Supplementary measures for Design, detailing and durability of important bridge structures and parameters for designing bridges other than important bridges in Maharashtra.

Government of Maharashtra ,
Public Works Department,
Circular No. RMR 1094/184/R-1,
Mantralaya, Bombay – 400 032
Date: 12th June 1996.

C I R C U L A R

Special publication No. 33- 1989 of the Indian Roads Congress prescribed the special measures to be adopted for design,detailing and durability of important bridge structures. The question of adopting three specifications to the bridges on the state roads was under consideration of the Government for some time.

2. In accordance with the special publication No. 33- 1989 of the Indian roads congress. The provision therein are to be made applicable broadly to the following categories of bridges irrespective of the class of the road, traffic intensity and severity of the enviornment:-
   (i) Bridges with prestressed concrete super-structure.
   (ii) Bridges with individual span length more than 30 m.
   (iii) Bridges built with innovative design/ construction / material.
3. Now after taking into consideration the views of the Chief Engineer's Committee on this issue , the Government is pleased to issue the following instructions:-
   So far as the State roads are concerned provisions of the SP – 33 shall be applied only to those bridges of the above mentioned categories which in addition satisfy at least one of the following two conditions:-

   (a) Bridges exposed to moderate environment on routes where present traffic volume is above 5000 p.c.u. per day or 15000 tonnes per day or where the 10 years projected traffic is more than 12000 p.c.u. per day or 36000 tonnes per day.
   (b) Bridges exposed to severe environment.

   Even when provisions of sp-33 become applicable for a bridge , partial prestressing shall be permitted even in severe environment , but all other provisions of sp-33 shall be satisfied.
4. For the bridges other than those covered by para 3 above, specifications of the Indian Roads Congress Bridge Codes shall apply except for the items included in the annexure to this circular depending on the degree of exposure to aggressive environment .

   Bridges on National Highways are outside the scope of this circular.

Encl.:- Annexure-I

Chief Engineer & Jt. Secretary

to Government

ANNEXURE-I

(Accompaniment to Govt. Circular No. RMR 1094/184/R-1 Dt. 12th June 1996)
Specifications for bridges which Sp.33 is not to applied.

Sr. No.	Description	Specifications to be	applied
		In severe Exposure Condition	In Moderate exposure Condition.
1.	Minimum internal dia.of Wells.	3.00 m	3.00 m
2.	Minimum steining thickness	0.60 m	0.50 m
3.	Pile Foundation	Pile foundation shall not be provided in flood zones with deep scour or at location where navigation is allowed	Pile foundation shall not be provided in flood zones with deep scour or at locations where navigation is allowed
4.	Minimum wall thickness of cellular piers and abutments.	R.C.C. 0.40 m (P.C.C. not permitted)	R.C.C. 0.30 m (P.C.C. not permitted)
5.	Trestic piers	Trestles not allowed in flood zone	Trestles not allowed in flood zone
6.	Minimum deck slab thickness	Minimum 240 mm for cantilever type of construction & minimum 200 mm for other types of construction.	Minimum 240 mm for cantilever type of construction & minimum 200 mm for other types of construction.
7.	Minimum web thickness	Minimum greater of 200 mm + O.D. of duct or 300 mm	Minimum greater of 150 mm + O.D. of duct or 250 mm
8.	Minimum nominal dia for Tor steel	10 mm	8 mm
9.	P.C.C.		
	Minimum grade	M:15	M:10
	Maximum W.C. Ratio	0.45	0.50
	Minimum cement content	250 Kg/Cum	210 Kg/CuM
10.	R.C.C		
	Minimum grade	M:25	M:10
	Maximum W.C. Ratio	0.40	0.40
	Minimum cement content	310 Kg/CuM	250 Kg/CuM
11.	P.S.C.		
	Minimum grade	As Per Sp.33	M:35
	Maximum W.C. Ratio	As Per Sp.33	0.40

	Minimum cement content	As Per Sp.33	360 Kg/CuM
12.	Minimum clear cover to reinforcement for all grades of concrete.		
	Slabs	40 mm as per S.P. 33 for P.S.C.	25 mm
	Webs/ Columns	40 mm as per S.P. 33 for P.S.C.	30 mm
	Footings/ Raft Slab	50 mm as per S.P. 33 for P.S.C.	40 mm
	Cable duct	As Per S.P. 33	60 mm
	Location of Reinf. Splice.	50 mm	50 mm
13.	Partial Prestress	Permitted (Tension in concrete upto 10 Kg/ Sq.Cm.	Permitted (Tension in concrete upto 20 Kg/ Sq.Cm.

Accompaniment to S.E.D.C. Circular No. 1004 Dated 21/03/97.

MATERIAL TABLE:-

Sr. No.	COMPONENT	CONCRETE GRADE (MINIMUM)				QUANTITY OF STEEL PER CUM OF CONCRETE
				AS PER S.P.33		
		MODERATE.	SEVERE.	MODERATE.	SEVERE.	
1	2	3	4	5	6	7
1	a. Parapet (R.C.C.)	M-20	M-25	M-20	M-25	As per T.P. (8.5-12 Kg/m)
	b. Railings	Collasplible type for submersible bridges				11.1 Kg/m (Structural steel inclu-ing pipes) Please see Type design
2	Kerb	M-20	M-25	M-20	M-25	
2.	Superstructure					
	a) Solid slab span upto &= 10m	M-20	M-25	M-35	M-40	As per T.P. (85-105 Kg per m)
	b) Girder & slab 10<span<20m	M-20	M-25	M-35	M-40	Girder-250 -400 Kg/M3 Slab 160-190 Kg/CuM (as per T.P.)
	c) R.C.C. Box					
	i) span 20m to 25 m	M-20	M-25	M-35	M-40	150 Kg/M3 to 175Kg/M3
	ii) span 25 to30m	M-35	M-40	M-35	M-40	175 to 200 Kg/Cum
	d) P.S.C. box span 30m to 60m	M-35	M-40	M-35	M-40	H.T.S. 30-40 Kg/CuM HYSD 150- Kg/Cum (Untensioned steel)

