MT. HAMILTON GRAVITY CALIBRATION LOOP

by

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General description This gravimeter calibration loop is so convenient to the San Francisco area that it has become the Geological Survey's most used and best established segment of the USGS calibration network. The loop begins at the USGS office at Menlo Park and consists of about 20 miles of freeway driving to the southeast part of San Jose before starting a rather sharp ascent of about 16 miles on a curvey two-lane road to the top of Mt. Hamilton (fig. 4). The gravity range starts at 979,958.7 mgal at Menlo Park (Chapman, 1966, p. 36) and decreases about 309.3 mgal (table 2) to 979,649.4 mgal at Mt. Hamilton, thus covering most of the gravity values observed in coastal California as far south as Santa Barbara. The loop takes about 4 to 6 hours for a round trip and can be run all year, although fog and rare winter snow may make the trip difficult. The gravity differences (table 2) are based on the average of 9 runs with LaCoste meter G17B during 1962-65 and have standard deviations of .03 to .05 mgal. As of December 1968, 22 usable runs with G17B are available and yield a total loop average of 309.295 mgal or only .01(5) mgal lower than the average of the first nine runs. The total loop average as determined by five runs in 1968 with G115B is 309.31 mgal or essentially the same as the G17B average within the standard deviation of the measurements (±.03 mgal).

A at Menlo Park Geological Survey office is 15 miles SE of San Francisco Airport, and can be reached from the Bayshore Freeway (US 101) by taking the Willow Road exit and continuing 1 mile SW to Middlefield Rd., then 2/3 mile NW to the office buildings at 345 Middlefield. The station is near the SW end of the entrance drive beyond the flagpole and at the N corner of building 2. The meter is read on the top of USGS bench mark "1JD, 1956" which is set in the N corner of the concrete walk along the drive NW of the building.

HC near San Jose is reached by returning to Bayshore Freeway and driving S about 20 miles to San Jose, thence turning E onto Tully Rd., which is 2.7 miles past the Santa Clara St. exit (fig. 3), going for 0.75 mile and turning right on Quimby Rd. which borders Hillview Golf Course, and continuing for about 2.5 miles to a private driveway leading to the right (S) and marked by a P. O. Box "L.B.M. Ranch, Box 273." A 4-foot-high concrete post is located at the SW corner of the intersection which contains USGS bench mark "74 HJH" in its top, and a gravity station marker "HC" is set in a concrete slab at the base of the post. The meter is read on the gravity mark.

HD at Halls Valley is reached by continuing E from HC about 4 miles along Quimby Rd. to its end at Mt. Hamilton Rd., thence 0.35 mile E to a metal gate on the left and across a dirt road leading N to a reservoir. The station is about 4 feet E of the east gate post, and the meter is read on a USGS gravity mark stamped "HD" which is set in a low concrete slab.

HE at Smith Creek Ranger Station is about 5 miles further on the same road at a sharp bend at the bottom of a valley, where the Ranger compound is on the right or outside edge of the bend. A fenced area containing a weather station is on the NW side of the entrance drive opposite a garage area. A USGS bench mark "121 JD" is set in a cement pillar a few feet SE of the weather station, and the meter is read on gravity marker "HE," which is set in a low concrete slab about 1/2 foot south of the bench mark.

HF at U-Curve of the Mt. Hamilton Rd. is 2.2 miles further and is on the outside edge of the most NW bend of the road around the crest of a small ridge. A witness post is observable from the road about 34 feet on the left and below the center line of the road. A few feet from the witness post is a cement pillar projecting about a foot above the ground and containing USGS bench mark "122 JD" in its top. Next to the bench mark is a low concrete slab with gravity mark "HF," on which the meter is read.

HG at another Ridge Summit is 2.6 miles E on the same road, and on the SE and outside edge of a curve. Just off a pull-out apron on the right (S) side of the road is a gravity mark "HG" set in a concrete slab next to a cement pillar containing USGS bench mark "123 JD." A witness post is set near the marks. The meter is read on the gravity mark.

HH at Lick Observatory on Mt. Hamilton is in the parking lot to the west of the main observatory. The station is about 150 feet NW of the main entrance to the building and about 20 feet from the curved wall bounding the parking area. The meter is read directly over a triangulation station mark, which is in a round hole about 6 inches in diameter and 6 inches deep in the asphalt pavement which is here crossed by white paint.

