DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF SCIENCE, RESEARCH, AND TECHNOLOGY
NEW JERSEY GEOLOGICAL SURVEY

Prepared in cooperation with the
U. S. GEOLOGICAL SURVEY
NATIONAL GEOLOGIC MAPPING PROGRAM

SURFICIAL GEOLOGY OF THE ELIZABETH QUADRANGLE ESSEX, HUDSON, AND UNION COUNTIES, NEW JERSEY
OPEN-FILE MAP OFM 42

(Appendix of well and boring logs accompanies map)

INTRODUCTION

Surficial deposits in the Elizabeth quadrangle include artificial fill, alluvial, estuarine, and windblown (eolian) sediments of postglacial age, and glacial sediments that are of late Wisconsinan age. The postglacial deposits are generally less than 20 feet thick. The glacial sediments include stratified sand, gravel, silt, and clay deposited in glacial lakes and by glacial streams, and till deposited by glacial ice. The stratified glacial sediments are as much as 300 feet thick. Till is as much as 90 feet thick.

The surficial deposits are delineated on the accompanying map and cross sections and are described below. The glacial and postglacial events they record are also discussed below. A brief summary of the hydrologic and engineering characteristics of the deposits is also provided below. Well and test-boring data used to draw bedrock-surface contours and to infer the subsurface distribution of the deposits are plotted on the map, and selected logs are listed in Appendix 1. Table 2 provides the composition of gravel clasts in the glacial deposits. Table 1 summarizes penetration-test data for the surficial materials. Figure 1 shows the extent of glacial lakes and ice margins in the quadrangle and adjacent areas. The chronologic relationships of the deposits are shown in the "Correlation of Map Units".

HYDROLOGIC AND ENGINEERING CHARACTERISTICS

Surficial deposits in the Elizabeth quadrangle convey water from the surface into the underlying bedrock and adjoining surface-water bodies. They also provide support for foundations, and are the materials excavated for underground structures, road and railroad cuts, and shipping channels. Before the 1930s they were mined for clay, sand, and gravel at a few places (Merrill and others, 1902). Urbanization precludes extraction now, although sand, silt, and clay dredged from Newark Bay, the Arthur Kill, and the Kill van Kull, if sufficiently free from contamination, may be usable for fill or landfill cover.

Hydraulic conductivities of the surficial deposits can be estimated from statewide glacial aquifer-test data on file at the N. J. Geological Survey (www.state.nj.us/dep/njgs/geodata/dgs02-1) and published aquifer-test and laboratory data summarized by Stanford and Witte (in press). Sand and gravel deposits (units Qbn, Qwb, Qez, Qbnf, Qpt, and parts of Qal) are highly permeable, with estimated hydraulic conductivities between 10^1 and 10^2 feet per day (ft/d). Silt and clay lake-bottom deposits (parts of units Qbnl and Ql) are of low permeability, with estimated hydraulic conductivities of 10^{-2} to 10^{-1} ft/d. Fine sand and silt in lake-bottom, alluvial, and estuarine deposits (parts of units Qbnl, Ql, Qpt, Qm, and Qal) and sandy silt till (unit Qt) are somewhat more permeable, with estimated hydraulic conductivities of 10^{-1} to 10^{0} ft/d. Estuarine and salt-marsh deposits (Qm) and fill (af) have variable hydraulic conductivities that depend on the clay and silt content of the material. Sandy tidal-channel sediments, salt-marsh peats with little mineral soil, and fill composed of sand, cinders, gravel, demolition debris, slag, and trash, may be highly permeable.

The strength of the surficial materials depends on their grain size, compaction, and water content. Estuarine, salt-marsh, and alluvial deposits (units Qm and Qal) are of low strength because they have not been subject to water or sediment loads greater than those at present, and have been continuously saturated or moist, and so are not compact. They also may contain significant amounts of organic matter, which is weaker than mineral soil. Standard Penetration Test (SPT) data from test borings (table 1) can be used to assess the compaction and strength of surficial deposits. These tests report the number of blows of a 140-pound hammer falling 30 inches that are required to drive a sampling tube 12 inches into the test material. For unit Qm they show a range of 0-38, with a mean of 3 and a standard deviation of 4 (647 tests). Forty-six percent of the tests had values of zero, indicating that the weight of the hammer or drilling rods alone was sufficient to drive the sampling tube the required distance. For unit Qal, the SPT values range from 0-89, with a mean of 24 and a standard deviation of 14 (221 tests), with 2 percent having values of zero. Construction on these materials generally requires the use of pilings to transfer loads to the underlying bedrock or till, or the excavation of the natural material and replacement with engineered fill of greater strength. The lake-bottom deposits are similarly of low strength because they have been continuously saturated from the time of deposition, except for the upper parts, which were exposed and desiccated when the glacial lakes drained. The desiccated layer, which is as much as 20 feet thick, but is not everywhere present, is more compact than the underlying lake-bottom material. SPT data show an overall mean of 14 and a standard deviation of 14 (1559 tests) for lake-bottom sediment, with 11 percent having a value of zero. The desiccated layer yields blow counts generally between 20 and 50, with some rare values as large as 150.

Map Units	Range of SPT Values	Mean ± Standard Deviation	Percentage of Zero Values	Number of Borings	Number of Tests
af	0-191	17.8±19.2	1.2%	223	737
Qm	0-38	2.8±4.5	45.9%	218	647
Qal	0-89	24.0±13.9	1.8%	67	221
Qbn, Qbnf, Qwb, Qez, Qpt	2-139	27.3±17.3	0%	79	573
Qbnl	0-157	13.7±13.9	11.4%	224	1559
Qt	3-330	67.4±57.8	0%	247	723

Table 1.--Standard Penetration-Test (SPT) data for surficial materials in the Elizabeth quadrangle.

Sand and gravel (units Qbn, Qbnf, Qwb, Qez, Qpt) are coarser-grained and, where they crop out, better-drained than the lake-bottom and postglacial deposits and thus are of greater strength. SPT values for these sands range from 2 to 139, with a mean of 27 and a standard deviation of 17 (573 tests). Most till (Qt) in the quadrangle was deposited beneath glacial ice and so has been consolidated by the weight of the ice. SPT values for till range from 3 to 330, with a mean of 67 and a standard deviation of 58 (723 tests). In till, low SPT values are typically recorded within 10 feet of the landsurface, where soil processes and bioturbation have disaggregated the matrix of the till. In many cases, till at depths greater than 10 feet, blows were stopped at 50 or 100 for penetrations of less than 6 inches. Thus, till is generally the surface of refusal for driven pilings.

Artificial fill consists of a variety of materials, including uncompacted trash and demolition debris, and compacted engineered fills composed of sand, silt, and gravel. SPT values for fill range widely from 0 to 191, with a mean of 18 and a standard deviation of 19 (737 tests), with 1.2 percent having a value of zero.

Data on the density, grain size, and Atterberg limits for the surficial materials are provided by Rogers and others (1951, 1952).

DESCRIPTION OF MAP UNITS

Postglacial Deposits--These include man-made fill (af), sediment deposited in estuaries and salt marshes (Qm), in freshwater swamps (Qs), in river flood plains and channels (Qal, Qpt), and windblown sediment blanketing parts of the west slope of the Palisades Ridge (Qe). They were all deposited after glacial retreat.

After glacial lake Bayonne drained to the Hackensack level (see below), the Passaic River, which likely included meltwater fed from the glacier to the north, cut a channel through the deltaic sand at and north of downtown Newark. This sediment was redeposited downstream as a broad terrace (Qpt) on the former Lake Bayonne lake-bottom. The Ironbound section of Newark (east of Route 21 and north of Interstate 78) is located on this terrace. This deposit may include some shallow-water deltaic sediment deposited in Lake Hackensack. Draining of Lake Hackensack caused the Passaic to cut its channel into the terrace and to deposit sandy alluvium (included in unit Qal) on the bottom of drained Lake Bayonne-Hackensack. This alluvial sand is now covered by salt-marsh deposits and fill in the Newark Bay-Newark Airport area. The Elizabeth River and its tributaries likewise cut channels and floodplains (included in unit Qal) into the glacial deposits after Lake Woodbridge drained and the Elizabeth River glaciofluvial deposit became inactive. At the same time, westerly winds blew fine sand and silt from the unvegetated former lake bottom in the Newark Bay area and deposited this sediment as a sheet along the base of the west slope of the Palisades Ridge (Qe). Some of the sand beneath the salt-marsh deposits may also be windblown.

Deposition of the alluvial sediments in the Newark Bay and Arthur Kill areas, and along the lower reaches of the Elizabeth and Passaic Rivers, was gradually replaced by estuarine and salt-marsh sedimentation (Qm) as sea level rose and flooded the former lake plains. Most of the salt-marsh sediment in the Newark Bay-Arthur Kill area has been deposited within roughly the past 3000 years (Newman and others, 1969).

Landfilling on the marsh and alluvial deposits began shortly after permanent European settlement in the 1600s. The earliest fills were likely along the Newark and Elizabeth waterfronts. Large-scale filling for railroad and industrial facilities and trash disposal occurred during the latter part of the nineteenth century and early twentieth century. The period between 1920 and 1970 saw continued filling for Newark Airport and the Port Newark-Port Elizabeth marine terminals. Virtually all of the original salt marsh, and some areas of formerly open water in Newark Bay, have been filled.

ARTIFICIAL FILL--Artificially emplaced sand, gravel, silt, clay, and rock; and man-made materials including cinders, ash, brick, concrete, wood, slag, metal, glass, and trash. Color variable but generally dark brown, gray, or black. As much as 40 feet thick but generally less than 20 feet thick. Mapped only where it covers salt-marsh, alluvial, or swamp deposits. Fill is also present in all urban areas as a layer generally less than 10 feet thick, except in highway and railroad fills, where it may be as much as 40 feet thick. The extent of fill is based, in part, on the position of shorelines and salt marshes shown in Salisbury (1895), N. J. Geological Survey (1889), and Merrill and others (1902).

ESTUARINE AND SALT-MARSH DEPOSITS--Organic silt and clay, and peat, with some sand and fine gravel; black, dark-brown, and dark-gray. As much as 25 feet thick.

ALLUVIUM--Sand, silt, minor gravel and clay; dark-brown, gray, reddish-brown. As much as 30 feet thick. Many small deposits along streams and in valley bottoms in urban areas, now covered by fill, are not mapped.

SWAMP DEPOSITS--Organic silt and clay, and peat. As much as 10 feet thick (estimated). The deposits are inferred from historical maps (N. J. Geological Survey, 1889) and are now entirely covered by fill.

EOLIAN DEPOSITS--Fine sand, minor silt; very pale brown. As much as 10 feet thick (Russell, 1880; Salisbury and Peet, 1895). Extent of deposits based, in part, on mapping in Merrill and others (1902). In places these deposits may have been removed during urbanization.

LOWER PASSAIC TERRACE--Fine-to-coarse sand and some silt, light reddish-brown, light-gray, very pale brown; some pebble gravel. Moderately to well-sorted; stratified. As much as 40 feet thick.

Glacial Deposits--These include till--a poorly sorted, nonstratified sediment containing gravel clasts and boulders, deposited directly from glacial ice (Qr) and sorted, stratified sediments. The stratified sediments include sand and gravel laid down by glacial meltwater in river plains (Qez), in glacial-lake deltas (Qwb, Qbn, possibly Qsp) and in glacial-lake fans (Qbnf), and varved silt, clay, and fine sand deposited on the bottoms of glacial lakes (Qnbl, Ql).

Before these deposits were laid down the underlying bedrock surface was shaped by glacial erosion. The bedrock surface (plotted at 50-foot contour interval on the geologic map) shows elongate northeast-southwest-trending troughs that descend to nearly 300 feet below sea level in the Newark-Harrison area, and to more than 100 feet below sea level in the Newark Bay area. To the south these troughs shallow and grade into a gently rolling bedrock surface less deeply scoured. The troughs are closed to an elevation of just below sea level, indicating that they are products of glacial scour, not filled preglacial valleys. Their southward shallowing may reflect reduced erosive capacity of the glacial ice as it thinned and spread upon exiting the higher-relief topography farther north in the Hackensack River Valley.

The bedrock valley extending westward from the Weequahic Lake area is the eastern end of the Kenilworth valley (Nemickas (1974), which is a tributary of the preglacial Raritan valley (Stanford, 1993). This is thus a preglacial fluvial valley only slightly modified by glacial erosion. Indeed, stratified sediments (Qsp) preserved beneath till in the Hillside-Irvington area are situated in a tributary valley that may have been dammed to form a lake basin during glacial advance. The bedrock surface beneath these deposits thus was not eroded during the most recent glaciation.

The upland in the northwestern sector of the quadrangle is underlain by glacially streamlined sandstone and siltstone bedrock. Till is generally thin over most of this area, indicating that the topography is the product primarily of glacial erosion. However, borings in the southern part of the upland along the Newark-Hillside-Irvington border record till as much as 80 feet thick, indicating that some of the ridges here may be drumlins formed by deposition of till.

Late Wisconsinan ice reached its southernmost position at Perth Amboy, about 12 miles south of Elizabeth (fig. 1), about 21,000 yrs B. P. (years before present), based on radiocarbon dates of organic material at the bottom of postglacial bogs in western New Jersey (Harmon, 1968; Cotter and others, 1986) and on organic sediments beneath till on Long Island (Sirkin, 1986). A continuous terminal moraine was deposited at the position of maximum advance (fig. 1). As the ice front retreated, a series of glacial lakes formed, dammed to the south by the moraine (Stanford and Harper, 1991). One of these, Lake Bayonne, occupied the Arthur Kill, Newark Bay, and upper New York Bay lowlands, and had an outlet over the moraine at Perth Amboy (fig. 1). This outlet was gradually lowered by erosion, and therefore the level of Lake Bayonne steadily declined. In the Elizabeth quadrangle a delta deposited in Lake Bayonne at Newark has a top elevation of about 30 feet above sea level. Adjusting for postglacial rebound of Earth's surface in response to release of the weight of the glacier, this altitude indicates the spillway at Perth Amboy had been eroded to about 25 feet below sea level (using the rebound rate of 3.5 feet per mile to the north from Stanford and Harper, 1991). Deposits in Lake Bayonne include deltaic sand and gravel (Qbn), lacustrine-fan sand and gravel (Qbnf), and lake-bottom silt, clay, and fine sand (Qbnl).

Continued erosion of the outlet at Perth Amboy, and along the Arthur Kill to the north, uncovered diabase bedrock at an elevation of 30 feet below sea level in the Arthur Kill about 4 miles south of Elizabeth. The diabase halted further downcutting and formed the stable spillway for Lake Hackensack (fig. 1). An auxiliary spillway was also established across diabase in the Kill van Kull near the Bayonne bridge (fig. 1). In the Elizabeth quadrangle, Lake Hackensack occupied the lowest parts of the Newark Bay lowland, although there was little accumulation of additional sediment on top of the Lake Bayonne deposits in this area because the ice margin at the time was more than 10 miles north of quadrangle. The lake drained eastward into the Hudson Valley when the retreating ice front uncovered Sparkill Gap, a deep gap through the Palisades Ridge, about 24 miles north of Newark.

The Elizabeth quadrangle includes a small area of deltaic and lacustrine-fan sand and gravel (Qwb) deposited in association with glacial Lake Woodbridge, which occupied the southwestern part of the Rahway River basin and was dammed on the east by the glacier margin. The deposit in the Elizabeth quadrangle was actually laid down in a local pond dammed between a Lake Woodbridge delta in Kenilworth and the eastward-retreating ice margin in the valley of the West Branch of the Elizabeth River (Stanford, 1991). Two deposits of lacustrine silt (Ql) were laid down in similarly-dammed tributary valleys to the south.

When the retreating ice margin uncovered the Elizabeth River Valley these local ponds drained. Meltwater draining down the valley deposited a fluvial plain (Qez) with an ice-contact head at the west end of Weequahic Lake. The valley fill beneath the northern part of this plain may contain lacustrine sand that filled a small glacial lake before fluvial drainage was established. Likewise, deposits forming the knobby topography in the Weequahic Lake area, east of the head of the fluvial plain, were also laid down in a lake. This lake may have been dammed by the ice-contact slope at the head of the plain and by ice blocks remaining in the area as the main glacier margin retreated eastward. The downstream end of the plain, at Elizabethport, drained into Lake Bayonne at an elevation of about 10 feet. The east edge of the plain is not confined by a valley side today and may have been walled by the glacier margin (margin M1 in fig. 1). Stratified deposits beneath the till in this area (wells 197, 198, 199, 236, 238, 246) suggest that the ice front readvanced approximately 1 mile to this position, which corresponds to the head of the plain at Weequahic Lake.

