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Supplementary Notes				
<p>Abstract</p> <p>In late 2000, the Northern Virginia District of the Virginia Department of Transportation (VDOT) received a request from a visually impaired citizen to install accessible pedestrian signals (APS) at an intersection in Falls Church. Since there were no national or state guidelines for this type of installation, the district was asked to install APS at an intersection in a pilot effort and to develop appropriate guidelines that VDOT could use statewide for future installations. The Virginia Transportation Research Council was asked to assist in developing the guidelines. Further, a committee composed of representatives from VDOT, the Federal Highway Administration, the Virginia Department for the Blind and Visually Impaired, and the blind and visually impaired community (formal organizations and individual citizen activists) was established to provide overall guidance and advice.</p> <p>A Phase I report documented the initial efforts to develop the guidelines and described the following sections of the guidelines: (1) a procedure for requesting APS, (2) the basic requirements for retrofitting, (3) an intersection evaluation methodology, and (4) a funding process. In addition, the report recommended that the procedures in these four sections be piloted by using them to identify other appropriate intersections at which different types of APS equipment could be installed.</p> <p>This Phase II report describes the results of the pilot with regard to the first four sections of the guidelines and the development of the final two sections of the guidelines: the basic statewide specifications for APS equipment, and the installation procedures. The final guidelines for installing APS at an existing intersection are included in an appendix.</p>				

**FINAL REPORT**

**GUIDELINES FOR THE RETROFIT INSTALLATION OF ACCESSIBLE  
PEDESTRIAN SIGNALS BY THE VIRGINIA DEPARTMENT  
OF TRANSPORTATION: PHASE II REPORT**

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## ABSTRACT

In late 2000, the Northern Virginia District of the Virginia Department of Transportation (VDOT) received a request from a visually impaired citizen to install accessible pedestrian signals (APS) at an intersection in Falls Church. Since there were no national or state guidelines for this type of installation, the district was asked to install APS at an intersection in a pilot effort and to develop appropriate guidelines that VDOT could use statewide for future installations. The Virginia Transportation Research Council was asked to assist in developing the guidelines. Further, a committee composed of representatives from VDOT, the Federal Highway Administration, the Virginia Department for the Blind and Visually Impaired, and the blind and visually impaired community (formal organizations and individual citizen activists) was established to provide overall guidance and advice.

A Phase I report<sup>1</sup> documented the initial efforts to develop the guidelines and described the following sections of the guidelines: (1) a procedure for requesting APS, (2) the basic requirements for retrofitting, (3) an intersection evaluation methodology, and (4) a funding process. In addition, the report recommended that the procedures in these four sections be piloted by using them to identify other appropriate intersections at which different types of APS equipment could be installed.

This Phase II report describes the results of the pilot with regard to the first four sections of the guidelines and the development of the final two sections of the guidelines: the basic statewide specifications for APS equipment, and the installation procedures. The final guidelines for installing APS at an existing intersection are included in an appendix.

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## **INTRODUCTION**

In late 2000, the Northern Virginia District of the Virginia Department of Transportation (VDOT) received a request from a visually impaired citizen to install accessible pedestrian signals (APS) at the intersection of Route 7 and Jefferson Avenue in Falls Church. At that time, there were no federal guidelines concerning APS, VDOT had no guidelines, and VDOT had never installed an APS at an intersection under its jurisdiction. Accordingly, VDOT's state traffic engineer requested that the district's traffic engineering section install APS at an intersection as a pilot effort and develop appropriate guidelines for future APS installations. The Virginia Transportation Research Council (VTRC) was asked to assist the district in this effort.

As a first step, a committee was appointed to provide overall guidance and advice in this effort. Members included representatives from VDOT's district and central offices, the VTRC, the Federal Highway Administration, the Virginia Department for the Blind and Visually Impaired, and the blind and visually impaired community (formal organizations and individual citizen activists). A list of members and their affiliations is provided in Appendix A.

The committee held its first meeting on December 14, 2000. Over the next 18 months, the committee met periodically to discuss general issues regarding APS while awaiting the actual installation of a pilot APS. The pilot was implemented on June 15, 2002, at the intersection of Vaden Drive and Virginia Center Boulevard/County Creek Road in Fairfax County with APS being installed on three of its four legs.

On April 24, 2003, the committee approved an outline (Figure 1) of the APS installation guidelines and the completed Sections I through IV, which define the process that should be followed to identify intersections at which APS should be installed. Included is information on requesting APS, the basic requirements that must be met, a methodology for evaluating intersections, and the funding process. A Phase I report<sup>1</sup> was published in May 2003 to document the efforts to that date.

- I. Introduction
- II. Basic Requirements
- III. Funding Process
- IV. Intersection Evaluation
  - A. Overview of the Procedure
  - B. Background on the Evaluation Methodology
  - C. Details on the Evaluation Factors and Rating Methodology
    - 1. Configuration of Intersection
    - 2. Width of Crossing
    - 3. Posted Speed Limit on Street to Be Crossed
    - 4. Special Traffic Conditions I
    - 5. Special Traffic Conditions II
    - 6. Special Pedestrian Signal Conditions
    - 7. Proximity of Intersection to Key Facilities
    - 8. Need to Cross by the Visually Impaired
    - 9. Time in Queue
    - 10. Other Special Traffic and Mobility Conditions
- V. Equipment
- VI. Installation Procedures
  - A. Manual on Uniform Traffic Control Devices
    - 1. Section 4E.06 Accessible Pedestrian Signals
    - 2. Section 4E.08 Accessible Pedestrian Signal Detectors
  - B. Miscellaneous Practices

**Figure 1. Outline of APS Installation Guidelines**

The committee determined that additional pilot installations were required to develop Sections V and VI of the APS installation guidelines, which cover the selection and installation of equipment. The committee further recommended that the process defined in Sections I through IV be used to select the intersections at which to install these additional pilot APS. It was concluded that the use of this process would serve as an effective field evaluation of the first four sections of the APS installation guidelines. Subsequently, APS units were installed at four additional intersections. The evaluation of all five of the pilot APS installations led to the development of the final two sections of the APS installation guidelines, which included specifications for APS equipment and an installation guidance.

## **PURPOSE AND SCOPE**

The purpose of the two-phased research effort was to assist the Traffic Engineering Section of VDOT's Northern Virginia District in the evaluation of pilot APS installations and the development of statewide guidelines for installing APS at existing intersections. The Phase I research<sup>1</sup> developed a six-section outline for the APS installation guidelines and the first four sections, which define the process that should be followed to identify intersections at which APS should be installed.

The first objective of this Phase II effort was to field test the process identified in Sections I through IV of the guidelines in order to evaluate it in actual practice and verify that the

funding process and evaluation methodology were valid. It also allowed for refining the process as needed to address problem areas that surfaced. The second objective was to evaluate the experiences at the five APS pilot intersections to develop the final two sections of the APS installation guidelines concerned with equipment and installation. This completed the APS installation guidelines.

The APS installation guidelines advanced in this research are limited to retrofit installations at existing intersections. Additional guidelines concerning the installation of APS at new intersections or intersections that are undergoing major improvements are being considered by the federal government and will likely be set forth in the future. The equipment and installation procedures described herein, however, should be valid for both situations.

## **METHODS**

The following tasks were undertaken for Phase II of the research.

1. *Field test the process identified in Phase I.* The first four sections of the approved APS installation guidelines were used to evaluate requests for APS installations in VDOT's Northern Virginia District in order to identify additional pilot APS intersections.
2. *Evaluate experiences at pilot APS installations.* Several types of APS units were installed at intersections in Northern Virginia. Based on discussions with the VDOT personnel involved with these installations, with visually impaired users, and with committee members, specific desirable features of APS were identified.
3. *Finalize guidelines for VDOT.* Based on the findings from the first two tasks, final guidelines to be used by VDOT for the retrofit installation of APS at existing intersections on a statewide basis were developed.

## **RESULTS**

### **Field Test the Process Identified in Phase I**

The process described in the first four sections of the APS installation guidelines approved in Phase I of the research includes a procedure for requesting an APS, the basic requirements that must be met, a methodology for evaluating intersections, and the funding process. Upon receiving a request for an APS to be installed at an intersection, VDOT staff must first determine whether certain basic requirements are met. If they are met, an evaluation is undertaken to determine first hand the needs of the blind or visually impaired individual, who made the request, specific characteristics of the intersection, and an estimated cost for the installation. The result of the evaluation is a score that can be used to prioritize requests for APS at a number of intersections if funding is limited. Funding is then approved, and the design and

procurement of equipment are initiated. Details of this process are described in the Phase I report.<sup>1</sup>

In order to generate requests for APS installations from the visually impaired community, members of the APS committee were asked to announce the program and procedures through their constituency and personal associations. Ten requests were received and processed (see Table 1). A sample intersection evaluation completed by VDOT traffic engineering staff is provided in Appendix B.

In late October 2004, the researchers met with VDOT personnel involved with pilot testing these four sections of the APS installation guidelines to discuss their experiences with the process and determine if revisions were needed. It was the consensus of those involved that the process worked well and that the procedures and funding set forth did not require revision.

### **Evaluate Experiences at Pilot APS Installations**

By early November 2004, five intersections in VDOT's Northern Virginia District were equipped with pilot APS installations. The intersections and date of installation are as follows:

1. Vaden Drive and Virginia Center Boulevard/County Creek Road, three crossings, June 15, 2002
2. Sunset Hills Road and Sallie Mae Drive/Plaza America Drive, one crossing, June 10, 2004
3. Gallows Road and Cottage Street, two crossings, July 12, 2004
4. Hayfield Road and Kingstowne Village Parkway, four crossings, August 25, 2004
5. Old Chain Bridge Road and Tennyson Drive, one crossing, November 2, 2004.

