

दक्षिणमध्यरेलवे  
SOUTH CENTRAL RAILWAY



T.P.R.Narayana Rao  
Chief Project Director/Bridge Works

Headquarters Office  
Works Branch  
Rail Nilayam  
Secunderabad

No.W.352/BR/ Policy/Subways

Dt.25.07.2022

**Sr.DEN/Co-ord /SC, BZA, GTL, GNT, HYB & NED**

**Sub :** Provision of weep holes in mass concrete retaining walls provided at Waterway Bridges, RUBs and in cuttings of formation or elsewhere due to space constraints, needing Earth retention on one side - The reasons behind and the instructions for closure of weep holes provided at RUB locations – Reg.

**Ref :** 1. Railway Board Instrn No.28/2019 issued vide Lr No.2017/CE-IV/RUB/88 dt.24.09.2019.  
2. Drawing No.GM(W)SC/BR/RUB/STD/4206/2019.

Provision of weep holes in mass concrete retaining walls has come as a historical practice from masonry retaining walls/wing walls. Masonry structures are made up of stones or bricks joined through lime mortar joints. If weep holes are not provided for easy passage of water, then the stagnant water, if any, behind the structure will seep through the masonry joints and over a period are likely to oxidate & leach out the mortar, weakening the masonry structure and its functionality to work as a whole unit.

This is in addition to the relief provided in hydrostatic pressure that is likely to develop due to rise of water to saturation levels on the earth being retained. For proper functioning of weep holes, dry rubble stone with gravel backing is also being specified to ensure that the water gets dissipated behind the retaining structure on its own and there is no loss of soil while the water is seeping through the weep holes provided.

In the case of mass concrete retaining walls, there are no joints other than construction joints. As such, it is a uniform integrated structure not permitting seepage of water through the retaining structure, except through the weep holes provided.

If weep holes are not provided, no water will be able to seep through the retaining walls and providing dry rubble with gravel backing behind will ensure that the water levels do not raise to cause saturated conditions behind the retaining wall leading to excess lateral pressure.

The maximum extent to which saturated conditions can exist is limited to the return level and as such, hydrostatic pressure has to be considered up to the return level, while designing the mass concrete retaining walls, if weep holes are not provided.

In the case of Waterway bridges, on the water way side there is a possibility of scour and underpinning due to loss of soil, leading to loss of passive earth pressure that can develop under normal circumstances. Due to this reason, the retaining walls designed for waterway bridges need to be conservatively designed (by providing safety factors of 2 against overturning and 1.5 against sliding), taking the hydrostatic pressure, if no weep holes are provided.



The normal retaining walls being provided as mass concrete structures may be found to be deficient in handling the lateral pressure and sliding forces under such circumstances, if weep holes are not provided.

However, in case of retaining walls provided at RUB locations, there is no possibility of scour of the road surface up to the founding levels and the passive earth pressure will be available throughout, under all circumstances from road level to foundation level. The hydrostatic pressure that can develop, if weep holes are not provided, cannot endanger mass concrete retaining walls provided.

Railway Board, vide Ref (1) above, have advised all Zonal Railways not to provide weep holes in retaining walls. The provision of weep holes in a number of RUBs constructed so far are becoming a major source of water ingress into the RUBs leading to water stagnation and serious criticism from the road users and public representatives. Even in our Railway, water stagnation is reported in number of RUBs with a significant contribution from water seeping through weep holes in retaining walls provided.

The issue of stability and safety of retaining wall provided as per standard drawing under ref (2) above was studied in depth by our Bridge Office. The stresses in the retaining wall upto foundation level were found to be within the permissible limits.

Further, when the soil behind is fully saturated also, the stability of the retaining wall provided against overturning and sliding is considered adequate. The structure will be much safer, even if no dry rubble back provided. Thus, the retaining wall is found to be safe, if weep holes are not provided also.

