User Manual

Laser Signal Smart Crosswalk Warning

System ClairSaf-LS

V1.0

TraffiClair Technology Co., Ltd.

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1. Product Overview

1.1 Current Situation

Currently, many roads are designed to ensure the smooth flow of traffic, and as a result, traffic lights are either not installed or are unsuitable at some pedestrian crossings. At night, the number of vehicles and pedestrians decreases, leading to a significant increase in vehicle speed. Coupled with poor visibility at night and reduced alertness due to fatigue, pedestrians are at a higher risk of traffic accidents when crossing the zebra lines.

1.2 Solution

TraffiClair has launched an intelligent zebra crossing warning system solution to address nighttime traffic safety issues on pedestrian crossings without traffic lights. This solution is applicable to city arterial and secondary roads, roads with multiple lanes or safety islands in the middle, suburban roads, and intersections of national and provincial roads with side roads. It balances the traffic efficiency of motor vehicles and pedestrian safety in areas without traffic lights, helping to solve the "pain points" of urban road safety hazards and filling a gap in the market.

1.3 Function Introduction

The ClairSaf-LS laser signal smart crosswalk warning system is primarily used at pedestrian intersections where there are no traffic signals at night or when the traffic lights are flashing yellow. By installing intelligent laser warning devices at both ends of the crosswalk, when pedestrians are about to enter the crosswalk, the devices project 28 red laser lines onto the shins of the crossing pedestrians, forming a red area projection. This allows drivers to receive red warnings and detect pedestrian

movements from a distance, especially in situations with insufficient lighting, lack of concentration, or impaired visibility (such as oncoming headlights, rainy or foggy weather). Drivers can then react promptly. At the same time, the red light attracts the attention of pedestrians, alerting even those distracted by mobile devices to the safety of crossing, thereby reducing the occurrence of traffic accidents.

2. Effect Demonstration





3. Addressing Difficulties

- Reduce safety hazards at intersections without traffic lights at night, addressing the problem of insufficient distance for vehicles to yield to pedestrians at high speeds.
- Eliminate safety hazards at poorly lit intersections, addressing the difficulty of vehicle detection of pedestrians in low-visibility conditions due to bad weather.
- Alert pedestrians crossing the zebra lines, addressing the safety risks posed by "smartphone zombies.

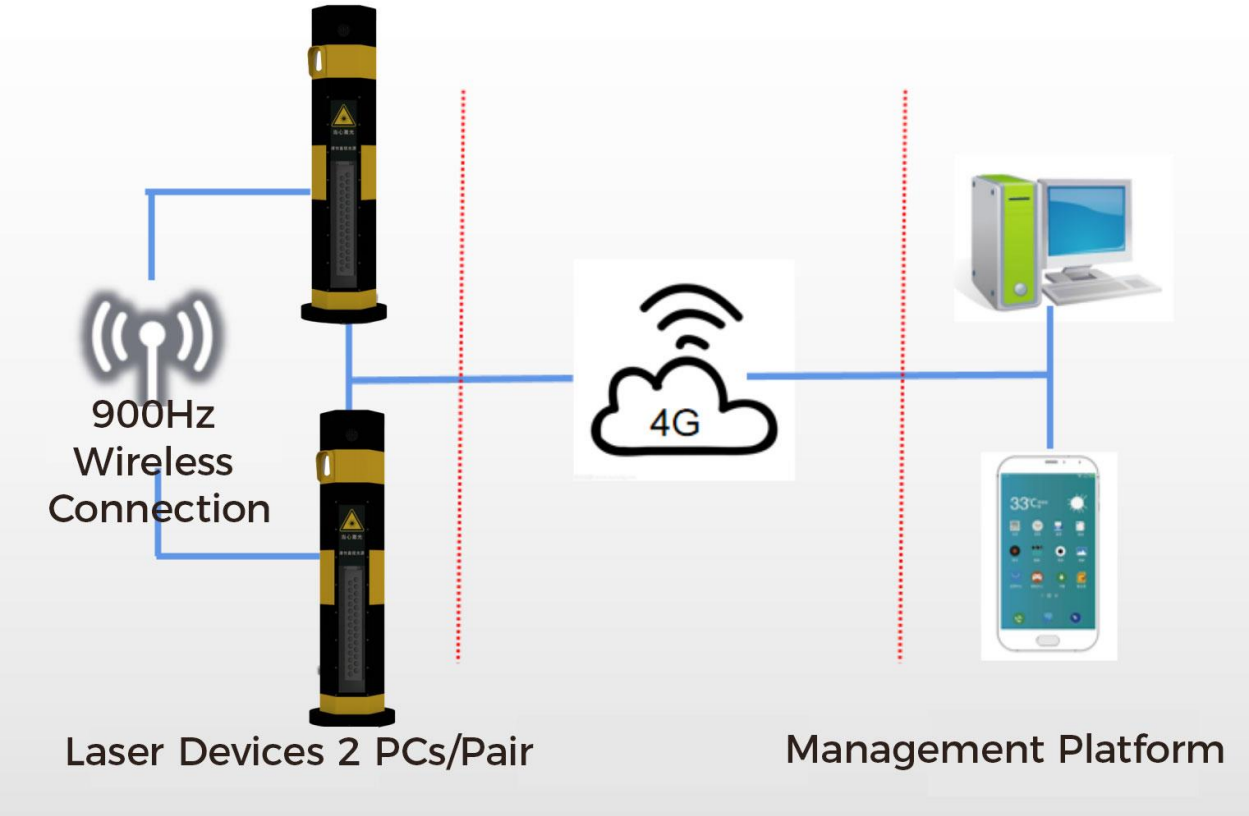
Application Scenarios	Solving Issues
Urban arterial roads (two to four lanes in each direction)	High pedestrian traffic, high demand for crosswalks, increased risk during nighttime due to fatigue and reduced alertness among drivers.
Roads with multiple lanes or safety islands in the middle	High vehicle speeds, inadequate distance for vehicles to yield to pedestrians, resulting in longer crossing times
Intersections between national or provincial highways and local roads	Poor lighting, driver visibility affected by oncoming vehicle high beams, and low pedestrian awareness.
Suburban roads	High vehicle speeds, moderate lighting conditions, pedestrians crossing the crosswalks unexpectedly.

