

# **Building a True Community**

## **The Access Board PROWAAC - Final Report**

**Public Rights-of Way Access Advisory Committee**  
**U.S. Architectural and Transportation Barriers Compliance Board**

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**Building a True Community**  
Final Report  
Public Rights-of-Way Access Advisory Committee

January 10, 2001

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U.S. Architectural & Transportation Barriers Compliance Board

Recommendations of the  
**Public Rights-of-Way Access Advisory Committee**  
to the  
**U.S. Access Board**  
**Final Report: Building a True Community**

prepared by the Editorial Subcommittee

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- Crosswalk markings are required at signalized intersections.
- The minimum crosswalk width is 8 feet.

#### **Crossing times (X02.5.5)**

- Pedestrian signal phase timing shall be calculated with a 3.5 feet per second pedestrian walk speed.
- Crossing distances, when calculating timing, shall include the length of the crosswalk and one curb ramp.

#### **Medians and pedestrian refuge islands (X02.5.6)**

- Compliant cut-throughs or curb ramps are required.
- Detectable warnings are required.

#### **Detectable warnings (X02.5.7)**

- Detectable warnings shall be provided only: 1) where a pedestrian way crosses a vehicular way, but not at unsignalized driveways; 2) where a rail system crosses a pedestrian way; 3) at reflecting pools in the public right-of-way; 4) at cuts through islands and medians; and 5) where required by proposed ADAAG Chapter 10.
- Specifications are provided for size, location, dome spacing and size, alignment, and visual contrast.

#### **Pedestrian overpasses and underpasses (X02.5.8)**

- Overpasses and underpasses must connect to a pedestrian access route.
- An elevator is required if more than 5 percent grade is required for greater than a 5-foot vertical rise.
- Signs must be tactile and visual and comply with proposed ADAAG §504.

#### **Roundabouts (X02.5.9)**

- Barriers must be provided where pedestrian crossings are prohibited.
- A cue must be provided to locate the pedestrian crossing.
- A pedestrian activated traffic signal must be provided at pedestrian crossings.

#### **Turn lanes at intersections (X02.5.10)**

- A cue must be provided to locate the pedestrian crossing.
- A pedestrian activated traffic signal must be provided at pedestrian crossings.

#### **Vehicular Ways and Facilities (X02.6)**

##### **On-street parking (X02.6.1)**

- The number of accessible spaces shall comply with proposed ADAAG §F208.2.
- One in eight, but at least one, accessible space must be van accessible.

*contacts a gutter lip, the caster wheels may be deflected and quickly stop the chair. Depending upon the velocity at the time of contact, the user may be thrown forward from the wheelchair. The degree of stormwater channelization provided by a drainage lip is not sufficient to offset the hazard it creates for pedestrians with disabilities.*

**Research need:** *Research is needed to develop design alternatives to minimize the adverse effect on wheelchair travel of surfaces that contain grade breaks.*

**X02.4.12 Detectable warnings.** Sidewalk/street transitions shall have a detectable warning complying with §X02.5.7.

**EXCEPTION:** Detectable warnings shall not be provided where the sidewalk/street transition occurs at an unsignalized driveway.

**Discussion:** *The committee recognized that some currently manufactured detectable warning products cannot be installed on warped surfaces or surfaces with grade breaks. The industry will need to accept the challenge to develop detectable warning surface materials that will be usable in non-planar applications.*

**X02.4.13 Vehicular obstructions.** Curb ramps and flush landings shall be located or protected so that legally parked vehicles do not obstruct the pedestrian access route.

**Discussion:** *It was agreed that there is a need for a provision related to preventing the obstruction of the pedestrian access route by legally parked cars. The recommended provision is consistent with Interim Final Rule section 14.2.4. Public agencies should consider lengthening the no parking zone adjacent to a crosswalk, since wheelchair users and people of short stature may be hidden from a motorist's view by parked cars.*

**X02.4.14 Curb type.** Reserved.

**Frontier issue:** *The committee discussed and wishes to add the following proposal to the list of frontier issues: To aid in the protection of all pedestrians at intersection corners, and to make intersection geometry more cane detectable, the committee suggests that where rolled or "rollover" curb sections are proposed in new construction, a transition be provided from the rolled curb section to a barrier or vertical curb section of at least the same height and running the entire return of the curb return, and within 10 feet of the edge of each curb ramp (excluding flares) or the flush street transition.*

## **X02.5 Pedestrian Street Crossings.**

### **X02.5.1 Pedestrian signal push buttons.**

**X02.5.1.1 General.** Where new traffic signals with pedestrian controls are installed, they shall comply with this section.

