# CHAPTER 4K. ACCESSIBLE PEDESTRIAN SIGNALS AND DETECTORS

## Section 4K.01 General

Support:

01 Accessible pedestrian signals and detectors provide information in non-visual formats (such as audible tones and/or speech messages, and vibrating surfaces). The decision of when to use accessible pedestrian signals is subject to requirements of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973.

02 The primary technique that pedestrians with vision disabilities use to cross streets at signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, which often corresponds to the onset of the green interval. The existing environment is often not sufficient to provide the information that pedestrians with vision disabilities need to cross a roadway at a signalized location.

03 The following factors are relevant in determining whether a particular signalized location presents difficulties for pedestrians with vision disabilities to cross the roadway:

A. Potential demand for accessible pedestrian signals;
B. A request for accessible pedestrian signals;
C. Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes;
D. The complexity of the traffic signal phasing (such as split phases, protected turn phases, leading pedestrian intervals, and exclusive pedestrian phases); and
E. The complexity of the intersection geometry.

04 The factors that make crossing at a signalized location difficult for pedestrians with vision disabilities include: increasingly quiet vehicles, turns on red (which mask the beginning of the through phase), continuous turning movements, complex signal operations, circular intersections, and wide streets. In addition, low traffic volumes might make it difficult for pedestrians with vision disabilities to discern signal phase changes.

05 State and local organizations providing support services to pedestrians with vision and/or hearing disabilities can provide advice to the traffic engineer on site-specific accessibility decisions. In addition, orientation and mobility specialists or similar staff can provide advice to inform such decisions. The U.S. Access Board (www.access-board.gov) provides technical assistance for making pedestrian signal information accessible to persons with vision disabilities.

**Standard:**

06 **When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing.**

07 **The information provided by an accessible pedestrian signal shall indicate which pedestrian crossing is served by each device.**

08 **Under steady (stop-and-go) operation, accessible pedestrian signals shall not be limited in operation by the time of day or day of week.**

Option:

09 Accessible pedestrian signal detectors may be push buttons or passive detection devices.

10 At locations with pretimed traffic control signals or non-actuated approaches, pedestrian push buttons may be used to activate the accessible pedestrian signals.

Support:

11 Accessible pedestrian signals are typically integrated into the pedestrian detector (push button), so the audible tones and/or messages come from the push button housing. They have a push button locator tone and a vibrotactile arrow, and can include audible beaconing and other special features.

Option:

12 The name of the street to be crossed may also be provided in accessible format, such as Braille or raised characters. Tactile maps of crosswalks may also be provided.

Support:

13 Specifications regarding Braille or raised characters can be found in the U.S. Department of Justice 2010 ADA Standards for Accessible Design, September 15, 2010, 28 CFR 35 and 36, Americans with Disabilities Act of 1990.

**Standard:**

14 **At accessible pedestrian signal locations where pressing the pedestrian push button is necessary to activate the walk interval, pressing the pedestrian push button shall activate both the walk interval and the accessible**

**pedestrian signals.**

15 **The tone of the walk signal shall not be similar to the push button locator tones.**

Option:

16 New signalized intersections and planned upgrades to signalized intersections that are equipped with pedestrian crosswalks as well as the following characteristics may be considered for accessible pedestrian signals when the need and viability are confirmed by an engineering study:

A. Intersections near blind centers and senior centers
B. Transit terminals
C. T-type intersections
D. Wide intersections
E. Intersections with unusual geometry
F. Skewed intersections
G. Mid-block crosswalks
H. Intersections with exclusive phasing
I. Intersections with leading pedestrian intervals
J. Intersections with frequent side street calls, and;
K. Intersections with high turning volumes
L. Pedestrian hybrid beacons
M. Rectangular Rapid Flashing Beacons

17 The installation of Accessible Pedestrian Signals may be considered when an engineering study and evaluation have been conducted and the following minimum conditions have been met:

A. The proposed intersection crosswalk must be signalized.
B. The audible devices should be retrofittable to the existing traffic signal hardware.
C. The signalized intersection should be equipped with pedestrian push buttons.
D. The selected crosswalk must be suitable for the installation of audible signals, in terms of surrounding land use and traffic patterns.
E. There must be a demonstrated need for the audible signals in the form of a request from an individual or group that would use the audible signal.
F. The individual or group requesting the device should agree to train the visually impaired users of the audible signals.