The smart crosswalk warning system solution effectively alerts drivers and pedestrians under various weather, road, and lighting conditions, increasing the distance at which drivers can detect pedestrians by over 100 meters. Especially in situations where

drivers' visibility is hindered due to rain, snow, fog, or haze, the laser lines are particularly effective.

4. Front End Architecture

The overall solution includes front-end equipment (intelligent zebra crossing warning devices), 4G IoT, and a cloud control platform (or wired network).



Voice broadcasting
(Content and volume adjustable)

Laser sensor
(Detection range for pedestrians: 0-20m)



Close-range detection
(When detecting a human body within 30cm, the laser shuts off)

Built-in tilt protection
(Device automatically shuts off in case of accidental displacement or tilt)

Red laser group
(Laser light group composed of 28 red lasers at 635nm, projecting laser lines in a 90-degree fan shape, with a total height of 40cm)

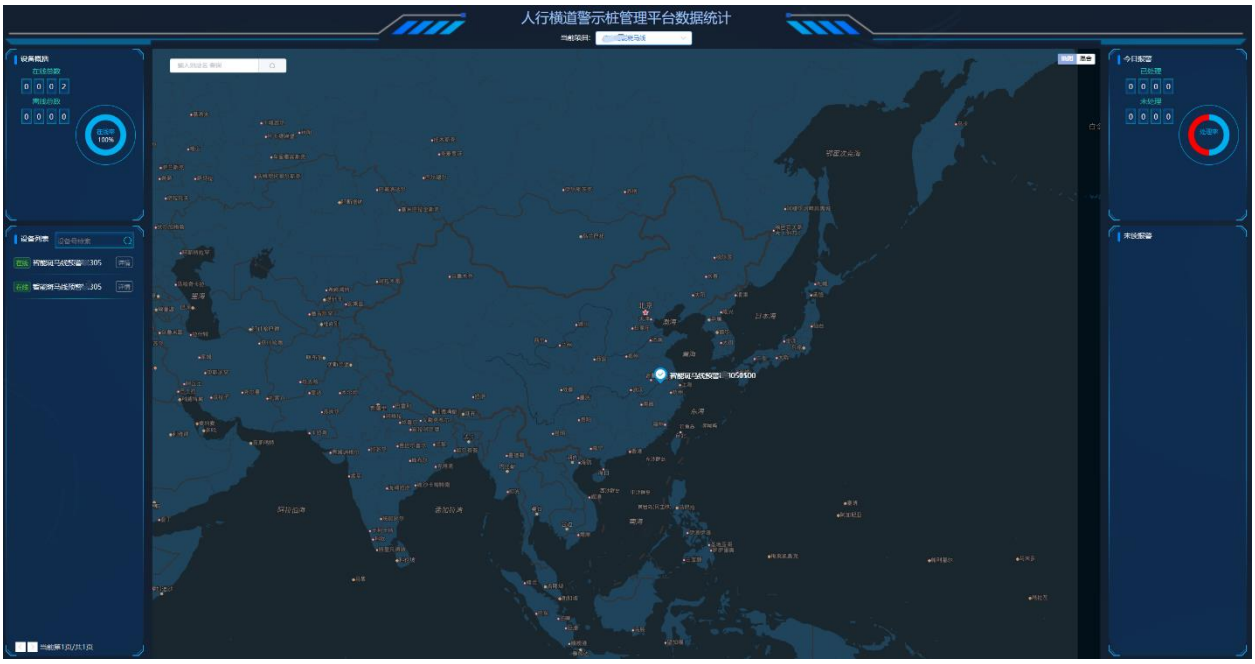
5. Specifications

Visible Laser	Projection sector angle greater than 90°. Shape: 28 linear light bands. Wavelength: 635 nm.
Detection Range	Laser sensor detection range: 20 meters.
Device Response Time	• Laser response time: within 0.2 seconds (from the moment a pedestrian enters the crosswalk to the laser projection time). • Device synchronization time: within 0.2 seconds (from the laser projection of one device to the laser projection of devices in the same group).
Operating Voltage	AC220V 50Hz (optional 12V solar power supply)
Laser Beam Operating Time	The laser beam operates for 0-60 seconds (adjustable) before stopping; during the startup period, if another person passes by, the illumination time is delayed, and after the last pedestrian passes the laser sensor, the device stops emitting light after 0-60 seconds (adjustable).
Voice Function	Adjustable voice operation time; customizable voice content.
Power Consumption	Maximum power: 25 W, Standby: 4 W.
Dimension	Diameter: 185mm; Height: 850mm
Wireless Communication	Supports 4G IoT module for remote upgrades; wireless monitoring, configuration, and switching.
Protection Class	IP67, triple waterproof power interface.
Surge Protection &	Common Mode 4KV

Lightning Protection	
Operating Temperature	-30℃ to +45℃
Protective Functions	● Overload, leakage, short-circuit protection module; equipped with lightning protection and grounding device. ● Close-range protection: Laser light turns off when a human body is detected within 30 centimeters. ● Tilt protection: Laser light turns off when the device tilts.
Extended Capabilities	● Display screen (After pedestrians enter the crosswalk, the display screen on the side facing approaching vehicles lights up, reminding drivers to slow down and yield to pedestrians crossing the road (editable text)). ● Linked with traffic lights signals. ● Solar powered. ● Wired network connection.

