

**BOROUGH OF BRENTWOOD  
NEIGHBORHOOD TRAFFIC  
CALMING PROGRAM**

**Adopted on February 23, 2010  
Resolution No. 2010-25**



**Table of Contents**  
**Neighborhood Traffic Calming Program**

§192-01 Introduction ..... 1

    A. Background ..... 1

    B. Introduction to Traffic Calming Devices ..... 2

§192-02 Purpose Statement ..... 2

    A. Goals and Objectives..... 3

§192-03 Policy Statements ..... 4

    A. Emergency Response ..... 4

    B. Traffic Calming Devices..... 4

    C. Maintenance ..... 6

    D. Residential Focus..... 6

    E. Minimum Criteria and Prioritization Criteria ..... 8

    F. Funding ..... 10

    G. Traffic Calming Device Removal ..... 10

§192-04 Neighborhood Traffic Calming Process ..... 11

    A. Step 1 – Request/Screening..... 11

    B. Step 2 – Traffic Calming Plan Development ..... 13

    C. Step 3 – Approval Process ..... 14

    D. Step 4 – Installation and Evaluation ..... 15

Appendix

Appendix A – Traffic Calming Policies

Appendix B – Traffic Calming Toolbox

## **§ 192-01 INTRODUCTION**

Some experts claim that speeding traffic is a social issue and behavioral problem that cannot be addressed through engineering or enforcement. These experts point out the paradox of human behavior in which a resident wants drivers to drive slowly on their street, however that same resident will speed in other residential areas. They believe that until this issue of human behavior is addressed, speeding problems will persist. Although this may be true to a certain degree, many local governments around the world have experienced some success with traditional traffic calming programs.

### **A. BACKGROUND**

The Borough receives numerous requests, complaints and suggestions from residents about traffic related issues. In 2008, the Borough Council inquired about the use of speed humps and other traffic calming measures to address excessive speeding vehicles and cut-through traffic in residential neighborhoods. From these inquiries the Brentwood Police Department has initiated increased focus on speeding citations and other traffic related citations in the hopes of curtailing some of the speeding throughout the Borough's residential neighborhoods. However, there is a high demand for enforcement all over the Borough and it is not very efficient to conduct enforcement on low volume residential streets. Sometimes enforcement works only on a temporary basis and there is a need for more permanent measures to reduce the speed of vehicles and discourage cut-through traffic on low volume residential streets.

The idea of utilizing traffic calming devices was raised again by the Borough Council in 2009 when concerns were raised by residents on Bauman Avenue that speeding has increased on Bauman Avenue. At the May 26, 2009 Council meeting, Council decided to direct staff to develop a Neighborhood Traffic Calming Policy that could be applied to residential neighborhoods borough wide.

This program is the product of Council's direction. The aim of the Neighborhood Traffic Calming Policy is to provide one comprehensive program that guides the use of engineering tools, commonly known as traffic calming devices, in responding to neighborhood traffic issues.

## **B. INTRODUCTION TO TRAFFIC CALMING DEVICES**

The Institute of Transportation Engineers defines traffic calming as follows: “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 devices can generally be divided into 4 categories: 1) Vertical deflection, 2) Horizontal shifts, 3) Constrictions and 4) Diverters & Closures. Examples of each of these devices are shown in Appendix B, “Traffic Calming Toolbox”.

Vertical deflection devices deflect the path of a vehicle in a vertical direction. These measures require motorists to slow considerably to minimize the impact when the vehicle passes over the device. Vertical deflection devices include speed humps, raised crosswalks and raised intersections.

Horizontal shift devices shift the path of a vehicle in a horizontal direction, forcing motorists to slow to maneuver around the devices. Horizontal shifts have a secondary effect in that they tend to break up the straight sight lines of a roadway, which in turn slows motorists by reducing the comfortable speed of travel. Examples include traffic circles, chicanes, and medians.

Constriction devices narrow the roadway and slow motorists by reducing the comfortable speed of travel. Constrictions include curb extensions, neckdowns and chokers. Other types of more passive constrictions are on-street parking, narrowed lanes and the addition of bicycle lanes.

Traffic diverters, street closures, and turn restrictions are another type of traffic calming measure. These are generally measures that alter the transportation circulation system by prohibiting access to existing streets.

Some agencies have had traffic calming programs for several decades now. Many of these programs have been successful. However, some agencies have since set up traffic calming removal programs and set moratoriums on implementing new devices. This movement is largely contributed to the proliferation of extremely restrictive traffic calming devices across an agency without due regard for the movement of traffic and the cumulative impacts. Therefore, it is particularly important to determine the need and appropriateness of devices as part of the traffic calming policy in order to reduce the likelihood of later implementing a traffic calming removal policy.

### **§ 192-02 PURPOSE STATEMENT**

The purpose of the Neighborhood Traffic Calming Policy is to improve livability and quality of life within residential neighborhoods through the deployment of traffic calming devices. This is accomplished by the following program steps:

- Define a process to evaluate neighborhood concerns.
- Identify criteria to implement various methods to calm traffic.
- Establish the means to pay for and maintain the devices.
- Prioritize the deployment of traffic calming devices.
- Implement the program through the Capital Improvement Program.

## **A. GOALS AND OBJECTIVES**

The Borough of Brentwood continually strives to ensure overall safety, protect its neighborhoods and improve the quality of life for its residents. Traffic conditions on residential streets certainly affect neighborhood livability and one's sense of community. Traffic that is traveling at inappropriate speeds and commuter traffic that is inappropriately using residential roadways can adversely affect a resident's quality of life.

However, implementing traffic calming measures is not a solution for all speeding and cut-through traffic woes. Each neighborhood may have its own unique set of problems that must be analyzed to identify solutions. This program was developed to guide Borough staff and inform residents about the processes and procedures for implementing traffic calming measures on residential streets. Under this policy, staff will work with residents to identify traffic issues in their neighborhoods and seek appropriate solutions.

The goal of the Neighborhood Traffic Calming Policy is to implement measures identified by a consensus of the neighborhood to affect driver behavior in such a way that improves safety and the quality of life for residents, pedestrians, bicyclists and other non-drivers. This goal is to be balanced with the Borough's goal to provide quick emergency response times for emergency vehicles including fire trucks, police and ambulances.

The objectives are as follows:

- Reduce vehicle speeds on residential streets.
- Discourage cut-through traffic.
- Promote conditions that encourage bicycle and pedestrian travel.
- Create attractive streetscapes in neighborhoods.
- Provide clear guidelines of the process to evaluate traffic calming measures.
- Encourage citizen involvement in all phases of neighborhood traffic calming activities.
- Make efficient use of Borough resources by prioritizing traffic calming requests.

