Marengo Matters

Good Evening,

I would like to thank the Mayor for extending an invitation to our group to share our concerns and to present some additional information that we have gathered about the ongoing traffic issues on Marengo Avenue.

But before I begin I would like to extend our deepest condolences to the family and friends of our South Pasadena neighbor who was fatally stabbed on Brent Avenue yesterday. We are all saddened by this horrific news.

Our Marengo Matters community group was formed to give the families in our neighborhood a voice and a forum to share their concerns and their ideas on how to address this issue.

For decades South Pasadena residents fought and were able to help stop the completion of the Long Beach Freeway.

Residents were concerned that the completion of the Long Beach Freeway would ruin the quality of life enjoyed by the residents and in essence would physically divide the city.

During this battle we all saw the immense increase in traffic on our city streets as commuters looked for ways to connect with the freeways to the north and south of our city.

But in recent years the number of cars on residential streets like Marengo has exploded as traffic APPS deliberately direct cars onto our street.

That coupled with "distracted" drivers and an attitude by far too many people that the rules of the road and speed limits don't apply to them has resulted in death, injury, property damage and a general sense of fear among the residents living on Marengo Avenue.

Obviously this is a crisis that is going to require a permanent physical solution to divert the traffic flow since we can't change the attitudes of people who are merely "driving through" our community looking for the FASTEST WAY to get from point A to Point B.

I realize we have limited time to address the Council so we have prepared packets for each of you to review our MARENGO MATTERS newsletters that clearly outline the neighbors positions, their concerns, and their suggestions.

We have included the obituary of our neighbor who was killed in the crosswalk on Marengo in July of 2022, we think it is important for you to each understand that he was more than just a statistic.

I requested and received from the SPPD Chief of Police a recap of the traffic statistics on Marengo from January 2023 to present which includes injury accidents, hit and run incidents, property damage, and citations— of which there were 345 tickets issued during this period in just the two blocks of South Marengo.

A copy of this information is in the packets we have prepared and distributed along with pictures of accidents, and most importantly some of the deterrents the residents would like to see put in place.

Marengo Matters has already distributed over 100 yard signs like those displayed here today— with more requests for additional signs being sent to us daily. People are really fed up with the blatant disregard for their immediate community.

The South Marengo residents' safety and quality of life has been completely destroyed.

I can say that with conviction because our family first moved to South Pasadena in 1922, built and completed our first home at 626 Magnolia in 1924, have owned a home on Pine Street, 2 homes on Meridian, a home on Gillette Crescent and we currently live on Marengo.

The residents are growing more determined every single day— and they are prepared to do WHATEVER it takes to permanently solve this problem before there is another death on our street … which if you don't act is inevitable.

Thank you and we will ALL be looking forward to seeing the actions you take to insure the safety of your residents.

OBITUARY

Tam Thanh Nguyen

JUNE 8, 1948 - JULY 28, 2022

Tam Nguyen, hero, Mars explorer, educator, and devoted family man dies at the age of 74. Tam Thanh Nguyen was born on June 8, 1948 in Saigon, Vietnam. Tam Thanh Nguyen's life tragically ended as the pedestrian in a motor vehicle accident on July 28, 2022.

He passed away unexpectedly, as a hero saving his wife and sister-in-law on July 28, 2022, at the age of 74.

Tam Thanh Nguyen was born on June 8, 1948 in Saigon, Vietnam (Truong Binh village, Can Giuoc district, Cho Lon province). He attended a mens-only high school at Petrus Ky (1959-1966) and Saigon University of Sciences (Saigon, Vietnam) to earn his Bachelor's degree in Physics and Chemistry (1967-1971). He was an educator/teacher in his early life. In 1973, Tam married the love of his life, Connie Nguyen (maiden name Le Xuan Nga) in Saigon in 1973 and who he supported and loved for 49 years.

Tam was a Vietnamese immigrant to the US as he came to the United States in 1975 with his wife, Connie Nguyen. He continued his education in the United States earning a Masters of Science in Electrical Engineering at Cal State Long Beach in 1982. Tam is survived by his wife, Connie Nga Le Nguyen of South Pasadena, CA. Tam and Connie raised 2 sons, David and Andrew Nguyen who are married to Teresa Nguyen and Alexis Dorian DeDonato, respectively. Through David and Teresa, Tam also has 2 grandkids, Connor and Brooke Nguyen. Andrew Nguyen, and daughter-in-law Alexis DeDonato both reside in Alhambra, CA. Tam also has 3 grand-dogs and 5 grand-chickens.

Tam is survived by his 5 siblings: Anh Loan Mai of Santa Ana, CA, Than Thanh Nguyen of Santa Ana, CA, Hoa Tuyet Tran, Houston, TX, Mai Tuyet Nguyen, Saigon, VN and Tai Thanh Nguyen, San Jose, CA. He is preceded in death by his parents Vang Van Nguyen and Phan Thi Tran and older brother Danh Thanh Nguyen.

He attended Petrus Truong Vinh Ky (1959-1966) and Trường Đại học Khoa học Sài Gòn, (Saigon University of Sciences) Saigon, Vietnam and earned his bachelor's degree in Physics and Chemistry (1967-1971). He was an educator/teacher in his early life.

He immigrated from Saigon, Vietnam in April 1975 to Los Angeles, CA. He received another bachelor's degree in Electrical Engineering and Masters of science in Computer Science at Cal State Long Beach. As a devoted lover of space, Tam enjoyed his lifetime career at the Jet Propulsion Laboratory (JPL) in La Canada Flintridge. Tam was involved in NASA's key Mars exploration program, Pathfinder. As a key software engineer, he had worked on the Mars rovers, Sojourner and Opportunity. In 1997, the Mars rover, Sojourner, became the first in the world to land on Mars. After dedicating his life and career to JPL for 38 years, he retired in 2018 to continue his travel around the world with his wife.

As a devoted husband and diligent caregiver to his wife, he served as her primary caretaker until the end interpreting her needs, providing medical care, and being an advocate for the Parkinson's disease community. He was also deeply connected with extended family members in the Southern California area where he always made the time to take care, visit, or spend time with. He was a supportive father and joyful grandfather to all his children and grandchildren, frequently making the time to attend his grandchildren's soccer games. Beyond family, he was a spiritual Buddhist and took time for himself to enjoy his hobbies of photography, skiing, biking, flying remote control planes and helicopters, and traveling the world.

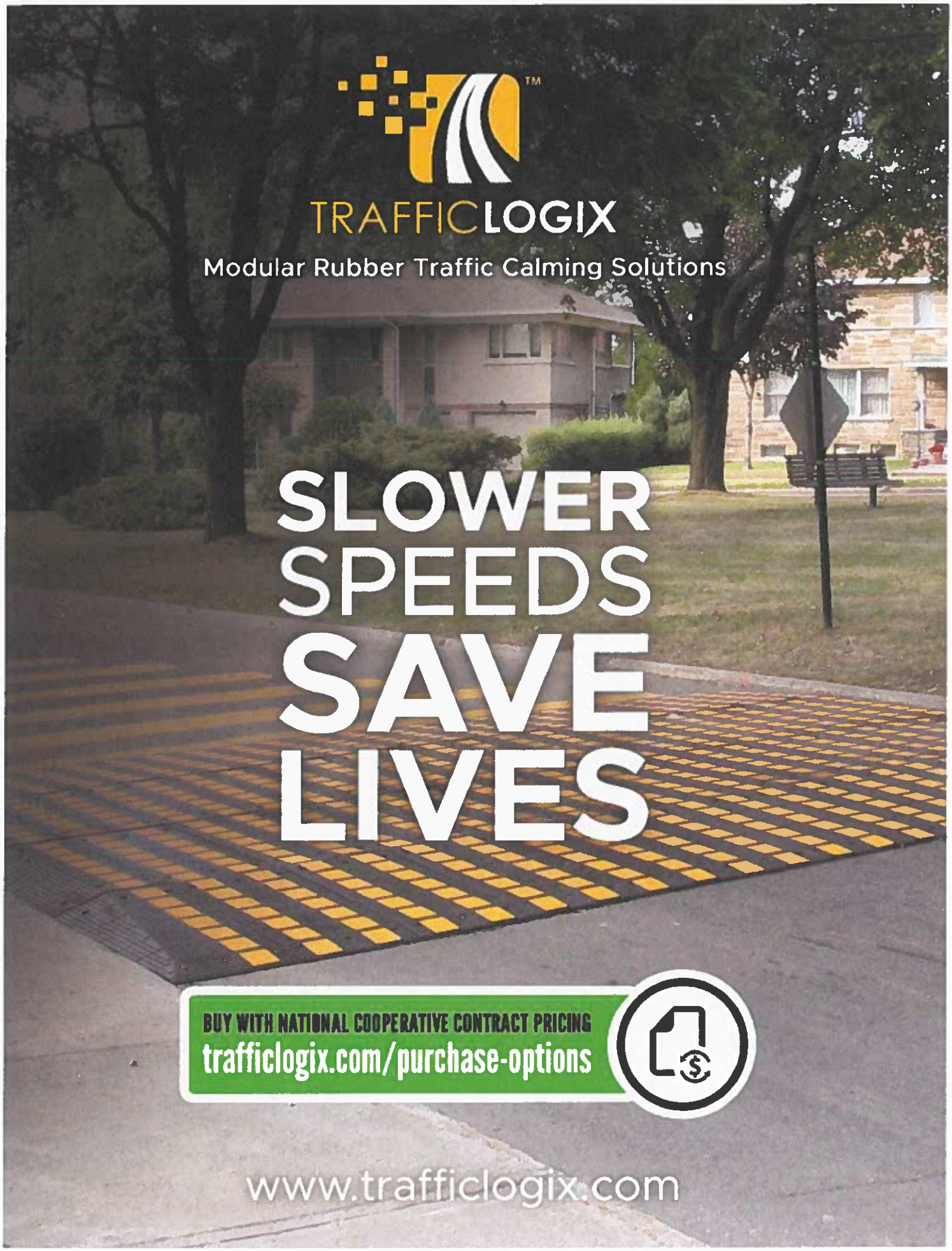
He was able to connect with anyone and everyone, which made him loved by all. He had a growth mindset and was the epitome of patience, compassion, generosity, and love. He will be dearly missed and always loved in our hearts.

A visitation in chapel for Tam will be held Friday, September 9, 2022 from 6:00 PM to 9:00 PM at Hua Yuan: Hall Of Grace, 3890 Workman Mill Rd, Whittier, CA 90601-1626. A funeral service will occur Saturday, September 10, 2022 from 10:30 AM to 12:00 PM at Hua Yuan: Hall Of Grace.

We Are Here Because They Are No Longer Able to Do So

Tam and Connie Nguyen / South Pasadena

MARENGO MATTERS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SLOWER SPEEDS SAVE LIVES
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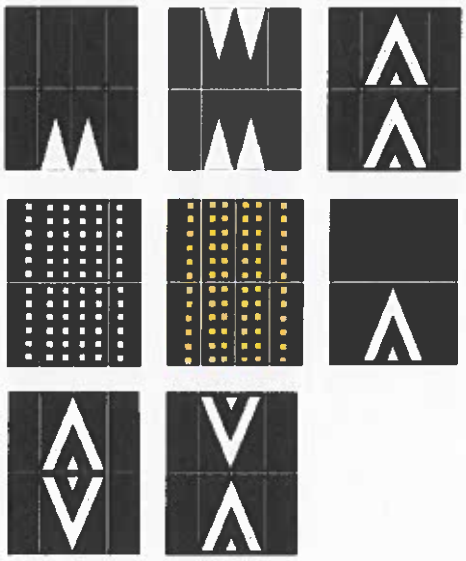
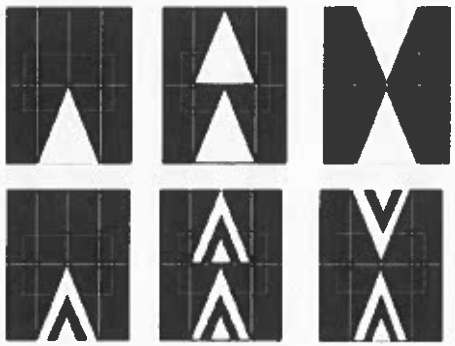
Highly reflective highway tape is embedded into the rubber during the manufacturing process. Available in a choice of yellow/white squares or white arrows, marking designs can be fully customized to your specifications.

Standard Series:
Cushions, humps & tables



V3 Series:
Cushions



BUILD YOUR OWN SOLUTION ONLINE

TRAFFICLOGIX.COM/BYOS

- Series of **small humps** with spaces between them
- Slow cars **without affecting emergency response** time
- Slows drivers while **allowing emergency vehicles to straddle** and pass
- Installed **across road width** in choice of lengths

7' Cushion Profile

- Raised traffic calming devices with **sloped design**
- **Less abrupt than speed humps** due to longer length
- Recommended for roads with **low speed limits**
- Slow cars to **a range of speeds** based on chosen length

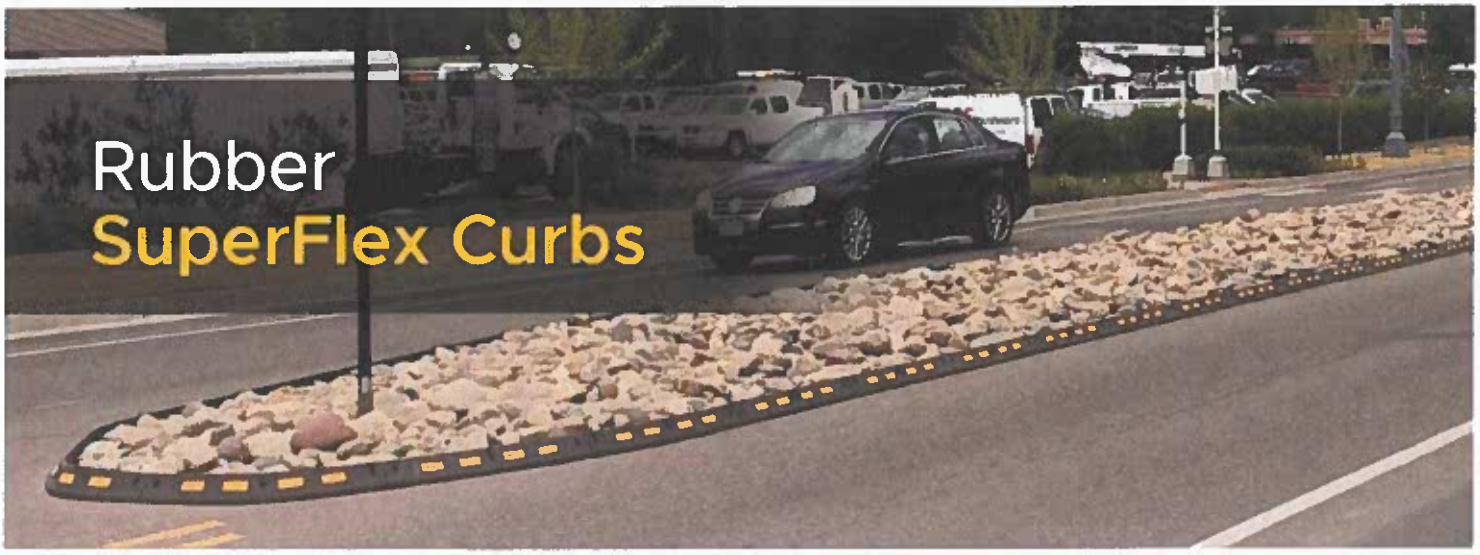
14' Hump Profile

- Flat-topped speed humps for more **gradual speed reduction**
- Allows entire vehicle to rest on top **for less abrupt slowing**
- Encourages **continued traffic flow** at reduced speeds
- Ideal for **residential roads**

14' Table Profile

- **Surface marked walkways** for safe pedestrian passage
- Provides **visual marked pathway** to assist in safe crossing
- Effective **speed deterrent** slows speeding vehicles
- **Dual safety advantage** for superior pedestrian protection

14' Raised Crosswalk Profile



Rubber SuperFlex Curbs

- Highly flexible rubber allows shaping to **any configuration**
- Used for traffic circles, roundabouts, chicanes, safety islands, and lane narrowing
- **Versatile solution** for multiple usages
- Available in brick red or black with **choice of tape color**

Rubber Cycle Lanes

- Creates **dedicated bike lanes** to protect cyclists
- **Sloped** delineators keep vehicle and bike traffic **in their respective lanes**
- **Visual separation** defines traffic spaces
- Guides **cyclists back into lane** while preventing vehicle traffic from entering bike lane

TRAFFICLOGIX

Why Traffic Logix?

