Neighborhood Traffic Management Program Manual

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INTRODUCTION

There is a growing concern that some residential streets do not function as multi-use areas in the true sense of the term. A multi-use area is one that is not dominated by vehicles, but shared by the pedestrians, bicyclists and vehicles. The multi-use concept for residential streets recognizes that there are corridors devoted to the efficient, rapid movement of vehicles, but requires that residential areas be serviced by roads designed to accommodate vehicular circulation in a non-threatening, non-intrusive manner. When severe speeding or volume problems exist on residential street quality of life is negatively affected. Methods to address these issues must be defined so that complaints registered regarding neighborhood traffic problems can be effectively and efficiently handled. This Policies and Procedures Manual has been developed as a guide to understanding how Arapahoe County will receive, evaluate and address neighborhood traffic issues.

TYPES OF NEIGHBORHOOD TRAFFIC PROBLEMS

Speed

Speeding generally occurs on roadways, which by design allow the driver to feel safe while exceeding the posted speed limit. Factors, which contribute to this perception, include long, unbroken street grade sight distances, steep roadway grades, overly wide roadways, low-density development, low pedestrian activity, and deep building setbacks. While young drivers and "outsiders" are popularly accused of speeding, the blame does not entirely lie with those two groups. Often those drivers who consistently violate posted speed limits are local residents.

The 85th percentile rule is generally used to measure speed on any given street. The 85th percentile speed is the speed at which 85% of the vehicles are travelling at or below. If the 85th percentile speed is below the speed limit, a speeding problem is judged not to exist. However, if the 85th percentile speed is above the posted speed limit, either the speed limit is not appropriate or a speeding problem may exist. Obviously, the more above the speed limit, the greater the potential is for a problem.

There are two schools of thought regarding the responsibility to control neighborhood speed limits:

1. First and foremost, roadways are designed to safely accommodate vehicular traffic and it is up to drivers to obey the law regardless of how fast they feel the roadway will safely accommodate traffic. Failing driver compliance, it is up to the local law enforcement agency to enforce safe speeds. This theory places the responsibility on the enforcement agency to maintain safe speeds.

2. The second school of thought submits that drivers will regularly and habitually violate the posted speed limit if they feel safe and comfortable doing so. It is therefore up to the planner and engineer to propose solutions that will make drivers feel uncomfortable exceeding the posted speed limit. In this scenario, it is up to the planner and engineer to control speed through educational programs and/or the physical design or alteration of the roadway.

Intrusion

Intrusion is the result of increased volume or excessive non-local traffic on a neighborhood street. Often this intrusion is caused by drivers using a local street to cut through a neighborhood and save time in their commute. Local streets, which are less impeded than others within the same neighborhood, invite cut-through traffic. Drivers are naturally drawn to those routes, which they perceive will save them time, even if that route does not provide the most direct path from point A to B. This increased cut-through-traffic can cause a local street to function as collector. The current maximum volume allocated for a local street in Arapahoe County is 1,500 vehicles per day (VPD).

Much like speeding, intrusion can be promoted or discouraged by street network design. If there is not a logical hierarchy of streets, traffic volume will not be suitably distributed. Likewise, land uses adjacent to roadways must be appropriately matched based on expected traffic volumes. The local neighborhood street should serve as the final destination roadway for the immediate residents of that neighborhood.

Accidents/Safety

Safety is an implied concern on streets experiencing speeding vehicles and/or intrusive traffic. There are however, cases where a particular intersection or pedestrian crossing is considered dangerous because of its location, the design of the street, and/or the behavior of the average driver. Of particular concern are locations near neighborhood schools and parks, which often generate high volumes of pedestrian activity. These areas require special consideration for the mobility and safety of the pedestrian.

In addition to high volume pedestrian areas, accident-prone intersections are a major concern. The accident rate at an intersection may not be particularly high, but its design and driver behavior might lead people to perceive that a higher than normal accident probability exists.

STRATEGIES

Range of Strategies

Traffic calming strategies can be grouped into three categories: 1. education, 2. enforcement, and 3. engineering. In general, only comprehensive and continued education and enforcement programs have met with long term success. The public will usually forget the lessons learned from short-term education and enforcement programs unless they are continually and creatively reinforced. However, a well planned and executed education program, if continually reinforced, can preclude the need for enforcement or re-engineering. Education should be the first step in any traffic-calming effort. Engineering refers to the physical alteration of the roadway. Typical engineering alternatives are more expensive to implement and may require additional maintenance, but they are also permanent in their effectiveness. Arapahoe County strives to have

a well balanced neighborhood traffic program that includes emphasis on education and enforcement, but also allows the opportunity for physical engineering solutions when warranted.

EMERGENCY VEHICLE RESPONSE CONSIDERATIONS

Emergency vehicle response is a basic requirement whenever physical street modifications are considered as part of a proposed neighborhood traffic management program. Changes in roadway physical characteristics that may be considered appropriate from a neighborhood traffic management viewpoint must be considered in the context of meeting adopted emergency vehicle response standards.

Figure 1 shows the primary emergency response routes for the urbanized area of Arapahoe County. These are considered of such importance that physical street modifications that would reduce or lower the level of service for emergency response activities will not be considered.

For those neighborhood streets not shown on this emergency vehicle priority route map, consideration of emergency vehicle access must be made on a case-by-case basis.