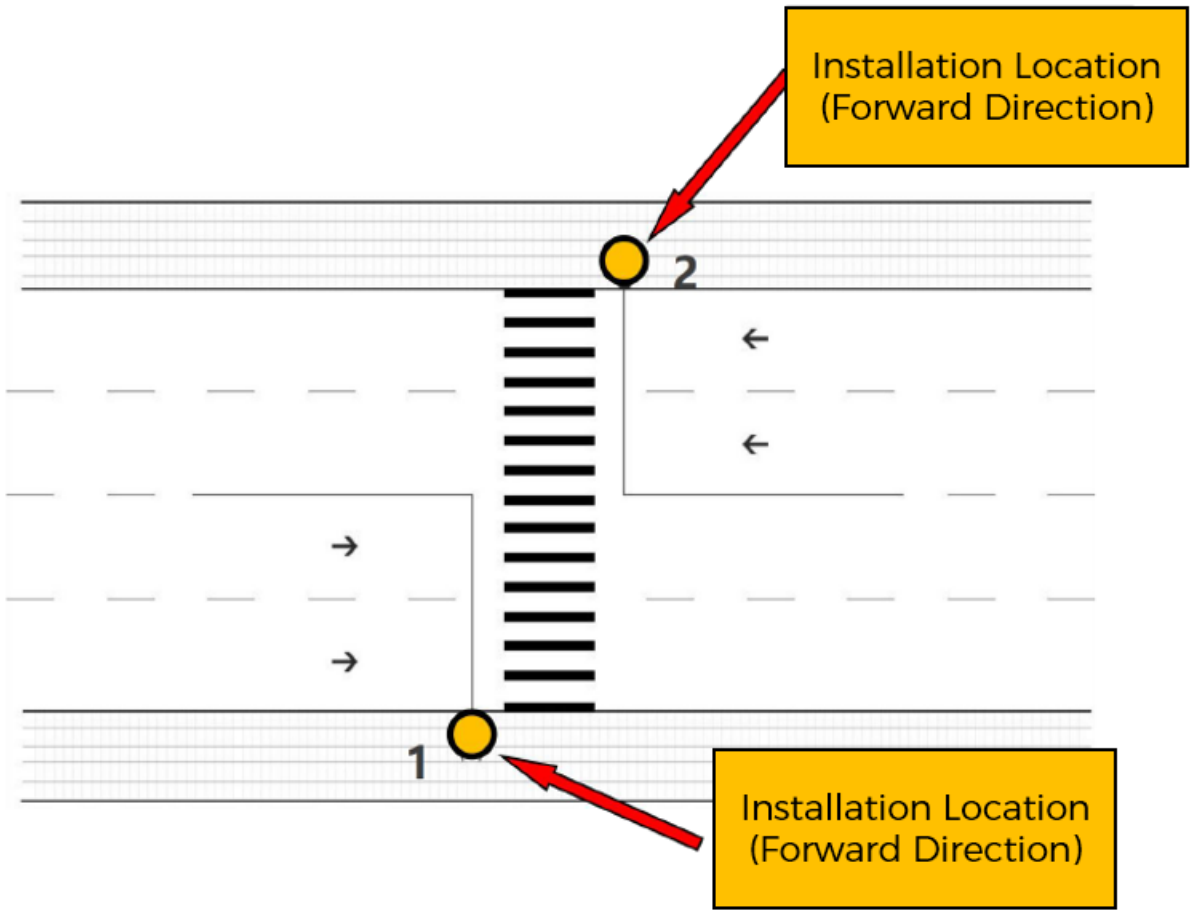
6. Management Platform

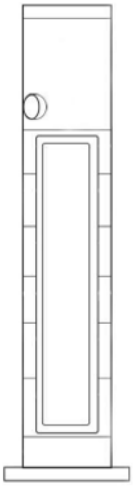
- Account management, administrator configuration, permission settings, add/delete devices.
- View front-end device locations, operational status, abnormal alerts, and operational data.
- Configure front-end device parameters: operation time, duration of laser light group illumination, brightness, etc.



