

## Executive Summary

1776 Wilson Boulevard is a 5 Story Class A office building with retail space. This report involves the relocation of this building to a new site in Oakland, California. After relocating, the existing post tensioned concrete structure will be analyzed and updated for new seismic loads. Upon the completion of this work, it was decided to redesign the building as a composite steel structure.

This entire process utilizes various Bentley RAM computer programs to aid in the analysis and redesigns. The first stages involved using RAM Structural System and RAM Concept to design and detail the existing concrete structure under new seismic loadings. Structural members were found undersized and bottom bar and edge reinforcing needed to be significantly increased to provide structural integrity to the system. Because of this is, it was decided to investigate a steel alternative.

A significant portion of the work involved redesigning the lateral force resisting system for the steel redesign and choosing an appropriate layout for the specially braced frames. These frames had to resist the increased seismic loads that were calculated after relocation. The new structure was found to have a base shear of 1006 k and an overturning moment of 54,575 ft-k. Using the centers of mass and rigidity as guidelines, a braced frame layout was designed utilized three interior special concentrically braced frames that minimized effects due to torsion. Other aspects taken into consideration during the design process included deflection criteria, vibration, and drift control. The braces were sized as W14x90 members.

A construction management breadth topic was studied to determine cost and schedule impacts of the relocation and subsequent redesigns. With a composite steel system, it was found that the schedule would be shortened by 10 working days and there would be a \$1.1 million dollar cost savings on the superstructure.

Based on these results, as well as weighing the pros and cons of the two systems, it was decided that the redesigned composite steel structure would be the choice for the relocated 1776 Wilson Boulevard.

A sustainability breadth study was also performed to compare energy savings for each location and to make sure the LEED Platinum rating was maintained after relocation. It was found that the green roof system was less economical for Oakland than a white roof would be, an annual difference of \$170 on energy costs was found. The PV solar panel array was found to be much more beneficial in the new climate, the addition of a green roof below the panels was studied and further increases in energy benefits were found. Heating and cooling loads for a south facing office were also performed and it was determined that the existing HVAC system would be oversized in the new climate. Taking everything into consideration, 1776 Wilson would maintain its LEED Platinum rating as well as provide significant energy benefit increases.