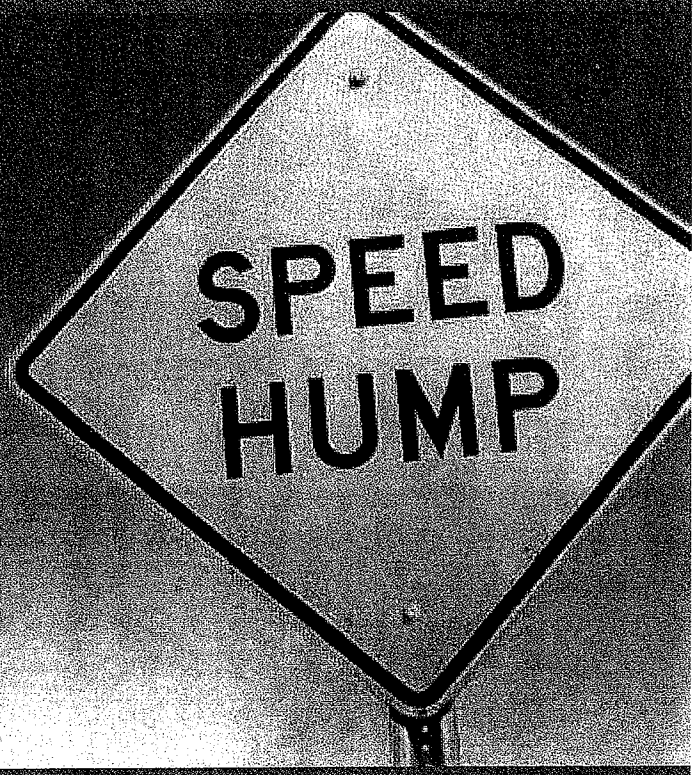
ITE Proposed Recommended Practice



GUIDELINES FOR THE DESIGN AND APPLICATION OF SPEED HUMPS

August 2007

Speed humps are only recommended on streets where the posted, prima facie, or statutory speed limit is 30 mph (50 km/hr.) or less.[22,23] However, during the engineering review, it is also important to consider the operating speed of the roadway.

Speed studies are used to identify the operating speed, especially the range and frequency of speeds on the street. These studies commonly use the 85th-percentile speed to describe operating speeds.

Speed humps should be carefully considered on streets where the 85th-percentile speed is 45 mph (72 km/hr.) or more. Lowering the 85th-percentile speed at speed hump or speed table locations more than 15 mph (24 km/hr.) will tend to create a pronounced "sine wave" type velocity profile. Such a velocity profile may be inappropriate with regard to both traffic safety and/or the noise of acceleration and deceleration. Research has indicated that 22-ft. (6.7-m) speed tables reduce 85th-percentile speeds to approximately 30 mph; therefore, the use of 22-ft. speed tables on streets with an 85th-percentile speed greater than 45 mph requires careful evaluation.[24]

The City of Portland updated its guidelines to differentiate between 14-ft. (4.3-m) speed humps and 22-ft. (6.7-m) speed tables. The revised guidelines suggest that 14-ft. speed humps may not be appropriate on streets with 85th-percentile speeds exceeding 40 mph (65 km/hr.) and that 22-ft. speed tables may not be appropriate on streets with 85th-percentile speeds exceeding 50 mph (80 km/hr.).

The 10-mph pace speed may also be of interest to determine which 10-mph speed range (such as 30–40 mph) describes the behavior of the largest number of drivers and the amount of speed variation among drivers.[25] Procedures for conducting speed surveys are described in ITE's *Manual of Traffic Engineering Studies, 6th Edition.*[26]