It should be noted that it is not the intent of this program to change the classification of roadways. Residential collector streets are designed to carry more traffic than local residential streets and are typically streets that provide access between local streets and arterial streets. It must be recognized that not all residential streets can mimic the traffic conditions of a cul-de-sac and it is not the goal of this program to achieve those conditions.

The steps of this Program involve: request from the neighborhood identifying a traffic calming issue, review and evaluation of the request to determine eligibility, analysis and development of potential traffic calming measures, review and agreement on appropriate measures for implementation by the Borough and the neighborhood, and implementation of the selected measures by the Borough.

## § 192-03 POLICY STATEMENTS

### A. **Emergency Response**

A critical concern about the use of traffic calming devices is the delay they may create for emergency response vehicles, including fire engines, ambulances and law enforcement vehicles. It is important to be aware of the trade-offs when making decisions about the use of traffic calming devices. The more aggressive devices for slowing traffic will slow emergency vehicle response as well, and in some cases may cause safety concerns.

It is important to point out that fire trucks respond to many life threatening medical emergencies, such as heart attack victims, in addition to fire emergencies. Often, a fire truck is the first to respond to a medical emergency. Thus, to areas at the limits of current response times, any significant traffic calming devices will cause response time failures.

Recognizing the importance of limiting any delays in emergency response time, all traffic calming devices will be designed to accommodate all emergency vehicles and to minimize its impacts on emergency vehicle response times. Most arterial and collector streets are considered primary emergency vehicle response routes and are used to access various parts of the Borough from the fire station. In order to minimize impacts to emergency vehicle response times, particular attention should be paid to the types of devices used on collector streets.

Devices that considerably limit or restrict emergency vehicle access on collector streets will not be allowed.

#### **Emergency Response Policies:**

##### Policy No. 1

- Traffic calming measures shall be designed to accommodate all emergency vehicles and to minimize their impacts on emergency vehicle response times.

##### Policy No. 2

- Traffic calming measures shall be limited on primary response routes.

##### Policy No. 3

- The Fire Department and the Police Department should be involved in the development of the traffic calming measures in neighborhoods and should approve all proposed plans.

### B. **Traffic Calming Devices**

There are a few basic types of traffic calming devices that have different effects on the motoring public. It is important to understand how each type of device works and its impacts on motorists and emergency vehicles. The following discussion is divided to explain each type of device and the associated policies.

*Horizontal shift devices* include traffic circles, chicanes, and medians. *Constriction devices* include curb extensions, neckdowns and chokers. Both horizontal shift and constriction devices slow traffic by physically forcing motorists to maneuver around the devices. The use of landscaping within these devices not only enhances the aesthetics of the streetscape but also increases their effectiveness by breaking up the motorist's line of sight, which reduces the comfortable speed of travel. Therefore, these devices, when used in conjunction with one another, are effective for a longer stretch of roadway rather than just in the immediate vicinity of the device. These devices

also tend to have relatively lower impacts on emergency response times in that the vehicles can continue to move around the devices without stopping. However, use of these devices usually requires prohibition of on-street parking adjacent to the device.

**Policies on Horizontal Shift and Constriction Devices:**

Policy No. 4

- No Horizontal shift and constriction devices such as medians, traffic circles, and chokers shall be used as acceptable traffic calming devices.

Policy No. 5

- Residents fronting the proposed devices must approve any required parking restrictions.

*Vertical deflection devices* include speed lumps, speed humps, speed tables, and raised crosswalks and intersections. The only vertical deflection device that is included in this program is the speed lump. Speed lumps are similar to speed humps, except they are divided into three lumps with one foot of space between each lump. The space between the lumps is specifically designed to accommodate the axle width of fire trucks. All other vehicles with smaller axle widths have to go over the humps from at least one side of the vehicle. Speed lumps are typically 12 to 14 feet long and 3 inches high.

One of the concerns associated with speed lumps is the potential increased noise in the immediate area where the speed lumps are installed because of braking and accelerating vehicles. It is important that residents immediately adjacent to the speed lumps concur to their installation.

**Policies on Vertical Deflection Devices:**

Policy No. 6

- Speed lumps and raised cross walks are the only approved vertical deflection devices to be used.

Policy No. 7

- Residents fronting the proposed speed lump or raised cross-walk must give their approval prior to installation.

*Diverters, street closures, and turn restrictions* are measures that alter the existing transportation circulation system. In developing a solution it is important not to shift the problem to another neighborhood. Turn restrictions and street closures can cause a tremendous amount of traffic diversion over a wide area. These types of measures have impacts that would need to be evaluated in a greater scope than just within a particular neighborhood. The impacts would include the environmental impacts due to changing the transportation circulation system. Many other boroughs have policies that ban or discourage street closures. For these reasons, diverters, closures and turn restrictions are not to be used as traffic calming measures. However, the use of diverters, street closures and turn restrictions may be used outside of this program and should be evaluated as part of a larger area-wide study if their use is to be considered.

### **Policy on Diverters and Closures:**

#### Policy No. 8

- Diverters, street closures, and turn restrictions shall not be used as part of this program.

**Stop signs** are not traffic calming devices. Residents, however, often request stop signs in an effort to calm traffic. Although residents believe that stop signs will reduce vehicle speeds, studies have shown that vehicle speeds after the vehicle has passed through the stop controlled intersection are as high, and occasionally higher, than without a stop sign, as motorists try to “make up” time lost at the stop sign. The acceleration and deceleration near stop signs generates noise and adversely affects air quality.

Inappropriate use of stop signs also creates significant adverse impact to emergency vehicles. Emergency vehicles are required to verify that a stop controlled intersection is clear of vehicles prior to entering. Many times this means that the emergency vehicle must nearly come to a stop. The delay to an emergency vehicle at a stop sign is similar to that caused by a vertical deflection device.

Stop signs are traffic control devices that should be used when appropriate to assign right-of-way to conflicting traffic movements, not to calm traffic. Stop signs should be installed only at locations where conditions meet established criteria, which has been the past practice of the Borough. Studies have shown that stop signs that do not meet established criteria (known as unwarranted stop signs) have a higher violation rate. Unwarranted stop signs also create disrespect of traffic control devices in general and affect behavior at other stop controlled intersections. It is for these many reasons that unwarranted stop signs are not to be used in this program.

