



SAR 97-3

STRATEGIC ANALYSIS REPORT on TRAFFIC CALMING initiated by Commissioner Leslie Katz

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I. INTRODUCTION

Purpose of Document

This report provides the SFCTA Board with a brief but comprehensive summary of transportation-related issues regarding the application of traffic calming techniques, and on a potential citywide policy on traffic calming. This Strategic Analysis Report, or SAR for short, highlights for the Board the significance of these issues in areas of SFCTA jurisdiction, and identifies implications for future policy decisions by the Board in its capacity as administrator of Proposition B funds and as Congestion Management Agency for San Francisco. Every effort was made to make this a factual document, avoiding speculation, and leaving judgment to the reader. This document was designed to inform policy-level decision-making, and its abbreviated length (only 10 pages plus an appendix) optimizes its usefulness to Authority Board members. Technical discussion has been condensed and only facts deemed essential to outline the policy-level issues are included. Additional information is available from the sources cited, or by calling José Luis Moscovich, Director of Plans and Programs, at (415) 557-6857.

Summary

Traffic calming can reduce speeding and cut-through traffic on residential streets, and increase pedestrian and bicycle safety and access. However, traffic calming is not a panacea. Traffic diversion impacts, overall automobile mobility impacts, and the effects on emergency and transit vehicles must be carefully considered. San Francisco has had mixed results in the past with traffic calming and lacks a clear policy on it. Other cities with comprehensive traffic calming programs, such as Portland and Seattle, have had greater levels of success with a variety of traffic calming techniques. Traffic calming devices which are a neighborhood amenity, in addition to their traffic calming function, are usually more acceptable to residents than temporary or purely functional ones. A successful traffic calming program includes an objective prioritization process and standards. Neighborhood involvement and buy-in is also critical to the success of such a program. This report includes recommendations for policy-level decision-making on traffic calming processes, impacts, and funding.

II. BACKGROUND SURVEY

What is traffic calming?

Traffic calming lessens vehicular impacts on residential streets by reducing speeds, accident severity, and sometimes traffic volumes. It can also improve neighborhood livability by reducing noise and localized air pollution. Traffic calming attempts to balance the needs of all users of a street: drivers, bicyclists, pedestrians, and others. Pedestrian safety improves with lower speeds: a person's chance of surviving a collision with a car relatively unscathed improves greatly if the car is traveling below 20 miles per hour.¹ Over 1,000 collisions involving pedestrians and cars were reported in San Francisco in 1996.² In the Bay Area, the percentage of all traffic-related fatalities and injuries that are pedestrians is higher than in most other metropolitan areas in the nation.³

San Francisco's street network

San Francisco's street network was designed before the widespread use of the automobile. Many of its original features, such as narrow streets, tight corners, on-street parking, and street trees, contribute to calm traffic. However, the City has widened some streets over the years, typically by reducing the widths of abutting sidewalks, and converted others to one-way circulation, to accommodate larger traffic volumes, allow higher speeds, and improve traffic flow.

¹ U.K. Dept. of Transportation, *Killing Speed and Saving Lives*.

² CHP, Statewide Integrated Traffic Record System, 1996.

³ Surface Transportation Policy Project, "Mean Streets 1998," www.transact.org/mean98/report/one

San Francisco was laid out in a grid system, often with no clear street hierarchy. This is preferable in many ways to a hierarchical suburban network because a variety of alternative routes disperses traffic and contributes to reducing congestion. However, the urban grid also has disadvantages: dispersed traffic spills over onto local streets; wide, straight, streets allow for high speeds; and many high volume arterial streets are also residential.

Balancing the desire for slower, lower volume, and more pedestrian-friendly streets, with people's mobility needs in a largely residential street network, is the key challenge of traffic calming in San Francisco.

"Balancing the desire for slower, lower volume, and more pedestrian-friendly streets, with people's mobility needs in a largely residential street network, is the key challenge of traffic calming in San Francisco."

A. Traffic Calming: the San Francisco Experience

The Department of Parking and Traffic (DPT) has recommended that a citywide policy on traffic calming be developed. Residents of several neighborhoods have also requested traffic calming. Although San Francisco does not have a formal policy on traffic calming, the City has for many years employed various devices which calm traffic. The City has had generally positive experiences with chokers, medians, and traffic circles, while the experiences with speed bumps, diverters, and street closures have been less positive.

