LIGHTGUARD SYSTEMS®

Product Guides
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IRWL
Layout Configurations

LIGHTGUARD SYSTEMS®

SELECTION GUIDE

An introduction to Smart Crosswalk™ Warning Light Systems

Introduction

Congratulations on taking the first step towards significantly reducing pedestrian accidents and injuries with a LightGuard Systems Smart Crosswalk™. An investment in a Smart Crosswalk™ heralds a safer environment for pedestrians and motorists, and also brings increased visibility of pedestrians during high traffic, nighttime, and in sub-optimal, or obscured visibility conditions.

Smart Crosswalk is an ideal pedestrian enhancement for applications such as:

- Public crosswalks
- Airports
- Trail crossings
- Hotels and casinos
- School zones
- Corporate campuses
- College campuses
- Shopping malls
- Parking facilities
- Hospitals

Smart Crosswalk™ In-Roadway Warning Lights (IRWL)

The LightGuard Systems IRWL is MUTCD compliant and a proven method of increasing driver awareness up to 95%.

A typical in-roadway warning light system is comprised of:

- IRWL light fixtures
- Base plates, 10" composite or 14" steel
- Passive pedestrian (bollards) and/or manual push button activation
- Flashing LED warning signs or RRFBs
- Controller, battery back-up and lockable weatherproof cabinet
- Solar and/or A/C power sources (wireless option available)

(See Figure 1.)

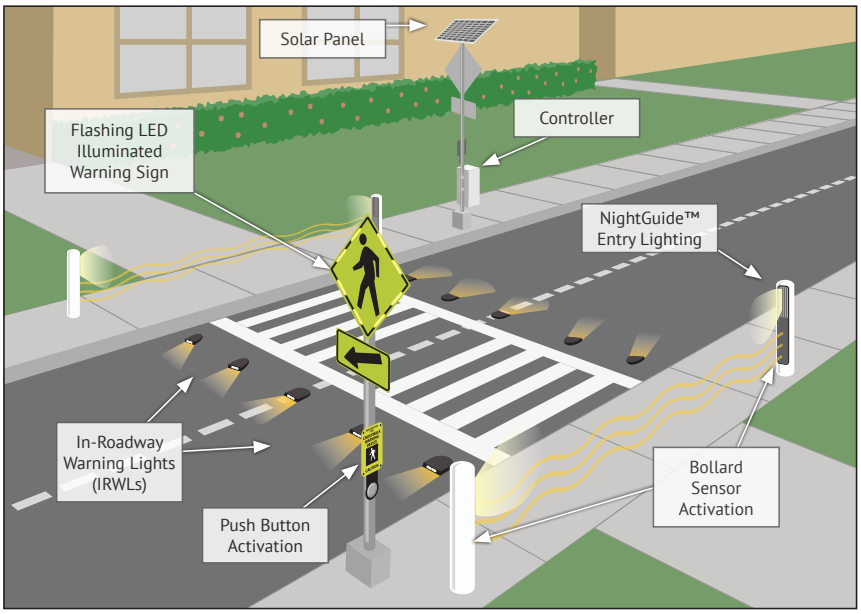


FIGURE 1

Selecting the Right Components for Your Project:

1. How Many In-Roadway Warning Lights?

The number of lanes in the roadway determine the number IRWL needed. A typical two-lane roadway requires five (5) IRWL installed on each side of the crosswalk—for a total of ten (10) IRWL, plus ten (10) base plates. (See Figure 2.)

The direction, or placement, of the IRWL faces away—outward from the crosswalk's center—to alert oncoming motorists in either direction, and to avoid distracting pedestrians as they are crossing the roadway.

Similarly, a typical four-lane roadway requires seven (7) lights facing outward in each direction for a total of fourteen (14) lights plus fourteen (14) base plates.

IRWL fixture with 10" composite base plate

FIGURE 2

TIP: IRWL fixtures are embedded into the roadway in the center of lanes, at roadway edges, and on lane lines — allowing vehicle tires to straddle the light fixtures.

2. Base Plate Options

Base Plates protect and house IRWL—and are purposefully designed for their durability and resistance. Our proprietary Debris-Free Self Clearing™ feature is built into the base plate. This design compresses air and "jets-out" the accumulated rubble through the fluted air channels. (See Figures 3 and 4.)

Standard 10" Base Plate

The 10" x 1.5" standard base plate is made of ultra-high strength composite material and is designed to be permanently embedded into the roadway.

Steel Snow Plow 14" Base Plate

For snowy regions we recommend our durable 30 lbs., 14" x 1 1/2" steel case-hardened base plate which is designed to protect against a snowplow blade.

10" Composite

Fluted Air Channels

FIGURE 3

14" Steel

Fluted Air Channels

FIGURE 4

3. Activation Methods

Smart Crosswalk™ passive pedestrian activation methods include: bi-directional infrared bollard sensors, radar and motion detection devices—all of which automatically trigger the systems flashing LED lights as pedestrians enter the crosswalk (See Figure 6); or manually via push button device. (See Figure 5.)

Each activation method has its benefits. However, the combination of both push button and bollard sensor is recommended to ensure optimal safety—as some pedestrians are more familiar and compliant with pushing a button, while others are not.

If only one activation method is selected, we recommend passive detection bollards which contain infrared light beam sensors. In addition to providing optimal pedestrian safety, bollard sensors also create a lighted visual entry point—inviting the pedestrian to cross at the safest place.

FIGURE 5

Studies show that pedestrians use a push button activation method at crosswalks only about 60% of the time—leaving 40% of pedestrians potentially "exposed" to vehicles traveling through the crosswalk.

