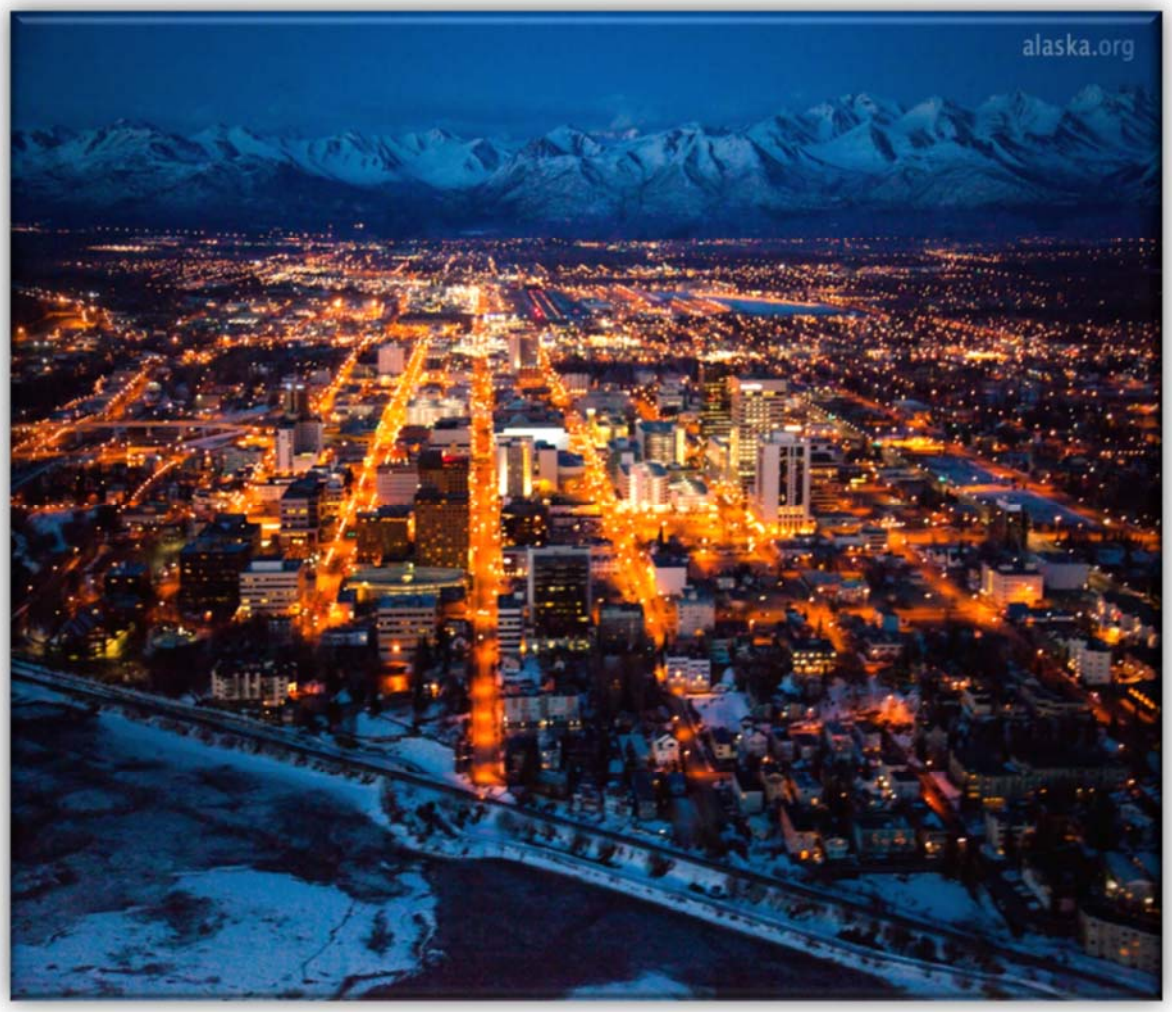
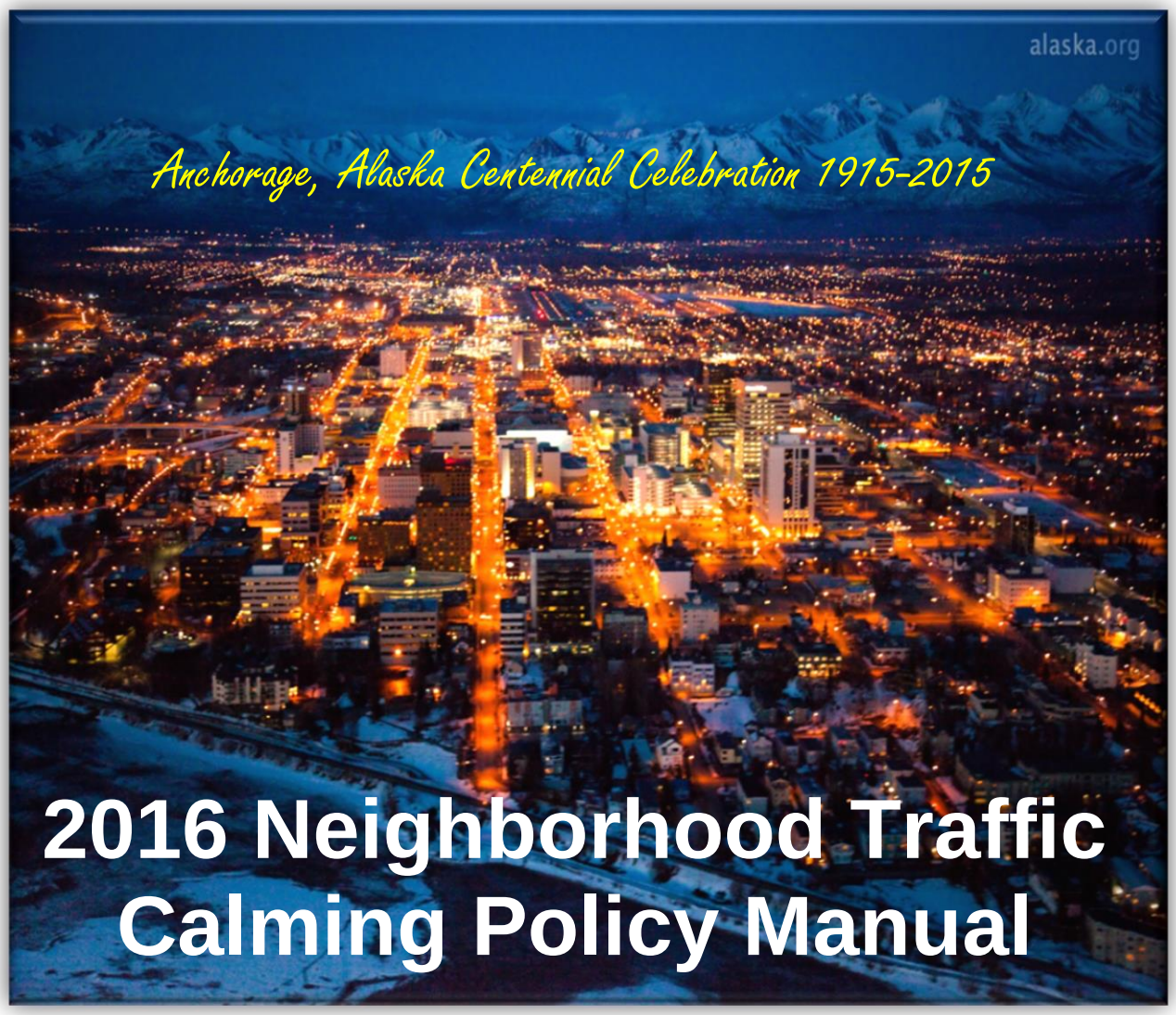


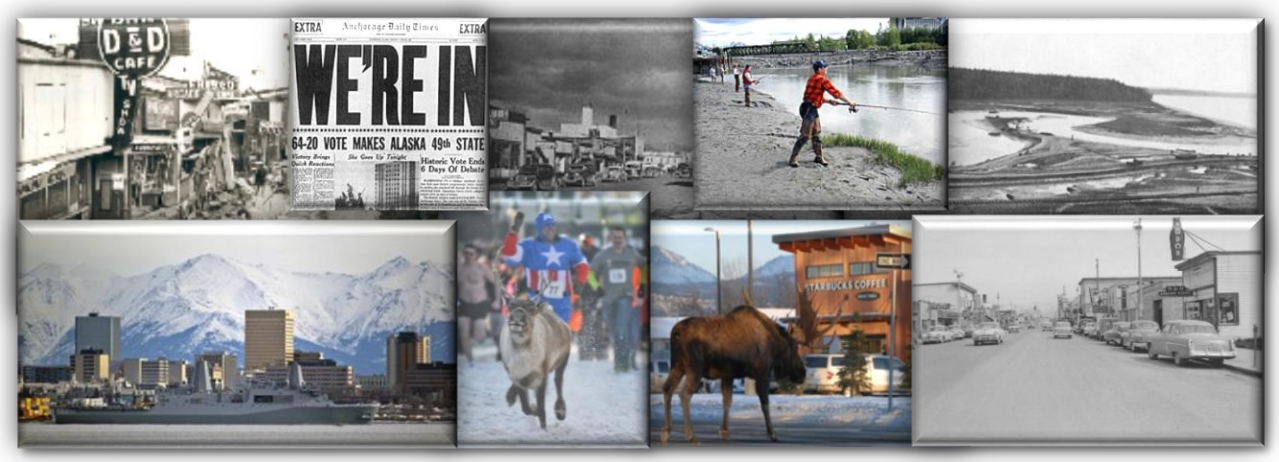
TRAFFIC DEPARTMENT

2016 Neighborhood Traffic Calming Policy Manual



2016 Neighborhood Traffic Calming Policy Manual

Prepared by the Traffic Department
Municipality of Anchorage



Stephanie Mormilo, PE
Municipal Traffic Engineer

TRAFFIC DEPARTMENT

www.muni.org/departments/works/traffic/pages/default.aspx

ACKNOWLEDGEMENTS

Our appreciation is extended to Alaska.org for permission to use the cover photo of downtown Anchorage. Photo Credit: Bob Kaufman, via Alaska.org

Permission granted from the Anchorage Museum and University of Alaska (Fairbanks and Anchorage) for use of archival photos

The Traffic Department wishes to express appreciation to Nazir Lalani, PE, ITE(F), ASCE(M), and Kent Whitson, PE, and credit to the cities of San Diego and Sacramento, California; Federal Way, Washington; and Iowa City, Iowa; and the Pennsylvania Department of Transportation for ideas and graphic concepts, and HDL Engineering Consultants for technical editing support.

Prepared under the direction of the Municipal Traffic Engineer: Stephanie Mormilo, PE by the Traffic Safety Section of the Municipality of Anchorage: Kristen Langley, ITE(M), ASCE(A), Supervisor

PREFACE

What is Traffic Calming?

Speeding and unsafe driving habits are a concern in communities across the United States. The Municipality of Anchorage (MOA) is no exception, with many of our neighborhoods' residents expressing their concerns.

In order to assist Community Councils and elected officials in addressing the major concerns about neighborhood speeds and safety, MOA has adopted this updated Traffic Calming Policy Manual (Policy Manual).

"Traffic Calming involves changes in street alignment, installation of barriers, and other physical measures to reduce speeds and cut-through traffic volumes in the interest of street safety, livability, and other public purposes[1]"

Our program does not specifically include measures such as enforcement—although enforcement and education are also important means of addressing unacceptable driver behavior. Warning signage is a component of most traffic calming measures; however, signage by itself nor right-of-way assignment at intersections, and striping are components of traffic calming.

The use of traffic control devices, particularly all-way STOP control at intersections and SPEED LIMIT signs—because drivers may ignore them—require increased enforcement. Unwarranted STOP signs may result in increased speeds away from intersection(s). MOA does not approve using signs such as "CHILDREN AT PLAY," "BLIND CHILD," etc. Research studies indicate that these signs provide no measurable improvement in safety, but are, in fact, counterproductive—increasing the risk to the public. Some are not approved for use on public roads in the United States.

Industry and nationally accepted traffic calming measures on the other hand are effective, by contrast, when properly located—and are self-enforcing.

In March 2001, the MOA Traffic Department published the Traffic Control Protocol Manual (TCPM)—prepared by DOWL Engineers. The TCPM provided a toolbox of traffic calming measures, rated their effectiveness, and provided some basic guidelines for their implementation. In December 2005, the MOA Traffic Department wrote our Policy Manual.

This "Centennial Edition" of the Policy Manual is a replacement of the 2005 Traffic Calming Policy Manual document. It includes updated information on accepted professional practices in traffic calming, and changes in the MOA Traffic Department's policies and procedures. Some information is included from the 2001 TCPM to provide context. This information includes clarification and revisions about our policies regarding roadways that are not candidates for traffic calming, identifies new techniques, and techniques that are no longer a part of the Municipality's program.

Any references to "Department" or "The Department" in this document will also be referring to the MOA Traffic Department as of the publishing date of this document. Any references to "Traffic Engineer" or "Director" refer to the Municipal Traffic Engineer or their approved designee.

These policies apply only to citizen-initiated traffic calming requests. MOA will follow its own internal process for agency-initiated traffic calming performed during the project design process. This may also result in removal and substitution of existing devices ('horizontal' replacing 'vertical', road narrowing replacing 'vertical', etc.) during the design and construction process.

Stephanie Mormilo, PE
Municipal Traffic Engineer

[1] Institute of Transportation Engineers (ITE) Traffic Calming State of the Practice, Ewing, 1999

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ACRONYMS AND TERMS

ACRONYMS

AASHTO: American Association of State and Highway Transportation Officials

AFD: Anchorage Fire Department

AKDOT: Alaska Department of Transportation and Public Facilities

AMC: Anchorage Municipal Code

APD: Anchorage Police Department

ARDSA: Anchorage Road and Drainage Service Area

ATM/ATMS: Alaska Traffic Manual Supplement, published by AKDOT, and a statewide supplement to the Federal MUTCD.

AWSC: All Way Stop Control

CBERRRSA: Chugiak Birchwood Eagle River Rural Road Service Area

FHWA: Federal Highway Administration

ITE: Institute of Transportation Engineers

JBER: Joint Base Elmendorf-Richardson

LRSA: Limited Road Service Area

MOA: Municipality of Anchorage

MUTCD: Manual of Uniform Traffic Control Devices, published by the Federal Highway Administration, and approved by Federal law, and the expected guidelines for the use and installation of signs, markings, signals in the public right-of-way.

OS&HP: Official Streets and Highways Plan of the MOA (2014, or most recent)

PSL: Posted Speed Limit

RAP: Recycled Asphalt Pavement

TCPM: 2001 Traffic Control Protocol Manual

TERMS AND DEFINITIONS

85th Percentile Speed: The speed at which 85 percent of the vehicles on a road are being driven at or below.

For example, an 85th percentile speed of 29 miles per hour means that 85 percent of the cars are traveling between 0 and 29 miles per hour. The remainder (15 percent) of the cars is driving at speeds 30 miles per hour of greater.

Affected Area consists of the private properties (1) abutting the streets considered for traffic calming devices together with; (2) abutting those other streets that are likely to experience an increase in traffic due to the traffic calming measures; and (3) those intersecting streets that have no other connections except via those roadways proposed for traffic calming.

Critical Response Route consists of those roadways classified as Collector or above, or functioning as the primary access into a neighborhood. The Department, after consultation with the affected Critical Agency Stakeholders: APD, AFD, MOA Public Works Street Maintenance and/or People Mover will make the determination of a critical response route. The determination is not appealable.

Directly Impacted Streets consists of the streets considered for traffic calming devices.

Documented Crash History consists of only those crashes reported to APD and the State of Alaska. Only those crashes attributable to speeding or involving pedestrians/cyclists are considered.

Critical Agency Stakeholder includes the following:

- AFD
- APD
- AKDOT
- MOA Street Maintenance
- People Mover/Transit Division

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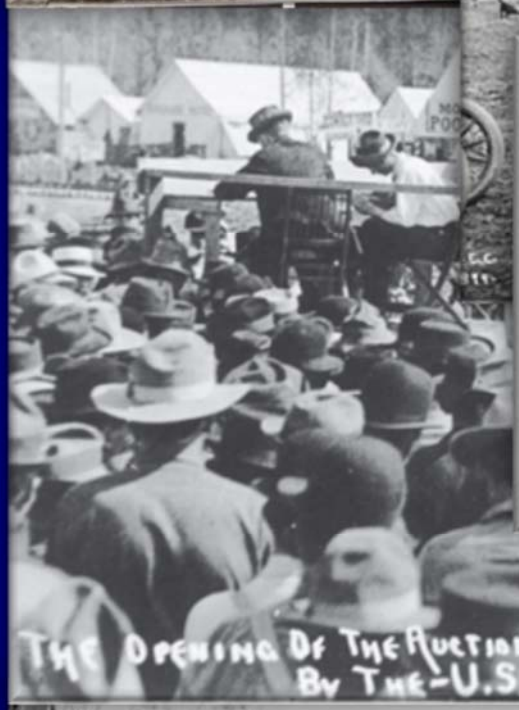
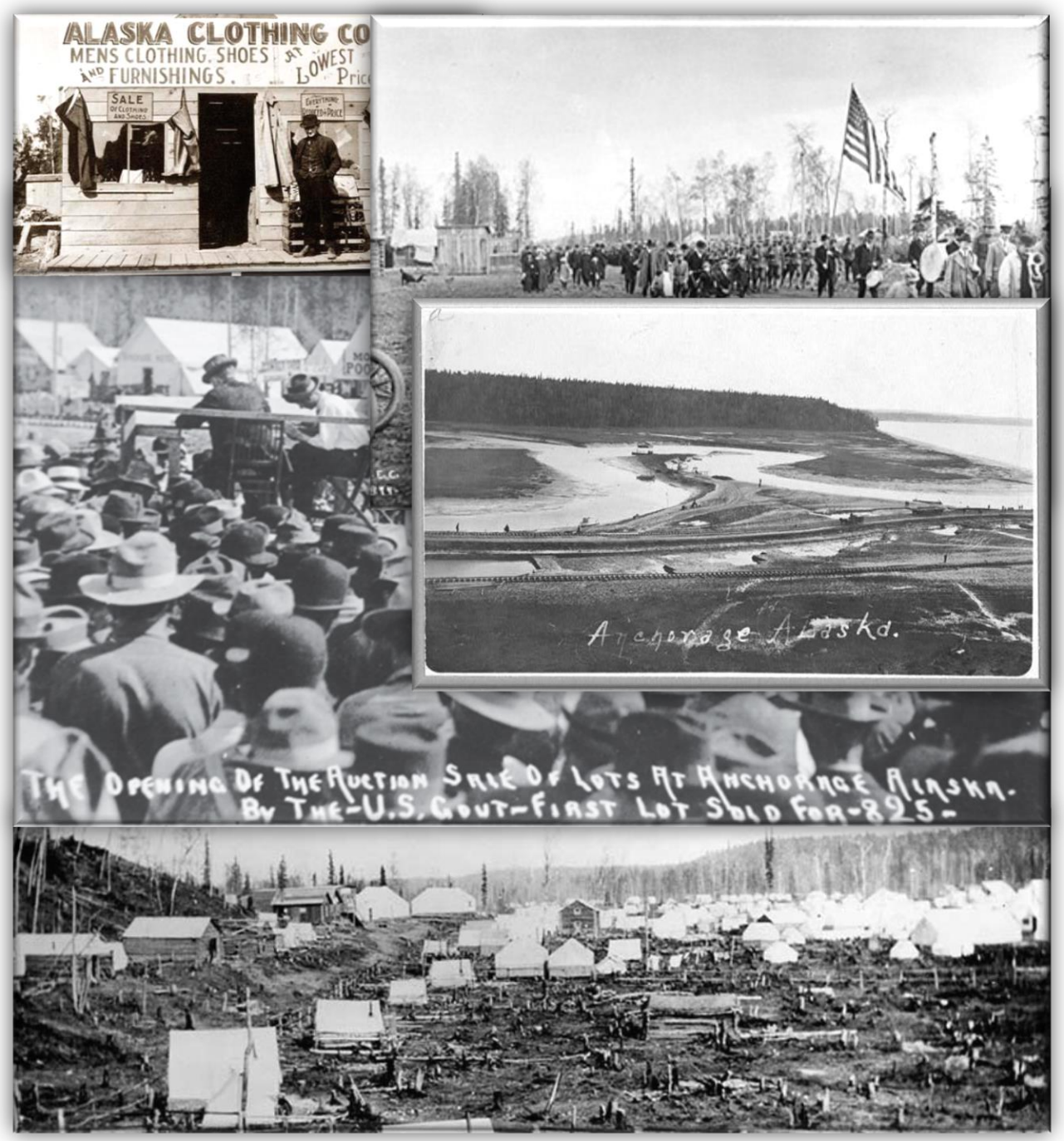


THE OPENING OF THE AUCTION SALE OF LOTS AT ANCHORAGE ALASKA.
BY THE-U.S. GOVT-FIRST LOT SOLD FOR-$25.-



Section 1—Introduction

SECTION 1—INTRODUCTION

1a. Overview of the Traffic Calming Program

Several introductory points need to be made.

First: The intent of the program is to address demonstrated and chronic speeding issues on local residential streets, only. Roadways classified as arterials on the OS&HP and most collector-classified roadways are not considered for traffic calming measures—even if there are homes that have direct access to the street.

The program does not apply to streets where the asserted speeding problem is a result of deliberate, staged, illegal activity (drag racing/time trials[1]) or other intermittent violations of the law[2]. The Department will not recommend installation of traffic calming on streets providing primary access for commercial vehicles <u>or on streets that only serves commercial or industrial properties</u>.

Second: The State of Alaska operates many of the "local" roadways within Anchorage. For example, East 88th, between Spruce and Elmore Road—a two-lane road with abutting homes—is a "state" road. The State does not have a traffic-calming program. The Division will not accept requests for traffic calming on State roads. A current map of the road ownership and maintenance responsibilities is available on the MOA Traffic Department's website[3], and on pages 4 and 6 of this Policy Manual.

Third: It is important to note that all traffic calming devices—types, uses, design, and location—must be approved by the Traffic Engineer, and by the critical stakeholders—Street Maintenance, AFD, APD, and others.

As will be discussed further, the program process applies to all (non-State) public roads in the LRSAs and CBERRRSA. Regardless of the maintenance and improvement responsibilities, the LRSAs must follow the process in the Policy Manual. The Traffic Engineer has final authority for the installation of traffic control devices and traffic calming in those communities. Any devices—signs, markings, speed humps, etc.—installed by a LRSA board without the approval of the Traffic Engineer will be ordered to be removed at the expense of the community.

Fourth: Two types of programs exist. The most common program is typically when traffic calming is requested for one or two streets in a neighborhood.

The second type is a "Specific Area Study" or "Area Study." This program evaluates the speeds and safety issues across a wide area.

For example, in the past, the Department has looked at neighborhood speeding and safety concerns across the Turnagain (see Appendix B of the Policy Manual), Russian Jack, and Mountain View neighborhoods. These area-wide studies engage an entire defined community to determine an approach to reduce traffic speeds and cut-through. A Specific Area Study may develop intermediate and long-term solutions, and the Department will evaluate a broader range of traffic calming measures.

Lastly, like other devices, all measures have positive effects and adverse consequences. Too often, residents will focus on the positive benefits and be unaware of the adverse consequences to themselves and their neighbors. The Department must consider both when making a decision.

AGENCY PROJECTS

Traffic calming measures may be incorporated into the design of roadway[4] projects:

- Resurfacing and restoration (which may include construction/reconstruction of sidewalks, curb and gutter) and major roadway reconstructions. In this instance, the

[1] Violations of Municipal Code 9.26.08

[2] The Department has received requests for speed humps to slow criminals fleeing from a crime scene, or, to prevent individuals who were speeding on a street while shooting at private improvements. The delay for properly spaced humps will be a few seconds per hump for most passenger vehicle. Therefore, there is no measureable public benefit to offset the consequences of the installation of the device.

[3] http://www.muni.org/Departments/works/traffic/Documents/Road_Ownership_Map_2011.pdf

[4] "Roads", "Roadways" and "streets" are interchangeable in this document.

cost of the traffic calming elements will be a part of the project costs.

- Traffic calming devices constructed as a part of the project may be a result of known speeding issues, or constructed due to anticipated changes in roadway connections, other agency projects, and pending private development.
- The Department will use this Policy Manual as a guideline in the development of traffic calming installed in conjunction with its own roadway projects.

BICYCLE ROUTES

Traffic calming must be carefully evaluated on roadways that already, or are expected to, serve as major corridors for bicycle traffic. Traffic calming devices that force cyclists to shift into traffic—chokers, island narrowings and chicanes built with central islands—may be eliminated from consideration on routes mapped in the Anchorage Bicycle Plan[5] for bicycle lanes or paved shoulder bikeways. The speed cushion device provides for emergency vehicle gaps that may also be used by cyclists.

AGENCY STAKEHOLDER CONCERNS

Emergency Services (AFD and APD)

AFD and APD evaluate the following issues when reviewing traffic calming initiatives:

- Adequate curb radii to accommodate emergency vehicles
- Efforts to minimize response time impacts
- The quantity and unobstructed access to fire hydrants

Street Maintenance

The MOA Street Maintenance Department evaluates the following issues when reviewing traffic calming initiatives:

- Adequate curb radii to accommodate maintenance vehicles
- Adequate space to turn around on closed streets
- Available space for snow storage
- Vertical delineation of modified and non-linear curb locations
- Impacts on time/effort required to clear snow
- Adequate drainage
- Resolution of right-of-way encroachments

Transit Service

People Mover is primarily concerned with the following:

- Maintaining adequate turning radii for buses
- Maintaining the quantity and locations of bus stops
- Improving boarding pads where practicable

Anchorage School District

The Anchorage School District has the following concerns when evaluating traffic calming initiatives:

- Adequate curb radii to accommodate school buses
- Pedestrian traffic safety
- Delineation of pedestrian routes
- Consideration of school locations during traffic calming framework plan formation
- Unobstructed access for bus routes

Solid Waste Services

Solid Waste Services is primarily concerned with providing adequate curb radii that will not hinder turning movements.

[5] http://www.muni.org/Departments/OCPD/Planning/AMATS/Documents/AdoptedBicyclePlan.pdf. Figure 13 and 14.

SECTION 1—INTRODUCTION

FUNDING

The Department currently receives approximately $500,000 annually for the program, including grants that might be made available for individual projects or neighborhoods. This $500,000 pays for the staff time needed to evaluate the need and appropriateness of traffic calming, the design costs, and, then the construction costs for the selected traffic calming measures.

The Traffic Calming Program works as a partnership between the MOA Traffic Department and the community—both individual residents and the Community Council. Each group has a specific responsibility in order to result in a successful program.

The program includes interim, lower cost measures that can be quickly implemented (such as radar speed signs) and permanent measures.

Even when the Community Council approves a resolution specifying a type of traffic calming[6], the Traffic Engineer has the authority to make recommendations for the specific types of traffic calming.

The affected Community Council must approve any requests for permanent traffic calming measures. The Department will not initiate a program upon a direct request from an individual citizen. We will initiate a "petition" (via mailed and returned response cards) that will be forwarded to the Community Council. This will include the names and addresses of a simple majority of the residents in the affected area (see definition).

This helps ensure that there is concurrence of an actual speeding problem and that the Community Council is taking action based on the needs of the community. This will prioritize the Department's limited staffing and resources to those requests that are likely to lead to successful programs.

Citizen-initiated traffic calming requests are subject to the following:

- The road must be under the jurisdiction of MOA.
- The road must be paved or will be paved in conjunction with a broader-scope project.
- The area to be covered by a community vote will be established by the Department.
- An approved petition must be submitted to the Community Council; and Community Council approval is required.
- The data collected by the MOA Traffic Department must indicate that the volume and speed criterion is met.

The Department will identify streets that do not meet the criteria for traffic calming, and ensure that the Community Council is notified of the decision. Streets not meeting the adopted criteria for traffic calming will not be considered for re-analysis for a period of three years after the date of the notification letter to the Community Council.

The Department will prioritize the road segments that do meet the criteria for traffic calming, and notify the Community Council of the priority/priorities of the roadways requested for traffic calming. The Community Council may alter the priorities within its boundaries, but, with few exceptions[7], may not place 'non-qualified' streets back into a construction prioritization.

Installation of temporary-type device may occur to evaluate options, or to influence driver behavior without the need for a permanent device.

Either funding must already be available or a grant allocation will need to be established. A majority of the residents in the affected area must approve the proposed location of the permanent devices selected by the Traffic Engineer.

[6] For example, a resolution in support of "…speed humps" will be considered as supporting 'traffic calming,' in general.

[7] A road that has several segments that meet the criteria for traffic calming, but where one segment within the overall corridor does not, is an example.

SECTION 1—INTRODUCTION

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SECTION 1—INTRODUCTION

EXHIBIT 1—State Road Ownership Map

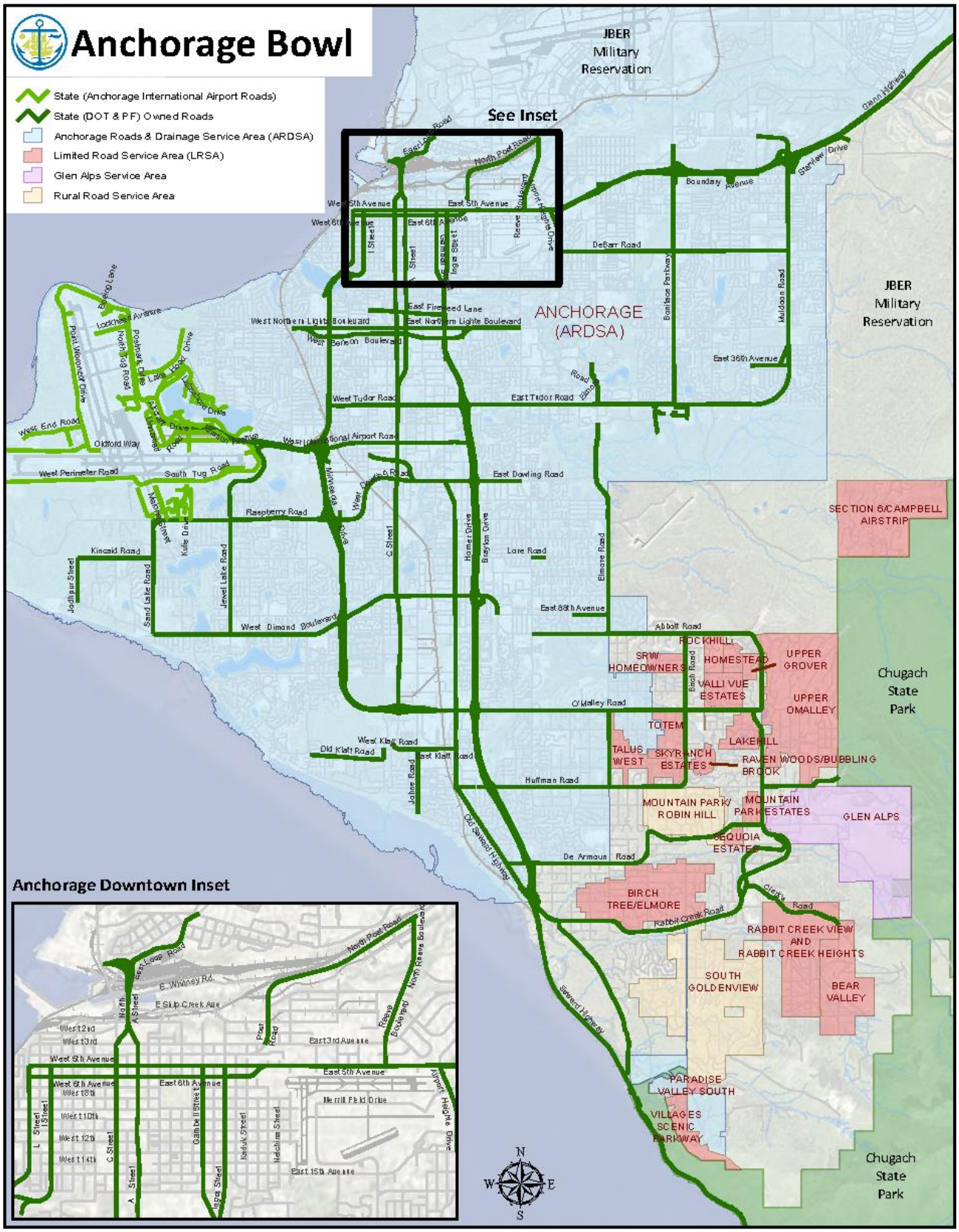

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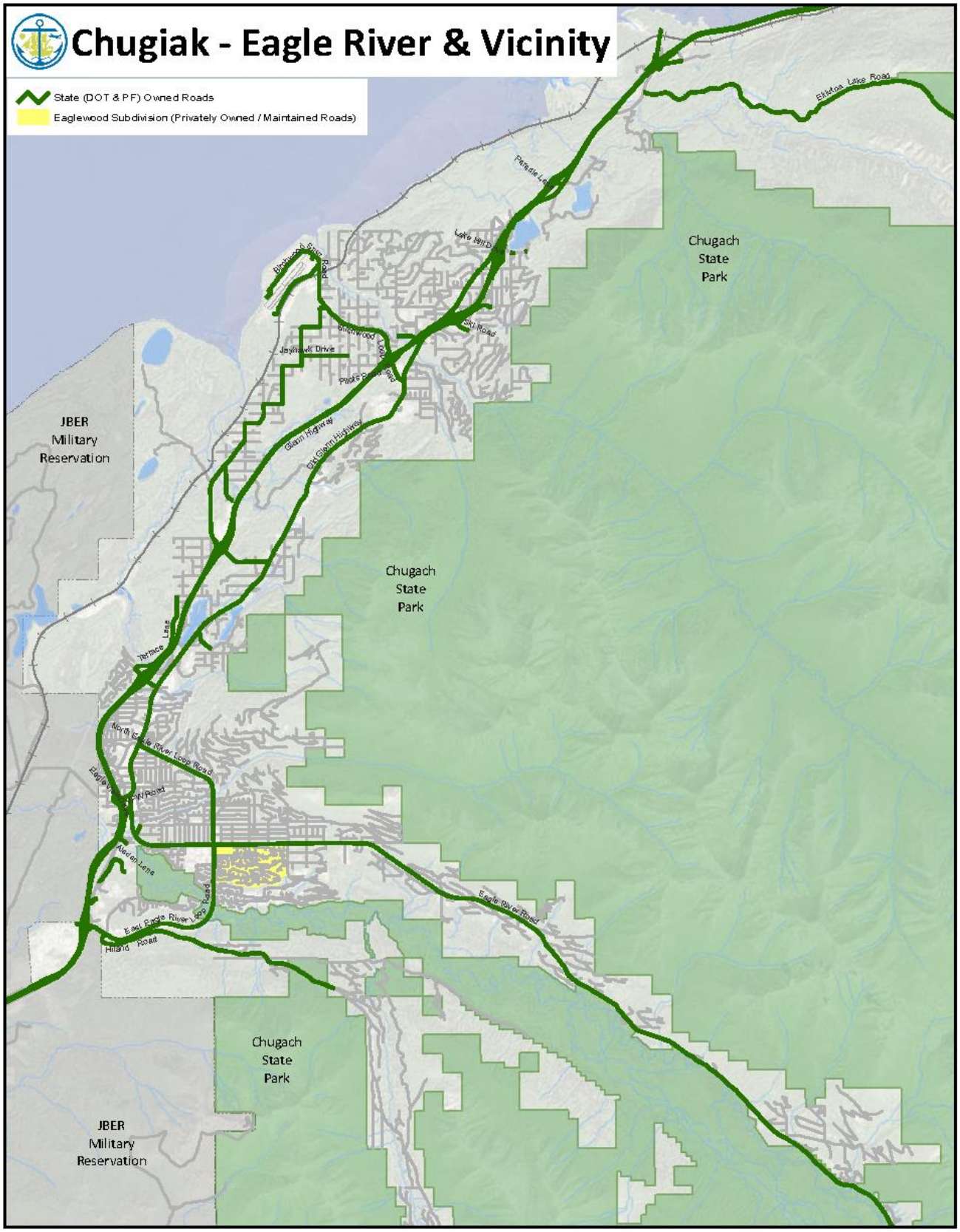
EXHIBIT 2—Road Ownership (CBERRRSA)



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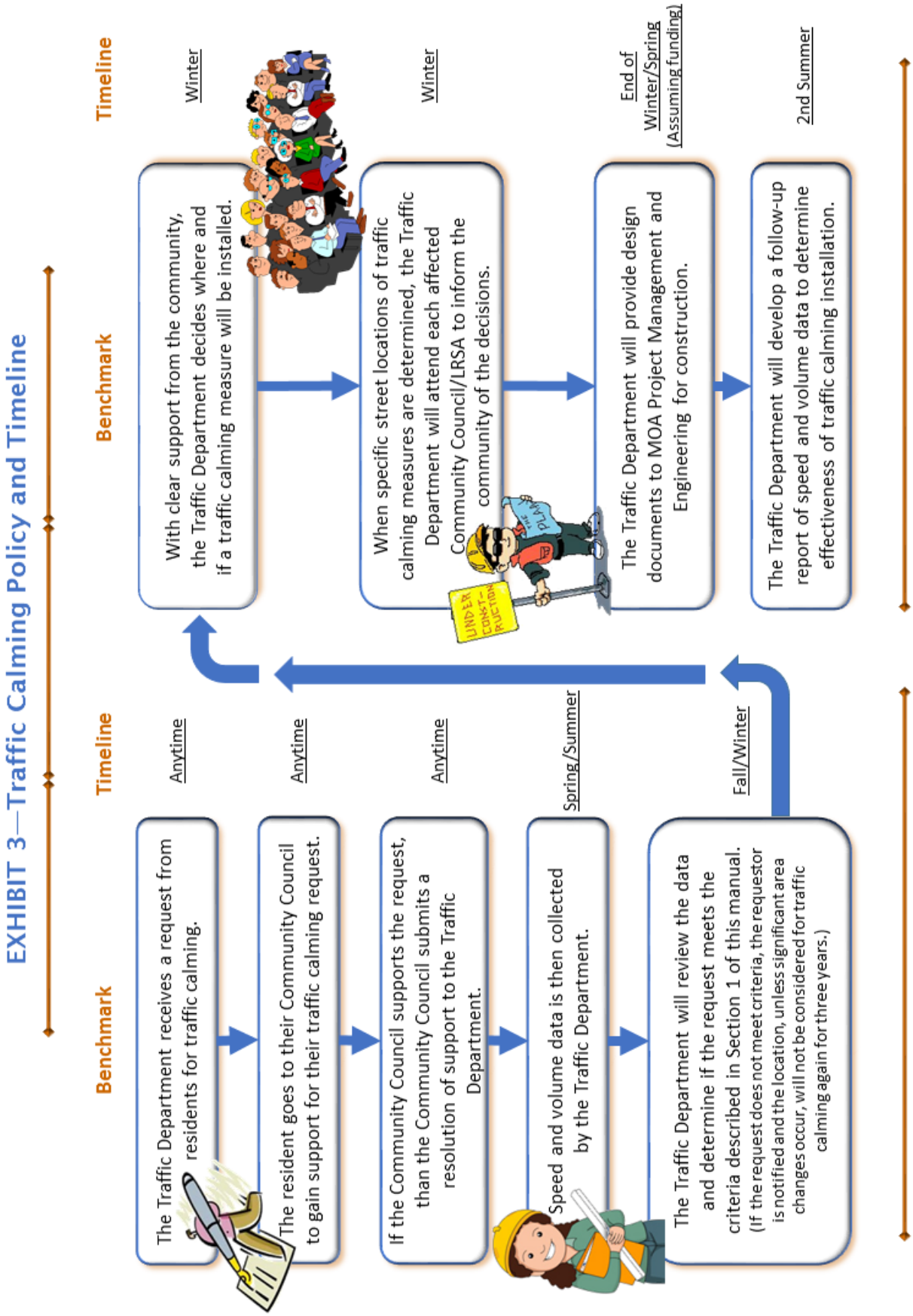
EXHIBIT 3—Traffic Calming Policy and Timeline
Benchmark
Timeline
The Traffic Department receives a request from residents for traffic calming.
Anytime
The resident goes to their Community Council to gain support for their traffic calming request.
Anytime
If the Community Council supports the request, than the Community Council submits a resolution of support to the Traffic Department.
Anytime
Speed and volume data is then collected by the Traffic Department.
Spring/Summer
The Traffic Department will review the data and determine if the request meets the criteria described in Section 1 of this manual. (If the request does not meet criteria, the requestor is notified and the location, unless significant area changes occur, will not be considered for traffic calming again for three years.)
Fall/Winter
Benchmark
Timeline
With clear support from the community, the Traffic Department decides where and if a traffic calming measure will be installed.
Winter
When specific street locations of traffic calming measures are determined, the Traffic Department will attend each affected Community Council/LRSA to inform the community of the decisions.
Winter
UNDER CONSTRUCTION
The Traffic Department will provide design documents to MOA Project Management and Engineering for construction.
End of Winter/Spring (Assuming funding)
The Traffic Department will develop a follow-up report of speed and volume data to determine effectiveness of traffic calming installation.
2nd Summer

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PROJECT PRIORTIZATION

Successful completion of the public and Department review/design process does not guarantee that the approved traffic calming measures will occur within an "expected by the community" period.