4.	Pedestal	Next higher grade of su perstructure		M-40	M-40	80-100 Kg/CuM
5	Abutment Cap (Fully resting)	M-20	M-25	M-35	M-40	85 Kg/CuM solid slab 185 Kg/CuM girder system
6	Pier Cap (Fully resting for cap width 0.75 to 1.2m	M-20	M-25	M-35	M-40	70-85 Kg/M3
7	Cantilever type cap for pier/ Abutment	M-20	M-25	M-35	M-40	230 Kg/CuM
8	R.C.C. Pier/ Abutment	M-10	M-15	M-25	M-30	Surface Rein forcement 5 Kg/M2 10 200 mm c/c
9	P.C.C. returns	M-10	M-15	M-15*	M-20*	
10	Solid RCC pier/ Abutment (Ht 8m to 15m)	M-20	M-25	M-35	M-40	75-100 Kg/CuM
11	Hollow pier/ coun terfort retaining wall type abutment	M-20	M-25	M-35	M-40	120 Kg/CuM
12	Levelling course below pier/Abutment	M-10	M-15	M-10	M-15	--
13	Well cap/pile cap (Dia 4.2m to 8m	M-20	M-25	M-35	M-40	120-160 Kg/ CuM (pier resting on cap) 80 Kg/CuM (pier resting on steining)
14	Well steining (Dia 3m to 6.2m & steining thickness = 6.0 to 1 m	M-10	M-15	M-25	M-30	14-20 Kg/M3
15	Top plug	M-10	M-15	M-15*	M-20	--

16	Bottom plug	M-15**	M-20	M-25**	M-30	
17	Well Kerb (Dia 6.2m to 3m)	M-20	M-25	M-35	M-40	70-80 Kg/ CuM
18	Box returns (ht.= 3m to 13.5m) (End unit & intermediate units)	M-20	M-25	M-25*	M-30*	52-78 Kg /cuM
19	Raft slab with cut off walls ie a channel section. (span 5m to 10m)	M-20	M-25	Not recommended		70-80 Kg/CuM
20	Cut off walls (detached)	M-10	M-15	Not recommended		5 Kg/ /M2 on each.
21	Piles	M-20 (Min cement content 400 Kg/Cum	M-25 Min cement content 400 Kg/CuM	M-35	M-40	75-100 Kg/CuM (Please Ref I.S. 2911 part I : 1979)
22	RCC Wearing coat	M-20	M-25	M-35	M-40	6 dia of 300 mm c/c both way
23	Cutting edge (dia of well 4m to 6.2m Thickness of steining = 0.6 to 0.90m)	M.S. steel (structural)				58Kg/Rmt
24	Expansion Joint	1. For solid slabs upto 10 m				Bituminous pad type.
Sr.No 1,2,3	For spans upto 10 m	2. For simply supported spans upto 10m				Burried type joint
Sr.No 4,5,6	For spans between 10m to 25m	3. Fixed end of simply supported span not not exceeding 10m				filler joint

Sr.No 7	For spans between 25m to 50 m	4. Simply supported spans upto 25m with maximum horizontal movement 25mm (only for deck with bituminous wearing coat : longitudinal gradient less than 2% & cross camber < 3%)	asphaltic plug joint. Copper plate type.
Sr.No.	For spans more than 50 m	5. Simply supported or continuous spans upto 25m with maximum horizontal movement less than 40 mm	Compression seal joint. Copper plate type.
		6. Simply supported or continuous spans upto 25m with Max. horizontal movement upto 50 mm	Elastometric slab seal joint. copper plate type.
		7. Spans 25m to 50m simply supported. Cantilever construction With Max. horizontal Movement upto 70mm	Single strip Seal joint Finger plate.
		8. Large to very large continuous to cantilever construction with movement in excess of 70 mm	Modular strip/Box seal joint. Finger Plate.
25	wearing coat	River Bridges:- 1. For annual rainfall>1000mm 50 BM + 25 AC (75 av.thickness 2. For annual rainfall <1000 mm 50 BM + 25 SDBC (75av. Thickness) Flyovers 3(a) For annual rainfall >1000mm for flyover & very Important bridge works 12 Mastic + 50 DBM + 25 Mastic. (b) For annual rainfall< 1000mm 50 mm DBM + 25mm mastic.	

26	Water spouts	As per MOST type design except dia of pipe as 150 mm @ One No./20 SqM area of deck.
27	Bearings	1. Tar paper for solid slabs less than or equal to 10m. 2. Neoprine bearings for spans less than or equal to 40m. 3. PTFE bearings – for spans more than 40 m

Notes : 1. The grades specified in the table are minimum preferable. These can be changed as per design requirement.

*2. The grades marked as * although are not as per SP-33 requirement, the changes are made as per the functional importance of the component.

3. Grades for leveling course in case of SP 33 are kept low as these are required only for leveling course.

**4. The concrete grades for bottom plug are increased one step above the grades for top plug as this concrete is expected to prevent the seepage of water from bottom.

5. The reinforcement quantities given in the table are for estimate purpose only. These quantities may vary depending on the design requirement . Proper judgement should be used to choose appropriate steel reinforcement quantity per Cum of concrete.

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