In the final analysis, it is recognized that there must be a balance as can only be determined on a case-by-case basis. The total involvement of the particular study process determines the relative importance of emergency vehicle response level of service versus the change in level of service for neighborhood residents with implementation of the physical changes. It is clear that the affected emergency response agencies should be involved early in the consideration of possible street physical changes and, should not be notified after the neighborhood has "bought in" to a particular scheme of changes to improve speed levels and/or volume conditions.

THE PROPOSED PROGRAM

INTRODUCTION

The proposed neighborhood traffic-management program consists of two stages:

- Stage 1 – Normal activities by the Traffic engineering staff.
- Stage 2 – Consideration of physical street modification necessitated by the inadequacy of Stage 1 actions in order in order to achieve the adopted acceptable speed and traffic volume standards.

STAGE 1

Stage 1 activities are focused on excessive or perceived excessive speeds utilizing the following countermeasures:

- Education of the neighbors about excessive speeds by the neighborhood residents. This would also include continuing speed awareness activities within the neighborhood.
- Traditional enforcement by the Sheriff's Department.
- Deployment of the radar speed trailer.

- Installation of signs and markings that are considered by the Traffic Engineer to be appropriate after a review of the particular situation.

The Stage 1 activities listed above can be expected to satisfy about 90-95% of the complaints.

STAGE 2

Introduction

Stage 2 activities would be considered only after the following criteria have been satisfied:

1. Stage 1 activities have failed to solve the actual or perceived problem(s), and
2. The speed and/or traffic volumes exceed the following limits on a local residential street:
   - 85^{th} percentile speed exceeds the posted speed limit by 5 mph or more and/or
   - Volume exceeds 800 vehicles per day, and
3. At least 51% of the residents (one signature per address) in an area designated by the Traffic Engineer have signed a petition (wording approved by the Traffic Engineer) in favor of conducting a study that may show that one or more streets in the area may be impacted by the installation of the defined Stage 2 techniques or tools.
4. Staff deems safety issues may warrant intervention.

The Stage 2 traffic management program discussed here is to be considered only after the Traffic Engineer has determined that techniques such as personal contact, education, radar speed trailer use, and other traditional techniques have been tried and have been determined unsuccessful in satisfying the particular problem. Also, this program applies to local streets with more than 800 ADT and/or 85^{th} percentile speeds greater than 5mph over the posted speed limit.

The goals of the Stage 2 program is to provide a methodology of solving problems that could not be solved under Stage 1.

A Detailed Guide

Objectives

1. Improve neighborhood livability by mitigating the impact of increasing traffic volumes and speed of vehicular traffic on residential neighborhoods.
2. Restrict vehicular speed to levels compatible with the residential environment.
3. Promote safe and pleasant conditions for residents, motorists, bicyclists, pedestrians, and transit riders on residential streets.
4. Encourage citizen participation in all phases of Stage 2 TMP.
5. Make efficient use of County resources.

Policies

1. Through traffic should be encouraged to use higher classification streets.
2. A combination of education, enforcement, and engineering methods should be employed. Traffic Management devices should be planned and designed in keeping with sound engineering and planning practices. The County Traffic Engineer shall direct the installation of traffic control devices (signs, signals, and markings) as needed to accomplish the project, in compliance with MUTCD Standards.
3. Emergency vehicle access should be accommodated in keeping with existing Public Safety response standards. If current emergency vehicle access does not meet the existing response standard, traffic management efforts should not further degrade the response time. The Emergency Vehicle Access Routes shown on Figure 1 – shall not be considered for Stage 2 street modifications.
4. Transit service access, safety, and scheduling should not be significantly impacted.
5. Reasonable vehicle access should be maintained. Pedestrian, bicycle, and transit access should be encouraged and enhanced wherever possible.
6. Parking removal should be considered on a project-by-project basis. Parking needs of residents should be balanced with the equally important function of traffic, emergency vehicle access, transit, bicycle, and pedestrian movement.
7. Application of Stage 2 TMP shall be limited to local and residential collector streets in neighborhoods with direct driveway access. The exception may be considered on collectors with no direct driveway access located near parks, schools, or in high pedestrian use areas with documented accident history.
8. To implement the Stage 2 TMP, the Traffic Engineer should process traffic management requests in accordance with applicable codes and related policies and within the limits of available resources. At a minimum, the procedure shall provide for submittal of project proposals, evaluation and selection, appropriate County Commissioners review, citizen participation, and communication of test results and specific findings to project area residents and affected neighborhood organizations before installation of permanent traffic calming devices.
9. The affected neighborhood association will be required to fund a minimum of 50% the cost of the improvement.
10. Stage 2 improvements must be supported by greater then 75% of the residents within the affected area as determined by Arapahoe County Traffic Engineer. The Arapahoe County Traffic Engineer must approve wording of the petition.

Types of Projects

The Stage 2 TMP encompasses two types of projects:

1. Internal Neighborhood Residential Collector Streets
2. Local Residential Streets

These projects are intended to decrease the negative impact of speeding on primarily residential internal neighborhood collector streets that have direct residential access, and to improve safety for all. These collector street functions to distribute traffic from a higher classification streets to local streets. Because of this function, these should not be physical diversion on these streets. Projects are however intended to make the streets safer by reducing speeds.