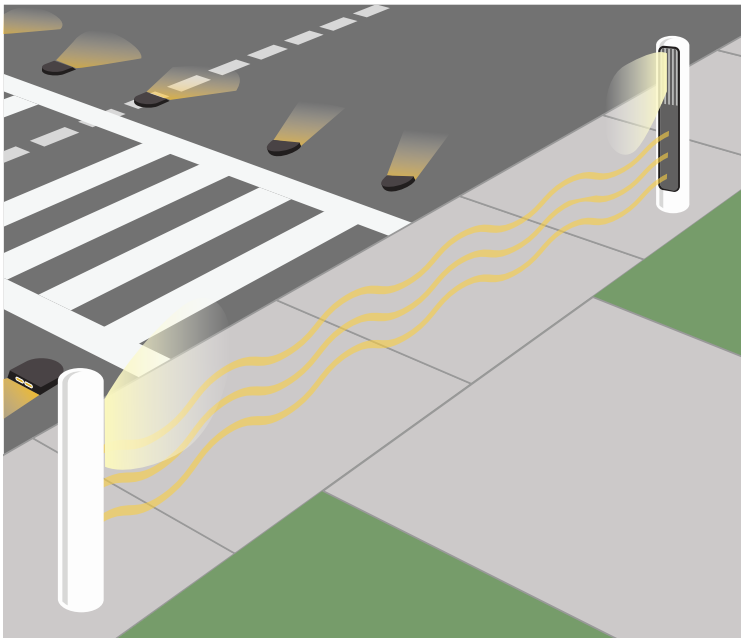


FIGURE 6

4. Type of Power — A/C and Solar

Your project's power source, location, budget and sun exposure will determine how your Smart Crosswalk™ will be configured: either to work with an existing A/C power source, or solar power—or both. If wiring a standard power supply to the Power Control Unit (PCU) isn't feasible, solar power is the ideal option.

5. System Controllers

The Power Control Unit (PCU) functions as the "brain" of your lighted crosswalk system. Users are able to set-up and adjust the activation timing of the flashing LED lights, monitor the system, and capture data. A fail safe feature automatically warns users of any system malfunction.

Advanced Controller

Advanced Controllers can monitor and store data, such as time, date, and movement in each crosswalk direction. They can be programmed to turn on automatically at a specific time, and then revert to standby mode for normal operation. They also have instantaneous battery back-up power in the event of a power failure.

The Advanced Controller can also be enhanced to accommodate additional pedestrian safety measures such as: flashing LED warning signs; flashing beacons; RRFBs; simultaneous yet independently activated crosswalks; remote communication; and other custom-based applications. (See Figure 8.)

Basic Controller

The Basic controller provides all of the requisite functions to operate your Smart Crosswalk™ successfully, such as setting the crossing rate time of the flashing LED lights. The Basic Controller does not include a backup battery, or the ability to store data. (See Figure 9.)

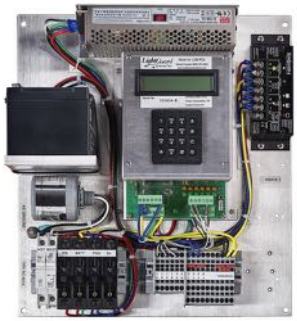


FIGURE 8

FIGURE 9

6. Flashing LED Illuminated Warning Signs

Our flashing LED warning signs are a highly visible warning solution that increase motorist yielding. FHWA and MUTCD compliant (W11-2, S1-1, W11-15), they are an ideal, budget-friendly pedestrian safety solution.

LED signs activate wirelessly via pedestrian push button or passive detection bollard sensors. Available as stand-alone warning systems, LED signs are commonly used in conjunction with in-roadway warning lights, and less commonly in combination with RRFBs.

Available in 30", 36" and 48" sizes, our LED signs are robust, maintenance-free and powerfully built. Each sign contains 96 high-intensity LED lights and flash at the Enlighten1™ rate.

Our Flashing LED Warning Signs:

- Contain 96 high-intensity LEDs
- Visible from up to 1 mile
- Flash at a photosensitive epilepsy safe rate
- Elegantly reinforce existing warning measures
- Are available in solar wireless
- Offered in solar and A/C power

Solar wireless flashing LED school crossing sign with push button

7. Rectangular Rapid Flashing Beacons (RRFB)

The RRFB is an economical, easy-to-install safety measure that increases motorist yielding. The LightGuard Systems RRFB system uses high-intensity LEDs to alert drivers of pedestrians in a crosswalk in real-time. It flashes at a highly visible MUTCD approved on/off rate that demands motorists' attention. It activates via ADA compliant push button or passive pedestrian detection bollard sensors. Offered in wireless solar and A/C hard wired; sold in pairs.

The Solar Wireless RRFB System Includes:

- 2 Enclosures
- 2 Wireless transceivers
- 2 Solar panels w/pole mounts
- 2 Batteries
- 2 Push button stations
- 2-30" Diamond FYG Pedestrian static signs (W11-2)
- 2-12" x 24" Down arrow signs (W16-7p)

Solar wireless RRFB pedestrian sign system with push button

Trust LightGuard Systems® as Your Partner

When you choose LightGuard Systems as your pedestrian safety partner, you are joining forces with an industry leader with a proven track record of more than twenty-five years.

- **Global** – LightGuard Systems has a global presence with thousands of systems installed in the USA and all over the world.
- **Innovative** – We have deep application knowledge and exceptional technical competence. We helped craft and set the IRWL standards that are in use today by the United States Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD).
- **Design** – Our design team creates elegant, robust, and highly-effective safety solutions for a wide range of applications.
- **Pursuit of Safety** – We are dedicated and committed to the pursuit of safety through technology and continually strive to improve pedestrian safety awareness in the communities we serve.

LIGHTGUARD SYSTEMS®

LightGuard Systems® Inc.
1-707-542-4547
FAX: 707-525-6333
office@lightguardsystems.com
www.lightguardsystems.com

Choosing Your Smart Crosswalk™ Equipment

How Many In-Roadway Warning Lights (IRWLs) Are Needed?

The number of IRWLs and base plates needed is determined by on the number of lanes in the roadway. Here is the formula we use for calculating how many IRWLs are needed for a crosswalk:

- Firstly, place one at each end of the crosswalk (or edge of the road/curb) to define the shoulder of the road
- Then, place one on the center lane line or turn lane
- Lastly, place one in each parking lane and/or in the center of each travel lane underneath the traveling car's license plate (NOT directly in the car's wheel path) in each direction

Each individual IRWL should face away from the crosswalk and point in the direction of the oncoming motorists' line of sight (NOT straight forward). The result is a slightly different, uniquely pointed angle for each IRWL. Refer to our published IRWL crosswalk layout diagrams for additional visual placement details. Our recommended layout patterns comply with the US Federal Highway Administration Manual and the Uniform Traffic Control Devices (MUTCD).

