

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

Providing Information to Pedestrians

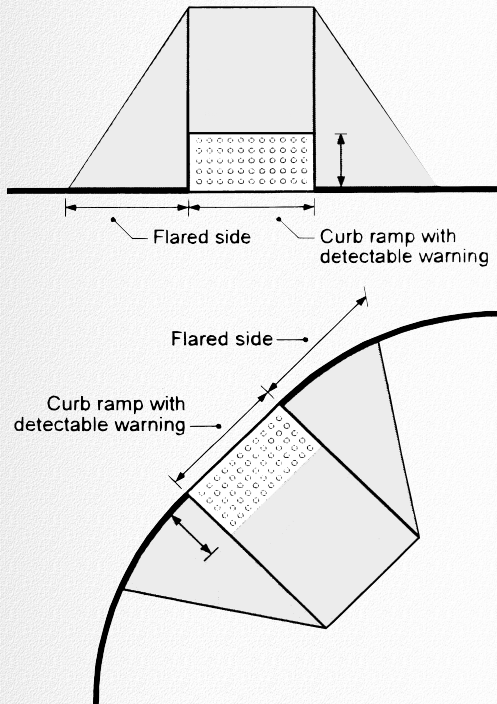


Figure 6-1. Curb ramp designs showing 610 mm (24 in) detectable warning (U.S. Access Board — Detectable Warnings: Synthesis).

To accommodate the information needs of all pedestrians, it is important to provide information that can be assimilated using more than one sense. For example, placing a detectable warning at the bottom of a curb ramp identifies the transition between the sidewalk and the street for people with vision impairments. The detectable warnings also provide an unmistakable stopping place to children and people with cognitive impairments. An accessible pedestrian signal with a locator tone responsive to ambient sound, that is quiet in the context of the environment, lets approaching pedestrians who are blind

know there is a push-button and tells them where it is located. When pushed, the information on the walk signal phase can include audible tones, verbal messages, and vibrotactile information. It also reminds sighted pedestrians to use the button. When the tone changes, indicating the onset of the WALK interval, people who are not watching the pedestrian signal, or who cannot see it because of glare, know that the WALK signal has begun. Redundancy and multiplicity of formats increase the likelihood that all users, including people with vision impairments, will be able to make informed traveling decisions.

Examples of pedestrian information range from pedestrian signage to accessible pedestrian signals. Whenever possible, transportation agencies should standardize the information formats used to provide information to pedestrians. If the information formats vary among locations, pedestrians may become confused and place themselves in dangerous situations. For example, pedestrians with vision

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

impairments may be misled if similar sounds are used to convey different meanings at different locations (e.g., beep indicates a North–South crossing in one area and an East–West crossing in another area). Ideally, all pedestrian information formats should be standardized nationally. For example, the newest revision of the Manual on Uniform Traffic Control Devices (MUTCD) will contain standardized guidance for accessible pedestrian signals. Where national standards have not been developed, transportation agencies are strongly encouraged to develop and implement State, regional, or local standards. The Institute of Transportation Engineers (ITE) is developing a toolbox that will take advantage of ongoing research to provide additional guidance to engineers and planners.

6.1 Non-visual information

All pedestrians must obtain a certain amount of information from the environment to travel along sidewalks safely and efficiently. Most pedestrians

obtain this essential information visually, by seeing such cues as intersections, traffic lights, street signs, and traffic movements. People with vision impairments also use cues in the environment to travel along sidewalks. For example, the sound of traffic, the presence of curb ramps, and the absence of buildings can identify an upcoming intersection for people with vision impairments. Some pedestrians who are blind have also learned how to estimate distances and directions that they have walked to determine their location relative to desired destinations (Long and Hill, in Blasch et al., 1997).

Good design in the form of regularly aligned streets, simple crossing patterns, and easy to understand city layouts is generally the best method to provide good orientation cues for pedestrians with vision impairments. However, accessible information is sometimes needed to supplement existing information.

Some forms of non-visual information are permanent, such as the edge of the curb; other cues, such as the sound of traffic, are intermittent. Although the

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

sound of traffic is a very effective way for people with vision impairments to identify an intersection, it is unreliable, because cars are not always present. Another issue that affects the usefulness of non-visual information is related to how familiar a person is with the environment. For example, people who live near a midblock crossing with raised directional tiles may be able to easily identify the information because they have used it repeatedly and are familiar with its presence (Section 6.4.1). However, people who are unfamiliar with the area would be less likely to understand such a surface unless it has been standardized for such a purpose. The most effective information is easy to locate and intuitive to understand even for pedestrians who are unfamiliar with an area. People with vision impairments stress the importance of consistency in design because accessible information added to the environment is most useful “when used in consistent locations so that travelers can rely on its existence” and find it easily (Peck & Bentzen, 1987).

6.2 Pedestrian signs

The majority of pedestrian information is conveyed through signs and signals in the public right-of-way that are directed primarily at motorists. Although these signs and signals often affect pedestrians, they are usually not intended or positioned for pedestrian use. For example, the street name signs on many arterials are hung in the center of the intersection, and traffic signals on a one-way street are often missing for pedestrians traveling in the opposite direction. Pedestrians require information that is specifically directed to their own needs because their sight lines, viewpoints, and travel speeds are substantially different from motorists. Pedestrians may even be endangered when important safety information, such as a stop or yield sign, is not easily seen or detected from the sidewalk corridor. Pedestrian signage should be consistent in format and in location. This enables people with cognitive impairments to learn to identify the information and understand the meaning. Without consistency,

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

pedestrian signs are difficult for many people to use and fully understand. Many European cities effectively provide street name information to pedestrians by placing signs on building walls in standard locations at each corner.