### **Policy on Stop Signs:**

#### Policy No. 9

- Unwarranted stop signs **shall not** be used as a part of this program.

### **C. Maintenance**

Many traffic calming devices alter the geometry of the roadway. Poorly designed traffic calming devices could interfere with street sweeping, snow removal, and other existing maintenance activities. This could have a negative effect on the appearance of the neighborhood and the residents’ quality of life.

### **Maintenance Policies:**

#### Policy No. 10

- Traffic calming devices shall be designed to minimize adverse impacts to street sweeping, snow removal, and other maintenance activities.

#### Policy No. 11

- The development of traffic calming devices should be coordinated with the Borough’s Public Works Department.

### **D. Residential Focus**

This program is focused on residential areas since the purpose of the program is to improve quality of life of residents. Only local residential and residential 2-lane collector streets will be considered in this program. Arterial streets are specifically excluded from this program because the nature of

arterial streets is to move large numbers of vehicles in a relatively free-flowing manner. Actually, non-neighborhood traffic is encouraged to use arterial streets in order to reduce cut-through traffic in the neighborhoods.

Diverted traffic must also be considered when evaluating traffic calming measures. In developing a solution for one traffic problem, it is important not to shift the problem to another neighborhood or other residential streets within the neighborhood. Therefore, it is necessary to identify a neighborhood boundary to study the effects of proposed traffic calming devices.

Neighborhood participation is important in order to develop a consensus of the issues that adversely affect the neighborhood, evaluate the pros and cons of the various traffic calming measures and ensure that the issues are adequately addressed. It is essential to consider a wide range of perspectives and observations in addition to engineering data. The program is designed so that residents can become actively involved in defining the problem(s) and in the decision-making process in order to have a sense of ownership of the outcome.

In addition to neighborhood participation, it is important that the process reflects the opinions of a majority of the residents and not just a few vocal residents. This is implemented through the use of a petition that must be signed by at least **80% of the households** within the neighborhood to initiate the traffic calming process. A preliminary neighborhood meeting will be held to discuss the traffic calming program prior to requiring the **80% petition**. Another petition is required to implement the proposed traffic calming devices. This second petition is needed in order to be sure there is enough support for approval of an assessment district. This is discussed in more detail under funding.

#### **Residential Focus Policies:**

##### Policy No. 12

- Traffic calming measures will only be considered on local residential and residential 2-lane collector streets.

##### Policy No. 13

- Traffic calming measures shall not be used on arterial streets or non-residential streets.

##### Policy No. 14

- Minimize diverted traffic to other local or residential collector streets.

##### Policy No. 15

- Borough staff will identify neighborhood study areas in order to evaluate the potential of diverted traffic.

##### Policy No. 16

- Maintain or improve the aesthetics of the streetscape through landscaping and hardscaping treatments.

##### Policy No. 17

- Residents within the neighborhood should be encouraged to participate in the identification of the issues as well as the development of the solution.

Policy No. 18

- Require a positive response from at least **80% of the households** within the identified neighborhood boundary to initiate the traffic calming process and also to approve the permanent installation of traffic calming devices.

**E. Minimum Criteria and Prioritization Criteria**

The need to prioritize projects arises when the demand for traffic calming exceeds Borough resources. This includes staff time to work on the project as well as construction funding. A common approach used by most other boroughs to efficiently utilize borough resources is to prioritize projects so that the neighborhoods with the greater problems are addressed first. Since most neighborhood traffic problems involve speeding vehicles or a high volume of vehicles relative to the street type, these criteria are weighted heavier in the ranking. Another factor that is considered in defining the extent of the problem is the average annual reported accidents. Also, the impact traffic will have on a neighborhood depends upon the character of the street in the neighborhood and the amount of pedestrian activity within the neighborhood. Streets that have a greater percentage of fronting homes, schools, parks or other public facilities are impacted more than streets that are lined with backing lot treatments. Neighborhoods that have a higher number of pedestrian generators, such as parks, schools and other public facilities, will be impacted greater than those neighborhoods without pedestrian generators. Due to the high concentration of school-aged pedestrians and localized traffic congestion associated with elementary, middle and high schools, these pedestrian generators are weighted double that of other non-school pedestrian generators. The prioritization criteria are also used to determine how the project should be funded. This is discussed in more detail under funding.

In addition to prioritizing projects, it is necessary to provide some minimum criteria that must be met in order for a neighborhood to qualify for traffic calming measures. These minimum criteria ensure that Borough staff and financial resources are used efficiently by not spending resources on streets that do not have a significant traffic problem and to avoid creating unmet expectations by having a long list of projects that may never get built. These minimum criteria are based on vehicle speeds and volumes.

For the purposes of the minimum and prioritization criteria, the data collected will be rounded up to the nearest whole number.

**Minimum Criteria and Prioritization Criteria Policies:**

Policy No. 19

- The minimum criteria to be used to determine if a street is eligible for traffic calming devices is as follows:

Speed –85th percentile speed (critical speed) is at least **30 mph**

Volume –Average daily traffic is at least **2 times the number of households in the study area.**

Policy No. 20

- The prioritization scoring criteria allows 20 maximum points and is as follows:

**Speed**

85 <sup>th</sup> percentile speed (critical speed)	Points
31 mph	2
32 mph	4
33 mph	6
34 mph	8
35 mph or more	10 maximum

**Accident History** - One point per accident susceptible to correction by traffic calming device, using the average annual accidents over past 3 years (5 points maximum)

**Fronting Uses (including homes, schools, parks & public facilities)**

Percentage of the street that has fronting uses	Points
10% or less	1
11 – 25 %	2
26 – 50%	3
51 – 75%	4
75 – 100%	5 maximum

**Pedestrian Generators (such as parks, schools, public facilities, not including homes)\***

Number of pedestrian generators within neighborhood boundary	Points
1	1
2	2
3	3
4	4
5 or more	5 maximum

\* Elementary, middle and high schools will be weighted double points in this category.

## **F. Funding**

**Administration Costs** - Administration costs include staff time to collect and analyze data, prioritize requests, conduct neighborhood meetings and design the traffic calming devices. These costs would be covered under normal operating budgets using existing staff.

**Capital Financing** – The construction costs of traffic calming devices will be budgeted annually as part of the Capital Improvement Fund.

The issue of traffic calming removal should not be dismissed as minor. Some agencies that have had traffic calming programs for several decades have now implemented traffic calming removal programs. The Borough can stretch its budget to cover more projects to more neighborhoods.

**Operations and Maintenance Financing** – The Borough will be responsible for the operations and maintenance costs associated with the Traffic Calming Device.

