



CITY OF ELK GROVE

SPEED CONTROL PROGRAM GUIDELINES

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Prepared for:

City of Elk Grove
Public Works Department

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1. INTRODUCTION

BACKGROUND

In 2002, the Public Works Department developed the Neighborhood Livability Program (NLP) in response to a multitude of citizen requests for neighborhood traffic calming. The NLP was modeled after successful programs in other cities that combine Education, Enforcement, and Engineering techniques, commonly referred to as the Three E's. The NLP conducted a series of pilot plans in three neighborhoods to educate residents on available traffic calming devices, assess policies and procedures set forth, and test the effectiveness of various traffic calming devices. The NLP is comprehensive in that it treats an entire neighborhood. This is beneficial in creating coordinated plans and minimizing the chances of pushing the problem from one street to another. However, treating an entire neighborhood takes substantial time and resources.

Since the adoption of the NLP program, Public Works staff has identified the need for a streamlined process that more quickly responds to resident's traffic calming requests. The Speed Control Program will reduce residents' wait time while efficiently using staff time to oversee the program. The program is anticipated to operate in lieu of the NLP.

GOAL

The Speed Control Program will provide City staff and residents with a streamlined program to address neighborhood speeding in established neighborhoods.

OBJECTIVES

The Speed Control Program utilizes the best practices in traffic calming and lessons learned from the NLP to efficiently address neighborhood speeding. To truly be effective, the program will:

- Determine eligibility based on clearly defined and easily measured parameters
- Use a priority ranking system to determine the order in which requests will be addressed
- Focus on localized traffic issues in the immediate rather than the larger neighborhood wide program
- Offer a limited number of traffic calming devices that require little design time and are effective at reducing speeds yet cost effective

Through these objectives, the program is anticipated to reduce the timeframe from a resident's request for traffic calming to actual construction. However, this timeframe is dependent on competing demand, priority ranking, available funding and timing of construction.

FUNDING

The City of Elk Grove will fund the planning, design, and construction of speed control measures through this program. Funding for the Speed Control Program is anticipated to come from Gas Tax and be reauthorized annually from the City approved Capital Improvement Program based on the amount of available funding city wide. The amount of annual funding will determine the number of speed control requests that can be responded to.

Residents or a group of residents whose street qualifies for speed control may elect to fund the devices. The resident or group of residents must enter into a memorandum of understanding (MOU) with the City of Elk Grove, wherein they agree to pay for all costs associated with the installation of speed control devices on their street (construction, inspection, administration, etc). Once a MOU is executed, the

location to receive speed control shall be included in the next City construction project rather than competing against other requests. Private payment for speed control does not relieve a location from the public survey requirement (see Chapter 4) or any other criterion set forth in these guidelines.

REVIEW OF OTHER JURISDICTIONS

Materials from the following agencies were reviewed to identify the range of options and common practices relating to the implementation of similar speed mitigation programs:

- City of Albuquerque, NM
- Montgomery County, MD
- City of Belmont, CA
- City of Sacramento, CA
- City of Bakersfield, CA
- City of Los Angeles, CA
- City of Riverside, CA
- Gwinnett County, GA
- City of Anaheim, CA
- County of Humboldt, CA
- City of Inglewood, CA
- City of Pittsburg, CA

The City of Elk Grove's program shares many similarities with the other surveyed programs including:

- Eligible Devices – The surveyed programs vary in terms of eligible device, but primarily rely on vertical devices (i.e., speed humps). Qualifying Criteria – All surveyed programs rely on a set of qualifying criteria. Speed and volume are the most common requirements. The City of Anaheim's Speed Hump Program used street width, street length, and classification as a truck or transit route as additional qualifiers.
- Request Selection Process – The surveyed programs tend to rely on either a "first come, first served" basis or priority ranking for implementation.
- Determining Neighborhood Support – All surveyed programs relied on some level of neighborhood support. The City of Belmont requires the petition to initially be signed by 75% of the residents on the street with a final support of 66% for the speed hump plan.

A summary table of other jurisdictions' programs is provided in the Appendix.

HOW TO USE THIS DOCUMENT

The remainder of this manual is presented in the following chapters:

- Chapter 2 – Initial Qualifying Criteria
- Chapter 3 – Toolbox of Available Program Speed Control Measures
- Chapter 4 – Implementation Procedures
- Chapter 5 – Procedures for Device Removal

While the document is primarily intended for City staff, residents interested in learning about the City's Speed Control Program may also find this document useful.

2. INITIAL QUALIFYING CRITERIA

The Speed Control Program begins when a resident submits a petition requesting treatment. The petition shall include the following:

- Street name
- Locations of concern (e.g., from A Street to C Street)
- Time of day when issue occurs (e.g., 4:00-6:00 PM)
- Signatures from 10 households (signatories must be legal residents 18 years and older)

Public Works staff will review the petition and initiates a traffic investigation to determine whether the street in question satisfies a series of requirements. The program petition is contained in Chapter 4. The series of requirements are necessary to rule out more appropriate traffic engineering and maintenance solutions (e.g., signage changes or trimming vegetation to improve sight distance). In addition, vertical traffic calming measures are not appropriate on every street even when basic qualifying criteria are met. Signing, striping and traffic control options will be evaluated prior to the recommendation of vertical speed control devices. Staff reserves the right to approve or reject speed hump requests on a case by case basis.

