BIOGRAPHICAL SKETCH

Clifton Tubb was born in McMinnville, Tennessee on July 15, 1994. He graduated high school from Warren County High School in McMinnville, Tennessee in May 2012. He is a graduate of Tennessee Technological University with a B.S. in Civil Engineering 2017 and a M.S. in Civil Engineering 2018. He focused his degree in Geotechnical and Structural Engineering. During his time at Tennessee Technological University, he won first place in the 2016 undergraduate research day. He earned his Engineering Intern certificate in July 2017.

EDUCATION

B.S., Civil Engineering

Tennessee Technological University

2012-2017

College of Engineering

TENNESSEE TECH

The Department of

Civil and Environmental Engineering

Announces the Thesis Defense

Of

Clifton Dillon Tubb

In Partial Fulfillment of the Requirements

For the degree of

Masters in Civil Engineering

Thursday, November 1, 2018

11:00 AM

Held at

PRESCOTT HALL ROOM 226

FIELD OF STUDY

Civil and Environmental Engineering

THESIS TOPIC

ASSESSMENT OF SHALLOW HIGHWAY EMBANKMENT FAILURES IN CENTRAL TENNESSEE

EXAMINING COMMITTEE

Dr. Daniel VandenBerge – Chairperson

Dr. Daniel Badoe

Dr. Benjamin Mohr

ABSTRACT

Compacted clay slopes are often constructed for civil engineering projects, such as highway embankments and land development. Many times, only limited information about soil properties is available at the time of design (e.g. soil classification, Atterberg limits, and relative compaction specifications). Design of compacted and stiff clay slopes is most often controlled by drained or long-term conditions. Over a long period of time, these clays tend to lose their initial compaction or stiff consistency due to various mechanisms, such as weathering and excavation. These mechanisms eventually cause the strength of the clay to reduce to a peak normally consolidated strength, which is also known as the fully softened shear strength. This study seeks to develop an efficient method could be used in preliminary design of such slopes. Six different landslides in central Tennessee were analyzed in an attempts to develop simpler and cheaper means to preform preliminary slope design. Each of these slopes was analyzed with two different approaches: a closed-form response function and limit equilibrium analysis using Slide 8.0. The limit equilibrium software was used to check the accuracy of the response function. For slopes with geometry and soil conditions that fell within the range used to develop the performance function, it was found to be an appropriate means to estimate the factor of safety. For most of the slopes a pore pressure ratio of 0.1 to 0.3 caused a factor of safety equal to 1.0. These conclusions allowed the development of preliminary design charts for slopes angles 2H:1V or flatter. Acknowledging the uncertainty in soil properties and response function a reliability approach was used rather than a specific factor of safety. The Taylor series FOSM method was used to determine sets of design conditions with a consistent reliability or probability of failure. Sets of design charts were made for probabilities of failure of 1% and 5%. These charts provide a simple way of estimating the maximum slope height and/or angles that can be used in preliminary design of stiff clay cut slopes and compacted clay embankments. For future work this method can be compared to other methods to show any flaws that may be obtained in this method or other forms of analysis. This method also gives the ability to determine whether or not slopes in central Tennessee are being design for long term conditions.