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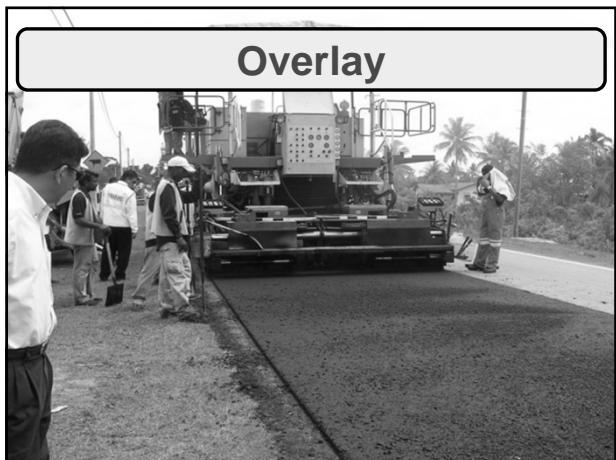
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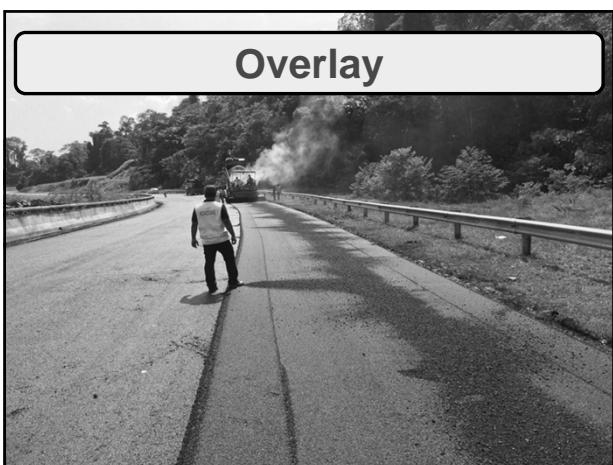
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## Overlay



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## Overlay



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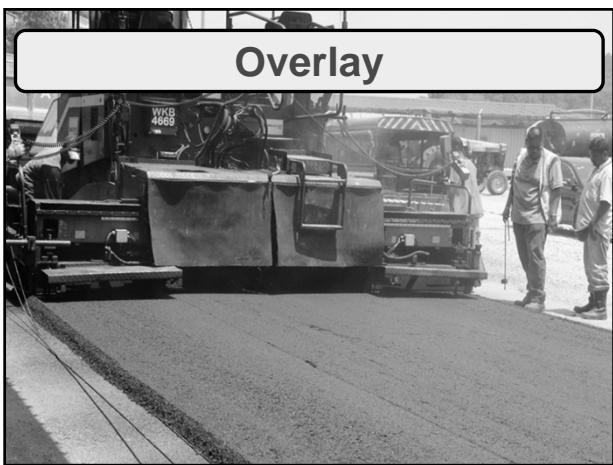
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## Overlay



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## Overlay



**Ketebalan (selepas dipadat) setiap lapisan turapan min  $\geq 2x$  saiz batu paling besar, max  $\leq 100$  mm.**

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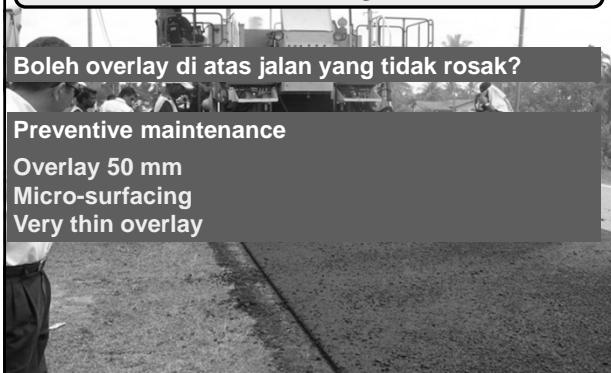
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## Overlay



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## Overlay



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Tack coat	RM 1.50/m <sup>2</sup>
Prime coat	RM 1.60/m <sup>2</sup>
AC 14	RM597.60/m <sup>3</sup>
AC 28	RM578.70/m <sup>3</sup>
Milling 0 – 50 mm	RM 7.70/m <sup>2</sup>
Milling 50 – 100 mm	RM 12.20/m <sup>2</sup>
Milling 101 – 150 mm	RM 17.40/m <sup>2</sup>
Milling 151 – 200 mm	RM 21.80/m <sup>2</sup>
CIPR 150 mm	RM 17.30/m <sup>3</sup>
CIPR 200 mm	RM 20.90/m <sup>3</sup>
CIPR 250 mm	RM 23.80/m <sup>3</sup>

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Bagi 1 km, 2 lorong (1000 m x 7 m = 7000 m <sup>2</sup> ):	
Tack coat	RM 10,500.00
Overlay 50 mm	RM209,160.00
Mill 50 mm	RM 53,900.00
Mill 100 mm	RM 85,400.00
Mill 110 mm	RM121,800.00
Mill and pave 50 mm	RM273,560.00
Mill and pave 80 mm	RM430,556.00
Mill and pave 100 mm	RM514,220.00
Mill 110, BC 60, WC 50	RM595,014.00
CIPR 250, BC 60, WC 50	RM514,864.00
CIPR 250, BC 60, WC 50	RM661,968.00 (1 km x 9 m)

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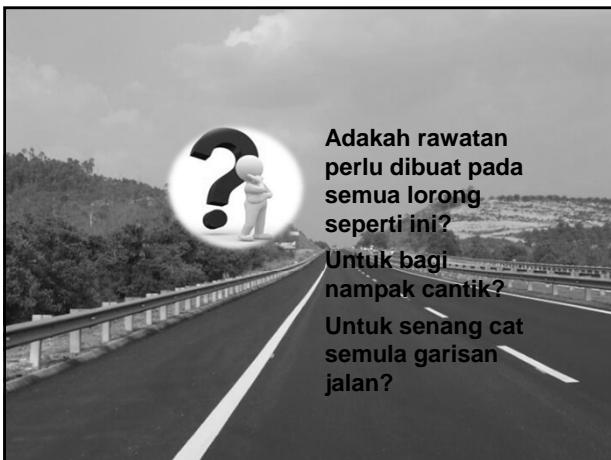
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**Bituminous tack coat**

**TUJUAN:** Untuk memastikan lapisan turapan baru melekat pada permukaan jalan sedia ada.



**Bituminous tack coat**

**SEMBURAN:** Rata pada permukaan yang bersih & kering. Kadar semburan  $0.25 - 0.55 \text{ liter/m}^2$



**Aplikasi:**  $0.25 - 0.55 \text{ liter/m}^2$ , semburan rata, tidak berbelang-belang.

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**Tidak rata**

Aplikasi: 0.25 – 0.55 liter/m<sup>2</sup>, semburan rata, tidak berbelang-belang.

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**Terlalu sedikit**

Aplikasi: 0.25 – 0.55 liter/m<sup>2</sup>, semburan rata, tidak berbelang-belang.

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**Terlalu banyak**

Aplikasi: 0.25 – 0.55 liter/m<sup>2</sup>, semburan rata, tidak berbelang-belang.

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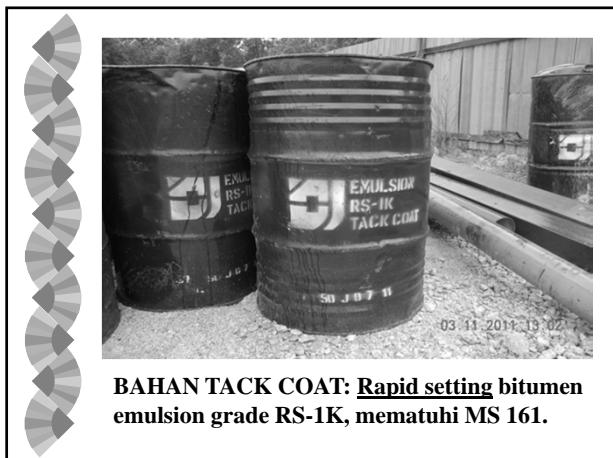
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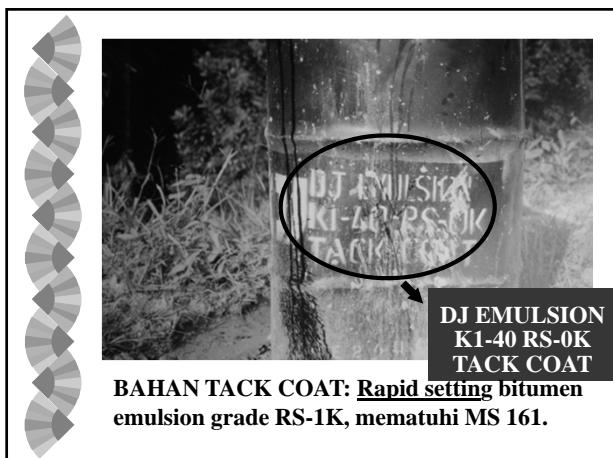
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<b><u>MS 161</u></b>				
	<b>RS-0K</b>	<b><u>RS-1K</u></b>	<b>RS-2K</b>	<b>RS-3K</b>
Bitumen, %*	38	<b>50</b>	<b>60</b>	<b>65</b>
Air, %	62	<b>50</b>	<b>40</b>	<b>35</b>
(K1-40)				
* minimum				

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<b><u>MS 161</u></b>				
<b>Bituminous prime coat</b>				
<b>SS-1K</b>				
Kadar aplikasi: 0.5 - 1.0 litre/m <sup>2</sup>				
Tujuan:				
* Menyediakan permukaan roadbase kalis air.				
* Menutup rongga.				
* Mengikat butiran longgar.				
* Mengeraskan permukaan roadbase.				
* Mengikat permukaan roadbase kepada asphalt.				
Prime coat seharusnya dibiarkan kering selama 24 jam.				

