HARMON GYMNASIUM and LEWIS HALL

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As part of the survey for seismic safety in campus buildings, I have surveyed two buildings on campus--Harmon Gymnasium and Lewis Hall.

HARMON GYMNASIUM

Harmon Gymnasium, located in the southwest part of the campus (FIGURE 1), was built in 1932. The building is a three-story concrete and steel frame structure and is located approximately one-half mile from the nearest trace of the Hayward fault. The recent structural survey of campus buildings rated it poor.[6]

The building is in heavy daily usage. Students (undergraduates and graduates) and faculty members alike make use of its many facilities such as squash, handball-racquetball, basketball, volleyball, and swimming. Also, outside school activities, which vary from morning to night, are provided by various departments, such as the Department of Physical Education, Department of Intramural Sports and Recreation, Department of Intercollegiate Athletics, and Department of Women's Inter-collegiate Athletics. In special inter-collegiate competition, for example PAC 10 basketball, the gymnasium has a maximum capacity of 6,700 people. Another department that is located in the gymnasium is the Department of Military Science, which involves the Military Officers' Education Program (ROTC).

The gymnasium has three floors. The first floor consists of various classrooms and offices, the locker rooms (men and women), machine room, physiology laboratory, and a motor development room. The second floor is the main gymnasium area, and around its perimeters are the weight and gymnastic rooms, various offices, and more classrooms. Finaily, the third floor has several small supply rooms, a machine room and is the main floor leading to the bleachers.

Results

In the event of a moderate to heavy earthquake with a magnitude of 6 to 8.2 on the Richter scale, severe damages can be expected within the building. There are innumerable types of potential hazards that I have found as a result of the building survey. On the first floor, for instance, the hallways have several unattached lockers. There may be major problems because they are liable to fall over, therefore blocking off doorways of rooms, exits, or even falling on people.

On the second floor, in the main gymnasium (court area), the problem is found in the exits. The main gymnasium has a total of nine exits of which only two remain free of any type of obstruction or "free standing" objects. Another potential hazard is found above the court area, where there are four large speakers suspended only by chains. This may be a problem because we do not know how well the chains can hold the speakers in event of a moderate or heavy earthquake.

The east hallway on the second floor has a high traffic rate. In this particular area are two "free standing" glass showcases which pose potential problems: 1) glass showcases are unattched and 2) the showcases are facing one of the stairways to the first floor, which would probably be blocking the way for traffic in both directions.

The weight room would probably be a disaster. Barbells and dumbells would easily fall over in violent shaking. Up on the roof are ventilation systems similar to those on the UC Santa Barbara campus, where the ventilation system is sitting on "springs". In the August 1978 earthquake, the UCSB ventilation system came off the springs, due to the sudden uplift. In the machine room on the UCSB campus, the sudden uplift also caused several heavy machines to come off the bolts holding the machines down and also caused some machines to shift off their bases. This may also occur in the machine rooms on the UCB campus.

Another major problem is that Harmon Gym lacks a sprinkler system, which I find should be given more consideration. In the past, the San Francisco (1906) and the Alaska (1964) earthquakes have shown that fires are one of the major causes for loss of lives and of buildings.

In the event that the main power unit goes out, there is an emergency back-up unit which is comprised of a series of large batteries, maintained and charged once a year. The back-up unit is supposed to go on automatically, in case the main power unit goes off.

The Robertson gymnasium on the UC Santa Barbara (UCSB) campus, in comparison to the Harmon gym on the UCB campus, is a two-floor concrete block structure with reinforced steel. This building was built in 1959 and has a capacity of 3,250 and a total capacity of 3,900 (in special events, for example, rock concerts). This building is also of high density use daily by students, faculty, and staff members. The Robertson gymnasium suffered an earthquake of a magnitude of 5.1 on the Richter scale in August of 1978. Fortunately, the earthquake occurred on a Sunday morning with virtually no one on campus. Damages that did occur in the building were only minimal--unlike other buildings on the campus.[19] Plaster cracks were found on walls as a result of the earthquake, and sliding doors were found off their tracks. The emergency back-up unit, which is powered by a natural gas supply, was rendered inoperable due to the tremendous shaking by the earthquake--leading to the closing of its gas valves. According to Bill Steinmetz (Environmental Health and Safety, UCSB), had the earthquake occurred at night with the gymnasium filled with people, we could visualize a great catastrophe because the gymnasium would have lacked auxiliary lighting.

