DESIGN OF FLEXIBLE PAVEMENT ON RIGID PAVEMENT

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Abstract - Composite pavement systems have shown the potential for becoming a cost- effective pavement alternative for highways with high and heavy traffic volumes, especially in Europe. This study investigated the design and performance of composite pavement structure composed of a flexible layer(top most layer)over a rigid base. There port compiles (1) a literature review of composite pavement systems in the U.S. and worldwide;

(2) an evaluation of the state-of-the practice in the U.S. obtained using a survey; (3) an investigation of technical aspects of various alternative composite pavement systems designed using available methodologies and mechanistic- empirical pavement distress models (fatigue, rutting, and reflective cracking); and (4) a preliminary life cycle cost analysis(LCCA)to study the feasibility of the most promising composite pavement systems. Composite pavements, when compared to traditional flexible or rigid pavements, have the potential to become a cost effective alternative because they may provide better levels of performance, both structurally and functionally, than the traditional flexible and rigid pavement designs. Therefore, they can be viable options for Spain, which have used composite pavements stems in their main road networks, have reported positive experiences in terms of functional and structure.

Key Words: Functional performance of AC surfacing ideally also provide low noice, high friction reduce plash and spray and smoothness.

1. INTRODUCTION

Transportation agencies and the road building industry have traditionally designed and constructed two pavement types, flexible and rigid. The selection of which type to use is often based on a pavement type selection(PTS)process to decide the best pavement alternative for a particular project. This process helps pavement engineers determine the most cost-effective pavement type capable of supporting anticipated traffic under existing environmental condition sand providing safety and

2001). Composite pavement systems have shown good potential for becoming acost-ective pavement alternative for high volume roadways (Nunn et al., 1997; Nunn, 2004).effective pavement alternative for high volume roadways (Nunn et al., 1997; Nunn, 2004).

There are several types of composite pavement structures; however, in this study, a composite structure is defined as a multi-layer structure where there is a flexible layer (top-most layer) over a rigid layer. The flexible (asphalt concrete) layer (e.g., dense-gradedhot- mixasphalt [HMA],stone matrix asphalt[SMA],open- graded friction course [OGFC], etc.) provides a smooth, safe, and quiet driving surface, whereas the rigid layer (e.g., cement- treated base [CTB], roller-compacted concrete[RCC]continuously reinforced concrete pavement[CRCP],etc.) provides a stiff and strongbase.

This high modulus rigid base tends to change the traditional pavement concept in which the layers' moduli decrease as depth increases. In composite structures, the stiffness of the base (rigid layer) is greater than that of the surface layer (flexible layer).

driving comfort to the traveling public (VDOT,

1.1 Why make compositelayer?

There is a very wide use of composite pavements in Spain as documented by Jofre and Fernandez (2004).Composite pavement structures in Spain are called semi-rigid pavements because they do not tend to use a portland cement concrete pavement (PCCP) as the base.Instead they use different types of rigid bases that mainly differ from one another in the cement contentand aggregate type. The typical rigid base characterization presented by Jofre and FernandezIn the United States, composite pavements usually have been the result of PCCP rehabilitation, consisting of HMA overlays on top of deteriorated rigid pavements and thus creating a composite structure. This type of rehabilitation action has been used to restore the functional performance of an existing pavement and/or to increase the structural capacity in order to handle. Additional and heavier traffic. The performance of composite pavements may vary due to different factors, such as design of the rigid base, selection of an ad maintain ability. A study of composite pavements presented by Hein et al.

1.2 Scope of study

1. Surfacing of new portland cement concrete (PCC) layer with high quality asphalt concrete (AC) layer(s),and Relatively thin, high-quality PCC surface atop a thicker, less expensive Pcc layer.

2.The project required the development and synthesis of sever components: (a) evaluation and screening of unbound layer and subgrade models; (b) development of soil water

3. Characteristics curve models of base and subgrade; (c) development of resilien

4. Modulus(MR) models of base and subgrade; (d) development of modulus of subgrade reaction model

5. Development of faulting model of base layers and conduction of performance prediction and sensitivity analysis.

2. METHODOLOGY

1. BTD and CTD tensile tests can be used to study the effect of the RAP content in the mixtures, the influence of usingdifferenttypesandpercentagesofbinder,thegrading of the mixture and the effect of the rest of the mixture components.

2. For each variable, different specimens willbe manufactured changing the value of the parameter considered. The curves obtained after the testingprocess

Adopted parameters:

a) Characterstics of the milled materials.

b) Selection of the new binder and new granular materials.

c) Dosage of the mixture.

d) performance testing.

2.1 Objective

1. Most cost efficient pavement

2. To develop most appreciate method

3. Analysis of data for highway network problem to illustrate

3. CONCLUSION

1. Composite pavement systems can become a cost effective pavement alternative during the PTSprocess for high-volume high-priority highways because of the functional, structural, and economic benefits they can provide during their servicelife.

2. These types of structures can provide long-life pavement that offers good serviceability levels and rapid, cost-effective maintenance operations.

3.Smoother surface attribute to firm foundation: tend to minimize rutting.

4. A composite pavement structure tends to have more reliable performance than a pavement of AC on unbound subbase.

5. The high degree of support provided to the AC by a stiff subbase reduces the tensile strain in the AC by about an order of magnitude.

4. REFERENCES :

1) Balbo, J.T. (1993). Study of the mechanical properties of cement treated crushedstone and its application to semi-rigid pavements (inPortuguese).

2) University of Sao Paulo, Polytechnical School. Balbo,J.T., and Cintra,J.P.(1994).

3) Discussion of Possible Designs of Composite Pavements. Highway Research Record, No. 37.Highway Research Board, Washington, DC.

4) Benefits of composite pavements. ARRB Transportation Research, SMEC International, Australia. Harichandran, R.S., and Baladi, G.Y.

5) Book Transportation Engineering and Google.