ORG.NO. SD/100

WITH EARTH CUSHION CASES

1.1 SINGLE CELL BOX

S.NO.	Nc/ab/Ec
1.	1/22/3
2.	1/22/4
3.	1/22/5
4.	1/23/3
5.	1/23/4
6.	1/23/5
7.	1/33/3
8.	1/33/4
9.	1/33/5
10.	1/34/3
11.	1/34/4
12.	1/34/5
13.	1/43/3
14.	1/43/4
15.	1/43/5
16.	1/44/3
17.	1/44/4
18.	1/44/5
19.	1/45/3
20.	1/45/4

S.NO.	Nc/ab/Ec
21.	1/45/5
22.	1/53/3
23.	1/53/4
24.	1/53/5
25.	1/54/3
26.	1/54/4
27.	1/54/5
28.	1/55/3
29.	1/55/4
30.	1/55/5
31.	1/63/3
32.	1/63/4
33.	1/63/5
34.	1/64/3
35.	1/64/4
36.	1/64/5
37.	1/65/3
38.	1/65/4
39.	1/65/5
40.	1/66/3

S.NO.	Nc/ab/Ec
41.	1/66/4
42.	1/66/5
43.	1/75/3
44.	1/75/4
45.	1/75/5
46.	1/76/3
47.	1/76/4
48.	1/76/5
49.	1/77/3
50.	1/77/4
51.	1/77/5
52.	1/85/3
53.	1/85/4
54.	1/85/5
55.	1/86/3
56.	1/86/4
57.	1/86/5
58.	1/87/3
59.	1/87/4
60.	1/87/5

1.2 DOUBLE CELL BOX

S.NO.	Nc/ab/Ec
1.	2/22/3
2.	2/22/4
3.	2/22/5
4.	2/23/3
5.	2/23/4
6.	2/23/5
7.	2/32/3
8.	2/32/4
9.	2/32/5
10.	2/33/3
11.	2/33/4
12.	2/33/5

1.3 TRIPLE CELL BOX

S.NO.	Nc/ab/Ec
1.	3/32/3
2.	3/32/4
3.	3/32/5
4.	3/33/3
5.	3/33/4
6.	3/33/5

WITHOUT EARTH CUSHION CASES

1.4 SINGLE CELL BOX

S.NO.	Nc/ab/Ec
1.	1/22/0
2.	1/23/0
4.	1/33/0
5.	1/43/0
6.	1/44/0
7.	1/45/0
8.	1/53/0
9.	1/54/0
10.	1/55/0
11.	1/63/0
12.	1/64/0
13.	1/65/0
14.	1/66/0
15.	1/75/0
16.	1/76/0
17.	1/77/0
18.	1/85/0
19.	1/86/0
20.	1/87/0

1.5 DOUBLE CELL BOX

S.NO.	Nc/ab/Ec
1.	2/22/0
2.	2/23/0
3.	2/32/0
4.	2/33/0

1.6 TRIPLE CELL BOX

S.NO.	Nc/ab/Ec
1.	3/32/0
2.	3/33/0

NOTES:

1. THIS INDEX SHEET DEFINES THE VARIOUS SIZE OPTIONS OF BOX CULVERT INCLUDED IN THESE STANDARD PLANS.
2. Nc / ab / Ec STANDS FOR NO. OF CELLS / CLEAR WIDTH – CLEAR HEIGHT / HEIGHT OF EARTH CUSHION.

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

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

INDEX SHEET

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/100

Source: MoST Standard Drawings for Box Cell Culverts (2000) - older reference, verify with current IRC / MoRTH. Scan cleaned by helptheengineer.com

DRG.NO. SD/101

(A) GENERAL

1. These notes are applicable for the Standard Drawings of R.C.C Box Cell Structures with earth cushion (3m,4m & 5m) and without earth cushions. For intermediate heights immediately higher value of earth cushion can be taken for standard drgs.
2. These drawings are applicable for right crossings with overall width of 12m for the roadway on top.
3. All dimensions are in millimeters unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.
4. Box cell designation i.e. Nc/ab/Ec stands for No. of cells/Clear width–Cear height/Height of earth cushion.
5. Design criteria:
   - I. The design is according to the following codes:
     - (a) I R C : 5–1985
     - (b) I R C : 6–1966 (1985 reprint)
     - (c) I R C : 21–1987(1997 reprint)
     - (d) I R C : 78–1985
   - II. The following loads have been considered in the design:
     - (a) One lane of IRC class 70R or two lanes of class A on carriage way, which ever governs.
     - (b) Wearing coat load of 3 KN/sq.m.
   - III. The design are applicable for 'MODERATE' AND 'SEVERE' conditions of exposure.
6. Wearing coat shall consist of the following for Box Cell Structures without earth cushions.
   - I.a A coat of mastic asphalt 12mm thick with a prime coat over the top of deck is to be provided before the wearing coat is laid.
   - I.b 50 mm thick asphaltic concrete wearing coat as per Clause 512 of MOST's Specifications for Roads and Bridge Works (Third Revision–1995).
   - II. In case of isolated construction of Box Cell Structures located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, 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 rienforcement shall be consist of 8mmø High Yield Strength Deformed bars @ 200mm centers in both direction over a strip of 300mm near the expansion joint. Reinforcement shall be placed at the centre of the centre of the wearing coat. wearing coat shall be discontinued at expansion joint locations. Joint filters shall extend upto the top of wearing coat.
   - III. For Box Cell Structures with earth cushion, no wearing coat shall be provided.
7. Type/position of return walls, railings, guards, posts, ramp, etc. in approach portion shall be decided by the Engineer–in–charge.
8. Lowest point in the proposed Box Cell plan area is assumed as Natural Ground level.
9. Invert level of Top surface of Bottom Slab is assumed as Bed Level

