

# Detectable Warning Surfaces

## What is a detectable warning

A detectable warning is “A standardized surface feature built in or applied to walking surfaces or other elements to warn of hazards on a circulation path.” (F106.5, Draft Final ADA and ABA Accessibility Guidelines, April 2, 2002) It is a unique and standardized feature, intended to function much like a stop sign and to alert pedestrians who are visually impaired to the presence of a hazard in the line of travel.

## Why is it necessary

As curb ramps have become common in response to the requirements of the Rehabilitation Act (1973) and the Americans with Disabilities Act (1990), an unintended consequence has been that blind pedestrians have found it more difficult to locate the boundary between the street and sidewalk. The only surface which has repeatedly been demonstrated to be detectable to most blind pedestrians, either under foot or by the use of a long cane, is the truncated dome detectable warning surface, which has been required on transit platform edges since 1991 and at curb ramps since July 2001.

## Specifications

“Detectable warnings shall consist of a surface of truncated domes aligned in a square grid pattern...”.

“Dome size. Truncated domes in a detectable warning surface shall have a base diameter of 0.9 in (23 mm) minimum to 1.4 inches (36mm) maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 in (5 mm).

Dome Spacing. Truncated domes in a detectable warning surface shall have a center-to-center spacing of 1.6 inches (41 mm) minimum and 2.4 inches (61mm) maximum and a base-to-base spacing of 0.65 inches (16mm) minimum, measured between the most adjacent domes on square grid.

Contrast. Detectable warning surfaces shall contrast visually with adjoining surfaces, either light-on-dark or dark-on-light.” (Draft Guidelines for Accessible Public Rights-of-Way, June 14, 2002)

## Research

Two research projects (Barlow and Bentzen, 1992, and Hauger, Safewright, Rigby & McAuley, 1994) confirmed that, for blind travelers, removal of the single most reliable cue to the presence of an intersecting street, that is, the down curb, caused problems. At curb ramps, even skilled travelers failed to detect the street before stepping into it on 39% of approaches. The failure to detect streets was highly correlated with slope of the curb ramp and with the abruptness of change in angle between the approaching sidewalk and the curb ramp. Hauger et al. also found that diagonal/ apex curb ramps were more likely to lead to unsuccessful street crossings.

Despite concerns that detectable warnings would negatively affect the travel of mobility impaired individuals, Bentzen et al. 1993; Bentzen et al. 1994, Hauger et al., 1994, and Hauger et al. 1996 found that truncated dome detectable warnings on slopes or curb ramps had little effect on safety and negotiability for persons having mobility impairments. In fact, Hauger et al. found that persons with mobility impairments generally considered curb ramps having detectable warnings to be safer, more slip resistant, more stable, and to require less effort to negotiate than concrete curb ramps. Both teams of investigators found, however, that a small minority of persons having mobility impairments experienced some difficulty as a result of detectable warnings.

### **Recommendations**

ADAAG originally required the detectable warning surface on the entire width and depth of curb ramps, excluding the flare. To minimize the possibility of problems for persons with mobility impairments and to provide consistent information about the location of the street to individuals who are blind, Bentzen and Barlow (1995) concluded by recommending that 24 in (610 mm) of truncated dome detectable warning be installed along the bottom of curb ramps. That amount had previously been demonstrated to be sufficient to enable detection and stopping on most approaches and was consistent with the depth of detectable warning used at the edges of transit platforms having a drop-off.

It is the current recommendation of American Council of the Blind and of the Association for the Education and Rehabilitation of the Blind and Visually Impaired and is consistent with the ADAAG requirement for truncated dome detectable warning at transit platforms. This is also the recommendation of the Public Rights-of-Way Access Advisory Committee (PROWAAC, Access Board, 2001).

There are now a number of truncated dome products available for installation on curb ramps in various climates and conditions. A report on detectable warnings has been developed by the Access Board and is available by calling 800-872-2253 and asking for Detectable Warnings: Synthesis of U.S. and International Practice. The publication is also available on-line at [www.access-board.gov](http://www.access-board.gov).

## Detectable Warning Surfaces

### ADA Fabricators

PO Box 179, N. Billerica, MA 01862  
Ph: (978) 262-9900  
Fax: (978) 262-1455  
Website: [www.adafabricators.com](http://www.adafabricators.com)

### Cobblecrete

485 West 2000 South, Orem, UT 84058  
Ph: (800) 798-5791 or (801) 224-6662  
Fax: (801) 225-1690  
Website: [www.cobblecrete.com](http://www.cobblecrete.com)

### COTE-L Industries, Inc.

1542 Jefferson Street, Teaneck, NJ 07666  
Ph: (201) 836-0733  
Fax: (201) 836-5220  
Website: [www.cotelind.com](http://www.cotelind.com)

### Crossville Ceramics

P.O. Box 1168, Crossville, TN 38555  
Ph: (931) 484-2110  
Fax: (931) 484-8418  
Website: [www.crossville-ceramics.com](http://www.crossville-ceramics.com)

### Disability Devices Distributor

17420 Mt Herman, Fountain Valley, CA 92708  
Ph: (714) 437-9237 or (800) 747-5651  
Fax: (714) 437-9309  
Website: [www.detectable-warning.com/](http://www.detectable-warning.com/)

### Engineered Plastics, Incorporated

300 Pearl Street, #200, Buffalo, NY 14202  
Ph: (800) 682-2525 or (716) 842-6039  
Fax: (800) 769-4463  
Website: [www.armor-tile.com](http://www.armor-tile.com)

