
Volumetric Design and Performance Evaluation of Super pave Mixtures for Sri Lankan Conditions

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Abstract

With the vigorous development of technology, road construction becomes a vital part of the economy. Roads connect the economic hubs in a country. Asphalt pavements are widely used because of their high strength, smooth surface and good durability.

The most commonly used Asphalt mix design in Sri Lanka is Marshall Mix Design. This Mix design mainly depends on the empirical nature. It is based on data obtained by observations and experiments rather than reliable in situ data. As a result of this, the Marshall Mix design procedure has substantial drawbacks with respect to replicating the real or actual behaviour of asphalt during construction and in actual service conditions. Due to the heavy traffic and increasing tonnage of vehicles, a lot of ruts, cracks and bulges appear in roads constructed according to Marshall Mix design even before the roads reach their service life.

Due to the increased traffic loads and change in climatic conditions enforced US Congress to support a research program to improve durability and performance of the roads. This research program is known as Strategic Highway Research Program or SHRP. One of the principal results from the Strategic Highway Research Program (SHRP) was the SUPERPAVE mix design method. The SUPERPAVE system includes a performance based asphalt binder system, new mix design method, new test procedures and new test equipment. The SUPERPAVE mix design method was designed to replace the Hveem and Marshall methods. The volumetric analysis common to the Hveem and Marshall methods provides the basis for the SUPERPAVE mix design method. The SUPERPAVE system ties asphalt binder and aggregate selection into the mix design process and considers climate conditions as well. The compaction devices from the Hveem and Marshall procedures have been replaced by a gyratory compactor and the compaction effort in mix design is tied to expected traffic.

This research is mainly focused on comparing the volumetric properties and performance of Marshall and SUPERPAVE mix designs. A comprehensive evaluation of the locally available aggregates usually used in Sri Lankan asphalt mix designs was carried out to ensure that these

materials and their gradations conform to the new mix design procedures developed by SUPERPAVE. Here we compare whether the Marshall Mix designs which are used in the Sri Lankan road industry will satisfy the SUPERPAVE criteria. Samples from both mix designs were prepared at the design asphalt contents and they were subjected to a comprehensive mechanical evaluation testing. These tests included indirect tensile test and Wheel track test.

Keywords: SUPERPAVE, Marshall, Indirect tensile test

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