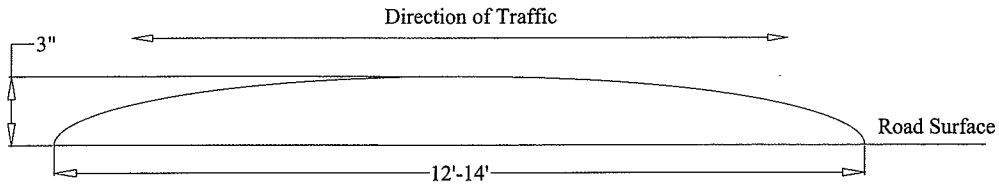
Speed violation frequency by time of day, day of week and directional split can also be measured. Where speed violations are observed throughout the day or occur at times of the day that are difficult to predict, physical traffic calming devices such as speed humps may be more effective than targeted enforcement.[27]

Different speed hump designs have been shown to affect the speed at which vehicles generally traverse the hump itself, as shown in Table 2.1. The longer length and plateau of a speed table can momentarily accommodate all the wheels of a passenger car.[28]

Table 2.1. Operating speeds traversing speed humps.

SPEED HUMP CHARACTERISTICS		85TH-PERCENTILE SPEED
LENGTH AND SHAPE	HEIGHT	
12-ft. (3.7-m) parabolic speed hump	3 in. (80 mm)	20 mph (32 km/hr.)
14-ft. (3.7-m) parabolic speed hump	3 in. (80 mm)	23 mph (37 km/hr.)
22-ft. (3.7-m) speed table, parabolic approaches	3 in. (80 mm)	30 mph (48 km/hr.)
22-ft. (3.7-m) speed table, straight approaches	3 5/8 in. (92 mm)	25 mph (40 km/hr.)

Source: Ewing, R. Traffic Calming: State of the Practice. *Washington, DC: Institute of Transportation Engineers, 1999. Prepared for U.S. Department of Transportation, Federal Highway Administration, Office of Safety Research and Development and Office of Human Environment, August 1999.*



12 Foot Parabolic Speed Hump Development in U.S. Customary Units

Distance (feet)	0.0	1.0	2.0	3.0	4.0	5.0	6.0
Finished Height (inches)	0.0	0.9	1.7	2.3	2.7	2.9	3.0

Metric Units

Distance (m)	0.000	0.305	0.610	0.914	1.219	1.524	1.829
Finished Height (mm)	0	23	42	57	68	74	76

14 Foot Parabolic Speed Hump Development in U.S. Customary Units

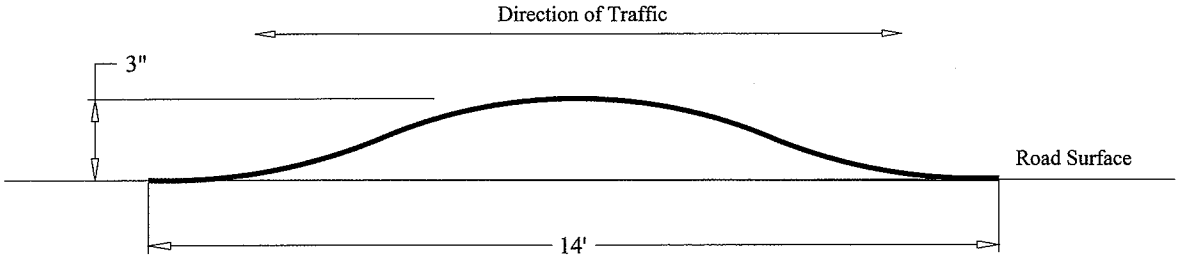
Distance (feet)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0
Finished Height (inches)	0.0	0.8	1.5	2.0	2.4	2.8	2.9	3.0

Metric Units

Distance (m)	0.000	0.305	0.610	0.914	1.219	1.524	1.829	2.134
Finished Height (mm)	0	20	38	51	61	71	74	76

Figure 4.1. Typical parabolic speed hump.

Note: Not to scale



Sinusoidal Speed Hump Development in U.S. Customary Units

Distance (feet)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
Finished Height (inches)	0.00	0.04	0.15	0.33	0.56	0.85	1.17	1.50	1.83	2.15	2.44	2.67	2.85	2.96	3.00

Metric Units

Distance (m)	0.000	0.152	0.305	0.457	0.610	0.762	0.914	1.067	1.219	1.372	1.524	1.676	1.829	1.981	2.134
Finished Height (mm)	0	1	4	8	14	22	30	38	47	55	62	68	72	75	76

Figure 4.2. Typical sinusoidal speed hump.

