EXECUTIVE SUMMARY

555 12TH Street is a 21 Story, 487,000 square foot complex that features class-A office space, retail space, and dining in one location. The majority of framing is structural steel W-shapes with a composite metal deck. The typical floor has an area of 24000 sq. ft. and provides a column free floor plan. All vertical structural elements are centered at the core, or perimeter frame. This open floor plan allows for the tenant to set up their office space to their own desire. The lateral system is a combination of eccentric braced frames at the core, and special moment resisting frames on the perimeter. This is a dual system acting in both major axes directions.

The Depth work conducted for this report focused on the redesign of the lateral force resisting system from a dual system to a reinforced concrete shear wall core. The proposed design exceeds the height limit of 240 ft, for shear wall systems in a high seismic region, so this design would be subject to a peer review. In order to ensure the most likelihood of acceptance of design in the professional world, 555 12th Street was designed based on performance under dynamic loading. This design included prescribing its own design criteria to exceed the code requirements of the IBC-2006, ASCE 7-05, and ACI 318 -05. With the implementation of shear walls, the perimeter special moment frames would be redesigned as gravity members only.

The structural program ETABS was used to perform the static and dynamic analysis of the building. Forces calculated from the equivalent lateral force procedure in ASCE7 were used in the model and design. The modeling process was iterative, and required a great deal of time to find the best design possible. After analysis and design it was found that the R/C shear walls in the core performed excellent under dynamic loading. All design criteria defined in the report were checked and passed. PCA column and RAM Structural System were used to check the shear wall designs and steel gravity columns, respectively. Hand calculations and design of coupling beams was also performed. The symmetrical layout of the floor and lateral force resisting elements limited the inherent torsion on the building. The removal of perimeter moment frames was thought to possibly cause excessive torsional forces, but the shear walls were found to have more than enough capacity and stiffness to account for this. The final layout consisted of four shear wall piers connected with coupling beams.

Breadth work investigating speech privacy of an open office layout, and construction management issues were also performed. It was determined that the speech privacy required for an open office space can be met with proper partitions, sound absorbing finish materials, and masking sound producers.

After completing the redesign and analyzing the cost, schedule, and constructability of the new system, it is the opinion of the writer that the new design is a feasible and economically advantageous alternative to the original design. With steel prices rising over the past decade, it is even more to owner's benefit, today, to consider the core only lateral system. It is imperative, that the peer reviewer be brought into the design phase at the beginning, and has periodic meetings to discuss/converse. If this is not done, then the building permit could be put on hold, which could greatly impact the start date of construction. This could mean a loss of thousands of dollars if tenant space was reserved for an opening date, and the building is not complete.