The initial qualifying criteria are shown in Table 1.

TABLE 1: SPEED CONTROL PROGRAM INITIAL QUALIFYING CRITERIA	
Criteria	Requirement
1. Street Classification	2-lane Local or Collector Street
2. Minimum Street Length	750 feet between traffic controls
3. Average Daily Traffic Volume ¹	500 – 4,000 Vehicles per Day
4. Posted Speed Limit	30 mph or less
5. 85 th Percentile Speed	≥ 5 mph over the posted speed limit
6. Adjacent Land Use	≥ 75% Residential, Park or School
7. Fire Department Review	Review primary emergency response route map to determine device eligibility; Eligible streets will be forwarded to the Fire Department for review, emergency response time impact analysis and comment.
Notes:	
1) Alternative traffic calming measures may be available for streets which exceed the average daily traffic threshold of 4,000 but serve less than 7,500 vehicles per day and meet all other criteria.	

Public Works staff will evaluate each request based on the initial qualifying criteria shown in Table 1 and in accordance with procedures set forth in Chapter 4. If a street satisfies the minimum requirements and is a candidate for the program, Public Works staff will notify the individual who submitted the request in writing. Staff will also notify applicants of non-qualifying streets and provide an explanation in writing as to why. If the street fails to meet the necessary requirements, the street may not be considered for the program for another two years. Based on the needs of the City and continued improvements to the program, qualifying criteria and the priority ranking system are subject to change at any time. Streets, which may have qualified for the program previously, shall be reevaluated in accordance with the most current set of qualifying criteria and ranking system established in subsequent revisions to this document. Public Works envisions maintaining the list in an Excel or similar database format.

3. TOOLBOX

This chapter presents the “toolbox” of traffic calming devices available for use in City of Elk Grove’s Speed Control Program. Speed control requests typically begin as a traffic investigation in response to a perceived traffic issue. Public Works staff will perform routine investigations to assess if non-physical (i.e., signing, striping, sight distance improvements) will address the concern before recommending the Speed Control Program.

Traffic calming devices applicable to the City of Elk Grove are categorized as one of the following:

- Non-Physical Measures - Any measure that does not require physical changes to the roadway. Non-physical devices are intended to increase drivers’ awareness of surroundings and influence driver behavior without physical obstructions.
- Vertical Deflection measures – Physical devices designed to create vertical deflection in order to slow vehicles. Vertical deflection devices such as speed humps or speed tables are the most effective at reducing vehicle speeds. These types of devices also pose the greatest potential to slow emergency response vehicles, buses, and delivery trucks.

For the purposes of this Speed Control Program, the “toolbox” consists of the following three vertical devices to address neighborhood speeding:

- Speed Humps
- Speed Lumps
- Speed Tables

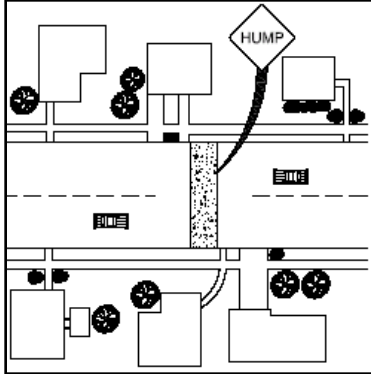
The devices listed above have been selected because they are effective at reducing vehicles speeds, are relatively easy to design, and are cost effective when compared to other devices. The Neighborhood Livability Program contained a wider range of devices to address neighborhood traffic concerns.

The remainder of this chapter presents the following information for each device in the “toolbox”:

- Description of the device
- Photograph and schematic
- List of advantages and disadvantages
- Estimated construction costs. Actual costs depend on a number of factors including street width and construction material
- Data sheet indicating measured reduction in speed, volume, and collision potential

Speed Hump

Speed humps are rounded raised areas placed across the road. They are generally 12 feet long (in the direction of travel), 3 to 3 ½ inches high, parabolic in shape, and have a crossing speed of 15 to 20 mph. Speed humps on roadways with bike lanes should have a sinusoidal profile. When placed on a street with rolled curbs or no curbs, bollards are placed at the ends of the speed hump to discourage vehicles from veering outside of the travel lane to avoid the device.



The magnitude of reduction in speed is dependent on the spacing of speed humps between points that require drivers to slow. Streets with higher 85th percentile speeds (e.g., 35mph) prior to application tend to experience the greatest speed reduction. In other words, it is unreasonable to expect significant speed reduction on streets with an initial 85th percentile speed less than 30mph.

Approximate Cost: \$2,000 - \$3,000 per location

Measured Effectiveness	
Reduction in 85 th Percentile Speeds	-22% (7 - 8mph reduction)
Note: Reported values represent the average of 179 sample locations (12' speed humps). Source: Traffic Calming State of the Practice, 1999.	