Note: Not to scale

Several jurisdictions, such as Burr Ridge, Illinois, have begun development of modified speed humps (also called speed lumps) that include spaces in the speed hump specifically designed to accommodate the track width of emergency vehicles.

Some agencies use temporary rubber speed humps to gauge public response before permanent devices are considered.[118] Anchorage, Alaska uses temporary speed humps not only to reduce speed but also to show neighborhoods what a speed hump is prior to installing permanent speed humps. Temporary speed humps in Anchorage are installed in the spring for a maximum of six months and are removed before the first snowfall.

4.1.2 *Speed Tables*

Speed tables have gained widespread acceptance for use on residential collectors and, if needed, on emergency vehicle access routes or transit routes. Many jurisdictions use speed tables that are 3-in. (80-mm) high and that have either parabolic or sinusoidal approaches.

In general, 22-ft. (6.7-m) speed tables with a 10-ft. (3.1-m) plateau and 6-ft. (1.8-m) straight, sinusoidal, or parabolic approaches are recommended for installation on residential collectors where the desired operating speed is 30 mph (48 km/hr.). A vertical height of 3 in. (76 mm) (2.75-in. [70-mm] minimum and 3.5-in. [90-mm] maximum) is recommended for any speed table. A typical speed table with straight approaches is shown in Figure 4.3. A speed table with sinusoidal approaches is shown in Figure 4.4. A speed table with parabolic approaches is shown in Figure 4.5. Refer to Figure 4.1 for the development of a parabolic approach and Figure 4.2 for the development of a sinusoidal approach.

If speed humps are to be installed on emergency vehicle access routes or transit routes, the 22-ft. (6.7-m) speed table with a height of 3 in. (76 mm) is recommended.

Portland has a modified speed table called the split speed table, which was designed specifically for fire trucks. Additional information on split speed tables can be found in *Traffic Calming: State of the Practice.*[119]

