使用软件评估与路面深度相关的柔性路面挠度（以吉马至谢卡路为例）

塔雷肯·库梅拉

吉马大学理工学院土木与环境工程学院 埃塞俄比亚 吉马

摘 要：为了满足中长期发展计划，埃塞俄比亚的公路建设需求越来越大。道路从该国首都向四面八方延伸。本研究的目的是使用软件沿吉马至谢卡路段评估柔性路面相对于路面深度的挠度，并将实验室结果与埃塞俄比亚道路管理局（ERA）标准进行比较。Ever Stress 软件（ESS）是一种数值分析技术，用于获得路面层的挠度。本研究的方法是找出道路参数（尺寸、层厚、弹性模量、泊松比、荷载和压力）在减少沥青路面疲劳开裂和车辙的主要原因方面的敏感性，沥青层底部的临界拉伸应变和路基顶部的临界压缩应变。在获得各层的 CBR 结果后，采用的分析方法是路面材料的弹性模量和泊松比作为设计参数。预期结果表明，沥青路面的位移或挠度（uz）高达 0.38mm，并随着路面厚度的增加而逐渐减小。较大的挠度值表示过度应力状态，这会导致路面因疲劳或累积塑性变形而开裂和变形。因此，路面层的相对挠度随着路面深度的增加而减小。

关键词：挠度；柔性路面；层厚；路面模数

Evaluation of Flexible Pavement Deflections with Respect to Pavement Depths Using Software (A Case Study Jimma to Seka Road)

Tarekegn Kumela

Faculty of Civil and Environmental Engineering, Jimma University, Institute of Technology, Jimma, Ethiopia

Abstract: Road building in Ethiopia is increasingly in demand to meet medium and long terms development programs. Roads are constructed radiating from the capital city of the country in all direction. The objective of this research study is to evaluate the flexible pavement deflections with respect to pavement depth using Software along Jimma to Seka road segment and compare the laboratory results with the Ethiopian Road Authority (ERA) standards. Ever Stress Software (ESS) is a numerical analysis technique to obtain the deflection of pavement layers. The methodology of this research was finding the sensitivity of the road parameters (dimension, layers thickness, elastic modulus, Poisson's ratio, loads and pressures) in reducing the major causes of failure in asphalt pavement fatigue cracking and rutting due to vertical surface deflections, the critical tensile strains at the bottom of the asphalt layer and the critical compressive strains on the top of subgrade. The analytical method used was the elastic modulus and Poisson's ratio of the pavement materials as design parameters after CBR results of each layers was obtained. The expected outputs have shown that the displacement or deflection (uz) was as high as 0.38mm in the asphalt surface and gradually decreased as the pavement thickness increased. Large values of deflections indicates an over stressed condition which results in the pavement surface to crack and distortion as a results of fatigue or accumulated plastic deformation. Therefore, the relative deflection of pavement layer decreases as the pavement depth increases.

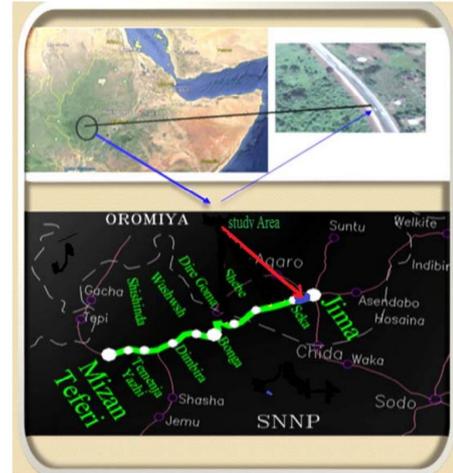Keywords: Deflections; Flexible pavement; Layers thickness; Pavement modulus

1.引言

AC

[1]

15km   50mm

DBST

-

[2]

[3]

2.问题说明

1.

[4]   070 40'07.3"   060 59'44.3"   360
49'43.6"   350 35'17.9"

Dystric

ph<5.5

3.目标   [5]

4.2

1   CBR

2
3   ERA

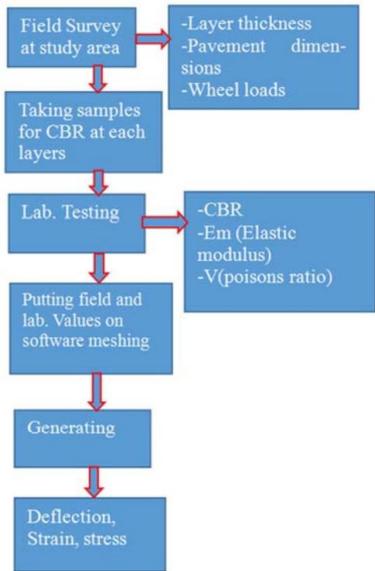## 4.方法
4.1.

