SAFETY ELEMENT

Two safety hazards within the Old Town San Diego community include geologic hazards and fire safety particularly as it relates to development on the steep natural slopes. This element identifies the locations of these hazards and provides guidelines to maximize public safety.

BACKGROUND

GEOLOGIC HAZARDS

Geologic risks within The City of San Diego have been mapped in the Seismic Safety Study for The City of San Diego by Woodward-Gizienski & Associates and F.B. Leighton & Associates. This study indicates potential locations for faults, unstable slopes, ground failures, unstable coastal bluffs and other terrain conditions. Geologic hazards are illustrated and are summarized below:

Faults. The closest known fault system that appears capable of generating a damaging earthquake is the Rose Canyon Fault Zone, located at the center of the community. Several faults within this zone are considered potentially active and a high risk.

Landslides and Slope Instability. Old landslides and landslide-prone formations are the principal non-seismic geologic hazards within the community. Conditions which contribute to slope instability include slope inclination, rock orientation of the bedding, soil characteristics and the presence of groundwater.

Slopes with a moderate or high risk of slope failure typically occur along the bluffs in conjunction with the fault line locations.

Liquefaction. A portion of the community at the intersection of freeways I-8 and I-5 is subject to liquefaction in the event of an earthquake, as a result of ground shaking. The area is the riverbed area which was subsequently cut-off from the main branch of the San Diego river by the freeway development. Because of the freeway development flooding in this area is not expected to occur. The potential from liquefaction damage is considered low, provided the buildings are adequately designed.

TABLE 6"

HAZARD-RISK ZONE CORRELATION CHART
EXPLANATION OF GEOLOGIC HAZARDS MAP AND GEOTECHNICAL
LAND-USE CAPABILITY HAP

GEOTECHNICAL CONSTRAINT/HAZARD		FEATURE OR PHENOMENON	HAZARD CATEGORY No. (SEE GEOLOGIC HAZARDS tap)	LAND-USE CAPABILITY MAP RISK ZONE A | B | C | D — INCREASING RELATIVE RISK →
GROUND RUPTURE	FAULTS	Active * (* As defined by State)	None Recognized	
		Potentially Active*	See Fault Map	
		Inactive, Presumed Inactive or Activity Unknown	See Fault Map	
POTENTIAL SLOPE INSTABILITY	SLIDES	Confirmed, Known, or Highly Suspected	21	
		Possible or Conjectured	22	
	SLIDE-PRONE FORMATIONS	Friars Formation: Neutral or Favorable Geologic Structure	23	
		Friars Formation: Thick Section and/or Unfavorable Geologic Structure	24	
		Ardath Shale: Neutral or Favorable Geologic Structure	25	
		Ardath Shale: Thick Section and/or Unfavorable Geologic Structure	26	
		Otay Formation	27	
POTENTIAL GROUND FAILURE	LIQUEFACTION	Potential Relatively High: (Major Alluvial Valleys, Groundwater 25' ±)	31	
		Potential Relatively Low: (Upper Drainage Areas of Major Valleys, Groundwater 25' ± Fluctuates Seasonally)	32	
COASTAL BLUFF STABILITY	GENERALLY UNSTABLE	Numerous Landslides, High Steep Bluffs, Rapid Erosion	41	
		Unfavorable Bedding Planes, Locally Rapid to Generally Rapid Erosion	42	
		Unfavorable Jointing, Locally Rapid Erosion	43	
	MODERATELY STABLE	Mostly Stable Formation With Some Locally Rapid Erosion	44	
		Some Landslides, Slow Erosion	49	
		Locally Unfavorable Geologic Structure; Slow or No Erosion	46	
	GENERALLY STABLE	Very Slow Erosion; No Slides	47	
		Broader Beach Areas; Developed Harbor	48	
ALL OTHER TERRAIN CONDITIONS	GENERALLY STABLE	Relatively Level Mesas - Underlain by Terrace Deposits and Bedrock	51	
		All Remaining Level and Sloping Areas - Minor Alluvial Valleys, Low Terraces, Rolling Hillside to Steep Mountainous Terrain	52	

** Table numbers correspond to numbers used in study report.

RISK ZONE RATING KEY:

A - Nominal B - Low C - Moderate D - High

AB. BC, AC - Variable Risk (Hazard Category No. 52 only)

GENERAL NOTES:

All risk zone ratings and hazard area boundaries subject to change, based on new data. Although flood hazard was not specifically evaluated for this study, it is taken into account in a general manner in the risk rating of potential liquefaction.

