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Analysis of Technical and Cost Barriers for Implementation of Green Infrastructure

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Graduate Student Council Research Grant Application Summary

1. Overview

My name is Liya E. Abera, a second year Ph.D. student in the Department of Civil Engineering. I am applying for the GSC grant to obtain a hydrological modeling software, HydroCAD, to use in my research for stormwater rainfall-runoff analyses.

2. Intellectual Merit

Stormwater runoff occurs when rainwater flows over the ground. Increase in impervious land cover due to urbanization and land development causes excess stormwater runoff that causes flooding events. Floods can be hazardous to communities by damaging properties and exposing them to contaminated water. Installation of Green Stormwater Infrastructure (GSI) is one sustainable way of reducing flooding events and preventing damages. However, two types of barriers prevent developers and engineers from installing these practices. The first type of barrier is technical, which includes a lack of understanding about the benefits of GSI and a lack of data demonstrating performance. The second type is economic, such as costs of constructing and maintaining GSI practices. We are performing research to evaluate how technical and economic barriers affect the implementation of GSI. Much of the evaluation has already been performed by conducting rainfall-runoff analysis using HydroCAD modeling software and life cycle cost analysis (LCCA) using spreadsheet tools. The HydroCAD software used for this project so far is free, with limited capabilities. Therefore, simplifications of the rainfall-runoff conditions were made. A paid version of HydroCAD is being requested via this proposal to be used for more detailed analyses. The analyses will be performed for different scenarios based on GSI type and storm events. This research will result in information to help developers and engineers see the options of implementing GSI to reduce the damages of stormwater on downstream properties.

3. External Opportunity

I will apply for the American Geophysical Union's (AGU) Horton (Hydrology) Research Grant. The application will close on 04/15/2020. The potential funding is \$10,000. If awarded, I will conduct stormwater runoff pollution analysis. The analysis will be performed by sampling stormwater runoff for different storm events from the inflow and outflow of GSI and conducting laboratory analyses. The award will be used to buy water quality testing laboratory equipment and kits and for sampling stormwater runoff. Adding the water quality analysis will help provide more useful information and conclusions about the benefits of GSI, which would help developers and engineer in their selection of specific GSI for their projects.