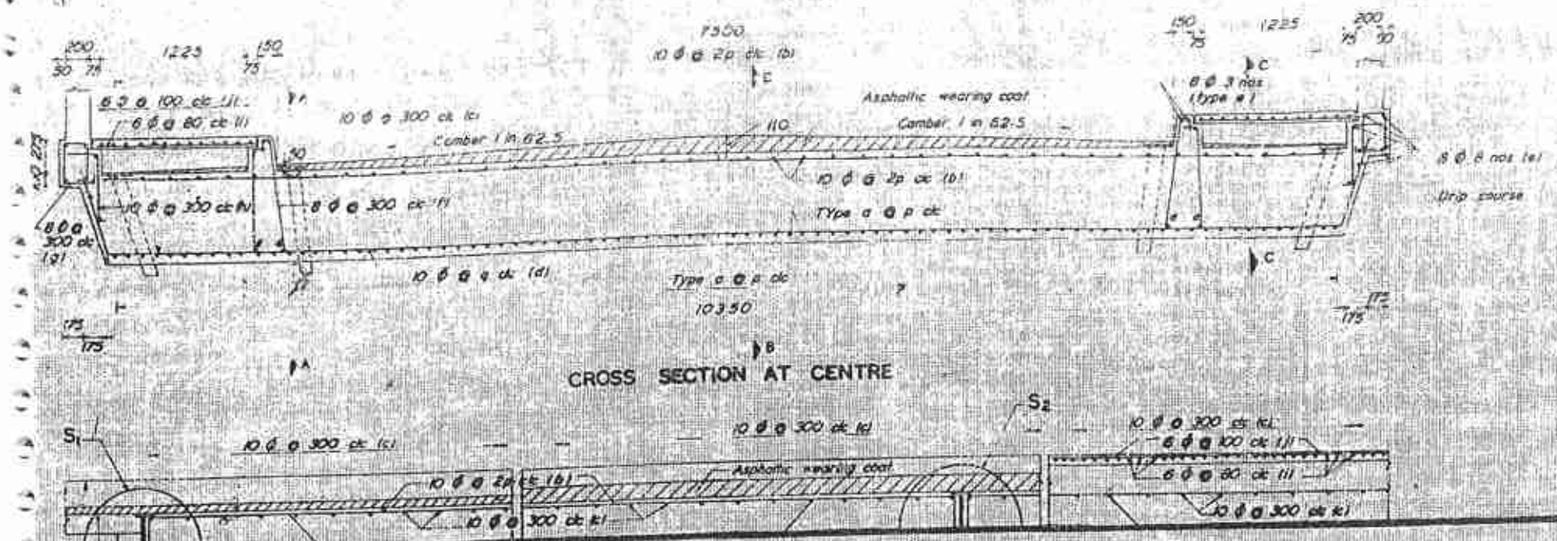

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes (i) IRC : 5-1970., (ii) IRC : 6-1966 & (iii) IRC : 21-1972
2. This drawing is applicable for Square Crossings
3. All dimensions are in millimetres
4. Concrete shall have a minimum 28 days works cube strength of 200 kg/cm on 150 mm cubes
5. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 432-1966 (with amendment No. 1 of August, 1968 and amendment No 2 of November, 1970) or I.S. 1786 - 1966 (with amendment No. 1 of August, 1968 and amendment No 2 of December, 1970).
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC : 21-1972.
8. Full scale elevation for the bars shall be laid out on a plane platform floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape.
9. The railings shall be of any approved type. The
14. Footpath slabs may be provided with a wearing course of precast chequered tiles fixed firmly and true to levels.
15. For schedule of reinforcement, quantities and reactions Drg. No. BD/6-74 may be referred to.
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc., unless approved measures are taken to protect the reinforcement from corrosion.

STANDARD PLANS FOR HIGHWAY BRIDGES

MINISTRY OF SHIPPING & TRANSPORT
ROADS WING
NEW DELHI
1983

CONTENTS

SLAB BRIDGES - WITH & WITHOUT FOOTPATH
SKEW SLAB BRIDGES - WITH & WITHOUT FOOTPATH
R.C.C. PIER FOR SLAB BRIDGES
WEARING COAT, EXPANSION JOINT AND DRAINAGE SPOUT.

VOL. II.

CONCRETE SLAB BRIDGES

Ministry of Shipping & Transport
(Roads Wing)

STANDARD PLANS FOR HIGHWAY BRIDGES

Vol. II

CONCRETE SLAB BRIDGES

(First Revision)

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The Indian Roads Congress
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Ministry of Shipping and Transport (Roads Wing)

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the Secretary, Indian Roads Congress,
Jamnagar House, Shahjahan Road,
New Delhi-110011

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PREFACE TO SECOND EDITION

Subsequent to the publication of first edition of this volume, some of the standard drawings for Reinforced concrete solid slab bridges had to be revised on account of revision of Ministry's standard drawing No. BD/1-69 for wearing coat and drainage spouts. In the revised drawings for slab bridges, the specifications of expansion joint have also been modified. The second edition contains the revised drawings. Further, in order to make this volume self-contained, drawing No. BD/1-69A showing revised details of wearing coat and drainage spouts has also been added.

New Delhi, March 10, 1983

G. VENKATESULU
Additional Director General (Bridges)

PREFACE TO FIRST EDITION

Standard Plans for Highway Bridges with R.C.C. Superstructure using mild steel round bars as reinforcement (Vol. I) was issued during 1973 by the Roads Wing.

With the introduction of High Yield Strength Deformed bars and the production of mild steel bars being phased out from the market, the demand for standard designs adopting High Yield Strength Deformed bars has become urgent. The preparation of standard designs was, therefore, taken up on a priority basis so that High Yield Strength Deformed bars could be used on a wider scale. M/s Tor-Steel Research Foundation in India helped in the computation of the design for solid slab bridges for square crossings.

This volume (Vol. II), the first in the series using High Yield Strength Deformed bars, contains standard plans for highway solid slab bridges. It also contains standard plans for R.C.C. piers suitable to carry the slab superstructure.

The plans have been evolved for two lanes of traffic with a carriageway width of 7.5 metre with and without footpath of 1.5 metre on either side and designed for one-lane of IRC Class 70-R wheeled or tracked vehicle or two lanes of Class 'A' vehicles. For decks-with-footpaths, the intensity of footpath loading has been assumed as 400 kg per square metre. The designs are based on the Standard Specifications and Codes of Practice for Road Bridges issued by the Indian Roads Congress. For construction purposes, Specifications for Road and Bridge Works issued by the Ministry of Shipping & Transport (Roads Wing) shall be followed. For convenience of estimation, a summary of details and quantities of different materials has also been given in Tables 1 to 5.

The plans have been made complete in all respects as far as possible so that they could be readily adopted in the field and also serve as contract drawings. I hope this publication will go a long way in maximising the use of high yield strength deformed bars and at the same time effecting economy in the construction of our slab bridges.

J.S. MARYA
Director General (Road Development) & Addl.
Secretary to the Govt. of India

New Delhi, Jan. 1, 1977

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A. SUMMARY OF QUANTITIES OF MATERIALS

TABLE 1. R.C.C. SIMPLY SUPPORTED RIGHT SLAB BRIDGES

S. No.	Effective Span (m)	WITHOUT FOOTPATHS						WITH FOOTPATHS					
		Overall Length (m)	Depth of slab (mm)	Quantity of Concrete (m^3)		Quantity of Steel (kg)		Overall length (m)	Depth of slab (mm)	Quantity of Concrete (m^3)		Quantity of Steel (kg)	
				Total per span	Per running metre	Total per span	Per running metre			Total per span	Per running metre	Total per span	Per running metre
1.	3.37	3.823	320	10.53	2.75	795	208	3.828	315	14.70	3.84	1121	293
2.	4.37	4.750	395	15.88	3.34	1124	237	4.778	365	20.90	4.37	1610	337
3.	5.37	5.740	450	21.66	3.77	1456	254	5.740	410	27.75	4.83	2046	356
4.	6.37	6.740	515	28.87	4.28	1866	277	6.740	470	36.85	5.47	2643	392
5.	7.37	7.740	575	36.80	4.75	2430	314	7.740	530	47.25	6.10	3267	422
6.	8.37	8.740	650	46.71	5.34	2887	330	8.740	595	59.30	6.78	4097	469
7.	9.37	9.740	720	57.41	5.89	3453	355	9.740	665	73.20	7.52	4660	478
8.	10.37	10.740	790	69.10	6.43	4067	379	10.740	740	89.30	8.31	5675	528

Notes : 1. Concrete and steel quantities do not include those of railings and wearing coat.
2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

TABLE 2. R.C.C. SIMPLY SUPPORTED SKEW SLAB BRIDGES WITH FOOTPATHS

S. No.	Right effective span (m)	Total span along direction of traffic (m)	Skew angle (degrees)	Depth of slab (mm)	Quantity of Concrete (m^3)		Quantity of Steel (kg)	
					Total per span	Per Running metre along the direction of traffic	Total per span	Per Running metre along the direction of traffic
1.	4.37	4.91	15	405	22.76	4.64	1494	304
2.	4.37	5.47	30	405	26.72	4.88	1731	316
3.	4.37	6.70	45	405	32.78	4.89	2317	346
4.	4.37	9.48	60	405	46.38	4.89	3478	367
5.	6.37	6.98	15	470	38.78	5.56	3164	453
6.	6.37	7.78	30	470	43.57	5.60	3642	468
7.	6.37	9.53	45	470	53.37	5.60	4853	509
8.	6.37	13.48	60	470	75.40	5.59	7503	557
9.	8.37	9.05	15	630	66.24	7.32	5493	607
10.	8.37	10.09	30	630	74.13	7.35	6413	636
11.	8.37	12.36	45	630	90.49	7.32	8326	674
12.	8.37	17.48	60	630	128.25	7.34	13192	755

Notes: 1. Concrete and steel quantities do not include those of railings and wearing coat.
2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

TABLE 3. R.C.C. SIMPLY SUPPORTED SKEW SLAB BRIDGES WITHOUT FOOTPATHS

S. No.	Right effective span (m)	Total span along direction of traffic (m)	Skew angle (degrees)	Depth of slab (mm)	Quantity of Concrete (m^3)		Quantity of Steel (kg)	
					Total per span	Per Running metre of bridge along the direction of traffic	Total per span	Per Running metre of bridge along the direction of traffic
1.	5.37	5.94	15	465	24.31	4.09	1936	326
2.	5.37	6.63	30	465	27.08	4.08	2216	334
3.	5.37	8.12	45	465	33.21	4.09	2870	353
4.	5.37	11.48	60	465	46.92	4.09	4182	364
5.	6.37	6.98	15	540	32.82	4.70	2480	355
6.	6.37	7.78	30	540	36.68	4.71	2869	369
7.	6.37	9.53	45	540	44.92	4.71	3634	381
8.	6.37	13.48	60	540	63.42	4.70	5611	416
9.	8.37	9.05	15	700	54.50	6.02	3813	421
10.	8.37	10.09	30	700	60.86	6.03	4355	432
11.	8.37	12.36	45	700	74.44	6.02	5369	434
12.	8.37	17.48	60	700	105.24	6.02	10409	595

Notes: 1. Concrete and steel quantities do not include those of railings and wearing coat.
2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

TABLE 4. PIER CAPS SUPPORTING RIGHT SLAB BRIDGES

Quantities per pier cap

S. No.	Effective span (m)	Without Footpaths		With Footpaths	
		Concrete (m^3)	Steel (kg)	Concrete (m^3)	Steel (kg)
1.	3.37	3.78	350	5.97	513
2.	4.37	4.11	369	6.48	553
3.	5.37	4.39	394	6.87	580
4.	6.37	4.70	423	7.38	610
5.	7.37	5.08	447	8.00	673
6.	8.37	5.30	474	8.48	700
7.	9.37	5.68	502	9.07	762
8.	10.37	5.88	519	9.66	790

Note : Steel quantities are inclusive of 5 per cent extra for laps and wastage.

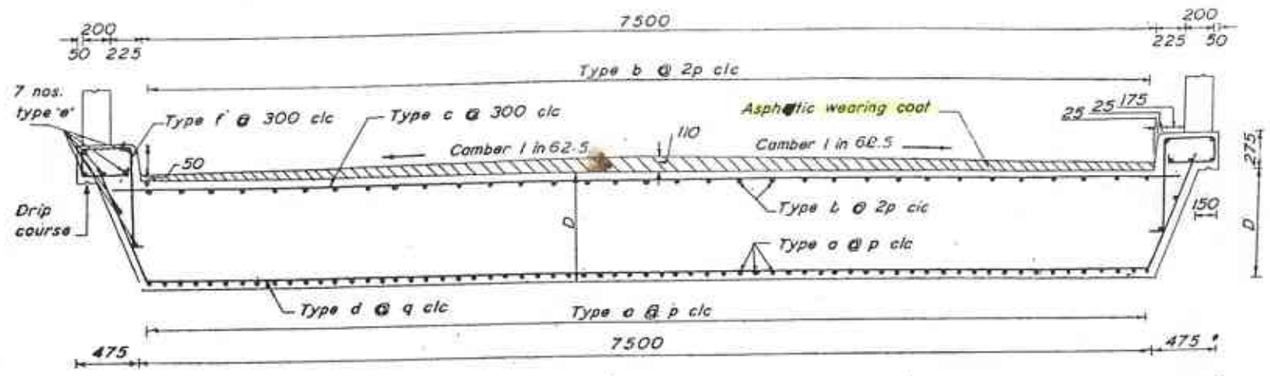
TABLE 5. PIERS SUPPORTING R.C.C. RIGHT SLAB BRIDGES

S. No.	Effective span (m)	Width of pier (mm)	Overall height of pier (m)	Quantities Per Pier			
				Without Footpaths		With Footpaths	
				Concrete (m^3)	Steel (kg)	Concrete (m^3)	Steel (kg)
1.	3.37	300	3	2.40	280	3.19	354
2.			4	3.50	404	4.69	541
3.	4.37	400	3	3.07	283	4 03	357
4.			4	4.49	397	6.02	538
5.			5	5.91	582	8.01	679
6.	5.37	500	3	3.67	307	4.80	354
7.			4	5.40	432	7.26	560
8.			5	7.17	623	9.75	752
9.	6.37	600	3	4.15	332	5.45	379
10.			4	6.22	434	8.40	560
11.			5	8.30	626	11.30	754
12.	7.37	700	4	6.91	474	9.30	556
13.			5	9.30	670	12.68	790
14.			6	11.67	890	16.05	1042
15.	8.37	700	4	6.80	640	9.03	813
16.			5	9.17	883	12.41	1023
17.			6	11.55	1203	15.78	1352
18.	9.37	800	4	7.39	684	9.80	837
19.			5	10.07	948	13.62	1129
20.			6	12.75	1287	17.44	1471
21.	10.37	800	4	7.26	770	9.42	877
22.			5	9.94	1081	13.24	1257
23.			6	12.62	1495	17.06	1694

Notes : 1. The quantities are for the pier portion only. Pier caps have been given separately.

2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

B. DRAWINGS



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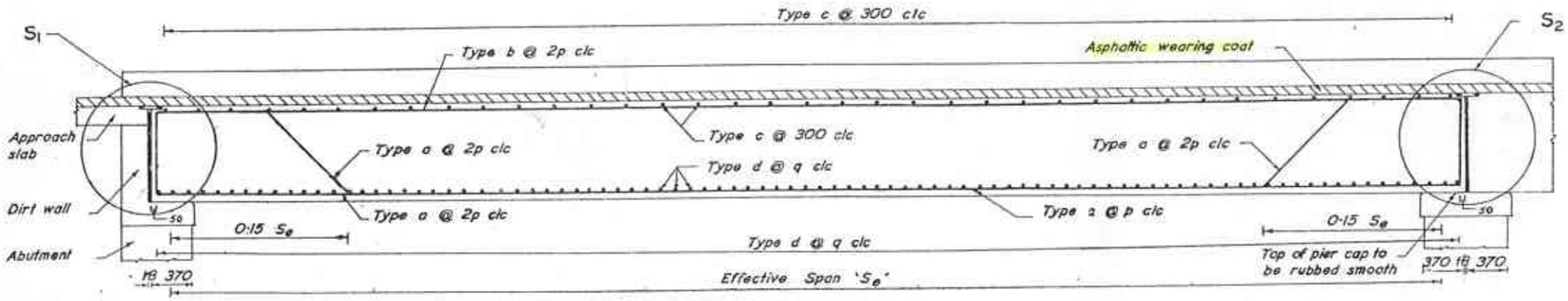
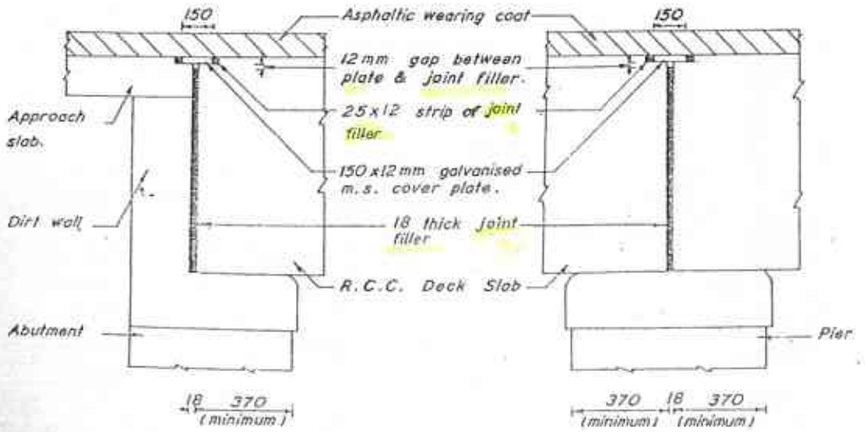


LONGITUDINAL SECTION



DETAIL AT S_1 DETAIL AT S_2

NOTE: Joint filler shall strictly conform to IS 1838 Products with ISI certification mark shall only be used.

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes :- (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. This drawing is applicable for Square Crossings.
3. All dimensions are in millimetres.
4. Concrete shall have a minimum 28 days works cube strength of 200 kg/cm^2 on 150mm cubes.
5. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139 - 1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970)
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC : 21-1972. This drawing is not applicable for welded joints.
8. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape.
9. The railings shall be of any approved type. The reinforcement from railings should be incorporated in the kerb before casting the slab. (Ref. BD-5-69 SD-159)
10. No provision for drainage has been made in this drawing. If required, drawing No. BD/1-69 may be referred to
11. Precast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
12. Properly braced steel plates shall be used as shuttering.
13. For schedule of reinforcement, quantities and reactions Drg. No. BD/2-74 may be referred to.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc., unless approved measures are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
A	1983	(i) WEARING COAT - CAMBER AND THICKNESS AT CENTRE MODIFIED, (ii) EXPANSION JOINT DETAILS AND NOTES MODIFIED.	E.E. S.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS
EFFECTIVE SPAN 3·37 TO 8·37 METRES

7·5 METRES ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
DO NOT SCALE — ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED: A.E.E.
RECOMMENDED: E.E.
RECOMMENDED: S.E.
APPROVED: C.E.

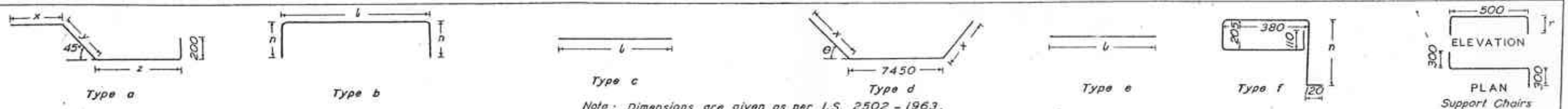
JANUARY, 74.
DRG. NO. BD/1-74-A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Effective span 'S' (m)	Bearing length at each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Main Slab																										Kerbs										Support Chairs	
				Longitudinal												Transverse														Longitudinal					Transverse						
				Type a							Type b							Type c					Type d								Type e					Type f						
				Dia ϕ (mm)	Spacing 'p' (mm)	No. of bars	x (mm)	y (mm)	z (mm)	Length of each bar (x+y+z+220-2.5ϕ) (mm)	Total length (m)	Dia ϕ (mm)	Spacing 2p (mm)	No. of bars	l (mm)	n (mm)	Length of each bar (l+2n-5ϕ) (mm)	Total length (m)	Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar L (mm)	Total length (m)	Dia ϕ (mm)	Spacing 'q' (mm)	No. of bars	Θ (degree)	x (mm)	Length of each bar (2x+7450) (mm)	Total length (m)	Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar L (mm)	Total length (m)	Dia ϕ (mm)	Spacing (mm)	No. of bars	n (mm)	Length of each bar (n+1140) (mm)	Total length (m)	Dia ϕ (mm)	r (mm)
3·37	370	3823	320	16	125	60	455	345	3060	4020	241·20	10	250	31	3775	260	4245	131·59	10	300	13	8000	104·00	8	70	53	44·6	610	8670	459·51	8	As shown	14	3775	52·85	10	300	26	475	1615	41·99	16	225
4·37	370	4750	395	20	150	50	490	445	3865	4950	247·50	10	300	26	4700	335	5320	138·32	10	300	16	8000	128·00	8	70	68	50·5	650	8750	595·00	8		14	4700	65·80	10	300	32	530	1670	53·44	20	295
5·37	370	5740	450	20	135	56	580	520	4710	5960	333·76	10	270	28	5690	390	6420	179·76	10	300	19	8000	152·00	8	70	82	54·2	685	8820	723·24	8		14	5690	79·66	10	300	38	570	1710	64·99	20	350
6·37	370	6740	515	22	140	54	665	610	5550	6970	376·38	10	280	27	6690	455	7550	203·85	10	300	23	8000	184·00	8	70	96	57·8	730	8910	835·36	8		14	6690	93·66	10	300	46	615	1755	80·73	22	415
7·37	370	7740	575	22	120	63	775	695	6400	7995	503·68	10	240	32	7690	515	8670	277·44	10	300	26	8000	208·00	10	105	74	61·1	775	9000	666·00	8		14	7690	107·66	10	300	52	660	1800	93·60	22	470
8·37	370	8740	650	25	140	54	825	800	7250	9010	486·55	10	280	27	8690	590	9820	265·14	10	300	29	8000	232·00	10	110	80	63·45	840	9130	730·40	8		14	8690	121·66	10	300	58	710	1850	107·30	22	545

Bending Diagrams



Note : Dimensions are given as per I.S. 2502 - 1963.

MAXIMUM REACTIONS (IN TONNES)

Effective Span (m)		3·37	4·37	5·37	6·37	7·37	8·37
Reaction at Abutment	Dead Load	15·97	23·20	31·00	40·52	50·91	63·67
	Dead Load + Live Load	56·57	64·50	74·18	85·42	97·75	111·96
	Dead Load + Live Load + Impact	75·07	82·50	91·20	101·82	113·51	127·17
Reaction at Pier	Dead Load	31·84	46·40	62·00	81·04	101·82	127·34
	Dead Load + Live Load	78·49	97·15	116·18	137·04	161·74	192·99
	Dead Load + Live Load + Impact	91·94	109·90	128·60	149·44	176·72	209·40

QUANTITIES (PER SPAN)

Effective Span (m)	3·37	4·37	5·37	6·37	7·37	8·37
CONCRETE : (Excluding wearing coat and railing) (cu.m)	10·53	15·88	21·66	28·87	36·80	46·71
STEEL : (Including 5% extra for laps and wastage) (kg.)	795	1124	1456	1866	2430	2887

Notes :

1. This drawing shall be read in conjunction with Drawing No. BD/1-74 showing the details of R.C.C. deck slab.
2. The schedule of reinforcement is based on bearing width of 370 mm. In case of increase in bearing width, the schedule of reinforcement shall be modified suitably.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

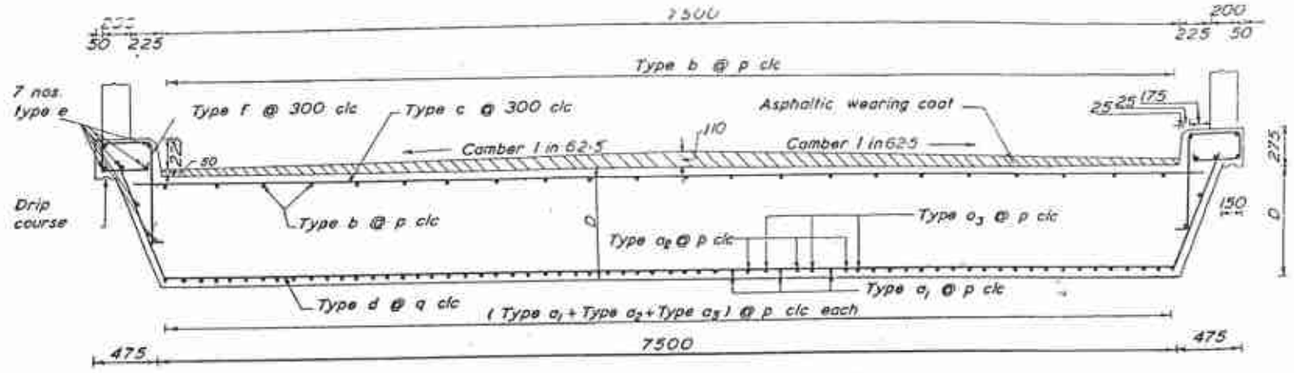
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS EFFECTIVE SPAN 3·37 TO 8·37 METRES

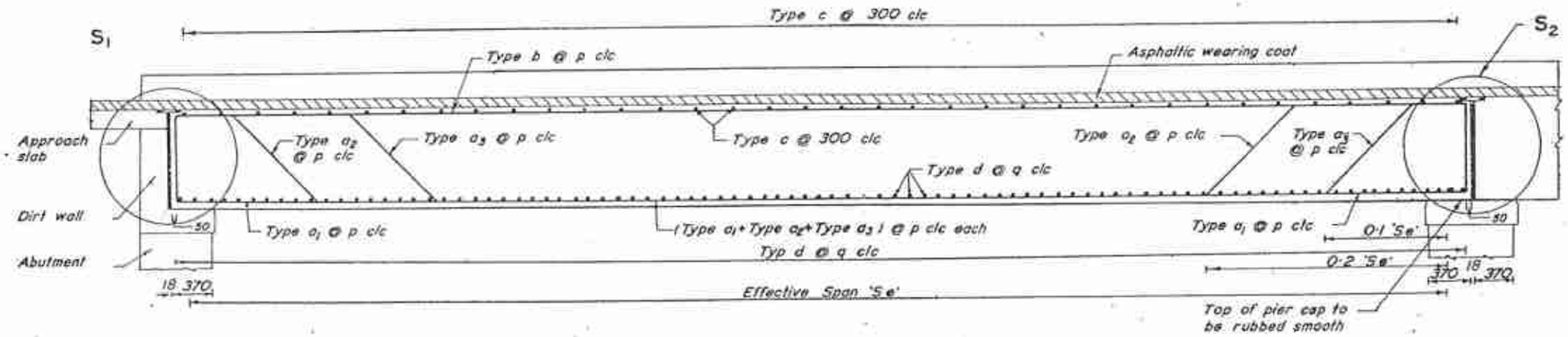
7·5 METRES ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
DO NOT SCALE — ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED: A.E.E. 8.7.74
RECOMMENDED: E.E. 8.7.74
RECOMMENDED: S.E. 8.7.74
APPROVED: D.E. 8.7.74

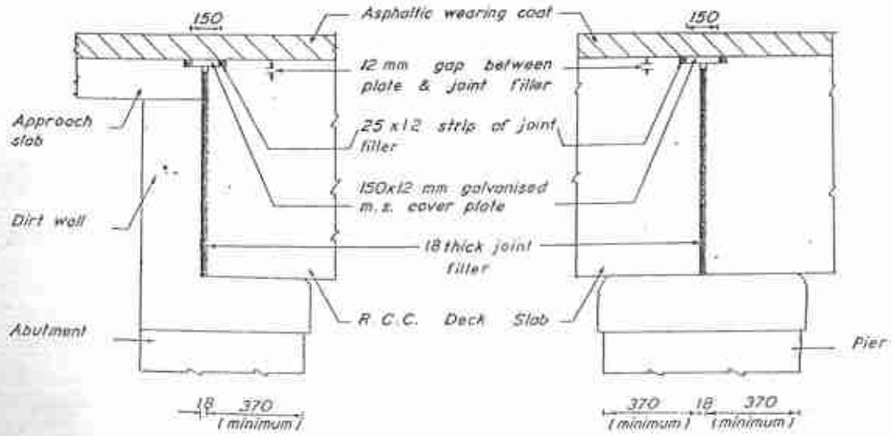
JANUARY, 74
DRG. NO. BD/2-74.



CROSS SECTION AT CENTRE



LONGITUDINAL SECTION



DETAIL AT S_1 DETAIL AT S_2

NOTE: Joint filler shall strictly conform to IS1838. Products with ISI certification mark shall only be used.

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes: (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. This drawing is applicable for Square Crossings.
3. All dimensions are in millimetres
4. Concrete shall have a minimum 28 days works cube strength of 200 kg./cm^2 on 150 mm cubes.
5. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970).
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC : 21-1972. This drawing is not applicable for welded joints.
8. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape.
9. The railings shall be of any approved type. The reinforcement from railings should be incorporated in the kerb before casting the slab.
10. No provision for drainage has been made in this drawing. If required, drawing No. BD/1-69 may be referred to.
11. Precast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
12. Properly braced steel plates shall be used as shuttering
13. For schedule of reinforcement, quantities and reactions Drg. No. BD/4-74 may be referred to.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc., unless approved measures are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
A	1983	(i) WEARING COAT-CAMBER AND THICKNESS AT CENTRE MODIFIED. (ii) EXPANSION JOINT DETAILS AND NOTES MODIFIED.	E.E. S.E. C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS EFFECTIVE SPAN 9·37 AND 10·37 METRES

7·5 METRES ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
DO NOT SCALE — ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED: A.E.E.	RECOMMENDED: S.E.	FEBRUARY, 74.
RECOMMENDED: E.E.	APPROVED: C.E.	DRG. NO. BD / 3-74 A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Main Slab

Longitudinal

Type a_1

Effective Span 'S' (m)	Bearing length of each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Dia ϕ (mm)	Spacing 'p' (mm)	No of bars	Length of each bar (L+700) (mm)	Total length (m)
9·37	370	9740	720	25	375	20	10340	206·80
10·37	370	10740	790	25	345	22	11340	249·48

Type a_2 or a_3

Dia ϕ (mm)	Spacing 'p' (mm)	No. of bars	x (mm)	y (mm)	z (mm)	x' (mm)	Length of each bar (x+2y+z+x') (mm)	Total length (m)
25	375	20	435	895	6560	1375	10160	203·20
25	345	22	465	995	7260	1505	11220	246·84

Type b

Dia ϕ (mm)	Spacing (mm)	No. of bars	b (mm)	n (mm)	Length of each bar (L+2n−5ϕ) (mm)	Total length (m)
10	375	20	9690	660	10960	219·20
10	345	22	10690	730	12100	266·20

Transverse

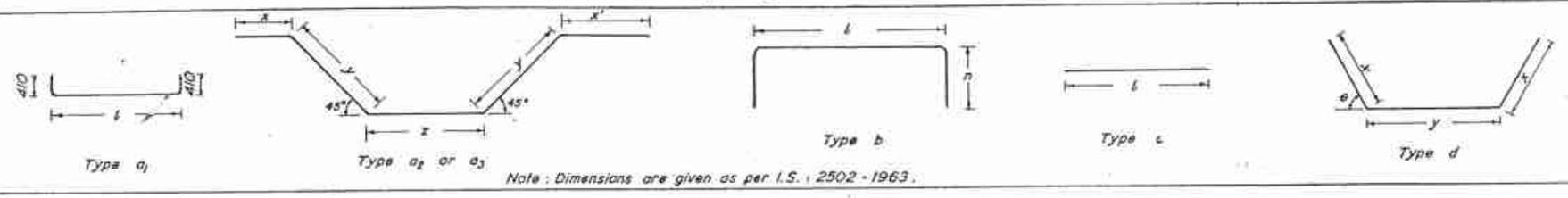
Type c

Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'L' (mm)	Total length (m)
10	300	33	8000	264·00
10	300	36	8000	288·00

Type d

Dia ϕ (mm)	Spacing 'q' (mm)	No. of bars	e (degree)	x (mm)	y (mm)	Length of each bar (2x+y) (mm)	Total length (m)
10	115	85	66·60	895	7450	9240	785·40
10	120	90	67·65	960	7450	9370	843·30

Bending Diagrams



Note : Dimensions are given as per I.S. : 2502 - 1963.

Kerbs

Longitudinal

Type e

Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'L' (mm)	Total length (m)
8	As shown	14	9690	135·66
8	As shown	14	10690	149·66

Transverse

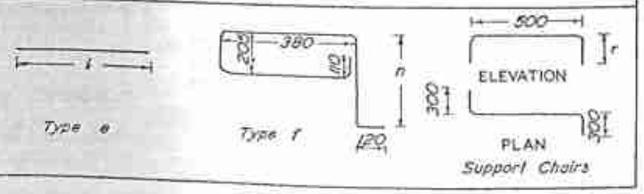
Type f

Dia ϕ (mm)	Spacing (mm)	No. of bars	n (mm)	Length of each bar (n + 1140)	Total length (m)
10	300	66	760	1900	125·40
10	300	72	810	1950	140·40

Support Chairs

Dia ϕ (mm)	r (mm)
22	615
22	685

Bending Diagrams



MAXIMUM REACTIONS (IN TONNES)

Effective Span (m)		9·37	10·37
Reaction at Abutment	Dead Load	77·39	92·29
	Dead Load + Live Load	128·02	146·79
	Dead Load + Live Load + Impact	132·89	160·62
Reaction at Pier	Dead Load	154·78	184·58
	Dead Load + Live Load	222·04	255·15
	Dead Load + Live Load + Impact	238·78	272·98

QUANTITIES (PER SPAN)

Effective Span (m)	9·37	10·37
CONCRETE : (Excluding wearing coat and railing) (cu.m)	57·41	69·10
STEEL : (Including 5% extra for lops and wastage) (kg.)	3453	4067

Notes :

1. This drawing shall be read in conjunction with Drawing No. BD/3-74 showing the details of R.C.C. deck slab.
2. The schedule of reinforcement is based on bearing width of 370mm. In case of increase in bearing width, the schedule of reinforcement shall be modified suitably.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

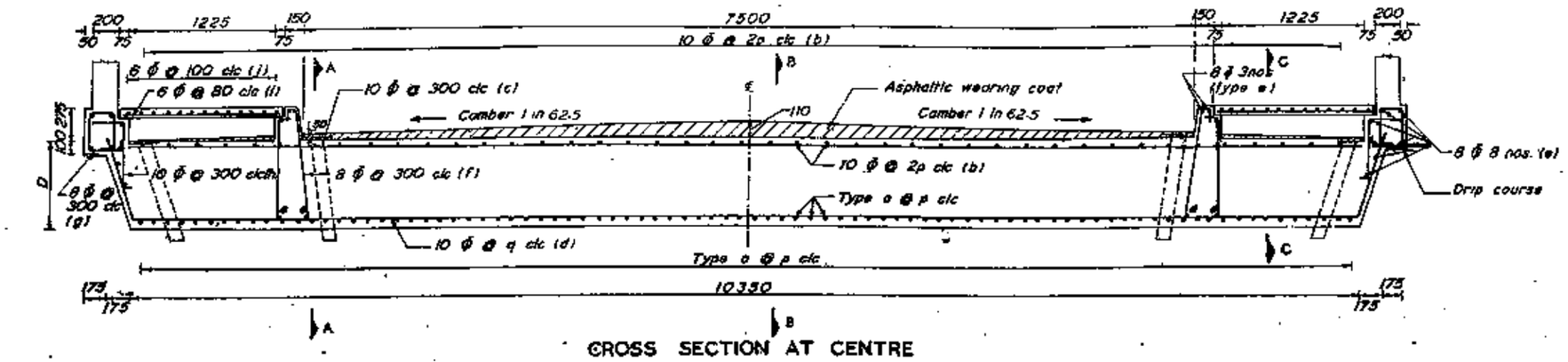
REINFORCED CEMENT CONCRETE SLABS EFFECTIVE SPAN 9·37 AND 10·37 METRES

7·5 METRES ROADWAY — DO NOT SCALE
TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

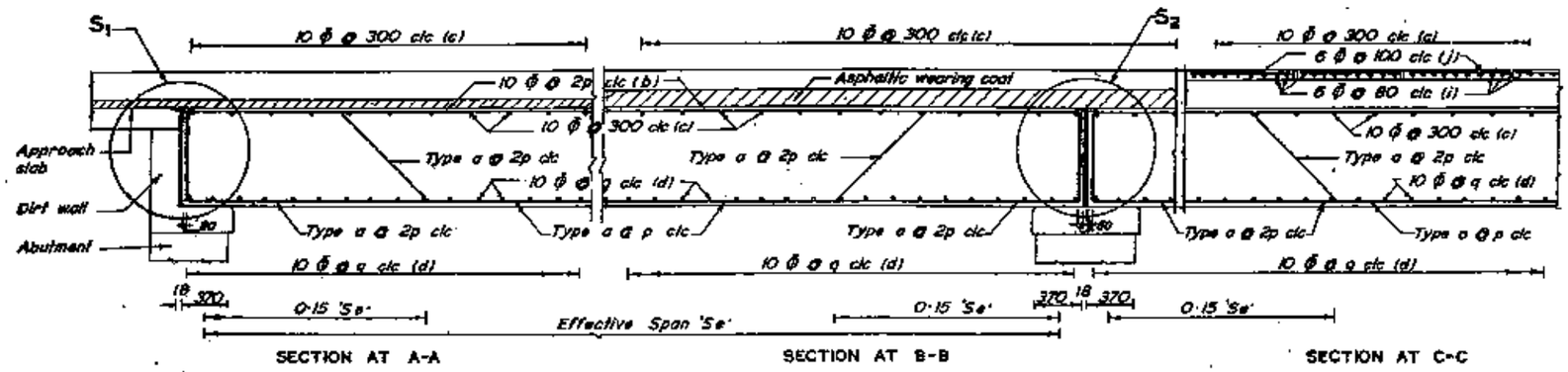
RECOMMENDED : A.E.E.
RECOMMENDED : E.E.
RECOMMENDED : S.E.
APPROVED : C.E.

FEBRUARY, 74
DRG. NO. BD/4-74.

High Yield Strength Deformed Bars



CROSS SECTION AT CENTRE

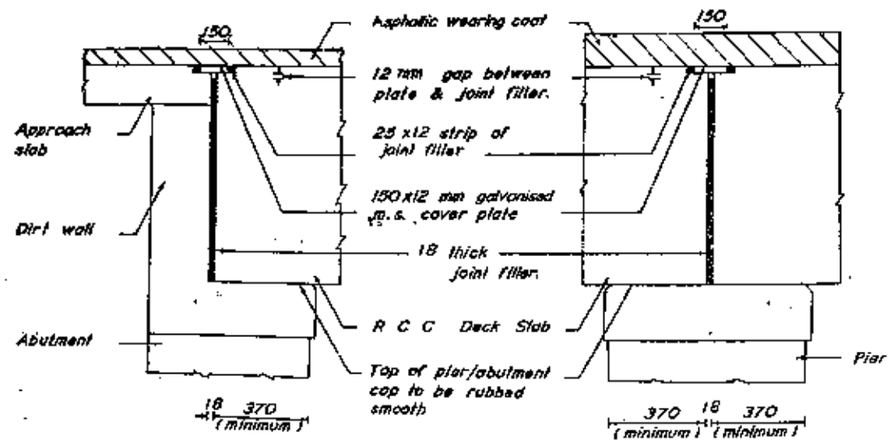


SECTION AT A-A

SECTION AT B-B

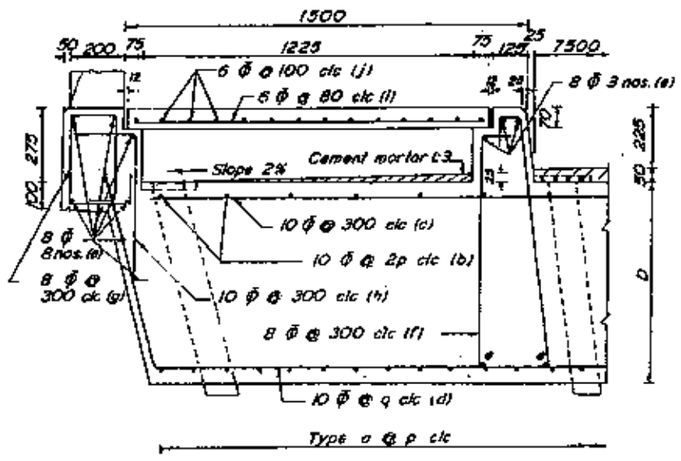
SECTION AT C-C

LONGITUDINAL SECTION



DETAIL AT S_1

DETAIL AT S_2



DETAILS OF FOOTPATHS

NOTE: Joint filler shall strictly conform to IS 1838 Products with ISI certification mark shall only be used.

NOTES :-

1. The design is according to the following Bridge Codes: (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. This drawing is applicable for Square Crossings
3. All dimensions are in millimetres
4. Concrete shall have a minimum 28 days works cube strength of 200 kg./cm² on 150 mm cubes.
5. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139-1966 (with amendment No. 1 of August, 1968 and amendment No 2 of November, 1970) or I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No 2 of December, 1970).
6. Minimum cover to any reinforcement shall be 25mm unless shown otherwise in the drawing.
7. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC: 21-1972. This drawing is not applicable for welded joints.
8. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape
9. The railings shall be of any approved type. The reinforcement from railings should be incorporated in the kerb before casting the slab
10. For the details of drainage Drawing No. BD/1-69 may be referred to
11. Precast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
12. Properly braced steel plates shall be used as shuttering.
13. The top surface of the precast footpath slabs shall be clearly marked for proper handling to avoid cracking.
14. Footpath slabs may be provided with a wearing course of precast chequered tiles fixed firmly and true to levels
15. For schedule of reinforcement, quantities and reactions Drg. No. BD/6-74 may be referred to
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc., unless approved measures are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
'A	1983	(i) WEARING COAT-CAMBER AND THICKNESS AT CENTRE MODIFIED. (ii) EXPANSION JOINT DETAILS AND NOTES MODIFIED	E.E. S.E. E.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS
EFFECTIVE SPAN 3·37 TO 8·37 METRES

7·5 METRE ROADWAY
1·5 M. FOOTPATHS
DO NOT SCALE

TWO LANES I.R.C. CLASS 'A' LOADING.
ONE LANE I.R.C. CLASS '70-R' LOADING.

RECOMMENDED: A.E.E.
RECOMMENDED: E.E.
RECOMMENDED: S.E.
APPROVED: C.E.

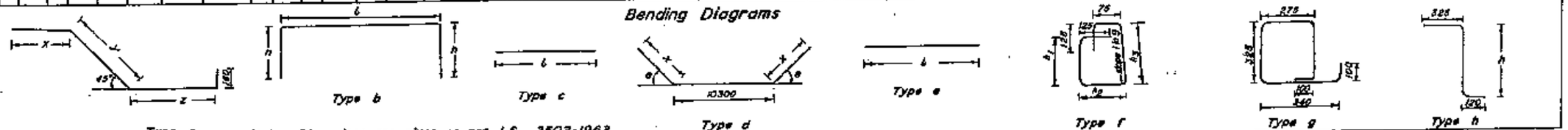
MARCH, 74.
DRG. NO. BD/5-74 A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Effective span 'Se' (m)	Bearing length at each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Main Slab: Longitudinal Type a: Dia φ (mm)	Spacing 'p' (mm)	No of bars	x (mm)	y (mm)	z (mm)	Length of each bar (x+y+z-3×φ) (mm)	Total length (m)	Type b: Dia φ (mm)	Spacing '2p' (mm)	No of bars	L (mm)	n (mm)	Length of each bar (L+2n-3×φ) (mm)	Total length (m)	Transverse Type c: Dia φ (mm)	Spacing (mm)	No of bars	Length of each bar 'L' (mm)	Total length (m)	Type d: Dia φ (mm)	Spacing 'q' (mm)	No of bars	a (deg)	x (mm)	Length of each bar (2x+1030) (mm)	Total length (m)	Kerbs: Longitudinal Type e: Dia φ (mm)	Spacing (mm)	No of bars	Length of each bar 'L' (mm)	Total length (m)	Transverse Type f: Dia φ (mm)	Spacing (mm)	No of bars	h1 (mm)	h2 (mm)	h3 (mm)	Length of each bar (h1+h2+h3+225) (mm)	Total length (mm)	Type g: Dia φ (mm)	Spacing (mm)	No of bars	Length of each bar (mm)	Total length (mm)	Type h: Dia φ (mm)	Spacing (mm)	No of bars	n (mm)	Length of each bar (mm)	Total length (m)
3·37	370	3829	315	16	125	63	450	355	3060	3685	330·786	10	250	42	3775	250	4225	177·45	10	300	13	10330	134·29	10	115	33	31	360	11000	363·00	8	Main Bars	26	3775	98·15	8	300	26	448	205	820	1395	36·27	8	300	26	1340	34·84	10	300	26	420	416	21·19
4·37	370	4778	365	16	105	99	525	425	3890	4980	491·040	10	210	50	4725	500	5275	263·75	10	300	16	10350	168·60	10	100	48	87	380	11040	530·59	8	Main Bars	25	4725	122·85	8	300	32	493	210	670	1500	48·00	8	300	32	1360	43·52	10	300	32	488	650	27·20
5·37	370	5740	410	20	145	72	610	490	4715	5910	425·520	10	290	38	5590	540	6320	287·52	10	300	19	10350	198·65	10	90	64	60·5	415	11130	712·32	8	Main Bars	26	5690	147·94	8	300	38	535	213	670	1888	60·83	8	300	38	1360	51·68	10	300	38	488	680	33·44
6·37	370	6740	470	20	125	83	700	565	5360	6935	575·605	10	250	42	6650	600	7440	312·48	10	300	23	10350	238·05	10	90	75	68	485	11230	842·26	8	Main Bars	26	6690	173·87	8	300	46	598	226	670	1716	78·89	8	300	46	1360	62·56	10	300	46	525	920	42·32
7·37	370	7740	530	20	110	94	790	650	6410	7960	748·240	10	220	48	7690	660	8850	410·88	10	300	25	10350	268·10	10	95	82	68	520	11540	989·86	8	Main Bars	26	7690	199·84	8	300	52	655	230	730	1945	76·84	8	300	52	1360	70·72	10	300	52	560	858	49·64
8·37	370	8740	595	20	95	108	875	740	7260	8985	879·368	10	190	55	8690	825	9690	532·95	10	300	29	10350	300·15	10	95	92	70·5	660	11660	1054·32	8	Main Bars	26	8690	225·94	8	300	59	720	240	795	1990	118·42	8	300	58	1360	78·88	10	300	58	605	1000	58·00

Bending Diagrams

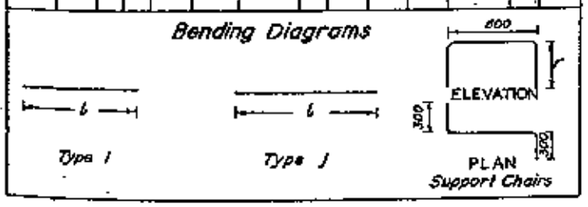


Note : Dimensions are given as per I.S. 2502-1963

Pre-Cast Footpath Slab

Effective span 'Se' (mm)	Width of each panel (mm)	Longitudinal Type i: Dia φ (mm)	Spacing (mm)	No of bars	Length of each bar 'L' (mm)	Total length (m)	Transverse Type j: Dia φ (mm)	Spacing (mm)	No of bars	Length of each bar 'L' (mm)	Total length (mm)	Support Chairs: Dia φ (mm)	Y (mm)
3·37	755	6	80	90	1300	117·00	6	100	140	705	98·70	16	220
4·37	785	6	80	120	1300	156·00	6	100	188	735	123·48	16	270
5·37	800	6	80	140	1300	182·00	6	100	196	780	147·00	20	310
6·37	738	6	80	162	1300	210·60	8	100	252	685	172·60	20	370
7·37	760	6	80	180	1300	234·00	6	100	280	710	198·80	20	430
8·37	785	6	80	220	1300	286·00	8	100	308	735	226·38	20	495

Bending Diagrams



MAXIMUM REACTIONS (IN TONNES)

	Effective Span (m)	3·37	4·37	5·37	6·37	7·37	8·37
Reaction at Abutment	Dead Load	21·00	29·26	38·53	50·15	63·52	78·89
	Dead Load + Live Load	63·80	73·52	84·97	99·09	115·00	132·42
	Dead Load + Live Load + Impact	83·30	91·52	101·99	118·49	130·76	147·53
Reaction at Pier	Dead Load	42·00	58·50	76·70	100·30	127·04	157·78
	Dead Load + Live Load	93·42	113·60	137·78	164·68	196·84	233·91
	Dead Load + Live Load + Impact	106·90	128·44	150·58	176·78	211·22	250·32

QUANTITIES (PER SPAN)

Effective Span (m)	3·37	4·37	5·37	6·37	7·37	8·37
CONCRETE (Excluding wearing coat and railings). (cu.m)	14·70	20·90	27·78	36·85	47·25	59·30
STEEL (Including 5% extra for laps and wastage) (kg.)	1121	1610	2046	2643	3287	4097

NOTES :

1. This drawing shall be read in conjunction with Drawing No. BD/5·74 showing the details of R.C.C. deck slab.
2. The schedule of reinforcement is based on bearing width of 370 mm. In case of increase in bearing width, the schedule of reinforcement shall be modified suitably.
3. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling. The width shown in this Drawing is not binding.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING NEW DELHI

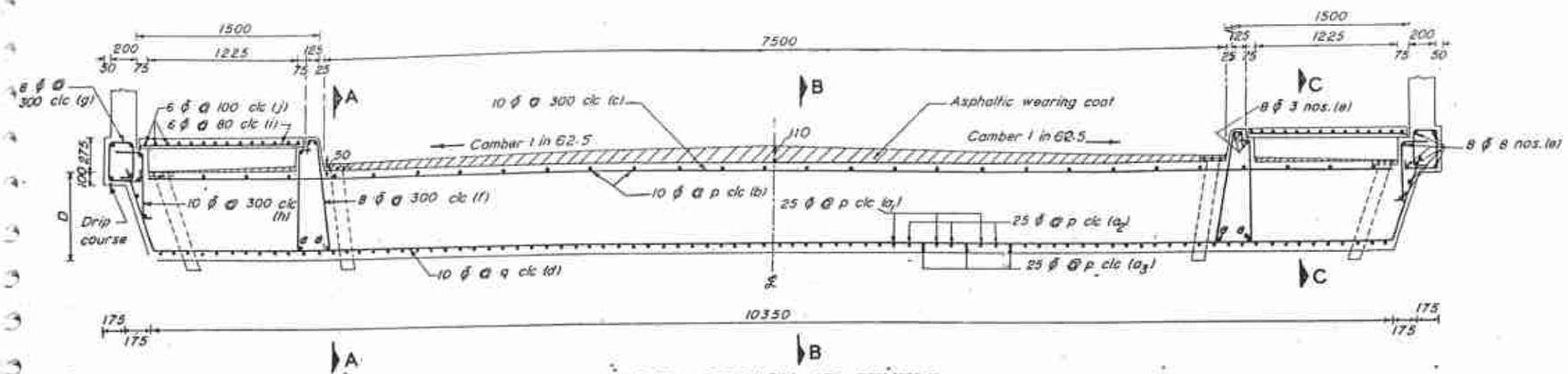
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS
EFFECTIVE SPAN 3·37 TO 8·37 METRES

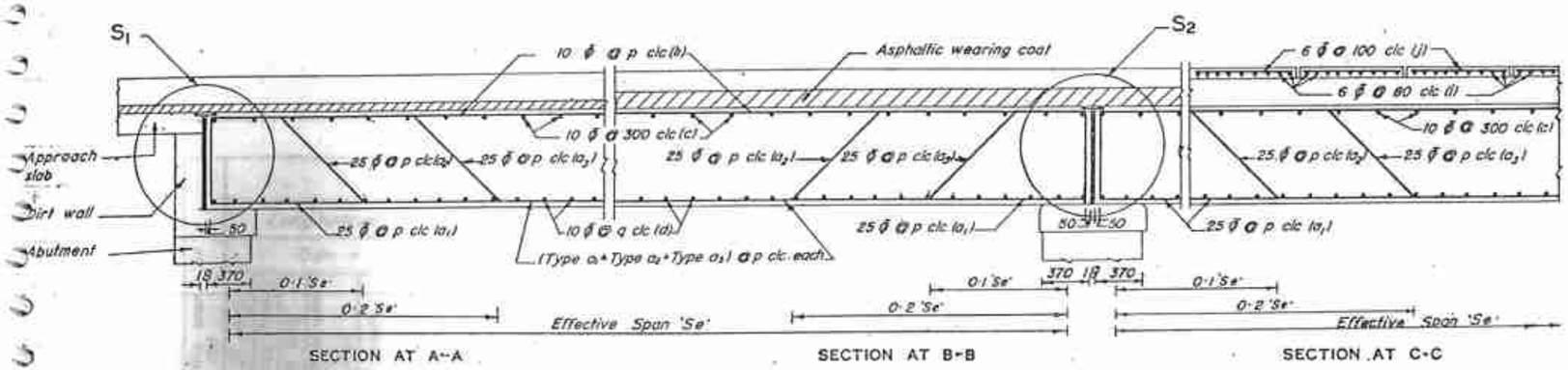
7·5 METRES ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
1·5 M FOOTPATHS — ONE LANE I.R.C. CLASS '70-R' LOADING
DO NOT SCALE

RECOMMENDED : A.E.E. / E.E.
RECOMMENDED : S.E. / C.E.
RECOMMENDED : S.E.
APPROVED : C.E.

MARCH 74.
DRG. NO. BD/5·74.

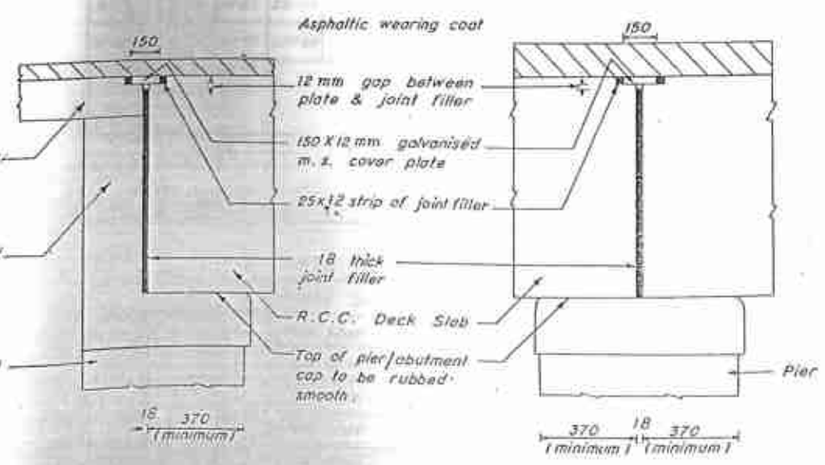


CROSS SECTION AT CENTRE



SECTION AT A-A SECTION AT B-B SECTION AT C-C

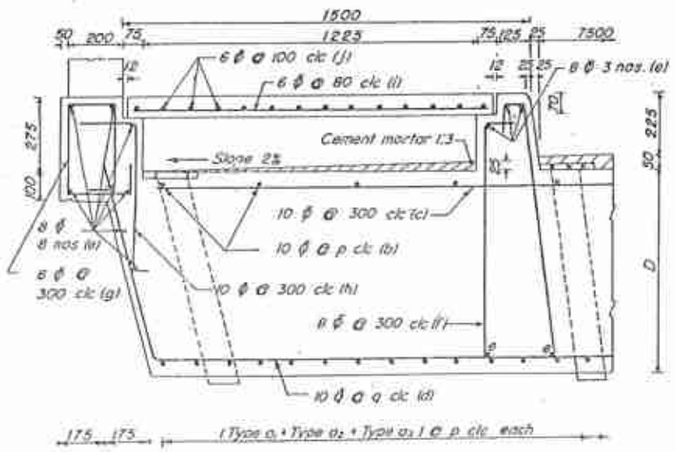
LONGITUDINAL SECTION



DETAIL AT S_1

DETAIL AT S_2

NOTE: Joint filler shall strictly conform to IS 1838. Products with ISI certification mark shall only be used.



DETAIL OF FOOTPATHS

NOTES :

1. The design is according to the following Bridge Codes (i) IRC : 5 - 1970, (ii) IRC : 6 - 1966, & (iii) IRC : 21 - 1972.
2. This drawing is applicable for Square Crossings
3. All dimensions are in millimetres
4. Concrete shall have a minimum 28 days works cube strength of 200 kg/cm^2 on 150 mm cubes.
5. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139 - 1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786 - 1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970).
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC : 21-1972. This drawing is not applicable for welded joints.
8. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape.
9. The railings shall be of any approved type. The reinforcement from railings should be incorporated in the kerb before casting the slab.
10. For the details of drainage Drawing No. BD/1-69 may be referred to.
11. Precast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
12. Properly braced steel plates shall be used as shuttering.
13. The top surface of the precast footpath slabs shall be clearly marked for proper handling to avoid cracking.
14. Footpath slabs may be provided with a wearing course of precast chequered tiles fixed firmly and true to levels.
15. For schedule of reinforcement, quantities and reactions Drawing No. BD/8-74 may be referred to.
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
A	1983	(i) WEARING COAT - CAMBER AND THICKNESS AT CENTRE MODIFIED. (ii) EXPANSION JOINT DETAILS AND NOTES MODIFIED.	C.E. S.E. S.E.

GOVERNMENT OF INDIA

MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

REINFORCED CEMENT CONCRETE SLABS EFFECTIVE SPAN 9·37 AND 10·37 METRES

7·5 METRE ROADWAY
1·5 M FOOTPATHS
DO NOT SCALE

TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED : S.E. 4-74
RECOMMENDED : E.E. 8/4/74
RECOMMENDED : S.E.
APPROVED : C.E. 4/5/74

MARCH, 74.
DRG. NO. BD/7-74-A

M 67

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Main Slab

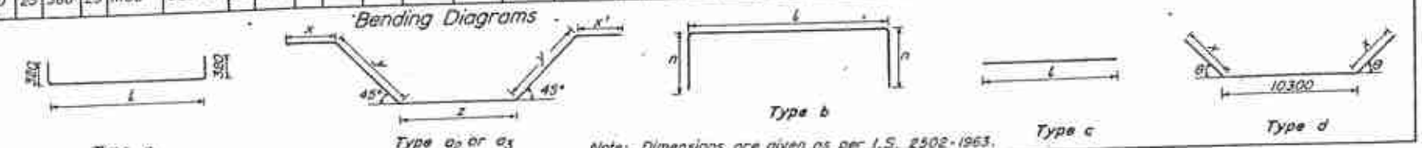
Longitudinal

Effective span 'Se' (m)	Bearing length at each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Type a_1: Dia ϕ (mm)	Spacing 'p' (mm)	No of bars	Length of each bar (l_1 + 515) (mm)	Total length (m)	Type a_2 or a_3: Dia ϕ (mm)	Spacing 'p' (mm)	No of bars	x (mm)	y (mm)	z (mm)	x' (mm)	Length of each bar (l_2+2x+z+x') (mm)	Total length (m)
9·37	370	9740	665	25	405	26	10155	264·03	25	405	25	480	835	6560	1420	10130	253·25
10·37	370	10740	740	25	360	29	11155	323·50	25	360	29	505	940	7260	1545	11190	324·51

Transverse

Effective span 'Se' (m)	Type b: Dia ϕ (mm)	Spacing 'p' (mm)	No of bars	ℓ (mm)	n (mm)	Length of each bar (l_1+2n−5ϕ) (mm)	Total length (m)	Type c: Dia ϕ (mm)	Spacing (mm)	No of bars	Length of each bar 'c'	Total length (m)	Type d: Dia ϕ (mm)	Spacing 'q' (mm)	No of bars	θ (deg)	x (mm)	Length of each bar (2x+10300) (mm)	Total length (m)
9·37	10	405	26	9690	590	10820	281·32	10	300	33	10350	341·55	10	95	102	73	640	11580	1181·16
10·37	10	360	29	10690	665	11970	347·13	10	300	36	10350	372·60	10	95	113	75	710	11720	1324·36

Bending Diagrams



Note: Dimensions are given as per I.S. 2502-1963.

Kerbs

Longitudinal

Effective span 'Se' (m)	Type e: Dia ϕ (mm)	Spacing (mm)	No of bars	Length of each bar 'ℓ' (mm)	Total length (m)
9·37	8	As shown	26	9690	251·94
10·37	8		26	10690	277·94

Transverse

Type f: Dia ϕ (mm)	Spacing (mm)	No of bars	h_1 (mm)	h_2 (mm)	h_3 (mm)	Length of each bar (h_1+h_2+h_3+225) (mm)	Total length (m)	Type g: Dia ϕ (mm)	Spacing (mm)	No of bars	Length of each bar (mm)	Total length (m)	Type h: Dia ϕ (mm)	Spacing (mm)	No of bars	n (mm)	Length of each bar (mm)	Total length (m)
8	300	66	785	245	860	2115	139·59	8	300	66	1360	89·76	10	300	66	650	1045	68·97
8	300	72	860	255	935	2275	163·80	8	300	72	1350	97·92	10	300	72	700	1095	78·84

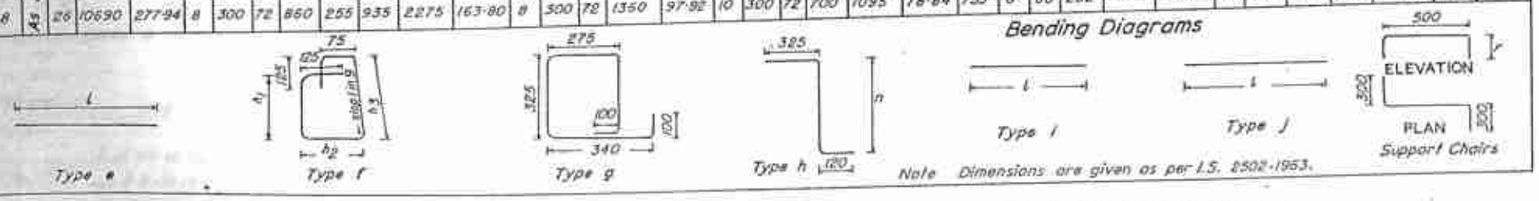
Pre-cast Footpath Slab

Width of each Panel (mm)	Longitudinal Type i: Dia ϕ (mm)	Spacing (mm)	No of bars	Length of each bar 'ℓ' (mm)	Total length (m)	Transverse Type j: Dia ϕ (mm)	Spacing (mm)	No of bars	Length of each bar 'c' (mm)	Total length (m)
800	6	80	240	1300	312·00	6	100	336	750	252·00
755	6	80	252	1300	327·60	6	100	392	705	276·36

Support Chairs

Dia ϕ (mm)	r (mm)
22	560
22	635

Bending Diagrams



Note Dimensions are given as per I.S. 2502-1953.

MAXIMUM REACTIONS (IN TONNES)

Effective Span (m)		9·37	10·37
Reaction at Abutment	Dead Load	96·47	116·59
	Dead Load + Live Load	152·94	177·53
	Dead Load + Live Load + Impact	167·81	191·36
Reaction at Pier	Dead Load	192·94	233·18
	Dead Load + Live Load	271·88	316·63
	Dead Load + Live Load + Impact	288·62	334·46

QUANTITIES (PER SPAN)

Effective Span (m)		9·37	10·37
CONCRETE : (Excluding wearing coat and railing).	(cu.m)	73·20	89·30
STEEL : (Including 5% extra for laps and wastage).	(kg.)	4660	5675

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/7-74 showing the details of R.C.C. deck slab.
2. The schedule of reinforcement is based on bearing width of 370 mm. In case of increase in bearing width, the schedule of reinforcement shall be modified suitably.
3. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling. The width shown in this Drawing is not binding.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

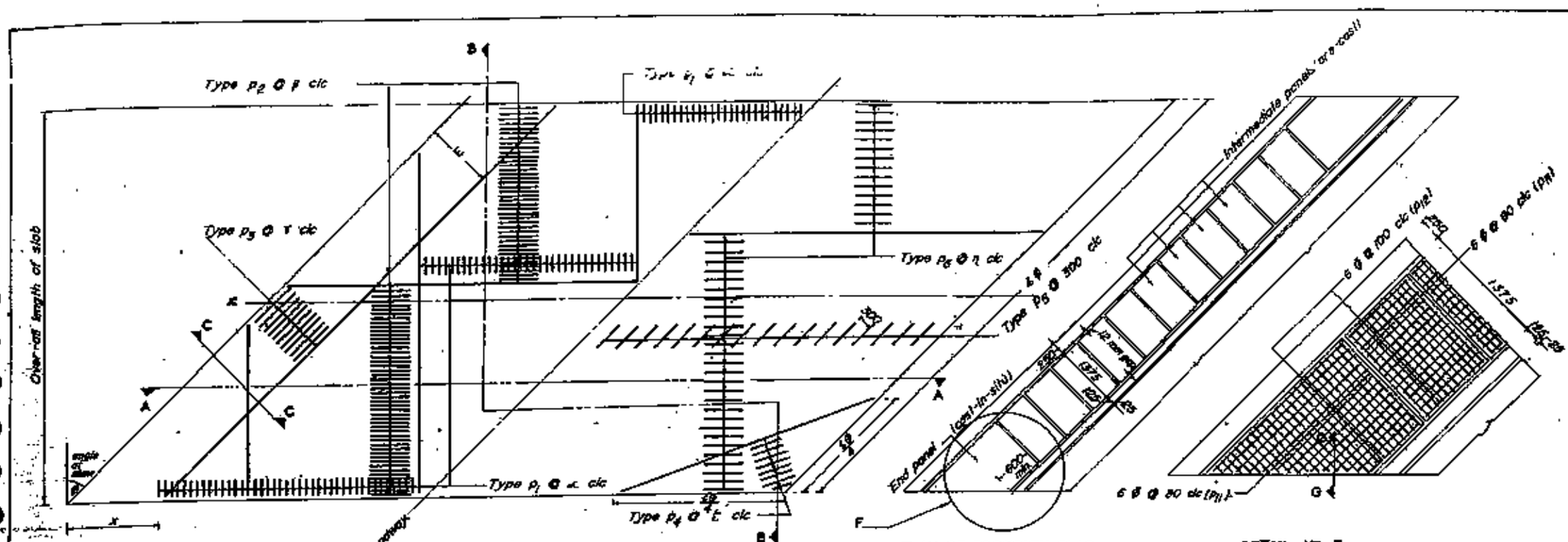
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

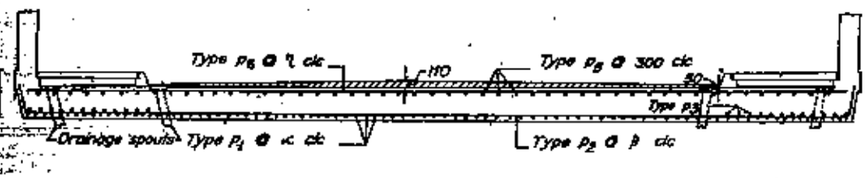
REINFORCED CEMENT CONCRETE SLABS EFFECTIVE SPAN 9·37 AND 10·37 METRES

7·5 METRES ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
1·5 M FOOTPATHS — ONE LANE I.R.C. CLASS '70-R' LOADING
DO NOT SCALE

RECOMMENDED: A.E.E. 4/74
RECOMMENDED: E.E. 4/74
RECOMMENDED: S.E. 4/74
APPROVED: C.E. 4/74

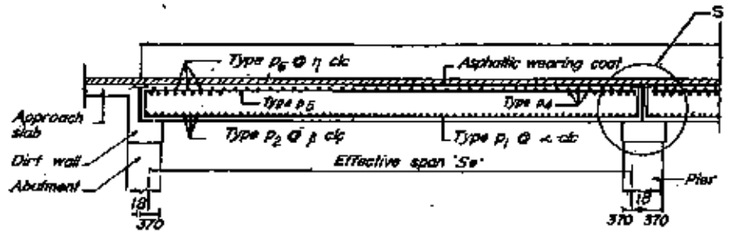
APRIL, 74.
DRG. NO. BD/8-74.



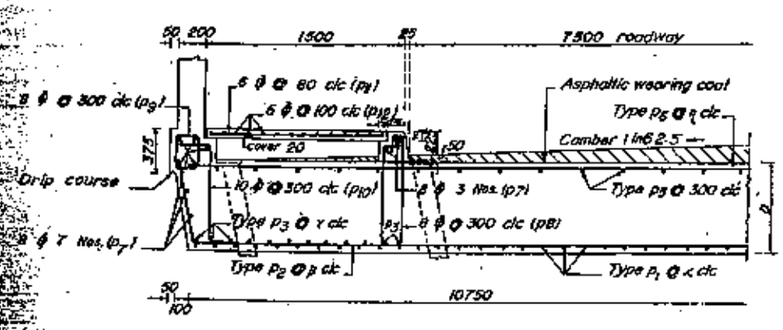


SECTION AT A-A

(Kerbs & footpath slab reinforcement not shown)

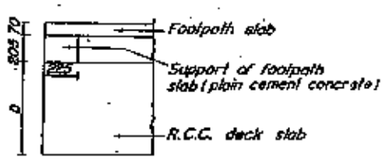


SECTION AT B-B

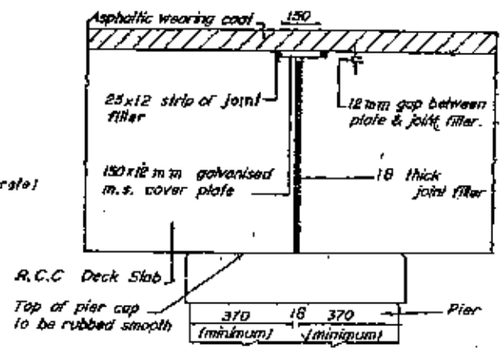


SECTION AT C-C

(Showing kerbs & footpath slab reinforcement)



SECTION AT G-G



DETAIL AT S

NOTE Joint filler shall strictly conform to IS 1838. Products with ISI certification mark shall only be used

High Yield Strength Deformed Bars

NOTES :

1. The design is according to the following Bridge Codes - (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC 21-1972
2. This drawing is applicable for Skew Bridges with angles of skew 15° to 60°. For any intermediate angle of skew between those given in the reinforcement table, spacing of bars can be linearly interpolated
3. For skew angles less than 15° the moment may be calculated for a right bridge of span centre to centre of supports, measured parallel to centre line of road-way. Main reinforcement may be provided in a direction parallel to traffic and transverse reinforcement parallel to abutment.
4. All dimensions are in millimetres.
5. Concrete shall have a minimum 28 days works cube-strength of 200 kg./cm² on 150 mm cubes.
7. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786-1966. (with amendment No. 1 of August, 1968 amendment No. 2 of December, 1970).
7. Minimum cover to any reinforcement shall be 25 mm unless otherwise shown in the drawing.
8. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of IRC : 21-1972. This drawing is not applicable for welded joints.
9. The railings shall be of any approved type. The reinforcement from railing should be incorporated in the kerb before casting the slab.
10. For the details of drainage, Drawing No. BD/1-69 may be referred to.
11. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
12. Properly braced steel plates shall be used as shuttering.
13. Top surface of the pre-cast footpath slab shall be clearly marked for proper handling to avoid cracking
14. Footpath slab may be provided with a wearing course of pre-cast chequered tiles fixed firmly and true to levels.
15. For schedule of reinforcement and quantities Drawing No. BD/11-74 may be referred to.
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measurs are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
A	1983	WEARING COAT - CAMBER AND THICKNESS AT CENTRE MODIFIED.	S.E. S.E. C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

REINFORCED CEMENT CONCRETE SKEW SLABS EFFECTIVE SPAN 4'37 TO 8'37 METRES

7'5 METRE ROADWAY
1'5 M. FOOTPATHS
DO NOT SCALE

TWO LANES I.R.C. CLASS A LOADING
ONE LANE I.R.C. CLASS 70-R LOADING

RECOMMENDED: A.E.E.
RECOMMENDED: E.E.
RECOMMENDED: S.E.
APPROVED: C.E.

JUNE, 74.
DRG. NO. BD/10-74A

SCHEDULE OF REINFORCEMENT (PER SPAN)

Main Deck Slab

Effective right span 'Se' (mm)	Bearing length at each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Angle of skew ⊕	Type P_1 'x' (mm)	Dia ϕ (mm)	Spacing 'x' (mm)	No. of bars	n (mm)	Length of each bar (2+2n−5ϕ) (mm)	Total length (m)
4370	370	4740	405	15°	1375	16	125	78	355	5270	411
				30°	1510	16	125	98	355	varying 3100 to 5270	495
				45°	1910	16	125	130	355	varying 2420 to 5270	620
				60°	2610	16	125	197	355	2030 to 5270	892
6370	370	6740	470	15°	1330	20	125	83	420	5465 to 7380	804
				30°	1460	20	125	108	420	3120 to 7380	711
				45°	1905	20	125	146	420	2525 to 7380	888
				60°	2575	20	125	225	420	2120 to 7380	1277
8370	370	8740	630	15°	1330	25	140	78	580	5760 to 9675	723
				30°	1810	25	140	107	580	3505 to 9676	873
				45°	1750	25	140	147	580	2665 to 9675	1065
				60°	2620	25	140	225	580	2430 to 9675	1523

Effective right span 'Se' (mm)	Type P_2 Dia ϕ (mm)	Spacing 'y' (mm)	No. of bars	θ (deg)	y (mm)	z (mm)	Length of each bar (2z + y) (mm)	Total length (m)
4370	10	130	37	71°	11050	370	11790	436
	10	130	37	69°	12350	370	13090	484
	10	130	37	65°	15150	370	15890	588
	10	130	37	57°	21450	370	22190	821
6370	10	85	79	74°	11050	430	11910	941
	10	85	79	73°	12350	430	13210	1044
	10	85	79	69°	15150	430	16010	1265
	10	85	79	62°	21450	430	22310	1762
8370	10	85	103	79°	11050	590	12250	1260
	10	85	103	79°	12350	590	13530	1394
	10	85	103	76°	15150	590	16330	1682
	10	85	103	69°	21450	590	22830	2331

Effective right span 'Se' (mm)	Type P_3 'z' (mm)	Dia ϕ (mm)	Spacing 'z' (min)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	1350	16	130	22	4510	99
	1350	16	130	25	5260	116
	1350	16	100	28	6560	184
	1310	16	90	30	9366	281
6370	1300	20	125	22	6580	145
	1300	20	125	22	7590	167
	1350	20	100	28	9390	263
	1310	20	90	30	13365	401
8370	1310	25	140	20	6650	173
	1310	25	140	20	9900	198
	1250	25	120	22	12210	267
	1350	25	100	28	17365	486

Effective right span 'Se' (mm)	Type P_4 Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	10	300	6	varying 300 to 1980	6
	10	300	6	800 to 2270	7
	10	200	6	1030 to 2970	12
	10	100	12	630 to 4390	30
6370	16	300	9	310 to 2665	12
	16	300	6	1185 to 3230	13
	16	200	10	365 to 4235	23
	16	100	18	275 to 6260	59
8370	20	300	10	325 to 3460	19
	20	300	8	1090 to 4820	21
	20	200	12	880 to 3490	37
	20	100	22	660 to 8140	97

Effective right span 'Se' (mm)	Type P_5 Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	10	300	37	4800	178
	10	300	37	5360	198
	10	300	37	6600	244
	10	300	37	9380	347
6370	12	300	23	11000	253
	12	300	23	12300	283
	12	180	37	15100	559
	12	110	61	21400	1305
8370	16	300	29	11000	319
	16	300	29	12300	356
	16	200	44	15100	664
	16	130	67	21400	1434

Effective right span 'Se' (mm)	Type P_6 Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	10	300	15	11000	178
	10	300	16	12300	197
	10	180	26	15100	392
	10	130	36	21400	770
6370	12	300	23	11000	253
	12	300	23	12300	283
	12	180	37	15100	559
	12	110	61	21400	1305
8370	16	300	29	11000	319
	16	300	29	12300	356
	16	200	44	15100	664
	16	130	67	21400	1434

Inner & Outer Kerbs

Effective right span 'Se' (mm)	Type P_7 Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	8		20	4800	96
	8		20	5360	107
	8		20	6600	132
	8		20	9380	188
6370	8		20	6870	138
	8		20	7690	154
	8		20	9430	189
	8		20	13380	268
8370	8		20	8940	179
	8		20	10000	200
	8		20	12250	245
	8		20	17380	348

Effective right span 'Se' (mm)	Type P_8 Dia ϕ (mm)	Spacing (mm)	No. of bars	h (mm)	Length of each bar (2h + 445) (mm)	Total length (m)
4370	8	300	34	545	1535	52
	8	300	36	545	1535	55
	8	300	46	545	1535	71
	8	300	64	545	1535	98
6370	8	300	46	605	1655	76
	8	300	54	605	1655	89
	8	300	64	605	1655	106
	8	300	92	605	1655	152
8370	8	300	60	760	1965	118
	8	300	68	760	1965	134
	8	300	82	760	1965	161
	8	300	116	760	1965	228

Effective right span 'Se' (mm)	Type P_9 Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar (1180) (mm)	Total length (m)
4370	8	300	34	1180	40
	8	300	36	1180	43
	8	300	46	1180	54
	8	300	64	1180	76
6370	8	300	46	1180	54
	8	300	54	1180	64
	8	300	64	1180	76
	8	300	92	1180	109
8370	8	300	60	1180	71
	8	300	68	1180	80
	8	300	82	1180	97
	8	300	116	1180	137

Effective right span 'Se' (mm)	Type P_{10} Dia ϕ (mm)	Spacing (mm)	No. of bars	h (mm)	Length of each bar (h + 320) (mm)	Total length (m)
4370	10	300	34	545	865	29
	10	300	36	545	865	31
	10	300	46	545	865	40
	10	300	64	545	865	55
6370	10	300	46	605	925	43
	10	300	54	605	925	50
	10	300	64	605	925	59
	10	300	92	605	925	85
8370	10	300	60	760	1080	65
	10	300	68	760	1080	73
	10	300	82	760	1080	89
	10	300	116	760	1080	125

Footpath Slab

Effective right span 'Se' (mm)	Type P_{11} Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	6	80	53	varying 400 to 1300	79
	6	80	75	190 to 1300	89
	6	80	97	100 to 1300	108
	6	80	146	100 to 1300	156
6370	6	80	89	400 to 1300	113
	6	80	104	190 to 1300	126
	6	80	153	100 to 1300	156
	6	80	196	100 to 1300	221
8370	6	80	115	400 to 1300	147
	6	80	133	190 to 1300	163
	6	80	168	100 to 1300	201
	6	80	246	100 to 1300	286

Effective right span 'Se' (mm)	Type P_{12} Dia ϕ (mm)	Spacing (mm)	No. of bars	Length of each bar 'z' (mm)	Total length (m)
4370	6	100	14	4800	67
	6	100	14	5360	75
	6	100	14	6600	92
	6	100	14	9380	131
6370	6	100	14	6870	96
	6	100	14	7690	108
	6	100	14	9430	132
	6	100	14	13380	187
8370	6	100	14	8940	125
	6	100	14	10000	140
	6	100	14	12250	171
	6	100	14	17380	244

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/10-74 showing the details of R.C.C. Skew Slabs.
2. The schedule of reinforcement is based on bearing width of 370mm. In case of increase in bearing width the schedule of reinforcement shall be modified suitably.
3. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling. The trapezoidal panels shown at the ends shall be cast-in-situ.
4. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent upto proper shape

QUANTITIES (PER SPAN)

Steel (including 5% extra for laps and wastage). (kg.)	Concrete (excluding railings and wearing coat) (cu.m)
1494	22·76
1731	26·72
2317	32·78
3478	46·38
3164	38·78
3642	43·57
4855	53·37
7503	75·40
5493	66·24
6413	74·13
8326	90·49
13192	128·25

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

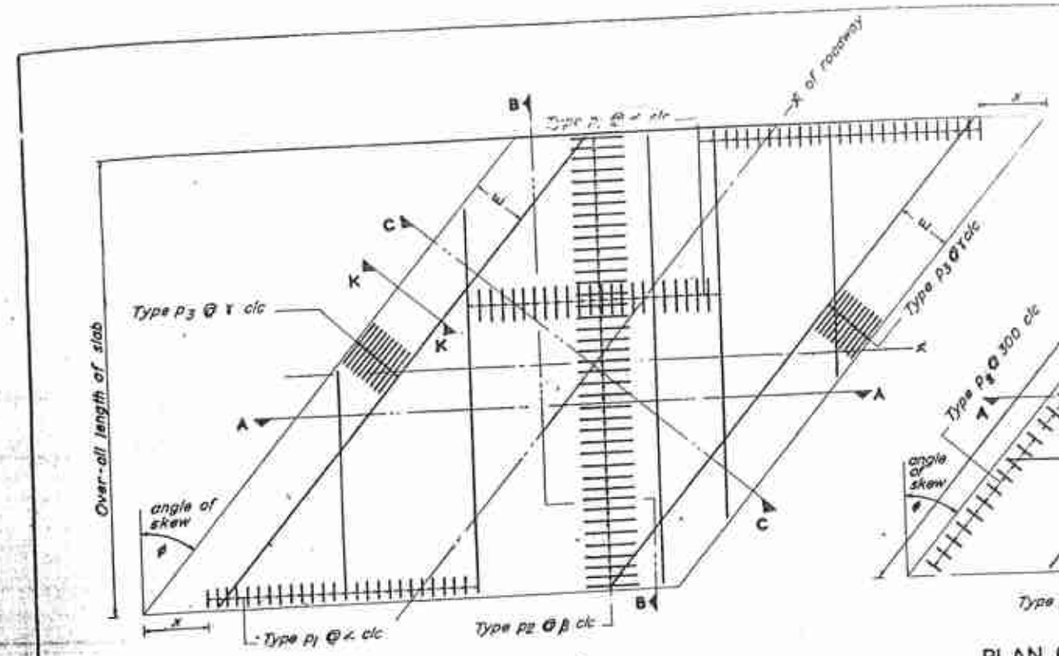
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

REINFORCED CEMENT CONCRETE SKEW SLABS EFFECTIVE SPAN 4·37 TO 8·37 METRES

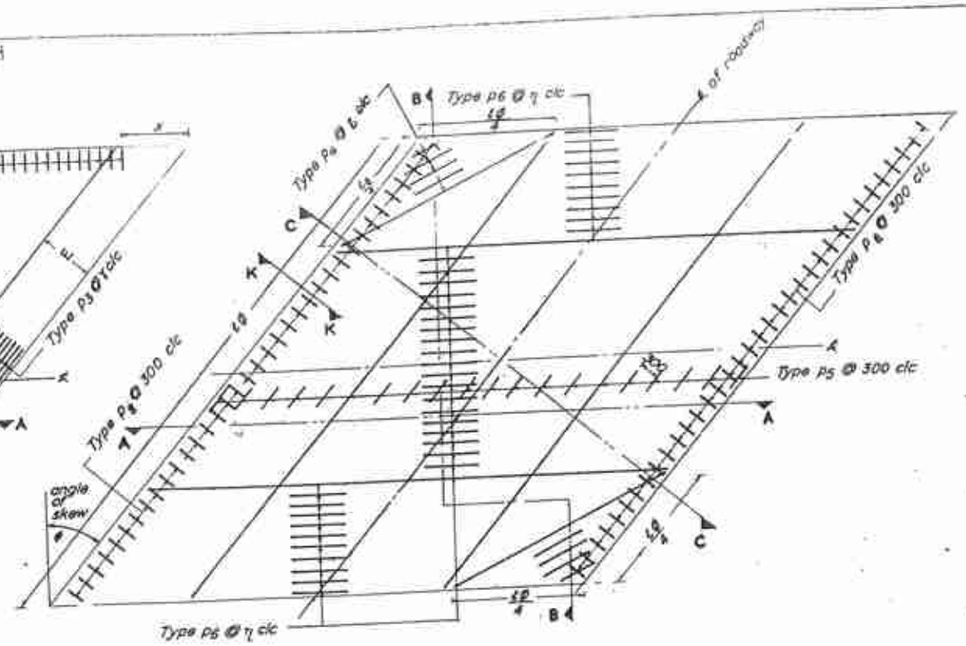
7·5 METRE ROADWAY — TWO LANES I.R.C: CLASS 'A' LOADING
1·5 M. FOOTPATHS — ONE LANE I.R.C. CLASS '70-R LOADING
DO NOT SCALE

RECOMMENDED: S.E. R.E.
RECOMMENDED: E.E.
RECOMMENDED: S.E.
APPROVED: C.E.

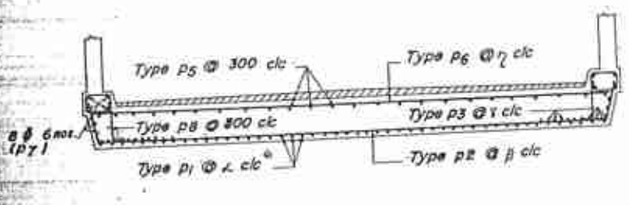
JUNE, 74.
DRG. NO. BD/11-74.



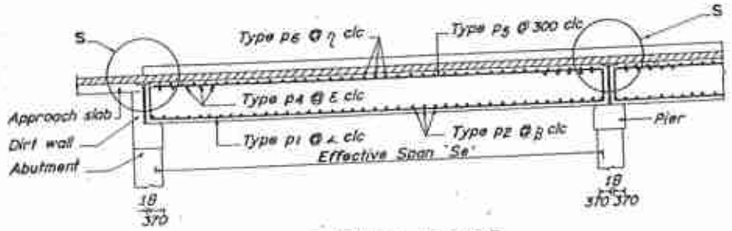
PLAN OF BOTTOM REINFORCEMENT



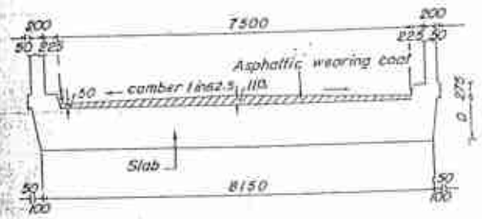
PLAN OF TOP REINFORCEMENT



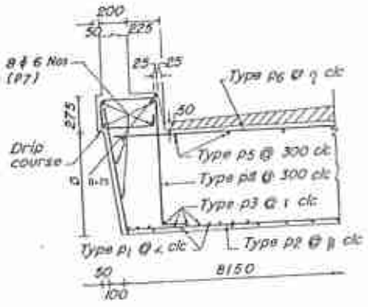
SECTION AT A-A



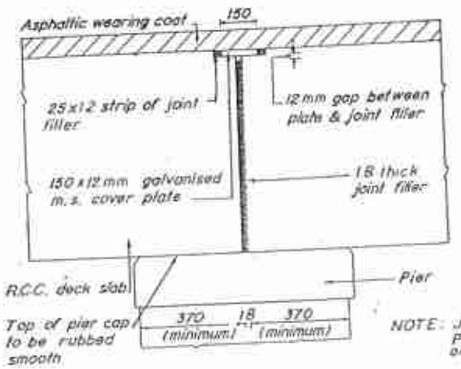
SECTION AT B-B



SECTION AT C-C
(Reinforcement not shown)



KERB DETAILS AT K-K



DETAIL AT 'S'

NOTE: Joint filler shall strictly conform to IS 1838. Products with ISI certification mark shall only be used.

