



Department of Public Works | 860.584.6125

MEMORANDUM

DATE: December 8, 2021

TO: Mayor Jeffrey Caggiano
Board of Public Works

FROM: Raymond A. Rogozinski, P.E., Director of Public Works

RE: Roadway Speed Bumps/Humps – Policy

In response to resident concern associated with speeding and based on the recommendation from DPW the Board of Public Works voted at its October meeting to investigate a program to install speed bumps/ humps within the City of Bristol.

The purpose of the investigation is to outline the pros and cons of speed bumps/humps, therefore please find the attached report prepared by VHB Engineering. DPW has invited VHB to present the report to the Board at the December 16 meeting along with representatives from both the City's Fire and Police Department.

As previously reported to the Board, there are a number of factors that should be considered such as roadway traffic volumes, road noise, emergency response times, and signage to list a few. As Director of Public Works, I do believe that issues associated with drainage and snow plowing can be managed with bumps/humps. However I strongly believe that if the installation of bumps/humps are pursued there should be a formal policy in place that provide guidance on the general location that they will and will not be allowed. In addition, if a speed bump/hump program is developed in the City it should weigh the potential benefits to the neighborhood with the potential impact to properties located adjacent to the bump/humps and the traveling public (including emergency vehicles).

Please feel free to contact me with any question at 860-584-6113.



Memorandum

To: Raymond Rogozinski, P.E.
Director of Public Works
City of Bristol
111 North Main Street
Bristol, CT 06010

Date: 12/7/21

Project #: 42650.21

From: Joseph Balskus, P.E., PTOE, RSP1

Re: Speed Hump Summary

Introduction

The City of Bristol is considering the implementation of a speed hump program to reduce vehicle speeds on roadways. Speed humps are a traffic calming device, with a physical rise in the roadway profile to force a reduction of vehicle speeds.

Traffic calming is defined as measures to reduce to speed of vehicles, through physical and non-physical means. Speed humps are one measure used to reduce speeds on roadways.

A speed hump as defined by the Institute of Transportation Engineers (ITE) and the Federal Highway Administration (FHWA) is a maximum 3 inch rise in the pavement surface, with a parabolic transition section of 6 feet in length along the roadway profile. The parabolic section, versus a straight taper section, provides a modest change in the roadway profile to reduce the vehicle speed. The speed hump is typically 12 feet long along the roadway.

The speed hump is constructed with bituminous concrete pavement, across the entire roadway width, with a tapered section to allow for stormwater drainage along the gutter/curb line.

The ITE speed hump detail is used nationally in thousands of communities similar to Bristol and is accepted by FHWA as a traffic calming measure.

The ITE speed hump detail is effective in reducing speeds to 25 miles per hour, from a maximum of 40 miles per hour prevailing speeds.

Speed hump studies has shown minimal increases in emergency vehicle travel times however they are not to be used on major fire truck routes and emergency routes to hospitals.

The ITE speed humps are best utilized in series, a minimum of two, and should be placed in between residential uses, preferably at the property boundaries. They should not be installed on curves and significant hills.

Speed Hump Program Considerations

The installation of speed humps along a roadway must considered in the context of the entire neighborhood and not just one roadway. Speed humps can cause traffic to divert from a roadway to adjacent roadways, increasing traffic on those adjacent roadways without speed humps. Therefore a thoughtful and open process should be developed for any municipality considering speed humps.

There are many communities in Connecticut with speed hump programs, where residents have successfully utilized speed humps to deter traffic and reduce speeds.

For any consideration of speed humps along a roadway, the following should be reviewed:

- Roadway Classification – Local, Collector, Arterial (prohibited)
- Vehicle classifications – Avoid roadways carrying more than 5% truck traffic
- Roadway ownership – Must be Locally owned/maintained by municipality
- Traffic signals – Avoid corridors where traffic signals are present
- Area type – Avoid locations within a Central Business District (consider with care)
- Emergency vehicles – Do not consider speed humps on emergency or fire truck routes
- Vehicle speeds – Do not consider roadways with prevailing speeds greater than 40 miles per hour
- Resident support - Majority of residents along the section of roadway should be supportive of the speed hump considerations before deployment
- Consider temporary roadways as a trial prior to installation of permanent roundabouts
- Traffic study – Review the potential adjacent roadways that may be utilized by diverted traffic
- Diverted traffic – Review the traffic patterns of diverted traffic and consider diverting to collector and/or arterial roadways
- Trial Basis – Consider a program where success factors are evaluated to ensure success of program
- Transparency – Provide all details of program to public from beginning
- Outreach -Include the key stakeholders, residents, business owners (if any on roadways), emergency services

Speed Hump Information - FHWA

See attached information detailing speed humps from FHWA and at the following websites:

https://safety.fhwa.dot.gov/speedmgt/traffic_calm.cfm

https://safety.fhwa.dot.gov/speedmgt/ePrimer_modules/module3pt2.cfm

U.S. Department of Transportation

Federal Highway Administration

1200 New Jersey Avenue, SE

Washington, DC 20590

202-366-4000

Safety

Traffic Calming ePrimer – Module 3

3.10 Speed Hump

DESCRIPTION AND GENERAL PURPOSE

ITE has developed a recommended practice entitled *Guidelines for the Design and Application of Speed Humps*. Further guidance and clarification can be found in that publication.

