STUDENT UNION and HILGARD HALL

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STUDENT UNION BUILDING

Constructed in 1963, the Student Union Building, or the ASUC (FIGURE 1), is a six-level steel frame, concrete and glass structure. It is bordered on its south side by Telegraph Avenue and Bancroft Way, only 1/2 mile west of an active trace of the Hayward fault. Structurally it is in good condition.[6]

The center of a variety of usages and services, the ASUC receives daily a relatively high volume of traffic. Students comprise the bulk of this traffic, while the rest is made up of tourists, visitors and other non-students having a wide variety of ages and backgrounds. Because a count was never taken of the number of people using the facilities, an exact figure cannot be given.

On the lower level is the ASUC Garage, the ASUC Recreation Center, the Textbook Department, the Building Operations machine shop, and a machinery room for the building's heating and cooling systems. The plaza level houses most of the services: the Art and Drafting Supply store, the Gift Department, the Electronics Department, two bookstores, the Photocopy-Printing Service, a Sundries Department, the Cookie Bear, the Bear's Lair and Pub, a check-cashing service and the Art Studio. Lounge and gathering areas, the Travel Center, the Box Office and Visitor Information make up the second level.

There are more lounge areas on the third level, but the major portion of this floor and the fourth level is taken up by the Pauley Ballroom. With a maximum capacity of 1,270 persons, it is used for dances, dining and other functions in need of a high capacity gathering area. Meeting or conference rooms and the Technical Operations room for the Pauley Ballroom are on the fourth level.

Results

The Pauley Ballroom has a very great potential for hazards. Large expanses of untempered glass windows extend from the floor to the ceiling, which is actually two stories in height. With the sufficient shaking that would occur in a moderate-to-heavy earthquake of magnitude 6.5 to 8.0 on the Richter scale, the windows could burst and possibly inflict injury to persons both inside and outside the building. A speaker system, heavy spotlights and rod-hung

fluorescent fixtures are suspended form the ceiling. Very large sheets (4'x8'x2") of acoustical board are each hung by two hinges and a chain. Needless to say, there exists a real threat to the large number of people who may be using the room at the time of an earthquake. During times of maximum use, it is likely that very few pieces of furniture will be available to take cover under.

Conference rooms such as the Madrone, Tan Oak and Douglas Fir Rooms are simply furnished with desks, tables and/or chairs. So furniture arrangement is not constant but changes with needs, thus varying the numberof places to hide under, in the event that the untempered glass breaks.

A false ceiling, recessed lighting fixture system, unattached filing cabinets, an unattached storage cabinet are present in the Travel Center office, and represent potential hazards.

On the same floor, the somewhat small Visitor Information office proved interesting since there are three smaller offices within. The ventilation system works poorly and working conditions are very crowded. There are unattached file cabinets with unlockable drawers and free-standing metal shelves over desks, that with sufficient shaking will possibly topple on room occupant(s) or pose as obstruction hazards.

The main problems encountered in the stores are in the stockrooms. Tall metal free-standing shelves are common as are unattached storage cabinets. In the Textbook Department, aisles are formed between the shelving and the path to an emergency exit is lined with these shelves and cabinets. Since this storeroom is also the receiving dock for the ASUC stores, substantial amounts of merchandise, especially textbooks, are stacked in the area before being distributed and stored in their proper areas. The heavy rolling receiving carts, when the wheels are not braked, are mobile obstruction hazards. Free-standing metal shelving and boxes of clothing line a wall in a Gift Department stockroom, forming a very narrow exit path. This, no doubt, is a fire hazard yet there is no sprinkler system or fire extinguisher present. Merchandise on shelves and displays, cash registers and other heavy objects on counters, in the selling areas, may fall to the floor, most likely resulting more in property loss. than in injuries.

During the August 1978 Santa Barbara and San Fernando 1971 earthquakes, heavy building machinery, such as pumps and generators, shifted and slid off their mounts even though some were bolted down.[2] Heavy unbolted equipment and machinery are present in the machine shop as are rod-suspended lighting fixtures and pieces of lumber that are adjacent to an exit and also above a row of the lighting fixtures. Steam, electrical and water pipes also cross the ceiling, and if severed, could cause injury. In the small building machinery room of the Textbook Department storeroom, bolts that are holding down the equipment appear thin and inadequate.