### **Funding Policies:**

#### Policy No. 21

- The Borough shall budget an allocation each year to the Capital Improvement Fund for the implementation costs associated with a traffic calming device.

#### Policy No. 22

- The Borough shall be responsible for all associated maintenance costs.

## **G. Traffic Calming Device Removal**

Although there are many policies and steps incorporated in the program to avoid the scenario whereby a neighborhood requests to have traffic calming devices removed, it is acknowledged that this may occur. In order for traffic calming devices to be removed from a neighborhood, the same process of neighborhood meetings and consensus requirements should be met. A neighborhood meeting would be held to discuss the issues and the impacts of traffic calming removal. A petition to garner 60% approval would need to be circulated within the original neighborhood boundary that installed the traffic calming device initially. The costs of removing traffic calming devices would be paid 100% by the Borough.

### **Removal Policies:**

#### Policy No. 23

- Require a positive response from at least 60% of the households within the original neighborhood boundary to remove traffic calming device.

#### Policy No. 24

- The Borough shall be responsible for all costs associated with the removal of any traffic calming device.

**§ 192-04      NEIGHBORHOOD TRAFFIC CALMING PROCESS**

**A.      Step 1 -- Request/Screening**

This step describes the method in which a request for a traffic calming project will be submitted and how this request will be reviewed to determine eligibility for development of a traffic calming project.

**Request from Residents**

An individual resident or a group of residents may submit a written request to the Borough of Brentwood, specifying the street(s) and type of concern.

**Determining Request Eligibility**

The request must be accompanied by a written petition, signed by residents from at least 80% of the households in the immediate vicinity of the location that is of concern.

Only Borough local and collector streets, as defined by the Borough's Roadway Classification system, are eligible for consideration.

**Define Study Area and Conduct Data Collection**

The Borough will determine if the request should be further evaluated and if the location is eligible for consideration. The Borough will first define and approve the study area based on input from the resident(s).

The process is divided into two distinct tiers, with Tier 1 being the existing police procedures and enforcement and Tier 2 being the Neighborhood Traffic Calming Program.

Tier 1 Analysis

First, staff will conduct a Tier 1 analysis. This may include data collection including traffic counts, speed surveys, collision history and pedestrian observations. Staff may recommend that the identified problem may be easily reduced or alleviated with Tier 1 implementation measures. (i.e., increased police presence). Tier 1 implementation measures are usually low cost tools, primarily consisting of education, enforcement and some engineering. Tier 1 implementation measures include:

- targeted enforcement
- improving sight distance by trimming landscaping
- appropriate additional signing, striping or pavement markings
- educational outreach
- placement of the radar speed trailer

If after 3 months, Tier 1 measures do not have a positive affect on traffic and the resident still has a concern, the resident(s) can request to move the request forward to Tier 2. If staff does not recommend the use of Tier 1 measures or the Tier 1 measures have already been implemented without the desired effect, the request may move directly to Tier 2.

### Tier 2 Analysis

In order for a request to be considered for Tier 2, the existing traffic conditions must meet the minimum criteria as stated in Policy 19. If these minimum criteria are not met, the request may not proceed for Tier 2 analysis.

If more than one (1) request is received, the requests are then prioritized for study among other requests utilizing the prioritization criteria as stated in Policy 20. Prioritizing requests provides clear guidelines to staff on how to manage the limited resources effectively by dealing with neighborhoods that have the most pressing issues first.

### Preliminary Neighborhood Meeting

A preliminary neighborhood meeting will be held and all of the residents within the boundary will be notified. The purpose of this first meeting is to listen to the concerns of the residents, discuss the traffic calming program and process, the use of traffic calming devices and the potential fiscal impacts. This will mostly be an educational meeting, both for staff to learn the concerns of the residents and for the residents to learn of the traffic calming process and its implications. This meeting is purposely held prior to the circulation of the initial petition so that the residents are more educated about the process that they are being asked to support. At this meeting, it is required that a neighborhood captain or neighborhood working group be identified in order to coordinate the future outreach efforts within the neighborhood.

### Neighborhood Petition

Since traffic calming measures impact many people in the neighborhood and the measures tend to be costly, it is necessary to determine if there is adequate support for the process before continuing. Therefore, a petition requesting initiation of the Tier 2 process must be signed by at **least 80% of the households within the neighborhood boundary**. The neighborhood captain or the neighborhood working group will need to coordinate this effort. If at **least 80% of the households** do not sign the petition, the request may not proceed. For the purposes of this program, a household is defined as any owned or rented living unit with its own street address, regardless of how many people live in each unit. Each household is represented by one signature.

### Data Collection Plan

If at least 80% of the households in the study area sign the petition the Borough may proceed with the Tier 2 process. The Borough then approves data collection plan based on the recommendation of the Borough's Traffic Consultant at a meeting of the Borough Council, to which residents of the affected neighborhood are invited. The data collection plan may include speed studies, automatic traffic recorder counts, intersection turning movement counts and origin/destination surveys.

The Borough and/or Traffic Consultant will collect data in the defined study area. As appropriate, residents from the affected neighborhood may be required to participate in the data collection process. Traffic data collection will be performed on Tuesdays, Wednesdays and/or Thursdays, between the beginning of the school year and the end of the school year. In special situations where the identified problem occurs specifically outside the school year the BOROUGH may approve collection of data outside of the school year.

**Determine if Data Collected Meets Criteria for Development of Traffic Calming Plan**

The collected traffic data will be compared to the criteria as stated in Policy 19 and in the following Table 1 to determine eligibility for development of a traffic calming plan.

**TABLE 1 – TRAFFIC DATA CRITERIA**

<b>Roadway Classification</b>	<b>Warrant</b>	<b>Threshold<sup>(1)</sup></b>
Local Street	Average Weekday Daily Traffic Volume <sup>(2)</sup> (24-hour)	Vehicles per day = 2 times the number of house-holds in study area.
	85 <sup>th</sup> Percentile Speed <sup>(3)</sup>	5 mph > posted speed limit
Collector Street	Average Weekday Daily Traffic Volume (24-hour)	5,000 vehicles per day
	85 <sup>th</sup> Percentile Speed	5 mph > posted speed limit

1. Threshold volumes are two-way volumes.
2. Average Weekday Daily Traffic (AWDT) Volume is defined as the total volume of vehicular traffic during a typical 24-hour weekday. The AWDT volume is calculated by taking the total volume of traffic during a number of whole days – more than 1 day and less than 1 year – divided by the number of days in that period.
3. 85th Percentile Speed is defined as the speed on a roadway, at or below which 85 percent of the motor vehicles travel.

