

Briefing Paper on Intersection Traffic Control Wayfinding Cues at Intersections Workshop

by

**William C. Kloos, P.E., Signals and St. Lighting Manager
City of Portland, Oregon**

October 11, 2004

BACKGROUND

Accessible intersection traffic control has been an evolving science and art over the past several years. The City of Portland has had some form of audible pedestrian signal for over 20 years. During the past ten years the City has greatly expanded its program to provide better service to all pedestrians using the City's transportation system. During that time City staff realized that we had gaps in knowledge and technology to provide the best and most flexible solutions. We tried many options and participated in national research projects. The purpose of this paper is to discuss the past, present, and future of providing accessible intersection traffic control at traffic signals. Portland, Oregon experience is the primary basis for this part of the paper. The last part of the paper discusses issues that continue to provide some conflict among system users, traffic engineers, and administrators.

THE PAST

In the late 1970's City of Portland staff installed buzzer-like devices at three intersections on request basis. These buzzers were inexpensive devices purchased from a local electronics store. These devices were installed at actuated signals so that the buzzer was only activated with a normal pedestrian push button call. Staff did receive some calls regarding the annoying sound and usually responded by placing some sort of baffling material around the buzzer. During the late 1980's the City began using an inexpensive Mallory chime as an audible device.

The chime was a more pleasing sound and the City seldom received any noise complaints even though the chime was installed in some fixed time intersections where the chime sounded every cycle. In installing these devices, staff worked closely with the requester to identify his or her specific needs. By 1995 the City had ten signalized intersections with audible devices.

In 1996 the City decided that a more formal policy was needed. City staff assembled a stake holders group, which included representation from the Oregon Council of the Blind, the National Federation of the Blind, the Oregon Commission for the Blind, Independent Living Resources, and other groups representing both the visually impaired community and mobility instructors. A proposed policy was developed over a series of three meetings. That policy was simple and straight forward. The City of Portland would install an audible pedestrian traffic signals only on a request basis and where needed. The intersection had to have some unique or unusual characteristics that warranted the addition of an audible signal. The criteria for installing an APS was fairly simple to meet as long as someone noted the location as a problem for them to cross. In deference to National Federation members, the City opted to use a technology that requires the user to hold the button for at least one second to place a call for an audible signal. This action made the technology 'refuseable' so that only those who wanted the sound would get it. Also the policy includes the requirement for referral to a mobility specialist. In some instances the crossing problems may be related to a lack of user skills that might be better addressed by further training.

The technology used to implement this new policy was manufactured by Novax Industries of British Columbia. Staff used the Button Activated Timer (BAT) from Novax to require that the button be depressed for at least one second. In addition, staff worked with Novax and McCain to take the speaker and

electronics out of the exterior Novax housing and mount them directly in the solid-state neon pedestrian indication modules used by the City. Installing the speaker and electronics inside the pedestrian head housing afforded more protection from vandalism and placed the speaker closer to the users' ears.

Regarding sounds used, the City had a trial installation that used both the standard cuckoo / peep-peep sounds and also voice messages. The voice message typically said "the walk light is now on to cross 41st Street". Even though these devices had background noise level sensors to increase the output as background noise increased, the voice message was often difficult to hear. The use of tones seems to be better for cutting through background noise in an urban street environment. After this initial test the City decided to just use the cuckoo and peep-peep sounds.

From 1996 through early 1999 the City installed audible signals at 15 more intersections, bring the total number of intersections with audible signals to 25. The City decided not to retrofit the old audible signals with the new technology unless the old units were being replaced for maintenance purposes.

THE PRESENT

In mid-1999 the City encountered the problem where the requests for audible signals outstripped City resources for the program. The City needed to activate a citizens advisory committee (CAC) to review and rank the requests. The possibility of this need was noted to in the 1996 policy. The City established an eight-person CAC with representation from the groups that had attended the 1996 policy development meeting.

