EXECUTIVE SUMMARY

The purpose of this senior thesis is to study the Bridgeside II project, which is a new building project located in the Technology Center in Pittsburgh, PA. This report is broken up into a project overview and three in-depth analyzes focusing on the foundation, photovoltaic modules, and BIM implementation. Each analysis is working to achieve an overall goal that includes completing the project in a shorter duration and pleasing the potential tenants so they will want to lease a space and will hopefully begin the interior designs before the shell building is complete.

One of the major constructability issues that was faced was the installation of the deep foundation system. Due to underground obstructions from the previous site use the pile contractor was unable to drive most of the steel H-piles to the bedrock. The majority of the piles had to be pre-drilled and this resulted in schedule delays and increased costs. After analyzing several other foundation systems, it was determined that using micro piles would be the most beneficial to the project. In order to fully understand the impacts of a mat slab foundation, a structural analysis was performed to determine the size and reinforcing of the slab. Each micro pile could be drilled into the ground at a high rate of speed and were able to break through the obstructions. Also both crews could be utilized for installing piles. Micro piles ended up being cheaper and can be installed quicker than driven piles or a mat slab. It was determined that using micro piles in lieu of driven piles would create a cost savings of $266,565 and a schedule reduction of 24 days.

The second analysis involves the replacement of certain glass panels on the façade with photovoltaic modules manufactured by Suntech Power. The purpose of implementing the PV modules was to create an energy savings that would reduce the life cycle costs of the building. The Suntech Light-Thru modules will replace some of the non-vision spandrel glass. The modules will still prevent views of the elevated slabs and they will generate 10 watts per square foot. An electrical analysis was necessary to determine the string sizes, number of inverters, and the impact of the inverters on the electrical panels. The PV system can be constructed in the same amount of time and will cost an additional $228,553. The modules can generate 23.4 kWh of energy each year that results in a 119 year payback period. Based on this analysis alone, the PV modules would not be accepted. However, if it is combined with the micro piles, the initial costs would be offset immediately and the owner and tenants would benefit from a yearly cost savings of $1,917.

The final analysis is a study of implementing BIM for core and shell projects focusing on the interior fit-out phases. Owners are often hesitant to use BIM because they are unsure how to assign responsibility and how to apply the model to their project. The new AIA BIM document and the Model Progression Specification help project teams determine how to specify a required level of detail for the model and who is responsible for it. Interior models can benefit potential tenants because many designs can be compared and tenants can see 3D and 4D visualizations of their space. Using interior models will help ease some of the tenant's hesitations about agreeing on a space before it is complete. A level of detail of 300 will provide an accurate model to develop interior designs, and cost estimates and schedules can be developed from the model information.