Major project steps:

A. Ranking and Selection

At least 75% of properties fronting on the street must be zoned residential in order for the street to be considered. Those street segments that meet this qualification will be ranked using the criteria shown in Appendix A. This criteria gives the highest importance to speed, as high speeds can be the chief detractor of safety and livability on residential collectors. It is also the element that can best be mitigated by the traffic management devices available.

Project selection reviews will begin with those streets ranking highest. The Traffic Engineer will review potential projects by looking at their size/complexity, compatibility with other Department projects, budget availability, and other factors. In addition to the identified high-ranking segments, projects may also include additional segments or portions thereof to ensure that street system continuity is maintained.

Procedure

The procedure for implementation of residential collector projects is outlined in Appendix C. The procedure will enable Traffic Engineering staff to measure project area residents' support for the project, and to allow for public participation. A project area meeting will be held, followed by additional meetings to work with residents to develop the traffic management plan. A petition will be required to show area support and a public hearing may be held. A close dialogue with project area residents will be provided for and encouraged throughout the process, with the end result being a project developed and supported by both staff and residents.

Local Residential Streets

The major steps that a project will go through are outlined as follows:

A. Initiation

These projects are citizen initiated. Residents and/or a neighborhood association contact the Traffic Engineer to express concerns about the traffic conditions on their streets. A Traffic Engineering Services (TES) Attachment Z application must be completed at this time. These concerns are reviewed by the Traffic Engineering staff, who collect preliminary data about the traffic conditions on the streets, including volume, speed, and accident

information. If there is no immediate solution and the Traffic Engineer deems it appropriate or it is specifically requested, the request is evaluated for a traffic management program. Remember that Stage 1 activities must be tried and those efforts exhausted before Stage 2 program methods will be considered.

B. Ranking and Selection

The street will be ranked using the criteria shown in Appendix B. This criteria gives equal importance to speed and volume, as neither high speeds nor volume are appropriate on local streets.

C. Procedure

A procedure for the implementation of local street projects has been developed to enable the Traffic Engineering staff to work with project area residents and to measure their support for the project. A project area meeting will be held, followed by additional meetings (if required) to work with residents to develop the traffic management plan. A petition will be required within the area, and a public hearing may be held. A close dialogue with project area residents is provided for and encouraged throughout the process, with the end result being a project developed and supported by both the Traffic Engineering staff and by residents. The detailed steps and requirements of this procedure are outlined in Appendix C.

APPENDIX A

RANKING CRITERIA FOR RESIDENTIAL COLLECTOR STREETS

Speed - Speed will be based on average daily speed during non-peak hours. Up to 30 points may be assigned (2 points for every mile over the posted speed limit up to a maximum of 30 points)

Volume – Volume counts will be based on average daily traffic (ADT). Up to 25 points may be assigned (1.667 points per 1,000 ADT, up to a maximum of 25 points for 15,000 ADT).

Residential Density – Residential density will be determined based on zoning. Both single and multi family residential buildings, which front on the street segment, will be included. Up to 20 points may be assigned at 4 points per 100 dwelling units per mile up to a total of 500.

Lack of Sidewalks - Street segments lacking sidewalks will be given 9 points. The lack of sidewalks is defined as the absence of a continuous sidewalk on both sides of the street segment.

Selections of these streets do not necessarily mean that sidewalks will be built as part of the project.

Elementary School Crossing – Street segments will be assigned 7 points if children need to cross the street to get to an elementary school. This includes marked crosswalks.

Other Pedestrian Generators - Street segments will be assigned 5 points if any of the following pedestrian generators occur within the street segment (i.e., from arterial to arterial) within 1,000 feet of the street:

- Retail Commercial uses
- Institutional uses
- Parks
- Schools not included in the elementary school crossing criterion (e.g. high schools)

Street Width – Street segments over 40 feet wide will be given 4 points.

APPENDIX B

RANKING CRITERIA FOR LOCAL STREETS

Traffic Volume - Average daily volume of over 1,000 vehicles on the segment of the project street having the highest volume divided by 100.

30 points are the maximum score allowed for traffic volume.

Speed - Percent of vehicle 85th percentile speeds 5mph over the posted speed limit on the segment of the project street having the highest percentage over the limit divided by 3.

30 points are the maximum score allowed for speed.

Accident Rates - Most recent three years of available accident data, counting only correctable accidents.

Accidents to be included are:

- Over the entire length of the street and/or,
- In the intersections of minor streets associated with movement in or out of the street and/or,
- In the intersections of collectors associated with movement in or out of the street.

The number of accidents times 1,000,000 vehicle miles times 0.30 divided by 365 days per year, the average daily traffic (ADT), the time period of the study, the length of the street section in miles, and an ADT adjustment factor of 0.86

30 points are the maximum score allowed for accidents.

Elementary Schools - 5 points if any public or private schools (kindergarten through 8th grade only) are located on the project street. Schools across collectors or through streets, or in the neighborhood, are addressed in the next section.

Score 5 points if any schools are present.

Pedestrian Generators - Up to 5 points may be given for each pedestrian area, except an elementary school on the street per the Traffic Engineer's discretion. Pedestrian areas may include parks, special housing facilities, high schools, elementary schools not on the street, or other facilities that generate a significant number of pedestrians. If a group of pedestrian areas is located in the same area of the street, a maximum of 5 points should be given to the group.

5 points are the maximum allowed for each individual or group of pedestrian areas on the street. A maximum of 10 points will be given.

