PENGUJIAN SISTEM LAMPU JALAN

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JENIS PENGUJIAN

1) Luminance – Luminance meter
   Jalan lurus (cd/m2) –
   sight distance 60m

2) Illuminance – Illuminance meter
   Conflict area (lux)

PERKARA PENTING

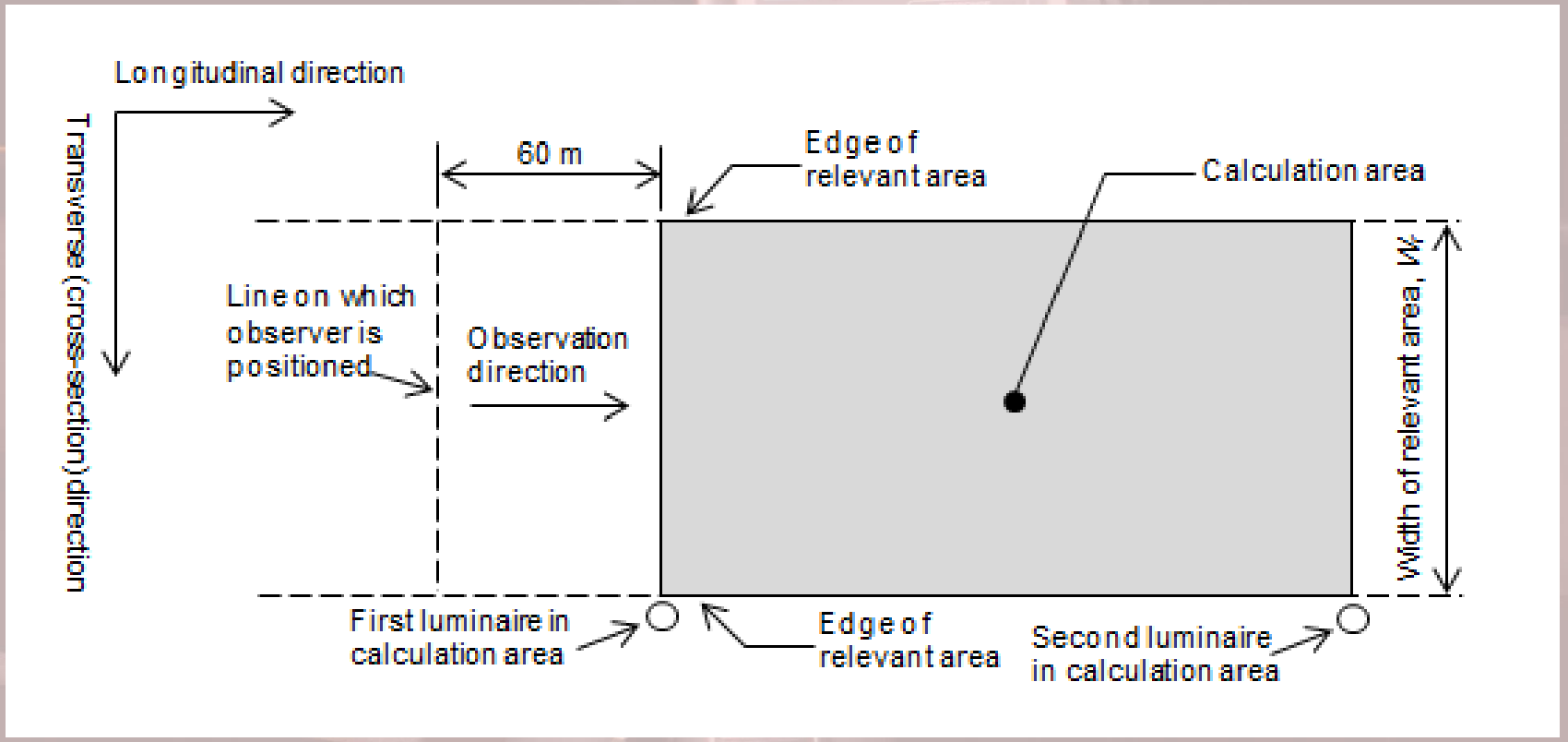
Perkara yang perlu diambil perhatian semasa pengujian :-

