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George Read Hall – The University of Delaware
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Technical Assignment #3
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Executive Summary:

This report is an analysis of the existing lateral force resisting system. Included in the report are seismic and wind analyses to determine the critical load condition, followed by subsequent checks of the existing system for strength, drift, and overturning.

George Read Hall is a five story residential dormitory located on the campus of the University of Delaware. It rises 68 feet high and encompasses approximately 129,000 square feet. The bearing walls consist of metal stud framing. The building utilizes a Hambro composite floor system with 14" open web steel joists and a $2^{3}/_{4}$" concrete slab. The "U" shape of the building makes it unique when designing the lateral force resisting system. Lateral loads can not be applied and distributed in the same manner as in a rectangular building. Additionally, the center of rigidity and the center of mass do not coincide, resulting in torsional shear.

The lateral force resisting system of George Read Hall consists of x-braced shear walls. At the fifth and fourth floor, the shear walls are constructed with 2-3" straps. 2-4" straps are used on the third and second floor, and $2\text{-}4^{1}/_{2}$" straps are used on the first floor. All straps are 16 gauge, 50 ksi.

After applying and distributing the lateral loads, it was determined that the seismic forces control the design. The worst case shear wall loading was modeled using RAM Advanse to determine the strength capacity and drifts. After analyzing the structure in RAM Advanse, it could easily be seen that the straps are underdesigned to carry the intended loading. Also, because of this, the drift of the building exceeds the allowable limits for each floor.

The reason for the members being underdesigned can be attributed to much higher calculated seismic forces in this report than in the original design. Additionally, the seismic loads were distributed to the shear walls differently than in the original design. In the original design, the seismic forces were most likely distributed by tributary width to the walls; however, this is not the appropriate method for non-flexible buildings.