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Structural Option
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The Hub on Chestnut
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EXECUTIVE SUMMARY

The following composition is the final product of a year long capstone project that is conducted by the Department of Architectural Engineering. Development begins by a 5-year AE student to select an existing building, to his/her interest, and use this structure as a model for technical research in accordance to their discipline. In the fall semester, each student analyzes and evaluates the existing design and submits three (3) technical assignments of the investigated material. A concluding report, based on the semester research, is submitted to the department with the students proposed redesign. The spring semester is dedicated to the individual developing the new design using an alternate system or by improving the existing conditions.

Within this report is the comparison of two structural designs. A newly constructed building, The HUB on Chestnut, was selected to provide a model and an existing structure. The existing structure is a flat plate, post-tensioned floor system support by a moment resisting concrete frame. The selected new design is precast hollow-core concrete slabs implemented on a steel girders supported by steel concentrically braced frames. Along with this design are two breadth topics that would help enhance the new structure. The first breadth is the application of a green roof and a recyclable gray water system. Second, is a cost and schedule comparison between the two structural systems.

The newly designed structure has proving to provide a much lighter structure as well as a more cost effective project. Load cases illustrated that the design was controlled by seismic loading over wind and the lateral system's members where sized based on LRFD strength design. All members were checked for strength as well as serviceability. Initial loading criteria's were provided to select effective member selection and avoid tedious and iterative applications. The RAM Structural System was used to aid analysis and provide redundant calculations.