



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

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Michael R. Pence, Governor
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DATE: January 9, 2014

TO: District Deputy Commissioners
District Technical Services Directors
District Traffic Engineers

OPERATIONS MEMORANDUM 14-01
SIGNALS

FROM: Brad L. Steckler, Director *BSL 1-9-14*
Traffic Engineering Division

SUBJECT: Accessible Pedestrian Signal (APS) Studies and Installation Considerations

I) Background

The INDOT Accessible Pedestrian Signals (APS) Policy states that the agency “is committed to implementing the installation of accessible pedestrian signals to ensure that where our pedestrian facilities communicate information, we also include features that provide information in a format that is accessible to individuals who are blind, have low vision, are deaf or have impaired hearing.” Consistent with the APS Policy, a study will be conducted to determine the need for APS, whether associated with a project to reconstruct/modernize or install a new signal or in response to an external request. In order for a particular location to be considered for APS it must either currently have or need pedestrian signal heads. While typically these locations will be roadway intersections, APS studies may also be needed at midblock crossings. (Additional background may be found in the NCHRP resource titled *Accessible Pedestrian Signals: A Guide to Best Practices*, available online at http://www.apsguide.org/chapter1_aps.cfm.)

II) Purpose

This operations memo supplements the guidance found in the *Indiana Manual on Uniform Traffic Control Devices (IMUTCD)* on the factors that should be evaluated in the study. Furthermore, this document provides guidance on installation.

III) APS Studies

An APS study should be performed by the district traffic engineering office for each external request received from the public or local government entity. See Appendix A for the standard APS request form. The district traffic engineering office should also perform an APS study for each new signal installation along with or upon completion of a signal warrant analysis. The designer should perform an APS study by the time of the preliminary field check for projects that include either full or partial signal reconstruction/modernization.

A three-tiered approach should be used when conducting APS studies. All tiers rely on exercise of professional engineering judgment toward practical and reasonable decision-making. The first set of criteria is used to determine if the location, by sheer inspection, has characteristics rendering it clearly ineligible for APS. If the location is not disqualified for APS based upon initial review, then the second tier criteria (which still can be quickly conducted) should be used to determine if the location should have APS. If the second set of criteria is not conclusive, a third tier that requires more in depth analysis should be used in the decision-making.

If the determination is made to install APS at an intersection APS should be provided for all pedestrian crossings at that intersection.

A. First Tier Criteria:

Criteria that should be considered that automatically disqualify a location are:

1. Pedestrian signal heads are not present and are not justified. In general, pedestrian signal heads are considered to be needed if sidewalk is present or will be installed at the intersection.
2. Pedestrian crossings are in an environment with enough ambient noise so as to require the APS volume to be more than 100 dB in order for the signal to be discernable. The MUTCD prohibits signal auditory volumes above this level. The ambient volume may be measured either by a device for that specific use (sound level meter) or another tool verified to be sufficiently accurate for this purpose. Measurement of ambient sound level need only be taken for the First Tier criteria analysis when there is reason to believe that the noise level is close to the limit.
3. Installation of APS would require an unreasonably extensive upgrade to the controller cabinet and a larger controller cabinet is not feasible due to right-of-way constraints. (Controller cabinet compatibility may be confirmed with the Office of Traffic Control Systems.)

B. Second Tier Criteria:

APS should be provided if any of these criteria are satisfied:

1. Traffic generators are present within two blocks of the intersection under study that by their nature would highly likely be expected to have recurring visually impaired users. Judgment should be exercised in establishing the proximity from the generator to the traffic signal that triggers APS installation; it may extend beyond two blocks in select cases. This type of generator is limited to hospitals, clinics, ophthalmologists/optometrists offices, employment centers or schools for the visually impaired; senior centers, and any other facilities associated specifically with the visually impaired. (Additional pedestrian features needed to accommodate APS, including sidewalk or pedestrian signal heads, should be provided if it is within the scope of work of the project. (If these additional features are outside the scope of work, see Section D on deferrals.)

2. Certain pedestrian phasing conditions. In certain cases, the need for APS is indicated by an exclusive pedestrian phase, a leading pedestrian interval, or where the WALK interval is not concurrent with the green phase for the adjacent parallel traffic. (Special pedestrian phasing should be confirmed with the Office of Traffic Control Systems.)
3. Explicit knowledge by the analyst of current visually impaired pedestrian users at the site, or of visually impaired persons who would likely walk if enhanced accommodations were in place.
4. The location is within a city or town that has or is planning to upgrade all of its signals to APS.