## Section 4K.02 Location

Support:

01 Accessible pedestrian signals that are located as close as possible to pedestrians waiting to cross the street provide the clearest and least ambiguous indication of which pedestrian crossing is served by a device.

*Guidance:*

02 *Push buttons for accessible pedestrian signals should be located in accordance with the provisions of Section 4I.05 and should be located as close as possible to the crosswalk line furthest from the center of the intersection and as close as possible to the curb ramp.*

**Standard:**

03 **Except for the situation regarding simultaneous walk indications for all crosswalks, if two accessible pedestrian push buttons are placed less than 10 feet apart or on the same pole (see Paragraphs 7 and 8 in Section 4I.05), each accessible pedestrian push button shall be provided with the following features:**

**A. A push button locator tone,**
**B. A vibrotactile walk indication,**
**C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication (see Section 4K.03), and**
**D. A speech push button information message (see Section 4K.05).**

04 **If the pedestrian clearance time is sufficient only to cross from the curb or edge of pavement to a median of sufficient width for pedestrians to wait and accessible pedestrian signal detectors are used, an additional accessible pedestrian signal detector shall be provided in the median.**

## Section 4K.03 Walk Indications

Support:

01 Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous information. Research indicates that a rapid percussive tone for each crossing coming from accessible pedestrian signal devices on separated poles located close to each crosswalk provides unambiguous information to pedestrians with vision disabilities. Vibrotactile indications provide information to pedestrians who are blind and deaf and are also used by pedestrians who are blind or who have low vision to confirm the walk signal in noisy situations.

**Standard:**

02 **Accessible pedestrian signals shall have both audible and vibrotactile walk indications.**

03 **Vibrotactile walk indications shall be provided by a vibrotactile arrow that is located on the push button (see Paragraph 1 in Section 4K.04). The vibrotactile arrow shall vibrate during the walk interval.**

04 **Accessible pedestrian signals shall have an audible walk indication during the walk interval only.**

05 **The audible walk indication shall be audible at the beginning of the associated crosswalk. The accessible walk indication shall have the same duration as the pedestrian walk signal except when the pedestrian signal rests in walk.**

*Guidance:*

06 *If the pedestrian signal rests in walk, the accessible walk indication should be limited to the first 7 seconds of the walk interval. The accessible walk indication should be recalled by a button press during the walk interval provided that the crossing time remaining is longer than the pedestrian change interval.*

**Standard:**

07 **Where two accessible pedestrian signals on one corner, or in a median, that are associated with different phases are placed less than 10 feet apart, the audible walk indication shall be a speech walk message (see Paragraph 3 in Section 4K.02). In all other cases, including at midblock crossings, on corners where only one accessible pedestrian signal is present, in a median, and on corners where two accessible pedestrian signals are separated by a distance of at least 10 feet, the audible walk indication shall be a percussive tone.**

08 **Audible tone walk indications shall repeat at eight to ten ticks per second. Audible tones used as walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.**

*Guidance:*

09 *The volume of audible walk indications and push button locator tones (see Section 4K.04) should be set to be a maximum of 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended push button press.*

**Standard:**

10 **Automatic volume adjustment up to a maximum volume of 100 dBA in response to ambient traffic sound level shall be provided.**

*Guidance:*

11 *The sound level of audible walk indications and push button locator tones should be adjusted to be low enough to avoid misleading pedestrians with vision disabilities when the following conditions exist:*

*A. Where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk.*

*B. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone.*

*C. At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.*

Option:

12 An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the beginning of the walk interval.

Support:

13 An alert tone can be particularly useful if the walk tone is not easily audible in some traffic conditions.

14 Speech walk messages communicate to pedestrians which street has the walk interval. To be a useful system, the words and their meaning need to be correctly understood by all users in the context of the street environment where they

are used. Because of this, tones are the preferred means of providing audible walk indications except where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet.

