

WARRANT CRITERIA AND PRIORITIZATION OF TRAFFIC CALMING PROCESS*

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1. Abstract

Many residents have concerns about speeding in neighborhoods. Traffic calming provides a process for identifying and addressing existing problems related to speeding, excessive traffic volumes, and safety concerns on residential streets. Traffic calming is a way to manage traffic so that its negative impacts on residents and pedestrians are minimized. The objective of this research is to illustrate a comprehensive review of the traffic calming practices in the North America, Australia and South African community in order to establish a reasonable outline and scope for the traffic calming process. From the study it was found that most of the cities use point scoring system to prioritize traffic calming projects while they are having a warrant based system to check the minimum criteria to install a traffic calming device. 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. From the case study it can be seen that 85th percentile speed and average daily traffic volume are the main two factors that are considered for warrant or minimum requirement for a traffic calming device installation.

2. Introduction

Streets not only serve to connect us to the destinations we seek to reach, they also help to define the vitality, character, and livability of our neighborhoods. Speeding traffic hinders our ability to enjoy neighborhoods—creating noise and making it hard to walk, cycle or drive safely. The goal of traffic calming is to make our streets safer and more comfortable for all users and residents. Traffic calming is a term that has, in recent years, become synonymous with providing the means to slow vehicles, reduce cut-through traffic volumes and help achieve a livable community. Through the use of a variety of measures, physical or otherwise, traffic calming helps reduce the undesirable effects of the motor vehicle in residential neighborhoods. Thus the objective of this research is to perform a comprehensive review of the traffic calming practices in the North American and some of the international community in order to establish a reasonable outline and scope for the traffic calming process.

Traffic calming exercises were reviewed from manuals and practices of different North American and Australian jurisdictions to have clear understanding of the process. Requests for traffic calming measures are growing at a rate that is stretching the City's capacity to manage the problem effectively, which has created the need for a formal set of procedures for dealing with neighborhood traffic issues. A prioritization scheme or framework would be a critical component for the planning of traffic calming process. The issue of prioritizing projects arises whenever there is a greater demand for traffic calming than there is funding available.

3. Traffic Calming Solutions: Getting Started

Traffic calming involves implementing strategic measures to reduce vehicle speed, excessive traffic volume, cut-through traffic on residential streets, and other safety-related neighborhood traffic concerns. Residents may feel some problems regarding to traffic speed, volume or other safety concerns and they may request the city do something. Upon receiving a request, traffic calming process starts. Before beginning this process most of the cities studied in this research, inform residents that the neighborhood traffic calming program requires a great deal of commitment. Active citizen participation is a key to the success of all traffic calming projects. Experience in other cities has shown that traffic calming projects installed without strong neighborhood participation are frequently unsuccessful, requiring the removal of some or all measures.

If the requests for traffic calming exceed the city resource then the need to prioritize projects arises. 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 City staff and financial resources are used efficiently by not spending resources on streets that do not have a significant traffic problem. These minimum criteria are based on vehicle speeds and volumes.

How projects are prioritized for funding becomes an important policy consideration as the requests for traffic calming are increased. A common approach used by most cities to efficiently utilize city 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 and the amount of pedestrian activity within the neighborhood. 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. Next section discusses some case-study about the warrants and prioritization of traffic calming process.

4. Case Study-Traffic Calming Warrants

As the term is used in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), warrants are minimum requirements that should be met, in most cases, before a given device is installed. Traffic calming proposal will be assessed against a number of warrant criteria, as outlined in the following section. Failure to satisfy these warrants would result in traffic calming not being recommended.

(a) Qualifying criteria for City of Mankato, Minnesota, USA¹⁾

Qualifying for Mankato's neighborhood traffic-calming program requires a multi-step process that may involve evening meetings and will require petitioning door-to-door. Additionally, the street being considered should meet the following pre-qualifications to be eligible for this program:

- Have a speed limit of 30 mph or less
- Be classified as a local or collector
- Have a right-of-way that is 66 feet wide or less
- Be at least 1,000 feet in length
- Cannot be a cul-de-sac
- Cannot be along a bus route and
- Cannot be used as a critical emergency response route or provide direct access to a fire/EMS station or hospital.

This program applies only to existing streets. It does not apply to future roads or to new subdivisions streets under construction.

(b) Minimum Criteria for city of Livermore, California, USA²⁾

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

- Speed : 85th percentile speed (critical speed) is at least 33 mph
- Volume : Average daily traffic is at least 1000 vehicles

(c) Minimum criteria City of Omaha, Nebraska, USA³⁾

The minimum criteria that are required to participate in this program are as follows:

- Neighborhood approval: 66% of the property owners within the defined project area must support traffic calming for the street (one lot = one vote).
- Traffic speed: 85th percentile speed greater than 30 mph along the street is mandatory.
- Traffic volume: ADT (average daily traffic) greater than 1000 vehicles on the street is mandatory.

(d) Warrants for traffic calming for Pasco County Traffic Operations Division, Florida, USA⁴⁾

Pasco County uses following warrants for traffic calming device installation:

- County Maintained Local residential streets only, installation on collector roads will not be permitted.
- Posted speed of 30mph or less.
- 85th percentile speed 5mph or greater over posted speed.
- Pavement width 24 feet or less.
- Average daily traffic volume of 3000 or less.

From the case study it can be seen that 85th percentile speed and average daily traffic volume are the main two factors that are considered for warrant or minimum requirement for a traffic calming device installation.

5. Case Study-Traffic Calming Prioritization

The prioritization process should highlight the main problems at any location and clear scheme objectives to be attained. Traffic calming projects are ranked against a number of prioritization criteria, as outlined in the following section.