The CAC and City staff started with a ranking process similar to that used in the cities of Los Angeles and San Diego. To help

understand the outcome of the ranking procedure, City staff applied the criteria to ten intersections on the request list. Seeing the results of this ranking and how the criteria affected the outcome, the CAC made some revisions to the scoring criteria.

An integral part to the whole scoring and evaluation process is the onsite visit by City staff and mobility instructors. When a request is received, the electrician responsible for these installations and a mobility instructor from the Oregon Commission for the Blind meet the requester at the candidate intersection to better understand the user's needs and concerns. During this visit staff make sure that they understand what the user is trying to do. Often the mobility instructor may make some recommendations to the user on better ways to approach and/or cross at the candidate location. After understanding the user concerns and agreeing that some sort of audible signal is a viable solution, the City staff person and mobility instructor then complete some field aspects of the scoring form. The remaining information such as volumes and accidents is gathered by office staff from existing City records.

During this process the issue of cost was raised. The Novax solution is costly (\$3,000 to \$10,000 per crossing depending on how much remedial electrical work is needed). The CAC and City staff expressed a desire to find lower cost options so that more intersections could be treated. City staff received approval from the CAC to install lower cost Mallory devices (with cuckoo peep-peep sounds) at appropriate locations. Since the Mallory device has no background noise level sensor nor Button Activated Timer, City staff is careful not to use the device near residents that might be disturbed by late night noise.

As of September 30, 2004 the City had 58 signalized intersections that have some form of accessible signal. The City has a total of 989 signalized intersections.

As with most successful programs, program champion(s) emerge that provide the leadership and energy for the program. Portland's accessible signal program is no different. Initially Portland had an experienced traffic signal electrician, Dave Grilley, who has provided the technical leadership to find and implement solutions in the field. Dave was committed to making the program work and enjoyed finding solutions for the users. Dave has now retired and the mantle has been passed to a younger electrician, Jason McRobbie. Jason has continued the program with enthusiasm and technical expertise. During the field reviews Dave and now Jason is joined by a mobility instructor, Mike Yamada, from the Oregon Commission for the Blind. Together they meet with the requestor to understand the individual needs. The team of Dave/Jason and Mike has done excellent work in understanding the users concerns and finding the best solutions.

THE FUTURE DIRECTION

The City will continue to use the basic 1996 policy for installing retrofit accessible audible signals. The ranking criteria will be used to evaluate future requests. The CAC will meet semi-annually to rank the requests. As elsewhere, funding will always be an issue. We are pursuing various grant options, and did receive one \$50,000 grant from a transit mobility source.

Regarding technology, City staff will continued to monitor new developments by the various manufacturers. Currently the City is using the Polara Navigator as its standard APS button. The integrated audible signal / vibro-tactile push button / locator tone devices work well in most of our applications. Two major concerns for the City will continue to be the potential for vandalism and the cost. A single crosswalk costs between \$2,000 and \$2,500 to retrofit with the Navigator APS.

The City of Portland is committed to providing mobility for all transportation users and will continue to use audible signals as one more tool to help pedestrians at signalized intersections.

INTERSECTION TRAFFIC CONTROL ISSUES

Below are a series of questions / issues that remain regarding accessible intersection control. Some relate to legal issues, others relate to application of technology. Consensus has not been reached on these issues.

1. Should an APS be installed at every intersection?

Is an accessible pedestrian signal required at all new intersections now? Not exactly. *The Manual on Uniform Traffic Control Devices* (MUTCD) issued by the Federal Highway Administration is the national standard for all traffic control devices including APS. Section 4E.06 of the MUTCD 2003 edition states, "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 all pedestrians in general, as well as the information needs of pedestrians with visual disabilities." The MUTCD provides information crucial in conducting such a study and the decision-making process for determining if there is a need for an APS. Guidelines developed by The U.S. Access Board call for an APS to be installed at all newly signalized or altered intersections that include the installation of visual pedestrian signals. If visual pedestrian signals are warranted, then audible and vibro-tactile output is necessary as well. The federal rulemaking process to adopt The U.S. Access Board's guidelines into ADA regulations is not yet complete.