**In view of the above, it is hereby instructed to close all weep holes in mass concrete retaining walls provided in RUBs already constructed or in progress with the above approved drawings, when the difference in road level (RL) at the end of retaining wall and the lowest road level at RUB is not more than 2.5m. The closing of weep holes shall be done by chip concrete (6mm down), at least up to 500 mm depth.**

However the field units shall positively confirm that the mass concrete wall provided shall be at least to the sections indicated as per Drawing ref (2) above, before we close the weeping holes. Wherever there is doubt, specific reference shall be made to Bridge office, with the details of mass concrete retaining wall structure provided.

**This instruction is specific to RUBs only.** Any extension of the same, if needed, shall be with the specific approval of Bridge office. A new Drawing is being developed for mass concrete retaining walls at RUB locations by CBE Office, without provision of weep holes for future use with additional safety features.

The above instructions need to be implemented on war footing and compliance shall be furnished to Headquarters office on or before 31<sup>st</sup> August, 2022.

  
( T.P.R.Narayana Rao )  
CPD / BW

Copy to:

1. PCE - for kind information.
2. DRM/SC, BZA, GTL, GNT, HYB & NED - for information.
3. CBE, CE/RSW - for information & necessary follow up.
4. Dy.CE/Br.D - for information and necessary action.



GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)

Instrn. No. 28/2019

No. 2017/CE-IV/RUB/88

New Delhi dated: 24.09.2019

The General Manager.  
All Zonal Railways.

**Sub: Drainage in LHS/RUB/Subway- Executive Summary.**

**Ref:** (i) Railway Board's letter No. 2006/CE-IV/Misc-2(RUBs) dated 18.04.2012 & 03.07.2018.  
(ii) Board's Office letter No. 2017/CE-IV/Misc (RUBs) dated 21.03.2017.  
(iii) Board's Office letter No. 2017/CE-IV/RUB/88 dated 04.10.2017 & 25.06.2019.

1. Railway Board vide letter referred above (ref. i), issued guideline that level crossing which do not qualify for sanction of RUB on cost sharing basis in terms of Para 925 of IRPWM, can be planned for elimination by Subways if found "technically feasible".

Due to large no. of representations from Public representatives (on water-logging) at newly constructed Subways, this policy was reviewed and it was decided that the responsibility for the maintenance of road passing through subway, lighting, drainage system, diversion road and any other allied works in Railway portion will be with Railways and beyond Railway portion the responsibility of maintenance rests with State Govt.

2. Therefore, the subject of Drainage assumes importance. Following is Executive Summary of instructions issued vide above referred letters. The actionable points are summarized below:

- (i) RUB/LHS/Subway should be constructed only at those locations, where it is technically feasible.
- (ii) Planning, construction and maintenance of drainage system in Railway area at RUB/LHS/Subway is the responsibility of the Railway.
- (iii) Cover shed of economical design on ramp/approaches may be provided as per site condition.
- (iv) The provision of drainage arrangement should be made the integral part of construction of RUB/LHS/Subway at planning stage itself for its proper functioning. The planning & execution should include detailing for collection of runoff water and its disposal till final outfall.
- (v) Rain water harvesting should be planned as per site conditions.
- (vi) Joints of RCC boxes should be properly sealed.
- (vii) Backfill material should be as per Clause 7.5 of IRS Bridge Substructure and Foundation Code. In lieu of graded filter (in the form of boulder/cobbles) on the vertical walls of RUB/LHS/Subway. Geo-composite drain may be used for trial purpose.

- (viii) Hump on road side or provision of reverse slope of road before start of downward ramp to RUB/LHS/Subway to avoid ingress of water through ramp and side. Retaining wall should continue along the approach slope upto the hump or from where reverse slope starts.
- (ix) Sump & pump arrangement to be done at critical locations during monsoon. The capacity of pump should be adequate.
- (x) Elaborate drainage arrangement should be done to divert surrounding water.
- (xi) **No weep holes should be provided in the RCC Box and the retaining walls of the subway.**
- (xii) All the above arrangements are indicative. Railway should decide the proper arrangements as indicated above as per site condition and same must be incorporated in the drawing of LHS to ensure all weather availability of the subway.

