

## Effects of Asphalt Modification with Nanomaterials on Fresh and Stored Bitumen

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**Abstract :** Nanomaterials have many applications in the field of asphalt paving. Two locally produced nanomaterials were used in the asphalt binder modification. The nanomaterials used are Nanosilica (NS), and Nanoclay (NC). The virgin asphalt binder was characterized by the conventional tests. The bitumen was modified by 3%, 5% and 7% of NS and NC. The penetration index (PI), and the retaining penetration (RP) was calculated based on the results of the penetration and the softening point tests. The results show that the RP becomes 95.35% at 5%NS modified bitumen and reaches 97.56% when bitumen is modified with 3% NC. The results show significant improvement in the bitumen stiffness when modified by the two types of nanomaterials, either fresh or aged (stored).

**Keywords :** bitumen, modified bitumen, aged, stored, nanomaterials

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