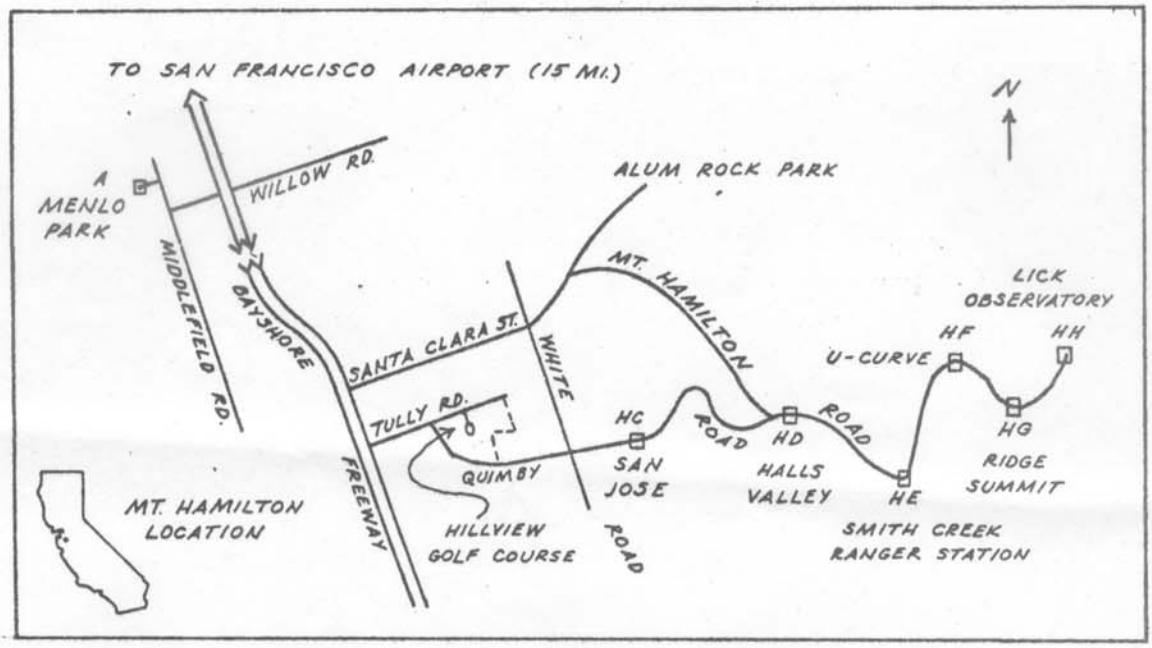


Fig. 4 Sketch map of Mt. Hamilton calibration loop

Table 2. Principal facts for gravity stations on the Mt. Hamilton calibration loop

Sta. No.	Name	Latitude		Longitude		Elev.[1]	Δg[2]
		°	'	°	'	feet	mgal
A	Menlo Park	37	27.34	122	10.18	53	--
HC	San Jose	37	19.55	121	46.56	321	73.81
HD	Halls Valley	37	20.55	121	42.89	1586	67.77
HE	Smith Creek Ranger Station	37	19.42	121	40.05	2154	32.22
HF	U - curve	37	20.47	121	40.00	2779	36.18
HG	Ridge Summit	37	20.36	121	39.04	3574	51.04
HH	Lick Observatory	37	20.52	121	38.49	4213	48.29
						Total Loop Difference A-HH	309.31

[1] All stations are located on or near U.S.G.S. or U.S.C.& G.S. bench marks except HD which was hand leveled in from a nearby road intersection elevation.

[2] Gravity differences relative to next previous station based on average of 9 runs with LaCoste meter G17B in 1962-65.

