



Conclusions

Partially restrained moment connections can be a useful way to resist lateral loads in a building. While slightly more expensive than braced framing, moment connections allow you more space architecturally and can be more easily used to resist problem spots of lateral loads.

The Hershey Academic Support Center utilizes a well designed lateral support system. When partial fixity calculations were applied, only a small portion of the building changed. Some of the top floor moment connections were able to be removed, but only at a cost savings of about \$4000. Also, the new moment values changed some of the floor members that were designed using “Type 2 with Wind” principals. The total savings of the steel totaled to \$12,320 bring the total money saved at \$16,320. For a project nearly \$17,000,000 in total budgeted money, this savings is very minimal. While the new system did save money overall, the amount of time required to find the specific fixity of each connection and apply it to the structure is not worth the money saved. If cost was an issue in the building, it would be more economical to use braced frames to resist the lateral loads and work around them architecturally.

For Construction Management, it was found that welded connections should be avoided when compared to bolted connections whenever possible. Bolted connections cost about half as much as welded connections and they were quicker to place as well. The use of plates over angles is usually due to the need for some extra strength against gravity loads on the building such as the Mechanical Penthouse on this building. If bolted plates would be used instead of welded ones, plate fracture must always be checked against the yield value of the plate to ensure that it can take moment. Another solution if possible can be to do the welding in-shop as that saves a considerable amount of money over welding in the field.

Architecturally speaking, it seems that adding an extra inch of concrete saves a considerable \$70,000 over cementitious fireproofing. The extra weight of concrete did not prove to be an issue with the columns or the structure when added. One reason why spray on fireproofing could have been selected over a



thicker slab is the time needed to complete each task. While the duration of both is not very far off, each of these tasks is completed during a separate step of construction, so it is possible that spray on fireproofing would be more time effective. Another reason spray on fireproofing could have been chosen is because the wet weight of the extra concrete could have caused problems in the structure depending on how the concrete was added. Both systems effectively meet the first protection code and both have their advantages.

All in all, the newly designed system didn't turn out to be quite as advantageous as planned, but much was learned from the overall design. My final recommendation for the building is to keep the original design and make better use of the time it would take to fully design each connection in the building.

