

EXPLANATION

SLOPE-MOVEMENT SYMBOLS

NOTE: Landslides shown on this map have been subdivided on the basis of the clarity of their morphology, as determined by direct observation in the field or by analysis of aerial photographs or by a combination of both methods. Therefore, landslides are classified according to the certainty of the evidence for their existence. The various designations are not intended to imply nor should they be interpreted to imply, the relative stability of the slopes involved. Accordingly, this map should not be used as a substitute for site-specific engineering geologic and soils engineering investigations. This map records observations and interpretations that were used, along with other data, in the preparation of the accompanying Relative Landslide Susceptibility and Debris Flow Susceptibility Maps (Plates A1 and A2).

LANDSLIDE DEPOSITS

A landslide is a mass of rock, soil, and/or debris that has been displaced downslope by sliding, flowing, or falling. Landslides include cohesive block slides and disrupted slumps that have formed by translation or rotation of the slope materials along one or more planar or curvilinear slip surfaces. Most of the landslides whose boundaries are delineated on the map are greater than 10 feet thick. Also shown are selected surficial features that typically involve only soil, colluvium, or other superficial debris that covers bedrock. The rate of movement of slope failures ranges from almost imperceptibly slow (as in earthflows) to extremely, even dangerously, rapid (as in debris flows).

**DEFINITE LANDSLIDE.** Exhibits all or nearly all of the features, including but not limited to headwall scarps, cracks, rounded toes, well-defined benches, closed depressions, springs, and irregular or hummocky topography that are common to landslides and are indicative of mass movement of slope materials. Continuous, single-headed arrows indicate general direction of movement.

**PROBABLE LANDSLIDE.** Exhibits several features that are common to landslides and are relatively likely to have resulted from mass movement of slope materials but are not so clearly defined that the landslide is certain. Interrupted, single-headed arrows indicate general direction of movement.

**QUESTIONABLE LANDSLIDE.** Exhibits one or a few, generally very subdued, features commonly associated with landslides. Typically lacks distinct landslide morphology but may exhibit disrupted terrain or other abnormal features that strongly suggest the occurrence of mass movement. Question mark signifies the uncertainty in the existence of the landslide due to the scarcity or ambiguity of evidence.

**SMALL LANDSLIDE.** Filled arrowhead indicates a landslide too small to delineate at the scale of the map. Center of arrowhead corresponds to the location of the landslide. Arrowhead points in the direction of movement. Question mark indicates that the existence of the landslide is uncertain.

**MULTIPLE SMALL LANDSLIDES.** Two or more landslides too small to delineate at the scale of the map.

**SMALL EARTHFLOW.** Arrow with solid arrowhead shows earthflow too small to delineate at the scale of the map. An earthflow is a relatively shallow deposit of soil or other colluvial material that has moved downslope, commonly at a rate too slow to observe except over long duration. Center of arrowhead corresponds to center of failure.

**DEBRIS FLOW.** (Also called mudflow, soil slip, or debris avalanche). Commonly a short-lived phenomenon resulting from the rapid failure of surficial slope materials. Typically leaves a train of debris in a scoured channel following runoff of the flow. Curved, open-headed arrow delineates channel. Scarp depicted by hachures where large enough to delineate.

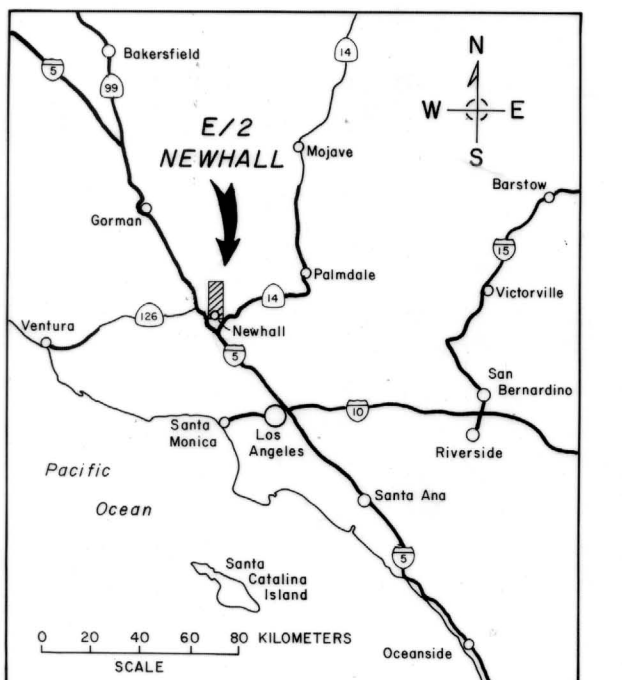
**DEBRIS FLOW SCAR.** (Not a deposit). Unfilled arrowhead depicts scar of debris flow too small to delineate at the scale of the map. Center of arrowhead corresponds to the location of the failure.

