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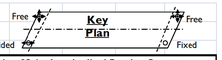
DRAWING No. NR/CIV/SD/2514

1909 Network Rail Modular Overbridges

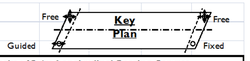
Bearing Schedule to EN1337



1	Structure name or reference			Accommodation Decks : 25.4m Longitudinal Bearing Centres			
2	Bearing identification mark			Fixed	Free	Guided	Free
	Type of bearing (number in accordance with EN1337 Table 1)			2.1	2.3	2.2	2.3
3	Number off			1	1	1	1
4	Seating material	Upper surface		Steel	Steel	Steel	Steel
		Lower surface		Grout	Grout	Grout	Grout
5	Average design contact pressure (N/mm^2) (capacity of structure)	Upper face	Serviceability limit state	130	130	130	130
			Ultimate limit state	180	180	180	180
		Lower face	Serviceability limit state	14.8	14.8	14.8	14.8
			Ultimate limit state	20	20	20	20
6	Design load (kN)	Service-ability limit state	Vertical N max.	2125	2125	2125	2125
			Vertical N permanent	680	680	680	680
	NOTE - loads stated relate to 25.4m span deck. For reduced loads associated with shorter spans refer to Load Table.		Vertical N min.	680	680	680	680
			Transverse $V_{y,sd}$	225	0	225	0
			Longitudinal $V_{x,sd}$	450	0	0	0
		Ultimate limit state	Vertical N	2900	2900	2900	2900
			Transverse $V_{y,sd}$	300	0	300	0
			Longitudinal $V_{x,sd}$	600	0	0	0
7	Displacement (mm)	Service-ability limit state	Irreversible Transverse $v_{y,sdi}$	0	±2.45	0	±2.45
			Irreversible Longitudinal $v_{x,sdi}$	0	±6.9	±6.9	±6.9
			Reversible Transverse $v_{y,sdi}$	0	±22.8	0	±22.8
			Reversible Longitudinal $v_{x,sdi}$	0	±64.4	±64.4	±64.4
		Ultimate limit state	Irreversible Transverse $v_{y,sdi}$	0	±3.31	0	±3.31
			Irreversible Longitudinal $v_{x,sdi}$	0	±9.32	±9.32	±9.32
			Reversible Transverse $v_{y,sdi}$	0	±24.1	0	±24.1
			Reversible Longitudinal $v_{x,sdi}$	0	±71.2	±71.2	±71.2
	NOTE - reversible bearing displacements increased by = 50mm longitudinally and = 20mm transversely above assessed values (EN1337 Cl. 5.4)						
8	Rotation (radians)	Service-ability limit state	Irreversible Transverse $\alpha_{y,sdi}$	$\pm 8.1\times10^{-3}$	$\pm 8.1\times10^{-3}$	$\pm 8.1\times10^{-3}$	$\pm 8.1\times10^{-3}$
			Irreversible Longitudinal $\alpha_{x,sdi}$	$\pm 11.0\times10^{-3}$	$\pm 11.0\times10^{-3}$	$\pm 11.0\times10^{-3}$	$\pm 11.0\times10^{-3}$
			Reversible Transverse $\alpha_{y,sdi}$	$\pm 7.6\times10^{-3}$	$\pm 7.6\times10^{-3}$	$\pm 7.6\times10^{-3}$	$\pm 7.6\times10^{-3}$
			Reversible Longitudinal $\alpha_{x,sdi}$	$\pm 9.5\times10^{-3}$	$\pm 9.5\times10^{-3}$	$\pm 9.5\times10^{-3}$	$\pm 9.5\times10^{-3}$
		Maximum rate (100xradians/kN)	Transverse $\alpha_{y,sdm}$	n/a	n/a	n/a	n/a
			Longitudinal $\alpha_{x,sdm}$	n/a	n/a	n/a	n/a
	NOTE - reversible bearing rotations increased by = 0.005 rads above assessed values (EN1337 Cl. 5.4)						
9	Maximum bearing dimensions (mm)	Upper surface	Transverse	500	500	500	500
			Longitudinal	500	500	500	500
		Lower surface	Transverse	500	500	500	500
			Longitudinal	700	700	700	700
		Overall height		150	150	150	150
10	Tolerable movement of bearing under transient loads (mm)		Vertical	±2	±2	±2	±2
			Transverse	±2	n/a	±2	n/a
			Longitudinal	±2	n/a	n/a	n/a
11	Maximum acceptable reaction to displacement under serviceability limit state (kN)		Transverse $W_{y,sd}$	tba	tba	tba	tba
			Longitudinal $W_{x,sd}$	tba	tba	tba	tba
12	Maximum acceptable reaction to rotation under serviceability limit state (kNxm)		Transverse $M_{y,sd}$	tba	tba	tba	tba
			Longitudinal $M_{x,sd}$	tba	tba	tba	tba
13	Type of fixing required		Upper face	Bolt	Bolt	Bolt	Bolt
			Lower face	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel
14	Special requirements	Bearings to cater for deck skews ranging from 0-30˚.					
		Design temperature ranges +38˚C => -25˚C. Assumed fixity temperatures +5˚C => +18˚C					
		Bearings top plate to be fixed into 500mm wide steelwork flange (skewed @ up to 30˚).					
		Max. longitudinal fixing bolt centres 400mm.					
		Horizontal loads on bearings derived from LM3 SV100 vehicle - loads independent of span length					

