

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR
SESI JUN 2016

DCC3113: HIGHWAY AND TRAFFIC ENGINEERING

TARIKH : 22 OKTOBER 2016
MASA : 11.15 AM - 1.15 PM (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Bahagian A: Struktur (2 soalan)

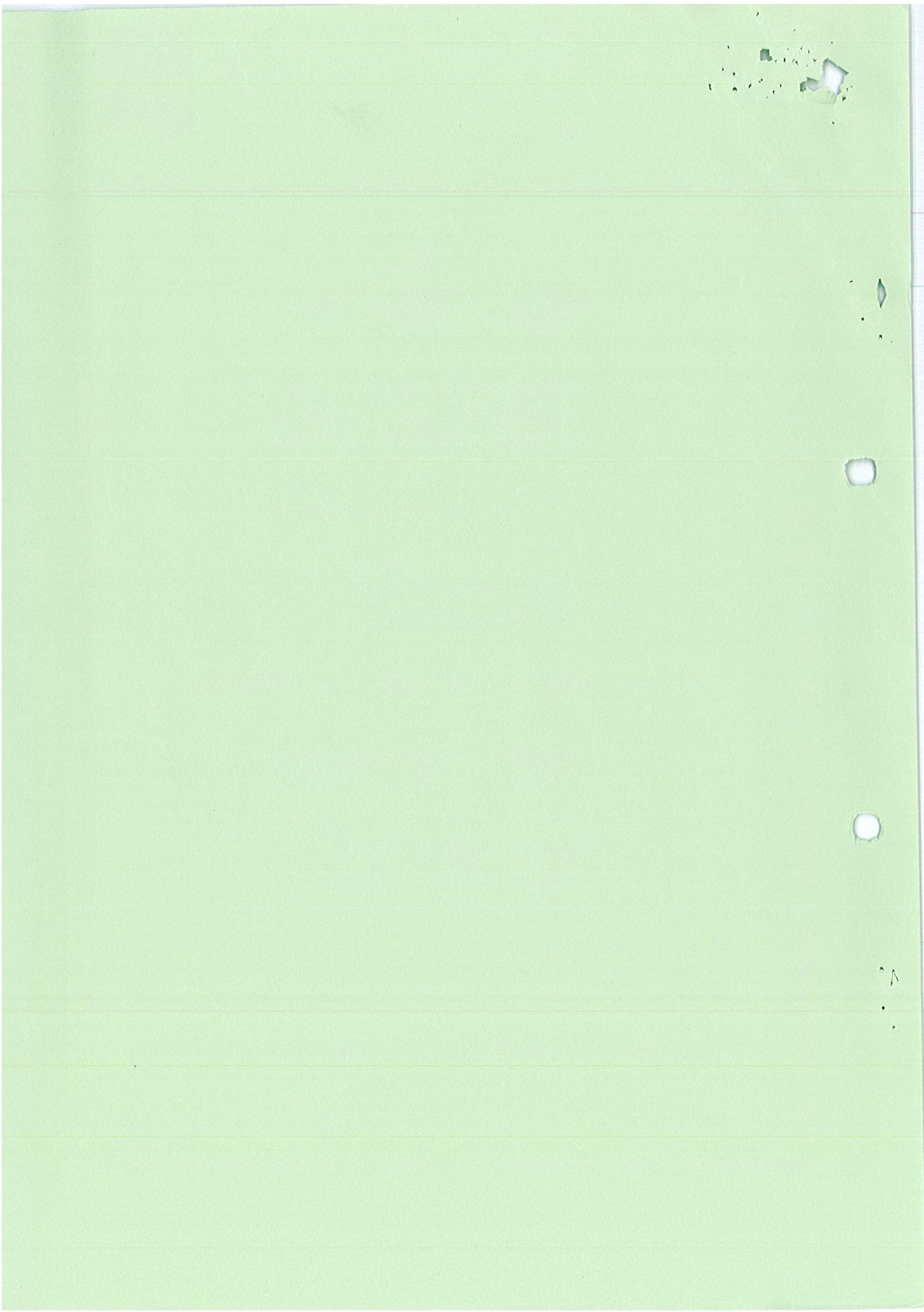
Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A: 50 MARKS
BAHAGIAN A: 50 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi DUA (2) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**

CLO1
C1

- (a) List **FIVE (5)** infra-structures used in transportation field in our country.

Senaraikan LIMA (5) infra-struktur pembinaan yang digunakan di dalam bidang pengangkutan di negara kita.

[5 marks]

[5 markah]

CLO1
C2

- (b) Explain transportation planning.