If the traffic data meets or exceeds one or more of the above criteria, the study location may be considered eligible for development of a traffic calming plan to address the goals of reducing daily traffic volumes, speeds or hourly traffic volumes, or some combination of these goals.

**B. Step 2 – Traffic Calming Plan Development**

This step will involve developing a traffic calming plan to meet the study’s specific goals and obtaining consensus from the neighborhood regarding the goals as developed in Step 1 of the plan. The BOROUGH will review and recommend the plan.

The Traffic Consultant will develop one or several optional plans to address the goals for the neighborhood, as well as design guidelines for their installation. The plans may only utilize those traffic calming devices identified in this policy.

A number of design factors may affect the feasibility of traffic calming measures. These may include steep roadway grades, horizontal/vertical curvature of the roadway, proximity to other signalized/unsignalized intersections and drainage. In addition, other issues such as, snow removal, emergency response delays/access, additional noise, increase in accidents and on-street parking removal could affect the implementation and effectiveness of traffic calming measures.

The plan will be presented at a Borough Council meeting. The meeting will be publicized via the Borough's various informational media. The Emergency Response agencies shall also be given the opportunity to review and provide comment on the proposed plan.

A consensus is developed within the neighborhood as to which option is preferred. The BOROUGH may use any of the following options to determine consensus.

1. The Public Safety Committee may appoint a committee of residents from the neighborhood to help develop alternatives for implementation of traffic calming devices and their fiscal impacts.
2. A second neighborhood meeting will be held to discuss study results, implementation of permanent measures, neighborhood approval requirements and funding scenarios.
3. Once the permanent project is finalized, a neighborhood vote is required to approve the traffic calming project. This vote requires a positive response from at least 80% of the households.
4. If the proposed plan (Calming Device Method) is approved, the Public Safety Committee may only then recommend the plan to the Brentwood Borough Council.

**C. Step 3 – Approval Process**

This step requires the Brentwood Borough Council to review and approve the plan, either as recommended or with imposed modifications.

The Brentwood Borough Council shall obtain public input by one of the following options:

1. Conduct a public hearing and solicit input.
2. Conduct another neighborhood survey for approval with a threshold requirement of greater than 80 percent of the residents in favor required for approval.

The Brentwood Borough Council may approve the plan, modify the plan or reject the plan with an option of sending a rejected plan back to the Public Safety Committee for further consideration. The Brentwood Borough Council will determine if the cost for implementation of the plan is within the Borough's budget established for the current year. If funding is not available, the plan may be deferred to a future year. If the plan is approved, the Brentwood Borough Council shall authorize its design and implementation on either a permanent or trial basis.

**D. Step 4 – Installation and Evaluation**

This step involves installing the traffic calming devices, determining their effectiveness and reporting the results to the Public Safety Committee and Borough Council.

1. After funding is allocated, the traffic engineering study and environmental review of the project will be conducted. Plans and specifications will be prepared if needed. Then the project will be advertised for construction/installation if needed. It is expected that construction would be completed within 12 months of Borough Council approval.
2. The devices are installed as either permanent or temporary devices as described in the approved plan.
3. The temporary devices will be tested during the test period that was established during the approval step, as detailed in the approved plan. Data is collected at predetermined locations and time intervals to determine if the devices meet the goals. Permanent installations may also be tested if the plan establishes the need.
4. After the test period is completed a report is prepared with the data collection results and submitted to the Public Safety Committee.
5. The report will be presented at a Public Safety Committee meeting.
6. If the devices are permanent and the Public Safety Committee determines that the results meet the intended goal, no further action will be taken.
7. If the devices are temporary, the Public Safety Committee will recommend to the Brentwood Borough Council that the devices should be removed, modified or permanently installed.
8. The Brentwood Borough Council shall determine through a public meeting or other means, if the temporary devices are to be removed, modified or made permanent.

## APPENDIX A

### Traffic Calming Policies For use in the Neighborhood Traffic Calming Program

#### Emergency Response Policies:

##### Policy No. 1

- Traffic calming measures shall be designed to accommodate all emergency vehicles and to minimize their impacts on emergency vehicle response times.

##### Policy No. 2

- Traffic calming measures shall be limited on primary response routes.

##### Policy No. 3

- The Fire Department and the Police Department should be involved in the development of the traffic calming measures in neighborhoods and should approve all proposed plans.

#### Policies on Horizontal Shift and Constriction Devices:

##### Policy No. 4

- No Horizontal shift and constriction devices such as medians, traffic circles, and chokers shall be used as acceptable traffic calming devices.

##### Policy No. 5

- Residents fronting the proposed devices must approve any required parking restrictions.

#### Policies on Vertical Deflection Devices:

##### Policy No. 6

- Speed lumps and raised cross walks are the only approved vertical deflection devices to be used.

##### Policy No. 7

- Residents fronting the proposed speed lump or raised cross-walk must give their approval prior to installation.

#### Policy on Diverters and Closures:

##### Policy No. 8

- Diverters, street closures, and turn restrictions shall not be used as part of this program.

#### Policy on Stop Signs:

##### Policy No. 9

- Unwarranted stop signs **shall not** be used as a part of this program.

## **Maintenance Policies:**

### Policy No. 10

- Traffic calming devices shall be designed to minimize adverse impacts to street sweeping, snow removal, and other maintenance activities.

### Policy No. 11

- The development of traffic calming devices should be coordinated with the Borough's Public Works Department.

## **Residential Focus Policies:**

### Policy No. 12

- Traffic calming measures will only be considered on local residential and residential 2-lane collector streets.

### Policy No. 13

- Traffic calming measures shall not be used on arterial streets or non-residential streets.

### Policy No. 14

- Minimize diverted traffic to other local or residential collector streets.

### Policy No. 15

- Borough staff will identify neighborhood study areas in order to evaluate the potential of diverted traffic.

### Policy No. 16

- Maintain or improve the aesthetics of the streetscape through landscaping and hardscaping treatments.

### Policy No. 17

- Residents within the neighborhood should be encouraged to participate in the identification of the issues as well as the development of the solution.

### Policy No. 18

- Require a positive response from at least **80% of the households** within the identified neighborhood boundary to initiate the traffic calming process and also to approve the permanent installation of traffic calming devices.

