



4-11-1 Pedestrian and Bicyclist Crossings

April 2025

Once the determination to install pedestrian signals is made, the next step is to determine where to install the pedestrian signal faces and detection (push buttons) if applicable. The designer **shall** consult the WMUTCD, Section 4E for Pedestrian Control Features and Chapter 9, Traffic Controls for Bicycle Facilities.

Pedestrian push buttons **shall** be shown on the signal plan, mounted approximately perpendicular and in advance of the crossing as required by the WMUTCD.

All pedestrian push buttons **shall** be accessible from the sidewalk to be able to be reached by walkers or people in a wheelchair. This *may* require the installation of a separate pedestrian pushbutton standard. Attempts to locate the pedestrian push buttons as shown in the WMUTCD and per ADA requirements **shall** be made.

The R10-3E, 3H, 3I, and 3J series pedestrian signs **shall** be mounted on the same poles or standards as the pedestrian push buttons for pedestrian signals with countdown displays. The countdown display style of pedestrian signals **shall** be used on all state-owned traffic signals.

All pedestrian signal faces *should* be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 10 feet from the end of the controlled crosswalk during both day and night. Sometimes this can be accomplished by attaching the pedestrian signal faces to traffic signal poles or standards. But, to meet the above requirement, a 10-foot pedestrian signal standard *may* need to be installed with just the pedestrian signal face and push button. If the pedestrian signal face can be installed on the traffic signal pole or standard, a 3.5-foot standard *may* still need to be used for a pedestrian push button to comply with the accessible requirements.

The pedestrian phasing *should* be shown adjacent the vehicular phasing on the sequence of operations sheet, shown by a double half arrow on the appropriate side of the vehicular phase arrow.

To accommodate bicyclists who want to cross a highway, a push button accessible to the bicyclist and sign stating, "Push Button for Green Light" (R10-3) as shown in Figure 1.1, *may* be installed. In this case, pedestrian signal faces are not installed; activation of the push button will call and time the pedestrian phase intervals or the bike minimum green interval.

Figure 1.1. R10-3 Sign for Bicyclist



ANIMATED EYES SYMBOL

Reference is made to the WMUTCD [4I.02](#).

The animated eyes symbol is a dynamic display that supplements standard pedestrian signal indications within the same section. This symbol consists of illuminated eyes that scan from side to side and is meant to prompt pedestrians to be aware of approaching vehicles.

POLICY

Pedestrian signal heads **shall** not incorporate the animated eyes symbol at state-owned signal installations.

SUPPORT

WisDOT supports the use of technologies that address a distinct need related to highway safety & traffic operations. Animated eyes are expected to have a limited effect on improving intersection safety but would require an increase in capital, operations, and maintenance costs. Benefits are not expected to outweigh additional resource expenditures.

IN-ROADWAY WARNING LIGHTS AT PEDESTRIAN CROSSINGS

Reference is made to the WMUTCD Chapter [4U](#).

In-roadway warning lights (IRWLs) 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 clear and might require the road users to slow down and/or yield.

IRWLs 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 STH system in Wisconsin, IRWLs 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.

POLICY

IRWLs, as defined herein, *may* be used on the Wisconsin STH system provided the local jurisdiction:

1. Applies 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, IRWLs **shall** be installed perpendicular to the direction of travel on the roadway and used to supplement crosswalk markings. IRWLs placed along the centerline of a highway, parallel to the direction of travel, **shall not** be used. IRWLs **shall not** be allowed on freeways or expressways.

Prior to the use of IRWLs, adequate trail of standard remedial measures **shall** be used to warn motorists of pedestrian crossings. IRWLs 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* also be implemented when practicable.

