Faculty of Engineering

Department of Transportation

Highway Engineering
Data Sheet

Professor Dr. Eng.

Gomaa Moussa

2011-2012

Combined Effect of Lane Width & Edge Clearance on Practical Capacity

2-Lane								
Edge Clearance (m)	Obstruction from one side				Obstruction from both side			
	3.75	3.50	3.00	2.75	3.75	3.50	3.00	2.75
1.85	100 %	86 %	77 %	70 %	100 %	86 %	77 %	70 %
1.50	96 %	83 %	74 %	68 %	92 %	79 %	71 %	65 %
0.50	91 %	78 %	70 %	64 %	81 %	70 %	63 %	57 %
0.00	85 %	73 %	66 %	60 %	70 %	60 %	54 %	49 %

Multi-Lane								
Edge Clearance (m)	Obstruction from one side				Obstruction from both side			
	3.75	3.50	3.00	2.75	3.75	3.50	3.00	2.75
1.85	100	97	91	81	100	97	91	81
1.50	99	96	90	80	98	95	89	79
0.50	97	94	88	79	94	91	86	76
0.00	90	87	82	73	81	79	74	66

Effect of Commercial Vehicles on Practical Capacity

Commercial Vehicles %	Level Terrain		Rolling Terrain	
	2-Lane	Multi-Lane	2-Lane	Multi-Lane
0%	100	100	100	100
10%	68	91	58	77
20%	62	83	47	63

Effect of Passing Sight Distance on Practical Capacity of 2-Lane Rural Roads Only

Percentage of Road Length Having Sight Distance Less than 450 m	Capacity (Passenger Car/hr/2-Lanes)	
	Speed (70 ~ 80 Km/hr)	Speed (80 ~ 90 Km/hr)
0%	900	600
20%	860	560
40%	800	500
60%	720	420
80%	620	300
100%	500	160

Minimum Stopping Sight Distance (S_n) Versus Speed (V)

V (km/hr)	50	65	80	95	105	110	120	130
S_n (m)	55	80	115	150	165	185	205	230

Minimum Stopping Sight Distance (S_p) Versus Speed (V)

Lanes	2-Lane					3-Lane		
V (Km/hr)	50	65	80	95	110	80	95	110
S_p (m)	245	385	510	620	700	360	440	500

P_{Co} → Practical Capacity

$PC = P_{Co} * F_1 * F_2$ veh/hr/2

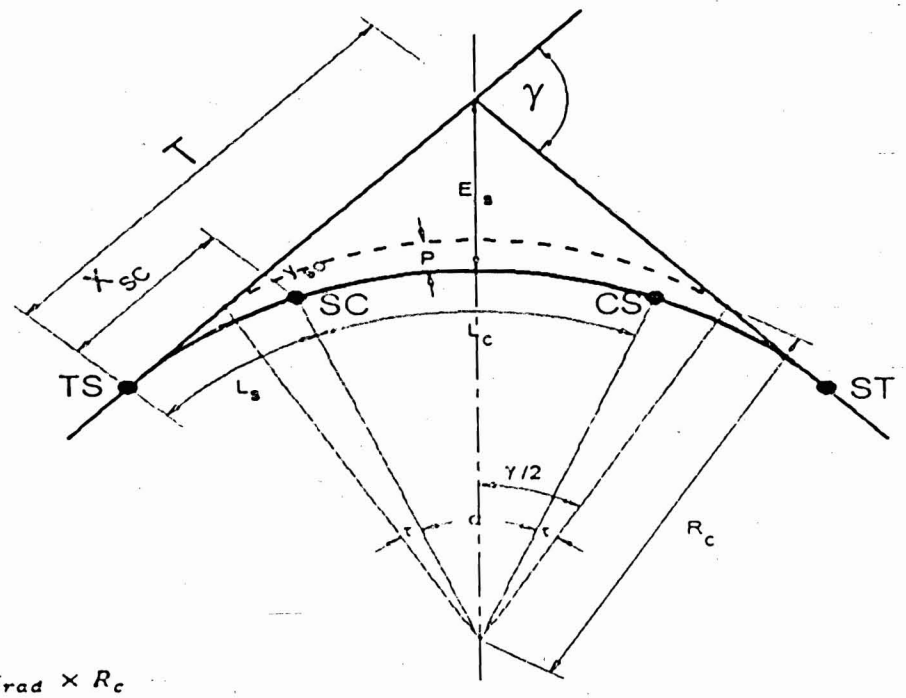
Coefficient of Side Friction (f_s) Versus Speed on Curve (V_c)