Our recycled rubber traffic calming solutions offer a **smarter, long-lasting alternative** to asphalt devices.

Reduced Speeds

Rubber solutions are proven effective in reducing 85th percentile speed by close to 20% and childhood injury or death by close to 60%.

Recycled Rubber

Made of 100% post consumer tires, Traffic Logix recycles more than 450,000 tires from landfills every year.

Customizable

Traffic Logix rubber solutions are made of individual units so you can use them to meet your specs, speed limits, and safety challenges.

TRAFFICLOGIX Rubber	VS	Asphalt
Will not fade or crack	Quality	Fades and cracks over time
Maintains consistent profile	Durability	Compresses with repetitive impact, uneven profile
No heavy equipment needed to install	Installation	Heavy equipment required for installation
Single lane closure	Disruption	Complete street closure during installation
Drivable immediately after installation	Usage	Only drivable after 2-3 days of cure time
Highly visible reflective markings	Markings	Markings need repainting after a few years
Can be removed, stored and relocated	Versatility	Must be destroyed for street repairs
Constructed of recycled rubber tires rescued from landfills	Impact	Petroleum based, depletes resources and pollutes water

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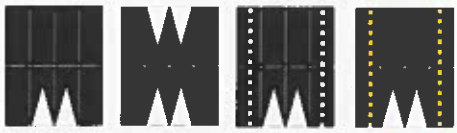
A Division of Logix ITS

Patterns - Speed Humps, Cushions and Tables

Cushion Examples Shown. Humps & Tables also available in similar patterns

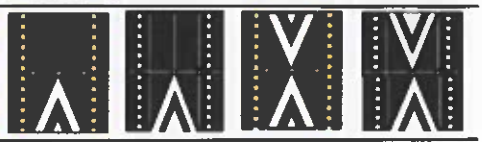
Standard Series is available in various widths and lengths in creating (SC) Cushions, (SH) Humps and/or (ST) Tables

From left to right
SC-070603-2A
SC-070603-4A
SC-070603-2A-2W
SC-070603-2A-2Y

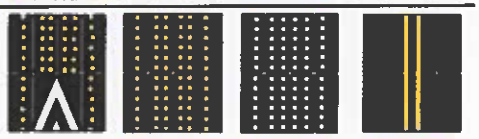


From left to right
SC-070603-M
SC-070603-2M-TW
SC-070603-2M-OW
SC-070603-DIA

From left to right
SC-070603-M-2Y
SC-070603-M-2W
SC-070603-2M-2Y-TW
SC-070603-2M-2W-TW

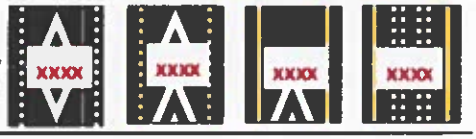


From left to right
SC-070603-M-Y
SC-070603-Y
SC-070603-W
SC-070603-2M-2Y-SLI



From left to right
* SC-070603-2A-2W
* SC-070603-2A-2Y
* SC-070603-2A-SLO
* SC-070603-2A-2Y

From left to right
* SC-070603-DIA-2W
* SC-070603-2M-2W-OW
* SC-070603-2M-2Y-SLO
* SC-070603-W-2Y-SLO



* XXXX **Non-Stock Item**

42" Approach and Exit Ramp

Cushions - 3' W, up to 9' W Lengths 7', 10.5', 14', 17.5', 21'
Height 3"

Humps - Various Widths Lengths 7', 10.5', 14', 21'
Heights 3", (4" -14' Length only)

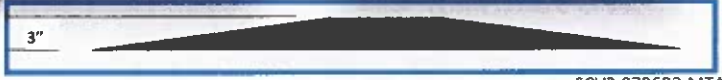
Tables - Various Widths Lengths 14', 17.5', 21', 24.5'
Heights 3", (4" -14' Length only)
Flat Top any length Parabolic at 4" H (14' Length only)

- All modules have patented dual interlocking tongue and grooves.
- Creates a bond among modules.
- Increases installed cushion vehicle impact resistance.
- Enhances long-term stability and product performance.

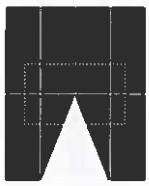
7' L x 6' W x 3" H Standard Series Cushion Profile Shown

V3 SERIES Cushions - 7'L x 6' W x 3"H **V3 SERIES Humps 7'L x Various Widths Only**

7' L x 6' W x 3" H V3 Series Cushion Profile Shown



SCV3-070603-TC



SCV3-070603-TB

SCV3-070603-TA

Steeper Approach Angle
Flat Top Design
Designed Speed 5 - 8 mph

SCV3-070603-MTC

SCV3-070603-MTB

SCV3-070603-MTA

Spring Valley, NY 10977 866.915.6449 www.trafficlogix.com

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Approved Rubber Traffic Calming Devices

QUESTIONS RELATING TO:
TECHNICAL ISSUES
INSTALLATION PROCEDEURES
PROBLEM SOLUTIONS
MARKING SELECTIONS
WHAT PRODUCT TO CHOOSE
PRICING

CONTACT: Bill Isaacson
Cell: 214.536.2559
MAIL: bisaacson@trafficlogix.com

GUIDELINES

All Traffic Logix Traffic Calming speed cushions, speed humps, speed tables or raised crosswalks start with the following:

SC= Speed Cushions	
SH= Speed Humps	
ST= Speed Tables	
CW= Crosswalks	
Next two numbers= Length	SC - 14 = 14' long
Next two = Width	SC - 1409 = 9' width
Last two = Height	SC-140903=3" high
Last numbers = Markings	SC-140903-2M-OW = 2 ea. MUTCD - One Way Direction
	SC-140903-2M-TW = 2 ea. MUTCD - Two Way Direction

ROADWAY WIDTH
Pavement Edge to Pavement Edge

12' to 15'	use 9' width products
16' to 19'	use 12' width products
20' to 22'	use 18' width products
23' to 25'	use 21' width products
26' to 30'	use 24' width products
31' to 33'	use 27' width products
34' to 36'	use 30' width products
37' or wider	**Contact:** Bill Isaacson

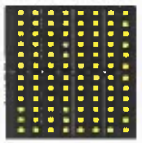
POSTED SPEED LIMITS
Rubber Product Length (As you would drive over it)

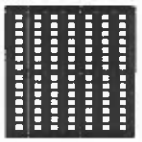
10 mph to 20 mph	+/- 5 mph	use 7' long products
15 mph to 25 mph	+/- 5 mph	use 10.5' long products
25 mph to 30 mph	+/- 5 mph	use 14' long products
30 mph to 35 mph	+/- 5 mph	use 21' long products
40 mph or higher	**Contact:** Bill Isaacson	

AVAILABLE MARKINGS


M=MUTCD


A=Arrows


Y=Yellow Squares


W=White Squares

- All modules have patented interlocking tongue and grooves.
- Creates a bond among modules.
- Increases installed cushion vehicle impact resistance.
- Enhances long-term stability and product performance.

7" Hardware is standard for asphalt installation.
Request 4" hardware if installing into concrete.

Module Part Numbers are Stamped on Outer Edge

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866.915.6449
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RUBBER CONDITIONAL USE WARRANTY

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Conditional Use Terms
Rubber Traffic Calming Devices

1. Traffic Logix traffic calming devices (the "Traffic Calming Products") are designed to be installed on local residential streets with posted speeds of 35 mph or less. Prior to installation, the Customer should determine if any federal, state, or local regulations govern the installation or use of Traffic Calming Products.
2. The installation location of any Traffic Calming Product should be reviewed by a Traffic Engineer.
3. Traffic Calming Products should only be used on roads with less than 5,000 vehicles per day.
4. Traffic Calming Products should be installed only on roads that are used primarily by passenger vehicles and/or emergency response vehicles with the roads themselves in respectable condition.
5. Traffic Calming Products should be installed in such a way that they are visible from at least 200 feet. For safe usage, Traffic Logix products must be installed in conjunction with appropriate signage in accordance with ITE's State of the Practice on Traffic Calming, as well as ITE's Manual on Uniformed Traffic Control Devices.
6. Traffic Calming Products should not be installed on roadways that have more than an 8% grade.
7. Traffic Calming Products should be installed with a minimum othree inches of asphalt or concrete underneath the device.
8. All bolts and anchors provided with product must be installed as instructed, and with Traffic Logix anchor adhesive that is also included with each product.
9. Quarterly inspection of each Traffic Calming Product is required. If the Traffic Calming Product has been damaged in any way, it should be replaced.
10. Traffic Logix Products should be removed prior to the first snowfall and should only be reinstalled in non-winter months.

Neighbor

1h ago Alhambra, California

Car hit on crosswalk Alhambra park

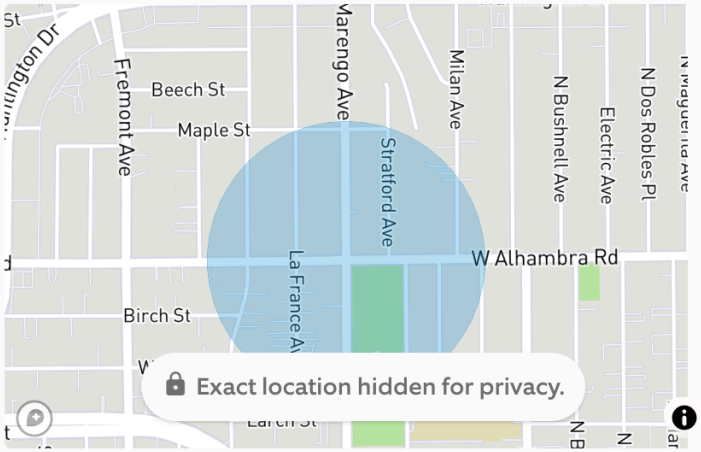
My son got hit by a car on intersection of Larch Street and Palm, he was biking home form school there is a crosswalk, he was turning left on the crosswalk, this car came from behind him hit him on the left side. He fell over the bike. thanks God. This guy is not too fast. My son got a few bruises on the legs and arm ,Bike is broken. My son is 16, He was shocked from this accident, didn't know what to ask or what to do, the guy quickly asked him is he OK? But didn't leave any information just left, I'm glad my son didn't get bad injury, but please stop for people crossing the street.

Person Description
Clothing: Red T Shirt, Black Frame Glasses,
Unique Traits: Male Older Age Around 60, Great White Hair, About 5'5" Hight

Vehicle Description
Car Type: Light Gray
Other Details: Sedan

Safety and Security

Share



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Final Report

Best Practices in Arterial Speed Management

Prepared for:

City of Pasadena

October 22, 2009

Kimley-Horn
and Associates, Inc.

Table of Contents

1. Recommendations

This report presents recommendations to update the City of Pasadena's traffic investigation process or Neighborhood Traffic Management Plan (NTMP) to include speed management measures for major streets. Major streets are defined as major collectors and arterials.

Many of the conventional residential street speed reduction measures presented in the City's Neighborhood Traffic Management Program Community Handbook are not appropriate for major streets. Measures such as speed humps, traffic circles, and angled parking are typically not used on major streets because they affect emergency vehicle response time, large vehicle mobility, and can affect the street's capacity. However, the handbook does identify some measures that have application on major streets including focused police enforcement, radar feedback signs, speed tables (raised intersections or crosswalks), pavement markings, roundabouts (on appropriate streets), and lane narrowings.

The recommendations in this report are based on the results of a literature review and interviews with experts and public agencies identifying a number of speed management techniques that can be implemented on major streets. This report recommends a tiered approach to speed management measures using average daily traffic volumes as criteria:

- Streets with greater than 20,000 vehicles per day
- Streets with fewer than 20,000 vehicles per day

1.1 Streets with greater than 20,000 vehicles per day

Roadways with greater than 20,000 vehicles per day need to maintain traffic capacity. Therefore, measures that significantly reduce capacity are not appropriate on these streets because they might divert traffic to parallel streets where an increase in traffic is undesirable. Streets with greater than 20,000 vehicles per day will typically consist of two or more travel lanes in each direction, and have traffic signals at major cross streets. The most effective speed management measures (which may be combined) for this tier of street are listed below.

- **Signal coordination** to a target speed of at least the posted speed limit.
- **Reduce travel lane width** to a maximum of 11-feet, and turn lanes may be reduced to 10-feet, as appropriate.
- Permanent **speed feedback signs** flashing "Slow Down" message when speed exceeds a preset limit (most effective when coupled with enforcement). Signs should be solar powered with ability to move from location to location.
- **Speed Enforcement Corridors** with regular targeted speed enforcement combined with a public awareness program.
- **Multi-lane urban roundabouts** at appropriate intersections. Approach and departure lanes can be designed for 15-20 mph. Most effective if used in multiple locations within the same corridor. Multi-lane roundabouts may not be desirable at intersections with high pedestrian or bicycle volumes.

