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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 2

Within this report, are five (5) preliminary floor systems designed to functional as alternates for The HUB on Chestnut, located in Philadelphia, Pennsylvania. The original system is a post-tensioned two-way flat slab. The selected group consists of a hollow-core concrete slab, two-way flat plate, two-way flat plate with dropped panels, one-way concrete joist, and a composite steel beam. These options were selected to comply with the architectural and structure constraints of the designed building. With a repetitive design in levels 3 through 9, a critical bay was selected from the 7th level. This bay represents the largest spans and is nearly symmetrical in both directions. A few minor modification to the existing structural layout where incorporated to provide simplicity in the preliminary designs. Each alternate system was designed based on a 30' x 30' exterior bay. Several systems have been designed in accordance with applicable industry codes. Such codes include the 2002 CRSI Design Handbook, PCI Handbook 6th Edition, AISC 3rd Edition Manual, as well as manufacturers design manuals.

Many factors are considered in selecting a sustainable floor system. The system first and for most must provide a safe and adequate floor that can support all superimposed loading conditions. It is assumed the provided design aids have been incorporated to meet the requirements of deflection. Other criterion that affects the selection is constraints due to architectural aesthetics, fire rating, constructability, scheduling, and economical costs. The HUB is subjected to all of these features and each, along with others, will be incorporated into the selection process. Although five of the six systems are concrete structures, no bias opinions have been implemented towards either material. The application of a concrete design provides many alternatives that are suitable for the existing structure.

The alternative floor system will be selected using a points system. Each design will receive a point ranging from 1 to 6. The more efficient and desirable systems will be awarded a low value. The system which receives the lowest total point value will be considered to be the most applicable design. Each system can be evaluated and compared to other another based on their total tallied points.

Further research can involve several systems. Two feasible designs are the application of open-web joists and non-composite steel beams. Both designs are part of standard industry practice but were not incorporated for comparison. The composite steel beam was already considered. Although non-composite design may or may not be more economical, a lower floor depth will be controlled by composite design.



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