V_c (km/hr)	30	50	60	80	90	100
f_s (m)	0.16	0.15	0.14	0.13	0.12	0.10

Minimum Spiral Curve Constant (A_{min}) of Clotoide Type Versus Speed on Curve (V_c)

V_c (km/hr)	40	60	80	100	120	140
A_{min}	50	100	150	200	350	500

Elements of Circular & Transition Curves



$$L_s = 2\tau_{rad} \times R_c$$

$$\gamma^\circ = 2\tau^\circ + \alpha^\circ$$

$$P = Y_{sc} + R_c \times [\cos\tau^\circ - 1]$$

$$L_c = \alpha_{rad} \times R_c$$

$$T = X_{sc} + [P + R_c] \times \tan\left(\frac{\gamma^\circ}{2}\right) - R_c \times \sin\tau$$

$$E_s = [P + R_c] \times \sec\left(\frac{\gamma^\circ}{2}\right) - R_c$$

Coordinates of Transition Curves:

$$X = L \times \left[1 - \frac{L^4}{40 \times A^4}\right] \qquad \& \qquad Y = \frac{L^3}{6A^2} \times \left[1 - \frac{L^4}{56 \times A^4}\right]$$

AASHTO Limits for Gradaion of Coarse Grianed Soils

Sieve Number	A-1		A-3	A-2
	A-1-a	A-1-b		
#10	50 max.			
#40	30 max.	50 max.	51 min.	
#200	15 max.	25 max.	10 max.	35 max.

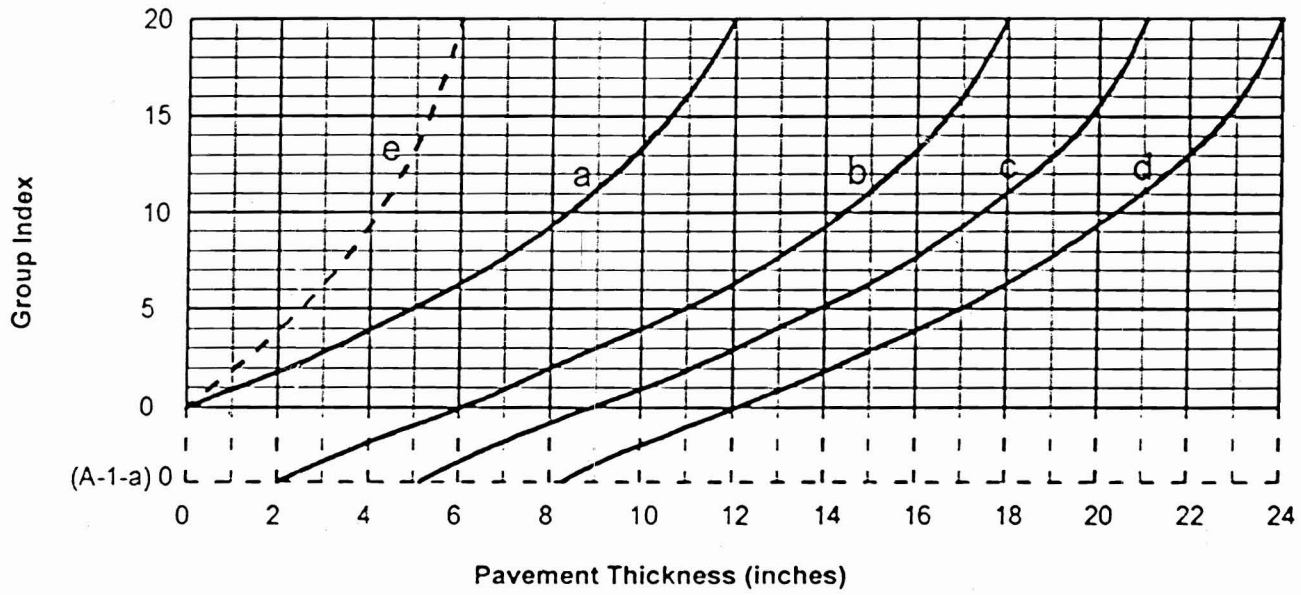
Group Index

$$GI = 0.2\,a + 0.005\,ac + 0.01\,bd$$

where;

a = %Passing Sieve Number 200 – 35 = 0 ~ 40
b = %Passing Sieve Number 200 – 15 = 0 ~ 40
c = LL – 40 = 0 ~ 20
d = PI – 10 = 0 ~ 20

