

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

Date: September 2, 2026

To: Users of the Traffic Engineering, Operations & Safety (TEOpS) Manual

From: Brian Porter
State Traffic Engineer

Subject: SEPTEMBER 2026 ISSUANCE

Listed below and placed in the BTO Manuals Library website are changes and additions to the Traffic Engineering, Operations & Safety Manual. Please make your coworkers aware of the following changes and that they can be found at <http://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/trans.aspx>.

The Traffic Engineering, Operations and Safety Manual can be found at:
<http://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/teops/default.aspx>

The following changes to the TEOpS Manual have been made:

- UPDATE 1-5-5 Table of Contents
- UPDATE 4-11-3 Beacons – clarify use of activated flashing beacons at railroad grade-crossings.
- ADD 6-1-2 Work Protection – added policy for worker protection as part of requirement of Title 23, Part 230, Subpart K

For any questions regarding the transmittal or the manual library, please contact Emily Silversen (emily.silversen@dot.wi.gov).



Traffic Engineering, Operations & Safety Manual

Chapter 1 General

Section 5 Manual Organization

1-5-1 Subject Numbering System

June 2005

DEFINITIONS

Chapter: A main divisional unit of this manual, addressing one of the major functions of traffic engineering or supporting functions.

Section: A grouping of related subjects within a chapter.

Subject: A specific guideline, policy or procedure.

SUBJECT NUMBERING

The manual is divided into topical chapters with each chapter having one or more sections that are divided into specific treatments of material, called subjects.

Chapters, sections and subjects are all numbered.

Chapter numbers are numbered consecutively, generally without gaps. Sections and subjects are numbered consecutively or sometimes with gaps--5, 10, 15, 20--to allow for future insertions of material at the most appropriate locations within the chapter or to follow the MUTCD numbering system.

Chapters 2 through 10 are allotted to subjects related to traffic control devices covered in the corresponding Parts 2 through 10 of the MUTCD.

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4-11-1 Pedestrian and Bicyclist Crossings

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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.

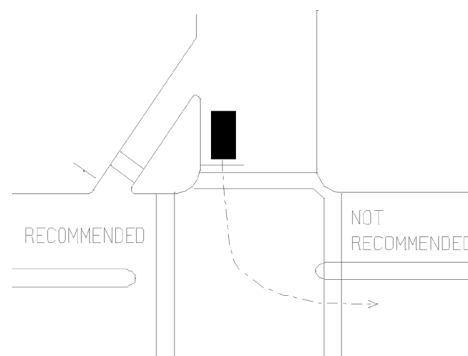
ADA requirements **shall** be considered when designing two-stage pedestrian crossings.

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

September 2026

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 used inconjunction with railroad grade-crossings **shall not** be approved on the STH system, except as provided in [TEOpS 8-1-20](#).
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.

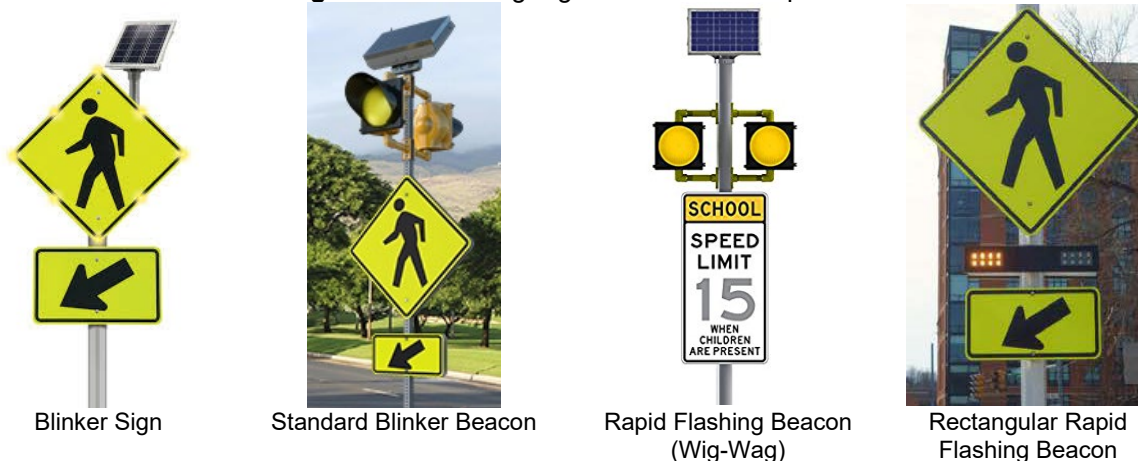
Warning beacon types

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.

