EARTH SCIENCES BUILDING and U.C. GARAGE

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Earth Sciences Building

The Earth Sciences Building, a six-story cement structure at the north gate of the Berkeley campus (FIGURE 1), accommodates three academic departments: the Departments of Paleontology, Geology and Geophysics, and Geography, as well as the Seismographic Station, the Museum of Paleontology, and the Earth Science Library. The following section discusses the exits and structural features of ESB and is succeeded by a section discussing the specific hazards of each floor. When appropriate, recommendations for the correction of hazards are included in the discussion.

Built in 1961, ESB is rated poor in the University's report on the structural safety of U.C. buildings,[6] due to the external cement columns supporting the south end of the building. These columns are similar to those which failed and caused the collapse of the Olive View Hospital during the San Fernando earthquake of 1971.[20] Because the building was constructed into the side of a hill, the north end of the bottom floor is below ground, while the south end serves as one of two principal exits. The second exit, located on the first floor towards the north end of the building, faces west. The potential hazard of falling glass at this west exit is manifest in a series of large glass panes which act as an outer wall of a stairwell extending up to the fifth floor. Both of the principal exits therefore may be too hazardous to use in the event of an earthquake. Fortunately, there is a lesser known exit on the east side of ESB towards the north end of the first floor, which is generally used for utility purposes. If kept free of obstructing objects, this short corridor may prove to be the safest of all exits. Access to exits from the upper floors is obtainable by either the hazardous west stairwell or by an inner stairwell at the south end of the building, in which falling tiles from the ceiling may be a problem, accented by the lack of emergency lighting. The external walls of the building are of stucco and pose no hazard of parapets or ornamental facings. The roof is flat and free of objects which might fall from atop the building.

The ground floor is largely occupied with activity relating to the Museum of Paleontology. Approximately fifty percent of the floor is devoted to the storage of fossil specimens in stacked cabinets. Many of the cabinets have hazardous material such as heavy boxes, glassware, and rocks

stored on top of them. Though these areas are not occupied by large numbers of people, there is a considerable amount of space used for heavy storage throughout ESB. By bolting cabinets together, installing security devices on doors and drawers, and removing dangerous material placed on top of cabinets, the safety of these areas can be considerably enhanced. The ground floor also features a photography lab, general workshop, X-ray lab, art room, two classrooms, the office for the Department of Paleontology, and various display cases of fossil specimens. Photography labs are also found on the third and fifth floor and generally contain chemicals which are flammable. The careful storage of these chemicals is essential for safety. Chemicals in general should be shelved low with seismic strips to prevent their falling. Interactive chemicals should be well separated. Unsecured heavy machinery in photography, X-ray, and workshop areas pose the danger of falling on people working in these areas. Metal and woodshops on the ground and fourth floors, and an electronic shop on the fourth floor, contain expensive equipment that needs to be secured. Radiation from X-ray labs on the same floors is a minor problem. The machines would have to be operating and adjusted for high X-ray output to pose any serious danger. The art and classrooms on the ground floor contain hazards typical to many personal offices and classrooms throughout ESB. References to these general hazards are made in the introduction preceding the reports on individual buildings (see page 105). Display cases are a substantial problem on the ground and third floors. Standing glass cases in the exit area of the ground floor need to be bolted to prevent them from falling over and obstructing passage to this exit. Display cases inset in the walls of the hallways on the third floor contain unsecured rocks on glass shelves. Though shattering glass may be a minor threat to the direct injury of persons, it could contribute to the overall panic that may evolve during an earthquake. The following sections are devoted to the problems of specific areas.

Library

The Earth Sciences Library is located at the north end of the second floor. The only immediate problem associated with the library other than falling lights, air vents, and broken glass, which are hazards in all campus libraries, is the security of card catalogs. Some catalogs are located by the only exit from the library and may obstruct this pathway should they fall over.

Hallways

Most of the hallways of ESB are subject to the possible rupture of exposed gas, hot water, and chemical disposal lines overhead. These same lines often extend into other areas where people are likely to be, such as adjacent laboratories and offices. Another hazard associated with hallways is the accumulation of miscellaneous material stacked outside of offices. Recently there has been an effort to secure this material, but much work needs to be done. Lockers pose

the same threat of obstructing hallways and need to be bolted to the walls. The pendant-type lights in the halls are typical of those found throughout ESB and should be braced to restrict lateral movement.

