

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)**

No. 2017/CE-IV/RUB/88

New Delhi dated: 22.04.2020

**The Principal Chief Engineer,
All Zonal Railways**

**Chief Administrative Officer (Con.),
All Zonal Railways**

Sub: Report on waterlogging and drainage problem in RUB/Subways

Large numbers of representations were received regarding waterlogging/drainage problem in RUB/Subways. In the past, number of instructions were issued to address the problem of waterlogging.

A committee was also constituted to address the problem of waterlogging and drainage in RUB/Subways. Recommendations by committee have been accepted by competent authority (ME).

Recommendations of the committee (duly accepted by competent authority) on waterlogging and drainage problem in RUB/Subways is enclosed herewith for guidance and implementation.

DA: One Booklet (53 Pages).

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22/4/2020.
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Copy to:

1. CMD/MDs - RVNL, IRCON, RITES, MRVC, KRCL, DFCCIL
2. CPD/BW, CBE, CE/RSW, all Zonal Railways for information and necessary action please.
3. E D/RDSO, Structure, Lucknow.

**Recommendations
on
Waterlogging and Drainage
Problem
in RUBs / Subways**



Railway Board
Ministry of Railways
Government of India

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Report of the Committee to examine and submit recommendations on waterlogging/ drainage problem in RUB/ Subways.

1.0 Preamble

Elimination of level crossings, being safety hazard, has been the mission area of Indian Railways. Whereas unmanned level crossings have already been eliminated, the work of elimination of manned level crossings is being done on war footing. As a result of the elimination, substantial improvement has been achieved in the safety of train operations.

Level crossings having Train-Vehicle-Units (TVU) less than 1.0 lakhs are being eliminated by providing RUBs/Subways. There has been problem of waterlogging in RUBs/Subways which has been substantially taken care of and further efforts are being continued. Status Report and technical solutions to overcome the problem of drainage have been enumerated in this report.

2.0 Current Scenario/Status

Level crossings accidents, especially on unmanned level crossings, had been a major contributor in the accidents over Indian Railways. Year wise population of unmanned level crossings and of accidents on them, as given below, establishes a positive correlation, as number of accidents on unmanned level crossings have sharply reduced since 2015-16.

Table-1: Year wise total number of Unmanned Level Crossings and Accidents on them over Indian Railways

Year	2012 -13	13- 14	14- 15	15- 16	16- 17	17- 18	18- 19	19- 20
No. of Unmanned Level Crossings	9718	9090	8300	7414	6388	4943	3479	0
Accidents	53	47	50	29	20	10	3	0

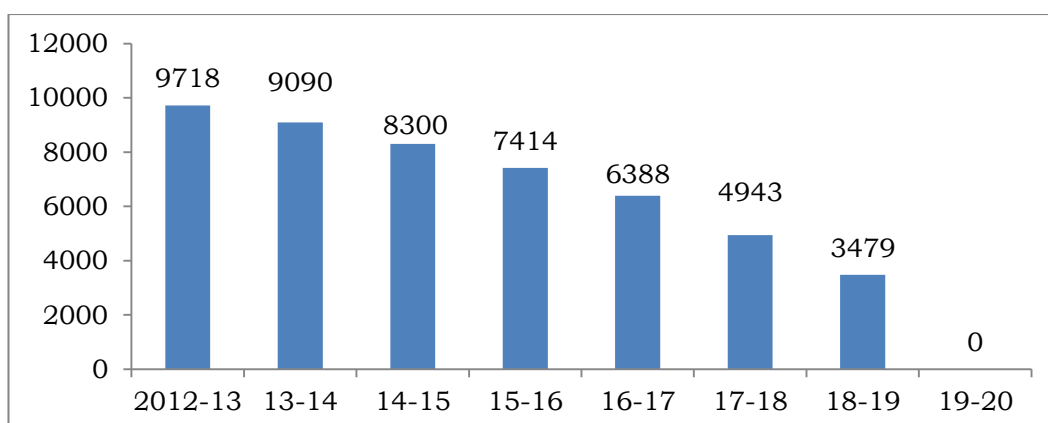


Chart-1: Number of Unmanned Level Crossings

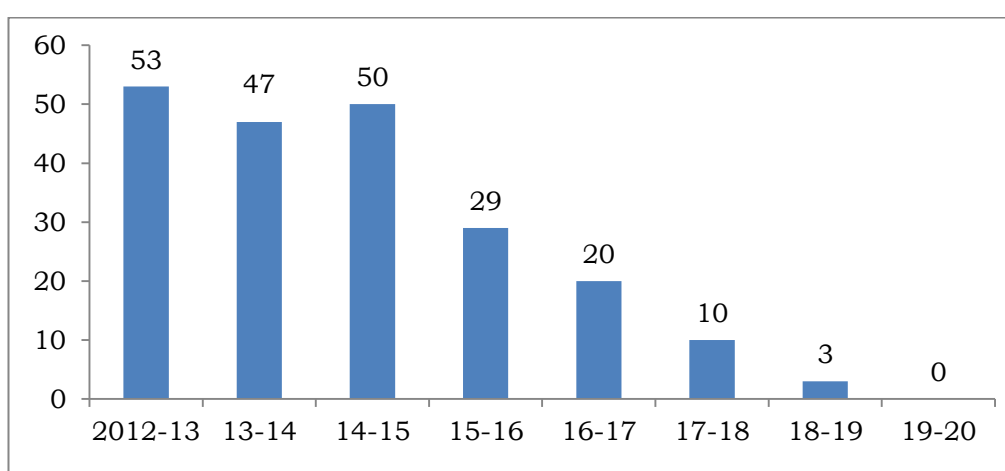


Chart-2: Accidents on Unmanned Level Crossings

Subsequent to and also in parallel to elimination of unmanned level crossings, elimination of manned level crossings has also attracted attention as manned level crossings are also a potential source of unsafe situations. Population of manned level crossings and accidents on them are tabulated below:

Table-2: Year wise total number of Manned Level Crossings and Accidents on them over Indian Railways

Year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20 (up to Jan. 2020)
No. of Manned Level Crossings	18672	18785	19047	19267	19480	19507	21340	20335
Accidents	5	4	6	6	0	3	3	1

Elimination of level crossings, being safety hazard, has been the mission area of Indian Railways. The level crossings can be eliminated by construction of ROB, RUBs/Subways, and diversion to existing ROB/RUBs/Subways/Level crossings. As per extant instructions, Road Over bridges (ROBs) are being constructed where Train-Vehicle-Unit (TVU) is more than 1.0 Lakhs, on cost sharing basis with sponsors like State Government. At other locations RUBs/Subways are being constructed to eliminate level crossings at a much lower cost.

RUBs/Subways have been introduced on the Indian Railways network in large numbers in recent past as these are one of the important methods of elimination of level crossings to avoid detentions to road users and improve safety of train operations. The population of RUBs/Subways has risen steeply on Indian Railways over the years as tabulated below:

Table-3: Year wise total number of RUBs/Subways over Indian Railways (as on 30.01.2020)

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total No. of RUBs/Subways	1509	2054	2291	3061	3863	4416	5704	6822	8519

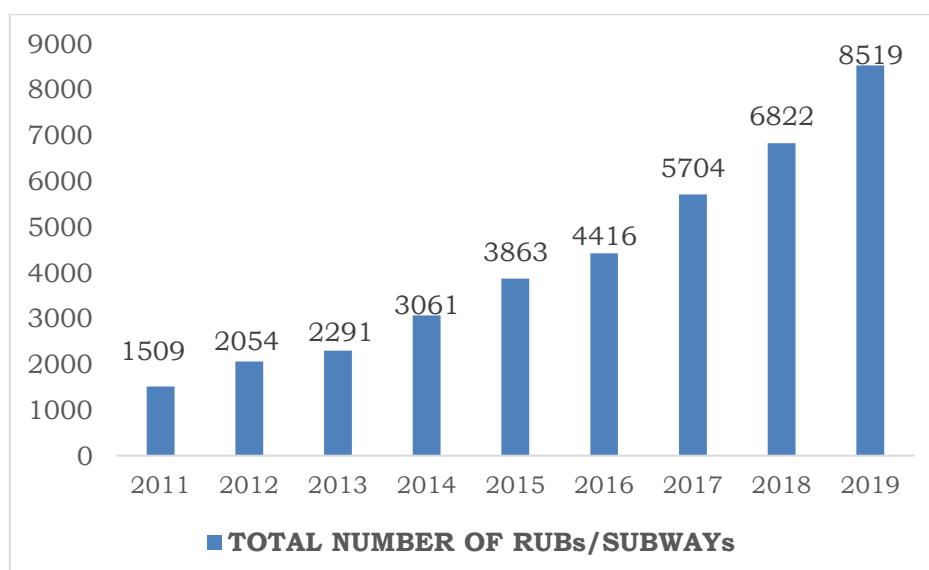


Chart-3 - Population of RUBs/Subways

Construction of RUBs/Subways involve intricate planning and execution covering large numbers of issues related to construction methodology, block requirements, duration of speed restriction, safety aspects, and drainage, etc. Drainage being an important aspect, has been given due attention in policy framework, planning, and execution stages from time to time. A number of initiatives have been taken to overcome the problem of drainage/waterlogging in RUBs/Subways. Steps taken by Zonal Railways have yielded positive results, but at many locations problem of drainage is not yet fully resolved.

The improvements effected on the ground have been reflected through various photographs of improved drainage at RUBs/Subways as given below:

Photographs from Central railway



Photographs from East Coast Railway





Photographs from Northeast Frontier Railway





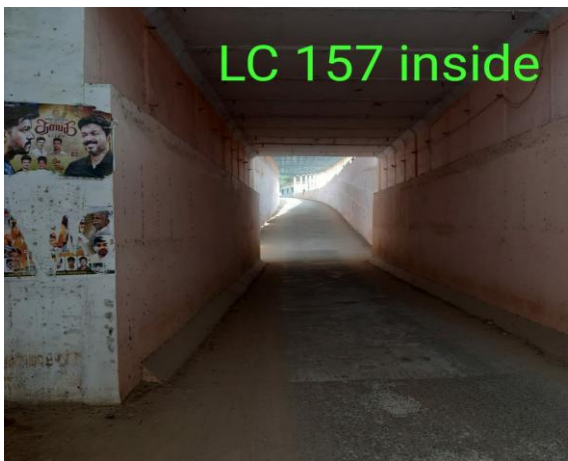


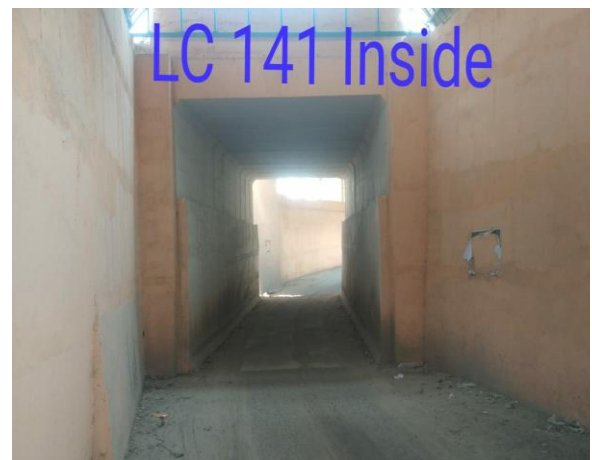
Photographs from Northern Railway





Photographs from Southern Railway





Photographs from South Central Railway



Photographs from South Western Railway



Photographs from Western Railway



Zonal Railways have submitted the status of RUBs/Subways regarding issue of waterlogging. The summary of the details indicating improvement status is tabulated as under:

Table-4: RUBs/Subways where problem of waterlogging is being resolved (As on 31.01.2020)

SN	Rly.	Total No. of RUBs	No. of RUBs/ Subways having no problem of drainage	No. of RUBs/ Subways where problem of Water logging noticed	No. of RUBs/ Subways where problem of Water logging noticed and Remedied	No. of RUBs/ Subways where problem is being resolved
1	CR	450	400	50	12	38
2	ER	330	307	23	13	10
3	ECR	79	58	21	3	18
4	ECOR	494	471	23	23	0
5	NR	841	740	101	40	61
6	NCR	436	208	228	27	201
7	NER	303	127	176	77	99
8	NFR	483	406	77	22	55
9	NWR	1220	553	667	32	635
10	SR	639	356	283	217	66
11	SCR	884	825	59	46	13
12	SER	262	256	6	4	2
13	SECR	317	265	52	45	7
14	SWR	654	527	127	73	54
15	WR	564	542	22	22	0
16	WCR	563	434	129	59	70
	TOTAL	8519	6475	2044	715	1329