Advantages

- Very effective at reducing speeds
- Relatively inexpensive
- Relatively easy for bicyclists to cross

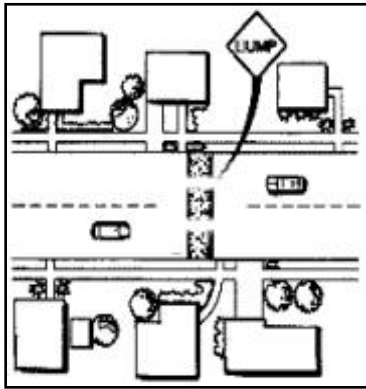
Disadvantages

- Can create a “rough ride” for drivers with certain physical disabilities
- Slows emergency vehicles and buses
- Aesthetics
- Signs and bollards may be unwelcome by adjacent residents
- Increased noise for nearby residents



Speed Lump

Speed lumps are similar in design to speed humps with at least two wheel cut-outs that allow large vehicles such as fire response and buses to pass with minimal slowing. The design limits passenger cars and mid-size SUVs from fully passing through the cut-outs, but allows one set of wheels to pass through the cut-out while the other set is required to travel over the lump.



Speed lumps can be constructed out of asphalt or pre-manufactured rubber cushions. The magnitude of reduction in speed is dependent of the spacing of speed lumps between points that require drivers to slow. Streets with higher 85th percentile speeds (e.g., 35mph) prior to application

tend to experience the greatest speed reduction. In other words, it is unreasonable to expect significant speed reduction on streets with an initial 85th percentile speed less than 30mph.

In 2007, the City of Sacramento conducted before and after speed studies on 29 streets where speed lumps were installed. Recorded speed reductions varied from 15 to 34 percent with an average of 22 percent, which is consistent with speed hump speed reduction.

Approximate Cost: \$2,000 - \$3,000 for Asphalt Speed Lump

Measured Effectiveness	
Reduction in 85 th Percentile Speeds	-22% (7 - 8mph reduction) Similar to speed humps.
Note: Reported values represent the average of 179 sample locations (12' speed humps). Source: Traffic Calming State of the Practice, 1999.	

Advantages

- Very effective in reducing speeds
- Minimizes delays to fire and transit vehicles
- Relatively easy for bicyclists to cross

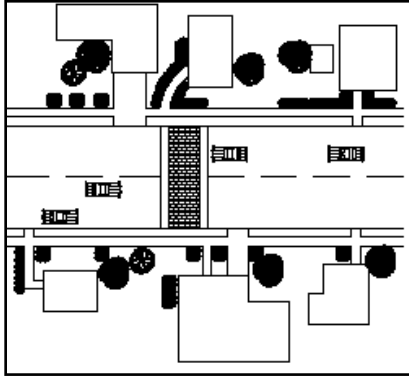
Disadvantages

- Vehicles with wide wheel base can pass through the lump using the wheel cut-outs
- Aesthetics
- Signs and bollards may be unwelcome by adjacent residents
- Increased noise for nearby residents



Speed Table

Speed tables are flat-topped speed humps approximately 22 feet long, which is typically long enough for the entire wheelbase of a passenger car to rest on top. Their long flat platforms, plus ramps that are more gently sloped than speed lumps, yield a higher design speeds than humps or lumps and thus may be more appropriate for streets with higher ambient speeds. The



shape and design provides a gentler ride and requires less slowing of fire response vehicles and buses when compared to speed humps. Brick or other textured materials improve the appearance of speed tables, draw attention to them, and may enhance safety and speed reduction.

The magnitude of reduction in speed is dependent on the spacing of speed tables between points that require drivers to slow. Streets with higher 85th

percentile speeds (e.g., 35mph) prior to application tend to experience the greatest speed reduction. In other words, it is unreasonable to expect significant speed reduction on streets with an initial 85th percentile speed less than 30mph.

Advantages

- Effective in reducing speeds, though not to the extent of speed humps or lumps
- Higher design speed creates a smoother ride for fire and transit vehicles than speed humps or lumps

Disadvantages

- Aesthetics
- Textured materials, if used, can be expensive
- Signs may be unwelcome by adjacent residents
- Increased noise for nearby residents

Measured Effectiveness	
Reduction in 85 th Percentile Speeds	-18% (6-7mph reduction)
Note: Reported values represent the average of 58 sample locations (22' speed tables). Source: Traffic Calming State of the Practice, 1999.	

Approximate Cost: \$ 5,000 for Asphalt Speed Table



4. IMPLEMENTATION PROCEDURES

This section describes the implementation procedures of the City's Speed Control Program. The process is separated into four key components focusing on specific tasks for executing an annual speed hump project. The three components of the process are:

- Project Initiation
- Project Support
- Project Implementation

Each step of these components is discussed in greater detail below.

PROJECT INITIATION

Speed Control Program Petition

The process is initiated when a resident or group of residents express interest in addressing speeding on their street and obtain a petition from City staff or the City website. The applicant completes the petition which requires the signatures from 10 households on the subject street, indicating they perceive a significant problem. If the minimum number of signatures cannot be obtained, then the process does not continue due to a lack support for action. The petition form is provided on the following two pages. Public Works will consider a speed control request without supporting signatures from only a school, church, park or other City Department.

