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Detailed Sections From Auger Holes in the Elizabethtown 1:100,000-Scale Quadrangle, North Carolina

By Robert E. Weems, William C. Lewis, Joseph H. Murray, David B. Queen, Jeffrey B. Grey, and Benjamin D. DeJong

Open-File Report 2011–1115

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
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U.S. Geological Survey, Reston, Virginia: 2011

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Suggested citation:
Weems, R.E., Lewis, W.C., Murray, J.H., Queen, D.B., Grey, J.B., and DeJong, B.D., 2011, Detailed sections from auger holes in the Elizabethtown 1:100,000-scale map sheet, North Carolina: U.S. Geological Survey Open-File Report 2011–1115, 286 p.

Cover: Southeast shore of White Lake, Bladen County, N.C. This lake, one of five natural lakes in the Elizabethtown 1:100,000 quadrangle, fills a Carolina bay that formed in dune sands of the Pinehurst Formation. Photograph by Robert E. Weems (U.S. Geological Survey).

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Conversion Factors

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
mile, nautical (nmi)	1.852	kilometer (km)
yard (yd)	0.9144	meter (m)
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
meter (m)	1.094	yard (yd)

Detailed Sections From Auger Holes in the Elizabethtown 1:100,000-Scale Quadrangle, North Carolina

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Introduction

The Elizabethtown 1:100,000 quadrangle is in the west-central part of the Coastal Plain of southeastern North Carolina (fig. 1). The Coastal Plain, in this region, consists mostly of unlithified sediments that range in age from Late Cretaceous to Holocene. These sediments lie with profound unconformity on complexly deformed metamorphic and igneous rocks similar to rocks found immediately to the west in the Piedmont province. Coastal Plain sediments generally dip gently to the southeast or south and reach a maximum thickness of about 850 feet (ft) in the extreme southeast part of the map area (fig. 2). The gentle southerly and southeasterly dip is disrupted in several areas by faulting.

The U.S. Geological Survey (USGS) recovered one core and augered 196 research test holes in the Elizabethtown 1:100,000 quadrangle to supplement sparse outcrop data in the map area. The recovered sediments were studied and data from these sediments recorded to determine the lithologic characteristics, spatial distribution, and temporal framework of the represented Coastal Plain stratigraphic units. These test holes were critical for accurately determining the distribution of major geologic units and the position of unit boundaries on the Elizabethtown geologic map (Weems and others, 2011); however, because much of the detailed subsurface data cannot be shown readily by means of this quadrangle map, detailed descriptions (appendix 1) have been collected in this open-file report for geologists, hydrologists, engineers, and community planners to provide a detailed shallow-subsurface stratigraphic framework for the Elizabethtown map region.

Methods

Surface elevations for each drill site were obtained by hand leveling from a known elevation, commonly a bench mark or spot elevation point on the appropriate 7.5-minute quadrangle. Lithologic data were gathered at each test site by augering with a truck-mounted, Mobile Drill B–40 power auger equipped with 5-ft-long drill stem sections. First one stem was augered into the ground and pulled to describe the soil profile. Subsequent runs added one, two, or three new stems, depending on depth and the ease of augering. The sample rise on the drill stems was kept to a minimum for greater accuracy.

Auger holes generally targeted the upper few feet of the Upper Cretaceous Cape Fear or Tar Heel Formations, except in the far eastern map region where the Upper Cretaceous Bladen Formation, the Upper Cretaceous Donoho Creek Formation, or the middle Eocene Castle Hayne

Limestone marked the deepest lithologic unit that could be readily reached with the B–40. Occasionally the drill bit would not penetrate an underlying lithified bed within the Coastal Plain section (here termed “refusal”). The nature of this rock unit sometimes could be inferred either by small chips on the end of the drill bit or by comparison to nearby outcrops or auger holes.

Lithologic descriptions were made by using a 10X hand lens, grain-size chart, and color charts. Auger sites were plotted on location with 7.5-minute topographic maps. Latitudes and longitudes were established either by using published USGS maps (North American Datum of 1927) or by using hand-held Garmin global positioning system (GPS) units.

Stratigraphy

A full listing of the stratigraphic names used here, their ages, and their general lithologic descriptions are given in table 1. Coastal Plain formational units are bounded by unconformities; formations generally start with a relatively coarse basal lag bed and fine upward. Members in formations, where present, generally represent distinctive lithologic facies that occur within that formation. Surficial stratigraphic units, bounding scarps, and overlying terrace surface names are summarized in table 2. Pre-Pliocene unit names mostly conform to those unit names used in this region by Owens (1989) and Sohl and Owens (1991). Names and definitions of Pliocene and Pleistocene terrace deposits largely follow the usages of Johnson and Berquist (1989) and Mixon and others (1989).

Older Coastal Plain units, mostly encountered in the shallow subsurface or along valley walls of deeply incised streams, include the Pleasant Creek Formation (Late Cretaceous, Coniacian and Santonian ages; documented in the map area only by Self-Trail, Wrege, and others (2004) from the deepest part of the Elizabethtown core), the updip and onshore lateral equivalent Cape Fear Formation (Late Cretaceous, Coniacian and Santonian ages), the Tar Heel Formation (Late Cretaceous, Campanian age), the Bladen Formation (Late Cretaceous, Campanian age), the Donoho Creek Formation (Late Cretaceous, Campanian age), the Castle Hayne Limestone (middle Eocene), and the Duplin Formation (late middle to late Pliocene). The subsurface distribution of these units is shown in figure 3.

The Cape Fear Formation was named for cross-bedded feldspathic sands that crop out in the northwestern map area along the lower Rockfish Creek. This unit appears to have been formed by anastomosing braided streams, which spread sand widely across the map area. In the eastern area, these deposits overlie and also seemingly intertongue with marine deposits of the age-equivalent Pleasant Creek Formation (Self-Trail, Prowell, and Christopher, 2004; Self-Trail, Wrege, and others, 2004).

The interbedded sands and clays of the overlying Tar Heel Formation, named for outcrops north of the community of Tar Heel along the Cape Fear River (Sohl and Owens, 1991), formed in marginal marine deltaic environments and contain abundant woody material, local diverse marine vertebrate faunas, and occasional remains of terrestrial vertebrates including dinosaurs (Miller, 1966, 1967, 1968; Baird and Horner, 1979; Robb, 1989; Self-Trail, Christopher, and others, 2004). Glauconitic sands in the Tar Heel Formation near Lumberton (auger holes SL–1–06 and SL–2–06) are probably the source of Late Cretaceous shark teeth reworked into the base of the Pliocene Duplin Formation in the Lumberton area (see appendix 3). These shark teeth attest to marine environments in the Lumberton area as early as the Campanian, and also attest to a steady westward expansion of the Coastal Plain marine depositional environment between the Santonian and Campanian ages.

The Bladen Formation overlies the Tar Heel Formation and is widespread across the eastern and southeastern map region (fig. 3). The Bladen Formation is well exposed at Walkers Bluff (Farrell and others, 2001) and documents another marked westward shift in the Coastal Plain depositional environment beyond that represented by the Tar Heel Formation. All deposits preserved in this map area represent shallow to mid-shelf marine environments, and the landward equivalents have been long since eroded away. The overlying Donoho Creek Formation is very similar lithologically to the Bladen Formation, but the Donoho Creek is consistently somewhat darker (almost always dark-olive-gray (5*Y* 3/1)). The pattern of distribution (fig. 3) strongly suggests an interval of erosion and channeling between the time the Bladen was deposited and the time the Donoho Creek was deposited. The contact between the Bladen and the Donoho Creek was encountered in three auger holes (RH–6–04, RH–9–04, RH–12–04), where a distinct lag bed marks the contact.

The limited spatial distribution of the Castle Hayne Limestone in the northeastern map area (fig. 3) suggests that the preserved deposits occupy a deeply incised paleo-valley system. The fabric, lithology, and fauna of the Castle Hayne, however, clearly show that its preserved deposits accumulated in a shallow to mid-shelf depositional environment that was far from any significant source of detrital sediment. Therefore, the preserved deposits did not form in restricted, estuarine environments as their channel-like geometry might suggest. Either fluvial-estuarine deposits, if once present, were swept away by submarine erosion, or else these channels were entirely sculpted by submarine erosion. This unit must have been continuous over much or all of the map area when it was originally deposited and only later was removed from most of the area by regional erosion.

The Duplin Formation was named from a collapsed sinkhole feature called Natural Well in the northeastern map area (fig. 1, locality WS–6–04). This unit is a very shelly sand deposit that contains a planktonic foraminiferal assemblage characteristic of Zone PL3 (Dowsett and Wiggs, 1992; Gradstein and others, 2004); the age of the Duplin is likely between 3.1 and 3.6 million years old (mega-annum, or Ma) (latest Zanclean and (or) early Piacenzian). Recent strontium dating of shells from outcrops along the Lumber River in the southwestern map area, however, suggests that the age of the Duplin there may range from 2.8 to 2.2 Ma (Graybill and others, 2009), which is younger than previously assumed. The Duplin generally has been considered to be time-equivalent to the upper part of the Yorktown Formation in northern North Carolina and Virginia, and quite possibly is equivalent in age to the unit immediately overlying the Rushmere and Morgarts Beach Members in the Roanoke Rapids region, called “Ty3” by Weems and Lewis (2007). Like the Castle Hayne, the Duplin has a very patchy distribution (fig. 3) but must have been present across all or most of the map area. These patchy remnants indicate that the map area, astride a zone of relative uplift called the Cape Fear arch, has been intermittently upwarped throughout most of the Cenozoic Era; however, the presence of late Pliocene and Quaternary terrace deposits that are not perceptibly warped indicates that this uplift has not been active during the last 3 million years.

Most of the surficial stratigraphic units that lie above the Duplin contain very similar facies that formed in fluvial, backbarrier, and sometimes barrier, shoreface, and near-shore depositional environments. These various units, where not heavily eroded, all fine upward to terrace surfaces that have regionally distinctive ranges of elevation. Each of these terrace packages represents an interglacial high stand of sea level. Continuous growth of the East Antarctic ice sheet over the past 2.8 million years (Barrett and others, 1992; Wilson, 1995; Ingólfsson, 2004) has prevented each successive terrace sequence from reaching the same elevation that the sequence reached during the preceding transgression because of steady net lowering of the world ocean; therefore, successively younger terraces form a downward-descending, stairstep sequence of flat-topped terraces separated

from each other by scarps that range from pronounced to subtle. Although each sequence is internally similar to the others, older terraces have progressively deeper and more pronounced weathering profiles and show progressively greater erosional degradation. Because each sequence becomes more nearly marine seaward (eastward), each unit shows an internal gradational shift southeastward toward finer lithologies, but shows an abrupt change from finer to coarser when moving from one terrace to the next younger one seaward. All of these criteria have been useful for distinguishing one terrace complex from another. Terrace, scarp, and formational usages are summarized in table 2.

The oldest terrace unit exposed in the map area consists of poorly sorted, clayey sand that occurs beneath a terrace that tops regionally at elevations ranging from 230 ft in the western part of its outcrop belt to 195 ft in the eastern part of its outcrop belt. This unit was named the Coharie Formation by Stephenson (1912), but since then the name has been restricted to terrace nomenclature (Colquoun, 1969). In the southeastern part of the Emporia 1:100,000-scale quadrangle, a thick estuary fill underlies a portion of this terrace and links it southeastward with sediments in the Chowan River area (Weems and others, 2010); therefore, the Coharie terrace unit appears to represent coastal and onshore strata that are age equivalent to the lower Pleistocene (Gelasian) Edenhouse Member of the Chowan River Formation (Blackwelder, 1981; Gibbard and others, 2010). This unit is most widespread in the far northwestern map area, but outliers also have been recognized and mapped in the central and northeastern area.

Terrace deposits between the elevations of 185 and 105 ft previously have been lumped together to the north in Virginia as the Bacons Castle Formation; however, two distinct units are represented in this complex, separated by a scarp at 137 to 147 ft. This scarp has been called the "Parler scarp" in South Carolina (Colquhoun, 1965) and the "Mechanicsville scarp" in northern South Carolina and southern North Carolina (DuBar and others, 1974). The name "Parler scarp" is used in this report. The older terrace deposit above the Parler scarp is designated as the "Varina Grove unit," after the Varina Grove Member of the Bacons Castle Formation as used by Johnson, Goodwin, and others (1987). The relative position of the Varina Grove unit in the regional stratigraphic system suggests that this unit may be the updip and nearshore to onshore equivalent of the Colerain Beach Member of the Chowan River Formation (Blackwelder, 1981).

The younger parts of what has been called the Bacons Castle Formation in Virginia are here assigned to the Waccamaw Formation and designated as the "Bahramsville unit" and the "Moorings unit" after the Bahramsville Member and the Moorings Member of the Bacons Castle Formation as used by Johnson, Goodwin, and others (1987) and Johnson, Ward and Peebles (1987). At Walkers Bluff in the southern part of the map southeast of Elizabethtown on the Cape Fear River, a shallow-shelf marine deposit is present that has been biostratigraphically dated as early Pleistocene (Newton and others, 1978; Graybill and others, 2009). This marine unit yields strontium ages (W. Burleigh Harris, University of North Carolina–Wilmington, oral commun., 2009; Badyrka and others, 2010) that are virtually identical to those ages from the type area of the Waccamaw Formation along the Waccamaw River (Dall, 1892; Blackwelder and Ward, 1979); therefore, this unit is assigned to the Waccamaw along with the conformably overlying Bahramsville and Moorings units. To avoid confusion, the shelly marine facies of the Waccamaw is here called the James City Member, after the James City Formation of DuBar and Solliday (1963), which is age equivalent to the marine beds of the Waccamaw Formation (Blackwelder, 1981). The marine beds have been traced in auger holes westward as far as Abbottsburg and Dublin, almost to the toe of the westernmost barrier ridge of the Moorings unit. Local rapid infilling of the coastal region during the Waccamaw transgression probably allowed successive barrier ridges to form

seaward of each other, burying these shallow-shelf marine sediments beneath successive, slightly younger and more seaward barriers. In other areas where multiple barrier ridges did not develop, age-equivalent shallow-shelf deposits were not preserved.

Similar lagoonal deposits closer to shore are associated with the next younger Windsor Formation near Rose Hill and Costin. These deposits are somewhat younger than the Waccamaw Formation but still early Pleistocene in age. In the past, the shelly parts of the Windsor often have been lumped together with the Waccamaw Formation. All younger Pleistocene units in the map area (the Charles City, Chuckatuck, Shirley, and Tabb Formations) represent nonmarine (fluvial to estuarine) marsh depositional environments. Their estuarine to marine facies are found only to the east and south of the map area.

Extensive sheets of dune sand (referred to the Pinehurst Formation in Weems and others, 2011) are present across all but the southeastern part of the map area and have been mapped as a separate unit distinct from the terrace deposits. Many have weak or no soil profile development and locally are often called “sugar sands” because they have only incipient soil profiles developed on them. Local deposits of this sort occur over a wide area in the Carolina and Georgia Coastal Plains (Markewich and Markewich, 1994) but are exceptionally thick and widespread in the Elizabethtown region. Two optically stimulated luminescence (OSL) ages from these dune sands in the map region indicate that they range in age at least from 8,575 ± 1,420 to 13,000 ± 930 years before present (B.P.) (one standard deviation (s.d.)) (Shannon A. Mahan, U.S. Geological Survey, written commun., 2005 and 2006, concerning localities HA–6–04 and AU–5–05, respectively). Radiocarbon ages from wood and peat samples taken from within these dune sand deposits in the map area yield ages ranging from 2,050 ± 40 to greater than 51,800 yrs B.P. (John P. McGeehin, U.S. Geological Survey, written commun., 2005, 2007, and 2008, concerning localities CC–1–07, CS–7–08, ES–4–08, HA–5–04, NL–2–06, SL–4–07, SL–6–07, and TO–3–08). These dates are consistent with other studies that indicate these dune fields and associated Carolina bays mostly formed during the Wisconsin glacial interval (Frey, 1953, 1955; Whitehead, 1964; Markewich and Markewich, 1994; Ivester and others, 2004, 2007), though the sands locally were reactivated in Holocene time. These deposits are closely associated with the “Carolina bays” (Johnson, 1942; Kaczorowski, 1977) that are prominent in this region, and the alignment of the dunes generally matches the long axis of the bays. Indeed, although some bays seem to represent wind-created deflation features, many seem to have resulted from ellipsoidal dune development that built up the bay rims above the terrace surfaces on which they rest. Where bays sit directly on older terrace surfaces that have thick, clay-rich weathering profiles, the underlying clayey soils block downward water percolation and tend to allow the bays to become swamps or lakes. Where bays resulted from wind-driven excavation and deflation, and the underlying materials consist of fairly fresh and unweathered sands, bays tend to be well drained through subsurface flow and do not contain swamps or lakes. The dune fields and bays appear to have formed through the action of persistent strong winds that blew from northwest to southeast during the Wisconsin glacial interval. These winds paralleled the edge of the great ice sheet that then covered northern North America and thus are probably eastward extensions of the wind patterns that formed the extensive wind-blown loess deposits of the central United States and the Sand Hills of Nebraska (Zanner and Kuzila, 2001).

In the Cape Fear River valley, alluvium occurs beneath two distinctly different terrace surfaces that have been mapped separately. A similar stratigraphy has been documented in the Roanoke River Valley (Weems and Lewis, 2007), and a sample from the basal sands beneath the higher (older) terrace deposit in the Roanoke River valley yielded a quartz blue-light OSL age of 17,200 ± 780 years B.P. (one s.d.). This age indicates that this unit in the Roanoke River valley is

no older than late Wisconsinan. The comparable terrace along the Cape Fear River also appears to represent a late Wisconsinan braided-river regime of the Cape Fear River that preceded a later post-Wisconsinan meandering-river regime (Leigh and others, 2004).

Structural Geology

Four faults (fig. 2) have been recognized in the Elizabethtown map area from anomalies in the Coastal Plain basement structure-contour map. These faults are the Clinton fault, the South River fault, the Turnbull fault, and the Cape Fear fault. A fifth structural feature, which marks the toe of a line of stream-gradient anomalies across the map area, appears to be a south-trending subsurface extension of the Tidewater Fall Line of Weems (1998). The Turnbull fault seems to deflect the course of the Cape Fear River to the south and also aligns with a remarkably straight region along Turnbull Creek. The South River also is remarkably linear along the trace of South River fault, and the zone of gradient anomalies has an obvious effect on most of the major stream gradients that cross the fault. No obvious surficial expression of the Clinton fault or the Cape Fear fault was observed within the map area.

Hydrogeology

In the map region, the surficial aquifer generally lies at the base of the surficial terrace unit. The surficial aquifer is the main stream recharge unit throughout the map area, and this aquifer is quite vulnerable to the introduction of surface pollutants. The geometry of the base of this aquifer is shown in figure 4. Deeper wells in the area generally tap aquifer horizons in the Cape Fear or Tar Heel Formations. These aquifers also are frequently tapped to the southeast as far as Wilmington, N.C., and overdrawing water from these aquifers could result in saltwater intrusion in the coastal regions to the southeast.

Acknowledgments

The authors would like to thank Lucy E. Edwards and Jean M. Self-Trail of the USGS for their thorough review of this manuscript. We also are grateful to Jean M. Self-Trail (USGS) for her numerous nannofossil identifications, which greatly helped in sorting out the very similar facies of the Bladen Formation, Donoho Creek Formation, and Castle Hayne Limestone in the eastern map area, and to Lucy E. Edwards for making dinoflagellate identifications from auger hole TH–1–06 that greatly helped in constraining the age of the basal unit in that hole. Finally, we thank Shannon A. Mahan (USGS) and John P. McGeehin (USGS) for providing very helpful OSL and carbon-14 dates on samples from various late Pleistocene units in the map area.

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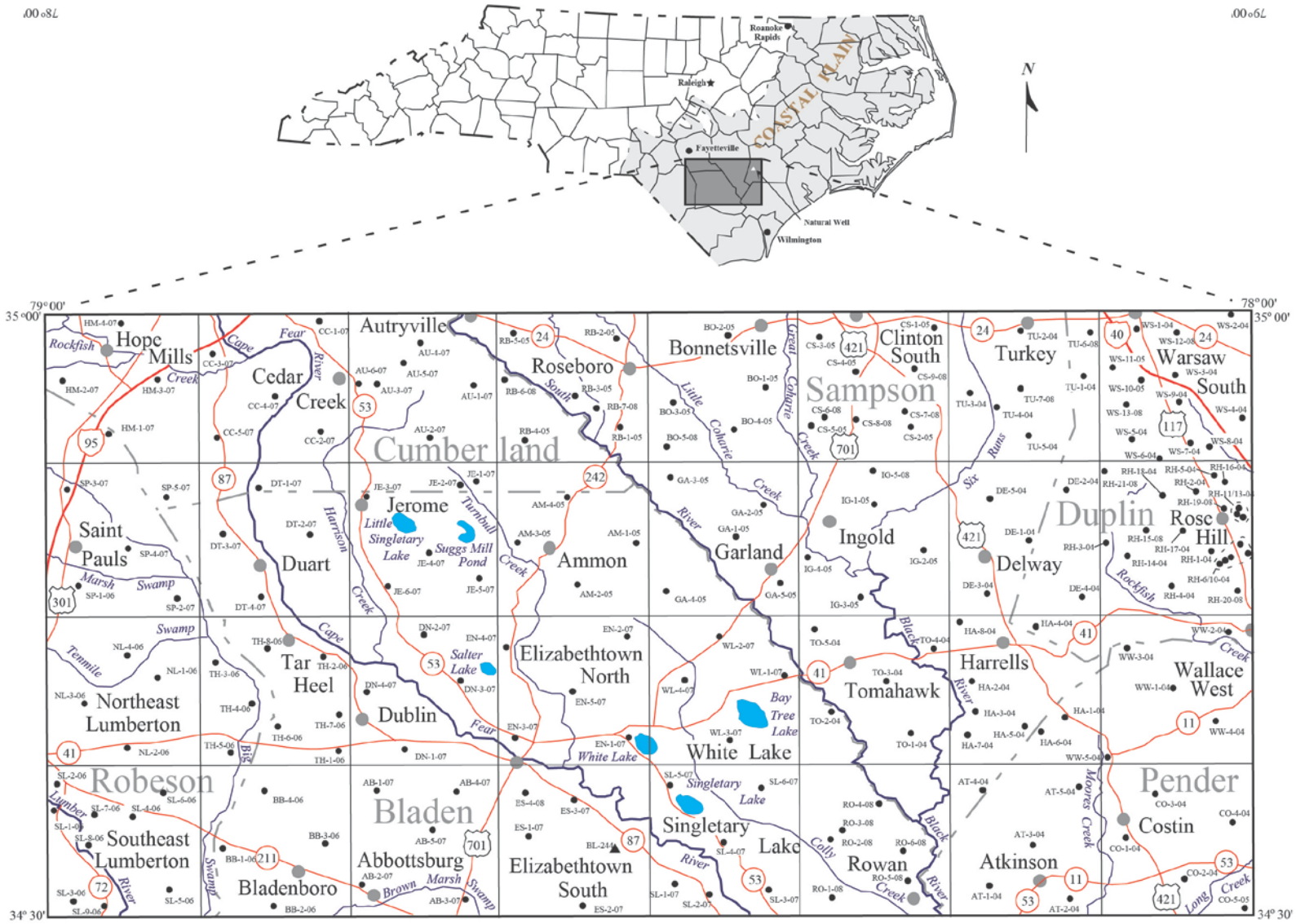

Figure 1. Map of the Elizabethtown 1:100,000-scale quadrangle showing names and locations of constituent 1:24,000-scale topographic maps, county names and boundaries, and auger-hole locations (small black circles). Base from U.S. Geological Survey State Map Index, 2001.