### Hanover Architectural Products, Inc.

240 Bender Road, Hanover, PA 17331  
Ph: (717) 637-0500  
Fax: (717) 637-7145  
Website: [www.hanoverpavers.com](http://www.hanoverpavers.com)

### Increte Systems

8509 Sunstate Street, Tampa, FL 33634  
Ph: (800) 752-4626 or (813) 886-8811  
Fax: (813) 886-0188  
Website: [www.increte.com](http://www.increte.com)

### Interlock San Diego

4351 Stanford Street, Carlsbad, CA, 92008  
Ph: 760-434-5586  
Fax: 760-434-3840  
Website: [detectablewarning.tierranet.com](http://detectablewarning.tierranet.com)

### Pavestone Company

4835 LBJ Freeway, Suite 700, Dallas, TX 75244  
Ph: 800-245-PAVE, 972-404-0400  
Fax: 972-404-9200  
Website: [www.pavestone.com](http://www.pavestone.com)

### Steps Plus, Incorporated

6375 Thompson Rd., Syracuse, NY 13206  
Ph: (315) 432-0885  
Fax: (315) 432-0612  
Website: [www.steps-plus.com](http://www.steps-plus.com)

### Strongwall Industries, Inc.

P.O. Box 201, Ridgewood, NJ 07451  
Ph: (800) 535-0668 or (201) 445-4633  
Fax: (201) 447-2317  
Website: [www.strongwall.com](http://www.strongwall.com)

### Summitville Tiles, Incorporated

P.O. Box 73, Summitville, OH 43962  
Ph: (330) 223-1511  
Fax: (330) 223-1414  
Website: [www.summitville.com](http://www.summitville.com)

### Transpro Industries, Incorporated

20 Jones Street, New Rochelle, NY 89701  
Ph: (800) 321-7870 or (914) 636-1000  
Fax: (914) 636-1282  
Website: [www.transpo.com](http://www.transpo.com)

### Vanguard ADA Products

20628 Broadway Ave., Snohomish, WA 98296  
Ph: (800) 290-5700  
Fax: (360) 663-3335  
Website: [www.vanguardonline.com](http://www.vanguardonline.com)

### Whitacre-Greer Fireproofing Company

1400 S. Mahoning Ave, Alliance, OH 44601  
Ph: (800) WGPAPER or (330) 823-1610  
Fax: (330) 823-5502  
Website: [www.wgpaver.com](http://www.wgpaver.com)

## **Curb ramps and detectable warnings - Resources**

**For detailed information and background, request:**

**Bentzen, B.L., Barlow, J.M. & Tabor, L.S. (2000). *Detectable Warnings: Synthesis of U.S. and International Practice*. Washington, D.C.: U.S. Access Board**

Available free by calling USA ABLE (800-872-2253) and requesting it by name, or on-line at the Access Board web site, [www.access-board.gov](http://www.access-board.gov).

### **Other resources:**

Barlow, J. & Bentzen, B.L. (1994). *Cues blind travelers use to detect streets*. Final report. Cambridge, MA: U.S. Department of Transportation, Federal Transit Administration, Volpe National Transportation Systems Center.

Bentzen, B.L., Nolin, T.L. & Easton, R.D. (1994a). *Detectable warning surfaces: Color, contrast and reflectance*. Cambridge, MA: U.S. Department of Transportation, Federal Transit Administration, Volpe National Transportation Systems Center. Report No. VNTSC-DTRS-57-93-P-80546.

Bentzen, B.L., Nolin, T.L., Easton, R.D., Desmarais, L. & Mitchell, P.A. (1994b). *Detectable warnings: Safety & negotiability on slopes for persons who are physically impaired*. Washington, DC: Federal Transit Administration and Project ACTION of the National Easter Seal Society.

Bentzen, B.L., Nolin, T.L., Easton, R.D., Desmarais, L. & Mitchell, P.A. (1993). *Detectable warning surfaces: Detectability by individuals with visual impairments, and safety and negotiability for individuals with physical impairments*. Final report VNTSC-DTRS57-92-P-81354 and VNTSC-DTRS57-91-C-0006. Cambridge, MA: U. S. Department of Transportation, Federal Transit Administration, Volpe National Transportation Systems Center, and Project ACTION, National Easter Seal Society.

Bentzen, B.L. & Barlow, J.M. (1995). Impact of curb ramps on safety of persons who are blind. *Journal of Visual Impairment and Blindness*, 89, 319-328.

Hauger, J, Rigby, J, Safewright, M. & McAuley, W. (1996). Detectable warning surfaces at curb ramps. *Journal of Visual Impairments and Blindness* 90:512-525.

Hauger, J.S., Safewright, M.P., Rigby, J.C. & McAuley, W.J. (1994). *Detectable warnings project: Report of field tests and observations*. Final Report to U.S. Architectural and Transportation Barriers Compliance Board. Blacksburg, VA: Virginia Polytechnic Institute and State University.

*Report of fundamental research on standardization relating to tactile tiles for guiding the visually impaired: Aiming at standardization of patterns*. (Study of the relationship between individual patterns and ease of recognition. (1998). Japan: Ministry of International Trade and Industry, National Institute for Technology and Evaluation.

*Building a True Community: Report of the Public Rights of Way Access Advisory Committee*. (2001) Washington, DC: U.S. Architectural and Transportation Barriers Compliance Board