Conclusion

Many of the hazards found in ESB are due to the lack of space. Rooms are generally overcrowded which leads to materials being placed where obstruction and falling hazards are created. Earthquake safety is often not considered in the storage of chemicals. Though there are water hoses located on each floor, these may become inoperative due to broken water mains. Chemical fire extinguishers should be distributed about the building for easy access in case this occurs. The building also lacks emergency lighting facilities. There is a definite need to develop contingency plans to facilitate the safe exit of occupants. The Geology and Geophysics Department is in the process of organizing a contingency plan by relegating responsibilities and disseminating information to the people of their department. This type of departmental action may be the most efficient and practical method of informing occupants as to what is the safest way to react in an earthquake. With the integration of the various departmental contingency plans, maximum earthquake preparedness can be established in a building.

U.C. Garage

The U.C. Garage is a single-story brick building located at the northwest corner of the Berkeley campus (FIGURE 1). The garage functions as an area of servicing and storage of U.C. vehicles. The headquarters for the University-operated special transportation systems, consisting of Humphrey-Go-Bart, Vincent-Van-Go, and the Richmond Field Station, Space Sciences, Stanford and Davis shuttles are located here. The garage employs thirty-two full-time and seventy part-time persons. The following section discusses the exits and structural features of the garage and is succeeded by sections discussing the hazards of specific areas. When appropriate, recommendations for the correction of hazards are included in the discussions.

The garage has been rated very poor in the University's report on the structural safety of U.C. buildings.[6] The reason for the very poor rating is due to the walls of the building being constructed of unreinforced brick. This type of construction is known to react poorly to the stresses of earthquakes. The building has a wooden roof which is supported by vertical steel columns and horizontal steel trusses. The main roof area is flat and contains numerous skylights of which some are in poor condition. The hazard of falling glass is especially prominent over work areas. The outer edges of the roof are slanted with ornamental Spanish tile. All but one exit from the building poses the threat of falling tiles, which are of very poor condition. The gas pump area is also positioned where falling tiles may hinder the pumping of gas in an emergency situation. In a structural survey done in 1973, it was determined that it would cost eighteen

dollars per square foot to repair the structural deficiencies of the entire garage.[14] Since there are 12,300 square feet in the building, the cost would come to $221,400.

Shop Areas

These areas include one small garage and the main garage area. Cabinets used for the storage of lacquers, thinners, paints, solvents, and other reactive chemicals need to be secured to the walls or floor. In some cases these chemicals are stored on open shelves where they present a fire potential. Lights and heaters in work areas are of the chain-hung type which are free to swing. Heaters, especially, need to be braced laterally because the gas lines which feed them may be broken by lateral forces. Tire racks pose the danger of falling over and spewing tires about a frequently used work area. The racks should be bolted and retention strips added to prevent falling tires. Other falling hazards include unsecured heavy machinery, body parts, and stacked seats. An effort should be made to better organize and properly store odds and ends to avoid their cluttering the floor and obstructing movement. Portable welding tanks could also pose problems and should be secured as best as possible.

Offices

These areas include both the administrative and transportation offices. The administrative office is free of hazards other than falling lights in the reception area. In the transportation office, there is the possibility that materials stored in an area adjacent to the staircase leading up to the office could fall and trap people. Materials should be more carefully stored.

Conclusion

Because of the very poor structural status of the garage, it remains questionable whether money should be allotted for non-structural repairs until the major structural imperfections are rectified. Still, many hazards can be mitigated with minimal cost. The number of "safe" places persons can escape falling hazards during the immediate onset of an earthquake is limited, and the only emergency back-up facility that exists is a handpump, should gasoline be needed.

There remains little doubt that the only alternative people occupying the building have in the occurrence of an earthquake is to flee the building, which in light of the hazards presented in this paper may result in numerous problems. A final recommendation is that a contingency plan be worked out and presented to employees which may help prevent panic and allow for exiting with maximum safety under the existing conditions.