Thesis Project Portfolio

Old Ivy Road Mixed-Use Development

(Technical Report)

The Impact of Car-Centric Infrastructure on Public Transit Systems in the United States

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

My capstone project is a design for a 35-acre mixed-use development at 2454 Old Ivy Road in Albemarle County, VA. The design includes over 300 housing units, which will help address the housing shortage in Charlottesville. The implementation of mixed uses will address the lack of walkable neighborhoods, while connections to the CAT bus network will expand public transportation connectivity into a new part of Charlottesville. The deliverables include a site plan, stormwater management plan, grading plan, and traffic design plan. These deliverables have been turned over to a team of engineers at Dewberry who are currently developing the same site, but are more limited by financial constraints. This freedom has given my group more flexibility in our design, allowing us to incorporate affordable housing and diverse transportation infrastructure.

The built environments that people live in and interact with play important roles in influencing well-being. The presence of infrastructure elements, or a lack thereof, impact human decisions, habits, and lifestyles. As designers of physical infrastructure, it is important to recognize how choices made during the design process impact the lives of future users. Star's theory of infrastructure connects humans and technologies. Star argues that technologies actively shape and influence the behaviors, practices, and power dynamics within a society. This theory can be applied to understand how transportation networks in mixed-use developments interact with existing infrastructure, transportation customs, and transportation devices.

I conducted case studies on the transportation systems in two different sized cities: Madison, WI and New York City, NY. I investigated each of these systems, with a particular focus on infrastructure-related factors that have contributed to their success. I found that the histories of local transit systems have played influential roles in shaping local transportation

customs. Additionally, trends in urban and suburban development have influenced investments in transit infrastructure, which has in turn favored certain transit modes. Competing transportation alternatives, such as automobiles, have inhibited the success of public transit systems, creating a positive feedback loop that has led to more infrastructure being designed for cars.

My capstone design incorporates infrastructure to support alternative modes of transportation through elements including bike lanes, multi-use paths, and connections to the Charlottesville Area Transit bus system. I considered historical transit systems and existing surrounding transportation infrastructure in my design. Developers should consider historical factors, local customs, and surrounding infrastructure as a part of the design process in order to create designs that fit into existing social and technical systems.