Location Criteria

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

1. Location is an uncontrolled pedestrian crossing.
2. 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.
3. Subject crossing is in municipal (non-rural) limits.
4. 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.
5. There exists a minimum of 1200 feet between the subject crossing and the nearest uncontrolled pedestrian crossing supplemented with in-roadway warning lighting unless exceptional conditions exist.
6. Roadway has a maximum of four travel lanes with a maximum single-stage crossing distance of 50 feet.
7. Approach speed is posted at less than 50 mph.
8. Adequate stopping sight distance exists based on the following approach speeds:
 - a. 15 or 25 mph = 200 ft
 - b. 30 mph = 250 ft
 - c. 35 mph = 300 ft

- d. 40 mph = 400 ft
- e. 45 mph = 500 ft

Design Requirements

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

1. Number/positioning of lights:
 - a. For two-lane undivided roadways: 5 IRWLs per direction
 - b. For four-lane undivided roadways: 7 IRWLs per direction
 - c. For four-lane divided roadways: 5 IRWLs per direction.
2. IRWLs **shall** be actuated and **shall not** flash continuously.
3. If pedestrian push buttons are used to actuate the IRWLs, a PUSH BUTTON TO TURN ON WARNING LIGHTS (R10-25) sign **shall** be mounted adjacent to or integral with each pedestrian push button.
4. 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.
5. 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.
6. Electrical wire **shall** be cast in a minimum of 8-inch concrete pavement. If IRWLs 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 also be 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.
7. Roadway profile **shall** be appropriately maintained by milling or wedging the approach to the crossing, as required.
8. IRWLs **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 and 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 and separation.
9. Features meant to accommodate impaired pedestrians such as actuator 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 IRWLs.
10. Other design criteria **shall** conform to the manufacturer's recommendations.

SUPPORT

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

1. IRWLs do not ensure that motorists will appropriately yield the right of way to pedestrians in the crossing.
2. A public awareness and education campaign *may* be required to educate the public prior to operating IRWLs.
3. IRWLs *may* cause rear-end collisions similar to a signal installation.
4. Placement of IRWLs between coordinated traffic control signals *may* cause progression problems.
5. Any improperly installed electrical equipment *may* pose a hazard to the public.
6. In Wisconsin, IRWLs *may* be susceptible to premature failure due to moisture buildup and/or snow removal operations.

7. The type of actuation used for IRWLs 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 school zones. In either case, an informational plaque *should* be used to briefly describe proper crossing behavior while using IRWLs. These are similar to informational plaques used at signalized pedestrian crossings (R10 series).
8. In IRWLs 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.

4-11-2 Pedestrian Phasing

April 2025

Due to the impacts on the geometric design, ADA requirements, signal placement, and potential impacts on capacity analysis, system analysis and signal timing, accommodating pedestrians *should* be explored early in the scoping process. The geometrics of signalized intersections **shall** be designed to accommodate pedestrian traffic now and in the future; however, discretion *should* be exercised when determining where to install pedestrian phases. The surrounding area *should* be surveyed for schools, elderly and disabled housing, multipurpose trails, parks, and developments which *may* generate pedestrian traffic to help identify the need for pedestrian signals.

If it is determined that pedestrian phasing will be installed, early consideration *should* be given to the manner in which the pedestrian movement will be called. In most instances, a pedestrian push button *should* be installed to allow for on-demand call of a pedestrian phase. This is typically applicable to pedestrian movements across the mainline street and *may* also be applicable to pedestrian movements across the side street, especially at an isolated intersection. Calling pedestrian phase by push button increases the efficiency and decreases the delay and driver frustration by minimizing the number of times that the pedestrian phase is activated.

It is also possible to call the pedestrian phase each cycle by putting the phase on pedestrian recall. Typically, pedestrian recall is the preferred application in downtown areas or where there is high transit usage where the pedestrian volumes are high and consistent. It is usually a function of pedestrian demand and the ability or need to implement the necessary timing parameters to accommodate pedestrians on a constant call basis.

