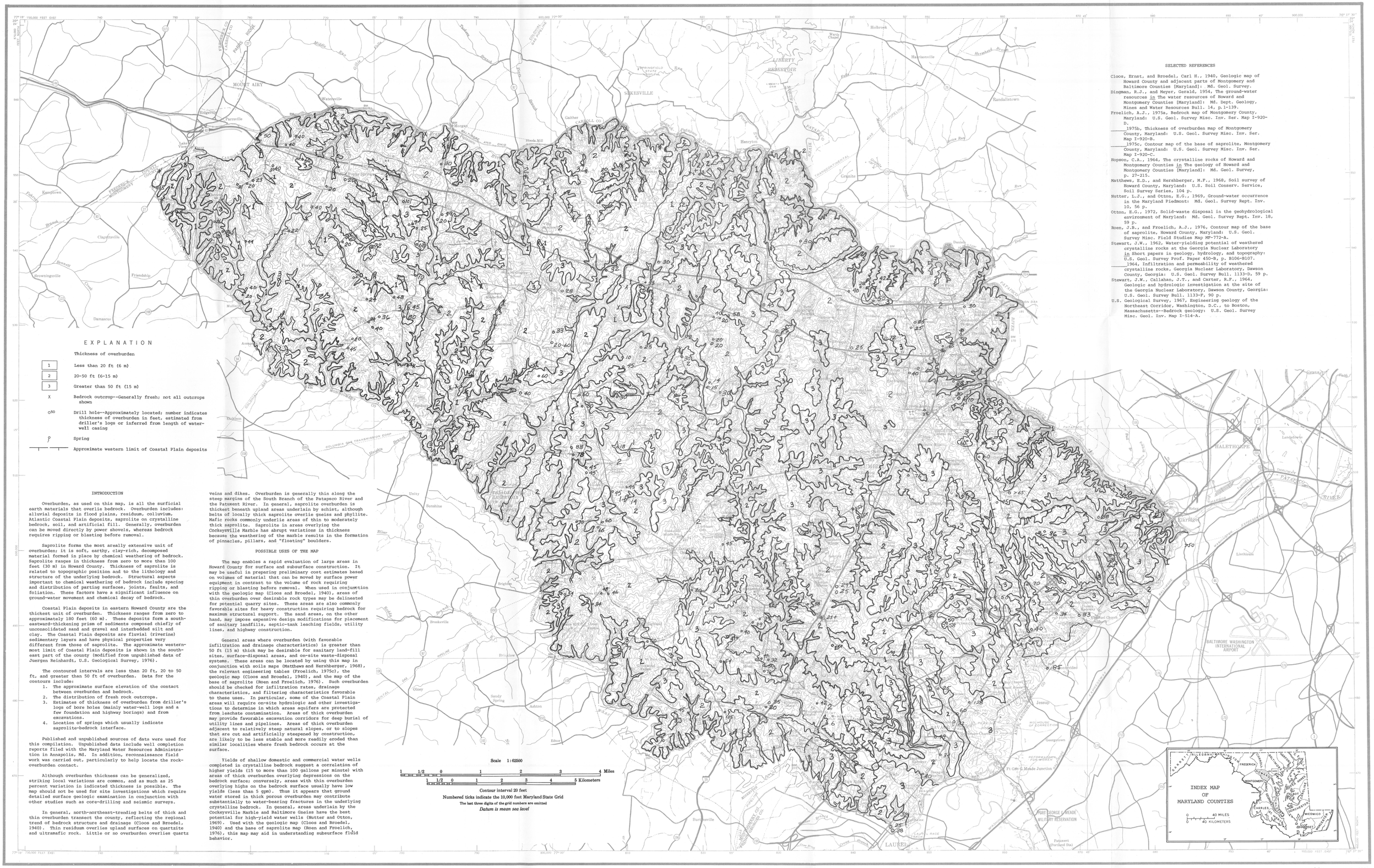
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-772-B
ROEN AND FROELICH—THICKNESS OF OVERBURDEN,
HOWARD COUNTY, MARYLAND



INTRODUCTION

Overburden, as used on this map, is all the surficial earth materials that overlie bedrock. Overburden includes: alluvial deposits in flood plains, residuum, colluvium, Atlantic Coastal Plain deposits, saprolite on crystalline bedrock, soil, and artificial fill. Generally, overburden can be moved directly by power shovels, whereas bedrock requires ripping or blasting before removal.

Saprolite forms the most areally extensive unit of overburden; it is soft, earthy, clay-rich, decomposed material formed in place by chemical weathering of bedrock. Saprolite ranges in thickness from zero to more than 100 feet (30 m) in Howard County. Thickness of saprolite is related to topographic position and to the lithology and structure of the underlying bedrock. Structural aspects important to chemical weathering of bedrock include spacing and distribution of parting surfaces, joints, faults, and foliation. These factors have a significant influence on ground-water movement and chemical decay of bedrock.

