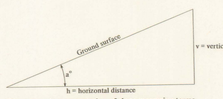
SLOPE MAP

The slope map summarizes the slope information provided by the contours on the topographic map by grouping local areas having similar slopes into a single map unit. The slope map was constructed basically from the topographic map by measuring the spacing between the contour lines. Greater accuracy was added by using aerial photographs to locate details of the topography not apparent from the contours. Many slope-map units coincide with the geologic-map units (Schmoll and Dobrovolny, 1972) because many of the geologic deposits have distinctive slope characteristics. Some slope measurements were made in the field, but the map has not been checked extensively on the ground.

Slope is the gradient of the land surface. It is the angle between the inclined ground surface and the horizontal. Slope is measured in the vertical plane that is at right angles to the intersection of the ground surface and the horizontal plane. The slope at a given location thus is a measure of the steepest gradient encountered on the ground surface at that point.

The slope categories were chosen as convenient percentage figures appropriate to land-use development. They are not intended to provide precise boundaries above or below which particular land uses are proscribed. Rather, they classify the land according to its slope, and serve as a guide to the relative effect slope has on land-use development. For this purpose slope is commonly expressed in percent; the amount of vertical rise of the land surface is given as a percentage of the horizontal distance over which the rise occurs. Corresponding ranges of values for slope angle in degrees, used commonly in scientific studies, and slope ratios, widely used in engineering practice, are also provided in the description of each unit. The relationship among these three systems for measuring slope is shown below.



Diagrammatic representation of slope-measuring terms

Slope in percent = v/h x 100
Slope angle in degrees = a°
Slope ratio = h:v (h to v) where v is equal to 1 unit of measurement

Another diagram illustrates the slopes chosen as boundaries for each of the slope categories.

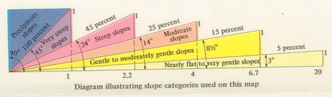


Diagram illustrating slope categories used on this map

Within each map unit are slopes that do not fall within the assigned category because the actual ground surface is more varied in relief than can be portrayed at the scale of this map. Areas of hummocky ground in which this is especially true are shown on the map by an overprint pattern. In general, deviations from the stated range of values for each unit are more commonly on the lower side of the stated range than on the upper side. Many of the boundaries on the map depict sharp breaks in slope, but others represent a gradual change in slope over a broad zone. The slope percentages for the map units are therefore only approximate, but it is believed that the slope-percentage figures are generally accurate to within about 10 percent of their value.

REFERENCE

Schmoll, H. R., and Dobrovolny, Ernest, 1972, Generalized geologic map of Anchorage and vicinity, Alaska: U.S. Geol. Survey Map I-787–A.

SLOPE CATEGORY

- Less than 5 percent — Less than about 3° — More than 20:1
- 5-15 percent — About 3°-8½° — 20:1-6.7:1
- 15-25 percent — About 8½°-14° — 6.7:1-4:1
- 25-45 percent — About 14°-24° — 4:1-2.2:1
- 45-100 percent — About 24°-45° — 2.2:1-1:1
- More than 100 percent — 45°-90° — Less than 1:1
- AREAS OF HUMMOCKY TOPOGRAPHY — These areas are characterized by a wide range of slopes including nearly flat areas on tops of hills and in bottoms of depressions, and slopes that change from gentle to steep over short distances on the hill sides. These areas are shown in the slope category that is prevalent.
- AREAS OF EXTENSIVE GRADING OR EXCAVATION — Commonly in gravel pits, where slopes have not been mapped because they are subject to change as grading proceeds. These areas are characterized by large flat areas bounded by escarpments with very steep or precipitous slopes; other slopes are present locally where excavated material has been piled or where ramps permit access from one level to another.
- ESCARPMENTS GENERALLY LESS THAN 20 FEET HIGH — Too small to show as separate map units. Slopes are generally steep to very steep. Line marks top of escarpment; ticks are on lower side.

DESCRIPTION OF MAP UNITS

DESCRIPTION

NEARLY FLAT TO VERY GENTLE SLOPES — Principally on alluvial surfaces and in broad areas formerly occupied by Cook Inlet or by lakes and ponds. Steeper slopes generally absent except in local areas of hummocky topography (overprinted by blue lines) where there are small hills having relief generally of less than 20 feet. Slopes present few problems to urban development; some of the nearly flat areas, however, are poorly drained.