NOTES :-

1. The design is according to the following Bridge Codes: (i) IRC : 5 - 1970, (ii) IRC : 6 - 1966 & (iii) IRC : 21 - 1972.
2. This drawing is applicable for Skew Bridges with angles of skew 15° to 60°. For any intermediate angle of skew between those given in the reinforcement table, spacing of bars can be linearly interpolated.
3. For skew angles less than 15° bending moment may be calculated for a right bridge of span centre to centre of supports, measured parallel to centre line of roadway. Main reinforcement may be provided in a direction parallel to traffic and transverse reinforcement parallel to abutment
4. All dimensions are in millimetres.
5. Concrete shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
6. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139 - 1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786 - 1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970).
7. Minimum cover to any reinforcement shall be 25 mm unless otherwise shown in the drawing.
8. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3. of IRC : 21 - 1972. This drawing is not applicable for welded joints.
9. The railings shall be of any approved type. The reinforcement from railing should be incorporated in the kerb before casting the slab.
10. No provision for drainage has been made in this drawing. If required, Drawing No. BD/1-69 may be referred to.
11. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover
12. Properly braced steel plates shall be used as shuttering.
13. For schedule of reinforcement and quantities Drawing No. BD/13-74 may be referred to
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

REVISION	YEAR	DETAILS	INITIALS
A	1983	(i) WEARING COAT - CAMBER AND THICKNESS AT CENTRE MODIFIED. (ii) EXPANSION JOINT DETAILS AND NOTES MODIFIED.	S.E. S.E. C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

REINFORCED CEMENT CONCRETE SKEW SLABS EFFECTIVE SPAN 5·37 TO 8·37 METRES

7·5 METRE ROADWAY — DO NOT SCALE — TWO LANES I.R.C. CLASS 'A' LOADING ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED ... A.E.E.
RECOMMENDED ... S.E.
RECOMMENDED ... S.E.
APPROVED: ... C.E.
JULY, 74.
DRG. NO. BD/12-74.A

SCHEDULE OF REINFORCEMENT (PER SPAN)

Main Deck Slab

Effective right span 'S' (mm)	Bearing length of each end (mm)	Over-all length of slab (mm)	Over-all depth of slab 'D' (mm)	Angle of skew '∅'	Type P1 'x' (mm)	P1 Dia ∅ (mm)	P1 Spacing 'c' (mm)	P1 No of bars	P1 'n' (mm)	P1 Length of each bar (4+2n−5∅) (mm)	P1 Total length (mm)	Type P2 Dia ∅ (mm)	P2 Spacing 'p' (mm)	P2 No. of bars	P2 'e' (deg)	P2 'y' (mm)	P2 'z' (mm)	P2 Length of each bar (2z+y) (mm)	P2 Total length (m)	Type P3 'E' (mm)	P3 Dia ∅ (mm)	P3 Spacing 'x' (mm)	P3 No. of bars	P3 Length of each bar 'z' (mm)	P3 Total length (m)	Type P4 Dia ∅ (mm)	P4 Spacing (mm)	P4 No of bars	P4 Length of each bar 'z' (mm)	P4 Total length (m)	Type P5 Dia ∅ (mm)	P5 Spacing (mm)	P5 No of bars	P5 Length of each bar 'z' (mm)	P5 Total length (m)	Type P6 Dia ∅ (mm)	P6 Spacing 'x' (mm)	P6 No of bars	P6 Length of each bar 'z' (mm)	P6 Total length (m)
5370	370	5740	465	15°	1025	20	130	62	405	varying 4335 to 6410	350	10	90	64	77°	8390	525	9440	374	1030	20	140	15	5550	89	16	300	6	690 to 2255	9	10	300	28	5840	163	10	300	19	8540	162
				30°	1095	20	130	82	405	2490 to 6410	434	10	90	64	77°	9360	525	10410	415	960	20	150	16	6420	103	16	300	6	650 to 2690	10	10	300	28	6520	185	10	300	19	9540	182
				45°	1415	20	130	112	405	2025 to 6410	569	10	90	64	73°	11470	525	12520	497	1010	20	120	18	7980	144	16	190	8	845 to 3385	18	10	300	28	8020	225	10	200	29	11700	340
				60°	2010	20	120	186	405	1780 to 6410	886	10	110	52	67°	16250	525	17500	558	1010	20	120	18	11385	205	16	110	14	350 to 5290	40	10	300	28	11380	318	10	180	32	18600	531
6370	370	6740	540	15°	1040	20	115	72	480	4545 to 7560	523	10	100	67	79°	8390	600	10560	438	1040	20	110	20	7590	152	16	300	6	1265 to 3240	14	10	300	28	7690	216	10	260	26	9540	248
				30°	1185	20	115	96	480	2790 to 7560	612	10	100	67	76°	11470	600	12670	527	1040	20	110	20	9390	188	16	170	10	985 to 4235	26	10	300	28	9430	264	10	200	34	11700	395
				45°	1425	20	115	135	480	2185 to 7560	768	10	100	67	70°	16250	600	17450	454	1040	20	80	20	13365	267	16	90	18	870 to 6850	64	10	300	28	13360	374	10	160	42	16600	697
				60°	2100	20	95	251	480	1970 to 7560	1333	10	160	42	70°	16250	600	17450	454	1040	20	80	20	13365	267	16	90	18	870 to 6850	64	10	300	28	8940	250	10	260	34	8540	290
8370	370	8740	700	15°	965	25	150	60	640	4510 to 9845	538	10	90	97	82°	8390	755	9900	595	950	25	150	14	8650	121	20	300	10	325 to 3460	19	10	300	28	10000	280	10	230	38	9540	363
				30°	1155	25	150	82	640	3005 to 9845	629	10	110	79	81°	9360	755	10670	532	1030	25	140	15	9900	158	20	300	8	1090 to 4220	22	10	300	28	12250	343	10	150	55	11700	644
				45°	1355	25	150	118	640	2390 to 9845	787	10	150	58	79°	11470	755	12980	467	960	25	130	16	12210	195	20	180	12	660 to 5500	57	10	300	28	12250	343	10	150	55	11700	644
				60°	2020	25	95	289	640	2215 to 9845	1655	10	180	49	74°	16250	755	17760	539	1010	25	120	18	17365	312	20	90	24	735 to 8120	107	10	300	28	17380	486	10	90	97	16500	1610

Kerbs

Effective right span 'S' (mm)	Type P7 Dia ∅ (mm)	P7 Spacing (mm)	P7 No of bars	P7 Length of each bar (mm)	P7 Total length (m)	Type P8 Dia ∅ (mm)	P8 Spacing (mm)	P8 No of bars	P8 'h' (mm)	P8 Length of each bar (1.4 × 1140) (mm)	P8 Total length (m)
5370	8	As Shown	12	5840	70	10	300	40	670	1810	73
	8		12	6520	79	10	300	44	670	1810	80
	8		12	8020	97	10	300	54	670	1810	98
	8		12	11380	137	10	300	76	670	1810	138
6370	8		12	6870	83	10	300	46	745	1885	87
	8		12	7690	93	10	300	52	745	1885	98
	8		12	9430	114	10	300	64	745	1885	121
	8		12	13390	161	10	300	90	745	1885	170
8370	8		12	8940	108	10	300	60	900	2040	122
	8		12	10000	120	10	300	68	900	2040	139
	8		12	12250	147	10	300	82	900	2040	167
	8		12	17380	209	10	300	116	900	2040	236

Effective right span 'S' (mm)	QUANTITIES (PER SPAN) Steel (including 5% extra for laps and wastage) (Kg.)	Concrete (excluding railing and wearing coat) (cu.m.)
5370	1936	24·31
	2216	27·08
	2870	33·21
	4182	46·92
6370	2480	32·82
	2869	36·68
	3634	44·92
	5611	63·42
8370	3813	54·50
	4355	60·86
	5369	74·44
	10409	105·24

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/19-74 showing the details of R.C.C. Skew Slabs.
2. The schedule of reinforcement is based on bearing width of 370 mm. In case of increase in bearing width the schedule of reinforcement shall be modified suitably.
3. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent up to proper shape.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

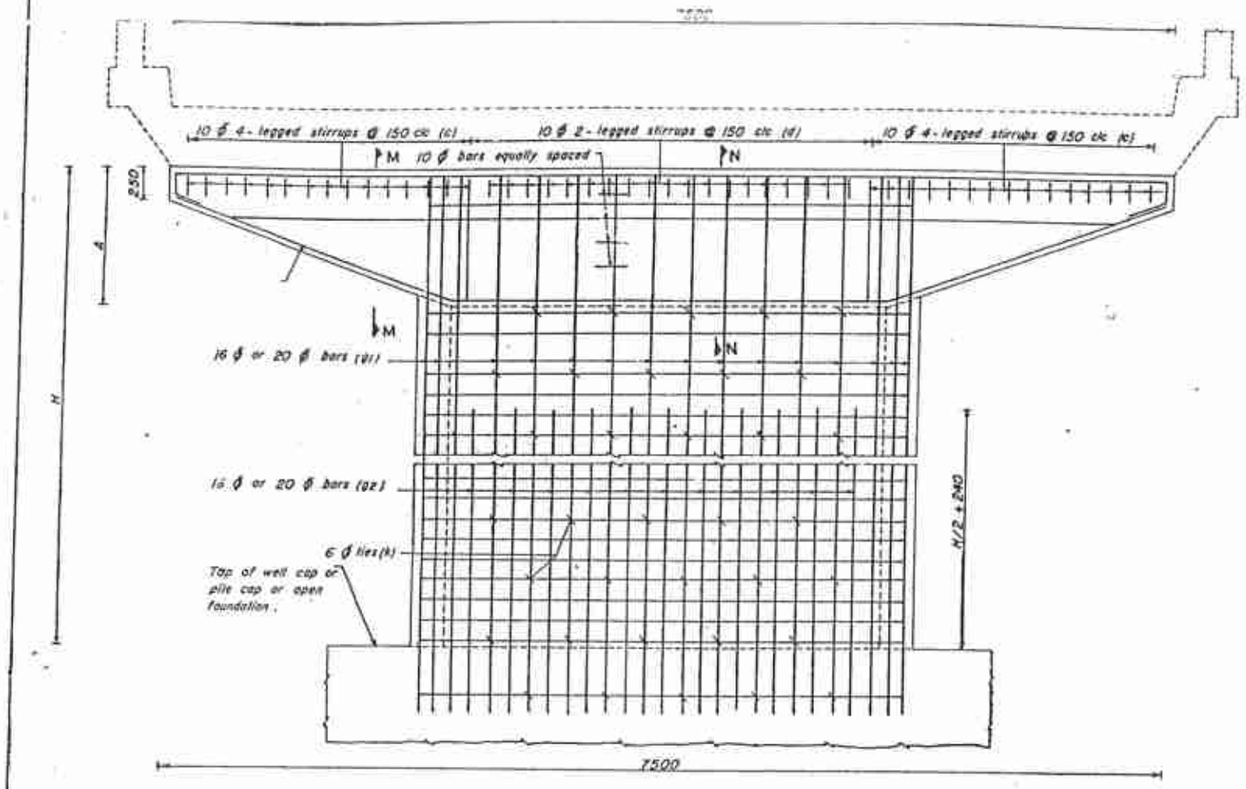
REINFORCED CEMENT CONCRETE SKEW SLABS EFFECTIVE SPAN 5·37 TO 8·37 METRES

7·5 METRE ROADWAY — TWO LANES I.R.C. CLASS 'A' LOADING
DO NOT SCALE — ONE LANE I.R.C. CLASS '70-R' LOADING

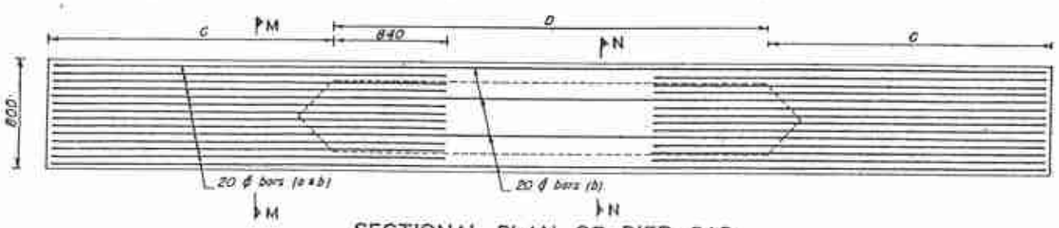
RECOMMENDED : A.E.E.
RECOMMENDED : E.E.
RECOMMENDED : S.E.
APPROVED : C.E.

JULY, 74.
DRG. NO. BD/13-74.

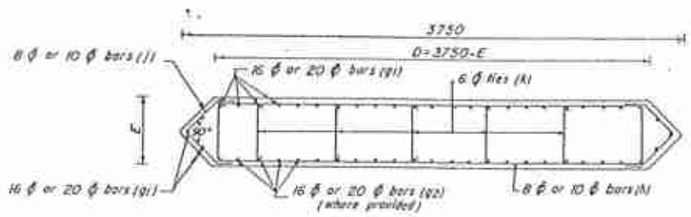
High Yield Strength Deformed Bars



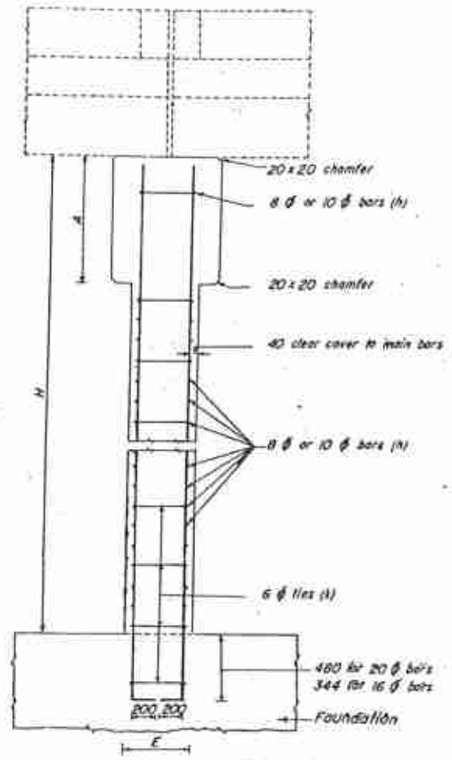
SECTIONAL ELEVATION
(SHOWING REINFORCEMENT DETAILS)



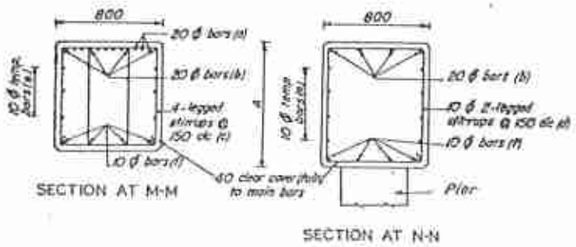
SECTIONAL PLAN OF PIER CAP



SECTIONAL PLAN OF PIER



SECTIONAL SIDE ELEVATION
(PIER REINFORCEMENT ONLY)



SECTION AT M-M

SECTION AT N-N

SECTIONS THROUGH PIER CAP
(PIER CAP REINFORCEMENT ONLY)

NOTES :-

1. The pier cap and pier are designed to support solid slab right bridges without footpaths issued vide Drg. No. BD/1-74 and BD/3-74.
2. The designs are based on the provisions contained in the I.R.C Bridge Codes (i) I.R.C. 5-1970 (ii) I.R.C. 6-1966 and (iii) I.R.C. 21-1972 and sound engineering practice.
3. Concrete shall have a minimum 28 day's works cube strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970) or I.S. 1139-1966 (with amendments of August, 1968 and November, 1970).
5. The design has been checked and found safe for a seismic force of G/10 taken as per clause 222 of I.R.C. 6-1966.
6. The shuttering of the span cast shall only be removed after the adjacent span is also cast or otherwise the pier shall be duly supported with stays on both sides.
7. Co-efficient of friction at the bearing surface (concrete to concrete) has been taken as 0.6 for designs. The top of pier cap shall be rubbed smooth with carborundum stone.
8. All dimensions are in millimetres.
9. Minimum cover to main steel reinforcement in the pier cap and pier shall be 40 mm. Cover to other reinforcement shall not be less than 25 mm.
10. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3. of I.R.C. 21-1972
11. Full scale elevation for the bars shall be lined out on a planed plastered floor to the dimensions shown on the drawing so as to get correct clearance between the different bars and then the bars bent to proper shape
12. For dimensions, schedule of reinforcement and quantities Drg. No. BD/9-75 may be referred to.
13. The design shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.
14. Kerb, Wearing Coat and Railings shall be cast after the adjacent span is cast.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATH)

PIER AND PIER CAPS FOR SLAB BRIDGES
GENERAL DRAWING

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES I.R.C. CLASS 'A' LOADING ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED : V. VEDAVUTHAM A.E.E.	RECOMMENDED : K. B. BARKAR S.E.	NOV. 1975.
RECOMMENDED : D. V. SIKKA E.E.	APPROVED : S. BALMENT RAO C.E.	DRG. NO. BD/8-75

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT AND QUANTITIES (PIER CAPS)

Effective Span (m)	Type 'a' & 'b' (20 ϕ) Spacing (mm) Type 'a'	Spacing (mm) Type 'b'	Number Type 'a'	Number Type 'b'	Length of each bar (mm) Type 'a'	Length of each bar (mm) Type 'b'	Total length (m) Type 'a'	Total length (m) Type 'b'	Total length (m) Total	Type 'c' (10 ϕ) Number (spaced @ 150 c/c)	x (mm)	y (mm)	Average length of stirrups (mm)	Total length (m)	Type 'd' (10 ϕ) Number (spaced @ 150 c/c)	x (mm)	y (mm)	Length of each stirrup (mm)	Total length (m)	Type 'e' (10 ϕ) Number (equally spaced)	Length of each bar (mm)	Total length (m)	Type 'f' (10 ϕ) Number (spaced as bar 'b')	h (mm)	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	QUANTITIES PER PIER CAP Steel: including 5% extra for laps and wastage (kg)	Concrete (cu.m)
3.37	70	varying	2x7	4	2825	7960	39.55	31.84	71.39	2x28	170 to 690	530	2180	118.72	22	690	720	3050	67.32	2x3	4890 to 7420	37.50	4	835	3400	2080	7560	30.24	350	3.78
4.37	63	varying	2x8	4	2675	7960	46.00	31.84	77.84	2x28	170 to 770	461	2102	117.71	22	770	720	3220	70.84	2x3	4975 to 7420	37.19	4	615	3300	2155	7610	30.44	369	4.11
5.37	56	232	2x9	4	2925	7960	52.65	31.84	84.49	2x30	170 to 840	484	2218	133.08	20	840	720	3360	67.20	2x3	4820 to 7420	38.72	4	685	3200	2220	7640	30.56	394	4.39
6.37	53	varying	2x10	4	2975	7960	59.50	31.84	91.34	2x30	170 to 920	497	2324	139.44	20	920	720	3520	70.40	2x4	4700 to 7420	47.80	4	765	3100	2290	7680	30.72	425	4.70
7.37	50	varying	2x11	4	3025	7960	66.55	31.84	98.39	2x30	170 to 1020	470	2370	142.20	20	1020	720	3720	74.40	2x4	4280 to 7420	46.80	4	865	3000	2380	7760	31.04	447	5.08
8.37	46	230	2x12	4	3025	7960	72.60	31.84	104.44	2x30	170 to 1070	490	2440	146.40	20	1070	720	3820	76.40	2x5	4090 to 7420	57.50	4	915	3000	2420	7840	31.36	474	5.30
9.37	43	varying	2x13	4	3075	7960	79.95	31.84	111.79	2x32	170 to 1170	493	2566	154.22	18	1170	720	4020	72.36	2x5	3985 to 7420	57.03	4	1015	2900	2480	7860	31.44	502	5.68
10.37	41	varying	2x14	4	3075	7960	86.10	31.84	117.94	2x32	170 to 1220	471	2572	164.61	18	1220	720	4120	74.16	2x5	3950 to 7420	56.85	4	1065	2900	2500	7900	31.60	519	5.88

SCHEDULE OF REINFORCEMENT AND QUANTITIES (PIERS)

Effective Span (m)	Height of Pier 'H' (m)	Type 'g' Dia of bar (mm)	Spacing (Approximate) (mm)	Number straight portion	Number out water	Number Total	Type 'g' x (mm)	Type 'g' Length of each bar (mm)	Type 'g' Total length (m)	Type 'g2' For straight portion only Dia of bar (mm)	Spacing (mm)	Number	x (mm)	Length of each bar (mm)	Total length (m)	Type 'h' Dia of bar (mm)	Spacing (mm)	No. of ties (Spaced @ 240 c/c)	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	Type 'j' Dia of bar (mm)	Spacing (mm)	Number	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	Type 'k' (6 ϕ) Spacing Horizontal	Spacing Vertical	Number	x (mm)	Length of each tie (mm)	Total length (m)	QUANTITIES PER PIER Steel: including 5% extra for laps and wastage (kg)	Concrete (cu.m)
5.37	3	16	213		2x7	2x1	38	3300	3460	124.56						8	150	2x17	3440	236	5836	130.42	8	150	2x17	175	340	1006	34.80	428	450	49	232	382	18.72	280	2.40
	4	16	296		2x12	2x1	26	4300	4460	115.96	16	296	2x12	2536	2696	69.70	8	150	2x24	3440	236	5836	184.13	8	150	2x24	173	340	1006	48.28	296	450	100	232	382	38.20	404	3.50
4.37	3	16	207		2x7	2x1	36	3300	3460	124.56						8	150	2x17	3340	336	5836	130.42	8	150	2x17	244	340	1148	39.04	414	450	49	332	482	23.62	283	3.07
	4	16	300		2x12	2x1	26	4300	4460	115.96	16	300	2x11	2536	2696	59.31	8	150	2x23	3340	336	5836	176.46	8	150	2x23	244	340	1148	52.80	300	450	90	332	482	43.38	397	4.49
	5	16	228		2x15	2x1	32	5300	5460	174.72	16	228	2x13	3036	3196	95.88	8	150	2x30	3340	336	5836	230.16	8	150	2x30	244	340	1148	69.68	456	450	72	332	482	34.70	582	5.91
5.37	3	16	200	143	2x17	2x3	40	3300	3460	138.40						8	150	2x16	3240	436	5836	122.75	8	150	2x16	314	340	1288	41.22	400	450	49	432	582	28.52	307	5.67
	4	16	292	143	2x12	2x3	30	4300	4460	133.80	16	292	2x11	2536	2696	59.31	8	150	2x23	3240	436	5836	176.46	8	150	2x23	314	340	1288	59.24	292	450	90	432	582	52.38	432	8.40
	5	16	221	143	2x15	2x3	36	5300	5460	196.56	16	221	2x15	3036	3196	98.88	8	150	2x30	3240	436	5836	230.16	8	150	2x30	314	340	1288	77.28	442	450	66	432	582	38.41	623	7.17
6.37	3	16	194	178	2x9	2x3	44	3300	3460	152.24						8	150	2x16	3140	536	5836	122.75	8	150	2x16	386	340	1432	46.82	388	450	56	532	682	38.19	332	4.15
	4	16	283	178	2x12	2x3	30	4300	4460	133.80	16	283	2x11	2536	2696	59.31	8	150	2x22	3140	536	5836	178.78	8	150	2x22	386	340	1432	63.00	283	450	90	532	682	61.38	434	6.22
	5	16	214	178	2x15	2x3	36	5300	5460	196.56	16	214	2x13	3036	3196	95.88	8	150	2x29	3140	536	5836	222.49	8	150	2x29	386	340	1432	83.06	428	450	66	532	682	45.01	626	8.30
7.37	4	16	231	213	2x14	2x3	34	4300	4460	151.64	16	231	2x13	2536	2696	70.10	8	150	2x21	3040	636	5836	161.11	8	150	2x21	456	340	1572	66.02	462	450	54	632	782	42.23	474	6.91
	5	16	188	213	2x17	2x3	40	5300	5460	218.40	16	188	2x16	3036	3196	102.27	8	150	2x28	3040	636	5836	214.82	8	150	2x28	456	340	1572	88.04	376	450	77	632	782	60.21	670	9.30
	6	16	150	213	2x21	2x3	44	6300	6460	284.24	16	150	2x20	3536	36 96	147.84	8	150	2x35	3040	636	5836	271.52	8	150	2x35	456	340	1572	110.04	300	450	65	632	782	50.63	890	11.67
8.37	4	20	300	212	2x11	2x3	28	4440	4590	128.52	20	300	2x10	2720	2870	57.40	10	240	2x15	3048	640	5883	116.49	10	240	2x15	456	420	1727	103.62	300	480	81	832	782	63.34	640	6.80
	5	20	240	212	2x13	2x3	32	5440	5590	178.88	20	240	2x13	3220	3370	87.62	10	240	2x19	3048	640	5883	147.75	10	240	2x19	456	420	1727	131.26	480	480	55	832	782	43.01	883	9.17
	6	20	194	212	2x16	2x3	38	6440	6590	250.42	20	194	2x16	3720	3870	123.84	10	240	2x23	3048	640	5883	178.62	10	240	2x23	456	420	1727	158.88	388	480	91	832	782	71.16	1203	11.65
9.37	4	20	290	165	2x11	2x5	32	4440	4590	146.88	20	290	2x10	2720	2870	57.40	10	240	2x14	2948	740	5883	108.92	10	240	2x14	527	420	1869	104.66	290	480	72	732	882	63.90	684	7.39
	5	20	232	165	2x13	2x5	36	5440	5590	201.24	20	232	2x13	3220	3370	87.62	10	240	2x19	2948	740	5883	147.75	10	240	2x19	527	420	1869	142.04	464	480	55	732	882	48.51	948	10.07
	6	20	186	165	2x16	2x5	42	6440	6590	276.78	20	186	2x16	3720	3870	123.84	10	240	2x23	2948	740	5883	178.62	10	240	2x23	527	420	1869	171.94	372	480	91	732	882	80.26	1287	12.75
	4	20	232	165	2x13	2x5	36	4440	4590	165.24	20	232	2x13	2720	2870	74.62	10	240	2x14	2948	740	5883	108.92	10	240	2x14	527	420	1869	104.66	464	480	40	732	882	35.28	770	7.26
10.37	5	20	186	165	2x16	2x5	42	5440	5590	234.78	20	186	2x16	3220	3370	107.84	10	240	2x18	2948	740	5883	139.79	10	240	2x18	527	420	1869	134.56	372	480	70	732	882	61.74	1091	9.94
	6	20	148	165	2x20	2x5	50	6440	6590	329.30	20	148	2x20	3720	3870	154.80	10	240	2x22	2948	740	5883	170.85	10	240	2x22	527	420	1869	164.48	296	480	108	732	882	95.26	1495	12.62

DIMENSIONS

Effective span of slab (respective) (m)	Depth of pier cap 'A' (mm)	Width of pier 'E' (mm)	Straight height of pier 'D' (mm)	Cantilever length of pier cap 'C' (mm)
3.37	770	300	3450	2025
4.37	830	400	3350	2075
5.37	920	500	3250	2125
6.37	1000	600	3150	2175
7.37	800	700	3050	2225
8.37	1150	700	3050	2225
9.37	1250	800	2950	2275
10.37	1300	800	2950	2275

NOTES :-

1. The details given in this drawing may be read in conjunction with Drawing No. BD/8-75.
2. Schedule of reinforcement are given as per I.S. 2502-1963.
3. For intermediate heights, the area of reinforcement required may be interpolated from the schedule of reinforcement.
4. Loads and moments at base of pier have not been given since the critical values for each case of foundation design may differ from that of pier.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATH)

PIER AND PIER CAPS FOR SLAB BRIDGES DETAILS AND SCHEDULES

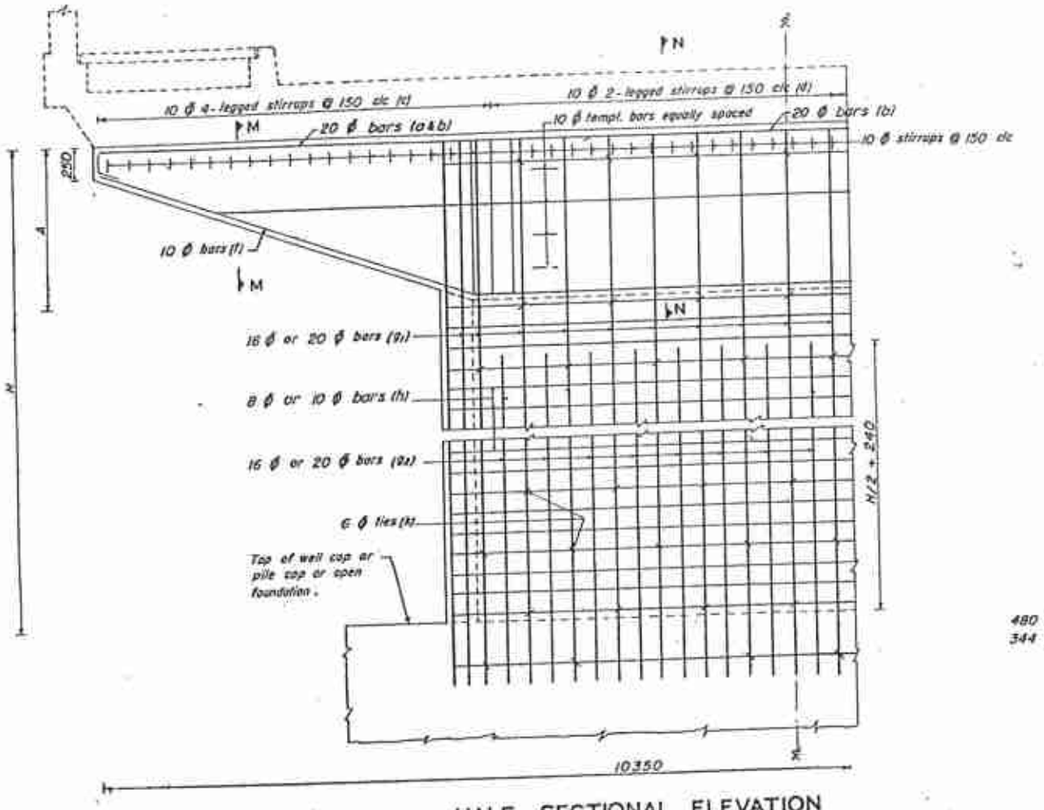
7.5 METRES ROADWAY
DO NOT SCALE

TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

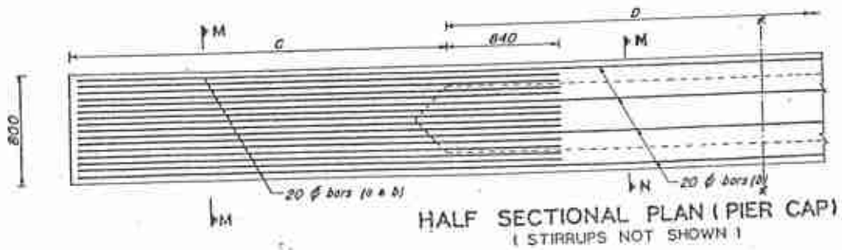
RECOMMENDED: V. VELAYUTHAM, A.E.
RECOMMENDED: G. V. SIKKA, S.E.
RECOMMENDED: K. G. BARKAR, E.E.
APPROVED: G. RALWANT RAO, C.E.

OCT. 1975.
DRG. NO. BD/9-75

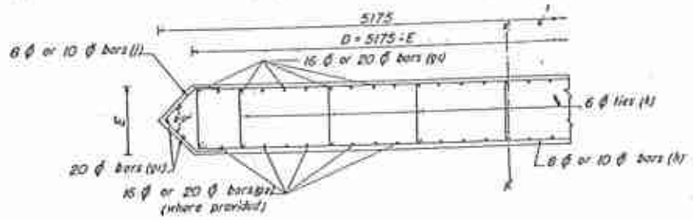
High Yield Strength Deformed Bars



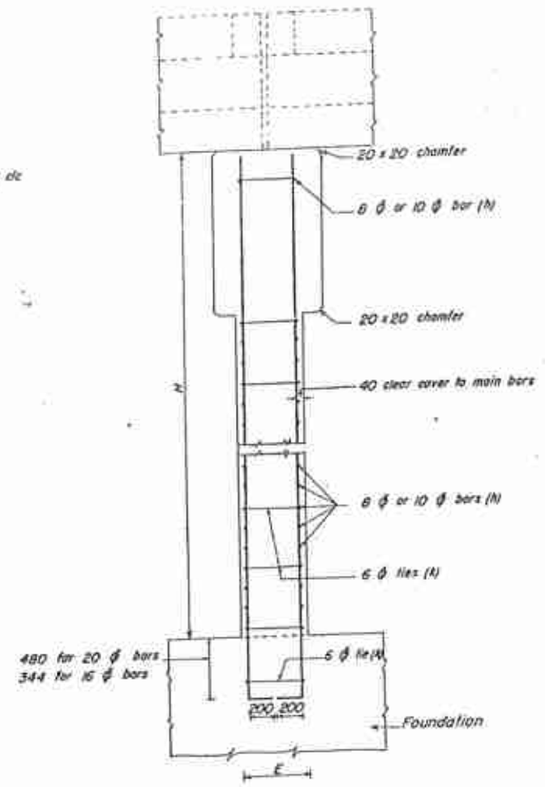
HALF SECTIONAL ELEVATION



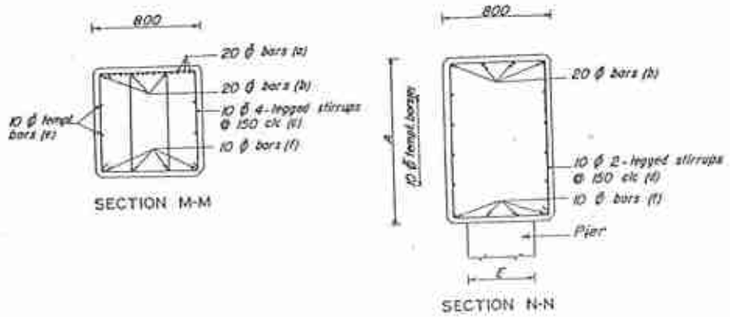
HALF SECTIONAL PLAN (PIER CAP)
(STIRRUPS NOT SHOWN)



HALF SECTIONAL PLAN (PIER)



SECTIONAL SIDE ELEVATION
(PIER REINFORCEMENT ONLY)



SECTION THROUGH PIER CAP
(PIER CAP REINFORCEMENT ONLY)

NOTES :-

1. The pier cap and pier are designed to support solid slab right bridges with footpaths issued vide Drg No BD/5-74 and BD/7-74.
2. For dimensions of pier and pier cap, schedule of reinforcement and quantities Drg. No. BD/11-75 may be referred to.
3. The designs are based on I.R.C. Bridge Codes (i) I.R.C. 5-1970, (ii) I.R.C. 6-1966 & (iii) I.R.C. 21-1972 and sound engineering practice.
4. The design has been checked for a seismic force of g/10.
5. Coefficient of friction at the bearing surface (concrete to concrete) has been taken as 0.6 for designs. The top of pier cap shall be rubbed smooth with carborundum stone.
6. Concrete shall have a minimum 28 day's works crushing strength of 200 kg/cm² on 150 mm cubes.
7. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970) or I.S. 1139-1966 (with amendments of August, 1968 and November, 1970)
8. Minimum cover to main steel reinforcement in the pier cap and pier shall be 40 mm. Cover to other reinforcement shall not be less than 25 mm.
9. Joints or lapping of bars shall be suitably staggered as per clause 304.6.3 of I.R.C. 21-1972.
10. The shuttering of the span cast shall only be removed after the adjacent span is also cast or otherwise the pier shall be duly supported on both sides.
11. Kerb, Wearing coat and Railings shall be cast after the adjacent span is cast.
12. Full scale elevation for the bars shall be lined out on a plane plastered floor to the dimensions shown on the drawing so as to bend the bars to proper shape.
13. All dimensions are in millimetres.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

PIER AND PIER CAPS FOR SLAB BRIDGES GENERAL DRAWING

7.5 METRES ROADWAY
1.2 METRES FOOTPATHS
FOOTPATH LOAD - 400 kg/m²
DO NOT SCALE

TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED : V. VELAYUTHAM A.E.E.	RECOMMENDED : R. R. BARKER S.E.		NOV., 1975.
RECOMMENDED : R. V. BEKKA E.E.	APPROVED : R. SALWANT RAO C.E.		DRG. NO. BD/10-75.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT AND QUANTITES (PIER CAPS)

Effective Span (m)	Type 'a' & 'b' (20 Φ) Spacing (mm) Type 'a'	Type 'b'	Number Type 'a'	Type 'b'	Length of each bar (mm) Type 'a'	Type 'b'	Total length (m) Type 'a'	Type 'b'	Total	Type 'c' (10 Φ) Number (Spaced @ 150 c/c)	x (mm)	y (mm)	Average length of stirrups (mm)	Total length (m)	Type 'd' (10 Φ) Number (Spaced @ 150 c/c)	x (mm)	y (mm)	Length of each stirrups (mm)	Total length (m)	Type 'e' (10 Φ) Number (equally spaced)	Length of each bar (mm)	Total length (m)	Type 'f' (10 Φ) Number (Spaced as per 'b')	h (mm)	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	QUANTITIES PER PIER CAP Steel : (including 5% extra for laps and wastage) (kg)	Concrete (cu.m)
3.37	58	232	2×9	4	3537	10810	63.68	43.24	106.92	2×38	490	484	2188	166.29	31	810	720	3300	102.30	2×3	6920 to 10300	51.66	4	640	4875	2772	10419	41.68	513	5.97
4.37	53	varying	2×10	4	3587	10810	71.74	43.24	114.98	2×38	535	497	2304	175.04	31	900	720	3480	107.88	2×4	6410 to 10300	66.84	4	730	4775	2843	10461	41.84	553	6.48
5.37	50	varying	2×11	4	3637	10810	80.02	43.24	123.26	2×40	570	470	2320	185.60	29	970	720	3620	104.98	2×4	6310 to 10300	66.40	4	800	4675	2913	10501	42.00	580	6.87
6.37	46	230	2×12	4	3687	10810	88.49	43.24	131.73	2×40	615	480	2430	194.40	29	1060	720	3800	110.00	2×4	6170 to 10293	65.88	4	890	4575	2983	10541	42.16	610	7.38
7.37	41	varying	2×14	4	3737	10810	104.64	43.24	147.88	2×42	670	471	2522	213.70	27	1170	720	4020	108.54	2×5	5820 to 10300	80.60	4	1000	4475	3065	10605	42.42	673	8.00
8.37	38	228	2×15	4	3737	10810	112.11	43.24	155.35	2×42	710	476	2612	219.41	27	1250	720	4180	112.86	2×5	5790 to 10297	80.45	4	1080	4475	3092	10659	42.64	700	8.48
9.35	35	varying	2×17	4	3787	10810	128.76	43.24	172.00	2×42	765	475	2720	228.48	27	1360	720	4400	118.80	2×6	5520 to 10300	94.92	4	1190	4375	3178	10731	42.90	762	9.07
10.37	33	231	2×18	4	3787	10810	136.33	43.24	179.57	2×42	815	482	2834	238.06	27	1460	720	4600	124.20	2×6	5490 to 10300	94.74	4	1290	4375	3217	10809	43.24	790	9.66

SCHEDULE OF REINFORCEMENT AND QUANTITIES (PIERS)

Effective Span (m)	Height of pier 'H' (m)	Type 'g1' Dia of bar (mm)	Spacing (Approximate) (mm) straight portion	Spacing (Approximate) (mm) cut water	Number straight portion	Number cut water	Number Total	x (mm)	Length of each bar (mm)	Total length (m)	Type 'g2' For straight portion only Dia of bar (mm)	Spacing (mm)	Number	x (mm)	Length of each bar (mm)	Total length (m)	Type 'h' Dia of bar (mm)	Spacing (mm)	Number	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	Type 'j' Dia of bar (mm)	Spacing (mm)	Number	x (mm)	y (mm)	Length of each bar (mm)	Total length (m)	Type 'k' (6 Φ) Spacing Horizontal	Spacing Vertical	No. of links	x (mm)	Length of each tie (mm)	Total length (m)	QUANTITIES PER PIER Steel : (including 5% extra for laps and wastage) (kg)	Concrete (cu.m)
3.37	3	16	230		2×22	2×1	46	3300	3460	159.56							8	150	2×16	4865	236	5260	168.35	8	150	2×16	173	340	1006	32.19	460	450	60	232	382	22.92	354	3.19
	4	16	300		2×17	2×1	36	4300	4460	160.56	16	300	2×16	2536	2696	86.27	8	150	2×23	4865	236	5260	242.01	8	150	2×23	173	340	1006	46.26	300	450	120	232	382	45.84	541	4.69
4.37	3	16	225		2×22	2×1	46	3300	3460	159.56							8	150	2×16	4765	336	5260	168.35	8	150	2×16	244	340	1148	36.74	450	450	60	332	482	28.92	357	4.03
	4	16	296		2×17	2×1	36	4300	4460	160.56	16	296	2×16	2536	2696	86.27	8	150	2×22	4765	336	5260	231.48	8	150	2×22	244	340	1148	50.51	296	450	120	332	482	57.84	538	6.02
	5	16	286		2×17	2×1	36	5300	5460	196.56	16	286	2×17	3036	3196	108.66	8	150	2×29	4765	336	5260	305.14	8	150	2×29	244	340	1148	66.58	286	450	150	332	482	72.30	679	8.01
5.37	3	16	244	143	2×20	2×3	46	3300	3460	159.56							8	150	2×15	4665	436	5260	157.83	8	150	2×15	314	340	1288	38.64	488	450	154	432	582	31.43	354	4.80
	4	16	298	143	2×16	2×3	38	4300	4460	169.48	16	298	2×16	2536	2696	86.27	8	150	2×22	4665	436	5260	231.48	8	150	2×22	314	340	1288	56.67	298	450	112	432	582	65.18	560	7.28
	5	16	264	143	2×18	2×3	42	5300	5460	229.32	16	264	2×18	3036	3196	115.06	8	150	2×29	4665	436	5260	305.14	8	150	2×29	314	340	1288	74.70	264	450	160	432	582	93.12	752	9.75
6.37	3	16	216	178	2×22	2×3	50	3300	3460	173.00							8	150	2×15	4565	536	5260	157.80	8	150	2×15	386	340	1432	42.96	432	450	60	532	682	40.92	879	5.46
	4	16	292	178	2×16	2×3	38	4300	4460	169.48	16	292	2×16	2536	2696	86.27	8	150	2×21	4565	536	5260	220.96	8	150	2×21	386	340	1432	60.14	292	450	112	532	682	76.38	560	8.40
	5	16	259	178	2×18	2×3	42	5300	5460	229.32	16	259	2×18	3036	3196	115.06	8	150	2×28	4565	536	5260	294.62	8	150	2×28	386	340	1432	80.19	259	450	160	532	682	109.12	754	11.30
7.37	4	16	296	213	2×16	2×3	38	4300	4460	169.48	16	295	2×15	2536	2696	80.88	8	150	2×21	4465	636	5260	220.96	8	150	2×21	456	340	1572	66.02	295	450	112	632	782	87.58	556	9.30
	5	16	233	213	2×20	2×3	46	5300	5460	251.36	16	233	2×19	3036	3196	121.45	8	150	2×27	4465	636	5260	284.09	8	150	2×27	456	340	1572	84.89	466	450	90	632	782	70.38	790	12.68
	6	16	201	213	2×23	2×3	52	6300	6460	335.92	16	201	2×22	3536	3696	162.62	8	150	2×34	4465	636	5260	357.75	8	150	2×34	456	340	1572	106.90	402	450	108	632	782	84.46	1042	16.05
8.37	4	20	296	212	2×16	2×3	38	4440	4590	174.42	20	296	2×15	2720	2870	85.10	10	240	2×13	4473	640	5310	138.01	10	240	2×13	456	420	1727	44.88	296	480	98	632	782	76.64	813	9.03
	5	20	298	212	2×16	2×3	38	5440	5590	212.42	20	298	2×15	3220	3370	111.10	10	240	2×18	4473	640	5310	191.16	10	240	2×18	456	420	1727	62.17	298	480	126	632	782	99.53	1023	12.41
	6	20	242	212	2×19	2×3	44	6440	6590	289.96	20	242	2×19	3720	3870	147.06	10	240	2×22	4473	640	5310	233.55	10	240	2×22	456	420	1727	75.99	484	480	88	632	782	68.82	1352	15.78
9.37	4	20	299	165	2×15	2×5	40	4440	4590	183.60	20	299	2×15	2720	2870	86.10	10	240	2×13	4373	740	5310	138.06	10	240	2×13	527	420	1869	48.59	299	480	91	732	882	60.26	837	9.80
	5	20	273	165	2×17	2×5	44	5440	5590	245.96	20	273	2×16	3220	3370	117.64	10	240	2×17	4373	740	5310	180.48	10	240	2×17	527	420	1869	63.55	273	480	135	732	882	119.07	1129	13.62
	6	20	222	165	2×20	2×5	50	6440	6590	329.50	20	222	2×20	3720	3870	154.80	10	240	2×21	4373	740	5310	222.94	10	240	2×21	527	420	1869	78.50	444	480	99	732	882	87.32	1471	17.44
10.37	4	20	282	165	2×16	2×5	42	4440	4590	192.78	20	282	2×16	2720	2870	91.84	10	240	2×13	4373	740	5310	138.01	10	240	2×13	527	420	1869	48.59	282	480	98	732	882	86.44	877	9.42
	5	20	230	165	2×20	2×5	50	5440	5590	279.50	20	230	2×19	3220	3370	138.06	10	240	2×17	4373	740	5310	180.48	10	240	2×17	527	420	1869	63.55	460	480	81	732	882	71.44	1257	13.24
	6	20	186	165	2×24	2×5	58	6440	6590	382.22	20	186	2×24	3720	3870	185.76	10	240	2×21	4373	740	5310	222.94	10	240	2×21	527	420	1869	78.50	372	480	121	732	882	106.72	1694	17.06

DIMENSIONS

Effective span of slab (supported) (m)	Depth of pier cap 'A' (mm)	Width of pier 'E' (mm)	Straight length of pier 'D' (mm)	Cantilever length of pier cap 'C' (mm)
3.37	890	300	4875	2737.5
4.37	980	400	4775	2787.5
5.37	1050	500	4675	2837.5
6.37	1140	600	4575	2887.5
7.37	1250	700	4475	2937.5
8.37	1330	700	4475	2937.5
9.37	1440	800	4375	2987.5
10.37	1540	800	4375	2987.5

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/10-75 showing the details of R.C.C. Pier and Pier Cap.
2. For intermediate heights, the area of reinforcement required may be interpolated from the schedule of reinforcement
3. Schedule of reinforcements are given as per I.S. 2502-1963.
4. Load and moments at base of pier have not been given since the critical values for each case of foundation design may differ from that of pier.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

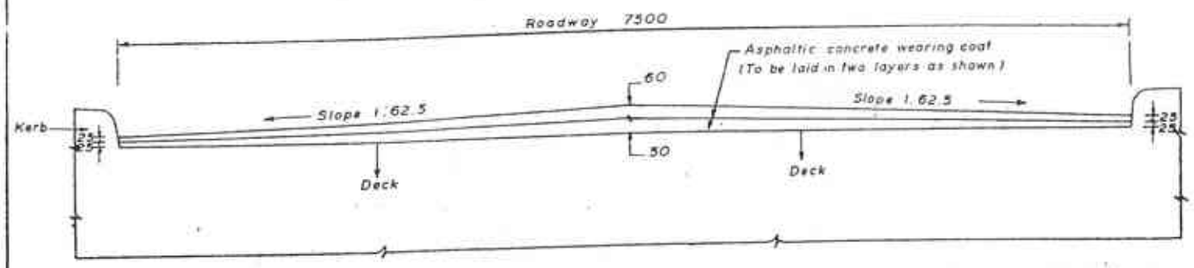
PIER AND PIER CAPS FOR SLAB BRIDGES DETAILS AND SCHEDULES

7.5 METRES ROADWAY
1.5 METRES FOOTPATH
FOOTPATHS LOAD-400 kg/m²
DO NOT SCALE

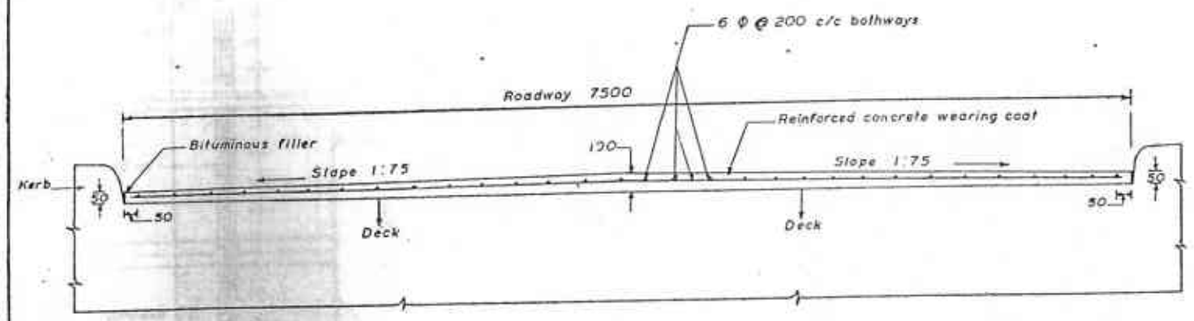
TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED : V. VELAYUTHAM, A.E.E.
RECOMMENDED : D. V. SINKA, E.E.
RECOMMENDED : K. B. SARKAR, S.E.
APPROVED : A. BALWANT RAO, C.E.

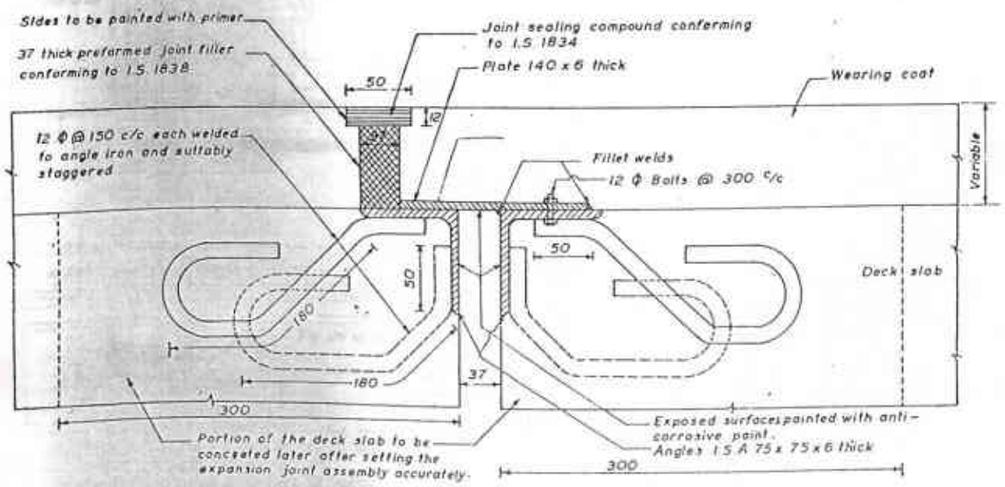
NOV. 1975
DRG. NO. BD/11-75.



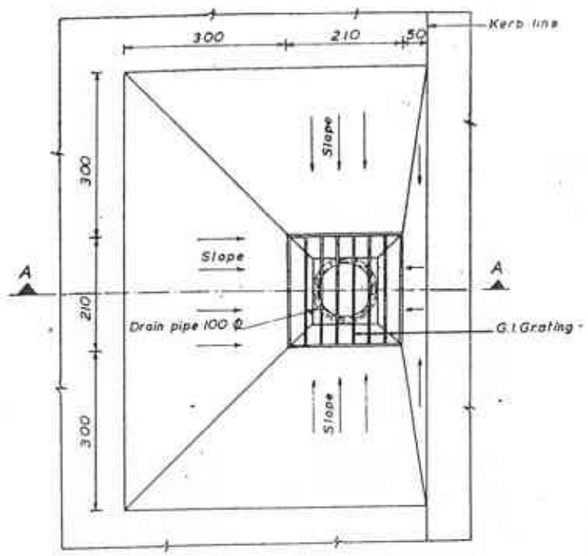
CROSS-SECTION SHOWING DETAILS OF ASPHALTIC CONCRETE WEARING COAT



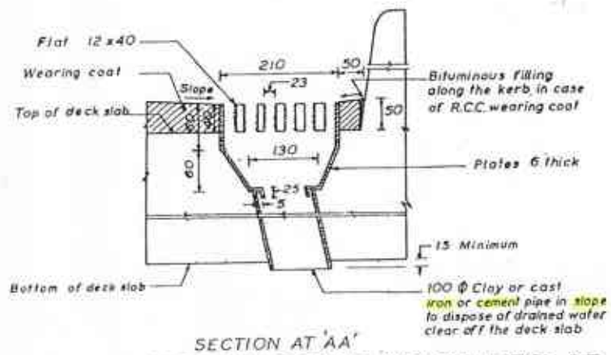
CROSS-SECTION SHOWING DETAILS OF REINFORCED CONCRETE WEARING COAT



DETAIL OF EXPANSION JOINT



PLAN



SECTION AT 'AA'

DETIALS OF DRAINAGE SPOUT AND COLLECTION PIT

NOTES

1. The details shown in this drawing are applicable for two lane highway bridges with level decks.
2. All dimensions are in millimetres.
3. Material specifications and workman ship shall be in accordance with Ministry's specification for road and bridge works unless stated otherwise in this drawing.
4. Reinforced concrete wearing coat :-
   (i) Wearing coat shall be bonded type.
   (ii) Concrete mix shall be of M 300 grade with cement content not less than 350 kg/m^3 and water cement ratio not more than 0.4.
   (iii) Reinforcement shall be placed in the middle of wearing coat.
   (iv) Spacing of reinforcement shall be reduced to 100mm in either direction over a strip of 300mm near the expansion joints.
   (v) Joints in the wearing coat may be avoided as far as possible. Reinforcement shall however, be continued across the joints, if provided.
5. Expansion joint details shown in this drawing are applicable for R.C.T-Beam and slab type bridge super structures as per Ministry's standard plans.
6. Drainage spout shall be galvanised after welding the plates and flats together.
7. Grating shall not be provided under footpath slab. 75 mm dia. drainage pipe shall only be used.
8. Spacing of drainage spout shall not exceed 10 metres.

SCHEDULE OF REQUIRMENTS FOR A CLEAR ROADWAY WIDTH OF 7.5 METRES

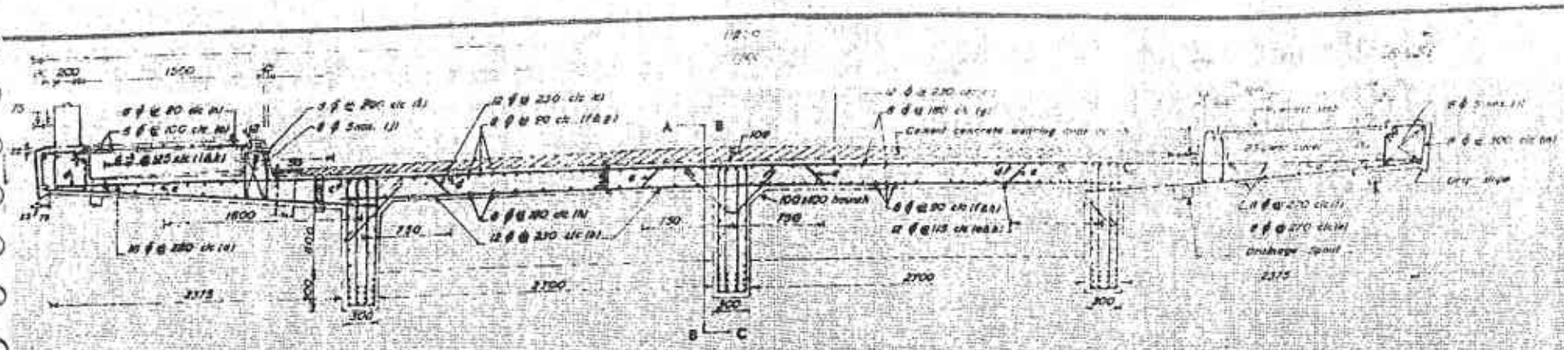
R.C. Wearing coat (Per metre span)			Asphaltic concrete wearing coat (Per metre span)			Expansion joint (Per joint)			Drainage spout (Per spout)		
S.No	Item	Quantity	S.No	Item	Quantity	S.No	Item	Quantity	S.No	Item	Quantity
1.	Cement concrete of grade M 300	0.5625 m^3	1.	Asphaltic concrete	0.6 m^3	1.	M.S. Angles I.S.A. 75x75x6 mm thick 7.5 m long.	2 Nos. (102 kg.)	1.	M.S. Plate 6 mm thick	0.16 m^2 (7.5 kg.)
2.	Steel reinforcement 6 mm ϕ @ 200 mm c/c bothways	16.5 kg.	2.	Straight run bitumen	7.5 kg.	2.	M.S. Plate (40 mm x 6 mm x 7.5 m long	1 No. (50 kg.)	2.	Flat 12 mm x 40 mm.	0.99 m (3.7 kg.)
						3.	12 mm ϕ anchor bars 396 mm long	200 Nos. (71 kg.)	3.	100 mm ϕ Drain pipe.	1 No.
						4.	12 mm ϕ bolts with nuts.	25 Nos.			

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING AND TRANSPORT
ROADS WING, NEW DELHI

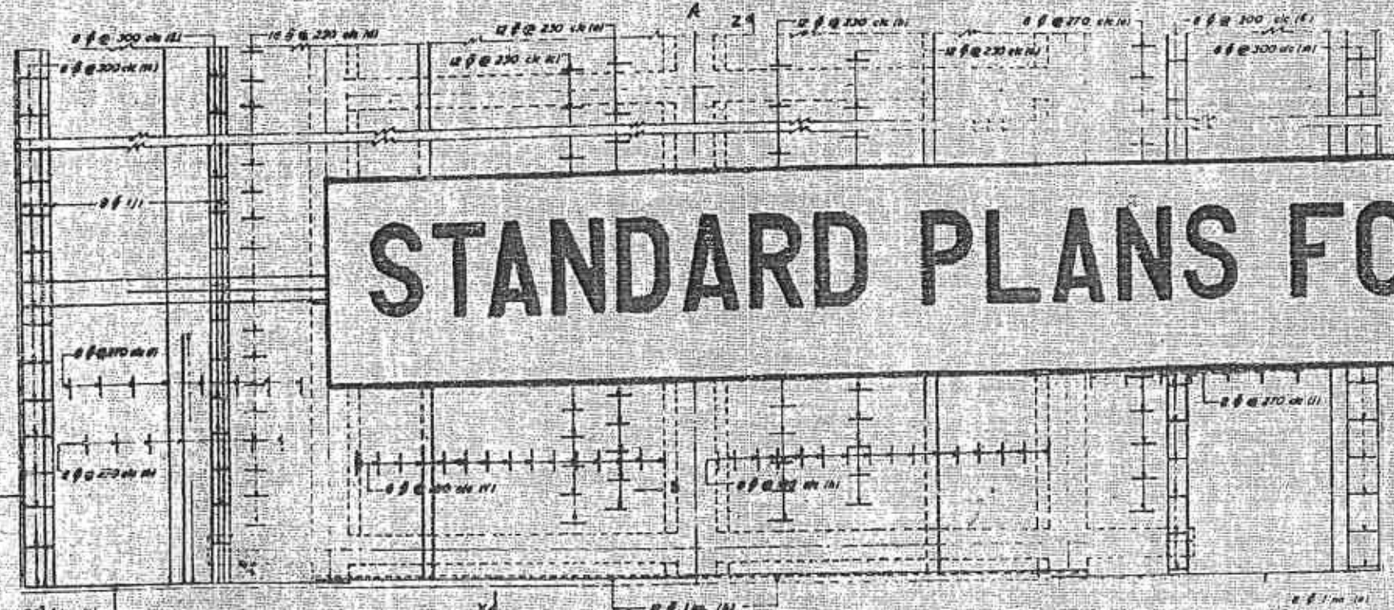
STANDARD CONCRETE BRIDGES

DETAILS OF WEARING COAT, EXPANSION JOINT AND DRAINAGE SPOUT.

RECOMMENDED BY	RECOMMENDED BY R.G. THAWANI S.E.	MAY 1983
RECOMMENDED BY R.S. SHARMA E.E. 25.5.83	APPROVED BY S.P. CHAKRABARTY S.E.	DRG. No. BD/1-69 A



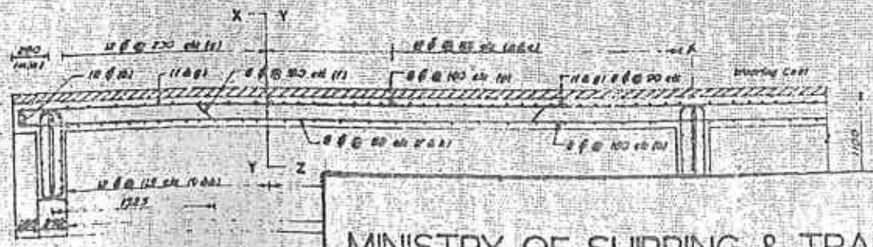
CROSS SECTION AT A-B-C



HALF TOP REINFORCEMENT

PLAN

HALF BOTTOM REINFORCEMENT



LONGITUDINAL

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC:6-1966 & (iii) IRC : 21-1972.
2. All dimensions are in millimetres. Only written dimensions shall be followed.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm on 150mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS:1139-1966 (with amendment NO. 1& 2) or IS: 1786-1966 (with amendment No. 1 & 2).
5. Joints or lapping of bars in mesh reinforcement shall be avoided as far as possible. However the provision in clause No. 304.6.3 of IRC : 21-1972 should be strictly followed ; if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
12. The width of each pre-cast R.C.C footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of precast chequered tiles, fixed firmly and true to levels, may be provided.
13. For details of girders, bearings & schedule of reinforcement, quantities and reactions refer Drawing No. SD/2-75A and SD/3-75A.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

STANDARD PLANS FOR HIGHWAY BRIDGES

MINISTRY OF SHIPPING & TRANSPORT
ROADS WING
NEW DELHI
1983

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T-BEAM BRIDGE SUPERSTRUCTURE — WIDTH & WITHOUT FOOTPATH
ELASTOMERIC BEARING
CONNECTION OF APPROACHES

VOL. III.

CONCRETE T-BEAM BRIDGES

Ministry of Shipping & Transport
(Roads Wing)

STANDARD PLANS FOR HIGHWAY BRIDGES

Vol. III

CONCRETE T-BEAM BRIDGES

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the Secretary, Indian Roads Congress,
Jamnagar House, Shahjahan Road,
New Delhi-110011

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FOREWORD

I am extremely happy to place before the community of Bridge Design and Construction Engineers the Standard Plans for Highway Bridges Vol. III Concrete T-Beam Bridges, which have been finalised in the Ministry of Shipping & Transport (Roads Wing) over the past few years. This publication second in the series of standard plans using high yield strength deformed bars, alongwith the previous Vol. II containing Standard Plans for concrete slab bridges published earlier, will prove to be quite useful in the proper planning, estimation and execution of most of the medium and minor Highway bridges which constitute the bulk of the total number of bridges being built in our country.

The publication has been made possible by the combined efforts of the officers and staff working in the Bridge Standard Zone of this Ministry who deserve commendation for the efforts made by them. The keen interest taken by Addl. Director General (Bridges) in bringing out this publication, but for which it would have taken a little more time, is also highly appreciated.

J.S. MARYA
Director General (Road Development) & Addl. Secretary to the Govt. of India

New Delhi, Oct. 1, 1980

PREFACE

Standard Plans (Vol. I) for Highway Bridges with RCC superstructure using mild steel round bars as reinforcement were issued during 1973 by the Roads Wing.

With the introduction of high yield strength deformed bars and the production of mild steel bars being phased out from the market, the demand for standard design adopting high yield strength deformed bars became urgent. The preparation of standard designs was, therefore, taken up on a priority basis so that high yield strength deformed bars could be used on a wider scale.

The Volume II, the first in the series using high yield strength deformed bars, was issued in 1977. It contained standard plans for solid slab type highway bridges and RCC piers suitable to carry the slab superstructure.

This Volume (Vol. III), the second in the series using high yield strength deformed bars, contains standard plans for RCC T-beam Highway bridge superstructures for effective spans of 10.5, 12.5, 14.5, 16.5, 18.75, 21.75, and 24.75 metres. It also contains drawings for elastomeric bearings and connection of approaches to highway bridges. It may be worthwhile to mention that the beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated for other spans. In order to get good finish, compaction and quality in the adoption of these standard designs, rigid steel shuttering made of steel plates of thickness of not less than 5 to 6 mm needs to be used and supported by un-yielding centering with steel pipes joined firmly to proper profile. These modular moulds and centering for these standard designs could be acquired by department and issued to contractors for economy.

The plans have been evolved for two lanes of traffic with a carriageway width of 7.5 metres without and with footpaths of 1.5 metres each on either side and designed for one-lane of IRC Class 70-R wheeled or tracked vehicle or two-lanes of Class 'A' vehicle. For decks with footpaths, the intensity of footpath loading has been assumed as 400 kg per square metre. The designs are based on the Standard Specifications and Codes of Practice for Highway Bridges issued by the Indian Roads Congress. For construction purposes, Specifications for Road and Bridge Works issued by the Govt. of India, Ministry of Shipping & Transport (Roads Wing) and as amended from time to time shall be followed. For convenience of estimation, a summary of details of quantities of different materials has also been given.

The plans have been made complete in all respects as far as possible so that they could be readily adopted in the field and also serve as contract drawings. I hope this publication will go a long way in maximising the use of high yield strength deformed bars and at the same time affecting economy and quality in the construction of our highway bridges.

Every possible care has been taken to eliminate errors in the drawings and tables, but errors or omissions, if any, found by the users and brought to our notice will be highly appreciated. Any suggestions for the improvement of this publication will also be most welcome.

The preparation of the standard designs in the present shape goes to the credit of several officers of this Ministry whose names appear in the title blocks of various drawings. Their contribution is gratefully acknowledged.

Thanks are also due to S/Shri D.P. Tiwari, N.D. Dua, S K. Mallick, M.N. Bhatt and Kanti Chander D/men in this Ministry of their diligence in the preparation of drawings.

The contribution of M/s Torsteg Research Foundation in India for their help in the preparation of some of the designs is thankfully acknowledged.

B. BALWANT RAO
Addl. Director General (Bridges), Ministry of Shipping & Transport (Roads Wing)

New Delhi, Oct. 1, 1980

A. SUMMARY OF QUANTITIES OF MATERIALS

TABLE-1 : R.C.C. SIMPLY SUPPORTED RIGHT T-BEAM SUPERSTRUCTURE WITH FOOTPATHS

S. No.	Effective span (m)	Overall length (m)	Depth of slab (mm)	Overall depth of longitudinal girders (mm)	Overall depth of cross girders (mm)	Quantities of concrete (cum)		Quantities of steel (kg)	
						Total per span	Per running metre	Total per span	Per running metre
1.	10.5	11.07	240	1100	800	43.75	3.95	7323	662
2.	12.5	13.07	240	1300	800	53.55	4.10	9042	692
3.	14.5	15.07	240	1600	1300	67.30	4.47	10663	708
4.	16.5	17.07	240	1700	1300	77.20	4.52	12713	745
5.	18.75	19.32	240	1900	1300	96.15	4.98	14540	753
6.	21.75	22.32	240	2200	1300	116.25	5.21	17880	801
7.	24.75	25.32	240	2500	1300	138.30	5.46	21100	833

Notes : 1. Concrete and steel quantities do not include those of railings and wearing coat.
2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

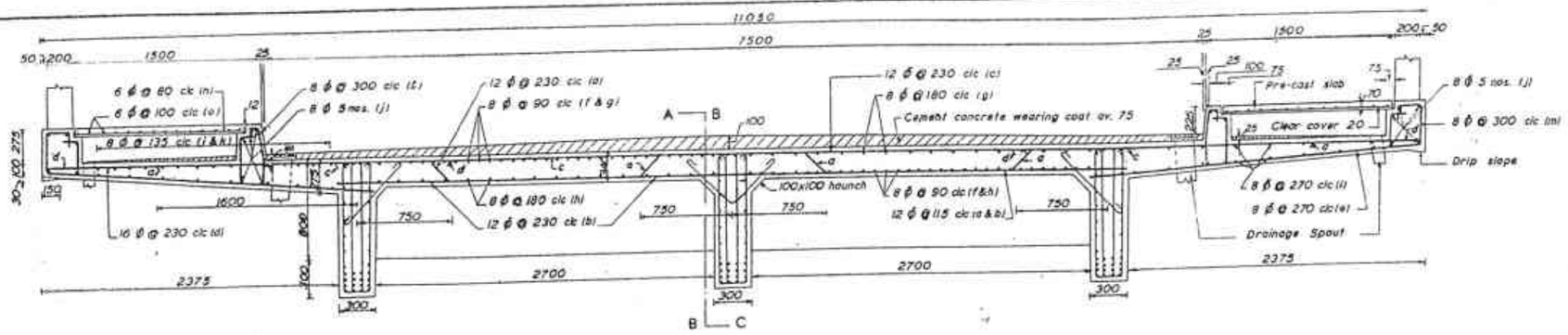
TABLE-2 : R.C.C. SIMPLY SUPPORTED RIGHT T-BEAM SUPERSTRUCTURE WITHOUT FOOTPATHS

S. No.	Effective span (m)	Overall length (m)	Depth of slab (mm)	Overall depth of longitudinal girders (mm)	Overall depth of cross girders (mm)	Quantities of concrete (cum)		Quantities of steel (kg)	
						Total per span	Per running metre	Total per span	Per running metre
1.	10.5	11.07	215	1075	775	33.30	3.01	6187	559
2.	12.5	13.07	215	1275	775	41.30	3.16	7618	583
3.	14.5	15.07	215	1575	1275	53.00	3.52	8749	581
4.	16.5	17.07	215	1675	1275	61.20	3.60	10373	608
5.	18.75	19.32	215	1875	1275	78.00	4.04	12080	625
6.	21.75	22.32	215	2175	1275	95.50	4.28	14880	667
7.	24.75	25.32	215	2475	1275	114.50	4.52	17590	695

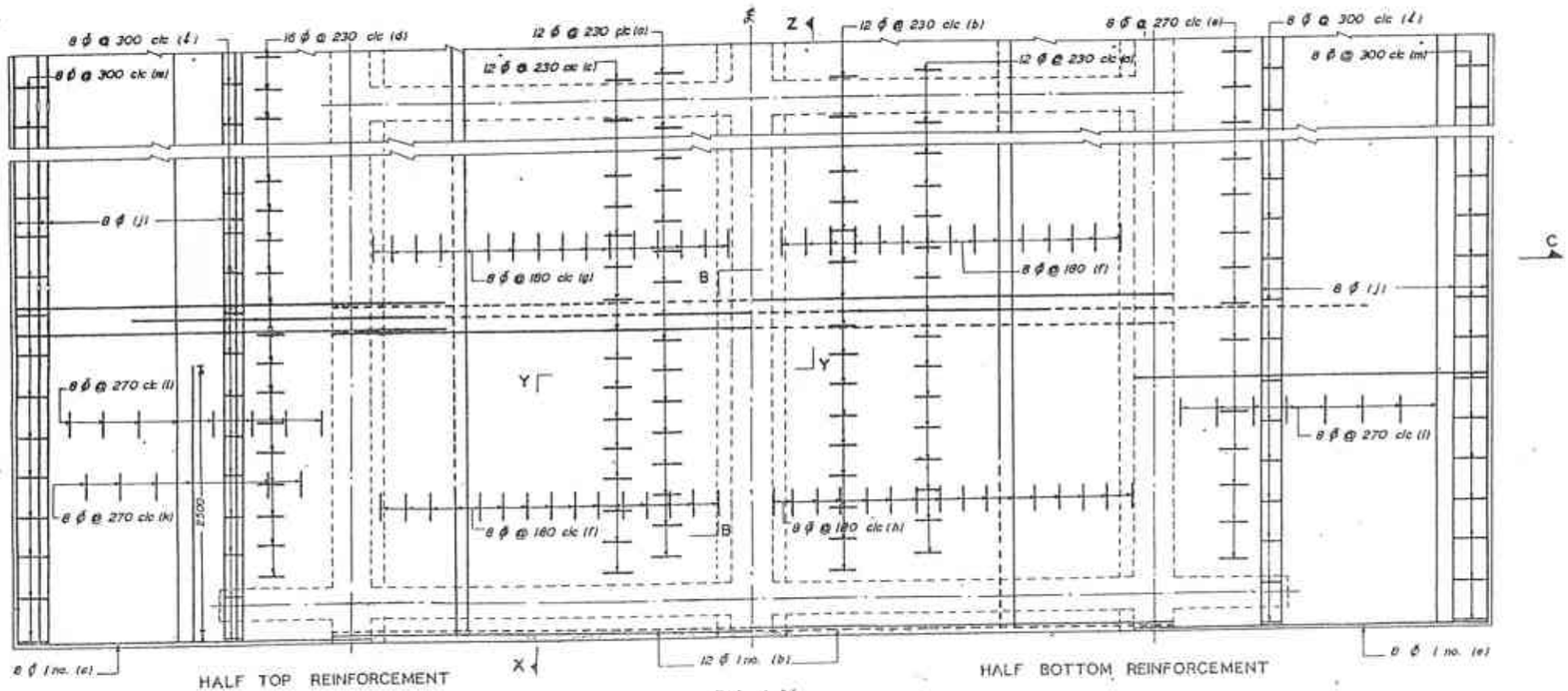
Notes : 1. Concrete and steel quantities do not include those of railings and wearing coat.
2. Steel quantities are inclusive of 5 per cent extra for laps and wastage.

B. DRAWINGS

High Yield Strength Deformed Bars



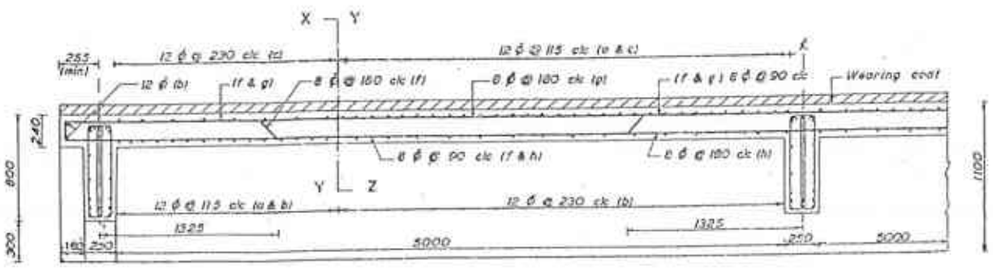
CROSS SECTION AT A-B-C



HALF TOP REINFORCEMENT

HALF BOTTOM REINFORCEMENT

PLAN



LONGITUDINAL SECTION AT X-Y-Z

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. All dimensions are in millimetres. Only written dimensions shall be followed.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with amendment No. 1 & 2) or IS : 1786-1966 (with amendment No. 1 & 2).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However the provision in clause No. 304.6.3. of IRC : 21-1972 should be strictly followed ; if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69 A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. The width of each pre-cast R.C.C. footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of precast chequered tiles, fixed firmly and true to levels, may be provided.
13. For details of girders, bearings & schedule of reinforcement, quantities and reactions refer Drawing No. BD/2 -75A & BD/3 -75A.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES I WITH FOOTPATHS I

R.C.C. T- BEAM : EFFECTIVE SPAN 10.5 METRES DETAILS OF SLAB

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD - 400 kg/m²

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

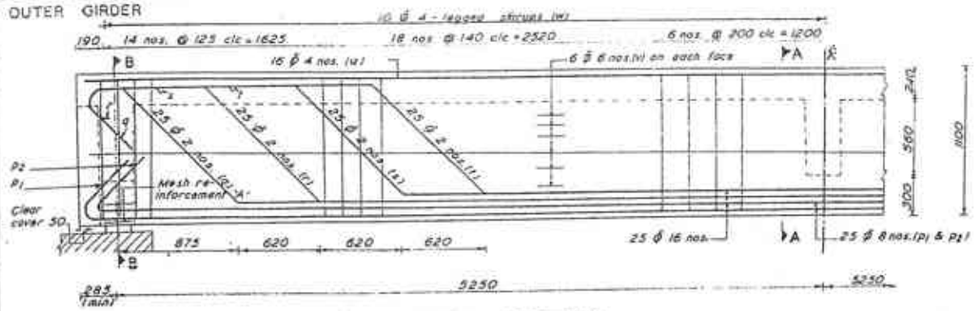
RECOMMENDED: S.S.C. KARTHANI
RECOMMENDED: S.C. MOTWANI, C.E.
RECOMMENDED: K.B. BANKA, C.E.
APPROVED: B. BALWANT RAO, C.E.

AUG., 1970.

DRG. NO. BD/1-75A

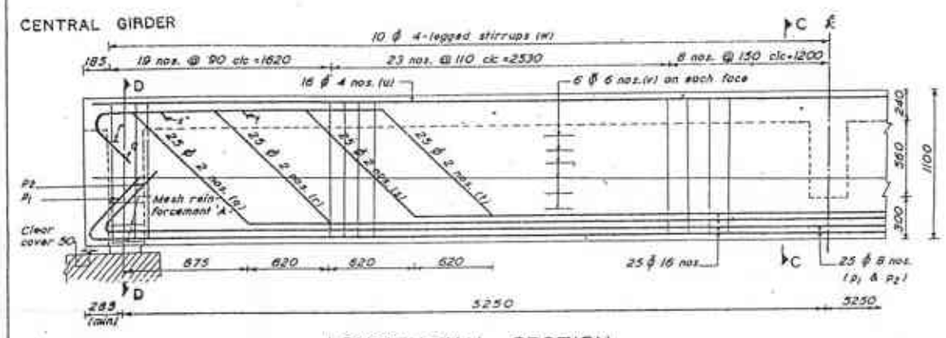
High Yield Strength Deformed Bars

OUTER GIRDER



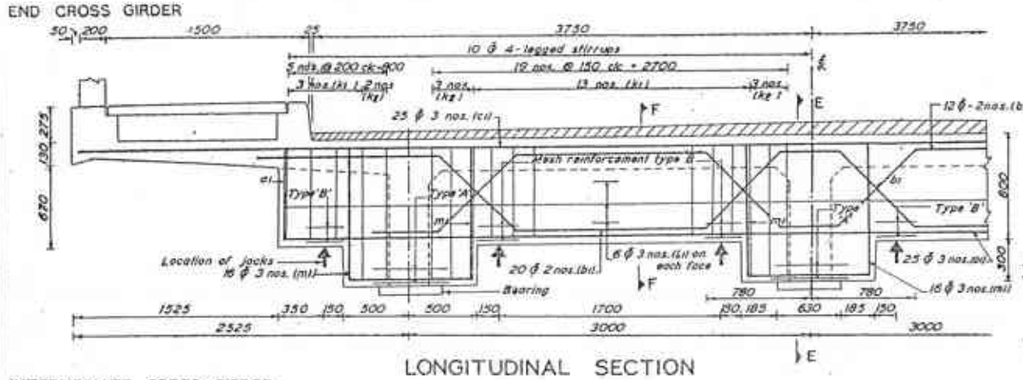
LONGITUDINAL SECTION

CENTRAL GIRDER



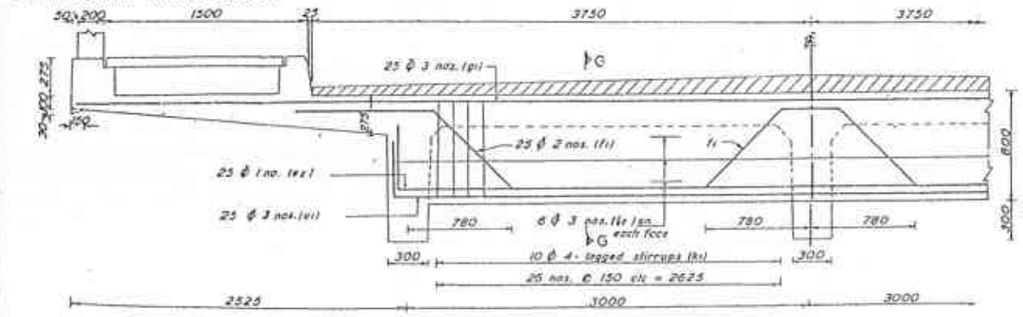
LONGITUDINAL SECTION

END CROSS GIRDER

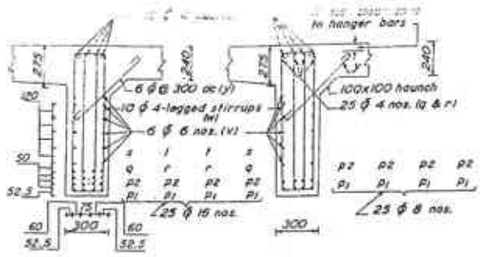


LONGITUDINAL SECTION

INTERMEDIATE CROSS GIRDER

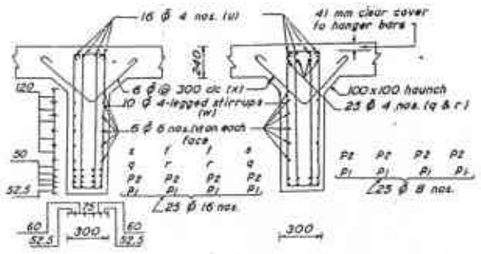


LONGITUDINAL SECTION



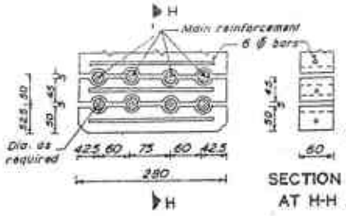
SECTION AT AA

SECTION AT BB
(CROSS GIRDER NOT SHOWN)



SECTION AT CC

SECTION AT DD
(CROSS GIRDER NOT SHOWN)



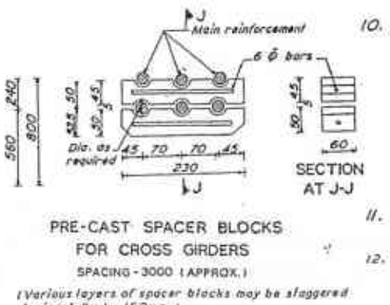
SECTION AT H-H

PRE-CAST SPACER BLOCKS FOR MAIN GIRDERS
SPACING - 3000 (APPROX)

1/4 POINT	MID SPAN	1/4 POINT
4 mm	6 mm	4 mm

L/4 L/4 L/4 L/4

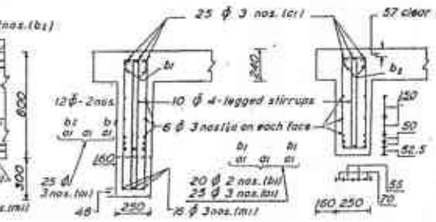
DEAD LOAD DEFLECTION DIAGRAM



SECTION AT J-J

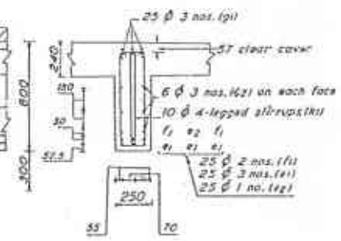
PRE-CAST SPACER BLOCKS FOR CROSS GIRDERS
SPACING - 3000 (APPROX.)

(Various layers of spacer blocks may be staggered horizontally by 150mm).

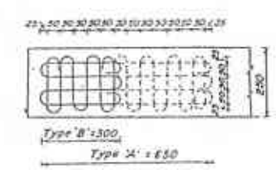


SECTION AT EE
(Longitudinal Girder not shown)

SECTION AT FF



SECTION AT GG



MESH REINFORCEMENT 6 mm

NOTES :-

1. For general notes refer Drawing No. BD/1 - 75A
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moment.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drawing No. BD/1 - 75A and BD/3 - 75A respectively.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⬆. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans.
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl.2005 of M.O.S.&T. specification.
    - i. Length (a) = 630 mm
    - ii. Width (b) = 220 mm
    - iii. No. of internal elastomeric layers = Four
    - iv. Overall thickness of bearings = 4x10+3x3+2x3 = 61 mm.
    - v. Design vertical load (DL+LL+Impact) = 85 tonnes.
11. All dimensions are in millimetres. Only written dimensions shall be followed.
12. For additional notes refer Drg. No, BD/3-75A.

REVISION	YEAR	DESCRIPTION	SIGNATURES
A	1980	1. Notes modified. 2. Type b_2 bars in end x-girder added. 3. Shape of end x-girder modified.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 10.5 METRES DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD - 400 kg/m²
TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED: G.S.Z. KANITHA, C.E.
RECOMMENDED: S.C. HOTWANI, S.E.
RECOMMENDED: K.B. SARKAR, S.E.
APPROVED: B. BALWANT RAO, C.E.

AUGUST, 1976.
DRG NO. BD/2 - 75A

High Yield Strength Deformed Bars.

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (kgs)
		SLAB					
1	a	2172, 225, 225, 1144, 225, R=10d, 225, 2172, 1500, 1500, 45°	12	9496	44	417.82	372
2	b	6300	12	6300	50	604.60	538
3	c				46		
4	d	3175	16	3175	92	292.10	462
5	e	2650	8	2650	86	227.90	89
6	f	1427, 224, 224, 2334, 224, R=10d, 224, 1427, 2600, 2600, 45°	8	11284	30	338.52	132
7	g	11020, 166, R=3d	8	11312	32	361.98	141
8	h	11020	8	11020	32	925.68	361
9	i				32		
10	j				20		
11	k	2500	8	2500	24	60.00	23
12	l	75, 125, 25, 206, 231, R=3d, 369, 175	8	1226	76	93.18	36
13	m	200, 125, 325, R=3d, 225, 275	8	1205	76	91.58	36
14	n	1300	6	1300	286	371.80	82
15	o	801	6	801	364	291.56	64
		MAIN GIRDERS					
1	P_1	450, R=3d, 450, 10910	25	11776	12	141.31	544
2	P_2	450, R=3d, 450, 10910	25	11776	12	141.31	544
3	q	257, 1200, 257, R=10d, 1200, 45°, 450, R=3d, 8750	25	12678	6	76.07	293
4	r	877, 1200, R=10d, 1200, 877, 45°, 120, R=3d, 7510	25	11818	6	70.91	273
5	s	1062, 1134, R=10d, 1134, 1062, 45°, 6210	25	10664	6	63.98	246
6	t	1062, 1134, R=10d, 1134, 1062, 45°, 5030	25	9424	6	56.54	218
7	u	11005	16	11005	12	132.07	209
8	v	11020	6	11020	36	396.72	87
9	w	R=3d, 1015, 160, 160, W	10	2x2598	252	1309.39	812
10	x	R=3d, 440, 440, X	6	1095	38	41.61	9
11	y	620	6	790	76	60.04	13

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (kgs)
		CROSS GIRDERS					
1	a_1	700, R=3d, 7900, 700	25	9175	6	55.05	212
2	b_1	1500, 320, 820, 400, 820, R=10d, 820, 1500, 1440, 1440, 45°	20	9560	4	38.20	94
3	c_1	10850	25	10950	6	98.55	379
4	g_1				3		
5	e_1	305, R=3d, 6200, 305	25	7085	3	21.25	82
6	e_2	355, R=3d, 6100, 355	25	7085	1	7.09	27
7	f_1	1062, 815, 815, 404, 815, R=10d, 815, 1062, 1440, 1440, 45°	25	8668	2	17.34	67
8	k_1	703, 95, 95, R=3d, K_1	10	2x1836	116	425.95	264
9	k_2	1003, 95, 95, R=3d, K_2	10	2x2436	32	155.90	97
10	t_1	7950	6	7950	12	95.40	21
11	t_2	6250	6	6250	6	37.50	8
12	m_1	1003, R=3d, 1003, 820	16	2846	18	51.23	81
13	A	Mesh reinforcement as shown in Drg. No. BD/2 -75A.	6	5930	12	71.16	16
14	B	-do-	6	2930	24	70.32	15
15	b_2	310, 620, 1440, R=10d, 1440, 620, 310, 45°, 400	12	7580	4	30.32	27

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
DL	DL+LL	DL+LL+I	DL	DL+LL	DL+LL+I
62	125	138.16	124	208.59	226.57

TOTAL QUANTITIES (PER SPAN)

1. STEEL: (including 5% extra for laps and wastage) = 7323 kgs.
2. CONCRETE: (excluding wearing coat and railings) = 43.75 cu.m.

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/1 -75A and BD/2 -75A showing the details of R.C.C. Deck Slab and R.C.C. Girders respectively.
2. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling.
3. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
4. Dimensions in the schedule are given as per I.S:2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/2-75A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the six jacks placed under one end x-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the six jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 10.3 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type by bars added. 2. Quantity of steel modified. 3. Addl. notes for Drg. No. BD/2-75A added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

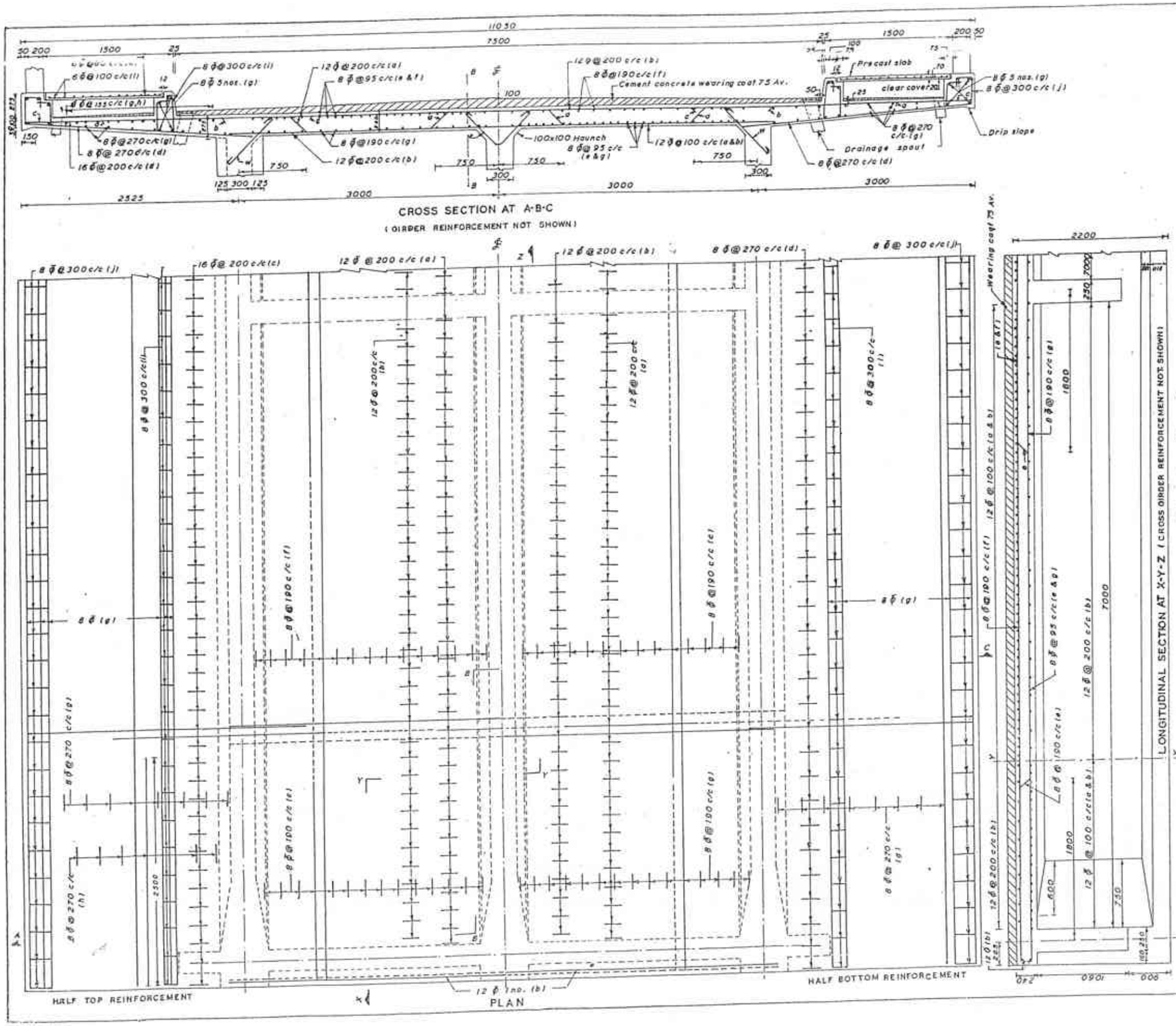
R.C.C.T-BEAM: EFFECTIVE SPAN 10.5 METRES
SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD 400 kg/m²

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS 70-R' LOADING

RECOMMENDED: G.S.C. KARTHA, S.E.
RECOMMENDED: T.C. MOTWANI, S.E.
RECOMMENDED: K. B. SARKAR, S.E.
APPROVED: B. BALWANT RAO, C.E.

AUGUST, 1976.
ORG. No. BD/3 -75A.



High Yield Strength Deformed Bars

NOTES:

1. The design is according to the following Bridge Codes: (i) IRC : 5 - 1970, (ii) IRC: 6 - 1966 & (iii) IRC: 21 - 1972 with latest amendments.
2. All dimensions are in millimetres
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 Kgs/cm² on 150 mm. cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS: 1139-1966 (with latest amendments) or IS: 1786-1966 (latest amendments)
5. This drawing shall not be applicable where reinforcing bars are joined by welding.
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause no. 304. 6. 3 of IRC: 21-1972 should be strictly followed, if laps are provided.
7. Minimum cover to any reinforcement shall be 25mmm.
8. Pre-cast mortar blocks of same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
9. Support bars of 12 ϕ shall be provided at suitable intervals as per IS: 2502-63.
10. Chamfers or fillets of size 25 mm x 25 mm shall be provided at all angles of the form-work unless otherwise specified in the drawing.
11. The railing shall be of any approved type. The reinforcement from railing should be anchored in kerb before casting the slab.
12. For details of wearing coat and drainage refer Drawing No. BD/1-69 A.
13. Properly stiffened steel plate shall be used as shuttering
14. The width of each pre-cast R.C.C footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of pre-cast chequered tiles, fixed firmly and true to levels may be provided
15. This drawing shall be read in conjunction with following Drawings:
    (i) BD/2-80 showing details of longitudinal girders.
    (ii) BD/3-80 showing details of cross girders.
    (iii) BD/4-80 showing schedule of reinforcement.
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved, measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING AND TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

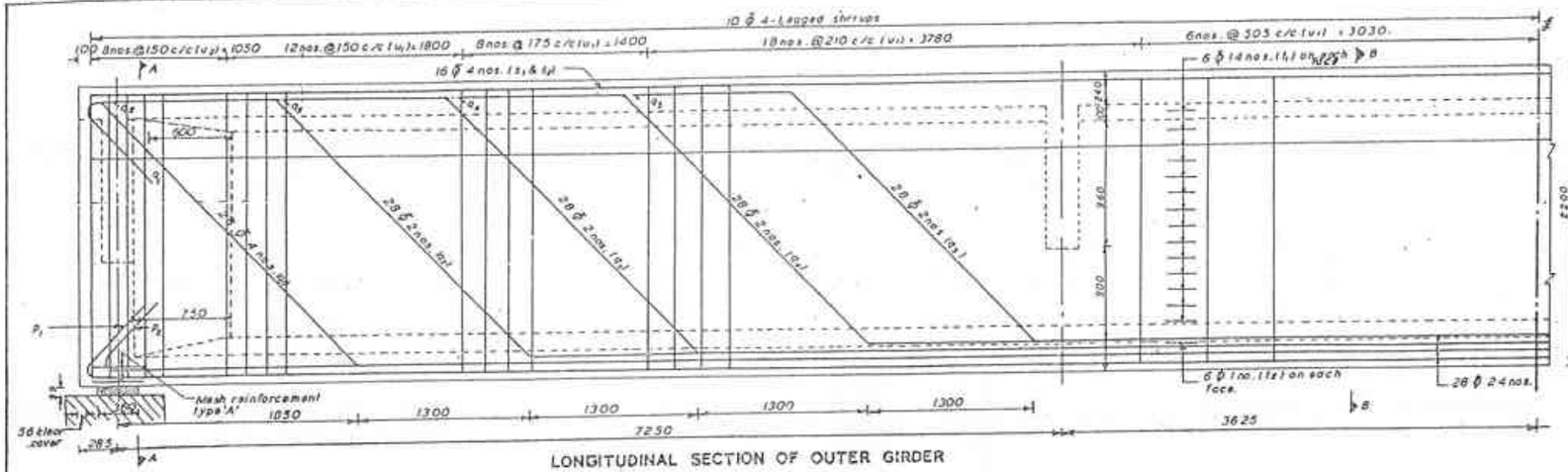
R.C.C. T-BEAM: EFFECTIVE SPAN 21.75 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
DO NOT SCALE

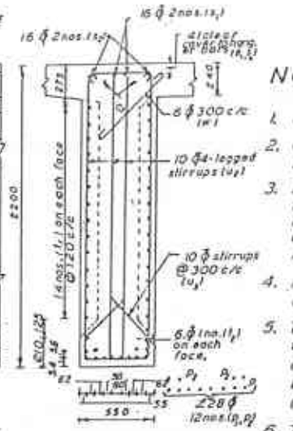
TWO LANES IRC CLASS 'A' LOADING.
ONE LANE IRC CLASS '70-R' LOADING.
FOOTPATH LOAD-400 Kgs/m².

