REDESIGN OF PHASE II OF THE IVY CORRIDOR

ANALYSIS OF THE SOCIOTECHNICAL EFFECTS OF GREEN INFRASTRUCTURE

A Thesis Prospectus
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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISORS

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The Grounds of the University of Virginia (UVA) has been hailed as one of the most beautiful college campuses in the United States. The University prides itself on its ability to blend newer construction into the original historic design. Recently, UVA has been looking to expand its Grounds northward into the Ivy Corridor. The Ivy Corridor is the northern entrance to Grounds and has been under-utilized by the University. The University of Virginia seeks to transform the Ivy Corridor into a space that serves as a fitting entrance to Central Grounds. This site design must meet local and state development standards as well as the objectives set by the University.

The design for such a space in Phase II of the Ivy Corridor became my team's technical project. As requested by the University, this design must feature green space that is usable by those who visit the Ivy Corridor and aids in stormwater management. My tightly coupled STS research topic is an analysis of the sociotechnical influence on this urban green space.

IVY CORRIDOR PHASE II REDESIGN

Under the guidance of Civil Engineering Professor Teresa Culver and P.E. and project manager Marshall Agee, Infrastructure Civil Engineers Soojin Jang, Eduardo Corro, and Cameron Murie and Environmental and Water Resources Civil Engineers Noah McGhee and I will create a site design that meets all the client's expectations for sustainability, usability, and aesthetics. As shown in Fig. 1, the Ivy Corridor Phase II site is approximately 5 acres (VHB, 2022). It is bordered by the Ivy Corridor Phase I site to the east, Copeley Road to the west, Ivy Road to the south, and the CSX rail line to the north.

Figure 1.

Ivy Corridor Project

An image of the Ivy Corridor Project with Phase II outlined in blue, [Photograph], by VHB, (2022)

This technical project seeks to create a useful and sustainable design plan for the Ivy Corridor. Aspects of this project include site layout, stormwater management, sustainability, multimodal transportation, construction administration, and utility planning. On this site layout will be building footprints, totaling 300,000 gross square feet (GSF) of residential (student) space, 100,000 GSF of academic space, and 50,000 GSF of dining space. As requested by the client, this site design will include an interactive stormwater management feature and an outdoor classroom. The interactive stormwater management feature must also use green infrastructure (for example, a rain garden or vegetated swale) to treat and store stormwater runoff. All stormwater Best Management Practices (BMP's) will be sized according to the *2013 DRAFT Virginia Stormwater Management Handbook* (Virginia Stormwater BMP Clearinghouse, 2013) The Virginia Runoff Reduction Method will be used to calculate pollutant load removal for pre and post development conditions (Virginia Department of Environmental Quality, n.d.). Also in this site design plan will be plans for utilities, parking, roadways, bicycle and pedestrian shared walkways, an outdoor amphitheater classroom, and recreational green space. All aspects of our design will adhere to UVA's own design guidelines (University of Virginia Facilities Management & University Building Official, 2021). The VDOT *Road Design Manual* will provide specifications on roadway design aspects, including sight distances and intersection spacing (Location and Design Division, 2022). Our design will meet all relevant requirements set by the City of Charlottesville, such as emergency access codes and parking codes (City of Charlottesville, n.d.). Accessibility will be a critical feature in our design and ADA guidelines will be incorporated in our pedestrian walkway and parking space design (U.S. Department of Justice Civil Rights Division, n.d.). LEED certification assessment of the site is another crucial aspect of this site design as it offers a comprehensive evaluation of the sustainability of a site or project (U.S. Green Building Council, n.d.). We aim for our site plan to reach at least LEED Silver certification in order to adhere to UVA's rule mandating all new development projects meet LEED Silver level or above (University of Virginia Facilities Management & University Building Official, 2021). Our goal for our redesign of Phase II of the Ivy Corridor is to create a design that meets University of Virginia and City of Charlottesville development standards and that includes sustainability and accessibility features to benefit its future users without harming the surrounding environment.

Our team will be using the elevation data and overhead imaging provided by UVA and VHB and the pre- and post-development site plans provided by VHB to aid in our design. We will also take into consideration the recommendations of the Ivy Corridor Strategic Planning Study, which has information on the surrounding sites, to ensure our Phase II plan seamlessly blends with the other University components of the Ivy Corridor (Biohabitats et al., n.d.). In a design report style paper, we will present our technical project composed of our design and a thorough explanation of the design features, development standard compliances, and sustainability assessment.

ANALYSIS OF THE SOCIOTECHNICAL EFFECTS OF GREEN INFRASTRUCTURE

My STS research paper will evaluate the sociotechnical effects of green space implementation and provide a framework for equitable implementation. An increasing number of urban areas are beginning to integrate more green infrastructure, such as rain gardens, green roofs, and bioretention ponds, as a means to manage stormwater runoff. The addition of green space to an urban area has several benefits such as improved climate resiliency and urban heat island mitigation (Abdulateef & A. S. Al-Alwan, 2022). Green infrastructure can also positively impact the health of the residents, especially in older, low-income neighborhoods (Cook et al, 2020). Lower rates of violent crime are another benefit to green infrastructure implementation. A case study conducted in Portland, Oregon found an inverse relationship between the number of trees present in neighborhoods and the number of violent crimes reported (Burley, 2018). While the implementation of green infrastructure yields numerous benefits, it also worsens inequity.

Gentrification and inadequate distribution are concerns that arise from the implementation of green space in urban areas. Compared to white, wealthy neighborhoods, green infrastructure is disproportionally implemented in low-income nonwhite neighborhoods (Walker, 2021). Furthermore, when green infrastructure is added to low-income communities of color, gentrification ensues as the prices of housing in the area rise, displacing the people who lived there and furthering inequality (2021).

STS scholars have developed different frameworks in order to analyze the sociotechnical effects of green infrastructure implementation. Kronenberg et al. (2021) identifies the three groups that facilitate the flow of benefits of green infrastructure to be infrastructures, institutions, and perceptions. The negative impacts of green infrastructure implementation can be mitigated by closely studying the dynamics of these groups (Kronenberg, 2021). Taguchi et al. (2020) take a different approach by breaking down the sociotechnical system into two aspects: the procedural (the actors involved in decision making) and the distributional (the actors that are affected and how they are affected). The two aspects and their relationship with each other can be analyzed to expose how inequity arises and a strategy can be developed to reduce the negative impacts of future green infrastructure implementation (Taguchi, 2020). Other works of interest include “The green experiment”, which analyzes the sociotechnical transitions of green infrastructure (Chini et al., 2017).

The resulting research paper will be a literature review of STS research and frameworks created to examine the flow of sociotechnical benefits and disadvantages of green infrastructure implementation. Through this analysis, a holistic framework will be developed to promote equity in future green infrastructure projects.

CONCLUSION

For the technical project, our team will design a comprehensive site plan for the redesign of Phase II of the Ivy Corridor. The plan will include considerations for site layout, transportation, utility design, construction management, sustainability, and stormwater management. The STS paper will analyze the sociotechnical effects of green infrastructure implementation and provide strategies for the equitable implementation of green infrastructure for future green infrastructure projects, like the green stormwater management infrastructure design in our technical project.

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