GLACIAL LAKE BAYONNE DEPOSITS--Deltaic, lake-bottom, and lacustrine-fan deposits. Deltaic deposits (Qbn) include the delta in downtown Newark and other low hills or terraces of sand and gravel of indistinct form within the Lake Bayonne basin. The deltaic deposits mapped in Newark Airport and to the north are former islands in the salt marsh that rose to elevations between 20 and 30 feet (N. J. Geological Survey, 1889). They are now graded away and covered by fill; their extent and composition is from N. J. Geological Survey (1889) and Merrill and others (1902). Lake-bottom sediment (Qbnl) is nearly continuous beneath units Qm and Qpt and locally extends beneath the distal parts of deltaic deposits. It may also occur locally beneath readvance till in the northern and eastern parts of Elizabeth. Lacustrine-fan deposits (Qbnf) are inferred from records of test borings and occur in places at the bottom of the Newark-Harrison valley fill. Some of the deltaic deposits also include lacustrine-fan sediment in the subsurface.

Deltaic deposits--Fine-to-coarse sand, reddish-brown, light reddish-brown, gray; some pebble gravel; minor cobble gravel. Well-sorted and stratified, with planar-to cross-bedding in fluvial topset beds of pebbly sand and pebble-to-cobble gravel in the upper 10 to 15 feet of the Newark delta; and dipping planar to ripple-cross-bedded foreset and bottomset beds, which may be locally deformed by collapse, in the rest of the deposits. As much as 100 feet thick.

Lake-bottom deposits--Silt, clay, and fine sand; gray to reddish-brown. Well-sorted and thinly layered to varved. As much as 200 feet thick. In subsurface only (all sections).

Lacustrine-fan deposits--Fine-to-coarse sand, minor silt; reddish-brown to gray; and pebble-to-cobble gravel. Moderately to well-sorted, stratified. As much as 100 feet thick. In subsurface only (sections BB' and D D').

ELIZABETH RIVER DEPOSITS--Fine-to-coarse sand, minor silt; reddish-brown, light reddish-brown, gray; and pebble-to-coarse-cobble gravel. Moderately to well-sorted, plane- to cross-bedded with possible inclined planar foreset and ripple-cross-bedded bottomset beds in lacustrine parts of the deposit. As much as 150 feet thick.

GLACIAL LAKE WOODBRIDGE DEPOSITS--Fine-to-coarse sand, minor silt, reddish-brown to light reddish-brown; pebble-to-coarse-cobble gravel; and sandy silty diamicton. Moderately to well-sorted, stratified. As much as 100 feet thick.

UNCORRELATED GLACIAL-LAKE DEPOSITS--Fine-to-medium sand, silt, clay; reddish-brown to gray. As much as 20 feet thick (estimated).

PRE-ADVANCE STRATIFIED SEDIMENT--Sand, gravel, some silt and clay; reddish-brown to gray. As much as 50 feet thick. In subsurface only, beneath till (wells 155, 160, 167, 171, 172, section CC').

RAHWAY TILL--Reddish-brown to light-reddish-brown silty sand to sandy clayey silt containing some to many subrounded and subangular pebbles and cobbles and a few subrounded boulders. Poorly sorted, nonstratified, generally compact below the soil zone. May include thin, discontinuous beds and lenses of sorted sand and gravel. As much as 90 feet thick but generally less than 20 feet thick.

MAP SYMBOLS

Contact--Solid where well-defined by landforms; dashed where approximate, gradational, or feathered/ged. Some contacts are modified from Salisbury (1895), Merrill and others (1902), and unpublished manuscript maps of R. D. Salisbury and C. E. Peet on file at the N.J. Geological Survey.

Striation--Observation at dot. Data from Salisbury and Peet (1895).

Elevation of bedrock surface in well or boring--Data from Parrillo (1959). "Less-than" sign (<) indicates bottom of boring did not reach bedrock.

Elevation of bedrock surface in well or boring--Data from Lovegreen (1974). Values are inferred from a bedrock topography map with a contour interval of 20 feet.

Elevation of bedrock surface from seismic reflection survey--Data from Jeffrey Waldner and David Hall, N. J. Geological Survey, 1997.

Elevation of bedrock surface in well or boring--Data from Nemickas (1974).

Elevation of bedrock surface in well or boring--Data from Herpers and Barksdale (1951).

Elevation of bedrock surface in well or boring--Data from files of the N. J. Geological Survey. Elevations in the Newark Bay-Port Newark-Port Elizabeth area are referenced to mean low water, which is 2.3 feet below mean sea level. Elevations elsewhere are referenced to base map datum.

Well with log in table 1--Location judged to be accurate to within 100 feet. Elevation of bedrock surface, datum as above, in parentheses.

Well with log in table 1--Location judged to be accurate to within 500 feet. Elevation of bedrock surface, datum as above, in parentheses.

Elevation of bedrock surface--Contour interval 50 feet.

Large bedrock outcrop--May be partly covered by fill or construction.

Former bedrock outcrop--Shown on unpublished manuscript maps by C. E. Peet, R. D. Salisbury, and H. B. Kummel (on file at the N. J. Geological Survey) but no longer exposed.

Well with log in table 1--On sections, projected to line of section.

Depth to bedrock in well or boring--On sections, projected to line of section. Dot indicates bedrock surface penetrated, no dot indicates bedrock not reached.

Unit to left of slash overlies unit to right--Shows extent of material underlying thin eolian deposits.

REFERENCES

Cotter, J. F. P., Ridge, J. C., Evenson, E. B., Sevon, W. D., Sirkin, L., and Stuckenrath, R., 1986, The Wisconsinan history of the Great Valley, Pennsylvania and New Jersey, and the age of the "Terminal Moraine", *in* Cadwell, D. H. (ed.), The Wisconsinan stage of the first geological district, eastern New York: N. Y. State Museum Bulletin 455, p. 22-50.

Harmon, K. P., 1968, Late Pleistocene forest succession in northern New Jersey: New Brunswick, N. J., Rutgers University, unpublished Ph. D. dissertation, 203 p.

Herpers, H. H., and Barksdale, H. G., 1951, Preliminary report on the geology and groundwater supply of the Newark, N. J., area: N. J. Department of Conservation and Economic Development, Division of Water Policy and Supply Special Report 10, 52 p.

Lovegreen, J. R., 1974, Paleodrainage history of the Hudson estuary: New York, Columbia University, unpublished M. S. thesis, 152 p.

Merrill, F. J. H., Darton, N. H., Hollick, Arthur, Salisbury, R. D., Dodge, R. E., Willis, Bayley, Pressey, H. A., 1902, Geologic atlas of the United States, New York City folio: U.S. Geological Survey Geologic Atlas Folio 83, 19 p.

Nemickas, Bronius, 1974, Bedrock topography and thickness of Pleistocene deposits in Union County and adjacent areas, New Jersey: U. S. Geological Survey Miscellaneous Investigations Map I-795, scale 1:24,000.

New Jersey Geological Survey, 1889, A topographical map of the counties of Bergen, Hudson, and Essex with parts of Passaic and Union: N. J. Geological Survey Atlas Sheet 7, scale 1:63,360.

Newman, W. S., Thurber, D. H., Zeiss, H. S., Rokeach, Allan, Musick, Lillian, 1969, Late Quaternary geology of the Hudson River estuary: a preliminary report: Transactions of the New York Academy of Sciences, v. 31, p. 548-570.

Parrillo, D. G., 1959, Bedrock map of the Hackensack meadowlands: N. J. Geological Survey Geologic Report Series 1, 25 p. Revised by H. F. Kasabach, 1962.

Rogers, F. C., Lueder, D. R., Obear, G. H., Zimpfer, W. H., 1951, Engineering soil survey of New Jersey, report 2, Essex County: Rutgers University, College of Engineering, Engineering Research Bulletin 16, 48 p.

Rogers, F. C., Lueder, D. R., Wang, Shangee, 1952, Engineering soil survey of New Jersey, report 5, Union County: Rutgers University, College of Engineering, Engineering Research Bulletin 19, 51 p.

Russell, I. C., 1880, On the geology of Hudson County, New Jersey: N. Y. Academy of Sciences Annals, v. 2, p. 27-50.

Salisbury, R. D., 1895, Surface geology: report of progress: N. J. Geological Survey Annual Report for 1894, p. 1-149.

Salisbury, R. D., and Peet, C. E., 1895, Drift phenomena of the Palisades Ridge: N. J. Geological Survey Annual Report for 1894, p. 157-224.

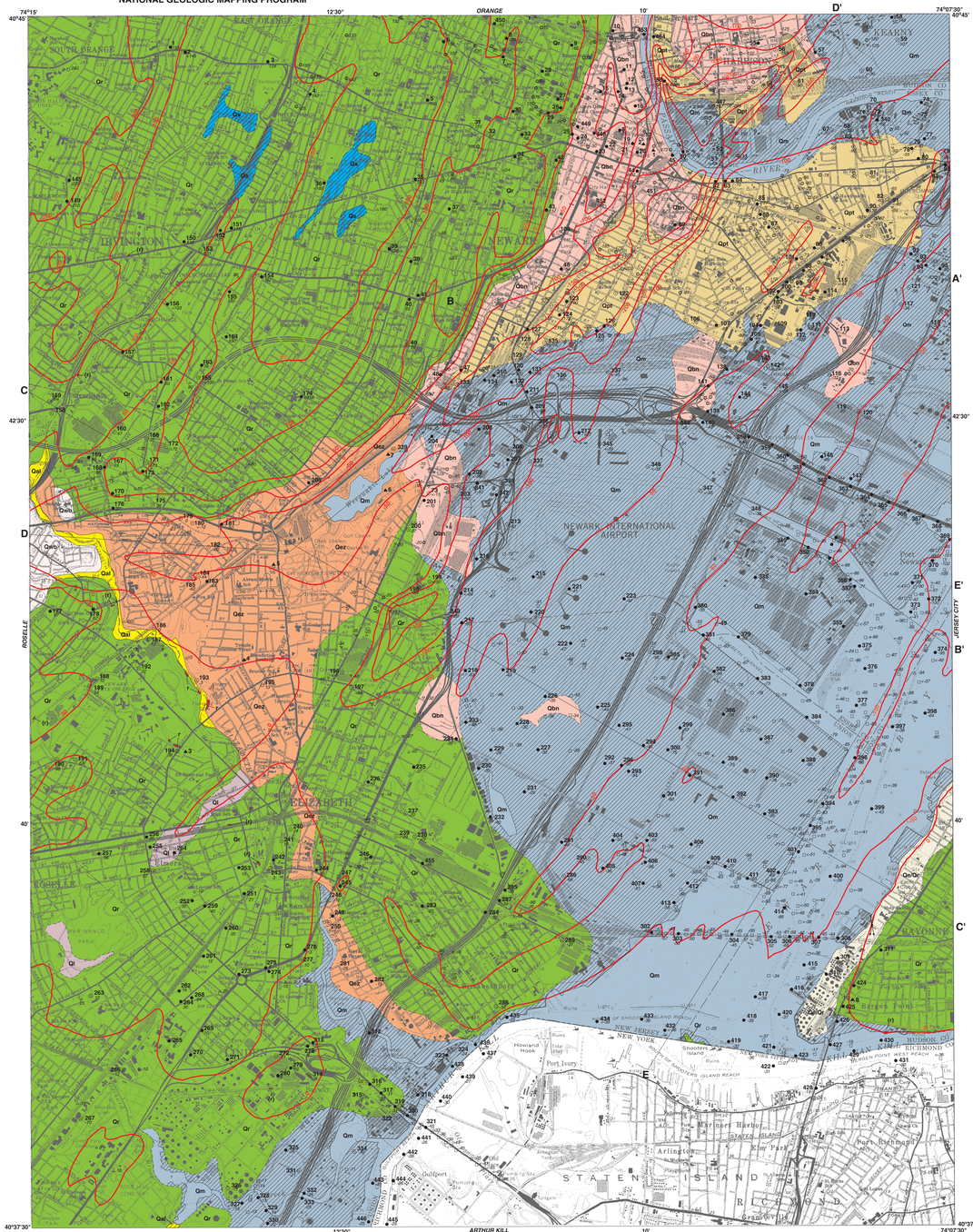
Sirkin, L. A., 1986, Pleistocene stratigraphy of Long Island, New York, *in* Cadwell, D. H. (ed.), The Wisconsinan stage of the first geological district, eastern New York: N. Y. State Museum Bulletin 455, p. 6-22.

Stanford, S. D., 1991, Surficial geology of the Roselle quadrangle, Union, Essex, and Morris counties, New Jersey: N. J. Geological Survey Open File Map 8, scale 1:24,000.

Stanford, S. D., 1993, Late Cenozoic surficial deposits and valley evolution of unglaciated northern New Jersey: Geomorphology, v. 7, p. 267-288.

Stanford, S. D., and Harper, D. P., 1991, Glacial lakes of the lower Passaic, Hackensack, and lower Hudson valleys, New Jersey and New York: Northeastern Geology, v. 13, no. 4, p. 271-286.

Stanford, S. D., and Witte, R. W., in press, Geology of the glacial aquifers of New Jersey: N. J. Geological Survey Geologic Report Series.



Base map from U. S. Geological Survey, 1955
Photorevised 1981

Geology mapped 1987, 1998

The interpretations presented here are provisional pending peer review.
There may be changes prior to publication.

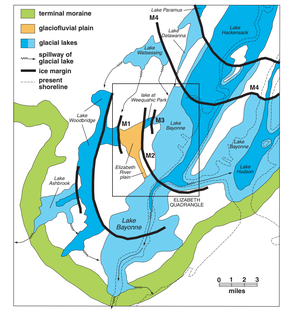


Figure 1.--Ice margins, glacial-lake spillways, and maximum extent of glacial lakes in the Elizabeth quadrangle and vicinity. Arrows show route of drainage from spillways. Ice margins include: M1= last ice margin before deposition of glacial Lake Woodbridge deposits ends. M2=ice margin during deposition of the Elizabeth blows of a glaciofluvial plain. This margin may mark the limit of a readvance from a position about 1 mile to the northeast. M3= last ice margin before lake in Weequahic Park area lowers to Lake Bayonne level. M4=ice margin during deposition of the Newark delta.

CORRELATION OF MAP UNITS

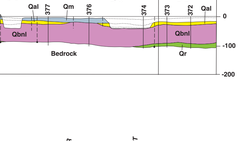


Table 2.--Composition of pebbles in surficial deposits

Site	Unit	Number of pebbles	Percentage of pebbles: red sandstone and shale [1]	gray sandstone and shale [2]	conglomerate [3]	gneiss [4]	Pensauken Formation [5]	gray quartzite [6]
1	Qbn	130	77	14	2	5	2	0
2	Qbn	144	69	15	0	12	2	2
3	Qt	93	97	0	0	3	0	0
4	Qez	123	81	8	0	10	0	1
5	Qez	122	82	5	0	12	0	1
6	Qez	141	71	5	0	23	0	1
7	Qez	117	85	10	1	4	0	0
8	Qt	115	87	9	0	4	0	0

[1]Passaic Formation.
[2]Primarily Passaic and Lockatong Formations, with some Paleozoic clasts.
[3]Purple to red-brown quartzite conglomerate from the Green Pond and Skunnemunk Formations.
[4]Proterozoic gneiss from the Hudson Highlands.
[5]White to yellow-stained quartz and quartzite.
[6]Either from the Shawangunk Formation or the Pensauken Formation.

