ATTACHMENT A

TOWN OF CARRBORO

RESIDENTIAL TRAFFIC MANAGEMENT PLAN
FOR
SPEED AND TRAFFIC CONTROL

ADOPTED BY:

CARRBORO BOARD OF ALDERMEN, JUNE 1996

A-2

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INTRODUCTION

Many residents approach the town with concerns over speeding in neighborhoods. The Residential Traffic Management Plan represents a commitment by the Town of Carrboro to promote the safety and livability of residential neighborhoods. The Residential Traffic Management Plan provides a process for identifying and addressing existing problems related to speeding, excessive volumes, and safety on town-maintained residential streets. Based on this policy, proper actions can be taken depending on the severity of the problem. This document also includes traffic control devices. Some of the devices may already be in use and other devices may be new. Both advantages and disadvantages of each device will be included.

PROCESS

The following is the process that must be completed when petitioning for traffic calming devices. This process is available only to citizens who live within the municipality of Carrboro, and who reside on town-maintained, residential streets. See the appendix for the petition.

- Petition: A "Petition To Request Traffic Control Devices" available from the town must be submitted with the signatures of the petitioners. A brief description of the traffic control device and the street desired to be amended is required in the petition as well. The petition must be submitted to the Planning Department. The petition must be signed by at least 75% of the property owners or residents of properties located on the project street. The petitioners are allowed to present no more than three (3) traffic calming devices as alternatives for use along their street. The completed form must be hand-delivered or mailed to:

PLANNING DEPARTMENT
TOWN OF CARRBORO
301 WEST MAIN STREET
CARRBORO, NC 27510

- Planning Staff Recommendation: After receiving and verifying the validity of the petition, a two-day traffic count to monitor traffic volume and traffic speeds will be done by the Planning Department. After which, the data received and the site in question will be analyzed and a recommendation as to the appropriate action to be taken will be forwarded to the representative of the neighborhood in concern. The recommendation will then be sent to the Transportation Advisory Board (TAB).
- TAB: The TAB will make recommendations to the Board of Alderman.
- Board of Alderman: The Board of Alderman reserves the final decision concerning actions to be taken. The Board will review the residents' petition, the staff's analysis, and TAB recommendation. The Board reserves the right to hold a public hearing as necessary if the proposed solution is deemed questionable by the residents.
- The construction and installation of some traffic calming devices may be expensive. The least costly form of traffic calming should be considered as the primary means of discouraging traffic in any specific case. When expensive devices are approved, the

petitioners that qualify may need to wait an extended time for installation. Once the actual date of installation is determined, the neighborhood representative will be contacted in writing.

- Removal of a traffic control device: Unless the TAB initiates a general request to the Board of Aldermen, the traffic calming device will stay in place for a minimum of three years. Removal before the three-year period must necessarily be at the cost to the residents. Unless the device is determined detrimental to the health and safety of the town's citizens by the affected residents and the town's emergency service staff, the process for petition for removal will be the same as the installation of the device. A petition with 75% of the street's occupants' signatures of removal must be done to remove traffic calming devices. Traffic calming devices must be ineffective in reducing average speeds in accordance with posted speed limits and/or vehicle volumes. The 85th percentile speeds must be less than 2 MPH lower than those speeds demonstrated prior to the installation of the devices in order to be considered ineffective. A staff analysis, followed by a TAB recommendation will be forwarded to the Board during a public meeting, and if necessary, for a public hearing.
- Streets that have traffic control devices installed may be excluded from the Snow Removal Plan and street cleaning activities, **depending on the type of device installed.** [PLEASE NOTE: Current devices, as listed, **would not** exclude a street from the Snow Removal Plan.]

EVALUATION CRITERIA FOR STREETS

- The street must operate as a town-maintained residential street.
- The posted speed limit on the affected length of the street must be 25 miles per hour which is the standard speed limit for residential streets.
- The 85th percentile vehicle speeds must exceed 35 MPH (+10 MPH over posted speed limit).
- Actual volume of traffic will be based on traffic counts conducted by Carrboro Planning and Public Works staffs (as recorded through staffs' administrative process).
- Guidelines reviewed by staff as received from the Institute of Transportation Engineers (ITE) that is appropriate for town streets.

LIST OF TRAFFIC CONTROL DEVICES

A comprehensive evaluation of twenty-five (25) traffic control devices has been included in this document (see appendix). A brief definition of each device is given. Also, a chart showing the advantages, disadvantages, and cost of each traffic control device is provided in the appendix.

APPENDIX

LIST OF TRAFFIC CONTROL DEVICES

CHICANES
CHOKERS/FAYETTEVILLE CHOKERS
ENFORCEMENT
FORCED TURN CHANNELIZATION
LOWERED STATUTORY MEDIANS
MULTI-WAY STOPS
NO PARKING
PAVEMENT MARKINGS
PORTABLE RADAR
NARROW STREET DESIGN
NO-TURN ON RED
ON-STREET PARKING
ONE-WAY DESIGNATION
PROTECTED PARKING
PUBLIC INFORMATION
RUMBLE STRIPS
TRAFFIC SIGNAL TIMING
SPEED TABLES
SPEED WATCH
STREET CLOSURE
TRUCK RESTRICTIONS
TURN RESTRICTIONS
UNDULATIONS
TRAFFIC CIRCLES

DEFINITION OF TRAFFIC CONTROL DEVICES

CHICANES are a form of curb extension which alternate from one side of the street to the other.

CHOKERS/FAYETTEVILLE CHOKERS involve reconstructing streets to narrow its lanes e.g. narrowing the street to a single lane to discourage traffic. Fayetteville chokers also slow traffic.

ENFORCEMENT involves two levels: 1) the standard level of enforcement, as presently provided by the Police Department, upon request by a citizen or neighborhood, and is dependent upon availability of resources; and 2) the extra enforcement level would target neighborhoods where speeding has been identified as a high level problem and would be an on-going process without citizen request (e.g. a specified number of policemen per neighborhood).

FORCED TURN CHANNELIZATION is installed in the form of a traffic island and prevents traffic from executing specific movements at an intersection.

LOWERED SPEED LIMITS such as a 25 MPH city-wide municipal speed limit.

MEDIANS can limit access from a thoroughfare into a neighborhood by controlling through traffic and reducing the number of speeders.

MULTI-WAY STOPS require a stop sign on all street corners where the streets intersect.

NARROW STREET DESIGN involves narrow street widths and tighter vertical and horizontal curves, which forces driver to drive at a slower speed. Posted speed limits should be less than 35 MPH. Existing neighborhood problems would not be addressed under this strategy since street design is the major component of this strategy.

NO-TURN ON RED involves placing "No-Turn On Red" signs at signalized entrances to neighborhoods.

NO PARKING may allow improved movement on otherwise congested residential streets.

ONE-WAY DESIGNATION involves designating a current two-way street as a one-way street.

ON-STREET PARKING requires on-street parking and may be effective because it forces motorist to slow down and to divert to other routes.

PAVEMENT MARKINGS such as 25 MPH marked horizontally on a road serves as a speed limit reminder.

PORTABLE RADAR could be placed on the road side, left unattended, and will alert motorists when they are speeding.

PROTECTED PARKING provides a landscaped island projecting out from the curb; the island creates protected parking bays.

PUBLIC INFORMATION through a continuous campaign would attack the problem of speeding by changing drivers' attitudes and habits.

RUMBLE STRIPS are ridges either cut in the pavement or laid over top of existing pavement to alert driver to slow down when driven over.

SPEED TABLES are flattened and extended long enough for both the front and rear wheels of a car to be on top of the table at once and can be comfortably crossed at 15 to 25 MPH.

SPEED WATCH is a program similar to the Neighborhood Crime Watch Program. The program helps organize neighborhoods to develop peer pressure programs to address speeding issues. One element involves neighbors reporting speeders to the police, and notifying the vehicle owner of the violation. Signs can be posted on the streets to warn motorists.

STREET CLOSURE involves closing streets to through traffic.

TRAFFIC CIRCLES are islands placed in the middle of intersections which forces the flow of traffic to form a circular pattern which a motorist would follow until exiting onto his/her desired street.

TRAFFIC SIGNAL TIMING limits the green light time motorists have to exit/enter a neighborhood, therefore reducing traffic.

TRUCK RESTRICTIONS restrict large trucks from using neighborhood streets.

TURN RESTRICTIONS do not allow turning and limits access to a neighborhood.

UNDULATIONS are designed so most vehicles can go over them at 20 mph without causing driver discomfort.

