



Executive Summary

This is a report to investigate the lateral system of the Earth and Engineering Sciences Building, which is located at the Pennsylvania State University campus in University Park. Its location will be a critical component of the lateral analysis performed in this report. In addition, several issues will be addressed in order to accurately evaluate the application of the system.

The framing system consists of a few main elements. This building is mostly steel framed. However, concrete is used for footings, column piers, load bearing walls, and shear walls. The shear walls, contrary to what was initially believed, are the main lateral resistant element. In technical report 1 the lateral system was evaluated as a moment resisting steel frame, but after discussion with the structural engineer it was determined that the shear walls were the main component in lateral resistance. This was mentioned in report 1, but will now be evaluated in depth.

In this report several issues will be discussed. Load cases will be determined in accordance to the codes listed in this report. Drift and story drift calculations will be made in order to determine the relative strength of the lateral system. Overturning moments and the impact they will have on the foundation will be investigated. Forces in the shear walls will be calculated using seismic loading as the critical case. Finally, a spot check of these walls will be performed in order to validate the size and reinforcement of these walls.

After investigation of the lateral system, it has been determined that the shear walls are adequate to resist the loading on the building. Drift on the shear walls is very small and is much less than the allowable drift. The amount of concrete in the walls is sufficient to withstand the lateral loads and does not require shear reinforcement beyond the minimum. It was also determined that the shear walls can substantially resist overturning moment.