Pedestrian Routes - A street classified as a pedestrian route in the Transportation Element of the Comprehensive Plan will be given 5 points.

Bicycle Routes - A street classified as a bikeway in the Transportation Element of the Comprehensive Plan will be given 5 points.

APPENDIX C

PROCEDURE FOR RESIDENTIAL COLLECTOR AND LOCAL STREET PROJECTS

STEPS:

1. **Staff receives written request for consideration of Stage 2 improvements and makes initial determinations.**

   After receiving written request to be considered for Stage 2 improvements the County Traffic Engineer will make a determination if all Stage 1 activities have been exhausted. If the Traffic Engineer does not feel all methods have been tried or enough time has been allowed for Stage 1 activities he will indicate that in a respond to the request along with what is planned to further address the issues. If the Traffic Engineer feels that all Stage 1 activities available have been tried for sufficient period of time the Traffic Engineer will conduct additional research and data collection to see if the area meets the minimum criteria for Stage 2 improvement consideration.

2. **Project ranking is completed.**

   If the project meets minimum criteria to be considered for Stage 2 improvements the project will then be ranked against other projects. Available funding will also be considered.

3. **Request of Area Petition.**

   If the project meets the criteria for Stage 2 improvements and ranks high enough that County funding may be provided the County will request that a petition be developed and circulated for signature. The County Traffic Engineer must approve the petition area and wording. A minimum of 50% of the property owners in the study area must sign in support of the study providing conceptual plans and cost estimates for Stage 2 improvements. At this time the County will get a bid to develop conceptual designs and cost estimates and present them at a community meeting. The neighborhood must agree to fund one-half the cost of this engineering work before it shall be authorized by the County.

4. **Present traffic-calming alternatives to residents at a Meeting. Determine the preferred traffic-calming alternative.**

Notification for this meeting will be sent to all those residents within the project area as approved by the Arapahoe County Traffic Engineer. At this meeting, the Traffic Engineering staff and the Consultant will present the traffic-calming plan(s) developed. Residents will be asked to prioritize their preferences in determining the plan they prefer. If necessary, a second meeting may be held to determine that final traffic-calming plan.

Petition to Install.

Once the project proponents have agreed upon an alternative a final petition must be circulated to the residents within the project area. The Arapahoe County Traffic Engineer must approve the wording on the petition and the project area. The petition must detail the proposed project include maps or drawings if necessary. The petition must also indicate the estimate cost of the project, maintenance responsibilities and the financial participation by the County and the neighborhood. A super majority (75% or above) of the residents in the project area must support the plan for installation to proceed.

5. **Design and Construction.**

If a super majority of the project area residents support the project plan, the neighborhood has entered into an agreement to fund a minimum of 50% of the design and construction and County funding is available the project may proceed. County staff will contract with the engineer to provide final engineering and any other related services such as bid documents, surveying, or construction management services. The project will then proceed to public bid and a construction contract will be awarded to the lowest responsible bidder.

The County shall reserve the right to remove Stage 2 improvements at any time. If at any time the neighborhood wishes to remove stage 2 improvements they must be done at the neighborhoods expense and supported by a petition signed by at least 51% percent of the residents in the area as approved by the Arapahoe County Traffic Engineer.

The County also reserves the right to construct Stage 2 improvements at any time.

Table 2-1
Strategy Characteristics

Traffic Calming Strategy	Street Type	Appropriate Use	Inappropriate Use	Benefits/ Effectiveness	Drawbacks
Education and Awareness • brochures • neighborhood meetings and workshops	All	• Initial tool to be used for an area that is primarily affected by "repeat offenders"	• Previously tried with no significant results • As a solitary solution in areas that visually encourage excessive speeds	• Empowers citizens • Can be effective with strong neighborhood participation • Can promote neighborhood cohesion.	• May be difficult to measure effectiveness • May need to be frequently updated/enforced • Public already inundated with information • Effectiveness may decrease over time
Radar Trailer • mobile radar trailer that monitors and displays motorists' speeds as they drive by	Local Collector and Some Arterial Streets	• To reduce speeds, esp. in school and construction zones where spot speed "education" is needed	• Remote locations • Four-lane roadways	• Public relations tool • Inexpensive	• Effective for limited time • Requires labor to move
Enforcement • use ofSherifff to monitor and enforce speed limits	All	• To reduce speeds, esp. in school and construction zones where spot speed "control" is needed	• Where pulling over a vehicle creates a hazard • Where problem can shift to alternate routes	• Immediately slows vehicle speeds • Public education	• Temporary solution • May divert problem to alternate route • May prompt complaints about inappropriate duty of sheriff officers • Expensive • Effectiveness may decrease over time if enforcement is not constant
Pavement Markings and Signage • edgelines and parking delineation • crosswalks • pedestrian or bicycle symbols • bike lane designations • yield signs	Primarily Collector and Arterial Streets, Some Local Streets	• To provide direction and reduce confusion	• Too many signs in area already	• Clearly defines travel paths • Enforceable • Inexpensive • Can cause "narrowing" effect	• Continuing maintenance • Too many signs reduce effectiveness • Drivers may ignore inappropriately placed signs
Speed Limit Signs	All	• Inform drivers of speed limit • Inform drivers of change in speed limit	• None	• Enforceable	• Drivers may ignore if the road is comfortable to drive at higher speeds.

