PRELIMINARY MAP OF SURFICIAL DEPOSITS IN THE SHUTESBURY QUADRANGLE, MASSACHUSETTS

by

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Two types of glacial deposits are present in the Shutesbury quadrangle. These deposits are differentiated on the map on the basis of lithology and mode of deposition.

Till (t) is a nonsorted, non-layered mixture of all grain-sizes deposited directly by glacial ice; it blankets the bedrock surface in varying thicknesses. In general, till is thicker on the north and western sides of bedrock hills and thinest, or absent, on the south and eastern sides. The distribution of shallow bedrock pattern on the map shows this relationship. The texture and composition of till in New England varies greatly depending on the lithology of the local bedrock from which it was derived. The Shutesbury quadrangle is underlain mostly by light-colored, coarse-grained bedrock of the Dry Hill Gneiss and Pelham Quartzite. Most till in the map area is very light gray in color, loose, and extremely sandy with relatively few stones and surface boulders. A darker gray, finer grained, compact till, however, was observed to underlie the loose, sandy upper till in several localities.

Glacial Stratified Deposits (g, sg, s, f) were laid down by glacial melt-water. Meltwater streams carried sediment from the melting glacier ice, transported, sorted, and deposited this sediment in layers. These deposits occur in the principal valleys and basins of the area and generally overlie till. The gravels and sands of the basin west of Pelham, Dean Brook valley, Roaring Brook valley, the Dudleyville basin, the Moore's Corner basin, and South Brook basin are chiefly lacustrine deposits built into temporary lakes or ponds dammed to the north or west by the retreating ice front. The water level of the lake controlled the surface elevation of the sediment. As the ice front retreated, lower spillways were uncovered; lake waters lowered causing deposition of sediment at lower elevations. Stratified deposits in the southwest corner of the map area were built into glacial Lake Hitchcock, an extensive lake occupying much of the Connecticut River valley to the west. Deposits in the West Branch Swift River valley and Doolittle Brook valley are fluvial deposits of melt-water streams graded to base levels higher than those of the modern streams occupying those valleys.

Stratified deposits have been divided into map units based on their specific range in grain size. Superposed units have been used on the map where field observation revealed that gravel and sand and gravel deposits are underlain by sand deposits. In addition, the gravel and sand and gravel deposits in the areas described above as lacustrine probably overlie sand in many places, although this relationship has not been shown on the map. Textures in these lacustrine deposits generally become finer with depth.

Recent stream alluvium (a) and swamp deposits (sw) are also stratified and have been distinguished from glacial deposits on the map.

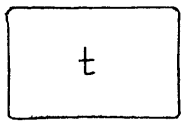
Most stratified deposits are mixtures of the three particle-size classes defined on the diagram below. Gravel particles include granules, pebbles, cobbles, and boulders. Sand particles include all sand sizes except very fine sand. Fine particles include very fine sand, silt, and clay. Very fine sand is included in this class, because it commonly occurs with finer materials and because very fine sand, silt, and clay behave similarly when water-soaked and under stress.

PARTICLE-SIZE CLASSIFICATION USED IN THIS REPORT
Modified from Wentworth (1922)

diameter of particles	10 inches 256 millimeters	2.5 64	.16 4	.08 2	.04 1	.02 .5	.01 .25	.005 .125	.0025 .068	.00015 .004	
Boulders	Cobbles	Pebbles	Granules	very coarse Sand	coarse Sand	medium Sand	fine Sand	very fine Sand	Silt	Clay	
GRAVEL PARTICLES				SAND PARTICLES				FINE PARTICLES			

Textural mapping involves a visual estimate of particle-size distribution by the geologist. Percentages of particle-sizes may, therefore, differ in places from the limits defined in the map units below. Mapped units may also contain lenses of material that differ in particle-size from the main mass of the map unit.

DESCRIPTIONS OF UNITS

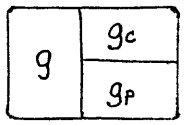


GLACIAL TILL DEPOSITS

Non-sorted, non-layered mixture of sand, silt, pebbles, cobbles and boulders deposited by glacier ice.

GLACIAL STRATIFIED DEPOSITS

Laid down by glacial meltwater in either fluvial or lacustrine systems; further differentiated on the basis of texture.

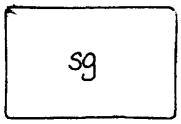


Gravel Deposits

Particle-sizes range from 100 percent gravel particles to 50 percent gravel particles and 50 percent sand particles. Material occurs as poorly sorted layers of different thickness.

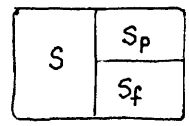
g_c, gravel particles are mostly cobbles

g_p, gravel particles are mostly pebbles



Sand and Gravel Deposits

Particle-sizes range from 50 percent gravel particles and 50 percent sand particles to 25 percent gravel particles and 75 percent sand particles. Material occurs as well to poorly sorted layers of different thickness in which particle sizes may range from gravel to sand both laterally and vertically.

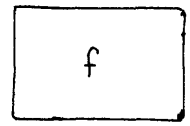


Sand Deposits

Particle-sizes range from 25 percent gravel particles and 75 percent sand particles through 100 percent sand particles to 50 percent sand particles and 50 percent fine particles. Material occurs as well to poorly sorted layers of different thickness.

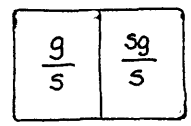
s_p, areas known to contain up to 25 percent gravel particles which are mostly pebbles

s_f, areas known to be mostly fine sand



Fine Deposits

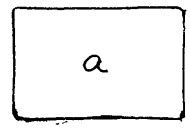
Particle-size range from 50 percent sand particles and 50 percent fine particles to 100 percent fine particles. Material occurs as well sorted layers of very fine sand, silt, and/or clay.



Superposed Deposits

Gravel and Sand and Gravel Deposits generally less than 10 feet thick overlying thicker sand deposits.

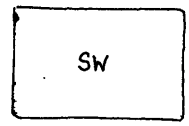
RECENT STRATIFIED DEPOSITS



Alluvium Deposits

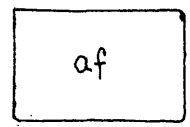
Highly variable layers of well to poorly sorted gravel, sand, or silt deposited by modern streams during flood stages. Contain variable amounts of organic material.

a_s, areas of alluvium known to be mostly sand



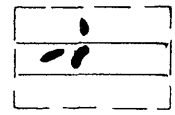
Swamp Deposits

Dark, decomposed organic material intermixed and interlayered with variable amounts of sand, silt, and clay. Locally contain scattered stones. Generally less than 10 feet thick and underlain by surrounding deposits.



ARTIFICIAL FILL

Shown only in areas of major emplacement such as road embankments, dams, and landfills.



BEDROCK OUTCROPS

Solid black areas indicate bedrock exposed at the surface; shown only where observed in the field. Ruled pattern shows areas where bedrock is inferred to be less than 10 feet beneath the surface and where numerous bedrock outcrops are likely to be found.

REFERENCES

Robinson, Peter et al., 1973, Progress bedrock geologic map, eastern part of Shutesbury quadrangle, central Massachusetts: Dept. of Geology University of Massachusetts, Amherst, Mass.

Wentworth, C.K., 1922, A scale of grade and class terms for clastic sediments: Jour. Geol., v. 30, p. 377-392.