Coastal Plain deposits in eastern Howard County are the thickest unit of overburden. Thickness ranges from zero to approximately 180 feet (60 m). These deposits form a southeastward-thickening prism of sediments composed chiefly of unconsolidated sand and gravel and interbedded silt and clay. The Coastal Plain deposits are fluvial (riverine) sedimentary layers and have physical properties very different from those of saprolite. The approximate westernmost limit of Coastal Plain deposits is shown in the southeast part of the county (modified from unpublished data of Juergen Reinhardt, U.S. Geological Survey, 1976).

The contoured intervals are less than 20 ft, 20 to 50 ft, and greater than 50 ft of overburden. Data for the contours include:

1. The approximate surface elevation of the contact between overburden and bedrock.
2. The distribution of fresh rock outcrops.
3. Estimates of thickness of overburden from driller's logs of bore holes (mainly water-well logs and a few foundation and highway borings) and from excavations.
4. Location of springs which usually indicate saprolite-bedrock interface.

Published and unpublished sources of data were used for this compilation. Unpublished data include well completion reports filed with the Maryland Water Resources Administration in Annapolis, Md. In addition, reconnaissance field work was carried out, particularly to help locate the rock-overburden contact.

Although overburden thickness can be generalized, striking local variations are common, and as much as 25 percent variation in indicated thickness is possible. The map should not be used for site investigations which require detailed surface geologic examination in conjunction with other studies such as core-drilling and seismic surveys.

In general, north-northeast-trending belts of thick and thin overburden transect the county, reflecting the regional trend of bedrock structure and drainage (Cloos and Broedel, 1940). Thin residuum overlies upland surfaces on quartzite and ultramafic rock. Little or no overburden overlies quartz veins and dikes. Overburden is generally thin along the steep margins of the South Branch of the Patapsco River and the Patuxent River. In general, saprolite overburden is thickest beneath upland areas underlain by schist, although belts of locally thick saprolite overlie gneiss and phyllite. Mafic rocks commonly underlie areas of thin to moderately thick saprolite. Saprolite in areas overlying the Cockeysville Marble has abrupt variations in thickness because the weathering of the marble results in the formation of pinnacles, pillars, and "floating" boulders.

POSSIBLE USES OF THE MAP

The map enables a rapid evaluation of large areas in Howard County for surface and subsurface construction. It may be useful in preparing preliminary cost estimates based on volumes of material that 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 geologic map (Cloos and Broedel, 1940), areas of thin overburden over desirable rock types may be delineated for potential quarry sites. These areas are also commonly favorable sites for heavy construction requiring bedrock for maximum structural support. The sand areas, on the other hand, may impose expensive design modifications for placement of sanitary landfills, septic-tank leaching fields, utility lines, and highway construction.

General areas where overburden (with favorable infiltration and drainage characteristics) is greater than 50 ft (15 m) thick may be desirable for sanitary land-fill sites, surface-disposal areas, and on-site waste-disposal systems. These areas can be located by using this map in conjunction with soils maps (Matthews and Hershberger, 1968), the relevant engineering tables (Froelich, 1975c), the geologic map (Cloos and Broedel, 1940), and the map of the base of saprolite (Roen and Froelich, 1976). Such overburden should be checked for infiltration rates, drainage characteristics, and filtering characteristics favorable to these uses. In particular, some of the Coastal Plain areas will require on-site hydrologic and other investigations to determine in which areas aquifers are protected from leachate contamination. Areas of thick overburden may provide favorable excavation corridors for deep burial of utility lines and pipelines. Areas of thick overburden adjacent to relatively steep natural slopes, or to slopes that are cut and artificially steepened by construction, are likely to be less stable and more readily eroded than similar localities where fresh bedrock occurs at the surface.

Yields of shallow domestic and commercial water wells completed in crystalline bedrock suggest a correlation of higher yields (15 to more than 100 gallons per minute) with areas of thick overburden overlying depressions on the bedrock surface; conversely, areas with thin overburden overlying highs on the bedrock surface usually have low yields (less than 5 gpm). Thus it appears that ground water stored in thick porous overburden may contribute substantially to water-bearing fractures in the underlying crystalline bedrock. In general, areas underlain by the Cockeysville Marble and Baltimore Gneiss have the best potential for high-yield water wells (Nutter and Otton, 1969). Used with the geologic map (Cloos and Broedel, 1940) and the base of saprolite map (Roen and Froelich, 1976), this map may aid in understanding subsurface fluid behavior.

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Base from Maryland Geological Survey, 1974.

THICKNESS OF OVERBURDEN MAP, HOWARD COUNTY, MARYLAND

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1978

Mapped by J. B. Roen, 1976.

Interior—Geological Survey, Reston, Virginia—1978

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