Emergency Response

Traffic Calming and Traditional Neighborhood Streets

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Origins and Purpose of this Manual

This manual was conceived and written following visits by the author, Dan Burden, to over 800 towns and cities across the nation dealing with speeding, congestion, noise and other problems on their streets. Many of these communities are struggling to make their streets more livable by reducing cut-through traffic and slowing down cars. Unfortunately, fire department personnel — the heroes in many of our towns and cities — often tend to come across as the villains when they oppose these changes. My experience is that fire department personnel are often blindsided by these changes and as a result they respond in a reactive way. When fire department personnel are part of the team that is trying to solve the problems, the results are often very different.

These issues are of special concern to me because I grew up in a family of firemen. My father was a fire chief in Columbus, then at Port Columbus Airport and later in Westerville, Ohio, and my brother recently retired as a lieutenant in Westerville. During the 1950s and 1960s, like many of my contemporaries, I walked and bicycled everywhere. I later spent more than thirty years learning the issues and then working with local governments in the state of Florida to design safe, livable and efficient streets. I believe that specialization and the failure of many professions to learn the broader issues of neighborhood and community design and safety have led to shortsighted approaches. Common sense is lacking in most local neighborhood and town development practices. I now travel to nearly 200 communities each year attempting to bring balance and a holistic approach to these issues, while identifying and resolving conflict between groups of specialists and local residents to promote a workable vision.

This guide, and the videotape that accompanies it, was developed to address some of these concerns and is part of an effort launched by the California-based Local Government Commission (LGC) to develop some tools that are useful to all parties concerned with these efforts. In the fall of 1999 the LGC arranged for me to visit with fire department personnel in Chico and Mountain View, California and Portland, Oregon. During those visits I had the chance to discuss some of the difficulties and challenges traffic calming and narrow streets pose to fire department personnel. I also learned the importance of working with your fire department from the outset.

In too many cases key professionals are left out of the communications loop, and are forced to make decisions in isolation and in defense of their specialization. Traffic engineers, planners, fire administrators, police, architects, developers and neighborhood residents all have something to offer and need to be part of the design team to create better streets and neighborhoods. I hope that this document will contribute to that effort.

Dan Burden

For additional information on the issues discussed in this manual, I refer the reader to ***Street Design Guidelines for Healthy Neighborhoods*** and ***Streets and Sidewalks, People and Cars: The Citizens' Guide to Traffic Calming*** available from the Local Government Commission at www.lgc.org. If you have additional questions or comments check the Walkable Communities web page at www.walkable.org.

EMERGENCY RESPONSE
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The Center for Livable Communities is a national initiative of the Local Government Commission, a non-profit, nonpartisan, membership organization of elected officials, city and county staff, and other interested individuals throughout California and other states.

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INTRODUCTION

During the past decade, residents in communities across the nation have been demanding that cities take action to slow traffic on their streets. The result has been adoption of a wide range of "traffic calming" measures. At the same time, a national movement has emerged that espouses "smart growth" and advocates creation of neo-traditional, "new urbanist," livable communities with narrow streets, lanes and alleys balancing the needs of motor vehicles with walking and bicycling.

While these changes have raised the concern of fire departments and other emergency responders, there is no reason for alarm. Well-conceived traffic calming techniques and traditional neighborhood street design can accomodate the needs of emergency responders while creating safe and livable neighborhoods. However, to insure that emergency response times are given full consideration, fire department personnel — along with other key players — must be at the table.

This manual is designed to provide fire department and other emergency response personnel with a working knowledge of traffic calming and traditional neighborhood street design so that they can play a partnership role in discussion and implementation of these measures. It is also designed to give elected officials, city managers, planners, traffic engineers and residents greater understanding of some of the challenges that emergency responders face.

The problem often starts when we think of streets as places designed only for cars and trucks. This view has become dominant throughout the U.S. in the past 50 years. But streets, especially local residential streets, have many roles to play. They are the "outdoor living room" where neighbors meet, kids play and we develop a sense of community. They are the place where our kids walk to school, learn to ride a bike and begin to develop the skills for coping with the larger world. They are also the place where our parents and grandparents remain connected and vital. As we build new communities and revitalize existing ones, we need to recognize that local streets have many roles to play and the movement of cars and trucks is only one of them.

Unfortunately, our task has been made more difficult by traffic management and traffic calming programs in many communities that have not been very well thought out.

For example, the proliferation of unwarranted stop signs, street closures and speed humps that result in significant increases in emergency response times is cause for concern.

However, this writer has found that cities with the most effective traffic calming and traditional neighborhood street programs rely on highly interactive partnerships between residents, engineers, policymakers and emergency response personnel. Leaving any stakeholder out of the process leads to problems; the needs of each group must be analyzed and evaluated. For example, Portland, Oregon fire administrators were left out of early traffic calming plans. This resulted in installation of speed humps and other measures on emergency response routes which caused delays of several minutes to some calls and eventually forced the department to abandon these important routes.

Emergency responders try to stay under a 4-minute response window to reach non-breathing patients in time. This response time also reduces the danger of fire, which doubles in intensity every minute.

Today, the planning and public works departments work with the fire department and other city agencies and residents to make sure traffic calming treatments meet their needs.

One thing that is certain: America has evolved a high degree of specialization in town and city development and management. This specialization, combined with poor communication, leads to planners, politicians, traffic engineers, police and fire administrators working independently and often at odds with one another. In addition, more and more citizens are feeling out of touch with their government. Given this atmosphere of poor communication, all sides tend to overreact.

Towns and cities implementing traffic calming programs report some bizarre behavior. A citizen in one California town carried his dead cat into City Hall, interrupted council members, and said *"There...the blood of my cat is on your shoulders....I hope you are happy!*" He got the City Council to install a dozen speed humps — against the advice of consultants urging the Council to wait for a month until a formal plan to install more sensitive and appropriate treatments could be worked out.

Recently, in one Idaho city the mayor ordered the fire chief to drive his truck into a roundabout while TV crews were filming. The reason? He wanted to prove that a roundabout would not work in his city. The press and public found this behavior childish and scary.

In this manual we describe a new language, vocabulary, art and science of neighborhood planning and traffic management for fire administrators. It is important for administrators of fire departments and fire marshalls to know why tighter corner radii are effective measures and may not slow response times. It is just as essential for traffic engineers or citizens to know why speed humps are not recommended on most emergency response routes.

It is also important to understand that traffic calming is still a "work-in-progress." While many of these issues are fairly common in parts of Europe, Australia, Japan and Canada, in the U.S. we still need more years to develop and test long term solutions. There is no national standard or "best practice" to follow. However, there is a lot that we do know, and it would be a serious mistake to dimiss traffic calming and traditional neighborhood street design as a fad.

Part One of this document covers some of the common myths about traffic calming. Part Two covers the tools of traffic calming. Part Three addresses new street-making skills, lists the important role of good land use planning, and discusses the design of streets of the future.

New cars on old streets. *America's oldest city, St. Augustine, Florida has some extremely narrow streets. With slight adaptation, conventional equipment is used throughout this historic district. Fire administrators have learned to use special equipment and approaches to protect some of the nation's oldest and best streets. Future streets are not likely to be this narrow, but to reach agreement on community-sensitive design will require greater flexibility.*

PART ONE: FACTS AND MYTHS

In an atmosphere in which emergency response personnel are sometimes left out of the fast changing community development and traffic engineering loop, it is sometimes hard to separate fact from fiction. This portion of the guide addresses common myths about driver behavior and traffic calming.

Fact or Myth #1

Faced with traffic calming measures, motorists will become more aggressive.

This statement is false. Most motorists behave aggressively on primary streets and highways where they are stuck in traffic or delayed for many minutes at busy intersections. Traditional and traffic calmed streets are designed to allow for a steady — albeit slower — flow of traffic. As a result, stress can be reduced in these tamer environments. Aggression does tend to escalate on higher speed suburban streets. These problems will continue. The same machines that give us freedom, access and mobility, making suburbs possible, getting us where we want to go "right now!" have also become dead ends for many. People report that they spend far too much time in their cars. This leads to aggression, frustration and many hours a week of personal lost time. Parking spaces are hard to find in many areas, intersections are jammed, and children have greatly reduced freedom to go places and do things on their own. New designs of neighborhood streets with traffic calming can help heal and repair many, but not all, of these problems caused by our over-dependence on motor vehicles.

Macho Man auto driver. *Furious tempers arise from being stuck in traffic. Tempers rise fastest on congested highways and arterial streets. Some drivers take to local streets just to stay in motion. Neighbors want to stop this unwarranted traffic. The appropriate response of a city is to fix the primary streets and intersections. Once traffic increases on local streets, traffic calming becomes a community priority. Faced with increasing traffic (averaging 2-5% growth per year) the desire for traffic calming will grow dramatically in the next decade.*

Fact or Myth #2

Traffic calming reduces response time.

Half-true. Poorly plannned traffic calming can impact response times. Well planned traffic calming programs should not. On some routes, traffic calming improves response times. Proper use of traffic calming on Balliol Street in Toronto, Ontario, where stop signs were removed, improved response times by 33%. Use of the right tools and attention to proper locations makes traffic calming a healthy partner to the safety mission of a town, reducing overall neighborhood crashes by 50-90%.

Fact or Myth #3

Traffic calming devices damage fire equipment.

This statement may be true. Case studies in Portland and other cities suggest repeated exposure to vertical traffic calming tools such as speed humps and speed tables may accelerate stress fractures of ladders, cabinets and other equipment and accessories. It is best to insist that such tools as humps not be placed on primary emergency response routes. Dips and potholes have similar effects.

Some tools improve access. *Well selected and well placed traffic calming features do not slow responders, and may help insure access. In this test in Chico, California the entry curb extension (neckdown) prevented motorists from parking near the intersection. When cars were parked near the intersection the maneuver took 90 seconds. With the neckdown, the maneuver was back to the normal 6 seconds.*

Select the right tools. *A series of speed humps on primary emergency response routes not only slows response, but may cause increased equipment fatigue. In most cases it is best to find alternatives to humps. In Everett, Washington an alternative treatment has similar speed reduction effects (bottom photo). The street is visually narrowed by striping to one ten foot lane. The narrower lane slows traffic but does not impede emergency response vehicles. This can be done at a lower price and provides a better alternative for everyone.*

Fact or Myth #4

Roundabouts and circles can delay emergency response times by up to 30 seconds.

This is largely untrue. Traffic circles are very large and can cause delays. However, large circles are not considered to be traffic calming devices. Most roundabouts, which are much smaller than circles, tend to speed up rather than delay emergency responders. Compared with four-way stop controls and many signalized intersections, which bring responders to a dead stop and can result in long queues, a roundabout keeps traffic moving. Typically, roundabouts slow most emergency equipment to 10-11 mph. But, by having empty intersection queues, response times may be improved by as much as 30 seconds, and even more in peak traffic times.

Roundabouts reduce intersection queues. *This Port Orchard roundabout is slightly larger than the previous intersection it replaced. Response times are kept in balance. Although it takes another 3-6 seconds to go around the new intersection, the queue of cars that slowed responders many hours of the day is gone. The added efficiency of roundabouts eliminates many delays caused by stacked traffic. The impact of roundabouts must be weighed against typical stacking at signalized intersections, traffic that usually must be bypassed.*

Fact or Myth #5

Traffic calming and narrow streets hinder site operations.

Largely untrue. Properly designed streets in new traditional developments include curb extensions at, or near, hydrant locations, thus prohibiting parking and assuring a full 20 foot space for operations. Close coordination with developers and planners assures high quality access and space for operations.

Fact or Myth #6

Traffic calming restricts access to streets.

False. Properly designed traffic calming measures include curb extensions, mountable medians and neckdowns designed with turning radii that allow adequate access to streets. For example, curb extensions physically prohibit motorists from parking near intersections where they might block access. Entry times into streets remain unchanged. In the most progressive traffic calming projects, new points of emergency access are provided to the neighborhood, enhancing walking and bicycling, as well.

Neckdowns improve access. *This neckdown in Boulder, Colorado not only reduces the entry speed of motorists, it insures that no one will park at the "throat," thus allowing access to the street.*

Fact or Myth #7

Traffic calming should not be used on emergency response routes, collector roads or arterials.