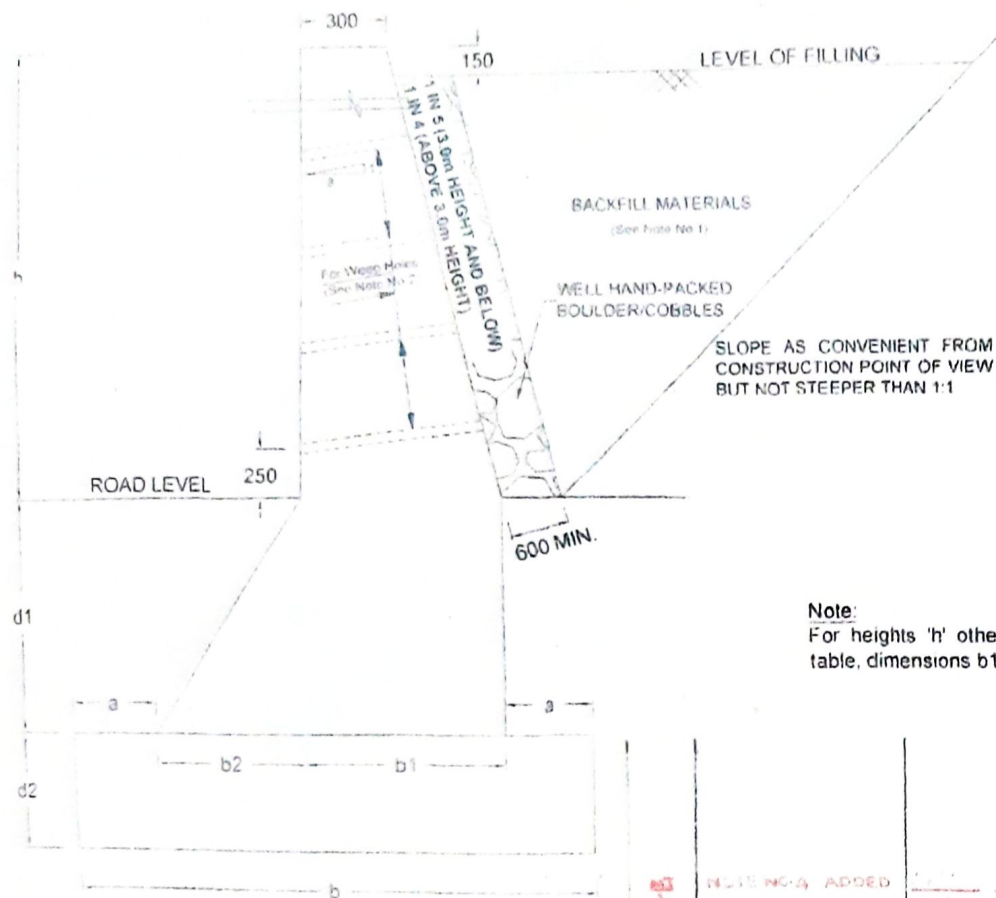
Above, instructions have been incorporated in RDSO Drawing No. RDSO/B-10159, RDSO/B-10159/1, RDSO/B-10153, RDSO/B-10156 and few more drawings of RUB/subway. These instructions are to be implemented as per site condition with ultimate aim that there should not be any water logging in the subway during its service.

The subway works are being executed by either construction or open line Engineers. They need to be sensitized for applying their Engineering knowledge to this important subject matter at the first stage of construction itself. Chief Engineer should exercise sample checks to ascertain application of above points in field. These instructions should be followed strictly.

(Subodh Kumar)  
Director CE/B&S-II  
Ministry of Railways  
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Copy to: PCEs & CAO/Cs. All Indian Railways, CMDs of IRCON, RITES & RVNL, MD/DFCCIL.





