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.

Sojka Pavilion and the Kinney Natatorium are 122,000+ Sqft addition to the Robert Langone Recreation and Athletic center build to house a 4000 seat basketball arena and NCAA regulation size swimming pool on the campus of Bucknell University in Lewisburg Pennsylvania. The superstructure of the two buildings consists of cold formed steel W shape bearing walls. The floor system is a 5" deep concrete slab on grade, reinforced by 6x6 W2.9x W2.9 welded wire fabric on the ground and on the second floor of each building is a composite construction, using 2" deep 18 gauge metal decking with ¾" x 5" shear studs and 6 ½" deep concrete slab. The roof system is prefabricated cold formed steel W shape trusses. All of this is supported by strip footings.

The existing lateral force resisting systems consists of X braced frames. The frames are located on both the long and short sides. On the long side of the building there are two identical side by side frames. These frames are each 31' 3" wide by 32' 6" tall and are braced by 4" diameter extra strong steel pipe made of ASTM 501A steel. The braces are divided into four sections and are connected at the center and to the frame by ½" thick steel gussets.

The short sides of the building have only one braced frame. These frames are 36' wide by 32' 6" tall and are braced by 5" diameter extra strong steel pipe. This bracing is divided into four just as the long side was and is connected in the same manor.

After applying and distributing the lateral loads, it was determined that the wind forces control the design. The worse case shear frame loading was modeled using RAM to determine the drifts and the spot checks from technical assignment 1 to determine the strength capacity. After these analyses, it could be determined that the X braces were underdesigned to carry the intended loading. Also, because of there undersizing, the drift of the building also exceeds the allowable limits for the building.

The reason for the members being underdesigned can be attributed to the higher calculated wind loads in this report then in the original design.