People with hearing impairments rely heavily on signs for navigational and safety information. It is recommended that transportation agencies also provide pedestrian safety information in audible, tactile, and/or vibrotactile formats for people who cannot use written information. Braille information may also be provided but is not a suitable substitute for more universally understood formats of

pedestrian information such as accessible pedestrian signals. Braille is less than ideal because users will have a hard time identifying the location of the information and because only about 10 percent of people who have vision impairments can read Braille. Indoors, the placement of Braille information signs should be standardized relative to doorways or other easily recognized features. In outdoor environments, the placement of Braille information signs should be standardized relative to doorways and other easily recognized features, following ADAAG. The standardized placement of Braille information in outdoor environments, however, is much more difficult to achieve than indoors, and thus, the use of an audible locator tone in conjunction with Braille information is almost always essential.

To improve safety for all pedestrians, information conveyed through graphics and written signs should be:

- Highly legible to pedestrians, including people with low vision;

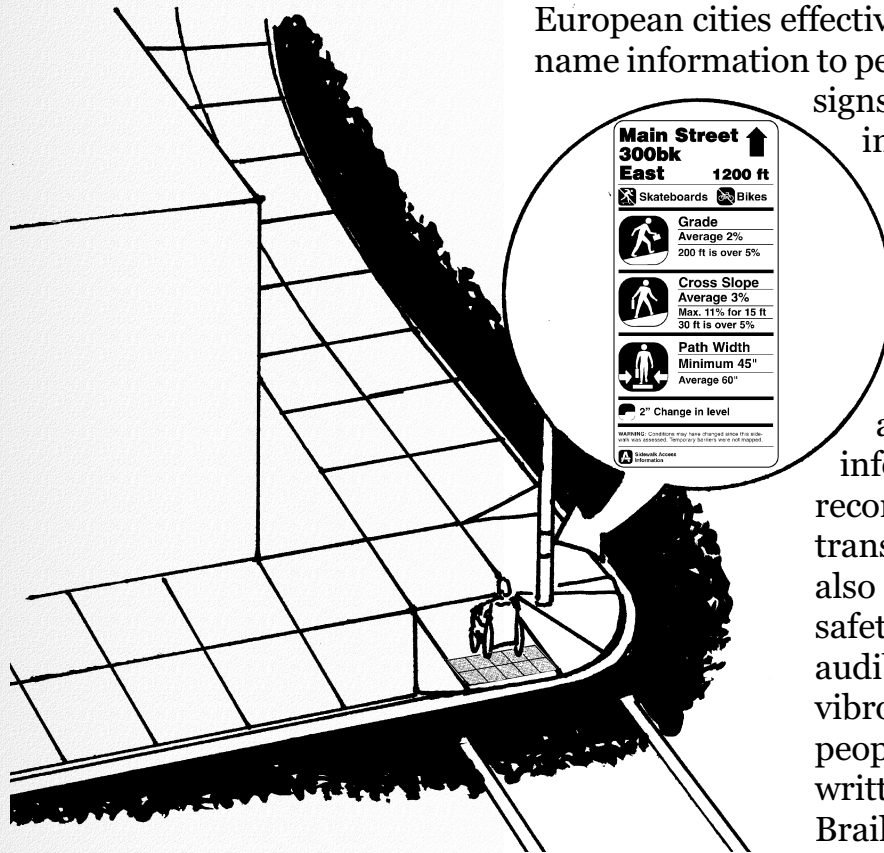


Figure 6-2. This sign containing sidewalk access information is mounted to a post at a height and location that does not protrude into the pedestrian zone. As a result, this wheelchair user is provided with helpful information about the steep grade ahead.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

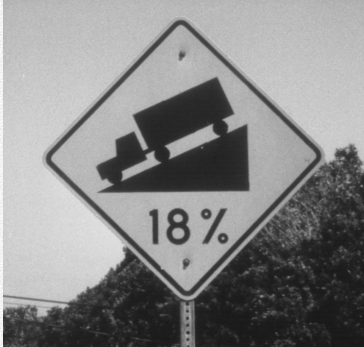


Figure 6-3. Pedestrians would benefit from signage that objectively describes upcoming conditions such as steep grades. Currently, this type of information is provided to motorists only.



Figure 6-4. This type of sign is provided in some trail environments. Pedestrians could benefit from objective sidewalk information such as this sign that indicates an upcoming steep grade.

- Designed using simple standardized formats;
- Placed in locations, such as on building walls, that do not limit the effective width of the sidewalk or block the clear path of travel for pedestrians including those who use assistive devices for mobility;
- Provided in alternative formats to be useable and accessible to all pedestrians, with or without disabilities;
- Placed at locations and at heights that do not protrude into the pathway and create obstructions; and
- Designed according to the MUTCD and ADAAG sign standards to ensure visibility and usability by pedestrians.

Strong consideration should also be given to including signs specifically designed to assist pedestrians. For example, warning signs, similar to

standard traffic warning signs, could provide information about potentially difficult sidewalk characteristics such as steep grades. Motor vehicle signs are not sufficient because the conditions that are significant for pedestrians (e.g., steep grades) may differ from those that affect vehicular traffic. Providing more accurate and objective information to pedestrians about the conditions that they will encounter enables them to make more informed decisions about which routes of travel are most appropriate to their own abilities. The pedestrian oriented signs containing access information (shown in Figure 6-2) were developed as part of a prototype Sidewalk Assessment Process (see Chapter 11). To date, these types of signs have not been introduced into the MUTCD. Inclusion of these signs in this guide does not constitute FHWA endorsement.