SCALE 1:24 000

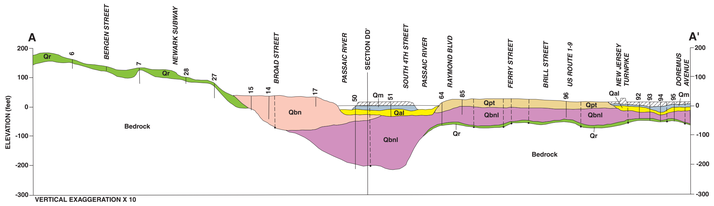
1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

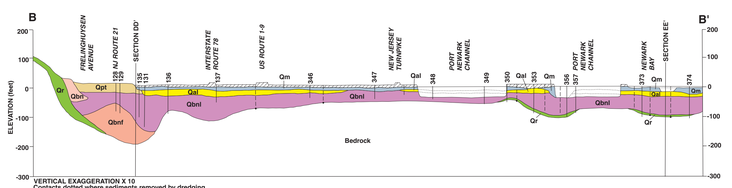
APPROXIMATE MEAN DECLINATION, 1999

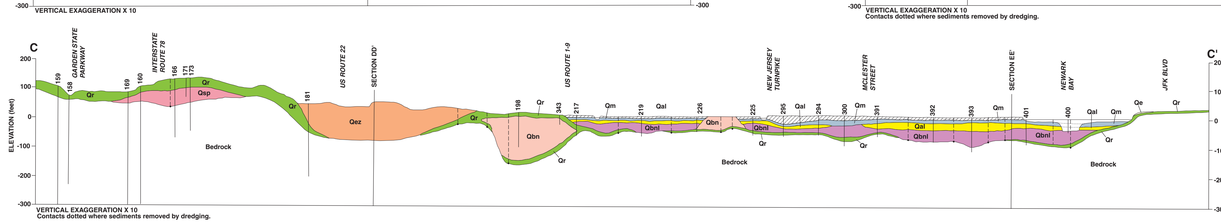
LOCATION IN NEW JERSEY

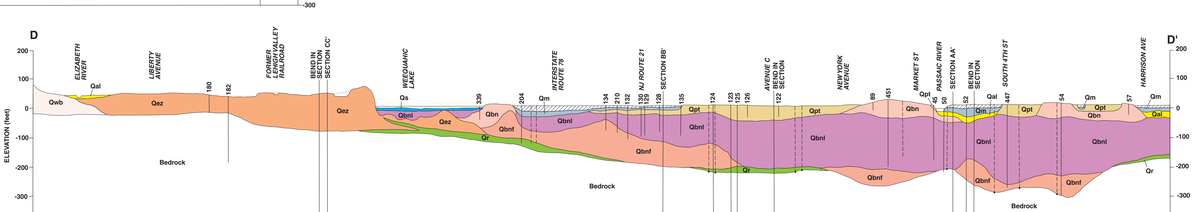
SURFICIAL GEOLOGY OF THE ELIZABETH QUADRANGLE, ESSEX, HUDSON, AND UNION COUNTIES, NEW JERSEY

by
Scott D. Stanford
2002









Surficial Geology of the Elizabeth Quadrangle, Essex, Hudson, and Union Counties, New Jersey

New Jersey Geological Survey
Open-File Map 42
2002
text to accompany map

Appendix 1.--Selected Well and Boring Logs

Well No.	Identifier[1]	Driller's Log	
		Depth[2]	Description[3]
1	26-672	0-25	clay and boulders (Qt)
		25-312	red sandstone rock
2	26-11130	abbreviated log	
		0-7	fill
		7-20	red-brown silty sand and gravel (Qt)
3	26-1334	0-21	hardpan (Qt)
		21-214	red rock
4	BWA files	0-58	red clay, stones and boulders (Qt)
	26-12-785	58-304	red sandstone rock
5	26-22852	0-20	red-brown clay silt, trace gravel (Qt)
		20-50	brown weathered sandstone
6	26-22335	0-15	red-brown sand and silt (Qt)
		15-30	weathered sandstone
7	26-25843	0-3	red-brown medium-to-fine sand and gravel (Qt)
		3-51	red shale
8	26-28623	abbreviated log	
		0-26	red-brown silty clay with rock fragments (Qt)
		26-35	red-brown rock fragments (bedrock)
9	26-19805	0-6	brown to black sand and gravel (fill over Qt)
		6-18	red-brown shale
10	NJGS files	0-8	brick and rubble fill
		8-40	red sand, coarse gravel, trace clay (Qbn)
11	26-12137	abbreviated log	
		0-11	brown fine sand, trace fine gravel (Qbn)
		11-14	medium gravel and fine sand (Qbn)
		14-48	fine sand and fine gravel (Qbn)
12	26-3173	0-50	sand and gravel (Qbn)
		50-70	red rock
		70-215	red shale
13	26-3532	0-30	sand and dirt (Qbn)
		30-44	fine sand (Qbn)
		44-300	red rock
14	26-24369	abbreviated log	
		0-12	red-brown silty sand (Qbn)
		12-22	red-brown clay silt (Qbn)

		22-36	red-brown silty sand (Qbn)
		36-56	red-brown sandy silt (Qbn)
		56-65	red-brown silty sand (Qbn)
		65-71	red shale, highly weathered red rock
15	26-25416	0-7	red-brown coarse sand with clay and stone (fill)
		7-20	large stone, rock (fill over Obn)
		20-23	clay (Qbn)
		23-40	medium sand, red (Qbn)
		40-45	clay with weathered bedrock
16	26-25763	abbreviated log	
		0-4	fill
		4-28	red-brown fine-to-medium sand, trace silt (Qbn)
		28-43	red-brown very fine sand and silt (Qbn)
		43-54	red-brown sand, trace silt, some gravel (Qt)
		54-61	weathered siltstone
17	26-19958	0-10	cobbles and sand (Qbn)
		10-34	sand (Qbn)
18	26-4930	0-56	sand, gravel (Qbn)
		56-308	red shale
19	26-15069	abbreviated log	
		0-14	brown medium-to-fine sand and gravel (Qbn)
		14-50	brown fine sand and silt (Qbn)
20	26-1053	0-147	sandy clay, clay (Qbn over Qbnl)
		147-700	shale
21	NJGS files	0-6	sand, brick, cinder fill
		6-13	fine red sand and gravel (Qbn)
		13-25	red sand and coarse gravel (Qbn)
		25-35	fine red sand (Qbn)
		35-45	red silt (Qbnl)
		45-58	red sand, gravel, clay binder (Qt)
		58-63	shale
22	26-3924	0-10	basement
		10-65	gravel, sand, clay (Qbn over Qbnl)
		65-280	red rock
23	26-3194	0-75	red sandy clay (Qbn over Qbnl)
		75-300	red shale
24	26-28483	0-50	brown fine sand (Qbn)
		50-53	fine-to-coarse sand and gravel (Qt)
		53-55	broken shale
25	26-28481	0-7	fill
		7-28	sand and gravel, silt (Qt)
		28-40	red shale
26	26-22996	0-3	fill
		3-6	red-brown clay silt (Qt)
		6-8	weathered shale (Qt?)
		8-28	red shale
27	26-19107	0-3	red-brown fine sand, some silt, little cobbles and gravel (Qt)
		3-52	red-brown siltstone

28	26-9762	0-14	gravel till (Qt)
		14-19	shale bedrock
29	26-25529	0-4	sand, gravel, brick fill
		4-19	red-brown clay, silt, gravel (Qt)
		19-54	red shale
30	26-22996	0-3	sand, gravel, wood fill
		3-6	red-brown clay silt (Qt)
		6-8	weathered shale (Qt?)
		8-28	red shale
31	26-16549	0-30	red-brown silty fine sand, trace gravel (Qt)
		30-35	red-brown decomposed shale
32	26-27185	0-38	red-brown fine sand with silt and gravel, trace cobbles (Qt)
		38-41	decomposed shale (Qt?)
		41-46	shale
33	26-3864	0-8	fill
		8-19	clay and stone (Qt)
		19-32	red hardpan with clay and sand (Qt)
		32-500	red shale
34	26-17979	0-8	sand, cement, brick, glass fill
		8-24	Brunswick Formation (bedrock)
35	26-29971	abbreviated log	
		0-6	silt, sand, gravel, crushed stone, brick, wood fill
		6-17	red-brown silt, clay, trace sand and gravel (Qt)
		17-29	weathered siltstone
36	26-25003	0-25	till (Qt)
37	26-7998	abbreviated log	
		0-22	reddish to gray-reddish sandy clayey silt with gravel (Qt)
		22-24	micaceous laminated red shale
38	26-22287	abbreviated log	
		0-14	red-brown sandy clayey silt (Qt)
		14-18	red-brown weathered shale
39	NJGS files	0-21	red sand, clay, gravel, boulders (Qt)
		21-26	shale
40	26-968	0-35	fill (fill over Qt)
		35-298	red rock
41	26-156	0-20	earth (Qt)
		20-496	red rock
42	26-29462	0-13	red-brown medium-to-fine silty sand (Qt)
		13-34	red shale
43	26-6962	0-55	sand, gravel, clay (Qt)
		55-200	shale
44	26-13759	abbreviated log	
		0-2	sand, gravel, brick fill
		2-10	brown fine-to-coarse sand and gravel (Qbn)
		10-70	brown fine sand and silt (Qbn)
		70-102	red-brown clayey silt and fine sand (Qbnl)

45	NJGS files Pennsylvania Railroad bridge boring 6A	0-21 21-31 31-71 71-162 162-182	cinder, gravel, clay fill sand and gravel (Qbn) red sand and clay (Qbnl) red clay (Qbnl) rock
46	26-315	0-78 78-303	earth and clay (Qbn over Qbnl) red shale rock
47	BWA files 26-22-254	0-30 30-104 104-107 107-119 119-123 123-389	sand and gravel (Qbn) gravel (Qbn over Qt) clay, sand, and stones (Qt) soft gray rock, yellow clay soft gray rock and a little clay red and gray shale and sandstone
48	26-9859	abbreviated log 0-38	red-brown sandy silt to silty sand, trace gravel (Qt)
49	26-28999	0-10 10-26	brown clayey silt (Qt) red shale
50	NJGS files Pennsylvania Railroad bridge boring 8D	0-10 10-17 17-27 27-48 48-59 59-71 71-92 92-200 200-213	water black silt, sand and gravel (Qal) red sand and gravel (Qal or Qpt) red sand (Qbn or Qpt) red sand and clay (Qbnl) red clay (Qbnl) red sand (Qbnl) red clay (Qbnl) rock
51	26-20110	0-13 13-21 21-52	fill black clay with peat (Qm) red-brown medium-to-fine sand, some gravel (Qal or Qpt)
52	BWA files 26-12-979	abbreviated log 0-15 15-35 35-45 45-65 65-145 145-180 180-193 193-212 212-218 218-699	fill dark fine sand, some gravel at base (Qm) sticky clay (Qm?) fine reddish brown sand and some stone (Qal or Qpt) sandy clay and soft brownstone (Qbnl) sticky clay (Qbnl) coarse brown sand (Qbnf) brownstone (Qbnf?) water-bearing gravel (Qbnf) brownstone
53	26-12783	0-3 3-9 9-18 18-25 25-34 34-42	black cindery fill red-brown medium-to-fine sand, trace silt (Qpt) gray silty clay with medium-to-fine sand layers (Qpt) gray medium-to-fine sand with silty layers (Qpt) red-brown coarse-to-fine sand, little silt, little coarse-to-fine gravel (Qbn) red-brown fine sand and silt (Qbn)
54	N 26-12-981	2 wells show 320 and 305 feet to bedrock	
55	26-5729	0-6 6-25	red-brown silty fine-to-medium sand, trace clay and gravel (Qbn) red-brown medium-to-fine sand, little silt (Qbn)

		25-35	red fine-to-medium sand, little silt, trace gravel (Qbn)
		35-40	red silty fine sand, gravel, trace clay--till (Qbn?)
56	26-4982	0-176	sand and gravel (Qbn)
		176-194	red shale
57	26-8676	abbreviated log	
		0-6	sand, brick, cinder, silt, clay fill
		6-16	tan fine sand, trace silt (Qbn)
		16-32	red-brown coarse-to-fine sand, trace silt and gravel (Qbn)
58	26-20605	abbreviated log	
		0-20	no log (probably fill over Qm)
		20-40	brownish gray medium-to-coarse sand (Qal)
		40-113	laminated fat clay and sandy silt (Qbnl)
		113-151	reddish brown gravel with sand and silt (Qbnf)
		151-404	reddish brown shale
59	26-20606	0-90	overburden, no log (Qm over Qbnl)
		90-112	till or gravel (Qt or Qbnf)
		112-431	shale
60	26-22204	0-3	gray-brown fine-to-medium sand, trace silt and wood (fill)
		3-12	silt with trace of fine sand (Qm?)
		12-86	sand with trace of silt (Qal over Qbnl)
61	26-537	0-90	sand and red clay (Qpt over Qbnl)
		90-112	soft red shale
		112-225	harder red shale
62	26-8105	0-9	brown sand and gravel fill
		9-50	layers of red-brown sand, silty sand, with some gravel (Qpt)
		50-77	red-brown silty sand (Qbnl)
63	26-8104	0-12	miscellaneous fill
		12-16	gray silt (fill or Qal)
		16-62	red-brown sand, some silt (Qpt over Qbnl)
64	26-8103	0-7	brown sand fill
		7-34	reddish brown medium-to-fine sand, some silt, some fine gravel (Qpt)
		34-38	red clay and silt (Qbnl)
		38-43	red fine sand, little silt (Qbnl)
		43-47	red silt, little fine sand (Qbnl)
		47-76	red fine sand, little silt (Qbnl)
		76-77	red fine sand, trace silt, trace gravel, little decomposed shale (Qt over bedrock?)
65	26-25150	0-7	black and gray silt and sludge (fill over Qm)
		7-20	red-brown fine sand and silt (Qpt)
		20-25	brown fine-to-coarse sand, some gravel (Qpt)
		25-35	red-brown silty sand (Qpt)
		35-45	red-brown silty fine sand and some gravel (Qpt)
66	26-2926	0-11	fill
		11-33	sandy shale (sic) (Qpt)
		33-55	sand with little gravel (Qpt)
		55-73	sand with red shale (Qbnl, “red shale” may be clay laminae)
		73-406	hard red shale

67	NJGS files	0-15	cinder, wood, steel fill
		15-20	brown peat (Qm)
		20-31	gray organic silt with decomposed vegetation (Qm)
		31-35	medium-to-fine brown sand with trace of gravel and trace of silt (Qpt)
68	26-2130	0-10	fill
		10-30	sandy clay (Qpt)
		30-45	clay (Qbnl)
		45-55	sandy clay (Qbnl)
		55-70	clay and gravel (Qbnl)
		70-90	sandy clay (Qbnl)
		90-140	clay matrix (Qbnl)
		140-144	soft shale
		144-500	red shale
69	26-9677	0-10	fill
		10-15	peat (Qm)
		15-51	fine sand and silt (Qpt)
		51-62	silty clay (Qbnl)
70	26-6983	abbreviated log	
		0-14	sandy fill with brick, wood, glass, gravel
		14-19	dark gray organic clayey silt (Qm)
		19-26	gray organic silt, fine sand, clay (Qm)
		26-40	gray-brown fine-to-medium sand and silt (Qpt)
		40-50	black to red-brown fine gravel and sand (Qpt)
		50-71	brown fine sand with silt lenses and a few silty clay seams (Qbnl)
		71-81	dense brown silty sand, some gravel (Qt)
71	26-355	0-8	fill
		8-35	gray clay (Qm)
		35-116	sand, gravel, and clay (Qpt over Qbnl)
		116-208	red rock
72	26-94	0-6	fill
		6-24	river bottom muck (Qm)
		24-42	sand and gravel (Qpt)
		42-67	fine silt (Qbnl)
		67-78	sand and gravel (Qt or Qbnf)
		78-87	fine silt (Qbnl or Qt)
		87-359	red shale rock
73	N 26-22-277	abbreviated log	
		0-5	fill
		5-30	red sand, some gravel (Qbn)
74	26-1940	0-90	clay, sand (Qpt over Qbnl)
		90-500	red rock and shale
75	26-3293	0-55	overburden (Qpt over Qbnl)
		55-300	sandstone
76	NJGS files	0-7	cinder, black dirt, black sand fill
		7-23	medium-to-fine brown sand (Qpt)
		23-27	medium-to-fine red sand, some gravel, trace silt (Qpt)
		27-50	medium-to-fine red sand (Qpt or Qbn)
77	26-12781	0-18	dark gray-brown sand, silt, gravel fill
		18-26	brown peat, gray silt, little fine sand (Qm)
		26-32	brown organic peat (Qm)
		32-40	fine-to-medium organic brown sand, some

			small gravel, more silt (Qpt or Qm)
78	26-1783	0-65	clay and stones (Qpt over Qbn)
		65-503	shale
79	26-11462	abbreviated log	
		0-10	wood, silt, cinders, sand fill
		10-25	red-brown fine-to-medium sand (Qpt)
		25-52	red-brown fine sand and silt, some clay (Qbnl)
		52-58	red-brown silty clay with sand and gravel (Qt)
		58-62	rock
80	26-4947	0-72	silt, clay (Qpt over Qbnl)
		72-400	red shale, sandstone
81	26-5082	abbreviated log	
		0-20	black muck (fill over Qm)
		20-40	red fine sand and muck (Qpt)
		40-45	red fine sand (Qpt)
		45-70	red clay and pieces of shale (Qbnl, "pieces of shale" may be varve fragments)
		70-85	red clay (Qbnl)
		85-300	red shale
82	26-2141	0-82	clay and dead sand (Qpt over Qbnl)
		82-500	red rock
83	NJGS files	0-10	fill
	Pulaski Skyway	10-20	river mud (Qm)
	boring 91	20-50	red sand (Qal or Qbn)
		50-61	soft red shale
		61-81	red shale
84	NJGS files	0-10	cinder fill
	Pulaski Skyway	10-30	brown sand (Qpt)
	boring 97	30-50	fine red sand and clay (Qbnl)
		50-60	coarse red sand and clay (Qt)
		60-80	red shale
85	26-11791	0-5	brown silty sand (Qpt)
		5-10	brown silty sand and gravel (Qpt)
		10-15	brown medium-to-fine sand (Qpt)
		15-20	brown clay and sand (Qpt or Qbnl)
		20-30	brown sand and silt (Qpt or Qbnl)
		30-45	brown silty clay (Qbnl)
		45-47	brown silt (Qbnl)
86	26-26675	0-19	medium and fine sands (Qpt)
		19-45	silty running sands (Qbnl)
87	26-22917	0-23	medium-to-fine sand with large gravel and cobbles (Qpt)
		23-26	red clay (Qbnl)
		26-50	very fine sand and silty red sand (Qbnl)
88	NJGS files	0-9	coarse red sand and gravel (Qpt)
		9-19	fine red sand (Qpt)
		19-26	fine red sand and clay (Qbnl)
		26-44	coarse red sand, large gravel, a little clay (Qbnf)
		44-52	fine red sand, large gravel, a little clay (Qbnf)
89	NJGS files	0-16	fine red sand (Qbn)
		16-22	fine red sand, gravel (Qbn)
		22-26	fine red sand, gravel, clay (Qbn)