Partly true. Most traffic calming tools, such as chicanes, diverters, humps and tables should not be placed on major routes. However, all visual tools which help slow speeders, such as gate-ways, medians, landscaping, pigmented bike lanes and similar devices have no negative effect on emergency response. Meanwhile, properly designed lane width reductions, lane reductions, roundabouts and mini-roundabouts, which help improve the flow of traffic, are appropriate for many of these locations.

Fact or Myth #8

Traffic calming has no net safety benefit.

Not true. With good community and traffic calming planning, delays to households can be minimized. Good planning and placement of response equipment, selective use of first response equipment, efficient intersections, and improved access to neighborhoods have positive effects. Meanwhile, risk to residents from traffic in neighborhoods is real. Many Seattle neighborhoods, where traffic calming has been used for over 20 years, have seen a 93% reduction in crashes. Other neighborhoods report a 25-80% reduction in crashes.

Fact or Myth #9

Street closures greatly impact emergency access and response time.

True. Traffic calming practicioners are cautioned to stay away from street closures and other measures that reduce access. Recent experiments with street closures in such cities as Coral Gables, Florida, and Dayton, Ohio have been regressive. They often simply move traffic to another street and create new problems there. Only in rare cases are street closures warranted and helpful to a neighborhood. If such closures are warranted, pedestrian, bicycle and fire access must be retained.

Bike lanes help emergency responders. *This major collector in Chico, California is well designed to calm traffic without vertical or even horizontal deflection tools such as humps and chicanes. The collector is calmed by restricting the street to two lanes and adding a median. Motorists pull into the bike lane to let responders pass. The bike lanes also allow wider turning radii at corners. Meanwhile, on a local street network, short medians and restrictive entries (below), allow easy access and movement. The visual effects combined with the horizontal deflection slow traffic to acceptable levels.*

Fact or Myth #10

Fire fighters have been injured or killed when hitting traffic calming measures.
Sadly true. Speed humps hit by a fire truck at high speed can cause personal injuries, and a standing or unbelted firefighter can be tossed from a vehicle. Clear safety rules on response procedures and practices, adequate protective gear, safe driving, training and supervision can eliminate these preventable risks.

Speed humps and tables can be hazardous. *If hit at a high speed, this speed table could injure a fire fighter. Drivers and other responders adhering to proper training, national response guidelines, use of equipment and other safety precautions should not be affected by properly designed and marked traffic calming features.*

Fact or Myth #11

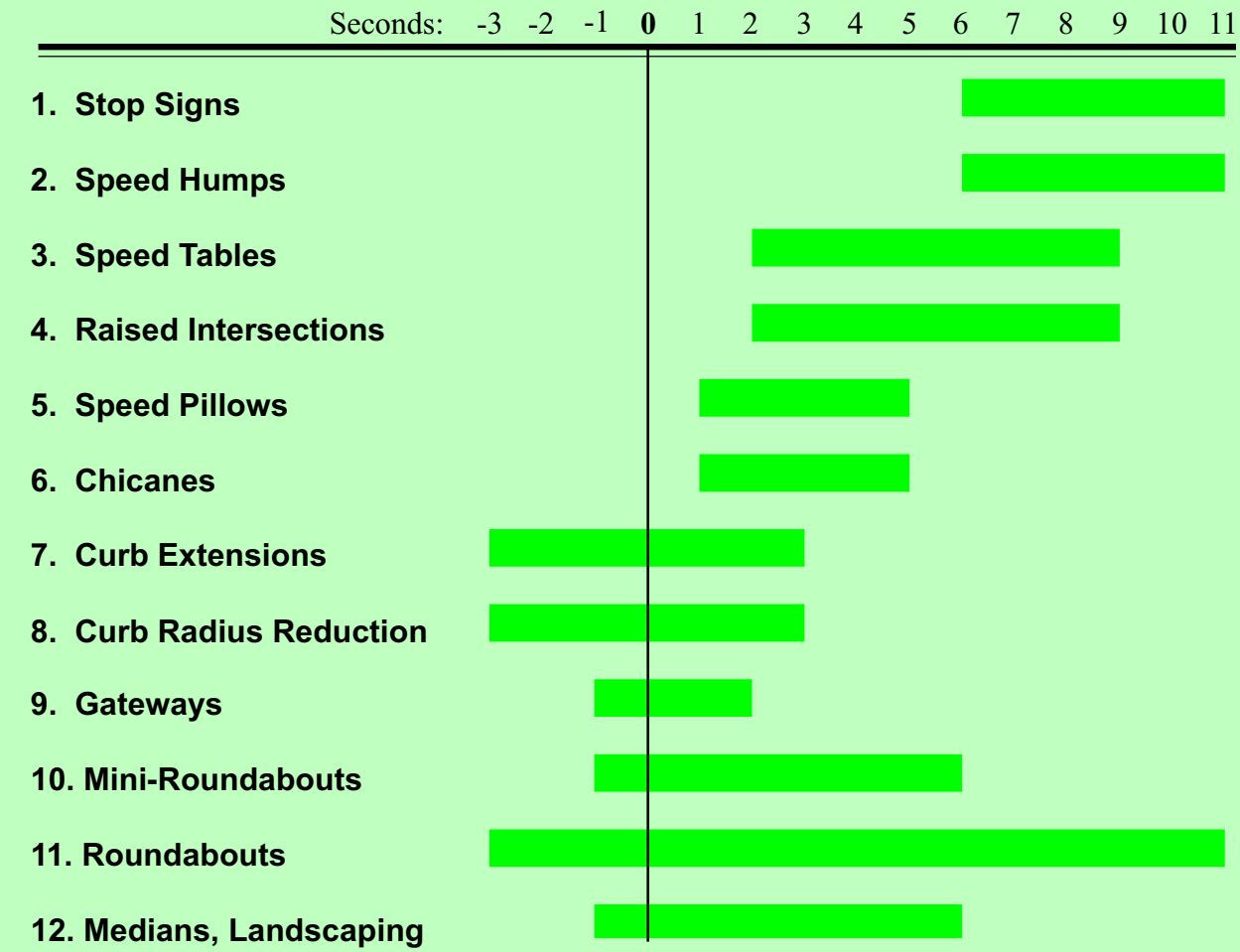
Traffic calming tools create added pollution, noise and risk.
Properly planned and placed traffic calming features have no negative effect on the environment. Most studies show that appropriate traffic calming tools produce steady, proper travel speeds through neighborhoods. This results in less noise, pollution and other negative effects. However, improperly placed humps and stop signs can have negative effects, including speed spiking, noise and traffic diversion to other streets. This can then result in the proliferation of poorly designed treatments.

Traffic calming has multiple benefits. *Traffic calmed streets reduce pollution, noise, risky behavior and inappropriate activities. This turn in Brea, California is properly designed for the typical elbow of a suburban street. Motorists exceeding 12-15 mph here would be uncomfortable. There is more than ample turning radius for the largest vehicles, including moving trucks.*

Speed humps can cause problems. *Inappropriate placement of traffic calming tools, such as speed humps, not only creates speed spiking, noise and delay, it also tends to transfer the problem to a nearby street, where concerns lead to installation of more inappropriate measures. Appropriate traffic calming tools must be placed using a systems-wide approach, treating an entire neighborhood, and not just the most pronounced problem site.*

PART TWO: TRAFFIC CALMING

Approximate Delay Caused by Different Treatments



Introduction to Traffic Calming

Americans have been concerned with the impact of cars on neighborhoods since the first autos came on the scene. For example, the Anti-Automobile Society, formed in Pennsylvania when the impact of autos was first being felt made this harsh pronouncement:

> *"Anyone driving a horseless carriage at night should come to a stop every mile and send up a signal rocket, then wait 10 minutes for the road to clear. If a team of horses should approach along the road, the motorist was obliged to pull off the road and cover his vehicle with a large canvas or painted cloth that would blend with the surrounding landscape. If the horses refused to pass even then, the motorist had to take his vehicle apart piece by piece and hide the pieces under the nearest bush."*

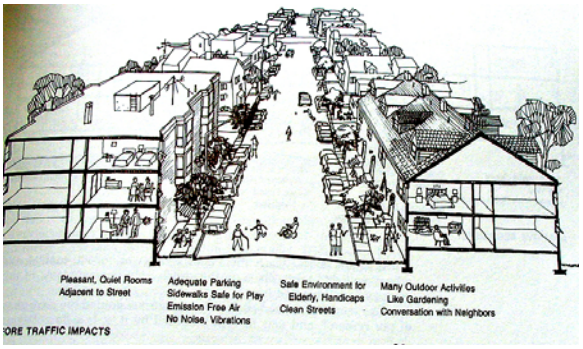
Imagine delays for emergency responders if such rules had ever been enforced! Fortunately, actions to tame the auto have taken a milder tone.

But while measures to civilize the car are more moderate today, traffic concerns are increasing as our towns and cities continue to grow, and as we've spread out more in a low density sprawl pattern of development to escape "overcrowded," "congested," "noisy" cities. The irony is that vehicular congestion hasn't gone away; instead it's gotten worse because in many of the suburban communities built since the 1950s we separated uses to such an extent that we made it impossible to run simple errands without jumping in the car. By now, more and more people recognize that there is no place to flee, and that we need to take steps to deal with the car and mitigate its negative impacts in the neighborhoods and streets where we live. Traffic calming has emerged as a reasonable way to do that.

So what is traffic calming, and how extensive are the treatments?

Traffic calming consists of a set of mostly physical treatments, or changes to roadways, that help manage the flow of traffic while requiring motorists to behave in a civil manner around shopping districts, schools and neighborhoods. Traffic speed, noise and volume are often reduced and a more even distribution of traffic often results from these efforts. Impacts range from moderate speed reductions (31 mph to 25 mph is common) on local streets, to reduced turning speeds on corners, improved pedestrian access across streets, and some arterial road adaptations (4 lanes may be reduced to 3 lanes).

Orlando, Florida is reconditioning many brick streets. Westmoreland Drive was traffic calmed by stripping off asphalt and reclaiming the former brick street and adding two roundabouts. Speeding was greatly reduced. Property sales and values climbed measurably following the changes. In retrospect, paving over brick did not save on maintenance costs, and by making higher speeds possible, these actions depressed residential home values. Measures such as brick streets have limited impact on response times.



Donald Appleyard's late 1970's work "Livable Streets" helped establish the harmful effects of traffic noise, volumes and speeds on neighborhood quality of life. When traffic volumes are low, as shown above, people play and associate with others and use the front portions of their homes. When traffic volumes, noise and speed are high, people abandon the front of their homes and interaction with neighbors is reduced.

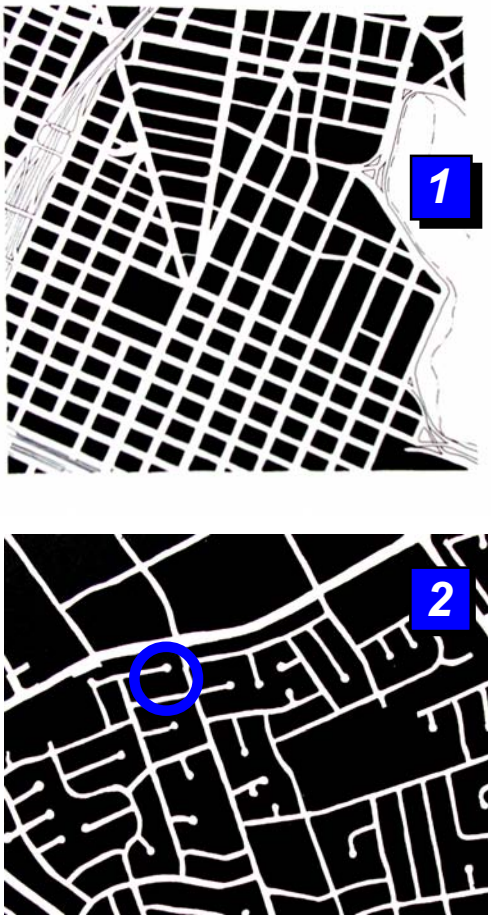
Measure of success. The measure of success of a traffic calmed street is not only seen in lower crash rates, speeds or volumes but in the number of people, and especially children, seniors and gardeners out in the street walking, playing and greeting their neighbors.