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**MS 161**

	RS-0K	<b>RS-1K</b>	RS-2K	RS-3K
Bitumen, %*	38	<b>50</b>	60	65
Air, %	62	<b>50</b>	40	35

\* minimum (K1-40)

Boleh atau tidak RS-0K disembur dengan lebih banyak bagi menggantikan kuantiti bitumen yang kurang (38% berbanding 50%)...?

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**MS 161**

	RS-0K	<b>RS-1K</b>	RS-2K	RS-3K
Bitumen, %*	38	<b>50</b>	60	65
Air, %	62	<b>50</b>	40	35

\* minimum (K1-40)

Sekiranya hujan turun selepas tack coat disembur, apa yang perlu dilakukan?

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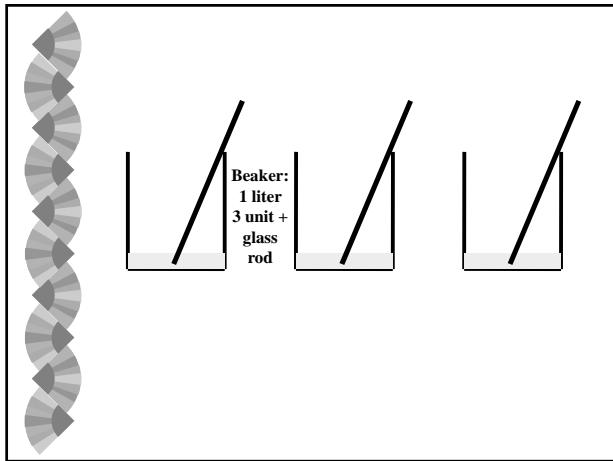
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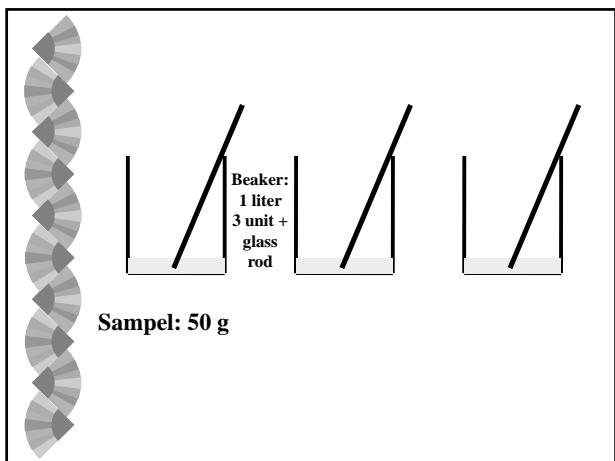
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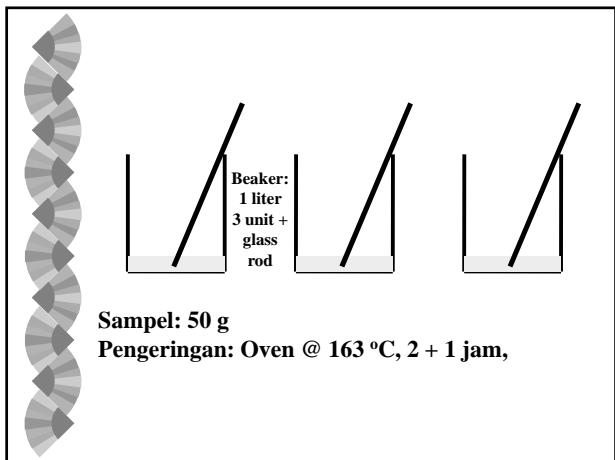
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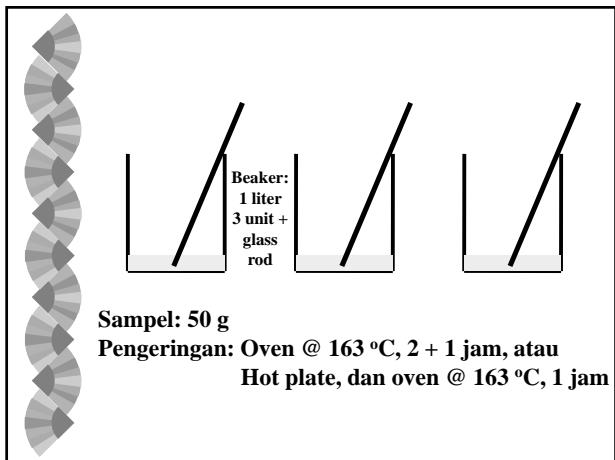
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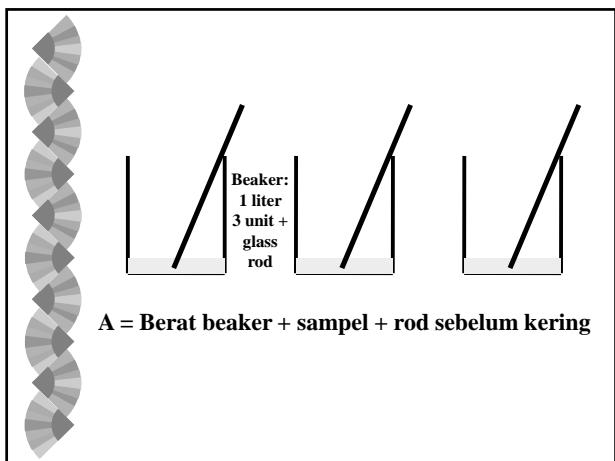
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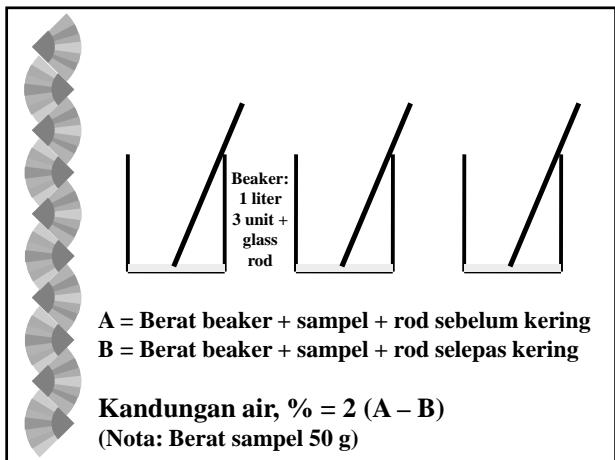
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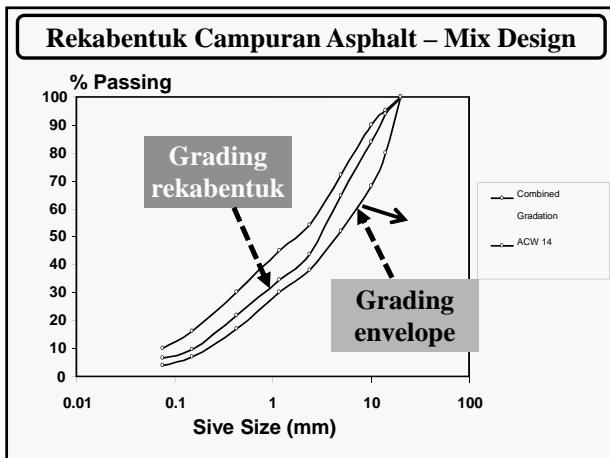
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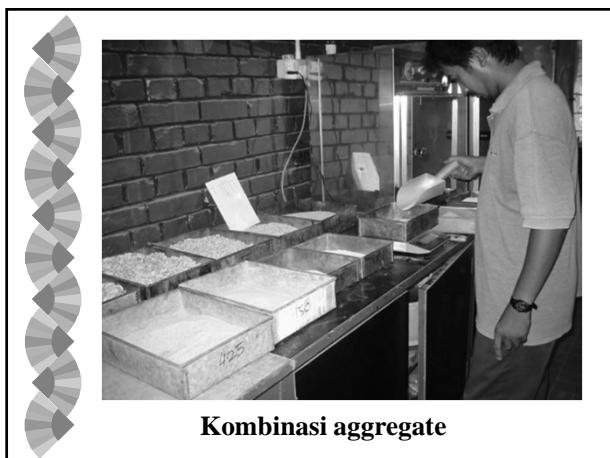
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**Sukatan kandungan bitumen**

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**Sukatan kandungan bitumen**

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**Bancuhan aggregate & bitumen (asphalt)**