TRAFFIC CONTROL DEVICES

SPEED CONTROL DEVICES	ADVANTAGES	DISADVANTAGES	ASSOCIATED COST
STOP SIGNS	**Perceived** effective by residents **May** allow traffic in the immediate vicinity of the stop sign. **May** reduce through traffic if travel time is increased significantly.	**Noise** level increases for residents near the stop sign **May** divert traffic to other streets **Effects** speed in the immediate vicinity of the sign, but not between intersections.	**$50 - $70 each**
SPEED LIMIT SIGNS	**Perceived** effective by residents	**May** not reduce speeding **Increases** enforcement requirements	**$50 - $70 each**
TURN RESTRICTIONS	**Effective** in reducing the number of speeding motorists by reducing through volumes. **Can** improve safety by eliminating turn movement.	**Reduces** access to or from a neighborhood for residents **Can** divert turning traffic to intersections considered less safe. **Increases** enforcement requirements	**$50 - $70 each**
ONE-WAY STREET DESIGNATIONS	**Can** be used to make travel through a neighborhood difficult thus reducing through traffic.	**Residential** street may be unsuitable for one-way operation **Speeds** may be higher on one-way streets **Requires** an increase in signage to make effective	**$50 - $70 each**
TRAFFIC SIGNAL TIMING	**Can** encourage traffic to use the main street **Green** signal time for streets exiting a neighborhood can be controlled to limit through traffic and reduce the volume of speeding motorists	**Residents** complaining about limited green signal time **Motorists** may violate red signals if they feel the controller is not working properly	**$20,000 - $30,000**
NO-TURN ON RED RESTRICTIONS	**Can** be used in conjunction with traffic signal control **Can** reduce through traffic by limiting the amount of time motorists can enter or exit a neighborhood.	**Limits** access to and from neighborhoods	**$50 - $70 each** (Cost may vary if installed in conjunction with traffic signalization.)
TRUCK RESTRICTIONS	**Perceived** to be effective in reducing truck traffic on residential streets	**Difficult** to enforce	**$50 - $70 each**

SPEED CONTROL DEVICES	ADVANTAGES	DISADVANTAGES	ASSOCIATED COST
ON- STREET PARKING	**Can** return a "residential" character to roadway, alerting motorists that they should travel slower.	**Children** crossing or running into street may not be seen due to parked cars.	**$50 - $70 each**
LOWER STATUTORY SPEED LIMIT	**May** be adhered to better than lower speed limits in individual neighborhoods	**Requires** legislature approval	**$50 - $70 each**
CHOKERS/FAYETTEVILLE CHOKERS	**Can** reduce traffic volume under some situations **Several** installations are needed to be effective over a length of roadway. **Improve** pedestrian safety if crossings are made at the location of choker.	**Fayetteville Chokers** designed to have an impact on speed. **Various** forms of chokers may have little impact on speed.	**$7,000 - $10,000** (Fayetteville Chokers can cost within a range of $3,475 to $4,600 per set.)
MEDIAN BARRIER	**Aids** flow of traffic on thoroughfares. **Restricts** through traffic and thus the volume of speeding traffic	**May** direct traffic to other residential streets **May** require street widening to install **Depends** on function or classification of streets	**$10,000 - $20,000**
TRAFFIC CIRCLES	**May** reduce speeds in vicinity of the traffic circle	**Increased** hazard to pedestrians and bicyclists by moving vehicle closure to intersection corners **Present** an obstacle to motorists **Require** parking restrictions, centerline marking, and traffic control signing to be safe **Cannot** be built within most residential street intersections due to minimum size requirements **Requires** lots of signage	**$5,000 - $30,000** Cost sensitive to intersection characteristics, design radius, etc.
ENFORCEMENT	**Frequent**, very visible enforcement can be effective.	**Redirects** police officer efforts away from crime and drug enforcement **Court** system treats speeding as a minor offense and assigns a low priority to prosecuting speeders	No specific costs can be provided.

SPEED CONTROL DEVICES	ADVANTAGES	DISADVANTAGES	ASSOCIATED COST
TRAFFIC DIVERTERS	**Can** reduce through traffic and ce thus reduce the volume of speeding traffic **Can** be constructed within the area of most residential inter-sections	**Barrier** system may need augmenting on private property to control motorists who would drive around the diverter **Some** diverters require enforcement to be effective	**$7,000 - $40,000**
RUMBLE STRIPES AND ROUGH PAVEMENT SUCH AS COBBLESTONE	**May** have some effect on slowing the faster drivers **Causes** driver to become more alert and/or slow down	**Creates** noise that may be objec-tionable to nearby residents	**N/A**
CUL-DE-SACS AND STREET CLOSURES	**Eliminates** through traffic and thus speeding traffic	**Can** divide a neighborhood into separate pockets **Unpopular** solution to some residents and most non-residents using the street **Should** not be installed on streets l longer than 500 ft long meaning there should be about 20 houses on a street generating 200 trips per day.	(Cost varies depending upon street width and radius design. The mini-mum costs would be no less than $30,000.)
LOWER DESIGN SPEED FOR RESIDENTIAL STREETS	**Can** effect speed since motorists tend to drive at conditions they feel are safe	**Requires** lower statutory speed limit which requires legislative approval **Can** create a less safe street if horizon-tal curves, vertical profiles, and other geometric controls are not closely controlled	**$50 - $70 each**
SPEED WATCH PROGRAM	**Involves** neighborhoods in applying peer pressure upon residents to obey speed limits	**Cost** of city personnel to collect radar speed information on a routine basis **Not** effective on street or in neighbor-hoods with any significant amount of through traffic **Application** of peer pressure can make residents hostile **Access** to the Police Information Net-work may be restricted	**N/A**
PUBLIC INFORMATION PROGRAMS	**Re-educate** the public to the dangers of speeding on residential streets. **Can** seek cooperation among residents to observe speed limits everywhere.	**Costs** depends on how information is disseminated	**N/A**

SPEED CONTROL DEVICES	ADVANTAGES	DISADVANTAGES	ASSOCIATED COST
NARROW STREET DESIGN	**Forces** drivers to slow down	**Can** only be implemented for new streets	**Design specific**
CHICANES	**Long** term effective means of reducing speeds according to study by Seattle Transportation Division in 1988 **Do** not block emergency vehicle access	**Drivers** are more likely to violate chicanes at intersections with low traffic volumes. **To** be recognized, the device requires signs, painted curbs, landscaping, reflectors and street lights..	**$4,000 per bulb.**

PLEASE NOTE: **ASSOCIATED COSTS FOR TRAFFIC CALMING DEVICES MAY VARY BETWEEN GEOGRAPHIC REGIONS OF THE UNITED STATES DUE TO LABOR COST, MATERIAL, AND SITE SPECIFIC CONSTRAINTS.**

TOWN OF CARRBORO

PETITION: TRAFFIC CONTROL DEVICES

WE, THE UNDERSIGNED RESIDENTS, HEREBY PETITION THE BOARD OF ALDERMEN TO APPROVE THE TRAFFIC CONTROL DEVICES DESCRIBED BELOW UPON THE INDICATED STREET OR PART THEREOF.

THE STREET OR PART THEREOF DESIRED TO BE AMENDED IS:

THAT PART OF _____ STREET FROM
_____ STREET TO
_____ STREET.

WITH RESPECT TO THE TRAFFIC CONTROL DEVICE PETITIONED FOR, WE REQUEST:

_____

_____

_____

[PLEASE NOTE: A MAXIMUM OF THREE (3) TRAFFIC CALMING DEVICES MAY BE REQUESTED.]

SIGNATURES OF PETITIONERS*	
RESIDENT'S SIGNATURES	LOT'S MAILING ADDRESS

*THE ADDRESSES OF PROPERTIES THAT WILL BE DIRECTLY AFFECTED BY THE PROPOSED CHANGE HAVE BEEN DETERMINED BY THE TOWN OF CARRBORO PLANNING DEPARTMENT. BY POLICY, THE BOARD OF ALDERMEN HAS STATED THAT IT WOULD PREFER TO ENTERTAIN REQUESTS FOR CHANGES IN STREET REGULATIONS PROPOSED BY CITIZENS ONLY WHERE 75% OF THE OCCUPANTS OF THE PROPERTIES DIRECTLY AFFECTED BY THE PROPOSED CHANGE HAVE SIGNED A PETITION REQUESTING THE CHANGES.

CERTIFICATE AS TO

SUFFICIENCY OF PETITION

FOR TRAFFIC CONTROL DEVICE

TO THE MAYOR AND THE BOARD OF ALDERMEN OF THE TOWN OF CARRBORO:

I, _____, TOWN CLERK OF THE TOWN OF CARRBORO, NORTH CAROLINA, DO HEREBY CERTIFY THAT THE ATTACHED "PETITION: TRAFFIC CONTROL DEVICES" WAS PRESENTED TO ME ON THE _____ DAY OF _____, 19____; THAT I HAVE INVESTIGATED THE SUFFICIENCY OF THE PETITION; AND THAT THE RESULTS OF MY INVESTIGATION IS AS FOLLOWS:

THE TOTAL NUMBER OF PROPERTIES DIRECTLY AFFECTED BY THE REQUESTED CHANGE IS _____.