360   375

15

20   40

2.

4.3.

3

4.CBR

-

-

4.4.   CBR

CBR

CBR

CBR

5.CBR

6.   CBR

CBR

Road properties	Layers thickness (mm)	Laboratory Test Results			ERA Standard Specification Results		
		CBR %	E$_{m}$, MPa	υ	CBR %	E$_{m}$, MPa	υ
Asphalt concrete	50	-	3000	0.350	-	3000	0.35
Base course	200	83.2	325	0.30	>80	300	0.30
Subbase course	250	40.4	183.6	0.30	>30	175	0.30
Subgrade course	-	7.78	91.05	0.30	>15	100	0.30

1.　　　ERA

AC

50mm　200mm　250mm

AC

50mm　200mm　　250mm

7.　　　CBR

7　　　　　　　　CBR

96　　　4

4

4.5.

-

-

-

8.

5.结果和讨论

9　　　　x　ℇxx　y　\400

yy

z　　ℇzz

10

9

ℇt

\400　c

Em　　　　　υ
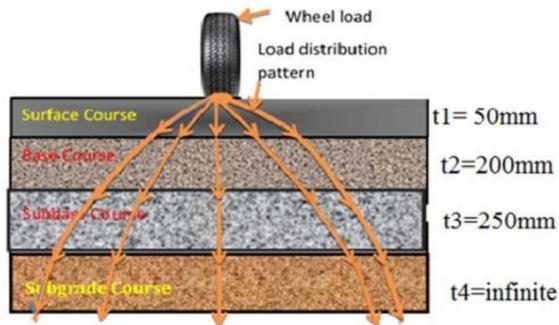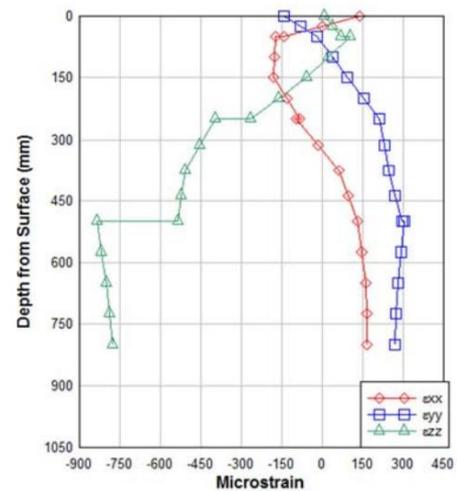
υ　　0.35

0.30　0.30　　0.30

40KN

690KPa　　　　　　　135mm

350mm　　　　　　　　　　　-

εxx (Microstrain) Contours

图 10

图 11

图 12

6.结论

a

CBR

b   0.38mm

0.02   0.5mm

c

图 12

7.建议

1

2

·

JiT

图 11

图 12   uz

图 12
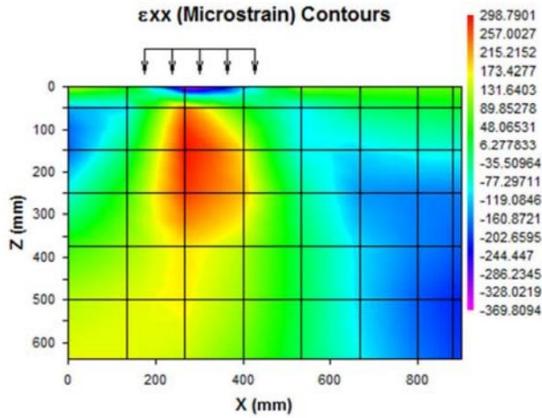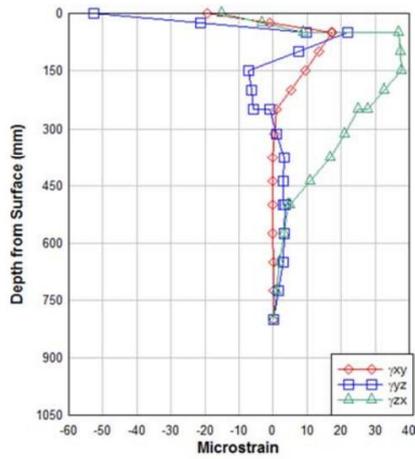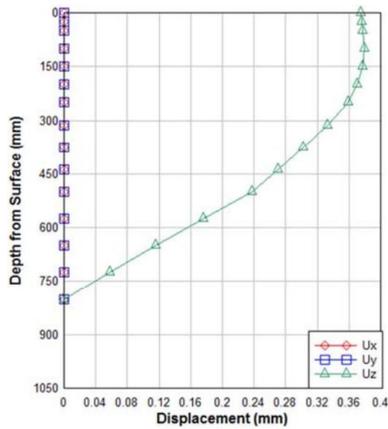
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