Terangkan Perancangan Pengangkutan.

[5 marks]

[5 markah]

CLO1
C3

- (c) Sequence the procedure to carry out the following pavement materials quality tests

Susunkan prosedur bagi menjalankan ujian-ujian terhadap mutu bahan turapan jalan raya yang berikut

- i. Aggregate Crushing Value Test

Ujian Nilai Penghancuran Agregat

- ii. Flakiness Index Test

Ujian Indeks Kekepinginan Agregat

- iii. Penetration Test

Ujian Penusukan

[15 marks]

[15 markah]

QUESTION 2**SOALAN 2**

CLO1

- (a) State
- FIVE (5)**
- materials that are used in the construction of rigid pavement.

C1

*Nyatakan **LIMA (5)** bahan yang digunakan dalam pembinaan turapan tegar.*

[5 marks]

[5 markah]

CLO1

- (b) Describe the following items as below:

C2

Terangkan item-item berikut seperti di bawah:

- i. Aggregates

Batu baur

- ii. Natural aggregates

Batu baur semulajadi

- iii. Coarse aggregates

Batu baur kasar

- iv. Fine aggregates

Batu baur halus

- v. Filler

Pengisi

[10 marks]

[10 markah]

CLO1

- (c) A new road has an initial average daily traffic of 8340 cv/day in both directions.

C3

The rate of traffic growth is 8%. Percentage of commercial vehicle is 15%. Design life of flexible pavement is 10 years and the CBR for sub-grade of the road is 4.8%.

Calculate;

Sebuah jalan baru mempunyai purata laluan harian sebanyak 8340 kenderaan/hari dalam kedua-dua arah laluan. Kadar perkembangan traffik adalah 8%. Peratus kenderaan perdagangan ialah 15%. Jangka hayat rekabentuk turapan lentur ialah 10 tahun dan nilai CBR untuk sub-gred jalan ini ialah 4.8%. Kirakan;

i. Annual commercial traffic for one way, V_o

Purata laluan tahunan untuk satu arah, V_o

[5 marks]

[5 markah]

ii. Cumulative commercial traffic for the design period, V_c

Kenderaan perdagangan kumulatif untuk jangka hayat rekabentuk, V_c

[5 marks]

[5 markah]

SECTION B: 50 MARKS
BAHAGIAN B: 50 MARKAH**INSTRUCTION:**

This section consists of **FOUR (4)** structured questions. Answer **TWO (2)** questions only.

ARAHAN:

Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **DUA (2)** soalan sahaja.

QUESTION 1**SOALAN 1**CLO2
C2

- (a) Pavement can be classified into two which are flexible pavement and rigid pavement.

Turapan boleh diklasifikasikan kepada dua iaitu turapan lentur dan turapan tegar.

- i. Describe **THREE (3)** functions of subbase layer.

*Terangkan **TIGA (3)** fungsi-fungsi bagi lapisan sub tapak.*

[3 marks]
[3 markah]

- ii. Explain in details the subbase layer construction method of flexible pavement in Malaysia.

Terangkan secara terperinci tentang kaedah pembinaan lapisan sub tapak bagi turapan lentur di Malaysia.

[12 marks]
[12 markah]

CLO2
C4

- (b) There are several types of rigid pavement that are usually used in road construction. Compare the advantages and disadvantages of Jointed Reinforced Concrete Pavement and Continuously Reinforced Concrete Pavement.

Terdapat beberapa jenis turapan tegar yang biasa digunakan di dalam pembinaan jalan raya. Bandingkan kelebihan dan kelemahan bagi Turapan Konkrit Tetulang Bersambungan dan Turapan Konkrit Tetulang Berterusan.

[10 marks]
[10 markah]

QUESTION 2
SOALAN 2

- CLO2 (a) Traffic signboards are needed to control the traffic operation and to help the road user. Illustrate **TWO (2)** types for each signboard.

*Papan tanda diperlukan untuk mengawal operasi lalulintas dan untuk membantu pengguna jalanraya. Lakarkan **DUA (2)** jenis papan tanda bagi setiap kategori.*

[10 marks]

[10 markah]

- CLO2 (b) The following conditions are given :

Chess of road JKR 05

Initial daily traffic volume (ADT) 6,600

Percentage of commercial vehicles 15%

Annual growth rate 7%

Equivalence factor 2.0

Subgrade CBR 5%

Type of terrain : Rolling terrain

Calculate the thickness of each layers in flexible pavement .

