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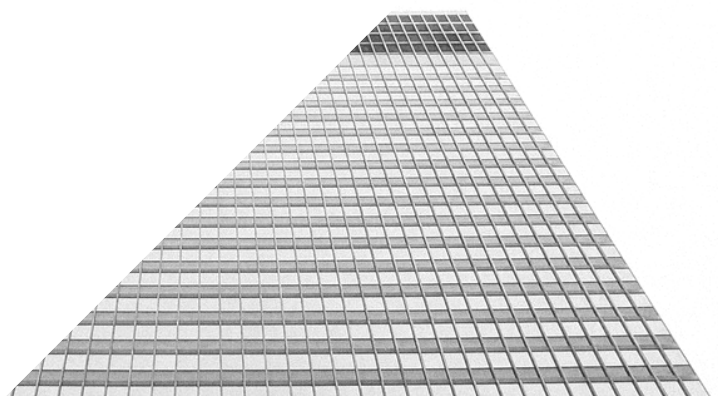

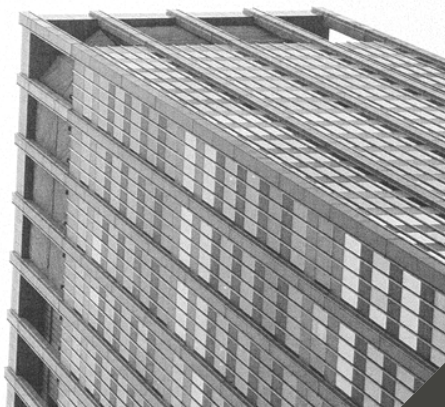

Performance Evaluation of Night Time Visibility (Retroreflection) & Skid Resistance of Road Pavement Markings with Ceramic Beads

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Abstract

Pavement markings play an important role to improve road safety and better road network to meet the social aspiration of the people by providing visual guidance to motorists. In order to function properly, pavement markings must be visible under all weather conditions & to any ages of drivers. In general, most pavement markings provide satisfactory performance under dry conditions. However, under wet night conditions, the visibility of these materials degrade significantly as the marking surface covered with water, leading to partial or complete disappearance of the marking.

Currently in Sri Lanka use thermoplastic paint for road marking with intermix of glass beads in order to give the retroreflection for night time visibility. However wet night visibility of these materials are not in satisfactory level due to these glass beads have a refractive index ranging from 1.5 to 1.9. A higher refractive index is needed to be able to reflect in wet weather conditions (Paul J. Carlson, 2007).

Therefore, this study was focused to evaluate the performance of thermoplastic road marking paints applied with ceramic beads which has refractive index over 2.4 and evaluate the improvement of visibility (especially night time retroreflectivity under wet condition) & skid resistance values.

At the initial stage, retro reflectivity (dry & wet) was measured for newly applied road marking on several locations to get the idea about current values and it has been seen lower values in wet conditions.

Thereafter laboratory investigations were carried out to evaluate the variation of retroreflection values & skid resistance by varying the amount of glass beads & ceramic beads, 250 g/cm^2 to 400 g/cm^2. It could be seen that retroreflection can be improved up to certain level and increasing glass beads beyond this will result to reduce the skid resistance value.

Subsequently a field trail was done with ceramic beads to study the improvement in visibility. In this study road marking was applied on Kotte-Bope Road (B240) over the pedestrian

crossing and night time visibility in dry & wet conditions and skid resistance were evaluated over 9 months.

High values (622 $mcd.m^{-2}.lx^{-1}$ - dry & 420 $mcd.m^{-2}.lx^{-1}$ – wet) of initial retroreflectivity & (85) skid resistance were obtained from the section which was applied with ceramic beads. However discoloring was observed in this section compared to the conventional glass bead section.

Further performance evaluation is needed to be carried out especially for the expressways which have issues of visibility during raining period with high speed & safety. The edge line of expressways are proposed to be evaluated at the preliminary stage. At the second stage, center lines to be evaluated giving due consideration for possible improvements in staining due to traffic movements.

As conclusions, ceramic beads could be used to gain high retroreflection and it is required to introduce & implement quality control checking of retroreflection under wet conditions and introduce these high quality materials to gain high visibility. Also retroreflectivity should be specified based on type of the roads (Highway/Expressway) to be visible under all weather conditions & to all road users since speed of the vehicle & age will determine the most prominent factors to visibility of these markings.

KEYWORDS: Thermoplastic Pavement Marking, Night time visibility, Skid resistance, Glass Beads, ceramic Beads

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