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Effective Surface Drainage for Kurla Junction

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Abstract - *A Drainage of a railway track is always an essential part of the railway track and plays an important role if the proper functioning and effectiveness of the travel is to be maintained. The Central Railway track being constructed in the 1800s is often susceptible to trouble cause due to change in the surrounding condition, inflow of water and amount of debris on the railway tracks has significantly been on the rise ever since. Although there have been significant improvements being done in order to suit the current needs, the drainage has seldom been on the receiving end of such changes. Thus, it is natural that growing inflow of water and lesser space for dissipation has crippled the drainage system. In this project Kurla junction has been evaluated. Investigation of the current condition, its limitations and remedial measures for an efficient drainage capable to satisfy the current and future needs is suggested.*

Key Words: **Central Railway, Kurla junction, Drainage, Limitations, Debris.**

1. INTRODUCTION

Drainage is the capture, collection and removal of water from, upon, or under the track. Water is one of the greatest threat to a railway track and thus drainage becomes the most important factor in track maintenance. Water seeping into the formation weakens the bonds between the soil particles and softens the soil resulting in creation of ballast pockets. Percolation of water into banks/cutting not only adds to the weight of the soil mass trying to slide but also increases the propensity for slope slide. It is also responsible for reduced shear strength of soil which further decreases the factor of safety for stability of slopes. Therefore, quick and timely disposal of water from formation top/slopes is very essential.

Drainage system should be effective in preventing the stagnation of water and allow quick disposal of water. At present, drainage is not being given its due importance in field. Thus, there arises a need for a drainage facility to be in constant check. In this paper focus have been given on knowing the current drainage system of the Central Railway station of Kurla which is suspected to be the area of distress for the entire Central Railway.

Kurla is a railway station on the Central and Harbour lines of the Mumbai Railway network. It is one of the oldest railway stations in India as it is a part of the 33.8 km Great Indian Peninsular Railway (GIPR) section between Mumbai and Thane that opened in 1853. It has an elevation of 5.300m and it has 8 platforms and 8 tracks. The existing drainage system in kurla is a conventional one with cess drains and cross drains discharging to the nearby nala.

Being a low-lying area, the sample patch selected provides a variety of limitation to any substantial drainage work. Hence the study of the limitation offered and the necessary solution to the same is imperative. Thus, we plan to provide a solution which provides minimum limitations and maximizes output.

2. LITERATURE REVIEW

Specific research pertaining to the selected patch haven't been done but related researches on the effect of water on the train track and the guidelines for efficient drainage design/maintenance or rehabilitation has been done previously. Studies done by Selig & Waters, 1994; Nurmikolu, 2005, indicated that Surplus water in the structure may cause 'mud pumping' which weakens it and leads to attrition of ballast. Based on the tests conducted by Brecciaroli and Kolisoja, 2006, an increase in water content also weakens the durability of track against repeated loading.

In a relatively recent study by Otter 2011, Mamou 2013; it was concluded that the moisture content on the track affects the suction pressure occurring in the unsaturated zone and friction between the soil particles chronic effects of which can lead to failure of soil. It is also clear that through these various impact methods water content also affects the shear strength of soil

3. METHODOLOGY

Sample The methodology may be broken into several parts, each of which should be undertaken in order to produce the most suitable drainage system for each instant the steps are:

1. Preliminary investigation.
2. Determination of the type of system required.
3. Estimation of capacity required.

Preliminary Investigation

The main objective of preliminary investigation is to establish the requirements of the drainage system and any restriction that may be imposed on the system. The procedure for carrying out a thorough preliminary investigation is as follows:

- Identification of the problem and thus the drainage objective
- Determination of the information required
- Collection and study of all available existing information
- Site inspection.

Determination of the type of system required

On completion of the preliminary investigation information gathered maybe complied and the decision made on the type of drainage system suitable

Estimation of capacity required

The next step is to estimate the volume of water that the drain will need to carry so that the size of the drain and its various components may be estimated.

Sizing the components

The drainage system may be sized to satisfy one of the following criteria:

- Sizing to satisfy space requirement.
- To satisfy maintenance requirement.

4. FINDINGS

Based on the steps followed in assessment of the present drainage scenario of the storm water at Kurla-junction on Central Railway, the following observations were noted.

- It was found that the longitudinal drains which runs parallel to the tracks do not run to full capacity as they are substantially clogged with stagnant water
- The stagnation of water was due to the improper bed slope provided.
- The depth as well as the bed slope are the parameters which can be modified in existing drains as the width is limited due to the restricted width between the tracks.
- A network of an additional cross drain and longitudinal drain which disposes directly into the Nala would be a suitable system to manage the excess rainfall.
- The drains running parallel can be deemed as insufficient as they work at 36.36% - 44.44 % of its full capacity due to the stagnant water, silt and debris present in the drains. Any excess rainfall cannot be efficiently handled by the present surface drainage system.

Since the present drainage system is designed only for a rainfall of 120mm any excess daily rainfall can cause significant waterlogging.

3. CONCLUSIONS

The longitudinal drain system needs to be re-designed to effectively drain away the storm water which have substantially been increasing due to increase in the rainfall. Along with it other supplementary techniques such as use of geotextiles, geo-membranes can be used to facilitate the improvement of drainage system

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