

SURFICIAL MATERIALS OF PORTAGE COUNTY, OHIO

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EXPLANATION

The character of the earth materials within the upper 20 feet of the surface can influence the uses that a land area will undergo, especially as economic growth and development increase competition for available land. Physical conditions and properties of surficial materials such as depth to bedrock, permeability, shrink-swell potential, and grain-size distribution and chemical properties such as mineralogy are important factors in determining the suitability of a land area for diverse applications such as agriculture, residential or commercial/industrial development, surface mining, solid-waste disposal, and recreational use. This study of the distribution of surficial materials in Portage County is intended to serve as a guide in land-use planning and is not intended to replace site-specific evaluation studies.

The materials which compose the upper 20 feet of land surface in Portage County consist mostly of unconsolidated glacially derived materials that range in thickness from a few to almost 500 feet. The only nonglacial surficial materials in the area are alluvium (modern stream deposits) and bedrock. The glacially derived materials, known as drift, consist of till, sand and gravel, and silt and clay. A map of the thickness of unconsolidated materials (drift plus alluvium) in Portage County is on open file at the Division of Geological Survey.

The most voluminous type of drift in Portage County is till, which is an unsorted, unstratified mixture of clay, silt, and sand, with minor amounts of pebbles, cobbles, and boulders. Portage County was covered by several different ice sheets during the Pleistocene Epoch (approximately 1.8 million to 10 thousand years ago), and each of these ice sheets deposited its own identifiable till. Tills of three ice sheets, each till having somewhat different physical characteristics, have been recognized at the surface in Portage County (Winslow and White, 1966). The approximate areal extent of each of these tills is shown on the inset map, and the generalized till boundaries are shown on the surficial materials map. Hiram Till is a silty clay containing very minor amounts of sand, pebbles, and boulders. Lavery Till is a clayey silt containing moderate amounts of sand, pebbles, cobbles, and boulders. Kent Till is a sandy clayey silt in which pebbles, cobbles, and boulders are common to abundant. All three tills are compact and have low to moderately low permeabilities (0.063 to 2.0 inches per hour). Permeability is lowest in the finest grained till (Hiram) and highest in the coarsest grained till (Kent Till). Hiram and Lavery Tills have low to moderate shrink-swell ratings, and Kent Till has a low shrink-swell rating (Richie and others, 1978). Generally, Hiram Till overlies Lavery Till, which in turn overlies Kent Till; however, any of the tills may be absent or too thin to be recognized at some locations. Older and coarser tills underlie Kent Till in many areas of the county, but are very rare at the surface in natural exposures. Each of the three tills ranges in thickness from a few inches to 25 or more feet, thus at any given location one, two, or several tills may be encountered within the upper 20 feet of land surface. Detailed descriptions of these tills appear in Winslow and White (1966).

Sorted and stratified sand and gravel deposited by melt-water from wasting ice sheets are abundant in the kames, eskers, and outwash deposits of western, northeastern, and central Portage County. Although these deposits are shown only as sand and gravel on the accompanying surficial materials map, it should be noted that large lenses of clay and silt overlying and/or within the material are very common. These sand and gravel deposits are potential sources of aggregate, but exploratory drilling is generally necessary to accurately determine the amount of aggregate at any given location. Portage County sand and gravel deposits can be characterized as being highly permeable and generally noncohesive. For more information regarding sand and gravel deposits in Portage County see Hull (1980).

Clay and silt deposited in former glacial lakes are common in some of the buried valleys of northern Portage County. These deposits are commonly interstratified with outwash and till as a result of alternating advances and retreats of glacial ice, thus they appear on the surficial materials map as interstratified deposits of till, clay, silt, sand, and gravel.

Alluvium, consisting mostly of silt and clay (although organic debris and lenses of sand and gravel are not uncommon), is a postglacial sediment deposited on the floodplains of streams and in bogs throughout the county. The alluvium is generally thin and overlies one or more other types of material within the upper 20 feet of land surface. Areas covered by alluvial deposits typically have high water tables and are generally prone to frequent flooding.

There are many natural and manmade lakes in Portage County. The smaller lakes are not delineated on the surficial materials map.

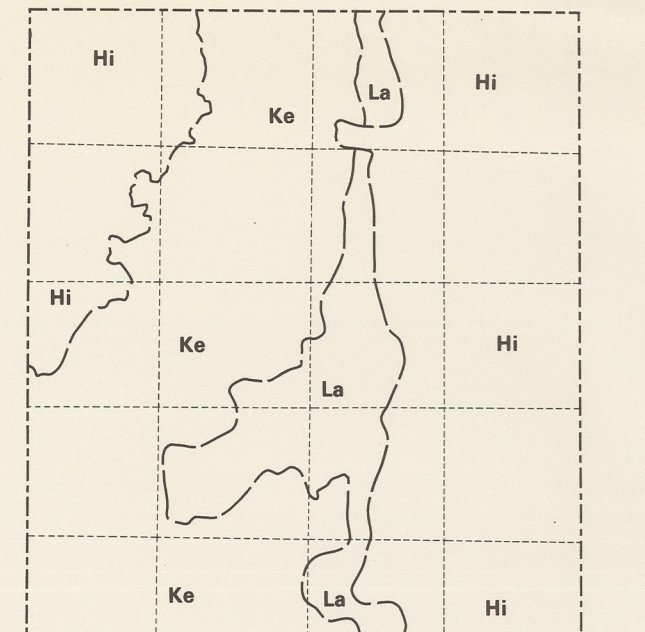
Bedrock of Devonian to Pennsylvanian age underlies the glacial veneer of Portage County and in places crops out at the surface. The near-surface bedrock (at depths of 20 feet or less) generally consists of Pennsylvanian sandstones and conglomerate; however, Pennsylvanian limestone, shale, and coal and Mississippian shale also may be present in the near surface, but to a much lesser extent. Devonian shales are not found within the upper 20 feet of land surface, but they do lie directly below the drift in some of the deeply incised buried glacial valleys in northwestern, northeastern, and central Portage County (see Winslow and White, 1966). Specific bedrock lithologies are not shown on the surficial materials map, however, areas of near-surface bedrock are indicated on the map. Additional information on the bedrock geology of Portage County is given in Winslow and White (1966).

