Concord Building
Clackamas, OR

Structural Narrative
November 13, 2019

Project Description

The Concord Building and property is a unique opportunity for the community of North Clackamas County to adapt and re-use a former grade school into office and community gathering space. The North Clackamas Parks and Recreation District purchased the property from the school district in 2014. The building and surrounding property are envisioned as a larger gathering space for the community and may include new library space for Oak Lodge Library. As part of the planning and programming process, the community identified priorities for the existing property including seismic strengthening of the existing Concord Building. This narrative is intended to supplement conceptual drawings developed describing the options for strengthening the existing building.

Structural Basis of Design

- *2017 ASCE 41: Seismic Design and Retrofit of Existing Buildings*
- Evaluated to the Basic Building Performance Objective for Existing Buildings (BPOE) for the following limit states:
    - Damage Control for an earthquake with a 250-year return period (BSE-1E)
    - Limited Safety for an earthquake with a 1,000-year return period (BSE-2E)
- Site Class D
- Occupancy greater than 500 people, Risk Category III structure
- Occupancy consists of office and assembly spaces
- No physical additions or alterations to the building
- Unreinforced Masonry Bearing Wall (URM) with flexible wood diaphragms
- Strengthening is voluntary

Building Description:

The Concord Building was originally constructed in 1935 with one major addition in 1948. The building is 46,000 square feet in a single-story structure with a full basement. Roof and floor structure is composed of light wood framed joists supported by interior stud bearing walls and exterior 2-wythe URM bearing walls. Discrete seismic strengthening was completed in 2001. Strengthening consists of new metal stud furred walls anchored to the interior face of URM walls around all entrance/exit egress pathways and along the entire eastern gymnasium wall. Strengthening appears to be designed to prevent collapse and falling hazards to allow for safer existing of the building following an earthquake.

Due to the type of construction and its vintage, the building has the following deficiencies:

- Lack of ductile lateral force resisting system
- Lacks in-plane and out-of-plane roof to wall connections
- Lacks in-plane and out-of-plane floor to wall connections
- Straight sheathed roof and floor diaphragms
- Re-entrant corner without cords and collectors
- Lacks positive connection between URM and basement concrete walls
- Unbraced URM chimney

Proposed Seismic Strengthening:

The proposed seismic strengthening utilizes work completed in 2001 and adds supplemental structure to enhance the structural performance of the building. Two strengthening options have been developed. Performance Option I addresses collapse hazards in the building and mitigates potential collapse of the existing perimeter URM walls. Strengthening the building structure using Performance Option I prevents collapse of the building. Strengthening consists of adding plywood sheathing to the roof and first floor of the 1948 addition. Metal stud furring walls are added to all URM perimeter walls and anchored to the URM. Furred walls are anchored to the floor and roof to re-support the gravity loads in the event the URM walls lose load carrying capacity. New plywood sheathing is added to the gymnasium ceiling to brace the ceiling structure and tie-in the ceiling to the surrounding building structure.

Performance Option II is in addition to the strengthening scope identified in Performance Option I and further enhances the building performance. Performance Option II adds new shotcrete shear walls to the building structure to provide a ductile lateral force resisting system for the building. The combination of Performance Option I and II provides a life safe structure with a limited damage state. The building may not be occupiable immediately following the design level earthquake (the big one) but would be repairable and useful once repairs were made. The building would likely be immediately occupiable following smaller earthquakes.