WITH RESPECT TO THE SIGNATURES ON THE ATTACHED PETITION, _____ SIGNATURES ARE THOSE OF RESIDENTS OF THE AFFECTED AREA WHICH IS 75% OF THE RESIDENTS ON THE PROJECT STREET.

THIS THE _____ DAY OF _____, 19_____.

_____

Town Clerk's Signature (Seal)

THIS FORM MUST BE ATTACHED TO THE "PETITION: TRAFFIC CONTROL DEVICES" AFTER ALL PETITIONERS' SIGNATURES HAVE BEEN OBTAINED.

DOCUMENT LAST AMENDED:

[THIS DOCUMENT CAN ONLY BE AMENDED BY OFFICIAL ACTION BY THE CARRBORO BOARD OF ALDERMEN.]

MAY 06, 1997		

ACKNOWLEDGMENT:

INFORMATION CONTAINED HEREIN WAS RESEARCHED, ANALYZED, AND COMPILED BY KIMBERLY SLEDGE. MS. SLEDGE WAS A GRADUATE STUDENT IN THE DEPARTMENT OF CITY AND REGIONAL PLANNING AT THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL. MS. SLEDGE SERVED AS AN INTERN IN THE PLANNING DEPARTMENT FROM SEPTEMBER 1995 THROUGH JUNE 1996 UNDER THE SUPERVISION OF THE TOWN'S TRANSPORTATION PLANNER, KENNETH WITHROW.

ATTACHMENT B

Minutes -- Carrboro Board of Aldermen – August 22, 2000

REQUEST TO ADOPT AN UPDATE TO THE RESIDENTIAL TRAFFIC MANAGEMENT PLAN

The Board of Aldermen adopted a Residential Traffic Management Plan (RTMP) on June 11, 1996. The plan was revised on May 6, 1997. A staff analysis in early 2000 revealed some areas that would benefit from further revision. The Transportation Advisory Board has reviewed and recommends the proposed revisions. A resolution that adopts the revisions to the RTMP was recommended for the Board's consideration. As amendments to the Land Use Ordinance and Town Code were needed to give the Town the authority to set standards for traffic calming devices on private streets, the recommended resolution also set a public hearing for September 26, 200 for the land use ordinance amendment.

Phil Conrad, the town's Transportation Planner, made the presentation.

The Board referred this matter back to the Transportation Advisory Board with the request for further review and discussion of:

The removal of the phrase that 85th percentile vehicle speeds must exceed 35 mph.
Deletion of traffic control devices from the list and definitions; and
Changing "speed humps" to "speed bumps"

Minutes -- Carrboro Board of Aldermen -- May 21, 2002

REQUEST FOR TRAFFIC CALMING IN WEXFORD AND WILLIAMS WOODS AT CATES FARM

The Town of Carrboro's Residential Traffic Management Plan provides an opportunity for residents to petition for traffic calming measures on neighborhood streets. Residents of two adjacent neighborhoods, Wexford and Williams Woods at Cates Farm, have petitioned the Town to install traffic calming measures on several streets. The requests have been analyzed and a report has been prepared. A resolution for the Board of Aldermen's consideration was provided.

Dale McKeel, the town's Transportation Planner, made the staff presentation.

Alderman Gist asked that copies of petitions be submitted to the Board in the future. She also requested that the contractor working in this area be contacted concerning speeding construction traffic and that the police department monitor the speeding in this area.

George Stouffer, a resident of 404 Tramore Drive, stated that he and his neighbors are concerned that a small child will be hit by a car. The problem has increased because Wyndham Drive has recently been opened up.

Frank Haines, a resident of 206 Autumn Drive, stated that the center of this neighborhood has no traffic control to prevent speeding. Mr. Haines asked for a timetable as to when the speed bumps could be put into place.

Jim Williams, a resident of 407 Tramore Drive, expressed concern about the speeding construction traffic.

Alice Anderson, 300 Autumn Drive, expressed concern about unsafe traffic on Autumn Drive Ms. Anderson suggested that barriers be put back up on Stratford and Wyndham.

Becky Hebert, a resident of 211 Wyndham Drive, requested that a four-way stop be installed now and the speed humps in the future.

Stephanie Padilla, a resident of Autumn Drive, stated that she observes people running the stop signs every day.

MOTION WAS MADE BY ALEX ZAFFRON AND SECONDED BY JOAL HALL BROUN TO:

Direct the town staff to install four-way stop signs at the intersection of Tramore and Wyndham Drives;

That the town staff and Transportation Advisory Board review the residential traffic management plan for speed and traffic control over the next 12 months, taking into

consideration other traffic management plans that have been put into place. The staff and TAB should consider developing a provision for "special circumstances" (i.e., schools, playground access, etc.) that may justify deviations from the policy.

That the town staff and Transportation Advisory Board consider traffic calming devices to address the issues that the neighbors requested (including all devices—not just those in the request from the neighbors), that grants be pursued, and that priorities be developed to address the issues listed in the petitions

That stop bars be painted at all stop signs;

That signs be installed at all three- and four-way stops to indicate that all motorists are to stop; and

That a speed bump at the playground be a priority.

That the police and fire departments comment on the affect of speed bumps on emergency response times.

VOTE: AFFIRMATIVE SIX, ABSENT ONE (MCDUFFEE)

The Board instructed staff to not take additional petitions for traffic calming devices over the next 12 months and/or until the policy is revises and/or funding is available.

The Board requested that the Police Department closely monitor this area at the time when the high school lets out, along with construction traffic on Tramore Drive.

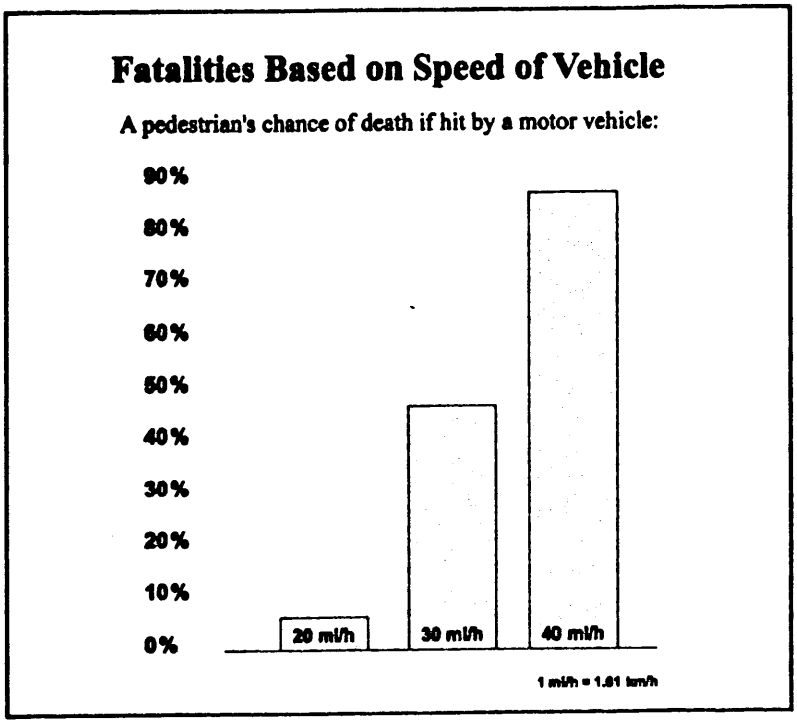
The Board also requested that the town staff check into whether higher fines could be imposed for traffic citations with the excess fines being set aside for traffic control devices.

Alderman Gist requested that neighbors be allowed to help fund the installation of traffic control devices.

Alderman Broun requested that the principal of Chapel Hill High be requested to remind students to drive safely.

Relationship between Vehicle Speed and Pedestrian Fatalities

- from Pedestrian Facilities Users Guide: Providing Safety and Mobility, published in 2002 by the Federal Highway Administration



ATTACHMENT E

Updating Traffic Calming Measures in Carrboro, North Carolina

A Report to the Carrboro Transportation Advisory Board
Prepared by Adena Messinger, April 2004

> "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: State of the Practice*, Reid Ewing

Executive Summary

The Town of Carrboro is currently considering revisions to the Residential Traffic Management Plan. In particular, the Transportation Advisory Board (TAB) is examining the policies guiding traffic calming requests. After reviewing the current policies of other cities and towns the following are recommendations for the TAB to consider:

1) Lower the 85th percentile standard, perhaps to + 7 MPH. If this change is implemented within a point system (see recommendation 2 below), then it should better reflect the degree of speeding, yet allow for other factors to be considered when evaluating the situation.
2) Adopt a point system for prioritizing and evaluating these requests.
3) Put forward the idea of educational strategies to the residents to gauge what level of interest and commitment there may be in initiating a community speed watch program.
4) Look at the new developments planned for the town and determine whether or not it is appropriate sense to apply a two-step traffic calming evaluation process.