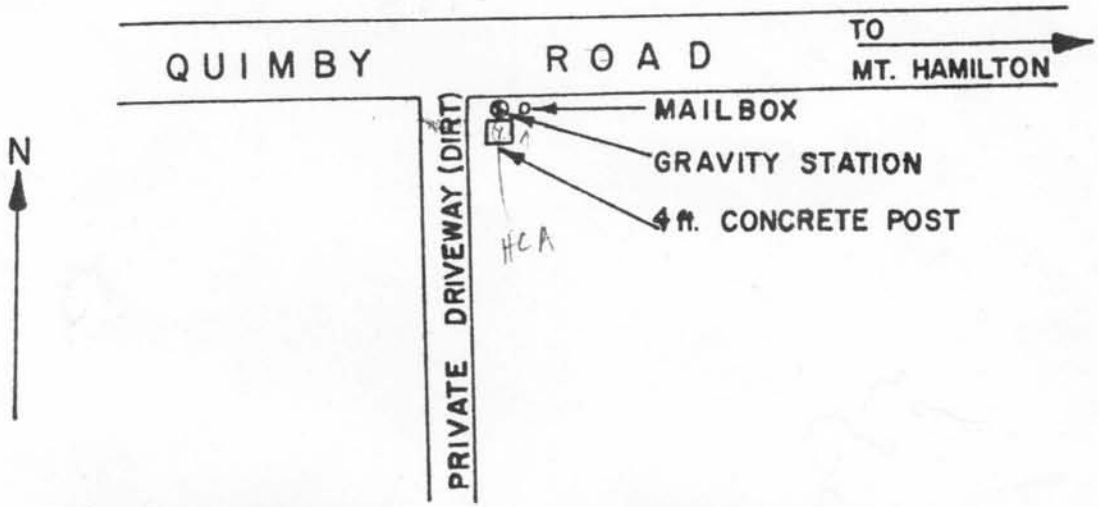
DESTROYED, SEE HCB

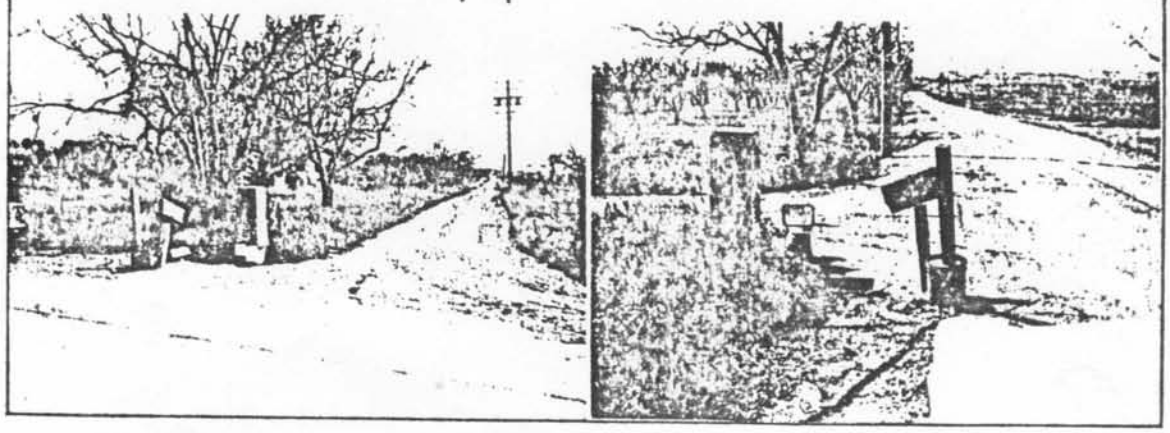
GRAVITY BASE STATION # HC

CITY San Jose, East	STATE California
LATITUDE 37° 19.55'	LONGITUDE 121° 46.56'
ELEVATION 321'	
OBSERVED GRAVITY 979,884.93 mgal	SBA -41.1 mgal

LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes & others, 1968) and is about 3¼ miles east of U.S. Highway 101 bypass and 1.1 miles east of White Road on Quimby Road in San Jose.

The gravity meter is read on a USGS gravity station marker stamped "HC" which is next to and north of a 4-foot-high concrete post containing USGS standard disk bench mark "74HJH." The station is on the south side of Quimby Road just east of a private driveway leading to the south and marked by a P. O. Box "L.B.M. Ranch, Box 273."