7. Product Selection Guide

A. Two-way, 2 to 6 lanes, without a safety island.



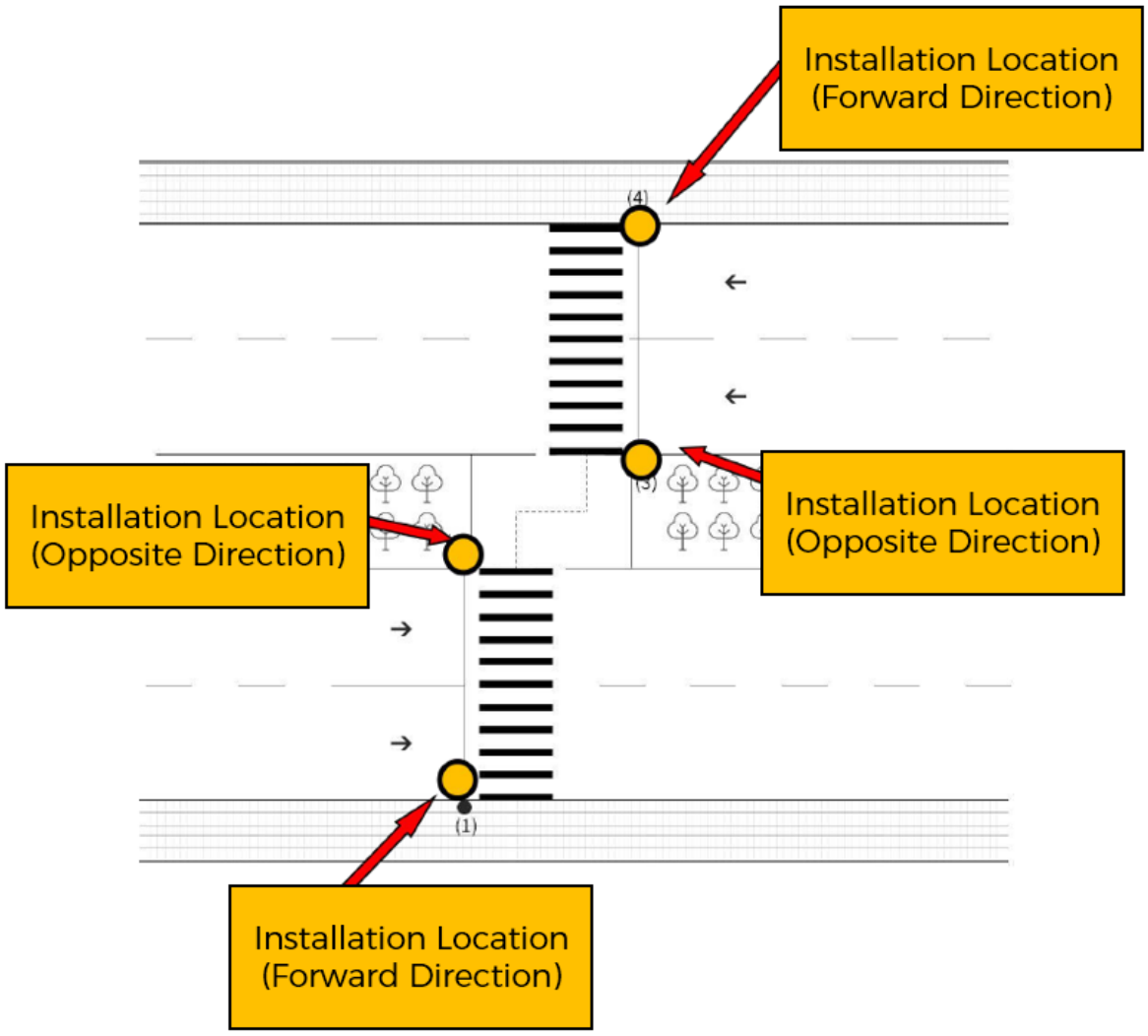


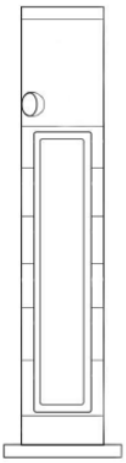
Forward Direction

Number of Devices: 1 pair

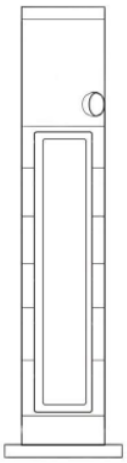
Installation Location: Adjacent to the roadside, aligned with the motor vehicle stop line, with the direction of the projected laser line in line with the driver's line of sight.