1) Keselamatan : traffic management plan (TMP), baju keselamatan
2) Cuaca – malam gelap, tidak hujan
3) Kestabilan lampu jalan – *discharge lamp* ambil masa utk stabil
4) Keadaan persekitaran – lampu luar, halangan pokok
5) Peralatan pengujian - perlu dikalibrasi
6) Lokasi yang sesuai – rujuk BS EN 13201-3 :2003
7) Laporan pengujian – direkod dgn tepat

Lighting Classes

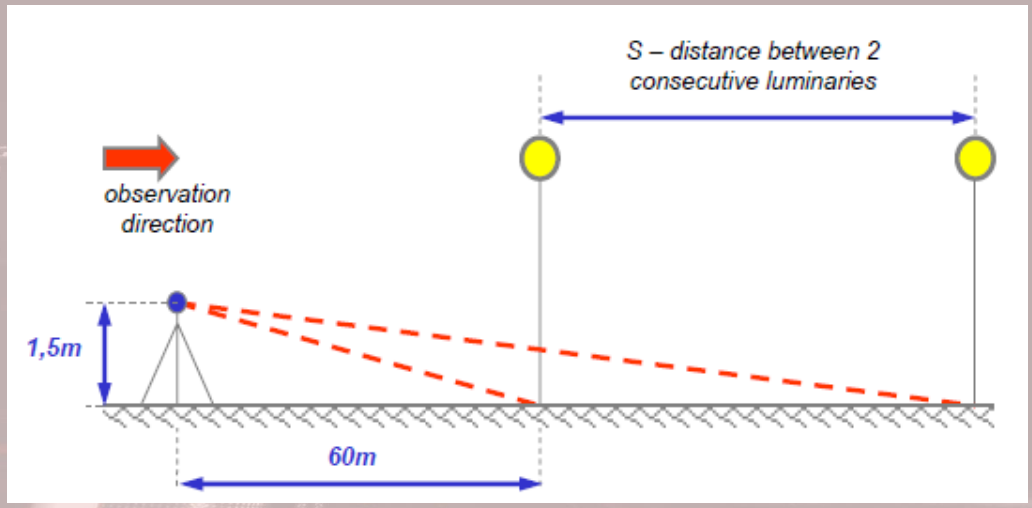
ME	This class is intended for users of motorised vehicles on traffic routes
CE	This class is intended for users of motorised vehicles in conflict areas such as road intersections, roundabouts, viewing distances are less than 60 m. etc.

