

## EXECUTIVE SUMMARY

The Grant School has stood in the heart of the George Washington University campus since 1882 and has housed the School Without Walls since 1977. In 2008, a 68,000 square foot addition was added along the south and east faces of the building. In addition to the building's expansion, the mechanical and electrical systems were replaced and updated.

Currently, the School Without Walls expansion project calls for a floor system that requires beams which range from W10 to W33 sections. With the addition of a 5 ¼" metal deck floor system, the total floor depth amounts to 38 ¼". A larger clearance between the ceiling and the floor system above would create an easier coordination of the electrical and mechanical systems in the building.

The structural design utilizes expansion joints to separate the 68,000 square foot addition from the historic building. These joints require the slab to cantilever from the column line to the edge of the existing historic building. To achieve this using the current steel system, moment connections are required.

This report explores an alternate gravity and lateral system design to the current steel system system. The proposed design consists of a one way post tensioned slab which spans across wide, but shallow post tensioned beams. Using this system easily allows the construction of the required cantilevered sections of the structure. Concrete moment frames, which eliminate the need for the current braced frames and shear walls, will be responsible for resisting the lateral loads that are exerted on the structure.

In addition to the structural depth study, two breadth topics were researched. The construction management breadth focuses on the effect the change in structural system has on schedule and overall cost.

The architectural breadth studies how dropping the ceilings of the existing building architecturally affects the spaces. Lowering the ceiling heights will allow for easier MEP coordination.

## ACKNOWLEDGEMENTS

I would like to extend a special thanks to the following individuals and firms who were essential to the success of this thesis project:



Turner Construction:

Tiffany Moore



The Pennsylvania State University:

Dr. Linda Hanagan  
Dr. Andres Lepage  
Dr. Ali Memari  
Robert Holland  
Kevin Parfitt



Holbert Apple Associates:

Richard Apple



ReStl Designers Inc.:

Adlai Luzuriaga



Ehrenkrantz Eckstut & Kuhn Architects

I would like to also thank all of my friends and family for their continuing support throughout the senior thesis process.