COUNCIL DECISION REQUEST

SUBJECT: Speed Humps

MEETING DATE: 05-11-06 CSP ITEM: Yes ☐ No ☒ KRA#

ITEM NO.: TENTATIVE SCHEDULE: N/A

SUBMITTED BY: LaRon G. Garrett AMOUNT BUDGETED: $ 0

SUBMITTAL TO AGENDA
APPROVED BY TOWN MANAGER EXPENDITURE REQUIRED: $ 0

CONT. FUNDING REQUIRED: $ 0

EXHIBITS (If Applicable, To Be Attached): Basic Speed Hump Guidelines

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RECOMMENDED MOTION

I move to direct staff to provide the Town Council with policies, regulations, and/or ordinances covering the criteria for the installation of speed humps, including but not limited to the following items: The community involvement process, hump design and location criteria, cost sharing relationships, installation and maintenance requirements, and evaluation/modifications/removal procedures

SUMMARY OF THE BASIS FOR RECOMMENDED MOTION:

We have recently received a request for the installation of speed humps on public roads within the Town of Payson. Currently, the Town does not have any particular policy or criteria for the installation or use of such a traffic control device. Before initiating a speed hump installation program, we should first adopt appropriate policies, regulations, and/or ordinances to handle elements such as the community involvement process, hump design and location criteria, cost sharing relationships, installation and maintenance requirements, and evaluation/modifications/removal procedures.

Speed humps have been used in several other municipalities to successfully control vehicle speeds. However, they are not without their issues. If done properly, they may be very beneficial in the Town. Therefore, staff recommends that the Town Council direct staff to prepare the appropriate policies, regulations, and/or ordinances and provide them to the Council for review and approval.

PROS: Having a policy in place will allow the Town to administer the installation of speed humps in a fair, logical and uniform manner as they are requested

CONS: There really aren't any cons to having a policy but there may be with the implementation of the policy.

PUBLIC INPUT (if any): N/A

BOARD/COMMITTEE/COMMISSION ACTIONS/RECOMMENDATIONS (if any) (give dates and attach minutes): N/A

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1.0 Introduction

1.01 Purpose

This Recommended Practice provides guidelines for the design and application of speed humps, a geometric design technique to control vehicular traffic speeds along a roadway. Speed humps consist of raised pavement constructed or placed in, on, and across or partly across a roadway. For the purposes of this document, speed humps are defined as a roadway geometric design feature whose primary purpose is to reduce the speed of vehicles traveling along that roadway. There might be certain secondary purposes to speed hump installations, such as traffic diversion, but that is not their primary intended purpose.

1.02 Speed Humps vs. Speed Bumps

A speed hump is a raised area in the roadway pavement surface extending transversely across the travel way (see Figure 1.1). Sometimes called pavement undulations or sleeping policemen, speed humps normally have a maximum height of 3 to 4 inches with a travel length of approximately 12 feet.

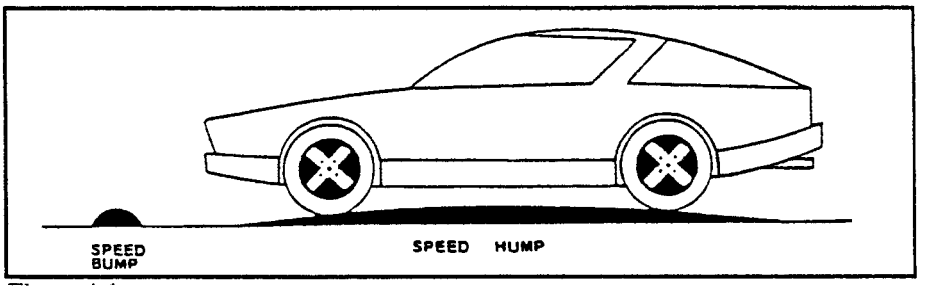

FIGURE 1.1
Source: Clement, J.P. "Speed Humps and The Thousand Oaks Experience." City of Thousand Oaks. Thousand Oaks, CA. September 1982.

