ACKNOWLEDGEMENT

The author wishes to acknowledge her thanks to Dr. P.S. Mony, Professor in Civil Engineering and Dean (Academic), Regional Engineering College, Calicut and Dr. N. Ramachandra Rao, Professor in Civil Engineering, College of Engineering, Trivandrum (now on deputation to Institute of Management in Government, Trivandrum) for their guidance and active encouragement which led to the successful completion of this research program.

Heartfelt thanks are extended to Dr. B.N. Nagaraj, Professor in Civil Engineering, Regional Engineering College, Calicut for his keen interest and active supervision at every stage of this research. But for his unstinted efforts, this thesis could not have been possible to be completed. The author is extremely indebted to Mrs. Sharada Nagaraj, Nithya and Ananth who treated her as a member of their family.

The author is thankful to Dr. R. Jayaraman, Director of Technical Education, Dr. P.V. John and Dr. T.K. George, former Principals, Dr. R. Ravikumar, Principal, College of Engineering, Trivandrum and Dr. D. Stanley, Head of the Department of Civil Engineering, for their encouragement throughout this research.
Sincere appreciation is extended to Dr. P. Gopalakrishnan Nair, Professor of Mathematics, Dr. K.V. Valsarajan and Prof. Jayasree Bhaskar, Dept. of Civil Engineering, and Dr. S. Ramakrishnan, Head of the Dept. of Computer Science & Engineering, College of Engineering, Trivandrum, for their active participation in the different phases of the research work.

The author is grateful to the post graduate students and the eighth semester students of the College of Engineering, Trivandrum, for their participation in the field investigations and compilation. She also thanks the post graduate students and research scholars and all her friends in Regional Engineering College, Calicut, for the help rendered.

Thanks are extended to her friends in the College of Engineering, Trivandrum, for their encouragement shown in the work. The author specially acknowledges Mrs. Vijayam and Mr. Sundaram for the efforts taken in typing the thesis and making the tracings.

The author wishes to recollect and acknowledge the cooperation and assistance rendered by the following organisations:

NATPAC, Trivandrum
Dept. of Town Planning, Kerala State
Kerala State Road Transport Corporation
Public Works Dept., Kerala State
The author takes this opportunity to record her heartfelt gratitude and affection to her parents Mr. and Mrs. P.K. Panicker, her husband Mr. P. Ramachandran, her sons Roshen and Ashok and other family members for their endurance and moral support which greatly encouraged her in the effective completion of the thesis.
FINANCIAL SUPPORT

This investigation is financed by the Centre for Applied and Fundamental Research, College of Engineering, Trivandrum. The author wishes to express her gratitude to the above organisation for extending the financial support which enabled successful completion of the project.