After a completed petition is submitted to the Public Works Department, staff reviews the petition and defines the appropriate limits for the street segment. A speed control project should consider the full length of the street and whether or not the treatment should extend beyond the block(s) specified in the petition.

SPEED CONTROL PROGRAM PETITION FORM

CITY OF ELK GROVE

This form enables residents of the City of Elk Grove to formally request the Public Works Department to initiate a traffic study to determine if speed humps or related traffic calming measures are suitable speed mitigation for a specific neighborhood street. To be considered, this three-part form must be filled out in its entirety and returned to:

City of Elk Grove
Attn: Speed Control Program Manager
Elk Grove City Hall
8401 Laguna Palms Way
Elk Grove, CA 95758

For more information on the City's Speed Control Program, please visit: Public Work's Web site or call (916) 683-7111.

Please clearly and concisely provide the following information. All three parts must be complete for the petition to be valid.

1. Street Representative Information

Name: _____

Address: _____

Telephone: _____

Date of submission: _____

2. Describe the existing traffic-related issues on your street that you believe require speed humps or similar devices to mitigate. Provide detail regarding specific locations where and the time of day when your concern is most prevalent. If necessary, provide a sketch or other supporting documentation.

SPEED CONTROL PROGRAM PETITION FORM

CITY OF ELK GROVE

3. Resident Support

Signatures from 10 different households in support of the Speed Control Program are required. Signatories must be legal residents 18 years and older living on the requested street.

We, the undersigned residents of _____(street) between _____(street) and _____(street),

do hereby request the City of Elk Grove, to install speed humps on our street to attempt to slow speeding drivers. By signing below, we understand that a speed hump with related signing and pavement markings may be installed in front of our property. We also understand that installing speed humps may produce some noise and increase emergency vehicle response time to our home.

	Signature	Printed Name	Address	Phone Number
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Define Study Area

During the investigation, Public Works staff will define the limits of the study area. The study area may be limited to the segment(s) identified in the petition or enlarged to encompass the full length of the street. Public Works staff may find it reasonable to extend the study area on roadways that serve a higher number of vehicles or to combine two or more separate requests for the same street. Logical study areas are commonly defined by physical features such as an arterial roadway, creek, traffic control device (e.g., stop sign) or transition in land use. By defining an appropriate study area, the program will employ a more comprehensive approach than addressing requests on a limited segment by segment basis. It is important to look at the cumulative impact of installing a series of vertical deflection measures and the unintended consequence they may have on trip diversion and emergency response time.

Qualifying Criteria

Following the review of the petition, staff will initiate a traffic investigation to determine whether the street in question satisfies a series of requirements. These qualifying criteria are necessary to rule out more appropriate traffic engineering and maintenance solutions (e.g., signage changes or trimming vegetation to improve sight distance). In addition, vertical traffic calming measures are not appropriate on every street even when basic qualifying criteria are met. Staff reserves the right to approve or reject speed control requests on a case by case basis.

The initial qualifying criteria listed in Table 1 (Chapter 1) are described in greater detail below.

1. Street Classification

The Speed Control Program is applicable only on two-lane residential streets designated as local or collector streets. The terms local and collector refer to the functional classification that denotes a specific level in the transportation network hierarchy and specifies the design of the facility according to City of Elk Grove standards. While the streets may have been designed for a particular purpose, they may in reality function differently than intended. Therefore, it may be difficult to differentiate between the two. Local streets provide direct access to residential properties and facilitate short neighborhood trips. Collector streets are secondary roads that connect motorists from surrounding local streets to arterial roadways and freeways and facilitate intermediate trip lengths. Each roadway has its own unique set of characteristics; therefore, eligibility of a specific roadway is determined by Public Works staff in coordination with other departments.

2. Minimum Street Length

The street segment in question must be at least 750 feet long between traffic controls. This requirement typically ensures that streets have at least two speed humps to slow traffic. The distance requirement also prevents over use of speed control measures in a relatively short distance.

3. Average Daily Traffic Volume

The street segment in question must serve at least 500 vehicles per day. This requirement ensures that speed humps are used discriminately on residential streets with a moderate level of traffic. Average daily traffic volume must be less than 4,000 vehicles per day. Higher volumes typically suggest roadway functionality greater than that of a local residential or collector.

Speed tables may be considered on higher volume facilities with up to 7,500 vehicles per day on a case-by-case basis. Placing devices on any street with volumes greater than 4,000 should be evaluated for traffic diversion potential to other roadways (including low-volume residential streets) which may offer unimpeded traffic flow or the perception of a shorter travel time.

4. Posted Speed Limit

The posted or prima-facie speed limit on the street segment in question must be 30 mph or less. Streets with posted speed limits higher than 30 mph are not eligible for this program due to the difference in prevailing vehicle speeds and the design speed of traffic calming devices.

5. 85th Percentile Speed

The 85th percentile speed must be at least 5 mph higher than the posted speed limit. The 85th percentile speed is the speed at which 85 percent of vehicles are traveling at or below. The 85th percentile speed shall be determined from a 24-hour speed survey. If the bi-directional 85th percentile speed is equal to or more than 5 mph over the posted speed limit, this criteria is satisfied.