Speed bumps

The City installed speed bumps in many locations in the 1970s to reduce speeding. These bumps, also called "rumble strips" in San Francisco, sharply jolt cars and bicyclists. The Department of Public Works stopped installing them due to complaints from residents about effectiveness and noise. The City subsequently removed many of them, but others have been maintained — and the City surveys the affected blocks whenever a street is repaved to determine if the bumps are still wanted.

Speed humps — modern speed bumps

The current design of speed *humps* is superior to that of *bumps*: they are wider, smoother, less jarring, more effective, and produce less noise and vibration. Speed humps have been requested by residents citywide, and the City has installed a few on a trial basis. DPT's concerns about speed humps include proliferation, emergency vehicle delay, and traffic diversion. Muni does not want speed humps on bus routes. Establishing policy criteria for speed hump installation, examining alternative techniques, and identifying a dedicated funding source can help address these concerns.

Chokers and Medians

In the 1970s the City installed chokers, also called neckdowns or bulbs, in the Duboce Triangle and the Mission District to slow down traffic and improve pedestrian safety by reducing crossing distances. Median islands and angle parking were also installed in the Duboce Triangle. Residents generally liked the devices and the associated urban design, landscaping and pedestrian safety improvements. DPT reports that there wasn't much of a speed reduction, although other cities have reported speed reductions using similar devices.⁴

Traffic Circles

San Francisco's experience with traffic circles has been limited but fairly successful. Several traffic circles can be found in the Park Merced area, and at Dewey and Taraval near Laguna Honda. Several more will be constructed in the southern half of the city. Traffic circles can prevent "exhibition driving" at wide intersections. In other cities they have been found to slow traffic and significantly reduce accident incidence and severity.⁵

Diverters in the Richmond District and Proposition R

A diverter forces traffic to turn at an intersection, impeding or rerouting through traffic. In the 1970s the City installed diverters in the Inner Richmond at the request of neighbors. However, other residents later requested their removal largely because of traffic diversion impacts. This experience helped prompt Proposition R, an advisory policy measure to impede through traffic flow at the request of neighborhoods, which was rejected in a 1976 citywide vote, 62% to 38%. After the failure of this measure, the City pursued traffic calming only on a piecemeal basis.

"Other traffic calming methods should be explored before closing a street."

Cul-de-sacs

Street closures, or cul-de-sacs, convert through streets into dead-ends. A cul-de-sac was recently constructed on Tiffany Avenue in the Mission District to reduce cut-through traffic.

However, traffic volumes increased on nearby streets, and DPT has studied replacing the cul-de-sac with other devices. If neighborhood safety and livability are the goals, significant traffic diversion to a *local* residential street cannot be an acceptable trade-off for reducing volumes on another street. Other traffic calming methods should be explored before closing a street.

⁴ Urban Transportation Monitor, "This Week's Survey Results," May 10 '96.

⁵ Ibid., and James E. Mundell, P.E., *Neighborhood Traffic Calming: Seattle's Traffic Circle Program*, ITE, 1997, pp. 3-5.

The Truth About Stop Signs

Residents often request stop signs to minimize traffic impacts in their neighborhood. The City installs stop signs to assign right-of-way if the intersection meets specific criteria. If stop signs are not perceived as appropriate, drivers may make only rolling stops and speeds may actually increase between intersections, defeating the very purpose for which the signs were installed. Stop signs also slow transit and bicyclists. For all the above reasons, stop signs are *not* desirable as traffic calming devices.

B. San Francisco: Policies and Studies

Traffic calming has a twenty plus year history in San Francisco in practice, and has been studied and recommended in various documents for years.

Master Plan

The Transportation Element of the Plan recommends the use of traffic calming devices such as chokers, speed humps, and street trees to discourage high-speed traffic. It also includes guidelines on street design to improve bicyclist and pedestrian circulation, and states that traffic calming measures should not interfere with transit service or bicycle movement. The Urban Design Element of the Plan highlights the importance of trees and landscaping in reducing the impact of noise and other traffic effects on residences along arterial streets.

Transit Preferential Streets (TPS) Program

This interdepartmental program, part of San Francisco's Transit First policy, gives priority to transit vehicles over automobiles on designated streets. Recent TPS projects with secondary traffic calming benefits include boarding islands (medians) and bus bulbs (chokers) on Market Street, in the Union Square area, and elsewhere.

DPT's Bicycle Plan

This plan proposes that traffic calming be used to create bicycle priority streets. It identifies specific devices compatible with bicycles, including speed humps, speed tables, traffic circles, medians, and road closures — provided they allow bicycle through access. The Plan also recommends a process for implementation, which emphasizes citizen participation, and also includes a process for prioritizing projects. The plan is in the beginning stages of implementation.