**X02.5.1.2 Features.** Push buttons shall have the following features.

**(A) Size.** Push buttons shall be a minimum of 2 inches (51 mm) across in at least one dimension.

**(B) Maximum force.** The force required to activate push buttons shall be no greater than 3.5 pounds (15.5N).

**(C) Operation.** Push buttons shall be operable with a closed fist.

**(D) Locator tone.** There shall be a locator tone complying with X02.5.1.5.

**(E) Visual contrast.** Push buttons shall have a visual contrast with the body background of at least 70 percent.

**(F) Indicator.** There shall be a visible and audible indicator that the button press has occurred.

**Advisory:** *A long button press (e.g., 3 seconds) may bring up the accessible features or additional accessibility features of the individual device. An additional button should not be used to bring up additional accessibility features. All accessible features available are to be actuated in the same way. Thus, for a given signal, a long button press could request more than one additional feature. Possible additional features include:*

- 1. sound beaconing by increasing the volume of the WALK tone and the associated locator tone for one signal cycle, so a blind pedestrian might be able to use the sound from the opposite side of the street to provide alignment information;*
- 2. sound beaconing by alternating the audible WALK signal back and forth from one end of the crosswalk to the other;*
- 3. providing extended crossing time; and*
- 4. providing a voice message with the street names at the intersection.*

**(F) Signage.** Signage accompanying push buttons shall comply with §X02.5.1.4.

**Discussion:** *These specifications are intended to make pedestrian push buttons accessible. The recommended change to a reduced maximum operating force is based*

*in part, on the preamble to proposed ADAAG 309 Operable Parts (p 62262, 2<sup>nd</sup> col): "Information indicates that most control buttons of keys can meet a 3.5 maximum pounds of force and a maximum stroke depth of 1/10 inches." The closed fist requirement is based on the Access Board's design guidelines: "Devices that can be operated by a closed fist acting on any point on the surface will be most usable by pedestrians who have mobility impairments." The provision of visual contrast and a locator tone enable blind or visually impaired pedestrians to locate the push button. The visible and audible indicator informs both visually impaired and sighted individuals that the request for a walk signal has been received.*

**X02.5.1.3 Push button location.** The location of push buttons shall be in accordance with the following minimum requirements.

**(A) Adjacent to landing.** The push button shall be mounted adjacent to a clear ground space or a landing on the pedestrian access route leading to the crosswalk. The clear ground space shall be at least 32 inches by 54 inches (815 by 1370 mm), shall slope no more than 1:48 in any direction, and shall be provided with a stable, firm and slip resistant surface from which to operate controls. This clear ground space may overlap entirely with the pedestrian access route.

**(B) Proximity to approach.** Where a parallel approach to the push button is provided, controls shall be within 10 inches (255 mm) of the clear ground space, measured horizontally, and centered on it. Where a forward approach is provided, controls shall abut and be centered on the clear ground space.

**(C) Direction of control face.** The control face of the push button shall be parallel to the direction of the crosswalk controlled by the push button, and no closer than 30 inches (760 mm) to the curb line.

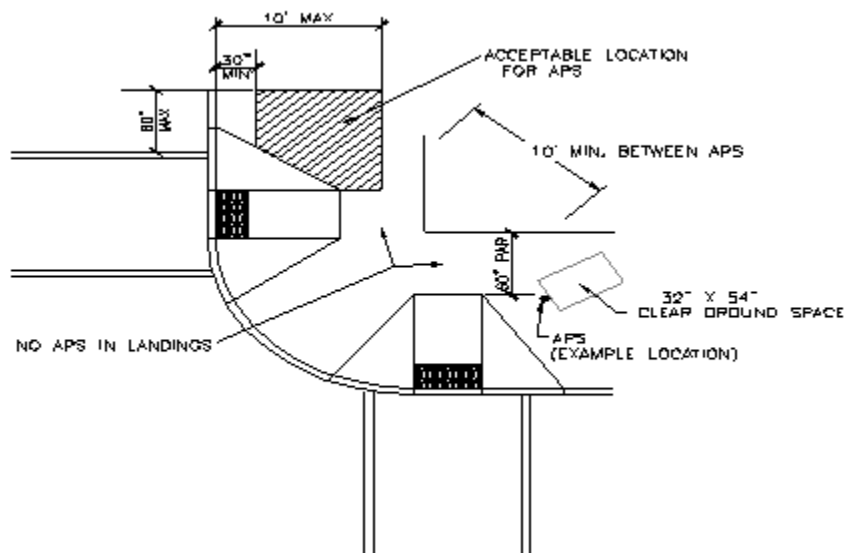
**(D) Mounting height.** The centerline of the push button shall be mounted 42 inches (1070 mm) above the clear ground space for approach.