Long term changes to traffic calming should produce a rise in home owners versus renters,

and a general increase in property values. Some traffic calming measures are immediate, as was seen on Westmoreland Drive in Orlando, Florida. Rebricking the streets there and adding two roundabouts at either end, led to a general rise in property values and allowed people to sell their homes for the first time in recent years. In most cases, however, property values will only rise after longer term changes to improve the attractiveness and character of the neighborhood are implemented.

Origins. Traffic calming, like road rage, is a reaction to the dominance of the car or to design that has focused entirely on automobiles. People inside cars are getting more and more upset. People outside of cars are also unhappy. These emotions are likely to become more common among a larger portion of the population as driving demands increase. At the same time, towns and cities of every size and in every region are running out of simple, affordable or even feasible solutions for moving and storing cars. And moving to the suburbs is no longer viewed as the solution.

How did we get this way? Land development patterns launched in the forties and fifties with the birth of suburbia now account for 80% of the built neighborhood form. These new patterns not only included wide, often treeless streets and dead end cul-de-sacs, but more significantly they tended to isolate us from other people and from many of our basic daily needs. Separation of homes from stores, offices and even parks and schools, has resulted in most families making an average of 10 auto trips each day. Families that used to manage with one car now have two and sometimes three to four cars, which has compounded the problem. The former classic development pattern with a grid of streets that connect to nearby shopping, churches and parks (top illustration) was replaced by the isolation of cul-de-sac suburban patterns (bottom illustration).



Emergency responders in historic Oakland, CA (1) above, have dozens of access routes. In Walnut Creek, CA (2) access to the circled cul-de-sac has only one point of access and is difficult to reach. Meanwhile, Radburn, NJ (3, next page), a neighborhood built in the 1920s, that preceded the modern day suburb, provides good access. Green space and low speed streets are maximized. The 1928 Radburn low-speed traffic model is linked to the birth of modern day traffic calming. (Credit, 1-2, Allan Jacobs "Great Streets" and 3, Randall Arendt, "Rural by Design.")

Cul-de-sac development patterns made it harder to get emergency equipment to more distant, landlocked and isolated homes, thus leading to insistence on wider streets, removal of on-street parking and wide turning radii. Nonetheless, the result is that the emergency responder often has greater distances to travel to small residential pockets on streets that are poorly connected. At the same time, driving distances have become longer as we've spread out more in sprawling development patterns.

Motorist and community response. To minimize time spent in the auto, drivers want to go faster and have fewer interruptions. As motorists drive faster on streets that welcome speed, residents look for tools that promise a reduction in speed. Enter the stop sign.

Early response to the domination of neighborhood streets by the car resulted in many residents lobbying for, and getting, stop signs. Some towns and cities report that 15-45% of existing neighborhood stop signs are

unwarranted. To make up the loss of time caused by stop signs or signals, many drivers speed up between intersections. Speed spiking and loss of response time results from incorrect use of these traffic tools.

Traffic calming is growing in popularity. Traffic calming is still young in America. Based on world trends, and many developing national issues, traffic calming will grow exponentially in the next decades. Smart growth, sustainable communities, desire for open space, rebuilding main streets, walkable communities, fitness lifestyles, more association with neighbors, a desire to get away from sterile neighborhoods, clean air and many other trends are pointing to significant interest in traffic calming.

In the section that follows, we explore some of the most common tools that can be used to calm traffic. We also discuss their impact on emergency responders. (For a more detailed discussion on traffic calming treatments, please refer to *Streets and Sidewalks, People and Cars: A Citizens' Guide to Traffic Calming* published by the Local Government Commission.)

Traffic Calming's Roots in America. *Radburn, New Jersey's innovative design, developed in the 1920s, was a first attempt to overcome early impacts of auto traffic. This low-speed design was later adapted for the first early traffic calming efforts in Holland and England. So, while we can trace the roots of traffic calming to the United States, it would be another thiry years before modern traffic calming would return to this country.*

1 Stop Signs

Stop Signs are not traffic calming tools

When communities lack a well thought out traffic calming program, residents often ask for unwarranted traffic control devices, such as stop signs, to be installed at inappropriate locations. Working with your community to get a balanced traffic calming program underway reduces placement of measures that might be inappropriate, such as stop signs. Good dialogue between city management, traffic engineering, elected officials and residents is essential to overcome stop sign abuse.

Average Delay: 6 – 11 seconds

Delays depend on the amount of visual screening at corners (i.e. parked cars, landscaping, buildings), as well as the weight and capabilities of the responding vehicle.

Comments:

1. Implement alternative traffic calming solutions.
2. Use curb extensions which remove some, or most of the screening at intersections and assist in response speed.
3. Consider mini-roundabouts, a superior intersection tool for many settings, that can reduce delays by 3-6 seconds.

Appropriate locations for stop signs:

Stop signs are acceptable where warranted, as specified by the Manual on Uniform Traffic Control Devices (MUTCD). An engineering study is needed to determine appropriate locations. Some cities install 20-40% more stop signs than are needed. Removing unwarranted stop signs can improve city-wide response times.

Inappropriate stop controls on emergency response routes are most critical, since they can delay responses to many locations. Work especially hard to overcome the inappropriate placements of stop signs. Curb extensions can often calm traffic while improving visibility for motorists entering streets (new sight triangles are created).

Of concern, but of lesser importance is placement of stop signs on local streets, especially in the last block or two of more remote housing.

Inappropriate use of stop signs delays response time to many locations. Work with city, state and elected officials to systematically remove inappropriate stop signs, replacing them with more appropriate tools such as mini-roundabouts that keep motorists and responders in motion. Stop sign placement should not be tolerated on collector and other primary response routes. If streets are wide, or on-street parking is needed, curb extensions improve sight distances (below). Wide streets can accomodate mini-roundabouts which can be used to make U-turns (bottom photo).

2 Speed Humps

Speed Humps are often overused

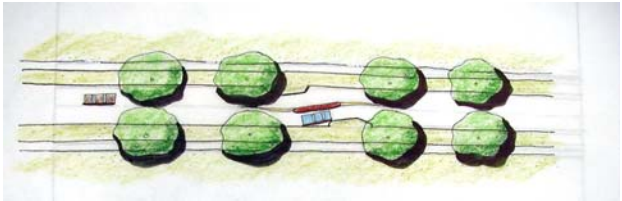
When communities lack a good traffic calming program, residents often ask for speed humps, since they are the only tool they know. Speed humps are also quite inexpensive ($1-2,000 per device), and therefore popular among budget-wise communities. However, humps in one location tend to shift the problem to parallel streets, thus requiring more humps. Speed humps can also be noisy. Working with your community to get a balanced traffic calming program underway reduces placement and inappropriate use of speed humps. Good dialogue between city management, traffic engineering, elected officials and residents is essential to overcome the overuse of speed humps. Once speed humps are in place, it is often difficult to work with residents to get more appropriate tools in place.

Average Delay: 6 – 11 seconds

Delays depend on severity of humps, location and the size, design and weight of responding vehicles. Large aerial ladder trucks with widely spaced axles take the longest to cross. There is also some evidence that humps stress equipment and create unnecessary wear.

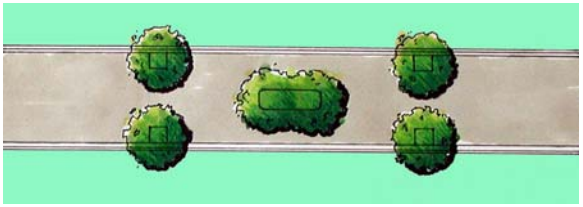
Comments:

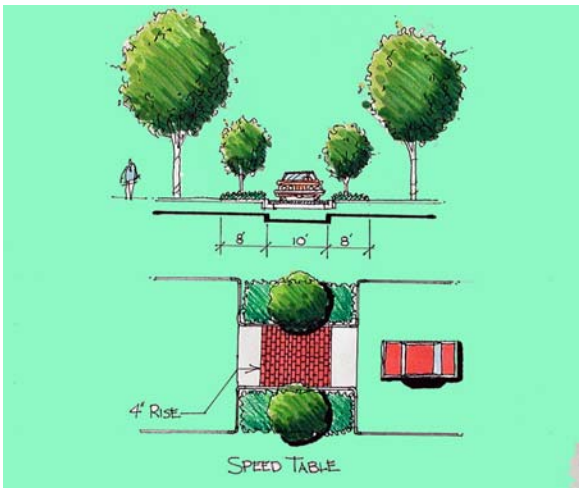
1. Implement alternative traffic calming solutions.
2. Consider using speed tables instead (page 12). All horizontal deflection tools and visual tools are preferred to vertical measures. Speed pillows (page 14) are also good alternatives.
3. On long blocks, short medians, one lane slow points, tree wells, and similar chicane effects are superior and more attractive.
4. Work with traffic engineers to allow sufficient horizontal deflection for these alternatives. If on-street parking is needed to keep appropriate deflections, do not insist that parking be removed.



Angled slow points *may be used when there is sufficient space between driveways. Fire trucks can straddle these low medians.*

Speed humps are especially abused on steep downgrades as seen in this example from Maui, Hawaii. These humps were used on a short cul-de-sac street of no more than 1,000 feet. Better solutions include tree wells (below), angled slow points (bottom left), or other tools that slip easily between driveways. When possible, suggest developers package driveways with double-drives every 200 feet or so. This design reduces the number of driveways. Presence of too many driveways eliminates effective on-street parking. Double driveways also provide 20-foot wide, or wider, operation zones near many properties. Reduction of driveways also allows greater selection of traffic calming tools. Speed tables (bottom) are easier for emergency response vehicles to navigate than humps.





3 Speed Tables

Speed Tables assist street crossings

Compared with speed humps, speed tables provide less of an impediment to emergency equipment while providing communities added value. Emergency response is slowed less than with speed humps, since speed tables have a gradual rise (1:12 to 1:20 rise), a flat area on top of at least ten feet, and then an equivalent descent grade. Community benefits include improved yielding by motorists to pedestrians and bicyclists at school crossings, bike trails and in some commercial area applications.

Average Delay: 2 – 9 seconds

Delays depend on size and weight of equipment, and overall operating speed. Delays are greater on collector streets, where running speeds are higher. Tests conducted in Portland, OR in 1995 found that 22-foot long speed humps (with a 10-foot long flat top) resulted in delays of from 0 to 9.2 seconds.

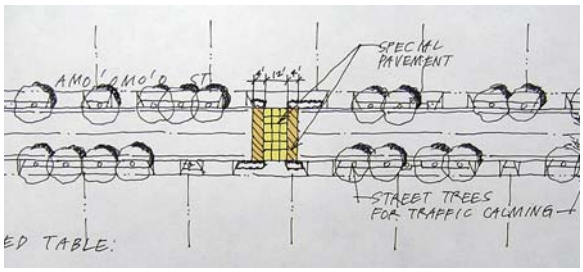
Comments:

1. Use alternative traffic calming solutions, especially medians with curb extensions that narrow travel lanes to ten feet.
2. Limit speed tables to the most vital locations, such as around schools, parks, senior centers and low speed commercial streets.
3. Use strong visual techniques such as Seminole Hump markings (middle photo, page 21) to enhance slowing, and keep vertical rise to a minimum (1:20).
4. Use markings in conjunction with imbedded roadway lights that flash when pedestrians are present as alternative to speed tables.

Appropriate locations for speed tables:

Speed tables are best used on side streets, local streets and areas not on emergency response routes. Some limited applications on emergency response routes are warranted, especially if the number of treatments is limited and has multiple benefits, such as enhancing motorist courtesy to pedestrians crossing the roadway. Speed tables are important tools on or near elementary, middle, high school and college campuses where pedestrian crossing volumes are high.

In Grand Junction. Colorado this flat-topped speed table (above) creates a level surface for pedestrian and trail crossings. Speed tables, such as this one, can be applied as the only traffic calming feature. As shown below speed tables can also be used in combination with medians, curb extensions and other treatments.



