

## ACKNOWLEDGEMENT

I wish to acknowledge the funding support from Suranaree University of Technology (SUT).

I would like to express thanks to Dr. Thanittha Thongrapha, thesis advisor, who gave a critical review. I appreciate his encouragement, suggestions, and comments during the research period. I would like to express thanks to Assoc. Prof. Dr. Pornkasem Jongpradist, Asst. Prof. Dr. Prachya Tepnarong, and Emeritus Prof. Dr. Kittitep Fuenkajorn for their valuable suggestions and comments on my research works as thesis committee members. Grateful thanks are given to all staffs of Geomechanics Research Unit, Institute of Engineering who supported my work.

Finally, I most gratefully acknowledge my parents for all their support and encouragement throughout the period of this study.

Thiti Patcharaarpakul