

ACKNOWLEDGEMENTS

I would like to express my gratitude to Dr. W. Samuel Easterling for his guidance and patience with respect to this project and in general. I would like to thank Dr. Thomas M. Murray for serving on my committee, his input in creating this document, and providing numerous leads that aided successful completion of this study. I would also like to extend my thanks to Dr. Carin Roberts-Wollman for her input in resolving concrete related issues in this study and for serving on my committee.

I would like to thank Brett Farmer, Denson Graham, Dennis Huffmann, and Ricky Woods for their help in fabrication of test specimens.

Assistance of several students was very important in the experimental part of this study. In reference to that, I wish to thankfully acknowledge generous help provided by Thad Chapman, Grace Chen, Jason Piotter, and Alvin Trout.

This study largely relied on the test results reported and studies performed by several students who investigated similar issues at Virginia Tech in the past. Without their input this study would not be possible. My gratitude goes to them. They are Steven Hankins, Douglas Lauer, David Gibbings, Chad Alander, and Jim Webler.

Finally, a great deal of credit for successful completion of this study goes to NUCOR Research and Development, which sponsored this as well as the preceding studies in this area at Virginia Tech. I would especially like to express my gratitude to David Samuelson, a research structural engineer with NUCOR Research and Development, for his contribution to and help with this study.