Proposed Alternate Lateral Resistance Systems for Whiteland Village: Staggered Truss and Partially Restrained Composite Connections

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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.

The analysis for this proposal only examines 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.

In order to reduce building weight and increase the potential for future renovation, the possibility of changing Whiteland Village to steel frame is being investigated. To determine the feasibility of this proposal, two different lateral systems will be investigated: staggered truss and partially restrained composite connections.

As a result of this analysis, it was determined that while staggered truss is a viable alternate structurally, economically it is not a better choice than the current shear wall system. Partially restrained composite connections were not a feasible alternative system with the braced frame plan that was analyzed.

Existing building envelopes were also analyzed as a part of this study. Suggestions were made to improve the building envelope at window openings. This included extended drip edges and the addition of a drainage cavity to the wall section. Detailing at mechanical wells was determined to be sufficient for removal of bulk water and snow. Moisture penetration was also addressed.