Pedestrian clearance time, FLASHING DON'T WALK (FDW) time, *should* always be sufficient for pedestrians to cross the entire approach especially at fully actuated isolated signals with push buttons. When pedestrian phase(s) are being added to an existing signal that operates in coordination or a new signal that will operate in coordination, it is important to assess the impact of the FDW interval on the cycle length. If a signal is pre-timed or operates in coordination, there *may* be some constraints against providing the entire pedestrian clearance every cycle. Ideally, the cycle length *should* be long enough to accommodate all ped phases every cycle. However, at large intersections this *may* lead to extremely long cycle lengths, excessive delays, long queues and a decrease in LOS.

Depending on the coordination settings used, the timing can be set up to allow the controller to go out of coordination when a pedestrian phase is actuated. This allows for the full pedestrian clearance to be provided and a feasible cycle length. However, this *may* not be desired since it can take several cycles to get back into coordination. Routine pedestrian actuations at a signal in a coordinated system *may* not allow for proper coordination.

An exclusive pedestrian phase (Barnes Dance) is not typically used. If an exclusive pedestrian phase is being considered for use, it **shall** be approved by the Regional Traffic Signal Engineer.

Channelized Right-turns

If a pork chop island exists, the recommended practice is to cross pedestrians from the radius to the pork chop island, then cross the mainline or side street.

For single lane channelized right turns that are not signalized (STOP, YIELD or free-flow conditions), pedestrian signals **shall not** be used. Pedestrian signals *should* be considered at crossings of single lane channelized right turns movements that are signalized. In that case, attention *should* be given to the placement of vehicular signal indications and whether those signals are readily viewable for the benefit of the pedestrian. Pedestrian signals **shall** be used at crossings of dual lane channelized right turn movements that are signalized.

Two-stage Crossings

Per WMUTCD 41.06, where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait, median-mounted pedestrian signals (with pedestrian

detectors if actuated operations is used) **shall** be provided and signing such as the R10-3e sign **shall** be provided to notify pedestrians to cross only to the median to await the next WALKING PERSON (symbolizing WALK) signal indication. A median of sufficient width to accommodate two-stage crossings are generally considered a minimum of 6-ft in total width for pedestrians and a minimum of 8-ft in total width for bicyclists if the crossing is associated with a path.

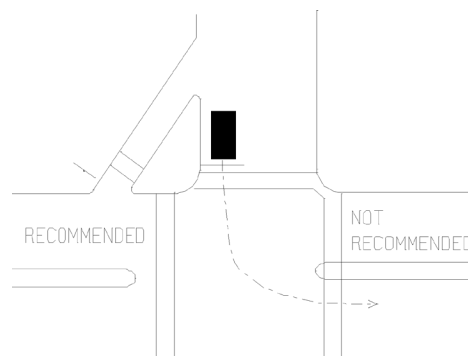
ADA requirements **shall** be considered when designing two-stage pedestrian crossings.

At any intersection with medians where a pedestrian could become stranded pedestrian push buttons *should* be placed in the median.

T-Intersections

It is recommended to place pedestrian crossings on the right side of a T-intersection to reduce the likelihood of left turning vehicles conflicting with pedestrians occupying the crosswalk on the receiving approach, as shown in Figure 2.1.

Figure 2.1. Pedestrian crossings at T-intersection



Visually Impaired Pedestrians

An engineering study *should* be conducted upon request for special accommodations for visually impaired pedestrians. Wide streets, right turn on reds, and complex signal operations are some of the factors that make it hard for visually impaired pedestrians to cross signalized intersections. Refer to WMUTCD [4K](#) for guidance on when to install Accessible Pedestrian Signals (APS) for visually impaired. In general, APS devices are reserved for use at crossings that are part of a route, along which the pedestrian with visual disabilities who is requesting the device, typically travels.

Bicycle Phasing

Bicycles *should* be treated as pedestrians or vehicular traffic depending on the type of user. If bicyclists that use pedestrian facilities request detection, then other pedestrian devices such as pedestrian signal heads, *should* be installed.

4-11-3 Beacons

April 2025

Reference is made to the WMUTCD Chapter [4S](#).