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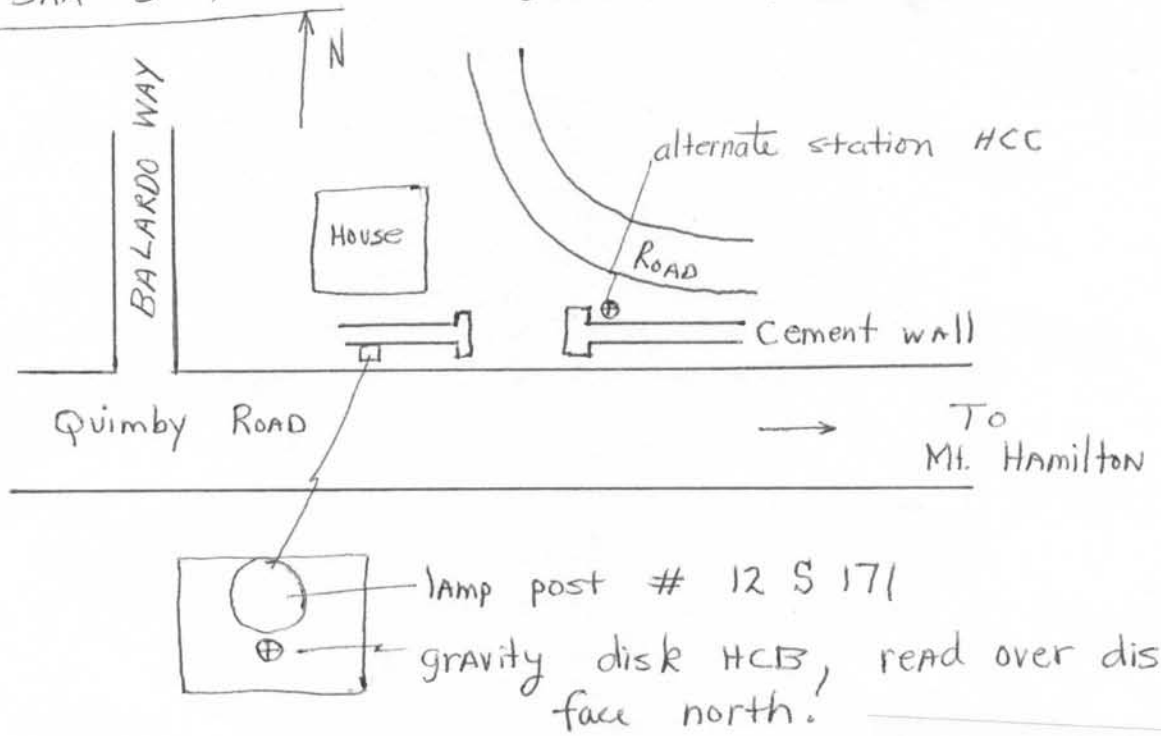
DAP.

HCB, San Jose, East. OG: 979, 885.08



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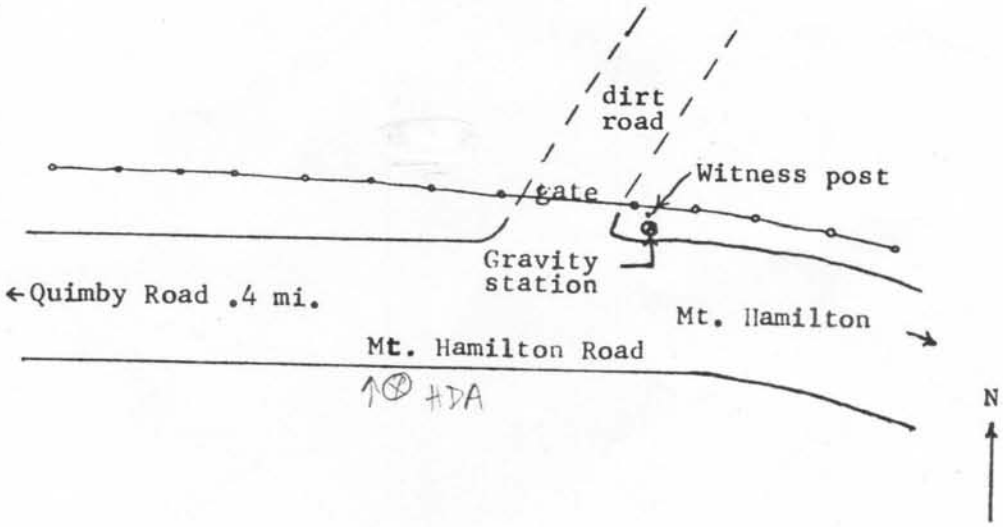
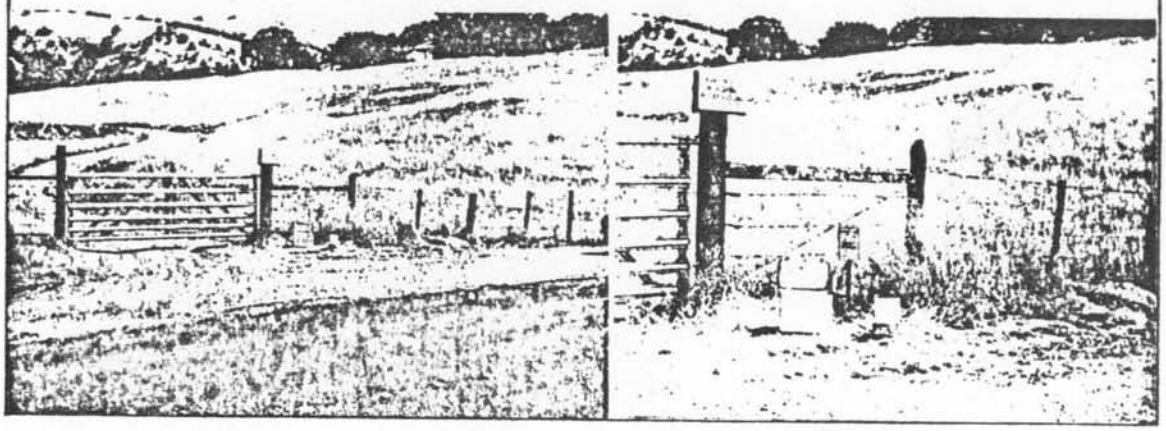
GRAVITY BASE STATION #HD

