

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

<b>Contract No.</b>	<b>Awarded to</b>	<b>Date Awarded</b>
SB1341-04-Z-0001	Gilsanz Murray Steficek LLP (GMS)	10/27/2003

### **DEVELOPMENT OF WTC 7 STRUCTURAL MODELS AND COLLAPSE HYPOTHESES**

Under solicitation number SB1341-03-R-0028, an indefinite deliverable, indefinite quantity (IDIQ) purchase order has been awarded to Gilsanz Murray Steficek LLP (GMS) of New York City and its team composed of Dr. John Fisher of Lehigh University, Pennsylvania, and Computer Aided Engineering Associates Inc., of Woodbury, Connecticut.

GMS is a structural engineering firm that specializes in new construction and renovation projects of office buildings, residential towers, industrial facilities, hospitals, and historic structures. Office building design projects include 300 Madison Avenue, and the Brooklyn Courthouse, high rise buildings. GMS partners have worked on several steel high rise buildings in New York City of the same vintage as WTC 7, prior to the formation of GMS in 1991. GMS also conducts blast design and progressive collapse analysis of steel and concrete buildings, which included nonlinear structural analysis and investigation of possible collapse initiation. Dr. John Fisher is a steel connections expert who specializes in the fatigue and fracture resistance of bolted and welded steel connections. CAEA specializes in transient thermal analysis, and has conducted training in nonlinear analysis for ANSYS software.

The GMS team will conduct analyses of the WTC 7 building's structural response to fire conditions. NIST will be conducting all fire analysis of the building in-house and supplying the time-temperature histories for the structural analysis to the GMS team. A rigorous review process of the work and products will be implemented. The review process includes independent reviews by third-party experts retained by NIST, Dr. Shankar Nair and Prof. Kaspar Willam, under solicitation number SB 1341-03-Q-0322, to augment in-house NIST reviews. Specific tasks that the GMS team will perform include:

1. Develop and validate a structural finite element model of WTC Building 7.
2. Conduct preliminary structural analyses, without fire effects, of sequences of member failures and load redistribution to identify credible failure sequences up to the point of collapse initiation.
3. Develop models of critical subsystems for identified failure sequences and analyze their response to representative fire conditions.
4. Conduct parametric studies of subsystems to determine the effects of influential parameters and their uncertainty on analysis results.
5. Develop approaches to simplify structural analyses for final global modeling and analyses.
6. Modify the structural finite element model of the WTC 7 building to incorporate simplifications and to support nonlinear structural analysis for building regions affected by fire.
7. Analyze selected collapse initiation sequences for probable fire growth and spread sequences provided by NIST.
8. Conduct parametric studies of the global analyses to determine the effects of influential parameters and their uncertainty on analysis results.

All major technical decisions involving contractor work require NIST guidance, review, and approval. In addition, findings, conclusions, and recommendations are the responsibility of NIST, not the contractor.

The GMS team combines engineers with experience in structural engineering of high rise steel office buildings, failure of structural steel connections, and thermal-structural analysis. Selected experience of key project personnel is summarized below:

All three founding Partners, Mr. Ramon Gilsanz, Mr. Philip Murray, and Mr. Gary Steficek, will be involved in this project. Mr. Gilsanz will act as the Principal for the project team.

- Mr. Ramon Gilsanz has over 20 years of experience as a structural engineer for a wide range of projects, including design, renovation, and progressive collapse analysis of high rise steel office buildings. He is a registered professional engineer and a registered structural engineer. He has received awards for design projects from the New York Association of Consulting Engineers and the American Consulting Engineers Council. He is a past president and a member of the Structural Engineers Association of New York and a member of American Society of Civil Engineers. He has a Master of Science degree in Civil Engineering from the Massachusetts Institute of Technology.
- Dr. John Fisher, P.E., is a Professor Emeritus of Civil Engineering at Lehigh University. He has over 35 years of experience in the design, behavior, and failure of steel structural connections of riveted, bolted, and welded structures and of composite steel-concrete members. He has conducted over 100 research projects in these areas since 1961. He has published over 260 reports and articles and is an author of several books on structural steel design and fatigue and fracture of steel connections. He has received numerous awards throughout his career in recognition of his contribution to structural engineering. He was elected to the National Academy of Engineering in 1986. In 1995 his work was recognized with the award of the ASCE John A. Roebling Medal for Lifetime Achievement in Bridge Engineering. In 2000 he received the John Fritz Medal for extraordinary vision in researching safety and performance of steel structures, and leadership in making discerning judgments for the public good. He has a Doctor of Philosophy degree in Civil Engineering from Lehigh University.
- Mr. Peter Barrett, P.E., is the Vice President of CAEA and a registered engineer. He has over 20 years of experience in thermal-structural applications using the finite element method. He has performed numerous geometric and material nonlinear static and dynamic analyses to evaluate the strength and stability of aerospace, nuclear, dam, and offshore structures. He has taught over 100 ANSYS training classes over the last 10 years about finite element theory, nonlinear analysis, and applied methods. He has a Master of Science degree in Structural Engineering Mechanics from the University of California Berkeley.