Thesis Project Portfolio

Engineers in Action: Coilolo River Pedestrian Bridge

(Technical Report)

Failure Upon Recruitment: An Actor-Network Theory Analysis of Florida International University's Role in the FIU Pedestrian Bridge Collapse

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Pedestrian bridges are often designed and constructed for the purpose of providing community members with safe, consistent access across rivers, highways, and railroads en route to their final destinations. Consistent with this theme, my technical work involved the development of a design and construction plan for a footbridge across the Coilolo River in Central Bolivia; this bridge will provide community members with year-round access to essential resources such as healthcare, education, and markets. Similarly, my STS research focused on the design and construction of the Florida International University (FIU) Pedestrian Bridge, a project that was meant to provide university students with safe access across a busy highway to reach the FIU campus. Through the analysis of the FIU Pedestrian Bridge Project, which collapsed during construction in 2018, I have learned of the inherent safety risks associated with footbridge projects and have applied lessons learned from this disaster to my team's Coilolo River Pedestrian Bridge Project.

My technical work involved the completion of a design and construction plan for a suspended footbridge in Coilolo, Jaime Zudáñez, Chuquisaca, Bolivia. The project deliverables that my team prepared for this project include a design drawing set, a design calculation package, a material list and bill of quantities, and a construction plan. The design process for the Coilolo River Pedestrian Bridge was guided by seven design objectives, provided by our client, Engineers in Action. These design objectives, listed in order of relative importance, include safety, durability, serviceability, maintainability, constructability, economics, and aesthetics. Having successfully developed a bridge design and construction plan in accordance with these objectives, our team has assisted Engineers in Action in achieving our collective goal of providing community members with consistent access to essential life resources.

My STS research explores why the FIU Pedestrian Bridge Project, which collapsed during construction in 2018 and killed six individuals, failed. My research focuses on the role that FIU played in the bridge collapse, particularly during the recruitment of design-build firms to complete the project. Through an actor-network theory analysis of the disaster, I claim that FIU significantly contributed to the bridge collapse by imposing stringent design, budget, and schedule requirements on bidding design-build firms immediately upon the release of the Request for Proposals (RFP) for the project. In turn, these requirements resulted in a complex, rushed design-build process that left open opportunities for error. The goal of this research was to evaluate the extent to which non-technical factors, such as the conceptual, economic, and social pressures applied by FIU, influenced the failure of the project.

By working on my technical and STS projects concurrently, I was able to both apply the seven design objectives, as listed above, to my technical work more effectively and better understand why certain objectives, such as safety, serviceability, and constructability need to be prioritized over other factors. My STS research provides an example of the dangers that arise when project stakeholders, including the owner, designer, and contractor, prioritize economics and aesthetics over safety and constructability. The insight gained from this research helped to influence my team's design decisions during the development of our technical project. Had I not conducted this STS research while completing my technical work, I would have lacked a more comprehensive understanding of the risks inherent with making design decisions that do not prioritize safety over all other objectives, leaving my team's bridge design vulnerable to failure.