RECOMMENDED: R. N. GHOSHAL, E.E.	RECOMMENDED: PRAFULLA KUMAR	JULY 1980
RECOMMENDED: R. S. SHARMA, E.E.	APPROVED: S. SEETHARAMAN, E.E.	DRG. NO. BD/1-80

High Yield Strength Deformed Bars



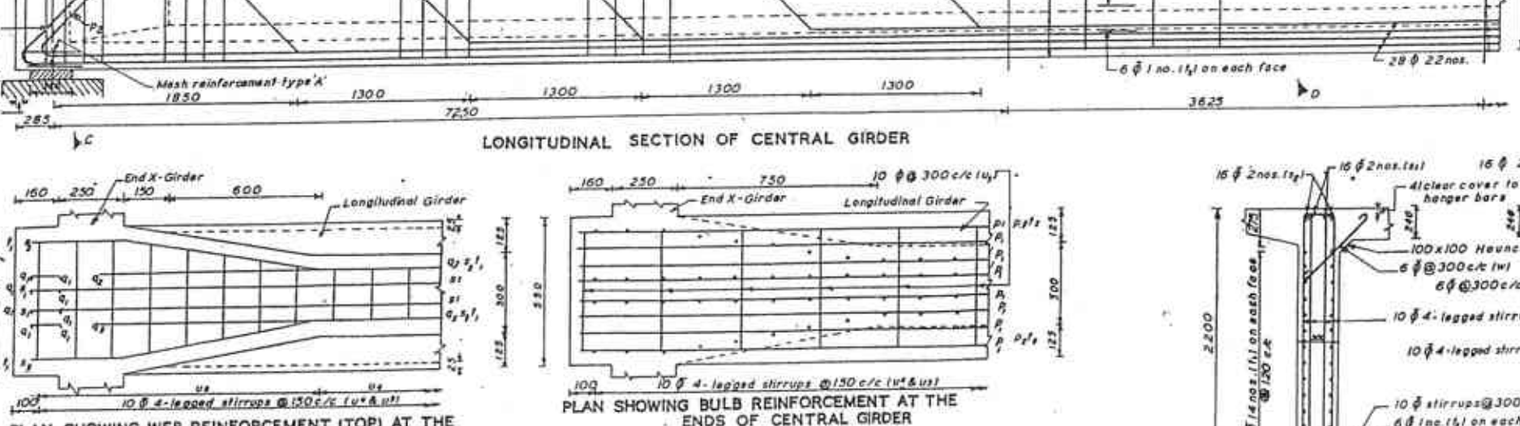
LONGITUDINAL SECTION OF OUTER GIRDER



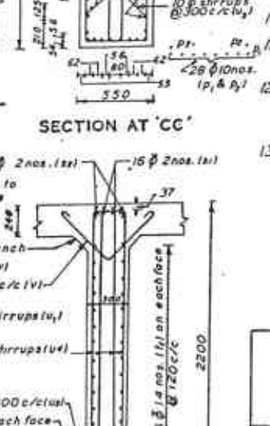
SECTION AT 'AA'

NOTES :-

1. For general notes refer Drawing No. BD/1-80 .
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement .
3. Precast spacer blocks of the strength not less than that of the concrete of girders shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting . But these should not be placed at points of maximum bending moment .
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram .
5. This drawing shall be read in conjunction with following drawings :
   (i) BD/1-80 showing details of slab ,
   (ii) BD/3-80 showing details of cross girders , and
   (iii) BD/4-80 showing schedule of reinforcement .
6. The expansion joints shall be of the approved type .
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 130 mm from the concrete surface shall be provided above the bearings . Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings .
8. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans .
9. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75B . Details of the elastomeric bearings for this design shall be as under :
   (i) Length (a) = 500 mm
   (ii) Width (b) = 360 mm
   (iii) Thickness of each internal elastomer layer = 12 mm
   (iv) Thickness of steel reinforcing plate = 3 mm
   (v) No. of internal elastomeric layer = Six
   (vi) Overall thickness of bearing = 99 mm
   (vii) Maximum design bearing pressure on substructure = 72 kg/cm².
   (viii) Design vertical load (D.L.+L.L.+ Impact) = 117.25 tonnes.
10. All dimensions are in millimetres .
11. This drawing shall not be applicable where reinforcing bars are joined by welding .
12. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings should be ensured .
13. Tests and specifications for elastomeric bearings shall strictly comply with cl. 2005 of M.O.S.&T. specification .



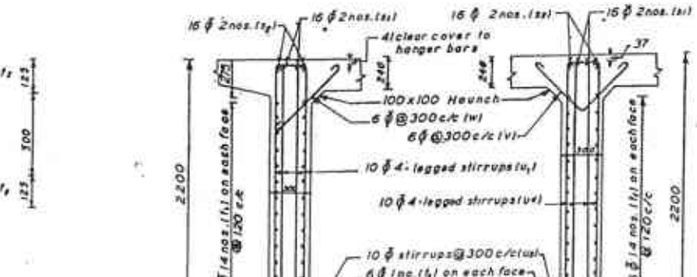
LONGITUDINAL SECTION OF CENTRAL GIRDER



SECTION AT 'CC'

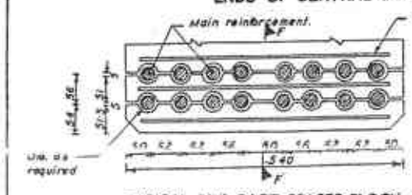
PLAN SHOWING WEB REINFORCEMENT (TOP) AT THE ENDS OF CENTRAL GIRDER

PLAN SHOWING BULB REINFORCEMENT AT THE ENDS OF CENTRAL GIRDER



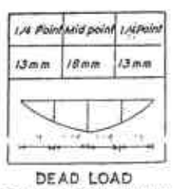
SECTION AT 'BB' OUTER GIRDER

SECTION AT 'DD' CENTRAL GIRDER

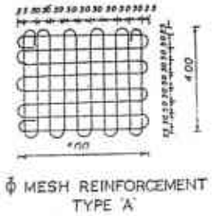


TYPICAL PRE-CAST SPACER BLOCK SPACING - 3000 (1800 x.)

SECTION AT 'FF'
(various layers may be staggered horizontally by 150 m m)



DEAD LOAD DEFLECTION DIAGRAM



6 ϕ MESH REINFORCEMENT TYPE 'A'

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

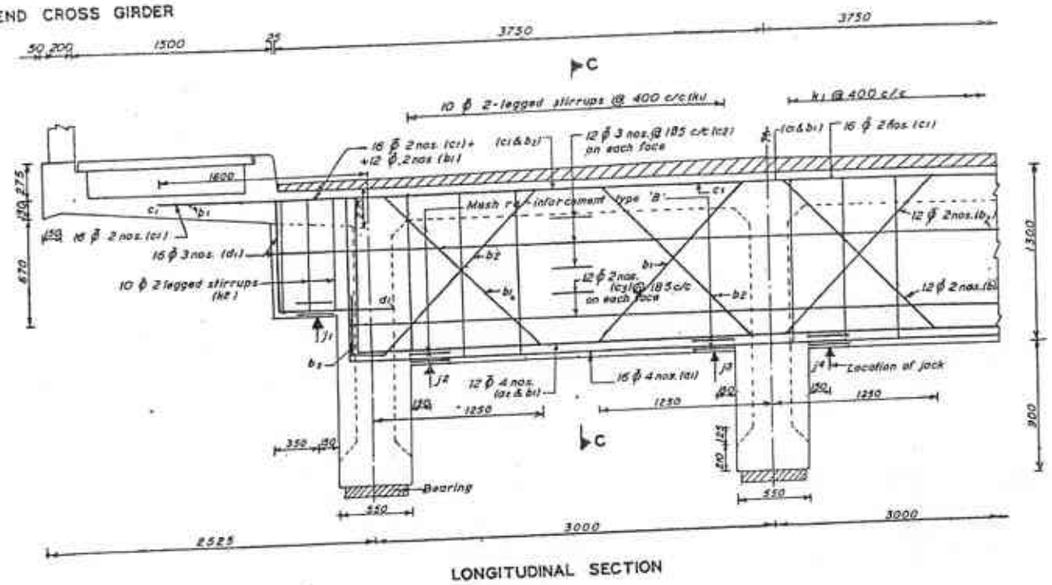
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 21.75 METRES DETAILS OF LONGITUDINAL GIRDERS

7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
1.5 METRES FOOTPATHS — ONE LANE IRC CLASS 70-R LOADING
DO NOT SCALE — FOOTPATH LOAD — 400 kg./m²

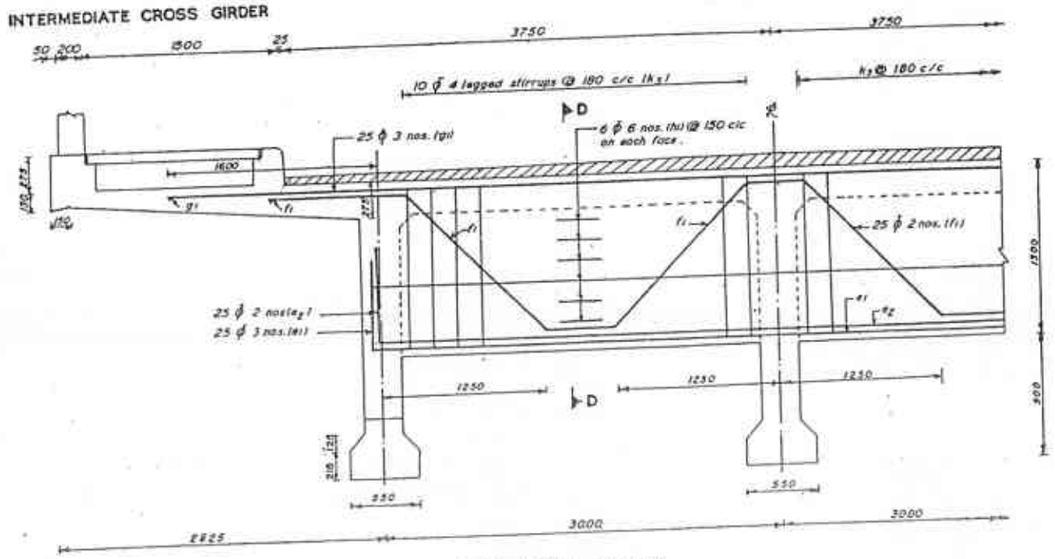
RECOMMENDED : R.H. GHOSHAL S.E.	RECOMMENDED : PRAFULLA MOHAN, S.E.	JULY, 1980.
RECOMMENDED : R.S. SHARMA, E.E.	APPROVED : S. SEETHARAMAN, C.E.	DRG. NO. BD/2-80.

END CROSS GIRDER

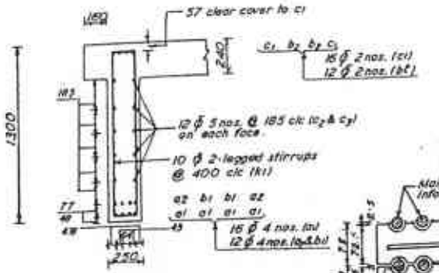


LONGITUDINAL SECTION

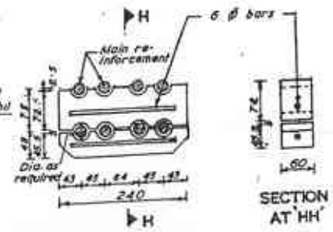
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT 'CC'



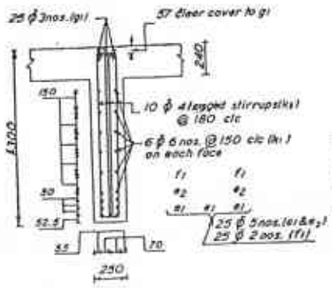
PRE-CAST SPACER BLOCK

SPACING - 3000 (APPX)

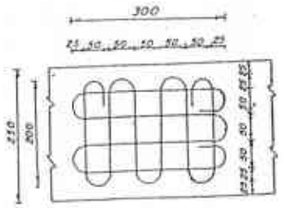
SECTION AT 'HH'

NOTES :—

1. This drawing shall be read in conjunction with following drawings:
   BD/1-80 showing details of slab
   BD/2-80 showing details of longitudinal girders
   BD/4-80 showing schedule of reinforcement.
2. For general notes refer drawings No. BD/1-80 and BD/2-80.
3. The location of jacks for lifting up the superstructure to re-place bearing etc. is shown thus ▲. These shall be distinctly etched for easy identification on cross giders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers one at 20 mm and the other at 100 mm from the concrete surface shall be provided in the girders and the pier/abutment caps at jack positions.
4. During the jacking operation all the six jacks placed under each end cross girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the six jacks are equal at all times.
5. Reaction per jack under lifting condition = 26.20 tonnes.
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinforcing bars are joined by welding.
8. There shall be two intermediate cross girders provided at a spacing of 7.25 metres c/c.

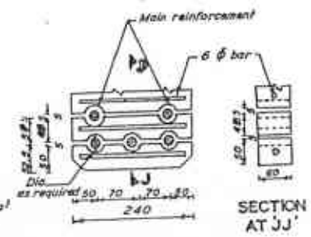


SECTION AT 'DD'



MESH REINFORCEMENT 6 ϕ

TYPE 'B'



SECTION AT 'JJ'

PRE-CAST SPACER BLOCK

SPACING - 3000 (APPX)

(various layers of spacer blocks may be staggered horizontally by 150 mm)

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

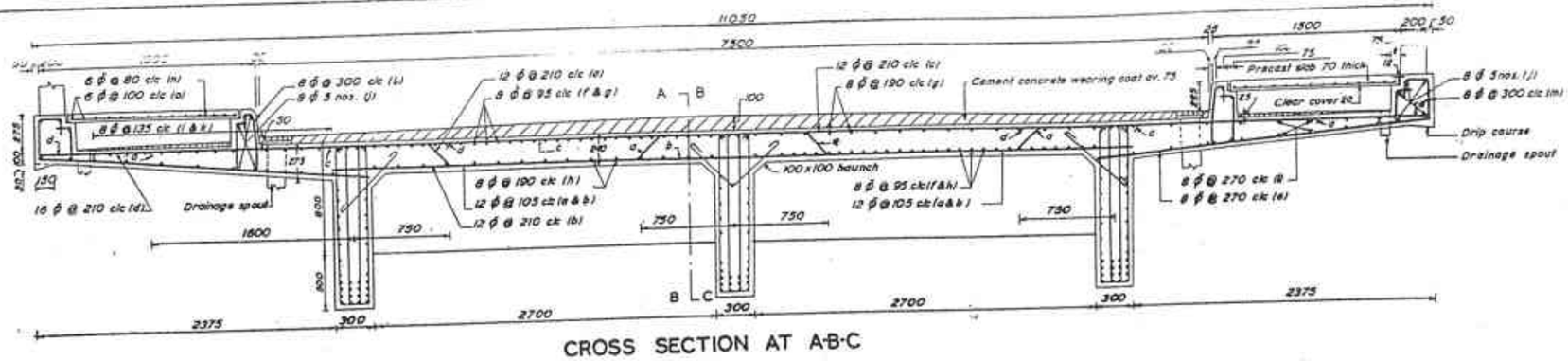
R.C.C. T-BEAM : EFECTIVE SPAN 21.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
DO NOT SCALE

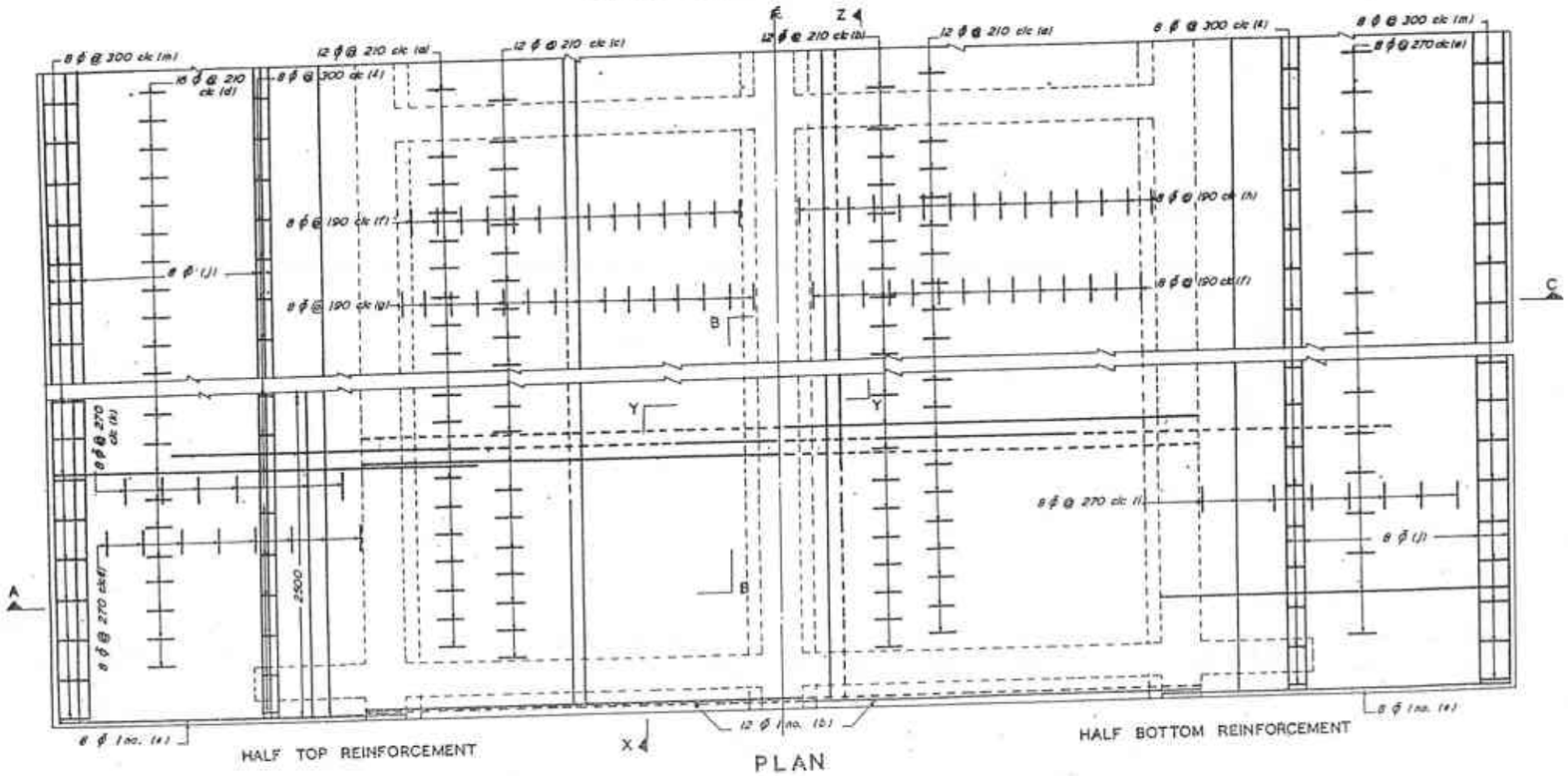
TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING
FOOTPATH LOAD — 400 kgs/m²

RECOMMENDED: K.N. GHOSHAL E.E.
RECOMMENDED: R.S. SHARMA, E.E.
RECOMMENDED: PRAFULLA KUMAR, SE
APPROVED: S. SEETHARAMAIYA, ICE

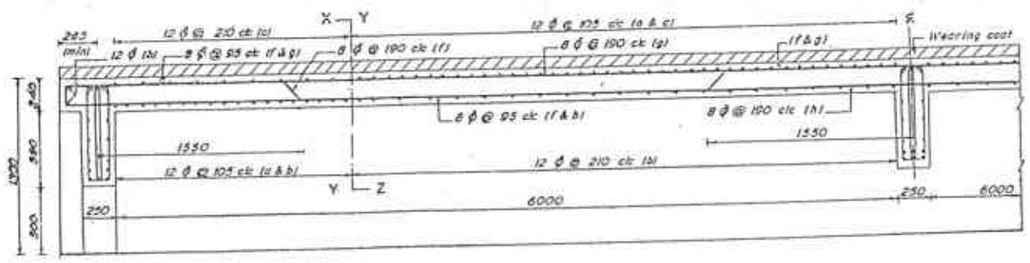
JULY, 1980.
DRG. NO. BD/3-80.



CROSS SECTION AT A-B-C



PLAN



LONGITUDINAL SECTION AT X-Y-Z

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. All dimensions are in millimetres. Only written dimensions shall be followed.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with amendment No. 1 & 2) or IS : 1786-1966 (with amendment No. 1 & 2).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3 of IRC : 21-1972 should be strictly followed ; if laps are provided.
6. Minimum cover to any reinforcement shall be 25mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. The width of each pre-cast R.C.C. footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of pre-cast chequered tiles, fixed firmly and true to levels, may be provided.
13. For details of girders, bearings & schedule of reinforcement, quantities and reactions refer Drawing No. BD/6-75A & BD/7-75A
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

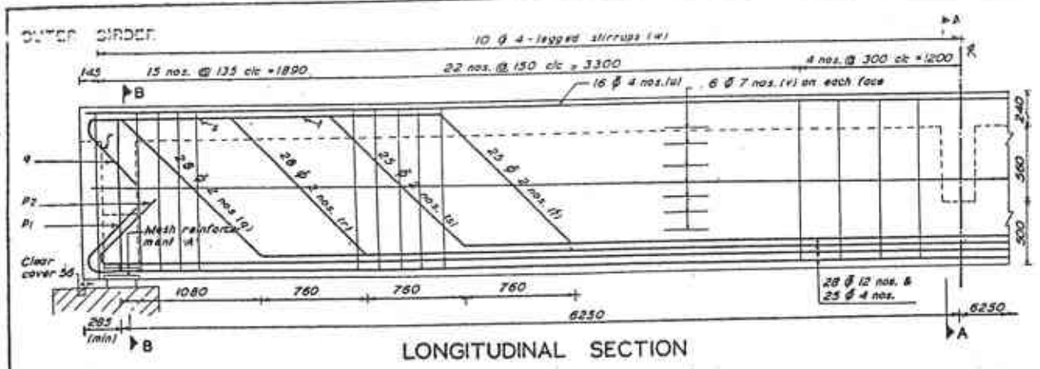
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

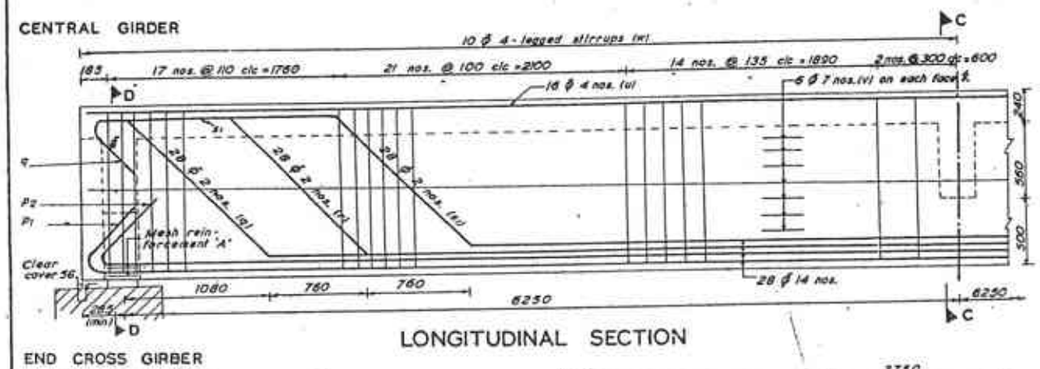
R.C.C. T-BEAM: EFFECTIVE SPAN 12.5 METRES
DETAILS OF SLAB

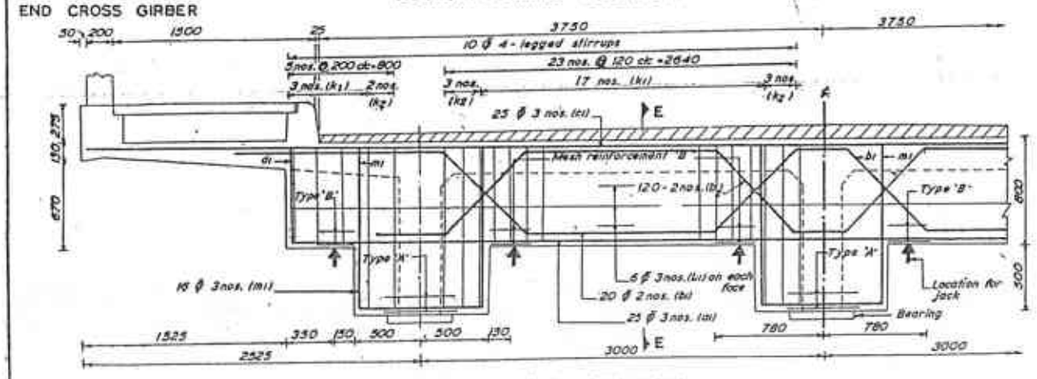
7.5 METRES ROADWAY 1.5 METRES FOOTPATH FOOTPATH LOAD-400 kg/m²	TWO LANES' IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING

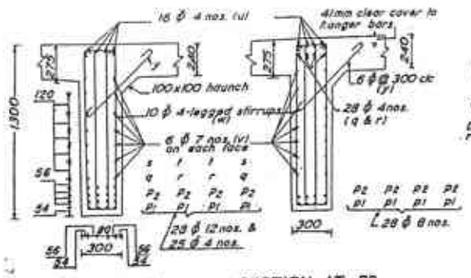
RECOMMENDED: D.S.C. KARTHA, A.E.E.	RECOMMENDED: K. B. SARKAR, S.E.	AUGUST, 1976.
RECOMMENDED: S.C. MOTWANI, E.E.	APPROVED: B. BALWANT RAO, C.E.	DRG. NO. BD/5 -75A

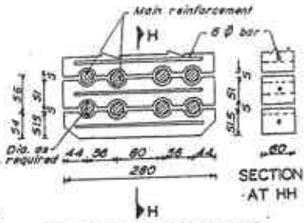
High Yield Strength Deformed Bars

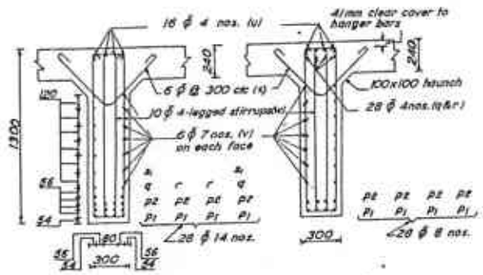


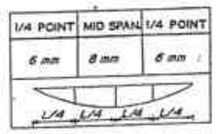






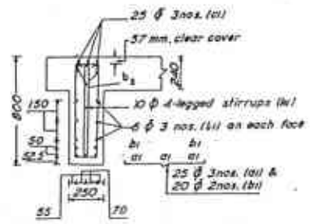


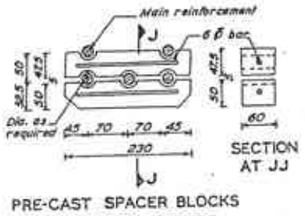


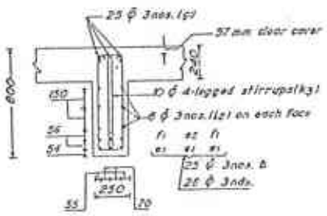


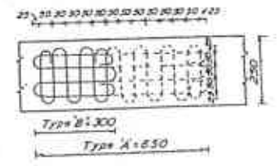
NOTES :-

1. For general notes refer Drawing No. BD/5 – 75 A.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise .
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder , shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moment .
4. Main beams shall be given upward camber to account for dead load deflection as shown in the diagram .
5. For details of slab and schedule of reinforcement , quantities and reactions refer Drawing No. BD/5 – 75A and BD/7 –75A respectively .
6. The expansion joints shall be of the approved type .
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ↑ These shall be distinctly etched on the cross girders and the pier / abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier / abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans .
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4 - 75B. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl. 2005 of M.O. S&T specification.
    - i. Length (a) = 630 mm
    - ii. Width (b) = 220 mm
    - iii. No. of internal elastomeric layers = Four
    - iv. Overall thickness of bearings = 60 mm
    - v. Design vertical load (DL+LL+Impact) = 80 tonnes.
11. All dimensions are in millimetres . Only written dimensions shall be followed .
12. For additional notes refer Drg.No. BD/7-75A.









Revision	Year	Description	Signatures
A	1980	1. Notes modified. 2. Type b_2 bars in end x-girder added 3. Shape of end x-girder modified .	E.E. D.E. Asstt. Engr.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING , NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 12.5 METRES
DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD = 400 kg/m²

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED: B.S.C. KARTHA, A.E.E.
RECOMMENDED: S.C. HOTWANI, E.E.
RECOMMENDED: K.E. BANKAR, S.E.
APPROVED: S. BALWANT RAO, C.E.

AUGUST, 1976.
DRG. NO. BD/6 –75A

High Yield Strength Deformed Bars.

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		SLAB					
1	a	2172, 225, 225, 1144, R=10d, 225, 225, 2172, 1500, 1500, 45°	12	9496	58	550.77	490
2	b	6300	12	6300	62	756.00	673
3	c				58		
4	d	3250	16	3230	116	377.00	596
5	e	2650	8	2650	100	265.00	103
6	f	1652, 224, 2784, 224, 1652, R=10d, 3150, 3150, 45°	8	13284	28	371.95	145
7	g	13020, 150, R=3d	8	13312	30	399.36	156
8	h	13020	8	13020	30	1067.64	416
9	i				32		
10	j				20		
11	k	2500	8	2500	24	60.00	23
12	l	75, 125, 25, 204, R=3d, 175, 200, 125, 325, R=3d, 275	8	1226	88	107.89	42
13	m		8	1205	88	106.04	41
14	n	1300	6	1300	330	429.00	94
15	o	820	6	820	420	344.40	76
		MAIN GIRDERS					
1	P_1	R=3d, 12938, 45°	28	13628	12	163.54	790
2	P_2	R=3d, 12846, 45°	28	13628	12	163.54	790
3	q	274, 1465, R=10d, 1465, 274, 45°, 200, 200, R=3d, 10340	28	14978	6	89.87	434
4	r	1034, 1465, R=10d, 1465, 1034, 45°, 115, 115, R=3d, 8820	28	13996	6	83.98	406
5	s	1190, 1365, R=10d, 1365, 1130, 45°, 7300	25	12450	4	49.80	192
6	s1		28		2	24.90	120
7	t	1190, 1365, R=10d, 1365, 1130, 45°, 2780	25	10930	4	43.72	168
8	u	13008	16	13006	12	156.07	247
9	v	13020	6	13020	42	546.84	120
10	w	R=3d, 1219, 164, 164, W, R=3d, 480, 480, X	10	2x3006	269	1617.23	1003
11	x		6	1095	44	48.18	11
12	y	840	6	790	88	69.52	15

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		CROSS GIRDERS					
1	a_1	700, R=3d, 100, 7900	25	9175	6	55.05	212
2	b_1	1300, 820, 400, 820, R=10d, 820, 1500, 45°, 1440, 1440	20	9560	4	38.20	94
3	a_1	10950	25	10950	6	98.55	379
4	g_1	I.C.C.			3		
5	e_1	I.C.C., 508, R=3d, 508, 6128	28	7064	3	21.19	102
6	e_2	I.C.C., 825, R=3d, 125, 6076	25	6915	1	6.92	27
7	f_1	I.C.C., 1052, 606, 420, 606, R=10d, 606, 1052, 45°, 1440, 1440	25	8648	2	17.30	67
8	k_1	703, R=3d, 703, 95, 95	10	2x1836	80	293.76	182
9	k_2	1203, R=3d, 1203, 95, 95	10	2x2836	32	181.50	113
10	k_3	703, R=3d, 703, 98, 98	10	2x1842	46	169.46	105
11	l_1	7950	6	7950	12	95.40	21
12	l_2	I.C.C. 6250	6	6250	6	37.50	8
13	m_1	1203, R=3d, 1203, 920	16	3246	18	58.43	92
14	A	Mesh reinforcement as shown in Drawing No. BD/6.-75A.	6	5930	12	71.16	16
15	B	-Do-	6	2930	24	70.32	15
16	b_2	310, 840, 840, 45°, 1440, R=10d, 400, 1440, 840, 840	12	7580	4	30.32	27

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
D.L.	DL+LL	DL+LL+LH	D.L	DL+LL	DL+LL+LH
75	143.19	158.37	150	241.25	260.34

TOTAL QUANTITIES (PER SPAN)

1. STEEL: = 9042 kgs.
   (including 5% extra for laps and wastage)
2. CONCRETE: = 53.55 cu.m

Note: These quantities do not include railing and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/5-75A and BD/6-75A showing the details of R.C.C. Deck Slab and R.C.C. Girders respectively.
2. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling.
3. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
4. Dimensions in the schedule are given as per I.S:2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/6-75A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the six jacks placed under one end cross-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the six jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 12.5 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1960	1. Type b_2 bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/6-75A added.	S.E. S.E. C.E

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 12.5 METRES SCHEDULE OF REINFORCEMENT

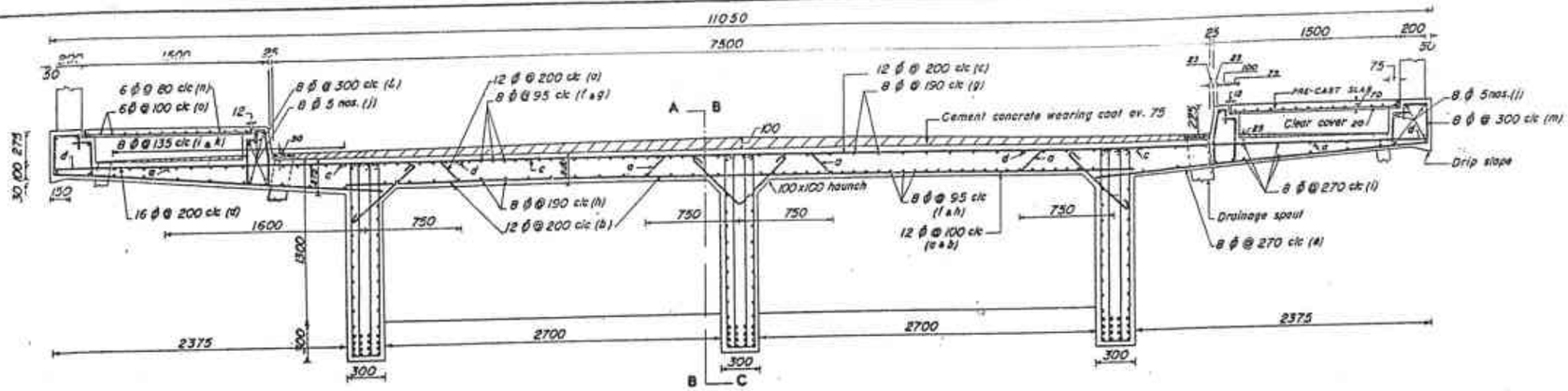
7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD 400 kg/m²

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

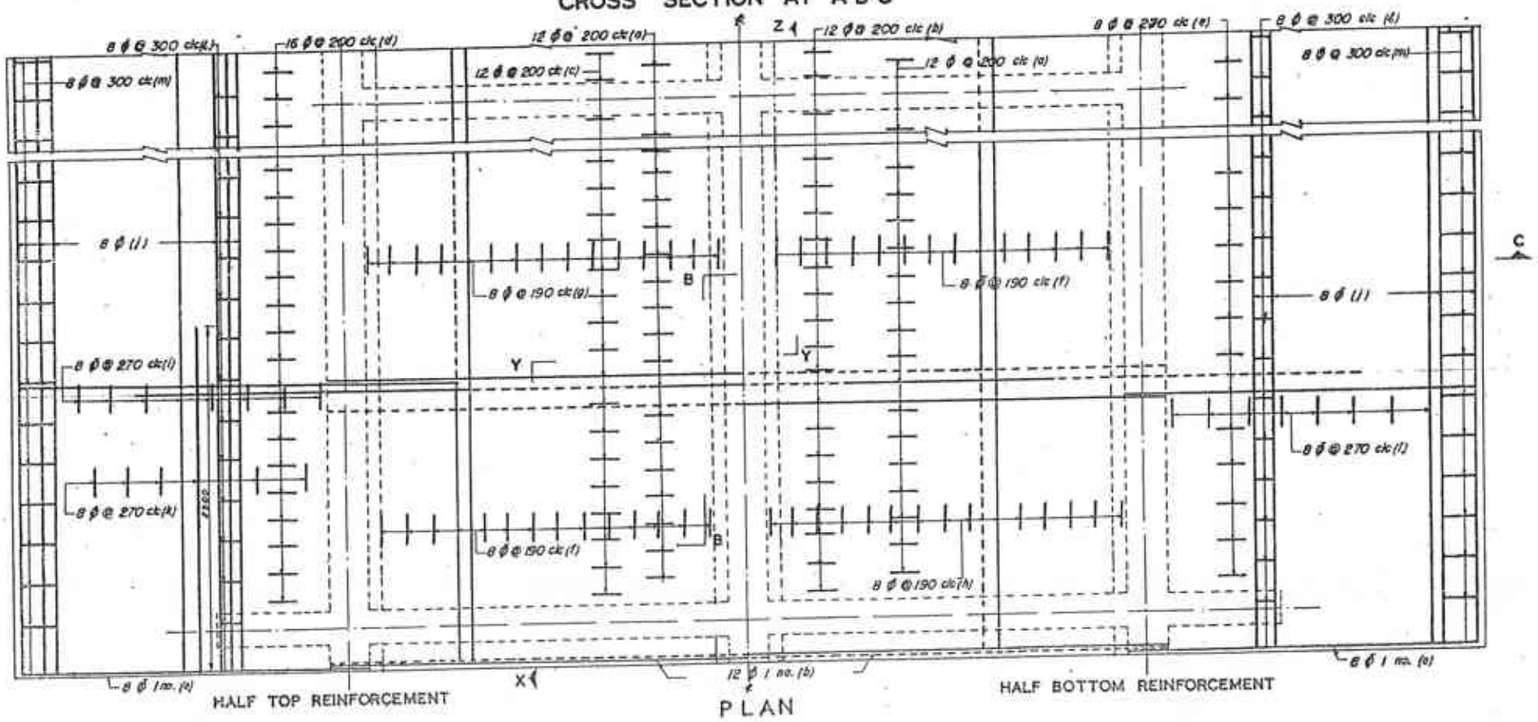
RECOMMENDED: D.S.C. KARTHA, A.E.E.
RECOMMENDED: S.C. MOTWANI, S.E.
RECOMMENDED: R. B. SARKAR, S.E.
APPROVED: R. BALWANT RAO, I.C.S.

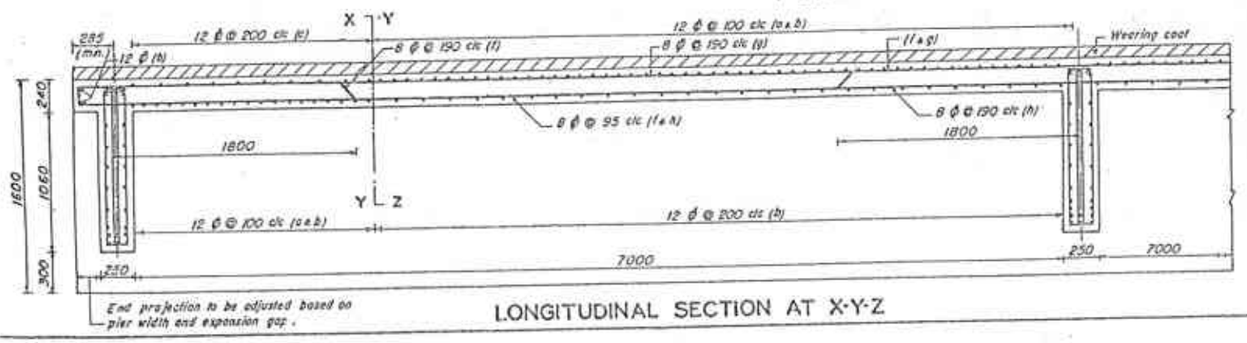
AUGUST, 1976.
DRG. No. BD/7 -75A.

High Yield Strength Deformed Bars



CROSS SECTION AT A-B-C





LONGITUDINAL SECTION AT X-Y-Z

NOTES :-

1. The design is according to the following Bridge Codes: (i) I.R.C. 5-1970, (ii) I.R.C. 6-1966 & (iii) I.R.C. 21-1972.
2. All dimensions are in millimetres. Only written dimensions shall be followed.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm^2 on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars with minimum yield stress of 42.5 kg/mm^2 and conforming to I.S. 1139-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of November, 1970) or I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However the provision in clause No. 304.6.3 of I.R.C. 21-1972 should be strictly followed; if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. The width of each pre-cast R.C.C. footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of precast chequered tiles, fixed firmly and true to levels, may be provided.
13. For details of Girders, Bearings & Schedule of Reinforcement, Quantities and Reactions refer Drg. No. BD/13-75A & BD/14-75A.
14. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

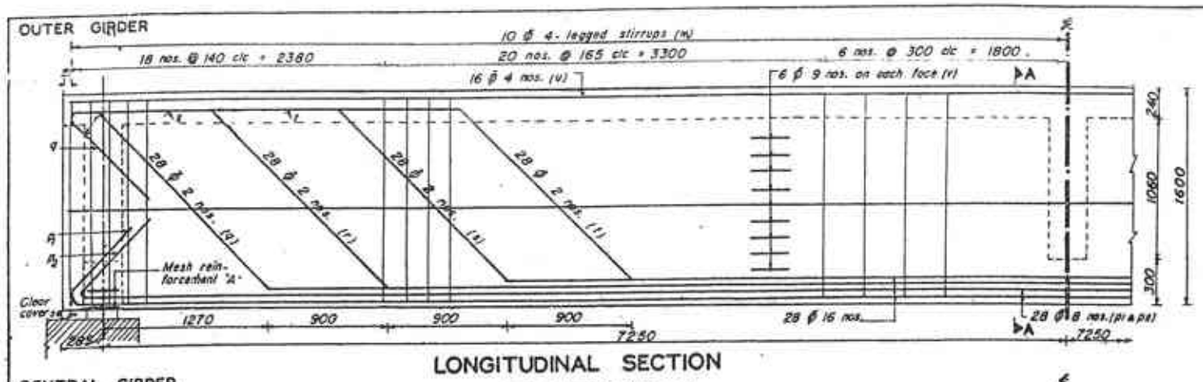
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 14.5 METRES
DETAILS OF SLAB

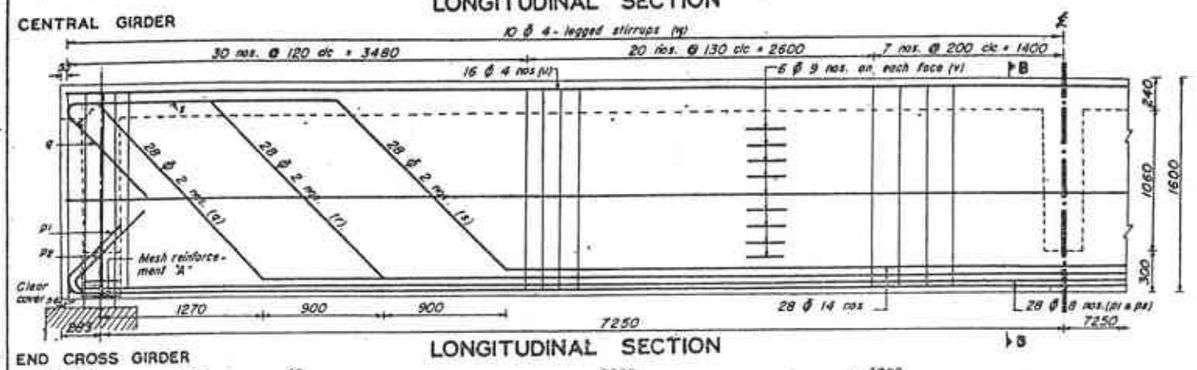
7.5 METRES ROADWAY 1.5 METRES FOOTPATHS FOOTPATH LOAD - 400 kg/m^2	TWO LANES I.R.C. CLASS 'A' LOADING ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED : G.S.C. KANTHA A.S.E.	RECOMMENDED : K. B. SARKAR S.E.	DEC, 1975
RECOMMENDED : S.C. MOTHANI S.E.	APPROVED : S. BALWANT RAO C.E.	DRG. NO. BD/12-75.

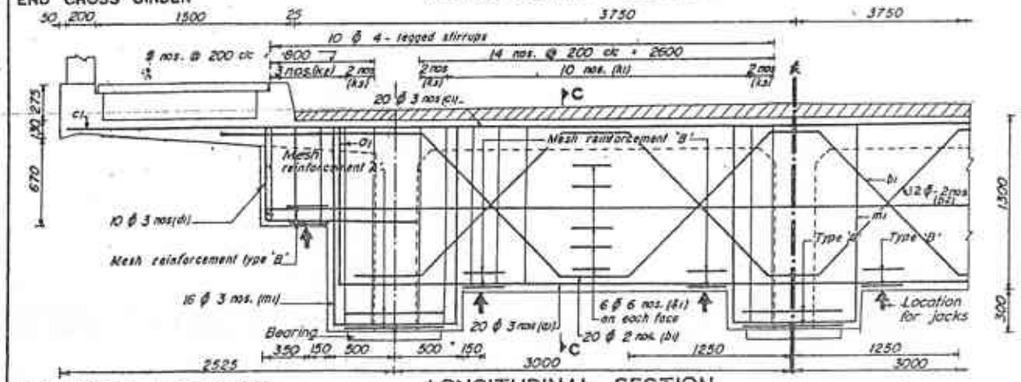
High Yield Strength Deformed Bars



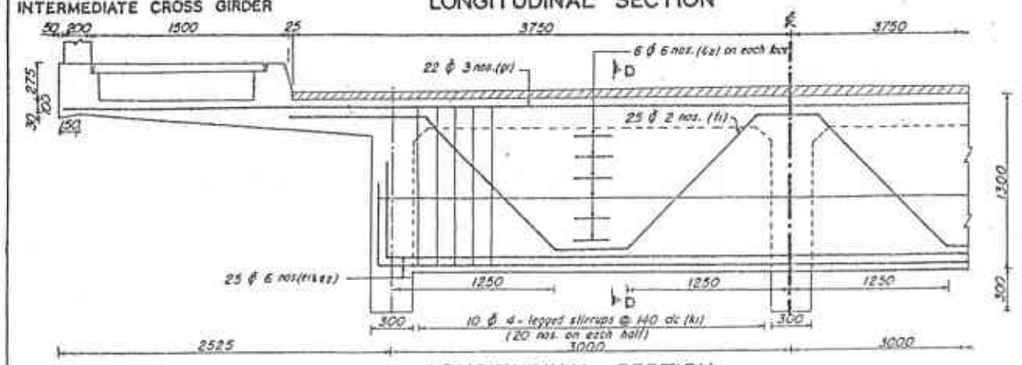
LONGITUDINAL SECTION



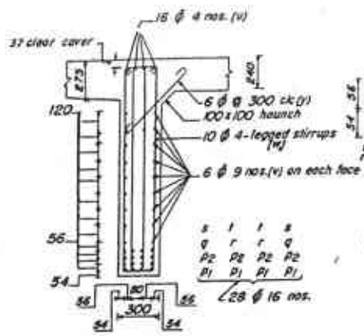
LONGITUDINAL SECTION



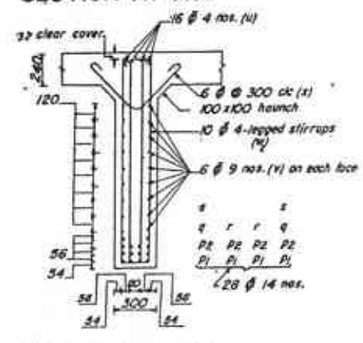
LONGITUDINAL SECTION



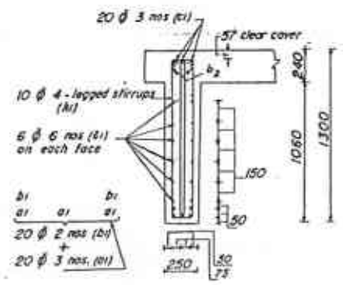
LONGITUDINAL SECTION



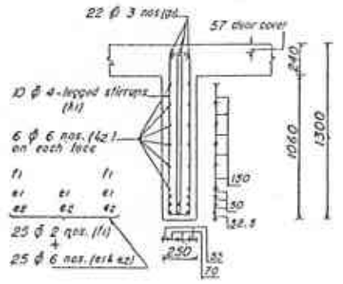
SECTION AT A-A



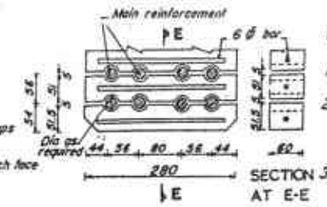
SECTION AT B-B



SECTION AT C-C



SECTION AT D-D

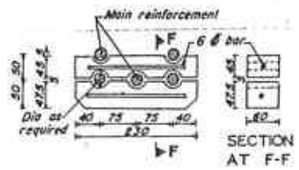


PRE-CAST SPACER BLOCKS FOR MAIN GIRDERS

SPACING - 3000 (APPROX)

1/4 POINT	MID SPAN	1/4 POINT
7 mm	9 mm	7 mm

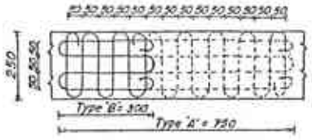
DEAD LOAD DEFLECTION DIAGRAM



PRE-CAST SPACER BLOCKS FOR CROSS GIRDERS

SPACING - 3000 (APPROX)

(Various layers of spacer blocks may be staggered horizontally by 150 mm.)



MESH REINFORCEMENT 6 mm

NOTES :-

1. For general notes refer Drawing No. BD/12-75.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum Bending Moment.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drawing No. BD/12-75 and BD/14-75A respectively.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⬆. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans.
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl.2005 of M.O.S.&T. specification.
    - I. Length (a) = 710 mm
    - II. Width (b) = 200 mm
    - III. No. of internal elastomeric layers = 3
    - IV. Overall thickness of bearing = 3x10 + 4x3 + 2x3 = 48 mm.
    - V. Design vertical load (DL+LL+ Impact) = 96 tonnes.
    - II. All dimensions are in millimetres.
12. For additional notes refer drg. BD/14-75A.

Revision	Year	Description	Signatures
A	1980	1. Notes modified. 2. Type b_2 bars in end x-girder added.	A.S.Khanna A.E.E., Dhawan S.E., Kumar 4/7/79 C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 14.5 METRES DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY 1.5 METRES FOOTPATHS FOOTPATH LOAD - 400 kg/m²	TWO LANES I.R.C. CLASS 'A' LOADING ONE LANE I.R.C. CLASS '70-R' LOADING	
RECOMMENDED : G. S. C. KARTHA A.E.E.	RECOMMENDED : K. B. SARKAR S.E.	DEC. 1975
RECOMMENDED : S. C. HOTHANI E.E.	APPROVED : B. RAJWANT RAO C.E.	DRG. NO. BD/13-75A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl No	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (kgs.)
		SLAB					
1	a	2172, 250, R=10d, 1144, 1500, 1500, 45°	12	9496	70	664·72	592
2	b	6300	12	6300	76	932·40	830
3	c				72		
4	d	3250	16	3250	144	468·00	739
5	e	2650	8	2650	114	302·10	118
6	f	1900, 224, 3284, R=10d, 3650, 45°	8	15280	28	427·84	167
7	g	15020, 166, R=3d	8	15312	30	459·36	179
8	h	15020	8	15020	30	1231·64	480
9	i				32		
10	j				20		
11	k	2500	8	2500	24	60·00	23
12	l	75, 125, 231, 25, 206, R=3d, 369, 175	8	1226	102	125·05	49
13	m	200, 125, 325, R=3d, 235, 275	8	1205	102	122·91	48
14	n	1300	6	1300	396	514·80	113
15	o	785	6	785	504	395·64	87
		MAIN GIRDERS					
1	p_1	R=3d, 45°, 14958	28	16500	12	39600	1912
2	p_2	R=3d, 45°, 14846			12		
3	q	136, 1890, 156, R=10d, 45°, 11960	28	17672	6	106·03	512
4	r	1036, 1890, R=10d, 45°, 10160	28	16190	6	97·14	469
5	s	1190, 1810, R=10d, 45°, 8360	28	14360	6	86·16	416
6	t	1190, 1810, R=10d, 45°, 6560	28	12560	4	50·24	243
7	u	15006	16	15006	12	180·07	285
8	v	15020	6	15020	54	811·08	178
9	w	1519, R=3d, 164, 420, 480	10	2x3606	287	2069·84	1283
10	x		6	1095	51	55·85	12
11	y	240	6	790	102	80·58	18

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (kgs.)
		CROSS GIRDERS					
1	a_1	200, R=3d, 6880, 1200	20	9180	6	55·08	136
2	b_1	1500, 1540, 324, R=10d, 500, 500, 45°	20	10484	4	41·94	104
3	c_1	10970	20	10970	6	65·82	163
4	d_1	200, R=8d, 1185	10	1800	12	21·60	13
5	e_1 / e_2	810, R=34, 6100, 1200, 870, 6200	25	7695	3 / 3	46·17	178
6	f_1	1062, 1460, 438, R=10d, 500, 500, 45°	25	9402	2	18·80	72
7	g_1	10962	22	10962	3	32·89	98
8	k_1	R=3d, 1203, 95, K_1	10	2x2836	80	453·76	281
9	k_2	702, 95, K_2	10	2x1836	12	44·06	27
10	k_3	R=3d, 1503, 95	10	2x3436	24	164·93	102
11	l_1	7480 (Average)	6	7450	24	178·80	39
12	l_2	6250	6	6250	12	75·00	17
13	m1	1503, R=3d, 920, 1503	16	3846	18	69·23	109
14	A	Mesh reinforcement as shown in Drawing No. BD/13-75A	6	67·80	12	81·36	18
15	B	- Do-	6	2930	24	70·22	15
16	b_2	310, 1240, 300, 1340, 45°, R=10d, 324, 1910, 300, 2340, 45°, 310	12	8504	4	34·02	30

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
D.L.	D.L+L.L.	D.L+L.L+I	D.L.	D.L+L.L.	D.L+L.L+I
93·50	167·65	182·10	187·00	283·40	300·95

TOTAL QUANTITIES (PER SPAN)

1. STEEL. = 10663 Kgs.
   (including 5% extra for laps and wastage)
2. CONCRETE = 67·30 cu.m.

Note: These quantities do not include rolling and wearing coat.

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/12-75 and BD/13-75A showing the details of R.C.C. Deck Slab & R.C.C. Girders respectively.
2. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling.
3. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
4. Dimensions in the schedule are given as per I.S. 2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/13-75A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the six jacks placed under one end cross-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the six jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 15.6 tonns.
4. Maximum design bearing pressure on sub-structure = 72 kg./cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type b_2 bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/13-75A added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

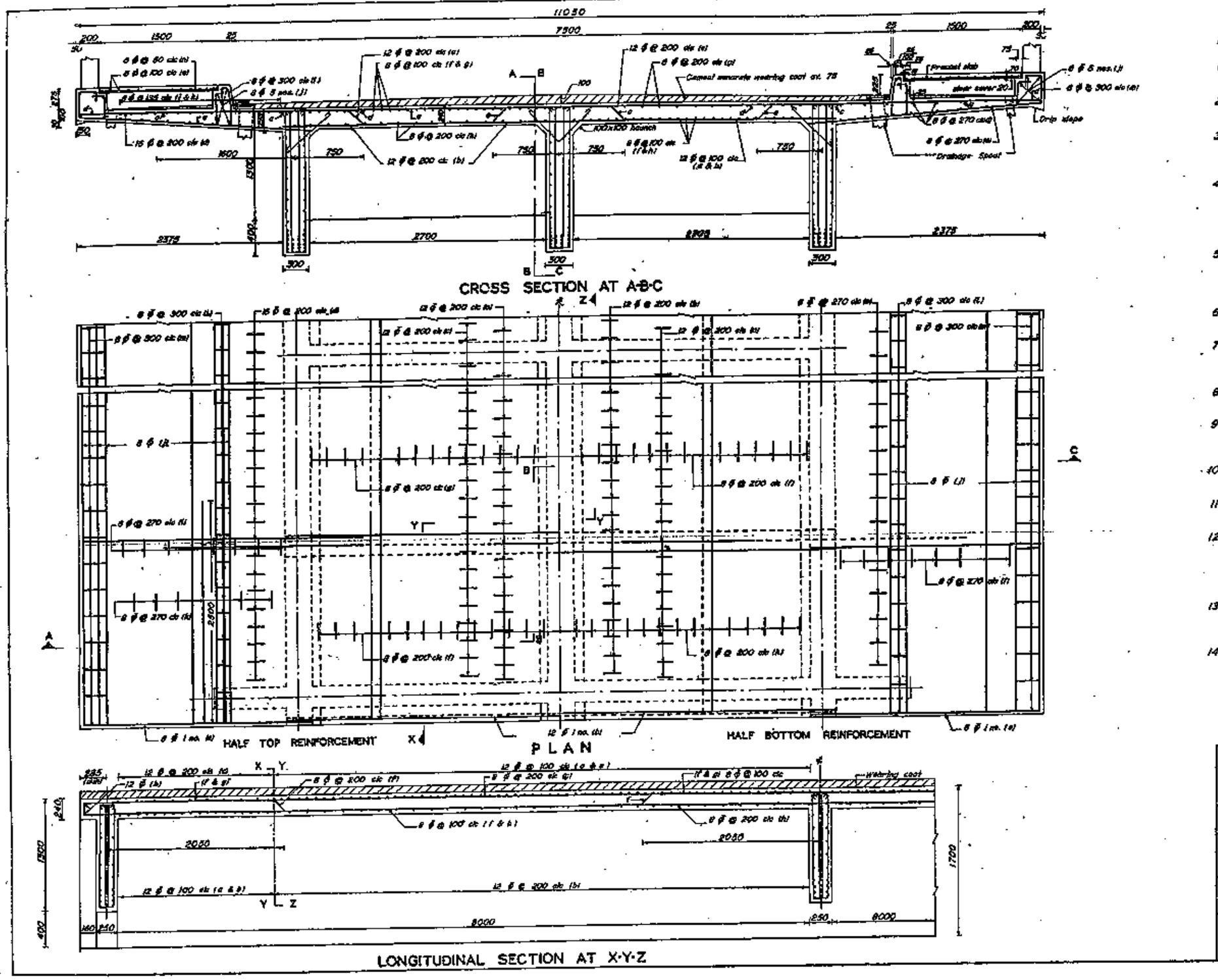
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 14.5 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD - 400 Kg/m²

TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED: U.S.C. KARTHA, A.E.E.	RECOMMENDED: K. S. SARKAR, S.E.	DEC., 1975
RECOMMENDED: S. C. MOTWANI, S.E.	APPROVED: B. BALWANT RAO, C.E.	DRG. No. BD/14-75A



High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes (i) IRC. 5-1970, (ii) IRC: 6-1966 & (iii) IRC: 21-1972.
2. All dimensions are in millimetres. Only written dimensions shall be followed.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 300 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to I.S. 1139-1966 (with amendment No. 1 of August, 1968 & amendment No. 2 of November, 1970) or I.S. 1786-1966 (with amendment No. 1 of August, 1968 and amendment No. 2 of December, 1970)
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However the provision in clause No. 304.6.5 of IRC: 21-1972 should be strictly followed, if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage, refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. The width of each precast R.C.C. footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking. A wearing course of precast chequered tiles, fixed firmly and true to levels, may be provided.
13. For details of Girders, Bearings and Schedule of Reinforcement, Quantities and Reactions refer Drg. No. BD/2-76A and BD/3-76A.
14. The drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 16.5 METRES
DETAILS OF SLAB

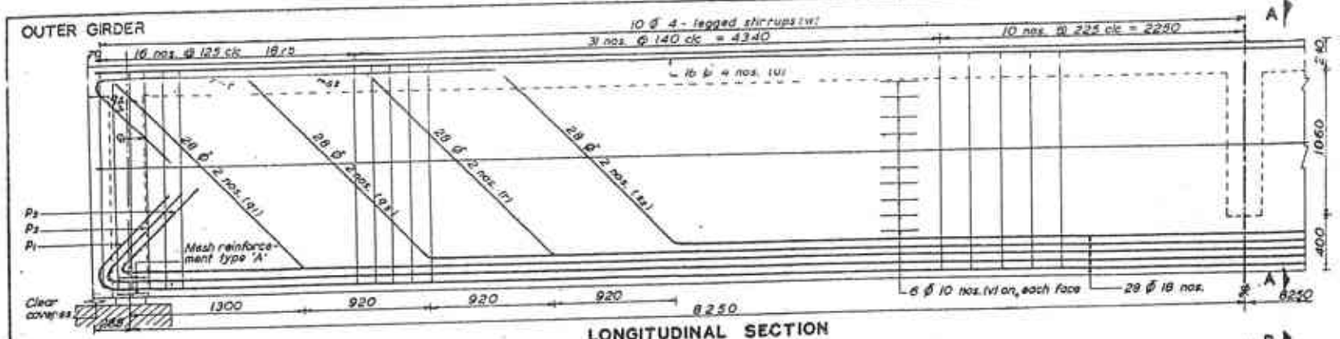
7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD - 400 kg/m²

TWO LANES I.R.C. CLASS 'A' LOADING
ONE LANE I.R.C. CLASS '70-R' LOADING

RECOMMENDED: S.S.C. KARTHA	RECOMMENDED: K. S. SASKAR	APRIL, 1976.
RECOMMENDED: S. C. MOTWANI C.E.	APPROVED: S. SALWANT RAO C.E.	DRG. NO. BD/1-76.

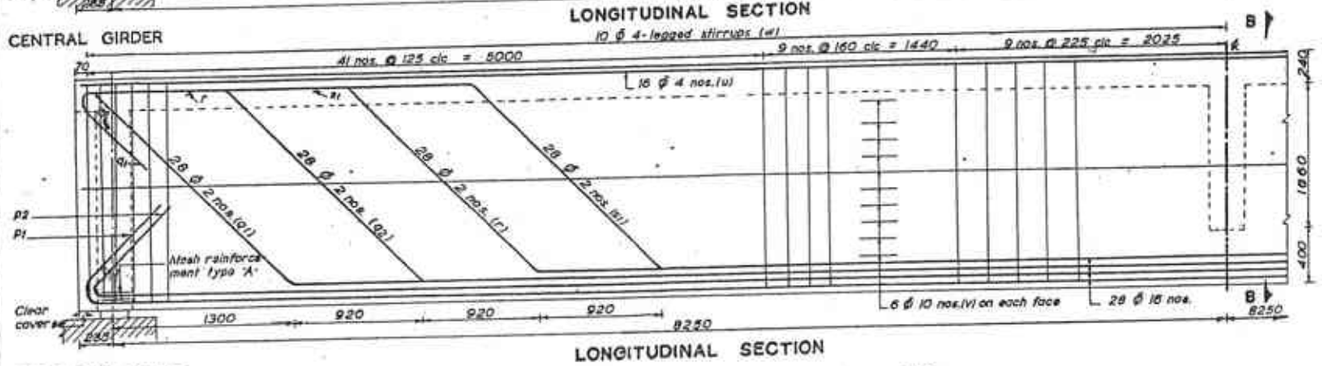
High Yield Strength Deformed Bars

OUTER GIRDER



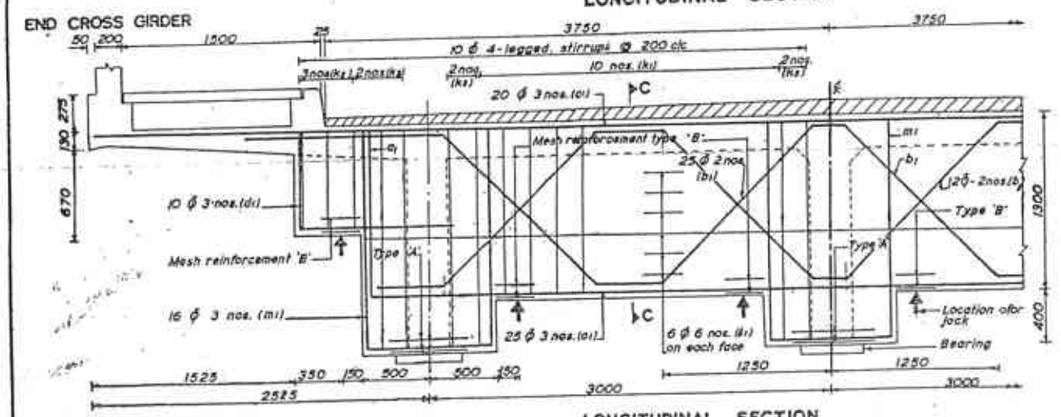
LONGITUDINAL SECTION

CENTRAL GIRDER



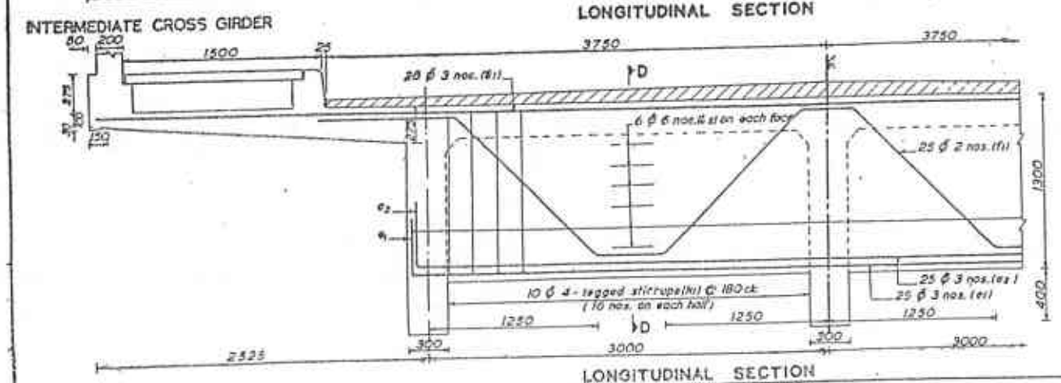
LONGITUDINAL SECTION

END CROSS GIRDER

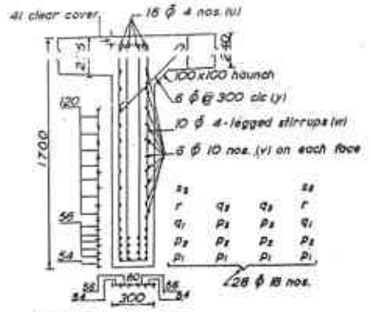


LONGITUDINAL SECTION

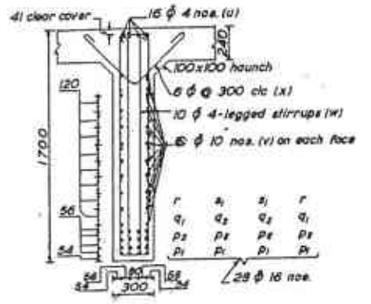
INTERMEDIATE CROSS GIRDER



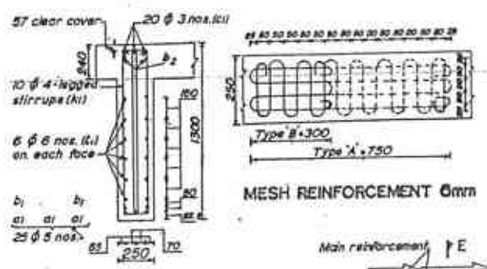
LONGITUDINAL SECTION



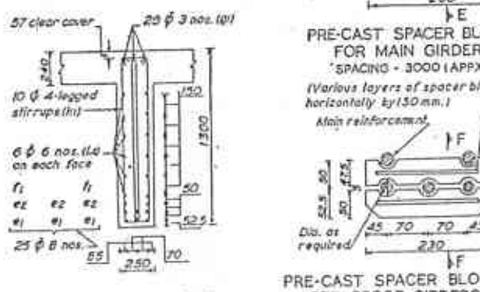
SECTION AT A-A



SECTION AT B-B



SECTION AT C-C

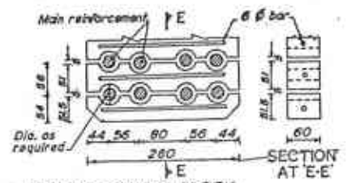


SECTION AT D-D

MESH REINFORCEMENT 6mm

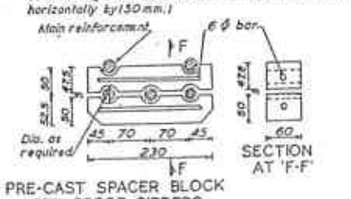
1/4 POINT	MID SPAN	1/4 POINT
8 mm	12 mm	8 mm

DEAD LOAD DEFLECTION DIAGRAM



SECTION AT E-E

PRE-CAST SPACER BLOCK FOR MAIN GIRDERS
SPACING - 3000 (APPX.)
(Various layers of spacer blocks may be staggered horizontally by 150 mm.)



SECTION AT F-F

PRE-CAST SPACER BLOCK FOR CROSS GIRDERS
SPACING - 3000 (APPX.)

NOTES :-

1. For general notes refer Drawing No. BD/1-76.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moment.
4. Main beams shall be given upward camber to account for dead load deflection as given in diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drawing No. BD/1-76 and BD/3-76A respectively.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ↑. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75A. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl. 2005 of M.O.S & T. specification.
    - I. Length (a) = 710 mm.
    - II. Width (b) = 220 mm.
    - III. No. of internal elastomeric layers = Four
    - IV. Overall thickness of bearing = 4 x 10 + 5 x 3 + 2 x 3 = 61 mm.
    - V. Design vertical load (DL + LL + Impact) = 102 tonnes.
11. All dimensions are in millimetres. Only written dimensions shall be followed.
12. For additional notes refer Drg No. BD/3-76A.

Revision	Year	Description	Signature
A	1980	1. Notes modified. 2. Type b2 bars in end x-girder added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 15.5 METRES DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
FOOTPATH LOAD - 400 kg/m²

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED: D.S.C. MARTHA, A.E.E.
RECOMMENDED: S.C. MOTWANI, E.E.
RECOMMENDED: K.B. SAHNI, S.E.
APPROVED: B. BALWANT RAO, C.E.

APRIL, 1976
DRG. NO. BD/2-76A

SCHEDULE OF REINFORCEMENT (PER SPAN)

S. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		SLAB					
1.	a	2172 225 R=10d 1144 225 225 632 2172 1500 1500 45°	12	9496	80	759·68	676
2	b	6300	12	6300	86	1058·40	942
3	c				82		
4.	d	3250	16	3250	164	533·00	842
5.	e	2650	8	2650	128	339·20	132
6	f	2132 224 R=10d 3784 224 224 2132 4150 4150 45°	8	17284	28	483·95	189
7	g	170 150 R=3d 17060 166	8	17312	28	484·74	189
8	h	17060	8	17020	28	1361·60	531
9	i				32		
10	j				20		
11	k	2500	8	2500	24	60·00	23
12	l	75 125 225 R=3d 208 358 175 l; 200 125 R=3d 325 225 m	8	1226	116	142·22	55
13	m		8	1205	116	139·78	55
14	n	1500	6	1300	456	592·80	130
15	o	650	6	850	532	453·20	100
		MAIN GIRDERS					
1	P_1	150 45° R=3d 18850	28	18500	12	222·00	1072
2	P_2	150 45° R=3d 18846	28	18500	12	222·00	1072
3	P_3	150 45° R=3d 16734	28	18500	4	74·00	357
4	q_1	94 150 R=3d 5020 R=10d 13230 94 45° 13900	28	19668	6	118·00	570
5	q_2	1014 150 R=3d 5020 R=10d 2030 1014 45° 12060	28	18326	2	36·65	177
6	q_3	1014 150 R=3d 1820 R=10d 1820 1014 45° 12060	28	18166	4	72·66	351
7	r	1190 1820 45° R=10d 1820 1190 10220	28	16500	6	99·00	478
8	s_1	1190 1820 45° R=10d 1820 1190 8380	28	14660	2	29·32	142
9	s_2	1190 1172 45° R=10d 1875 1190 8380	28	14510	4	58·04	280
10	u	17006	16	17006	12	204·07	322
11	v	17020	6	17020	60	1021·20	225
12	w	1615 1615 1164 R=3d W; 480 R=3d 480 X	10	2×3806	343	2610·92	1619
13	x		6	1095	58	63·51	14
14	y	1100	6	790	116	91·64	20

S. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		CROSS GIRDERS					
1	a_1	1260 R=3d 1260 8800	25	9075	6	54·45	210
2	b_1	1500 1830 500 1530 334 1830 R=10d 1530 1500 45° 500	25	10454	4	41·82	161
3	c_1	10970	20	10970	6	65·82	163
4	d_1	700 R=3d 1125	10	1800	12	21·60	13
5	e_1	810 R=3d 810 8200	25	7695	3	23·09	89
6	e_2	860 R=3d 860 8100	25	7695	3	23·09	89
7	f_1	1088 1455 1455 444 1455 R=10d 1088 1455 45° 500 500	25	9388	2	18·78	72
8	g_1	10950	25	10950	3	32·85	126
9	k_1	1803 R=3d 1803 95 K_1; 703 R=3d 703 95 K_2	10	2×2836	72	408·38	253
10	k_2		10	2×1836	12	44·06	27
11	k_3	1603 R=3d 1603 95	10	2×3636	24	174·53	108
12	l_1	AV=7450	6	7450	24	178·80	39
13	l_2	6250	6	6250	12	75·00	17
14	m_1	1603 R=3d 1603 820	16	4046	18	72·83	115
15	A	Mesh reinforcement as shown in Drg. No. BD/2-76A.	6	6760	12	81·36	18
16	B	- DO -	6	2930	24	70·22	15
15	b_2	310 1390 500 1390 R=10d 1390 500 1390 42° 310 334	12	8474	4	33.90	30

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
D.L	D.L+L.L	D.L+L.L+I	D.L.	D.L+L.L	D.L+L.L+I
106·30	185·40	199·40	212·60	313·20	329·60

TOTAL QUANTITIES (PER SPAN)

1. STEEL (including 5% extra for laps and wastage) = 12713. Kgs.
2. CONCRETE = 77.20 cum.

Note: These quantities do not include railing and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/1-76 and BD/2-76A showing the details of R.C.C. Deck Slab & R.C.C. Girders respectively.
2. The width of each panel of pre-cast footpath slab may be such as to facilitate easy handling.
3. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
4. Dimensions in the schedule are given as per I.S.2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/2-76A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the six jacks placed under one end x-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the six jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 17.7 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type b_2 bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/2-76A added.	S.E. S.E. C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C.T-BEAM: EFFECTIVE SPAN 16·5 METRES SCHEDULE OF REINFORCEMENT

7·5 METRES ROADWAY
1·5 METRES FOOTPATHS
FOOTPATH LOAD 400 Kg/m²

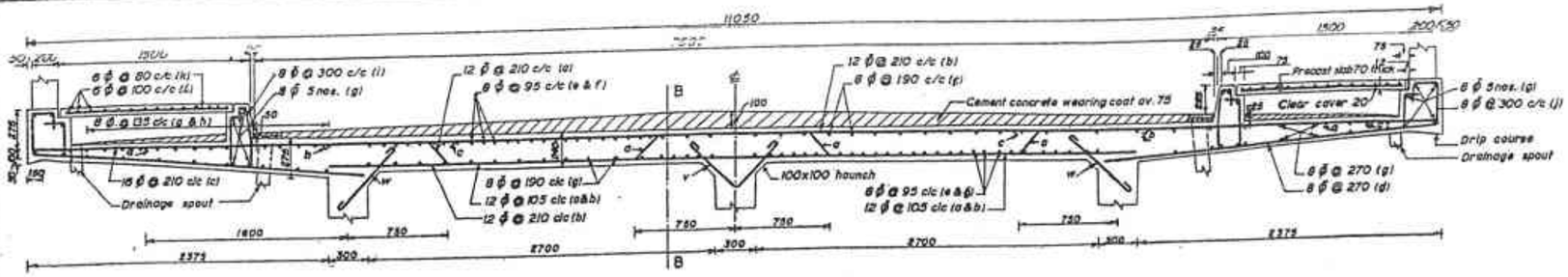
TWO LANES IRC CLASS 'A' LOADING.
ONE LANE IRC CLASS '70-R' LOADING.

RECOMMENDED: S.C. KARTHA, S.E.
RECOMMENDED: S.C. MOTHAM, S.E.
RECOMMENDED: K.K. SARKAR, S.E.
APPROVED: B. BALWANT RAO, C.E.

APRIL, 1976

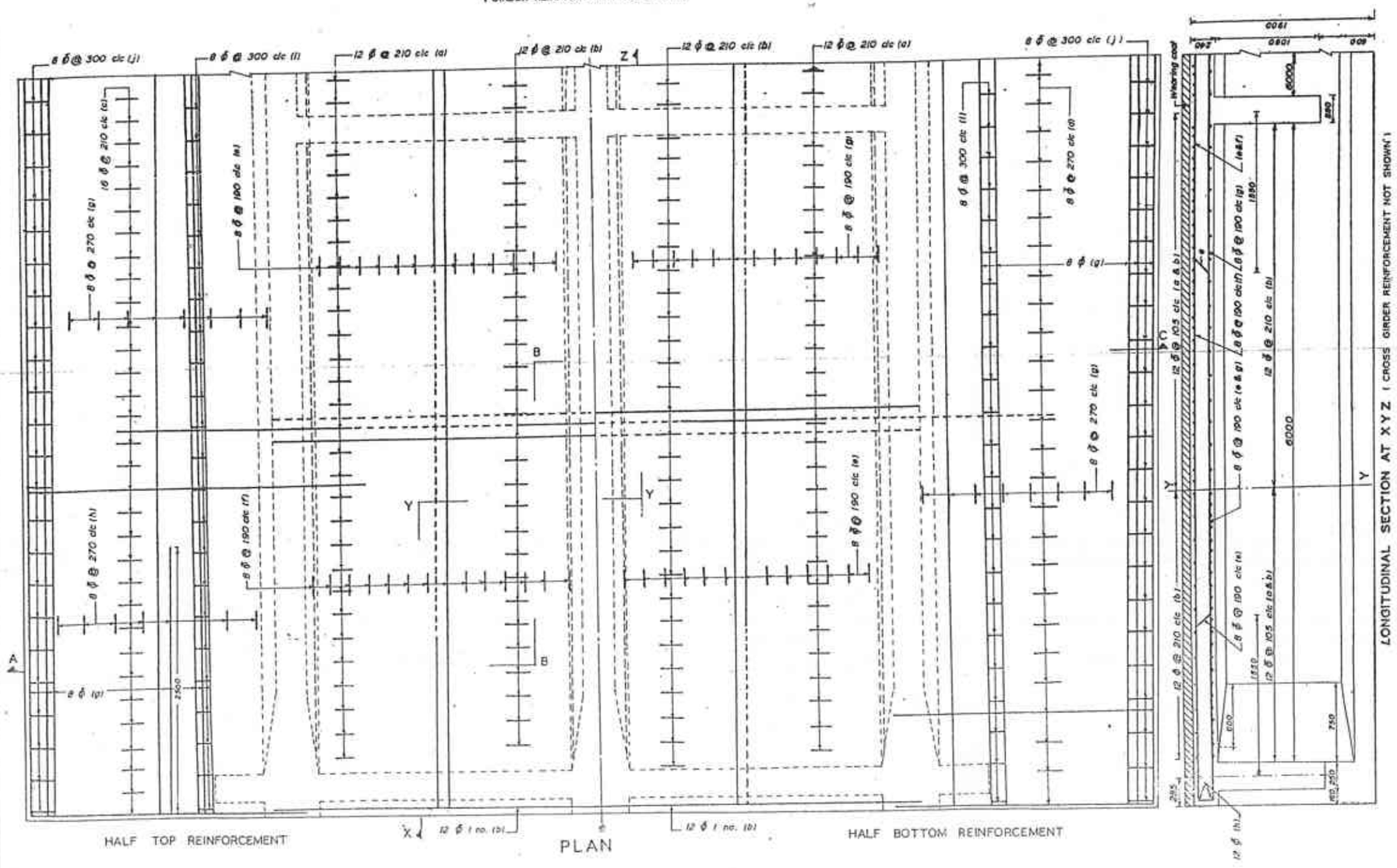
DRG. NO. BD/3-76A.

High Yield Strength Deformed Bars



CROSS SECTION AT ABC

(GIRDER REINFORCEMENT NOT SHOWN)



HALF TOP REINFORCEMENT

PLAN

HALF BOTTOM REINFORCEMENT

LONGITUDINAL SECTION AT XYZ (CROSS GIRDER REINFORCEMENT NOT SHOWN)

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5 - 1970, (ii) IRC : 6 - 1966 & (iii) IRC : 21 - 1972 with latest amendments .
2. All dimensions are in millimetres .
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150mm cubes .
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with latest amendments) or IS : 1786-1966 (with latest amendments) .
5. This drawing shall not be applicable where reinforcing bars are joined by welding .
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible . However , the provision in clause No. 304.6.3 of IRC : 21-1972 should be strictly followed , if laps are provided .
7. Minimum cover to any reinforcement shall be 25 mm.
8. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover .
9. Support bars of 12 mm dia. shall be provided at suitable intervals as per IS : 2502-1963 .
10. Chamfers or fillets of size 25mm x 25mm shall be provided at all angles of the form work unless otherwise specified in the drawing .
11. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab .
12. For details of wearing coat and drainage refer Drawing No. BD/1-79A.
13. Properly stiffened steel plates shall be used as shuttering ,
14. This drawing shall be read in conjunction with the following drawings :
    (i) BD/6-79 showing details of longitudinal girders ,
    (ii) BD/5-79A showing details of cross girders , and
    (iii) BD/8-79A showing schedule of reinforcement .
15. The width of each pre-cast R.C.C. footpath slab shall be such as to facilitate easy handling . The top surface should be clearly marked and shall be handled properly to avoid cracking . A wearing course of pre-cast chequered tiles fixed firmly and true to levels shall be provided.
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion .

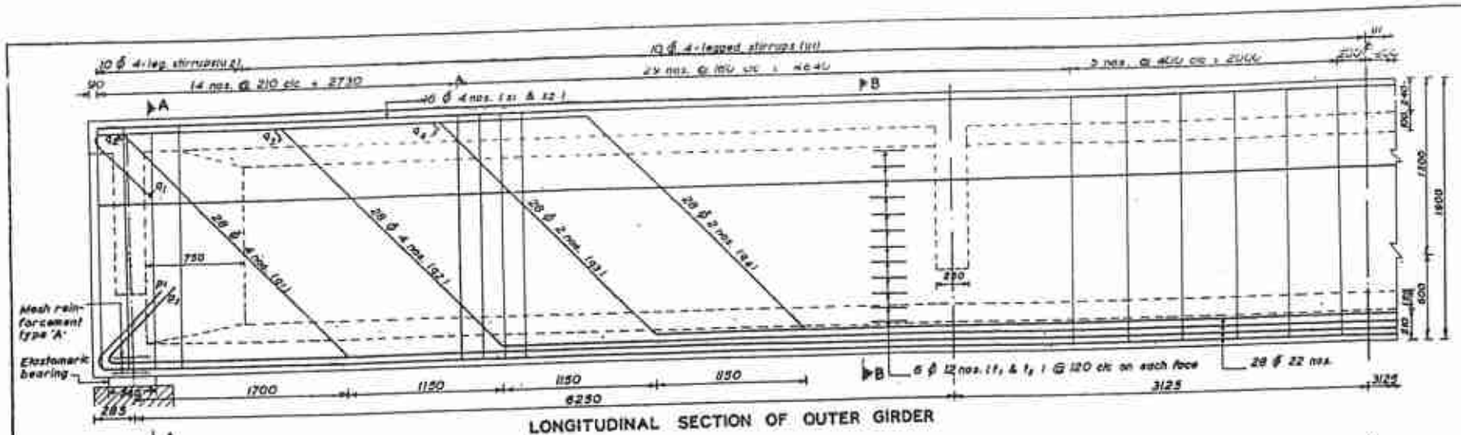
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI .

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

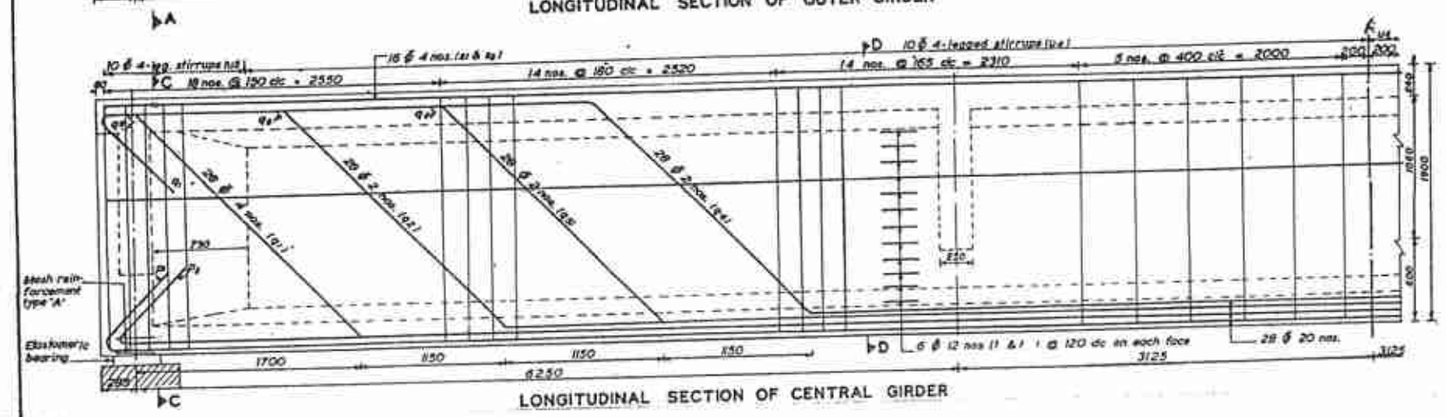
R.C.C. T-BEAM : EFFECTIVE SPAN 18.75 METRES
DETAILS OF SLAB

7.5 METRES ROADWAYS 1.5 METRES FOOTPATHS DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING FOOTPATH LOAD – 400 kg/m²
RECOMMENDED : ASHOK KUMAR, A.E.E. RECOMMENDED : R.S. SHARMA, S.E.	RECOMMENDED : PRAFULLA KUMAR, S.E. APPROVED : G. VENKATESULU, C.E.
	JULY, 1979. DRG. NO. BD/5-79.

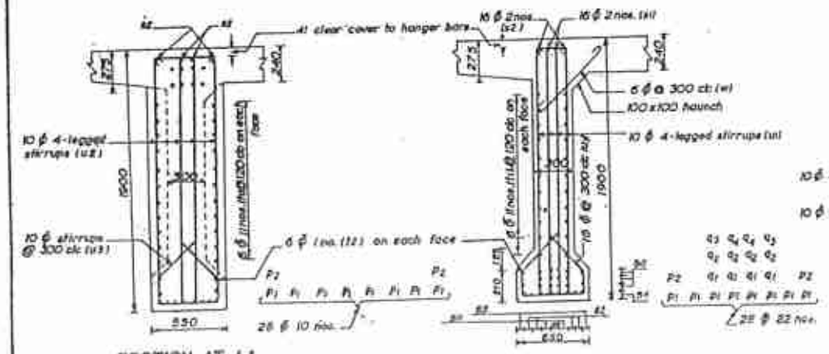
High Yield Strength Deformed Bars



LONGITUDINAL SECTION OF OUTER GIRDER

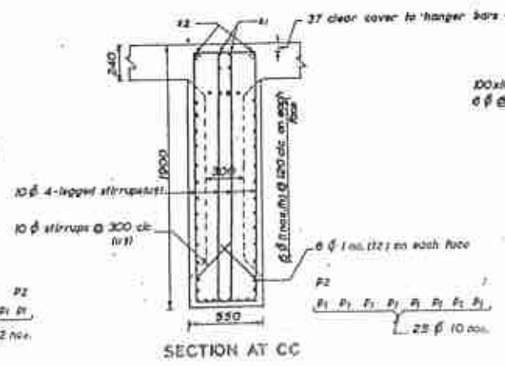


LONGITUDINAL SECTION OF CENTRAL GIRDER

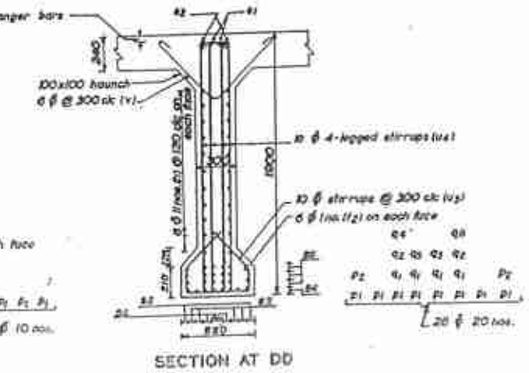


SECTION AT AA

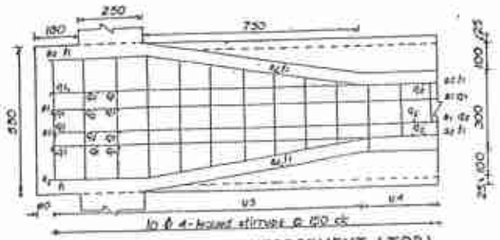
SECTION AT BB



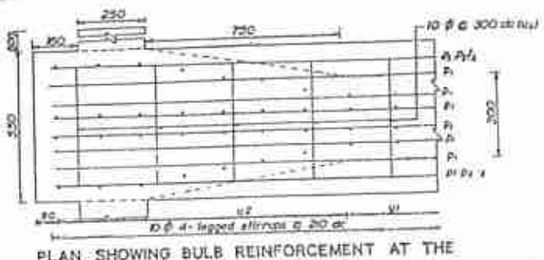
SECTION AT CC



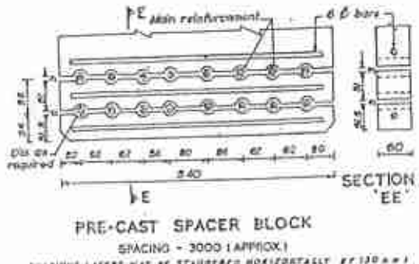
SECTION AT DD



PLAN SHOWING WEB REINFORCEMENT (TOP) AT THE ENDS OF CENTRAL GIRDER



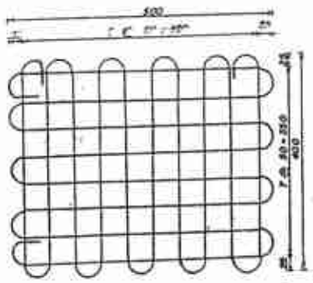
PLAN SHOWING BULB REINFORCEMENT AT THE ENDS OF OUTER GIRDER



PRE-CAST SPACER BLOCK

SPACING - 3000 (APPROX.)