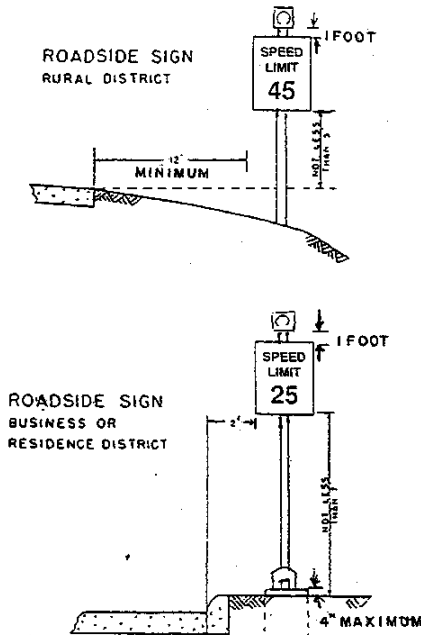
The following information provides conditions and processes related to the issuance of permits:

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

[9E7](#) *should* be made part of the permit. SDDs [9C5](#) and [9D3](#) for control cabinet installations *may* also apply.

6. In the event of the reconstruction of the highway, reasonable notice *should* be given to the municipality to allow their removal of the equipment and arranging for disconnecting the electrical service.

Figure 3.2. Standard Flashing Beacon Installations for Rural & Urban Districts





Traffic Engineering, Operations & Safety Manual

Chapter 6 Work Zone Traffic Control

Section 1 General

6-1-1 Work Zone Policy Statement

December 2022

The Wisconsin Department of Transportation (WisDOT) is committed to promoting safety for the traveling public and workers, minimizing congestion and adverse traffic impacts, and providing for improved public satisfaction during construction, maintenance, utility, and all other activities performed on or near the WisDOT highway network. Compliance with this policy will reduce work zone crashes, travel time, and provide benefits to all stakeholders. All regional offices and statewide bureaus are responsible for implementing the portions of this policy affecting their operations.

GOALS AND OBJECTIVES

The goals and objectives of this policy are to:

- Reduce crashes in work zones.
- Provide a conducive environment for safety and mobility for workers and the traveling public.
- Minimize work zone related delays not to exceed 15 minutes above normal recurring traffic delays.
- Provide traveler information to minimize delays and improve mobility, efficiency and safety.
- Clearly define stakeholder responsibilities.
- Develop work zone training for WisDOT staff.
- Evaluate and continuously improve work zone safety and mobility performance.

APPLICABILITY

This policy is applicable to all work, including contracts for highway construction, railroad crossings, maintenance, and utility projects on state trunk highways, and Federal and State funded local roads improvement projects. These activities must have a Transportation Management Plan (TMP).

WisDOT will submit all TMPs to the Federal Highway Administration (FHWA) for their concurrence on all projects subject to federal oversight, both on and off the National Highway System (NHS) per the WisDOT/FHWA Federal-Aid Oversight Agreement. WisDOT must approve projects not subject to Federal Oversight, both on and off the NHS.

It is WisDOT's policy to consider work zone impacts in all phases of project development and construction. Incorporate specific mitigation strategies in the TMP during the project development process to address the characteristics of a project and its associated work zone impacts. Work zone data and annual project reviews will be used to evaluate work zone processes and procedures. The changes made to the TMP during construction will facilitate improvements at the project level and system-wide. Personnel involved in project development and construction *should* receive appropriate training periodically.

This policy supplements existing Department wide policies, standards, guidelines, processes, and practices as detailed in the FDM, Standard Specifications, Construction and Materials Manual (CMM), Traffic Engineering Operations and Safety Manual (TEOpS), Wisconsin MUTCD, etc. Refer to [FDM 11-50-5](#) for TMP preparation process.

