

Nick Szakelyhidi
Structural
MK Parfitt
Office Building, Washington, DC
Final Report
4-3-06



All renderings courtesy of Dreyfus Property Group and KRJDA

Executive Summary

The building being evaluated is a mixed use office building located in downtown Washington, DC. A continuous glass façade covers the exterior of the building. On 3 sides, there is a 20' cantilevered bay which allows the façade to be uninterrupted by vertical supports. The structure of this unique building is a cast in place two-way post-tensioned flat slab with drop panels at columns. Lateral forces are resisted by monolithic concrete moment frames in the north-south and east-west directions.

As an area of investigation, the structural system was designed using a composite steel equivalent. The thesis research assessed the design of this equivalent and the affect on gravity and lateral systems. The result was a decrease in building weight by over 300%. Seismic effects on the building were reduced significantly. Lateral stiffness was decreased by approximately half but the braced frames and moment frames were still able to bear the lateral forces due to the seismic force reduction. A consequence of the building composite steel framing system was an increase in floor depth. The original structure maintained a maximum depth of 24 inches, whereas the provisional steel structure saw a maximum depth of 26 ½ inches.

The cost comparison yielded a price estimate for the composite steel structure that closely rivaled the cost of the concrete structure. Composite steel construction proved to be a marginally quicker than the existing concrete frame. LEED analysis make certain that steel attain an equal or higher rating that the concrete equivalent.

After all aspects of the project were considered, It was decided that there were not enough clear benefits using the composite steel system to warrant its use over the existing post-tensioned cast in place concrete structural system.