- **Pedestrian improvements at intersections** including a combination of curb bulbouts, high visibility crosswalks, and smaller turning radii to decrease speeds of turning vehicles.
- Long-term speed management involves **transitioning suburban streets into urban thoroughfares**. Urban contexts, and associated multimodal activity, tend to lower speeds. Elements of urban thoroughfares include buildings built to the edge of the street with ground floor uses that generate pedestrian activity, street trees, pedestrian-scaled intersection spacing, and on-street parking.

1.2 Streets with fewer than 20,000 vehicles per day

Streets with average daily traffic volumes between 10,000 and 20,000 vehicles per day allow more flexibility in the types of speed management measures that can be implemented. Streets with this level of traffic volume usually do not require the same level of capacity as a higher volume street, and are frequently overbuilt. These streets typically are four lanes wide (two lanes in each direction), but may only need to be one lane in each direction. The most effective speed management measures (which may be combined) for this tier of street are listed below.

- **Four to three lane conversion (Road Diet)**, particularly effective on four lane undivided streets. This measure provides one travel lane in each direction and a center median or turn lane. Streets with average daily traffic volumes of 15,000 to 18,000 can usually be accommodated with this configuration. Streets approaching 20,000 vehicles per day may also be accommodated by this configuration, but a capacity analysis is required. The additional width gained with road diets can be used for multiple improvements to the street depending on need such as medians, bike lanes, wider sidewalks and landscaping, on street parking, or some combination of each. Road diets also allow further pedestrian improvements at intersections such as curb bulbouts or pedestrian refuges.
- **Single-lane urban roundabouts** at appropriate intersections. A combination of road diet and single-lane roundabouts along a corridor is one of the most effective combinations of major street speed management measures.
- **Signal coordination** to a target speed of at least the posted speed limit.
- **Reduce travel lane width** to a maximum of 11-feet, and turn lanes may be reduced to 10-feet, as appropriate.
- Permanent **speed feedback signs** flashing "Slow Down" message when speed exceeds a preset limit (most effective when coupled with enforcement). Signs should be solar powered with the ability to move from location to location.
- **Speed Enforcement Corridors** with regular, targeted speed enforcement combined with a public awareness program.
- Long-term speed management involves **transitioning suburban streets into urban thoroughfares** (see Section 1.1).
- **Raised intersections** primarily at gateways to residential or commercial districts (most effective if used in multiple locations delineating speed management areas) may be used on streets with posted speed limits of 30 mph or less and traffic volumes between 10,000 and 15,000 vehicles per day.

While each individual recommendation can be effective, a combination of measures may have a greater success of reducing travel speeds on arterials and major collectors.

Speed management measures should be implemented throughout and across jurisdictions to have the most impact combined with appropriate enforcement.

2. Background and Purpose of Study

The City of Pasadena has commissioned this study to examine best practices in managing speed on the City's arterial and collector streets. This study identifies speed management strategies and measures being used worldwide, but mostly within the United States. The emphasis is on applications employed in California. The impetus for this study is recent regulatory changes in California that affect how public agencies evaluate and establish speed limits.

In California, speeds are determined by methodology set forth in the California Manual of Uniform Traffic Control Devices (MUTCD).[1]

The current MUTCD determines speed by using the 85th percentile speed rounded to the nearest 5 mph increment. The posted speed limit may be lowered an additional 5 mph with sufficient documentation of unapparent conditions and consistent with the California Vehicle Code section 22358.5 cited above. Other factors for considerations include incidents and causes of collisions, residential density, and pedestrian and bicycle safety.

This study identifies current practices in managing traffic speeds on streets typically classified as arterials or collectors. The study design includes:

- Review of the literature on speed management methods and effectiveness,
- Interviews of experts in the field of traffic operations and speed management, and
- Interviews of municipalities that have employed speed management methods.

3. Definition of Speed Management

Speed management is a multi-disciplinary approach to controlling speeds using enforcement, design, and technology applications. Speed management should reflect the needs of multiple modes and respond to the street's surroundings. The benefits of speed management are safer roads with fewer incidents and less severe injuries.

Speed management techniques can be used regardless of the posted speed. While "traffic calming" is a type of speed management usually used on local residential streets, speed management can be used on all types of streets, including arterials or state highways, for safety benefits, to provide a more consistent speed throughout a corridor, or to decrease the number of speed violators.

Speed management methods may be either passive or active. Passive methods are devices or designs that provide feedback to the motorist about their speed, or

[1] 2008 California Vehicle Code section 22358.5

designs in which the motorist perceives the need for a lower speed. Active methods are physical devices or technologies that force drivers to slow or stop.

4. Literature Review

The literature review focused on speed management techniques being used on collectors or arterials in urban or suburban locations. There is an abundance of literature on traffic calming for residential streets, but most of the methods and devices are not applicable to the unique characteristics of arterials. Further, the quantitative assessment of techniques in the literature is based on data collection specific to residential streets and cannot be used to determine the effectiveness of these methods on arterials.

Arterial streets are designed to move traffic longer distances efficiently through a corridor, often at relatively high speeds. Speed management techniques that work well on a slower, less-traveled residential street, are not as effective, or not appropriate, on high volume, higher speed corridors. Arterial streets are primary response routes for emergency vehicles which need to travel at high speeds, or are designated truck routes. Therefore, methods that force lower speeds, such as vertical displacement methods (i.e., speed humps) are not appropriate for these streets.

Speed management literature often focuses on safety benefits, with fewer studies on quantitative speed changes. Some of the literature comes from European countries because they are often more advanced in speed management and have more extreme visions of the use of the roadway. The literature review is divided into the common types of techniques currently employed in the United States and found to be effective on arterials.

4.1 Roundabouts

Roundabouts are an intersection traffic control technique in which traffic moves one way around the intersection. They have safety benefits because they decrease the number of conflict points by removing left turns. They also lower speeds approaching and within the roundabout based on the angle of deflection entering the roundabout and the radius of the roadway's curvature. Smaller roundabouts with different merging operations or stop control are called traffic circles. Traffic circles can be used mid-block to slow traffic, but are usually used on low volume residential streets. Roundabouts may require pedestrians to cross longer distances and be aware of traffic merging in and out of the intersection. Bicyclists can use the pedestrian approaches to the roundabout or can mix with the general flow of traffic. In larger, multi-lane roundabouts, a striped or separated bicycle facility can be designed. According to the NCHRP Report 613, roundabouts improve bicycle safety by slowing down cars to match bicycle speeds and reduce turning movement conflicts between bicycles and cars, although these safety benefits are less than the safety benefits to cars and pedestrians. There are numerous studies on roundabouts and safety improvements. One study by the Maryland State Highway Administration found that a roundabout at the intersection of two state routes decreased crash incidents by 70%, injury accidents decreased by 90%, and there was less delay than if a traffic

signal had been used.[2] Roundabouts are widely accepted as a speed reduction technique, often used on high speed roadways. Studies have shown that entry speeds for roundabouts are between 13 and 17 mph for the 85th percentile speed.[3] Roundabouts have also been shown to "reduce mid-block speed by at least 10%" and reduce travel speeds within the intersection to approximately 15 mph.[4]

4.2 Road Diets

A road diet is a technique that narrows the effective width of the roadway for cars. This may mean removing lanes or narrowing the individual travel lanes, increasing the sidewalk width, or adding a median. It may also mean adding left turn lanes, dedicated transit lanes, on-street parking, or some combination of each. A common application of road diet is the conversion of a four-lane undivided street into a three-lane street comprised of one travel lane in each direction and a center turn lane. This application is often used to provide bike lanes and/or on-street parking. Road diets are a very common arterial speed management technique and often cited as the most effective. There is a substantial collection of before and after studies for road diet applications. They have been used effectively throughout the world and are frequently used in areas with high pedestrian and bicycle use. In Victoria, British Columbia a road diet was used for a 4-lane road (2 lanes in each direction) with an AADT of 24,000. The road diet consisted of left turn lanes, pedestrian refuge medians, and full-time on-street parking. The volumes on this road did not change, and traffic did not divert to other roads, but speeds were decreased by 5km/hour (3 mph) and incidents decreased by 17 per year.[5]

4.3 Intersection Design

Intersections are an important location for speed management because of the potential for conflicts with cars, pedestrians, and bicyclists and the number of possible movements. Intersections can be designed with raised intersections or crosswalks, pedestrian bulbouts, offset lanes, monument features, and smaller turning radii. These techniques work by narrowing the street's cross-section or providing visual cues to motorists to travel slower, while benefiting pedestrians and bicyclists through shorter crossings and higher visibility. Intersection design primarily has an impact on the speed of vehicles approaching and traveling through an intersection, and can improve pedestrian accessibility. Raised intersections are level with the sidewalk and are often accomplished with textured pavers or colored and stamped concrete to create a visual cue. In a sample of three sites, raised

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[2] "Handbook of Speed Management Techniques" By Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute, September 1998.

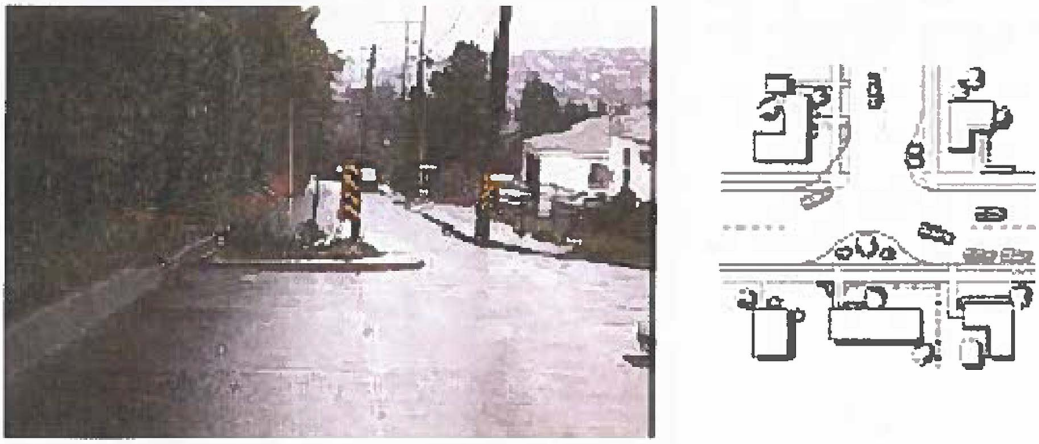
[3] "NCHRP Report 613 Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections" National Cooperative Highway Research Program Pg 46.

[4] "Traffic Calming of State Highways: Application New England." Per Garder, University of Maine, John Ivan, University of Connecticut, Jianhe Du, University of Connecticut, June 19, 2002. Pg 17.

[5] "Traffic Calming on Arterial Roadways" by Michael Skene, on ITE's website.

intersections used alone decreased the 85th percentile speed by 1%.[6] T-intersections can be realigned so the through movement is deflected and becomes a turning movement as is shown in Figure 1. According to traffic calming.org and supported by the literature review, no data has been documented to show the effectiveness of realigned intersections. The combination of monuments, landscaping, and pedestrian bulbouts has limited data for measuring their effectiveness at intersections, but studies have been done on the individual components along residential streets. Studies show that changes in the character of the road have decreased speeds. For example, on two-lane rural highways there was a 4 mph decrease in the areas of the road that had trees, compared to areas without trees.[7] Pedestrian bulbouts, extending the curb into the intersection to decrease pedestrian crossing distance and to narrow the roadway, have been shown to reduce average speed by 13%.[8]

Figure 1. Realigned T-intersection



Source: Delaware Department of Transportation Final Regulations Traffic Calming Design Manual. Delaware Register of Regulation Vol. 4, Issue 3, September 2000. Pg 544.

4.4 Pavement Markings/Striping

Pavement markings and striping can be used for speed management by creating an illusion of deflection or narrower lanes or by changing the environment to make drivers more aware of their speed. One type of pavement marking is a series of transverse lines that gradually get closer together to give the illusion that drivers are going faster than they really are, causing them to slow down. This is frequently used when approaching an intersection, crosswalk or merge point where drivers will need to slow down in advance of the decision point. The same theory holds for chevron markings across a lane. These pavement markings are most effective when used in

[6] www.trafficcalming.org, accessed on September 5, 2008. Sponsored by Fehr and Peers Transportation Consultants. http://www.trafficcalming.org/raisedintersections.html

[7] NCHRP 124 – Guidelines for Speed Reduction Treatments at High-Speed Intersections. Pg 2-48

[8] "Types of Traffic Calming Methods" City of Santa Clarita; http://www.santa-clarita.com/cityhall/pw/traffic/TrafficCalming.pdf accessed on May 5, 2009.

combination with a change in pavement surface, such as rumble strips or pavement textures (cobblestone, texturizing). Striping can also be used to narrow lanes for a less expensive road diet or to mark the actual speed limit on the pavement to make drivers aware of the speed limit. A study on pavement markings used for speed management found that longitudinal markings were not effective when used alone, but transverse pavement markings were. Three case studies were used for before and after studies on transverse pavement markings – an exit ramp in New York, a rural road in Mississippi with a speed limit of 45 mph, and a rural road in Texas with a 60 mph speed limit (45 mph on curves). The New York case study found a 4 mph reduction in speed, the Mississippi case found a long-term reduction of nearly 5 mph, and the Texas case study found no statistical difference.[9]

4.5 Speed Humps and Speed Bumps

Speed humps and speed bumps are the most common traffic calming measure used on residential streets, but on higher speed roads (over 30 mph) they cause significant driver discomfort and "jolt the vehicle's suspension" and are not recommended[10]. Speed tables or platforms (raised crosswalks or intersections with a flat top) are vertical deflection techniques that are applicable on arterials because of their geometric design and the smoother transition at higher speeds. These are not recommended for speeds over 45 mph and are generally for lower speed roads.[11] They are also not recommended in areas where the vehicle will encounter them at a high speed; instead, they can be used in conjunction with curves, stop signs or signals to prevent acceleration after slowing or stopping.[12] This technique can reduce traffic volumes and divert traffic to parallel streets.[13] There is limited data on the effectiveness of speed tables for arterials with speeds greater than 45 mph. On streets with speeds less than 45 mph, speed tables have been shown to be an effective speed reduction technique. In Gwinnett County, Georgia, 43 speed tables were installed, resulting in an average speed reduction of 9 mph.[14] A sample of data

[9] "Traffic Control Devices Pooled Fund Study – Pavement Markings for Speed Reduction" by Bryan Katz, December 2004.