Traffic Calming Strategy	Street Type	Appropriate Use	Inappropriate Use	Benefits/ Effectiveness	Drawbacks
Stop Signs	Local and Collector Streets	• To reduce accidents due to undefined right-of-way • At low volume street intersections with higher volume streets	• To reduce speeds • Steep grades • Insignificant traffic volumes • On higher volume street intersecting lower volume street	• Prioritize traffic movements • May reduce cut-through traffic • Inexpensive	• Does not decrease average speeds - drivers tend to rapidly accelerate after sign • Drivers ignore if there is insignificant cross traffic or if stop signs are excessively used • Noise and air pollution increase
Curb Extensions	Local and Collector Streets	• To reduce accidents at intersections with high pedestrian usage	• On designated bike route	• Reduce accidents by reducing pedestrian crossing distance • Reduce speeds through intersection if lane width is significantly reduced • Does not encroach upon adjacent properties • Will accommodate emergency vehicles	• Speeds may increase between intersections • Reduces width of travelway for bicyclists • May cause drainage problems
Raised Crosswalks	Local Street Entry, Collector Streets	• To reduce accidents and speeds at locations with high pedestrian usage	• On primary emergency vehicle route	• Improve safety for pedestrians • Reduce speeds at crosswalk	• Speeds may increase away from crosswalk • May damage vehicles if improperly designed • Installation cost is moderate to high
Raised Median Islands	Local Street Entry, Collector and Arterial Streets	• To reduce excessive speeds due to street width	• On streets with residential driveways • Where median displaces bikeway or premium on-street parking	• Reduce speeds if lane width is significantly reduced • Provide pedestrian refuge area • Provide landscaping area	• Reduce width of travelway for bicyclists • Installation cost is moderate to high

Traffic Calming Strategy	Street Type	Appropriate Use	Inappropriate Use	Benefits/ Effectiveness	Drawbacks
Roadway Deviations or Chicanes	Local and Collector Streets	• To reduce excessive speeds due to street width and unimpeded sight distance	• To reduce accidents and cut-through traffic • On streets with residential driveways • On streets where on-street parking is at a premium • Roadways with inadequate ROW to implement safe, effective treatment	• Reduce speeds without impeding emergency vehicle access • May reduce cut-through traffic	• If designed improperly, some drivers accelerate around chicanes in order to avoid oncoming traffic
Traffic Circles	Local and Collector Streets	• To reduce accidents and speeds at intersections • As aesthetic enhancement	• To reduce cut-through traffic • At locations where modifications to the street width or corner radii are not required to accommodate circle	• Reduce intersection accidents and speeds • Cost savings from accident reduction exceeds construction cost • Do not divert traffic to other residential streets • Aesthetic enhancement if landscaped • Can be designed to allow access for emergency vehicles	• Some drivers may go wrong way to turn left • Cause emergency vehicles to slow down • Relative cost is moderate to high
Lane Narrowing or Neckdowns	Most	• To reduce excessive speeds due primarily to street width	• To reduce accidents and cut-through traffic • On streets with residential driveways • On roadways with inadequate ROW to implement safe, effective treatment	• Reduce speeds if lane width is significantly reduced • May provide opportunity for landscaping	• May present hazard to bicyclists • Relative cost is moderate to high

Traffic Calming Strategy	Street Type	Appropriate Use	Inappropriate Use	Benefits/ Effectiveness	Drawbacks
Chokers	Local and Collector Streets	• To reduce excessive speeds due primarily to street width • To improve pedestrian crossing conditions	• On roadways with inadequate ROW to implement safe, effective treatment • To reduce cut-through traffic	• Reduce speeds and may reduce accidents • Require less linear distance than chicanes, neckdowns or roadway narrowing measures • Do not impede access for emergency vehicles	• May present hazard to bicyclists • Relative cost is moderate

Table 2-2

Traffic Calming Strategy Average Costs*

Strategy	Average Cost
Education and Awareness	Variable - Dependent upon extent of program
Pavement Marking and Signage	$_____ per foot of striping $100 per sign
Curb Extensions	Average - Between $7,000 and $10,000 (per extension)
Raised Crosswalks	Low to Average - Between $1,000 and $10,000
Raised Median Island	Average - Between $8,000 and $15,000
Chicane	Average - Between $10,000 and $40,000
Traffic Circle	Average to Expensive - Up to $25,000
Neckdown	Average to Expensive - Between $10,000 and $40,000
Choker	Expensive - Greater than $40,000 (4-way intersection)

*Note: Costs vary considerably based on landscaping and other improvements.

Table 3

Applicability Summary

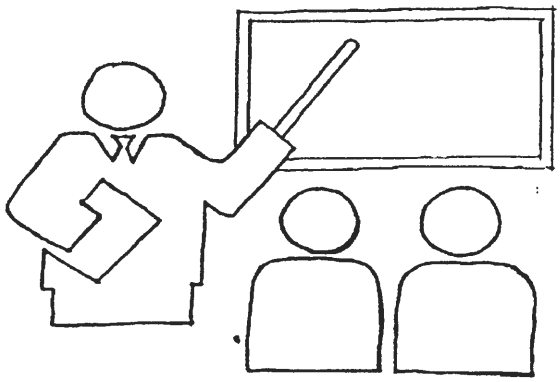
Traffic Calming Strategy	Intent: Reduction of Traffic Speeds	Reduction of Traffic Intrusion	Reduction of Accident	Provisions for Pedestrians and Bicyclists
Education				
Enforcement				
Radar Trailer				
Pavement Markings & Signage				
Speed Limit Signs				
Stop Signs				
Curb Extensions				
Raised Crosswalks				
Raised Median Islands				
Roadway Deviations or Chicanes				
Traffic Circles				
Lane Narrowing or Neckdowns				
Chokers				