**(E) Close to crosswalk.** The push button shall be mounted no further than 5 feet (1.5m) from the extension of the crosswalk lines, and within 10 feet (3m) of the curb line, unless the curb ramp is longer than 10 feet (3m).

**(F) Proximity to curb or transition ramp.** When located at a curb ramp, the push button shall be placed within 24 inches (610 mm) horizontally of the top corner of the curb ramp, on the side furthest from the center of the intersection of the roadway. When located at a transition ramp, the push button shall be placed adjacent to the lower landing.

**Advisory:** It should be noted that for information in vibrotactile format to be useable, the pole must be located so the user is able to keep a hand on the button while aligned at the top of the curb ramp or at the crosswalk. Note: vibrotactile information alone is not allowed.

**(G) Separation.** Where there are two accessible pedestrian signals on the same corner, the push buttons shall be mounted on poles separated by at least 10 feet (3 meters).

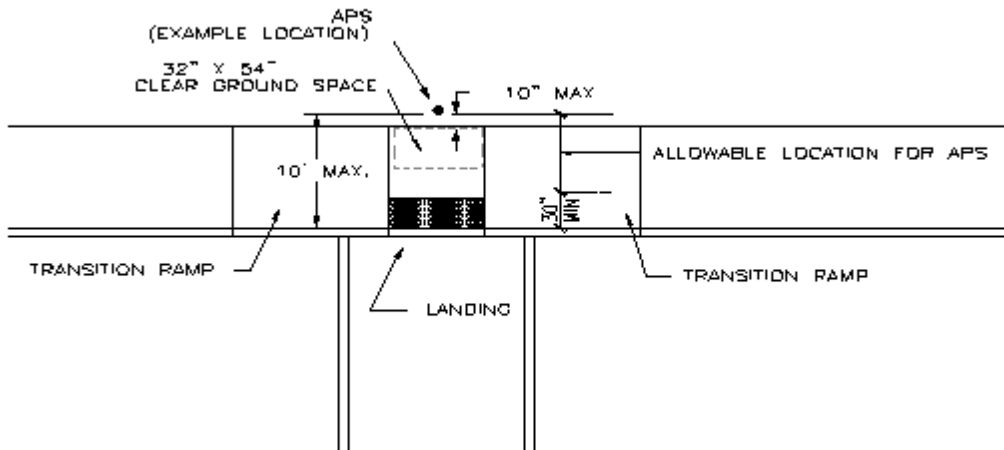


**Figure X02.5 A Curb Ramp APS Zones**

Curb ramps at an intersection with APS zones indicated in plan.

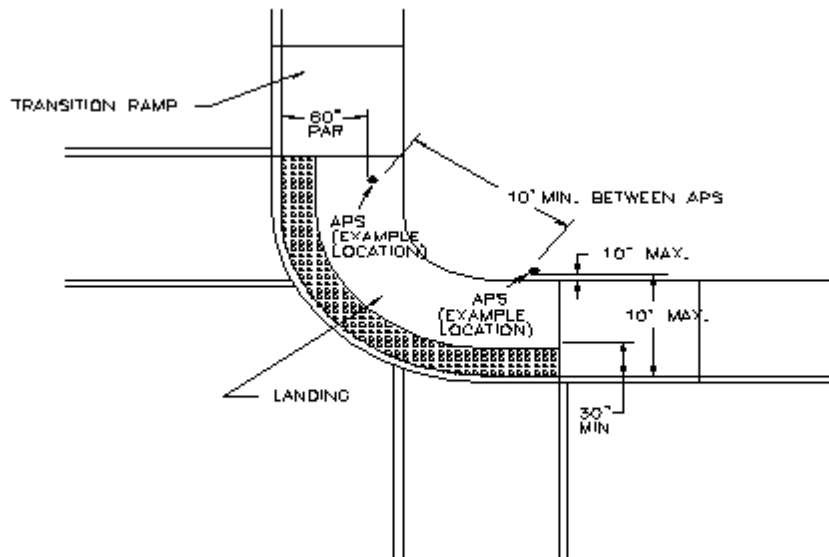
**EXCEPTION:** If the requirement for separation cannot be met due to location requirements (A) through (G), two accessible pedestrian signal-related push buttons may be installed on a single pole. If installed on the same pole, the APS must be equipped to provide speech-transmitted data or other technology that delivers an unambiguous message about which crosswalk has the walk signal indication.