[10] "Handbook of Speed Management Techniques" By Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute, September 1998.

[11] "Evaluation of Gateway and Low-Cost Traffic Calming Treatments for Major Routes in Small Rural Communities" by Shauna Hallmark, Neal Hawkins. Center for Transportation Research and Education, Iowa State University. 2007.

[12] NCHRP Report 613 – Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections, NCHRP 2008 Pg 53

[13] "Handbook of Speed Management Techniques" By Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute, September 1998.

[14] NCHRP Report 613 – Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections, NCHRP 2008 Pg 54

on speed table effectiveness found an average of 18% decrease in 85th percentile speeds. [15]

4.6 Traffic Signal Techniques

Traffic signals can be used as speed management techniques in multiple ways. Signals can be synchronized to give a progressive green band for cars traveling at a specified speed. Synchronization can be combined with signs that inform drivers that the signals are timed for a specific speed, as an education measure. Vehicles traveling faster than the coordinated speed will have to stop more frequently. In Portland, Oregon, signals within the downtown area are coordinated to speeds of 12 to 18 mph. In France, synchronizing signals to create a "green wave" has been shown to reduce the average speed 10 to 20% and a 15 to 25% reduction in the 85th percentile speed.[16] This technique is particularly effective on one-way streets, but can also be used effectively on two-way streets. There are also "rest on red" signals where a signal is red until a car drives over a detector placed at a pre-set distance from the intersection. This requires a car to slow on the approach to the intersection since the light is red, but does not require the car to stop because the light changes before the car comes to a complete stop. Some municipalities have experimented with speed activated traffic signals, where vehicles approaching an intersection at high speeds trigger a red light.

4.7 Shared Space

Shared space is a common technique used in Europe. A shared space can take a variety of forms, but in general the street is envisioned as a public space with no one mode having priority over another. Pedestrians are free to cross anywhere. Often, there are no pavement markings, requiring drivers to be attentive and navigate around other vehicles, pedestrians, and bicycles. There may be trees or street furniture in the "road" that act as a deflection. Shared space evolved from the Dutch "woonerven" concept of giving pedestrians priority over other modes. In the Netherlands, the number of incidents on the shared space has decreased by 95%.[17]

4.8 Feedback and Enforcement Techniques

Feedback and enforcement techniques include speed trailers, flashing beacons, flashing speed limit signs, or police enforcement. These techniques are designed to make motorists aware that they are exceeding the speed limit by changing something noticeable in their environment, such as a flashing sign. A study in Bryan, Texas used speed trailers to reduce speeds, but they were not found to have a lasting impact. Another study in Riverside, California maintained lower speeds by up

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[15] www.trafficcalming.org, accessed on September 5, 2008. Sponsored by Fehr and Peers Transportation Consultants. http://www.trafficcalming.org/speedtables.html

[16] "Speed Management" by Organisation for Economic Cooperation and Development and European Conference of Ministers of Transport. 2006.

[17] "A Green Light for Common Sense: to Slow Drivers, German town drops traffic signals and lane markers" Craig Whitlock, Washington Post Foreign Service, December 24, 2007.

to 4 mph a week after a speed trailer was removed.[18] Using speed monitoring displays in school zones has shown to decrease the number of speed violators and result in a 17% reduction in speeds.[19] One of the most common arterial speed management techniques in the United States is the radar speed feedback sign, and many municipalities provide permanent installations of these devices. These devices have evolved from simple displays of speed to devices that display speed, speed limit, and flash "slow down" when vehicles exceed limits. Police enforcement of speed still remains a fundamental element of arterial speed management.

4.9 Deflection

Deflection techniques used for speed management require the car to redirect from its travel path to avoid gaining speed on a straight roadway. Chicanes and road narrowing medians are two types of deflection techniques. The deflection measures are designed to be easily navigated if the vehicle is driving at the proper speed. These techniques may be a challenge for emergency or transit vehicles. They have proven effective in Ontario, Canada where speed control medians were implemented on Mohawk Road. The mean speed decreased by 9% and the percentage of vehicles exceeding the speed limit was reduced by 20%.[20]

4.10 Other Techniques

Other speed management techniques are mentioned within the literature, but are not implemented frequently and lack evidence to support their effectiveness. A "neighborhood pace car program" is one technique where members of the community pledge to always travel the speed limit to set the pace for drivers following them. Another technique is to use tactile surfaces (such as rumble strips) to deliberately increase road noise and vehicle vibration to warn drivers to slow. There is the concept of creating visual cues that notify motorists they are traveling in urbanized places where pedestrians and bicycles may be encountered. This includes street enclosures (buildings fronting streets, tree canopies, on-street parking) and other urbanizing features within and outside the public right-of-way. Many agencies prohibit the use of vertical displacement devices on arterial streets (i.e., speed humps), but indicated that they would employ less obtrusive measures such as gateway treatments, narrowing travel lanes, bulbouts, parking bays, on-street parking, detached sidewalks, bicycle lanes, and textured pavement at pedestrian crossings. These treatments may not significantly decrease traffic speeds on arterial streets, but they address safety concerns and the quality of the experience or sense of place created for pedestrians, bicyclists, and motorists[21]. Variable speed limits are

[18] "Speed Management Techniques for Collectors and Arterials" TRB Circular, E-C019 Urban Street Symposium 2000, Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute.

[19] "Effectiveness of Speed Monitoring Displays in Speed Reduction in School Zones" by Choulki Lee, Sangsoo Lee, and Bongsoo Choi for TRB Annual Meeting in 2006.

[20] "Arterial Speed Calming – Mohawk Road Case Study" TRB Circular, EC019 Urban Street Symposium 2000, Gerry Forbes, Synectics Transportation Consultants.

[21] "County of Sacramento Neighborhood Traffic Management Program – Best Practices White Paper". Fehr & Peers Associates, Inc. 2004.

used to respond to varying traffic conditions. Variable speed limits require drivers to slow down in adverse weather conditions or in advance of an incident or congestion point. These potential speed management techniques are not widely used but may be as effective as other techniques.

4.11 Conclusion

Speed management techniques can generally be divided into two categories, active (physical) and passive. Active techniques are ones that require a physical design change, such as roundabouts or raised medians. Passive techniques include signage, signalization, and enforcement techniques. Active techniques are generally more effective at changing driver behavior, but may be more costly to implement and may not be appropriate on arterial streets. In general, the literature on speed management for arterials is limited and qualitative with most of the literature focusing on residential applications. The literature review focused on individual speed management techniques; however, these measures are more effective when used in combination with multiple techniques over the length of a corridor. The Danish approach to speed management focuses on using active and passive techniques concurrently in what is called a "speed triangle." The triangle consists of physical measures, enforcement, and education, similar to the American "three E's of engineering, education, and enforcement" often cited as an approach to neighborhood traffic management. The education piece can be as simple as posting speed limits frequently, or as complex as public education programs. The physical measures that have proven effective in Denmark are roundabouts, speed humps, bicycle lanes, and changes in road surface. These measures have been relatively inexpensive to implement and have shown a 16% reduction in speed. The speed triangle method has been in use for over ten years and is still found to be as effective now as when it was first implemented.

5. Best Practices

Experts in the field provided input on best practices for speed management with an emphasis of techniques that have proven effective on arterials and state of the art techniques that will be the future of speed management. Experts were interviewed from Federal agencies, State Departments of Transportation, local municipalities and major universities. Appendix B has a complete list of the experts that were interviewed.

5.1 Effective Techniques

The most effective speed management techniques are ones that have a long lasting impact. Many techniques work in the short term because the concept is novel. This is true for pavement markings, radar feedback signs, or for visual cue techniques like trees. Enforcement techniques are also only effective in the short-term and must be employed consistently for long term effectiveness. More permanent enforcement techniques like "fake" red light running cameras may work for longer periods, but if people do not receive a negative consequence for running the red light or speeding the effectiveness will wear off.

Roundabouts and road diets were most commonly referenced as having the largest impact, anecdotally. Overall, the experts agree that a combination of techniques

should be used, and that speed management should be implemented corridor-wide (and across jurisdictions) to have the most impact with appropriate enforcement.

5.2 State of the Art Techniques

State of the art techniques in speed management are found primarily in Europe. The concept of shared space has proven effective throughout Europe, but is not used in the United States, and would not likely be applied to arterial streets. These techniques use elements of geometric design and traffic calming that are familiar in the United States, but take it a step further to apply these elements in a way that are not typically used in the United States. For instance, in Switzerland, one speed management application consisted of a typical road diet with a drivable cobblestone median. The drivable median, which is not often seen in the US, can be used for left turns or passing busses. Another application is to have dedicated bicycle lanes and vehicular travel lanes so narrow that cars cannot pass bicyclists. Cars must wait for the bicycles or pass at an intersection. When no bicycle is present, cars may take part of the bicycle lane. This technique works best in areas of high bicycle usage. This technique is considered "state of the art" because the bicycles are given priority in the road and the lane for the cars is striped narrower than typical widths.

The final state of the art technique frequently mentioned was the integration of technology into speed management. The most basic example of this is signal synchronization. The more advanced techniques involve in-vehicle applications. The Vehicle Infrastructure Initiative (VII) also known as Intellidrive sponsored by the Federal Highway Administration (FHWA) is the deployment of advanced technologies to allow vehicles to communicate with each other and the road. The vehicle would be warned of unsafe driving conditions, such as wet pavement, and respond appropriately. The vehicles would keep a safe distance between each other and know if a potential conflict were approaching, like a car driving too fast. This initiative is being rolled out by the federal government and is currently being tested with input from the automotive industry.

5.3 Important Considerations

Speed management is often a multi-disciplinary decision because it requires input from emergency services, engineering, street maintenance departments, landscape architects, and transit service providers. To be most effective, it also requires input from the public as early in the process as possible to get buy-in and to understand how the community functions. Bicycle and pedestrian advocacy groups may also be involved. Speed management also requires knowledge of the existing traffic patterns, both quantitative and qualitative. Quantitative measures of traffic counts, intersection turn movements, and speeds help to determine the existing condition and the need. The public can explain qualitative information that can be just as important. For instance, one street can be used as a cut-through for children from school to a local park. The existing conditions can determine what the need is, what the goal is, and what techniques are appropriate.

Speed management should be examined along corridors and across jurisdictions. It is important for a corridor to have a consistent speed through different jurisdictions if the character remains the same. A consistent speed also reduces speeding in areas where previously speed limits fluctuated, but travelers may not have realized the difference. Speed management should have a maximum distance between "slow"

points to prevent drivers from gaining speed between measures. Often, the intersection is a slow point and also determines the capacity of the street. If speed management techniques are used between intersections, the capacity of the street will likely not change.

5.4 Expert Interviews

Table 1 summarizes the information gained from interviewing national experts on speed management. Experts included researchers, university professors, and key agency staff at the local, state and federal levels. The table identifies the expert's opinion on the effectiveness of each measure identified and provides additional anecdotal information.

Table 1. Summary of Interviews with Experts in Speed Management

Expert	Speed Management Strategy/Measure	Opinion on Effectiveness	Notes
Kay Fitzpatrick, Texas Transportation Institute	Speed humps, speed tables	Effective	Not widely used on arterials. Not much public support, particularly from emergency service providers.
	Visually narrowing road		Lack of rigorous data on effectiveness.
	Roundabouts	Effective	Show speed reductions and an increase in safety. Pedestrians, especially blind pedestrians may not prefer over signals.
	Pavement markings	Not Very Effective	Only work for a short-time. Pavement markings have an advantage because they are cost effective.
	Speed feedback signs	Effective	Most effective when coupled with enforcement. Enforcement is the key to all measures.
	Raised crosswalks	Effective	Act as speed tables to slow vehicles, but benefit pedestrians by increasing the visibility of pedestrians.
Reid Ewing, University of Maryland	Visually narrowing road	Effective	
	Lateral shifts	Effective	Used frequently in Europe. MUTCD has a formula to calculate shift required on arterials.
	Speed cushions (speed platforms)	Effective	Lowers vehicle speeds, but does not impact emergency vehicles.
	Roundabouts	Effective	20 - 25 mph circulating speeds

Table 1. Summary of Interviews with Experts in Speed Management

Expert	Speed Management Strategy/Measure	Opinion on Effectiveness	Notes
	Synchronized signals	Very Effective	Used effectively in urban settings to create a progression. Slow point speeds should be 5-10 mph below posted speeds.
	Raised crosswalks combined with neckdowns	Effective	Slow traffic and increase pedestrianization.
Frank Quon, Caltrans	Adaptive signal control	Effective	Signals timed for a specific speed. The speed is posted for motorists to know what the appropriate travel speed is for a green band. Methods are used across jurisdictions.
	Automated enforcement	Effective	Working with CHP to identify test cases.
	Radar trailers/ speed Feedback signs	Effective, but degrades over time	Effectiveness degrades if not coupled with enforcement.
	Variable speed limits	Future use	Not used much in United States, helpful for setting speeds corresponding to congestion and in speed transition zones.
	Vehicle Infrastructure Integration (VII)	Future use	Use technology to exchange data from sensors in the road to have the vehicle automatically respond to conditions.
	Speed Enforcement Corridors	Effective	Combined with other techniques, educate public that these corridors have enforcement for speeding and other violations.
	Flashing beacons		Used on intersection approaches to slow traffic through the intersection.
Davey Warren, Federal Highway Administration	Roundabouts	Very Effective	Use in conjunction with a "roundabout corridor".
	Visually narrowing road	Effective	Reduce number of lanes by adding medians, converting travel lanes to parking, etc.
	Speed feedback signs	Effective but degrades over time	Only effective in the short-term.
	Speed limit markings on pavement in red paint	Effective, but degrades over time	Used on rural arterials. Effective because of novelty. Shows decrease of up to 9 mph, but eventually degrades.

