U.S. GEOLOGICAL SURVEY
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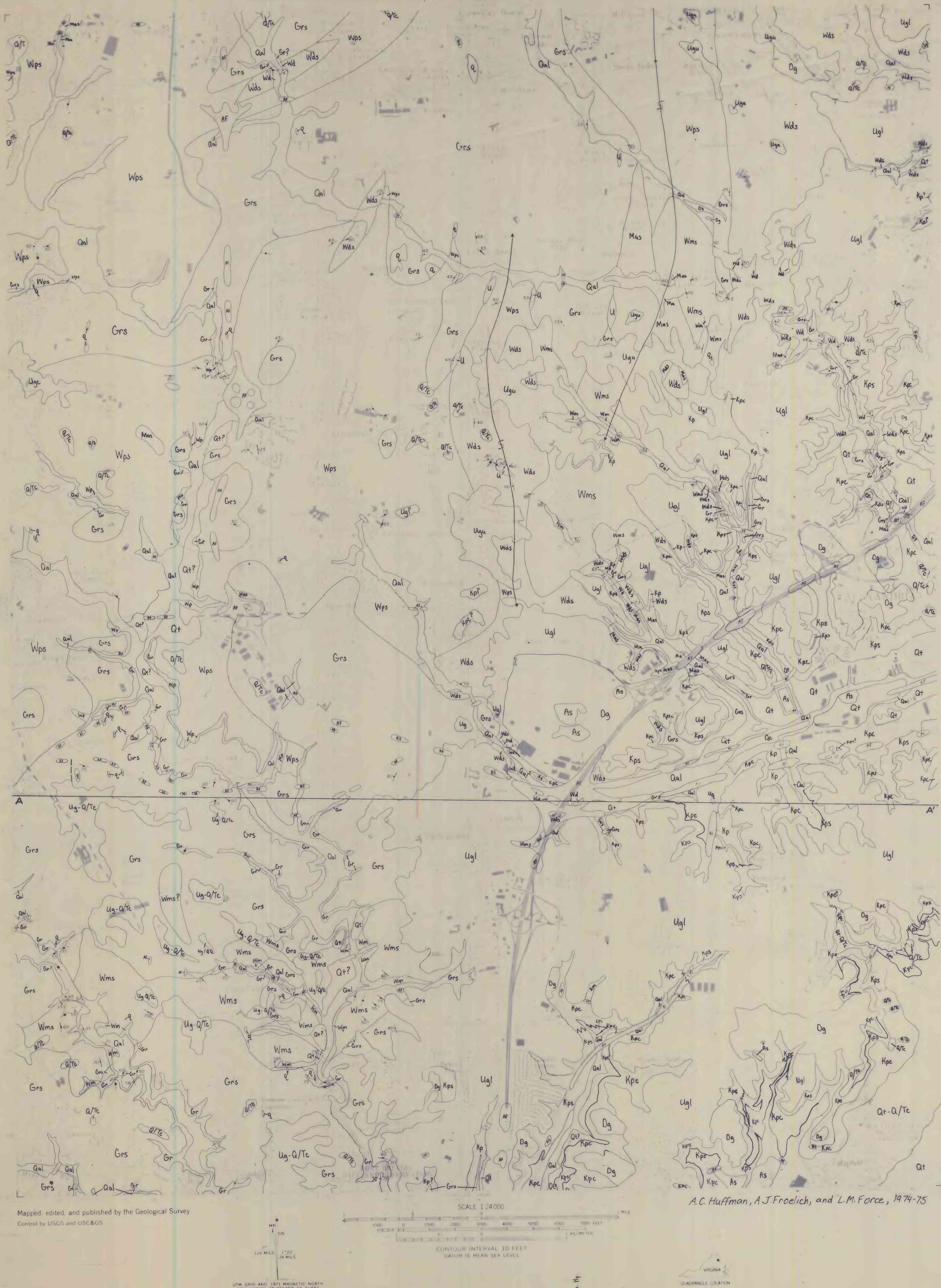