Flashing beacons (a.k.a. flashers, warning flashers, beacons) are a special type of signal indication used to supplement standard regulatory and warning signs. According to the WMUTCD, flashing beacons have the following applications:

1. Intersection control beacon
2. Stop beacon
3. Speed limit sign beacon
4. Warning beacon (includes Rectangular Rapid Flashing Beacons)

Warning beacon includes Rectangular Rapid Flashing Beacons (RRFB). Flashing beacons are part of a sign, as it pertains to the provisions for allowing the installation of the beacons on highway right-of-way. Statutes [84.02 \(4\)\(c\)](#) and [86.19 \(3\)](#) convey exclusive authority for signs and warning devices on the state trunk system to the department.

This policy contains provisions for proper application, design, and permitting of flashing beacons on the STH

system.

POLICY

General

The following general criteria apply to all flashing beacon installations on the STH system:

1. There are two types of flashing beacons:
 - a. Red—only to be used with STOP signs
 - b. Yellow—to be used with any yellow warning (W-series) signs, speed limit, speed limit reduction, pedestrian warning and school speed limit signs

Flashing beacons **shall** only be associated with the sign installations referred to above.

2. Flashing beacons are supplementary to signs. When used, they **shall** be mounted on the same support as the sign which the beacon supplements in accordance with WMUTCD [4S.01](#).
3. Activated flashing beacons **shall not** be approved on the STH system for use in conjunction with train crossings.
4. Emergency vehicle entrances *may* have activated flashing beacons, which will cancel after a pre-timed period of flash.
5. State-owned and permitted installations
 - a. The department *may* determine that flashing beacons are needed and *may* install and maintain them at specific sites. In this case, the regional traffic engineer **shall** make a final determination regarding the use of these devices on behalf of the department.
 - b. At locations where, local authorities determine that the use of flashing beacons is desirable, a permit *may* be issued for the installation and maintenance of flashing beacons. Permitted installations are subject to the approval of the department and the conditions of this policy. Additionally, permits are revocable at the discretion of the department.

Application of Flashing Beacons

The following sections highlight policy items for flashing beacons that *may* be different from those represented in WMUTCD Chapter [4S](#).

Intersection Control Beacon: Used at intersections where traffic or physical conditions do not justify conventional traffic control signals, but crash rates indicate the possibility of a special need, generally located over the center of an intersection. Refer to WMUTCD [4S.02](#).

Stop Beacon: Refer to WMUTCD.

Speed Limit Sign Beacon: Refer to WMUTCD [4S.04](#). The department rarely, if ever, would install and maintain flashing beacons with speed limit signs or school speed limit signs. Local authorities **shall** follow the permit requirements stated below.

Warning Beacon: Refer to WMUTCD [4S.03](#).

Flashing Beacon Design & Installation

The following provisions pertain to the installation, operation, and maintenance of flashing beacons other than rectangular rapid flashing beacons (RRFBs) on the state trunk highway system.

1. Location
 - a. Ground mount: Flashing beacons *may* be ground mounted, where they will be approximately one foot above the sign they supplement. The sign *should* be in the lateral and vertical location as specified in the WMUTCD Chapter 2. Illustrations of typical ground-mount installations are in Figure 3.1 below.
 - b. Overhead mount: A flashing beacon *may* be mounted on one or both sides of an overhead sign. It *may* be mounted above the sign if the entire assembly including the sign has a minimum clearance of 17 feet.
2. For state-maintained installations, the standard size of flashing beacons is 12 inches in diameter. At the discretion of the regional traffic engineer, permitted (not state-maintained) installations that are in areas with a posted speed less than 30mph *may* use 8-inch diameter beacons.