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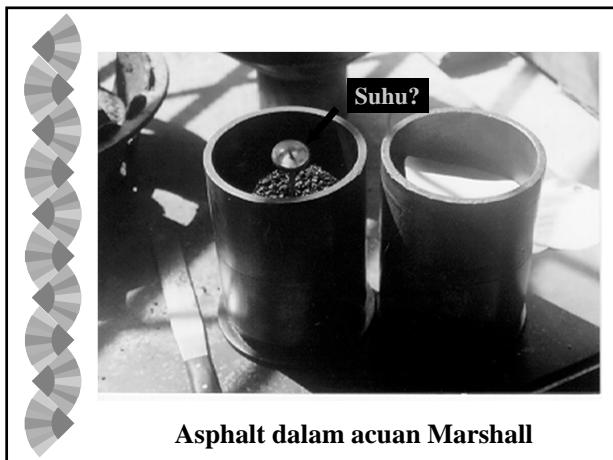
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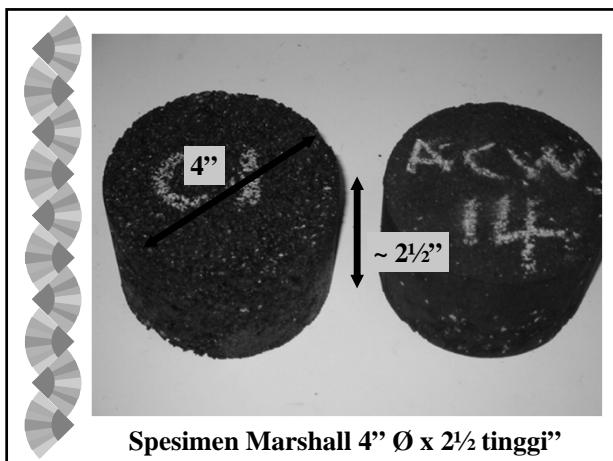
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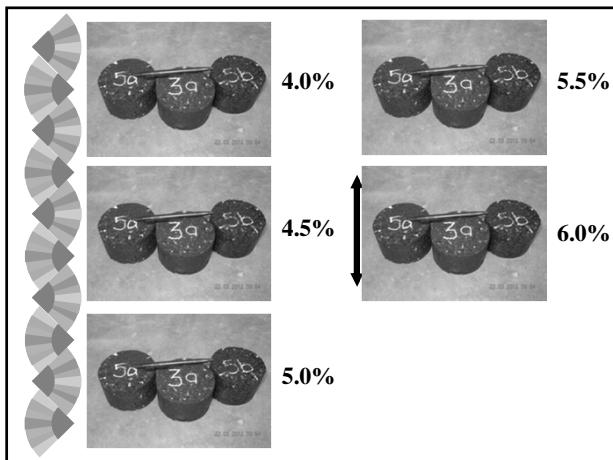
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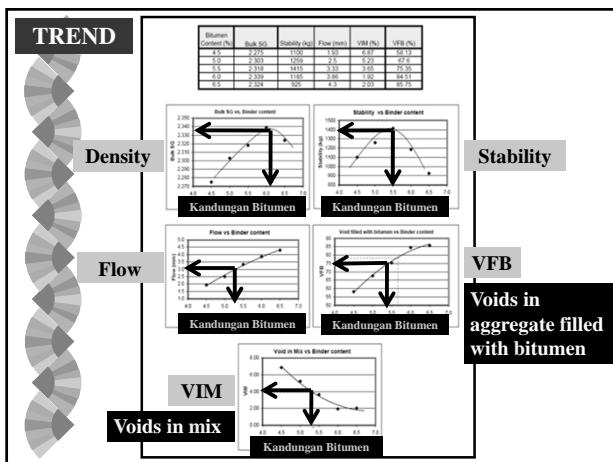
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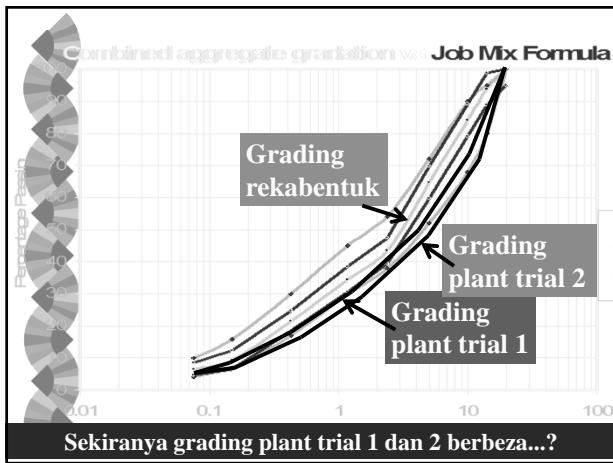
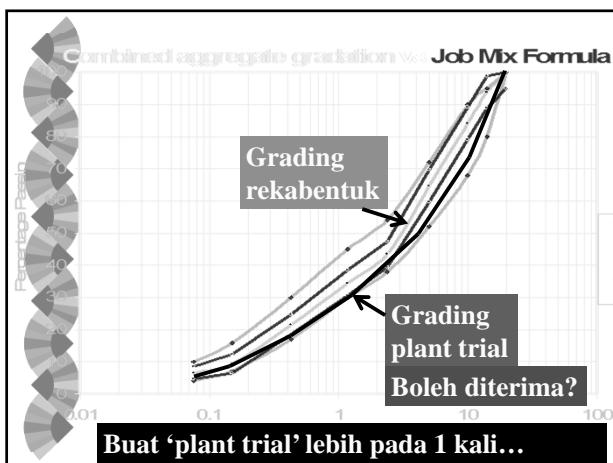
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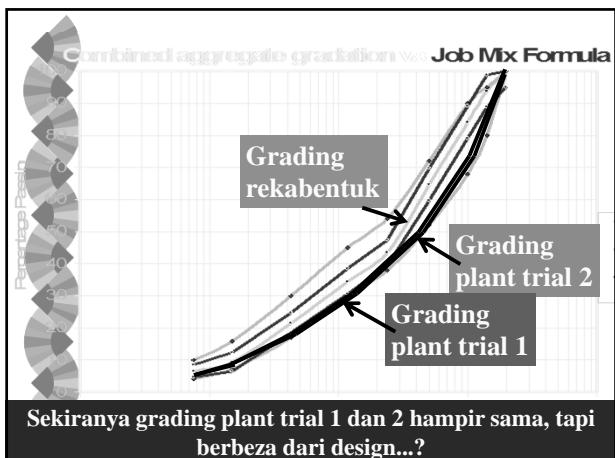
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<b>Jadual 4.11 JKR/SPJ TOLERANSI bagi Asphaltic Concrete</b>	
Parameter	Variasi yang dibenarkan (% berat asphalt)
Kandungan bitumen.	$\pm 0.2 \%$
Batu baur yang telus ayak 5.0 mm dan ayak yang lebih besar.	$\pm 5.0 \%$
Batu baur yang telus ayak 3.35 mm dan 1.18 mm.	$\pm 4.0 \%$
Batu baur yang telus ayak 0.425 mm dan 0.150 mm.	$\pm 3.0 \%$
Batu baur yang telus ayak 0.075 mm.	$\pm 2.0 \%$





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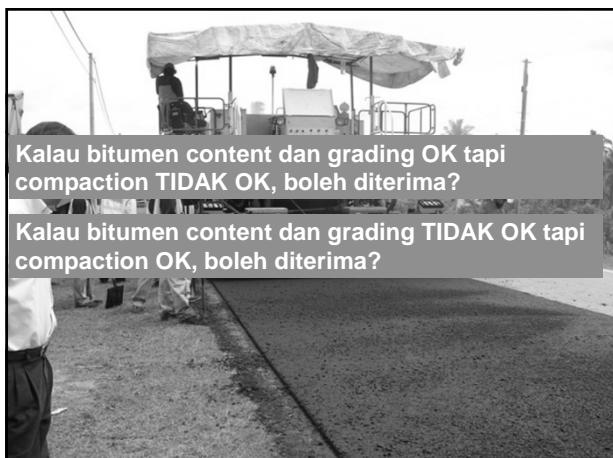
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## Overlay



Padatkan asphalt dengan roller

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## Pemadatan



- Rolling pattern: 2-2-10-2**  
2 – Steel wheel roller (statik)  
2 – Steel wheel roller (getaran)  
10 – Pneumatic tyre roller  
2 – Steel wheel roller (statik)

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1 pass

1 pass

1 pass

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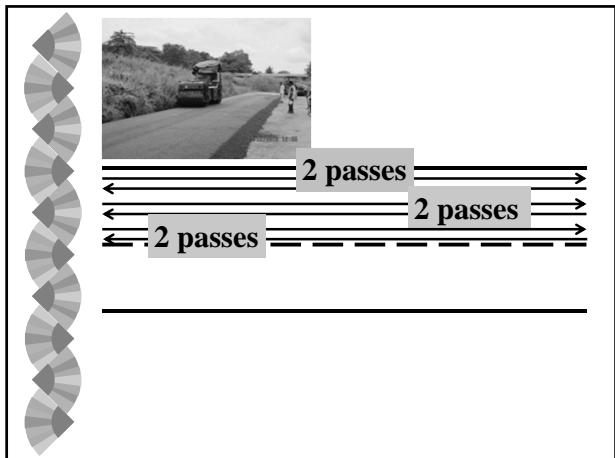
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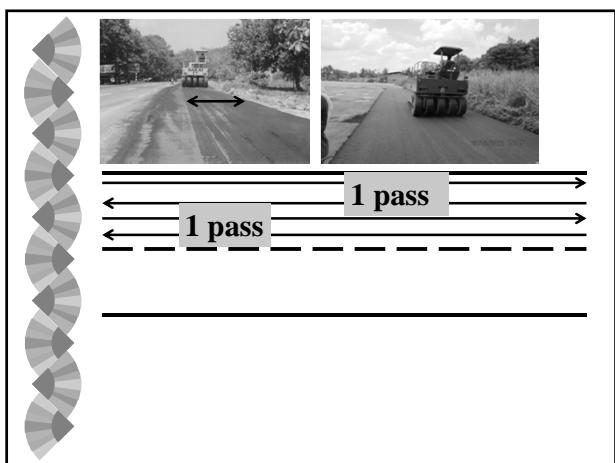
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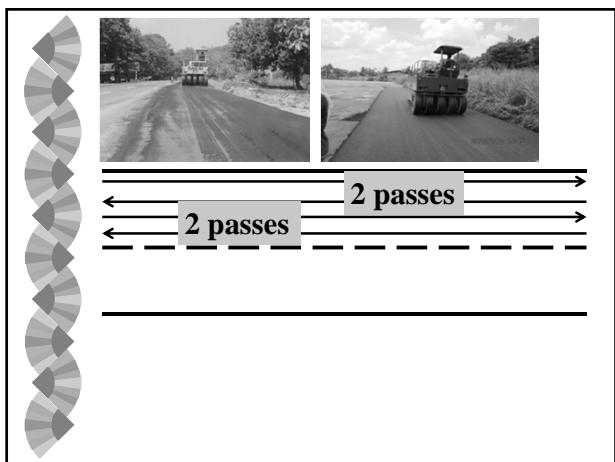
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## PEMADATAN ASPHALT



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### JKR/SPJ/1988 Clause 4.2.4.4 (e) Rollers

★ A pneumatic tyre roller and two steel wheel tandem rollers shall be provided.

