The Residences of Sherman Plaza
Evanston, IL

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Structural Technical Report 1
Structural Concepts / Structural Existing Conditions Report

Executive Summary

The structural existing conditions of Sherman Plaza documented in this report have been compiled to provide an overview of the building's structural system, including information about the required loading, design criteria and assumptions. This report is divided into the following main sections: the structural system description, design codes and assumptions, and calculations.

Sherman Plaza, located in downtown Evanston, IL, is a 25 story condominium that includes a 54,000 square foot health club, a half acre rooftop garden, 152,000 square feet of retail space, and a new adjoining 1,585 car parking garage. The main structural system of the residential tower is reinforced cast-in-place concrete columns, shear walls, beams and slabs. The building is supported by a foundation of belled caissons. Lateral loads are resisted by both shear walls and perimeter moment frames.

The overarching design code for Sherman Plaza is BOCA 1996. Other standards used in the design of the building that are referenced in BOCA 1996 are ASCE 7-98, AISC LRFD 2nd Edition 1994, and ACI 318-95. The building was originally designed using older versions of the code, but the new calculations will utilize the newest version.

The existing conditions of the building were analyzed by calculating the gravity and lateral loads and by performing spot checks on typical structural elements. The wind loads and seismic loads were calculated using ASCE 7-02. For this report, the moment frames and shear walls will be considered separately in the lateral element check. A full lateral load distribution will be completed for Technical Assignment 3. A portal method analysis was used to analyze a perimeter moment frame, and a shear wall was analyzed by distributing the direct and eccentric forces to each wall. The

gravity loads were tabulated in an Excel spreadsheet. Spot checks for gravity loads were performed on typical floor framing members.

The calculated checks of the gravity and lateral elements produced very similar results to their actual design. A typical two-way slab was chosen to analyze and it was found that it required 13#6 top bars in the short span column strip and 13#6 top bas in the long span column strip. The actual design called for 12#6 bars in the long span and 10#6 bars in the short span. The rest of the slab required the minimum design value of #5@12” bars. The calculated reinforcement is very similar to the actual design. Next, a perimeter beam was checked for flexural and torsional strength. It was found that the beam required 3#7 top and bottom bars, which is smaller than the actual beam design of 4#7 top and bottom bars. This beam, however, will also take lateral load, because it is a part of the perimeter moment frame. Therefore, it will probably require more reinforcement to take this lateral load.

The portal method was used to analyze one of the perimeter moment frames, and it was found that the perimeter beam required 4#8 top and bottom bars. This design is slightly higher than the actual design of 4#7 top and bottom bars. The calculated design, however, was conservative, because the moment frames were made to take all the lateral load, without consideration of the shear walls. A shear wall was also checked by distributing the lateral loads according to wall rigidity. The wall was found to require #5@12” reinforcement, which was the same as the actual design of the wall.