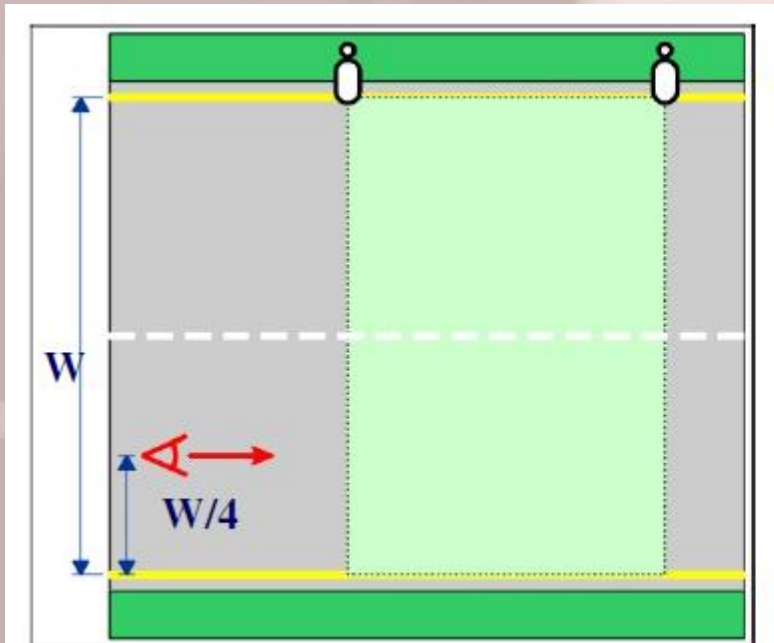
Measurement Area for Luminance

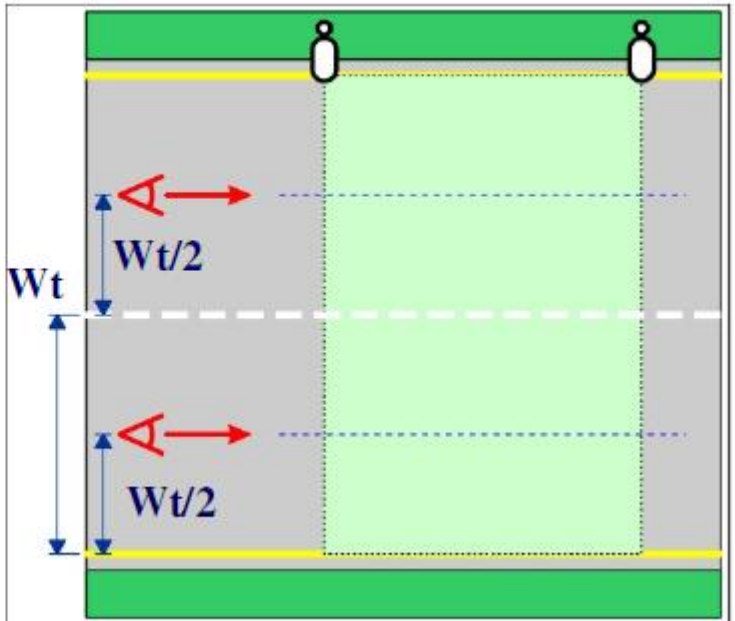


Position of observer for luminance measurement

- The observer's eye is at the height of 1.5 m above the road level.
- The observer is positioned in the middle of each lane in turn. For each position of the observer, the luminance is measured over the whole width of the carriageway

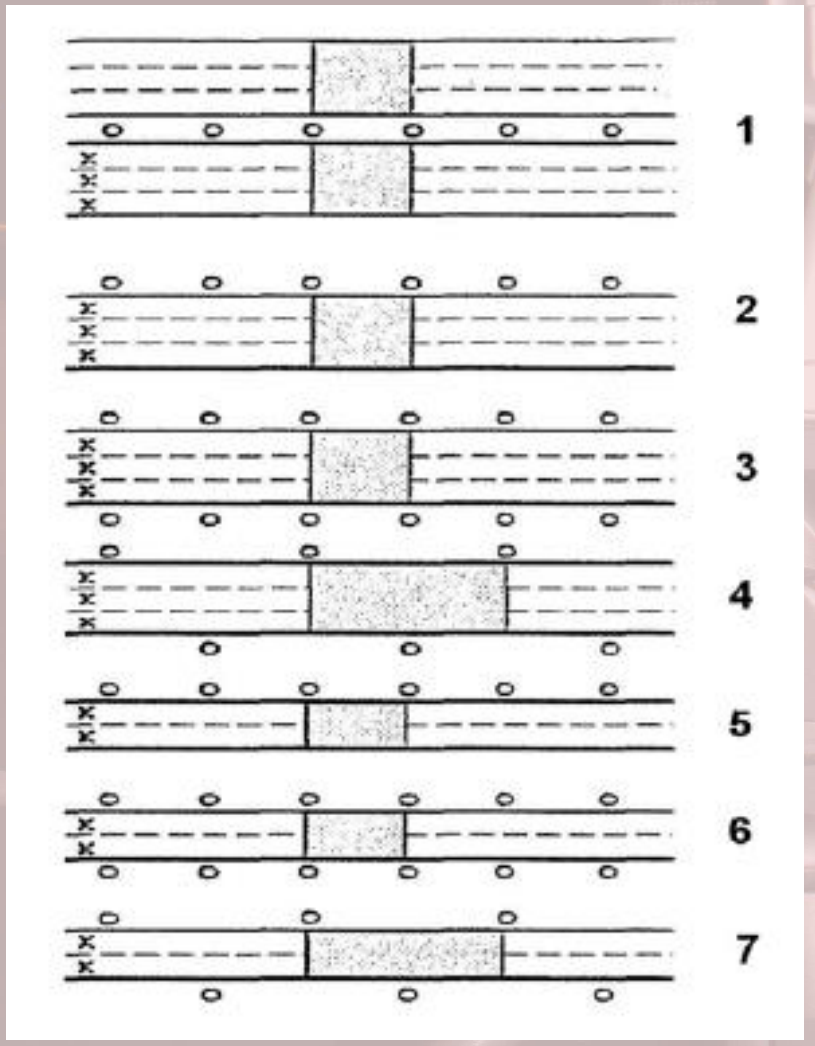






Position of observer for luminance

For each position of the observer, the luminance is measured over the whole width of the carriageway.



