A. General

Reference is made to the *WisMUTCD*, Chapter 4N.

In-Roadway Warning Lights (IRWL's) are special types of highway traffic control devices installed in the roadway pavement to warn road users that they are approaching a condition on or adjacent to the roadway that *may* not be readily apparent and might require the road users to slow down and/or yield.

IRWL's are actuated devices with flashing indications that provide real-time warning of a specific condition. In-pavement lights that supplement pavement markings by operating in a steady burn state **shall** also require WisDOT approval but are not the focus of this policy.

On the State Trunk Highway (STH) system in Wisconsin, IRWL's are limited to situations warning of: marked school crosswalks, marked mid block crosswalks, marked crosswalks on uncontrolled approaches, and other roadway situations involving pedestrian crossings that are not associated with other types of traffic control.

B. Policy

IRWL's, as defined herein, *may* be used on the Wisconsin STH system, provided the local jurisdiction: 1) apply for a permit, 2) agrees to fund the installation, operation and maintenance of the device, 3) agrees to be responsible for any corresponding damage to the roadway or damage to highway maintenance equipment, and 4) properly cites appropriate locations based on the conditions of this policy. The municipality *should* understand that the permit may be revoked, especially in the event of safety or operational issues. In such a situation, the original costs and costs to restore the pavement are the obligation of the permit holder.

When allowed by permit, IRWL's **shall** be installed perpendicular to the direction of

travel on the roadway and used to supplement crosswalk markings. IRWL's placed along the centerline of a highway, parallel to the direction of travel, **shall** not be used. IRWL's **shall** not be allowed on freeways or expressways.

Prior to the use of IRWL's, adequate trial of standard remedial measures **shall** be used to warn motorists of pedestrian crossings. IRWL's will be used only to supplement typical warning devices such as signs, markings, and crossing guards. Other strategies, such as providing a median refuge roadway lighting in advance of the crossing, or enforcement campaigns, are more universally recognizable methods of warning motorists of these conditions, and *should* be also be implemented when practicable.

Location Criteria

It is recognized that the use of IRWL's *may* affect STH traffic operations by increasing delay and reducing mobility, especially if used near existing signalized or stop controlled intersections. The following location criteria **shall** be met:

- Location is an uncontrolled pedestrian crossing.
- Location is an established school route, accommodates a minimum pedestrian volume of 100 pedestrians/day, or location has experienced pedestrian crashes in the past 3 years.
- Subject crossing is located in municipal (non-rural) limits.
- There exists a minimum of 300 feet between the subject crossing and the nearest uncontrolled pedestrian crossing, or intersection traffic control device on the STH.
- There exists a minimum of 1,200 feet between the subject crossing and the nearest uncontrolled pedestrian crossing supplemented with In-Roadway Warning Lighting, unless exceptional conditions exist.
- Roadway has a maximum of four travel lanes with a maximum single-stage crossing distance of 50 feet.
- Approach speed is posted at less than 50 mph.
- Adequate stopping sight distance exists based on the following approach speeds:
    - 15 or 25 mph = 200 ft
    - 30 mph = 250 ft
    - 35 mph = 300 ft
    - 40 mph = 400 ft
    - 45 mph = 500 ft

Design Requirements

In the interest of uniformity, reliability and consideration for other highway users, the following minimum design requirements for IRWL's **shall** be met:

- Number/positioning of lights:
    - For two-lane undivided roadways, 5 IRWL's per direction,
    - For four-lane undivided roadways, 7 IRWL's per direction,
    - For four-lane divided roadways, 5 IRWL's per direction.