VDOT personnel installed all the units and set them up to accommodate the needs of the visually impaired citizen who requested them. During or shortly after installation, VDOT district personnel met with the requesting party at each intersection to discuss how the APS was working and to fine-tune the installation as needed. In addition, VDOT district personnel and the researchers accompanied other visually impaired citizens who visited several of the installations to determine their assessment of the installation and type of APS used.

In late October 2004, the researchers met with the district staff involved with the pilot installations to discuss their experiences (those at the meeting are hereinafter referred to as the "working group"). The goal of the meeting was to identify the basic type of APS unit and supplementary features that should be required for future installations and thus incorporated into Sections V and VI of the APS installation guidelines. The resulting requirements were based on the following:

**Table 1. APS Evaluation Status Report**

<b>Intersection</b>	<b>Status</b>	<b>Request Date</b>	<b>Score</b>	<b>Implementation Issues</b>
Kingstowne Village Parkway at Hayfield Road	Installation complete	7/16/03	90	4 of 4 crossings requested. ROW issues need to be resolved for pushbutton pole locations on NE corner. Raised medians in crosswalks.
South Van Dorn Street at Lake Village Drive	Delete from list; requesting person moved	9/3/03	86	1 of 4 crossings requested (crossing South Van Dorn on south side of intersection). Raised median in crosswalk. Requester says median helps by providing point of reference in crossing.
Sunset Hills Road at Sallie Mae Drive	Installation complete	8/22/03	88	1 of 4 crossings requested (crossing Sunset Hills on east side of intersection). No implementation problems. Traffic Engineering Section has forwarded red lined signal plan.
Gallows Road at Cottage Street	Installation complete	9/1/03	78	2 of 4 crossings requested (crossing Gallows on south side of intersection and Cottage on east side). ROW and pushbutton pole location issues on SW corner.
Route 7 at Jefferson Street	Under review	Unknown; identified by committee	78	2 of 4 crossings requested (crossing Route 7 on east and west side of intersection). Raised median in crosswalk and crosswalk realignment needed. ROW issues in SE and SW corners. Upgrade existing ped signs/signals.
Route 236 at Medford Drive	Delete from list; unable to locate requesting person	Unknown; identified by committee	75	2 of 4 crossings requested (crossing Route 236 on west side and Medford on north side of intersection.) Raised median in crosswalk on Medford. Signal being rebuilt at this location.
South Van Dorn Street at Kingstowne Village Parkway	Delete from list; requesting person moved	9/3/03	71	1 of 4 crossings requested (crossing South Van Dorn on north side of intersection). Difficult situation due to free flow right-turn lane on southbound South Van Dorn. Consider rumble strips and ped crossing signage here; requester does not want "blind pedestrian" signs.
Route 50 at Prosperity Avenue	Delete from list; not feasible	9/1/03	67	1 of 4 crossings requested (crossing Route 50 on east side of intersection). Very difficult situation with free flow rights in NE and SE corners. Investigate alternative routes.
Route 29 at Gallows Road	Under review; difficult implementation issues	9/1/03	51	1 of 4 crossings requested (crossing Gallows on west side of intersection). No sidewalk leading to NW corner. No ADA ramp in NW corner; fiber optic box relocation issue here.
Route 50 at Williams Drive	Under review; difficult implementation issues	10/1/03	N/A No existing pedestrian signals	Consider as alternate to Route 50 at Prosperity intersection. 1 of 4 crossings requested (crossing Route 50 on west side of intersection). Difficult crossing issues on Williams north of intersection.
Old Chain Bridge Road at Tennyson Drive	Installation complete	11/20/03	63	1 of 4 crossings requested (crossing Old Chain Bridge on east side of intersection). Heavy volume near employer with visually impaired employee.

1. experiences of VDOT personnel who installed the APS units
2. discussions with and opinions of the visually impaired users who requested APS at a specific intersection or who independently visited other intersections
3. discussions with and opinions of committee members during the numerous meetings documented in the Phase I research.<sup>1</sup>
4. requirements in the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD)<sup>2</sup>
5. draft guidelines proposed by the Public Rights-of-Way Access Advisory Committee,<sup>3</sup> which was appointed by The Access Board (an independent federal agency) in 1999 (Appendix C provides information on these guidelines).

## **Types of APS**

APS units are categorized into four design types: pedhead-mounted, pushbutton integrated, vibrotactile-only, and receiver-based.<sup>4</sup> The working group selected pushbutton integrated as the type to procure. This type of unit has a speaker integrated into the pushbutton housing and typically has a raised (tactile) arrow that is installed to point parallel with the direction of travel on the crosswalk. The arrow may also vibrate when the walk signal is on. The locator tone and walk tone or message come directly from the speaker in the unit. Pedestrian pushbuttons should be a minimum of 2 in (51 mm) across in one dimension and should contrast visually with their housing or mounting.<sup>3</sup>

## **Walk Indication**

The indication of the walk interval is arguably the most critical information that needs to be conveyed by an APS to a visually impaired user. The requirements of the walk indication are as follows:<sup>4</sup>

- must be unambiguous with regard to which street and crosswalk has the walk interval
- must be audible from the beginning of the associated crosswalk
- should be no louder than the associated quiet locator tone unless a louder beaconing feature is actuated for a single pedestrian phase
- should have a much faster repetition rate than that of the locator tone when tones are used to indicate the walk interval
- should be readily detectable in the presence of ambient vehicular sound
- should be highly localizable

- should be uniquely recognizable as a walk signal.

The walk interval can be provided by the use of tones, speech messages, or vibrating surfaces,<sup>4</sup> with each having advantages and disadvantages. The working group selected all three options for the VDOT-required APS units: the unit should have a vibrating surface and have the capability of using either a tone or speech message for the walk indication. Normally, a speech message should be used for the walk indication.

### *Tones*

The walk interval tone should be similar to the locator tone (see later discussion about this feature), but should repeat at a faster rate. The tone can best be defined as a tick or percussive tone; a buzz, cuckoo, beep, or chirp was not considered acceptable for the walk interval tone. The unit should have the capability of emitting the selected sound for as long as the walk signal is on at the pedestrian signal head. Tones should consist of multiple frequencies with a dominant component at 880 Hz.<sup>3</sup> The duration of the tone should be 0.15 sec and should repeat at intervals of 0.15 sec.<sup>3</sup>

### *Speech Messages*

Speech messages have become increasingly popular in the U.S. market. The unit should have the capability of emitting a message for as long as the walk signal is on at the pedestrian signal head. The words and their meanings must be clear and concise and correctly understood by the visually impaired user. The basic model to be used for the message is as follows:<sup>4</sup>

- “Howard. Walk sign is on to cross Howard” (walk message for Howard Street).
- “Walk sign is on for all crossings” (walk message for intersections with exclusive pedestrian phase).

### *Volume of Tones or Speech Messages*

The volume of the tone or speech message is critical to its effectiveness; both must be heard above the surrounding sounds. However, the tone or speech message must not be so loud as to cause problems to adjacent homes or businesses or prevent visually impaired pedestrians from hearing critical traffic sounds used for alignment, determining that cars have stopped, and hearing cars that may be turning across their path.<sup>4</sup> Therefore, the tone or voice volume measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>3</sup> with a maximum of 89 dB<sup>2</sup> and should be responsive (adjust to) to ambient noise level changes.

### *Vibrating Tactile Arrow*

The APS unit should have a raised (tactile) arrow that is installed to point parallel with the direction of travel on the crosswalk. It should vibrate during the walk interval. The arrow can be part of or above the pushbutton or located on top of the unit. This allows the visually

impaired user who is also hearing impaired to know when the walk interval is on and helps to provide confirmation of the walk interval at noisy intersections.

The arrow should be raised 1/32 in (0.8 mm) minimum and should be 1½ in (38 mm) minimum in length. The arrowhead should be open at 45 degrees to the shaft and should be 33 percent of the length of the shaft. Stroke width should be 10 percent minimum and 15 percent maximum of arrow length. The arrow should contrast with the background.<sup>3</sup>

## **Preferred Features**

### *Pushbutton Locator Tone*

In most cases, a pedestrian must locate and push a button to actuate a walking indication on the pedestrian signal head. Sighted pedestrians can easily see the instructions and locate the pushbutton; however, these actions are a problem for a visually impaired pedestrian. Therefore, the APS unit should have a locator tone at the pushbutton to alert the visually impaired user of its presence and location.

The locator tone should be similar to the walk tone if one is used for the walk indication; however, it should not repeat as rapidly as the walk tone. The locator tone can best be defined as a tick or percussive tone; a buzz, cuckoo, beep, or chirp was not considered acceptable for the walk interval. It should have a duration of 0.15 sec or less and should repeat at 1-sec intervals.<sup>2</sup> The locator tone should always operate during the “Don’t Walk” interval of the pedestrian signal and during the flashing “Don’t Walk” interval<sup>3</sup> if a countdown feature is not being used (see later discussion about this feature). The locator tone should be deactivated if the traffic signal is in a flashing operation<sup>2</sup> or if the pedestrian signal system is otherwise inoperative.<sup>3</sup> The locator tone should have the following characteristics:

1. Tones should consist of multiple frequencies with a dominant component at 880 Hz.<sup>3</sup>
2. The volume measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>3</sup> with a maximum of 89 dB<sup>2</sup> and should be responsive to ambient noise level changes.
3. Tones should be audible 6 to 12 ft (1.8 to 3.7 m) from the pushbutton or to the building line, whichever is less.<sup>2</sup>

Once a pedestrian locates and engages the pushbutton, a confirmation light comes on to confirm that a request has been received and that pedestrian signal timing has been activated. To provide this confirmation to a visually impaired pedestrian, some form of immediate audible indication is emitted, e.g., a beep, tick, or other percussive tone.