NAME Halls Valley	STATE California
LATITUDE 37° 20.55'	LONGITUDE 121° 42.89'
ELEVATION 1586'	
OBSERVED GRAVITY 979,817.16 mgal	SBA -34.5 mgal

LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes and others, 1968) and is about 4 miles east of station HC along Quimby Road to its end at Mt. Hamilton Rd., thence 0.35 mile east to a metal gate on the left and on the east side of a dirt road leading north to a reservoir.

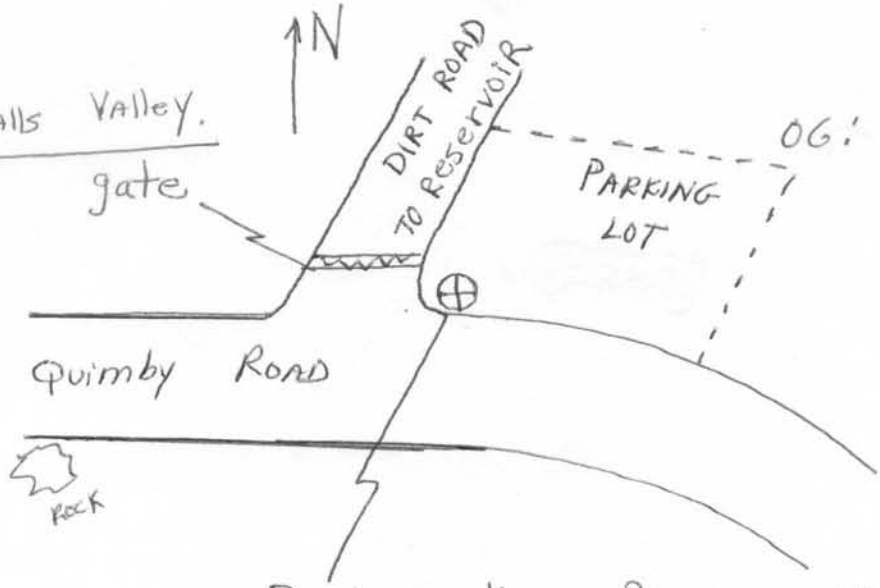
The gravity meter is read on a USGS gravity station marker stamped "HD" set in a low concrete slab which is about 4 feet east of the east gate post.





1/13/84 DAP

HDB, Halls Valley.