## **Minimum Criteria and Prioritization Criteria Policies:**

### Policy No. 19

- The minimum criteria to be used to determine if a street is eligible for traffic calming devices is as follows:

Speed –85th percentile speed (critical speed) is at least **30 mph**

Volume –Average daily traffic is at least 2 times the number of households in the study area.

Policy No. 20

- The prioritization scoring criteria allows 20 maximum points and is as follows:

**Speed**

<b>85<sup>th</sup> percentile speed (critical speed)</b>	<b>Points</b>
31 mph	2
32 mph	4
33 mph	6
34 mph	8
35 mph or more	10 maximum

**Accident History** - One point per accident susceptible to correction by traffic calming device, using the average annual accidents over past 3 years (5 points maximum)

**Fronting Uses (including homes, schools, parks & public facilities)**

<b>Percentage of the street that has fronting uses</b>	<b>Points</b>
10% or less	1
11 – 25 %	2
26 – 50%	3
51 – 75%	4
75 – 100%	5 maximum

**Pedestrian Generators (such as parks, schools, public facilities, not including homes)\***

<b>Number of pedestrian generators within neighborhood boundary</b>	<b>Points</b>
1	1
2	2
3	3
4	4
5 or more	5 maximum

\* Elementary, middle and high schools will be weighted double points in this category.

**Funding Policies:**

Policy No. 21

- The Borough shall budget an allocation each year to the Capital Improvement Fund for the implementation costs associated with a traffic calming device.

Policy No. 22

- The Borough shall be responsible for all associated maintenance costs.

**Removal Policies:**

Policy No. 23

- Require a positive response from at least **80% of the households** within the original neighborhood boundary to remove traffic calming device.

Policy No. 24

- The Borough shall be responsible for all costs associated with the removal of any traffic calming device.

## APPENDIX B

### Traffic Calming Toolbox For use in the Neighborhood Traffic Calming Program

**Purpose:**

This toolbox was developed to provide guidance on the use of various traffic calming devices for use in the Borough of Brentwood. It is intended to be used in conjunction with the overall Neighborhood Traffic Calming Policy that outlines the goals, objectives, policies and procedures for addressing neighborhood traffic concerns in Brentwood. Each page provides the following information for different traffic calming devices:

**Description:**

An illustration and written description is provided for each device.

**Application:**

Each traffic calming device or tool is designed to address specific traffic calming issues. The application section outlines the common uses for each device.

**Advantages:**

Each tool included in the toolbox provides some advantages to traffic calming and to the quality of life in the neighborhood. The advantages sections outlines the positive impacts associated with each traffic calming measure.

**Disadvantages:**

Although each device included in the toolbox provides some positive aspects to traffic calming, each has negative impacts as well. The disadvantages are outlined so that tools can be evaluated for both their positive and negative effects.

**Variations:**

There are often several variations of specific traffic calming devices. Several of these are provided where they are appropriate.

**Considerations:**

This section offers a variety of issues that should be considered for each traffic calming measure. Emergency response and operational concerns are flagged in this section.

**Cost:**

The cost section is intended as a general guide to costs, using high, moderate and low designations for the different devices.

## **Traffic Calming Tools Recommended in the Program**

### **Enforcement and Monitoring**

- Targeted Speed Enforcement
- Speed Monitoring Radar Trailer
- Neighborhood Speed Watch

### **Signing and Striping**

- Speed Limit Sign
- Neighborhood Speed Watch Signs
- Roadway Striping

### **Pavement Texture and Color**

- Textured crosswalks or intersections
- Colored pavement in crosswalks

### **Vertical Deflection**

- Removable - Speed Lumps/Cushions

## **Traffic Calming Tools Not Recommended for use in the Program**

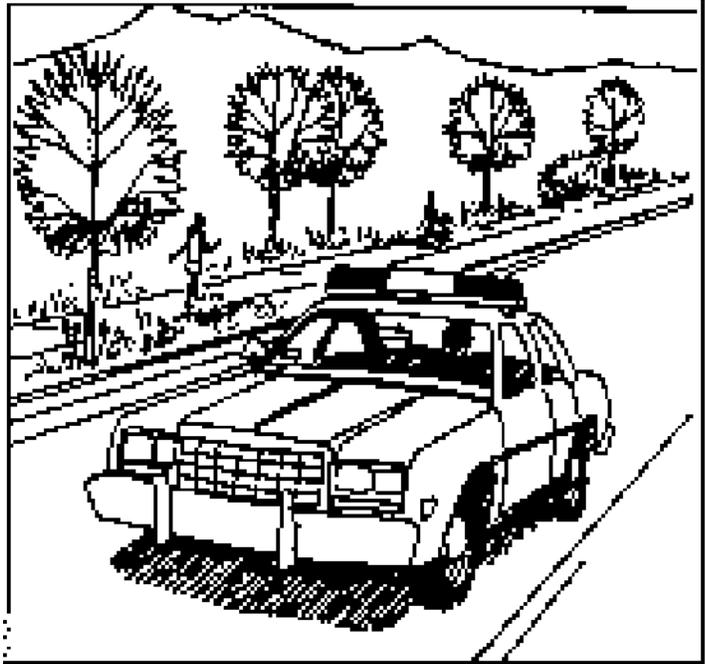
There are a few traffic calming tools that are not recommended to be included in this toolbox. They are discussed more extensively in the staff report. Generally, the tools that are in the toolbox offer more effective results in addressing the desired outcomes and have fewer negative impacts.

- **Rumble strips** are series of pavement bumps that create a "rumble" effect as cars drive over them. They are often used to alert drivers as they approach tolls on toll-ways or stop signs on highways in isolated areas. Rumble strips are not effective as speed control devices and do little or nothing to discourage cut-through traffic. In addition, due to the noise they generate, they would be inappropriate to use within neighborhoods.
- **Children at Play Signs** are commonly requested in neighborhoods; however, they are not standard traffic control devices and have not been found to be effective in improving the safety of children. Residential areas commonly have children and the presence of signs does not change driving behavior in the neighborhood. One of the disadvantages of the Children at Play sign is that they can create false sense of security, which can increase the potential for accidents and injuries. If the safety of children is the major concern in a neighborhood or at a specific location, there are more effective tools that can be used to improve safety.