### *Pushbutton Information Message*

The working group noted the importance of an informational speech message to advise the visually impaired user of the need to wait for a walk signal. The message can also provide

information about other features at the intersection. The message should be activated immediately upon engaging the pushbutton or upon pushing and holding it up to but not more than 0.5 sec. The volume of the message measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>3</sup> with a maximum of 89 dB<sup>2</sup> and should be responsive to ambient noise level changes. Once activated, the information message should repeat itself until being immediately truncated by the initiation of the walk interval tone or message. The term “wait” should always be used.<sup>2</sup> Examples of messages are the following:<sup>4</sup>

- Model pushbutton message: *Wait to cross Howard at Grand.*
- Model pushbutton message for intersections having an exclusive pedestrian phase with right turns on red prohibited: *Wait to cross Howard at Grand. Wait for red light for all vehicles.*
- Model pushbutton message for intersections having an exclusive pedestrian phase with right turns on red permitted: *Wait to cross Howard at Grand. Wait for red light for all vehicles. Right turn on red permitted.*
- Model pushbutton message for angled crosswalks: *Wait to cross Howard at Grand. Crosswalk angles right.*
- Model pushbutton message for crosswalks to medians where a second button push is required: *Wait to cross Howard at Grand. Short walk phase. Raised (or cut-through) median with second pushbutton.*
- Model pushbutton message for signalized crosswalks to splitter islands: *Wait to cross right- turn lane to island for Howard and Grand crosswalks.*

If the information message is activated immediately upon the pushbutton being engaged, this message may serve as confirmation to the visually impaired pedestrian that his or her request was received and that pedestrian signal timing was activated.

### *Pedestrian Countdown*

A pedestrian interval countdown display may be added to a pedestrian signal head to inform sighted pedestrians of the number of seconds remaining until the termination of the pedestrian change or clearance interval. The countdown display typically accompanies the flashing raised stop hand in the pedestrian head. The intent is simply to inform pedestrians of the timing of the clearance interval so they can make practical decisions regarding either entering the crossing or speeding up their walk rate to ensure clearing the crosswalk prior to the onset of traffic flow. An APS unit accommodates this function for a visually impaired pedestrian with a verbal or speech countdown.

The NCHRP synthesis and guide to best practices regarding APS<sup>4</sup> suggests that the countdown information is unlikely to provide any advantage to visually impaired pedestrians as

they are usually moving as quickly as possible to cross the street and that knowing the time left would have no practical benefit. Further, the countdown message might mask important traffic sounds. Based on positive experiences with the countdown feature with sighted pedestrians, however, the working group strongly favored having this feature as an option for the APS unit.

### *Audible Beacons*

*Beaconing* is defined as providing directional orientation (homing) to a visually impaired pedestrian through the use of an audible sound or signal. Typically, the volume of the walk message or tone and the subsequent sound that occurs during the flashing or change interval (either the locator tone or the countdown message) are increased. The APS units could also be set such that the sounds alternate back and forth from one end of the crosswalk to the other. Some APS units include a separate speaker oriented in line with the appropriate crosswalk to focus the sound.<sup>4</sup>

Beaconing may be needed at intersections that have skewed crosswalks or irregular geometry such as multiple legs, at crosswalks longer than 70 ft (unless another APS is installed in an existing median), and at crosswalks used by a visually impaired pedestrian with a severe veering problem. It is not appropriate at locations with free right turns or split phasing.<sup>4</sup>

Although beaconing has only specific applications, and the increased sound levels can be distracting and mask important traffic sounds, the feedback from visually impaired users was very favorable toward this feature. Therefore, the working group felt that a beaconing capability should be required.

### **Miscellaneous Practices**

The working group discussed several general practices concerning installation of APS units that they believed were critical to success:

- *Coordination with requesting citizen.* Meeting with the visually impaired citizen who requested the APS to determine his or her specific needs and concerns is a critical first step to a successful installation. (This step is required in the previously approved Section IV of the APS installation guidelines.) Likewise, it is critical to meet with him or her after the APS is first installed to provide instruction on how to use the APS and, if needed, to fine-tune its operation.
- *Location of APS pushbuttons.* Successful operation of the APS is highly dependent on the pushbutton being installed at the appropriate specific location. Information on proper location is provided in the MUTCD<sup>2</sup> and the NCHRP synthesis and guide to best practices regarding APS.<sup>4</sup>
- *Removal of APS units not being used.* Once VDOT district staff learns that an APS unit is no longer needed at a location (e.g., the user has moved), immediate steps should be taken to disengage the unit and remove it for use at another site. Since there is no practical way that VDOT can routinely monitor usage, non-usage will

typically be reported by adjacent residents or business owners (primarily via complaints) or possibly by social service agencies. In addition, VDOT maintenance crews responding to equipment problems might determine that an APS is not being used.

- *Rest in “Walk” operation.* At intersections where the pedestrian signal on particular crossings (primarily on the side or minor street) “rests” in the “Walk” interval, the APS walk interval indications should operate for only one timing cycle when the pushbutton is activated; i.e., the APS pushbutton should normally “rest” in locator tone operation unless a pedestrian actually pushes the button and calls for the APS walk interval.

### **Finalizing the Guidelines**

Based on the findings from Tasks 1 and 2, the final recommended guidelines were crafted and are presented in Appendix D. Sections I through IV and the two forms developed for use in the process (one to be used by the visually impaired citizen to request an installation and one to be used to evaluate the intersection at which the installation was requested) were recommended in Phase I of the research.<sup>1</sup> Section V was developed from the meeting with VDOT personnel involved with the selection and installation of the pilot APS and the subsequent discussions about equipment and features. Section VI has two subsections. The first contains the sections of the MUTCD pertaining to APS that is included for the convenience of the user of the guidelines. The second contains several general installation practices recommended by VDOT personnel at the aforementioned meeting.

### **CONCLUSIONS**

- *The process outlined in Sections I through IV of the draft APS installation guidelines, the form to be used by a visually impaired citizen to request an installation, and the form to be used to evaluate the intersection at which the installation was requested are valid and need no revision. These were reported in Phase I of the research project.<sup>1</sup>*
- *The following type of APS unit and features are preferred.*
  - *The basic type of unit should be pushbutton integrated with a raised vibrotactile arrow.*
  - *The walk interval should be available as both a tone and speech message and should be accompanied by a vibrating tactile arrow.*
  - *The unit should be capable of providing the following additional features: a pushbutton locator tone; a pushbutton information message, including an extended push capability for special messages; a pedestrian countdown message; and an audible beaconing.*
- *The following practices help to ensure a successful APS installation:*

- *maintaining close coordination with the visually impaired individual who requested the installation*
- *following guidelines for placement of the APS pushbuttons in the MUTCD<sup>2</sup> and the NCHRP synthesis and guide to best practices regarding APS<sup>4</sup>*
- *removing APS units not being used*
- *modifying the operation of APS units where the pedestrian signal “rests in walk.”*
- *VDOT guidelines for installing APS units at existing intersections should reflect these conclusions and the accompanying details provided previously in this report.*

## **RECOMMENDATIONS**

1. *VDOT district staff should conduct a 1-year pilot test of the guidelines outlined in Appendix D. This time frame may need adjustment depending on the number of cases for which the guidelines are employed, i.e., the number of requests for APS received.*
2. *Following the 1-year pilot test, the researchers should meet with appropriate VDOT central office and district personnel to discuss their experiences with the guidelines. As appropriate, the guidelines should then be revised and adopted as final.*

## **REFERENCES**

1. Arnold, Jr., E.D. and Dougald, L.E. *Guidelines for the Retrofit Installation of Accessible Pedestrian Signals by the Virginia Department of Transportation: Phase I Report*. VTRC 03-TAR3. Virginia Transportation Research Council, Charlottesville, 2003.
2. Federal Highway Administration. *Manual on Uniform Traffic Control Devices for Streets and Highways*, Part 4: Highway Traffic Signals, Chapter 4L: Pedestrian Control Features, Section 4E.06: Accessible Pedestrian Signals, Section 4E.09: Accessible Pedestrian Signal Detectors. Washington, D.C., 2003.
3. The Access Board. *Draft Guidelines for Accessible Public Rights-of-Way*, June 17, 2002. <http://www.access-board.gov/rowdraft.htm#1106>. Accessed December 10, 2004.
4. Barlow, J.M., Bentzen, B.L., and Tabor, L.S. *Accessible Pedestrian Signals: Synthesis and Guide to Best Practice*. An Interim Product Prepared for National Cooperative Highway Research Program Project 3-62 Guidelines for Accessible Pedestrian Signals. Transportation Research Board, Washington, D.C., 2003.

## APPENDIX A

### MEMBERS OF THE ACCESSIBLE PEDESTRIAN SIGNAL COMMITTEE

<b>Name</b>	<b>Organization</b>
Gene Arnold	Virginia Transportation Research Council
Melanie Brunson	Visually impaired citizen
Becky Crowe	Federal Highway Administration
Vijaya Dabir	Virginia Department for the Blind and Visually Impaired
Lance Dougald	Virginia Transportation Research Council
Mohamed Dumbuya	Federal Highway Administration
Loren Epton	Virginia Department of Transportation
Mark Hagan	Virginia Department of Transportation
Doug Hansen	Fairfax County Department of Transportation
Melanie Hughes	Virginia Department for the Blind and Visually Impaired
Bud Keith	Visually impaired citizen
Tarsem Lal	Federal Highway Administration
Thomas Lee	Virginia Department of Transportation
Leslie Martin	Virginia Department of Transportation
Dona Sauerburger	Citizen
Robert Souza	Virginia Department of Transportation
Chris Wells	Fairfax County Department of Transportation