By July 2015, we identified more than seventy roads as meeting the initial criteria for a documentable speeding problem. We also removed approximately seventy roads from further consideration after the data found no documentable speeding occurring on the roads. This number (approximately 140) was due, in part, to the number of requests that the Department received during a several year hiatus of the MOA program (ending in mid-2012), and the Department's need to gather and evaluate the traffic data.

All traffic calming requests will be considered, and prioritized, against the current list with priority given to the existing seventy road list, and will compete for available design and construction funding.

Prioritization based on a point system by the Traffic Engineer incorporates the following:

- Proximity to schools or location within an established school zone (see the Department's Safe Routes to School Manual)
- Documented crash history
- The spacing of controlled intersections (higher points for longer spacing)
- The availability of sidewalks or paved shoulders for pedestrians
- The difference between the legally-established posted speed limit (PSL) and the documented 85th percentile speed
- Traffic volumes exceeding the 'norm' for a roadway's classification

1b. Types of Approved Traffic Calming Measures

MOA's traffic calming "toolbox" incorporates four basic device categories. Each device is best suited to a particular set of conditions, although a combination of measures can be used on long roadway segments. This may include horizontal measures where the road alignment in one area may not be suited to a vertical device. For example, a variable voluntary speed-compliance sign in a particular location within a larger project where neither horizontal nor vertical devices are appropriate.

FIGURE 1—

APPROVED TRAFFIC CALMING MEASURES	
Speed Control (Electrical)	Radar Speed Signs
Speed Control (Vertical)	Speed-Humps/Cushions Speed Tables Raised Crosswalks Raised Intersections
Speed Control (Horizontal)	Compact Traffic Circles Roundabout Road Narrowing Lateral Shifts Chicanes Neck-downs Chokers Island Narrowings
Volume Control	Full Street Closures Half Street Closures Forced Turn Islands Diverters Gateways

1. **Speed Control Measures (Electronic)** involve the use—either temporary or permanent—of variable speed signs activated by radar. These devices provide immediate feedback of the vehicle's speed—up to a limit—to avoid adverse driver behavior.

2. **Speed Control Measures (Vertical)** are raised segments of the roadway surface designed to limit the speed by creating a "bump" and a limited degree of discomfort to the motorist and passengers at inappropriate neighborhood travel speeds. Although "gateway" treatments may have the secondary consequence of limiting speeds by creating dead-ended conditions for vehicles, their primary purpose is volume control.

3. **Speed Control Measures (Horizontal)** alter the typical 'straight line' vehicle travel path or narrow the roadway to reduce speeds. These measures can affect access to abutting properties and, if poorly located, create issues for cyclists travelling on the roadway.

4. **Volume Control Measures** consist of a variety of measures available to reduce the number of vehicles using a particular roadway. These can have adverse consequences to emergency vehicle response times, but can provide a better neighborhood "environment" for pedestrians and cyclists.

1c. Types of Unapproved Traffic Calming Measures

In the past certain types of devices and sign categories have been used across the United States and Anchorage in an attempt to reduce speeds, raise awareness of "vulnerable" groups, or limit cut-through traffic.

In some cases, accepted professional practice within the traffic engineering profession has changed. Nationally mandated standards have eliminated the use of signs on public roads; and the signs have been found to be at least ineffective and at worst counterproductive.

Some measures create hazardous conditions for all roadway users; and others may create unacceptable impacts to emergency responders.

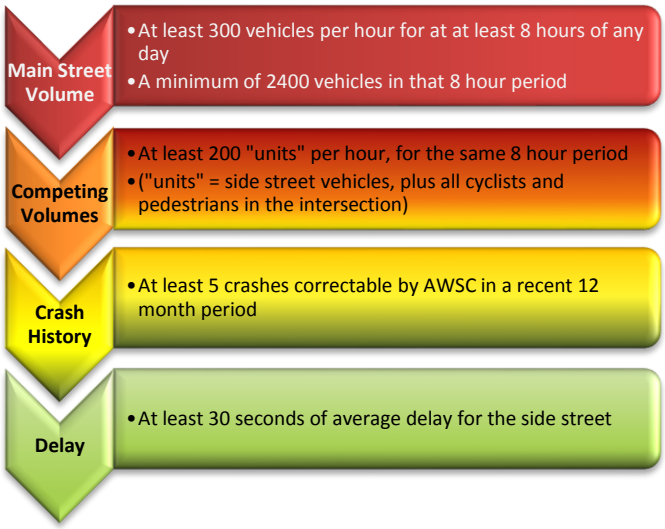
MOA, as with other governmental agencies in the United States and Alaska, is required to install signs in accordance with FHWA's Manual of Uniform Traffic Control Devices (MUTCD) and, here in Alaska, the Alaska Traffic Manual Supplement (ATMS). These updated documents reflect new issues, new traffic control devices, and eliminate non-performing techniques for signing and marking roadways. Although governmental agencies may propose new types of signage, those modifications are required to be approved, by written permission, to conduct a specific experiment. Upon completion of the test, the signage must be promptly removed until FHWA has issued a ruling allowing general use.

Other types of signs that have been removed from the approved list—"Children at Play" signs—are generally allowed to remain until no longer serviceable, and usually on a pre-determined removal schedule.

ALL-WAY STOP CONTROL[1]

All-Way STOP Control (AWSC) is limited to conditions where a combination of reported crashes and high traffic volumes exist at an intersection. These are locations where the normal "Rules of the Road": yield to traffic on the right at an uncontrolled or partially controlled intersection is no longer effective; where an intersection is programmed for signalization; and where drivers experience excessive delay when entering the intersection. MUTCD states that the use of AWSC for speed control is inappropriate[2].

FIGURE 2—MUTCD Criteria ("warrants") Summary



Installation of AWSC at locations where it is not "warranted" places all road users at risk, and places MOA at increased liability in the event of a crash. While this "traffic calming" treatment has been used in the past, the Department will not use it in the future.

[1] See Appendix "D" for our information page on AWSC

[2] MUTCD Section 2B.04 "Right of Way at Intersections"

SECTION 1—INTRODUCTION

ARTIFICALLY-REDUCED SPEED LIMITS[3]

The Institute of Transportation Engineers (ITE) has published a FHWA recommended practice for the establishment of speed limits on public roads: Methods and Practices for Setting Speed Limits – An Informational Report[4]. This represents a professional practice consensus that while not 'binding,' is adopted by FHWA, and represents the standard against which actions to set speed limits will be judged.

The presumption is that the overwhelming majority of drivers (85 percent) are mindful of their behavior, and operate their vehicles in a reasonable manner.

This standard indicates that speed limits should be, for a variety of reasons, set as close as possible at speeds the majority of drivers believe is reasonable and prudent.

Specifically, speed limits should be set at the 5 mile per hour (MPH) increment closest to the 85th percentile[5], absent compelling conditions—roadway alignment, road width, documented crash history—or other conditions that a motorist might not be in a position to expect. Further, there is a presumption that some drivers are simply careless and will not respond to reasonable expectations of appropriate travel speeds.

Speed limits have been lowered at a number of locations around Anchorage at the request of APD. In several cases, when neighbors raised concerns about the "continued" speeding on a roadway, the Department measured the same speeds that were occurring prior to the change. The consequence has been that the speeds—previously being 3 or 4 MPH over the PSL[5]—are now 8 or 9 MPH over the [reduced] speed limit. No change in behavior has occurred. Exhibit 7 shows one location where this occurred.

The Anchorage Municipal Code authorizes the Traffic Engineer to use discretion where 'special hazards' exist along a roadway. Special hazards typically include unexpected conditions along the roadway, or other conditions not readily apparent to the driver—substandard road/lane widths, a significant number of bicycles on a corridor designated on MOA's plan, substandard curves and/or a high crash rate.

Short streets may be posted for either Speed Limit 15 or 20 MPH if less than 300 feet, or 600 feet, respectively, in length.

CHILDREN AT PLAY SIGNS[6]

Drivers can expect children in a neighborhood.

These signs are not permitted for use on public roads, and have not been approved for use by FHWA for several decades. They are not on the list of approved signs in the MUTCD nor the State's supplement to the MUTCD (the Alaska Traffic Manual Supplement—or ATM)

One of the primary goals of a warning sign is to advise residents of a regulation (a speed limit sign, for example), provide guidance (street name signs or destination signs), or to advise the public of a roadway condition.

Although the Department has installed these signs in the past, FHWA has recommended that public agencies remove these signs as promptly as possible. The Department's policy is to (a) not install new signs of this type; and (b) remove any existing signs through attrition during the course of normal maintenance activities on the accompanying speed limit signs.

[3] See Appendix "D" for our information page on Speed Limits

[4] ITE Publication IR-133. Published 2012

[5] See "Terms and Definitions" on page iv

[6] See Appendix "D" for information page on Children at Play signs

In fact, it is recommended that the removal of these signs carry a very high priority. They have no positive benefit, and they can encourage children to play in/near the street where it is, objectively, unsafe to do so. Children, until they are in their early to mid-teens, do not fully comprehend the real hazard that any motor vehicle might represent—and need adult supervision.

Similarly, the Department will not install signs providing warnings of special needs children living in the neighborhood. There are public agencies that have an established protocol for these signs requiring parents to provide confidential/private personal and medical information, and an agreement to notify the agency of a change of address and the achievement of the child's (typically, thirteenth) birthday.

GATES

The Anchorage Assembly has the legal authority to close roads. However, gates are not a device in the Department's traffic calming toolbox. They may be appropriate for controlling access to private roads/driveways, as well controlling access to parks, port facilities, and federal installations—or where an emergency responder needs access between properties.

Most roads in the Anchorage service areas are public—regardless of the specific agency responsible for maintenance. They exist for the use of all members of the public—regardless of whether any individual member of the public has a "need" to be on that road or lives on a nearby road. Public streets simply exist for the access needs of all members of the public.

The installation of gates may create public safety concerns. They can increase the time needed for emergency response (even if a key is available to the gate) to a neighborhood, delaying a timely response for medical emergencies, natural disasters, fire or police emergencies, etc.

Furthermore, they can shift a neighborhood traffic complaint to another street by redirected traffic and creating longer, circuitous routes. This can encourage the creation of a new—and potentially worse—speeding problem than was the basis for the decision to gate the road.

SPEED BUMPS[7]

Due to substantial liability consequences, speed bumps are not approved for use on public roads. They are often used in commercial and residential parking lots. They are a short—typically 1-foot long—section of paving varying in height, and are not built to a common, engineered standard. Speed bumps limit crossing speeds to about 5 MPH—far below reasonable travel speeds on public streets. Emergency responders and commercial vehicles may have to come to a near stop to cross these unapproved devices.

A vehicle can be damaged while being driven at a reasonable speed across the bumps. Emergency vehicles—ambulance/aid car or fire vehicle—driven across a "bump" can be damaged and the occupants can be placed at risk of injuries. During a response large fire suppression/fighting equipment can be damaged and the occupants injured during the impact.

TEMPORARY SPEED HUMPS

Until a few years ago, the Department's Traffic Calming Program toolbox included—in effect—a trial period of installation of temporary speed humps as a precursor to the installation of paved, permanent speed humps.

The temporary humps are preformed sections of flexible material bolted into the roadway pavement—in the same way that the new temporary curbing "tool" is now used as a part of the Traffic

[7] See Appendix "D" for our information page on the difference between Speed Humps and Speed Bumps

Calming Program. This device is no longer available for use.

The individual sections of the humps typically required a four-person crew to carry off the truck, move to the desired location and bolt to the pavement.

The same size crew is required to remove the temporary humps prior to early-mid fall prior to measurable water infiltration and the onset of freezing conditions. This is the case with the temporary curbing currently used. Reductions of staffing between the adoption of the 2005 Policy Manual and this update have resulted in MOA not having available staff for this specialized task.

The use of temporary curbing to create horizontal-type traffic calming devices—for example compact traffic circles in the center of intersections—is now an option for temporary traffic calming measures. Some of the adverse issues associated with temporary speed humps, however, exist for the temporary curb sections. The curbs must be removed in the early-mid fall—since they, too, are bolted into the pavement. However, the individual sections of curbing are smaller, weigh much less than the hump sections, and are, therefore, able to be placed by a smaller group of workers.

Further discussion of the temporary curbing is contained in Section 3.

EDGELINE AND CENTERLINE STRIPING

Striping alone has a mixed-record for effectiveness, and may be suited—particularly as a part of establishing bicycle routes—to calming traffic on higher-volume/higher speed collectors and arterials. Generally, when used on local streets, striping a roadway has had the effect of increasing speeds through curves in the roadway. The striping provides drivers with defined path through the curve, and/or a heightened (potentially misleading) level of confidence that a vehicle travelling in the opposite direction will comply with the striping and not crossover into oncoming traffic.

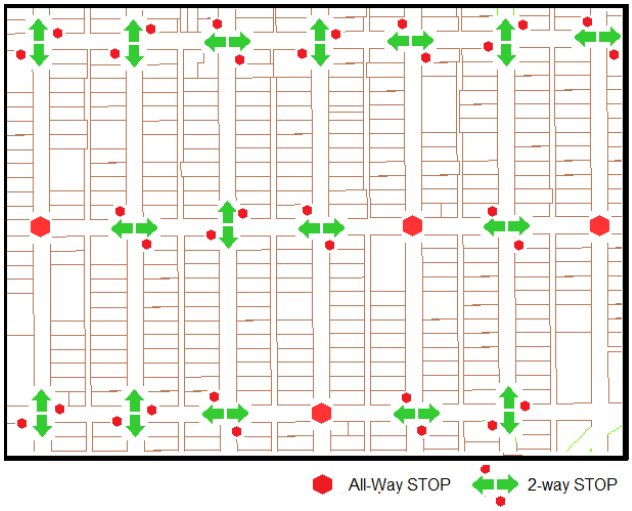
As is the case with the temporary speed hump program, there is also a budgetary impact that MOA cannot currently overcome. The annual repainting of traffic markings exceeds the staffing available at the MOA's Paint & Sign Shop. Although materials like methyl methacrylate, and epoxy-based markings do not require the same annual maintenance of the markings, the cost is prohibitive for most residential uses. The initial installation lasts longest when striping is placed in a cut-in groove.

The program, as briefly noted previously, is not intended for cul-de-sac streets that are less than 600 feet in length—measured from the center of the nearest intersecting 'through' street.

BASKETWEAVE STOP CONTROL

In the past, another type of traffic calming measure has been used in Anchorage. This measure uses an alternating assignment of right-of-way STOP signs at intersections in a grid system of neighborhood streets. This type of measure forces drivers to stop at every other intersection.

FIGURE 3—Example of "Basketweave" STOP Controlled Intersections in Anchorage



This is not an appropriate use of a traffic control device. It has the potential to mislead drivers into the rationale for STOP controls at intersections—locations where it is actually warranted. This would include addressing crash history; excessive delays due to traffic volumes; and where there actually are high numbers of pedestrians and cyclists entering/crossing the intersection.

The MUTCD specifically states, *"Yield or STOP signs should not be used for speed control."*

1d. Location of Traffic Calming Measures

The Traffic Calming Program is intended for local residential streets and some roads classified as collectors on MOA's Official Streets and Highways Plan.[8]

Collector streets or streets that function as collector streets by providing the main access into a neighborhood, will generally be limited to horizontal-type measures. However, the speed cushion-type vertical device may be used on collector roadways—under certain conditions.

Vertical-type measures are designed for PSLs less than 35 MPH.

The Department has a responsibility to coordinate with the critical agency stakeholders during the evaluation of traffic calming measures. Some traffic calming measures may have an adverse impact on emergency vehicle operations and response times. Some devices, in fact, may inadvertently result in injuries to emergency personnel. Therefore, when deciding upon the type of measurer employed, emergency vehicle response routes must be identified and addressed.

Vertical measures are not appropriate for cul-de-sac streets less than 600 feet in length. Some horizontal speed control measures may be installed at the intersection with the through street.

Alleys do not qualify for traffic calming measures as they are intended for local access and for a wide range of commercial vehicles.

The following combination of volumes and speeds must be met to qualify for speed control measures.

TABLE 1—Matrix of Approved/Unapproved Devices by Road Classification

	Expressway	Major Arterials	Minor Arterials	Collectors	
				Class 1	Class 1B/1C
Traffic Calming Device					
Chicanes	No	No	No	No	Yes
Curb Extensions	Yes (see Note 1)	Yes	Yes	Yes	Yes
Half Diverter	No	No	No	No	No
Landscaped Roadway	Yes (see Note 1)	Yes	Yes	Yes	Yes
Midblock Neckdown	No	No	Yes	Yes	Yes
Parking Bays	No	Yes	Yes	Yes	Yes
Pavement Surface Treatment	No	Yes	Yes	Yes	Yes
Raised Crosswalks	No	No	No	No	Yes
Raised Intersections	No	No	No	No	Yes
Raised Median	Yes (see Note 1)	Yes	Yes	No	Yes
Roundabouts	Yes (see Note 1)	Yes	Yes	Yes	
Speed Actuated Signage	No	No	No	No	Yes
Speed Cushions	No	No	No	No	Yes
Speed Humps	No	No	No	No	No
Street Closures	No	No	No	No	No
Traffic Circles	No	No	No	No	Yes

NOTE 1: These are under AKDOT jurisdiction

Although roadways that have an 85th percentile speed of at least 6 MPH over the PSL, they may be candidates for traffic calming. This will not apply to roads where a speed limit of 20 MPH was not a result of the Traffic Engineer's authority under AMC 9.26.020 or supported by a formal engineering and traffic survey.

TABLE 2—Volume/Speed Criteria for Qualifications of Physical Devices

	85th Percentile ≤5 MPH over PSL (PSL min. 25 MPH)	85th Percentile 6 MPH < *V* ≤10 MPH over PSL	85th Percentile >10 MPH over PSL
≥2000[9] vpd	Not Warranted	Evaluate Further	Evaluate Further
≥500[10] vpd, but ≤ 2000	Not Warranted	Evaluate Further	Evaluate Further
<500 vpd	Not Warranted	Not Warranted	Evaluate Further

[8] www.muni.org/Departments/OCPD/Planning/AMATS/AMATS_Adopted_Plans/OSHP_Complete_Document1.26.15.pdf

[9] Streets with volumes of 2,000 vehicles/day (approximately) are typically collector-type streets in nature—or classified as such on the OS&HP. Exceptions may be made on a case-by-case basis—or approved for traffic chokers or traffic circles at intersections OR speed cushions

[10] This is equivalent to the traffic generated by between fifty to seventy homes

SURFACING

All physical measures in the roadway require a paved road, and most require curbs and gutters either in-place or proposed to be constructed. Strip-paved roads, for instance, may not make good candidates for speed humps.

The lack of curbs and gutters may encourage motorists to drive onto the shoulder to evade the full, intended, effect of the hump. In addition, as will be described later, vertical measures may divert stormwater runoff out of the public right-of-way and into private property.

Certain types of roadway surfaces will not hold an engineered traffic-calming device in place. These include:

- Chip sealed
- Recycled asphalt paving (RAP)
- Gravel

1e. Data Collection

Due to climate conditions experienced in the Anchorage area, there is a relatively narrow period available for gathering accurate and representative speed data.

The most representative traffic data is collected when schools are in session. However, between October and April, traffic speed data can be skewed by our local weather conditions (snow or ice on the road) as well as increasing, then declining, periods of darkness during normal commute times. In addition, studded tires can damage the hoses, and, in heavy rainstorms, water can enter the hoses.

During the summer, vacation schedules and the lack of school-based trip activity may also result in atypical data.

The Department, therefore, will focus its efforts on data collection near schools between April and late May, and then again in September through October. Other data requests—locations where the data is less likely to be influenced by summer schedules—are held until the period between June and September.

The data collected includes travel speeds and volumes. Both are needed to make a determination of whether a street qualifies.

1f. Service Area Factors

Service areas are identified geographic locations established to perform specific maintenance functions.

Alaska State Statute Section 29.35.450 states: *Special services include services not provided for a unified municipality or higher or different level of service.*

While the Department's responsibilities are area-wide, LRSA capital improvement funding is done by each individual service area. However, the Municipal Traffic Engineer must approve all improvements, signage, traffic control, and traffic calming devices (type and location).

The Department works to implement traffic calming measures jointly with the following service areas:

- ARDSA
- CBERRRSA
- LRSA, various names
- Glen Alps Service Area
- Goldenview Rural Road Service Area

The Department will also work with the Homeowners Association outside of any other established service area.

The following pages have maps of the location of ARDSA and the current LRSAs in the Anchorage Bowl and Hillside. A separate map of CBERRRSA is also provided.

TRAFFIC CALMING REQUESTS AND STUDIES

All service areas will be required to follow the criteria outlined in this Policy Manual.

The Department will investigate and analyze all LRSA traffic calming requests. Unlike ARDSA requests, the construction costs for the approved traffic calming devices—permitting, temporary

traffic control, signing, striping—will be the responsibility of the service area.

If a service area desires an area study, as outlined in Section 6, responsibility for payment of the study—staff resources, consultant, etc.—resides with the service area, itself, Consultant selection for the study must follow MOA purchasing procedures, and the Department will manage the project. Construction costs associated with the improvements are the full responsibility of the service area.

A CBERRSA resident/Homeowners Association will need to provide a request letter to the Traffic Engineer that indicates assurance of financial responsibility of construction and maintenance of any devices approved. The resident/Homeowners Association will also need to request a resolution of approval/non-objection from the CBERRRSA Board. A letter or other copy of that resolution is forwarded to the Department.

1g. Removal of Traffic Calming Measures

On occasion, the Department may receive requests to amend or remove previously installed traffic calming devices.

Removal requests may be submitted to the Department to resolve inadvertent stormwater/drainage issues created by the installation of the device, development/ redevelopment of a property that changes an access location, or changes in the roadway system eliminating the need for traffic calming devices.

Previous versions of this Policy Manual had no specific process to follow although, informally, residents were required to request a resolution in support of amending/eliminating the traffic calming devices.

Individuals requesting relocation, revision, or removal of traffic calming measures will need to submit a petition demonstrating majority support of the proposal along the directly impacted street[11]. This will also require a Resolution of the Community Council to the Department

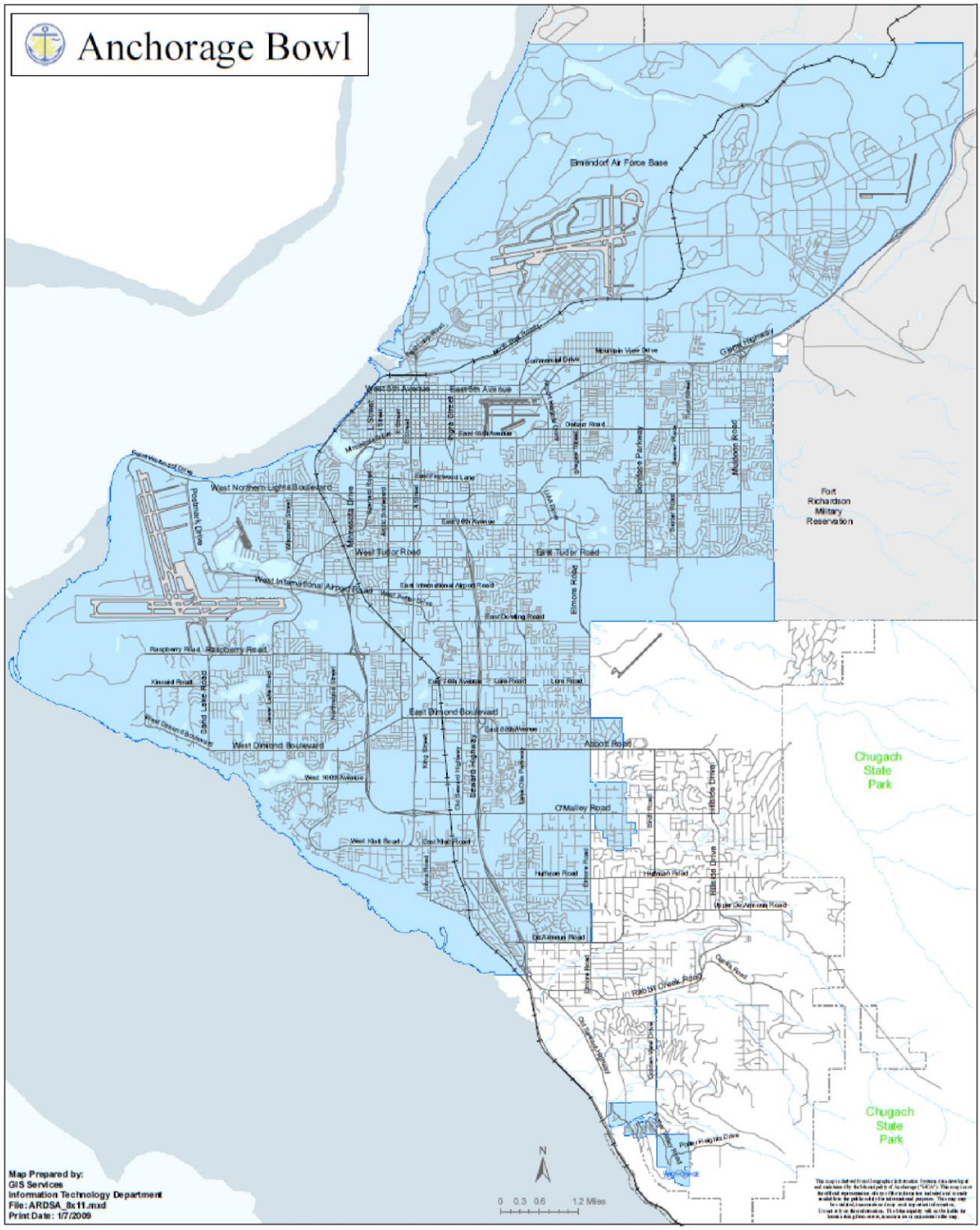
In order to prevent the financial costs and expenditure of staff resources on a repeated cycle of installation, removal or modification, and reinstallation, a successful approval for modifying/removing traffic calming devices will result in a ten year hold upon further modification requests. This will begin at the date of completion of the construction.

New requests within that “hold” period to amend again the traffic calming will be denied by the Department.

The Municipality of Anchorage may remove traffic calming devices that become a source of a public or private nuisance—without the consent of the neighborhood. One example of a nuisance would occur when the device diverts stormwater runoff from the road onto private property. Another example would be the creation of a pond on the uphill side of a vertical device which freezes over in winter, and creates an unexpected driving condition for the public and emergency responders.

[11] See “Terms and Definitions” on page v

EXHIBIT 4—



Anchorage Roads and Drainage Service Area

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EXHIBIT 5—


Chugiak - Eagle River & Vicinity
Glenn Highway
Eklutna Lake Road
Chugach State Park
JBER Military Reservation
Beach Lake
Glenn Highway
Old Glenn
Chugach State Park
Chugiak, Birchwood, EagleRiver Road Service Area (CBERRSA)
Golden Eagle
Eagle River Loop
Hiland
Eagle River Rd.
Chugach State Park
JBER Military Reservation

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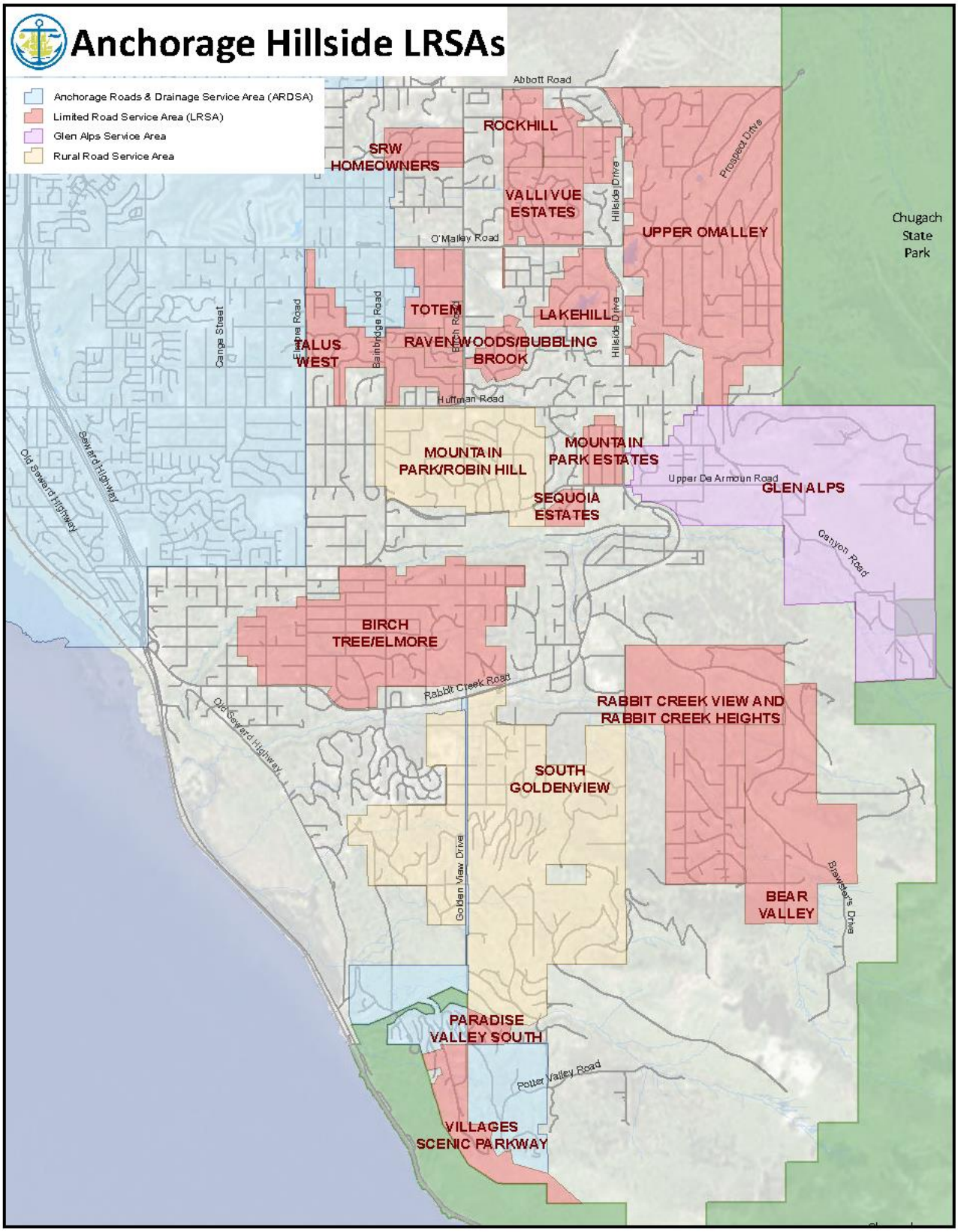
EXHIBIT 6—Hillside Area LRSA Map



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EXTRA
Anchorage Daily Times
EXTRA
RAID DUTCH HARBOR!


MAP OF
CITY OF ANCHORAGE
ALASKA


1927
Benny Benson Designs the Alaska Flag


R-313 Alaska Railroad Depot - Anchorage, Alaska

Section 2

Section 2—Temporary Radar Speed Sign Program

SECTION 2—TEMPORARY RADAR SPEED SIGN PROGRAM

2a. INTRODUCTION

With the elimination of the Department's temporary speed hump program, portable radar speed signs have been added as a "temporary" measure providing timely response to neighborhood traffic speeding concerns.

Radar speed signs/Voluntary Speed Compliance[1] signs provide real-time feedback to drivers approaching the device. The travel speed is displayed as the driver approaches the device, providing the driver an opportunity to become aware of the precise measured speed, and adjust their behavior.

The devices can be programmed to not display 'reckless' approach speeds. This discourages deliberate/willful speeding, avoiding the device to be used for "drag racing" in the neighborhood.

The current devices have the capability to record the travel speeds of the vehicles on the road; however, the Department is not currently using this functionality. It would permit the Department to evaluate and monitor travel speeds and volumes that occur daily—as well as provide a day-by-day comparison of behavior during atypical events.

The devices are only installed after the speed data indicates the 85th percentile speed exceeds 5 MPH over the posted speed limit.

Use of this device has significant benefits compared to other types of temporary traffic calming:

- Installation time is substantially the same as that required for standard street signage.
- The device can be left in place during the winter—unlike temporary curbs—since there is no risk of damage to the pavement and base material from water infiltration and freeze/thaw cycles.
- The device may be installed along any road, regardless of surfacing material or the presence of curbs and gutters.
- Currently, the devices do not have the software for recording travel speeds. This requires regular visits by the Department's Data Collection staff to determine the effectiveness of the device.
- The devices are, like other portable devices and traffic signs, a potential target for theft or vandalism—leading to a need to replace them.
- The devices are battery-powered. This requires staff to monitor the condition of the batteries on a regular basis—more frequently during cold weather.
- Nearby residents may object to the illumination resulting from the activation of the device by an oncoming vehicle.

TABLE 3—Volume/Speed Criteria for Qualification for Radar Speed Signs

	85th Percentile ≤5 MPH over PSL (PSL min. 25 MPH)	85th Percentile 6 MPH ≤*V* ≤10 MPH over PSL	85th Percentile >10 MPH over PSL
≥2000[2] vpd	Not Warranted	Not Warranted	Evaluate Further
≥500[3] vpd, but ≤2000	Not Warranted	Evaluate Further	Evaluate Further
<500 vpd	Not Warranted	Evaluate Further	Evaluate Further

INITIAL TESTS AND RESULTS

Tests of the first four installations of the radar speed signs were very successful, and showed significant

[1] The term "Radar Speed Signs will be used in this document

[2] Streets with volumes of 2000 vehicles/day (approximately) are typically collector-type streets in nature—or classified as such on the OS&HP. Exceptions may be made on a case-by-case basis—or approved for traffic chokers at intersections.

[3] This is equivalent to the traffic generated by between fifty to seventy homes

changes in driver behavior. Where the travel speeds were significantly higher than the PSL, they dropped—well below the PSL—within a matter of a few weeks. As time progressed, the 85th percentile speeds slowly returned to reasonable and prudent levels within a normal margin of variation around the PSL.

Where travel speeds were recorded as below the PSL, the opposite change was noted. The 85th percentile speeds increased to a point above the PSL; then, over time, decreased slowly to a reasonable and prudent margin of speed variation.

DURATION OF INSTALLATION

Several of the initial installations have remained in place for over a year allowing long-term monitoring of the roadway speeds. The monitoring determines the effectiveness of the devices or if motorists become complacent and begin to ignore the device.

This Policy Manual establishes that under normal circumstances the devices will remain installed on a street for a period of no more than 18 months, and left in place for a period of no less six months.

2b. PLACEMENT

The use of radar detection requires the device to have a clear field of view of approaching traffic, and that at least several hundred feet of 'line of sight' available to permit a motorist an opportunity to perceive, react, and adjust their travel speed. The device must also be placed away from intersections to get 'free flow' conditions.

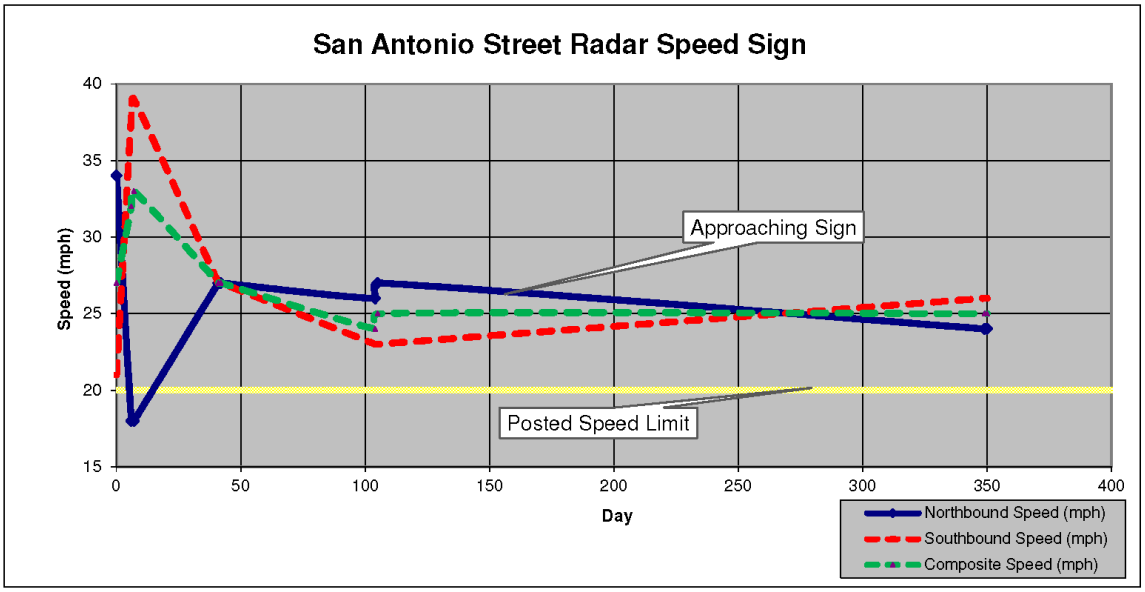
This results in the following criteria for placement:

- A location away from horizontal or vertical curves in the roadway.
- Limited, or no, vegetation near the roadway surface that might block the view of the sign display.
- Separation from an intersection. The device should be no closer than 50 feet from any intersection—and further away from an intersection where the street in question has had STOP control installed.
- No conflicts with existing, higher priority, street signage—school zone signage, warning signs such as "STOP AHEAD," "Ped Xing," and other regulatory or warning signs.
- A location away from abutting homes' windows.

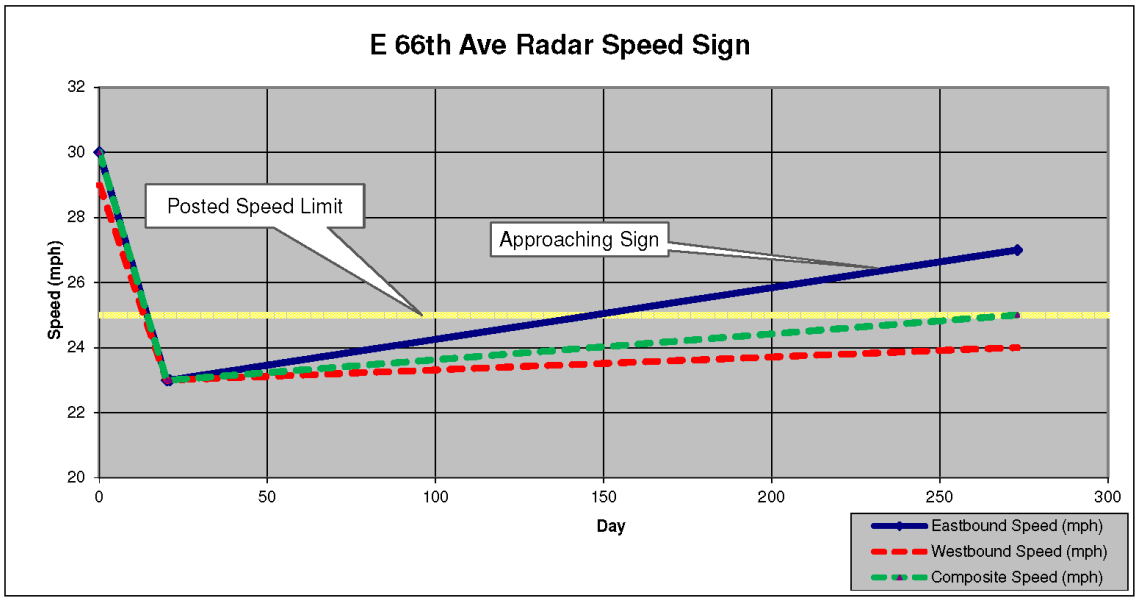
This last criterion is neither a 'safety' nor an 'effectiveness' issue. Some residents find the light from the display, while the device is operating in periods of darkness, to be objectionable. In addition, as is the case with many traffic control devices, some residents perceive that there will be a reduction in the value of their property. We will give this criterion the lowest consideration in locating the device—since the other criteria can result in reductions in the effectiveness of the device, or create safety issues if higher priority signs are blocked.