 Primary Effectiveness  Not Applicable  Secondary Benefits

ATTACHMENT I

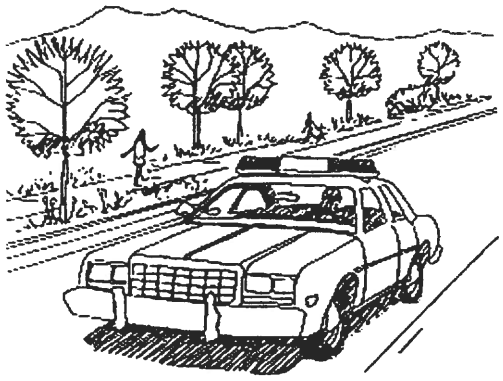
NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM
(Education)
A Stage 1 Tool

Activities that inform and seek to modify driver behavior. Techniques include printed information, meetings, and workshops with staff, interaction with neighbors, enforcement activities, school programs, parent outreach, etc.



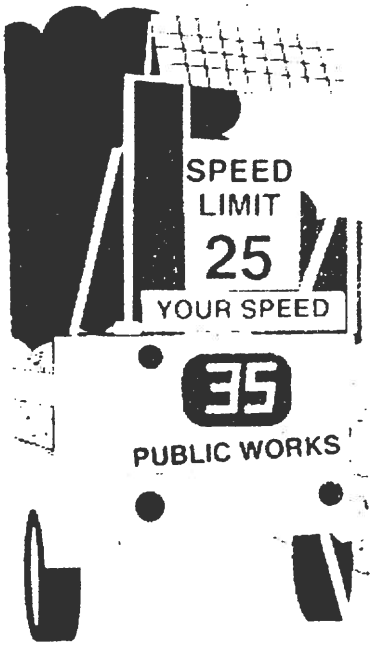
ENFORCEMENT
(Visible and Active Sheriff Presence)
A Stage 1 Tool

Sporadic monitoring of speeding and other violations by sheriff. Sheriff deputies can come out to a neighborhood for short periods of time to issue tickets. Additionally, sheriff deputies can "take a neighborhood under their wing," and monitor traffic on a regular basis. Neighborhood can also contract with off duty sheriff deputies to provide enforcement.



SPEED WATCH
(Speed Wagon/Trailer)
A Stage 1 Tool

The use of a portable radar speed meter capable of measuring vehicle speed graphically and then displaying the speed to passing drivers.

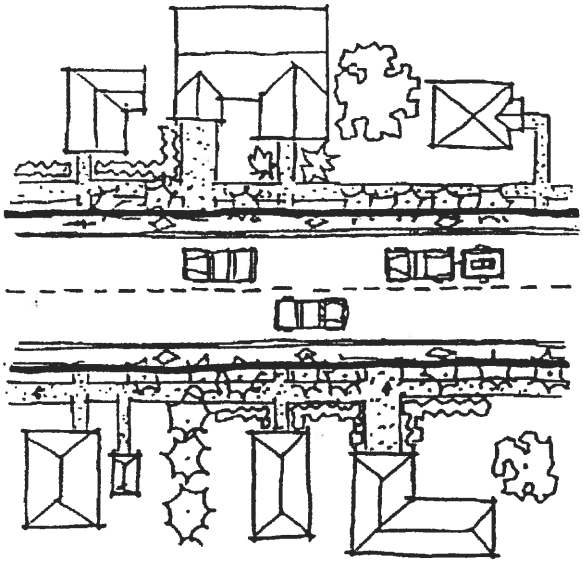


SPEED LIMIT SIGNS
A Stage 1 Tool

Signs that inform drivers of the maximum safe driving speed under normal conditions.

STREET STRIPING
A Stage 1 Tool

Highlighting various areas of the street to increase the driver's awareness of speed or other conditions (e.g., edge of travel way to create a narrowing/slowing effect while defining space for cyclists).



SPEED TABLES
(3-4" X 22')
A Stage 2 Tool

Speed humps with a long flat section, often
used as crosswalks.