B. Two-way, 2 to 6 lanes with a safety island.





Forward Direction

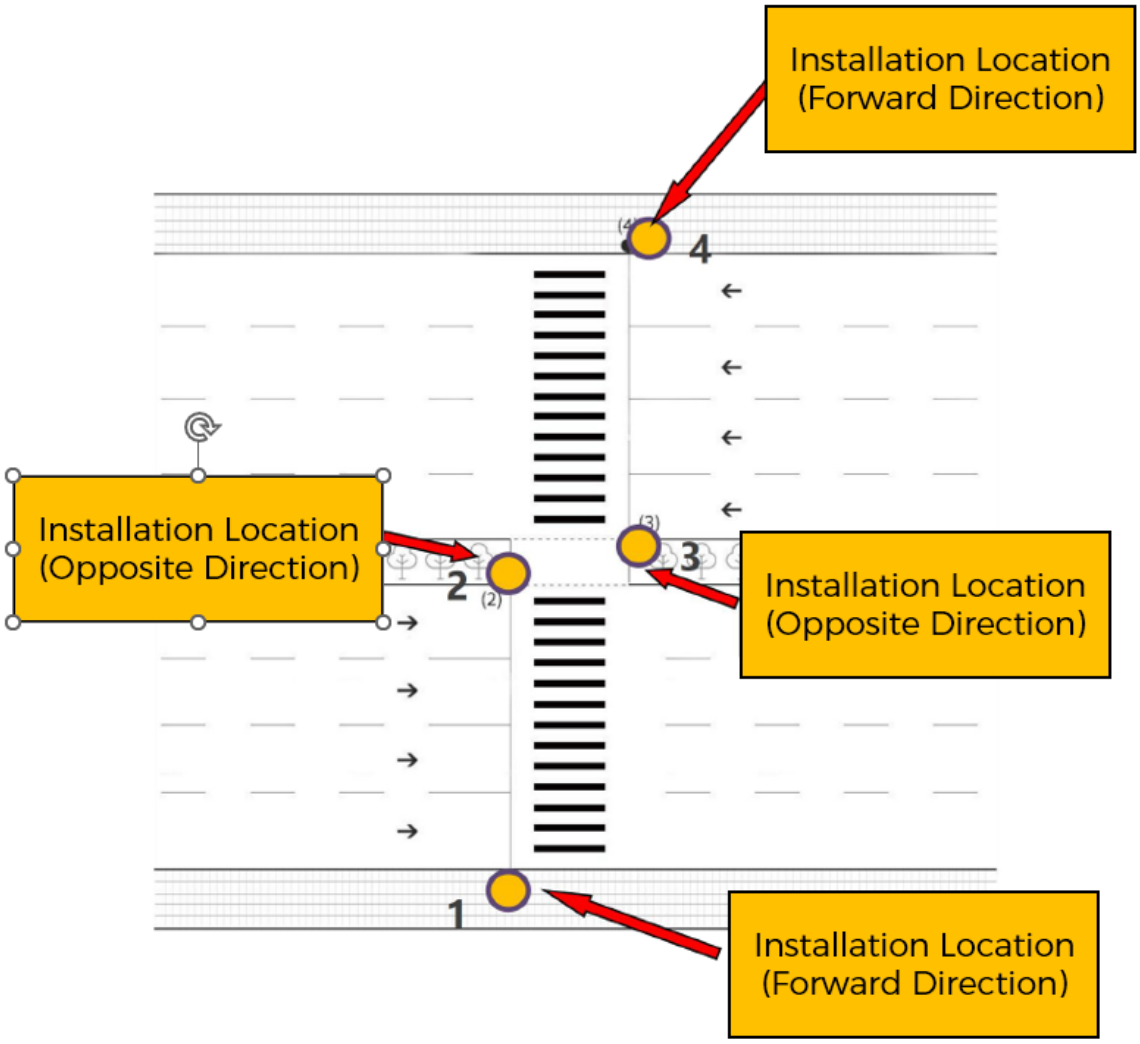


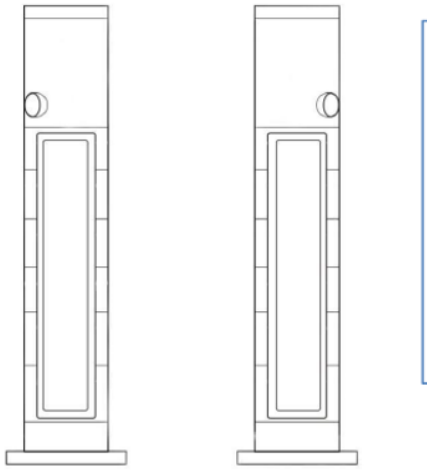
Opposite Direction

Number of Devices: 2 pair

Installation Location: Adjacent to the roadside, aligned with the motor vehicle stop line, with the direction of the laser projection in line with the driver's line of sight.

