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The Use Of Sulphur in Bituminous Binder

Final Report

To

United Nations Educational Scientific and Cultural Organization

Under Contract : SC/RP 562006

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July 1984

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เลขที่	TE 221 P53	1984
เลขที่	006133	
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SUMMARY

This report describes an experimental investigation into the use of sulphur as partial substitution for bitumen in conventional bituminous binder. A review of social, economic and environmental consequences of the possible use of sulphur-bitumen binder in rural road construction is also presented.

The addition of sulphur into bitumen binder yields a new binder material, commonly known as Sulphur Extended Asphalt (SEA) or Sulphur Asphalt (SA) binder. The material when used as binder in normal bituminous concrete mix gives an increase in stability of the mix, without significant effect on the flexibility of the mix as measured by the flow values.

In the present experiment, The Marshall method of testing has been used to determine the composition of the SEA binder that would give optimum values of stability and flows. It was found that the optimum composition consists of 40 percent sulphur and 60 percent asphalt by weight, in other words a SEA binder percentage of 40-60. At this percentage the stability at optimum binder content of 5.89 percent by weight of aggregate is 2070 kilograms, almost double that of asphaltic concrete mix under the same conditions. The corresponding flow value is 14.5. In general, stability increases as the sulphur percentage is increased.

The stability of mixture was found to be sensitive to compaction temperature when the percent sulphur in the binder is above 40 and compaction above 130°C is required in order to achieve higher level of stability.

The use of 40 percent sulphur by weight to replace bitumen in the binder would result in saving of 5.7 % in the cost of binder alone which represent about 44 million Baht for Thailand in 1982. Other economic benefits include lower cost of pavement due to reduction in design thickness. The social consequence is in terms of the improvement in the quality of life of the rural populations through more social political and cultural exchange, better education and public protection by government agencies. On available information it can be concluded that use of SEA in road construction poses no problems to the environment.

It appears that the use of sulphur in bituminous binder is feasible, technology is essentially the same as in conventional paving operations. If it is economical as it has been shown in many places then, sulphur-bitumen binder could prove to be a viable alternative binder of the future.