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Design and Analysis of Construction of Flexible Payments : A Review

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ABSTRACT

Most of the roads constructed in India have flexible pavement. Pavement is designed to support the wheel load imposed on it by traffic moving over it. Some Pavement should be strong enough to resist external stresses and to distribute the external load and transfer the load through different layers to sub grade and drainage system of roads.This study also includes the collection of required field data like existing pavement structure traffic data, pavement surface condition and rebound deflection by using Benkelman beamThe second part of this highlights the drainage condition of the road length and the need of improvement in the drainage system for a particular flexible pavement area. Many ways are discussed to modify the drainage system of the existing road. Both surface and subsurface drainage systems are discussed in this study as it includes interception

1. INTRODUCTION

Pavements are the key elements of infrastructure of the country whose functions are to promote transport activities economic activities and to improve the standard of living. Flexible pavementThe layers of flexible pavement reflect the deformation of the lower layers onto the surface of the layer on the whole having low or negligible flexural. The flexible pavement layers transmit the vertical or compressive stress to the lower layer by grain to grain transfer through the point of contact into each granular structureHighway drainage is the process of removing and controlling excess surface and subsurface water within the right way including interception and diversion of water from the road. The installation of a suitable surface and subsurface drainage system is an essential part of highway design and construction. Highway drainage is used to clear surface water fromRoads need to be well drained to stop flooding even surface water can cause problems with ice in the winter. Water left standing on roads can. Due to unexpected economic developments in the given region the traffic loads on the arterial roads may increase at a rapid rate; the pavements also undergo higher distress Therefore the existing pavement is to be strengthened by providing additional pavement layer or overlaying one or more layers above the existing flexible pavement. The maintenance engineer should therefore

Definitions

Strengthening of pavement: Strengthening of pavement is defined as the process of providing the required overlay on existing pavements so that they perform more efficiently over a given design period

Traffic Volume: The total number of vehicles crossing the action of road per unit time at any selected period Traffic volume is used as a quantity measure of flow the commonly used

Traffic Density: It is the number of vehicles occupying a unit length of lane of a roadway at a given moment expressed as vehicles per kilometer

Average daily traffic (ADT): When traffic volume counts are carried out only for a few days (3 to 7 days) the average daily traffic volume obtained is called average daily traffic volume (ADT).

Highway drainage: It is the process of removing and controlling excess surface and subsurface water within the right of way.. It is the process of removing

2. LITREATURE REVIEW

Hofstra and Klomp (1972) [1] found that the deformation in flexible pavements was greater in loading enforcement surface and gradually reduced depending on the depth. This is because the wheel tracking is a permanent deformation and thus increasing the depth increases the resistance and shear stresses are reduced. Asphalt with low shear strength, essential for resistance to repetitive loads of traffic, have intense display wheel tracking problem. The problem is more acute especially during the summer season, as high temperatures are observed on the roadway.

Jacobs (1995) [2] analyzed the stresses in a pavement structure consisting of three layers, with constant thickness for each layer, one Poisson's ratio for all layers, the same elastic modulus for base and subgrade layers, and three different elastic moduli for the AC layer. He concluded that the normal stresses at the bottom of the asphalt concrete layer were not affected by the tangential stress on the surface. The tensile stresses at the edge of the loaded area can be much higher than the tensile stresses atthe bottom of the asphalt concrete layer.

Huebner et al. (2001) [3]concluded that the frequency of the load, as well as the size, variety and arrangement of the imposed loads determine the stress and the structural condition of the pavement. Furthermore, with regard to traffic loads, especially important is the pressure, the type of tire (e.g. studded tires damage the bituminous material) and the transverse position of the wheels. Thus the movement of vehicles causes damage to the roadway and eventually degrades its functionality.

Jitendra et al. (2013) [4] carried out a framework for quantification of the effect of drainage quality on structural and functional performance of pavement by identifying a simple framework for quantification of the effect of drainage quality on structural as well as functional performance of the pavement. They presented the structural and functional performance of the pavement in predicted terms of deflection and roughness respectively. Their study was useful to reduce the maintenance cost of highway pavement system and to preserve huge highway network in India.

Dipanjan (2014) [5] studied highway surface drainage system and problems of water logging and concluded that adverse roadway elements contributing to highway accidents were substandard roadway alignment or geometry, lack of shoulders and shoulder defects, absent or inappropriate pedestrian facilities, narrow and defective lanes and bridges/bridge approaches, roadside hazards, undefined pavement centre and edge lines, poor sight distances and visibility, unmarked and inappropriate design of intersections, serious allocation deficiencies along the route, haphazard bus stops, and others are causes of water logging problem in highway. This research traced that proper drainage is a very important consideration in design of a highway.

Magdi, (2014) [6] studied the impacts of poor drainage on road performance in Khartoum, a city in Sudan with two case studies; attempts were made to find out the reasons for road failure within the first five years as a result of poor drainage. In this quest, it was discovered that four basic reasons lead to early deterioration of road pavements in the study, these factors according to the research includes, poor drainage design and construction, poor maintenance structure, use of low-quality materials and no local standard of practice.

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