**IMPORTANCE OF TRACK DRAINAGE**

Drainage of track is the most important factor for the proper maintenance of track. Water softens the formation unless it is drained away as soon as it falls on the track. Soft formation has less bearing capacity and is liable to settle under load, seriously affecting the track parameters as well as retentivity of packing. Interpenetration of soil and ballast takes place in a soft formation causing loss of ballast into the formation on the one hand and mud pumping and clogging of ballast on the other. Loss of ballast on account of poor drainage can be quite substantial. Ballast pockets inside the embankement collect water and further soften the soil of the bank. Clogging of ballast affects drainage of water on to the formation to be led in to the side drains. It also affects the elasticity of the track which means more wear and tear of track components and vehicle undergear, resulting in rail fracture, spring breakages and premature renewal of track and vehicle components.

**GOOD DRAINAGE OF TRACK**

2.1 It can be ensured by
(i) Maintenance of clean ballast which will drain the water quickly on to the formation.
(ii) Maintenance of proper slope of formation so that the water brought on to the formation flows out of the track easily and quickly.
(iii) Proper drainage arrangements so that water does not stand near the track and flows away from the track readily.

Item (i) above is ensured on overhauling of track and deep screening of track as per schedule laid down. Item (ii) above is ensured through a network of drains where natural ground levels do not permit free and fast flow of drain water away from the track.

2.2 Drainage of track on embankments takes place as long as the cess level is maintained and the ballast is clean. However in cuttings and in yards where free and quick flow of water away from track is not possible, a well planned drainage system must be provided.

2.3 While doing track renewals/doublings/gauge conversions, drainage arrangements required as per this circular must be planned as part of the relaying estimate and completed along with the track work.

2.4 Growth of vegetation in track indicates clogging of ballast and lack of adequate track drainage. Such stretches should be overhauled or deep screened.

2.5 About 25 to 50 mm below the rail foot shall be kept clear of any ballast, earth or cinder on all lines inside and outside the yards to enable surface flow, avoid corrosion and prevent failure of track circuits.

2.6 The Permanent Way staff shall keep all side drains and catch water drains clear as part of annual maintenance not only on run through lines but also on non running lines in yards. They should ensure that the outfall of these drains and the waterways of all bridges and culverts are kept free from obstruction. The spoils from cleaning drains or cuttings shall not be deposited at a place from where it is likely to be washed back into the drains.

2.7 The muck arising in the course of deep screening and overhauling shall be dumped on to the side slopes or used to make up cess in the case of track in embankments. In the case of track in cuttings, the muck should be removed and dumped in such a location that it will not be washed into the drains nor will it in any other way interfere with the drainage of the station yard.

**Drainage in mid section**

3.1 Side drains along the track shall be provided in cuttings and zero fill locations, where the cess level is not above the ground level. All drains must be given adequate grade to enable free flow of the collected water.

3.2 On Group `A' routes essentially and on other routes preferably side drains shall be lined except where the drains are cut in rocky strata.

3.3 To take the full flow of side drains adequate opening should be provided under level crossing, trolley refuges and OHE masts where these exist in cuttings.
3.4 Wherever necessary, catch water drains shall be provided in cuttings. Their size may be kept according to the volume of the water catered for.
3.5 Surplus ballast in the shoulder retards drainage and encourages vegetation growth. All such ballast shall be taken out of track and stacked in small heaps alongside.

DRAINAGE IN STATION YARDS.

4.1 Ballast section in station yards must be the same as on main line
4.2 Every station yard shall have network of cross and longitudinal drains, whether earthen or masonry, such that the storm water is led away in the least possible time.
4.3 Arrangements for surface drainage at carriage watering points and washing hydrants shall be efficiently maintained. The water must be adequately trapped and led away in a pipe or line drain.
4.4 The yards must be kept clear of all of all loose materials, heaps of earth or cinder which will interface with drainage.
4.5 Every yard must have a Master Plan For Drainage. The drainage plan shall show reduced levels of rails at suitable intervals from which the cess levels can be derived and levels of outfalls, drain crossings and other obligatory points determined.

4.6 PLANNING OF YARD DRAINAGE
While planning yard drainage, the following guidelines should be kept in view:
(i) Surface drains shall generally be open for ease of cleaning and inspection. While designing drains in yards, velocity range of 0.5 1.0 m/sec. for kutcha drains and 1.0 2.0 m/sec. for pucca drains may be adopted.
(ii) Longitudinal drains between two tracks should be saucer shaped. However, drains with vertical sides may be provided wherever saucer drains are not practicable.
(iii) In the case of large size drains and in some in some particular situation in yards, drains covers may have to be provided.
(iv) Normally, the drain top shall not be above the cess level for effective drainage of ballast bed. However, if a drain with higher top level has to be provided to retain ballast, weep holes shall be provided at the assumed cess levels and the drain designed so as not to flow above bottom level weep holes. Weep holes generally gets choked. A preferable alternative is to provide 1 cm. Wide vertical weep slits at about one metre intervals, right from the top level of the drain down upto the cess level of the drain down upto the level.
(v) Wherever outfall is available at either end of a yard, longitudinal drain shall be provided with slope in opposite direction from the middle of the yard. This will ensure minimum size and depth of the drains.
(vi) Formation with in 3.5 metres of track center line shall be maintained at least 200 mm below the sleeper bottom for run through lines and 150 mm for the other lines.

DRAINAGE OF PLATFORMS

5.1 All end platforms shall normally be slopped away from the track.
5.2 All drains from platform shelters, tea stalls, toilets, water taps or other sullage generation points shall be in pipes and normally discharged on the non track side of the end platform. If necessary longitudinal covered drains may be provided on the platform.
5.3 In the case of island platform s, all drains shall discharge on the less important track and not towards the run through line. Wherever situation exists to the contrary, the drainage shall be modified to conform.
5.4 Whenever a cross drain discharges towards a track, it should be in a pipe discharging directly in to the drain between the track.
5.6. All drains emanating from the platform must be provided with suitable grating, well fixed in position so that any material likely to clog the drain is retained on the grating.

DRAINAGE IN BC SOIL CUTTINGS

Old IRW&WM Indian Railways Way and Works Manual says “In BC soil cuttings the catch water drains are to be provided sufficiently away from the track, since after getting soaked in water BC soil completely loses its strength and will breach in to the track/side drains blocking the side drains. For this reason extra land shall be acquired” Alternately we shall go for RCC drains, as catch water drains in BC soils to avoid the above problem.