EXHIBIT 7—Radar Speed Sign Results

	Date	Day	Northbound Speed (mph)	Southbound Speed (mph)	Composite Speed (mph)	Northbound Volume (vpd)	Southbound Volume (vpd)	Composite Volume (vpd)
Pre Install	6/5/2013	0	**34**	21	27	333	426	759
Week 1	6/11/2013	6	18	38	32	323	396	719
Week 1	6/12/2013	7	18	39	33	313	371	684
Week 6	7/16/2013	41	27	27	27	371	330	701
Week 6	7/17/2013	42	27	27	27	424	386	810
Week 15	9/17/2013	104	26	23	24	562	598	1160
Week 15	9/18/2013	105	27	23	25	553	567	1120
Week 50	5/20/2014	349	24	26	25	593	616	1209
Week 50	5/21/2014	350	**24**	26	25	657	649	1306

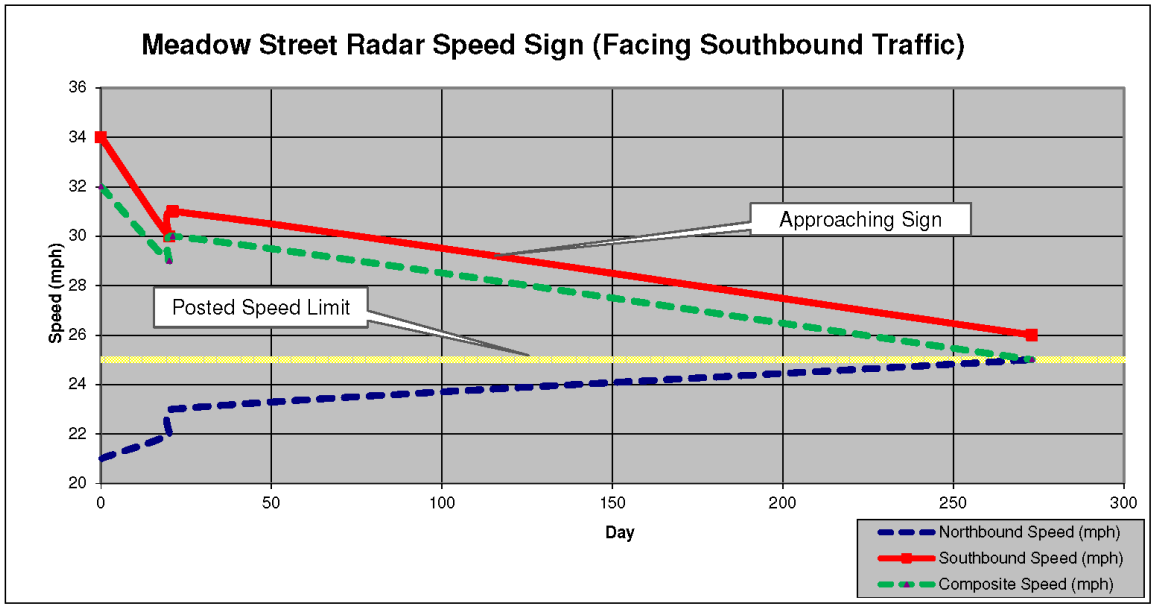


	Date	Day	Eastbound Speed (mph)	Westbound Speed (mph)	Composite Speed (mph)	Eastbound Volume (vpd)	Westbound Volume (vpd)	Composite Volume (vpd)
Pre Install	9/25/2013	0	**30**	29	30	174	158	332
Week 3	10/15/2013	20	23	23	23	81	104	185
Week 3	10/16/2013	21	23	23	23	86	74	160
Week 40	6/25/2014	273	**27**	24	25	73	77	150



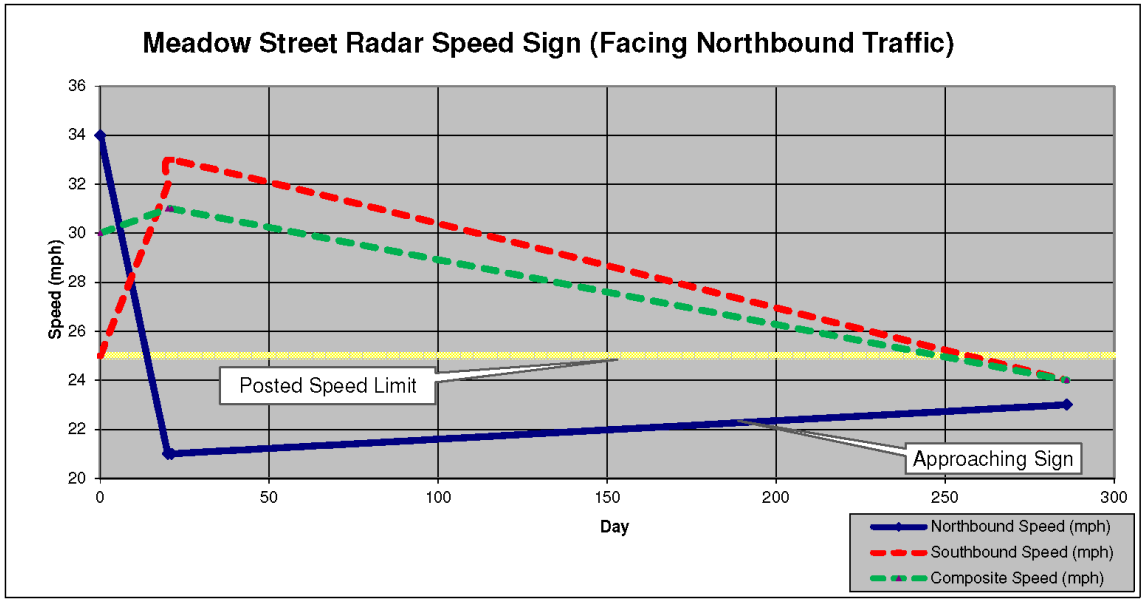
Sign #1 - Northernmost Sign facing Southbound Traffic

	Date	Day	Northbound Speed (mph)	Southbound Speed (mph)	Composite Speed (mph)	Northbound Volume (vpd)	Southbound Volume (vpd)	Composite Volume (vpd)
Pre Install	9/25/2013	0	21	**34**	32	280	764	1044
Week 3	10/15/2013	20	22	30	29	370	910	1280
Week 3	10/16/2013	21	23	31	30	390	920	1310
Week 40	6/25/2014	273	25	**26**	25	248	730	978



Sign #2 - Southernmost Sign facing Northbound Traffic

	Date	Day	Northbound Speed (mph)	Southbound Speed (mph)	Composite Speed (mph)	Northbound Volume (vpd)	Southbound Volume (vpd)	Composite Volume (vpd)
Pre	9/25/2013	0	**34**	25	30	281	727	1008
Week 3	10/15/2013	20	21	32	31	325	883	1208
Week 3	10/16/2013	21	21	33	31	361	890	1251
Week 41	7/8/2014	286	23	24	24	318	734	1052
Week 41	7/9/2014	287	**24**	24	24	283	743	1026




ANCHORAGE
RENDEZVOUS
MODE DAY
GIFT
Greetings from Anchorage, Alaska
EXTRA
Anchorage Daily Times
EXTRA
WE'RE IN
64-20 VOTE MAKES ALASKA 49th STATE
Victory Brings Quick Reactions
She Goes Up Tonight
Historic Vote Ends 6 Days Of Debate
U.S. AIR FORCE

Section 3

Section 3—Temporary Traffic Calming: Temporary Curbing Devices

SECTION 3—TEMPORARY TRAFFIC CALMING PROGRAM
Temporary Curbing Devices

3a. INTRODUCTION

Another device has been added to MOA's traffic calming toolbox to provide a new "temporary device" to the now-cancelled temporary speed hump program. This new 'tool' involves the use of pre-cast sections of rubber curbing that can be used to create a variety of traffic calming devices.

The temporary curbing allows for a variety of horizontal traffic calming forms: curb extensions, traffic circles, chicanes, "eyebrow" islands, and median islands—providing design flexibility for conditions on each roadway where they are used.

These curb sections, like the temporary speed humps that they replaced, are bolted into the street pavement. Like the speed hump sections, this requires the road be paved, and in generally good condition with no major pavement failures near the proposed location. In addition, the curbing—fastened to the pavement with bolts—must also be removed in early to mid-fall, and the bolt holes in the pavement sealed with an epoxy.

Unlike temporary speed humps, curbing sections can create mini traffic circles at the center of intersections, curbed neck-downs at the intersections, chicanes, and median islands. One of the other benefits associated with this device is that the curb sections are capable of being moved into, or out of, place in the roadway by one person per section—rather than the four-person crew required for the individual speed hump sections.

Use of the device also permits a more 'aesthetic' hardscaping/landscaping treatment during the temporary installation—allaying some community concerns about the device.

This device allows a test of community support and results before the expenditure for permanent solutions.

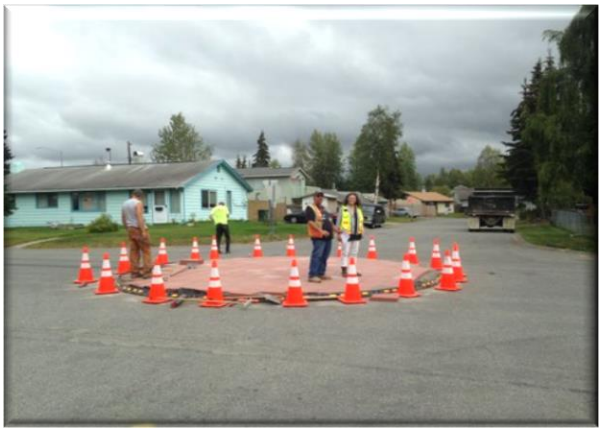
Lastly, the design allows some flexibility in installation allowing the critical agency stakeholders to verify that the device will not affect their needs. In this way, the devices can be used on collector-classified roads.

The initial experiment on Nunaka Drive, installing mini traffic circles at two intersections, resulted in a significant improvement in some of the travel speeds along the roadway. Neighborhood support dramatically increased following installation, and a sense of community 'ownership' of the device was generated. The aesthetic elements included installing shrubs in planter bowls and paver brick surfacing.

Two basic types have been considered, and, at least conceptually designed for installation on MOA roads.

TEMPORARY TRAFFIC CIRCLES

As of 2015, these temporary devices have been implemented only in one location—Nunaka Drive. Installation took approximately two days to fasten the curbing sections to the pavement, at two intersections between Debarr Road and Sterling Way. One location was at a four-legged intersection (Nunaka at Buckner). The other device was installed at a "T" intersection—Nunaka Drive at Perry Street.



Installation process at Nunaka Drive/Buckner intersection

It took another two days to set the concrete pavers in the completed circles

Completed device at Nunaka Drive/Perry intersection

The results of the temporary installation are in Exhibit 8 on page 31.

This general type of design may also be used to reduce the effective paved area where there is an 'eyebrow' constructed along the roadway experiencing speeding. In the following image—showing an eyebrow on East 84th, west of Elmore Road—the red lines indicate where the 'edges' of the island would be located.

East 84th "eyebrow" west of Elmore Road

TEMPORARY SHOULDER-SIDE DEVICES

Unlike temporary traffic circles, but like any other shoulder-side devices, the impacts to stormwater runoff are a possible concern in the design of the device.

A careful review of the grades in the gutter flowline on the road is needed to ensure that stormwater is still able to flow into catch basins and that ponding will not occur.

Two other advantages of the neckdown are:

- A minor reduction in the road crossing distance for pedestrians.
- A reduction of the curb return radius can be made—slowing the effective speed at which a vehicle can cut the corner.

As with other permanent shoulder-side devices, the impacts to accessing private property and street maintenance will also need to be considered.

COSTS

The curbing and installation cost is insignificant. Approximately $50,000 was spent for acquisition of the curbing and subsequent installation for the Nunaka Drive project.

We were able to reuse the curbs used for that project. A sufficient number of curb sections with yellow reflectorized markings (needed for devices in the center of intersections or center of the road) was purchased for the two circles. (See photos for the approximate size.) Approximately half as many sections—with white-colored reflectorized markings for use as shoulder-side devices—were purchased with that project.

The Department anticipates purchasing additional curb sections to deploy temporary devices at more than one or two locations at a time.

EXHIBIT 8—Nunaka Drive Speed Reduction Results

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PAWN SHOP
LOANS
Los Angeles Times
FINAL
STRICKEN ALASKA STRUGGLES TO RISE
Tidal Waves Kill 10 in Crescent City
Tidal Waves After Quake Spread Wide Havoc Along Coast
Waves Rip Boats Here, Smash Dock Facilities
Johnson Acts Quickly to Aid Alaska Victims
Earth Rang Like Bell, Caltech Scientists Say
LIFE
FURY OF THE QUAKE—

Section 4

Section 4—Permanent Speed Hump Program

SECTION 4—PERMANENT SPEED HUMP PROGRAM

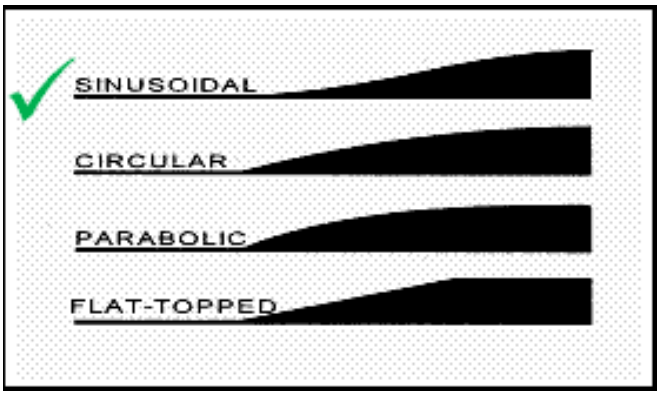
4a. INTRODUCTION

Permanent speed humps are the most frequently requested traffic-calming device—aside from the unapproved 'speed bump'—by members of the public. They are the most obvious form of traffic calming known to the public. Permanent speed humps are certainly the most commonly installed by public agencies—historically—and perceived to be easily installed.

However, they are intended as a secondary measure—not necessarily as the primary response to a documentable neighborhood speeding issue—following other forms of traffic calming. In response to a community complaint, MOA will not immediately start with the installation of speed humps as "the" solution to a neighborhood concern. Like most traffic control devices, even a properly designed and located speed hump installation—using multiple humps, as indicated—can have adverse impacts on street maintainability, emergency response times (fire, police, and medical), and public transit.

On the other hand, they can—when properly used—be an effective means of reducing travel speeds.

Permanent speed humps are constructed with asphalt paving and typically 3 inches (with construction tolerances) in height with a specific curve (a sinusoid) in the change of elevation above the abutting road pavement.



Commonly used speed hump profiles.
MOA-used profile with green checkmark.

Historically, the Department had one type of speed hump in the toolbox—with some variations (as built over the years) in length[1] and height.

A second type of hump is adopted for use with this Policy Manual—a more recently developed device referred to as a "Speed Cushion." More discussion on this device will follow in this section.

The Department may use permanent speed humps (or speed cushions) as an interim measure before costlier measures: chicanes, bulb-outs, neckdowns, etc. are able to be constructed, or while awaiting a planned roadway reconstruction. However, the construction of permanent speed humps will typically be the end of the program for a particular road and particular set of community concerns.

As with other forms of traffic calming, the candidate roads must be paved. Priority for this device will be given to roads that have been constructed with curbs and gutters. Those roads will usually have an engineered vertical alignment to address drainage issues that can arise from the placement of the hump, the curbs and gutters will control the stormwater impacts, and, the curb will limit the potential for motorists to attempt to evade the hump by driving on the paved/unpaved shoulder.

Both forms of vertical device require, for safety reasons, warning signs (both the "Speed Hump" message sign and the sign with the diagonal-down arrow) located on the shoulder of the road.

Installed speed hump with markings and signs

[1] From 11 to 22 feet as measured along the center of the road.
The current design is 13 feet in length

STANDARD SPEED HUMP

The MOA "standard" speed hump is placed along minor neighborhood access routes. This avoids impacts to transit and minimizes the potential impacts to emergency responders and commercial vehicles (movers, home improvement deliveries, garbage pick-up) that must have access to residential roads.

FIGURE 4—

MEASURED EFFECTIVENESS OF STANDARD SPEED HUMPS	
Speeds	-22%[1]
Volumes	-18%[2]
Crashes	-13%[3]

Source: Traffic Calming—State of the Practice 2000

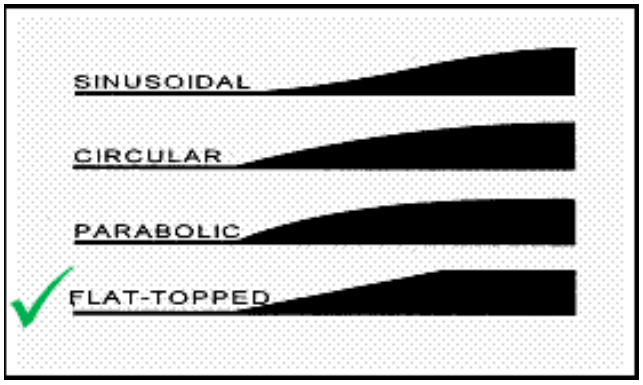
[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes

SPEED CUSHION

Speed cushions are a modified form of speed hump that allows unimpeded passage between sections of the hump for most emergency vehicles. A pair of gaps is constructed centered on the roadway, with a spacing designed for emergency vehicles in use in Anchorage.

Installed speed cushions
(NOTE: MOA will be deploying the "Regina Hump" device. The photo shows a similar device.)

There are several designs in use in the United States and Canada, and the Department is going to use a design made available from the City of Regina[2], Saskatchewan. Although other public agencies in the United States have variations on a preferred design, we believe that the "Regina Hump" is the most appropriate design for winter conditions experienced in Anchorage.



Profile of speed cushion.
MOA-used profile with green checkmark.

FIGURE 5—

MEASURED EFFECTIVENESS OF SPEED CUSHIONS	
Speeds	-27%[1]
Volumes	unk[2]
Crashes	unk[3]

Source: Feer and Peers Study in Sacramento, CA

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes unk – no post-installation studies available or insufficient data

Two modifications that the City of Regina recommended, after their initial deployment, will be implemented. First, the height of the device is being increased to 3.5 inches (a typical speed hump is 3 inches high). This will reduce the potential for private-vehicle operators to use the left side gap (on their side of the road) for the driver's side wheels and cross the hump only on the passenger side wheels. Second, the City's post-installation report recommended that a double yellow centerline be extended for a short distance in each direction approaching the device.

4b. CRITERIA

As noted on Table 4, permanent speed humps will only be considered on roads where the 85th

[2] Speed Reduction While Accommodating Emergency Vehicles with Small Inner Track Widths, Sharla Cote, EIT, City of Regina, SK 2007

percentile speed is six or more miles per hour over the PSL.

Typically, speed humps are not installed on roads with daily volumes of more than approximately 2,000. Those roadways are designated as collectors (or higher) or are typically acting as neighborhood collectors and often serve as primary response routes for emergency vehicles. As noted elsewhere, roads that provide access to the docks/loading areas of commercial/retail uses (used by trucks), will not be considered for either hump or cushion devices.

TABLE 4—Volume/Speed Criteria for Speed Humps

	85th Percentile ≤5 MPH over PSL (PSL min. 25 MPH)	85th Percentile 6 MPH ≤*V* ≤10 MPH over PSL	85th Percentile >10 MPH over PSL
≥2000[5] vpd	Not Warranted	Other Devices	Other Devices
≥500[6] vpd, but ≤2000	Not Warranted	Evaluate Further	Evaluate Further
<500 vpd	Not Warranted	Not Warranted	Evaluate Further

4c. PLACEMENT

In order to minimize the potential for adverse stormwater impacts to abutting properties or to minimize the potential hazard associated with icing/snow accumulation during winter, humps will generally not be an approved device for roads with a grade greater than 6 percent[3] or more or on roads that are 'flat' that may create localized ponding (and icing).

Adequate visibility of the associated signage will be required during the process of establishing the location for either type of device. A continuous visibility of 300 feet is recommended to ensure that motorists have an opportunity to prepare for the 'bump' and allow snowplow operators to adjust their equipment.

Installation of only a single speed hump on a road has almost no impact on speeding—except at the hump itself—and speeds can sometimes increase to compensate for that reduction. Because of recommendations for the effective spacing of speed humps, and the required separation from intersections, short[4] cul-de-sac streets will not be candidates for either speed humps or speed cushions—regardless of traffic volumes.

The following represents the placement criteria:

- Adequate visibility of the device and associated warning sign, regardless of horizontal or vertical alignment, and regardless of private improvements (structures or landscaping) in/near the right-of-way.
- Spacing of 400 and 500 feet between pairs of humps, and clearly visible for between 200 and 300 feet in advance of the device.
- Separation from an intersection. The device should not be proposed within 50 feet of an intersection, and preferably more than 100 feet from an intersection.
- Not on a primary emergency response route or a transit route (standard speed humps only).
- Separation from transit stops or established school bus stops.
- No conflicts between the required device signage with higher priority signage. The device signage should not block the visibility of these higher priority signs—school zone warning signs, STOP/Yield signs, speed limit signs, etc.

[3] ITE recommends a maximum grade of 8 percent in Guidelines for the Design and Installation of Speed Humps. Winter weather conditions suggests a more conservative maximum of 6 percent.

[4] Less than 600 feet as measured from the center of the turnaround to the center of the intersecting street.

[5] Streets with volumes of 2,000 vehicles/day (approximately) are typically collector-type streets in nature—or classified as such on the OS&HP. Exceptions may be made on a case-by-case basis—or approved for traffic chokers or traffic circles at intersections or speed cushions

[6] This is equivalent to the traffic generated by between 50 to 70 homes

- Not scheduled for reconstruction within two years.

- Proximity to property corners.

The latter point is not a safety issue. Many residents find the appearance of warning signs to be objectionable, and perceive the devices reduce property values.

Where the subdivision has been laid-out with offset driveways, this may present few locations where a resident would not be impacted.

Some of these criteria are based upon the considerations of safety for the operators (and/or passengers) of the critical agency stakeholders—emergency vehicles and transit vehicles, for example.

The increased response time for emergency vehicles, resulting from a need to drive over the hump slowly, is a potential impact to each resident in the community—and not just those along the road proposed for these devices. Data published from the City of Mobile, Alabama, found that the average delay to a fire engine/truck was more than seven seconds per hump. When the goal of responding to an emergency is about magnitude of 120 seconds—from station to emergency—each seven-second delay per hump can be significant to a life safety event.

Average delay per measure type:

Speed tables	7.47	seconds per table
Speed humps	7.07	seconds per hump
Traffic circle	9.10	seconds per device
Speed cushion	5.31	seconds per hump

The City of Portland, Oregon has additional data collected, based upon three "desired" free-flow travel speeds—25, 30, and 35 MPH. For fire engines, the increased delay ranged from a low of about 2.5 seconds per hump at 25 MPH to a high of 5.2 seconds per hump at 35 MPH. For fire trucks, the range was from 3.5 seconds per hump at 25 MPH to 6.5 seconds per hump at 35 MPH.

If warranted, the Department's overall device placement plan will need approval by a majority of the residents in the affected area.

A map of a subdivision in Anchorage, with the hypothetical limits of an affected area, the directly impacted roads, and the "location" of the proposed vertical devices, is shown in Figure 6.

FIGURE 6—Sample Map Demonstrating "Directly Impacted" vs. Affected Area"

Postage-paid response cards[7] will be sent to the taxpayers and residents in the affected area[8]. We must receive a response from at least 90 percent of the residents/property owners in the affected area for a valid 'petition'. There must be no less than 51 percent support from all 'votes' received in the affected area, and at least 60 percent support from the directly impacted residents. The response cards must be returned within thirty days of the date of mailing.

"Blue and red" (combined) shading in Figure 3 indicates the residences in the affected area. "Red" shading (broken out) identifies the directly impacted residences. "Gold" shading identifies the directly impacted roads. Black lines crossing the roads identify proposed device locations. Green represents open spaces and parks in the neighborhood.

[7] This facilitates a considered and fully voluntary response to the matter—in the same manner as an election ballot—when deciding an issue that has both positive and adverse consequences and which involves the expenditure of tens of thousands of dollars of public funds. Cards are provided unique ID numbers to ensure accuracy of the community support.

[8] See definition on page v

If the required thresholds are not achieved for either overall number of responses or the number of affirmative responses in support, the Department may propose revised locations for the humps, or we may revise the overall concept to include other device types that are perceived to address the documented speeding concerns.

A maximum of two follow-on attempts will be made to gain community support. During this review cycle, the critical agency stakeholders will be included in the redesign process.

If threshold response rates are not achieved by the third round of 'voting,' the Department will make the determination that the community has insufficient interest to merit the expenditure of public funds for construction of traffic calming. A letter will be sent to the Community Council and local elected officials (Assembly, State House of Representatives and State Senate) advising them of the failure to achieve majority support for traffic calming

This will result in the placement of a three year hold on new traffic calming requests for the road(s).

SECTION 4—PERMANENT SPEED HUMP PROGRAM

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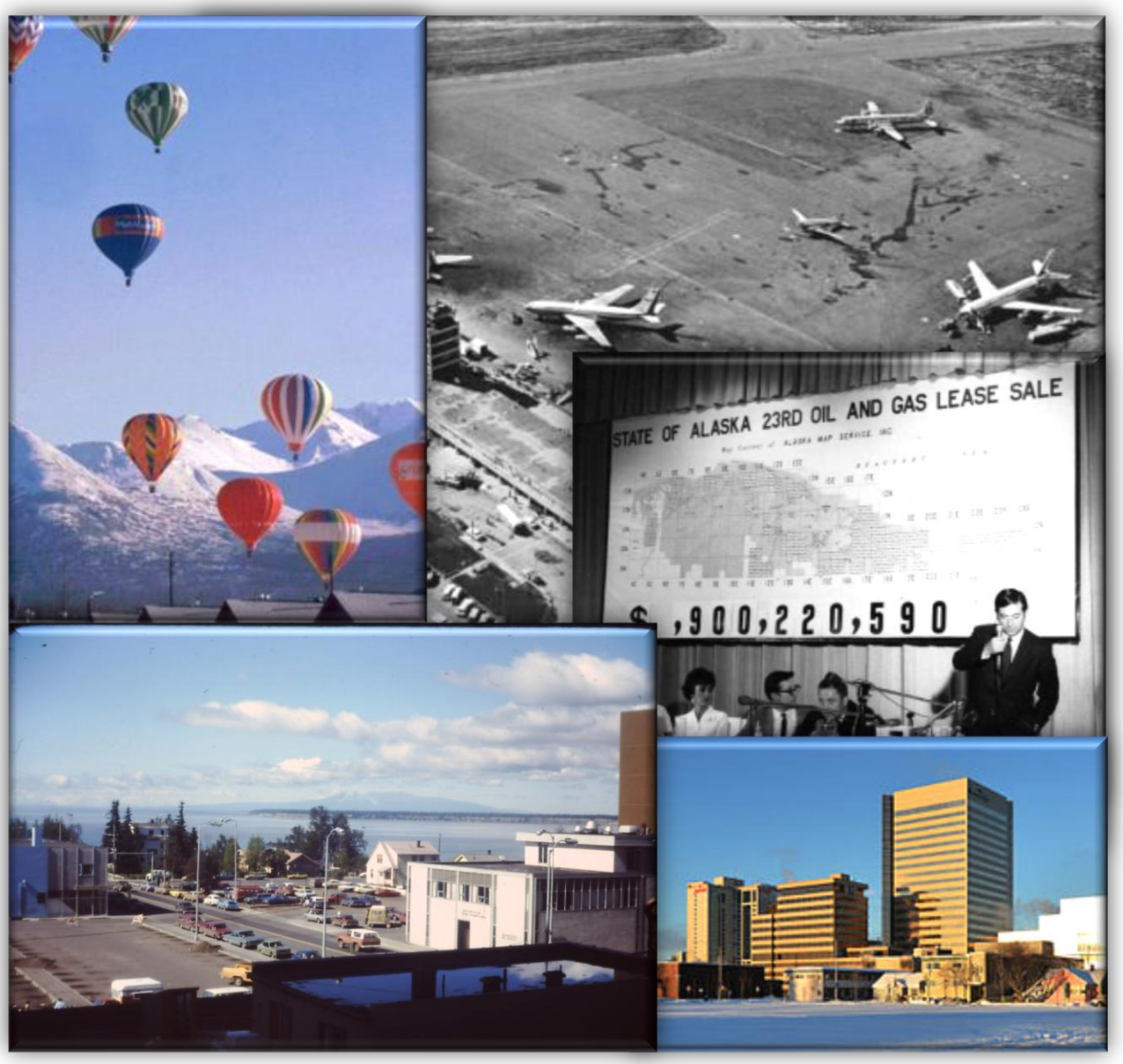
Section 5



Section 5—Permanent Traffic Calming Program: Other Types

SECTION 5—PERMANENT TRAFFIC CALMING PROGRAM: OTHER TYPES

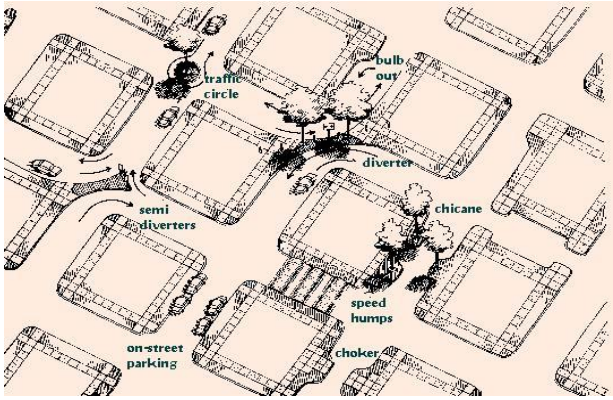
5a. INTRODUCTION

The MOA Traffic Department has a number of devices—other than speed humps or speed cushions—available in the traffic calming toolbox.

As noted in Figure 1, these devices fall—broadly—into the following three categories of devices.

- Speed Control (Horizontal)
- Speed Control (Vertical)
- Volume Control

In addition, MOA does have a limited number of permanently installed radar speed signs. The cost of a device ranges—based upon experience—between $35,000 to $50,000. This will limit the use of this device to locations where neither horizontal nor vertical devices are appropriate.



Source: Iowa City, Iowa Traffic Calming Program

Very high volume collectors with significant speeding issues will typically be the only locations where this type of device is appropriate.

For two reasons, many agencies default to installation of speed humps: lower cost, and easier installation. Most of the devices in this category can be substantially more expensive. For example, added work for the design, potential reconstruction of the road, surface and subsurface improvements, and right-of-way purchases to install.

The Department will not consider volume control measures outside of an area-wide analysis and a comprehensive plan. These types of devices have secondary impacts well beyond those associated with speed humps and cushions.

The most frequently used types of permanent devices that are horizontal measures include:

- Chokers
- Compact Traffic Circles
- Intersection Neckdowns

The most frequently used types of permanent devices that are vertical measures (other than speed humps and cushions) include:

- Raised Crosswalks
- Raised Intersections
- Speed Tables

In conjunction with roadway improvement projects, the following horizontal measures may also be added:

- Chicanes
- Roadway Narrowing
- Island Narrowing
- Lateral shifts

A sample report for a Specific Area Study is provided in Appendix B to provide Policy Manual readers an opportunity to view the breadth of review and level of effort required.

Shoulder side devices—chokers, neckdowns, and Chicanes, primarily—will require that steel facings be set into the curbs to minimize damage to the concrete caused by snowplows.

Steel facing set into curb (McRae/Northwood)

5b. HORIZONTAL DEVICES AND PLACEMENT

CHOKERS

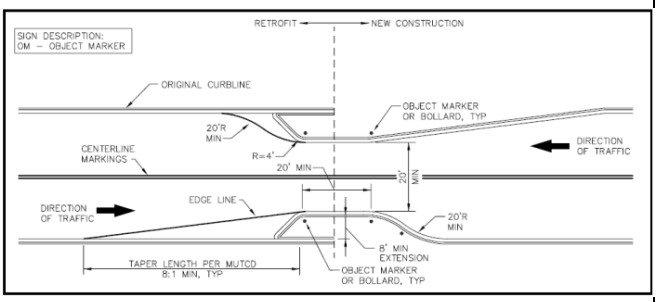
Similar to the island narrowing device, the design of this type of device will require careful evaluation from AFD and MOA Street Maintenance.

This type of device, as noted previously, will force cyclists riding near the shoulder to shift into traffic at each location—or force them to ride "as a vehicle" (i.e. in the travel stream).

Plowing and street sweeping operations may be adversely impacted by the chokers. That will typically limit the number of chokers that may be proposed along a given road segments.

Roads with a large number of driveways (small lot residential subdivisions)—particularly where driveways are offset from one another—will limit the opportunities for use of this type of device.

However, the reduction in roadway width can be beneficial to pedestrians crossing the roadway. The choker forces traffic away from pedestrians walking along the road creating a perception of substantially safer walking conditions.



Mid-block choker details

At the time of producing the Policy Manual, MOA is constructing chokers along Meadow Street, between East 68th and East 72nd avenues. This traffic-calming project is an example of an MOA-initiated project—rather than a proposal initiated by residents. Meadow Street was proposed for major reconstruction, and the chokers were incorporated into the design of the new roadway improvements.

Chokers under construction on Meadow Street, north of East 72nd

FIGURE 7—

MEASURED EFFECTIVENESS OF CHOKERS	
Speeds	-14%[1]
Volumes	-20%[2]
Crashes	unk[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in Average annual crashes unk – no post-installation studies available or insufficient data

COMPACT TRAFFIC CIRCLES

This type of device has been used in only a few locations in Anchorage. The device works well in controlling speeds on long, straight (tangent) sections of roadway. They work best where there is a well-developed grid system of roadways (South Addition or Mountain View) that reduce the adverse impacts upon vehicles with long wheel-bases (in residential areas—home supply deliveries, moving company trucks and fire equipment). As shown in the photo on page 41, legally, traffic must circulate around the island to make a left turn.

This type of device has been used with considerable success in Seattle, Washington—most often in residential areas that have well-developed, grid-type system layouts and very narrow streets—common in the early decades of the 20th century. Seattle's Capitol Hill neighborhood—on the northeast side of downtown Seattle—has had traffic circles installed at most intersections for several decades.

SECTION 5—PERMANENT TRAFFIC CALMING PROGRAM: OTHER TYPES

An obvious difference between Seattle and Anchorage is our winter weather and the extent street plowing is required. Seattle rarely receives snowfalls that trigger the need for their agency to plow the roads.

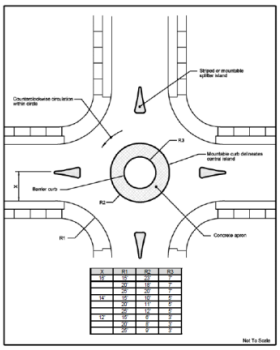
"Classic" Seattle traffic circle with bike route "shared lane arrows"

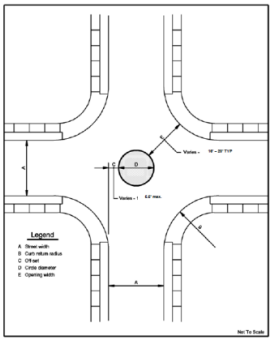
Seattle traffic circle with art imprinted in the concrete

A contemporary version provides a larger turning radius around the circle. This limits the need for long wheelbase vehicles (moving company trucks, home improvement store deliveries) and fire equipment to complete a left turn in front of the device (driving the wrong direction). It is required where traffic circles have been installed at intersections on "narrow" streets.

Note the difference in the street widths in the above photos.

The City of Seattle's policy requires the abutting homeowners to become responsible for maintenance of any landscaping in the circle.





With Splitter Islands **Without**

Intersection Compact Traffic Circles

Traffic circle at East 16th/Birchwood east of Airport Heights Elementary School

Device issues:

Advantages

- Reduces pedestrian crossing distance with splitter islands
- May visually enhance the street through landscaping and public art; however, care must be taken that these do not limit the visibility of pedestrian and bicycle activity.

Disadvantages

- May adversely impact driveway access near the intersection.
- Splitter islands, if used, may impact snow removal operations.
- Requires precise design for access to large vehicles, if used on primary response routes or

transit routes; although that may be addressed by the use of 'truck aprons'.

- May create confusion as to the appropriate path for left turning vehicles, especially long-wheelbase vehicles.

FIGURE 8—

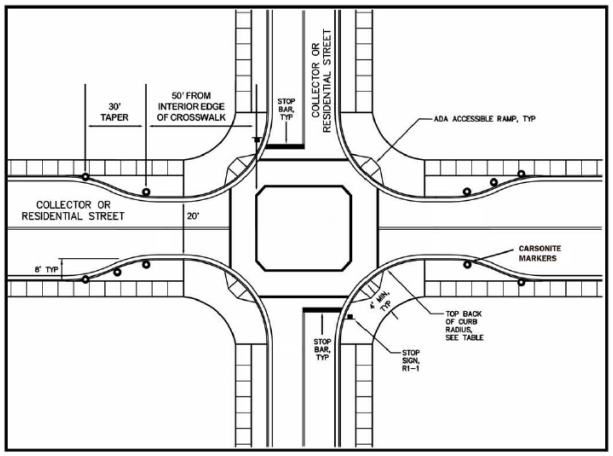
MEASURED EFFECTIVENESS OF COMPACT TRAFFIC CIRCLES	
Speeds	-11%[1]
Volumes	-5%[2]
Crashes	-71%[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in Average annual crashes unk – no post-installation studies available or insufficient data

INTERSECTION NECKDOWNS

This device requires a very involved design to ensure that impacts to large wheelbase vehicles have been addressed. Intersection neckdowns can be applied to streets that are wide and parking exists. In these conditions intersections can be narrowed without trucks crossing over into opposing traffic. When the streets are not wide or do not have on-street parking, intersections cannot be narrowed down without trucks crossing over into opposing traffic.



Intersection neckdown profile

MOA will consider designs requiring a large wheelbase vehicle to cross over the centerline into on-coming traffic when volumes entering the intersection are low. The 2001 TCPM recommended volumes less than 500 vpd (fifty vehicles during the peak hour), heavy vehicle traffic less than 2 percent of the daily total, and the road not being a transit route.

Intersection neckdown at West 48th Avenue/A Street (with raised intersection)

Device issues:

Advantages

- Reduces pedestrian crossing distance
- May visually enhance the street through landscaping and public art; however, care must be taken that these do not limit the visibility of pedestrian and bicycle activity.

Disadvantages

- May adversely impact driveway access near the intersection
- Requires precise design for access to large vehicles if used on primary response routes or transit routes
- May create issues for snow removal and street sweeping operations

FIGURE 9—

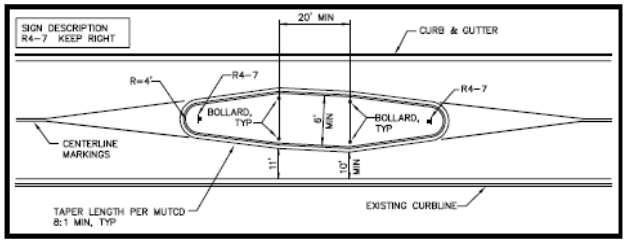
MEASURED EFFECTIVENESS OF INTERSECTION NECKDOWNS	
Speeds	-7%[1]
Volumes	-10%[2]
Crashes	unk[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes unk – no post-installation studies available or insufficient data

ISLAND NARROWINGS

The design of this type of device will require careful evaluation from AFD and MOA Street Maintenance. Both agencies require clearance between the median curb and the effective edge of the travelled-way. AFD requires space to set-up when responding to a fire emergency; and Street Maintenance requires sufficient residual width to plow the roadway during the winter.



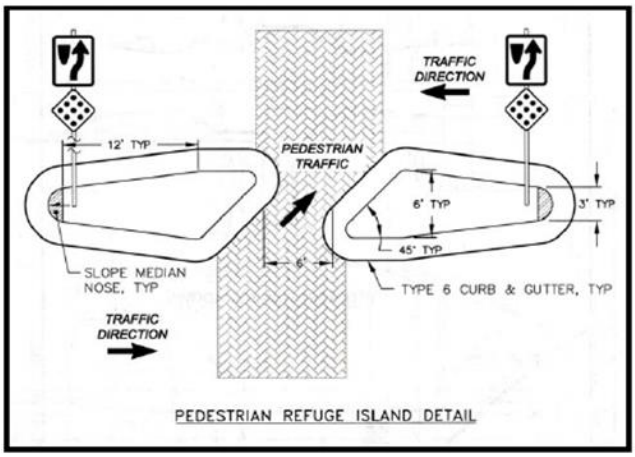
Island without Pedestrian Refuge

In addition, the island must have sufficient width to install the required street signage.