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**Figure X02.5 B Transition Ramp APS Zones**

Transition ramps at an intersection with APS zones indicated in plan.



**Figure X02.5 C Shared Curb Ramp APS Zones**

Shared ramp at an intersection with APS zones indicated in plan.

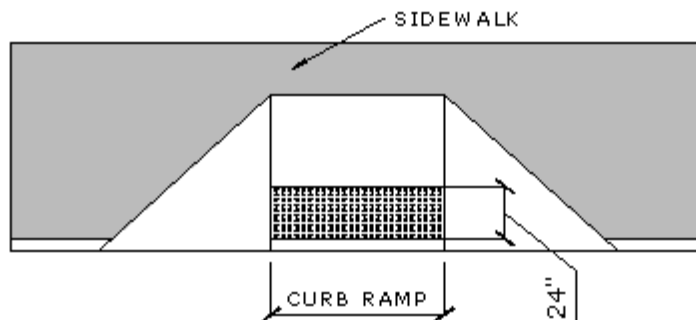
**X02.5.6.2 Detectable Warnings.** Curb ramps at medians and refuge islands, and locations where medians and refuge islands are cut through level with the street at crosswalks, shall have detectable warnings complying with §X02.5.7.

**X02.5.7 Detectable warnings.**

**X02.5.7.1 General.** Where required, detectable warnings shall comply with §X02.5.7.

**X02.5.7.2 Application.** Detectable warnings shall be provided only at the following locations:

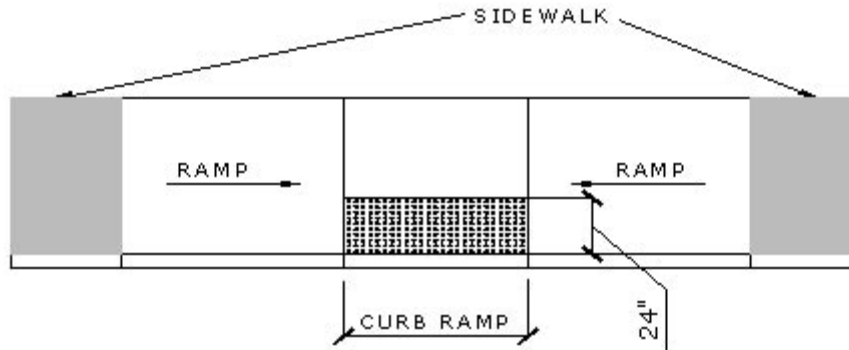
**(A)** Where a sidewalk crosses a vehicular way, excluding unsignalized driveway crossings.



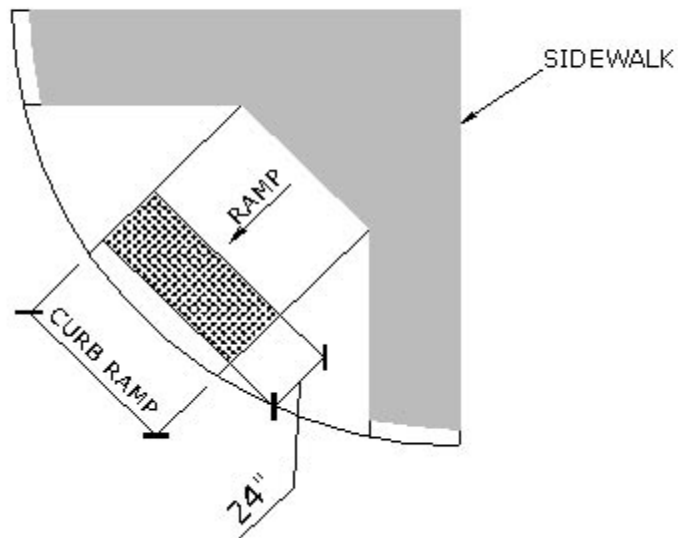
**Figure X02.5 G Detectable Warning at Curb Ramp**

Illustrates 24" deep detectable warning located near the street edge of the curb ramp.

