October 14, 2013

An Important note from the Principal Investigator Abolhassan ASTANEH-ASL, on the document that follows:

I wrote this article in November 2001 discussing lessons learned from the collapse of WTC Towers.

Respectfully,

Abolhassan ASTANEH-ASL, Ph.D., P.E.

Professor and P.I. for the NSF Funded UC Berkeley WTC Project

Lessons From Ground Zero: Understanding Why the Twin Towers Collapsed and Engineering Solutions to Prevent Future Tragedies

Supported by NSF, University of California-Berkeley professor and expert on steel buildings Abolhassan Astaneh-Asl is recovering critical evidence from the site of the collapsed World Trade Center (WTC) towers. Steel fragments from the WTC hold valuable clues for understanding why the buildings collapsed, including the relative contributions of impact and heat stresses. Such knowledge can help prevent future tragedies by enabling construction of buildings more resistant to earthquakes, bombs, and other catastrophic forces.

Important information that might have been lost to the rapid removal and recycling of steel from the WTC site has instead been captured for future analysis. Thanks to the swift, effective action of NSF staff, especially Priscilla Nelson, Joy Pauschke and Richard Fragaszy, funding was approved a mere three days after the terrorist attacks. Within a week, Astaneh was in New York City, gathering perishable data. He initially spent 20 days at ground zero, followed by a further six days in late October.

Amidst 40,000 tons of twisted steel, Professor Astaneh located and recovered an internal column hit by what may have been one of the planes. This piece of steel for the first time shows us what might have happened to internal columns when the planes hit the buildings. He has collected heat-deformed specimens resembling "something from a Salvador Dali painting." The heat was so intense that fire proofing on the steel melted into a thin, glasslike layer. He has been able to establish that the construction of the twin towers was "almost perfect".

With separate funding, Professor Astaneh plans to undertake various analyses of his WTC data [link to www.ce.berkeley.edu/~astaneh]. With the help of other research collaborators, he will examine cross-sections of steel specimens under an electron microscope to determine how much heat they were subjected to and for how long. He and a colleague, Dr. David McCallen of Lawrence Livermore National Laboratory will construct a realistic computer-simulation model of the WTC, calibrate it using data gathered on site, and examine alternative crash scenarios (e.g., planes with less fuel aboard, 747s instead of 767s, planes hitting the building lower or higher etc.). The main objective is to learn lessons from this tragedy and apply such lessons to future buildings as well as existing high-rises to prevent such catastrophes and to save lives.

Astaneh is a recipient of prior NSF support to develop an innovative technology of his own design involving the use of concrete-and-steel composite shear walls to make buildings more bomb- and earthquake-resistant. In a separate project, Astaneh is investigating application of a cable-based technology in retrofitting existing buildings, to prevent "pan-caking" of floors in the event of a terrorist attack and removal of columns. This past summer, funded by General Services Administration, the technology was tested and was shown that it can be used successfully in new construction. Following those tests, using a grant from National Science Foundation, Astaneh is preparing a specimen to be used to test application of such cable-based technology in retrofitting existing structures. Testing of the retrofit technology is scheduled for early 2002.

For more information, contact Abolhassan Astaneh-Asl at astaneh@ce.berkeley.edu, 510-642-4528.

This document is part of the **"World Trade Center Post-Disaster Reconnaissance and Perishable Structural Engineering Data Collection"**, a research project funded by the U.S. National Science Foundation at the Univ. of California Berkeley with Prof. Abolhassan ASTANEH-ASL (http://www.ce.berkeley.edu/~astaneh). as the Principal Investigator. Duration of the project was from 10/2001 to 9/2002. Further Information and project archives are at http://lib.berkeley.edu/ENGI/WTC.