DPT's traffic calming memorandum

Last November, DPT completed a memorandum on traffic calming for the Parking and Traffic Commission. The report stated that traffic calming should be considered from an area-wide standpoint. It suggested criteria for evaluating traffic calming programs and devices, and

concluded that photo-radar speed enforcement best met these criteria. It also suggested the need for a citywide policy and a plebiscite regarding traffic-calming before pursuing projects on anything more than a case-by-case basis. DPT has recently received funding for a traffic calming study in Bernal Heights.

C. Traffic Calming in Other Cities

Traffic calming programs have been developed in many cities throughout Australia, Western Europe, and North America. We researched traffic calming programs in Seattle and Portland, which are well-established and successful, as well as those of nearby cities.

Seattle

In Seattle, each neighborhood determines its prioritization of traffic calming projects as part of local planning efforts. After projects are screened at the district level by neighborhood groups, they are then prioritized citywide.

"Seattle's traffic circles are landscaped, which improves their acceptance among residents..."

Seattle's traffic calming effort has relied to a large degree on traffic circles. Seattle's traffic circles are built with mountable curbs — designed to better accommodate trucks and fire engines. Seattle's traffic circles are also landscaped, which improves their acceptance among residents, and further slows traffic by breaking sight lines. The city finds that traffic circles are the most effective way to reduce speeding and collisions with a minimum of controversy. Seattle and other cities have experienced significant accident reductions at intersections after installing traffic circles.⁶

In Seattle and other cities, stop signs have been eliminated or replaced with yield signs where traffic circles are installed. This smoothes traffic flow and reduces air pollution. In San Francisco, construction of splitter islands, which can function as a pedestrian refuge, could help address concerns that drivers won't yield right-of-way to pedestrians at an intersection without a stop sign.

Portland

Traffic calming projects in Portland are prioritized according to a point system that ranks eligible streets citywide according to a variety of criteria, including: speed, volume, pedestrian routes and activity areas, school location, bicycle routes, and transit routes. The traffic calming program includes separate elements for local streets and collector streets, as well as an elementary school safety program and a special program for speed

⁶ James E. Mundell, P.E., *Neighborhood Traffic Calming: Seattle's Traffic Circle Program*, ITE, 1997, pp. 3-5.

humps. Portland's program has reduced speeds significantly on many local streets.

In Portland, the traffic calming program includes a series of neighborhood meetings and project ballots. Although this may be time-consuming and expensive it helps ensure agreement about a proposal. The process first requires a petition to study traffic calming from residents. It also involves as many as four neighborhood meetings to identify problems, discuss solutions, and review alternative designs. Finally, a project ballot is taken, requiring majority or super-majority approval from residents of the affected street, intersecting streets, and the next adjacent parallel streets. A modified version of Portland's traffic calming program has been used in Sacramento and elsewhere, and could also work here.

"...a series of neighborhood meetings and project ballots... helps ensure agreement about a proposal."

Oakland

The City of Oakland has installed speed humps on about 1,000 blocks, and has used a variety of other devices to reduce speeding. Oakland initially budgeted about \$1,000,000 dollars per year for a three-year period to initiate its program. It currently spends about \$350,000 annually. Oakland has funded its program through local sales tax proceeds, state gas tax money, and federal community development funds.

Berkeley

Berkeley has employed a variety of traffic calming devices for many years in order to slow traffic and reduce volumes on local residential streets. Berkeley residents have raised a number of concerns about diverters in particular, including traffic diversion and aesthetics (the devices were originally installed as temporary measures and remain minimally landscaped). Berkeley recently placed a moratorium on further installation of speed humps due to their cumulative effect on emergency vehicle response times, and due to the discomfort and pain they cause some disabled drivers.

San Jose

San Jose uses photo-radar cameras to enforce speed limits, in addition to its other traffic calming efforts. Under San Jose's trial program, cameras are placed in vans which monitor problem streets and issue speeding tickets. San Jose's annual budget for its trial program is about \$200,000, which city officials expect to be offset by \$40,000 in ticket revenues.

The traffic calming devices most widely used, their purposes, pros and cons, and costs are detailed in Appendix A. Few traffic calming techniques are completely free of potentially negative side effects. There are many variations on these devices, and still others which have been used successfully in other cities but which are not mentioned in this report.

