

# PUBLIC LIGHTING DESIGN MANUAL

(Third Edition)

## Supplementary Notes No. 2

1. These supplementary notes supplement Section 8 of the Public Lighting Design Manual (PLDM) to introduce a new type of non-illuminated traffic bollard, namely omnidirectional non-illuminated retro-reflective traffic bollard.
2. The following paragraphs supersede Section 8.4 of the PLDM :

### **8.4 NON-ILLUMINATED RETRO-REFLECTIVE TRAFFIC BOLLARDS (NRTB) AND OMNIDIRECTIONAL NON-ILLUMINATED RETRO-REFLECTIVE TRAFFIC BOLLARDS (O-NRTB)**

*Traffic bollards have been applied at road junctions and refuge islands to provide a visual cue to approaching vehicles and assist drivers in steering to the correct traffic lane. Due to the nature and locations of the traffic bollards, conventional illuminated traffic bollards (ITBs), with internal light sources, are vulnerable to damage resulting in a high damage rate, high maintenance costs, and low service availability.*

*Non-illuminated retro-reflective traffic bollards (NRTBs), which are able to restore to their upright position after impacts, have been introduced to replace conventional ITBs at suitable locations. The conspicuity of NRTBs comes from the reflection of the light beams of vehicle headlights casting on the retro-reflective panels back to the drivers.*

*NRTBs rely on the light beams of vehicle headlights directly reflected from the sign face back to the driver and, therefore, there are limitations for the installation locations of NRTBs. NRTBs are applied only at locations where vehicle headlights can cast light on the retro-reflective conspicuity panels in a straight-ahead direction, i.e. at i) slip road junctions, ii) non-road junctions (with refuge islands), iii) the rear side of refuge islands at T-road junctions and iv) the rear side*

*of refuge islands at cross-road junctions. It is unsuitable for locations where the vehicle headlights cannot light the signage in a straight-ahead direction, e.g. when turning at a road junction.*

*To extend the application of NRTBs, a new type of NRTB, namely omnidirectional non-illuminated retro-reflective traffic bollards (O-NRTB), is introduced for the replacement of remaining ITBs located at the front side of refuge islands at T-road junctions and cross-road junctions.*

*O-NRTBs, with a hexagonal cross-section, in addition to the front and rear retro-reflective conspicuity panels, are further equipped with 4 retro-reflective conspicuity side panels (i.e. 2 pairs of convex V-shape side panels). The omnidirectional retro-reflective conspicuity panels, composing both front/rear and side panels, reflect light beams of vehicle headlights to the driver when an approaching vehicle makes a turn, allowing visibility of the O-NRTB at all angles.*

*The sign face of O-NRTB shall be directed to the oncoming traffic and its body shall be securely attached to a flexible support post. It shall be conspicuously visible to motorists and other road users at all times. The body shall be made of flexible plastic material and formed with six-sided retro-reflective strips in order for the sign face and conspicuity panels to be visible at all angles.*

#### **8.4.1 DESIGN STANDARDS OF NRTB AND O-NRTB**

*The design, dimensions, and physical performance of the bollard body and conspicuity panels of NRTB and O-NRTB shall meet the requirements set in BS 8442 for reflective self-righting bollards.*

*The retro-reflective material used in conspicuity panels of NRTB and O-NRTB shall be of high-intensity micro-prismatic type and comply with relevant European Technical Approval guidelines. It shall also comply with BS EN 12899-1 and in the performance class of R3B-UK or above. For the minimum coefficient of retro-reflection, the values for fluorescent yellow are the same as those given for yellow, unless specified in relevant standards or European Technical Approval guidelines.*

*NRTB and O-NRTB shall be tested in accordance with BS EN 12767 to demonstrate that they are able to restore to their upright position after impacts from any direction. They shall comply with the requirements for testing of vehicle*

*impacts with the permanent road equipment support structures, and be classified under performance type (100-NE-A-R-NS-MD-0 and 70-NE-A-R-NS-MD-0 for NRTB and O-NRTB respectively) as described in BS EN 12767.*

