

## Executive Summary

The Southwest Student Housing building is a new building to be constructed in Tempe, AZ. It will be built using slip-forms for the concrete core structure that will function both as the gravity and lateral system. The floors will be assembled using lift-slab construction for ease of assembly and speed of erection. The building will cost an estimated \$37 million, and 177 days of construction to complete.

In order to test the versatility of this type of building construction, this report focuses on redesigning the structural system to withstand increased seismic design loads. The new design loads for the building are about 325% greater than the original seismic design loads, which resulted in a doubling of the overall concrete volume (an increase in wall thickness from 8" to 16"), and quintupling of reinforcement volume.

To truly investigate the impact of transitioning the building design to SDC D, the building must be evaluated from a cost and scheduling standpoint as well. This report investigates the bare material cost difference between the original building design and the redesign geared toward SDC D. The overall cost difference totals to an increase of about 8% of the total building cost. The resulting impact on the schedule is minimal, with approximately 10 to 20 additional days needed to slip-form the larger cores. The construction method is the primary reason that the impact on the schedule is so small--the fluid pre-assembly of the majority of the components needed for construction allows for minimal time delays throughout the actual construction process.

In addition to cost and scheduling, this report includes investigations on the impact of the structural redesign on the typical building floor plan. To have a stiffer building, the cores were made to be as continuous as possible, which removed the majority of the openings that were previously present. These openings gave the residents access to the interior of the cores for usable apartment unit space. Making the walls continuous closes off that usable space, unless the floor plan is rearranged. The *Effect on Architecture* section provides several options for how to rearrange the apartment units to take advantage of some corridor space to provide access to the cores without having openings. The maximum decrease in unit area for the new floor plan options was found to be about 5% of the original apartment unit area, while some apartments received up to a 33% increase in area.

This report also discusses the potential for the Southwest Student Housing building to become LEED Certified. Ultimately, it is concluded that the building could become LEED Certified with relative ease and minimal cost investment if the owner and contractor take the time to plan ahead for certain things during the preconstruction phase of this project.