C. There are safety islands on roads with eight or more lanes in both directions.



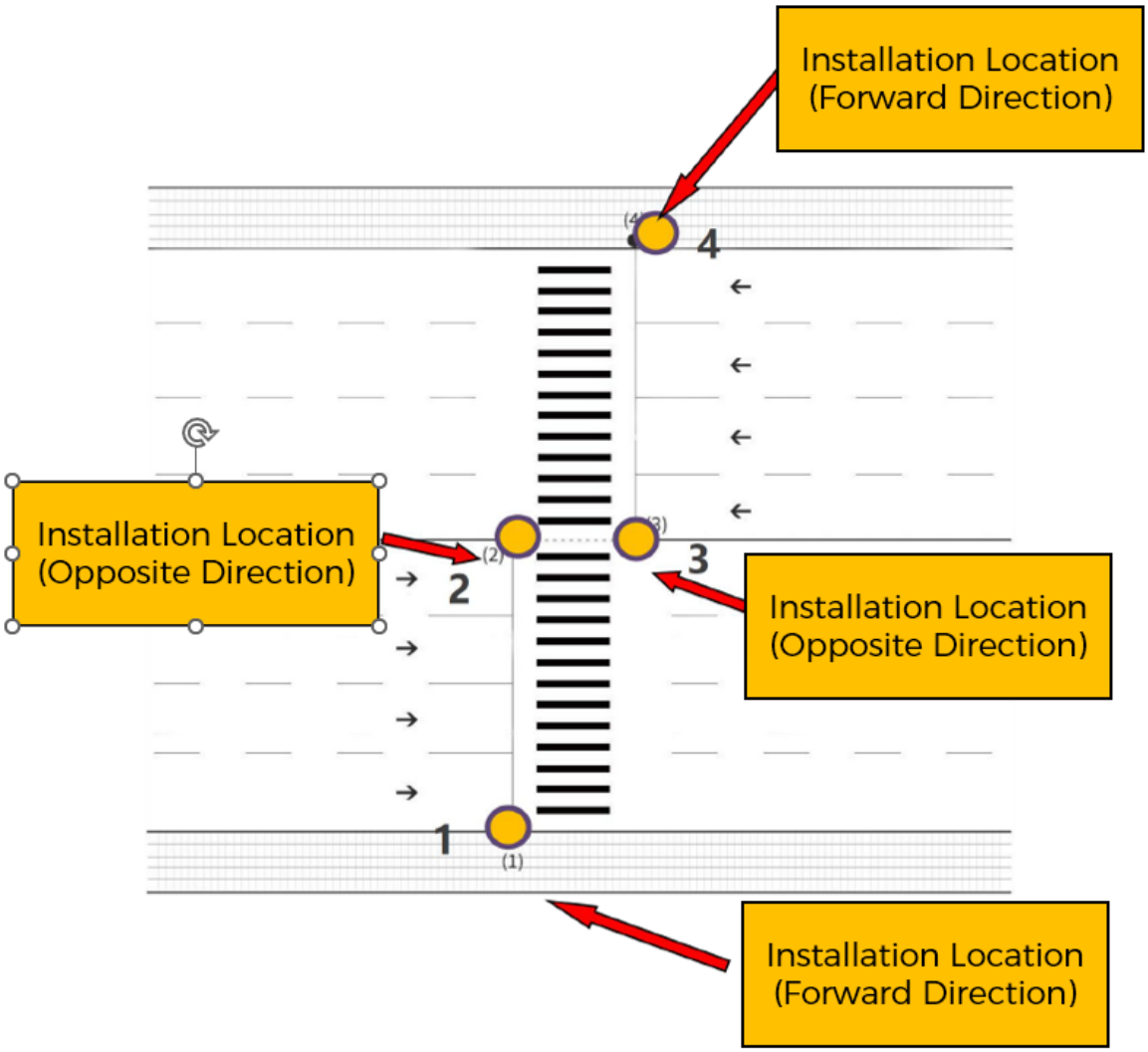


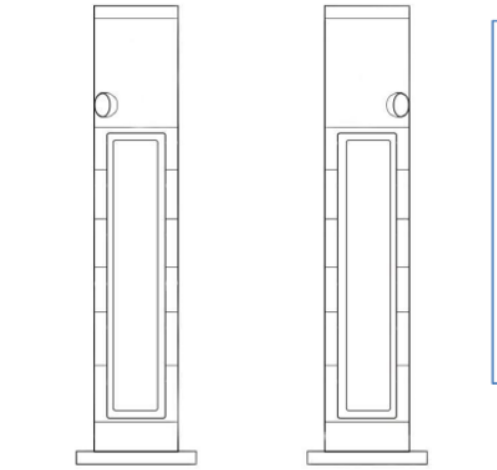
Forward Direction Opposite Direction

Number of Devices: 2 pair

Installation Location: Adjacent to the roadside, aligned with the motor vehicle stop line, with the direction of the laser projection in line with the driver's line of sight.

D. Eight lanes or more in both directions.





Number of Devices: 2 pair

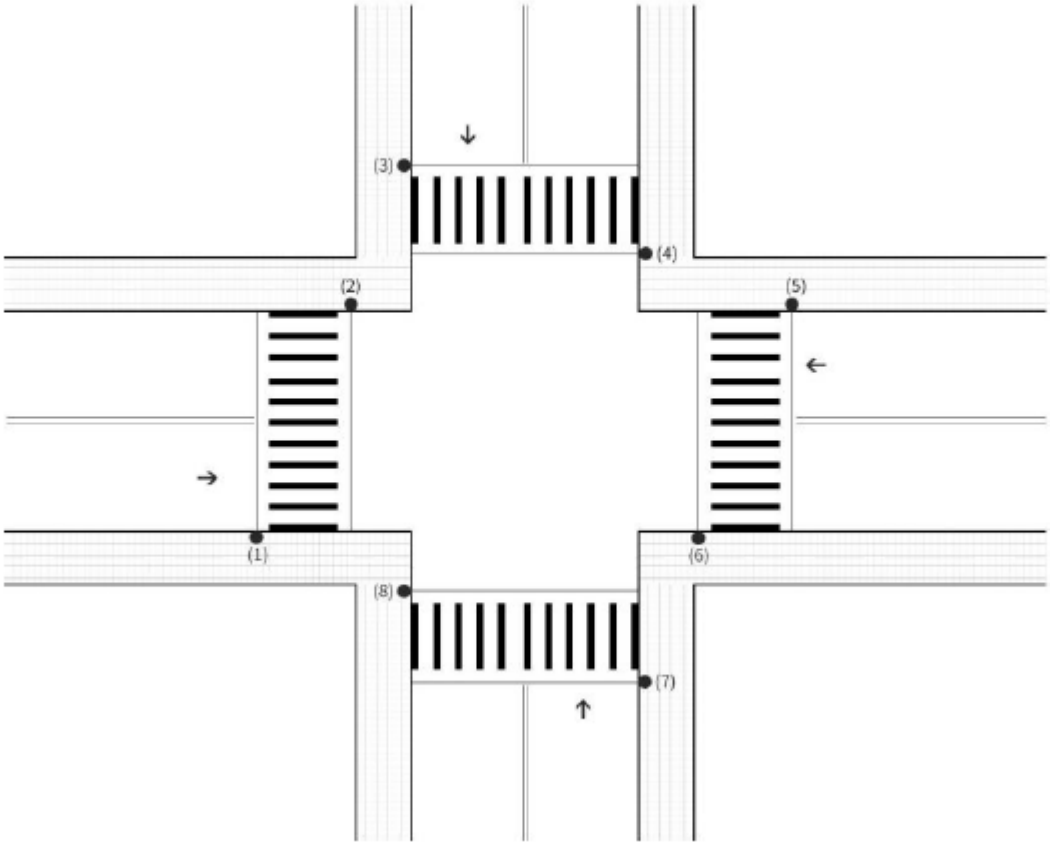
Installation Location: Adjacent to the roadside, aligned with the motor vehicle stop line, with the direction of the laser projection in line with the driver's line of sight.

E. Selection Example

(1) Crossroads (Intersections - Crossroads, T-intersections)

Analysis: There are no safety islands in the middle of each zebra crossing, and each direction has no more than 4 lanes.

