

## **Executive Summary**

The Christina Landing Apartment Tower is a 22 story apartment building located just outside center city Wilmington, DE. The tower provides 250,000 square feet of floor space. The structure is a predominately cast-in-place concrete building. Its floors are supported by a two way flat slab system. The typical floor system also incorporates small areas of reinforced concrete and post-tensioned beams to aid the lateral force resisting system. The floors are supported by square and round concrete columns. Lateral forces induced on the building are resisted by a box of four shear walls. All columns and shear walls rest on a foundation system of H-piles and pile caps. Typical floor loads are 130psf dead load and 40psf live load.

This thesis investigates two structural redesigns as well as an acoustic, and construction management study. The first of the structural alternates analyzes the feasibility of reducing the existing 8” reinforced concrete slab to a 7” post-tensioned concrete plate. This study proved to be quite effective decreasing both reinforcing and concrete volumes while also decreasing the maximum deflections. The second structural change involved negating the effect of the existing equivalent moment frames in the building and using an additional shear wall to replace their function. This analysis also proved successful decreasing the total building deflection over 3” in locations. The first of the breath topics covered was an acoustic study of transmission losses between floors and walls at various locations in the tower. It was found that the existing structure preformed well acoustically however the proposed redesign could be benefited acoustically by addition of sound absorbing elements around the post-tensioned slab. Finally, a construction management study was preformed. Its goal was to investigate the difference between the existing and proposed floor systems. While this analysis showed the post-tensioned system would save significant material cot it would also cause an increased project duration.