6.3 Detectable warnings

All people obtain information about the environment in a variety of ways. Therefore, the most accessible information

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

is conveyed in more than one format. For example, detectable warnings can generally be identified by texture. However, if they are made with a material that differs in resiliency and color from the surrounding surface, detectable warnings can also be detected visually or by the sound of the cane or foot contacting the surface. The color contrast of a detectable warning can help people of short stature, children, and wheelchair users to locate the curb on the opposite corner (McAuley, Hauger, Safewright, & Rigby, 1995).

A detectable warning is defined in ADAAG Section 3.5 as, “a standardized surface feature built in or applied to walking surfaces or other elements to warn visually impaired people of hazards on a circulation path” (ADAAG, U.S. Access Board, 1991). Research shows that detectable warnings designed according to ADAAG are highly detectable by people with vision impairments (Peck & Bentzen, 1987). Other surfaces, such as aggregate and grooves, are less detectable and less easily understood by people with vision impairments. Consistency and uniqueness

are key factors in how effective a warning is to the user. Detectable warnings are only beneficial to people with vision impairments if they convey a unique message and are placed in a standardized location. Therefore, detectable warnings should always be designed according to ADAAG specifications. Truncated domes (detectable warnings) are required at transit facility platform edges and are familiar to users as an underfoot warning of impending change.

6.3.1 Design specifications for detectable warnings

According to ADAAG, detectable warnings should consist of raised truncated domes with a:

- Bottom diameter of 23 mm (0.9 in);
- Top diameter of 10 mm (0.4 in);
- Height of 5 mm (0.2 in);
- Center-to-center spacing of 60 mm (2.35 in); and
- Visual contrast.

Detectable Warnings:

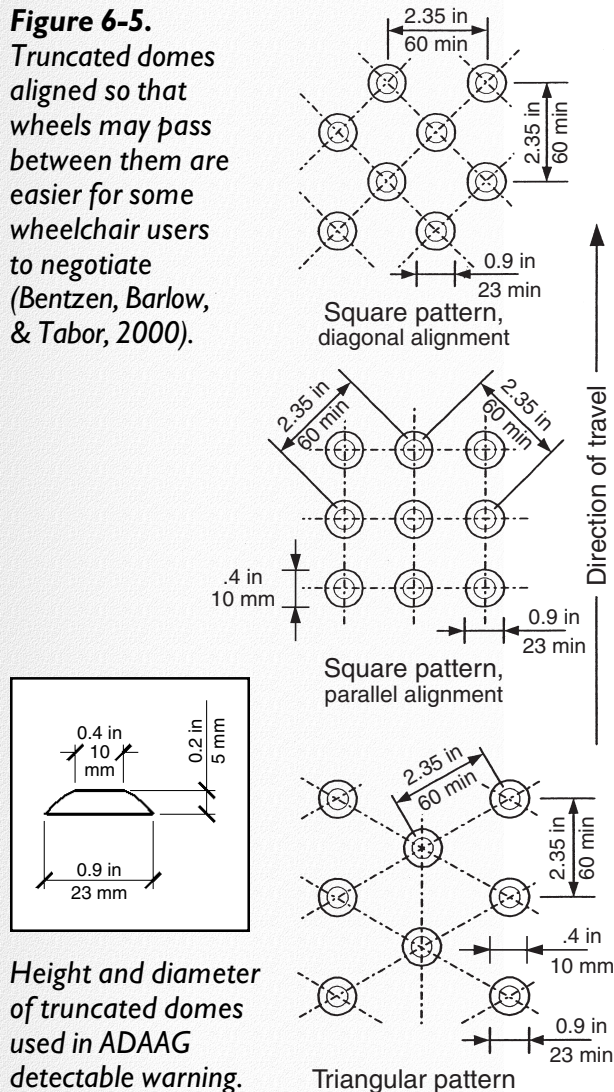
- Diameter of 23 mm (0.9 in) at the bottom of the dome
- Diameter of 10 mm (0.4 in) at the top of the dome
- Height of 5 mm (0.2 in)
- Center-to-center spacing of 60 mm (2.35 in) with visual contrast
- Visual contrast

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

Figure 6-5. Truncated domes aligned so that wheels may pass between them are easier for some wheelchair users to negotiate (Bentzen, Barlow, & Tabor, 2000).



ADAAG specifies truncated domes over rounded domes because they provide greater access to people with mobility impairments. In addition, the color of the detectable warning should contrast visually with adjoining surfaces; either light on dark, or dark on light. The ADAAG Appendix, Section A29.2 recommends that the material used to provide contrast should contrast by at least 70 percent. Contrast is determined by the following formula (ADAAG, U.S. Access Board, 1991):

$$\text{Contrast} = [(B1 - B2)]/B1 \times 100$$

Where,

B1 = light reflectance value (LRV) of lighter area

B2 = light reflectance value (LRV) of darker area

Detectable warnings that are installed indoors should also differ

in resiliency. This stipulation only applies to indoor surfaces, because many materials, such as rubber, that are used to provide contrasting resiliency do not wear well in outdoor areas, especially in harsh winter environments. However, where environmental conditions are favorable, differences in resiliency should also be incorporated in outdoor locations.

