to an interim review by City staff prior to permanent installation.

3.0 Traffic Management Background

The United States has used street closures and traffic diverters dating back to the late 1940s and early 1950s, but it was not until the 1970s that Seattle, Washington completed area-wide demonstrations of traffic management strategies. Since then, traffic management has been continually studied and implemented throughout the United States. Strategies include street closures, traffic diverters, speed humps/bumps, signing, increased enforcement and many others, but they all are implemented to accomplish one of the following:

- Modify driver behavior (reduce speed)
- Modify traffic characteristics (reduce volume)
- Improve safety (pedestrian and bicyclists)

Traffic management can be simplified as a two step process: (1) identify the nature and extent of traffic-related problems on a given street or area and (2) select and implement the proper strategy for reducing the identified problem. The traffic management strategies discussed in this document are solutions to a narrowly defined set of problems and are not universally applicable or effective at solving all problems. The wrong traffic management strategy used in the wrong application will not improve conditions – it will only increase City costs and may even make conditions worse.

Since not all strategies are appropriate for every problem the City has developed a process to identify the appropriate solutions. The process includes identifying the problem, evaluating potential strategies, and implementing appropriate measures while including public participation and governmental approval. This process is summarized in Section 4.

The process and strategies included in this document are intended to be used on streets classified as local residential streets to reduce speeds and volumes. (Streets within the City of Blaine are classified based on definitions from the Metropolitan Council defined in Appendix C of the Blaine Transportation Plan. The current Road Classification Map, Figure 4.10 from the Blaine Transportation Plan, identifies street classifications within the City of Blaine – see Appendix D.) By definition arterials and collector roadways are intended to have higher speeds and accommodate higher volumes; therefore it would be against the function of arterials or collectors to implement traffic management strategies. These roadways are intended to operate efficiently with high volumes and speed. When arterials and collectors are operating efficiently they provide the necessary mobility for the traveling public and prevent the need to divert to the residential street network.

4.0 Procedure Summary

A flow chart, ***Exhibit 1,*** provides a summary of the procedures for implementing a traffic management strategy on a residential street. The process includes the following steps:

Step 1 - Identify Candidate Streets/Neighborhoods

First residents must identify candidate streets for traffic improvement and submit a written request to the City Engineering Department. Any requests for project proposals require a written application with 25% of project neighborhood signing the application. ***Appendix A*** provides a sample request form.

Step 2 - Preliminary Screening and Evaluation

The City Engineering Department will review requests and determine whether they can be handled as part of the normal traffic engineering process or police enforcement function of the City or if they qualify for consideration under the Neighborhood Traffic Management Program.

Step 3 – Data Collection and Traffic Study

If it is determined that the request falls under the Neighborhood Traffic Management Program the City will undertake an engineering study of the street(s) or neighborhood including gathering relevant data of the proposed street.

Step 4 – Develop/Evaluate Traffic Management Strategies

Based on the traffic study and input from other departments, the City Engineering Department will make a preliminary determination of the need for traffic management measures and make recommendations as to which measures would be appropriate.

Step 5 – Conduct Neighborhood Meeting and Petition

A neighborhood meeting will be held, or a summary letter will be sent, to present the conclusions of the traffic study and discuss appropriate next steps in the process. At this time a petition will be sent out to determine neighborhood support for the recommended traffic management strategy and to receive input from affected residents.

Step 6 – Traffic Management Strategy Approval

The recommended strategy will not be implemented without the support of 65% of the project neighborhood and 50% of any affected neighborhood. In addition to neighborhood approval, the City Council must also approve the implementation of the traffic management strategy.

Step 7 - Implement Temporary Measures and Monitor

If measures are approved it may be possible to implement first a temporary measure. If a temporary measure is used, it will be monitored for 3 months to determine its effectiveness.

Step 8 – Approve Permanent Measures

Results from the monitoring of the temporary measure will determine if the strategy will be made permanent by approval from the City Council. If the temporary measure is not effective the Engineering Department will revisit the analysis and development of strategies (Steps 3 and 4) or choose to not continue the process.

Step 9 – Monitoring

Once a traffic management strategy has been implemented the City will continue to conduct periodic monitoring of the site to collect data for future implementation of strategies and to document the effectiveness of existing measures. This program and the associated Toolbox may be amended at any time by the City Council.

Appeals – Decisions of staff can be appealed to the City Council. The appeals process will follow established City procedures.

Removal – Existing traffic management measures and/or measures installed under the Program may be requested to be removed. The request for removal of a project will be processed generally using the same procedures as outline in this program requiring written request and appropriate neighborhood approval.

5.0 Procedural Details

Step 1 - Identify Candidate Streets/Neighborhoods

Residents may identify candidate streets or areas for traffic improvements. Some request may be handled by phone or verbally from residents to City Staff, which could result in increased police enforcement or placement of the City's speed display trailer. Any requests for permanent traffic management strategies require a written application with 25% of the project neighborhood signing the application. ***Appendix A*** provides a sample petition and request letter.

It should be noted that it is the policy of the City that only residential streets are to be considered for implementation of traffic management strategies set forth in this document. Application of these strategies on collector or arterial streets is excluded and not included in this process.

Step 2 –Preliminary Screening and Evaluation

The City Traffic Engineer will review requests to determine whether or not they should be handled as part of normal traffic engineering procedures or police enforcement of the City, or if they qualify for consideration under the Neighborhood Traffic Management Program. Some requests may be able to be handled within the current traffic engineering procedures such as planned infrastructure improvements or reconstructions. In addition, common requests for increased traffic enforcement, participation in a neighborhood speed watch program, and placement of the variable speed display trailer are commonly handled by the Police Department and will be forwarded to the appropriate staff.

Review of requests will consist of comparing the identified street characteristics with the following initial criteria:

- The street in question must be classified as a Local (residential) street in the City of Blaine Transportation Plan (see Figure 4.10 from Blaine Transportation Plan in Appendix D).
- The requests must be related to speeding, excessive traffic volumes, crashes, cut-through traffic, truck traffic or other related impacts on a residential street.

If it is determined that the request falls under the function of this plan, then Step 3 will be initiated. If not, the request shall be followed up as appropriate by the City Traffic Engineer as part of the Departments normal function, including coordination with Police, Fire, and Public Works Departments as needed.

Step 3 – Data Collection and Traffic Study

If it is determined that the request falls under the guidelines of the management program, the City Traffic Engineer will conduct an engineering study of the street(s) or neighborhood. The study will include the following actions:

Define Project Area / Impacted Area

The definition of the project area and impacted areas sets up the project boundaries and will be used to determine neighborhood support during the petition process and for the assessment process if a strategy is implemented.

Data Collection

Traffic data collection will include (as appropriate based on identified problem) one or more of the following:

- Traffic volume counts (24 hour counts in 15 minute increments, truck volume counts)
- Pedestrian counts
- Radar or machine-based speed surveys (85th percentile, median, average, 10 mile per hour pace)
- Cut-through traffic estimates (based on license plate surveys, or other video techniques)
- Crash information (three years recommended)
- Roadway Geometry (sight distance, lane configuration, etc.)
- Land Use Mix (density of residential and presence of sidewalks, pedestrian generators such as schools, parks, bus routes, unique features)

Evaluation of Traffic Data

From the data collected the traffic problems associated with the neighborhood street can be documented. The documentation will be valuable in the development of possible traffic management strategies.

From the data collected the City will also be able to rank the potential projects for further study. ***Table 1*** provides the ranking criteria. This ranking will be beneficial if the number of request submitted is beyond the fiscal and staffing ability of the city. By ranking requests based on the criteria set forth in ***Table 1***, the city can prioritize the projects to focus funding accordingly.

