Awarded Contracts for External Experts to Support the NIST World Trade Center (WTC) Disaster Investigation

Contract No.	Awarded to	Date Awarded
SB1341-03-W-0715 (Area 3)	Dr. Kaspar Willam	6/16/2003

OUTSIDE EXPERTS FOR BASELINE STRUCTURAL PERFORMANCE, IMPACT ANALYSIS, STRUCTURAL RESPONSE TO FIRE, COLLAPSE, ETC.

Under solicitation number SB1341-03-Q-0322, firm fixed-price purchase orders have been awarded to experts in five technical areas for their experience and judgment at the most senior professional level to provide expert technical assistance as follows:

Area 3: Thermal-Structural Analysis of Structural Systems Exposed to Fire
A purchase order for Area 3 has been awarded to Prof. Kaspar Willam, a Professor of Civil Engineering at the University of Colorado at Boulder, Colorado. Dr. Willam will provide technical expertise and assistance for analysis of the structural response of the impact-damaged WTC 1 and 2, and of WTC 7, to uncontrolled fires. The analyses will include separate evaluations of components and subsystems (exterior and interior columns, floor truss members, floor system) and of the global structural system response. The specific tasks Dr. Willam will perform include:

- Provide expert technical assistance in finite element and analytical modeling for thermal-structural analysis of structural systems, characterization and constitutive relations of materials at elevated temperature, and thermal analysis and thermal-structural response of structural systems.
- Conduct in-depth, review and critique of the work done on the thermal-structural response of the WTC towers to fire. The review shall include: a) appropriateness of the models for their intended uses, including modeling assumptions, level of detail, model geometry and material properties, and verification and validation procedures; and b) appropriateness of the analyses and accuracy of results.

Dr. Willam has a doctorate in civil engineering and is a recognized expert with over 33 years of experience in the fields of finite element analysis, constitutive modeling, inelastic behavior, thermo-mechanical behavior of materials and structures, and computing in applied mechanics. He has published numerous papers in each of these fields. He is a Fellow of the American Society of Civil Engineers (ASCE), a Fellow of the American Society of Mechanical Engineers (ASME), and a Fellow of the US Association of Computational Mechanics (USACM). He received the Newmark medal of the American Society of Civil Engineers in 2003 for his outstanding contributions in structural engineering and mechanics. He will be providing technical assistance and expertise in the following areas.

- Temperature-dependent thermal and mechanical materials characterization and constitutive modeling.
- Analytical modeling and transient thermal and thermal-mechanical finite element analysis.
- Analytical modeling and nonlinear finite element analysis of structural systems subjected to degradation of mechanical properties at elevated temperatures.