- IRWL's **shall** be actuated & **shall** not flash continuously.
- If pedestrian push buttons are used to actuate the IRWL's, a PUSH BUTTON TO TURN ON WARNING LIGHTS (R10-25) sign **shall** be mounted adjacent to or integral with each pedestrian push button.
- For four-lane divided roadways with median widths equal to or exceeding 6 feet, pedestrian actuation in the median **shall** be provided to allow for a two-stage crossing of the roadway.
- Lights **shall** be evenly spaced across the entire traveled way. Lights *should* be positioned outside of vehicle wheel paths and *should* also consider bicyclist routes adjacent the traveled way. Lights placed near the centerline of the roadway *should* be offset slightly to minimize interference with pavement marking operations.
- Electrical wire **shall** be run through conduit to a pull box, located outside of the traveled way.
- IRWL's **shall** be cast in a minimum of 8-inch concrete pavement. If IRWL's are being installed with an improvement project that requires a pavement section greater than 8 inches, then the pavement at the crossing *should* be made to match that of the adjacent roadway. Pavement reinforcement *may* not be required, but this decision will reside with the Regional Pavement Design Unit. Doweling to adjacent concrete pavement will be also required at the direction of the Regional Pavement Engineer. A minimum 2 feet of clearance to the edge of the concrete **shall** be maintained. Pavement structure **shall** be installed according to WisDOT Standard Specifications. Installation in existing pavement by sawing or coring is not permissible. Minimal width of the concrete, measured longitudinally in the direction of traffic, **shall** be 12 feet.
- Roadway profile **shall** be appropriately maintained by milling or wedging the approach to the crossing, as required.
- IRWL's **shall** flash for the entire calculated pedestrian clearance time. Pedestrian clearance *should* be calculated based on a 3.5 ft/sec walking speed. Locations frequented by children & elderly users *may* have a pedestrian clearance based on a slower walking speed. A brief time extension of 3 to 7 seconds *may* be added to allow for vehicle/pedestrian response & separation.
- Features meant to accommodate impaired pedestrians such as actuators buttons with locator tones, supplemental Braille signing, etc. *should* be considered at individual locations on a case-by-case basis. If used, these devices **shall** be furnished and maintained by the municipality that requests the IRWL's.
- Other design criteria **shall** conform to the manufacturer's recommendations.

C. Support

There are several general points of concern regarding the use of these devices:

- IRWL's do not ensure that motorists will appropriately yield the right of way to pedestrians in the crossing.
- A public awareness and education campaign *may* be required to educate the public prior to operating IRWL's.
- IRWL's *may* cause rear end collisions similar to a signal installation.

- Placement of IRWL's between coordinated traffic control signals *may* cause progression problems.
- Any improperly installed electrical equipment *may* pose a hazard to the general public.
- In Wisconsin, IRWL's *may* be susceptible to premature failure due to moisture build-up &/or snow-removal operations.
- The type of actuation used for IRWL's needs to be considered. Active detection (i.e. pushbutton) may create a false sense of security for pedestrians who are not familiar with the use of such devices or the rules of the road. Because of these factors, passive detection (i.e. infrared) is considered more appropriate for these types of applications, especially in crosswalks associated with schools zones. In either case, an informational plaque should be used to briefly describe proper crossing behavior while using IRWL's. These are similar to informational plaques used at signalized pedestrian crossings (R10 series).
- If IRWL's will be placed outside of existing Connecting Highway limits within a municipality, consideration *should* be given to extend those limits to include the installation location.

Application/Permit for In-Roadway Warning Lighting

Wisconsin Department of Transportation
87.07(2) & 349.065 Wis. Stats.

When approved, this permit documents the terms and conditions for use by the Municipality of In-Roadway Warning Light (IRWL) systems on highways under the jurisdiction of WisDOT.

Submit the completed application in duplicate to the WisDOT Transportation Regional Office that has maintenance jurisdiction of the state trunk highway where the crossing will be located. A separate application is necessary for each pedestrian crossing supplemented with In-Roadway Warning Lights.

1. Applicant – Municipality		
2. Mailing Address		
3. Name of 24/7 Emergency Contact	4. Contact Telephone Number	5. Cell or Pager Number
6. Pedestrian Crossing Location – On STH (Include Municipal Street Name):	7. At or Nearest Intersecting Street:	8. If not at Intersection, Distance and Direction from Nearest Intersecting Street: feet ☐ N ☐ S ☐ E ☐ W
9. Crosswalk markings permit no. (per TGM 3-2-17):		

It is understood and agreed that approval is subject to the applicant's full compliance with the pertinent Statutes, as well as any codes, rules, regulations, and permit requirements of other jurisdictional agencies. The applicant shall also comply with all permit conditions, superimposed notes, and detail drawings, which may be added by WisDOT. In the event this permit is revoked, WisDOT has no responsibility for any costs related to the installation or costs to restore the roadway to its previous condition; those costs are the responsibility of the applicant. Any alteration of this form by the applicant is prohibited and may be cause to revoke this permit.

