THE EFFECT OF THE 100 SIEVE

ON THE

TOTAL PERCENT PASSING THE 200 SIEVE

Report R72-4

March 1972

VERMONT DEPARTMENT OF HIGHWAYS

John T. Gray, Commissioner

R. H. Arnold, Chief Engineer

A. W. Lane, Materials Engineer

Report Prepared By

Bituminous Concrete Section

INTRODUCTION

The question was brought up during other research (I) that if the number 100 mesh sieve was removed from the standard bank of sieves, would this overload the number 200 mesh sieve and give erroneous results. (The method of sieve analysis used by the Bituminous Concrete Section for aggregate recovered from bituminous mixtures or for fine aggregates to be used in bituminous mixtures is AASHO T-30 Modified). In our research (2) on the subject of mechanical sieving of aggregates, it states that in no case, however, shall the fraction retained on any sieve at the completion of the sieving operation weigh more than 4 g. per sq. in. of sieving surface. (For an 8 inch sieve, this is 200 g.). For the critical sieve, this amount may be regulated by: I) the introduction of a sieve having larger openings than in the critical sieve or, 2) by the proper selection of the size of the sample.

The critical sieve in our case is the #200, and we are taking out of the sieve bank the #100 sieve. Our size of sample is predetermined to give accurate asphalt cement contents during the extraction process.

(1) Procedure for Recovery of Asphalt Cement in Marshall Method Design Specimens Report 72-1

(2) AASHO T-27-70

PROCEDURE

The equipment used in the Laboratory is similar to that used in the field for sieve analysis. The balance used in the Laboratory was capable of weighing 2000 grams to the nearest 0.1 of a gram. The standard bank of sieves used were 8" round with square openings starting with a 3/4", 1/2", 3/8", #4, #8, #16, #30, #50 and #100 and ending with a #200 mesh sieve and pan. The shaker was a rotap capable of holding a bank of 6 sieves and pan. The oven was capable of maintaining a uniform temperature of 110 $\pm 5^{C}$.

The sample for sieve analysis of fine aggregates was brought to the approximate weight desired by splitting the moist aggregate in a sample splitter.

After the approximate sample was obtained, it was dried in an oven to a constant weight at a temperature of $110^{C} \pm$ 5C. Three predetermined weights were picked of 400, 600, 750 grams and the samples were reduced to these weights. After weighing, the sample was put into the standard bank of sieves and shaken by the mechanical shaker for 8 minutes. After shaking, the material on the individual sieves were weighed to the nearest 0.1 gram and percentages computed.

After the first shaking, the same material was then reweighed and again put into the bank of sieves without the number 100 mesh sieve in the bank. Again it was shaken, weighed and computed.

The above procedure was repeated twice with 750, 600, and 450 grams of fine aggregate in each series.

Type III mixes were then prepared and after extracting the bitumen from the bituminous mixtures, the same procedure was followed for the extracted aggregate as for the fine aggregate except fewer tests were run.

RESULTS OF TESTS

SERIES A

	Initial Wt.	Totals of Separate Wt.	Wt. on #200	% Passing #200
Full Bank	400.0	400.2	56.3	4.3
Bank-100	399.1	399.3	191.9	4.5
Full Bank	600.0	600.0	91.3	4.8
Bank-100	598.4	598.2	292.4	5.1
Full Bank	750.0	749.1	128.4	5.7
Bank-100	747.0	746.4	402.4	6.1

SERIES B

Full Bank	400.0	399.2	59.9	5.7
Bank-100	399.1	400.0	184.9	5.8
Full Bank	600	599.7	92.7	6.0
Bank-100	599.5	599.3	284.8	6.1
Full Bank	750.0	750.0	119.8	6.0
Bank-100	749.2	748.7	357.8	6.1

EXTRACTED AGGREGATE

Full Bank	1051	1050	74	4.9
-100 E	1052	1051	199	4.9
Full Bank	1369.5	1369.5	88.2	4.8
-100 F	1371.1	1369.5	250.3	5.1

CONCLUSION

After completing the tests and observing the results, it is seen that even when purposely overloading the #200 sieve, little difference is noted in the percent passing that sieve.

It is concluded therefore, that deleting the #100 sieve from the 1972 Vermont Standard Specifications will not be detrimental to the end result of extraction gradations of bituminous concrete pavement. This will be especially true as these gradations are reported to the nearest whole percent, thus negating any differences of tenths of percent for the majority of instances.