

2002.5.20. /

1.

가

가

1)

가

2)

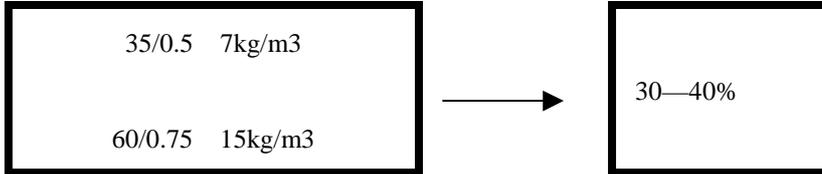
(

)

35/0.5  
30—40%

7kg/m<sup>3</sup>, 60/0.75

15kg/m<sup>3</sup>



. kg

HC35/0.5	649m
HC80/60	300m
HC50/0.7	325m
HC50/0.8	254m
HC65/60(60/0.9)	200m

[#8@150](#)

kg

7m

가

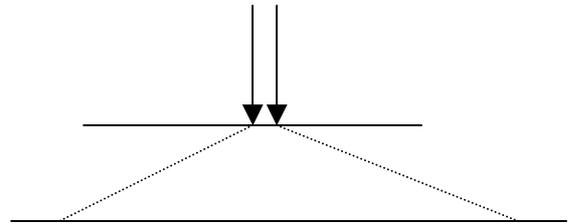
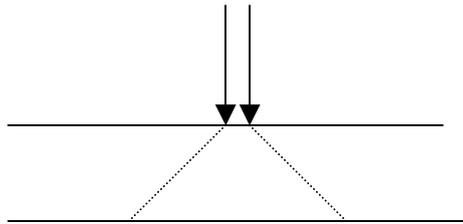
가

가

가 , , , 가

가

( )



가 가

가

1) ( )

2)

$$M_n = M_o + M_p > M_u$$

Westergaard

Losberg

1)

K

2)

(a)

(b)

(c)

3)

## 2.

가

15~25cm 가  
±3cm

K

K

Subgrade

	k-value(N/mm3)	
	Lower value	Upper value
Humus soil or peat	0.005	0.015
Recent embankment	0.01	0.02
Fine or slightly compacted sand	0.015	0.03
Well compacted sand	0.005	0.1
Very well compacted sand	0.1	0.15
Loam or clay(moist)	0.03	0.06
Loam or clay	0.08	0.1
Clay with sand	0.08	0.01
Crushed stone with sand	0.1	0.15
Coarse crushed stone	0.2	0.25
Well compacted crushed stone	0.2	0.3

## 3.

가.

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Hetenyi's

formulae

$$M_{max} = 0.168 * q/\lambda^2$$

$$f_b \text{ ( maximum bending stress) } = 1.008 * q/\lambda^2 h^2$$

q ;

$$\lambda ; (3k/Eh^3)^{0.25}$$

## Slab on grade calculation for uniform load by Hetenyi's equation &

### LOAD DATA

	<b>2</b> ton/m <sup>2</sup>	0.2 kg/cm <sup>2</sup>
k-value	<b>0.05</b> N/mm <sup>3</sup>	5 ton/m <sup>2</sup>

### THICKNESS

	<b>110</b> mm
load transfer (edge)	30 %
	<b>8000</b> mm
L/h=	72.7272727
Application	indoor please mention indoor or outdoor
shrinkage of concrete	0.02 %
restraint factor	1
contact surface	<b>4</b> 1:vinyl 2:sand 3:granular subbase
Temperature difference	<b>0</b>

### CALCULATED STRESSES AND MOMENTS

	Load stress	Shrinkage	Temperature	subtotal
CENTRAL	2.11	0.90	0	3.01
EDGE	2.11	0.45	0	2.56
Corner	2.11	0	0	2.11
Max stress				<b>3.01</b>
uniform load	2.11	0.9	0	3.01

	Uniform load
safety factor for ductility	1.40
stress factor for fatigue strength	1.00
min fu of SFRC	<b>3.01</b>
	<b>30.00</b> N/mm <sup>2</sup>
	3.86 N/mm <sup>2</sup>

15.00 HC80/60

15.00 HC80/60

HC80/60	15.00
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### . Rack

Rack leg size ; a x b

Leg span(distance) ; z

=> combined contact area = (a+z)b

Rack leg

Point load  
Westergaard combined load

.