The undersigned certifies that he/she is authorized to sign this application on behalf of the named unit of government.

X

(Authorized Representative) (Title) (Date)

Approved for the Wisconsin Department of Transportation

Permit Number
__-____-_____

X

(Authorized Representative) (Date)

Three-digit, consecutive permit number
County number
District number

In-Roadway Warning Lighting Installation Conditions

1. WisDOT's Policy for *In-Roadway Warning Lighting* is hereby made a part of this permit (copy attached).
2. The design, installation and operation shall comply with the State Electrical Code and Chapter 4N of the Wisconsin Manual of Uniform Traffic Control Devices.
3. During the installation and subsequent maintenance, the permittee shall follow all pertinent provisions for work zone traffic control as provided in Part 6 of the Wisconsin Manual of Uniform Traffic Control Devices.
4. IRWL's shall be installed only to supplement transverse crosswalk markings at approved locations. The use of these devices does not preclude the need for standard warning signs associated with the crossing.
5. If used, pushbutton actuators shall be mounted on break-away pedestal bases adjacent to the pedestrian crossing. Service poles shall be set back to the right of way line or otherwise comply with the setbacks as prescribed in the WisDOT's policy on permitted highway lighting.
6. Permittee shall develop & implement local awareness/educational campaign. This may be done using Public Service Announcements, press releases, or providing accessible written materials. Evidence such a campaign shall be submitted to appropriate WisDOT staff.
7. Concrete bases, if used, shall not extend more than four inches above the ground at any point.
8. The permittee shall: a) maintain the equipment in proper working order, b) repair damage to the adjacent pavement and restore right-of-way disturbed by installation or maintenance of equipment, c) be responsible for any subsequent damage to the roadway or damage to highway maintenance equipment, and d) coordinate the installation with other right-of-way users (i.e. utilities, adjacent property owners, etc.). If not already, the permittee shall become a member of Diggers Hotline. Failure to do so will result in permit revocation.
9. It is the responsibility of the permittee to maintain locational information or locating In-Roadway Warning Lighting facilities in the field for the purposes of avoiding utility conflicts.
10. All costs of design, installation, operation, maintenance and relocation or removal due to road construction shall be the responsibility of the permittee.
11. It is the responsibility of the permittee to identify upcoming highway improvement projects that will affect In-Roadway Warning Lighting installations and appropriately coordinate with WisDOT staff. WisDOT will not participate in sharing costs related to removal or relocation of In-Roadway Warning Lighting due to improvement projects.
12. The permittee shall notify WisDOT prior to turning on the device for the purpose of inspection to verify compliance.
13. Subsequent maintenance of In-Roadway Lights that require the permittee to access public right-of-way *may* require a Work on Highway Right-of-Way Permit (DT1812). Should any of these selected maintenance activities encroach in the STH traveled way, or if activities impact the free flow of traffic on the STH highway (closure of a travel lane, diversion of traffic, etc.), a permit shall first be obtained from the Department. Examples of work that does <u>not</u> require a permit include:
    a. Buried cable locates and facility marking.
    b. Reading electrical service meters.
    c. Repair to electrical service.
    d. Land surveys.
    e. Controller programming.
    f. Connect and test wiring of cable at pull box and pedestal locations.
    g. Pedestal base, standard, bracket, and hardware repair/replacement.
    h. Remove debris from warning devices.
    i. Repair cable bonding or grounds.
    j. Visual condition surveys.
    k. Trim trees or remove brush for vision of warning devices.
    l. Fuse replacement.
    m. Replace overhead highway lighting lamps and cleaning glass.
    n. Repair or replace outdoor lighting control.
    o. Reset time clock or control switches.
    p. Replace equipment tags or identifiers.
    q. Minor repair of electrical cable (splices, etc.).
14. Other conditions: ☐ No ☐ Yes – Specify below: