













**SURFICIAL GEOLOGY OF THE HIGHTSTOWN QUADRANGLE,  
MIDDLESEX AND MERCER COUNTIES, NEW JERSEY**









by  
Scott D. Stanford  
2002

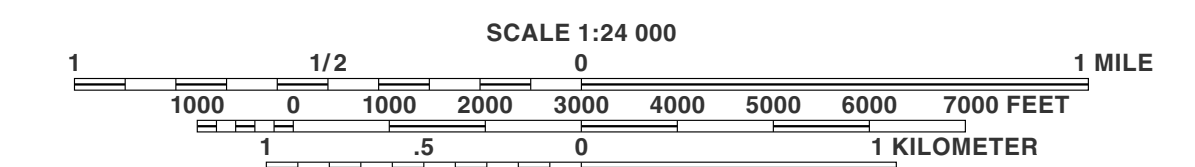
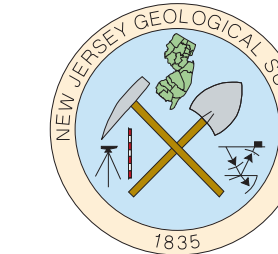
**MAP UNITS**

Age of unit indicated in parentheses. For units spanning more than one period, principal age is listed first.  
Order of map units in list does not necessarily indicate chronologic sequence.

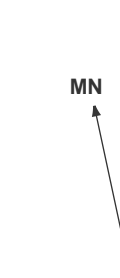
-  **ARTIFICIAL FILL**—Sand, silt, clay, gravel; brown, gray, yellowish brown; may include demolition debris (concrete, brick, asphalt, glass) and trash. As much as 20 feet thick. Many small areas of fill in urban areas are not shown.
-  **Qal** **ALLUVIUM** (Holocene and late Pleistocene)—Sand, silt, clay, peat; yellowish brown, dark brown, gray; and pebble gravel. Abundant organic matter. Sand is chiefly quartz, with some glauconite and mica. Gravel is quartz and quartzite with minor ironstone. As much as 20 feet thick. Deposited in floodplains, channels, and groundwater seepage areas.
-  **Qs** **SWAMP AND MARSH DEPOSITS** (Holocene and late Pleistocene)—Peat and organic silt, sand, and clay; dark brown to black. As much as 10 feet thick.
-  **Qcal** **COLLUVIUM AND ALLUVIUM** (Holocene and late Pleistocene)—Interbedded alluvium and colluvium in headwater valleys. As much as 10 feet thick.
-  **Qe** **EOLIAN DEPOSITS** (late Pleistocene and Holocene)—Fine sand and silt, very pale brown to reddish yellow. Sand is chiefly quartz with minor shale fragments, glauconite, and mica in places. As much as 6 feet thick. Shown as an overprint pattern where generally continuous but less than 3 feet thick.
-  **Qtl** **LOWER TERRACE DEPOSITS** (late Pleistocene)—Sand and minor silt; yellow, yellowish brown, reddish yellow; and pebble gravel. Sand is chiefly quartz with some glauconite and mica. Gravel is quartz and quartzite with minor ironstone. Adjacent to Carnegie Lake, gravel includes some gray siltstone and minor red siltstone and gray gneiss. As much as 30 feet thick. Forms stream terraces with surfaces 5 to 20 feet above the modern floodplain.
-  **Qcl** **LOWER COLLUVIUM** (late Pleistocene)—Sand, silt, minor clay; yellow, yellowish brown, reddish yellow, light gray; some quartz and ironstone pebbles. As much as 10 feet thick. Forms aprons graded to lower terraces or the modern floodplain.
-  **Qtu** **UPPER TERRACE DEPOSITS** (middle Pleistocene)—Sand and minor silt; yellow, reddish yellow; and pebble gravel. Sand is chiefly quartz, quartzite, and minor ironstone. As much as 20 feet thick. Forms stream terraces with surfaces 20 to 30 feet above the modern floodplain.
-  **Tp** **PENSAUKEN FORMATION** (Pliocene)—Sand, minor silt and clay; yellow to reddish yellow; pebble gravel and minor cobble gravel, particularly at the base of the deposit. Sand is chiefly quartz with some weathered feldspar and minor glauconite and mica. Gravel is chiefly quartz and quartzite with some chert and ironstone, and minor amounts of deeply weathered sandstone, mudstone, diabase, and gneiss. Locally iron-cemented. Locally includes beds of dark-gray to reddish-yellow clay as much as 6 feet thick. As much as 140 feet thick. In erosional remnants of a dissected river plain.
-  **Tpg** **PENSAUKEN FORMATION, GLAUCONITIC PHASE** (Pliocene)—Sand, minor silt and clay; reddish yellow to yellowish brown; and pebble gravel. Sand is chiefly quartz with some glauconite and mica and minor feldspar. Gravel is chiefly quartz and quartzite with some chert. As much as 20 feet thick. A phase of the Pensauken Formation deposited by tributaries from the Coastal Plain.
-  **Qwcp** **WEATHERED COASTAL PLAIN FORMATIONS**—Exposed sand and clay of Coastal Plain bedrock formations. May be overlain by thin, patchy alluvium and colluvium. Quartz, chert, and ironstone pebbles left from erosion of surficial deposits may be present on the surface and in the upper several feet of the formation.
-  **Qws** **WEATHERED SHALE AND SANDSTONE**—Silty clay to sandy silt; reddish brown, pale red, reddish yellow, gray; with few to some angular pebble- and cobble-sized fragments of siltstone and sandstone, and a few quartz, chert, and ironstone pebbles left from erosion of surficial deposits. As much as 30 feet thick.