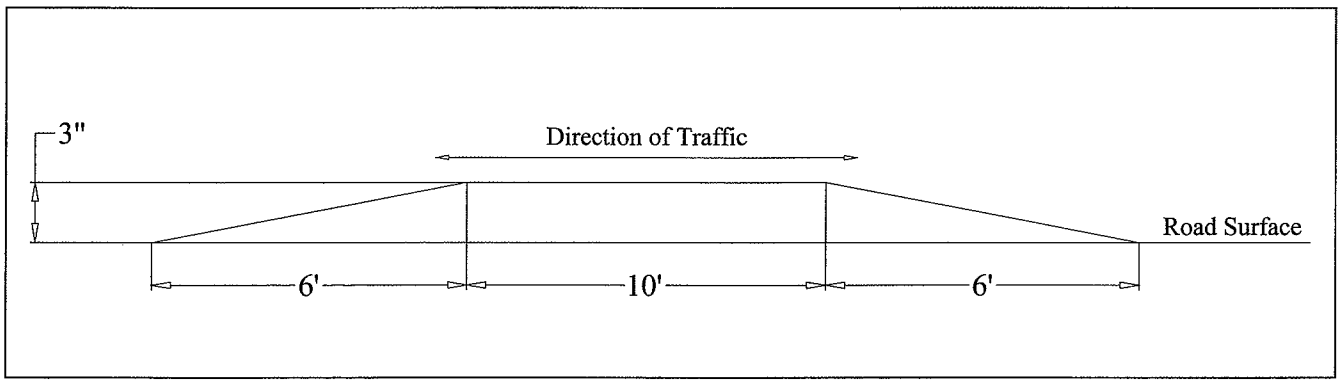


Figure 4.3. Typical straight approach speed table.
Note: Not to scale

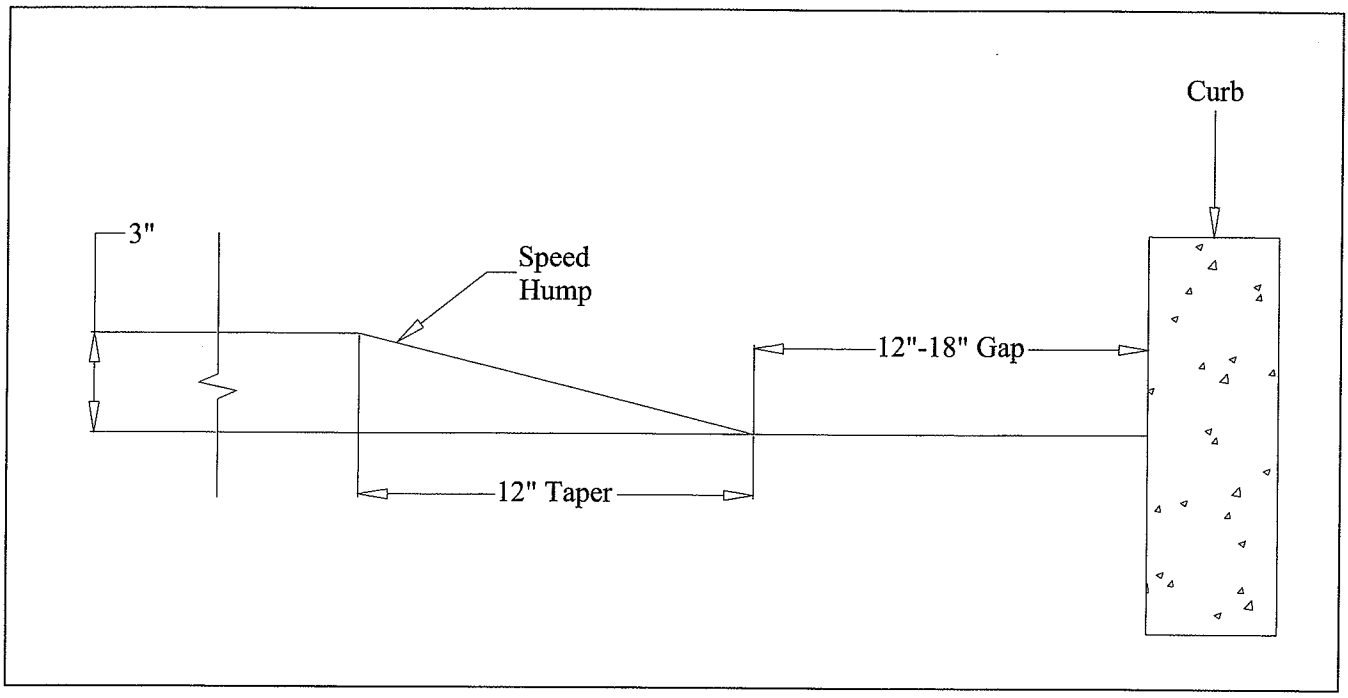


Figure 4.6. Speed hump roadway edge treatment on roadways with curbs.
Note: Not to scale

For speed tables, the same edge taper design is recommended to maintain drainage while discouraging gutter-running. However, for speed tables that will be used as a raised crosswalk, the plateau can be extended from curb to curb to facilitate pedestrian access, if permitted by site topography and with appropriate upstream water drainage provided. For sites with a difference in height between the speed table and the curb, a curb ramp can be constructed to provide a smooth transition for pedestrians from the pavement to the speed table used as a crosswalk. Portland either constructs a curb ramp to connect the speed table to the existing curb height or constructs a standard curb ramp and increases the speed table edge taper to 3 ft. (0.9 m) to provide a more pedestrian accessible ramp.

4.2.2 *Rural Areas*

On roads with a rural cross-section (roads without curbs), drivers may try to avoid speed humps by driving onto the shoulder or even onto the roadside.