C. Third Tier Criteria:

If the first and second tier criteria are not conclusive then a full study should be performed. Typically a site visit will be needed to collect all the relevant data and information. The full APS study should consider all of the criteria given in the IMUTCD:

1. Potential demand for APS from traffic generators that are within two blocks of the location that by their nature may have visually impaired users on a recurring basis. Judgment should be exercised in establishing the proximity of the generator to the signal that triggers the need for APS. This type of generator may include government office buildings, convention centers, major retail or commercial areas, stadiums or arenas, and mass transit terminals or stops. Additionally schools, churches, and other prominent institutions may have members visually impaired who use the crossing now, or would given enhanced accommodations. If this type of generator is identified, management at the places themselves, local government officials or advocacy groups for the visually impaired should be contacted to supply information on presence and extent of visually impaired persons associated with those sites. See Appendix B for a list of some of the local and state advocacy groups.
2. Previous requests for APS have been received at the location. Who made the request and when it was made should be taken into account. If the request was made by or on behalf of a private citizen more than one year prior to the beginning of the study, an attempt should be made to follow up with the previous requestor to ensure the request still stands.
3. Traffic volumes during periods when pedestrians are likely to be present. Pedestrian counts need not be considered as part of the APS study. However, the APS study should note:
 - a. Periods of low traffic volumes on the minor street during pedestrian activity. Irregular traffic on the minor street results in less audio cues for the impaired therefore a greater need for APS. A daytime hourly volume less than 120 (approximately two vehicles for a 60 second

cycle) may indicate a need for APS. If hourly counts are not readily available they may be estimated from the AADT by applying a standard traffic distribution percentage. For urban locations this value is 5%. Additional information may be obtained from the ITE *Traffic Engineering Handbook*.

- b. Periods of high right-turn-on-red (RTOR) volumes. RTOR traffic greater than 60 during any hour (one vehicle per 60 second cycle) indicates a possible need for APS. If peak hour turning movement counts are not available or have not been estimated through signal warrant analysis, a minimum 15 minute sample count should be taken.
4. Certain types of signal phasing. Split phasing or protected left-turn phasing increases the need for APS.
 5. Intersection geometry/characteristics. In general the more difficult the crossing is the greater the need for APS. These geometric characteristics are among those that should be reviewed when considering the need for APS:
 - a. Crosswalk length, approach width. The wider the crossing the greater the need for APS. Crosswalk widths less than 40 ft do not typically present special challenges.
 - b. Crossing alignment. A pedestrian path across the intersection (not necessarily within the crosswalk lines) that is skewed from the direction of the approaching sidewalk can be particularly challenging to the visually impaired.
 - c. Curb radius. Radii greater than 25 ft may hinder the visually impaired and decrease the likelihood that they can properly orient themselves at the start of the crossing movement.
 - d. Curb ramp alignment. A curb ramp that is not aligned with the direction of the crossing can be misleading to the visually impaired.
 - e. Islands/Medians. The presence of islands or median can be misleading to the visually impaired.
 - f. Transverse Crosswalk Slope. Severe slopes (>5%) can lead the visually impaired to veer towards the downhill side and off course.
 - g. Speed Limit. Higher speed limits (> 40 mph) indicate a greater need for APS.

Additional factors that should be considered in the study include:

6. Other pedestrian or bicyclist facilities. The presence of sidewalk, curb ramps, bike lanes, pedestrian hybrid signals, etc is indicative of locations where there is a potential need for APS.

7. Presence of APS at any adjacent intersection. If an adjacent intersection is so equipped then the likelihood that a visually impaired pedestrian may use the location is increased.
8. Other relevant objective factors may be considered and added to the study as deemed appropriate.

If the study is being performed in response to an external request (whether present or past, the latter as in criterion 2 above), a determination for APS *should* be made if even to a slight degree the Third Tier criteria are met. Otherwise, for studies performed in the planning of a reconstruction/modernization or new signal project, if the criterion is met for potential use/demand (criterion 1 above), in concert with information confirming definite use obtained through outreach, and any of the other criteria are satisfied, APS should be recommended.

If any of the third tier criteria are met APS may be recommended.

In recognition of special site conditions that cannot all be pre-determined for the purpose of systematically judging merit of APS, a determination for APS installation *may* be made if none of the third tier criteria are satisfied. In this exceptional event, the analyst is compelled to detail the rationale.

D. APS Deferral

If the determination is made for APS but additional features are needed (e.g. curb ramps) that are beyond the scope of work of the project (the essential project intent), the installation of APS can be deferred to a later time when the additional work can be more reasonably executed.

E. Submission and Documentation:

The study should be submitted for approval to the District Traffic Engineer (if performed by others). A copy of the approved study should be provided to the Title VI/ADA Program Manager of the Economic Opportunity Division, and if recommendations are being made regarding a construction project, the results of the study should be provided to the Project Manager. The recommendation for APS installation will be included in the INDOT ADA Transition Plan by the ADA Program Manager.

