



C E N T E R F O R
**P O R T L A N D C E M E N T C O N C R E T E
P A V E M E N T T E C H N O L O G Y**

Fly Ash Soil Stabilization for
Non-Uniform Subgrade Soils, Volume II:
Influence of Subgrade Non-Uniformity
on PCC Pavement Performance

Final Report
April 2005

IOWA STATE UNIVERSITY

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The Center for Portland Cement Concrete Pavement Technology (PCC Center) is housed at the Center for Transportation Research and Education (CTRE) at Iowa State University. The mission of the PCC Center is to advance the state of the art of portland cement concrete pavement technology. The center focuses on improving design, materials science, construction, and maintenance in order to produce a durable, cost-effective, sustainable pavement.

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16. Abstract <p>To provide insight into subgrade non-uniformity and its effects on pavement performance, this study investigated the influence of non-uniform subgrade support on pavement responses (stress and deflection) that affect pavement performance.</p> <p>Several reconstructed PCC pavement projects in Iowa were studied to document and evaluate the influence of subgrade/subbase non-uniformity on pavement performance. In situ field tests were performed at 12 sites to determine the subgrade/subbase engineering properties and develop a database of engineering parameter values for statistical and numerical analysis. Results of stiffness, moisture and density, strength, and soil classification were used to determine the spatial variability of a given property. Natural subgrade soils, fly ash-stabilized subgrade, reclaimed hydrated fly ash subbase, and granular subbase were studied. The influence of the spatial variability of subgrade/subbase on pavement performance was then evaluated by modeling the elastic properties of the pavement and subgrade using the ISLAB2000 finite element analysis program.</p> <p>A major conclusion from this study is that non-uniform subgrade/subbase stiffness increases localized deflections and causes principal stress concentrations in the pavement, which can lead to fatigue cracking and other types of pavement distresses. Field data show that hydrated fly ash, self-cementing fly ash-stabilized subgrade, and granular subbases exhibit lower variability than natural subgrade soils. Pavement life should be increased through the use of more uniform subgrade support. Subgrade/subbase construction in the future should consider uniformity as a key to long-term pavement performance.</p>			
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INFLUENCE OF SUBGRADE NON-UNIFORMITY ON PCC PAVEMENT PERFORMANCE

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	XI
INTRODUCTION	1
BACKGROUND	3
Pavement Distress	3
Spatial Variation of Soil Stiffness	3
Support under PCC Pavements	4
Case Study: Ohio SHRP Test Road, U.S. Rt. 23, Delaware, Ohio	4
Subgrade Models for Numerical Analysis	5
Dense Liquid Model	5
Elastic Solid Model	6
METHODS	7
Collection of Field Data	7
Task 1: Project Selection	7
Task 2: Grid Pavement and Document Pavement Quality	13
Task 3: DCP Testing	13
Task 4: Clegg Impact Hammer Testing	14
Task 5: GeoGauge Stiffness Testing	14
Task 6: Nuclear Density Gauge Testing	16
Task 7: Determine Subgrade/Subbase Index Properties	17
Finite Element Modeling to Evaluate Pavement Response	17
Task 1: Estimate Modulus of Subgrade Reaction	18
Task 2: Select Pavement Engineering Properties and Loading Conditions	18
Task 4: Evaluate Pavement Responses	19
Task 5: Estimate Pavement Life from Numerical Analysis Output	20
Statistical Analysis of Field and Numerical Results	20
Task 1: Determine the Mean, Standard Deviation, and COV Values for In-Situ Tests	20
Task 2: Perform SAS Analysis of ISLAB2000 Results	20
MATERIALS	21
In Situ Test Results	21
Nuclear Density Gauge	21
GeoGauge Stiffness	21
Dynamic Cone Penetrometer	21
Clegg Impact Hammer	21
Subgrade/Subbase Index Properties	21

RESULTS	27
Pavement Modeling	27
ISLAB2000 Results	27
Pavement Life Results	38
Statistical Analysis.....	40
Field Data Statistical Analysis	41
DISCUSSION	43
ISLAB2000 Pavement Modeling.....	43
Statistical Analysis.....	44
Field Data Statistical Analysis	44
ISLAB2000 Statistical Analysis	44
SUMMARY AND CONCLUSIONS	45
REFERENCES	47
APPENDIX – IN SITU TESTING RESULTS.....	48

LIST OF FIGURES

Figure 1. CBR data indicating non-uniform subgrade, US 61, Muscatine, IA.....	2
Figure 2. Project 1: Highway 63 in Eddyville, Iowa	8
Figure 3. Project 2: Highway 330 northeast of Bondurant, Iowa	8
Figure 4. Location for projects 3 and 4: Knapp Street, Ames, Iowa	10
Figure 5. Location for projects 5 and 6: I-235 West Des Moines, Iowa	10
Figure 6. Location for project 7: Highway 34 east of Fairfield, Iowa.....	11
Figure 7. Location of project 8: U.S. Highway 218, Henry County.....	11
Figure 8. Location of project 9: Interstate 35 north of Highway 20.....	12
Figure 9. Location for projects 10 and 11: Ames, Iowa	12
Figure 10. Location for project 12: University and Guthrie Aves, Des Moines, Iowa	13
Figure 11. DCP testing on westbound entrance ramp of I-235 at 35th Street in West Des Moines, Iowa.....	15
Figure 12. Clegg Impact Hammer	15
Figure 13. GeoGauge.....	16
Figure 14. Nuclear Density Gauge	16
Figure 15. Winkler spring foundation to simulate non-uniform subgrade/subbase stiffness	17