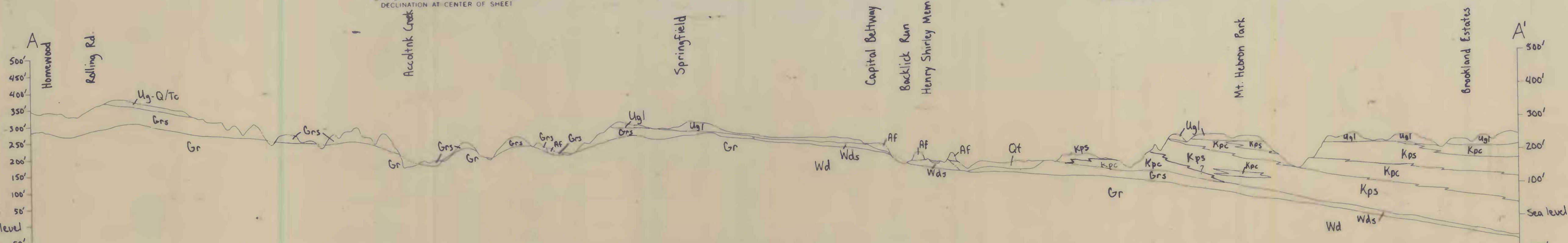

EXPLANATION

ARTIFICIALLY CHANGED GROUND

- Af — Af-artifical fill
- As — As-Sediment pond fill
- Dg — Dg-Disturbed ground

SEDIMENTARY ROCKS

- Qal — Qal-alluvium (Recent; Quaternary)
- unconformity
- Q/Tc — Q/Tc-colluvium (Quarternary and/or Tertiary)
- Qt — Qt-terraces (Pleistocene and/or Recent)
- unconformity
- Ugl — Ugl-upland gravel, low level (Post Oligocene; Quaternary and/or Tertiary)
- unconformity
- Ugu — Ugu-upland gravel, high level
- unconformity
- Kp, Kps, Kpc — Potomac Group (Lower to Middle Cretaceous; Cretaceous; Mesozoic)
  - Kp-undivided
  - Kps-sand and gravel facies
  - Kpc-clay and silt facies

Cenozoic: Quaternary, Tertiary

unconformity

METAMORPHIC AND IGNEOUS ROCKS

(Precambrian and/or Lower Paleozoic)

- q — q-quartz veins, masses, bodies
- Grs, Gr — Gr-granitoid rocks (Clarendon granite, aplite, pegmatite, quartz diorite, etc.); Grs-saprolite on granitoid rocks
- U — U-ultramafic rocks (serpentinite, talc schist, soapstone, etc.)
- Mas, Ma — Ma-mafic rocks (amphibolite, greenstone, chlorite schist, tonalite, etc.); Mas-saprolite on mafic rocks

Glenarm Series — Wissahickon Formation

- Wps, Wp — Wp-pelitic schist facies; Wps-saprolite on pelitic schist
- Wms, Wm — Wm-metagraywacke facies; Wms-saprolite on metagraywacke
- Wds, Wd — Wd-diamictite gneiss facies; Wds-saprolite on diamictite gneiss

Symbols

- Contact, approximately located; dotted where concealed.
- Inverted syncline, approximately located; arrows show direction of dip of limbs and direction of plunge
- Strike and dip of predominant foliation
- Strike of vertical foliation
- Fault
- Strike and dip of predominant joint set
- Strike of vertical joint set
- Quarry, granite.

PRELIMINARY GEOLOGIC MAP OF THE ANNANDALE QUADRANGLE, VIRGINIA

GENERAL GEOLOGY

The Annandale quadrangle lies in the Piedmont and Coastal Plain physiographic provinces which are separated by the northeast trending Fall Line zone. The Piedmont is underlain by foliated metamorphic and igneous rocks of Precambrian and (or) early Paleozoic age; the Coastal Plain is underlain by poorly consolidated, interbedded sedimentary deposits of sand, gravel, silt and clay of Cretaceous to Quaternary age.