1 six lane road with central reservation

2 three lane road, single side luminaire arrangement

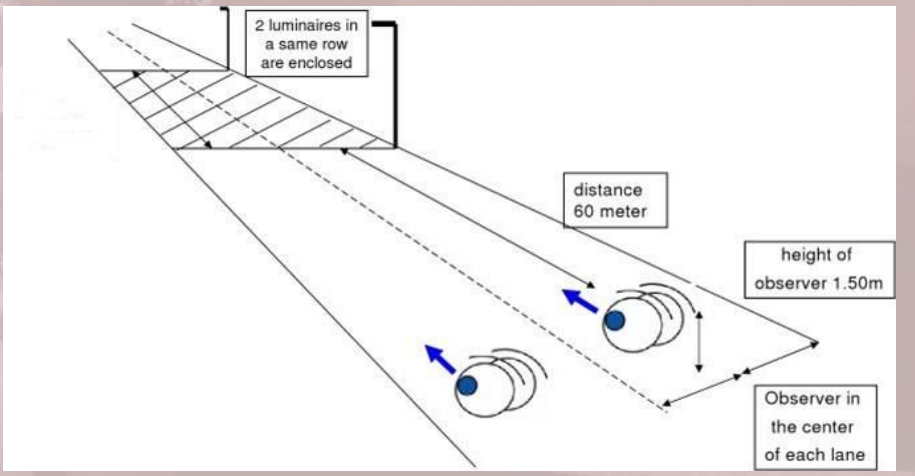
3 three lane road. Double side luminaire arrangement

4 three lane road. Staggered luminaire arrangement

5 two lane road. Single side luminaire arrangement

6 two lane road. Double side luminaire arrangement

7 two lane road. Staggered luminaire arrangement



LUMINANCE TEST

1) Jarak observer dari lampu jalan = **60m**

2) Jarak longitudinal **D=S/N**

D : jarak di antara titik (longitudinal) , m

S : jarak antara lampu jalan

N : bilangan titik longitudinal (S<30m, N=10)

(S>30m, N= integer terkecil yang memberi D<3m)