OG: 979, 817.13

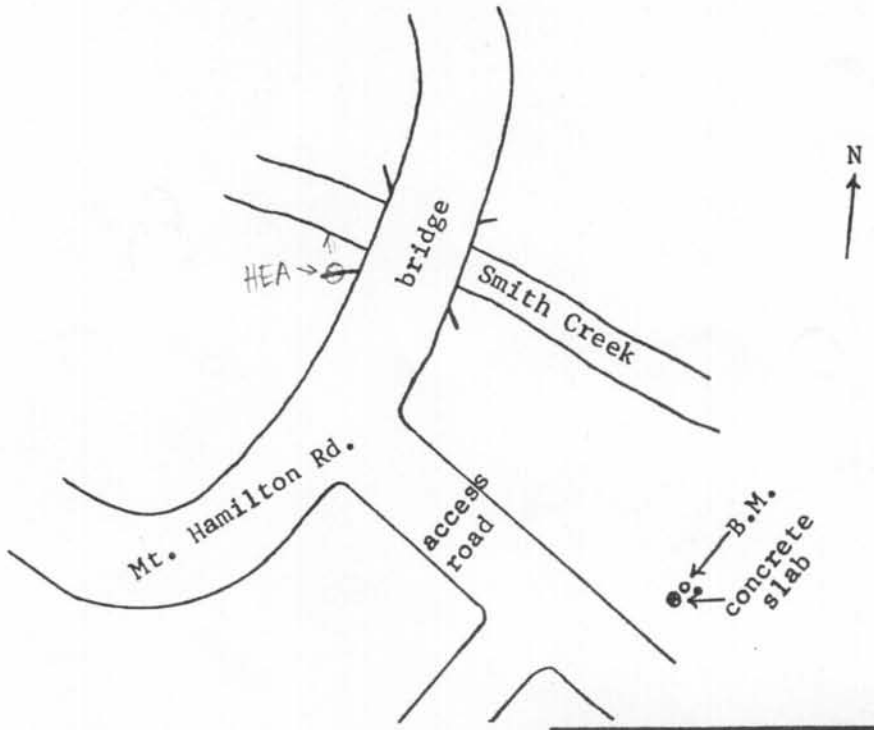
Bench mark, Read gravity directly over B.M., face north.

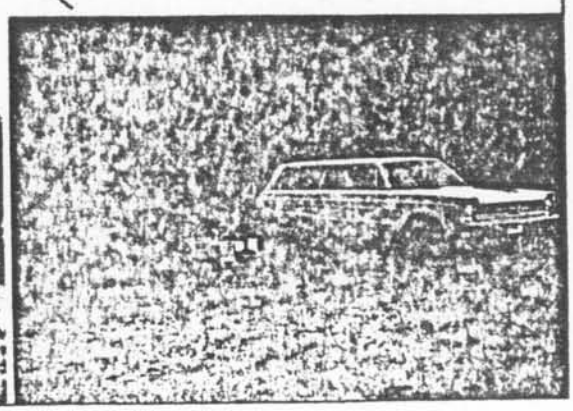
GRAVITY BASE STATION # HE

NAME Smith Creek Ranger Station	STATE California
LATITUDE 37° 19.42'	LONGITUDE 121° 40.05'
ELEVATION 2154'	
OBSERVED GRAVITY 979,784.94 mgal	SBA -31.0 mgal

LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes and others, 1968) and is about 5 miles east of station HD on Mt. Hamilton Rd. at the Smith Creek Ranger Station.

The gravity meter is read on a USGS gravity station marker stamped "HE" set in a low concrete slab about ½ foot south of USGS bench mark "121-JD". The station is on the southeast side of Mt. Hamilton Rd., on the south side of Smith Creek, and on the north side of a dirt road on the north side of the ranger station buildings.