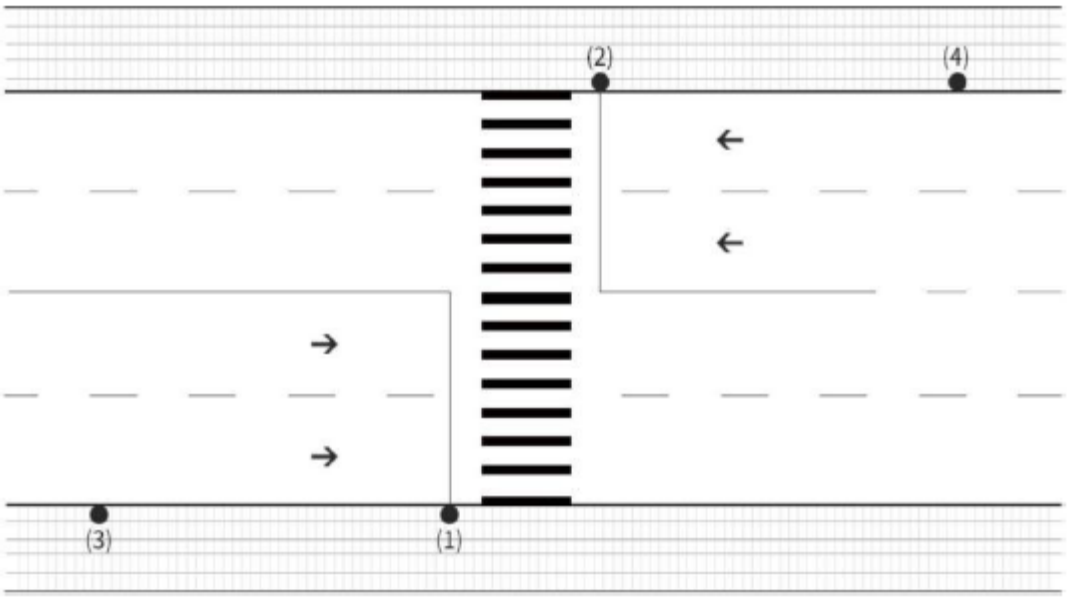
Selection: One pair of forward-facing devices is sufficient for each zebra crossing, totaling 4 pairs of warning system front-end devices required for the 4 zebra crossings.



(2) On High-Speed Roads (or roads with steep slopes or sharp curves where drivers cannot directly see the road ahead):

Analysis: Two-way road with four lanes and no safety island in the middle of the zebra crossing.

Selection: Use one pair of warning system front-end devices. Due to the high speed, install active illuminated signs (or LED display screens) ahead of the zebra crossing at positions 3 and 4 as shown in the diagram.

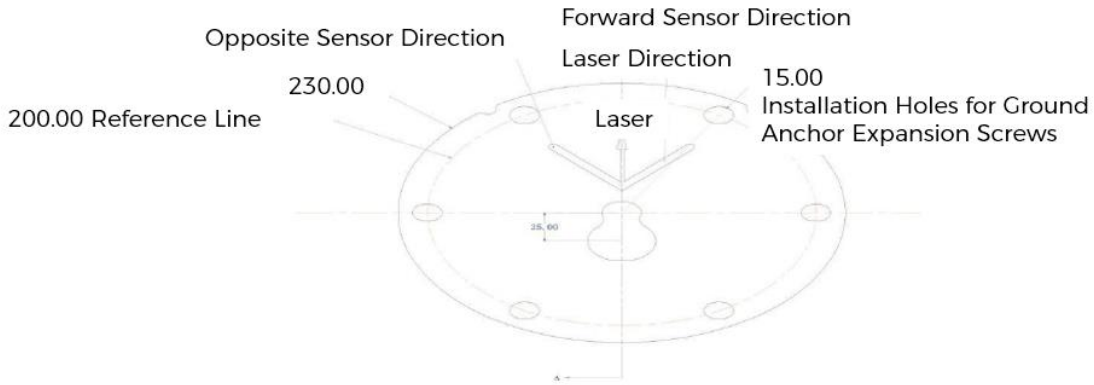

(2)
(4)
(3)
(1)

8. Front-End Post Installation Instructions

A. For Roads and Curbs with Good Hardening, Suitable for Expansion Fixation:

1) This product is installed at the edge of the pedestrian crossing that requires warning.

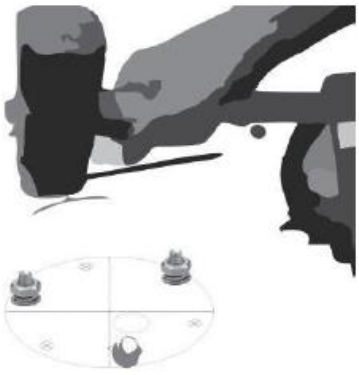
2) Install the product along the roadside aligned with the car stop line (to avoid obstruction by vehicles). Mark the determined location on the ground, and affix the drilling template.



3) Use an impact drill to drill holes according to the positions marked.

4) Install six M12 expansion bolts into the holes and remove the nuts.







5) Pass through the flange of the intelligent zebra crossing warning system and tighten the nuts, leaving some adjustment space for subsequent adjustments.



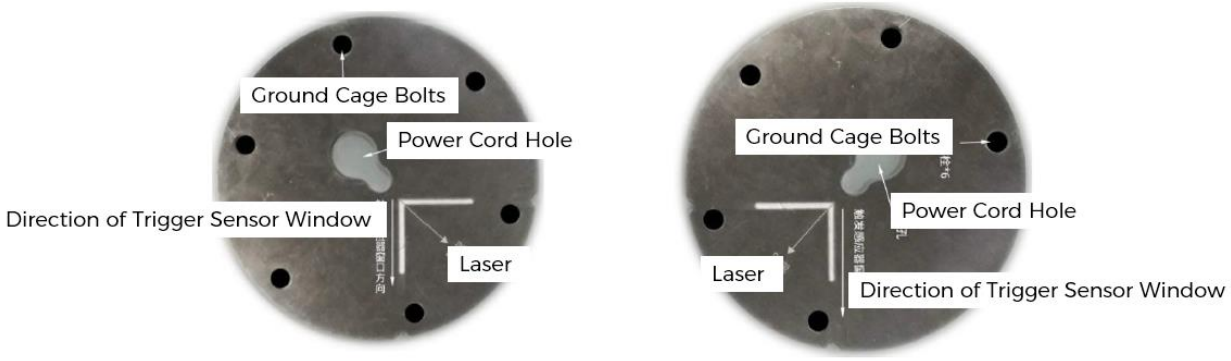
6) Ensure that the light emitted by the intelligent zebra crossing warning system is horizontally aligned with the pedestrian zebra crossing area.

