

Executive Summary

The Gateway Commons building in Ithaca, New York is a mixed-use development building being used for retail and residential apartments. It has a basement floor below grade and six floors above grade at a height of 62 feet. CMU walls supporting precast concrete hollow core planks make up the building structure. The building façade uses a combination of brick, an Exterior Insulation Finish System (EIFS), and metal panels. The apartment units are designed as luxury apartments. Construction of this project started in December of 2005 and was completed in April of 2007.

This report consists of a detailed study of an alternative structural system. The structural members: columns, girders, pan joist slab, footings and shear walls were all designed according to the loads applied and constraints that restricted the member sizes. Columns of size 14"x24", girders of the size 14"x18" and 14"x16", and a pan joist slab with a tops slab of 4.5" thick with 7"x10" joists were used in the structure redesign of the gravity force resisting system. 8" thick ordinary reinforced concrete shear walls were used as the lateral force resisting system.

Two breadth studies were preformed to validate the redesign of the structure. In the architecture breadth new structure was designed as an office building to show that the new structure allows for versatility in redesign of the architecture. The column layout on the new structure was superimposed on the existing architecture floor plan that the new structure is compatible with the existing architecture.

A construction management breadth was also completed for this project. The cost of the existing structure is \$2,078,841. The cost of the new structure will be \$1,293,136. The total cost savings of switching the structure from precast hollow core concrete planks on CMU walls to a concrete pan joist system is \$785,705. A schedule comparison was also preformed and the new structure was able to be completed 79 day before the existing structure would have finished.