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Influence of Polymer Type and Structure on Polymer Modified Asphalt Concrete Mix

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Two low density polyethylene (LDPE) resins and two ethyl vinyl acetate (EVA) polymers were used to modify asphalt. LDPE showed better elastic behavior in as received polymer, but higher elastic behavior was observed for EVA modified asphalt. Base asphalt concrete mix (ACM) and polymer modified asphalt concrete mix (PMACM) were prepared using Marshall Method of mix design (ASTM D 1559). Marshall Stability test, moisture susceptibility test (AASHTO T 283-89), resilient modulus (M_R) and permanent deformation test were performed to investigate the effect of polymer type and structure on PMACM. About 30% stability loss was observed for all concrete mixes. But EVA polymer with low VA content had the least stability loss (7%). Moisture susceptibility test revealed that ACM and PMACM were very sensitive to water. For all PMACMs, resilient modulus (M_R) was higher than that of ACM. Again, M_R was higher for EVA with low VA content. PMACM was found to have better permanent deformation (rutting) resistance compare to ACM. This resistance was significantly high for low VA content EVA mix, which indicated the excellent elastic behavior of this polymer in the mix. This elastic behavior of PMA correlate very well with the M_R and rusting resistance properties of PMACM.