6. Adjacent Land Use

The street segment frontage must consist of a minimum of 75 percent residential, parks or school uses. If the adjacent properties are not built out and functioning as intended, these streets will be evaluated on a case by case basis.

7. Fire Department Review

The presence of a primary fire response route presents another factor in selecting the most appropriate, if any, traffic calming device. Fire apparatus are more sensitive to vertical and horizontal shifts than passenger vehicles. A reduction in travel speed equates to a slower response time.

The Fire Department has a response goal of 6 minutes or less, 90% of the time, as measured by the first arriving unit to the scene of the emergency. The longer it takes the Fire Department to respond to an incident, the higher the probability of the severity of a situation. Depending on the design, vertical deflection measures may slow vehicles, including fire trucks.

The following measures will be taken before installing traffic calming measures on a street as part of this program:

- Public Works staff will review primary emergency response routes identified by the Fire Department.
 - If the street is a primary response route but meet qualifying criteria 1, 2, 4 and 6, Public Works staff will flag the location and initiate discussion with the Fire Department on a case-by-case basis prior to collecting speed and volume data to satisfy qualifying criteria 3 and 5. Only speed lumps or speed tables will be considered on primary response routes.
 - If the street is not a primary response route and meets qualifying criteria 1 through 6, Public Works will qualify the street for the program. Public Works will prepare a list of streets for Fire Department to review quarterly. Speed humps, lumps, tables will be considered on non-primary response routes.
- Public Works will supply the Fire Department with an initial map that identifies proposed placement and frequency of the devices under consideration.
 - At the Fire Department's discretion, they may choose to conduct analysis and document response time impacts in relation to response time goals.
 - In the event where response time goals are anticipated to be exceeded as a direct result of device placement, Public Works will disclose the Fire Department's findings in the annual staff report presented to City Council for construction project approval.

8. Additional Considerations

Trip Diversion

Public Works staff will estimate the potential for a specific traffic calming proposal to create trip diversion. In some instances placing vertical deflection measures on one street may cause vehicles to change routes for convenience or a perceived travel time advantage. Staff will consider the cumulative impact of installing a series of vertical deflection measures and the unintended consequence they may have on trip diversion to adjacent residential streets. Public Works may deny a speed hump request on the basis of probable trip diversion.

Site Review

Public Works staff will review the street for other installation constraints and challenges. Engineering judgment will determine the suitability of traffic calming within horizontal curves or where sight distance may be compromised.

Priority Ranking System

A priority ranking system allows City staff to quantitatively assign a numerical value to every candidate street. This process will prioritize the requests based on the amount of traffic, speed of traffic, and adjacent land use. The following point allocation method will be used in order to rank streets qualifying for the program:

TABLE 2: PRIORITY RANKING SYSTEM	
Criteria	Point
Vehicle Traffic (Daily)	1 point for every 50 vehicles
Vehicle Speed (Daily 85 th percentile)	5 points for every mile per hour over the posted limit
Land use	1 point for every residential unit adjacent to the Street
	1 point for every 25 feet of apartment frontage
	1 point for every 25 feet of school frontage
	1 point for every 25 feet of park or playground frontage

Public Works staff will collect, investigate, and rank requests throughout the year. Staff will publish the score and rank of qualifying street segments annually. Public Works will advertise a deadline by which requests need to be submitted for consideration in the next construction project. Staff will determine the number of areas that can be treated in the upcoming year based upon budget and staff resources. Staff will publish a draft implementation list annually based primarily on the priority rating system.

Response to Applicant

If a street satisfies the minimum requirements and is a candidate for the program, Public Works staff will notify the individual who submitted the request in writing. Staff will also notify applicants of non-qualifying streets and provide an explanation as to why the street was declined. If the street fails to meet any of the necessary requirements, the street may not be considered for the program for another 2 years.

Based on the needs of the City and continued improvements to the program, qualifying criteria and the priority ranking system are subject to change at any time. Streets, which may have qualified for the program previously, shall be reevaluated in accordance with the most current set of qualifying criteria and ranking system established in subsequent revisions to this document. Public Works staff will keep applicants abreast of changes to the program which may impact the viability of program applicability for their street.

PROJECT SUPPORT

After the draft implementation list is developed, Public Works staff will identify local support through a survey sent via regular mail or hand-delivered. Only properties with land adjacent to the subject street(s) will receive a survey. Current residents will receive the survey regardless if they are owners or tenants. Surveys will be sent far enough in advance to reach recipients two and one half (2 ½) weeks prior to the response deadline. The survey will include a description of the proposed project indicating the type and approximate location of device(s) being proposed.

A minimum response rate and support rate must be met for the project to move forward. For implementation to be considered, a minimum of 50 percent of all surveys must be returned, with two-thirds (67 percent) of respondents in favor. For example, if 100 surveys are mailed out, at least 50 must be returned with 34 of those in favor of the proposed project. If a street fails to receive the necessary two-thirds majority approval, the street may not be considered again for the program for five years at which time a new petition must be submitted. Apartments present a unique situation because residents may be less likely to respond. For this reason, surveys from apartment units are not counted toward the minimum response rate, but will be counted in favor or against the proposed plan.