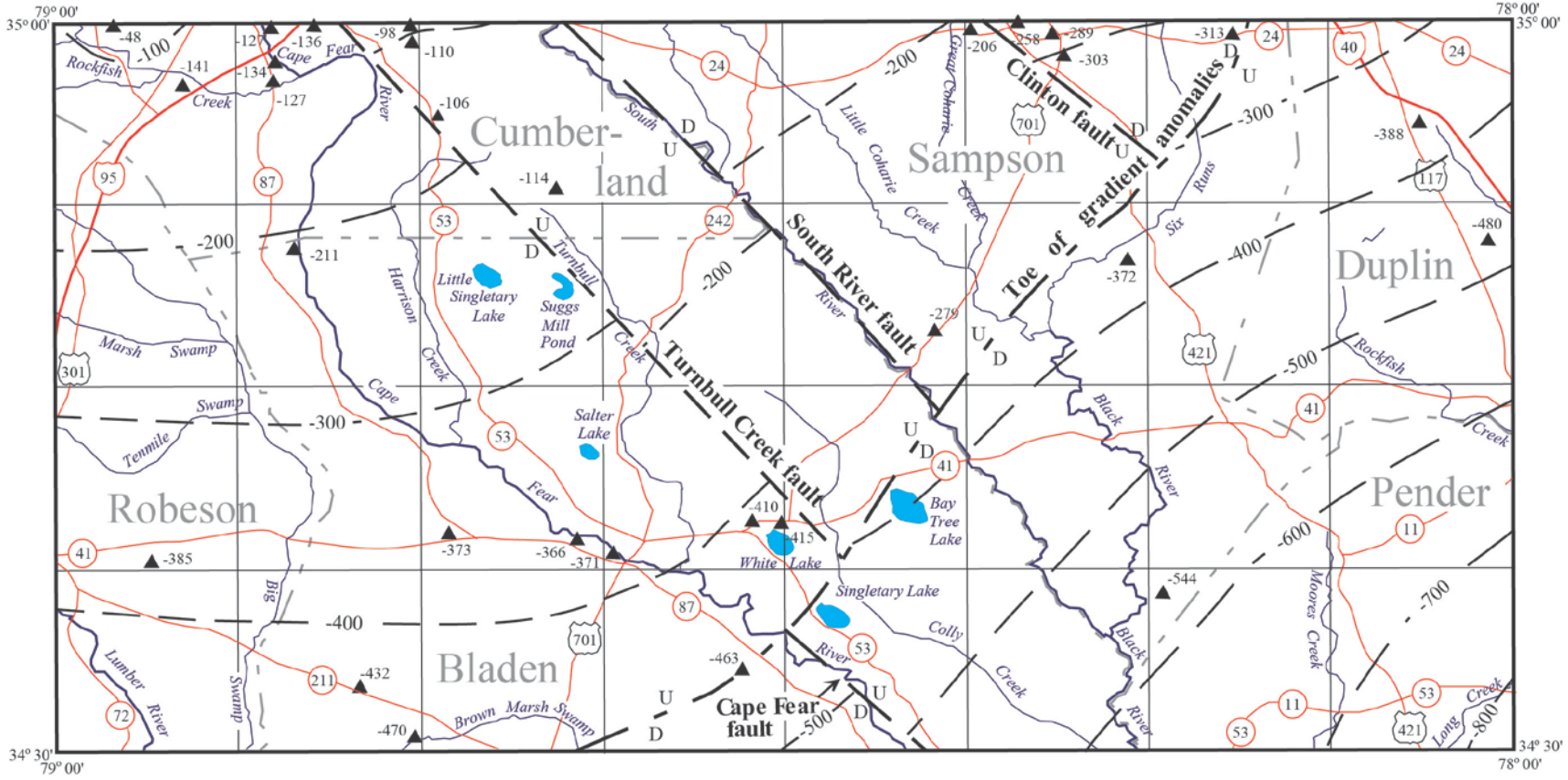

Figure 2. Structure-contour map of the Elizabethtown 1:100,000-scale quadrangle showing the base of the Coastal Plain. Structure contours (short-dashed lines) are in feet below sea level. Faults shown by long-dashed bold lines; U, upthrown block; D, downthrown block. Basement control points are shown by black triangles; values shown are in feet below sea level. The toe of gradient anomalies line (shown by the bold long- and short-dashed line) indicates the downstream end of a series of steepened stream gradients that are interpreted to mark the trace of a reactivated basement fault that moved up on its western side recently enough to prevent the intersected stream gradients from re-equilibrating. Base from U.S. Geological Survey State Map Index, 2001.

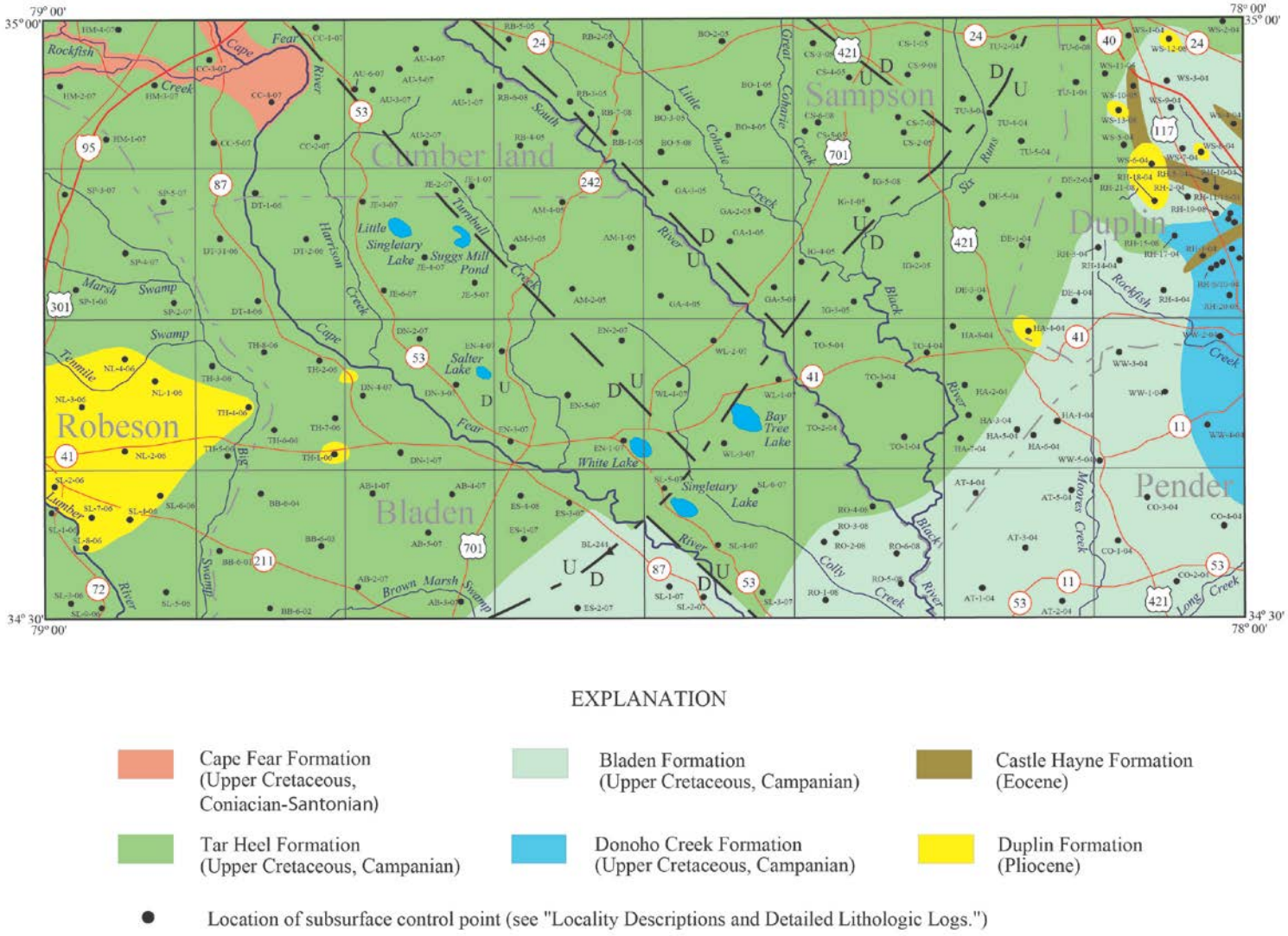

Figure 3. Generalized geologic map of the Elizabethtown 1:100,000-scale quadrangle showing faults and the subsurface distribution of Duplin Formation and older units beneath the Pliocene to Pleistocene terrace units. Subsurface control points (black circles) are described in “Locality Descriptions and Detailed Lithologic Logs.” Base from U.S. Geological Survey State Map Index, 2001.

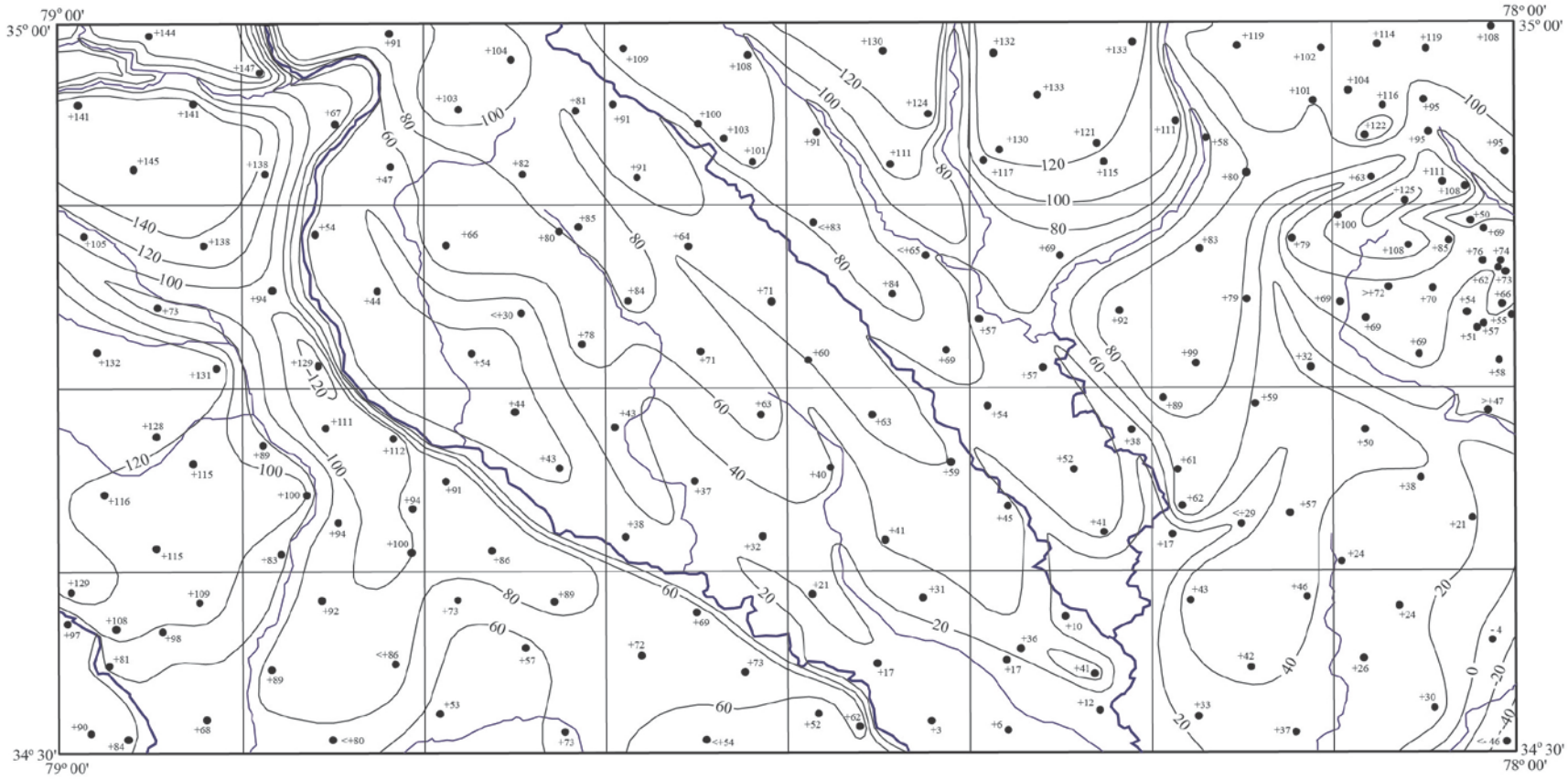

Figure 4. Structure-contour map of the Elizabethtown 1:100,000-scale quadrangle showing the base of the surficial aquifer. Subsurface control points are shown by black circles; values shown are elevations (in feet) above or below sea level. Base from U.S. Geological Survey State Map Index, 2001.

Table 1. Age and relative position of stratigraphic units in map area.

Unit	Lithology	Age
Artificial fill	Materials variable	Holocene.
Peaty marsh deposits	Peat and muck	Holocene and Pleistocene(?).
Alluvium	Fine to coarse quartz sand, silty or clayey, pebbly	Holocene and Pleistocene(?).
Older alluvium	Fine to coarse quartz sand, silty or clayey, gravelly	Holocene(?) and Pleistocene.
Dune sand	Fine to medium quartz sand, well-sorted, clean	Holocene(?) and Pleistocene.
Tabb Formation[1]	Fine to coarse quartz sand, poorly sorted, clayey	Pleistocene.
Shirley Formation	Fine to coarse quartz sand, poorly sorted, clayey	Pleistocene.
Chuckatuck Formation	Fine to coarse quartz sand, poorly sorted, clayey	Pleistocene.
Charles City Formation	Fine to coarse quartz sand, poorly sorted, clayey	Pleistocene.
Windsor Formation	Fine to coarse quartz sand, poorly sorted, locally gravelly	Pleistocene.
Waccamaw Formation, Moorings unit	Fine to medium quartz sand, well-sorted	Pleistocene.
Waccamaw Formation, Bahramsville unit	Fine to coarse quartz sand, poorly sorted, muddy, gravelly	Pleistocene.
Waccamaw Formation, James City Member	Fine to coarse quartz sand, well- to poorly sorted, muddy, shelly	Pleistocene.
Varina Grove unit	Fine to coarse quartz sand, poorly sorted, muddy, gravelly	Pleistocene.
Chowan River Formation, Coharie Member	Fine to coarse quartz sand, poorly sorted, clayey, silty	Pleistocene.
Duplin Formation	Fine to medium quartz sand; mollusk shells often abundant	Pliocene.
Castle Hayne Limestone	Fine to medium silty calcite-quartz sand, well-sorted	Middle Eocene.
Donoho Creek Formation	Fine to medium silty calcareous quartz sand, glauconitic, locally shelly; contains scattered round quartz granules	Upper Cretaceous.
Bladen Formation	Fine to coarse silty calcareous quartz sand, locally shelly, poorly sorted, glauconitic	Upper Cretaceous.

Table 1. Age and relative position of stratigraphic units in map area.—Continued

Unit	Lithology	Age
Tar Heel Formation	Fine to coarse quartz sand, silty and clayey, pyritic, lignitic, dense; interbedded with dense clays	Upper Cretaceous.
Cape Fear Formation	Fine to coarse feldspathic quartz sand, silty and clayey, dense, varicolored	Upper Cretaceous.
Pleasant Creek Formation[1]	Silt, clayey, sandy (very fine), dense, varicolored; interbedded with fine to medium quartz sand and dense, varicolored clays	Upper Cretaceous.

[1]Within map area, but not augered

Table 2. Nomenclature and maximum elevation for terrace units used in map area.

Map unit names	Equivalent unit names in southern North Carolina (and South Carolina)	Overlying surface (Virginia names)	Overlying surface (Carolina names)	Maximum elevation (feet)	Intervening scarp
Chowan River Formation		Ashland Plain[1]	Coharie terrace	235	
					Broad Rock scarp.
Varina Grove unit		Essex Plain[1]	Sunderland terrace	182	
					Parler scarp.
Waccamaw Formation		Norge Uplands	Okefenokee terrace	137	
					Surry scarp.
Windsor Formation		Lackey Plain	Wicomico terrace	105	
					Ruthville scarp.
Charles City Formation		Grove Plain	Penholoway terrace	80	
					Lee Hall scarp.
Chuckatuck Formation	Canepatch Formation, (Ladson Formation)	Grafton Plain	Upper Talbot terrace	62	
					Kings Mill scarp.
Shirley Formation	Flanner Beach Formation, (Ten Mile Hill beds)	Huntington Flat	Lower Talbot terrace	49	
					Suffolk scarp.
Tabb Formation	Socastee Formation (Wando Formation)	Todds Flat	Pamlico terrace Princess Anne terrace Silver Bluff terrace	26 17 7	

[1]Name introduced in Weems and Lewis (2007)

Appendix 1. Locality Descriptions and Detailed Lithologic Logs

(Sands are quartz sands unless otherwise indicated.)

Abbotsburg Quadrangle

AB–1–07: 5.9 mi west of eastern quadrangle border, 7.15 mi north of southern quadrangle border, in northwestern 1/9th of map area (latitude 34.6027°N., longitude 78.7287°W.). Surface elevation 115 ft.

LITHOLOGY	DEPTH, IN FEET
Fill material	0–0.5
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine, silty, slightly clayey; yellowish brown (10*YR* 5/2) with dusky-yellowish-brown (10*YR* 2/2) mottles, grading down to yellowish gray (5*Y* 6/2)	0.5–2
Sand, fine, slightly silty; pale yellowish gray (5*Y* 8/2) with dusky-yellowish-brown (10*YR* 2/2) streaks	2–2.5
Sand, dominantly fine (but can be very fine to medium), silty, clayey; grayish-brown (5*YR* 4/2) with light-brown (5*YR* 5/6) mottles	2.5–6
Sand, poorly sorted, fine to very coarse, granular, slightly silty; grayish brown (5*YR* 4/2) with light-brown (5*YR* 5/6) mottles grading down around 8 ft to yellowish gray (5*Y* 8/1); lower contact somewhat gradational	6–11
Sand, very fine to fine, well-sorted, pale-yellowish-gray (5*Y* 9/1); bottom 4 inches (in.) dark orange (10*YR* 8/6)	11–13
Sand, very fine, clayey; grades down to very fine to fine, silty, slightly clayey, soft; olive gray (5*Y* 4/1)	13–23
Sand, fine to medium, silty, slightly clayey, soft; sparse fine mica; olive gray (5*Y* 4/1)	23–25
Waccamaw Formation, James City Member	
Sand, fine, light-olive-gray (5*Y* 7/1); very abundant aragonitic shell hash; lower contact somewhat gradational	25–33
Sand; very fine to fine, light-olive-gray (5*Y* 7/1); coarsens downward to fine to medium; abundant calcite silt and aragonite shells; rounded phosphate pebbles up to 2 cm in diameter abundant near base	33–42

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium, clayey, dense, medium brownish gray (5*YR* 5/1); grades down to very fine to fine, silty, clayey, dense, finely micaceous sand that is dark greenish gray (5*G* 4/1) with pale-greenish-gray (5*GY* 7/1) mottles 42–46

Base of Waccamaw Formation, Bahramsville unit: **+90 ft above sea level**
Base of Waccamaw Formation, James City member: **+73 ft above sea level**

Bottomed in Tar Heel Formation

AB–2–07: 6.2 mi west of eastern quadrangle border, 1.6 mi north of southern quadrangle border, in southwestern 1/9th of map area (latitude 34.5232°N., longitude 78.7330°W.). Surface elevation about 110 ft.

LITHOLOGY	DEPTH, IN FEET
Fill, silty, fine sand	0–2
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty; grayish brown (10*YR* 4/2) grading down through yellowish gray (5*Y* 7/2) to dark yellowish orange (10*YR* 6/6 to 10*YR* 7/6)	2–7
Sand, very fine, silty, clayey, grayish-yellow (5*Y* 7/4)	7–9
Silt, very clayey, sandy (very fine), yellowish-gray (*5Y* 8/1); slightly sticky	9–12
Sand; very fine grading down rapidly to fine to medium; light gray (*N* 7)	12–13
Clay, silty, dense, stiff; medium gray (*N* 5) grading down through grayish brown (5*YR* 4/2) with greenish-gray (5*GY* 6/1) mottles (16–17 ft) and medium gray (*N* 5) (17 to 19 ft) then back to grayish brown (5*YR* 4/2)	13–21
Clay, dense, sticky, slightly greasy; scattered medium to coarse, subrounded quartz grains increasingly abundant downward; dark olive gray (5*Y* 3/1) grading down through dark olive gray (5*Y* 3/1) with dark-greenish-gray (5*G* 4/1) mottles (24–26 ft) to all dark greenish gray (5*G* 4/1)	21–31
Silt, very clayey, sticky, greasy; sparse very fine mica; light olive gray (5*Y* 5/2); fragment of olive-brown (5*Y* 3/4) wood	31–41
Sand, very fine to fine, silty, clayey, olive-brown (5*Y* 3/4)	41–42
Waccamaw Formation, James City Member	
Coquina; mostly fragments of oyster shell in matrix of silty and clayey fine sand; medium dark gray (*N* 4)	42–46
Sand, fine to medium, olive-gray (5*Y* 3/2); sparse shells and fragments of dark-reddish-brown (10*R* 3/4) wood	46–53
Sand, very fine, silty, clayey, dark-greenish-gray (5*GY* 4/1); abundant dark-reddish-brown (10*R* 3/4) lignite fragments	53–54
Sand; fine to medium grading down to medium to coarse in basal foot; dark greenish gray (5*GY* 4/1); rounded clasts of dark-reddish-brown (10*R* 3/4) lignite up to 2 cm in diameter	54–57

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, dense, lignitic; dark greenish gray (5*GY* 4/1)
grading down to olive gray (5*Y* 4/1) 57–61

Base of Waccamaw Formation, Bahramsville unit: **+68 ft above sea level**
Base of Waccamaw Formation, James City Member: **+53 ft above sea level**

Bottomed in Tar Heel Formation

AB–3–07: 1.5 mi west of eastern quadrangle border, 1.4 mi north of southern quadrangle border, in southeastern 1/9th of map area (latitude 34.5204°N., longitude 78.6503°W.). Surface elevation about 100 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Silt, sandy (very fine), slightly clayey; grayish yellow (5*Y* 7/4) grading down through dark yellowish orange (10*YR* 6/6) to medium brown (5*Y* 4/6)	0–1
Silt, very clayey, medium-brown (5*Y* 4/6)	1–3
Clay, dense, silty; yellowish gray (5*Y* 7/1) grading down (at 11 ft) to yellowish gray (5*Y* 7/1) with pale-yellowish-gray (5*Y* 8/2) mottles and dark yellowish orange (10*YR* 6/6); lower contact gradational	3–14
Clay, greasy, silty, dark-olive-gray (5*Y* 3/1); softer than interval above; scattered laminae of very fine sand; lower contact gradational	14–23
Waccamaw Formation, James City Member	
Sand, very fine to fine, silty, dark-gray (*N* 3)	23–25
Sand, fine to medium, silty; grades down to fine to coarse, poorly sorted, silty and clayey; light gray (*N* 7) grading down to medium dark gray (*N* 4); abundant mollusk shells and black, subrounded phosphate pebbles up to 2 cm in diameter	25–27
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense, massive, dark-olive-gray (5*Y* 3/1); pervasive burrows filled with very light gray (*N* 8), very fine sand	27–31

Base of Waccamaw Formation, Bahramsville unit: **+77 ft above sea level**
Base of Waccamaw Formation, James City Member: **+73 ft above sea level**

Bottomed in Tar Heel Formation

AB–4–07: 1.95 mi west of eastern quadrangle border, 7.55 mi north of southern quadrangle border, in northeastern 1/9th of map area (latitude 34.6092°N., longitude 78.6587°W.). Surface elevation about 122 ft.