Baris pertama titik-titik ialah pada jarak D/2 dari lampu

3) Jarak Tranverse **d = WL/3**

d : jarak antara titik (tranverse), m

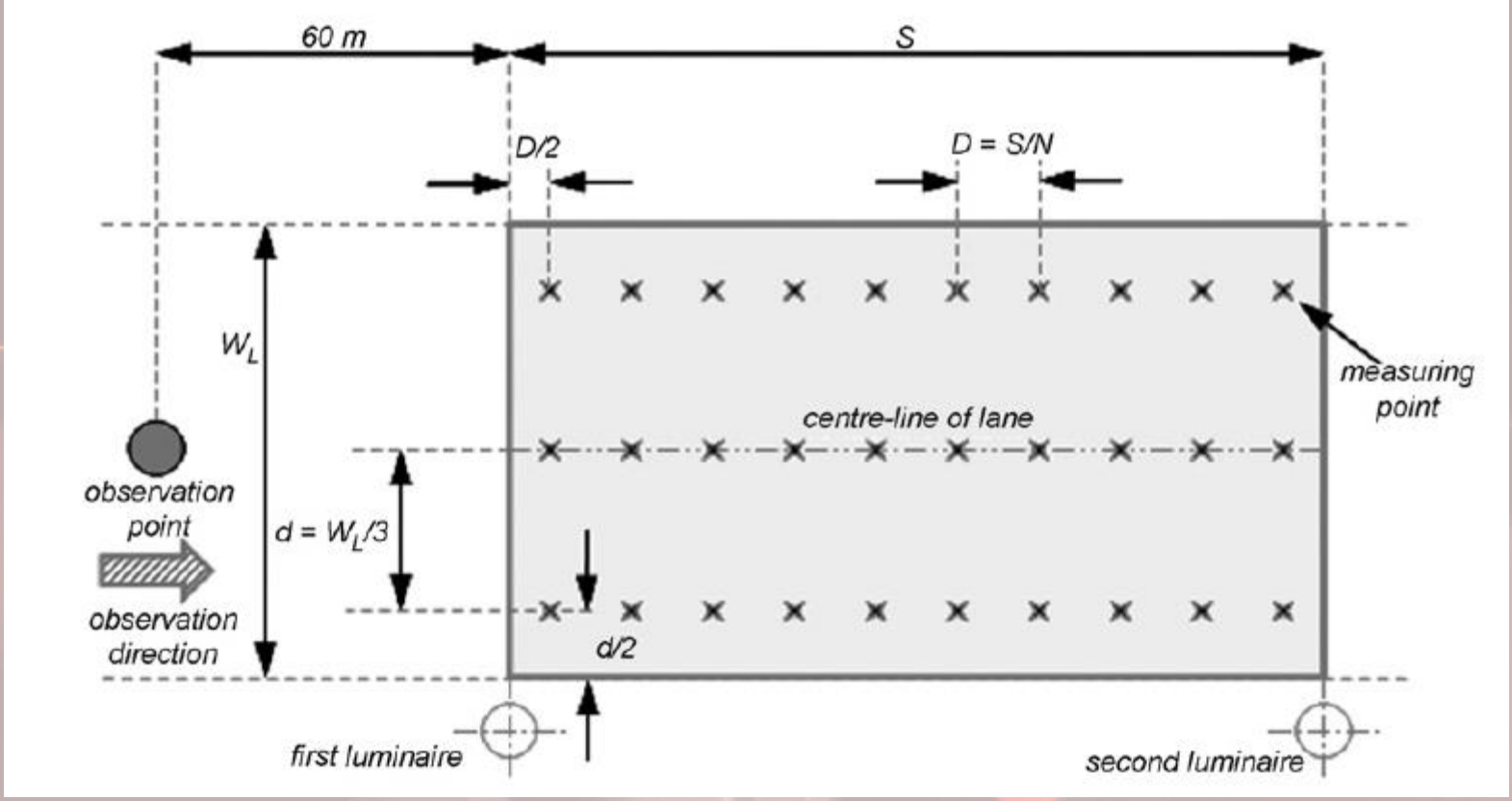
WL : Lebar lane, m

Jarak titik pertama dari edge line = d/2

4) Tinggi mata pemerhati = **1.5m** dari road level

Position of measurement points for luminance

(Refer MS 825, BS EN 13201)



W_L : width of the lane (m)
D : spacing between points in the longitudinal direction (m)
S : spacing between luminaires (m)
N : number of calculation points in the longitudinal direction,
for $S \leq 30$ m, $N = 10$
for $S > 30$ m, **the smallest integer** giving $D \leq 3$ m.
d : spacing between points in the transverse direction.

Average luminance and overall uniformity

Average luminance (L_{ave})and overall uniformity of luminance (U_O) should be calculated **for the entire carriageway and for each position of the observer.**

The U_O is calculated from the formula:

$$U_O = \frac{L_{min}}{L_{ave}}$$

where,

L_{min} : lowest luminance, **occurring at any grid point** in the field of measurement

Longitudinal uniformity

Longitudinal uniformity of luminance (U_L)should be measured for each centre line of each lane. The U_L is calculated from the formula:

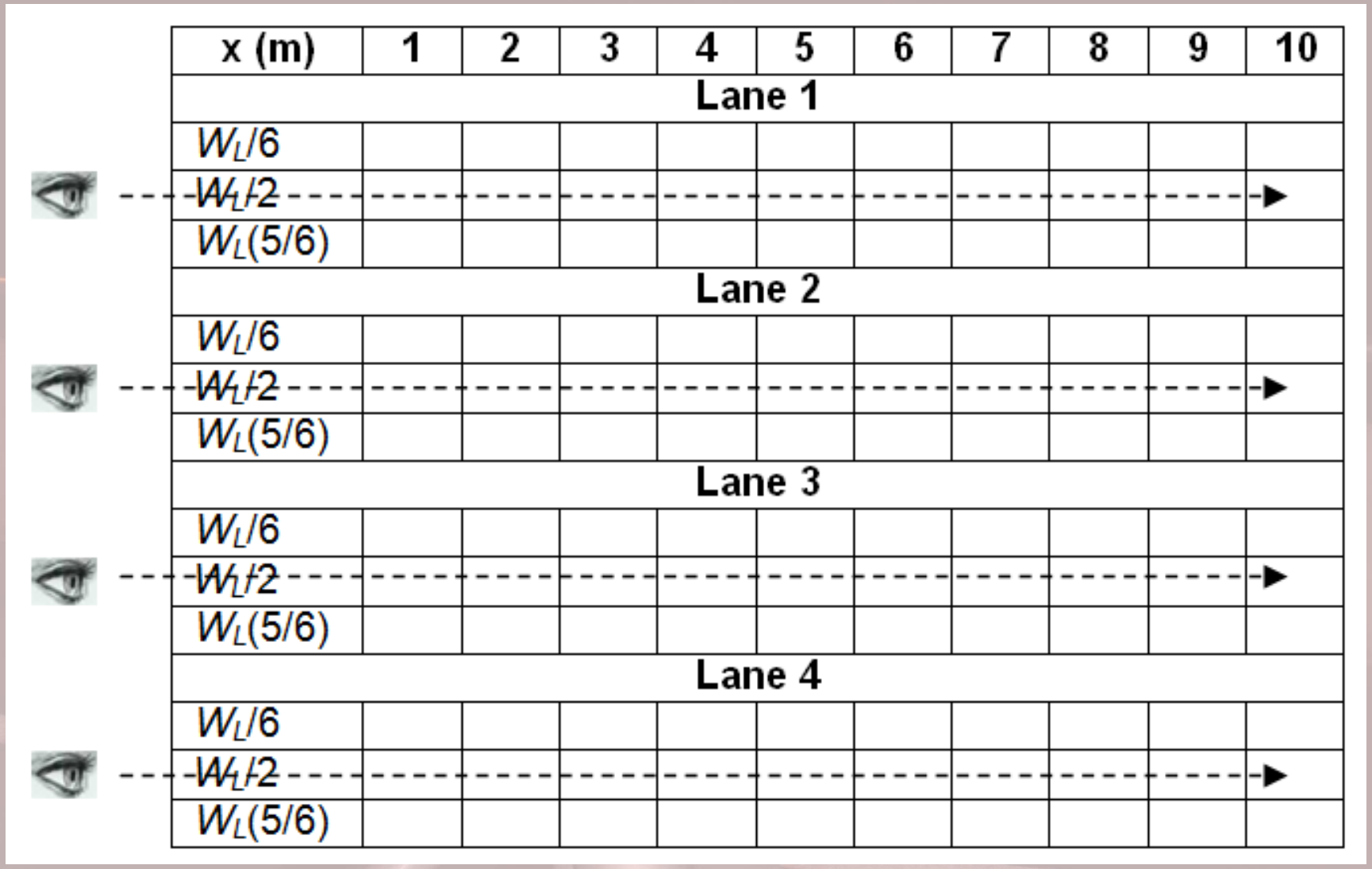
$$U_L = \frac{L_{min}}{L_{max}}$$

where,

L_{min} : lowest luminance in the longitudinal direction **along the centre line of each lane.**

L_{max} : highest luminance in the longitudinal direction **along the centre line of each lane.**

Measurement of longitudinal uniformity



x (m)	1	2	3	4	5	6	7	8	9	10
Lane 1										
$W_L/6$										
$W_L/2$										
$W_L(5/6)$										
Lane 2										
$W_L/6$										
$W_L/2$										
$W_L(5/6)$										
Lane 3										
$W_L/6$										
$W_L/2$										
$W_L(5/6)$										
Lane 4										
$W_L/6$										
$W_L/2$										
$W_L(5/6)$										

Measurement of luminance

Result

Average luminance (L_{ave})

L_{ave} = _____ cd/m^2 (take the lowest value between four observers)

Overall uniformity of luminance (U_o)

U_o = _____ (take the lowest value between four observers)

Longitudinal uniformity of luminance (U_L)

U_L = _____ (take the lowest value between four lane)

LUMINANCE TEST

ILLUMINANCE TEST

Measurement of illuminance

For conflict areas or viewing distances are less than 60 m, illuminance measurements should comply with CE lighting classes.