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### JKR/SPJ/1988 Clause 4.2.4.4 (e) Rollers

★ A pneumatic tyre roller and two steel wheel tandem rollerss shall be provided.

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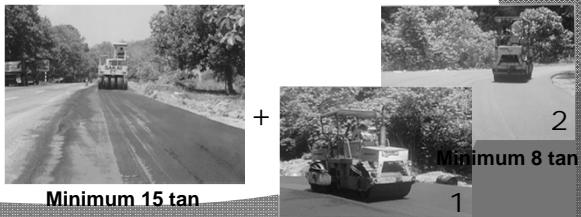
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**JKR/SPJ/1988 Clause 4.2.4.4 (e)  
Rollers**

- ★ A pneumatic tyre roller and two steel wheel tandem rollers shall be provided.

**JKR/SPJ/1988 Clause 4.2.4.4 (e)  
Rollers**

- ★ A pneumatic tyre roller and two steel wheel tandem rollerss shall be provided.



**JKR/SPJ/1988 Clause 4.2.4.4 (e)****Rollers**

★ A pneumatic tyre roller and two steel wheel tandem rollers shall be provided.

However, a three wheel steel roller may be substituted for one of the tandem rollers if the S.O. shall so approve.

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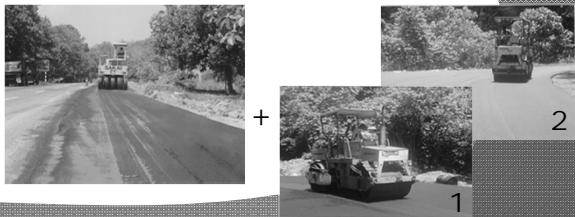
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**JKR/SPJ/1988 Clause 4.2.4.4 (e)****Rollers**

★ However, a three wheel steel roller may be substituted for one of the tandem rollers if the S.O. shall so approve.



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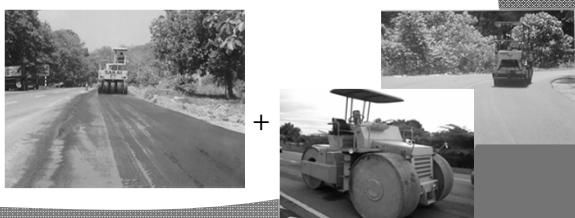
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**JKR/SPJ/1988 Clause 4.2.4.4 (e)****Rollers**

★ However, a three wheel steel roller may be substituted for one of the tandem rollers if the S.O. shall so approve.



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**JKR/SPJ/1988 Clause 4.2.4.5 (i)  
Compaction of Asphaltic Concrete**

★ **Initial** (or breakdown) rolling shall be carried out with an approved steel wheel tandem roller or three wheel steel roller.

The **final** rolling shall be carried out with an approved steel wheel tandem roller.

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**Trial Lay**

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**Construction**

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- Di mana supervisor?
- Ada orang check temperature?
- Siapa yang tentukan bila nak gelek, di mana nak gelek?
- Ada orang check rolling pattern?



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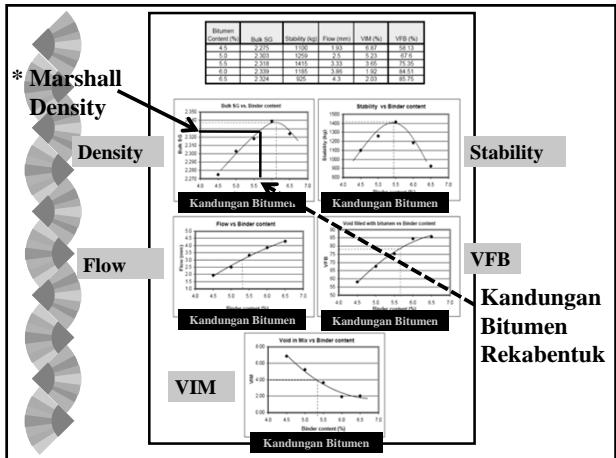
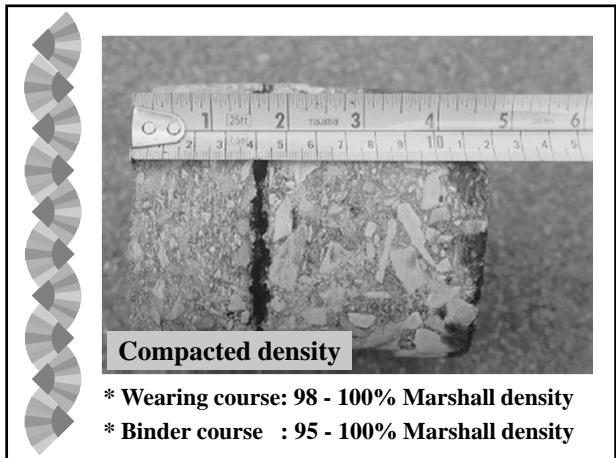
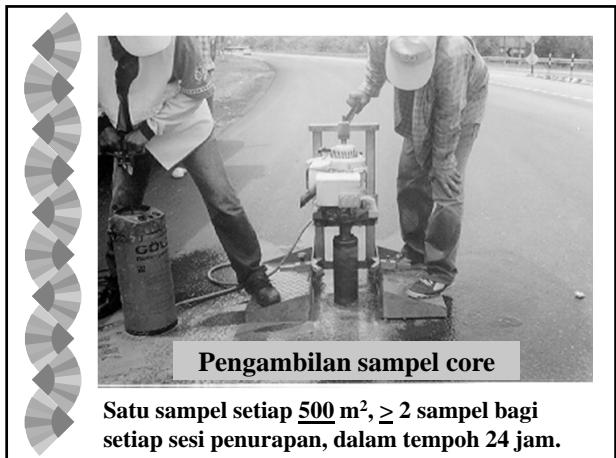
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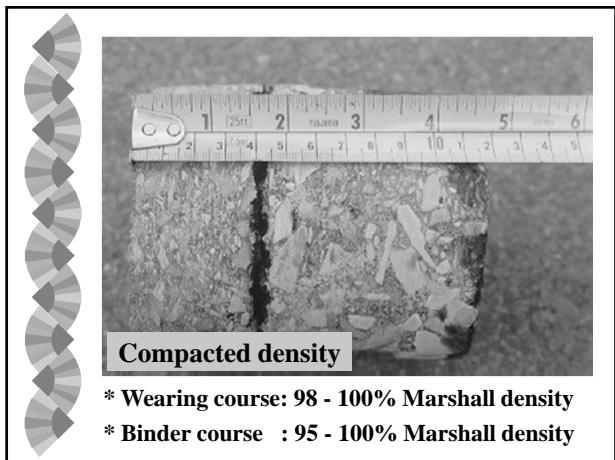
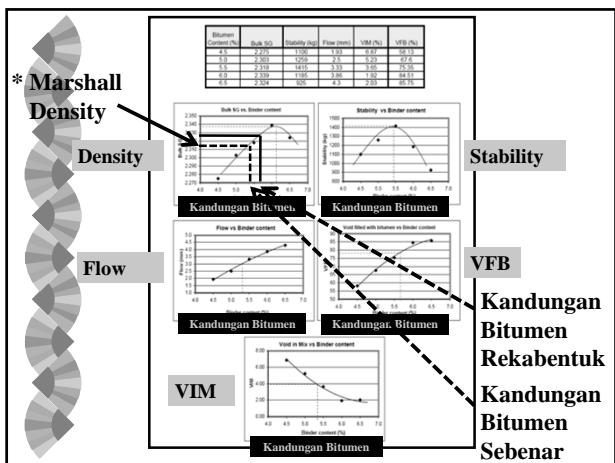
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Bagi compacted density, tidak ada toleransi +/- ke?