4 Raised Intersections

Raised Intersections serve as gateways

Raised intersections are superior to 4-way stop controls, which significantly slow responders. Raised intersections are most popular in downtowns, college campuses and other special locations. They are also used in neighborhoods as gateways into subdivisions. Their high cost limits the frequency and locations of these often colorful treatments. They are most often used where motorists have a history of failing to yield to pedestrians. Raised intersections are useful in tight rights-of-way where large trucks must turn and roundabouts cannot fit.

Average Delay: 2 – 8 seconds

Delays depend on length of intersections, general travel speed along the corridor, whether turns are being made, and related operational factors.

Comments:

1. Use alternative traffic calming solutions, especially mini-roundabouts, roundabouts and modified intersections.
2. Consider that intersection humps are the most expensive vertical deflection tool. They are most often used as gateways into downtowns or prominent neighborhoods.
3. Use improved, standard at-grade intersection geometrics, and provide added safety with median noses to slow left turning motorists. Also use “pork chop” islands to separate conflicts with turning vehicles.
4. Use colorful paver stones or other visual effects to slow motorists.

Appropriate locations for intersection tables:

Use as replacements to 4-way stops and other problem intersections where volumes are moderate. If volumes are higher, roundabouts provide higher performance and safety. Intersection humps are often used as gateways. When possible keep away from major response routes, especially near fire stations.

Raised intersections can be used for lower speed environments, or as gateways at the juncture of two collector streets. They can also be used where collector and local streets intersect. Raised intersections are popular in shopping districts and other locations where many pedestrians are found.

Modified intersection in Honolulu, Hawaii (below) uses horizontal deflection instead of vertical deflection. Motorists have greatly increased their courtesy toward pedestrians at this high volume intersection. Emergency responders are slowed slightly with this treatment which is located within half a mile of a fire station.

Raised intersection in Seattle, Washington (bottom).

5 Speed Pillows

Speed pillows are attractive solutions

Speed pillows are designed to force motorists to track around both sides of 3-4 inch raised islands. Speed pillows work best with additional measures such as curb extensions, landscaping and medians. Larger vehicles, such as fire trucks can straddle the pillows and hence there is little, if any, loss of time. Short wheel base ambulances may need to slow slightly, producing a 1-4 second reduction in response time.

Average Delay: 1 – 4 seconds

Delays are experienced only by smaller equipment, such as small wheel base ambulances. Larger equipment is not affected by speed pillows.

Comments:

1. These treatments are strongly preferred by responders over the delays and vertical jolt of humps.
2. Should be designed so that they are easily detected.
3. It is helpful to add curb extensions to create a narrowed ten foot opening and to provide space for landscaping. With such additional aids, it becomes easy to detect and steer vehicles into the center of the roadway. Experienced large vehicle operators can easily straddle the pillow.

Appropriate locations for speed pillows:

Speed pillows are especially effective around schools, parks, commercial side streets and similar locations. Pillows may be a preferred treatment as part of colorful gateways, and as a preferred alternative where there is a strong desire by neighborhoods to have speed humps.

Speed pillows are effective on narrow streets with lots of driveways and on-street parking and in other places where few choices for treatments other than humps exist.

Speed pillows are more attractive than humps, often adding value to neighborhoods. The pillow is softened on all edges with a graded rise. Although most motorists do not hit the pillows, they are forced to slow in order to track their wheels on each side. Vancouver, Washington tests speed pillows with fire equipment (below).

6 Chicanes

Chicanes are a series of islands

Chicanes offer designers many choices for creating horizontal deflection. All horizontal deflection tools are preferred by responders, since they don't cause vertical jolts, and speed reductions are more moderate. Chicanes can be any collection of islands forcing motorists to divert their path. These islands are more effective when landscaped ground cover and trees provide contrast. The farther away an island can be seen the more powerful the effect and the safer the measure becomes.

Average Delay: 1 – 4 seconds

Delays on local streets, where responders are already looking for house numbers, are low. These same measures on collector streets and in downtown locations are more significant, typically creating delays of 4 seconds. When chicanes are substituted for stop controls, they can speed response times by 3-4 seconds.

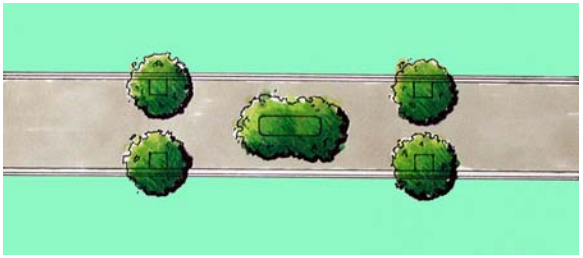
Comments:

1. These treatments are strongly preferred by responders over the delays and vertical jolt of humps.
2. Should be designed so that they are easily detected.
3. Design chicanes that create 20-foot wide openings so responders have space, away from parking, to set up for fire or medical response. It is appropriate to plan these measures in newer or rebuilt streets so that fire hydrants are placed in the same location (see lower photo).

Appropriate locations for chicanes:

Chicanes are universal tools fitting well into most places where there are not too many driveways. Chicanes work on most streets wider than 24 feet. They are popular around schools, as gateways into downtowns and neighborhoods, and at troublesome intersections. Chicanes can be effective alternatives to stop control intersections.

Chicanes are a series of islands forcing horizontal deflection and lowering speeds to 15-18 mph for autos, and 8-12 mph for large response vehicles. Chicanes are especially effective in neighborhoods and village centers, as well as most other locations. Chicanes allow intersections to be improved without addition of unwarranted stop signs. Chicanes can aid emergency responders by creating 20-foot wide, or wider, operations space where autos cannot be parked, and by permitting fire hydrants to be prominently located (see photo below).



7 Curb Extensions

Curb extensions aid many intersections

Curb extension are a fire responder's best friend when it comes to operation locations. Main streets, schools and other popular places, where parked cars block intersections or other critical operations areas, are good locations for curb extensions. Curb extensions in downtowns have little impact on through movement, and significantly improve entry to side streets by keeping parked cars away from intersections. Curb extensions come in many varieties and are often called bulbouts or neckdowns.

Average Delay: Varies widely

Delays on through movement, if any, are typically very minor. In many applications, curb extensions aid responders by keeping parked cars away from corner entries. In some cases, responders will need to wait for cars to exit or back up in order to swing wide to enter a street.

Comments:

1. Use curb extensions where motorists routinely park too close to intersections.
2. Curb extensions remove some or much of the screening at intersections and assist in response speed.
3. Mini-roundabouts or roundabouts are other intersection tools for many settings. They keep delays to moderate levels.
4. Higher volume side street locations require additional assurance that larger vehicles do not have to cross over the center line to make their entries.
5. Right-hand turns are the most critical. If neckdowns are used, place curb extensions on the right side of the street to be entered (see middle photo).
6. Curb extensions provide good places to install fire hydrants away from parked cars and in easily identified locations.

Appropriate locations for curb extensions:

Curb extensions are effective in locations with high volumes of pedestrians, where parking is scarce, and where 20-foot wide operations space is needed for fire operations. They work well in downtowns, around schools, institutions, college campuses and other similar locations.

As downtowns, schools and other critical areas become log-jammed with parking, curb extensions come to the rescue. Through-speeds are maintained, and turning speeds can be greatly enhanced. Chico, CA fire responders (below) demonstrate that a simple curb extension (area of cones) that prevents motorists from parking near the intersection, can increase entry speed by 60-90 seconds. Curb extensions are not only effective at street entries, but at hydrant locations (bottom), since they keep motorists from blocking hydrants and fire operation areas.

8 Curb Radius Reductions

Slowing cars as they enter streets

Many towns have not used sufficient care on street entries. This oversight creates high speed entries into neighborhoods and endangers pedestrians trying to move along collector or arterial streets. Curb radius reductions are similar to curb extensions, but they often have a stronger mission to perform; they help lower entry speeds to safe levels and allow safe pedestrian crossings. Motorist turning speeds are typically reduced from 20-30 mph to 10-15 mph. Curb radius reductions aid responders by assuring that parking will not occur at these locations.

Average Delay: Varies widely

Creating tighter corners most often reduces entry speeds during right-hand turns, but has no effect on left-hand turns. In many applications, curb radius reductions aid responders by keeping parked cars away from corner entries. In some cases, responders will need to wait for cars to exit or back up in order to swing wide into a street.

Comments:

1. Use curb radius reductions where motorists routinely park too close to intersections.
2. Curb extensions remove some, or most of the screening at intersections and assist in response speed.
3. Mini-roundabouts, or roundabouts, are other intersection tools for many settings. They keep delays to moderate levels.
4. Right-hand turns are the most critical. Work with traffic engineers to make sure that your largest vehicles can still access neighborhoods. This may require crossing over the center line of the street you are departing.

Appropriate locations for curb radius reductions:

Curb radius reductions are effective in locations with high volumes of pedestrians, where parking is scarce and, around schools, institutions, downtowns, college campuses and other locations.

Designers have been negligent in allowing wide sweeping curb radii in many locations. This design creates unsafe and unfriendly conditions for pedestrians. Proper channelization of motorist movements may create momentary delays for some responders (on right turns), but serve as an important aid to control vehicle parking and turning speeds. The photo below shows an overly wide entry. Adding islands to reduce the corner radius would also provide an appropriate location for hydrants. Consider more appropriate turning radii in new neighborhood designs. Truck turning templates can be used to assure that all vehicles can enter safely. Radius reduction in Honolulu, HI (bottom photo).

9 Gateways

Gateways slow entry speeds

Well designed gateways can reduce speeds by narrowing lanes to ten feet and visually tightening the space of entry. Skilled responders know their speeds are unimpeded. In some cases, gateways improve response times by preventing motorists from parking in critical locations near intersections.

Average Delay: Varies widely

Depending on design, gateways reduce entry speeds from right-hand turns and have no effect on left-hand turns. If gateways are set back 20 feet or more from intersections there is no loss of speed.

Comments:

1. Use gateways where motorists routinely park too close to intersections.
2. Gateways should be designed to minimize visual screening, thus assisting in response speed.
3. Gateway medians are designed to reduce entry and exit speeds to make streets less attractive to through traffic.
4. Right-hand turns are the most critical. Work with traffic engineers to make sure that your largest vehicles can access neighborhoods. This may require crossing over the center line of the street you are departing.

Appropriate locations for gateways:

Gateways can be located at entries to downtowns, main streets, institutions, schools and neighborhoods. Gateways tell motorists that they are entering a special place and that they need to behave in a civil manner. In many settings the gateway can be set back to allow for turning speed entry. In addition, median islands can be designed to allow effective turning movements. At many gateways, median islands are moved forward to protect pedestrians crossing the street. Effective design incorporates the needs of motorists, bicyclists and pedestrians.

Gateways are places of adjustment. All great towns, institutions and neighborhoods greet people while letting them know that they should alter their behavior to avoid endangering lives. Gateways can assist responders by assuring that physical openings are not blocked by parked cars. Most responders know that gateways offer sufficient lane width and that they can enter unimpeded. Strong vertical landscaping treatments are appropriate at gateways.

10 Mini-Roundabouts

Mini-Roundabouts reduce crashes

Mini-roundabouts provide excellent counter-measures to the proliferation of stop signs. Although all emergency responders must slow, the reduction in speed, in contrast to stop controls, is minimized. Seattle, Washington has over 900 mini-roundabouts on the ground. They have reduced crashes by 70 to 93% over ten years while allowing emergency responders to move at acceptable speeds. Yield signs, not stop signs, should be used with mini-roundabouts. These treatments are safer for responders than 4-way stops.

Mini-roundabouts can be used to replace stop signs in many neighborhood locations. Seattle and many other northwestern towns are proving that these tools are effective and safe alternatives to stop controls. Mini-roundabouts are especially helpful in reducing conflicting speeds. They have been shown to reduce crashes by 70-93%. Note in the photo below that small splitter islands are used in larger intersections. Large vehicles can turn across the face of the roundabout, mounting the low concrete splitter island. In many cases response times are improved. Make certain that designs prevent parking close to these treatments.