TABLE 1 Ranking of Traffic Management Requests	
85th Percentile speeds 5 mph over posted speed limit	Yes – continue No – no traffic management strategy implemented
Public school yard, playlot, playground development adjacent to benefited area (0 to 200 points)	None +0 All of 1 side +100 All of 2 sides +200
Residential development adjacent to benefited area (0 to 100 points)	None +0 All of 1 side +50 All of 2 sides +100
Number of reported correctable crashes based on last 5 years of available data (0 to 200 points)	20 per crash; maximum of 200 points
Sidewalk adjacent to project area (0 to 100 points)	None +100 All of 1 side +50 All of 2 sides +0
Percent of potential assessment properties supporting project by petition (180 to 300 points)	3 points per percent; maximum 300 points
Average residential density adjacent to project area (0 to 50 points)	0 dwelling units per 100 lin. ft. = 0 points 5+ dwellings units per adjacent 100 lin. ft. = 50 points

Step 4 - Develop/Evaluate Traffic Management Strategies

Using the data collected during the development of the traffic study and applying recognized traffic engineering standards, the City Engineering Department will recommend the use of one or more neighborhood traffic management strategies. A "toolbox" of strategies is included in *Section 6.0* of this plan. While it is not inclusive of all strategies, it provides a summary of the most applied and successful measures as documented in the research summarized in ***Appendix***

B. The toolbox includes a brief description of the strategy, its effects on volume, speed, noise, and safety, a discussion of its advantages and disadvantages and design considerations. The following strategies are included in the toolbox:

Traffic Control Devices

- Vehicle Restrictions
- Turn Restrictions
- One-Way Streets
- Watch Children Signs
- Stop Sign Implementation
- All-Way Stop Sign Implementation
- Parking Restrictions
- Pavement Markings
- Speed Limits

Enforcement

- Increased Enforcement
- Variable Speed Display Board

Roadway Adjustments

- Narrowing Lanes
- Chokers
- Mid-Block Narrowing
- Chicane

Vertical Elements

- Speed Humps/Bumps/Tables
- Raised Crosswalk
- Median Barrier
- Traffic Circle
- Street Closure
- Full / Diagonal Diverter
- Partial Diverter

Effectiveness of Strategies

As stated earlier, traffic management strategies are not universally applicable or effective at solving all problems. The Institute of Transportation Engineers has collected data on the effectiveness of traffic management strategies implemented throughout the United States. ***Table 2*** provides a summary of this data and can be useful in the selection of appropriate traffic management strategy to implement. Along with the information provided in Table 2 on effectiveness, the following are some other effectiveness considerations:

- Traffic control devices, by themselves, are almost never effective at reducing traffic volumes or vehicle speeds.
- Enforcement can be effective if applied regularly and over an extended period of time.
- In most cases, enforcement will result in local residents being ticketed.
- Roadway adjustments (narrowing) have proven to be moderately effective but at high implementation costs.
- Vertical elements (primarily speed humps/bumps) have proven to be moderately effective but neighborhood acceptance has been mixed.
- The combination of enforcement plus other strategies has proven to be the most effective approach.

TABLE 2 Effectiveness of Management Strategies	**Volume Reductions**	**Speed Reduction**	**Safety Improvement**	**Increase in Air/Noise Pollution**	**Emergency Access Issues**	**Access Restriction**	**Increased Maintenance Efforts**	**Cost**
Traffic Control Devices								
Vehicle Restriction	Poss	Poss	Poss	No	Poss	Yes	No	Low
Turn Restrictions	Yes	Poss	Poss	No	No	Yes	No	Low
One-Way Streets	Poss	No	Poss	No	Poss	No	Poss	Low
Watch Children Signs	No	No	No	No	No	No	No	Low
Stop Sign Implementation	No	No	No	Yes	Yes	No	No	Low
All-Way Stop	No	No	Poss	Yes	No	No	No	Low
Parking Restrictions	No	No	Poss	No	No	No	No	Low
Speed Limits	No	No	No	No	No	No	No	Low
Painted Crosswalks	No	No	No	No	No	No	No	Low
Enforcement								
Increased Enforcement / Speed Watches	No	Yes	Poss	No	No	No	No	Mid
Variable Speed Display Board	No	Yes	Poss	No	No	No	No	Low
Roadway Adjustments								
Narrowing Lanes	No	Poss	Poss	No	No	No	No	Mid
Chokers	No	Poss	Yes	No	Poss	No	No	High
Mid-Block Narrowing	No	Poss	Poss	No	No	No	No	Mid
Chicane	Poss	Poss	No	No	No	No	Yes	High
Sidewalks	No	No	Poss	No	No	No	Poss	Mid
Vertical Elements								
Speed Bumps/Humps/Table	Poss	Yes	Poss	Poss	Poss	No	Poss	Mid
Raised Crosswalk	Poss	Yes	Poss	Poss	Poss	No	Poss	Mid
Median Barrier	Yes	Poss	Poss	No	Yes	Yes	Poss	High
Traffic Circle	No	Poss	Poss	No	Poss	No	Yes	High
Street Closure	Yes	Poss	Poss	No	Yes	Yes	Poss	High
Full Diverter	Poss	Poss	Poss	No	Yes	Yes	Poss	High
Partial Diverter	Poss	Poss	Poss	No	No	Yes	Poss	High

Cost Estimate and Funding

For the purpose of discussions with affected residents, a cost estimate will be developed for the recommended strategy. It is the policy of the City of Blaine that the following cost sharing will occur with an approved traffic management strategy:

- City of Blaine will pay the cost of administrative work, traffic study and data collection
- City of Blaine pays 25% of the construction and installation costs of major strategies while the neighborhood affected will pay 75% of the cost (minor items such as installation of a limited number of signs or painting of crosswalks and other pavement markings would be assumed completely by the City)
- For those local streets that carry in excess of 2,000 vehicles per day, the City of Blaine will pay 75% of the construction and installation costs of major strategies while the neighborhood affected will pay 25% of the cost.

Costs associated with implementing traffic management strategies vary significantly from just over $250 for installing a speed limit sign to $10,000 or more for a landscaped median construction. ***Table 3*** provides a summary of typical implementation costs for traffic management strategies.

TABLE 3
Typical Implementation Costs

Type of Implementation	Unit	Unit Cost
Warning Signs	Per sign	$250
Pavement Markings - Roadway Striping - Crosswalk Striping	 Per linear foot Per crosswalk	 $1.00 $150
Textured Pavement	Per crosswalk	$1,500
Street Lighting	Per fixture	$7,500
Raised Crosswalk	Per crosswalk	$4,000
Speed Humps	Per hump	$5,000
Mid-Block Choker	Per choker	$5,000
Intersection Choker	Per approach	$5,000
Mid-Bock Speed Table	Per table	$7,500
Intersection Speed Table	Per intersection	$25,000
Traffic Circle	Per intersection	$15,000
Center Island	Per approach	$15,000
Half Closures	Per intersection	$40k to $60k
Full Closures	Per intersection	$120,000

Source: City of Minneapolis & ITE, Traffic Calming – State of the Practice

While the city will cost share only the implementation costs, the consideration of future maintenance costs are also a factor for determining the most appropriate strategy. While the implementation of a traffic sign may appear to be the least expensive option at only $250, the additional $100 per year of annual maintenance needs to be considered. A comparison of the annual costs for the most common strategies for speed reduction, increased enforcement and speed humps, is included in ***Table 4***.