## APPENDIX B

### SAMPLE INTERSECTION EVALUATION

ACCESSIBLE PEDESTRIAN SIGNAL EVALUATION		
Location: <i>SUNSET HILLS ROAD/SALLIE MAE / PLAZA AMERICA</i>		
Date: <i>9/10/03</i>	Day: <i>WEDNESDAY</i>	Time of Day: <i>1:15</i>
Weather Conditions: <i>CLEAR, SUNNY</i>		
Evaluation Team Members: <i>OSTRANDER, HARRELL, SOUZA, GRAY</i>		
Specific Needs of Requesting Party: <ul style="list-style-type: none"> <li>- <i>CROSSES SUNSET HILLS ROAD TO GO TO AND FROM WORK.</i></li> <li>- <i>CROSSES SUNSET HILLS ROAD ON THE EAST SIDE OF THE INTERSECTION WHICH HAS EXISTING CROSSWALK AND PED SIGNALS</i></li> </ul>		
EVALUATION FACTOR	POINTS	
<b>1. Configuration of Intersection</b>	<i>15</i>	
<p>Points are assigned if the intersection's configuration causes there to be an absence of straight through traffic that is parallel to the crossing to be used by the requesting party or that is close enough to be heard. For example, the intersection may be skewed, offset, or does not have certain straight through movements (as is the case in a 3-leg tee intersection). Accordingly, if there <b>is no</b> straight through traffic flow that is parallel to the crosswalk to be used by the requesting party or close enough to be heard, assign 15 points.</p> <p><u>Comments:</u> <i>LOWER SIDE STREET VOLUMES</i></p>		
<b>2. Width of Crossing to be Used by Requesting Party</b>	<i>10</i>	
<u>Width (feet)</u>	<u>Points</u>	<u>Comments:</u>
40 or less	2	
41 to 52	4	<i>137 FT.</i>
53 to 68	6	
69 to 78	8	
79 or more	10	

<b>3. Maximum Posted Speed Limit on Street to be Used by Requesting Party</b>		<b>3</b>
<u>Speed (mph)</u>	<u>Points</u>	Comments:
0 to 25	1	
26 to 30	2	
31 to 35	3	35 MPH
36 to 40	4	
41 or more	5	
<b>4. Special Traffic Conditions I</b>		<b>15</b>
If there <b>are</b> heavy right-turn volumes ( $\geq 40$ vehicles in the peak hour or the existence of a right turn lane) from the street parallel to or right-turn signals or arrows that impact the crossing to used by the requesting party, assign 15 points.		
<u>Comments:</u> HEAVY RIGHT TURNS - CHECKED COUNT		
<b>5. Special Traffic Conditions II</b>		<b>0</b>
If there <b>is</b> a free flow right turn lane (with or without a right-turn island) that impacts the crossing to used by the requesting party, assign 15 points.		
<u>Comments:</u>		
<b>6. Special Pedestrian Signal Conditions</b>		<b>0</b>
If there <b>are</b> lead pedestrian phases, exclusive pedestrian phases, or mid-block exclusive pedestrian signals that impact the crossing to be used by the requesting party, assign 15 points.		
<u>Comments:</u>		
<b>7. Proximity of Intersection to Key Facilities</b>		<b>8</b>
<u>Proximity to Facility</u>	<u>Points</u>	Comments:
4 to 6 blocks	2	
3 blocks	4	
2 blocks	6	
1 block	8	
At the Facility	10	
(Use 400 feet as an estimate of an average block length.)		
<b>8. Need to Cross by Visually Impaired</b>		<b>15</b>
If the purpose of the requesting party's need to cross <b>is related to</b> work/employment or school, assign 15 points.		
<u>Comments:</u> WORK - PURPOSE OF TRIP		

<b>9. Time in Queue</b>		22
<u>Month in fiscal year request received</u>	<u>Points</u>	
July	24	
August	22	
September	20	
October	18	
November	16	
December	14	
January	12	
February	10	
March	8	
April	6	
May	4	
June	2	
<b>10. Other Special Traffic &amp; Mobility Conditions</b>		0
<p>If special traffic &amp; mobility conditions <u>do exist</u> as determined by Orientation and Mobility Specialist (including intersections at which traffic volumes are so low as to result in problematic crossing conditions for the requesting party), assign 15 points.</p> <p><u>Comments:</u></p>		
<b>TOTAL POINTS</b>		88
Additional Comments by Evaluation Team:		

(Aerial photo is typically attached for reference.)



## APPENDIX C

### DRAFT GUIDELINES ON APS PUBLIC RIGHTS-OF-WAY ACCESS ADVISORY COMMITTEE

#### Background

(This “Background section” was excerpted from text in various informational links on the Access Board website: <http://www.access-board.gov/>.)

The Access Board is an independent Federal agency devoted to accessibility for people with disabilities. Several different laws influence the Board’s activities, to include The Architectural Barriers Act (ABA) and The Americans with Disabilities Act (ADA) and, over the years, the Board has developed various guidelines to implement them.

These guidelines ensure that facilities are accessible to people with disabilities and currently focus mainly on facilities on sites. They address some features common to public sidewalks; e.g., curb ramps: however, additional guidance is necessary to address conditions unique to public rights-of-way. Access for visually impaired pedestrians at street crossings and wheelchair access to on-street parking are typical of the issues requiring additional guidance.

In 1999, the Board chartered a 33-member Public Rights-of-Way Access Advisory Committee to develop recommendations on guidelines for accessible public rights-of-way. Members represented disability organizations, public works departments, transportation and traffic engineering groups, design professionals and civil engineers, government agencies, and standards-setting bodies. Based on a committee report entitled *Building a True Community*, draft guidelines entitled *Draft Guidelines for Accessible Public Rights-of-Way* were crafted and released for comment on June 17, 2002. Over 1,400 comments were received. Once all comments are considered, the Board will release a revised set of guidelines and provide another opportunity for public comment.

#### Guidelines

Guidelines for APS are covered in Section 1106, entitled Accessible Pedestrian Signal Systems, of the *Draft Guidelines for Accessible Public Rights-of-Way*,<sup>2</sup> and are reproduced in the following section.

##### 1106 Accessible Pedestrian Signal Systems

**1106.1 General.** Pedestrian signal systems shall comply with 1106.

**1106.2 Pedestrian Signal Devices.** Each crosswalk with pedestrian signal indication shall have a signal device, which includes audible and vibrotactile indications of the WALK interval. Where a pedestrian pushbutton is provided, it shall be integrated into the signal device and shall comply with 1106.3.

**1106.2.1 Location.** Pedestrian signal devices shall be located 60 inches (1525 mm) maximum from the crosswalk line extended, 120 inches (3050 mm) maximum and 30 inches (760 mm) minimum from the curb line, and 120 inches (3050 mm) minimum from other pedestrian signal devices at a crossing. The control face of the signal device shall be installed to face the intersection and be parallel to the direction of the crosswalk it serves.

**EXCEPTION:** The minimum distance from other signal devices shall not apply to signal devices located in medians and islands.

**1106.2.2 Reach and Clear Floor or Ground Space.** Pedestrian signal devices shall comply with 308. A clear floor or ground space complying with 305 shall be provided at the signal device and shall connect to or overlap the pedestrian access route.

**1106.2.3 Audible Walk Indication.** The audible indication of the WALK interval shall be by voice or tone.

**1106.2.3.1 Tones.** Tones shall consist of multiple frequencies with a dominant component at 880 Hz. The duration of the tone shall be 0.15 seconds and shall repeat at intervals of 0.15 seconds.

**1106.2.3.2 Volume.** Tone or voice volume measured at 36 inches (915 mm) from the pedestrian signal device shall be 2 dB minimum and 5 dB maximum above ambient noise level and shall be responsive to ambient noise level changes.

**1106.3 Pedestrian Pushbuttons.** Pedestrian pushbuttons shall comply with 1106.3.

**1106.3.1 Operation.** Pedestrian pushbuttons shall comply with 309.4.

**1106.3.2 Locator Tone.** Pedestrian pushbuttons shall incorporate a locator tone at the pushbutton. Locator tone volume measured at 36 inches (915 mm) from the pushbutton shall be 2 dB minimum and 5 dB maximum above ambient noise level and shall be responsive to ambient noise level changes. The duration of the locator tone shall be 0.15 seconds maximum and shall repeat at intervals of one second. The locator tone shall operate during the DON'T WALK and flashing DON'T WALK intervals only and shall be deactivated when the pedestrian signal system is not operative.

**1106.3.3 Size and Contrast.** Pedestrian pushbuttons shall be a minimum of 2 inches (51 mm) across in one dimension and shall contrast visually with their housing or mounting.

**1106.3.4 Optional Features.** An extended button press shall be permitted to activate additional features. Buttons that provide additional features shall be marked with three Braille dots forming an equilateral triangle in the center of the pushbutton.

**1106.4 Directional Information and Signs.** Pedestrian signal devices shall provide tactile and visual signs on the face of the device or its housing or mounting indicating crosswalk direction and the name of the street containing the crosswalk served by the pedestrian signal.

**1106.4.1 Arrow.** Signs shall include a tactile arrow aligned parallel to the crosswalk direction. The arrow shall be raised 1/32 inch (0.8 mm) minimum and shall be 1-1/2 inches (38 mm) minimum in length. The arrowhead shall be open at 45 degrees to the shaft and shall be 33 percent of the length of the shaft. Stroke width shall be 10 percent minimum and 15 percent maximum of arrow length. The arrow shall contrast with the background.

**1106.4.2 Street Name.** Signs shall include street name information aligned parallel to the crosswalk direction and complying with 703.2.

**1106.4.3 Crosswalk Configuration.** Where provided, graphic indication of crosswalk configuration shall be tactile and shall comply with 703.5.1.

## APPENDIX D

### GUIDELINES FOR THE RETROFIT INSTALLATION OF ACCESSIBLE PEDESTRIAN SIGNALS

#### Virginia Department of Transportation Mobility Management Division

## I. INTRODUCTION

An accessible pedestrian signal (APS), which is used in conjunction with standard pedestrian signals, makes signal information accessible to blind, visually impaired, and other disabled persons by providing information in a non-visual format, typically audible tones, verbal messages, and/or vibrotactile surfaces.

