

HIGHWAYS

Permanent Load Transfer: JRI+ System (supported edges and sealed joints)

Slabs with measures 3a * 3b are articulated forming a * b slabs

JRI+ JOINTS		Heavy Traffic: 10.000 trucks/day and line						Concrete 4,5 MPa	
Length	Width	Thickness	Soil Reaction	Therm. Stress	Load Stress	Total Stress	Equivalent Axes	Years: 250	Slab resist.
(3,5*3) 10,5	(3,5*3) 10,5	0,26	0,00	0,00	1,164	1,164	333.000.000	(20% De-icing)	4,37
(3*3) 9	(3,5*3) 10,5	0,22	28	0,255	0,693	0,948	1.644.000.000	Yes	4,44
(2,3*3) 6,9	(2,625*3) 7,875	0,19	92	0,341	0,672	1,013	1.310.000.000	Yes	4,57
(1,6*3) 4,8	(2,1*3) 6,3	0,15	220	0,308	0,815	1,123	950.000.000	Yes	4,82
m	m	m	MPa/m	MPa	MPa	MPa	13 Tons Axes		MPa

JRI+ JOINTS		Soft Traffic: 25 trucks/day and line						Concrete 4,5 MPa	
Length	Width	Thickness	Soil Reaction	Therm. Stress	Load Stress	Total Stress	Equivalent Axes	Years: 250	Slab resist.
(3,5*3) 10,5	(3,5*3) 10,5	0,19	0,00	0,00	2,295	2,295	500.000	(20% De-icing)	4,68
(2,3*3) 6,9	(2,625*3) 7,875	0,15	28	0,180	1,939	2,118	2.900.000	Yes	4,82
(1,6*3) 4,8	(2,1*3) 6,3	0,12	92	0,219	2,048	2,267	2.500.000	Yes	5,09
(1,2*3) 3,6	(1,75*3) 5,25	0,08	220	0,283	2,275	2,558	2.300.000	Yes	5,71
m	m	m	MPa/m	MPa	MPa	MPa	13 Tons Axes		MPa

K=0,00MPa (De-icing areas, time 20%)					
Length	Width	Thickness	Traffic		
10,5 3,5	10,5 3,5	0,26	T00	13 Tons (IMDp ≥ 4.000)	
10,5 3,5	10,5 3,5	0,25	T0	(IMDp de 2.000 a 4.000)	
10,5 3,5	10,5 3,5	0,24	T1	(IMDp de 800 a 2.000)	
10,5 3,5	10,5 3,5	0,23	T2	(IMDp de 200 a 800)	
10,5 3,5	10,5 3,5	0,22	T31	(IMDp de 100 a 200)	
10,5 3,5	10,5 3,5	0,21	T32	(IMDp de 50 a 100)	
10,5 3,5	10,5 3,5	0,20	T41	(IMDp de 25 a 50)	
10,5 3,5	10,5 3,5	0,19	T42	(IMDp ≤ 25)	

K=28MPa CBR=3					
Length	Width	Thickness	Traffic		
9 3	10,5 3,5	0,22	T00	13 Tons (IMDp ≥ 4.000)	
8,7 2,9	10,5 3,5	0,21	T0	(IMDp de 2.000 a 4.000)	
8,4 2,8	10,5 3,5	0,20	T1	(IMDp de 800 a 2.000)	
8,1 2,7	10,5 3,5	0,19	T2	(IMDp de 200 a 800)	
7,8 2,6	7,875 2,625	0,18	T31	(IMDp de 100 a 200)	
7,5 2,5	7,875 2,625	0,17	T32	(IMDp de 50 a 100)	
7,2 2,4	7,875 2,625	0,16	T41	(IMDp de 25 a 50)	
6,9 2,3	7,875 2,625	0,15	T42	(IMDp ≤ 25)	

K=92MPa CBR=30					
Length	Width	Thickness	Traffic		
6,9 2,3	7,875 2,625	0,19	T00	13 Tons (IMDp ≥ 4.000)	
6,6 2,2	7,875 2,625	0,18	T0	(IMDp de 2.000 a 4.000)	
6,3 2,1	7,875 2,625	0,17	T1	(IMDp de 800 a 2.000)	
6,0 2,0	7,875 2,625	0,16	T2	(IMDp de 200 a 800)	
5,7 1,9	6,3 2,1	0,15	T31	(IMDp de 100 a 200)	
5,4 1,8	6,3 2,1	0,14	T32	(IMDp de 50 a 100)	
5,1 1,7	6,3 2,1	0,13	T41	(IMDp de 25 a 50)	
4,8 1,6	6,3 2,1	0,12	T42	(IMDp ≤ 25)	

K=220MPa CBR=100					
Length	Width	Thickness	Traffic		
4,8 1,6	6,3 2,1	0,15	T00	13 Tons (IMDp ≥ 4.000)	
4,8 1,6	6,3 2,1	0,14	T0	(IMDp de 2.000 a 4.000)	
4,8 1,6	6,3 2,1	0,13	T1	(IMDp de 800 a 2.000)	
4,8 1,6	6,3 2,1	0,12	T2	(IMDp de 200 a 800)	
4,5 1,5	5,25 1,75	0,11	T31	(IMDp de 100 a 200)	
4,2 1,4	5,25 1,75	0,10	T32	(IMDp de 50 a 100)	
3,9 1,3	5,25 1,75	0,09	T41	(IMDp de 25 a 50)	
3,6 1,2	5,25 1,75	0,08	T42	(IMDp ≤ 25)	

Surface and thickness measurements interpolate for other foundations

For instance, for a **T0** traffic with a reaction module of 55MPa/m and width of 10,5m:
 Length "a" will be $2,2+(2,9-2,2)*(92-55)/(92-28) = 2,605\text{m}$
 Width "b" will be $2,625+ (3,5-2,265)*(92-55)/(92-28) = 3,14\text{m}$ with $b \leq 1,5*a=1,5*2,60=3,9\text{m}$
 Thickness "c" will be $0,18+(0,21-0,18)*(92-55)/(92-28) = 0,197$. Slab will be $2,6*3,5*0,2\text{m}$

Width "b" can be different in the same section. For instance, 2,5; 3,5 and 4,5m
 Thicknesses in the table are minimum, not average
 Concrete resistance can be lower than 4,5MPa, increasing thicknesses
 Shoulders have the same concrete cross section as the roadbeds

It will be possible to adapt to specific solutions in each specific case with inadequate or marginal terrain

The asphalt concrete layer will get a finish of concrete or a layer of asphalt mix, according to the project
 The AC layer can be extended only on roadbed areas, or on shoulders too
 An asphalt concrete layer can be applied at any moment

Useful life of the whole table is 250 years. Only the rolling asphalt mix layer will require renovation
 Useful life grows with a reinforcement, like in conventional roadbeds

A fissure repair is made with an alternating sewing in both sides of fissure and sealing

There is no need of bases, or sub-bases, nor of an improvement of foundation

The following table renders the relation between CBR and K module of soil reaction:

1 MPa/m = 101,9 Ton/m ³					
CBR %	2	3	4	5	7
K (MPa/m)	21	28	35	42	48
CBR %	10	15	20	50	100
K (MPa/m)	55	62	69	140	220