Detectable warnings can be laid out on a diagonal grid, a triangular grid, or a square grid. All three designs are equally detectable by people with vision impairments. However, square or triangular grids are recommended because they allow enough space for wheelchair users to roll between the domes. A list of companies that manufacture detectable warnings is compiled in Appendix D.

6.3.2 Installation recommendations for detectable warnings

Care should be taken when selecting and installing detectable warnings. Truncated domes that are uneven or too high will cause some pedestrians, including

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER



Figure 6-6. A snowplow with a brush that is used to remove snow from sidewalks in Anchorage effectively removes snow from truncated dome surfaces.

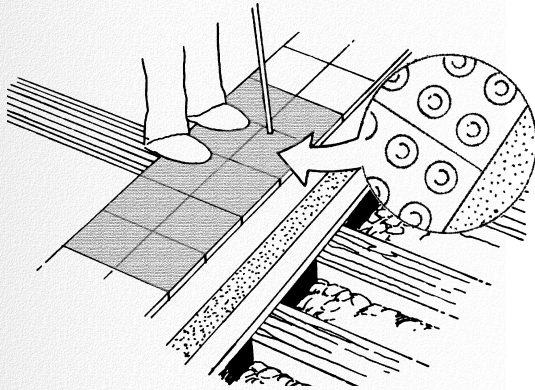


Figure 6-7. ADAAG requires truncated domes to be installed at all transit platforms.

people who use wheelchairs or walking aids as well as inline skaters, to become unstable.

Some models of truncated domes cannot withstand snow plowing or the destructive effects of snow and ice. Therefore, the successful installation will require some creativity. For example, in Anchorage,

Alaska, a snowplow with a brush is used to clear sidewalks with detectable warnings. The durability and practical application of truncated domes is a topic in need of further research.

6.3.3 Recommended locations

A 610 mm (24 in) strip of detectable warnings should be used in the following locations to improve access for people with vision impairments:

- At the edge of depressed corners;
- At the border of raised crosswalks and raised intersections;
- At the base of curb ramps;
- At the border of medians and islands; and
- At the edge of transit platforms and where railroad tracks cross the sidewalk.

These locations warrant detectable warnings because if unidentified, they represent potential hazards for pedestrians with vision impairments. Detectable warnings are intended to let people with vision impairments know that they are approaching a potentially hazardous situation. For this reason, it would not be appropriate to use detectable warnings to convey other information such as the location of a midblock crossing. It's recommended that truncated domes be placed 152 mm to 200 mm (6 in to 8 in) from the bottom of the ramp. This placement may be more usable by pedestrians in wheelchairs.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

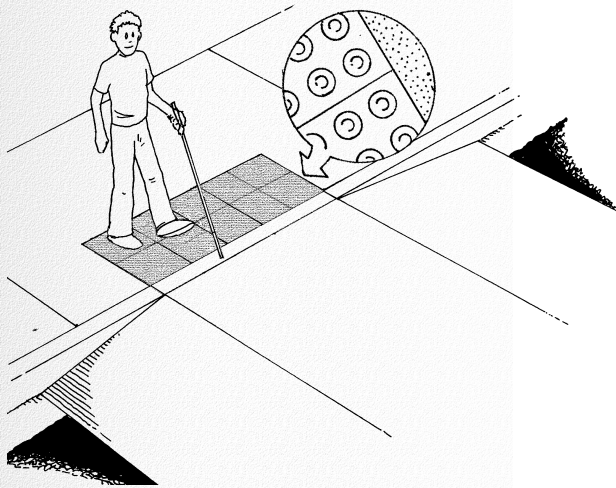


Figure 6-8. A 610 mm (24 in) strip of detectable warnings should be installed at the edge of a raised crosswalk to identify the transition between the sidewalk and street.

Case Study 6-1

Austin, Texas, has a long standing commitment to installing detectable warnings at curb ramps primarily in response to feedback from community organizations representing people with vision impairments.

Currently, only transit platforms are required by ADAAG to include detectable warnings. The requirement for detectable warnings at curb ramps has been temporarily suspended. However, detectable warnings are also needed at the edge of depressed corners, and at the border of raised crosswalks, raised intersections, cut-through medians, and cut-through islands because the transition from the sidewalk to the street is difficult for people with vision impairments to identify.

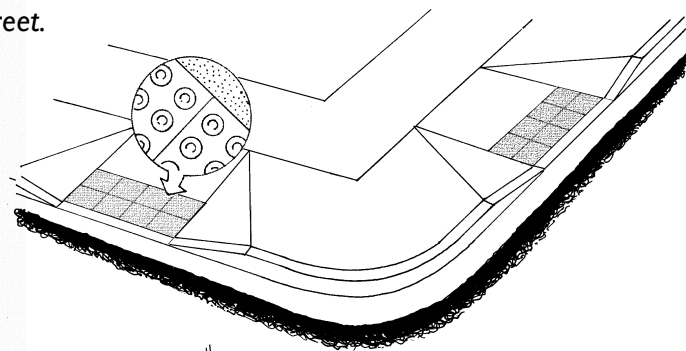


Figure 6-9. GOOD DESIGN: A 610 mm (24 in) strip of detectable warnings should be installed at the bottom of a curb ramp to indicate the transition from the sidewalk to the street.

Detectable warnings are also strongly recommended at the base of curb ramps, as well as at the edge of ramped medians and islands (see Sections 8.7 and 8.8), because ramped surfaces are more difficult to identify than a hard curb. Research to determine the impact of curb ramps on people with vision impairments has shown that on curb ramps that comply with ADAAG 4.7 (i.e., have a maximum grade of 8.3 percent), 48 percent of people with vision impairments cannot reliably detect the ramp to street transition (Bentzen and Barlow, 1995).

