RUTGERS
Center for Advanced Infrastructure and Transportation

Project Overview Report

1. UTC Identifying Number
   DTRT13-G-UTC28
2. Center Identifying Number
   CAIT-UTC-NC5
3 Project Title
   Bridge Retrofit or Replacement Decisions: Tools To Assess Sustainability and Aid Decision-making
4. Principal Investigator & Contact Information
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7. Project Description
   Several sustainability rating, scorecard, and quantitative and/or qualitative performance metrics tools exist to assist in the assessment of sustainability of bridge projects, e.g. the Sustainable Transportation Analysis and Rating System (STARS) and INVEST. These tools are mostly applied after a project is completed or late in the decision when most of the retrofit details have been decided. What is needed are tools to help in the early stages of decision-making about whether to repair or reconstruct bridges when there are more choices open and hence a greater ability to radically reduce environmental and societal impacts. What is missing is the life cycle inventory data to allow comparison of construction and maintenance techniques for sustainability objectives, such as worker safety and increased ozone emission from slowed and stopped car traffic, in addition to cost. This research will set up the framework for a life cycle inventory database for bridge repair and construction techniques including social and environmental sustainability concerns. Bridge experts and practitioners will be recruited to upload their information about the service life of bridges and sustainability impacts to this database. This research will also modify existing early-state commercial product design decision-making tools to create an applicable tool for bridge retrofit decisions utilizing sustainability information available in the life cycle inventory database.
8. Implementation of Research Outcomes (or why not implemented)
   The results of this research, an inventory database and an early-stage decision-making tool for considering sustainability of bridge repair or replace decisions will be made available online publicly. The database will be set up such that users can access and add their own information within the set framework. This cache of sustainability information about bridges will be accessible to researchers, practitioners, DOTs, and the general public. An example analyzing a typical bridge retrofit using the database information will be published. The case study of the early stage bridge retrofit design decision-making tool will also be published. Additionally, the tool will be made publicly available with guidance documentation such that interested parties in using the tool will be able to access and utilize it without assistance. In particular, members of the assembled cohort of bridge experts and practitioners as well as DOTs, academics, and the general public will be updated of the progress and the completion of the inventory database and tool, and encouraged to utilize them both. Broader dissemination will occur through jjournal publications, conference presentations, and by partnering with the University of Delaware's Center for Innovative Bridge Engineering.

9. Impacts/Benefits of Implementation (actual, not anticipated)
   TBD
10. Dates and Budget
    Start Date: 1/1/2015
    End Date: 12/31/2015
    UTC (CAIT) Dollars: $ 45,139
    Cost Sharing: $ 45,550
    Total Dollars: $ 90,689
11. Keywords
    Bridge rehabilitation, bridge maintenance and repair, life cycle assessment, life cycle inventory, decision-making, sustainability
12. Web Links (Reports and Project Website)
    https://cait.rutgers.edu/cait/research/bridge-retrofit-or-replacement-decisions-tools-assess-sustainability-and-aid-decision-