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U.S. Department of the Interior  
United States Geological Survey  
Plot derived from  
OpenFile Report 98-354

Base scanned from U.S. Geological Survey 1:250,000 San Francisco South and Hunters Point 7.5' Quadrangle topographic maps, 1980 photorevised editions.

Stateplane Projection  
California Coordinate System Zone 3

This map is a plot derived from data contained in the digital database Open-File Report 98-354, "Preliminary Geologic Map of the San Francisco South 7.5' Quadrangle and part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California: A Digital Database". A PostScript and Portable Document Format plot file of this map is included in the Open-File Report, but the Open-File Report does not contain a paper copy of this map. The Open-File Report consists of the digital data and a pamphlet explaining the database and indicating how to obtain the data from which this map was prepared as well as the PostScript and Portable Document Format plot file of the map. The pamphlet also explains how those without computers can obtain a plot of this map from a private vendor.



## PRELIMINARY GEOLOGIC MAP OF THE SAN FRANCISCO SOUTH 7.5' QUADRANGLE AND PART OF THE HUNTERS POINT 7.5' QUADRANGLE, SAN FRANCISCO BAY AREA, CALIFORNIA

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Magnetic declination is 16.5 degrees east of north

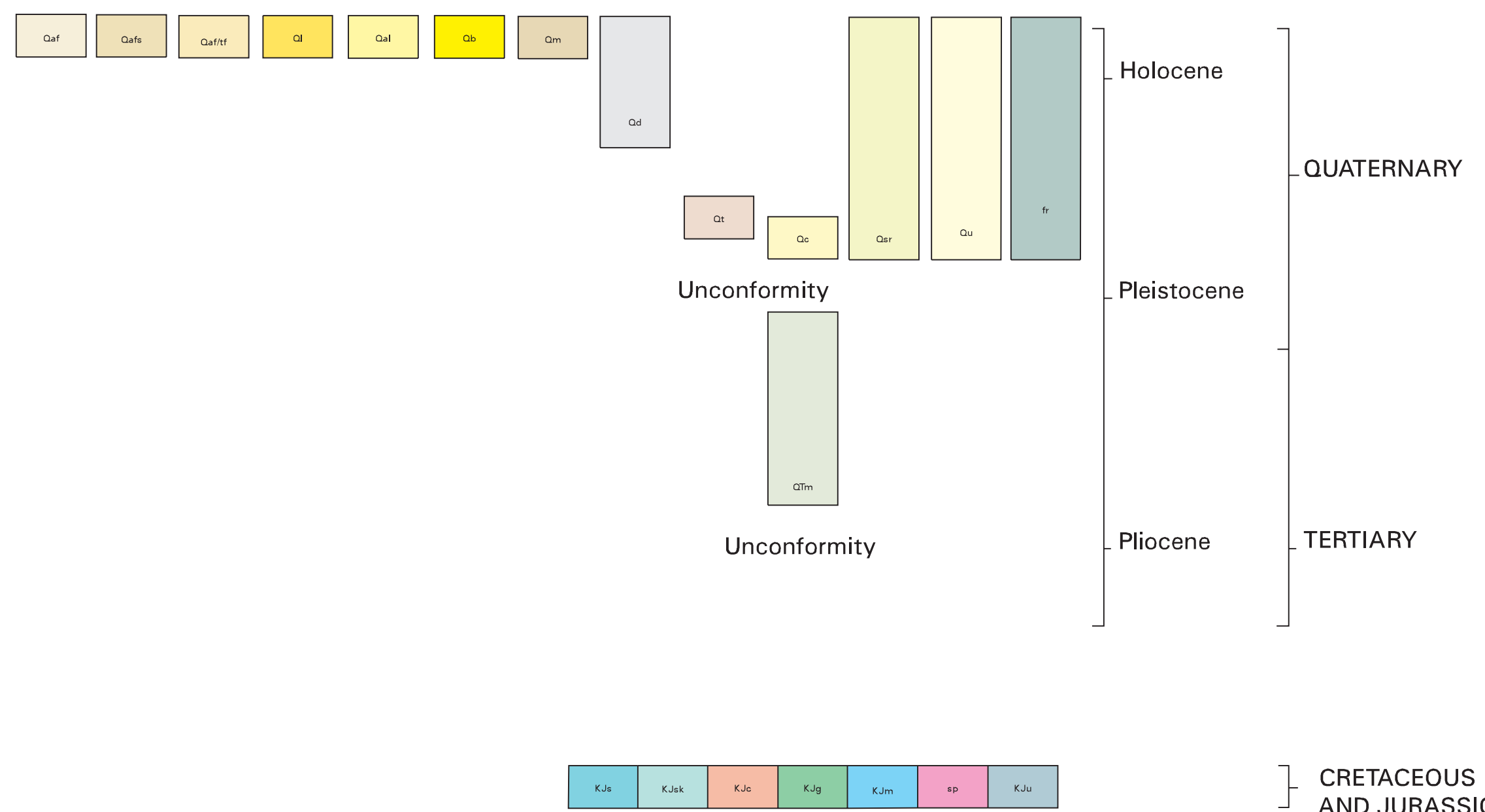
### EXPLANATION

#### GEOLOGIC UNIT DESCRIPTIONS

- water
- QUATERNARY**  
**Holocene**
  - Qaf Artificial fill  
Clay, silt, sand, rock fragments, organic matter, and man-made debris.
  - Qatf Artificial fill over tidal flat  
Clay, silt, sand, rock fragments, organic matter, and man-made debris, placed over tidal flats.
  - Qafs Artificial fill, Native American shellmound.  
Dark silty to sandy soil containing shell fragments and rare intact shells.
  - Ql Landslide deposits  
Composition and structure depend on the geologic formation involved and type of landslide.
  - Qal Alluvium  
Mostly sand and silt but locally contains clay, gravel, or boulders; generally gray to brown.
  - Qb Beach Deposits  
Predominantly well sorted medium-grained loose gray sand; locally consists of sand, gravel and cobbles.
  - Qm Bay mud  
Soft (moist) to firm (dry) clay and silt; locally contains shell fragments, plant remains, and thin beds of sand.
  - Qd Dune sand  
Well sorted fine-grained sand, gray and loose in most places, grayish orange to reddish brown and firm in a few places. Age extends into Pleistocene.
- Pleistocene**
  - Qt Marine terrace deposits  
Predominantly friable well sorted fine-grained yellowish-orange to gray sand; includes alluvial gravel and colluvial clay.