These guidelines provide the Virginia Department of Transportation (VDOT) a process with which to assess and evaluate the need to install (retrofit) an APS at an existing intersection. The goal is that all requests for APS installation receive a fair and equal assessment, that funds are expended in the most effective manner, and that all installations are undertaken as quickly as possible. The guidelines also provide information on the type of APS equipment to deploy and procedures for installing it. The goal is to install the most suitable equipment uniformly throughout the state and to ensure that the required and best installation procedures are followed.

The guidelines describe a process in which an intersection must first meet particular basic requirements in order to be considered for an APS. Then, if an APS is justified, an intersection must be evaluated to determine first hand the needs of the requesting blind or visually impaired individual, the estimated cost of installation, and the intersection's need for an APS relative to other intersections for which an APS has been requested. The scores received in the evaluation determine this relative need and, if needed because of limited funding, can be used to develop a prioritized list of intersections to be funded. Once the installation is scheduled, guidance is provided on the type of equipment to deploy and on procedures for installing it.

*It should be noted that different guidelines that are not yet developed might be applicable at new intersections or at intersections undergoing major improvements.*

## II. BASIC REQUIREMENTS

1. There must be a formal request and a demonstrated need for an APS (as evidenced by Requirement 2).
2. The attached "Request for the Installation of Accessible Pedestrian Signals Form" must be completed and submitted to the appropriate VDOT District Traffic Engineer. Anyone having difficulty completing the form will be given the appropriate assistance needed either to complete it or to submit the required information. The requestor should be a blind or visually impaired individual or a person or agency filing on his or her behalf.

3. The intersection must be signalized and equipped with pedestrian signals on the crossing for which APS is being requested. The following procedure should be followed in implementing this basic requirement:
  - a. If the intersection is signalized and the crossing for which APS is being requested is equipped with pedestrian signals, proceed with its evaluation.
  - b. If there are plans for the installation of pedestrian signals on the crossing for which APS is being requested, revise them (unless shown to be an undue hardship) to include APS. In this case, the intersection need not be evaluated. If there is undue hardship, install the pedestrian signals without APS as planned and proceed with its evaluation.
  - c. If there are no pedestrian signals on the crossing for which APS is being requested and no plans for them, conduct a traffic engineering study at the intersection to determine if pedestrian signals are warranted. If warranted, include the appropriate APS when the pedestrian signals are installed. The intersection need not be evaluated.
4. The attached “Accessible Pedestrian Signal Evaluation Form” must be completed as instructed for intersections requiring an evaluation. The form can be used by any office by writing in the appropriate contact information or revised electronically with the contact information.

### **III. FUNDING PROCESS**

Each fiscal year, the district requests and is allocated an amount of funds for the APS retrofit program. Generally, intersections approved for APS retrofit are funded on a “first come, first served” basis unless the funds are depleted. If the funds are depleted, the approved intersections are put on hold or carried over to the next funding cycle (typically a fiscal year). The new funds are distributed first to the carried over intersections based on a priority established by an evaluation score and then to any new intersections for which requests are received and approved. This basic process is repeated year after year. There is an exception involving intersections carried over into a third funding cycle that is explained in the following comprehensive explanation of the process.

More specifically, when a request for an APS retrofit installation is received, it is checked against the basic requirements. If the intersection is approved and requires an evaluation, a team is assembled to visit the intersection to conduct the evaluation. (The evaluation process is described later.) Funds are then allocated to the intersection based on an estimated cost, and the retrofit is scheduled for design and installation. This first come, first served process is repeated until the funding is depleted. At that point, further requests are evaluated and then put on hold or carried over until funding becomes available from the next funding cycle (typically at the beginning of the next fiscal year). Once the new funds are received, they are allocated to the carried over intersections based on a prioritized list established by the evaluation scores. If funds still remain after being distributed to the prioritized list, further requests for APS retrofit installations are once again funded, designed, and scheduled for implementation on a first come,

first served basis until the funds are depleted. Again, further requests are evaluated and then put on hold or carried over until new funding becomes available.

The exception to this process is when intersections are carried over into a third funding cycle (typically the third fiscal year). Any such intersections will receive first priority for the funds, with their existing evaluation scores used if need be. They will not be combined with intersections that received approval during the second funding cycle (typically fiscal year), that is, were over only one cycle.

*For the first year of the program only*, an initial period of three months will be allowed to publicize and promote the APS program, assemble existing APS requests, collect an initial round of requests, and conduct intersection evaluations. After the three-month period, an initial prioritized list of intersections to receive APS retrofit installations should be developed, and then the procedures described in these guidelines should be followed.

#### **IV. INTERSECTION EVALUATION**

##### **A. Overview of Procedure**

Once a request is received for an APS and it is determined that the intersection meets the basic requirements and needs to be evaluated, an evaluation team should be assembled to visit the intersection and conduct the evaluation described later in order to derive a priority score. This evaluation should be conducted within one month of the date the written request was received.

Team members should include the requesting blind or visually impaired person, an orientation and mobility specialist (possibly from the Virginia Department of Blind and Visually Impaired, and the VDOT District Traffic Engineer or designated representative. Both the local VDOT Resident Engineer and a representative from the local city, town, or county should be invited to be a member of the evaluation team and included if they accept. Finally, the requesting blind or visually impaired individual may, at his or her discretion, invite others to participate in the evaluation as a member of the evaluation team.

During the intersection visit, members of the evaluation team should thoroughly discuss all possible solutions to address the crossing needs of the requesting blind or visually impaired person. These discussions should include, but not be limited to, minor intersection improvements, installation of new crosswalks, installation of pedestrian signals with APS on crossings for which APS are not being requested, consideration of the needs of other potential blind or visually impaired individuals, and consideration of the intersection's characteristics after improvements are made.

At any point deemed appropriate and at the discretion of the VDOT District Traffic Engineer, an intersection may be reevaluated to account for changes that would influence the evaluation score and hence the ranking on the prioritized list. Similarly, if a significant amount of time elapses between the intersection's evaluation and the design or installation of the APS system, the VDOT District Traffic Engineer should ensure that there is a continued need for the

APS. For example, the requesting blind or visually impaired person may have relocated since submitting the request.

## **B. Background on Evaluation Methodology**

If the specified basic requirements are met, an APS should be installed at the requested intersection after an evaluation is undertaken. The evaluation will determine first hand the needs of the requesting blind or visually impaired person, the estimated cost of installation, and the intersection’s need for an APS relative to other intersections for which an APS has been requested. Should funding be limited, the evaluation process will be used to prioritize multiple requests for installations to determine an appropriate order of the expenditure of funds and the design/installation of the retrofit APS. When this happens, new funds will be distributed and installations scheduled at intersections based on the scores received in the evaluation process.

A logical process to compare intersections should include an evaluation of factors that impact the ability of a blind or visually impaired pedestrian to cross an intersection and that specifically address the needs of the requesting party. Some factors are more important than others, and the evaluation process should allow the evaluation team to distinguish and account for this distinction through the use of the point system. The following factors will be used to establish a prioritized list of intersections to receive funding and to be scheduled for an APS installation in the case of limited funding. More details on the factors and the rating methodology to be used are provided in the next section.

<b>Accessible Pedestrian Signal Evaluation Factors</b>	
<b>Evaluation Factor</b>	<b>Brief Description</b>
1. Configuration of Intersection	Skewed, offset, lacking particular straight through movements
2. Width of Crossing	Width of approach used by requesting party
3. Maximum Posted Speed Limit on Street to Be Crossed	Maximum posted speed limit on street to be used by requesting party
4. Special Traffic Conditions I	Heavy right-turn volumes and right-turn signals or arrows
5. Special Traffic Conditions II	Free flow right-turn lane (with or without a right-turn island)
6. Special Pedestrian Signal Conditions	Lead or exclusive pedestrian phases, mid-block exclusive pedestrian signals
7. Proximity of Intersection to Key Facilities	Distance to pedestrian generators or attractors
8. Need to Cross by Visually Impaired	Work- or school-related trip purpose by requesting party
9. Time in Queue	Length of time intersection has been waiting for funding based on time since request
10. Other Special Traffic and Mobility Conditions	Catchall to account for other concerns, especially if low volumes are a problem

## C. Details on Evaluation Factors and Rating Methodology

The following factors and rating methodology should be used to evaluate intersections for which an APS installation has been requested and that have met the basic requirements. The evaluation team should review this methodology, employ it when conducting an intersection evaluation, and complete the attached “Accessible Pedestrian Signal Evaluation Form.” If needed due to limited funding, the total score tallied should be used to rank the intersection on a prioritized list of intersections that have been approved for APS installation.

It is very important to re-emphasize that the application of these factors and this rating methodology, and thus the scoring and point systems contained therein, are applied equally to all intersections. The final score is used only to establish a relative ranking of intersections that have already been approved for an APS; that is, the absolute value of the score has no bearing on the earlier justification process.

### 1. Configuration of Intersection

The number of approaches to an intersection and the geometric design (offset, skewed, etc.) can affect the ability of the blind or visually impaired pedestrian to cross the roadway safely. The blind or visually impaired pedestrian listens for the traffic going straight through the intersection that is close and parallel with the crosswalk being traversed to guide his or her passage across the roadway. Accordingly, when an intersection’s configuration is skewed, offset, or does not have particular straight through movements (as is the case in a three-leg tee intersection), a crossing can become unsafe for the blind or visually impaired pedestrian. Points are assigned if there is no straight through traffic parallel with the crossing to be used by the requesting party or if the traffic is not close enough to be heard.

<b>Configuration of Intersection</b>	<b>Points</b>
No straight through traffic flow parallel with crosswalk to be used by requesting party or traffic not close enough to be heard	15

### 2. Width of Crossing

Wider streets are more difficult for the blind/visually impaired pedestrian to safely cross. Points are assigned on the basis of the width of the crossing to be used by the requesting party. Crossing width is measured from the curb at the embarkation point to the curb at the destination point. Islands and medians should be included in the total crossing distance even if they are equipped with separate pedestrian actuators. Efforts should be made to permit blind/visually impaired pedestrians to cross in one continuous movement. Traffic signal timings should be extended to accommodate a full crossing. Divided streets with or without a pedestrian actuator in the median should be handled as a single crossing, with the width measured across the entire street.

