A Letter in Response to: In-Pavement Flashing Warning Lights

By Brian Olsen, British Columbia Section

I was quite interested in your Article in the recent IMSA Journal where you evaluated in-pavement flashing lights for crosswalks. I agree that the in-pavement lights appear to be somewhat effective in drawing driver attention to the presence of the crosswalk when activated. However, use of overhead flashing beacons for this purpose in a “Special Crosswalk” configuration is, in my opinion, a far better alternative for many reasons.

Attached is a diagram (page 38) from the BC Ministry of Transportation Pedestrian Crossing Control Manual which shows a typical arrangement for what in Canada is called a “Special Crosswalk”. Even though it may be considered “low-tech” or “old-school” I still think it is a more effective method of warning traffic and protecting pedestrian safety. The “Special Crosswalk” consists of two overhead double-sided internally illuminated pedestrian crossing signs, each equipped with a flashing yellow beacon and a high intensity down light that provides area lighting focused directly on the crosswalk area. The down-lights and internally illuminated signs are photocell controlled and the flashing beacons are activated by a pushbutton or passive sensors and controlled by a simple “pedestrian cross-over controller”. Agencies that install any kind of flashing yellow beacon pedestrian warning devices should also be aware that these devices, like many traffic control devices, are generally not well respected by drivers. They also have the potential to give pedestrians a false sense of security if they assume vehicles will stop for flashing yellow lights. In some situations the in-pavement systems may be more respected initially but this is likely only because of the “novelty factor”. They are something drivers have not seen often or at all and because of this it tends to attract their interest. However, over time these will lose their “novelty factor” as drivers get used to seeing them.

I am not aware of any studies that have compared the effectiveness of in-pavement systems with Special Crosswalks. In most studies or evaluations of in-pavement systems the comparison is between a standard crosswalk (with no lights) and a crosswalk equipped with in-pavement lights. The anecdotal information I have on in-pavement systems suggests that they are difficult and costly to maintain.

In-pavement lighting technology was originally developed for use in airport runways and taxiways to guide ground movements of aircraft. Obviously this could not have been done with overhead mounted lights. When these lights are used at airports, they are usually installed in concrete pavements, not asphaltic pavement. This allows a much higher reliability because the life span of the concrete pavement is several times that of asphaltic pavement. Special crosswalks avoid the pavement problems completely. They require very little maintenance, are very reliable and have many other advantages as well. The following is a list of the relative advantages and disadvantages of each type of pedestrian crossing system:

Special Crosswalk Advantages
- Visible from behind large vehicles especially when stopped (reduces passing in crosswalk)
- Visible over crest vertical curves
- Large target value of flashers
- Draws attention to regulatory crosswalk signs that flashers are mounted on
- Not affected by deteriorating pavement
- Not affected by buildups of road sand, salt, dust
- Not affected by accumulations of ice or snow
- Not affected by snow plowing
- Not affected by rain, water pooling
- Extremely reliable operation
- Pedestrian crossing area is always illuminated with high intensity down-lighting fixtures built into overhead signs (shielded to prevent glare)
- Crosswalk signs are mounted overhead and are clearly visible in all traffic conditions
- Poles are ideal locations for activation buttons or sensors
- Significantly lower operating and maintenance cost than in-pavement systems
- Poles and arms effectively frame the crosswalk area drawing more attention to it’s presence

In-pavement System Advantages
- New technology gets noticed by drivers (novelty effect)
- Quick installation
- Inconspicuous until activated (disadvantage?)
- Politically attractive if considered to be the state-of-the-art in pedestrian crossing safety
- Help from aggressive sales professionals to get funds approved and to sell concept of warning lights at crosswalks
- News media friendly because it

Continued on page 35

IMSA Journal
In-Pavement Flashing Warning Lights... From page 32

Special Crosswalk Disadvantages
- Utility conflicts might make pole installation difficult
- Slightly higher initial installation cost
- May conflict with overhead utilities
- Vehicles that leave the roadway could strike poles