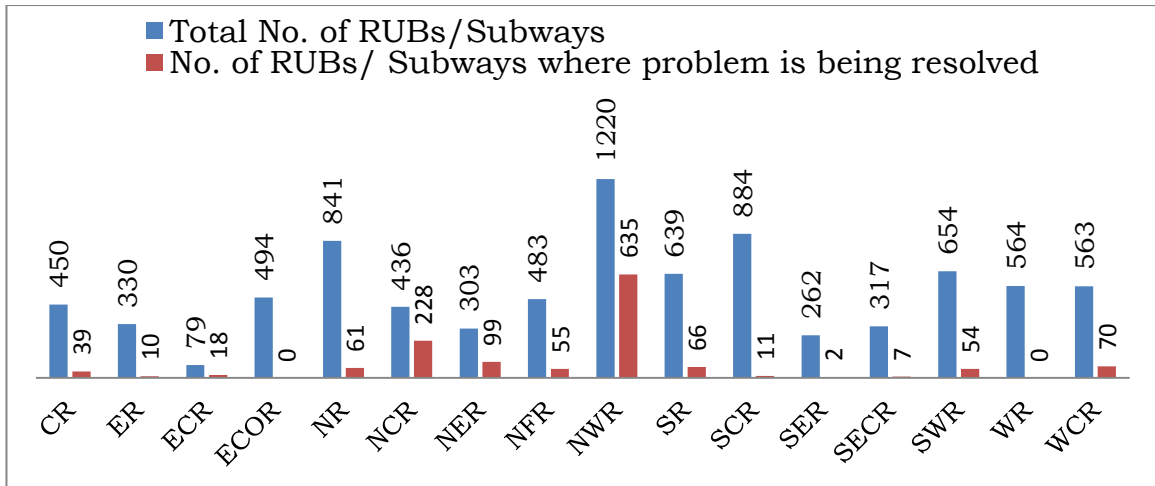


Chart-4: RUBs/Subways where problem of drainage is being resolved

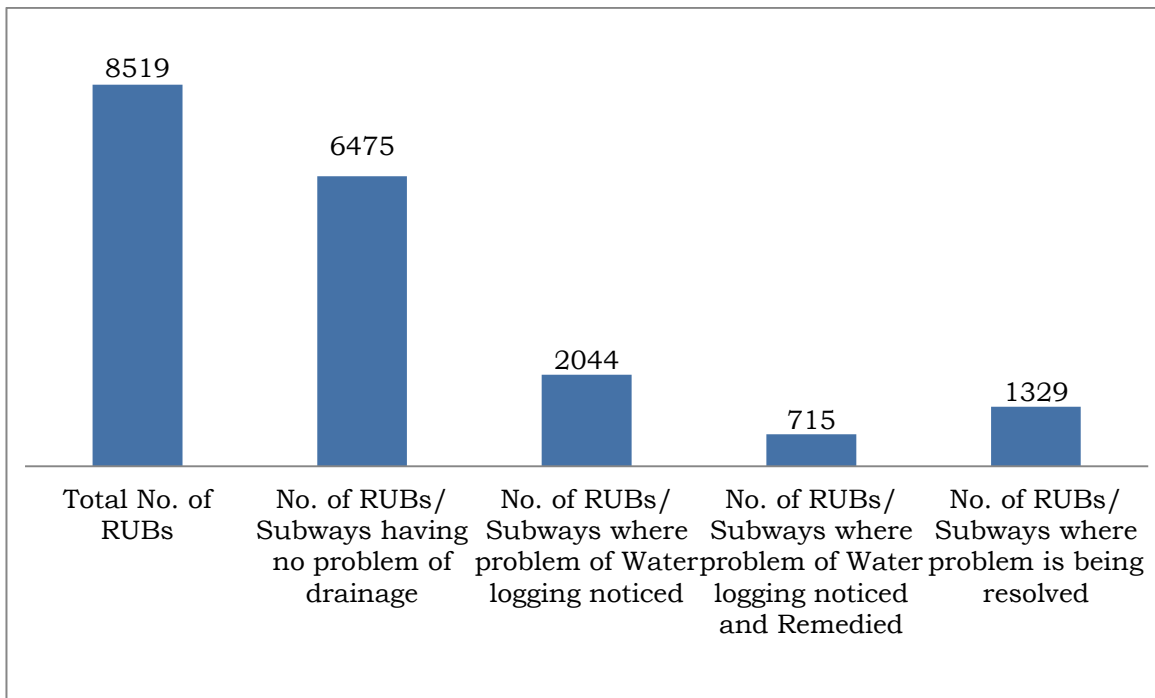


Chart-5: Status of Improvement in Drainage in RUBs/Subways on IR

It is observed that out of 8519 RUBs/Subways constructed across the country, problem of drainage has been identified in 2044 RUBs/Subways. Out of these, the problem has been taken care of in 715 RUBs/Subways. The progress on this front in remaining 1329 i.e. in 15.6% Subways is being closely monitored and the problem of waterlogging will be solved in all RUBs/Subways on Indian Railways by 31.05.2020.

Committee discussed and deliberated on the information received from Zonal Railways. The committee also gathered relevant/critical

information from the Zonal railways, discussed with officers during meetings and site visits. Detailed report covering various aspects of the drainage in RUBs/Subways has accordingly been prepared with proposed action plan to prevent entry of water through seepage and direct precipitation, which includes drainage arrangements in water logged areas.

Problem of waterlogging and drainage at RUBs/Subways have been reported from field during monsoon and sometimes in non-monsoon season as well when groundwater table is high. These problems have caused inconvenience to public, leading to complaints/representations from various public representatives. Detailed instructions have been issued by Railway Board in past on the subject. Zonal Railways have also been continuously making efforts to mitigate waterlogging/ drainage problem. Efforts made have yielded fruitful results. Experience gained has been compiled and covered in this report.

3.0 Steps involved in construction of RUB/Subway

The various steps involved in Construction of RUB/Subway in lieu of a level crossing are as under:

3.1 Site Survey:

3.1.1 Suitable Site with sufficient Bank height and having Proper Drainage feasibility is selected for construction of RUB/Subway. All details should be collected.

3.1.2 Detailed soil investigation should be conducted.

3.1.3 S&T cable, electrical cable or any other cable or OHE wire, and other utilities should be surveyed and planning for their shifting /diversion by concerned department should be done.

3.2 **Design of RUB/Subway:** The Boxes to be used for construction of RUB/Subway are designed and gradient of Approach Road and Curvature are also decided.

3.3 **Design of Drainage Arrangement:** The Drainage Arrangement is also designed for efficient drainage of water away from the RUB/Subway and prevent any waterlogging inside it. The parameters to be considered are relative level

of road in underpass vis-à-vis natural ground, level of groundwater table, annual rainfall, permeability of soil, slope of terrain, etc.

- 3.4 **Preparation of General Arrangement Drawing (GAD):** A General Arrangement Drawing (GAD) should be prepared for each site considering above aspects and incorporating site specific arrangements for drainage to ensure all weather availability of RUBs/Subways.

4.0 Common construction methodologies adopted for construction of RUBs/Subways

- 4.1 Launching of RCC Boxes by cut & cover Method in Traffic Block.

The RUB/Subway is constructed by blocking the rail traffic, excavating the formation and placing the precast Box segments during the traffic block, restoring the rail traffic, and subsequently opening it for road traffic after completing approaches. The method involves a traffic block of large duration say of 6 to 8 hours. The pros and cons of the method are listed below:

4.1.1 Advantages

4.1.1.1 Fairly Economical

4.1.1.2 Faster execution and commissioning

4.1.2 Disadvantages

4.1.2.1 Larger Duration Blocks are required.

4.1.2.2 Heavy Machinery is required.

4.1.2.3 Failure of machinery may lead to major disruption of traffic

4.1.2.4 Poor quality control in aligning joints of the Box segments, filling behind the box

- 4.2 Launching (air-pushing) of Boxes by using Restricted Height Girder

In this method, the rail traffic is temporarily run on relieving girders placed during the traffic block, below which the RUB/Subway is constructed. The relieving girders are removed and rail traffic is restored on the newly constructed RUB/ Subway. The road traffic is subsequently allowed after

completing approaches. The method requires multiple traffic blocks for placing and removing the relieving girders. The pros and cons of the method are listed as follows:

4.2.1 Advantages

4.2.1.1 Smaller Duration Blocks are required.

4.2.1.2 Quality is better.

4.2.2 Disadvantages

4.2.2.1 Heavy Machinery is required.

4.2.2.2 Dependency on relieving girder is high.

4.2.2.3 More blocks required for each RUB/Subway

4.3 Box Pushing method through Embankment

The method involves pushing of Box through the railway embankment with the rail traffic passing under suitable speed restriction. Precaution is required to avoid disturbance to the railway track during pushing of the Box. The method is time consuming. In addition, taking up multiple sites will require speed restrictions at many places. The pros and cons of the method are listed as follows:

4.3.1 Advantages

4.3.1.1 Less disruption to rail traffic.

4.3.1.2 Better quality control.

4.3.1.3 No involvement of crane & heavy equipment.

4.3.1.4 Seamless joint i.e. no seepage problem

4.3.2 Disadvantages

4.3.2.1 Costly.

4.3.2.2 Needs trained staff and skilled supervision.

4.3.2.3 Imposition of caution order for a longer duration.

4.3.2.4 Chances of Sudden Collapse at the face of cutting edge leading to unsafe situation

5.0 Causes of waterlogging in RUB/Subway

Water logging will occur in any RUB/Subway whenever rate of inflow into it is more than the rate of outflow of water out of it. Accordingly, causes of waterlogging in RUBs/Subways can be summarized based on factors affecting rate of inflow/outflow as follows:

5.1 Factors affecting rate of inflow

5.1.1 Seepage from surrounding ground and from approaches through joints.

- 5.1.2 The storm water reaching in subway from the approaches.
- 5.1.3 Water coming from weep holes provided in retaining walls of approach roads.
- 5.1.4 Direct rainfall in case of LHS constructed below ground level.

5.2 Factors affecting rate of outflow

- 5.2.1 Natural drainage not available.
- 5.2.2 Choking of drainage arrangement.
- 5.2.3 Impermeable soil / rock or clay found below box culvert.
- 5.2.4 General submergence of the area during monsoon.
- 5.2.5 Relative level of road inside the RUB/Subway viz-a-viz the natural ground.

6.0 Arrangements for drainage commonly employed in RUB/Subways.

Initially, RUBs/Subways were constructed where railway embankment of sufficient height was available. These locations did not require complicated drainage arrangements unless accompanied by factors adversely affecting the drainage such as high groundwater table, high annual rainfall, high intensity of rainfall, and impervious soil strata.

- 6.1 If the height of embankment is sufficient, and road level in the Subway is higher with respect to adjoining ground level, then the drain from RUB/Subway leads the water to any drain nearby or to water bodies at lower level. The drain is periodically cleaned.
- 6.2 If the road level of RUB/Subway is lower than adjoining ground level and no suitable natural drainage is available, then the water from the RUB is drained to sump well for water harvesting where pervious strata is available. The percolation bore should be taken below the lowest ground water table. However the percolation would be low in soils of low permeability or impermeable soils. Hence this method is suitable if pervious strata can be reached
 - 6.2.1 Alternatively, where suitable natural drainage is not available below the road level of RUB/Subway and

recharge of groundwater reservoir is also not feasible/inadequate, water is collected in a sump and then lifted through pumps of suitable capacities for further disposal into the available natural drainage at a higher level.

- 6.3 In many cases, it is possible to locate a natural drainage in about a kilometer of RUBs/Subways. RCC open drains or RCC Hume pipes or a combination of both can be considered depending on the distance between the RUB/Subway and the outfall. The slopes of drains should generally be steeper than 1 in 250.

7.0 System improvement measures and instruction issued on possible solutions to eliminate waterlogging

7.1 Instructions issued by Railway Board:

- 7.1.1 Railway Board vide letter No. 2017/CE-IV/Misc (RUBs) dated 21.03.2017 reiterated that construction of RUB/Subways should be taken up only if found technically feasible as per site condition. The letter is enclosed as Annexure-1.
- 7.1.2 Railway Board vide letter No. 2006/CE-IV/Misc-2/(RUBs) dated 03.07.2018 decided that responsibility for 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. Railway Board also desired that the demarcation of maintenance responsibility should be clearly indicated. The letter is applicable to all cases where level crossings are being closed with provision of Subways/RUBs. The letter is enclosed as Annexure-2.
- 7.1.3 The Minutes of the Meeting of CRB with GMs during video conference held on 2nd August, 2019, directing intense monitoring, taking up both short term and long term measures to prevent waterlogging in RUBs/Subways, are enclosed as Annexure-3.

- 7.1.4 Railway Board reiterated the important issues related to construction of RUB/ Subways including drainage vide PED/Bridges/RB letter no. 2017/CE-IV/RUB/88 dated 04.10.17 issued to GM's all Zonal Railways. The letter is enclosed as Annexure- 4.
- 7.1.5 Railway Board, in view of the gravity of the waterlogging problem in RUBs/Subways, issued Executive Summary of issued instructions to General Managers of all Zonal Railways encompassing various aspects of drainage in LHS/RUB/Subway vide Director(CE)/ B&S-II/ RB letter no. 2017/CE-IV/RUB/88 dated 24.09.19. The letter is enclosed as Annexure-5.
- 7.1.6 Railway Board, vide letter no. 2017/CE-IV/RUB/88 dated 22.01.2020 (enclosed as Annexure-6), have reiterated that RUB/Subway will be constructed only at locations, where there is no problem of drainage. The letter further stipulates that any proposal for sanction of RUB/Subway in lieu of level crossings must be accompanied by a certificate by an officer in SAG that RUB/Subway is feasible at the proposed location and there will not be any problem of drainage.