LITHOLOGY	DEPTH, IN FEET
Fill material	0–1
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine with scattered medium grains, silty, slightly clayey; grayish brown (5*YR* 3/2) grading down through light yellowish brown (10*YR* 6/4) (2–3 ft) and dark yellowish orange (10*YR* 6/6) (3–4 ft) to pale brown (5*YR* 5/2)	1–7
Sand; very fine to medium, dominantly fine; moderately well sorted; silty; pale yellowish orange (10*YR* 8/6) grading down through light olive gray (5*Y* 5/2) (8–10 ft) to dark olive gray (5*Y* 3/1)	7–18
Silt, very clayey, greasy; massive texture; medium greenish gray (5*GY* 5/1)	18–29
Silt, very clayey; scattered fine to medium quartz grains and wood chips; grayish green (5*G* 5/2); lower contact somewhat gradational	29–32.5
Sand, fine to medium; scattered subrounded quartz granules; yellowish gray (5*Y* 8/1)	32.5–33
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, very stiff, olive-gray (5*Y* 4/1); wood chips and occasional thin laminae of very fine to fine sand	33–36

Base of Waccamaw Formation, Bahramsville unit: **+89 ft above sea level**

Bottomed in Tar Heel Formation

AB–5–07: 3.35 mi west of eastern quadrangle border, 5.05 mi north of southern quadrangle border, in central 1/9th of map area (latitude 34.5636°N., longitude 78.6862°W.). Surface elevation about 130 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine, silty and clayey; medium grayish brown (5*YR* 4/2) grading down through pale grayish orange (10*YR* 8/4) (4–8 in.) to dark yellowish orange (10*YR* 6/6)	1–2
Sand, very fine to fine, silty and clayey, dark-yellowish-orange (10*YR* 6/6)	2–3
Sand, very fine to fine, silty; yellowish gray (5*Y* 7/2) with sparse light-brown (5*YR* 5/6) mottles	3–6
Sand, very fine to fine, silty, pale-grayish-orange (10*YR* 8/4); abundant very fine mica	6–11
Sand, very fine to fine, silty; abundant very fine mica; pale red (10*R* 6/2) grading down through yellowish orange (10*YR* 7/6) intermingled with white (*N* 9) to light yellowish brown (10*YR* 6/4)	11–13
Sand, fine, humic; dusky brown (5*YR* 2/2) grading down to pale brown (5*YR* 5.5/2); lower contact somewhat gradational	13–19
Sand, fine to coarse, poorly sorted, clean, medium-brown (5*Y* 4/6)	19–21
Sand, fine to very coarse, poorly sorted, clean; medium brown (5*Y* 4/6) grading down through medium yellowish brown (10*YR* 5/4) (22–24 ft) to pale grayish orange (10*YR* 8/4); lower contact gradational	21–29
Sand, very fine to fine, clean; yellowish brown (10*YR* 5/2) with streaks of pale grayish orange (10*YR* 8/4) and yellowish orange (10*YR* 7/6) in basal 2 ft	29–40
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, sandy (very fine); pale olive gray (5*Y* 7/1) with dark-yellowish-orange (10*YR* 5/6) mottles	40–41
Sand, fine to coarse, poorly sorted, subrounded, silty; grayish orange (10*YR* 7/4) grading to yellowish orange (10*YR* 7/6) at 43 ft with reddish-brown (10*R* 5/6), and pale-yellowish-gray (5*Y* 8/2) streaks	41–46
Sand, fine to coarse, poorly sorted; sparse quartz granules; yellowish orange (10*YR* 7/6); lower contact somewhat gradational	46–52
Sand, fine, well-sorted; slightly silty but fairly clean; dark gray (*N* 3)	52–58
Silt, very clayey, medium-gray (*N* 5); 1-cm-diameter, sand-filled burrows below 62 ft; lower contact somewhat gradational	58–66
Sand, fine to coarse, poorly sorted, medium-gray (*N* 5); contains lignite clasts of Tar Heel Formation reworked from unit below	66–73

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, massive, very dense, olive-gray (5*Y* 4/1);
abundant dusky-brown (5*YR* 2/2) lignite 73–76

Base of Waccamaw Formation, Moorings unit: **+90 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+57 ft above sea level**

Bottomed in Tar Heel Formation

Ammon Quadrangle

AM–1–05: 0.39 mi west of eastern quadrangle border, 3.81 mi north of southern quadrangle border, in east-central 1/9th of map area, along road into Smith Bay, 0.3 mi from end of road (latitude 34.8040°N., longitude 78.5067°W.). Surface elevation 97 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, fine, clean, pale-orange (10*YR* 7/2)	0–0.5
Sand, fine to medium, very humic, brownish-black (10*YR* 2/1)	0.5–3
Sand, fine to medium, less humic than interval above; dark yellowish brown (10*YR* 4/2)	3–4
Sand, fine to medium, more humic than interval above; yellowish brown (10*YR* 3/1)	4–6
Sand; medium to coarse grading down to medium to very coarse; subrounded; slightly humic; yellowish brown (10*YR* 4/4) grading down through light yellowish brown (10*YR* 6/4) to pale yellowish gray (5*Y* 7/2); lower contact somewhat gradational	6–23
Sand, fine, silty, woody, light-olive-gray (5*Y* 5/2)	23–24
Silt, sandy (very fine), clayey; denser than interval above; pale olive gray (5*Y* 7/1)	24–26
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, micaceous, dark-greenish-gray (5*GY* 4/1); very dense and sticky	26–29
Sand, very fine to fine, very micaceous, very lignitic, dark-greenish-gray (5*GY* 4/1)	29–35
Silt, very clayey, micaceous, dark-greenish-gray (5*GY* 4/1); very dense and sticky	35–36

Base of Windsor Formation: **+71 ft above sea level**

Bottomed in Tar Heel Formation

AM–2–05: 3.50 mi west of eastern quadrangle border, 1.78 mi north of southern quadrangle border, along northern side of road north of Charlie Long Millpond, 0.75 mi east of intersection with North Carolina State Road 1505 in south-central 1/9th of map area (latitude 34.7758°N., longitude 78.5614°W.). Surface elevation 93 ft.

LITHOLOGY DEPTH, IN FEET

Windsor Formation

Sand; fine with sparse medium grains; soft; grayish yellow (5*Y* 7/4) 0–1

Sand; fine with sparse medium grains; silty; stiff; dusky yellowish orange (10*YR* 5/6) 1–2

Sand, fine to medium, slightly silty, yellowish-orange (10*YR* 5/6); much softer than interval above 2–6

Sand, fine to medium, thixotropic, light yellowish brown (10*YR* 6/4); lower contact somewhat gradational 6–10

Sand, medium to coarse, yellowish-orange (10*YR* 7/6), soft, thixotropic; lower contact gradational 10–17

Sand, medium to very coarse, subangular to subrounded; abundant subangular to subrounded quartz granules in basal foot; yellowish orange (10*YR* 7/6); soft and thixotropic 17–22

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, sandy (very fine), stiff, micaceous, dark-greenish-gray (5*GY* 4/1); thin stringers or burrows of very fine, clean sand 22–31

Base of Windsor Formation: **+71 ft above sea level**

Bottomed in Tar Heel Formation

AM–3–05: 6.38 mi west of eastern quadrangle border, 4.82 mi north of southern quadrangle border, along eastern side of North Carolina State Road 1331, 0.05 mi south of power line crossing in west-central 1/9th of map area (latitude 34.8203°N., longitude 78.6119°W.). Surface elevation 95 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand; fine with sparse medium grains; dark yellowish brown (10*YR* 4/2) over pale grayish orange (10*YR* 8/4); soft	0–1
Sand; fine grading down to fine to medium; pale grayish orange (10*YR* 8/4) grading down to dusky yellowish orange (10*YR* 5/6)	1–5
Sand, fine, silty, clayey, stiffer than interval above; pale yellowish gray (5*Y* 8/2) with reddish-orange (10*R* 7/8) mottles	5–6
Sand, medium to coarse, subangular to subrounded, silty; pale brown (5*YR* 6/6) grading down to dark yellowish orange (10*YR* 6/6); tough drilling	6–11
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey; dusky yellowish orange (10*YR* 5/6) with dark-yellowish-brown (10*YR* 4/2) mottles; weathered zone on unit below	11–13
Silt, dense; scattered very fine sand-filled burrows; dusky greenish gray (5*GY* 3/1)	13–26

Base of Windsor Formation: **+84 ft above sea level**

Bottomed in Tar Heel Formation

AM–4–05: 6.38 mi west of eastern quadrangle border, 4.82 mi north of southern quadrangle border, along western side of North Carolina State Road 242, 1.5 mi southwest of intersection with North Carolina State Road 210 in north-central 1/9th of map area (latitude 34.8500°N., longitude 78.5590°W.). Surface elevation about 112 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium; pale orange (10*YR* 7/2) over dark reddish brown (5*YR* 3/4) with dusky-yellowish-brown (10*YR* 2/2) streaks	0–1
Sand, medium to coarse, silty; increasingly humic downward; light yellowish brown (10*YR* 6/4) grading down through very pale orange (10*YR* 8/2) (2 to 4 ft) to brownish black (5*YR* 2/1)	1–6
Sand, medium to coarse, silty; very humic and humate cemented; dark yellowish brown (10*YR* 4/2) grading rapidly at 9 ft to dusky yellowish brown (10*YR* 2/2)	6–11
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand; fine grading down to fine to medium; yellowish gray (5*Y* 7/2)	11–18
Sand, medium to very coarse, yellowish-gray (5*Y* 7/1)	18–28
Silt, sandy (very fine to fine), yellowish-gray (5*Y* 7/1)	28–29
Sand; fine to medium grading down to medium to very coarse; yellowish gray (5*Y* 7/1); rounded lignite lumps in basal 2 ft	29–48
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, micaceous, lignitic, dusky-greenish-gray (5*GY* 3/1); interbedded with very fine, clean, micaceous, lignitic, dark-grayish-green (5*G* 4/2) sand	48–51

Base of dune sand: **+101 ft above sea level**
Base of Windsor Formation: **+64 ft above sea level**

Bottomed in Tar Heel Formation

Atkinson Quadrangle

AT–1–04: 5.55 mi west of eastern quadrangle border, 1.72 mi north of southern quadrangle border, 50 ft northwest of 102-ft spot elevation at intersection of dirt roads in southwestern 1/9th of map area (latitude 34.5252°N., longitude 78.2213°W.). Surface elevation 102 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to coarse but dominantly medium, poorly sorted, mostly subangular, clean; dark yellowish brown (10*YR* 3/2) grading down through medium yellowish brown (10*YR* 5/4) to yellowish orange (10*YR* 7/6)	0–2
Sand; fine to coarse, dominantly medium; poorly sorted; mostly subangular; clean; grayish orange (10*YR* 7/4) grading down through dark yellowish brown (10*YR* 4/2) (2.5–3.5 ft) to pale yellowish brown (10*YR* 6/2)	2–4
Sand; fine to coarse, dominantly medium; poorly sorted; mostly subangular; clean; dusky yellowish brown (10*YR* 2/2); thixotropic	4–17
Sand; fine to coarse, dominantly medium; poorly sorted; occasional lenses of fine sand cemented by humate; dark reddish brown (5*YR* 3/4); wood clast near base	17–28
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand; mostly fine with some medium; silty and slightly clayey; medium brown (5*YR* 4/6) grading to light yellowish brown (10*YR* 6/4) at 29 ft	28–35
Silt, clayey to very clayey, sandy (very fine), finely micaceous, light-olive-gray (5*Y* 6/1); much stiffer than interval above; lower contact somewhat gradational	35–44
Sand, very fine to fine, very silty and moderately clayey, stiff, light-olive-gray (5*Y* 6/1); lower contact somewhat gradational	44–46.5
Sand, fine to coarse, poorly sorted, silty and clayey, stiff, grayish-yellowish-green (10*GY* 6/2); sparse subangular to subrounded quartz pebbles up to 1 cm in diameter	46.5–47.5
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, very clayey, stiff and dense; sparse very fine sand grains; woody; dark grayish green (5*GY* 4/2); becomes sandier downward; lower contact somewhat gradational	47.5–53
Sand; fine to medium grading down to medium to coarse; silty; medium gray (*N* 5); quartz pebbles and a few clayballs up to 1 cm in diameter at base	53–62

Sand; fine to medium grading to coarse to very coarse; medium gray (*N* 5); abundant subrounded quartz pebbles up to 1 cm in diameter; some clayballs 62–69

---------- UNCONFORMITY ----------

Bladen Formation

Sand, fine to medium, silty, clayey, dark-olive-gray (5*Y* 2/2) 69–76

Base of dune sand: **+74 ft above sea level**
Base of Charles City Formation: **+54.5 ft above sea level**
Base of Windsor Formation: **+33 ft above sea level**

Bottomed in Bladen Formation

AT–2–04: 1.93 mi west of eastern quadrangle border, 0.82 mi north of southern quadrangle border, beside dirt road 0.15 mi south of the letter "D" in the word "RAILROAD" (see label on quadrangle map) in southeastern 1/9th of map area (latitude 34.5124°N., longitude 78.1581°W.). Surface elevation 55 ft.

LITHOLOGY	DEPTH, IN FEET
Chuckatuck Formation	
Sand, very fine, silty and clayey, dark-yellowish-orange (10*YR* 6/6)	0–1
Silt, sandy (very fine), clayey, stiff, dense, slightly sticky; medium brown (5*YR* 5/6) with light-yellowish-gray (5*Y* 7/1) mottles below 3 ft that increase in abundance downward	1–6
Sand, fine to coarse, poorly sorted, angular to subangular, granular, clayey and silty; medium brown (5*YR* 5/6) with light-yellowish-gray (5*Y* 7/1) mottles	6–8
Sand, fine to coarse, poorly sorted, subangular to subrounded, pebbly, slightly silty, soft, light-brown (5*YR* 6/4)	8–11
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, clayey, greasy, massive, sandy (very fine), dark-greenish-gray (5*GY* 4/1); becomes sandier downward	11–17
Sand, fine to very fine, silty, dark-greenish-gray (5*GY* 4/1); quartz pebbles up to 1 cm in diameter and wood fragments	17–18
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine, well-sorted, dark-greenish-gray (5*GY* 3/1); sparse quartz pebbles and dense clayballs at base	18–23
Dense interval, very slow drilling, no recovery	23–24
Sand, fine, well-sorted, silty, dark-grayish-olive (10*Y* 3/2); more dense and harder drilling than in sand above	24–36

Base of Chuckatuck Formation: **+44 ft above sea level**
Base of Charles City Formation: **+37 ft above sea level**

Bottomed in Bladen Formation

AT–3–04: 3.07 mi west of eastern quadrangle border, 3.51 mi north of southern quadrangle border, at beginning of dirt road 0.7 mi north-northeast of Woodcock Cemetery in central 1/9th of map area (latitude 34.5513°N., longitude 78.1782°W.). Surface elevation 68 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand, very fine, silty and clayey; dark yellowish brown (10*YR* 3/2) grading downward to yellowish orange (10*YR* 7/6) with light-yellowish-gray (5*Y* 7/1) mottles	1–6
Silt, clayey, sandy (very fine); light yellowish gray (5*Y* 7/1) (6–7 ft) grading down to light olive gray (5*Y* 6/1)	6–8
Sand; mostly fine grading down to fine to medium; angular to subangular; silty and clayey; medium dark gray (*N* 4) grading down to dark greenish gray (5*G* 4/1); lower contact gradational	8–21
Sand, medium to coarse, subangular, silty, very porous and permeable, olive-gray (5*Y* 4/2); subrounded quartz pebbles up to 1 cm in diameter in basal foot	21–26
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, well-sorted, silty and slightly clayey, olive-gray (5*Y* 3/2); scattered rounded quartz granules; includes parts of two adjacent fining-upward cycles that break at 33 ft	26–36

Base of Charles City Formation: **+42 ft above sea level**

Bottomed in Bladen Formation

AT–4–04: 5.41 mi west of eastern quadrangle border, 7.01 mi north of southern quadrangle border, at southwestern corner of field 0.3 mi north-northeast of Cypress Lake in northwestern 1/9th of map area (latitude 34.6018°N., longitude 78.2193°W.). Surface elevation 85 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand; fine grading down to fine to medium at base; well-sorted; silty; pale yellowish brown 10*YR* 6/2) grading down through dusky yellowish brown (10*YR* 2/2) to dark reddish brown (5*YR* 3/4)	0–1
Sand, fine, silty; grayish yellow (5*Y* 5/4) grading down to dark yellowish brown (10*YR* 4/2)	1–3
Sand, fine, silty, humic, dusky-brown (10*YR* 2/2)	3–5
Sand, fine to medium; medium fraction angular; dark reddish brown (5*YR* 3/4) grading down to dusky brown (10*YR* 2/2)	5–8
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand; fine grading down to very fine; silty and clayey; dusky yellow (5*Y* 6/4); much denser and stiffer than unit above, lower contact somewhat gradational	8–13
Silt, very clayey, sandy (very fine), pale-olive-gray (5*Y* 6/2); dense and stiff; lower contact gradational	13–19
Sand, very fine, silty and clayey, pale-olive-gray (5*Y* 6/2); softer than interval above; sparse pebbles and wood chips near basal contact	19–22
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, sandy (very fine), dense and stiff, dark-greenish-gray (5*G* 4/1)	22–26
Sand; fine to medium grading to medium to coarse near base; feldspathic; clean; medium olive gray (5*Y* 5/1); thixotropic; quartz pebbles up to 1 cm in diameter	26–42

---------- UNCONFORMITY ----------

Bladen Formation

Sand, fine, silty to silty and clayey, dark-greenish-gray (5*GY* 3/1);
much denser than unit above..... 42–46

Base of dune sand: **+77 ft above sea level**
Base of Charles City Formation: **+63 ft above sea level**
Base of Windsor Formation: **+43 ft above sea level**

Bottomed in Bladen Formation

AT–5–04: 1.26 mi west of eastern quadrangle border, 7.49 mi north of southern quadrangle border, 0.7 mi northwest of Marshburn Cemetery in northeastern 1/9th of map area (latitude 34.6088°N., longitude 78.1466°W.). Surface elevation 66 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine to fine, silty, slightly clayey; dark yellowish brown (10*YR* 3/2) grading down through light yellowish brown (10*YR* 6/4) to yellowish orange (10*YR* 7/6)	0–2
Sand, very fine to fine, silty, slightly clayey; yellowish orange (10*YR* 7/6) with yellowish-gray (5*Y* 7/2) mottles grading down through yellowish orange (10*YR* 7/6) with yellowish-gray (5*Y* 7/2) mottles and medium reddish brown (10*R* 4/6) to yellowish gray (5*Y* 7/2) with yellowish-orange (10*YR* 7/6) mottles	2–6
Silt, clayey, sandy (very fine to medium); light brown (5*YR* 5/6) grading rapidly to dark yellowish orange (10*YR* 6/6); lower contact somewhat gradational	6–13
Sand, fine to medium, silty and slightly clayey, light-yellowish-brown (10*YR* 6/4), lower contact somewhat gradational	13–16
Sand, fine to coarse, poorly sorted, silty, medium-gray (*N* 5); clayey and pebbly in basal foot; subrounded quartz pebbles up to 3 cm in diameter	16–20
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, silty, olive-gray (5*Y* 3/2)	20–26

Base of Charles City Formation: **+46 ft above sea level**

Bottomed in Bladen Formation

Autryville Quadrangle

AU–1–05: 0.96 mi west of eastern quadrangle border, 4.50 mi north of southern quadrangle border, at entrance to farm road on western side of North Carolina State Road 2030, 1.1 mi south-southeast of Union Hill Church in east-central 1/9th of map area (latitude 34.9405°N., longitude 78.6416°W.). Surface elevation 112 ft.