The APS study report should include the following:

- Title heading, with “APS Study” as part of that;
- Name(s) of the person conducting the study;
- Date
- Site/location description;
- Scope/purpose of project (if considered as part of a construction project);
- Summary of the vicinity, the types of facilities and buildings in the area;
- Copies of any request for APS (full study only);
- Pedestrian Volumes (full study only)

- Traffic Counts (full study only)
- Length of pedestrian crossings
- Complete intersection geometry (full study only)
- Summary of any existing pedestrian/bicycle facilities
- Signal phasing
- Challenges to APS at the location, if applicable (e.g., ambient noise, need for associated infrastructure features that are well outside project scope). A recommendation to postpone installation of APS until such a time that additional associated work can be done should be noted along with an indication of when the future installation is expected to occur.
- If APS is not recommended, a summary of any other practical measures INDOT should take to enhance accessibility at the site for the visually impaired should be provided. (For instance, this may involve the installation of the current INDOT standard push button which is larger in size than older models, has a tactile arrow with high color contrast, and has an audible tone when activated.)

See Appendix C for the standard APS study report form which should be used.

F. Responding to Requests:

According to the INDOT APS Policy, the response to an external requestor should be made within 90 days with a determination. To facilitate timely responses the final study with the determination for or against APS should be provided to the ADA Program Manager within 60 days of receipt of a notice that a request for APS has been made.

IV) Installation Considerations

The following items should be considered when installing APS at a traffic signal:

- A. Location.** Push buttons with APS should be located according to [Section 4E.08](#) of the IMUTCD. Where possible, push buttons for separate crossing movements should be located on separate poles at least 10 ft apart. Each should be no more than 10 ft from the curb/shoulder but within 5 ft from the crosswalk.
- B. Pedestrian Crossing Length.** For longer crosswalks where it is necessary to increase the volume of the audible tone consideration, a speaker or baffling should be provided with the APS. These features can aid the crossing activity for visually impaired and helps to minimize noise pollution to the surrounding area.
- C. Controller Compatibility.** Older TS-1 type cabinets may not be compatible with APS. Should the determination be made for APS at an intersection with one of those cabinet types, the cabinet must be modified or replaced, unless R/W constraints exist as indicated in Section A3.
- D. Wiring.** Each APS push button should be wired independently to the controller cabinet. A 7C/14 cable is needed between the controller and each corner with APS.
- E. Volume Adjustment.** After initial installation the volume level should be checked to ensure it is adequate and does not exceed the IMUTCD limits.

F. Contract Special Provisions / Pay Item / Plan Notation. A special provision will be needed that specifies push button integrated type of APS with push button locator and WALK indication tones such that volumes automatically adjust to ambient sound. The APS device shall also be designed so that a speaker or baffling can be provided or can be added later to provide directional control of the WALK tone. The volume level should be tested and adjusted so that the tone is discernible on the far side of the crosswalk and that it does not exceed 100 dB. A standard manufacturer's warranty should be specified.

At locations where it is necessary to place two push buttons within 10 ft of each other or on the same pole, a speech message for the walking movement and a speech push button message must be specified.

The plans shall identify pushbutton as being provided with APS. The pushbutton pay item description should be adjusted accordingly.

BLS/dhb/jeb

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Appendix A
Request Form for the Installation of Accessible Pedestrian Signals (APS)

Name: _____

Please indicate if you are one of the following:

- Visually Impaired Pedestrian
Local Public Agency:
Group or Association:

Address: _____

State: _____ Zip Code: _____

Telephone: _____ Email Address: _____

I/We request the installation of APS at the following intersection(s):

Table with 3 columns: Major Road, Minor Road, City, Town, or County. Contains 4 empty rows for data entry.

Note: Attach additional form sheets if request includes more than 4 locations

Please describe the difficulty experienced in crossing this/these intersections:

Signature: _____ Date: _____

Mail Completed Request Forms to:
Indiana Department of Transportation
Attn: Title VI / ADA Program Manager
100 N Senate Ave. Rm. N750
Indianapolis, IN 46204
or Fax to: (317) 233-1481

For Office Use Only

Date Received: _____ Received By: _____

Date Forwarded for APS Study: _____

Note: Form will be made available in alternative format upon request

Appendix B: Advocacy Groups for the Visually Impaired

Statewide:

- American Counsel of the Blind of Indiana ([ACBI](#))
- Indiana Council on Independent Living ([ICOIL](#))

Local Groups:

- accessABILITY Center for Independent Living, Inc.
5302 E. Washington Street
Indianapolis, IN 46218
317-926-1660
info@abilityindiana.org
<http://www.abilityindiana.org/>
- The Independent Living Center of Eastern Indiana (Richmond)
1818 W. Main Street
Richmond, IN 47374
765-939-9226 office
765-935-2215 Fax/TTY
877-939-9226 Toll Free
jimm@ilcein.org
- The League of Blind & Disabled (Ft. Wayne)
5821 South Anthony Blvd.
Fort Wayne, IN 46816
260-441-0551 office V/TTY
260-441-7760 fax
800-889-3443 (toll free)
The.League@verizon.net
- The Wabash Independent Living and Learning Center (Terre Haute)
The WILL Center
4312 S. Seventh Street
Terre Haute, IN 47802
812-298-9455 office
812-299-9061 Fax
info@thewillcenter.org