A speed bump is also a raised pavement area across a roadway and generally has a height of three to six inches with a length of one to three feet (see Figure 1.1). Speed bumps are typically found on private roadways and parking lots and do not tend to exhibit consistent design parameters from one installation to another. From an operational standpoint, humps and bumps have critically different impacts on vehicles. Within typical residential speed ranges, humps create a gentle vehicle rocking motion that causes some driver discomfort and results in most vehicles slowing to 15 miles per hour (mph) or less at each hump and 25 to 30 mph between properly spaced humps in a system. At high speeds the hump can act as a bump and jolt the vehicles suspension and its occupants or cargo. A bump, on the other hand, causes significant driver discomfort at typical residential speeds and generally results in vehicles slowing to 5 mph or less at the bump. At high speeds bumps tend to have less overall vehicle impact because the suspension quickly absorbs the impact before

the vehicle body can react. In general, bicycles, motorcycles, and other vehicles with rigid or near-rigid suspensions are more susceptible to damage and loss of control from humps or bumps than vehicles with flexible suspensions. However, speed humps represent a lesser risk to vehicles with rigid or near-rigid suspensions than do speed bumps.

Speed humps have the advantage of being largely self-enforcing and of creating a visual impression, real or imagined, that a street is not intended for speeding or through traffic. Some items to consider before speed hump installation are their initial construction and continuing maintenance costs, the potential negative impact on emergency and service vehicles, increases in vehicle noise, the imposition of inconvenient access to some parts of the neighborhood, and, to some, their unsightliness. They are also static and therefore must be appropriate for use at all hours of the day and night. In addition, it is mandatory that they be supported with some combination of traffic control devices such as signs and/or pavement markings to warn motorists of their presence and indicate the expected and appropriate behavior.

Where designed and installed with proper planning and engineering review, speed humps have generally been found to be effective at reducing vehicle speeds without increasing accident rates. In fact, some studies indicate that speed hump installations have actually reduced accident rates on residential streets. Additionally, there is no evidence in the source materials reviewed for this report indicating that properly designed and installed speed humps have caused or contributed to accidents or increased accident rates.

Within the United States, speed bumps of varying design have been routinely installed on private roadways and parking lots without the benefit of proper engineering study regarding their design and placement. Speed humps, on the other hand, have evolved from extensive research and testing and have been designed to achieve a specific result on vehicle operations without imposing unreasonable or unacceptable safety risks. The guidelines for speed humps as presented in this document are primarily based upon those experiences.

1.03 Previous Research and Experience

Speed humps originally were developed in the early 1970s by the Transport and Road Research Laboratory (TRRL) in Great Britain. TRRL first tested along a test track various hump sizes and shapes on several vehicle types operating over a range of speeds. From this work the TRRL parabolic profile hump was developed. Since then speed humps have been extensively tested and used in Europe as well as Australia and New Zealand. The U.S. Federal Highway Administration (FHWA) also performed off-road testing of the TRRL humps in St. Louis in 1979 and deemed them safe to proceed with public street tests. In addition, an emerging number of cities in the United States and Canada either use or have tested speed humps since the early 1980s, and in November 1983 a Subcommittee of the California Traffic Control Devices Committee issued a final report which supported the

prudent use of speed humps on public streets.

Research in Australia has developed an alternative design to the TRRL profile humps developed in Great Britain. The so-called flat-topped road humps tested by the Australian Road Research Board (ARRB) have yielded observations and results similar to their English counterparts. Flat-topped designs have also been successfully utilized in Portland, Oregon, and Seminole County, Florida. The flat top section is usually constructed of brick paving with asphalt or concrete ramps and has generally been found more aesthetically acceptable than non-brick treatments. This design tends to reduce the deformation problems experienced with asphalt humps but might increase vehicle noise and maintenance requirements.

The results of speed hump research and testing can be summarized:

- Traffic speeds are decreased at the humps and at locations between properly spaced successive humps. Speeds of the fastest drivers are affected as well as those of average drivers. The speed distribution generally narrows with the greatest effect on higher vehicle speeds.

- A single hump will only act as a point speed control. To reduce speeds along an extended section of street a series of humps is usually needed.

- Speed humps will often divert traffic to other streets, especially in those situations where a significant amount of traffic is using the street as a shortcut, detour, or overflow from a congested collector or arterial roadway. Volume reductions also are affected by the number and spacing of humps and the availability of alternative routes.

- Speed and volume modifications caused by humps tend to remain constant over time.