Table 1. Summary of Interviews with Experts in Speed Management

Expert	Speed Management Strategy/Measure	Opinion on Effectiveness	Notes
	Variable speed limits	Future use	Used in Melbourne, Australia to set speed limits based on conditions.
	Automated enforcement	Very Effective	Helps reinforce physical measures.
	Deflection	Effective	Curb extensions with a center island or other techniques that require vehicles to move out of a straight path create "slow points".
	Blank-out speed limit signs	Effective	Dark sign that displays speed limit if approaching vehicle is speeding. Sign displays speed limit and flashing "Slow Down" message.
	Intelligent Speed Adaptation	Future Use	Governs speed of the car based on road conditions (part of VII).
Eugene Jud, Cal Poly San Luis Obispo	Medians, trees, islands, pedestrian bulbouts to visually and physically narrow streets	Very Effective	Used throughout the world to provide visual cues and make drivers uncomfortable if moving too fast.
	Mountable cobblestone medians for visual narrowing	Effective	Allows emergency vehicles or left turning vehicles to drive on the median.
	Roundabouts	Very Effective	Used in place of traffic signals to slow intersection speeds and avoid vehicle collisions. Expert's preferred method of speed management.
	Speed Tables	Effective	Caltrans highly discourages speed tables on arterials. Used in France on arterials near schools with volumes up to 17,000.
	Shared lanes	Effective	Street converted from 2-12' lanes to 1 lane with dedicated bicycle lanes. Cars must drive behind bicycles and pass when able. Not generally accepted in U.S. on arterials or collectors.
	Narrow travel lanes	Effective	Lanes narrowed to 8 - 9'. Cars in both directions must pull over for emergency vehicles. Not generally accepted in U.S. on arterials or collectors.

Table 1. Summary of Interviews with Experts in Speed Management			
Expert	**Speed Management Strategy/Measure**	**Opinion on Effectiveness**	**Notes**
	Shared streets	Effective	Streets without striping or signage used to place all modes - bicycle, transit, pedestrian, personal vehicles on equal level of importance. Drivers must be attentive. Not generally accepted in U.S. on arterials or collectors.

6. Agency Interviews

Table 2 summarizes the experiences of public agencies throughout the United States. These agencies were identified as those who have implemented or explored speed management techniques. The table presents effectiveness information if available from the agency.

Table 2. Summary of Interviews with Public Agencies Implementing Speed Management Measures				
Agency	**Speed Management Strategy/Measure**	**Speed Reduction Effectiveness**		**Notes**
		Initial	**After 1 Year**	
City of Oakland, CA	Speed feedback signs	12%[22]	6%[23]	Started with portable signs, but success led to installation of 11 permanent installations.
	Curb extensions at intersections	No Data		Intended effects of bulbouts is to decrease vehicle speed by the visual impression of a narrower road
	Safer crossings for pedestrians on arterial and collector streets	No Data		Striping crosswalks with high-visibility materials and patterns and installing the most updated MUTCD crosswalk signs and in-street "yield to pedestrian" signs (for school and mid-block locations).
Arlington County, VA	Restriped streets to add bicycle lanes, and narrow travel lanes	4.5 to 5 mph drop in 85th percentile[23]		Use 10' inner and 11' outer travel lanes, sometimes down to 9.5' width on older arterials with constraints.
	Curb extensions and transit stop "nubs"	No Data		Periodic measures less effective than continuous measures (such as lane narrowing).
	Medians, edge lines, and parking to	No Data		Added on street parking wherever feasible (if supported by adjacent land use) to create

[22] Effectiveness based on anecdotal information provided by City of Oakland staff.

[23] Interview with Richard Best, Arlington County Transportation Commission Coordinator, July 25, 2008

Table 2. Summary of Interviews with Public Agencies Implementing Speed Management Measures

Agency	Speed Management Strategy/Measure	Speed Reduction Effectiveness		Notes
		Initial	After 1 Year	
	physically or visually narrow streets.			friction.
	Valley gutters	No Data		Slowed traffic but opposed by emergency service providers.
	Enforcement: target areas and blitz strategies	Limited Effect		Effective during enforcement periods but quickly lost effectiveness between enforcement periods.
	Citizen radar enforcement. Civic Association sends letters to speeders	Limited Effect		Administrative burden for County.
	Traffic circles and roundabouts	Effective No Data		Limited right-of-way made measure challenging to implement. Issues with blind pedestrians.
	Passive measures - education	Effective in long-term		Difficult to implement consistently.
	Speed actuated traffic signal	Limited effectiveness		Maintenance and calibration difficult. Triggered at 15 mph over speed limit. Public support when first installed.
Caltrans (District 7)	Traffic signal synchronization to speed limit	No Data		Adaptive signal control systems to facilitate capacity and manage speed. Deployed in 5 corridors in LA County. Believes one of the most effective strategies.
	Enforcement	No Data		Critical and a priority for Caltrans.
	Speed Enforcement Corridors and Public education	No Data		A strategy Caltrans is considering.
	Safety Corridors, combination of enforcement, engineering and education	No Data		Used effectively on rural highways, and may be effective on urban arterials.
	Automated speed enforcement (red light enforcement)	No Data		Caltrans believes measure has merit, exploring.
	Speed feedback signs	No Data		Caltrans believes effective in combination with enforcement.
	Variable speed limits combined with enforcement	No Data		Allows focus on mobility and decreased speed during congested periods. Effective in speed transition zones. Creates "change in environment" that attracts drivers attention.
City of Mesa, AZ	Variable speed limits in school zones with flashing beacons	8 mph reduction in 85th percentile (after 4-5 years)		VSL sign changes from 45 to 35 between 7:30 AM and 4:00 PM. Initially not effective (static signs) until flashing beacons installed. Little enforcement necessary.

Table 2. Summary of Interviews with Public Agencies Implementing Speed Management Measures

Agency	Speed Management Strategy/Measure	Speed Reduction Effectiveness		Notes
		Initial	After 1 Year	
	Speed feedback signs in combination with red light photo enforcement	4 mph reduction in 85th percentile speed		Installed on all approaches to photo enforced intersections and top ten accident locations (65 placements). Enforces speeding on green light through intersection as well as red light running. Good public acceptance.
City of Pleasanton, CA	Speed feedback signs with flashing red SLOW DOWN when 5 mph over speed limit	Initial reduction in speed	Speed increases but less than before sign	More effective on residential streets than arterials. Flashing SLOW DOWN important, found that drivers ignored flashing speed only. On wider arterials placement of sign is important: placed in median close to faster lanes.
	Street trees to visually narrow streets. Canopy over street intensifies tunnel effect	No Data		This measure built into street design standards and community values.
	Road diets (4 to 3 lane conversion) on minor arterials with about 15,000 ADT	3+ mph reduction[24]		Implemented diet with 10' wide travel lanes plus bicycle lanes and wide CTWLTL (15-16').
	Lane narrowing	Effective. No Data.		Narrowed 12' lanes to 11' or sometimes 10'. Used striped median of double yellow lines 5' wide.
	Traffic circle/roundabout, on arterial with 75' diameter and 10' mountable apron	Effective, but not preferred.		Expensive (landscaped about $200,000). Public complaints, confusion, false sense of excessive speeds by public, increase in noise, right-of-way confusion from unfamiliar drivers. Fire approved design. City considers other more cost-effective measures.
	Speed actuated traffic signal in combination with speed feedback sign. Signal set to turn red when speeds 5-7 mph over limit	Effective in localized speed reduction.		Drivers tend to slow for signal and speed up afterward. Initially caused long queues when triggered, so City turned off speed actuation during peak periods. Detectors set back 500-600 feet to capture speeders without getting through yellow phase.
Portland, OR	Speed Tables/Speed Humps	4 -10 mph drop in 85%. Up to 35% decrease in speeds[25].		Very effective. City policy prohibits deflection techniques on emergency vehicle routes.
	Medians, curb extensions, and lane reduction to physically narrow streets	No Data		Purpose is to increase pedestrian safety, speed reduction has been a secondary benefit.
	Photo-enforcement	Effective - No data		Very effective technique. Can be coupled with physical measures or speed feedback signs.

[24] Interview with Joshua Pack, Senior Transportation Engineer, City of Pleasanton

[25] Data provided by Richard Burchfield, City Traffic Engineer, Portland, OR. *Final Project Evaluation – Traffic Calming Program*, undated.

Table 2. Summary of Interviews with Public Agencies Implementing Speed Management Measures

Agency	Speed Management Strategy/Measure	Speed Reduction Effectiveness		Notes
		Initial	After 1 Year	
	Mobile speed feedback signs	Very effective No data	No Data Effective-ness degrades	Public opinion is very favorable. Mobile signs allow more neighborhoods to receive benefits.
	Synchronized signals for a specific speed on 1-way streets	No data.		Some streets with short blocks and high pedestrian activity are synchronized for speeds as low as 15 mph.
	Rumble Strips	Not recommended		Public complaints because of noise.
Riverside, CA	Radar Trailer Deployment	No data		Speed management generally implemented on request of public. 1st step is radar trailers to determine if there is a problem.
	CMS Display Board	No data		Portable 4'x8' sign that displays speed and a flashing message "Reduce speed now" or "Thank you for not speeding"
	Targeted Enforcement	Effective - No data		Police enforcement for a few days to raise consciousness.
	Two-way turn lane, medians, angled parking to narrow roads	Very effective - No data		Very effective technique. Reduced 4 lane collectors with 10 - 15,000 vehicles to 2 lanes with medians and two-way turn lanes.
	Permanent speed feedback signs	5-10 mph decrease, one downhill location reduced speeds almost 20 mph[26]		Most effective technique along with narrowing. Strong favorable public opinion. Speed feedback signs about $10,000 for solar panels, battery back-ups, wi-fi connection. Also includes flashing strobe if speed is over a certain threshold that is similar to the light used for red-light enforcement so people think there is photo-enforcement even though there isn't.
Chandler, AZ	Speed Feedback Signs	8-10 mph decrease in 85%[27]		Used in school zones in areas where there are dual speed limits (45 mph during non-school hours and 35 mph during school).
	Synchronized signals for a specific speed	No data		Arterial is a 1mi by 1mi grid. Signals are timed for a 38 mph progression. Surrounding jurisdictions use signage to tell motorists what speed the signals are set for to prevent speeding to "make the light"

[26] Interview with Steve Libring, City Traffic Engineer, Riverside, CA, October 9, 2008

[27] Data provided by Mike Mah, City Transportation Engineer, Chandler Arizona. *Chandler Summary.xls – 35mph School Zones on Hunt Highway.* Date of Survey March – April 2007.

Table 2. Summary of Interviews with Public Agencies Implementing Speed Management Measures

Agency	Speed Management Strategy/Measure	Speed Reduction Effectiveness		Notes
		Initial	After 1 Year	
City of El Cerrito, CA	Speed platforms	One location reduced 85th speed from over 30 to 20 mph[28]. Plan before and after studies for future installations.		Implementing on major collector streets and one major arterial, after conferring with police and fire departments. An existing platform installed on major collector (city's highest accident location) reduced 85th percentile from 30 mph to 20 mph. Implemented for pedestrian safety rather than speeding problems. Combining with curb bulb-outs.
	Speed Feedback Signs	No Data		Appeared effective, but installed at same time as new traffic signal so not sure which measure was most effective. Not planning on future installations because public feels they are visually intrusive. Have been using radar trailer for years - found to be effective and supported by public.
	Curb bulbouts	No Data		Using on major arterial streets primarily for pedestrian safety.
San Francisco Municipal Transportation Agency	Road diets	Data Still Being Collected Has been effective		Implemented nearly 30 road diets. Sometimes to slow traffic, other times to create space for bike and/or pedestrian projects, and sometimes for all three.

[28] Effectiveness citation based on interview with City staff.

Appendix A – References

The following annotated bibliography shows specific speed management techniques in **bold** to draw the reader's attention to the extent each technique is discussed in the literature review.

2008 California Vehicle Code section 22358.5
This section of the vehicle code discusses how a speed limit is determined.

"Achieving a Multimodal Vision: Arterial Transportation Management in Arlington County, Virginia" by Richard Best and R. John Martin
This paper summarizes Arlington County's Arterial Management Study in which street classifications and future traffic volumes were used to develop street typology overlays and an arterial transportation management (ATM) toolbox. The study also developed recommendations for specific measures on eleven corridors in the county. ATM measures discussed include **radar speed trailers, traffic signal timing, reduction in lane width, medians, edge treatments, and striping.**

"Are Roundabouts Good for Business?" Alex J. Ariniello and Dan Hartman. TRB National Roundabout Conference. 2005.
This presentation summarizes the positive impact that roundabouts have had for businesses in Golden, Colorado. The businesses opposed the use of roundabouts in place of traffic signals because of the perceived negative impact it would have on businesses. Before and after studies show the businesses had increased sales after the roundabouts were installed.

"Arterial Speed Calming – Mohawk Road Case Study" TRB Circular, EC019 Urban Street Symposium 2000, Gerry Forbes, Synectics Transportation Consultants.
This paper uses Mohawk Road as a case study for arterial traffic management. Mohawk Road is a two-lane arterial with a 50km/hr speed limit and with 85th percentile speeds of up to 70 km/hr. The general public wanted to decrease speeds along the route. Suggested techniques included **traffic control, speed humps, and speed control medians.** The public chose to implement speed control medians, wide medians with landscaping used to decrease road width and provide a visual change in the environment. The medians helped to decrease mean speed by 9% and a 20% reduction in the number of drivers exceeding the speed limit.

"Arterial Street Traffic Calming with Three-Lane Roads" ITE 2002 Annual Meeting. TA Sohrweide, B Buck.
This article describes the traffic calming implemented on two four lane arterial roadways. Both arterials were converted to three lane roadways with a two way center turn lane. This form of a **road diet** resulted in a slight decrease in average and 85th percentile speeds (2 mph) and a decrease in capacity and incidents.

"Arterial Traffic Calming Program" by Crysttal Aktins-Conwell and Doug McCollum. City of Portland. 1993.
This report is a summary of Portland's Arterial Traffic Calming Program including the procedures for selecting a project and the tools that can be used for traffic calming. The program uses a combination of education, enforcement, and engineering. The engineering tools allowed includes **gateways, speed humps, curb extensions, raised crosswalks, medians, and textured pavements.**

"Arterial Traffic Calming – is it an oxymoron?" by James West for Institute of Transportation Engineers
This paper examines the need for traffic calming and the need for emergency vehicle access on arterials. A **split hump** was successfully used in Portland to slow traffic, but not significantly impede emergency vehicles. Eugene, Oregon used **curb extensions, textured pavements, and street trees** to slow a collector to 20 mph. **Gateways, landscaped medians, and curb extensions** were used to calm traffic on state highways. This paper does not provide quantitative effectiveness studies of the treatments.

"Calming New York City Intersections". Michael R. King, former Director of Traffic Calming, NYC Department of Transportation. TRB Circular E-C019: Urban Street Symposium.
This paper discusses traffic calming in New York City to benefit pedestrians and decrease pedestrian and vehicle incidents. Options discussed include signal retiming to provide a leading pedestrian interval and **curb extensions**. Curb extensions provided inconclusive results for pedestrian safety. This paper did not address changes in speed caused by the treatment.

