Gateway Plaza
Wilmington, DE
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Structural Option
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Senior Thesis Proposal:
Framing Redesign Using Post-tensioned Concrete

EXECUTIVE SUMMARY

Gateway Plaza is a 15-story office tower located in Wilmington, DE. The Gensler design, financed by the Buccini/Pollin Group, will be the first new building constructed in the Central Business District in 15 years and one of the few office towers with a glazed curtain wall façade. In addition to 387,000 ft^2 of rentable office space Gateway Plaza will offer the city, the site will also be host to a 5-story parking garage in its rear.

The building sits on clusters of drilled pier foundations which penetrate up to 70', down to bedrock. The superstructure of Gateway Plaza is composite steel with an typical floor-floor height of 13'-6". A variety of concentrically braced steel frames, located mainly in the rear of the building, resist lateral loads transferred by the rigid diaphragm. The most structurally challenging feature of Gateway Plaza is its 52'x36' bays. Preserving this open layout of the office is a major concern for the architect.

The goal of the thesis project will be to redesign the entire building with concrete. Columns will be transformed to cast-in-place concrete, and floor systems will now be post-tensioned flat slabs. To resist the lateral loads, concrete shear-walls will be implemented. The idea behind the redesign is to determine a different system that will decrease the floor depth while preserving the 52' spans. The purpose of this work is to become more familiar with the design of post-tensioned slabs and the implications they may have on a design.

In addition to a structural redesign of Gateway Plaza, several outside topics will be researched and discussed to determine what implications they will have on the design of the structural system. First, a construction management study will be performed to determine a new construction schedule based on the different tasks and trades that must be accounted for using a post-tensioned system compared to a composite steel system. Second, a mechanical study will be conducted to determine if a more efficient duct layout can be achieved. Consequently, if efficiency can be gained, a new, smaller fan shall be selected.

This project will be performed in steps and completed and presented to a panel of faculty jurors at the end of the Spring Semester.