(B) MATERIAL SPECIFICATIONS

CONCRETE

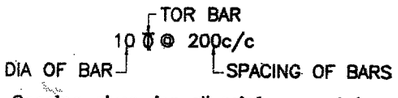
1. Concrete shall be design mix and shall have minimum 28 days characteristic strength on 150mm cubes for all elements of structure as indicated below:

Element	Concrete grade		Characteristic strength (MPa)	
	Moderate condition of exposure.	Severe condition of exposure.	Moderate condition of exposure.	Severe condition of exposure.
(a) Box.Cell Structure	M 20	M 25	20	25
(b) Wing Walls	M 20	M 20	20	20
(c) Curtain Wall	M 15	M 20	15	20
(d) Levelling Course	M 15	M 15	15	15

2. High strength ordinary Portland cement conforming to IS:8112 or ordinary Portland cement conforming to IS:269 capable of achiving the required design concrete strength shall only be used.
3. The minimum cement concrete and water cement ratio in the concrete design mix shall be 310 kg per 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.
4. The total chloride contents and Sulfuric anhydride (S03) of all concrete as a percentage of mass of cement in mix shall be limited to 0.3% and 4% respectively.
5. The slump of concrete shall be checked as per IS:516. Concrete should have the slump of 50–75mm.
6. Use of admixtures such as super plasticisers for concrete may be made with the approval of the engineer–in–charge.
7. Aggregate shall confirm to CL 302.3 of IRC:21 –1987 (1997 reprint) and maximum aggregate size should not exceed 40mm.

REINFORCEMENT

1. All reinforcement shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS:1786.
2. Unless otherwise shown on the drawing, bars are marked in numerical numbers (as ①, ② or ③) and corresponding information is provided in bar bending schedule. Bars configuration is shown as –



3. Spacing given for all reinforcement is perpendicular to bar unless otherwise shown on drawings.

EARTH FILL/EMBANKMENT

Back filling material should confirm to CL 305.2 of MOST specification and earth cushion embankment should be constructed in accordance to section 300 of MOST specification (THIRD REVISION 1995)

WATER

1. Water to be used in concreting and curing shall be conforming to Clause 302.4 of IRC 21–1987.

EXPANSION JOINT

1. The asphalt plug expansion joint shall be provided in accordance with MOST specification and shall be procured from manufacturers as approved by MOST

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50 mm unless otherwise shown in the drawings.
2. Construction Joints:
   - I. The location and provision of construction joints shall be approved by Engineer–in–charge suggested location of construction joints in the direction parallel to the direction of water flow is shown in the General Arrangement drawings of Box Cell Structures.The concreting operation shall be carried out continuous upto the construction joints.
   - 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.
     - (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.
3. Welding of reinforcement bars shall not be permitted.
4. Laps in reinforcement:
   - I. Minimum lap length of reinforcement shall be decided as per the reinforcement arrangement based on the clause–304.6.6 of IRC:21–1987.
   - II. Not more than 50% of reinforcement shall be lapped at any one location.
5. Bending of reinforcement bars shall be as per IS : 2502.
6. Supporting chairs of 12 mm diameter shall be provided at suitable intervals as per IS : 2502.
7. Concrete shall be produced in a mechanical mixer of capacity not less than 200 lts. having integral weigh–batching facility and automatic water measuring and dispensing device.
8. Proper compaction of concrete shall be ensured by use of full width screed vibrators for concrete.
9. Properly braced steel plates shall be used as shuttering.
10. Sharp edges of concrete shall be chamfered.
11. Filter media should be provided in accordance to clause 2504.2.2 of MOST specifications(THIRD REV.1995).
12. In presence of soil with aggressive soil condition, the concrete faces in contact with earth shall be protected with approved bituminous paint or coating as decided by the Engineer–in–change

(D) GENERAL SPECIFICATIONS

1. The work shall be executed in accordance with MOST's Specification for Road and Bridge Works (Third Revision, 1994) except wherever otherwise mentioned.

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GENERAL NOTES

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