"Creyke Road Living Streets Pilot Project – Traffic Calming an Arterial Road in Christchurch, New Zealand" ITE 2005 Annual Meeting. Andrew Macbeth.
This paper addresses the desire to balance the needs of all road users (vehicles, pedestrians, and cyclists) on Creyke Road in New Zealand. Creyke Road carries 14,000 vehicles per day and approximately 900 cyclists per day. The arterial management techniques used include a **road diet, medians, landscaping, and textured pavements**. An "after" study was not completed.

"Determining Effective Roadway Design Treatments for Transitioning from Rural Areas to Urban Areas on State Highways" Oregon Department of Transportation and Federal Highway Administration. 2008.
The report uses a simulation to evaluate using traffic calming measures in transition zones from rural to urban areas. Traffic calming techniques discussed include **landscaping, gateways, medians, curb extensions, road diets, roundabouts, raised intersections, speed cushions, traffic control, striping, and crosswalks.** Landscaping, gateways, and medians were used in a simulation model to determine their effectiveness. Gateways used with medians were the most effective speed reducing technique according to the simulator results.

"Effectiveness of Speed Monitoring Displays in Speed Reduction in School Zones" by Choulki Lee, Sangsoo Lee, and Bongsoo Choi for TRB Annual Meeting in 2006.
This paper documents the short-term and long-term effectiveness of **speed monitoring displays** in school zones. In the short-term, average speeds were reduced by 17.5%. In the long-term, the average speed was reduced by 12.4%.

"Effects of Urban Street Environments on Operating Speeds" U.S. Department of Transportation Federal Highway Administration. 2007.
This report analyzes the impact of the street environment in low-speed arterials on speed. It uses probe data from Atlanta and simulation models for analysis. Number of roadside features, intersection density, grade changes, and **medians** were the variables in the study. Medians and intersection density had minimal impact on

speed. The presence of raised curb, dense land use conditions and frequent driveways, in combination, reduce operating speeds and flat curves with long site distance increases operating speeds.

"Evaluation of Gateway and Low-Cost Traffic Calming Treatments for Major Routes in Small Rural Communities" by Shauna Hallmark, Neal Hawkins. Center for Transportation Research and Education, Iowa State. 2007.
This report analyzes the impact of traffic calming treatments on highways through rural towns in Iowa. It includes a literature review of effective traffic calming treatments in rural areas including **curb extensions, rumble strips, chicanes, landscaping, medians, gateways, striping, textured pavements, road diets, roundabouts, and speed humps.** The low cost treatments used include **gateways, speed tables, speed feedback signs, textured pavement, and striping.** Speed feedback signs and speed tables were found to be effective, medians and gateways treatments produced mixed results.

"Final Regulations" *Traffic Calming Design Manual.* Delaware Department of Transportation Division of Planning and Policy. 2000.
This manual provides guidance for planning, design, and implementing traffic calming in Delaware and is a supplement to the state's Road Design Manual. It describes the process for selecting projects (both proactive and reactive implementations). The toolbox of techniques includes **diverters, medians, speed humps, raised intersections, roundabouts, chicanes, and curb extensions.** Each technique is described qualitatively and speed and volumes impacts for most methods are given. The manual also provides design details for the techniques and recommendations as to which technique is suitable for each roadway classification.

"Flexible Design of New Jersey's Main Streets" by Reid Ewing and Michael King. New Jersey of the Voorhees Transportation Policy Institute - Edward J. Bloustein School of Planning & Public Policy Rutgers, The State University of New Jersey for the New Jersey Department of Transportation.
This manual provides recommendations for reclassifying and designing roads to be context sensitive. The following context sensitive design features were discussed – **medians, striping, curb extensions, and turning radius**. Case studies throughout the United States were used to explain the concept of flexible design. One case study uses **lateral shifts** to slow traffic .

"Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections" National Cooperative Highway Research Program Report 613. 2008.
This report provides guidelines for selecting speed reduction treatments and describes the types of treatments, their design, and their impact on speed and safety. Treatments described include **warning signs, striping, rumble strips, roundabouts, medians, speed tables, and road diets**.

"Guidelines on Traffic Calming for Towns and Villages on National Routes" National Roads Authority. 2005.
This report provides guidance on how to implement traffic calming techniques on roads in Ireland. It includes planning and legal considerations and techniques appropriate for both transition and urban roads. The techniques discussed includes **gateways, landscaping, signage, striping, medians, and curb extensions**.
This report also includes landscape guidelines and construction specifications of

techniques. It focuses mainly on specifications and design requirements. It does not include any measures of effectiveness.

"A Green Light for Common Sense: to Slow Drivers, German town drops traffic signals and lane markers" Craig Whitlock, Washington Post Foreign Service, December 24, 2007.
The town of Bohmte, Germany decided to address their traffic problem by turning their streets into shared space. They have removed striping, curbs, and traffic control in an effort to give cars, pedestrians, and bicycles equal access and priority. The public opinion has been mixed.

"Handbook of Speed Management Techniques" By Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute, September 1998.
This report provides basic information on a variety of speed management techniques including their applicability, effectiveness, and case studies for each. The techniques are divided in four sections – roadway design, roadway surface, traffic control, and enforcement. The design techniques include **chicanes, neckdowns, road diets, diverters, gateways, and roundabouts.** The surface techniques include **speed humps, speed tables, crosswalks, striping, and rumble strips.** The traffic control techniques include **speed limit signs, stop signs, flashing beacons, and school zones.** Enforcement techniques include **citizen watch, auto-enforcement, and speed trailers**. The amount and type of data available for each technique varies, but all list the pros and cons of each and for what types of roads they are appropriate.

"How to Design Streets that Don't Invite Speeding" by Andrew J. Ballard, P.E., P.T.O.E. ITE 2002 Annual Meeting. 2002.
This paper documents San Antonio's residential street design program where the streets are designed to prevent speeding. Streets must limit the length of unimpeded street length. If the unimpeded street length exceeds the limit, traffic circles, medians, speed humps, and t-intersections can be used. There is no measure of effectiveness for these techniques.

"Impacts of Traffic Calming" TRB Circular – E-C019 Urban Street Symposium 2000, Reid Ewing.
This paper documents the quantifiable impacts of traffic calming measures including **speed humps, speed tables, raised intersections, narrowings, slow points, and diverters**. The studies were primarily conducted on lower volume local streets with speeds around 25 mph.

"Improving Pedestrian Safety at Unsignalized Crossings" Transit Cooperative Research Program, National Cooperative Highway Research Program Repo562. Sponsored by the FTA. 2006.
This report summarizes the characteristics of pedestrian activity and different pedestrian crossing treatments and analyzes their effectiveness using field studies. The pedestrian crossing treatments discussed include traffic signals, flashing beacons, roadway lights, striping, and crosswalks.

"Operational Effectiveness of Speed Humps in Traffic Calming" by Raj V. Ponnaluri, P.E. and Paul W. Groce. ITE Journal. 2005.

This paper uses a case study to evaluate the effectiveness on speed humps on residential streets. **Speed humps** reduced 85th percentile speeds by 22 to 29 percent.

"Pedestrian Safety Impacts of Curb Extensions: A Case Study" by Randal S. Johnson for Oregon Department of Transportation and Federal Highway Administration. 2005.
This report documents the time it takes for a vehicle to yield to a pedestrian at a curb extension. It also documents the change in speed after a **curb extension** was installed.

"Road Safety Engineering: Evaluation of Traffic Calming Schemes Constructed on National Roads 1993-1996" by F. Crowley and A. MacDermott.
This report gives a qualitative assessment on the traffic calming program in Ireland using speed, incidents, and costs as measures of effectiveness. Traffic calming techniques evaluated include **gateways, road diets, signage, striping, and medians.** Gateways and signage produced statistically significant speed reductions.
"Sacramento County Neighborhood Traffic Management Program (NTMP) – Best Practices White Paper", Fehr & Peers Associates, Inc., June, 2004.
This paper documents the best practices of agencies that have started traffic management programs in terms of the organization of the program, legal issues, and how the planning process works. The paper also gives examples of programs that have implemented arterial traffic calming.

"A Short History of Physical Speed Reduction Measures in European Urban Areas" by Nicole Muhlrad for National Research Institute for Transportation and Safety.
This paper documents the evolution of street design and street users from vehicles to bicycles and pedestrians. It discusses arterial traffic calming programs throughout Europe from a planning perspective. Many of the techniques discussed were high risk because they had not been used before and required more collaborative planning. The techniques used in Europe are **chicanes, roundabouts, striping, textured pavements, and landscaping**.

"Speed Management" by Organisation for Economic Co-Operation and Development. European Conference of Ministers of Transport. 2006.
This report documents issues associated with speeding and international policies for reducing speeding. The focus is on self-explaining roads as a means to signal to drivers the appropriate speed based on the classification and function of the road. Speed management techniques discussed include **gateways, medians, road diets, roundabouts, variable speed limits and speed humps.** The report gives qualitative and limited quantitative analysis on their speed management and safety impacts. It also discusses how speed limits are set and the perception of signage and striping on speed and speed limits. State of the art techniques for managing speed involve in-vehicle technology to monitor and regulate speed. The use of enforcement, both automated and responsive, is a major policy recommendation to manage speed. The report gives a summary of policy recommendations for education, enforcement, infrastructure, speed limits, and technology for speed management.

"Speed Management: A Road Safety Manual for Decision Makers and Practitioners" Geneva Global Road Safety Partnership. 2008.

This report was created as A "how to" manual for speed management to address implementing, funding, and enforcing a speed management program. It covers assessing the situation, developing and managing a program, and evaluating safety. Examples of speed management, setting speed limits, safety improvements, and enforcement are given throughout the text as best practices. **Raised intersections, speed humps, rumble strips, roundabouts, and road diets are** examples of speed management techniques that are discussed quantitatively. The effectiveness of many of the techniques are discussed using case study data where available.

"Speed Management Strategic Initiative" USDOT and NHTSA, Sept. 2005.
This report discusses the goals and objectives of the initiative to reduce speed-related incidents by describing the. federal government's role in collecting information on speeding while regulation is left to state and local governments. The report outlines specific objectives and actions for the initiative to collect data and evaluate the relationship between speed, speed limits, and incidents.

"Speed Management Techniques for Collectors and Arterials" TRB Circular, E-C019 Urban Street Symposium 2000, Angelia Parham and Kay Fitzpatrick, Texas Transportation Institute.
This paper explains the process of developing the "Handbook of Speed Management Techniques" and the speed management techniques most frequently used on collectors and arterials. The most common method of speed control on collectors and arterials is increased enforcement, **speed limit signing and enforcement, flashing beacons, speed trailers,** and **rumble strips.** The assessment of each technique is primarily qualitative.

"Speed Management in Urban Areas" *Nordic Road and Transport Research*. No 2 1999 – DUMAS – Developing Urban Management and Safety.
The report presents guidelines for planning, implementing and evaluating speed management programs in urban areas. Subjects include collecting and mapping data, setting targets or goals of the program, developing and designing a plan, public involvement, and evaluation of the program. The report lists a menu of speed management techniques without any evaluation or detail on each. The speed management techniques include **road diets, surface treatments, gateways, roundabouts, and chicanes**.

"Speed Table Installation Update" City of Oakland Park, Florida - City Commission Agenda Item Report. 2008.
This paper concludes that the addition of four **speed tables** effectively reduced speeds in the area and no further tables were needed. The speed tables reduced the 85 percentile speed by 4.5 mph. Financial impact and specifications are included in the report.

"Traffic Calming Design Standards for New Residential Streets: A Proactive Approach" by Joseph E. Womble, P.E. and W. Martin Bretherton Jr., P.E. ITE Journal. 2003.
This article discusses the issue of residential speeding in Gwinnett County, GA, near Atlanta. It discusses early traffic calming efforts such as a neighborhood speed watch program and retrofitting speed humps. Developers are now required to include in their plans for future developments various techniques to reduce

speeding such as **tangent lengths, traffic circles, medians and speed humps.** The purpose of the program is to keep the 85th percentile speeds between 25 and 30 mph.

www.trafficcalming.org, accessed on September 5, 2008. Sponsored by Fehr and Peers Transportation Consultants.
The website gives the definition and history of traffic calming, and discusses the advantages, disadvantages, and effectiveness of specific techniques. The effectiveness of specific measures on reducing 85th percentile speed is shown. The measures shown are **speed tables, raised intersections, roundabouts, chicanes, chokers, curb extensions, diverters, and medians.**

"Traffic Calming of State Highways: Application New England" by Per Garder of University of Maine, and John N. Ivan, and Jianhe Du of University of Connecticut. 2002.
This report evaluates the safety and acceptance of traffic calming measures. The public is resistant to traffic calming measures on major arterials. The report gives a history of traffic calming in Europe and the United States and the advantages and disadvantages of **speed tables, medians, roundabouts, chicanes, signalization, and rumble strips.** The report concludes the general public accepts **narrowed roads and horizontal realignment better than speed humps and other vertical devices**, and the public is in favor of speed enforcement, as long as it's not applied to them.

"Traffic Calming on Arterial Roadways" by Michael Skene, on ITE's website.
"Traffic Calming Benefits, Costs, and Equity Impacts" By Todd Litman, *Victoria Transport Policy Institute* December 1999.
The article examines various definitions of traffic calming and ties traffic calming to safety benefits. It gives examples of traffic calming used on arterials. In the first example, the number of lanes on a roadway were reduced in an attempt to make the corridor safer. The second example uses gateways and other designs to achieve calming. It provides quantitative analysis of the speed and safety benefits of each case study.

"Traffic Calming on Main Roads Through Rural Communities" U.S. Department of Transportation Federal Highway Administration. FHWA Publication No. FHWA-HRT-08-067.
This report summarizes the effects of various low cost traffic calming techniques based on a study of main rural highways in Iowa. It outlines the study methodology, listing several options of calming techniques, and measures their costs and effectiveness. Techniques mentioned are **striping, speed tables, speed feedback signs, and lane narrowing.** Before and after studies were conducted for up to a year after implementation with missed results.

"Traffic Control Devices Pooled Fund Study – Pavement Markings for Speed Reduction" by Bryan Katz, Turner Fairbank Highway Research Center, December 2004.
This report analyzes inexpensive pavement marking treatment to determine the effectiveness of reducing speeds at three different locations. It reviews and assesses **appropriate signage for roundabouts, colors used to distinguish tollbooth lanes, symbol used on signs, flashing beacons at unsignalized**

pedestrian crossings, and pedestrian countdowns vs. flashing "don't walk" signals. Overall, speeds decreased after the pavement markings were implemented.