REFERENCES CITED

- Hull, D. N., 1980. The sand and gravel resources of Portage County, Ohio. Ohio Division of Geological Survey Report of Investigations 114, map with text.
 Ritchie, Alexander, and Bauder, J. R., Christman, R. L., and Reese, P. W., 1978. Soil survey of Portage County, Ohio. U.S. Department of Agriculture, Soil Conservation Service, 13 p., 65 map sheets.
 Winslow, J. D., and White, G. W., 1966. Geology and ground-water resources of Portage County, Ohio. U.S. Geological Survey Professional Paper 511, 90 p., maps.

*Permeability is the property or capacity of a rock, sediment, or soil for transmitting a fluid. The standard unit of measurement for permeability is the darcy. Permeability can also be described in terms of the velocity at which a fluid can flow through a medium (inches per hour or centimeters per second), or the volume of fluid which can pass through a given cross-sectional area in a given amount of time (gallons per day per square foot). A Manton is another unit of measure and equals 1 gallon of water per day per square foot. A permeability of 0.067 inches per hour approximately equals a permeability of 54.8 Manton/darcy. A permeability of 2.0 inches per hour (1 Manton/darcy) or 54.8 Manton/darcy.

*Shrink-swell potential describes the tendency of a material to change volume independently of externally applied loads, that is, to shrink when dry and to swell when wet. Shrinkage and swelling are most pronounced in fine-grained materials and result from (1) the varying extent to which some clays absorb water, and (2) the building and release of capillary tensile stresses within the pore water. Building foundations and structures placed in or on host materials having a high shrink-swell potential may distort and fail due to volumetric changes in the host material.



GENERALIZED DISTRIBUTION OF TILL UNITS IN PORTAGE COUNTY

Hi - Hiram Till (silty clay)
 La - Lavery Till (clayey silt)
 Ke - Kent Till (sandy clayey silt)

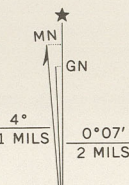
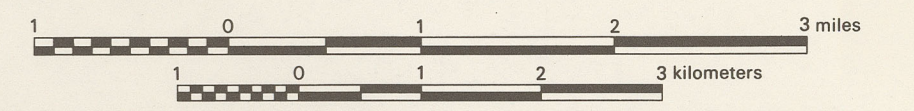
CARTOGRAPHIC DRAFTING BY LISA VAN DOREN

PHOTOTYPESSETTING BY JEAN M. LESHER



DOMINANT MATERIAL TYPES IN THE UPPER 26 FEET OF THE LAND SURFACE

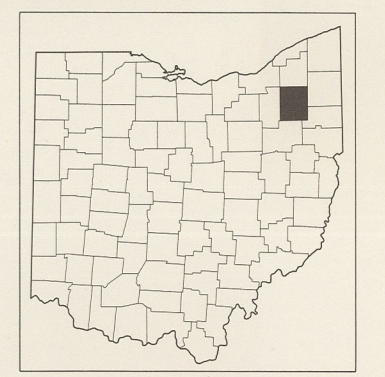
- Sand and gravel (sand and gravel deposits within these areas commonly contain lenses of till and other silty/clayey materials)
- Till over sand and gravel
- Sand and gravel over bedrock
- Till over sand and gravel over bedrock
- Alluvium over sand and gravel
- Alluvium over till
- Alluvium over till over bedrock
- Till
- Till over bedrock
- Interstratified deposits of till, clay, silt, sand, and gravel
- Interstratified deposits of till, clay, silt, sand, and gravel over bedrock
- Alluvium over interstratified deposits of till, clay, silt, sand, and gravel
- Alluvium over sand and gravel over bedrock
- Areas where surficial materials have been greatly disturbed by surface mining operations
- Unit contacts, dashed where approximate
- Generalized till boundary, see inset map for till names



1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

WINNEMUNG (1970)	AURORA (1980)	MAKITA (1970)	GAMBERTVILLE (1970)
HUBBARD (1970)	KEST (1970)	RAVENNA (1970)	WINDHAM (1970)
ANDREWSVILLE (1980)	SUFFIELD (1970)	ATTER (1970)	DEERFIELD (1970)
NORTH CANTON (1980)	MARTINVILLE (1970)	LUMVILLE (1970)	ALLIANCE (1970)

1:24,000 U.S. GEOLOGICAL SURVEY TOPOGRAPHIC QUADRANGLE MAPS COVERING PORTAGE COUNTY (DATES IN PARENTHESES INDICATE DATE OF NEGATIVES USED TO COMPILE BASE)



LOCATION MAP

CONTOUR INTERVAL IS 10 FEET DATUM IS MEAN SEA LEVEL

10,000-foot grid based on Ohio coordinate system, north zone County lies within Connecticut Western Reserve