A speed hump is an elongated mound in the roadway pavement surface extending across the travel way at a right angle to the traffic flow (see Figure 3.10.1). A speed hump is typically 3 inches in height (with applications as high as 4 inches) and 12 feet in length along the vehicle travel path axis (note: a *speed hump* that is 20 feet in length and flat in the middle is considered a *speed table* in this ePrimer).

At typical travel speeds along a residential street or in a small commercial business district, a speed hump produces sufficient discomfort to a motorist driving above the speed hump design speed to discourage speeding. It encourages the motorist to travel at a slow speed both upstream and downstream of as well as over the speed hump.

[A speed hump is also referred to as a road hump or undulation.]

[What's the difference between a speed hump and a speed bump? A speed hump is typically 12 feet in length (in the direction of travel), between 3 and 4 inches in height, and is intended for use on a public roadway. A speed bump is much shorter, between 1 and 2 feet in length (in the direction of travel). A speed bump can be as much as 6 inches in height. A speed bump is typically found in a parking lot or commercial driveway, but not on a public roadway.]

The initial speed hump applications were similar to the 12-foot speed hump, characterized in this section of the ePrimer. Variations in length and shape were applied and were initially considered speed hump variations. As the 20-foot measure became a standardized size and shape, it became known as a speed table. The reader is cautioned that when reviewing literature, design standards, and effectiveness analyses for speed hump, what is included within the umbrella of "speed humps" has varied over time.

[Five field studies of 51 speed humps measured crash reductions between 33 and 48 percent (Source: FHWA, Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Crashes, July 2014)

http://www.safety.fhwa.dot.gov/speedmgt/ref_mats/eng_count/2014/reducing_crashes.cfm

[Seven field studies of 199 speed humps measured reductions between 6 and 13 mph for 85th percentile speeds (Source: FHWA, Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Speed, July 2014)

http://www.safety.fhwa.dot.gov/speedmgt/ref_mats/eng_count/2014/reducing_speed.cfm



Figure 3.10.1. Speed Hump with Bicycle Lane and On-Street Parking
 (Source: Scott Batson)

APPROPRIATE APPLICATION

Appropriate Application – Speed Hump	
Type of Street	<p>Appropriate for a residential local street or any street where the primary function is to provide access to abutting residential property (see Figure 3.10.2)</p> <p>Appropriate for a street that provides access to a school, park, or community center</p> <p>Also appropriate for neighborhood or residential collectors</p>
Intersection or Roadway Segment	<p>Placed at a midblock location, and not near an intersection; as an example, Pennsylvania recommends a distance of 150 feet from an unsignalized intersection and 250 feet from a signalized intersection</p> <p>Should not be placed on a sharp curve; ITE <i>Guidelines for the Design and Application of Speed Humps</i> recommends a minimum horizontal curve radius of 300 feet (see Figure 3.10.3)</p>

Roadway Cross-Section	<p>Can be used on a single-lane one-way street or two-lane two-way street; should stretch across only one travel lane in each direction</p> <p>Typically installed on a roadway with an urban cross-section (i.e., curb and gutter)¹¹</p> <p>Typically placed one foot from a curb for drainage or six inches from the edge of a non-curbed roadway</p> <p>A speed hump can be applied on a cross-section both with and without sidewalks or bicycle facilities</p>
Speed Limit	<p>Appropriate if posted speed limit is 30 mph or less (per ITE <i>Guidelines for the Design and Application of Speed Humps</i>); many jurisdictions adhere to ITE maximum (e.g., South Carolina, Pennsylvania); some use a 25 mph ceiling (e.g., Delaware)</p> <p>Generally not appropriate when the pre-implementation 85th percentile speed is 45 mph or more</p>
Vehicle Traffic Volume	<p>Appropriate if daily traffic volume is relatively low; as examples, Pennsylvania sets a maximum daily volume of 3,500; South Carolina uses a maximum of 4,000; Pasadena, CA (41) uses a daily volume maximum of 4,000, with at least 1,000 vehicles in each direction</p> <p>ITE <i>Guidelines for the Design and Application of Speed Humps</i> recommends consideration only if no more than five percent of the overall traffic flow consists of long-wheelbase vehicles</p>
Emergency Route	<p>Generally not appropriate for a primary emergency vehicle route or a street that provides access to a hospital or emergency medical services; speed cushion and speed table are similar vertical measures that could be appropriate</p> <p>An emergency vehicle can cross a properly designed speed hump but at a slow speed</p>
Transit Route	<p>Generally not appropriate for a bus transit route but examples of speed humps on bus routes do exist; a speed table and speed cushion are similar vertical measures that could be appropriate</p>
Access Route	<p>Not appropriate along the primary access to a commercial or industrial site</p>
Grade	<p>Can be installed on, or beyond, a crest vertical curve only if there is adequate stopping sight distance or warning signs are provided</p> <p>ITE <i>Guidelines for the Design and Application of Speed Humps</i> recommends consideration only on a street with a grade of 8 percent or less (see Figure 3.10.4); many jurisdictions adhere to that maximum (e.g. Pennsylvania, South Carolina) but others follow a lower value: Delaware – 6 percent; Minnesota and Pasadena, CA -5 percent</p>