TABLE 4
Comparison of Annual Costs

Measure	Initial Cost	Annual Cost	Annual Revenues
Photo-radar (ownership option)	$85,000	$145,000	$40,000
Photo-radar (lease option)		$214,000	$40,000
Targeted Police Enforcement	$70,000	$194,000	$40,000
Speed Humps	$300,000	$30,000	$0

Source: ITE, Traffic Calming – State of Practice

Step 5 – Conduct Neighborhood Meeting and Petition

After the completion of the traffic study and the development and evaluation of potential strategies, the city will wither hold a Neighborhood Meeting or distribute a letter to inform the community on the process and results of the traffic study and provide information on the recommended strategies. Based on the engineering study and input from residents, the city will make a preliminary determination and recommendation for the need of traffic management strategies.

Step 6 – Traffic Management Strategy Approval

Once the traffic study results, management strategies, and cost estimates have been provided to affected neighborhood residents, a survey/petition will be circulated to ascertain whether or not the neighborhood approves of the recommended strategy and are willing to cover the potential costs of implementation. The recommended strategy will not be implemented without the support of 65% of the project neighborhood and 50% of any affected neighborhood.

Once approval is obtained from the neighborhood the strategy will be presented to the City Council for approval.

Step 7 - Implement Temporary Strategy and Monitor

In most cases, the strategy will be implemented with temporary materials and remain in place for approximately three to six months depending on the type of improvement. The strategy will be evaluated to determine if it addresses the identified problems and is consistent with the Neighborhood Traffic Management Plan goals. During the test period residents may provide comments to the City Engineering Department regarding the improvement. At any time during this test phase appeals of the decision for installing the strategy can be submitted and forwarded to appropriate staff.

Step 8 – Approve Permanent Strategy

If it is determined that the temporary strategy does not achieve the intended goals of reducing speeds, cut through traffic or other identified problems, the City Engineering Department will review other potential measures and recommend the elimination of all strategies or test the installation of a different strategy.

Effective temporary strategies will be brought to the council for approval for the installation of a permanent form of the approved traffic management strategy.

Step 9 – Monitoring and Future Actions

The City will conduct periodic monitoring of the fully installed traffic management strategy to determine if the project continues to provide effective improvement to the neighborhood. The monitoring will be conducted at the discretion of the City based on available funding, staffing levels, and resident comments.

If monitoring shows that the implemented strategy fails to achieve the intended goals it may be removed.

Legal Considerations

From the local government perspective, the legal issues surrounding traffic management strategies fall into three categories: statutory authority, constitutionality, and tort liability. First, the local government must have legal authority to implement traffic management strategies on a given roadway (statutory authority). Second, the local government must respect the constitutional rights of affected landowners and travelers on the roadways (constitutionality). And finally, the local government must take steps to minimize the risk to travelers from the installation of traffic management strategies (tort liability). Through documentation of the entire process, including the collection and evaluation of traffic data, the decision process, and interaction with the public, the Blaine Traffic Management Program can minimize potential legal difficulties.

6.0 Toolbox of Neighborhood Traffic Management Strategies

The following Toolbox provides information on a variety of traffic management strategies. Each strategy includes information on its purpose, its effectiveness for solving different types of traffic problems, and a summary of advantages and disadvantages for implementation. To make the toolbox understandable and usable it has been organized into types of strategy as follows:

Traffic Control Devices – the use of common traffic control devices, such as signing and pavement markings, to solve neighborhood traffic problems. Included in this category are:

- Vehicle restrictions
- Turn restrictions
- One-Way streets
- Watch for Children Signs
- Stop Sign Implementation
- All-Way Stop Sign Implementation
- Parking Restrictions
- Pavement Markings
- Speed Limits

Enforcement – there are two options for using enforcement as a traffic management strategy: increase police enforcement, the use of Variable Speed Display Boards

Roadway Adjustments – there are multiple strategies for traffic management that change the appearance of the roadway including:

- Narrowing of lanes
- Chokers
- Mid-Block Narrowing
- Chicane

Vertical Elements – introducing vertical elements to the roadway, either as obstacles for vehicles to drive over or around, are common traffic management strategies. These include:

- Speed Humps/Bumps/Tables
- Raised Crosswalks
- Median Barrier
- Traffic Circles
- Street Closer
- Full / Diagonal Diverter
- Partial Diverter

Vehicle Restriction

Purpose
Truck route ordinances, or weight restrictions are place on streets and roadways for various reasons. Some of these reasons include noise, excessive traffic volumes, speeds, and safety concerns. (Does not refer to normal use of spring time load restriction for pavement preservation purposes.)

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Heavy vehicle volumes may be reduced
Speed	No effect
Traffic Noise	Noise may be reduced
Traffic Safety	Little or no effect
Advantages	• Possible reduction in noise and volumes • Restrictions viewed in a positive manner by the neighborhoods • Preservation of structural integrity and life of a street
Disadvantages	• Traffic usually is shifted to a different street • Businesses that generate the heavier traffic can complain of hardships and inconveniences • Other heavy vehicles that serve the neighborhood may be restricted (school buses, garbage trucks, delivery vehicles, etc.)
Problem Target	• Cut-through traffic • High volumes • High collision rates
Design	• Legality of the truck route – can not be used on state aided county and city roadways.

Turn Restrictions

Purpose

Can be used in neighborhoods where "cut through" traffic has been documented to be unusually high. Traffic control technique involving the use of regulatory signing which prohibits certain traffic movements generally where an arterial and local street meet. Involve the use of standard "No Right Turn" or "No Left Turn" sign with or without rush hours limitations.

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Where turning movements onto local residential streets are reduced, volumes on those streets are lessened.
Speed	To the extent that traffic cutting through is diverted, speeds on the local residential street may be reduced.
Traffic Noise and Air	Noise may be reduced, but transferred to other streets
Traffic Safety	May improve on the restricted volume street if compliance is high, but effects on alternative routes need to be evaluated.
Advantages	• Low installation cost • Possible reduction in crashes
Disadvantages	• If turn prohibition sign is installed without a reasonable alternative violations are likely. • Complaints may rise on diversion routes. • Turn prohibition signs have a very low level of effectiveness unless coordinated levels of enforcement are high.
Problems Targeted	• Cut through traffic
Design	• Turn restriction signs should be used on the periphery of neighborhoods rather than within them. • Most effective when used during rush hour when "cut through" traffic is a problem • Consideration should be given to install physical barriers to aid in the enforcement of turn restriction signs

One-Way Streets

Purpose

Conversion of two-way streets to one-way operation for purposes of residential street traffic control take three forms:

CASE #1 - Divergent and convergent one-way residential streets to reduce direct through routes impacting the neighborhood.

CASE #2 - Alternating one-way streets throughout a portion of a grid system to gain safety advantages of one-way operations.

CASE #3 - Creating a one-way couplet by paring a residential street with a nearby thru street to create a corridor for thru traffic

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Case #1 – reduces traffic volumes where thru traffic is a problem Case #2 – no significant effect on traffic volumes Case #3 – increases volumes on one street and reduces volumes on adjacent streets
Speed	May increase speeds due to improved motorist comfort levels.
Traffic Noise and Air	Minimal effect except in Case #1 which creates longer, circuitous routes for local traffic.
Traffic Safety	One-way streets result in fewer potential conflicting movements, improving safety.
Advantages	• Possible increased parking • Inexpensive to implement • May reduce traffic volumes • May increase roadway capacity
Disadvantages	• May be considered inconvenient for residents • Possible increase in speeds • May increase volumes on other streets
Problems Targeted	• High traffic volumes • High crashes due to conflicting movements
Design	• One way streets can be used in combinations that force turns every few blocks to minimize speeding or cut-through problems

Watch for Children Signing

Purpose
A variety of signs exist to try and warn of the presence of children, “Watch for Children,” “Slow, Children at Play,” etc. The request for these signs generally stems from parents’ concern for their children’s safety in the streets near their home. Unfortunately, the request for this type of signage is based on a widespread but false belief that traffic signs provide protection.