,

5

load

5

80%

Westergaard  
Westergaard  
가 4  
가 2  
가  
combined

HC80/60

# HC80/60

		210kg/cm <sup>2</sup>											
K		0.015N/mm <sup>3</sup> (1.1ton/m <sup>2</sup> )				0.05N/mm <sup>3</sup> (5.3ton/m <sup>2</sup> )				0.1N/mm <sup>3</sup> (10.3ton/m <sup>2</sup> )			
(kg/m <sup>3</sup> )		15	20	25	30	15	20	25	30	15	20	25	30
1		10	10	10	10	10	10	10	10	10	10	10	10
2		12	12	12	11	12	11	11	11	11	11	11	10
5		19	18	18	17	18	17	17	16	17	16	16	16
10		26	25	24	24	24	24	23	22	23	23	22	21
20		36	35	34	33	33	32	32	31	32	31	30	29
500kg/m <sup>2</sup>		10	10	10	10	10	10	10	10	10	10	10	10
1ton/m <sup>2</sup>		14	13	11	11	10	10	10	10	10	10	10	10
1.5ton/m <sup>2</sup>		30	28	25	24	10	10	10	10	10	10	10	10
2ton/m <sup>2</sup>		53	49	45	41	10	10	10	10	10	10	10	10
3ton/m <sup>2</sup>						11	10	10	10	10	10	10	10
4ton/m <sup>2</sup>						19	18	16	15	10	10	10	10
5ton/m <sup>2</sup>						30	27	25	23	10	10	10	10

		240kg/cm <sup>2</sup>											
K		0.015N/mm <sup>3</sup> (1.1ton/m <sup>2</sup> )				0.05N/mm <sup>3</sup> (5.3ton/m <sup>2</sup> )				0.1N/mm <sup>3</sup> (10.3ton/m <sup>2</sup> )			
(kg/m <sup>3</sup> )		15	20	25	30	15	20	25	30	15	20	25	30
1		10	10	10	10	10	10	10	10	10	10	10	10
2		12	11	10	10	11	11	10	10	11	10	10	10
5		18	17	17	20	17	16	16	15	16	16	15	15
10		24	24	23	23	23	22	22	21	22	21	21	20
20		35	33	32	31	32	31	30	29	30	29	29	28
500kg/m <sup>2</sup>		10	10	10	10	10	10	10	10	10	10	10	10
1ton/m <sup>2</sup>		12	11	10	10	10	10	10	10	10	10	10	10
1.5ton/m <sup>2</sup>		25	23	21	20	10	10	10	10	10	10	10	10
2ton/m <sup>2</sup>		45	41	38	35	10	10	10	10	10	10	10	10
3ton/m <sup>2</sup>						10	10	10	10	10	10	10	10
4ton/m <sup>2</sup>						16	15	14	13	10	10	10	10
5ton/m <sup>2</sup>						25	23	21	20	10	10	10	10

		270kg/cm <sup>2</sup>											
K		0.015N/mm <sup>3</sup> (1.1ton/m <sup>2</sup> )				0.05N/mm <sup>3</sup> (5.3ton/m <sup>2</sup> )				0.1N/mm <sup>3</sup> (10.3ton/m <sup>2</sup> )			
(kg/m <sup>3</sup> )		15	20	25	30	15	20	25	30	15	20	25	30
1		10	10	10	10	10	10	10	10	10	10	10	10
2		11	11	11	10	11	10	10	10	10	10	10	10
5		17	16	16	16	16	16	15	15	15	15	15	14
10		23	23	22	22	22	21	21	20	21	20	20	19
20		32	31	31	30	30	29	29	29	29	28	27	27