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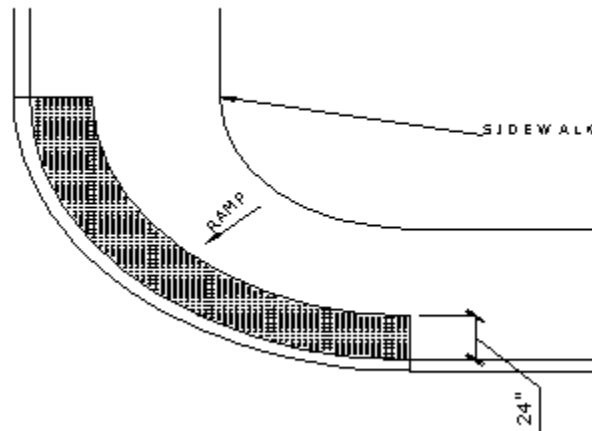


**Figure X02.5 H Transition Ramp with Detectable Warning**  
Shows detectable warning at a transition ramp.

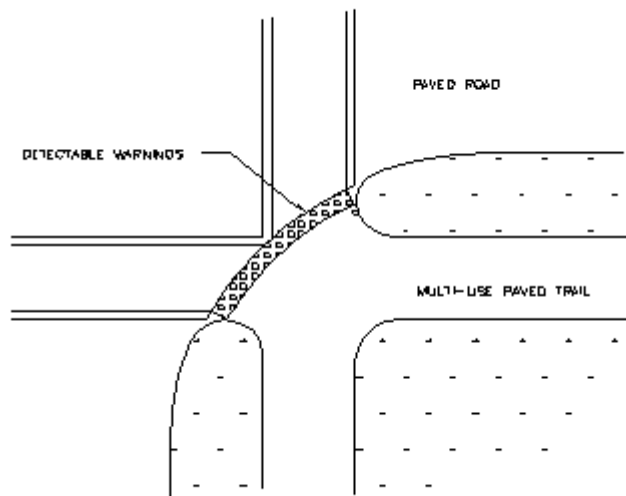


**Figure X02.5 I Shared Curb Ramp with Detectable Warning**  
Shows detectable warning at a shared curb ramp.

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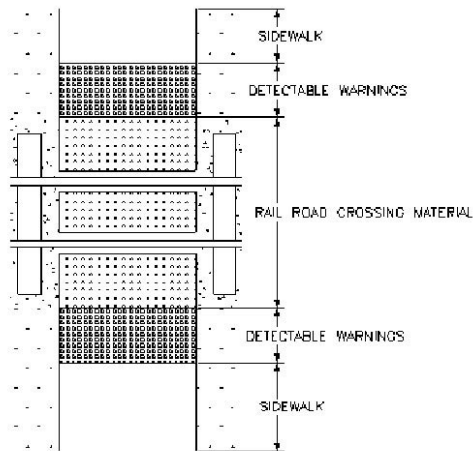
**Figure X02.5 J Detectable Warning at Blended Curb**  
Shows detectable warning at blended curb.



**Figure X02.5 K Detectable Warnings at Multi-Use Path**  
Plan view of a multi-use path and road intersection. Detectable warnings are indicated at the intersection.

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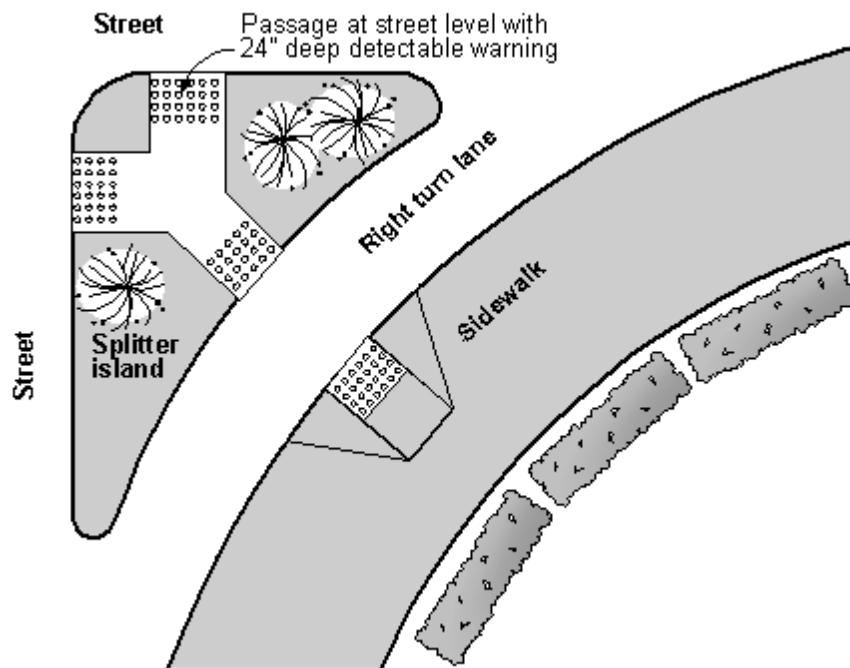
**(B)** Where a rail system crosses pedestrian facilities that are not shared with vehicular ways.