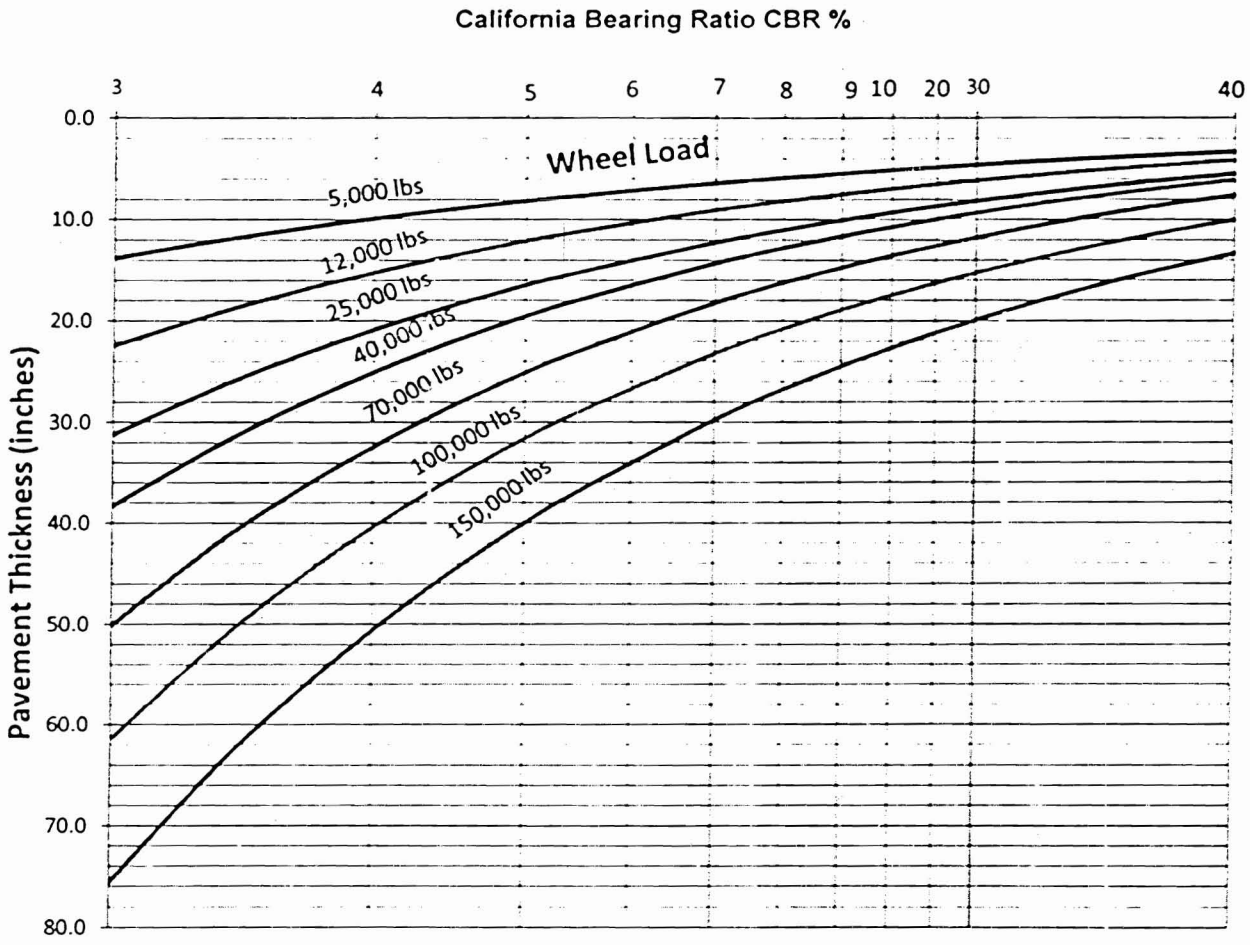
Group Index (G.I.) Design Chart For Flexible Pavement