*The area of the circle on the retro-reflective sign shall be of about 700cm<sup>2</sup> with a diameter of about 30cm. The requirements of signages on NRTB and O-NRTB shall refer to the latest edition of the Transport Department's Working Drawings and the Transport Planning and Design Manual.*

#### **8.4.2 INSTALLATION**

*NRTB and O-NRTB shall be suitable for installation on the existing pre-casted concrete plinths without any modification work being necessary on the plinths. They are installed using an anchor kit or concrete-in base or equivalent. The recommended mounting method by the manufacturers shall be referred to and submitted to the Engineer for approval.*

*Where an NRTB or an O-NRTB is installed to replace an ITB, the abandoned underground cables for the original ITB shall be removed as directed by the Engineer.*

3. The following paragraphs supersede Section 8.5 of the PLDM :

#### **8.5 APPLICATION LOCATIONS FOR INSTALLATION OF ITB, NRTB AND O-NRTB**

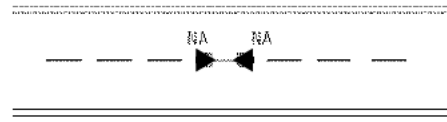
*NRTBs rely on the light beams of vehicle headlights directly reflected from the sign face back to the driver; they should only be installed at locations where vehicle headlights can cast lights on the retro-reflective conspicuity panels in straight-ahead locations, i.e. "SA", "NA", "TA", and "CA" as shown in Figure 2 below.*

*O-NRTBs are visible at all angles and, therefore, are installed at the front side of refuge islands at t-road junctions and cross-road junctions, i.e. "TB" and "CB" to replace illuminated traffic bollards (ITBs).*

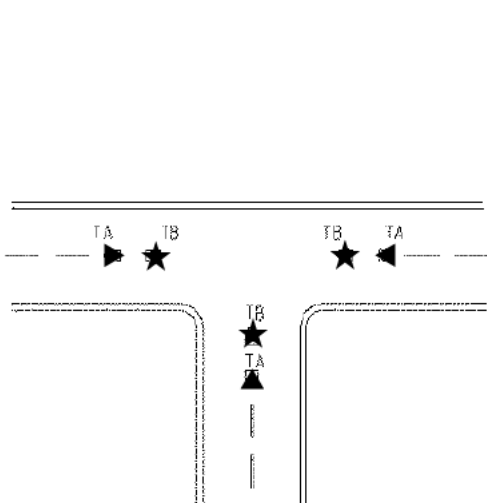
*The proposal of locations for installation, body colour, and color of retroreflective sheets for NRTBs and O-NRTBs shall be submitted to the Engineer for approval.*



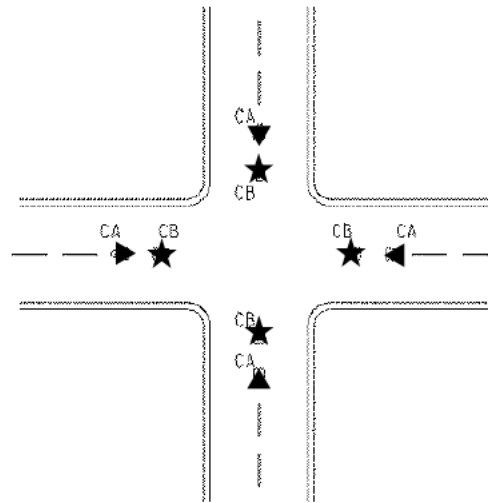
SLIP ROAD JUNCTION  
(FOR UNI-DIRECTIONAL TRAFFIC  
WITH DIVERGING LANES)



NON-JUNCTION  
(WITH REFUGE ISLANDS)



T-ROAD JUNCTION



CROSS-ROAD JUNCTION

LEGEND

- ★ ITB / O-NRTB
- ▲ NRTB

Figure 2 : Recommended Installation Locations of ITBs, NRTBs and O-NRTBs