Average Delay: Varies widely

Most often mini-roundabouts improve response times when compared to neighborhood stop signs. There is no significant impact on left- or right-hand turns (left turns can be made across the front of the roundabout, just as with standard intersections). Through movements are slowed by 3-6 seconds. Since most mini-roundabouts are on local streets, where responders are already searching for house numbers, delays are minimal. When used on collector streets, delays can be up to six seconds. Motorists should not be allowed to park close to intersections where they might block entry to the street.

Comments:

1. Where motorists routinely park too close to an intersection roundabouts may require additional measures.
2. Right-hand and left-hand turns are largely unaffected. Use curb extensions to prevent parking too close to the intersection.
3. Left-hand turns can be made across the front face of mini-roundabouts. Note that the white concrete splitter island in the photo to the right is mountable. Smaller mini-roundabouts do not use these islands, making entries even easier.

Appropriate locations for mini-roundabouts:

Best locations are in neighborhoods and small commercial settings. Mini-roundabouts are safer, more attractive and more functional alterations of intersections than stop controls. All entries are under yield control.

11 Roundabouts

Roundabouts are powerful and safe

Roundabouts are the most effective (and sometimes controversial) new tools for intersections. Roundabouts are proving to be safer, more efficient tools for moving traffic through intersections with minimal delays. Replacing intersection signals with roundabouts can significantly reduce, or eliminate, traffic queues. Some roundabouts reduce average wait times from 12-50 seconds to 2-6 seconds. Roundabouts are also gaining popularity for aesthetic reasons. They can reduce noise and pollution levels, and help pedestrians cross streets safely and efficiently.

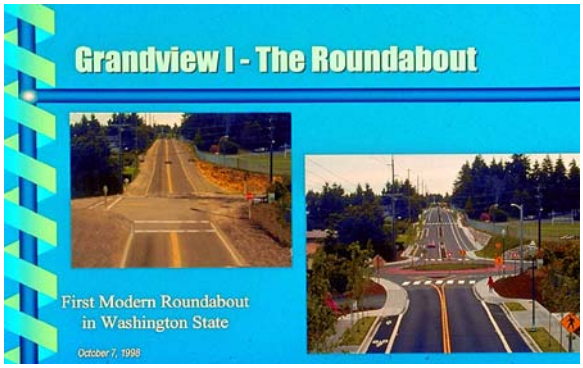
New roundabout built in Salt Lake neighborhood in Honolulu, Hawaii (above). Parents driving their children to this neighborhood school were creating havoc. The roundabout handles vehicles of all sizes and even permits the largest vehicles to make U-turns. Pre-roundabout congestion forced many parents to drive their children to school. Today, many children travel on their own. The Grandview Avenue roundabout opened in University Place, Washington (bottom photo), ending years of quarter-mile backups at the 4-way stop it replaced. A local fire station was aided significantly by ending the long queues.

Average Delay: Varies widely

Some roundabouts improve response times by eliminating stacking of vehicles during red traffic signal phases. In the Grandview case (bottom photo), quarter mile long traffic queues lasting for periods of an hour were eliminated by the more efficient roundabout. Today, the same road finds queue lengths of no more than six cars. Through-movements for emergency responders at roundabouts are similar to those at intersections with signals and stop controls. Left-hand turns may take from 2-10 seconds longer. However, U-turns are easily made.

Comments:

1. Roundabouts eliminate the possibility of motorists parking too close to intersections.
2. Roundabouts may be inappropriate in areas where traffic backs up from other signalized intersections. Consider other intersection designs for these locations.
3. Most roundabouts are designed with truck aprons so rear wheels of large trucks can be accommodated.



Appropriate locations for roundabouts:

Roundabouts work in a variety of settings. Although cities are just beginning to install them, most are being placed on wide local streets, collectors and arterial roads carrying no more than 25,000 autos daily. Roundabouts are also popular as gateway entries to downtowns, neighborhoods and commercial districts. Roundabouts are proving to be powerful allies to access management. Generally, they are first located in towns or villages on roads with 20,000 ADT or less. Once drivers get used to them, two-lane roundabouts can be applied to intersections with as many as 50,000 vehicles per day.

12 Medians, Landscaping

Medians slow traffic and improve safety

Medians and landscaping features are attractive and functional traffic calming tools. Medians slow traffic on curves, prevent unsafe access to streets from commercial and residential driveways, and provide refuge for pedestrians wishing to cross streets.

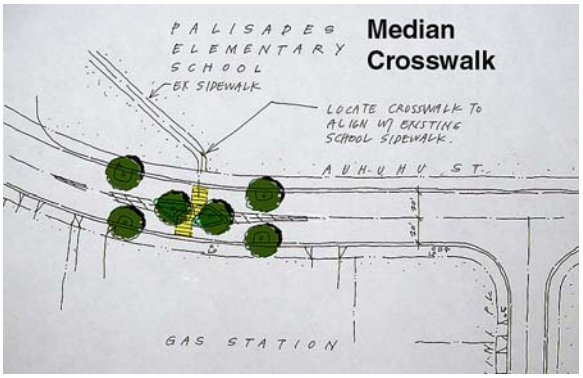
Refuge islands are short medians. Well placed short medians slow motorists on long streets and minimize delays for emergency responders. Long medians can have mountable areas which allow responders to get to the other side of the street. Landscaping features enhance many traffic calming treatments, allowing motorists to detect the change hundreds of feet away. Long medians on 2-lane streets must include bike lanes, to provide motorists with space to pull over when a responder goes by. Bike lanes and medians also add more effective turning radii on corners, making it easier for large vehicles to maneuver.

Average Delay: Minimal or None

Most medians create visual change, tighten a lane to ten feet, but keep the responder moving at safe, uniform speeds. Responder speeds on collector streets are usually not affected by medians. On local streets, short medians may also include horizontal deflection which can slow the responder by an average of 3-6 seconds.

Comments:

1. Include bike lanes if median is longer than 500 feet.
2. Speed tables can be added around schools, parks and other pedestrian destinations.
3. On long blocks, short medians, one lane slow points, tree wells, and similar chicane effects may work better than medians and can be just as attractive.
4. Work with traffic engineers to allow sufficient horizontal deflection for these alternatives. If on-street parking is needed to keep appropriate deflection, ensure that parking is not removed.
5. When necessary, medians can be designed so that large vehicles can drive over them in an emergency.
6. Medians can be designed to allow access for wheelchairs by creating a pass-through at grade. To increase safety, the pass-through should be designed with a 45-degree angle so pedestrians are looking at oncoming traffic (as shown in the middle photograph).



Medians are used in many settings to reduce speeds and to make it easier for pedestrians to cross the street. Medians which are short (50-100 feet) are referred to as refuge islands. It is best to narrow travel lanes to 10 feet each, thus creating a visual tightening, known as a choker. This 10 foot width is more than adequate for a trained responder. Medians with landscaping features (as shown above) are one of the best overall safety features in traffic calming, and are very popular around parks, schools, libraries, downtowns and other areas where pedestrians are critical to the life of the town or neighborhood. A median with seminole humps (below).

13 Street Closures

Street closures should be avoided

When communities lack a traffic calming program or knowledge of other choices, residents often ask for street closures to have the benefits of a cul-de-sac style street. This shifts traffic onto other streets and denies critical access. Except in rare settings, street closures can have very negative effects. Closures should only be used as the last resort.

Average Delay: 60–240 seconds

Delays depend on the additional distance a responder must cover to reach the same destination. Even when block lengths are short, street closures force the responder to detour by one or more streets.

Comments:

1. Use alternative traffic calming solutions.
2. Virtually all other tools are preferred.
3. Use partial closures instead.
4. When essential to use a full closure, insist that pedestrian, bicycle and emergency access be retained.
5. Breakaway bollards and other landscaping materials can be used to prevent motorist entry while allowing emergency access.

Appropriate locations for street closures:

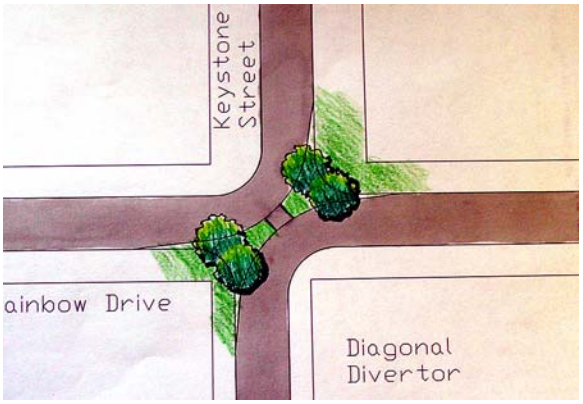
Street closures may be appropriate for some school, park and entertainment areas. These can be temporary or permanent closures. In the scene above, for example, the school and field are connected by denying street access to motorists during school hours. In an emergency, responding vehicles can knock over the bollards and enter. In some cases, when residents support this loss of access, temporary closure of school streets can become a permanent measure. Wider applications of street closures should be avoided in most cases. The negative effects on a community can be very powerful and long-lasting.

Temporary street closures may be warranted near schools, parks and entertainment districts. Emergency responders are not delayed if bollards are designed to be knocked down. In other cases these same locations may be appropriate for permanent street closures. However, emergency access must be maintained. Partial closures and extreme neckdowns are another alternative (see below).

14 Diverters

Diverters rechannel traffic

Equal and fair distribution of traffic sometimes calls for treatments forcing motorists back to the principal roadway. Although diverters are rarely used, they can be effective when cut-through traffic needs to be sent back where it belongs. Diverters can be designed so that response vehicles can drive over them. Diverters are not always popular with residents because the people living in a neighborhood are impacted the most. Median closures and other diverters benefit bicycling and walking by diverting motorists away from a particular route.



Diverters can be diagonal, star or other shapes. Diverters should be mountable for emergency responders and allow passage to bicyclists and pedestrians. Diverters are most often placed inside a neighborhood, especially on local streets. In other cases they are placed on avenues, collectors or other boundary streets, to keep traffic from cutting through a neighborhood.

Average Delay: 6-120 seconds.

Delays depend on whether emergency access across the diverter is permitted, or not. When an opening has been left for a responder, times remain similar, with a 6-10 second delay. However, if emergency access is not designed into the measure, delays can be as severe as with street closures. Median closures (bottom photo) divert motor vehicle traffic but may not impact emergency responders.

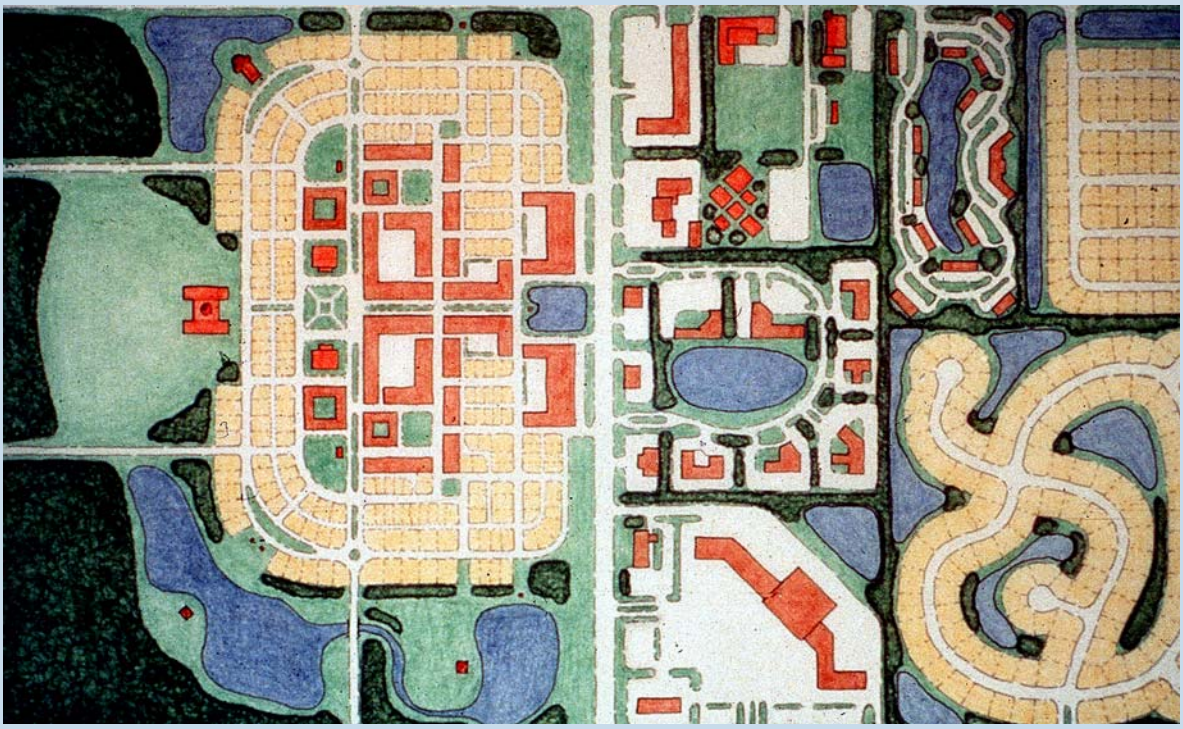
Comments:

1. Fix the principal road to lower cut-through traffic.
2. Use alternative traffic calming solutions.
3. Most other tools are preferred.
4. Use partial closures and neckdowns instead.
5. When essential to use a diverter, insist that pedestrian, bicycle and emergency access be retained.
6. Breakaway bollards and other landscaping materials can be used to prevent motorist entry while allowing emergency access.