"Types of Traffic Calming Methods" City of Santa Clarita; http://www.santa-clarita.com/cityhall/pw/traffic/TrafficCalming.pdf accessed on May 5, 2009.
This paper documents different traffic calming techniques and their advantages, disadvantages, cost, and effectiveness. **Speed humps, speed tables, raised crosswalks, raised intersections, chicanes, chokers, curb extensions, medians, and diverters** are described as possible traffic calming techniques.

"Variable Speed Limits", Speed Management Workshop, Dallas, TX. March 2000. Powerpoint presentation by Warren Davies.
This Powerpoint presentation discusses the background, objectives, and effects of variable speed limits using both foreign and domestic examples. **Variable speed limits** are used to handle various situations such as road hazards, traffic, and weather conditions. The technology includes fiber optic technology, radar, and cameras.

"West Palm Beach Traffic Calming – the Second Generation" TRB Circular – E-C019 Urban Street Symposium 2000, Timothy Stillings, Ian Lockwood, City of West Palm Beach.
West Palm Beach's multifaceted approach of traffic calming has helped to revitalize the downtown area. The report outlines the effects of changes in driving habits, pedestrian safety, aesthetics, and economic development as a result of traffic calming. Traffic calming techniques used include **road diets, landscape, and raised intersections**. The paper also documents the changes to the city's traffic calming policy over time to expand beyond residential streets.

Appendix B –Interviews

Interviews were completed with the following experts in speed management and agency representatives who have implemented speed management techniques. Additionally, some responses were obtained via an email survey released by the East Bay Traffic Engineers group in Northern California. An email survey was also distributed to the Orange County Traffic Engineering Council and to City Traffic Engineers (CTE).

Public Agency Interviews

- Richard Best, Arlington County, Virginia. Public Works Planner.
- Frank Quon, Caltrans District 7, Los Angeles, California. Deputy District Director of Operations.
- Yvetteh Ortiz, City of El Cerrito, California. Engineering Manager.
- Joshua Pack, City of Pleasanton, California. Traffic Engineer.
- Michael Mah, City of Mesa, Arizona.
- Robert Burchfield, City of Portland, Oregon. City Traffic Engineer
- Steve Libring, City of Riverside, California. City Traffic Engineer

Public Agencies Responding to Email Survey

- Joe Wang, City of Oakland. Senior Transportation Engineer.
- Mike Sallaberry, San Francisco Municipal Transportation Agency.

Expert Interviews

- Eugene Jud, Professor of Civil Engineering, California Polytechnic State University, San Luis Obispo
- Davey Warren, Federal Highway Administration, Office of Research, Speed Research Program.
- Kay Fitzpatrick, Texas Transportation Institute, Texas A&M University. Research Professor.
- Reid Ewing, University of Maryland. Author of Institute of Transportation Engineers' "Traffic Calming: State of the Practice".
- Frank Quon, Caltrans District 7, Los Angeles, California. Deputy District Director of Operations.

Appendix C –Interview Questions

Questions for Experts

1. What is your background on speed management for arterials?
2. In your opinion, what techniques have proven empirically to be the most successful in terms of speed reduction on arterials?
3. What do you consider the most effective combination of arterial speed management techniques?
4. What techniques have proven effective on residential streets, but are not as effective on arterials?
5. Are there any threshold speeds or ADTs for speed management? Do some techniques work better under or over a specific speed?
6. What are the state of the art techniques that you are researching now?
7. Do you have any documented case study information on arterial speed management or can you recommend any resources?
8. Do you know of any cities in California that use arterial speed management techniques?
9. Follow-up with questions about specific techniques.

Questions for Public Agencies

1. Have you implemented speed management techniques on arterials?
2. What caused you to investigate speed management for arterials?
3. What were the before speeds and/or ADTs on the roads you were considering as candidates for management?
4. What techniques did you consider? Which ones have you implemented?
    a. Physical devices
    b. Passive or advisory devices
5. What techniques did you consider but reject?
6. What resources or case studies did you use when you were considering arterial speed management?
7. Do you have before or after data for the arterials with speed management techniques?

8. Do the techniques that you have implemented perform as you expected?

9. What input did the public have in the measures used? What has been the public's reaction to the measures?

10. What would you do differently next time either with the planning or implementation of the speed management techniques? What would you do the same?

Electronic Solar Powered Driver Speed Feedback Signs

Location — Glenarm Street West of Fair Oaks and East of Pasadena Avenue

As part of the City of Pasadena's "Arterial Speed Management Program", the City has a program to install Electronic Speed feedback signs along certain arterials in the City. The Electronic Speed feedback signs alert motorists to let them know how fast they are driving.

Subject to funding availability, the City usually plans to install 2-4 signs annually. For the streets to qualify, the street must be an arterial or collector with documented speeding issues as evidenced by higher operating speeds above the posted speed limits. The street must meet the minimum traffic volume of at least 2,500 vehicles per day for 2 to 3 lane streets, and 5,000 vehicles per day for 4 or more lane arterial streets. It must be on a street segment with at least ¼ mile long of uninterrupted section with no traffic controls such as stop signs or traffic signals. Street segments that meet these criteria will be added to a waiting list and the sign will be installed once funding is available. If there are more qualified locations than available funding, priority will be given based on the combination of the degree of speeding, road safety records and traffic volume.

An Invitation to Join Your Neighbors

MARENGO MATTERS

Whether you are new to the neighborhood or a long time Marengo Avenue resident, our street has become an alternate cross town connector road for cars and trucks traveling from Pasadena — 210 and 134 Freeways to southern Alhambra — 10, 5 and 710 Freeways.

Traffic citations and accidents in the city of South Pasadena have skyrocketed and on July 27, 2022 a northbound car failed to heed the stop sign at the intersection of Marengo Avenue and Maple, striking three elderly pedestrians in the crosswalk.

Hoa Le suffered a broken femur that required surgery, Connie Nguyen, a Parkinson's patient suffered cuts, bruises and a contusion to her head and Tam Nguyen, Connie's husband, was killed.

Unfortunately this traffic issue is not exclusive to Marengo Avenue.

Traffic laws are becoming a suggestion rather than a mandatory.

Fremont Avenue, Fair Oaks Avenue, and Huntington Drive are all being heavily impacted by this growing traffic issue.

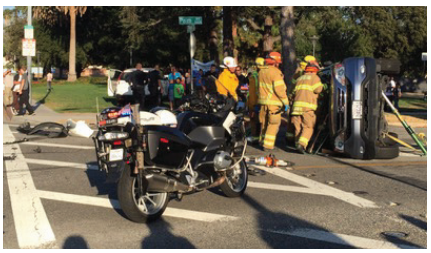
The City of South Pasadena has launched the Fremont Avenue, Fair Oaks Avenue and Huntington Drive Transportation Project to begin to develop permanent solutions to these traffic issues across the City.

Since the fatal accident, a number of concerned citizens have worked tirelessly on behalf of the entire neighborhood lobbying members of the South Pasadena City Council, the Mayor and others to understand what can be done to address these issues.

The **Marengo Matters** neighborhood group which was recently formed, met with the Toole Design Group who have been engaged by the City of South Pasadena to study the problems, develop a variety of solutions and to ultimately help implement the final approved traffic abatement concepts.

Donuts

Roll Over



Bicyclist Hit

MARENGO MATTERS

Marengo Matters members also attended the September 28th meeting at the **South Pasadena Library Community Room** where the consultants shared their preliminary findings and starter ideas.

The Toole Design Group will be holding additional meetings on October 17th and 19th in the same location.

We are distributing this flyer to all the homes on Marengo Avenue to encourage everyone to join our grassroots organization.

We will be sharing—

- **Current traffic stats including citations and accidents**
- **Updates from the City of South Pasadena Mobility Transportation and Infrastructure Commission**
- **Updates on the design process to "quiet" the traffic and improve the safety and quality of life throughout the City**

Regardless of what traffic abatement measures are adopted, this is going to be a long process.

Therefore it is important we continue to lobby the City to repaint our crosswalks, replace our faded stop signs, post speed limit signs and have traffic officers posted whenever possible to slow the traffic on Marengo Avenue.

JOIN MARENGO MATTERS & STAY INFORMED!

It's simple, just send your name, street address and email address to:

marengomatters2023@gmail.com

South Pasadena, CA – Pedestrian Killed In Auto Wreck On Marengo Ave Near Maple St

South Pasadena, CA (July 31, 2022) – A vehicle collision reported in South Pasadena claimed the life of one person while leaving two others seriously injured. At around 8:30 p.m., on July 27, emergency crews were called to the scene of a motor vehicle accident on Marengo Avenue.

Reports from authorities show that a male and two women were crossing the roadway at Marengo Avenue in Maple Street during the evening hours. At the same time, a Toyota sienna was traveling northbound on Marengo Avenue, approaching the intersection. A van entered the intersection and failed to stop at a stop sign for unknown reasons.

As the Toyota proceeded through the intersection, it struck the pedestrians.

The three victims were rushed to an area hospital for emergency medical care. The male pedestrian succumbed to his injuries after arriving.

A woman driving Westbound on Alhambra road made a left turn at the intersection of Marengo and Alhambra Road and hit a bicyclist.

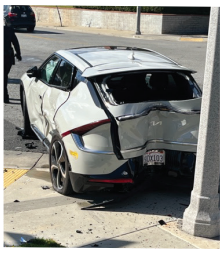
South Pasadena Paramedics, the Alhambra Fire Department and police department from Alhambra responded.

We believe the bicyclist was transported for treatment.

Pedestrian Hit

Hit Parked Cars

Broadsided and Forced Into Pole



Join Marengo Matters & Stay Informed!

MARENGO MATTERS

Whether you are new to the neighborhood or a long time Marengo Avenue resident, our street has become an alternate cross town connector road for cars and trucks traveling from Pasadena — 210 and 134 Freeways to southern Alhambra — 10, 5 and 710 Freeways.

Traffic citations and accidents in the city of South Pasadena have skyrocketed and on July 27, 2022 a northbound car failed to heed the stop sign at the intersection of Marengo Avenue and Maple, striking three elderly pedestrians in the crosswalk killing one of them.

The City of South Pasadena has launched the **Fremont Avenue, Fair Oaks Avenue** and **Huntington Drive Transportation Project** to begin to develop permanent solutions to these traffic issues across the city.

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It's simple, just send your name, street address and email address to:

marengomatters2023@gmail.com

We are distributing this flyer to all the homes on Marengo Avenue to encourage everyone to join our grassroots organization.

We will be sharing—

- **Current traffic stats including citations and accidents**
- **Updates from the City of South Pasadena Mobility Transportation and Infrastructure Commission**
- **Updates on the design process to "quiet" the traffic and improve the safety and quality of life throughout the City**

Regardless of what traffic abatement measures are adopted, this is going to be a long process.

Therefore it is important we continue to lobby the City to repaint our crosswalks, replace our faded stop signs, post speed limit signs and have traffic officers posted whenever possible to slow the traffic on Marengo Avenue.

Pedestrian Hit

Hit Parked Cars

Broadsided and Forced Into Pole

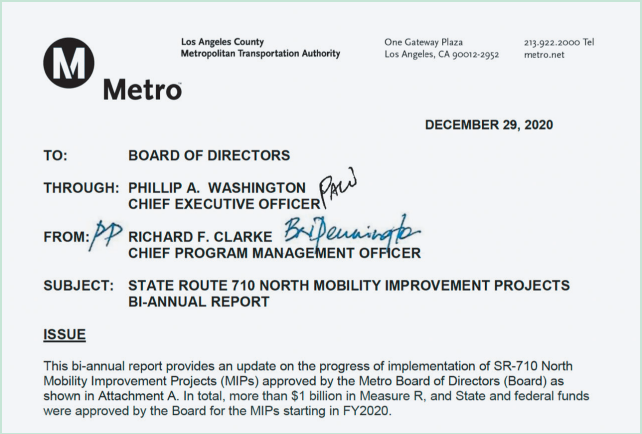
Marengo Matters UPDATE

- The South Pasadena City Council has approved the budget for the **Traffic Safety Assessment of Marengo Avenue** which will provide funding for traffic data collection, analysis and recommendations to "quiet" the traffic on the Marengo Avenue corridor.
- Toole Design Group has been engaged by the City of South Pasadena to study the problems, develop a variety of solutions and to ultimately help implement the final approved traffic abatement concepts.
- Members of the Marengo Matters neighborhood group are attending all scheduled meetings of the **Commission on Mobility Transportation and Infrastructure.**

South Pasadena Regional Traffic Corridor Improvements FUNDING

The City has received funding from several grants.

SR-710 North Mobility Improvement Projects (MIPs) approved by the Metro Board of Directors totaling, more than $1 billion in Measure R, and State and Federal funds were approved by the Board for the MIPs starting in FY2020.



Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

DECEMBER 29, 2020

TO: BOARD OF DIRECTORS

THROUGH: PHILLIP A. WASHINGTON
CHIEF EXECUTIVE OFFICER

FROM: RICHARD F. CLARKE
CHIEF PROGRAM MANAGEMENT OFFICER

SUBJECT: STATE ROUTE 710 NORTH MOBILITY IMPROVEMENT PROJECTS
BI-ANNUAL REPORT

ISSUE

This bi-annual report provides an update on the progress of implementation of SR-710 North Mobility Improvement Projects (MIPs) approved by the Metro Board of Directors (Board) as shown in Attachment A. In total, more than $1 billion in Measure R, and State and federal funds were approved by the Board for the MIPs starting in FY2020.