RESPONSIBILITIES

Bureau of Highway Traffic Operations (BTO) and Bureau of Project Development (BPD) Directors and Regional Directors

- Advocate for compliance with TMP guidelines and lane closure policies, and approve corridor and project variances to established guidelines.
- Maintain awareness of the cumulative impacts of multiple projects along a corridor.
- Advocate for funding support for mitigation strategies included in TMPs.

Bureau of Traffic Operations (BTO)

- Review and approve TMP that have the following criteria:
 - Type 3
 - Federal Oversight
 - Innovative Contracting (lane rental, enhanced liquidated damages, etc.)
 - Speed Declarations on 65 or 70 mph routes
 - Nonstandard mitigation strategies
 - Law Enforcement mitigation

- Two weeks will be given for the review period. Approval will be contingent on comments being addressed, use of temporary speed zones and traffic mitigation strategies selected.
- Develop and maintain work zone traffic control standards and guidelines.
- Develop work zone traffic control specifications and standardized special provisions (STSP) in coordination with the Bureau of Project Development (BPD) and regional WisDOT offices.
- Review continually the effectiveness of work zones, improve and update work zone processes, procedures and policies to ensure quality and statewide consistency.
- Review and comment on work zone traffic control and mobility exceptions for TMP type 3.
- Develop work zone training program. The training program will provide appropriate levels of detail for supervisors, project managers, project engineers, inspectors, flaggers and workers.
- Review/approve speed zone declarations when reducing speed limit for all interstates and for facilities with a normal posted speed of 65 mph and 70 mph facilities.
- Review/approve traffic mitigation strategies used.

Bureau of Project Development (BPD)

- Review Design Study Reports (DSR) for work zone TMP and identified TMP type.
- Coordinate with BTO and Region for review of TMP Type 3, and for exceptions to TMP and lane closure guidelines.
- Participate with BTO in reviewing work zone effectiveness and updating work zone processes and policies.

Regional WisDOT Offices

The project manager in collaboration with traffic operations at the Region is responsible for developing and implementing TMP. The TMP is developed according to TMP guidance, the FDM, TEOpS, WisMUTCD, and other supplemental policies, directives, and applicable project specific contract documents including handbooks and special Traffic Control Plans.

Project Development Chief

- Support the consideration of work zone impacts and development of TMPs early in the project development process for all projects.
- Support coordination of TMPs along corridors and between adjacent regions and neighboring states.
- Support resource availability for TMP development, mitigation strategy measures and activities.
- Inform Regional Director of all projects with significant traffic impacts.
- Approves non-local program TMPs in the region

Operations Chief

- Maintain awareness of corridor and project variances that exceed the allowable limits.
- Maintain awareness of project-specific exceptions to work zone mobility policy.
- Advocate for resource availability for TMP development and strategies measures and activities.

Regional Planners

- Identify TMP type during scoping process in collaboration with PDS and Traffic Unit.
- Identify potential strategies in scoping document.
- Identify funding needs and issues associated with the TMP.
- Coordinate scheduling of projects to minimize repetitive construction projects or activities along a segment of roadway and to minimize conflicting projects on parallel/alternate routes.

Regional Traffic/Work Zone Engineers

- Provide input into type of TMP during scoping process.
- Provide input during TMP development, implementation and conflict resolution. Two weeks will be given for the review period. Approval will be contingent on comments being addressed,
- Provide input for all traffic impact assessment and mitigation decisions during project initiation, scoping, design, construction and evaluation.
- Provide input on project reviews, approval, and modification of all TMP strategies.
- Verify that traffic control measures are in conformance with WisMUTCD, SDDs, TEOpS, WisDOT Standard and Supplemental specifications.
- Verify that traffic delays are minimized and do not exceed allowable limits. If exceeded consult with TMP team and / or project staff about possible modifications to the TMP.
- Review implementation plan with the project engineer before construction.
- Verify with project staff that the contractor is complying with TMP as it relates to the handling of traffic.

- Review changes made by the contractor or project engineer during construction.
- Review traffic control measures as needed to address field conditions pertaining to traffic flow, visibility, and safety.
- During TMP development review criteria in [TEOpS 13-5-6](#) to determine if a temporary speed limit reduction is appropriate. If so, ensure that a temporary speed declaration is completed prior to implementing the reduced limit.