3. Ground-mounted supports **shall** be the same as are normally used to support the sign, and of the same cross-section as normally used. These **shall** be 4 x 4 or cross-drilled 4 x 6 posts, or in urban areas signal posts on concrete footings, or light poles or wood poles where speeds are low. Usage of any kind of pole **shall** be in conformance with the offsets specified in highway lighting permit policy, [FDM 11-15-1](#).
4. The installation of two posts, one for the sign and the other for the flashing beacon, is not permissible within the clear zone because of the unpredictable behavior of the combination of two posts when struck.
5. Service poles must be offset to the right-of-way line or in conformance with offsets in [FDM 11-15-1](#).
6. Service *may* drop to the top of the support, which would be extended to maintain an 18-foot minimum wire-to-ground clearance as per Wisconsin electrical code. Service *should* preferably be installed underground. In the latter case, the conduit **shall** be run up and attached to the post or pole. The control box *may* be mounted on the post or pole.
7. At the discretion of the regional traffic engineer, solar-powered flashing beacon installations *may* be allowed on the STH system provided the installation meets applicable electrical and crash standards.
8. According to [TEOps 2-1-8](#), flashing beacons and STOP or STOP AHEAD signs that incorporate flashing displays (e.g. blinker signs) **shall not** be used at the same intersection approach.

Warning Beacon (i.e., RRFBs) Design & Installation

Yellow flashers are to be used with any yellow warning (W-series) signs and school speed limit signs. Actuated blinker signs are supplementary to warning signs. When used, they **shall** be mounted on the same support as the sign which the beacon supplements in accordance with [WMUTCD 4S.03](#).

At locations where it is determined that the use of warning sign enhancements signs is desirable, a permit *may* be issued for the installation and maintenance of these blinker-type signs. Permitted installations are subject to the approval of the Department and the conditions of this policy. Additionally, permits are revocable at the discretion of the Department.

It is recognized that the use of warning sign enhancements *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 *should* be met prior to approval:

1. The location is an uncontrolled pedestrian crossing.
2. A minimum volume of 20 or more pedestrians during a single hour (any four consecutive 15-minute periods) of an average day *should* be met. Young (<12), elderly (>85) and disable pedestrians count 2 times toward volume thresholds. Additionally, seasonal day volumes can be used in place of average day volumes if the crossing is in a known tourist area.
3. A minimum vehicular volume of 1,500 vehicles per day.
4. Maximum of four lanes crossed, unless there is a raised median, in which case it can be six lanes.
5. There exists a minimum of 300 feet between the subject crossing and the nearest controlled pedestrian crossing or intersection traffic control device on the state trunk highway system. Consideration *should* be given to extending this distance beyond 300 feet if the proposed crosswalk location falls within an auxiliary turn lane for the nearby intersection or if the standing queue from the intersection extends over the proposed crosswalk location.
6. Adequate stopping sight distance exists based on [FDM 11-10-5](#) or greater than 8 times the posted speed limit.
7. RRFBs **shall** use a much faster flash rate and **shall** provide 75 flashing sequences per minute (except for existing RRFBs that follow FHWA IA-11). According to [IA-21](#), the left and right RRFB indications **shall** operate using the following sequence:

RRFB Flash Pattern												
Beacon	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.05 sec	0.25 sec
Left	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
Right	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

The use of warning sign enhancements *may not* be appropriate at locations where there is a combination of both high traffic volumes and high pedestrian volumes. In these situations, there *may* be an increase in crashes and/or delay that make the use of the actuated blinker signs inappropriate. Instead, a traffic signal or Pedestrian Hybrid Beacon (PHB) *should* be considered, if feasible.

Consideration *should* also be given to spacing between pedestrian crossings – both uncontrolled as well as those supplemented with warning sign enhancements. These blinker-type signs are highly visible and therefore can be confusing or distracting to drivers if there are too many within their field of vision at one time. Historically, 1,200 feet has been a rule of thumb for minimum spacing.