Guidelines used for assigning risk rating within hazard category No. 52:

	Rating
1. Mostly developed area, essentially on mesas or within tracts developed by minimal grading.	AB
2. Generally low slopes adjoining canyon or bay areas; may Include low, nearly flat terraces; graded tracts having low to moderate slope heights.	AB or B
3. Moderate to high natural or graded slopes with no special hazards Identified nearby.	B
4. Mostly moderate to high, locally steep natural or graded slopes; some hazards in adjoining areas or within area.	BC
5. Areas Including all the above.	AC

Multiple risk designations were permitted within a single category No. 52 area, without a line boundary separating them. Where a lesser hazard (e.g., an Inactive fault) extended into a confirmed slide, the higher risk predominates; however, the approximate fault location is shown by a dashed boundary.

TABLE 8**

SUITABLE LAND USES ACCORDING TO RISK

BUILDING TYPE/LAND USES			RISK ZONE —INCREASING RELATIVE RISK→ A	B	C	D
GENERALLY INCREASING "ACCEPTABLE RISK" ↓	Group I	Nuclear Facilities. Large Dams. Electrical Power Intertie Systems	•	O	X	X
	II	Hospitals; Fire, Police, Emergency Communication Facilities; Critical Transportation Elements, such aa Bridges, Overpasses; Smaller Dams; Important Utility Centers	•	O	X	X
	III	Schools, Churches, Large or Highrise Buildings, or Other Places Normally Attracting Large Concentrations of People, such as Civic Buildings. Large Commercial Structures, Most Roads, Other Utilities	•	•	O	X
	IV	Residential (Single-Family Residences, Apartments, etc.) Most Commercial and Minor Public Structures	•	•	O	O(1)
	V	Most Industrial, Other Minor Commercial (Warehouses, Wharves, Docks)	•	•	O	O(1)
	VI	Agriculture, Marinas, Managed Mineral Resource Development. Parks, Other Open Space. Refuse Disposal Sites	•	•	•	•

FOOTNOTES:

1. Development may be feasible in slide areas if adequate provisions are made for stabilization; not generally feasible In potentially active fault zones.

GENERAL NOTES; This chart is for general land-use planning only. Suitability for specific uses for a specific site must be confirmed by further Investigation, An area evaluated as unsuitable for a particular use does not necessarily preclude the use, if no other more suitable alternative sites are available, and. provided that all potential hazards can be mitigated.

SYMBOLS;

- • Suitable
- O Provisionally Suitable
- X Generally Unsuitable

TABLE 9"

RECOMMENDED GEOTECHNICAL INVESTIGATIONS

RISK ZONE (GEOTECHNICAL LAND-USE CAPABILITY MAP)	GEOTECHNICAL HAZARD CATEGORY No. (GEOLOGIC HAZARDS MAP)	TYPE INVESTIGATION (1) BY BUILDING TYPE/LAND USE GROUP: GEOLOGIC	SOIL	SEISMIC	COMMENTS SPECIAL CONSIDERATIONS
A	51	I-II	I-V	I-III(2)	Footnotes: (1) Scope of Investigations can range from very preliminary, feasibility-type studies utilizing available research data (at the planning stages of a project) to in-depth investigations requiring extensive field exploration and engineering/geologic/seismic analysis (at the design/construction stage) depending upon the complexity of site conditions and the Importance of the proposed structure. (2) Refer to special state regulations regarding investigation standards and construction codes for schools and hospitals; also federal regulations for nuclear facilities. Commonly only "high-rise" structures in Groups II and m would require a seismic Investigation in Risk Zones A and B. (3) Land uses, such as disposal sites or mineral resource development (open-pit mines, oil fields) may require a geologic investigation to evaluate their environmental Impact, as regards slope stability or subsidence effects. Environmental Impact reports may be required to meet state as well ss federal guidelines, depending on jurisdiction. (4) Refer to state legislation (Alquist-Priolo Hazards Zone Act) regarding Identification of active and potentially active faults; investigations to evaluate ground rupture hazard and seismic shaking. H. U. D. requires seismic analysis of F.H.A. financed developments in vicinity of active or potentially active faults.
	52	I-III	I-V	I-III	
B	25, 45, 46 47, 52	I-V	I-V	I-III	
	32	VI (3)	I-V	I-III	
	48	--	I-V	I-III	
C	INACTIVE FAULT 22-24, 26, 27 42-44, 52	I-V	I-V	I-III	
	31	VI (3)	I-V	I-V	
D	POTENTIALLY ACTIVE FAULT (4)	I-V	I-V	I-V	
	21, 41	I-V	I-V	I-III	