Finally, the median island itself may affect access to any driveways, and on-street parking will likely need to be removed.

Longer islands may create an impression that the road is a median-divided arterial, and actually result in increased speeds and substantial impacts to driveway access.

The combination of these constraints will result in the use of this device being limited to collector roads with limited direct access to abutting homes, and roads that are not designated bicycle routes.



Island Narrowing on East 16th

east of Lake Otis Parkway Island with Pedestrian Refuge Island Narrowing on East 16th at Airport Heights Elementary

The length of the island can be increased based upon the degree of direct driveway access or the willingness to accept the turn restrictions created by the island. The minimum length should be one car length—not including the tapered sections at each end.

Device issues:

Impacts (beneficial or adverse) to collision, speed, and volume data are not available.

Advantages

- Reduces pedestrian crossing distance
- May visually enhance the street through landscaping and public art; however, care must be taken that these do not limit the visibility of pedestrian and bicycle activity.
- Provides a refuge area for pedestrians, which is beneficial in residential areas, parks, and schools.

Disadvantages

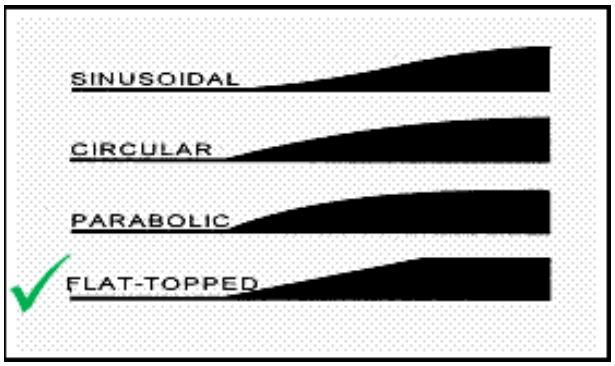
- May adversely impact parking and driveway access to abutting properties
- May create issues for snow removal and street sweeping operations
- Shifts vehicle traffic towards the typical riding position cyclists use on the roadway—creating a potential hazard

FIGURE 10—

MEASURED EFFECTIVENESS OF ISLAND NARROWING (Pedestrian Only)	
Pedestrian Safety	See Footnote
Volumes	unk
Crashes	unk
Source: Huang & Cyneki, 2001	
Increased pedestrian use of crosswalk. No significant difference in motorists yielding to pedestrians	
unk – no post-installation studies available or insufficient data	

5c. VERTICAL DEVICES AND PLACEMENT

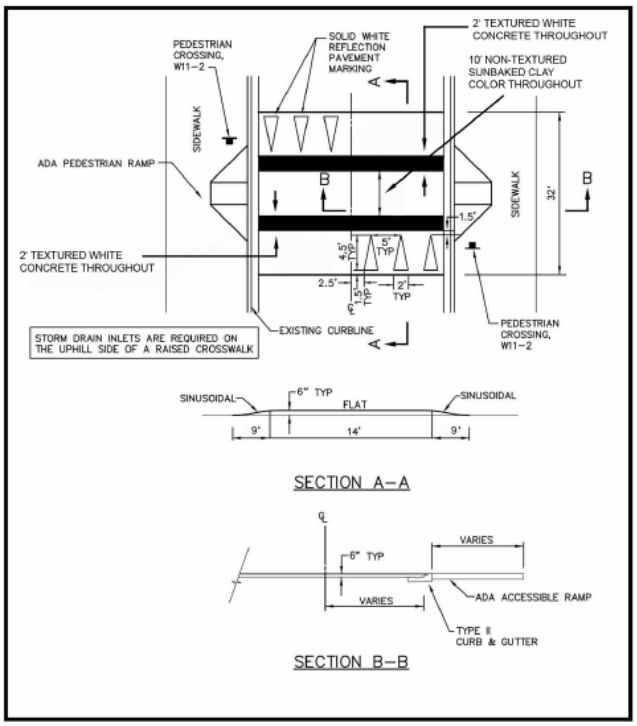
Example profile for speed cushion.



MOA-used profile with green checkmark.

RAISED CROSSWALKS

This type of device is most frequently associated with traffic calming near public schools. Rather than using the sinusoidal curve associated with a speed hump, the approaches to the raised table (the actual crosswalk area) are angled with a flat upper surface. In addition, the devices are constructed from Portland Cement Concrete.



Raised Crosswalk Detail

The sidewalk must connect to the crosswalk via curb ramps meeting Americans with Disabilities Act standards.

Alternatively, the raised crosswalk or intersection may extend to the sidewalk level. However, our experience at Rogers Park included damage to low-clearance vehicles and to the crosswalk itself.

In either case, pedestrians will need a tactile surface—as is the case at all other curb ramps.

Raised crosswalk on Northwood Avenue, south of Aspen

Device issues:

Advantages

- Speeds are reduced, but often to a higher crossing speed than with speed humps (typical crossing speed is 25 and 27 MPH)
- No effect on access
- Reported to increase pedestrian visibility
- After studies indicate crashes have been reduced an average of 45 percent after installation
- Traffic volumes may decrease by up to 12 percent depending upon the availability of alternate routes

Disadvantages

- May create issues for snow removal
- Like most vertical devices, may create localized storm drainage and ponding issues

FIGURE 11—

MEASURED EFFECTIVENESS OF RAISED CROSSWALKS	
Speeds	-18%[1]
Volumes	-12%[2]
Crashes	-45%[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes unk – no post-installation studies available or insufficient data

RAISED INTERSECTIONS

As with the raised crosswalks, the sidewalks must connect to the crosswalk via curb ramps meeting ADA standards. Alternatively, the intersection may extend to the sidewalk level.

This also introduces the possibility during snow events for motorists to 'lose' the guidance of having the sidewalk at a different elevation than in the road travelled-way—placing pedestrians at an increased risk during snow events.

Device issues:

There are no "after studies" to indicate crash reduction, but the expected reductions may not be as substantial as other devices.

Advantages

- Speeds are reduced, but often to a higher crossing speed than with speed humps (typical crossing speed is 25 and 27 MPH)
- Reported to increase pedestrian visibility and likelihood drivers will yield to pedestrians.
- After studies indicate crashes have been reduced an average of 45 percent after installation
- No effect on access

- Traffic volumes may decrease by up to 12 percent depending upon the availability of alternate routes

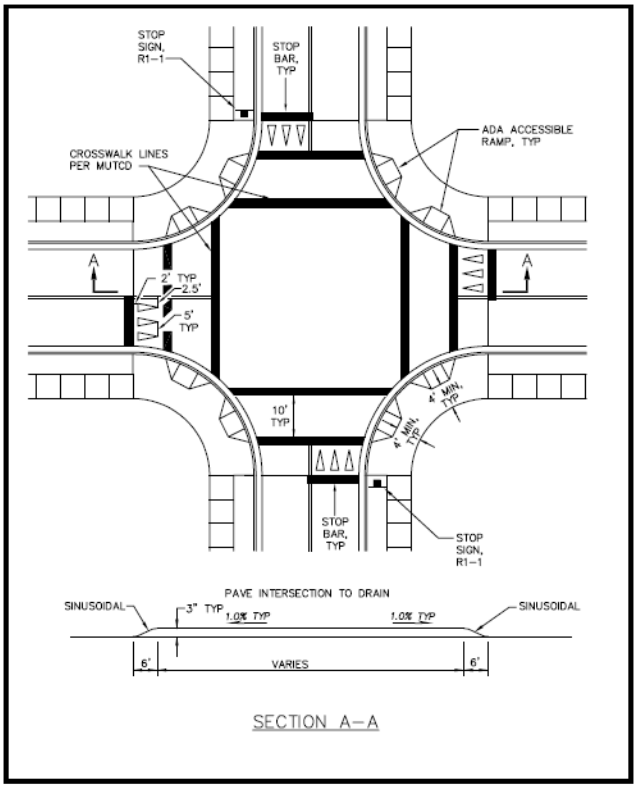
- Preferred by emergency responders—only as compared to other vertical devices—due to reduced impact to the safety of equipment operators and patients being transported

Disadvantages

- May create issues for snow removal

- Like most vertical devices they may create localized storm drainage and ponding issues

- Vehicle travel speeds are reduced, but often to a higher crossing speed than other devices due to longer 'platform' (across the width of the intersection versus across a 10-foot wide raised crosswalk or 13-foot speed hump)



Raised intersection detail

Raised intersection McRae at 35th Ave

FIGURE 12—

MEASURED EFFECTIVENESS OF RAISED INTERSECTIONS	
Speeds	-1%[1]
Volumes	-12%[2]
Crashes	unk[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes unk – no post-installation studies available or insufficient data

SPEED TABLES

The speed table is, essentially, a mid-block version of a raised crosswalk with a longer raised platform (the 'table'). Pedestrian crossings are not accommodated in this design.

Speed tables on East 72nd near Basel

Speed tables are one of the few vertical traffic calming devices that are likely to be supported by

Transit and AFD. The length of the raised platform allows the long wheelbase vehicles utilized by these stakeholders to avoid the close succession of 'jolts' to those occupying the vehicle.

FIGURE 13—

MEASURED EFFECTIVENESS OF SPEED TABLES	
Speeds	-18%[1]
Volumes	-12%[2]
Crashes	-45%[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in average annual crashes unk – no post-installation studies available or insufficient data

5d. HORIZONTAL DEVICES MANDATING ROAD RECONSTRUCTION

Although many traffic-calming devices can be retrofitted into the existing improvements, some will usually require considerable reconstruction of the roadway. This may involve conversion of a strip-paved roadway to a road with curbs, gutters, and sidewalks, or require removal and reconstruction of the existing curbs, gutters, and installation of a revised storm drain system (catch basins) to successfully capture stormwater and melt.

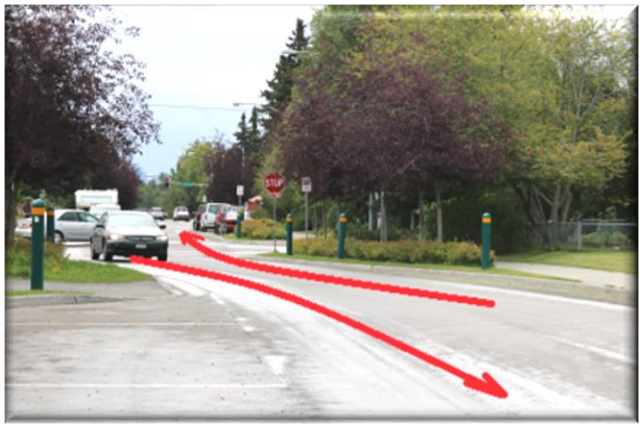
This will typically make the selection of these devices restricted to incorporation into a major roadway reconstruction.

CHICANES

Although the traditional device will be constructed with multiple horizontal curves, and it may work best for controlling speeds, a design alternative can stretch the chicane over several blocks on a roadway.

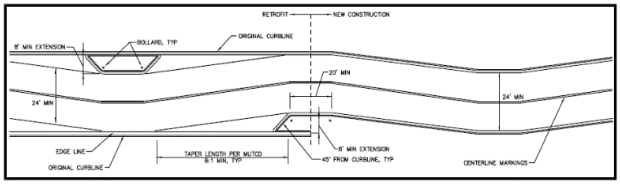
Chicanes usually have only a minimal impact on travel speeds unless there is also a reduction in the curb-to-curb width of the travelled-way. Without a lane width reduction, the chicane becomes the equivalent of a curvilinear street with relatively little impact on travel speeds.

Chicane installed in Sydney, Australia



Chicane on Karluk Street between East 8th Avenue East and East 15th Avenue. Red arrows show curvilinear alignment

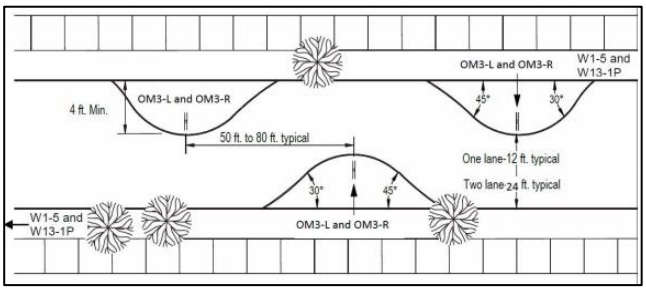
In order to be effective at controlling speeds, in addition, the chicane must provide a significant change in vehicle direction within a short distance.



Chicane detail

The Pennsylvania Department of Transportation's Traffic Calming Handbook has a diagram that illustrates the type of design needed for an effective reduction in traffic speeds. However, this must be balanced against MOA Street Maintenance's ability to remove snow effectively from the roadway.

Source: Pennsylvania Department of Transportation Traffic Calming Handbook, Published 2012



Some chicane designs may not require a complete reconstruction of the roadway. Those should be considered the exception rather than the rule.

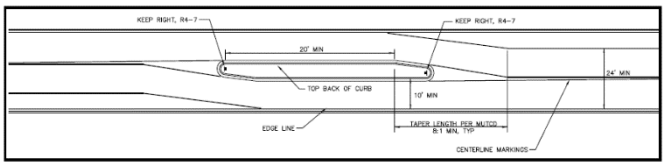
ROADWAY NARROWING

This can be among the most effective means of controlling speeds available, and perhaps one of the most expensive techniques available. For roadways with engineered drainage systems, MOA will need to reset curb inlets and install/modify conveyance systems. Driveways may need to be rebuilt, which may become a problem as they need to be built to current standards. Sidewalks and intersection curbing must be built to current accessibility standards required by the ADA, and, the proposed Right-of-Way Accessibility Guidelines.

However, removal of on-street parking may be an issue with residents, particularly in neighborhoods where the parcels have limited street frontage, or onsite parking spaces.

LATERAL SHIFTS

As with the island narrowing device, the median island in a lateral shift, itself, may affect access to any driveways, and on-street parking will likely need to be removed.



Lateral shift detail

Longer islands may create an impression the road is a median-divided arterial, and actually result in increased speeds and substantial impacts to driveway access.

This device will also shift motor vehicle traffic towards any cyclists—creating a safety issue for that user group.

The constraints associated with this device limit its use to collector roads with limited direct access to abutting homes and roads that are not designated bicycle routes.

The length of the median island can increase based upon the degree of direct driveway access or the willingness to accept the turn restrictions created by the island.

Device issues:

Impacts (beneficial or adverse) to collision, speed, and volume data are not available.

Advantages

- Reduces pedestrian crossing distance
- May visually enhance the street through landscaping and public art; however, care must be taken that these do not limit the visibility of pedestrian and bicycle activity
- Provides a refuge area for pedestrians, which is beneficial in residential areas, near parks, and near schools

Disadvantages

- May adversely impact parking and driveway access to abutting properties
- Shifts vehicle traffic towards the typical position cyclists will use on the roadway—creating a potential hazard
- May create issues for snow removal and street sweeping operations

5e. PERMANENT RADAR SPEED SIGNS

Radar speed signs/ Voluntary Speed Compliance signs provide real-time feedback to each driver approaching the device. The travel speed is displayed as the driver approaches the device, providing the driver an opportunity to become aware of the precise measured speed, and then adjust their behavior.

Radar speed sign on McRae at Northwood

The devices can be programmed to not display 'reckless' approach speeds. This discourages deliberate/willful speeding or avoids the device used to support "drag racing" in the neighborhood.

Radar speed sign on 15th Avenue West, west of "P" Street

The current devices have the capability to record the travel speeds of the vehicles on the road; however, the Department is not currently using this functionality. It would permit the Department to evaluate and monitor travel speeds and volumes that occur daily—as well as provide a day-by-day comparison of behavior during atypical events.

Use of this device has significant benefits over the other types of temporary traffic calming:

- The device may be installed along any road, regardless of surfacing material or the presence of curbs and gutters.
- The device will operate without frequent servicing of the power source (batteries on the temporary installations).
- Currently, the devices do not have the software for recording travel speeds. This requires regular visits by the Department's Data Collection staff to determine the effectiveness of the device
- The devices are, like other devices and traffic signs, a potential target for theft or vandalism leading to a need to replace them.
- The devices require a service point for full-time power.
- Installation time and cost is substantially higher than required for most other devices, plus the device will necessitate routine maintenance and reprogramming.
- There may be conflicts between required lateral separation between the travel lane on the roadway AND sidewalks and the edge of the sign that results from the size of the foundation and sign, the location of sidewalks, and the available right-of-way.
- Nearby residents may object to the illumination from the activation of the device by an oncoming vehicle.

PLACEMENT

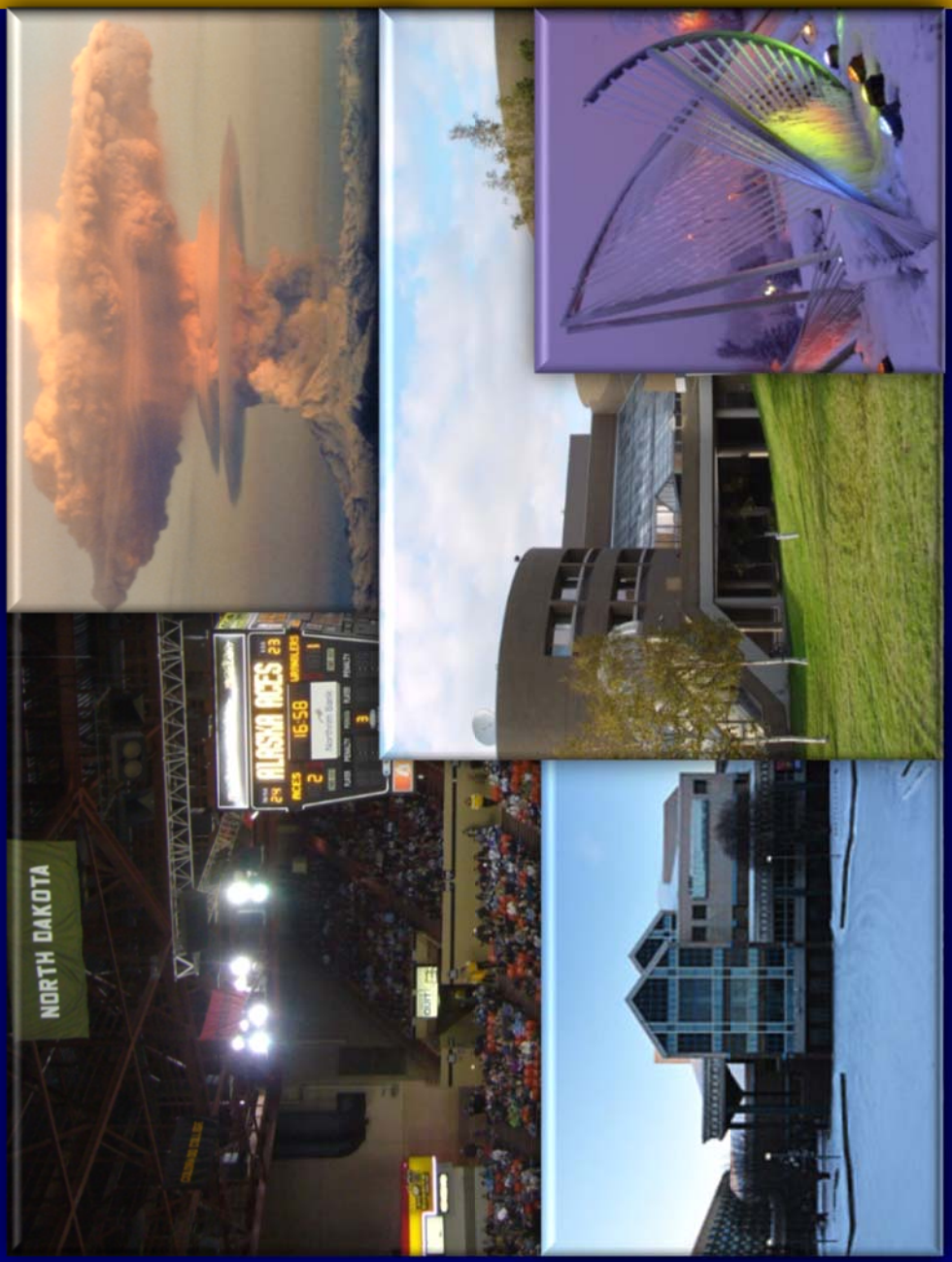
The use of radar detection requires the device be located in a clear field of view of approaching traffic, and that at least several hundred feet of 'line of sight' be available to permit motorists to perceive, react, and adjust their travel speed.

The device must be placed away from intersections to get 'free flow' conditions.

This results in the following criteria for placement:

- A location away from horizontal or vertical curves in the roadway
- Limited or no vegetation near the roadway surface that might block the view of the sign display
- No conflicts with existing, higher priority street signage: school zone signage, warning signs such as "STOP AHEAD," "Ped Xing," and other regulatory or warning signs.
- Separation from an intersection. The device should be no closer than 50 feet from any intersection, and further away from an intersection where the street in question has had STOP control installed.
- Located away from abutting home windows. As is the case with the temporary devices, this is not a safety issue.

Section 6



Section 6—
Specific Area Studies

SECTION 6—SPECIFIC AREA STUDIES

6a. INTRODUCTION

Specific area studies encompass a comprehensive look at the traffic calming needs of an entire neighborhood—an area that may include hundreds of residences and more than a dozen roadways. They are typically a review of an entire Community Council area, or a significant percentage thereof. An entire community may be engaged including ongoing coordination with the Community Council, members of the Anchorage Assembly, and local members of the State House and Senate.

These types of studies may involve the full range of 'typical' traffic calming measures—speed humps, chokers, neckdowns and in addition involves devices unique to the Specific Area Study program.

FIGURE 14—Traffic Calming Toolbox Qualitative Assessment

TRAFFIC CALMING TOOL BOX	Volume Reduction	Speed Reduction	Safety Improvement	Pollution Reduction	Access Restriction	Emergency Access	Maintenance Issues	Community Acceptance	Cost
Full Closures	●	●	⊖	●	●	●	●	○	●
Half Closures	⊖	⊖	⊖	<>	●	●	○	○	●
Forced turn islands/ Diverters	⊖	⊖	⊖	<>	●	●	●	○	●
Speed Humps/Tables/ Raised Crosswalk/Raised Intersection	⊖	●	○	○	○	●	⊖	○	⊖
Traffic Circle/Roundabouts	○	⊖	⊖	○	○	●	⊖	○	●
Lateral Shifts/Chicanes	⊖	○	⊖	○	○	○	○	●	●
Neckdowns/Chokers	⊖	⊖	⊖	○	○	○	○	○	●

KEY
- ○ Low, Unlikely, No
- ⊖ Mid, Moderate, Possible
- ● High, Likely, Yes
- <> Traffic Shift
- n/a Not applicable

These added devices may include intersection treatments to physically divert traffic, closing roads to one-direction of through traffic, or preventing through traffic on a roadway segment allowing only non-motorized traffic to travel the entire block length.

Due to the considerable expense of data collection, staff and consultant time, and potential construction costs, this program must be implemented through a dedicated grant. These projects will typically be contracted out to consultant engineers.

As of the date of this Policy Manual, there are no pending requests for a new Specific Area Study.

Past studies are as follows (with dates in parentheses):

Mountain View	(1998)
Airport Heights	(1999)
Rogers Park	(2000)
Government Hill	(2003)
Russian Jack	(2004)
Northeast Anchorage	(2006)
Eastern Half of the Abbott Loop	(2006)
Turnagain	(2006)

6b. STUDY PROCESS

The study process begins with a study area nomination from the affected Community Council or member(s) of the Anchorage Assembly.

- **Public Involvement**
  - *Meet with Community Council*
  - *Form traffic calming work group*
  - *Public meetings*
  - *Identify areas of concern*
- **Collection of Data**
  - *Volume*
  - *Speed*
  - *Cut-through*
  - *Transit*
  - *Safety/Emergency vehicle routes*
- **Analysis and Report**
  - *Results of analysis*
  - *Identification of appropriate traffic calming measures that fit with the community*
  - *Preparation of a map showing improvements*
  - *Prioritization of improvements with estimated costs*

6c. TYPES OF SPECIFIC AREA STUDY TRAFFIC CALMING MEASURES

As noted previously, traffic calming can be divided into four categories.

1. VOLUME CONTROL MEASURES

These devices consist of road modifications primarily designed to reduce the number of vehicles that use a specific roadway. There is a secondary benefit; however, in terms of reductions in travel speeds depending upon the type of device.

2. VERTICAL SPEED CONTROL MEASURES

These devices are elevated segments of roadway and gateway/landscape treatments requiring vehicles to slow down.

3. HORIZONTAL SPEED CONTROL MEASURES

This type of device alters the typical straight line traveled way or narrows a specific roadway to reduce speed.

4. SPEED CONTROL MEASURES (OTHER)

Permanent radar speed signs are the most frequently used. They provide immediate feedback of actual travel speeds to motorists, and provide a message to "Slow Down (___)" or "Your Speed (___)"

These four categories comprise the Department's traffic calming toolbox. All categories of traffic calming can be utilized in some aspect of the Traffic Calming Program.

Devices in 2 and 4 above have been previously discussed in the Policy Manual, and will not be discussed further. All may be implemented in an area-wide study.

6d. VOLUME CONTROL MEASURES

There are three basic types of volume control measures:

1. Partial intersection closures
2. Intersection diverters
3. Full closures

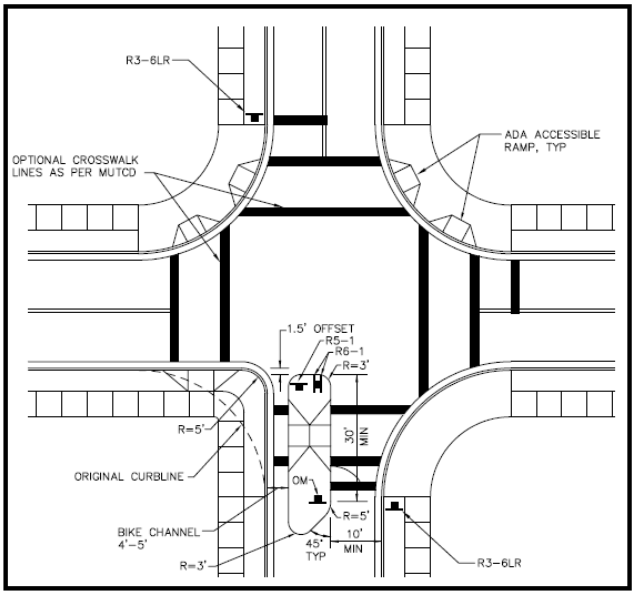
Each of these, especially the first two, can have a substantial beneficial impact on traffic volume. However, the desired diversion of traffic may not always result in a return of traffic to the collector and arterial roadway system.

In addition, notwithstanding the immediate appeal to law enforcement activities, our experience with this type of technique has suggested that individuals fleeing a police officer on foot can run through closures, forcing a responding officer in their vehicle to divert through the neighborhood.

Fire responses and medical responses are similarly forced to find routes through the neighborhood to get around the closures.

Partial closures are constructed as a device that cuts-off one direction of travel on a roadway. These are typically installed near an intersection that serves as the entrance to a neighborhood. This allows residential traffic to exit the neighborhood at this location, but not enter.

This technique avoids some of the impacts to emergency responders of the other types of closures, since law enforcement officers and fire personnel will drive around the restriction—even if, technically, illegal—by driving on the wrong side of the residential street.



Partial closure

Partial closure at Lane Street at Mountain View Drive (outbound traffic permitted, only looking north towards JBER)

Partial closure at Bunn Street at Mountain View Drive (inbound traffic permitted, only. Looking south toward Mountain View Drive. Note pedestrian sidewalk on original road alignment)

FIGURE 15—

MEASURED EFFECTIVENESS OF PARTIAL CLOSURES	
Speeds	-19%[1]
Volumes	-42%[2]
Crashes	unk[3]

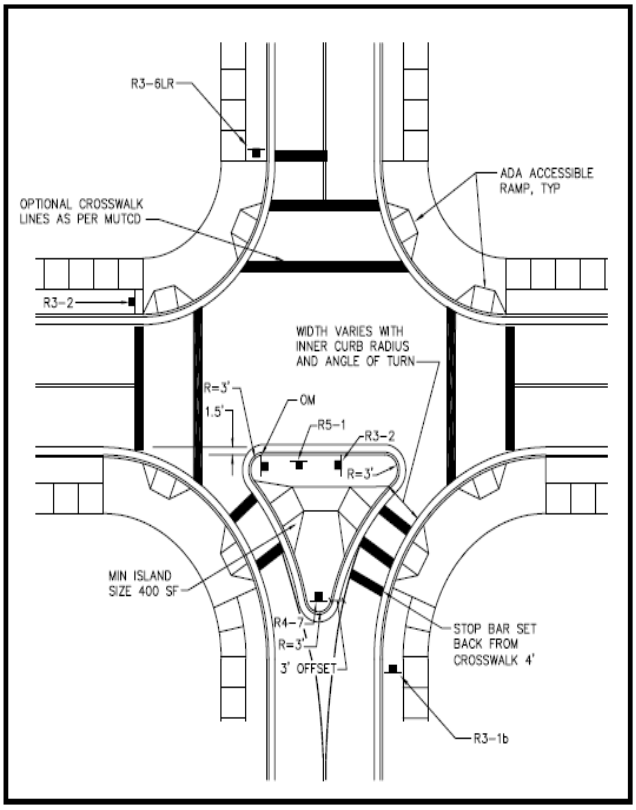
Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in Average annual crashes unk – no post-installation studies available or insufficient data

This technique cannot be used on already dead-ended roadways. Furthermore, on roadways where a partial intersection diverter is used and there is little conflicting (exiting) traffic, drivers may simply drive on the wrong side of the roadway to avoid the restriction.

Partial diverter at Fireweed at Seward Highway

Intersection diverters are a curbed 'island' of various design types that force traffic approaching the intersection to move onto the intersecting roadway. This can result in a decrease in volumes on each roadway, since drivers may shift their other—longer—routes to avoid the forced diversion. This obviously results in increased traffic volumes on those alternative routes, which may be other roadways in the same neighborhood.

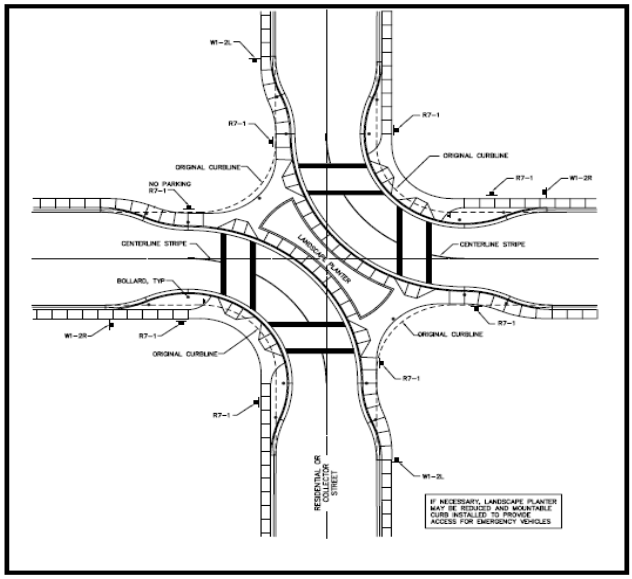


Partial intersection diverter

This device reduces traffic volumes by redirecting it to other streets. This is done to shift non-local traffic

away from local. These devices can have a substantial impact on traffic volumes. However, the percentage of non-local traffic on the local street is going to influence the effectiveness of the device.

While speeds, as with most other forms of traffic calming, will typically decrease near the intersection that has been treated, there are only small speed reductions at the midblock. The safety benefits of diverters are achieved by diverting cut-through traffic and by reducing accidents at the diverter intersection through elimination of all conflict points.



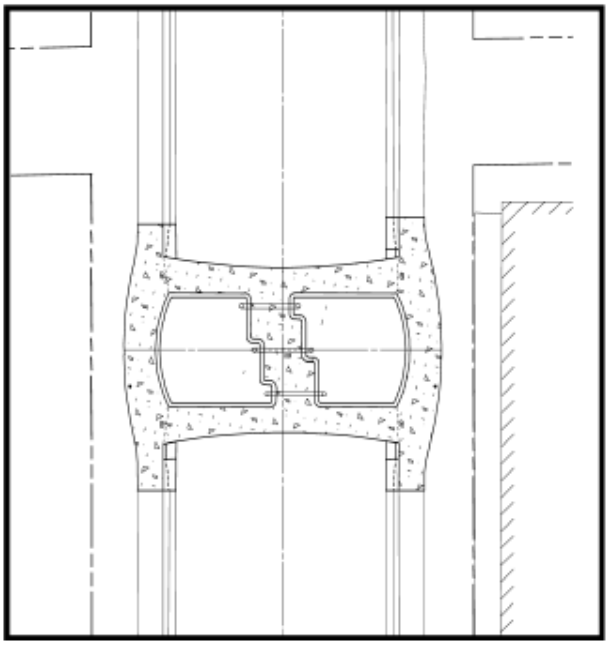
Full diverter

Full diverter at Pine Street at Thompson Avenue

Full closures apply this same concept—except, at a non-intersection location. This may be a particularly useful solution where there are a high number of pedestrians on or near the roadway segment in question—a school, area playground, senior center, etc.

This type of device has been used in the Mountain View neighborhood to close North Hoyt intersecting Mountain View Drive. Pedestrian traffic is still able to get to the transit route along Mountain View Drive, and the 'stub' on the south side of the closure provides some overflow parking for the nearby businesses.

Full closure on North Hoyt, north of Mountain View Drive



Full closure

FIGURE 16—

MEASURED EFFECTIVENESS OF FULL CLOSURES	
Speeds	unk[1]
Volumes	-44%[2]
Crashes	unk[3]

Source: Traffic Calming—State of the Practice 2000

[1] Reduction in 85th Percentile Speeds between slow points
[2] Reduction in vehicles per day
[3] Reduction in Average annual crashes unk – no post-installation studies available or insufficient data

6e. COSTS OF TRAFFIC CALMING MEASURES

Due to design variations, the costs of some types of traffic calming measures will vary dramatically from site to site. Associated improvements will add to the costs; however, the "order of magnitude" cost of some of the basic calming measures follows.

These estimates should be considered to be "planning-level," rather than a "likely" cost.

For example, a strip-paved road may require full reconstruction of the roadway including construction of curbs and gutters and storm drain systems—in addition to the cost of the device itself. Design engineering increases with the complexity of the device.

Information is based on construction costs in Alaska. Most roadway improvement costs are significantly higher in Alaska than in communities in the "Lower 48."

Street widths, relocation or installation of signs and striping, stormwater system construction or relocation, etc., will dramatically affect these cost estimates.

Temporary Radar Speed Signs ..... $5,000 (each)

Speed Humps/Cushions ..... $10,000 (each)

Speed Tables ..... $12,500 (each)

Concrete Crosswalks (at grade) .... $10,000 (each)

Island Narrowings ..... $25,000 (each)

Chokers ..... $25,000 (each)

Permanent Radar Speed Signs ..... $35,000 (each)

Compact Traffic Circles ..... $60,000 (each)

Raised Crosswalks ..... $80,000 (each)

Intersection Neckdowns ..... $100,000 (site)

Lateral Shifts ..... $150,000 (each)

Chicanes ..... $150,000 (block)

Raised Intersections ..... $150,000 (each)

Roadway NarrowingVaries: no estimate available

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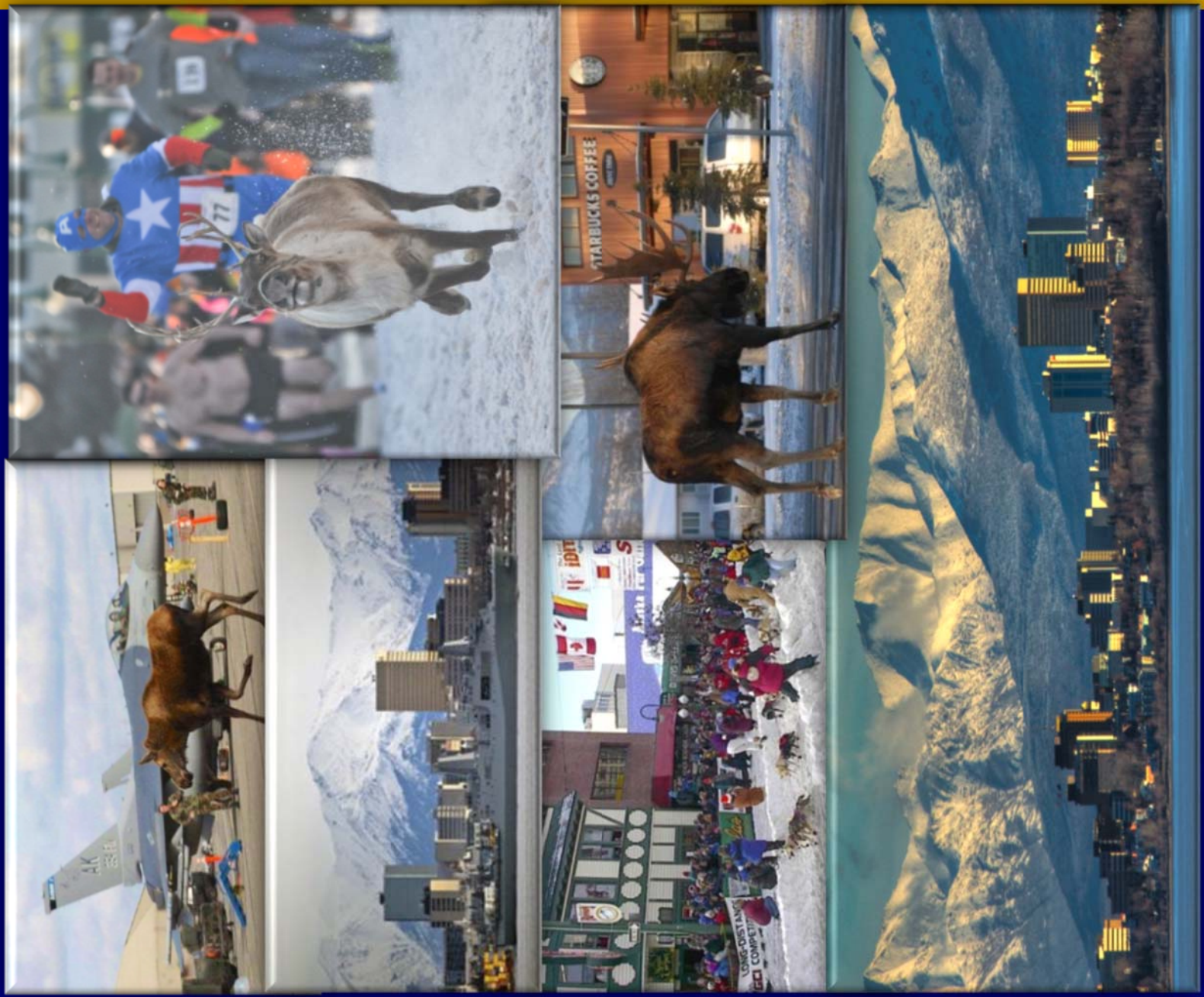
STARBUCKS COFFEE

Section 7—Summary

SECTION 7—SUMMARY

The subject of traffic calming is inherently controversial. This is due to the competing demands of maintaining mobility for a range of users—motor vehicle operators, cyclists, and pedestrians of all age groups—enabling timely emergency response for fire and medical emergencies, law enforcement activities, and in the Anchorage area—efficient snow removal.

Adding to the controversy is the fact that, at least with vertical traffic calming measures, there is an increased amount of noise generated by cars moving over the devices (humps, speed tables, or speed cushions), and the sound associated with vehicles accelerating once the car has passed over the device. Even the visual impact of the required warning signs can generate complaints from abutting residents.

Added complexity is simply due to the manner in which Anchorage developed, and the way the roadway system was built—a mix of traditional 'grid' systems and suburban development, constrained in some places by our community's natural beauty of streams, lagoons, and other waterways, parks, hills, and mountains.

In some instances, historic residential development occurred along the few roads in town, and these roads subsequently became the major corridors—leading to a situation where residential homes now abut roadways that function as the arterial roadway system. This leads to traffic volumes and speeds that are not compatible with the expectations of residents, but there are no realistic options for diverting traffic away from those streets.

As stated in the 2001 TCPM:

> *"Traffic calming is not a "magic bullet." Traffic calming devices are effective in some circumstances at appropriately reducing traffic volumes and speeds. The device should be selected based on established criteria and engineering judgment from the variety of devices included in the "toolbox" of traffic calming measures contained herein. Traffic calming is not the solution for all of Anchorage's traffic safety concerns. Traffic calming improvements should only be considered where sound judgment and experience dictates that the modifications may be appropriate."*

New techniques are being developed by public agencies around the world. As we can, we will investigate those devices to determine which can solve Anchorage's speeding concerns—increasing the number of 'tools' in the traffic calming toolbox.