Effects	
Volumes	No Effect
Speed	No Effect
Traffic Noise and Air	No Effect
Traffic Safety	No Effect
Advantages	• Low initial cost for one installation. Installation plus an annual maintenance cost may become significant if installed at a large number of locations.
Disadvantages	• Signs of this type might indicate that the street is an acceptable place to play
Problems Targeted	• Not effective for any of the common traffic issues
Design	• The Watch for Children warning signs are not standard signs included in the Minnesota Manual on Uniform Traffic Control Devices because of their lack of effectiveness in slowing traffic or increasing safety of neighborhood streets.

Stop Sign Implementation

Purpose

Regulatory sign that is used to assign right-of way at an intersection. Only recommended for installation if specific guidelines are met in accordance with the Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD). Stop signs should not be used for speed control or volume reduction and should not be installed on the major street unless justified by an engineering report.

R1-1

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Little or no effect
Speed	Little or no reduction in speed, speed possibly increases due to drivers speeding up to make up for time lost at the stop sign
Traffic Noise and Air	Noise is increased near the intersection due to the increase activity of acceleration. Air quality worsens due to deceleration, idling and acceleration
Traffic Safety	Possible increase in crashes, possibly due to the stop signs being unexpected or deemed unnecessary, therefore encouraging rolling stops or by instilling a false sense of security in crossing motorists and pedestrians.
Advantages	• Inexpensive installation costs (do require continual maintenance costs) • Defines driver's right-of-way • Increase opportunity for pedestrians to cross the roadway • May discourage cut-through traffic
Disadvantages	• Can cause negative traffic safety impacts if sign is not warranted • May result in mid-block speeding • Increasing levels of intersection control are associated with increased frequency of crashes. • Difficult to enforce full stop control compliance • Could result in increase in speeds between the signs as drivers try to make up for lost time
Problems Targeted	• At intersections where right-of-way is confusing
Design	• Guidelines need to be met as established in the Minnesota Manual on Uniform Traffic Control Devices • In most cases the street carrying the lowest volumes should be stopped to minimize the number of vehicles stopping

All-Way Stop Sign Implementation

Purpose

The All-Way STOP condition is primarily intended to address either a higher than expected intersection crash frequency or to be an interim measure at locations that have demonstrated a need for a traffic signal installation, but where the signal cannot be installed in a reasonable period of time. It is a common belief that installing STOP signs on all approaches of an intersection will result in fewer crashes. Research indicates that average crash frequency at All-Way STOP controlled intersection is 50% higher than thru/STOP intersections. Also, there is no evident to suggest that STOP signs decrease travel speeds.

R1-1

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Little or no effect.
Speed	Little or no reduction in speed, mid-block speed possibly increase
Traffic Noise and Air	Little or no effect.
Traffic Safety	In most cases, the installation of an All-Way STOP will increase the frequency of crashes. Only in those rare cases where the number of crashes with the Thru/STOP control is unusually high, is the forecast of safety improvement probable.
Advantages	• Inexpensive installation costs (do require continual maintenance costs) • Defines driver's right-of-way • Increase opportunity for pedestrians to cross the roadway • May discourage cut-through traffic
Disadvantages	• Can cause negative traffic safety impacts if sign is not warranted • May result in mid-block speeding • Increasing levels of intersection control are associated with increased frequency of crashes. • Difficult to enforce full stop control compliance • Could result in increase in speeds between the signs as drivers try to make up for lost time
Problems Targeted	• Unusual conditions at intersection including crash frequency, turning patterns, delay and pedestrian conflicts.
Design	• Traffic volumes and crash frequency thresholds need to be met as established in the Minnesota Manual on Uniform Traffic Control Devices. •The most effective deployment of the All-Way STOP condition is at intersections where the volume of traffic on the major and minor roads is approximately equa.

Parking Restrictions

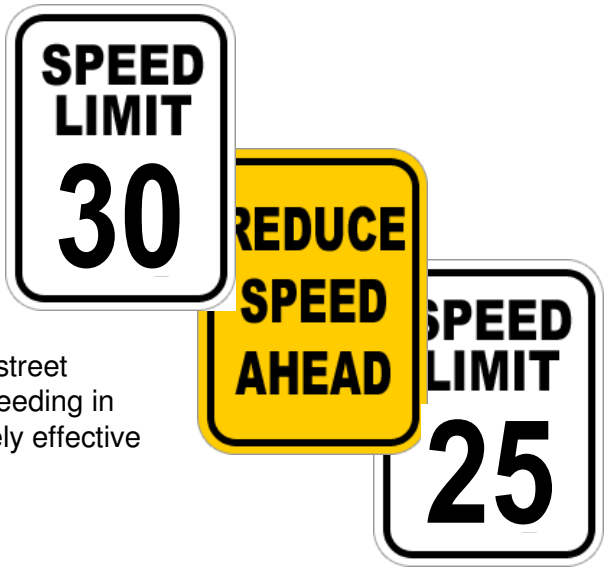
Purpose

Parking restrictions can assist in improving residential street safety in two ways:
1) Clearance No Parking Zones to improve sight lines at intersections and crosswalks
2) Extended No Parking Zones to improve visibility of and for pedestrians along the length of the block.

Source: FHWA Manual on Uniform Traffic Control Devices

Effects	
Volumes	Little or no effect
Speed	Minimal changes unless there are extended No Parking Zones that can create the potential for increased speeds
Traffic Noise and Air	Little or no effect
Traffic Safety	Increasing sight line distances reduce right angle conflict between vehicles at intersections, alleys and driveways
Advantages	• Can reduce some types of accidents (late evening hit and run parked vehicle accidents and crashes related to parking maneuvers) •
Disadvantages	• In area where on-street parking is at capacity and there is no alternative off-street parking additional restriction to parking can be controversial to residents •
Problems Targeted	• Non-Residential parking intrusion
Design	• Should review the impacts of parking on surrounding streets

Speed Limits



Purpose

Speed limits are determined by the Minnesota Department of Transportation (consistent with State Statutes) based on an analysis of the actual speed profile of the road. The basic premise of Minnesota's law is that the majority of motorists will pick a safe and reasonable speed given the horizontal and vertical design of the street, locations of driveways, sidewalks, obstructions, and the use of the street by pedestrians. Lowering the speed limit to address speeding in a neighborhood has never proven to be even moderately effective without also including very high levels of enforcement.

Effects	
Volumes	Little or no effect
Speed	Drivers generally ignore posted speed limits and travel at speeds which the drivers consider reasonable
Traffic Noise and Air	Little or no effect.
Traffic Safety	Effects of speed limit changes on traffic safety on local residential streets have not been reported. Research suggests that crash frequencies on urban roadways are unrelated to vehicle speeds.
Advantages	• Research indicates that when speed limits are set at or near the 85th percentile speed, roadway crash frequencies are at a minimum.
Disadvantages	• Speed limits on urban roadways are either set by Statute or by MnDOT. • Research suggests that crash frequencies on urban roadways are unrelated to vehicle speeds.
Problems Targeted	• High speeds through residential neighborhood
Design	•

Painted Crosswalks

Purpose
Provide a designated, marked location for pedestrians to cross residential street and make drivers more aware of potential pedestrian conflicts.