The City of South Pasadena portion of the SR-710 North Mobility Improvement Projects (MIPs) are allocated as shown below:

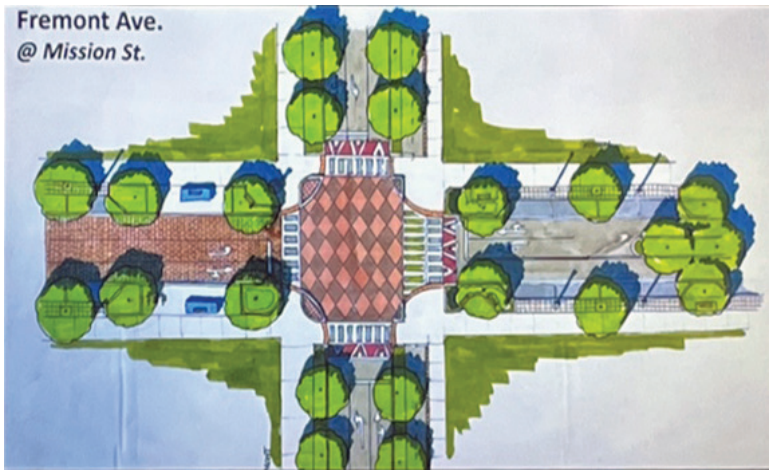
- South Pasadena Regional Traffic Corridor Improvements [Fremont, Huntington, Fair Oaks] SR-110/Fair Oaks Ave Interchange Modifications **$38,000,000**
- South Pasadena SR-110/Fair Oaks Avenue Interchange Modifications [Right-of-Way Acquisition, Design Improvements & Construction] **$32,000,000**
- **$10 million of Metro MIP Grant** focuses on enhancing transportation management, upgrade local intersections, traffic signals, and intelligent transportation systems (ITS) along Fremont Avenue and Huntington Drive. Additionally, it targets improvements at the intersections of Fair Oaks Avenue and Huntington Drive, as well as Fremont Avenue and Huntington Drive.
- **MAT Grant— $6,000,000** earmarked to enhance safety and traffic flow for pedestrians, cyclists, bus riders, and vehicles along Huntington Drive and Fremont Avenue in the City.

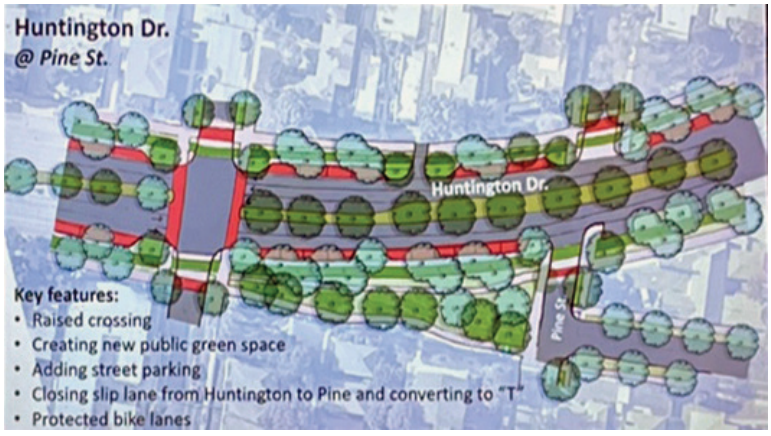
Preliminary Design Recommendations

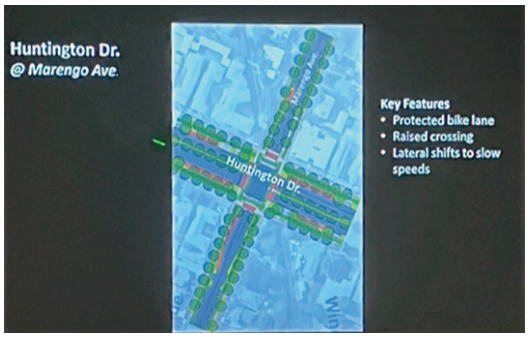
Ideas Shared to "Quiet" the Traffic Flow on Key Connectors

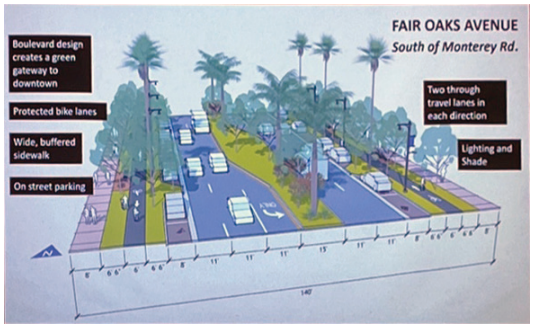
The Toole Design Group presented a variety of possible design ideas to mitigate the heavy traffic that flows through the City of South Pasadena daily.

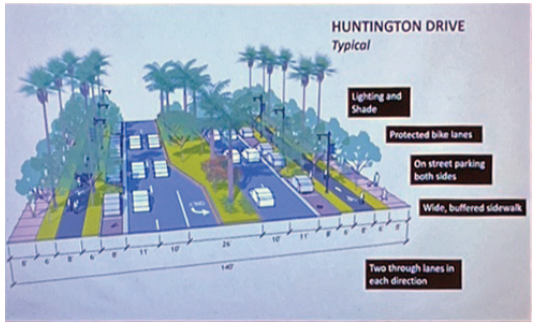
Shown is a sampling of the design concepts* presented at the last Community meeting.

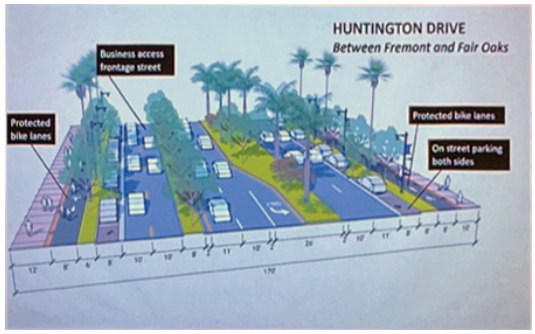


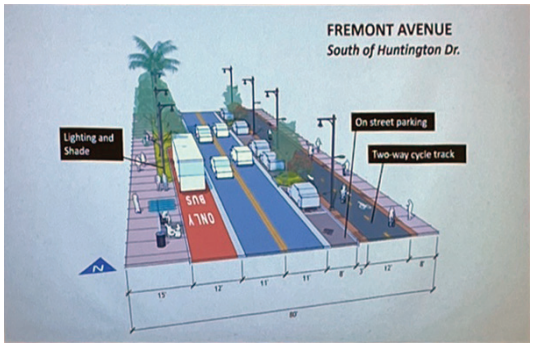












* Designs concepts are preliminary and still need to be refined and updated based on input from the City, the Police and Fire Departments.

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- The City of South Pasadena is continuing to study the traffic issues that are creating safety problems to develop and pilot a variety of solutions and to ultimately help implement the final approved traffic abatement concepts.
- The South Pasadena "Slow Streets" Program aims to enhance traffiic safety by reminding motorists to slow down and be aware of people using the street. Selected residental streets will utilize signage and other temporary traffic calming measures, such as curb extensions, dedicated bicycle lanes, and high-visibility crosswalks to reduce speeding and improve safety.

It's Our Neighborhood and Quality of Life — STAY INFORMED & ENGAGED

Marengo Matters UPDATE

Project Area

Based on a public request process, the following streets were nominated and approved for the first phase of this temporary demonstration project.

- **Oak St. - Meridian to Garfield**
- **Hermosa Ave. - Grand to Columbia**
- **Grand Ave. - Mission to Columbia**

Residents were asked to provide their feedback on the temporary installation.

A residential "Slow Streets" demonstration that included temporary signage and other traffic safety measures was also installed on Marengo Avenue north of Huntington Drive.

MOBILITY AND TRANSPORTATION INFRASTRUCTURE COMMISSION (MTIC)

(MTIC) is a five member body to serve in an advisory capacity to the City Council on policies regarding:

- Mobility policy matters related to transportation and mobility including traffic management plans, transit, multi-modal transportation and active transportation, evolving transportation and mobility technologies, parking management, and regional transportation matters
- Federal, state, regional and local transportation funding and planning
- Input on transportation and mobility policies such as the transportation related Capital Improvement Project items, Neighborhood Traffic Management Plan, and Active Transportation Plan, etc
- A forum for community input on mobility topics

MTIC Meeting Information

Meetings are held on the 3rd Tuesday of the month at 6:30 p.m.

Council Chamber
1424 Mission Street
South Pasadena, CA 91030

Staff Liaison Ted Gerber,
Director of Public Works
(626) 403-7240
tgerber@southpasadenaca.gov

By Chris Greenspon (Excerpt)

South Pasadenans have had since last September to adapt and respond to a series of quick-build multimodal road facilities, along Grand Avenue and also Oak Street. These include bike lanes, curb extensions, high-visibility crosswalks, and Slow Streets signs.

According to city staff, no speed or collision data was collected prior to the demonstration program, which was only meant to run for six months starting in late August 2023.

The installations were funded by a $420,000 Metro grant from 2019 for Open Streets events. Then in 2020, the COVID-19 pandemic came, and the money was repurposed. In 2022, the San Gabriel Valley Council of Governments gave the city another $45k to get something done with the funding before its November 2023 usage deadline.

At this point, it's been more than six months, and residents have formed opinions. On March 20th the South Pasadena City Council voted to do away with most of the bike lanes and all of the delineators, under pressure from locals who didn't want them in their neighborhoods.

READ FULL ARTICLE HERE

SGV

Eyes on the Street: Pasadena's New Roundabouts

A sightly new pair of traffic circles have been making the rounds in the Crown City, and transportation activists are pleased

By **Chris Greenspon**

1:22 PM PDT on July 2, 2024

The roundabout at N. Hill Avenue and E. Topeka Street in Pasadena. Credit: Chris Greenspon/SBLA

To make some streets safer, Pasadena is building roundabouts. There is an almost finished roundabout on Avenue 64 at Burleigh Drive (all that's missing is landscaping and the western parkway), and the recently completed North Hill Avenue roundabout at East Topeka Street.

The roundabout at N. Hill Avenue and E. Topeka Street in Pasadena. Credit: Chris Greenspon/SBLA

Colin Bogart - a volunteer with the Pasadena Complete Streets Coalition and Active Transportation Director for the public health non-profit Day One - says he's very happy with the execution of both roundabout projects, especially the one on Hill.

"That was actually a project that was developed by the [Pasadena] Department of Transportation, closely with the residents who live in that area," Bogart tells SBLA. "In fact, myself and other members of the Complete Streets Coalition originally wanted to try to participate in community outreach, and the city asked us politely not to participate unless we had anybody who actually lived in that immediate area, because they really wanted it to be a choice of the folks who lived in that area as a means to calm traffic on Hill."

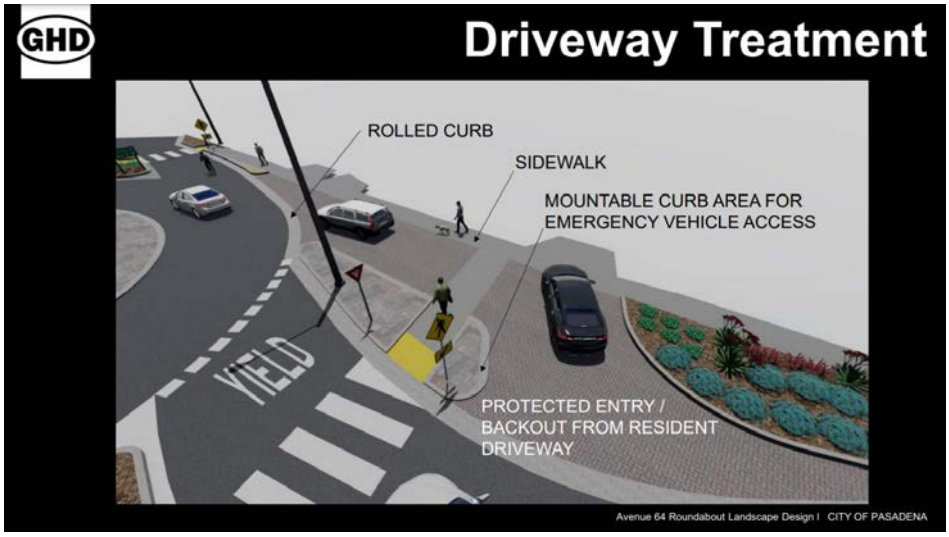
According to the Department of Public Works, this portion of Hill averages 9,000 car trips per day. With one lane in each direction and no center turn lane, residents should be able to more easily come and go from their driveways.

At the time SBLA visited Hill and Topeka, drivers passed through the circle gingerly, without struggle. Some big trucks were a bit slowed by the somewhat tight turn, which is the point; to reduce collisions and injuries.

The nearly complete roundabout at Avenue 64, on the other hand, has such wide lanes that it accommodates larger cars with ease. The southbound side of it is almost straight though, and doesn't seem to slow drivers much.

The roundabout at Avenue 64 and Burleigh Drive in Pasadena. Credit: Chris Greenspon/SBLA

It does have a number of thoughtful features though: curb extensions, high visibility crosswalks (still being painted last week), rainwater capture elements. There is also hardscaping around the center planter for service trucks, as well as around the adjacent driveways to allow safe coming and going for residents.



The project was selected over “public concerns that Avenue 64 is being used as a cut-through route from neighboring cities, resulting in speed-related collisions and poor pedestrian safety,” and particular issues with “vehicles using the two-way left-turn lane as a passing lane.”

“Avenue 64 and that particular [forked] intersection was very weird and big and open, so it's much better with a roundabout there,” says Bogart.

Fresh paint on the Avenue 64 roundabout in Pasadena. Courtesy of the Pasadena Complete Streets Coaltion and Pilar Reynaldo.

In the past, some residents in the city haven’t responded well to roundabouts, Bogart recalls. A pair of roundabouts on Glenarm Street (at Los Robles Avenue and at El Molino Avenue) were both saddled with unnecessary stop signs due to a lawsuit from several neighborhood associations, according to the city’s website.

Bogart laments, “I guess they were convinced that these roundabouts were gonna cause people to avoid El Molino and Los Robles [... and] it was going to discourage people from using those two streets, and so they were going to cut through their neighborhood streets instead. And so they filed a lawsuit, and in the end, the compromise was that they had to put in stop signs at those two intersections.”

Additionally, left turns through the neighborhood from Glenarm were physically blocked off as part of the lawsuit. So was it worth putting in the roundabouts at all?

The city’s data says, yes. “Indications are that after an initial uptick following installation, crashes are holding at levels that are lower than the pre-installation condition.”

Those Glenarm roundabouts have been in place since the late 90's. If Pasadena's own metrics aren't enough to convince readers, here's some more corroboration. Study after study finds that roundabouts reduce collisions.

That's why Bogart says Pasadena needs them, and he's heartened by the two newest additions.

"We don't have a good track record in Pasadena when it comes to traffic collisions, particularly in relation to pedestrians and bicyclists," he remarks. "We're highly ranked by the California Office of Traffic Safety. We're generally in the top 10 of similar sized cities for pedestrian and bicyclist injuries and fatalities. So something needs to be done, and this is a cost effective way to do it, and a way that can actually be very attractive if the city makes it so."

Completion for the Avenue 64 roundabout is anticipated by the end of July.

CG

Chris Greenspon

Chris is the San Gabriel Valley Reporter for Streetsblog LA and co-host for SGV Connect. He's been a La Puente native since 1991, and a radio journalist since 2014. He hosts the podcast SGV Weekly.