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Structural Technical Report 2

Structural Study of Alternate Floor Systems

[Executive Summary](#)

This report is intended to be a detailed description and preliminary analysis of the structural design of Whiteland Village in Exton, PA. Whiteland Village is a 1,320,000 sq. ft. sprawling retirement community, which is slated for completion by November 2008. The physical components of the first phase of the complex include three 5 story residence buildings, a commons building, and a healthcare facility. The entire footprint has a basement level, which serves as covered parking and utility spaces. The master plan for the site is included in the report as Appendix A. The phase one construction will be on the west side of the campus, including U-1 (renamed R-1), U-2 (renamed R-4), and the J building (renamed R-2). The other buildings will go into planning as soon as Whiteland Village becomes profitable, and will be connected with a pedestrian link.

The residence buildings, designed by Dever Architects, were intended to resemble large typical suburban single family homes with the use of mansard roofs with asphalt shingles and a central exhaust system to limit the amount of roof-mounted equipment and roof penetrations. Each condominium includes a balcony or patio.

In order to complete a thorough analysis, the scope of this report only includes the most current design of the three residence buildings. It is intended to be a preliminary analysis of alternate floor systems for the project. In addition to a brief description of the existing loading conditions, each alternate is analyzed and compared on the basis of constructability, fire protection, weight (in regards to footings), noise transmission, depth, cost, and impact on lateral resistance systems. Whiteland Village is predominately a CMU bearing wall system with a single steel framed section, supporting precast plank. In addition to investigating the current system, Girder-Slab composite, composite, one-way void slab, and ribbed slab flooring systems were also researched. As a result, the ribbed slab was deemed too deep a system, and has been removed from consideration of further investigation. For more thorough insight into the various alternates, sketches of floor plans, sections, and details have been included. The appendix material includes first floor plans of each building and calculations for each floor system.