Finally, there is—as of this updated Policy Manual—a fundamental issue confronting all of Alaska's residents—the declining revenue to the State of Alaska and the Municipality of Anchorage. This decline limits the funds available for a range of services including maintenance of the existing infrastructure, modifications to existing streets to add traffic calming measures, even staff resources to assist residents with their concerns about perceived speeding and excessive traffic volumes.

The Traffic Department staff is committed to providing the best service to our customers—the residents and all road users within Anchorage.

Stephanie Mormilo, PE, Municipal Traffic Engineer/Department Director
Traffic Department
Municipality of Anchorage

Kristen Langley
Traffic Safety Division Manager
Traffic Department
Municipality of Anchorage

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Appendix A

Appendix A

Registration Number
xx-xxxxx-xxxxxx

ATTN: Tim Myland, P.E. Traffic Calming Program Engineer

Municipality of Anchorage Traffic Department
P.O. Box 196650
Anchorage, AK 99519-6650

Recipient Name
Address
City, ST ZIP Code

Municipality of Anchorage
Traffic Department

TRAFFIC
DEPARTMENT

Stephanie Mormilo, P.E.

Municipal Traffic Engineer

Please Vote Here

This ballot is your opportunity to voice your opinion as to whether the Municipality of Anchorage installs the proposed traffic calming devices should be installed as shown on the subject streets.

Please mark your opinion, place within the enclosed postage paid envelope and drop in a mailbox by (date), or, drop-off at the Municipality's Traffic Department at:

Traffic Department

4700 Elmore Road

(this is the MOA Permit Center)

Attn: Traffic Calming Program
Second Floor
Anchorage, AK
99507
907-343-8406

Please note that this is an advisory ballot. Therefore, the ballots are considered public records and subject to Public Disclosure laws – and are not "secret."

Individual registration numbers are assigned to each ballot and each mailer to ensure only one vote per household/owner.

Please make only one (1) selection from the list of items for a specific location. Print your name, address, phone number and your ballot's Registration Number, and sign where indicated

Contact Us

ATTN: Tim Myland, P.E. Traffic Calming Program Engineer

Municipality of Anchorage Traffic Department
4700 Elmore Road, Second Floor
Anchorage, AK
99507
MylandTD@muni.org

Location 1 ☐ A) Traffic Circle ☐ B) Speed Hump ☐ C) No Action

Location 2 ☐ A) Traffic Circle ☐ B) Speed Hump ☐ C) No Action

Location 3 ☐ A) Traffic Circle ☐ B) Speed Hump ☐ C) No Action

Location 4 ☐ A) Traffic Circle ☐ B) Speed Hump ☐ C) No Action

Print Name Signature Address Phone

REGISTRATION NUMBER FROM MAILER_____

Appendix B

Appendix B

Turnagain Parkway: Prior to Traffic Calming Study

Turnagain Traffic Calming Study

Turnagain Parkway: Interim Striped Solution Implemented During Traffic Calming Study

August 2006

Prepared for:

Municipality of Anchorage
Traffic Department
4700 South Bragaw Street
Anchorage, Alaska 99507

Prepared by:

DOWL ENGINEERS
4041 B Street
Anchorage, Alaska 99503
(907) 562-2000

Turnagain Parkway: Proposed Permanent Solution with Sidewalk and Curb Bulbs - Simulated Scenario

TURNAGAIN AREA TRAFFIC CALMING STUDY

Prepared for:

Municipality of Anchorage
Traffic Department
4700 Bragaw Street
Anchorage, Alaska 99507

Prepared by:

DOWL Engineers
4041 B Street
Anchorage, Alaska 99503
(907) 562-2000

W.O. D59232A

July 2006

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APPENDICES

LIST OF ACRONYMS

AADT ..... annual average daily traffic
ADT ..... average daily traffic
CAC ..... Citizens Advisory Committee
DOT&PF ..... State of Alaska, Department of Transportation
DOWL ..... DOWL Engineers
ITE ..... Institute of Transportation Engineers
MOA ..... Municipality of Anchorage
mph ..... miles per hour
ROW ..... right-of-way
TATCS ..... Turnagain Area Traffic Calming Study
TCPM ..... Traffic Calming Protocol Manual
TTC ..... Turnagain Community Council
vpd ..... volume per day

1.0 INTRODUCTION

The Municipality of Anchorage (MOA) Traffic Department initiated this study to evaluate traffic calming issues within the Turnagain Community Council district boundary (i.e., the study area). The study area is bordered by Westchester Lagoon/Knik Arm to the north, Lake Hood to the south, Knik Arm to the west, and Minnesota Drive to the east. The study focuses on neighborhood livability issues associated with motorized and non-motorized traffic circulation on the neighborhood collector and local street network.

The objective of the Turnagain Area Traffic Calming Study (TATCS) is to collaborate with the residents of the study area to identify transportation and safety improvements that improve pedestrian and non-motorized traffic accommodations, reduce travel speeds, and decrease cut-through traffic in residential areas. The results of this study will guide area traffic calming funding and planning decisions in the foreseeable future.

The scope of this study includes the following tasks:

- examination of existing transportation conditions within the study area,
- evaluation of vehicular and non-motorized traffic circulation and patterns within the study area,
- soliciting community input through public meetings and by organizing a Citizens Advisory Committee (CAC),
- improving neighborhood safety by developing design alternatives to mitigate the identified negative transportation impacts, and
- examining the impacts of the various design alternatives on utilities, street maintenance, emergency vehicle access, pedestrian facilities, and transit facilities.

Figure 1: Study Area Location Map

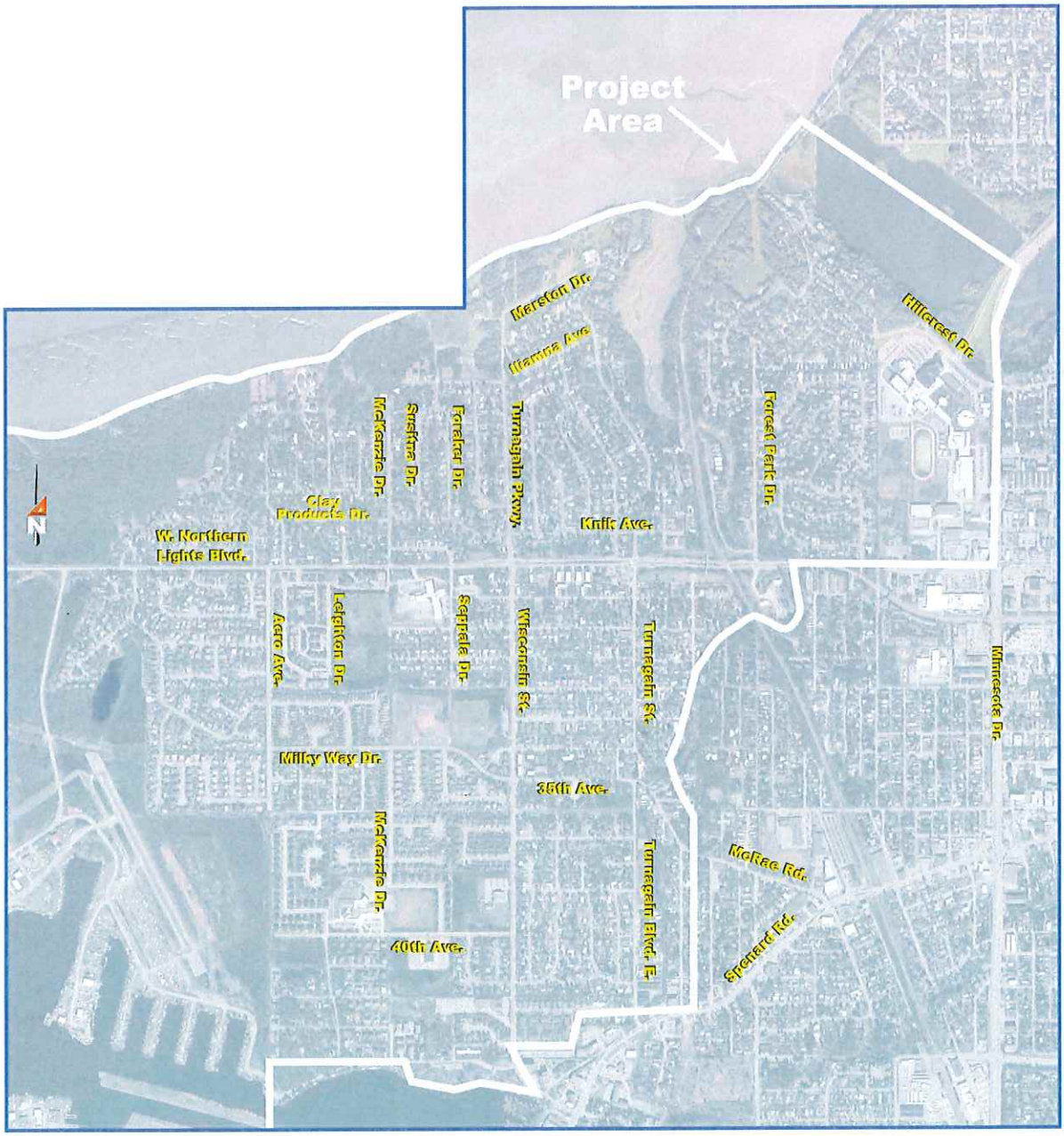


Figure 2: Study Area Vicinity Map

2.0 PUBLIC INVOLVEMENT

The public involvement process was a significant component of this project. The project attempted to collect community input on the subject of traffic calming in the neighborhoods, excluding arterial roadways. Public input for this project was solicited through public meetings, a CAC, meetings with agency representatives, and through regular monthly updates at the Turnagain Community Council (TCC) meetings. Project staff also developed a project website where the public could submit comments, contact staff, track the progress of the project, and review meeting announcements, meeting minutes, and meeting presentation information. Table 1 summarizes the public involvement process on the project.

Table 1: Public Involvement Activities

Activity	Date
Public Scoping Meeting	February 16, 2006
CAC Meeting #1	March 21, 2006
CAC Meeting #2	April 27, 2006
CAC Meeting #3	May 25, 2006
Public Meeting #2	June 19, 2006
CAC Meeting #4	June 26, 2006
Agency Meeting	Incorporated into CAC meetings
TCC Reports	Monthly from March to June 2006

2.1 Citizens Advisory Committee

A CAC included eight area residents representing local viewpoints and concerns. CAC members were selected from a list of names nominated by the TCC, and were purposely chosen not to be concentrated in a single neighborhood. Rather, members were well distributed throughout the TCC district. The CAC met at least once per month , both with and without project staff, to discuss the project, review recommendations, and provide input.

2.2 Agency Involvement on the CAC

The Anchorage Police Department, Anchorage Fire Department, Emergency Services, Street Maintenance, Public Transportation Department, Planning Department, and other municipal officials were also participants on the CAC to provide agency input and perspective on proposed traffic calming measures.

The agencies' primary concerns were:

Street Maintenance – Ensure that changes in roadway alignments and profiles are well marked to facilitate snow removal. Provide adequate snow storage areas along improved roads.

Fire – Ensure that roads and intersections are designed to accommodate fire trucks and not appreciably lengthen emergency response times.

Transit – Propose improvements to leave existing bus routes intact without increasing ride time or diverting route path.

3.0 TRAFFIC CALMING PRINCIPLES

3.1 General

The Institute of Transportation Engineers' (ITE) Traffic Calming State of the Practice (Ewing, 1999) defines traffic calming as "Changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and/or cut-through volumes in the interest of public safety and livability."

The ITE definition specifically excludes non-engineering measures such as modifying street appearance to decrease vehicle speeds, increased traffic enforcement, and educating the public about the actual versus perceived traffic volumes and speeds.

The traffic calming principles employed in this study are in accordance with ITE, the MOA Traffic Calming Protocol Manual (TCPM), and the Draft Traffic Calming Policy Manual. This study considers engineering and non-engineering related traffic calming measures.

3.2 Applicability and Procedures

The TCPM outlines traffic calming principles and applicability, including procedures for recommending traffic calming improvements on MOA road facilities with a designation of collector or below. Table 2 shows the application guidelines for the various traffic calming measures (reference TCPM, Table 5).

Table 2: Traffic Calming Application Guidelines (TCPM, 2001)

Traffic Calming Application Guidelines			
Traffic Calming Measure	**Street Classification**		**Other Restrictions**
	Neighborhood Collectors	**Local Streets**	
Volume Control Measures			
Full Closures	No	May be suitable	
Half Closures Diagonal Diverters Forced Turn Islands	No	500-5,000 vpd[2] ≥ 25% non-local traffic	
Vertical Speed Control Measures			
Speed Humps	Daily volume ≤ 5,000 vpd Posted speed ≤ 25 mph[1] Not on primary emergency routes or bus routes		Grade ≤ 8%
Speed Tables Raised Crosswalks Raised Intersections	Daily volume ≤ 10,000 vpd Posted speed ≤ 25 mph Not on primary emergency response routes		Grade ≤ 8%
Horizontal Speed Control Measures			
Traffic Circles	Daily volume ≤ 5,000 vpd Posted speed U 25 mph		Grade ≤ 10%
Roundabouts (one circulating lane)	Daily volume ≤ 15,000 vpd Posted speed U 25 mph	No	Grade ≤ 6%
Lateral Shifts	Daily volume ≤ 20,000 vpd Posted speed ≤ 25 mph		
Two-Lane Chicanes Realigned Intersections	Daily volume ≤ 5,000 vpd Posted speed ≤ 25 mph		Grade ≤ 8%
One-Lane Chicanes (Two-Way operation)	Daily volume ≤ 2,000 vpd Posted speed ≤ 25 mph		
Narrowings			
Neckdowns Center Island Narrowings Two-Lane Chokers	Daily volume ≤ 20,000 vpd Posted speed ≤ 25 mph		
One-Lane Chokers (Two-Way operation)	Daily volume ≤ 2,000 vpd Posted speed ≤ 25 mph		
Combined Measures	Subject to limitations of component measures		

[1] mph: miles per hour
[2] vpd: volume per day

The design alternatives suggested in this study are traffic calming techniques that have been successfully implemented in Anchorage and other communities nationwide. They have been adapted to meet the specific needs of the area from climate and design vehicle perspectives. All traffic calming measures shown in Table 2 were presented as valid traffic calming options for consideration within the study area. For definitions and examples of specific traffic calming treatments, refer to the TCPM.

4.0 EXISTING CONDITIONS

4.1 Traffic Data

The public process identified Turnagain Parkway, Iliamna Avenue, Knik Avenue, Clay Products Drive, McKenzie Drive, Turnagain Street, Turnagain Boulevard East, Milky Way Drive, 40th Avenue, and Lakeshore Drive as having perceived elevated traffic speeds. Figure 3 shows speed study data collected for the study area .

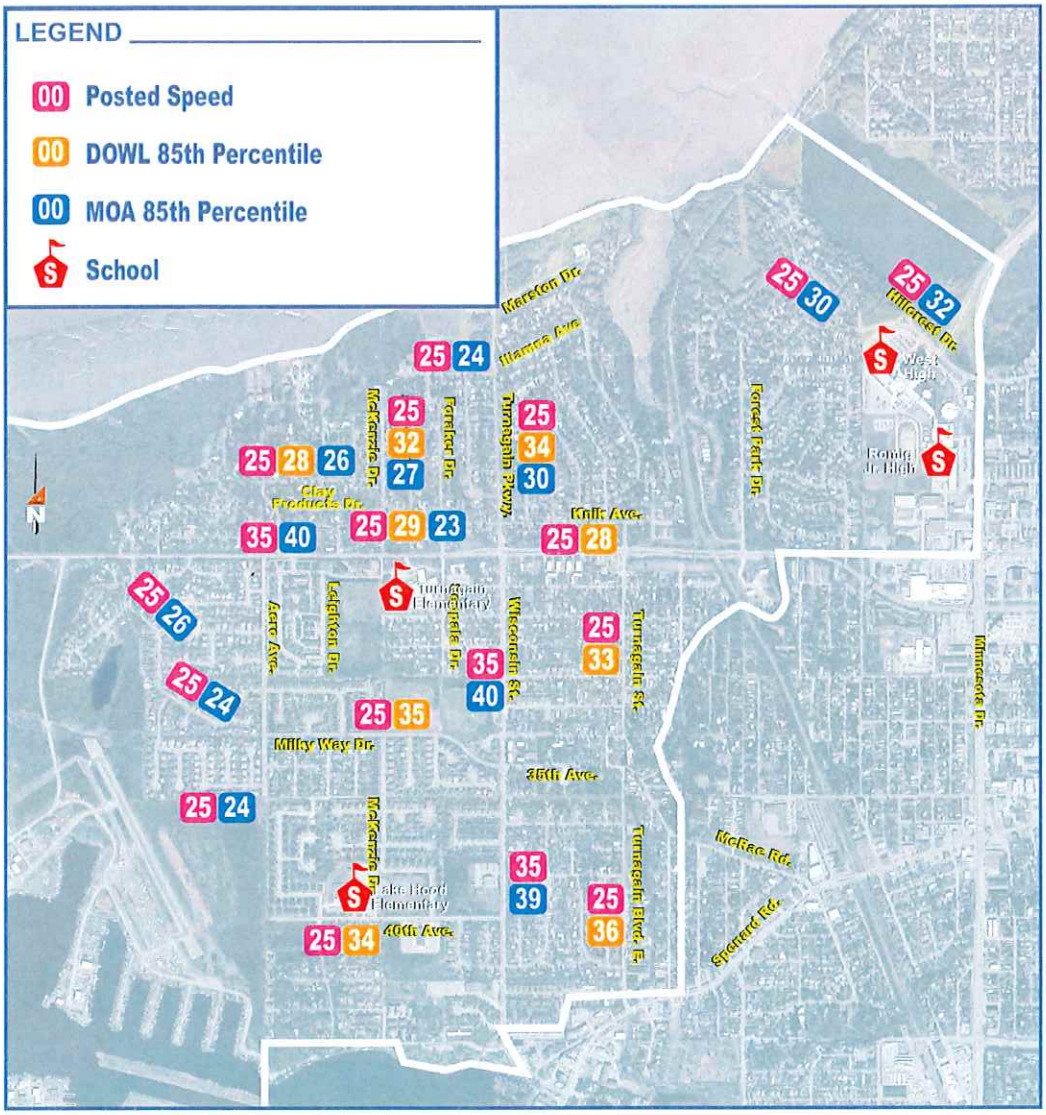


Figure 3: Speed Study Data

Figure 4 shows the 2004 annual average daily traffic (AADT) volumes for the principal roadways in the area.

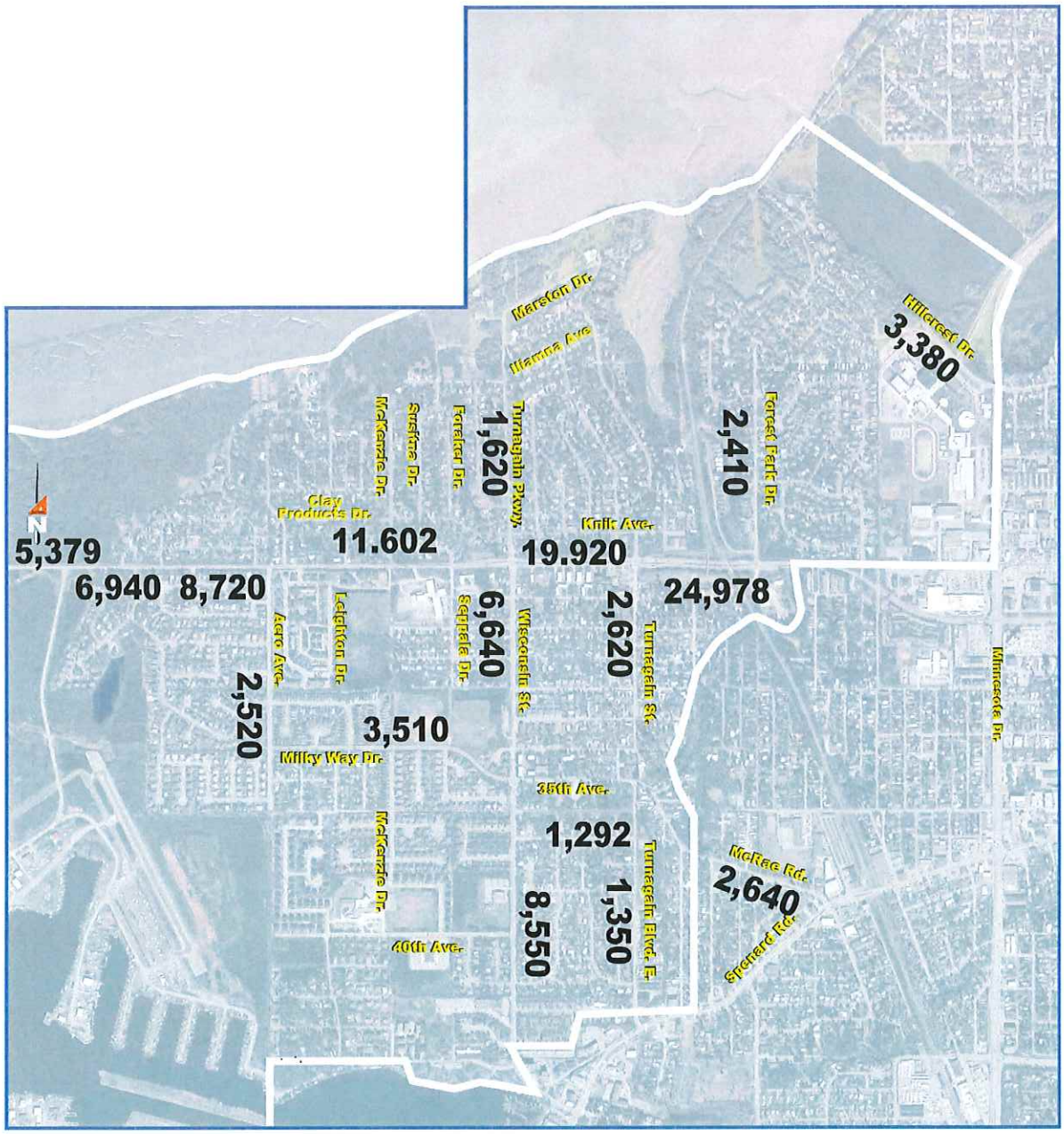


Figure 4: 2004 Study Area Annual Average Daily Traffic (AADT)

4.2 Transit Routes

Route 36 is the only transit route in the study area and serves Minnesota Drive, West Northern Lights Boulevard, Aero Avenue, Milky Way Drive, and Wisconsin Street.

4.3 Recent Modifications to the Area Road Network

Several road construction projects are underway or scheduled for the near future that affect or will affect traffic patterns including:

- The reconstruction of Aero Avenue from West Northern Lights Boulevard to Cosmos Drive (in progress, scheduled 2006 completion),
- The upgrade of West Northern Lights Boulevard from Nathaniel Court to Wisconsin Street (in progress, scheduled 2006 completion),
- 35th Avenue and McRae Road Improvements (design study completed), and
- Marston Drive/Foraker Drive Road Improvement District (currently in the design study phase).

5.0 TRAFFIC CALMING ISSUES

Multiple traffic circulation issues were identified within the study area based on input from the community, public agencies, and the field observations of project staff. Appendix A contains the comments and concerns received from the public.

Based on the public and CAC comments received, staff research, and data collection, this traffic calming study concentrates on the following road corridors within the TCC boundary:

Turnagain Parkway (Iliamna Avenue to West Northern Lights Boulevard)
Iliamna Avenue (Foraker Drive to Turnagain Parkway)
Knik Avenue (McKenzie Drive to Turnagain Parkway)
Clay Products Drive (Telequana Drive to McKenzie Drive)
McKenzie Drive (north of West Northern Lights Boulevard)
Turnagain Street (West Northern Lights Boulevard to 35th Avenue)
Turnagain Boulevard East (35th Avenue to Spenard Road)
Milky Way Drive (Aero Avenue to Wisconsin Street)
40th Avenue (Beechcraft Drive to Wisconsin Street)
Lakeshore Drive (Wisconsin Street to Aircraft Drive)

5.1 Turnagain Parkway

5.1.1 Concerns/Issues

The most common concerns identified during the public process for this street are the lack of pedestrian accommodations and perceived high traffic speeds. In addition, an unmarked, mid-block pedestrian pathway connects St. Elias Drive and Turnagain Parkway and passes between residences. Neither the path nor the users of the path are readily visible by motorists due to poor sight distance and lack of advanced signage. Residents also report vehicles disregarding the stop-control at the Iliamna Drive intersection.

5.1.2 Existing Conditions

Turnagain Parkway is a Class IC Neighborhood Collector roadway with approximately 1,620 average daily traffic (ADT). The roadway consists of a 32-foot-wide paved section with curb and gutter that extends north from West Northern Lights Boulevard to Marston Drive. An all-way stop is located at the Turnagain Parkway/Iliamna Avenue intersection. The development along Turnagain Parkway is single family residential with Lynn Ary Park located on the northwest corner of Turnagain Parkway and Iliamna Avenue. On-street parking is permitted only on the west side of Turnagain Parkway. Sidewalks and crosswalks exist only at the intersection with West Northern Lights Boulevard.

5.1.3 Analysis

Turnagain Parkway has relatively high pedestrian use. It provides direct access to Lynn Ary Park and to the coastal trail.

A radar spot speed study on Turnagain Parkway indicated an 85th percentile speed of 34 mph; 9 mph over the posted speed limit. This value is at the upper end of the range typically seen on streets posted at 25 mph.

5.1.4 Possible Alternatives

The following measures were considered for Turnagain Parkway:

- No action,
- Installation of signage to alert drivers of existing pedestrian pathway,

- Installation of pedestrian facilities, possibly separated from vehicular traffic to improve pedestrian safety,

- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic,

- Installation of a chicane to break up the straight street and reduce travel speeds and cut-through traffic, in addition to the delineation and visibility enhancements of the mid-block, non-striped pedestrian path,

- Installation of chokers, raised intersections, and/or traffic circles along the corridor to reduce traffic volumes, speeds, and cut-through traffic, and/or

- Implementation of traffic calming within the existing curb-to-curb footprint to minimize adjacent impacts. Improvements consist of lane narrowing, periodic mid-block half-chokers, on-street parking, and pedestrian facilities.

5.1.5 Evaluation

Figure 5 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Sign Installation	●	○	○	◒	○	●	○	●	●	●
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chicane	○	●	○	○	○	●	◒	●	◒	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection	◒	●	◒	◒	●	●	◒	◒	◒	◒
Traffic Circles	◒	●	◒	◒	◒	●	◒	○	○	◒

Figure 5: Evaluation of Turnagain Parkway Alternatives

5.2 Iliamna Avenue

5.2.1 Concerns/Issues

The lack of pedestrian facilities is the main concern on Iliamna Avenue. Iliamna Avenue is a local road with relatively low volume during the winter and a considerably higher volume (both vehicle and pedestrian) during the summer due to its close proximity to Lynn Ary Park and the coastal trail. On-street parking decreases pedestrian visibility, but provides friction to slow motorists.

5.2.2 Existing Conditions

Iliamna Avenue is a local street with approximately 500 ADT (summer). The roadway consists of a 32-foot-wide paved road with curb and gutter. The segment of primary concern extends west from Turnagain Parkway to the intersection of Foraker Drive/Iliamna Avenue. The development along the corridor is single family residential with Lynn Ary Park located on the north side of the corridor. On-street parking is permitted on both sides of the roadway. There are no existing sidewalks or crosswalks within the corridor.

5.2.3 Analysis

Iliamna Avenue is similar to Turnagain Parkway. It has high pedestrian use accessing Lynn Ary Park and the coastal trail.

No speed study was conducted for this roadway.

5.2.4 Possible Alternatives

The following alternatives were considered on Iliamna Avenue:

- No action,
- Installation of separated sidewalks or pathways along Iliamna Avenue,
- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic,
- Installation of chokers at Foraker Drive and Douglas Drive to reduce pedestrian crossing distances and improve visibility of signage, and/or

- Installation of raised intersections or crosswalks at Foraker Drive and Douglas Drive to enhance pedestrian crossing safety and calm speeds.

5.2.5 Evaluation

Figure 6 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection/Crosswalk	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 6: Evaluation of Iliamna Avenue Alternatives

5.3 Knik Avenue

5.3.1 Concerns/Issues

Based on public input and staff research, the primary issues on Knik Avenue occur between McKenzie Drive and Turnagain Parkway and consist of excessive vehicle speeds, cut-through traffic, and the lack of pedestrian accommodations. Residents also report a large percentage of vehicles that use Knik Avenue to avoid the school zone on West Northern Lights Boulevard. Although Knik Avenue is classified as a local street, it is presently carrying volumes typically seen on collector roadways. This dual-role function adds to the community concern and justification for traffic calming treatments.

5.3.2 Existing Conditions

Knik Avenue is a local street with approximately 2,200 ADT. Presently, Knik Avenue extends from Draper Drive to a dead-end west of McKenzie Drive. The study section consists of a 23-foot-wide paved roadway with curb and gutter. The road serves only residential development. On-street parking is permitted along both sides of the road and there are no existing pedestrian facilities.

5.3.3 Analysis

Pedestrians frequently use Knik Avenue to access community parks and trails.

A radar spot speed study on Knik Avenue indicated an 85th percentile speed of 28 mph; 3 mph over the posted speed limit. This value is within the range typically observed on streets posted at 25 mph. An observer may perceive the vehicle speeds as being excessive due to the constricted "feel" of the roadway left by the on-street parking and lack of sidewalks.

5.3.4 Possible Alternatives

The following alternatives were considered on Knik Avenue:

- No action,
- Installation of separated sidewalks or pathways along Knik Avenue,
- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic,
- Installation of chokers at Susitna Drive to reduce the pedestrian crossing distance and improve visibility of signage, and/or
- Installation of a raised intersection or crosswalk at Susitna Drive to enhance pedestrian crossing safety and slow vehicles.

5.3.5 Evaluation

Figure 7 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable	Minimize Cost	Speed Reduction	Volume Reduction	Safety Improvement	Pedestrian/ Bicycle Improvement	Maintain Access to Surrounding Areas	Reduces Cut-through Traffic	Minimizes Impacts To School Buses	Minimizes Impacts to Emergency Access	Minimizes Impacts on Maintenance
Treatment										
No Action	●	○	○	○	○	●	○	●	●	◒
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection/Crosswalk	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 7: Evaluation of Knik Avenue Alternatives

5.4 Clay Products Drive

5.4.1 Concerns/Issues

The most common concerns identified by the public in this corridor are the lack of pedestrian accommodations and elevated vehicle speeds.

5.4.2 Existing Conditions

Clay Products Drive is a local street with approximately 900 ADT. The roadway consists of a 27-foot-wide paved road with curb and gutter that extends from Telequana Drive to McKenzie Drive. The development along Clay Products Drive is mixed residential with Didlika Park located on the northwest corner of the Clay Products Drive/McKenzie Drive intersection.

Clay Products Drive, much like Knik Avenue, exhibits high pedestrians use. Didlika Park, Pete's Place Park, and the coastal trail are sources of pedestrian traffic in the area.

5.4.3 Analysis

A radar spot speed study on Clay Products Drive indicated an 85th percentile speed of 28 mph; 3 mph over the posted speed limit. This value is within the range typically seen on streets posted at 25 mph. As with Knik Avenue, an observer may perceive the vehicle speeds as being excessive due to the on-street parking and lack of sidewalks.

5.4.4 Possible Alternatives

The following measures were considered for Clay Products Drive:

- No action,
- Installation of pedestrian facilities separated from vehicular traffic to improve pedestrian safety,
- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic, and
- Installation of a choker or raised intersection at the Clay Products/McKenzie intersection to reduce travel speeds.

5.4.5 Evaluation

Figure 8 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 8: Evaluation of Clay Products Drive Alternatives

5.5 McKenzie Drive

5.5.1 Concerns/Issues

Public concerns for this segment relate primarily to the lack of pedestrian facilities and vehicle speeds. This local residential street is straight and relatively wide with underutilized on-street parking. High-density housing on Tulik Drive, Clay Products Drive, West Marston Drive, McKenzie Drive, and Seppala Drive contribute to high vehicular use of McKenzie Drive as compared to nearby parallel roadway. In addition, McKenzie Drive is the most direct walking route to Turnagain Elementary School from much of the area north of the

school and the most direct route from points south to access the coastal trail, Didlika Park, or Lyn Ary Park. Daily vehicle volumes approach those typical on a collector roadway.

5.5.2 Existing Conditions

McKenzie Drive is a local street with approximately 1,300 ADT. The roadway consists of a 33-foot-wide, two-lane paved roadway with curb and gutter that extends north from West Northern Lights Boulevard. On-street parking is allowed on both sides of the road. Development along the corridor is residential with Didlika Park located on the northwest corner of McKenzie Drive and Clay Products Drive.

5.5.3 Analysis

A radar spot speed study on McKenzie Drive indicated an 85th percentile speed of 32 mph; 7 mph over the posted speed limit. This value is typical of other streets in Anchorage that are posted at 25 mph. The long, straight, and wide character of McKenzie Drive contributes to the speeding concern.

5.5.4 Possible Alternatives

The following alternatives were considered on McKenzie Drive:

- No action,
- Installation of separated sidewalks or pathways to accommodate the pedestrian traffic,
- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic,
- Installation of a chicane to break up the straight street and reduce travel speeds,
- Installation of chokers or raised intersections along the corridor to reduce travel speeds, and/or

- Implementation of traffic calming within the existing curb-to-curb footprint to minimize adjacent impacts. Improvements consist of lane narrowing, periodic mid-block half-chokers, on-street parking, and pedestrian facilities.

5.5.5 Evaluation

Figure 9 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chicane	○	●	○	○	○	●	◒	●	◒	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection/Crosswalk	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 9: Evaluation of McKenzie Drive Alternatives

5.6 Turnagain Street and Turnagain Boulevard East

5.6.1 Concerns/Issues

Public comments indicate the concerns on Turnagain Street and Turnagain Boulevard East are high traffic volumes, high vehicle speeds, poor pavement conditions, and the lack of pedestrian facilities. These roadways are presently functioning as collectors in terms of volume but are neither designed nor classified as such, contributing to the community concern.

5.6.2 Existing Conditions

Turnagain Street (West Northern Lights Boulevard to 35th Avenue) is a local street that experiences high traffic volumes given its functional classification (2,600 ADT). It is a 23-foot-wide strip paved road with no pedestrian accommodations. The pavement is in poor condition. Surrounding development is mixed residential with some commercial activity. On-street parking is allowed despite the narrow cross-section.

Turnagain Boulevard East (35th Avenue to Spenard Road) is a 25-foot-wide strip paved road with no pedestrian facilities. Fish Creek Park is located on the east side of the road for more

than half the length of the corridor. Development is mostly residential with some commercial development near Spenard Road. Turnagain Boulevard is an attractive north/south pedestrian route due to its centralized location and connectivity, and presently carries approximately 1,350 ADT.

5.6.3 Analysis

A radar spot speed study on Turnagain Street indicated an 85th percentile speed of 33 mph; 8 mph over the posted speed limit. A radar spot speed study on Turnagain Boulevard East indicated an 85th percentile speed of 36 mph; 11 mph over the posted speed limit. These values are at or above the range typically seen on local streets posted at 25 mph.

5.6.4 Possible Alternatives

The following alternatives were considered to address the concerns on Turnagain Street:

- No action,
- Installation of a choker at the West Northern Lights Boulevard/Turnagain Street intersection to reduce travel speeds and cut-through traffic,
- Upgrading the roadway to urban street standards to better accommodate the traffic volumes, and
- Installation of separated sidewalks or pathways to accommodate north/south pedestrian traffic.

5.6.5 Evaluation

Figure 10 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Upgrade to Urban Standards	○	○	○	◒	◒	●	○	●	●	●
Pedestrian Facilities	◒	○	○	●	●	●	○	●	●	◒

Figure 10: Evaluation of Turnagain Street/Boulevard Alternatives

5.7 Milky Way Drive

5.7.1 Concerns/Issues

The primary concerns for this roadway are elevated vehicle speeds and the lack of pedestrian facilities west of McKenzie Drive providing access to Balto Seppala Park.

5.7.2 Existing Conditions

Milky Way Drive is a Class IC Neighborhood Collector roadway with approximately 3,500 ADT. The roadway consists of a 32-foot-wide paved roadway with curb and gutter. Sidewalks are located on both sides of the roadway, but they are discontinuous through the corridor. An all-way stop is located at the Milky Way Drive/McKenzie Drive intersection.

5.7.3 Analysis

A radar spot speed study on Milky Way Drive indicated an 85th percentile speed of 35 mph; 10 mph over the posted speed limit. This value is at the upper end of the range typically seen on streets posted at 25 mph. The wide paved surface and all-way stop at McKenzie Drive contribute to the mid-block speeding concern, in an area of moderate pedestrian use to/from nearby Balto Seppala Park.

5.7.4 Possible Alternatives

The following alternatives were considered on Milky Way Drive:

- No action,

- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic, and

- Installation of a choker or raised intersection at McKenzie Drive to reduce the pedestrian crossing distance and calm traffic speeds.

5.7.5 Evaluation

Figure 11 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable **Treatment**	**Minimize Cost**	**Speed Reduction**	**Volume Reduction**	**Safety Improvement**	**Pedestrian/ Bicycle Improvement**	**Maintain Access to Surrounding Areas**	**Reduces Cut-through Traffic**	**Minimizes Impacts To School Buses**	**Minimizes Impacts to Emergency Access**	**Minimizes Impacts on Maintenance**
No Action	●	○	○	○	○	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection/Crosswalk	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 11: Evaluation of Milky Way Drive Alternatives

5.8 40th Avenue

5.8.1 Concerns/Issues

The primary concern for this roadway is excessive vehicle speed in close proximity to Lake Hood Elementary School.

5.8.2 Existing Conditions

40th Avenue is a 29-foot-wide paved roadway with curb and gutter, a 5-foot-wide sidewalk located on the north side of the road, and an all-way stop at the 40th Avenue/Beechcraft Drive intersection. Painted crosswalks exist at 40th Avenue/Beechcraft Drive (all approaches), Andree Drive (east-west crossing), and a north-south crossing at 40th Avenue/Balchen Drive. Development is mostly residential, with two churches located within the corridor and Lake Hood Elementary on the northeast corner of the Beechcraft Drive/40th Avenue intersection.

5.8.3 Analysis

A radar spot speed study on 40th Avenue indicated an 85th percentile speed of 34 mph; 9 mph over the posted speed limit. This value is at the upper end of the range typically seen on

local streets posted at 25 mph. The straight, long, and relatively wide roadway contributes to the speeding concern.

5.8.4 Possible Alternatives

The following alternatives were considered for 40th Avenue:

- No action,
- Replace the painted crosswalks at the Beechcraft Drive intersection with textured crosswalks,
- Installation of speed humps at mid-block locations to reduce travel speeds and discourage cut through traffic, and
- Install chokers or raised intersections at Andree and Balchen Drives to reduce the pedestrian crossing distance and depress traffic speeds.

5.8.5 Evaluation

Figure 12 compares the advantages and disadvantages of the considered alternatives.

Key ○ Low, Unlikely, No ◒ Mid, Moderate, Possible ● High, Likely, Yes N/A Not Applicable	Minimize Cost	Speed Reduction	Volume Reduction	Safety Improvement	Pedestrian/ Bicycle Improvement	Maintain Access to Surrounding Areas	Reduces Cut-through Traffic	Minimizes Impacts To School Buses	Minimizes Impacts to Emergency Access	Minimizes Impacts on Maintenance
Treatment										
No Action	●	○	○	○	○	●	○	●	●	◒
Textured Crosswalks	◒	◒	○	○	◒	●	○	●	●	◒
Speed Humps	●	●	◒	○	○	●	◒	○	○	◒
Chokers	◒	●	◒	◒	●	●	◒	◒	◒	◒
Raised Intersection/Crosswalk	◒	●	◒	◒	●	●	◒	◒	◒	◒

Figure 12: Evaluation of 40th Avenue Alternatives

5.9 Lakeshore Drive

5.9.1 Concerns/Issues

The primary concerns for this roadway, raised during the June 19, 2006 public meeting, are elevated vehicle speeds and perceived cut-through traffic.

5.9.2 Existing Conditions

Lakeshore Drive is a Class IC Neighborhood Collector roadway with approximately 1,450 ADT. This roadway serves the southern end of the TCC boundary.

