

Executive Summary

Southtown Building No. 5 is a luxury residential building located in the center of Roosevelt Island in Manhattan's East River. It houses 123 condominiums in 16 floors with an underground cellar which houses storage units as well as mechanical and electrical space. The building is the fifth out of nine apartment buildings in a development that is planning to revitalize the once industrial Roosevelt Island into a place in which people will live, work, and play. The apartment building also houses a full service lobby with a concierge, mail room, health club, multi-purpose room, children's play area, party room, and rooftop terraces.

With the building being located in New York City, height restrictions play a significant role in building construction. Having a height limitation of 187 feet from the datum, floor-to-floor heights as well as floor thicknesses are a very important factor. With this in mind, the structural engineer utilized a reinforced concrete flat plate floor slab with a thickness of 8" for typical floors. This type of system allowed for a fairly wide open layout for the architect's one, two, and three bedroom condos.

This report focuses on an in-depth study of engineering for an alternative structural steel system to the replace the existing cast-in-place concrete system. To keep floor thickness as close to 8" as possible, a Girder-Slab system was utilized for typical floors. This system consists of prefabricated steel beams, known as D-beams, which support prestressed hollow core floor planks. Additionally, the ground floor was designed as a composite steel and concrete deck system to allow for heavier loads. Additionally, the lateral system was redesigned from the original cast-in-place concrete shear walls to concentric braced frames to keep continuity of the steel system.

In addition to the depth study of an alternative steel system, two breadth studies were completed. The first breadth study analyzed construction management topics associated with the redesign of the structural system. This study compared existing costs and schedules associated with the concrete system to the new cost and construction schedule of the steel system. The second breadth study involved extensive research into achieving a LEED certified building. In addition to twenty-six points that were analyzed and applied to Southtown Building No. 5, a building energy analysis was performed to compare the existing PTAC air-conditioning units to an alternative air source heat pump system.

