

GENERALIZED DESCRIPTION OF ENGINEERING PROPERTIES OF MAP UNITS<sup>1/</sup>

[Many of the data presented by courtesy of Converse Foundation Engineering Company]

NAME AND MAP SYMBOL	LITHOLOGY	SOIL DEVELOPMENT AND WEATHERING	POROSITY (percent voids)	PERMEABILITY (as compared with well sorted coarse sand, here classed as highly permeable, and clay, here classed as very slightly permeable to impermeable)	WORKABILITY (includes excavability and compactability)	SLOPE STABILITY (measured in terms of historical as opposed to geologic time)		EARTHQUAKE STABILITY (refers to relative stability for a given structure on different map units)	FOUNDATION CONDITIONS	POSSIBLE OR REPORTED USE	UNIT WEIGHT (pounds per cubic foot) (dry)	COMPRESSIBILITY	SHEARING STRENGTH (for confined materials)
						MASS STABILITY <sup>2/</sup>	EROSION SUSCEPTIBILITY						
Artificial fill (af)	Extremely variable. Chiefly materials derived from units adjacent to fill site. Includes patches of trash, particularly in southern part of map area	None	40-50 in uncompacted fill; 20-30 in controlled compacted fill	Variable; generally low to moderate except where there is considerable admixed clay. Very low for controlled compacted fill	May be excavated by hand except where materials are composed of coarse trash. Easily excavated with power equipment. Difficult to drill where trash exists	Low to moderate owing to generally unconsolidated character of materials. Higher where well compacted	High to moderate	Variable; conditioned largely by character of underlying materials and thickness of fill. Low for loose fill; high for controlled compacted fill	Poor for uncontrolled fill to excellent for controlled compacted fill		75-90 where uncompacted; 100-120 in controlled fills	Variable. High to moderate; increased by water content. Low where compacted under engineering supervision	Variable but commonly low. High where compacted under engineering supervision
Alluvium (Qal)	Chiefly poorly sorted sands with intermixed silt and pebbly to cobbly material; derived locally. Alluvial debris in southern and western sections generally coarser than that observed elsewhere in map area. Poorly bedded. Alluvial debris bottoming ravines in northern section moderately well indurated; elsewhere it is less well consolidated	Varies from none to moderate soil development. Surface veneer commonly contains abundant organic debris, but humus zone generally no more than 1-2 inches thick. A horizon generally less than 2 feet thick; evidences of weathering locally found at depths in excess of 10 feet	30-40	Moderate to low lateral permeability; generally low vertical permeability	May be excavated by hand except where characterized by high clay content. Easily excavated with power equipment. Good compactability	Low to moderate. Reflects cementation, permeability, and topographic setting. Trenched alluvium in northern part of hills known to have stood in vertical cuts for periods in excess of 3 years	Moderate to high. Extensively gullied locally	Moderate to poor	Fair for minor structures in southern and western parts; good in northern sections where well indurated	Possible source of top soil for gardens. Possible fill	75-90	Moderate to high	Low to moderate
Flood-plain deposits (Qfp)	Chiefly well sorted fine to medium sands. Locally underlain at depths of 5-10 feet by clean gravelly material. Moderately well bedded. Poorly indurated in the few exposures examined	Not well known. Probably poor to moderate soil development in this area	30-40	Low to high lateral permeability; generally moderate vertical permeability	May be easily to very easily excavated by hand. Good compactability	Low. Will stand in vertical walls up to 4 feet high for a few days under favorable circumstances	High	Poor in zones of loose sands or gravels. Fair where dense but deep; good where dense and shallow	Fair to good depending on density. Good on clean gravel	Possible fill	90-110	Generally moderate to high; decreasing with depth	Low to moderate, increasing with depth. High for clean gravels
Cap deposits (Qac)	Chiefly poorly sorted arkosic sands and sandstones. Commonly contains angular pebbly material. Essentially unbedded. Commonly very well cemented	Moderate soil development. A horizon generally about 2 feet thick with very thin organic rich layer. Weathering locally extends to depths of 10-15 feet, commonly obscuring completely character of unweathered material. Soil developed on this unit distinctly redder than that characteristic of other units in this area	20-30	Generally low to very low except where extensively weathered; moderate permeability in extensively weathered zones	Generally excavated by hand with extreme difficulty. Probably easily excavated with power equipment. Good compactability	High where well cemented to moderately low where deeply weathered	Low to moderate	Good to excellent	Fair where deeply weathered. Excellent on unweathered material	Possible fill	90-120	Moderate to high where weathered; low below weathered zone	Moderate where weathered; high below weathered zone