7.2 Instructions issued by RDSO:

RDSO has issued various standard drawings for construction of RCC Box, for constructing bridges over waterways as well as RUBs/Subways. These drawings are essentially type plans which provide dimension, details of reinforcement, foundation pressure, and other requirements such as provision of earth cushion, etc. for various loading standards of Railways. Various type plans referred in construction of RUBs/Subways are tabulated below:

Table -:5 RDSO Type Plans for RCC Box Culverts

Serial Number	RDSO Type Plan No	Brief Description
1	B-10153	Segmental Single Box Culvert, Span length 4m, 4.5m, 5m & 5.5m, and Box height 3.6m, 4m, 4.5m & 5m suitable for 25 Tonne Loading
2	B-10156	Segmental Single Box Culvert, Span length 4m, 5m & 5.5m, and Box height 3.6m & 4m suitable for DFC Loading

3	B-10159/1	Segmental Box Culvert for RUB, Span length 6m, and Box height 4.65m suitable for 25 Tonne Loading
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The above type plans are referred in the Site specific General Arrangement Drawings for RUBs/Subways. The detailed drainage arrangement is unique for each RUB/Subway site and it should be shown on the General Arrangement Drawing of the RUB/Subway. RDSO has communicated actionable points to Zonal Railways vide letter no. CBS/ LUSW Dt: 18.09.2019 & letter no. CBS/LUSW dated 15.10.2019 (placed as Annexure-7 and Annexure-8) for guidance of executing agencies. Up-to-date revised drawings have also been uploaded on Railnet site (i.e.10.100.2.12 – Directorates – B&S Directorate – B&S Drawings). Even though action required for all weather availability of a RUB/Subway is site specific, RDSO has incorporated following points in the standard drawings tabulated above.

- 7.2.1 RUB/LHS/Subway should be constructed only at those locations, where it is technically feasible.
- 7.2.2 Cover may be provided as per site condition on ramp.
- 7.2.3 The provision of drainage arrangement should be made the integral part of construction of RUB/LHS/ Subways at planning stage itself for its proper functioning. The planning & execution should include detailing for collection of water and its disposal till final outfall.
- 7.2.4 Joints of box segments should be sealed properly.
- 7.2.5 Rain water harvesting should be planned as per site condition.
- 7.2.6 Hump on road side or provision of reverse slope of road before start of downward ramp to RUB/LHS/Subways to avoid ingress of water through ramp and side should be considered. Retaining wall should continue along the approach slope upto the hump or from where reverse slope starts.
- 7.2.7 Sump-pump arrangement at critical locations to be done.
- 7.2.8 Elaborate drainage arrangement need to be done to divert surrounding water.

7.2.9 Responsibility in railway portion lies with Railway and beyond Railway portion to the responsibility of maintenance rests with State Govt.

In addition to above instructions, Zonal Railways have also issued local instructions based on situations prevalent over the Railway.

8.0 Deliberations

Committee after study of the extent of problem and the solutions implemented in field, finds major technical issues involved can be categorized in following heads:

8.1 Drainage Problem arising due to the construction aspects:

Major construction aspect affecting the drainage is creation of joints due to adoption of segmental construction i.e. Subway (RUB) which is constructed using RCC Box segments under the track by means of Cut and Cover Method (with or without use of Restricted Height Girder). In addition, provision of weep holes, presence of unavoidable joints between the RCC Box and the approach retaining walls, and joints between segments of the retaining walls also affect the drainage adversely. The solutions implemented in the field are elaborated below.

8.1.1 Entry of water from joints in the RCC Box and Retaining walls can be overcome by sealing the joints using appropriate sealants. In new constructions, the number of joints should be minimized. Special care should be taken to seal the joint between the RCC Box & wing walls/retaining walls, and joints between the segments of retaining walls in approaches. In addition weep holes should not be provided and properly sealed wherever already provided.

8.1.2 There may be cases of continuous and heavy seepage of groundwater from the joints in high watertable area. Care shall be taken for providing a monolithic RCC lining with water proofing compounds inside the subway in addition to sealing of joints for its better functioning of the subway during service in such cases.

8.2 Drainage aspects where road level in the RUB/Subway is higher than the natural ground:

The situation will occur when the height of railway embankment is sufficient to accommodate the RUB/Subway while keeping the road inside it above the natural ground level. No drainage problem is anticipated in such cases as rainwater falling into the RUB/Subway will drain towards the natural ground under gravity. Only suitable side drains leading to the natural drainage of the area should be sufficient except in areas having high rainfall and high groundwater table where additionally cross drains may need be provided to prevent accumulation of water near the RUB/Subway to ensure its all-weather availability.

8.3 Drainage Problem arising due to road level in the RUB/Subway being lower than the natural ground:

It will be the case in most of the situations. In such cases, the road inside the RUB/Subway goes below the level of natural ground, therefore, rainwater in the surrounding area will flow towards inside the RUB/Subway under gravity. The first step is to intercept and prevent the rainwater from flowing into the RUB/Subway because it is difficult to dispose the rainwater once it gets accumulated inside the RUB/Subway. Next step is to suitably dispose the rainwater accumulated inside the RUB/Subway. The solutions discussed below include both intercepting the rainwater by providing humps, cross drains, and cover the approaches of the RUB/Subways before it enters the RUB/Subway & disposal of the rainwater entered into the RUB/Subway by collecting it into sumps, recharge of groundwater, pumping to natural a drainage at higher level, etc. or a combination of these methods.

8.3.1 Rainwater can be prevented from entering into the RUB/Subway by

8.3.1.1 Providing a hump at the junction of approach of RUB/Subway and the natural ground along with cross drain covered with steel grating to prevent the entry of surface run-off. The

retaining wall in approaches should be extended upto end of the hump.

8.3.1.2 Providing cover shed to prevent direct precipitation from accumulating in the approaches of RUB/Subway in regions with high rainfall and where problem of natural drainage exists.

8.3.2 Even after intercepting and diverting the rainwater away from the RUB/Subway, some water will accumulate inside the RUB/Subway. It needs to be disposed of either of the following measures or combinations thereof:

8.3.2.1 Providing cross drains to lead the accumulated water to sumps from where it is taken to soak pits/recharge pits for water harvesting if the permeable strata is available. Pumping arrangements may be planned as standby in high rainfall areas.

8.3.2.2 If the rate of recharge is inadequate or recharge is not possible due to impermeable soil or high groundwater table, the pumping arrangement needs to be ensured for draining out accumulated water to natural drainage.

8.4 Other Common aspects:

It is essential that elaborate drainage network should be planned for disposal of the intercepted water and water accumulated in the RUBs/Subways. Care should be taken for carrying intercepted water across the RUBs/Subways through open drains, piped drains, and suitable cross-drainage arrangements. The drainage arrangements should cater for all eventualities such as high rainfall, high groundwater table, and occurrence of impermeable soil strata which will lead to low rate of recharge of rainfall into the ground.

9.0 Possible Solutions

- 9.1 Basic principles, which have to borne in mind, to prevent waterlogging and devising related remedial measures for RUB/Subways are as follows:
 - 9.1.1 Appropriate site selection where natural drainage is feasible e.g. locations having suitable height of railway embankment, etc. Locations having high groundwater table, near to waterways/ canals, low lying areas, etc. should be avoided.
 - 9.1.2 Intercept, divert, and suitably dispose the surface runoff from nearby areas before it enters the RUB/Subway. Where natural drainage is not possible, drain water to a sump and further dispose by groundwater recharge or pumping out.
 - 9.1.3 Prevent ingress of groundwater in the RUB/Subway including its approaches by sealing joints, provision of lining, and humps on approaches above Road level, and retaining wall along approaches.
 - 9.1.4 Covering of approaches in low lying RUBs/Subways should be resorted to only in high rainfall area as it is a costly measure.
- 9.2 Commonly encountered situations can be categorized in two categories viz; where the lowest level of road in the RUB/Subway i.e. the level of road inside the RCC Box is higher than the ground level; and where the level of the road inside the RCC Box is lower than the ground level. The degree of difficulty in ensuring all weather availability of the RUB/Subway increases as the road level of subway dips further below the ground level. Success of measures taken to ensure proper drainage in the RUB/Subway is also dependent on a large extent on parameters like topography of the area, annual rainfall, maximum intensity of rainfall, and level of the highest anticipated level of groundwater table with reference to the road level inside the RCC Box. Considering above mentioned important factors, the various situations occurring in the field and possible solutions can be categorized as follows:

Table -6: Proposed solutions

Height of embankment	Level of groundwater table with respect to Ground Level			
	Low		High	
	Annual Rainfall < 800 mm	Annual rainfall > 800 mm	Annual Rainfall < 800 mm	Annual rainfall > 800 mm
Track on embankment and Road level inside the RCC Box higher than the ground level	Minor works as per site requirement to be decided by engineer-in-charge	Minor works as per site requirement to be decided by engineer-in-charge	Minor works as per site requirement to be decided by engineer-in-charge	Proper side drains and cross drains as per site requirement
	SCHEMATIC ARRANGEMENT SHOWN IN GROUP-I			SCHEMATIC ARRANGEMENT SHOWN IN GROUP-II
Track on embankment and Road level inside the RCC Box lower than the ground level	Sump + open drains / closed drains or combination of both	Cover over the approaches+ Sump + open drains / closed drains or combination of both (Pumping arrangement as Standby)	Lining of the Subway + Cover over the approaches + sump + pumping arrangement + surface drainage and suitable cross-drainage wherever required	Lining of the subway + cover over the approaches + sump + pumping arrangement + surface drainage and suitable cross-drainage ROB preferable over RUB
	SCHEMATIC ARRANGEMENT SHOWN IN GROUP-III		SCHEMATIC ARRANGEMENT SHOWN IN GROUP-IV	

*High groundwater table is considered as 2.0 m below the lowest level of road in the RUB/Subways.

The above table is to be read with following notes:

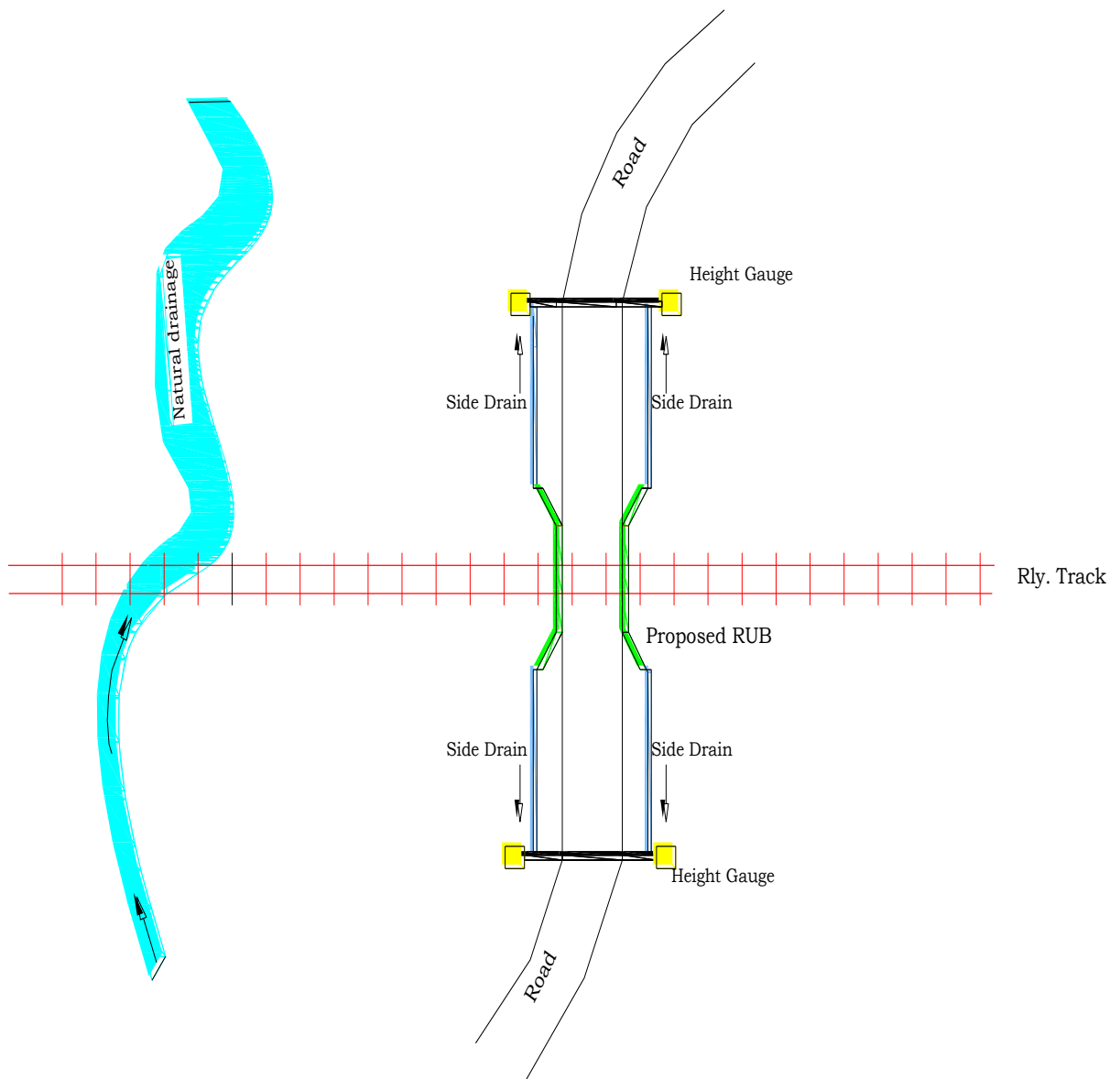
- The joints of segments of RCC Box, Joints between Box and the retaining walls, and segments of retaining walls in

approaches must be sealed. Weep holes should not be provided in new RUBs/Subways. Sealing of weep holes, wherever already provided, should be ensured in all cases.