Introduction

The Town of Carrboro is currently re-evaluating its Residential Traffic Management Plan. In particular they are considering updating the traffic calming policy and exploring new options for implementing traffic calming measures. This initiative is motivated by several new and outstanding requests for speed controls submitted by residents. As the Board of Aldermen (BOA) prepares to revisit the Town's policy and respond to traffic calming requests, the Transportation Advisory Board (TAB) is tasked with providing recommendations that will guide the BOA's decisions. This paper examines a variety of traffic management policies and provides a review of the traditional traffic calming approaches: engineering, enforcement, and education. Processes for evaluating both existing and new developments in Carrboro are considered. In addition, recommendations are included for the TAB to consider before compiling a guidance document for the BOA.

Background

Traffic claming refers to a variety of techniques that help to slow down drivers, usually on residential streets. The different techniques generally fall into one of three categories: engineering, education, or enforcement. Engineering refers to some kind of physical alteration of the street. Engineering measures range from speed humps and rumble strips to traffic circles and chicanes. Education refers to community awareness and neighborhood speed watch groups. The goal of educating community members about speeding issues is to raise awareness that there is a speeding problem, which hopefully results in a behavioral change, i.e., not to speed. Enforcement is generally the jurisdiction of the police department, for example with ticketing drivers that speed[1]. A traffic calming program may include all three approaches, a combination of two, or just one.

While many cities have traffic calming programs in place, Carrboro was one of the first to establish a program in North Carolina in 1996. The program began in response to citizen concerns with speeding on several residential streets[2]. Under the program, the town has considered several engineering measures to reduce speeding: stop signs, chicanes, speed humps, and speed tables. The primary mitigation tools have been speed humps and stop signs (see Figure 1).

The Carrboro residential speed limit is 25 MPH, with a few streets posted at 20 MPH. Most traffic calming programs use the "85th Percentile" rule to determine whether or not traffic calming should be implemented on a street. According to the 85th percentile rule at least 15% of the vehicles monitored on a street in questions have to be exceeding the speed limit by some number of MPH. In Carrboro, that number is 10 MPH.

In August 2000 and May 2002, in response to information provided by the staff and requests from Carrboro residents, the Carrboro Board of Aldermen requested that the TAB review certain aspects of the Residential Traffic Management Plan. In particular they requested the following:

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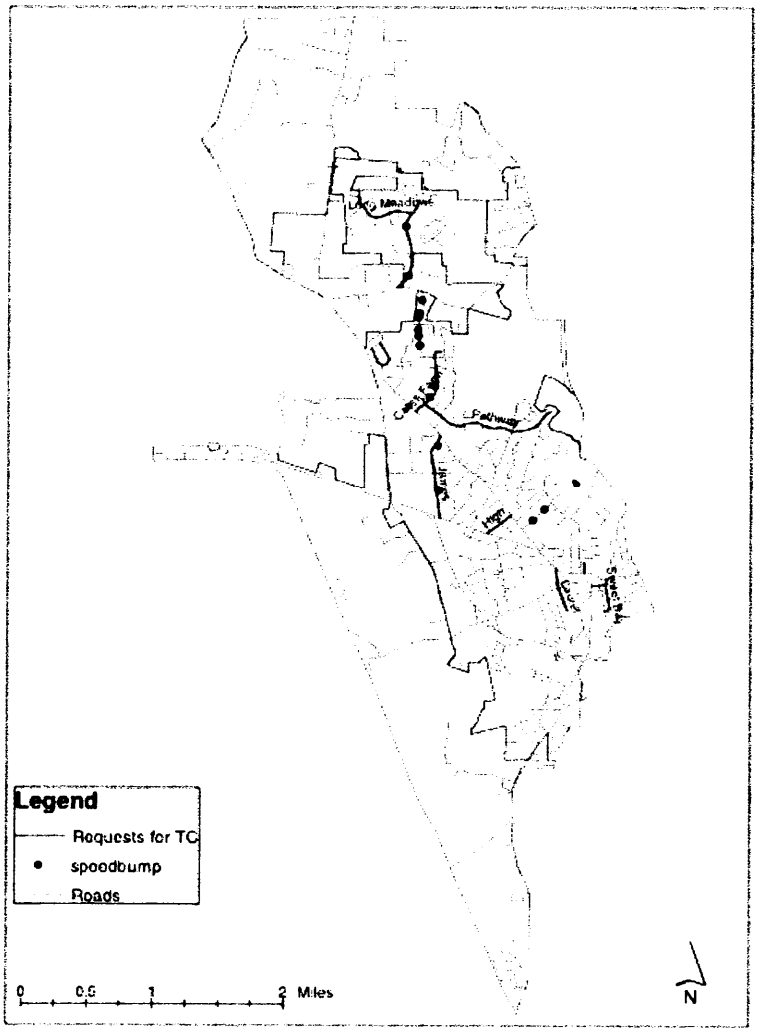
[1] Ewing, Reid. "Traffic Calming: State of the Practice," Institute of Transportation Engineers: Washington, DC, 1999.

[2] McKeel, Dale. Personal Communication, April 15, 2004.

- The removal of the phrase that 85th percentile speeds must exceed 35 MPH (i.e., 10 MPH above the 25 MPH speed limit)
- Consideration of other traffic management plans that have been put into place
- Consider developing a provision for special circumstances that may justify deviations from the policy (i.e., schools, playgrounds, etc.)[3]

Figure 1. Speed Bump Locations in Carrboro



[3] McKeel, Dale. Personal Communication, April 15, 2004.

Requests for traffic calming

The general procedure for requesting that some form of traffic calming be implemented on a street requires that the concerned residents submit a petition to the Carrboro Department of Transportation and that the petition is signed by 75% of the residents who would be affected by the approval of the request[4].

Records show approximately 12 requests for traffic calming measures between 1999 – 2004. Two of the requests were approved, three remain unresolved, and the remaining requests were either denied or a final ruling was not in the file. Figure 2 illustrates the locations of these requests.

The current Carrboro traffic calming policy following a request is as follows:

> Evaluation Criteria For Streets
> - The street must operate as a town-maintained residential street.
> - The posted speed limit on the affected length of the street must be 25 miles per hour which is the standard speed limit for residential streets.
> - The 85th percentile vehicle speeds must exceed 35 MPH (+10 MPH over posted speed limit).
> - Actual volume of traffic will be based on traffic counts conducted by Carrboro Planning and Public Works staffs (as recorded through staffs' administrative process).
> - Guidelines reviewed by staff as received from the Institute of Transportation Engineers (ITE) that is appropriate for town streets.
>
> Source: *Residential Traffic Management Plan for Speed and Traffic Control*, adopted by the Carrboro Board of Aldermen 1996, updated 1997.

Appendix A includes the entire process for requesting a traffic-calming device for a residential street in Carrboro.