B formation (Qbu)	Chiefly coarse to medium sand, commonly pebbly to cobbly. Locally contains lenses or layers of very fine sand to clay-silt. Well bedded and cross bedded. Generally poorly consolidated	Moderate soil development. A horizon averages about 2 feet in thickness. Well developed weathered zone generally no more than 5 feet thick, but some evidence of weathering observed locally 10-15 feet beneath the surface	35-45	High to low lateral permeability; generally moderate vertical permeability	May be excavated by hand except in few zones where it is well cemented. Easily excavated with power equipment. Good compactability	Moderate. Stands in 1:1 cuts 10 feet or more in depth for periods of 5 years or more without evidence of massive failure. Will stand in shallow vertical cuts during dry season. Locally free running	Moderate to high	Fair where deeply weathered; good below weathered zone	Fair for light structures on weathered soil. Excellent for deep footings	Source of sand and gravel for concrete aggregate. Good quality fill when blended	85-110	Moderate to high in upper 5 feet becoming lower with depth	Do.
gravelly facies (Qbg)	Pebbly to cobbly material in coarse to medium sand matrix. Moderately well bedded. Generally poorly consolidated	do.	do.	High to moderate	Generally easily excavated by hand. Good compactability	Moderate. Stands in 1:1 cuts 10 feet or more in depth for periods of 5 years or more without evidence of massive failure. Will stand in shallow vertical cuts during dry season	Moderate to high	do.	Fair to good	Source of sand and gravel for concrete aggregate is questionable owing to locally abundant slate and phyllite fragments. Good quality fill when blended	do.	do.	Do.
sand facies (Qbs)	Well sorted medium to coarse sand. Well bedded. Poorly consolidated to unconsolidated	do.	do.	High to moderate	May be easily excavated by hand. Good compactability	Low to moderate. Commonly stands in 1:1 cuts for periods of 5 years or more without evidence of massive failure. Locally free running	High to moderate	do.	do.	Possible source of sand for blending with concrete aggregate. Good quality fill when blended.	80-100	Generally low. Moderate where unconsolidated	Generally moderate to high
very fine sand to clay-silt facies (Qbsi)	Chiefly silt to very fine sand. Locally clay rich. Noticeable lithologic variation from bed to bed common within this unit. Well bedded	Not well known, but soil development probably comparable to other facies of B formation	35-50	Generally low	May be excavated by hand with some difficulty. Good compactability	Moderate. Will stand in 1:1 cuts for periods of 3 years or more without evidence of massive failure. Will stand in shallow vertical cuts during dry season	Moderate	do.	Poor in weathered zone; good where unweathered	Possible fill	85-110	Moderate to high where weathered; low below weathered zone	Generally moderate but may be low along bedding planes when wet
A formation (Tq)	Chiefly silt to very fine sand. Locally clay rich. Generally uniform composition throughout unit. Fine sand layers evident in higher parts of section. Commonly very well bedded. Moderately well consolidated. Calcareous and iron concretions locally prominent	Moderate soil development. A horizon averages about 2 feet in thickness, but humus zone generally only 1-2 inches thick. Evidences of weathering observed locally to depths of 10 feet	30-40	Generally low	May be excavated by hand with difficulty. Easily excavated with power equipment. Good compactability	Moderate. Stands in 1:1 cuts for periods of 5 years or more without evidence of massive failure. High vertical cuts known to have failed massively, probably along joints	Moderate to low	do.	do.	Possible fill	95-120	do.	Do.

<sup>1/</sup> Where there is a range of properties indicated, the first limiting adjective describing the range identifies the dominant property; for example, the phrase "coarse to medium sand" indicates that the coarse fraction dominates

<sup>2/</sup> Assumes bedding to be essentially horizontal; stability tends to be reduced where bedding dips out of slope