

Executive Summary

The current design of 246 West 17th Street consists of seven modern stories of flat-plate, two-way slab construction atop three stories of historic construction featuring steel framing and load-bearing masonry exterior walls. The weight of the concrete addition contributes an incredible amount of weight to the structure, requiring that the foundation be increased dramatically in size, that the historic steel columns be heavily reinforced, and that the long-span transfer beams be supported with very deep reinforcing beams. Furthermore, the lateral force resisting system makes no attempt to utilize the existing steel or the mass masonry exterior walls; instead, shear walls have been implemented and have been designed to take all lateral loads.

Structural Depth Study: System Optimization

This report explores an alternate design to the current concrete system (referred to herein as the “current design”) in an attempt to lessen the degree of reinforcement required within the historic portion of the structure. The proposed design consists of steel framing with a lightweight concrete slab-on-deck system. To resist lateral forces, steel chevron braces have been implemented into the design in lieu of concrete shear walls.

Mechanical Breadth Study: HVAC Coordination

The conversion to a steel frame structure results in a significantly different floor system depth. To account for this change and allow for optimal coordination between the new structure and the mechanical HVAC system, the floor-to-floor heights have been increased on the newer stories and the system ducts have been resized to fit within the new interstitial space between ceiling and beam.

Construction Management Breadth: System Cost Study

The difference in cost of steel systems and concrete systems is apparent in areas such as the required materials and the associated labor. For this report, a system-oriented study has been carried out to evaluate the optimal design based on overall economy. As indicated, factors such as labor and material have both been taken into account to prove that the proposed steel system will in fact be most economical.