5.9.3 Analysis and Evaluation

Traffic volumes and speeds may be elevated on Lakeshore Drive due to the West Northern Lights Boulevard Upgrade project, which began construction in summer 2005 and is scheduled for completion in fall 2006. Present-day traffic volumes and speeds are likely influenced by the Northern Lights Boulevard project as motorists avoid the construction zone, leading to a potential increase in through traffic. MOA Traffic Department is studying traffic volumes and speeds on Lakeshore Drive as of the date of this report in order to isolate the traffic impacts to Lakeshore Drive from the West Northern Lights Boulevard Upgrade project. Potential solutions will be developed as required based on the traffic monitoring results.

6.0 RECOMMENDATIONS SUMMARY

This section summarizes the recommended traffic calming measures and transportation improvements that constitute the Traffic Calming Framework Plan for the Turnagain Area (Figure 13). The framework plan shows the inter-relationships of the transportation improvements from a neighborhood-wide perspective.

The framework plan contains multiple vertical traffic control measures (raised intersections and raised crosswalks). Vertical traffic control measures can add additional site-specific project costs identified during the design phase to resolve drainage issues. In like manner, horizontal control measures such as chicanes can affect project right-of-way (ROW) requirements. The framework plan should allow the flexibility to substitute other control measures such as chokers, chicanes, textured crosswalks, or other improvements if costs to remedy drainage or ROW issues prove to be cost-prohibitive.

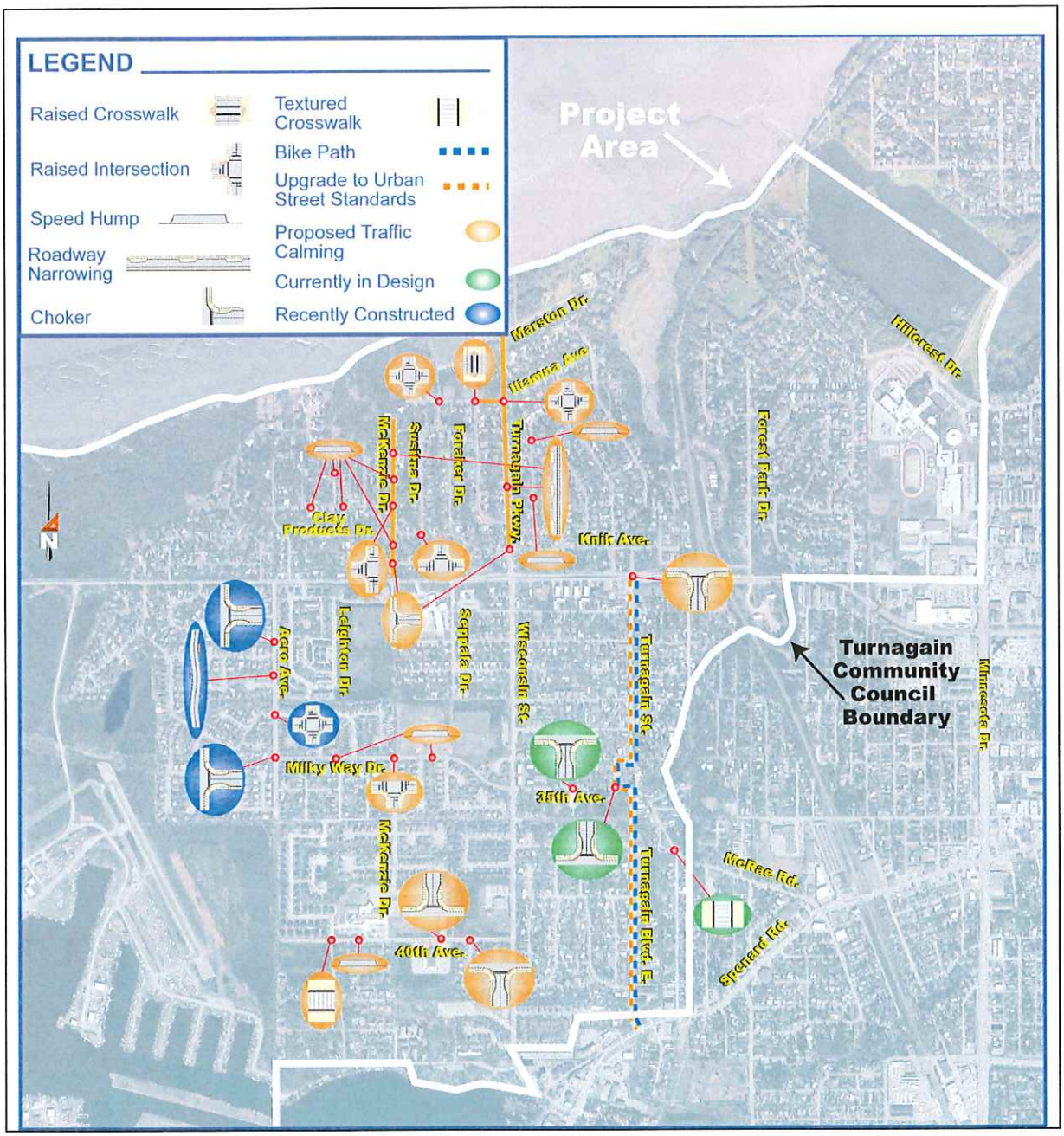


Figure 13: Traffic Calming Framework Plan

6.1 Turnagain Parkway

The Turnagain Parkway recommendations consists of: (1) installing signage for the existing mid-block pedestrian pathway, (2) implementing roadway narrowing between Knik Avenue and Marston Drive (including installation of periodic mid-block half-chokers), (3) constructing pedestrian/bicycle facilities on one side of the road, (4) constructing an on-street parking lane on the other side of the road, (5) installing a choker at the Turnagain

Parkway/Knik Avenue intersection, and (6) installing a raised intersection at the Turnagain Parkway/Iliamna Avenue intersection as shown in Figure 14. The north-south raised crosswalk recommended for Iliamna Avenue should be constructed with the Turnagain Parkway improvements to reduce area construction impacts. These improvements are estimated to cost approximately $750,000. The primary advantages of these improvements are:

- traffic capacity should not be impacted,
- improved pedestrian crossing locations,
- separation of the pedestrian facilities from the traveled way,
- minimize impact to the area behind existing curb lines,
- a reduction in traffic speeds on Turnagain Parkway, and
- increased awareness of the all-way stop at the Turnagain Parkway/Iliamna Avenue intersection.

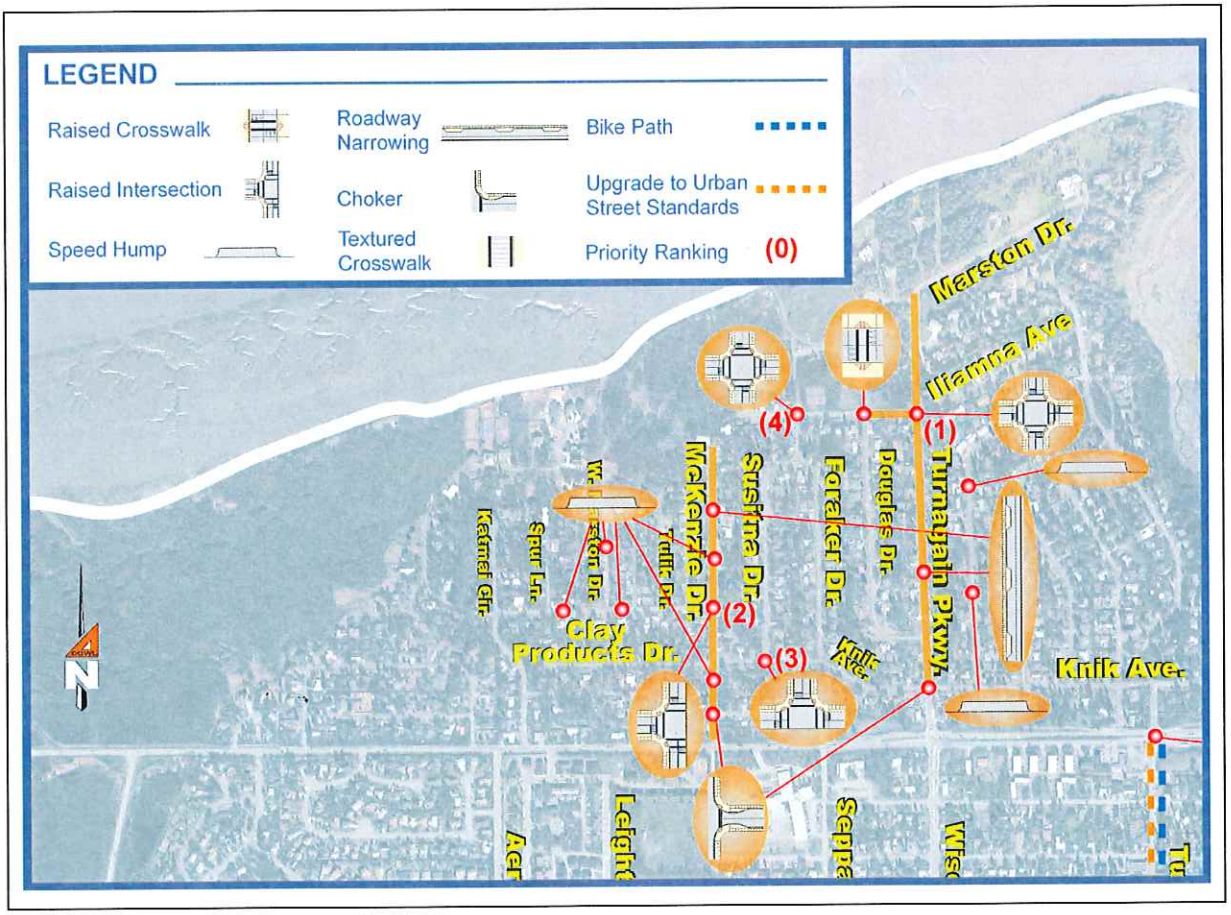


Figure 14: Improvements North of West Northern Lights Boulevard

6.2 Iliamna Avenue

The recommended improvement on Iliamna Avenue consists of a raised intersection at the Iliamna Avenue/Foraker Drive intersection and a raised crosswalk at Iliamna Avenue/Douglas Drive intersection as shown in Figure 14. These improvements are estimated to cost approximately $170,000 and will:

- improve pedestrian crossing locations,
- increase awareness of pedestrian and park activity, and
- reduce vehicle speeds.

6.3 Knik Avenue

The recommended improvement on Knik Avenue is a raised intersection at the Knik Avenue/Susitna Drive intersection as shown in Figure 14. This improvement is estimated to cost approximately $150,000 and will reduce vehicle speeds near the intersection.

6.4 Clay Products Drive and West Marston Drive

Recommended improvements on Clay Products Drive and West Marston Drive consist of the installation of several speed humps on these roadways as shown in Figure 14. These improvements are estimated to cost approximately $15,000 and will:

- increase awareness of pedestrian and park activity, and
- reduce vehicle speeds.

6.5 McKezie Drive

The McKenzie Drive recommendations consist of: (1) implementing roadway narrowing between Seppala Drive and the north terminus of McKenzie Drive (including installation of periodic mid-block half-chokers), (2) constructing pedestrian/bicycle facilities on one side of the road, (3) constructing an on-street parking lane on the other side of the road, (4) installing a raised intersection at the McKenzie Drive/Clay Products Drive intersection, (5) installing a choker at the McKenzie Drive/Seppala Drive intersection, and (6) installing two speed humps in the corridor as shown in Figure 14. These improvements are estimated to cost approximately $610,000. The primary advantages of these improvements are:

- traffic capacity should not be impacted,
- separation of pedestrian facilities from the traveled way,

- minimizes impact to the area behind existing curb lines, and
- reduction in traffic speeds on McKenzie Drive.

6.6 Turnagain Street and Turnagain Boulevard East

The recommended improvements for Turnagain Street and Turnagain Boulevard East consist of: (1) upgrading the roadway to urban residential street standards with a sidewalk on one side of the roadway and a separated trail on the other side, and (2) installation of a choker at the entrance from West Northern Lights Boulevard as shown in Figure 15. These improvements are estimated to cost approximately $3,000,000 and will:

- better accommodate existing traffic circulation, and
- enhance pedestrian safety by providing a separated walkway and shorter pedestrian crossings at the intersections.

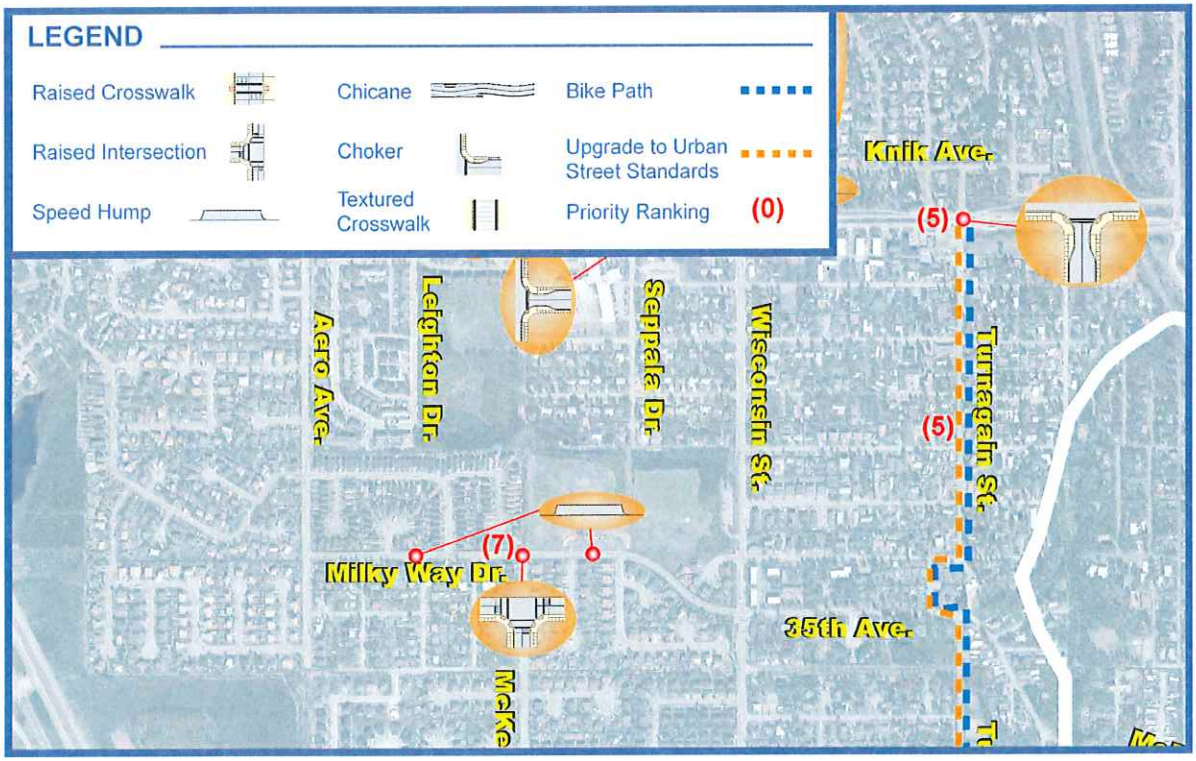


Figure 15: Turnagain Street/Boulevard and Milky Way Drive Improvements

6.7 Milky Way Drive

Recommended improvements on Milky Way Drive consist of: (1) installing two speed humps along the corridor , and (2) installing a raised intersection at the McKenzie Drive intersection as shown in Figure 15. These improvements are estimated to cost approximately $160,000 and will:

- increase awareness of pedestrian and park activity, and
- reduce vehicle speeds.

6.8 40th Avenue

The recommended improvements for 40th Avenue consist of: (1) replacing the striped crosswalks at the Beechcraft Drive intersection with textured crosswalks, (2) installation of a speed hump in front of Lake Hood Elementary School, and (3) installation of chokers at the intersections of Andree Drive and Balchen Drive as shown in Figure 16. These improvements are estimated to cost approximately $245,000 and will:

- increase awareness of pedestrian and school activity,
- reduce vehicle speeds, and
- enhance pedestrian safety by providing a separated walkway and shorter pedestrian crossings at the intersections.

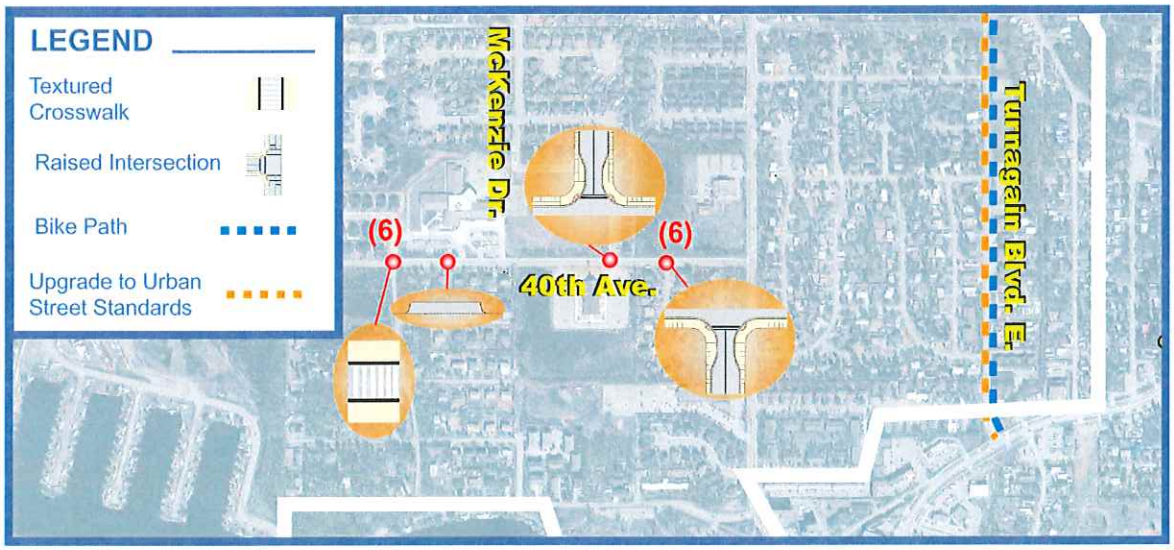


Figure 16: 40th Avenue Improvements

7.0 IMPROVEMENTS CONSIDERED BUT NOT RECOMMENDED

The Forest Park Drive corridor has a perceived speeding and cut-through traffic problem. The multiple all-way stops along the corridor have a tendency to increase mid-block speeds.

As part of this project and with the assistance of several CAC members, staff measured the cut-through volumes to be approximately 26 percent of total p.m. peak volumes. In other words, 26 percent of vehicles counted in the corridor during the p.m. peak traffic hour entered Forest Park Drive from the Minnesota Drive/Hillcrest Drive off-ramp and exited the corridor at West Northern Lights Boulevard to westbound destinations. Congestion on Minnesota Drive southbound at West Northern Lights Boulevard is suspected to be a contributing factor to the observed cut-through pattern.

The Alaska Department of Transportation and Public Facilities (DOT&PF) is planning to construct intersection improvements at the Minnesota Drive/West Northern Lights Boulevard intersection in summer 2006 to increase intersection safety and capacity. Specifically, DOT&PF will be constructing a 400-foot long southbound right-turn-only lane at the intersection. The right-turn lane is under construction as of the date of this report.

Project staff documented speeding and cut-through concerns on Forest Park Drive, but in light of the recent termination of proposed roadway upgrades to Forest Park Drive and the aforementioned DOT&PF project, no action is recommended until the effects of the right-turn lane on speeding and cut-through traffic (which may be correlated) can be studied.

8.0 ESTIMATED CONSTRUCTION COSTS

A summary of the conceptual cost estimate for the recommended improvements is summarized below in Table 3.

Table 3: Recommended Traffic Calming Measures Conceptual Cost Estimate Summary

Location	Recommended Improvement	Quantity	Unit Cost	Subtotal	Location Total
Turnagain Parkway	Roadway Narrowing	1	$500,000	$500,000	$750,000
	Raised Intersection	1	$150,000	$150,000	
	Choker	1	$100,000	$100,000	$100,000
Iliamna Avenue	Raised Intersection	1	$150,000	$150,000	$170,000
	Raised Crosswalk	1	$20,000	$20,000	
Knik Avenue	Raised Intersection	1	$150,000	$150,000	$150,000
Clay Products Drive	Speed Hump	3	$5,000	$15,000	$15,000
McKenzie Drive	Roadway Narrowing	1	$350,000	$350,000	$610,000
	Raised Intersection	1	$150,000	$150,000	
	Choker	1	$100,000	$100,000	
	Speed Hump	2	$5,000	$10,000	
Turnagain Street and Turnagain Boulevard	Upgrade road (with pedestrian upgrades)	1	N/A *	N/A *	N/A *
Milky Way Drive	Raised Intersection	1	$150,000	$150,000	$160,000
	Speed Hump	2	$5,000	$10,000	
40th Avenue	Choker	2	$100,000	$200,000	$245,000
	Speed Hump	1	$5,000	$5,000	
	Textured Crosswalk	4	$10,000	$40,000	
St. Elias Drive	Speed Hump	2	$10,000	$5,000	$10,000
Total Traffic Calming Identified					$2,110,000

* Traffic calming improvements to be implemented as part of separately funded CIP project.

8.1 Cost Estimate Assumptions

Costs shown do not include planning, engineering, project administration, construction inspection, annual maintenance, utility improvements required by the improvements, or ROW acquisition costs, and are represented in 2006 dollars.

8.2 Project Sequencing/Priorities

Improvements shown in Figure 13 are prioritized based on community safety, livability, interests of the community, logical construction sequence, and engineering judgment of the greatest need. These priorities are shown in Figures 14, 15, and 16. Speed humps are not prioritized by this project because they are funded by a separate source through the MOA Traffic Department's Speed Hump Program and therefore could be implemented independently of other capital improvements. Other improvements, for example the

Turnagain Street/Turnagain Boulevard upgrades, may use alternative funding sources such as a Road Improvements District (RID) or Capital Improvements Program (CIP). The improvements listed in Table 3 are arranged below in descending order of priority:

1. Turnagain Parkway and Iliamna Avenue – The CAC agreed that this roadway is in the most need of improvement. The existing cross-section does not immediately alert motorists that they are on a local street; consequently, vehicle speeds are elevated. The high pedestrian use on the corridor (to access Lynn Ary Park and the coastal trail) and between St. Elias Drive and Turnagain Parkway further justifies the highest priority community need. The roadway narrowing on Turnagain Parkway and raised intersection at Iliamna Avenue will improve the look and feel of this corridor for both drivers and pedestrians. The choker at Turnagain Parkway/Knik Avenue intersection will act as a compelling reminder to motorists that they have entered a residential area.

2. McKenzie Drive – The elevated speeds along McKenzie Drive were second priority to the CAC. Didlika Park is located along the corridor and many pedestrians use McKenzie Drive to access nearby parks and the coastal trail. The roadway narrowing, raise intersection, choker, and speed humps will slow traffic and improve pedestrian crossings.

3. Knik Avenue/Susitna Drive raised intersection – Knik Avenue has elevated speeds and is used as a cut-through for people avoiding the school zone on West Northern Lights Boulevard. The raised intersection will slow vehicle speeds and should deter some of the existing cut-through traffic.

4. Iliamna Drive/Foraker Drive raised intersection – This is a continuation of the Turnagain Parkway and Iliamna Drive improvements. It will improve the corridor adjacent to Lynn Ary Park and will induce drivers to reduce speeds through this pedestrian-heavy area.

5. Turnagain Street and Turnagain Boulevard East – Both of these roadways are narrow strip-paved roads with no pedestrian facilities. The CAC and design team recommend that the entire length be upgraded to include curb and gutter and

pedestrian facilities should be provided on one or both sides of the roadway. The choker at the intersection of West Northern Lights Boulevard and Turnagain Street will serve as a physical reminder to the driver that they are entering a residential area.

6. 40th Avenue – School zone speeding is the primary concern on 40th Avenue. Adding the chokers and speed hump in front of the school should result in a noticeable decrease in vehicle speeds. There are several existing crosswalks along the corridor, but the four at Beechcraft Drive are highly used by elementary school students. Encouraging these students to utilize textured crosswalks will give motorists a visual and auditory warning that they are driving through a crosswalk.

7. Milky Way Drive – Elevated speeds in close proximity to Balto Seppala Park and pedestrian activities prompted the traffic calming recommendations on this roadway. A raised intersection and speed humps will alert drivers to observe the posted speed in the corridor.

Appendix C

Appendix C

Speed Reduction While Accommodating Emergency Vehicles with Small Inner Track Widths

Sharla Cote, Engineer-in-Training
City of Regina

Paper prepared for presentation

at the Roundabouts and Traffic Calming: Sustainable Infrastructure Assets Session

of the 2007 Annual Conference of the
Transportation Association of Canada
Saskatoon, Saskatchewan

ABSTRACT

The City of Regina implemented speed cushions, which are new to Regina, on Whelan Drive. The high speeds and proximity to an elementary school and two parks contributed to why Whelan Drive was selected to be the location of this pilot project.

Speed cushions were used instead of conventional speed humps due to the need to provide unimpeded access for emergency vehicles with small inner track widths while slowing down passenger vehicles. Regina Fire Department raised concerns regarding the time they lose driving over speed humps when responding to emergencies.

Conflict studies have been done to monitor the number of individuals that improperly use the speed cushions in order to determine if they are causing any additional problems. Speed studies have also been performed to measure the impact of the speed cushions on the 85th percentile, which is the speed which 85% of vehicles are travelling at or below. The studies were performed in the fall, winter and spring since installation in order to measure the ongoing success of the project.

Minor improvements can be made to make this design even more safe and desirable, such as additional signage, increased enforcement of crossing the centre line, and filling in one of the gaps.

With ongoing monitoring and implementation of some key suggestions, this pilot project could be a positive solution to speeding problems on residential and collector streets, yet still provide the fast and safe passage of emergency vehicles.

1.0 Introduction

1.1 Project History

The City of Regina has a Traffic Calming Program wherein locations that are deemed to have speeding or shortcutting problems are analysed based on a variety of criteria in order to assess which locations are the most critical.

As part of this program, the location of Whelan Drive between Reed Place and Radway St was determined to need some type of traffic calming installed in 2006 to reduce speeds and improve pedestrian safety.

The speed cushions needed to accommodate the small inner track width of City of Regina Fire Department pumper trucks and were designed accordingly. The resulting unique design is considered a pilot project in Regina and is being regularly monitored for its effectiveness and possible safety risks. If it is considered a success based on lowering the 85th percentile while not posing a new safety hazard, it may be implemented in other areas of the city.

1.2 Site Characteristics/Initial Conditions

1.2.1 Traffic Characteristics

Whelan Drive is a collector street which carries approximately 5,000 vehicles per day (vpd) (1). It is an important east-west connection for residents in the northwest area of Regina, providing access to major roads such as McCarthy Boulevard, Rochdale Boulevard and Courtney Street. Whelan Drive is not a bus route and the majority of vehicles using the road are passenger vehicles.

1.2.2 Surrounding Land Use

The surrounding land uses include an elementary school with approximately 300 students (2), single-family housing and access to Lakewood Park and Whelan/Radway Park. Lakewood Park is a large, well-used park containing walkways connecting many different neighbourhoods, multi-purpose gazebo, tennis courts and a large pond. Figure 1 shows the portion of Whelan Drive in discussion, including the surrounding land uses.

Figure 1 – Whelan Dr Project Boundaries and Surrounding Land Use

1.2.3 Geometric Characteristics

Whelan Drive is 11 m wide curb-to-curb with two driving lanes and two parking lanes. The grade of the road at Lakewood Drive is 3.14% and as it progresses eastward, it levels out to 0.5%. There were no drainage issues at this location. There are 1.5 m wide sidewalks on both sides of the street.

1.2.4 Signage and Pavement Markings

Like most residential collectors in Regina, the road did not have any pavement markings prior to traffic calming. The south parking lane in front of the school is signed as no stopping for most of the length of Whelan Drive in the study area. There is an all-way stop at Radway Street and Whelan Drive and stop controls on all side streets in the study area.

1.2.5 Speed Characteristics

This location has a 40 kilometres per hour (km/hr) posted speed limit due to the proximity to the elementary school. This speed limit is in effect between 8:00 a.m. and 10:00 p.m., every day of the year. Prior to traffic calming, a spring 2006 speed study found that the 85th percentile at this location was 50 km/hr, well above the posted speed limit.

1.2.6 Pedestrian Characteristics

Whelan Drive has a pedestrian corridor with overhead sign signs and flashing lights, as well as a painted crosswalk. This pedestrian corridor is located east of the main entrance to the school at the Lakewood Park entrance. A 2005 pedestrian count showed that over the noon-hour, over 100 pedestrians crossed at this location.

At the intersection of Whelan Drive and Lakewood Drive there are side-mounted pedestrian signs for east-west traffic on Whelan Drive.

1.2.7 Collision Data

The most recent collision data available is to the end of 2004. The most recent five-year collision history (2000-2004) showed a total of seven collisions along this corridor. One of these collisions involved a young pedestrian. There were no fatalities on this segment during the five-year period.

2.0 Traffic Calming Analysis

Based on the existing conditions and studies that had been performed, City of Regina Traffic Engineering staff determined that some form of traffic calming needed to be implemented at this site. The fundamental problem was a speeding/pedestrian crossing conflict. Since the pedestrian corridor, painted crosswalk and reduced speed limit were already in place, it was decided that vertical deflection was needed to physically slow the drivers down.

While Regina has implemented typical speed humps in other locations, Traffic Engineering staff had been made aware that the Fire Department was strongly opposed to them. They observed that the speed humps slowed down their fire trucks, which can be a critical amount of time in an emergency. For this reason, Traffic Engineering staff decided to explore different alternative forms of vertical deflection.

Ultimately, speed cushions were determined to be the next best option to slow down vehicles on Whelan Drive.

3.0 Speed Cushion Design

3.1 Speed Cushion Definition

A speed cushion is a raised area of a roadway, which deflects both the wheels and the frame of a traversing vehicle, similar to speed humps (3). Most vehicles will have to take the speed cushion with one side of the vehicle's wheels on the

cushion and one side on the road. The purpose of a speed cushion is to selectively reduce vehicle speeds of passenger cars (4).

3.2 Design Considerations

The main determinant of the design of these speed cushions involved the width of inner track width of the biggest pumper fire truck. Project participants were surprised to discover that the inner track width of the fire truck was 1.18 m, roughly the same width as many passenger vehicles. This similarity meant that whatever design that was chosen must allow for fire trucks to pass over unimpeded, but not allow other vehicles with the same inner track width to pass over them the same way and defeat the purpose of the speed cushions.

Other things taken into consideration were spacing of the speed cushions, height and width of the cushions, potential parking restrictions, maintenance, pavement markings and signage.

3.3 Final Speed Cushion Design

The final design of the speed cushions are shown in Figure 2, with a more detailed description described at the end of this section. The recommended layout of the three sets of speed cushions are shown in Figure 3.

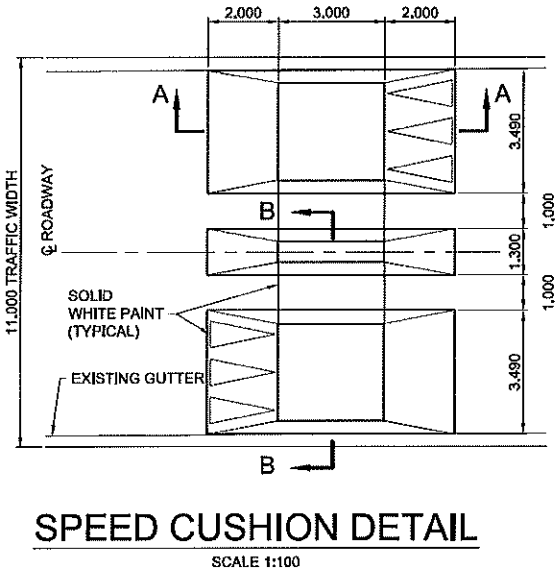


Figure 2 – Speed Cushion Design Details

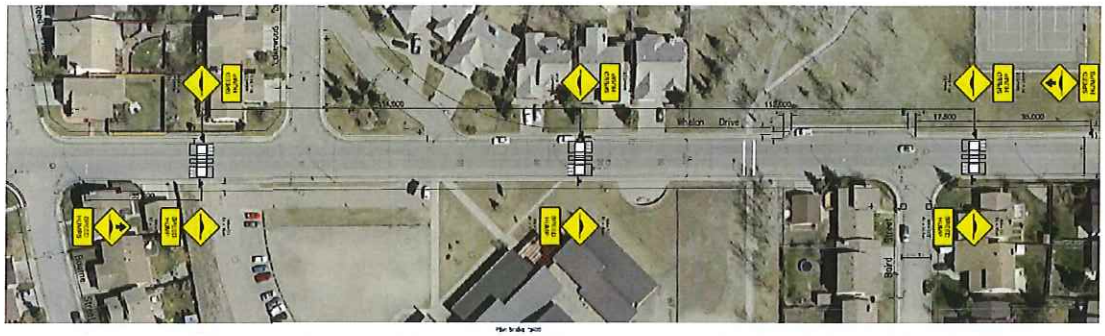


Figure 3 – Layout of Speed Cushions on Whelan Drive

As shown, there is a small cushion that straddles the centre line of the road. The goal of this design is to allow emergency vehicles to drive over the centre speed cushion unimpeded. All other vehicles should drive over the side cushions, either with all four wheels over the side cushion or with two wheels in the gap and two wheels on the side cushion. By painting a yellow centre line down the middle of the road, it would make it illegal for non-emergency vehicles to drive over the centre hump, according to City of Regina Traffic Bylaws. While it was acknowledged that there is physically nothing to prevent non-emergency vehicles from driving over the centre cushion, this was viewed to be a pilot project designed to attempt to provide both traffic calming and unimpeded emergency vehicle access at the same time.

The following list describes the features of the speed cushions and the rationale behind them.

- Height – 90 millimetres (mm)
    - TAC guidelines suggest a typical speed hump height of 80 mm (3). The 90 mm height selected for these speed cushions was in anticipation of the diminished effect that taking the speed cushions with two wheels on the flat road and two wheels on the speed cushion would have. It would also discourage people with low-riding cars from taking the centre cushion.
- Width
    - Centre Cushion – 1.30 m
        - The 1.3 m width would allow 1.18 m wide fire truck to pass over the centre cushion completely unimpeded
    - Side Cushion – 3.49 m
        - The two side cushions were made 3.49 m so they would span from the curb to the centre cushion, with 1.00 m in between the side cushions and the centre cushion. These 1.00 m gaps allow for enough extra space for the fire trucks to driver over the gaps without needing to slow down to precisely line up with them.
- Length – 7.00 m overall

    - As per TAC guidelines (3)
- Distance between sets of speed cushions – approximately 115 m
    - Placement of the three sets of cushions worked out well, spaced at least 30 m from intersections. The centre hump was spaced exactly between the front lawns of two houses so it was as far away from the driveways as possible.
- Signage – Speed hump WA-50 signs (Figure 4) installed in both directions at each set of speed cushions. "Speed hump ahead" signs (Figure 5) installed 35 m in advance of first set of speed cushions in both directions. The decision to use speed hump signs over speed cushion signs was based on not wanting to create unnecessary confusion over a new term. Since the speed cushions have a similar purpose and appearance to speed humps, it was decided that they would be referred to as speed humps.

Figure 4 – WA-50 Speed Hump Sign

Figure 5 – "Speed Hump Ahead" Sign

- White painted arrows – 3 on each side cushion, 1 on the centre cushion, both directions
    - To indicate the vertical deflection to drivers, as per TAC guidelines (3)
- Painted yellow centre line
    - This road previously did not have a painted yellow centre line, so installing one would make it illegal, according to City of Regina Traffic Bylaws, for any vehicles other than emergency vehicles to cross the centre line and drive over the centre cushion.
    - The line breaks approximately 60 centimetres in advance and after each cushion. This was done due to the complexity of painting the centre line over the narrow centre cushion.

4.0 Public Consultation

4.1 Emergency Services

The final speed cushion design was discussed with the Regina Fire Department, the Regina Police Service and Emergency Medical Services (EMS). All three organizations supported the new design and appreciated that their concerns were taken into consideration. The Fire Department was invited by Traffic

Engineering to bring their largest fire truck on site during construction to ensure that the new design would work for them. This was done on the first day of construction and was a complete success. Painted lines were drawn on the pavement to indicate where the cushions were to be built and the fire truck slowly drove through the painted gaps. This on site meeting was critical, as we discovered that the fire truck wheels needed approximately 30 cm more than had been originally designed. This additional gap space was needed so the fire trucks don't have to slow down in order to align themselves to the narrow gaps.

4.2 Neighbourhood Mail Drop

Regina's Traffic Calming Program requires the approval of at least two-thirds of residents that are directly impacted by the traffic calming i.e. those with frontage on the proposed street. For this reason, the City hand-delivered open house notices to the approximately 40 houses that would be directly impacted by having speed cushions in front of or adjacent to their home. These notices were different from all the others in that they gave more detailed information and had a survey on the back so those people who couldn't attend the open house could fill it out and mail it back. The City of Regina wanted to ensure that those people still had an opportunity to have their say in the project.

4.3 School Mail Drop

Since the students at the adjacent elementary school would be the most obvious beneficiaries of the speed cushions, Traffic Engineering staff provided enough open house notices to be sent home with every student. This way, parents that do not live in the area would be notified of the open house.

4.4 City-Wide Notice

An open house notice in Regina's main newspaper provided awareness for citizens throughout the city that there would be an opportunity for them to come and see the design and voice their opinions before the construction began.

4.5 Open House Results

The open house was held on July 20, 2006 at the affected elementary school on Whelan Drive. Though it was less-than-ideal that the open house was held during the summer when children were not in school, it was felt that sufficient numbers of people would still be interested in attending.

Ultimately, 17 individuals came to the open house, which is not out of the ordinary for Regina. Providing the survey on the back of the neighbourhood mail drop was beneficial, as 35 household surveys were returned. Most comments had to do with requesting traffic calming at additional locations and the occasional concern regarding snow building up in between the gaps in winter.

The final results indicated that 83% of those who returned surveys were in support of the speed cushions. Since this was well over the required two-thirds, the project was approved and sent out to tender. The speed cushions were constructed on September 25, 2006, just weeks after the start of a new school year. To date, there have only been two calls from the public specifically about the installed speed cushions. Both of these calls were made before winter and voiced concerns over snow piling up in the gaps and causing vehicles to lose control.

5.0 Analysis

5.1 Preliminary Speed Study

A speed study was conducted three weeks after construction of the speed cushions to evaluate the initial effect on drivers' speeds. The results of this preliminary speed study were very promising and are described in Table 1. The average 85th percentile was reduced by 11 km/hr to 39 km/hr.

Table 1 – Preliminary Speed Study Results

	Number of vehicles	Mean Speed (km/hr)	Speed Differential (km/hr)	85th Percentile (km/hr)
9:30 a.m. – 10:30 a.m.	99	35	12	40
3:15 p.m. – 4:15 p.m.	256	32	15	38
Average	178	34	13	39

5.2 Winter Conflict Study

With a long winter season in Regina, it is important that the speed cushions are monitored for their effectiveness in the presence of winter conditions. In March, 2007, a conflict study was conducted to see how drivers were adjusting to the speed cushions in the presence of snow.

The objectives of the conflict study were to count the number of vehicles that drove over the speed cushions as desired ("Proper") and the number that drove over any of the centre cushions ("Improper"). The study was conducted on a school day between 10:00 a.m. and 11:00 a.m. and again between 11:45 a.m. and 12:45 p.m. The results are summarized in Tables 2 and 3.

Table 2 – Winter Conflict Study Results – 10:00 a.m.–11:00 a.m.

Eastbound	
Proper	Improper
52	3
(95%)	(5%)

Westbound	
Proper	Improper
35	9
(80%)	(20%)

Average	
Proper	Improper
43	6
(87%)	(12%)

Table 3 – Winter Conflict Study Results – 11:45 a.m.-12:45 p.m.

Eastbound	
Proper	Improper
86	3
(97%)	(3%)

Westbound	
Proper	Improper
89	7
(93%)	(7%)

Average	
Proper	Improper
87	5
(95%)	(5%)

The results indicate that during times when drivers know children are in school (Table 2), there were higher percentages of people that drove over the centre cushion. Another observation is that westbound drivers tend to take the centre cushion more often than eastbound drivers. Overall, it was satisfying to see that only 5 – 12% of drivers drove over the centre cushions.

Analysis of the details of which centre cushion(s) drivers took shows that of the drivers that drove over a centre cushion, 86% of them took the centre cushion from the middle set, which is located directly in front of the school. A possible explanation for this is that most on-street parking happens in front of the school near the middle set of cushions, so drivers feel compelled to drive closer to the centre of the road to avoid potential conflict with parked cars.