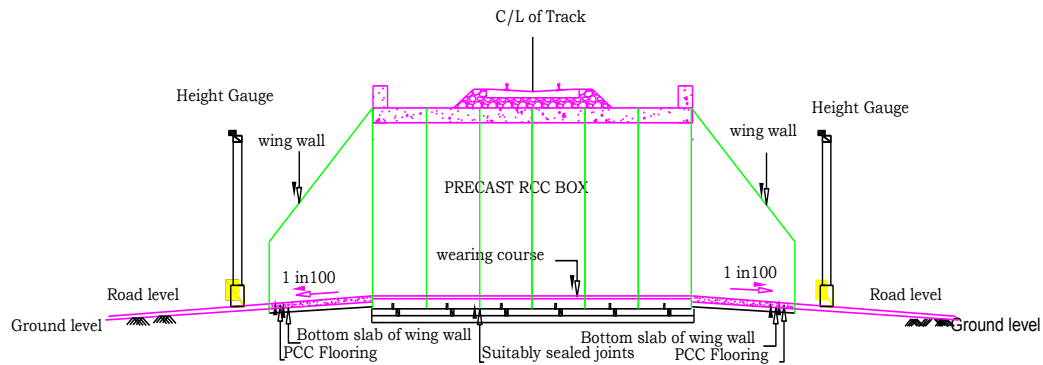
- b. Local arrangements such as catch water drains, raising of walls, and raised hump with reverse slope alongwith grating to prevent ingress of water, etc. to be provided as per site requirement.
- c. Electrically operated sensor based pumping arrangements are preferable in built up and urban areas. Standby diesel operated pumps to be ensured.
- d. Water harvesting may be planned where groundwater table is low and pervious strata is available.
- e. The proposed drainage arrangements for each group are considered minimum requirements and indicative only. These may be suitably augmented/modified as per the site conditions.

Based on the above principles, specific drainage arrangement shall be integral part of General Arrangement Drawing which should show details of collection of water and its disposal till final outfall with levels and arrangements to ensure all weather availability of RUB/Subway.

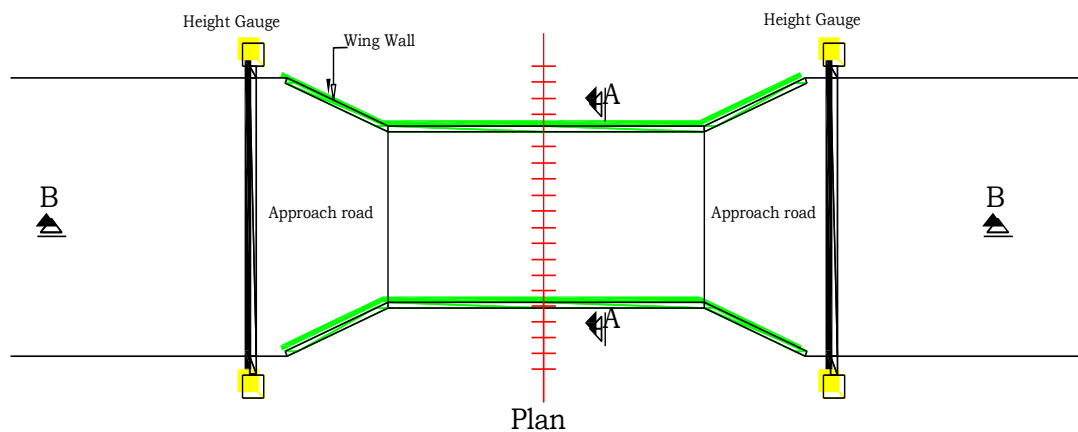
Schematic arrangements of the Groups I, II, III and IV are given in following pages.



SCHEMATIC KEY PLAN



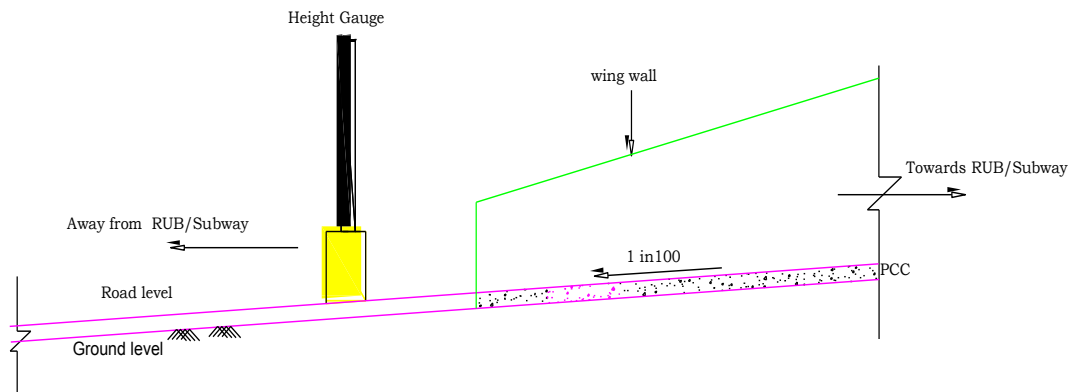
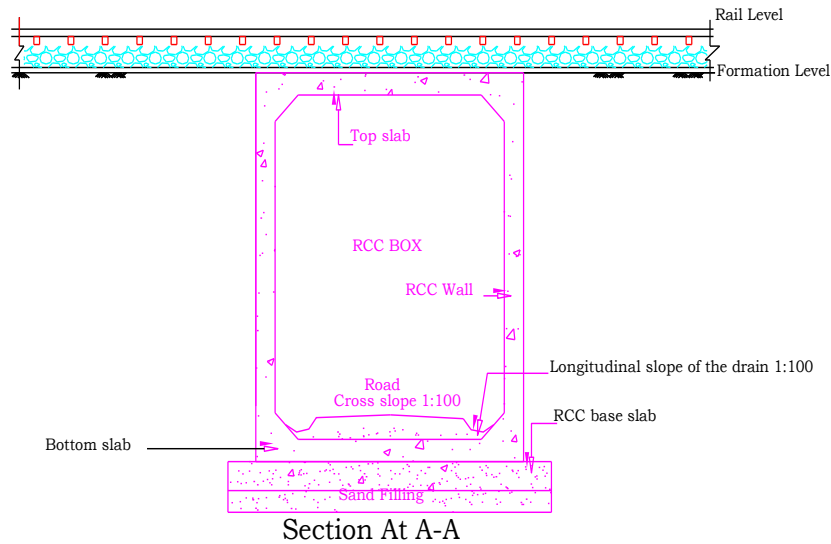
Sectional Elevation At B B



Schematic Arrangement Suitable for
RUBs /Subway where road level inside the RCC Box is above
the Ground Level except High Groundwater Table i.e < 2m below the road level and
and Annual Rainfall more than 800mm

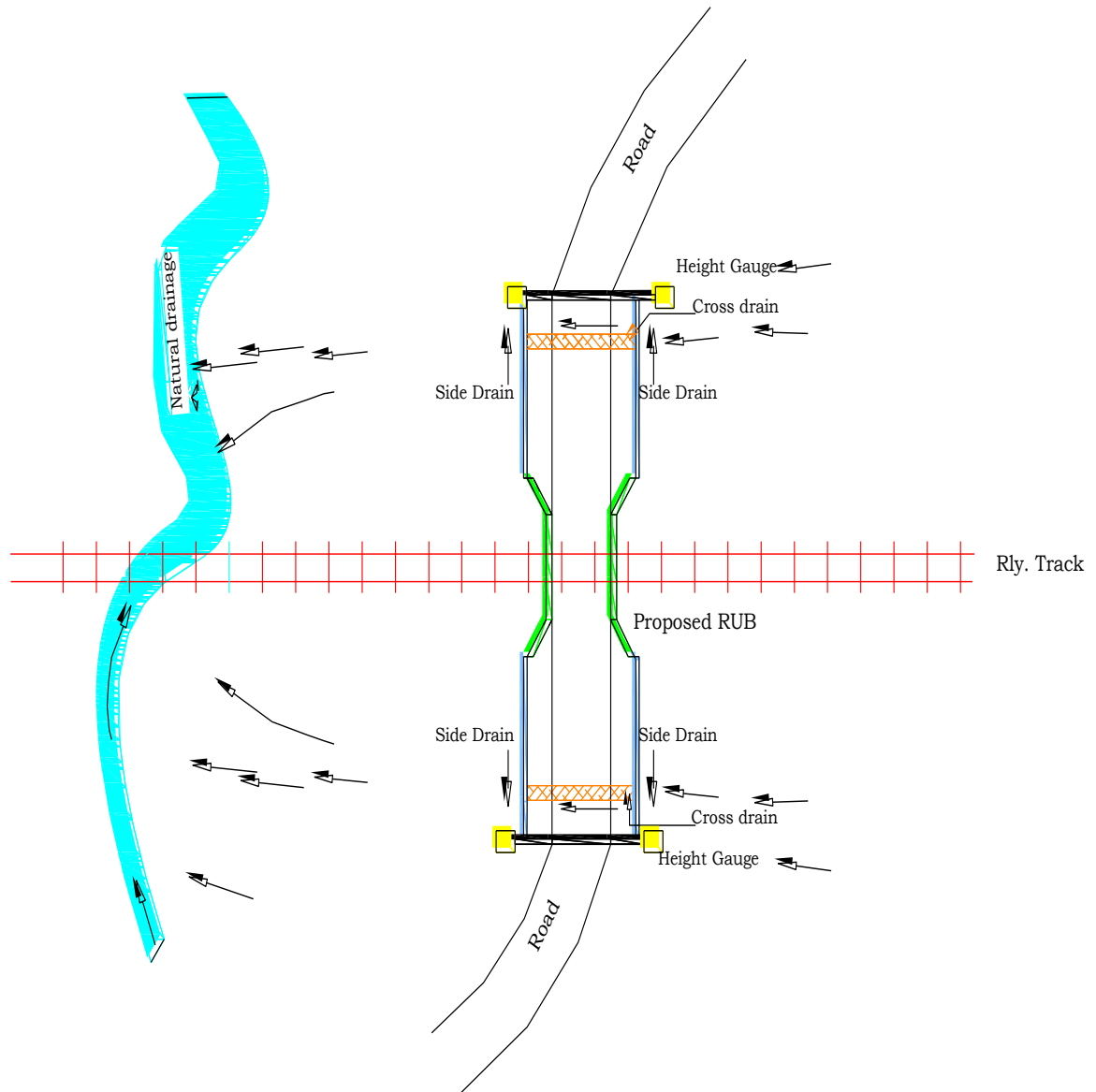
Notes:-

1. Sealing of joints between RCC Box segments and Joints between Wing Walls & RCC Box should be ensured.
2. Suitable drainage arrangement should be provided as per site requirement.

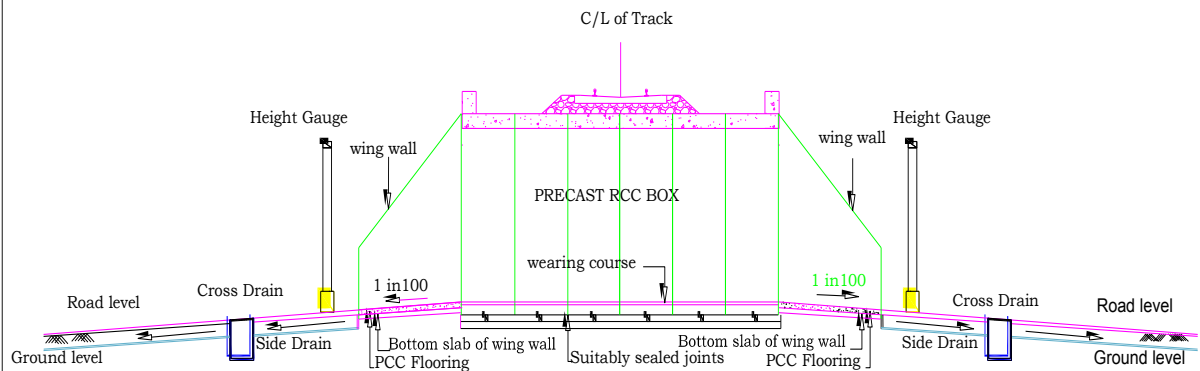


Notes:-

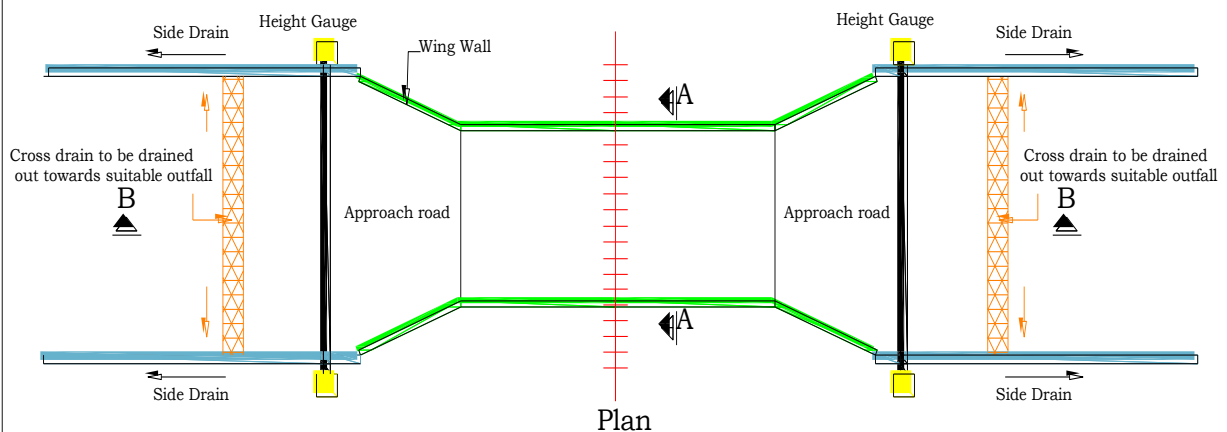
1. Sealing of joints between RCC Box segments and Joints between Wing Walls & RCC Box should be ensured.
2. Suitable drainage arrangement should be provided as per site requirement.