It is recommended that speed humps be extended across the entire paved surface of the roadway. If installed on roadways with paved shoulders, it is recommended that speed humps be extended across the width of the shoulder to discourage vehicles from attempting to avoid the humps. If installed on roadways with unpaved shoulders, the shoulder could be paved at the speed hump locations so that the humps can be extended across the shoulder to the roadside (see Figure 4.7).

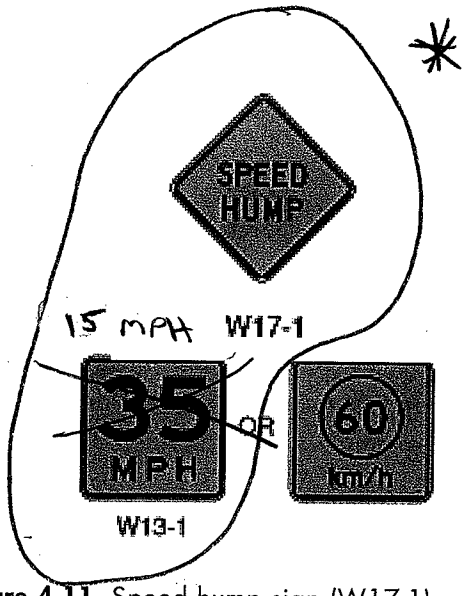


Figure 4.11. Speed hump sign (W17-1) and advisory speed plaques (W13-1).

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition. *Washington, DC: Federal Highway Administration, 2003.*

Some agencies install a special supplemental plaque indicating the length of a series of speed humps. These signs are installed under the first speed hump sign preceding the series of humps (see Figure 4.12). Side road approaches that intersect a street within a series of humps should be evaluated with regard to the need for advanced notification signing. Some agencies install warning signs with supplemental arrow plates indicating the location of speed humps on an intersecting street.

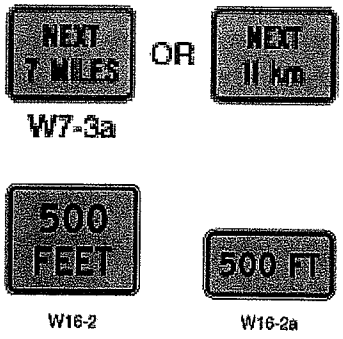


Figure 4.12. Distance plaques (W7-3a, W16-2 and W16-2a).

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition. *Washington, DC: Federal Highway Administration, 2003.*

Appropriate signs as recommended in MUTCD should be used at speed table locations that also are designated as crosswalks to warn drivers of pedestrian activity and advise pedestrians to cross the roadway using the crosswalk.

Speed hump warning signs should be placed so that they are clearly visible to approaching motorists and follow MUTCD guidelines.

Although undesirable in residential areas, additional warning devices such as special attention flags or flashing lights may be warranted where unusual combinations of roadway or vehicle operating conditions exist.

4.4.2 *Pavement Markings*

Pavement markings also are recommended to warn drivers of the location of speed humps (see Figures 4.13 and 4.14). Some agencies include advance word messages (typically "BUMP") and special markings directly in advance of or on the hump. Several speed hump marking designs are in use today. The design selected should not create confusion with standard crosswalk markings unless the hump location is intended for pedestrian crossings. It is recommended that pavement word and symbol markings be installed in conformance with MUTCD guidelines. Double-yellow centerline markings to draw additional attention to speed hump locations also could be used. Some agencies also use reflective markers in advance of or at the speed hump to improve nighttime visibility.