- **Stop signs** are not traffic calming devices. Studies have shown that stop signs that do not meet established criteria have a higher violation rate. Studies also show that vehicle speeds after the vehicle has passed through an unwarranted stop controlled intersection are as high, and occasionally higher, than without a stop sign, as motorists try to “make up” time lost at the stop sign. The acceleration and deceleration near stop signs generates noise and adversely affect air quality. Inappropriate use of stop signs also creates significant delay to emergency vehicles since they are required to nearly come to a stop to verify that the intersection is clear of vehicles prior to entering.
- **Diverters, street closures, and turn restrictions** are measures that alter the existing transportation circulation system. In developing a solution it is important not to shift the problem to another neighborhood. Turn restrictions and street closures can cause a tremendous amount of traffic diversion over a wide area. These types of measures have impacts that would need to be evaluated in a greater scope than just within a particular neighborhood. The impacts would include the environmental impacts due to changing the transportation circulation system. Many other cities have policies that ban or discourage street closures. For these reasons, diverters, closures and turn restrictions are not recommended for use as traffic calming measures, but rather should be evaluated as part of a larger area-wide study if their use is to be considered.

## Enforcement and Monitoring

### TARGETED SPEED ENFORCEMENT



**Description:** Police presence to monitor speeds and issue formal or courtesy citations.

**Application:**

- Streets with documented speeding problem and need for quick mitigation.
- In conjunction with a Tier 1 Analysis.
- Locations where restrictions are being violated.
- Higher volume streets such as major and collector streets.

**Advantages:**

- Effective while officer actually monitoring traffic.
- Flexible measure that can be implemented in almost any location at short notice.
- Personal contact with educational opportunity.
- Visibility of marked patrol car or motorcycle encourages compliance.

**Disadvantages:**

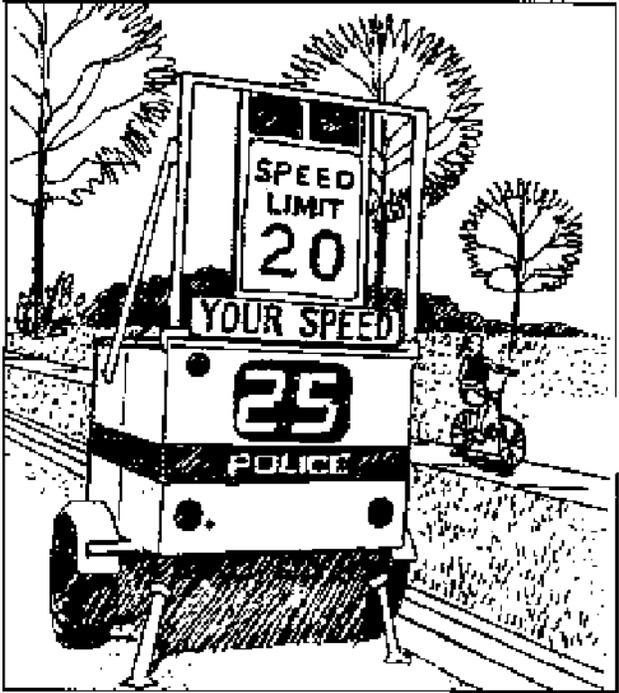
- Fines do not typically cover cost of enforcement.
- Disrupts efficient traffic flow on high volume streets.
- Short "memory effect" on motorists when enforcement officers no longer present.

**Special Considerations:**

- Often helpful in school zones.
- May be used during "learning period" when new devices or restrictions first implemented.
- Demand for enforcement is greater than available resources.

**Cost:** High cost primarily due to the staffing requirements.

## Enforcement and Monitoring



### **SPEED MONITORING RADAR TRAILER**

**Description:** Mobile trailer mounted radar display that informs drivers of their speed. Providing the posted speed limit on the device reminds drivers to slow down if they are traveling too fast.

**Application:**

- Any street where speeding is a problem.
- In conjunction with a Tier 1 Analysis.

**Advantages:**

- Educational tool.
- Good public relations.
- Less expensive than police enforcement.
- May be implemented immediately with little planning.
- Effective for temporary speed reduction needs.

**Disadvantages:**

- Duration of effectiveness may be limited.
- Only effective for one direction of travel at a time.
- May only be effective for short distances.
- Not self enforcing.

**Special Considerations:**

- Should not be used in remote areas.

**Cost:**

- Moderate cost to use due to staffing requirements.
- Expensive to enforce.

## **Enforcement and Monitoring**

### **NEIGHBORHOOD SPEED WATCH**

#### **Description:**

The purpose of the program is to increase motorist awareness of the 25 MPH speed limit on local streets and reduce speeds in our neighborhoods.

The program includes:

- Neighborhood Informational Canvass
- Fliers with accident and speed data and information on targeted enforcement.
- Neighborhood Speed Awareness Signs.
- Unique messages and graphics mounted on garbage cans by residents.
- Targeted Police Enforcement.
- Police enforce and issue citations during identified problem times.

#### **Application:**

- Any residential street where speeding is a problem
- In conjunction with a Tier 1 Analysis.

#### **Advantages:**

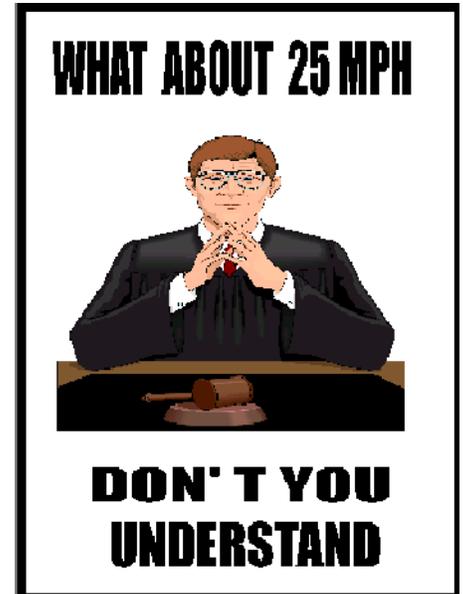
- Educational tool.
- Directly involves residents in the solution.
- Effective for temporary speed reduction needs.

#### **Disadvantages:**

- Duration of effectiveness may be limited

#### **Cost:**

- Expensive to enforce



## Signing and Striping

### **SPEED LIMIT SIGN**

#### **Description:**

Signs that define the legal driving speed under normal conditions

#### **Application:**

- Streets where speeding is a problem.
- In conjunction with a Tier 1 Analysis.

#### **Advantages:**

- Provides clear definition of legal speed limit.
- Provides context for enforcement efforts.
- Provides goal for traffic calming efforts.
- No impact to emergency response times.

#### **Disadvantages:**

- Typically not effective in and of themselves.
- Not self enforcing.
- Requires on-going police enforcement.
- Unrealistically low speed limits are difficult to enforce and tend to be disregarded.
- More visual pollution from signs in the neighborhood.

