



Office of the City Manager

INFORMATION CALENDAR

November 8, 2011

To: Honorable Mayor and Members of the City Council

From: *PK* Phil Kamlarz, City Manager

Submitted by: Andrew Clough, Director, Public Works

Subject: Evaluation of Speed Tables and Use of Traffic Calming Tools

INTRODUCTION

Public Works Transportation staff have tested and evaluated the use of speed tables as an option for physical traffic calming to reduce vehicular speeding in local/residential streets on non-emergency/ non-evacuation routes. The outcome is that speed tables have been effective in reducing traffic speeds and staff will utilize speed tables as one possible device for speed reduction. The decision to install speed tables will be through the traffic calming program for locations that have been identified to have a significant speeding problem.

SUMMARY OF TESTING AND EVALUATION

The speed data collected before and after the installation of speed tables indicate significant reductions in speed after installation of speed tables. Speed reduction ranged from 17% to over 23% on the Josephine Street and Forest Avenue locations, resulting in 85% of traffic traveling at or below the posted speed limit of 25mph. On Rose Street, where split speed tables were installed, a 9% reduction in speed was observed and considered significant. However, the 85th percentile speed (defined as the speed exceeded by only 15 percent of vehicles) remained 4 mph over posted speed limit of 25 mph. While the majority of the adjacent residents expressed positive feedback about these devices, we also received a few negative comments from two residents who had initially supported the installation of split speed tables on Rose, specifically on eastbound Rose. According to these residents, “motorists traveling eastbound usually bypass the speed table by driving on the opposite side of the roadway, creating dangerous driving conditions; and given the upslope of Rose in the eastbound direction, some motorists speed up after driving over the speed table to make up the lost time; resulting in more noise and air pollution.” One of these residents insisted on removing the speed table in front of his property on eastbound Rose. Subsequently, at the City Manager’s direction, the eastbound speed table was removed in August 2011. This indicates that the slope of a street should be taken into consideration prior to installing any type of speed table, to avoid repeating the negative experience on Rose Street.

Several of Berkeley Fire Department’s (BFD) fire engines have made test runs over the newly installed speed tables, and according to BFD they have received positive

responses from different fire stations. The main concern on future installation of speed tables is that they should not be installed on emergency access and evacuation network routes, as established in the City of Berkeley General Plan, page T-33, Figure # 9 unless approved by BFD for installation of a split speed table. The City's Disability Services Specialist, along with Traffic Engineering staff, also conducted tests riding a paratransit bus over the trial speed tables, speed humps, and speed cushions. During these field tests no major discomfort or inconvenience was felt/observed, though the speed tables were deemed to be the most comfortable device to drive over. Staff did not receive any major complaint/negative feedback from the Commission on Disability or from Berkeley Police Department (BPD). Both BFD and the Disability Services Specialist asked to be consulted in any future site selection process, as Traffic Engineering staff have done in the Speed Table Trial Pilot project.

Traffic Engineering staff seek to address concerns of neighborhood groups about traffic impacts in their area. The trial installation of speed tables has been favorably received by residents, who have requested more of these vertical deflections for many locations in Berkeley. Staff plans to use speed tables as one of the traffic calming options available for speed reduction. Use of speed tables would be conditional upon meeting the traffic engineering criteria specified in the City's Traffic Calming Policy, in addition to support from emergency services providers and the City's Disability Services Specialist.

CURRENT SITUATION AND ITS EFFECTS

The Berkeley City Council imposed a moratorium on the installation of new speed "humps" in 1995, largely in response to concerns expressed about them by the Berkeley Fire Department (BFD) the previous year regarding their adverse impact on emergency response times, and potential damage to fire apparatus. Fire trucks must maintain an even slower speed than passenger cars when driving over speed humps, because doing otherwise may cause the large vehicle frames to flex awkwardly, which could result in damage. In addition, some Berkeley residents with particular health problems complained about the speed humps, saying they caused them pain even when traveling over the humps at a very low speed.

Mayor Bates, and Council Members Maio and Capitelli introduced a recommendation in July 2007 for a pilot project to test speed cushions, a different form of vertical pavement deflection device¹ than a speed hump. A trial installation to evaluate the effectiveness of 2 kinds of speed cushions in reducing vehicular speeds on residential streets was conducted in 2008. The study parameters were based on whether or not overall traffic

¹ **Vertical pavement deflection devices** are a range of devices that seek to reduce traffic speeds when vehicles drive over them. These include: **Speed bumps**, 6 – 12" long, 3 – 4" high, extending the width of the roadway with nearly semicircular shape; **Speed humps**, 12' long, 2.5 – 4" high, extending the width of the roadway with a parabolic shape; **Speed cushions**, same dimensions as speed humps, with cut out channels spaced the width of emergency vehicle tires and too wide for typical passenger cars; **Speed tables**, 22' long, 2.5 – 4" high with a 10' long flat top and 6' long approach and departure ramps that may have a linear, parabolic, or sinusoidal profile.

speed was reduced, and the results showed that, on average, there was a reduction in traffic speed resulting from the installation of speed cushions. However, there were concerns from the Commission on Disability related to potential physiological impacts on people with disabilities traveling over the cushions as either passengers or drivers; and the Fire Department evaluation of the 2008 trial showed that ambulances had difficulty traveling quickly and easily over the cushions, reducing emergency response times below the desired level. Consequently, the citywide implementation of speed cushions was not adopted.