90	26-4514	0-82	sand and gravel (Qpt over Qbn)
		82-300	red shale
91	26-10144	0-10	fill--silty sand with brick fragments
		10-20	fine-to-medium red silty sand, trace clay (Qpt)
		20-52	fine-to-medium red-brown silty sand (Qpt or Qbnl)
92	NJGS files	0-6	fill
	Central Railroad	6-15	sand and ashes (fill over Qm)
	of New Jersey	15-17	coarse sand (Qal)
	boring 47	17-31	sand (Qal)
		31-34	gravel (Qal)
		34-45	sand and clay (Qbnl)
		45-50	sand (Qt?)
		50-51	red shale
93	26-28979	0-20	miscellaneous fill--ash, sand
		20-22	chemical residue
		22-24	black peat (Qm)
		24-50	brown-red medium-to-fine sand with silt (Qal over Qbnl)
		50-55	brown-red shale till (Qt)
		55-57	weathered shale
94	26-28981	abbreviated log	
		0-18	miscellaneous fill--brick, concrete, cinder, chemical residue
		18-20	brown peat (Qm)
		20-37	dark-gray organic silt (Qm)
		37-42	gray-brown medium-to-fine sand (Qal)
		42-49	dark-brown silt (Qbnl)
		49-58	red-brown glacial till (Qt)
		58-59	bedrock
95	NJGS files	0-5	fill
	Central Railroad	5-24	red sand and clay (Qm over Qal)
	of New Jersey	24-34	gray sand and clay (Qbnl)
	boring 45	34-44	fine sand (Qbnl)
		44-54	red sand and clay (Qbnl or Qt)
		at 54	red shale
96	NJGS files	0-6	clayey sand fill
	Route 25 viaduct	6-29	red silty medium-to-coarse sand (Qpt)
	boring 59	29-54	red silty clayey medium-to-coarse sand to sandy clay (Qbnl)
		54-55	red clayey gravel with shale fragments (Qt)
97	NJGS files	0-5	fill
	Route 25 viaduct	5-25	red medium-to-coarse sand (Qpt)
	boring 52	25-46	red clayey fine sand (Qbnl)
		46-55	red sandy clay (Qbnl)
		55-67	gravelly and sandy clay (Qt)
		67-68	red shale
98	NJGS files	0-6	sand and gravel fill
	Route 25 viaduct	6-32	red fine-to-coarse silty sand, little clay (Qpt)
	boring 48	32-76	stiff red clay and sandy clay (Qbnl)
		76-82	red gravelly clay (Qt)
		82-83	red shale
99	26-1180	0-NR	clay, silty clay, quicksand (Qpt over Qbnl)
		NR-500	red shale
		well cased to 120 feet	

100	NJGS files	0-5	fill
	Route 25 viaduct	5-19	red very-fine-to-medium sand (Qpt)
	boring 41	19-62	stiff red silty clay (Qbnl)
		62-80	red clayey gravel (Qt)
		80-85	red clay with shale fragments (Qt or bedrock)
101	26-13206	abbreviated log	
		0-5	brown sand, brick, cinder fill
		5-32	red-brown coarse-to-fine sand (Qpt)
102	NJGS files	0-5	cinder fill
	Route 25 viaduct	5-26	red clayey fine sand (Qpt)
	boring 37	26-81	red silty clay, a little sandy clay (Qbnl)
		81-87	red till (Qt)
103	NJGS files	0-4	reddish medium sand with organic matter (fill)
	Route 25 viaduct	4-32	red clayey very-fine-to-medium sand (Qpt)
	boring 34	32-80	stiff red clay, a little sandy clay (Qbnl)
		80-82	clayey shale gravel and red shale (Qt over bedrock)
104	NJGS files	0-5	cinder fill
	Route 25 viaduct	5-42	red sandy clay (Qbnl)
	boring 30	42-61	red clay, some gravel (Qt)
105	NJGS files	0-21	cinder fill
	Route 25 viaduct	21-61	red clay (Qbnl)
	boring 23	61-67	red clay with gravel (Qt)
		67-74	red shale
106	26-2977	0-20	fill--dirt, wood, sand
		20-77	clay, sand, and gravel mix (Qpt over Qbnl)
		77-306	red shale
107	26-2053	0-95	silt, clay sediments (Qpt over Qbnl)
		95-400	shale
108	Woolman, 1896,	0-80	clay and quicksand (Qbn over Qbnl)
	p. 183, Unger well	at 80	red rock
109	26-4345	0-20	garbage (fill)
		20-71	red hardpan (Qbnl)
		71-405	red shale
110	26-25246	abbreviated log	
		0-10	fill--black sand, gravel, wood
		10-13	gray silt (Qm)
		13-18	gray to red-brown fine-to-medium sand, trace fine gravel (Qpt)
		18-70	red-brown silty clay (Qbnl)
		70-74	red dense silt and clay with some gravel (Qt)
		74-87	bedrock
111	26-25243	abbreviated log	
		0-6	fill--black cinders, gravel, ash, sand
		6-8	gray-brown clay, fine-to-medium sand (Qm?)
		8-60	red-brown silt and clay, trace gravel (Qbnl)
		60-65	silt, gravel, weathered gravel (Qt)
		65-67	red-brown weathered shale
112	26-5450	abbreviated log	
		0-6	fill--bricks, cinders, sand
		6-8	black, brown peat (Qm)
		8-10	gray fine-to-coarse sand (Qpt)
		10-62	reddish brown silt and clay, little gravel (Qbnl)
		62-71	red-brown silt and clay with gravel (Qt)

		71-72	reddish brown shale
113	26-4784	0-5	stony fill
		5-38	gray clay (Qbnl)
		38-50	red hardpan (Qt)
		50-105	red shale
		105-170	red sandstone
114	26-24406	0-48	red-brown sand and silt (Qpt over Qbnl)
		48-72	red-brown till (Qt)
		72-78	red-brown sandstone
115	26-24849	abbreviated log	
		0-3	fill
		3-46	red-brown fine sand and silt (Qpt over Qbnl)
		46-52	red silt with gravel (Qt or Qbnl)
116	26-1420	0-42	fill-clay-sand-clay (Qbnl)
		42-220	shale
117	26-20558	0-18	fill--black, brown sand, wood, brick, cement
		18-44	red-brown fine-to-medium sand, silt (Qbnl)
		44-57	red shale, decomposed
118	26-30444	abbreviated log	
		0-13	miscellaneous fill
		13-30	gray silty clay (Qm)
		30-41	fine-to-medium sand, some silt (Qal)
		41-52	brown clayey silt (Qbnl)
119	26-17934	abbreviated log	
		0-27	brown, gray sand, silt; some cinders, wood, slag (fill)
		27-30	brown peat (Qm)
		30-35	gray sand and silt, little peat (Qal)
		35-65	red silt, clay, trace fine sand (Qbnl)
		65-70	red dense sand and gravel, little silt, trace clay (Qt)
		70-75	red weathered siltstone
		75-85	red siltstone
120	26-15459	abbreviated log	
		0-29	brown, gray silt, sand, cinders (fill)
		29-34	brown peat (Qm)
		34-42	red fine sand, little silt (Qal)
		42-55	red silt, some clay (Qbnl)
		55-65	red very stiff silt, some clay, trace sand and gravel (Qt)
		65-75	red weathered shale
121	26-20333	abbreviated log	
		0-19	fill--brown sand, silt, gravel, wood
		19-33	gray-brown organic silt and peat (Qm)
		33-68	red-brown clayey silt, little sand, trace gravel (Qbnl)
		68-73	red-brown fine-to-coarse sand with some gravel and silt (Qt)
		73-76	red-brown fractured shale
122	26-13397	0-35	medium-to-fine sand, some gravel (Qpt)
123	26-4006	0-48	fill (possible old well or pit)
		48-92	light brown sand (Qpt over Qbn)
		92-113	red clay (Qbnl)
		113-203	red hardpan (Qt or Qbnl)

		203-496	red shale
124	26-1302	0-4	fill
		4-11	sandy clay (Qpt)
		11-24	quick sand (Qpt)
		24-32	hardpan (probably desiccated Qbnl)
		32-53	hard dry clay (desiccated Qbnl)
		53-76	sandy clay (Qbnl)
		76-98	clay-gravel matrix (Qbnl or Qbnf)
		98-133	sandy clay (Qbnl)
		133-181	clay-gravel matrix (Qbnf or Qt)
		181-245	soft shale
		245-485	red shale
125	Herpers and Barksdale, 1951, p. 47	0-5	concrete and cinders (fill)
		5-15	yellow clay (fill or Qpt)
		15-27	fine red sand (Qpt)
		27-55	red quicksand (Qpt)
		55-80	tough red clay (desiccated Qbnl)
		80-125	soft red clay (Qbnl)
		125-190	red sandy clay (Qbnl)
		190-210	soft red clay (Qbnl)
		210-215	hardpan (Qbnl or Qt)
		215-225	sand and clay (Qbnl or Qt)
		225-408	red rock
126	26-28694	0-11	dark red-brown silty fine sand (Qpt)
		11-26	dark red and brown fine-to-medium sand (Qpt)
		26-40	dark red and brown silty fine-to-medium sand (Qpt or Qbnl)
127	NJGS files Route 21 viaduct boring 1	abbreviated log	
		0-2	cinders, sand, broken stone (fill)
		2-6	red sand and gravel (Qpt)
		6-16	yellow and red clay (Qbnl)
		16-58	red sand and red clay (Qbnl)
		58-65	red fine sand (Qbnl or Qbnf)
		65-73	red fine sand and gravel (Qbnf or Qbnl)
		73-82	red fine sand and red clay (Qbnl)
		82-85	red clay (Qbnl)
		85-87	red fine sand (Qbnl)
128	26-12065 boring 7	abbreviated log	
		0-6	fill--black cinders, ash, gravel
		6-30	red-brown sand, little silt (Qpt)
		30-63	red-brown clay and silt (Qbnl)
		63-78	red-brown fine-to-medium sand, little silt (Qbnf)
		78-91	red-brown coarse-to-fine sand, some gravel, little silt (Qbnf)
129	26-12065 boring 5	abbreviated log	
		0-6	fill-black cinders, ash, gravel, sand
		6-33	red-brown fine-to-coarse sand (Qpt)
		33-75	red-brown silt and clay, trace fine sand (Qbnl)
		75-101	red-brown coarse-to-fine sand, little silt (Qbnf)
130	NJGS files Route 21 viaduct boring 23	abbreviated log	
		0-3	cinders and broken stone (fill)
		3-12	soft silt (Qm)
		12-23	fine red sand, trace red clay, soft (Qpt)
		23-109	red clay and fine red sand, hard (Qbnl)
131	26-12065 boring 1	abbreviated log	
		0-6	dark gray silt and clay (fill)
		6-20	black peat (Qm)

		20-36	brown, gray medium-to-fine sand, little clayey silt (Qal)
		36-140	red-brown silt and clay, trace fine sand (Qbnl)
132	26-12065	abbreviated log	
	boring 8	0-6	black sand, gravel, silt, wood (fill)
		6-16	brown, black clayey silt and peat (Qm)
		16-31	brown fine sand (Qpt)
		31-96	red-brown silt and clay, trace fine sand (Qbnl)
		96-111	red-brown fine sand and silt (Qt or Qbnf)
133	26-5309	0-160	sand, clay (Qpt over Qbnl)
		160-190	red shale
134	26-19891	0-5	soil and cinder fill
		5-15	brown silty medium-to-fine sand and gravel (fill)
		15-20	organic peat (Qm)
		20-30	brown silty medium-to-fine sand and gravel (Qpt)
		30-45	brown silty fine sand (Qbnl)
		45-82	brown silty medium-to-fine sand and gravel (Qbnf)
135	26-11053	0-8	brown silt, sand and gravel fill
		8-11	peat (Qm)
		11-13	brown sand with organics (Qm)
		13-32	red-brown silty sand (Qpt)
		32-101	red-brown silty clay, some sand (Qbnl)
136	26-13433	0-6	miscellaneous fill
		6-15	black silty sand, trace organics (Qm)
		15-45	red-brown silty fine sand (Qal or Qbnl)
		45-75	red-brown silty clay (Qbnl)
		75-85	red-brown clayey silt (Qbnl)
		85-100	decomposed shale
137	26-25028	0-10	gray-black fine silty sand with wood and cinders (fill)
		10-20	gray-brown fine silty sand (Qm and Qal)
		20-40	red-brown fine silty sand (Qal or Qbnl)
		40-50	red-brown silt, some fine sand (Qbnl)
138	NJGS files	0-19	cinder fill
	Route 25 viaduct	19-25	gray silty clayey fine sand with vegetable
	boring 15		matter (Qm)
		25-35	red fine silty sand (Qal)
		35-60	red sandy clay (Qbnl)
		60-74	red silty fine sand (Qbnl)
		74-77	gravelly red clay and decomposed shale (Qt)
139	26-22658	0-5	light-brown silty fine sand and fine gravel (fill)
		5-13	red-brown clayey sandy silt, trace shale fragments (fill)
		13-17	light-brown organic silty sand (Qm)
		17-52	red-brown sandy silt, trace fine gravel (Qbnl)
140	26-22659	0-19	red-brown sandy clayey silt, trace gravel (fill?)
		19-35	red-brown clayey silt (Qbnl)
		35-52	red-brown sandy clayey silt, trace fine gravel (Qbnl or Qt)
141	NJGS files	0-7	cinder fill
	Route 25 viaduct	7-20	red sandy clay (Qbnl)
	boring 1	20-40	red clayey fine sand (Qbnl)
		40-53	red-brown stiff clay with gravel (Qbnl or Qt)
		53-54	decomposed red shale
142	26-3850	0-7	fill
		7-17	black muck (Qm)
		17-60	red clay (Qbnl)

		60-74	red clay and gravel (Qt)
		74-495	red shale
143	26-3043	0-18	fill
		18-57	red clay (Qbnl)
		57-400	red shale
144	26-8749	abbreviated log	
		0-4	black cinders (fill)
		4-6	brown-black organic clay (Qm)
		6-24	red-brown silty fine sand (Qal)
		24-58	varved red-brown silty clay (Qbnl)
		58-66	red-brown clayey silt and gravel (Qt)
		at 66	shale fragments
145	26-20715	abbreviated log	
		0-17	black sand, silt, refuse (fill)
		17-20	brown fine sand, some silt (Qal)
		20-25	red-brown silt, trace sand and gravel (Qal)
		25-33	red-brown silt (Qbnl)
		33-39	brown clayey silt (Qbnl)
146	29-12312	abbreviated log	
		0-10	brown silt, sand, gravel, wood (fill)
		10-23	brown peaty silt and peat (Qm)
		23-27	brown-gray silty fine sand, trace peat (Qal)
		27-37	red silt (Qbnl)
		37-43	brown-red fine-to-medium gravel and sand (Qbnf)
		43-71	brown-red clay and silt (Qbnl)
		71-76	red clay and silt with little gravel (Qt)
		76-80	red hard silty weathered shale
147	26-12311	abbreviated log	
		0-16	brown silt, sand, gravel, rubble (fill)
		16-23	brown-black peat (Qm)
		23-25	gray fine sand (Qal)
		25-46	brown-red silt and clay (Qbnl)
		46-58	red-brown silt, some clay and gravel (Qt)
		58-65	red silty weathered shale
148	26-6880	0-2	red-brown sandy clayey silt with gravel and brick fragments (fill)
		2-12	red-brown clayey silt and silty clay, some medium-to-fine sand and gravel (Qt)
		12-51	red shale
149	26-7377	0-11	red-brown coarse-to-fine sand, some gravel and cobbles, trace silt (Qt)
		11-14	red shale
150	26-1098	0-40	earth, clay, dirt (Qt)
		40-250	red rock
151	26-286	0-45	earth (Qt)
		45-402	red rock
152	26-686	0-79	mixture of hardpan, sand and streaks of clay (Qt)
		79-213	red rock
153	26-1659	0-25	loose sand, stone, and clay (Qt)
		25-230	red sandstone
154	26-4452	0-5	fill
		5-28	hardpan and clay (Qt)
		28-46	fractured shale