Traffic calming is an effective way of reducing speeding and accidents on residential streets. The reduction in accident incidence and severity associated with traffic circles is especially well-established. Portland engineers found drops of greater than 50% in accident frequency after installation of traffic circles; Seattle researchers found drops of greater than 80%, and dramatic reductions in accident severity as well.⁷

Certain traffic calming devices can also improve access for non-automobile transportation. For example, TPS measures improve transit passenger safety and access. Bicycle priority streets can increase safety and access for bicyclists. Chokers, medians, raised crosswalks and other devices reduce pedestrian crossing time and distance and can improve safety. Traffic calming can also improve less tangible aspects of neighborhood livability, for example by improving aesthetics and reducing automobile noise and pollution.

A toolkit of traffic calming devices can be used to respond to a variety of needs. The City should use devices which have worked in the past, including chokers, medians, circles, pavement treatments, and street trees; consider those which show promise, such as speed tables and raised crosswalks; and proceed cautiously with those which have not been successful in the past, such as diverters and street closures. Access restriction devices should only be used when volume reductions are desired, and street closure should only be pursued as a last resort.

Proliferation of speed humps and their negative impacts has been problematic in some other cities. In fact, some cities require a super-majority approval in neighborhood project ballots for speed humps and other devices such as diverters, while only requiring simple majority approval for devices which have fewer impacts. In some instances speed humps may indeed be the best option, but in general the City should use them judiciously. Other devices besides speed humps should be considered when addressing speed reduction, including speed tables on high volume streets and raised crosswalks in high pedestrian traffic areas.

III. EXAMPLES OF DEVICE APPLICATIONS

A. Evaluation of Traffic Calming Devices

⁷ City of Portland, [www.trans.ci.portland.or.us/Traffic Management/trafficcalming/reports/TrafficCircle/Execsum](http://www.trans.ci.portland.or.us/Traffic%20Management/trafficcalming/reports/TrafficCircle/Execsum), and

James E. Mundell, P.E., *Neighborhood Traffic Calming: Seattle's Traffic Circle Program*, ITE, 1997, pp. 3-5.

Traffic calming devices which are well-designed and attractively landscaped will be the most acceptable to residents. Street trees, landscaping, and urban design treatments can enhance the appearance and effectiveness of traffic calming devices such as circles, medians, or chokers. This may require neighborhood involvement, possibly including residents sharing some of the maintenance burden. Permanent installation of traffic calming devices will usually be more acceptable to neighbors than temporary installation. Well-designed and attractively landscaped permanent devices are seldom removed, so there is little or no cost advantage to installing temporary devices on a trial basis.

"...other devices besides speed humps should be considered when addressing speed reduction."

B. Potential Applications

Although speeding and safety problems are ubiquitous, each neighborhood, and often each street or intersection, is unique and may require an individualized approach. The following examples illustrate some of the common problems and possible ways to address them.

Issue: Cut-through traffic on local streets

A number of local residential streets in neighborhoods such as Bernal Heights are used as shortcuts by drivers seeking to avoid congested arterial routes and intersections. Traffic speeds can be reduced on such streets by a variety of vertical and lateral displacement devices, which also discourage drivers from using them as quick short-cuts. If these techniques prove inadequate, access restriction devices may be worth exploring. The challenge lies in avoiding the diversion of cut-through traffic to an adjacent local street. The more functionally appropriate place for this diverted traffic is on arterial streets.

"The challenge lies in avoiding the diversion of cut-through traffic to an adjacent local street."

Reducing cut-through traffic on local residential streets can be accomplished by improving flow on non-residential arterial streets. For example, if traffic signals on an arterial are properly timed, or a left turn lane is added or left turn signal timing altered, this will simultaneously improve traffic flow at a moderate speed and discourage cut-through traffic on local neighborhood streets. Increased traffic on an arterial street which is also *residential*, or which is already congested, may not be a desirable outcome. This concern may be partly mitigated by installing chokers and improving the landscaping, urban design, and pedestrian environment of the arterial street without reducing its capacity.

Issue: Speed and volume on collector streets

Several corridors in neighborhoods such as the Mission District and the Tenderloin are served by parallel sets of residential streets which carry heavy traffic volumes. Chokers, landscaping, medians, and special pavement treatment of intersections — such as colored and textured materials which look like brick — can improve the pedestrian environment of the street and mitigate some of the negative impacts of automobile traffic. These techniques, as well as increasing crossing time for pedestrians and improving pedestrian signals, can improve safety for pedestrians.

