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AE 481W
Structural Option

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URS Office Building
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SENIOR THESIS PROPOSAL

Lateral System Redesign



EXECUTIVE SUMMARY:

Steel frame structure clad with masonry, the 5 story 100,000 SF URS Office Building is a multiuse structure containing mercantile area on the ground floor and office space from floor 2 through 5. Completed construction within a year this 7 million dollar project located in Columbus, Ohio leads as a prototype building in the developing Arena District.

Structural steel composes beams, columns, girders, and bracing members. Composite floor system is in use utilizing shear studs and spread footings with grade beams are the foundation system. Lateral system consists of 3 braced frames and 2 moment frames. Moment frames were used due to architectural constraints. Also due to asymmetric layout of lateral system, effects of torsion were sizeable.

During the upcoming semester redesign of lateral system is proposed. Goal is to reduce the impact torsion has on the structure. Two very different solutions are proposed. First is to rearrange the current lateral system. By adding and/or relocating the braced frames, hope is to reduce eccentricity and also to eliminate moment frames. In order to do this proper and accurate method in determining frame stiffness will be investigated and implemented. Then using hand calculation along with RAM and ETABS, proper placement of the braced frames will be made. Second solution proposed is to construct the building in concrete and using shearwalls as the new lateral system. For this solution complete redesign of the structure is necessary. Applied loads will be recalculated, gravity members will be sized, and finally shearwalls will be designed.

Breadth studies proposed are organizing new schedule for concrete redesign and determining best layout of ductwork to explore if smaller fan could replace the current equipment. Alteration from steel to concrete requires significant changes to the schedule and the hope is with careful planning and good coordination, to reduce construction time. Using post-tensioned concrete slab reduces floor depth significantly which lead to decrease in building volume. With the most efficient ductwork layout, possibility of smaller fan exists.

Great learning opportunity is present in the upcoming semester. Intent is to have a better grasp in structural design and its impact in construction process as a whole.