

Seismic Retrofit and Structural Improvement of a Camp Facility for Children with Life-Altering Medical Conditions

Abstract

Project Description: Camp X provides year-round programs for children and their families with life-altering medical conditions. The camp's Executive Director requested us to perform a seismic assessment of the camp facility and provide retrofit recommendations. Furthermore, they requested non-seismic improvements be made to the facility making it universally accessible. A team of four civil engineering students worked on this as their capstone project under the supervision of three licensed engineers from the industry and two faculty members.

During the site visit the team made the required measurements and took pictures of the facility with a 3D scan camera. Using these it developed AutoCAD engineering drawings of the camp. Based on the drawings and structural analysis, it came up with structural retrofits and non-seismic structural improvements.

Seismic Retrofits: The team made several seismic retrofit recommendations. Roof chords longer than 20 ft were strengthened to minimize deflections; mezzanine to wall connection was improved to resist against rotational or sliding failure of the mezzanine; timber walls were secured to the foundation; narrow shear walls were anchored to the floor to prevent failure.

Non-seismic structural Improvements: Improvements were made to the bathroom and the main floor making them universally accessible. The kitchenette was converted into a full-size kitchen with a breakfast nook.

Collaboration of Faculty, Students, Licensed Professional Engineers and other Allied Professionals: Three engineers from a local company (1 SE & 2 PEs) provided technical guidance to the team. Two local architects advised the team on the non-seismic structural improvements and making the building code compliant. A contractor assisted the team with cost estimation for the improvement. The civil engineering department advisory board consisting of around a dozen engineers listened to the student presentation and provided feedback. The team participated in a local ASCE competition which was judged by four PEs and an EIT.

Benefits to Public Health, Safety and Welfare: The impetus for the project was the safety and welfare of the campers. Seismic improvements will make the building safer; non-seismic improvements will make the building universally accessible and will improve the welfare of its users.

Multidisciplinary nature: This project encompassed multiple disciplines: structural and seismic engineering, architecture, cost estimation and engineering drafting. Furthermore, the team used 3D scan camera technology to recreate the building for design and effective presentations.

Knowledge and Skills Gained This project gave an opportunity for the students to expand their technical knowledge base, to improve their oral and written communication skills, project management and leadership skills. This project also gave an appreciation of how engineers could help better the lives of a community.