Optimization of Anti-Glare Block Spacing in Expressways

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Abstract

Glare occurs when visual field brightness is greater than the luminance, to which eyes are adapted during driving. Glare can be occurred due to the approaching head lamps at night time / low light conditions. Visibility is required for a safe driving and any obstruction to the driver's vision can affect the driving, resulting a threat to the roadway safety. Glare is a significant factor causing vision obstructions. Hence, driving at night can be more hazardous and difficult compared to the day time as the headlight glare reduces the visibility of vehicles while causing fatigue to the driver.

Effective reduction of glare by utilizing anti-glare blocks will be helpful to address this issue. Considering the movement of high speed vehicles in the expressways (Design speed of Sri Lankan expressways =100kmph) and other design parameters, the provision of anti-glare blocks can be justified as a solution for the reduction of glare. However, anti-glare blocks do not work well in rolling alignments with vertical curvatures. Furthermore, anti-glare blocks can restrict the vision of opposing carriageways while affecting the surveillance and the safe utilization of emergency crossing points.

According to the recommended technical standards, the initial selection of the suitable type of anti-glare blocks are done considering the light screening/cut-off angle (α), the width of the blocks, the spacing of the blocks, and the height of the blocks. As per the British standards (BS EN12676-1:20000), the recommended range of the cut-off angle (α) for straight sections is $\tan \alpha \geq 0.33$. For curved sections, the degree of curvature at the center of the curve should be added to the above value. Recommended width of the blocks ranges from 200 mm – 300 mm. Cost of installation and aesthetically pleasing appearance should also be considered during the selection of the width of the blocks as they are installed on the top of NJBs, on the sides of half NJBs, on the guard rails, and on narrow center medians. British standards recommend (BS EN12676-1:20000) the non-glare height for straight sections to be 1.80 m above the finished surface of the road. Height of the anti-glare blocks depends on many factors like number of lanes, median width, head light distance for maximum glare, and height of driver's eyes. Apart from the design parameters, other factors contributing for the selection of anti-glare blocks are; cost of installation, method of installation, minimum cleaning

requirements, aesthetically pleasing appearance, and reduced weight (At an event of impact, the debris is light and non-metallic).

Since the country does not have a proper guideline for the selection of the optimum spacing for anti-glare blocks, it is complicated to conduct a selection process for the Sri Lankan context. Optimum spacing is not site specific and a general spacing value for expressways may not be economical as well. A model to determine the optimum spacing of anti-glare blocks was proposed by this study and it will ensure the safety and comfort of the roadway users.

Keywords: Anti-glare block spacing, Light screening/Cut – off angle (α), Optimization of block spacing, Cost optimization

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