1909 Network Rail Modular Overbridges

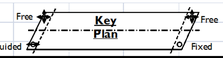
Bearing Schedule to EN1337



1	Structure name or reference			Rural AP Decks : 25.4m Longitudinal Bearing Centres			
2	Bearing identification mark			Fixed	Free	Guided	Free
	Type of bearing (number in accordance with EN1337 Table 1)			2.1	2.3	2.2	2.3
3	Number off			1	1	1	1
4	Seating material	Upper surface		Steel	Steel	Steel	Steel
		Lower surface		Grout	Grout	Grout	Grout
5	Average design contact pressure (N/mm^2) (capacity of structure)	Upper face	Serviceability limit state	130	130	130	130
			Ultimate limit state	180	180	180	180
		Lower face	Serviceability limit state	14.8	14.8	14.8	14.8
			Ultimate limit state	20	20	20	20
6	Design load (kN)	Service-ability limit state	Vertical N max.	3410	3410	3410	3410
			Vertical N permanent	1500	1500	1500	1500
	NOTE - loads stated relate to 25.4m span deck. For reduced loads associated with shorter spans refer to Load Table.		Vertical N min.	1500	1500	1500	1500
			Transverse $V_{y,sd}$	225	0	225	0
			Longitudinal $V_{x,sd}$	450	0	0	0
		Ultimate limit state	Vertical N	4600	4600	4600	4600
			Transverse $V_{y,sd}$	300	0	300	0
			Longitudinal $V_{x,sd}$	600	0	0	0
7	Displacement (mm)	Service-ability limit state	Irreversible Transverse $v_{y,sdi}$	0	±3.2	0	±3.2
			Irreversible Longitudinal $v_{x,sdi}$	0	±7.15	±7.15	±7.15
			Reversible Transverse $v_{y,sdi}$	0	±25.3	0	±25.3
			Reversible Longitudinal $v_{x,sdi}$	0	±64.2	±64.2	±64.2
		Ultimate limit state	Irreversible Transverse $v_{y,sdi}$	0	±4.32	0	±4.32
			Irreversible Longitudinal $v_{x,sdi}$	0	±9.65	±9.65	±9.65
			Reversible Transverse $v_{y,sdi}$	0	±27.8	0	±27.8
			Reversible Longitudinal $v_{x,sdi}$	0	±70.9	±70.9	±70.9
	NOTE - reversible bearing displacements increased by = 50mm longitudinally and = 20mm transversely above assessed values (EN1337 Cl. 5.4)						
8	Rotation (radians)	Service-ability limit state	Irreversible Transverse $\alpha_{y,sdi}$	$\pm 6.7\times10^{-3}$	$\pm 6.7\times10^{-3}$	$\pm 6.7\times10^{-3}$	$\pm 6.7\times10^{-3}$
			Irreversible Longitudinal $\alpha_{x,sdi}$	$\pm 6.9\times10^{-3}$	$\pm 6.9\times10^{-3}$	$\pm 6.9\times10^{-3}$	$\pm 6.9\times10^{-3}$
			Reversible Transverse $\alpha_{y,sdi}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$
			Reversible Longitudinal $\alpha_{x,sdi}$	$\pm 7.5\times10^{-3}$	$\pm 7.5\times10^{-3}$	$\pm 7.5\times10^{-3}$	$\pm 7.5\times10^{-3}$
		Maximum rate (100xradians/kN)	Transverse $\alpha_{y,sdm}$	n/a	n/a	n/a	n/a
			Longitudinal $\alpha_{x,sdm}$	n/a	n/a	n/a	n/a
	NOTE - reversible bearing rotations increased by = 0.005 rads above assessed values (EN1337 Cl. 5.4)						
9	Maximum bearing dimensions (mm)	Upper surface	Transverse	750	750	750	750
			Longitudinal	500	500	500	500
		Lower surface	Transverse	750	750	750	750
			Longitudinal	700	700	700	700
		Overall height		200	200	200	200
10	Tolerable movement of bearing under transient loads (mm)		Vertical	±2	±2	±2	±2
			Transverse	±2	n/a	±2	n/a
			Longitudinal	±2	n/a	n/a	n/a
11	Maximum acceptable reaction to displacement under serviceability limit state (kN)		Transverse $W_{y,sd}$	tba	tba	tba	tba
			Longitudinal $W_{x,sd}$	tba	tba	tba	tba
12	Maximum acceptable reaction to rotation under serviceability limit state (kNxm)		Transverse $M_{y,sd}$	tba	tba	tba	tba
			Longitudinal $M_{x,sd}$	tba	tba	tba	tba
13	Type of fixing required		Upper face	Bolt	Bolt	Bolt	Bolt
			Lower face	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel
14	Special requirements	Bearings to cater for deck skews ranging from 0-30˚.					
		Design temperature ranges +38˚C => -25˚C. Assumed fixity temperatures +5˚C => +18˚C					
		Bearings top plate to be fixed into 500mm wide steelwork flange (skewed @ up to 30˚).					
		Max. longitudinal fixing bolt centres 400mm.					
		Horizontal loads on bearings derived from LM3 SV100 vehicle - loads independent of span length					