1. Which Type of Base Plate?

10" Durable Reinforced Thermoplastic Polymer
14" Steel Case-Hardened Snowplow Blade Resistant

2. Which Activation Device?

Our systems can be activated automatically using Automatic Activation Pedestrian Detection Bollards or manually using an ADA compliant push buttons. Bollards are our most popular and effective solution for the following reasons:

- Bollards create an attractive and inviting visual entrance point for pedestrians
- Bollards require no pedestrian interaction
- Studies show that pedestrians use push buttons 60% of the time, leaving 40% vulnerable
- Bollards can be installed up to 60 feet apart, and placed several feet away from the crosswalk
- Bollards activate only when the pedestrian is entering the crosswalk, not when exiting

3. Which Power Source and Controller?

AC or Solar-Powered

The Smart Crosswalk™ is a low voltage DC powered system typically powered by AC with an AC-DC converter power supply. If AC power is not available, solar power is a reliable option.

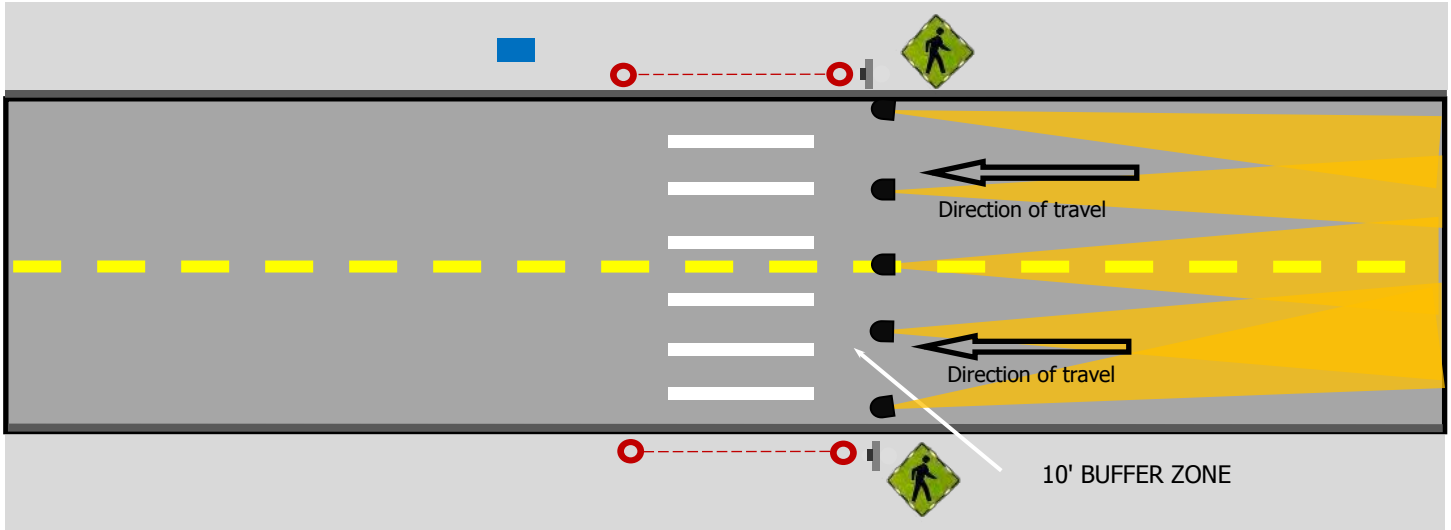
Advanced or Basic

Our Basic Controller provides all of the essential functions to operate any Smart Crosswalk system. Our Advanced Controller has a programmable microprocessor with the ability to store time, date, and number of activations. It can also be programmed to turn on at a specific time, flash continuously, and revert to standby mode during normal operation. Battery backup power ensures continuous operation for up several days, depending on power usage.

4. Flashing LED Signs

Our MUTCD compliant ultra-bright flashing LED warning signs can be added to any Smart Crosswalk system to further enhance visibility. One sign can be used at each side of the crosswalk, or back to back for a total of four. With 96 LED lights in each sign, they reinforce drivers' awareness of pedestrians as they are crossing the street. They are available and effective as stand-alone systems in solar, wireless and hardwired A/C power. Flashing LED signs can be ordered in a variety of sizes and are suitable for a wide array of applications.

2-Lane One-Way
In-Roadway Warning Light (IRWL)



The *Smart Crosswalk*™ IRWL has unidirectional light beams directed at approaching drivers to alert them that pedestrians are in the crosswalk. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk providing a safety buffer zone for the pedestrian.

System Components Key

- In-Roadway Warning Light (IRWL) module housed inside a baseplate
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED enhanced border
- Automatic Activation Bollards
- Power Control Unit (PCU)
- Manual push button assembly