LITHOLOGY DEPTH, IN FEET

Waccamaw Formation, Bahramsville unit

Sand, very fine to fine, silty, slightly clayey; brownish black (5YR 5/1) overlying dark yellowish brown (10*YR* 5/4) 0–3

Sand, very fine to fine, silty, slightly clayey; dusky yellowish brown (10*YR* 5/6) with light-brown (5*YR* 5/6) mottles; lower contact somewhat gradational 3–5

Sand, fine to medium, silty, subangular, medium-gray (*N* 5) 5–6

Sand; fine to medium grading down to medium to coarse; silty; yellowish brown (5*YR* 5/2) grading down through pale yellowish gray (5*Y* 8/2) and pale grayish orange (10*YR* 8/4) to yellowish gray (5*Y* 8/1) 6–12

Sand, fine to medium, very silty and clayey, very-pale-orange (10*YR* 8/2) 12–12.5

Sand, medium to very coarse, silty; pale yellowish gray (5*Y* 8/2) grading to medium gray (*N* 5) at about 24 ft; subrounded to rounded quartz pebbles up to 1.5 cm in diameter at top; pebbles become subangular to subrounded downward and increase in diameter to a maximum of 2.5 cm 12.5–28

Sand, fine to medium, very silty, micaceous, medium-gray (*N* 5); subrounded to rounded quartz pebbles up to 1 cm in diameter and wood chips (mostly concentrated at base) 28–31

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand; fine grading down to fine to medium; silty; slightly clayey; very micaceous; very lignitic; sulfurous odor; medium greenish gray (5*G* 5/1); a few dark-greenish-gray (5*GY* 3/1), clayey silt lenses 31–46

Base of Waccamaw Formation, Bahramsville unit: **+81 ft above sea level**

Bottomed in Tar Heel Formation

AU–2–05: 3.53 mi west of eastern quadrangle border, 1.58 mi north of southern quadrangle border, at entrance to dirt road on southwest side of North Carolina State Road 1002, 0.45 mi southeast of St. Marks Church in south-central 1/9th of map area (latitude 34.8980°N., longitude 78.6870°W.). Surface elevation 111 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, clean; brownish black (5*YR* 2/1) overlying pale yellowish brown (10*YR* 6/2) overlying dark yellowish brown (10*YR* 3/4)	0–2
Silt, clayey, sandy (very fine); dark yellowish brown (10*YR* 4/2) grading down through dusky yellowish brown (10*YR* 2/2) to yellowish brown (10*YR* 5/2) at about 6 ft	2–10
Sand, very fine to fine, silty, yellowish-brown (10*YR* 5/2)	10–11
Sand; fine grading down through fine to medium to medium to very coarse; quartz pebbles at base; pale yellowish brown (10*YR* 6/2)	11–29
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, dense, very clayey; sparse lignite and mica; dusky greenish gray (5*GY* 3/1)	29–36

Base of Waccamaw Formation, Bahramsville unit: **+82 ft above sea level**

Bottomed in Tar Heel Formation

AU–3–05: 5.64 mi west of eastern quadrangle border, 4.61 mi north of southern quadrangle border, at entrance to dirt road (not on map) on northwestern side of North Carolina State Road 2024, 1.05 mi northeast of Cedar Creek Lookout Tower in west-central 1/9th of map area (latitude 34.9422°N., longitude 78.7237°W.). Surface elevation 118 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty; dusky yellowish brown (10*YR* 2/2) overlying pale yellowish brown (10*YR* 6/2) with dark-yellowish-orange (10*YR* 6/6) mottles	0–1
Silt, sandy (very fine), clayey, stiff; yellowish brown (10*YR* 5/2) with dark-yellowish-orange (10*YR* 6/6) mottles grading down to pale olive gray (5*Y* 7/1)	1–6
Sand, very fine to fine, very silty and clayey, pale-olive-gray (5*Y* 7/1)	6–7
Sand; fine to medium grading down to medium to coarse; slightly silty; yellowish gray (5*Y* 8/1) grading down to light olive gray (5*Y* 6/1); subangular quartz pebbles up to 1 cm in diameter toward base	7–15
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, dense, very clayey, sparsely lignitic and micaceous, dusky-greenish-gray (5*GY* 3/1)	15–18
Sand, fine to medium, very micaceous and lignitic, medium- to light-greenish-gray (5*GY* 7/1)	18–25
Silt, very clayey, dense, sparsely lignitic and micaceous, dusky-greenish-gray (5*GY* 3/1)	25–26

Base of Waccamaw Formation, Bahramsville unit: **+103 ft above sea level**

Bottomed in Tar Heel Formation

AU–4–05: 3.91 mi west of eastern quadrangle border, 7.07 mi north of southern quadrangle border, at old home site on southeastern side of North Carolina State Road 2022, 1.95 mi west of Christian Light Church in north-central 1/9th of map area (latitude 34.9776°N., longitude 78.6933°W.). Surface elevation 122 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty, clayey; dark yellowish brown (10YR 3/2) over dark yellowish orange (10*YR* 6/6)	0–1
Sand; very fine to fine grading down to fine to medium; silty and clayey; yellowish gray (5*Y* 8/1) grading down through light grayish orange (10*YR* 7/8) to yellowish orange (10*YR* 7/6)	1–6
Sand; medium to coarse grading down to medium to very coarse; subangular; slightly silty; pale grayish orange (10*YR* 8/4) grading down to pale orange (10*YR* 8/2)	6–16
Sand, medium to very coarse, pale-grayish-orange (10*YR* 8/4); subrounded quartz pebbles up to 1.5 cm in diameter	16–18
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, silty and clayey; grades down to fine to medium, very silty, very micaceous, lignitic; top 2 in. light grayish orange (10*YR* 7/8), dusky greenish gray (5*GY* 3/1) below	18–24
Sand, fine, well-sorted, very micaceous; light gray (*N* 7) (24–25 ft) grading down to dark greenish gray (5*GY* 3/1); clay lens at 27 ft with lignite fragments	24–27.5
Sand, coarse, silty, micaceous, dusky-greenish-gray (5*GY* 3/1)	27.5–31

Base of Waccamaw Formation, Bahramsville unit: **+104 ft above sea level**

Bottomed in Tar Heel Formation

AU–5–05: 4.47 mi west of eastern quadrangle border, 5.75 mi north of southern quadrangle border, 100 ft northeast of North Carolina State Highway 210 on southern rim of Sewell Bay on boundary between north-central and central 1/9th of map area (latitude 34.9776°N., longitude 78.6933°W.). Surface elevation 118 ft.

Surface outcrop along back edge of small borrow pit adjacent to road. Took sand sample in polyvinylchloride (PVC) pipe from bay rim to obtain optically stimulated luminescence (OSL) age date. Sample yielded a quartz blue-light OSL age of 13,000 ± 930 years B.P. (one s.d.) (Shannon A. Mahan, USGS, written commun., 2006).

AU–6–05: 6.51 mi west of eastern quadrangle border, 3.93 mi north of southern quadrangle border, 400 ft south of Cedar Creek Lookout Tower in west-central 1/9th of map area (latitude 34.9776°N., longitude 78.6933°W.). Surface elevation about 130 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, soft, clean; dusky yellowish orange (10*YR* 5/6) grading down through light grayish brown (5*YR* 4/2) (2–6 ft), pale yellowish gray (5*Y* 8/2) (6–7 ft), medium yellowish brown (10*YR* 5/4) (7–8 ft), pale olive brown (5*YR* 6/6) (8–10 ft), dark olive gray (5*Y* 2/2) (10–13 ft) to dark yellowish brown (10*YR* 4/4) 0–14

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine, silty, slightly clayey, brownish-gray (5YR 4/1)..... 14–14.5

Silt, clayey, sticky, sandy (very fine); yellowish gray (5Y 7/2) with dark-yellowish-orange (10YR 6/6) mottles below 18 ft 14.5–25

Sand, very fine to fine, slightly silty, finely micaceous, light-greenish-gray (5G 7/1) 25–26

Base of dune sand: **+116 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville unit

Bladenboro Quadrangle

BB–1–06: 5.62 mi west of eastern quadrangle border, 3.94 mi north of southern quadrangle border, 100 ft east of North Carolina State Road 1128, 0.2 mi south of crossing over CSX Railroad just south of Butters, in west-central 1/9th of map area (latitude 34.5573°N., longitude 78.8481°W.). Surface elevation 113 ft.

LITHOLOGY	DEPTH, IN FEET
Sand-pit fill	0–12
Waccamaw Formation, Bahramsville unit	
Sand, very fine, silty and clayey; abundant cypress(?) wood shreds; brownish gray (5*YR* 4/1)	12–15
Sand, fine to medium, angular to subangular, rather clean; yellowish gray (5*Y* 7/1) grading down at 18 ft to pale pinkish gray (5*YR* 9/1)	15–23
Sand, medium to very coarse, angular to subangular, clean, dark-yellowish-orange (10*YR* 6/6)	23–24
---------- UNCONFORMITY ----------	
Duplin Formation(?)	
Silt, sandy (very fine), olive-gray (5*Y* 3/2)	24–26
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, medium to coarse, slightly micaceous, silty, clayey, dense, pale-bluish-gray (5*B* 8/1)	26–31

Base of Waccamaw Formation, Bahramsville unit: **+89 ft above sea level**
Base of Duplin Formation(?): **+87 ft above sea level**

Bottomed in Tar Heel Formation

BB–2–06: 3.48 mi west of eastern quadrangle border, 0.57 mi north of southern quadrangle border, on western side of North Carolina State Road 1177, 0.12 mi north of end of road, south-central 1/9th of map area (latitude 34.5082°N., longitude 78.8105°W.). Surface elevation 116 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty; dark yellowish brown (10*YR* 3/2) grading down to yellowish gray (5*Y* 6/2) at 1 ft	0–3
Sand, very fine to fine, silty; dark yellowish orange (10*YR* 5/6) grading to grayish orange pink (10*YR* 7/2) at 4 ft	3–6
Sand; very fine with scattered medium grains grading down to fine to very fine at 11 ft; silty; about 1 percent very fine, dark, heavy minerals; thixotropic; pale yellowish gray (5*Y* 9/1) with pale-yellowish-orange (10*YR* 8/6) blotches	6–17
Sand, very fine, silty, medium-gray (*N* 5)	17–19
Silt, clayey, sandy (very fine), medium-gray (*N* 5)	19–20
Sand, very fine, silty, clayey, medium-gray (*N* 5); abrupt contact with bed below	20–23
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, fine to medium, angular to subangular; grades down to fine and slightly micaceous; silty; medium olive gray (5*Y* 5/1)	23–35
Sand, medium to very coarse, angular to subangular, clayey and silty, dark-gray (*N* 3); possible basal lag bed	35–36

Base of Waccamaw Formation, Bahramsville unit: **+93 ft above sea level**

Bottomed in Varina Grove unit

BB–3–06: 1.19 mi west of eastern quadrangle border, 4.33 mi north of southern quadrangle border, on sand rim on northwestern border of small bay, 400 ft west-southwest of intersection of North Carolina State Roads 1117 and 1118, east-central 1/9th of map area (latitude 34.5630°N., longitude 78.7705°W.). Surface elevation 142 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine, humic; brownish black (5*YR* 1/1) grading down through dusky yellowish brown (10*YR* 2/2) to dark reddish brown (5*YR* 3/4)	0–2
Sand, very fine to fine, humic; dusky brown (5*YR* 2/2) grading down through medium grayish brown (5*YR* 4/2) (3–4 ft) to grayish orange pink (5*YR* 6/2)	2–6
Sand, very fine to fine, thixotropic; grayish orange pink (5*YR* 6/2) grading down through pale orange (10*YR* 7/2) (9–20 ft), dark yellowish orange (10*YR* 6/6) (20–24 ft), very dark yellowish orange (10*YR* 5/6) (24–28 ft), and pale olive brown (5*Y* 6/6) (28–36 ft) to dusky yellow (5*Y* 6/4)	6–38
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty, clayey; olive gray (5*Y* 4/2) grading down to olive gray (5*Y* 4/1) at 40 ft; interbedded with clayey, sandy (very fine), medium-greenish-gray (5*G* 5/1) silt	38–52
Sand; medium to coarse grading down to medium to very coarse; olive gray (5*Y* 4/1); subangular to angular quartz pebbles up to 0.5 cm in diameter near base; possible basal lag bed	52–56

Base of Waccamaw Formation, Moorings unit: **+104 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville Member

BB–4–06: 4.53 mi west of eastern quadrangle border, 7.15 mi north of southern quadrangle border, at southern corner of field located 0.32 mi west-northwest of intersection of North Carolina State Roads 1101 and 1100, north-central 1/9th of map area (latitude 34.6035°N., longitude 78.8258°W.). Surface elevation 116 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, slightly silty; dark yellowish orange (10*YR* 6/6) grading down to very dark yellowish orange (10*YR* 5/6)	0–2
Sand, fine to medium, subangular to angular; dark orange (10*YR* 6/8) grading down through yellowish orange (10*YR* 7/6) (3–4 ft), yellowish gray (5*Y* 7/2) (4–5 ft), and medium yellowish brown (10*YR* 5/4) (5–5.5 ft) to dark reddish brown (5*YR* 3/4)	2–6
Sand, fine to coarse, subangular to angular, soft, dark-reddish-brown (5*YR* 3/4)	6–9
Sand, very fine, silty, clayey, grayish-orange-pink (5*YR* 6/2)	9–10
Sand, very fine to fine, silty; grayish orange pink (5*YR* 6/2) with very pale orange (10*YR* 8/2) mottles	10–11
Sand, fine to medium, silty, soft, subangular to angular; yellowish orange (10*YR* 7/6) with a reddish-orange (10*R* 5/6) streak at 14 ft	11–18
Sand, medium to coarse, silty, soft, subangular to angular, dark-yellowish-orange (10*YR* 6/6)	18–19
Silt, clayey, sandy (very fine), medium-greenish-gray (5*GY* 5/1)	19–24
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to medium; greenish black (5*GY* 2/1) grading down to medium greenish gray (5*GY* 5/1)	24–25
Sand, fine to very coarse, poorly sorted, very clayey and silty, stiff, dense; pinkish gray (5*YR* 7/1) grading down through medium gray (*N* 5) (27–29 ft) to light bluish gray (5*B* 7/1) and bluish gray (5*B* 6/1); interval includes three complete fining-upward cycles, each about 2 ft thick and grading at base from medium to very coarse and granular with subrounded granules upward to fine at top; coarser fractions feldspathic, finer fractions kaolinitic	25–31

Base of Waccamaw Formation, Bahramsville unit: **+92 ft above sea level**

Bottomed in Tar Heel Formation

Bonnetsville Quadrangle

BO–1–05: 1.90 mi west of eastern quadrangle border, 4.63 mi north of southern quadrangle border, on southeastern rim of small bay 0.35 mi southwest of intersection of North Carolina State Roads 1234 and 1235 in east-central 1/9th of map area (latitude 34.9422°N., longitude 78.4083°W.). Surface elevation 152 ft.

LITHOLOGY — DEPTH, IN FEET

Dune sand

Sand, fine, slightly silty, soft; yellowish brown (10*YR* 5/2) grading down to pale grayish orange (10*YR* 8/4) 0–1

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, very fine to medium, silty, clayey; much stiffer and denser than unit above; scattered coarse grains and granules toward base; dark yellowish orange (10*YR* 6/6) grading down through light brown (5*R* 5/6) to reddish brown (10*R* 5/6) with yellowish-gray (5*Y* 7/2) mottles 1–11

Sand, fine to coarse, silty, dusky-yellowish-orange (10*YR* 5/6); lower contact somewhat gradational 11–18

Sand; medium to coarse grading down to coarse to very coarse; very pale orange (10*YR* 8/2) grading down to orange pink (10*R* 7/4); sharp contact with unit below 18–25

---------- UNCONFORMITY ----------

Chowan River Formation, Coharie Member

Silt, clayey, sandy (very fine), stiff and dense; light orange (10*YR* 7/2) with orange-pink (10*R* 7/4) mottles 25–27

Sand; very fine to fine grading rapidly downward to medium to coarse; light orange (10*YR* 7/2); about 1 percent fine, dark heavy minerals; thixotropic and soft 27–27.5

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, clayey, sandy (very fine), stiff; yellowish orange (10*YR* 7/6) with pale-yellowish-brown (10*YR* 6/2) streaks; weathered 27.5–29.5

Silt, clayey, sandy (very fine), stiff, dusky-greenish-gray (5*GY* 3/1); sparse lignite; thin, very fine sand-filled burrows 29.5–31

Base of dune sand: **+151 ft above sea level**
Base of Varina Grove unit: **+127 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+124.5 ft above sea level**

Bottomed in Tar Heel Formation

BO–2–05: 3.10 mi west of eastern quadrangle border, 6.98 mi north of southern quadrangle border, on western side of North Carolina State Road 1303, 100 yards (yd) south of abandoned home, 0.8 mi southwest of Concord in north-central 1/9th of map area (latitude 34.9765°N., longitude 78.4293°W.). Surface elevation 167 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, slightly silty, soft; yellowish brown (10*YR* 5/2) grading down to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine to medium, silty, stiff; dark yellowish orange (10*YR* 6/6) grading down through light brown (5*YR* 5/6) to light yellowish brown (10*YR* 6/4)	1–6
Sand, fine to medium, silty, thixotropic, reddish-orange (10*YR* 5/6)	6–12
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, very fine, clayey and silty, stiff and dense; grayish red (5*R* 4/2) grading down through medium brownish gray (5*YR* 5/1) to yellowish gray (5*Y* 8/1) in basal foot	12–17
Sand; fine grading down through fine to medium and medium to coarse to medium to very coarse and granular; silty; yellowish gray (5*Y* 8/1) grading down through pale grayish orange (10*YR* 8/4) (27–34 ft) and medium yellowish brown (10*YR* 5/4) (34–36 ft) to dark yellowish orange (10*YR* 6/6); clayballs containing lignite lumps in basal 3 ft	17–37
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, sandy (very fine), micaceous, lignitic, dusky-greenish-gray (5*GY* 3/1)	37–41

Base of dune sand: **+155 ft above sea level**
Base of Varina Grove unit: **+130 ft above sea level**

Bottomed in Tar Heel Formation

BO–3–05: 5.57 mi west of eastern quadrangle border, 3.47 mi north of southern quadrangle border, on northern side of North Carolina State Road 1240, 0.25 mi east of Andrews Chapel in west-central 1/9th of map area (latitude 34.9254°N., longitude 78.4726°W.). Surface elevation 115 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, silty, soft; yellowish brown (10*Y*R 5/2) grading down to grayish yellow (5*Y* 7/4)	0–1
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty and clayey; denser than unit above; dark yellowish orange (10YR 6/6) grading down to dark yellowish orange (10YR 6/6) with light-gray (N 7) and light-brown (5YR 5/6) mottles in basal 2 ft	1–7
Sand, coarse to very coarse, dark-yellowish-orange (10YR 6/6); subangular to subrounded quartz pebbles up to 2 cm in diameter	7–8
Sand, fine to medium, silty, thixotropic, pale-yellowish-orange (10YR 8/6)	8–11
Sand; fine to medium grading down to medium to very coarse; pale yellow (5Y 8/6); rare, scattered quartz pebbles	11–21
Gravel, quartz; angular to subrounded pebbles up to 2 cm in diameter; yellowish orange (10YR 7/6)	21–24
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, silty and clayey, micaceous, lignitic, olive-brown (5*Y* 3/4)	24–26
Silt, very clayey, dense and stiff, lignitic, micaceous, dusky-greenish-gray (5*GY* 3/1); iron-oxide tubes (root ghosts?)	26–31

Base of dune sand: **+114 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+91 ft above sea level**

Bottomed in Tar Heel Formation

BO–4–05: 3.29 mi west of eastern quadrangle border, 2.29 mi north of southern quadrangle border, on eastern side of North Carolina State Road 1217 and southern side of cemetery, 0.6 mi north of intersection with North Carolina State Road 1214 in south-central 1/9th of map area (latitude 34.9085°N., longitude 78.4325°W.). Surface elevation 140 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, grayish-orange (10*YR* 6/4)	0–0.5
Sand, very fine to fine, clayey and silty, dense and tough; pale brown (5*YR* 6/6) with medium-brown (5*YR* 4/6), medium-red (5*R* 4/6), and yellowish-gray (5*Y* 8/1) mottles	0.5–6
Sand; fine to medium grading down to fine to coarse; silty; dark orange (10*YR* 6/8)	6–11
Sand, medium to very coarse, angular to subangular, silty, medium-orange-pink (10*R* 7/4); abundant subrounded quartz pebbles up to 3 cm in diameter at base	11–23
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, fine, slightly silty, thixotropic, pinkish-gray (5*YR* 8/1)	23–26
Sand; fine to medium grading down to medium to coarse; subangular to subrounded; medium reddish orange (10*R* 6/6)	26–29
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, sandy (very fine), clayey, weathered; yellowish orange (10*YR* 7/6) with yellowish-gray (5*Y* 7/1) mottles	29–31
Sand, very fine, clayey and silty, micaceous, lignitic, dusky-greenish-gray (5*GY* 3/1)	31–36

Base of Waccamaw Formation, Bahramsville unit: **+117 ft above sea level**
Base of Varina Grove unit: **+111 ft above sea level**

Bottomed in Tar Heel Formation

BO–5–08: 6.36 mi west of eastern quadrangle border, on western side of North Carolina State Road 1215 at entrance to private road, 0.65 mi southwest of Mintz in southwestern 1/9th of map area (latitude 34.8889°N., longitude 78.4863°W.). Surface elevation 142 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, clean, soft, humic; dark yellowish brown (10*Y*R 3/2) grading down through light yellowish brown (10*Y*R 6/4) (1–3 ft) to dark yellowish orange (10*YR* 6/6)	0–5
Sand, fine to medium, silty and slightly clayey; stiffer than interval above; pale brown (5*Y*R 5/2) grading down to very pale brown (5*YR* 6/2)	5–8
Sand, fine to medium, silty, very humic, dusky-brown (5*YR* 2/2)	8–9
Sand, fine to medium, silty, soft; dark yellowish brown (10*YR* 4/2) grading down to yellowish orange (10YR 7/4) at about 17 ft	9–19
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Silt, clayey, stiff, sticky, weathered; pale yellowish brown (10YR 6/2) with light brown (5YR 5/6) streaks; lower contact somewhat gradational	19–20
Silt, clayey, sandy (very fine), finely micaceous; medium olive gray (5Y 5/1) grading down to pale olive gray (5Y 7/1)	20–26

Base of dune sand: **+123 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville unit

Cedar Creek Quadrangle

CC–1–07: 1.70 mi west of eastern quadrangle border, 8.09 mi north of southern quadrangle border, 200 ft east of North Carolina State Road 2010, 0.03 mi south of intersection of North Carolina State Roads 2010 and 2011 in northeastern 1/9th of map area (latitude 34.9925°N., longitude 78.7795°°W.). Surface elevation about 142 ft.