  - Qsr Slope debris and ravine fill  
Stony silty to sandy clay; locally silty to clayey sand or gravel; yellowish-orange to medium gray, unstratified or poorly stratified. Where it overlies the Merced or Colma Formation it is commonly a silty to clayey sand, or gravel.
  - Qc Colma Formation  
In northwest and central parts of area, friable well sorted fine to medium sand containing a few beds of sandy silt, clay, and gravel. In southeast part of area, mostly sandy clay and silty sand; yellowish orange to gray.
  - Qu Sedimentary deposits, undifferentiated
- fr** Fault rocks  
Zone of gouge, breccia, fractured and sheared rock along the San Andreas fault. Gradational contact with surrounding rocks. Limits poorly known. Age extends into Holocene

#### TERTIARY AND QUATERNARY

- Pleistocene and Pliocene**
  - QTm Merced Formation  
Friable to firm sand, silt, and clay; minor amounts of gravel, lignite, and volcanic ash, medium gray to yellowish orange.
- CRETACEOUS AND JURASSIC**  
Franciscan Complex and associated rocks
  - KJs Sandstone and shale  
Interbedded sandstone and shale, hard where fresh and intact, soft where weathered or sheared. Commonly medium dark gray where fresh, olive gray to yellowish brown where moderately weathered, and yellowish orange to yellowish gray where highly weathered.
  - KJsk Sandstone and shale  
Sandstone generally containing more than two percent potassium feldspar.
  - KJc Chert  
Hard chert interbedded with firm shale; chert layers generally two or three inches thick, shale layers less than one inch thick; generally grayish red.
  - KJg Greenstone  
Altered volcanic rocks, fine grained, mostly basalt; hard where fresh, but weathered and firm to soft in most exposures; commonly grayish olive to moderate olive gray where moderately weathered, dark yellowish orange to light brown where highly weathered.
  - KJm Metamorphic rocks  
Hard to firm, fine- to coarse-grained schistose, gneissose, or granulose metamorphic rocks; dark gray, dark greenish gray, or dark bluish gray.
  - sp Serpentine  
Hard to soft, generally greenish gray; contains small bodies of grabbro and diabase.
  - KJu Sheared rocks  
Small to large fragments of hard rock in matrix of sheared rock. Matrix generally coherent and firm, but soft in places, especially where weathered. Dark gray where fresh, yellowish brown where weathered. Derived mostly from shale and sandstone of Franciscan Complex and serpentine.



### CHANGES FROM EARLIER MAPS

This digital map is based on the 1952-1957 mapping that was released in earlier paper maps (Bonilla, 1965, 1971), modified as described below.