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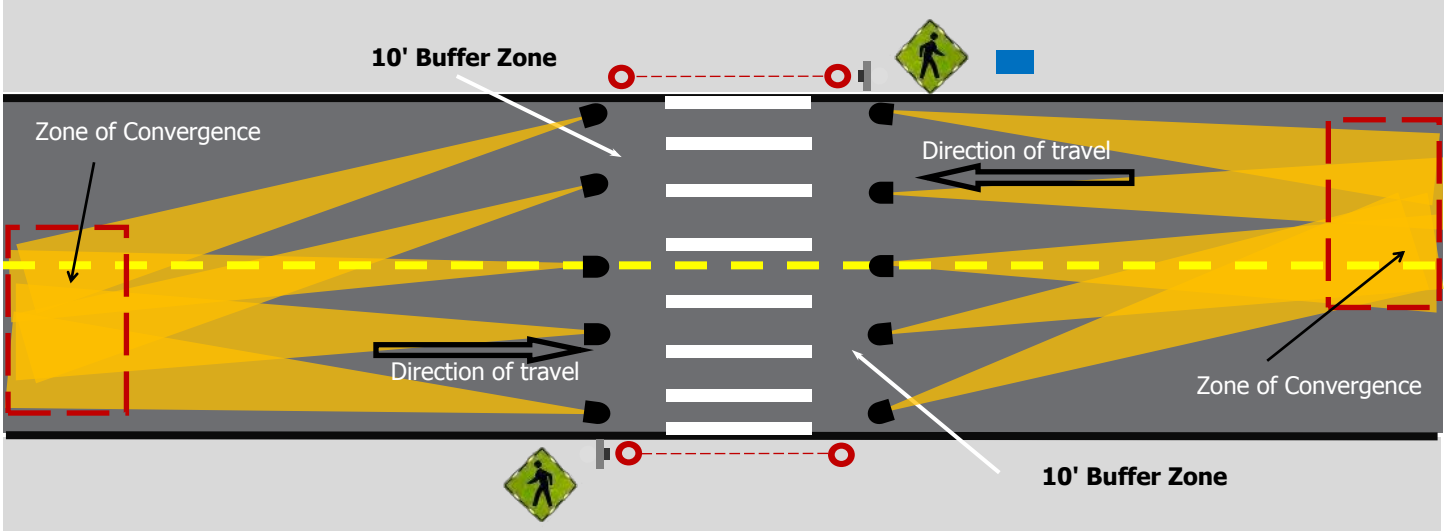
2-Lane Two-way
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the cross-walk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the cross-walk.

System Components Key

- In-Roadway Warning Light (IRWL) module housed inside a baseplate
- Automatic Activation Bollards
- Manual push button assembly
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED enhanced border
- Power Control Unit (PCU)
- The *Zone of Convergence*

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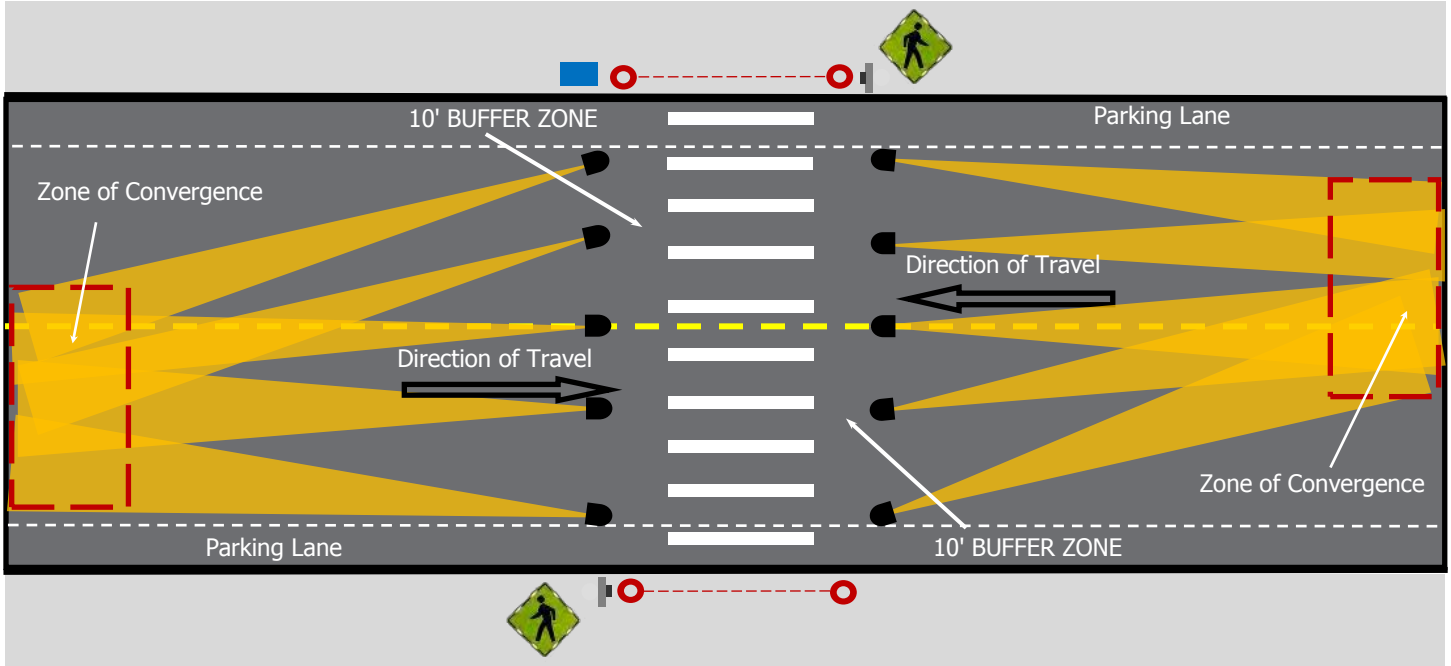
2-Lane Two-way w/Parking Lanes
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the cross-walk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the cross-walk.

System Components Key

- In-Roadway Warning Light (IRWL) module housed inside a baseplate
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED enhanced border
- Automatic Activation Bollards
- Power Control Unit (PCU)
- Manual push button assembly
- The *Zone of Convergence*