		46-201	red shale and sandstone
155	26-622	0-6	fill
		6-19	clay and stone (Qt)
		19-56	sand and gravel (Qsp or Qt)
		56-70	soft red rock
		70-209	red rock
156	26-18789	abbreviated log	
		0-37	red-brown sandy silt with gravel (Qt)
157	26-10993	0-25	brown medium-to-fine sand, little coarse-to-fine gravel, trace silt, trace cobbles (Qt)
		25-30	red-brown sandstone
158	26-4513	0-10	overburden (Qt)
		10-300	red shale
159	26-1857	0-20	fill
		20-36	red clay (Qt)
		36-425	red sandstone rock
160	26-453	0-12	boulders and clay (Qt)
		12-48	sand, gravel and boulders (Qt or Qsp)
		48-53	red clay (weathered rock or Qsp)
		53-903	gray and red rock
161	26-2187	0-4	fill
		4-10	sandy clay (Qt)
		10-25	clay matrix (Qt)
		25-35	sandy clay (Qt)
		35-50	hardpan (Qt)
		50-80	sandy clay and clay matrix (Qt)
		80-250	shale
162	26-27698	0-2	fill
		2-95	sand and gravel and cobbles (Qt)
163	26-132	0-76	red earth (Qt)
		76-229	red shale
164	26-720	0-3	dirt (fill)
		3-38	sand, clay and some boulders (Qt)
		38-245	red rock
		245-260	gray rock
		260-400	red rock
165	26-15410	abbreviated log	
		0-60	reddish brown silty sand to silty clay with gravel (Qt)
166	26-81	0-95	red dirt and some boulders (Qt)
		95-200	red shale
167	26-57	0-29	reddish clay, sand, boulders (Qt)
		29-42	fine red sand, some gravel, clay (Qt)
		42-61	red hardpan with fine sand and broken rock (Qt)
		61-63	fine red sand (Qsp)
		63-71	coarse gray and brown sand, broken rock (Qsp?)
		71-83	red clay, hardpan (weathered rock?)
		83-312	red shale
		312-322	red and gray shale
168	26-273	0-35	sandy soil (Qt)
		35-65	hardpan (Qt)

169	26-4453	0-40	sand and gravel (Qt)
		40-536	red sandstone
170	NJGS files	0-6	top soil, cinders, ashes--fill
		6-11	red silty sand, clay and gravel (Qt)
		11-16	fine red silty sand (Qt)
		16-26	red silty sand, clay and gravel (Qt)
		at 26	refusal (bedrock)
171	26-23919	0-34	till (Qt)
		34-50	coarse sand (Qsp)
		50-57	fine sand (Qsp)
172	26-27962	0-26	dark reddish brown silty fine sand, clay streaks (Qt)
		26-39	dark reddish brown silty fine-to-medium sand (Qt)
		39-75	dark reddish brown silty fine sand with clay streaks (Qt or Qsp)
173	26-1171	0-82	earth, clay, dirt (Qt)
		82-183	red rock
174	26-26252	abbreviated log	
		0-25	red-brown sandy silt to clayey silt with gravel (Qt)
175	26-615A	0-15	cinder fill
		15-35	red hard pan (Qt)
		35-45	red hard clay (Qt or weathered rock)
		45-108	very hard sand rock
176	26-25771	abbreviated log	
		0-8	silt, stone fill
		8-18	reddish silt and gravel (Qt)
		18-27	shale
177	26-1984	0-18	clay and boulders (Qt)
		18-241	red rock
178	26-5955	0-8	red-brown coarse-to-fine sand, some coarse-to-fine gravel, some silt, trace cobbles (Qt)
		8-11	soft red shale
		11-26	red shale and sandstone
179	26-23969	0-10	fine-to-coarse sand fill
		10-35	fine-to-coarse sand and gravel, some silt, trace clay (Qez)
		35-58	fine sand and silt (Qez, lacustrine beds?)
		58-64	boulder at 58 (till or rock)
		64-69	red shale
180	26-11440	abbreviated log	
		0-8	red, gray sand, cement, brick, slag, concrete--fill
		8-22	red-brown silt and medium-to-fine sand, some gravel (Qez)
		22-38	red-brown medium-to-fine sand, some gravel, trace silt (Qez)
		38-54	red-brown medium-to-coarse sand and gravel (Qez)
		54-56	red-brown silt (Qez, lacustrine beds?)
181	26-4624	0-100	sand, gravel (Qez)
		100-250	sandstone
182	26-4309	0-50	overburden (Qez)
		50-225	red shale and red sandstone
183	26-3615	0-18	red sand (Qez)

		18-21	gravel (Qez)
		21-77	fine red sand (Qez, lacustrine beds?)
		77-84	sand and gravel (Qez or Qt)
		84-461	red rock
184	26-237	0-6	fill
		6-11	red clay (Qez)
		11-54	red sandy clay (Qez, lacustrine beds?)
		54-79	clay, stones and gravel (Qt)
		79-379	red shale rock
185	26-55	0-7	soft red dirt (Qez)
		7-92	red dirt and clay (Qez, lacustrine beds?)
		92-352	red rock
186	26-201	0-10	clay (Qal or Qez)
		10-20	coarse sand (Qez)
		20-24	small gravel (Qez)
		24-90	soft red shale
		90-600	hard red shale
187	26-6780	abbreviated log	
		0-27	red-brown silty sand, some gravel (Qt)
		27-31	red weathered shale
		at 31	refusal (rock)
188	26-11874	0-4	gravel, clay and sand (Qt)
		4-12	red-brown silt and clay (Qt)
		12-22	bedrock
189	26-11879	0-6	red-brown silty clay and weathered shale (Qt)
		6-20	bedrock
190	26-1782	0-22	red sand and gravel (Qt)
		22-420	red rock
191	26-117	0-17	red earth (Qt)
		17-125	red shale
192	26-852	0-23	clay, gravel, fine sand (Qt)
		23-475	red shale
193	26-221	0-19	top soil, brown dirt and silt (Qt)
		19-22	boulders (Qt)
		22-400	shale
194	26-45	0-22	dirt, gravel, hardpan (Qt)
		22-151	red shale
195	26-697	0-29	red sandy clay (Qez over Qt)
		29-202	red shale and sandstone
196	26-9855	0-5	brown silt (fill or Qt)
		5-12	brown clayey silt (Qt)
		12-30	red silty clay (Qt)
197	26-696	0-7	cinders and fill
		7-19	blue clay (Qt or fill)
		19-49	red clay (Qt)
		49-50	sand and gravel (Qt or Qbn)
		50-76	red soupy sand and clay (Qt or Qbn)
		76-88	reddish brown hardpan (Qt)
		88-89	dirty sand and gravel (Qt)
		89-93	soupy red clay (Qt or Qbn)
		93-203	clay and red shale

198	26-19272	0-12	fine sand, silt, some clay (Qt)
		12-74	fine-to-medium sand (Qbn)
		74-120	bedrock
199	26-25006	0-5	sand (Qt or fill)
		5-10	silt, sand and clay (Qt)
		10-40	fine silty sand (Qbn)
		40-73	fine-medium sand (Qbn)
200	26-912	0-3	cinders and fill
		3-7	blue gray clay (fill or Qt)
		7-40	red clay (Qt)
		40-41	red sandstone
		41-500	red shale
201	NJGS files	0-7	gravel, sand, clay, cinders--fill
		7-14	red sand, clay, gravel (Qbn or fill)
		14-30	fine red sand and silt (Qbn)
202	26-7488	0-10	cinder fill, some wood (fill over Qm)
		10-64	coarse-to-fine brown sand, trace silt (Qbn)
		64-100	brown sand and clayey silt (Qbn)
203	26-20060	abbreviated log	
		0-6	black sand and cinders (fill)
		6-8	red-brown clayey sand, some silt (fill)
		8-16	gray organic clay with peat fibers (Qm)
		16-20	brown fine-to-medium sand, trace clay and silt (Qal)
		20-60	red-brown clayey silt to silty clay (Qbnl)
		60-104	red-brown fine-to-medium sand, some silt and gravel (Qbnf)
		104-105	red-brown till (Qt)
		105-110	shale
204	NJGS files	0-19	cinder fill
		19-38	bog (Qm)
		38-48	reddish clay (Qbnl)
		48-62	yellow clay (Qbnl)
		62-74	gray clay (Qbnl)
		74-83	red sand (Qbnf)
		83-112	fine red sand, little clay (Qbnf)
		112-123	gravel, sand, little clay (Qt)
205	NJGS files	0-2	brown clay, sand, gravel (fill or Qt)
		2-9	red clay, sand, gravel (Qt)
		9-20	red sand, gravel, clay (Qt)
206	26-137	0-115	earth (fill over Qm over Qbnl)
		115-603	red rock
207	26-20812	0-15	fill--clay, wood, cinders, sand
		15-22	gray organic silt (Qm)
		22-25	gray fine sand (Qal)
		25-32	red silt (Qbnl)
208	26-7486	abbreviated log	
		0-8	cinder fill
		8-16	dark-brown peat and organic silt (Qm)
		16-90	brown fine-to-coarse sand, trace silt (Qbnf)
		90-100	red decomposed sandstone, shale and siltstone
209	NJGS files Route 21 viaduct boring 37	0-45	red sand, red clay and broken stone (Qal over Qbnl)
		45-48	gray sand (Qbnl)

		48-58	fine red sand (Qbnl)
		58-70	fine red sand and small amount of red clay (Qbnl)
		70-88	red clay and small amount of red sand (Qbnl)
		88-91	red clay (Qbnl)
210	26-19933	0-5	miscellaneous fill--soil, cinders
		5-10	peat (Qm)
		10-15	brown medium-to-fine sand (Qal)
		15-20	brown coarse-to-fine sand and gravel (Qal)
		20-50	brown fine sand and silt (Qbnl)
		50-65	brown silt and clay, trace fine sand (Qbnl)
		65-75	brown clay, trace fine sand (Qbnl)
		75-82	brown medium-to-fine sand and silt (Qbnf?)
211	NJGS files	0-11	soft silt (Qm)
	Route 21 viaduct	11-25	fine red sand (Qal)
	boring 31	25-42	fine red sand and red clay (Qbnl)
		42-56	red clay and red sand (Qbnl)
		56-91	red clay (Qbnl)
212	NJGS files	abbreviated log	
	Newark Airport	0-10	cinder and ash fill
	boring NA-1-2	10-25	gray peaty organic silt (Qm)
		25-41	red fine-to-very-fine silty sand (Qal)
		41-110	red clayey silt (Qbnl)
		110-111	fine red sandy silt (Qt)
		111-120	red shale
213	NJGS files	abbreviated log	
	Newark Airport	0-7	cinders and ash fill
	boring NA-1-6	7-13	black peaty organic silt (Qm)
		13-46	red fine sand, a little coarse sand (Qal)
		46-85	red sandy silt to silty clay (Qbnl)
		at 85	refusal (bedrock or till)
214	NJGS files	abbreviated log	
	Newark Airport	0-6	black peaty organic silt (Qm)
	boring NA-4-42	6-18	red very fine silty sand (Qal)
		18-28	red silt (Qbnl)
		28-73	red fine sand, trace silt (Qbnl)
		73-85	granite and shale boulders (Qt or Qbnf)
		85-90	red fine sand, trace silt, very dense (Qt)
215	NJGS files	abbreviated log	
	Newark Airport	0-13	cinder and garbage fill
	boring NA-1-7	13-21	gray peaty organic silt (Qm)
		21-24	gray sandy silt (Qm or Qal)
		24-64	red clayey silt to silty clay (Qbnl)
		64-71	red silty clay and shale gravel, very dense (Qt)
		at 71	refusal (bedrock)
216	NJGS files	abbreviated log	
	Newark Airport	0-3	black peaty organic silt (Qm)
	boring NA-4-41	3-66	red fine-to-coarse sand, trace gravel (Qbn)
		66-75	red silty fine sand (Qbnl)
		75-91	red clayey silt and clayey silt (Qbnl)
		91-93	red silty clay and shale fragments (Qt)
		93-98	red shale rock
217	NJGS files	abbreviated log	
	Newark Airport	0-6	peat (Qm)
	boring NA-4-44	6-8	brown silty fine sand (Qal)
		8-23	red very fine sandy silt (Qbnl)
		23-27	red clayey silt (Qbnl)
		27-44	red silty fine sand, some shale gravel (Qt)

		44-51	red clayey silt to silty sand, some shale gravel (Qt)
		51-56	red shale rock
218	NJGS files	abbreviated log	
	Newark Airport	0-7	peaty organic silt to silty sand (Qm)
	boring NA-4-46	7-32	red silty coarse-to-fine sand, some gravel (Qbn or Qt)
		32-37	red clayey silt (Qbnl)
		37-42	red silty very fine sand (Qbnl)
		42-64	red silty clay, some shale gravel and granite boulders (Qt)
		64-69	red shale rock
219	NJGS files	abbreviated log	
	Newark Airport	0-7	garbage and ash fill
	boring NA-4-50	7-10	peaty organic silt (Qm)
		10-15	gray very fine sandy silt (Qal)
		15-19	fine red sand (Qal)
		19-53	red clayey silt (Qbnl)
		53-61	red shale rock
220	NJGS files	abbreviated log	
	Newark Airport	0-9	gray peaty organic silt
	boring NA-1-9	9-20	red to gray fine sand (Qal)
		20-55	red silty clay to fine-sandy silt (Qbnl)
		55-57	red silty clay and shale fragments (Qt)
		at 57	refusal (bedrock)
221	NJGS files	abbreviated log	
	Newark Airport	0-1	red silty sand and gravel fill
	boring NA-4-22	1-18	gray peaty organic silt (Qm)
		18-20	gray medium-to-fine silty sand (Qal)
		20-40	red clayey silt and shale fragments (Qbnl)
		40-43	highly compressed red silty clay and some shale fragments (Qt)
		43-48	red shale rock
222	NJGS files	abbreviated log	
	Newark Airport	0-16	gray peaty organic silt to fine sand (Qm)
	boring NA-4-21	16-41	red silt, trace red clay and quartz gravel (Qbnl)
		41-47	highly compressed red silty clay and decomposed shale fragments (Qt)
		47-52	red shale rock
223	NJGS files	abbreviated log	
	Newark Airport	0-24	gray peaty organic silt (Qm)
	boring NA-4-24	24-49	red silty clay (Qbnl)
		49-54	red shale rock
224	NJGS files	abbreviated log	
	Newark Airport	0-9	peaty organic silt (Qm)
	boring NA-4-38	9-14	gray silty very fine sand (Qal)
		14-29	red clayey silt (Qbnl)
		29-37	red silty clay and some shale fragments (Qt)
		37-42	red shale rock
225	NJGS files	abbreviated log	
	Newark Airport	0-2	peaty organic silt (Qm)
	boring NA-4-35	2-9	gray silty fine sand (Qal)
		9-20	red fine-sandy silt (Qbnl)
		20-41	red silt (Qbnl)
		41-44	red silty clay, some decomposed shale fragments (Qt)
		44-49	red shale rock
226	NJGS files	abbreviated log	
	Newark Airport	0-1	peat (Qm)
	boring NA-4-28	1-19	brown to gray silty very-fine-to-fine sand (Qal)