**Note:**  
For heights 'h' other than those given in the above table, dimensions b1 & b shall be interpolated

SLNO	h (mm)	b1 (mm)	d1 (mm)	d2 (mm)	b2 (mm)	a (mm)	b (mm)	Maximum worked out foundation pressure (net pressure) (t/m <sup>2</sup> ) *
1A					600	500	3400	25
1B			1200		800	800	3500	25
1C	6000	1800		600	900	800	3500	25
1D			1300		1300	800	4200	25
1E			2100		2100	800	5100	25
2A			1200		600	450	3175	25
2B	5500	1675		800	900	450	3175	25
2C			1300		1300	450	3275	25
2D			1700		1700	600	4575	25
3A					600	400	2900	25
3B	5000	1550	1200		900	500	3050	25
3C			1300		1200	500	3250	25
3D			1300		1300	600	4050	25
4A					600	300	2425	25
4B	4500	1425	1500		900	300	2425	25
4C				300	1200	500	3225	25
4D					1500	300	3525	25
5A					600	300	2500	25
5B	4000	1300	1500		750	300	2550	25
5C				300	1150	300	3050	25
6A					800	150	2275	25
6B	3500	1175	1500		800	300	2575	25
7	3000	900	1500	300	600	300	2100	25
8	2500	700	1500	300	500	300	1700	25
9	2000	500	1500	300	400	150	1300	25
10	1500	300	1000	300	300	150	1000	25
11	1000	200	800	300	200	150	800	25

\* SBC of soil at site should be more than the worked out pressure mentioned above

#### NOTES

- BOULDER FILLING AND BACK FILL MATERIALS SHALL BE PROVIDED AS PER CL: 7.5 OF IRS SUBSTRUCTURE AND FOUNDATION CODE AND RDSO DRG NO. RDSO/B-10159 d1 18.11.15 WITH ALT 1
- WEEP HOLES SHALL BE OF 75/100 DIA PVC/AC PIPES STAGGERED @ 1000mm C/C IN VERTICAL AND HORIZONTAL DIRECTIONS ABOVE ROAD LEVEL
- SURCHARGE IS NOT PERMITTED BEHIND THE RETAINING WALL
- THE DEPTH OF FOUNDATION (AS SHOWN) BE PROVIDED BY ENSURING THE MINIMUM EMBEDMENT INTO THE ROCK. IF THE FOUNDATION IS ENCOUNTERED WITH THE ROCK, WHERE UCS OF ROCK IS MORE THAN 12.5 MPa, (AS PER CL 7.5.2.1 OF IRS (18.11.15))

#### SPECIFICATIONS

- MINIMUM GRADE OF CONCRETE FOR RETAINING WALL SHALL CONFORM TO CL: 5.4.4 OF IRS CONCRETE BRIDGE CODE AS PER EXPOSURE CONDITIONS
- ALL WORKS ARE TO BE CARRIED OUT AS PER
  - IRS CONCRETE BRIDGE CODE REPRINTED SEPTEMBER 2014 INCLUDING LATEST A&C SLIPS IN CONJUNCTION WITH RELEVANT I.S. SPECIFICATIONS MENTIONED THERE IN
  - INDIAN RAILWAYS UNIFIED STANDARD SPECIFICATIONS FOR MATERIALS AND WORKS 2010

## SOUTH CENTRAL RAILWAY

DRG. NO. GM/W/SC/BR/RUB/STD/4206/2019

STANDARD DRAWING

FOR MASS / PLAIN CEMENT CONCRETE  
RETAINING WALL (WITH WEEP HOLES) ALONG THE ROAD  
FOR RUB APPROACHES

CBE

(K. RAMAKRISHNA)

By CE / Br D

(P. RAJAGOPAL RAO)

AXEN / ROB

(N. J. REDDY)

SSE / Works / Br D

(C. M. SARMA)