DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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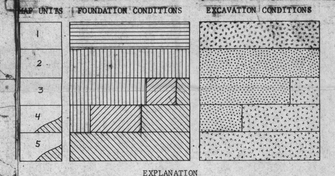
FOUNDATION AND EXCAVATION CONDITIONS

This map interprets the geologic map units shown on the generalized geologic map (Map I-787-A) in terms of foundation and excavation conditions inferred from the materials represented by these map units. Additional data from an unpublished standard geologic map and from the published slope map (Map I-787-B) have also been used in compiling this map. The map is necessarily very generalized, and presents approximate conditions that may be expected rather than precisely defined conditions that exist at any given site. This is because there is a wide range both of variability of the distribution of the various geologic materials within each geologic unit (as indicated on the generalized geologic map), and of engineering characteristics of these materials even where their distribution is well known. Neither of these aspects has been investigated in detail sufficient for specific site use.

Five map units are arranged in a relative sequence from excellent to poor foundation and excavation conditions. These map units were made by combining three categories based on relative ease of excavation and four categories of foundation conditions based on relative load-bearing capacity of the material independent of its response to earthquake shock. (Areas in which the materials are particularly subject to loss of bearing capacity in response to earthquakes are shown on the slope-stability map, I-787-E.) Three of the five map units represent generally favorable conditions that pose few major problems; the other two units represent generally unfavorable conditions that require particular engineering solutions. A line pattern is used on parts of these two units to indicate areas of readily identifiable peat deposits that present one specific type of problem.

The diagram below gives a crude approximation of the proportions of various conditions inferred to be present within materials represented by each map unit. Three of the map units--the upper two and the lowest--represent more uniform foundation and excavation conditions, thus allowing more reliable predictions. The other two units represent a greater variety of conditions and the reliability of prediction is therefore less.



EXPLANATION

Categories of relative foundation conditions

- Excellent--Very high bearing capacity
- Good--High bearing capacity
- Fair--Moderate bearing capacity
- Poor--Low bearing capacity

Categories of relative excavation conditions

- Easy--Problems for power equipment negligible
- Moderate--Some local problems for power equipment expectable
- Difficult--Requires blasting prior to removal

Diagram illustrating the proportion of each category of foundation and excavation condition within each map unit. These proportions are crude approximations.

Foundation and excavation conditions represented by the map units and described below are related to the dominant geologic materials and the slope categories. Other factors, such as problems with equipment operation due to the nature of the terrane, are also listed. A chart following the descriptions shows specifically the way in which these map units were derived from the map units that appear on the generalized geologic map and on the slope map. These "rules" were generally followed, but in some places they were modified to accommodate particular situations known to deviate from the generalized approach.

DESCRIPTION OF MAP UNITS

1 — FOUNDATION CONDITIONS EXCELLENT--Hard bedrock is at the surface or at shallow depth and can support very heavy loads. Excavation difficult; require blasting. In many places slopes range from steep to precipitous, and operation of heavy equipment may be restricted; in some places cliffs and canyon walls preclude use as foundation sites for most structures

2 — FOUNDATION CONDITIONS GOOD--Chiefly homogeneous gravel and sand that is generally 20 feet or more thick and can accommodate heavy loads. Excavation by power equipment generally easy except in isolated places where large boulders are present

3 — FOUNDATION CONDITIONS GENERALLY GOOD TO FAIR, BUT LOCALLY POOR--Good in most of map area where various materials, including gravel, sand, and diamicton (mixed gravel, sand, silt, and clay), can support heavy to moderately heavy loads; fair to poor in some depressions in areas of hummocky topography where fine-grained material may have lower bearing strength, and on some steep slopes of limited extent where instability problems are likely. Excavation by power equipment generally easy, but may be moderately difficult where diamicton is very compact or where boulders are present. The material varies widely in texture; in places where fine grained, cuts may be unstable

4 — FOUNDATION CONDITIONS GENERALLY FAIR TO POOR--Silt and clay may lack sufficient bearing strength for heavy loads; moderate to very steep slopes are potentially unstable. In places, indicated by line pattern, peat is present at the surface and the water table may be high; in some of these places peat can be removed, the water table lowered relatively easily, and foundation conditions thereby improved. Excavation hindered where steep slopes pose difficult operating problems and where fine-grained materials cause cut slopes to be unstable; bedrock may be encountered at shallow depth in the mountainous part of this area

5 — FOUNDATION CONDITIONS POOR--Chiefly fine-grained materials (silt and clay) that have low bearing capacity; also includes extensive areas of poorly drained material, small areas of active sand dunes, and the sea and river bluffs that are either composed mostly of unstable fine-grained material or that are now being eroded. In places, indicated by line pattern, considerable thicknesses of peat may be present, and (or) marsh conditions may prevail; the peat is generally underlain by silt and clay, and these areas are more difficult to modify for suitable foundation conditions than the peat areas of the preceding map unit. Excavation is hindered by unstable materials and high water table

Chart showing the general relations between units on this map and units on the generalized geologic map and on the slope map. Most of the geologic map units have been subdivided on the basis of slopes, and on the basis of a few minor details not shown on the generalized geologic map

Foundation and excavation conditions map (I-787-D)	Generalized geologic map (I-787-A)		Slope map (I-787-B)
	Map unit	Description	
1	b	Bedrock	All slopes
2	an, al, af ga	Large alluvial fan, channel, and delta deposits Large kame terrace deposits	Nearly flat to moderate slopes
3	an, al, af ga sh, sl m, gm mg f	Small alluvial deposits, and those known to be chiefly sand Most glacial alluvium Most sand deposits in hills and in low-lying areas Most moraine and morainelike deposits Probable glaciomarine deposits where dominantly coarse grained Most fill emplaced by man	Nearly flat to moderate slopes; locally steep in areas of hummocky topography
4	al, af, sl s, bc mg sl l ls f	Alluvium and other low-lying deposits overlain by peat (indicated by pattern) Silt and clay deposits where relatively well drained Probable glaciomarine deposits where dominantly fine grained Beach deposits Glacier-dammed lake deposits where relatively well drained Some old landslide deposits Fill emplaced on tidal silt	Nearly flat to moderate slopes
	c m, ga sh	Most colluvium Moraine deposits and glacial alluvium Stabilized sand dunes	Steep to very steep slopes
5	l s bc ls (various) f	Pond and lake deposits chiefly clay and silt Tidal deposits Bootlegger Cove Clay where poorly drained Most landslide deposits Areas of peat that display patterned ground or that are underlain by clay and silt; all marsh areas (indicated by pattern) Fill composed chiefly of clay and silt	Nearly flat to steep slopes
	be e sh	Bootlegger Cove Clay where exposed in bluffs Colluvium where derived chiefly from fine-grained material; river and sea bluffs actively being eroded Active sand dunes	Steep to precipitous slopes

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

FOUNDATION AND EXCAVATION CONDITIONS MAP OF ANCHORAGE AND VICINITY, ALASKA

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U.S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards.

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET. DATUM IS MEAN LOWER LOW WATER
HORIZONTAL DISTANCES BETWEEN THE SHORELINE SHOWN ON THE MAP AND THE MEAN LOWER LOW WATER SHORELINE MAY BE AS MUCH AS 1000 FEET
THE MEAN RANGE OF TIDE IS APPROXIMATELY 31 FEET

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1962

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