LITHOLOGY	DEPTH, IN FEET
Disturbed ground, mottled and swirled sand with quartz pebbles at base	0–1
---------- UNCONFORMITY ----------	
Dune sand	
Sand, fine to medium; increasingly more silty and carbonaceous downward; very pale orange (10*YR* 8/2) grading downward to pale brown (5*YR* 5/2)	1–5
Peat, dusky-brown (5*YR* 2/2)	5–7
Sand, fine to medium, feldspathic, humic, thixotropic; dark reddish brown (5*YR* 3/4) grading down to light yellowish brown (10*YR* 6/4)	7–11
Peat, dusky-brown (5*YR* 2/2)*	11–12
Sand, humic, dominantly fine with medium fraction, feldspathic, humic, dark-brown (5*YR* 2/4)	12–15
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine, silty and slightly clayey, dark-gray (*N* 3); much denser than unit above	15–16
Silt, clayey; greasy texture; medium yellowish gray (5*Y* 7/1); lower contact gradational	16–19
Silt, clayey, sandy (very fine grading down to very fine to fine), kaolinitic, very pale bluish green (5*BG* 8/2)	19–26
Sand, fine to coarse, very clayey and silty, dense and sticky; greenish gray (5*G* 6/1) with light-gray (*N* 7) mottles; kaolin streaks from weathered feldspar grains	26–29
Sand, medium to very coarse, poorly sorted, soft, silty; quartz pebbles toward base; pebbles subangular and up to 4 cm in diameter; rare clayballs; light olive gray (5*Y* 6/1) grading down to medium gray (*N* 5)	29–41

---------- UNCONFORMITY ----------

Chowan River Formation, Coharie Member(?)

Sand, fine to medium; dark gray (*N* 3) grading down to medium brownish gray (5*YR* 5/1); clasts of clayey sand with carbonized wood and fragments of aragonitic shells 41–51

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, dense, medium-dark-gray (*N* 4); clasts of brown to black, lignitic wood 51–52

Base of dune sand:	**+127 feet elevation**
Base of Waccamaw Formation, Bahramsville unit:	**+101 feet elevation**
Base of Chowan River Formation, Coharie Member(?):	**+91 feet elevation**

Bottomed in Tar Heel Formation

*Wood fragment at base of peat yielded a radiocarbon age greater than 51,800 B.P. (John P. McGeehin, USGS, written commun., 2008).

CC–2–07: 1.72 mi west of eastern quadrangle border, 1.90 mi north of southern quadrangle border, on eastern side of dirt road near northern side of cemetery, 0.83 mi northeast of intersection of North Carolina State Roads 2228 and 2023 in southeastern 1/9th of map area (latitude 34.9027°N., longitude 78.7799°W.). Surface elevation about 88 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, soft; medium grayish brown (5*YR* 4/2) grading down to very pale yellowish brown (10*YR* 7/2)	0–2
Peat, sandy, dark-brown (5*YR* 2/4)	2–2.5
Sand, fine to medium, soft; grayish orange pink (5*YR* 7/2) grading to dark yellowish orange (10*YR* 6/6) at 4 ft	2.5–8
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, clayey; much stiffer than unit above; pale yellowish brown (10*YR* 6/2) grading down to yellowish gray (5*Y* 7.5/1)	8–11
Sand, very fine to fine, silty, slightly clayey, medium yellowish gray (5*Y* 6/2); lower contact gradational	11–15
Sand; fine to medium grading down to medium to coarse; silty; feldspathic; sparse subangular quartz granules; medium yellowish gray (5*Y* 6/2); lower contact somewhat gradational	15–25
Sand; fine grading down to fine to medium; pale yellowish gray (5*Y* 8/2); 1–2 percent very fine, dark, heavy minerals; thixotropic	25–37
Sand, medium to coarse, feldspathic, garnetiferous, medium-gray (*N* 5); subrounded to rounded quartz granules and sparse shell and wood fragments; rounded quartz pebbles up to 1 cm in basal foot	37–41
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, dense; occasional lumps of pyrite; dark olive gray (5*Y* 3/1) grading down to very dark gray (*N* 2.5)	41–47

Base of dune sand: **+80 ft above sea level**
Base of Charles City Formation: **+47 ft above sea level**

Bottomed in Tar Heel Formation

CC–3–07: 6.30 mi west of eastern quadrangle border, 6.42 mi north of southern quadrangle border, 400 ft east of North Carolina State Road 2212, 0.4 mi south-southeast of center of overpass across Interstate 95 in northwestern 1/9th of map area (latitude 34.9683°N., longitude 78.8606°W.). Surface elevation about 164 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, slightly silty, soft; grayish brown (5*YR* 4/2) (3 in. thick) over pale grayish orange (10*YR* 8/4)	0–1
Sand, very fine to fine, slightly silty; dark yellowish orange (10*YR* 6/6) with dark-yellowish-gray (5*Y* 6/2) mottles	1–8
Sand, very fine to fine, slightly silty; light brown (5*YR* 5/6) grading down to yellowish orange (10*YR* 7/6)	8–11
Sand, fine to medium, subangular, slightly silty; dark yellowish orange (10*YR* 5/6) grading down to pale grayish orange (10*YR* 8/4)	11–17
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, sandy (very fine), very micaceous, yellowish-gray (5*Y* 8/1)	17–17.5
Sand; dominantly fine with some medium; silty; very micaceous; dark yellowish orange (10*YR* 6/6) with medium-reddish-brown (10*R* 4/6) mottles around plinthite nodules	17.5–19
Clay, silty, weathered; dark yellowish orange (10*YR* 6/6) with medium-yellowish-brown (10*YR* 5/4) streaks	19–20
Clay, silty, dense, stiff, dark-gray (*N* 3); rare blebs of black, lignitic wood	20–21

Base of Varina Grove unit: **+147 ft above sea level**

Bottomed in Tar Heel Formation

CC–4–07: 3.60 mi west of eastern quadrangle border, 3.90 mi north of southern quadrangle border, on western side of North Carolina State Road 2233, 0.15 mi south of intersection with southern end of North Carolina State Road 2224 in central 1/9th of map area (latitude 34.9318°N., longitude 78.8131°W.). Surface elevation about 80 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, soft, pale-grayish-orange (10*YR* 8/4)	0–3
---------- UNCONFORMITY ----------	
Older alluvium	
Sand, medium to very coarse, poorly sorted, silty and slightly clayey, light-brown (5*YR* 5/6)	3–4
Sand, medium to very coarse, poorly sorted, slightly silty, very pale grayish orange (10*YR* 9/4)	4–6
Sand, medium to very coarse, poorly sorted, very pale grayish orange (10*YR* 9/4); abundant pebbles up to 5 cm in diameter	6–12
Gravel, composed of subrounded to rounded quartz pebbles up to 5 cm in diameter; yellowish gray (5*Y* 8/1) grading down to medium dark gray (*N* 4)	12–13
---------- UNCONFORMITY ----------	
Cape Fear Formation	
Sand, fine to medium, angular to subangular; clay matrix mostly kaolin; dense; light gray (*N* 7.5) grading down to medium light gray (*N* 6)	13–16

Base of dune sand: **+77 ft above sea level**
Base of older alluvium: **+67 ft above sea level**

Bottomed in Cape Fear Formation

CC–5–07: 5.88 mi west of eastern quadrangle border, 1.70 mi north of southern quadrangle border, 100 ft south of North Carolina State Road 2261, 300 ft west of intersection of North Carolina State Roads 87 and 2261 in southwestern 1/9th of map area (latitude 34.8997°N., longitude 78.8530°W.). Surface elevation about 159 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand; dominantly very fine but up to fine; silty; clayey in basal 6 in.; pale yellowish brown (10*YR* 6/2) grading down through pale yellowish gray (5*Y* 8/2) (0.5–1.5 ft) to light brown (5*YR* 5/6)	0–2
Sand, very fine, silty, slightly clayey; light brown (5YR 5/6) grading down to dark yellowish orange (10*YR* 6/6) at 4 ft	2–8
Sand, very fine to fine grading down to fine to medium; clean; pale yellowish orange (10*YR* 8/8) grading down through yellowish gray (5*Y* 8/1) (10–12 ft) to light orange pink (10*R* 8/4)	8–12
Sand, fine to coarse, poorly sorted, slightly silty and clayey, grayish-orange (10*YR* 7/4); subrounded to rounded quartz granules	12–13
Sand, fine to medium, very silty and clayey; pale olive gray (5*Y* 7/1) with medium-red (5*R* 5/4) mottles; interbedded with very fine to fine, silty, grayish-orange(10*YR* 7/4) sand	13–17
Sand, fine to medium, silty, medium-red (5*R* 5/4)	17–21
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense, stiff, sticky, medium-dark-gray (*N* 4); occasional lenses of clean, angular, very fine quartz sand and pyrite lumps	21–31

Base of Varina Grove unit: **+138 ft above sea level**

Bottomed in Tar Heel Formation

Clinton South Quadrangle

CS–1–05: 0.80 mi west of eastern quadrangle border, 7.64 mi north of southern quadrangle border, by abandoned house on farm road 0.9 mi northeast of Bethany Church in northeastern 1/9th of map area (latitude 34.9849°N., longitude 78.2639°W.). Surface elevation 150 ft.

LITHOLOGY	DEPTH IN FEET
Dune sand	
Sand, very fine to fine with sparse medium to coarse grains, clean; yellowish orange (10*YR* 7/6) grading down to light yellowish brown (10*YR* 6/4)	0–3
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, very fine, clayey and silty, dark reddish brown (10*R* 3/6) with brownish-gray (5*YR* 4/1) mottles grading down to medium brownish gray (5*YR* 5/1)	3–6
Sand; fine grading down to fine to medium; medium brownish gray (5*YR* 5/1) with very light gray (*N* 8) mottles	6–10
Silt, very clayey, sticky and dense, light-gray (*N* 7)	10–12
Silt, sandy (very fine), slightly clayey; scattered grains of fine to medium, subangular quartz sand; medium dark gray (*N* 4); grades rapidly to very fine to coarse, poorly sorted, silty clay; dense clasts of lignitized wood and a discoidal quartz pebble 2.5 cm in maximum diameter near base	12–17
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, finely micaceous, dense and sticky, dark-greenish-gray (5*GY* 3/1)	17–26

Base of dune sand: **+147 ft above sea level**
Base of Varina Grove unit: **+133 ft above sea level**

Bottomed in Tar Heel Formation

CS–2–05: 1.92 mi west of eastern quadrangle border, 2.25 mi north of southern quadrangle border, by abandoned house southeast of North Carolina State Road 1150, 0.3 mi northwest of intersection with North Carolina State Road 1147 in southeastern 1/9th of map area (latitude 34.9077°N., longitude 78.2831°W.). Surface elevation 143 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, clean, light-yellowish-brown (10*YR* 6/4)	0–1
Sand, very fine, silty and clayey, stiff and dense, massive; light brown (5*YR* 6/6) grading down to medium reddish brown (10*R* 4/6); plinthite nodules up to 0.5 cm in diameter	1–6
Sand; very fine to fine grading down to fine; less silty and clayey downward; medium reddish brown (10*R* 4/6) grading down to yellowish orange (10*YR* 7/6)	6–11
Sand, fine, slightly silty; much softer than interval above; yellowish gray (5*Y* 8/1); lower contact somewhat gradational	11–14
Sand, medium to coarse; contains sparse subrounded Quartz granules; dark yellowish orange (10*YR* 5/6)	14–28
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, medium to coarse, coarsely micaceous, dense, yellowish-orange (10*YR* 7/6); fine, silty, lignitic, light olive gray (5*Y* 5/2) to pale grayish orange (10*YR* 8/4) and medium brown (5*YR* 4/6) sand lenses	28–36

Base of Varina Grove unit: **+115 ft above sea level**

Bottomed in Tar Heel Formation

CS–3–05: 6.13 mi west of eastern quadrangle border, 7.18 mi north of southern quadrangle border, on eastern side of North Carolina State Road 1262, 0.5 mi north of intersection with North Carolina State Road 1228 in northwestern 1/9th of map area (latitude 34.9790°N., longitude 78.3575°W.). Surface elevation 137 ft.

LITHOLOGY DEPTH, IN FEET

Varina Grove unit

Sand, fine to medium; scattered coarse grains; silty; dark yellowish orange (10*YR* 6/6)..... 0–1

Sand, medium to very coarse, poorly sorted, slightly silty, dark-yellowish-orange (10*YR* 6/6); subrounded to rounded quartz pebbles up to 2 cm in diameter near base 1–5

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, dense, medium-brown (5*YR* 4/6)..... 5–6

Sand; very fine to fine, scattered grains up to very coarse; very micaceous (coarse mica plates); silty; dark yellowish orange (10*YR* 6/6)..... 6–11

Sand, fine to medium, subangular; clayey matrix; pale olive gray (5*Y* 6/2)..... 11–12

Silt, clayey, sandy (very fine), dense, finely micaceous, very dark greenish gray (5*GY* 3/1) 12–22

Base of Varina Grove unit: **+132 ft above sea level**

Bottomed in Tar Heel Formation

CS–4–05: 4.23 mi west of eastern quadrangle border, 5.15 mi north of southern quadrangle border, at home site on northern side of North Carolina State Road 1146, 0.3 mi west of intersection with U.S. Highway 701 in central 1/9th of map area (latitude 34.9496°N., longitude 78.3241°W.). Surface elevation 162 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, very fine to fine, silty; dark yellowish brown (10YR 4/2) grading down to medium yellowish orange (10YR 7/6)	0–3
Sand; coarsens slightly downward to dominantly fine; silty; pale reddish brown (10R 5/6) with yellowish-gray (5Y 7/1) streaks	3–6
Sand, fine, slightly silty, pale-grayish-orange (10YR 8/4); white kaolin powder visible upon drying	6–10
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, fine to medium, slightly silty, thixotropic; very fine, dark, heavy minerals; pale yellow (5*Y* 8/6) grading down to pale yellowish gray (5*Y* 8/2)	10–19
Sand, fine, silty and clayey, pale yellowish gray (5*Y* 8/2) with reddish-brown (10*R* 5/6) mottles	19–19.5
Sand, fine to coarse, poorly sorted, subangular, yellowish-orange (10*YR* 7/6)	19.5–22
Sand, medium to very coarse, poorly sorted, feldspathic; sparse fine, dark, heavy minerals; angular to subrounded; clean; yellowish gray (5*Y* 8/1) grading down to yellowish orange (10*YR* 7/6)	22–29
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to coarse, poorly sorted, silty, lignitic; olive gray (5*Y* 4/2) with olive-black (5*Y* 2/1) clayballs	29–36.5
Sand, fine, silty and clayey, micaceous, olive-black (5*Y* 2/1)	36.5–37
Sand, fine to coarse, poorly sorted, silty, lignitic, olive-gray (5*Y* 4/2)	37–46

Base of dune sand: **+152 ft above sea level**
Base of Varina Grove unit: **+133 ft above sea level**

Bottomed in Tar Heel Formation

CS–5–05: 6.58 mi west of eastern quadrangle border, 2.74 mi north of southern quadrangle border, on old road (not on map) 1.35 mi southwest by west of Tyndall Grove Church in southwestern 1/9th of map area (latitude 34.9107°N., longitude 78.3651°W.). Surface elevation 140 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to medium, subangular to subrounded, slightly silty, light-yellowish-brown (10*YR* 6/4)	0–1
Sand, medium to coarse, silty; light yellowish brown (10*YR* 6/4) grading down to medium brown (5*YR* 4/6); granules and small, subangular to subrounded quartz pebbles up to 0.7 cm in diameter	1–6
Sand, medium to coarse, silty; pale brown (5*YR* 6/2) grading down to dark yellowish orange (10*YR* 6/6); quartz-pebble gravel at base with subrounded pebbles up to 1.1 cm in diameter	6–8
Sand; fine to coarse, dominantly medium; angular to subangular; pale grayish orange (10*YR* 8/4)	8–16
Sand; fine to coarse, dominantly medium; angular to subangular; silty; kaolinitic; coarsely micaceous; pale yellowish brown (10*YR* 5/6)	16–18
Sand, fine to coarse, angular to subangular, poorly sorted, very pale orange (10*YR* 8/2); quartz granule to pebble bed at base; subangular to subrounded pebbles up to 0.7 cm in diameter	18–23
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to medium, very silty and kaolinitic, very micaceous; yellowish gray (5*Y* 8/1) grading down to pale yellowish orange (10*YR* 8/6)	23–26

Base of Varina Grove unit: **+117 ft above sea level**

Bottomed in Tar Heel Formation

CS–6–08: 6.11 mi west of eastern quadrangle border, 2.73 mi north of southern quadrangle border, on northern side of North Carolina State Road 1221, 0.48 mi east of intersection with North Carolina State Road 1219 in southwestern 1/9th of map area (latitude 34.9105°N., longitude 78.3573°W.). Surface elevation 152 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, soft; yellowish orange (10*YR* 7/6) grading down to dark yellowish orange (10*YR* 6/6)	0–4
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand; very fine to fine grading down to fine to medium; silty; slightly clayey; stiff; dark yellowish orange (10*YR* 6/6) with darker yellowish-orange (10*YR* 5/6) streaks	4–9
Sand, very fine to fine, clayey, silty; yellowish gray (5*Y* 7/2) grading down to grayish orange pink (5*YR* 7/2) at 11 ft	9–16
Sand, fine to medium, silty; much softer than interval above; light orange (10*YR* 7/8); contains one clay-rich, pale-grayish-orange pink (5*YR* 8/2) sand rip-up clast; lower contact somewhat gradational	16–19
Sand; fine to coarse grading down to medium to very coarse; poorly sorted; silty; soft; yellowish gray (5*Y* 8/1); abundant subrounded to rounded quartz granules and pebbles up to 1 cm in diameter in basal foot	19–22
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, clayey and silty; dark yellowish orange (10*YR* 6/6) with darker yellowish-orange (10*YR* 5/6) streaks; dense, rounded clasts of lignitic wood up to 3 cm in diameter	22–24
Clay, silty, greasy, very dense; pale yellowish brown (10*YR* 6/2) with dark-yellowish-orange (10*YR* 6/6) and yellowish-brown (10*YR* 5/2) streaks	24–26

Base of dune sand: **+148 ft above sea level**
Base of Varina Grove unit: **+130 ft above sea level**

Bottomed in Tar Heel Formation

CS–7–08: 2.15 mi west of eastern quadrangle border, 2.88 mi north of southern quadrangle border, at entrance to dirt road on eastern side of North Carolina State Road 1150, 1.05 mi north-northwest of intersection with North Carolina State Road 1147 on boundary between east-central and southeastern 1/9th of map area (latitude 34.9167°N., longitude 78.2873°W.). Surface elevation 156 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, well-sorted, silty, grayish-yellow (5*Y* 7/4)	0–1
Sand; dominantly fine with some medium grains; slightly silty; soft; pale yellowish gray (5*Y* 8/2) with dark-yellowish-orange (10*YR* 6/6) streaks grading down through pale brown and humic (5*YR* 6/2) (3–4 ft) to pale pinkish gray (5*YR* 9/1)	1–6
Sand; dominantly fine with some medium grains; slightly silty; soft; dark yellowish orange (10*YR* 6/6) grading down to yellowish gray (5*Y* 8/1)	6–10
Sand, very fine to fine, silty and slightly clayey, pale-brown (5*YR* 5/2); stiffer than interval above; 1-cm-thick layer of carbonaceous material at top	10–11
Sand, very fine to fine, silty and slightly clayey, pale-yellowish-brown (10*YR* 7/2); lower contact gradational	11–16
Sand, fine, silty, clayey, yellowish-gray (5*Y* 8/1); clay stringers; lower contact abrupt	16–22.5
Peat, woody, dusky-brown (5*YR* 2/2)*	22.5–23
Clay, silty, sandy (very fine grading down to very fine to fine), medium-dark-gray (*N* 4)	23–24.5
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, very fine to fine, silty and clayey; dark yellowish orange (10*YR* 6/6) with pale-orange (10*YR* 7/2) mottles	24.5–25
Sand, fine to medium, slightly silty, yellowish-gray (5*Y* 8/1)	25–26
Sand, fine to medium, silty, clayey, dark-gray (*N* 3)	26–32
Sand; dominantly fine with rare, scattered, medium to very coarse grains; silty; clayey; medium-olive-brown (5*Y* 4/6)	32–33
Sand, fine, silty, clayey, olive-gray (5*Y* 3/2); scattered quartz granules and pebbles at base up to 0.5 cm in diameter	33–35

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, micaceous, lignitic, very stiff and dense, dark-greenish-gray (5*GY* 4/1)..... 35–41

Base of dune sand: **+131.5 ft above sea level**
Base of Varina Grove unit: **+121 ft above sea level**

Bottomed in Tar Heel Formation

*Wood fragment in peat yielded a radiocarbon age greater than 51,800 B.P. (John P. McGeehin, USGS, written commun., 2008).

CS–8–08: 4.63 mi west of eastern quadrangle border, 2.28 mi north of southern quadrangle border, on eastern side of U.S. Highway 701, 1.1 mi south of intersection with North Carolina State Road 1222 (west side) and 1149 (east side) at Butlers Crossroads in south-central 1/9th of map area (latitude 34.9080°N., longitude 78.3310°W.). Surface elevation 166 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, soft, slightly silty and clayey toward base; yellowish brown (10*YR* 5/2) grading down through pale grayish orange (10*YR* 8/4) to dark yellowish orange (10*YR* 6/6)	0–2
Sand; dominantly fine but with some medium grains; clean to slightly silty; pale grayish yellow (5*Y* 9/4) with dark-yellowish-orange (10*YR* 6/6)	2–6
Sand, fine, clean, thixotropic; intermingled pale orange (10*YR* 8/2) and grayish yellow (5*Y* 7/4)	6–10
Sand, fine, silty, slightly clayey, soft; very pale brown (5*YR* 6/2) grading down to grayish brown (5*YR* 3/2)	10–11
Sand, fine, slightly silty, soft, pale-brown (5*YR* 5/2)	11–13
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand; dominantly fine but with some medium grains; silty, clayey, pale-grayish-orange-pink (10*YR* 8/2); much stiffer and denser than unit above; lower contact gradational	13–19
Sand; dominantly fine but with some medium grains; slightly silty; slightly clayey; pale grayish orange (10*YR* 8/4) grading down to pale yellowish gray (5*Y* 9/1); lower contact gradational	19–23
Sand;, fine to coarse with minor fraction of very coarse; subangular to angular; poorly sorted; pale yellowish gray (5*Y* 9/1)	23–26

Base of dune sand: **+153 ft above sea level**

Bottomed in Varina Grove unit

CS–9–08: 1.70 mi west of eastern quadrangle border, 5.51 mi north of southern quadrangle border, on northern side of North Carolina State Road 1935, 0.78 mi northeast of intersection with U.S. Highway 421 in east-central 1/9th of map area (latitude 34.9551°N., longitude 78.2793°W.). Surface elevation 160 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, slightly silty; upper half humic and yellowish brown (5*YR* 5/2), lower half light yellowish brown (10*YR* 6/4)	0–1
Sand; dominantly fine but with some medium grains; slightly silty; dark yellowish orange (10*YR* 6.5/6) with medium-brown (5*YR* 4/6) mottles below 3 ft	1–5
Sand; dominantly fine but with some medium grains; soft; very fine; dark, heavy minerals or charcoal flakes; yellowish gray (5*Y* 8/1) grading down to dark yellow (5*Y* 6/6)	5–6
Sand, fine, silty, slightly clayey; stiffer and denser than interval above; pale yellowish brown (10*YR* 6/2) with medium-orange (10*YR* 7/8) mottles	6–7
Sand, fine, clean; yellowish gray (5*Y* 8/1) grading down through yellowish orange (10*YR* 7/6) (11–12 ft) to pale yellowish gray (5*Y* 7/2) intermingled with dark yellow (5*Y* 7/4); less than 1 percent very fine, dark, heavy minerals	7–14
Silt, clayey, yellowish-gray (5*Y* 8/1); 2 in. thick	at 14
Sand, fine, clean, thixotropic; pale yellowish gray (5*Y* 7/2) intermingled with dark yellow (5*Y* 7/4)	14–22
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, fine to very coarse, poorly sorted, clayey, silty; very pale orange (10*YR* 8/2) grading down to pale orange (10*YR* 7/2); subangular granules of quartz	22–26

Base of dune sand: **+138 ft above sea level**

Bottomed in Varina Grove unit

Costin Quadrangle

CO–1–04: 5.80 mi west of eastern quadrangle border, 4.53 mi north of southern quadrangle border, 200 ft south of North Carolina State Road 1216, 0.22 mi west of intersection with North Carolina State Road 11 and U.S. Highway 421 (Piney Wood) in west-central 1/9th of map area (latitude 34.5659°N., longitude 78.1014°W.). Surface elevation 65 ft.

