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Structural Evaluation by FWD In Flexible Pavement

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ABSTRACT

Pavement performance evaluation an prediction are of great importance to facilitate pavement management system. Pavement evaluations are conducted to determine functional and structural conditions of a pavement section either for purposes of routine monitoring or planned corrective action. The Falling Weight Deflectometer is a device that is used to evaluate pavement and pavement layer stiffness. It is a trailer-mounted device that operates by dropping a weight on to the pavement and measuring the resulting pavement deflections. Various computations may be performed on the deflection data to evaluate the pavement and the stiffness of it and its constituent layers. During testing, a FWD subjects the pavement surface to a load pulse which simulates the load produced by a rolling vehicle wheel. The load pulse is produced by dropping a large weight onto a "buffer" which shapes the pulse, and then transmitted to the pavement through a circular load plate. Data are acquired from various sensors for use in post-test analysis of pavement properties. Data collected from FWD can be used for determination of structural capacity of in-service pavements for analytical analysis of pavement performance, predicting layer moduli for pavement component layers, remaining life of pavements and in deciding strengthening and rehabilitation measures to be adopted for meeting the requirements. Analyses of data are being carried out using standard software as supplied by the manufacturer. Information such as load, layer types and thicknesses, range of moduli and Poisson's ratio etc. for different layer materials would also be needed for FWD deflection data analysis.

While carrying out analyses of data, it assumes material to be homogeneous, isotropic, linear elastic, weightless and semi-infinite. This report contains evaluation on flexible pavement by FWD and according to resulting data, design of overlay will be done accordingly.

Keywords: - Pavement Evaluation, FWD, Structural Evaluation, Flexible Pavement

I. INTRODUCTION

Any structure which is built will become damage with time.So it is necessary that the structures need to be evaluated consistently and Also it is necessary to predict the remaining life of the structure or pavement. Sometimes bituminous overlay on top of existing pavement is required to meet future traffic demand, Hence in such cases a structural evaluation is required to determine the present pavement condition before deciding the overlay thickness. As we know pavement damages with time with repeated application of loads and due to effect of climatic parameters.The rate of damages will depend on condition of pavement, the rate of traffic loading, climatic condition and various other parameters.

It is also necessary to evaluate the functional and structural condition of the pavement consistently. as we should be able to access the structural condition and functional condition of the pavement consistently and decide weather the pavements require any maintenance, Major rehabilitation or even reconstruction. need for maintenance and rehabilitation can be accessed on the basis of the the revaluation that we carry out. pavements are evaluated typically for two types of performances, one is functional performance and the other one is structural performance.Functional performance is the ability of the pavement to provide comfortable, safe, economical riding surface to the users. That basically is a function of the pavementAs far as the user is concerned, user requires safe and comfortable ride. As long as the pavement it is in a position to to give satisfactory service to the road user in terms of safe comfortable ride the pavement continuous to be in a functionally acceptable condition.

II. RESULTS AND DISCUSSION

RHS: -

Sr.No.	Chainge	An overlay calculated value. In mm.
1	19300	150
2	18996	150
3	18752	1050
4	18497	100
5	18224	100
6	17983	100
7	17734	150
8	17488	150
9	17148	100
10	17148	100

TABLE: RHS Overlay Calculated value

LHS: -

Sr.No.	Chainge	An overlay calculated value. In mm.
1	17000	135
2	17250	135
3	17500	135
4	17750	90
5	18000	90
6	18278	135
7	18567	130
8	18815	135
9	19023	90
10	19346	135

TABLE: LHS Overlay Calculated value

Discussion

1. In this project for flexible pavement design only commercial vehicles with gross weight above 3000 kg are considered for classified volume count. The average CVPD is found out as 697 but for convenience round up it and took 700 for calculation.

2. As the CVPD is 350 which is medium so annual traffic growth rate as 5% for estimation of traffic growth rate also design period of 15 years has been adopted.
3. In pavement condition survey total weighted rating obtained is 2.0. As a result of the pavement condition survey mentioned in Table 1 shows that the pavement is in good condition. Isolated cracks of less than 3.0 mm width is less than 5% area of total paved surface and average rut depth is less than 10 mm.
4. Pavement structure according excavated test pits shows that maximum depths for BT, base (GSB+WBM) and Sub base (GSB) layers are 65mm, 260mm, 725mm respectively. For calculation average depth 50mm, 250 mm selected for BT and Base respectively.
5. As KUAB PVD software requires seed data of crust thickness composition in 4 layers so it was assumed that sub base divided into 2 layers having thickness 400 mm each, also assume Poissons ratio for asphalt overlay is 0.35, Reference temperature for calculations 35 0C and Modulus (E) for asphalt overlay is 3500 MPa.
6. From FWD testing data it is observed that the maximum deflection is occurs in (Do) sensors which is located exactly below the standard impact load of 40 KN took same for the calculation of layer moduli.
7. Results for overlay shows required overlay ranging between 105mm to 145 mm. Selection of final overlay thickness is highly critical, it required combined decision panel of expertise. As we consider that subdivision of road as per KUAB PVD program and result comes according to that (whole road as an one section) so provide a average overlay thickness 130 mm throughout entire length of the road.

III. CONCLUSION

1. According to this study, we can concluded that FWD can be used as BT and Granular layer subgrade strength evaluation for the maintenance of the pavement.
2. Structural evaluation of pavements involves application of a load to pavement and measuring its response in deflection.
3. To ensure that unacceptable levels of distressesd is occured during design period, the critical strains developed under the load should be less than limiting strain values corresponding to the design traffic selected.
4. For crust designs of flexible pavements FWD test results should be analyzed using KUAB software so that remaining life of the existing layers, layer moduli can be calculated for the realistic and economical designs.
5. Among the equipment available for structural evaluation of pavements, the FWD is largely used world-wide because it simulates, to a large extent, the actual loading conditions of the pavement .

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