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AE 481W

## Technical Report 3 Lateral System Analysis

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### [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 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.

In order to complete a thorough analysis, the scope of this proposal only includes the most current design of the three residence buildings, which were designed by Dever Architects. The current structural system consists of 8" hollow core precast plank, spanning approximately 30' between 10" CMU bearing walls. Lateral loads are resisted by a combination of concrete and masonry shear walls, steel moment frames, and steel braced frames.

The lateral system of Whiteland Village consists of a series of shear walls, within each building section, acting together to resist seismic loads. These walls are typically concrete masonry construction in the transverse direction and concrete in the longitudinal direction. Every shear wall has numerous penetrations, which do not necessarily stack floor to floor. The rigid floor diaphragm redistributes shear loads to the wall sections that do not stack within each shear wall. Areas of concern within this design include the ability of the floor system to act as a rigid diaphragm and having multiple shear walls intersect in the middle of the building section. Overall building overturning is not a concern, due to the immense weight of the floor and wall systems.