EXECUTIVE SUMMARY- REVISED

The IAC Headquarters is an 11-story office building that serves InterActiveCorp, an internet and media conglomerate. It is located on West 18th Street in the Chelsea neighborhood of Manhattan and is positioned along the Hudson River. At approximately 130,000 sq ft in size and 150 feet high, the IAC/InterActiveCorp Headquarters stands out along the New York City skyline because of its unique sculptural shape.

STRUCTURAL DEPTH

The current structural system of the IAC Headquarters is a two-way reinforced concrete flat-plate system with reinforced concrete shear walls. The proposed thesis will include a redesign of the entire floor system as post-tensioned, which will, in turn, result in changes to the shear wall core. There were a number of design concerns that dictated the decision to redesign using a post-tensioned system. For instance, the soil is very poor on the site, resulting in unforeseen costs and time spent during construction of the foundations. Additionally, the building undergoes substantial torsional motion. Through the redesign, these issues can hopefully be remedied. Because a post-tensioned system will require lower slab thicknesses, the weight of the building will decrease, resulting in fewer loads on the foundations. Another point of potential concern was to design a more efficient transfer slab at the sixth floor setback. Instead of the two-way flat-plate design, the uplift from the tendons in a post-tensioned system will reduce the likelihood of long-term creep, and lessen significant deflections or vibrations.

The post-tensioned system will be redesigned using RAM Concept, while ETABS will be used to model the lateral system. In conjunction with the computer models, hand calculations will be performed as well to verify the computer output. Investigations will be made to determine if changes to the shear walls or post-tensioning systems will help to alleviate the torsion acting on the building. Because torsion can cause large loads on the lateral system of the building, it would be advantageous to redesign the building so that it undergoes less torsional motion. Changes to the shear wall locations or sizes will be considered as a possible solution to alleviate torsion, as will designing the post-tensioned system to carry a portion of these loads. Additionally, the use of different concrete strengths throughout the building will be studied in both the shear walls and the columns. This could potentially lead to the optimization of the shear walls and could create uniformity in column sizes so that forms can be reused.

BREADTH STUDIES

Construction: To determine the time and costs necessary to redesign the IAC building with a post-tensioned floor system.

Changing the gravity system of the IAC Headquarters will drastically alter the construction process and, thus, the scheduling and costs associated with it. This topic will involve composing a construction schedule using Microsoft Project and comparing its critical path to that of the actual construction. Additionally, the costs of both systems will be analyzed. Another issue to address is that there are not construction workers currently working in New York City that are familiar with building a post-tensioned floor system. For this reason, it will also be important to evaluate whether or not it would be worthwhile to bring experienced workers in from outside of the city in order to construct the building, based on what is found from the scheduling and cost study.

Building Envelope: To develop a blast-resistant glass façade, while considering the thermal and lighting effects of the facade change.

Frank Gehry, a world renowned architect, designed the InterActiveCorp/IAC Headquarters and, though it stands at only 150 feet tall, its sculptural quality makes it a high-profile building in the New York City skyline. This breadth topic will focus on utilizing skills learned in the AE542-Building Enclosures course to design a blast-resistant system for the IAC Headquarters' all-glass facade. This would include determining standoff distances and computing the thickness of the glass to resist blast. This is especially important in buildings with all glass in order to avoid the 'wet-blanket' effect. Additionally, basic thermal and lighting calculations will be preformed to evaluate the difference between the current glass facade and that which is being proposed.

This topic also affects the structural system of the building because, in order to make the blast-resistant glass a worthwhile alternative to the facade, the building's structure must also be able to sustain blast loads. The shear walls will take into account a blast load when designed. Additionally, if there is time permitting, a structural study of progressive collapse will also be performed.

In the event of a substantial change to the shear walls, an architectural breadth will be necessary.

MAE COURSE-RELATED STUDY

The MAE requirement for this project will be fulfilled through the design of the blast-resistant building facade. Methods taught in the AE542: Building Enclosures course will be used to determine glass type and thicknesses. Additionally, use of the AE597A: Computer Modeling course will be vital when modeling the IAC Headquarters. Though RAMConcept was not taught in this modeling course, the concepts learned, such as semi-rigid diaphragms and meshing, will be implemented in the redesign of the IAC Headquarters.