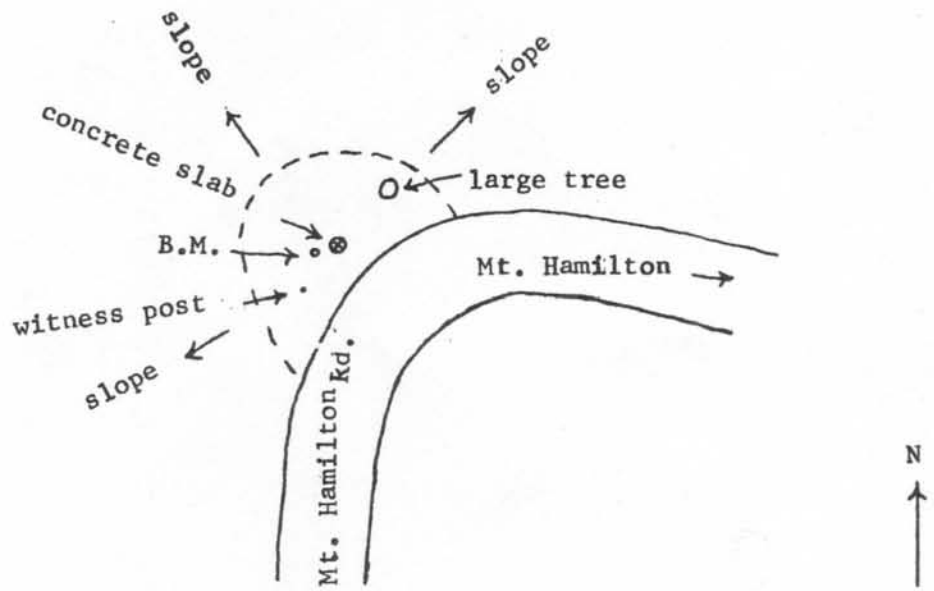


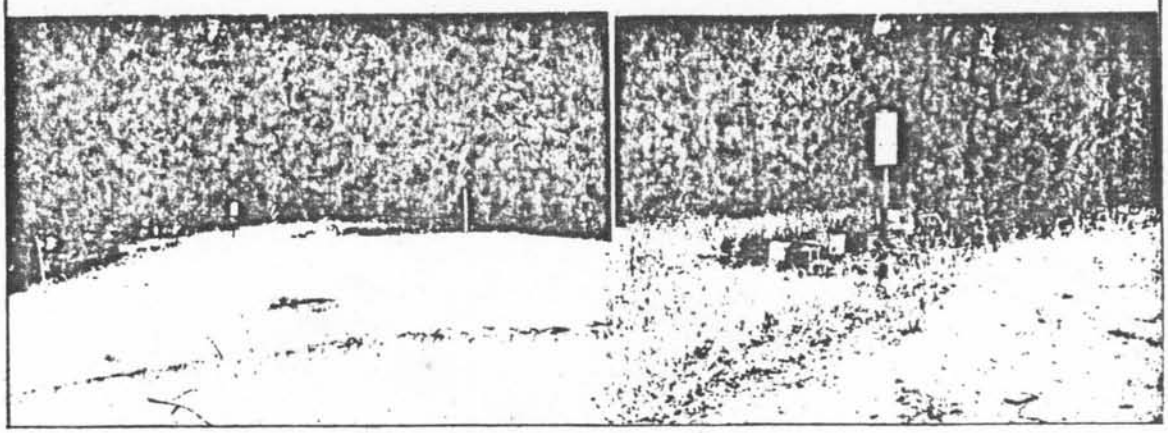
GRAVITY BASE STATION # HF

NAME Mt. Hamilton Rd. at curve	STATE California
LATITUDE 37° 20.47'	LONGITUDE 121° 40.00'
ELEVATION 2779'	
OBSERVED GRAVITY 979,748.76 mgal	SBA -31.3 mgal

LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes and others, 1968) and is about 2.2 miles north of station "HE" on the northwest side of Mt. Hamilton Rd.

The gravity meter is read on a USGS gravity station marker stamped "HF" set in a low concrete slab about one foot east of USGS bench marker "122-JD". A witness post is 34 feet northwest of the road, and the gravity station is a few feet to the northeast of the post.





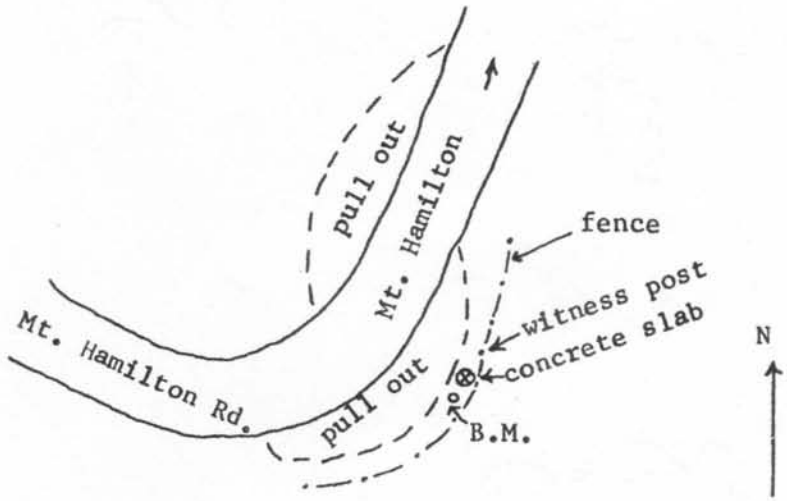
GRAVITY BASE STATION # HG

NAME Mt. Hamilton Rd. at ridge summit	STATE California
LATITUDE 37° 20.36'	LONGITUDE 121° 39.04'
ELEVATION 3574'	
OBSERVED GRAVITY 979,697.72 mgal	SBA −34.5 mgal

