

## Executive Summary

The building at 8621 Georgia Avenue is proposed to be built on an existing 0.69 acre parking lot located in the downtown business district of Silver Spring, Maryland. The 17 story, 347,000 ft<sup>2</sup> project will create more downtown multi-family housing and parking for the booming region. Construction on the project began at the beginning of 2015 and is anticipated to take 20-24 months.

The originally designed structure of the building begins with a dual system of mat foundation and spread footings. The gravity system on the first four floors of the building, which will be utilized as a parking garage, consists of two way concrete with the use of drop panels. The 12 remaining floors above are post-tensioned concrete slabs. The lateral system of the building consists of 14 shear walls. A structural overview of the existing concrete system is presented in greater detail within the first portion of the report. The remainder of the report with focus on the steel redesign of the building.

The primary structural redesign of the building was accomplished by implementing a composite beam-girder system for the apartment levels atop the existing concrete parking garage. The stringent height restriction in the area controlled a lot of the design decisions. Bay sizes were limited to be cooperate with the architecture of the apartments and parking garage as well as to minimize beam depth. To accommodate a tight height restriction, a level of parking garage was moved below grade which lent itself to a redesign of the foundation system.

The lateral displacements on the building were amplified due to the decreased building mass. The lateral system was redesign to accommodate the new building stiffness and deflections. The existing concrete shear wall system was adjusted to fit in with the steel redesign and multiple moment frames were added to reduce displacements as well as building torsion.

Two breadth topics were investigated as results from the steel redesign. One breadth is related to the parking garage ventilation while the other is a construction cost analysis. Previously, the parking garage levels were designed as open air structures, but with a level being below grade, a ventilation system needed to be designed. Finally, an extensive cost analysis was performed on the building to determine the feasibility of the redesign.

After investigations were completed, it was found that the steel redesign is feasible and relatively cost effective, but it may not be the most efficient system. Due to the minimized bay sizes and beam size requirements to minimize vibrations, the steel members are not as optimized as they could be. The steel system also would increase project schedule and potentially cause problems on what appears to be a very condensed sight in an urban setting. Therefore, the steel redesign option could be a feasible option for a building owner but not the system that I would personally recommend.