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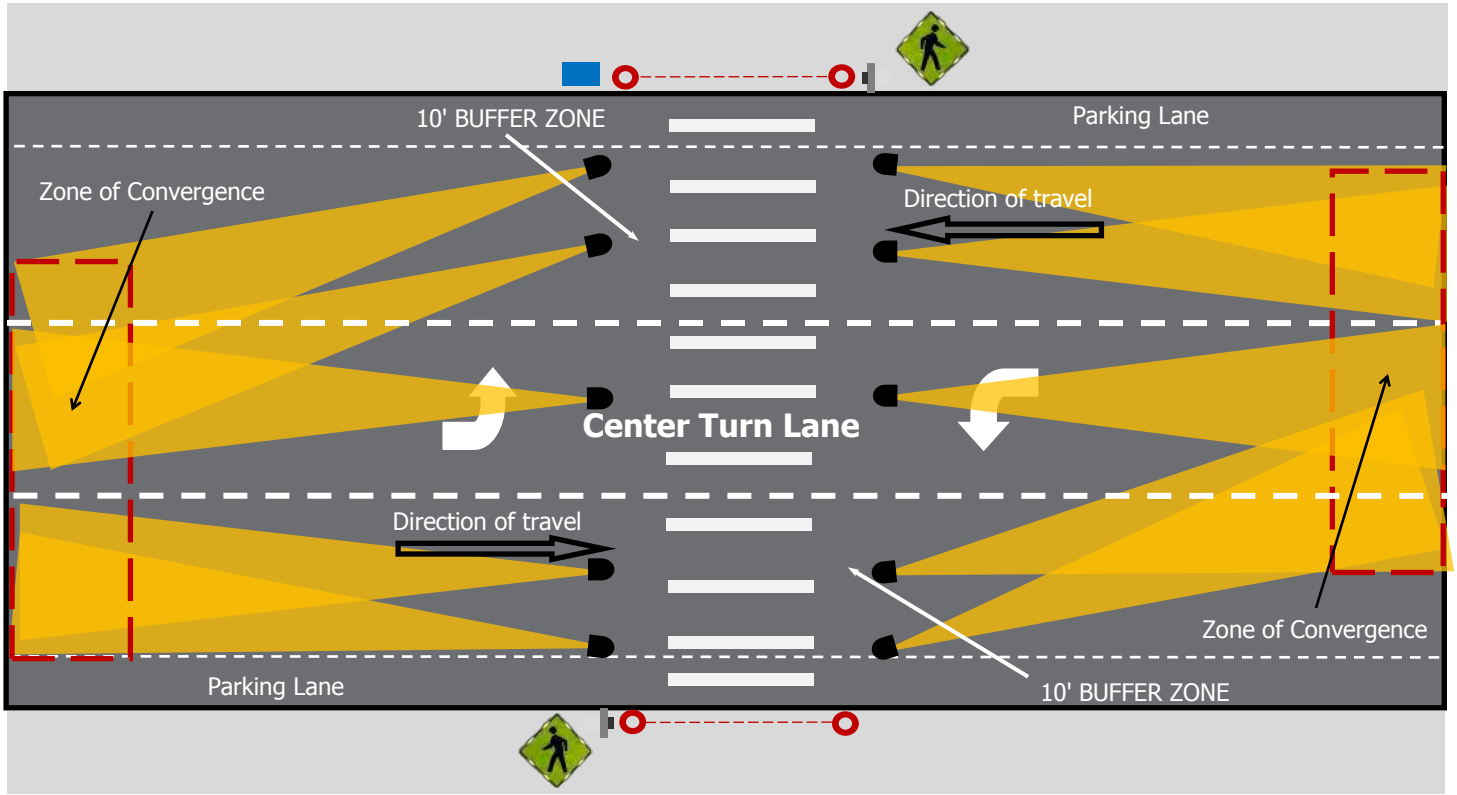
2-Lane Two-way w/Center Turn Lane
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

System Components Key

- In-Roadway Warning Light (IRWL) module housed inside a baseplate
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED enhanced border
- Automatic Activation Bollards
- Power Control Unit (PCU)
- Manual push button assembly
- The *Zone of Convergence*

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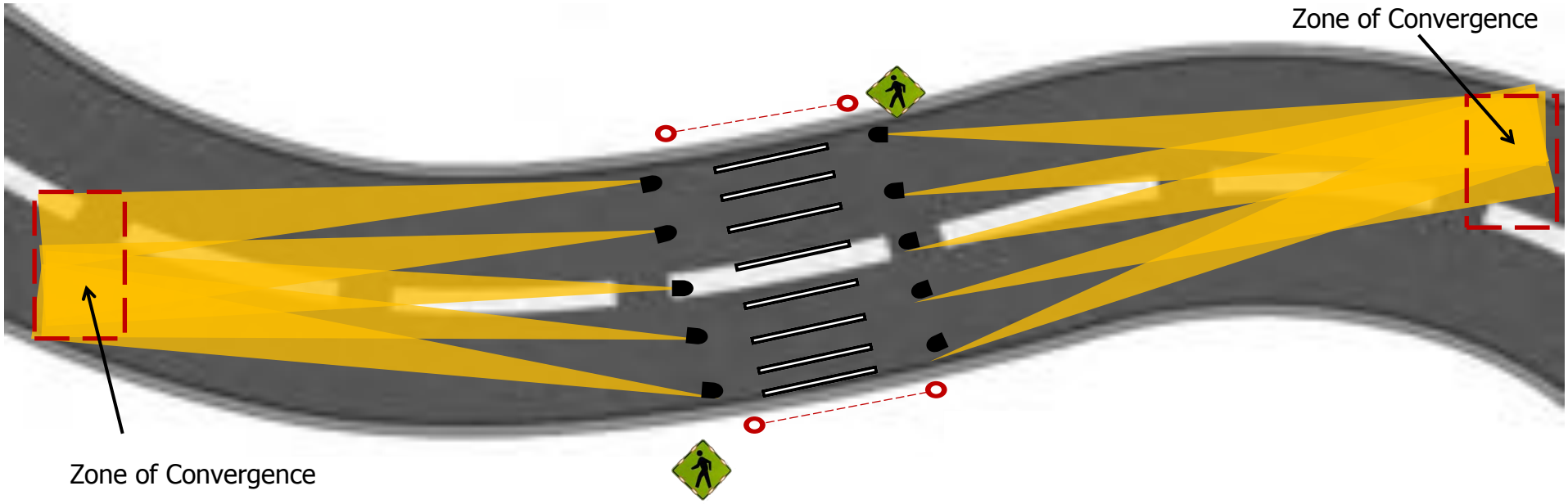
For Crosswalk Safety, "Trust the Guard™"

2-Lane Curved Road

In-Roadway Warning Light (IRWL) System



Determining the location of the "Zone of Convergence" on a curved roadway is similar to a straight roadway. Determine the total stopping distance based upon the speed limit of the roadway. The **minimum** starting point of the convergence zone is determined by the **minimum** stopping distance on dry pavement for the posted speed limit. This minimum stopping distance includes a motorist decision distance, based on a one-second reaction time, plus the necessary speed deceleration distance required to come to a complete stop under optimum conditions.