The revisions of the 1971 map are of four general types: 1) increase in area of artificial fill near San Francisco Bay shoreline; 2) changes in representation of structural geology; 3) corrections of errors in the earlier map; and 4) changes to accommodate the digital format. Water boundaries on the San Francisco Peninsula have changed owing to addition of artificial fill since 1971, both at the shoreline and inland, necessitating changes in the database. The bayward boundaries of artificial fill were taken from the 1980 topographic base map. A recent study of geophysical, geomorphic, and geological data found no evidence supporting the existence of the hypothetical San Bruno fault as a mappable structure (U.S. Geological Survey, 1997), and the fault has been deleted. Fold axes, mostly within the Merced Formation, have been added (Bonilla, 1996); axes classed as probable or possible in the latter report are shown as "approximately located" in this database. Errors and omissions in earlier versions of the map (Bonilla, 1965, 1971) have been corrected, including changing the unit description of the rock exposure north of San Francisco International Airport from KJs to KJsk, adding a few areas of bedrock that had been omitted, and correcting some structural attitudes. A cartographic error that placed the Serra Fault too far east near Sneath Lane has been corrected. The zone of shearing along the San Andreas fault and isolated shear zones, both formerly shown by a symbol, and old tidal flats, formerly shown by an overprint, are all treated as map units in the digital version.

### FAULTS AND LANDSLIDES

This map is intended to be of general use to engineers, land-use planners, and others. However, its small scale does not provide sufficient detail for site development purposes. In addition, this map does not take the place of fault-rupture hazard zones designated by the California State Geologist (Hart and Bryant, 1997). The map shows mappable landslides as they existed about 1959. Although many of the landslides still exist, many others have been removed by urban development or by natural processes, and post-1959 landslides are not shown. Landslides and other ground failures that occurred since 1959 were caused primarily by heavy rainfall in 1968 through 1982 (Nilsen, and others, 1976; Ellen and Wiczeck, 1988), the 1989 earthquake (Sitar, 1991; Tinsley and others, 1998), and the heavy rainfall of 1997-1998.

### REFERENCES CITED

- Bonilla, M.G., 1965, Geologic map of the San Francisco South quadrangle, California: U.S. Geological Survey Open-File Map 1:250,000.
- Bonilla, M.G., 1971, Preliminary geologic map of the San Francisco South Quadrangle and part of the Hunters Point Quadrangle, California: U.S. Geological Survey, Miscellaneous Field Studies Map, MF-0311, scale 1:24,000, two sheets.
- Bonilla, M.G., 1996, Late Cenozoic folds and thrust faults, San Francisco South quadrangle, in Jayko, A.S., and Lewis, S.D., comps., 1996, Toward assessing the seismic risk associated with blind faults, San Francisco Bay region, California: U.S.G.S. Open-File Report 96-257, p. 36-38.
- Ellen, S.D. and Wiczeck, G.F., 1988, eds., Landslides, floods and marine effects of the storm of January 3-5, 1982, in the San Francisco Bay region, California: U.S. Geological Survey Professional Paper 1454, 310 p.
- Hart, F.W. and Bryant, W.A., 1997, Fault-rupture hazard zones in California: Alquist-Priolo Earthquake Fault Zoning Act of 1972 with index to Earthquake Fault Zones Maps: California Division of Mines and Geology Special Publication 42, revised 1997.
- Nilsen, T.H., Taylor, F.A., and Dean, R.M., 1976, Natural conditions that control landsliding in the San Francisco Bay region—an analysis based on data from the 1968-69 and 1972-73 rainy seasons: U.S. Geological Survey Bulletin 1424, 35 p.
- Sitar, Nicholas, 1991, Earthquake-induced landslides in coastal bluffs and marine terrace deposits, p. 75-82 in Baldwin, J.E., II, and Sitar, Nicholas, eds., The 1989 Loma Prieta earthquake: Engineering geologic perspectives: Association of Engineering Geologists, Special Publication no. 1.
- Tinsley, J.A., III, Egan, J.A., Kayan, Robert, Bennett, M.J., Kropp, Alan, and Holzer, T.L., 1998, Appendix A, Maps and descriptions of liquefaction and associated effects, in Holzer, T.L., ed., The Loma Prieta, California, earthquake of October 17, 1989—Liquefaction: U.S. Geological Survey Professional Paper 1551-B, p. B287-B314.
- U.S. Geological Survey, 1997, Investigation of the San Bruno fault near the proposed extension of the Bay Area Rapid Transit Line from Colma to San Francisco International Airport: U.S. Geological Survey Open-File Report 97-429, 73 p.