Appropriate locations for street closures:

Diverters are helpful when there are no other effective tools for eliminating cut-through traffic. Most residents report that they are less concerned with volume and more concerned with speed. Hence, speed control measures may be sufficient in most cases. Bicycle boulevards (freeways for bikes) can be charted through a neighborhood, taking out stop signs, and diverting traffic. The bottom photo illustrates such an application.

PART THREE: TRADITIONAL NEIGHBORHOOD STREETS



Drawing Courtesy of Ramon Trias

Traditional **Conventional**

Lower speed roads, improved access

Emergency response times are often slowed in conventional sprawl pattern communities, especially with long cul-de-sac streets. Older, traditional neighhborhoods, and new smart growth communities offer far more links and approaches. Principal roadways are designed with similar high speed access, but local streets include tighter turning radii, reduced centerline curves, more on-street parking and narrower lanes and streets. Alleys are often provided, yielding two more points of access to properties. In a well-planned new traditional neighborhood, fire and medical access speeds can be kept the same, or improved. In contrast to the conventional pattern on the right, which has only a few points of access to more than 200 properties, the traditional pattern on the left has nine points of access to the same number of properties. Responders stay on main streets longer and are able to hold their speed. Multiple routes of approach help emergency responders in many ways.

Introduction to Traditional Neighborhood Development

Many planners and elected officials recognize we cannot build our way out of the traffic-spawning suburban development pattern. But what do we do? Increasingly, we are seeing the design of neotraditional or new urbanist neighborhoods that incorporate pre-suburban development features. These new neighborhoods are modeled to look a lot like historic neighborhoods with walking scale streets and lots of street connections.

Several real estate studies reveal that home buyers tend to like streets with low traffic volume, slow traffic speeds and minimal noise. Families with children want neighborhoods with nearby parks, schools and other activities while retired "baby boomers" are looking for sidewalks, trails, greenways and convenient services. The traditional pattern of development meets many of these requirements. It allows up to 40% of all trips to be made by walking, bicycling and transit. These new (old style) traditional neighborhoods also call for a new set of street standards. Blocks are shorter, streets and lanes are narrower, alleys are included, and on-street parking is encouraged.

In some towns, fire administrators sometimes oppose the traditional model because of their concern over narrower streets, tighter turning radii, on-street parking and other features. However, in order for these neighborhoods to work and insure the safety of their residents, it is critical that town officials, fire administrators and developers work in partnership to understand the proper combination of features.

A properly built traditional development has many added points of access to streets, more access to each home (with alleys, 4 points of access), and often better built homes that are less prone to fires. Most important, the streets in a traditional neighborhood will not require any traffic calming measures, since motorists will feel uncomfortable driving faster than 25 mph.

Fewer stop signs, greater number of access points and more direct routes of travel, aid residents and emergency responders to access properties in a timely and efficient manner. Meanwhile, design of these streets is becoming a more exact science. Designers must anticipate not only ways to keep traffic moving slowly, but to allow access by large equipment to all locations.

Metro Square, in Sacramento, California (top two photos) is an example of urban infill using a compact, village style design. While housing density (20 units per acre) is high, the quiet, low-speed street design supports all types of access. These units were sold in one day. The new style of streets in traditional village design must be more exact so that conventional fire and sanitation equipment is supported. The radii on this park in Mountain View, California (bottom photo) is too tight for this pumper truck to get through when a car is parked near the curve. A simple modification to the park design would have allowed the truck to turn.

Satisfying the Needs of Residents and Responders

Traditional Neighborhood Development (TND) streets must meet the needs of all those making use of them. Traditional streets require high levels of connectivity. Their performance must be measured on how well they provide multiple points of access, parking, room for fire operations and low speed travel.

Keeping in mind that alleys, lanes and streets are each local in purpose and character, speed is not the issue. To meet the many demands of the community the streets must generate low speeds and allow for on-street parking, while creating minimal delay.

A review of these four photos can help us think about parking access, operations and speed on older traditional and newly built TND streets.

1. **San Luis Obispo, California.** In the first TND street photo, the built street is 36 feet wide. Faced with over 30 feet of operating space motorists are inclined to speed.

2. **Everett, Washington.** Parking lanes are provided on each side of the street. The painted parking line keeps motorists operations confined to a 20-foot wide operating space. Speeds are a little high here. Removing the painted center line has the potential to reduce speeding.

3. **Victorian Harbor. Suisun City, California.** Photo three of a TND built in the mid-1990s shows a better solution. The street is 20 feet wide with curb and gutter. Parking is inset, with pockets on each side at various locations. Housing density runs about 8-10 units per acre. This neighborhood has alleys, so most resident parking is off the street. The proximity of trees and a roundabout that terminates a driver's view keep speeds to about 20 mph. Fire operations have the necessary 20 feet. Hydrants are protected from intrusions by parked cars by locating them on curb extensions.

4. **Orenco Station. Hillsboro, Oregon.** Photo four illustrates a new neighborhood that will have densities from 11-15 units per acre. Although this neighborhood also will have alleys, the higher densities call for more on-street parking. Note that the operating width is about 20-22 feet, with curb extensions to insure that no one will park at the hydrant.

Skinny Streets and How They Work

In a traditional neighborhood, skinny streets are sometimes found on short, low density residential streets. Instead of cul-de-sacs, two final driveways can be set across from one another in a hammerhead fashion to permit informal turning. Skinny streets by definition are very narrow, often as narrow as 20 feet in the U.S. and 10 feet in Australia and Europe.

Skinny streets are sensitive to people and to the environment, yet they allow a full 20 feet of operations for fire equipment. A street of 200 to 700 feet in length may serve from 20 to 70 homes.

Parking is not normally allowed on a skinny street. Informal parking may occur off the street. In the scene depicted in the top photo a skinny street in Palatka, Florida makes use of a shallow curb. The street dead-ends with a set of two driveways to permit turning. Water percolates through brickwork, or runs off the roadway into the sandy soil. Due to the very low number of houses (20) traffic remains very light, hence sidewalks are not used.

While the traditional skinny streets shown above are quite narrow and keep cars from speeding, they are designed to provide access to emergency responders. Blocks are relatively short in traditional grid pattern neighborhoods and emergency responders often have multiple points of access.

In contrast, looking from the above street across the 2-lane arterial road we see that the same width street is used. However, a higher number of households calls for a double set of sidewalks. The street remains skinny. Parking is still not permitted. Just as with the brick section, water runs off the asphalt across the low curb and percolates into the sandy Florida soil.

Skinny streets should be seen as long driveways that provide good access to the few properties served. Designs are for low speed travel of 15-20 mph. Skinny streets are especially popular in semi-rural areas, but can be found in highly developed urban areas such as in Portland, OR.

Skinny streets make it possible to upgrade older dirt or crushed stone travelways with a more permanent and structurally sound base at an affordable cost and with minimal environmental impact.

Skinny streets should be 20 feet wide, or have a solid walkway that can support the occasional need for an aerial ladder truck and related fire fighting operations. Skinny streets are not built in locations where long or even moderate distances must be traversed.

In Australia and Europe skinny streets are common. Ten foot wide streets are popular and built in many locations. These streets have short blocks and often have inset parking, and appropriately spaced locations for fire operations.

Traditional Neighborhood Travelway Vocabulary

Traditional streets allow timely response. This response is based on the proximity of the lane or street to avenues and boulevards that permit higher speeds of between 30 and 45 mph.

Traditional streets contrast sharply with conventional streets that often end in cul-de-sacs. Quite often, responders making their way through a conventional neighborhood must travel on one, or several, long or very long local streets. These streets often take the responder up to half-a-mile away from a collector street.

This plan of Fairview Village, a new traditional neighborhood in the Portland, Oregon region shows a mix of uses, a variety of street types, and multiple connections.

Traditional streets are designed for 20 mph travel. They have short blocks, multiple connections, tight corner turning radii, and tight centerline curves. These streets are close to the primary route of entry and higher speed roadways so very little time is lost. Thus, most traditional street patterns allow the responder to reach most houses faster than with higher speed roads in conventional suburban neighborhoods.The building blocks for these traditional neighborhood travelways include:

1. Trails: Connections to other neighborhoods and avenues that are designed primarily for walking and bicycling, but can provide additional access for emergency responders. Maximum speed 15 mph.

2. Alleys: Alleys add two additional points of access, but cannot be traversed at more than 15 mph. Two-way access is provided to all properties. Some parking may be included. In traditional neighborhoods, houses may have additional rooms or dwelling units overlooking the alley.

3. Lanes: Lanes can accommodate one-way or, more typically, two way travel, with parking on one side only. Lanes are designed for 15-20 mph speeds.

4. Streets: Traditional streets provide two-way travel and at least two points of access on all but the last block of a corridor. Speeds are designed for travel at 20 mph. Parking is provided on both sides of the street. Since most cars are parked in the garage or driveway, only a few cars will typically park on the street. Streets would be less effective if parking were restricted to one side. If parking on only one side of the street is desired, lanes should be used instead.

5. Avenues: Added width allows for turning lanes, medians or a combination of turning lanes and refuge islands. Bicycle lanes are essential to the success of avenues, allowing motorists to pull out of the way of emergency responders. Avenues can be designed with or without on-street parking. Design speed is set at 30-35 mph.

6. Boulevards: Multi-laned two-way streets providing emergency response speeds up to 45 mph. Boulevards take advantage of medians, well designed intersections and easy access to neighborhoods.

7. Parkways: Multi-laned highways with medians and highly restricted turning movements. Emergency responders have high levels of access into neighborhoods, and high speed access to these locations.

In the section that follows we discuss these different travelways and their impact on emergency response in more detail.

1 Trails, Links

Trails reduce auto trips, increase access

Multi-use trails and protected open space are highly desired elements in today's neighborhoods. Although everyone wants these trails and open space, not everyone is sure that they want them in "their backyard." Hence, it is easier to design new neighborhoods that incorporate these elements than to retrofit existing suburban neighborhoods. When these new points of access are provided, insist that they complete vital responder links to properties that may be hard to get to.

Environmentally sensitive communities like Village Homes in Davis, California (above) are seeking ways to build added bicycle, walking and emergency access. This is easily accomplished in new neighborhoods by requiring these added links. In older suburban neighborhoods such links can sometimes be made through easements. If necessary, surfaces of trails can be stabilized for emergency responders.

Disadvantage to Responders: None.

Trails add new connections, and in some cases allow additional operations space for hard-to-reach buildings.

Comments:

1. In most settings it is possible to gain access through short links of 100 to 300 feet. Porous materials such as open block, finely crushed stone or other pavers, can be used to alow water infiltration.
2. In some cases, bollards are used to prevent motorist access. However, bollards are rarely needed. A sign and low curbing keeps motorists from attempting illegal entries.

Appropriate locations for trails:

Trails and links serve as vital connections to schools, parks, libraries and other civic buildings, as well as connection points to stores and neighborhoods. Although trails are built to structural loads of small maintenance vehicles only, short sections can be enhanced for large emergency response vehicles. A good selection of trails and links can reduce residents' dependence on motor vehicles for many trips. Added benefits include protection of open space, access to recreation for residents of all ages and increased property values.