Project Manager/Squad Leader

Project managers and staff will ensure appropriate action is taken to reduce work zone impacts to workers and the traveling public. Responsibilities include:

- Ensure project activities conform to the TMP.
- Designate a trained person at the project level, whose responsibilities include oversight of TMP implementation.
- Determine resource needs associated with the TMP development and implementation.
- Ensure traffic control measures are in conformance with WisMUTCD, SDDs, WisDOT Standard and Supplemental Specifications and project-specific plans.
- Ensure contingency plans are implemented if necessary.
- Facilitate project reviews, approval, and modification of all TMP strategies.
- Ensure traffic delays are minimized and do not exceed allowable limits. If exceeded consult with TMP team or Regional Work Zone Engineer about possible modifications to the TMP.
- Verify contractor complies with the TMP as related to their performance of work.
- Review changes made by the contractor or project engineer during construction.
- Notify Regional Communication Managers of significant project traffic impacts due to incidents.

Project Designer/ Leader

- Confirm scoping TMP type based on project needs and constraints.
- Develop content of TMP components, address mitigation and contingency plans based on needs of the project.
- Develop traffic control measures in conformance with WisMUTCD, SDDs, TEOpS, WisDOT's Standard and Supplemental Specifications.
- Minimize traffic delays during plan development, and ensure allowable limits are not exceeded. If exceeded consult with TMP team, Project Manager/Squad Leader or Regional Traffic Engineer/ Work Zone Engineer about possible modifications to the TMP.
- Notify Project Manager and Regional Work Zone Engineer of traffic impacts during TMP and TCP development.
- Develop contract requirements to ensure contractor complies with the TMP as related to their performance of work.
- Analyze changes requested or made by the contractor during construction.
- Work to ensure necessary TMP measures are planned and implemented by the contractor.
- Coordinate with nearby projects to minimize conflicting construction activities as needed.
- Coordinate with Regional Traffic Engineer/Work Zone Traffic Engineer and regional freight coordinator to evaluate the TMP, highlight problem areas, successes and changes to the original TMP. A formal TMP follow-up evaluation report is not required on TMP type 1 projects but highly recommended on all TMP type 2 and required for all type 3 projects.

Other Stakeholders

It is advisable to have clear communication channels among all staff in the region to facilitate implementation of the Public Information and Outreach Plan (PIOP) and the Incident Management Plan (IMP).

- Regional Permit personnel
- Regional Maintenance personnel
- Regional Utilities personnel
- Regional Communications Manager
- FHWA
- Law enforcement
- Counties and local officials
- Industry

Contractor - Responsibilities

It is the contractor's responsibility to:

- Designate a trained person, whose responsibility is to ensure compliance with the traffic control plan and other contractual provisions related to the TMP.
- Ensure contractor personnel are trained in traffic control to a level commensurate with their responsibilities.
- Work with the project engineer to ensure lane closures and / or disruptions to the traveling public are minimized according to the contract.
- Perform quality control of work zones to promote consistency and ensure compliance with contract documents and guidelines.
- Recommend traffic control improvements to the project engineer to address field conditions pertaining to visibility, traffic flow, worker, and motorist safety.

Law Enforcement

Responsibilities for law enforcement include:

- Providing active and passive enforcement of traffic laws according to work zone law enforcement mitigation contracts, to promote safety and mobility in work zones.
- Identifying unsafe traffic conditions.
- Taking appropriate measures (in coordination with the project engineer) to clear work zone incidents quickly.
- Understanding of work zone traffic control and operation and additional TMP components.
- Documenting work zone incidents for future assessment of work zone impacts and process improvements.

6-1-2 Worker Protection

September 2026

Purpose

Title 23, Part 630, Subpart K, Temporary Traffic Control Devices, provides requirements for worker protection.

Applicability

This policy is applicable to all work, including contracts for highway construction, railroad crossings, maintenance, and utility projects on state trunk highways, and Federal and State funded local roads improvement projects.