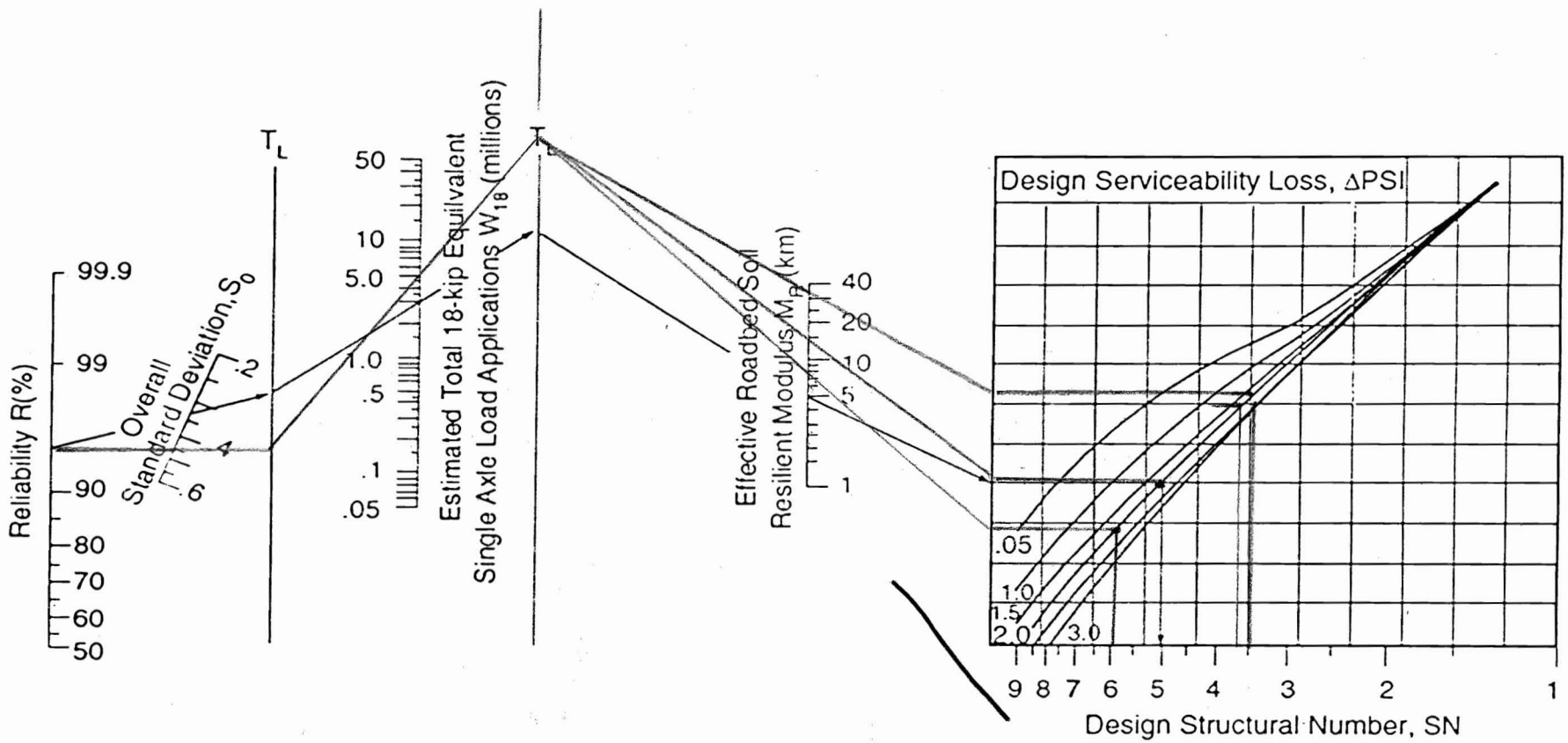
where;

a = thickness of sub-base course
b = total thickness in case of light traffic (< 50 truck/day)
c = total thickness in case of medium traffic (= 50 ~ 300 truck/day)
d = total thickness in case of heavy traffic (> 300 truck/day)
e = thickness of equivalent base course

