

**Project Information Form**

Project Title:	Framework for Urban Metabolism and Life Cycle Assessment of Hardscape
University:	University of California, Davis
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Funding Source(s) and Amounts Provided (by each agency or organization):	US Department of Transportation (USDOT) - \$40,895.53
Total Project Cost:	\$40,895.53
Agency ID or Contract Number:	UCD-DOT-301 DTRT13-G-UTC29
Start and End Dates:	October 1, 2016 through March 31, 2018
Brief Description of Research Project:	<p>Urban hardscapes can be defined as human-altered surfaces in contact with the earth in urban areas other than alterations for horticulture. Hardscape covers large portions of the urban surface area, and has potentially large influence on air emissions, truck traffic and its associated problems, and the potential for flooding. Modeling the inflows of hardscape materials and the outflows of demolished hardscape and other rock-based products from buildings and other civil infrastructure is expected to provide a means to find solutions for reducing these flows and their impacts. Modeling of urban hydrology with respect to the effects of hardscape on surface and groundwater flows from precipitation is expected to provide a means to find solutions that will reduce the risk of flooding and improve groundwater recharge.</p> <p>The goal of this white paper is to advocate that researchers and policy-makers use the analytical approach of combining urban (UM), material flow analysis (MFA) and elements of life cycle assessment (LCA) to measure and improve the efficiency of urban hardscape in large urbanized areas with respect to environmental impacts affecting global warming, safety and quality of life through use of alternative hardscape structure and materials and more permeable hardscape. The white paper provides details on the proposed UM-LCA framework. Additionally, several data sources and modeling tools were identified that can be used in the UM-LCA framework to quantify material and energy flows and environmental impacts including water flows. An effort was also made to identify data for a few of the cities in California in order to demonstrate parts of the data collection and presentation process. The framework developed is not limited to a single U.S. state, rather it can be used in any geographic region of the U.S.</p>



# National Center for Sustainable Transportation

Describe Implementation of Research Outcomes (or why not implemented): Place any photos here	
Impacts/Benefits of Implementation (actual, not anticipated):	
Web Links <ul style="list-style-type: none"><li>• Reports</li><li>• Project website</li></ul>	<a href="https://ncst.ucdavis.edu/project/framework-urban-metabolism-life-cycle-assessment-hardscape/">https://ncst.ucdavis.edu/project/framework-urban-metabolism-life-cycle-assessment-hardscape/</a> <a href="https://escholarship.org/uc/item/77g742tq">https://escholarship.org/uc/item/77g742tq</a>