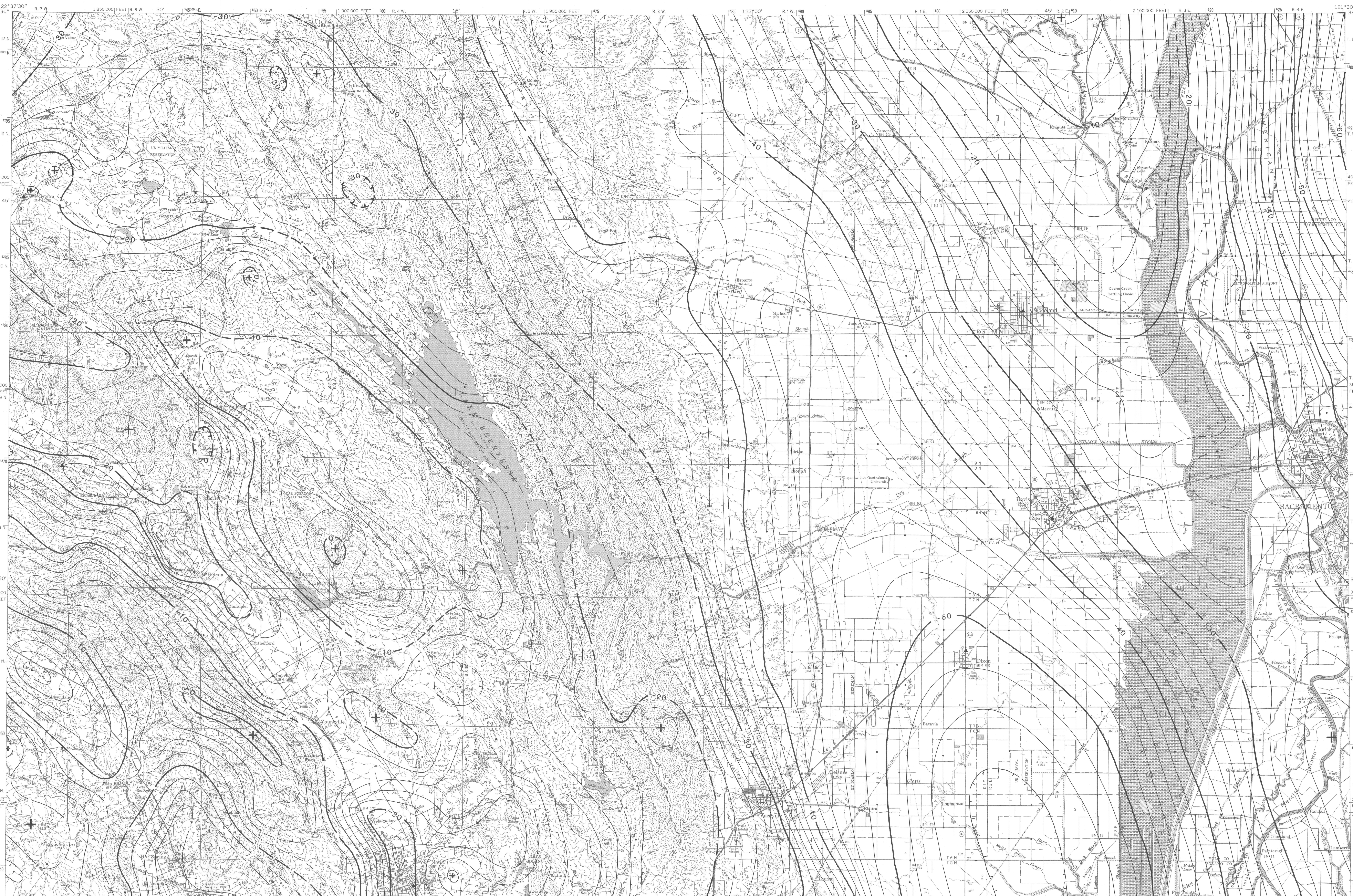
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF–780B
ROBERTS, ROBBINS AND CHAPMAN
BOUGUER GRAVITY NORTHEASTERN S.F.BAY REGION, CALIF.