PRINCIPAL DATA SOURCES

Bibliography*

California Division of Mines and Geology, 1962 and 1965 San Diego and Santa Ana Geol. Map Sheets. Bulletin 106-2.

Kennedy, M, P., 1969 and 1973. C.D.M.G. Preliminary geologic maps of portions of San Diego; 1973a, C.D.M.G., California Geology, v. 26; 1973b, U.C.R., Ph.D. dissertation.

Leighton, F. B., and Associates, in-house reports.

Nichols, D. R., and Buchanan-Banks, J. M., 1974, U.S.G.S. Circular 690.

Aerial Photographs

Source	Date and I Flight Number)
U. S. Dept of Agriculture	1964 (AXN Series. 1-DD through 6DD)
Fairchild	1932 (1980); 1937 (4640); 1939 (5984); 1941 (6850, 7117, 10680); 1951 (16960, 17589). 1952 (17200. 18305); 1953 (19230); 1955 (22287); 1956 (22620); 1958 (22930).

FIRE HAZARDS

The potential for minimal fire hazard exists particularly along the natural hillsides with chaparral vegetation. Few hillside areas exist along the eastern portion of the community that could be impacted by fire hazard.

RECOMMENDATIONS

Geologic Studies. WHEN GEOLOGIC HAZARDS ARE KNOWN OR SUSPECTED, A GEOLOGIC RECONNAISSANCE SHOULD BE PERFORMED PRIOR TO PROJECT APPROVAL TO IDENTIFY DEVELOPMENT CONSTRAINTS. This requirement would supplement the need for a full geotechnical report, which will be required at a later time in the permit process.

Hydrology. MAINTAIN THE NATURAL DRAINAGE SYSTEM AND MINIMIZE THE USE OF IMPERVIOUS SURFACES. Concentrations of runoff should be adequately controlled to prevent an increase in downstream erosion and impacts on soil stability. Irrigation systems should be properly designed to avoid over-watering which can impact soil stability and result in landslides.

Vegetation. NATIVE VEGETATION SHOULD BE RETAINED WHERE POSSIBLE. Graded slopes should be revegetated with native and/or drought-tolerant species to restore pre-development flora drainage conditions and soil stability.

Development Intensity and Building Height. DEVELOPMENT INTENSITY SHOULD BE MODERATE TO FURTHER MITIGATE KNOWN GEOLOGIC CONDITIONS. Height of buildings should also be maintained low to further reduce potential safety impacts due to the seismic sensitivity of the area.

Hillside Development. DEVELOPMENT OF HILLSIDES SHOULD BE LOW DENSITY, BURDENED AREAS SHOULD CLUSTER AWAY FROM THE BLUFFS. The low density development and the restrictions of development away from the steep bluffs is an effective way of adding development issues and potentially hazardous landforms.

River Area Development. THE SCALE OF DEVELOPMENT IN THE ROSECRANS, RIVER AREA SHOULD BE MAINTAINED LOW. Height limits of 30 feet and larger structures would further encourage mitigate potential liquefaction impacts.

Hillside Development. FIRE BREAK CORRIDORS SHOULD BE REQUIRED OF HILLSIDE DEVELOPMENT. A toe and rim setback of 15 feet are suggested. This setback should be landscaped with fire resistant, plants and other landscaping materials, native species are encouraged. Thinning of native vegetation should take place during the spring to protect from winter flooding and summer fires.