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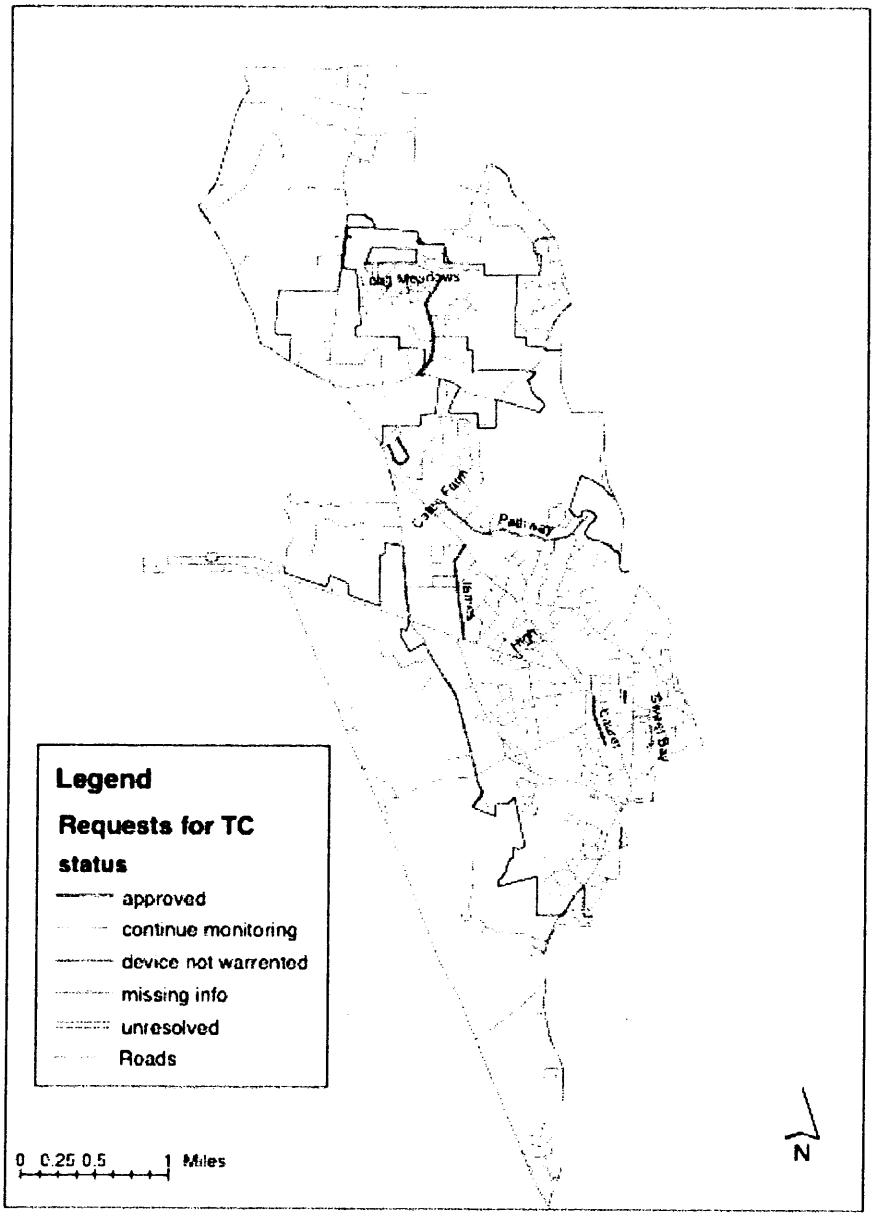
[4] Town of Carrboro. *Residential Traffic Management Plan for Speed and Traffic Control*, adopted by the Carrboro Board of Aldermen 1996, updated 1997.

Figure 2. Traffic Calming Request Locations and Status



Recommendation Methodology

The first step in providing recommendations for the Transportation Advisory Board was to gather Carrboro-specific traffic calming data with the assistance of the Carrboro Transportation Planner (see Table 1).

The second step was to gather general traffic calming information through several web searches. The primary reference was Reid Ewing's "Traffic Calming: State of the Practice," prepared for ITE/FHWA in 1999.

The third step was to select peer towns/cities against which to compare Carrboro's Traffic Management Program. The initial plan was to select these jurisdictions using the following set of criteria:

- Population
- In a neighboring state
- Availability of information

These selection criteria were desired because they would control for potential differences due to size. In addition, a nationwide survey of best practices in traffic calming highlighted on Raleigh's Traffic Calming web page uses population size as the peer factor. The use of neighboring states was intended to narrow the field of cities found with a comparable population size. Using the 2003 *Places, Towns and Townships* reference guide, cities with a population size similar to Carrboro were identified. The third criterion, information, was an unavoidable limiting factor, as not all jurisdictions of the small-ish size of Carrboro have a web page, and those that do, do not always provide the information needed to include them in the comparison.

As it turned out, the ability to collect the appropriate information was more limiting than initially thought. Out of the 16 cities identified that matched the first two criteria (population and neighboring state), only one provided the necessary information. While this at first appeared to be a significant problem, after reviewing traffic calming policies of various other cities across the country, the differences between policies – regardless of population size – were very similar. Therefore, the cities examined were selected primarily based on available information (see Table 2).

A separate group of cities were selected as well because of their proximity to Carrboro. This was included because the TAB expressed that it was important to be aware of the practices that nearby cities and towns are implementing (see Table 3).

The last step was to analyze all of the information with two goals in mind. The first goal was to evaluate Carrboro's policy for implementing traffic calming measures (i.e., the 85th percentile speed is 10 MPH above the speed limit) and recommend to either change or leave the policy as it stands.

The second goal was to identify the best traffic calming measures for Carrboro. It was stated earlier that the most common measures implemented falls under the engineering category, and is usually a speed hump or stop sign. Using the information gathered about

peer group strategies and the costs and benefits of different strategies, the recommendations could be made to the Carrboro TAB.

Findings

Traffic Calming Policies

Tables 2 and 3 illustrate examples of traffic calming policies in other cities. In general, traffic calming policies contain the same four strategies. These include 1) petition requirement from the concerned citizen, with a certain percentage of resident signatures, 2) a survey of the speed conditions on the road in question, 3) an 85th percentile threshold, and 4) approval or denial of the request[5]. These steps are in line with Carrboro's policy. The most significant difference is how each city chooses to use the 85th percentile rule. Carrboro sets the rule for approval at 10 MPH over the posted speed limit. On the other hand, as a contrast, consultants have recommended that Raleigh to use a 5 MPH approval rule[6].

Traffic Calming Measures

Engineering

The Carrboro Transportation Planner has already provided the TAB with a comprehensive evaluation of engineering options for traffic calming (see Appendix A). In general, the advantage of an engineering solution is that is provides a physical barrier to speeding on the particular road on which it is placed. However, engineering solutions are often expensive; even speed humps, which are a less expensive measure, can cost a town around $2,000.00[7]. Physical barriers can also cause unintended consequences on nearby roads. For example, if a particular road has a physical traffic calming measure, drivers may begin to avoid that road, increasing traffic and perhaps speeding on an alternative route. Finally, not all residents want engineering solutions.

Education

There are different types of education programs being implemented across the country, but in general they focus on neighborhood volunteers serving as monitors and speed counters. Some example programs include:

Neighborhood Traffic Management Program/Neighborhood Watch Programs[8].

Tucson, AZ

> Tucson has a volunteer program where citizens are able to borrow equipment to record a vehicle's speed and license number. If a vehicle is breaking the speed limit, the vehicle owner receives a letter from the police department to make

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[5] For example: "Neighborhood Traffic Calming Process," http://www.ci.austin.tx.us/roadworks/process.htm; City of Palo Alto Neighborhood Traffic Calming Program, http://www.cityofpaloalto.org/transportation/ntcp/booklet.html; City of Charlottesville, http://www.charlottesville.org/default.asp?pageid=07BEEF0E-FE64-4602-AC47-8B278BDEAF6E; City of Missoula Traffic Calming, http://www.ci.missoula.mt.us/publicworks/calming.htm

[6] Raleigh Traffic Calming Study, http://www.kimley-horn.com/raleightrafficcalming/

[7] www.trafficcalming.org

[8] Traffic Calming for Communities, http://www.ite.org/traffic/locations.htm

him/her aware of the speed violation. The letter is also intended to make him/her aware that the neighborhood is concerned about speeding. There are no penalties associated with the violation.

Seattle, WA

The Seattle program occurs in three-phases: 1) Volunteer citizens monitor vehicles with a radar gun and then send letters to the speeders, 2) A speed sign is placed at the worst spots and police enforcement is implemented, 3) The Police Department conducts follow-up enforcement.

Phoenix, AZ

The Phoenix program begins with an evaluation process to see if a Neighborhood Watch Program is right for the neighborhood. If so, volunteers collect speeding data and the violators receive notification/education letter, similar to the programs above.

Neighborhood Traffic Control Program

Gresham, OR

A citizen petition that is followed by preliminary data collection initiates this program. If traffic calming is warranted, the next stage involves citizen meetings and a collaborative planning process, during which a course of action is decided upon. They then conduct a test of the recommended action, and if it passes, they begin construction of a full program. The Gresham program has also established criteria for ranking neighborhoods that require attention:

- Volume – ADT
- Speed -- % above speed limit
- Accidents
- Schools
- Other pedestrian generators such as elderly housing and pocket parks

All of these education-based programs require a motivated citizenry and in some cases, cooperation between the Department of Transportation and the police department. The limits to an education program are 1) it carries no real penalty, 2) it requires time and effort on the part of town residents, and 3) it does not guarantee results. Advantages of implementing an education program are 1) it can be a very low-cost measure, compared to an engineering solution, 2) it raises awareness and tries to institute a behavioral change, and 3) has the potential to create a sense of community as well as address a speeding problem.

Enforcement

The third "e" in the traffic calming toolbox is under the jurisdiction of the town's police force. Enforcement employs a penalty system for violators of the speed limit, such a

ticket. The following enforcement strategies are adapted from Portland, Oregon's Neighborhood Traffic Safety Partnership[9]:

- Traffic fines
- Targeted Locations
- School Zone Enforcement
- Pedestrian and Bicycle Law Enforcement
- Traffic Safety Commission / Court Watch
- Automated Enforcement
    - Photo Radar
    - Red Light Cameras
    - Speed Display Boards

While enforcement programs can be effective at short-term speed control, unless enforcement is maintained, there is less incentive for speeders to change their behavior. Coupling enforcement with education is perhaps a more effective route.

