Executive Summary

The Gateway Commons building in Ithaca, New York is a mixed-use development building being used for retail and residential apartments. It has a basement floor below grade and six floors above grade at a height of 62 feet. CMU walls supporting precast concrete hollow core planks make up the building structure. The building façade uses a combination of brick, an Exterior Insulation Finish System (EIFS), and metal panels.

The purpose of this report is to analyze the effects of the lateral loading on the shear walls. The report includes descriptions of the foundation, walls, floor system, roof system and lateral system. An overview of the building dead loads, live loads, and code requirements are provided. An analysis of the lateral loading on the building due to wind and seismic forces is provided. It was determined that seismic would be the controlling lateral force being resisted by the shear walls. It creates a base shear of 208 kips compared to 95.1 kips due to the wind forces, and a overturning moment of 9500 ft-k compared to 3383 ft-k due to the wind forces.

A simplified ETABS model was constructed to analyze how the shear walls resist the seismic lateral loading on the building. The following load combinations provided by ASCE-07 were analyzed in the ETABS program to determine the design forces:

- 0.9D + 1.0E
- 1.2D + 1.0E + L
- 1.4D

The center of mass and center of rigidity for this building are far enough apart from each other to create torsional effects that are large enough to control the design of the buildings lateral system. This is shown in the story drift analysis by the first mode being due to torsion and having a period of 0.695s. This shows that the walls are the least stiff when trying to resist against torsion. Also, the allowable story drift of $0.01h_{sx}$ for seismic loading was compared against the values determined by ETABS. The results below show that the total drifts of the building are acceptable for loading in the X and Y direction.

Drift: X direction

Story	Story Height (ft)	Story Drift (in)	Allowable Story Drift 0.01hsx	
6	62	0.31 <	0.62	ok
5	52	0.24 <	0.52	ok
4	42	0.17 <	0.42	ok
3	32	0.1 <	0.32	ok
2	22	0.05 <	0.22	ok
1	12	0.02 <	0.12	ok

Drift: Y direction

Story	Story Height (ft)	Story Drift (in)	Allowable Story Drift 0.01hsx	
6	62	0.16 <	0.62	ok
5	52	0.12 <	0.52	ok
4	42	0.08 <	0.42	ok
3	32	0.05 <	0.32	ok
2	22	0.02 <	0.22	ok
1	12	0.01 <	0.12	ok

At the 4^{th} floor design checks of one of the shear walls was conducted. It was done once with the loads on the wall that were determined by ETABS and once with loads that were obtained through hand calculations. At the end of the report appendixes include calculations that were performed to conduct the lateral system analysis.