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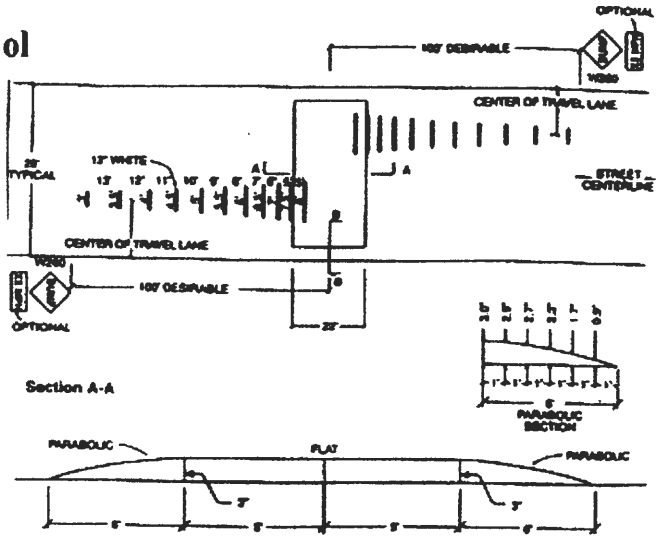
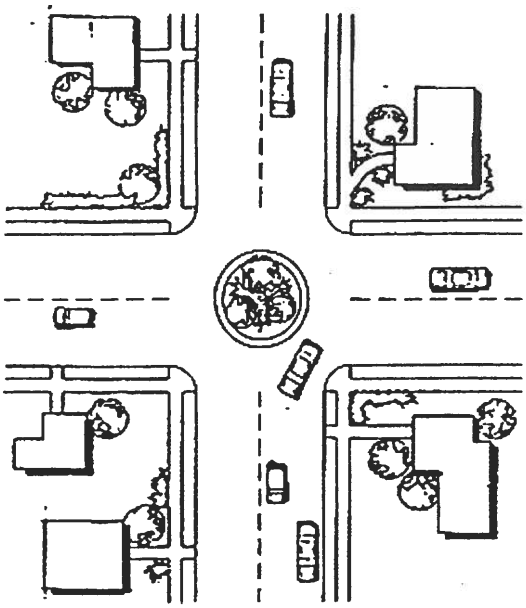


TRAFFIC CIRCLES

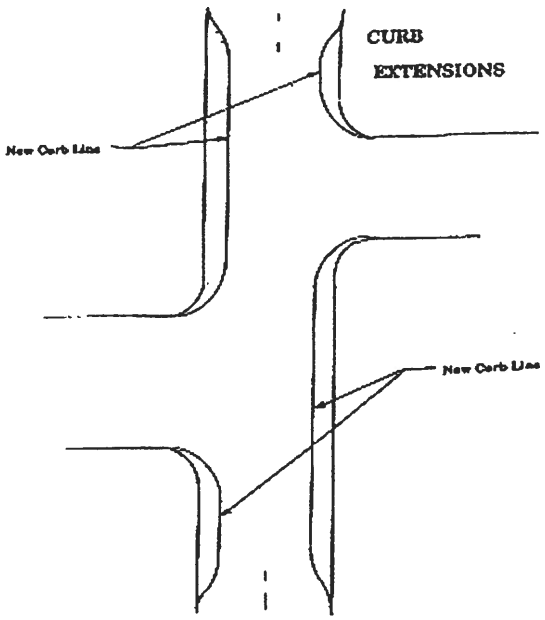
A Stage 2 Tool

This device is a circle in the middle of two intersecting routes. Direct straight-through movements are obstructed by the central island, causing traffic to move around the circle in a one-way pattern. Approaches to the intersection area are normally controlled by "YIELD" signs. Their primary purpose is to slow high-speed traffic. They also reduce the number of reported accidents. Traffic circles are most effective when constructed in a series.



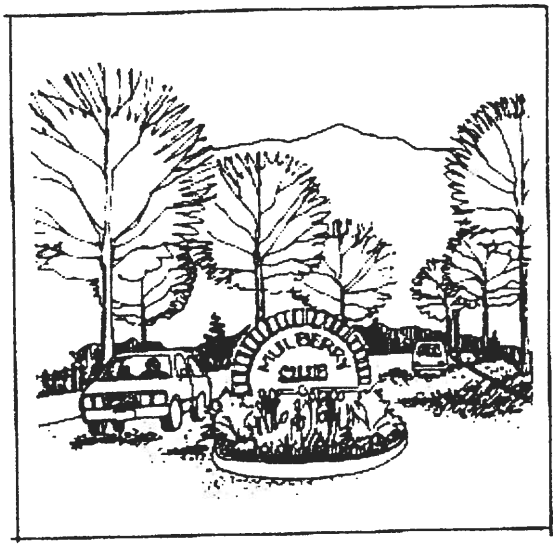
CURB EXTENSIONS
(Entry, Exit, Mid-Block)
A Stage 2 Tool

Curb extensions narrow the street by widening the sidewalk and/or the landscaped parking strip. They are used to make pedestrian crossings easier and to provide a visual narrowing along the roadway that helps increase driver awareness. They can be installed either at intersections or mid-block.



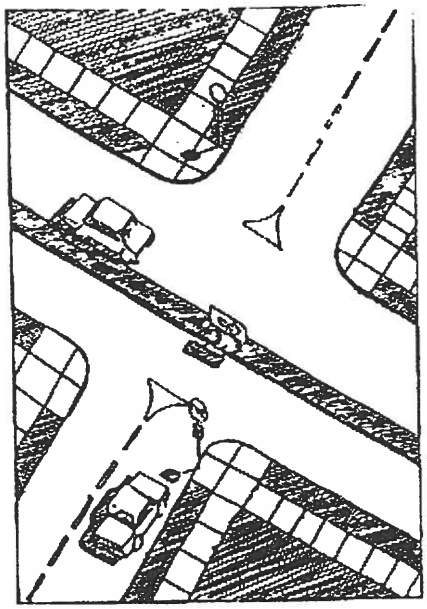
MEDIAN ENTRY/EXIT ISLANDS
A Stage 2 Tool

Traffic islands used to create narrower
Roadway at entry/exit point.



