

## **Thesis Project Portfolio**

### **Engineers in Action: Eswatini Suspended Bridge**

(Technical Report)

### **Vision Zero in Oslo: A Radical Transition to a City without Cars**

(STS Research Paper)

An Undergraduate Thesis

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## **Sociotechnical Synthesis**

In Eswatini, Africa, an impoverished country on the South African border, the Zombodze and Boyane communities have been dealt the difficult circumstance of having to cross a large gorge to have access to schools and the marketplace. Safe access to these is vital to improving the community and providing opportunities for advancement for these people, especially children. A temporary timber bridge is in place to cross the gorge now when flooding occurs, but it is low, has no railings, and becomes very slippery when wet. It also does not give sufficient passage for livestock to be transported to or from the marketplace. Several people have died trying to cross the river using this bridge. For these reasons, Engineers in Action (EIA), an organization that specializes in building footbridges for impoverished communities, has chosen this site to construct a new bridge. A team of students at the University of Virginia has been tasked with designing the bridge for this site.

The City of Oslo, Norway, has recently become a world leader in traffic safety and bikeability. Through the process of implementing dozens of kilometers of cycling lanes and disincentivizing driving, especially in the town center, Oslo has dramatically reduced their road fatalities. Many of these changes have come since 2015 through the work of several groups of people, such as cyclists, environmentalists, advocates of public transit, and advocates of safety. Learning how Oslo made these changes is important for other cities to know so they may use similar strategies and hopefully achieve similar results.

Oslo and Eswatini are different in almost every way (culture, climate, geography, etc.), but their problems were very related: the infrastructure in place was leading to injuries and loss of life. Both places needed something to change, and both can use the strategy of adding or changing infrastructure to meet their goals. As mentioned before though, these are two very

different places in the world, meaning the implementation of solutions is not the same for each. Both will need to make physical changes to their infrastructure, but Oslo had the added task of making changes to their culture for their changes to take hold.

For the bridge in Eswatini, the team used resources from EIA to learn about the factors and considerations that go into designing a bridge. Each member of the team had different roles, and though nobody on the team will be involved in the construction of the bridge they designed, the project was treated as if everyone would be involved on site. A couple members focused specifically on designing the bridge and creating the drawing sets. Those who were not directly involved in the design process were still able to check calculations and ensure a sound bridge structure. These members also focused on aspects such as community relations, safety, construction, and quality control. The end result of this project is a completed bridge design, along with other key aspects of construction such as material acquisition, quality control checks, and a construction schedule.

To examine what went into the physical and cultural changes that led to Oslo becoming one of the most bike-friendly cities in the world, the Social Construction of Technology (SCOT) framework was used. Through the use of the SCOT framework, relevant social groups were analyzed to determine which one(s) had the largest impact on changes being made to the city's infrastructure to improve cycling facilities significantly. Through examining the agendas and ideologies of key contributors like the mayor of Oslo or political parties, it was determined that rather than the efforts of cyclists themselves to improve cycling infrastructure, environmentalists and road safety advocates were the driving force in accomplishing change. This is because two of Oslo's main goals were to eliminate road fatalities and to reduce its environmental impact. Cycling is a simple way to achieve both of those, and Oslo utilized this fact exceptionally.