**Figure X02.5 L Detectable Warnings At Railroad Crossing**  
Plan view of detectable warnings at a railroad crossing.

(C) At reflecting pools within the public right-of-way, which have no curb or rim protruding above the walking surface.

(D) At islands and medians that are cut through level with the roadway.



**Figure X02.5 M Refuge Island with Detectable Warnings**

Plan view of pedestrian passage that cuts through a refuge island at the same level as the street. Detectable warnings are shown at each end of the cuts.

**Advisory:** Where islands or medians are less than 4 feet wide, the detectable warning should extend across the full length of the cut through the island or median.

(E) Where required by proposed ADAAG Chapter 10.

**Discussion:** The detectable warning is a unique and standardized surface intended to function much like a stop sign to alert pedestrians who are blind or visually impaired to the presence of hazards in the line of travel. The truncated dome surface should not be used for wayfinding or directional information. The removal of curbs, which provided a clearly defined indication of the location of the edge of the street, has caused difficulty for individuals who are blind or visually impaired. The locations above were identified by the committee as being appropriate for the installation of detectable warnings.

*Detectable warnings are not required at unsignalized driveways based on comments to the committee that installation at driveways would make it harder to truly identify the streets.*

### **X02.5.7.3 Specifications.**

**(A) Size.** Detectable warnings shall be 24 inches (610 mm) in the direction of travel and extend the full width of the curb ramp or flush surface.

**Discussion:** *Research has confirmed that for persons who are visually impaired, there is a high level of risk of inadvertent street entry associated with the presence of curb ramps, particularly those having slopes of 1:12 or less (Bentzen, B. & Barlow, J., 1995; Hauger, S., Rigby, J., Safewright, M. and McAuley, W., 1996). It has been demonstrated that detectable warnings complying with existing ADAAG §4.29.2 are highly detectable by persons with visual impairments, and can provide an effective stop signal for persons who are blind or visually impaired which can be used to determine the end of the sidewalk and the beginning of the vehicular way. Research has also demonstrated that 24 inches of detectable warning material is sufficient to enable persons who are blind or visually impaired to stop on 90 percent of approaches (Peck, A. & Bentzen, B., 1987).*

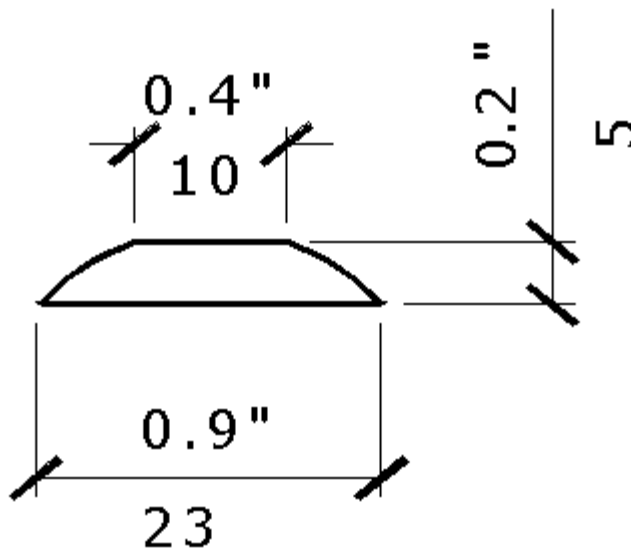
*Research has now been conducted which addresses concerns about safety of detectable warnings for individuals with mobility impairments, indicating that detectable warnings on slopes have minimal impact on the safety and ease of travel for persons having physical disabilities (Bentzen, B., Nolin, T., Easton, R., Desmaris, P., and Mitchell, P., 1994; Hauger, et al, 1996). On the basis of this research, the committee voted to recommend the installation of detectable warnings at sidewalk/street transitions.*