**MAP SYMBOLS**

-  **Contact**—Contacts of alluvium and swamp deposits are well-defined by landforms and are drawn from 1:12,000 scale aerial photographs. Contacts of other units are approximately located based on both landforms and field observation points.
-  **Material observed** in hand-auger hole, exposure, or excavation.
-  **Shallow topographic basin**—Of probable periglacial origin.
-  **Well or boring**—Upper number (italicized) is identifier, lower number is thickness of surficial material, in feet. Identifiers of the form '28-xxxx' are N. J. Department of Environmental Protection well permit numbers. Identifiers of the form '23-xxx' and '21-xxx' are from Gronberg, J. M., Birkelo, B. A., and Pucci, A. A., 1989. Selected borehole geophysical logs and drillers' logs, northern Coastal Plain of New Jersey: U. S. Geological Survey Open-File Report 87-243, 133 p. Identifiers of the form 'Sxx' and 'Wxx' are borings made for a proposed ship canal in the 1930s, and for sand-resource exploration, respectively. Logs of these borings are on file at the N. J. Geological Survey. Identifiers of the form 'HT4' are borings made by J. P. Owens and D. S. Powers of the U. S. Geological Survey in 1991 as part of a regional cooperative geologic mapping project with the N. J. Geological Survey.
-  **Elevation of base of Pensauken Formation**—In feet above sea level. Contour interval 20 feet. Dashed where eroded.
-  **Paleocurrent measurement**—Arrow indicates paleoflow direction, "x" indicates location of measurement. Measurements made on tabular, planar cross beds.
-  **Thin eolian deposits**—Veneer of fine sand and silt, generally less than 3 feet thick.
-  **Bedrock strike ridge**—Low ridge parallel to strike of bedrock. Drawn from airphotos.

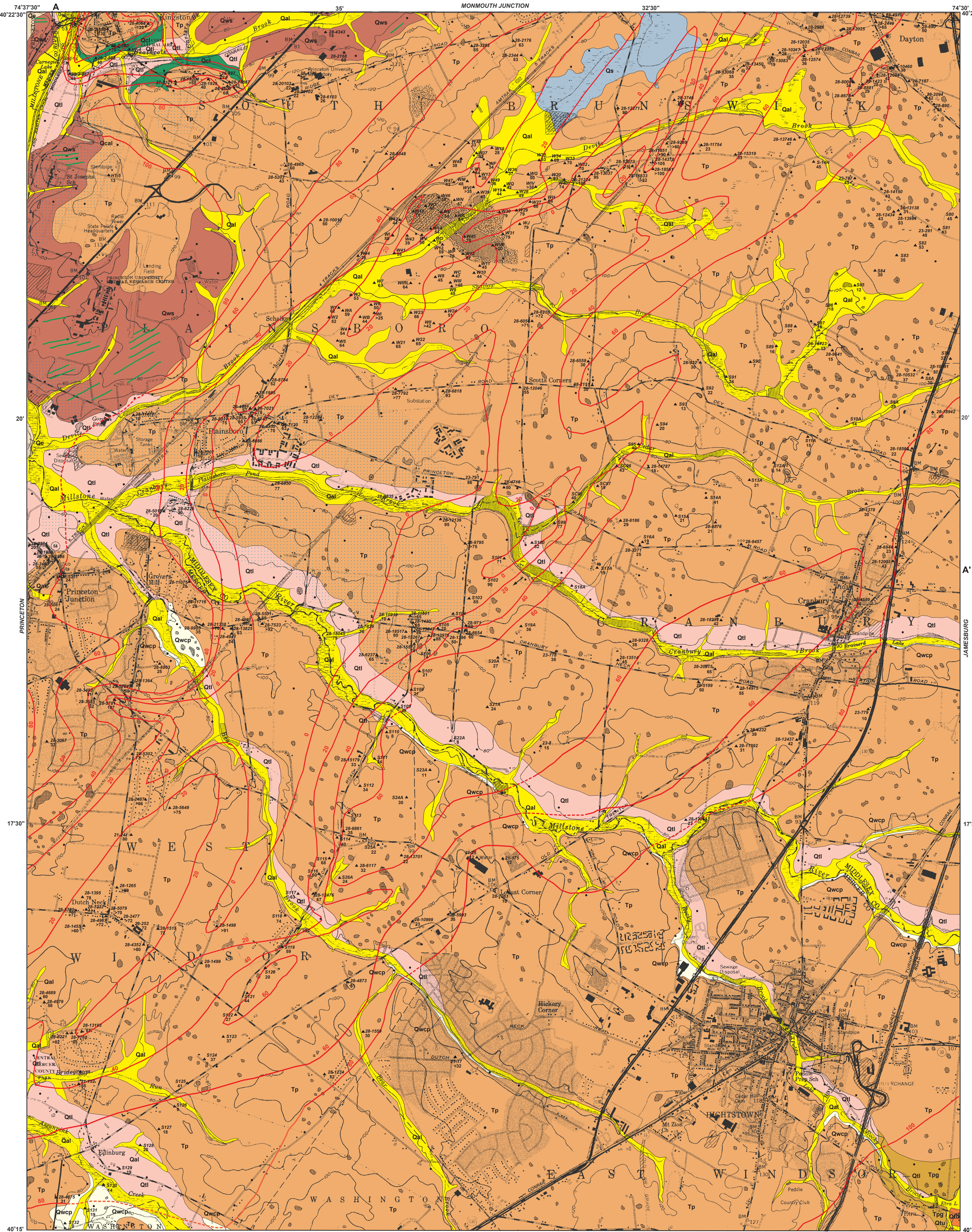


CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



1981 MAGNETIC NORTH  
DECLINATION AT CENTER  
OF SHEET IS 11.8°

LOCATION IN  
NEW JERSEY



Base from U. S. Geological Survey, 1954  
Photorevised 1981

Geology mapped 1991