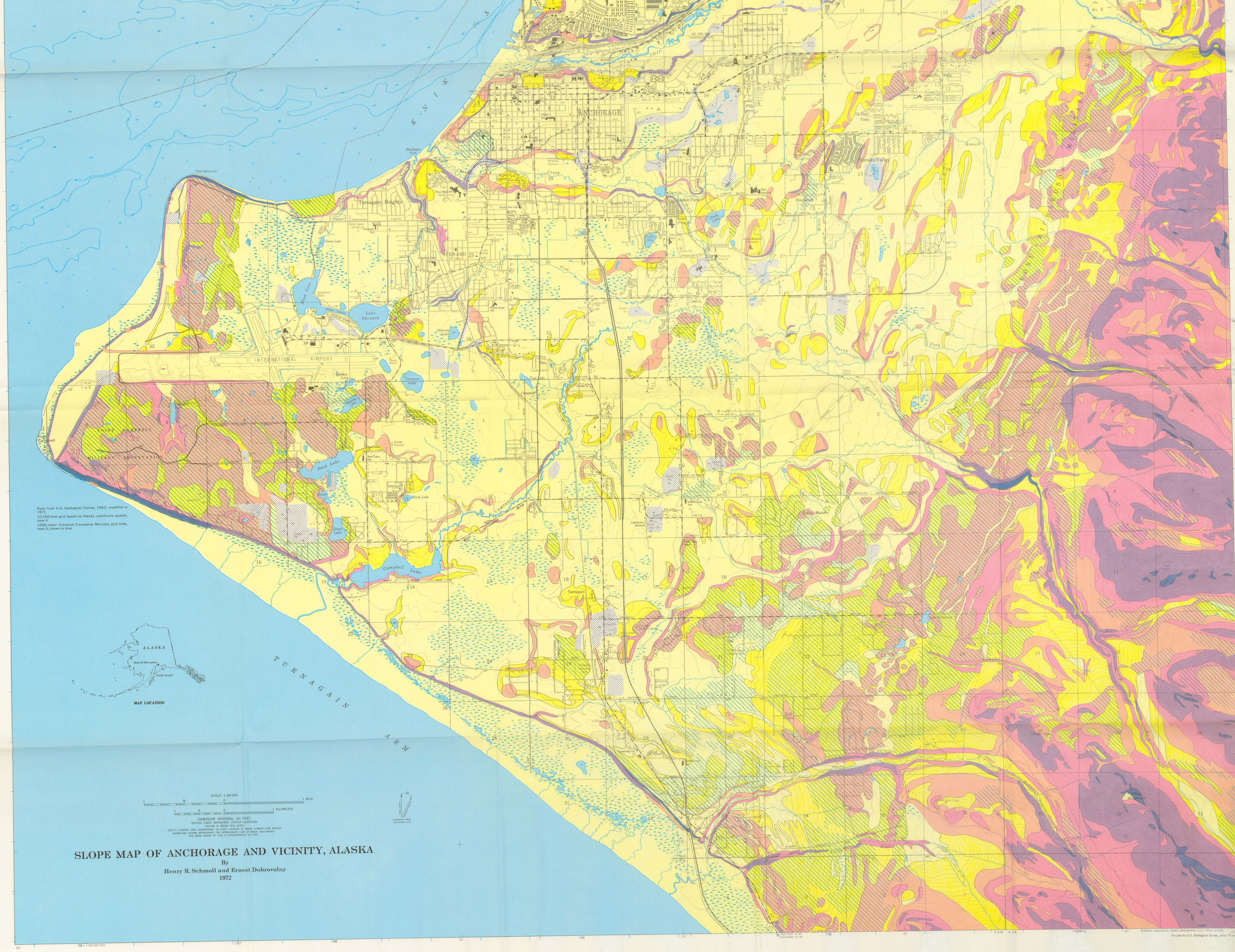
GENTLE TO MODERATELY GENTLE SLOPES — Smooth slopes on sides and ends of isolated hills, on the steeper parts of some alluvial fans and terraces, and in mountain valleys. Hummocky topography on glacial and related deposits having relief of about 50 feet or less is indicated by overprint blue lines. Slopes may present minor grading problems, but such problems generally are not a hindrance to subdivision or other types of land development.

MODERATE SLOPES — Smooth slopes on the steeper parts of isolated hills and on relatively gently inclined areas within the mountains. Extensive areas of hummocky ground on glacial and related deposits having relief of as much as 100 feet are indicated by overprint blue lines Slopes must be given considerable attention in the design of any construction; care is required to locate linear features such as drainage lines and access roads so that they have proper gradients. Much grading may be necessary to obtain the less steeply sloping ground suitable for most types of development; even so, building densities probably have to be lower here than in areas of more gentle slope.

STEEP SLOPES — Unusually steep slopes associated with hummocky terrane and the more subdued escarpments adjacent to some alluvial channels. In the mountains includes most of the lower slopes where bedrock commonly does not crop out. Slopes pose significant problems to most types of land development. Subdivision practices followed on areas of gentler slope are generally precluded here, as freedom of movement and other choices necessary to obtain proper gradients for roads and other uses are highly restricted by direction of slope. Extensive grading required for most types of development must be carefully planned to prevent slope instability.

VERY STEEP SLOPES — Long narrow escarpments along sea bluffs and some valley walls where underlying deposits are generally concealed by colluvium. Includes most of the mountain slopes where bedrock commonly is exposed. Slopes make most types of development difficult, as direction of movement is limited to nearly along the contour of the slope and disturbing the natural slopes is likely to cause slope instability.

PRECIPITOUS SLOPES — Cliffs along the sea bluffs where erosion is now active or has been active in the recent past. Includes major cliffs in the mountains. Surficial deposits and bedrock commonly are well exposed. Development of almost any kind is precluded by difficulty of access and problems of continuing erosion.



Base from U.S. Geological Survey, 1962; modified in 1971
10,000-foot grid based on Alaska coordinate system, zone 4
1000-meter Universal Transverse Mercator grid ticks, zone 6, shown in blue

SLOPE MAP OF ANCHORAGE AND VICINITY, ALASKA

By
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1972

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For sale by U.S. Geological Survey, price 75 cents