October 17, 2006 Matls. IM 351
Supersedes October 19, 2004

DETERMINING ASPHALT BINDER CONTENT IN HOT MIX ASPHALT (HMA) MIXTURES BY CALCULATION

SCOPE

The percent of binder in hot mix asphalt mixtures can be determined by calculation using test results from IM 350 and IM 369.

REFERENCED DOCUMENTS:

IM 350, Determining Maximum Specific Gravity of Hot Mix Asphalt (HMA) Mixtures

IM 369, Determining Specific Gravity of Asphalt Binder

PROCEDURE

A. Determine the Effective Specific Gravity of the Aggregate, G_{se}.

$$G_{se} = \frac{100 - P_b}{\frac{100}{G_{mm}} - \frac{P_b}{*G_b}}$$

*G_b at 77°F/77°F (25°C/25°C)

Throughout the first day of production, obtain at least three (3) samples of HMA, which will represent that day's production. Determine the maximum specific gravities on each of these samples according to IM 350 and determine the average. The binder contents may be obtained by measurements from tank stick or flow meter. The specific gravity of the binder may be obtained from the certification document or by test using IM 369.

B. After G_{se} has been determined it is used throughout the project to calculate the binder content of the mixture. If any proportions are changed G_{se} must be redetermined.

Determine the Binder Content for a given set of proportions, P_b.

$$P_b = \frac{(G_{se}) * (G_b) - (G_{mm}) * (G_b)}{(G_{se}) * (G_{mm}) - (G_{mm}) * (G_b)} \times 100$$

REPORTING

The calculated asphalt content is reported to three (3) significant figures.

EXAMPLE CALCULATIONS

Given:

P_b = 5.75
G_b = 1.021
G_{mm} = 2.451

$$G_{se} = \frac{100 - 5.75}{\frac{100}{2.451} - \frac{5.75}{1.021}} = \frac{94.25}{40.80 - 5.63}$$

$$G_{se} = \frac{94.25}{35.17} = 2.680$$

$$P_b = \frac{(G_{se}) * (G_b) - (G_{mm}) * (G_b)}{(G_{se}) * (G_{mm}) - (G_{mm}) * (G_b)} \times 100$$

Given:

G_{se} = 2.680
G_b = 1.021
G_{mm} = 2.451

$$P_b = \frac{(2.680)(1.021) - (2.451)(1.021)}{(2.680)(2.451) - (2.451)(1.021)} \times 100 = 5.75\ \%\ \text{Asph.}$$