-261.02 from A
HG-HH = -48.29

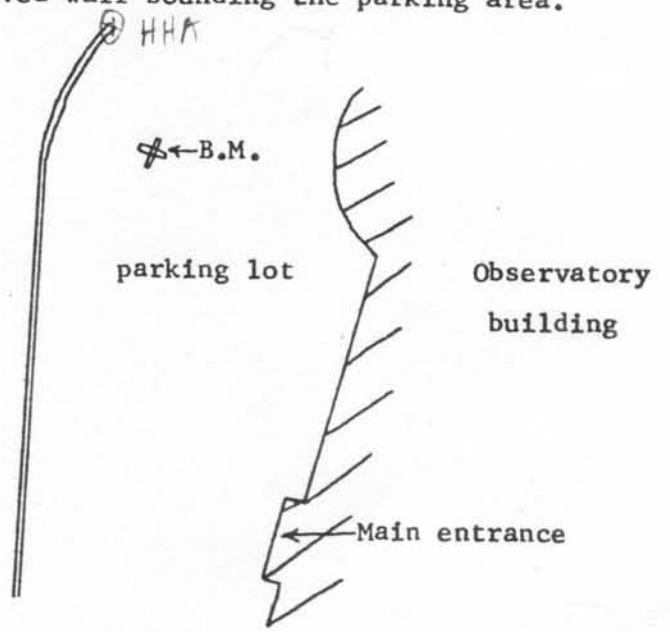
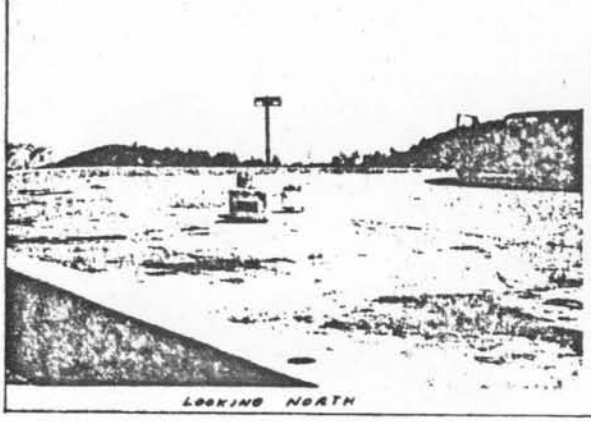
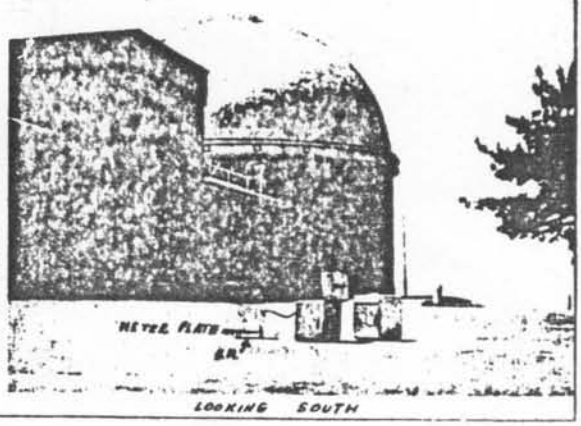
LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes and others, 1968) and is about 2.6 miles east of station "HF" on the east side of Mt. Hamilton Rd.

The gravity meter is read on a USGS gravity station marker stamped "HG" set in a concrete slab and ½ foot north of USGS bench mark "123 JD." The station is about 4 feet higher than the road, and there is a witness post about 2-3 feet north of the station.



GRAVITY BASE STATION # HH

NAME Lick Observatory	STATE California
LATITUDE 37° 20.52'	LONGITUDE 121° 38.49'
ELEVATION 4213'	
OBSERVED GRAVITY 979,649.43 mgal -309.31 from A.	SBA -44.8 mgal

LOCATION DESCRIPTION: This station is part of the Mt. Hamilton Calibration Loop (Barnes and others, 1968) and is in the parking lot to the west of Lick Observatory's main building (This is the original building).

The gravity meter is read on the asphalt pavement directly over a triangulation station bench mark, which is in a round hole about 6 inches in diameter and 6 inches deep. The station is about 150 feet northwest of the main entrance to the building and about 20 feet from the curved wall bounding the parking area.