Maintenance and utility work zone activities that do not receive Federal-aid funding are recommended but are not required to follow this policy. Refer to the latest version of the Wisconsin Work Zone Field Manual for work zone protection procedures.

This policy supplements existing Department wide policies, standards, guidelines, processes, and practices as detailed in the FDM, Standard Specifications, Construction and Materials Manual (CMM), Traffic Engineering Operations and Safety Manual (TEOpS), Wisconsin MUTCD, etc.

Worker Protection Definitions

The following definitions will be used throughout the guidance:

Errant Vehicle: A vehicle that deviates from a travel lane in an uncontrolled and unpredictable manner. Causes can include driver distraction or fatigue; sudden medical issues; skidding; hazardous weather; and impacts with roadside features.

High Anticipated Operating Speed: Work zones with a pre-construction posted speed limit of 45 mph or greater are considered to have a high anticipated operating speed.

Means of Escape: A clear, open escape area where no physical barrier or significant drop-off prevents a worker from safely moving out of the path of an errant vehicle.

Positive Protection Devices: Devices that contain or redirect errant vehicles and meet applicable industry crashworthiness evaluation criteria.

Exposure control measures: Traffic management strategies to avoid work zone crashes involving workers and motorized traffic by eliminating or reducing traffic through the work zone, or diverting traffic away from the work space.

Worker Protection

A project **shall** use positive protection when the following conditions are all met:

1. Work takes place on a roadway that has a posted speed limit of 45 mph or greater
2. Workers do not have a clear means of escape from an errant vehicle

The following examples do not provide workers with a clear, open escape area:

Falling Risk

- Bridge decks
- Retaining walls
- Excavation sites more than 18 inches
- Protected slopes exposed by barrier removal, If the barrier is there to protect something other than the slope then this is likely not a concern
- Working from an aerial device (snooper, bucket truck, ladder, boom lifts, scissor lift, etc.)

Crushing/Pinning Risk

- Tunnels
- Between traffic and a barrier system with a height of 32 inches and greater
- Between traffic and a retaining wall
- Between the working width of two barrier systems
- Working between traffic lanes
- Between traffic and shielded objects exposed by barrier removal

Design for Worker Protection

Step 1: Identification of worker protection need

Identify the work areas within the project limits that require positive protection for workers. Verify what the current posted speed limit is on the roadway. If the speed is 45 mph or greater, identify locations where workers will have no means of escape. Consider the type of work taking place and equipment that will be present, as this *may* limit a workers means of escape.

Identification and mitigation begins during the project planning. The identification is completed by project design staff, maintenance forces, and utility permit applicants.

For improvement projects this starts during the Work Zone Impact Assessment and continues throughout the development of the traffic control plans and Transportation Management Plan. By identifying the need for worker protection during the WZIA, projects will be able to select the appropriate strategies to minimize exposure.

For maintenance projects, identification for worker protection begins during the annual Region Project List development.

For utility projects, identification for worker protection must be identified in the utility permit.

Step 2: Project Duration

Consider the duration of the work that will expose workers. The duration of the work and worker presence at a particular location assists in determining the mitigation strategy needed. The durations are defined in the WMUTCD 6N.01 as:

Long-term Stationary is work that occupies a location more than 3 days. An example is a reconstruction project **Intermediate-term stationary** is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour. Examples are nighttime mill and overlay or base patching projects.

Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period. Examples are culvert replacements or daytime mill and overlay projects.

Short duration is work that occupies a location up to 1 hour. An example is a special marking project.

Mobile is work that moves intermittently or continuously. Examples are long line marking, crack-filling, saw cutting, or installation of temporary traffic control.

Step 3: Work area protection

Once the locations are identified, there are three options to protect workers. The first is positive protection, the second is exposure control measures, and the third is reducing speed. These measures are only required to be in place while the workers are present. It is up to the project team to determine the appropriate approach based on the project factors.

Positive Protection Devices

Temporary concrete barrier is a positive protection device that will satisfy the requirement for worker protection. FDM 11-50-35 describes WisDOT's use of Temporary Concrete Barrier for protecting the traveling public from roadside hazards. When used for protecting the traveling public from roadside hazards temporary concrete barrier *may* meet the need for worker protection. When worker protection on projects is not already met in the requirements of 11-50-35, temporary concrete barrier *may* be used. Typically, temporary concrete barrier would be used on long-term stationary projects.