¹¹ If the street does not have curbing, an obstruction such as signing, flexible delineator posts, or bollards may be necessary to discourage a motorist from driving around the hump. Potentially hazardous objects (e.g., rocks, boulders) should not be used.



Figure 3.10.2. Speed Hump on Residential Neighborhood Street
(Source: Lucy Gibson)



Figure 3.10.3. Speed Hump Along Horizontal Curve
(Source: Scott Wainwright)



Figure 3.10.4. Speed Hump on a Grade
 (Source: Scott Wainwright)

EFFECTS AND ISSUES

Effects and Issues – Speed Hump	
Vehicle Speed	<p>Single speed hump reduces vehicle speeds to the range of 15 to 20 mph when crossing the hump; speed reduction effects decline at the rate of approximately 0.5 to 1 mph every 100 feet beyond the 200 foot approach and exit of a speed hump; in order to retain slower vehicle speeds over longer distance, series of speed humps is needed (see Figure 3.10.5)</p> <p>ITE <i>Guidelines for the Design and Application of Speed Humps</i> recommends spacing of 260' to 500' to keep 85th percentile operating speed between 25 and 30 mph; some jurisdictions have refined guidelines:</p> <ul style="list-style-type: none"> • Pennsylvania – spacing between 250 and 600 feet • South Carolina – spacing of no less than 350 feet • Virginia – spacing of approximately 500 feet, clear visibility of 200 feet, and placement no closer than 200 feet from an intersection • Pasadena – speed hump series only on street segment that is at least 1,200 feet in length and traffic signals or Stop signs are at least 1,200 feet apart <p>Proper placement of initial speed hump in a series is significant; ITE <i>Guidelines for the Design</i></p>

	<p><i>and Application of Speed Humps</i> recommends that the first speed hump in a series be normally located in a position where it cannot be approached at high speed from either direction; to achieve this objective, it is typically installed within 200 feet or less of a small-radius curve or Stop sign or, if installed on a street with a significant downgrade, at the top of a hill</p> <p>Refer to Module 4 for additional data</p>
Vehicle Volume	<p>As single installation, there is little traffic diversion from the street; as part of a series, typical volume reductions of 20 percent observed</p> <p>Refer to Module 4 for additional data</p>
Pedestrian Safety and Mobility	<p>Not a preferred location for a crosswalk Refer to Module 6 for additional discussion</p>
Bicyclist Safety and Mobility	<p>Bicyclist safety should not be affected; some jurisdictions use maximum street grade of 5 percent on a street with a speed hump if designated as a bicycle route</p> <p>Bicyclist can negotiate speed hump with little delay or discomfort; it is also possible for a bicyclist to bypass a speed hump by passing through the gap between the hump and the curb and gutter</p> <p>Refer to Module 6 for additional discussion</p>
Motorist Safety and Mobility	<p>Speed effects of a single or series of speed humps are greater than for any other traffic calming measure with the exception of route diversions that eliminate a particular traffic movement</p> <p>Produces sufficient discomfort to a motorist driving above the speed hump design speed to discourage speeding</p>
Emergency Vehicle Safety and Mobility	<p>Typical delay for a fire truck is in the 3 to 5 second range; for an ambulance with a patient, delay can be as much as 10 seconds</p> <p>Refer to Module 5 for additional discussion</p>
Large Vehicle Safety and Mobility	<p>Typical delay for a large commercial vehicle is in the 3 to 7 second range</p> <p>Refer to Module 5 for additional discussion</p>
Accessibility of Adjacent Property	<p>Does not typically require removal of any on-street parking or affect accessibility of adjacent property (see Figure 3.10.6)</p>
Environment	<p>Potential for increased noise due to vehicle braking and accelerating and to the vibration of loose items in truck beds or trailers</p>
Design Issues	<p>Placement factors include vertical and horizontal alignment of the street, proximity to the nearest intersection, location of driveways and on-street parking, presence or absence of street lighting, location of designated pedestrian crossings, drainage, and utility access points (drains, valves, etc.)</p> <p>Should not require relocation of above- and below-ground utilities</p> <p>May not be appropriate on a roadway where drainage gutter or flow of water is in the center of the roadway; drainage and hydraulic impacts need careful evaluation</p>