Effects	
Volumes	No effect
Speed	No effect
Traffic Noise and Air	No effect
Traffic Safety	Research has shown that marked crosswalks at uncontrolled intersection are unrelated to pedestrian safety.
Advantages	• Reasonably effective at identifying locations with potential pedestrian conflicts. • Helps to concentrate pedestrian activities at specific intersection and on specific legs of intersections.
Disadvantages	• At uncontrolled intersections, appears to create a false sense of security in pedestrians – the 8" white line with stop the oncoming 4,000 pound vehicle. • Costly to maintain • Not required to establish legal cross-walk locations.
Problems Targeted	• Concentrating pedestrian crossing activities, particularly when combined with other strategies such as advanced warning signs, systems of sidewalks, enforcement, etc.
Design	• Marking cross walks is not necessary to establish legal crossing locations and is unrelated to pedestrian safety. •Marked crosswalks may be part of a program to designate walking routes and concentrate pedestrian crossings when combined with other strategies.

Increased Enforcement / Speed Watches

Purpose

The effective use of public safety/police personnel to encourage reduced speeds in residential areas. Enforcement usually involves the use of radar to identify speeders and ticket violators.

Speed Watches rely on neighborhood participation to create awareness and, in turn, help control speeds in neighborhoods.

Effects	
Volumes	Little or no effect
Speed	Speed reduction as long as enforcement is maintained (the “halo” effect of infrequent enforcement is as little as 1 mile or 4 hours).
Traffic Noise and Air	Little or no effect.
Traffic Safety	May reduce overall crashes if speeds are actually reduced.
Advantages	• Easy to implement • Effective with repetitive enforcement on a non-routine basis. • Speed Watch programs have been perceived positively by neighborhood, even in areas where significant speed reductions were not measured. These types of programs may make neighborhoods find that they do not actually have a speeding problem.
Disadvantages	• Not self-enforcing; temporary measure, dependent on resources •Expensive and not always desirable to use police for traffic enforcement due to budget and manpower constraints
Problems Targeted	• Speeding • Moving vehicle violations • Running stop signs
Design	• The locations of implementation should be clearly identified to minimize the time spent enforcing and maximize the resultant speed reduction. • Actual speed surveys should be used to narrow problem to specific time (day of the week, time of day) and location.

Variable Speed Display Board

Purpose

A portable speed display board wired to a radar provides passing motorists their travel speed along with the speed limit. The display can help raise driver awareness, encourage compliance, and direct driver's attention to the posted speed limit. The purpose is to remind drivers that they are speeding to help encourage compliance.

Effects	
Volumes	Little or no effect
Speed	Lower observed speeds when device is present
Traffic Noise and Air	Little or no effect
Traffic Safety	There is the potential for sudden braking by some motorists
Advantages	• Portable Display board can be used in various locations enabling residents to borrow and place on their street • Low cost ($2,000 to $11,500 per unit) • Can be used to target timing and location of police enforcement (if data shows excessive speeds at a certain time)
Disadvantages	• Possible concerns with causing conflict between citizens involved (vigilantism) • May only provide short term effectiveness • Possible vandalism or could encourage aggressive drivers to see how fast they can go • Needs power to function • Requires personnel to move and place unit
Problem Targeted	• Any location where speeding is a problem or where drivers need to be educated about traffic issues in the area.
Design	• Variety of types of variable speed display boards available – some include traffic county abilities.

Narrowing Lanes

Purpose

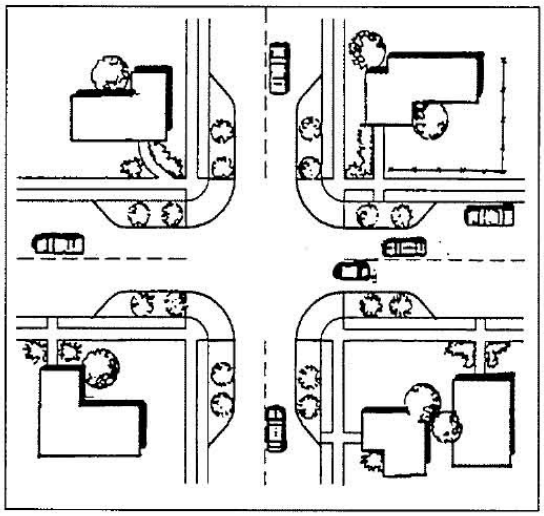
The reduction of the typical pavement width along a roadway. The narrowing can be achieved physically by removing part of the pavement surface or by simply using pavement markings to indicate narrow travel lanes.

Effects	
Volumes	Little or no effect
Speed	Possible reduction in speed
Traffic Noise and Air	Little or no effect
Traffic Safety	Potential for improved pedestrian safety due to shorter street crossing times, but at the same time bicycle safety may be compromised by physically removing part of the pavement surface.
Advantages	• Use of pavement markings to narrow street is relatively inexpensive ($0.20 per lineal foot). • Narrowing of street may provide opportunity for street beautification programs
Disadvantages	• May require the prohibition of on-street parking causing hardship or inconvenience for residents • May result in shifting volumes to adjacent streets if number of lanes is reduced
Problems Targeted	• Wide residential streets where speed reduction is desired • Excess street volume on multilane streets
Design	• Must not create significant impact due to loss of parking

Chokers at Intersections

Purpose

Narrowing of the street at an intersection to constrain the width of the traveled way. They provide shorter pedestrian crossing distances and provide protection to the beginning of a parking lane. The driver also senses the roadway narrowing when approaching one of these measures, which can result in speed reduction and a reminder that the driver is entering a residential area.



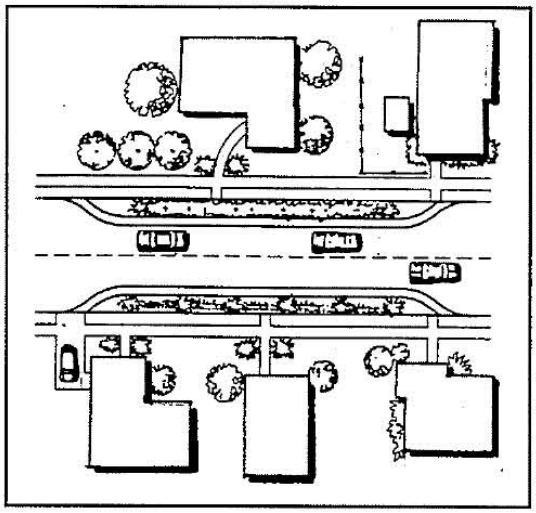
Source: Institute of Transportation Engineers
Traffic Calming: State of Practice

Effects	
Volumes	Little or no effect
Speed	Minimal changes
Traffic Noise and Air	Little or no effect.
Traffic Safety	Potential for improved pedestrian safety due to shorter street crossing times, but at the same time bicycle safety may be compromised by physically removing part of the pavement surface.
Advantages	• Good for pedestrians due to shorter crossing distance • Provides space for landscaping and neighborhood “gateway” • Should not affect emergency response time • Minimal inconvenience to drivers
Disadvantages	• May require the prohibition of on-street parking causing hardship or inconvenience for residents • May cause bicyclists to travel in same traffic lane as vehicles • May require redesign of drainage system
Problems Targeted	• Mid-block locations with speeding and/or cut-through traffic
Design	• There must be adequate turning radius for emergency vehicle access especially on narrow streets

Mid-Block Narrowing

Purpose

Segment(s) of roadway narrowing where curbs are extended toward the center of the roadway on one or both sides of the street to constrain the width of the traveled way. They provide shorter pedestrian crossing distances and provide protection to the beginning of a parking lane. The driver also senses the roadway narrowing when approaching one of these measures, which can result in speed reduction.



