



Executive Summary:

Lateral System Analysis and Confirmation Design is an depth look at the lateral system of Lexington II and the loads of which it must carry.

The structural system of Lexington II is 2-way flat plate slab on a monolithically poured frame. Lexington II has a central core of shear walls which run the entire length of the building. The shear walls and columns rest directly on a MAT foundation. Of these systems, it is the shear walls which support the entire lateral load which affects Lexington II.

Wind and seismic loads are calculated so that it is possible to determine the critical load case as defined in ASCE 7- 02. For Lexington II the critical load case was found to be $1.2D + 1.6W + .5L + .5Lr$.

Using rigidity, loads are distributed between the shear walls of Lexington II. Due to the small number of shear walls in Lexington II, it can easily be seen that in the E/W direction each wall carries 50% of the shear load while in the N/S direction there is only one wall which will carry the entire concentric shear. Mathematical calculations can prove this logic to be correct. Torsional loads are distributed between walls based on a wall's rigidity and proximity to the center of rigidity.

Lateral loads will have many effects on building design. Along with a shear force, lateral loads produce a torsional moment on floor diaphragms. This moment is transferred to the shear walls as an additional shear load. Lateral loads can also affect the building as an entirety by creating an overturning moment which must be opposed by the buildings dead load. Another way in which lateral loads can affect a building is by causing drift or horizontal displacement of the building.

All lateral loading affects on a building can be checked using hand calculations or computer software. The ETABS computer program can provide in depth data on applied lateral forces, story shear, pier torsion, and shear wall design. All calculations preformed by ETABS should also be verified manually. Both hand calculations and simple logic and help in this process.

For Lexington II it was determined that current shear wall system is efficient in supporting the building's entire lateral load while staying in deflection, over turning, and torsional requirements.