		19-35	red clayey silt (Qbnl)
		35-38	red silty clay, some shale gravel (Qt)
		38-43	red shale rock
227	NJGS files	abbreviated log	
	Newark Airport	0-2	peat (Qm)
	boring NA-4-30	2-3	sandy silt (Qal)
		3-13	silty sand (Qal)
		13-29	sandy clayey silt (Qbnl)
		29-32	gravelly silty clay (Qt)
		32-37	rock
228	NJGS files	abbreviated log	
	Newark Airport	0-2	silty sand (fill?)
	boring NA-4-17	2-10	sandy silt (Qm)
		10-13	sand (Qal)
		13-18	sandy silt (Qbnl)
		18-34	silt (Qbnl)
		34-40	rock
229	NJGS files	abbreviated log	
	Newark Airport	0-11	cinder fill
	boring NA-4-15	11-14	clayey organic silt (Qm)
		14-36	silty sand (Qal over Qbnl or Qt)
		36-39	gravelly silty clay (Qt)
		39-47	rock
230	NJGS files	0-4	light-brown sand and silt (fill)
		4-9	organic silt and clay (Qm)
		9-24	fine red sand and silt (Qbnl)
		24-40	fine red sand, clay, trace of silt and some gravel (Qt)
		at 40	refusal (bedrock)
231	NJGS files	0-10	hydraulic fill with decomposed vegetation (fill over Qm)
		10-15	gray medium-to-fine sand with traces of silt and gravel (Qal)
		15-35	reddish brown fine sand with some gravel and clay (Qbnl)
		35-39	reddish brown fine sand with shale rock (Qt)
		at 39	refusal (bedrock)
232	26-26105	0-4	cinder fill
		4-6	black organic silt (Qm)
		6-20	red-brown sandy silt and clay (Qbnl)
		20-45	red-brown decomposed shale (Qt?)
		45-50	red-brown shale
233	NJGS files	abbreviated log	
	Newark Airport	0-6	cinder, rubbish fill
	boring NA-4-13	6-9	organic silt and peat (Qm)
		9-42	sand (Qal over Qbnl)
		42-55	gravelly clayey silt (Qt)
		55-63	rock
234	26-8310	0-51	sand (Qbn)
		51-600	red shale
235	26-6867	0-55	overburden (Qt)
		55-420	red sandstone
236	26-24309	0-10	red-brown clayey silt with gravel and some sand (Qt)
		10-26	red-brown clayey silt with small rounded gravels and silt lens (Qt)
		26-36	fine-to-medium sand with very thin clayey silt lenses (Qbnl or Qsp)

237	26-65	0-40	sand and gravel (Qt)
		40-49	clay and hardpan (Qt)
		49-101	shale
238	26-9102	0-36	red-brown silty clay (Qt)
		36-50	red-brown fine sand, some silt (Qbnl)
239	26-22281	abbreviated log	
		0-22	brown clay and silt, little to some fine gravel (Qt)
		22-55	brown clay and silt, little to some fine sand (Qbnl)
		55-57	brown silt and clay, little medium-to-fine gravel with rock fragments (Qt)
240	26-23034	abbreviated log	
		0-5	sand and gravel fill
		5-11	brown, red fine sand and silt, trace clay (Qt)
		11-30	red-brown shale
241	NJGS files	0-4	fill
		4-7	reddish brown fine sand (Qt)
		7-20	reddish brown medium-to-fine sand with trace clay and gravel (Qt)
		20-21	red shale
242	NJGS files	0-3	crushed stone, sand, gravel fill
		3-13	red sand, clay, gravel (Qt)
		13-18	shale rock
243	26-14742	0-12	dark-brown medium-to-coarse sand, little silt, some medium gravel (Qt)
		12-15	red siltstone
244	26-6387	0-3	red clayey silt and gravel (Qt)
		3-18	soft red shale
245	26-14148	0-3	sand fill
		3-8	silty clay, shale (Qt)
		8-18	weathered shale
246	26=19640	0-7	sand and gravel fill
		7-20	brown clay-silt (Qt)
		20-58	brown sandy silt (Qt or Qbnl)
		58-68	glacial till, some layers of silty sand (Qt)
		68-70	shale bedrock
247	26-18320	abbreviated log	
		0-8	sand, silt fill
		8-25	red-brown coarse-to-fine sand with clayey silt and gravel (Qt)
		25-27	red-brown to gray weathered shale
248	26-18219	abbreviated log	
		0-15	red-brown fine-to-coarse sand, trace silt (Qez)
		15-20	red-brown coarse-to-fine sand with gravel, trace silt and clay (Qt)
		20-23	red-brown weathered shale
		23-30	shale
249	26-29355	0-10	red-brown sand (Qez)
		10-12	red-brown clay to rock (Qt)
250	26-10122	0-3	fill
		3-6	brown silt, gravel (fill or Qal)
		6-10	red clay (Qez)
		10-16	red sand (Qez)

		16-18	red gravel (Qt or Qez)
		at 18	bedrock
251	NJGS files	0-3	fine red and brown clay and sand (Qt or fill)
		3-14	fine red sand, clay, gravel (Qt)
		14-16	soft red shale
252	26-138	0-10	earth, clay, soft rock (Qt)
		10-255	red shale rock
253	26-5144	0-20	clay (Qt)
		20-235	shale
254	26-2363	0-33	red clay (Ql over Qt)
		33-250	red rock
255	26-30364	0-5	fill--sandy clay and gravels, brick, etc.
		5-20	red-brown silty sand and clay, some gravels and small cobbles throughout (Qt)
		20-26	weathered red-brown shale
256	26-8367	0-9	decomposed red shale, coarse-to-fine angular sand, little medium-to-fine gravel, trace clay (Qt)
		9-17	red shale
257	26-3384	0-24	overburden (Qt)
		24-500	hard and soft red rock
258	26-25592	0-8	some fill, hard-packed sand and gravel (Qt)
		8-180	soft to medium red shale
259	26-20132	0-4	fill--red-brown clay, trace fine-to-medium gravel
		4-9	reddish brown clay, trace gravel (Qt)
		9-20	shale rock
260	26-5807	0-15	overburden (Qt)
		15-200	shale
261	26-21150	0-4	gray clay fill
		4-13	red-brown silty clay (Qt)
		13-41	red shale
262	26-13124	0-14	red clayey silt with red shale fragments (Qt)
		at 14	decomposed red shale
263	26-4055	0-10	hardpan (Qt)
		10-290	red shale
264	26-13121	0-4	red clayey silt with red shale fragments (Qt)
		4-14	decomposed red shale
265	26-5674	abbreviated log	
		0-2	fill
		2-14	red-brown clayey silt with gravel and sand (Qt)
		14-16	red shale
266	26-2969	0-27	clay (Qt)
		27-360	shale
267	26-1282	0-40	red clay and shale (Qt)
		40-202	more solid shale
268	26-24634	0-6	fill
		6-30	red shale

269	26-22909	0-8	coarse sand (Qt)
		8-15	red shale
270	26-27833	0-2	fill
		2-11	red, brown silty clay (Qt)
		11-14	brown shale
271	26-179	0-15	earth and clay (Qt)
		15-255	red shale rock
272	29-19373	0-6	fill
		6-15	medium and fine sand (Qt)
		15-31	sandy clay (Qt)
		31-38	weathered rock
		38-91	bedrock
273	26-22736	abbreviated log	
		0-12	silt and clay with some sand, gravel, and rock fragments (Qt)
		12-13	red and green siltstone and shale
274	26-9343	0-4	sand, cinder fill
		4-7	red silty clay, trace coarse-to-fine sand and fine gravel (Qt)
		7-9	weathered shale
		9-18	red shale
275	26-19987	0-4	fine-to-coarse sand, gravel, trace silt (Qt)
		4-12	decomposed shale
276	26-23157	abbreviated log	
		0-12	reddish brown clays and silts, some fine sands (Qt)
		12-16	red shale
277	26-562	0-5	earth and clay (Qt)
		5-400	red shale rock
278	26-13613	abbreviated log	
		0-22	red clayey silt and fine gravel, trace fine-to-coarse sand (Qt)
		at 22	red shale bedrock
279	26-6947	abbreviated log	
		0-2	brown to black sand and gravel fill
		2-8	red clayey sandy silt, trace shale fragments (Qt)
		8-55	red shale and sandstone rock
280	26-19371	0-5	sand (fill or Qt)
		5-13	sandy clay (Qt)
		13-20	rock
		20-57	bedrock
281	26-20752	abbreviated log	
		0-6	brown fine-to-medium sand, some fine gravel and silt (Qez)
		6-37	brown, red-brown clayey silt with some gravel and trace sand and boulders (Qt)
		37-45	red shale rock
282	26-1870	0-31	clay (Qt)
		31-92	shale
283	26-1661	0-45	clay (Qt)
		45-264	red shale

284	26-10953	abbreviated log	
	boring 73	0-50	brown clayey silt, trace sand, little gravel (Qt)
		50-56	red shale
285	26-10953	abbreviated log	
	boring 27	0-40	brown sand fill
		40-49	brown to brown-red clayey silt, little gravel and sand (Qt)
		49-65	brown fine sand and silt (Qbnl or Qt)
		65-75	brown-red clayey silt with gravel and sand (Qt)
		75-80	red shale
286	26-8211	0-10	silty sand (fill)
		10-19	meadow mat (Qm)
		19-24	gray fine sand, little coarse sand and fine gravel, trace silt and clay (Qal)
		24-50	brown silty clay, little fine sand to fine gravel (Qbnl)
		50-76	brown silty clay, little fine sand to coarse gravel (Qbnl over Qt)
		76-90	red shale
287	26-10981	abbreviated log	
		0-4	brown silty sand (fill?)
		4-19	brown clayey silt, little sand and gravel (Qt)
		19-30	brown fine sand, little silt (Qt or Qbnl)
		30-44	red clayey silt, some to little sand and gravel (Qt)
		44-49	red shale
288	26-3156	0-66	red clay and red fine sand (Qt over Qbnl?)
		66-467	red rock
289	26-21943	0-70	overburden (Qt over Qbnl?)
		70-550	red shale
290	26-8210	abbreviated log	
		0-19	brown sand, silt, wood, metal--fill
		19-21	red-brown fine-to-coarse sand and silt, little fine gravel (Qal)
		21-47	red-brown silt, trace clay, little fine -to-coarse sand, trace rock fragments (Qbnl)
		47-55	decomposed red shale
		55-65	red shale
291	26-8216	0-24	fill--dark-brown silt, metal, concrete, paper, wood
		24-42	red-brown fine sand, some silt (Qal over Qbnl)
		42-61	red-brown silt, little fine-to-coarse sand, trace clay (Qbnl)
		61-80	red shale
292	26-29940	0-7	fill--brown medium-to-fine sand, trace fine gravel, trace silt
	boring 20	7-17	trash fill
		17-22	dark gray organic silt and decomposed vegetation, some clay (Qm)
		22-27	brown medium-to-fine sand, trace silt and fine gravel (Qal)
		27-38	reddish brown silty fine sand (Qbnl)
		38-46	reddish brown clayey silt (Qbnl)
		46-52	reddish brown clayey silt and shale fragments
		at 52	refusal (bedrock)
293	26-5473	0-8	medium-to-fine brown sand (fill)
		8-14	miscellaneous fill
		14-20	brown organic silt (Qm)
		20-24	dark gray silt-clay (Qm)
		24-30	red-brown fine silty sand (Qal)
		30-54	red-brown silt, trace sand (Qbnl)

		54-64	red-brown silty clay (Qbnl)
		64-73	red shale
294	26-29940 boring 1	0-6	brown medium-to-fine sand, trace silt, trace fine gravel (fill)
		6-17	black sand, silt, stone, metal, paper, wood (fill)
		17-28	dark gray to brown organic silty clay, some decomposed vegetation (Qm)
		28-33	brown silty medium-to-fine sand, trace fine gravel, trace clay (Qal)
		33-43	reddish brown silt (Qbnl)
		43-58	reddish brown silty clay (Qbnl)
		58-60	reddish brown silty clay, some shale fragments (Qbnl or Qt)
295	26-5469	abbreviated log	
		0-18	red-brown sand and gravel (fill)
		18-30	wood, metal, sand, gravel--refuse fill
		30-32	gray fine-to-medium sand and organic silty clay (Qm)
		32-38	red-brown fine sand, trace silt and gravel (Qal)
		38-53	red-brown silty clay, trace fine sand and gravel (Qbnl)
		53-56	red-brown sandy silty clay and gravel (Qt)
		56-67	red shale
296	26-29940 boring 14	abbreviated log	
		0-4	brown medium-to-fine sand, trace silt, trace fine gravel (fill)
		4-20	black sand, silt, metal, wood (fill)
		20-23	dark gray organic silt (Qm)
		23-27	dark gray silty fine sand (Qal)
		27-33	dark gray silt, trace clay, trace fine sand (Qbnl)
		33-42	reddish brown silty fine sand (Qbnl)
		42-62	reddish brown clayey silt to silty clay (Qbnl)
		62-65	reddish brown silty clay and shale fragments (Qt)
297	26-11722	abbreviated log	
		0-10	brown-gray sand, silt, wood, gravel, brick (fill)
		10-20	gray peaty silt (Qm)
		20-30	gray to brown-red fine sand, little silt (Qal)
		30-46	brown-red varved silt and clay (Qbnl)
		46-48	red sandy silt, some gravel (Qt)
		48-53	red weathered shale
		at 53	refusal (bedrock)
298	26-30045	0-5	gray top soil, trace organics (Qm)
		5-10	red-gray sand and gravel, trace clay (Qal)
		10-20	gray clay (Qbnl)
		20-40	red-brown clay (Qbnl)
		40-42	red decomposed shale
		42-45	red shale
299	26-5471	0-12	miscellaneous refuse
		12-14	gray organic clay and silt (Qm)
		14-17	gray silty fine sand (Qal)
		17-24	gray clay and silt (Qbnl)
		24-28	gray silty fine sand (Qbnl)
		28-73	red-brown silt, trace sand (Qbnl)
		73-88	red silty clay, shale fragments (Qbnl or Qt)
		88-93	red shale, some gray silt and sand (Qt?)
		93-103	red shale
300	26-18486	0-4	brown fine sand and gravel (fill)
		4-10	red-brown fine sandy silt, trace clay (fill)
		10-16	layered red-brown silt and sand (fill)
		16-31	gray-green organic silt, trace fine sand (Qm)

		31-70	layered red-brown sandy silt to silty sand and clay (Qbnl)
		70-90	red-brown till (Qt)
		90-100	red-brown sandy shale
301	26-5474	abbreviated log	
		0-9	brown sand fill
		9-16	garbage fill
		16-23	gray clay and silt (Qm)
		23-27	fine gray sand, trace of silt (Qal)
		27-44	red fine silty sand (Qbnl)
		44-62	red-brown varved silty clay (Qbnl)
		62-72	red glacial till (Qt)
		72-82	red shale
302	NJGS files	0-11	water
	Central RR of NJ	11-13	mud (Qm)
	Newark Bay bridge	13-19	gray sand (Qal)
	boring 30	19-37	red clay with sand (Qbnl)
		37-50	red clay (Qbnl)
		50-61	red sandstone
303	NJGS files	0-9	water
	Central RR of NJ	9-16	mud (Qm)
	Newark Bay bridge	16-28	gray sand (Qal)
	boring 26	28-55	red clay (Qbnl)
		55-64	red sandstone
304	NJGS files	0-9	water
	Central RR of NJ	9-13	mud and shells (Qm)
	Newark Bay bridge	13-19	gray sand and gravel (Qal)
	boring 18	19-27	gray sand (Qal)
		27-38	red clay (Qbnl)
		38-47	gravel with clay (Qt)
		47-55	red sandstone
305	NJGS files	0-10	water
	Central RR of NJ	10-15	mud (Qm)
	Newark Bay bridge	15-29	gray sand (Qal)
	boring 12	29-40	red clay (Qbnl)
		40-54	clay and gravel (Qt)
		54-64	gray sandstone
306	NJGS files	0-27	water
	Central RR of NJ	27-31	mud (Qm)
	Newark Bay bridge	31-37	red clay with gravel (Qal or Qbnl)
	boring 9B	37-65	red clay (Qbnl)
		65-71	red sand (Qt or Qbnf)
		71-81	gray sandstone
307	NJGS files	0-18	water
	Central RR of NJ	18-24	mud (Qm)
	Newark Bay bridge	24-28	clay with gravel (Qal or Qbnl)
	boring 4A	28-54	red clay (Qbnl)
		54-59	red sandstone
		59-67	gray sandstone
308	NJGS files	0-8	water
	Central RR of NJ	8-13	mud (Qm)
	Newark Bay bridge	13-15	sand and mud (Qal)
	boring 1	15-20	coarse gray sand (Qal)
		20-42	red clay with gravel (Qbnl over Qt)
		42-54	gray sandstone
309	26-24453	0-5	brown fine-to-medium sand, trace silt with fine-to-coarse gravel and brick (fill)