When detectable warnings are installed on curb ramps, only the lower 610 mm (2 ft) of the curb ramp should be covered rather than the entire ramp to maximize detectability and minimize the negative impacts on people who rely on wheeled devices for mobility. In some cases, it may be beneficial to set the detectable warning back 152 mm to 200 mm (6 in to 8 in) from the curb. This allows wheelchair users to gain momentum before traveling over the truncated domes. It also gives people with vision impairments additional

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

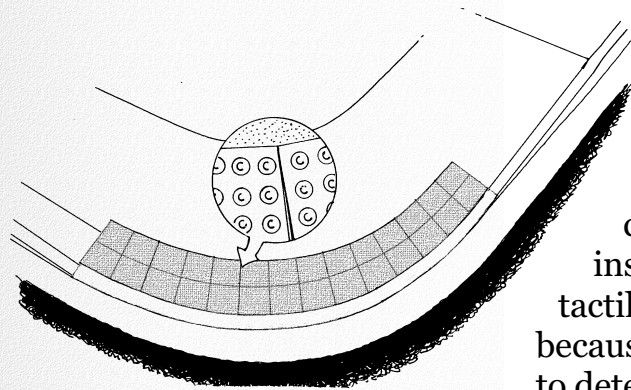


Figure 6-10. GOOD DESIGN:
A 610 mm (24 in) strip of detectable warnings should be installed at the boarder of a depressed corner to identify the transition between the sidewalk and the street.

time to react to the detectable warning before they reach the street. Smooth surfaces should be provided adjoining to the detectable warning to maximize contrast. For example, it is better to install smooth concrete next to raised tactile surfaces than aggregate concrete because the change in texture is easier to detect.

6.3.4 Grooves

Grooves cannot be reliably detected by people with vision impairments and should not be used as a substitute for detectable warnings. One study determined that concrete panels with various groove configurations had only a 9 to 40 percent rate of detectability (Templer, Wineman, and Zimring, 1982). Cane users may confuse them with the grooves between sidewalk panels and cracks in the sidewalk.

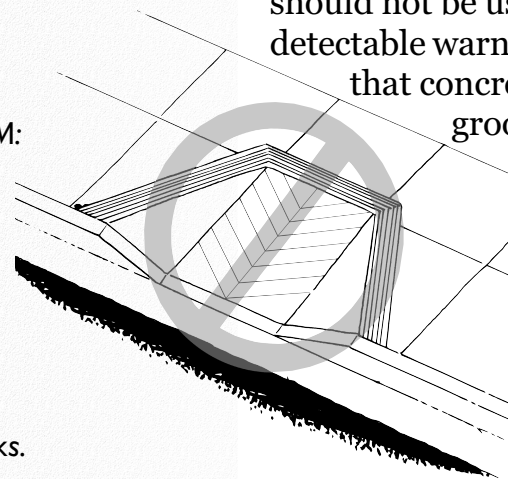


Figure 6-11. POTENTIAL PROBLEM:
Grooves are not the equivalent of a detectable warning because people with visual impairments can easily confuse them with sidewalk expansion joints or cracks in the sidewalks.

Long white cane users often travel using a tapping technique and only scrape the tip of the cane along the ground when more in-depth exploration of an area is warranted. Other times they may use a technique of keeping the cane in constant contact with the ground. However, canes can generally only detect grooves if the constant contact technique is used to scan the environment. For this reason, grooves are generally ineffective to warn of a potentially hazardous situation, such as an intersection. In addition, dirt, snow, ice, weeds, and other debris in the sidewalk environment are likely to collect in grooves and obscure any warning intended. For these reasons, grooves should not be relied upon to warn pedestrians of potentially hazardous situations, such as the approach of an intersection.

6.4 Directional surfaces

Directional surfaces, which are distinct from detectable warning surfaces, may be used to convey wayfinding information

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

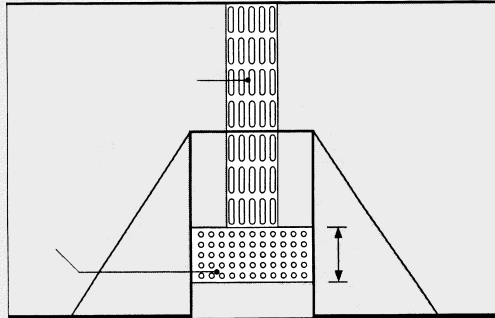


Figure 6-12. Diagram showing requirements for guidance surface and detectable warning on curb ramps in New Zealand.

to pedestrians with vision impairments. Wayfinding information provides orientation clues for people with vision impairments. This type of information can be used to delineate paths across open plazas, crosswalks, and complex indoor environments, such as transit stations or the location of a crossing that may not be in an expected location such as at roundabouts and midblock crossings. Directional surfaces are only useful to pedestrians with vision impairments if the information is identifiable and easy to understand. In addition, each type of surface should be used in a unique and standardized format. The International Organization for Standardization (ISO) committee is currently developing standards for directional surfaces.