A mobile barrier trailer is an option for positive protection, when the available work periods are recurring or the work zone is mobile. The mobile barrier trailer is used to shield the workers, then it would be moved once the work is complete. Mobile barrier trailers *may* be used on any duration project to satisfy the worker protection need.

Truck or trailer mounted attenuators can be used specifically in short duration or mobile operations. The TMA's **shall** be placed in advance of the workers it protects. TMA's *may* also be used on longer duration projects at spot locations within the activity area as needed.

Exposure Control Measures

Exposure control measures remove traffic from the work area while the work is taking place. Exposure control measures include:

- Full roadway closures
- Ramp closures
- Rolling road blocks

By removing traffic from the work area other measures such as positive protection *should not* be needed solely to protect workers.

Speed Control

When the speed of the roadway is reduced to less than 45 mph, positive protection or exposure control measures do not have to be used. The following examples describe traffic control measures that reduce the speed of the work zone:

- Flagging operations, as the flaggers control the traffic entering the work area. This slows the traffic down from a normal operating speed when the requirement for positive protection is otherwise met. The flaggers must be stationed outside of the work area that requires worker protection, if they cannot, the use of AFAD's is needed.
- Temporary signals perform a similar function in slowing traffic down.
- At intersections, putting a signal into a red flashing condition on all approaches slows traffic from its normal operating speed. Contact regional signal units when considering the use of red flashing signals.
- Temporary speed zone declarations reduce the speed on highways to under 45 mph. This is an option on two-lane two-way highways and multilane undivided with posted speed limits of 55 mph. The speed limit would need to be reduced from 55 mph to under 45 mph. Additional design features must also be included to give drivers the perceived need to slow down.

Step 4: Incorporate into traffic control plans

Incorporate any worker protection measures into the traffic control plans and miscellaneous quantities. Detail specific worker protection locations that require attention from the contractors.

Engineering Study

In situations where workers cannot be protected as stated above, an Engineering Study **shall** be developed that describes and justifies why it cannot be protected. Involve the applicable BPD Design Oversight Engineers, Regional Traffic Work Zone Engineer, BTO Work Zone Engineers, Maintenance, and Utility sections and

possibly FHWA.

The Engineering Study **shall** include the following:

- Location of the Work Area
- Posted speed limit
- Basis of no means of escape
- Distance between edge of traffic and workers
- Type of work
- Duration of work

The Engineering Study *should* thoroughly describe the inability to follow the standard. Each location will have a unique set of issues that factor into the inability to follow the standard. These factors *may* include availability of detour routes, additional worker exposure from the mobilization of barrier systems, limitations of barrier systems, and work zone mobility issues for both the public and the contractor.

The Engineering Study *should* also describe how the project will move forward in completing the work and any mitigation proposed that are less than the standard. Include factors that reduce the risk to workers, such as lower traffic volumes based on time of day, and distance between traffic and work area.

Attach the Engineering Study to the TMP Section 9 and note the location of interest on the plan set. For maintenance and utilities, attach the Engineering Study to the project documentation for the work. The Engineering Study is to be completed by the project design staff or entity doing the work.

Appendix A: Project discussion

Base-Patching

Base-patching on its own does not create a high-risk work area. However, worker protection can be created based on the roadway features such as:

- Work is between traffic and a barrier system
- Work is between traffic and construction equipment

In the case of construction equipment causing the need for worker protection, contractors will be responsible for protecting the work area.

Drop-off protection

FDM 11-50-35 has requirements to use positive protection to protect drop-offs. In order to save costs, projects have eliminated the drop-off risk by placing a wedge of material along the edge that has the drop-off. While doing this eliminates the drop-off, the workers might still require protection. In these cases using the temporary concrete barrier provides protection for both the workers and the drop-off risk.

Road Closed

When the R11-2, R11-3, or R11-4 series of signs is used, the road is considered closed. In some cases traffic *may* still be present but not in the volume with the road open. Work areas will not be considered high-risk when the road is closed as closing the road is part of exposure control.