(VARIOUS LAYERS MAY BE STAGGERED HORIZONTALLY BY 150 m.m.)



6 ϕ MESH REINFORCEMENT TYPE 'A'

1/4 POINT	MID SPAN	1/4 POINT
8 mm	12 mm	8 mm

L/4 L/4 L/4 L/4

DEAD LOAD DEFLECTION DIAGRAM

NOTES :-

1. For general notes refer Drawing No. BD/5-79
2. Clear cover shall not be less than 40 mm for main reinforcement and 25mm for other reinforcement.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. This drawing shall be read in conjunction with following :
   - (i) Drg. No. BD/5-79 showing details of slab
   - (ii) Drg. No. BD/7-79A showing details of cross girders
   - (iii) Drg. No. BD/8-79A showing schedule of reinforcement.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 130 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated easily for other spans.
9. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specifications shall strictly comply with cl. 2005 of M.O.S. & T. specification.
   - i. Length (a) = 500 mm
   - ii. Width (b) = 360 mm
   - iii. Thickness of each internal elastomer layer = 12 mm
   - iv. Thickness of steel reinforcing plate = 3 mm
   - v. No. of internal elastomeric layers = six
   - vi. Overall thickness of bearing = 99 mm
   - vii. Maximum design bearing pressure on sub-structure = 72 kgs/cm2.
   - viii. Design vertical load (DL+LL+Impact) = 110 Tonnes
10. All dimensions are in millimetres.
11. This drawing shall not be applicable where reinforcing bars are joined by welding.
12. At the time of replacement of elastomeric bearings (whenever necessory) uniform seating of the main girders over the new bearings should be ensured.

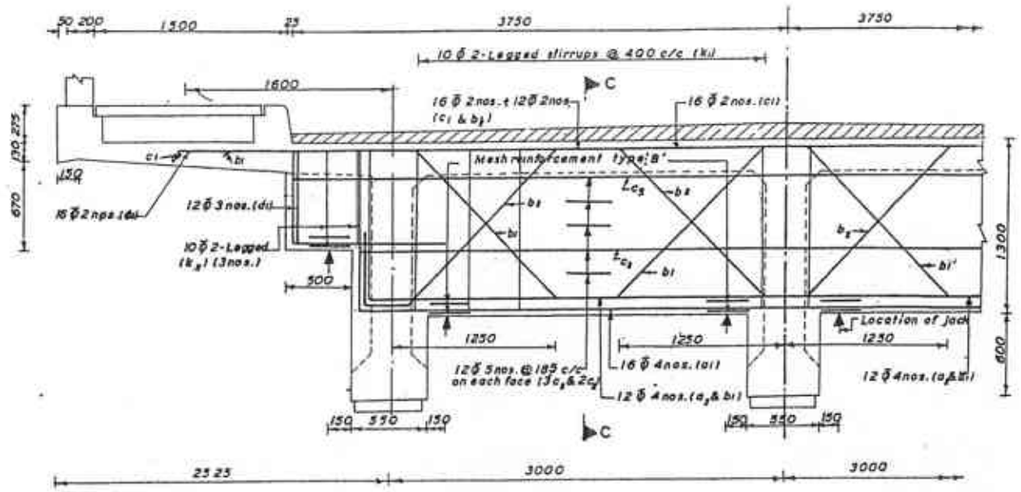
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 18.75 METRES DETAILS OF LONGITUDINAL GIRDERS

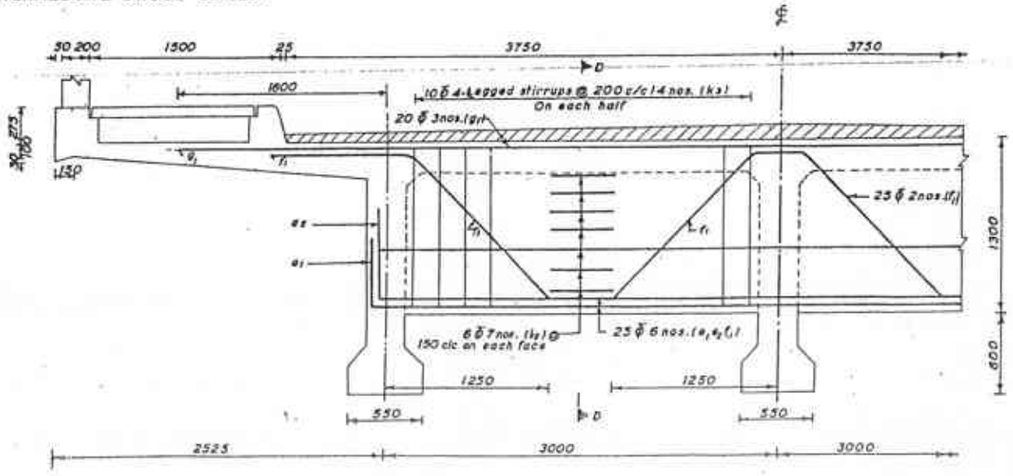
7.5 METRES ROADWAY 1.5 METRES FOOTPATHS DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING FOOTPATH LOAD = 400 Kg/m²
RECOMMENDED: ASHOK KUMAR, A.S.E.	RECOMMENDED: PRAFULLA KUMAR, S.E.
RECOMMENDED: R. S. SHARMA, E.E.	APPROVED: M. VENKATESULU, C.E.
	JULY, 1979.
	DRG. NO. BD/6-79.

END CROSS GIRDER

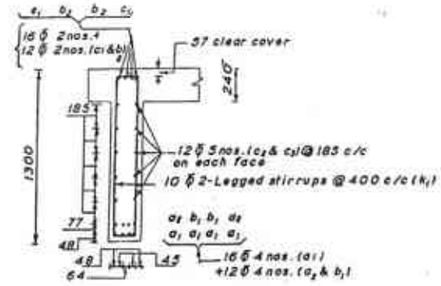


LONGITUDINAL SECTION

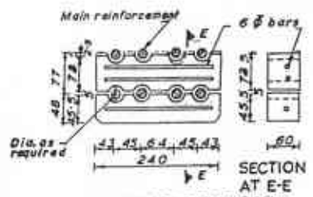
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION

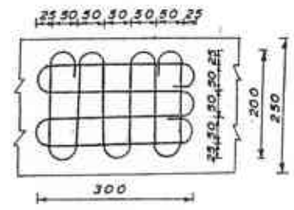


SECTION AT C-C

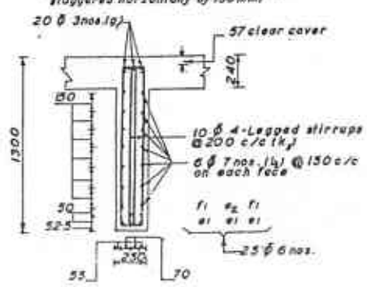


SECTION AT E-E

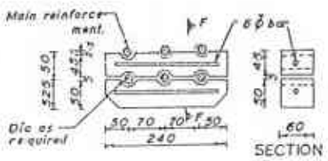
PRE-CAST SPACER BLOCK
FOR END CROSS GIRDER
SPACING - 3000 (Appx.)
(Various layers of spacer blocks may be staggered horizontally by 150 mm)



6 ϕ MESH REINFORCEMENT
TYPE 'B'



SECTION AT D-D



SECTION AT F-F

PRE-CAST SPACER BLOCK
FOR INTERMEDIATE CROSS GIRDER
SPACING - 3000 (Appx.)

NOTES:

1. This drawing shall be read in conjunction with following drawings:
   (i) BD/5-79 showing details of slab.
   (ii) BD/6-79 showing details of longitudinal girders.
   (iii) BD/8-79A showing schedule of reinforcement.
2. For general notes, refer Drawing No. BD/5-79 and BD/6-79.
3. The location of jacks for lifting up the superstructure to replace bearings etc., is shown thus ▲. These shall be distinctly etched for easy identification on the cross-girders and pier/abutment caps. Mesh reinforcement type 'B' in two layers one at 20 mm and the other at 100 mm from the concrete surface shall be provided in the girders and the piers/abutment caps at jack positions.
4. During the jacking operation all the six jacks placed under one end cross girder shall be operated simultaneously using stress control-system so as to ensure that the reactions on all the six jacks are equal at all times.
5. Maximum reaction on any jack under lifting condition = 22.1 tonnes.
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinfocing bars are joined by welding.
8. There shall be two intermediate cross girders provided at a spacing of 6.25 Metres c/c.

REVISION	DESCRIPTION	YEAR	INITIAL
A.	1. Length of b1 and g1 type bars corrected. 2. Spacer blocks dimensions modified.	1980	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C.T-BEAM : EFFECTIVE SPAN 18.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
DO NOT SCALE

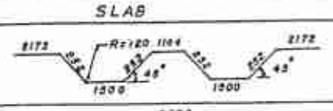
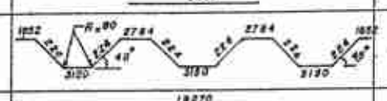
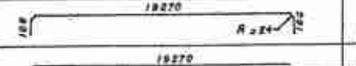
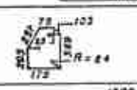
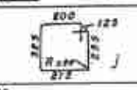
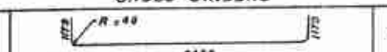
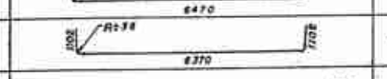
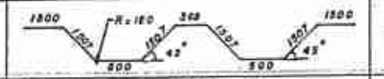
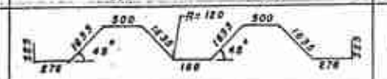
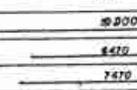
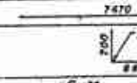
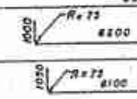
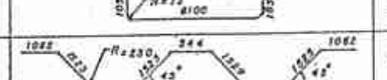
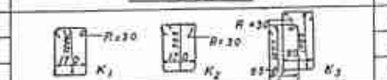
TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING
FOOTPATH LOAD = 400 Kg/m²

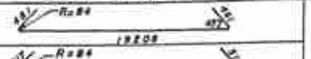
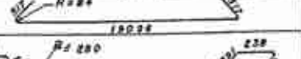
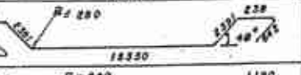
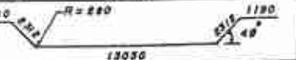
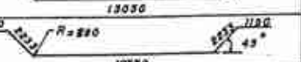
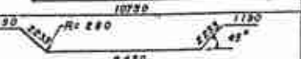
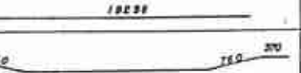
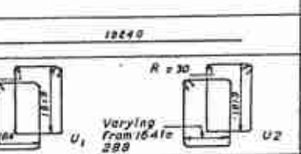
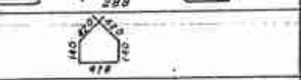
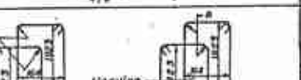
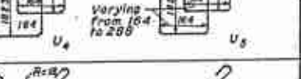
RECOMMENDED: ASHOK KUMAR, AEE
RECOMMENDED: R.S. SHARMA EE
RECOMMENDED: PRAFULLA KUMAR S.E.
APPROVED: G. VENKATESULU CE

JULY, 1979
DRG. NO. BD/7-79A.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No of bars	Total Length (m)	Weight (Kgs)
		SLAB					
1	a		12	9496	87	826.152	735
2	b	6300	12	6300	184	1159.20	1032
3	c	3250	16	3250	186	604.50	955
4	d	2650	8	2650	144	381.60	149
5	e		8	19666	28	550.648	215
6	f		8	19562	30	586.86	229
7	g	19270	8	19270	88	1580.14	616
8	h	2500	8	2500	28	70.00	27
9	i		8	1228	132	161.83	63
10	j		8	1205	132	159.06	62
11	k	1300	6	1300	506	657.80	145
12	l	790	6	790	644	508.76	112
		CROSS GIRDERS					
1	a_1		16	8748	8	69.984	111
2	a_2		12	6514	4	34.056	30
3	b_1		12	10396	4	41.584	37
4	b_2		12	9270	4	37.08	33
5	c_1	9200	16	9200	4	36.80	58
6	c_2	6470	12	6470	8	51.76	46
7	c_3	7470	12	7470	12	89.64	80
8	d_1		12	1555	12	18.66	17
9	e_1		25	8075	6	48.45	187
10	e_2		25	8075	2	16.15	62
11	f_1		25	9568	4	38.272	147
12	g_1	8200	20	9200	6	55.20	136
13	l_2	6250	6	6250	28	175.00	38
14	k_1		10	2986	28	83.608	52
15	k_2		10	1990	12	23.88	15
16	k_3		10	5672	56	317.63	200
17	B	Mesh reinforcement as shown in Drg.No.BD/7-79	6	2943	24	70.63	16

Sl No	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total Length (m)	Weight (Kgs.)
		MAIN GIRDER					
1	P_1		28	20078	24	481.87	2327
2	P_2				6	120.47	582
3	q_1		28	21840	12	262.08	1266
4	q_2		28	20054	10	200.54	969
5	q_3		28	17596	4	70.38	340
6	q_4		28	15296	6	91.78	443
7	q_5		28	17754	2	35.508	172
8	S_1	19256	16	19256	6	115.54	25
9	S_2		16	19260	6	115.56	26
10	f_1		6	19260	66	1271.16	280
11	f_2	19240	6	19240	6	115.44	25
12	U_1		10	8412	168	1413.22	876
13	U_2		10	8660	24	207.84	129
14	U_3		10	1548	195	301.86	187
15	U_4		10	8488	86	724.81	449
16	U_5		10	8676	16	138.82	86
17	V		6	1035	65	67.28	15
18	W		6	750	130	97.50	22
19	A	Mesh reinforcement as shown in Drg.No.BD/6-79	6	6771	12	105.23	23

MAXIMUM REACTIONS (IN TONNES)

AT ABUTMENT			AT PIER		
DL	DL+LL (Without Impact)	DL+LL (With Impact)	DL	DL+LL (Without Impact)	DL+LL (With Impact)
132.41	218.05	229.42	264.82	369.42	384.76

TOTAL QUANTITIES (PER SPAN)

1. STEEL: = 14580 Kgs
(Including 5% extra for laps and wastage)

2. CONCRETE: = 96.15 Cum

Note: These quantities do not include railings and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/5-79, BD/6-79, and BD/7-79A showing the details of R.C.C. Deck Slab, Longitudinal Girders and Cross Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per IS:2502-1963.

A.I. Schedule for U, K and V type bars and total quantity of steel modified.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C.T-BEAM: EFFECTIVE SPAN 18.75 METRES
SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY
1.5 METRES FOOTPATH
DO NOT SCALE

TWO LANES IRC CLASS 'A' LOADING.
ONE LANE IRC CLASS '70-R' LOADING.
FOOTPATHS LOAD = 400 Kg/m²

RECOMMENDED: ASHOK KUMAR, A.E.E.
RECOMMENDED: R.S. SHARMA, S.E.
RECOMMENDED: PRAFULLA KUMAR, S.E.
APPROVED: G. VENKATESULU, C.E.

JULY, 1979.
DRG. NO. BD/8-79A.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars.	Total length (m)	Weight (kgs)
		SLAB					
1.	a	2172, 2x3, R=120, 1148, 45°, 1500, 1500	12	9496	108	1025.57	913
2.	b	6300	12	6300	214	1348.20	1200
3.	c	3250	16	3250	224	728.00	1150
4.	d	2650	8	2650	166	439.90	172
5.	e	1900, 224, 3284, R=80, 3650, 2650, 3650	8	22662	28	634.54	247
6.	f	22270, R=24, 168	8	22562	30	676.86	264
7.	g	22270	8	22270	82	1826.14	712
8.	h	2500	8	2500	24	60.00	23
9.	i	(i) 125, 250, R=24, 175	8	1226	150	183.90	72
10.	j	(ii) 200, 125, 325, R=24, 375	8	1205	150	180.75	71
11.	k	1300	6	1300	594	772.20	170
12.	l	775	6	775	756	585.90	129
		CROSS GIRDERS					
1.	a_1	R=48, 6470	16	8748	8	69.98	111
2.	a_2	200, W=36, 6389	12	8532	4	34.13	30
3.	b_1	1500, 1573, R=120, 276, 45°, 1573, 1500, 500, 500	12	10568	4	42.27	38
4.	b_2	500, 1573, 45°, R=120, 276, 1573, 500, 332, 332	12	9232	4	36.89	33
5.	c_1	9200	16	9200	4	36.80	58
6.	c_2	7470	12	7470	12	89.64	80
7.	c_3	6470	12	6470	8	51.76	46
8.	d_1	200, R=48, 692	16	1545	12	18.54	29
9.	e_1	465, R=75, 6200	25	7405	6	44.43	171
10.	e_2	215, R=75, 215, 6102	25	7405	4	29.62	114
11.	f_1	1062, 1564, R=120, 464, 1564, 1062, 500, 500	25	9384	4	37.54	145
12.	g_1	9200	25	9200	6	55.20	213
13.	h_1	6250	6	6250	24	150.00	33
14.	k_1	1203, R=30, 170, (Kı)	10	2986	28	83.61	52
15.	k_2	1203, 170, (K2)	10	1986	12	23.83	15
16.	k_3	K=20, 1203, 92, 1203	10	2x2836	64	363.00	225
17.	B	Mesh reinforcement as shown in Drg. No. BD/3-80	6	2930	24	70.32	16

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars.	Total length. (m)	Weight (kgs)
		MAIN GIRDERS					
1.	p_1	22208, R=84	28	23100	24	554.40	2678
2.	P_2	22056, R=84	28	23100	10	231.00	1116
3.	q_1	18050, R=280	28	25390	12	304.68	1472
4.	q_2	18450, R=280	28	23304	6	139.82	676
5.	q_3	12850, R=280	28	20704	6	124.22	600
6.	q_4	10250, R=280	28	17944	6	107.66	520
7.	q_5	7650, R=280	28	15344	6	92.04	445
8.	s_1	22240	16	22240	6	133.44	211
9.	s_2	22260	16	22260	6	133.56	211
10.	t_1	SPLAY 1 in 6, 20000	6	22260	84	1869.84	411
11.	t_2	22240	6	22240	6	133.44	29
12.	u_1	8x30, 2118, 164, 8x30, 2118, 164, VARYING FROM 164 TO 286	10	2x4806	174	1672.49	1037
13.	u_2		10	2x4930 avg.	32	315.52	196
14.	u_3	148, 300, 220, 300, R=30, 478	10	1546	225	340.30	216
15.	u_4	8x30, 164, 2112, VARYING FROM 164 TO 286, 8x30, 2112	10	2x4814	87	837.64	519
16.	u_5		10	2x4938 avg.	16	158.02	98
17.	V	450, R=18, 450	6	1035	75	77.63	17
18.	W	600	6	750	150	112.50	25
19.	A	Mesh reinforcement as shown in Drg. No. BD/2-80.	6	9770	12	105.24	23

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
D.L	D.L+L.L (WITHOUT IMPACT)	D.L+L.L (WITH IMPACT)	D.L	D.L+L.L (WITHOUT IMPACT)	D.L+L.L (WITH IMPACT)
157.13	240.55	259.05	314.25	423.25	437.30

TOTAL QUANTITIES (PER SPAN)

Steel : = 17880 kgs
(Including 5% extra for laps and wastage)

Concrete : = 116.25 cu.m.

Note: These quantities do not include railing and wearing coat

NOTES :-

1. This drawing shall be read in conjunction with Drawing No. BD/1-80, BD/2-80 and BD/3-80 showing the detail of R.C.C. Deck slab, Longitudinal girders and Cross girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensons shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per IS : 2502-1963.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 21.75 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
DO NOT SCALE

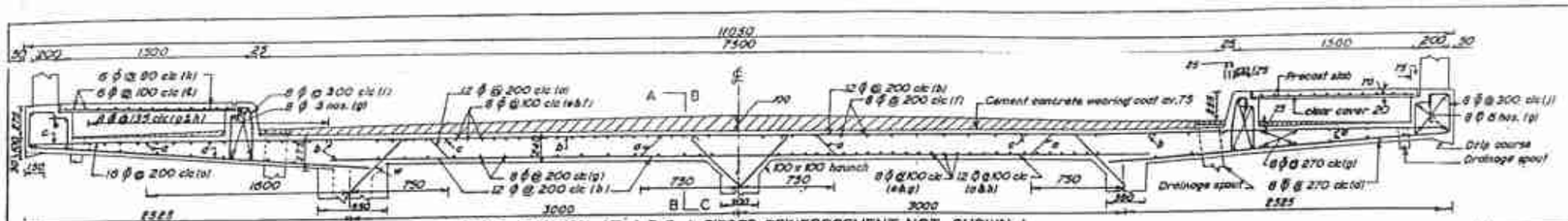
TWO LANES IRC CLASS A LOADING
ONE LANE IRC CLASS 70-R LOADING
FOOTPATH LOAD – 400 kgs/m²

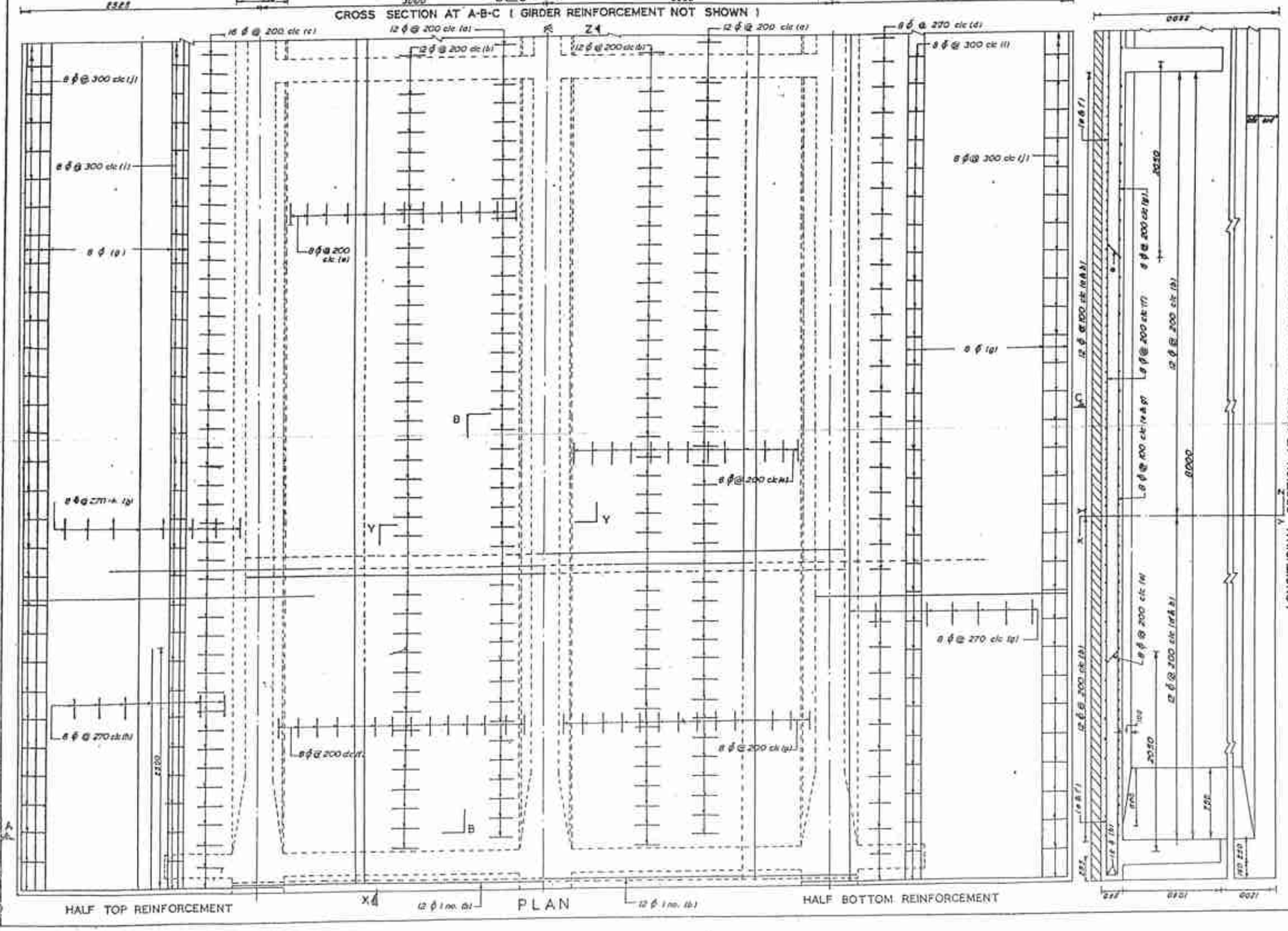
RECOMMENDED: B.N. GHOSHAL, S.E.
RECOMMENDED: B.S. SHARMA, S.E.
RECOMMENDED: PRAFULLA KUMAR
APPROVED: B. SEETHARAMA, M.C.E.

JULY, 1980.
DRG. NO. BD/4 - 80.

High Yield Strength Deformed Bars

CROSS SECTION AT A-B-C (GIRDER REINFORCEMENT NOT SHOWN)





NOTES :-

1. The design is according to the following bridge codes : (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972 with latest amendments .
2. All dimensions are in millimetres .
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes .
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with latest amendments) or IS : 1786-1966 (with latest amendments) .
5. This drawing shall not be applicable where reinforcing bars are joined by welding .
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible . However the provision in clause No. 304.6.3 of IRC : 21-1972 should be strictly followed, if laps are provided .
7. Minimum cover to any reinforcement shall be 25 mm .
8. Precast mortar blocks of same strength as the slab concrete shall be used under the reinforcement to ensure the required cover .
9. Support bars of 12mm dia. shall be provided at suitable intervals as per IS : 2502-1963 .
10. Chamfers or fillets of sizes 25mm x 25mm shall be provided at all angles of the form work unless otherwise specified in the drawing .
11. The railing shall be of any approved type . The reinforcement from railing should be anchored in the kerb before casting the slab .
12. For details of wearing coat and drainage spouts refer drawing No. BD1 :-69 A .
13. Properly stiffened steel plates shall be used as shuttering .
14. The width of each precast R.C.C. footpath slab shall be such as to facilitate easy handling. The top surface should be clearly marked and shall be handled properly to avoid cracking . A wearing course of precast chequered tiles, fixed firmly and true to levels may be provided .
15. This drawing shall be read in conjunction with the following drawings: (i) BD/6-80 showing details of longitudinal girders, (ii) BD/7-80 showing details of cross girders, and (iii) BD/8-80 showing schedule of reinforcement
16. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

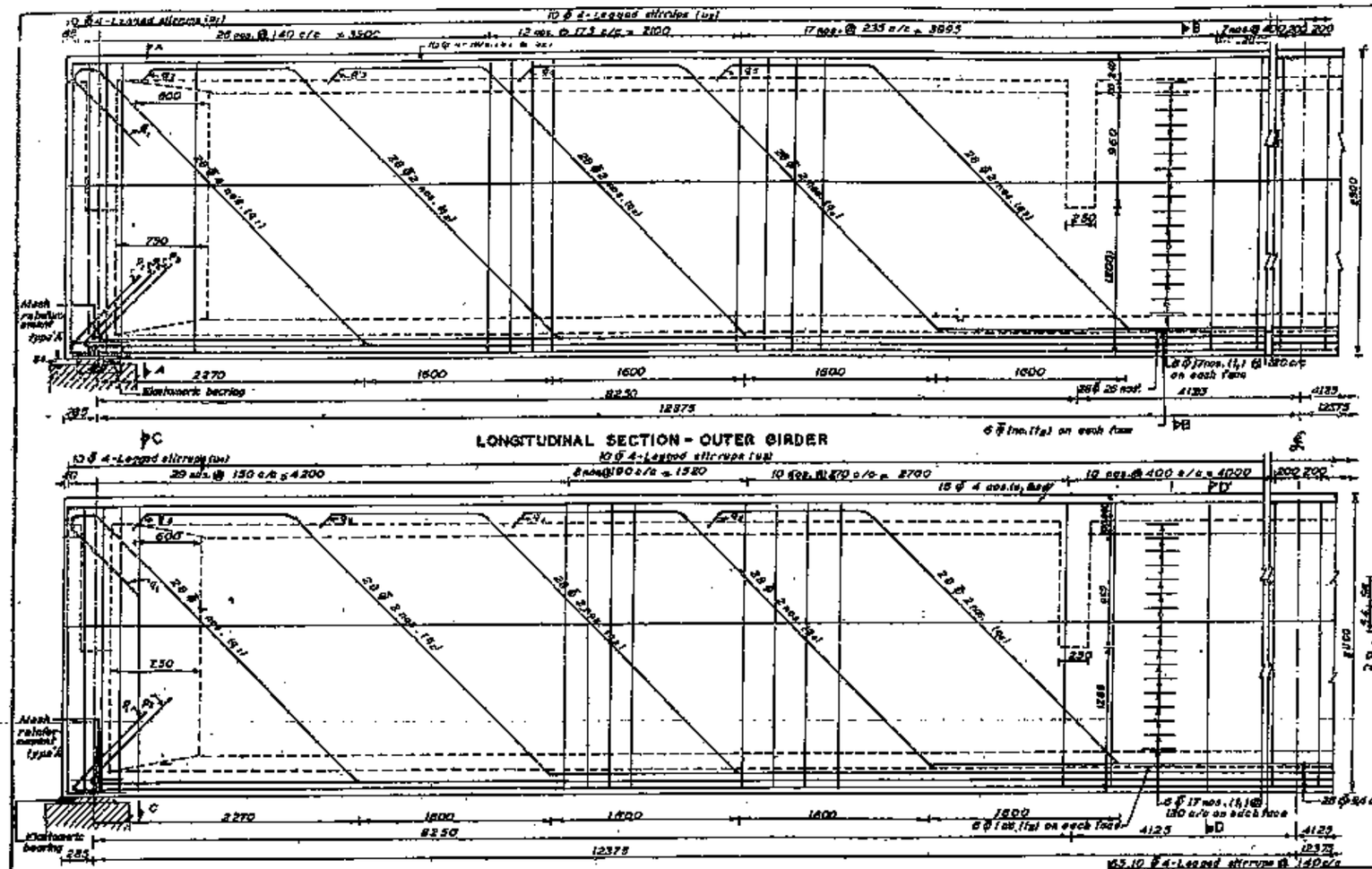
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

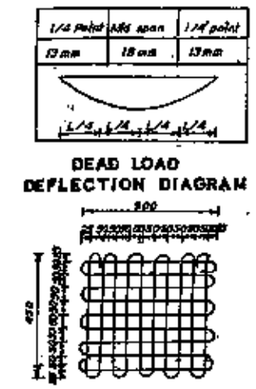
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

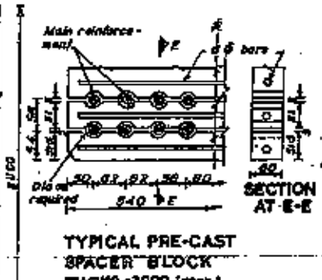
R.C.C. T-BEAM: EFFECTIVE SPAN 24.75 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY 1.5 METRES FOOTPATHS DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING FOOTPATH LOAD – 400 kgs/m²
RECOMMENDED : RECOMMENDED: R.S. SHARMA, E.E.	RECOMMENDED: PRAFULLA KUMAR, S.E. APPROVED: S. SEETHARAMAIYER, C.E.
	OCT, 1980 DRG. NO. BD/5-80.

High Yield Strength Deformed Bars







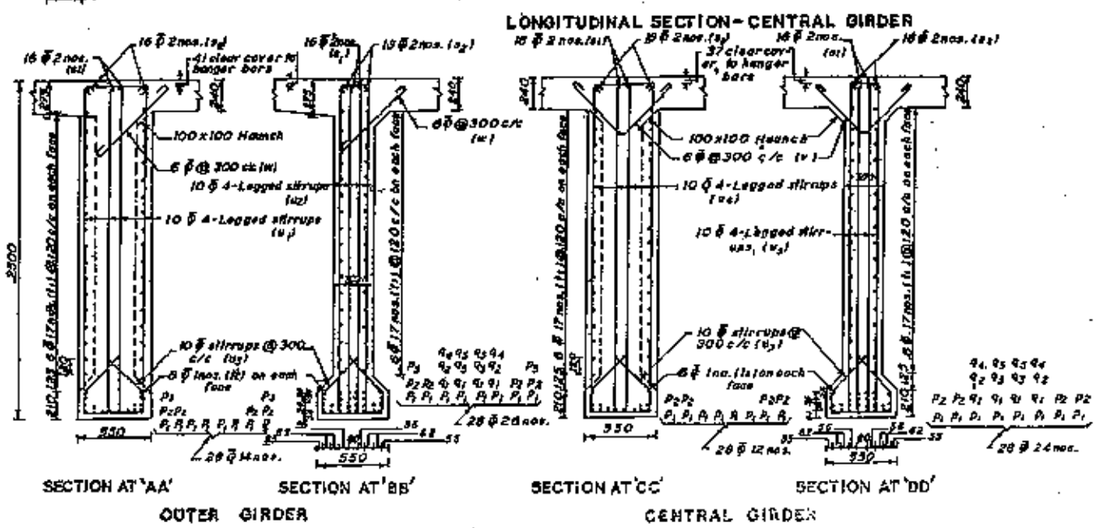
TYPICAL PRE-CAST SPACER BLOCK

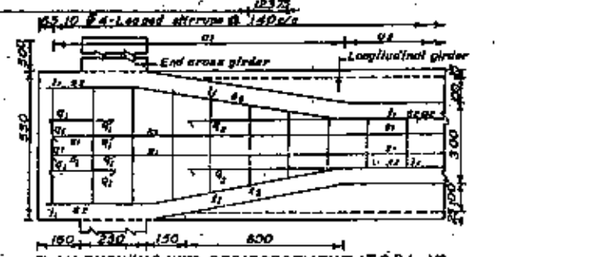
SPACING @ 3000 (approx.)

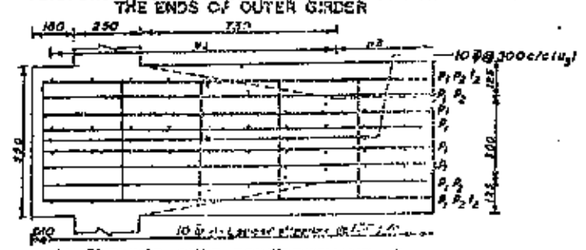
(Various layers may be staggered horizontally by 150 mm).

NOTES:

1. For general notes refer Drawing No. BD/5-80.
2. Clear cover shall not be less than 40mm for main reinforcement and 25 mm for other reinforcement.
3. Pre-cast spacer blocks of strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. This drawing shall be read in conjunction with the following:
   (i) Drawing no. BD/5-80 showing details of slab.
   (ii) Drawing no. BD/7-80 showing details of cross girder.
   (iii) Drawing no. BD/8-80 showing schedule of reinforcement.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20mm and the other at 130mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated easily for other spans.
9. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-78 B. Details of the elastomeric bearings for this design shall be as under:
   (i) Length (a) = 500 mm.
   (ii) Width (b) = 400 mm.
   (iii) Thickness of each internal elastomeric layer = 12 mm.
   (iv) Thickness of steel reinforcing plate = 3 mm.
   (v) No. of internal elastomeric layers = Five
   (vi) Overall thickness of bearing = 84 mm.
   (vii) Maximum design bearing pressure on substructure = 72 Kgs./cm².
   (viii) Design Vertical load (DL+LL+Impact) = 132 tonnes.
10. All dimensions are in millimetres.
11. This drawing shall not be applicable where reinforcing bars are joined by welding.
12. At the time of replacement of elastomeric bearings (whenever necessary) uniform seating of the main girders over the new bearings should be ensured.
13. Tests and specifications for elastomeric bearings shall strictly comply with cl. 2005 of M.O.S. & T. specification.







GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

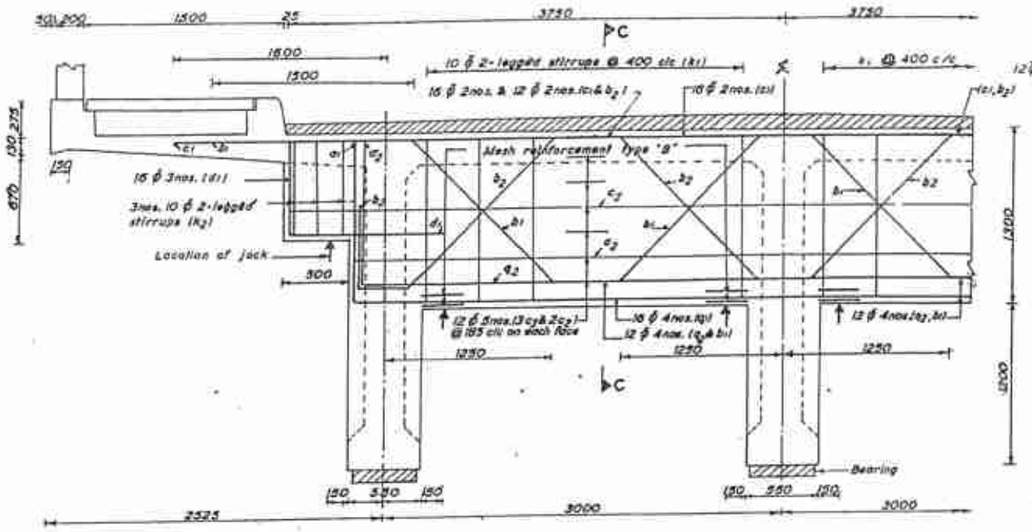
STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C.T-BEAM: EFFECTIVE SPAN 24.75 METRES
DETAILS OF LONGITUDINAL GIRDERS

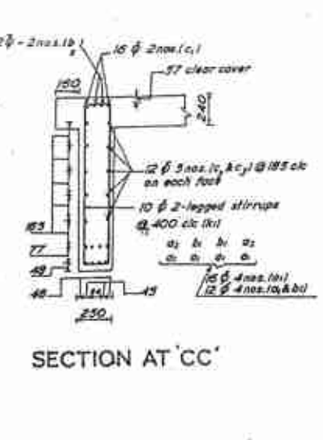
7·5 METRES ROADWAY 1·5 METRES FOOTPATHS DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING. ONE LANE (IRC CLASS 70-R LOADING. FOOTPATH LOAD 400 Kg/m²
RECOMMENDED: R. S. KHANNA, S.E.	RECOMMENDED: PRAFULLA KUMAR, S.E. APPROVED: S. SEETHARAMAN, C.E.
	OCT. 1980 DRG. No. BD/6-80

High Yield Strength Deformed Bars

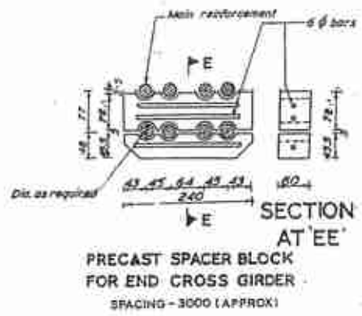
END CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT 'CC'



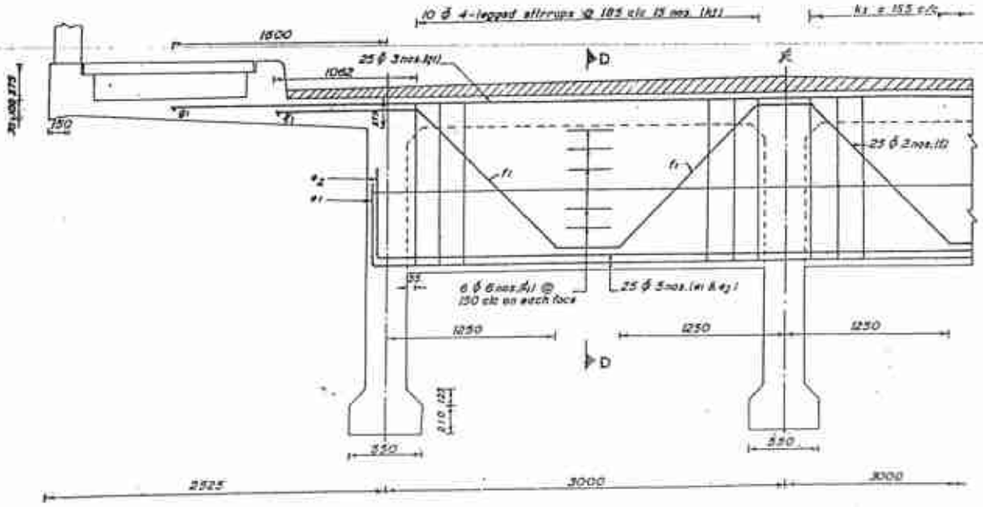
PRECAST SPACER BLOCK
FOR END CROSS GIRDER
SPACING - 3000 (APPROX)

SECTION AT 'EE'

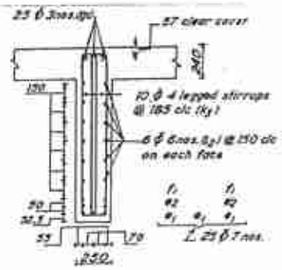
NOTES :—

1. This drawing shall be read in conjunction with the following drawings :
   (i) BD/5-80 showing details of slab
   (ii) BD/6-80 showing details of longitudinal girders
   (iii) BD/8-80 showing schedule of reinforcement.
2. For general notes, refer Drawing Nos. BD/5-80 & BD/6-80.
3. The location of Jacks for lifting up the superstructure to replace bearings etc. is shown thus ↑. These shall be distinctly etched for easy identification on the cross-girders and pier/abutment caps. Mesh reinforcement type 'B' in two layers one at 20mm and the other at 100mm from the concrete surface shall be provided in the girders and the piers/abutment caps at jack positions.
4. During the jacking operation all the six jacks placed under one end cross girder shall be operated simultaneously using stress control-system so as to ensure that the reactions on all the six jacks are equal at all times.
5. Maximum reaction on any jack under lifting condition = 31.2 tonnes
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinforcing bars are joined by welding.
8. There shall be two intermediate cross girders provided at a spacing of 8.25 metres c/c.

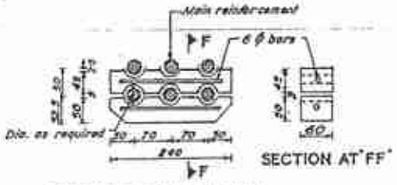
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION

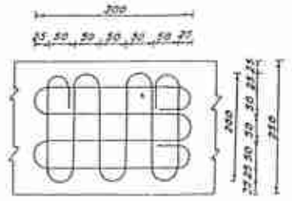


SECTION AT 'DD'



PRECAST SPACER BLOCK
FOR INTERMEDIATE CROSS GIRDER
SPACING - 3000 (APPROX)
(Various layers of spacer blocks may be staggered horizontally by 150 mm.)

SECTION AT 'FF'



6 ϕ MESH REINFORCEMENT
TYPE 'B'

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 24.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROAWAY 1.5 METRES FOOTPATHS DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING FOOTPATH LOAD — 400 kg/m²
RECOMMENDED:	RECOMMENDED: PRAFULLA KUMAR, S.E.
RECOMMENDED: R.K. SHARMA, S.E.	APPROVED: S. SEETHARAMIAH, C.E.
	OCT. 1980
	DRG. NO. BD/7-80.

SCHEDULE OF REINFORCEMENT (PER SPAN)

High Yield Strength Deformed Bars.

Sl. No.	Type of bar	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		SLAB					
1	a	1172, 234, R=120, 1144, 234, 2172, 45°, 1500, 2800	12	9496	130	1138.32	1014
2	b_1	6300	12	6300	250	1575.00	1402
3	c	3250	16	3250	254	825.50	1304
4	d	2650	8	2650	188	498.20	194
5	e	3132, R=80, 3784, 234, 45°, 4160, 4159, 4160	8	25666	26	667.32	260
6	f	2.5870, R=24, 150	9	25562	28	715.74	239
7	g	25270	8	25270	80	2021.60	788
8	h	2500	8	2500	24	60.00	28
9	i	25, 60, 125, 225, 275, (I)	8	1226	170	208.42	81
10	j	225, 125, 275, (J)	8	1205	170	204.85	80
11	k	1500	6	1500	616	800.80	176
12	l	850	6	850	784	666.40	147
		CROSS GIRDERS					
1	a_1	R=48, 175, 6470	16	8748	8	69.98	111
2	a_2	R=36, 1807, 8388	12	8532	4	34.13	30
3	b_1	1300, 1824, R=120, 574, 1572, 1800, 45°, 500, 500	12	10568	4	42.27	38
4	b_2	332, 1373, 200, 45°, 574, R=120, 1373, 375, 332	12	9232	4	36.89	33
5	c_1	9200	16	9200	4	36.80	58
6	c_2	8470	12	8470	8	67.76	48
7	c_3	7470	12	7470	12	89.64	80
8	e_1	R=75, 1000, 9200	25	8075	6	48.45	187
9	e_2	1050, R=75, 1050, 6100	25	8075	4	32.30	124
10	f_1	1062, 1454, R=250, 466, 1454, 1454, 45°, 500, 500	25	9384	4	37.54	145
11	g_1	9200	25	9200	6	55.20	213
12	g_2	6220	8	6220	24	148.80	93
13	k_1	R=30, k_1	10	2986	28	83.61	52
14	k_2	R=30, k_2	10	1986	12	23.83	15
15	k_3	R=30, k_3	10	5672	60	340.32	211
16	d_1	R=48, 763, 923	16	1545	12	18.54	29
17	s	Mesh reinforcement as shown in the Drg.No.BD/7-80	6	2943	24	70.63	16

Sl. No.	Type of bar	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of bars (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		MAIN GIRDERS					
1	R_1	941, R_1 84, 45°, 25206	22	26078	24	625.87	3023
2	R_2	941, R_2 84, 45°, 25094			12	312.94	1512
3	R_3	942, R=84, 45°, 24864			4	104.31	504
4	q_1	908, 3440, R=280, 3440, 908, 45°, 20210	28	28398	12	340.78	1646
5	q_2	1199, 2141, R=280, 2141, 1200, 45°, 17010	28	25712	6	154.27	745
6	q_3	1199, 2141, R=280, 2141, 1182, 45°, 13810	28	22512	6	135.07	652
7	q_4	1190, 1000, R=280, 1190, 45°, 10610	28	19154	6	114.92	555
8	q_5	1190, 1000, R=280, 1190, 45°, 7410	28	15934	6	95.72	462
9	q_1	32234	18	28258	6	151.54	239
10	q_2	370, 750, 750, 750, 370, 23000	18	25260	6	151.56	239
11	t_1		8	25260	102	2578.52	567
12	t_2	23240	6	23240	6	139.44	33
13	u_1	R=90, u_1, R=90, u_2, Varying from 484 to 588	10	11060 c/c	32	353.92	219
14	u_2		10	10812	216	2335.39	1448
15	u_3	420, 420, 478	40	1548	255	394.74	245
16	u_4	R=90, 2423, a_4, R=90, a_3, Varying from 164 to 288	12	11076 c/c	16	177.22	110
17	u_5		10	10828	98	1061.14	658
18	v	R=180, 450, V	8	1035	85	87.98	19
19	w	450, W	8	750	170	127.50	28
20	A	Mesh reinforcement as shown in Drg.No.BD/6-80	6	8771	12	105.25	23

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/5-80, BD/6-80 and BD/7-80 showing the details of R.C.C. Deck Slab, Longitudinal Girders and Cross Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per I.S: 2502-1963.

MAXIMUM REACTION (IN TONNES)

	At Abutment		At pier		
D.L.	D.L+L.L (Without Impact)	D.L+L.L (With Impact)	D.L.	D.L+L.L (Without Impact)	D.L+L.L (With Impact)
187	279.20	290.90	374	466.70	489.60

TOTAL QUANTITIES (PER SPAN)

1. Steel :- = 21100 Kgs.
(Including 5% extra for laps and wastage)
2. Concrete :- = 138.30 cum
Note:- These quantities do not include railing and wearing coat.

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STANDARD CONCRETE BRIDGES (WITH FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 24.75 METRES
SCHEDULE OF REINFORCEMENT

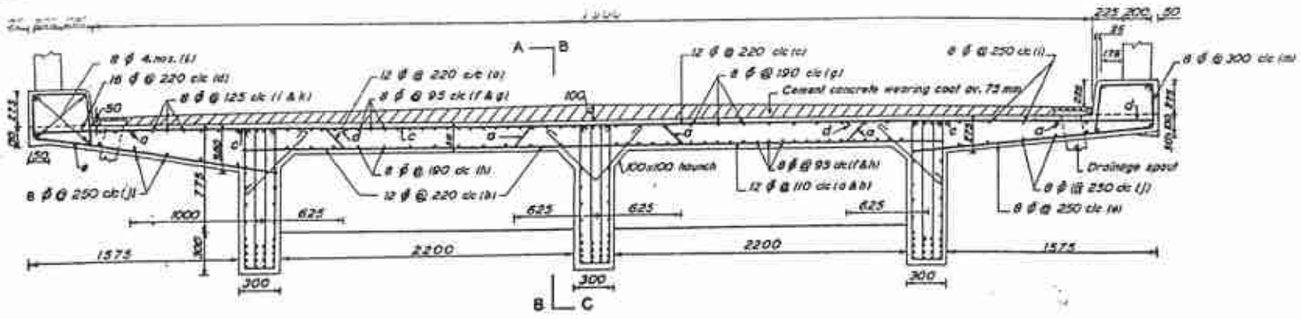
7.5 METRES ROADWAY
1.5 METRES FOOTPATHS
DO NOT SCALE

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IR C CLASS '70-R' LOADING.
FOOTPATH LOAD = 400 Kg/m²

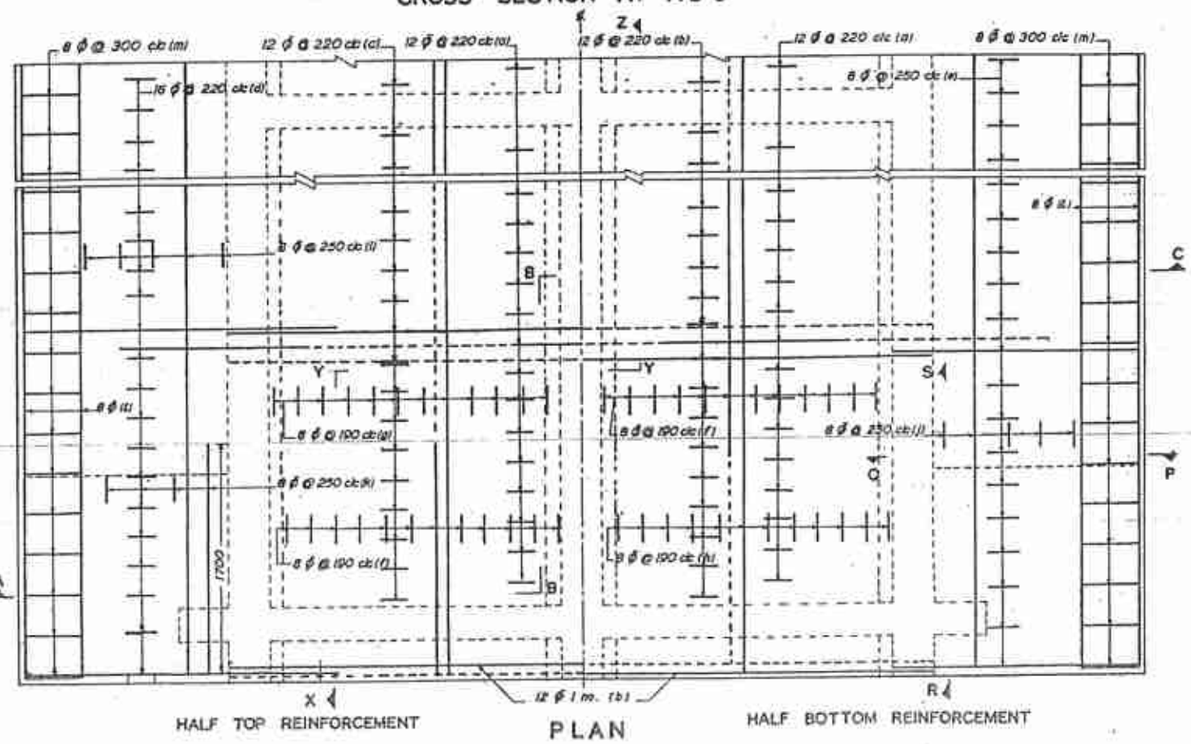
RECOMMENDED: S.S. SHARMA, S.E.
RECOMMENDED: PRAFULLA KUMAR
APPROVED:

OCT. 1980
DRG. NO. BD/8-80

High Yield Strength Deformed Bars



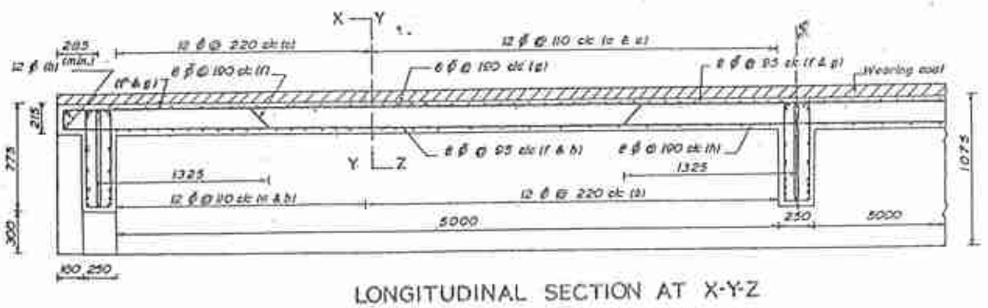
CROSS SECTION AT A-B-C



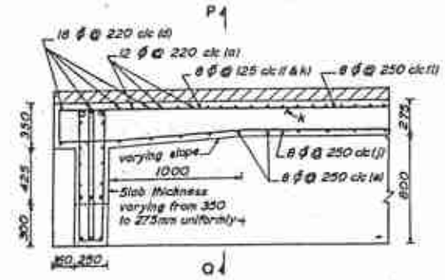
HALF TOP REINFORCEMENT

PLAN

HALF BOTTOM REINFORCEMENT

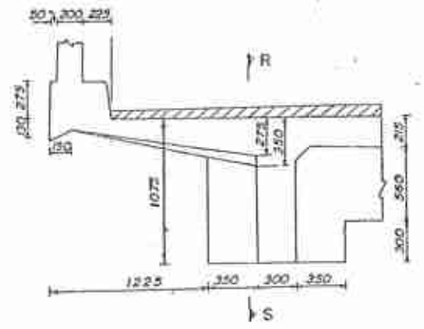


LONGITUDINAL SECTION AT X-Y-Z



SECTION AT R-S

(SHOWING LOCAL VARIATION IN THICKNESS OF CANTI-LEVER SLAB AT THE ENDS)



SECTIONAL ELEVATION AT P-Q

(SHOWING LOCAL VARIATION IN THE THICKNESS OF CANTI-LEVER SLAB AT THE ENDS)

REINFORCEMENT NOT SHOWN

NOTES :-

1. The design is according to the following Bridge Codes: (i) IRC : 5-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with amendments No. 1 & 2) or IS : 1786-1966 (with amendments No. 1 & 2).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3. of IRC : 21-1972 should be strictly followed ; if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 $\bar{\phi}$ shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. For details of Girders, Bearings & Schedule of Reinforcement, Quantities and Reactions refer Drawing No. BD/8-76A & BD/9-76A.
13. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

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ROADS WING, NEW DELHI.

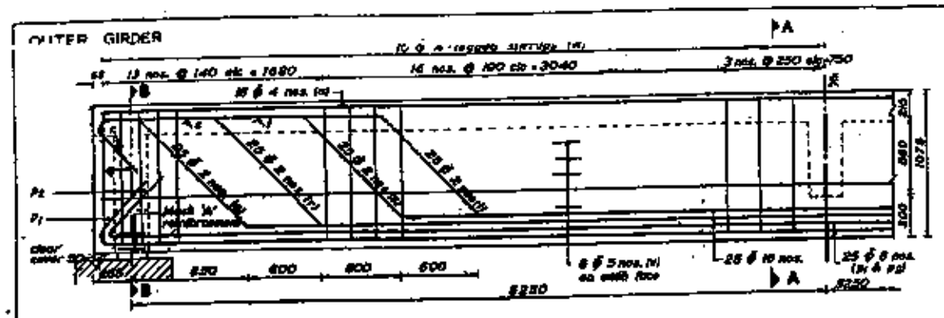
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATH)

R.C.C. T-BEAM : EFFECTIVE SPAN 10.5 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED: G.S.C. KARTHA, A.E.E. RECOMMENDED: S.C. HOTWANI, E.E.	RECOMMENDED: K.B. SARKAR, S.E. APPROVED: S. SALWANT, R.D.C.E.
	MAY, 1976 DRG. NO. BD/ 7-76

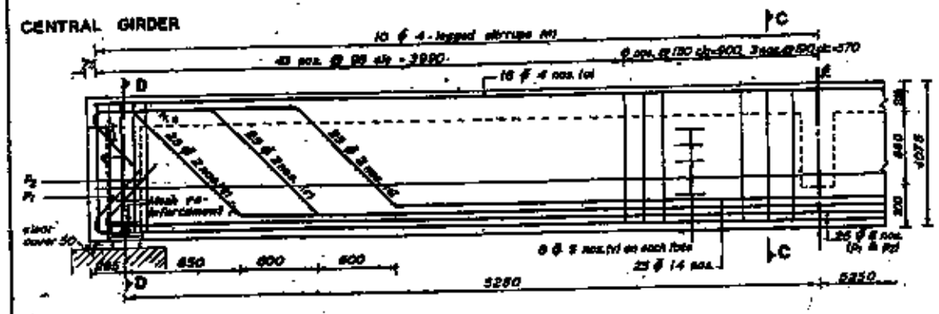
High Yield Strength Deformed Bars

OUTER GIRDER

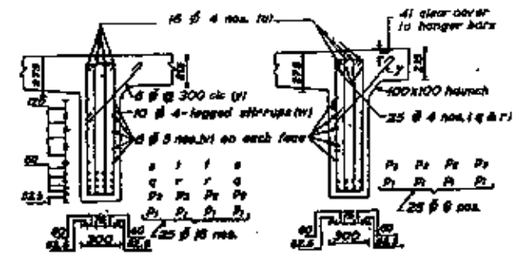


LONGITUDINAL SECTION

CENTRAL GIRDER

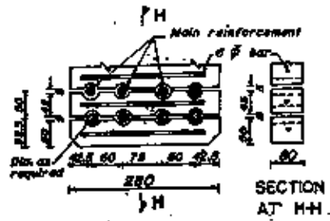


LONGITUDINAL SECTION



SECTION AT A-A SECTION AT B-B

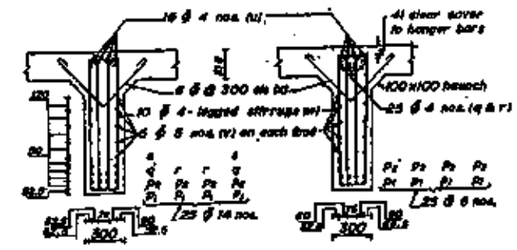
(CROSS GIRDER NOT SHOWN)



SECTION AT H-H

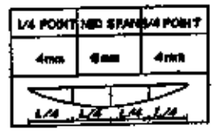
PRE-CAST SPACER BLOCK FOR MAIN GIRDERS

SPACING - 3000 (APPROX)



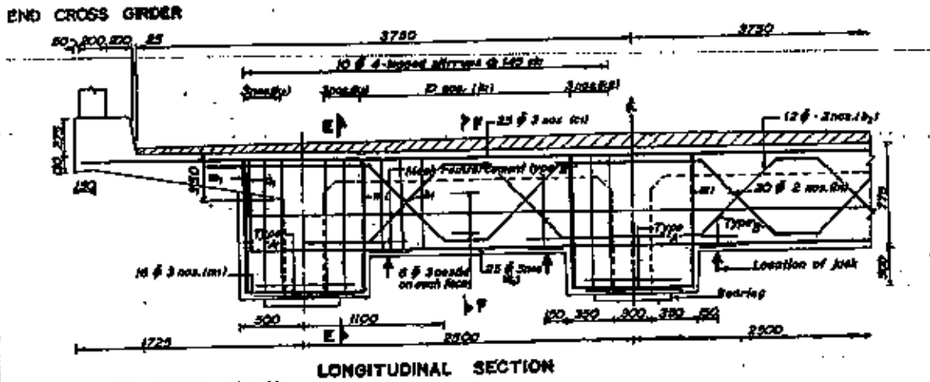
SECTION AT C-C SECTION AT D-D

(CROSS GIRDER NOT SHOWN)



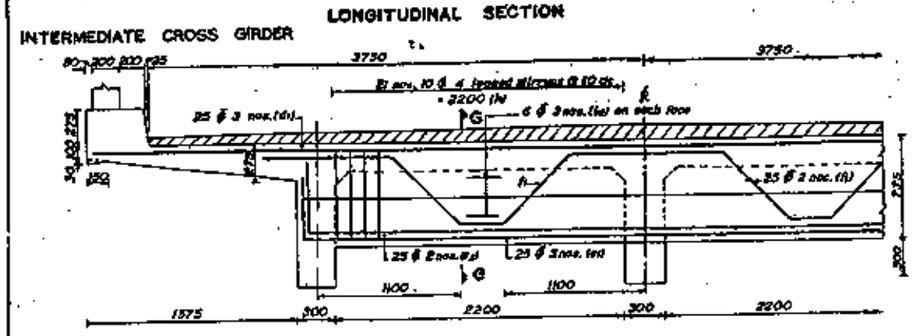
DEAD LOAD DEFLECTION DIAGRAM

END CROSS GIRDER

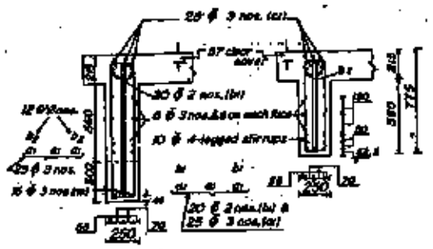


LONGITUDINAL SECTION

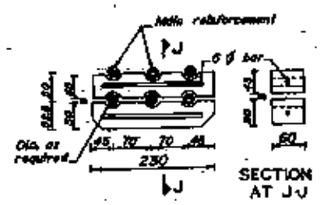
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT E-E SECTION AT F-F

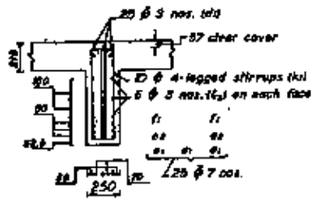


SECTION AT J-J

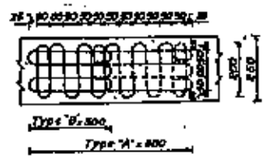
PRE-CAST SPACER BLOCK FOR CROSS GIRDERS

SPACING - 3000 APPROX)

(Various layers of spacer blocks may be staggered horizontally by 150 mm)



SECTION AT G-G



MESH REINFORCEMENT 6mm.

NOTES :-

1. For general notes refer Drawing No. BD/7-76.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum Bending Moment.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drawing No. BD/7-76 and BD/8-76A respectively.
6. The expansion joints shall be of the approved type.
7. TWO layers of mesh reinforcement type 'A' one at 50 mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⊕. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans.
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75A. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl. 2005 of M.O. S&T specification.
    - i. Length (a) = 460 mm.
    - ii. Width (b) = 220 mm.
    - iii. No. of internal elastomeric layers = Four
    - iv. Overall thickness of bearings = 5+(4×8)+4×3 = 79 mm
    - v. Design vertical load (DL + LL + Impact) = 75 tonnes
11. All dimensions are in millimetres.
12. For additional notes refer Drg. No. BD/8-76A.

Revision	Year	Description	Signatures
A	1980	1. Holes modified. 2. Type b_2 bars in x-girder added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

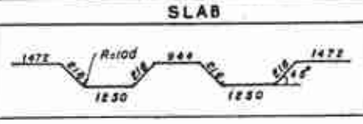
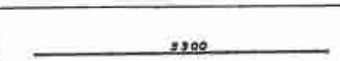
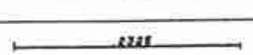
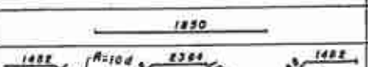
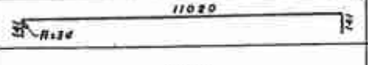
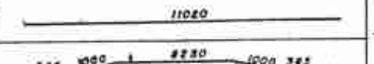
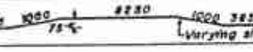
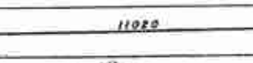
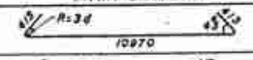
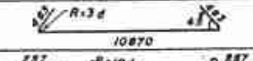
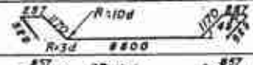
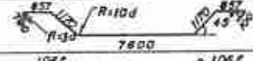
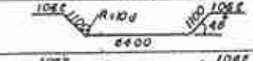
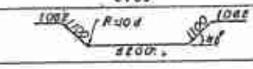
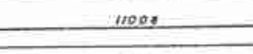
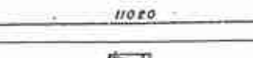
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

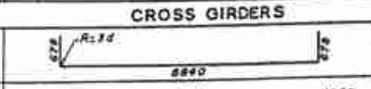
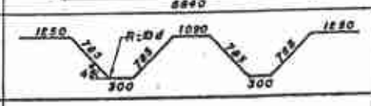
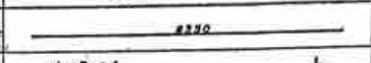
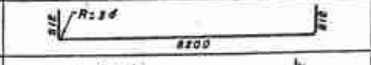
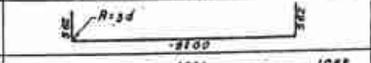
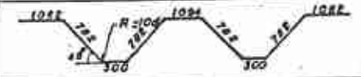
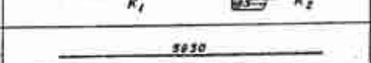
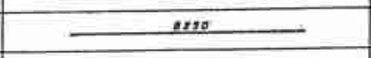
R.C.C. T-BEAM : EFFECTIVE SPAN 10.5 METRES DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY	TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE	ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED: G.C. BARTHAKUR	RECOMMENDED: S. B. KANNAN, S.E.
RECOMMENDED: S.C. MOTWANI, S.E.	APPROVED: P. GAJWANT RAO, C.E.
	MAY, 1976.
	ORG. NO. BD/8-76A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs.)
		SLAB					
1	a		12	7252	46	333·59	294
2	b		12	5300	50	508·80	453
3	c				46		
4	d		16	2325	102	237·15	375
5	e		8	1850	90	166·50	65
6	f		8	11240	24	269·76	105
7	g		8	11262	24	270·29	105
8	h		8	11020	24	484·88	189
9	i				10		
10	j				10		
11	k		8	1700	16	27·20	11
12	l		8	11020	8	88·16	34
13	m		8	1656	76	125·86	49
		MAIN GIRDERS					
1	A_1		25	11750	12	141·00	543
2	A_2		25	11750	12	141·00	543
3	Q		25	12666	6	76·00	293
4	r		25	11808	6	70·85	273
5	s		25	10724	6	64·34	248
6	t		25	9524	4	38·10	147
7	u		16	11006	12	132·07	205
8	v		6	11020	30	330·60	73
9	w		10	2@2548	229	1166·92	724
10	x		6	1035	38	39·33	9
11	y		6	750	76	57·00	13

S. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars.	Total length (m)	Weight (Kgs.)
		CROSS GIRDERS					
1	a_1		25	7071	6	42·43	163
2	b_1		20	7330	4	29·32	72
3	c_1		25	8350	6	75·15	289
4	d_1				3		
5	e_1		25	6100	3	18·30	70
6	e_2		25	6100	2	12·20	47
7	f_1		25	6946	2	13·89	53
8	k_1		10	2@1786	82	292·90	182
9	k_2		10	2x2386	36	171·79	107
10	l_1		6	5950	12	71·40	16
11	l_2		6	5250	6	31·50	7
12	m_1		16	2796	18	50·33	80
13	A	Mesh reinforcement as shown in Drawing No. BD/8-76A	6	5500	12	66·00	15
14	B	-DO-	6	2930	24	70·22	15
15	b_2		12	5850	4	23·40	21

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
DL	DL+LL	DL+LL+I	DL	DL+LL	DL+LL+I
49·40	106·00	119·15	98·80	170·55	188·55

TOTAL QUANTITIES (PER SPAN)

1. STEEL = 6187 Kgs.
(including 5% extra for laps and wastage)
2. CONCRETE = 33·30 cu.m.

Note: These quantities do not include railing and wearing coat.

NOTES:-

1. This drawing shall be read in conjunction with Drawing No. BD/7-76 and BD/8-76A showing the details of R.C.C. Deck Slab & R.C.C Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per IS:2502-1963

ADDITIONAL NOTES FOR DRG. NO. BD/8-76A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the four jacks placed under one end x-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the four jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 12.4 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm²

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type b2 bars added. 2. Quantity of steel modified. 3. Addl. notes for Drg. No. BD/8-76A added.	R.K. Sharma C.E. Ramesh Chandra S.E. Balwant Singh C.E. 4/9/80

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI

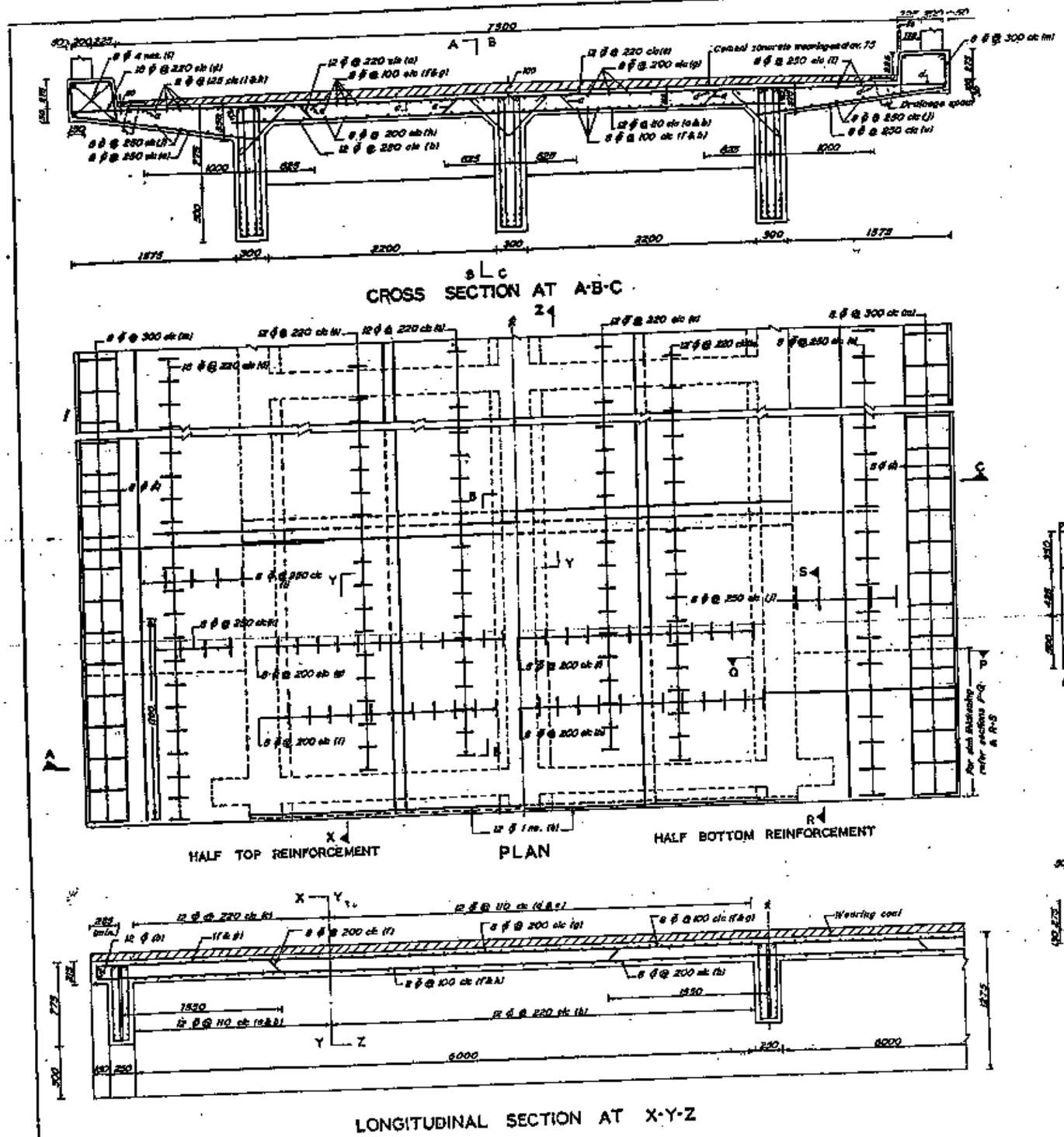
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

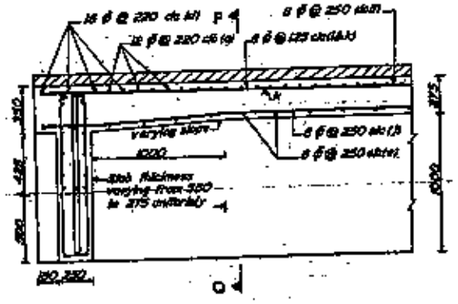
R.C.C.T-BEAM: EFFECTIVE SPAN 10·5 METRES SCHEDULE OF REINFORCEMENT

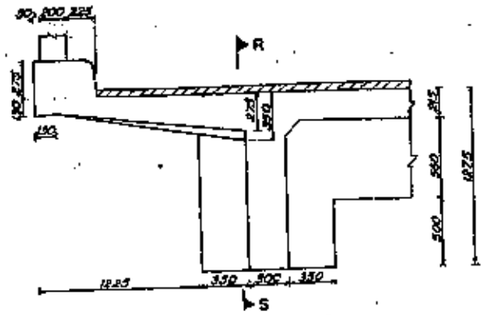
7·5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE — ONE LANE IRC CLASS 70-R LOADING

RECOMMENDED: G.C. KASTHA, A.S.E.	RECOMMENDED: K.P. SARKAR, S.E.	MAY, 1976
RECOMMENDED: S.C. MOTWANI, C.E.	APPROVED: B. SALWANT RAI, C.E.	DRG. No. BD/9-76A

High Yield Strength Deformed Bars


CROSS SECTION AT A-B-C
PLAN
HALF TOP REINFORCEMENT
HALF BOTTOM REINFORCEMENT
LONGITUDINAL SECTION AT X-Y-Z


SECTION AT R-S
(SHOWING LOCAL VARIATION IN THICKNESS OF CANTILEVER SLAB AT THE ENDS)


SECTION AT P-Q
(SHOWING LOCAL VARIATION IN THICKNESS OF CANTILEVER SLAB AT THE ENDS)
REINFORCEMENT NOT SHOWN

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC : 6-1965 & (iii) IRC : 21-1972.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with latest amendments) or IS : 1786-1985 (with latest amendments).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3. of IRC : 21-1972 should be strictly followed, if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. For details of girders, bearings & schedule of reinforcement, quantities and reactions refer Drawing No. BD/11-76A and BD/12-76A.
13. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 12.5 METRES
DETAILS OF SLAB

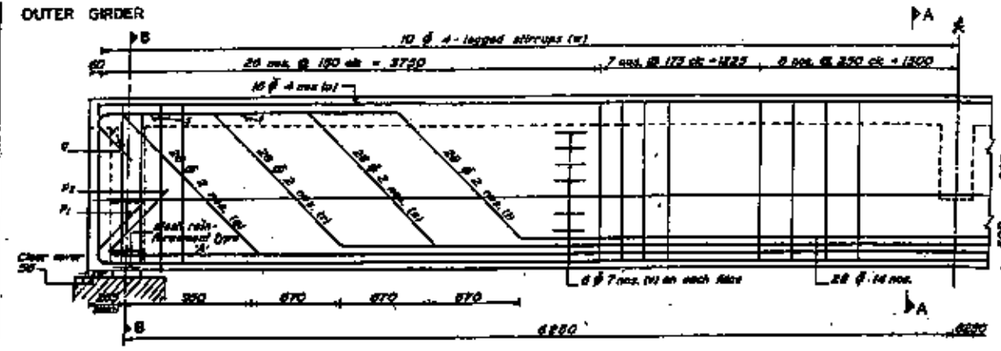
7.5 METRES ROADWAY
DO NOT SCALE

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

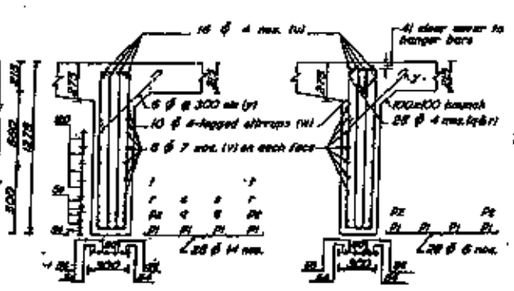
RECOMMENDED: G.S.C. NARTHA, S.E.	RECOMMENDED: K.B. SARKAR, S.E.	SEPT., 1976.
RECOMMENDED: S.C. ROTWANI, S.E.	RECOMMENDED: S. SAKHANT NAG, S.E.	DRG. NO. BD/10-76

High Yield Strength Deformed Bars

OUTER GIRDER

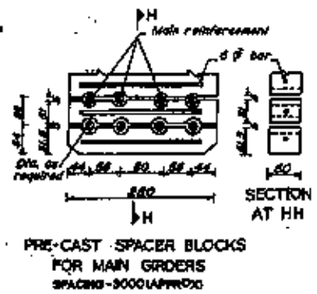


LONGITUDINAL SECTION



SECTION AT AA

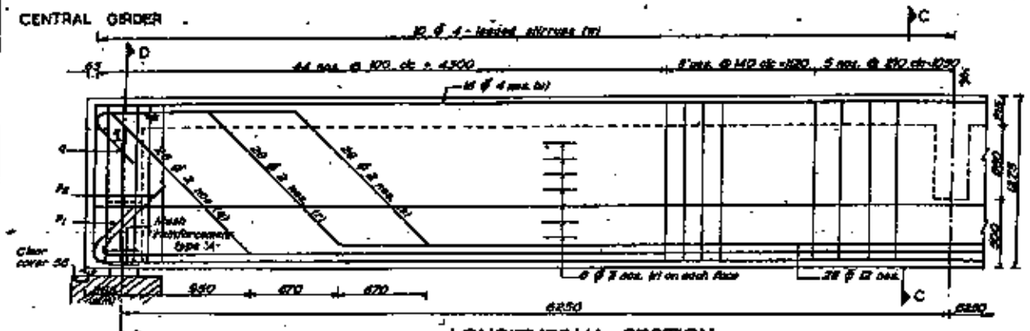
SECTION AT BB
(CROSS GIRDER NOT SHOWN)



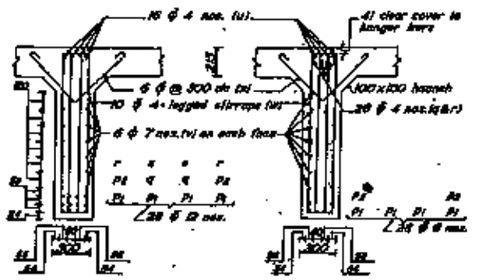
PRE-CAST SPACER BLOCKS FOR MAIN GIRDERS
SPACING - 3000 (APPROX.)

SECTION AT HH

CENTRAL GIRDER

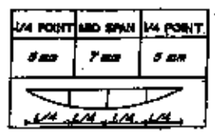


LONGITUDINAL SECTION



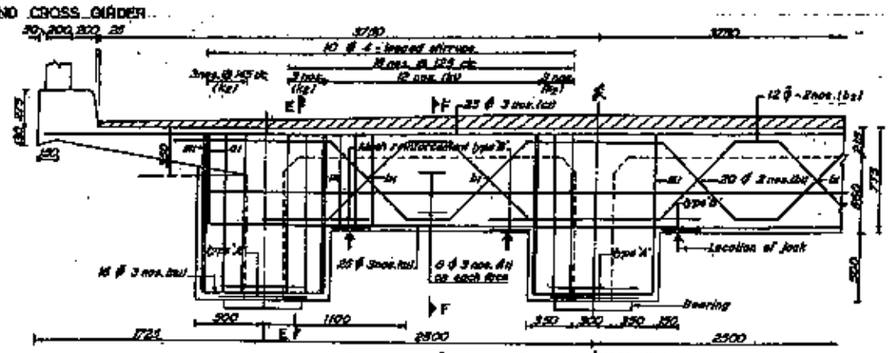
SECTION AT CC

SECTION AT DD
(CROSS GIRDER NOT SHOWN)



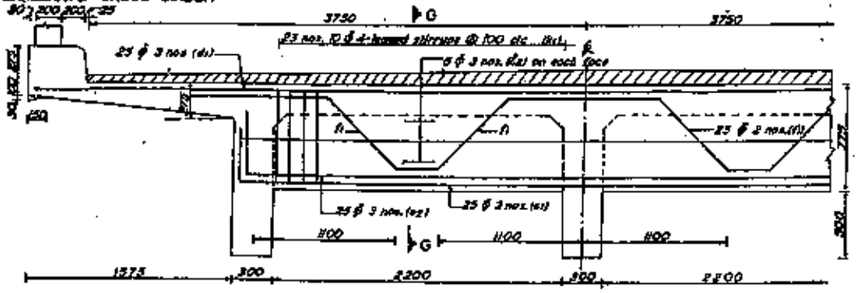
DEAD LOAD DEFLECTION DIAGRAM

END CROSS GIRDER

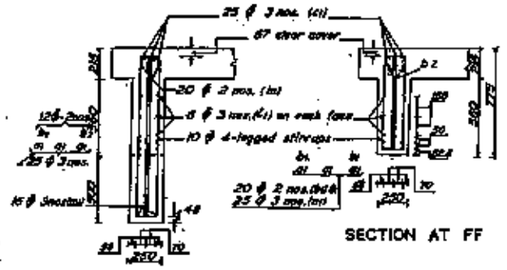


LONGITUDINAL SECTION

INTERMEDIATE CROSS GIRDER

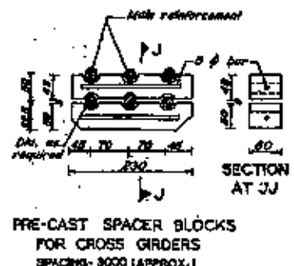


LONGITUDINAL SECTION



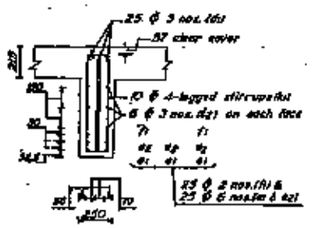
SECTION AT EE

SECTION AT FF

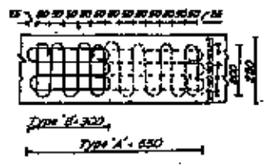


PRE-CAST SPACER BLOCKS FOR CROSS GIRDERS
SPACING - 3000 (APPROX.)
(Various layers of spacer blocks may be staggered horizontally by 150 mm).

SECTION AT JJ



SECTION AT GG



MESH REINFORCEMENT 6mm

NOTES :-

1. For general notes refer Drawing No. BD/10-76.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drawing No. BD/10-76 and BD/12-76A respectively.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⇑. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans.
10. The general arrangement of elastomeric bearings to be provided shall be as per drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl. 2006 of M.O.S.&T. specification.
    - i. Length (a) = 450 mm
    - ii. Width (b) = 250 mm
    - iii. No. of internal elastomeric layers = Four.
    - iv. Overall thickness of bearings = 140 mm.
    - v. Design vertical load (DL+LL+Impact) = 45 tonnes.
11. All dimensions are in millimetres.
12. For additional notes refer Drg. No. BD/12-76.

Revision	Year	Description	Signatures
A	1980	1. Notes modified. 2. Type b_z bars in end x-girder added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 12.5 METRES
DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED: C.S.C. BHATIA, S.E.	RECOMMENDED: K.B. SAKHARE, C.E.
RECOMMENDED: S.C. HOTWANI, S.E.	APPROVED: R. SRIVASTAVA, ADD'L. S.E.
	SEPT., 1976.
	DRG. NO. BD/11-76A

High Yield Strength Deformed Bars.

SCHEDULE OF REINFORCEMENT (PER SPAN)

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia. of bars 'd' (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs.)
		SLAB					
1	a	1472, 216, 228, 944, 216, R=10d, 1472, 1250, 1250, 45°	12	7252	54	391.61	349
2	b	5300	12	5300	60	614.80	547
3	c				56		
4	d	2325	16	2325	120	279.00	441
5	e	1850	8	1850	106	196.10	76
6	f	1677, 188, 2826, 188, R=10d, 1677, 3150, 3150, 45°	8	13240	22	291.28	114
7	g	13020, 141, R=3d, 141	8	13262	24	318.29	124
8	h	13020	8	13020	24	442.68	173
9	i				10		
10	j	385, 1000, 10230, 1000, 385, Varying slope, 75	8	13020	10	130.20	51
11	k	1700	8	1700	16	27.20	11
12	l	13020	8	13020	8	104.16	41
13	m	23, 384, 409, 385	8	1656	88	145.73	57
		MAIN GIRDERS					
1	P_1	821, 45°, R=3d, 341, 12858	28	14208	12	170.50	824
2	P_2	767, 45°, R=3d, 720, 12648	28	14208	6	85.25	412
3	q	113, 1210, R=10d, R=3d, 1890, 113, 45°, 10400	28	15328	6	91.97	444
4	r	838, 1430, R=10d, R=3d, 1430, 838, 45°, 9260	28	13976	6	83.86	405
5	s	1180, 2230, R=10d, 1430, 1180, 45°, 7820	28	13160	6	78.96	381
6	t	1180, 2430, R=10d, 1430, 1180, 45°, 9380	28	11660	4	46.64	225
7	u	13006	16	13006	12	156.07	247
8	v	13020	6	13020	42	546.84	120
9	w	R=3d, 1184, 1184, W, R=3d, 450, 450, X	10	2x2956	267	1578.50	973
10	x		6	1035	44	45.54	10
11	y		6	750	88	66.00	15

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia. of bars 'd' (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs)
		CROSS GIRDERS					
1	a_1	228, R=3d, 228, 3640	25	7071	6	42.43	163
2	b_1	1230, 228, 285, 1090, 285, R=10d, 1230, 45°, 300, 300	20	7330	4	29.32	72
3	c_1	8350	25	8350	6	75.15	289
4	d_1				3		
5	e_1	475, R=3d, 475, 8200	25	6025	3	18.08	70
6	e_2	325, R=3d, 325, 8100	25	6025	3	18.08	70
7	f_1	1062, 710, 710, 1184, 710, R=10d, 1062, 710, 45°, 300, 300	25	6758	2	13.52	52
8	k_1	R=3d, 475, 475, 85, k_1, R=3d, 1178, 1178, 85, k_2	10	2x1786	94	335.77	208
9	k_2		10	2x2786	36	200.59	124
10	l_1	8350	6	5950	12	71.40	16
11	l_2	3250	6	5250	6	31.50	7
12	m_1	1178, R=3d, 1178, 820	16	3196	18	57.53	91
13	A	Mesh reinforcement as shown in Drg. No. BD/11-76A.	6	5930	12	71.16	16
14	B	- DO -	6	2930	16	46.88	10
15	b_2	510, 300, 185, R=10d, 185, 300, 765, 45°, 765, 510, 1040	12	5850	4	23.40	21

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
DL	DL+LL	DL+LL+I	DL	DL+LL	DL+LL+I
60.00	123.73	139.75	120.00	195.45	215.55

TOTAL QUANTITIES (PER SPAN)

1. Steel: = 7618 Kgs. (including 5% extra for laps and wastage)
2. Concrete: = 41.30 cu.m.

Note: These quantities do not include railing and wearing coat.

NOTES:-

1. This drawing shall be read in conjunction with Drawing No. BD/10-76 and BD/11-76A showing the details of R.C.C. Deck Slab & R.C.C. Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per I.S.2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/11-76A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the four jacks placed under one end cross-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the four jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 15.0 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type b_2 bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/11-76A added.	