6.4.1 Raised directional tiles and pavers

Raised directional textures, such as raised directional tiles or pavers, are a common type of wayfinding information used in Europe and Asia. At the present

time, they are less common in the United States. The design of raised directional textures uses a truncated surface, similar to detectable warnings; however, rather than domes, long raised bars are laid out in parallel rows. Raised directional tiles/pavers can be used to identify crossing locations, such as midblock crossings or roundabout crossings, which are often set three to four car lengths back from the actual intersection. On a sidewalk, directional tactile tiles/pavers are laid across the entire sidewalk corridor with the long raised bars perpendicular to the user's path of travel. When the pedestrian crosses the bars, they are an indication that the long raised bars lead to a pedestrian crossing.

Truncated dome surfaces should be used only as a warning, not to provide orientation information.

6.4.2 Intersection guidestrips

Another form of wayfinding information is the intersection guidestrip. This device is installed in the center of

Case Study 6-2

Many countries in Europe have begun to experiment with tactile surfaces for wayfinding. France, for example, has begun using tactile surfaces to mark businesses in commercial districts.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

the crosswalk to help users maintain the proper crossing alignment. Guidestrips can be raised or indented depending on the design. Guidestrips improve orientation for people with vision impairments at complex intersections where travel patterns are unusual (San Francisco Bureau of Engineering, 1996). Guidestrips are only beneficial to people who know they are there and understand how to use them. Additional research is needed to determine if intersection guidestrips have a negative impact on bicyclists.

already crossing to complete their crossing. Pedestrians at corners should not start a new crossing; and

- DON'T WALK interval — the interval when pedestrians are not permitted to cross.

Where deemed necessary to provide visible pedestrian signals, audible or vibrotactile information should also be used. Accessible pedestrian signals (APS) provide redundant audible, vibrotactile, and/or transmitted information about the status of the coinciding visual pedestrian signal. Providing crossing information in a variety of formats enhances recognition and understanding of the information by all pedestrians, particularly individuals with vision or cognitive impairments and young children. Accessible pedestrian signals can provide a variety of information in addition to timing (when the signal cycle allows pedestrians to cross the street). Audible wayfinding tells which roads intersect at the junction and orientation information such as the directional

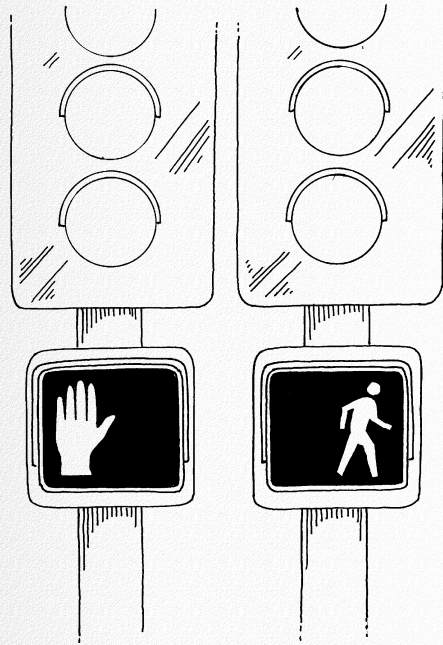


Figure 6-13. GOOD DESIGN: Pictorial symbols are easier to understand for people with cognitive impairments, children, and people who do not speak English.

6.5 Accessible pedestrian signals

Pedestrian signal indications are special types of traffic signals that are used to control pedestrian traffic patterns and movements (U.S. Department of Transportation, 1988). They consist of a series of signals to indicate:

- WALK interval — the interval designated for pedestrians to cross;
- Clearance interval — the interval designated for pedestrians who are

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

heading of each crosswalk. If the accessible pedestrian signal includes a pedestrian actuated control device, it should be easy to manipulate and readily identifiable and accessible by all pedestrians. New standard pedestrian signals use icons rather than words to convey information, which is easier to understand for most pedestrians, especially those with cognitive impairments and people who do not understand English.

There are three main types of accessible pedestrian signals that rely on a variety of information formats including audible broadcast, tactile, vibrotactile, and receiver-based systems. The following sections will evaluate three primary types of accessible pedestrian signals:

- Pedestrian signal indicators with automated signal phasing (fixed time signals);
- Pedestrian actuated signal devices; and
- Signals transmitted from the vicinity of the pedestrian signal to a personal receiver.

More detailed information about accessible pedestrian signals is available in a 1998 review by Bentzen and Tabor. The report provides an analysis of different types of accessible pedestrian signals, contains information regarding manufacturers, and is available from the U.S. Access Board (Bentzen & Tabor, 1998).

6.5.1 Installation recommendations

At many signalized intersections, people with vision impairments rely on the surge of parallel traffic to indicate the onset of the WALK interval. However, this method is unreliable at intersections with low traffic volumes, where there are unreliable auditory cues, high volumes of turning vehicles, or complex pedestrian crossings.

The implementing regulation under Title II of the Americans with Disabilities Act requires that all facilities constructed or altered after January 26, 1992 be designed and constructed to be accessible to people with disabilities (U.S. Department of Justice, 1991a). Therefore, all newly installed

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

pedestrian signals should have accessible design features. The Transportation Equity Act for the 21st Century (TEA-21) further supports the installation of accessible pedestrian signals by stipulating that the installation of audible signals and signs be included in new transportation plans and projects, where necessary, for safety (TEA-21, 1999).

In addition to including accessible pedestrian signals in all new construction, it is also recommended that existing signal devices that are not accessible be prioritized for replacement. The priorities for determining where existing pedestrian signals should be improved include:

- Complex or irregularly shaped intersections;
- Intersections experiencing high volumes of turning traffic;
- Signalized intersections where traffic sounds are sporadic or masked by ambient noise;
- Intersections that have vehicular actuation of the traffic signals;

- Intersections with complex signal phasing;
- Major corridors leading to areas of fundamental importance such as post offices, courthouses, and hospitals;
- Exclusive pedestrian phase areas, such as motorist stopped in all directions; and
- Locations requested by people with vision impairments (Bentzen & Tabor, 1998).