LITHOLOGY — DEPTH, IN FEET

Charles City Formation

Sand, fine to medium, subangular, silty, clayey; olive brown (5*Y* 6/6) grading down to dusky yellowish orange (10*YR* 5/6); round quartz pebbles at base up to 1 cm in diameter 0–2

Silt, clayey and sandy (very fine), tough; light brown (5*YR* 5/6) with yellowish-gray (5*Y* 7/2) mottles grading down to yellowish gray (5*Y* 7/2) with light-brown (5*YR* 5/6) mottles 2–11

Sand medium to coarse grading down to medium to very coarse; angular to subangular; poorly sorted; some granules; silty; dark yellowish orange (10*YR* 6/6) 11–23

Silt, clayey, sandy (very fine), grayish-orange (10*YR* 7/4) 23–24

Sand, coarse to very coarse, pebbly, dark-yellowish-orange (10*YR* 6/6) 24–34

---------- UNCONFORMITY ----------

Windsor Formation

Silt, sandy (very fine), clayey, yellowish-orange (10*YR* 7/6) 34–35

Silt, sandy (very fine), slightly clayey, slightly micaceous, dark-greenish-gray (5*G* 4/1) 35–39

---------- UNCONFORMITY ----------

Bladen Formation

Sand, fine to medium, silty, olive-gray (5*Y* 3/2) 39–46

Base of Charles City Formation: **+31 ft above sea level**
Base of Windsor Formation: **+26 ft above sea level**

Bottomed in Bladen Formation

CO–2–04: 2.96 mi west of eastern quadrangle border, 1.84 mi north of southern quadrangle border, on northern side of North Carolina State Road 1403 at entrance to dirt road, 1.25 mi east-southeast of Wards Corner, in south-central 1/9th of map area (latitude 34.5270°N., longitude 78.0515°W.). Surface elevation 47 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand; very fine to fine but with scattered medium to very coarse grains; silty and clayey; yellowish brown (10*YR* 5/2) (2 in. thick) over dark yellowish gray (5*Y* 6/2) 0–1

Sand, dominantly fine to medium, poorly sorted, clayey, silty, stiff; dark yellowish orange (10*YR* 6/6) grading down to pale orange (10*YR* 7/2) 1–6

Sand; dominantly medium to coarse but with some very coarse grains and granules; silty; yellowish gray (5*Y* 7/4) (6–8 ft) grading down to yellowish gray (5*Y* 8/1); contains quartz pebbles up to 2 cm in diameter 6–17

---------- UNCONFORMITY ----------

Windsor Formation

Sand, very fine to fine, silty, slightly clayey; pale olive (10*Y* 6/4) grading down through dark yellowish orange (10*YR* 6/6) (17.5–18.5 ft) to dark greenish gray (5*GY* 4/1) 17–51

Base of Charles City Formation: **+30 ft above sea level**

Bottomed in Windsor Formation

CO–3–04: 4.58 mi west of eastern quadrangle border, 7.32 mi north of southern quadrangle border, on southern side of North Carolina State Road 1209 at entrance to dirt road, 1.7 mi east-northeast of Shiloh Church, in north-central 1/9th of map area (latitude 34.6064°N., longitude 78.0799°W.). Surface elevation 66 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine, silty and clayey; dark yellowish brown (10*YR* 4/2) with pale-yellowish-brown (10*YR* 6/2) mottles over dusky yellow (10*Y* 6/4) with light-brown (5*YR* 5/6) and light-olive-gray (5*Y* 6/1) mottles	0–2
Sand, very fine, clayey and silty; light olive gray (5*Y* 6/1) with dusky-yellow (10*Y* 6/4) and light-brown (5*YR* 5/6) mottles grading down to yellowish orange (10*YR* 7/6) with light-olive-gray (5*Y* 6/1) mottles	2–6
Silt, sandy (very fine), clayey, yellowish-orange (10*YR* 7/6)	6–13
Silt, clayey, light-olive-gray (5*Y* 6/1)	13–15
Sand, very fine, silty, clayey; grades down to fine, silty sand; medium olive gray (5*Y* 5/1)	15–20
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, greasy, dark-greenish-gray (5*G* 4/1)	20–30
Sand; fine to medium grading down to medium to coarse; silty, medium dark gray (*N* 4); quartz pebbles up to 2 cm in diameter in basal foot	30–42
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, silty, dark-grayish-olive (10*Y* 3/2)	42–51

Base of Charles City Formation:	**+46 ft above sea level**
Base of Windsor Formation:	**+24 ft above sea level**

Bottomed in Bladen Formation

CO–4–04: 1.13 mi west of eastern quadrangle border, 5.11 mi north of southern quadrangle border, on dirt road on western side of power line, 0.95 mi north of New Hope Church, in east-central 1/9th of map area (latitude 34.5743°N., longitude 78.0196°W.). Surface elevation 53 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand, very fine, silty and clayey; dusky yellowish brown (10*YR* 2/2) grading rapidly down to dark yellowish gray (5*Y* 7/1); sand grades rapidly to dark yellowish orange (10*YR* 6/6) with light-brown (5*YR* 5/6) and dark-yellowish-gray (5*Y* 7/1) mottles at 3 ft	1–7
Silt, clayey; greasy texture; greenish gray (5*GY* 6/1) grading to olive gray (5*Y* 4/1) at 12 ft	7–25
Sand, very fine to fine, slightly silty, thixotropic, olive-gray (5*Y* 4/1)	25–39
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, dark-greenish-gray (5*G* 4/1)	39–56
Sand, fine to medium, soft, dark-greenish-gray (5*G* 4/1)	56–57
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, olive-gray (5*Y* 3/2); much denser than unit above	57–61

Base of Charles City Formation: **+14 ft above sea level**
Base of Windsor Formation: **-4 ft below sea level**

Bottomed in Bladen Formation

CO–5–05: 0.26 mi west of eastern quadrangle border, 0.37 mi north of southern quadrangle border, on southwestern side of North Carolina State Road 1402, 0.45 mi northwest of southeastern corner of quadrangle, in southeastern 1/9th of map area (latitude 34.5055°N., longitude 78.0041°W.). Surface elevation 52 ft.

LITHOLOGY	DEPTH, IN FEET
Chuckatuck Formation	
Sand, very fine, silty, slightly clayey; yellowish brown (10*YR* 5/2) over grayish yellow (5*Y* 7/4)	0–1
Sand, very fine, silty and clayey; grayish yellow (5*Y* 7/4) with reddish-brown (10*R* 5/6) mottles grading down through yellowish orange (10*YR* 7/6) with medium-gray (*N* 5) (6–7 ft) to yellowish-gray (5*Y* 8/1) mottles	1–8
Sand, fine, silty; softer than interval above; reddish brown (10*R* 5/6) grading down to yellowish orange (10*YR* 7/6) at 8.5 ft	8–11
Sand, fine to medium, light-yellowish-brown (10*YR* 6/4)	11–15
Sand, medium to coarse; light yellowish brown (10*YR* 6/4) grading down to yellowish orange (10*YR* 7/6) at 19 ft	15–28
Sand, medium to very coarse; pale brown (5*YR* 6/6) grading down through orange (10*YR* 7/8) to olive gray (5*Y* 4/2) at 32 ft; subangular to subrounded quartz pebbles up to 1.2 cm in diameter	28–35
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, fine, well-sorted, silty, dark-greenish-gray (5*GY* 4/1); thixotropic in top 10 ft; micaceous below 55 ft	35–98

Base of Chuckatuck Formation: **+17 ft above sea level**

Bottomed in Windsor Formation

Delway Quadrangle

DE–1–04: 3.27 mi west of eastern quadrangle border, 4.50 mi north of southern quadrangle border, on northwestern side of North Carolina State Road 1003, 0.65 mi east-northeast of intersection with North Carolina State Road 1946, in central 1/9th of map area (latitude 34.8155°N., longitude 78.1822°W.). Surface elevation 118 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand; fine with scattered medium to coarse grains; silty, clayey; yellowish brown (10*YR* 5/2) grading down through light yellowish brown (10*YR* 6/4) (0.5–1 ft) to dusky yellowish orange (10*YR* 5/6)	0–11
Sand, fine, silty, clayey, yellowish-orange (10*YR* 7/6)	11–14
Sand, fine to medium, silty, soft; yellowish orange (10*YR* 7/6) grading down through grayish olive (10*Y* 4/2) (27–36 ft) to dark greenish gray (5*GY* 4/1)	14–39
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, very clayey, silty, dense; locally abundant coarse mica and lignite; dark olive gray (5*Y* 3/1) with grayish-green (10*GY* 5/2) blotches in basal foot	39–51

Base of Waccamaw Formation, Bahramsville unit: **+79 ft above sea level**

Bottomed in Tar Heel Formation

DE–2–04: 1.62 mi west of eastern quadrangle border, 7.27 mi north of southern quadrangle border, on northern side of North Carolina State Road 1118, 0.6 mi east of Duplin-Sampson County line, in northeastern 1/9th of map area (latitude 34.8554°N., longitude 78.1534°W.). Surface elevation 137 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, silty, clayey; very dark yellowish brown (10*YR* 3/2) over light yellowish brown (10*YR* 6/4)	0–2
Sand, fine, very clayey, silty; dark yellowish gray (5*Y* 7/1) with pale-brown (5*YR* 6/6) streaks in basal foot	2–6
Sand, fine, silty, soft, grayish-orange (10*YR* 7/4)	6–9
Sand, fine, silty, soft, pale-yellowish-orange (10*YR* 7/6)	9–10
Silt, clayey, sandy (very fine), very pale orange (10*YR* 8/2)	10–11
Sand, fine to medium, silty; rounded quartz pebbles up to 1 cm in diameter at base; pale brown (5*YR* 6/6)	11–12
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, fine, silty, clayey; light yellowish gray (5*Y* 8/2) grading down to medium yellowish brown (10*YR* 5/4)	12–13
Sand, fine, slightly silty, soft, very light gray (*N* 8)	13–16
Sand; fine to medium grading down to fine to coarse; poorly sorted; slightly silty; soft; pale yellowish gray (10*Y* 8/2)	16–34
Sand, fine to coarse, poorly sorted, silty, soft, olive-gray (5*Y* 4/2)	34–42
Sand, fine to coarse, poorly sorted, slightly silty, pale-olive-brown (5*Y* 6/6)	42–47
Sand, fine, silty, clayey, pale-olive-brown (5*Y* 6/6)	47–57
Sand, medium, clean but humic, olive-gray (5*Y* 4/1); clayballs of lithology of unit below that are weathered to yellowish brown (10*YR* 5/2), dark orange (10*YR* 6/8), and dark olive gray (5*Y* 3/1)	57–58

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, clayey, lignitic, coarsely micaceous; much denser than unit above; dark olive gray (5*Y* 3/1) with grayish-olive-green (5*GY* 3/2) blotches 58–61

Base of Waccamaw Formation, Bahramsville unit: **+125 ft above sea level**
Base of Varina Grove unit: **+79 ft above sea level**

Bottomed in Tar Heel Formation

DE–3–04: 5.17 mi west of eastern quadrangle border, 1.47 mi north of southern quadrangle border, at beginning of northern dirt-road fork off unnumbered paved road, 0.6 mi northwest of Shanghai, in southwestern 1/9th of map area (latitude 34.7715°N., longitude 78.2154°W.). Surface elevation 114 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, clean; dusky yellowish brown (10*YR* 2/2) grading down to pale yellowish brown (10*YR* 6/2)	0–1
Sand, fine, silty, clayey; dusky yellowish brown (10*YR* 5/6) grading to brownish gray (5*YR* 4/1) at 2 ft	1–6
Sand, very fine, clayey, silty, light-greenish-gray (5*GY* 7/1)	6–9
Sand, very fine to fine, silty, slightly clayey, medium-gray (*N* 5)	9–15
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to medium, slightly silty, dark-yellowish-orange (10*YR* 6/6)	15–16
Sand, very fine to fine, silty, clayey, micaceous, lignitic, olive-gray (5*Y* 4/1)	16–18
Silt, sandy (very fine), clayey, coarsely micaceous, lignitic, olive-gray (5*Y* 4/1)	18–21

Base of Waccamaw Formation, Bahramsville unit: **+99 ft above sea level**

Bottomed in Tar Heel Formation

DE–4–04: 1.34 mi west of eastern quadrangle border, 1.03 mi north of southern quadrangle border, on dirt road 400 ft southeast of 89-ft spot elevation point at intersection with North Carolina State Road 1129, in southeastern 1/9th of map area (latitude 34.7651°N., longitude 78.1483°W.). Surface elevation 87 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, fine, clean; abundant roots; dusky yellowish brown (10*YR* 2/2) grading down through yellowish brown (10*YR* 5/2) to very pale orange (10*YR* 8/2)	0–1
Sand, fine, well-sorted, humic; dusky yellowish brown (10*YR* 2/2) grading down through yellowish brown (10*YR* 5/2) (2–5 ft) to very dark yellowish brown (10*YR* 3/2)	1–8
Silt, clayey, sandy (very fine to fine), pale-yellowish-brown (10*YR* 6/2)	8–15
Sand, very fine to fine, silty, clayey, light-olive-gray (5*Y* 6/1)	15–17
Sand, fine, silty; softer than interval above; olive gray (5*Y* 4/1) grading at 24 ft to dark greenish gray (5*GY* 4/1)	17–26
Sand, fine, slightly silty, massive, dark-greenish-gray (5*GY* 4/1); scattered medium to coarse quartz grains and rounded wood chips in basal foot	26–55
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, very fine to fine, clayey, silty, dense, lignitic, dark-greenish-gray (5*GY* 4/1)	55–60
Sand, very fine to fine, clayey, silty, sparsely shelly, very dark greenish gray (5*GY* 3/1)*	60–62
Silt, sandy (very fine to fine); abundant shell fragments; dark greenish gray (5*GY* 4/1)	62–64

Base of Windsor Formation: **+32 ft above sea level**

Bottomed in Bladen Formation

*Contains a Cretaceous calcareous nannofossil Zone CC 15 or younger assemblage (Jean M. Self-Trail, USGS, oral commun., 2004).

DE–5–04: 5.72 mi west of eastern quadrangle border, 6.78 mi north of southern quadrangle border, 0.05 mi north of North Carolina State Road 1945, along dirt road, 0.7 mi west of Trinity Church, in northwestern 1/9th of map area (latitude 34.8485°N., longitude 78.2252°W.). Surface elevation 134 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, slightly silty; yellowish brown (10*YR* 5/2) grading down through dark grayish yellow (5*Y* 7/4) (1–3 ft) to grayish yellow (5*Y* 8/4)	0–4
Sand, fine, silty; much stiffer than interval above; dark yellowish orange (10*YR* 6/6) grading down at 9 ft to grayish orange (10*YR* 7/4)	4–13
Sand; fine to medium grading down to medium to coarse; silty; light brown (5*YR* 5/6)	13–17
Sand, medium to coarse, dark-yellowish-orange (10*YR* 6/6); abundant quartz pebbles up to 2 cm in diameter	17–18
Sand, medium to coarse, silty, dark-yellowish-orange (10*YR* 6/6); gravelly at base with rounded quartz pebbles up to 3 cm in diameter and light-olive-gray (5*Y* 6/1) clayballs	18–27
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Silt, clayey, sandy (very fine); grades down to fine, silty, clayey sand; very dark greenish gray (5*GY* 3/1)	27–46
Sand, medium to coarse, silty, very dark greenish gray (5*GY* 3/1)	46–51
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, lignitic, dense, stiff, dark-olive-gray (5*Y* 3/1)	51–54
Sand, fine to medium, clayey, silty, micaceous; lignitic with some rounded detrital wood chips; dark olive gray (5*Y* 3/1); very dense and stiff; very hard drilling	54–56

Base of Waccamaw Formation, Bahramsville unit: +107 ft above sea level
Base of Chowan River Formation, Coharie Member: +83 ft above sea level

Bottomed in Tar Heel Formation

Duart Quadrangle

DT–1–07: 3.62 mi west of eastern quadrangle border, 6.88 mi north of southern quadrangle border, at entrance to dirt road on western side of North Carolina State Road 2229, 200 ft north of Cumberland and Bladen County line, in north-central 1/9th of map area (latitude 34.8500°N., longitude 78.8134°W.). Surface elevation 64 ft.

LITHOLOGY	DEPTH, IN FEET
Older alluvium	
Sand, very fine to fine, silty, slightly clayey; medium yellowish brown (10*YR* 5/4) grading down through grayish orange (10*YR* 7/4) and dark yellowish orange (10*YR* 6.5/6) to very pale orange (10*YR* 8/2)	0–2
Sand, fine to medium, silty; yellowish orange (10*YR* 7/6) grading down to dark yellowish orange(10*YR* 6/6)	2–4
Sand, very fine, very silty and slightly clayey, very pale yellowish brown (10*YR* 6.5/2)	4–5
Sand, fine to medium, silty; softer than interval above; yellowish gray (5*Y* 7/2)	5–6
Sand; fine to medium grading down to medium to coarse and granular; subangular to subrounded; yellowish orange (10*YR* 7/6)	6–10
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, clayey, silty, micaceous; scattered wood chips; dark gray (*N* 3); scattered very fine, clean, very angular, very dark greenish gray (5*G* 3/1) sand lenses	10–12
Clay, silty, sandy (very fine), very dark greenish gray (5*G* 3/1); bits of wood and pyrite lumps	12–21

Base of older alluvium: **+54 ft above sea level**

Bottomed in Tar Heel Formation

DT–2–07: 1.70 mi west of eastern quadrangle border, 4.74 mi north of southern quadrangle border, 400 ft northwest of unnumbered road, 0.11 mi west of power line and 0.28 mi south of Pine Acres Road, in east-central 1/9th of map area (latitude 34.8189°N., longitude 78.7797°W.). Surface elevation 82 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand; mostly fine but up to medium; soft; grayish brown (5*YR* 3/2) grading down to dark yellowish orange (10*YR* 6/6)	0–1
Sand; mostly fine but up to medium; soft; yellowish orange (10*YR* 7/6) grading down through dark yellowish orange 10*YR* 5.5/6) (4–5 ft) to pale grayish orange (10*YR* 8/4)	1–12
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, clayey, sandy (very fine), grayish-brown (5*YR* 3/2)	12–13
Silt; more clayey than interval above; sandy (very fine); olive gray (5*Y* 4/1); lower contact abrupt	13–16
Sand, fine to coarse, poorly sorted, feldspathic, slightly silty, soft, pale-yellowish-brown (10*YR* 6/2); local concentrations of subrounded to rounded quartz pebbles up to 1 cm in diameter	16–36
Sand, medium to very coarse, poorly sorted, medium-yellowish-gray (5*Y* 7/1); abundant subrounded to rounded quartz pebbles up to 3 cm in diameter and a lignitized wood clast	36–38
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, sandy (very fine), stiff, dense; sparse wood fragments; dark brownish gray (5*YR* 3/1)	38–41

Base of dune sand:	**+70 ft above sea level**
Base of Charles City Formation:	**+44 ft above sea level**

Bottomed in Tar Heel Formation

DT–3–07: 5.83 mi west of eastern quadrangle border, 4.92 mi north of southern quadrangle border, on southwestern side of North Carolina State Road 1302, 0.95 mi east of intersection with North Carolina State Road 1305, in west-central 1/9th of map area (latitude 34.8214°N., longitude 78.8522°W.). Surface elevation about 142 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to coarse, poorly sorted, subangular, silty, clayey, pale-yellowish-brown (10*YR* 6/2); lower contact somewhat gradational	0–3
Sand; fine to medium grading down to very fine to fine at 6 ft; angular to subangular; slightly clayey and silty; pale gray (*N* 8.5)	3–11
Sand, fine to coarse, poorly sorted; increasingly silty downward; subrounded to rounded quartz granules; dark yellowish orange (10*YR* 6/6) grading down through yellowish gray (5*Y* 8/1) (12–12.5 ft) and pale grayish orange (10*YR* 8/4) (12.5–14 ft) to grayish yellow (5*Y* 7/4)	11–19
Sand, very fine, silty, clayey; pale brown (5*YR* 5/2) with yellowish-orange (10*YR* 7/6) mottles	19–19.5
Sand, medium to very coarse, poorly sorted; subrounded to rounded quartz granules and sparse subangular pebbles up to 0.5 cm in diameter; pale yellowish gray (5*Y* 8/2) grading down through pale grayish orange (10*YR* 8/4) (26–30 ft) and yellowish gray (5*Y* 8/1) (30–30.5 ft) to dark reddish orange (10*R* 5/6)	19.5–31
Sand, medium to very coarse, poorly sorted; more clayey and silty than interval above; medium gray (*N* 5) grading downward to light olive gray (5*Y* 5/2); scattered wood chips; clayball with black lignite and grayish-black (*N* 2) matrix at 33–33.5 ft	31–36
Sand, fine to medium, silty; not clayey; very wet; medium brown (5*YR* 4/6) grading down to medium yellowish brown (10*YR* 5/4); lower contact somewhat gradational	36–46
Sand, fine to medium, silty; increasingly clayey downward; medium dark gray (*N* 4); scattered wood chips throughout and scattered subrounded to rounded quartz granules near base	46–48
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, sandy (very fine), dense, medium-dark-gray (*N* 4); graphite streaks from wood	48–51

Sand, very fine to fine, clean, very micaceous;
light gray (*N* 7) grading down to dark bluish gray
(5*B* 4/1); scattered lignite clasts 51–55

Base of Varina Grove unit: **+94 ft above sea level**

Bottomed in Tar Heel Formation

DT–4–07: 3.51 mi west of eastern quadrangle border, 1.33 mi north of southern quadrangle border, 200 ft west of North Carolina State Highway 87, 0.1 mi north of 151-ft "Deed" benchmark in south-central 1/9th of map area (latitude 34.7694°N., longitude 78.8112°W.). Surface elevation 152 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand; dominantly fine but occasionally very fine to medium; silty; clayey; sticky; plinthitic nodules at 4 ft; light yellowish brown (10*YR* 6/4) grading down through dark yellowish orange (10*YR* 6/6) (2–6 ft) to reddish orange (10*R* 6/8)	0–8
Sand, very fine, very clayey and silty, dense, sticky, yellowish-gray (5*Y* 8/1)	8–11
Sand, very fine, silty, slightly clayey, light-orange-pink (10*R* 8/4); some clay-rich lenses; lower contact somewhat gradational	11–16
Sand, fine to medium, silty, slightly clayey, medium-orange-pink (10*R* 6/6)	16–19
Sand, fine to medium, silty, clayey; light reddish orange (10*YR* 7/6) grading down to pale orange (10*YR* 8/8) at 19.4 ft	19–21
Silt, very clayey, sandy (very fine), grayish-pink (5*R* 8/2)	21–21.5
Sand; fine to medium grading rapidly down to medium to very coarse; abundant subangular to subrounded quartz pebbles up to 3 cm in diameter; pale brownish orange (5YR 8/6); lower contact abrupt	21.5–23
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, micaceous, stiff, sticky, dense; grayish orange (10*YR* 8/4) grading down to yellowish orange (10*YR* 7/6) at 23.5 ft	23–26

Base of Varina Grove unit: **+129 ft above sea level**

Bottomed in Tar Heel Formation

Dublin Quandrangle

DN–1–07: 4.33 mi west of eastern quadrangle border, 1.05 mi north of southern quadrangle border, on eastern side of Knoxville Lane along old railroad grade, 0.35 mi south-southeast of North Carolina Highway 41, on ridge between McNeil Bay and Sheriff White Bay, in south-central 1/9th of map area (latitude 34.6403°N., longitude 78.7009°W.). Surface elevation about 138 ft.