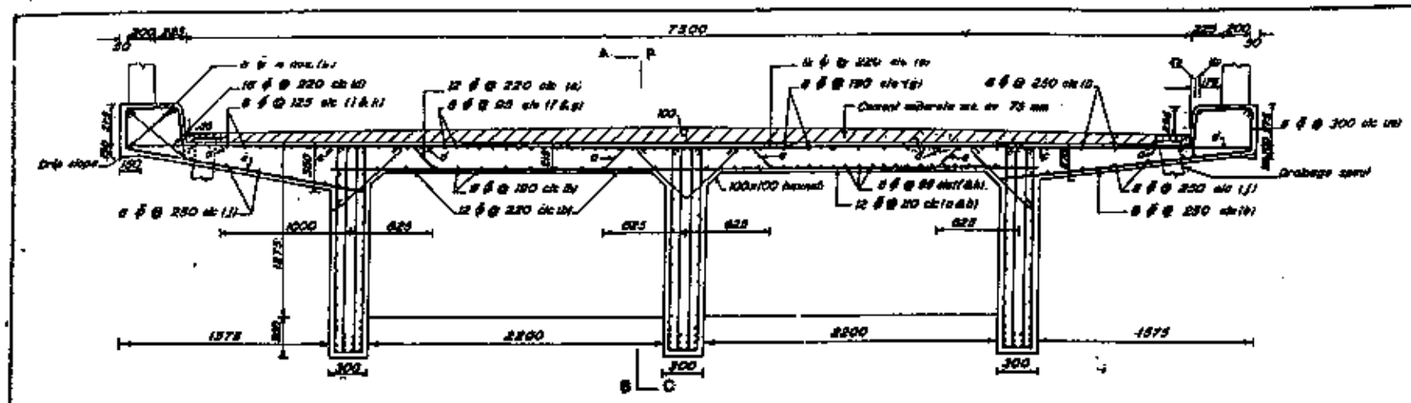
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

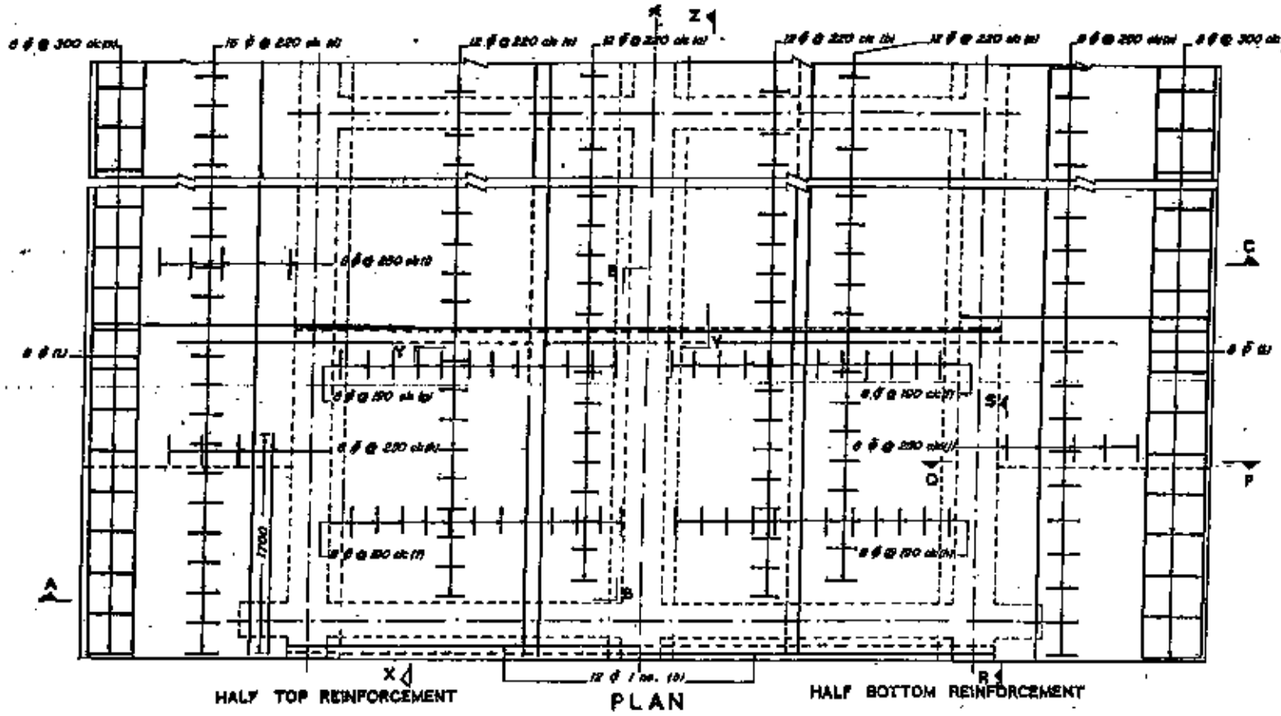
R.C.C.T-BEAM: EFFECTIVE SPAN 12.5 METRES
SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY. TWO LANES IRC CLASS 'A' LOADING.
DO NOT SCALE. ONE LANE IRC CLASS 70-R LOADING.

RECOMMENDED: G.K.C. NAIR, S.E.	RECOMMENDED: R.K. BANKAR, C.E.	SEPT. 76
RECOMMENDED: R.C. HOTWANI, S.E.	APPROVED: R. RAJWADE, SECY. TO THE GOVT. OF INDIA	DRG. No. BD/12-76A



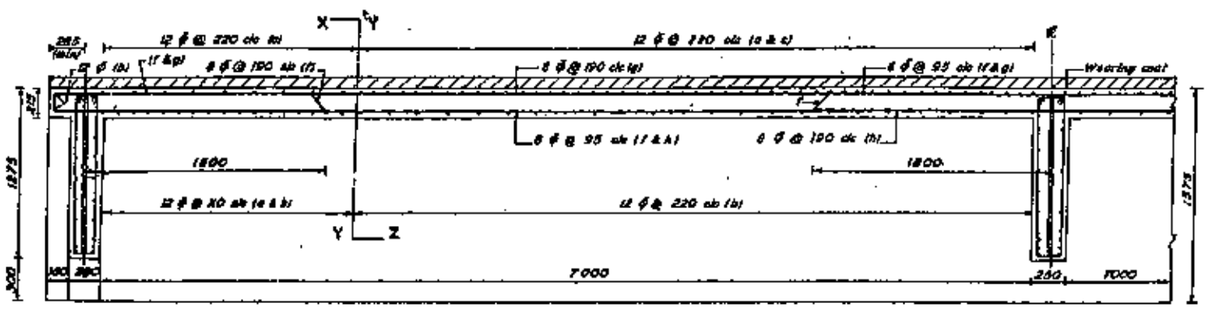
CROSS SECTION AT A-B-C



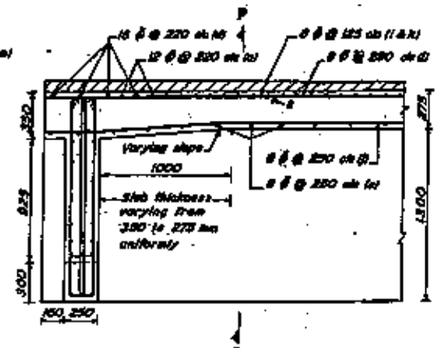
HALF TOP REINFORCEMENT

PLAN

HALF BOTTOM REINFORCEMENT

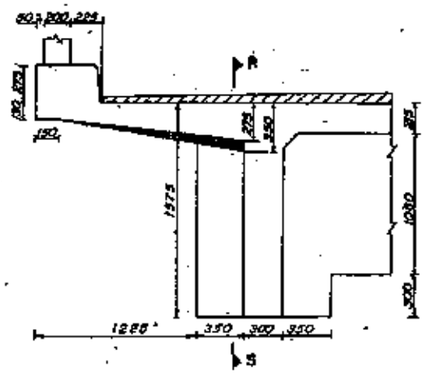


LONGITUDINAL SECTION AT X-Y-Z



SECTION AT R-S

(SHOWING LOCAL VARIATION IN THE THICKNESS OF CANTILEVER SLAB AT THE ENDS)



SECTIONAL ELEVATION AT P-Q

REINFORCEMENT NOT SHOWN

BUT

SHOWING LOCAL VARIATION IN THE THICKNESS OF CANTILEVER SLAB AT THE ENDS

High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC: 5-1970, (ii) IRC: 6-1966 & (iii) IRC: 21-1972.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS: 1139-1966 (with amendments No. 1 and 2) or IS: 1786-1966 (with amendments No. 1 and 2).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However the provision in clause No. 304.6.3 of IRC: 21-1972 should be strictly followed, if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete, shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69 A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. For details of Girders, Bearings and Schedule of Reinforcement, Quantities and Reactions refer Drawing No. BD/5-76A and BD/6-76A.
13. This drawing shall not be used in unfavourable conditions of exposure such as marine atmospheres etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

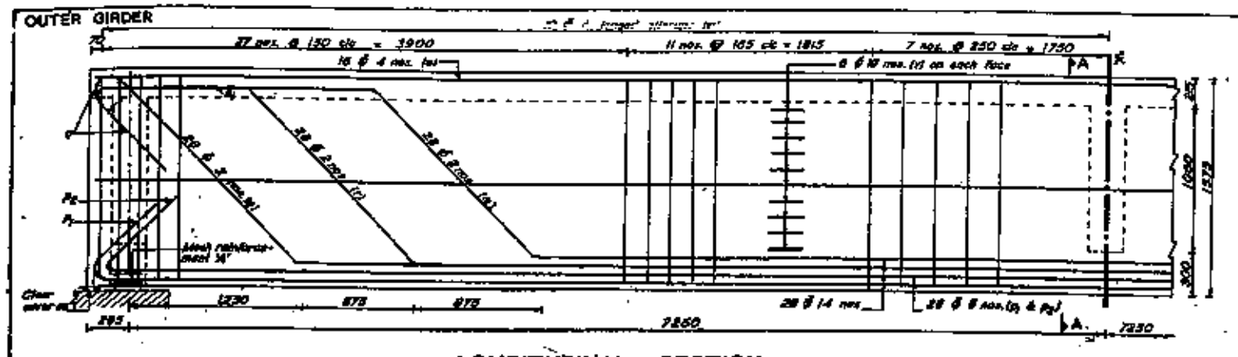
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 14.5 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES I.R.C. CLASS 'A' LOADING ONE LANE I.R.C. CLASS '70-R' LOADING

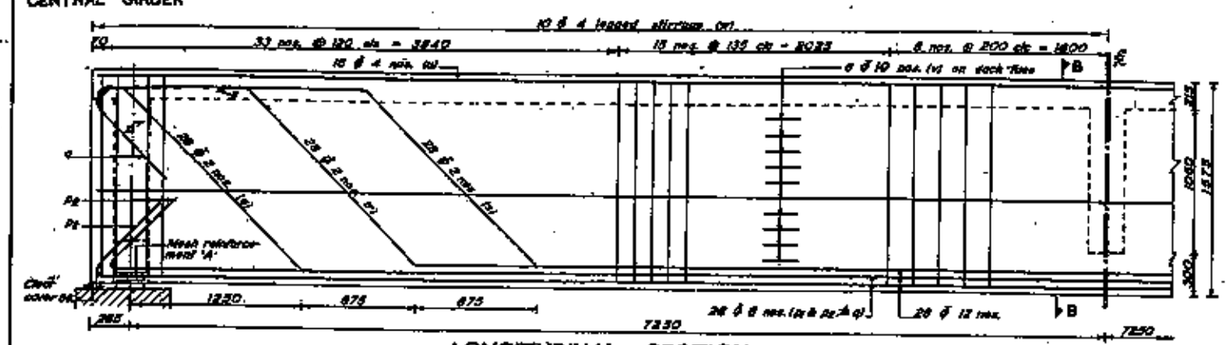
RECOMMENDED: G. S. C. RASTHA A.E.E.	RECOMMENDED: H. N. SARKAR	FEB, 1976.
RECOMMENDED: S. C. NOTHANI E.E.	APPROVED: S. SALWANT RAO C.E.	DRG. NO. BD/4-76

OUTER GIRDER



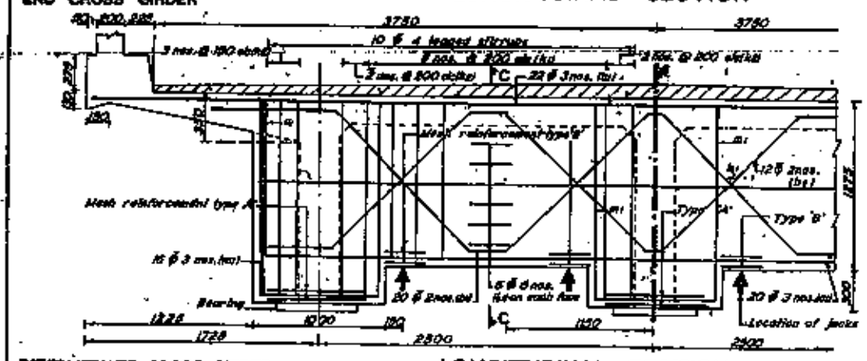
LONGITUDINAL SECTION

CENTRAL GIRDER



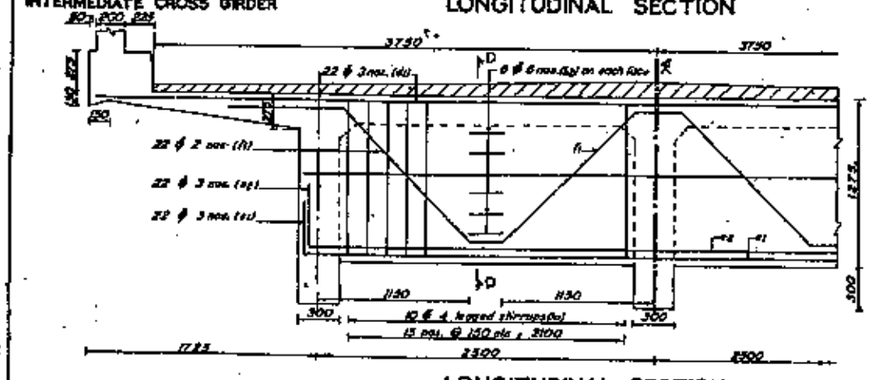
LONGITUDINAL SECTION

END CROSS GIRDER

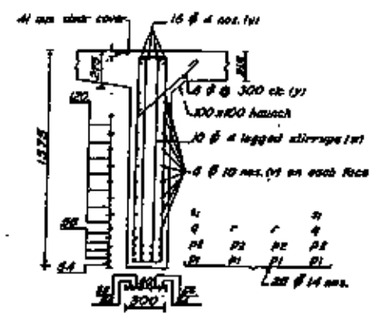


LONGITUDINAL SECTION

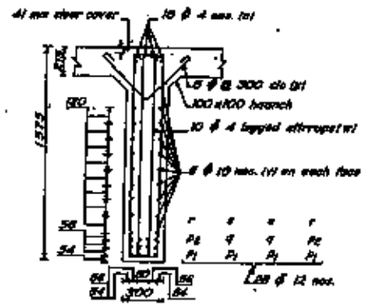
INTERMEDIATE CROSS GIRDER



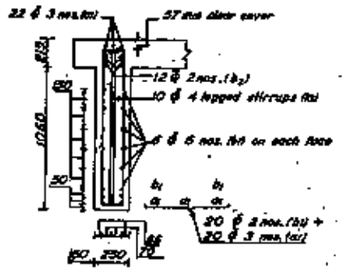
LONGITUDINAL SECTION



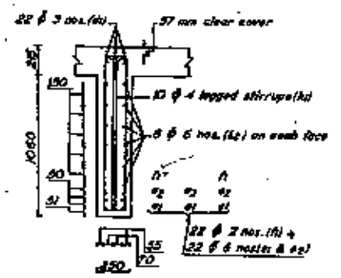
SECTION AT A-A



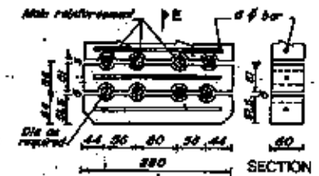
SECTION AT B-B



SECTION AT C-C

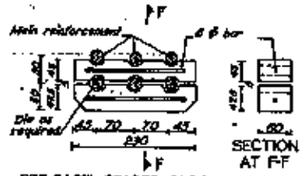


SECTION AT D-D



SECTION AT E-E

PRE-CAST SPACER BLOCKS FOR MAIN GIRDERS
SPACING - 3000 (APPROX)
(Various layers of spacer blocks may be staggered horizontally by 150 mm.)

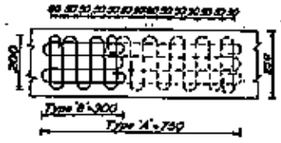


SECTION AT F-F

PRE-CAST SPACER BLOCKS FOR CROSS GIRDERS
SPACING - 3000 (APPROX)

1/4 POINT	MID SPAN	1/4 POINT
6 mm	9 mm	6 mm

DEAD LOAD DEFLECTION DIAGRAM



MESH REINFORCEMENT 6 mm

High Yield Strength Deformed Bars

NOTES :-

1. For general notes refer Drawing No. BD/4-76.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum Bending Moment.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. For details of slab and schedule of reinforcement, quantities and reactions refer Drg. No. BD/4-76 and BD/6-76A respectively.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ▲. These shall be distinctly etched on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above.
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans.
10. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specification shall strictly comply with cl.2005(b) M.O.S & T. specification.
    i. Length (a) = 630 mm
    ii. Width (b) = 230 mm
    iii. No. of internal elastomeric layers = 4.
    iv. Overall thickness of bearings = 4 (10 + 3) + 2 x 3 = 61 mm.
    v. Design vertical load per bearing = 45 tonnes.
    vi. All dimensions are in millimetres.
12. For additional notes refer Drg. No. BD/6-76A.

Revision	Year	Description	Signatures
A	1980	1. Notes modified. 2. Type 'B' bars in end X-girder added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM EFFECTIVE SPAN 14.5 METRES DETAILS OF GIRDERS AND BEARINGS

7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE — ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED: D.S.C. MATHUR, S.E.E.
RECOMMENDED: S.C. MOTWANI, S.E.
RECOMMENDED: K.D. SANGAR, S.E.
APPROVED: D. SALWANI, D.G.(R.D.) & E.O.

FEBRUARY, 76
DRG. NO. BD/5-76A.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs.)
		SLAB					
1	a	1478, 818, 1250, 818, 844, 816, R=10d, 1478, 1250, 45°	12	7252	64	464.13	413
2	b	83382	12	5300	68	699.60	623
3	c				64		
4	d	8328	16	2325	138	320.85	507
5	e	1850	8	1850	122	225.70	88
6	f	1857, 1854, 3334, 1854, R=10d, 1857, 3680, 3680, 45°	8	15240	24	365.76	143
7	g	15020, R=3d, 178	8	15262	24	366.29	143
8	h	15020	8	15020	24	660.88	258
9	i				10		
10	j	385, 1000, 13250, 1000, 385, Varying slope			10		
11	k	1700	8	1700	16	27.20	11
12	l	15020	8	15020	8	120.16	47
13	m	284, 68, 305, 406, 305	8	1656	102	168.91	66
		MAIN GIRDERS					
1	P_1	R=3d, 45°, 14228	28	15208	12	194.50	938
2	P_2	R=3d, 45°, 14448			10	162.05	783
3	q	85, 1180, R=10d, 1180, 113, 45°, 12388	28	17668	6	105.41	509
4	r	1044, 1180, R=10d, 1180, 1044, 45°, 10250	28	16216	6	97.30	470
5	s	1180, 1180, R=10d, 1180, 1180, 45°, 8800	28	14580	8	89.18	141
6	t	1180, 1180, R=10d, 1180, 1180, 45°, 8560	28	14420	4	57.68	279
7	u	15004	16	15006	12	180.07	285
8	v	15020	6	15020	60	901.20	198
9	w	1434, 1434, 1434, 1434, W	10	2x8356	289	2035.37	1274
10	x	R=3d, 450, 450, X	6	1035	51	327.9	12
11	y	600	6	750	102	76.50	17

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs.)
		CROSS GIRDERS					
1	a_1	R=3d, 8230, 878	20	8096	8	48.38	120
2	b_1	850, 1500, R=10d, 172, 1500, 850, 200, 200, 45°	20	8292	4	33.17	82
3	c_1	8382	22	8362	6	75.26	224
4	d_1				3		
5	e_1	R=3d, 8212, 878	22	8220	3	37.32	112
6	e_2	R=3d, 8124, 878			3		
7	f_1	835, 1450, R=10d, 276, 1450, 835, 45°, 200, 200	22	8266	2	16.53	49
8	k_1	R=3d, 878, 878	10	2x2780	52	344.72	214
9	k_2	R=3d, 878, 878	10	2x3360	28	189.28	117
10	l_1	8250	6	5930	24	142.90	31
11	l_2	8250	6	5250	12	63.00	14
12	n_1	1478, R=3d, 878, 910	16	3796	18	68.33	108
13	A	Mesh reinforcement as shown in Drg.No.BD/6-76A	6	6780	12	81.36	18
14	B	- DO -	6	2930	16	46.88	10
15	b_2	300, 1500, R=10d, 1500, 300, 45°, 310, 172, 310	12	7612	4	30.45	27

MAXIMUM REACTIONS (IN TONNES)

AT Abutment			AT Pier		
D.L	DL+LL	DL+LL+I	D.L	DL+LL	DL+LL+I
73.50	141.30	155.75	151.00	230.70	248.25

TOTAL QUANTITIES (PER SPAN)

1. Steel: (including 5% extra for laps and wastage) = 8749 Kgs.
2. Concrete: = 83.00 cum

Note:- These quantities do not include railing and wearing coat.

NOTES:-

1. This drawing shall be read in conjunction with Drawing No BD/4-76 and BD/5-76A showing the details of R.C.C. Deck Slab & R.C.C. Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per IS:2502-1963

ADDITIONAL NOTES FOR DRG. NO. BD/5-76A:-

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the four jacks placed under one end cross-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the four jacks are equal at all times.
3. Maximum reaction on any jack under lifting condition = 18.9 tonne.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type b_2 bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/5-76A added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C.T. BEAM: EFFECTIVE SPAN 14.5 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY
DO NOT SCALE

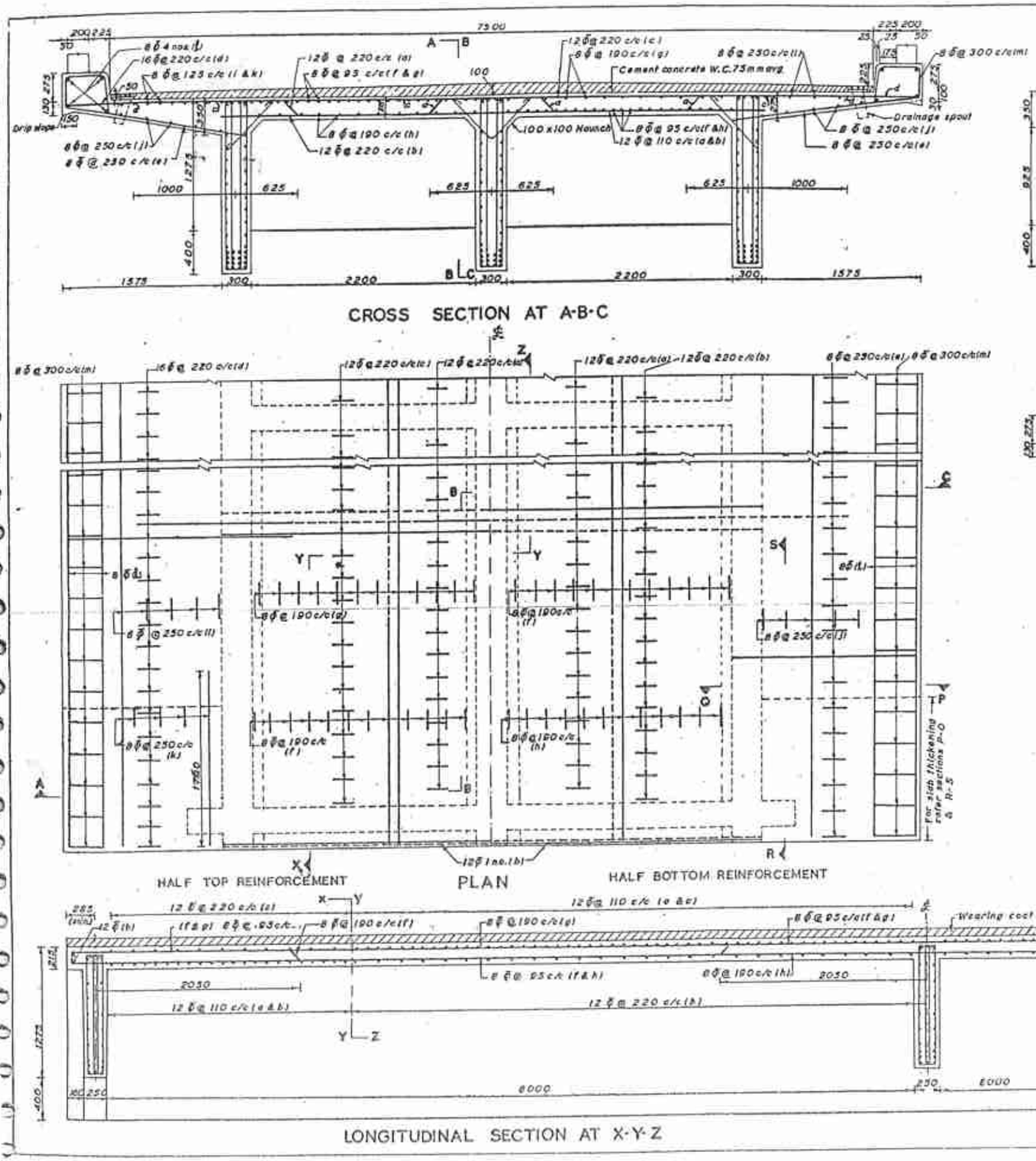
TWO LANES IRC CLASS 'A' LOADING.
ONE LANE IRC CLASS 70-R LOADING.

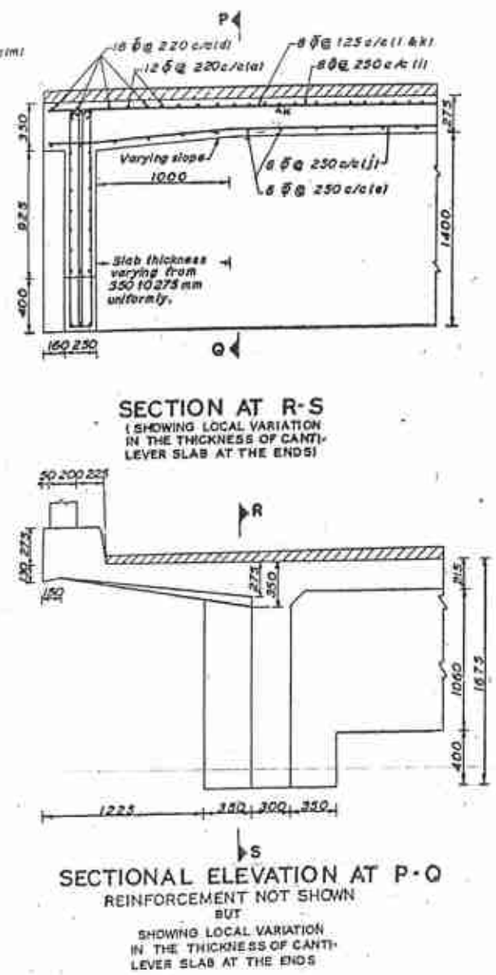
RECOMMENDED: K.G. KHOSLA, S.E.
RECOMMENDED: S.C. JAIPURIAR, S.E.
RECOMMENDED: K.S. SAKSENA, S.E.
APPROVED: P. GAUTAM RAO, C.E.

FEB, 76.

DRG. NO. BD/6-76A.

High Yield Strength Deformed Bars





1. The design is according to the following Bridge Codes: (i) IRC: 5-1970 (ii) IRC: 8-1966 & (iii) IRC: 21-1972.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS: 1139-1966 (with latest amendments) or IS: 1786-1966 (with latest amendments).
5. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3 of IRC: 21-1972 should be strictly followed, if laps are provided.
6. Minimum cover to any reinforcement shall be 25 mm unless shown otherwise in the drawing.
7. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
8. Support chairs of 12 ϕ bars shall be provided at suitable intervals.
9. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
10. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
11. Properly stiffened welded steel plates shall be used as shuttering.
12. For details of Girders, Bearings and Schedule of Reinforcement, Quantities and Reactions refer Drawing No. BD/14-76A and BD/15-76A.
13. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

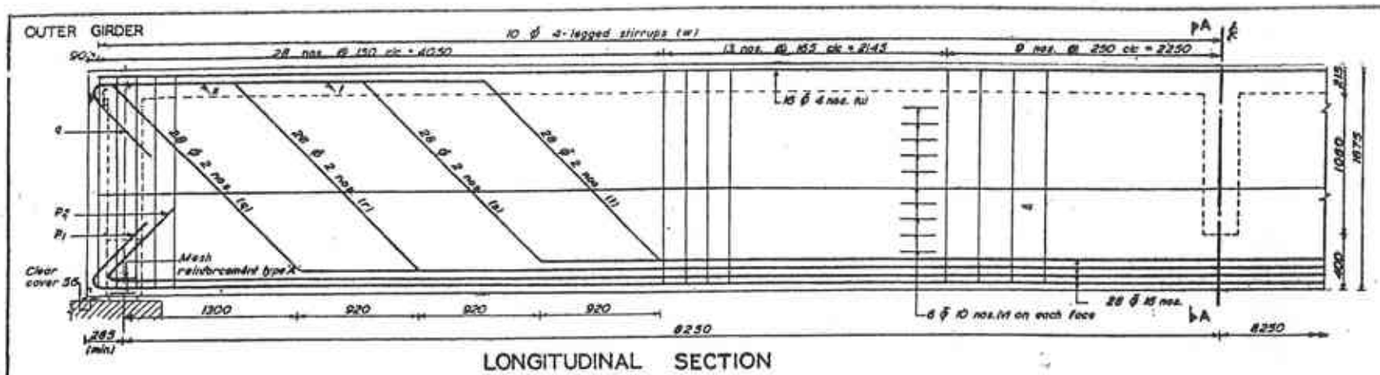
STANDARD CONCRETE BRIDGES (WITH OUT FOOT PATHS)

R.C.C.T-BEAM: EFFECTIVE SPAN 16·5 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS 70-R LOADING.	
RECOMMENDED: G.S.C. KARTHA, A.E.E.	RECOMMENDED: A.B. SARKAR, E.E.	SEPT. 76
RECOMMENDED: S.C. MOTWANI, E.E.	APPROVED: B. BALWANT RAO	DRG. No. BD/13-76

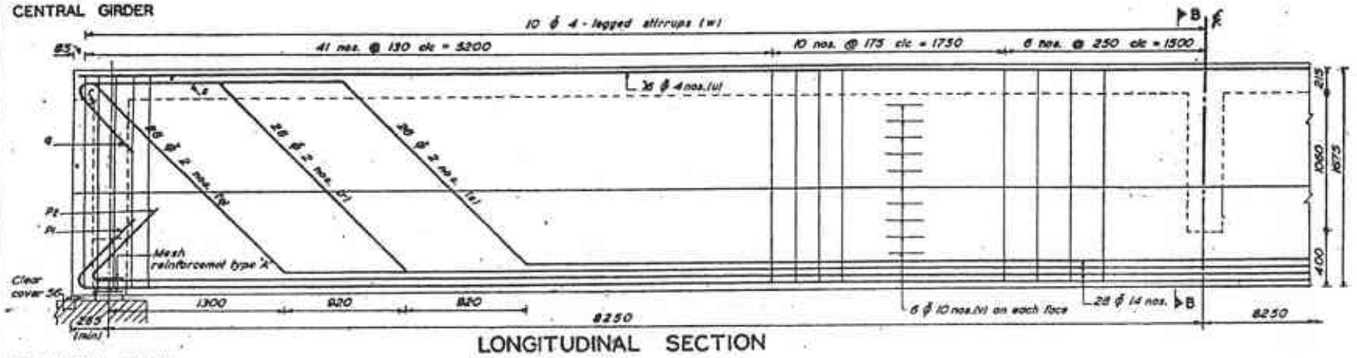
High Yield Strength Deformed Bars

OUTER GIRDER



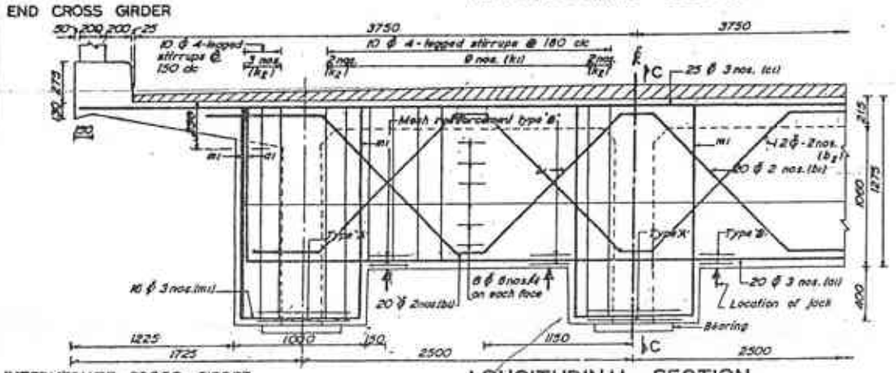
LONGITUDINAL SECTION

CENTRAL GIRDER

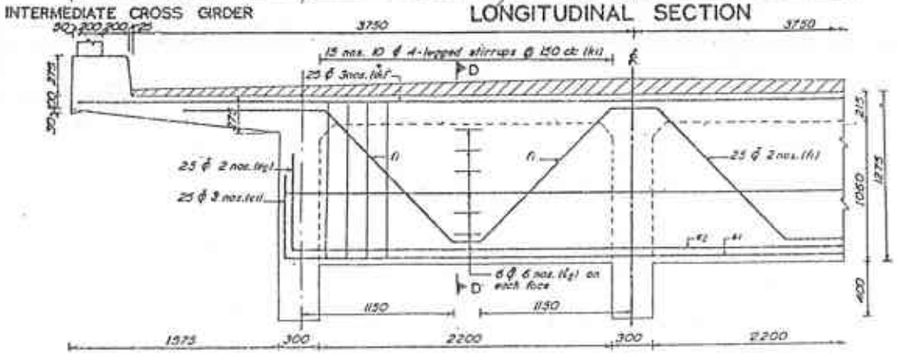


LONGITUDINAL SECTION

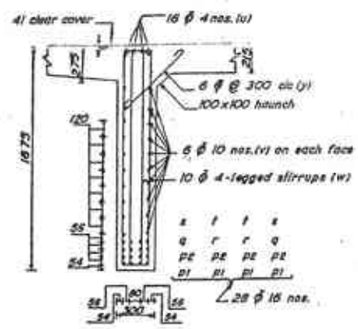
END CROSS GIRDER



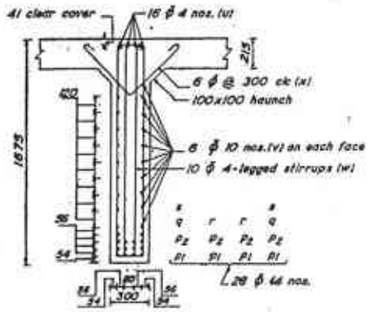
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



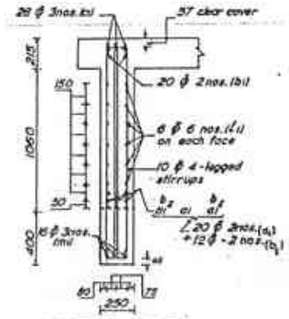
SECTION AT AA



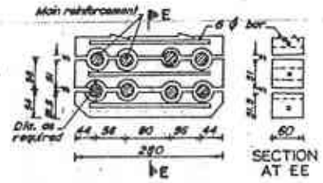
SECTION AT BB

NOTES :-

1. For general notes refer Drawing No. BD/13-76 .
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement unless specified otherwise .
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder , shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moment .
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram .
5. For details of slab and schedule of reinforcement, quantities and reactions refer drawing No. BD/13-76 and BD/15-76A respectively .
6. The expansion joints shall be of the approved type 1-69A
7. Two layers of mesh reinforcement type 'A' one at 20mm and the other at 100 mm from the concrete surfaces shall be provided above the bearings . Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings .
8. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⊕ . These shall be distinctly etched on the cross girders and the pier/abutment caps . Mesh reinforcement type 'B' in two layers shall be provided in the girders and pier/abutment caps at jack positions at heights indicated in note 7 above .
9. The beam sections have been so proportioned that they permit use of modular shuttering which could be repeated easily for other spans .
10. The general arrangement of elastomeric bearings to be provided shall be as per drawing No. BD/4-75B. Details of the elastomeric bearings for this design shall be as under. Tests and specication shall be strictly comply with cl. 2005 of M.O.S.&T. specification.
    - i. Length (a) = 630 mm
    - ii. Width (b) = 220 mm
    - iii. No. of internal elastomeric layers = Four
    - iv. Overall thickness of bearings = 4x16+3x3+2x3 = 81mm.
    - v. Design vertical load (DL+LL+Impact) ≤ 90 tonnes.
11. All dimensions are in millimetres .
12. For additional notes refer Drg. No. BD/15-76A.



SECTION AT CC
(Longitudinal Girder not shown)

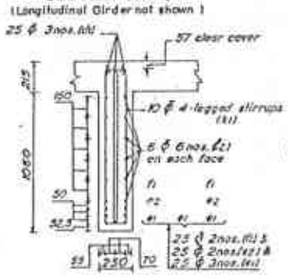


PRE-CAST SPACER BLOCKS FOR MAIN GIRDERS
SPACING-3000 (APPROX.)
(Various layers of spacer blocks may be staggered horizontally by 150 mm .)

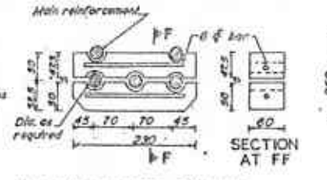
SECTION AT EE

1/4 POINT	MID SPAN	1/4 POINT
8 mm	12 mm	8 mm

DEAD LOAD DEFLECTION DIAGRAM

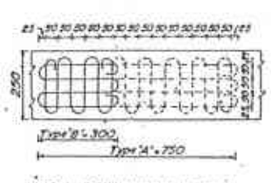


SECTION AT DD



PRE-CAST SPACER BLOCKS FOR CROSS GIRDERS
SPACING-3000 (APPROX.)

SECTION AT FF



MESH REINFORCEMENT 6mm

Revision	Year	Description	Signatures
A	1980	1. Notes modified. 2. Type b_2 bars in end x-girder added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 16.5 METRES
DETAILS OF GIRDERS AND BEARINGS

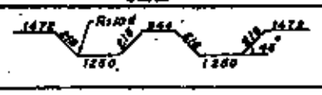
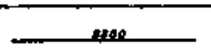
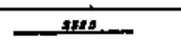
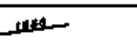
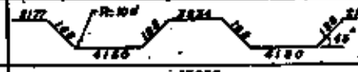
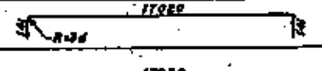
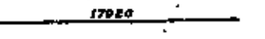
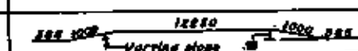
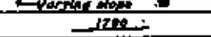
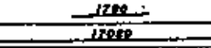
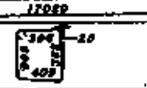
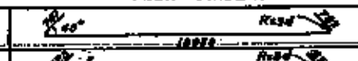
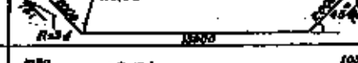
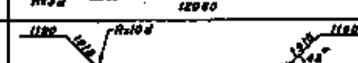
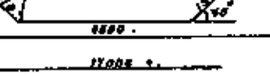
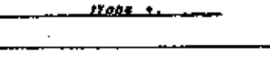
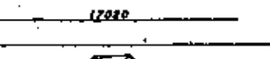
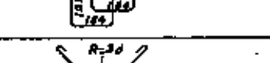
7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE — ONE LANE IRC CLASS 70-R LOADING

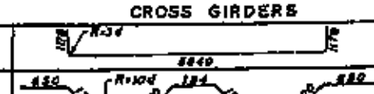
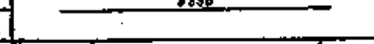
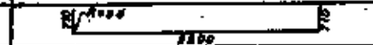
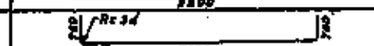
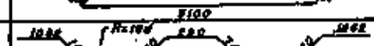
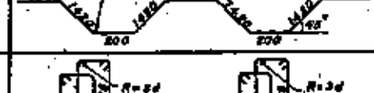
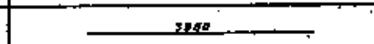
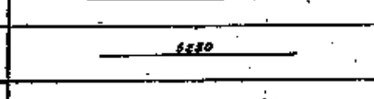
RECOMMENDED: O.S.C. KARTHA, A.E.E.
RECOMMENDED: S.C. MOTWANI, E.E.
RECOMMENDED: K. D. SARKAR, D.E.
APPROVED: D. SALWANI, B.E., C.E.

SEPT., 1976.
DRG. NO. BD/14-76A.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs.)
		SLAB					
1	a		12	7252	72	522.14	466
2	b		12	5300	78	805.60	717
3	c				74		
4	d		16	2525	136	362.70	573
5	e		8	1880	138	235.30	100
6	f		8	17240	24	413.76	161
7	g		8	17262	24	414.29	162
8	h		8	17020	24	748.88	292
9	i				10		
10	j				10		
11	k		8	1700	16	27.20	11
12	l		8	17020	8	136.16	53
13	m		8	1656	116	192.10	75
		MAIN GIRDERS					
1	P_1		28	18440	12	221.28	1069
2	P_2		28	18440	12	221.28	1069
3	q		28	19808	6	117.65	568
4	r		28	18316	6	109.90	531
5	s		28	16430	6	98.58	476
6	t		28	14590	4	58.36	282
7	u		16	17006	12	204.07	322
8	v		6	17020	60	1021.20	225
9	w		10	2x3756	311	2336.23	1448
10	x		6	1035	58	60.03	13
11	y		6	750	116	87.00	19

S. No.	Type of bars	Shape of bars (Not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (M)	Weight (Kgs.)
		CROSS GIRDERS					
1	a_1		20	8095	6	48.58	120
2	b_1		20	8284	4	33.14	82
3	c_1		25	8350	6	75.15	288
4	d_1				5		
5	e_1		25	8495	3	19.49	75
6	e_2		25	8495	2	13.00	50
7	f_1		25	8494	2	17.00	65
8	k_1		10	2x2786	86	367.75	226
9	k_2			2x3586	28	200.82	125
10	l_1		6	3950	24	142.80	31
11	l_2		6	8250	12	88.00	14
12	m_1		16	3996	18	71.93	114
13	A	Mesh reinforcement as shown in Drg. No. BD/14-76A.	6	6760	12	81.36	16
14	B	- Do -	6	2930	16	46.88	10
15	b_2		12	7604	4	30.42	27

NOTES:-

1. This drawing shall be read in conjunction with Drawing No. BD/13-76 and BD/14-76A showing the details of R.C.C. Deck Slab & R.C.C Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per IS:2502-1963.

ADDITIONAL NOTES FOR DRG. NO. BD/14-76A :

1. At the time of replacement of elastomeric bearings (whenever necessary), uniform seating of the main girders over the new bearings shall be ensured.
2. During jacking operation all the four jacks placed under one end x-girder shall be operated simultaneously using stress control system so as to ensure that the reactions on all the four jacks are equal at all times.
3. Maximum reactions on any jack under lifting condition = 21.6 tonnes.
4. Maximum design bearing pressure on sub-structure = 72 kg/cm².

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
DL	DL+LL	DL+LL+I	DL	DL+LL	DL+LL+I
87.00	157.00	170.90	174.00	256.25	272.70

TOTAL QUANTITIES (PER SPAN)

1. Steel: (including 5% extra for laps and wastage) = 10373 kgs.
2. Concrete: : 61.20 cu.m.

Note: These quantities do not include railing and wearing coat.

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Type 3a bars added. 2. Quantity of steel modified. 3. Additional notes for Drg. No. BD/14-76A added.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

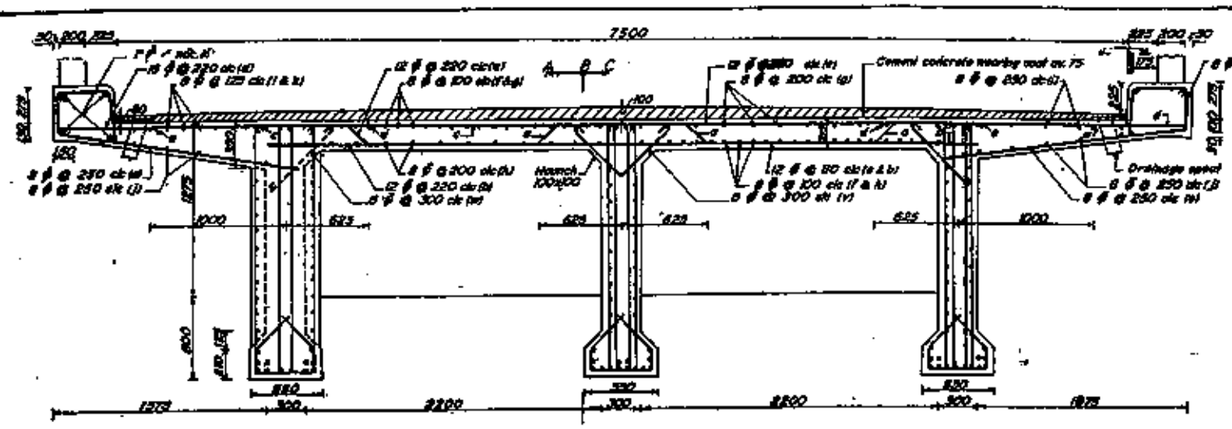
R.C.C. T-BEAM: EFFECTIVE SPAN 16.5 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING. ONE LANE IRC CLASS 70-R LOADING.
DO NOT SCALE

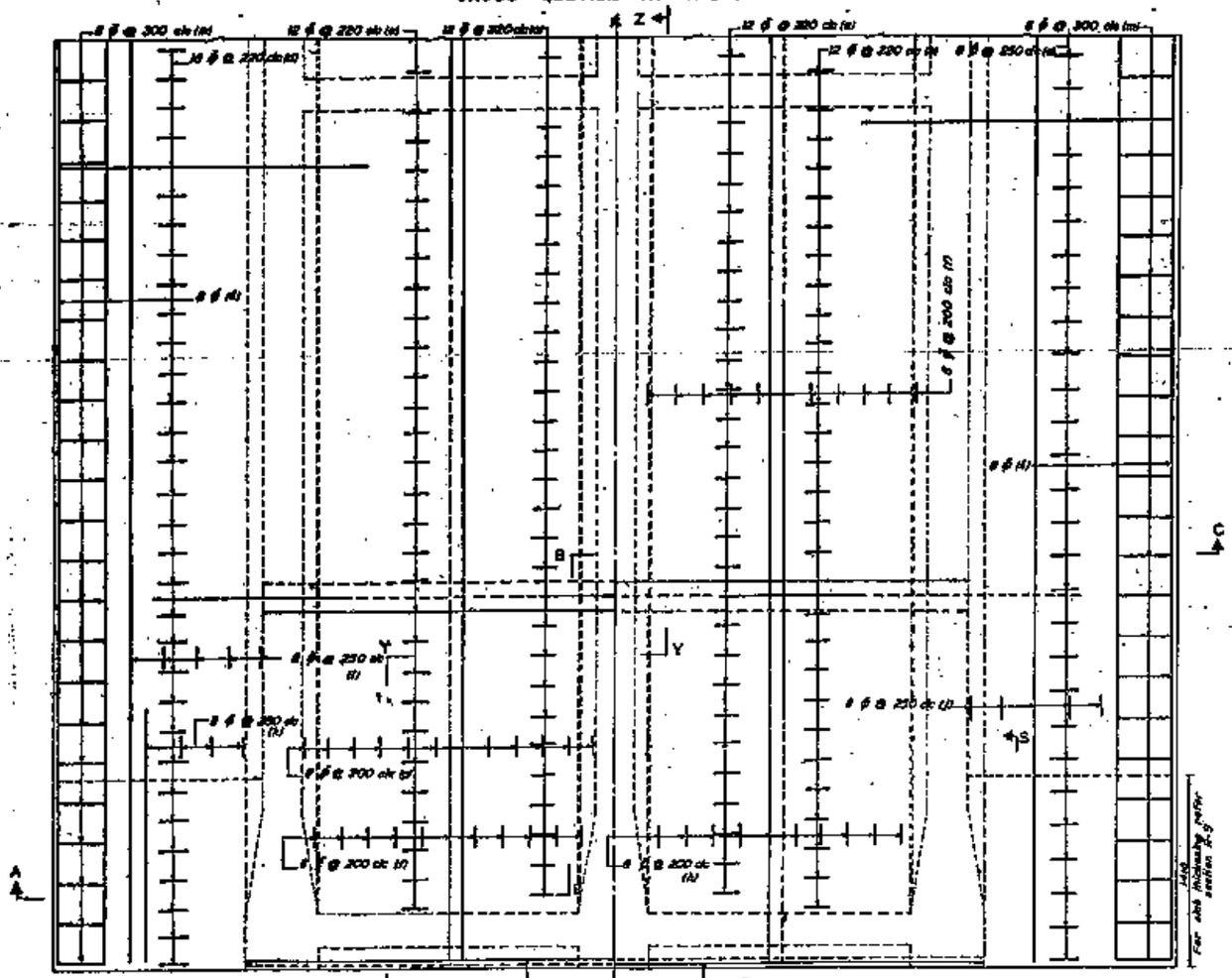
RECOMMENDED: S.C. KARYNA, A.E.E.
RECOMMENDED: R.S. SANKAR, S.E.
RECOMMENDED: S.C. MOTWANI, S.E.
APPROVED: S. BALAKOTAIAH, C.E.

SEPT. 76
DRG. No. BD/13-76A

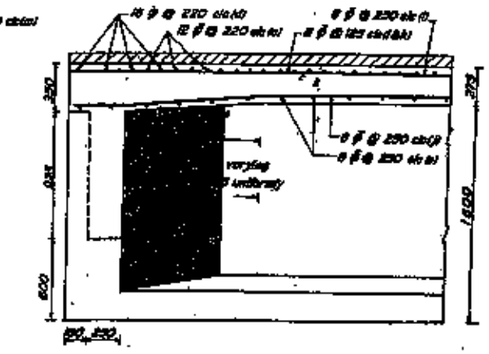
High Yield Strength Deformed Bars



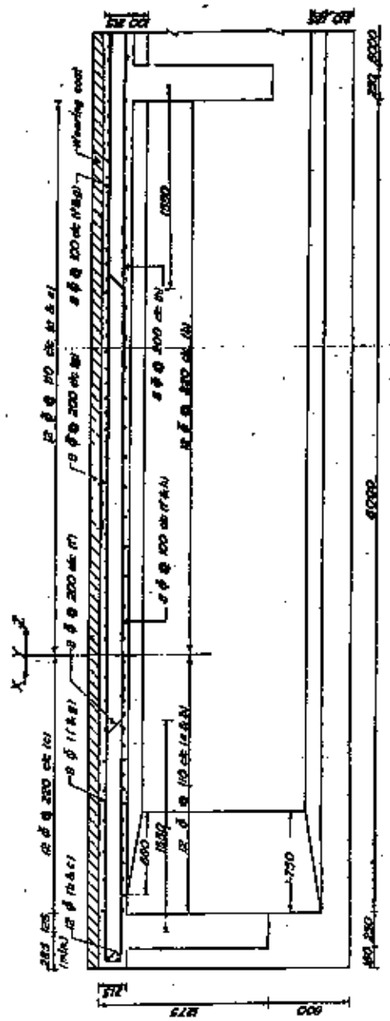
CROSS SECTION AT A-B-C



PLAN



SECTION AT R-S
(SHOWING LOCAL VARIATION IN THE THICKNESS OF CANTILEVER SLAB AT THE ENDS)



LONGITUDINAL SECTION AT X-Y-Z

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC : 6-1966, (iii) IRC : 21-1972 with latest amendments.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 [with latest amendments] or IS : 1786-1966 [with latest amendments].
5. This drawing shall not be applicable where reinforcing bars are joined by welding.
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.8.3. of IRC : 21-1972 should be strictly followed, if laps are provided.
7. Minimum cover to any reinforcement shall be 25 mm.
8. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
9. Support Chairs of 12 ϕ bars shall be provided at suitable intervals.
10. Chamfers or fillets of sizes 25mm×25 mm shall be provided at all angles of the form work unless otherwise specified in the drawing.
11. The railings shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
12. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
13. Properly stiffened welded steel plates shall be used as shuttering.
14. This drawing shall be read in conjunction with following drawings :
    (i) BD/2-77A showing details of longitudinal girders.
    (ii) BD/3-77A showing details of cross girders
    (iii) BD/4-77A showing schedule of reinforcement.
15. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

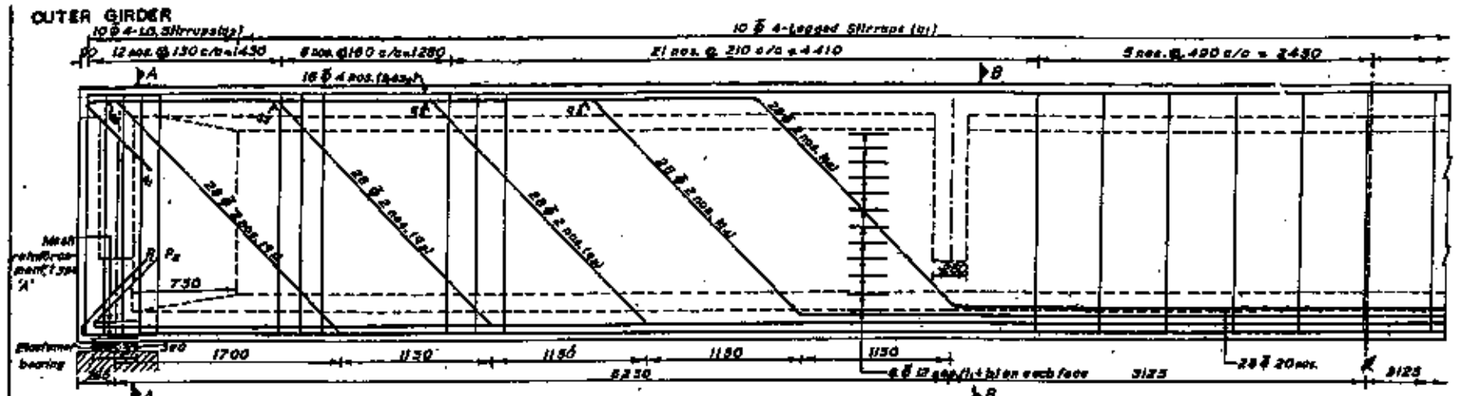
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 18.75 METRES
DETAILS OF SLAB

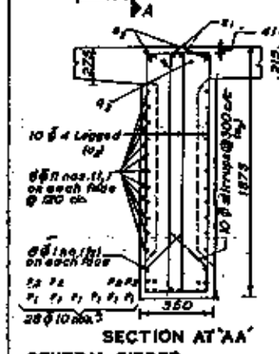
7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED: R.S. Khanna, E.C.	RECOMMENDED: B.S. Murthy, E.C. — DEC. 1977
RECOMMENDED: R.S. Khanna, E.C.	APPROVED: S. Venkateswaran, C.E. — DRG. NO. BD/1-77.

High Yield Strength Deformed Bars

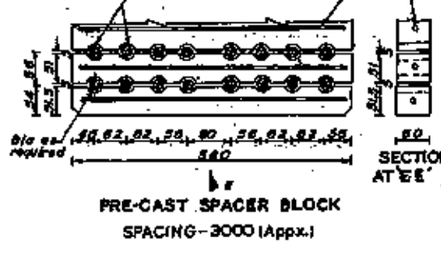
OUTER GIRDER



LONGITUDINAL SECTION

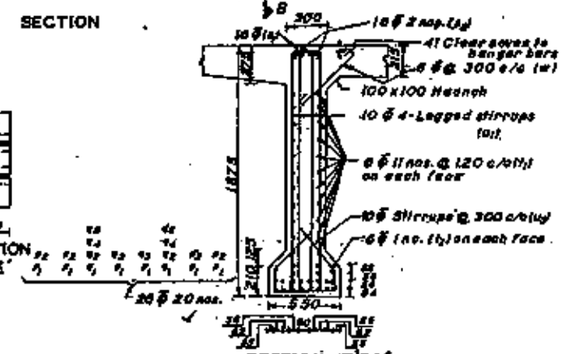


SECTION AT 'AA'
CENTRAL GIRDER

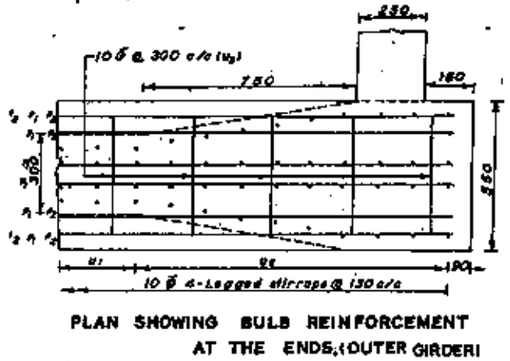


PRE-CAST SPACER BLOCK
SPACING - 3000 (Appx.)

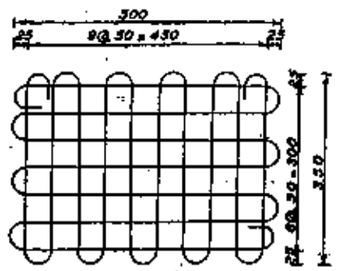
SECTION AT 'EE'



SECTION AT 'BB'



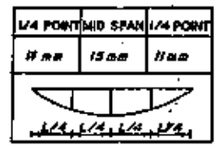
PLAN SHOWING BULB REINFORCEMENT
AT THE ENDS (OUTER GIRDER)



6 ϕ MESH REINFORCEMENT
TYPE "A"

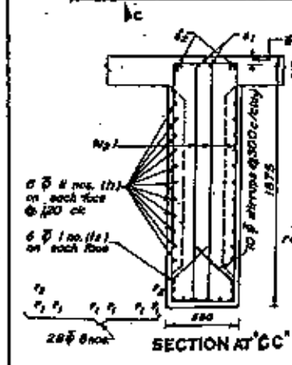
NOTES:

1. For General notes refer Drawing No. BD/1-77.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. This drawing shall be read in conjunction with following.
   (i) Drawing No. BD/1-77 showing details of slab,
   (ii) Drawing No. BD/3-77 showing details of cross girders and
   (iii) Drawing No. BD/4-77A showing schedule of reinforcement.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A', one at 20 mm. and the other at 130 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated easily for other spans.
9. The general arrangement of elastomeric bearings to be provided shall be as per drawing No. BD/4-75. Details of the elastomeric bearings for this design shall be as under:
   i. Length (a) = 300 mm.
   ii. Width (b) = 320 mm.
   iii. Thickness of each internal elastomer layer = 12 mm.
   iv. Thickness of steel reinforcing plate = 3 mm.
   v. Overall thickness of bearings will be 84 mm.
   vi. No. of internal elastomeric layers = five.
   vii. Design vertical load (DL+LL+Impact) = 97 tonnes
   viii. Maximum design bearing pressure on sub-structure = 72 Kg/cm²
10. All dimensions are in millimetres.
11. This drawing shall not be applicable where reinforcing bars are joined by welding.
12. At the time of replacement of elastomeric bearings whenever necessary uniform seating of the main girders over the new bearings should be ensured.
13. Tests and specifications for elastomeric bearings shall comply with cl. 2005 of M.O.S. & T. specifications.

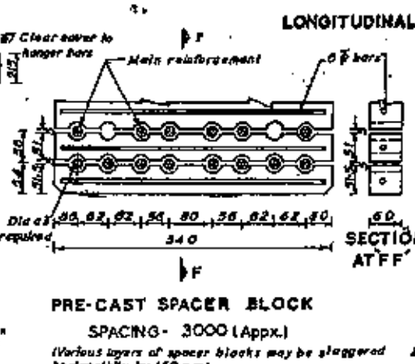


DEAD LOAD
DEFLECTION DIAGRAM

LONGITUDINAL SECTION

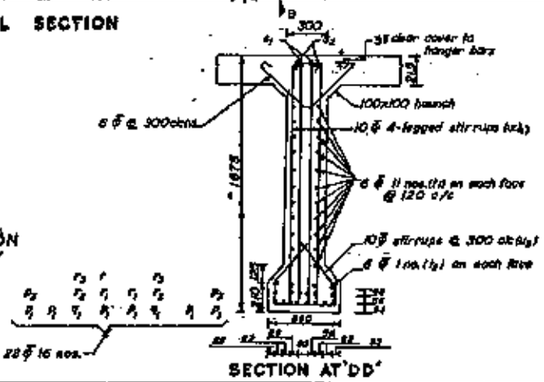


SECTION AT 'CC'

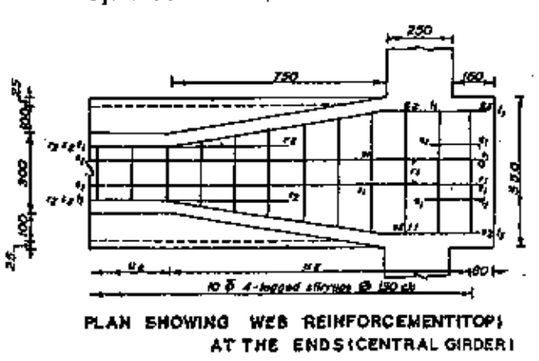


PRE-CAST SPACER BLOCK
SPACING - 3000 (Appx.)
(Various layers of spacer blocks may be staggered horizontally by 150 mm).

SECTION AT 'FF'



SECTION AT 'DD'



PLAN SHOWING WEB REINFORCEMENT (TOP)
AT THE ENDS (CENTRAL GIRDER)

Revision	Year	Description	Signature
A	1980	1. Notes modified. 2. stirrups in central girder modified	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 18·75 METRES
DETAILS OF LONGITUDINAL GIRDERS

7·5 METRES ROADWAY
DO NOT SCALE.

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS 70-R LOADING

RECOMMENDED: R.S. Sharma, S.E.

RECOMMENDED: R.S. Murthi, S.E.

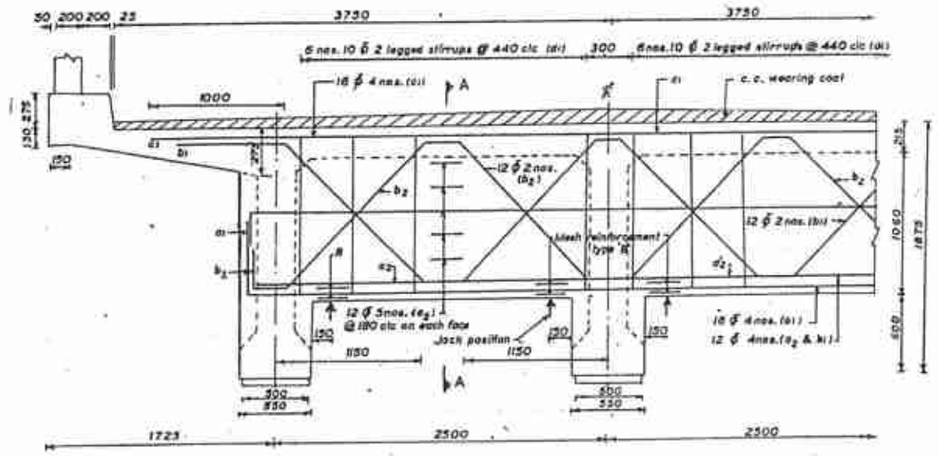
APPROVED: G. Venkateswulu, Dir.

DEC. 1977.

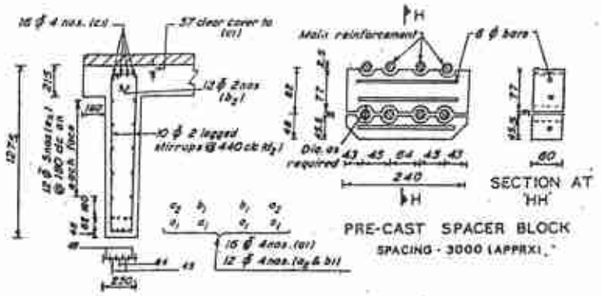
DRG. NO. BD/2-77A

High Yield Strength Deformed Bars

END CROSS GIRDER



LONGITUDINAL SECTION

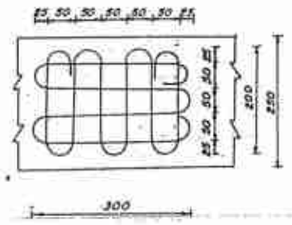


SECTION AT 'HH'

PRE-CAST SPACER BLOCK

SPACING - 3000 (APPRX).

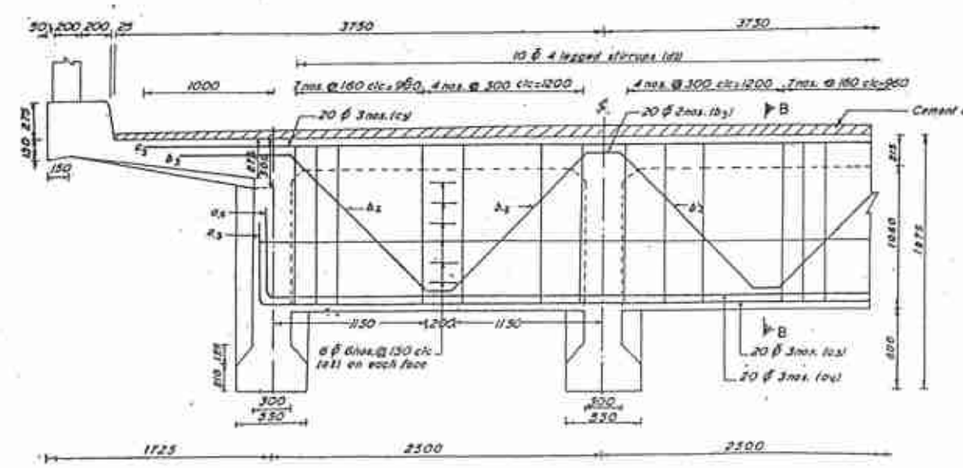
SECTION AT 'AA



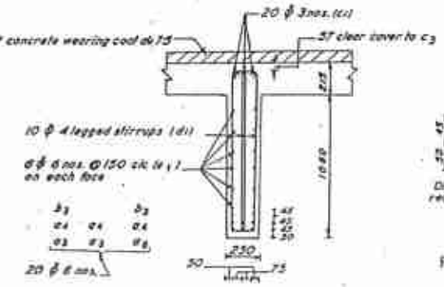
MESH REINFORCEMENT 6mm ϕ̄

TYPE 'B'

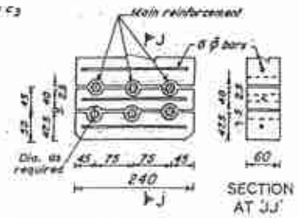
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT BB'



SECTION AT 'JJ'

PRE-CAST SPACER BLOCKS

SPACING - 3000 (APPROX.)

(Various layers of spacer blocks may be staggered horizontally by 150 mm.)

NOTES :—

1. This drawing shall be read in conjunction with following drawings
   (i) BD/1-77 showing details of slab
   (ii) BD/2-77A showing details of longitudinal girders and
   (iii) BD/4-77A showing schedule of reinforcement.
2. For general notes, refer Drawings No. BD/1-77 and BD/2-77A.
3. The location of jacks for lifting up the superstructure to replace bearings etc., is shown thus ↑. These shall be distinctly etched for easy identification on the cross girders and the Pier/Abutment caps. Mesh reinforcement type 'B' in two layers one at 20 mm and the other at 100mm from the concrete surface shall be provided in the girders and the Pier/Abutment caps at jack positions.
4. During the jacking operation all the four jacks placed under one end cross girder shall be operated simultaneously using stress control system so as to ensur that the reaction on all the four jacks is equal at all times.
5. Maximum reaction on any jack under lifting condition = 27 tonnes.
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinforcing bars are joined by welding.
8. There shall be two intermediate cross girders provided at a spacing of 6.25 metres etc.

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Reinforcement in End Cross Girder modified. 2. Notes 4 and 5 added.	[signature] E.E. [signature] S.E. [signature] C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

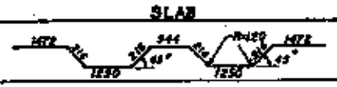
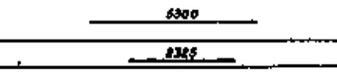
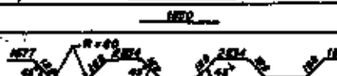
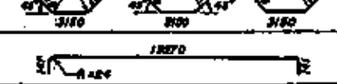
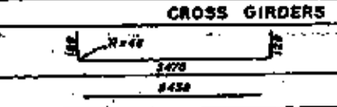
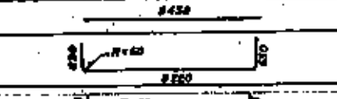
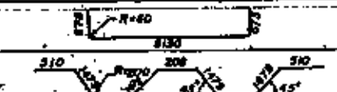
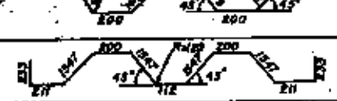
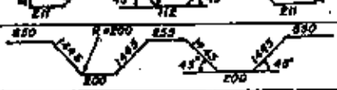
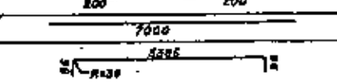
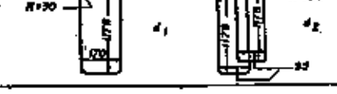
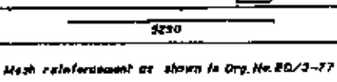
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

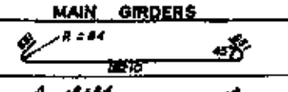
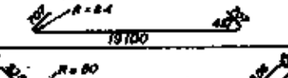
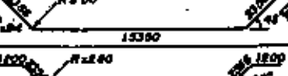
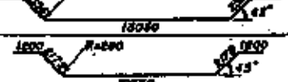
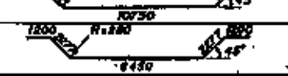
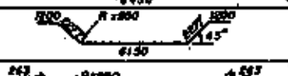
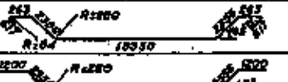
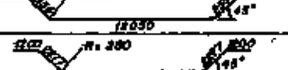
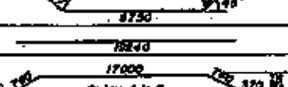
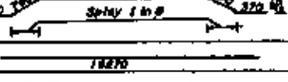
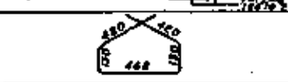
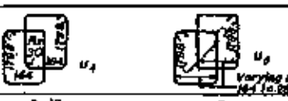
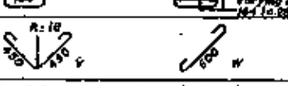
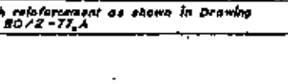
R.C.C. T-BEAM : EFFECTIVE SPAN 18.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING	
RECOMMENDED:	RECOMMENDED: Sd/- S. S. MINTHY, EE.	DEC. 1977.
RECOMMENDED: Sd/- R. S. SHARMA, E.E.	APPROVED: Sd/- G. VENKATESWAR, C.E.	DRG. NO. BD/3-77A.

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT

Sl. No.	Type of Bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm.)	No. of bars	Total length (m)	Weight (kgs.)
		SLAB					
1	a		12	7252	61	587.41	523
2	b	5300	12	5300	88	466.40	415
3	c				84	445.20	396
4	d	2325	16	2325	176	409.20	647
5	e	1850	8	1850	136	251.60	115
6	f		8	19600	22	431.20	172
7	g	19270	8	19512	24	468.29	187
8	h	19270	8	19270	24	462.48	185
9	i				10	192.70	77
10	j		8	19270	10	192.70	77
11	k	1700	8	1700	16	27.20	11
12	l	19270	8	19270	8	154.16	62
13	m		8	1636	130	215.28	86
		CROSS GIRDERS					
1	v_1		16	5646	8	45.17	71
2	a_2	5438	12	5438	4	21.75	19
3	a_3		20	6380	6	38.28	95
4	a_4		20	6380	6	38.28	95
5	b_1		12	7544	4	30.18	27
6	b_2		12	7588	4	30.35	27
7	b_3		20	8155	4	32.54	80
8	c_1	7000	16	7000	8	56.00	88
9	c_2		12	5518	20	110.36	98
10	c_3	7000	20	7000	6	42.00	103.
11	d_1		10	2936	24	70.46	44
12	d_2		10	5372	44	245.17	152
13	e_1	5230	6	5250	24	126	28
14	B	Mesh reinforcement as shown in Drg. No. BD/3-77 A	6	2930	16	46.88	10

Sl. No.	Type of Bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (kgs.)
		MAIN GIRDERS					
1	P_1		28	20460	18	368.28	1779
2	P_2		28	20460	10	204.60	988
3	q_1		28	21928	6	131.57	635
4	q_2		28	20162	4	80.65	390
5	q_3		28	17862	4	71.45	345
6	q_4		28	15404	4	61.62	298
7	q_5		28	12944	4	51.76	250
8	r_1		28	21770	2	43.54	210
9	r_2		28	19162	2	38.32	185
10	r_3		28	15704	2	31.41	152
11	s_1	19240	16	19240	6	115.44	182
12	s_2		16	19280	6	115.68	183.
13	f_1		6	19260	66	1271.16	280
14	f_2	19270	6	19270	6	115.62	25
15	U_1		20	8312	146	1213.55	752
16	U_2		10	8560 (LAP)	36	308.16	191
17	U_3		10	1558	195	303.81	188
18	U_4		10	8328	83	691.22	429
19	U_5		10	8576 (LAP)	18	154.37	96
20	V		6	1055	65	67.28	15
21	W		6	750	130	97.50	21
22	A	Mesh reinforcement as shown in Drawing No. BD/2-77 A	6	7740	12	92.88	20

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At Pier		
D.L.	D.L.+L.L. (WITHOUT IMPACT)	D.L.+L.L. (WITH IMPACT)	D.L.	D.L.+L.L. (WITHOUT IMPACT)	D.L.+L.L. (WITH IMPACT)
107.73	161.28	194.59	213.46	299.76	315.10

TOTAL QUANTITIES (PER SPAN)

1. STEEL* = 12080, Kgs.
   (Including 5% extra for laps and wastage)
2. CONCRETE* = 78.00 cu.m.

Note: These quantities do not include railing and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing No. BD/1-77, BD/2-77 A and BD/3-77 A showing the details of R.C.C./Deck Slab, Longitudinal girders and cross girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape
3. Dimensions in the schedule are given as per I.S. 2502-1963.

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Detail of cross-girder, longitudinal girders and quantity of steel modified	C.E. S.E. C.E.

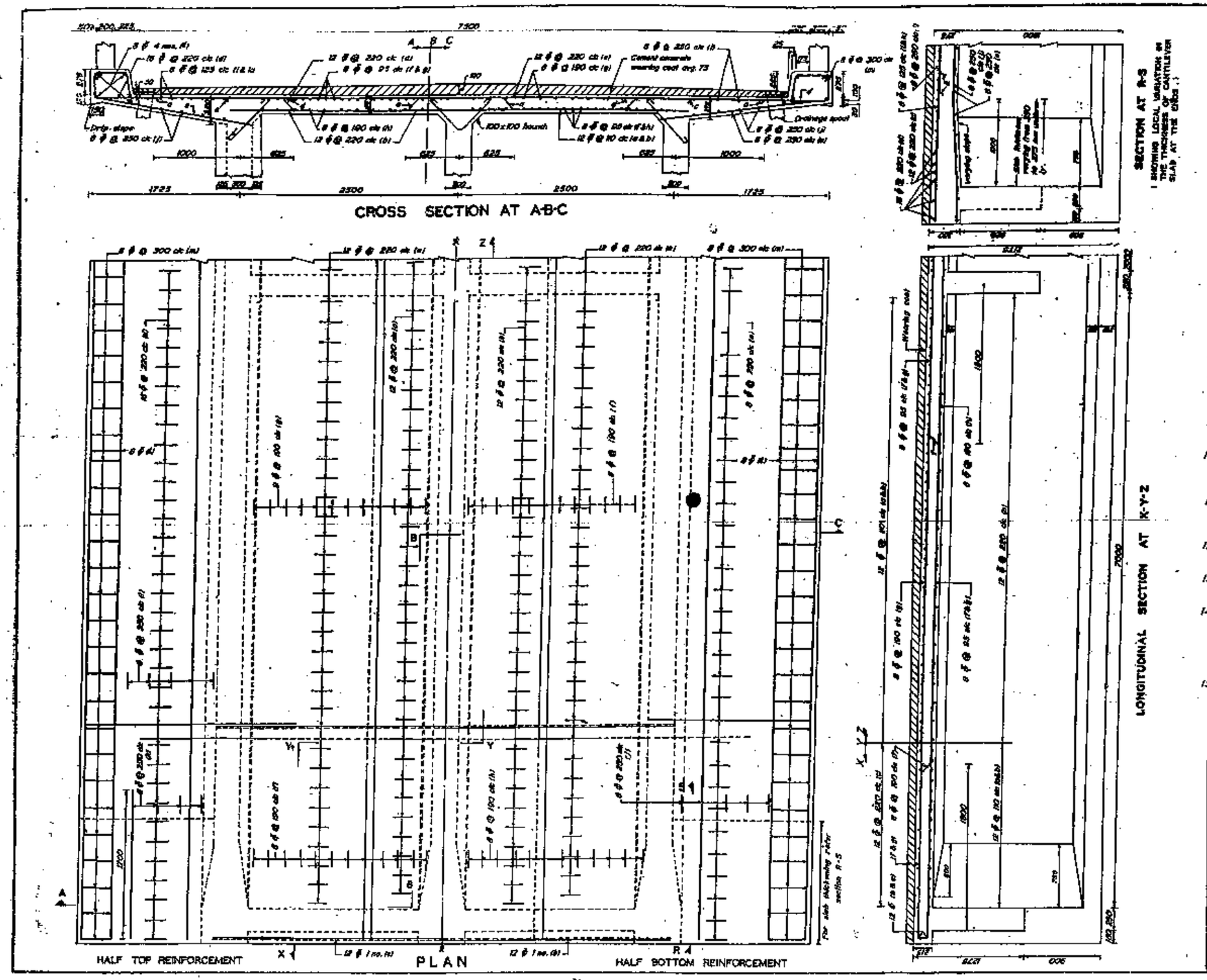
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATH)

R.C.C. T-BEAM: EFFECTIVE SPAN 18.75 METRES
SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE — ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED:	RECOMMENDED: Sd/- G.S.R. MURTHY S.E.	DEC. 1977
RECOMMENDED: Sd/- A.B. SHARMA, S.E.	APPROVED: Sd/- D. VENKATA REDDI, C.E.	DRG. NO. BD/4-77A.



High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes : (i) IRC : 5-1970, (ii) IRC : 6-1966, (iii) IRC : 21-1972 with latest amendments.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kg/cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with latest amendments) or IS : 1786-1966 (with latest amendments).
5. This drawing shall not be applicable where reinforcing bars are joined by welding.
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3. of IRC : 21-1972 should be strictly followed, if laps are provided.
7. Minimum cover to any reinforcement shall be 25 mm.
8. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
9. Support Chairs of 12 ϕ bars shall be provided at suitable intervals.
10. Chamfers or fillets of size 25 mm x 25 mm shall be provided at all angles of the form work unless otherwise specified in the drawing.
11. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
12. For details of wearing coat and drainage refer Drawing NO. BD/1-69 A.
13. Properly stiffened welded steel plates shall be used as shuttering.
14. This drawing shall be read in conjunction with the following drawings :
    (i) BD/6-77A showing details of longitudinal girders
    (ii) BD/7-77A showing details of cross girders.
    (iii) BD/8-77A showing schedule of reinforcement
15. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

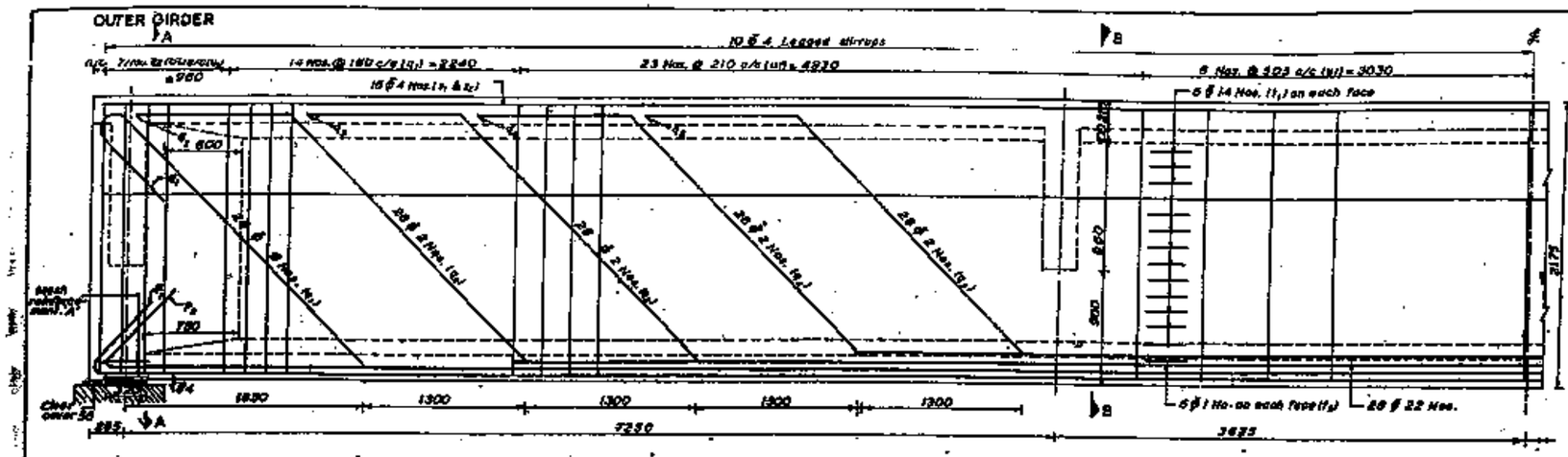
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 21.75 METRES
DETAILS OF SLAB

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED: G.S.C. KANTHALABE RECOMMENDED: S.C. NOTWANI, E.E.	RECOMMENDED: PRAVALLA KUMAR, S.E. APPROVED: P. VENKATESULU, C.E.
FEB. 1978.	DRG. NO. BD/5-77

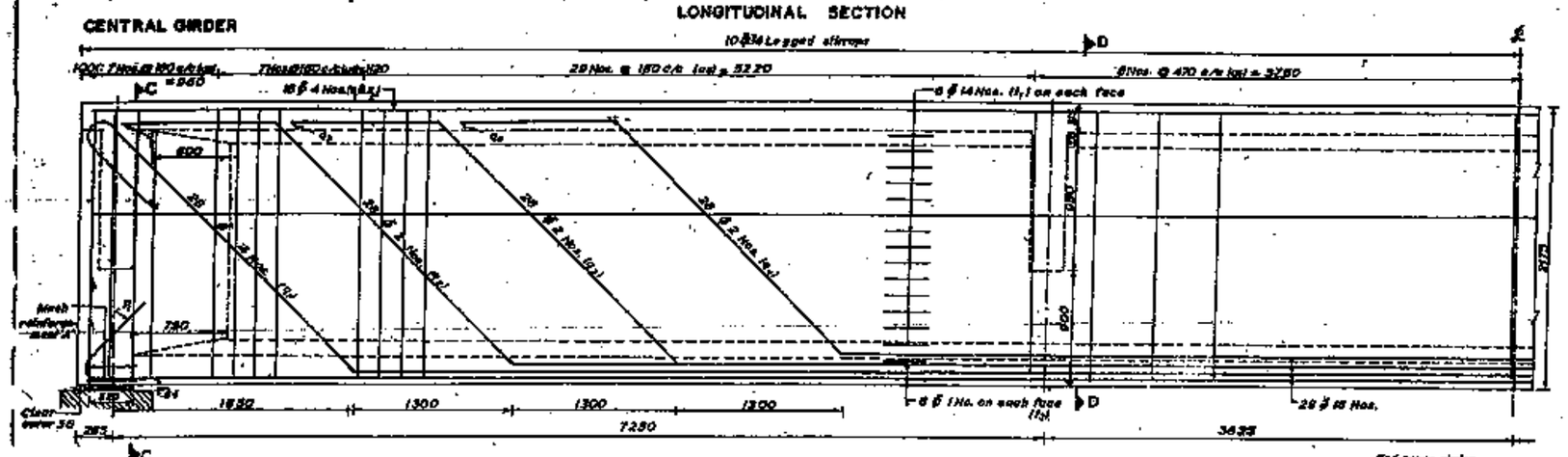
High Yield Strength Deformed Bars

OUTER GIRDER

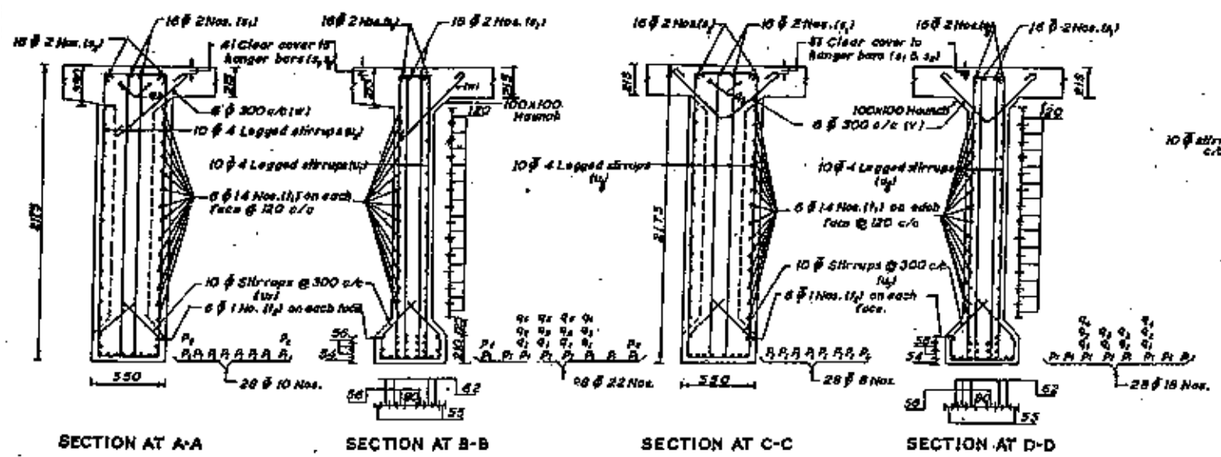


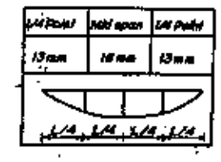
LONGITUDINAL SECTION

CENTRAL GIRDER

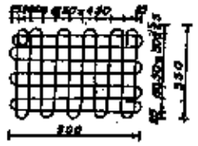


LONGITUDINAL SECTION





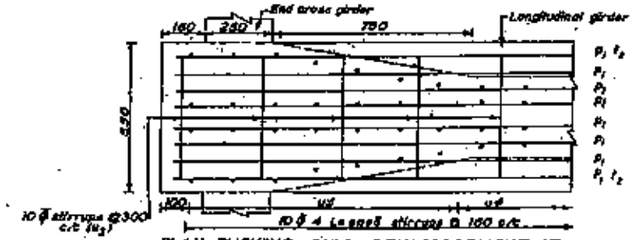
DEAD LOAD DEFLECTION DIAGRAM



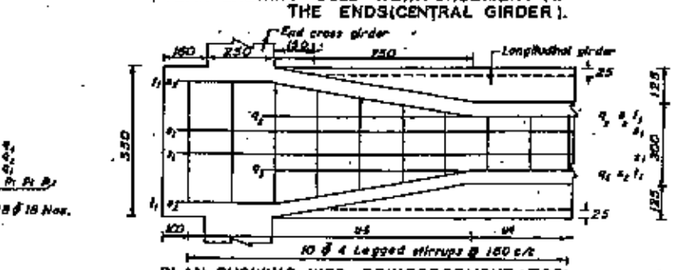
MESH REINFORCEMENT 6 MM. TYPE 'A'

NOTES:

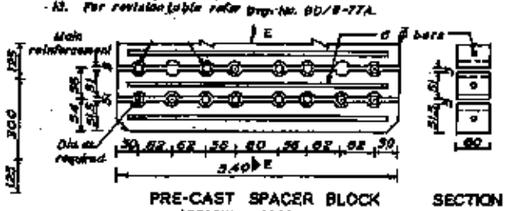
1. For General notes refer Drawing No. BD/5-77.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder shall be Provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. This drawing shall be read in conjunction with following drawings:
   (i) BD/3-77 showing details of slab.
   (ii) BD/7-77 showing details of cross girders.
   (iii) BD/8-77 showing schedule of reinforcement.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A'; one at 20 mm and the other at 120 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated easily for other spans.
9. The general arrangement of elastomeric bearings to be provided shall be as per drawing No. BD/4-73. Details of the elastomeric bearings for this design shall be as under:
   (i) Length (a) = 500 mm.
   (ii) Width (b) = 320 mm.
   (iii) Thickness of each internal elastomer layer = 12 mm
   (iv) Thickness of steel reinforcing plate = 3 mm.
   (v) Overall thickness of bearings will be 84mm.
   (vi) No. of internal elastomer layers = five
   (vii) Design vertical load (DL+LL+Impact) = 105 tonnes.
   (viii) Maximum design bearing pressure on sub-structure = 72 Kg/cm²
10. All dimensions are in millimetres.
11. This drawing shall not be applicable where reinforcing bars are joined by welding.
12. At the time of replacement of elastomeric bearings (whenever necessary) uniform shelving of both girders over the new bearings should be ensured.
13. For revision table refer Drg. No. BD/8-77A.



PLAN SHOWING BULB REINFORCEMENT AT THE ENDS (CENTRAL GIRDER).



PLAN SHOWING WEB REINFORCEMENT (TOP) AT THE ENDS (CENTRAL GIRDER)



PRE-CAST SPACER BLOCK (SPACING = 3000 (APPX.) (Various layers may be staggered horizontally by 150 mm)

SECTION AT E-E

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 21·75 METRES

DETAILS OF LONGITUDINAL GIRDERS

7.5 METRES ROADWAY. TWO LANES IRC CLASS 'A' LOADING. ONE LANE IRC CLASS '70-R' LOADING.

DO NOT SCALE.

RECOMMENDED: G.S.C. KARTHA, A.E.E.

RECOMMENDED: S.C. GUPTA, E.E.

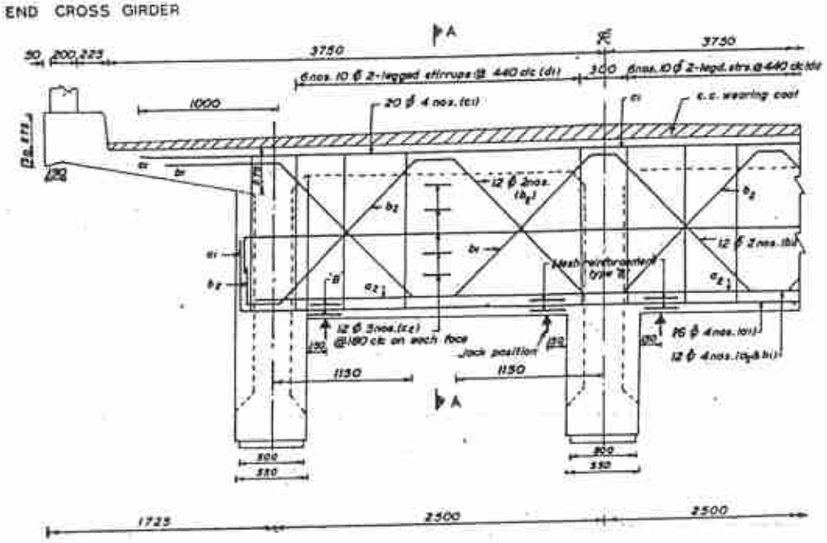
RECOMMENDED: PRAFULLA KUMAR, S.E.