<b>Width of Crossing to Be Used by Requesting Party (feet)</b>	<b>Points</b>
40 or less	2
41 to 52	4
53 to 68	6
69 to 78	8
79 or more	10

### 3. *Posted Speed Limit on Street to Be Crossed*

The speed of approaching traffic reflects the capability of approaching drivers to stop for pedestrians clearing the intersection as the traffic signals and pedestrian signals change. Points are assigned on the basis of the maximum posted speed limit on the street to be used by the requesting party. More points are assigned for higher speeds.

<b>Maximum Posted Speed Limit on Street to Be Used by Requesting Party (mph)</b>	<b>Points</b>
0 to 25	1
26 to 30	2
31 to 35	3
36 to 40	4
41 or more	5

### 4. *Special Traffic Conditions I*

There are special conditions found at intersections that are related to traffic flow and signals and signal timings that may hinder the capability of a blind/visually impaired pedestrian to cross the street. These conditions include heavy right-turn volumes ( $\geq 40$  vehicles in the peak hour or the existence of a right turn lane) from the street parallel to the crossing and right-turn signals or arrows. Accordingly, points are assigned if these conditions impact the crossing to be used by the requesting party.

<b>Special Traffic Conditions I</b>	<b>Points</b>
Heavy right-turn volumes ( $\geq 40$ vehicles in peak hour) from street parallel with crossing or right-turn signals or arrows that impact crossing to be used by requesting party	15

### 5. *Special Traffic Conditions II*

Particular special conditions at intersections are related to geometric features that may hinder the capability of a blind or visually impaired pedestrian to cross the street. One of the most critical is a free flow right-turn lane (with or without a right-turn island). Special care must be taken when installing an APS to mitigate the problems associated with this condition. Accordingly, points are assigned if this condition impacts the crossing to be used by the requesting party.

<b>Special Traffic Conditions II</b>	<b>Points</b>
Free flow right-turn lane (with or without a right-turn island) that impacts crossing to used by requesting party	15

6. *Special Pedestrian Signal Conditions*

Particular special conditions at intersections are related to pedestrian signals that may hinder the capability of a blind or visually impaired pedestrian to cross the street. These conditions include the presence of a lead pedestrian phase, an exclusive pedestrian phase, or a mid-block exclusive pedestrian signal. Accordingly, points are assigned if any of these conditions impacts the crossing to be used by the requesting party.

<b>Special Pedestrian Signal Conditions</b>	<b>Points</b>
Lead pedestrian phases, exclusive pedestrian phases, or mid-block exclusive pedestrian signals that impact crossing to be used by requesting party	15

7. *Proximity of Intersection to Key Facilities*

An APS system should be considered at intersections that are close to facilities that attract or generate significant amounts of pedestrian traffic. An APS would improve the safety and mobility of the blind or visually impaired pedestrian and make these facilities more accessible. Examples are medical, educational, social, recreational, commercial, shopping, public, governmental facilities, and transit stops. Pedestrian demand is based in part on how close the intersection is to these facilities; i.e., the closer a facility, the more the demand. Likewise, points are assigned based on the closeness of these facilities to the intersection; i.e., the closer a facility, the more the points. In the case of multiple facilities, points should be assigned using the closest facility to the proposed APS deployment site. An estimate of 400 ft can be used an average block length.

<b>Proximity of Intersection to Key Facilities</b>	<b>Points</b>
4 to 6 blocks	2
3 blocks	4
2 blocks	6
1 block	8
At subject facility	10

8. *Need to Cross by Visually Impaired*

A blind or visually impaired pedestrian has a trip purpose or reason for every crossing needed. Although all trips are important, those related to work/employment or school are considered much more important. Accordingly, points are assigned if the need to cross is related to work/employment or school.

<b>Need to Cross by Visually Impaired</b>	<b>Points</b>
Need to cross is related to work/employment or school	15

9. *Time in Queue*

APS retrofit installations should be undertaken as soon as possible, and this factor enhances the score of intersections that have been waiting the longest to be funded. Points are assigned based on when during the fiscal year the request for an APS retrofit installation was received. More points are assigned as the wait time increases. As noted previously, once an intersection is carried over the second year (into the third year), however, it is automatically placed on a priority list to receive funding regardless of how its score compares with the scores of intersections requested during the second fiscal year.

<b>Time in Queue</b>	<b>Points</b>
<i>Month in fiscal year request received</i>	
July	24
August	22
September	20
October	18
November	16
December	14
January	12
February	10
March	8
April	6
May	4
June	2

10. *Other Special Traffic and Mobility Conditions*

This factor is intended to provide the orientation and mobility specialist on the evaluation team an opportunity to add 15 points based on special conditions not adequately covered by previous factors or based on special needs of the requesting party. In particular, the orientation and mobility specialist should consider adding the points if traffic volumes are so low as to result in crossing conditions that are a problem for the requesting party.

<b>Other Special Traffic and Mobility Conditions</b>	<b>Points</b>
Special traffic and mobility conditions	15
Comments:	

**V. EQUIPMENT**

Unless site-specific factors dictate otherwise, the APS equipment installed at the intersection should have the characteristics described in this section of the guidelines. Any

exceptions should be left to engineering judgment, and the VDOT District Traffic Engineer should most likely be the one to make the decision for an exception.

## **A. Description of Main APS Unit**

The basic APS unit should be a pushbutton integrated unit with a raised (tactile) arrow that vibrates when the walk signal is on. The unit should have a locator tone, a walk tone, and the capability of providing a voice message, with all sounds typically coming directly from a speaker in the unit. The pushbutton should be a minimum of 2 in (51 mm) across in one dimension and should contrast visually with its housing or mounting.<sup>2</sup> The following are specific details of its operation.

### *Pushbutton Locator Tone*

The APS unit should have a locator tone at the pushbutton to alert the visually impaired user of its presence and location. The locator tone should be similar to the walk tone if one is used for the walk indication; however, it should repeat at a slower rate. The locator tone can best be defined as a tick or percussive tone; a buzz, cuckoo, beep, or chirp is not considered acceptable for the walk interval. It should have a duration of 0.15 sec or less and should repeat at 1-sec intervals.<sup>1</sup> The locator tone should always operate during the “Don’t Walk” interval of the pedestrian signal and during the flashing “Don’t Walk” interval<sup>2</sup> if the countdown feature is not being used. See the later section that describes this additional feature. The locator tone should be deactivated if the traffic signal is in a flashing operation<sup>1</sup> or if the pedestrian signal system is otherwise inoperative.<sup>2</sup> The locator tone should have the following characteristics:

1. Tones should consist of multiple frequencies with a dominant component at 880 Hz.<sup>2</sup>
2. The volume measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>2</sup> with a maximum of 89 dB<sup>1</sup> and should be responsive to ambient noise level changes.
3. Tones should be audible 6 to 12 ft (1.8 to 3.7 m) from the pushbutton or to the building line, whichever is less.<sup>1</sup>

### *Confirmation of Pedestrian Signal Timing Activation*

Once a pedestrian locates and engages the pushbutton, a confirmation light should come on to confirm that a request has been received and that pedestrian signal timing has been activated. In order to provide this confirmation to a visually impaired pedestrian, some form of immediate audible indication should be emitted, e.g., a beep, tick, or other percussive tone. A pushbutton information message may also serve as this confirmation if it starts immediately upon engaging the pushbutton. See the later section that describes this additional feature.

### *Walk Interval Tone*

The walk tone of the APS unit should be similar to the locator tone except that it should repeat at a faster rate. The tone is best defined as a tick or percussive tone; a buzz, cuckoo, beep, or chirp is not considered acceptable for the walk interval. The duration of the tone should be 0.15 sec and should repeat at intervals of 0.15 sec.<sup>2</sup> The unit should have the capability of emitting the selected sound for as long as the walk signal is on at the pedestrian signal head. The walk interval tone should have the following characteristics:

1. Tones should consist of multiple frequencies with a dominant component at 880 Hz.<sup>2</sup>
2. The volume measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>2</sup> with a maximum of 89 dB<sup>1</sup> and should be responsive to ambient noise level changes.

### *Walk Interval Voice Message*

The APS unit should have the capability of emitting a voice message during the walk interval for as long as the walk signal is on at the pedestrian signal head. The words and their meanings must be clear and concise and correctly understood by the visually impaired user. The basic model to be used for the message is:<sup>3</sup>

- “Howard. Walk sign is on to cross Howard” walk message for Howard Street).
- “Walk sign is on for all crossings” (walk message for intersections with exclusive pedestrian phase).

The voice message should normally be used for the walk interval. Its volume measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>2</sup> with a maximum of 89 dB<sup>1</sup> and should be responsive to ambient noise level changes.

### *Vibrating Tactile Arrow*

The APS unit should have a raised (tactile) arrow that is installed to point parallel with the direction of travel on the crosswalk. It should vibrate during the walk interval. The arrow can be part of or above the pushbutton or located on top of the unit.

The arrow should be raised at least 1/32 in (0.8 mm) and should be at least 1½ in (38 mm) in length. The arrowhead should be open at 45 degrees to the shaft and should be 33 percent of the length of the shaft. Stroke width should be from 10 to 15 percent of the length of the arrow. The arrow should contrast with the background.<sup>2</sup>

## **B. Additional Features**

The APS unit should provide the following optional features.

