Thesis Project Portfolio

Stormwater Management in the Ivy Corridor Redevelopment

(Technical Report)

What We Can Learn from the Ecological Zoo: Designing for Social Sustainability with Dynamic Community Input

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Redevelopment as an Opportunity for Enhanced Social Cohesion

For my technical project, my group was tasked with the redevelopment of the Ivy Corridor bounded by Emmett Street, Ivy Road and Copeley Road. Being a civil/environmental engineering capstone, our main focus was stormwater, but our Request for Proposal (RFP) also stipulated square footage requirements for designated retail, academic, and open congregating space. This is where the understanding of sociotechnical systems comes into play: the efficacy of our design is not evaluated by solely technical metrics (peak runoff or pollutant discharge), but also a dimension that includes the overall social cohesion of our site design. To understand what cohesion in an academic setting means, I focused my STS research on social sustainability of design via an extensive study of ecological zoos with an abstraction to redevelopment projects.

Another crucial component of this technical project was the perspective and headspace we were designing within as UVA students with our fingers on the pulse of what works and doesn't work with respect to how Grounds is configured. With UVA planning to expand in the coming years, it faces the crucial inflection point of whether it will design for technological proficiency or for the good of the community. The insight from the ecological zoo showed that mimicking an animal's native biome increases the productivity of the animal, so if we wanted a design that benefited the students, the social dimensions of that design must be in service of the nuanced behavioral dynamics within the student body.

But again, the RFP outlined plans for not only academic buildings but also local businesses and tourist-centric fixtures, something which we knew very little about. The insight gleaned from my STS research offered a viable recourse: humans are more productive when in close proximity to nature (including access to windows) and spatial heterogeneity increases

biodiversity in a community. To the former, we employed three stormwater Best Management Practices (BMPs) that offer not only ecological benefit but are also naturalistic and therefore contribute to the tranquility and productivity of the site. To the latter point on heterogeneity, our vision for the site included mixed-use buildings, encouraging small business owners to share space with young professionals and/or students. This confluence of ideas and backgrounds creates a nexus of conversation that bolsters the social sustainability of the site by encouraging personal and ideally meaningful connection among the patrons.

When first assigned this project, I forecasted what the site would look like: I looked at all of the discrete components of the RFP and thought of compartmentalized solutions to each that would eventually morph into our final design plan. Such a simplistic method may check all of the boxes on the RFP, but it ignores the impetus behind the redevelopment of the Ivy Corridor in the first place, which is to preserve the atmosphere and ambiance of UVA as the university expands to fit the demand of new generations. Even after just a couple of weeks in STS, I knew that I needed to think holistically about what success looked like for this project in order to draft a comprehensive development proposal wherein the individual components outlined in the RFP were satisfied in a technical sense that was also in service of this larger goal of preservation. Finding documents for your STS research that allow you to understand each dimension of your problem is anything but easy, and applying the insights of those sources to the intricacies of your project is just as hard. For anyone looking to meaningfully discover something novel about a problem, I suggest they start small and not set out a goal to discover an earth-shattering principle that changes your field of engineering. Small findings lead to big discoveries: you're lighting a spark that may, over time, build to a flame.