

**COMPARATIVE LABORATORY PERFORMANCE OF
HOT ROLLED SHEET (HRS)
AND
ASPHALT TREATED BASE (ATB)**

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**PROGRAM SISTEM DAN TEKNIK JALAN RAYA
FAKULTAS PASCA SARJANA
INSTITUT TEKNOLOGI BANDUNG
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A thesis submitted in partial satisfaction of the
requirements for completion of the S-2 programme at the
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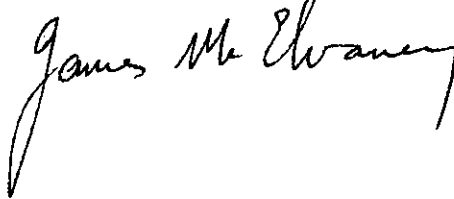
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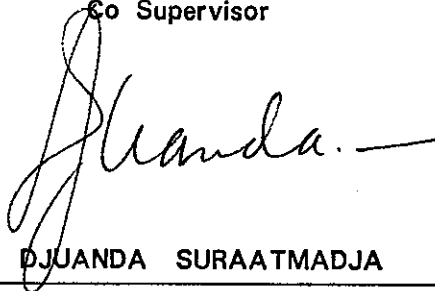
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SYNOPSIS

In the current round of highway pavement betterment project in Indonesia, especially in West Jawa, Asphalt Treated Base (ATB) with 55% of coarse aggregate is used as a regulating course and is overlaid with a Hot Rolled Sheet mix containing 30% of coarse aggregate. ATB, a gap graded mixture is very close in composition to the BS 594-1985 specification for 50% coarse aggregate and the HRS is very close to BS 594-1985 specification for type F wearing course no. 9 (30/14).

Information from the betterment projects indicates that the bitumen content of the HRS used is about 15% higher than that of the ATB mix. The purpose of the investigation described in this thesis was to compare these mixes on the basis of laboratory performance tests. Tests used were Marshall test, indirect tension test, wheel tracking test and skid resistance test.

For the particular conditions under which this investigation was carried out, it may be concluded that on the basis of strength parameters the performance of ATB is comparable with that of HRS. In terms of resistance to rutting at elevated temperature (60°C), ATB has a clear superiority over HRS. ATB has an optimum binder content of 5.5% while that of HRS is 8.2%. The lower optimum binder content of the ATB combined with a high voids content (>8%) may present durability problems if this material is used as a wearing course. Laboratory measurements of skid resistance indicate equal performance in terms of BPN and within the specified value for critical sites while the texture depth of the ATB is approximately twice that of the HRS. Field

measurements of skid resistance show both mixes to have values of BPN less than the minimum specified value. 'Stiffness' of both mixes, as measured in the laboratory, is in excess of the maximum value recommended for wearing course mixes in Indonesian conditions. A study should be made of current methods of aggregate production in order to establish if gradations obtained comply with specification.

RINGKASAN

Dewasa ini pada proyek peningkatan jalan di Indonesia, terutama di Jawa Barat, digunakan Asphalt Treated Base (ATB) dengan 55% agregat kasar sebagai lapisan perata dan di atasnya diberi lagi lapisan penutup Hot Rolled Sheet dengan 30% agregat kasar. ATB adalah campuran gap graded yang sangat mirip dengan spesifikasi BS 594-1985 untuk 50% agregat kasar dan HRS juga sangat mirip dengan spesifikasi BS 594-1985 untuk tipe F lapisan aus no. 9(30/14).

Menurut informasi dari proyek peningkatan jalan, kadar aspal untuk HRS kira-kira 15% lebih tinggi dari ATB. Maksud dari penyelidikan dari thesis ini adalah untuk membandingkan performance dari kedua macam campuran ini berdasarkan hasil test laboratorium, seperti test Marshall, test indirect tension dan test skid resistance.

Berdasarkan keadaan di laboratorium maka dapat diambil kesimpulan bahwa parameter kekuatan dari ATB kira-kira sama dengan kekuatan HRS. Untuk ketahanan terhadap rutting pada temperatur 60°C, ATB menunjukkan kelebihanannya dari pada HRS. ATB mempunyai kadar aspal optimum 5,5% sedangkan HRS 8,2%. Kadar aspal yang lebih rendah pada ATB dan dikombinasikan dengan air voids yang tinggi (>8%) akan dapat menimbulkan masalah durabiliti (tahan lama) bila dipakai sebagai lapisan aus. Pengukuran skid resistance di laboratorium memberikan hasil yang sama pada kedua campuran tersebut sedangkan texture depth ATB kira-kira 2 kali lebih besar. Hasil pengukuran di lapangan untuk kedua jenis campuran tersebut dibawah nilai minimum yang disyaratkan. 'Kekakuan' dari kedua campuran tersebut di laboratorium melampaui

nilai maximum yang disyaratkan sebagai lapisan aus untuk kondisi Indonesia. Penelitian harus dilakukan mengenai cara produksi agregat yang berlaku sekarang sehingga hasilnya dapat sesuai dengan spesifikasi.

I INTRODUCTION

Highway pavements in Indonesia which were built before the Second World War are typically comprised of Telford type base, (a single layer of elongated stones 100 - 300 mm in diameter) overlain with a macadam which is built up in layers of progressively finer hand-split rock chips. The macadam layers are grouted with hand-sprinkled hot bitumen and the final surface is blinded with sand. The result is an all-weather pavement, but under growing traffic loadings the pavement deforms differentially as the non-uniform, hand placed materials are compacted and the Telford boulders are gradually forced deeper and deeper into the subgrade (Corne, 1983).

The condition of this kind of pavement, which is pervious, becomes worse if the drainage system is inappropriate. Water entering the pavement leads to bitumen stripping and rapid deterioration of the pavement surface as high pore pressure and suction are generated by passing wheel loads. These mechanisms of pavement failure lead primarily to surface irregularities, cracking and extensive pot-holing.

Since complete reconstruction of the old pavement on an extensive scale can rarely be justified economically at the present time, the obvious and urgent pavement maintenance priority is the application of overlay surfacings which are more impervious and more durable than the existing penetration macadam. Although surface dressings used extensively in neighbouring Australasia fulfill the sealing function satisfactorily, it is not considered to be a realistic proposition in Indonesia because surface dressing with thin chip

seals can not arrest the problem of continual pavement distortion nor contribute very significantly to regulating the existing distortions (Corne, 1983).

In 1979 The Directorate of Highways (Bina Marga) adopted a new policy under which all pavement betterment projects wherever possible were to be carried out using overlays of asphalt treated base (ATB) and asphaltic concrete (AC) surfacing. This was subsequently changed to ATB plus Hot Rolled Sheet (HRS) instead of AC.

Once necessary crushing and mixing plant is in place, machine-laid dense mats of plant-mix asphalt can be laid rapidly and are able to provide the necessary stabilising and regulating function as well as giving a highly durable and smooth riding surface. The initial cost, moreover, is only of the same order as that required for the penetration macadam overlays while the long term construction cost of successive resurfacings is very much lower as a result of longer overlay life (Corne, 1983).

It is of interest to understand the basic characteristics of the current two-layer overlay, HRS over ATB. Both layers have a high bitumen content and in money terms both layers are costly. It would be interesting to see if a single layer of ATB offered any technical advantage over the current two-layer overlay.