SCHEMATIC KEY PLAN



Sectional Elevation At B-B

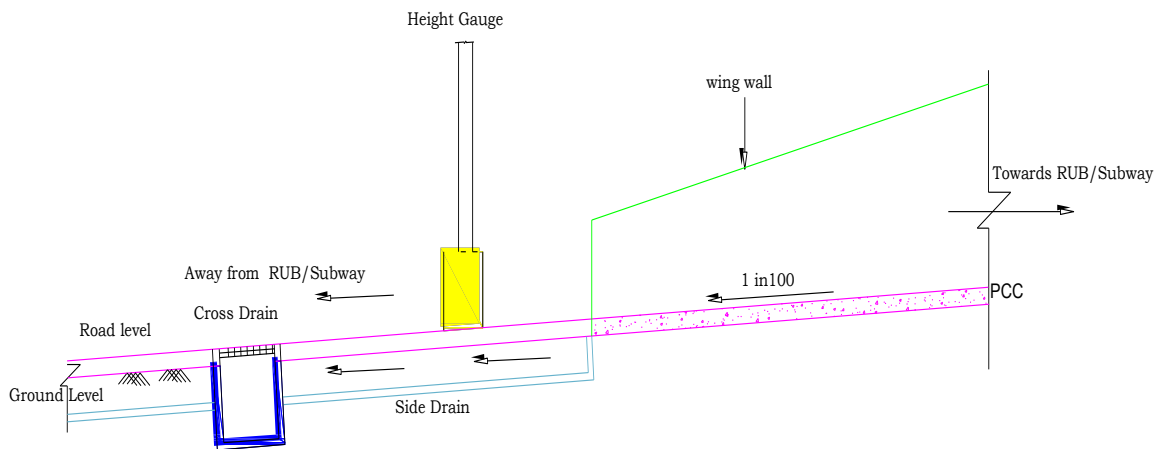
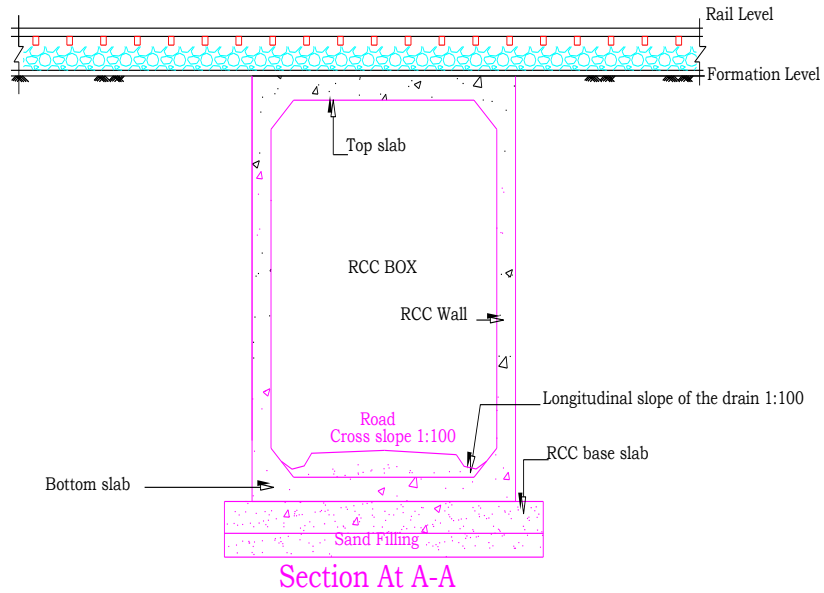


Schematic Arrangement Suitable for

RUBs /Subway where road level inside the RCC Box is above the Ground Level, High Groundwater Table i.e < 2m below the Road Level inside the RCC Box and Annual Rainfall is more than 800mm

Notes:-

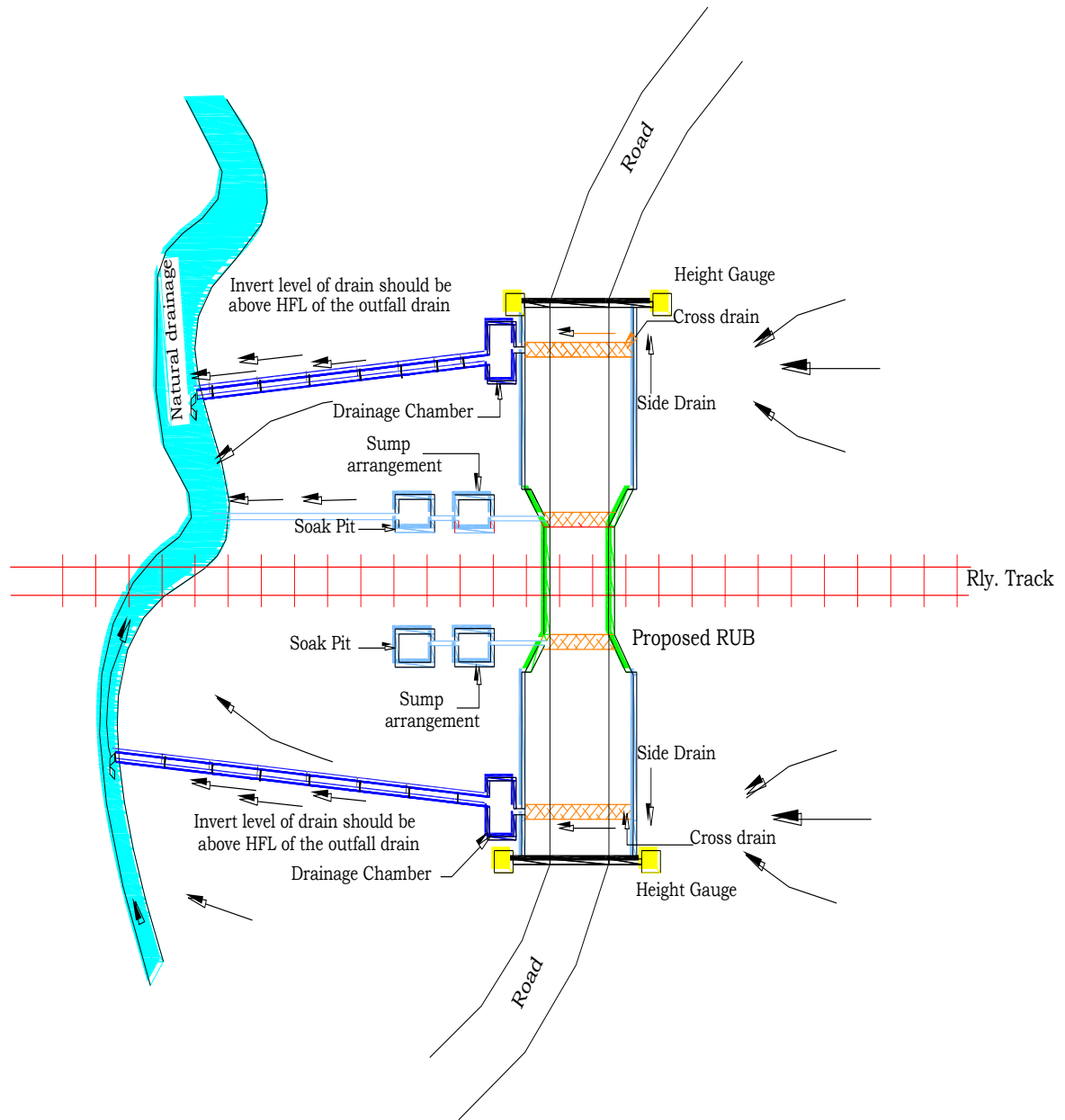
1. Sealing of joints between RCC Box segments and Joints between Wing Walls & RCC Box should be ensured.
2. A combinations of cross drain and side drain should be provided as per site requirement.



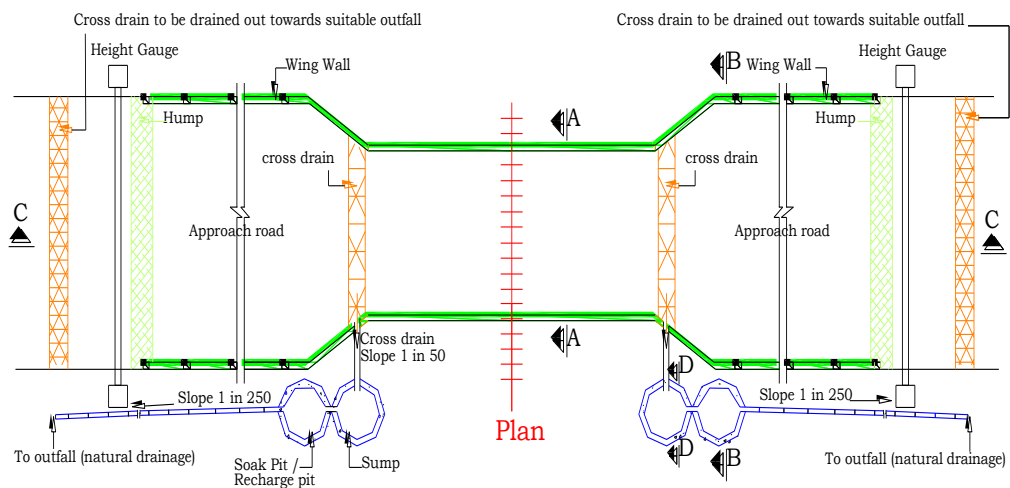
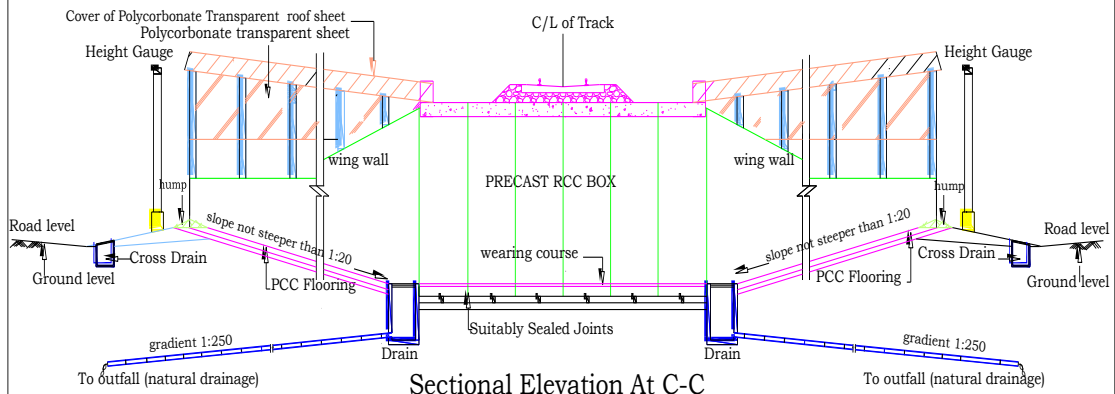
Schematic Arrangement Suitable for

RUBs /Subway where road level inside the RCC Box is above the Ground Level, High Groundwater Table i.e < 2m below the Road Level inside the RCC Box and Annual Rainfall is more than 800mm

1. Sealing of joints between RCC Box segments and Joints between Wing Walls & RCC Box should be ensured.
2. A combinations of cross drain and side drain should be provided as per site requirement.