LITHOLOGY — DEPTH, IN FEET

Waccamaw Formation, Moorings unit

Sand, fine, well-sorted; pale yellowish brown (10*YR* 6/2) grading down through grayish yellow (5*Y* 7/4) to dark yellowish orange (10*YR* 6/6) 0–1

Sand, fine to medium, silty, dark-yellowish-orange (10*YR* 6/6); lower contact somewhat gradational 1–5

Sand, fine to coarse, poorly sorted; grades down through fine to medium to dominantly fine; yellowish gray (5*Y* 7/2) with light-brown (5*YR* 5/6) mottles grading down through very pale orange (10*YR* 8/2) (5–6 ft) and pale yellowish orange (10*YR* 8/6) (7–9 ft) to light grayish orange pink (5*YR* 8/2); lower contact somewhat gradational 5–13

Sand; fine to medium grading down to medium; grayish orange pink (5*YR* 7/2) grading down through pale yellowish orange (10*YR* 8/6) to light yellowish gray (5*Y* 8/1); lower contact abrupt 13–14

Waccamaw Formation, Bahramsville unit

Silt, very clayey, sandy (very fine); very pale yellowish brown (10*YR* 7/2) grading down through pale brownish gray (5*YR* 6/1) to medium gray (*N* 5); lower contact somewhat gradational 14–21

Sand, very fine grading down to very fine to fine; very silty and clayey; olive gray (5*Y* 4/1) 21–28

Sand, mostly fine, silty, dark-olive-gray (5*Y* 3/1) 28–30

Waccamaw Formation, James City Member

Sand; mostly fine but up to medium; silty; abundant chalky shells; greenish gray 5*GY* 6/1)* 30–36

Coquina; fine to medium sand matrix; very silty; pale olive gray (5*Y* 7/1) 36–38

Sand; fine to medium grading down to fine to coarse; poorly sorted; silty; sparsely shelly; olive gray (5*Y* 4/1); large fragment of dusky-brown (5*YR* 2/2) lignite at base 38–44

Sand; fine to coarse, poorly sorted, grading down to fine to medium; subrounded; clean; soft; grayish brown (5*YR* 3/2); scattered rounded lignite fragments 1–2 cm in diameter..... 44–52

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, very silty and clayey, micaceous, sparsely lignitic, dense, stiff, tough; light olive gray (5*Y*6/1) with dark-greenish-gray (5*G* 4/1) mottles grading down through brownish gray (5*YR* 7/1) to medium grayish brown (5*YR* 4/2)..... 52–56

Base of Waccamaw Formation, Moorings unit: +124 ft above sea level
Base of Waccamaw Formation, Bahramsville unit: +108 ft above sea level
Base of Waccamaw Formation, James City Member: +86 ft above sea level

Bottomed in Tar Heel Formation

*Early Pleistocene calcareous nannofossil assemblage recovered at 36 ft (Jean M. Self-Trail, USGS, oral commun., 2007).

DN–2–07: 3.53 mi west of eastern quadrangle border, 7.61 mi north of southern quadrangle border, on southeastern side of North Carolina State Road 1323, 0.78 mi northeast of intersection with North Carolina Highway 53, in north-central 1/9th of map area (latitude 34.7363°N., longitude 78.6856°W.). Surface elevation about 72 ft**.**

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to coarse, poorly sorted, soft, clean, yellowish-gray (5*Y* 8/1)..... 0–2

Sand, fine to medium, humate-cemented; dusky brown (5*YR* 2/2) grading down at 3.5 ft to medium yellowish brown 10*YR* 5/2)..... 2–4

Sand, fine to medium, soft, very pale orange (10*YR* 8/2)..... 4–6

Sand, fine to coarse, poorly sorted, soft; pale yellowish brown (10*YR* 7/2) grading down through dark yellowish brown (10*YR* 3/2) (7–7.5 ft), yellowish gray (5*Y* 7/2) (7.5–14 ft), pale yellowish brown (10*YR* 6/2) (14–14.5 ft), and orange (10*YR* 7/8) (14.5–15 ft) to pale grayish orange (10*YR* 8/4)..... 6–16

---------- UNCONFORMITY ----------

Older alluvium

Peat, sandy (very fine to fine), micaceous, dark-yellowish-brown (10*YR* 3/2)..... 16–19

Sand; dominantly medium to coarse with minor fine fraction; soft; pale grayish orange (10*YR* 8/4); lower contact somewhat gradational..... 19–23

Sand, medium to very coarse, poorly sorted, feldspathic, yellowish-gray (5*Y* 8/1); subrounded to rounded quartz pebbles up to 1 cm in diameter; soft; becomes silty downward..... 23–27

Sand, fine to coarse, poorly sorted, granular, silty and slightly clayey, yellowish-orange (10*YR* 7/6)..... 27–28

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium, silty, clayey, micaceous,
medium-olive-gray (5*Y* 5/1); dark-brown (5*YR* 2/4)
lignite clasts 28–31

Base of dune sand: **+56 ft above sea level**
Base of older alluvium: **+44 ft above sea level**

Bottomed in Tar Heel Formation

DN–3–07: 3.62 mi west of eastern quadrangle border, 6.88 mi north of southern quadrangle border, at southern terminus of North Carolina State Road 1334, in east-central 1/9th of map area (latitude 34.6984°N., longitude 78.6570°W.). Surface elevation 60 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, soft, slightly silty; brownish gray (5*YR* 4/1) grading down to grayish orange (10*YR* 7/4) at 2 in. 0–2

Sand, fine to medium, silty, clayey; very dark yellowish orange (10*YR* 5/6) grading down to pale grayish orange (10*YR* 8/4) with light-brown (5*YR* 5/6) streaks 2–3

---------- UNCONFORMITY ----------

Chuckatuck Formation

Sand, fine to medium, silty, clayey, very light gray (*N* 8); root fragments 3–6

Sand; fine to medium grading down through medium to very coarse at 10 ft then back to fine to medium at 12 ft and then back to medium to very coarse at 15–17 ft; clean; soft; yellowish gray (5*Y* 7/2) 6–17

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, micaceous, dense, stiff, dark-olive-gray (5*Y* 3/1); abundant very fine sand-filled burrows 0.5 to 1 cm in diameter and pyrite lumps 17–21

Base of dune sand: **+57 ft above sea level**
Base of Chuckatuck Formation: **+43 ft above sea level**

Bottomed in Tar Heel Formation

DN–4–07: 3.62 mi west of eastern quadrangle border, 6.88 mi north of southern quadrangle border, along dirt road 0.08 mi west of North Carolina State Road 1339, 0.6 mi north of intersection with North Carolina State Road 1338, in west-central 1/9th of map area (latitude 34.6766°N., longitude 78.7224°W.). Surface elevation 140 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine; pale yellowish brown (10*YR* 6/2) grading down to dark yellowish orange (10*YR* 6/6)	0–1
Sand, very fine to fine, silty, clayey; very dark yellowish orange (10*YR* 5/6) with dark-orange (10*YR* 6/8) mottles	1–5
Sand, very fine to fine, sugary, soft; white (*N* 9) grading rapidly down to silty and light brown (5*YR* 5/6)	5–6
Sand, very fine to fine, slightly silty, thixotropic; 1–2 percent very fine, dark, heavy minerals; grayish orange pink (5YR 7/2) grading down to yellowish gray (5*Y* 8/1) in basal foot; lower contact abrupt	6–22
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, greasy, sandy (very fine); dark orange (10*YR* 8/6) with yellowish-gray (5*Y* 8/1) blotches	22–24
Sand; very fine to fine grading down to very fine to medium; poorly sorted; silty; yellowish gray (5*Y* 7/2)	24–34
Silt, very clayey, greasy, sandy (very fine); upper foot yellowish orange (10*YR* 7/6) grading rapidly down to medium gray (*N* 5)	34–39
Sand; dominantly fine to medium, but ranges from very fine to coarse; poorly sorted; silty; dark greenish gray (5*GY* 3/1)	39–42
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, very fine, very clayey and silty, dense, stiff, micaceous, medium-greenish-gray (5*GY* 5/1)	42–43
Sand, very fine to fine, silty, micaceous; softer than interval above; yellowish gray (5*Y* 7/1); lower contact somewhat gradational	43–47
Sand; fine to medium grading down to fine to coarse; poorly sorted; silty; yellowish gray (5*Y* 7/1) with grayish-brown (5*YR* 3/2) blotches; lower contact abrupt	47–49

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, sandy (very fine), sparsely micaceous, stiff, dense; medium olive gray (5*Y* 5/1) with medium-greenish-gray (5*G* 5/1) mottles, lower contact somewhat gradational 49–54

Sand, very fine, silty, clayey, micaceous, dense, olive-gray (5*Y* 4/1); thin laminae of fine sand; lignite clasts 54–57

Sand, fine to medium, silty, yellowish-brown (10*YR* 5/2); lower contact abrupt 57–59

Sand, very fine to fine, silty, very micaceous, light-olive-gray (5*Y* 6/1); 3-in.-thick layer of clayey, carbonaceous, micaceous, dusky-brown (5*YR* 2/2) silt at 63 ft 59–65

Sand, medium to coarse, silty, clayey, brownish-gray (5*YR* 4/1); scattered lignite fragments 65–68

Sand, medium to coarse, subrounded, silty, medium-brownish-gray (5*YR* 5/1) 68–71

Base of Waccamaw Formation, Moorings unit: +118 ft above sea level
Base of Waccamaw Formation, Bahramsville unit: +98 ft above sea level
Base of Chowan River Formation, Coharie Member: +91 ft above sea level

Bottomed in Tar Heel Formation

Elizabethtown North Quadrangle

EN–1–07: 0.99 mi west of eastern quadrangle border, 1.43 mi north of southern quadrangle border, on northeastern side of North Carolina Highway 53, 0.4 mi east of junction with U.S. Highway 701, in southeastern 1/9th of map area (latitude 34.6460°N., longitude 78.5174°W.). Surface elevation 71 ft.

LITHOLOGY	DEPTH, IN FEET
Sand, fine to medium; swirled colors; disturbed ground	0–3
Dune sand	
Sand, fine, clean; dusky brown (5*YR* 2/2) grading down through yellowish brown (10*YR* 5/2) (3.5–5 ft) to grayish yellow (5*Y* 7/4)	3–6
Sand; fine grading down to fine to medium; clean; dark yellowish brown (10*YR* 4/6) grading down through very pale orange (10*YR* 8/2) (6.5–8.5 ft) and through dark yellowish brown (10*YR* 4/4) (8.5–12.5 ft) to medium yellowish brown (10*YR* 5/4)	6–17
---------- UNCONFORMITY ----------	
Chuckatuck Formation	
Sand, fine, clayey, silty; dark reddish brown (5*YR* 3/4) rapidly grading down to grayish brown (5*YR* 3/2)	17–17.3
Silt, sandy (very fine), clayey, stiff, somewhat sticky; light gray (*N* 7) grading down through light greenish gray (5*G* 7/1) (21–24 ft) to light greenish gray (5*G* 7/1) with light-olive-brown (5*Y* 5/4) mottles	17.3–31
Sand, fine, well-sorted, yellowish-gray (5*Y* 8/1); sparse very fine, dark ,heavy minerals; lower contact somewhat gradational	31–36
Sand, fine to coarse, poorly sorted, yellowish-gray (5*Y* 8/1); very fine, dark, heavy minerals	36–39
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, lignitic, coarsely micaceous, dense; olive gray (5*Y* 4/1) grading down to dusky brown (5*YR* 2/4)	39–42
Sand, fine, silty and clayey, micaceous, dark-olive-gray (5*Y* 2/2) to olive-gray (5*Y* 4/2); interbedded with coarsely micaceous, woody peat layers	42–49

Clay, silty, sandy (very fine), finely micaceous, dense, very lignitic, dark-olive-gray (5*Y* 3/1); medium-greenish-gray (5*GY* 7/1), very fine sand-filled burrows about 1 cm in diameter in basal 2 ft 49–56

Base of dune sand: **+54 ft above sea level**
Base of Chuckatuck Formation: **+32 ft above sea level**

Bottomed in Tar Heel Formation

EN–2–07: 1.37 mi west of eastern quadrangle border, 7.32 mi north of southern quadrangle border, on northern side of intersection of North Carolina State Roads 1524 and 1509, on Susies Hill in northeastern 1/9th of map area (latitude 34.7311°N., longitude 78.5234°W.). Surface elevation 111 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, soft, pale-yellowish-orange (10*YR* 8/6); lower contact somewhat gradational	0–6
Sand, fine to medium, clean, soft, grayish-orange (10*YR* 7.5/4)	6–11
Sand, fine to medium, silty, soft, medium-brown (5*YR* 4/4)	11–17
Sand, fine to medium, clean, soft; pale yellowish orange (10*YR* 8/6) grading down through very pale orange (10*YR* 8/2) and very pale orange (10*YR* 8/2) with dark-yellowish-orange streaks (10*YR* 6/6) (23–26 ft) to pale yellowish brown (10*YR* 6/2)	17–29
Sand, fine to medium, very humic, soft, dark-brown (5*YR* 2/4)	29–34
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand, fine to medium, subangular, very clayey, pale-yellowish-gray (5*Y* 8.5/1); abundant kaolinite	34–35
Sand; fine to medium grading down through medium to coarse and granular to medium to very coarse; poorly sorted; pebbly (up to 3 cm diameter); soft; slightly silty; pale yellowish brown (10*Y* 6/2) grading down through dark yellowish brown (10*YR* 4/4) to light yellowish brown (10*YR* 6/4)	35–48
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to medium, silty, clayey, coarsely micaceous, dark-reddish-brown (5YR 3/4); locally abundant lignitized wood; much denser than unit above; dark yellowish brown (10YR 4/2) grading down to olive gray (10Y 6/1)	48–60

Clay, slightly lignitic, finely micaceous, dense, massive,
olive-gray (5Y 4/2) 60–61

Base of dune sand: **+77 ft above sea level**
Base of Charles City Formation: **+63 ft above sea level**

Bottomed in Tar Heel Formation

EN–3–07: 6.11 mi west of eastern quadrangle border, 1.76 mi north of southern quadrangle border, on southern side of North Carolina Highway 53, 0.85 mi west of intersection with North Carolina Highway 242, in southwestern 1/9th of map area (latitude 34.6506°N., longitude 78.6065°W.). Surface elevation 48 ft.

LITHOLOGY	DEPTH, IN FEET
Older alluvium	
Sand; mostly fine but up to medium; clean; contains less than 1 percent very fine to fine, dark, heavy minerals; dark yellowish brown (10*YR* 4/2) grading down through grayish orange (10*YR* 7/4) (0.5–2 ft), yellowish orange (10*YR* 7/6) (2–3 ft), and very pale orange (10*YR* 8/2) (3–4 ft) to pale yellowish brown (10*YR* 6/2)	0–6
Sand, medium to coarse, subrounded, soft, clean, pale-yellowish-brown (10*YR* 7/2)	6–10
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense, stiff, dark-olive-gray (5*Y* 3/1); 3-in.-thick layer	at 10
Sand; dominantly fine but up to medium; silty; slightly micaceous; olive gray (5*Y* 4/1) to medium gray (*N* 5); very dark reddish brown (10*R* 2/4) lignite clasts	10–16

Base of older alluvium: **+38 ft above sea level**

Bottomed in Tar Heel Formation

EN–4–07: 6.42 mi west of eastern quadrangle border, 7.28 mi north of southern quadrangle border, on southwestern side of North Carolina State Road 1324, 0.22 mi northwest of intersection with North Carolina Highway 242, in northwestern 1/9th of map area (latitude 34.7306°N., longitude 78.6121°W.). Surface elevation 85 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, subrounded to rounded, soft; very pale yellowish brown (10*YR* 7/2), grading down to dusky brown (5*YR* 2/2) at 1 ft	0–4
Peat, sandy (very fine), dark-brown (5*YR* 2/4); wood clast near base	4–5
Sand, fine to medium, subrounded to rounded, silty, medium-brown (5*YR* 4/6)	5–6
Sand; dominantly fine but up to medium; subangular to subrounded; silty; soft; medium-brown (5*YR* 4/6)	6–8
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, very clayey, stiff; light greenish gray (5*G* 8/1) grading down through light greenish gray (5*G* 8/1) with light-olive-brown (5*Y* 5/4) mottles (11–19 ft) to light olive brown (5*Y* 5/4) with light-greenish-gray (5*G* 8/1) mottles; lower contact somewhat gradational	8–24
Sand, very fine, very clayey and silty; softer than interval above; light greenish gray (5*G* 8/1)	24–25
Sand; fine to medium grading rapidly down to medium to coarse; slightly silty to clean; pale yellowish brown (10*YR* 7/2); lower contact gradational	25–40
Sand, medium to very coarse, pale-yellowish-brown (10*YR* 7/2); abundant subrounded quartz pebbles up to 4 cm in diameter in basal few inches	40–42
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, very silty, dark-brownish-gray (5*YR* 3/1); abundant yellowish-orange (10*YR* 7/6) and dark-brown (5*YR* 2/4) lignite	42–46

Base of dune sand:	**+77 ft above sea level**
Base of Charles City Formation:	**+43 ft above sea level**

Bottomed in Tar Heel Formation

EN–5–07: 3.70 mi west of eastern quadrangle border, 4.66 mi north of southern quadrangle border, on dirt road 0.06 mi east of junction with North Carolina State Road 1511 (junction is location of 63-ft spot elevation), in central 1/9th of map area (latitude 34.6925°N., longitude 78.5654°W.). Surface elevation 64 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, subrounded to round, humic; dusky brown (5*YR* 2/2) grading down to light yellowish brown (10*YR* 6/4) 0–2

Sand; dominantly fine but up to medium; silty; very pale yellowish brown (10*YR* 7/2) grading down to light brown (5*YR* 5/6) 2–3

Sand; dominantly fine but up to medium; humic; pale brown (5*YR* 5/26) 3–6

---------- UNCONFORMITY ----------

Chuckatuck Formation

Sand; dominantly fine but ranges from very fine to medium; poorly sorted; subangular to subrounded; humic slightly silty; medium brown (5*YR* 4/6) 6–16

Sand, medium to very coarse, poorly sorted; medium brown (5*YR* 4/6) grading down to yellowish brown (10*YR* 6/2) at 19 ft; lower contact gradational 16–26

Sand, coarse to very coarse, dark-brown (5*YR* 2/4); abundant subrounded to rounded quartz pebbles up to 1 cm in diameter 26–27

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, very clayey and silty, dense, brownish-gray (5YR 4/1) 27–30

Clay, very silty, micaceous; light grayish green (10G 3/2) interbedded with dark olive gray (5Y 3/1); medium-brown (5YR 4/6) lignite clasts; burrows filled with very fine, pale-yellowish-gray (5Y 9/1) sand in basal 2 ft 30–36

Base of dune sand: **+58 ft above sea level**
Base of Chuckatuck Formation: **+37 ft above sea level**

Bottomed in Tar Heel Formation

Elizabethtown South Quadrangle

ES–1–07: 5.58 mi west of eastern quadrangle border, 4.55 mi north of southern quadrangle border, along dirt road (not on map) 0.12 mi east of North Carolina State Road 1700, 0.75 mi south of junction with North Carolina State Road 1708, in west-central 1/9th of map area (latitude 34.5661°N., longitude 78.5976°W.). Surface elevation 116 ft.