Every effort should be made to provide links from residential areas to nearby amenities such as parks, shopping centers, schools and transit stops.

2 Alleys

Alleys increase access and parking

The modern alley is designed to get the garage off the front of the house. This allows houses to be closer to the street and to include neighborhood-friendly features like a front porch. A well designed alley is clean and attractive and provides options for parking, underground utilities, and trash pickup. Alleys also create opportunities for affordable housing by allowing the developer or owner to build an accessory unit above the garage.

Disadvantages to Responders: None.

Alleys add two additional points of access to each property. Distances to carry equipment are reduced. Alleys can also provide more direct access to kitchen fires and other hard-to-reach points located in the rear of the home.

Comments:

1. Widths of ten feet (paved or unpaved) are common for alleys. Short paved drives into garages with setbacks of 7 feet allow the responder nearly 24 feet of operations.
2. Parking should be allowed only in acceptable locations, both in the garage, in narrow spaces between garages, and in some specially dedicated open lots. Random parking should be discouraged through design.

Appropriate locations for alleys:

Alleys are generally found on short blocks of 200 to 400 feet. They become less practical on long blocks. Alleys are ideal in most traditional and neotraditional neighborhoods, and in many portions of these neighborhoods. Alleys allow two-way travel. Although in some cases it is possible to have two alleys meet as a tee intersection, these need to be wide enough for truck turns. Terminating an alley at a tee intersection of a street works best when there are curb extensions to prohibit parking on the street. More often, alleys are part of the traditional grid street pattern.

Smart Growth communities are seeking ways to reduce the impact of driveways, locate useful places for utilities, and add low cost housing. Modern alleys make it possible to have more functional streets. Trees can be planted on streets and lanes without impacting utilities. Alleys are a boon to emergency responders, giving them more options for access and operations. Alleys can range from a width of 10 to 20 feet. Narrow widths call for garage setbacks of seven to ten feet to allow motorists to turn into garages.

3 Lanes

Lanes provide low speed access

Lanes are 18 feet wide, two feet below the desired operating space for fire fighting operations. Parking in a lane is restricted to one side. The added space needed to extended aerial operations may be addressed in several ways. Some responders say that they can operate in the slightly reduced width of 18 feet. Others state that they can operate with an occassional double set of driveways. This assures a solid base of more than 20 feet of street width and at least 30 feet of width between structures. And some fire departments report that a sidewalk that is attached to the curb or a reinforced driveway provide enough structural support for heavy equipment

Disadvantages to Responders: Low speed.

Lanes are considered the safest street type available because travel speeds are kept below 20 mph. Hence they are very popular in traditional neighborhoods. To allow fast response, lanes are always limited to several blocks in length, and can be easily reached through faster collector and sometimes arterial streets. As a result, most or all homes on a lane can be reached quickly.

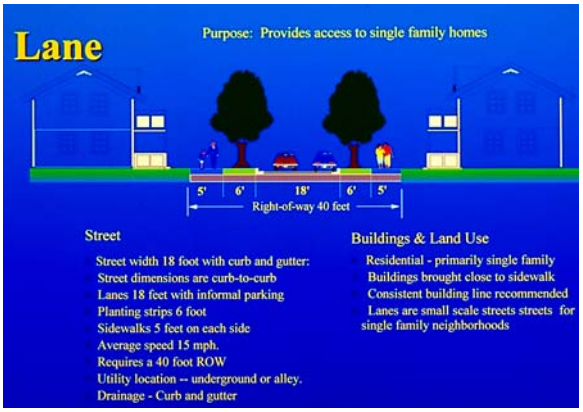
Comments:

1. Lanes are not generally permitted in conventional neighborhoods
2. Lanes are not permitted in difficult to access locations, such as the interior of a large neighborhood.
3. Parking is restricted to one side of the street. Developers should build double sets of driveways every 200-300 feet to permit sufficient operations space.

Appropriate locations for lanes:

Lanes are permitted in portions of a traditional neighborhood that are easily accessible from a principal travel way. Since most traditional neighborhoods, by definition, have multiple points of entry, lanes may be found in most locations of the neighborhood. Lanes are not as appropriate for conventional suburban development, especially if they are in locations that are difficult to access.

Lanes are short access ways with parking. *Lanes are 18 feet wide, or slightly narrower. Parking is always restricted to one side of the street. Sidewalks are often included. Traffic volumes are very low, due to the short block lengths of 500 feet or less and the short number of blocks (2-3 maximum before a collector category roadway). Fire administrators should seek a protected no parking space every 200-300 feet. The best way to assure this operations space is to have the developer commit to a double set of driveways at those locations.*



4 Streets

Streets provide access, more parking

Streets in traditional neighborhoods are typically 26 feet wide, curb to curb, with parking on both sides of the street. Motorists must share the travel way. Streets and lanes have proven to have the highest safety levels of any travel way. Speeds of 20 mph are common. Just as with lanes, streets must establish an operations area for emergency responders every 200 to 300 feet. This can be done by placing a tree well 6 feet wide and 30 feet long on one side of the street and a double set of driveways on the other. The hydrant can be placed in the extended tree well (see pages 15 and 37 for samples and details).

Disadvantages to Responders: Low speed.

Streets, like lanes, are designed for slow speed travel, so speeds will have to drop as responders enter a neighborhood. However, because streets and lanes are short and have multiple points of access, delays are often minimal. Overall response times to streets can be maintained through a well designed site plan.

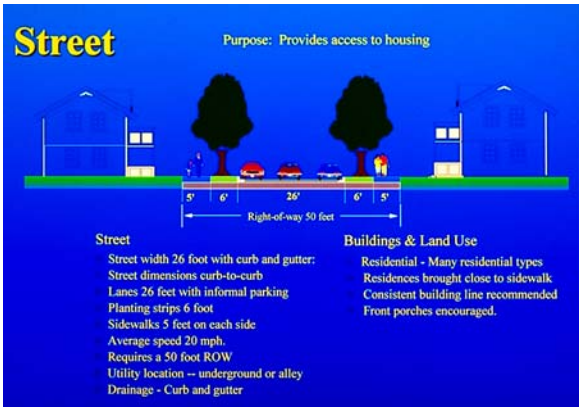
Comments:

1. Traditional narrow streets are not generally permitted in conventional neighborhoods
2. Traditional streets are not permitted in difficult to access locations, such as the interior section of a large neighborhood.
3. Parking is restricted every 200 to 300 feet to allow for emergency operations. Developers can package double sets of driveways and tree wells every 200-300 feet to permit sufficient space for emergency operations.
4. Provide alleys in the design to absorb most of the parking for residents. In that way, on-street parking will typically only be used by guests and overflow parking.

Appropriate locations for streets:

Streets are permitted in portions of a traditional neighborhood that are easily accessible from a principal travel way. Since most traditional neighborhoods, by definition, have multiple points of entry, streets may be found in most locations of the neighborhood. Traditional streets are not as appropriate for conventional development, especially in isolated locations.

Smart Growth communities are seeking ways to build low speed streets with abundant on-street parking, thus minimizing off-street parking and auto storage. The emergency responder requires a 20-foot wide space for fire fighting operations every 200-300 feet, and preferably on entry corners and at a mid-block location. A double set of driveways across from a tree well assures no parking in these areas. This neo-traditional Seattle street (below) provides a "no parking" space next to the tree well.



5 Avenues

Avenues keep traffic moving

Avenues are higher speed travel ways servicing streets and lanes in traditional and conventional neighborhoods. Avenues have sufficient width and storage space to keep traffic moving. To maximize capacity, avenues should be designed to keep speeds at 30-35 mph. Avenues often support higher density housing like townhouses, apartments and other multiple family dwellings, as well as retail and other commercial mixed use buildings. Entry streets to new traditional neighborhoods are often designed as avenues. Avenues often have gateways and can have tremendous carrying capacity, often moving 10-20,000 vehicles daily.

Disadvantages to Responders: None.

Avenues add new connections, keep traffic moving and in some cases allow additional operations space for hard to reach buildings. In traditional development, avenues may have only two lanes, with either a third lane for turning movements, or a median, turning pockets and bike lanes.

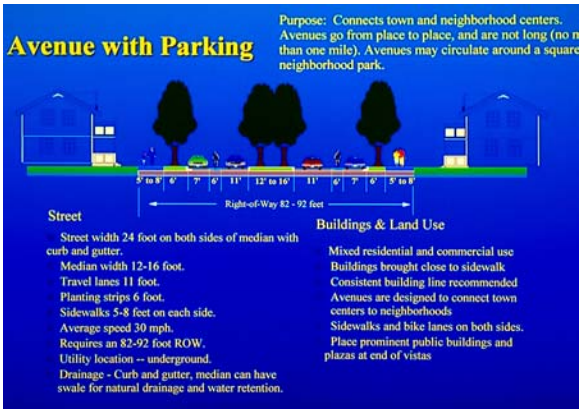
Comments:

1. Avenues provide essential speed and movement for responders. They are well connected to other avenues and boulevards, with some streets and lanes branching from appropriate locations.
2. When roundabouts are used on avenues, speeds can be kept to proper levels and corridor travel times can be improved by reducing congestion typically found at signalized intersections.

Appropriate locations for avenues:

Avenues are the engines that permit streets and lanes to be workable. Avenues should be placed every 8 blocks, or more frequently, to permit easy and efficient access to lanes and streets. Avenues can have on-street parking and bike lanes and also serve as transit corridors. As a general rule, a resident should not have to walk more than four blocks to reach transit service.

Faster speeds (30-35 mph) on avenues are assured with appropriate design. A typical section has two lanes, a median with left turning pockets or a third lane. Bike lanes are essential if medians are more than 150 feet long. Bike lanes create more turning radii, better sight distance and allow motorists to pull into them to let the responder pass. Avenues are often well landscaped to create a sense of place. When used as gateways into a neighborhood center they provide a sense of arrival. Avenues owe their success to well-designed intersections that keep traffic moving.



6 Boulevards

Boulevards are one of the big traffic engines

Boulevards can include up to six lanes, but typically are four lanes, with extra lanes at intersections. Boulevards often carry 20-40,000 vehicles per day, and at times up to 60,000. New boulevards are designed to be bicycle- and pedestrian-friendly, and include medians, refuge islands, bike lanes and transit. Boulevards easily manage traffic at 30, 35, 40 and 45 mph, based on adjacent land uses. Well-designed boulevards have limited access, so as to maintain roadway efficiency and improve safety.

Disadvantages to Responders: None.

Boulevards provide essential speed and movement for responders. They are well connected to avenues, with some streets and lanes branching off from appropriate locations.

Comments:

1. Stopped conditions on boulevards are minimized. Stop sign controls are never used. If signals are used, fire truck activated signal controls (Opticom style) will help keep responders moving.
2. Roundabouts may be a preferred intersection treatment to keep the traffic queues empty at most or all times.
3. If continuous medians are used, bike lanes are essential, to provide a space for motorists to pull into to let responders pass.

Appropriate locations for boulevards:

Boulevards are often laid out on a classic one mile grid, and in challenging geography often follow river valleys or lake shores or ridge lines, and provide high levels of connectivity to avenues and other streets. Used in this fashion the boulevard often becomes a corner or border for traditional and conventional neighborhoods. It is essential that roadway investments go into keeping these facilities strong and healthy. Building boulevards with too many lanes can create new problems, so the general rule is to widen intersections and keep the main portions to only those lanes that are needed. Bike lanes are essential. In some cases medians can be reinforced to permit responder vehicle crossover to avoid strangled signalized intersections.

Boulevards can allow for movement of 20-40,000 vehicles daily, and sometimes more. A good network of boulevards is needed to give higher speed access to distant destinations. Boulevards should not be overbuilt. They need to move cars, trucks, bicycles, pedestrians, and transit vehicles. As with avenues, boulevards require well-designed intersections to keep traffic in motion. Medians add to capacity and safety (often doubling safety of roads with five or more lanes) and make it possible for pedestrians and bicyclists to cross at important points.