System Component Key

- In-Roadway Warning Light (IRWL) signal light module housed inside a baseplate
- Automatic Activation Bollards with infrared light beam
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED border enhanced flashing lights
- Power Control Unit (PCU) Solar or AC/DC

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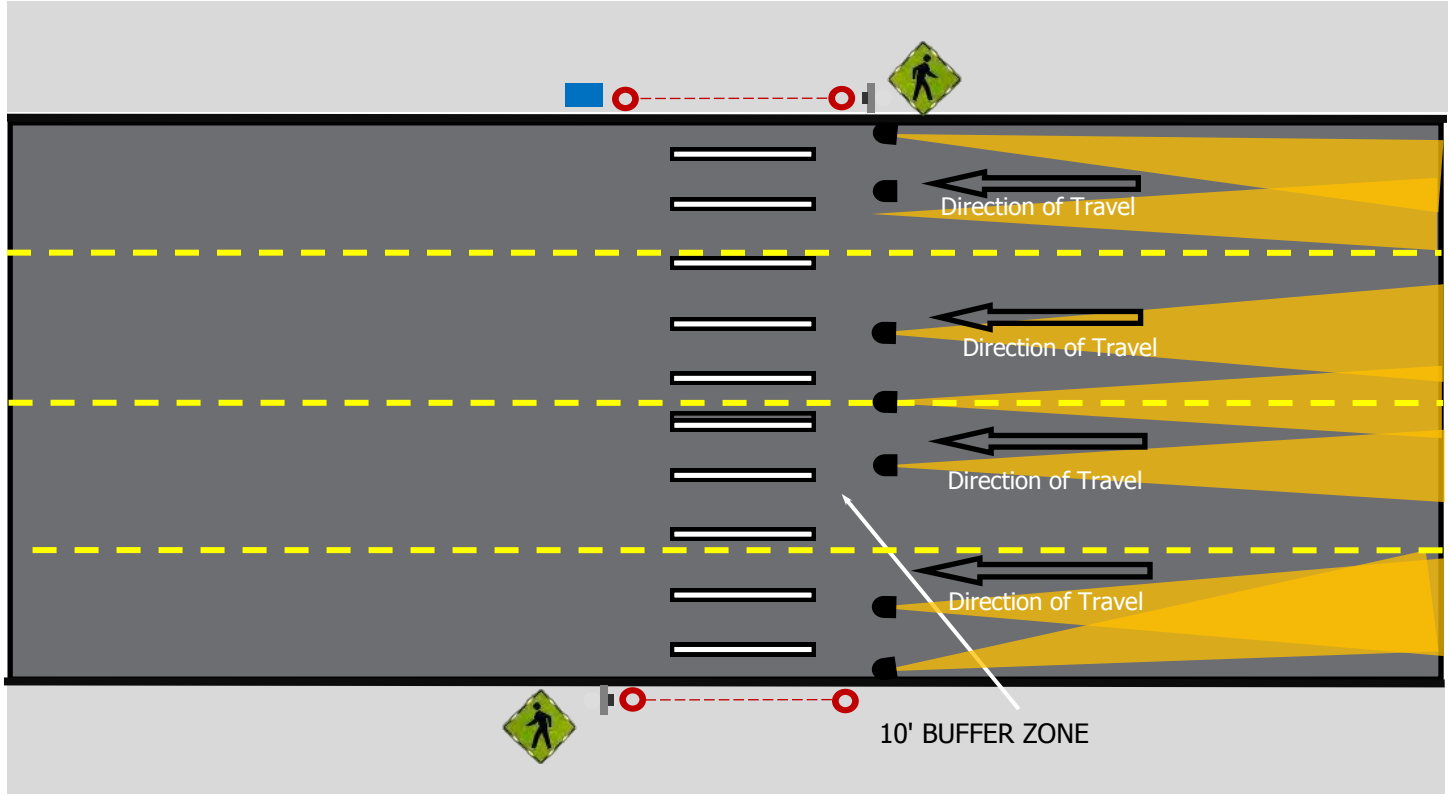
4-Lane One-Way
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

System Components Key

- In-Roadway Warning Light (IRWL) module housed inside a baseplate
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED enhanced border
- Automatic Activation Bollards
- Power Control Unit (PCU) Solar or AC/DC
- Manual push button assembly