BACKGROUND

As already noted, there has been a moratorium on the installation of speed humps since 1995 due to concerns expressed by the Fire Department and the disabled community. The initial motion to adopt installation of speed humps along several specific streets was part of a Council action on a larger report addressing the U.C. Neighborhoods Transportation and Traffic Plan. While the report did not specify how long the “delay” should be, minutes of the meeting reflect a “1-year moratorium on construction of any new speed humps until completion of the evaluation.” Since then, Council has extended the moratorium on speed humps indefinitely, largely at the request of the Commission on Disability.

In November 2010 the Berkeley City Council directed the Public Works Department – Transportation Division to install speed tables on a trial basis at different City locations/districts. Speed tables are flat-topped with a comparable height to properly designed speed humps, and they’re typically long enough for the entire wheelbase of a passenger car to rest on the flat section before completing the crossing. The long flat surface of speed tables allows movement at a greater speed than over speed humps, and with less impact on vehicles with a longer wheel base. Speed tables are suitable for locations where speeds in compliance with posted limits are desired, and a smoother ride is required for larger vehicles, such as fire trucks, resulting in a less jarring effect on vehicles and passengers. Unlike speed cushions, speed tables are a single, solid span, which makes it feasible to use them as part of a raised crosswalk. The longer section and possible lower height of speed tables make these devices friendlier to emergency vehicles and the disabled community.

Based on criteria established in the traffic calming policy, and concerns/comments received from the BFD, Berkeley Police Department (BPD), and the Commission on Disability, the following 3 streets were recommended for the installation of speed tables on a trial basis. Since vehicle speeds are typically higher at the mid block, the speed tables were installed at mid block on the selected streets.

1. Rose Street between Ordway and Juanita*
2. Forest Avenue between Claremont and Piedmont
3. Josephine Street between Vine and Rose

*Note: Rose Street is an emergency route with the characteristics of a collector roadway. However, the local community was interested in including Rose for speed

table installation on a trial basis, and while BFD initially had concerns on this selection, they later proposed installation of split speed tables between Ordway and Juanita. A split speed table crosses only one direction of traffic and is paired with a second split speed table for the opposite direction 50 to 100 feet away; this allows emergency vehicles to slalom around the devices to avoid being slowed as much as they would driving over the speed table.

POSSIBLE FUTURE ACTION

Transportation staff will consider the use of speed tables as one of the options available for physical traffic calming in order to reduce vehicular speeding on local/residential streets on non-emergency/ non-evacuation routes, when recommended by a traffic calming study with input from emergency services personnel and the Disability Services Specialist.

FISCAL IMPACTS OF POSSIBLE FUTURE ACTION

The current (2011) cost for the installation of modular speed tables, excluding future maintenance,² is approximately \$12,000 per location. This includes the following items:

- Evaluation of suitable sites by City staff
- Bidding/administrative process
- Installation of speed table by contractor

For comparison purposes, other physical traffic calming devices vary in cost from \$16,000 to \$46,000. The estimated costs (at 2010/2011 levels) for selected traffic calming options are as follows:

- Traffic Circle: \$33,000 each
- Rectangular Rapid Flashing Beacons System: \$46,000 per pair
- Bulb-out with drainage: \$40,000 per corner
- Circular flashing beacons: \$26,000 per pair
- Speed feedback signs: \$16,000 per sign location

The Public Works Transportation Division typically has an annual budget of \$50,000 for all traffic calming efforts throughout the City.

CONTACT PERSON

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Attachments:

1: Speed Tables Trial Installation

² More time is needed to determine the future maintenance cost of these devices.

Speed Tables Trial Installation

In November 2010, Council approved a recommendation submitted by the Public Works Director to conduct a pilot project for speed tables. Based on site selection criteria (see below), and the fact that vehicle speeds are typically higher at mid-block, speed tables were installed at mid-block on these three streets in January 2011:

1. Rose Street between Ordway/Juanita (Split Speed Table)
2. Forest Avenue between Claremont/Piedmont (Regular Speed Table)
3. Josephine between Vine/Rose (Regular Speed Table)

The Council also recommended installing a speed feedback sign on Alcatraz Avenue between Baker/Idaho and evaluating the effect on speed reduction.