*A few committee members did not fully support this recommendation, feeling there might be a significant adverse impact on safety and ease of travel for wheelchair users. The committee discussed threshold ramp grade requirements where only the gentlest ramps (1:15 and flatter) would have detectable warnings. Nonetheless, because such a requirement would tend to confuse both designers and builders and would give inconsistent information to individuals who are visually impaired, the committee voted to require detectable warnings on all sidewalk/street transitions regardless of slope.*

**(B) Location.** The detectable warning shall be located so that the edge nearest the curb line or other potential hazard is 6 to 8 inches (150 to 205 mm) from the curb line or other potential hazard, such as a reflecting pool edge or the dynamic envelope of rail operations.

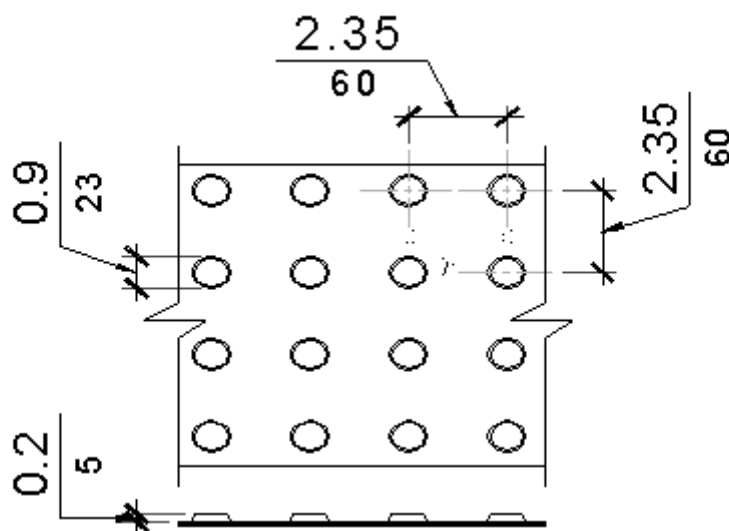
**Discussion:** Placement of the detectable warnings a maximum of 6 to 8 inches back from the curb line gives some latitude in placement of the detectable warning. Where curbing is embedded at the sidewalk/street junction, this will not need to be replaced. In addition, allowing 6 to 8 inches of ramp (or curb) surface beyond the detectable warning will give pedestrians who are blind an additional stopping distance before they step into the street. It will also enable some persons having mobility impairments to make a smoother transition between the street and the curb ramp.

**(C) Dome size and spacing.** Truncated domes shall have a diameter of 0.9 inch (23 mm) at the bottom, a diameter of 0.4 inch (10 mm) at the top, a height of 0.2 inch (5 mm) and a center-to-center spacing of 2.35 inches (60 mm) measured along one side of a square arrangement.



**Figure X02.5 N Dome Section**

Section of dome from a detectable warning. Drawing shows height, top and bottom dimensions.



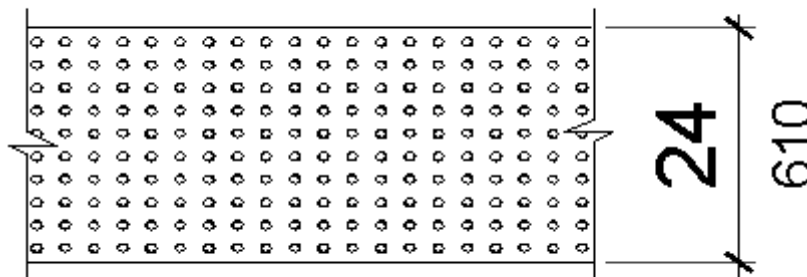
**Figure X02.5 O Dome Spacing**

Plan and section views of detectable warning domes and their relative spacing on the x and y axis.