Additional Resources:

- Blind and Visually Impaired Services ([BVIS](#)) Office within the Indiana Family and Social Services Administration
- Independent Living Centers: <http://www.in.gov/fssa/ddrs/2762.htm>



Appendix C Accessible Pedestrian Signals (APS) Study Report Form

Intersection:		
*Field Study Date:	*Time:	*Day of Week:
*Weather Conditions		
Investigator(s):		
Specific Needs of Requesting Party:		
<p>A. First Tier Criteria (check all that apply)</p> <input type="checkbox"/> 1. Sidewalks not present or would not be installed concurrently with APS <input type="checkbox"/> 2. Pedestrian crosswalks are in an area with ambient noise above 100 dB <input type="checkbox"/> 3. Installation of APS requires upgrade to controller cabinet and a larger controller cabinet would be infeasible due to right of way constraints		
<p>If any of the boxes in Section A above are selected, the APS Study is complete and APS should not be used at the subject intersection.</p>		
<p>B. Second Tier Criteria (check all that apply)</p> <input type="checkbox"/> 1. Traffic generators within 2 blocks of the intersection that serve the visually impaired Traffic generator(s): _____ <input type="checkbox"/> 2. Exclusive pedestrian phase, leading pedestrian interval, or pedestrian phase not concurrent with parallel through movement <input type="checkbox"/> 3. Visually impaired pedestrian users either present or anticipated if APS is provided <input type="checkbox"/> 4. Intersection is in a city or town that uses or will use APS at all pedestrian signals		
<p>If any of the boxes in Section B above are selected, the APS Study is complete and APS should be used at the subject intersection.</p>		
<p>C. Third Tier Criteria (check all that apply)</p> <input type="checkbox"/> 1. Presence of at least one traffic generator within 2 blocks with use by the visually impaired confirmed by an appropriate source (use additional sheets if necessary): Traffic generator: _____ Demand Confirmed: <input type="checkbox"/> Traffic generator: _____ Demand Confirmed: <input type="checkbox"/> Traffic generator: _____ Demand Confirmed: <input type="checkbox"/> Traffic generator: _____ Demand Confirmed: <input type="checkbox"/> <input type="checkbox"/> 2. Previous requests for APS? Previous requestor(s): _____ Date(s): _____ Previous requestor(s) still reside in vicinity <input type="checkbox"/> <input type="checkbox"/> 3(a). Daytime hourly volume on minor street less than 120 vehicles per hour for any hour during the day <input type="checkbox"/> 3(b). Right turn on red volumes exceed 90 vehicles for any approach for any hour <input type="checkbox"/> 4. Split phasing or protected left turn phasing <input type="checkbox"/> 5(a). Crosswalk lengths (check if any length is more than 40 ft) North Leg _____ East Leg _____ South Leg _____ West Leg _____ <input type="checkbox"/> 5(b). Skewed Crossing? (attach aerial photo of intersection with study) <input type="checkbox"/> 5(c). Curb ramp radius > 25 ft for any ramp at the location <input type="checkbox"/> 5(d). Curb ramp not aligned with crosswalk direction		

* Applicable only when field work is performed.

Accessible Pedestrian Signals (APS) Study Report Form

C. Third Tier Criteria (continued):

- 5(e). Median greater than 4 ft wide?
Median width: _____
- 5(f). Crosswalk slope greater than 5%?
Crosswalk transverse slope: _____
- 5(g). Speed limit greater than 40 mph on any approach
North Leg _____ East Leg _____
South Leg _____ West Leg _____
- 6. Bike lanes, shared use path, etc., present
- 7. APS Present at Adjacent Intersections?
- 8. Other relevant factors (pedestrian crashes, channelized right-turn lane with yield control, etc):

Please describe: _____

For Section C, if study is being performed at the request of the public and any of the other criteria (items 3 through 8) are satisfied then APS should be used at the subject intersection. For studies performed as part of construction project planning if either box 1 or box 2 are selected and any one of boxes 3 through 8 are selected, APS **should** be used. APS **may** be used if any one box in line C is selected.

D. Additional Comments:

E. Recommendations: (if APS is not recommended, provide an explanation and attach additional sheets or pictures if necessary)

APS Recommended APS Not Recommended

F. Signatures:

Date

Title: _____ (typically designer or district investigations engineer)

Date

Title: _____ (typically project manager or district traffic engineer)