### *Pushbutton Information Message*

A pushbutton informational speech message should advise the visually impaired user of the need to wait for a walk signal. The message can also provide information about other features at the intersection. The message should be activated immediately upon engaging the pushbutton or upon pushing and holding it up to but not more than 0.5 sec. The volume of the message measured at 36 in (915 mm) from the pedestrian signal device should be 2 dB minimum and 5 dB maximum above ambient noise level<sup>3</sup> with a maximum of 89 dB<sup>2</sup> and should be responsive to ambient noise level changes. Once activated, the information message should repeat itself until being immediately truncated by the initiation of the walk interval tone or message. The term “wait” should always be used.<sup>2</sup> Examples of messages are the following:<sup>3</sup>

- Model pushbutton message: *Wait to cross Howard at Grand.*
- Model pushbutton message for intersections having an exclusive pedestrian phase with right turns-on-red prohibited: *Wait to cross Howard at Grand. Wait for red light for all vehicles.*
- Model pushbutton message for intersections having an exclusive pedestrian phase with right turns-on-red permitted: *Wait to cross Howard at Grand. Wait for red light for all vehicles. Right turn on red permitted.*
- Model pushbutton message for angled crosswalks: *Wait to cross Howard at Grand. Crosswalk angles right.*
- Model pushbutton message for crosswalks to medians where a second button push is required: *Wait to cross Howard at Grand. Short WALK phase. Raised (or cut-through) median with second pushbutton.*
- Model pushbutton message for signalized crosswalks to splitter islands: *Wait to cross right turn lane to island for Howard and Grand crosswalks.*

If the information message is activated immediately upon engaging the pushbutton, this message may serve as confirmation to the visually impaired pedestrian that his or her request was received and that pedestrian signal timing was activated.

### *Pedestrian Countdown*

The APS unit should be capable of providing a voice message countdown for the visually impaired pedestrian. The pedestrian signal head may have a pedestrian interval countdown display to inform sighted pedestrians of the number of seconds remaining until the termination of the pedestrian change or clearance interval. This display typically accompanies the flashing raised stop hand in the pedestrian head. The intent is simply to inform pedestrians of the timing of the clearance interval so they can make practical decisions regarding either entering the crossing or speeding up their walk rate to ensure clearing the crosswalk prior to the onset of traffic flow. The APS unit provides this capability via a voice message.

## *Audible Beacons*

The APS unit should be capable of providing beacons. *Beacons* is defined as providing directional orientation (homing) to a visually impaired pedestrian through the use of an audible sound or signal. The volume of the walk message or tone and the subsequent sound that occurs during the flashing or change interval (either the locator tone or the countdown message) may be increased. The system could also be set such that the sounds alternate back and forth from one end of the crosswalk to the other. The system may also have a separate speaker oriented in line with the appropriate crosswalk to focus the sound.<sup>3</sup>

Beacons may be needed at intersections having skewed crosswalks or irregular geometry such as multiple legs, at crosswalks longer than 70 ft (unless another APS is installed in an existing median), and at crosswalks used by a visually impaired pedestrian with a severe veering problem. It is not appropriate at locations with free right turns or split phasing.<sup>3</sup>

## **VI. INSTALLATION PROCEDURES**

### **A. Manual on Uniform Traffic Control Devices for Streets and Highways**

Sections 4E.06 and 4E.09 of the MUTCD provide guidance on accessible pedestrian signals. These sections are included here for the convenience of the user of these guidelines.<sup>1</sup>

#### **Section 4E.06 Accessible Pedestrian Signals**

##### **Support:**

The primary technique that pedestrians who have visual 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, corresponding to the onset of the green interval. This technique is effective at many signalized locations. The existing environment is often sufficient to provide the information that pedestrians who have visual disabilities need to operate reasonably safely at a signalized location. Therefore, many signalized locations will not require any accessible pedestrian signals.

##### **Guidance:**

If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross reasonably safely and effectively, an engineering study should be conducted that considers the safety and effectiveness for pedestrians in general, as well as the information needs of pedestrians with visual disabilities.

##### **Support:**

The factors that might make crossing at a signalized location difficult for pedestrians who have visual disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets. Further, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern signal phase changes.

Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities, can often act as important advisors to the traffic engineer when consideration is being

given to the installation of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also might be able to provide a wide range of advice. The U.S. Access Board's Document A-37, "Accessible Pedestrian Signals," provides various techniques for making pedestrian signal information available to persons with visual disabilities (see [Addresses](#) for the address for the U.S. Access Board).

Accessible pedestrian signals provide information in nonvisual format (such as audible tones, verbal messages, and/or vibrating surfaces).

Information regarding detectors for accessible pedestrian signals is found in Section 4E.09.

**Standard:**

**When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal shall clearly indicate which pedestrian crossing is served by each device.**

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

Guidance:

The installation of accessible pedestrian signals at signalized locations should be based on an engineering study, which should consider the following factors:

- 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 traffic signal phasing; and
- E. The complexity of intersection geometry.

Support:

Technology that provides different sounds for each nonconcurrent signal phase has frequently been found to provide ambiguous information.

**Standard:**

**When choosing audible tones, possible extraneous sources of sounds (such as wind, rain, vehicle back-up warnings, or birds) shall be considered in order to eliminate potential confusion to pedestrians who have visual disabilities.**

Guidance:

Audible pedestrian tones should be carefully selected to avoid misleading pedestrians who have visual 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 multileg 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.

**Standard:**

**When accessible pedestrian signals have an audible tone(s), they shall have a tone for the walk interval. The audible tone(s) shall be audible from the beginning of the associated crosswalk. If the tone for the walk interval is similar to the pushbutton locator tone, the walk interval tone shall have a faster repetition rate than the associated pushbutton locator tone.**

Support:

A pushbutton locator tone is a repeating sound that informs approaching pedestrians that they are required to push a button to actuate pedestrian timing, and that enables visually impaired pedestrians to locate the pushbutton (see Section 4E.09).

Guidance:

The accessible walk signal tone should be no louder than the locator tone, except when there is optional activation to provide a louder signal tone for a single pedestrian phase.

Automatic volume adjustment in response to ambient traffic sound level should be provided up to a maximum volume of 89 dBA. Where automatic volume adjustment is used, tones should be no more than 5 dBA louder than ambient sound. The A-weighted sound pressure level should conform to the requirements of "ISO 1996-1:1982" and "ISO 1996-2:1987" (see Addresses for the address for the International Organization for Standards).

**Standard:**

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

**The verbal message that is provided at regular intervals throughout the timing of the walk interval shall be the term "walk sign," which may be followed by the name of the street to be crossed.**

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

- A. It shall be the term "wait."**
- B. It need not be repeated for the entire time that the walk interval is not timing.**

Option:

Accessible pedestrian signals that provide verbal messages may provide similar messages in languages other than English, if needed, except for the terms "walk sign" and "wait."

Support:

A vibrotactile pedestrian device communicates information about pedestrian timing through a vibrating surface by touch.

**Standard:**

**Vibrotactile pedestrian devices, where used, shall indicate that the walk interval is in effect, and for which direction it applies, through the use of a vibrating directional arrow or some other means.**

Guidance:

When provided, vibrotactile pedestrian devices should be located next to, and on the same pole as, the pedestrian pushbutton, if any, and adjacent to the intended crosswalk

#### **Section 4E.09 Accessible Pedestrian Signal Detectors**

**Standard:**

**An accessible pedestrian signal detector shall be defined as a device designated to assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase.**

**At accessible pedestrian signal locations with pedestrian actuation, each pushbutton shall activate both the walk interval and the accessible pedestrian signals.**

Option:

Accessible pedestrian signal detectors may be pushbuttons or passive detection devices.

Pushbutton locator tones may be used with accessible pedestrian signals.

Guidance:

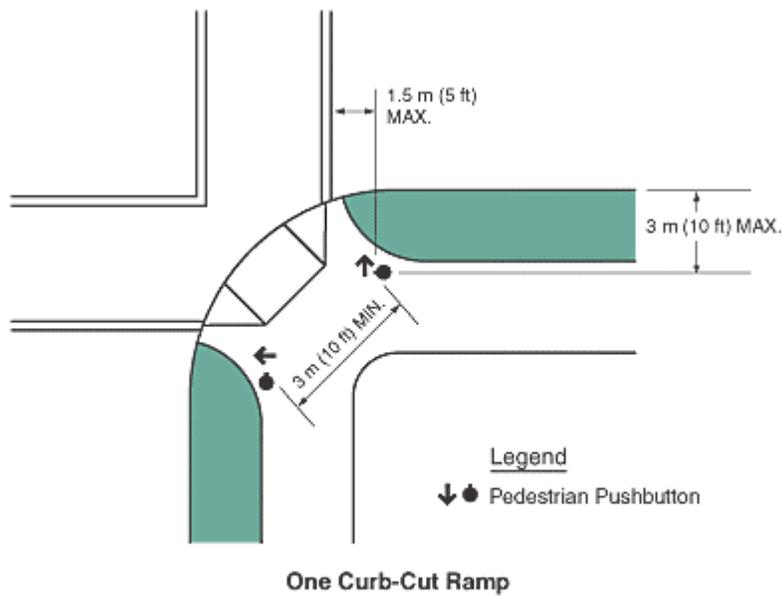
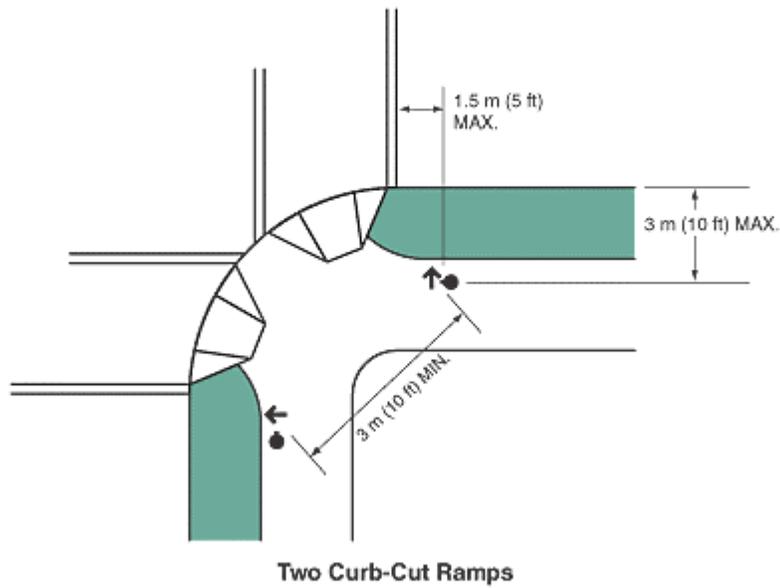
At accessible pedestrian signal locations, pushbuttons should clearly indicate which crosswalk signal is actuated by each pushbutton. Pushbuttons and tactile arrows should have high visual contrast as described in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11). Tactile arrows should point in the same direction as the associated crosswalk. At corners of signalized locations with accessible pedestrian signals where two pedestrian pushbuttons are provided, the pushbuttons should be separated by a distance of at least 3 m (10 ft). This enables pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton.