Public Works will present City Council with a final implementation list consisting of surveyed, community-supported (two-thirds majority) streets for approval. Residents will be informed of the survey results, Council approval and construction schedule, if applicable, by mail.

PROJECT IMPLEMENTATION

Public Works will prepare final construction documents for the approved implementation list and solicit bids for the annual project. Specific device location will be finalized in accordance with location selection guidelines presented below. Devices shall be constructed in accordance with device design standards and specifications set forth in the construction documents.

Location Selection Guidelines

To finalize the precise location for device installation, the following guidelines are recommended:

- Devices shall not be located over manholes, water valves and survey monuments.
- A minimum distance of 250 feet from a traffic signal or stop control should be maintained.
- Devices should be located a minimum distance of 100 feet from uncontrolled street intersections.
- Devices should be located at least ten feet away from driveways and 25 feet away from fire hydrants.
- Devices should be located near street lights to enhance night visibility.
- Installation near property lines is desirable to minimize impacts on a single parcel.
- Parking restrictions are not required at devices locations; however, drivers may prefer not to park on the raised device.

- Care should be taken when placing devices within horizontal or vertical curves and on roadways with grades greater than 5 percent. Adequate sight distance to device or advanced warning shall be maintained.
- Speed humps and lumps should be placed at a minimum interval of 200 feet and a maximum interval of 600 feet to maintain effective mid-block speed control. Speed tables should be used discriminately at a minimum interval of 500 feet. The number of devices placed on a street is determined by the street length and interval spacing.

Device Design Features

A few key design features control vertical device effectiveness and driver comfort. The final construction standards selected for the City will specify these and other design details.

Vertical device profiles describe the angle or approach of the vertical measure that a vehicle would traverse. The following three profiles types are commonly used as illustrated in Exhibit A:

- Sinusoidal profiles have slightly less reduction effects on speed than circular and parabolic profiles but higher comfort levels for vehicles and bicyclists and are typically more difficult and expensive to construct due to the slope of the profile.
- Circular profiles have moderate reduction effects on speeds (compared to the two other profiles) and comfort levels for vehicles and bicyclists.
- Parabolic profiles has the greatest reduction effects on speeds but have the lowest comfort levels for vehicles and bicyclists to the greater rise in the slope of the profile.

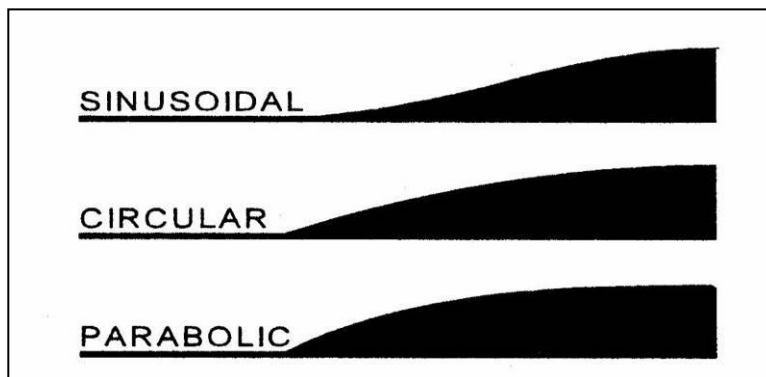


Exhibit A: Ramp Profiles of Vertical Deflection Measures

The edge taper refers to the transition area between a vertical measure at its full height and the edge of the device. Edge tapers on vertical deflection measures should extend to the edge of the pavement (i.e. not into the gutter) to prevent blocking the gutter drainage. Vertical devices should extend across any parking or bike lane to prevent drivers from veering into the bike lane or otherwise attempting to avoid the device.

To deter drivers from avoiding the vertical measures where no vertical curb exists, Public Works may require a bollard be placed adjacent to the travel way centered on the device.

Draft Device Specifications

The following draft device specifications are recommended based on designs published in Traffic Calming State-of-the Practice¹, the Canadian Guide to Traffic Calming² and successful practices of other jurisdictions. The exact specifications and design standards will be provided by Public Works with the release of the annual construction bid package.

Speed Hump

An asphalt concrete speed hump should be 12 feet in the direction of travel and a height between 3 ¼ inches to 3 ¾ inches. The speed hump should extend from lip of gutter to lip of gutter. There will be an edge taper of 1 foot to 2 feet originating at the crest of the speed hump and converging at the lip of gutter. Asphalt concrete shall be mixed and placed in accordance with City of Elk Grove Standard Specifications.

Speed Lump

An asphalt concrete speed lump will be 12 feet in the direction of travel and a height between 3 ¼ inches to 3 ¾ inches. The center lump (or lumps if the design requires one lump in each travel lane) will be approximately 5 ½ feet across. There will be a gap between lumps to accommodate the wheelbase of fire trucks and buses. The exact spacing will be evaluated and determined by Public Works in consultation with the Fire Department. The speed lump will extend to the lip of gutter. There will be an edge taper of 1 foot to 2 feet originating at the crest of the speed lump and converging at the lip of gutter. Asphalt concrete shall be mixed and placed in accordance with City of Elk Grove Standard Specifications.