#### **Special Considerations:**

- Speed limits set by an engineering analysis tend to be higher than limits set by political pressures.

#### **Cost:**

- Low; inexpensive to install.
- High; expensive to enforce.



## Signing and Striping

### NEIGHBORHOOD SPEED WATCH SIGNS

#### **Description:**

Installed Speed Watch Area sign at both ends of the block. The signs will stay in place for two months, while the community participates in the program. The Speed Watch Area signs are meant to increase driver awareness of the neighborhood's concerns with speeding traffic.

Yard signs are intended to inform drivers that they are traveling on a neighborhood street and remind drivers to slow down. The sign features eye catching colors and the primary message "Slow Down". You may choose from three secondary messages: "Kids live here, keep 'em safe", "Drive like you live here", or "Respect our streets, respect our neighborhoods".



#### **Application:**

- Streets where speeding is a problem.
- In conjunction with a Tier 1 Analysis. **Advantages:**
- Readily available to be installed.
- May give the appearance that the street is being monitored.
- No impact to emergency response times.
- Inexpensive solution.



#### **Disadvantages:**

- Typically not effective in and of themselves.
- Not self enforcing.
- More visual pollution from signs in the neighborhood.

#### **Cost:**

- Low; inexpensive to install.
- High; expensive to enforce.

## **Signing and Striping**

### **ROADWAY STRIPING**

#### **Description:**

A center line strip to delineate travel paths. Roadway Cross/VASCAR striping across the roadway width and/or edge line markings used to delineate lane widths.

#### **Application:**

- Streets where speeding is a problem.
- In conjunction with a Tier 1 Analysis

#### **Advantages:**

- A center line stripe can be effective in channeling traffic and thereby reducing speeds.
- Cross striping gives the appearance of a Police monitoring presence and thus causes drivers to reduce speed.
- Edge line markings make the appearance of a reduced lane width and thus have the potential for reducing speeds.
- No impact to emergency response times.
- Low cost.

#### **Disadvantages:**

- Not self enforcing.
- Duration of effectiveness may be limited

#### **Cost:**

- Low; inexpensive to install.



## **Pavement Texture and Color**

### **TEXTURED CROSSWALKS**

#### **Description:**

Are ideal for residential applications. Can be made of interlocking paving stones, reinforced stamped concrete, bricks, cobble stones, coarse asphalt. Colors can also be included in the design to attract

attention. <http://www.students.bucknell.edu/projects/trafficcalming/endnotes.html>



#### **Application:**

- Streets where speeding is a problem.
- Tier 2 Option
- Can be used at cross walks to better define them and emphasize a pedestrian crossing.
- Locations where there is some special identity, such as where pedestrian traffic is frequent.

#### **Advantages:**

- Attracts the driver's attention visually, audibly, and physically.
- Add to the aesthetics of the area. Enhances the streetscape.
- No impact to emergency response times.

#### **Disadvantages:**

- Not self enforcing.
- Potential slight increase in road noise.
- Potential rise in maintenance costs if heavy vehicles are common and/or a stable base is not created.
- May increase noise as vehicles traverse the textured surface.

#### **Cost:**

- Low cost compared with other measures.
- Costs vary depending on material used and area to be covered but range from \$10,000 to \$25,000.
- Annual maintenance cost is \$250 - \$500.

## **Pavement Texture and Color**

### **COLORED PAVEMENTS IN CROSSWALKS**

#### **Description:**

Pavement can be installed with many different colors and patterns. These unique properties can slow drivers by forcing them to process different patterns as they approach an area. Colored pavement can also help delineate the separation between a travel lane and lanes that accommodate other modes of transportation.

#### **Application:**

- Streets where speeding is a problem.
- Tier 1 or Tier 2 Option
- Can be used at cross walks to better define them and emphasize a pedestrian crossing.
- Locations where there is some special identity, such as where pedestrian traffic is frequent.

#### **Advantages:**

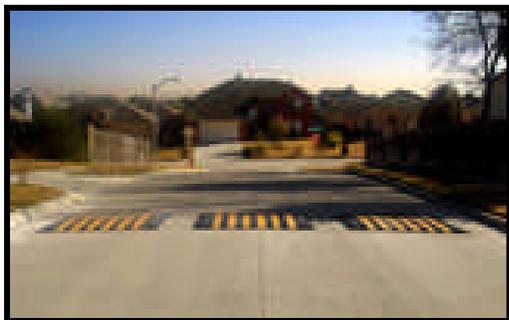
- May reduce speeds and volumes.
- Attracts the driver's attention visually, audibly, and physically.
- Add to the aesthetics of the area. Enhances the streetscape.
- Increases pedestrian safety.
- No impact to emergency response times.

#### **Disadvantages:**

- Not self enforcing.
- Can create vehicular hazards.
- Can make roadway features difficult to see if installed too densely.
- Potential rise in maintenance costs.
- Surface can be slick and hazardous to pedestrians and cyclists.

#### **Cost:**

- Low cost compared with other measures.
- Annual maintenance cost is \$100 - \$500.



## **Vertical Deflection**

### **REMOVABLE – SPEED LUMPS/CUSHIONS**

#### **Description:**

Speed lumps/cushions are the newest available traffic calming device, and perhaps the most innovative. Speed Cushions have several distinct advantages. Designed as three small speed humps, speed cushions effectively slow cars down. However, the wider axle of emergency vehicles allows them to pass without slowing down. In addition, speed cushions are more affordable than speed humps or tables since they require less material.

#### **Application:**

- Any two-lane residential street where speed control is desired.
- The street segment shall be improved with curb and gutter and at least 750 feet long
- Shall not be installed within at least 150 feet of the beginning or ending of a curve.
- Shall be spaced at a minimum of 100 feet from an intersection.
- Usually spaced 300 to 600 feet apart
- Could be used in conjunction with other approved traffic calming devices.
- The roadway longitudinal grade is 5% or less

#### **Advantages:**

- Effective in reducing speed.
- Can reduce vehicular volume.
- Prefabricated options can be easily installed and removed in winter or to relocate.

#### **Disadvantages:**

- Increases noise and air pollution near lumps/cushions.
- May cause slight delay on emergency response vehicles other than fire trucks.
- Not aesthetically pleasing.
- May divert traffic to parallel streets.
- May cause discomfort to motorists/passengers with spinal injuries.



#### **Special Considerations:**

- Require advance warning signs and object markers at lumps/cushions.
- Should be located adjacent to existing street lights.

#### **Cost:**

- Low to medium cost to install.