

Thesis Project Portfolio

Empirical Model Relating Chloride Loading Density and Conductance for Prediction of Galvanic Corrosion

(Technical Report)

The Economic Effects of Pedestrianized Downtowns in Mid-Sized American Cities

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Corrosion has a very high cost, requiring more frequent maintenance and material replacement. One particularly aggressive form of this is galvanic corrosion, which is when two dissimilar metals are connected. In order to reduce this problem, it would be helpful to develop a finite element analysis model of this type of attack. An important aspect to building this would be to correlate loading density with conductance, but only preliminary research has previously been conducted. In order to address this issue, we have developed computer models to correlate these two parameters. In particular, we used Acuity sensor data provided by LunaLabs to build this model. Many statistical approaches were used. Meanwhile, I am also interested in the economic effects of pedestrianized downtowns. It is important to consider the wider human and social impact of this project because street design impacts the lifestyle of its residents. Therefore, it is important to examine this impact to improve the day-to-day experience of its users.

However, cities are complex. They have many people, groups, and organizations constantly interacting and influencing each other in an intricate tangle of connections. It is important to consider ideas such as how a road impacts a shopper's behavior or how a car driver will lobby their local government for increasing parking spaces. By understanding that everything plays a role in the network of a city, we can begin to understand the shape it takes.

I am using meta-analysis combined with literature review to further investigate the structure of a city and its economic potential. Fortunately, cities publicly publish yearly data about their economic health which can be used to compare key standard factors between them. Additionally, literature can provide alternative perspectives and analysis for what does and doesn't work within the American city. I expect to find that car-dependent infrastructure is usually more costly for a city. I believe highly urbanized and walkable cities such as New York

produce more capita per square acre than sprawling, lower density suburbs. Additionally, I believe I will find that walkability must be a city-wide phenomenon, not just a localized area. Therefore, I believe car centric infrastructure will be better in areas that are already largely car dominated.

Although my capstone project and STS research do not have a lot in common, I hope both will exemplify the interconnections between the decisions of the engineer and its consequences on societal behaviors.