

## Executive Summary

Jackson Crossing is a low income residential apartment building in Alexandria, Virginia. The project site is located just south of Washington, D.C. directly adjacent to a highway, Jefferson Davis Highway. The highway divides the area surrounding the site into a commercial zone on one side and a residential zone on the Jackson Crossing side. The building is five stories above grade with a lower and upper garage level below grade.

For this report, a redesign will be considered to replace the existing wood framed structure on a concrete podium. The redesign will be a concrete system with two-way reinforced flat plate slabs supported by concrete columns along with concrete moment frames to resist lateral forces.

Relating to the gravity system, a column dimension of 14" by 14" was found to be adequate based off the compressive strength of the section. Two columns were designed; one for columns with factored axial loads above 260k and one for columns with factored axial loads below 260k. The two-way slabs were initially designed with a 9" thickness but were ultimately detailed as 8" thick. This thickness was determined to provide a reasonable amount of reinforcement along with meeting deflection requirements.

The lateral system was redesigned as moment frames around the exterior of the structure. Eccentricities between the Center of Rigidity and Center of Mass were minimum with the frame layout. Both the columns and beams in the frames were designed with a 16" by 24" section to provide a greater moment of inertia in the direction of loading. Two separate frame reinforcement details were designed; one for the north-south direction and one for the east-west direction. This is because the north-south direction frames experience larger forces due to their shorter lengths.

A construction management study was done to determine the redesigned structure's impact on the project's cost and schedule. From this breadth, it was determined that the redesigned increased the structure cost by 22% and increased the duration along the critical path by 24 days.

The mechanical breadth focused on the acoustical performance of the redesigned structure. A concrete slab was found to have an adequate STC rating along with an IIC rating assuming a carpet and pad is installed.

A two-way reinforced concrete slab system is a viable alternative for Jackson Crossing. While it adds cost and time to the construction, the redesigned structure is durable and has a smaller floor depth compared to the existing wood framed structure.