In-pavement System Disadvantages
- NOT easily visible from behind large vehicles especially when stopped (drivers may try to pass)
- NOT easily visible over crest verticle furves
- Low target value of flashers due to small size
- Does not draw attention to regulatory crosswalk signs (ped crossing signs in Canada are classified as "Regulatory")
- Are affected by or can fail due to deteriorating pavement
- Can be obscured or damaged by buildups of road sand, salt dust
- Can be blocked by accumulations of ice or snow
- Can be damaged by snow plowing
- Visibility may be significantly degraded by rain, water pooling
- High exposure to many sources of damage may reduce reliability
- No area illumination for crosswalk
- Glare from lights at road level may result in a screening effect at night masking the darker pedestrians behind the lights
- No possibility for crosswalk signs to be mounted overhead
- Requires additional poles for activating buttons or sensors
- Significantly higher operating and maintenance cost
- System must be removed and re-installed everytime road is milled and re-paved (every 6 to 15 years)
- Potential for potholing to occur around light units

1. Special crosswalks may be installed at either pedestrian or school crosswalks and should be used only when all of the following criteria have been met:
   a. The posted speed is less than or equal to 60 km/h,
   b. The roadway is not greater than:
      • two through lanes in each direction for two-way streets or
      • three through lanes for one-way streets,
   c. The installation would not disturb traffic flow at an adjacent traffic control signal or another special crosswalk,
   NOTE: A minimum spacing of 200 m from an adjacent traffic control signal is recommended.
   d. Safe stopping sight distance is available for motorists approaching the crosswalk,
   NOTE: Decision sight distance is desirable.
   e. The installation would not create constant interruptions in vehicular traffic due to the level of pedestrian and vehicular volumes.

5.2 Description Of Installation (Figure 2.5)

The installation of a special crosswalk is described as follows:

Marking
1. The pavement marking consists of the zebra design, as described in Figure 1.1.

Signs
2. Two white on black Pedestrian Crosswalk (RA-5) signs shall be mounted overhead for each approach.

Pedestrian Crossing Control Manual for British Columbia
Page: 2-18 Section: Chapter: April 1996
Date: Application and Installation

3. One sign shall be over the centre of the right half of the roadway and the other sign shall be over the centre of the left half of the roadway.

4. Each pedestrian symbol shall be oriented to face toward the centre of the roadway.

5. These signs shall be a minimum size of 60 x 75 cm, though the preferred sign size is 90 x 120 cm.

6. Each overhead sign will contain:
   • Internal illumination,
   • downlighting for the crosswalk area and
   • one flashing yellow beacon (20 cm lens).

5. SPECIAL CROSSWALKS

5.1 Application Guidelines
November/December 2003

Continued on page 38
Page 35
7. Upon activation by the pedestrian, the two flashing beacons per approach (one per sign) shall flash alternately.

8. It is also recommended that side mounted RA-4 signs (60 x 75 cm) be installed on the shaft of the davit poles.

**Pedestrian Crosswalk Ahead Signs**

9. Pedestrian Crosswalk Ahead (WC-2) warning signs should be used where there is limited visibility for the crosswalk.

10. The recommended distance between the crosswalk and the WC-2 sign is dependent on the approach speed (Figure 2.5).

**Stopping Restrictions**

11. To improve visibility of pedestrians for motorists, a vehicular stopping prohibition, in effect at all times, should be implemented 30 m on the near side and 15 m on the far side of the special crosswalk.

**Passing Restriction - Single Lane Approach**

12. On a single lane approach, a passing restriction should be implemented for traffic approaching the special crosswalk. Special Crosswalks

**Pedestrian Crossing Control Manual for British Columbia**

Page: 2-19 Section: Chapter: April 1996
Date: Application and Installation

13. The length of the no passing zone is dependent upon the approach speed. **NOTE:** For an approach speed of 50 km/h, a minimum dimension of 65 m should be used (Dimension “A” in Figure 2.5).

**Lane Changing Restriction - Multilane Approach**

14. On multiline approaches, solid white lane lines should be installed on each approach to the crosswalk to prohibit lane changing.

15. The recommended length of the solid line is dependent upon the approach speed (30 m is suggested for 50 km/h).

**Timing**

16. A 30-40 second time is desirable to minimize the interruption to vehicular traffic. Special Crosswalks

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