APPROVED: D. Kumar, Jt. Secy. (R)

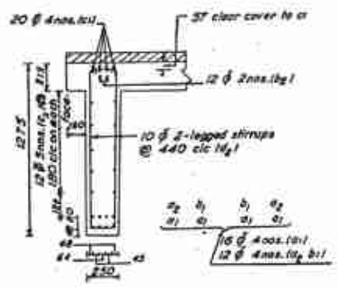
FEB. 1978

DRG. NO. BD/6-77A

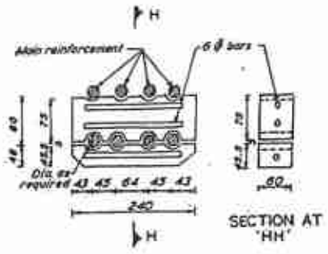
END CROSS GIRDER



LONGITUDINAL SECTION



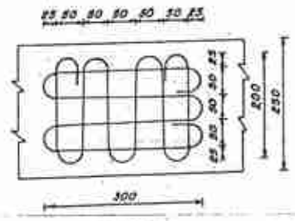
SECTION AT 'AA'



PRE-CAST SPACER BLOCK

SPACING - 3000 (APPX)

SECTION AT 'HH'

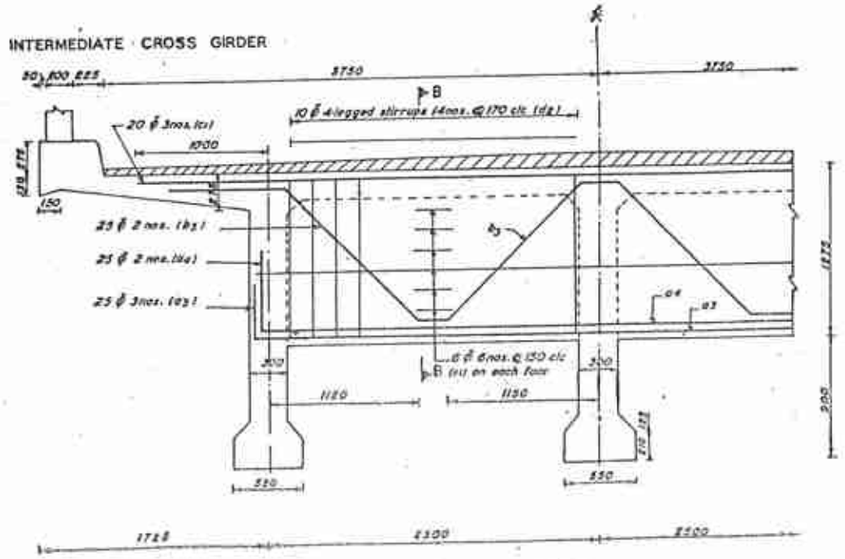


MESH REINFORCEMENT 6mm TYPE 'B'

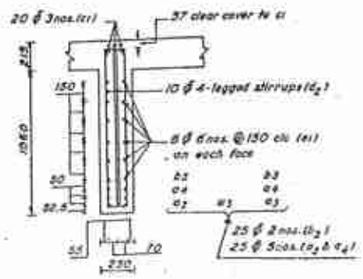
NOTES :-

1. This drawing shall be read in conjunction with the following drawings:
   (i) BD/5-77 showing details of slab
   (ii) BD/6-77A showing details of longitudinal girders
   (iii) BD/8-77A showing schedule of reinforcement.
2. For general notes, refer drawing Nos. BD/5-77 and BD/6-77A.
3. The location of jacks for lifting up the superstructure to replace bearings etc., is shown thus ↑. These shall be distinctly etched for easy identification on the cross-girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers one at 20mm and the other at 120mm from the concrete surface shall be provided in the girders and the pier/abutment caps at jack positions.
4. During the jacking operation all the four jacks placed under one end cross-girder shall be operated simultaneously using stress control system so as to ensure that the reaction on all the four jacks is equal at all times.
5. Maximum reaction on any jack under lifting condition = 27 tonnes.
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinforcing bars are joined by welding.
8. There shall be two intermediate cross girders provided at a spacing of 7.25 metres etc.
9. Tests and specifications for elastomeric bearing shall comply with cl. 2005 of M.O.S.&T specifications.

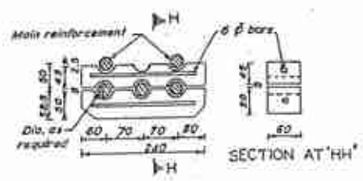
INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT 'BB'



PRE-CAST SPACER BLOCK
(INTERMEDIATE CROSS GIRDER)
SPACING - 3000 (APPROX)

(Various layers of spacer blocks may be staggered horizontally by 150mm.)

SECTION AT 'HH'

REVISION	YEAR	DESCRIPTION	SIGNATURE
A	1980	1. Reinforcement in End Cross Girder modified. 2. Notes 4,5 & 9 added.	G.S. Khanna B.E. C.E.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

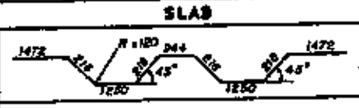
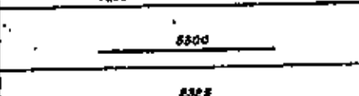
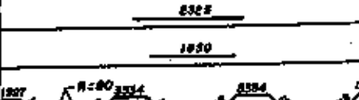
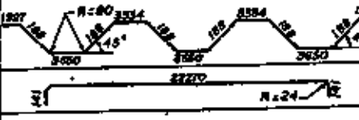
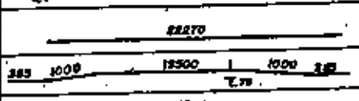
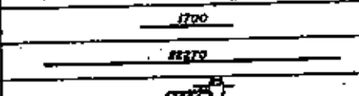
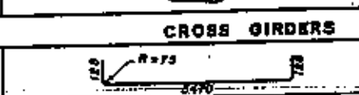
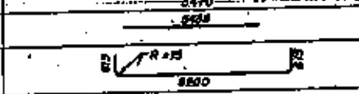
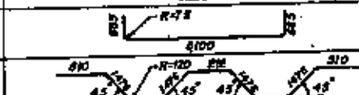
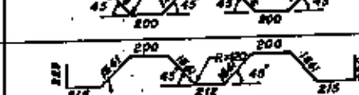
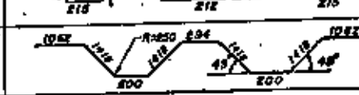
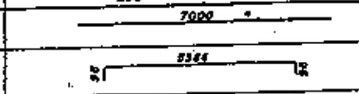
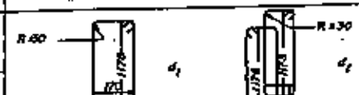
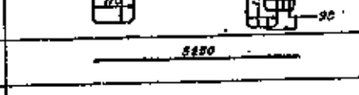
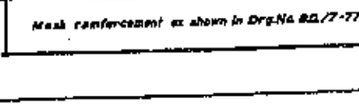
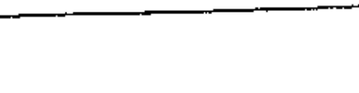
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

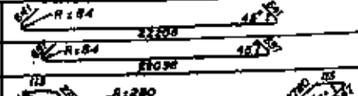
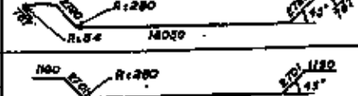
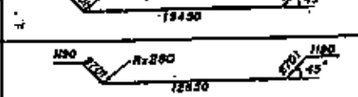
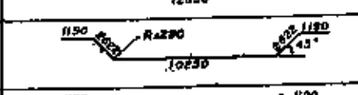
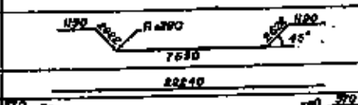
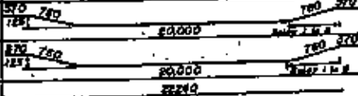
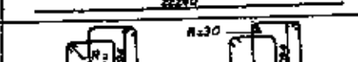
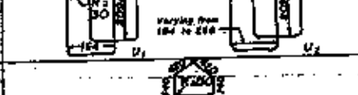
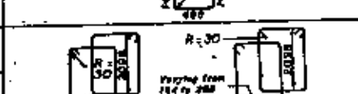
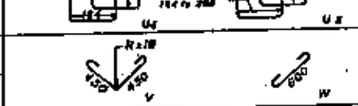
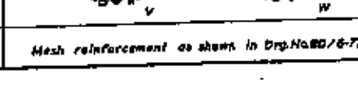
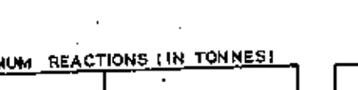
R.C.C T-BEAM: EFFECTIVE SPAN 21.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROADWAY DO NOT SCALE	TWO LANES IRC CLASS 'A' LOADING ONE LANE IRC CLASS '70-R' LOADING
RECOMMENDED:	RECOMMENDED: SE/H.Q.S.TR. PRAFULLA KUMAR, EE
RECOMMENDED: SE/H.Q.S.TR. S.C. MOTWANI, EE	APPROVED: SE/A D. VENKATESWARLU, CE
	FEB, 1978.
	DRG. NO. BD/7-77A

High Yield Strength Deformed Bars

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs)
		SLAB					
1	a		12	7252	96	696.19	620
2	b		12	5300	98	1038.80	925
3	c				98		
4	d		16	2525	204	479.30	749
5	e		6	1850	180	333.00	130
6	f		8	22600	24	542.40	212
7	g		8	22512	24	540.29	211
8	h		8	22270	24	767.18	295
9	i				10		
10	j		8	22270	10	221.70	87
11	k		8	1700	16	27.20	11
12	l		8	22270	8	178.16	69
13	m		8	1638	150	245.40	97
		CROSS GIRDERS					
1	a_1		16	5648	8	45.18	71
2	a_2		12	5438	4	21.75	19
3	a_3		25	5305	6	31.83	146
4	a_4		25	5306	4	25.82	97
5	b_1		12	7536	4	30.14	27
6	b_2		12	7512	4	30.05	27
7	b_3		25	8490	4	33.96	131
8	c_1		20	7000	14	98.00	241
9	c_2		12	5518	20	110.36	98
10	d_1		10	2936	24	70.46	44
11	d_2		10	2x2786	56	312.03	193
12	e_1		6	5250	24	126.00	28
13	B	Mesh reinforcement as shown in Drg.No.BD/7-77A	6	2930	16	46.88	10

Sl. No.	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs)
		MAIN GIRDERS					
1	P_1		28	23438	24	656.25	3179
2	P_2				4		
3	q_1		28	25318	12	303.82	1467
4	q_2		28	23232	6	139.39	673
5	q_3		28	20632	6	123.79	598
6	q_4		28	17874	6	107.24	518
7	q_5		28	15274	4	61.10	295
8	s_1		16	22240	6	133.44	211
9	s_2		16	22260	6	133.56	211
10	t_1		6	22260	84	1869.84	411
11	t_2		6	22240	6	133.44	29
12	u_1		10	2x4756	170	1617.04	1003
13	u_2		10	2x4880 (AVG)	28	273.28	169
14	u_3		10	1358	225	350.55	217
15	u_4		10	2x4764	87	828.94	514
16	u_5		10	2x4898 (AVG)	14	136.86	85
17	v		6	1035	75	77.63	17
18	w		6	750	150	112.50	25
19	A	Mesh reinforcement as shown in Drg.No.BD/6-77A	6	7740	12	92.88	20

MAXIMUM REACTIONS (IN TONNES)

At Abutment			At pier		
DL	DL+LL (without Impact)	DL+LL (with Impact)	DL	DL+LL (without Impact)	DL+LL (with Impact)
192.05	209.20	221.70	264.10	330.55	364.60

TOTAL QUANTITIES (PER SPAN)

1. STEEL = 14880 Kgs.
   (including 5% extra for laps and wastage.)
2. CONCRETE = 95.50 cum.
   Notes; These quantities do not include railing and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing Nos. BD/5-77, BD/6-77 A and BD/7-77 A showing the details of RC.C.Deck slab, Longitudinal Girders and Cross Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to proper shape.
3. Dimensions in the schedule are given as per I.S. 2502-1963.

REVISION TABLE FOR DRG. No. BD/6-77 A

REVISION	YEAR	DESCRIPTION	SIGNATURES
A	1980	1. Notes modified 2. Stirrups in central girder modified.	

REVISION	YEAR	DESCRIPTION	SIGNATURES
A	1980	1. Details of cross-girder, longitudinal girders and quantity of steel modified.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 21.75 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY — DO NOT SCALE

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

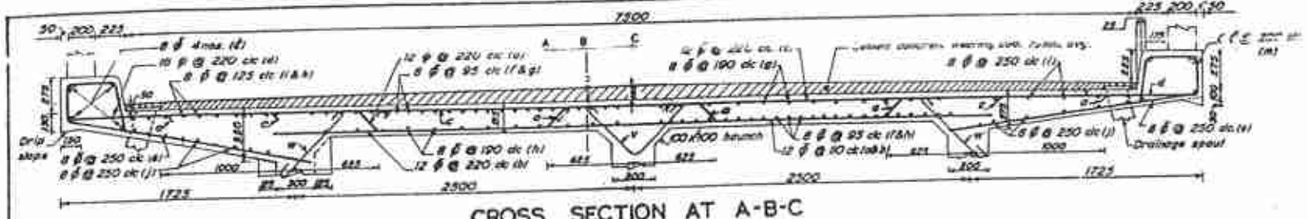
RECOMMENDED: S.S.C. KANTHA, A.E.E.

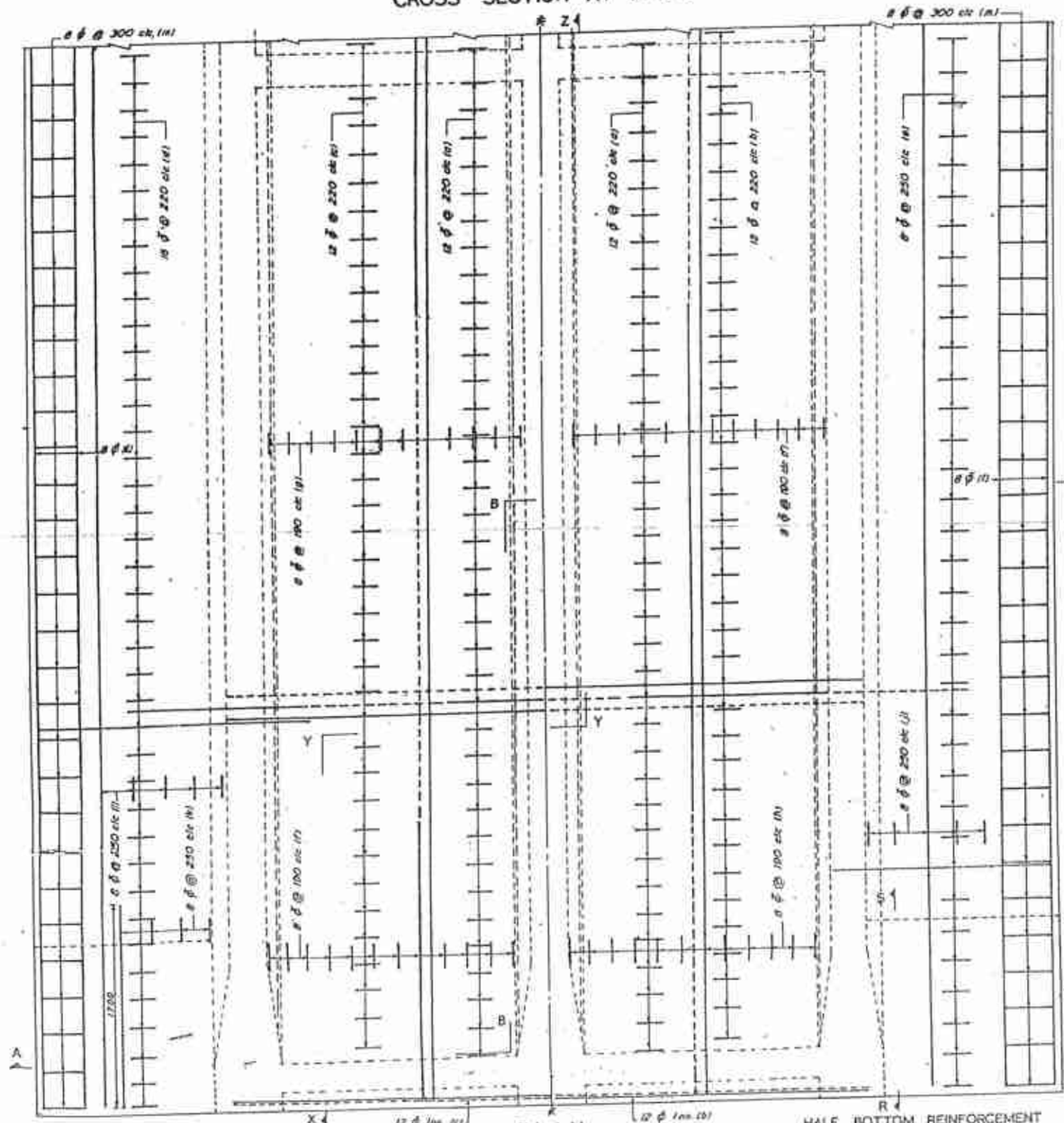
RECOMMENDED: 6/4/78 R.C. MOTHAMI, E.E.

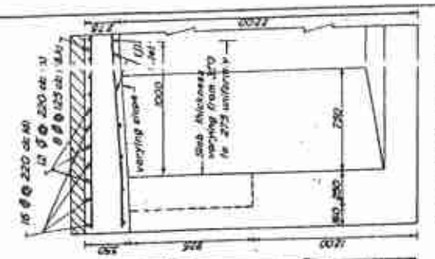
RECOMMENDED: 3/4/78 PRAHLAD KUMAR, S.E.

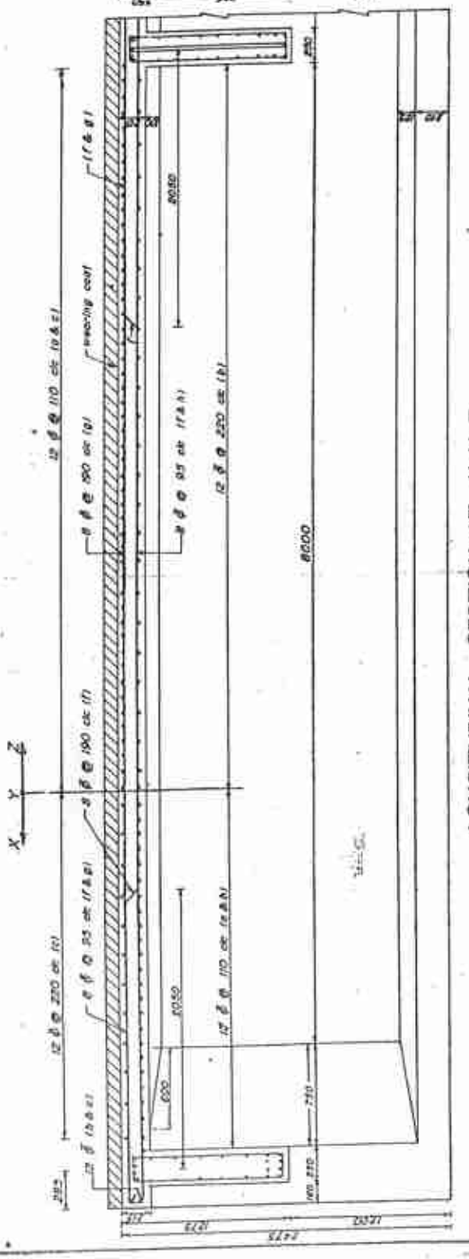
APPROVED: 3/4/78 D. VENKATESWARLU, C.E.

FEB. 1978
DRG. NO. BD/8-77 A









High Yield Strength Deformed Bars

NOTES :-

1. The design is according to the following Bridge Codes (i) IRC : 3-1970, (ii) IRC : 6-1966 & (iii) IRC : 21-1972 with latest amendments.
2. All dimensions are in millimetres.
3. Concrete for both beams and slab shall have a minimum 28 days works crushing strength of 200 kgs / cm² on 150 mm cubes.
4. Reinforcing steel used shall be High Yield Strength Deformed Bars conforming to IS : 1139-1966 (with latest amendments) or IS : 1786-1966 (with latest amendments).
5. This drawing shall not be applicable where reinforcing bars are joined by welding.
6. Joints or lapping of bars in main reinforcement shall be avoided as far as possible. However, the provision in clause No. 304.6.3 of IRC : 21-1972 should be strictly followed, if laps are provided.
7. Minimum cover to any reinforcement shall be 25 mm.
8. Pre-cast mortar blocks of the same strength as the slab concrete shall be used under the reinforcement to ensure the required cover.
9. Support bars of 12 mm dia. shall be provided at suitable intervals as per IS: 2502-63.
10. Chamfers or fillets of size 25 mm x 25 mm shall be provided at all angles of the form work unless otherwise specified in the drawing.
11. The railing shall be of any approved type. The reinforcement from railing should be anchored in the kerb before casting the slab.
12. For details of wearing coat and drainage refer Drawing No. BD/1-69A.
13. Properly stiffened steel plates shall be used as shuttering.
14. This drawing shall be read in conjunction with the following drawings :
    (i) BD/2-78A showing details of longitudinal girders
    (ii) BD/3-78A showing details of cross girders
    (iii) BD/4-78A showing schedule of reinforcement
15. This drawing shall not be used in unfavourable conditions of exposure such as marine atmosphere etc. unless approved measures are taken to protect the reinforcement from corrosion.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

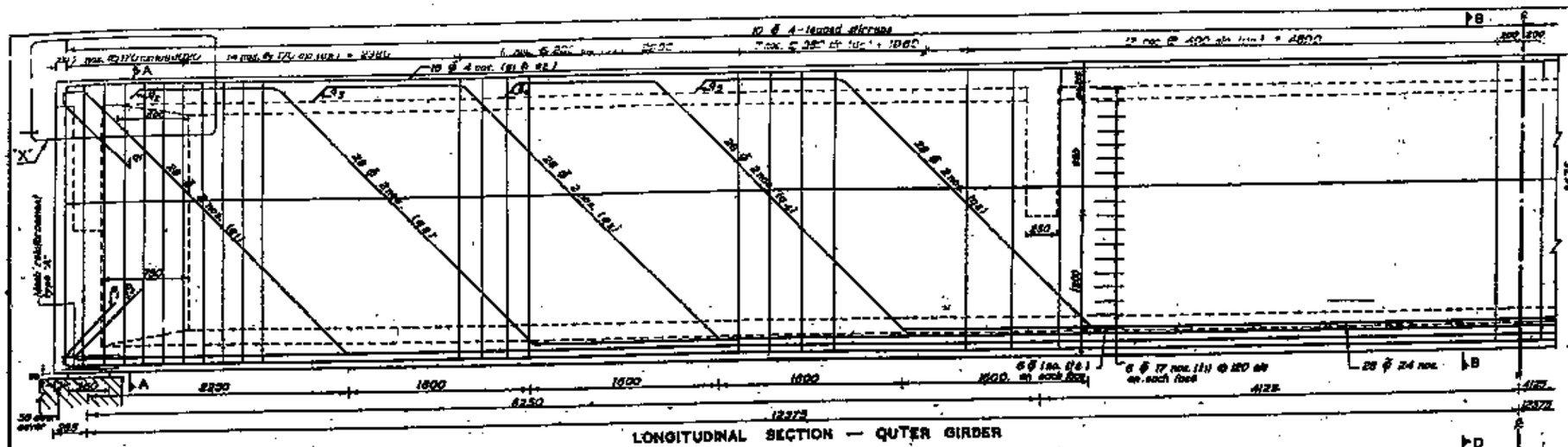
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

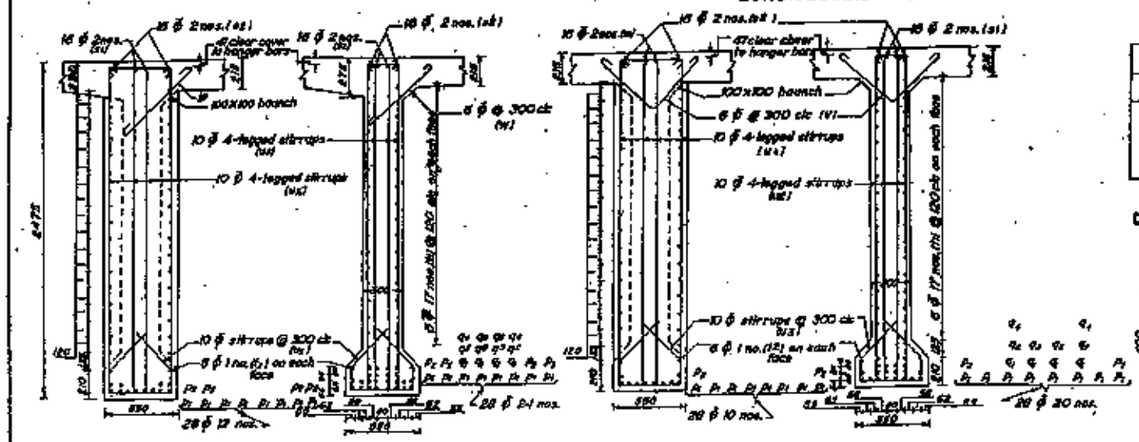
R.C.C. T-BEAM: EFFECTIVE SPAN 24.75 METRES DETAILS OF SLAB

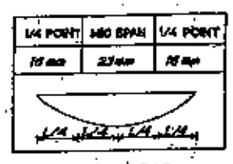
7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING
DO NOT SCALE — ONE LANE IRC CLASS '70-R' LOADING

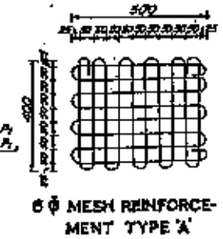
RECOMMENDED : S.C. MOTWANI, S.E.
RECOMMENDED : [illegible]
APPROVED : D. VENKATESULU, C.E.

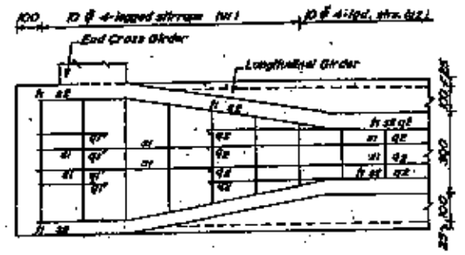
AUGUST, 1978.
DRG. NO. BD/1-78.

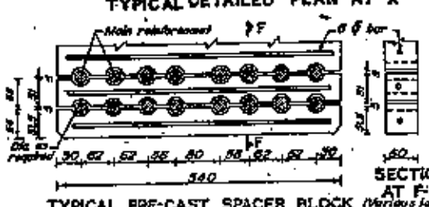








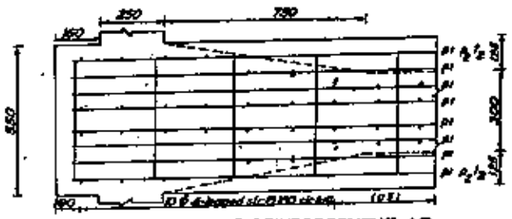




High Yield Strength Deformed Bar's

NOTES :-

1. For general notes refer Drawing No. BD/1-78.
2. Clear cover shall not be less than 40 mm for main reinforcement and 25 mm for other reinforcement.
3. Pre-cast spacer blocks of the strength not less than that of the concrete of girder, shall be provided as per the sketch to maintain the correct spacing of the main bars during concreting but these should not be placed at points of maximum bending moments.
4. Main beams shall be given upward camber to account for dead load deflection as given in the diagram.
5. This drawing shall be read in conjunction with following :
   (i) Drg. No. BD/1-78 showing details of slab.
   (ii) Drg. No. BD/3-78A showing details of cross girders.
   (iii) Drg. No. BD/4-78A showing schedule of reinforcement.
6. The expansion joints shall be of the approved type.
7. Two layers of mesh reinforcement type 'A' one at 20 mm and the other at 150 mm from the concrete surfaces shall be provided above the bearings. Similar mesh reinforcement of suitable size shall also be provided in the pier/abutment caps below the bearings.
8. The beam sections have been so proportioned that they permit the use of modular shuttering which could be repeated easily for other spans.
9. The general arrangement of elastomeric bearings to be provided shall be as per Drawing No. BD/4-78B. Details of the elastomeric bearings for this design shall be as under :
   i. Length (a) = 300 mm, ii. Width (b) = 350 mm
   iii. Thickness of each internal elastomer layer = 12 mm
   iv. Thickness of steel reinforcing plate = 3 mm,
   v. No. of internal elastomeric layers = six.
   vi Overall thickness of bearing = 99 mm.
   vii Design vertical load (DL+LL+ Impact) = 115 tonnes.
   viii Maximum design bearing pressure on sub-structure = 73 kg/cm².
10. All dimensions are in millimetres.
11. This drawing shall not be applicable where reinforcing bars are joined by welding.
12. At the time of replacement of elastomeric bearings (whenever necessary) uniform seating of the main girders over the new bearings should be ensured.
13. For revision table refer Drg. No. BD/4-78A
14. Tests and specifications for elastomeric bearings shall strictly comply with cl. 2003 of M.O.S. & T specification.



GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM : EFFECTIVE SPAN 24.75 METRERS DETAILS OF LONGITUDINAL GIRDERS

7.5 METRES ROADWAY
DO NOT SCALE

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS '70-R' LOADING

RECOMMENDED: S.G. MOTWANI, S.E.

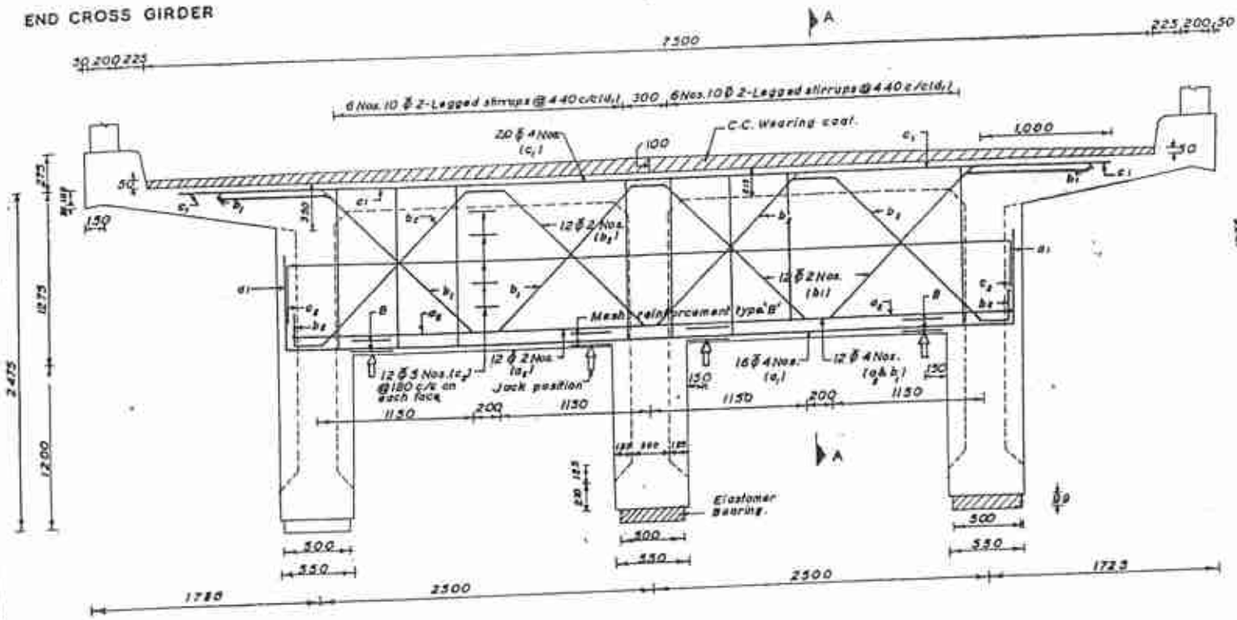
RECOMMENDED: PRAFULLA KUMAR, S.E.

APPROVED: D. VENKATESWARLU, C.E.

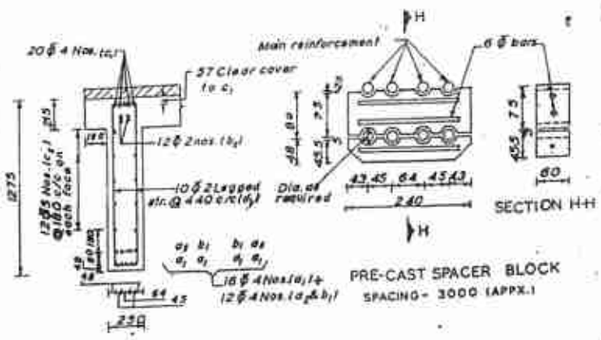
AUGUST, 1978.

DRG. NO. BD/2-78A

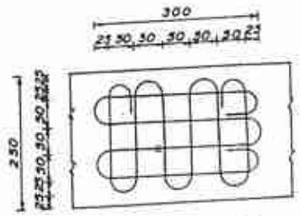
END CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT A-A

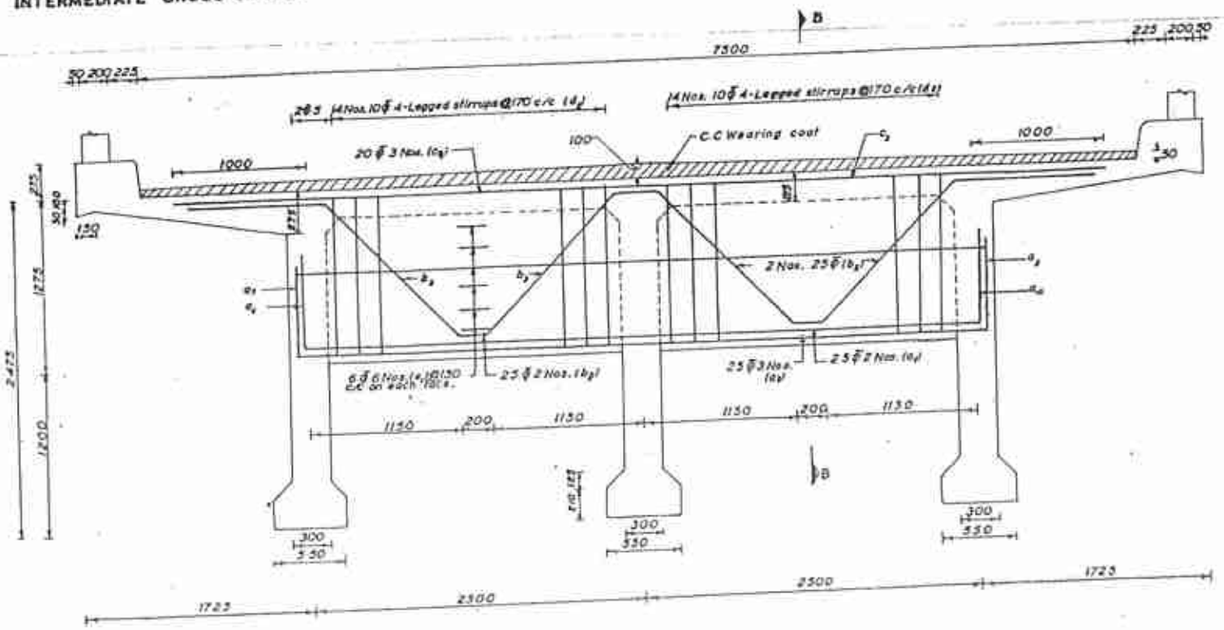


MESH REINFORCEMENT 6 mm TYPE 'B'

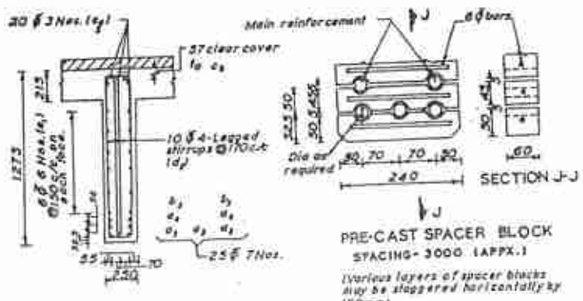
NOTES:

1. This drawing shall be read in conjunction with the following drawings.
   (i) BD/1-78 showing details of slab.
   (ii) BD/2-78 A showing details of longitudinal girders.
   (iii) BD/4-78 A showing schedule of reinforcement.
2. For general notes refer Drawings Nos. BD/1-78 and BD/2-78 A
3. The location of jacks for lifting up the superstructure to replace bearings etc. is shown thus ⇧ These shall be distinctly etched for easy identification on the cross girders and the pier/abutment caps. Mesh reinforcement type 'B' in two layers one at 20 mm and the other at 100 mm from the concrete surface shall be provided in the girders and the pier/abutment caps at jack positions.
4. During the jacking operation all the four jacks placed under one end cross girder shall be operated simultaneously using stress control system so as to ensure that the reaction on all the four jacks is equal at all times.
5. Maximum reaction on any jack under lifting condition = 40 Tonnes.
6. All dimensions are in millimetres.
7. This drawing shall not be applicable where reinforcing bars are joind by welding.
8. There shall be two intermediate cross girders provided at a spacing of 8.25 metres c/c

INTERMEDIATE CROSS GIRDER



LONGITUDINAL SECTION



SECTION AT B-B

Revision	Year	Description	Signature
A	1980	1. Reinforcement in end x-girder modified.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 24.75 METRES
DETAILS OF CROSS GIRDERS

7.5 METRES ROADWAY, DO NOT SCALE.

TWO LANES IRC CLASS 'A' LOADING
ONE LANE IRC CLASS 70-R' LOADING

RECOMMENDED:

RECOMMENDED: PRAFULLA KUMAR, S.E.

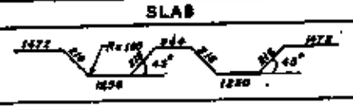
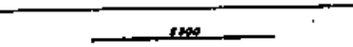
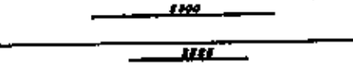
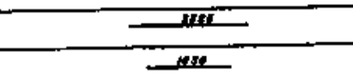
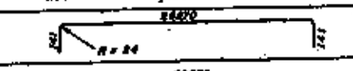
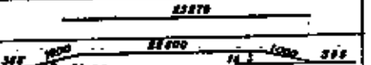
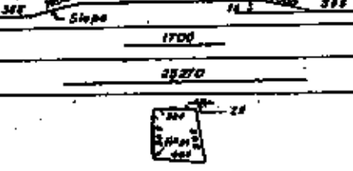
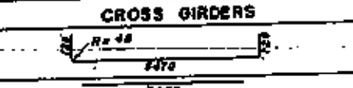
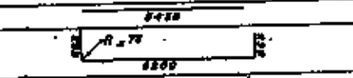
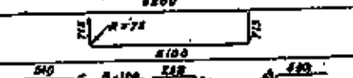
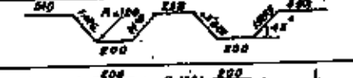
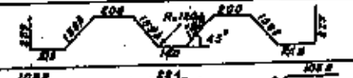
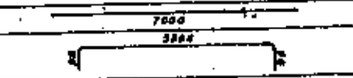
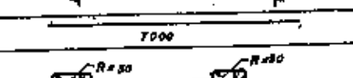
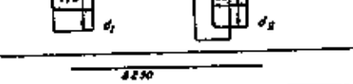
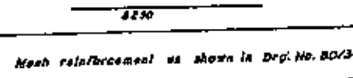
APPROVED: D. VENKATESULU, C.E.

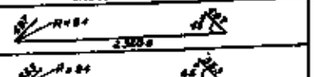
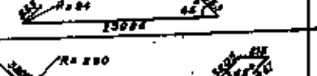
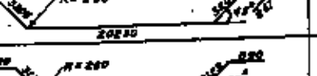
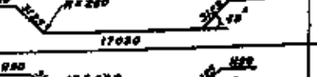
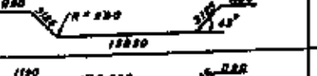
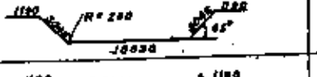
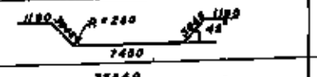
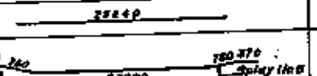
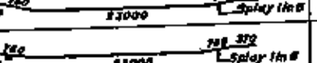
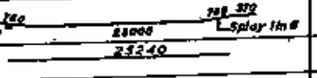
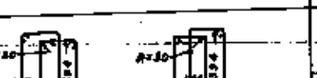
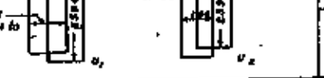
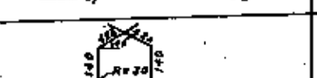
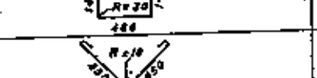
AUG. 1978

DRG. No. BD/3-78 A.

High Yield Strength Deformed Bars.

SCHEDULE OF REINFORCEMENT (PER SPAN)

Sl No	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs)
		SLAB					
1	a		12	7262	108	783.82	697
2	b		12	5300	113	1197.80	1066
3	c				113		
4	d		16	2333	232	539.40	852
5	e		8	1930	204	377.40	151
6	f		8	25600	24	614.40	246
7	g		8	25312	24	612.29	245
8	h		8	25270	24	111.88	445
9	i				10		
10	j				10		
11	k		8	1700	16	27.20	11
12	l		8	25270	8	202.16	81
13	m		8	1856	170	281.52	113
		CROSS GIRDERS					
1	a_1		16	5646	8	45.17	71
2	a_2		12	5438	4	21.75	19
3	a_3		25	8400	6	64.00	247
4	a_4				4		
5	b_1		12	7636	4	30.14	27
6	b_2		12	7672	4	30.05	27
7	b_3		25	8464	16	33.86	130
8	c_1		20	7000	8	56.00	136
9	c_2		12	5518	20	110.36	98
10	c_3		20	7000	6	42.00	104
11	d_1		10	2936	24	70.46	44
12	d_2		10	2x2785	88	312.03	193
13	e_1		6	5250	24	126.00	28
14	B	Mesh reinforcement as shown in Drg. No. BD/378	6	2930	16	46.88	10

Sl No	Type of bars	Shape of bars (not to scale) (Dimensions are in millimetres)	Dia. of bars (mm)	Length of each bar (mm)	No. of bars	Total length (m)	Weight (Kgs)
		MAIN GIRDERS					
1	B_1		28	26130	24	688.10	4284
2	B_2				10		
3	q_1		28	28389	12	340.42	1644
4	q_2		28	25680	6	154.08	744
5	q_3		28	22480	6	134.88	651
6	q_4		28	18122	6	114.73	554
7	q_5		28	15922	4	63.69	308
8	q_6		16	23240	6	151.44	236
9	q_7		16	25280	6	151.86	239
10	l_1		6	25260	102	2576.52	567
11	l_2		6	25240	6	151.44	33
12	u_1		10	2x5480 cv.	22	308.88	190
13	u_2		10	2x5336	276	1885.31	1169
14	u_3		10	1558	255	397.29	246
15	v		6	1035	85	87.98	19
16	w		6	730	170	127.50	28
17	A	Mesh reinforcement as shown in Drg. No. BD/2-78.	6	8787	12	105.20	23
18	w_1		10	2x5488 cv.	14	153.66	95
19	w_2			2x5364	100	1072.80	665

MAXIMUM REACTION (IN TONNES)

AT ABUTMENT			AT PIER		
DL	DL+LL (without Impact)	DL+LL (with Impact)	DL	DL+LL (without Impact)	DL+LL (with Impact)
152.50	237.40	249.10	315.00	403.10	416.00

TOTAL QUANTITIES (PER SPAN)

1. STEEL: = 17590 kgs.
   (including 8% extra for laps and wastage)
2. CONCRETE: = 114.50 cum
   Note: These quantities do not include railings and wearing coat.

NOTES:

1. This drawing shall be read in conjunction with Drawing Nos BD/1-78, BD/2-78A and BD/3-78 showing the details of R.C.C. Deck Slab, Longitudinal girders and Cross Girders respectively.
2. Full scale elevation for the bars shall be lined out on a plain plastered floor to the dimensions shown on the drawing so as to get correct clearance between different bars and then the bars bent up to the proper shape.
3. Dimensions in the schedule are given as per IS:2502-1963

REVISION TABLE FOR DRG. NO. BD/2 -78 A

Revision	Year	Description	Signatures
A	1980	1. Notes modified 2. Stirrups in central girder modified.	

Revision	Year	Description	Signatures
A	1980	1. Type q_1 & q_7 stirrups added. 2. Details of type b_1, b_2, c_1, q_1 & u_2 bars and quantity of steel modified.	

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

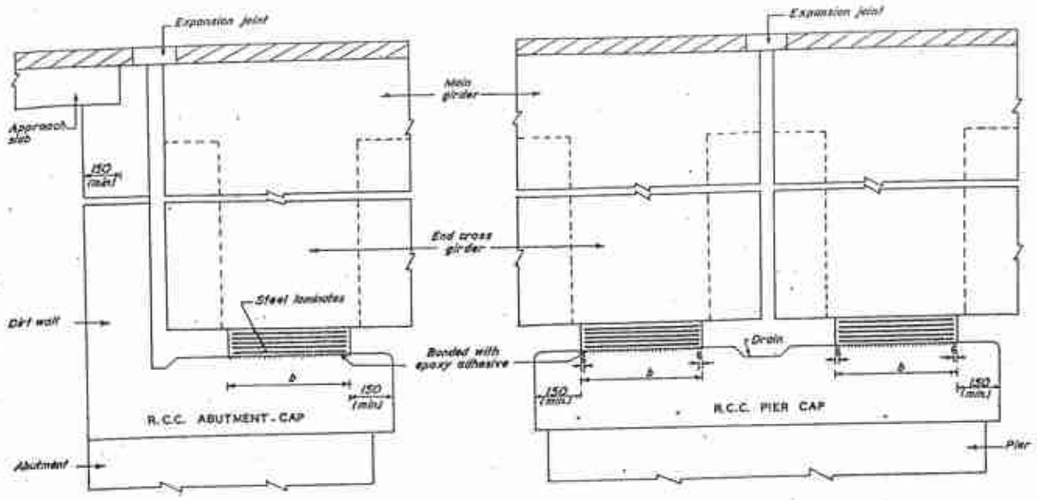
STANDARD CONCRETE BRIDGES (WITHOUT FOOTPATHS)

R.C.C. T-BEAM: EFFECTIVE SPAN 24·75 METRES SCHEDULE OF REINFORCEMENT

7.5 METRES ROADWAY — TWO LANES IRC CLASS 'A' LOADING, ONE LANE IRC CLASS 70-R LOADING
DO NOT SCALE

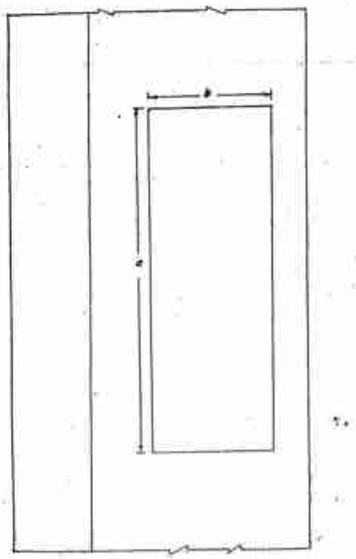
RECOMMENDED:
RECOMMENDED:
RECOMMENDED:
APPROVED:

AUG. 1978
DRG. No. BD/4-78A

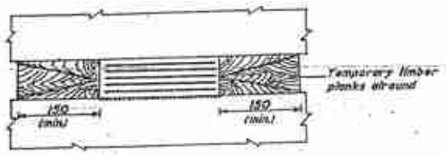


BEARING AT ABUTMENT

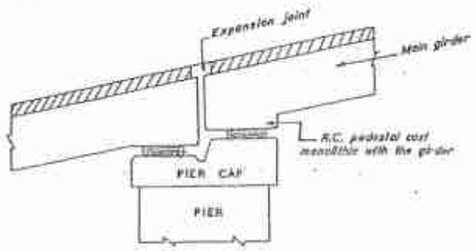
BEARINGS AT PIER



PLAN



TEMPORARY TIMBER PLANKS FOR INSTALLATION



INSTALLATION OF BEARINGS FOR SLOPING SUPER-STRUCTURE

INSTALLATION INSTRUCTIONS :

1. The position of the bearings shall be accurately marked on Pier / Abutment cap and the area where the bearings will be seated accurately levelled .
2. The concrete surface shall be freed from any loose material and cleaned of any grease , oil , paint etc . and it shall be dry at the time of fixing .
3. The surface of the elastomer shall be freed from any foreign matter , grease , oil , pant etc.
4. Once prepared , the concrete or elastomer surface should not be touched with bare hands.
5. Immediately after these have been placed in position the bearings shall be covered with canvas or a suitable covering material to protect from direct sun light and the weather until the concrete of the super-structure is cast .

6.1. The bearings shall be fixed in position with any approved type of epoxy resin adhesive . The instructions of adhesive manufacturer shall be scrupulously followed in fixing the bearings.

6.2. The concreting of girders shall be taken up only after ensuring that the adhesive for fixing the elastomeric bearings to the Pier / Abutment cap has set .

7. During concreting , the sides of bearings shall be covered with wooden planks as per sketch . These planks will be so placed that any load transfered to the bearings during concreting due to settlement of centering etc. shall be borne by the planks . The wooden planks should be supported by wedges in such a way that these can be easily removed after concreting of superstructure . Alternatively , any other suitable temporary support system approved by the Engineer-in-Charge may be adopted .
8. The side covering shall be removed after the superstructure concrete is set . The sides of the bearings shall be cleaned of any deposit of cement slurry / concrete .
9. At the time of replacement of bearings (whenever necessary), uniform seating of the main girders over all the new bearings shall be ensured .
10. BEARINGS FOR SLOPING SUPERSTRUCTURE :

The bearings shall be placed horizontally . The end portion of the girders above the bearings shall be made horizontal , adequately reinforced and cast monolithic with the girder so as to fit exactly above the bearings , as shown in the sketch .

NOTES :

1. Specifications including permissible tolerances for the Elastomeric Bearings shall be in accordance with clause 2005 of the Specifications for Road and Bridge Works (first revision) 1978 of the Ministry of Shipping & Transport (Roads Wing).
2. Elastomer (neoprene) to be used in bearings shall be of shore hardness of 60 .
3. The rotation due to constructional inaccuracy has not been considered in the design of the bearings . It is, therefore, essential that great care is exercised in placing the bearings accurately and installation instructions followed scrupulously . This is all the more important when the super-structure consists of pre-cast girders .
4. Elastomeric bearings should not be used in areas where the minimum temperature goes below (-) 10°c .
5. Thickness of any internal layer of elastomer shall be 10mm unless specified otherwise in the drawing .
6. The thickness of steel laminates shall not be less than 3 mm and the edges shall be rounded or chamfered . The steel shall conform to IS : 226 .
7. Bearings shall be handled carefully . These shall be protected from bright sun light and extreme cold . These shall be stored neatly under cover till used on the bridge.
8. All dimensions are in millimetres .
9. The bearings shall be tested in accordance with cl. 2005 of M.O. S&T specification before installation .

DATE	REVISION	DESCRIPTION	E.E	S.E	C.E
Sept 78	A	Installation instructions and notes modified.			
Oct 80	B	1. Note 9 added. 2. Installation instructions and details for sloping super-structure modified.			

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI

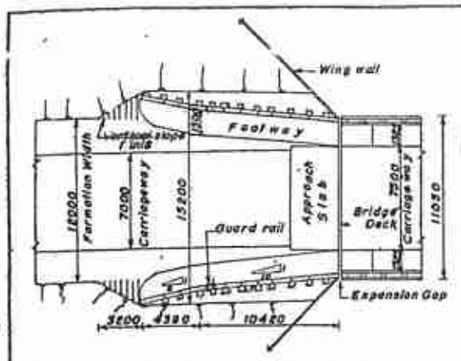
STANDARD CONCRETE BRIDGES

ELASTOMERIC BEARINGS FOR GIRDER BRIDGES

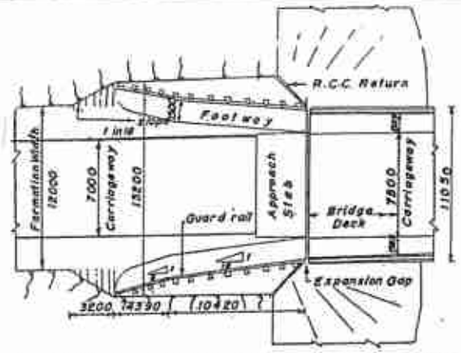
RECOMMENDED : Sd/- (S.C. MOTWANI, S.E.)
RECOMMENDED : Sd/- (D.V. SIKKA, S.E.)
RECOMMENDED : Sd/- (H.B. SARKAR, S.E.)
APPROVED : Sd/- (D. BASUMAT RAO, C.E.)

AUG. 1976
DRG. NO. BD/4-758.

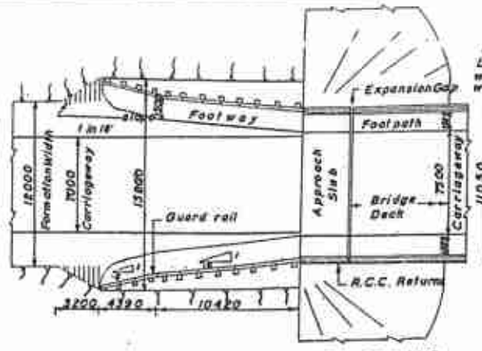
High Yield Strength Deformed Bars.



(i) WITH SOLID WING WALLS

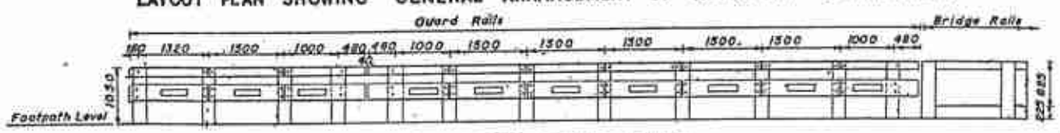


(ii) WITH SPLAYED R.C.C. CANTILEVER RETURNS

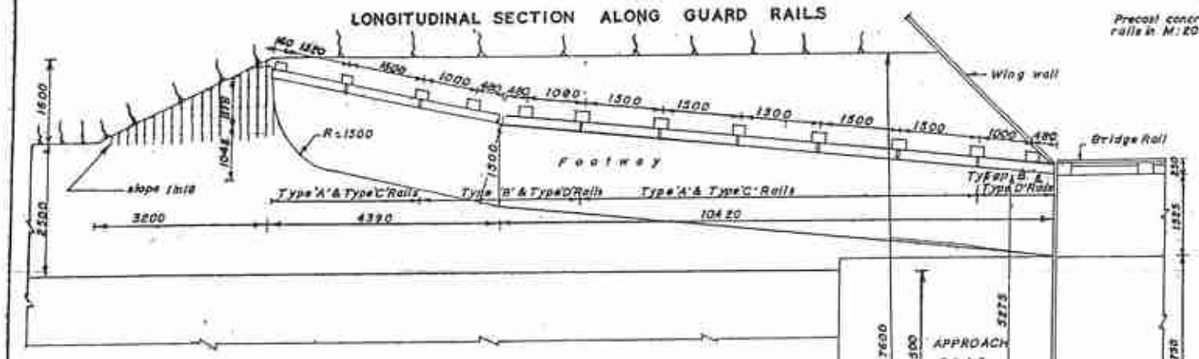


(iii) WITH STRAIGHT R.C.C. CANTILEVER RETURNS

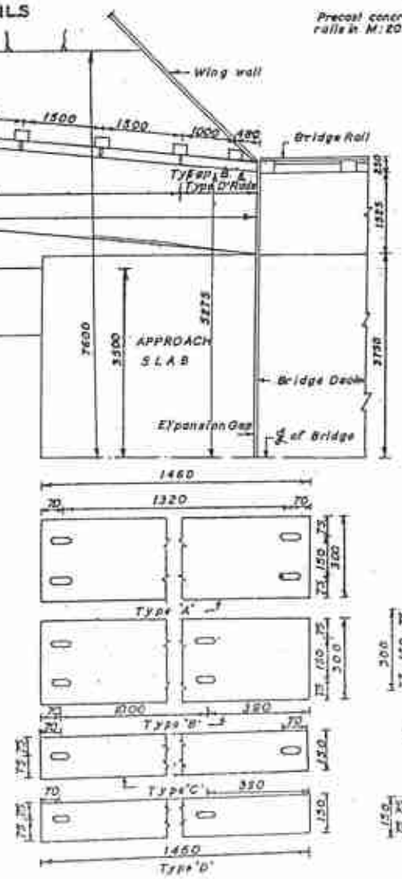
LAYOUT PLAN SHOWING GENERAL ARRANGEMENT OF APPROACH CONNECTION.



LONGITUDINAL SECTION ALONG GUARD RAILS



DETAILED LOCATION PLAN OF GUARD RAILS AND POSTS

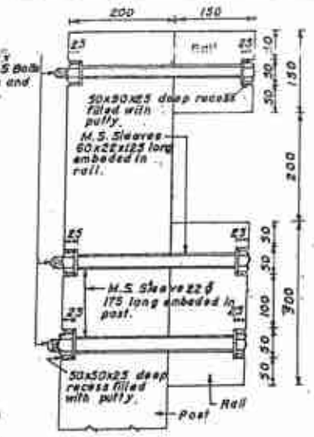


POSITION OF HOLES FOR M.S. BOLTS IN PRECAST RAILS

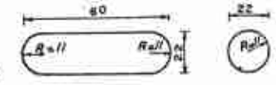
SCHEDULE OF REINFORCEMENT (PER APPROACH ON EACH SIDE OF BRIDGE)

Structural component	Type of bar	Shape of bar (not to scale)	Dia of bar (mm)	Length of each bar (mm)	No. of bars per component.	Total Length of bar per component. (m)	Weight of bar per component (Kgs)	No. of component.	Total Weight (Kgs.)
Guard Post	a	1818, R=48, 1920	16	4416	2	8.832	13.995	24	335
	b	R=48	16	2150	1	2.150	3.397	24	82
	c	R=18, 150	6	6316	19	17.024	3.745	24	90
Guard Rails Type 'A' & 'C'	d	R=36, 1314	12	3350	2	6.720	6.034	20	121
	e	1360	12	1380	2	2.760	2.456	20	49
Type 'A' & 'C'	f	R=18, R=18	6	726	14	11.144	2.452	20	49
Type 'B' & 'D'	g		6	495	14	6.944	1.028	20	31
	h	R=36, 1364	12	2940	2	5.880	5.233	20	105

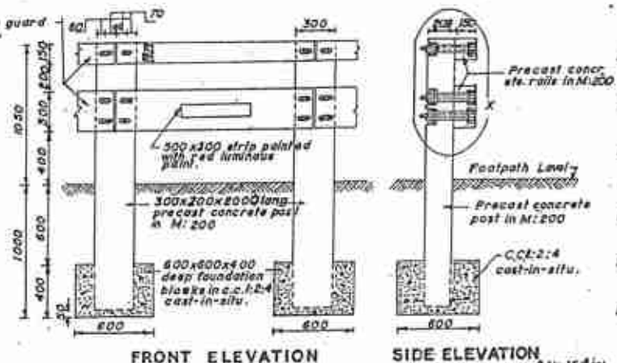
Quantity of steel including 5% extra for laps and wastage. = 905 Kgs.
Quantity of concrete M:200 for precast posts and rails. = 5 Cu.m.
Quantity of concrete 1:2:4 for cast-in-situ foundation blocks. = 3 Cu.m.
No. of 20 ϕ bolts, nuts, washers and sleeves etc. = 120 each.



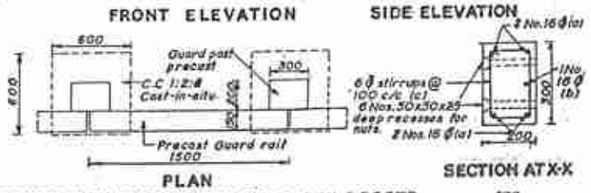
ENLARGED DETAILS 'A' 'X'



60x22x125 LONG M.S. SLEEVES FOR RAILS. 22ϕ 175 LONG M.S SLEEVES FOR POSTS

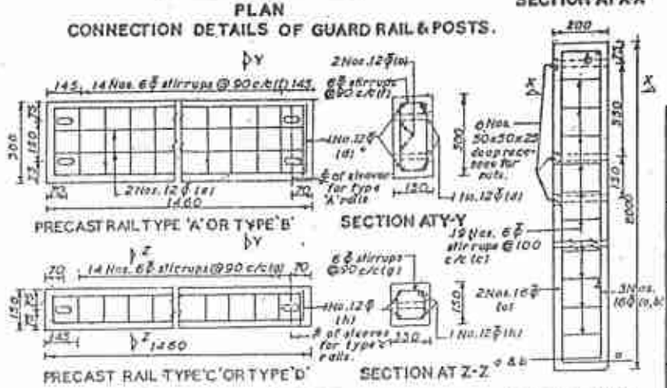


FRONT ELEVATION SIDE ELEVATION



PLAN SECTION AT X-X

CONNECTION DETAILS OF GUARD RAIL & POSTS.



NOTES:

1. This drawing shows typical arrangement of approach connection to Highway Bridges along with guard rail system to be provided on the approaches.
2. For embankments of less than 3 metres height, provision of guard rails on approaches is not obligatory.
3. The proposed system is based on a precast rail length of 1.46 metres and maximum c/c spacing of 1.5 metres between posts.
4. The guard posts and rails shall be of precast concrete with a minimum 28 days works crushing strength of 200 Kgs/cm² on 150mm cubes.
5. Foundations of guard posts shall be in c.c. 1:2:4 cast-in-situ.
6. Steel reinforcement used shall be high yield strength deformed bars conforming to I.S:1139-66 or IS: 1786-66 with latest amendments.
7. Minimum cover to any reinforcement shall be 25mm.
8. All steel components such as sleeves, nuts, bolts & washers etc. shall conform to clause 1903 of M.O.S & T specification for Road and Bridge Works (1st. Revision 1978).
9. If the height of Bridge Railing is other than that indicated in this drawing, the arrangement may be suitably modified keeping the height of bottom rail same as indicated in this drawing and the top of the top guard rail flushing with the top of bridge railing.
10. The inside face of the guard rail shall be kept flush with inside face of the bridge railing/posts at the junction.
11. A strip of size 300mm x 100 mm on every lower guard rail shall be painted red with luminous paint as shown in this drawing.
12. For better visibility the guard rail system shall be painted either white or in a colour to match with the colour of bridge railing.
13. Soil around the posts shall be properly compacted after installation of the posts.
14. Proper care shall be taken in handling the precast components, in order to avoid any damage.
15. Foundation concrete shall be laid only after fixing the rail to the posts, and holding the posts in position by suitable temporary supporting system.
16. The temporary supporting system shall be removed only after the foundation concrete has properly set and earth back filled.
17. All dimensions are in millimetres.

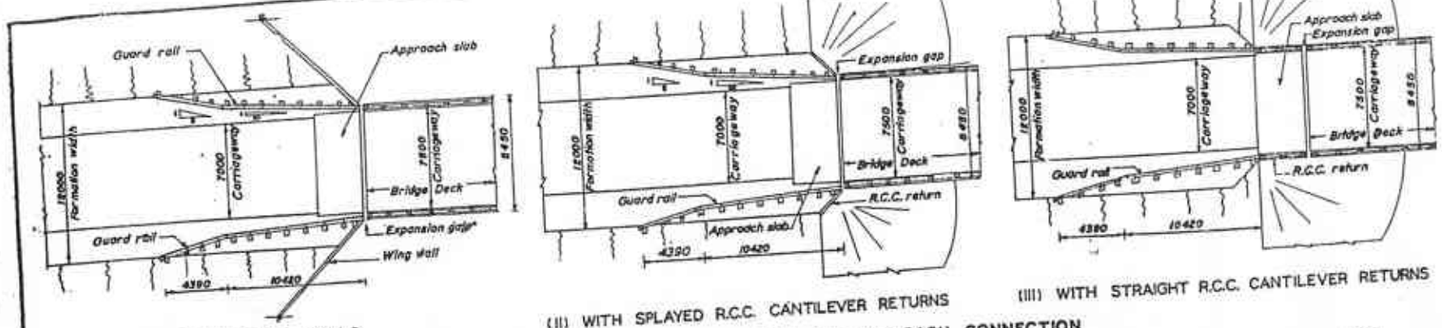
GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT.
ROADS WING, NEW DELHI.

CONNECTION OF APPROACHES TO TWO LANE HIGHWAY BRIDGES

(WITH FOOTPATHS)

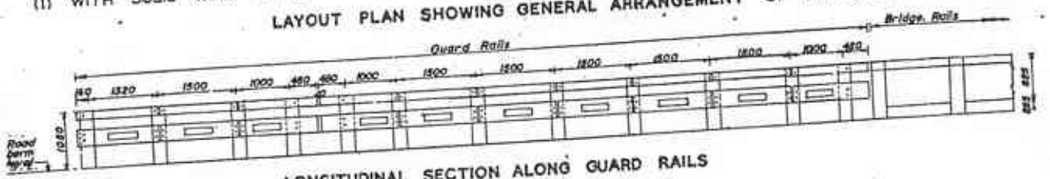
DO NOT SCALE

RECOMMENDED: S.C. HOTWANI, A.E.E.	RECOMMENDED: PRAHLAD KUMAR, S.E.	JAN. 1979
RECOMMENDED: R.S. SHARMA, E.E.	APPROVED: M. VENKATA RAO, C.E.	DRG. NO. BD/2-79

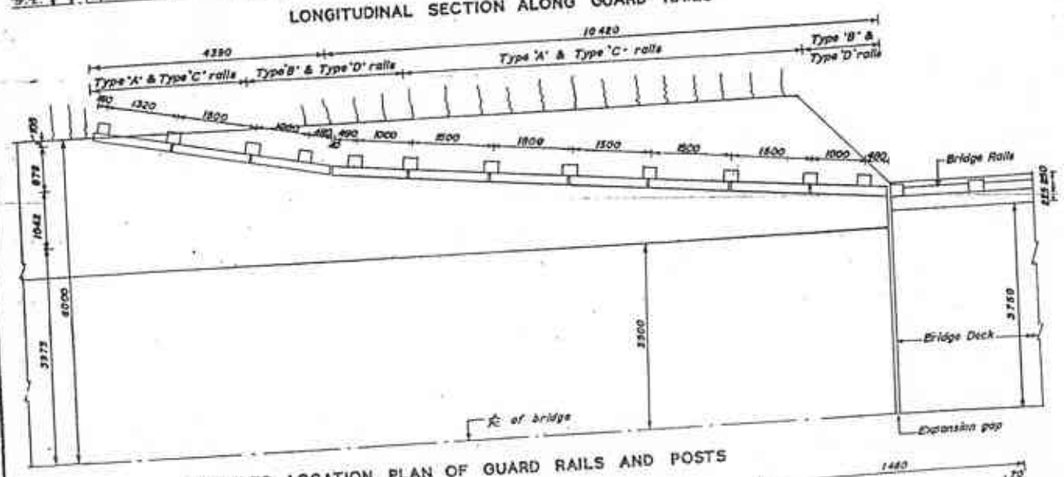


(I) WITH SOLID WING WALLS (II) WITH SPLAYED R.C.C. CANTILEVER RETURNS (III) WITH STRAIGHT R.C.C. CANTILEVER RETURNS

LAYOUT PLAN SHOWING GENERAL ARRANGEMENT OF APPROACH CONNECTION



LONGITUDINAL SECTION ALONG GUARD RAILS

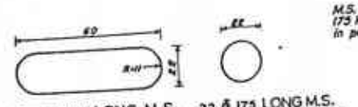


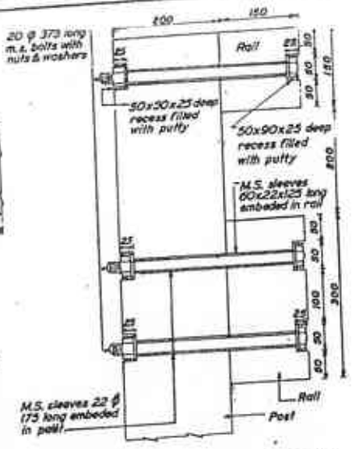
DETAILED LOCATION PLAN OF GUARD RAILS AND POSTS

SCHEDULE OF REINFORCEMENT (PER APPROACH ON EACH SIDE OF BRIDGE)

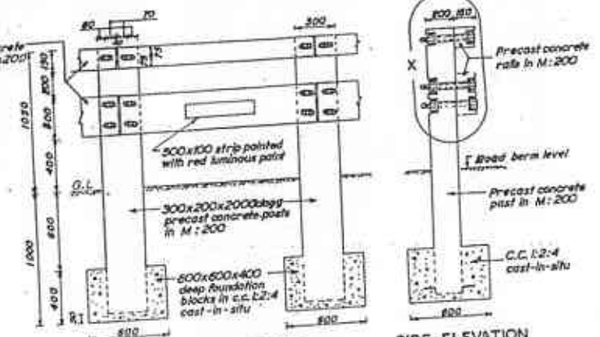
Structural Component	Type of bar	Shape of bar (not to scale)	Dia. of bar (mm)	Length of each bar (mm)	No. of barsper compo-nent	Total length of bars per component (m)	Weight of bars per components (kgs)	No. of compo-nents	Total weight (kgs)
Guard Post	a		16	4416	2	8.832	13.905	24	333
	b		16	2150	1	2.150	3.357	24	82
	c		6	696	10	17.024	3.765	24	90
Guard Rail Type 'A' & 'B'	d		12	3390	2	6.700	6.034	20	121
	e		12	1380	2	2.760	2.456	20	49
Guard Rail Type 'C' & 'D'	f		6	796	14	11.144	2.452	20	49
	g		6	496	14	6.944	1.528	20	31
	h		12	2940	2	5.880	5.233	20	105

Quantity of steel including 5% extra for laps and wastage = 905 kgs.
Quantity of concrete M:200 for precast posts and rails = 5 cu.m.
Quantity of concrete 1:2:4 for cast-in-situ foundation blocks = 3 cu.m.
No. of 20 ϕ bolts, nuts, washers and sleeves etc. = 120 each

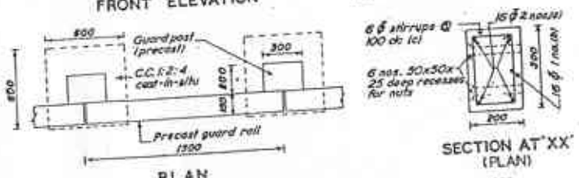




ENLARGED DETAILS AT 'X'

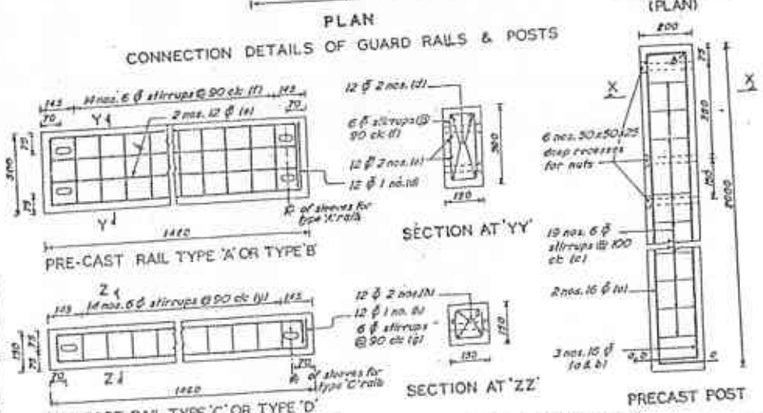


FRONT ELEVATION SIDE ELEVATION



PLAN SECTION AT 'XX' (PLAN)

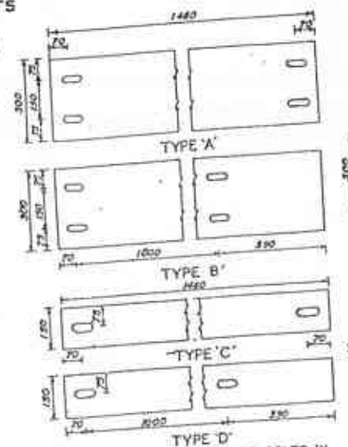
CONNECTION DETAILS OF GUARD RAILS & POSTS



PRE-CAST RAIL TYPE 'A' OR TYPE 'B' SECTION AT 'YY'

PRE-CAST RAIL TYPE 'C' OR TYPE 'D' SECTION AT 'ZZ' PRECAST POST

REINFORCEMENT ON POST-SIDE FACE DETAILS OF REINFORCEMENT



POSITION OF HOLES FOR M.S. BOLTS IN PRECAST RAILS

High Yield Strength Deformed Bars

NOTES :-

1. This drawing shows typical arrangement of approache connection to Highway Bridges along with guard rail system to be provided on the approaches.
2. For embankments of less than 3 metres height, provision of guard rails on approaches is not obligatory.
3. The proposed system is based on a precast rail length of 1.46 metres, and maximum c/c spacing of 1.5 metres between posts.
4. The guard posts and the rails shall be of precast concrete with a minimum 28 days works crushing strength of 200 kgs./cm² on 150 mm cubes.
5. Foundations of guard posts shall be in c.c. 1:2:4 cast-in-situ.
6. Steel reinforcement used shall be High Yield Strength Deformed Bars conforming to IS: 1139-66 or IS: 1786-66 with latest amendments.
7. Minimum cover to any reinforcement shall be 25 mm
8. All steel components such as sleeves, nuts, bolts and washers etc. shall conform to clause 1903 of M.O.S&T specification for Road and Bridge Works (Ist. revision 1978).
9. If the height of Bridge Railing is other than that indicated in this drawing, the arrangement may be suitably modified keeping the height of bottom rail same as indicated in this drawing and the top of the top guard rail flushing with the top of the bridge railing.
10. The inside face of the guard rail shall be kept flush with inside face of the bridge railing/posts at the junction.
11. A strip of size 500 x 100 mm on every lower guard rail shall be painted red with a luminous paint as shown in this drawing.
12. For better visibility the guard rail system shall be painted either white or in a colour to match with the colour of bridge railing.
13. Soil around the posts shall be properly compacted after installation of the posts.
14. Proper care shall be taken in handling the precast components in order to avoid any damage.
15. Foundation concrete shall be laid only after fixing the rails to the posts, and holding the posts in position by suitable temporary supporting system.
16. The temporary supporting system shall be removed only after the foundation concrete has properly set and earth back-filled.
17. All dimensions are in millimetres.

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
ROADS WING, NEW DELHI.

CONNECTION OF APPROACHES TO TWO LANE HIGHWAY BRIDGES

(WITHOUT FOOTPATHS)

DO NOT SCALE

RECOMMENDED: S.C. MOTWANI, S.E.	RECOMMENDED: PRAMILA RAJORIA, S.E.		JANUARY, '79
RECOMMENDED: R.S. SHARMA, E.E.	APPROVED: G. VENKATESULU, C.E.		DRG. NO. BD/1-79.

FOREWORD

I have great pleasure in placing before the community of Bridge Engineers, this Volume of Standard Plans for Highway Bridges covering RCC right slab type superstructure. This publication is the first in the series of new Standard Plans for Highway Bridge Superstructure being brought out keeping in view the recent changes in specifications and provisions in the Bridge Codes. I am sure this publication will prove extremely useful in proper planning, estimation and execution of highway bridges in the country.

The publication has been made possible by the sustained efforts of the personnel of the Bridges Standards and Research zone of the Bridges Directorate of this Ministry and the Consultant associated with the work, who deserve commendation for the work done by them. The keen interest of the Addl. Director General (Bridges), in taking up this work and bringing out this publication in a short time is worthy of special mention.

(K.K. SARIN)
Director General (Road Development) &
Addl. Secretary to the Govt. of India

New Delhi, June 1, 1991

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ANO: 2-956

PREFACE

The Standard Plans for Highway Bridges with RCC Slab Type Superstructure (Volume II) were first issued by the Ministry of Surface Transport (Roads Wing) in the year 1977. Since then there have been several revisions in the specifications and provisions of the Bridge Codes. The preparation of revised Standard Drawings, therefore, taken up towards the end of 1989 and completed on top priority.

This Volume, the first in the series of new Standard Drawings for Superstructure, contains Standard Plans for RCC Slab type highway bridge superstructure for 3.0 to 10.0 metre effective spans. It also contains drawings for wearing coat, railings and miscellaneous items. A separate volume containing bill of quantities for various items of superstructures will also be issued shortly.

The design caters for one lane of IRC Class 70-R wheeled/tracked loading or 2-lanes of IRC Class A loading whichever produces more severe effect. Footpaths have been designed for a crowd load of 5 kN/m². Keeping in view the current practice of providing a deck of the same width as the adjoining road for NH bridges having total length less than 30 m, the overall width between the outer faces of the railing kerb has been kept as 12 m. The wearing coat will be of mastic and asphaltic concrete type, except in remote areas where average 75 mm thick cement concrete wearing coat may also be adopted. The designs are based on Standard Specifications and Codes of Practice for Highway Bridges issued by the Indian Roads Congress. For construction purposes, Specifications for Road and Bridge works issued by the Govt. of India, Ministry of Surface Transport (Roads Wing), as amended from time to time, will apply.

The plans have been made complete in all respects so that they could be readily adopted for preparation of estimates and also serve as construction drawings in the field. The entire design philosophy adopted lays great emphasis on constructability i.e. convenient and full translation of the design on to the ground. A great deal of attention has, therefore, been paid to dimensioning and detailing. I have no doubt that the wide spread adoption of these Standard Plans will lead to reduction in time of construction and enhancement of the quality and durability of our road bridges.

Every possible care has been taken to eliminate errors in the Drawings but users are requested to bring to our notice errors or omissions, if any, which may come to light while using these Drawings in their bridge works.

The work of preparing the Designs and Drawings was carried out by the Consultant, M/s. Consulting Engineering Services (India) Pvt. Ltd., New Delhi. Equally important contributions in the finalisation of the designs and details were made by officers of the Ministry whose names appear in the title blocks of various drawings. The enthusiasm and dedication which they brought to bear on the task are to be highly appreciated.

(NINAN KOSHI)
Addl. Director General (Bridges),
Ministry of Surface Transport (Roads Wing)

New Delhi, June 1, 1991

(A) GENERAL

1. These notes are applicable for the Standard Drawings for R.C.C. solid slab superstructure with and without footpaths.
2. These drawings are applicable only for right bridges with overall width of 12 m.
3. No raised footpaths shall be provided on the bridges having length less than 30m unless the same are otherwise existing on the approaches.
4. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.
5. Design criteria:
   I. The design is according to the following codes:
      (a) IRC : 5-1985
      (b) IRC : 6-1966 (1985 reprint)
      (c) IRC : 21-1987.
   II. The following loads have been considered in the design:
      (a) One lane of IRC class 70R or two lanes of IRC class A on carriage way, whichever governs.
      (b) Footpath load of 5 kN/sq.m for superstructure having footpaths.
      (c) Wearing coat load of 2 kN/sq.m.
   III. The designs are applicable for 'MODERATE' AND 'SEVERE' conditions of exposure.
6. Public utility services (except water supply and sewerage), if required, shall be carried over the bridge through 150mm diameter ducts provided in the footpaths. Total load of such services shall not be more than 1.0 kN per metre on each footpath. Water/sewerage pipeline shall not be carried over any part of the superstructure. Inspection chambers in footpaths may be provided as shown in the drawing. The location and spacing of chambers along the footpath will be decided by the Engineer-in-charge in consultation with the users.
7. Wearing coat shall consist of the following:
   I.(a) A coat of mastic asphalt 6mm thick with a prime coat over the top of the deck before the wearing coat is laid. The prime coat of mastic asphalt shall be 30% straight run 30/40 penetration grade bitumen and 59% light solvent (Benzol) to be laid over the deck slab. The insulating layer of 6mm thick mastic asphalt with 75% lime stone dust filler and 25% of 30/40 penetration grade bitumen shall be laid at 375°F with broom over prime coat.
   (b) 50mm thick asphaltic concrete wearing coat in two layers of 25mm each as per Clause 512 of MOST's Specifications for Road and Bridge Works (Second Revision-1988)
   II. In case of isolated bridge construction or bridges located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, the Engineer-in-charge may permit provision of 75mm thick cement concrete wearing coat in M30 grade concrete with maximum water cement ratio as 0.40. The reinforcement shall consist of 6mm High Yield Strength Deformed bars @ 200mm centres reducing to 100 centres in both the directions over a strip of 300mm near the expansion joint. Reinforcement shall be placed at the centre of the wearing coat. Wearing coat shall be discontinued at expansion joint locations. Joint fillers shall extend upto the top of wearing coat.
8. 20mm expansion joint does not cater for any allowance for possible tilting of abutment.
9. Support for the deck slab shall provide a bearing width of 400mm.
10. In urban areas, chequered tiles may be provided in the footpath portion by suitably adjusting the thickness of the footpath slab.
11. Type/position of return walls, railings, guard posts, ramp etc. in approach portion shall be decided by the Engineer-in-charge.

(B) MATERIALS SPECIFICATIONS :

Concrete

1. Concrete shall be of design mix and shall have minimum 28 days characteristic strength on 150mm cubes for all elements of superstructure as indicated below;

Conditions of exposure	Concrete grade	Characteristic Strength
'MODERATE'	M 25	25 MPa (for 3m to 9m span)
'MODERATE'	M 30	30 MPa (for 10m span)
'SEVERE'	M 30	30 MPa (for 3m to 10m span)

2. High strength ordinary portland cement conforming to IS:8112 or ordinary portland cement conforming to IS 269 capable of achieving the required design concrete strength shall only be used.
3. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 310 kg/cu.m and 0.45 respectively for 'MODERATE' conditions of exposure. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 400 kg/cu.m and 0.40 respectively for 'SEVERE' conditions of exposure.

Reinforcement

All reinforcing bars shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS 1786.

Water

Water to be used in concreting and curing shall conform to Clause 302.4 of IRC 21-1987.

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50mm unless shown otherwise in the drawings.
2. For ensuring proper cover of concrete to reinforcement bars specially made polymer cover blocks shall only be used.
3. Construction Joints
   I. The location and provision of construction joints shall be approved by Engineer-in-charge. The concreting operation shall be carried out continuously upto the construction joint.
   II. concrete surface at the joint shall be brushed with a stiff [illegible] after casting while the concrete is still fresh and it has only partly hardened.
   III. Before new concrete is poured the surface of old concrete shall be prepared as under:
      a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris/laitance and made rough so that 3/4 of the size of the aggregate or structurally damaging the concrete.
      b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet.
      c) The old surface shall be soaked with water without leaving puddles immediately before starting concreting to prevent the absorption of water from new concrete.
   IV. New concrete shall be thoroughly compacted in the region of the joint.
4. Welding of reinforcement bars shall not be permitted.
5. Laps in reinforcement:
   I. Minimum lap length of reinforcement shall be kept as 83 d where 'd' is the diameter of bar.
   II. Not more than 50% of reinforcement shall be lapped at any one location.
6. Bending of reinforcement bars shall be as per IS : 2502.
7. Supporting chairs of 12mm diameter shall be provided at suitable intervals as per IS : 2502.
8. Concrete shall be produced in a mechanical mixer of capacity not less than 200 litres having integral weigh-batching facility and automatic water measuring and dispensing device.
9. Proper compaction of concrete shall be ensured by use of full width screed vibrators for concrete in deck slab.
10. Properly braced steel plates shall be used as shuttering.
11. Sharp edges of concrete shall be chamfered.

(D) GENERAL SPECIFICATIONS

The work shall be executed in accordance with MOST's Specification for Road and Bridge Works (Second Revision, 1988) except wherever otherwise mentioned.

(E) REFERENCE TO DRAWINGS

Drawing No.	Title.
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD//105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)
SD/106	DETAILS OF R.C.C. RAILINGS (WITH FOOTPATHS)
SD/107 THROUGH SD/114	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3m To 10m (WITHOUT FOOTPATHS)
SD/115 THROUGH SD/122	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3m To 10m (WITH FOOTPATHS)

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REVISION

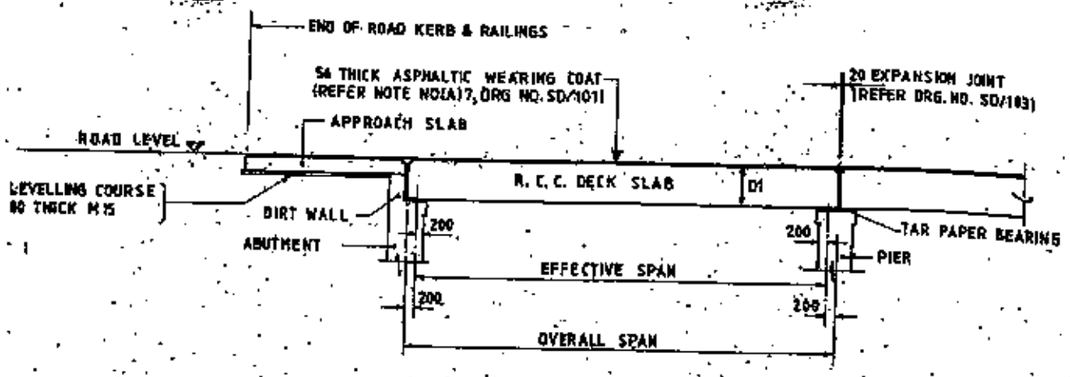
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB
SUPERSTUCTURE (RIGHT) SPAN 3.0m To 10.0 m
(WITH AND WITHOUT FOOTPATHS)
GENERAL NOTES

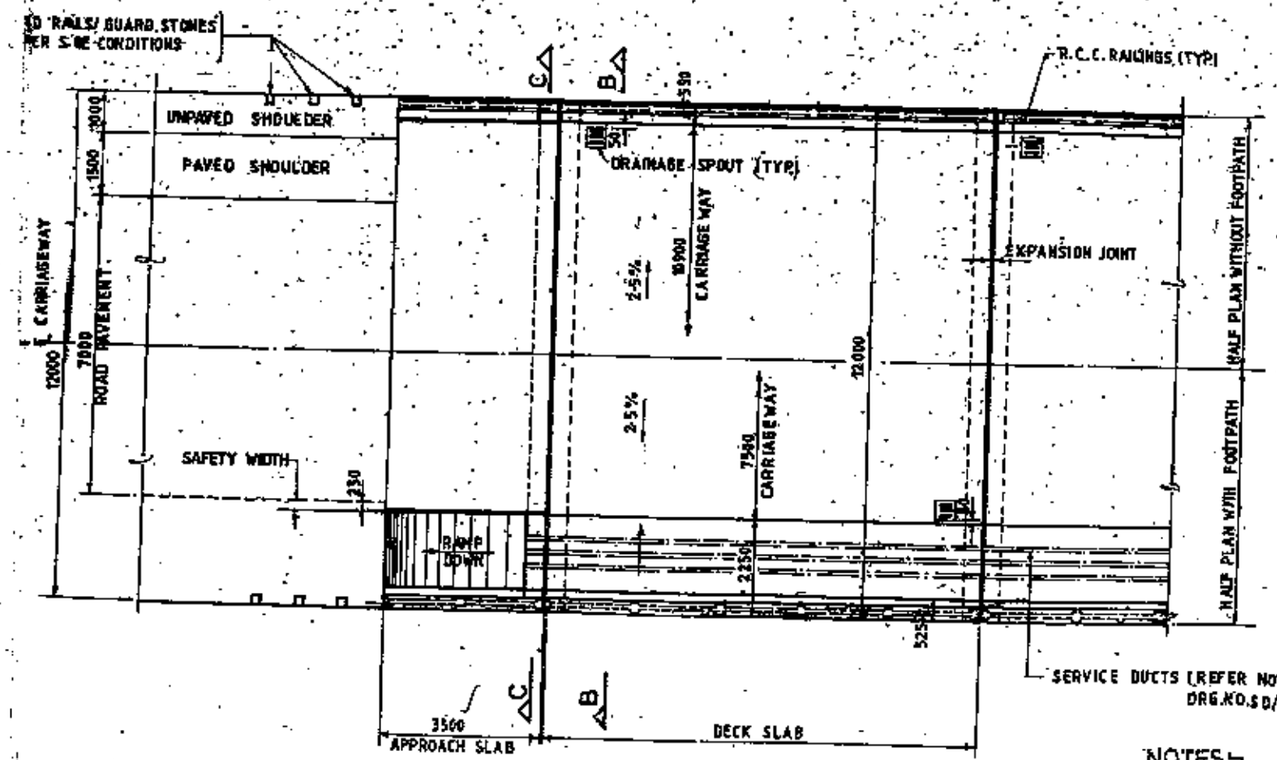
RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S.K. KAISTHA) S.E.	(M.K MUKHERJEE) C.E.	DRG. NO. SD/101

DRG. NO. SD/102

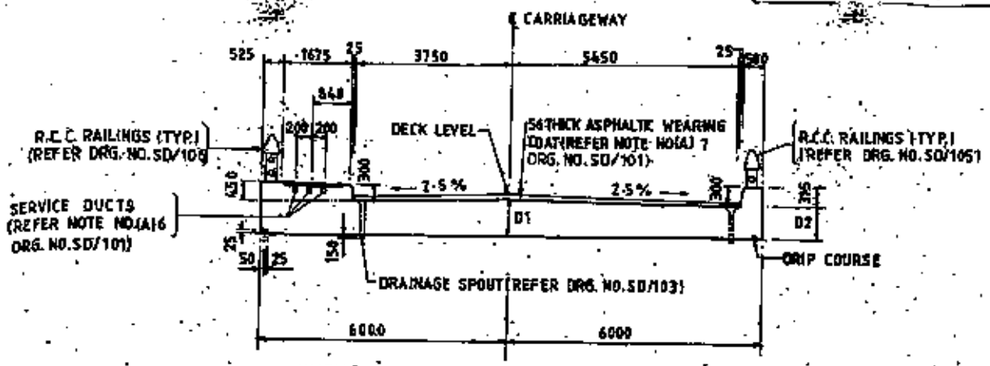


SECTION A-A

(ROAD KERB & RAILINGS NOT SHOWN.)

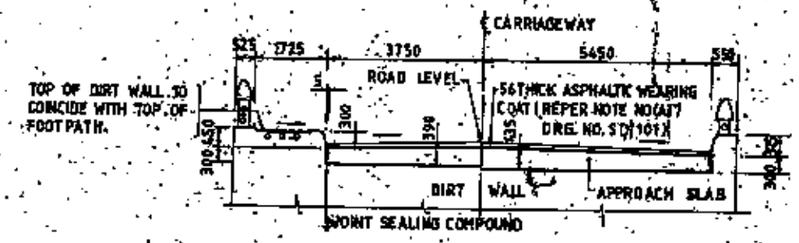


PLAN.



SECTION B-B

FOR VALUES OF D1 & D2 REFER RELEVANT DRAWINGS (DRG. NO. SD/107 THROUGH SD/122.)



SECTION C-C

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS. (WITHOUT FOOTPATHS)
SD/106	DETAILS OF R.C.C. RAILINGS (WITH FOOTPATHS)
SD/107 THROUGH SD/114	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3·0 m TO 10·0 m (WITHOUT FOOTPATHS)
SD/115 THROUGH SD/122	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3·0 m TO 10·0 m (WITH FOOTPATHS)

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Typical arrangement of drainage spouts has been shown in plan. Suitable modifications may be made by the Engineer-in-charge as per site conditions and intensity of rainfall.

