
Executive Summary

The current climate and societal state of the world is calling upon engineers to step forward and pave the path to a new sustainable future. In order for our generation to stand out as a people who persevered through the adversities that a fossil fueled industrial revolution as laid upon us, we must rethink the way we approach every issue and structural engineering shall be no exception to this rule. This will never be accomplished by merely doing less bad with minor adjustment to the materials we hold close within our comfort zones but only by reaching out to try things that haven't been done before. The author of this thesis is not proposing that the technologies used in this redesign will be the saving grace that upholds our reputation for the generation that comes but that mindset that leads one to solutions such as these will.

Building Description

The Centre Court Apartments stand at 67.5' and contain five levels of student housing atop two levels of parking, intermixed with lobby and commercial area on the ground floor. The building is wrapped with load bearing CMU hollow core blocks that also act as the lateral resisting system of the building. The floor slabs are made of 8" pre-cast hollow core planks, which bear on the CMU exterior walls and a series of wide flange beams. These then distribute the load to the concrete columns leading to the spread footing foundation below.

Redesign

The environmental and societal impact of the structural and building enclosure materials used in the Centre Court Apartments are the main focus of this redesign. The exterior walls were designed with pre-cast, non-load bearing, straw bale wall assemblies, which will bear on two-way flat plate slab with a concrete lateral resisting frame system all specified with high fly ash content replacing up to 50% of the Portland Cement content. An architectural breadth was conducted to compensate for all of the design adjustments that the redesign resulted in and compensate for with an improved environmental air quality.

Conclusion

Between the increased square footage, favorable cost comparisons, benefits to local commerce, air quality upgrades, education of advancing technologies in an area they are not as prevalent, and advanced environmental stewardship all around to say the least, the increase in scheduling, inexperienced contractors, and minor parking plan issues appear to be a sizable pill to swallow per the research contained in this document. Acting as the guinea pig for any project is a large risk, although the benefits of being the first in Centre County, Pennsylvania to take the initial step to a greener structural community have potential to yield great dividends.