Traffic circles, speed tables and medians have been used on collector streets in other cities. However, applying these more restrictive devices may shift traffic to adjacent residential streets, and displacing traffic from a collector or arterial to a *lower* classification street is not acceptable. As a rule, analysis of impacts should consider entire areas or corridors, encompassing several parallel streets such as arterials or collectors, to ensure that traffic diversion is fully understood.

Issue: Speeding on low-volume local streets

Drivers often speed on low-volume local residential streets, especially wider ones. This happens in neighborhoods like the Sunset, although complaints about speeding are not specific to any one San Francisco district. Common solutions in other cities have included installation of speed humps and traffic circles. In some cases, the street may have excess capacity, allowing sidewalk widening, conversion of parallel parking to angle parking, or reduction in the width or number of traffic lanes — possibly allowing for the addition of a bicycle lane. A key challenge in these situations lies in the opposition of drivers to proliferation of speed humps.

IV. STRATEGIC ANALYSIS

Are there opportunities to address traffic calming issues in San Francisco through legislative action? This section addresses that question. It identifies basic issues, policy-level trade-offs, and opportunities for legislative action.

We have identified the following three main areas that require policy-level guidance:

- a) **Process:** Should traffic calming projects be planned and implemented as part of a citywide program or on a neighborhood-by-neighborhood basis, or some combination of the above?
- b) **Impacts:** In addition to their beneficial impacts, traffic calming projects can have traffic diversion impacts, as well as impacts on transit service and emergency vehicles. Should the City adopt policies to address the trade-offs between neighborhood livability

improvements and system-wide impacts on the transportation system? What might such mechanisms look like?

- c) **Budget Prioritization:** Should the City adopt policies to address the prioritization of investment in traffic calming projects? What should be the size of the City's traffic calming budget, given the competition with other transportation funding needs? How should we set priorities among traffic calming initiatives in different parts of the city? What are the potential funding sources?

The sections below address these three areas, provide some initial recommendations, and suggest the logical next steps in arriving at a policy framework.

A. Process

In addition to the proper application of individual traffic calming devices mentioned previously, a successful program must have a mechanism for prioritizing projects. Other aspects of a successful program include maximum improvement in the livability of residential streets, acceptable levels of congestion on the arterial network, opportunity for neighborhood involvement, and cost containment.

Current process

The current case-by-case approach to traffic calming usually begins with requests from an individual or a neighborhood group. DPT researches the issue, examining traffic speeds, volumes, and other relevant information. DPT staff will usually meet and correspond with concerned residents if traditional traffic engineering measures do not resolve the issue. Instances where this process has led to installation of traffic calming devices were highlighted earlier in section II-A of this report.

Although the flexibility of this ad-hoc process is an advantage, the current approach has sometimes been perceived as unresponsive by the public. Additionally, lack of resources for neighborhood-wide analysis has in the past led to some projects with adverse impacts. This process is also limited in scope and lacks a stable source of funding, partly because the desirability of a citywide traffic calming program has not yet been addressed at the policy level.

"... it is key that (traffic calming) impacts not cause the performance of the street network to substantially deteriorate."

Education and Enforcement

Enforcement and education efforts can be useful supplements to a traffic calming program. Education about speed limits and traffic laws can reduce speeding.

For example, many people do not know that the speed limit on the vast majority of local residential streets is 25 miles per hour. Traditional enforcement of speed laws could be supplemented by photo radar programs. Based on the experiences of San Jose, installation of photo-radar cameras on streets with speeding problems would probably be an effective way to temporarily reduce speeds. The advantages of such a program are its flexibility, ease of deployment, and the fact that it targets speeders without impacting other drivers. However, such a program also raises privacy issues, and its legal status is uncertain. Unlike other traffic calming approaches, photo-radar would neither be self-enforcing nor permanent. Enforcement-only programs can do little to reduce volume on cut-through routes.

Neighborhood-based approach

Prioritizing traffic calming projects at the district level, as in Seattle, provides flexibility and empowers residents. Relying upon neighborhoods to identify, prioritize, and design solutions to transportation problems helps ensure greater acceptance of the solutions, and may produce innovative results as well. However, prioritization at the citywide level across neighborhoods is also indispensable, and must include consideration of overall and cumulative impacts on the transportation system.

