

Executive Summary

The proposed thesis will include a complete redesign of the existing structural frame of the Student Health Center. One of the main benefits of a new concrete structure, in place of the current steel frame, will be a possible increase in the number of stories due to a decreased slab thickness. Post-tensioning of floor slabs will be considered as it will create a greater decrease in thickness compared to other alternatives. Shear walls will also need to be designed to be practically implemented into the current building layout to resist lateral loads because there will no longer be a steel moment frame in place. Concrete frames are significantly heavier than steel frames; therefore, a check of foundation impacts will be done. Upon completion of calculations, comparisons will be drawn in regards to strength, serviceability, practicality of construction, architectural aesthetics, floor area, and floor height.

Effects of this structural system change will also be included as a breadth topic. Cost and schedule effects will be examined, as well as, other construction management issues associated with the new concrete system. A possible foundation change due to the large dead load of the concrete will induce some indirect cost to proposed structural system. These indirect costs will also be examined as part of this breadth topic.

A study of solar shading will also be completed as a breadth topic. The current fabric shades on the south facing curtain wall keep wrinkling and rolling up unevenly due to their large size. Alternate shading systems, such as light shelves and overhangs, will be proposed and compared with respect to architectural integrity, cost, constructability, efficiency, and durability. A possible reduction in fixtures, due to additional daylighting, will also be examined and changes in lighting fixture layouts in perimeter rooms may be needed. Long term savings due to the change in room fixtures will be included in the comparative study between shading systems.