		5-15	gray fine-to-coarse sand and gravel, trace silt, trace boulders (Qe over Qt)
		15-35	red till (Qt)
310	26-24456	0-15	sand, gravel, brick, concrete fill
		15-36	red-brown till (Qt)
311	26-19191	abbreviated log	
		0-17	green-brown to red medium-to-fine sand and clayey silt, little gravel (Qt)
		17-19	light-brown siltstone
312	26-10958	0-7	black silt, trace gravel, trace sand (Qm)
		7-9	brown clayey silt, little gravel and coarse sand (Qt)
		9-12	red gravel, little silt and sand (Qt)
		12-27	red shale
313	26-14102	abbreviated log	
		0-27	red-brown very-fine-sand and silt to clayey silt, little gravel (Qt)
		27-30	red-brown shale--highly weathered
314	26-21712	0-20	brown to red-brown medium-to-fine silty sand with gravel (Qt)
		20-22	shale
315	26-24201	abbreviated log	
		0-30	silty clay with little fine-to-coarse sand and fine-to-medium gravel (Qt)
		at 30	shale
316	NJGS files	0-18	brown dirt or soil (fill over Qt)
	Goethals Bridge	18-25	red clay and sand (Qt)
	boring 24+79.33	at 25	red shale
317	NJGS files	0-23	red clay (Qt)
	Goethals Bridge	23-34	red shale
	boring 27+42		
318	26-15643	0-35	red-brown silty clayey coarse-to-fine sand (Qt)
		35-40	red shale
319	NJGS files	0-31	red clay (Qt)
	Goethals Bridge	31-41	gneiss and shale boulders (Qt)
	boring 35+34	41-51	red shale
320	NJGS files	0-11	ash and sand (fill)
	Goethals Bridge	11-22	red sand and clay (Qt)
	boring 40+81	22-60	red shale and sandstone
321	NJGS files	0-9	water
	Goethals Bridge	9-36	silt (Qm)
	boring 49+96	36-41	sand, gravel (Qal or Qt)
		41-45	broken shale (Qt?)
		45-53	red shale
322	26-30240	0-10	sand, cinder, wood, gravel fill
		10-18	dark brown peat and dark gray organic silt (Qm)
		18-24	reddish brown silt, clay, sand, gravel (Qt)
		24-26	reddish brown shale
323	26-8295	abbreviated log	
		0-7	building rubble (fill)
		7-15	brown silty clay (Qm)
		15-19	brown clayey silt (Qm or Qbnl)

		19-30	brown sandy silt (Qbnl or Qt)
		30-31	bedrock
324	26-29715	abbreviated log	
		0-13	black to red-brown gravel, clay, sand fill
		13-17	brown-gray meadow mat, little clay, trace silt (Qm)
		17- 29	brown to gray clay and organics (Qm)
		29-32	red-brown fine-to-coarse gravel and clay (Qt)
		at 32	red-brown siltstone
325	26-20380	0-9	red silty clay with fine sand and shale (fill)
		9-14	brown and black peat (Qm)
		14-23	red silty fine sand trace medium-to-fine gravel (Qt)
		23-35	decomposed shale and rock fragments
		35-40	red shale rock
326	26-26040	abbreviated log	
		0-10	dark brown cinders, construction debris (fill)
		10-19	greenish, yellow, red silty clay, little sand, some gravel (Qt)
		19-20	red-brown silt and shale
327	26-29456	0-6	brown to black sand and cinder fill
		6-15	red-brown clayey sand (Qt)
		15-44	red-brown shale
328	26-29444	abbreviated log	
		0-11	light gray to reddish brown silty clay and sand, some gravel and pebbles (fill)
		11-19	meadow mat and gray clay (Qm)
		19-22	reddish brown fine sand (Qt)
		at 22	shale
329	26-29443	0-7	red-brown to black silty clay and sand fill
		7-14	brown silty fine sand (Qm or Qt)
		14-21	red-brown clay with gravel (Qt)
		21-49	red-brown fractured shale
330	26-29452	0-12	light gray fine sand (fill)
		12-31	reddish-brown medium sand and gravel, some shale fragments (Qt)
331	26-23436	0-15	fill
		15-30	till (Qt)
		30-50	bedrock
332	26-20126	abbreviated log	
		0-12	brown, black, red-brown gravel, sand, silt, cinders, clay (fill)
		12-25	gray-black organic silt (Qm)
		25-34	red-brown silt, some fine-to-coarse gravel, little fine-to-coarse sand, trace clay (Qt)
		34-40	red siltstone
333	26-20122	abbreviated log	
		0-13	black, brown, red-brown cinders, sand, gravel, silt, ashes (fill)
		13-26	gray organic silt (Qm)
		26-35	red-brown silt, some fine-to-medium gravel, little fine-to-coarse sand (Qt)
		35-45	red siltstone
334	26-6308	0-10	fill--concrete, sand, gravel, bricks
		10-17	black organic silt and peat (Qm)

		17-18	weathered shale
335	26-28063	0-15	clay and peat (fill over Qm)
		15-17	clay (Qm)
		17-31	sand (Qal)
		31-36	clay (Qbnl)
		36-82	clay, till and bedrock (Qbnl over Qt)
336	NJGS files	0-13	mud and silt (Qm)
	Peddie Ditch	13-25	sand (Qal)
	boring 16	25-40	very hard and tough red clay (Qbnl)
337	N 26-22-286	0-26	muck and fill (fill over Qm)
		26-28	fine gray sand and clay (Qal)
		28-54	fine red sand and clay (Qbnl)
		54-70	red clay (Qbnl)
		70-80	fine red sand and clay (Qbnl)
		80-100	fine red sand (Qbnf)
338	N 26-22-288	0-15	fill
		15-17	decayed vegetation (Qm)
		17-22	fine gray sand and clay (Qal)
		22-38	red silt (Qbnl)
		38-44	chocolate-brown clay with thin strata of fine sand (Qbnl)
339	N 26-22-196	0-11	fill
	boring 4	11-30	red silty sand and gravel (Qez)
		30-42	red silty medium sand (Qez)
340	26-19962	0-9	fill
		9-12	organic silt (Qm)
		12-72	brown silty medium-to-fine sand (Qpt over Qbnl)
341	NJGS files	0-8	dirt fill
		8-12	red fine sand (Qal)
		12-57	red fine sand and clay (Qbnl)
		57-58	gravel, little sand (Qbnf or Qt)
342	NJGS files	0-16	clay and ash fill
		16-23	river mud (Qm)
		23-25	gray sand and clay (Qal)
		25-34	clay and a little sand (Qbnl)
		34-62	red clay (Qbnl)
		62-92	clay, very fine sand (Qbnl)
		92-100	red clay (Qbnl)
343	N 26-22-542	0-13	red sand, red shale, brown and gray clay (Qt)
		13-22	red silt (Qbnl?)
		22-30	red sand and gravel (Qbnf?)
		at 30	brown clay (Qbnl?)
344	N 26-22-372	0-5	fill
		5-19	fine red sand, some clay (Qbn)
		19-28	red clay with sand and gravel (Qbnl)
		28-36	red clay (Qbnl)
		36-46	red clayey fine-to-medium sand and gravel (Qt)
		46-50	red clay, some shale fragments (Qt)
		50-68	red shale
345	NJGS files	0-12	mud and silt (Qm)
	Peddie Ditch	12-18	sand (Qal)
	boring 14	18-40	very hard and tough red clay (Qbnl)
346	NJGS files	0-12	mud and silt (Qm)
	Peddie Ditch	12-16	sand (Qal)

	boring 12	16-40	very hard and tough red clay (Qbnl)
347	NJGS files	0-15	mud and silt (Qm)
	Peddie Ditch	15-40	very hard and tough red clay (Qbnl)
	boring 10		
348	NJGS files	0-16	mud and silt (Qm)
	Peddie Ditch	16-18	sand (Qal)
	boring 8	18-40	very hard and tough red clay (Qbnl)
349	NJGS files	0-9	soft meadow muck (Qm)
	Port Newark	9-17	sand and clay (Qal)
	boring 4B	17-56	red clay (Qbnl)
		at 56	shale
350	NJGS files	0-10	soft meadow muck (Qm)
	Port Newark	10-16	sand and clay (Qal)
	boring 20B	16-37	red clay (Qbnl)
		at 37	shale
351	NJGS files	0-9	cinders and sand (fill)
	Port Newark	9-18	organic silt (Qm)
	boring 284	18-28	sand (Qal)
		28-33	sandy silt (Qal)
		33-63	clay (Qbnl)
		63-72	till (Qt)
		72-82	shale
352	NJGS files	0-39	water
	Port Newark	39-41	organic silt (Qm)
	boring 363	41-50	clay with gravel (Qal?)
		50-62	clay (Qbnl)
		62-67	shale
353	NJGS files	0-18	cinders, silt, clay (fill)
	Port Newark	18-29	sand (Qal)
	boring 280	29-38	silt and clay (Qbnl)
		38-65	clay (Qbnl)
		65-79	sandy silty clay (Qbnl)
		79-87	till (Qt)
		87-97	shale
354	NJGS files	0-5	clay fill
		5-19	mud (Qm)
		19-23	gray fine sand, some clay (Qal)
		23-31	grayish brown sand (Qal)
		31-66	red clay (Qbnl)
		66-71	clay and gravel (Qt)
		at 71	rock
355	NJGS files	0-8	sand, gravel fill
	Port Newark	8-21	organic silt, peat (Qm)
	boring 210	21-32	silty sand (Qal)
		32-44	clayey silt (Qbnl)
		44-64	silty clay (Qbnl)
		64-67	sandy silty clay (Qbnl)
		67-70	silty clay (Qbnl)
		70-74	till (Qt)
356	NJGS files	0-22	water
	Port Newark	22-35	organic silt (Qm)
	boring 220	35-67	clayey silt (Qbnl)
		67-88	sandy silty clay (Qbnl)
		88-96	till (Qt)

357	NJGS files	0-5	water
	Port Newark	5-48	silty clay (Qbnl)
	boring 223	48-53	silt (Qbnl)
		53-77	silty clay (Qbnl)
		77-83	shale
358	Lovegreen, 1974	0-9	gray organic silt (Qm)
	fig. 17	9-15	brown sand (Qal)
		15-53	reddish brown varved clay and silt (Qbnl)
		53-55	red sandstone
359	Lovegreen, 1974	0-15	gray organic silt (Qm)
	fig. 17	15-25	reddish brown varved clay and silt
		25-39	red sandstone
360	Lovegreen, 1974	0-9	fill
	fig. 17	9-18	gray organic silt (Qm)
		18-54	reddish brown varved clay and silt
		54-59	red sandstone
361	Lovegreen, 1974	0-18	fill
	fig. 17	18-26	brown sand (Qal)
		26-60	reddish brown varved clay and silt
		60-61	red sandstone
362	Lovegreen, 1974	0-14	gray organic silt (Qm)
	fig. 17	14-18	brown sand (Qal)
		18-53	reddish brown varved clay and silt (qbnl)
		53-55	red sandstone
363	Lovegreen, 1974	0-8	fill
	fig. 17	8-15	gray organic silt (Qm)
		15-35	brown sand (Qal)
		35-38	reddish brown varved clay and silt (Qbnl)
		38-41	red sandstone
364	Lovegreen, 1974	0-11	gray organic silt (Qm)
	fig. 17	11-42	brown sand (Qal)
		42-45	reddish brown varved clay and silt (Qbnl)
		45-50	red sandstone
365	Lovegreen, 1974	0-38	gray organic silt (Qm)
	fig. 17	38-55	reddish brown varved clay and silt (Qbnl)
		55-65	red sandstone
366	Lovegreen, 1974	0-30	gray organic silt (Qm)
	fig. 17	30-47	gray sand (Qal)
		47-92	reddish brown varved silt and clay (Qbnl)
		92-101	red sandstone
367	Lovegreen, 1974	0-8	fill
	fig. 17	8-39	gray organic silt (qm)
		39-94	reddish brown varved silt and clay (Qbnl)
		94-110	red sandstone
368	Lovegreen, 1974	0-21	gray organic silt (Qm)
	fig. 17	21-60	reddish brown varved silt and clay (Qbnl)
		60-70	red sandstone
369	NJGS files	abbreviated log	
	Newark Bay	0-20	black organic silty clay and peat (Qm)
	boring 3025	20-27	gray to reddish brown fine sand, trace silt and gravel (Qal)
		27-88	red-brown varved silty clay (Qbnl)
		88-95	red-brown silty clay, some gravel (Qt)

		95-105	red shale
370	NJGS files	abbreviated log	
	Newark Bay	0-30	brown fine sand fill
	boring 3136	30-43	brown to gray fine sand, little silt, trace gravel (Qal)
		43-105	red-brown varved clayey silt to silty clay (Qbnl)
		105-114	red shale
371	NJGS files	abbreviated log	
	Newark Bay	0-20	brown sand to black silty clay fill
	boring 3023	20-40	gray organic silty clay, trace fine sand, trace shells (Qm)
		40-90	red-brown varved silty clay (Qbnl)
		90-93	red-brown clayey silt, trace gravel, trace red shale (Qt)
		93-113	red shale
372	NJGS files	abbreviated log	
	Newark Bay	0-2	water
	boring 3103	2-17	gray organic silty clay (Qm)
		17-30	gray fine sand, little silt (Qal)
		30-95	red-brown varved clayey silt (Qbnl)
		95-101	red-brown clayey silt, trace red shale fragments (Qt)
		101-106	red shale
373	NJGS files	abbreviated log	
	Newark Bay	0-4	water
	boring 3098	4-17	black to dark gray organic silty clay, trace fine sand, trace shells (Qm)
		17-30	gray fine sand, trace silt and gravel (Qal)
		30-85	red-brown varved silty clay (Qbnl)
		85-91	red-brown clayey silt, trace gravel, little red shale (Qt)
		91-101	red shale
374	NJGS files	abbreviated log	
	Newark Bay	0-10	water
	boring 3042	10-30	gray to black organic silty clay, little shells and fine sand (Qm)
		30-35	brown coarse-to-fine sand, some gravel (Qal)
		35-95	red-brown varved silty clay (Qbnl)
		95-105	red shale
375	NJGS files	0-7	water
	Port Newark	7-24	organic silt and sandy silt (Qm)
	boring 262	24-43	clayey silt (Qbnl)
		43-61	sandy silty clay (Qbnl)
		61-70	till (Qt)
		70-75	shale
376	NJGS files	abbreviated log	
	Newark Bay	0-3	water
	boring 3021	3-24	black, gray organic silty clay, trace fine sand (Qm)
		24-95	red-brown varved silty clay (Qbnl)
		95-100	red shale
377	NJGS files	abbreviated log	
	Newark Bay	0-2	water
	boring 3091	2-20	black organic silty clay, trace fine sand (Qm)
		20-25	brown fine sand, trace silt and gravel (Qal)
		25-89	red-brown varved silty clay (Qbnl)
		89-96	red shale
378	NJGS files	abbreviated log	
	Port Newark	0-21	organic silt (Qm)
	boring 27	21-27	silty sand (Qal)
		27-58	silty clay (Qbnl)
		58-63	shale

379	NJGS files	0-9	gravel (fill)
	Port Newark	9-14	organic silt (Qm)
	boring 14	14-22	clayey silt (Qm)
		22-29	sand (Qal)
		29-34	silty clay (Qbnl)
		34-61	sandy silty clay (Qbnl)
		61-69	till (Qt)
		at 69	refusal on rock
380	NJGS files	0-7	clayey silt (Qm)
	Port Newark	7-18	organic silt and peat (Qm)
	boring 4	18-22	silty sand (Qal)
		22-34	silt (Qbnl)
		34-39	silty clay (Qbnl)
		39-54	sandy silty clay (Qbnl)
		54-63	till (Qt)
		63-69	shale
381	NJGS files	0-11	organic silt (Qm)
	Port Elizabeth	11-14	organic sand (Qal)
	boring 38	14-20	sandy silt (Qal)
		20-40	silty clay (Qbnl)
		40-52	till (Qt)
		52-57	shale
382	NJGS files	0-12	organic silt (Qm)
	Port Elizabeth	12-20	silty sand (Qal)
	boring 6	20-43	sandy silt (Qal)
		43-62	sandy silty clay (Qbnl)
		62-72	till (Qt)
		72-77	shale
383	NJGS files	0-18	peat and organic silt (Qm)
	Port Elizabeth	18-29	sand (Qal)
	boring 20	29-36	silty sand (Qal)
		36-49	silty clay (Qbnl)
		49-53	clayey silt (Qbnl)
		53-63	sandy silty clay (Qbnl)
		63-72	silty clay (Qbnl)
		72-79	till (Qt)
		79-84	shale
384	NJGS files	0-13	organic silt (Qm)
	Port Elizabeth	13-23	silty sand (Qal)
	boring 28	23-29	sandy silt (Qal)
		29-69	sandy silty clay (Qbnl)
		69-71	silty clay (Qbnl)
		71-74	till (Qt)
		74-84	shale
385	NJGS files	0-8	organic silt and peat (Qm)
	Port Elizabeth	8-18	silty sand (Qal)
	boring 2	18-27	silty clay (Qbnl)
		27-32	shale
386	NJGS files	abbreviated log	
	Port Elizabeth	0-15	organic silt and peat (Qm)
	boring 11	15-27	silty sand (Qal)
		27-33	sandy silt (Qal)
		33-71	silty clay (Qbnl)
		71-77	till (Qt)
		77-85	shale
387	NJGS files	abbreviated log	