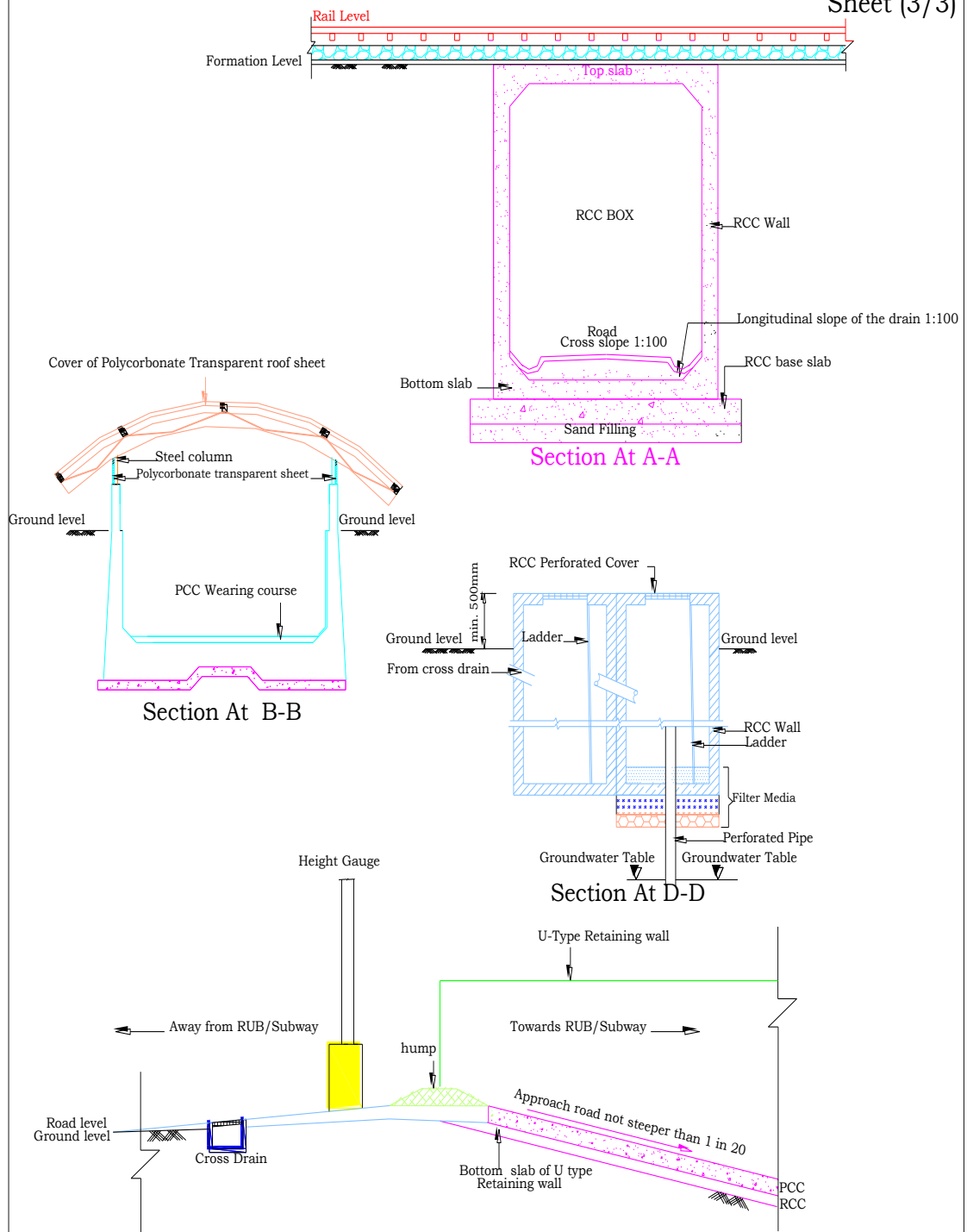
SCHEMATIC KEY PLAN



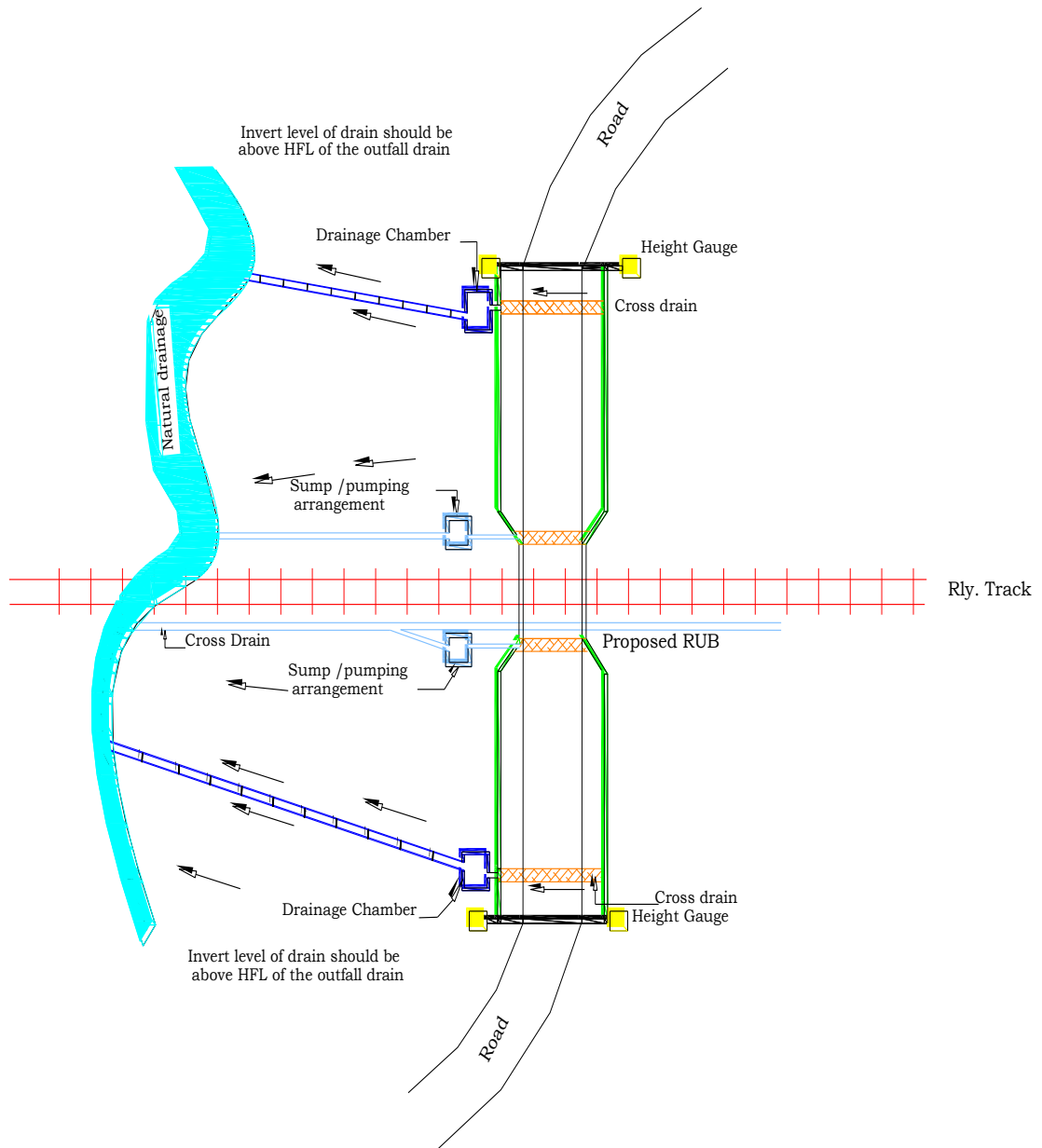
**Schematic Arrangement Suitable for
RUBs /Subway where road level inside the RCC Box is below the ground level with
low Groundwater Table i.e Groundwater Table > 2m below road level inside the RCC Box**

Notes:

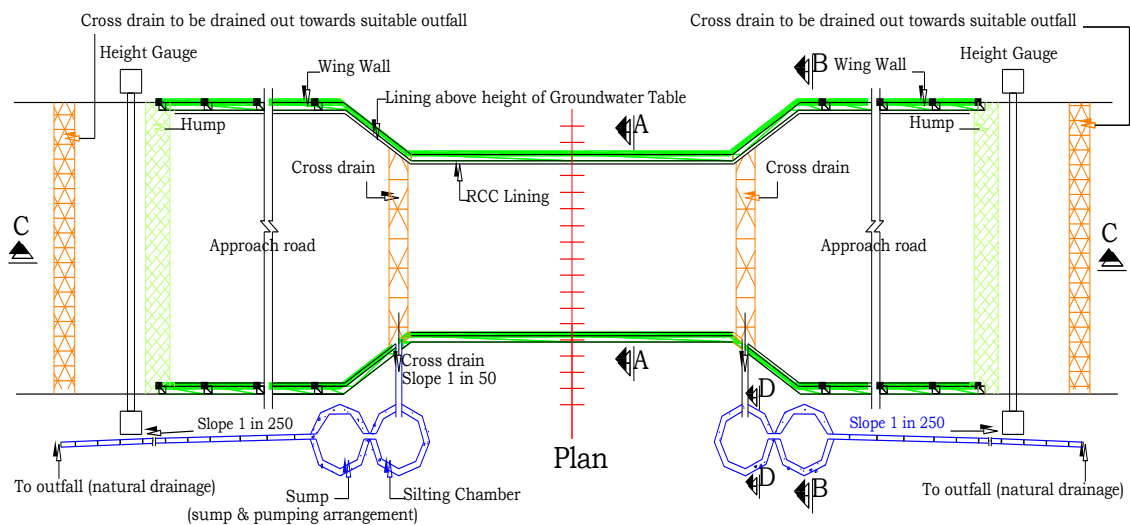
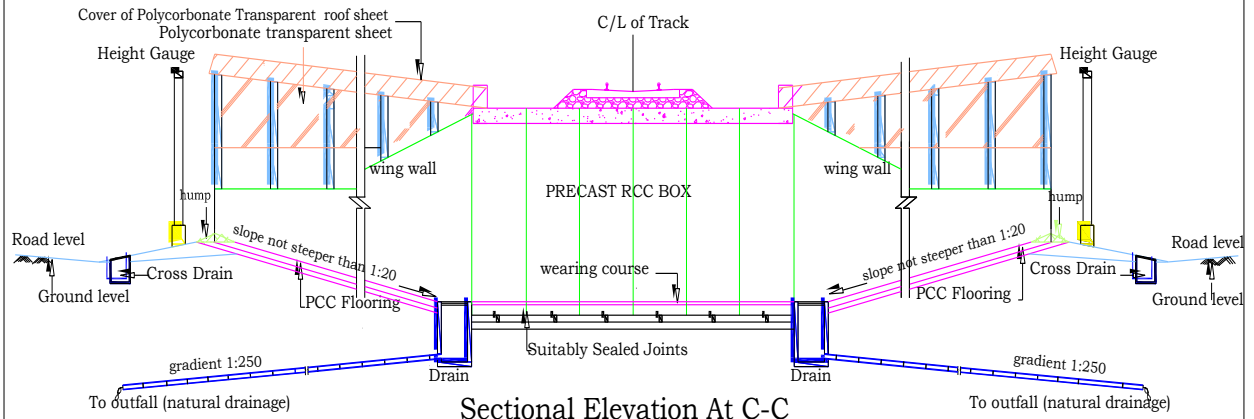
1. In low annual rainfall (< 800mm) area, cover over the approaches should not be provided.
2. Sealing of joints between RCC box segments, joints between Wing Walls & RCC box and joints between segments of retaining wall should be ensured.
3. Sump and recharge pit along with cross drain (opened/closed) or combination of both is to be provided as per site requirement.



Schematic Arrangement Suitable for
RUBs /Subway where road level inside the RCC Box is below the ground level with
low Groundwater Table i.e Groundwater Table > 2m below road level inside the RCC Box



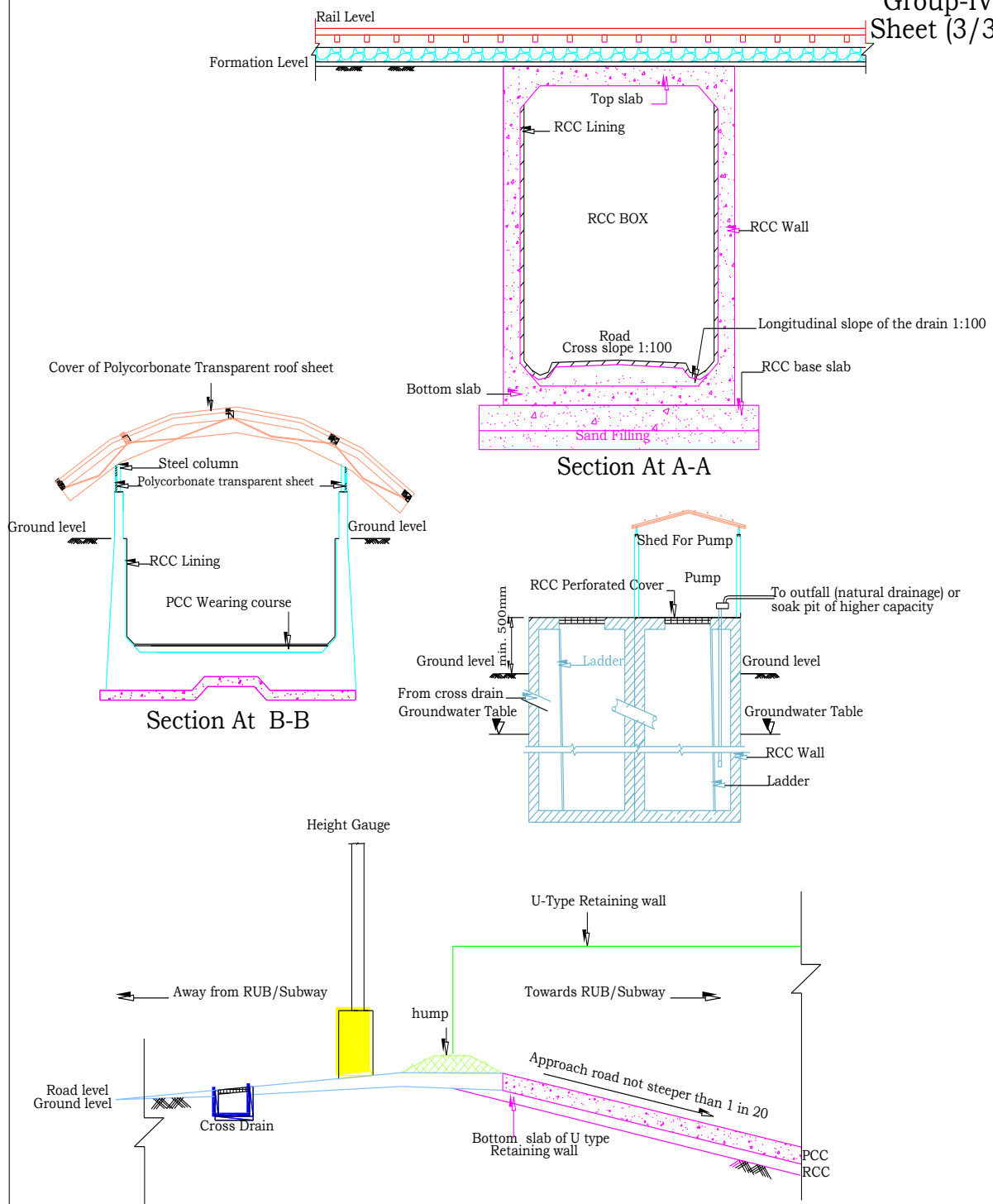
SCHEMATIC KEY PLAN



Schematic Arrangement Suitable for
RUBs /Subway where road level inside the RCC Box is below the ground level with
High Groundwater Table i.e Groundwater Table < 2m below road level inside the RCC Box

Notes:

1. Sealing of joints between RCC box segments, joints between Wing Walls & RCC box and joints between segments of retaining wall should be ensured.
2. Lining of RCC box, Wing Walls and retaining walls above the groundwater table is to be provided as per site requirement.
3. Sump, pumping arrangement and cross drains or syphon or combination of both with opened/closed drains to divert surface runoff through near by natural drain is to be provided as per site requirement.



