

FINITE ELEMENT ANALYSIS OF  
DEEP EXCAVATIONS

by

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Dissertation submitted to the Faculty of  
Virginia Polytechnic Institute and State  
University in partial fulfillment of the  
requirements for the degree of

DOCTOR OF PHILOSOPHY  
in  
Civil Engineering

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September 18, 1998

Blacksburg, Virginia

Keywords: finite element analysis, excavation, excavation support  
system, SAGE



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(ABSTRACT)

This dissertation describes enhancements made to the finite element program, SAGE, and research on the performance of deep excavations. SAGE was developed at Virginia Tech for analysis of soil-structure interaction problems (Morrison, 1995). The purpose of the work described in this text with SAGE was to increase the capabilities of the program for soil-structure analysis. The purpose of the research on deep excavations was to develop a deeper understanding of the behavior of excavation support systems.

The significant changes made to SAGE during this study include implementation of Biot Consolidation, implementation of axisymmetric analysis, and creation of a steady state seepage module. These changes as well as several others are described. A new manual for the program is also included.

A review of published studies of deep excavation performance and recent case histories is presented. Factors affecting the performance of excavation support systems are examined, and performance data from recent published case histories is compared to data from Goldberg et al.'s 1976 report to the Federal Highway Administration.

The design, construction, and performance of the deep excavation for the Dam Number 2 Hydroelectric Project is described. Finite element analyses of the excavation that were performed with SAGE are presented and discussed.



## ACKNOWLEDGMENTS

I would like to express my appreciation to Professor J. Mike Duncan for his guidance, support, and encouragement throughout the course of this project. I am indebted to Dr. Duncan for his patient review of this manuscript. I am also grateful to my committee members, Professors Tom Brandon, T. Kuppusamy, George Filz, Jim Mitchell, and Romesh Batra for their advice and assistance during my work and for their work in reviewing this manuscript.

Clark Morrison performed a great deal of work in the initial development of SAGE. His work provided a solid foundation for my work with SAGE. His efforts are greatly appreciated. Kai Wong and Diane Baxter helped to debug SAGE and offered thoughts on how to improve it. SAGE is a better program because of their involvement.

Nikken Sekkei, Ltd., Japan and the Charles E. Via Jr. Civil Engineering Department sponsored my work. I am also grateful to Nikken Sekkei and Dr. Duncan for a memorable and enjoyable visit to Osaka, Japan in July 1997. The Charles E. Via Jr. Civil Engineering Department provided support in the form of the Via Fellowship and a half-time instructorship position. I am grateful to Nikken Sekkei, Virginia Tech, and the Via family for their support of my studies.

I owe a great deal to my friends who encouraged me to pursue a Ph.D. In particular, I thank Dr. Vern Schaefer for his encouragement and friendship during this experience. Working with Vern as an undergraduate was an important learning experience in my development as an engineer and person.

In addition, I express my sincere thanks to my parents, Keith and Cecilia Bentler, my brothers, Kevin, Dan, Joe, and Jimmy, and my sister, Kathy, for their love and

encouragement. I thank them for teaching me the value of hard work, honesty, and perseverance. I also express my thanks and my love to my wife Katherine for her support, friendship, love, and encouragement as I worked to complete this endeavor.

Finally, I thank God for the many blessings he has bestowed on me.

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