Source: Institute of Transportation Engineers
Traffic Calming: State of Practice

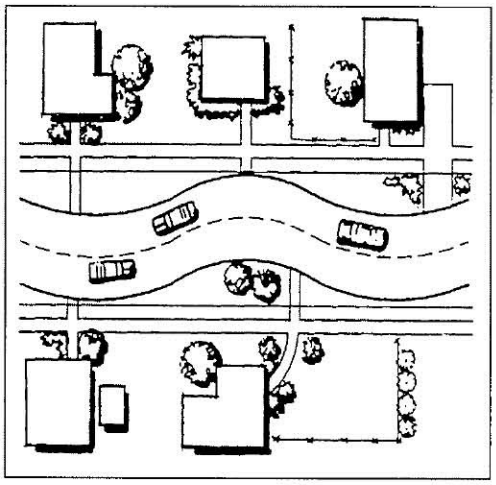
Effects	
Volumes	Little or no effect
Speed	Minimal changes
Traffic Noise and Air	Little or no effect.
Traffic Safety	Potential for improved pedestrian safety due to shorter street crossing times, but at the same time bicycle safety may be compromised by physically removing part of the pavement surface.
Advantages	• Good for pedestrians due to shorter crossing distance • Provides space for landscaping • Does not affect emergency response time • Minimal inconvenience to drivers
Disadvantages	• May require the prohibition of on-street parking causing hardship or inconvenience for residents • May create drainage issues where curb and gutter exist • May create diversion for bicyclists
Problems Targeted	• Mid-block locations with speeding and/or cut-through traffic
Design	• Must not significantly impede emergency vehicle access

Chicane

Purpose

Curvilinear reconstruction involving the introduction of curvatures on previously straight alignment. Curvilinear reconstruction can be accomplished in two different ways:

1. Reconstruct the street with a curved centerline alignment and a uniform roadway width
2. Introduce chokers or other types of barriers on alternate sides of the street to create a serpentine travel path.



Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	Possible reduction in volumes
Speed	Possible reduction in speeds
Traffic Noise and Air	Little to no effect
Traffic Safety	Little or no effect
Advantages	• Possible reduction in volumes and speed • No restriction in access to residents • Can be landscaped enhanced • Less disruptive for emergency vehicles than speed humps
Disadvantages	• Curbside parking must be prohibited in some locations • Winter maintenance problems • Possible impacts to drainage • High cost of reconstruction
Problems Targeted	• Excessive speeds
Design	• Not appropriate for narrow streets (22 feet is appropriate width)

Sidewalks

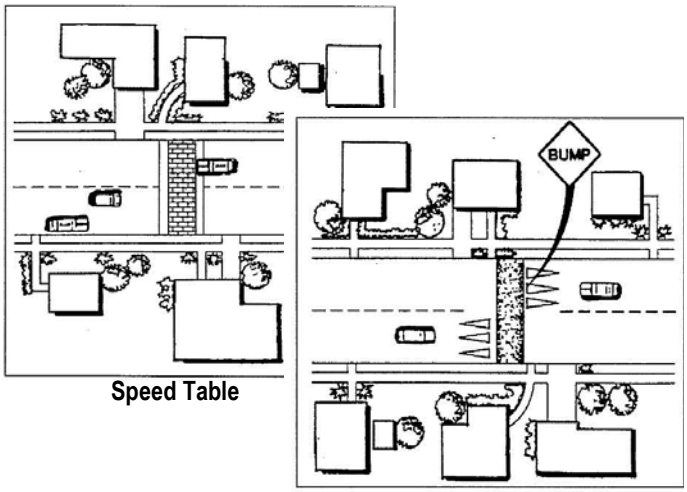
Purpose
Sidewalks are intended to provide pedestrians with a safe walking location when traffic volumes or vehicle speeds make walking on the street potentially dangerous.

Effects	
Volumes	No Effect.
Speed	No Effect.
Traffic Noise and Air	No Effect.
Traffic Safety	Possible decrease in pedestrian crashes.
Advantages	• Positively separates pedestrians and vehicles. • Very effective at reducing pedestrian/vehicle conflicts. •
Disadvantages	• Moderately costly to implement. • Requires systematic deployment to achieve high levels of effectiveness. •Increased maintenance efforts. • Mixed neighborhood acceptance.
Problems Targeted	• High levels of pedestrian activity, especially at/near pedestrian generators (schools, parks, retail areas, etc)
Design	• Should be installed along all arterials and collectors (because of the traffic volumes and speed) and along residential streets based on providing connections to areas with high levels of pedestrian activity.

Speed Bumps/Humps/Tables

Purpose

A physical feature (usually made of asphalt or rubber mounds) that are designed to rise above the roadway surface and extend across the roadway perpendicular to the traffic flow. Typically used to reduce vehicle speeds.



Speed Table

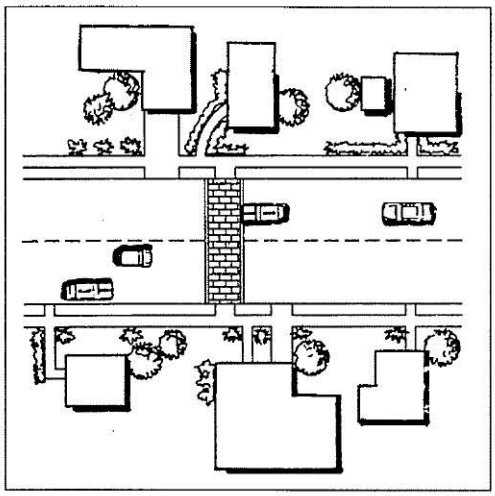
Speed Bump

Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	May reduce traffic volumes
Speed	Effective in slowing vehicles traveling at typical residential speeds to approximately 5 to 15 mph depending on type installed at the device – may reduce overall speeds by 5 to 7 mph.
Traffic Noise and Air	May have an increase of noise at the bumps/humps
Traffic Safety	Traffic safety has not been found to be compromised with these devices. Traffic safety benefits can be gained if speeding is involved.
Advantages	• Reduces speeds • Usually reduces traffic volumes • Does not require parking removal or interfere with bicycle/pedestrian traffic
Disadvantages	• Can potentially increase noise • Can cause traffic to shift to parallel residential or collector streets • May decrease emergency vehicles response times
Problems Targeted	• Excessive speed • High volumes
Design	• Speed humps are only effective for 250 feet on either side of the hump. Thus, a neighborhood considering speed hump installation would require two to three installations.

Raised Crosswalk

Purpose
A raised crosswalk is a speed table designed as a pedestrian crossing, usually at mid-block to provide additional warning of a pedestrian crossing



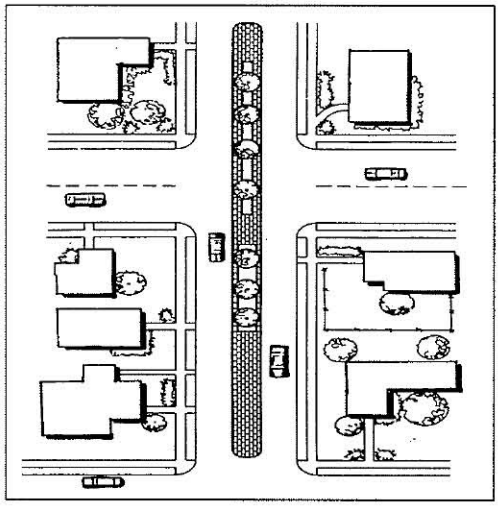
Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	Possible reduction in traffic volumes
Speed	Decrease in speed at crosswalk
Traffic Noise and Air	Possible increase in traffic noise
Traffic Safety	May increase awareness of pedestrians
Advantages	• Speed control at pedestrian crossing • Increases pedestrian visibility and awareness to driver • May reduce traffic volumes
Disadvantages	• Possible increase in noise • Possible diversion of traffic to other streets • May impact drainage
Problems Targeted	• High mid-block pedestrian crossing and excessive vehicle speeds
Design	• Should be placed in mid-block • Not appropriate for grades greater than 5 percent • Most common height is between 3 and 4 inches and typically have ramps 6 feet long

Median Barrier

Purpose

A physical means for preventing left turning traffic on a major street from accessing a local street and through traffic from continuing on that local street. Alternate routes fro diverted traffic should be analyzed with regard to traffic carrying capacity and desirability.