Many agencies have developed and implemented speed hump signs and markings that are not included in the current edition of MUTCD. For example, the City of Beaverton suggests that checkerboard markings are effective and require low maintenance. Portland uses chevron markings on speed humps supplemented with the word "BUMP" placed 50 ft. (15.2 m) upstream from the speed hump location.[141] The City of Atlanta, DeKalb County and Gwinnett County in Georgia use

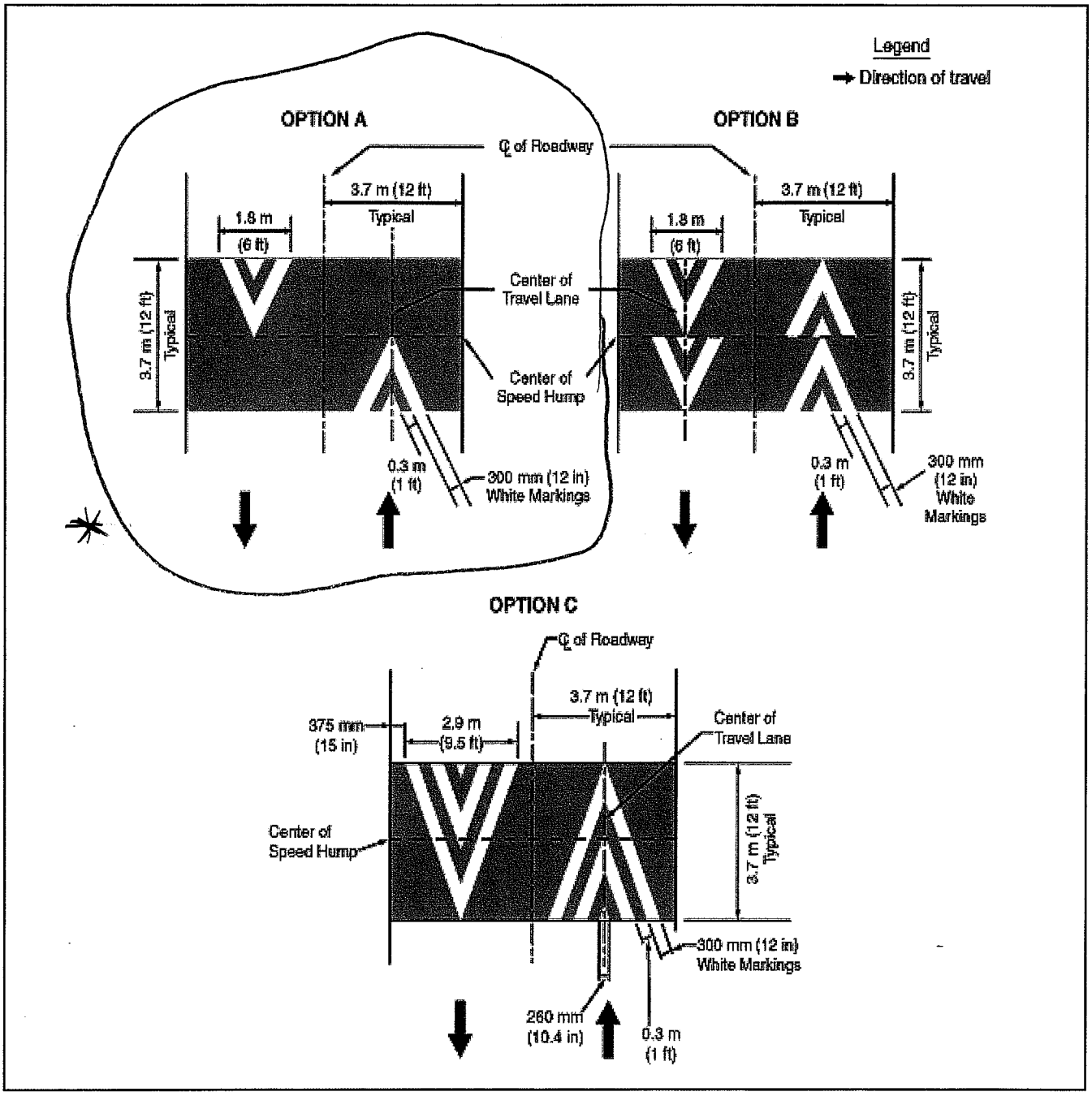


Figure 4.13. Speed hump pavement markings.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition. *Washington, DC: Federal Highway Administration, 2003.*