- Speed humps have not been found to pose a traffic safety hazard when properly designed and installed at appropriate locations. In fact, accident experience generally remains stable or decreases due to reduced speeds and volume, thereby improving the inherent safety of a particular street or residential area.

- Where humps are successful at reducing speeds, there is probably little net change in road noise or possibly even a reduction in noise levels. Traffic noise will generally decrease with fewer vehicles and lower speeds, but noise may increase at the hump, particularly if significant numbers of trucks use the street.

- Adequate signing and marking of each speed hump is essential to warn roadway users of the humps presence and guide the users subsequent action.

- The need to reduce speeds for speed humps tends to have a negative impact on air quality and energy consumption assuming traffic volumes remain the same. For comparison purposes, this impact is typically less than the effects of a stop sign installation.

- Large trucks, buses, and emergency vehicles can safely pass over humps but must travel at relatively low speeds or significant jolts to the vehicle, discomfort or injury to occupants, and jostling of cargo will be experienced. Speed humps have been used to deter trucks and larger vehicles from using particular streets.

- The majority of local street residents will normally support speed hump installations and endorse their continued use.

It should be noted that some speed hump installations in the United States and other countries have been unsuccessful and ultimately modified or removed. Modification or removal is rare where proper consultation/participation processes were used initially. Factors resulting in their removal have included the following:

- Residents dissatisfaction over the gentle hump design (as opposed to the more drastic bump) and its perceived inability to dramatically slow vehicles or reduce traffic volumes to a desired level.

- Local policy decisions to favor traffic circulation needs over residents quality of life concerns.

- Undesired traffic diversion to other residential streets.

- Aesthetics of the humps and associated signs and markings.

- Increased noise level at the hump caused by vehicle rocking and acceleration/deceleration.

- Impacts on snow plowing and other street maintenance functions.

- Concerns with impacts to emergency vehicle response.

- Concerns with liability for personal injury and damage claims.

- Inadequate funding for the initial and/or continued maintenance costs of the hump and its traffic control devices.

Table 1 is a list of those jurisdictions identified in the source materials that are known to have used or tested speed humps as residential traffic management devices.

TABLE 1:
Partial Listing of Jurisdictions with Speed Hump Experience

UNITED STATES AND CANADA

Phoenix, Arizona
Agoura Hills, California
Berkeley, California
Brea, California
Camarillo, California
Claremont, California
Corona, California
Palo Alto, California
Pasadena, California
Placentia, California
Sacramento, California
Sacramento County, California
San Jose, California
San Leandro, California
San Luis Obispo, California
Santa Monica, California
Santa Rosa, California
Simi Valley, California
Thousand Oaks, California
Westlake Village, California
Toronto, Ontario, Canada
Vancouver, British Columbia, Canada
Winnipeg, Canada
Jefferson County, Colorado
Washington, D.C.
Hillsborough County, Florida
Orlando, Florida
Seminole County, Florida
Tampa, Florida
Temple Terrace, Florida
Titusville, Florida
Atlanta, Georgia
Fulton County, Georgia
Gwinett County, Georgia
Wichita, Kansas
Rockville, Maryland
Boston, Massachusetts
Deephaven, Minnesota
St. Louis, Missouri
Omaha, Nebraska
New York City, New York
Columbus, Ohio
Dayton, Ohio
Toledo, Ohio
Oklahoma City, Oklahoma
Portland, Oregon
Arlington, Texas
Dallas, Texas
Houston, Texas
Bellevue, Washington
Seattle, Washington
Appleton, Wisconsin

INTERNATIONAL

Australia
Belgium
Canada
Finland
France
Germany
Great Britain
Israel
Japan
The Netherlands
New Zealand
Norway
South Africa
Sweden

RESEARCH AGENCIES

Australian Road Research Board (ARRB)
Federal Highway Administration (FHWA), United States Department of Transportation
Netherlands Study Center for Traffic Engineering
Transport and Road Research Laboratory (TRRL), Great Britain

The written materials reviewed in the preparation of this report are listed in the Source Materials section at the end of the report. This list also includes some documents that were not obtained for review by the Task Force, but might be of interest or assistance to those interested in speed humps or related design features.

