



## Executive Summary

The Hershey Academic Support Center is part of the Hershey Medical Center complex and is owned by The Pennsylvania State University. Constructed from March 1999 to August 2000, The Penn State Geisinger Health System was designed as the primary occupant, but was dissolved before the building was occupied. Currently the building is used for auxiliary purposes of the Hershey Medical Center and accommodates 680 people. The building itself can be considered in two sections, an East and a West wing. The wings are structurally identical with the only difference between them found in the center section. The building footprint encompasses a total area of 150,000 square feet. The total height of the building over 5 stories is measured as 56'-0" with the height to top of the roof including the Mechanical Penthouse being 69'-0". The building consists of a conventional structural steel system with composite beam floor framing and a precast concrete and glass facade. Moment connections placed at the columns as well as braced steel frames help to resist the wind and lateral loads throughout the building.

A study was conducted to investigate why the lateral system in the building was supported by a composite floor system, moment frames, and braced framing on the roof. It was initially believed that the system was over-designed and that a considerable amount of money could be saved if less lateral resisting components were in place. To more accurately get connections information, the original assumption of fully rigid connections was thrown out and research was conducted to find the true rigidity of all the partially restrained moment connections. After the moment connections were designed for their true partial fixity, calculations were made to see if moment connections could be removed. The resulting change in moment could also alter the floor system since this building uses a special design known as Type 2 with Wind. The new system removed some of the top floor moment connections as well as reduced a few member sizes, but the total cost savings of about \$16,000 was not worth the time needed to find the specific partial fixity values.



A construction management study was done to compare the differing costs of the 16 types of moment connections found in the Hershey Academic Support Center. Milton Steel Fabricators as well as RS Means were used to compare cost values and it was found that welded connections are considerably more expensive than bolted connections. Field welding in particular is the most costly option, so if cost is the major issue in the building, avoid welding as much as you can or stick with a braced frame system instead. Another advantage of bolts over welds is that they are easier to implement and therefore take less time than welds. Welds are particularly used when strength of connection is an important issue or if the connection could possibly fracture with bolts instead of yield.

The last study conducted was an architectural study focusing on the fire prevention of the building. It was noted that the building needed to have a 2 hour fire rating and when using Lightweight concrete, a two hour fire rated slab needs to be 3.5" thick. The original slab was only 2.5" thick and cementitious spray on fireproofing was added so that the building met up to code. The system was switched and the thicker slab ended up being around \$70,000 cheaper overall. The added slab weight on the structure did not directly affect the column sizes, so the new system is a valid option for this structure.