In the main building machinery room, a stand supporting a water tank high off the ground may collapse, if inadequately designed, as some did in the 1971 San Fernando earthquake.[2]

The Art Studio with its rolling trays, display cases, unbolted shelves with ceramic works add to the problems that may arise from the unbolted kilns, mixers and presses toppling or sliding about.

Most lighting fixtures of the second floor hallway and lobby are potential hazards. On the stairway leading to the third floor, there is a metal ring of lights delicately hung by thin cables. Failure of these cables would obstruct the entire stairway, which is the major exit from the third to the second floor. On the wall, halfway up the same flight of stairs, hangs a large rug-like piece of artwork, which, if inadequately supported, could fall over the stairway, intensifying panic and injuries. In a second floor lounge area, large decorative beam-like structures are rod-suspended directly overhead. Along the center of the hallway are smaller lamps, similarly suspended to the one mentioned above.

The arrangement of chairs and tables in the Pub would present the main obstructions to exit while bottles placed on overhead ledges would only compound the problems.

An emergency power system, running on diesel fuel, and regularly maintained, supplies the building with electricity whenever the primary source (PG&E) is cut off. A cut-off in the primary source automatically trips on the generator, which is connected to emergency lighting in the halls and stairwells.

HILGARD HALL

Situated in the quiet northwest side of campus about 1/2 mile west of an active trace of the Hayward fault, Eugene Waldemar Hilgard Hall (FIGURE 1) was built in 1912. This handsome building is of steel frame and concrete construction, rated fair in a structural survey of campus buildings.[6] Its elaborate ornate castings, balconies, lamposts and columns project an image of charm and grace.

It is a four-level structure primarily used as a center of research and administration for the Departments of Plant Pathology, Soils and Plant Nutrition, Cell Physiology, Entomology and increasingly less by the Department of Nutrition. Hilgard Hall is a building with a low diversity of uses and low volume of traffic.

The number of persons using the building and its facilities remains fairly constant throughout the year, consisting only of graduate students and researchers. There are no large lecture-type rooms or undergraduate courses held in this building.

Results

The lack of space seems to be the major problem in this building, as can be seen just by walking through the halls. There are free-standing metal shelves, metal storage cabinets, large refrigerators, shakers, wheeled centrifuges, gas cylinders without restraints, wheeled carts with glassware and other equipment lining the walls of the hallways.

In the labs, which are very similar throughout the building, instruments, refrigerators, incubators and glassware are placed on counter tops. Bottles of chemicals and light equipment are allowed to hang over the raised lips on some shelves, which defeats their intended purpose. The typical arrangement of heavy unbolted items such as refrigerators and autoclaves, with sufficient shaking, easily lend themselves to create obstructed pathways. In the northeast stairwell, the placement of a large wooden storage cabinet is a partial setting for a disaster, since if it does fall, it would effectively block the exit doors, which swing into the affected sied.

Several large wheeled garbage can carts are found on the basement level without any sort of mechanisms to hold them stationary. Because they are free-rolling and adjacent to an exit, they are of concern. Some gas cylinders are found standing alone, free of any restraints, on their side perpendicular to the exit or inadequately secured with a very light duty chain.

Fire extinguishers are found only outside of the labs, in the hallways. This would be useless to someone needing an extinguisher while in the lab, but finding the exit blocked with debris or heavy objects.

The Plant Pathology storeroom has most of the tall storage shelves bolted together and seismic stripping installed, but there are also some shelves storing glassware that are free-standing and on the sides of exit paths. As much as possible, heavier bottles and items are stored as low as practical. Autoclaves and incubators with steam supplies are not bolted and if an earthquake does strike, could slide or topple and cause extensive injuries, not only from the obstructed pathways, but also from steam from the severed pipes. Wheeled carts with glassware and other lab supplies are left in doorways and adjacent to them.

Displayed on the second floor are numerous bottles of soil samples taken decades ago. Since the display case is quite high, lines the wall, is old, and has a thin glass front, it is reasonable to assume that many of the bottles will slip from their thin, highly positioned wires and push through the glass front, depositing debris on the floor and causing possible injuries.

Though very attractive, the ceramic tile roof, overhanging balconies, chimneys, ornamental castings and parapets are very much visible threats. Experience in previous earthquakes indicates that roof tiles similar to those on Hilgard Hall may slide off in a sheet-like manner,

with sufficient shaking. This will probably be responsible for a great portion of the injuries that may occur outside of the building. Many of the balconies or parapets, located directly above exits and walking paths, are clearly existing hazards.