1.04 Conclusions

As discussed previously, extensive research and use throughout Great Britain, Australia, the United States, and other countries indicates that the use of a properly designed speed hump or speed hump system, installed using the proper engineering analysis and judgment, can be a useful geometric roadway design feature to manage traffic speeds on roadways intended to serve as local residential streets. Speed humps have been found, in general, to reduce traffic speed, volumes, and accidents depending on the site-specific circumstances of the installation. In addition, they discourage through traffic from using a local street as an alternative route to inconvenient or congested arterial and collector systems. Despite concerns over liability, vehicle damage, and emergency vehicle impacts, these problems either have not occurred or have been found to be insignificant when considering the positive aspects of humps.

Speed humps are not a cure-all for residential street traffic problems and should be applied only where sound engineering judgment justifies their use. Other passive and active devices and techniques should be considered and possibly tested to determine if less restrictive forms of residential traffic management will address these concerns.

Speed humps should not be considered an option to good residential planning and subdivision street design, nor should they be used to convert streets to playgrounds or otherwise encourage pedestrian activity in public streets.

The lack of guidance and heavy reliance on individual judgment has led to hump-type installations that incorporated poor designs, improper roadway geometric coordination, poor choice of construction materials or methods, and absence of needed signs and markings. The safety of speed humps and their ability to perform their intended use is directly contingent upon their proper design and application. When it is determined that a residential traffic management problem exists and that speed humps are an appropriate technique to reduce or eliminate the problem, this ITE Recommended Practice will assist in establishing locally adopted guidelines for the design and application of those geometric design features.

1.05 Use of the Recommended Practice

This ITE Recommended Practice is to be used in conjunction with good engineering practice. These guidelines do not constitute either final or complete design and evaluation criteria for speed humps, speed hump systems, or residential traffic management control programs. Local conditions must be evaluated for all speed hump installations. In addition, specific terrain, weather, traffic, or land use characteristics may require local modification of these guidelines. Other documents such as the ITE *Recommended Guidelines for Subdivision Streets: A Recommended Practice, Residential Street Design and Traffic Control,* and other standard practice documents should be consulted as necessary.

2.0 Guidelines for Speed Humps Use

2.01 Engineering Study

Speed humps should be installed only to address documented safety or traffic concerns supported by traffic engineering studies and after consideration of alternative traffic control measures. Speed humps can be implemented individually or in conjunction with other traffic control measures depending upon area conditions and characteristics.

Since speed humps may divert traffic to other street facilities, an estimate of the amount and location of that diversion should be made so that the potential impacts of the proposed humps can be fully considered. If the humps are expected to create equal or greater traffic problems on another residential street, they should not be installed, except as part of a comprehensive local traffic management plan.

2.02 Street Classification and Use

In the United States, speed humps should be installed only on those roadway facilities functionally classified as local streets as defined in *A Policy on Geometric Design of Highways and Streets* published by AASHTO, the American Association of State Highway and Transportation Officials. These streets generally permit direct access to abutting lands, connect to higher classification streets, offer the lowest level of mobility, usually contain no bus routes, and deliberately discourage service to through traffic movement. Further, these local streets should be residential in nature.

2.03 Street Width and Number of Lanes

Speed humps should be used only on streets with no more than 2 travel lanes, or where the overall pavement width is not greater than 40 feet. In addition, the pavement should have good surface and drainage qualities. Street widths greater than 40 feet can be considered for speed humps if they maintain only 2 travel lanes.

2.04 Street Grades

Speed humps normally should be considered only for use on streets with grades of 8 percent or less approaching the hump. When installed on streets with significant downgrades, special care should be taken to ensure that vehicles will not approach the humps at excessive speed. Where weather such as ice, snow and drainage is a concern, special analysis should be undertaken in considering the grades at the upper values of the range.

2.05 Horizontal and Vertical Alignment

Speed humps should not be placed within severe horizontal or vertical curves that might result in substantial lateral or vertical forces on a vehicle traversing the hump. Humps should be avoided within horizontal curves with less than a 300-foot centerline radius and on vertical curves with less than the minimum safe stopping sight distance. For curves with less than a 300-foot radius, the forces acting on the vehicle as it traverses the curve naturally slows the vehicle. If possible, humps should be located on tangent rather than curve sections.

2.06 Sight Distance

Speed humps generally should be installed only where the minimum safe stopping sight distance (as defined for the United States in AASHTOs *A Policy on Geometric Design of Streets*) can be provided. The 85th percentile speed can also be considered in placing humps.

