THE DURHAM SCHOOL of ARCHITECTURAL ENGINEERING and CONSTRUCTION

University of Nebraska Lincoln

DISASTER DEBRIS MANAGEMENT: RECYCLING AND REUSE

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Research Summary:

In the last ten years, disasters like hurricanes Sandy and Katrina and the earthquakes in Haiti and Japan have caused communities to be overwhelmed with the amount of debris that is left behind. Identifying the amount of debris that is generated by a disaster will help communities better plan its management and the recovery process. Understandably, debris management plans may vary by location and type of hazard. However, with the common goal of effective recovery, there are lessons learned that may be gleamed from past events to better plan for future disasters. The long term goal of this research, focused on post-disaster debris management, is the development of guidelines to recycle and reuse construction material debris in hazard prone areas, which assist in recovery and reconstruction. In pursuit of this goal, the first research objective is to characterize and quantify debris material from a natural disaster. This work involves case study assessments of debris generation by past natural disasters. The second research objective includes assessing the feasibility of construction material debris/waste being recycled or reused for reconstruction. Thus leading to the third objective, the development of salvage-ability criteria to reuse and recycle disaster debris.

The rationale for this research is that its successful completion will provide opportunities for advancement by improving disaster recovery/reconstruction practices such that they include sustainability. Through debris management or the recycling and reuse of debris materials, we have a chance to alter how we impact the environment.

Significance: Following major disasters, the disposal and removal of building debris/waste can have a taxing effect, both economically and environmentally. Sustainable recovery provides options to relieve some of that burden, while leaving room for improvements. *This research is significant because the research findings have the potential of advancing knowledge on the use of sustainable measures in the disaster recovery/reconstruction process, thus ultimately reducing the impact on the economy and the environment.* The proposed work is designed to capitalize on the large quantities of material debris/waste that remains after a natural disaster while introducing new avenues of sustainability and disaster recovery. The intellectual contributions include the development of guidelines for sustainable construction, methodologies for the structural assessment of debris/waste, and performance measures to address salvage-ability.

Expected Outcomes: This research is potentially transformative because it ties together green engineering, the use of science and technology to minimize environmental impact, and disaster recovery; thus advancing a field that is currently dominated by the excessive use of landfills for debris disposal. At the completion of this work, I expect to have developed a methodology for enhancing the way

communities are rebuilt during the recovery process. Moreover, it is my expectation that the successful completion of this research would lead to additional discoveries in the relatively new field of sustainable disaster recovery, for both natural and technological hazard events.

Additionally, the broader impact of the proposed research has many multidisciplinary implications. Extensions are possible to social science, the study of human factors; urban planning and land use; and environmental science.