Since there is no emergency power system, as in the ASUC, many research experiments will be lost and rescue operations, especially if at night, would be greatly hindered in their effectiveness.

Recommendations

Many of the potential hazards to life and property described above, are needless and avoidable. Tall free-standing shelves, cabinets and lockers are mainly toppling and obstruction hazards. In addition to toppling, cabinets may have their doors pushed open by objects stored inside. The cabinets should be bolted to the wall or floor. If they are back-to-back, or arranged in rows, they may be bolted at the tops by metal stripping, thus providing a broader base and avoiding a possible "domino" effect. They can also be rearranged so as to minimize the hazard.

Workbench shelving, usually located along the middle of lab benches, are typical storage areas for commonly used bottles of chemicals and reagents. Many have raised edges or lips, while others do not. However, it was seen that, especially in a crowded area, even the raised edge can be rendered useless by placing items over the top of the edge, which enables them to slide. Seismic fencing used by the Chemistry Department at U.C. Santa Barbara proved helpful in limiting damage to items stored on those types of shelves. Installing such fencing or storing little-used items in a safe place can lessen the crowded shelf problem and help to prevent needless losses.

Bracket-mounted wall shelves, light in construction, are usually located over desks and are incapable of holding very heavy objects without posing a potential hazard. They can be located in little-used areas and should only be used for the storage of light objects.

Cabinets that are wall-mounted should have positive locking mechanisms. The glass pane sliding-door type eliminates the pushing open of the door but contents may be pushed out through the glass front. Seismic stripping may be installed and for future design, the glass should be a tempered or safety type.

Certain types of lighting fixtures collapsed in the Alaskan earthquake of 1964[4] and the San Fernando earthquake of 1971.[2] Single rod-suspended types, especially if in rows, have been known to fail. Fixtures that are recessed into false ceilings or surfaced-mounted onto them have also been known to collapse. Diffusers, types of attachment and arrangement should be designed for maximum safety.

Free-standing heavy objects such as refrigerators, incubators, autoclaves, machinery and wheeled objects are sliding, toppling and obstruction hazards. These should be bolted down adequately, rearranged or immobilized and placed out of pathways.

Hanging objects may range from potted plants to large speakers. The injuries incurred from these may vary from light to loss of life. Hanging plants can easily be re-located to lesser used areas of a room, that is, not above a doorway or desk. Larger hanging objects, especially those placed high above frequently used areas, should be checked periodically and very thoroughly by qualified persons as their placement, security and adequacy of support and attachment.

Other heavy objects such as test instruments, small refrigerators that may slide or fall off shelves, table tops or other high places should be properly secured, keeping in mind not to impair their needed functions. Those objects not in constant use should be stored at lower levels and out of exit paths.

Display cases, if unattached, pose an obstruction hazard and since usually one or more sides are made of glass, heavy display items may push through the glass, which is an additional hazard. They should be attached to a wall or other building element or rearranged to lessen the hazard. If possible, display items may be tied down.

Gas cylinders should, at all times, be properly secured. Attention should be given to the type and height of attachment. A chain or strap placed too high or low allows a cylinder to either slip under or topple over.

Emergency equipment such as fire extinguishers and hoses should be visible, readily available and usable in any areas that may need such equipment. This should be true for emergency power systems and sprinkler systems. It is essential that emergency facilities be available where needed and that they be regularly maintained.

Summary

It is seen that the Student Union Building and Hilgard Hall are very much different, in terms of persons using the building facilities, the facilities themselves and in age and in construction.

Because of the diversity of persons using the ASUC facilities and the high volume of traffic, it can be assumed that there will be persons unfamiliar with the building layout. This, combined with the potential hazards described above, would greatly increase the intensity of panic and thus injury that may occur.

Whereas the ASUC will probably face a higher incidence of injury, Hilgard Hall, because of the low number of people using the building, would have losses arising mainly from damage to property. A similar situation with a higher volume of traffic would undoubtedly yield a greater number of injuries. Since this is primarily a graduate study and research building, test

instruments and related equipment are more likely to be up-dated and more sophisticated than those found in the usual undergraduate laboratory; therefore damage to these would be greater in terms of dollars.

It is hopeful, that by implementing many of these recommendations, along with an equal amount of common sense, a substantial reduction in the incidence of property and life loss and a better understanding and continuing consciousness of earthquakes will evolve.