	Port Elizabeth	0-9	organic silt (Qm)
	boring 24	9-25	silty sand (Qal)
		25-33	sandy silt (Qal)
		33-60	silty clay (Qbnl)
		60-61	till (Qt)
		61-66	shale
388	NJGS files	0-13	organic silt and peat (Qm)
	Port Elizabeth	13-28	silty sand (Qal)
	boring 34	28-39	sandy silt (Qal)
		39-71	silty clay (Qbnl)
		71-81	till (Qt)
		81-101	shale
389	NJGS files	abbreviated log	
	Port Elizabeth	0-15	organic silt and peat (Qm)
	boring 16	15-25	silty sand (Qal)
		25-38	sandy silt (Qal)
		38-77	sandy silty clay (Qbnl)
		77-79	decomposed shale (Qt?)
		79-89	shale
390	NJGS files	abbreviated log	
	Port Elizabeth	0-11	organic silt, sand, peat (Qm)
	boring 32	11-23	silty sand (Qal)
		23-35	sandy silt (Qal)
		35-70	silty clay (Qbnl)
		70-74	till (Qt)
		74-79	shale
391	NJGS files	abbreviated log	
	Port Elizabeth	0-12	organic silt and peat (Qm)
	boring 9	12-37	silty sand, sand (Qal)
		37-53	silty clay (Qbnl)
		53-54	decomposed shale (Qt?)
392	NJGS files	abbreviated log	
	Port Elizabeth	0-16	organic silt and peat (Qm)
	boring 22	16-38	silty sand to sandy silt (Qal)
		38-76	silty clay (Qbnl)
		76-77	decomposed shale (Qt?)
		77-82	shale
393	NJGS files	abbreviated log	
	Port Elizabeth	0-11	organic silt and peat (Qm)
	boring 36	11-40	sand, silty sand (Qal)
		40-84	silty clay (Qbnl)
		84-95	till (Qt)
		95-110	shale
394	NJGS files	0-3	water
	Port Elizabeth	3-17	organic silt (Qm)
	boring 801	17-34	silty sand (Qal)
		34-73	silty clay (Qbnl)
		73-83	till (Qt)
		83-94	rock
395	NJGS files	0-2	water
	Port Elizabeth	2-15	organic silt (Qm)
	boring 636	15-29	silty sand and gravel (Qal)
		29-70	silty clay (Qbnl)
		70-80	till (Qt)
		80-91	rock
396	NJGS files	abbreviated log	

	Port Elizabeth	0-8	water
	boring 30	8-15	organic silt and sand (Qm)
		15-28	silty sand and sand (Qal)
		28-63	silty clay (Qbnl)
		63-85	till (Qt)
		85-90	shale
397	NJGS files	0-20	water
	U. S. Army	20-25	mud and sand (Qm)
	Corps of Engineers	25-31	sand (Qal)
	boring 142	31-38	stiff clay (Qbnl)
398	NJGS files	abbreviated log	
	Newark Bay	0-7	water
	boring 3107	7-22	gray organic silty clay, trace fine sand, trace shells (Qm)
		22-29	gray fine sand, trace silt, trace gravel (Qal)
		29-66	red-brown varved silty clay (Qbnl)
		66-71	brown and white sandstone, red shale
399	NJGS files	0-15	water
	U. S. Army	15-26	mud (Qm)
	Corps of Engineers	26-28	sand (Qal)
	boring 120	28-30	clay and gravel (Qal)
		30-43	clay (Qbnl)
400	NJGS files	0-16	water
	U. S. Army	16-24	mud and sand (Qm)
	Corps of Engineers	24-28	sand and gravel (Qal)
	boring 117	28-39	clay (Qbnl)
401	NJGS files	0-2	water
	Port Elizabeth	2-14	organic sand (Qm)
	boring 649	14-25	sand (Qal)
		25-68	clayey silt (Qbnl)
		68-75	till (Qt)
		75-85	rock
402	NJGS files	0-4	water
	Port Elizabeth	4-15	peat, organic sand (Qm)
	boring 837	15-20	sand (Qal)
		20-50	silty clay (Qbnl)
		50-69	till (Qt)
		69-75	rock
403	NJGS files	abbreviated log	
	Allied Chemical	0-9	rubbish and silt fill
	boring 12-2	9-21	fibrous peat and organic silt (Qm)
		21-32	red-gray fine sand (Qal)
		32-57	red clayey silt (Qbnl)
		57-67	red clayey silt and coarse-to-fine gravel, with some coarse-to-fine sand (Qt)
404	NJGS files	abbreviated log	
	Allied Chemical	0-8	brown silt and fine sand to red coarse-to-fine sand--hydraulic fill
	boring 22-8	8-19	peat and gray organic silt (Qm)
		19-50	brown silt and fine sand (Qbnl)
		50-66	red clayey silt, some fine sand and angular cherty gravel (Qt)
405	NJGS files	abbreviated log	
	Allied Chemical	0-8	brown silt--hydraulic fill
	boring 22-7	8-14	peat, organic silt (Qm)
		14-29	gray coarse-to-fine sand, some gravel (Qal)
		29-50	red varved silt to clayey silt (Qbnl)

		50-65	red clayey silt, some coarse-to-fine gravel, little coarse-to-fine sand, boulders (Qt)
406	NJGS files	abbreviated log	
	Allied Chemical	0-9	brown silt--hydraulic fill
	boring 22-5	9-15	fibrous peat and organic silt (Qm)
		15-30	brown medium-to-fine sand (Qal)
		30-59	red varved silt and fine sand (Qbnl)
		59-65	red coarse-to-fine sand, some coarse-to-fine gravel, little clayey silt (Qt)
407	NJGS files	abbreviated log	
	Allied Chemical	0-8	brown silt--hydraulic fill
	boring 22-6	8-16	fibrous peat (Qm)
		16-30	gray medium-to-fine sand, trace silt (Qal)
		30-49	brown varved silt and fine sand (Qbnl)
		49-61	red clayey silt, some gravel, little fine sand (Qt)
408	NJGS files	abbreviated log	
	Allied Chemical	0-16	fibrous peat and gray organic silt (Qm)
	boring 12-4	16-26	gray medium-to-fine sand, little gravel and silt (Qal)
		26-70	red varved clayey silt (Qbnl)
		70-76	red clayey silt and decomposed shale gravel, little fine sand, stiff (Qt)
409	NJGS files	abbreviated log	
	Allied Chemical	0-7	cobbly gravelly sand--hydraulic fill
	boring 32-6	7-13	gray organic silt (Qm)
		13-22	red coarse-to-fine sand, some gravel (Qal)
		22-43	reddish-brown coarse-to-fine sand, trace silt (Qal or Qbnl)
		43-58	reddish brown varved silt and fine sand (Qbnl)
		58-60	reddish brown sandy silt and gravel (Qt)
410	NJGS files	0-2	water
	Port Elizabeth	2-9	peat (Qm)
	boring 817	9-35	silty sand (Qal)
		35-58	silty clay (Qbnl)
		58-72	till (Qt)
		72-82	rock
411	NJGS files	0-3	water
	Port Elizabeth	3-14	peat and organic sand (Qm)
	boring 814	14-20	silty sand (Qal)
		20-51	silty clay (Qbnl)
		51-64	till (Qt)
		64-74	rock
412	NJGS files	abbreviated log	
	Allied Chemical	0-6	red to brown cobbly gravel and sand (fill)
	boring 32-3	6-13	gray organic sand, little silt (Qm)
		13-45	gray to grayish red coarse-to-fine sand, some silt and gravel (Qal)
		45-58	red clayey silt (Qbnl)
		58-65	red clayey silt, some coarse-to-fine sand and gravel, boulders (Qt)
413	NJGS files	abbreviated log	
	Allied Chemical	0-4	cobbly gravelly sand--hydraulic fill
	boring 32-1	4-14	gray organic silt, some shells (Qm)
		14-43	gray medium-to-fine sand, trace silt (Qal)
		43-53	gray clayey silt, little fine sand (Qbnl)
		53-65	red clayey silt, some silt and gravel, boulders (Qt)
414	NJGS files	0-18	water

	Port Elizabeth	18-22	peat (Qm)
	boring 823	22-61	silty clay (Qbnl)
		61-66	till (Qt)
		66-76	rock
415	NJGS files	0-7	water
	U. S. Army	7-16	sand and shells (Qm)
	Corps of Engineers	16-26	clay and shale (Qt)
	boring 181	at 26	shale
416	NJGS files	0-17	water
	U. S. Army	17-37	clay and shale (Qt)
	Corps of Engineers	at 37	stiff clay (Qt?)
	boring 182		
417	NJGS files	0-17	water
	U. S. Army	17-25	sand (Qm over Qal)
	Corps of Engineers	25-38	stiff clay (Qbnl)
	boring 179		
418	NJGS files	0-28	water
	U. S. Army	28-32	sand (Qm or Qal)
	Corps of Engineers	32-34	hard gravel (Qt)
	boring 178	34-35	hard clay and shale (Qt)
		at 35	shale rock
419	NJGS files	0-12	water
	U. S. Army	12-15	mud (Qm)
	Corps of Engineers	15-17	sand (Qal)
	boring 177	17-32	stiff clay (Qbnl)
		at 32	rock
420	NJGS files	0-18	water
	U. S. Army	18-32	mud, sand, shells (Qm)
	Corps of Engineers	32-34	sand (Qal)
	boring 183	34-37	clay and shale (Qt)
		at 37	shale
421	NJGS files	0-18	water
	U.S. Army	18-21	gravel (Qt?)
	Corps of Engineers	at 21	hardpan or rock (Qt or bedrock)
	boring 203		
422	NJGS files	0-30	water
	U. S. Army	30-31	sand (Qm)
	Corps of Engineers	at 31	rock
	boring 186		
423	NJGS files	0-4	water
	U. S. Army	4-9	sand (Qm)
	Corps of Engineers	9-12	clay (Qbnl or Qt)
	boring 199	12-13	clay and shale (Qt)
		at 13	shale rock
424	NJGS files	abbreviated log	
	Bayonne bridge	0-24	red clay, sand, gravel (Qt)
	boring 70	24-30	trap rock
425	NJGS files	abbreviated log	
	Bayonne bridge	0-16	red clay, boulders, running sand (Qt)
	boring 106	at 16	rock
426	NJGS files	abbreviated log	
	Bayonne bridge	0-8	cinders (fill)
	boring 37	8-14	mud and silt (Qm)

		14-16	gray fine sand (Qe)
		16-19	sand and gravel (Qt)
		19-29	trap rock
427	NJGS files	abbreviated log	
	Bayonne bridge	0-9	water
	boring 30	9-14	mud and silt (Qm)
		14-23	rock
428	NJGS files	0-6	water
	Bayonne bridge	6-21	mud and silt (Qm)
	boring 17	21-31	rock
429	NJGS files	0-21	water
	U. S. Army	21-23	boulders (Qt? or bedrock)
	Corps of Engineers		
	boring 85		
430	NJGS files	0-22	water
	U. S. Army	22-32	sand and boulders (Qt)
	Corps of Engineers	at 32	rock
	boring 87		
431	NJGS files	0-30	water
	U. S. Army	30-31	rock or boulder (bedrock)
	Corps of Engineers		
	boring 88		
432	NJGS files	0-3	water
	U. S. Army	3-15	mud and shells (Qm)
	Corps of Engineers	15-19	sand (Qal)
	boring 167	19-31	sand and gravel (Qbn?)
433	NJGS files	0-16	water
	U. S. Army	16-19	mud (Qm)
	Corps of Engineers	19-26	gravel (Qal)
	boring 168	26-36	hard clay (Qbnl)
		at 36	hard clay or shale
434	NJGS files	0-24	water
	U. S. Army	24-31	mud (Qm)
	Corps of Engineers	31-34	sand (Qal)
	boring 57	34-39	clay (Qbnl)
435	NJGS files	0-14	water
	U. S. Arrmy	14-25	clay (Qt or Qm)
	Corps of Engineers	at 25	rock
	boring 13		
436	NJGS files	0-15	water
	U. S. Arrmy	15-23	clay (Qt or Qm)
	Corps of Engineers	at 23	rock
	boring 1		
437	NJGS files	0-24	water
	U. S. Arrmy	24-29	clay (Qt or Qm)
	Corps of Engineers	at 29	rock
	boring 2		
438	NJGS files	0-18	water
	U. S. Arrmy	18-20	sand and clay (Qt)
	Corps of Engineers	at 20	rock
	boring 5		
439	NJGS files	0-20	water

	U. S. Arrmy	20-24	sand (Qm or Qbn)
	Corps of Engineers	24-27	gravel (Qal or Qbn)
	boring 3	at 27	rock
440	NJGS files	0-1	water
	U. S. Arrmy	1-16	mud (Qm)
	Corps of Engineers	16-21	sand (Qal)
	boring 7	21-30	clay (Qt or Qbnl)
		at 30	rock
441	NJGS files	0-1	water
	U. S. Arrmy	1-20	mud (Qm)
	Corps of Engineers	20-24	sand (Qal)
	boring 8	24-28	clay (Qt or Qbnl)
		at 28	rock
442	NJGS files	0-10	water
	U. S. Arrmy	10-23	mud (Qm)
	Corps of Engineers	23-26	sand (Qal)
	boring 9	at 26	rock
443	NJGS files	0-16	water
	U. S. Arrmy	16-31	clay (Qt or Qbnl)
	Corps of Engineers	at 31	rock
	boring 11		
444	NJGS files	0-1	water
	U. S. Arrmy	1-17	mud (Qm)
	Corps of Engineers	17-20	sand (Qal)
	boring 10	20-27	clay (Qbnl or Qt)
		at 27	rock
445	NJGS files	0-1	water
	U. S. Arrmy	1-18	mud (Qm)
	Corps of Engineers	18-25	sand (Qal)
	boring 12	25-28	clay (Qbnl or Qt)
		at 28	rock
446	NJGS files	0-12	water
	U. S. Arrmy	12-15	mud (Qm)
	Corps of Engineers	15-23	clay (Qbnl or Qt)
	boring 14	at 23	rock
447	N 26-12-976	0-267	silt and clay (Qpt over Qbnl)
		267-272	gravel--cobbles of gneiss, baked shale, sandstone, up to 4 inches in diameter (Qbnf)
448	NJGS files	0-30	clay (Qbn or fill)
	Newark subway	30-50	fine sand and clay (Qbn, Qbnl)
	boring 5		
449	NJGS files	0-35	sand, gravel (Qbn)
	Newark subway	at 35	red shale and sandstone
	boring 7A		
450	NJGS files	0-20	sand (Qt or fill)
	Newark subway	20-28	sand and clay (Qt)
	boring 25		
451	Smock, 1891, p. 262	0-225	alternating layers of sand and clay (Qbn over Qbnl)
452	N 26-22-232	foundation exposure shows	
		0-25	glacial sand and gravel (Qbn)
		25-39	very compact, tough red stony clay till (Qt)

		at 39	red sandstone
453	NJGS files	0-8	water
	Stickle bridge	8-30	(no log, probably Qal over Qbn)
	boring 22	30-37	red silty sand and gravel (Qbn)
		37-39	red clay with fragments of red shale (Qt)
		39-49	red sandy shale and argillaceous red sandstone
454	NJGS files	0-15	(no log, probably fill over Qpt)
	Stickle bridge	15-37	red clayey sand and gravel (Qpt)
	boring 31	37-76	red clayey silty very fine sand (Qbnl)
		76-86	red shale and sandstone
455	26-10495	abbreviated log	
		0-66	red hard silt, little fine-to-coarse sand, little gravel, trace clay (Qt)
		66-69	red weathered shale

[1]Numbers of the form 26-xxxx are well permit numbers issued by the N. J. Department of Environmental Protection, Bureau of Water Allocation. Numbers of the form N 26-xx-xxx are N. J. Atlas Sheet grid locations of entries in the N. J. Geological Survey permanent note collection. The notation “NJGS files” indicates borings from various construction or dredging projects that are on file at the N. J. Geological Survey but that are not entered into the permanent note collection. The notation “BWA files” followed by a N. J. Atlas Sheet grid location indicates borings with logs in the Bureau of Water Allocation files that do not have well permit numbers. Notations of the form “Lovegreen, 1974" refer to logs provided in the cited publications.

[2]Depth in feet below ground or water surface.

[3]Inferred map units and comments by author in parentheses. All descriptions are reproduced as they appear in the original source, except for minor format, spelling, and punctuation changes. Notation “NR” indicates “not reported’. Logs identified as abbreviated have been condensed for brevity. Map units are inferred from the known extent of materials at the surface and from known depositional settings, in addition to the driller’s descriptions.