For luminance measurements are practicable (traffic routes), the illuminance measurements should also be taken to check the compliance between the design and installation.

ILLUMINANCE TEST

1) Jarak longitudinal **D=S/N**

D : jarak di antara titik (longitudinal) , m

S : jarak antara lampu jalan

N : bilangan titik longitudinal (S<30m, N=10)

(S>30m, N= integer terkecil yang memberi D<3m)

Baris pertama titik-titik ialah pada jarak D/2(m) dari lampu

3) Jarak Transverse **d = Wr/n**

d : jarak antara titik (tranverse), m

Wr : Lebar kawasan, m

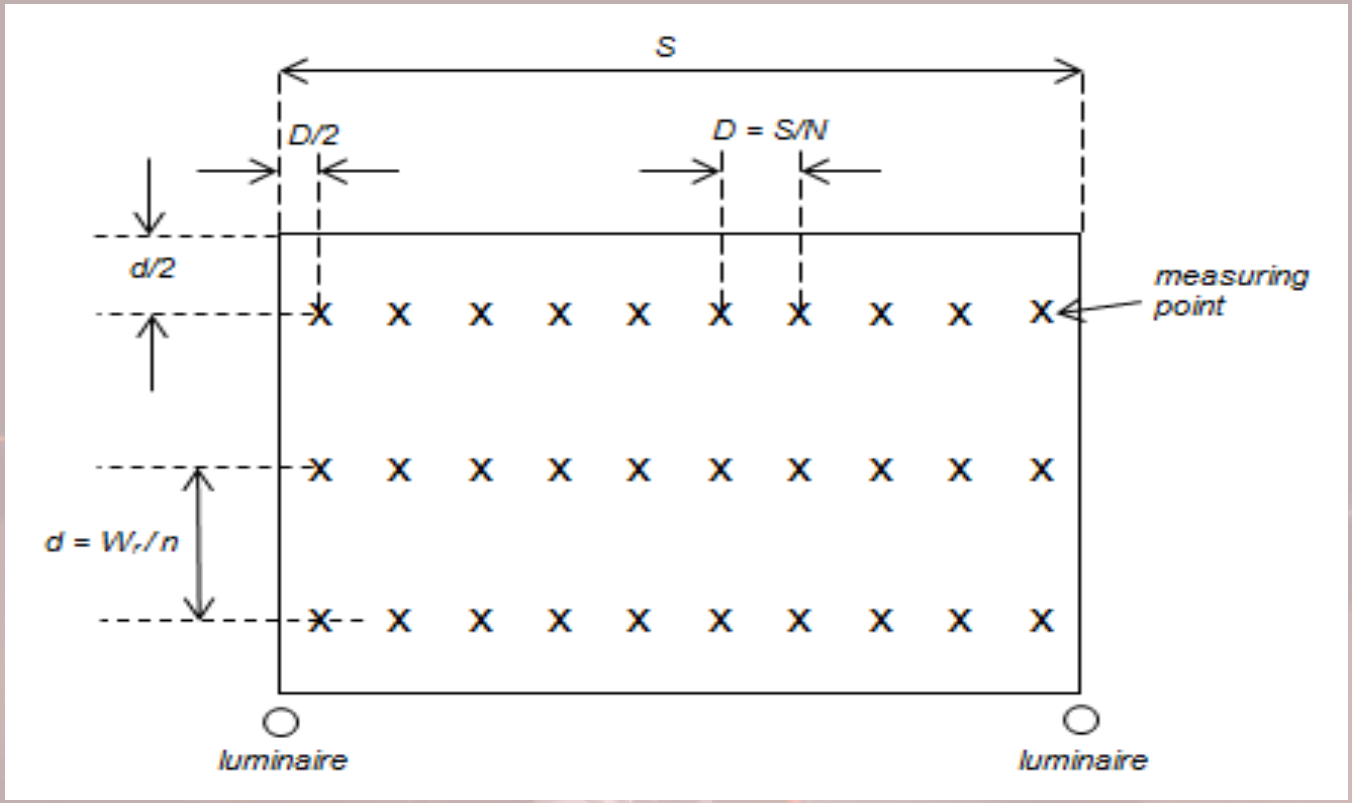
n: bil titik di lokasi tranverse mesti >3 dan integer terkecil yang memberi d <1.5m