PIEDMONT ROCKS

Most of the metamorphic rocks underlying the Piedmont Province in the Annandale quadrangle are lithofacies of the Wissahickon Formation of the Glenarm Series (Higgins and Fisher, 1971, p. 769-774). They are subdivided into three major units: the pelitic schist facies (Wp), the metagraywacke facies (Wm), and the diamictite gneiss facies (Wd; formerly the Sykesville Formation of Jonas, 1928). The Wissahickon rocks are associated with several types of mafic rocks (Ma), including igneous bodies of tonalite, metagabbro and metadiorite, and metamorphic masses of amphibolite, greenstone, chlorite schist and quartz-chlorite schist. Small, sheared bodies of ultramafic rocks (U), such as serpentinite, talc schist and soapstone, locally crop out. The metamorphic rocks are intruded by granitoid igneous rocks (Gr) which include granite, adamellite, granodiorite, quartz monzonite and quartz diorite, pegmatite and aplite. Most of these granitoid rocks are considered to be related to the Clarendon Granite of Huffman, 1975, and to the felsic intrusives to the southwest (Mixon, Southwick, and Reed, 1972), and the Occoquan Granite of Lonsdale (1927, p. 45).

Both igneous and metamorphic rocks are cut by quartz veins (q).

Outcrops of unweathered crystalline rocks in the quadrangle are sparse and are mainly restricted to deep bedrock gorges of the principal streams. Most of the interstream uplands of the Piedmont are formed on saprolite, a weathered mantle of red-brown, earthy, porous, spongy material which retains the structure of the original rock, but which can be readily dug by shovel. Saprolite is predominantly a sticky, sandy, silty and micaceous clay which grades downward into unweathered rock at depths that average 15 m (50 ft), but locally exceed 50 m (160 ft). Where possible, saprolite has been mapped and related to the underlying rock, as the physical and chemical properties are closely related to the mineralogy of the parent material.

Bedding and foliation of schist, metagraywacke, and gneiss are usually indistinct and the structure is difficult to determine. Two ill-defined antiformal axes are shown on the Annandale quadrangle, but other structures are undoubtedly present. One north-trending fault was identified; it cuts the granite near Homewood in the west-central part of the quadrangle, Both schist and metagraywacke are micaceous, quartzose and locally contain fine garnets. In places the mica schist, metagraywacke, and mafic rocks are isoclinally folded and well foliated with distinct northeast or northwest schistosity and steep northwest and southeast dips; elsewhere they show slaty cleavage warped by two or more phases of axial surface crenulation cleavage. The gneiss is generally a coarsely crystalline, more massive feldspathic rock than the schist or metagraywacke; it contains abundant garnets and rounded pebbles of quartz, as well as angular fragments of exotic rock types that differ from the locally granitoid matrix, in a chaotic mass. The granitoid rocks are predominantly medium to coarsely crystalline, massive to rudely layered, consist mostly of feldspar, quartz, biotite and muscovite micas. Both metamorphic and igneous rocks have distinct joint patterns which cut the foliation: a set of north-trending joints dips steeply east; a set of generally east-trending joints dips steeply south; and a northeast set dips steeply either northwest or southeast.

UNCONSOLIDATED SEDIMENTARY DEPOSITS

Unconsolidated and poorly consolidated sediments of the Coastal Plain overlap the crystalline rocks in the southeastern third of the quadrangle, with outlying patches of younger gravel farther west. The sediments have been deposited by rivers from the Cretacequs (100 million years ago) to the present time. Coastal Plain strata thicken from a feather edge along the Fall Line zone to more than 100 m (330 ft) at Brookland Estates, on the eastern edge of the quadrangle. They may dip as much as 19m/km (100'/mile) at the base; the youngest beds are nearly flat. The oldest deposits are the basal beds of the Potomac Group (Potomac Formation of McGee, 1888) of Cretaceous age (Doyle and Hickey (in press), and Fontaine, 1896); they rest directly on saprolite developed on the crystalline rocks. The lower part of the Potomac Group (the Patuxent Formation of Clark and Bibbins, 1897) consists of arkosic sand and quartz gravel interbedded with silty clay. The sand is primarily subangular to subrounded quartz and white feldspar which weathers to kaolinitic clay. Higher in the Potomac Group (eastward) the composition of the coarse fraction (Kps) remains the same but the proportion of strata containing fine sediment (Kpc) is greater than strata containing coarse sediment. The sand is gray or stained yellow by iron oxide. It is commonly cross-bedded; the predominant direction of dip of cross-bedding is southeast and the maximum angle between the foresets and horizontal is 23°. The gravel occurs in lenses 0.3 to 2 m thick within sand units as much as 27 m (90 ft) thick. More than 95% of the pebbles are less than 2.5 cm (1") long and are well rounded quartz; most of the remainder are chert and quartzite. The pebbles are generally isolated and surrounded by sand, and in a few cases a single layer of pebbles occurs in gray sandy clay.