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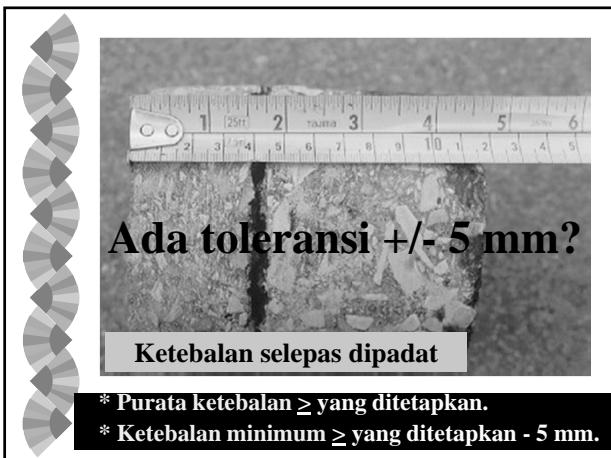
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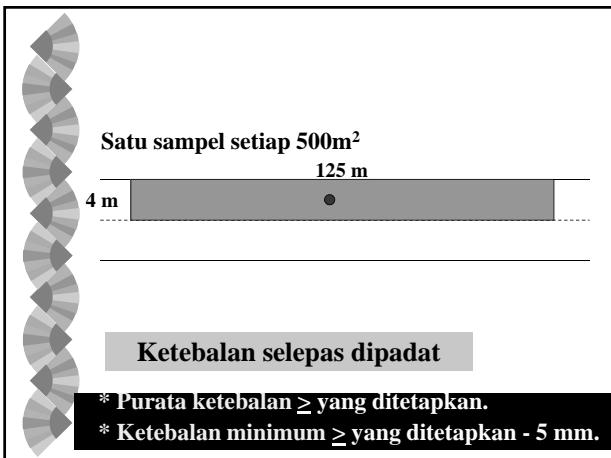
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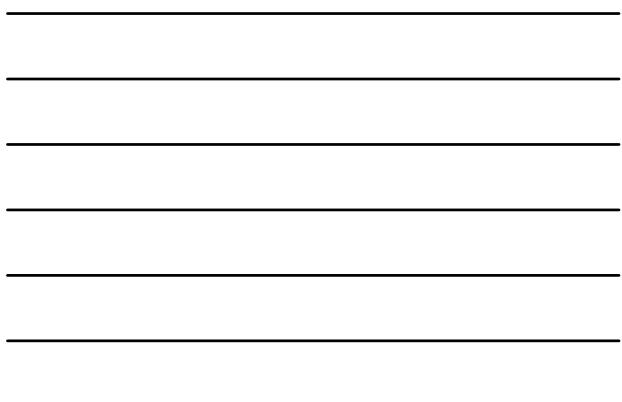
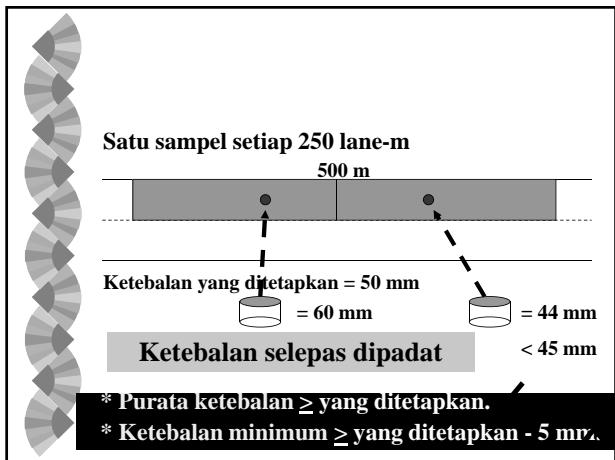
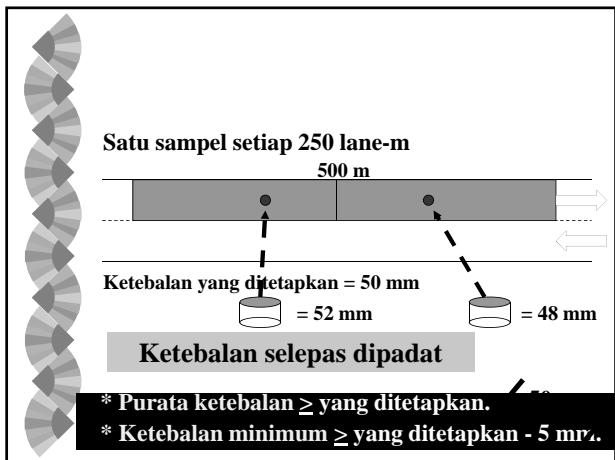
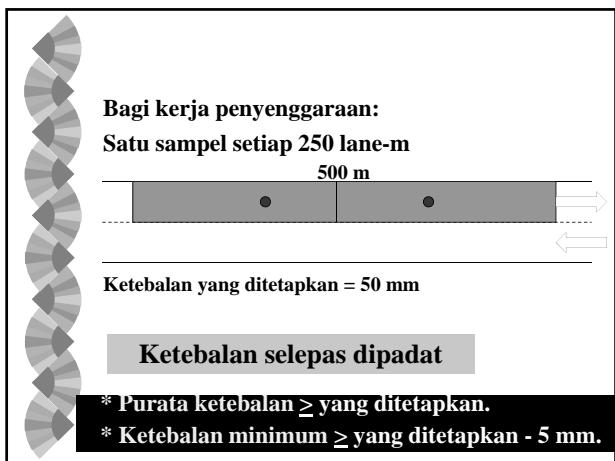
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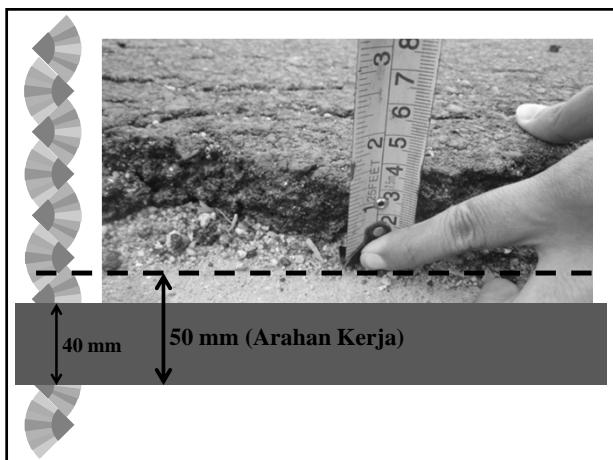
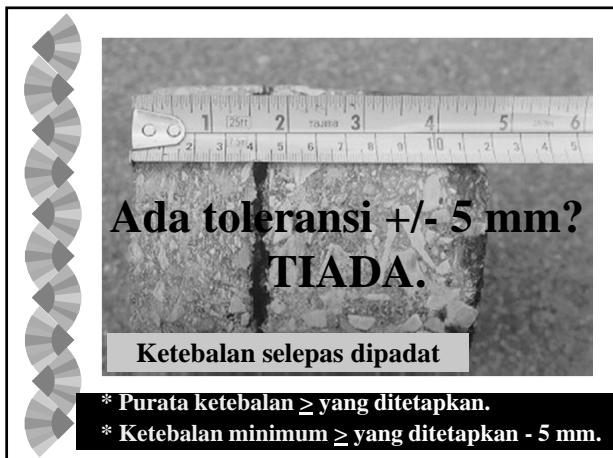
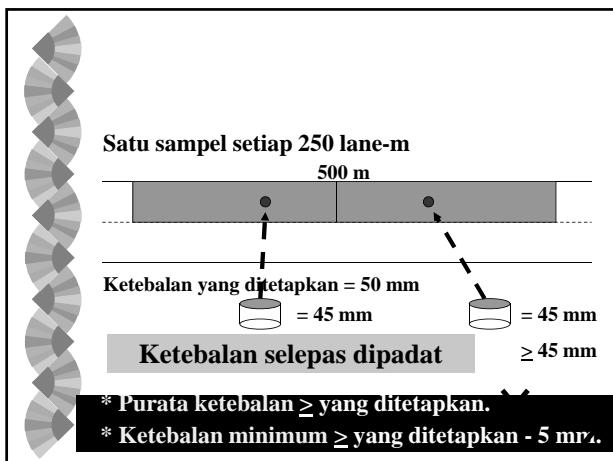
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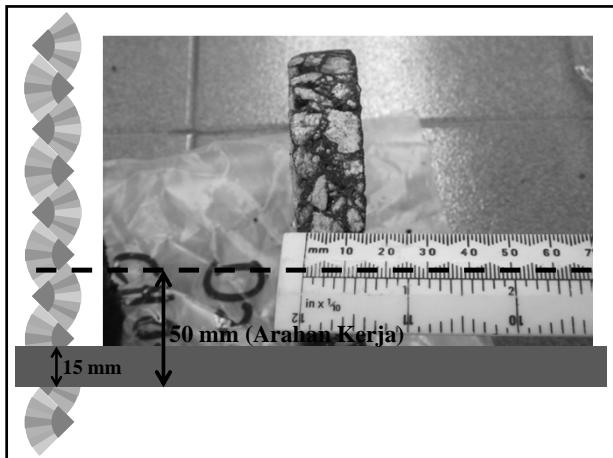
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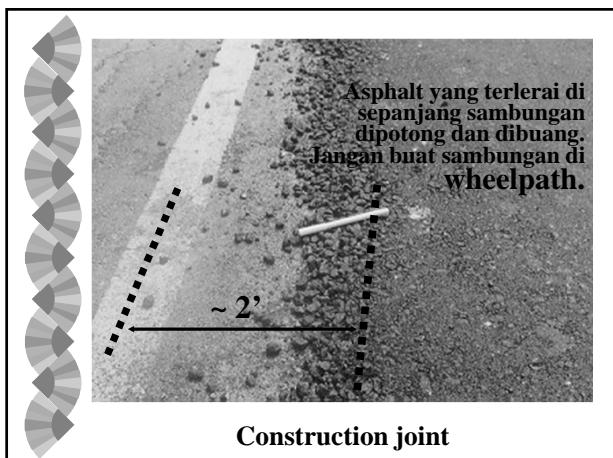
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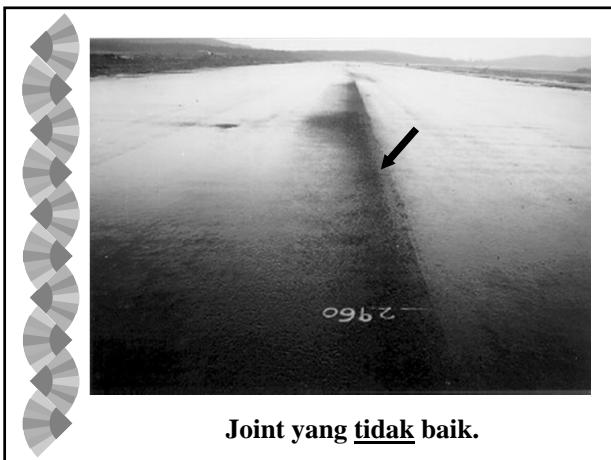
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Mesin penggelek mesti ada tangki air & sistem perenjis untuk memastikan semua tayar basah & bersih semasa menggelek.