Follow-up (post installation) traffic surveys were performed in May 2011.

As a result of the trial installation and analysis, staff recommends that speed tables be included as an option among the range of traffic calming tools available for use in implementing traffic calming measures on residential non-emergency response routes.

Site selection Criteria

The following Criteria are used for eligibility of locations for traffic calming. Selection of locations for the Speed Table trial required qualification on the basis of speed in addition to the other eligibility requirements for traffic calming.

Minimum Criteria to Qualify for Traffic Calming	
SHALL meet the following 2 conditions:	AND at least <u>1</u> of these conditions:
1. Any residential street area; AND	<ul style="list-style-type: none"> • Where the 85th percentile speed profile is greater than 5 mph over the speed limit; OR
2. In the case of “physical” traffic calming measures, where 50%+1 of households, within 1 block of the proposal, who have expressed their opinion in a City-sponsored poll, such as a questionnaire, support the proposal.	<ul style="list-style-type: none"> • Proximity to school or park (within two blocks), or senior center (within one block) combined with 85th percentile speed profile greater than 3 mph over the speed limit; OR
	<ul style="list-style-type: none"> • Mitigate a documented collision pattern (bike, pedestrian, motor vehicle); OR • Where there’s a documented problem of a significant or inappropriate number of “through” motor vehicles on the street or in the neighborhood, per ITE volume guidelines for neighborhood streets (2,500 vehicles per day average)

Traffic Surveys:

Traffic surveys consisting of vehicle speed and volume data were recorded over a 24-hour period during May 2010. UC Berkeley was in session during all data collection except Rose “before” data. The following tables summarize the results of these surveys.

Speed Data

Location	Direction	Before Installation 85 th ile Speed (MPH)	After Installation 85 th ile Speed (MPH)	Change in 85 th ile Speed (MPH)	Change in 85 th ile Speed (%)
Josephine Street between Vine St & Rose St	NB	31	24	-7	-23%
	SB	31	25	-6	-19%
Forest Avenue between Claremont Av & Piedmont Av	EB	32	25	-7	-22%
	WB	30	25	-5	-17%
Rose Street between Ordway St & Juanita St	EB	32	29	-3	-9%
	WB	32	29	-3	-9%
Alcatraz Avenue* between Baker St & Idaho St	WB	32	30	-2	-6%

*on Alcatraz Avenue only: speed feedback sign is installed in the west bound direction.

Volume Data (Not a criteria for speed tables)

Location	Direction	Before Installation Traffic Volume (Veh/Day)	After Installation Traffic Volume (Veh/Day)	Change in Traffic Volume (Veh/Day)	Change in Traffic Volume (%)
Josephine Street between Vine St & Rose St	NB	249	250	1	0.4%
	SB	281	196	-85	-30%
Forest Avenue between Claremont Av & Piedmont Av	EB	772	626	-146	-19%
	WB	354	345	-9	-3%
Rose Street between Ordway St & Juanita St	EB	1575	1418	-157	-10%
	WB	1321	1312	-9	-0.7%
Alcatraz Avenue* between Baker St & Idaho St	WB	4361	4379	18	0.4%

*on Alcatraz Avenue only: speed feedback sign is installed in the west bound direction.

Notes:

- Before Installation data collected: Josephine April 2006, Forest March 2005, Alcatraz March 2010, Rose June 2010.
- After Installation data collected: All locations May 2011.
- 85th percentile speed is the speed below which 85% of the traffic is traveling. No more than 15% of observed traffic exceeds this speed.

Conclusion:

Comparison of data before and after installation for the 3 speed table trial locations (total of 6 directions) shows there was a significant and consistent reduction in the speed of traffic traveling on these streets. The data also shows that while there were some significant reductions in traffic volumes at some of the locations, the reductions in volume were not uniformly significant. In summary:

1. On average, both Forest and Josephine locations experienced a drop in the 85th percentile speed in the range of 17-23%. Rose Street experienced a 9% drop in speed. From a traffic engineering perspective, these drops are considered to be significant.
2. Changes in volume were not consistent enough to lead to any meaningful conclusions.
3. Standard speed tables are effective on residential/local streets (non-emergency/non-evacuation response routes).
4. Split speed tables need careful design to avoid wrong way driving.
5. Speed tables on uphill roads can be problematic depending on the driver response.
6. When speed tables are recommended for traffic calming, both BFD and the Disability Services Specialist should be consulted about site selection.
7. Speed feedback signs are effective on major/collector streets and emergency routes as a traffic calming tool without slowing down emergency vehicles or causing any discomfort to individuals with physical sensitivities.

