Text in green is to be part of UC Santa Cruz building database and may be part of UCOP database

DATE: 2018-06-28

UC Santa Cruz building seismic ratings
Mt. Hamilton Garage – Res #7

CAAN #7231
7281 Mt. Hamilton Road, Santa Cruz, CA 95140
UCSC Campus: Mt. Hamilton

<table>
<thead>
<tr>
<th>Rating summary</th>
<th>Entry</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Seismic Performance Level (rating)</td>
<td>V (Poor)</td>
<td></td>
</tr>
<tr>
<td>Rating basis</td>
<td>Level 1</td>
<td></td>
</tr>
<tr>
<td>Date of rating</td>
<td>2019</td>
<td></td>
</tr>
</tbody>
</table>
| Recommended UC Santa Cruz priority category for retrofit | B          | Priority A=Retrofit ASAP
                                                          |            | Priority B=Retrofit at next permit application |
| Ballpark total construction cost to retrofit to IV rating<sup>1</sup> | Very High | Location is remote. Building is very small. |
| Is 2018-2019 rating required by UCOP?               | Yes        | Building was not previously rated          |
| Further evaluation recommended?                    | No         |                                            |

<sup>1</sup> We translate this FEMA 154 evaluation to a Seismic Performance Level rating using professional judgment. Non-compliant items or a certain score in the FEMA 154 evaluation do not automatically put a building into a particular rating category, but we evaluate such items along with the combination of building features and potential deficiencies, focused on the potential for collapse or serious damage to the gravity supporting structure that may threaten occupant safety. See Section III.B of the 19 May 2017 UC Seismic Safety Policy and Method B of Section 321 of the 2016 California Building Code.

<sup>2</sup> Per Section III.A.4.i of the 26 March 2019 UC Seismic Program Guidebook, Version 1.3, the cost includes all construction cost necessitated by the seismic retrofit, including restoration of finishes and any triggered work on utilities or accessibility. It does not include soft costs such as design fees or campus costs. The cost is in 2019 dollars.
Building information used in this evaluation

- None

Additional building information known to exist

- None

Scope for completing this form

A site observation was completed on 11 June 2019, and a FEMA P-154 Level 1 evaluation was completed.

Brief description of structure

The Mt. Hamilton Garage is a one-story wood framed building with a hipped roof that was constructed in 1949. It contains a rectangular footprint with an area of approximately 240 square feet, and it is located in the Lick Observatory complex in Mt. Hamilton, California. The building was formerly utilized as a storage facility, but it has since been boarded up and abandoned.

The roof diaphragm is comprised of wood shingles over straight wood sheathing. The walls are horizontal wood siding over building paper and diagonal sheathing with let-in braces on the inside. The shingles, siding, and paper are significantly warped and deteriorated; nails are rusted. If continued occupancy is required, this structure may be a candidate for demolition, or removal and replacement of the existing roof, wall finishes, and sheathing down to the rafter and studs could be performed.

The structure utilizes the exterior sheathed walls as the primary lateral force-resisting system. A large garage door opening located on one exterior wall creates a “C”-shaped lateral system. As such, the building is torsionally irregular.

Brief description of seismic deficiencies and expected seismic performance including mechanism of nonlinear response and structural behavior modes

Identified seismic deficiencies of the building include the following:

- The Mt. Hamilton Garage is torsionally irregular. It contains solid exterior walls on three sides; however, a large door opening is located one elevation which creates a “C”-shaped lateral force-resisting system. The deficiency is not considered significant because of the small size of the building and the relatively solid wall at the rear of the structure.
FEMA P-154 Score

Summary of review of nonstructural life-safety concerns, including at exit routes.\(^3\)

There are no falling hazards that pose a risk to the building occupants.

<table>
<thead>
<tr>
<th>UCOP nonstructural checklist item</th>
<th>Life safety hazard?</th>
<th>UCOP nonstructural checklist item</th>
<th>Life safety hazard?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy ceilings, feature or ornamentation above large lecture halls, auditoriums, lobbies or other areas where large numbers of people congregate</td>
<td>None observed</td>
<td>Heavy partitions braced by ceilings</td>
<td>None observed</td>
</tr>
<tr>
<td>Heavy masonry or stone veneer above exit ways and public access areas</td>
<td>None observed</td>
<td>Appendages</td>
<td>None observed</td>
</tr>
<tr>
<td>Unbraced masonry parapets, cornices or other ornamentation above exit ways and public access areas</td>
<td>None observed</td>
<td>Unrestrained hazardous materials storage</td>
<td>None observed</td>
</tr>
<tr>
<td>Masonry chimneys</td>
<td>None observed</td>
<td>Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.</td>
<td>None observed</td>
</tr>
</tbody>
</table>

Discussion of rating

A Seismic Performance Level rating of $V$ is assigned to this structure due to the significant level of deterioration of the roof diaphragm, wall sheathing and nailing. Had it been in better condition, it would have received a rating of $IV$. Although the building is likely torsionally irregular, the wall piers that remain adjacent to the door opening are deemed sufficient, and, given its compact geometry, the roof diaphragm likely would have contained sufficient capacity to distribute the rotational forces to the remaining walls.