BASE FROM U.S. GEOLOGICAL SURVEY
SAN FRANCISCO BAY REGION,
SHEET 2 OF 3, 1970

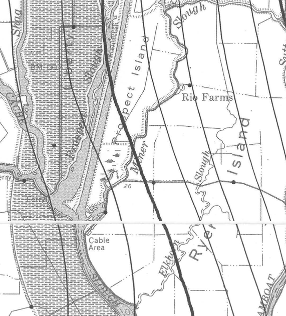
SCALE 1:125 000

CONTOUR INTERVAL 200 FEET

DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

SHEET DIAGRAM



COUNTY KEY
A. MARIN
B. SONOMA
C. NAPA
D. SOLANO
E. CONTRA COSTA
F. ALAMEDA
G. SANTA CLARA
H. SANTA CRUZ
I. SAN MATEO
J. SAN FRANCISCO

BOUGUER GRAVITY MAP OF NORTHEASTERN SAN FRANCISCO BAY REGION, CALIFORNIA

BY

C. W. ROBERTS, S. L. ROBBINS, AND R.H. CHAPMAN

1977

DISCUSSION

This map is sheet 2 of the three sheets of a Bouguer gravity map of the San Francisco Bay region and includes the eastern part of the Santa Rosa, the western part of the Sacramento, and some of the northeast part of the San Francisco and northwest part of the San Jose 1° x 2° quadrangles. The western part of this map utilizes data from two sheets of the "Bouguer gravity map of California" (Chapman and Bishop, 1968, 1974) and data from Bishop and others (1973). The eastern part of this map uses data from Oliver and Robbins (1974), Robbins, Oliver, and Roberts (1976), and Robbins and others (1974); the last is the basis for the "Bouguer gravity map of California - San Jose sheet" (Robbins and others 1976). Some of the data used by Chapman and Bishop (1968, 1974) have been modified. The approximate boundaries for the original data sources are shown on the index figure and are keyed to the sources list.

The observed gravity values from the various surveys have been adjusted to a common datum by means of a network of gravity base stations (Chapman, 1966). The base network is on the datum of Behrendt and Woollard (1961) and Woollard and Rose (1963) and is referenced to a national gravity base station at the San Francisco airport. Most of the surveys were made with either LaCoste and Romberg or Worden gravity meters calibrated on one or more of the U.S. Geological Survey calibration ranges (Barnes and others, 1969, p. 526-527).

All data have been reduced to complete Bouguer anomalies for a density of 2.67 g/cm^3. The terrain corrections were made to a radius of 166.7 km using a computer program developed by Plouff (1966).

The values of observed gravity are believed to have an accuracy of ±0.05 to ±0.3 mgal relative to the local base station. Complete Bouguer gravity contours at 2-mgal intervals are shown by solid lines in areas of complete coverage and dashed lines in areas of incomplete coverage.

The main improvements of this map over earlier versions (Chapman and Bishop, 1968, 1974; Oliver and Robbins, 1974; and Robbins, Oliver and Holden, 1976) are: 1) new data in some areas (mainly in Sacramento Valley), 2) better terrain corrections on the older data, and 3) a 2-mgal contour interval instead of a 5-mgal interval.

A tabulation of the principal facts and a map showing station numbers and locations for those stations west of 122° west longitude are available on request from the Sacramento office of the California Division of Mines and Geology. Similar information for stations east of 122° west longitude is given in Robbins and others (1974) and Robbins, Oliver, and Roberts (1976).

A brief discussion of the regional gravity field relative to the geology and a tabulation of rock densities for some of the rock units are presented by Chapman and Bishop (1968, 1974) and Robbins, Oliver, and Holden (1976).

REFERENCES

Barnes, D. F., Oliver, H. W., and Robbins, S. L., 1969, Standardization of gravimeter calibrations in the Geological Survey: EOS, v. 50, no.10, p. 526-527.

Behrendt, J. C., and Woollard, G. P., 1961, An evaluation of the gravity control network in North America: Geophysics, v. 26, no. 1, p. 57-76.

Bishop, C. C., Knox, R. D., Chapman, R. C., Rodgers, D. A., and Chase, G. B., 1973, Geological and geophysical investigations for Tri-Cities seismic safety and environmental resources study: California Div. Mines and Geology, Prelim. Rept. 19, 43 p.

Chapman, R. H., 1966, Gravity base station network: California Div. Mines and Geology Spec. Rept. 19, 49 p.