**Discussion:** *The size and spacing of the domes affect detectability by pedestrians who are blind. This specification is much more detailed than that in the current ADAAG, and offers much less latitude in dimensions and spacing. It ensures that the dome spacing is the maximum currently known to be consistent with high detectability. The diameter measurement in the present ADAAG is ambiguous if the user of these guidelines is not told whether the diameter is to be measured at the bottom or the top of the truncated domes. As currently implemented by most U.S. manufacturers, it is the bottom diameter that measures 0.9 inch, and the top diameter varies widely. The diameter of the dome where it touches the sole of the shoe affects detectability, and the top diameter of 0.4 inch, in the suggested language, is based on current research (see below).*

*A few members of the committee felt that there needed to be more flexibility in the size and shape of the domes. Some suggestions were that the domes be a semi-spherical shape using a 1-inch base, or a "butte" design with a larger top diameter (0.6 inch). Wider spacing, up to 3 inches, between domes was also suggested. It was felt that the wider gaps or lanes between the domes would better accept the wheel path of most wheelchairs so that users would not need to "bump" over the domes. However, there was no evidence that either of these alternatives would be better or worse than the proposed standard in terms of ease of traversal by wheelchair users and detectability for individuals who are blind or visually impaired. The proposed standard is supported by research on spacing and detectability completed in Japan in 1998. The committee voted to recommend the parallel alignment of domes as well as the two-foot depth of the detectable warning, in consideration of minimizing bumpiness for wheelchair users.*

**(D) Dome alignment.** Domes shall be aligned on a square grid in the predominant direction of travel to permit wheels to roll between domes.



**Figure X02.5 P Dome Alignment**

Plan view of a detectable warning surface showing domes aligned in rows, not skewed diagonally.

**Discussion:** *This specification ensures the greatest degree of safety and negotiability for persons with mobility impairments. It requires square alignment, to give persons using wheeled mobility aids the greatest chance of being able to avoid the truncated domes.*

**(E) Visual Contrast.** There shall be a minimum of 70 percent contrast in light reflectance between the detectable warning and an adjoining surface, or the detectable warning shall be “safety yellow”. The material used to provide visual contrast shall be an integral part of the detectable warning surface.

**Advisory:** *Both domes and the underlying surface must meet the contrast requirement. Visual contrast shall be measured in accordance with existing ADAAG, A4.2.9.2, appendix.*

**Discussion:** *For pedestrians with low vision, a visual contrast will provide information about the location of the detectable warning and the street edge. Safety yellow is a color that is standardized for use as a warning in the pedestrian/highway environment. It has been demonstrated to be highly detectable when used as a detectable warning in contrasts as low as 40 percent (Bentzen, B.L., Nolin, T.L. & Easton, R.D. (1994) Detectable warning surfaces: Color, contrast and reflectance. Final report, US Department of Transportation, Federal Transit Administration, Volpe National*

*Transportation Systems Center. VNTSC-DTRS 57093-P-80546.) ADAAG currently recommends a 70 percent contrast, dark-on-light or light-on-dark.*

*There was concern on the part of some members that it may be impossible to develop and maintain a minimum 70 percent visual contrast with the materials commonly used in construction of public street improvements, such as portland cement concrete. The committee agreed that visual contrast was essential but some members suggested that a lesser level of contrast could be as effective and more economical to provide than a minimum 70%.*

*Some members of the committee noted that safety yellow is not conspicuous to many persons with low vision, and that therefore high visual contrast should be the sole measure of whether detectable warnings are visible.*

**Research need:** *The committee encourages the transportation industry to broaden its testing of color and contrast of typical construction materials and to include pedestrians with vision impairments in the development of standards. Work performed at The Lighthouse in New York City and research by Bentzen et al. (1994) can provide a useful basis for future research.*

## **X02.5.8 Pedestrian overpasses and underpasses.**

**X02.5.8.1 General.** Where pedestrian overpasses and underpasses are provided to cross public rights-of-way, each shall meet the requirements set forth in this section.

**X02.5.8.2 Pedestrian access route.** Where pedestrian overpasses and underpasses are provided as a primary means to cross a street, they must have continuous pedestrian access routes and shall provide an accessible connection to adjacent pedestrian facilities. When the continuous pedestrian access route of an overpass or underpass requires a ramp (i.e. with a grade greater than 1:20) and the vertical rise is greater than five feet, an elevator complying with proposed ADAAG §407.2 is required.

**X02.5.8.3 Stairs.** Stairs, when provided, shall comply with proposed ADAAG §504.

**X02.5.8.4 Signs.** Signs, where provided, shall be both tactile and visual and shall comply with proposed ADAAG §703.2.

**X02.5.8.5 Lighting.** Reserved.

**Advisory:** *When artificial lighting is used to illuminate a pedestrian underpass, variable level lighting should be considered to maximize accessibility for persons with low vision. The difference between external lighting conditions and those in the overpass or*