Map Showing Surface Materials, District of Columbia

by

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The map showing surface materials of the District of Columbia differentiates unconsolidated and partly consolidated deposits (overburden) from areas of shallow bedrock. Bedrock generally requires drilling and blasting prior to removal, whereas the unconsolidated and partly consolidated materials can generally be moved by power equipment.

The surface materials have been grouped on the basis of similar constituents, physical properties, and engineering behavior of the materials which underlie the soil, regardless of their geologic age (see Table 1). The map is based on the Preliminary geologic map of the District of Columbia (Hack and Froelich, 1975). Units 1 and 2 are identical with artificial fill and alluvium, respectively; Unit 3 groups terrace gravel and upland gravel; Unit 4 combines the Potomac sand and gravel facies with the Monmouth, Calvert and Aquia Formations, all of which are sandy; Unit 5 is identical to the Potomac clay and silt facies; and Units 6 and 7, respectively, separate saprolite from the underlying crystalline parent bedrock, including the Wissahickon Formation, Kensington Gneiss, Georgetown Complex and quartz bodies.

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References

Froelich, A. J., and Hack, J. T., 1975, Preliminary geologic map of the District of Columbia, U. S. Geological Survey Open-file map, scale 1:24,000.

Mueser, W. H., and others, 1967, Final report, subsurface investigation; Washington Metropolitan area rapid transit authorized basic system, Connecticut Avenue Route: U.S. Dept. Commerce, Nat'l Tech. Inf. Service, PB-179653, v. 1.

Table 1: Selected Engineering Properties of Overburden and Bedrock, Surface Materials, District of Columbia

Map Symbol	Unit	Special Conditions	Total Unit Weight PCF	Shear Strength Cohesive KSF	Effective Friction Angle Ø	Allowable Bearing Pressure TSF	Standard Penetration Test, Blows/foot
1	Artificial fill	local overburden mixed with rock	120-130	--	28°-30°	None to 1.5 (needs special study	10-20
2	Alluvium	Organic clay Silty sand	110-120 130	0.2-0.7 --	23° 30°	None ordinarily 2	 5-15
3	Gravel Deposits (Upland & terraces)	Clay and silt Sand and gravel	130 130	0.7-3.5 --	25°-28° 30°-38°	1 or less - 3 1.5-4	8-30 10-60+
5	Unconsolidated Sands & Clays[2]	Plastic clay Sandy clay	130 130	1-5 4-6	20°-25° 25°-30°	1-5 4-7	20-50+ 30-100
4		Silty to gravelly sand	135	--	34°-38°	5-8	30-100+
6	Saprolite (decomposed rock)	Near surface micaceous, unstructured. Undisturbed, compact, retains rock structure	140 140+	0.9-4 -- 4-5	30° 36°	3-5 5	10-50+ 50-100+
7	Bedrock	Highly jointed, weathered, schistose gneiss, Moderately jointed, sound gneiss	170 170	0.5-5ksi [compressive strength] 5-15ksi	45° 45°	10+ 30-60	---

Where shear strength in KSF is listed the material is expected to perform as a cohesive soil. Where no shear strength is listed the material is expected to perform as a cohesionless soil.

PCF - Pounds per cubic foot; KSF - Kips per square foot.
KIP - A-unit of weight equal to 1000 pounds used to express a deadweight load.
TSF - Tons per square foot; ksi - kips per square inch.
Blows/foot - Number of blows of 140 pound hammer falling 30 inches required to drive a 2 inch O.D. sampling spoon 1 foot.

[1]Modified from Table 7, Soil properties for design, Final Report, Subsurface Investigation, Conn.Ave.Rt; report submitted to Washington Metropolitan Area Transit Authority, by Mueser and others, December, 1967.
[2]The swelling potential of the clays in the area should also be considered in engineering design.