6.5.2 Fixed timed signals (pedestrian signal indicators with automated signal phasing)

Audible pedestrian signals mounted on pedestrian signal indicators with automated signal phasing are the most common type of accessible pedestrian signal in the United States today. They emit sounds such as a bell, buzz, tone, or bird call (typically “cuckoo” and “chirp”) to alert pedestrians to the WALK interval

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER



Figure 6-14. GOOD DESIGN: In addition to providing audible and vibrotactile information, Swedish pedestrian signals include a simple tactile map of the pedestrian crossing. This intersection has a median and three lanes of traffic.

(i.e., during the steady WALK signal). Some models use one sound to indicate North/South crossings and another sound to indicate East/West crossings. The different sounds alert pedestrians with vision impairments to which crosswalk at an intersection has the WALK interval. However, the success of this system requires that the streets be oriented according to cardinal directions, that users know the orientation of the desired crosswalk, and that they remember the sound associated with crossing in the desired location. Even in areas where such signals are standardized, confusion is reported in the *ITE Journal* (Bentzen, B.L., Barlow, J.M., and Franck, L., September 2000).

An accessible pedestrian signal should provide the best possible information to pedestrians, particularly those who have vision impairments. It must also be acceptable to others in the neighborhood and should not be vulnerable to weather or vandalism. When choosing an accessible pedestrian signal that uses tones, it is important to choose sounds that will not

be easily masked by wind and rain or confused with other sounds, such as birds or vehicle back-up tones.

Most of the accessible pedestrian signal technologies available in the United States today are equipped with volume control that responds automatically to ambient sound. Tones that are 2–5 dB above ambient sound at intersections can be heard 1.830 m to 3.66 m (72 in to 144 in) away by most people. This is loud enough for a locator tone and for a WALK signal at simple, regular intersections of moderate width. At such intersections, the pedestrian who is blind needs to know the onset of the WALK interval but does not normally require a beacon for guidance. Some devices are able to broadcast prerecorded speech messages from the pedestrian head telling the name of the street being crossed and the status of the signal cycle. However, it has been difficult to achieve good speech intelligibility in times of high traffic (Bentzen & Tabor, 1998).

At irregular or exceptionally wide intersections, some pedestrians with vision

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

impairments like to use the audible signal as a beacon to help them align and travel directly toward the opposite corner. Audible pedestrian signals that are currently available do not provide this beaconing very well because it comes simultaneously from both ends of the crosswalk. On-going research in Canada (C. LaRoache, University of Ottawa) is directed toward developing a signal that alternates between speakers at both ends of a crosswalk to provide directional information. Transmitted signals can also provide excellent directional information if they are designed and tuned so that real-time signal information can be picked up only when receivers are oriented in line with the crosswalk.

6.5.3 Pedestrian actuated signal devices

Pedestrian actuated signal devices are part of many traffic signals and require the user to push a button in order to activate a walk signal indicator and initiate a WALK

interval. Use of pushbuttons may also lengthen a WALK interval to provide adequate crossing time. Where pedestrian interaction with a pushbutton is necessary to initiate or lengthen a walk interval, a locator tone is necessary to inform blind pedestrians that pedestrian actuation is required and to indicate the location of the pushbutton. According to the MUTCD, pedestrian actuated signal devices should be installed:

- When a traffic signal is installed under the Pedestrian Volume or School Crossing warrant;
- When an exclusive pedestrian phase is provided (when motorists are stopped in all directions);
- When vehicular indications are not visible to pedestrians; and
- At any established school crossing with a signalized intersection (U.S. DOT, 1988).

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

6.5.3.1 Providing information in multiple formats

People with vision impairments are at a disadvantage at an intersection if they are unaware of the presence of pedestrian actuated signal devices. Even if they are aware of the signal, they may have slower starting times because of the time it takes to identify the pedestrian actuated control device, activate the signal, return to the curb, and realign themselves for crossing. Information needs to be accessible and usable by all pedestrians, including those with vision impairments. In addition, all pedestrians benefit from receiving safety information in multiple formats.

Audible, vibrotactile, and visual information can all be provided as part of the pedestrian actuated signal device. The preferred type of device in Australia, common also in many European countries, is an audio-vibrotactile pushbutton with a tactile arrow. This type of signal is now available in the United States.

The audible component of the pedestrian signal has a quiet, slowly

repeating tone or ticking sound throughout the DON'T WALK phase and the clearance interval. This locator tone informs pedestrians that they need to push a button to request a WALK interval, and the sound itself guides the pedestrian to the location of the pedestrian actuated signal device. The WALK interval is signaled by a much faster tone. Another option includes verbal information indicating the name of the street controlled by the pedestrian actuated signal device. One manufacturer has developed an audio-vibrotactile pedestrian actuated signal device with the WALK signal and locator tone at the same volume, except when a pedestrian pushes the button for more than three seconds. The long button press requests a louder signal during the next pedestrian phase. Thus the pedestrian who is blind has louder information available on request, but other people in the neighborhood rarely hear a loud signal.

The tactile component of the pedestrian signal is most commonly presented as a raised arrow on the pedestrian actuated signal device.