1909 Network Rail Modular Overbridges

Bearing Schedule to EN1337



1	Structure name or reference			Urban Decks : 25.4m Longitudinal Bearing Centres			
2	Bearing identification mark			Fixed	Free	Guided	Free
	Type of bearing (number in accordance with EN1337 Table 1)			2.1	2.3	2.2	2.3
3	Number off			1	1	1	1
4	Seating material	Upper surface		Steel	Steel	Steel	Steel
		Lower surface		Grout	Grout	Grout	Grout
5	Average design contact pressure (N/mm^2) (capacity of structure)	Upper face	Serviceability limit state	130	130	130	130
			Ultimate limit state	180	180	180	180
		Lower face	Serviceability limit state	14.8	14.8	14.8	14.8
			Ultimate limit state	20	20	20	20
6	Design load (kN)	Service-ability limit state	Vertical N max.	3850	3850	3850	3850
			Vertical N permanent	1750	1750	1750	1750
	NOTE - loads stated relate to 25.4m span deck. For reduced loads associated with shorter spans refer to Load Table.		Vertical N min.	1750	1750	1750	1750
			Transverse $V_{y,sd}$	225	0	225	0
			Longitudinal $V_{x,sd}$	450	0	0	0
		Ultimate limit state	Vertical N	5200	5200	5200	5200
			Transverse $V_{y,sd}$	300	0	300	0
			Longitudinal $V_{x,sd}$	600	0	0	0
7	Displacement (mm)	Service-ability limit state	Irreversible Transverse $v_{y,sdi}$	0	±3.5	0	±3.5
			Irreversible Longitudinal $v_{x,sdi}$	0	±10.4	±10.4	±10.4
			Reversible Transverse $v_{y,sdi}$	0	±25.9	0	±25.9
			Reversible Longitudinal $v_{x,sdi}$	0	±65.0	±65.0	±65.0
		Ultimate limit state	Irreversible Transverse $v_{y,sdi}$	0	±4.73	0	±4.73
			Irreversible Longitudinal $v_{x,sdi}$	0	±14.0	±14.0	±14.0
			Reversible Transverse $v_{y,sdi}$	0	±28.6	0	±28.6
			Reversible Longitudinal $v_{x,sdi}$	0	±72.0	±72.0	±72.0
	NOTE - reversible bearing displacements increased by = 50mm longitudinally and = 20mm transversely above assessed values (EN1337 Cl. 5.4)						
8	Rotation (radians)	Service-ability limit state	Irreversible Transverse $\alpha_{y,sdi}$	$\pm 6.8\times10^{-3}$	$\pm 6.8\times10^{-3}$	$\pm 6.8\times10^{-3}$	$\pm 6.8\times10^{-3}$
			Irreversible Longitudinal $\alpha_{x,sdi}$	$\pm 7.0\times10^{-3}$	$\pm 7.0\times10^{-3}$	$\pm 7.0\times10^{-3}$	$\pm 7.0\times10^{-3}$
			Reversible Transverse $\alpha_{y,sdi}$	$\pm 7.1\times10^{-3}$	$\pm 7.1\times10^{-3}$	$\pm 7.1\times10^{-3}$	$\pm 7.1\times10^{-3}$
			Reversible Longitudinal $\alpha_{x,sdi}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$	$\pm 7.3\times10^{-3}$
		Maximum rate (100xradians/kN)	Transverse $\alpha_{y,sdm}$	n/a	n/a	n/a	n/a
			Longitudinal $\alpha_{x,sdm}$	n/a	n/a	n/a	n/a
	NOTE - reversible bearing rotations increased by = 0.005 rads above assessed values (EN1337 Cl. 5.4)						
9	Maximum bearing dimensions (mm)	Upper surface	Transverse	750	750	750	750
			Longitudinal	500	500	500	500
		Lower surface	Transverse	750	750	750	750
			Longitudinal	700	700	700	700
		Overall height		200	200	200	200
10	Tolerable movement of bearing under transient loads (mm)		Vertical	±2	±2	±2	±2
			Transverse	±2	n/a	±2	n/a
			Longitudinal	±2	n/a	n/a	n/a
11	Maximum acceptable reaction to displacement under serviceability limit state (kN)		Transverse $W_{y,sd}$	tba	tba	tba	tba
			Longitudinal $W_{x,sd}$	tba	tba	tba	tba
12	Maximum acceptable reaction to rotation under serviceability limit state (kNxm)		Transverse $M_{y,sd}$	tba	tba	tba	tba
			Longitudinal $M_{x,sd}$	tba	tba	tba	tba
13	Type of fixing required		Upper face	Bolt	Bolt	Bolt	Bolt
			Lower face	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel	Bolt/Dowel
14	Special requirements	Bearings to cater for deck skews ranging from 0-30˚.					
		Design temperature ranges +38˚C => -25˚C. Assumed fixity temperatures +5˚C => +18˚C					
		Bearings top plate to be fixed into 500mm wide steelwork flange (skewed @ up to 30˚).					
		Max. longitudinal fixing bolt centres 400mm.					
		Horizontal loads on bearings derived from LM3 SV100 vehicle - loads independent of span length					