The following are additional notes from this conflict study:

- There was no snow in the gaps of the speed cushions; it is naturally packed down by drivers
- The snow on top of the speed cushions was packed similar to the snow on the road
- The road had been graded, however there was snow in the parking lanes, which could make drivers prefer to drive more towards the centre of the road
- There were no conflicts or confusion between drivers and pedestrians
- There were no "close calls" involving a driver taking the centre cushion when another vehicle was approaching in the oncoming direction
- There was sufficient traffic in both directions to make people not want to take the centre cushion
- A large truck parks in front of one house every day at the middle set of speed cushions, likely making vehicles want to drive closer to the centre of the road

Figures 6 - 8 show images of what the speed cushions look like in the winter, and how drivers look while using the speed cushions properly and improperly.

Figure 6 – Speed Cushions During Winter

Figure 7 – Proper Use of Speed Cushion

Figure 8– Improper Use of Speed Cushion

5.3 Spring Conflict Study and Speed Study

A spring conflict study and speed study were conducted in April, 2007. The purpose of the spring conflict study was mostly to monitor the longer-term impacts of the speed cushions during ideal driving conditions. A speed study was performed simultaneously, which will provide data to compare against the preliminary speed study from Fall 2006. The results of this conflict study are shown in Table 4.

Table 4 – Spring Conflict Study – 11:45 a.m.-12:45 p.m.

Eastbound	
Proper	Improper
51	3
(95%)	(5%)

Westbound	
Proper	Improper
61	17
(78%)	(22%)

Average	
Proper	Improper
56	10
(87%)	(13%)

The results show that a higher number of people drive over the centre cushions during dry, ideal conditions than during winter conditions. However, the difference is surprisingly low. On average, only 13% of drivers use the centre cushion; just 1% higher than the upper range observed during the winter. These results are promising, in that 87% of drivers are using the speed cushions responsibly.

The following are additional notes made during this study:

- There were no conflicts or confusion between pedestrians and drivers
- There were no "close calls" involving a driver taking the centre cushion when another vehicle was approaching in the oncoming direction
- There was sufficient traffic in both directions to make people not want to take the centre cushion
- The same large truck as in the winter conflict study still parks in front of one house by the middle set of speed cushions. Drivers in the spring sometimes elected to drive over the side cushion with all four wheels, meaning they got very close to the parked truck.

Figures 9 - 12 show images of what the speed cushions look like in ideal, dry conditions and how drivers look while using the speed cushions properly and improperly.

Figure 9 – Speed Cushion During Dry Conditions

Figure 10 – Speed Cushion During Dry Conditions – Alternate View

Figure 11 – Improper Use of Speed Cushion – Dry Conditions

Figure 12 – Proper Use of Speed Cushion – Dry Conditions

The speed study data is shown in Table 5. The average 85th percentile is 42 km/hr for both directions. This is a 3 km/hr increase from the Fall 2006 speed study done immediately after installation. The most recent speed data shows that the majority of drivers are still using the speed cushions responsibly. An 85th percentile of 42 km/hr is a great improvement over the 50 km/hr it was prior to speed cushions.

Table 5 – Spring Speed Study Results – 11:45 a.m.-12:45 p.m.

	Number of vehicles	Mean Speed (km/hr)	Speed Differential (km/hr)	85th Percentile (km/hr)
Eastbound	64	34	11	40
Westbound	78	37	14	44
Average	71	35	13	42

5.4 Overall Results

A summary of the results for all the speed studies are shown in Table 6. The results show an overall decrease of 8 km/hr from prior to installation of the speed cushions. This is a decrease typically found with regular speed humps, so it is very promising that this kind of decrease has resulted from speed cushions.

Table 6 – Overall Speed Data

	Average 85th Percentile (km/hr)	Overall Change (km/hr)
2005 – Pre-construction	50	
2006 – Immediately post-construction	39	-11
2007 – Spring	42	-8

Table 7 shows the difference between how drivers behave during winter and spring road conditions, based on the averages from the conflict studies. The data shows that drivers use the centre cushion an average of 4% more during dry road conditions.

Table 7 – Comparison of Winter and Spring Conflict Studies

	Proper	Improper
Winter – 10:00 a.m. – 11:00 a.m.	87%	12%
Winter – 11:45 a.m. – 12:45 p.m.	95%	5%
Winter Average	91%	9%
Spring – 11:45 a.m. – 12:45 p.m.	87%	13%

6.0 Recommendations

There are some key improvements that could be made to the existing speed cushions to reduce the ability of drivers to use the centre cushion, and in turn, improve the safety of this location. The following recommendations are shown by increasing complexity:

- Extend yellow painted centre line – As mentioned previously, the painted centre line stops and starts approximately 60 centimetres away from the speed cushion. With a little additional time and expense, these gaps in the line could be filled so there is a continuous centre line, further compounding the fact that it is wrong to drive over the centre cushion.
- Install new signs – Create some new signs that indicate to drivers that it is illegal and punishable by $50 to cross the centre line (5).
- Increase police enforcement – By occasionally doing some enforcement of crossing the centre line, the number of drivers that cross the centre line may be reduced.
- Restrict parking near speed cushions – By restricting within 30 m on either side of each set of speed cushions, the number of people who use the centre cushion to leave space for the parked cars would likely be reduced since the parked cars would no longer be able to park there. This parking restriction would be in effect during school hours, but would allow for residents to park on street at night. This could be a sensitive issue as many people feel entitled to the parking lane directly in front of their home.
- Fill in the westbound gaps – The majority of improper driving over the centre cushions were done by westbound drivers. By filling in the gaps with additional asphalt in just the westbound direction, the majority of offenders would not be able to use the centre cushions, and fire trucks would be able to have one set of wheels in the other gap and one set of wheels on the side cushion. This would require negotiations with the fire department to determine whether or not they feel comfortable with that.

7.0 Conclusion

The speed cushion pilot project undertaken by the City of Regina has been a success in that it has reduced the 85th percentile to values that are considered acceptable. In addition, while the design is new to Regina residents and has potential for conflicts between drivers, there have been no significant problems created by the speed cushions. Overall, the project has done well, with a few minor improvements that can be made to make it even more successful. After any recommendations are implemented, the conditions will be reviewed to evaluate the impact of the improvement. The project will be reviewed once more in the fall at the one-year milestone to determine whether or not the design should be implemented at other locations.

8.0 References

(1) City of Regina, 2004 Traffic Flow Map.

(2) MacNeill Elementary School, http://macneill.rbe.sk.ca/ . Accessed on April 12, 2007.

(3) Transportation Association of Canada, Canadian Guide to Neighbourhood Traffic Calming. December, 1998.

(4) The Corporation of Delta, Neighbourhood Traffic Calming Policy and Procedures. Accessed April 12, 2007. http://www.corp.delta.bc.ca/assets/Engineering/PDF/roads_traffic_calming_policy.pdf

(5) City of Regina, Engineering and Works Department Traffic Bylaw #9900, Including Amendments to July 24, 2006.

Appendix D

Appendix D

MUNICIPALITY OF ANCHORAGE
Traffic Department

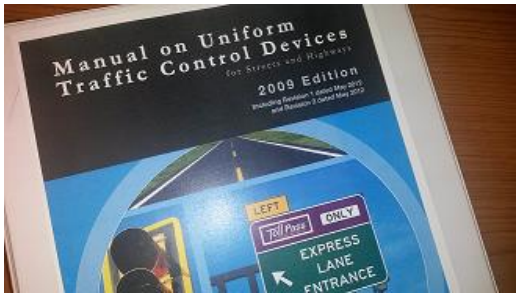
SIGN INSTALLATION BULLETIN

All-Way STOP

The Municipality of Anchorage receives requests – often in response to a citizen's 'near miss' type event at an intersection - to install "All Way" Stop at intersections. This may be at an intersection that currently has no STOP signs assigning right-of-way ("uncontrolled") or STOP signs on a lower volume road where it intersects a higher volume street – regardless of whether the intersection is a three-legged or four-legged intersection.

These requests may also come in response to concerns that vehicles on a road are travelling at an inappropriate speed for conditions for pedestrians, cyclists, or the operators of other motor vehicles.

The adopted Manual on Uniform Traffic Control Devices indicates this about the installation of All-Way STOP control at intersections.



"Multi-way STOP control can be a useful safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, cyclists and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic is approximately equal."

Section 2B.07 "Multi-Way STOP Applications" Manual on Uniform Traffic Control Devices, FHWA, 2009

A reference is made to Uniform Vehicle Codes, as well.

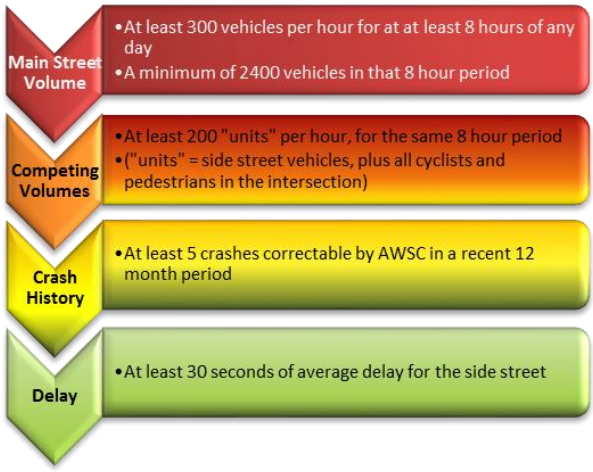
"State or local laws written in accordance with the Uniform Vehicle Code establish the right of way rule at intersections having no regulatory signs such that the driver of a vehicle approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the intersection."

Section 2B.04 "Right of Way at Intersections" Manual on Uniform Traffic Control Devices, FHWA, 2009

Several basic principles are used by the Traffic Engineer with respect to the installation of these – and other types – of regulatory signs.

First, traffic control devices – particularly in residential areas – should be used to the least extent possible. Over-signage – particularly along residential streets where there is already considerable demand for driver attention – results in an additional distraction to motorists. That incremental distraction can be a problem for the safety of pedestrians in, near, or crossing the roadway and the safe movement of cars into and out of driveways.

Second, any over-signage will result in a reduction in the effectiveness of the messages being communicated to road users. This can and will affect the effectiveness of the information being communicated by those signs that are critically-needed to warn motorists of conditions that they might not be aware of – and which are potential hazards to pedestrians, cyclists, and other motorists.



Third, signage should be used sparingly to supplement – but not substitute – for an obligation to be aware of the rules of the road. Knowledge of Alaska State law and Municipal Code is obligation of each person who uses a road in the Municipality of Anchorage.

Fourth, the installation of every traffic control device has both an intended – and a series of recognizable unintended – consequences. A traffic signal system will assist in providing an orderly assignment of right-of-way at intersections and help reduce the number of right-angle and approaching turn crashes, but will do little to reduce – and, in fact, will usually increase - the number of rear-end collisions. A marked crosswalk at a location where pedestrians cross a roadway may provide some guidance to motorists of pedestrian activity, but can lead to an increase in rear-end crashes when pedestrians step into traffic – or, worse, can result in crashes involving the pedestrian when they assume that they can do so without regard to the ability of the vehicle to come to a stop.

For these reasons, an engineering study of conditions: traffic volumes, pedestrian and cyclist volumes, sight lines, delay for cars entering the intersection from the side street, crash history, is required before All-Way STOP control is considered at an intersection.

Typically, we will expect that at least 40% of the total entering volume needs to be entering the intersection from the minor/side street. The MUTCD indicates that the volumes should be 'approximately' equal.

Municipal Policy on All-Way STOP Control:

For these – and other reasons – the Municipality of Anchorage establishes as a policy that, and particularly in residential areas, All-Way STOP limit signs will be installed only when the warrants in the Manual on Uniform Traffic Control Devices have been evaluated – and determined to be met.

All-Way STOP control will not be approved, as well, as a traffic calming or speed control measure.

Finally, an evaluation for a requested conversion to All-Way STOP Control may result in a determination that either the conditions have changed from the time of the existing right-of-way assignment was installed, or, that the existing assignment was used as a means of speed control. In this instance, the Municipality may change the existing right-of-way assignment to conform to current conditions and standards. This may include changing the directions that are stopped at an intersection, or, may even result in substitution of a less-restrictive right-of-way assignment: yield control or no assignment of right-of-way.

Produced by the Traffic Safety Division
Traffic Department
4700 Elmore Road
Anchorage, Alaska

Stephanie Mormilo, P.E.
Municipal Traffic Engineer

MUNICIPALITY OF ANCHORAGE
Traffic Department

SIGN INSTALLATION BULLETIN

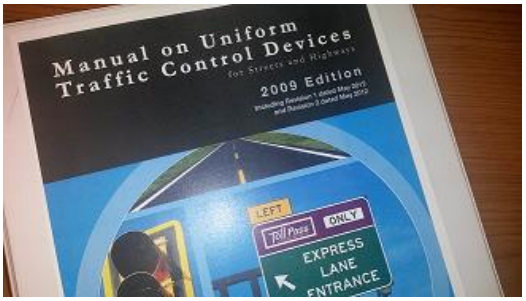
Children at Play Signs

Although not as commonly requested as in the past (for a variety of reasons), "Children at Play" signs – or variations on that same message: "Slow Children at Play", "[running child image] at Play, "Watch for Children", etc. have been asked-for by parents concerned about the safety of children playing in/around their neighborhoods.

The Federally-adopted Manual on Uniform Traffic Control Devices (MUTCD) states the following about warning signs:

"The purpose of a warning sign is to provide advance warning to the road user of unexpected conditions on or adjacent to the roadway that might not be readily apparent."

Section 5.01 "Introduction" Manual on Uniform Traffic Control Devices for Streets and Highways, 2009, Federal Highway Administration



Municipal Policy on Children at Play Signs:

"Children at Play" signs are not recognized by the State of Alaska or the Federal Highway Administration as official traffic control devices – and are no longer installed on public streets in Anchorage. These signs have been installed in the past throughout the Municipality of Anchorage; however, the signs that are installed in neighborhoods are being left in place until they are no longer serviceable (as is permitted by the MUTCD), or, until maintenance is performed on the associated speed limit signs. At that time, the "Children at Play" signs will be removed.

Public agencies across the United States have taken a similar position that these signs should be removed, and, in fact, the removal of these signs should carry a high priority.

These signs are deceiving and ineffective. Drivers already have a reasonable expectation of the presence of children in residential areas – especially at certain times of the day and/or days of the week. Studies have demonstrated that the signs do nothing to increase safety – and, in fact – can provide an additional distraction to drivers. Over-signage – particularly along residential streets where there is already considerable demand for driver attention – results in an additional distraction to motorists. That incremental distraction can be a problem for the safety of pedestrians in, near, or crossing the roadway and the safe movement of cars into and out of driveways.

A study by the National Cooperative Highway Research Program (CCHRP) – part of the Transportation Research Board – reported that nearly 80 percent of the crashes involving children resulted from an unsafe or illegal act by the child. The report concluded that no traffic control device could be expected to protect a child.

The NCHRP provided reports in "Synthesis of Highway Practice No. 139 Pedestrians and Traffic Control Measures" (1988) and Synthesis of Highway Practice No. 186 Supplemental Advance Warning Devices" (1993) that indicated "Non-uniform signs such as 'Caution – Children at Play', 'Slow – Children at Play', 'Slow – Children' or similar legends should not be permitted at any time… the removal of any non-standard signs should carry a high priority."

Pediatric trauma physicians have cited the studies, and concur that children – particularly young children – should actively be discouraged from playing near, or on, streets and that adults have the primary responsibility for ensuring the safety of their children in/near their homes.

Even into their teens, children have difficulty judging the approach speeds of oncoming vehicles. Association of Psychological Sciences, based in London, http://pss.sagepub.com/content/22/4/429.full.pdf+html, make a finding that "*Our study is the first to demonstrate that the neural mechanisms for detection of looming [on-coming traffic] are not fully developed until adulthood*."

Addressing the Safety of Young Children:

Unnecessary signs confuse and annoy drivers and foster a disrespect for all signs. Signs used in accordance with the Federal MUTCD can and should be posted for school zones and pedestrian crossings, as well as near established playgrounds and other recreational areas, where a need exists.

The Muni has an active Neighborhood Traffic Calming Program, however, to determine if motorists are driving at an inappropriate speed, or if there is a significant amount of non-local traffic using the neighborhood streets. This program can be an effective means of addressing the concerns that parents and families may have.

Parents have a vital role in providing for their childrens' safety – and may, in fact, be the most effective means of addressing safety concerns. They have the ability to teach children that it is not safe to play in/near the street, and to discourage children from doing so without adult supervision.

Parents, however, should resist the temptation to purchase these signs from on-line sources, however, and install the signs in or near the public road. Under Alaska State law, it is illegal for anyone other than the Municipal Traffic Engineer to post signs – whether on public or private property – that attempt to regulate or control traffic on an abutting public roadway.

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MUNICIPALITY OF ANCHORAGE
Traffic Department

MARKED CROSSWALK INSTALLATION BULLETIN

"Painted/Marked Crosswalks"

The Municipality of Anchorage – like most public agencies across the United States – often receives requests to paint crosswalks. These requests may be for a variety of reasons: aiding vulnerable population groups (elderly or school children, the disabled), heighten awareness for workers whose parking spaces may be on the opposite side of the street from the building in which they work, slowing traffic near public and private parks, etc.

These requests may be for locations at intersections, or, at mid-block locations like trail crossings.

The subject of marking crosswalks generates considerable passion on the part of parents, senior citizens, employees, school administrators and pedestrian advocacy groups. There is a belief that marking/painting a crosswalk always represents a safer condition for pedestrians.

As is too common in issues related to traffic and pedestrian safety, the actual situation is very different. There are both positive benefits and unintended – adverse – consequences. This suggests that careful consideration be made before a decision to mark/paint a crosswalk, and that an analysis be done to provide the information that might indicate that there is a net benefit – or a net adverse consequence to the public – of doing this.

Post-installation studies:

A series of studies – dating back to the 1970s – have been done in the United States. Early studies conducted in Southern California found that, after accounting for the volumes of vehicles and pedestrians and the type of right-of-way assignment at intersections, the rate of pedestrian crashes was as much as 3 times higher where the crosswalks had been marked as compared to similar locations where the crosswalks had not been marked.

Subsequent studies around the United States have shown some variation in that increased rate of vehicle-pedestrian crash history.

Several years ago, after studies were completed about the appropriateness of marking crosswalks, the Federal Highway Administration published a table that provided a guide to when crosswalks should – and should not – be marked. This information has been accepted – and incorporated into – the State of Alaska's Traffic Manual Supplement to the nation-wide Manual on Uniform Traffic Control Devices.

Standards on Marked Crosswalks:

The Municipality of Anchorage follows the Alaska Traffic Manual Supplement's requirements. Other than at locations where there is a signal controlling motorized and non-motorized traffic, we will – typically – deny requests for marking a crosswalk. There may be locations: near schools, a few mid-block locations with high numbers of pedestrians, where we will mark a crosswalk – and, secondarily, enhance the crossing location with added signage, flashing beacons overhead flashing lights, or a pedestrian crossing signal.

Traffic volumes on the roadway should be a minimum of 2000 ADT (Average Daily Trips). Almost all streets with volumes below 2000 ADT have adequate gaps for pedestrians, and, many are local residential streets where many types of pavement markings – with the exception of 'Stop bars'/'Limit lines' at STOP-controlled intersections - are not present.

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Table 3B-101. Recommended Practice for Crosswalk Marking on Uncontrolled Approaches or at Midblock Locations

No. of Lanes	Raised Median?	Vehicle AADT (vpd)													
		<9000				>9,000 to 12,000				>12,000 to 15,000			>15,000		
		Speed Limit (MPH)													
		≤30	35	40	≥45	≤30	35	40	≥45	<30	35	40	<30	35	40
2	No	C	C	M	N	C	C	M	N	C	C	N	C	M	N
3	No	C	C	M	N	C	M	M	N	M	M	N	M	N	N
>4	Yes	C	C	M	N	C	M	N	N	M	M	N	N	N	N
>4	No	C	M	N	N	N	M	N	N	N	N	N	N	N	N

Source: FHWA-RD-01-075: Safety and Effectiveness of Marked vs. Marked Crosswalks at Uncontrolled Locations, 2002

C	Candidate locations for marked crosswalks. Before marking a crosswalk, the site should be studied to ensure it is suitable. The study may include a review of pedestrian volumes, available gaps, sight distance (see Note 1), vehicle mix, pedestrian mix, distance to adjacent crossings (see Footnote 2). Crosswalks should not be installed at locations with fewer than 20 pedestrian crossings per peak hour (or 15 for elderly and/or child pedestrians)
M	Marginal candidate sites for marked crosswalks. Pedestrian risk may increase if crosswalks are marked. If pedestrian improvements are necessary, other options should be explored before marking crosswalks
N	Crosswalks should not be installed at these locations

See footnotes below.

Table 4A-101 Grouping of Traffic Control Device Alternatives Based on Conditions at Crossing Locations

Recurring Hourly Pedestrian Volume	Vehicular Traffic Volume and Speed																
			Vehicle AADT (vpd)														
			<4500	>4500 to 9,000				>9,000 to 12,000				>12,000 to 15,000			>15,000		
			Speed Limit (MPH)														
	No. of Lanes	Raised Median or Refuge	All	≤30	35	40	≥45	≤30	35	40	≥45	<30	35	40	<30	35	40
<20/hr	Any	Any	NE See also 2C.01 and 3B.18														
≥20/hr	2, 3	Yes	NE: See also 2C.01 and 3B.18	NE	NE	EW	ER	NE	NE	EW	ER	NE	NE	ER	NE	EW	ER
	2	No		NE	NE	EW	ER	NE	NE	EW	ER	NE	NE	ER	NE	EW	ER
	3	No		NE	NE	EW	ER	NE	EW	EW	ER	EW	EW	ER	EW	ER	ER
	≥4	Yes		NE	NE	EW	ER	NE	EW	ER	ER	EW	EW	ER	ER	ER	ER
	≥4	No		NE	EW	ER	ER	EW	EW	ER	ER	ER	ER	ER	ER	ER	ER
School Crossing	EW = See Part 7 for school routes,beacon systems, and Part 4 for signal warrants																
≥20/hr	ER – See Part 4 for Pedestrian Hybrid Beacon Guidelines and School Crossing Warrants *(Engineering Study Required)*																
≥75/hr	ER – See Part 4 forTraffic Control Warrants *(Engineering Study Required)*																

Source: Alaska Traffic Manual Supplement, 2015

DEVICE GROUPING

- **NE** Non-electrical devices (sight distance improvements, signs, striping, medians, etc.)
- **EW** Electrical Warning Devices (beacons, lighting, sign borders, in pavement lights, etc.)
- **ER** Electric Regulatory Devices (hybrid beacons, signals)

Abbreviations

- **vpd:** Vehicles per day
- **AADT:** Annual Average Daily Traffic Volumes
- **MPH:** Miles per hour

Notes:

1. Marked crosswalks should not be installed on uncontrolled approaches or midblock locations where visibility distance of pedestrians or the crosswalk would be less than the Stopping Sight Distance for Design" given in the latest version of the AASHTO A Policy on the Geometric Design of Highways and Streets. Desirably, crosswalks would only be installed where there is sufficient sight distance to allow pedestrians to cross the road without conflicting with vehicles continuing at the 85 %ile speed, assuming the pedestrian starts walking at the moment the vehicle comes into sight. Pedestrian crossing time should be computed in accordance with the procedure for determining adequate gaps given in the Institute of Transportation Engineers Traffic Engineering Handbook, (page 78 in the 4th Edition)

2. Crosswalks should not be installed on uncontrolled approaches or at midblock locations where they will encourage pedestrians to divert from nearby signalized or grade-separated pedestrian crossings.

Progression to a higher-level treatment – beyond simply marking the crosswalk – will need to follow the flowchart in Table 4A-102

Table 4A-102 Order of Selection for Traffic Control Devices or Strategies at Crossing Locations

	One or more factors for consideration After Table 4A-101						
DEVICE GROUPING	**GAPS**	**SIGHT DISTANCE**	**SAFETY RISK**	**PED VOLUME**	**TRAFFIC CONTROL STRATEGIES FOR A CROSSING LOCATION**	**ORDER OF DEVICE SELECTION**	OPTIONAL
NE – NON-ELECTRICAL[1]	≥1/minute average or ≥1/signal cycle	Above Minimum	<75%ile	<20/hour	Devices not provided for sites with adequate gaps, good visibility, low pedestrian volume, or low crash history	None	
	<1/min avg, or </signal cycle	Below Minimum	>75%ile		Locate or provide alternate crossing location (primarily to resolve sight distance)	Increasing - Command of Attention <--------	
					Median refuge island or divided/split highway lanes (primarily to achieve gaps)[2]		
					Standard retro-reflective signs (primarily for warning or drawing attention)		
					High visibility signs, markings, delineators, or post reflectors (primarily for warning or drawing attention)		
					Portable In-Street Signs[3]		
					Flag carry		
EW-ELECTRICAL WARNING	<1/min avg, or </signal cycle	Below Minimum	≥95 %ile crash history or crash prediction	>20/hour or <MUTCD Guidelines and Warrants	Pedestrian street light electrolier(s)[4]	Increasing Command of Attention <--------	
					Ped Activated Rectangular Rapid Flashing Beacons RRFB (when ≥ 40mph > 2 lanes, or roundabout exits[2]		
					Overhead active alternating LED beacon w/ped detection[5]		
					Continuous single roundel LED beacons above sign[6]		
					Continuous single Overhead LED beacon		
					LED bollards for walkways (primarily used in transit areas		
					Continuous LED flashing borders in sign		
					Ped activated LED flashing borders in sign		
					Combined side mount and Overhead ped activated beacons		
					In pavement crosswalk lights[7]		
					Other electrical warning devices		
ER-ELECTRICAL REGULATORY	Less than 1 per minute or 1 per Signal cycle	Below Minimum	≥95 %ile crash history or crash prediction	≥20/hr	Ped Hybrid Beacon (Engineering Study Required)	Increasing Command of Attention <--------	
				≥75/hr	**Signal, Midblock Signal, or Half-Signal (Engineering Study Required)**		

Source: Alaska Traffic Manual Supplement, 2015

FOOTNOTES

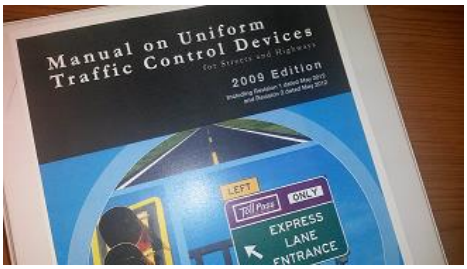
1	NE – non-electrical project solutions are acceptable until an electrical project can be determined as being needed
2	Median refuge may be used to convert undesirable gaps into adequate two-stage gap
3	Consider portable in-street signs primarily for special events and school control. These require active on-site oversight
4	Provide overhead lighting at marked crosswalks when feasible
5	Active flashing beacon systems are preferable to passive beacon systems
6	Flashing beacon systems may be used to mark zones not identifiable as a single crossing, or areas without overhead lighting
7	In-pavement lights should only be considered in a low risk environment for damage, where there is extensive maintenance capability
8	Should be ¼ mile or more from existing signals on arterial 2-way roadways, unless coordinated with existing signals

MUNICIPALITY OF ANCHORAGE
Traffic Department

SIGN INSTALLATION BULLETIN

"Special Needs Children" Signs

Although not as commonly requested as "Children at Play" signs – or variations on that same message: "Slow Children at Play", "[running child image] at Play, "Watch for Children", etc. signs have been asked for by parents concerned about the safety of their children with vision or hearing impairments – or, children diagnosed with autism spectrum disorders.



The Federally-adopted Manual on Uniform Traffic Control Devices (MUTCD) states the following about warning signs:

"The purpose of a warning sign is to provide advance warning to the road user of unexpected conditions on or adjacent to the roadway that might not be readily apparent."

Section 5.01 "Introduction" Manual on Uniform Traffic Control Devices for Streets and Highways, 2009, Federal Highway Administration

Signs that convey the message "Blind Child Area," "Deaf Child" or "Autistic Child" are not recognized by the State of Alaska or the Federal Highway Administration as official traffic control devices – and are no longer installed on public streets in Anchorage. These signs have been installed in the past in a few locations in the Municipality of Anchorage; however, the signs that are installed in neighborhoods are being left in place until they are no longer serviceable (as is permitted by the MUTCD), or we become aware that the family in question has moved from the neighborhood. At that time, the signs will be removed.

Public agencies across the United States have a variety of policies on these types of signs. Some agencies will do so upon request since a compelling point can be made that a motorist – in a residential neighborhood – may not be aware that a special needs child is living in the area – which meets the 'purpose' criteria for a warning sign, as noted above.

Even those advocacy groups for individuals with these issues have mixed opinions on the use of these signs. Some even object to the notion of defining a child by their disability: "Blind Child" or "Deaf Child" – which is partly forced by the need to convey a readily-understood message that can fit on a standard-sized street sign.

The need to convey a readily-understood message also does not account for the possibility that any particular child may have several issues: they may have impaired vision and impaired hearing, for one example. In addition, not only there is no quantifiable 'standard' of any of these impairments (a child may have very poor vision, but still be able to discern some objects, another may be able to hear some sound frequencies, but not others), but, some impairments are progressive – becoming worse, or better, with time and medical care.

Lastly, there is the real issue that the families of these children may move – without notice to the public agency responsible for the installation, maintenance, and – ultimately – removal of the sign.

Many of the public agencies that will install these signs require the following from the family:

1) A physician's statement identifying the extent of the disability
2) Concurrence from the parents of their understanding that the sign will be removed when the child reaches a specified (often, 13 years) age. That may include a sworn statement of the child's date of birth.
3) Written acknowledgement from the parents of their understanding that the sign provides no guarantee of their child's safety – and that they remain responsible for monitoring their child's activities.
4) A commitment to notify the public agency – in a timely manner – of any positive changes in their child's impairments (for example, cochlear implants, use of hearing aids, etc. for children with hearing impairments).
5) A commitment to notify the public agency – in a timely manner – of any relocation to another place of residence.

This requires a commitment of personal information that many parents are unwilling to provide. And, it requires close tracking from the public agency.

Municipal Policy on "Special Needs Children" Signs:

"Blind Child," "Deaf Child" or other variations on signage for special needs children are not recognized by the State of Alaska or the Federal Highway Administration as official traffic control devices, and will not be installed on those streets over which the Municipal Traffic Engineer has jurisdiction.

There is no evidence that the signs provide any benefit to the safety of children. There is no evidence that the signs result in any behavioral changes by drivers. Reports from the National Cooperative Highway Research Program have indicated the "Non-uniform signs….should not be permitted at any time… and the removal of any non-standard signs should carry a high priority." In addition, nearly 80 percent of the crashes involving children resulted from an illegal or unsafe act by the child. In reality, no traffic control device could be expected to protect a child.

Pediatric trauma physicians have cited the studies, and concur that children – particularly young children – should actively be discouraged from playing near, or on, streets and that adults have the primary responsibility for ensuring the safety of their children in/near their homes.

Even into their teens, and even without accounting for impairments, children have difficulty judging the approach speeds of oncoming vehicles. Association of Psychological Sciences, based in London, http://pss.sagepub.com/content/22/4/429.full.pdf+html, make a finding that "*Our study is the first to demonstrate that the neural mechanisms for detection of looming [on-coming traffic] are not fully developed until adulthood*."

Addressing the Safety of Young Children:

Unnecessary signs confuse and annoy drivers and foster a disrespect for all signs. Signs used in accordance with the Federal MUTCD can and should be posted for school zones and pedestrian crossings, as well as near established playgrounds and other recreational areas, where a need exists.

The Muni has an active Neighborhood Traffic Calming Program, however, to determine if motorists are driving at an inappropriate speed, or if there is a significant amount of non-local traffic using the neighborhood streets. This program can be an effective means of addressing the concerns that parents and families may have.

Parents have a vital role in providing for their childrens' safety – and may, in fact, be the most effective means of addressing safety concerns. They have the ability to teach children that it is not safe to play in/near the street, and to discourage children from doing so without adult supervision.

Parents, however, should resist the temptation to purchase these signs from on-line sources, however, and install the signs in or near the public road. Under Alaska State law, it is illegal for anyone other than the Municipal Traffic Engineer to post signs – whether on public or private property – that attempt to regulate or control traffic on an abutting public roadway.

Produced by the Traffic Safety Division
Traffic Department
4700 Elmore Road
Anchorage, Alaska

Stephanie Mormilo, P.E.
Municipal Traffic Engineer

MUNICIPALITY OF ANCHORAGE
Traffic Department

SIGN INSTALLATION BULLETIN

Speed Limits

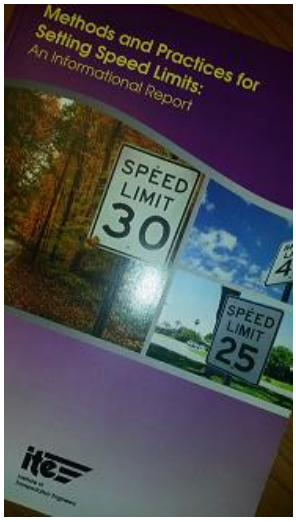
The Municipality of Anchorage has adopted speed limits that are located at Anchorage Municipal Code (AMC) 9.26.

An introductory point needs to be made: Posted Speed Limits represent the MAXIMUM legal travel speed on a roadway under ideal roadway conditions. Road users are obliged to use reasonable judgment when operating their vehicles, and consider the conditions: icing/snow, fog, rain, traffic congestion, lighting, pedestrian activity, that exist at the time that they are operating a vehicle.

Anchorage Municipal Code 9.26.010 states

"No person may drive a vehicle at a speed greater than is reasonable and prudent under the conditions and having regard to the actual and potential hazard then existing."

From the Institute of Transportation Engineers



"Selecting an appropriate speed limit for a facility can be a polarizing issue for a community. Residents and vulnerable road users generally seek lower speeds to promote quality of life for the community and increased security for pedestrians and cyclists; motorists seek higher speeds that minimize travel time. Despite the controversy surrounding maximum speed limits, it is clear that the overall goal of setting a speed limit almost always to increase safety within the context of retaining reasonable mobility."

Methods and practices for Setting Speed Limits: An Informational Report, Institute of Transportation Engineers, 2012

Several basic principles are used by the Traffic Engineer with respect to the installation of these – and other types – of regulatory signs.

First, traffic control devices – particularly in residential areas – should be used to the least extent possible. Over-signage – particularly along residential streets where there is already considerable demand for driver attention – results in an additional distraction to motorists. That incremental distraction can be a problem for the safety of pedestrians in, near, or crossing the roadway and the safe movement of cars into and out of driveways.

Second, any over-signage will result in a reduction in the effectiveness of the messages being communicated to road users. This can and will affect the effectiveness of the information being communicated by those signs that are critically-needed to warn motorists of conditions that they might not be aware of – and which are potential hazards to pedestrians, cyclists, and other motorists.

Third, as suggested above, signs should be used to advise road users of conditions that they might not reasonably expect.

Municipal Policy on Posted Speed Limits:

For these – and other reasons – the Municipality of Anchorage establishes as a policy that, particularly in residential areas, speed limit signs will be installed only at the entrance(s) to residential neighborhoods – where a motorist is exiting a higher speed limit roadway and must reduce their speed to that which is appropriate for a residential neighborhood. Speed limit signs may be added in rural residential neighborhoods where a residential street might be ½ mile, ¾ mile, or longer, and supplemental speed limit signs may be appropriate to remind road users of the appropriate speed limit.

In addition, the Municipality of Anchorage establishes as a policy that, consistent with Alaska State law, residential streets will typically be posted for a 25 MPH speed limit. Variations, as permitted by either good professional judgment by the Traffic Engineer of the existence of a special hazard[1], or, the limited conditions outright permitted under Municipal Code.

The presence of children in a residential neighborhood will not necessarily be considered a 'special hazard' (as codified at A.M.C. 9.30.030) for establishing a speed limit below that otherwise appropriate for a residential roadway. The extent of overall pedestrian activity, at a particular time of day or street, is a factor that a motorist must use in selecting an appropriate speed below the posted maximum *at that moment*.

Produced by the Traffic Safety Division
Traffic Department
4700 Elmore Road
Anchorage, Alaska

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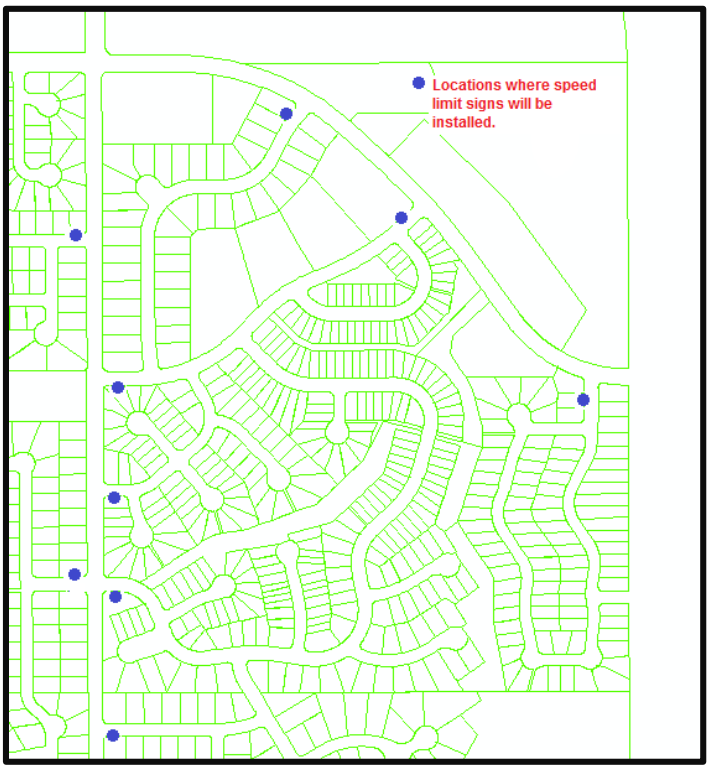
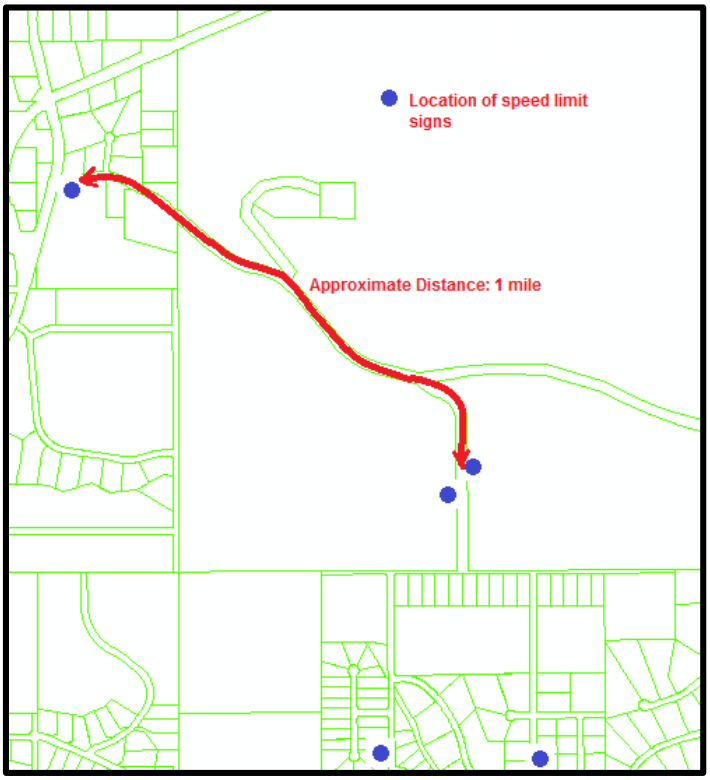
Municipal Traffic Engineer

[1] This will typically include schools with high numbers of school-age pedestrians abutting the road in question, roads with an above-average crash history, or unique roadway and roadside conditions: narrow pavement, unpaved roads, steep drop-offs adjacent to the road, etc.



Sample neighborhood with typical speed limit sign placements



Sample neighborhood with long, single access.

MUNICIPALITY OF ANCHORAGE
Traffic Department

SIGN INSTALLATION POLICY

"No Parking" signs

The Municipality of Anchorage has adopted parking regulations that are located at A.M.C. 9.30.

Four principles are used for guidance by the Traffic Engineer with respect to the installation of signs in residential neighborhoods.

First: Traffic control devices should be used to least extent necessary. Over-signage, particularly in neighborhoods results in a diminishment in the effectiveness of the message of those signs that convey critically-needed information for the health, safety and welfare of the community – both residents and those travelling through the neighborhood to other destinations. This includes pedestrians, cyclists, and motorists.