Figure 3.10.5. Series of Speed Humps
(Source: City of Stockton, California)

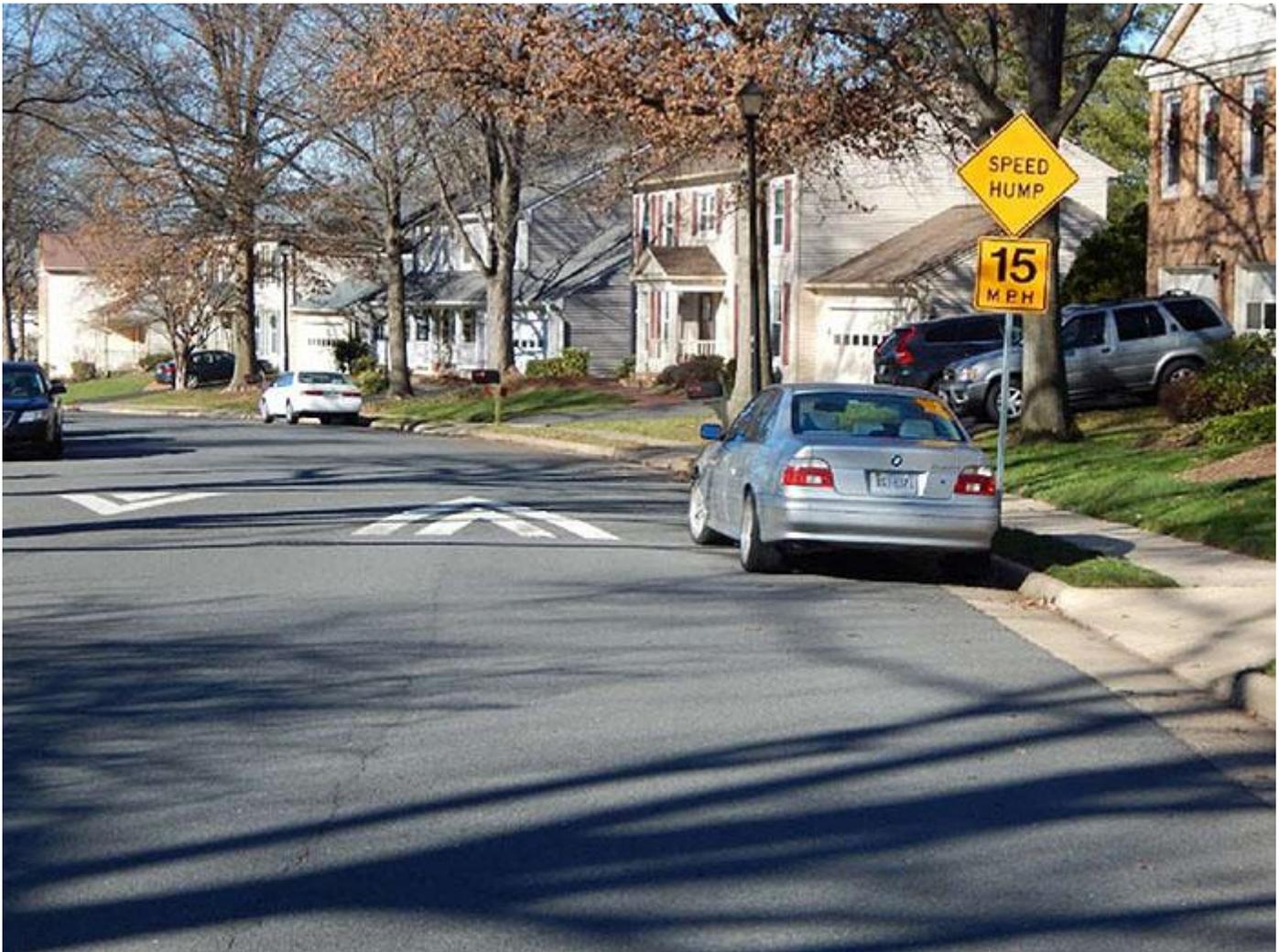


Figure 3.10.6 Adjacent to Speed Hump
(Source: Lewis Grimm)

ADDITIONAL DESIGN CONSIDERATIONS

ITE provides specific design and application guidance for speed humps; refer to *Guidelines for the Design and Application of Speed Humps*.

ITE guidelines specify a speed hump that is 12 feet long (in the direction of travel) and 3 inches in height.

A sample design for a speed hump is presented in Figure 3.10.7.