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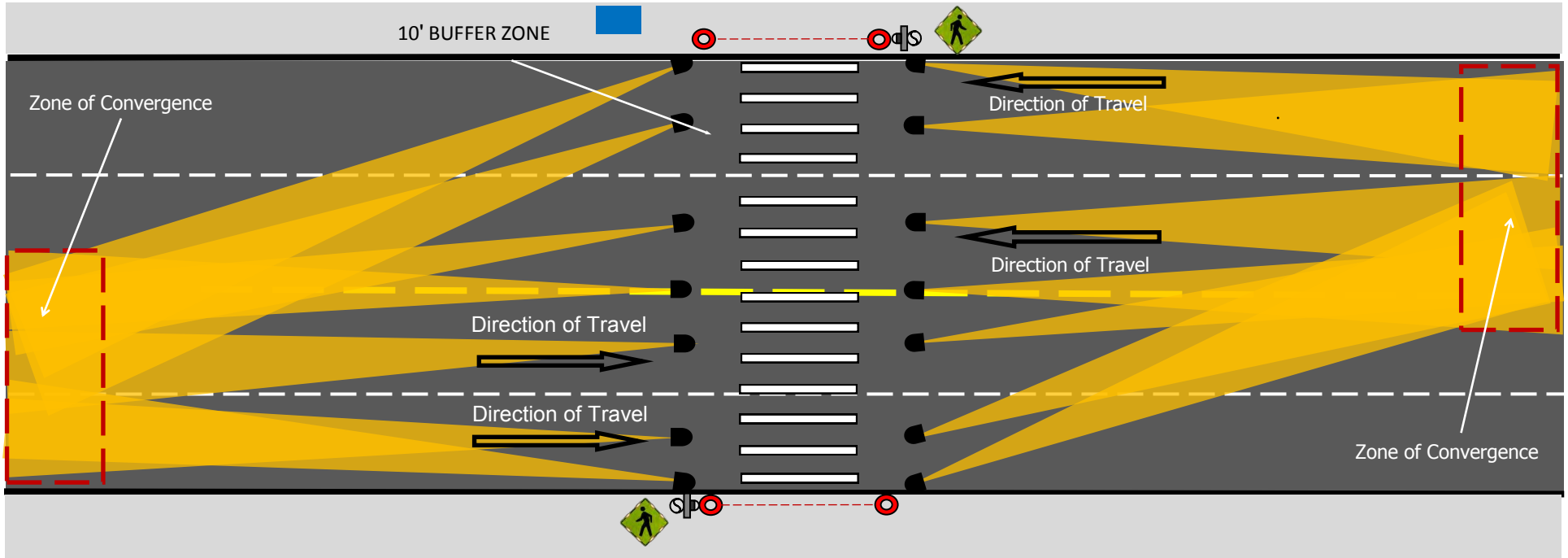
4-Lane Two-way
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL light modules have uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

System Component Key

- In-Roadway Warning Light (IRWL) housed inside a baseplate
- Automatic Activation Bollards with infrared light
- Manual push button assembly
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED border enhanced flashing lights
- Power Control Unit (PCU) Solar or AC/DC

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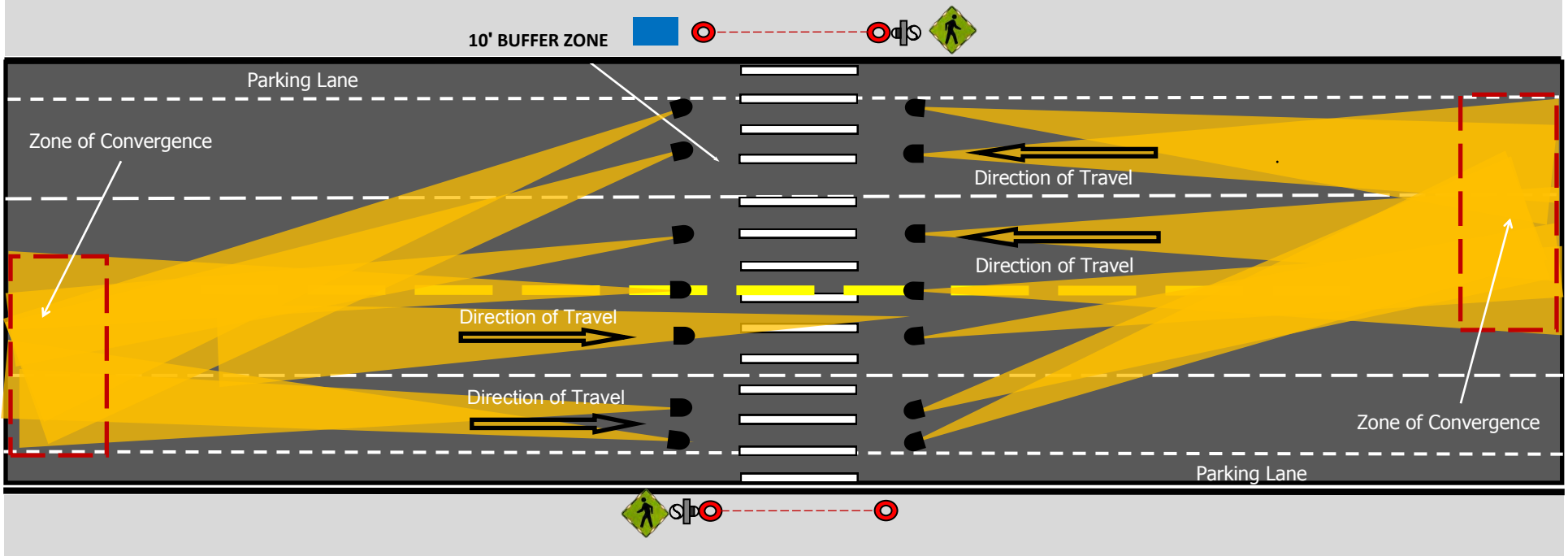
4-Lane Two-way w/Parking Lanes
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

SYSTEM COMPONENT KEY

- In-Roadway Warning Light (IRWL) signal light module housed inside a baseplate
- Automatic Activation Bollards with infrared light beam technology
- Manual Push Button Assembly
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED border enhanced flashing lights
- Power Control Unit (PCU) Solar or AC/DC

