

# The Residences of Sherman Plaza Evanston, IL

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Structural Option  
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## Senior Thesis Proposal

### Executive Summary

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The main structural system of Sherman Plaza consists of a reinforced cast-in-place concrete superstructure. This 25 story condominium building is comprised of concrete columns, beams, two-way slabs, and has a lateral system that is a combination of shear walls and moment frames. The building rests on a foundation of belled caissons. While this system is effective, it is somewhat inefficient in terms of material usage, time and constructability. The two-way slabs are difficult and time-consuming to construct because of their formwork and shoring. The high weight of the system results in the need for large concrete foundations. A large amount of concrete is also used for the building's shear walls, perimeter edge beams, and dense column grid.

This building redesign proposal will attempt to produce a new structural system that will improve constructability, shorten construction time, and lower costs without decreasing the building's quality. This goal will be accomplished by replacing the existing concrete system with a new structural steel system. This new system will be much lighter than the existing system, resulting in smaller foundations. It will also be easier to construct, because the formwork and shoring will not be needed. The number of columns could be also reduced, which will produce savings in material costs.

In addition to the considerations of the floor framing, the lateral resisting system will need to be reanalyzed. The seismic loads will need to be recalculated for the lighter building weight. The existing concrete moment frames will need to be replaced by steel frames. An all steel lateral system, comprised of moment frames or bracing, will be considered in order to eliminate the difficult steel beam to concrete wall connection. The steel moment frames, however, will require special connections.

These connections and other drawbacks of the steel system will have to be taken into account when determining the effectiveness of the new system.

The new structural steel system will be designed under the provisions of AISC LRFD 3<sup>rd</sup> Edition. The analysis of the gravity floor framing members will be completed using a RAM Steel model. These member sizes will be used to construct an ETABS model to analyze the building's lateral system. The steel connections for the moment frames will be calculated by hand.

This change in the building's structural material will affect other aspects of the building. A breadth study will be performed in two other disciplines to further investigate the new system's effectiveness. The first study will be an estimate of the new building's cost and construction schedule. The second study will be an acoustics analysis. It will be determined if the new system provides enough sound isolation between residential dwellings and between the retail and residential areas.