NO	DATE	DESCRIPTION	BY

REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

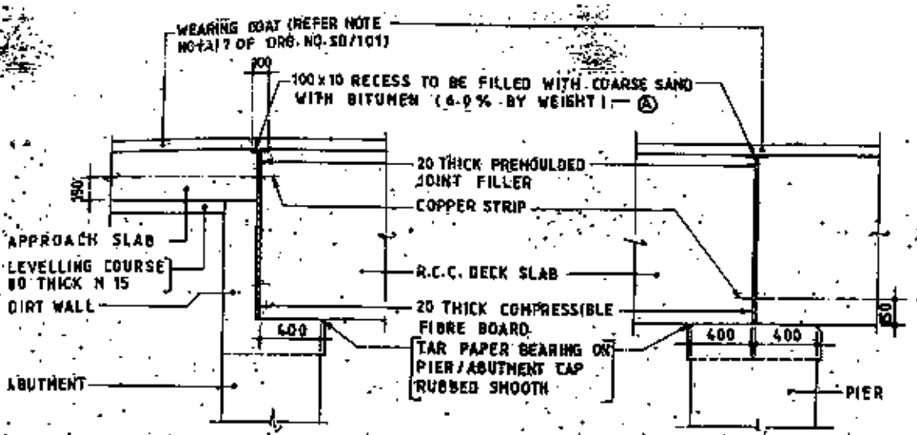
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 3·0 m TO 10·0 m

(WITH AND WITHOUT FOOTPATHS)

GENERAL ARRANGEMENT

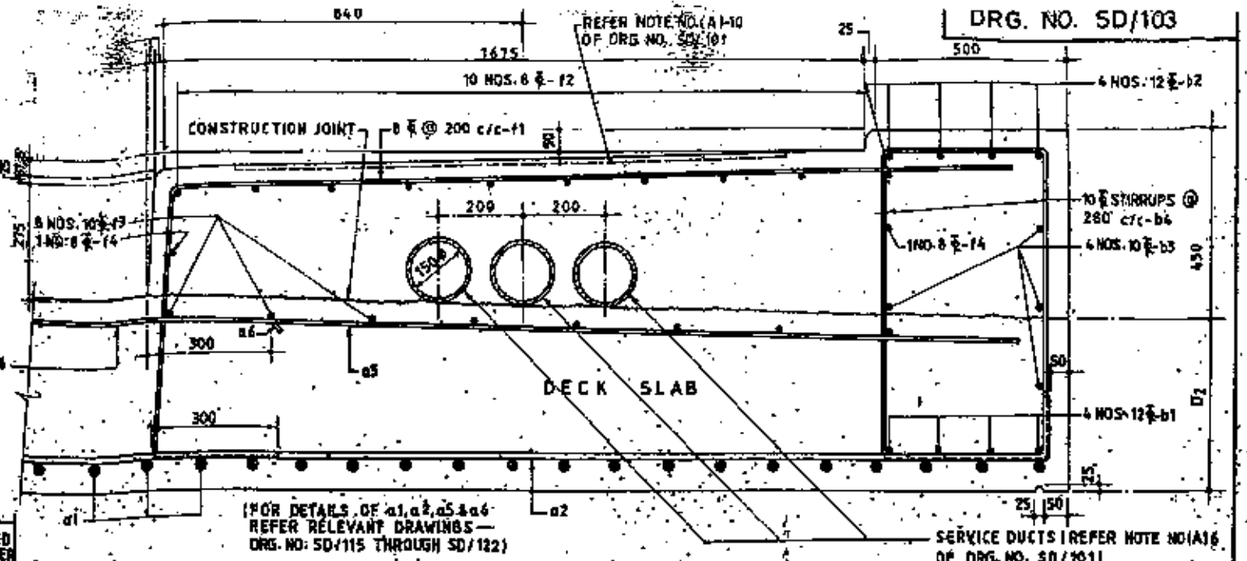
RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) S.E.	(S.K. KAISTHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/102



AT ABUTMENT

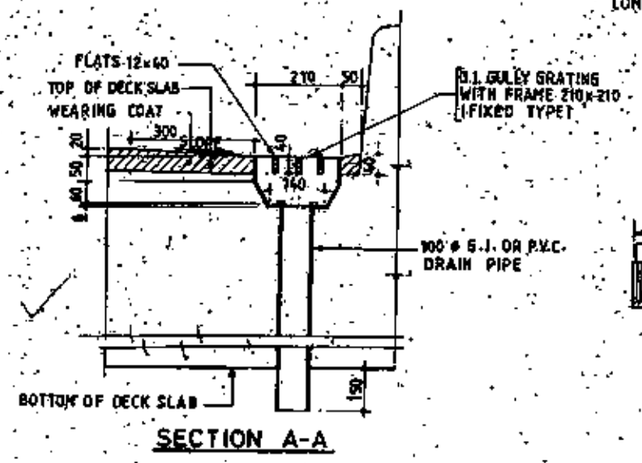
AT PIER

DETAILS OF EXPANSION JOINT

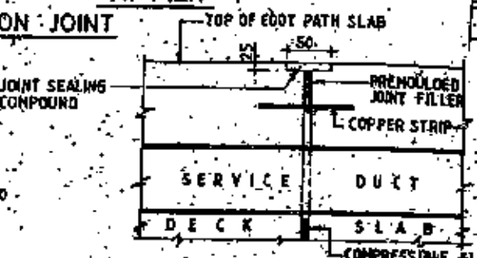


ENLARGED DETAILS OF FOOTPATH & KERB

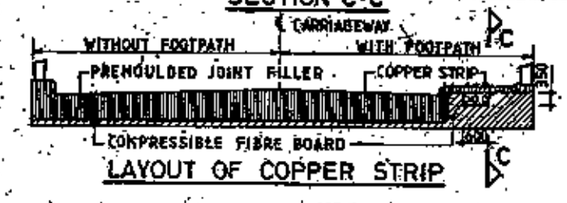
(REINFORCEMENT OF RAILING POST NOT SHOWN)



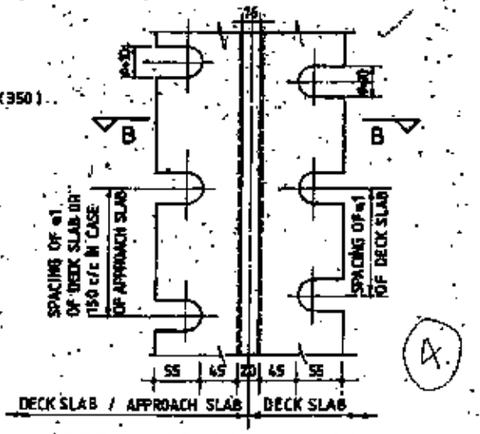
SECTION A-A



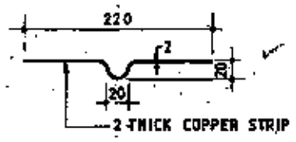
SECTION C-C



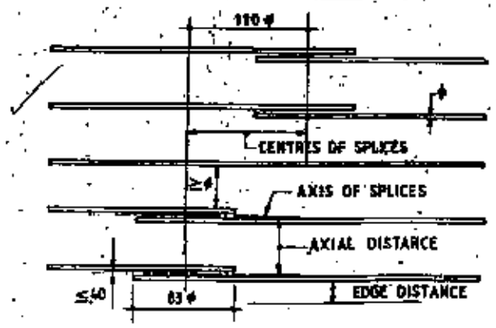
LAYOUT OF COPPER STRIP



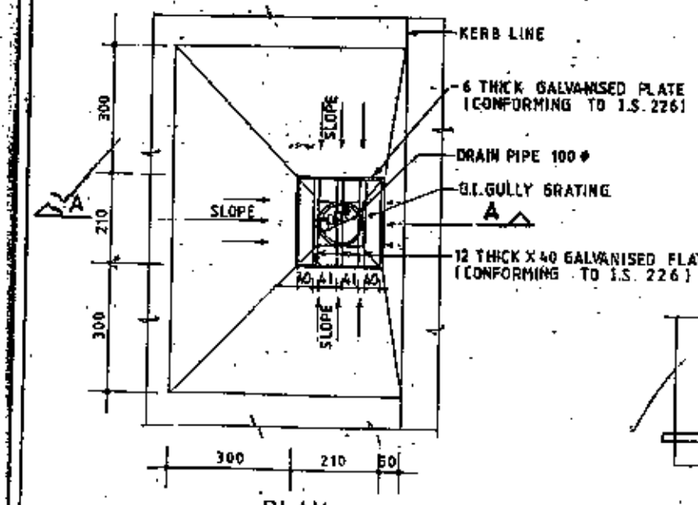
DETAIL OF COPPER STRIP



SECTION B-B

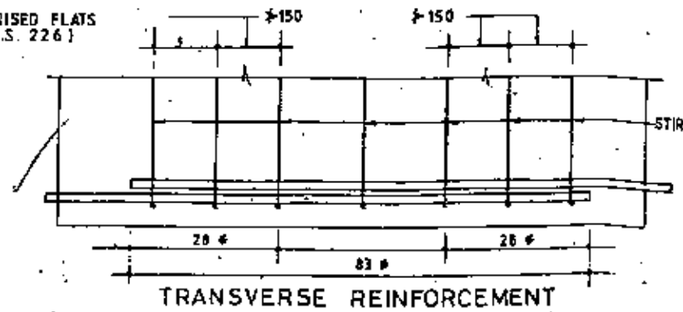


LAP SPLICES OF BARS IN TENSION



PLAN

(DETAILS OF DRAINAGE SPOUT & COLLECTION PIT)



TRANSVERSE REINFORCEMENT AT LAP SPLICES IN KERBS

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Splicing of main longitudinal bars in deck slab shall be avoided as far as practicable. In case the splicing of bars becomes unavoidable, the arrangement shall be as shown in the drawing.
3. Area of bars spliced at any section shall not exceed 50 % of the total area of the bars provided at the section.
4. Joint filler shall conform to IS 1838. Products with I.S.I certification mark shall only be used.
5. The reinforcement of deck slab shall be suitably modified to accommodate the drainage spout. Also refer note no. 2 of drawing no. SD/102. The reinforements marked f1 and f2 shall be modified in the region of inspection chamber.
6. The drainage spout shall be galvanised after welding the plates/flats.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)
SD/106	DETAILS OF R.C.C. RAILINGS (WITH FOOTPATHS)
SD/107 THROUGH SD/114	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3.0m TO 10.0m (WITHOUT FOOTPATHS)
SD/115 THROUGH SD/122	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3.0m TO 10.0m (WITH FOOTPATHS)

NO.	DATE	DESCRIPTION	BY

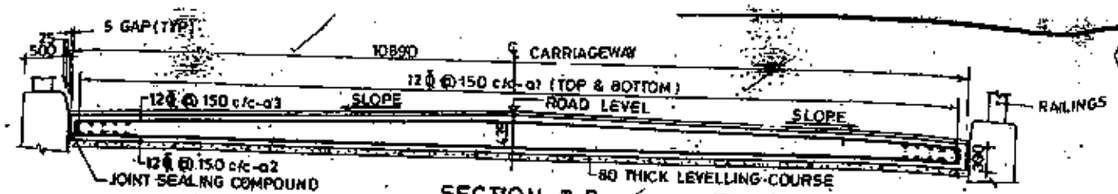
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

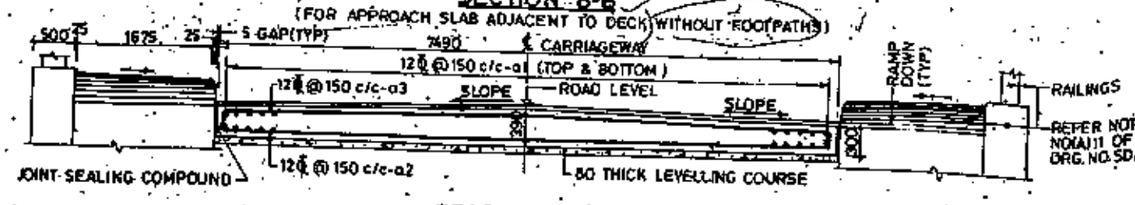
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB
SUPERSTRUCTURE (RIGHT) SPAN 3.0m TO 10.0m
(WITH AND WITHOUT FOOTPATHS)
MISCELLANEOUS DETAILS

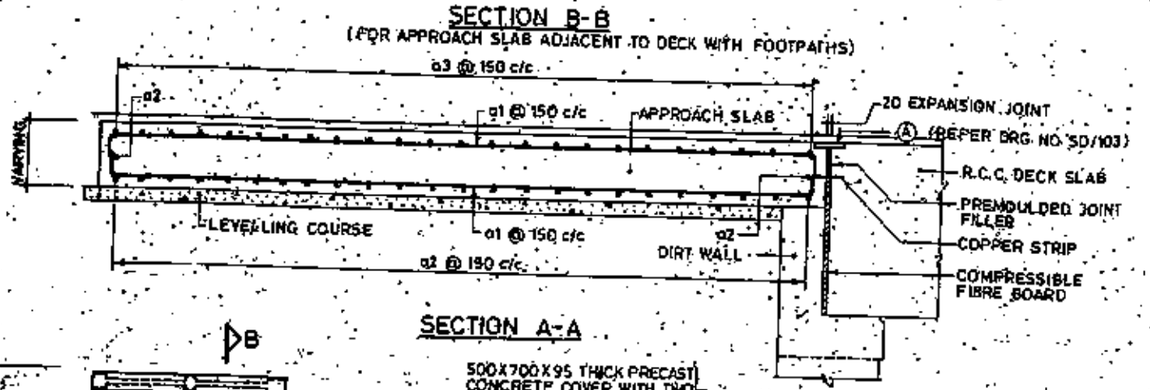
RECOMMENDED BY		APPROVED BY	1990
(S.S. REDDY) E.E.	(S.K. KASTHA) S.E.	(RN. SHIVAPRASAD) C.E.	DRG. NO. SD/103



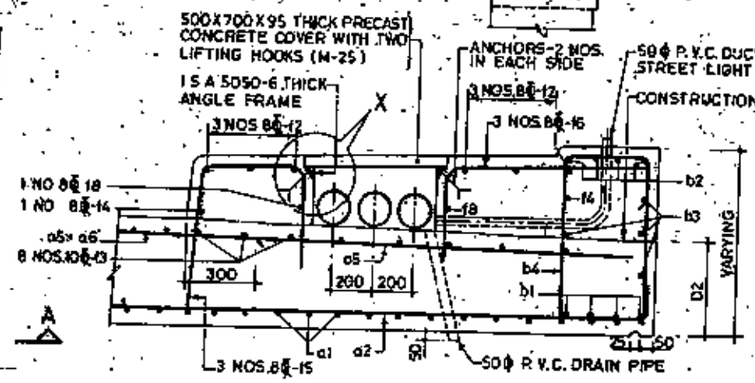
SECTION B-B
(FOR APPROACH SLAB ADJACENT TO DECK WITHOUT FOOTPATHS)



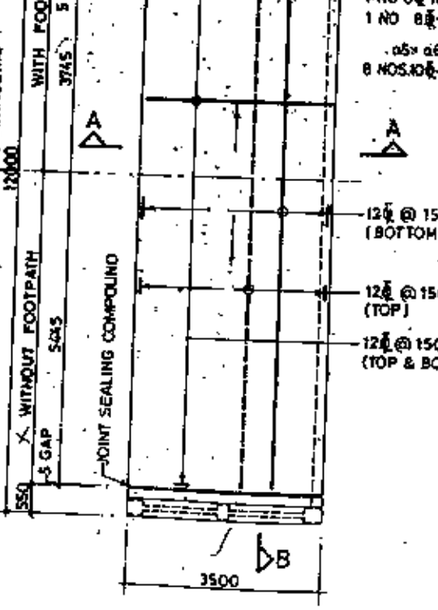
SECTION B-B
(FOR APPROACH SLAB ADJACENT TO DECK WITH FOOTPATHS)



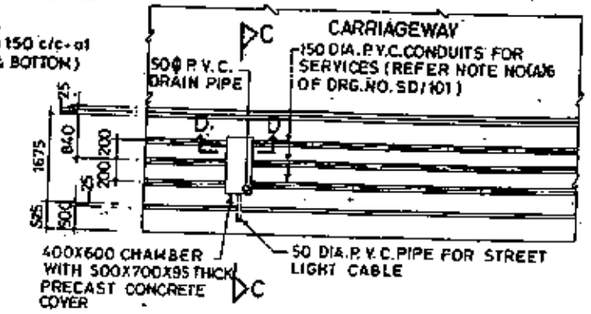
SECTION A-A



SECTION C-C
(REINFORCEMENT OF RAILING POST NOT SHOWN FOR VALUES OF D2 & DETAILS OF a1, a2, a5, a6, b1, b2, b3 & b4 REFER RELEVANT DRAWINGS :- DRG. NOS. SD/115 THROUGH SD/122)



PLAN
(SHOWING REINFORCEMENT DETAILS OF APPROACH SLAB). (ABUTMENT, DIRTWALL & LEVELLING COURSE NOT SHOWN)



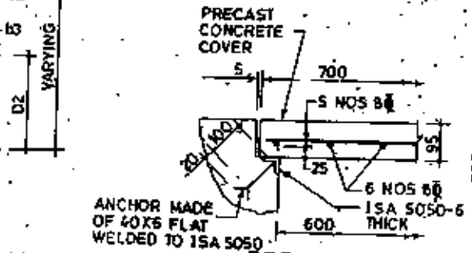
PART PLAN OF BRIDGE DECK
(SHOWING DETAILS OF INSPECTION CHAMBER IN FOOTPATH THE LOCATION AND SPACINGS ALONG THE FOOTPATHS TO BE DECIDED BY ENGINEER-IN-CHARGE AS PER SITE CONDITIONS AND IN CONSULTATION WITH THE CONCERNED AUTHORITIES)

(*) SCHEDULE OF REINFORCEMENT (PER APPROACH SLAB). ORG. NO. SD/104

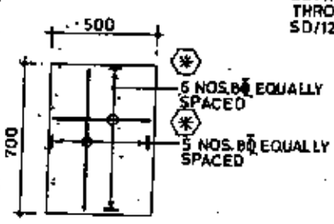
SL.NO.	LOCATION	BAR MKD.	SHAPE	DIA. (m.m.)	SPACING (m.m.)	LENGTH (m.m.)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
APPROACH SLAB ADJACENT TO DECK WITHOUT FOOTPATHS									
1	SLAB TOP & BOTTOM ALONG-X	a1	3400, R=50, 200, 200	12	150	3730	146	544·58	484
2	SLAB BOTTOM ALONG-Y	a2	150, R=50, 150, 10790	12	150	11020	26	286·52	254
3	SLAB TOP ALONG-Y	a3	5395, 5395, R=50, 150, 150, 195	12	150	11020	24	264·48	235
APPROACH SLAB ADJACENT TO DECK WITH FOOTPATHS									
4	SLAB TOP & BOTTOM ALONG-X	a1	3400, R=50, 200, 200	12	150	3730	100	373·00	331
5	SLAB BOTTOM ALONG-Y	a2	150, R=50, 150, 7390	12	150	7620	26	198·12	176
6	SLAB TOP ALONG-Y	a3	3695, 3695, R=50, 150, 150, 95	12	150	7620	24	182·88	162

QUANTITIES

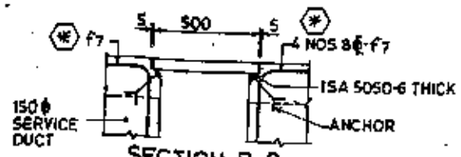
CONCRETE IN APPROACH SLAB (cu.m.)	WITH FOOTPATHS	9·04
	WITHOUT FOOTPATHS	14·01
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg.)	WITH FOOTPATHS	702
	WITHOUT FOOTPATHS	1022
ASPHALTIC WEARING COAT (sq.m.)	WITH FOOTPATHS	25·22
	WITHOUT FOOTPATHS	38·12



DETAIL-X



DETAILS OF PRECAST CONCRETE COVER FOR INSPECTION CHAMBER



SECTION D-D
(SHOWING SHAPE OF BARS IN THE REGION OF INSPECTION CHAMBER OTHER REINFORCEMENTS ARE NOT SHOWN)

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)
SD/106	DETAILS OF R.C.C. RAILINGS (WITH FOOTPATHS)
SD/107 THROUGH SD/114	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3·0m TO 10·0 m (WITHOUT FOOTPATHS)
SD/115 THROUGH SD/122	R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3·0m TO 10·0 m (WITH FOOTPATHS)

NOTES:-
1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. The reinforcement of railing posts shall be incorporated before casting of deck slab. The railings shall conform to drawing no. SD/105 or SD/106 or any other approved type.
3. Dimensions in schedule of reinforcement are given as per I.S. 2502
4. (*) Schedule of reinforcement does not include change in reinforcement around inspection chamber, precast cover to chamber and railings.

MKD	DATE	DESCRIPTION	BY

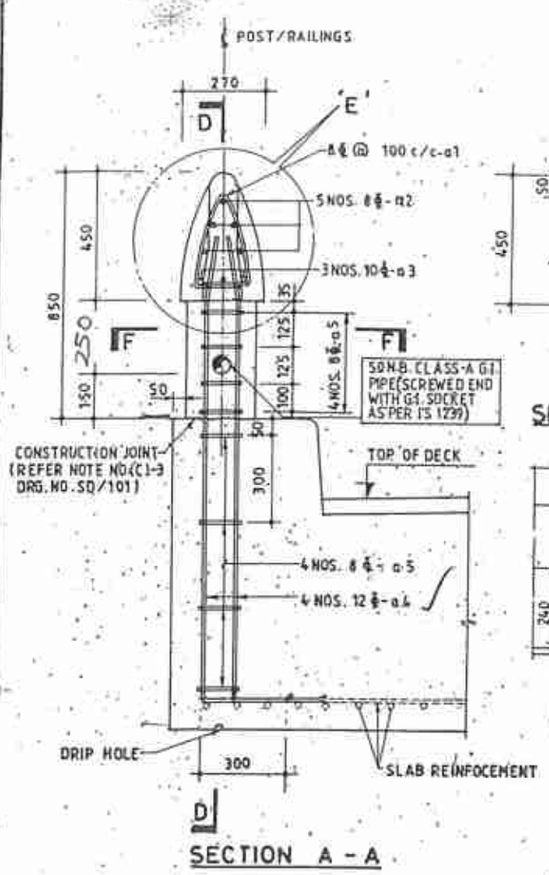
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

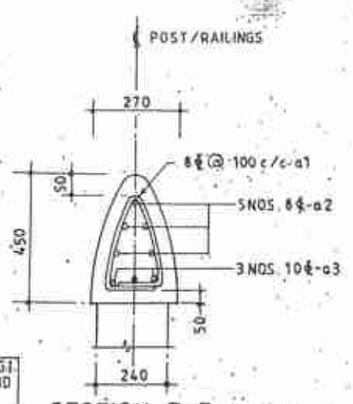
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 3·0m TO 10·0m
(WITH AND WITHOUT FOOTPATHS)
MISCELLANEOUS DETAILS

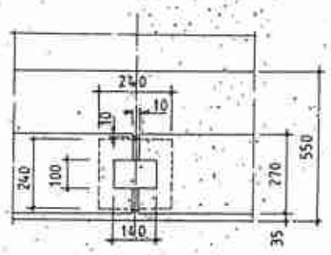
RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S. K. KAISTHA) S.E.	(P. N. SHIVAPRASAD) C.E.	DRG. NO. SD/104



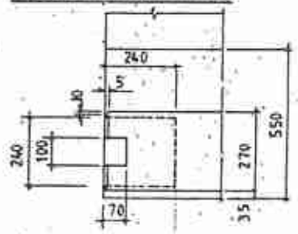
SECTION A - A



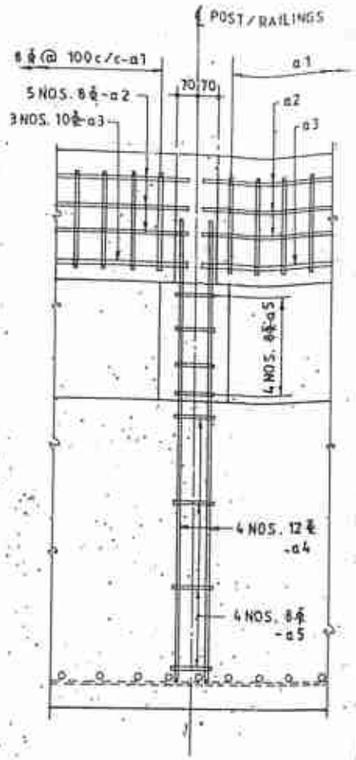
SECTION B-B



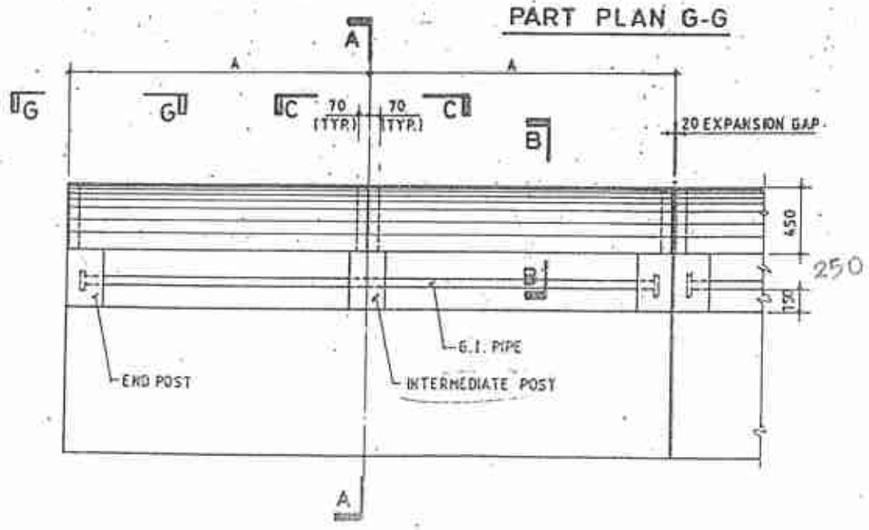
PART PLAN C-C



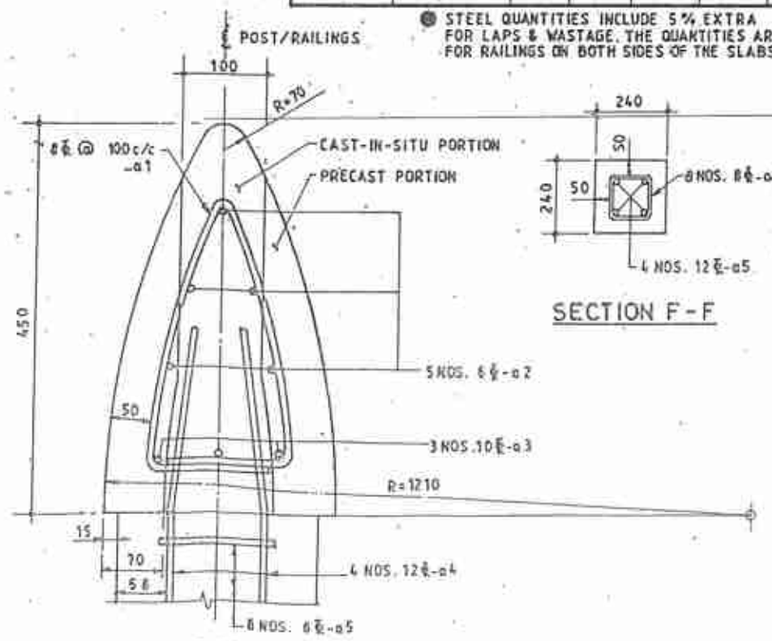
PART PLAN G-G



SECTION D - D



GENERAL ELEVATION



DETAIL - E

SECTION F - F

SCHEDULE OF REINFORCEMENT FOR RAILING ON ONE SIDE

SL NO.	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH(m)	WEIGHT (kg)
1	RAILINGS	a1		8	100	940	$\left[\frac{A-160}{100}+1\right]\times N$ $=N1$	$N1\times\frac{940}{1000}$ $=L1$	L1 × 0·395
2	RAILINGS	a2		8	-	(A-50)	$5\times N$ $=N2$	$\frac{N2\times(A-50)}{1000}$ $=L2$	L2 × 0·395
3	RAILINGS	a3		10	-	(A-50)	$3\times N$ $=N3$	$\frac{N3\times(A-50)}{1000}$ $=L3$	L3 × 0·617
4	POST	a4	225, h, 300; 225, h, 300	12	-	h + 489	$4\times(N+1)$ $=N4$	$\frac{h+489\times N4}{1000}$ $=L4$	L4 × 0·888
5	POST	a5	124, 124	8		688	$8\times(N+1)$ $=N5$	$\frac{688\times N5}{1000}$ $=L5$	L5 × 0·395

* FOR END POST INNER TWO BARS THE SHAPE IS. h, 300

QUANTITIES (PER SPAN)

EFFECTIVE SPAN(m)	NUMBER OF DIVISIONS 'N'	A (mm)	h (mm)	QUANTITY STEEL (Kg) @	CONCRETE(m3) RAILINGS	CONCRETE(m3) RAIL POSTS
3	2	1700	915	95	0·65	0·14
4	3	1467	965	127	0·84	0·18
5	3	1800	1015	143	1·03	0·18
6	4	1600	1065	176	1·22	0·23
7	4	1850	1115	195	1·41	0·23
8	5	1680	1215	230	1·60	0·27
9	5	1880	1265	249	1·79	0·27
10	6	1734	1365	288	1·98	0·32

@ STEEL QUANTITIES INCLUDE 5% EXTRA FOR LAPS & WASTAGE. THE QUANTITIES ARE FOR RAILINGS ON BOTH SIDES OF THE SLABS.

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. The maximum size of the aggregate to be used for precast concrete work shall be limited to 12mm.
3. The centre to centre spacing 'A' between successive vertical posts shown in the elevation shall be adjusted to suit the length of the bridge span for which the railing is used but in no case shall its value exceed 2000.
4. The details of reinforcement in kerb and deck slab have not been shown in the drawing.
5. Railings to be built after the structural concrete of superstructure has hardened and the shuttering for the superstructure is released.
6. Railings shall be carefully constructed true to line and grade. Post shall be vertical with a tolerance not to exceed 1 in 500.
7. Special care shall be taken to match the surface of the cast-in-situ portion.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/107 THROUGH SD/114	R.C.C SOLID SLAB SUPERSTRUCTURE (RIGHT) SPANS 3·0m TO 10.0m (WITHOUT FOOTPATHS)

MKD	DATE	DESCRIPTION	BY

REVISION

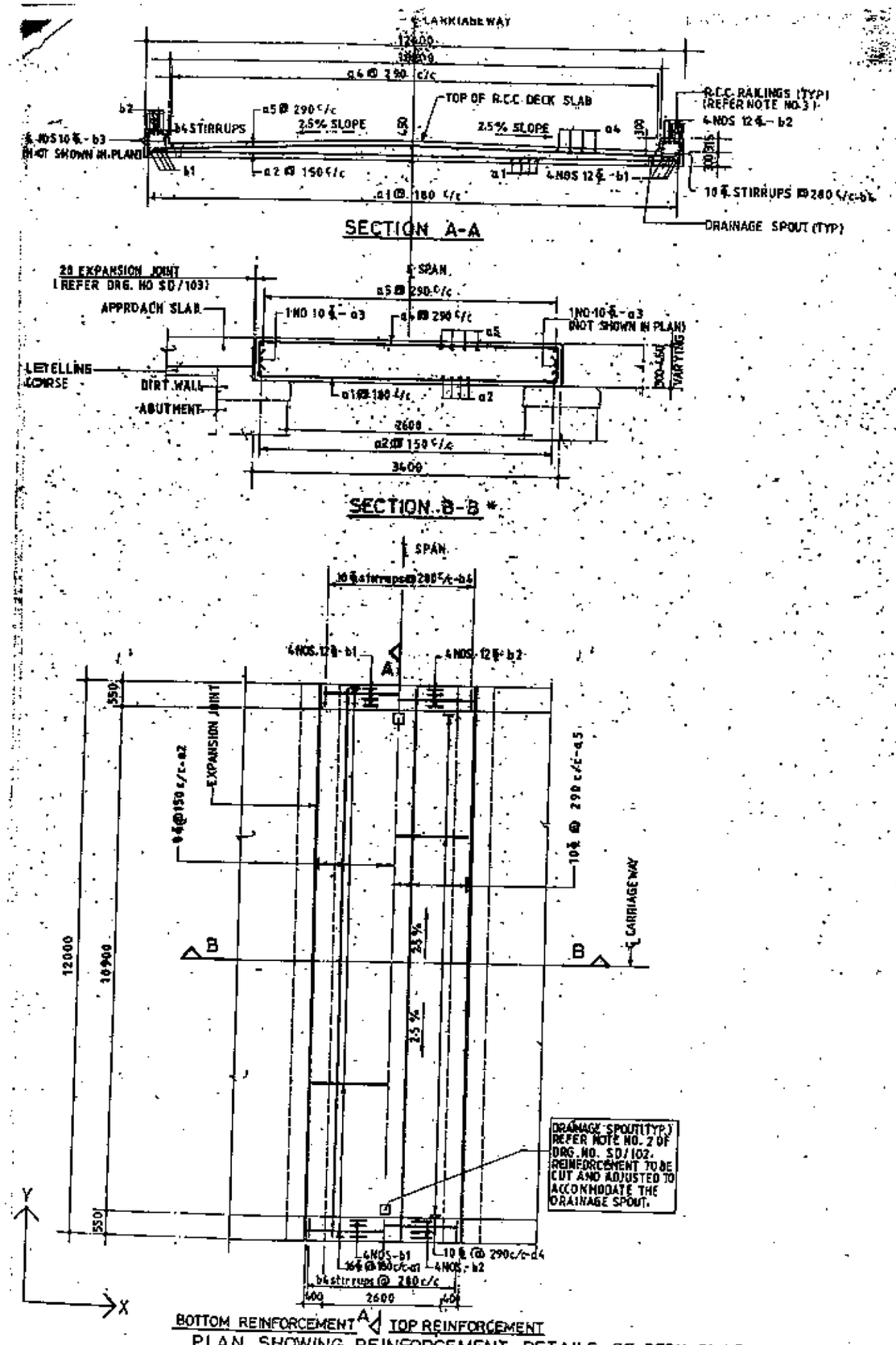
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB
SUPERSTRUCTURE (RIGHT) SPAN 3·0 m TO 10·0 m
(WITHOUT FOOTPATHS)

DETAILS OF R.C.C. RAILINGS

RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) C.E.	(S.K. KAISTHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/105



PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

DRG. NO. SD/107

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL.NO	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	200 R=60 3300 200	16	180	3600	67	241.20	381
2	SLAB-BOTTOM ALONG-Y	a2	200 R=30 11900 200	8	150	12250	23	281.75	111
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	3300 200 R=40 200	10	290	3640	39	141.96	88
5	SLAB-TOP ALONG-Y	a5	5600 5600	10	290	11600	13	150.80	93
6	KERB-BOTTOM	b1	350 R=50 3292 350	12	—	3930	8	31.36	28
7	KERB-TOP	b2	3300 350 R=50 350	12	—	3930	8	31.44	28
8	KERB-SIDES	b3	300 R=40 3268 300	10	—	3810	8	30.48	19
9	KERB-STIRRUPS	b4	270 405 430	10	280 ●	1995	26 ●	51.74	32

● DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS - REFER DRG. NO. SD/103.

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m and wearing coat @ 2 kN/sq.m. = 489 kN.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAIL OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	3.0
CONCRETE (cu.m.)	16.42
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	835
ASPHALTIC WEARING COAT (sq.m)	37.06

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no (B)-1 of drawing no. SD/101 regarding the design mix to be adopted.
3. The reinforcement of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no. SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per IS 2502.
5. Reinforcement of adjacent span superstructure, approach slab not shown.

MKD	DATE	DESCRIPTION	BY

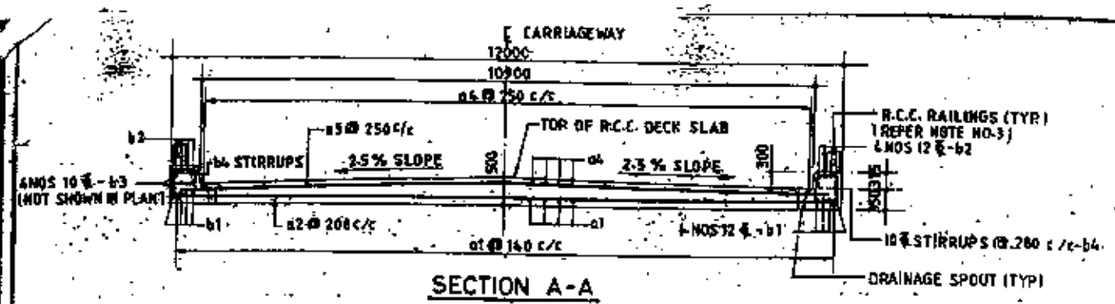
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

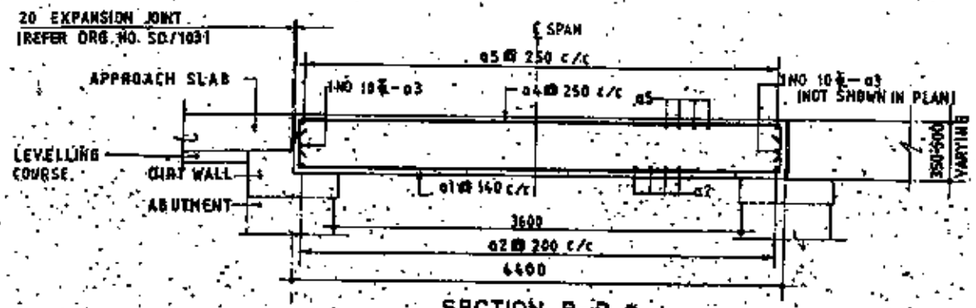
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB
SUPERSTRUCTURE (RIGHT) SPAN 3.0m
(WITHOUT FOOTPATHS)

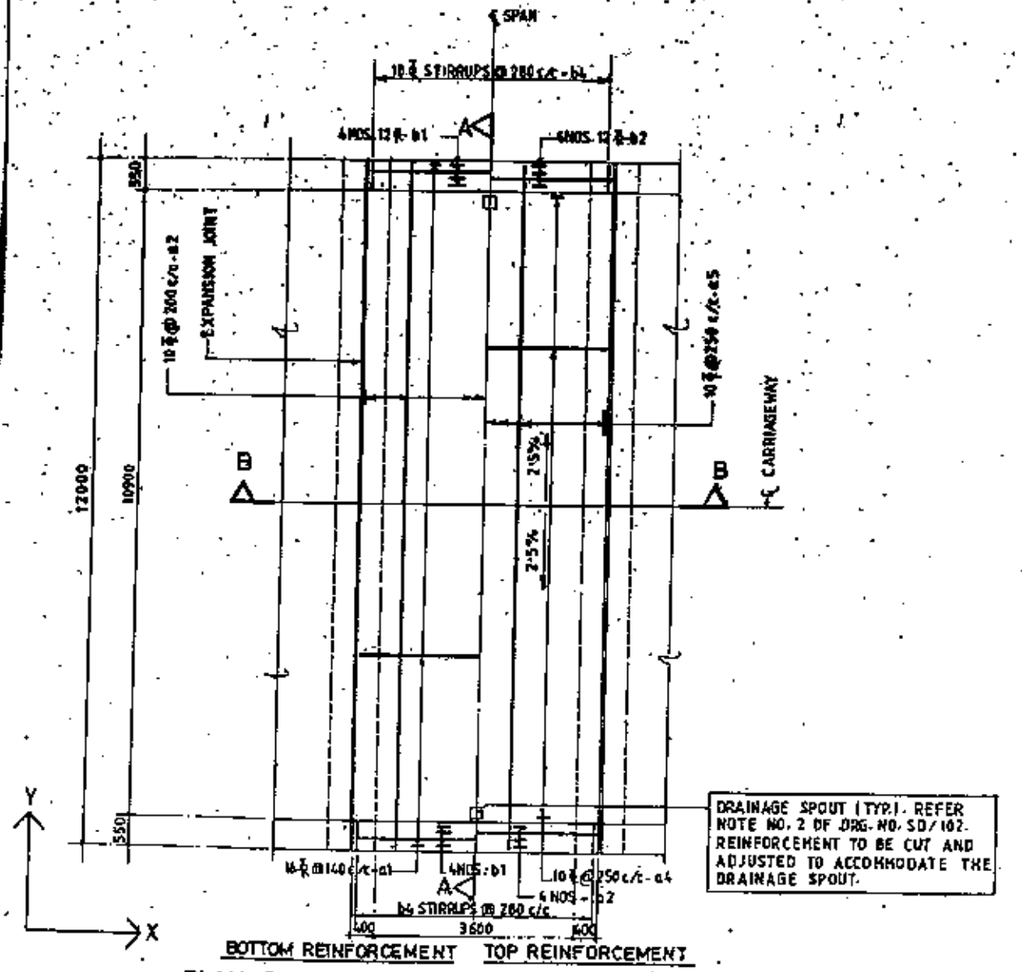
RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKUDI) E.E.	(S.K. KAISTHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/107



SECTION A-A



SECTION B-B *



PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL NO	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG -X	a1	250, R=40, 4200, 250	16	140	4700	86	404.20	639
2	SLAB-BOTTOM ALONG -Y	a2	250, R=40, 11200, 250	10	200	12240	23	281.52	174
3	SLAB-SIDE ALONG - Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG - X	a4	4300, 250, R=40, 250	10	250	4740	45	213.30	132
5	SLAB-TOP ALONG - Y	a5	5800, 5800, 250	10	250	11600	19	220.40	136
6	KERB - BOTTOM	b1	250, R=50, 4292, 250	12	—	4920	8	39.36	35
7	KERB - TOP	b2	4300, 250, R=50, 250	12	—	4930	8	39.44	35
8	KERB - SIDES	b3	225, R=40, 4268, 225	10	—	4860	8	38.86	24
9	KERB - STIRRUPS	b4	430, 250, 250, 430	10	280 @	2100	34 @	71.40	44

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS. REFER ORG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m and wearing coat @ 2 kN/sq. m. = 696. kN

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	4.0
CONCRETE (cu.m.)	23.89
STEEL WELDOMS 5% EXTRA FOR LAPS AND WASTAGE (kg)	1296
ASPHALTIC WEARING COAT (sq.m)	47.96

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no (B)-1 of drawing no. SD/101 regarding the design mix to be adopted.
3. The reinforcement of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no. SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per I.S. 2502.
5. * Reinforcement of adjacent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

MKD	DATE	DESCRIPTION	BY

REVISION

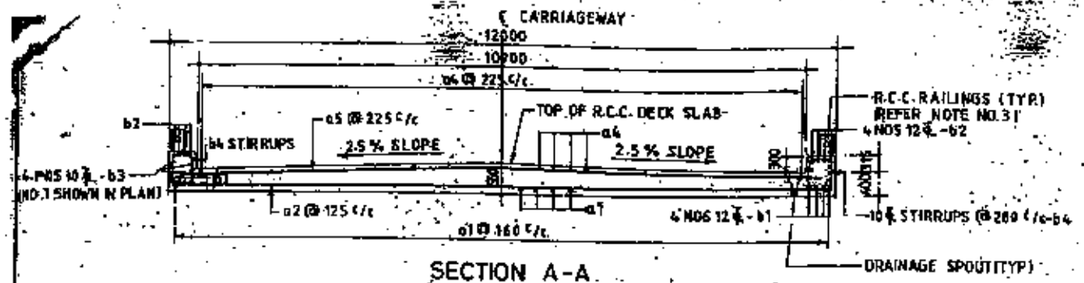
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

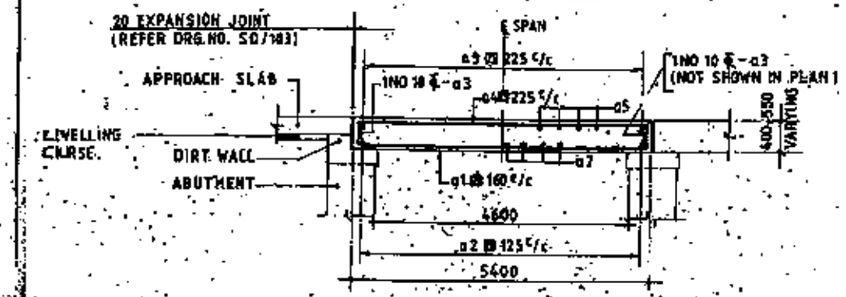
R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 4.0m

(WITHOUT FOOTPATHS)

RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S.K. KAISTHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/108



SECTION A-A



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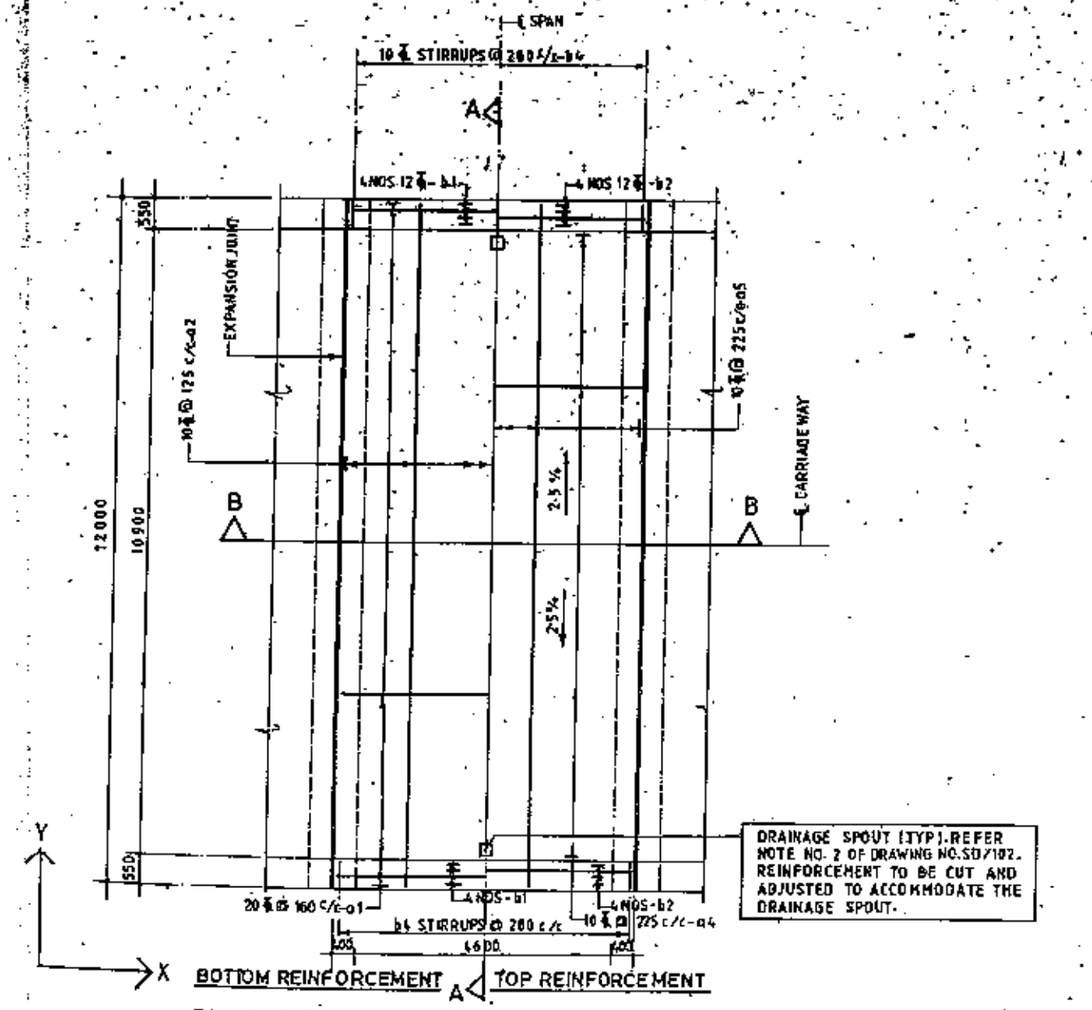


PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

DRG. NO. SD/109

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL.NO	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	100, R=80, 200, 5200	20	160	5760	76	439·28	1085
2	SLAB-BOTTOM ALONG-Y	a2	250, R=40, 250, 11900	10	125	12340	44	542·96	335
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23·80	15
4	SLAB-TOP ALONG-X	a4	5300, 200, R=40, 400	10	225	5840	50	292·00	180
5	SLAB-TOP ALONG-Y	a5	5800, 5800, 100	10	225	11600	25	290·00	179
6	KERB - BOTTOM	b1	400, R=50, 400, 5285	12	—	6010	8	48·08	43
7	KERB - TOP	b2	5800, 400, R=50, 400	12	—	6030	8	48·24	43
8	KERB - SIDES	b3	225, R=40, 225, 5260	10	—	5650	8	46·80	29
9	KERB - STIRRUPS	b4	150, 375, 100, 100, 100	10	260@	2185	40@	87·40	54

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS-REFER DRG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3 kN/m and wearing coat @ 2 kN/sq.m. = 932 kN

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	5.0
CONCRETE (cu.m.)	32·57
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	2061
ASPHALTIC WEARING COAT (sq.m)	58·86

NOTES :-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no(8)-i of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcement of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.

@ Dimensions in schedule of reinforcement are given as per IS 2502

* S.Reinforcement of adjacent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANOUS DETAILS
SD/105	DETAILS OF R.C.C RAILINGS (WITHOUT FOOTPATHS)

MKD	DATE	DESCRIPTION	BY

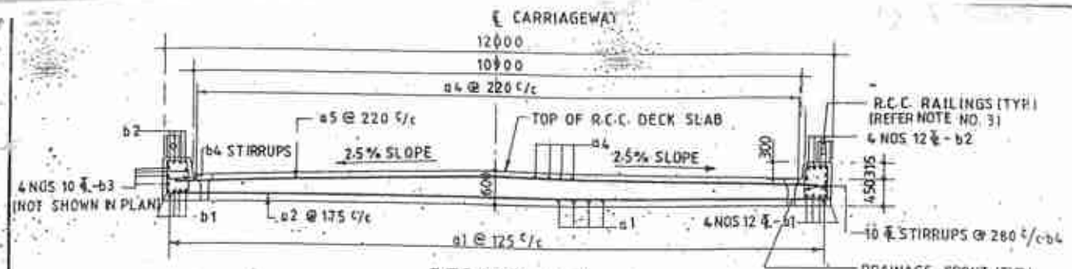
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

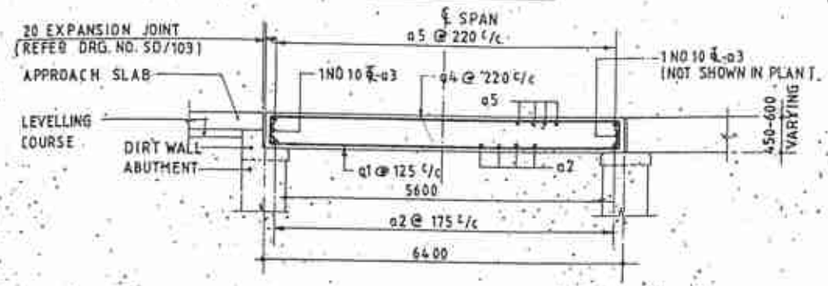
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB
SUPERSTRUCTURE (RIGHT) SPAN 5.0m
(WITHOUT FOOTPATHS)

RECOMMENDED BY		APPROVED BY	, 1990
(U. JAYAKODI) E.E.	(S.K. KAISTHA) S.E.	(H.K. MUKHERJEE) C.E.	DRG. NO. SD/109



SECTION A-A



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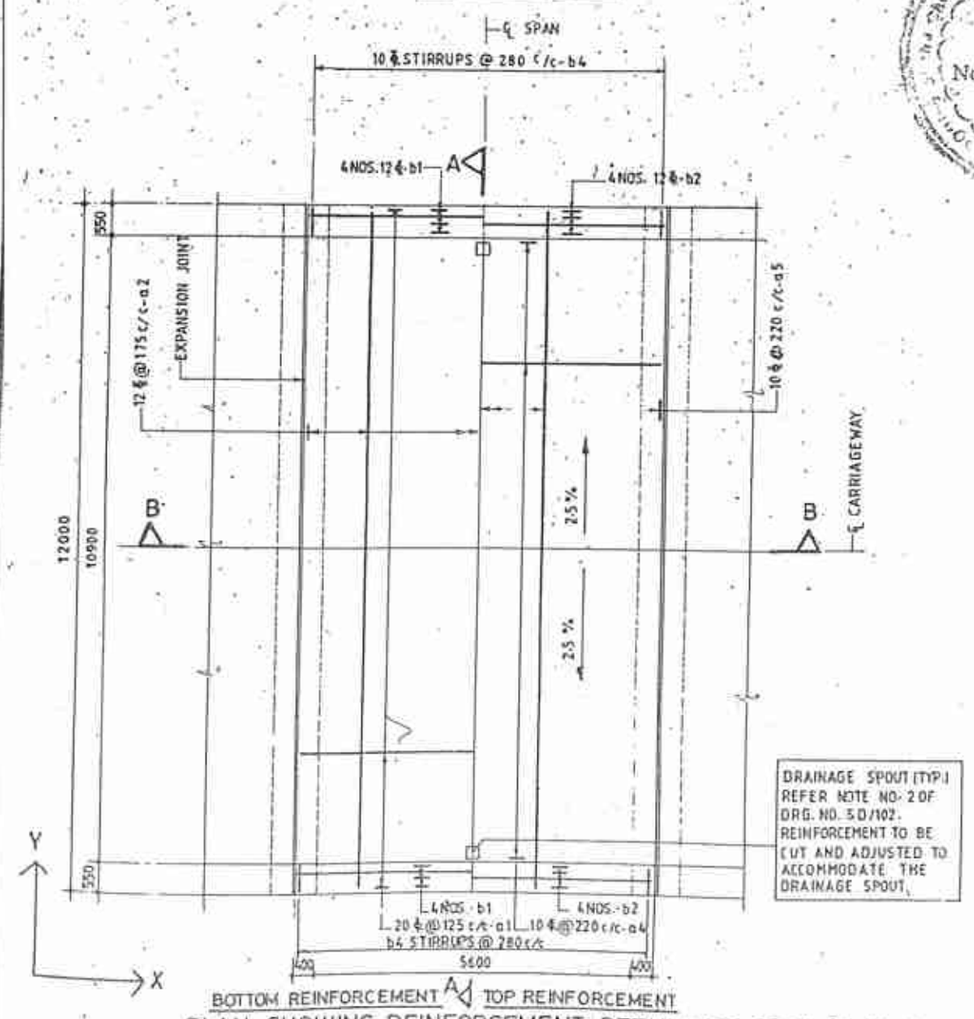


BOTTOM REINFORCEMENT A/ TOP REINFORCEMENT

PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB

Chief Engineer (Dgal)
LIBRARY
No.
ROORKEE

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL NO	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	325, R=60, 6300, 325	20	125	6830	97	662.51	1636
2	SLAB-BOTTOM ALONG-Y	a2	250, R=50, 11900, 250	12	175	12330	37	456.21	405
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	6300, 325, R=40, 325	10	220	6890	51	351.39	217
5	SLAB-TOP ALONG-Y	a5	5800, 5800, 242	10	220	11600	30	348.00	215
6	KERB-BOTTOM	b1	400, R=50, 6284, 400	12	—	7010	8	56.08	50
7	KERB-TOP	b2	6300, 400, R=50, 400	12	—	7030	8	56.24	50
8	KERB-SIDES	b3	325, R=40, 6280, 325	10	—	6850	8	54.80	34
9	KERB-STIRRUPS	b4	240, 400, 623, 225	10	280 ⊕	2280	48 ⊕	109.44	68

⊕ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS - REFER DRG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m and wearing coat @ 2kN/sq.m. = 1196 kN.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	6.0
CONCRETE (cu.m)	42.43
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	2825
ASPHALTIC WEARING COAT (sq.m)	69.76

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no. (B)-1 of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcement of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per I.S. 2502.
5. Reinforcement of adjacent span superstructure, approach slab not shown.

MKD.	DATE	DESCRIPTION	BY

REVISION

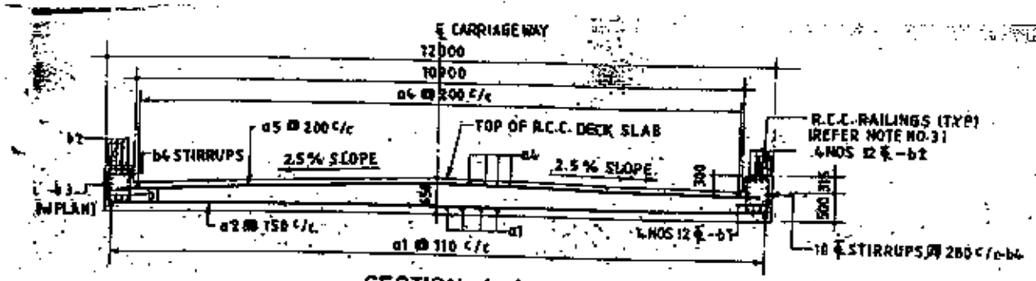
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

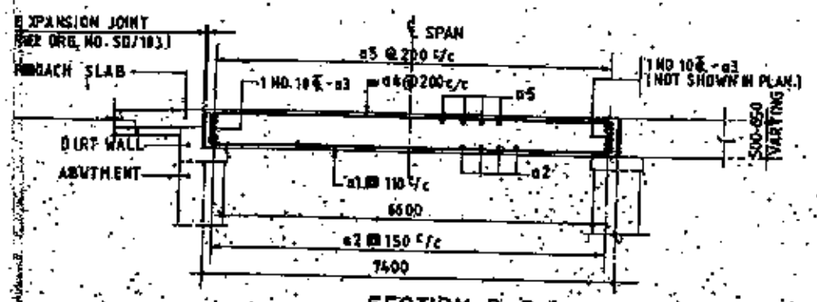
R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 6.0m

(WITHOUT FOOTPATHS)

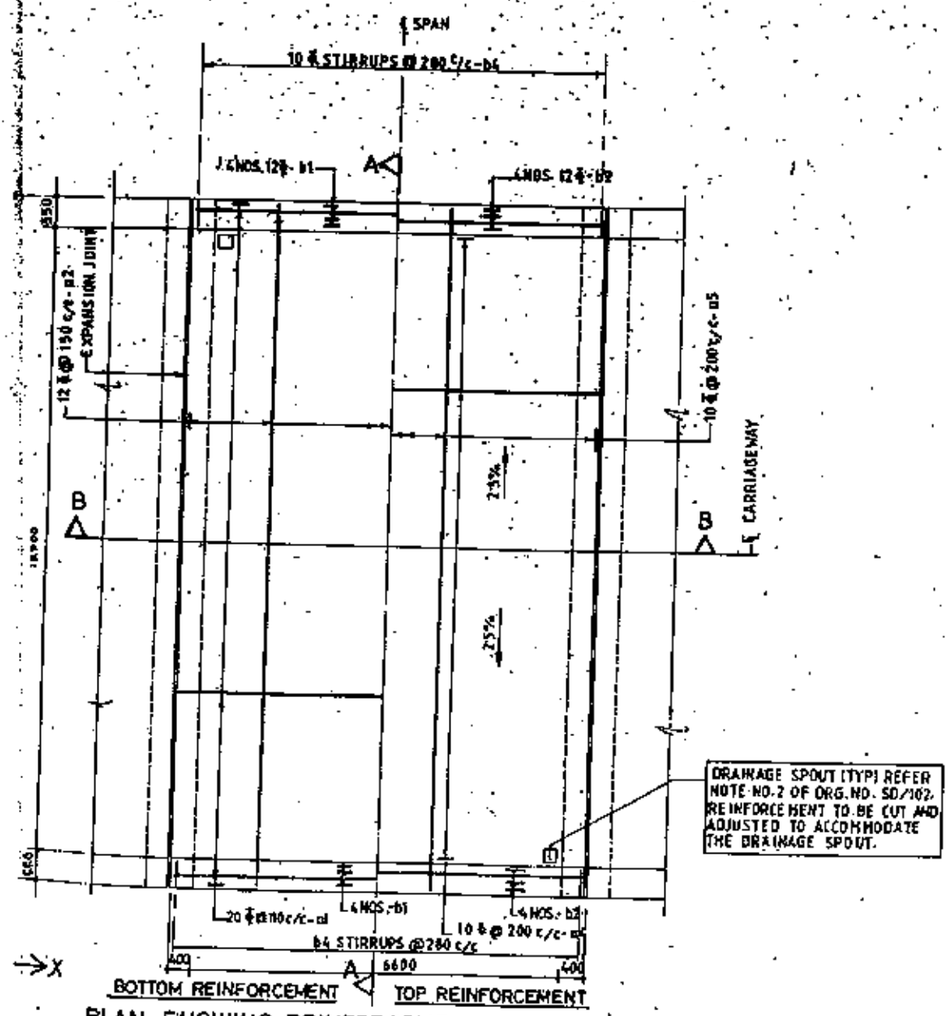
RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S.K. KASTHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/110



SECTION A-A



SECTION B-B *



PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

SCHEDULE OF REINFORCEMENT (PER SPAN)

DRG. NO. SD/111

SL.NO	LOCATION	BAR MKD.	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	R=90, 7300	20	110	7880	110	866.80	2141
2	SLAB-BOTTOM ALONG-Y	a2	R=50, 11900	12	150	12330	50	616.50	547
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	7300, R=40	10	200	7960	56	444.64	274
5	SLAB-TOP ALONG-Y	a5	5800, 5800	10	200	11600	28	640.80	272
6	KERB - BOTTOM	b1	R=50, 7284	12	—	8110	8	64.88	58
7	KERB - TOP	b2	7900, R=90	12	—	8130	8	65.04	58
8	KERB - SIDES	b3	R=40, 7260	10	—	7850	8	62.80	39
9	KERB - STIRRUPS	b4	400, 436	10	280	2380	54	128.52	79

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS - REFER DRG. NO. SD/103.

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m and wearing coat @ 3 kN/sq.m. = 1498 kN

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	7.0
CONCRETE (cu.m.)	53.51
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	3657
ASPHALTIC WEARING COAT (sq.m)	80.66

NOTES :-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no (8) of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcement of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per I S 2502
5. Reinforcement of adjecent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES.
SD/102	GENERAL ARRANGEMENT.
SD/103 & SD/104	MISCELLANEOUS DETAILS.
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

MKD	DATE	DESCRIPTION	BY

REVISION

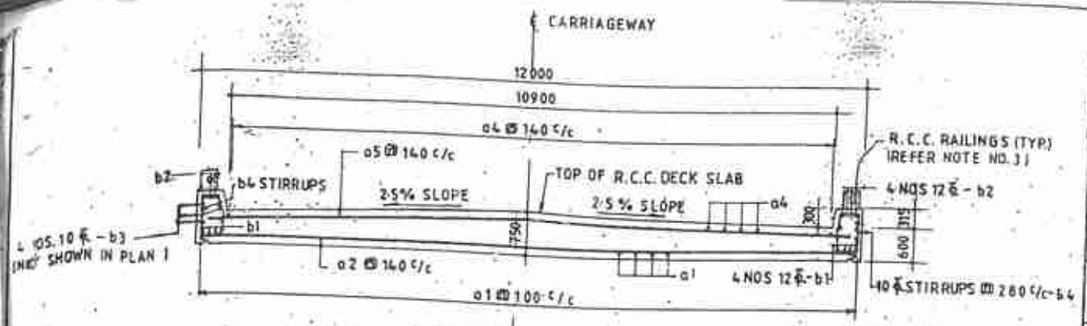
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

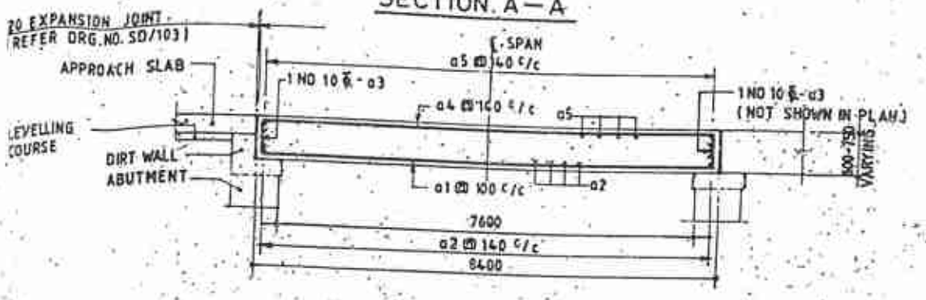
R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 7.0m

(WITHOUT FOOTPATHS)

RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S.K. KAISTHA) S.E.	(H.K. MUKHERJEE) C.E.	DRG. NO. SD/111



SECTION A–A



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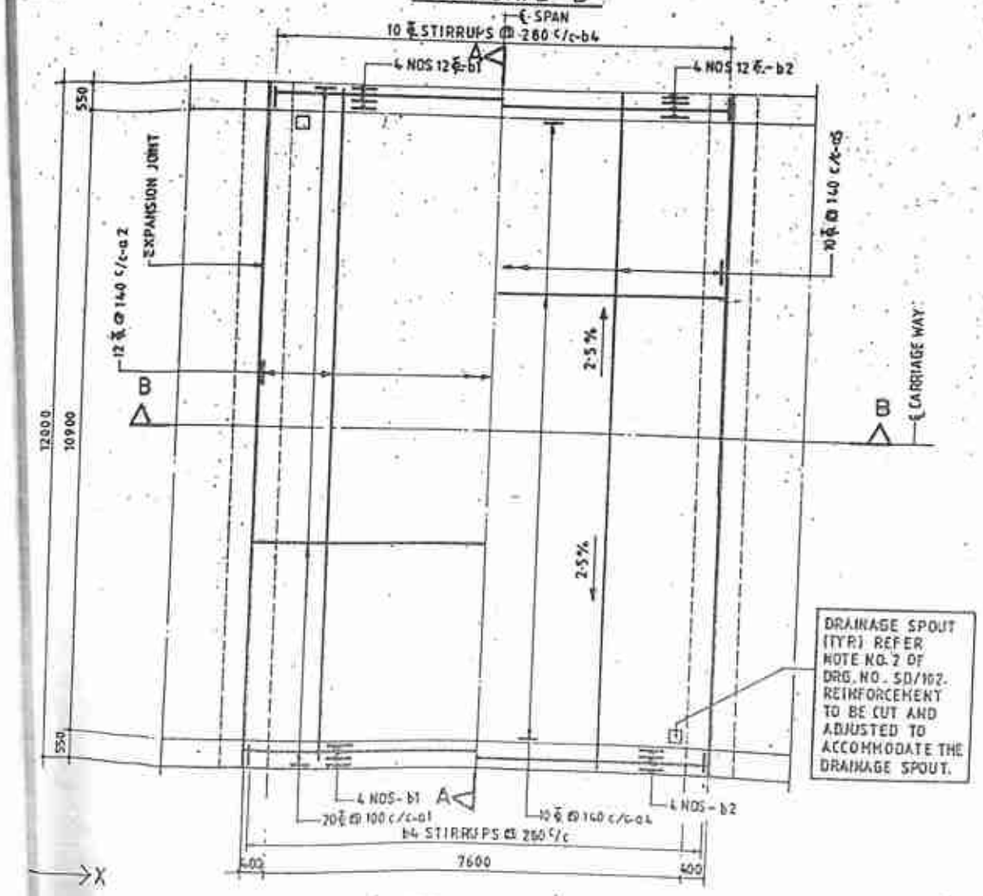


BOTTOM REINFORCEMENT TOP REINFORCEMENT

PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL NO	LOCATION	BAR MKD	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH(m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	600, R-80, 8200, 600	20	100	8980	120	1077.60	2662
2	SLAB-BOTTOM ALONG-Y	a2	200, R-50, 11900, 200	12	140	12430	61	758.23	673
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	8300, 400, R-40, 400	10	140	9040	79	714.16	441
5	SLAB-TOP ALONG-Y	a5	5800, 5800, 345	10	140	11600	61	707.60	437
6	KERB - BOTTOM	b1	500, R-50, 8284, 500	12	—	9210	8	73.68	65
7	KERB - TOP	b2	8300, 500, R-50, 500	12	—	9230	8	73.84	66
8	KERB - SIDE	b3	315, R-40, 8260, 315	10	—	8850	8	70.80	44
9	KERB - STIRRUPS	b4	400, 400, 773	10	280@	2580	62@	159.96	99

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS – REFER DRG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3KN/m and wearing coat @ 2 kN/sq m = 1933 kN

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	8·0
CONCRETE (cu. m.)	70·81
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	4727
ASPHALTIC WEARING COAT (sq.m)	91·56

NOTES:–

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no.(8)-i of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcements of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per IS:2502.
5. Reinforcement of adjacent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

MKD	DATE	DESCRIPTION	BY

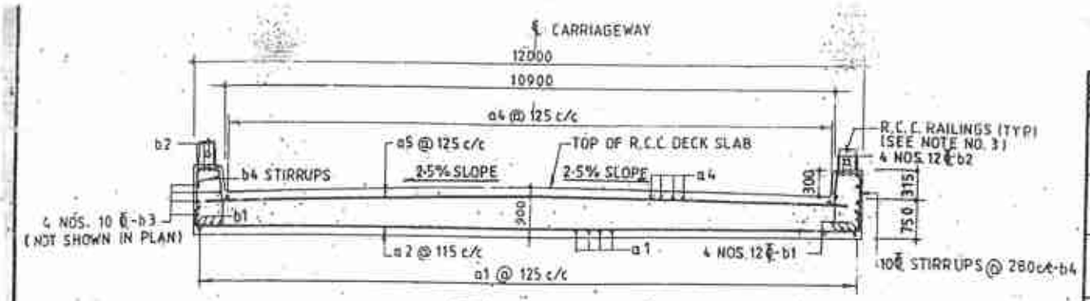
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

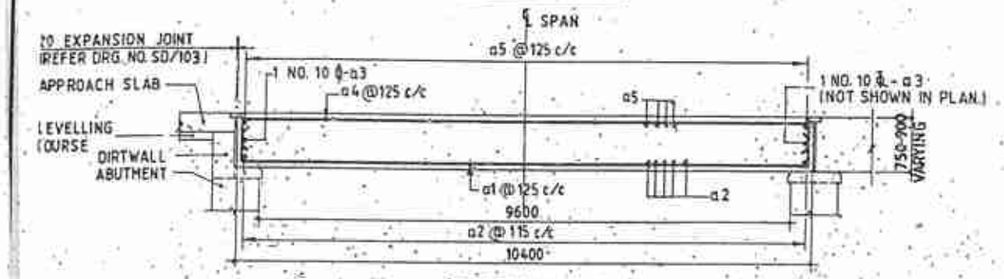
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 8·0m (WITHOUT FOOTPATHS)

RECOMMENDED BY		APPROVED BY	1990
(U. JAYAKODI) E.E.	(S.K. KAISTHA) S.E.	(P.K. MUKHERJEE) C.E.	DRG NO. SD/112



SECTION A-A



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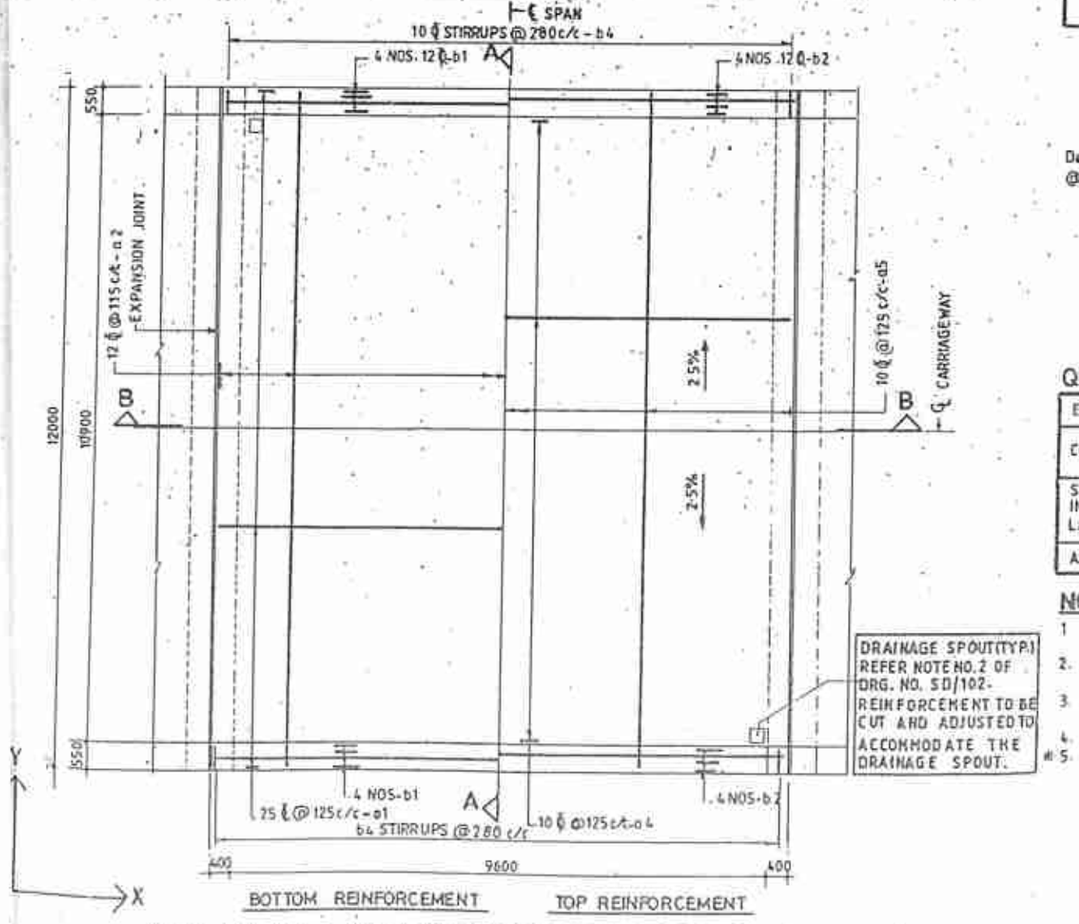


PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB

SCHEDULE OF REINFORCEMENT (PER SPAN)

SL NO	LOCATION	BAR MKD	SHAPE	DIA. (mm)	SPACING (mm)	LENGTH (mm)	NOS	TOTAL LENGTH(m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	500, R=100, 10300, 500	25	125	11150	96	1070.40	4121
2	SLAB-BOTTOM ALONG-Y	a2	300, R=50, 11900, 300	12	115	12430	91	1131.13	1004
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	10300, 500, R=40, 500	10	125	11240	89	1000.36	617
5	SLAB-TOP ALONG-Y	a5	5800, 5800, 165	10	125	11600	84	974.40	601
6	KERB-BOTTOM	b1	650, R=50, 10275, 650	12	—	11500	8	92.00	82
7	KERB-TOP	b2	16300, 650, R=50, 650	12	—	11530	8	92.24	82
8	KERB-SIDES	b3	325, R=40, 10250, 325	10	—	10840	8	86.72	54
9	KERB-STIRRUPS	b4	225, 207, 643, 318, 68	10	280@	2870	76@	218.12	135

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS-REFER DRG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m. and wearing coat @ 2kN/sq.m. = 2843 kN.

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	10.0
CONCRETE (cu. m.)	106.40
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	7047
ASPHALTIC WEARING COAT (sq. m.)	113.36

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no.(8)-H of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcements of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per IS 2502
5. Reinforcement of adjacent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS. (WITHOUT FOOTPATHS)

MKD.	DATE	DESCRIPTION	BY

REVISION.

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 10·0m

(WITHOUT FOOTPATHS)

RECOMMENDED BY		APPROVED BY	1990.
(S.S. REDDY) E.E.	(S.K. KAISTHA) S.E.	(P.K. SHIVAPRASAD) C.E.	DRG. NO SD/114

(A) GENERAL

1. These notes are applicable for the Standard Drawings for R.C.C. solid slab superstructure with and without footpaths.

2. These drawings are applicable only for skew bridges with overall right width of 12 m.

3. No raised footpaths shall be provided on the bridges having length less than 30 m measured along skew direction unless the same are otherwise existing on the approaches.

4. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.

5. Design criteria:

   I. The design is according to the following codes:

      (a) IRC:5-1985

      (b) IRC:6-1966 (1985 reprint)

      (c) IRC:21-1987.

   II. The following loads have been considered in the design:

      (a) One-lane of IRC class 70R or two lanes of IRC class A on carriageway, whichever governs.

      (b) Footpath load of 5 kN/sq.m for superstructure having footpaths.

      (c) Wearing coat load of 2 kN/sq.m.

   III. The designs are applicable for 'MODERATE AND SEVERE' conditions of exposure.

6. Public utility services (except water supply and sewerage), if required, shall be carried over the bridge through 150 mm diameter ducts provided in the footpaths. Total load of such services shall not be more than 1.0 kN per metre on each footpath. Water/sewerage pipeline shall not be carried over any part of the superstructure. Inspection chambers in footpaths may be provided as shown in the drawing. The location and spacing of chambers along the footpath will be decided by the Engineer-in-charge in consultation with the users.

7. Wearing coat shall consist of the following:

   I. (a) A coat of mastic asphalt 6 mm thick with a prime coat over the top of the deck before the wearing coat is laid. The prime coat of mastic asphalt shall be 30 per cent straight run 30-40 penetration grade bitumen and 50 per cent light solvent (Benzol) to be laid over the deck slab. The insulating layer of 25 mm thick mastic asphalt with 75 per cent lime stone dust filler and 25 per cent of 30/40 penetration grade bitumen shall be laid at 375°F with broom over prime coat.

      (b) 50 mm thick Bituminous Concrete wearing coat in two layers of 25 mm each as per Clause 509 of MoRT&H's Specifications for Road and Bridge Works (Fourth Revision 2001)

   II. In case of isolated bridge construction or bridges located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, the Engineer-in-charge may permit provision of 75 mm thick reinforced cement concrete wearing coat in M30 grade concrete with maximum water cement ratio as 0.40. The reinforcement shall consist of 8 mm High Yield Strength Deformed bars @200 mm centres. However, in the 300 mm width adjacent to expansion joint the reinforcement shall comprise 8 mm dia HYSD bars spaced at 100 mm centre-to-centre in both directions.

8. Wearing coat shall be discontinued at expansion joint locations. Joint fillers shall extend upto the top of wearing coat.

9. Width of expansion joint has been kept 20 mm only which does not cater for any allowance for possible tilting of abutment.

10. Support for the deck slab shall provide a bearing width of 400 mm measured in a direction perpendicular to support.

11. In urban areas, chequered tiles may be provided in the footpath portion by suitably adjusting the thickness of the footpath slab.

12. Type/position of return walls, railings, guard posts, ramp etc. in approach portion shall be decided by the Engineer-in-charge.

(B) MATERIALS SPECIFICATIONS

Concrete

1. Concrete shall be design mix shall have minimum 28 days characteristic strength of 30 MPa on 150 mm cubes for all elements of superstructure for both 'SEVERE' and 'MODERATE' conditions of exposure.

2. Ordinary portland cement conforming to IS:269 or high strength ordinary portland cement conforming to IS:8112 capable of achieving the required design concrete strength shall only be used.

3. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 310 kg/cu.m. and 0.45 respectively for 'MODERATE' conditions of exposure. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 400 kg/cu.m. and 0.40 respectively for 'SEVERE' conditions of exposure.

Reinforcement

All reinforcement bars shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS:1786.

Water

Water to be used in concreting and curing shall conform to Clause 302.4 of IRC:21-1987.

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50 mm unless shown otherwise in the drawings.

2. For ensuring proper cover of concrete to reinforcement bars specially made polymer cover blocks shall only be used.

3. Construction joints

   I. The location and provision of construction joints shall be approved by the Engineer-in-charge. The concreting operation shall be carried out continuously upto the construction joint.

   II. The concrete surface at the joint shall be brushed with a stiff brush after casting while the concrete is still fresh and it has only slightly hardened.

   III. Before new concrete is poured the surface of old concrete shall be prepared as under:

   a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris/laitance and made rough so that 1/4 of the size of the aggregate is exposed but without dislodging the aggregate or structurally damaging the concrete.

   b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet.

   c) The old surface shall be soaked with water without leaving puddles immediately before starting concreting to prevent the absorption of water from new concrete.

   IV. New concrete shall be thoroughly compacted in the region of the joint.

4. Welding of reinforcement bars shall not be permitted.

5. Laps in reinforcement:

   I. Minimum lap length of reinforcement shall be kept as 83 d where 'd' is the diameter of bar.

   II. Not more than 50 per cent of reinforcement shall be lapped at any one location.

   III. For closely spaced bars lapping may be avoided by providing suitable type of mechanical splices.

6. Bending of reinforcement bars shall be as per IS:2502.

7. Supporting chairs of 12 mm diameter shall be provided at suitable intervals as per IS:2502.

8. Concrete shall be produced in a mechanical mixer of capacity not less than 200 litres having integral weigh-batching facility and automatic water measuring and dispensing device.

9. Proper compaction of concrete shall be ensured by use of full width screed vibrators for concrete in deck slab.

10. Properly braced steel plates shall be used as shuttering.

11. Sharp edges of concrete shall be chamfered.

(D) GENERAL SPECIFICATIONS

The work shall be executed in accordance with MoRT&H's Specifications for Road and Bridge Works (Fourth Revision, 2001) except wherever otherwise mentioned.

(E) For details refer MoRT&H's Standard Drawings as listed below:

Drawing No.	Title
SD/152, SD/153 SD/154, SD/155	General Arrangement for various skew angles
SD/156, SD/157 & SD/158	Miscellaneous details
SD/159	Details of R.C.C. Railings (without footpaths)
SD/160	Details of R.C.C. Railings (with footpaths)
SD/161-SD/164 SD/169-SD/172 SD/177-SD/180 SD/185-SD/188	R.C.C. solid slab Superstructure (without footpaths) for various skew angles
SD/165-SD/168 SD/173-SD/176 SD/181-SD/184 SD/189-SD/192	R.C.C. solid slab superstructure (with footpaths) for various skew angles

R.C.C. SOLID SLAB SUPERSTRUCTURE (SKEW) RIGHT EFFECTIVE SPAN 4.0 m TO 10.0 m (WITH AND WITHOUT FOOTPATHS) GENERAL NOTES

(A) GENERAL

1. These notes are applicable for the Standard Drawings for R.C.C. solid slab superstructure with and without footpaths.
2. These drawings are applicable only for right bridges with overall width of 12 m.
3. No raised footpaths shall be provided on the bridges having length less than 30 m unless the same are otherwise existing on the approaches.
4. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.
5. Design criteria:
   - I. The design is according to the following codes:
     - (a) IRC:5-1985
     - (b) IRC:6-1966 (1985 reprint)
     - (c) IRC:21-1987.
   - II. The following loads have been considered in the design:
     - (a) One lane of IRC class 70R or two lanes of IRC class A on carriageway, whichever governs.
     - (b) Footpath load of 5 kN/sq.m for superstructure having footpaths.
     - (c) Wearing coat load of 2 kN/sq.m.
   - III. The designs are applicable for 'MODERATE AND SEVERE' conditions of exposure.
6. Public utility services (except water supply and sewerage), if required, shall be carried over the bridge through 150 mm diameter ducts provided in the footpaths. Total load of such services shall not be more than 1.0 kN per metre on each footpath. Water/ sewerage pipeline shall not be carried over any part of the superstructure. Inspection chambers in footpaths may be provided as shown in the drawing. The location and spacing of chambers along the footpath will be decided by the Engineer-in-charge in consultation with the users.
7. Wearing coat shall consist of the following:
   - I. (a) A coat of mastic asphalt 6 mm thick with a prime coat over the top of the deck before the wearing coat is laid. The prime coat of mastic asphalt shall be 30 per cent straight run 30/ 40 penetration grade bitumen and 50 per cent light solvent (Benzol) to be laid over the deck slab. The insulating layer of 6 mm thick mastic asphalt with 75 per cent lime stone dust filler and 25 per cent of 30/40 penetration grade bitumen shall be laid at 375°F with broom over prime coat.
     - (b) 50 mm thick asphaltic concrete wearing coat in two layers of 25 mm each as per Clause 512 of MoRT&H's Specifications for Road and Bridge Works (Second Revision, 1988)
   - II. In case of isolated bridge construction or bridges located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, the Engineer-in-charge may permit provision of 75 mm thick cement concrete wearing coat in M 30 grade concrete with maximum water cement ratio as 0.40. The reinforcement shall consist of 8 mm High Yield Strength Deformed bars @200 mm centres reducing to 100 centres in both the directions over a strip of 300 mm near the expansion joint. Reinforcement shall be placed at the centre of the wearing coat. Wearing coat shall be discontinued at expansion joint locations. Joint fillers shall extend upto the top of wearing coat.
8. 20 mm expansion joint does not cater for any allowance for possible tilting of abutment.
9. Support for the deck slab shall provide a bearing width of 40 mm.
10. In urban areas, chequered tiles may be provided in the footpath portion by suitably adjusting the thickness of the footpath slab.
11. Type/position of return walls, railings, guard posts, ramp etc. in approach portion shall be decided by the Engineer-in-charge.

(B) MATERIALS SPECIFICATIONS

Concrete

1. Concrete shall be of design mix and shall have minimum 28 days characteristic strength on 150 mm cubes for all elements of superstructure as indicated below:

Conditions of exposure	Concrete grade	Characteristic Strength
'MODERATE'	M 25	25 MPa (for 3 m to 9 m span)
'MODERATE'	M 30	30 MPa (for 10 m span)
'SEVERE'	M 30	30 MPa (for 3 m to 10 m span)

2. High strength ordinary portland cement conforming to IS:8112 or ordinary portland cement conforming to IS:269 capable of achieving the required design concrete strength shall only be used.
3. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 310 kg/cu.m and 0.45 respectively for 'MODERATE' conditions of exposure. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 400 kg/cu.m and 0.40 respectively for 'SEVERE' conditions of exposure.

Reinforcement

All reinforcing bars shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS:1786.

Water

Water to be used in concreting and curing shall conform to Clause 302.4 of IRC:21-1987.

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50 mm unless shown otherwise in the drawings.
2. For ensuring proper cover of concrete to reinforcement bars specially made polymer cover blocks shall only be used.
3. **Construction Joints**
   - I. The location and provision of construction joints shall be approved by Engineer-in-charge. The concreting operation shall be carried out continuously upto the construction joint.
   - II. The concrete surface at the joint shall be brushed with a stiff brush after casting while the concrete is still fresh and it has only slightly hardened.
   - III. Before new concrete is poured the surface of old concrete shall be prepared as under:
     - a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris/laitance and made rough so that 1/4 of the size of the aggregate or structurally damaging the concrete.
     - b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet.
     - c) The old surface shall be soaked with water without leaving puddles immediately before starting concreting to prevent the absorption of water from new concrete.
   - IV. New concrete shall be thoroughly compacted in the region of the joint.
4. Welding of reinforcement bars shall not be permitted.
5. Laps in reinforcement:
   - I. Minimum lap length of reinforcement shall be kept as 83 d where 'd' is the diameter of bar.
   - II. Not more than 50 per cent of reinforcemen be lapped at any one location.
6. Bending of reinforcement bars shall be as per IS
7. Supporting chairs of 12 mm diameter shall be pr at suitable intervals as per IS:2502.
8. Concrete shall be produced in a mechanical mi capacity not less than 200 litres having integral w batching facility and automatic water measurin dispensing device.
9. Proper compaction of concrete shall be ensured l of full width screed vibrators for concrete in deck
10. Properly braced steel plates shall be used as shutt
11. Sharp edges of concrete shall be chamfered.

(D) GENERAL SPECIFICATIONS

The work shall be executed in accordance MoRT&H's Specification for Road and Bridge V (Fourth Revision, 2001) except wherever othe mentioned.

(E) For details refer MORT&H's Standard Dra as listed below:

Drawing No.	Title
SD/102	General Arrangement
SD/103 & SD/104	Miscellaneous Details
SD/105	Details of R.C.C. Raili (without footpaths)
SD/106	Details of R.C.C. Railings (v foot-paths)
SD/107 through SD/114	R.C.C. solid slab superstructure (right) Spans 3 m to 10 m (without footpaths)
SD/115 through SD/122	R.C.C. solid slab superstructure (right) Spans 3 m to 10 m (with footpaths)

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) EFFECTIVE SPAN 3.0 m TO 10.0 m (WITH AND WITHOUT FOOTPATHS) GENERAL NOTES

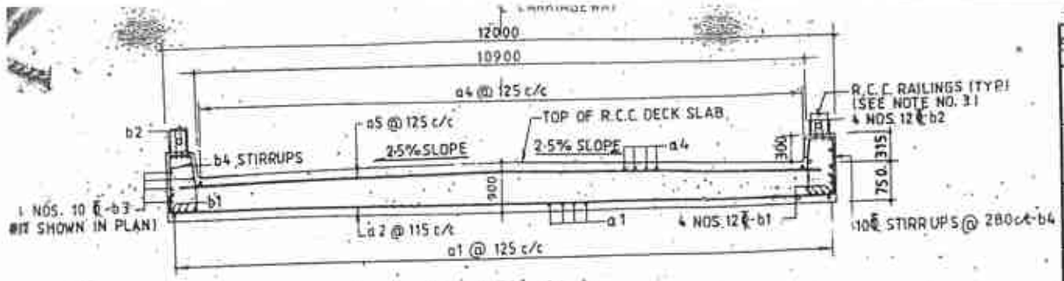
Type	Effective Span (m)	Depth of Slab D1 (mm)	Depth of Slab D2 (mm)	Concrete (m^3)	Steel (kg)	Asphaltic wearing coat (m^2)	Type	Effective Span (m)	Depth of Slab D1 (mm)	Depth of Slab D2 (mm)	Concrete (m^3)	Steel (kg)	Asphaltic wearing coat (m^2)
↑ Without Foot Paths ↓	3.0	450	300	16.42	835	37.06	↑ With Foot Paths ↓	3.0	450	300	20.44	917	25.50
	4.0	500	350	23.89	1296	47.96		4.0	500	350	29.09	1391	33.00
	5.0	560	400	32.57	2061	58.86		5.0	550	400	38.95	2170	40.50
	6.0	600	450	42.43	2825	69.76		6.0	600	450	50.00	2955	48.00
	7.0	650	500	53.51	3657	80.66		7.0	650	500	62.25	3794	55.50
	8.0	750	600	70.81	4727	91.56		8.0	750	600	80.74	4823	63.00
	9.0	820	670	87.14	6076	102.46		9.0	820	670	98.26	6166	70.50
	10.0	900	750	106.40	7047	113.36		10.0	900	750	118.70	7124	78.00

Note:

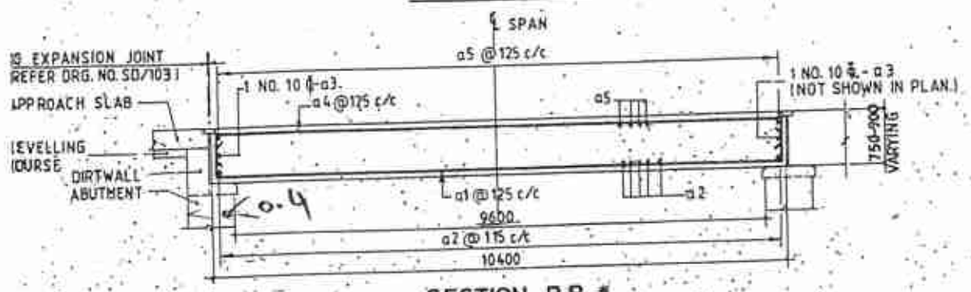
1. Quantity of steel includes 5 per cent extra for laps and wastage
2. Quantities pertaining to approach slab and railings not included.

