MAP SHOWING THICKNESS OF OVERBURDEN, VIENNA QUADRANGLE, VIRGINIA AND MARYLAND

by

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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

General Statement

Overburden is the term used with this map to designate all the surficial earth materials that overlie fresh bedrock. Overburden includes: soil; disturbed ground and artificial fill; alluvial deposits in flood plains; terrace deposits along streams; hillside colluvium and residual lag gravels; upland gravel; and saprolite on crystalline bedrock. Overburden can generally be moved directly with power shovels, whereas bedrock generally requires ripping or blasting before removal.

Saprolite comprises the thickest and most extensive unit of overburden in the Vienna quadrangle; it is soft, earthy, clay-rich, decomposed material formed in place by chemical weathering of crystalline bedrock. Saprolite ranges in thickness from zero to more than 50 metres (160 ft) in the quadrangle. The thickness is a function of topographic position and of the lithology and structure of the underlying bedrock. Little or no saprolite overburden overlies ultramafic rock or quartz veins and dikes. Mafic rocks commonly underlie areas of thin to moderately thick saprolite overburden. In general, saprolite overburden is thickest beneath upland areas underlain by schist, but areas of locally thick saprolite overlie gneiss and phyllite.

A unit of upland gravel and sand comprises small areas of overburden with physical properties radically different from those of saprolite. It commonly forms nearly level upland surfaces, and is locally about 10 metres (30 ft) thick. Hillside colluvium and residual lag gravels on Piedmont upland surfaces rarely exceed 6 metres (20 ft) in overburden thickness. Overburden is thin along most stream valleys and lowlands, except where alluvial and terrace deposits locally may exceed 6 metres (20 ft) in thickness.

The map is arbitrarily contoured on the basis of less than 10 feet, 10 to 50 feet, and increasing multiples of 50 feet of overburden thickness. The contours are based on the ground surface elevation in relation to the following kinds of data:

1. The approximate elevation of the contact between overburden and bedrock.

2. The distribution and elevation of fresh rock outcrops.

3. Estimates of thickness of overburden from driller's logs of holes (mainly water well logs) and foundation, utility, and highway borings and excavations.

4. Local seismic refraction lines.

The cross-section illustrates the thickness and distribution of overburden on the bedrock surface, and depicts the relationship of overburden thickness to surface topography and to subsurface topography on the bedrock.

Possible uses of the map

One application of this map is to enable rapid evaluation of large areas for surface and subsurface construction. The map may be useful in preparing preliminary cost estimates based on volumes of material which can be moved by surface power equipment in contrast to the volume of rock requiring ripping or blasting before removal. When used in conjunction with the Bedrock Map, areas of thin overburden over desirable rock types may be delineated for potential quarry sites.

Areas of thin overburden are also commonly favorable sites for heavy construction requiring strong bedrock for maximum structural support. The same areas, on the other hand, would generally require extensive design modifications for placement of sanitary landfills, septic tank leaching fields, utility lines and highway construction. Areas of thick overburden, on the other hand, may provide favorable routes or excavation corridors for deep burial of utility lines and pipelines. Thick saprolite overburden which underlies relatively steep natural slopes, or slopes that are cut and artificially steepened by construction, are likely to be less stable and more readily eroded than steep slopes where fresh bedrock occurs at the surface. Used in conjunction with soils and other relevant maps and tables, this map may aid in understanding subsurface fluid behavior.

Published and unpublished sources of data (mainly water well logs and soil survey data) used to compile this map, as well as a selected bibliography, are listed in the References. In addition, a limited amount of new field work was carried out, particularly to help position the interface between rock and overburden; however, new core and auger holes and seismic refraction lines are sparse, and field checks were rapid and not intensive. Thus the final result embodies interpretations synthesized from a variety of sources. Although overburden thickness can be generalized, striking local variations are common, and as much as 25% variance from indicated thickness is possible. The map cannot reliably be used for detailed site investigations, which usually require intense surface and subsurface geologic examination in conjunction with engineering and other studies, such as core drilling and seismic surveys. Although the map presents a broad picture of the general distribution of overburden thickness in the map area, its potential inaccuracies in detail should always be kept in mind.

Selected References

Engineering geology of the Northeast Corridor, Washington, D.C. to Boston, Massachusetts, 1967, U.S. Geol. Survey Miscellaneous Geologic Investigation Map I-514-A, B. C.

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Porter, H. C., Derting, J. H., Elder, J. H., Henry, E. F., and Pendleton, R. F., 1963, Soil Survey of Fairfax County, Virginia, U. S. Department of Agriculture, Soil Conservation Service in cooperation with Virginia Agriculture Experiment Station and Fairfax County, Virginia, Series 1955, no. 11, 103 p.

EXPLANATION

Thickness of Overburden, in feet below land surface

5	More than 150
4	100 - 150
3	50 - 100
2	10 - 50
1	Less than 10 (Fresh bedrock outcrops common)

Data control point

X	Bedrock outcrop; generally fresh; not all outcrops shown.
62●	Drill hole, approximately located; number indicates thickness in feet of overburden estimated from drillers' logs or inferred from length of casing in water wells.
>23○	Drill hole, approximately located; bedrock not penetrated; number indicates thickness in feet of overburden penetrated.
~○	Spring, commonly at or near contact of overburden on bedrock.