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### PENGGUNAAN BITUMEN GRED 60 – 70 DI ASIA TENGGARA

Singapura: sejak 1970an

Filipina: sejak 1980an

Thailand: sejak 1988

Vietnam: sejak 1990an

Indonesia: gred 60 – 70 dimasukkan dalam spesifikasi pada 1987, gred 80 – 100 dikeluarkan dari spesifikasi pada 2008.

Malaysia: gred 60 – 70 dimasukkan dalam spesifikasi pada 2008, gred 80 – 100 dikeluarkan dari spesifikasi 1 Mei 2017.



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**PERBEZAAN ANTARA BITUMEN GRED 60 – 70  
DENGAN 80 – 100**

Penetration Grade	Softening Point	Flash Point
80 – 100	45 – 52 °C	> 225 °C
60 – 70	48 – 56 °C	> 250 °C



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**Wheel Tracking Test**



Applied load = 700 N, Test temperature = 60 °C

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Materials	Wheel Tracking Rut
ACW 20 + 80-100	17.9 mm
ACW 20 + 60-70	7.3 mm
ACW 20 + Polymer	2.1 mm
ACB 28 + 80-100	14.8 mm
ACB 28 + 60-70	8.7 mm
ACB 28 + Polymer	1.6 mm



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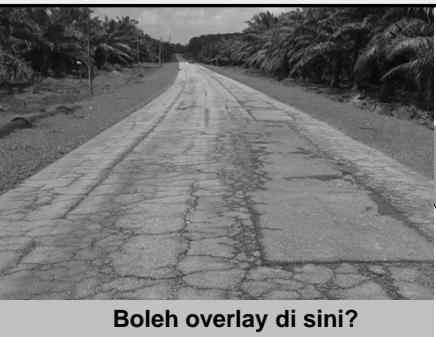
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**Overlay**



**Boleh overlay di sini?**

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Tuan,

PENSWASTAAN PENYENGGARAAN JALAN-JALAN PERSEKUTUAN DI SEMENANJUNG MALAYSIA  
- Surat Laksana Kerja Bagi Kerja Berkala Bukan Pavemen ( PERUNTUKAN B11 )

Dengan segala hormatnya marujuk kepada perkara di atas dan surat rujukan JKR.D.S(J)600/1-2/1 (82) bertarikh 9 Mei 2016 adalah berkaitan.

2. Dimaklumkan bahawa pejabat ini memohon pertukaran kaedah pembalakan iaitu dari kaedah 'Mill & Pave' kepada kaedah 'Overlay' di Laluan Persekutuan

3. Setelah diteliti, pejabat ini mendapati bahawa kerosakan pada permukaan jalan yang rosak tersebut tidak memerlukan rawatan 'Mill & Pave' tetapi pejabat ini mencadangkan rawatan 'Overlay'. Bagi pandangan pejabat ini, rawatan secara 'Overlay' (Lampiran A) merupakan rawatan lebih efektif berbanding 'Mill & Pave' (Lampiran B) kerana lanya meliputi kawasan yang lebih luas sebagaimana dinyatakan dalam Lampiran.

4. Untuk makluman tuan juga, keperluan rawatan 'Overlay' disebabkan oleh status jalan tersebut adalah Jalan Protokol.

Sekian. Terima kasih.

**Alasan:**

**1. Overlay meliputi kawasan yang lebih luas.**

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Tuan,

PENSWASTAAN PENYENGGARAAN JALAN-JALAN PERSEKUTUAN DI SEMENANJUNG MALAYSIA  
- Surat Laksana Kerja Bagi Kerja Berkala Bukan Pavemen ( PERUNTUKAN B11 )

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4. Untuk makluman tuan juga, keperluan rawatan 'Overlay' disebabkan oleh status jalan tersebut adalah Jalan Protokol.

Sekian. Terima kasih.

**Alasan:**

**2. Status jalan adalah Jalan Protokol.**

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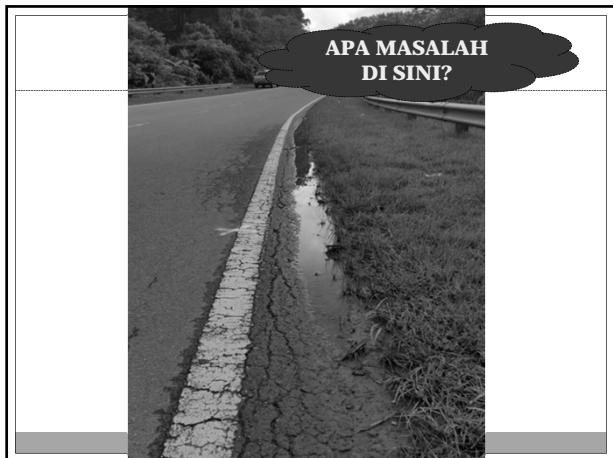
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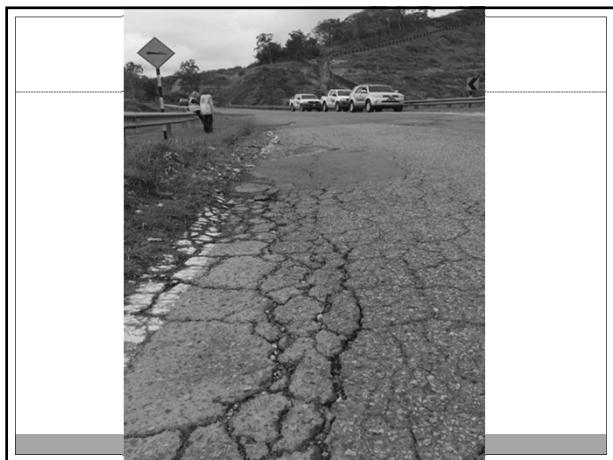
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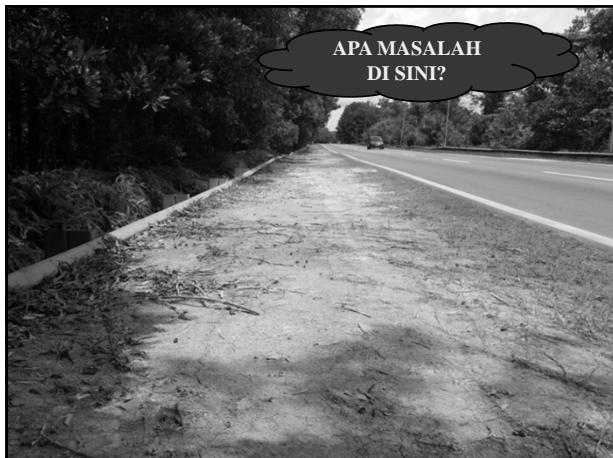
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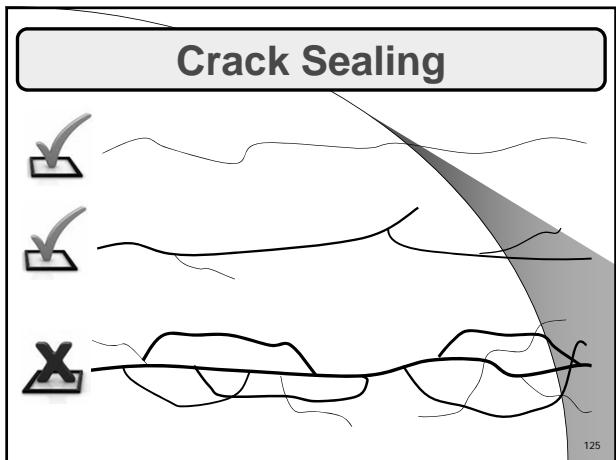
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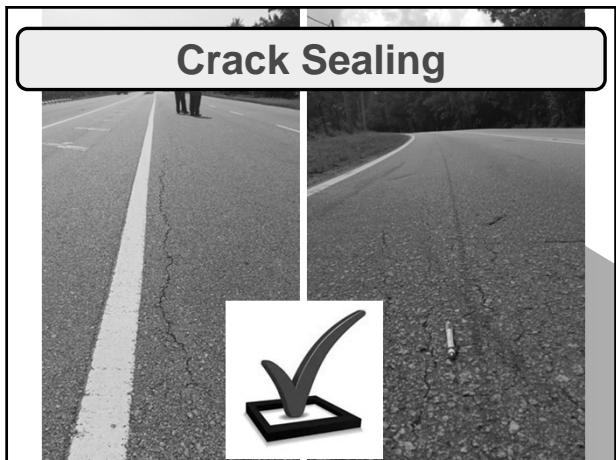
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## Crack Sealing



