

THE ODYSSEY

ARLINGTON, VA



Aaron Snyder

Structural Option

Advisor: M. Kevin Parfitt, PE

Structural Technical Report I

October 5, 2006

Structural Concepts / Structural Existing Conditions Report

Executive Summary:

The Odyssey is a 475,650 SF luxury residential complex located in Arlington, Virginia. It features 2- 3 story townhouses adjacent to 3 levels of underground parking and towers clad with glass curtain walls and brick. There are 16 stories of apartments with suites located on the top floors and retail space on the ground floors. In this first technical report the existing structural conditions of the Odyssey are introduced through detailed descriptions of the foundation, floor, column, and lateral systems. A preliminary analysis of design loads and lateral forces are spot checked on a typical column and shear wall for discrepancies in design criteria. The analyses provide better understanding into loading and code assumptions made through ASCE7-02 provisions.

The wind analysis was carried out under ASCE7-02 section 6 with general building assumptions including disregarded façade curvature and overall rectangular dimensions. The preliminary analysis resulted in an unbalanced leeward to windward wind ratio which may be a result of the preliminary assumptions. A further detailed analysis is required to obtain a specific controlling wind direction and resulting loading envelope. A seismic analysis was carried out under the equivalent lateral force procedure specified in section 9 of ASCE7-02. All seismic factors were chosen through design parameters based upon the building characteristics and location. As a result of the analysis the controlling seismic direction is E-W with a base shear of 2045k.

Design checks upon both gravity and lateral systems were carried out to verify the accuracy of loading assumptions made through code provisions. The 2-way post-tensioned flat slab system was determined acceptable to resist slab moments from typical floor live and dead loads on a typical residential level of the Odyssey. Through the preliminary analysis the slab stresses resulting from post-tensioning maintained values within the ultimate stresses. A column located on the 1st level was spot checked to ensure the design reinforcement was adequate to resist accumulated gravity loads over the remaining levels. The loading on the column corresponded closely to given design column load of 2180k and the 12 -#11 bar reinforcement was found adequate up to 2340k. An analysis of the lateral systems will be addressed in the Lateral Systems Analysis and Confirmation Design report. Analysis calculations and observations are found in Appendices A - E as well as descriptive figures of preliminary structural design components and a typical floor plan.