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## Technical Report 3 – Lateral Systems

### Executive Summary

The Hershey Academic Support Center sports a composite floor design on each floor of the building. The main lateral system for this building is varying moment connections located at almost every column. These connections extend to all 5 floors of the buildings and brace the building in both the N-S and the E-W conditions. The moment connections in the building are only for partially restraining the lateral movement, but for the purpose of computer analysis, these connections were assumed to be fully restrained. Wind and Seismic values were transferred from Technical Report 1 and obtained from ASCE 7-02.

This Technical Report contains a complete lateral analysis of the Hershey Academic Support Center. Lateral forces were distributed by finding the individual stiffness of each moment frame in the building. This stiffness was then used to distribute direct and torsional shear forces throughout the building. To find the deflection and story drift, a model of each moment frame was created in SAP2000 and the portal method was used to check the computer deflection values. These drift values were checked against the criteria of  $H/400$  and passed for both the individual members and the structure as a whole. The building was also checked for overturning and strength, both of which passed analysis. Lastly, three members were spot checked to see if the proposed design matched up with the loads calculated. One member was taken from each of the three building sections and the overall design came out exactly the same or very close.

By the values that were calculated, it could be argued that “Type 2 with Wind” design was used because it proposed members that were just slightly smaller than those calculated by the seismic design. It is my opinion that this is indeed the case with my structure, judging by the varying member’s sizes per bay and the fact that shear studs were used in the composite floor design. The change in the controlling lateral load is most likely attributed to the wind factor code change from 1.7 when the original design was done and my redesign with the new wind factor of 1.6.