U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PROFESSIONAL PAPER 1357
PLATE 4

MATERIALS UNITS

(See figure 2 for explanation of proportions. Flatland deposits, which underlie the uncolored land areas on this map, are described by Helley and others, 1979)

Soft sandstone, conglomerate, and clayey rock
- **Largely conglomerate**—Units 100-108
- **Largely sandstone**—Units 110-118
- **Sandstone, conglomerate, and clayey rock**—Units 120-134
- **Tuffaceous sandstone, conglomerate, and clayey rock**—Units 140, 141
- **Largely clayey rock**—Units 150-156

Volcanic rock
- **Intrusive rock**—Units 200-204
- **Flow rock**—Units 210-221
- **Flow rock and fragmental rock**—Units 230-241
- **Pillow lava and fragmental rock**—Units 250, 251, 253-256
- **Welded tuff**—Units 260-262
- **Tuff and tuff breccia**—Units 270-275
- **Tuff and tuffaceous rocks**—Units 280-285
- **Varied volcanic rocks**—Units 290, 291

Firm sandstone and clayey rock
- **Largely conglomerate**—Units 300-303

Almost all sandstone
- **Largely clean**—Units 310-315
- **Clean to dirty**—Units 320-323
- **Largely dirty**—Units 330-335

Largely sandstone
- **Largely clean**—Units 340, 342-345
- **Clean to dirty**—Units 350-379
- **Largely dirty**—Units 380-394
- **Sandstone and clayey rock**—Units 399-426
- **Largely clayey rock**—Units 430-433, 435, 436, 438-446, 448-453
- **Almost all clayey rock**—Units 460, 461, 465-474

Siliceous rock
- **Largely siliceous rock**—Units 500, 501, 503, 504, 506-511
- **Siliceous and nonsiliceous rock**—Units 519-530, 532-541

Well-bedded, hard to firm sandstone and clayey rock
- **Largely conglomerate**—Units 600-604
- **Conglomerate and sandstone**—Units 610-616
- **Largely sandstone**—Units 620-635
- **Sandstone and clayey rock**—Units 640-659
- **Largely clayey rock**—Units 660-689

Deformed hard sandstone and clayey rock
- **Unsheared Franciscan sandstone and shale**—Unit 700
- **Franciscan sandstone and shale**—Unit 701
- **Flyschlike Franciscan shale and sandstone**—Unit 702
- **Franciscan metamorphic rocks, largely unsheared**—Unit 703
- **Franciscan rocks, undivided**—Unit 704

Mixed clayey sheared rock, hard blocks, and masses of fractured hard rock
- **Franciscan gouge and severely sheared shale with blocks**—Unit 800
- **Franciscan melange, largely of clastic rocks**—Unit 801
- **Franciscan melange of metamorphic rocks**—Unit 802
- **Variably sheared Franciscan sandstone and shale**—Unit 803
- **Variably sheared Franciscan metagreenstone**—Unit 804
- **Sheared serpentinite**—Unit 805

Hard homogeneous rock
- **Unsheared ultramafic rocks and serpentinite**—Units 900, 901
- **Diabase and gabbro**—Units 902-905
- **Granitic rocks**—Units 906, 907
- **Limestone and marble**—Units 908, 909
- **Silica-carbonate rock and Franciscan high-grade metamorphic rocks**—Units 910, 911

Contact between units—Dashed or queried where concealed by landslide deposit or where location is uncertain

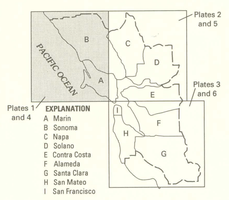
Sheared or shattered rock in fault—Dashed where approximately located; dotted where concealed; queried where presence or extension is uncertain. Only faults that affect hillside terrain are shown

Sheared or shattered rock in bedrock landslide deposit—Shown only locally (see Index map on pl. 1). Arrow indicates principal direction of past landslide movement

PREPARATION OF THE SLOPE MAP

This slope map was prepared by generalizing the complex, six-interval slope map of the San Francisco Bay region (U.S. Geological Survey, 1972). Pairs of adjacent slope intervals on the original map (0-5 and 5-15 percent, 15-30 and 30-50 percent, and 50-70 and greater than 70 percent) were combined photographically from the original negatives to produce the three slope intervals of the present map. The new negatives were then edited by opaquing to delete areas less than about 1 mm long or, where narrow and elongate, less than about 2 mm long and to similarly simplify intricate boundaries of larger areas. False slope information resulting from contour adjustments around railroads and highways and at quadrangle junctions was corrected where possible, but the influence of quadrangle boundaries is still evident in places.

- Gentle slopes—0-15 percent
- Moderate slopes—15-50 percent
- Steep slopes—Greater than 50 percent



INDEX MAP OF THE SAN FRANCISCO BAY REGION SHOWING LOCATION OF PLATES 1-6, AREA OF THIS MAP (SHADED), LOCATION OF COUNTIES, AND BOUNDARY OF STUDY AREA (DASHED LINE)

Base from U.S. Geological Survey, San Francisco Bay Region, Sheet 1, 1970
50,000-foot grid based on California coordinate system, zone 2
5000-meter Universal Transverse Mercador grid ticks, zone 10
Lambert Conformal Conic projection

APPROXIMATE MEAN DECLINATION, 1995

SCALE 1:125 000

CONTOUR INTERVAL 200 FEET
DOTTED LINES REPRESENT 40-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

AREA OF REPORT

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1995

Geology compiled, simplified, and modified for materials purposes by C.M. Wentworth and R.J. Greenwood, 1972-74; northern Mayacmas Mountains compiled by C.M. Wentworth and W.R. Stewart, 1979

HILLSIDE SLOPES OF THE NORTHWESTERN PART OF THE SAN FRANCISCO BAY REGION, CALIFORNIA

By
Stephen D. Ellen and Carl M. Wentworth

1995

Ellen, S.D., and Wentworth, C.M., 1995, Hillside materials and slopes of the San Francisco Bay region, California: U.S. Geological Survey Professional Paper 1357.