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Structural Analysis of Hole-Type Plate for Weight Lightening of Road Sign

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Abstract : Road sign sizes are related to their support and foundation, and the large-scale support that is generally installed at roadsides can cause inconvenience to pedestrians and damage the urban landscape. The most influential factor in determining the support and foundation of road signs is the wind load. In this study, we introduce a hole-type road sign to analyze its effects on reducing wind load. A hole-type road sign reduces the drag coefficient that is applied when considering the air and fluid resistance of a plate when the wind pressure is calculated, thus serving as an effective option for lightening the weights of road sign structures. A hole-type road sign is punctured with a perforator. Furthermore, the size of the holes and their distance is determined considering the damage to characters, the poor performance of reflective sheets, and legibility. For the calculation of the optimal specification of a hole-type road sign, we undertook a theoretical examination for reducing the wind loads on hole-type road signs, and analyzed the bending and reflectivity of sample road sign plates. The analytic results confirmed that a hole-type road sign sample that contains holes of 6 mm in diameter with a distance of 18 mm between the holes shows reflectivity closest to that of existing road signs; moreover, the average bending moment resulted in a reduction of 4.24%, and the support's diameter is reduced by 40.2%.

Keywords : hole type, road sign, weight lightening, wind load
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