Speed Table

An asphalt concrete speed table will be 22 feet in the direction of travel, consisting of two 6-foot long ramps on each end of a 10-foot long platform. The platform should be a minimum height of 3 ¼ inches and a maximum height of 3 ¾ inches. The speed table will extend from lip of gutter to lip of gutter. There will be an edge taper of 1 foot to 2 feet originating at the crest of the speed lump and converging at the lip of gutter. Asphalt concrete shall be mixed and placed in accordance with City of Elk Grove Standard Specifications.

Traffic Signs and Markings

All required traffic signs and markings will be part of the contract bid package, unless these items are to be installed by City Crews. Upon installation, all signs and markings should comply with the most current adopted version of the California Manual of Uniform Transportation Devices (MUTCD).

Pavement markings should include “chevron” pavement markings centered on the travel lane for all devices. For speed lumps, a double yellow centerline pavement markings on both approaches of the lump may be installed for the length of 50 feet measured from the edge of the lump or to the nearest driveway, whichever is less.

Advanced warning signs should be placed in advance of the first vertical measure from each approach and significant side street. Additional signs and pavement markings should be installed at the discretion of the City Traffic Engineer and as specified in the contract bid package and City of Elk Grove standard plans.

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- ¹ Ewing, R. (1999). *Traffic Calming: State of the Practice*. Washington, DC: Institute of Transportation Engineers/Federal Highway Administration.
 - ² *Canadian Guide to Neighborhood Traffic Calming*, (1998) Ottawa, Canada: Transportation Association of Canada.

5. PROCEDURES FOR DEVICE REMOVAL

In the event that residents desire removal of existing devices, a process similar to the installation process will be required. The following section provides guidance for the removal of devices once installed. The process for removal requires demonstrated resident support and may require funding by resident(s) if the devices have been in place for less than two years.

Device removal may be considered when all of the criteria listed below are met:

- A petition must be submitted identifying the location of speed humps (or similar device) to be removed and the motivation for removing them. The petition requires signatures from 10 households on the subject street. If the minimum number of signatures cannot be obtained, then the process does not continue due to a lack support for action.
- Vertical measures are found to be ineffective at reducing speed based on a speed survey conducted over a 24-hour period. The mid-block speed must be less than 2mph lower than the speed demonstrated prior to installation in order to be considered ineffective. In addition, the mid-block 85th percentile speed should be within 5mph of the posted or prima-fascia speed.
- Devices were placed in a location conflicting with the adopted guidelines, and another location exists which does not conflict with the adopted guidelines.
- A community meeting is held to discuss device removal.
- A survey of residents on the affected street. A 75 percent response rate with 75 percent of respondents in support is required for removal.

Device removal is subject to City Council approval. Removals may be addressed simultaneously when Public Works staff presents the final implementation list for the annual construction project to City Council.

**APPENDIX:
REVIEW OF OTHER JURISDICTIONS**

**TABLE A.1
COMPARISON OF SPEED CONTROL PROGRAMS**

Jurisdiction, State	Eligible Devices	Qualifying Criteria	Priority Ranking System	Device Selection Guidelines	Location Selection Guidelines	Notes
Albuquerque, NM (Local Street Improvement Program)	<ul style="list-style-type: none"> Speed Humps 	<ul style="list-style-type: none"> >500 ADT >5 mph over posted limit 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Cut through traffic = >30% non-local Source: City of Albuquerque Neighborhood Traffic Management program, 2008. http://www.cabq.gov/streets/ntmp
Montgomery County, MD	<ul style="list-style-type: none"> Speed Humps Separate program includes traffic circles, curb extensions, median islands, and edgeline treatments 	<ul style="list-style-type: none"> >7 mph over posted limit on secondary residential street >9 mph over posted limit on primary residential street 1,000-4,000 ADT (100 peak hour trips) >1,000 feet 	<ul style="list-style-type: none"> Yes, but unclear of priority system 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Source: Residential Speed Hump Program and Guidelines, 2008 Plan cannot include more than 15 speed humps or equal more than 3% of capital budget
City of Belmont, CA	<ul style="list-style-type: none"> Speed Humps 	<ul style="list-style-type: none"> 500-4,000 ADT >15% of vehicles in excess of 32 mph Street length >750 feet (uninterrupted) 	<ul style="list-style-type: none"> Yes, based on: <ul style="list-style-type: none"> Speed ADT Schools/parks Percent of holds in support Collision history 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> ≥250 feet from traffic signal ≥1,000 feet from nearest street ≥10 feet from nearest driveway 	<ul style="list-style-type: none"> Source: City of Belmont, Amendment to the Neighborhood Traffic Calming Program – Speed Hump Installation Policy, 2007