Citywide ranking system

One advantage of a citywide ranking approach, as used in Portland, is that it provides an objective mechanism for prioritization of projects. Additionally, this approach can accommodate area-wide solutions, particularly if traffic is a concern throughout the neighborhood, or if traffic calming a particular street would impact others nearby.

In summary, a successful program will have clear goals for reducing speeding and improving safety. Such a program will have an objective prioritization process and objective standards, as well as a strong neighborhood involvement and approval component. Enforcement and public education of and about speed limits and traffic laws are useful complements to a successful traffic calming program.

B. Impacts

System Performance

The implementation of traffic calming measures may have a cumulative impact on system performance: it is key that these impacts not cause the performance of the street network to substantially deteriorate. In San Francisco the Congestion Management Program (CMP) provides one way to evaluate impacts on arterials and freeways. The CMP requires that a deficiency plan be prepared if congestion on a designated arterial exceeds the adopted standard. The traffic calming techniques examined here

for use on collectors, such as chokers, should not cause such a deterioration, although more drastic measures, such as removing traffic lanes, might do so in some instances. Implementation of traffic calming on groups of local streets simultaneously could result in significant impacts on a CMP street.

One of the key trade-offs is the issue of internal neighborhood circulation versus neighborhood accessibility to the rest of the city. Applying traffic calming to several adjacent neighborhoods might increase travel times for people traveling across town. A related issue is the perception that most traffic on local streets is non-local. While this is sometimes the case, in general most of the traffic on local streets is indeed local in nature, as established by license plate surveys and traffic analyses. In most cases, the desirable objective should therefore be *speed* reduction, not *volume* reduction.

Traffic Diversion

Any traffic calming device, even those intended only for speed reduction, will likely produce some traffic diversion. Portland's traffic calming program addresses this issue through an "impact threshold curve." Other cities have instead set a certain maximum percentage increase of traffic on the affected street. The best way to address the issue of what happens to diverted traffic is to set an upper acceptable limit of how much of a congestion increase is acceptable on the affected street, established by an impact threshold curve or a certain maximum percentage increase. In some cases, the intent is to actually reduce volumes on a street. In these cases traffic diversion to an arterial street may be acceptable.

"The best way to address the issue of diverted traffic is to set an upper acceptable limit..."

Differentiation of the Street Network

Another issue is how much the street grid should or would be hierarchically defined as a result of traffic calming, or in order to implement it. It is common for large cities and suburbs to officially classify streets as major arterials (citywide thoroughfares), minor arterials (district routes), and collectors. The collectors provide access to neighborhood streets but are not major thoroughfares. This is known as a "differentiated" grid, because each type of street is given a different function in terms of handling traffic. Although San Francisco has designated major and secondary arterials streets, it does not have a network of designated collector streets. Devices which reduce volumes on local streets, such as physical access restrictions, are not appropriate on arterial or collector streets. Therefore, should the City wish to pursue a traffic calming program, a distinction between local and collector streets should be developed in conjunction with it.

Modal Shifts

Modal shifts from automobiles to other modes of transportation, like transit or bicycles, have not been a documented result of traffic calming in the cities surveyed in this report. Without corresponding improvements in non-automobile transportation systems, we suspect that modal shifts resulting from the implementation of traffic calming would be of marginal significance. Traffic calming should be pursued primarily for its beneficial effects on safety, as there are other more effective strategies to decrease automobile reliance. The Countywide Transportation Plan, currently being developed, can inventory local traffic calming priorities, and identify opportunities where a traffic calming scheme in a corridor could complement an improvement in bicycle or pedestrian facilities.

Muni

Minimal impact on the Municipal Railway can be ensured by carefully choosing appropriate devices, such as chokers and medians, for Muni routes, and preventing diverted traffic from causing significant congestion on such streets. Speed humps are not acceptable on Muni or primary emergency vehicle routes. Devices compatible with Muni service are indicated in Appendix A, and include chokers, traffic circles, and medians. Traffic calming should not interfere with San Francisco's Transit First policy.

Emergency Services

Emergency services can be maintained by treating the primary emergency route network similarly to the Muni network. Devices acceptable on such a network are also indicated in Appendix A, and are similar to those compatible with Muni vehicles. On local streets which are *not* part of the network, some delay will likely result, but emergency service can be maintained by utilizing devices which accommodate emergency vehicles, such as chokers, medians, and traffic circles with adequate lateral clearance, and by using speed humps judiciously. Research in Portland indicates that depending on the specifics of the device's design, the type of vehicle, and its speed, speed humps and traffic circles delay emergency vehicles between 0 and 11 seconds per device.⁸

C. Budget Prioritization

Unless there is a citywide prioritization process, the trade-offs between funding levels for various neighborhoods must be determined by the budget process. Funding prioritization will also have to address the level of priority given to various transportation programs, including traffic calming. The Countywide Transportation Plan could

⁸ www.trans.ci.portland.or.us/Traffic_Management/trafficcalming/Emergency/emergency.htm

gauge the size of the program and identify trade-offs with other programs.