**MULTIPLE DEBRIS FLOW SCARS.** Two or more scars too small to delineate at the scale of the map.

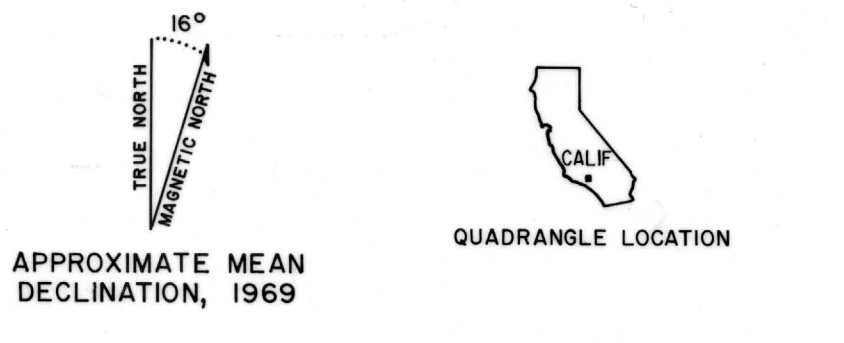
ADDITIONAL SLOPE-STABILITY INFORMATION

**EROSIONAL ENHANCEMENT.** Site of potential slumping due to height and steepness of bank and periodic undercutting by stream erosion.

**INCISED CHANNEL OR GULLY.** Typically the site of many small slumps and landslides due to failure of banks. Slope failures are too small to map. Not depicted where failures are rare or non-existent.