2.07 Traffic Speeds

Speed humps generally should be installed only on streets where the posted or prima facie speed limit is 30 mph or less. Speed humps should be carefully considered on streets where the majority of vehicles travel at relatively fast speeds, such as 45 mph or greater.

When speed humps are installed to address speeding concerns, studies should be performed to confirm the magnitude and extent of the speeding problem to ensure that the installation of humps can be expected to appreciably address that problem. Prevailing vehicle speeds should be considered in this speed analysis.

2.08 Traffic Volumes

Speed humps have been successfully installed on streets with a wide range of traffic volumes. These installations have included both local residential and collector streets. As a result of the wide variation in volumes [several hundred to 10,000+ Average Daily Traffic (ADT)] no specific volume threshold or range is defined. Each individual location should be evaluated to justify installation.

2.09 Traffic Safety

When installed to address documented or anticipated vehicle or pedestrian accidents, the causes of those accidents should be susceptible to correction by speed humps. Proposed speed hump locations should be evaluated to determine that such an installation will not introduce increased accident potential for the subject street.

2.10 Vehicle Mix

Speed humps normally should not be installed on streets that carry significant volumes (greater than 5 percent) of long wheel-base vehicles unless there is a reasonable alternative route for those vehicles. Special consideration should also be given to motorcycles, bicycles, and other types of special vehicles that use the street. The impacts that speed humps might have on these individual vehicle types should be considered in the decision to install humps and ultimately considered in their design and location.

2.11 Emergency Vehicle Access

Speed humps should not be installed on streets that are defined or used as primary or routine emergency vehicle access routes.

2.12 Transit Routes

Speed humps generally should not be installed along streets with established transit routes. If humps are installed on transit routes, their design should consider the special operational characteristics of these vehicles.

2.13 Community Support

When speed humps are installed in response to community requests, a documented majority of the residents along the affected portion of that street ideally should support their installation.

3.0 Community Relations and Administrative Procedures

3.01 Supporting Ordinances and Regulations

Before initiating a speed hump installation program, agencies should first adopt the appropriate policies, regulations, and/or ordinances to govern elements such as the community involvement process, hump design and location criteria, cost sharing relationships, installation and maintenance requirements, and evaluation/modification procedures.

3.02 Speed Hump Request Procedures

Resident surveys should be required to determine support for speed hump installation after it is determined that a particular street is eligible for humps. Ideally, a documented majority of the residents should be in favor of the installation after consideration of alternative traffic control and traffic management techniques.

3.03 Staff Evaluation

An adequate engineering and safety investigation of any speed hump request should be made to determine that the agencies adopted guidelines are met for speed hump use.

Since speed humps might have a wide ranging impact not only on the vehicles crossing them but also on the residents living on the immediate and nearby streets, their installation typically should be studied within the context of an overall neighborhood traffic management study. Such a study would involve thorough processes for considering, evaluating, implementing, and monitoring speed humps and any other traffic management techniques utilized. Jurisdictions with limited resources may consider adopting a prioritization system for installation of humps.

3.04 Coordination Procedures

Proposed speed hump installations should be reviewed by the police, fire, ambulance, and other emergency service departments; area residents and those next to humps that might be impacted by the speed hump installation; and other potentially affected groups such as school districts, transit operators, and refuse collection agencies. Comments received should be considered fully in the decision-making process.

If humps are to be installed, residents and affected agencies should be notified of the exact objectives, timing, location, and other relevant details of the installation. It is also advisable to meet with emergency service providers to more fully inform them of the humps expected impacts on special vehicle types for various operating speeds.

3.05 Removal Procedures

Removal of speed humps should be considered only after an adequate review period and subsequent engineering analysis has been performed to determine the traffic characteristics along the route and the impacts to the remaining street system. If speed humps are being removed due to a lack of public support, a majority of residents typically should support their removal.

Before making a decision to remove speed humps, all petitioners originally requesting the installation should be given the opportunity to comment on the proposed removal.

3.06 Cost

Consideration should be given to a possible requirement that those individuals requesting speed humps participate in the funding of their installation, maintenance, and removal, if necessary. Regardless of funding source, it is critical that adequate and ongoing resources be allocated to properly inspect and maintain the humps and supporting devices.