Review on the Specialized Casing with Concrete Sleepers as an alternate for Conventional Ballast in Flood Prone Areas

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ABSTRACT

Indian railways play a major role in India's economy and transportation system and stands as third largest rail network globally. It is generally recognized that ballasted track will cost lesser than concrete slab track, but the cost is more to maintain and renew over the life of railway, reduction in ballast height[3] henceforth there is a need of replacements or enhancements in those conventional structure by replacing with ballastless sleepers overcoming all the drawbacks of the ballasted sleepers i.e there will be no ballast settlement due to high speed, proper track geometry, lesser maintenance cost and also the major pros isflood water drainage resulting in the more stable track in flood prone areas of India.

Keywords: Ballastless sleepers, floodwater, Drainage, Concrete, specialized concrete casing

INTRODUCTION

As per assessment of slab track[1],Ballastless sleepers have more advantages over ballasted track since it can be designed as an engineered structure for the planned loading and drainage.Ballast allows only 12% of water to pass through it and decreases over time. When train passes, the load pushes the water in and out in a pumping action and it sucks the water back in bringing sand and mud with it resulting in development of voids underneath. Flow of flooded water clogs within the aggregate whereas Ballast is washed away leaving the tracks and sleeper suspended, as a result derailment of tracks occurs. In the event of heavy rainfall, precast slab track tends to have higher surface water runoff whilst ballast tends to slow down the water discharge in to the drainage system. Drainage of water consisting of simple surface channel drains between the two tracks, feeding into a central catch pit and ballast shoulders on the outside of the slab tracks to dissipate the water flow in vertical direction onto the earthwork support structure [2] and water flowing across the sleepers can be drained by providing the hollow openings within the concrete casing in sleeper setup as shown in Figure 1.

OBJECTIVE

Usually, Casing Concrete Slabs tends to have a design life of 60-80 years in comparison with ballast which have lasted 20-30 years specially in flood prone areas. To serve for longer time, Construction of a hollow pipes is suggested, which are provided in between the sleepers so that they allow easy passage of water through it during flooding and more importantly withstand the loads from the train i.e have good compressive strength, also it

holds the tracks intact and prevent the longitudinal and lateral movement of tracks as shown in Figure 2.

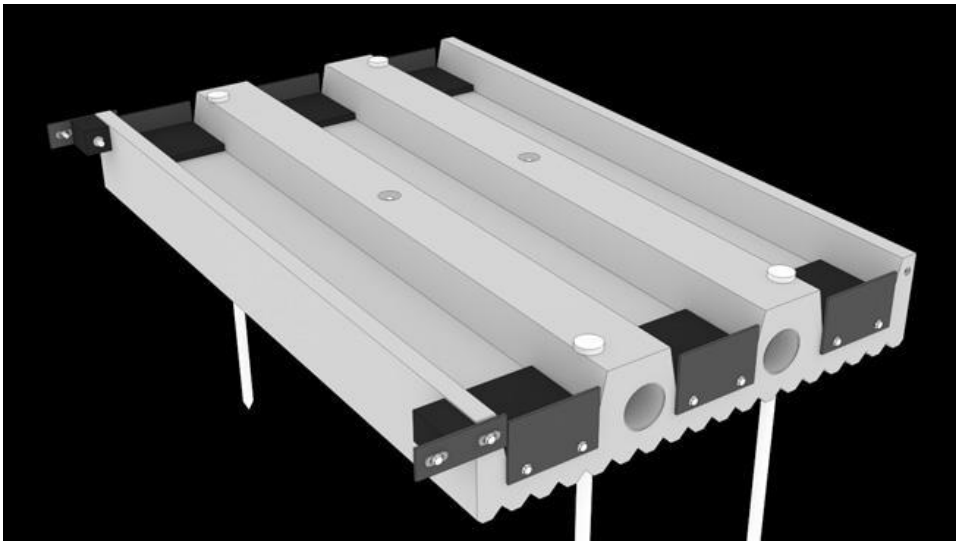

Figure 1. Hollow Concrete Sleepers for Proper Drainage

Figure 2. Sleepers with Casing Setup

CONCLUSION

1. Derailment of trains will be avoided because of improper drainage of flood water.
2. On railway bridges 30-50% ballast weight is removed, since it is not necessary to use ballast for load distribution.
3. Avoid vegetation beside the tracks as it resists the easy passage to water.
4. Economical compared with the ballasted sleepers in flood prone areas and the draining of water is shown in figure 3.

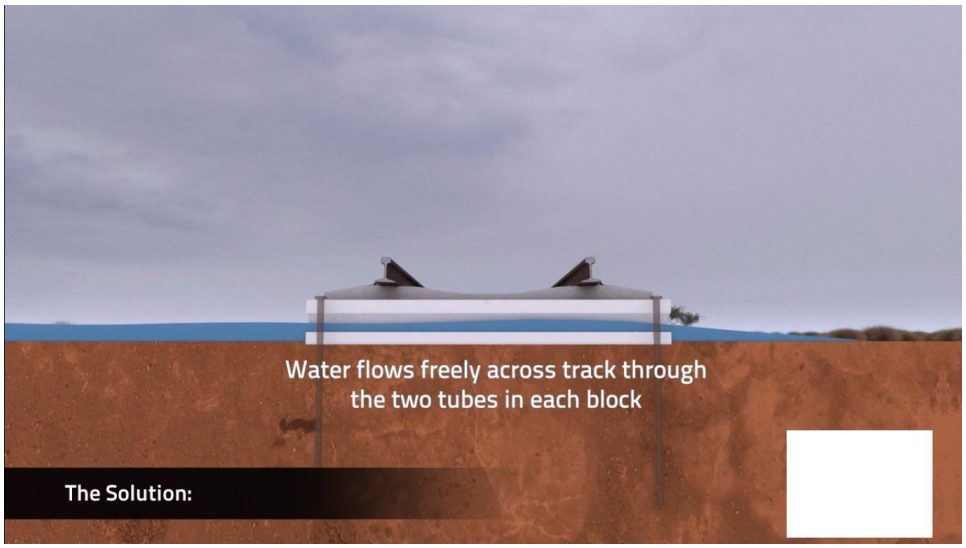

Figure 3. Drainage of water within the concrete sleeper casing

5. Advantages of ballastlesstrack[3]

- Low maintenance
- Low built-in height
- Big security redundancy
- small alignment parameter possible
- use of eddy-current break possible
- no ballast whirl
- open for emergency car and trucks traffic
- no herbicide plant deduction necessary

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