Jarak titik pertama dari edge line = d/2(m)

4) Illuminance meter : Atas jalan raya

Measurement points for illuminance

(Based on MS 825, BS EN 13201)



D : spacing between points in the longitudinal direction (m)
S : spacing between luminaires (m)
N : number of calculation points in the longitudinal direction,
for $S \leq 30$ m, $N = 10$
for $S > 30$ m, **the smallest integer** giving $D \leq 3$ m
d : spacing between points in the transverse direction (m).
W_r : width of the carriageway or relevant area (m).
n : the number of points in the transverse direction with a value $n \geq 3$ and is **the smallest integer** giving $d \leq 1.5$ m.

Average illuminance and uniformity of illuminance

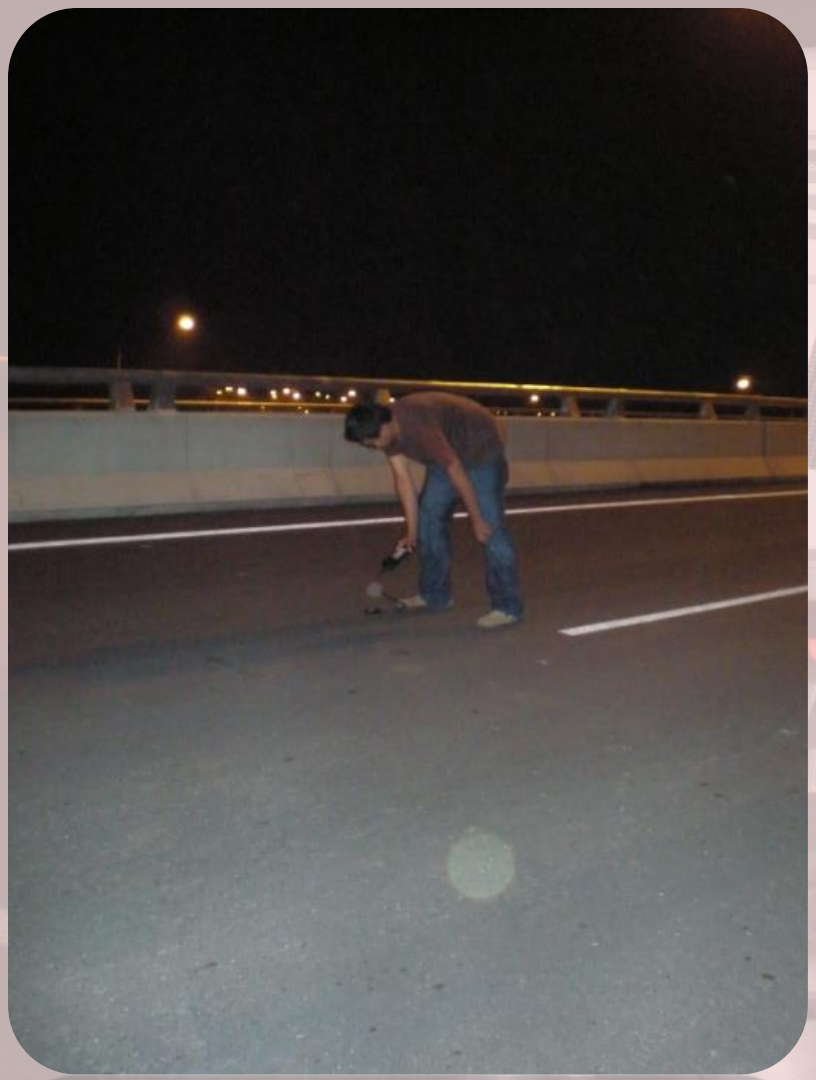
Average illuminance($\bar{E}$)and uniformity of illuminance (U_o)should be calculated for the entire relevant area. The U_o is calculated from the formula:

$$U_O = \frac{E_{min}}{\bar{E}}$$

where,

E_{min} : lowest illuminance, occurring at any grid point in the field of measurement.

ILLUMINANCE TEST



Credit isi kandungan slide : Ir. Hamzah Ismail, UPRBA2 CKE