LEWIS HALL

Lewis Hall, built in 1929, is located in the northeastern part of the campus (FIGURE 1) and is one of four chemistry buildings on the campus. The building is a four-story structure with two stairwells at each end of the building. Daily the building is not in heavy use; it has light to moderate traffic. The building is located less than a quarter mile from the nearest trace of the Hayward fault. Structurally, it is rated fair.[6]

Lewis Hall consists primarily of labs, several small rooms and offices, and a large lecture room. The first, third, and fourth floors of the building are primarily used by graduate students and professors where research experiments are in progress, whereas the second floor is used mainly by the undergraduates.

Results

In surveying the various rooms and laboratories in Lewis Hall, I found most of the potential hazards on the third and fourth floors of the building. The first two floors are relatively free of hazards since the first floor has few labs, and the second floor labs have recently been remodeled and are used mainly by undergraduates (who do only controlled experiments).

Most of the problems found in the research labs on the third and fourth floors are that large autoclaves, centrifuges, incubators, and other large heavy machines are not bolted down to the floor. The problem with this is that some are near the pathway to exits. From previous experience in UCSB, we can expect this large equipment to move in a moderate to heavy earthquake. Another problem I have encountered is that refrigerators, multi-shelved wooden cabinets and two-door metal cabinets are found by doorways. The refrigerators and cabinets have heavy objects on top of them, such as large glass jars, and cardboard boxes filled with heavy odds and ends, which are liable to fall off during a severe earthquake. In several labs, heavy machines such as spectrometers, centrifuges, and microscopes are found very close to the edge of the tables and also probably would fall off.

There is also a problem with the proper attachment of gas tanks. Most gas tanks I have seen are clamped down (when in use) by two "C" clamps, but there are some improperly attached or not attached at all. The most unusual type of attachment of gas tanks is one strapped by only two thin rubber gas hoses. There are some attached by a loose, thin chain, and others strapped onto a small four-foot-high table--all in a sense like having almost no strap at all. The improperly attached gas tanks would most likely fall during a moderate earthquake. In some of the labs there is a problem of finding fire extinguishers because some are standing on the ground behind cluttered boxes or large machines. The majority of shelves containing chemicals which

lack seismic strips or wooden braces are found predominately in the old labs, while some recently remodeled labs had both the seismic strips and the wooden braces. From past experiences, such as on the UCSB campus, shelves lacking seismic strips and braces have a greater tendency to permit chemicals to fall over.

Hallways on all floors with the exception of the third floor, are clear of large free-standing objects. On the third floor there are several free-standing objects, including a two-door metal cabinet facing the entrance to the stairwell, and several wooden boxes and boards standing randomly along the hallway.

Lewis Hall has undergone several changes in the last few years. For example, labs have been modified, primarily on the second floor. Several labs have also been repainted, which is fine, except that all the pipes have been painted the same color, therefore losing their description as gas, air, or water pipes. If for any reason a certain pipe had to be identified, it would have to be retraced. Lewis Hall, like Harmon Gym, lacks a sprinkler system; serious thought should be given this matter. Lewis Hall also lacks an emergency back-up power unit, should the main unit go out.

Summary

There are hazards common to rooms and offices in both buildings that need to be considered. To avoid potential damage, it is essential to have proper arrangement of furniture in the room/office to minimize the hazards of falling objects and blockage of exits to the individual(s) occupying the room. As a result of the building survey, I found that one of the major problems was the lack of space (predominately found in labs). Objects such as glass bottles and heavy machines are placed in areas that may be hazardous in event of an earthquake.

We must therefore take into account a safety factor and maximize it. Safety factors can be achieved by doing common sense things: closing cabinet doors when not in use (I found many opened cabinets containing large glassware, chemicals, etc.), placing heavy bottles at ground level with lighter bottles on shelves, removing heavy objects from high areas, and removing carts on rollers from path of entrances/exits.[2] Experiences with earthquakes in the past have shown their devastating effects on buildings and landscapes; therefore I feel that it is essential that all buildings on campus should take into consideration an earthquake contingency plan which would minimize loss of lives and probably the loss of buildings.