Getting back to the original question, should an APS be installed at every new or substantially altered signalized intersection? I would argue that most should have an APS, especially since Oregon policy has been to install pedestrian signal heads at all signalized intersection if the crossing is allowed. However, what about a downtown Portland location with 30' or less crossing in a

one-way grid with all fixed time signals? I would argue 'no' that the APS is not needed and would be too noisy.

2. Standardization will take years to accomplish. How do we get there?

As noted above the City of Portland has nearly 1,000 signalized intersections built over a 50-year time period. We need to make sure that any new installations comply with current standards and recommended practices. But since we install few totally new intersections, the issue is primarily how to rebuild existing intersection. Often we barely have funds to make the simplest of changes. Providing accessibility at signalized intersection in Portland will be a long process, but a process that we need to start now. The age old saying applies – “How do you eat an elephant? One bite at a time.”

The MUTCD includes information on where and how to locate APS. Many existing corners are problematic and require unique solutions to fit the particular site.

3. What walking speed should we use for pedestrian clearance intervals?

The US Access Board guidelines called for a 3.0 feet per second (fps) assumed walking speed for determining the pedestrian clearance interval. The current standard used by most US traffic engineers is 4.0 fps. For a 60-foot crossing, the 3.0 speed would yield a 20-second pedestrian clearance time. The same 60-foot crossing would get a 15-second pedestrian clearance time for a 4.0 fps. Many argue that the greater clearance time is needed for a wide range of pedestrians including many elderly and disabled. Many traffic engineers will use a lower walking speed at specific locations with known senior populations, but not done on a system wide basis. This added clearance time is a capacity issue for major arterials with minor cross streets with APS.

A recent article by LaPlante and Kaeser in the Sept. 2004 ITE Journal noted that the 4.0 fps value represented the “average” walking speed for pedestrians. For all pedestrians the 15th percentile speed is 3.5 fps, and for elderly the 15th percentile is 3.0 fps. In January 2004 a proposal submitted to the Signals Technical Committee of the National Committee on Uniform Traffic Control Devices included using 3.5 fps for the pedestrian clearance time and 3.0 fps for the total pedestrian crossing time (walk plus pedestrian clearance interval). This looks to be a more workable compromise.

4. What should we use for messages?

The street environment has many difficult acoustic problems. Ambient noise levels vary greatly, even during a single traffic signal cycle. Dense urban settings have tall buildings that reflect sound in unexpected ways. The spoken voice does not “cut through” the background as well as certain tones, but the spoken voice can provide valuable queues for visibly impaired pedestrians. In Portland we are using a combined tone and verbal message. We use the “standard” tone for E-W and N-S crossings followed by the phrase “Division St., walk sign is on to cross Division street”, where the appropriate cross street name is inserted for Division.

5. What about beaconing?

Traffic engineers are still confused over when and where beaconing should be used. Beaconing is having the APS noise level loud enough so that a traveler beginning his/her crossing can hear the APS on the other side of the street and use it as a directional beacon to aid in finding the appropriate landing on the far side of the street. Others tell us that most travelers just want the APS to let them know when to begin crossing, then the APS should be quiet so that the pedestrians can use their own

listening skills for crossing. Researchers have told me that beaconing may only be applicable only at unique intersections. In Portland, we are using the verbal countdown message of the Polara Navigator during the pedestrian clearance interval. The sound level is not loud enough to be heard across the street, but can typically be heard when the traveler is within 20' of the landing.

6. During retrofits, is it OK to just address the most critical crosswalks, or do APS need to be installed for all crossings?

This question primarily relates to our funding for just retrofitting intersections with APS only, and not a complete intersection reconstruction. With our limited funding for this activity, I argue that we should concentrate on known problems first rather than doing a more systematic change. Should I retrofit one crosswalk at four different locations to address specific mobility complaints that we have received, or just retrofit 4 crosswalks at one intersection where only one crosswalk has been identified as the problem?

S:\PEDS\AUDIBLE\Wayfinding workshop Oct 2004\White paper traffic control WCK 20041010b.doc