

Science Center  
Research Park  
3711 Market St.  
Philadelphia, PA

The Pennsylvania State  
University Department of  
Architectural Engineering  
Senior Thesis 2009-2010

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**[THESIS PROPOSAL]**

## EXECUTIVE SUMMARY

The Science Center Research Park is a 401,032 GSF mixed-use building and is approximately 144 feet tall. It currently has the largest green roof in the city of Philadelphia. The building includes offices, wet labs, retail space, and a 500 car parking garage. The structure is made up of steel construction, and composite deck. Lateral support is provided by steel braced frames using HSS steel shapes for cross-bracing. The ground floor is a reinforced slab on grade with grade beams, and drilled caissons that support the buildings columns.

This thesis proposal states that the existing design of the Science Center Research Park building is a sufficient design. The proposal is for the relocation the building into an active seismic zone. The relocation will cause the need for re-calculation of the lateral loads and an investigation for different lateral systems to resist the new controlling lateral loads. The composite steel slab will be change from normal weight concrete to light weight concrete, and gravity structural members will be reduced in size if possible.

The breadth topics include the investigation of the impact on the scheduling and cost of the building, and the building enclosure option of blast-resisting glazing. Information on the existing building's schedule and cost will need to be obtained. The building enclosure breadth will take more investigation.

At the end of this report is an appendix that contains all the calculations for the loads stated above.

## **BREADTH OPTIONS**

### **BREADTH STUDY 1: IN-DEPTH COST AND SCHEDULE ANALYSIS (CM)**

This breadth study will investigate the scheduling and cost impact of the change of the floor slab to light weight concrete and the change of the lateral system. The scheduling changes consist of the additional time that would possibly be needed. The cost of the original design will be compared to the cost of the proposed redesign. The cost will be affected by change of member sizes, the proposed lateral system, construction time and labor costs.

### **BREADTH STUDY 2: BUILDING ENCLOSURES**

This breadth study will investigate the option of a blast-resistant glass façade. By changing the existing glass façade to blast-resistant glass façade considerations for acoustical, lighting and thermal effects have to be taken into account for. The disadvantages of the proposed changed should be investigated. The structure of the building also is able to withstand the blast load. An investigation on blast protection for the structural members in the parking garage should be done. Depending on the lateral system chosen for redesign, the lateral system might take the blast load into consideration also.