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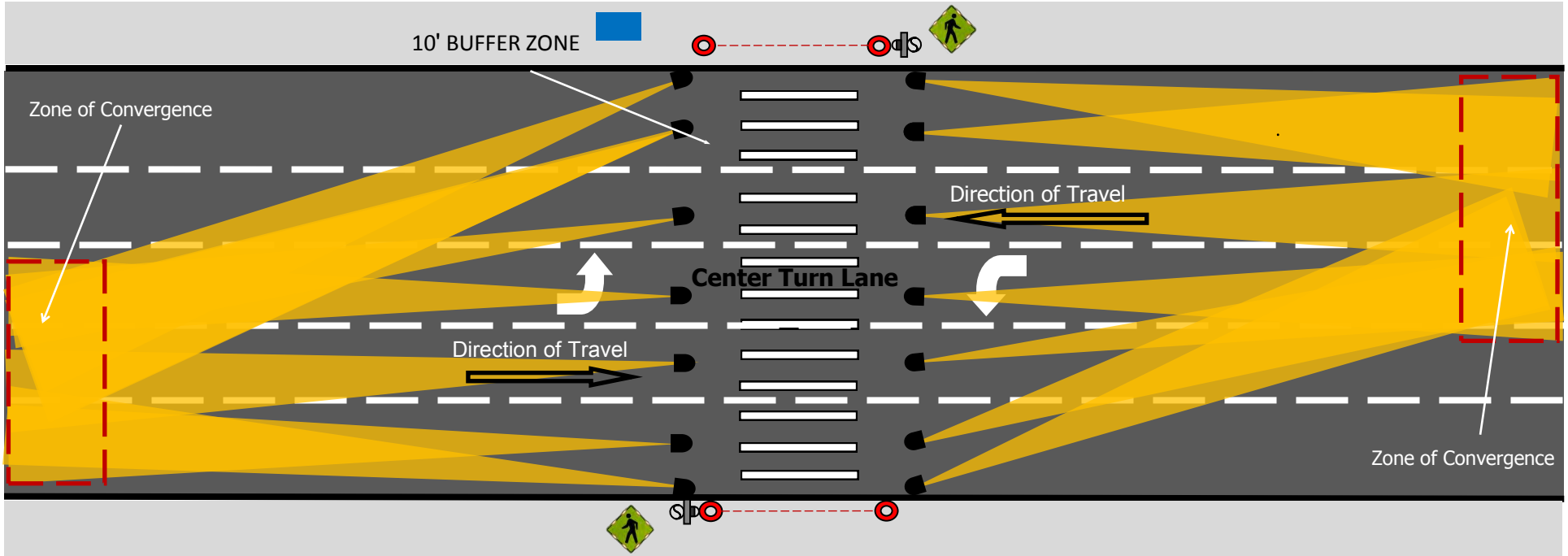
4-Lane Two-way w/Center Turn Lane
In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL light modules have uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away (MUTCD Section 4N.02.03D) from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

SYSTEM COMPONENT KEY

- In-Roadway Warning Light (IRWL) signal light module, housed inside a baseplate
- Automatic Activation Bollards with infrared light beam technology
- Manual push button assembly
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED border enhanced flashing lights
- Power Control Unit (PCU) Solar or AC/DC

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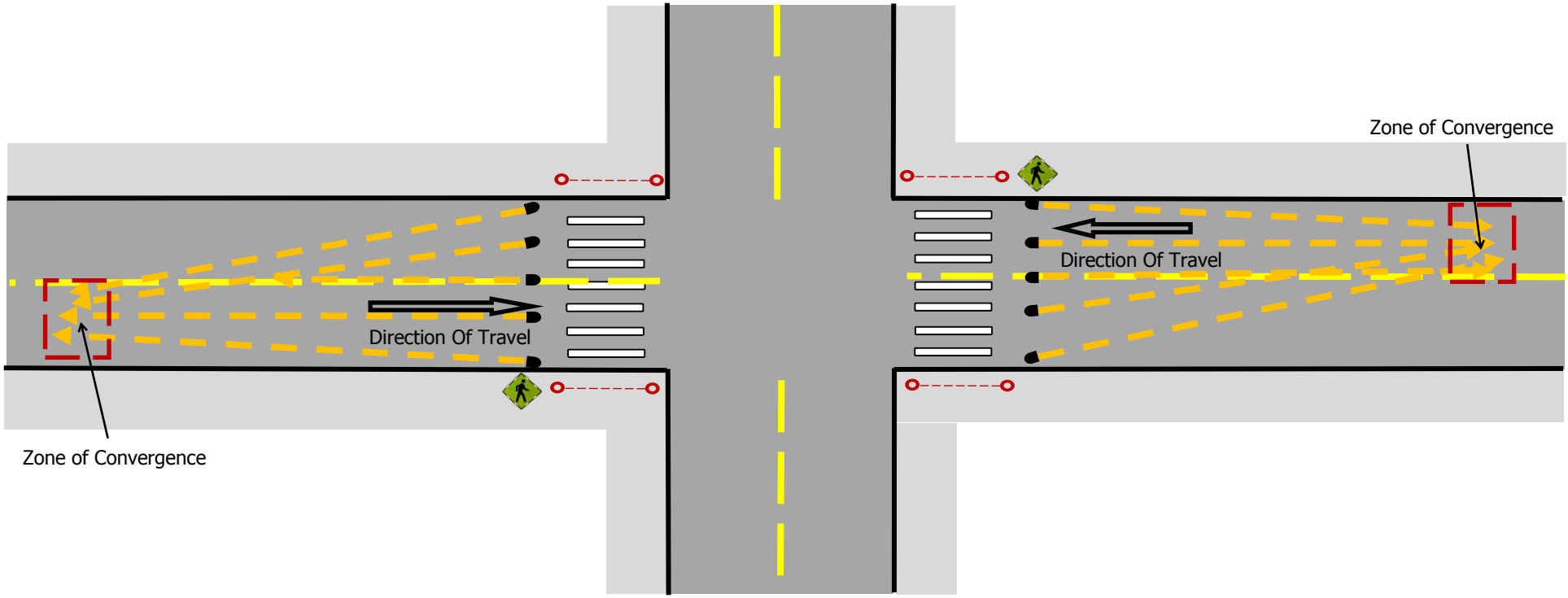
4-Lane Intersection Envelope

In-Roadway Warning Light (IRWL) System



The *Smart Crosswalk*™ IRWL has uni-directional light beams that are directed towards approaching drivers. The IRWLs are installed at a distance of 10' away from the crosswalk in a pattern designed to achieve optimal visibility of the flashing lights. When the approaching vehicle then enters the Zone of Convergence, the light beams merge at the eye level of the driver. They are flashing at the Enlighten1™ flash rate/pattern alerting the driver to pedestrians in the crosswalk.

System Component Key

- In-Roadway Warning Light (IRWL) signal light module housed inside a baseplate
- Automatic Activation Bollards with infrared light beam technology
- Manual push button assembly
- Pedestrian (W11-2) sign or School crossing sign (S1-1) with LED border enhanced flashing lights
- Power Control Unit (PCU) Solar or AC/DC May be installed at any corner

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