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WASHABLE APRON

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ABSTRACT

The railway companies all over the world use ballast less track systems for many years. Due to their experiences it is obvious that such systems show a lot of advantages compared to ballasted tracks. Their experience demonstrates that such systems have substantial advantages when compared with ballasted tracks. Especially, on high –performance and high- speed routes. Ballast less track systems like elastically supported concrete slab track installed to ensure maximum track availability and minimum maintenance needs. Based on track bed of ballast less track, sensitivity analysis on structural elasticity shows that improving the track bed situation, raising the elasticity of resilient pad under the rail and focusing on the uniformity of longitudinal elasticity in rail are very crucial to track elasticity.

In this project a systematic introduction was made of structural design on ballast less track in different section of subgrade, bridge and tunnel, etc. as well as drainage system, transition section. A summary is made of technical innovations on structural design, engineering material, construction survey and control technology and maintenance technology, etc.

I. INTRODUCTION

Ballast has been an integral part of railway track for many years. It is an economical medium providing an elastic support to the sleepers and absorbs major part of the noise created by passing wheels. Material require for construction is locally available but ballasted track calls for frequent maintenance attention, and periodical screening. It causes dust pollution. Hence, railways all over have been researching and developing a more permanent track base, in form of ballast less track for their high speed lines. In ballast less tracks the ballast is substituted by support layer of concrete slabs. Though they will be more expensive, they will be most cost effective for such lines.

Presently all over the world ballast less track concepts are in practice, although at a moderate volume. The pattern of slab track use seems to rise by the time due to the higher demands for high speed railways and heavy freight trains. The slab may be cast-in-situ, resulting in a continuous length of concrete, or it may be constructed in discrete precast sections laid end to end.

Before modern nation of hygiene level opened, railway platform typically like open sewer that arises flying nuisance with bad smell. We are all aware of maximum nuisance to passenger in station, particularly platform lines due to dropping from stopped passenger trains. It obvious that these lines cannot be kept clean with conventional. Apart from unhygienic conditions created on these lines, entire track becomes slushy water logged and track condition, deteriorates.

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Calculation methods and parameters concerning train load, thermal effect of high-speed railway ballast less track, together with the structural design methods are summarized. By increasing the width or/and by applying eccentric reinforcement in the concrete bearing layer (CBL), a significant amount of soil treatment can be avoided. The increased stiffness of the slab track in many cases can replace the need of massive soil improvements when slab track is applied in earth structures, making it economically competitive comparing to the ballasted track. The Slab track can be constructed in three ways:

(a) Using a slab with reinforcement at the neutral line. Since the bending stiffness of such slab is very poor massive soil improvements are required which makes such slab structure financially less attractive.

(b)Using a slab with reinforcement at the top and at the bottom of the slab, this improves the bending strength of the track structure.

(c) Using bridge or bridge like structures as a substructure in slab track design. Theinfluence of bending of the bridge has a restricted influence on the bending stresses in track slab.

II. METHODOLOGY

General Method of Construction:-

The following points should be necessary for carrying out the construction of washable apron :-

- **Block existing track :-**

The block existing track is generally adopted if the already track is existing, so we block the existing track.

- **Surveying:-**

Before the actual work of survey start, the study of available maps of the area is made. This help in fixing the suitable alignment. The various surveys are carried out as follow:-

A. Preliminary survey

B. Location survey

The object of preliminary survey is to conduct the survey work along the alternative route and to decide which routewill be the most economical. The cross section are taken as all representative points along the route. The main object of location survey is to carry out the detail survey along the route which has been found and fixed ass the most economical route from the data of the preliminary survey. The instrument is used for these survey are theodolite, steel tape, prismatic compass.

- **Dismantle of track ,sleeper, rail fitting :-**

Before construction of washable apron the existing structure should bedismantle such as track, sleeper, rail fitting.

- **Excavation up to required depth:-**

After the dismantling the excavation is done. In the excavation process the removal of ballast, rubble and murrum is done up to the required depth.

- **Sub-grade:-**

Subgrade is naturally occurring soil, which is prepared to receive the pavement, sleepers and rails for constructing the railway track. This prepared surface is also called formation. Formation could be in embankment, level or cutting, depending upon the ground condition.

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- **Pavement construction:-**

The pavement is constructed over the formation. It consists of two layers viz. PCC of M25 grade and RCC of grade M40.The main function of pavement is to transmit the load coming from sleepers and rails. The two different layers of concrete pavement are then connected by means of using „Epoxy Resin" chemical

- **Joints :-**

The need for such joint arises when construction work is required to be stopped at a place other than the location of contraction or an expansion joint, due to some breakdown of the machinery or any other reason. Such joints are of butt type and extend to the full depth of the pavement. The sealing of such joints shall be done in the same manner as for contraction joints, by cutting a groove 10-12mm wide and 20-25mm deep. Generally, such joints are avoided in highways. The work is normally terminated at a contraction or expansion joint.

- **Compaction:-**

Compaction is necessary to remove entrapped air present in concrete after it is mixed, transported and placed. It also eliminates stone pockets and remove all types of voids. Consolidation is the process of making the freshly placed PCC into a more uniform and compacted mass by eliminating undesirable air voids & causing it to move around potential obstruction (such as reinforcing steel).

- **Laying of sleepers, track & fitting:-**

The main function of sleeper is holds the track to gauge, transmit and distribute on coming load topavement. Tracks provide a hard, smooth and unchanging surface for passage of heavy moving load with minimum friction between the steel rails and steel wheels. Rails transmit the load to sleepers and consequentlyreduce pressure on ballast and formation below.

- **Checking correct the parameter:-**

Parameter includes gauge length, level, and cross level. The gauge length must be standardized. Surface of the pavement should be leveled.

- **Preparation of side drain:-**

The accumulation of water reduces the friction in all sorts of soil and hence it is very important to construct suitable drain to take out the rain water and make the earth work stable. In case of embankment, the rain water is easily drained off.

- **Curing:-**

Curing is done with help of gunny bags and these bags are laid on apron surface. This curing is done for28 days.

- **General cleaning& Finishing** :-

In case of normal concrete just before concrete becomes non-plastic, the surface shall be belted transversely in quick strokes with a two-ply canvas belt. After belting, the pavement shall be given a broom finish with an approved clean steal or fiber broom. The broom shall be pulled gently over the surface from edge to edge & the adjacent stokes shall be slightly overlapped. After belting &brooming completed, but before the initial set of concrete, the edges shall be carefully finished.

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III. CONCLUSION

The ballastless track slab will lead to safer and swifter railway transportation compared to ballasted tracks. As per IS 456:2000 this can be designed as slab element. Longitudinal and Transverse reinforcement at both top and bottom to adverse hogging and sagging effect respectively is arrived as 12 mm diameter bars at 180 mm c/c spacing.

An effort should be made in the right earnest to develop future ballastless track for mass utilization for the construction in Indian railways with high precision accuracy by automated machines which infact can save lot of foreign exchange revenues.

In order to satisfy various conditions mentioned, the specific attributes of good ballastless track for choice in Indian conditions should be with

• Proven design having been in service for a number of years.

• Economy in cost of construction.

• Durability long life for components, specially rubber and cushioning material which will require replacement during life time of the base and suitability for Indian weather and maintenance conditions.

• Minimum number of patented components.

• Easy and economical maintainability ease of change of parts with minimum dislocation to traffic.

• Ease in restoration of traffic in case of accidents/derailments.

• Effective drainage of track.

• Noise pollution and vibration control within practicable limits.

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