INDEX MAP



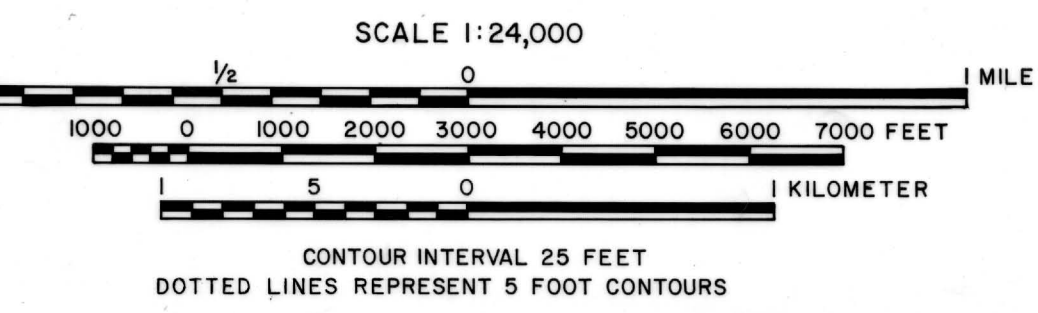
QUADRANGLE LOCATION

GEOLOGIC UNITS

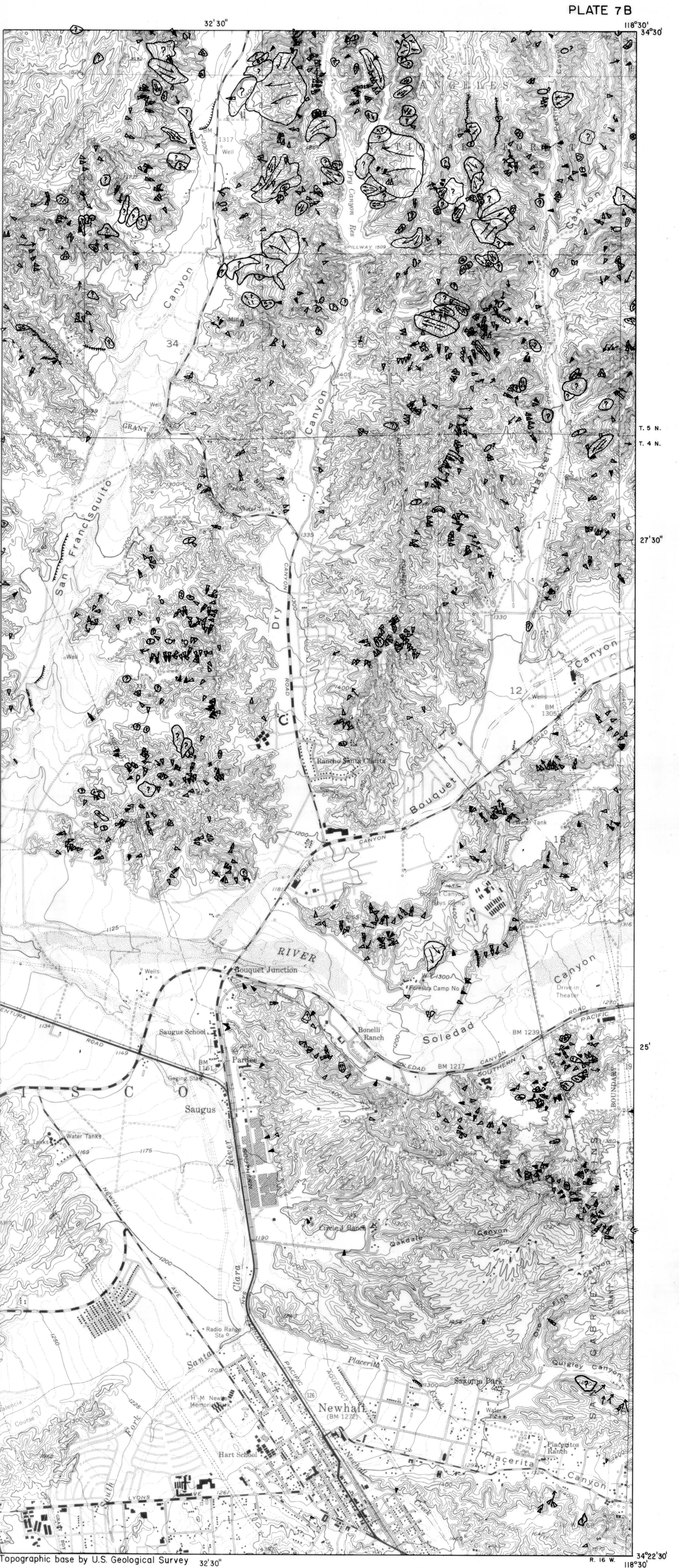
- cf** Cut and fill (man-made) - ground which has been severely modified, as of February 1985, by grading or otherwise heavily developed so as to significantly alter the natural slopes; stability is generally not evaluated in these areas.
- Qal** Alluvium - generally unconsolidated deposits of sand, silt and gravel; sorting and clast size are highly variable; includes stream channel flood plain and slope wash deposits; also includes older alluvium where deposits show a close relationship to current drainage patterns as in valleys occupied by incised streams, alluvium on valley margins, or low terraces created by geologically recent stream incision. These deposits are generally very permeable and include relatively few slope failures, due, in part, to the lack of significant relief. Erosion may be a problem locally.
- Qt** Terrace deposits - slightly to moderately consolidated silt to bouldery sand; sorting and clast size are highly variable; induration primarily results from silvial and pedogenic clay. These deposits unconformably overlie older units. Some Qt may be equivalent to Pacoia Formation (Qp), or generally coincides with broad older terrace surfaces and terrace surface remnants on ridge crests. These deposits are generally well-sorted and stand well in low vertical cuts but may include small slope failures where ground water on or near the terrace surface. Larger failures affecting Qt usually result from the weakness of the underlying rock. Erosion is readily induced or accelerated by human activities, such as road grading or agriculture.
- Qp** Pacoia Formation - locally clayey tan to brown non-marine siltstone, sandstone and conglomerate and rare silty shale; moderately to well consolidated, poorly to moderately indurated but locally cemented near ground surface, moderately to well sorted, massive to well bedded. Qp represents a partial basin filling consisting locally of interfingering of sediments from the Santa Susana Mountains and northern foothills of the Pacific-Santa Clara River sediments. Qp generally lies unconformably on Saugus Formation, but locally appears to be conformable where both are nearly horizontal. Landslides occur in both natural and artificial cut banks. Debris flows are exceedingly rare except on the steepest slopes. Erosion and surficial failures may be triggered by minor grading.
- Tob** Saugus Formation - non-marine light tan to brown, reddish-brown and greenish-gray mudstone, siltstone, sandstone and gray to brown conglomeratic sandstone; moderately to well indurated, poorly to well sorted, massive to well bedded. Saugus Formation represents paleo-Santa Clara River floodplain deposits and adjacent interfingering tributary and alluvial fan sediments. Lower Saugus Formation, exposed in the northern third of the map area, laps unconformably onto Tc and the upper Saugus Formation, south of Newhall, includes the 0.73 million year old Bishop ash, and elsewhere may be locally gradational with or include undifferentiated Tc. Three facies are distinguished within the Saugus Formation: Tob, T0c, and T0s. Facies boundaries are broadly gradational and depicted in a very general way. T0c (banded facies) - usually distinguished by cyclic bedding consisting of moderately to well-sorted, well-indurated, massive to crudely bedded, gray to tan, medium to coarse sandstone and conglomeratic sandstone grading upward to a brown (7.5 YR) to reddish-brown (5 YR) massive sandy mudstone or silty sandstone and separated from the overlying sandstone or conglomerate by an erosional contact. Above this about contact the sandstone is cemented with carbonate and forms variably resistant marker beds. T0s (coarse facies) - dominantly gray to light brown fluvial sandstone and conglomeratic (pebbly to bouldery) sandstone with scattered greenish-gray siltstone and silty sandstone; moderately to well sorted, massive to well bedded, moderately to well indurated. Southeast of "Bonelli Ranch" - two or three 25- to 50-foot thick reddish-brown clayey siltstone to silty sandstone beds are locally traceable. T0c may be equivalent to Qp above a local unconformity in the northern third of the map area. T0s (silty facies) - tan to reddish-brown sandstone, silty sandstone and siltstone interbedded with tan to brown conglomeratic sandstone; poorly to well sorted, moderately to well indurated. T0c grades to T0s where the finer brown to red-brown sediments become scarce; T0s grades to T0c at the contacts between cyclical units become more gradual and the cyclic nature of the sandstone becomes less regular; T0s grades to T0c with loss of reddish-brown sediments. Shallow soil slips, often becoming debris flows, are common in T0b and only slightly less common in T0c and T0s. Bedrock landsliding is generally structurally controlled, occurring on dip slopes in T0b or occasionally in overstepped slopes with daylighted bedding in T0c. Landsliding in T0s is less subject to structural control. Shallow landslides (less than 10 feet thick) occur in all facies. Landsliding is particularly likely where Saugus Formation is less than 60 feet thick overlying Tc.
- Tc** Catalina Formation - moderately to well indurated, laminated to massive, marine, brown to tan sandstone, silty fine sandstone and shale. Unconformably overlies Saugus Formation. Large, structurally controlled landslides are pervasive. Slope failures also occur across bedding on overstepped slopes; failures involve overlying Saugus Formation where relief is sufficient and Tc is not below base level. Soil slips are not common except in very steep terrain or where Tc is capped by Saugus Formation in which case debris flows originate near the contact.
- Tmcl** **Tmc** Mint Canyon Formation - Tmcl - gray to brown, medium- to fine-grained, poorly to moderately indurated sandstone, siltstone and calcareous claystone of lacustrine origin; well bedded, moderately to well sorted, grades upward into Tc. Tmc - tan to yellowish-tan moderately-well indurated sandstone, conglomeratic sandstone and conglomerate of fluvial origin; moderately well bedded, poorly sorted, grades upward into Tmcl and also grades upward and laterally into Tc. Landsliding in Tmc is usually structurally controlled and is less common than in Tc. Tmcl, although inherently weaker than Tmc, exhibits relatively the same density of landslides as Tmc in this area because most of the slopes developed on Tmcl are already reduced to a more stable configuration.