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## Crack Sealing



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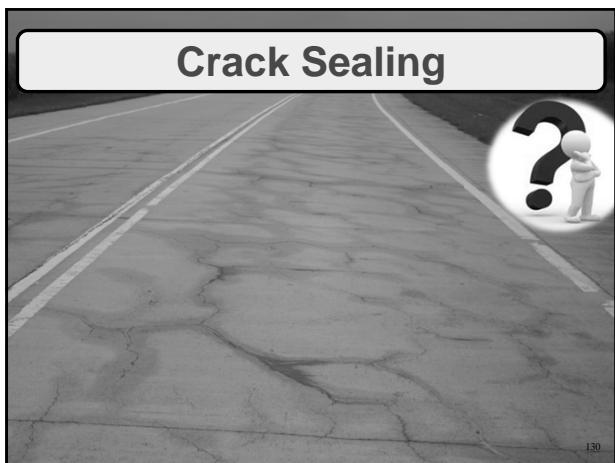
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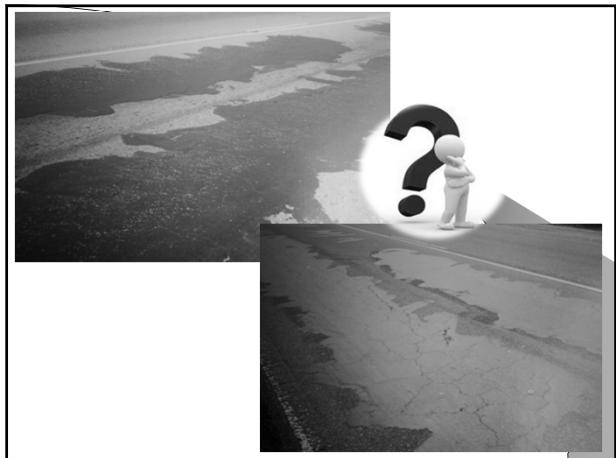
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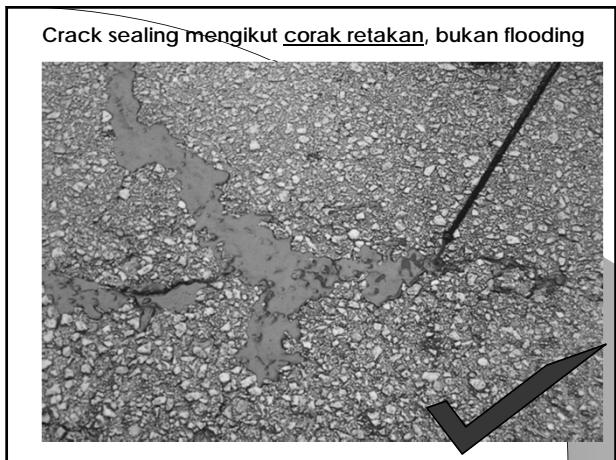
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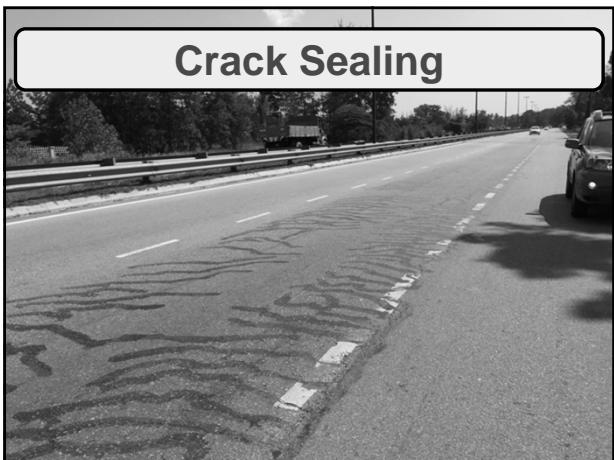
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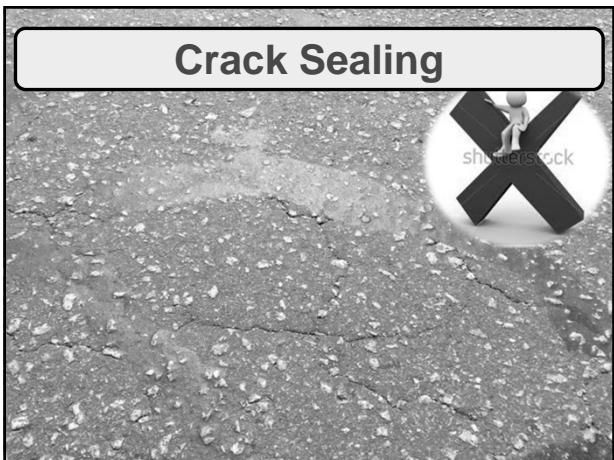
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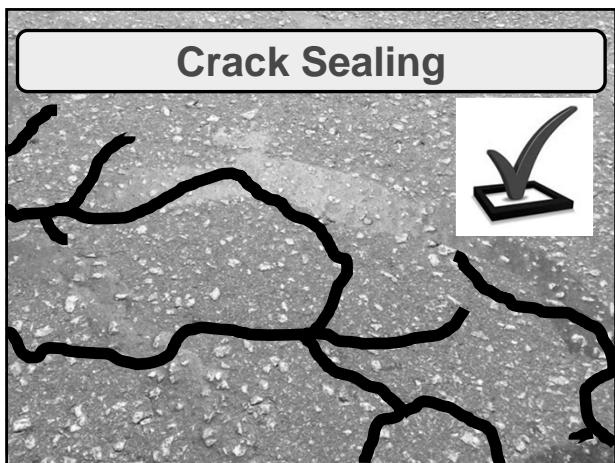
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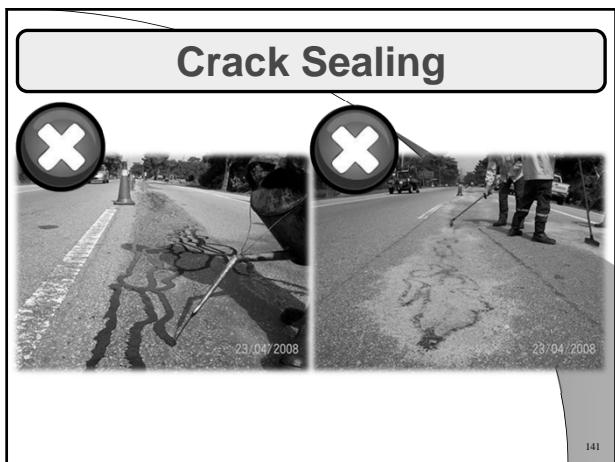
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### Crack Sealing



Bersih dan keringkan rekahan

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### Crack Sealing



Spray crack sealant ikut urat rekahan

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### Crack Sealing



Sapu crack sealant ke dalam rekahan

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### Crack Sealing



Tabur quarry duat ke atas crack sealant selepas kering

### Crack Sealing



Bersihkan lebihan quarry dust yang tidak melekat pada crack sealant

### Crack Sealing



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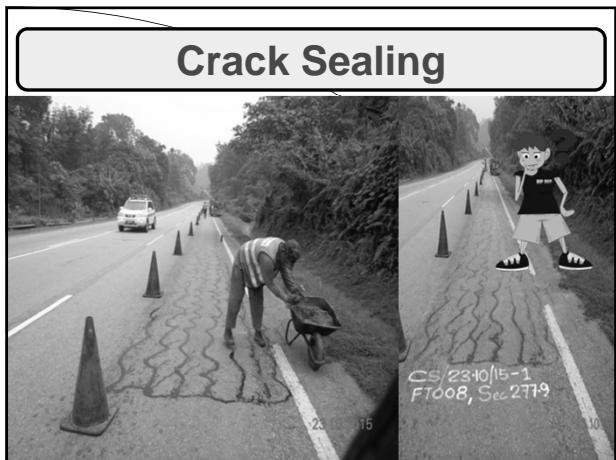
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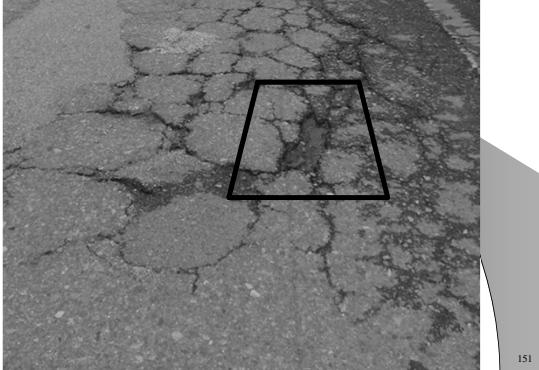
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### MERAWAT KERETAKAN



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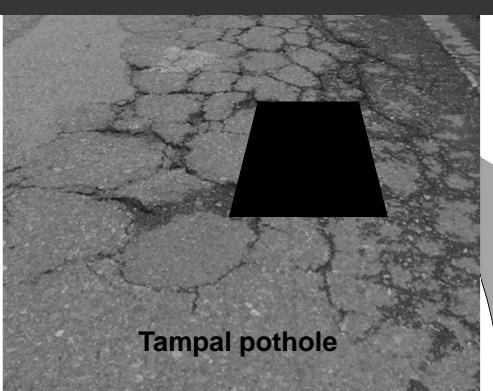
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### MERAWAT KERETAKAN