R.C.C. Solid Slab Superstructure (Right)

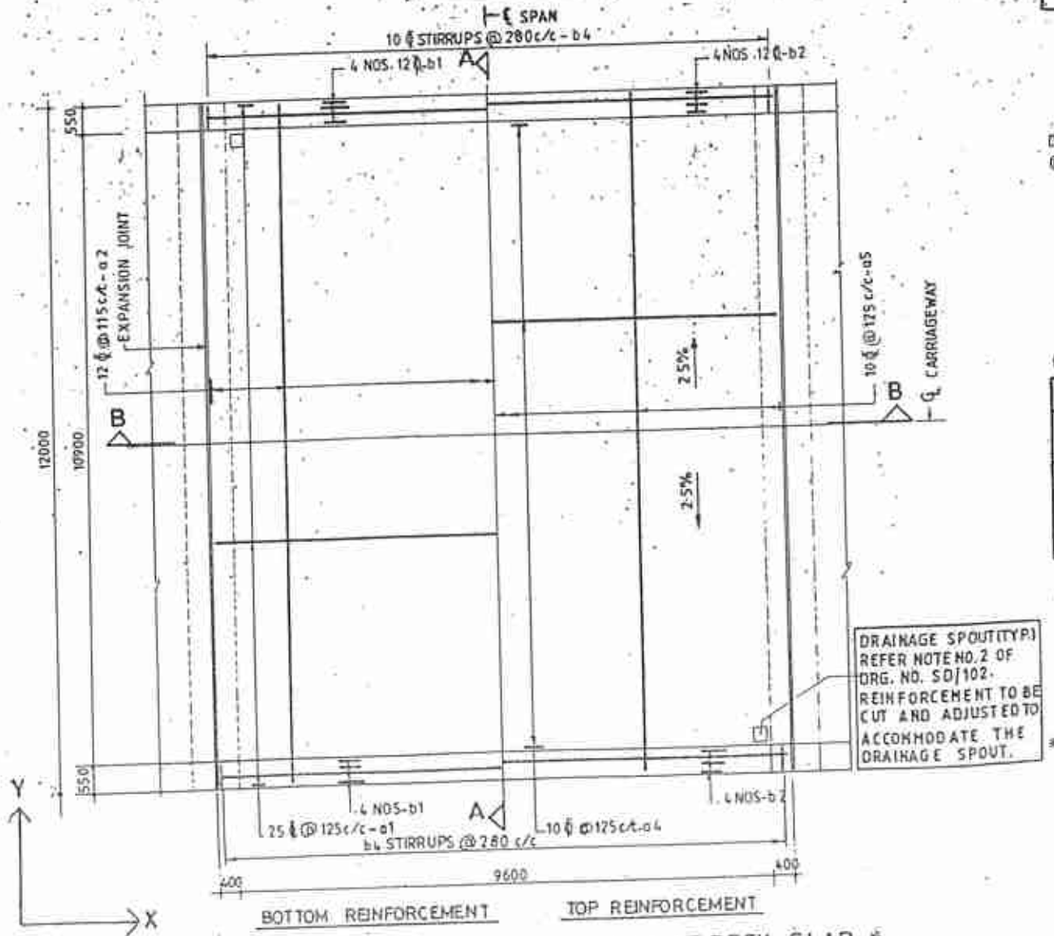
Effective Span 3.0 m to 10.0 m
(With and Without Footpaths)
Depth of Slab and Quantities
Per Span



SECTION A-A



SECTION B-B *



PLAN SHOWING REINFORCEMENT DETAILS OF DECK SLAB *

SCHEDULE OF [illegible]

SL NO	LOCATION	BAR MKD	SHAPE	DIA (mm)	SPACING (mm)	LENGTH (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
1	SLAB-BOTTOM ALONG-X	a1	500 R=100 500 / 10300	25	125	11150	96	1070.40	4121
2	SLAB-BOTTOM ALONG-Y	a2	100 R=50 1200 / 11900	12	115	12430	91	1131.13	1004
3	SLAB-SIDE ALONG-Y	a3	11900	10	—	11900	2	23.80	15
4	SLAB-TOP ALONG-X	a4	10300 / 500 R=40 500	10	125	11240	89	1000.36	617
5	SLAB-TOP ALONG-Y	a5	5800 5800	10	125	11600	84	974.40	601
6	KERB-BOTTOM	b1	650 R=50 650 / 10275	12	—	11500	8	92.00	82
7	KERB-TOP	b2	10300 / 650 R=50 650	12	—	11530	8	92.24	82
8	KERB-SIDES	b3	325 R=40 325 / 10750	10	—	10840	8	86.72	54
9	KERB-STIRRUPS	b4	275 300 / 425 150	10	280@	2870	76@	218.12	135

@ DOES NOT INCLUDE THE ADDITIONAL STIRRUPS AT LAPS OF LONGITUDINAL BARS-REFER DRG. NO. SD/103

Dead load of the superstructure per span including R.C.C. railings @ 3kN/m and wearing coat @ 2kN/sq.m = 2843 kN.

QUANTITIES (PER SPAN)

EFFECTIVE SPAN (m)	10.0
CONCRETE (cu.m.)	136.46
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	7047 *
ASPHALTIC WEARING COAT (sq.m.)	113.36

NOTES:-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Special attention is invited to note no.(8)-i of drawing no SD/101 regarding the design mix to be adopted.
3. The reinforcements of railing posts shall be incorporated before casting of the deck slab. The railings shall conform to drawing no SD/105 or any other approved type.
4. Dimensions in schedule of reinforcement are given as per IS 2502
* 5. Reinforcement of adjacent span superstructure, approach slab not shown.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/101	GENERAL NOTES
SD/102	GENERAL ARRANGEMENT
SD/103 & SD/104	MISCELLANEOUS DETAILS
SD/105	DETAILS OF R.C.C. RAILINGS (WITHOUT FOOTPATHS)

MKD.	DATE	DESCRIPTION	BY

REVISION

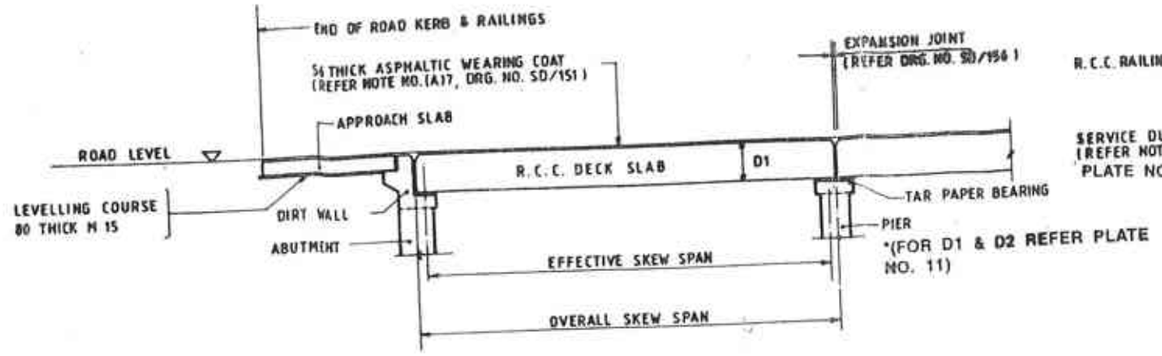
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

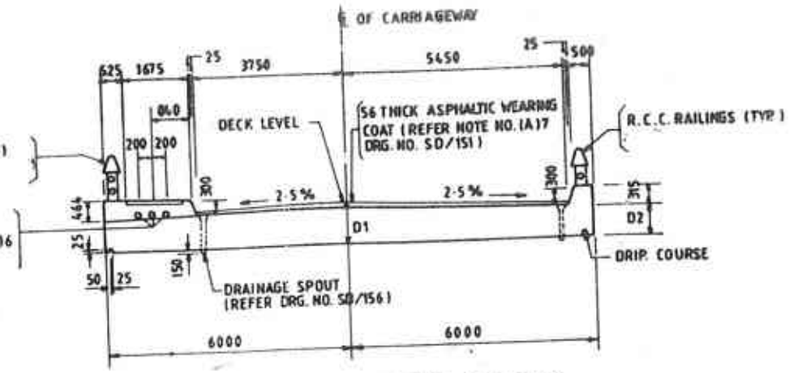
R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) SPAN 10·0m

(WITHOUT FOOTPATHS)

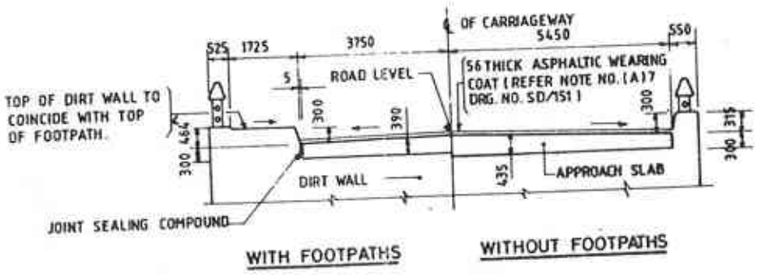
RECOMMENDED BY		APPROVED BY	1990
(S.S. REDDY) E.E.	(S.K. KAISTHA) S.E.	(P.N. SHIVAPRASAD) C.E.	DRG. NO. SD/114



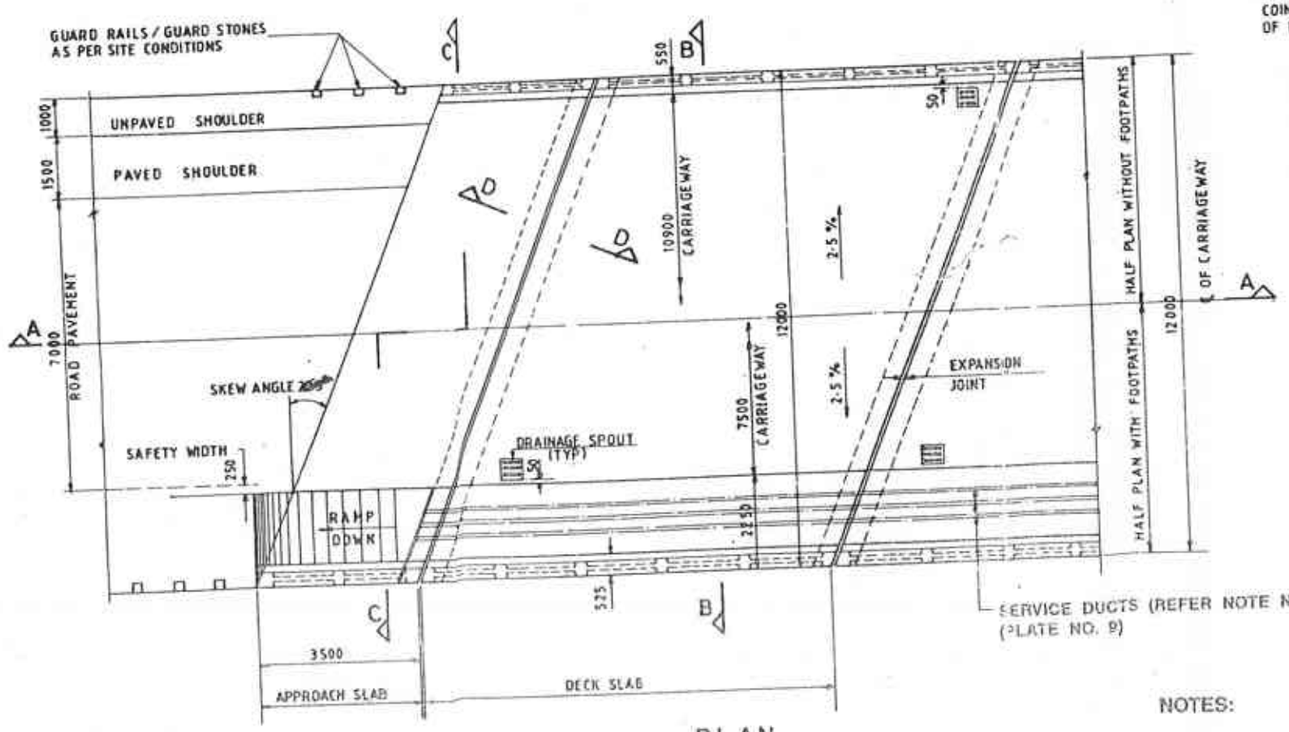
SECTION A - A
(ROAD KERB & RAILINGS NOT SHOWN)



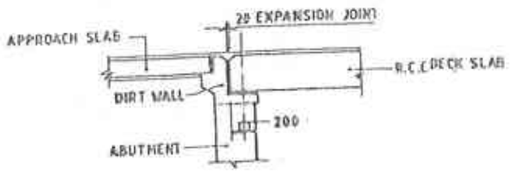
SECTION B - B



SECTION C-C



PLAN



SECTION D-D

NOTES:

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Typical arrangement of drainage spouts has been shown in plan. Suitable modifications may be made by the Engineer-in-charge as per site conditions and intensity of rainfall

R.C.C. SOLID SLAB
SUPERSTRUCTURE (SKEW)
RIGHT EFFECTIVE SPAN
4.0; 6.0; 8.0; 10.0 m
(WITH AND WITHOUT FOOTPAHTS)
GENERAL ARRANGEMENT

Type	Skew Angle	Right Effective Span (m)	Depth of Slab D_1 (mm)	Depth of Slab D_2 (mm)	Concrete (m^3)	Steel (kg)	Asphaltic wearing Coat (m^2)
Without Foot Paths	0°	8	750	600	70.81	4721	31.56
	15°	4	525	375	26.10	1768	49.65
	15°	6	625	475	45.90	3956	72.23
	15°	8	775	625	75.920	7064	94.79
	15°	10	925	775	113.40	8785	117.36
	22.5°	4	525	375	27.33	1882	51.92
	22.5°	6	625	475	48.06	3851	75.50
	22.5°	8	775	625	79.45	5867	99.10
	22.5°	10	925	775	118.6	9704	122.70
	30°	4	525	375	29.12	2063	55.37
	30°	6	625	475	51.22	3886	80.55
	30°	8	775	625	84.69	6292	105.73
	30°	10	925	775	126.47	10147	130.90
	35°	4	525	375	30.82	2279	58.54
	35°	6	625	475	54.21	4329	85.16
	35°	8	775	625	89.61	7804	111.78
	35°	10	925	775	133.78	11311	138.38

Type	Skew Angle	Right Effective Span (m)	Depth of Slab D_1 (mm)	Depth of Slab D_2 (mm)	Concrete (m^3)	Steel (kg)	Asphaltic wearing Coat (m^2)
With Foot Paths	15°	4	525	375	31.47	1845	34.16
	15°	6	625	475	53.73	3773	49.7
	15°	8	775	625	86.17	7094	65.22
	15°	10	925	775	126.07	8781	80.75
	22.5°	4	525	375	32.91	2003	35.72
	22.5°	6	625	475	56.17	4030	51.95
	22.5°	8	775	625	90.10	6108	68.19
	22.5°	10	925	775	131.81	9983	84.43
	30°	4	525	375	35.10	2193	38.10
	30°	6	625	475	59.92	4039	55.43
	30°	8	775	625	96.12	6548	72.75
	30°	10	925	775	140.61	10474	90.07
	35°	4	525	375	37.10	2415	40.28
	35°	6	625	475	63.35	4529	58.60
	35°	8	775	625	101.61	8100	76.91
	35°	10	925	775	148.63	11654	95.21

Note:

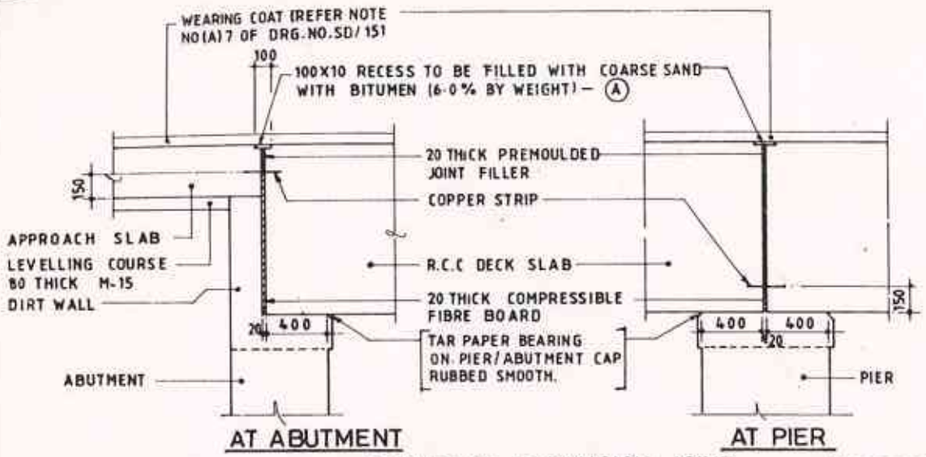
1. Quantity of steel includes 5 per cent extra for laps and wastage.
2. Quantities pertaining to approach slab and railings not individed.

R.C.C. Solid Slab Superstructure (Skew)

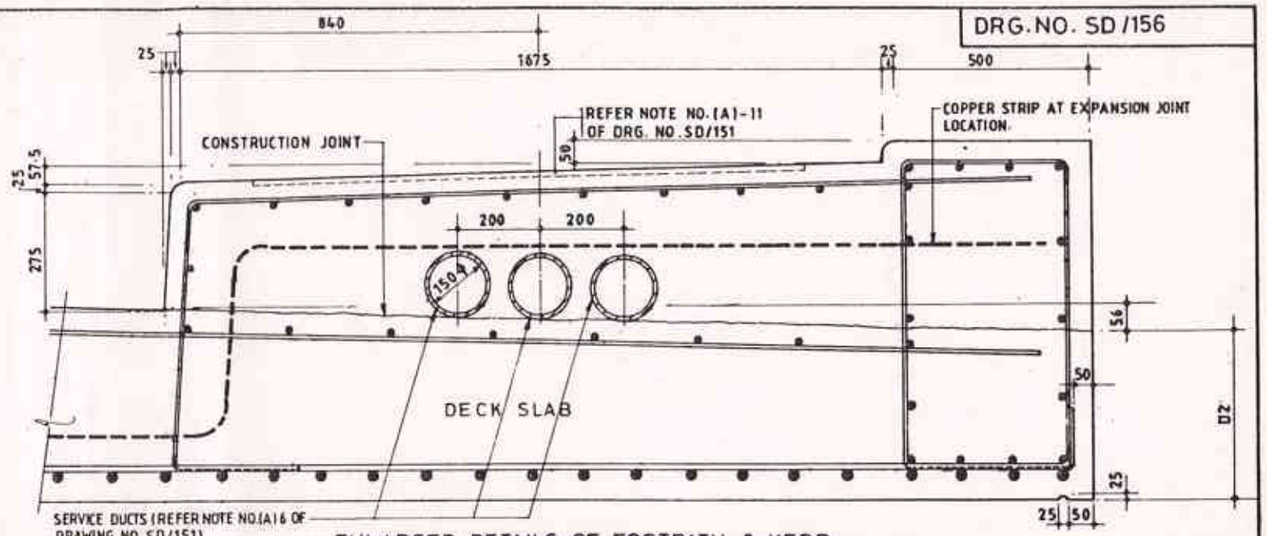
Right Effective Span
4.0; 6.0; 8.0; 10.0 m
(With and Without Footpaths)

DEPTH OF SLAB AND QUANTITIES PER SPAN

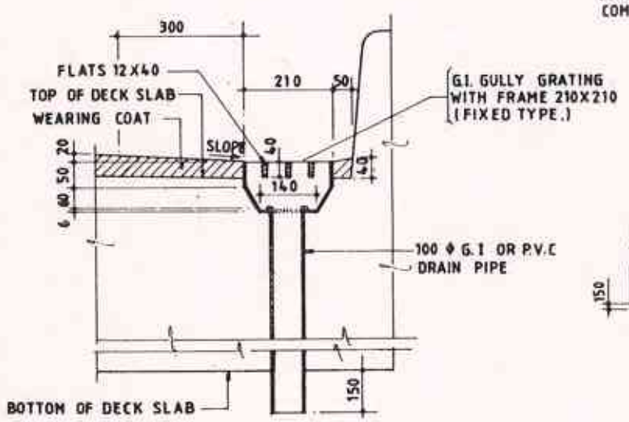
DRG.NO. SD/156



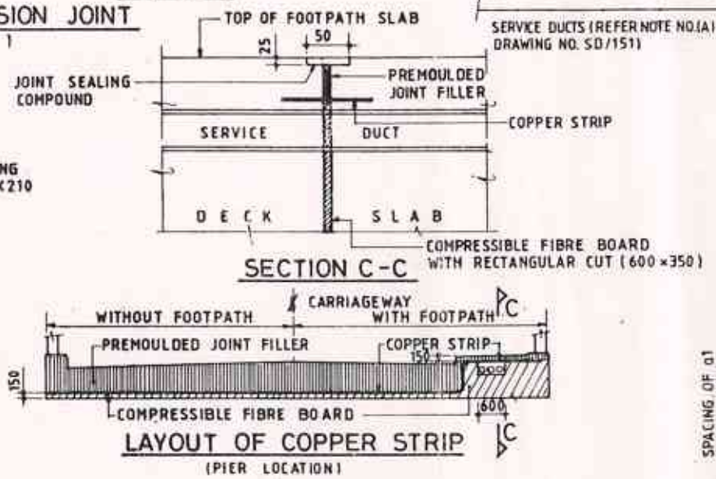
DETAILS OF EXPANSION JOINT
(RIGHT DIMENSION)



ENLARGED DETAILS OF FOOTPATH & KERB
(FOR REINFORCEMENT DETAILS & VALUES OF D2 REFER RELEVANT DRAWINGS)
(RIGHT DIMENSIONS)

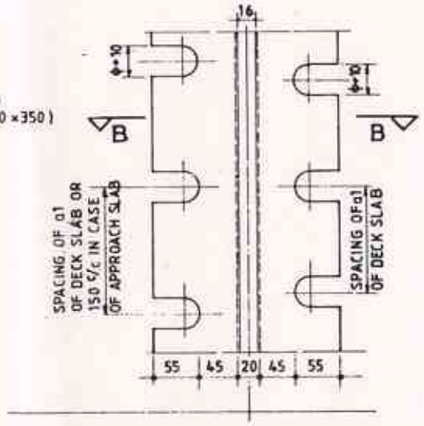


SECTION. A-A

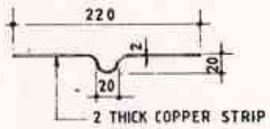


SECTION C-C

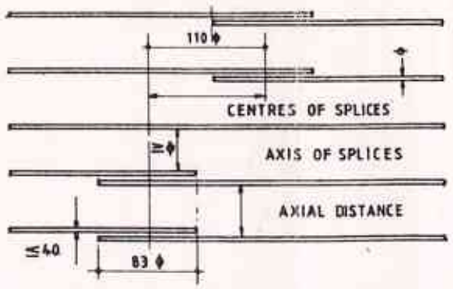
LAYOUT OF COPPER STRIP
(PIER LOCATION)



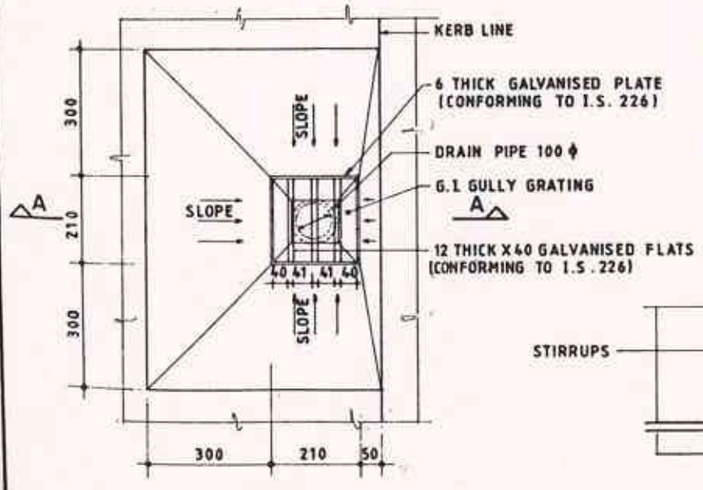
DETAIL OF COPPER STRIP



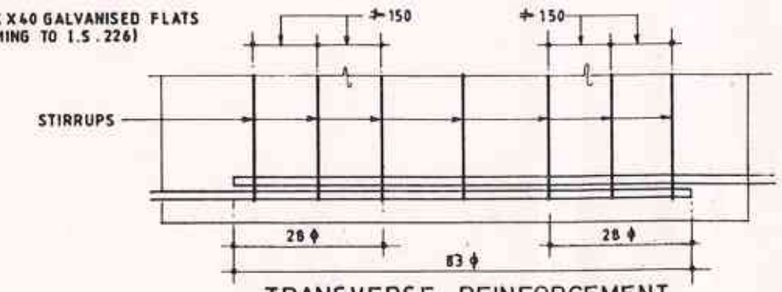
SECTION. B-B



LAP SPLICES OF BARS IN TENSION



PLAN
(DETAILS OF DRAINAGE SPOUT & COLLECTION PIT)



TRANSVERSE REINFORCEMENT AT LAPS SPLICES IN KERBS

NOTES :-

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Splicing of main longitudinal bars in deck slab shall be avoided as far as practicable. In case the splicing of bars becomes unavoidable, the arrangement shall be as shown in the drawings.
3. Area of bars spliced at any section shall not exceed 50% of the total area of the bars provided at the section.
4. Joint filler shall conform to IS 1838. Products with I.S.I certification mark shall only be used.
5. The reinforcement of deck slab shall be suitably modified to accommodate the drainage spout. Also refer note no.2 of Drawing nos. SD/152, SD/153, SD/154 or SD/155. The reinforcement marked f1 and f2 shall be modified in the region of inspection chamber.
6. The drainage spout shall be galvanised after welding the plates/flats.

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/151	GENERAL NOTES
SD/152 THROUGH SD/155	GENERAL ARRANGEMENT FOR VARIOUS SKEW ANGLES
SD/157, SD/158	MISCELLANEOUS DETAILS
SD/159	DETAILS OF RCC RAILINGS (WITHOUT FOOTPATHS)
SD/160	DETAILS OF RCC RAILINGS (WITH FOOTPATHS)
SD/161 - SD/164, SD/169 - SD/172, SD/177 - SD/180, SD/185 - SD/188	RCC SOLID SLAB SUPERSTRUCTURE (WITHOUT FOOTPATHS) FOR VARIOUS SKEW ANGLES
SD/165 - SD/168, SD/173 - SD/176, SD/181 - SD/184, SD/189 - SD/192	RCC SOLID SLAB SUPERSTRUCTURE (WITH FOOTPATHS) FOR VARIOUS SKEW ANGLES

MKD	DATE	DESCRIPTION	BY

REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

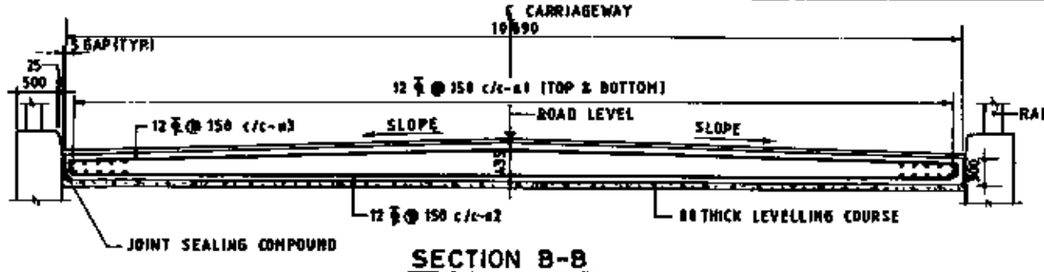
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (SKEW) SPAN 4.0m TO 10.0m WITH AND WITHOUT FOOTPATHS

MISCELLANEOUS DETAILS

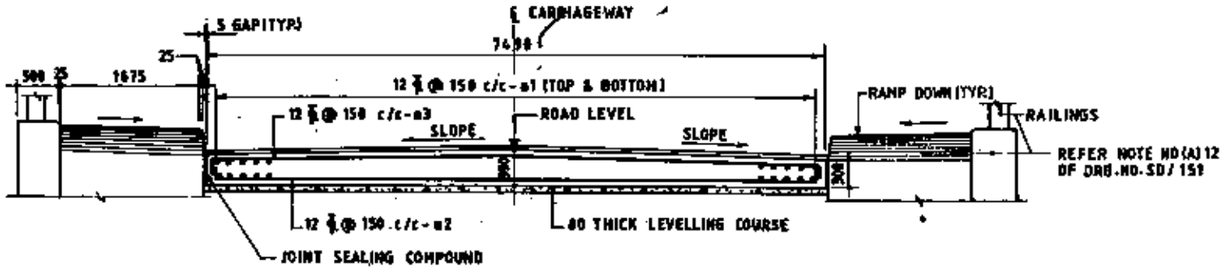
RECOMMENDED BY		APPROVED BY	1992
(ASHOK KUMAR) S.E	(R.H. SARMA) S.E	(M.K. MUKHERJEE) C.E.	DRG.NO. SD/156

DRG. NO. SD/157



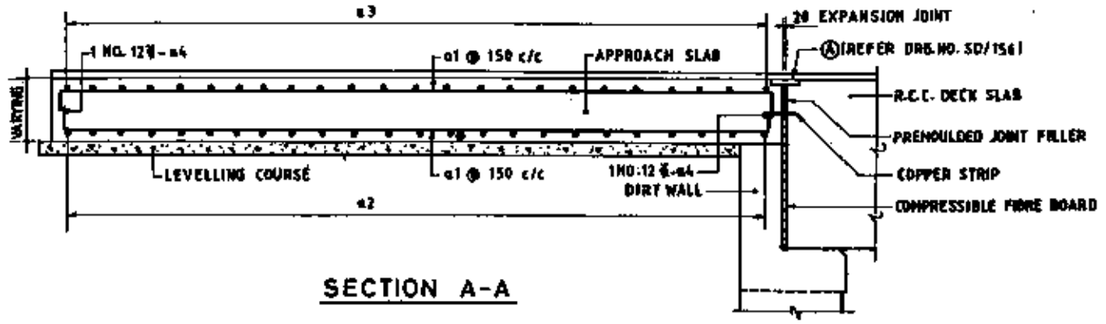
SECTION B-B

(FOR APPROACH SLAB ADJACENT TO DECK WITHOUT FOOTPATHS)

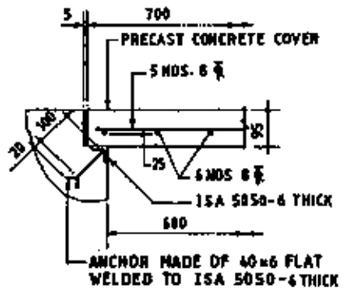


SECTION B-B

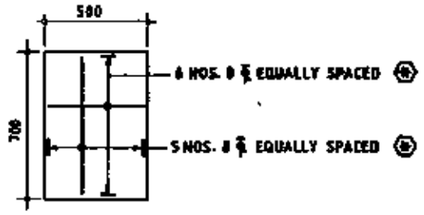
(FOR APPROACH SLAB ADJACENT TO DECK WITH FOOTPATHS)



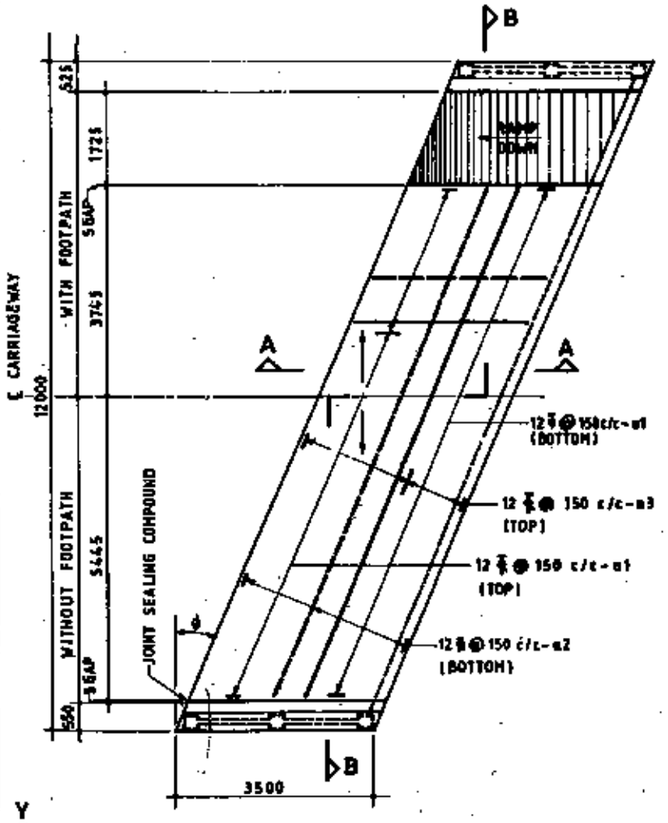
SECTION A-A



DETAIL - X

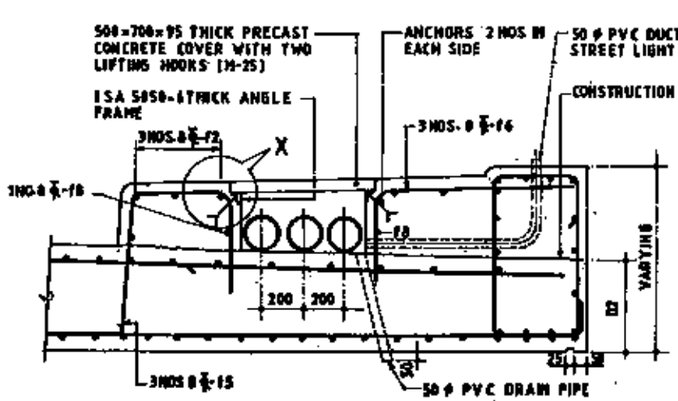


DETAILS OF PRECAST CONCRETE COVER FOR INSPECTION CHAMBER



PLAN

(SHOWING REINFORCEMENT DETAILS OF APPROACH SLAB)
(ABUTMENT, DIRTWALL & LEVELLING COURSE NOT SHOWN)



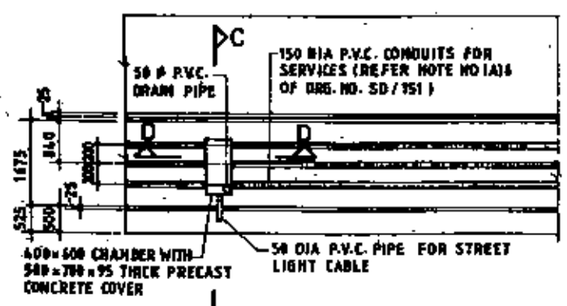
SECTION C-C

(REINFORCEMENT OF RAILING POST NOT SHOWN. REFER RELEVANT DRAWINGS. FOR VALUES OF D2 & DETAILS OF REINFORCEMENT)

SECTION D-D

(SHOWING SHAPE OF BARS IN THE REGION OF INSPECTION CHAMBER OTHER REINFORCEMENTS ARE NOT SHOWN)

(B) Refer note No.1 of DRG. No. SD/150



PART PLAN OF BRIDGE DECK

(SHOWING DETAILS OF INSPECTION CHAMBER IN FOOTPATH. THE LOCATION AND SPACINGS ALONG THE FOOTPATHS TO BE DECIDED BY ENGINEER-IN-CHARGE AS PER SITE CONDITIONS AND IN CONSULTATION WITH THE CONCERNED AUTHORITIES)

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/151	GENERAL NOTES
SD/152 THROUGH SD/155	GENERAL ARRANGEMENT FOR VARIOUS SKEW ANGLES
SD/154, SD/158	MISCELLANEOUS DETAILS
SD/159	DETAILS OF R.C.C RAILINGS (WITHOUT FOOTPATHS)
SD/160	DETAILS OF R.C.C RAILINGS (WITH FOOTPATHS)
SD/161 : SD/168	R.C.C SOLID SLAB SUPERSTRUCTURE (WITHOUT FOOTPATHS) FOR VARIOUS SKEW ANGLES
SD/169 - SD/172	
SD/177 - SD/180	
SD/185 - SD/188	
SD/165 - SD/168	R.C.C SOLID SLAB SUPERSTRUCTURE WITH FOOTPATHS) FOR VARIOUS SKEW ANGLES
SD/173 - SD/176	
SD/181 - SD/184	
SD/189 - SD/192	

NOTES:

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. The reinforcement of railing posts shall be incorporated before casting of deck slab. The railings shall conform to drawing no SD/159 or SD/160 or any other approved type.
3. Dimensions in schedule of reinforcement are given as per IS: 2502

MKD	DATE	DESCRIPTION	BY

REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. SOLID SLAB SUPERSTRUCTURE (SKEW) SPAN 4.0m TO 10.0m

(WITH AND WITHOUT FOOTPATHS)

MISCELLANEOUS DETAILS

RECOMMENDED BY		APPROVED BY	1992
(ASHOK KUMAR) S.E.	(R.H. SARMA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/157

SCHEDULE OF REINFORCEMENT – 15° SKEW (PER APPROACH SLAB)

SL.NO.	LOCATION	BAR MKD	SHAPE	DIA. (mm)	SPACING (mm)	LENGTH (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
APPROACH SLAB ADJACENT TO DECK WITHOUT FOOTPATHS									
1	SLAB TOP & BOTTOM ALONG-X	a1	200 R=48 200 (3488)	12	150	3728	146	544.29	490
2	SLAB BOTTOM ALONG-N	a2	150 R=48 150 (11174)	12	150	11402	23	262.25	236
3	SLAB TOP ALONG-N	a3	150 R=48 150 (5589, 5589)	12	150	11406	23	262.34	236
APPROACH SLAB ADJACENT TO DECK WITH FOOTPATHS									
4	SLAB TOP & BOTTOM ALONG-X	a1	200 R=48 200 (3488)	12	150	3728	101	376.53	339
5	SLAB BOTTOM ALONG-N	a2	150 R=48 150 (7651)	12	150	7879	23	181.22	163
6	SLAB TOP ALONG-N	a3	150 R=48 150 (3826, 3826)	12	150	7880	23	181.24	163

QUANTITIES – 15° SKEW

CONCRETE IN APPROACH SLAB (cu.m)	WITH FOOTPATHS	9.04
	WITHOUT FOOTPATHS	14.01
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	WITH FOOTPATHS	698
	WITHOUT FOOTPATHS	1018
ASPHALTIC WEARING COAT (sq.m)	WITH FOOTPATHS	24.22
	WITHOUT FOOTPATHS	38.12

SCHEDULE OF REINFORCEMENT – 30° SKEW (PER APPROACH SLAB)

SL.NO.	LOCATION	BAR MKD.	SHAPE	DIA. (mm)	SPACING (mm)	LENGTH (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (kg)
APPROACH SLAB ADJACENT TO DECK WITHOUT FOOTPATHS									
1	SLAB TOP & BOTTOM ALONG-X	a1	200 R=48 200 (3488)	12	150	3728	146	544.29	490
2	SLAB BOTTOM ALONG-N	a2	150 R=48 150 (12459)	12	150	12687	21	266.43	240
3	SLAB TOP ALONG-N	a3	150 R=48 150 (6231, 6231)	12	150	12690	21	266.49	240
APPROACH SLAB ADJACENT TO DECK WITH FOOTPATHS									
4	SLAB TOP & BOTTOM ALONG-X	a1	200 R=48 200 (3488)	12	150	3728	101	376.53	339
5	SLAB BOTTOM ALONG-N	a2	150 R=48 150 (8533)	12	150	8761	21	183.98	166
6	SLAB TOP ALONG-N	a3	150 R=48 150 (4268, 4268)	12	150	8764	21	184.04	166

QUANTITIES – 30° SKEW

CONCRETE IN APPROACH SLAB (cu.m)	WITH FOOTPATHS	9.04
	WITHOUT FOOTPATHS	14.01
STEEL INCLUDING 5% EXTRA FOR LAPS AND WASTAGE (kg)	WITH FOOTPATHS	785
	WITHOUT FOOTPATHS	1019
ASPHALTIC WEARING COAT (sq.m)	WITH FOOTPATHS	24.22
	WITHOUT FOOTPATHS	38.12

REFERENCE DRAWINGS

DRAWING NO.	TITLE
SD/151	GENERAL NOTES
SD/152, SD/153	GENERAL ARRANGEMENT FOR VARIOUS SKEW ANGLES
SD/156, SD/157	MISCELLANEOUS DETAILS
SD/159	DETAILS OF R.C.C RAILINGS (WITHOUT FOOTPATHS)
SD/160	DETAILS OF R.C.C RAILINGS (WITH FOOTPATHS)
SD/161 - SD/164, SD/169 - SD/172, SD/177 - SD/180, SD/185 - SD/188	R.C.C SOLID SLAB SUPERSTRUCTURE (WITHOUT FOOTPATHS) FOR VARIOUS SKEW ANGLES
SD/165 - SD/168, SD/173 - SD/176, SD/181 - SD/184, SD/189 - SD/192	R.C.C SOLID SLAB SUPERSTRUCTURE (WITH FOOTPATHS) FOR VARIOUS SKEW ANGLES

NOTE :–

1. Schedule of reinforcement does not include change in reinforcement around inspection chamber, precast cover to chamber and railings.

MKD	DATE	DESCRIPTION	BY

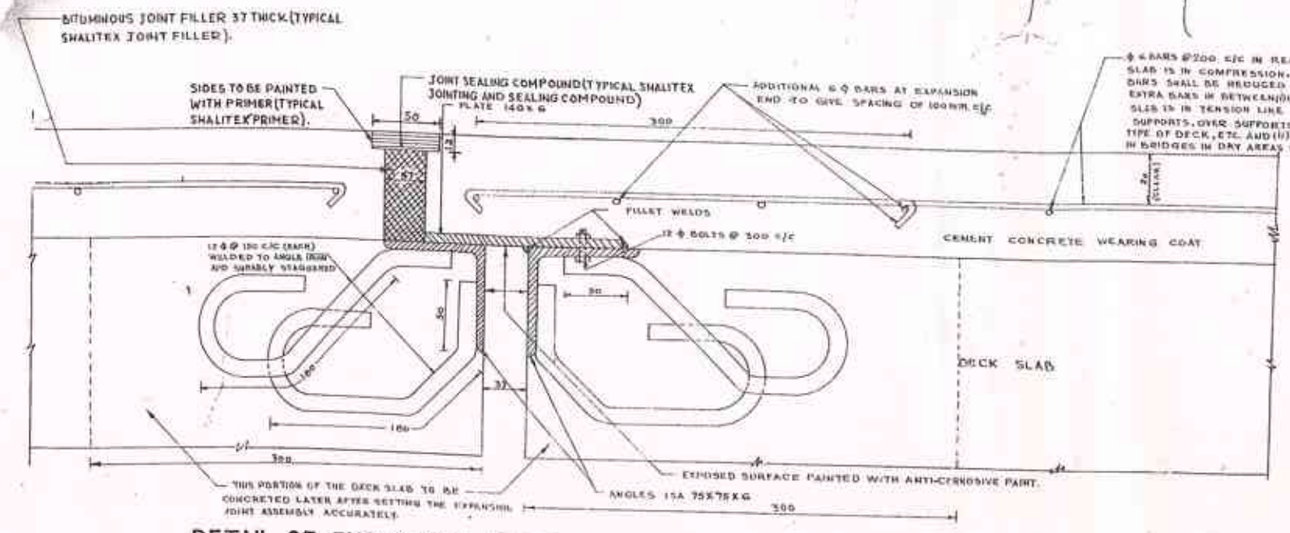
REVISION

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

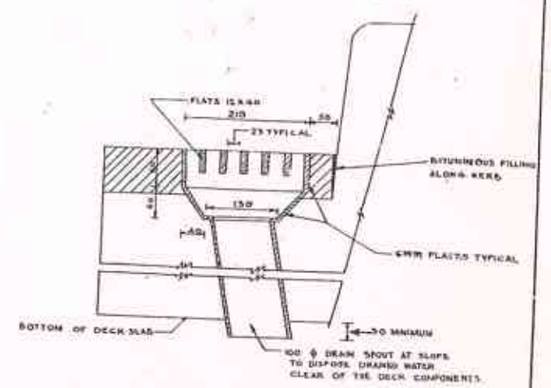
STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C SOLID SLAB SUPERSTRUCTURE SPAN 4.0m TO 10.0m 15° AND 30° SKEW (WITH AND WITHOUT FOOTPATHS) MISCELLANEOUS DETAILS

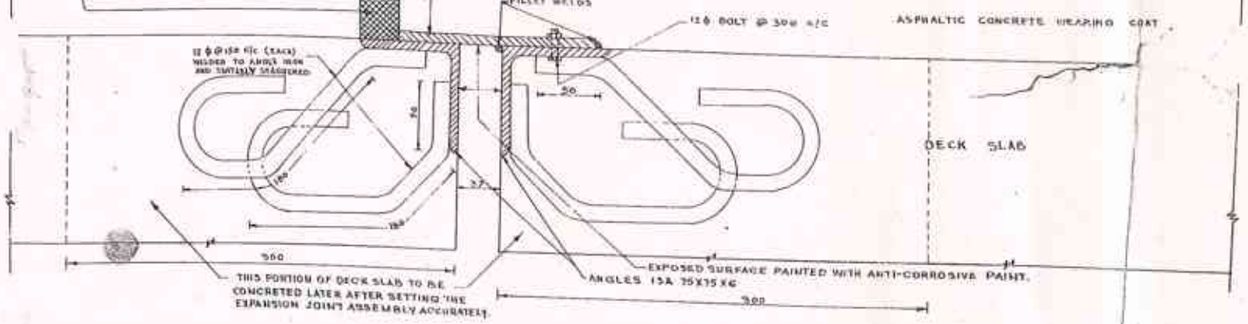
RECOMMENDED BY		APPROVED BY	1992
(ASHOK KUMAR) S.E.	(R.H. SARMA) S.E.	(M.K. MUKHERJEE) C.E.	DRG NO. SD/158 SHEET 1/2



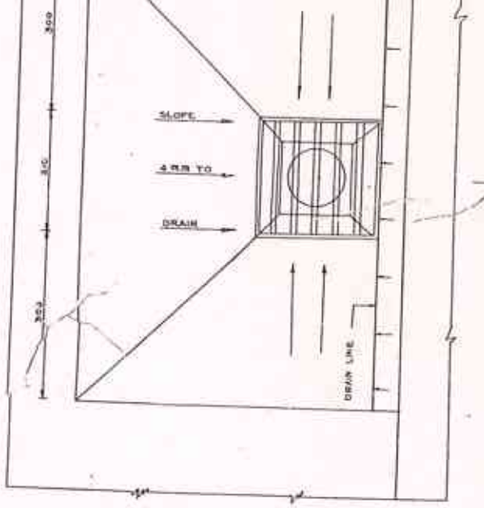
DETAIL OF EXPANSION JOINT AND CEMENT CONCRETE WEARING COAT



SECTION AT E-E



DETAIL OF EXPANSION JOINT AND ASPHALTIC CONCRETE WEARING COAT



PLAN

DETAILS OF DRAINAGE SPOUT

SCHEDULE OF REQUIREMENTS

WEARING COAT (CEMENT CONCRETE) (PER METRE LENGTH)		WEARING COAT (ASPHALTIC CONCRETE) (PER METRE LENGTH)		EXPANSION JOINT (PER JOINT)		DRAINAGE SPOUT (PER SPOUT)	
1. CONCRETE	0·0675	1. ASPHALTIC CONCRETE	0·039 cu.m.	1. ANGLES 1.S.A. 75x75x6 75 MM LONG	2 NOS.	1. 6 MM PLATE	0·065 Sq.M.
2. M.S. REINFORCEMENT IN WEARING COAT (a) ϕ 6 BARS @ 200 c/c IN BOTH DIRECTIONS.	15 Kg.			2. FLAT IRON 140 x 6 x 35 M.	150 GMS.	2. FLAT IRON 12 x 4 x 0	0·33 M.
(b) ϕ 6 BARS @ 100 c/c IN BOTH DIRECTION	30 Kg.			3. 12 ϕ ANCHOR BARS - 356 LONG	200 GMS.	3. 100 ϕ DRAIN SPOUT (LENGTH TO SUIT)	1 NO.
				4. 12 ϕ BOLTS WITH NUTS	2 NOS.		

THIS SCHEDULE IS FOR A CLEAR ROADWAY OF 7·5 m

8. THE SEALING COMPOUND SHALL BE POURED IN THE JOINT ON THE TOP OF THE FILLER AFTER CLEANING THE JOINT BY THE HELP OF COMPRESSED AIR.

GENERAL NOTES:-

CONCRETE — CONCRETE IN WEARING COAT SHALL HAVE A MINIMUM 28 DAYS WORKS CUBE STRENGTH OF 160 kg/cm² ON 150 mm CUBES.

REINFORCEMENT — MILD STEEL REINFORCEMENT SHALL CONFORM TO THE LATEST I.S. 432 GRADE I TESTED STEEL.

STRUCTURAL STEEL — STRUCTURAL STEEL SECTIONS SHALL CONFORM TO THE LATEST I.S. 226.

ASPHALTIC CONCRETE — SHALL CONFORM TO ANY APPROVED SPECIFICATION.

NOTES:-

1. THE LONGITUDAL AND TRANSERSE CAMBERS SHALL BE ACHIEVED AS SUGGESTED IN THE SUPER-STRUCTURE DRAWING.
2. THE CAMBER TO BE PROVIDED IN THE CASE OF CEMENT CONCRETE & ASPHALTIC CONCRETE WEARING COAT SHALL BE 1:75 AND 1:60 RESPECTIVELY.
3. THE SPACING OF DRAINAGE SPOUTS SHALL NOT BE MORE THAN 10 METERS.
4. THE DRAINAGE SPOUTS SHALL BE GALVANISED AFTER WELDING THE PLATES TO-GETHER.
5. THE DETAILS OF EXPANSION JOINT WILL HOLD GOOD FOR TOTAL EFFECTIVE EXPANDABLE LENGTHS (IN THE CASE OF SIMPLY SUPPORTED SPANS WITH FREE BEARINGS ON THE SAME PIER THE TOTAL EFFECTIVE LENGTH WILL BE TWICE THE SPAN LENGTH) UPTO 80 METERS IN THE CASE OF BRIDGES IN EXTREME CLIMATE LOCALITIES AND 115 METERS IN THE CASE OF BRIDGES IN MODERATE CLIMATE LOCALITIES.
6. THE DIMENSIONS AND SIZES OF COMPONENTS INDICATED IN THE DRAWING ARE IN MILLIMETERS UNLESS INDICATED OTHERWISE.
7. FIXING OF EXPANSION JOINT ASSEMBLY IN THE GAP SPECIALLY LEFT SHOULD BE DONE WITH CARE. SPECIAL CARE SHALL BE TAKEN IN COMPACTING THE CONCRETE IN THIS GAP TO SEE THAT NO HOLLOWS ARE LEFT BEFORE LAYING WEARING COAT THE EXPANSION JOINT ASSEMBLY SHOULD BE CHECKED FOR EFFICIENT FUNCTIONING.
8. THE SEALING COMPOUND SHALL BE POURED IN THE JOINT ON THE TOP OF THE FILLER AFTER CLEANING THE JOINT BY THE HELP OF COMPRESSED AIR.

S.NO	DESCRIPTION	DATE	INITIAL
1.	DETAILS OF THE EXPANSION GAP IN THE WEARING COAT (EXPANSION JOINT.	21.4.71	
2.	NOTE NO. 8 ADDED.	8.6.67	

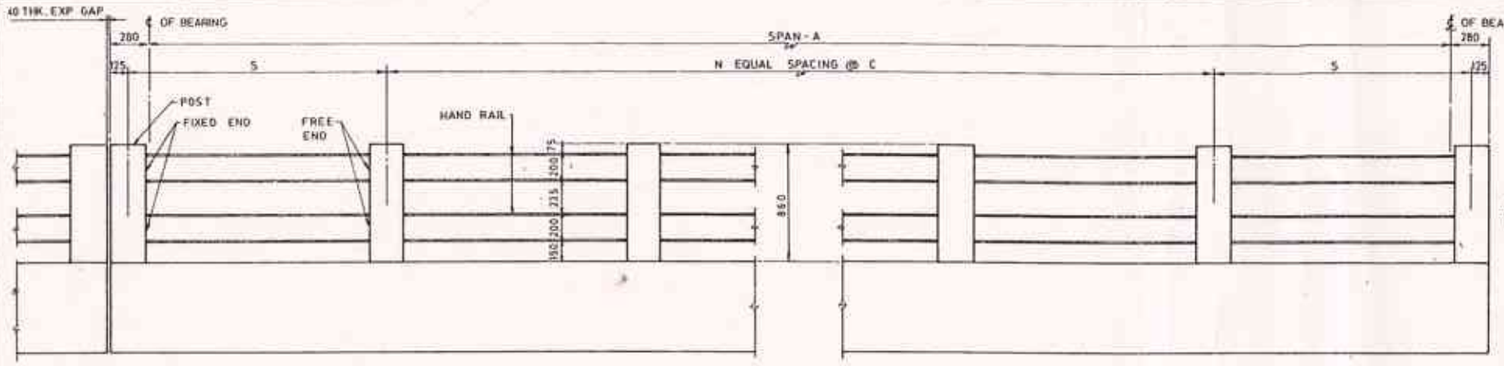
REVISIONS

GOVERNMENT OF INDIA
MINISTRY OF SHIPPING & TRANSPORT
(ROADS WING)

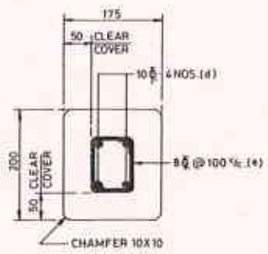
FILE NO. SP-6(6)/66-R
DRN. S.D.M
TRD. K.P.J.D
CHD.

DETAILS OF WEARING COAT, EXPANSION JOINT AND DRAINAGE SPOUTS FOR CONCRETE BR

DRG. NO. SD/ 201.



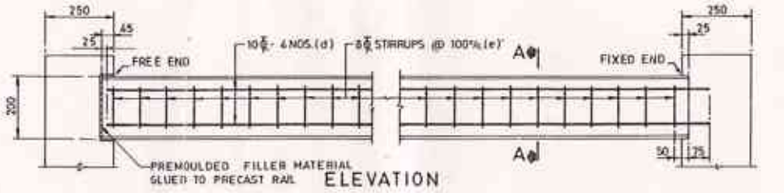
ELEVATION



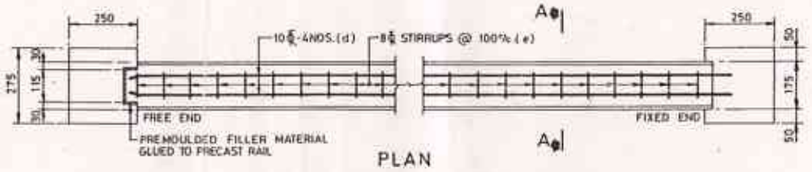
SECTION - A. A

NOTES

1. Centre to centre spacing between successive vertical posts shown in the elevation shall be adjusted to suit the length of bridge span for which the railing is used but in no case it shall exceed 1870 mm.
2. Reinforcement of railing post should be suitably anchored in deck slab.
3. Casting of post shall be done in single pour after accurately positioning the precast handrail.
4. Railing shall be constructed only after the structural concrete of superstructure has hardened and shuttering is released.
5. In case other type of railing is used the weight of same on each side shall not exceed 3 KN per metre.
6. Expansion gaps in railing shall be provided at the same locations as in the deck slab.
7. This drawing is to be read in conjunction with following drawing.
   i) General notes .... Drg. No. SD/ 200.

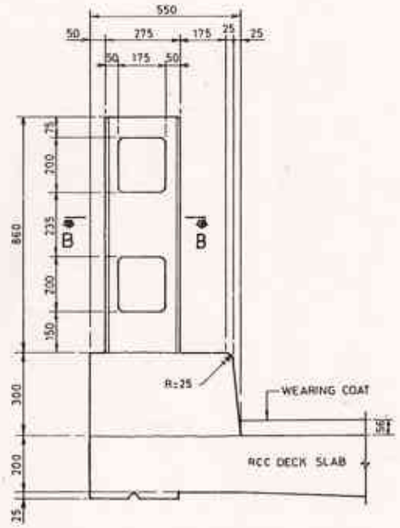


ELEVATION

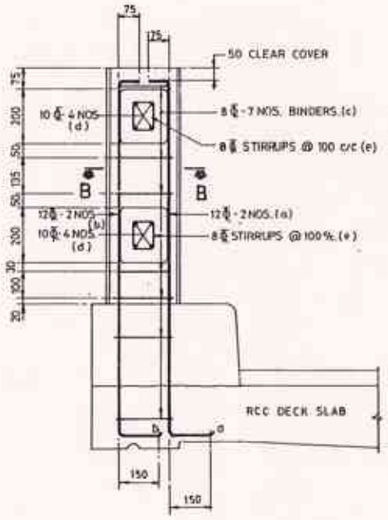


PLAN

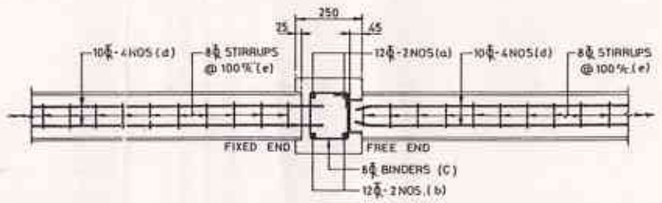
DETAIL OF PRECAST HANDRAIL



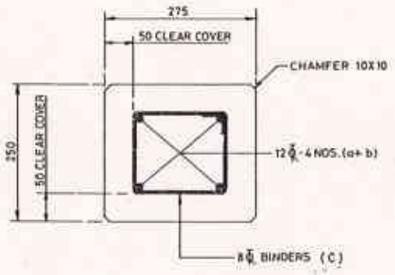
SECTION THROUGH POST
(DIMENSIONS ONLY)



SECTION THROUGH POST



REINFORCEMENT ARRANGEMENT OF HANDRAIL & POST



SECTION - B.B

BAR BENDING SCHEDULE FOR HANDRAIL AND POST FOR DIFFERENT SPANS

* = FOR END SPAN
** = FOR CENTRAL SPAN
S = END SPAN
C = CENTRAL SPAN

SPAN A (m.)	SPACING OF POSTS (mm)	NO. OF POSTS	BAR MARK (a) 12ϕ - 2 NOS. PER POST				BAR MARK (b) 12ϕ - 2 NOS. PER POST				BAR MARK (c) 8ϕ BINDERS 7 NOS PER POST				BAR MARK (d) 10ϕ - 4 NOS. PER RAIL L = LENGTH OF BAR - 153 mm.				BAR MARK (e) 8ϕ STIRRUPS @100% PER RAIL				TOTAL WEIGHT INCLUDING 5% FOR LAPS AND WASTAGE (Kg.)
			LENGTH OF BAR (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (Kg.)	LENGTH OF BAR (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (Kg)	LENGTH OF BAR (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (Kg)	LENGTH OF BAR (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (Kg)	LENGTH OF BAR (mm)	NOS.	TOTAL LENGTH (m)	WEIGHT (Kg.)	
24	S=1870 C=1870	(12+2)2 = 28	1413	2X28 =56	79·13	71·22	1413	56	79·13	71·22	746	7X28 =196	146·22	58·49	1743	208	362·54	217·52	446	17X52 =884	394·26	157·70	604.96
21	S=1780 C=1775	(11+2)2 = 26	1413	2X26 =52	73·48	66·13	1413	52	73·48	66·13	746	7X26 =182	135·77	54·31	1653* 1648**	32* 160**	316·58	189·95	446	16X48 = 768	342·53	137·01	539.21
18	S=1831 C=1831	(9+2)2 = 22	1413	2X22 =44	62·17	55·95	1413	44	62·17	55·95	746	7X22 =154	114·88	45·95	1704	160	272·64	163·58	446	17X40 = 680	303·28	121·31	484.08
16	S=1820 C=1810	(8+2)2 = 20	1413	2X20 =40	56·52	50·87	1413	40	56·52	50·87	746	7X20 =140	104·44	41·78	1693* 1683**	32* 112**	242·67	145·60	446	17X36 = 612	272·95	109·18	418.22
14	S=1800 C=1785	(7+2)2=18	1413	2X18 =36	50·87	45·78	1413	36	50·87	45·78	746	7X18 =126	94·00	37·60	1673* 1658**	32* 96**	212·70	127·62	446	17X32 =544	242·62	97·05	371.52
12	S=1760 C=1758	(6+2)2=16	1413	2X16 =32	45·22	40·70	1413	32	45·22	40·70	746	7X16 =112	83·55	33·42	1633* 1631**	32* 80**	182·74	109·64	446	16X28 = 448	199·81	79·92	319.60
10	S=1719 C=1718	(5+2)2=14	1413	2X14 =28	39·56	35·60	1413	28	39·56	35·60	746	7X14 = 98	73·11	29·24	1592* 1591**	32* 64**	152·77	91·66	446	16X24 =384	171·26	68·51	273.64

MKD.	DATE	DESCRIPTION	BY
		REVISION	

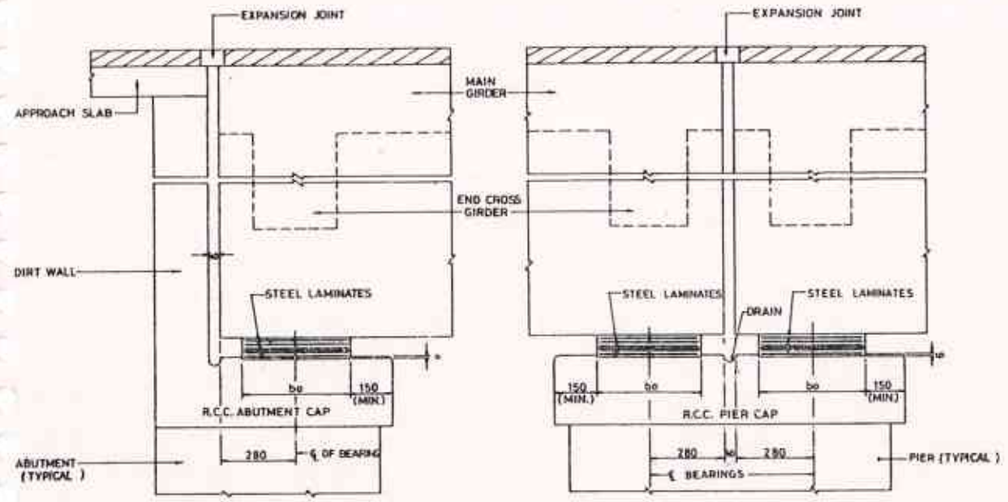
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. T-BEAM AND SLAB SUPERSTRUCTURE
DETAILS OF R.C.C. RAILINGS
FOR BRIDGES WITHOUT FOOTPATHS.

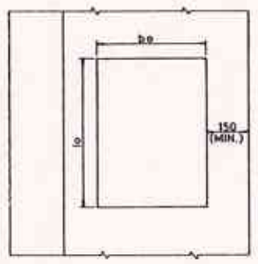
RECOMMENDED BY:		APPROVED BY :	1991
(M. P. MARWAH) E.E.	(N. K. SINHA) S.E.	(M. K. MUKHERJEE) C.E.	DRG. NO. SD/ 201.

Drg. No. SD/ 203

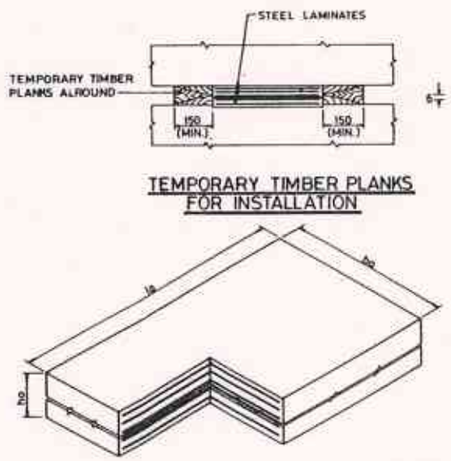


BEARING AT ABUTMENT

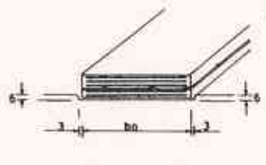
BEARINGS AT PIER



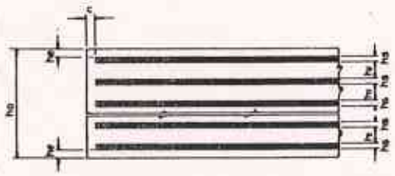
PLAN



TEMPORARY TIMBER PLANKS FOR INSTALLATION



DETAIL OF RECESS



TYPICAL SECTION OF ELASTOMERIC BEARING

ISOMETRIC VIEW OF ELASTOMERIC BEARING

SPAN (m)	lo (mm)	bo (mm)	ho (mm)	NO. OF INTERNAL LAYERS OF ELASTOMER 'n'	NO. OF STEEL LAMINATE	hi (mm)	hs (mm)	he (mm)	c (mm)	MINIMUM STRENGTH OF CONCRETE OF SUBSTRUCTURE BELOW BEARINGS
24·00	560	400	96	5	6	12	4	6	6	M 30
21·00	500	400	96	5	6	12	4	6	6	M 30
18·00	500	360	96	5	6	12	4	6	6	M 30

INSTALLATION INSTRUCTIONS

1. Care shall be taken in packing, transportation, storage and handling to avoid any mechanical damage, contamination with oil, grease and dirt, undue exposure to sunlight and weather.
2. The bearings shall be placed in a recess as shown in the drawing.
3. The position of the bearings shall be accurately marked on pier/ abutment cap and the area where the bearings will be seated accurately levelled.
4. The concrete surface shall be free from any loose material and cleaned of any grease, oil, paint etc. and it shall be dry at the time of fixing of bearing. The surface shall be sand blasted, clean of all laitance and levelled true.
5. Bearings must be placed between true horizontal surfaces (maximum tolerance 0·2 per cent perpendicular to load) and at true plan position of their control lines marked on receiving surfaces (maximum tolerance ± 3 mm). Concrete surfaces shall be free from local irregularities (maximum tolerance ± 1 mm in height).
6. Where bearings are installed prior to its concreting, the forms around the bearings shall be soft enough for easy removal. Forms shall also fit the bearings snugly and prevent any leakage of mortar grout. Any mortar contaminating the bearings during concreting shall be completely removed before setting.
7. The temporary forms shall be removed after the superstructure concrete has set. The sides of the bearings shall be cleaned of any deposit of cement slurry / concrete.

MAINTENANCE

1. The bearings shall be subjected to planned maintenance care.
2. The exposed bearing surface shall be maintained clean and free from contamination with grease or oil, etc.
3. Annual routine maintenance inspection or special maintenance inspection of all bearings shall be made to check for any surface cracking or signs of damage, deterioration or distress.
4. Damaged bearings shall be replaced immediately. To avoid differences in stiffness, all adjacent bearings on the same line of support shall also be replaced and uniform seating of the main girders over all the new bearings shall be ensured.
5. Procedure of jacking of girders shall be as indicated in notes of the cross girder drawing.

NOTES

1. Specifications including permissible tolerances for the Elastomeric Bearings shall be in accordance with IRC:83 (part II) 1987 standard specifications and code of practice for Road Bridges Section IX part II- Elastomeric Bearings.
2. The design of elastomeric bearings is applicable to the bridges in the zone indicated below (Refer. cl. 222 of IRC:6-1966(1985 Reprint).

Zones	Applicability to bridges
I and II	all bridges
III and IV	all bridges up to total length of 60 m.
III and IV [where Horizontal seismic co-efficient $(\alpha\beta\lambda) \leq 0{\cdot}075$]	bridges more than 60 m length.

3. Raw Material : Chloroprene (CR) shall only be used in manufacture of bearings.
- 3·1 Grades of raw elastomer of proven use in elastomeric bearings, with low crystallisation rates and adequate shelf life (e.g. Neoprene WRT, Bayprene 110 or equivalent) shall be used. No reclaimed rubber or vulcanised wastes shall be used. The raw elastomer content of the compound shall not be lower than 60 per cent. The ash content shall not exceed 5 per cent. (As per tests conducted in accordance with ASTM D-297).EPDM and other similar candidate elastomers for bridge bearing use shall not be permitted.
4. Fabrication, testing and acceptance of bearings shall be in accrodance with IRC: 83 (part II) 1987.
5. Elastomeric bearings should not be used in areas where the minimum temperature goes below (−) 10°C.
6. Bearings shall be handled carefully. These shall be protected from bright sun light and extreme cold. These shall be stored neatly under cover till installation.
7. This drawing shall be read in conjunction with drg. nos.
   i, General notes.... Drg. No. SD/200
   ii, Drawings for General Arrangement, Details of longitudenal girders and Details for cross girders for the corresponding spans.
8. Bearings shall be procured only from prequalified manufactures.

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REVISION			

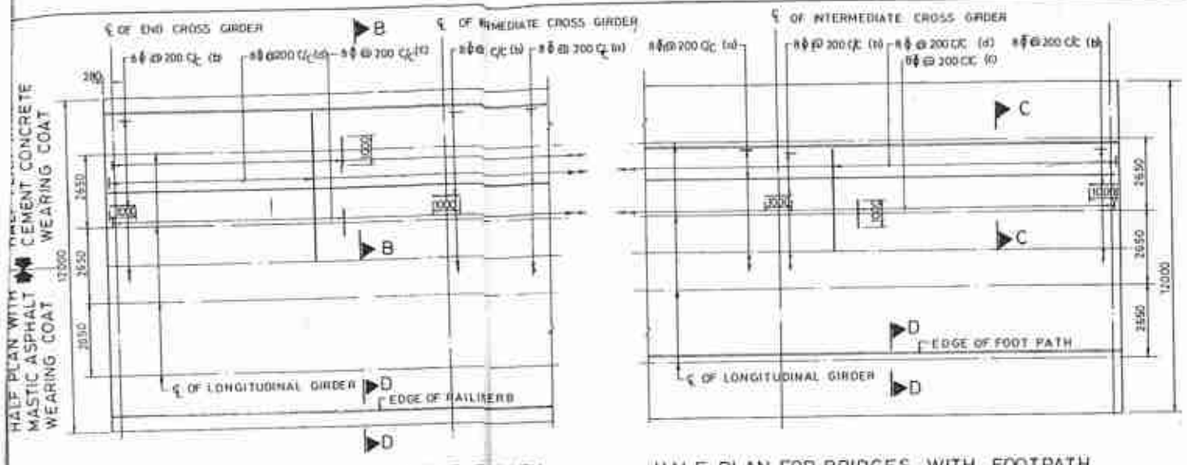
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. T-BEAM AND SLAB SUPERSTRUCTURE WITH AND WITHOUT FOOTPATHS
DETAILS OF ELASTOMERIC BEARINGS

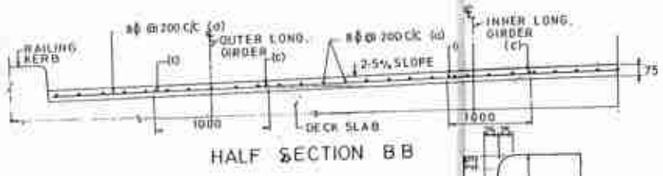
RECOMMENDED BY:		APPROVED BY :	1991
(M. P. MARWAH) E.E.	(N.K. SINHA) S.E.	(M.K. MUKHERJEE) C.E.	DRG. NO. SD/203

DRG. NO. SD / 205

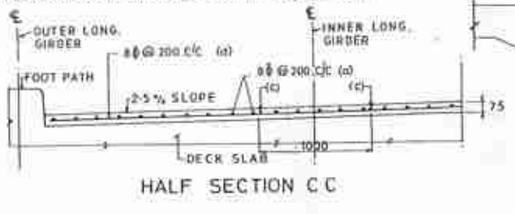


HALF PLAN FOR BRIDGES WITHOUT FTPATH

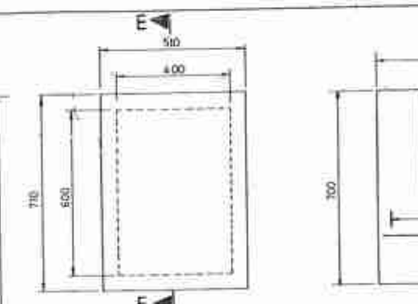
HALF PLAN FOR BRIDGES WITH FOOTPATH



HALF SECTION B B



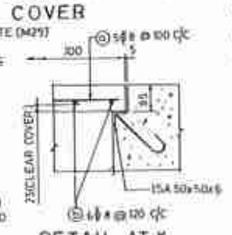
HALF SECTION C C



SECTION E-E

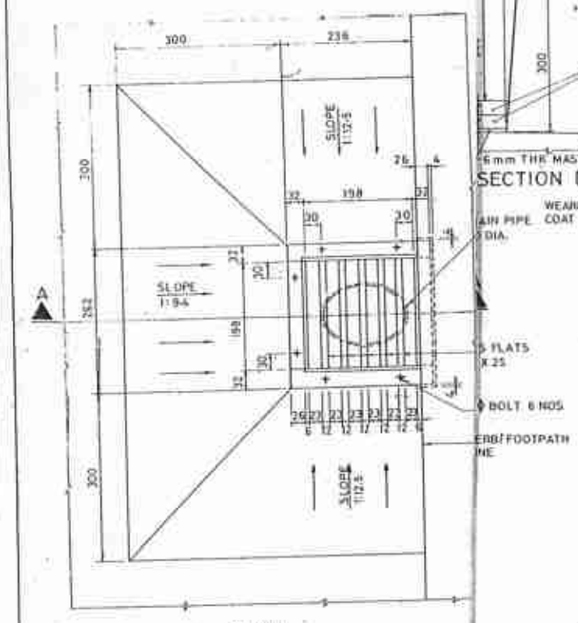
PLAN OF INSPECTION CHAMBER

PLAN OF PRECAST CONCRETE COVER

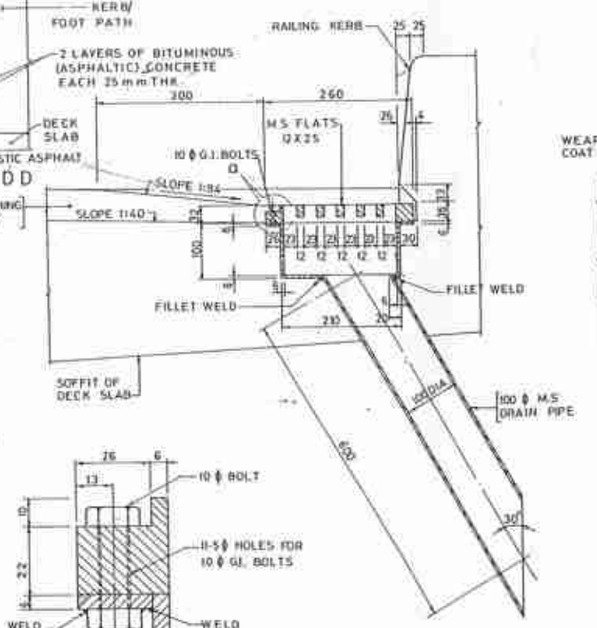


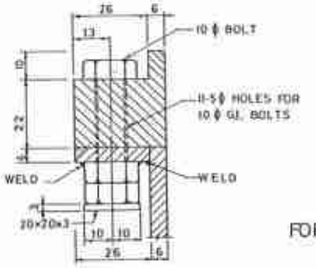
DETAIL AT-X

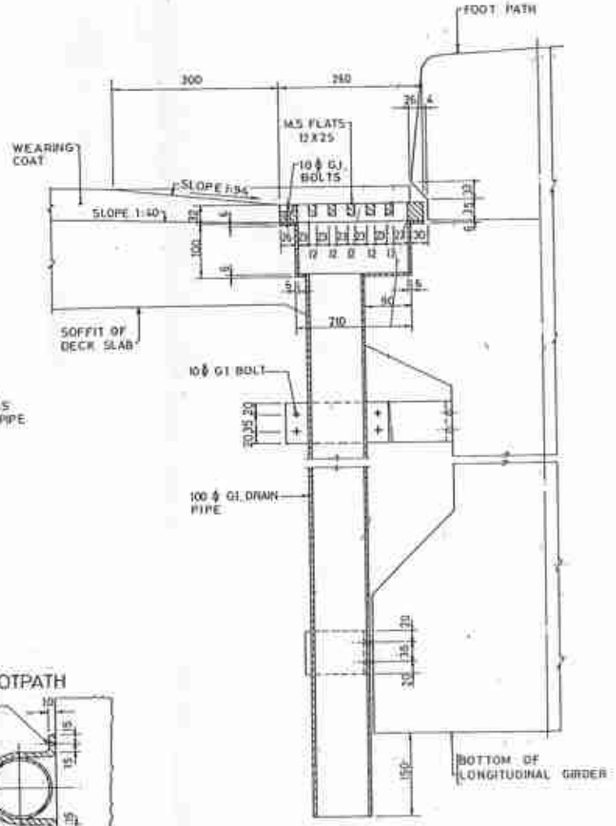
DETAIL OF INSPECTION CHAMBER

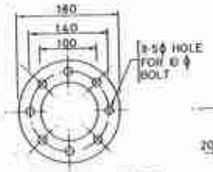


DETAILS OF DRAINAGE SPOUT AND COLLEC PIT

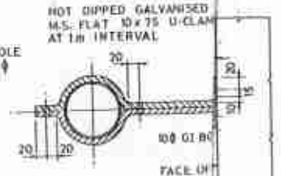




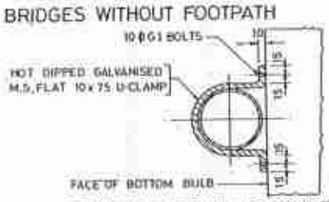




TYPICAL DETAIL FOR LENGTHENING DRAINAGE SPOUT



TYPICAL DETAIL OF CONNECTION OF DRAINAGE SPOUT WITH FACE



TYPICAL DETAIL OF CONNECTION OF DRAINAGE SPOUT WITH BULB OF GIRDERS

NOTES

1. All dimensions are in millimetres.
2. The details shown in this drawing are applicable for R.C.C T-Beam slab Superstructure with and without footpaths.
3. Material specifications and workman-ship shall be in accordance with MOST Specifications for Road and Bridge works (2nd revision 1988) unless stated otherwise in this drawing or drawing No. SD/200
4. Wearing coat shall consist of the following
   a) A coat of mastic asphalt 6mm thick, with a prime coat over the top of the deck before the wearing coat is laid. The prime coat of mastic asphalt shall be 30% straight run 30/40 penetration grade betumen and 50% light solvent (Benzol) to be laid over the deck slab. The insulating layer 6mm thick Mastic asphalt with 75% lime stone dust filler and 25% of 30 to 40 penetration grade bitumen shall be laid at 375°F with broom over prime coat
   b) 50 mm thick asphatic concrete wearing coat in two layers of 25mm each as per clause No 512 of MOST Specification for Road and Bridge works (2nd revision 1988).
5. In case of isolated bridge construction or bridges located in remote areas where provision of mastic and asphalt concrete wearing coat is not practicable, the Engineer in charge may permit provision of 75 mm thick cement concrete wearing coat in M 30 grade concrete as shown in the drawing
6. Spacing of drainage spout in different spans will be as shown in the general arrangement drawing of the corresponding spans.
7. Drainage spout and collection pit assembly shal be fabricated from mild steel and after fabricatio the complete assembly expect grating shall be given a hot dipped galvanised coating.
8. The fixing clamps will be of hot dipped galvanise M S flat.
9. Mimimum number of clamps to be provided with vertical drainage spout for fixing to longitudinal girders shall be two.
10. Reinforcement in wearing coat will be placed at the centre of the wearing coat.

NO.	DATE	DESCRIPTION	BY
REVISION			

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) NEW DELHI

STANDARD DRAWINGS FOR ROAD BRIDGES

R.C.C. T-BEAM AND SLAB SUPERSTRUCTURE WITH AND WITHOUT FOOTPATHS DETAILS OF MISCELLANEOUS ITEMS

RECOMMENDED BY		APPROVED BY	DRG. NO.
(M. P. MARWAH) S.E.	(N.K. SINHA) S.E.	(ZHA HURNERJEE) C.E.	SD/ 205

(A) GENERAL

1. These notes are applicable for the Standard Drawings for R.C.C. solid slab superstructure with and without footpaths.
2. These drawings are applicable only for right bridges with overall width of 12 m.
3. No raised footpaths shall be provided on the bridges having length less than 30 m unless the same are otherwise existing on the approaches.
4. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.
5. Design criteria:
   I. The design is according to the following codes:
      (a) IRC:5-1985
      (b) IRC:6-1966 (1985 reprint)
      (c) IRC:21-1987.
   II. The following loads have been considered in the design:
      (a) One lane of IRC class 70R or two lanes of IRC class A on carriageway, whichever governs.
      (b) Footpath load of 5 kN/sq.m for superstructure having footpaths.
      (c) Wearing coat load of 2 kN/sq.m.
   III. The designs are applicable for 'MODERATE AND SEVERE' conditions of exposure.
6. Public utility services (except water supply and sewerage), if required, shall be carried over the bridge through 150 mm diameter ducts provided in the footpaths. Total load of such services shall not be more than 1.0 kN per metre on each footpath. Water/ sewerage pipeline shall not be carried over any part of the superstructure. Inspection chambers in footpaths may be provided as shown in the drawing. The location and spacing of chambers along the footpath will be decided by the Engineer-in-charge in consultation with the users.
7. Wearing coat shall consist of the following:
   I. (a) A coat of mastic asphalt 6 mm thick with a prime coat over the top of the deck before the wearing coat is laid. The prime coat of mastic asphalt shall be 30 per cent straight run 30/ 40 penetration grade bitumen and 50 per cent light solvent (Benzol) to be laid over the deck slab. The insulating layer of 6 mm thick mastic asphalt with 75 per cent lime stone dust filler and 25 per cent of 30/40 penetration grade bitumen shall be laid at 375°F with broom over prime coat.
      (b) 50 mm thick asphaltic concrete wearing coat in two layers of 25 mm each as per Clause 512 of MoRT&H's Specifications for Road and Bridge Works (Second Revision, 1988)
   II. In case of isolated bridge construction or bridges located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, the Engineer-in-charge may permit provision of 75 mm thick cement concrete wearing coat in M 30 grade concrete with maximum water cement ratio as 0.40. The reinforcement shall consist of 8 mm High Yield Strength Deformed bars @200 mm centres reducing to 100 centres in both the directions over a strip of 300 mm near the expansion joint. Reinforcement shall be placed at the centre of the wearing coat. Wearing coat shall be discontinued at expansion joint locations. Joint fillers shall extend upto the top of wearing coat.
8. 20 mm expansion joint does not cater for any allowance for possible tilting of abutment.
9. Support for the deck slab shall provide a bearing width of 40 mm.
10. In urban areas, chequered tiles may be provided in the footpath portion by suitably adjusting the thickness of the footpath slab.
11. Type/position of return walls, railings, guard posts, ramp etc. in approach portion shall be decided by the Engineer-in-charge.

(B) MATERIALS SPECIFICATIONS

Concrete

1. Concrete shall be of design mix and shall have minimum 28 days characteristic strength on 150 mm cubes for all elements of superstructure as indicated below:

Conditions of exposure	Concrete grade	Characteristic Strength
'MODERATE'	M 25	25 MPa (for 3 m to 9 m span)
'MODERATE'	M 30	30 MPa (for 10 m span)
'SEVERE'	M 30	30 MPa (for 3 m to 10 m span)

2. High strength ordinary portland cement conforming to IS:8112 or ordinary portland cement conforming to IS:269 capable of achieving the required design concrete strength shall only be used.
3. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 310 kg/cu.m and 0.45 respectively for 'MODERATE' conditions of exposure. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 400 kg/cu.m and 0.40 respectively for 'SEVERE' conditions of exposure.

Reinforcement

All reinforcing bars shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS:1786.

Water

Water to be used in concreting and curing shall conform to Clause 302.4 of IRC:21-1987.

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50 mm unless shown otherwise in the drawings.
2. For ensuring proper cover of concrete to reinforcement bars specially made polymer cover blocks shall only be used.
3. **Construction Joints**
   I. The location and provision of construction joints shall be approved by Engineer-in-charge. The concreting operation shall be carried out continuously upto the construction joint.
   II. The concrete surface at the joint shall be brushed with a stiff brush after casting while the concrete is still fresh and it has only slightly hardened.
   III. Before new concrete is poured the surface of old concrete shall be prepared as under:
      a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris/laitance and made rough so that 1/4 of the size of the aggregate or structurally damaging the concrete.
      b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet.
      c) The old surface shall be soaked with water without leaving puddles immediately before starting concreting to prevent the absorption of water from new concrete.
   IV. New concrete shall be thoroughly compacted in the region of the joint.
4. Welding of reinforcement bars shall not be permitted.
5. Laps in reinforcement:
   I. Minimum lap length of reinforcement shall be kept as 83 d where 'd' is the diameter of bar.
   II. Not more than 50 per cent of reinforcemen be lapped at any one location.
6. Bending of reinforcement bars shall be as per IS
7. Supporting chairs of 12 mm diameter shall be pr at suitable intervals as per IS:2502.
8. Concrete shall be produced in a mechanical mi capacity not less than 200 litres having integral w batching facility and automatic water measurir dispensing device.
9. Proper compaction of concrete shall be ensured l of full width screed vibrators for concrete in decl
10. Properly braced steel plates shall be used as shutt
11. Sharp edges of concrete shall be chamfered.

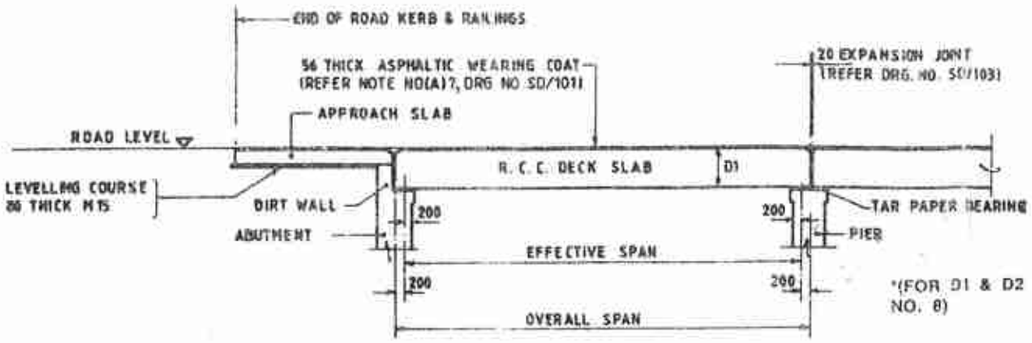
(D) GENERAL SPECIFICATIONS

The work shall be executed in accordance MoRT&H's Specification for Road and Bridge V (Fourth Revision, 2001) except wherever othe mentioned.

(E) For details refer MORT&H's Standard Dra as listed below:

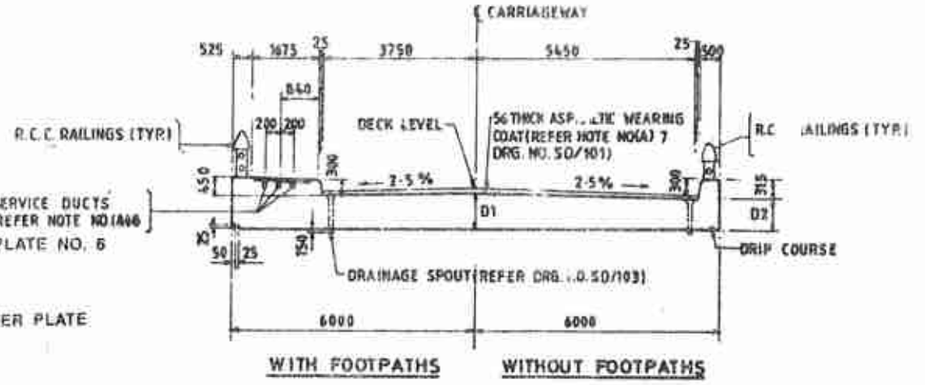
Drawing No.	Title
SD/102	General Arrangement
SD/103 & SD/104	Miscellaneous Details
SD/105	Details of R.C.C. Raili (without footpaths)
SD/106	Details of R.C.C. Railings (foot-paths)
SD/107 through SD/114	R.C.C. solid slab superstructure (right) Spans 3 m to 10 m (without footpaths)
SD/115 through SD/122	R.C.C. solid slab superstructure (right) Spans 3 m to 10 m (with footpaths)

R.C.C. SOLID SLAB SUPERSTRUCTURE (RIGHT) EFFECTIVE SPAN 3.0 m TO 10.0 m (WITH AND WITHOUT FOOTPATHS) GENERAL NOTES

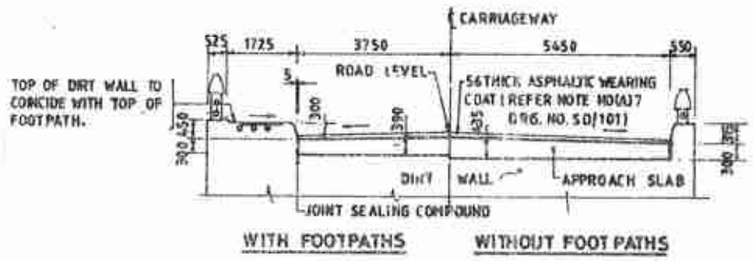


SECTION A-A

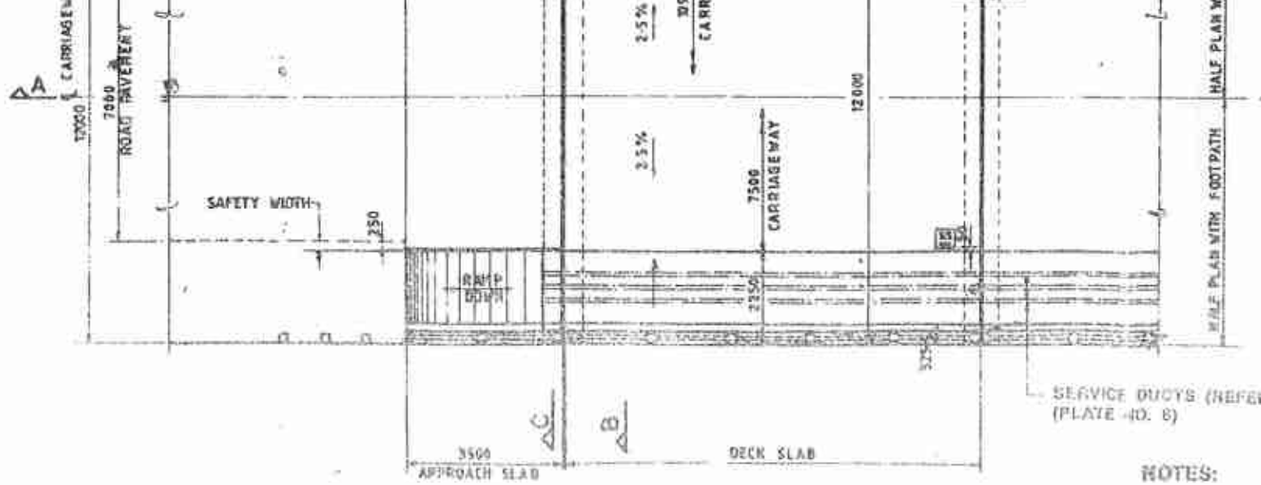
(ROAD KERB & RAILINGS NOT SHOWN.)



SECTION B-B



SECTION C-C



PLAN

NOTES:

1. All dimensions are in millimetres unless otherwise mentioned. Only written dimensions are to be followed.
2. Typical arrangement of drainage spouts has been shown in plan. Suitable modifications may be made by the Engineer-in-charge as per site conditions and intensity of rainfall.

R.C.C. SOLID SLAB
SUPERSTRUCTURE (RIGHT)
EFFECTIVE SPAN
3.0 m to 10.0 m
(WITH AND WITHOUT FOOTPATHS)
GENERAL ARRANGEMENT