A Fourth "E"?

Each of the traditional "three Es" of traffic calming has advantages and disadvantages. Perhaps the addition of a fourth "E," *engagement*, can increase the effectiveness of any of those solutions. Engaging community members in the details of traffic calming takes education one step further by asking for their input and creativity not only in the outreach process (as in a neighborhood watch program), but also in the engineering and enforcement approaches to reducing residential speeding. One engagement mechanism that seems to be popping up in cities across the country is called *street reclaiming*[10]. Street reclaiming can involve activities as well as design. The activity part of street reclaiming involves residents getting outside and having a presence along their street. It can be sitting on a lawn or front porch and reading, having kids playing in front houses, or taking walks along neighborhood streets. The design component "entails changing the psychological feel of streets so they feel less like a corridor owned exclusively by cars and more like a series of interconnected outdoor living rooms."[11] Another form of engagement can involve community meetings where residents and transportation professionals dialogue about possible solutions and how to implement them.

New Developments

The city of Winston-Salem had outlined a two-step procedure for traffic calming in new developments. These two steps are presented in the flow charts below. Essentially the key considerations are whether or not the development warrants any traffic calming, whether the new development will impact existing developments such that they will require traffic calming, and a public process for taking a particular course of action. The implications of this policy for Carrboro are discussed in the *recommendations* section.

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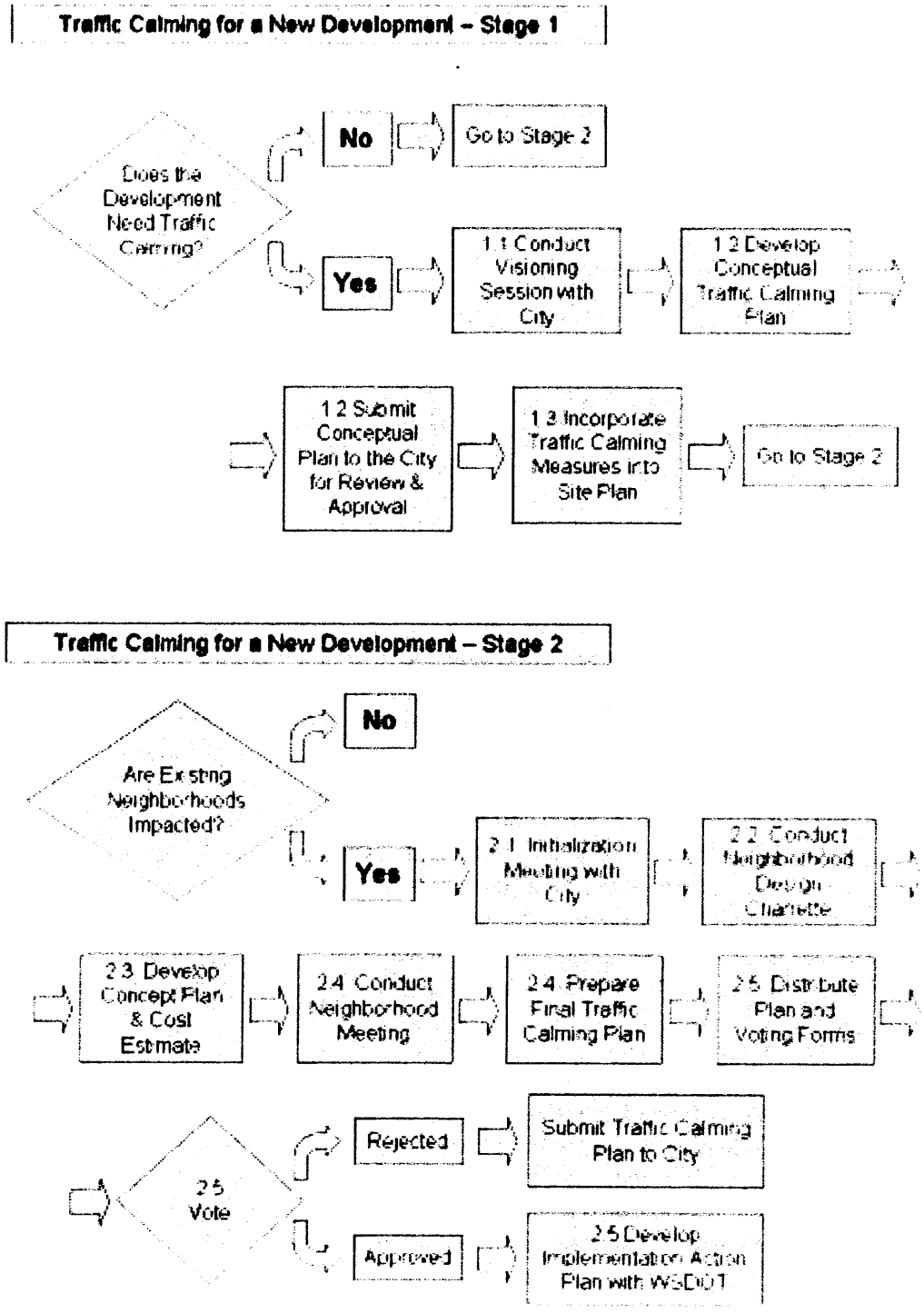
[9] http://www.trans.ci.portland.or.us/Projects/NTSP/default.htm

[10] See http://www.lesstraffic.com/Programs/SR/SR.htm

[11] Engwicht, David. "Street Reclaiming – Introduction," www.lesstraffic.com/Articles/Traffic/SR1.htm



Source: City of Winston-Salem Traffic Calming Policy, May 2003

Recommendations

Everything in this report up until now has served to set the stage for establishing a set of recommendations regarding the revision of the Residential Traffic Management Plan. The essential issues up for revision include the 85th percentile rule of +10 MPH above the posted speed limit, consideration of other traffic calming programs that cities are implementing, and special provisions for certain situations.

Recommendation #1. For most of the petitions requesting traffic measures the 85th percentile rule was not violated and so the requests were denied. However, for most of those cases the recorded speeds were close to 10 MPH over the posted limit. The question then becomes, is 10 MPH a reasonable standard? There are certainly precedents for using a stricter standard. A consequence of lowering the standard is the approval of more requests. While this may more accurately address residents' concerns, it may also add a financial burden to the town; many of the engineering solutions are costly.
Therefore, the first recommendation is:

> Lower the 85th percentile standard, perhaps to + 7 MPH. If this change is implemented within a point system (see recommendation 2 below), then it should better reflect the degree of speeding, yet allow for other factors to be considered when evaluating the situation.

Recommendation #2. Another strategy employed by more and more cities is a "point system" for deciding how to prioritize traffic calming requests. Based on the point system, like the one below in Table 4, the town can prioritize traffic calming requests. Requests that score low would be considered a low priority and vice versa, enabling the town to direct any available funds to the high priority projects. The low priority requests do not have to be shelved and alternative, low-cost mitigation measures can be applied. This point system also allows for the town to consider special situations, such as school crossings and pedestrian activity. In light of the diversity in Carrboro's requests for traffic calming, it is recommended that the town adopt a point system for prioritizing and evaluating these requests. A point system also allows for a more substantive explanation to residents when a request is denied.

Table 4. Request Prioritization Point System Example

Criteria	Points
Traffic Volume	5 points for every 20% of volume that exceeds the expected neighborhood volume
Speed	1 point for every MPH that the 85th percentile speed exceeds 25 MPH on a local residential street, or 35 MPH on a residential collector or commercial street
Pedestrian/bicycle volume	5 points for every 10 peds/cyclists in the peak hour
Sidewalks	5 points for no continuous sidewalks on at least one side of the street
Crash frequency	5 points for an injury accident, 1 point for a property damage only accident – within the last 3 years
Land use	5 points if residential, 2 if commercial
Street trees/streetscaping	5 points for no or few street trees
School route	5 points if the street is on a designated school walk route
Bus stops	1 point for each transit stop and 2 points for each school bus stop

Adapted from: City of Winston-Salem Traffic Calming Policy, May 2003

Recommendation #3. An approach that Carrboro has not yet taken is education. Starting up a neighborhood speed watch program can be a low-cost measure and has the potential to result in speed reductions. However, the amount of time it can take to put the program in place, the need for active and concerned citizens, and the uncertainty of resulting improvements can serve a barrier to implementing an education program. Despite those barriers, recommendation 3 is to put the idea of educational strategies to the residents to gauge what level of interest and commitment there may be in initiating a community speed watch program.

Recommendation #4. The Winston-Salem approach to traffic calming in new developments seems to get at the engagement, education, and potentially engineering components of traffic calming. Carrboro should look at the new developments planned for the town and determine whether or not it is appropriate to apply a two-step traffic calming evaluation process.