SYMBOLS

- strike and dip of bedding
- approximate strike and dip of bedding
- strike and dip of overturned bedding
- strike of vertical bedding
- approximately horizontal bedding
- strike and dip of fault
- contact between mapped units - solid where well located, dashed where approximate, dotted where concealed
- fault - solid where well located, dashed where approximate, dotted where concealed
- gradational contact - indicates general area of a gradual transition between facies in Saugus Formation
- locally delineated reddish-brown siltstone and silty sandstone beds in T0c facies of Saugus Formation
- axis of anticlinal fold, dotted where projected, arrowhead on axis shows direction of plunge
- axis of synclinal fold, dotted where projected, arrowhead on axis shows direction of plunge
- as defined on Plate 7B



SCALE 1:24,000



LANDSLIDES AND RELATED FEATURES



GEOLOGIC MAP

LANDSLIDE HAZARDS IN THE EAST HALF OF THE NEWHALL QUADRANGLE LOS ANGELES COUNTY, CALIFORNIA  
Landslide Hazard Identification Map No. 7

by  
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Program Authority Statement - This map has been prepared in accordance with the LANDSLIDE HAZARD IDENTIFICATION ACT (Chapter 7.7, Division 2 of the California Public Resources Code)

SOURCES OF GEOLOGIC DATA

1. Simplified from Smith, D.P., 1984, Geology of the northeast quarter of the Newhall quadrangle, Los Angeles County, California: California Department of Conservation, Division of Mines and Geology Open-File Report 84-49 LA, 42 p., 1 plate (1:9,600); details of T0s and additional landslides by J.A. Treiman, 1985-86.
2. Simplified from Treiman, J.A., 1986 (in preparation), Geologic map of the southeast quarter of the Newhall quadrangle, Los Angeles County, California: California Department of Conservation, Division of Mines and Geology, 1 plate (1:9,600).