Rating form completed by:

RUTHERFORD + CHEKENE
ruthchek.com
Evaluator: BL
Date: 06/28/2019

*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 #6

CAAN #7232
7281 Mt. Hamilton Road, Santa Cruz, CA 95140
UCSC Campus: Mt. Hamilton

Plan


East Elevation (Looking Northwest)


| Rating summary | Entry | Notes |
|---|---|---|
| UC Seismic Performance Level (rating) | IV (Fair) | |
| Rating basis | Level 1 | **FEMA P-154[1]** |
| Date of rating | 2019 | |
| Recommended UC Santa Cruz priority category for retrofit | None | Priority A=Retrofit ASAP<br>Priority B=Retrofit at next permit application |
| Ballpark total construction cost to retrofit to IV rating[2] | None | Building is abandoned |
| Is 2018-2019 rating required by UCOP? | Yes | Building was not previously rated |
| Further evaluation recommended? | No | |

[1] 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*.

[2] 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 1916. It contains a rectangular footprint with an area of approximately 231 square feet, and it is located near the Lick Observatory in Mt. Hamilton, California. The building was formerly utilized as a storage facility, but it has since been 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 two full-height let-in braces on the inside of each of the walls. The shingles are moderately deteriorated, and the siding paint is peeling. From the interior, the rafters and the studs appear to be in good condition.

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 on the east elevation which creates a "C"-shaped lateral force-resisting system.

**FEMA P-154 Score**

**BASIC SCORE, MODIFIERS, AND FINAL LEVEL 1 SCORE, $S_{L1}$**

| FEMA BUILDING TYPE (Do Not Know) | W1 | W1A | W2 | S1 (MRF) | S2 (BR) | S3 (LM) | S4 (RC SW) | S5 (URM INF) | C1 (MRF) | C2 (SW) | C3 (URM INF) | PC1 (TU) | PC2 | RM1 (FD) | RM2 (RD) | URM | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Basic Score** | 2.1 | 1.9 | 1.8 | 1.5 | 1.4 | 1.6 | 1.4 | 1.2 | 1.0 | 1.2 | 0.9 | 1.1 | 1.0 | 1.1 | 1.1 | 0.9 | 1.1 |
| Severe Vertical Irregularity, $V_{L1}$ | -0.9 | -0.9 | -0.9 | -0.8 | -0.7 | -0.8 | -0.7 | -0.7 | -0.7 | -0.8 | -0.6 | -0.7 | -0.7 | -0.7 | -0.7 | -0.6 | NA |
| Moderate Vertical Irregularity, $V_{L1}$ | -0.6 | -0.5 | -0.5 | -0.4 | -0.4 | -0.5 | -0.4 | -0.3 | -0.4 | -0.4 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | NA |
| Plan Irregularity, $P_{L1}$ | -0.7 | -0.7 | -0.6 | -0.5 | -0.5 | -0.6 | -0.4 | -0.4 | -0.4 | -0.5 | -0.3 | -0.5 | -0.4 | -0.4 | -0.4 | -0.3 | NA |
| Pre-Code | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | -0.3 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | -0.2 | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 |
| Post-Benchmark | 1.9 | 1.9 | 2.0 | 1.0 | 1.1 | 1.1 | 1.5 | NA | 1.4 | 1.7 | NA | 1.5 | 1.7 | 1.6 | 1.6 | NA | 0.5 |
| Soil Type A or B | 0.5 | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.3 | 0.2 | 0.3 | 0.3 | 0.1 | 0.1 |
| Soil Type E (1-3 stories) | 0.0 | -0.2 | -0.4 | -0.3 | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | -0.2 | -0.1 | -0.2 | -0.2 | 0.0 | -0.1 |
| Soil Type E (> 3 stories) | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | NA | -0.3 | -0.1 | -0.1 | -0.3 | -0.1 | NA | -0.1 | -0.2 | -0.2 | 0.0 | NA |
| Minimum Score, $S_{MIN}$ | 0.7 | 0.7 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 1.0 |

FINAL LEVEL 1 SCORE, $S_{L1} \geq S_{MIN}$: 1.9 — UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING") IV

**Summary of review of nonstructural life-safety concerns, including at exit routes.[3]**

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

[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.

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

### Discussion of rating

A Seismic Performance Level rating of IV is assigned to the structure. 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 contains sufficient capacity to distribute forces to the remaining walls in rotation.

### 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 17 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.

| Additional building data | Entry | Notes |
|---|---|---|
| Latitude | 37.342924 | |
| Longitude | -121.638409 | |
| Are there other structures besides this one under the same CAAN# | No | |
| Number of stories above lowest perimeter grade | 1 | |
| Number of stories (basements) below lowest perimeter grade | 0 | |
| Building occupiable area (OGSF) | 231 | |
| Risk Category per 2016 CBC Table 1604.5 | II | |
| **Site data** | | |
| Site class | B | |
| Site class basis | Inferred | 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 | Low | |
| Liquefaction assessment basis | Inferred | Engineering judgment given the lack of surficial soils and mountaintop location. |

| | | |
|---|---|---|
| Landslide potential | Low | |
| Landslide assessment basis | Inferred | Engineering judgment given the building site is relatively level. |
| Active fault rupture identified at site? | No | |
| Fault rupture assessment basis | CGS Website | 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 |
| **Applicable code** | | |
| Applicable code or approx. date of original construction | Built: 1916<br>Code: Unknown | |
| Applicable code for partial retrofit | None | No partial retrofit |
| Applicable code for full retrofit | None | No full retrofit |
| **Model building data** | | |
| Model building type North-South | W1 – Wood Frame | |
| Model building type East-West | W1 – Wood Frame | |
| FEMA P-154 score | 1.9 | |
| **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 | - | |
| **Report attachments** | | |
| P 154 Level 1 Form and Site | | |

# APPENDIX A

# FEMA P-154 Form and Site Map

Berkeley
UNIVERSITY OF CALIFORNIA

# 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 #6
**Building Name:**
**Use:** Storage
**Latitude:** 37.342924 **Longitude:** -121.638409
**$S_S$:** 1.656 g (MCER Site Class B) **$S_1$:** 0.54g (MCER 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:** 1916 ☒ EST
**Total Floor Area (sq. ft.):** 231 **Code Year:** Unknown
**Additions:** ☒ None ☐ Yes, Year(s) Built:

**Occupancy:** Assembly ☐ Commercial ☐ Emer. Services ☐ Historic ☐ Shelter
Industrial ☐ Office ☐ School ☐ Government
(Utility) ☐ Warehouse ☐ Residential, # Units:

**Soil Type:** ☐ A Hard Rock ☒ B Avg Rock ☐ C Dense Soil ☐ D Stiff Soil ☐ E Soft Soil ☐ F Poor Soil **DNK** *If DNK, assume Type D.*

**Geologic Hazards:** Liquefaction: Yes/(No)/DNK Landslide: Yes/(No)/DNK Surf. Rupt.: Yes/(No)/DNK

**Adjacency:** ☐ Pounding ☐ Falling Hazards from Taller Adjacent Building

**Irregularities:** ☐ Vertical (type/severity)
☒ Plan (type) Torsion ("C"-shaped lateral system

**Exterior Falling Hazards:** ☐ Unbraced Chimneys ☐ Heavy Cladding or Heavy Veneer
☐ Parapets ☐ Appendages
☐ Other:

**COMMENTS:**

1. Roof diaphragm is wood shingles over straight sheathing. Walls are horizontal wood siding over building paper over horizontal sheathing with two full height let-in braces on inside of each of the walls except the garage opening on the east side. Shingles are moderately deteriorated and siding paint is peeling, but interior rafters and studs are in good condition.
2. Note that FEMA P-154 uses the $MCE_R$ Site Class B site parameters to determine the Seismicity Region. The Very High Seismicity Region applies here since $S_s$=1.66 > 1.5 (though $S_1$ = 0.54 < 0.6).

☒ Additional sketches or comments on separate page

## BASIC SCORE, MODIFIERS, AND FINAL LEVEL 1 SCORE, $S_{L1}$

| FEMA BUILDING TYPE (Do Not Know) | W1 | W1A | W2 | S1 (MRF) | S2 (BR) | S3 (LM) | S4 (RC SW) | S5 (URM INF) | C1 (MRF) | C2 (SW) | C3 (URM INF) | PC1 (TU) | PC2 | RM1 (FD) | RM2 (RD) | URM | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Basic Score** | 2.1 | 1.9 | 1.8 | 1.5 | 1.4 | 1.6 | 1.4 | 1.2 | 1.0 | 1.2 | 0.9 | 1.1 | 1.0 | 1.1 | 1.1 | 0.9 | 1.1 |
| Severe Vertical Irregularity, $V_{L1}$ | -0.9 | -0.9 | -0.9 | -0.8 | -0.7 | -0.8 | -0.7 | -0.7 | -0.7 | -0.8 | -0.6 | -0.7 | -0.7 | -0.7 | -0.7 | -0.6 | NA |
| Moderate Vertical Irregularity, $V_{L1}$ | -0.6 | -0.5 | -0.5 | -0.4 | -0.4 | -0.5 | -0.4 | -0.3 | -0.4 | -0.4 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | NA |
| Plan Irregularity, $P_{L1}$ | -0.7 | -0.7 | -0.6 | -0.5 | -0.5 | -0.6 | -0.4 | -0.4 | -0.4 | -0.5 | -0.3 | -0.5 | -0.4 | -0.4 | -0.4 | -0.3 | NA |
| Pre-Code | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | -0.3 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | -0.2 | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 |
| Post-Benchmark | 1.9 | 1.9 | 2.0 | 1.0 | 1.1 | 1.1 | 1.5 | NA | 1.4 | 1.7 | NA | 1.5 | 1.7 | 1.6 | 1.6 | NA | 0.5 |
| Soil Type A or B | 0.5 | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.3 | 0.2 | 0.3 | 0.3 | 0.1 | 0.1 |
| Soil Type E (1-3 stories) | 0.0 | -0.2 | -0.4 | -0.3 | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | -0.2 | -0.1 | -0.2 | -0.2 | 0.0 | -0.1 |
| Soil Type E (> 3 stories) | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | NA | -0.3 | -0.1 | -0.1 | -0.3 | -0.1 | NA | -0.1 | -0.2 | -0.2 | 0.0 | NA |
| Minimum Score, $S_{MIN}$ | 0.7 | 0.7 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 1.0 |