Variation in Bearing Reactions for Differing Deck Types and Spans

Bridge Type	EN 1337 Bearing Schedule Design Load Parameters					Longitudinal Bearing Centres									
						8.5m Span	10m Span	12m Span	14m Span	16m Span	18m Span	20m Span	22m Span	24m Span	25.4m Span
Accom	6	Design load (kN)	Service-ability limit state	Vertical N	max.	958	1061	1199	1286	1437	1471	1576	1799	1990	2148
					permanent	216	252	302	353	403	453	511	573	635	679
					min.	216	252	302	353	403	453	511	573	635	679
				Transverse $V_{y,sd}$		225	225	225	225	225	225	225	225	225	225
				Longitudinal $V_{x,sd}$		450	450	450	450	450	450	450	450	450	450
			Ultimate limit state	Vertical N		1293	1432	1619	1737	1940	1985	2127	2428	2687	2900
				Transverse $V_{y,sd}$		300	300	300	300	300	300	300	300	300	300
				Longitudinal $V_{x,sd}$		600	600	600	600	600	600	600	600	600	600
Rural AP	6	Design load (kN)	Service-ability limit state	Vertical N	max.	1668	1796	1902	2109	2319	2523	2735	3065	3119	3397
					permanent	474	548	657	770	893	1017	1143	1279	1401	1490
					min.	474	548	657	770	893	1017	1143	1279	1401	1490
				Transverse $V_{y,sd}$		225	225	225	225	225	225	225	225	225	225
				Longitudinal $V_{x,sd}$		450	450	450	450	450	450	450	450	450	450
			Ultimate limit state	Vertical N		2252	2425	2567	2847	3131	3406	3693	4137	4211	4586
				Transverse $V_{y,sd}$		300	300	300	300	300	300	300	300	300	300
				Longitudinal $V_{x,sd}$		600	600	600	600	600	600	600	600	600	600
Urban	6	Design load (kN)	Service-ability limit state	Vertical N	max.	1776	1933	2192	2420	2662	2903	3150	3395	3654	3836
					permanent	540	635	766	901	1040	1185	1334	1484	1636	1741
					min.	540	635	766	901	1040	1185	1334	1484	1636	1741
				Transverse $V_{y,sd}$		225	225	225	225	225	225	225	225	225	225
				Longitudinal $V_{x,sd}$		450	450	450	450	450	450	450	450	450	450
			Ultimate limit state	Vertical N		2397	2609	2959	3267	3594	3919	4252	4583	4933	5179
				Transverse $V_{y,sd}$		300	300	300	300	300	300	300	300	300	300
				Longitudinal $V_{x,sd}$		600	600	600	600	600	600	600	600	600	600

Rev	Date	Description of revision	Design'd	C'kd
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Network Rail

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	Name	Position	Signature	Date

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BEARING SCHEDULE

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