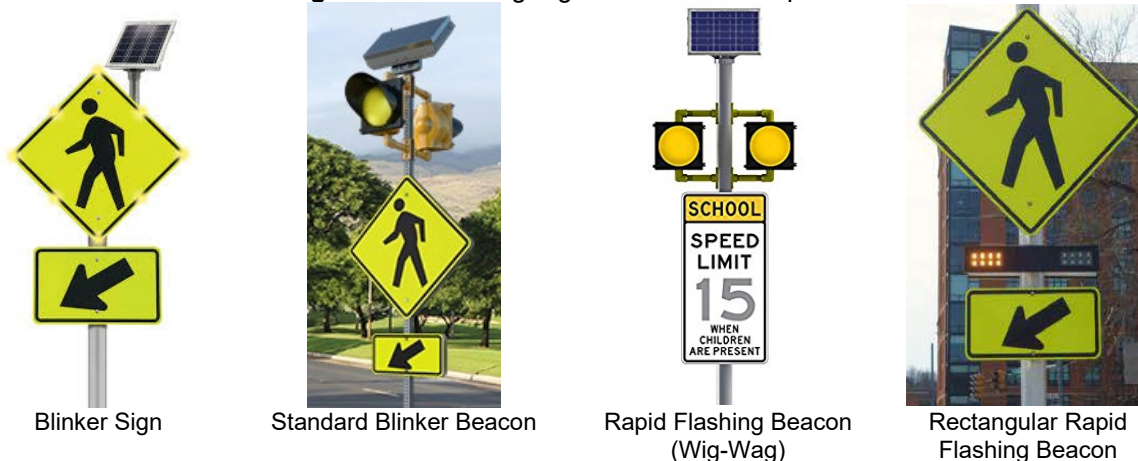
Warning beacon types

There are four options that *may* be used to enhance pedestrian and school warning signs:

1. Blinker Sign. Refer to [TEOpS 2-1-8](#) for application criteria.
2. Standard Blinker Beacon. Refer to [TEOpS 4-2-3](#) for application criteria.
3. Rapid Flashing Beacon (Wig-Wag).
4. Rectangular Rapid Flashing Beacon (RRFB). RRFBs can only be pedestrian actuated.

These devices can be pedestrian actuated and/or time-of-day programmed.

Figure 3.1. Warning Sign Enhancement Options



As of March 20, 2018, FHWA has granted interim approval ([IA-21](#)) for the optional use of the RRFB as a pedestrian-actuated conspicuity enhancement to supplement standard pedestrian crossing or school crossing signs at uncontrolled marked crosswalks to any jurisdiction that submits a written request to FHWA. WisDOT received statewide approval from FHWA to allow all jurisdictions to install an RRFB. The jurisdiction must agree to furnish a list of locations where RRFBs are installed, acknowledge that FHWA has the right to rescind the interim approval at any time and acknowledge that the interim approval does not guarantee that the provisions will be adopted into the WMUTCD.

PERMITTING OF FLASHING BEACONS

Any improperly installed electrical equipment *may* pose a hazard to the public. As such, the department spells out general and specific conditions, which are part of the permit agreement. These conditions are incorporated into the permit form, [DT1877](#), a copy of which is appended to this policy. The WMUTCD Chapter [4S](#) and specific conditions stated above **shall** also be followed for flashing beacons installed on all state trunk highways. Flashing beacons installed on connecting highways **shall not** require a WisDOT permit.

The following information provides conditions and processes related to the issuance of permits:

1. Permit applications **shall** be received, and permits issued, by the appropriate regional office.
2. Permits for flashing beacons *may* only be issued to municipalities, not to private individuals at agencies, or to power companies. This *should* result in working with the most responsible and objective agency associated with the safety problem being addressed.
3. The region *may* rightfully deny the issuance of the permit. Reasons for denial *may* include: lack of need, conflict with other traffic control devices, vulnerable location, lack of confidence in the maintaining ability of the subject agency, or knowledge that the request is due to reaction rather than long term need of commitment.
4. The region *may* revoke the permit for any of the reasons above, especially regarding lack of maintenance, as well as for reasons cited on the permit itself.
5. For permitted flashing beacons installed on signal standards, Standard Detail Drawings [9C2](#), [9C3](#), and