**FINAL LEVEL 1 SCORE, $S_{L1} \geq S_{MIN}$:** 1.9 **UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING")** IV

### EXTENT OF REVIEW

**Exterior:** ☐ Partial ☒ All Sides ☐ Aerial
**Interior:** ☐ None ☒ Visible ☐ Entered
**Drawings Reviewed:** ☐ Yes ☒ No
**Soil Type Source:** Rock is visible
**Geologic Hazards Source:** CGS website
**Contact Person:** Joe Halay

### LEVEL 2 SCREENING PERFORMED?

☐ Yes, Final Level 2 Score, $S_{L2}$ _____ ☒ No
Nonstructural hazards? ☐ Yes ☒ No

### OTHER HAZARDS

**Are There Hazards That Trigger A Detailed Structural Evaluation?**

☐ Pounding potential (unless $S_{L2}$ > cut-off, if known)
☐ Falling hazards from taller adjacent building
☐ Geologic hazards or Soil Type F
☐ Significant damage/deterioration to the structural system

### ACTION REQUIRED

**Detailed Structural Evaluation Required?**

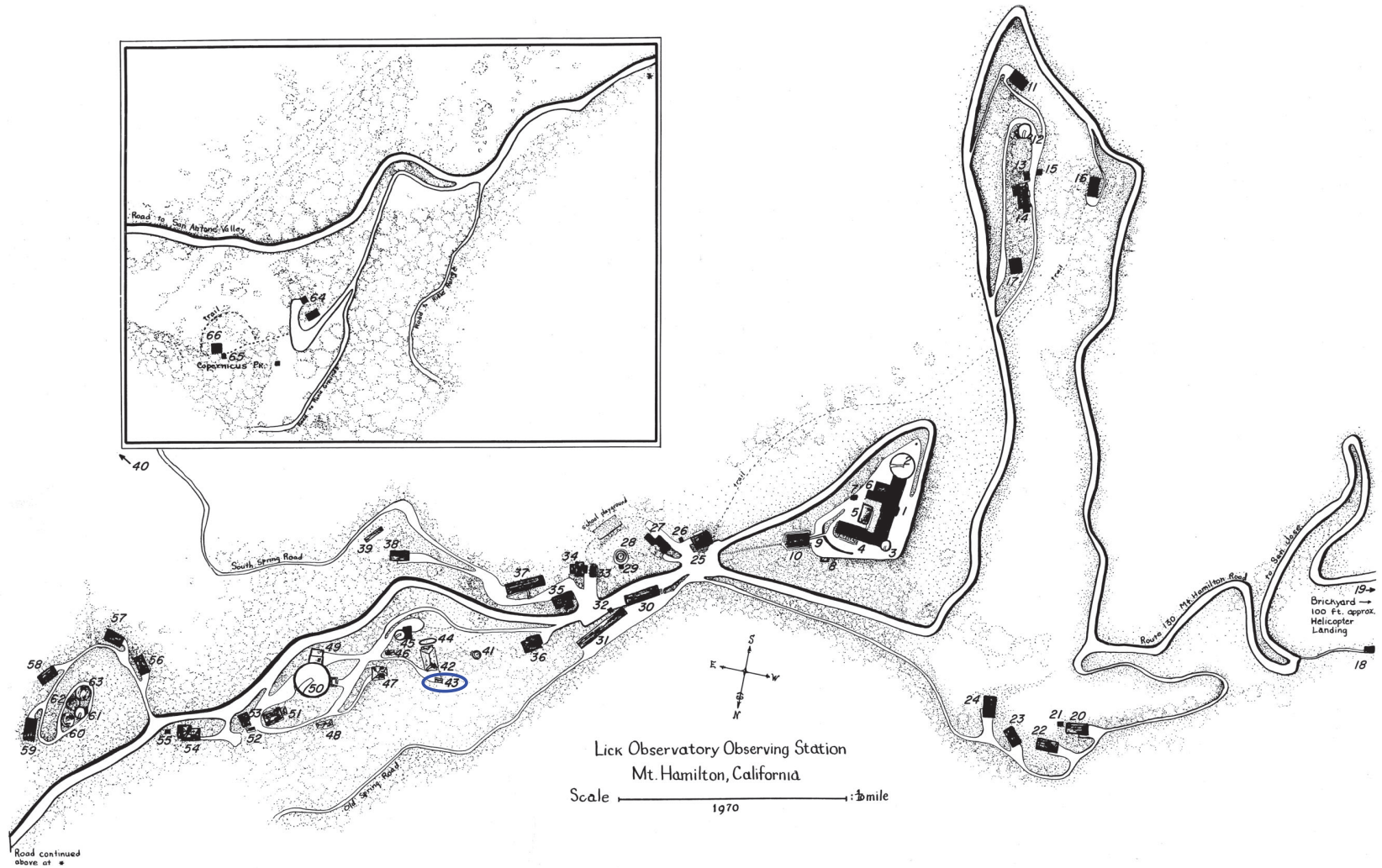
☐ Yes, unknown FEMA building type or other building
☐ Yes, score less than cut-off
☐ Yes, other hazards present
☒ No