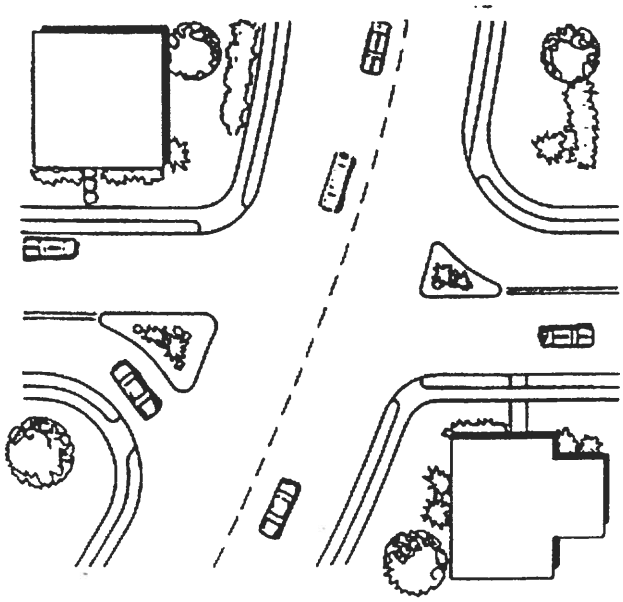
MEDIAN BARRIERS
A Stage 2 Tool

A median barrier (raised median) is used at the intersection of a major and a minor street to prevent left turns to and from the minor treet, in addition to through movements across the major street.



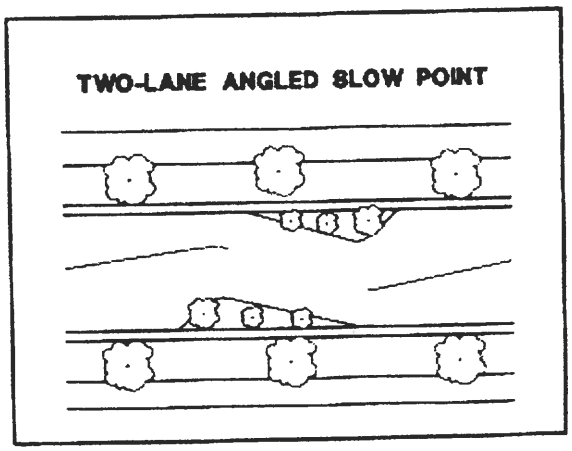
FORCED-TURN ISLANDS, BARRIERS, CHANNELIZATION
A Stage 2 Tool

This technique primarily involves the utilization of traffic islands to restrict specific traffic Movements at an intersection. The basic purpose of forced-turn channelization is to discourage the use of a particular route or street segment by through traffic.



MID-BLOCK SLOW POINTS, CHICANES
A Stage 2 Tool

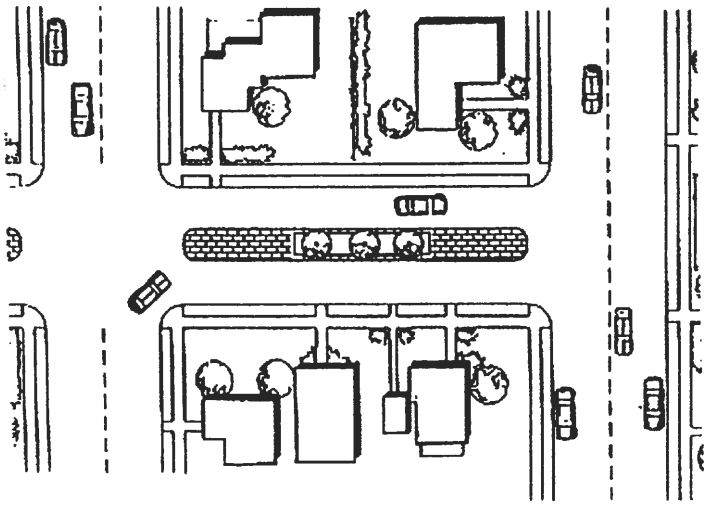
Serpentine curb protrusions offset from each other in mid-block locations that narrow the width of the roadway and help reduce traffic speeds and improve safety.



MEDIAN MID-BLOCK ISLANDS
A Stage 2 Tool

Traffic islands between intersections to create

a narrower roadway or provide refuge for Crossing pedestrians.



Attachment 2

TRAFFIC ENGINEERING SERVICES APPLICATION
Arapahoe County

Department Of Development Services/Infrastructure Management
5334 South Prince Street – Littleton, Colorado 80166 – 303-795-4640

Applicant Name: _____ Date _____
Address: _____ Telephone Numbers:
_____ Home: _____
_____ Work: _____

Describe Problem and Location (attach sketch if appropriate)

Applicants Suggested Solution (show on sketch if appropriate)

Supporting Documents
Drawing Attached
☐ Petition Attached (list number of signatures _____) (Attach drawing that shows location of signators)
☐ Homeowners Association letter attached (show Association area on map)
☐ Other (describe) _____

The Arapahoe County Department of Development Services/Infrastructure Management received this application on _____.
It has been assigned case number _____. In general, we evaluate applications on a first-submitted first-evaluated basis. At present, we have a backlog of approximately _____ applications. It is my estimate that we should be able to process your application in approximately _____ months.

Comments: _____ Signature: _____
_____ Traffic/Transportation Engineer
_____

Evaluation completed Signature: Traffic/Transportation Engineer
Resppnse dated _____ sent.