15 If speech walk messages are used, pedestrians have to know the names of the streets that they are crossing in order for the speech walk messages to be unambiguous. In getting directions to travel to a new location, pedestrians with vision disabilities do not always get the name of each street to be crossed. Therefore, it is desirable to give users of accessible pedestrian signals the name of the street controlled by the push button. This can be done by means of a speech push button information message (see Section 4K.05) during the flashing or steady UPRAISED HAND intervals, or by raised print and Braille labels on the push button housing.

16 By combining the information from the push button message or Braille label, the vibrotactile arrow aligned in the direction of travel on the relevant crosswalk, and the speech walk message, pedestrians with vision disabilities are able to correctly respond to speech walk messages even if there are two push buttons on the same pole.

**Standard:**

17 **If speech walk messages are used to communicate the walk interval, they shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies.**

*Guidance:*

18 *Speech walk messages that are used at intersections having pedestrian phasing that is concurrent with vehicular phasing should be patterned after the model: "Broadway. Walk sign is on to cross Broadway."*

19 *Speech walk messages that are used at intersections having exclusive pedestrian phasing should be patterned after the model: "Walk sign is on for all crossings."*

20 *Speech walk messages should not contain any additional information, except they should include designations such as "Street" or "Avenue" where this information is necessary to avoid ambiguity at a particular location.*

21 *Speech walk messages should not state or imply a command to the pedestrian, such as "Cross Broadway now." Speech walk messages should not tell pedestrians that it is "safe to cross," because it is always the pedestrian's responsibility to check actual traffic conditions.*

**Standard:**

22 **A speech walk message is not required at times when the walk interval is not timing, but, if provided:**

**A. It shall begin with the term "wait."**

**B. It need not be repeated for the entire time that the walk interval is not timing.**

23 **If a pilot light (see Section 4I.05) is used at an accessible pedestrian signal location, each actuation shall be accompanied by the speech message "wait."**

Option:

24 Accessible pedestrian signals that provide speech walk messages may provide similar messages in languages other than English, if needed.

**Standard:**

25 **If used, speech walk messages in a language other than English shall be stated first in English, and then repeated in the second language, alternating back and forth while the walk interval is timing.**

## Section 4K.04 Vibrotactile Arrows and Locator Tones

**Standard:**

01 **To enable pedestrians with vision disabilities to distinguish and locate the appropriate push button at an accessible pedestrian signal location, and to help them align with the crosswalk, each push button shall clearly indicate by means of a vibrotactile arrow which crosswalk signal is actuated by the push button. Vibrotactile arrows shall be located on the button of the push button assembly, shall have high visual contrast (light on dark or dark on light), and shall be aligned parallel to the direction of travel on the associated crosswalk.**

02 **A locator tone shall be incorporated into the accessible pedestrian signal equipment to help pedestrians with vision disabilities locate the vibrotactile arrow, and the associated push button if a push button is provided.**

Support:

03 A push button locator tone is a repeating sound that informs approaching pedestrians that a push button to actuate pedestrian timing or receive additional information exists, and that enables pedestrians with vision disabilities to locate the push button.

**Standard:**

04 **Push button locator tones shall have a duration of 0.15 seconds or less, and except as provided in Paragraph 5**

**of this Section, push button locator tones shall repeat at 1-second intervals at all times that the audible walk indication is not active, including during the pedestrian change interval and during the time that the pedestrian signal is resting in walk (see Paragraph 6 in Section 4K.03).**

Option:

05 The push button locator tone may default to a deactivated mode during periods when the steady UPRAISED HAND (symbolizing DON'T WALK) signal indication is being displayed for the associated crosswalk if a passive pedestrian detection system is implemented that activates the locator tone at all times (other than when the audible walk indication is active) that a pedestrian is present within a 12-foot radius from the push button location. Where pedestrian facilities (such as sidewalks) are present, the passive detection requirement may be reduced such that it only applies to pedestrians who are on the pedestrian facilities within the 12-foot radius from the push button location.

