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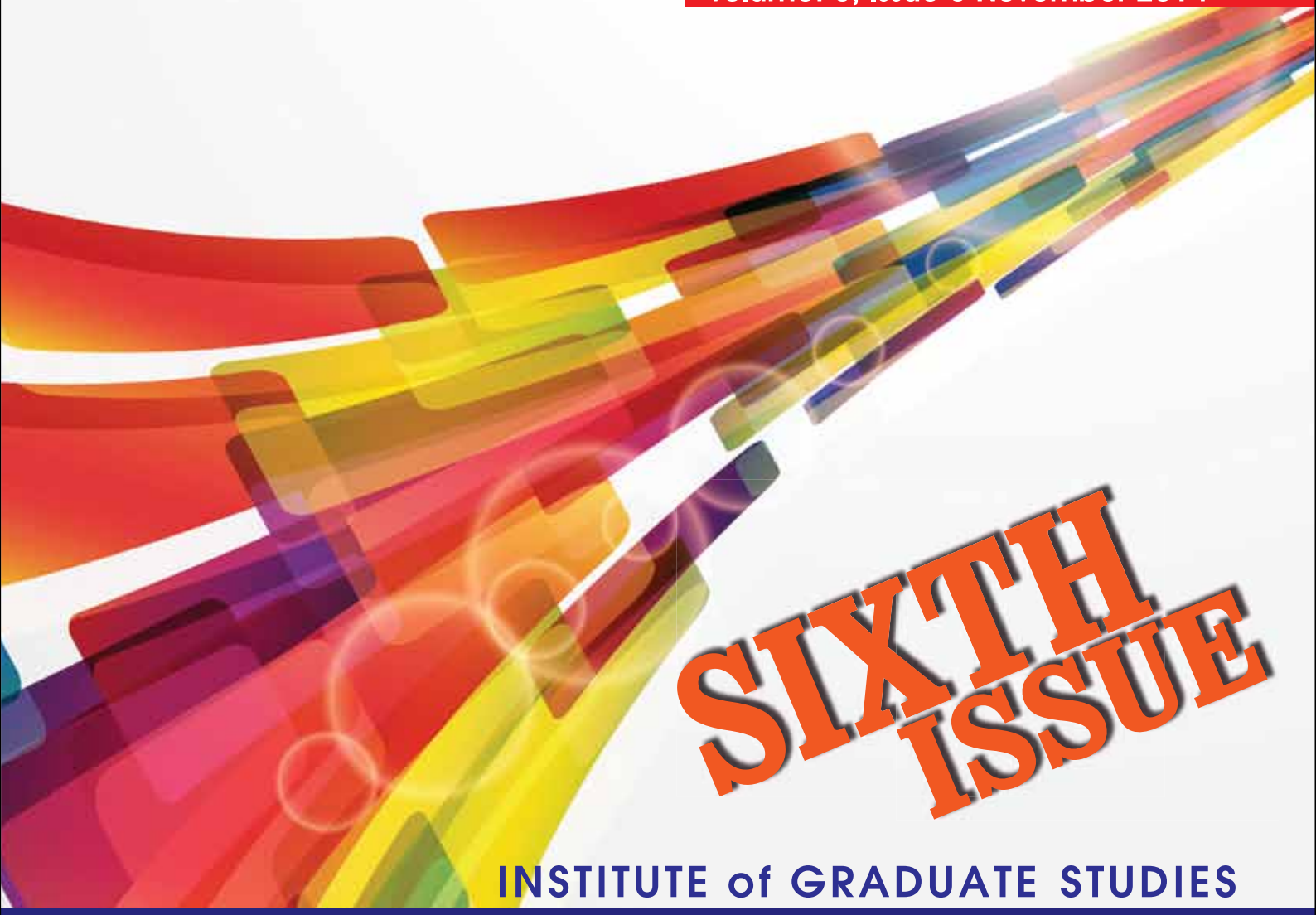

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Title :
Development And Performance Determination Of Warm Mix Asphalt Using Rap For Malaysian Conditions

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Current concerns on the scarcity of resources necessitate the road building industry to review its production of asphaltic concrete. The use of Warm Mix Asphalt (WMA) technologies with asphalt mixtures containing reclaimed asphalt pavement (RAP) may provide synergistic advantages. WMA-RAP mixes conserves scarce resources such as aggregates by using RAP as partial replacement of aggregates and reduces the use of energy (reduction in production temperature) by using WMA additives. Most specifications allow not more than 30% RAP as higher percentages of RAP introduces variability in the material properties and produces inconsistencies in asphalt mix properties. The goal of this study was to evaluate the performance of warm mix asphalt with high proportions of RAP (30%, 40% and 50%) and using Sasobit as the warm mix additive to reduce the mixing and compaction temperature. The research focused on performance investigations of conventional hot mix asphalt using AC14 gradation as control mix and three types of warm mix asphalt with AC14 gradation incorporating high proportions of RAP (30%, 40%, and 50% RAP). The research was carried out in three phases, namely; the pilot phase to ensure that all research materials conform to the specifications,

the second phase was to carry out the mix design to produce the WMA-RAP mixes and the third phase was to investigate the performance of the mixes. Marshall Method was used to produce all samples to determine the proper concentration of Sasobit to be added into the asphaltic concrete, and in establishing the suitable mixing and compaction temperature, this phase also consist of the determination of optimum bitumen content for 30%, 40% and 50% RAP mixes. The criteria followed are those set in Section 4, Malaysian Specification for Road works, published by the Public Works Department of Malaysia (PWD Malaysia). Thereafter, the volumetric properties, Marshall stability, flow and the performance of all mixes in terms of stiffness, moisture damage, rut depth and fatigue were investigated. The results show no substantial differences in volumetric properties. The stability and stiffness values of WMA-RAP mixes were higher than those of the control mix. The rut depths of all WMA-RAP mixes were relatively lower than the control mix. The fatigue life-cycle, all WMA-RAP mixes performed better than the control mix. The WMA-RAP mixes also met the minimum Tensile Strength Ratio (TSR) criteria of 80%. The performance models have been developed through regression analysis for resilient modulus, moisture damage, rut depth, and fatigue. It can be concluded that WMA-RAP mixes performed similar to or better than the conventional hot mix asphalt. It is recommended that further research on the performance of WMA-RAP is carried out for other gradation types and asphalt mixes. Also, a full scale study should also be carried out to measure and compare the field performance of WMA-RAP mixes with conventional hot mix asphalt mixes.