Maklumat yang disediakan adalah seperti berikut :

Jenis Laluan Jalan JKR 05

Purata Lalulintas Harian (ADT) 6,600

Peratus kendaraan perdagangan 15%

Kadar pertumbuhan tahunan 7%

Faktor setara 2.0

CBR subgred 5%

Jenis muka bumi : Beralun

Kirakan ketebalan setiap lapisan turapan lentur

[15 marks]

[15 markah]

QUESTION 3
SOALAN 3

CLO2
C2

- (a) Identify **FIVE (5)** factors of potential conflict points occur at an intersection.

*Kenalpasti **LIMA (5)** faktor yang berpotensi berlaku titik konflik di persimpangan.*

[5 marks]

[5 markah]

CLO2
C3

- (b) A fixed time two phase signal is to be provided at four arms intersection. The actual flow rate, Q and saturation flow, S are shown in **Table 3**.

Lampu isyarat dua fasa hendaklah disediakan di satu persimpangan empat. Kadar aliran sebenar dan aliran tepu adalah seperti yang ditunjukkan di dalam Jadual 3.

Table 3/Jadual 3

	North/Utara	South/Selatan	East/ Timur	West/ Barat
<i>Actual flow rate (pcu/hr), Q</i>	600	500	500	300
<i>Kadar aliran sebenar (ukp/j), Q</i>				
<i>Saturation flow, S</i>	1885	1885	1845	1845
<i>Aliran tepu, S</i>				

Given data /Data diberi

Amber time, $a = 3 \text{ sec}$

Masa kuning, $a = 3s$

Lost time, $l_1 = 2 \text{ sec}$

Masa kehilangan, $I = 2s$

Integrated period, $I = 4 \text{ sec}$

Tempoh perubahan, $I = 4s$

Calculate: / Kirakan:

- i. Maximum Saturation Flow, y_{max} .

Aliran tepu maksimum, y_{max} .

[3 marks]

[3 markah]

- ii. Optimum cycle time, C_o .

Masa kitaran optimum, C_o .

[3 marks]

[3 markah]

- iii. Length of cycle time, L

Panjang masa kitaran, L

[3 marks]

[3 markah]

- iv. Green times to the two phases, G(a) and G(b)

Masa hijau ditetapkan, G(a) and G(b)

[3 marks]

[3 markah]

- v. Time diagram for each phase.

Rajah masa setiap fasa

[3 marks]

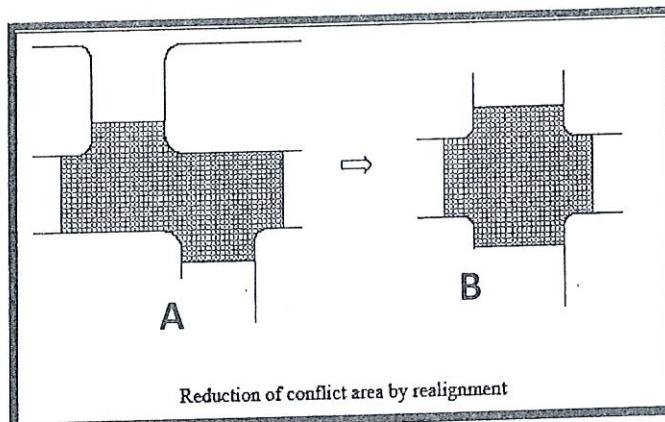
[3 markah]

CLO2
C5

- (c) Channelisation and realignment can reduce conflict area. As an engineer at Bandar Raya Melaka, predict **FIVE (5)** solutions from situation A to situation B by considering factor of reduction conflict area as shown in **Figure 1**.

Penyaluran dan penyusunan semula aliran jalan boleh mengurangkan konflik sesuatu kawasan. Sebagai seorang jurutera di Bandar Raya Melaka, Jangkakan LIMA (5) penyelesaian dari keadaan konflik kawasan A ke keadaan konflik B dengan mengambilkira faktor kawasan pengurangan konflik seperti yang ditunjukkan di dalam Rajah 1.

Figure 3/Rajah 3



[5 marks]

[5 markah]

QUESTION 4

SOALAN 4

CLO2
C3

- (a) Using diagrams, sketch **FIVE (5)** examples on how traffic control devices can reduce road accidents.

Dengan bantuan gambarajah, lakarkan **LIMA (5)** contoh bagaimana peranti kawalan trafik boleh mengurangkan kadar kemalangan jalanraya

[10 marks]

[10 markah]

CLO2
C3

- (b) Pavement maintenance includes all the methods and techniques used to restore or maintain a specified level of service and to prolong pavement life by slowing its deterioration rate. Interpret all categories of road maintenance with **THREE (3)** examples for each category.