Figure 6-15. GOOD DESIGN: This pedestrian actuated signal device, used widely in Australia, provides information to pedestrians in audible, visual, vibrotactile, and tactile formats.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

The arrow indicates which street is controlled by the push button. Tactile pedestrian signals can also provide map information using raised circle and line symbols to indicate details such as the number of lanes to be crossed, the direction of traffic in each lane, and whether there is a median (Bentzen & Tabor, 1998).

The vibrotactile component of the pedestrian actuated signal device vibrates synchronously with the slow or fast repeating tone or tick. This vibrotactile signal communicates pedestrian signal information to pedestrians who have both hearing and vision impairments. Vibrotactile signals can also be installed at medians to prevent “signal message overlap” when audible broadcast signals are used on corners of the crosswalk.

Some designs of pedestrian actuated signal devices have only tactile or vibrotactile information and do not provide an audible element. These designs are not recommended because the

information is only available to pedestrians who are aware of it and can independently locate the device. Table 6-1 outlines the information that should be provided at a pedestrian actuated signal device.

6.5.3.2 Physical design characteristics

In addition to providing information in multiple formats, the physical design of the pedestrian actuated control device should be carefully considered. The following steps should be taken to ensure that pedestrian actuated signal devices are accessible to all pedestrians including those with vision and mobility impairments:

- Locate the device as close as possible to the curb ramp without interfering with clear space;
- Install the device so that it can be operated from a level segment of the sidewalk rather than having to be on the curb ramp itself;

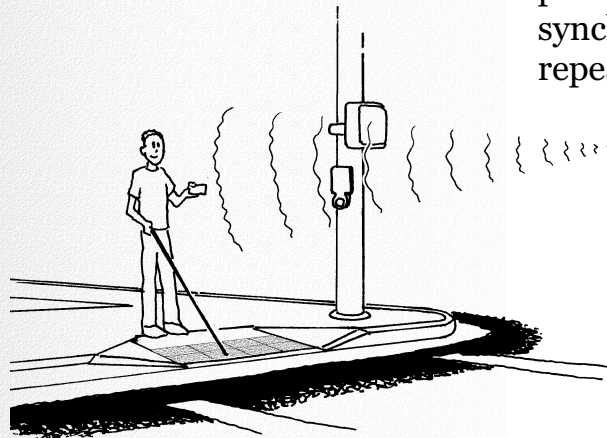


Figure 6-16. Receiver-base pedestrian systems pick up infrared signals from receiver on the other side of the crosswalk and play them back as audible messages, such as when the “WALK” signal phase is activated or street location.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

Table 6-1. Summary of information at a pedestrian-activated signal device that can be perceived through a variety of senses.

	Types of Information at Pedestrian-Activated Signal Devices				
	Visible at the Pushbutton	Visible at the Signal Head	Audible	Vibrotactile	Tactile*
DON'T WALK Interval (Pushbutton not activated)	Bright light above button	"DON'T WALK" text or hand	Slow locator tick*	Slow vibration	Raised tactile arrow points in crossing direction
WALK Interval	Bright light above button flashes on and off	"WALK" text or person walking steady illumination	Rapid tick/tone*	Rapid, regular vibration	
Clearance Interval	Bright light above button	"DON'T WALK" text or hand icon flashes	Slow locator tick/tone*	Slow vibration	

* Pushbutton must be accurately positioned on the pole to provide accurate directional information.

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

- Center the device at the button, providing a level (less than 2.0 percent slope) clear space at least 36 in x 48 in, or 60 in x 60 in if pedestrians will be required to turn or maneuver in order to use the device;
- Mount the device no higher than 1.065 m (42 in) above the sidewalk so that children, people of short stature, and people who use wheelchairs can easily reach and operate it;
- The control face of the button shall be parallel to the direction of the marked crosswalk.
- One button per pole, separated by 3 m is preferred.
- Place the device no closer than 760 mm (30 in) to the curb, no more than 1.5 m (5 ft) from the crosswalk, NES, extended and within 3 m (10 ft) of curb, unless curb ramp is longer than 3 m (10 ft);
- Design the device activation button so that it can be easily operated by people with limited hand function. Small or difficult to manipulate button designs should be avoided. Larger buttons are good for people wearing gloves;
- Design the activation button to require a minimum amount of force, no greater than 15.5 N (3.5 lbf) for people with limited hand and arm strength; and
- Avoid button designs that are activated through conductivity because they are unusable by people with prosthetic hands.

6.5.4 Infrared or LED transmitters

Infrared or LED transmitters can transmit speech messages to personal receivers carried by some pedestrians with vision impairments. The speech messages give standardized information about the status of the signal cycle — either WALK

6

PROVIDING INFORMATION TO PEDESTRIANS

CHAPTER

Case Study 6-3

The City and County of San Francisco are committed to making intersection and sidewalk environments accessible to pedestrians with vision impairments through the use of remote, infrared, audible signals that label intersections, public buildings, bus stops, transit stations, the ferry terminal, and public toilets.

or WAIT. This pair of messages has been found to be less likely to be misunderstood in noisy intersections than WALK and WAIT, or WALK and DON'T WALK (Crandall, Bentzen & Myers, 1998). Messages may also give the pedestrian's location, direction of travel, and the name of the street to be crossed. Messages may also label streets, bus stops, transit platforms, and other priority areas for

pedestrians. The transmitters may be mounted on traffic poles, buildings, and other significant locations. Signal information can be obtained only when the user is pointing the receiver in line with the crosswalk. Thus, these systems provide excellent directional information. Although the information is being transmitted continuously, only people who are using receivers hear it.

