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**Structural Option**  
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**The Hub on Chestnut**  
**Philadelphia, PA**  
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## **Executive Summary**

### **Structural Technical Report 1**

The contents of this report provide an arrangement of analyses that contributes to my presumption that The HUB on Chestnut is designed as a concrete moment-resisting frame structure. The first investigation was to obtain the contributing lateral loads due to wind and seismic lateral forces. A wind load analysis was performed to locate in which direction the wind would be most critical. The East/West direction, which is perpendicular to the long dimension of the building, is calculated to be most critical. By inspection, the rectangular structural columns are oriented to allow their strong axis, by moment of inertia, to be exposed in this direction which will function better to resist the moment produced by wind forces. The seismic loading analysis has governed as the most critical lateral load over wind. Although Philadelphia is located in an earthquake active zone I chose to apply wind loading during spot-checks.

Another observation from the columns' schedule is that most supports are all uniform in size with minimal changes in reinforcement. This led me to believe that there is a low ratio between steel and concrete in the upper levels. After performing a pure axial spot-check on an interior and exterior column, located on the Level 5, I found that minimal steel is needed and the girth of the column provides axial support. I concluded that the steel provide in the columns are to resist moment. When performing a column calculation with an applied moment, on the same level, I found the column was still oversized. My conclusion in the column design is that the post-tensioning system running through the column lines must exhibit a large factor in determining size and reinforcement.

In slab design, because the columns are spaced almost square, my first assumption was two-way spanning with minimum reinforcing due to post-tensioning. After concluding my column design I revisited this assumption. I declared that the one interior column line and two exterior lines provide support for a one-way slab system and the post-tensioning oriented E/W provides extra support from the exterior panels load. The tendons running N/S are used to help resist moment in the frames as well as supplying strength the floor system.

With the conclusions stated above my first presumptions of design had been altered. Although I did not find exact numerical data to compare with the erected design, my spot-checks had made me modify my predictions on the structural design based on the inspection of working drawing.

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PHILADELPHIA, PA

Technical Assignment 1  
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