10.0 Conclusion

Safety has been the topmost concern of Indian Railways. Majority of train accidents have been taking place at the level crossings. Therefore, elimination of level crossings has been taken up as mission area by Indian Railways. Whereas unmanned level crossings have been eliminated, elimination of manned level crossings is being done on war footing. Manned level crossings having TVU more than 1.0 lakh are being eliminated by ROB/Normal height Subways and other level crossings are being replaced by RUBs/Subways.

Drainage arrangement at Subways is the real challenge being faced at site. Out of 8519 RUBs/Subways constructed across the country, problem of drainage has been identified in 2044 RUBs/Subways. Out of these, the problem has been taken care of in 715 RUBs/Subways. The progress on this front in remaining 1329 i.e. in 15.6% Subways is being closely monitored and the problem of waterlogging will be solved in all RUBs/Subways on Indian Railways by 31.05.2020. In order to solve the problem, considered views, based on the inputs from the field, have been indicated in the report to tackle the problem of drainage in remaining RUBs/Subways.

As meticulous planning and adoption of appropriate construction methodology play a major role in ensuring all-weather availability of the RUB/Subway, these have been briefly described in the report highlighting the pros and cons of the various methodologies. The causes of waterlogging in the RUB/Subway need to be understood clearly to formulate the strategy to overcome the problem. The action plan should be to control /tackle the factors leading to increased rate of inflow of water into the RUB/Subway and maximize the outflow/ disposal of whatever water gets into it.

Instructions and policy directives issued in this regard have been listed in the report as ready reckoner. Also, the commonly adopted drainage arrangements were studied and matched with the site conditions.

There may be number of combinations of topographical, meteorological, and site conditions at each RUB/Subway. Each case is unique requiring application of sound engineering practice and latest technology for devising a successful drainage

plan. Therefore, due diligence is essential for developing an integrated drainage plan for each RUB/Subway considering site specific information and broad policy directives mentioned above. Possible solutions based on the basic principles enunciated in the report and good practices adopted over Indian Railways has been proposed in an easy to follow tabular format. While proposing solutions, it has been tried to club these permutations and combinations into four groups for the sake of simplicity and ease of implementation. The site specific solutions can be developed based on the proposed solutions which are considered the minimum indicative requirements.

The suggestions mentioned should be implemented in the new RUBs/Subways being constructed as well as in existing Subways to solve the problem of drainage. RUB/Subway should be avoided in Level Track and Cuttings and in the regions where problem of high rainfall, terrain sloping towards the RUB/Subway, and high groundwater table exists as all-weather availability of the RUB/Subway cannot be ensured.

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD

No.2017/CE-IV/Misc (RUBs)

New Delhi, Dated 21.03.2017

General Manager
All Zonal Railways

Sub: Clarification on provision of Subways/RUBs in lieu of Level Crossings.

Ref: This office letter no. 2006/CE-IV/Misc-2(RUBs) dated 18.04.2012.

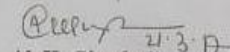
Vide this office letter referred above, Zonal Railway were advised that level crossing, which do not qualify for sanction of RUB on cost sharing basis in terms of Para 925 of IRPWM, can be planned for elimination by subways, if found, technically feasible. Vertical clearance of such subway should be kept below 5.0 M and sanctioned at Railway's cost, i.e. Railways will bear the complete initial cost of construction of subway (bridge and approach portion within or outside Railway land) and future maintenance cost of subway proper.

Many representations have been received from Member of Parliament as well as commuters that there is serious problem of water logging and visibility for road users at newly constructed RUBs/Subways. These issues have not been addressed during planning and execution stage. At many places RUBs/subways remains flooded most of the time because it has been constructed below original ground level and no system of adequate drainage seem to have been provided.

Instruction vide above refereed letter was issued from construction of RUB/Subway, *if technically feasible*. It appears that construction of RUB/Subway got sanctioned and executed at those locations also where it was technically not feasible. Survey should be conducted immediately for RUB/Subways, where problem exists and remedial action be taken.

It is reiterated that construction of RUB/Subways should be taken up only if found technically feasible as per site condition and first stage priority should be given to construct RUB/Subway for elimination of unmanned level crossings.




(A.K. Singhal)

Executive Director CE/B&S

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No. 2006/CE-IV/Misc-2/(RUBs)

New Delhi Dt: 03.07.2018

The General Manager
All Zonal Railways.

Sub: Maintenance of Subways/RUBs in lieu of level crossings.

Ref: Board's letter no 2006/CE-IV/Misc-2(RUBs) dated 18.04.2012.

The issue of maintenance of Subways/RUBs constructed in lieu of Level Crossings was under consideration in Board's office. On receipt of references from some of the Railways it has been decided by Board 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. In addition, **Board desire that Railways must obtain consent for closure of level crossing prior to construction of subway from concerned Road Authority and the demarcation of maintenance responsibility should be clearly indicated.**

This would be applicable to all cases where level crossings are being closed with provision of Subways/RUBs.

This issues with the concurrence of Finance Directorate of Ministry of Railways.

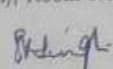

(Subodh Kumar)
3/7/18
Director CE/B&S-II
Railway Board

No. 2006/CE-IV/Misc-2/(RUBs)

New Delhi Dt: 03.07.2018

Copy forwarded for information to:

- (i) PFAs, All Indian Railways.
- (ii) Deputy Comptroller and Auditor General of India (Railways), Room No. 224, Rail Bhavan, New Delhi (with 45 spares).


For Financial Commissioner (Railways),

89

**Minutes of the meeting taken during Video Conference by CRB with all
GMs on 02.08.2019.**

MM - 06/ 2019

SN	Discussion/Items	Action by
1.0	The Video Conference was held to discuss and review the measures regarding water logging under RUB/LHS. CRB mentioned that the Parliament session is in progress and number of complaints from the MPs are being made to Hon'ble MR and even to Hon'ble PM regarding the subject matter. It was desired that in the coming 2 to 3 days, complete re-assessment of the vulnerable locations in the Zonal Railways be carried out. The arrangements of pumps including by outsourcing be done for removal of water logging in the RUBs/LHS.	
1.1	CRB desired to have short term measures for next 2-3 months to ensure no water logging takes place. As a long term measures in next 1 year (before next monsoon), the Railways should be able to provide pump/pumping arrangements, cover over shed, ramps etc. as per site conditions.	All GMs
1.2	Daily monitoring mechanism should be set up at both Headquarter and Division level for treating this as an emergency including water logging as noticed.	
1.3	GMs were asked to monitor 3 to 4 more critical and vulnerable locations on their Zones. DEN/ADEN should be deputed to such locations to reconfirm the adequacy of arrangements.	
1.4	GMs should hold similar video conference with DRMs and their Engineers to sensitise them of the importance and urgency of the subject matter. The photographs should also be taken to firm confidence in the public representatives. ME mentioned that the responsibility of this subject lies with only one department i.e. Civil Engineering. ME reviewed the position zone wise which is as under:-	
2.0	ME mentioned that there are a total of 8288 number of RUBs as on 01.04.2019 on IR. Only 965 numbers were identified as vulnerable for which the Zonal Railways have confirmed of having made adequate arrangements to avoid water logging before the present monsoon (30.06.2019). The summary of instructions issued by Railway Board from time to time is reiterated below: - RUB/LHS/Subway should be constructed only at those locations, where it is technically feasible. - Cover may be provided as per site condition on ramp. - The provision of drainage arrangement should be made the integral part of construction of RUB/LHS/Subways at planning stage itself for its	All GMs

	proper functioning. The planning & execution should include detailing for collection of water and its disposal till final outfall. • Joints of box segments should be sealed properly. • Rain water harvesting should be planned as per site condition. • Hump on road side or provision of reverse slope of road before start of downward ramp to RUB/LHS/Subways to avoid ingress of water through ramp and side may be provided. Retaining wall should continue along the approach slope upto the hump or from where reverse slope starts. • Sump-pump arrangement at critical locations need to be provided for providing water-pumping system. • Elaborate drainage arrangement need to be provided to divert surrounding water. • Responsibility in Railway portion lies with Railway and beyond Railway portion to the responsibility of maintenance rests with State Govt.	
3.0	Central & Western: GM mentioned that there are 21 such locations on CR which have been taken care of. However, the RUBs in city areas which have been constructed on deposit terms are having responsibility of the local Municipal Corporation/bodies. "A communication to this effect be immediately sent." It was also suggested to provide a small board on these RUBs (deposit terms) indicating the responsibility of the Municipal Corporation/bodies for the drainage arrangements. The details should be sent to the Railway Board of such locations. GM/Western however, mentioned that on few locations, public is doing Tress passing under the railway water bridges during the dry season which comes under water during monsoon. This aspect was noted by Railway Board. Such locations should be kept on record.	GM/CR GM/WR
4.0	ER:- No case of water logging exists today.	GM/ER
5.0	ECR:- No case of water logging exists today.	GM /ECR
6.0	ECOR:- GM mentioned that there are 15 vulnerable locations on which round the clock pumping arrangements have been provided. However, problem is persisting on 2 of the locations. ME desired to submit photographs of the same.	GM /ECOR
7.0	NR:- No case of water logging exists today.	GM/NR
8.0	NWR:- GM mentioned that there are issues on DFC route, Rewari, Ringus, Jaipur, and Phulera. There are such 140 locations. ME desired that details of these 140 locations and the action plan to make it free from water logging along with photographs should be submitted by Monday and responsibility lies with Open Line only.	GM /NWR
9.0	NCR:- On 46 locations, pump and pumping arrangements have been provided. On 86 locations, need based pumping is being done.	GM /NCR

10.0	NER:- GM mentioned about 103 vulnerable locations. 3 of them were critical. On 1 location the local villagers were forcing to open the LC temporarily by not allowing pumping. However, with the intervention of local MP, the pumping was carried out to make it free from water logging.	GM /NER
11.0	NFR:- GM mentioned 73 vulnerable locations. 2 of these in Katihar Division are flooded including the surroundings. Photographs should be sent for these 2. Cover over ramps for 49 RUBs have been sanctioned.	GM /NFR
12.0	SR:- At 4 locations out of 76 there are problems of pumping arrangements to be given to local panchyats. ME intervened and mentioned that responsibility lies with Open Line. Zonal Railway should submit an Assurance and photographs for these 4 locations.	GM /SR
13.0	SCR:- There is no issue regarding water logging.	GM /SCR
14.0	SER:- There is only 1 case (Ranchi Division) where there is a heavy seepage which is not being pumped out. ME desired that this should be properly looked into and drainage provided. Photographs should be sent to Railway Board for this case.	GM /SER
15.0	SECR:- There is no issue regarding water logging.	GM /SECR
16.0	SWR:- GM mentioned that there is one location at Tumkur where there is a flood in the surrounding areas. Photographs should be sent.	GM /SWR
17.0	WCR:- GM revised the vulnerable locations to 119 out of which 12 are critical. On 2 locations (Bhopal Division) the local administration is forcing for temporarily opening of the LC. ME mentioned that GM is the final authority to take a decision. However, the LC once opened may not be closed under public pressure. Details along with photographs should be sent. PED Bridge mentioned that this is a Dash Board item. The revised vulnerable locations is now shown in the Annexure. This should be kept in record, location-wise.	GM /WCR

Meeting ended with reiteration by CRB of its importance.

DA: One

No. 2017/CE-IV/RUB/88(RDSO)

Copy to:

CRB

ME

Copy to All GMs of All Indian Railways



Alok Kansal
(ALOK KANSAL) 2/8/19
PED/Bridge

o/c

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD**

No. 2017/CE-IV/RUB/88

New Delhi, dated 04.10.2017

**General Manager
All Zonal Railways**

Sub: Important issues related to construction of RUB/Subways including drainage.

Ref: (i) Board's Office letter No. 2006/CE-IV/MISC-2(RUBs) dated 18.04.2012.
(ii) Board's Office letter No. 2017/CE-IV/Misc (RUBs) dated 21.03.2017.
(iii) Report on RUB/Subway circulated vide letter no. 2017/CE-IV/RUB/88 dated 03.07.2017.
(iv) CRS/NE Circle letter No. 1675/Policy/Pt-I dated 16.08.2017.

Railway Board vide letter dt. 18.04.2012, referred above, 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".

Many representations have been received on water-logging at newly constructed RUB/LHS/Subways. These RUB/LHS/Subways remains flooded most of the time due to inadequate drainage system. This situation indicates that drainage issues might not have been addressed properly by Railway during planning and execution stage and also by state govt. during service.

