Forest Park Condominiums Seismic Repair and Retrofit

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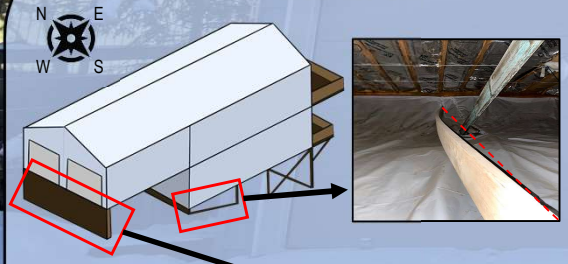
Project Background

The Forest Park Condominiums suffered structural damage as a result of the November 30, 2018 earthquake. The objective of this project was to determine possible improvements that would prevent future failures from a similar magnitude earthquake or windstorm.

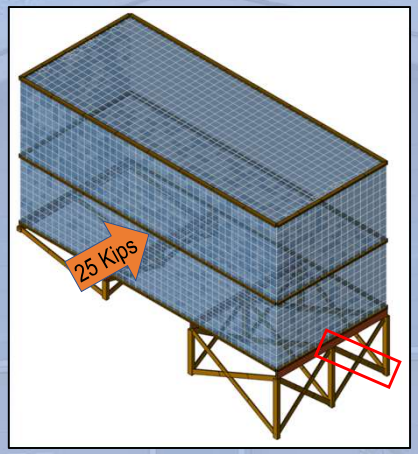
Existing Conditions



Basic Structure: Each structure (2 units) has a lower crawlspace, two enclosed stories, a garage and an attic. The structures sit on a hill with a slope of roughly 3:1 with the driveway oriented uphill.

Damage: The '18 earthquake caused damage to the crawlspace cross bracing and the foundation wall under the garage. This made it clear that the buildings lateral system needed to be inspected.

Structural Analysis

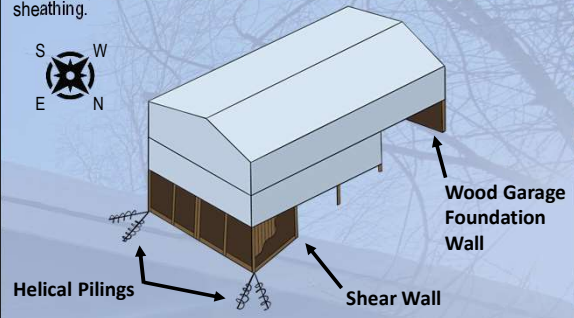


Seismic vs. Wind: In order to determine the worst-case scenario for the building, both wind and seismic forces were checked. After calculating and comparing the max forces from a code level wind and seismic event, it was found that seismic would produce approximately 25 kips to the building shown in the figure above.

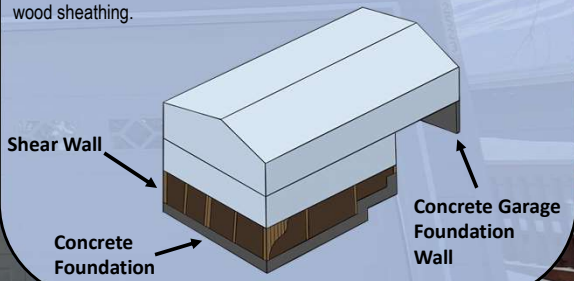
Bracing Strength: After analyzing the building in Risa 3D software, it was determined that more strength would be required to resist a current code level seismic event. The lateral bracings highlighted by the red rectangle in the figure above were too long to be acceptable. This meant the bracings would need to be completely replaced for safety and to meet current code standards.

Alternatives

Alternative 1 – The first alternative involves using wood shear walls on top of beams to transfer the load to helical pilings. Having two helical pilings at each corner will absorb the shear from the short and long sides of the building. The garage foundation wall would be replaced with an all-weather-wood stem wall and the interior garage wall would be covered with wood sheathing.



Alternative 2 – The second alternative involves adding a concrete basement to the home. This alternative would add 508 square feet to each condo unit. This unfinished space could be used for kayaks or snowshoes, or typical Alaskan gear. The garage foundation wall would be replaced with an 8-inch concrete wall and the interior garage wall would be covered with wood sheathing.



Summary and Recommendations

Alternative 1: Wood
- East end wooden shear wall
- Wood foundation wall repair
- Steel beam under garage
- Approximate cost of $24,000

Alternative 2: Concrete
- Enclosed concrete basement
- Concrete foundation wall repair
- Steel beam under garage
- Approximate cost of $73,500

Recommendation: Tectonic Engineers recommends Alternative 2: Concrete because it provides adequate lateral resistance for a current code seismic event and increases the overall value of the condominium unit by about $50,000.