500kg/m <sup>2</sup>	10	10	10	10	10	10	10	10	10	10	10	10	10
1ton/m <sup>2</sup>	10	10	10	10	10	10	10	10	10	10	10	10	10
1.5ton/m <sup>2</sup>	22	20	18	17	10	10	10	10	10	10	10	10	10
2ton/m <sup>2</sup>	38	35	32	29	10	10	10	10	10	10	10	10	10
3ton/m <sup>2</sup>					10	10	10	10	10	10	10	10	10
4ton/m <sup>2</sup>					14	13	12	10	10	10	10	10	10
5ton/m <sup>2</sup>					22	20	18	17	10	10	10	10	10

		300kg/cm <sup>2</sup>											
K		0.015N/mm <sup>3</sup> (1.1ton/m <sup>2</sup> )				0.05N/mm <sup>3</sup> (5.3ton/m <sup>2</sup> )				0.1N/mm <sup>3</sup> (10.3ton/m <sup>2</sup> )			
(kg/m <sup>3</sup> )		15	20	25	30	15	20	25	30	15	20	25	30
1		10	10	10	10	10	10	10	10	10	10	10	10
2		11	10	10	10	10	10	10	10	10	10	10	10
5		16	16	15	15	15	15	15	14	15	14	14	14
10		22	22	21	21	21	21	20	20	20	20	19	19
20		31	30	29	29	29	28	27	27	28	27	26	26
500kg/m <sup>2</sup>		10	10	10	10	10	10	10	10	10	10	10	10
1ton/m <sup>2</sup>		10	10	10	10	10	10	10	10	10	10	10	10
1.5ton/m <sup>2</sup>		19	17	16	15	10	10	10	10	10	10	10	10
2ton/m <sup>2</sup>		33	30	28	26	10	10	10	10	10	10	10	10
3ton/m <sup>2</sup>					59	10	10	10	10	10	10	10	10
4ton/m <sup>2</sup>						12	11	10	10	10	10	10	10
5ton/m <sup>2</sup>						19	17	16	15	10	10	10	10

## Joint

		15kg						20kg					
		15kg	20kg	25kg	30kg	35kg	40kg	15kg	20kg	25kg	30kg	35kg	40kg
10cm	400cm	450	500	550	600	800	380	400	420	440	460	500	
11cm	440	495	550	605	660	880	418	440	462	484	506	550	
12cm	480	540	600	660	720	960	456	480	504	528	552	600	
13	520	585	650	715	780	1040	494	520	546	572	598	650	
14	560	630	700	770	840	1120	532	560	588	616	644	700	
15	600	675	750	825	900	1200	570	600	630	660	690	750	
16	640	720	800	880	960	1280	608	640	672	704	736	800	
17	680	765	850	935	1020	1360	646	680	714	748	782	850	
18	720	810	900	990	1080	1440	684	720	756	792	828	900	
19	760	855	950	1045	1140	1520	722	760	798	836	874	950	
20	800	900	1000	1100	1200	1600	760	800	840	880	920	1000	
21	840	945	1050	1155	1260	1680	798	840	882	924	966	1050	
22	880	990	1100	1210	1320	1760	836	880	924	968	1012	1100	
23	920	1035	1150	1265	1380	1840	874	900	900	1012	1058	1150	
24	960	1080	1200	1320	1440	1920	900	900	900	1056	1104	1200	
25	1000	1125	1250	1375	1500	2000	900	900	900	1100	1150	1250	
26	1040	1170	1300	1430	1560	2080	900	900	900	1144	1196	1300	
27	1080	1215	1350	1485	1620	2160	900	900	900	1188	1242	1350	
28	1120	1260	1400	1540	1680	2240	900	900	900	1232	1288	1400	
29	1160	1305	1450	1595	1740	2320	900	900	900	1276	1334	1450	
30	1200	1350	1500	1650	1800	2400	900	900	900	1320	1380	1500	

4.