(a) Project ranking system Toronto, Canada⁵⁾

In approving the harmonized traffic calming policy, city council of Toronto, Canada approved a ranking system to prioritize traffic calming projects. The point rating system is outlined in Table 1, and elements such as demographics, safety, traffic conditions and land use would be used to assess relative priority.

Table 1: Project ranking system for Toronto, Canada

Ranking Max.100 points	Speed (0 to 25 points)	Local Road: 2 points for each km/h that the 85th th percentile speed is above the Minimum Speed threshold used in criteria 4 & 5 of the Traffic Calming Policy	Collector Road: 1 point for each km/h that the 85th th percentile speed is above the Minimum Speed threshold used in criteria 4 & 5 of the Traffic Calming Policy
	Volume (0 to 25 points)	Local Road: 1 point for every 100 vehicles of daily traffic (0-2500 vehicles per day)	Collector Road: 1 point for every 220 vehicles of daily traffic over 2500 (2500-8000 vehicles per day)
	Collisions (0 to 25 points)	5 points for 1 preventable collisions ¹ recorded by police in the past 3 years; or 10 points for 2 or more preventable collisions ¹ recorded in the past 3 years; or 10 points for 1 or more preventable collisions ¹ recorded resulting in personal injury in the past 3 years.	
	Pedestrian and bicycling factors (0 to 25 points)	5 points for each pedestrian generator (e.g. park, school, seniors centre, recreation centre, church, or other public institution, etc.) 10 points for a signed bicycle route ²	

Approved projects would be competing for limited funds each year and a ranking system is applied city-wide to ensure that those streets with the worst problems or greatest need would be funded first.

(b) Scoring Chart for Summit County, USA⁶⁾

Given that there is a limited amount of money budgeted and County staff time allocated to the implementation of the traffic calming program, road and street segments that qualify for traffic calming plan development are scored based on traffic calming plans for the scoring chart shown in table 2, and given a ranking for prioritizing the project. Road and street segments that have the highest ranking will be developed first. The ranking also establishes a priority for funding Plans which receive approval of the “affected neighborhood”.

Table 2: Scoring chart for Summit County, USA

Criteria	Points	Basis for Point Assignment
Speed	0 to 60	Five Points given for each mph over the 85 th percentile plus 6 mph for minor local roads, and 11 mph for major local roads
Volume	0 to 30	One point assigned for every 40 vehicles over 400 for traffic volumes between 400 and 1,400 ADT; for volumes over 1,400 ADT, 30 points assigned
Sidewalks	0 to 10	Zero (0) points assigned if sidewalks on both sides of the road segment; Five (5) points assigned for sidewalk on one side of the road segment; Ten (10) points assigned for no sidewalks along road segment

(c) Project Ranking System District of Columbia, WS USA⁷⁾

District of Columbia, WS USA ranks projects on the basis of: speed (85th percentile), volume, accidents, school crossing, residential density, pedestrian generators and sidewalks. The request date will be the basis for breaking ties with the earlier request taking precedence. Project ranking system District of Columbia, WS is shown in table 3.

Table 3: Criteria for rating projects for District of Columbia, WS USA

Criteria	Maximum points	Basis for point assignment
Speed (85 th percentile)	30	5 pts for every 5 mph over posted speed limit
Volume	20	ADT divided by 100
Accidents	15	1 pt for each crash/year at one location
School crossing	10	2 pts if children must cross street to get to school
Residential density	10	1 pt for every 150 dwelling units/sq mile of study area
Pedestrian generators	5	1 pt each for up to five pedestrian generating facilities in or near project street
No sidewalks	10	5 pts if no continuous sidewalk, and 5 pts if pedestrian traffic volume is considered high

Total Possible Points	100
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The study shows that different city use different criteria to prioritize traffic calming programs but in general their evaluation criteria are traffic speed, volume, sidewalk condition and safety issues or accidents.

6. Discussion

From the study it is seen that traffic calming is a proactive, community-based program designed to enhance the quality of life in neighborhoods. It is a common goal among city staffs and residents to calm traffic on local residential streets where speeding, accidents, and/or non local traffic are concerns, providing a safer environment for pedestrians, cyclists and motorists. From the study it can be seen that 85th percentile speed and average daily traffic volume are the main two factors that are considered for warrant or minimum requirement for a traffic calming device installation.

From the study it was found that most of the cities use point scoring system to prioritize traffic calming projects while they are having a warrant based system to check the minimum criteria to install a traffic calming device. The study shows that different city use different criteria to prioritize traffic calming programs but in general their evaluation criteria are traffic speed, volume, sidewalk condition and safety issues or accidents. There is evidence that some city also use lottery or first come first serve basis to prioritize traffic calming programs.

In a study of Lockwood⁸⁾ raised a question that how does one quantify the feeling of safety, aesthetics, and improved pedestrian environment? If these could be and were quantified, then how would one combine them and determine the definitive line between warranted and not warranted? Because of the limitations of a warrant-based system for establishing where and when traffic calming should be applied, tests of appropriateness are recommended, followed by prioritizing instead of warrants⁸⁾.

From the research it can be observed that there is no theoretical basis for the point scoring system as well as the threshold limit set for the warranting criteria. A study of Guegan⁹⁾ regarding to the point scoring system shows that AHP (Analytic Hierarchy Process) can be used as a multiple criteria decision making tool to prioritize traffic calming projects. The AHP incorporates qualitative factors and engineering judgments in rating traffic calming projects, while the point scoring systems do not. Thus, projects that are affected by issues that cannot be quantified in a point scoring system will be ranked more suitably by the AHP⁹⁾. From the study it can be observed that the prioritization process should highlight: the main problems at any location and clear scheme objectives to be attained

References

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