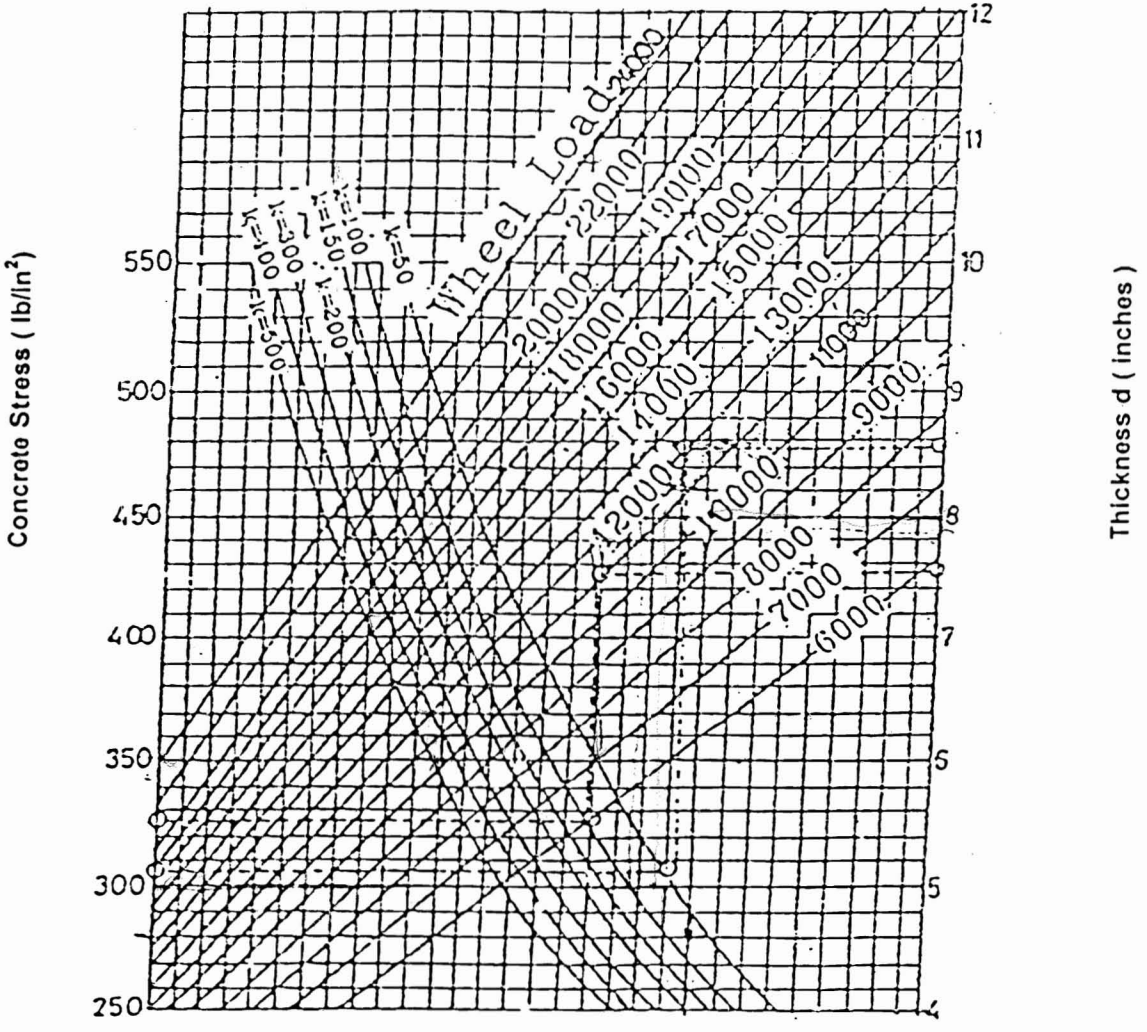
C.B.R. Design Chart For Flexible Pavement



AASHTO 1993 Design Guide Procedure Chart For Flexible Pavement



Design Charts for Rigid Pavement Thickness (Protected Corners)



Design Charts for Rigid Pavement Thickness (Unprotected Corners)