Chapman, R. H., and Bishop, C. C., 1968, Bouguer gravity map of California-San Francisco sheet: California Div. Mines and Geology, scale 1:250,000.

________ 1974, Bouguer gravity map of California - Santa Rosa sheet: California Div. Mines and Geology, 7 p., 1 map, scale 1:250,000.

Clement, W. C., 1965, Complete Bouguer map of the northern part of the San Francisco Bay area and its geologic interpretation: U.S. Geol. Survey Map GP-468, scale 1:125,000.

Oliver, H. W., and Robbins, S. L., 1974, Preliminary Bouguer gravity map of Sacramento 1° x 2° quadrangle, California: U.S. Geol. Survey open-file rept. 74-183, 1 map, scale 1:250,000.

Plouff, Donald, 1966, Digital terrain corrections based on geographic coordinates [abs.]: Geophysics, v. 31, no. 6, p. 1208.

Robbins, S. L., Oliver, H. W., and Holden, K. D., 1976, Bouguer gravity map of California - San Jose sheet: California Div. Mines and Geology, scale 1:250,000.

Robbins, S. L., Oliver, H. W., Holden, K. D., and Farewell, R. C., 1974, Principal facts, accuracies, and sources for 3046 gravity stations on the San Jose 1° x 2° quadrangle, California: U.S. Geological Survey Report, 196 p.; available from National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia, NTIS-PB232728.

Robbins, S. L., Oliver, H. W., and Roberts C. W., 1976, Principal facts, accuracies, sources, base station descriptions, and plots for gravity stations on the Sacramento 1° x 2° quadrangle, California: U.S. Geol. Survey Rept., 85 p.; available from National Tech. Inf. Service, U.S. Dept. Commerce, Springfield, Virginia, NTIS-PB258470.

Woollard, G. P., and Rose, J. C., 1963, International gravity measurements: Madison, Wis., Univ. Wisconsin Geophys. and Polar Research Center, 518 p., illus., tables.

EXPLANATION

• Gravity Field Station

▲ Gravity Base Station

Lines of equal Bouguer anomaly in milligals

Contour interval 2 mgal (dashed in areas of poor control)

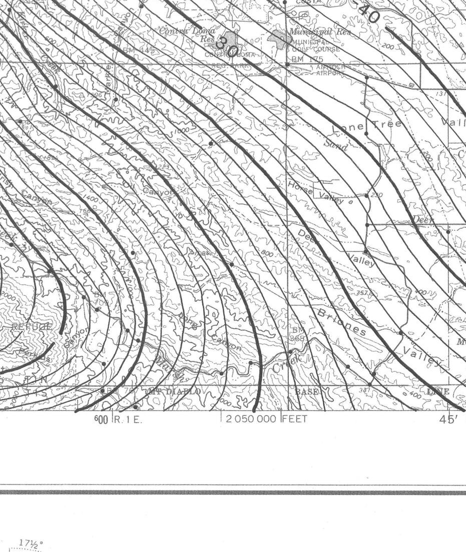
+ indicates gravity high

indicates gravity low

Reduction density: 2.67 g/cm^3

Datum is 979,958.74 milligals at the U.S. Geological Survey, Menlo Park, Calif. (California Division of Mines and Geology gravity base station No. 173)

Terrain corrections for all stations have been made to 166.7 km.



INDEX TO SOURCES OF GRAVITY DATA

ORIGINAL SOURCES OF GRAVITY DATA

1 C. C. Bishop and others (1973)
2 R. H. Chapman (written commun., 1972)
3 R. H. Chapman and C. C. Bishop (1968, 1974)
4 W. G. Clement (1965)
5 J. F. Evernden (written commun., 1961) dashed line traverses
6 J. Gasch (written commun., 1966)
7 Humble Oil Company (written commun.)
8 U.S.G.S. (Robbins and others, 1974)
9 U.S.G.S. (Robbins and others, in press)
10 L. C. Wood (written commun., 1965)
11 G. P. Woollard (written commun., 1965)

Source data are available from the California Division of Mines and Geology, Sacramento, Calif.

Interior--Geological Survey, Reston, Va.--1977

For sale by Branch of Distribution, U.S. Geological Survey Box 25286, Federal Center, Denver, CO 80225