Second: Signs can become a distraction. Drivers' attention needs to be on activities occurring in and near the road. Even a moment's distraction can result in an incident.

Third: Signage should be used sparingly to supplement – but not substitute – an obligation to be aware of the rules of the road. A working knowledge of Alaska State Statutes and Municipal Codes is an obligation of every motorist when they travel on the roadway system.

Fourth: The installation of every traffic control device has both an intended consequence - and an adverse consequence that most residents may not be aware of, but which staff have to be mindful of to ensure that the proper solution is applied to a particular problem. A traffic signalization system will provide an orderly assignment of right-of-way at high-volume intersections and reduce the frequency of some types of crashes. However, there will frequently be an increase in the number of rear-end crashes – so, an intersection that is already experiencing a pattern of rear-end crashes should typically not be 'solved' by installation of a traffic signal system. A marked crosswalk on high-volume/high-speed roads may provide some guidance to motorists and pedestrians about crossings, however, installation of a marked crosswalk can lead to an increase in the number of rear-end collisions.

An unneeded parking restriction may move the demand for on-street parking to another location within the neighborhood – even if residents comply with the restriction, or perceive that enforcement will follow.

On-street parking, unless restricted for a persistent traffic safety issue (parking on a sidewalk, parking too close to an intersection and impairing the ability to see around a corner, overflow parking from an institutional use in a residential neighborhood, etc.), is open to all users of the public roadway system. The 'space' on the street in front of a home – for instance – doesn't "belong" to that resident. Any legal parking space – away from mailboxes, driveways, hydrants – is available to be used by any member of the driving public, or, for local deliveries by commercial users.

For these reasons, the Municipality of Anchorage will typically not install "No Parking" signs along residential streets unless there is a persistent problem that has resisted correction after targeted enforcement by the Anchorage Police Department. "No Parking" signs will also not be installed in response to neighbor-to-neighbor disputes about activities such as parking in front of mailboxes, dumpsters or driveways.

Municipal Code was re-written several years ago (with respect to the date of this policy document, in 2016) to provide authority to the Anchorage Police Department to cite vehicle owners for parking violations – without the need for a sign or signs to be installed. For instance, Municipal Code states that parking is prohibited within 20 feet of a typical intersection – and a sign is not required. Parking is prohibited within 10 feet either side of a mailbox – and, again, no signs are needed. Parking is not permitted within 15 feet either side of a fire hydrant – and, again, signs are not required to enforce that restriction.

In general, without a documentable safety condition: crash history, recommendations from the Anchorage Police Department, Street Maintenance, or the Anchorage School District (based upon a potential hazard along an identified school walking route[1], or, recurring spill-over parking from a commercial/institutional use into a residential neighborhood, the Municipality of Anchorage will not install "No Parking" signs.

In the event that a private party requests that parking be prohibited along an entire block face, the proposed restriction will not be approved without

- a resolution in support from the Community Council
- written concurrence from at least 75% of the homeowners along both sides of the roadway

A diagram of the most frequently-occurring conditions covered by Municipal Code (i.e. those locations where "No Parking" signs will typically not be installed) follows.

Appendix "A" to this Policy summarizes the most frequently needed sections of Anchorage Municipal Code Title 9.

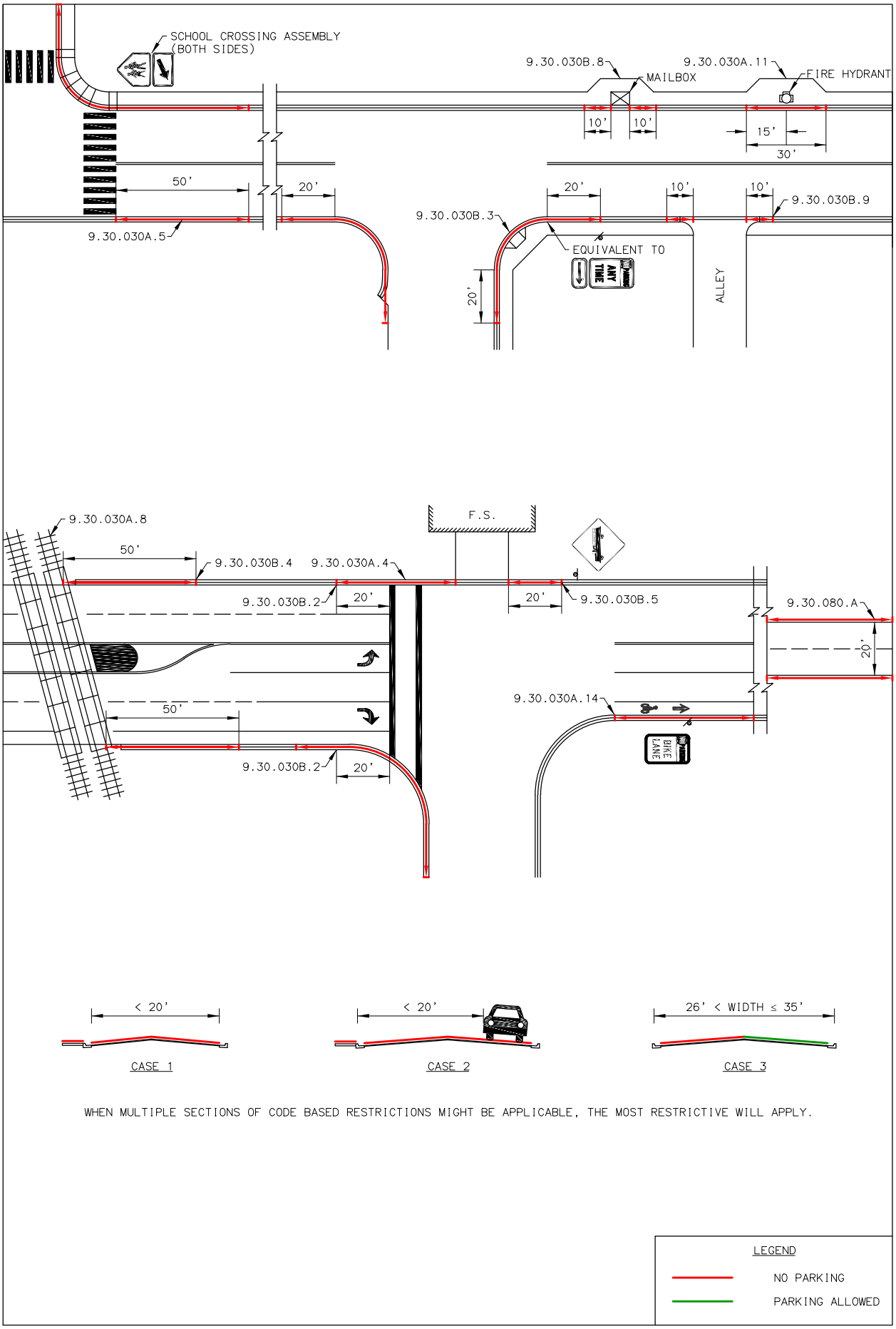
Because the question arises from time-to-time, the Municipality of Anchorage does not paint curbs to identify parking limitations outside of the Anchorage Central Business District. The Downtown Partnership provides special funding for installation and maintenance of the painted curbs (loading zones, ADA parking, standard parking spaces) that allows that work to be done each year.

Although there is Code (AMC 9.65) that authorizes the implementation of permit parking in residential neighborhoods, that program is not administered by the Muni's Traffic Department.

Produced by the Traffic Safety Section
Traffic Engineering Department
4700 Elmore Road
Anchorage, Alaska

[1] See current Safe Routes to School Manual

FIGURE 1



Parking Regulations

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Appendix “A”

Excerpts from Anchorage Municipal Code Title 9

- **9.30.030 - Stopping, standing or parking prohibited in specified places.**

Except when necessary to avoid conflict with other traffic, or in compliance with law or the directions of a police officer or official traffic control device, no person shall:

A. Stop, stand or park a vehicle:

1. On the roadway side of any vehicle stopped or parked at the edge or curb of a street.
2. On a sidewalk.
3. Within an intersection.
4. On a crosswalk.
5. Within 50 feet of a marked crosswalk in a designated school zone.
6. Alongside or opposite any street excavation or obstruction when stopping, standing or parking would obstruct traffic.
7. Upon any bridge or other elevated structure upon a street.
8. On any railroad tracks.
9. At any place where official signs prohibit stopping.
10. At any place immediately adjacent to a red painted curb except municipal transit buses and municipal transit support vehicles at designed municipal transit bus stops.
11. Within 15 feet of a fire hydrant or within 15 feet of a fire safety sprinkler, standpipe or other fire protection system control valve, whether such valve is mounted on a building or the ground.
12. Within a fire lane designated as such by posted signs.
13. In the middle of a cul-de-sac.
14. in a designated bicycle lane.

B. Park a vehicle, whether occupied or not, except temporarily for the purpose of and while actually engaged in loading or unloading merchandise or passengers:

1. In front of a public or private driveway.
2. Within 20 feet of a marked crosswalk not located within a designated school zone.
3. Within 20 feet from the point of tangent of curb return at any intersection.
4. Within 50 feet of the nearest rail of a railroad crossing.
5. Within 20 feet of the driveway entrance to any fire station.
6. At any place where official signs prohibit parking, with the exception of fire lanes and handicapped parking areas.
7. At any place immediately adjacent to a yellow painted curb.
8. Within ten feet of a curbside mail box.
9. Within ten feet of an alley entrance.

C. No person may move a vehicle not lawfully under the person's control into any such prohibited area or away from a curb such distance as is unlawful.

D. No person may park a vehicle on public property in a place not marked, designated or otherwise provided for parking, nor shall a vehicle be parked in a manner contrary to the indicated or conventional parking usage or mode in those areas where parking is permitted.

(CAC 9.30.030; AO No. 78-72; AO No. 78-146; AO No. 80-4; AO No. 87-142; AO No. 89-52; AO No. 94-68(S), § 14, 8-11-94; AO No. 98-171(S), § 3, 1-12-99; AO No. 2011-113(S), § 67, 11-22-11, eff. 12-22-11)

- **9.30.040 - Parking not to obstruct traffic.**

No person shall park any vehicle upon a street other than an alley in such manner or under such conditions as to leave available less than 20 feet of roadway available for free movement of vehicular traffic.

(CAC 9.30.040; AO No. 78-72; AO No. 80-4; AO No. 2011-113(S), § 68, 11-22-11, eff. 12-22-11)

- **9.30.050 - Parking in alleys.**

A. No person shall park a vehicle within an alley in the central business traffic district except for active loading or unloading of freight or materials.

B. No person shall park a vehicle within an alley in such manner or under such conditions as to leave available less than ten feet of the width of the alley for the free movement of vehicular traffic.

C. No person may stop, stand or park a vehicle within an alley in such position as to block the driveway entrance to any abutting property.

(CAC 9.30.050; AO No. 78-72; AO No. 2011-113(S), § 69, 11-22-11, eff. 12-22-11)

- **9.30.080 - Parking on narrow streets.**

A. The municipal traffic engineer is authorized to erect signs indicating no parking upon any street, when the width of the roadway does not exceed 26 feet, or upon one side of a street as indicated by such signs when the width of the roadway does not exceed 35 feet.

B. When official signs prohibiting parking are erected upon narrow streets as authorized in this section, no person may park a vehicle upon any such street in violation of any such sign.

(CAC 9.30.080; AO No. 78-72)

- **9.30.130 - Parking during street cleaning and snow removal.**

A. The traffic engineer is authorized to determine and designate by proper sign places in which stopping, standing or parking of vehicles would be prohibited during certain hours of the day for the purpose of removal of snow, ice, rocks, gravel, dirt, debris, litter or other accumulation upon public streets, alleys, sidewalks, places, municipal parking lot or other place where the municipality by law or written agreement has a legal duty to make such a removal.

B. When official signs prohibiting parking during certain hours of the day are erected as authorized in this section, no person may stop, stand or park a vehicle in such a designated place.

(CAC 9.30.130; AO No. 78-72; AO No. 80-4)

- **9.30.140 - Parking time limits.**

A. The traffic engineer is authorized to determine places in which there is public demand or necessity for short-time parking and to designate such places by proper signs indicating the time limit for parking.

B. When official signs are erected indicating time limit parking in places as authorized in this section:

1. Except as provided in subsection B.2 of this section, no person may stop, stand or park a vehicle in such designated place for a time longer than indicated on such signs.
2. No person may stop, stand or park a vehicle that displays a valid handicapped parking permit issued or approved by the traffic engineer in such designated place for a time longer than 1.5 times the maximum time indicated on such signs.

(CAC 9.30.140; AO No. 78-72; AO No. 95-6, § 3, 5-16-95)

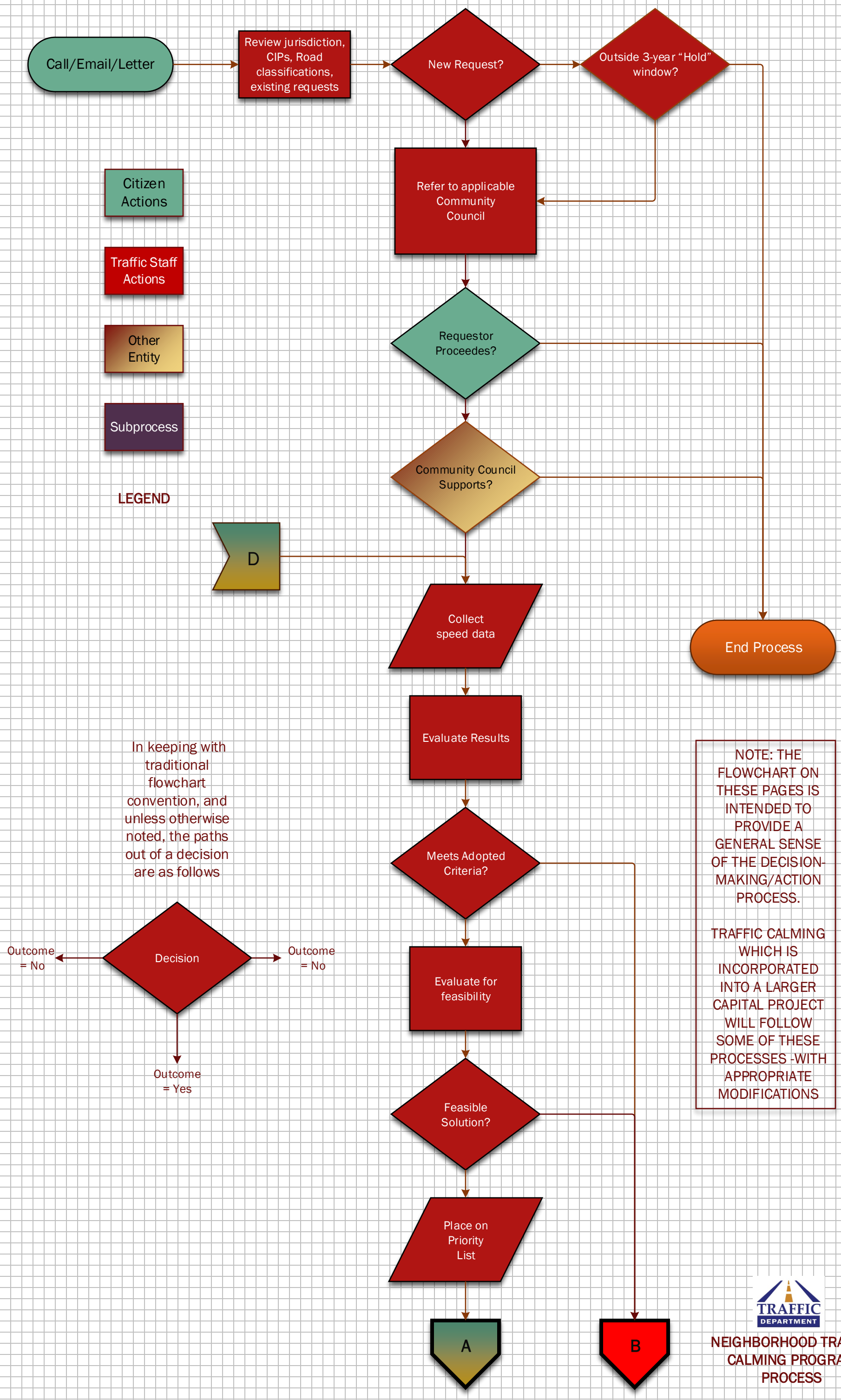
- **9.30.150 - Parking for longer than 24 hours.**

No person may park a vehicle on any street, vehicular way or area, or municipally owned parking lot for a period of time longer than 24 hours, except from Friday noon until Monday noon.

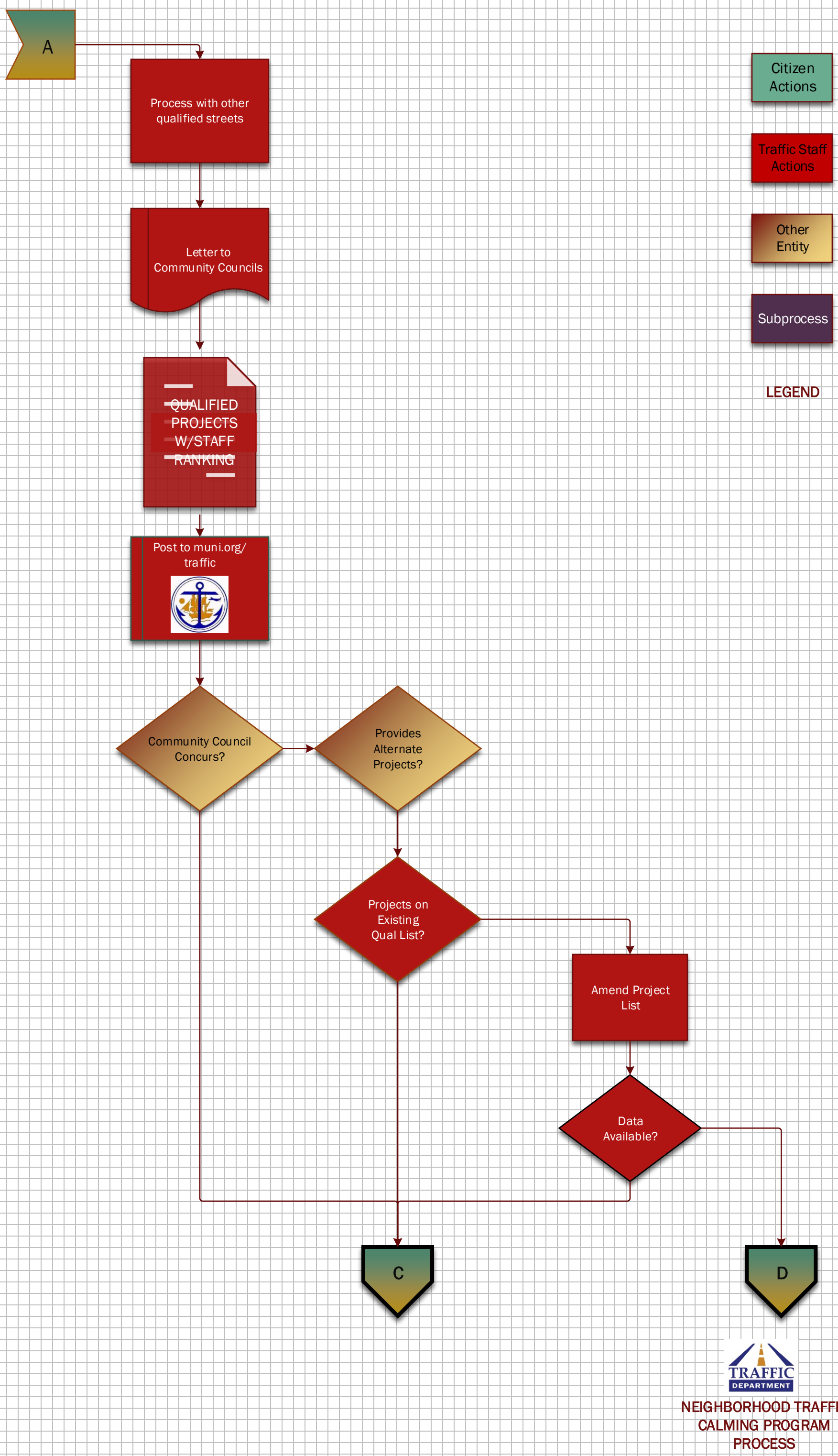
(CAC 9.30.150; AO No. 78-72; AO No. 80-4; AO No. 2011-113(S), § 71, 11-22-11, eff. 12-22-11)

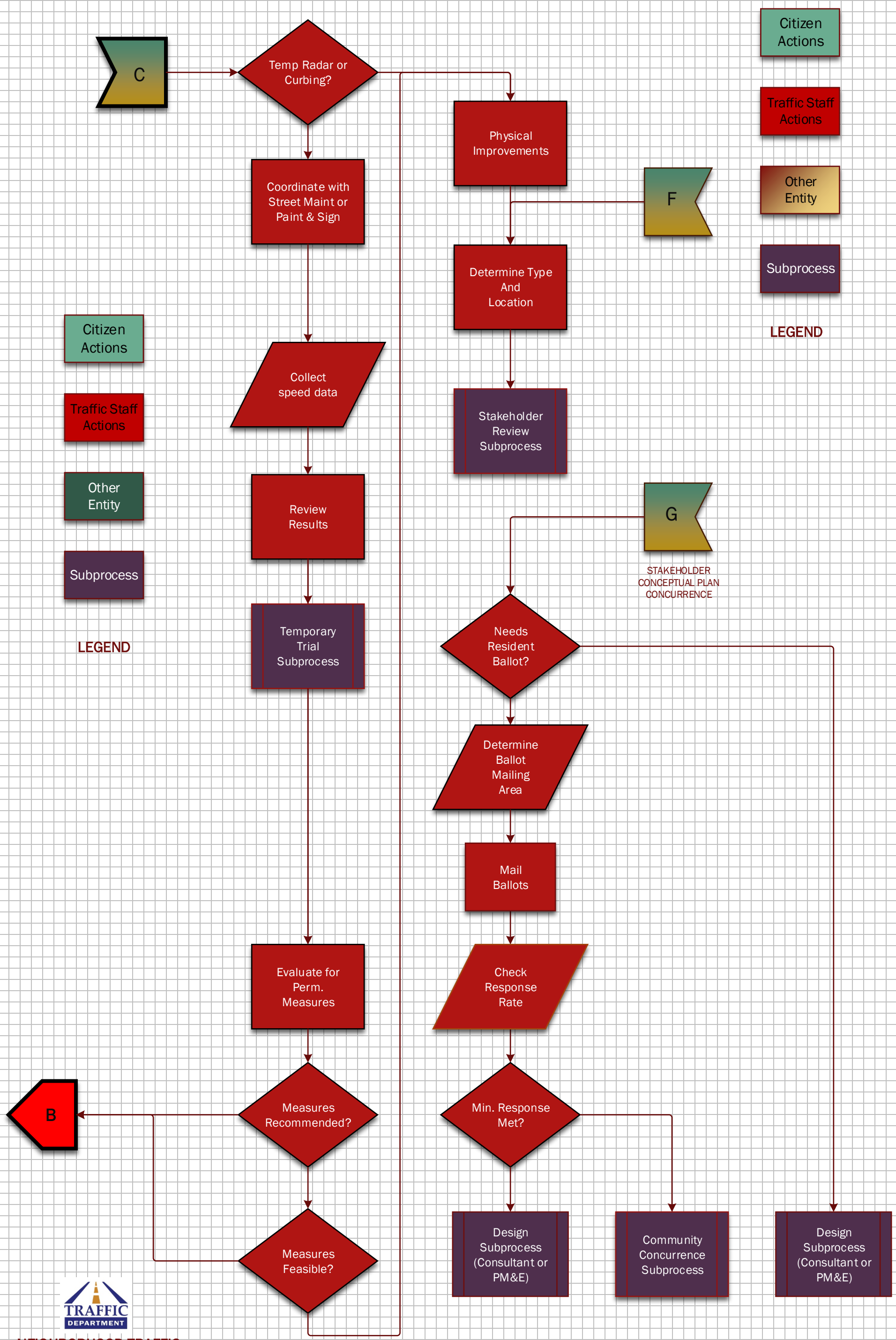
Appendix E

Appendix E



NEIGHBORHOOD TRAFFIC CALMING PROGRAM PROCESS


A
Process with other qualified streets
Letter to Community Councils
QUALIFIED PROJECTS W/STAFF RANKING
Post to muni.org/ traffic
Community Council Concurs?
Provides Alternate Projects?
Projects on Existing Qual List?
Amend Project List
Data Available?
C
D
Citizen Actions
Traffic Staff Actions
Other Entity
Subprocess
LEGEND
TRAFFIC DEPARTMENT
NEIGHBORHOOD TRAFFIC CALMING PROGRAM PROCESS



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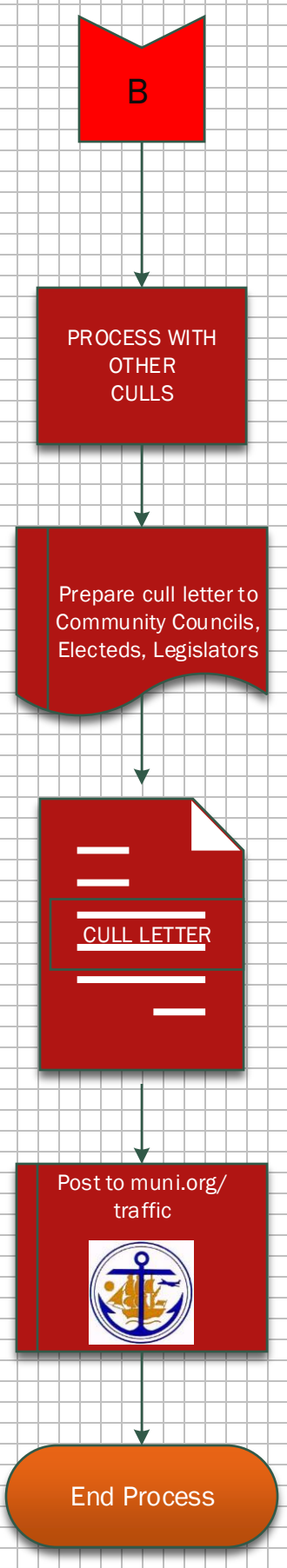

LEGEND

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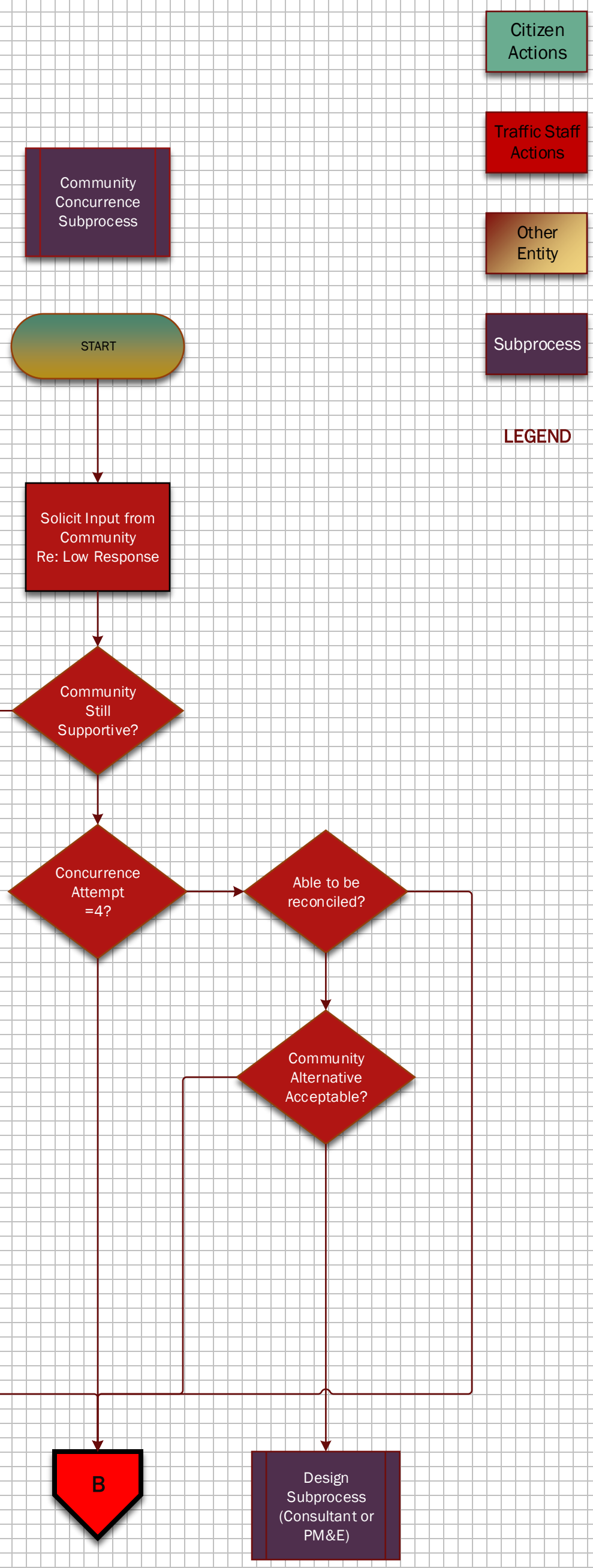
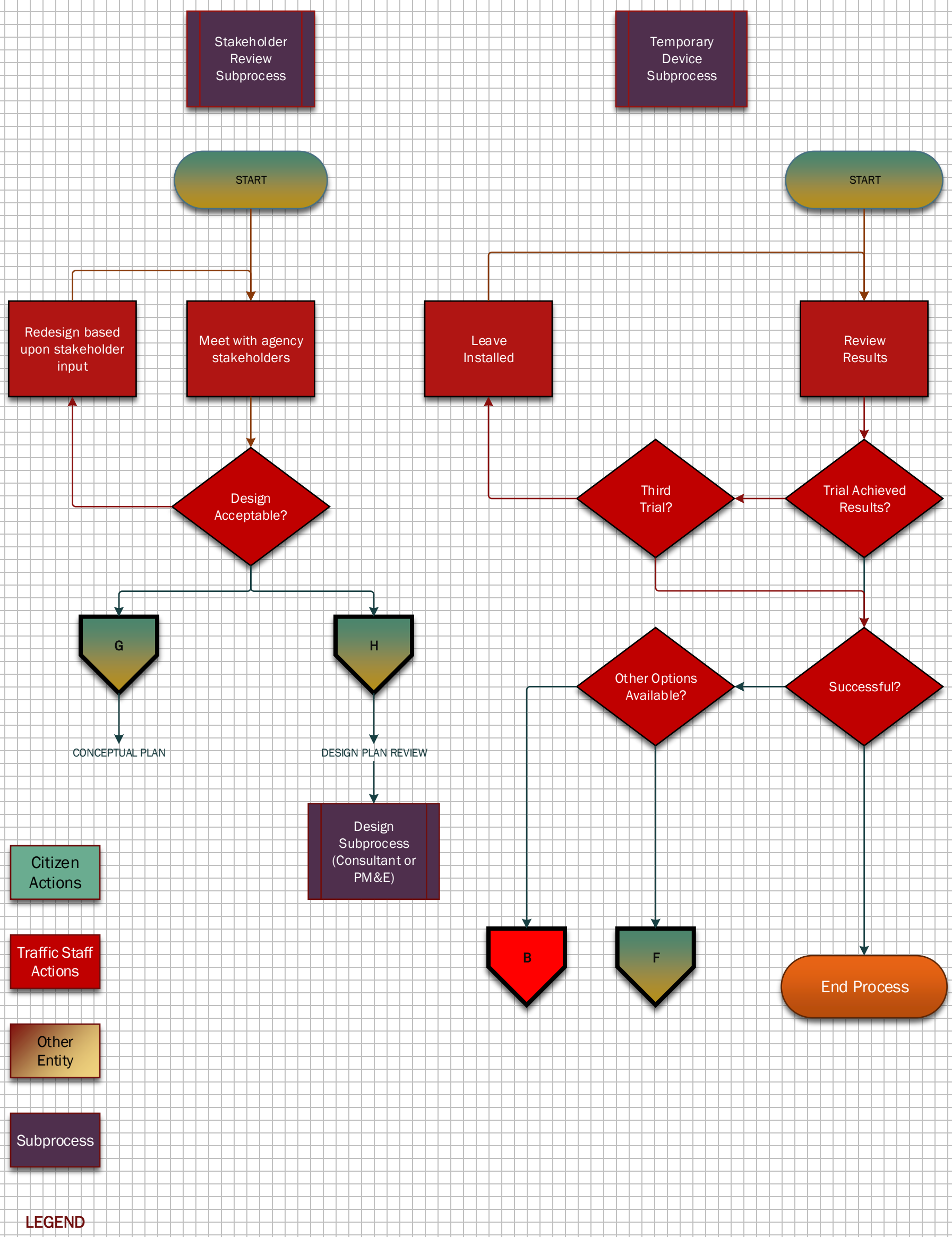


TRAFFIC DEPARTMENT

NEIGHBORHOOD TRAFFIC CALMING PROGRAM PROCESS



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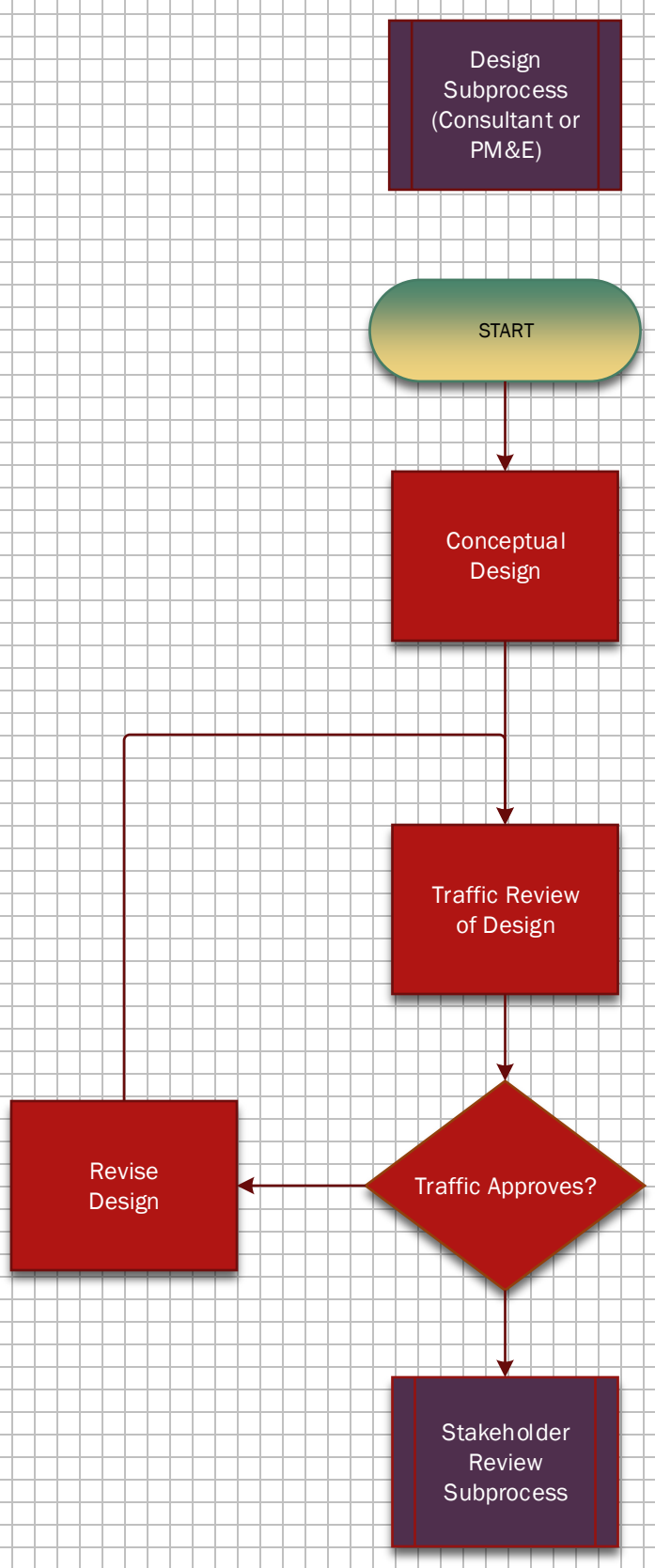

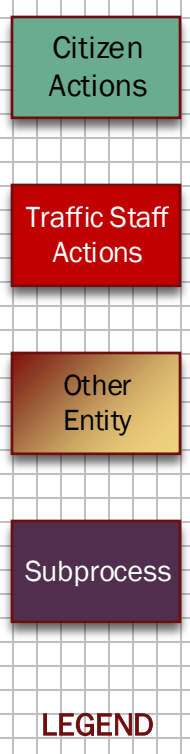

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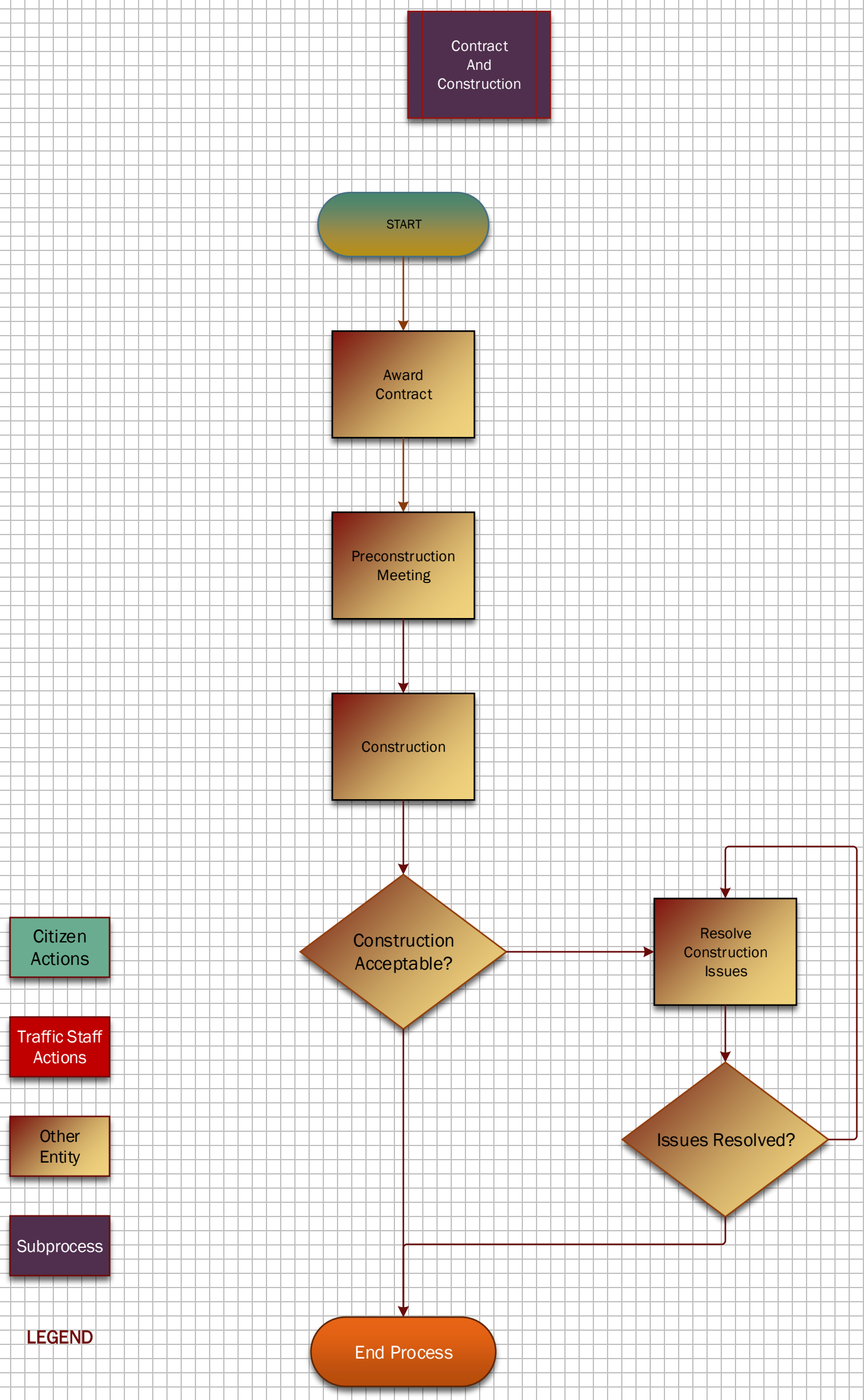

TRAFFIC DEPARTMENT

NEIGHBORHOOD TRAFFIC CALMING PROGRAM PROCESS

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