Thesis Project Portfolio

Meadow Creek Golf Course 17th Hole Fairway Erosion and Drainage

(Technical Report)

Augusta National Exclusionary Practices Shape the Way Society Perceives Golf

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Marshall Epperson

Spring, 2025

Department of Civil Engineering

Table of Contents

Sociotechnical Synthesis

Meadow Creek Golf Course 17th Hole Fairway Erosion and Drainage

Augusta National Exclusionary Practices Shapes the Way Society Perceives Golf

Prospectus

Sociotechnical Synthesis

Marshall Epperson

April 20, 2025

The relationship between the technical and STS components of my thesis lies in the mutual engagement with how golf courses are both physically and socially constructed. My capstone project addresses a technical challenge related to golf, at the 17th hole of Meadow Creek Golf Course, aiming to develop sustainable and functional stormwater drainage, erosion and sediment control, and construction feasibility solutions. On the other hand, my STS research paper explores how exclusionary practices at Augusta National Golf Club, one of the most famous golf courses in the world, shape broader societal perceptions of golf, especially among historically marginalized groups and the different socioeconomic classes. These two components intersect in recognizing that golf courses are more than just recreational spaces, they are shaped by both technical design choices and the social values embedded within them. The way a course is built, maintained, and experienced is deeply informed by who the space is for, who feels welcome, and who is left out. Together, the technical and STS lenses highlight how engineering decisions exist within a broader socio-cultural landscape.

The technical report on the Meadow Creek Golf Course, located in Charlottesville, Virginia, is facing ongoing stormwater management drainage, erosion, and sediment control issues. On the 17th hole, ongoing enlargement of a head cut is expanding onto the hole's playing area. The current drainage infrastructure, including upstream ponds and channels, is inadequate, leading to sedimentation, flooding, and water quality issues. The ponds, basins, and streams present in this area cannot effectively treat or handle stormwater runoff. This is causing the golf

course to flood, carrying runoff with nutrients from course fertilizers into the Rivanna River. This has broader implications for the Chesapeake Bay, as there are limitations on the amount of sediment, nitrogen, and phosphorus that can be discharged into the bay. The existing stormwater infrastructure is not designed to manage these issues effectively, leading to overland bypass worsening the erosion and sediment problems. In order to mitigate the Meadow Creek Golf Course stormwater management concerns, our team has come up with three different options for the city to choose from. The options are: new stormwater pipe installation below grade with a hardened outfall, a swale, and a step pool conveyance system. Each solution has been created through digital design software, and each solution has its own pros and cons.

The STS portion of my paper seeks to explore how Augusta National, alongside golf courses as a whole, continue to resist change and inclusivity, specifically catered towards African Americans and women, and contributes to the divide between different socioeconomic classes and how they perceive these spaces. The first section of the paper, the literature review, will cover background information that is necessary to understand while exploring this topic. The history and traditions of golf, its exclusive nature, the natural resource it strains, and theoretical framework will be outlined in this section. Next, the methods section will showcase how the information on Augusta National, the PGA, and other datasets that were found and used to incorporate into the paper. In my analysis, you will find an in-depth analysis on how the exclusive nature of Augusta National has ruined common marginalized groups perception of golf and golf courses, as well as a breakdown on the differences between perception of those in different socioeconomic statuses using the Social Construction of Technology (SCOT). The conclusion will provide concrete outlooks on the game of golf, what society should do in the future, and how others could build off this paper to conduct their own research.

Working on both the technical and STS components of my thesis simultaneously allowed me to see the practice of civil engineering in a much broader context than I would have if I had done each part in isolation. While the technical aspect of my thesis required real world problem solving involving erosion and drainage at a specific location, the STS research pushed me to consider who golf courses are designed for and why certain communities have historically been excluded from these spaces. Thinking critically about the exclusionary legacy of Augusta National made me more aware of the social and cultural significance of the spaces we build. It encouraged me to question how our designs might unintentionally reinforce existing inequalities, and how inclusive engineering can help counteract that. The dual focus deepened my understanding of how civil engineering is never just technical, it's always part of a larger social fabric that shapes and is shaped by our designs.