**Standard:**

06 **Push button locator tones shall be deactivated when the traffic control signal or pedestrian hybrid beacon is operating in a flashing mode. This requirement shall not apply to traffic control signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a steady (stop- and-go) mode by pedestrian actuations.**

07 **Push button locator tones shall be intensity responsive to ambient sound.**

*Guidance:*

08 *Push button locator tones should be audible 6 to 12 feet from the push button, or to the building line, whichever is less.*

Support:

09 Section 4K.03 contains additional provisions regarding the volume and sound level of push button locator tones.

## Section 4K.05 Extended Push Button Press Features

Option:

01 Pedestrians may be provided with additional features such as increased crossing time, audible beaconing, or a speech push button information message as a result of an extended push button press.

**Standard:**

02 **If an extended push button press (see Paragraph 18 in Section 4I.05) is used to provide any additional feature(s), a push button press of less than one second shall actuate only the pedestrian timing and any associated accessible walk indication, and a push button press of one second or more shall actuate the pedestrian timing, any associated accessible walk indication, and any additional feature(s).**

03 **If additional crossing time is provided by means of an extended push button press, a PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Section 4I.05) shall be installed adjacent to the pedestrian push button detector.**

Support:

04 Audible beaconing is the use of an audible signal in such a way that pedestrians with vision disabilities can home in on the signal that is located on the far end of the crosswalk as they cross the street.

05 Not all crosswalks at an intersection need audible beaconing. Audible beaconing is not appropriate at locations with channelized turns or split phasing, because of the possibility of confusion.

*Guidance:*

06 *Audible beaconing should be considered following an engineering study at:*

- *A. Crosswalks longer than 70 feet, unless those crosswalks are divided by a median that has another accessible pedestrian signal with a locator tone;*
- *B. Crosswalks that are skewed;*
- *C. Intersections with irregular geometry, such as more than four legs;*
- *D. Crosswalks where audible beaconing is requested by a person with vision disabilities; or*
- *E. Other locations where a study indicates audible beaconing would be beneficial.*

07 *If audible beaconing is used, it should be initiated by an extended push button press.*

**Standard:**

08 **If audible beaconing is used, the volume of the push button locator tone during the pedestrian change interval of the called pedestrian phase shall be increased up to a maximum of 100 dBA, and shall come from a loudspeaker that is mounted at the far end of the crosswalk at a height of 7 to 10 feet above the pavement.**

*Guidance:*

09 *The audible beaconing loudspeaker mounted at the far end of the crosswalk should be within the width of the crosswalk.*

Support:

10 When the locator tone is active during the pedestrian change interval at a traffic control signal or pedestrian hybrid beacon where audible beaconing is used, the locator tone from the audible beaconing loudspeaker is at an elevated volume, while the locator tone from the accessible pedestrian signal is at its normal, quiet setting.

Option:

11 The sound level of the accessible pedestrian signal walk indication and subsequent push button locator tone may be increased by an extended push button press.

12 Speech push button information messages may provide intersection identification, as well as information about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands.

**Standard:**

13 **If speech push button information messages are made available by actuating the accessible pedestrian signal detector, they shall only be actuated when the walk interval is not timing. They shall begin with the term "Wait," followed by intersection identification information modeled after: "Wait to cross Broadway at Grand." If information on intersection signalization or geometry is also given, it shall follow the intersection identification information.**

*Guidance:*

14 *Speech push button information messages should not be used to provide landmark information or to inform pedestrians with vision disabilities about detours or temporary traffic control situations.*

Support:

15 Additional information on the structure and wording of speech push button information messages is included in the Institute of Transportation Engineers' "Electronic Toolbox for Making Intersections More Accessible for Pedestrians Who Are Blind or Visually Impaired."