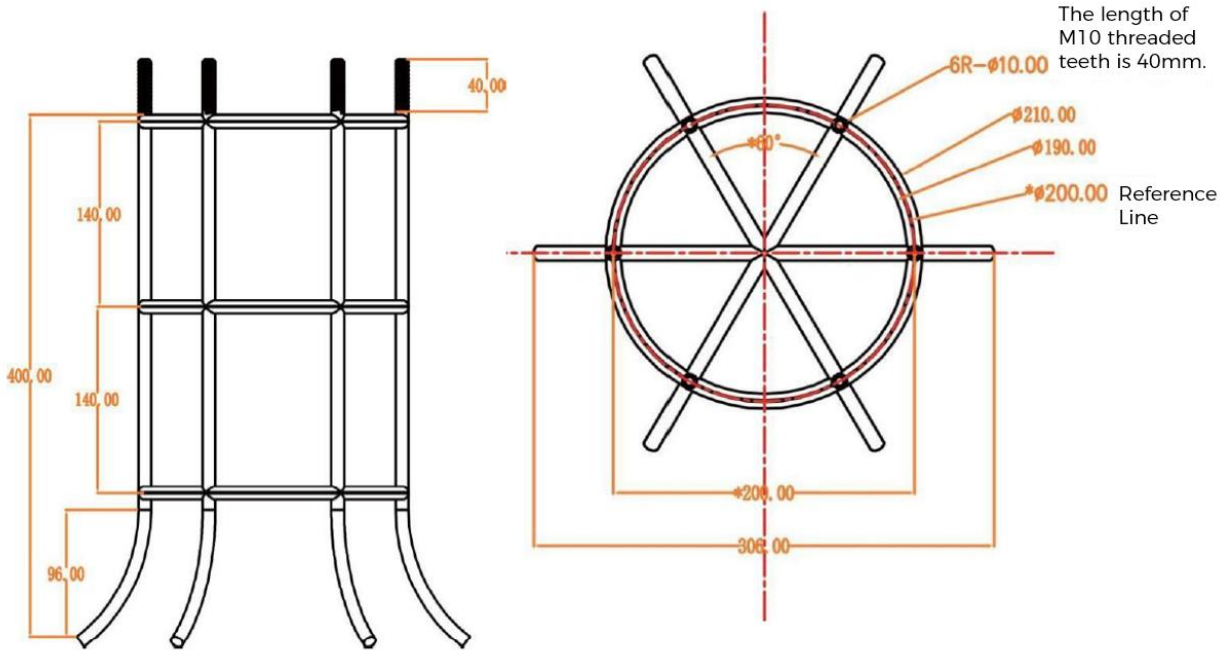
7) Tighten the screws to secure the system, then connect the power supply. Observe the position and status of the laser detector and the main and auxiliary laser beams.

B. Installation with Ground Anchors on Soft Ground

1) Dig a hole in the ground with a diameter of 0.4 meters and a depth of 0.4 meters, then place the ground anchor inside.

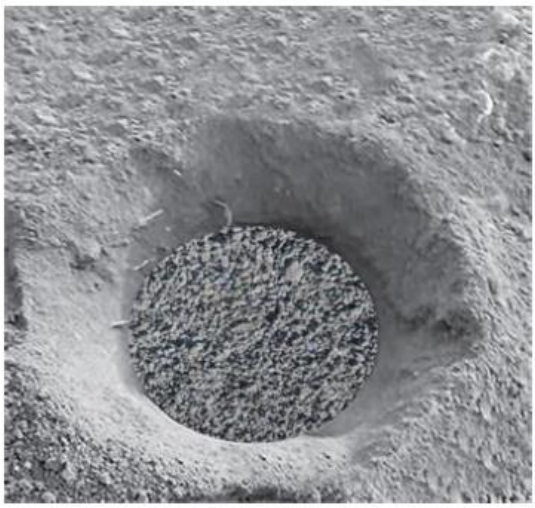
2) Install the base plate into the ground anchor. Rotate the ground anchor to the correct position according to the direction of the laser and trigger sensor windows on the base plate (pay attention to distinguish between forward and reverse directions).





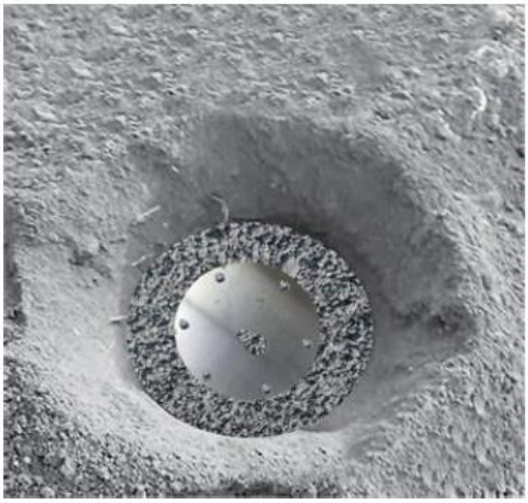
3) Remove the base plate, pull out the power cord conduit, pour in commercial concrete, and wait for it to solidify.





4) Install the base plate.





Installation Notes:

1. Install an independent power control switch and equip it with leakage and short-circuit protection devices.
2. A 0.5-meter long vertical grounding rod should be connected under the ground

cage.

3. When adjusting the angle, try to avoid working in environments with strong sunlight or heavy fog.
4. Keep the transparent cover clean to avoid affecting the normal operation of the transmitter.
5. Do not open the post privately, as there is a risk of electric shock!