Conclusion

Traffic calming is, perhaps, not the sexiest of transportation issues, yet it is an integral part of everyday life for residents of any community. As cities and towns continue to grow and develop what was once a suitable traffic calming policy may need to be revised: such is the case with the Town of Carrboro. A review of the current traffic calming requests, the state of the traffic calming practice, and example programs from m around the country revealed that there are opportunities for Carrboro to implement a number of new, low cost, traffic calming policies and measures. This report provided a variety of recommendations for the Carrboro Transportation Advisory Board members to consider as they prepare to provide guidance to the Board of Aldermen.

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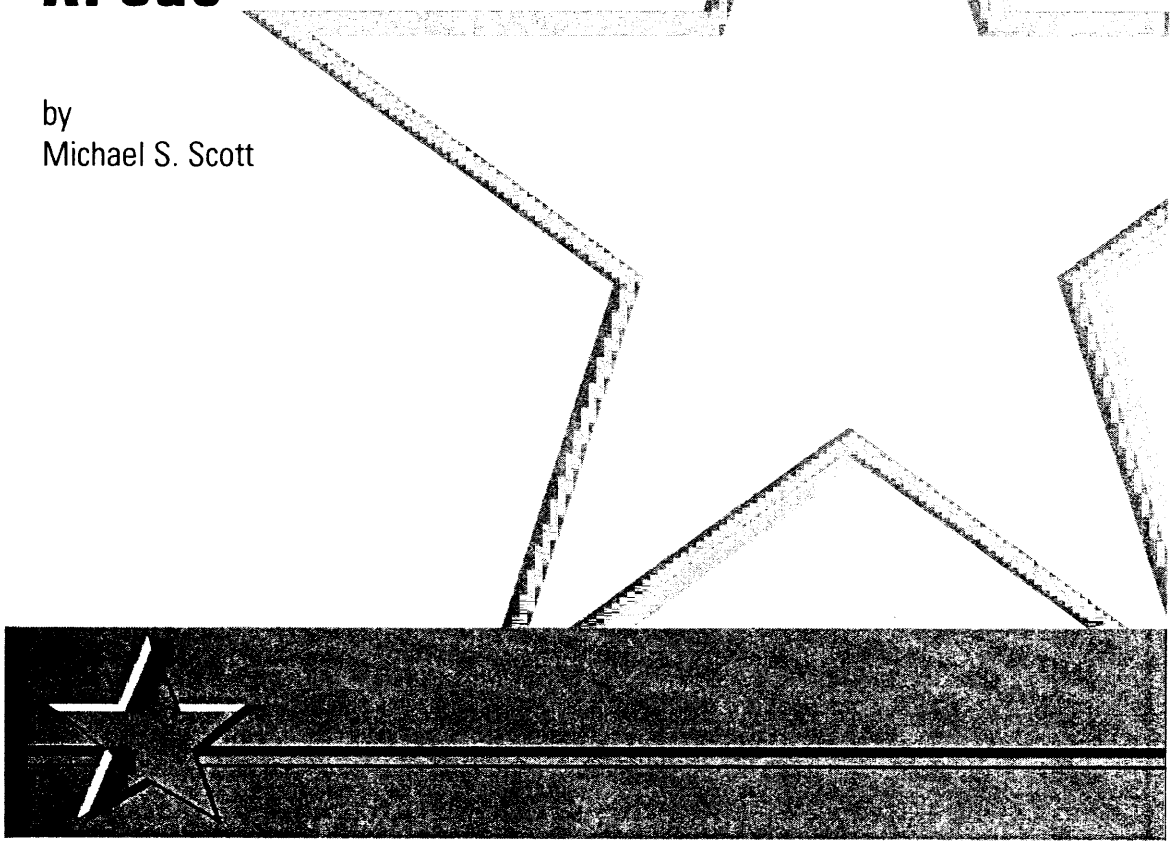
Speeding in Residential Areas

by
Michael S. Scott



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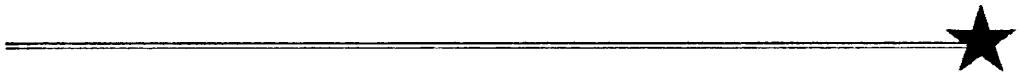

have a safety margin factored into them, so the result is a double safety margin that actually makes the road seem safe for travel at 35 to 40 mph. Because most drivers travel at what they perceive are safe speeds rather than the posted speed limit, they will end up driving 10 to 15 mph faster than the engineers originally intended. This unintended effect reflects an underlying tension in road safety–a desire on the one hand to build roads that encourage drivers to drive at slower, safer speeds, and a desire on the other hand to make roads safe enough for drivers who choose to drive faster. Road and traffic engineers have often tried to resolve this tension by making roads wider, straighter and more obstruction-free. More recent trends have been in the opposite direction, to get drivers to slow down.

12. Increasing fines and penalties. Higher fines and penalties, beyond the threshold that offenders consider meaningful, do not continue to reduce speeds.[46]

13. Erecting stop signs. Many aggrieved citizens believe that erecting stop signs along residential roads will force drivers to slow down. They pressure elected officials and traffic engineers to erect new stop signs. However, the most common effect on actual driving behavior is that drivers speed up mid-block to make up for lost time, thereby keeping average speeds high, increasing acceleration noise and decreasing fuel efficiency.[47]

14. Installing speed bumps or rumble strips. Speed *bumps*, as opposed to speed *humps*, do not effectively reduce speeds, and can be hazardous.[48] Rumble strips–intermittent series of bumps across the road–do not reduce speeds directly; they merely serve to warn drivers of a hazard ahead.[49]

15. Reengineering vehicles. New vehicle technology holds some potential to control speeding, but most features are not yet standard or widely accepted by the public.[50] *Speed limiters* prevent a vehicle from going faster than a set speed. Speed limiters can be programmed to receive electronic signals from transmitters along the road and adjust maximum speeds automatically. So-called *smart cards* can electronically record a vehicle's speed and report it automatically to enforcement authorities. *Electronic speed indicators*, reading electronic roadside signals, can warn drivers they are speeding, or speed indicators in the vehicle can electronically trigger roadside warning signals.

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Appendix: Summary of Responses to Speeding in Residential Areas

The table below summarizes the responses to speeding in residential areas, the mechanism by which they are intended to work, the conditions under which they ought to work best, and some factors you should consider before implementing a particular response. It is critical that you tailor responses to local circumstances, and that you can justify each response based on reliable analysis. In most cases, an effective strategy will involve implementing several different responses. Law enforcement responses alone are seldom effective in reducing or solving the problem.

Response No.	Page No.	Response	How It Works	Works Best If...	Considerations
Engineering Responses					
1.	9	Using traffic calming	Makes it more difficult for vehicles to speed, or makes drivers believe they should slow down for safety	...road and environment changes are made in compliance with recommended specifications, the affected public supports the changes, and potential negative impacts are considered and minimized	Some changes to the environment require high capital expenditures; cost-effectiveness must be considered over the long term
2.	12	Posting warning signs and signals	Encourages drivers to slow down by reminding them of the speed limit and calling their attention to hazards on the road ahead	...the signs or signals stand out from other road signage, they convey the reason for the reduced speed, and they are supplemented by police enforcement	Where there are many other signs and sights competing for drivers' attention, it is not easy to get drivers to notice speed warnings

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Response No.	Page No.	Response	How It Works	Works Best If...	Considerations
Education Responses					
3.	13	Conducting anti-speeding public awareness campaigns	Intended to change the social acceptability of speeding	...they are carefully tailored for various target audiences (e.g., commuters, young male drivers)	The effects are usually not immediate and substantial; the messages need not be overtly accusatory, but may convey facts about the dangers and consequences of speeding to debunk myths about speed and driving
4.	15	Informing complainants about actual speeds	Improves complainants' understanding of the exact nature of the problem	...you suspect that complaints are exaggerated or unrealistic	Proving that vehicles are traveling the speed limit does not necessarily mean that speeds are appropriate for conditions, but might suggest that responses other than enforcement are more appropriate
5.	15	Providing realistic driver training	Helps drivers better appreciate the effects of speed on their ability to control a vehicle	...drivers can actually feel the effects of speed on their driving skills	Requires skilled instructors, special safety equipment and protected driving areas
Enforcement Responses					
6.	15	Enforcing speeding laws	Increases drivers' risks of being stopped	...drivers believe it will occur, it has meaningful costs to offenders, police apply it generally rather than only at specific times and	Requires a lot of resources initially to change drivers' perceived risks of getting stopped; giving the public advance notice must be balanced against