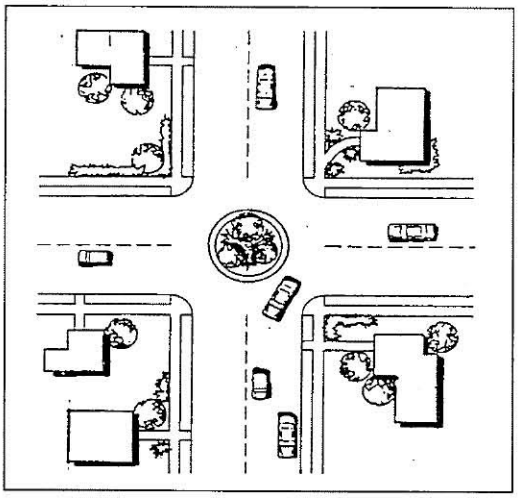
Source: Institute of Transportation Engineers
Traffic Calming: State of Practice

Effects	
Volumes	Vary depending on proportion of traffic that is prohibited by the median barrier
Speed	Small reduction possible
Traffic Noise and Air	Little or no effect
Traffic Safety	May provide some safety benefits for pedestrians as a safety island for crossing the major street
Advantages	• Assists in pedestrian crossing • Prevents vehicles from passing vehicles that are turning right • May improve safety through access limitations • Visually enhances the street
Disadvantages	• Diversion of traffic to other locations possible • Disrupts continuity of local street system • Maintenance of island required • Reduction in access for residents
Problems Targeted	• Cut through traffic • Vehicle conflicts
Design	• Must meet drainage requirements • Must not significantly impede emergency vehicle access

Traffic Circle

Purpose

A traffic circle is a raised geometric control island, frequently circular, in the center of an intersection of local streets. Typically, traffic circles would be about 20 feet in diameter. Traffic traveling through the intersection must avoid the island affecting the path and speed of the traffic.



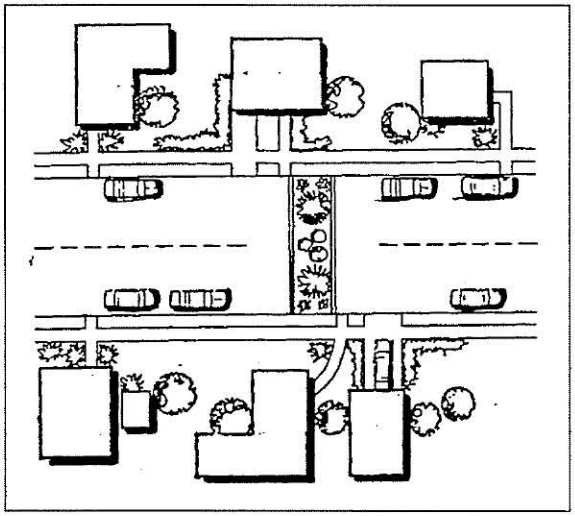
Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	Little or no effect
Speed	May reduce speed at intersection
Traffic Noise and Air	Little or no effect
Traffic Safety	May decreases vehicle conflicts at intersection
Advantages	• Reduces speed at intersection approach • Reduces vehicle conflicts at intersection • Provides equal access to intersection for all drivers • Does not restrict access to residents • Can be landscaped
Disadvantages	• Some parking restrictions required • Local experience has found these devices to be ineffective • Can restrict access for trucks, buses and may increase emergency vehicle response time • Winter Maintenance
Problems Targeted	• Excessive speeds • Crash history at intersection
Design	• A minimum of 30 feet of curbside parking must be prohibited at each corner of the intersection

Street Closure

Purpose

A street closure, for the purpose of this tool box, is defined as closing a street either at one end or the other, or at a mid block location to eliminate unwanted through traffic.

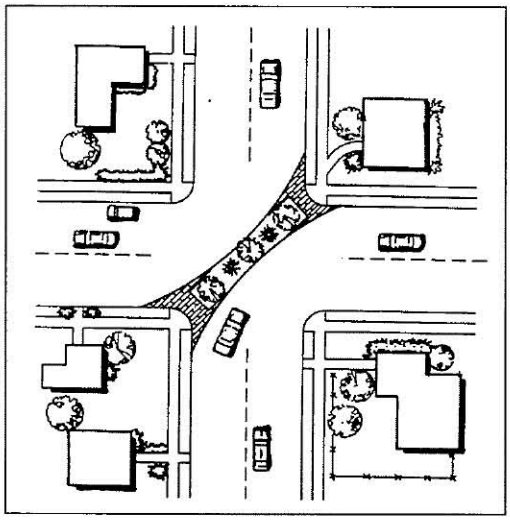


Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	Reduces through traffic volumes
Speed	May reduce speed
Traffic Noise and Air	Little to no effect
Traffic Safety	May improve safety of street
Advantages	• Eliminates through traffic • Possibly reduces speed of remaining vehicles • Can maintain pedestrian and bike access
Disadvantages	• Increases emergency vehicle response times • May cause inconvenience for some residents • May divert traffic to other streets • May require additional right-of-way acquisition • Winter maintenance
Problems Targeted	• Cut through traffic volumes
Design	• There needs to be a minimum of 120 foot right-of-way to accommodate the minimum turning radius of 40 feet.

Full / Diagonal Diverter

Purpose
A full diverter, sometimes called a diagonal diverter, is a raised barrier place diagonally across an intersection that physically divides the intersection and forces al traffic to make a sharp turn.

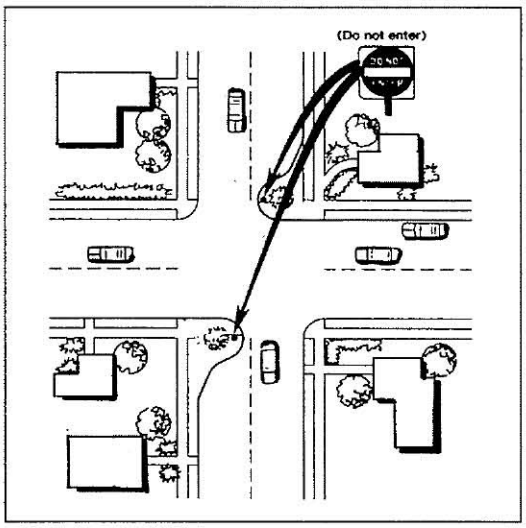


Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	May decrease traffic volumes
Speed	May reduce speed
Traffic Noise and Air	Little or no effect
Traffic Safety	Possible improvement
Advantages	• Reduces traffic volumes • Restricts vehicle access while maintaining bicycle and pedestrian access
Disadvantages	• Prohibits or limits access and movement • Restricts access for emergency vehicles • May impact drainage • May impact parking
Problems Targeted	• Cut through traffic • Speed – forces driver to slow to make the turn
Design	• The curvature of the diverter is dependent on the intersection roadway widths. • Special care needs to be taken with drainage design. • The intent is to divert traffic to arterial and collector streets. • Needs to be good visibility approaching the diverter for drivers to react and navigate the turn safely

Partial Diverter

Purpose
A partial-diverter is the narrowing of a two way street in order to eliminate one direction of travel. The concept can only be used at an intersection and attempts to reroute traffic attempting to use the protected street onto other roadways.