가.

1)

2)

가

가

가

가

12cm

가 2-3cm

가 가

HC80/60 15kg/m <sup>3</sup>	-1~-3cm	HC80/60 30kg/m <sup>3</sup>	-4~-6cm
HC80/60 20kg/m <sup>3</sup>	-2~-4cm	HC80/60 35kg/m <sup>3</sup>	-5~-7cm
HC80/60 25kg/m <sup>3</sup>	-3~-5cm	HC80/60 40kg/m <sup>3</sup>	-6~-8cm

\*\*

1) ;  
10mm isolation joint

2)  
가)  
 ) 15—25cm  
 )  
 ) 가 가 가

1) 가  
가  
가

2) 가  
2  
1-2 가 가  
가

1)

가 7—8cm  
 가 12cm  
 가 가  
 가

2)

가 가  
 가) )  
 가) ; ( ) → 7—8cm  
 가 ; → 12cm

\*\*

)

가 ; + ( ) → 2-3cm  
 가 ; + ( 2.5m) +  
 → 3” 가

\*

3)

가  
 가 6—12  
 가

\*\*

가

가

가

4)

가

가

가

가

5)

가)

(induced contraction joint)

24

가

48

가 3:2

1/3

3mm

\*\*\* HC80/60 40kg/m3

45M X 45M

300KG/CM2

15CM

40%

\*\*\*\*

48

) (construction joint) . 1  
 . Expansion Joint Shrinkage Joint  
 . 가 .

) Isolation Joint

가 . 가 .

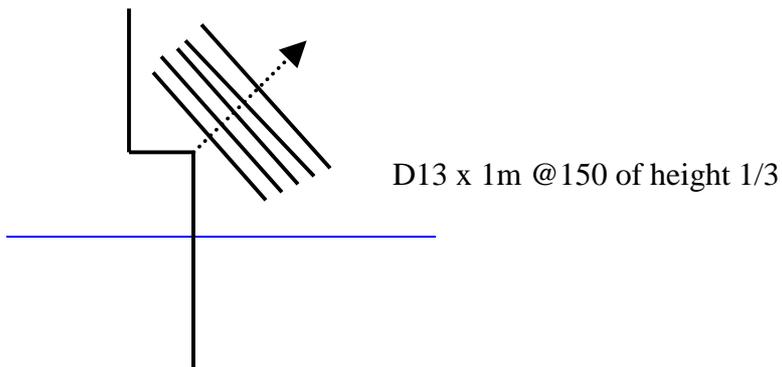
) Expansion Joint  
 Expansion Joint 가 15cm  
 120m 가 240m  
 25mm

**6) Jointless floor**

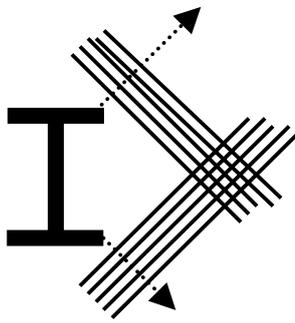
; Min 300kg/cm2  
 ; HC80/60 40kg/m3  
 ;  
 ; K=min 0.05N/mm3  
 Expansion Joint ; Max 45 x 45m  
 : or  
 5—6 가

가	10mm
2mx2m	5.8mm
	5D13 @150
	1/3

**Jointless floor**



D13 x1.5m @150 x 5-6 pieces



1. ;
2. ; 2001.9--10
3. ; 300kg/cm<sup>2</sup>
4. ; 2,000 x 2,000 x 150mm
5.
  - 1) 80mm
  - 2) D11cm
- 6.

NR-R			15cm	11ton
SR-R	D13@150 ,		15cm	54ton
F30R-R	30kg/m <sup>3</sup>		15cm	40ton
F40R-R	40kg/m <sup>3</sup>		15cm	52ton