Keeping in view of large no. of representations, Railway Board vide letter No. 2016/CE-IV/LX-ROB/RUB (Innovations), dated 20-09-2016 has nominated a committee consisting of EDCE/B&S/Railway Board, CBE/NR, CBE/WCR & ED/Structure/RDSO, to study the various issues related to construction of RUB/LHS/Subways and frame guideline for uniform adoption by the Zonal Railways.

Committee recommended that;

- i. Construction of RUB/Subway should normally be done where sufficient embankment height is available so that there is no drainage problem.
- ii. Construction of RUB/Subway may have to be done where there is less embankment height but proper natural drainage leading to nearby bridge/low lying area can be provided, however, in such cases the invert level of drain should be above the normally observed flood level in nearby bridge/low lying area.
- iii. Normally, construction of RUB/Subway need not be carried out where general ground level is above the bed level of proposed subway. However, in exceptional circumstances, Construction of RUB/Subway may have to be done where there is problem of water logging i.e. the general ground level is above the bed level of proposed RUB/Subway. In such cases the joints of RCC boxes should be properly sealed, U-type RCC lining should be made and cover shed of economical design on approaches may be provided as per site condition. The sumps should also be provided with pumping arrangement for pumping out of water.

Instruction have further been issued by Board vide letter dt. 21.03.2017 (reference (ii) above) that due to serious drainage problem at large no of RUB/LHS/Subways locations, should be constructed only at those locations, where it is technically feasible from drainage point of view.

CRS/NE Circle vide his letter no.1675/Policy/Pt-I/564 dated 16.08.2017 addressed to GM/NER & GM/NCR, informed that "For Limited height subways, the drainage is a serious concern. Most of the plans received with application are either not having any drainage arrangement or arrangement indicated in very casual way. For each and every site, specific drainage arrangement shall be integral part of Plan which should show details of collection of water and its disposal till final outfall with levels. A specific note as to how all weather availability of subway will be ensured shall invariably be enclosed with application".

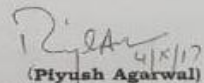
As such, Zonal Railway should plan drainage arrangement as per site situation & following options of drainage can also be considered in addition to earlier issued guideline on drainage:

- a) Joints of box segments should be sealed properly.
- b) Rain water harvesting.
- c) Hump on road side or provision of reverse slope of road before start of downward ramp to RUB/LHS/Subways 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.
- d) Sump-pump arrangement at critical locations for providing water-pumping system.
- e) Elaborate drainage arrangement to divert surrounding water

From the above, it is clear that drainage issue can be tackled with proper planning and execution even at locations having inadequate bank height. UMLC planned for elimination by construction of RUB/LHS/Subways must be eliminated on priority by sorting out the issue of drainage. The provision of drainage arrangement should be made the integral part of construction of RUB/LHS/Subways at planning stage itself for its proper functioning. The planning & execution should include detailing for collection of water and its disposal till final outfall.

CRS/NE Circle further informed that in majority of cases, the subway is planned 10-20m away from existing level crossing location and subway is subsequently connected with very sharp curve at approach. This severely restricts the actual capacity of subway to handle road traffic and is permanent bottleneck.

In view of the above, the approach of RUB/LHS/Subways should be planned in such a way to avoid sharp curve in the approach road. To ensure this, as far as possible, RUB/LHS/Subways should be constructed either on the same alignment of level crossing by temporary diversion/closure of level crossing or at suitable location so as to avoid bend in the approach road to the maximum extent.


(Piyush Agarwal)

Principal Executive Director/Bridge

Copy to: PCEs/All Zonal Railway for information and necessary action.

Page 2 of 2

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.

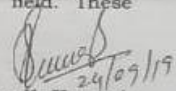
Ref: (i) Railway Board's letter No. 2006/CE-IV/Misc-2(RUBs) dated 18.04.2012 & 03.07.2018.
(ii) Board's Office letter No. 2017/CE-IV/Misc (RUBs) dated 21.03.2017.
(iii) Board's Office letter No. 2017/CE-IV/RUB/88 dated 04.10.2017 & 25.06.2019.

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.

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No. 2017/CE-IV/RUB/88

New Delhi dated: 22.01.2020

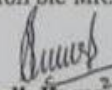
Principal Chief Engineer,
All Zonal Railways.

Chief Administrative Officer (Con.),
All Zonal Railways.

Sub: Construction of RUB/Subway in lieu of level crossings.

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 & 24.09.2019.

1. Instruction was issued (ref. (i) above) that level crossings which do not qualify for sanction of RUB/Subway on cost sharing basis in terms of Para 925 of IRPWM, can be planned for elimination by RUBs/Subways, if found "technically feasible". However, it appears that RUBs/Subways have been constructed at those locations also, where it was technically not feasible. As such, large no. of representations from Public representatives (on water-logging) at newly constructed RUB/Subways had been received and it is increasing day by day.
2. Due to above problem, further guidelines have been issued for giving due importance to drainage and possible measures to be taken to improve drainage. Even after issue of guidelines, there appears to be hardly any improvement and drainage problem continues.
3. In view of the above it has been decided that RUB/Subway will be constructed only at locations, where there is no problem of drainage. To ensure this, before sending any proposal for sanction of RUB/Subway in lieu of level crossings, it must be certified at SAG level that RUB/Subway is feasible at the proposed location and there will not be any problem of drainage in future. In absence of the certificate, Railway Board will not be in the position to sanction the work of RUB/Subway. Same principle shall be applicable for works being sanctioned under Law Book- GM's power.
4. Any drainage problem not solved is being viewed seriously by Hon'ble MR.


(Subodh Kumar)
Director CE/B&S-II

26/9/19 S.No. 237

Abhay Kumar
अभय कुमार
Director/B&S/CB-II
निदेशक/पुल एवं संरचना/सी0वी0-2



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No.CBS/LUSW

Dated: 18.09.2019

The General Manager (ENGG.)

- Central Railway, Mumbai CST-400 001.
- Eastern Railway, Fairlie Place, Kolkata-700 001.
- East Central Railway, Hazipur- 844 101.
- East-Coast Railway, Bhubaneshwar- 751 016.
- Northern Railway, Baroda House, New Delhi- 110 001.
- North-Central Railway, Allahabad- 211 001.
- North Eastern Railway, Gorakhpur-273 001.
- North-Western Railway, Jaipur-302 001.
- Northeast Frontier Railway, Maligaon, Guwahati-781 061.
- Southern Railway, Park Town, Chennai-600 003.
- South Central Railway, Rail Nilayam, Secunderabad-500 371.
- South East Central Railway, Bilaspur- 495 004.
- South Eastern Railway, Garden Reach, Kolkata-700 043
- South-Western Railway, Hubli 580 023.
- Western Railway, Mumbai-400 020.
- West-Central Railway, Jabalpur 482 001.

Sub: Alteration and Improvement in drawing of RDSO for RCC segmental box for RUB/LHS

Ref.: 1. Railway Board letter No. 2017/CE-IV/RUB/88 dated 05.08.2019. S.No. 221
2. EDCE/B&S/Railway Board e-mail dated 05.09.2019. S.No. 224

With reference to above and as per requirements of Zonal Railways, some alterations regarding drainage arrangement have been carried out in the provisional RDSO drawing Nos. RDSO/B-10153, RDSO/B-10156, RDSO/B-10159 and RDSO/B-10159/1 which were issued to Zonal Railways for design of segmental RCC box culvert for Limited Height Subway (LHS) conforming to 25t loading-2008 and DFC loading. The details are given below:

SN	Drawing No.	Loading	Description
1.	RDSO/B-10153 (Alt-5)	25t	1. Note no. 9 is modified for allowing Geo-composite drain in lieu of graded filter for trial purpose. 2. New note no. 22 is added regarding drainage & related arrangement. 3. Alteration in cross section of Pre-cast box unit for restoring the provision of well hand packed boulders.
2.	RDSO/B-10156 (Alt-4)	DFC	1. Note no.10 is modified for allowing Geo-composite drain in lieu of graded filter for trial purpose. 2. New note no. 22 is added regarding drainage & related arrangement. 3. Alteration in cross section of Pre-cast box unit for restoring the provision of well hand packed boulders.

3.	RDSO/B-10159 (Alt-1)	25t	1. New note no. 13 (I) to (XI) added to improve drainage in RUB/LHS/Sub way. 2. New note no. 14 added for the provision backfill material and allowing Geo-composite drain in lieu of graded filter for trial purpose.
4.	RDSO/B-10159/1 (Alt-2)	25t	1. Note no. 9 is modified for allowing Geo-composite drain in lieu of graded filter for trial purpose. 2. Alteration in cross section of Pre-cast box unit for restoring the provision of well hand packed boulders.

Soft copy of each provisional drawing has been uploaded on RDSO website (i.e. 10.100.2.12 →Directorates →Bridge & Structures→B&S Drawing) for trial adoption and sending comments, if any, from field point of view.

DA: Nil

(Abhay Kumar)
Director/B&S/CB-II
for Director General/B&S

Copy to:

A. The Chief Administrative Officer (Constn.):

1. Central Railway, Mumbai CST-400 001.
2. Eastern Railway, Fairlie Place, Kolkata-700 001.
3. East Central Railway, Mahendrughat, Patna (Bihar)-800 004.
4. East Coast Railway, Bhubaneswar, (Orissa) 751 016
5. Northern Railway, Kashmere Gate, Delhi-110 006.
6. USBRL Project, Northern Railway, Satyam Complex, Trikuta Nagar Extn., Jammu-180 020.
7. North Central Railway, Allahabad, (U.P.).
8. North Eastern Railway, Gorakhpur-273 001.
9. North Western Railway, Jaipur, (Rajasthan) 482 001
10. Southern Railway, 183, Periyar High Road, Egmore, Chennai - 600 008
11. South Central Railway, DRM/Secunderabad Office Compound, Secunderabad-500 371.
12. South Eastern Railway, Garden Reach, Kolkata-700 043
13. South East Central Railway, Bilaspur 495 004
14. South Western Railway, No. 18 Miller Road, Bangalore, (Karnataka) 560 046
15. Western Railway, Mumbai-400 020.
16. West Central Railway, Jabalpur. (M.P.) 482 001
17. Southern Railway, Karshaga Road, GCDA Complex, 1st Floor, Ernakulam, Kerala- 682 012.

B. General Manager (Construction), Construction Organization, N.F. Railway, Maligaon, Guwahati.

C. Executive Director Civil Engg./B&S, Railway Board, Rail Bhawan, Room No.140A, New Delhi-110001

D. Director, Indian Railway Institute of Civil Engineering (IRICEN), Pune - 410 001.

(Abhay Kumar)
Director/B&S/CB-II
for Director General/B&S

o/c

37/17/2019 28/10/19 5101241

Abhay Kumar
अभय कुमार
Director/B&S/CB-II
निदेशक/पुल एवं संरचना/सीओ-2



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No.CBS/LUSW Dated: 15.10.2019

The General Manager (ENGG.)

- Central Railway, Mumbai CST-400 001.
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- East Central Railway, Hazipur- 844 101.
- East-Coast Railway, Bhubaneshwar- 751 016.
- Northern Railway, Baroda House, New Delhi- 110 001.
- North-Central Railway, Allahabad- 211 001.
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- South Eastern Railway, Garden Reach, Kolkata-700 043
- South-Western Railway, Hubli 580 023.
- Western Railway, Mumbai-400 020.
- West-Central Railway, Jabalpur 482 001.

Sub: Alteration for Restoration/Improvement in RCC Box drawings of RDSO.

Ref.:

- Railway Board letter No. 2017/CE-IV/RUB/88 dated 05.08.2019.
- EDCE/B&S/Railway Board e-mail dated 05.09.2019.
- This office letter of even no. dated 18.09.2019.

With reference to above and as per requirements of Zonal Railways, some alterations regarding restoration of Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code etc., have been carried out in the provisional RDSO drawings which were issued to Zonal Railways for construction of RCC box culvert conforming to 25t loading-2008, DFC loading etc. The details are given below:

SN	Drawing No.	Loading	Description
1.	RDSO/M-00004 (Alt-4)	HM	1. Note no. 8 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
2.	RDSO/M-00005 (Alt-2)	HM	1. Note no. 8 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code. 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
3.	RDSO/M-00008 (Alt-3)	HM	1. New note no. 12 is added for the provision backfill material and allowing Geo-composite drain in lieu of graded filter for trial purpose. 2. New note no. 22 is added regarding drainage &

			related arrangement. 3. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
4.	RDSO/B-10151/R (Alt-2)	DFC	1. Note no. 9 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
5.	RDSO/B-10152/R (Alt-2)	25t	1. Note no. 9 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
6.	RDSO/B-10154/R (Alt-1)	DFC	1. Note no. 9 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
7.	RDSO/B-10155 (Alt-4)	25t	1. Note no. 10 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
8.	RDSO/B-10157 (Alt-4)	DFC	1. Note no. 10 is restored for providing Back Fill Material as per Clause 7.5 of IRS Bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.
9.	RDSO/B-10158 (Alt-3)	DFC	1. Note no. 10 is restored for providing Back Fill Material as per Clause 7.5 of IRS bridge Sub-structure & Foundation Code 2. Alteration in cross section of RCC box for restoring the provision of well hand packed boulders.

Soft copy of each provisional drawing has been uploaded on RDSO website (i.e. 10.100.2.12 →Directorates →Bridge & Structures→B&S Drawing) for trial adoption and sending comments, if any, from field point of view.

DA: Nil

(Abhay Kumar)
Director/B&S/CB-II
for Director General/B&S
o/c *Churanya*