Recommendations for further evaluation or retrofit

No further analysis is required.

Peer review of rating

This seismic evaluation was discussed in a peer review meeting on 24 June 2019. Reviewers present were Robert Graff of Degenkolb Engineers and Joe Maffei of Maffei Structural Engineering. Comments from the reviewers have been incorporated into this report. The reviewers agreed with the assigned rating.

<table>
<thead>
<tr>
<th>Additional building data</th>
<th>Entry</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>37.342748</td>
<td></td>
</tr>
<tr>
<td>Longitude</td>
<td>-121.637910</td>
<td></td>
</tr>
<tr>
<td>Are there other structures besides this one under the same CAAN#</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

\(^3\) For these Tier 1 evaluations, we do not visit all spaces of the building; we rely on campus staff to report to us their understanding of if and where nonstructural hazards may occur.
Number of stories above lowest perimeter grade: 1
Number of stories (basements) below lowest perimeter grade: 0
Building occupiable area (OGSF): 240
Risk Category per 2016 CBC Table: None
Risk Category per 2016 CBC Table 1604.5: Structure is abandoned

### Site data

<table>
<thead>
<tr>
<th>Site class</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site class basis</td>
<td>Inferred</td>
</tr>
<tr>
<td>Liquefaction potential</td>
<td>Low</td>
</tr>
<tr>
<td>Liquefaction assessment basis</td>
<td>Inferred</td>
</tr>
<tr>
<td>Landslide potential</td>
<td>Low</td>
</tr>
<tr>
<td>Landslide assessment basis</td>
<td>Inferred</td>
</tr>
<tr>
<td>Active fault rupture identified at site?</td>
<td>No</td>
</tr>
</tbody>
</table>

The site class B indicates that the Lick Observatory complex is built on a rocky outcropping at the top of Mt. Hamilton. Fractured rock is visible adjacent to the building.

Liquefaction potential assessed as Low, based on engineering judgment given the lack of surficial soils and mountaintop location.

Landslide assessed as Low, based on engineering judgment given the building site is relatively level.

### Applicable code

<table>
<thead>
<tr>
<th>Applicable code or approx. date of original construction</th>
<th>Built: 1949</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code: Unknown</td>
<td></td>
</tr>
</tbody>
</table>

No applicable code or approx. date of original construction.

### Model building data

<table>
<thead>
<tr>
<th>Model building type North-South</th>
<th>W1 – Wood Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model building type East-West</td>
<td>W1 – Wood Frame</td>
</tr>
<tr>
<td>FEMA P-154 score</td>
<td>1.9</td>
</tr>
</tbody>
</table>

### Previous ratings

- **Most recent rating**: None
- **Date of most recent rating**: 
- **2nd most recent rating**: 
- **Date of 2nd most recent rating**: 
- **3rd most recent rating**: 
- **Date of 3rd most recent rating**: 

Source: University of California, Santa Cruz

The Earthquake Zones of Required Investigation Lick Observatory Quadrangle has no Earthquake Fault Zones near Mt. Hamilton. The Mt. Hamilton area was “not evaluated for liquefaction or landslides.” See [http://gmw.conservation.ca.gov/SHP/EZRIM/Maps/LICK_OBSERVATORY_EZRIM.pdf](http://gmw.conservation.ca.gov/SHP/EZRIM/Maps/LICK_OBSERVATORY_EZRIM.pdf)
Report attachments

P 154  Level 1 Form and Additional Photos
APPENDIX A

FEMA P-154 Form and Site Map
**Rapid Visual Screening of Buildings for Potential Seismic Hazards**