Response No.	Page No.	Response	How It Works	Works Best If...	Considerations
6. (cont'd)				locations, and drivers are not tipped off by cues as to when enforcement is or is not happening	not allowing drivers to anticipate where and when enforcement is occurring; expensive to maintain consistently
7.	17	Enforcing speeding laws with speed cameras	Significantly increases the level of speed monitoring and enforcement, thus increasing drivers' perceptions of the risk of getting caught speeding and serving as a deterrent	...camera placement is not too obvious, and locations are changed periodically	Drivers slow down when they know they are approaching a speed camera, but quickly speed up once they have passed it; some strong public concerns about invasions of privacy and absence of personal interaction in enforcement; usually requires special legislative authorization for cameras' use as evidence in prosecution; financial issues related to fees and uses of fine revenue
8.	18	Using speed display boards	Encourages drivers to slow down by measuring vehicle speeds and prominently displaying them	... a high percentage of drivers speed inadvertently, and the speed display boards are supplemented by police enforcement	Unattended speed display boards are vulnerable to vandalism
9.	19	Arresting the worst offenders	Helps change the common belief that speeding is not a serious offense	...there is sufficient public support	May require special legislative and policy authorization

Response No.	Page No.	Response	How It Works	Works Best If...	Considerations
10.	19	Having citizen volunteers monitor speeding	Enhances informal social disapproval of speeding	...citizens who are directly affected by the speeding participate	Citizens must be properly trained for the specific tasks
Responses With Limited Effectiveness					
11.	20	Reducing speed limits	Intended to slow drivers' speeds through posted signs and police enforcement	...there are adequate levels of police enforcement	Reducing speed limits by itself will reduce average speeds only by small amounts; some speed limits are too low rather than too high, inviting disrespect for them; careful speed studies should be conducted before changing speed limits
12.	21	Increasing fines and penalties	Creates meaningful consequences for speeders, thereby deterring all drivers, generally, and those who are cited, specifically	...the fines and penalties are set high enough to get drivers' attention, but not so high as to compromise public support for them	Beyond a certain threshold, higher fines and penalties do not continue to reduce speeds
13.	21	Erecting stop signs			The effects are to increase speeds mid-block and increase noise from vehicle acceleration

Response No.	Page No.	Response	How It Works	Works Best If...	Considerations
14.	21	Installing speed bumps or rumble strips			They do not reduce speeds directly, but merely warn drivers of hazards ahead
15.	22	Reengineering vehicles	Technological devices can restrict vehicles' maximum speed, automatically notify authorities that vehicles are speeding, or trigger warning signals to drivers when they are speeding	...consumers are willing to accept this technology and pay for it	To date, few vehicles or roads are equipped with this technology, and public support for it is not yet certain

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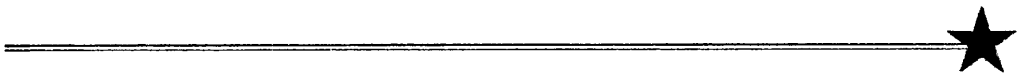

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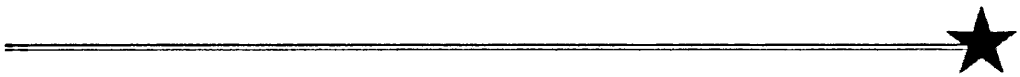

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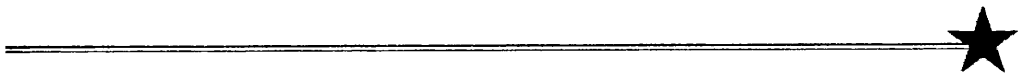

About the Author

Michael S. Scott

Michael S. Scott is the director of the Center for Problem-Oriented Policing, Inc. and clinical assistant professor at the University of Wisconsin-Madison Law School. He was formerly chief of police in Lauderhill, Fla.; served in various civilian administrative positions in the St. Louis Metropolitan, Ft. Pierce, Fla., and New York City police departments; and was a police officer in the Madison, Wis., Police Department. Scott developed training programs in problem-oriented policing at the Police Executive Research Forum (PERF), and is a judge for PERF's Herman Goldstein Award for Excellence in Problem-Oriented Policing. He was the 1996 recipient of the Gary P. Hayes Award for innovation and leadership in policing. Scott holds a law degree from Harvard Law School and a bachelor's degree from the University of Wisconsin-Madison.

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Recommended Readings

- ***A Police Guide to Surveying Citizens and Their Environments***, Bureau of Justice Assistance, 1993. This guide offers a practical introduction for police practitioners to two types of surveys that police find useful: surveying public opinion and surveying the physical environment. It provides guidance on whether and how to conduct cost-effective surveys.

- ***Assessing Responses to Problems: An Introductory Guide for Police Problem-Solvers***, by John E. Eck (U.S. Department of Justice, Office of Community Oriented Policing Services, 2001). This guide is a companion to the *Problem-Oriented Guides for Police* series. It provides basic guidance to measuring and assessing problem-oriented policing efforts.

- ***Conducting Community Surveys***, by Deborah Weisel (Bureau of Justice Statistics and Office of Community Oriented Policing Services, 1999). This guide, along with accompanying computer software, provides practical, basic pointers for police in conducting community surveys. The document is also available at www.ojp.usdoj.gov/bjs.

- ***Crime Prevention Studies***, edited by Ronald V. Clarke (Criminal Justice Press, 1993, et seq.). This is a series of volumes of applied and theoretical research on reducing opportunities for crime. Many chapters are evaluations of initiatives to reduce specific crime and disorder problems.

EXCERPT OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, NOVEMBER 2003

Section 2C.23 BUMP and DIP Signs (W8-1, W8-2)

Guidance:
BUMP (W8-1) and DIP (W8-2) signs (see Figure 2C-4) should be used to give warning of a sharp rise or depression in the profile of the road.

Option:
These signs may be supplemented with an Advisory Speed plaque (see Section 2C.46).

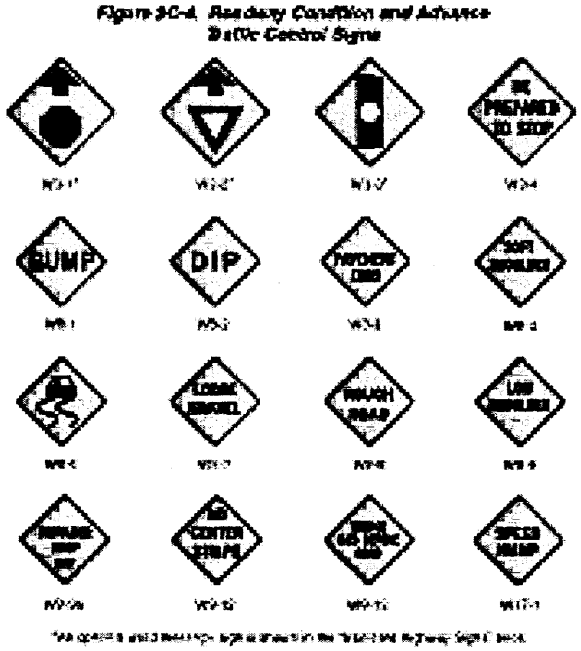
Standard:
The DIP sign shall not be used at a short stretch of depressed alignment that might momentarily hide a vehicle.

Guidance:
A short stretch of depressed alignment that might momentarily hide a vehicle should be treated as a no-passing zone when centerline striping is provided on a two-lane or three-lane road (see Section 3B.02).

Section 2C.24 SPEED HUMP Sign (W17-1)

Guidance:
The SPEED HUMP (W17-1) sign (see Figure 2C-4) should be used to give warning of a vertical deflection in the roadway that is designed to limit the speed of traffic.

Figure 2C-4 Roadway Condition and Advance Traffic Control Signs



If used, the SPEED HUMP sign should be supplemented by an Advisory Speed plaque (see Section 2C.46).

Option:
If a series of speed humps exists in close proximity, an Advisory Speed plaque may be eliminated on all but the first SPEED HUMP sign in the series.

The legend SPEED BUMP may be used instead of the legend SPEED HUMP on the W17-1 sign.

Support:
Speed humps generally provide more gradual vertical deflection than speed bumps. Speed bumps limit the speed of traffic more severely than speed humps. However, this difference in engineering terminology is not well known by the public, so for signing purposes the terms are interchangeable.

ATTACHMENT H

A RESOLUTION SPECIFYING FURTHER ACTION IN FOLLOW-UP TO THE TRANSPORTATION ADVISORY BOARD REVIEW OF THE RESIDENTIAL TRAFFIC MANAGEMENT PLAN
Resolution No. 181/2003-04

WHEREAS, the Town of Carrboro seeks to ensure that its existing policies are responsive to community concerns; and

WHEREAS, Transportation Advisory Board has reviewed the Town's Residential Traffic Management Plan and compiled materials to assist with the update of this document.

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that the Aldermen accept the information and, if desired, direct as follows:

1.
2.

This is the 8th day of June in the year 2004.