**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 ☐ DNK

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

Legend: MRF = Moment-resisting frame; BR = Braced frame; RC = Reinforced concrete; SW = Shear wall; URM INF = Unreinforced masonry infill; TU = Tilt up; MH = Manufactured Housing; LM = Light metal; FD = Flexible diaphragm; RD = Rigid diaphragm




1. 7240 Main Building
2. 7240 36-inch Refracting Telescope
3. 7240 12-inch Refracting Telescope
4. 7279 Laboratory and Measuring Bldg.
5. 7260 Photographic Bldg. and Plate Vault
6. 7239 Library Building
7. 7288 Transformer Vault
8. 7287 Water Booster Pump
9. 7298 Heating Plant Building
10. 7213 Old Dormitory (No. 1)
11. 7214 Res. # 10 - Vacant
12. 7211 Crossley 39-inch Reflecting Telescope
13. 7234 Garage - Res. # 1
14. 7266 Res. # 1 - Dietsch
15. 7285 Transformer Vault
16. 7220 Res. # 15 - Stone
17. 7271 Res. # 2 - Vacant
18. 7237 Incinerator
19. 7262 Pump House - North Spring
20. 7225 Res. # 20 - Gehri
21. 7295 Transformer - Vault
22. 7224 Res. # 19 - Roessler
23. 7223 Res. # 18 - Sunzeri
24. 7222 Res. # 17 - Hansen
25. 7202 Dining Hall and Rec. Room
26. 7286 Transformer Vault
27. 7272 Res. # 3 - Guest House
28. 7209 Tauchmann 22-inch Reflecting Telescope
29. 7273 Reservoir and Pump House - Huygen Peak
30. 7281 Shop Building
31. 7282 Garage, Shop, and Storage Building
32. 7297 Water Booster Pump
33. 7235 Fire Truck Garage
34. 7280 School House
35. 7267 Res. # 4 - Clark
36. 7268 Res. # 5 - Owens
37. 7212 New Dormitory (No. 2)
38. 7219 Res. # 14 - Harlan
39. 7229 Quonset Hut - Storage
40. 7261 Pump House - South Spring
41. 7210 Crocker Dome
42. 7269 Res. # 6 - Vacant
43. 7232 Garage - Res. # 6
44. Swimming Pool
45. 7215 Carnegie Twin 20-inch Refracting Telescope
46. 7231 Garage - Res. # 7
47. 7265 Res. # 7 - Vacant
48. 7264 Annex from Res. # 7 - Vacant
49. 7276 Coudé Auxiliary Telescope (CAT)
50. 7276 120-inch Reflecting Telescope
51. 7270 Res. # 8 - Vacant
52. 7233 Garage - Res. # 8
53. 7226 Annex to Res. # 8 - Kron Annex
54. 7205 Res. # 9 - Bumgarner
55. 7289 Transformer Vault
56. 7217 Res. # 12 - Sylvester
57. 7216 Res. # 11 - Miller
58. 7218 Res. # 13 - Hinkley
59. 7221 Res. # 16 - Laub
60. 7274 Reservoir - Kepler Peak
61. 7208 24-inch Photometric Reflecting Telescope
62. 7293 Water Tank - 261,000 gals.
63. 7294 Water Tank - Kepler Peak
64. Santa Clara Co. Communications Bldg.
65. Fire Lookout Bldgs. - State Div. of Forests
66. 7275 Reservoir - Copernicus Peak

A. Bumgarner 11-1970
F. Greeby 12-1973