

A Methodology for the Identification of Critical Locations in Infrastructures

by

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Submitted to the Department of Nuclear Engineering
on April 30, 2004, in partial fulfillment of the
requirements for the Degree of Master of Science in
Nuclear Engineering

ABSTRACT

The extreme importance of critical infrastructures to modern society is widely recognized. These infrastructures are complex, interdependent, and ubiquitous; they are sensitive to disruptions that can lead to cascading failures with serious consequences. Protecting the critical infrastructures from terrorism, human generated malevolent attack directed toward maximum social disruption, presents an enormous challenge. Recognizing that society cannot afford the costs associated with absolute protection, it is necessary to identify the critical locations in these infrastructures. By protecting the critical locations society achieves the greatest benefit for the protection investment. This project examines a screening methodology for the identification of critical locations in infrastructures. The framework models the infrastructures as interconnected digraphs and employs graph theory and reliability theory to identify the vulnerable points. The vulnerable points are screened for their susceptibility to a terrorist attack, and a prioritized list of critical locations is produced. The prioritization methodology is based on multi-attribute utility theory, and involves various disciplines including quantitative risk assessment and decision analysis. The methodology is illustrated through the presentation of a portion on the analysis conducted on the community of the Massachusetts Institute of Technology.

Thesis Supervisor: George Apostolakis
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Acknowledgements

I am grateful to everyone who aided in my journey through MIT. I am especially appreciative of my advisor, Professor George Apostolakis, for his vision, commitment, encouragement, and clear thought. I wish to thank my thesis reader, Professor Hastings, for his insight and support. I am thankful for the tremendous support I received from Mr. Joe Gifun, from the MIT Facilities Department, without which I would have never gotten started on this work. I appreciate the United States Navy for providing me with such a challenging and rewarding assignment.

I want to thank my wife, Katie, for her love and friendship, standing beside me through life, and sharing in my triumphs and failures. I am most grateful for the value of family, the love of our children, the things I learn from them, and the joy they bring to our lives. I am thankful for each one of them. Our daughter, Sarah, who has a contagious love of learning and an unmatched joy with which she faces the new experiences that each day brings. Our son, Matthew, with his unwavering curiosity, persistence in pursuing an answer, and his forever reminding me that “Why?” is a very important question. Our son, David, who encourages me to think at all hours of the day and night, and to take breaks. Together, they provide a constant reminder of what is really important in life. To my parents, Don and Jill Lemon, I wish to express my thanks for your guidance, encouragement, teaching me the value of hard work, and the importance of doing a job right the first time.