Units consisting primarily of well- to poorly-sorted montmorillonitic clay and quartz silt (Kpc) as much as 23 m (75 ft) thick are interbedded with the sand and gravel of the Potomac Group. Weathering produces volume changes and cracks due to the swelling characteristics of the montmorillonite in the clay beds, and a change in color from gray or gray green to yellow and red due to oxidation of iron. A section through the Potomac Group typically contains a higher proportion of clay beds to the east than along the Fall Line, where sand and gravel predominate.

Nearly flat, sheet-like deposits of Tertiary and Quaternary upland gravel and sand (Ug) overlie the Cretaceous deposits, and upland gravel deposits overlap the Fall Line and directly overlie the saprolite to the west. The uppermost and oldest gravel and associated clayey sand which generally occurs above 350' in elevation, (Ugu) is up to 15 m (50 ft) thick; it is stained dark orange brown due to concentration of iron oxide and contains distinctive crumbly yellow quartzite clasts. Well-rounded cobbles up to 15 cm (6") long are common. Quartzite is the predominant lithology, but quartz and chert are also abundant. Other pebbles and cobbles of red sandstone and siltstone, volcanics, plutonic igneous and metamorphic rock types are present.

A lower gravel (Ugl) which occurs from 250 ft to 300 ft in elevation is typically 6 to 9 m (20 to 30 ft) thick but locally may be as much as 18 m (60 ft) thick. It is similar to the upper gravel except that it lacks the deep orange color and the crumbly quartzites. Limonite crusts as much as 5 cm (2 in) thick, and clay hard pans are present in the upper part of both gravels.

Younger terrace deposits (Qt) occur adjacent to some modern streams above the present floodplain. They contain reworked Cretaceous and younger gravels and freshly eroded bedrock and rare saprolite clasts. The matrix is somewhat sandy and micaceous. The terraces are typically 3 m (10 ft) thick with a maximum thickness of 9 m (30 ft). Hybla Valley in the southeast corner of the quadrangle is an abandoned meander scar of the Potomac River. The post-Cretaceous sediment fill in Hybla Valley is probably at least 30 m (100 ft) thick.

Colluvium (Q/Tc) is surface material of any composition which moves very slowly downhill within the soil zone. Two examples of colluvium are the gravel veneer covering low- to moderate slopes flanking upland gravel deposits, and concentrations of angular quartz at the top of saprolite containing quartz veins.

Modern alluvium (Qal) in the Coastal Plain is lithologically similar to the younger terrace sediments, except that the proportion of first cycle crystalline material is higher. Alluvium in Piedmont valleys is primarily derived from the crystallines, with abundant rock and saprolite and only minor reworked upland gravel clasts. Modern alluvium is less than 6 m (20 ft) thick except locally along Cameron Run, where it exceeds 15 m (50 ft) in thickness.

ARTIFICIALLY CHANGED GROUND

Artificial fill (Af), artificial sediment pond fill (As) and disturbed ground (Dg) are shown in areas where the underlying natural units are obscured.

ENGINEERING, GEOPHYSICAL, RESOURCE AND ENVIRONMENTAL ASPECTS OF THE MAP UNITS

Selected natural characteristics and engineering properties of the units on this map appear on tables 1, 2, and 3 accompanying the Surface Materials Map (Force and Froelich, 1975). Structure contours on the base of the Potomac Group and basic surface and subsurface data appear on a basic data map (unpub. data). Economic resources are delineated on a mineral resources map of Fairfax County (1:48,000; unpub. data). An unpublished aeromagnetic map (U.S.G.S.) aided in defining covered bedrock units. Ground water in the area is discussed by Cady (1938), Cederstrom (1946) and Johnston (1964). The soils of Fairfax County were surveyed in 1963 (Porter and others, 1963) and are being resurveyed by the County Soil Scientist.

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

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1975