

Research Needs Statement

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Title:	A Framework for Quantitative Assessment of the Environmental, Social, And Economic Benefits of TDOT Infrastructure Projects
Key Words:	Green Infrastructure, Environmental, Social,
Research Problem Statement:	<p>Although traditional approaches to infrastructure development might be convenient to DOTs and contractors because of their ease of construction and relatively inexpensive initial investments, their costs are not sustainable on the long run as they require expensive maintenance and repair. Moreover, they contribute to adverse environmental and social impacts. As such, there is a growing need for sustainable integrated infrastructure management practices – also named green infrastructure – as an alternative for traditional approaches.</p> <p>While recent years have witnessed an increase in studies attempting to place a value on green infrastructure versus traditional practices, most only consider either an individual benefit or set of benefits (such as storm water, heat island effect, or increased property value benefit) while comparing between practices. Very few take an all-encompassing approach due to the difficulty in quantifying the different benefits.</p> <p>It has become widely known that green infrastructure solutions outperform traditional infrastructure solutions in delivering multiple environmental, social, and economic benefits. To-date though, DOTs find difficulties in quantifying social and environmental benefits. As such, they rely heavily on traditional life-cycle and cost-benefit analysis in evaluating alternatives for urban infrastructure developments. These analyses only consider financial factors such as initial cost and running cost, and marginalize environmental and social merits. Thus, it could be concluded that DOTs do not have a standardized framework for assessing the integrated environmental, social, and economic benefits of water management developments. Thus, when offered the choice between green infrastructure and traditional infrastructure alternatives, the available assessment approaches provide incomplete pictures of the benefits, thus leading to unfitting decision making and mishandling of the taxpayers’ money.</p>

Research Objective:	Develop a systematic framework that integrates quantifiable environmental and social benefits with the economic benefits of enabling green infrastructure over traditional development approaches.
Related Research/Continuation of Past or Current Project:	<ul style="list-style-type: none"> • https://www.epa.gov/green-infrastructure • https://www1.nyc.gov/html/dep/html/stormwater/using_green_infra_to_manage_stormwater.shtml. • https://ddot.dc.gov/GreenInfrastructure • https://www.wri.org/blog/2012/06/green-vs-gray-infrastructure-when-nature-better-concrete
Expected Deliverables:	<ul style="list-style-type: none"> • Development of a frame work that TDOT could build upon to create and develop more green and less gray infrastructure. • Would serve as the primary data source for further research and analysis.
Estimate of Problem Funding & Research Period:	The research period is estimated to be 24 months. The estimated funding is \$200,000.
Urgency and Potential Benefits:	Infrastructure created around the environment instead of through it will last longer and function better.
Implementation Planning:	This research is essential for successful future transportation planning projects including travel demand modeling and integrated transportation and land use planning.
Person(s) Developing the Problem Statement:	Planning Application Office, TDOT.Research@tn.gov
Submission Date:	35T
Problem Number	20