- i. Emergency maintenance
- ii. Present/routine maintenance
- iii. Periodic maintenance

*Penyelenggaraan turapan termasuklah semua kaedah dan teknik yang digunakan untuk mengembalikan atau mengekalkan tahap perkhidmatan jalan supaya jangka hayat turapan lebih panjang serta dapat memperlahangkan kadar kemerosotan turapan. Terjemahkan semua jenis penyelenggaraan jalan beserta **TIGA** (3) contoh bagi setiap kategori.*

- i. Penyeleggaraan kecemasan
- ii. Penyelenggaraan semasa/rutin
- iii. Penyelenggaraan berkala

[15 marks]

[15 markah]

SOALAN TAMAT

LAMPIRAN FORMULA DCC3113: HIGHWAY & TRAFFIC ENGINEERING

INTERSECTION DESIGN

a. $S = 525 W \text{ or } S = 160 W$

b. $y = \frac{Q}{S}$

c. $L = \sum l + \sum (l - k)$

d. $C_o = \frac{1.5L+5}{1-Y}$

e. $g_{phase} = (C_o - L) \left(\frac{y_{phase}}{Y} \right)$

FLEXIBLE PAVEMENT DESIGN

a. $V_o = ADT \times 365 \times (P_c / 100) \times \text{Directional}$

b. $V_c = V_o [1 + r]^n - 1] / r$

c. $ESA @ JBG = V_c \times e$

d. $V_x = V_i (1 + r) x$

e. $c = I_x R \times T$

f. $C = 10 \times c$

g. $TA' = SN = a_1 D_1 + a_2 D_2 + \dots + a_n D_n$

$G_{phase} = g_{phase} + l - k$

PAVEMENT DESIGN FORMULA

Table 3.1 Guide for Equivalence Factor

Percentage of selected heavy goods vehicles*	0-15%	16-50%	51-100%
Type of road Equivalence Factor	local 1.2	trunk 2.0	3.0

Table 3.2 Maximum Hourly Capacity under ideal conditions

Road Type	Passenger Vehicle Units per hour
Multilane	2000 per lane
Two lanes (bothways)	2000 total for bothways
Three lanes (bothways)	4000 total for bothways

Table 3.3 Carriageway Roadway Reduction Factor

Carriageway Width	Shoulder Width			
	2.00m	1.50m	1.25m	1.00m
7.5m	1.00	0.97	0.94	0.90
7.0m	0.88	0.86	0.83	0.79
6.0m	0.81	0.78	0.76	0.73
5.0m	0.72	0.70	0.67	0.64

Table 3.4 Traffic Reduction Factor

Type of Terrain	Factor*
Flat	$T = 100/(100+P_c)$
Rolling	$T = 100/(100+2P_c)$
Mountainous	$T = 100/(100+5P_c)$

Table 3.5 Structural Layer Coefficients

Component	Type of Layer	Property	Coefficient
Wearing and Binder Course	Asphalt Concrete		1.00
Base Course	Dense Bituminous Macadam	Type 1: Stability > 400 kg	0.80
		Type 2: Stability > 300 kg	0.55
	Cement Stabilized	Unconfined Compressive strength(7 days) 30-40 kg/cm ²	0.45
		Mechanically Stabilized crushed aggregate	0.32
Subbase	Sand, laterite etc.	CBR ≥ 20%	0.23
	Crushed aggregate	CBR ≥ 30%	0.25
	Cement Stabilized	CBR ≥ 60%	0.28

Table 3.6 Minimum Layer Thickness

Type of layer	Minimum thickness
Wearing Course	4 cm
Binder Course	5 cm
Base Course	Bituminous
	Wet Mix
	Cement treated*
Subbase Course	Granular
	Cement treated

Table 3.7 Standard & Construction Layer Thickness

Type of layer	Standard thickness	One layer lift
Wearing course	4-5 cm	4-5 cm
Binder course	5-10 cm	5-10 cm
Base Course	Bituminous	5-20 cm
	Wet mix	10-20 cm
	Cement treated	10-20 cm
Subbase Course	Granular	10-30 cm
	Cement treated	15-20 cm

Table 3.8 Minimum thickness of Bituminous Layer

T _A	Total thickness of bituminous layer
< 17.5 cm	5.0 cm
17.5 - 22.5 cm	10.0 cm
23.0 - 29.5 cm	15.0 cm
> 30.0 cm	17.5 cm