**FEMA P-154 Data Collection Form**

**Level 1**

**VERY HIGH Seismicity**

---

**Address:** 7281 Mt. Hamilton Road  
San Jose, CA  
Zip: 95140

**Other Identifiers:** CAAN 7231 Mt Hamilton Garage - Res #7

**Building Name:** Formerly storage; now boarded and abandoned.

**Use:** Formerly storage; now boarded and abandoned.

**Latitude:** 37.342748  
**Longitude:** -121.637910

**S1:** 1.65g (MCE, Site Class B)  
**S2:** 0.539g (MCE, Site Class B)

**Screener(s):** Bret Lizundia/Jin Yu  
**Date/Time:** 6/11/19 / 2:45 PM

**No. Stories:** Above Grade: 1  
Below Grade: 0  
Year Built: 1949

**Total Floor Area (sq. ft.):** 240  
**Code Year:**

**Additions:**  
**Occupancy:**  
**Soil Type:**

**Geologic Hazards:**

**Adjacency:**

**Irregularities:**

**Exterior Falling Hazards:**

**COMMENTS:**

1. Roof diaphragm is wood shingles over straight sheathing. Walls are horizontal wood siding over building paper over diagonal sheathing with let-in braces on inside. Shingles, siding, and paper are significantly warped and deteriorated; nails are rusted. Garage door is boarded shut, and building is abandoned.

2. Note that FEMA P-154 uses the MCE, Site Class B site parameters to determine the Seismicity Region. The Very High Seismicity Region applies here since $S_1 = 1.65 > 1.5$ (though $S_1 = 0.54 < 0.6$).

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**BASIC SCORE, MODIFIERS, AND FINAL LEVEL 1 SCORE, $S_1$:**

<table>
<thead>
<tr>
<th>FEMA BUILDING TYPE</th>
<th>Do Not Know</th>
<th>$W_1$</th>
<th>$W_2$</th>
<th>$S_1$</th>
<th>$S_2$</th>
<th>$S_3$</th>
<th>$S_4$</th>
<th>$S_5$</th>
<th>$C_1$</th>
<th>$C_2$</th>
<th>$C_3$</th>
<th>$C_4$</th>
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<th>$RM_1$</th>
<th>$RM_2$</th>
<th>$URM_1$</th>
<th>$NH_1$</th>
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<tbody>
<tr>
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<td>1.8</td>
<td>1.5</td>
<td>1.4</td>
<td>1.6</td>
<td>1.4</td>
<td>1.2</td>
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<td>1.2</td>
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<td>1.0</td>
<td>1.1</td>
<td>0.9</td>
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<td>Severe Vertical Irregularity, ( V_{s1} )</td>
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<td>-0.9</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.7</td>
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<td>-0.7</td>
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<td>Moderate Vertical Irregularity, ( V_{s1} )</td>
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<tr>
<td>Plan Irregularity, ( P_1 )</td>
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<tr>
<td>Fire-Code</td>
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<td>Post-Benchmark</td>
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<td>Soil Type A or B</td>
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<tr>
<td>Soil Type E (1-3 stories)</td>
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<tr>
<td>Soil Type E (3 stories)</td>
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<td>-0.3</td>
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<td>-0.2</td>
<td></td>
</tr>
</tbody>
</table>

**Minimum Score, $S_1$:**

| 0.7 | 0.7 | 0.7 | 0.5 | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 1.0 |

**FINAL LEVEL 1 SCORE, $S_1$: 1.9**

**UCOP SEISMIC PERFORMANCE LEVEL (OR 'RATING') V**

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**EXTENT OF REVIEW**

**Exterior:** None  
**Interior:** None  
**Drawings Reviewed:** Yes  
**Rock is visible:**

**Geologic Hazards Source:** Geotech Report/CGS website

**Contact Person:** Joe Halay

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**LEVEL 2 SCREENING PERFORMED?**

- Yes, Final Level 2 Score, $S_2$:  
- No, Nonstructural hazards?: Yes  
- No

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**OTHER HAZARDS**

- Are There Hazards That Trigger A Detailed Structural Evaluation?  
- Yes, unknown FEMA building type or other building
- No, score less than cut-off
- Yes, other hazards present

**ACTION REQUIRED**

- Detailed Structural Evaluation Required?  
- Yes
- No

- Detailed Nonstructural Evaluation Recommended? (check one)
- Yes, nonstructural hazards identified that should be evaluated
- No, nonstructural hazards exist that may require mitigation, but a detailed evaluation is not necessary
- No, no nonstructural hazards identified

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**Legend:**  
- MRF = Moment-resisting frame  
- RC = Reinforced concrete  
- URM INF = Unreinforced masonry INF  
- BR = Brick frame  
- SW = Shear wall  
- TU = Tie-up  
- LM = Light metal  
- RD = Rapid diaphragm

Where information cannot be verified, screeners shall note the following: EST = Estimated or unreliable data  
DNK = Do Not Know