Pushbuttons for accessible pedestrian signals should be located (see Figure 4E-2) as follows:

- A. Adjacent to a level all-weather surface to provide access from a wheelchair, and where there is an all-weather surface, wheelchair accessible route to the ramp;
- B. Within 1.5 m (5 ft) of the crosswalk extended;
- C. Within 3 m (10 ft) of the edge of the curb, shoulder, or pavement; and
- D. Parallel to the crosswalk to be used.

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

**Figure 4E-2. Recommended Pushbutton Locations for Accessible Pedestrian Signals**



**Standard:**

**When used, pushbutton locator tones shall be easily locatable, shall have a duration of 0.15 seconds or less, and shall repeat at 1-second intervals.**

Guidance:

Pushbuttons should be audibly locatable. Pushbutton locator tones should be intensity responsive to ambient sound, and be audible 1.8 to 3.7 m (6 to 12 ft) from the pushbutton, or to the building line, whichever is less. Pushbutton locator tones should be no more than 5 dBA louder than ambient sound.

Pushbutton locator tones should be deactivated during flashing operation of the traffic control signal.

Option:

At locations with pretimed traffic control signals or nonactuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals.

The audible tone(s) may be made louder (up to a maximum of 89 dBA) by holding down the pushbutton for a minimum of 3 seconds. The louder audible tone(s) may also alternate back and forth across the crosswalk, thus providing optimal directional information.

The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print.

**B. Miscellaneous Practices**

The following practices should be followed to ensure successful installation of APS at an existing intersection.

*Coordination with Requesting Citizen*

Meeting with the visually impaired citizen who requested the APS to determine his or her specific needs and concerns is a critical first step to a successful installation. (Note that this is required in Section IV.) Likewise, it is critical to meet with him or her after the APS is first installed to provide instruction on how to use the APS and, if needed, to fine-tune its operation.

*Location of APS Pushbuttons*

Successful operation of the APS is highly dependent on the pushbutton being installed at the appropriate specific location. Information on proper location is provided in both the MUTCD<sup>2</sup> and the NCHRP synthesis and guide to best practices regarding APS.<sup>4</sup>

*Removal of APS Units Not Being Used*

Once VDOT district staff learns that an APS unit is no longer needed at a location (e.g., the user has moved), immediate steps should be taken to disengage the unit and remove it for use at another site. Since there is no practical way that VDOT can routinely monitor usage, non-usage will typically be reported by adjacent residents or business owners (primarily via

complaints) or possibly by social service agencies. In addition, VDOT maintenance crews responding to equipment problems might determine that an APS is not being used.

### *Rest in Walk Operation*

At intersections where the pedestrian signal on certain crossings (primarily on the side or minor street) “rests” in the “Walk” interval, the APS walk interval indications should operate for only one timing cycle when the pushbutton is activated; i.e., the APS pushbutton should normally “rest” in locator tone operation unless a pedestrian actually pushes the button and calls for the APS walk interval.

## **REFERENCES**

1. Federal Highway Administration. *Manual on Uniform Traffic Control Devices for Streets and Highways*, Part 4: Highway Traffic Signals, Chapter 4L: Pedestrian Control Features, Section 4E.06: Accessible Pedestrian Signals, Section 4E.09: Accessible Pedestrian Signal Detectors. Washington, D.C., 2003.
2. The Access Board. *Draft Guidelines for Accessible Public Rights-of-Way*, June 17, 2002. <http://www.access-board.gov/rowdraft.htm#1106>. Accessed December 10, 2004.
3. Barlow, J.M., Bentzen, B.L., and Tabor, L.S. *Accessible Pedestrian Signals: Synthesis and Guide to Best Practice*. An Interim Product Prepared for National Cooperative Highway Research Program Project 3-62 Guidelines for Accessible Pedestrian Signals. Transportation Research Board, Washington, D.C., 2003.

**ATTACHMENT A**

**ACCESSIBLE PEDESTRIAN SIGNAL EVALUATION**

<b>ACCESSIBLE PEDESTRIAN SIGNAL EVALUATION FORM</b>		
Location:		
Date:	Day:	Time of Day:
Weather Conditions:		
Evaluation Team Members:		
Specific Needs of Requesting Party:		
<b>EVALUATION FACTOR</b>		<b>POINTS</b>
<b>1. Configuration of Intersection</b>		
<p>Points are assigned if the intersection’s configuration causes there to be an absence of straight through traffic that is parallel to the crossing to be used by the requesting party or that is close enough to be heard. For example, the intersection may be skewed, offset, or does not have certain straight through movements (as is the case in a 3-leg tee intersection). Accordingly, if there is <i>no</i> straight through traffic flow that is parallel with the crosswalk to be used by the requesting party or close enough to be heard, assign 15 points.</p> <p><u>Comments:</u></p>		
<b>2. Width of Crossing to Be Used by Requesting Party</b>		
<u>Width (feet)</u>	<u>Points</u>	<u>Comments:</u>
40 or less	2	
41 to 52	4	
53 to 68	6	
69 to 78	8	
79 or more	10	

<b>3. Maximum Posted Speed Limit on Street to be Used by Requesting Party</b>		
<u>Speed (mph)</u>	<u>Points</u>	<u>Comments:</u>
0 to 25	1	
26 to 30	2	
31 to 35	3	
36 to 40	4	
41 or more	5	
<b>4. Special Traffic Conditions I</b>		
If there <i>are</i> heavy right-turn volumes ( $\geq 40$ vehicles in the peak hour or the existence of a right-turn lane) from the street parallel with the crossing or right-turn signals or arrows that impact the crossing to be used by the requesting party, assign 15 points. <u>Comments:</u>		
<b>5. Special Traffic Conditions II</b>		
If there <i>is</i> a free flow right-turn lane (with or without a right-turn island) that impacts the crossing to be used by the requesting party, assign 15 points. <u>Comments:</u>		
<b>6. Special Pedestrian Signal Conditions</b>		
If there <i>are</i> lead pedestrian phases, exclusive pedestrian phases, or mid-block exclusive pedestrian signals that impact the crossing to be used by the requesting party, assign 15 points. <u>Comments:</u>		
<b>7. Proximity of Intersection to Key Facilities</b>		
<u>Proximity to Facility</u>	<u>Points</u>	<u>Comments:</u>
4 to 6 blocks	2	
3 blocks	4	
2 blocks	6	
1 block	8	
At the Facility	10	
(Use 400 feet as an estimate of an average block length.)		
<b>8. Need to Cross by Visually Impaired</b>		
If the requesting party's need to cross <i>is</i> related to work/employment or school, assign 15 points. <u>Comments:</u>		

<b>9. Time in Queue</b>		
<u>Month in fiscal year request received</u>	<u>Points</u>	
July	24	
August	22	
September	20	
October	18	
November	16	
December	14	
January	12	
February	10	
March	8	
April	6	
May	4	
June	2	
<b>10. Other Special Traffic and Mobility Conditions</b>		
<p>If special traffic and mobility conditions <i>do exist</i> as determined by the Orientation and Mobility Specialist (including intersections at which traffic volumes are so low as to result in crossing conditions that are a problems for the requesting party), assign 15 points.</p> <p><u>Comments:</u></p>		
<b>TOTAL POINTS</b>		
Additional Comments by Evaluation Team:		



**ATTACHMENT B**

**REQUEST FOR THE INSTALLATION OF ACCESSIBLE PEDESTRIAN SIGNALS FORM**

Requesting Party's Name: \_\_\_\_\_  
(blind or visually impaired pedestrian)

Address: \_\_\_\_\_ City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone (Home): \_\_\_\_\_ Telephone (Work): \_\_\_\_\_

I request that the Virginia Department of Transportation install Accessible Pedestrian Signals (APS) to cross \_\_\_\_\_ (route number/street name) at the intersection of \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_ (city, town, or county).

Please describe the difficulty you have in crossing:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Please call _____ at _____ with questions and/or mail form to:   
--

**For Office Use Only**

Date Received: \_\_\_\_\_ Received by: \_\_\_\_\_

- a. If the intersection is signalized and the crossing for which APS is requested is equipped with ped signals, evaluate the intersection.
- b. If there are plans to install ped signals on the crossing, revise them (unless shown to be undue hardship) to include APS and do not evaluate the intersection. If undue hardship, install ped signals without APS as planned and evaluate the intersection.
- c. If there are no ped signals on the crossing and there are no plans for ped signals, conduct a study to determine if ped signals are warranted. If warranted, include appropriate APS when ped signals are installed, and do not evaluate the intersection.

Evaluation Date: \_\_\_\_\_ Evaluation Team: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Recommendations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature (District Traffic Engineer): \_\_\_\_\_ Date: \_\_\_\_\_

Signature (District EO Manager): \_\_\_\_\_ Date: \_\_\_\_\_

**Attach Evaluation Sheets and All Supporting Documentation.**