Funding Levels

Portland budgets between \$1,000,000 and \$3,000,000 annually for its traffic calming program. In the past 12 years, the City of Portland has built over 70 traffic circles, over 300 speed humps, and many other devices. Seattle's annual program budget for traffic calming is currently \$450,000, and their construction budget is about one-third of that. The City of Seattle has constructed over 600 traffic circles in the past 25 years, and currently constructs about 30 per year.

A traffic calming program in San Francisco would cost at least several hundred thousand dollars a year, and possibly much more. Depending on the extent of the program, the types of devices constructed, and the amount of staff time devoted to working with the neighborhoods, a fairly comprehensive citywide traffic calming program for San Francisco could easily run into the tens of millions of dollars in total over the lifetime of the program. A traffic calming scheme relying mainly upon speed humps would cost less than one involving more expensive devices such as traffic circles and chokers. However, the least expensive option is not always best. In addition to budgeted costs, there are also additional costs, such as extra travel time, and additional savings, such as reduced accidents and improved livability.

Funding Sources

Cities tap a variety of sources to fund traffic calming programs. In San Francisco, most of the current funding for traffic calming comes from a variety of programs under Proposition B, the local transportation sales tax. In other cities, sales tax, gas tax funds, general fund, and other sources are most commonly utilized. Following are some current and potential funding sources:

PROPOSITION B

- The Traffic Control System category provides money for traffic and intersection controls. This year \$50,000 will be spent on five traffic circles.
- The Bicycle and Pedestrian category can be used to fund projects which improve pedestrian access, such as chokers, and for projects that calm traffic which are part of San Francisco's Bicycle Plan, such as Bicycle Priority Streets.
- The Downtown Pedestrian Project Program funds improvements for pedestrian access and safety downtown, such as chokers.
- San Francisco spends approximately \$400,000 to replace existing trees and \$900,000 for additional trees annually as part of the Street Tree Program.

- The Transit Preferential Streets (TPS) Program receives funding from Proposition B and other sources. Bus bulbs and medians are TPS measures which also calm traffic.
- The Street Resurfacing Program, run by DPW, also receives funding from Proposition B, but does not currently include funding for traffic calming.

OTHER LOCAL FUNDING SOURCES

General Fund: Cities often tap their general fund for traffic calming. The amount of money allocated to a traffic calming program would be commensurate with the program's importance vis-a-vis other city priorities.

Bonds: DPT has suggested a plebiscite on traffic calming, possibly including a bond measure. Bond measures have been used to fund other traffic calming programs, such as the initial program in Seattle.

Assessment districts: Some cities pass all or part of the cost of devices on to residents through an assessment district or a local improvement district. Portland operates several traffic calming programs, and their speed hump purchase program is funded this way. Portland allows property owners to assess themselves if residents support a project which does not rank high enough on the citywide list to receive public funding. In other cities, residents themselves have purchased devices, or applied for government grant money. These options should be fully explored in San Francisco.

Gas Tax: Oakland and Sacramento have funded their traffic calming programs partly through monies from the state gas tax. San Francisco, however, receives less gas tax revenue per capita than other California cities, and spends most of it on street sweeping and maintenance.

NON-LOCAL FUNDING SOURCES

Livable Communities: Funding is available for projects which improve pedestrian and bicycle circulation and access to transit through the federal government's Livable Communities Initiative and its Transportation and Community and System Preservation Pilot Program, and through MTC's Transportation for Livable Communities program. Traffic calming techniques which could meet this objective include chokers, street narrowing, and landscape and streetscape improvements.

Air Quality Improvement: Funding is available for traffic calming projects which reduce air pollution through the Bay Area Air Quality Management District's Transportation Fund for Clean Air. Traffic circles might be eligible for funding if they were on arterial streets and if they were not controlled by stop signs. Candidate locations might include roads in parks, such as the Kezar

Drive entrance to Golden Gate Park. Funding may also be available through the federal government's Congestion Management Air Quality program.

