In Case of Fire

by Melissa Kennedy

West Islip High School was built in 1958, and since that time, new wings were added and changes were made in the fire exits, creating some problems with the old fire drill plan. I became aware of this problem when my classroom was changed—during the first fire drill, it seemed that my classes had to walk farther than any other class in the building!

At the time I could do nothing but a slow burn, but the next year, after my discrete math class had its first fire drill, the students were easily convinced that a study of the fire exits was due. The class, which consists of six above-average students, came up with three objectives for this project:

1. Shorten the distances to exits where possible.
2. Cut down on the congestion at exits.
3. Assign paths to exits so that no two paths cross.

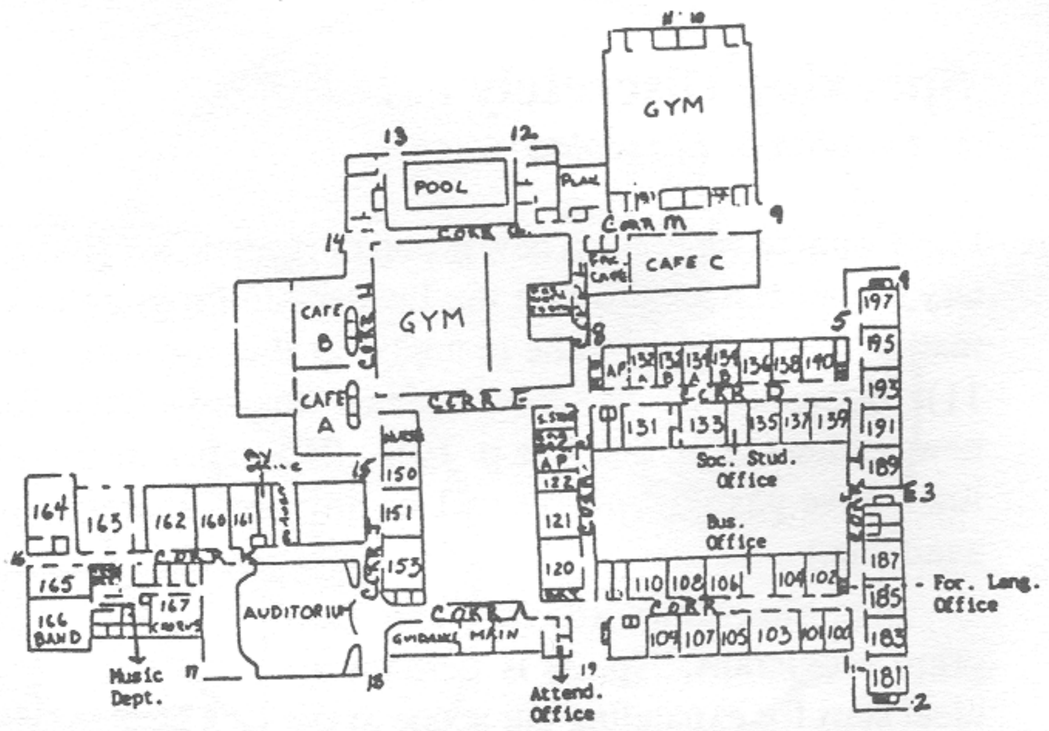
I copied floor plans of the school from the student handbook and fire exit assignments from the faculty handbook (see picture). Each student was assigned several exits along with the job of finding all the rooms that used those particular exits. Next, we drew a chart with the exits and the rooms that used them, and color-coded a floor plan to show this information. Most of this was accomplished during one class period, and finished as homework the same night. Next, the students decided that the following were the most important things to measure:

1. The maximum distance to each exit among the rooms assigned to it.
2. The number of doors at each exit.
3. The number of people using each exit.

Using these figures, we could then find the maximum distance from any room to its exit, compute the number of people per door (a measure of congestion), and thus estimate the maximum time necessary for all rooms to clear their exits.

Working in pairs and using their floor plans as a guide, the students measured the distance to the room farthest from its exit for each of twelve exits. They used a 50-foot tape measure (donated by the physical education department) and measured distances to the nearest foot. In order to estimate the number of people using an exit, the students decided to look at a worst-case scenario. They assumed that each classroom was filled to capacity with 30 students, each cafeteria with 250 students, and each gym with 60 students. Various offices—the nurse's office, guidance office, and main office were assigned appropriate numbers. From these figures the maximum number of people using an exit was calculated.

After gathering the information and studying it, the students wrote up their findings and recommendations and presented their report to the building principals. The report



First Floor

FLOOR PLAN

included a list of doors that were not operational or inaccessible, as well as those that were underused or overused. It presented a plan to re-route some of the paths to use the exits more efficiently. The students also suggested that the old fire drill signs in the classrooms be replaced with new ones that showed floor plans with arrows indicating the evacuation routes. This would help both students and teachers follow the assigned routes and alleviate congestion caused by classes using the wrong route.

In the course of studying the fire drill exits, the students discovered that there were good reasons for having certain rooms use certain exits. They found that our classroom was indeed the farthest in the school from its assigned exit, but found a way to re-route this classroom and others in the same wing to a closer, underused exit. They made positive suggestions that would improve both the safety and efficiency of a school evacuation. The students were especially pleased that the principals took their project seriously and used their report the next time they made changes in the fire exit procedures. Not only did this project provide a natural setting to develop skill in optimization, measurement, and estimation, but it gave the students an excellent model for making improvements in their community. ❖