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### MERAWAT KERETAKAN



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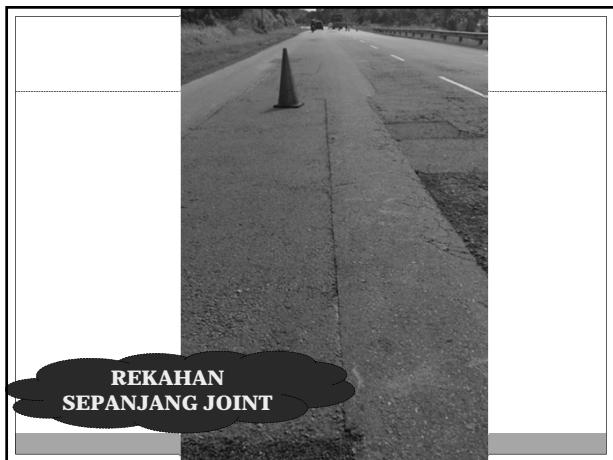
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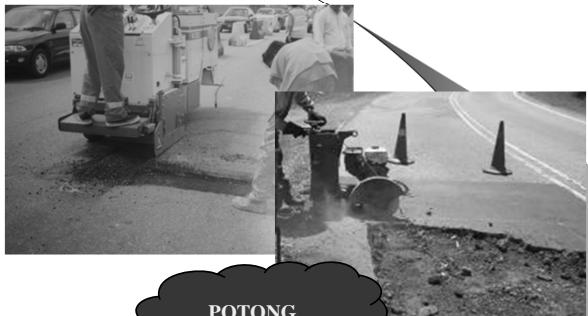
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### Potong dan Tampal



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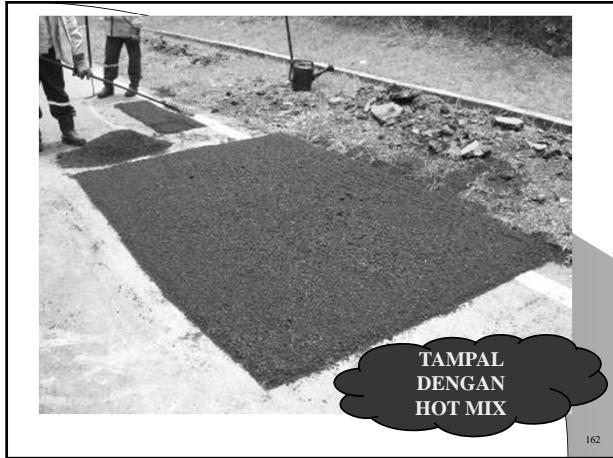
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### Potong dan Tampal

The diagram shows a cross-section of a road. It features a dashed rectangular outline representing the existing asphalt layer. Inside this, a solid black U-shaped cutout indicates where the old asphalt has been removed. A grey shaded area to the right represents the new asphalt being applied or compacted.

- Tack coat perlu disapu di bahagian tepi keratan.






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**Potong dan Tampal**

SEMASA	SELEPAS

A 3D white figure stands next to a large question mark, symbolizing the 'before and after' transformation.

R/21015  
7/2008

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LAMPIRAN E2

PROSEDUR PENGETAHUAN RUTIN

ROADCARE (M) SDN BHD

LAPORAN BERGAMBAR DILAKUKAN SELEpas PENGETAHUAN RUTIN

MELAKA

PERIODE : 01 Okt 2015

TERMINAL : JALAN KERETA API MELAKA

LEMAH DAN KERIKIL

LEPAS POTONG TIDAK HACK, TERUS SPRAY TACK COAT DAN TAMPAL!!!

DOKUMEN TERBAWAH

© MNC PICTURES 2015

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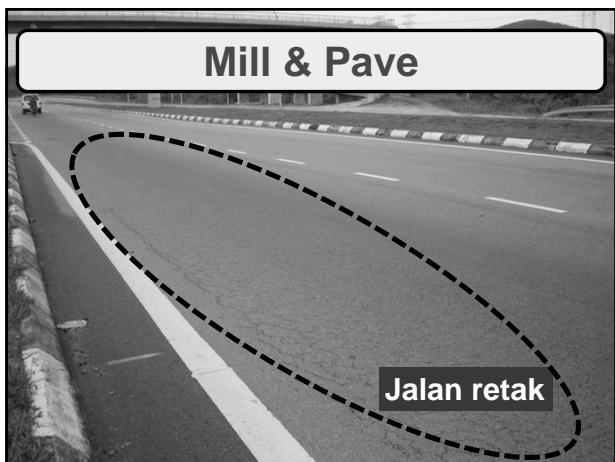
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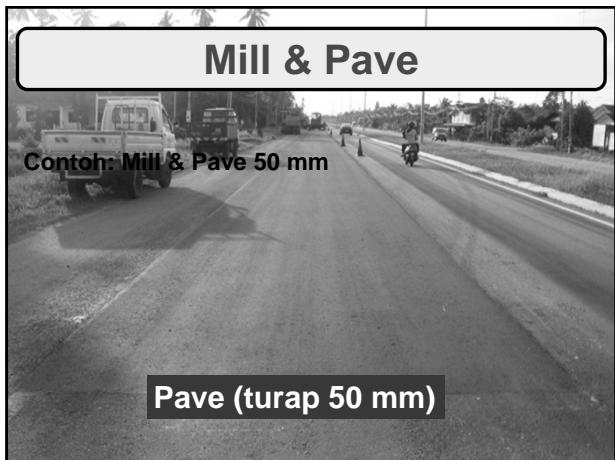
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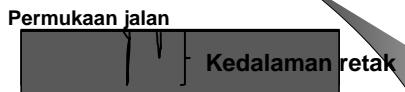
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**Bagaimana menentukan kedalaman milling?**

- Berdasarkan kepada kedalaman kerosakan.



- Ambil kira kedalaman lapisan permukaan.



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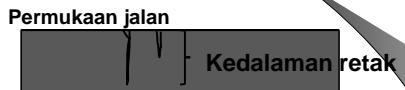
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**Bagaimana menentukan kedalaman milling?**

- Berdasarkan kepada kedalaman kerosakan.



- Ambil kira kedalaman lapisan permukaan.



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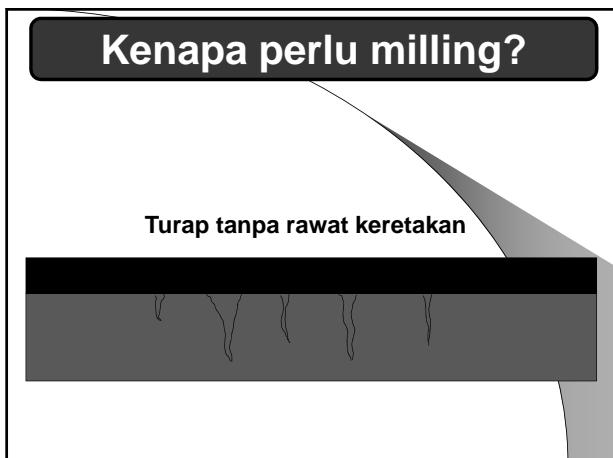
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### Kenapa perlu milling?

Keretakan pantulan



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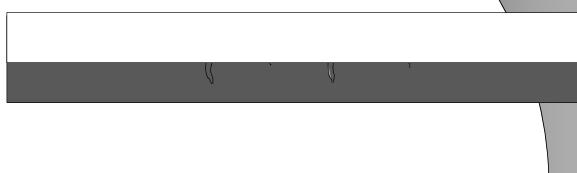
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### Kenapa perlu milling?

Mill dahulu....



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### Kenapa perlu milling?

.... baru turap



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**Pakai JCB?**



**Habuk milling mesti dibersihkan**





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### Berlekuk

Selepas...

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### Berlekuk

Lekuk tidak mungkin dapat diisi oleh asphalt semasa penurapan. Asphalt bukan cecair!

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### Berlekuk

Lapisan nipis yang tidak stabil

Lekuk

Lekuk tidak mungkin dapat diisi oleh asphalt semasa penurapan. Asphalt bukan cecair!

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## Berlekuk



Lapisan nipis yang tidak stabil

Lekuk

Lekuk tidak mungkin dapat diisi oleh asphalt semasa penurapan. Asphalt bukan cecair!

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## Berlekuk



Masalah pemasatan

Lapisan nipis yang tidak stabil

Lekuk

Lekuk tidak mungkin dapat diisi oleh asphalt semasa penurapan. Asphalt bukan cecair!

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## Berlekuk



Lapisan nipis yang tidak stabil

Lekuk

Lekuk tidak mungkin dapat diisi oleh asphalt semasa penurapan. Asphalt bukan cecair!

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## Berlekuk



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## Serpihan asphalt lama



Serpihan asphalt lama yang tidak dibuang juga boleh menjadikan keputusan ujian ke atas sampel.

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### Rumusan

- 1. Semasa milling, wearing course lama mesti dibuang semua.
- 2. Milling depth ditentukan melalui sampel core.
- 3. Permukaan jalan selepas milling semestinya rata dan tidak berlekuk.
- 4. Serpihan asphalt lama dan lekuk akan menjelaskan prestasi turapan.
- 5. Serpihan asphalt lama akan menjelaskan keputusan ujian ke atas sampel core.
- 6. Habuk milling mesti dibersihkan sebelum sembur tack coat - permukaan milling mesti bersih dan kering.

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**Terima Kasih**

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