7 Parkways

Parkways are lower impact highways

Parkways have the potential to move far more traffic than a boulevard. Parkways have few intersections and carry traffic long distances without interruption. It is possible to move 40-80,000 vehicles per day on a well designed parkway. There are no driveways, and very few left hand turns permitted in a parkway. Parkways can be designed to allow emergency responders to jump the median island at key locations. Motorists are forced to turn right in and right out. Special U-turn pockets can be included to allow vehicles to double back.

Disadvantages to Responders: None.

Parkways assure high speed 40-60 mph travel. Parkways provide access to regional destinations. Access to avenues, lanes, streets, and even some trail connections, can be built into the system.

Comments:

1. Parkways must be designed to permit the responder to jump the median at all access entries.
2. In some cases bollards are used to prevent motorist access. However, the bollards are rarely needed. A sign and low curbing will keep motorists from attempting illegal entries.

Appropriate locations for parkways:

Parkways should only be located in suburban and semi-rural areas. Freeways can be designed with parkway elements. Some locations for future freeway corridors should be designed as parkways to reduce the environmental, social and other impacts associated with freeway design.

Parkways are the powerhouse of movement. Think of a parkway as a wholesome, highly efficient form of a freeway without the land consumption of on and off ramps. Only a few towns have them. New portions of towns and cities have the opportunity of using these efficient movers of vehicles, while accommodating bicyclists and pedestrians along parallel trails. This parkway in Bellevue, Washington (above), has been on the ground for 20 years. It easily moves 41,000 vehicles per day, using 4-lanes and limited traffic signals. Access, even to side streets, is highly restricted. No left turns are permitted into or out of most side streets. Instead, U-turn pockets are provided. Meanwhile, emergency responders are given additional access by crossing over on specially lowered median sections (below).

8 Intersections

Efficient intersections move all modes

Intersections are places to safely orchestrate the conflict between cars, cyclists and pedestrians and to provide for efficient movement of all modes.

Disadvantages to Responders: None.

Well built intersections are needed to keep responders in motion. In some settings, activated signal controls (Opticom style) allow the fastest and most uniform flow of traffic. In others cases, roundabouts are a superior tool, keeping the intersection free of traffic build-up more hours a day than through conventional signal controls. Traffic modeling can be used to determine which tool is likely to perform the best.

Comments:

1. In most settings, signal systems can be refined to allow an emptying of traffic queues while responders are approaching.
2. In some settings, 4-way stop controls are effective. However, as roadway volumes increase, signals or roundabouts perform best.
3. Two-lane roundabouts can be effective at dealing with volumes as high as 50,000 cars per day, keeping traffic queues to a minimum most times of the day.
4. Intersections can be designed to work efficiently by keeping driveways several hundred feet away from the intersection, adding medians with turning pockets, and right turn lanes with pork chop islands (as seen in the lower right corner of the top photo).

Pedestrian friendly intersections are built at a scale to keep traffic in motion. Overly wide intersections complicate safety, access and pedestrian issues. The above intersection at Connecticut and "K" Streets in Washington, D.C. is an excellent example of a top performing intersection that is not overly wide and accomodates pedestrians. Clearwater, Florida collapsed three nonsignalized and three signalized intersections into one roundabout intersection (below). The alteration allows another 20,000 vehicles to move (40,000 to 60,000), plus it also accomodates 6-8,000 pedestrians on special weekend days at the beach.

9 On-Street Parking

On-Street Parking should not get in the way

An important goal of traditional and environmentally sensitive, smart growth neighborhoods is to reduce the number of driveways, off-street parking and other permeable surfaces that lead to water runoff, heat gain and other ill effects. On-street parking is an important resource. However, when we combine more compact development with reduced off-street parking, the increased number of people parking on-street can create an operations problem. There are several ways to maintain open spaces for fire-fighting operations short of restricting parking altogether.

Signs and painted curbs have some effect in preventing illegal and problematic parking. A surer measure is to have the developer build double sets of driveways and crosswalks to create a no-parking zone that is visually obvious and will be enforced by the neighborhood. Similar treatments are created through placement of alleys, tree wells, curb extensions and combinations of other treatments. Where dwelling unit densities are low, parking is not likely to be an issue. In the bottom photo the double driveways located across from a driveway and hydrant create space for emergency operations.

Create "No Parking" Spaces by Design

People find it difficult to park in the following locations: At driveways, marked crosswalks, at mail pick-up stations, alleyways, tee intersections and other places where such illegal parking would not go unnoticed. Although in many locations drivers will obey "no parking" or "no standing" signs and red curbs, design constraints often work best.

Comments:

1. Place a double set of driveways every 200 or 300 feet, or at other distances prescribed by the fire department or fire marshall.
2. Place alleys on short connector blocks across from one another to achieve the same goal.
3. Place mail box clusters, curb extensions or other treatments at locations where residents and guests will find it inappropriate to park.
4. Since police rarely have a chance to notice and correct inappropriate parking behavior, ask neighborhood leaders to take charge of notifying illegal parkers or to alert police of ongoing problems.

Appropriate placement:

Protected open street space is appropriate at regular intervals set by the fire department or fire marshall. Generally, space is needed every 200-300 feet, or at each mid-block hydrant location.

10 Other Techniques

GIS-aided response

Many cities are purchasing improved vehicle computer systems to aid in their response to greatly increased traffic and a need to get diverse equipment to difficult neighborhood locations. In-vehicle display systems can map the best route choice, indicate the locations of all traffic calming measures, identify traffic buildup locations and show the routes of travel of other responders who are on their way and already at the site.

These systems have become commonplace in enforcement. Communities should consider their high rate of return for medical and fire response. With more and more challenges being placed in and around neighhborhoods, these systems can prove to be a highly valuable, if not essential, tool to achieve community goals.

Neighborhood fire stations

Fire administrators and city management must continue to measure the value and importance of new or relocated stations to provide rapid response.

Smaller, appropriate size equipment

Emergency response administrators in historic towns with tight street geometry know the importance of using equipment that gives the fastest response times. Why should it be different in towns with wider streets? Big equipment is often not as desirable as lighter-weight, faster-accelerating equipment.

Unfortunately, the decision on what equipment to purchase and operate is not always simple. Pressures to purchase the largest piece of emergency equipment must be measured against the end goal of getting teams to the emergency in a timely manner.

Many Australian fire departments are critical of U.S. practices. They are purchasing less and less equipment from our country, opting instead to go with Swedish and other equipment that give them improved response and improved insurance and performance ratings. It is likely that, in time, our manufacturers will provide more options. But, until such equipment becomes readily available administrators should look for the equipment best suited to the mission.

Stations in revitalized downtowns, near new traditional neighborhoods and other locations provide faster response times. Efficient response times should be a widely held community value. In some cases, changes in streets, traffic patterns, land uses and other changes will lead to an evaluation of station locations, size of units, better emergency equipment and computer-aided response equipment. More than ever, responders must rely on new technologies. Just as systems are adapting to change, so must our ability to plan and place new types of streets and treatments.

Reference Material and Additional Resources

Resources on Traffic Calming and Emergency Response

The following list of references provides added background on this emerging topic. While we do not agree with all of the claims made in these documents, we believe they are helpful in gaining a better understanding of the issues. In the final analysis, it is essential that this material be balanced with a holistic approach that applies the information in this manual along with other sources to fit local conditions.

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Resources on Traditional Neighborhood Design

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Additional Resources

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Appendix

Speed Reduction Saves Lives

How effective is traffic calming in reducing crashes and crash severity? Extensive work in Europe and America reveals substantial improvement in safety at speeds appropriate to neighborhoods. Most traffic calming and traffic management programs reduce crashes in neighborhoods by 20% to over 90%.

How is this so? As the top graph illustrates, casualty rates grow exponentially as speed increases. There is a high survival rate when pedestrians or bicyclists are hit at speeds of 15-20 mph.

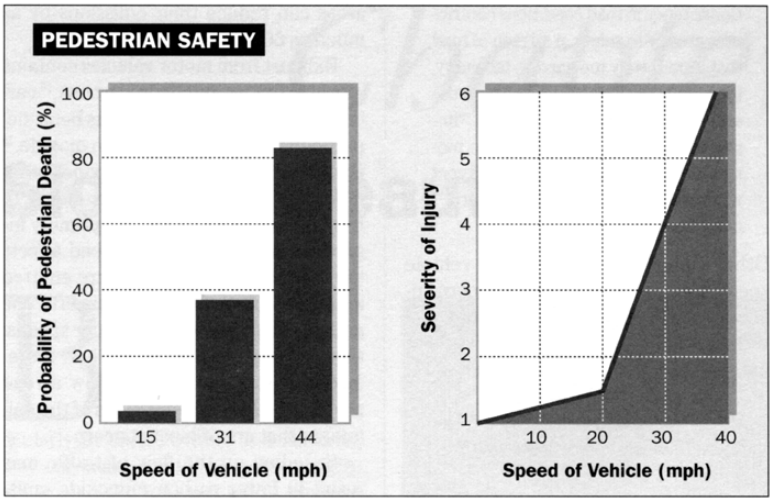
Injuries become quite severe at 30 mph, and catastrophic at speeds of 40 mph and higher. High speeds (above 25 mph) have never been appropriate to a neighborhood. Yet current designs induce higher-end speeds.

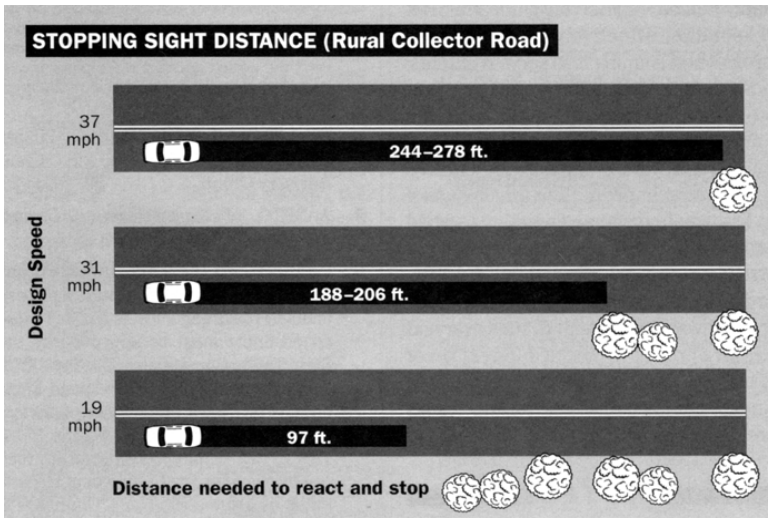
Some studies reveal that children, and especially teenagers in suburban neighborhoods, are at greater risk of losing their lives in traffic crashes than their counterparts in inner city locations who often deal with gang-related violence.

The lower graphic illustrates how critical reaction time drops dramatically as speeds increase.

Today the greatest source of danger in modern neighborhoods for people of all ages is not the house fire, but traffic.

Thus, one of the greatest ways the fire, police and other safety partners in a community can address community safety needs is to advocate low-speed, efficient neighborhood streets.





Source: Take Back Your Streets, 1995

Traffic related deaths and injuries of children is a growing national concern. *The Centers for Disease Control and Prevention and the "Let Kids Live" coalition, have learned that young children are more likely to die as a result of traffic crashes than through all childhood diseases combined. Reduction in traffic deaths and injuries is best handled through an aggressive campaign for seat belt and child restraint compliance, and by reducing vehicle speeds in neighborhoods where children spend much of their time. Only through better designed traditional neighborhoods, and aggressive efforts at traffic calming conventional neighborhoods, will these important community and national goals be achieved.*

Local Government Commission
www.lgc.org

A nonprofit, nonpartisan, membership organization, the Local Government Commission is composed of forward-thinking, locally elected officials, city/county staff, and other interested individuals. The LGC inspires and promotes the leadership of local elected officials to address the problems facing our communities by implementing innovative policies and programs that lead to efficient use of civic, environmental and economic resources.

The LGC has produced additional street design and safety publications, including *Street Design Guidelines for Healthy Neighborhoods; Streets and Sidewalks, People and Cars – The Citizens' Guide to Traffic Calming; Designing Safe Streets and Neighborhoods;* and *Land Use Planning for Safe, Crime-Free Neighborhoods*.

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