**TABLE A.1
COMPARISON OF SPEED CONTROL PROGRAMS**

Jurisdiction, State	Eligible Devices	Qualifying Criteria	Priority Ranking System	Device Selection Guidelines	Location Selection Guidelines	Notes
					<ul style="list-style-type: none"> • ≥25 feet from nearest fire hydrant • Preferably near existing street lighting • At least two humps per block • ≥200 feet sight distance 	
City of Sacramento, CA	<ul style="list-style-type: none"> • Speed Humps • Speed Lumps • Speed Tables 	<ul style="list-style-type: none"> • Street length • Adjacent land use 	<ul style="list-style-type: none"> • Scored and ranked list by City Council district 	<ul style="list-style-type: none"> • Depends on speed, volume, speed limit, and emergency and bus routes 	<ul style="list-style-type: none"> • Minimum distance from controls and driveways • Other requirements 	<ul style="list-style-type: none"> • Source: City of Sacramento Speed Hump Program Guidelines, January 27, 2004
City of Bakersfield, CA	<ul style="list-style-type: none"> • Undulations 	<ul style="list-style-type: none"> • >500 ADT but <2500 ADT • 25mph speed limit • Street <40 feet wide • 67% of vehicles must exceed posted speed or 85th percentile must exceed posted speed by 10mph 	<ul style="list-style-type: none"> • City Engineer recommendation to City Council 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Minimum distance from controls and driveways • Other requirements • Grades <10% 	<ul style="list-style-type: none"> • Source: City of Bakersfield "Official" Policy Relative to the Use of Road Undulations on Public Streets
City of Los Angeles, CA	<ul style="list-style-type: none"> • Speed Humps 	<ul style="list-style-type: none"> • >5 mph over posted limit 	<ul style="list-style-type: none"> • First come, first served 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Source: LADOT Speed Hump

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COMPARISON OF SPEED CONTROL PROGRAMS**

Jurisdiction, State	Eligible Devices	Qualifying Criteria	Priority Ranking System	Device Selection Guidelines	Location Selection Guidelines	Notes
	<ul style="list-style-type: none"> • Speed Tables 					Program General Information Package, 2008
City of Riverside, CA	<ul style="list-style-type: none"> • Speed Humps • Enforcement • Speed display boards 	<ul style="list-style-type: none"> • >500 ADT • >30% vehicles >6 mph over posted limit 	<ul style="list-style-type: none"> • Not apparent whether first come first serve or a priority based approach. Requires the following: qualifying criteria, neighborhood support, match resident funding, and Council approval 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • 25% match by residents • Source: The City of Riverside's NTMP – Speed Humps, 2008
Gwinnett County, GA	<ul style="list-style-type: none"> • Speed Tables • Traffic Circles 	<ul style="list-style-type: none"> • Posted speed of 25 mph • >10 mph over posted limit requires 70% neighborhood support • <10 mph over posted limit requires 90% support • Not established truck, transit, preferred emergency vehicle route 	<ul style="list-style-type: none"> • First come first served 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • 100-200 feet from curve or intersection • 300-500 foot spacing 	<ul style="list-style-type: none"> • Source: Gwinnett County Speed Hump Program Manual, June 2007

**TABLE A.1
COMPARISON OF SPEED CONTROL PROGRAMS**

Jurisdiction, State	Eligible Devices	Qualifying Criteria	Priority Ranking System	Device Selection Guidelines	Location Selection Guidelines	Notes
City of Anaheim, CA	<ul style="list-style-type: none"> • Speed Humps • Program being replaced by comprehensive area-wide NTMP 	<ul style="list-style-type: none"> • 1,340 feet long • ≤40 feet wide • >30 feet curb-to-curb • >2,000 ADT • 25 mph posted speed with 66% vehicles ≥ 30 mph • Not established truck or transit route 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Placed at property lines • Not placed over manholes, water valves, etc. • Placed adjacent to street lights 	<ul style="list-style-type: none"> • Source: City of Anaheim Council Policy 205: Speed Humps, 1990
County of Humboldt, CA	<ul style="list-style-type: none"> • Speed Humps 	<ul style="list-style-type: none"> • Road classification and width • Street length • 85th percentile speed > 32mph • ADT > 13,000 	<ul style="list-style-type: none"> • Department recommendation to Board of Supervisors 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Spacing requirements 	<ul style="list-style-type: none"> • Source: County of Humboldt Speed Hump Policy, July 24, 2007
City of Inglewood, CA	<ul style="list-style-type: none"> • Speed Humps 	<ul style="list-style-type: none"> • <3,000 ADT • Not a transit or emergency response route • 25mph speed limit • Adjacent land use 	<ul style="list-style-type: none"> • Prioritized based on volume, speed accidents, land use 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Placement criteria include spacing and distance from nearest controls 	<ul style="list-style-type: none"> • Source: City of Inglewood Traffic Calming Policy: Speed Humps
City of Pittsburg, CA	<ul style="list-style-type: none"> • Speed Humps (14' and 22') 	<ul style="list-style-type: none"> • 85th percentile speed >5mph over posted 	<ul style="list-style-type: none"> • Staff recommendation to Community 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Placement criteria include spacing and 	<ul style="list-style-type: none"> • Source: City of Pittsburg Traffic Calming Policy,

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Jurisdiction, State	Eligible Devices	Qualifying Criteria	Priority Ranking System	Device Selection Guidelines	Location Selection Guidelines	Notes
		speed <ul style="list-style-type: none"> • 750 feet long • Not a transit route • > 500 ADT and < 3,000 ADT 	Advisory Commission for concurrence; final City Council approval <ul style="list-style-type: none"> • Equation for determining priority 		distance from nearest controls	Revised May 17, 2004

Source: Fehr & Peers, 2008.