Source: Institute of Transportation Engineers *Traffic Calming: State of Practice*

Effects	
Volumes	Reduces traffic volumes in the eliminated direction
Speed	Possible speed reduction
Traffic Noise and Air	Little or no effect
Traffic Safety	Improved pedestrian crossing
Advantages	• Allows for movement of emergency vehicles • Reduces traffic volumes • Allows two-way traffic on the remainder of the street • Shorter pedestrian crossing at intersection
Disadvantages	• Parking may be impacted and reduced • Interrupts street network connectivity • Emergency vehicles do have to drive around partial closure with care
Problems Targeted	• Excessive volumes on residential street
Design	• Care has to be given in the design to not hinder unnecessarily emergency vehicles due to poor design

Appendix A

Petition

Appendix B

Resources on Traffic Calming

Traffic Calming State of the Practice, Institute of Transportation Engineers

Investigating the Effectiveness of Traffic Calming Strategies on Driver Behavior, Traffic Flow and Speed, Report 2002-02, Minnesota Local Road Research Board

Effective Traffic Calming Applications and Implementation, Report 1999-01, Minnesota Local Road Research Board

Neighborhood Traffic Control, North Central Section Institute of Transportation Engineers, December 1994

Minnesota Traffic Calming, MnDOT Local Road Research Board: www.mn-traffic-calming.org

Minnesota Department of Transportation/Speed Limits: www.dot.state.mn.us/speed/index.html

Appendix C

Glossary of Key Terms

85th Percentile	The speed at or below which 85 percent of vehicles surveyed travel. The measurement is one criteria used to set the speed limit on roadways.
10 mile per hour pace	Speed range representing the speeds of the largest percentage of vehicles in a speed survey.
Access	The ability to enter and/or exit a property, street or neighborhood.
Affected Neighborhood	Properties expected to receive the majority of the impacts from an implemented traffic management strategy.
Arterial	Roadway with emphasis on mobility over land access and connects cities with adjacent communities and the metropolitan highway system.
Capacity	The maximum number of vehicles that can use a given section of roadway during a given period of time.
Collector Street	A roadway that connects neighborhoods. Collector streets are shown on the current Road Classification map (Figure 4.10 Appendix D) in the Blaine Transportation Plan.
Correctable Crashes	Types of crashes which engineers are able to reduce through signal improvements, intersection geometry changes, traffic control devices, and access management techniques.
Cut-Through Traffic	Traffic using local streets to travel between neighborhoods instead of collector street.
Diversion	Traffic volumes that are moved from one street to another.
Impacted Area	Area that will receive the majority of the impacts from an implemented traffic management strategy including diversion of traffic volumes.
Local Street	A roadway that connects blocks within neighborhoods.
Transportation Plan	Plan adopted by the City of Blaine and used for planning of transportation infrastructure. www.ci.blaine.mn.us/_InsideCityHall/_PublicServices/_Engineering/_BlaineTransportationPlan/_BlaineTransportationPlan_Home.htm
Speed Survey	A survey of vehicles performed with radar to determine the speed at which they are traveling. The 85th percentile is determined by a speed survey.
State Aid Road	A designated roadway (City or County) which receives state funds for maintenance and construction. Additional rules and standard apply to these roadways.

Appendix D

Figure 4.10 - Recommended Roadway System

City of Blaine Transportation Plan

Petition for Traffic Management Strategy Implementation

The undersigned resident of properties bordering on: _____

Between the intersections of: _____ and _____

Brief Description of Traffic Related Problem: _____

_____

_____

Hereby request assistance with traffic related problems.

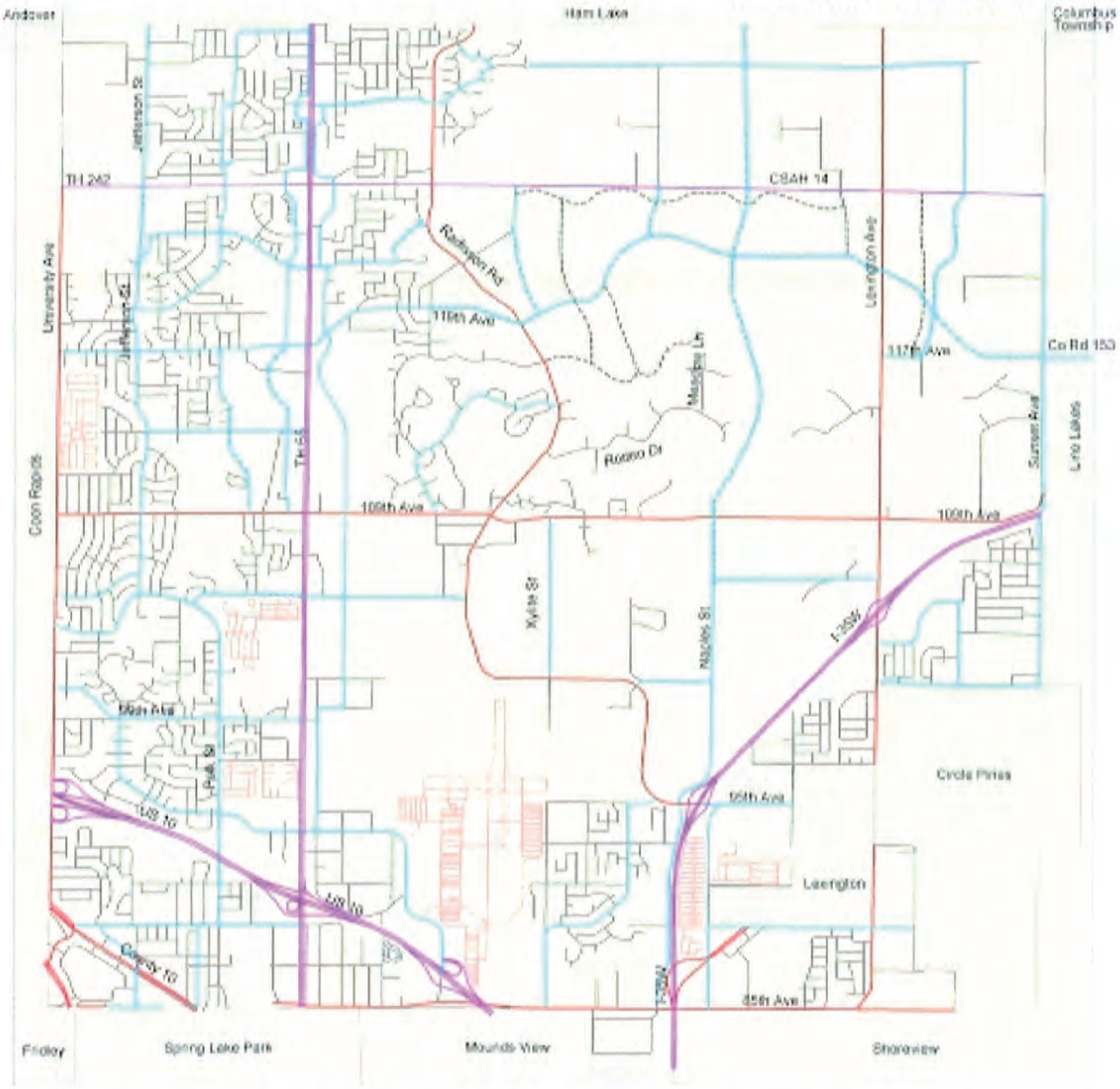
Signatories should understand that the City of Blaine has determined that affected residents shall bear 75% of the cost of installing traffic management strategies.

NAME (Signature)	Address (Include Apartment #)	Comments

Petition submitted by:

Name_____ _____Address_____Phone_____

Figure 4.10
Recommended Roadway System



Legend

Functional Road Classification
- Future Collector
- Collector
- Future Local Road
- Local Road
- Minor Arterial
- Principal Arterial
- Private Road
- Blaine Municipal Boundary

N

PARSONS

Blaine Transportation Plan