

Thesis Project Portfolio

Employing Predictive Trend Analysis to Decrease Construction Schedule Delay
(Technical Report)

**A Virtue Ethics Analysis of Engineering Practice and the Hyatt Regency Walkway
Collapse**
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2021

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Sociotechnical Synthesis - Construction Schedule Delay and Ethical Engineering

The connection between my technical work and STS research exists largely in their exploration of shortcomings in the construction industry. While both involve the construction of medium-sized buildings, they differ in which type of shortcoming they aim to address. My technical work analyzes construction delays and their causes with the goal of predicting and preventing delays in future construction projects. On the other hand, my STS research focuses on a particular structural failure and its relationship to the importance of ethical engineering practice in construction. Though my technical work and STS research explore different examples of shortcomings in construction practice, they both serve to recognize shortcomings in the construction industry and identify ways of improving them.

The technical project outlined in my Technical Report looks into construction delays and their causation and prevention. My capstone team partnered with Hourigan, a general contracting and construction firm, to analyze scheduling data from three of their recently completed medium-sized construction projects. We categorized each individual delay by delay source and delay factor, which were determined based on information gained from interviews with Hourigan's project teams for each project. We then used statistical analyses to assess correlations between delay factors and their frequencies in order to determine the main causes of delays. Through our analyses, we found that subcontractors, designers, and owners had the largest impact. Based on our results, we created recommendations for Hourigan to employ in the future in order to prevent future delays.

My STS research paper explores a different shortcoming in the construction industry, namely the failure of a structure and the morality of the engineers involved. I investigate the collapse of the Hyatt Regency walkways through the lens of virtue ethics to assess the morality

of Gillum and Duncan, the structural engineers in charge of the project. I utilized three of Michael Pritchard's virtues for morally responsible engineers to examine the actions and intentions of the structural engineers: the habit of clear documentation, a commitment to quality, and the ability to see the big picture and appreciate the details. In the context of these virtues, I claim that the two structural engineers are morally responsible for the collapse of the walkways and subsequently the loss of life due to the collapse. The purpose of this research is to outline the importance of morally responsible engineering practice in construction regardless of the scale of the project.

In working on my technical work and STS research simultaneously, I was able to add more value to each project than if I had completed them separately from one another. My STS research and its emphasis on the virtues of moral engineering prompted me to bear those virtues in mind as I investigated delay causation and prevention in my technical work. Likewise, working with scheduling data and learning about delay causation in my technical work gave me a better understanding of the inner workings and time and cost dependencies of medium-sized construction projects like the one I discuss in my STS research paper. The shared timeline of my technical work and STS research allowed both projects to favorably influence the other, allowing me to gain a better understanding of the construction industry and its potential shortcomings.