DECEMBER 2017

Wednesday, December 13, 2017

TECHNICAL PROGRAM

Designing Bases and Subgrades for Better Pavement Performance

Speaker: Robert L. Lytton, Ph.D., P.E. Professor of Civil Engineering at Texas A&M University, Bryan TX, Tel. No. 979-845-9964.

Dr. Lytton is an Honorary FPA Life Member, FPA Structural Committee Member, Professor of Civil Engineering in the Zachry Civil Engineering Department of the Texas A&M University, and a Licensed Professional Engineer in Texas with a Ph.D. in Civil Engineering from the University of Texas (1967).

Dr. Lytton is internationally recognized for his work in the study of the effect of expansive soil on foundations and pavements, having given presentations on the subject worldwide, most recently as the keynote speaker at the *2nd Transportation Research Congress in Beijing, China* in May 2017. The same Research Congress hosted a symposium that was named in his honor, called *The 2nd Transportation Research Congress Symposium in Honor of Robert L Lytton*. In August 2017, at the International Conference in Philadelphia, Pennsylvania, ASCE's Transportation and Development Institute (T&DI) bestowed its 2017 Francis C. Turner Award on Dr. Lytton for his advancements and innovation of pavements design and construction.

Dr. Lytton has selflessly presented to this FPA forum at least 15 times and he has also presented in past FPA seminars.

PRESENTATION SUMMARY

To an audience of approximately 80 attendees Dr. Lytton gave his presentation on Designing Bases and Subgrades for Better Pavement Performance. This presentation included and vastly expanded on Dr. Lytton's presentation from December 10, 2014.

Dr. Lytton addressed the problem of poor performance of both flexible and rigid pavements relative to subgrade/unbound layer properties. The objective of his research is to propose enhancements needed to better reflect the influence of subgrade/unbound layer (properties and thickness).
The National Cooperative Highway Research Program (NCHRP) of the National Academies of Science acknowledged that subgrades and base courses have a major effect on pavement performance. In the past engineers had used primitive models to model subgrades and base course that resulted in a mismatch between design and performance. The NCHRP went out for bids for R&D on how to improve the modeling of pavements, base courses, and subgrades to better represent what is experienced in the field. TAMU was awarded the project and is nearing completion of its study. TAMU's study results are the subject of Dr. Lytton's presentation.

TAMU's study included models of reinforced / unreinforced concrete and asphalt pavements. The primary variables in TAMU's newly developed pavement design procedure affecting pavement performance were load, moisture, and temperature. Dr. Lytton presented interesting new results in pavement/base/subgrade performance relationships, particularly with respect to pavement joints in reinforced and unreinforced concrete pavements, and the use of geosynthetics in reinforcing base courses. He also showed that using radar, it may now be possible to determine the

percent of lime or cement that was installed in stabilized base courses, something that has not been done before. Dr. Lytton emphasized a number of important factors in the unbound layers:

- Modulus: moisture-sensitive, stress-dependent, cross-anisotropic
- Permanent deformation: moisture-sensitive, stress-dependent
- Shear strength: moisture-sensitive
- Erosion
- Thickness

Factors emphasized in the Subgrade are:

- Modulus: moisture-sensitive, stress-dependent
- Permanent deformation: moisture-sensitive, stress-dependent
- Shear strength: moisture-sensitive
- Foundation

Based on the research and verified by field studies an AASHTO Standard for a Permanent Deformation Test is being proposed. The Standard Method Test will determine the permanent deformation properties of Geosynthetic-Reinforced and Unreinforced Granular material.

To view Dr. Lytton's slide presentation, click here:

PAST FPA PRESENTATIONS

To read summaries of previous FPA presentations by Dr. Lytton, please click:

December 2016 - Design of Drilled Shafts in Expansive Soils. Part 3
December 2015 - Edge Cracking in Pavements on Expansive Soils: Causes and Countermeasures
December 2014 - Methylene Blue Test of Soil Properties: A Rapid and Accurate Field Test
December 2013 - Design of Drilled Shafts in Expansive Soils. Part 2
December 2012 - Design of Pavements on Expansive Clay Subgrades
December 2011 - Design of Drilled Shafts in Expansive Soils
December 2010 - Effects of Trees on Foundations
December 2009 - Contrasting Design Approaches for Slabs-on-Ground and Raised Floor Foundations on Expansive Soils
December 2008 - How to use the PTI-3rd Edition to Design Foundations in Houston
December 2007 - Design of Structures to Resist the Pressures and Movements of Expansive Soils
December 2006 - Revisitation of Expansive Soils
December 2004 - Case Studies of Residential Foundation Movements in Southern Houston Area
August 2003 - How to Run Soil Suction Tests
August 2002 - Shallow Slope Failures and Suction from Vegetation
August 2001 - Methods to Aid Structural and Geotechnical Engineers in Designing Slab-on-Grade