Other Funding Sources: There are several other state funding sources which provide funding for traffic calming programs and devices. These include grants from the Office of Traffic Safety, which supplied equipment and support for Sacramento's program; grants for Environmental and Enhancement and Mitigation, which funds beautification of transportation corridors with landscaping; and the Hazard Elimination Safety Program, which can fund devices such as medians which improve traffic safety.

V. RECOMMENDATIONS AND NEXT STEPS

A. Recommendations

Program Recommendations

1. If the City wants a traffic calming program, it should have clear goals, such as reducing unsafe speeds on residential streets, reducing cut-through traffic on certain local streets, reducing automobile collisions, and improving safety and access for pedestrians and bicyclists.
2. A traffic calming program should include an objective process and clear standards for prioritization, similar to the point system used in Portland outlined in section II.C.
3. A traffic calming program should include a strong neighborhood involvement component similar to the Portland approach outlined in II.C. At a minimum this should include neighborhood meetings, and a petition and/or project ballot requiring at least a majority vote of neighborhood residents before a traffic calming device is installed.
4. Traffic calming must be considered area-wide in order to minimize potential spillover effects. Traffic diversion to other residential streets should be assessed using an impact threshold curve, or a maximum percentage increase.
5. Traffic calming must not allow the CMP network's mobility function to substantially deteriorate.
6. Traffic calming must not interfere with Muni's operations, significantly reduce mobility on the primary emergency route network, or drastically reduce emergency response times.
7. For the purposes of evaluating traffic calming impacts and selecting appropriate traffic calming devices, a standardized functional classification of streets as local or collector should be developed.
8. Enforcement and education efforts can complement a successful traffic calming program.

9. A photo-radar program might be an enforcement supplement to other traffic calming efforts, but it can not replace them.
10. Funding sources identified in Section IV.B should be tapped for a traffic calming program.

Traffic Calming Device Recommendations

1. In choosing devices, it is best to use a toolkit of devices and preserve some flexibility in their application. Recommended devices are discussed in part III.A. They include, but are not limited to: chokers, medians, circles, and alternatives to speed humps such as raised crosswalks and speed tables.
2. When residents request speed humps, the City should consider other devices as well. This would include raised crosswalks in high-pedestrian-traffic areas, speed tables on streets such as collectors, and other speed control devices.
3. Physical access restriction devices should only be considered where volume reductions are actually appropriate. Streets should only be closed after other feasible options have been explored.
4. The neighborhood benefits most when a device that has a traffic calming function also becomes an amenity. This can be accomplished through the good design and attractive landscaping of permanently installed devices.

B. Next Steps

If this SAR is adopted, the following next steps should be taken to enable implementation of a comprehensive traffic calming program:

1. The Authority, working with DPT and other City departments, should develop a process for handling requests or initiatives for traffic calming projects in the city. The process should address the steps to be applied to requests, from the moment they are received at DPT, including information and data gathering, evaluation procedures, the use of technical criteria, methods, and guidelines, and describe a public involvement component. The traffic calming study underway in Bernal Heights should serve as a test case for these purposes.
2. DPT, in coordination with the Authority, and other City departments, should develop a technical methodology for evaluating traffic calming requests from residents. This methodology should consider, at a minimum, a set of thresholds for evaluating potential traffic diversion and other impacts of traffic calming proposals on city streets. The methodology should also begin the development of a standardized functional classification of city streets or a similar method that can be used for the purpose of evaluating these impacts, and to help to select appropriate traffic

calming devices in each instance. The methodology should also explore the use of these thresholds as a way to standardize the analysis and reduce the required staff time as well as improve the City's response time to neighborhood requests. The methodology should address the use of the computerized travel demand model under development by the Authority, to permit the evaluation of impacts on the Congestion Management network and for area-wide analyses.

3. DPT should work with the Authority, through the Countywide Transportation Plan (Plan) process, to establish an inventory of potential traffic calming projects in the city. As part of the Plan process, the Authority should develop recommendations for the size of the traffic calming program for the city, as well as specific priority projects or categories of projects, or priority areas for street calming. The Authority and DPT should also develop recommendations regarding a funding strategy which may involve existing and/or new funding sources.
4. The Authority staff, in cooperation with DPT and other departments, should develop an implementation schedule for items 1 through 3 above and provide periodic progress reports to the Authority Board.

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Additional information was provided by officials working with San Francisco's DPT, DPW, Muni, SFFD, and SFPD, and others in the cities of Berkeley, Oakland, Portland, and Seattle.

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