LITHOLOGY DEPTH, IN FEET

Waccamaw Formation, Bahramsville unit

Sand, very fine to fine, silty, clayey; grayish orange (10YR 7/4) with dark-yellowish-orange (10*YR* 6/6) streaks in upper 1 ft, then medium brown (5*YR* 4/6) with grayish-orange (10*YR* 7/4) mottles and dark yellowish orange (10*YR* 6/6) 0–5

Sand; very fine to fine grading down to very fine; silty; clayey; yellowish gray (5*Y* 7/2); clay content increases downward; lower contact somewhat gradational 5–7

Silt, very clayey, sandy (very fine), stiff, dense; pale olive gray (5*Y* 6/2) with pale-yellowish-orange (10*YR* 8/6) streaks grading down through pale olive gray (10*YR* 8/6) (8–12 ft) to greenish gray (5*GY* 6/1) with dark-yellowish-orange (10*YR* 6/6) streaks, yellowish orange (10*YR* 7/6), pale yellowish orange (10*YR* 8/6), and medium olive brown (5*Y* 4/4) 7–22

Silt, very clayey, sandy (very fine), stiff, dense; greenish gray (5*GY* 6/1) intermingled with medium gray (*N* 5); lower contact somewhat gradational 22–34

Waccamaw Formation, James City Member

Sand, very fine to medium, very clayey and silty, olive-gray (5*Y* 4/1); sparse thin shells; lower contact abrupt 34–37

Sand, fine, well-sorted, very light gray (*N* 8); abundant shell hash (mostly oyster) 37–41

Coquina; fine to coarse quartz sand matrix; very light gray (*N* 8); subrounded pyrite lumps up to 2 cm in diameter abundant in basal foot 41–44

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, sandy (very fine), dense, dark-olive-gray (5*Y* 3/1); abundant pyrite nodules 1–2 cm diameter; scattered very light gray (*N* 8) to white (*N* 9), very fine sand-filled burrows up to 1 cm in diameter 44–49

Base of Waccamaw Formation, Bahramsville unit: +82 ft above sea level
Base of Waccamaw Formation, James City Member: +72 ft above sea level

Bottomed in Tar Heel Formation

ES–2–07: 3.22 mi west of eastern quadrangle border, 0.34 mi north of southern quadrangle border, at entrance to dirt road on eastern side of North Carolina State Road 1708, 0.36 mi north-northeast of southern quadrangle border along trace of road, in south-central 1/9th of map area (latitude 34.5049°N., longitude 78.5561°W.). Surface elevation 98 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, slightly silty; light yellowish brown (10*YR* 6/4) grading down through grayish yellow (5Y 7/4) to pale grayish orange (10*YR* 8/4)	0–2
Sand, very fine to fine, very silty and clayey, stiff; dark yellowish orange (10*YR* 6/6) with reddish-orange (10*R* 5/6) and very light gray (*N* 8) streaks	2–6
Silt, clayey, sandy (very fine), stiff, sticky; sparse very fine mica; dark yellowish orange (10*YR* 6/6) with reddish-orange (10*R* 5/6) and very light gray (*N* 8) streaks; lower contact somewhat gradational	6–14
Silt, sandy (very fine), clayey, yellowish-orange (10*YR* 7/6); lower contact somewhat gradational	14–19
Sand, very fine to fine, slightly silty; grayish orange (10*YR* 7/4) grading to yellowish gray (5*Y* 8/1) at 19.5 ft; sparse very fine to fine, silvery mica	19–21
Sand, very fine to fine, silty, soft; orange (10*YR* 7/8) mingled with light yellowish brown (10*YR* 6/4); interbedded with centimeter-scale layers of yellowish-gray (5*Y* 8/1), clayey silt	21–29
Silt, very clayey, sandy (very fine), yellowish-gray (5*Y* 7/2)	29–29.5
Sand, very fine to fine, silty, dark-greenish-gray (5*GY* 4/1); clay content increases downward; centimeter-scale, clayey, silt lenses scattered throughout interval	29.5–35
Waccamaw Formation, James City Member	
Sand, fine to medium, silty, medium-greenish-gray (5*GY* 5/1); moderately abundant shell hash (mostly oyster)	35–39
Sand, fine to coarse (modally medium), dark-gray (5*Y* 3/1); coarse fraction rounded; clean; basal foot contains brownish-black (5*YR* 2/1) lignite lumps and clayballs	39–44

Base of Waccamaw Formation, Bahramsville unit: **+63 ft above sea level**

Bottomed in Waccamaw Formation, James City Member

ES–3–07: 3.44 mi west of eastern quadrangle border, 6.57 mi north of southern quadrangle border, on southwestern side of North Carolina Highway 87, 1.5 mi northwest of junction with North Carolina State Road 1709, in north-central 1/9th of map area (latitude 34.5954°N., longitude 78.5597°W.). Surface elevation 107 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty; grayish brown (5*YR* 3/2) grading down to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine to coarse (modally medium), silty, clayey, dense; dark yellowish orange (10*YR* 6/6) with reddish-brown mottles (10*R* 5/6) below 6 ft	1–6.5
Silt, very clayey, stiff, dense; light olive gray (5*Y* 6/1) with reddish-brown (10*R* 5/6) mottles	6.5–7
Sand, very fine to fine; pale yellowish orange (10*YR* 8/6) grading down through light brown (5*YR* 5/6) (8–9 ft) to light yellowish brown (10*YR* 6/4)	7–10
Sand, very fine, silty, very clayey; light red (5*R* 6/6) with yellowish-gray (5*Y* 7/2) streaks	10–11
Sand very fine, silty, pale-yellowish-orange (10*YR* 8/6)	11–12
Silt, very clayey, sandy (very fine), tough, dense; grayish orange (10*YR* 7/4) grading down through grayish orange pink (5*YR* 7/2) (12.5–13.5 ft) to light olive gray (5*Y* 6/1); lower contact somewhat gradational	12–22
Sand, very fine to fine, silty, clayey; light brown (5*YR* 5/6) grading down to light yellowish brown (10*YR* 6/4)	22–26
Sand, fine to medium, silty; light brown (5*YR* 5/6) grading down through pale reddish brown (10*R* 5/6) (26–27 ft) and grayish yellow (5*Y* 7/4) (27–28 ft) to light brown (5*YR* 6/4)	26–33
Sand, very fine to fine, micaceous, yellowish-orange (10*YR* 7/6); interbedded with very clayey, light-olive-gray (5*Y* 6/1) silt	33–34
Sand, very fine to fine, very clayey and silty, micaceous, dark olive gray (5*Y* 3/1); abundant burrows filled with sand (very fine to fine), clean, light greenish gray (5*GY* 7/1); some dark-brown (5*YR* 2/4) lignite fragents	34–35
Waccamaw Formation, James City Member	
Sand, medium to coarse, clean, dark-greenish-gray (5*G* 3/1); sparse shell fragments	35–38

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, dense, stiff, finely micaceous, dark-olive-gray (5*Y* 3/1) 38–46

Base of Waccamaw Formation, Bahramsville unit: **+72 ft above sea level**
Base of Waccamaw Formation, James City Member: **+69 ft above sea level**

Bottomed in Tar Heel Formation

ES–4–08: 5.88 mi west of eastern quadrangle border, 6.96 mi north of southern quadrangle border, along dirt road 200 ft of junction with North Carolina State Road 1700, 0.50 mi north of junction with North Carolina State Road 1705, in northwestern 1/9th of map area (latitude 34.6007°N., longitude 78.6027°W.). Surface elevation about 132 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine; well-sorted, but with scattered coarse to very coarse grains; silty; yellowish brown (10*YR* 5/2) grading down to yellowish orange (10*YR* 6.5/6)	0–1
Sand, fine, well-sorted, silty; medium yellowish brown (10*YR* 5/4) grading down through grayish orange pink (5*YR* 7/2) (3–5 ft) to pale brown (5*YR* 5/2)	1–6
Sand, fine, very silty, pale-yellowish-brown (10*YR* 6/2); dark-reddish-brown (10*YR* 3/2) wood fragments*	6–7
Sand, fine, slightly silty; yellowish gray (5*Y* 8/1) grading down through pale brown (5*YR* 6/2) to light grayish brown (5*YR* 4/2)	7–10
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine), sticky, stiff; light olive gray (5*Y* 5.5/2) grading down to medium olive gray (5*Y* 5/1)	10–13
Sand, very fine to fine, clayey, silty, light-olive-gray (5*Y* 5/2); lower contact gradational	13–18
Sand, very fine to fine, very silty, slightly clayey, olive-gray (5*Y* 4/1)	18–21

Base of Waccamaw Formation, Moorings unit: **+122 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville unit

*Wood fragment at base of peat yielded a radiocarbon age greater than 51,800 B.P. (John P. McGeehin, USGS, written commun., 2008).

Garland Quadrangle

GA–1–05: 1.78 mi west of eastern quadrangle border, 4.56 mi north of southern quadrangle border, at intersection of old railroad right-of-way and end of unnumbered paved road 1/9 mi east-northeast of Green Bridge, in central 1/9th of map area (latitude 34.8163°N., longitude 78.4237°W.). Surface elevation 115 ft.

LITHOLOGY	DEPTH, IN FEET
Railroad roadbed fill	0–2
Dune sand	
Sand, fine to medium, slightly silty; dark yellowish brown (10*YR* 4/2) grading down through pale yellowish brown (5*YR* 6/2) (3–5 ft) to yellowish gray (5*Y* 8/1); lower contact somewhat gradational	2–12
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand; very fine to fine grading down to medium to coarse near base; very clayey and silty; stiff; dense; pale olive gray (5*Y* 5/1) grading near base to pale orange (5*YR* 7/2); scattered quartz granules and pebbles up to 0.7 cm in diameter	12–31
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, very clayey and silty, finely micaceous, very dense, dark-greenish-gray (5*GY* 3/1)	31–36

Base of dune sand: **+103 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+84 ft above sea level**

Bottomed in Tar Heel Formation

GA–2–05: 1.62 mi west of eastern quadrangle border, 6.22 mi north of southern quadrangle border, 0.05 mi south of North Carolina State Road 1207, 0.95 mi east-northeast of intersection of North Carolina State Road 1207 and North Carolina Highway 411, in northeastern 1/9th of map area (latitude 34.8402°N., longitude 78.4032°W.). Surface elevation 106 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, medium to coarse, slightly silty; dusky yellowish brown (10*YR* 2/2) grading down through grayish brown (5*YR* 3/2) to pale yellowish brown (10*YR* 6/2) 0–1

Sand; medium to coarse grading down to fine to medium; silty; slightly humic in lower part; yellowish gray (5*Y* 7/2) grading down to medium brown (5*YR* 4/2) at 2 ft; abundant wood material (stump?) at base..... 1–12

---------- UNCONFORMITY ----------

Windsor Formation

Sand; fine grading down to medium to coarse; silty; pale grayish orange (10*YR* 8/4) grading down to very pale yellow (5*Y* 9/1)..... 12–16

Sand, fine to medium, silty, very pale orange (10*YR* 8/2)..... 16–17

Silt, sandy (very fine), slightly clayey, light-gray (*N* 7)..... 17–27

Sand, very fine grading down to fine to medium; light gray (*N* 7) 27–31

Sand, fine to medium, pale-yellowish-gray (5*Y* 8/2)..... 31–34

Sand; fine to medium grading down to medium to coarse; silty; pale yellowish gray (5*Y* 8/2); denser than interval above..... 34–41

Base of dune sand: **+94 ft above sea level**

Bottomed in Windsor Formation

GA–3–05: 5.98 mi west of eastern quadrangle border, 7.98 mi north of southern quadrangle border, just south of intersection of dirt road with North Carolina State Road 1214 at 146-ft spot elevation, in northwestern 1/9th of map area (latitude 34.8658°N., longitude 78.4795°W.). Surface elevation 144 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, medium, clean and soft; pale yellowish brown (10*YR* 6/2) over dark yellowish brown (10*YR* 4/2)	0–1
Sand; medium grading down to medium to coarse; clean; soft; dark yellowish brown (10*YR* 4/2) grading down to pale yellowish brown (10*YR* 7/2)	1–6
Sand, medium to coarse, humic, dusky-yellowish-brown (10*YR* 2/2)	6–21
Sand, fine to medium, clean to slightly silty; medium yellowish brown (10*YR* 5/4) grading down to pale yellowish brown (10YR 7/2) at 25 ft; lower contact abrupt but no lag bed	21–28
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine); scattered fine to medium grains; sticky and moderately dense; light olive gray (5*Y* 6/1) grading down in basal foot to olive gray (5*Y* 4/1)	28–41
Sand, very fine to medium, clayey, silty, olive-black (5*Y* 2/1); wood fragments	41–43
Sand, medium to very coarse, poorly sorted, slightly silty; medium olive gray (5*Y* 5/1) grading down in basal foot to pale olive gray (5*Y* 7/1); abrupt basal contact but no lag bed	43–51
Silt, very clayey, sandy (very fine), medium-greenish-gray (5*GY* 5/1)	51–54
Sand, medium to coarse, silty, medium-olive-gray (5*Y* 5/1)	54–56
Silt, clayey, dark-greenish-gray (5*GY* 4/1)	56–59
Gravel; angular to rounded quartz clasts up to 3.5 cm in diameter; dark greenish gray (5*GY* 4/1); peaty in basal 4 in.	59–61

Base of dune sand: **+116 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville unit

GA–4–05: 6.36 mi west of eastern quadrangle border, 1.30 mi north of southern quadrangle border, on southern side of North Carolina State Road 1002 just south of abandoned house located 0.15 mi southeast of Sinai Church, in southeastern 1/9th of map area (latitude 34.7692°N., longitude 78.4859°W.). Surface elevation 91 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, very fine to fine, silty, clayey; dark yellowish brown (10*YR* 4/2) grading down to yellowish brown (10*YR* 5/2)	0–1
Sand; very fine to fine grading down to fine; dark yellowish orange (10*YR* 6/6) grading down through dark yellowish orange (10*YR* 6/6) with reddish-brown (10*R* 5/6) and pale-olive-gray (5*Y* 7/1) mottles (2–4 ft) to pale olive gray (5*Y* 7/1); lower contact somewhat gradational	1–6
Sand, medium to coarse, pale-orange (10*YR* 7/2); lower contact somewhat gradational	6–14
Sand, medium to very coarse, angular to subangular, poorly sorted, pale-olive-gray (5*Y* 7/1); lower contact gradational	14–27
Sand, coarse to very coarse, granular, slightly silty; light olive gray (5*Y* 6/1) to olive gray (5*Y* 4/1); angular metamorphic pebble 1.5 cm in diameter	27–31
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, silty, clayey, micaceous, lignitic, dark-greenish-gray (5*GY* 4/1)	31–41

Base of Windsor Formation: **+60 ft above sea level**

Bottomed in Tar Heel Formation

GA–5–05: 0.83 mi west of eastern quadrangle border, 1.98 mi north of southern quadrangle border, along old railroad right-of-way at southeastern edge of town of Garland, 0.4 mi northwest of Evening Light Church, in southeastern 1/9th of map area (latitude 34.7789°N., longitude 78.3894°W.). Surface elevation 134 ft.

LITHOLOGY	DEPTH, IN FEET
Railroad roadbed fill	0–2
Dune sand	
Sand, fine to coarse, silty, humic; dusky yellowish brown (10*YR* 2/2) grading down through yellowish brown (10*YR* 5/2) (4–18 ft) and medium yellowish brown (10*YR* 5/4) (18–30 ft) to yellowish orange (10*YR* 7/6); a few zones in this interval humate cemented; lower contact abrupt	2–32
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, very clayey, dense and stiff; dark yellowish orange (10*YR* 6/6) grading down to light olive gray (5*Y* 6/1)	32–35
Silt, clayey, sandy (very fine), greenish-gray (5*GY* 6/1)	35–39
Sand, fine, silty, micaceous, light-greenish-gray (5*GY* 7/1), lower contact somewhat gradational	39–54
Sand; medium to coarse grading down to medium to very coarse and granular with small quartz pebbles up to 1 cm in diameter; pale yellowish gray (5Y 8/2)	54–65.5
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, micaceous, dense, dark-greenish-gray (5*GY* 3/1)	65.5–66

Base of dune sand: **+102 ft above sea level**
Base of Windsor Formation: **+68.5 ft above sea level**

Bottomed in Tar Heel Formation

Harrells Quadrangle

HA–1–04: 1.21 mi west of eastern quadrangle border, 2.93 mi north of southern quadrangle border, on western side of U.S. Highway 421, 0.45 mi north-northwest of intersection of North Carolina State Road 1211 with U.S. Highway 421, in east-central 1/9th of map area (latitude 34.6675°N., longitude 78.1461°W.). Surface elevation 81 ft.

LITHOLOGY — DEPTH, IN FEET

Dune sand

Sand, fine to medium, subangular, silty, light-olive-brown (5*Y* 5/4) 0–2

---------- UNCONFORMITY ----------

Windsor Formation

Sand, very fine to fine, clayey, silty; medium brownish gray (5*YR* 5/1) with yellowish-gray (5*Y* 7/1) mottles..... 2–6

Sand; very fine to fine interbedded with fine to medium; clayey; silty; yellowish gray (5*Y* 8/1) grading down to grayish orange pink (5*YR* 7/2) 6–9

Silt, clayey, sandy (very fine), yellowish-orange (10*YR* 7/6)..... 9–12

Silt, clayey, intermittently sandy (very fine); medium gray (*N* 5) grading down through medium greenish gray (5*GY* 5/1) to dark greenish gray (5*GY* 4/1)..... 12–19

Sand; fine grading down to fine to medium; slightly silty; dark greenish gray (5*GY* 4/1); scattered wood fragments and small quartz pebbles near base 19–24

---------- UNCONFORMITY ----------

Bladen Formation

Sand, fine to medium, silty, olive-gray (5*Y* 3/2) 24–26

Sandstone, fine to medium, calcite-cemented, medium-olive-gray (5*Y* 5/1) 26–28

Sand, fine to medium, silty, calcareous, olive-gray (5*Y* 3/2) 28–31

Base of dune sand: **+79 ft above sea level**
Base of Windsor Formation: **+57 ft above sea level**

Bottomed in Bladen Formation

HA–2–04: 6.07 mi west of eastern quadrangle border, 5.21 mi north of southern quadrangle border, along northwest side of dirt road, 0.3 mi south-southwest of intersection with North Carolina State Road 1118, 0.8 mi north-northwest of intersection of North Carolina State Road 1118 and 1007, in west-central 1/9th of map area (latitude 34.7007°N., longitude 78.2310°W.). Surface elevation 80 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, fine to medium, soft, humic; medium brown (5*YR* 4/6) grading down to dusky brown (5*YR* 2/2)	0–3
Sand, fine to medium, well-sorted, subangular; slightly silty and clayey in basal foot; yellowish gray (5*Y* 8/1)	3–6
Sand, fine to medium, silty; pale orange (10*YR* 8/2) grading down through light yellowish brown (10*YR* 7/4) (8–9 ft) to dark yellowish orange (10*YR* 6/6)	6–19
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine; interbedded with clay; micaceous; lignitic; dark olive gray (5*Y* 3/1) grading down at 3 in. to dark greenish gray (5*GY* 3/1)	19–21

Base of Windsor Formation: **+61 ft above sea level**

Bottomed in Tar Heel Formation

HA–3–04: 5.56 mi west of eastern quadrangle border, 3.11 mi north of southern quadrangle border, on western side of abandoned house, 0.05 mi east of North Carolina State Road 1106, in west-central 1/9th of map area (latitude 34.6702°N., longitude 78.2222°W.). Surface elevation 78 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, fine to medium, clean; dark yellowish brown (10*YR* 4/2) grading down to light yellowish brown (10*YR* 6/4)	0–2
Sand, fine to medium, very humic; yellowish brown (10*YR* 5/2) grading down to dusky brown (10*YR* 2/2)	2–5
Sand, very fine to fine, clayey, silty, pale-brown (5*YR* 5/2)	5–6
Sand; fine to medium grading down to fine to coarse; poorly sorted; clean; thixotropic; dark reddish brown (5*YR* 3/4)	6–16
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, micaceous, dense, dark-greenish-gray (5*GY* 4/1); clay lenses and lignite in basal foot	16–26
Sandstone, fine to medium, calcite-cemented, medium-olive-gray (5*Y* 5/1)	26–28
Sand, fine to medium, silty, calcareous, olive-gray (5*Y* 3/2)	28–31

Base of Charles City Formation: **+62 ft above sea level**

Bottomed in Tar Heel Formation

HA–4–04: 3.17 mi west of eastern quadrangle border, 7.59 mi north of southern quadrangle border, at northwestern end of dirt road, 0.3 mi northwest of Peterson Cemetery, in north-central 1/9th of map area (latitude 34.7355°N., longitude 78.1802°W.). Surface elevation 73 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, fine, silty; dark yellowish brown (10*YR* 3/2) grading down at 1 ft to light yellowish brown (10*YR* 6/4)	0–4
Sand, very fine to fine, silty and clayey, stiff, yellowish-gray (5*Y* 8/1)	4–5
Sand, fine to medium, soft, silty, yellowish-orange (10*YR* 7/6)	5–6
Sand, medium to coarse, clean, slightly silty, grayish-yellow (5*Y* 8/4); abrupt contact with bed below	6–9
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, sandy (very fine), very stiff and dense; yellowish orange (10*YR* 7/6) with very light gray (*N* 8) and medium-reddish-brown (10*R* 4/6) mottles in basal 2 ft	9–14
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine to medium, subangular, silty, slightly clayey, dark-yellowish-orange (10*YR* 5.5/6); softer than unit above	14–16
Sand; fine to medium grading down to medium to coarse; soft; thixotropic; dark yellowish orange (10*YR* 5.5/6)	16–43
Sand, medium to coarse, shelly, dark-yellowish-orange (10*YR* 5.5/6)	43–46
Coquina, quartzose, pale-olive (10*Y* 6/2); abundant echinoid spines and bryozoans	46–55
Sand, medium to coarse, shelly; pale olive (10*Y* 6/2) grading down to medium light gray (*N* 6)	55–61

Base of Charles City Formation: **+64 ft above sea level**
Base of Windsor Formation: **+59 ft above sea level**

Bottomed in Duplin Formation

HA–5–04: 2.77 mi west of eastern quadrangle border, 3.09 mi north of southern quadrangle border, on road through Gap Bay, 0.35 mi northeast of road intersection at 85-ft spot elevation, in central 1/9th of map area (latitude 34.6699°N., longitude 78.1731°W.). Surface elevation 85 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Carolina Bay fill	
Peat, compact, greasy, dusky-yellowish-brown (10*YR* 2/2); wood fragments*	1–4
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, sandy (very fine); medium yellowish brown (10YR 5/4) grading down to yellowish gray (5*Y* 7/2)	4–7
Silt, soft, medium-greenish-gray (5*G* 5/1); lower contact abrupt	7–20
Silt, sandy (very fine), clayey, dark-greenish-gray (5G 4/1); much denser than interval above	20–22
Silt, sandy (very fine), clayey, olive-black (5*Y* 2/1); wood fragments	22–23
Silt, sandy (very fine), clayey, dark-greenish-gray (5*G* 4/1)	23–24
Silt, sandy (very fine), shelly, dark-greenish-gray (5*G* 4/1)	24–28
Silt, clayey, dark-greenish-gray (5*G* 4/1); very calcareous but no shells	28–42
Sand; very fine to fine grading down to fine to medium; sparsely shelly; very calcareous; dark greenish gray (5G 4/1)	42–50
Sand, medium to coarse, dark greenish gray (5*GY* 4/1); phosphate granules and wood fragments	50–56

Base of Carolina Bay fill: **+81 ft above sea level**

Bottomed in Windsor Formation

*Wood fragment at base of peat yielded a radiocarbon age of 2,050 ± 40 years B.P. (John P. McGeehin, USGS, written commun., 2005).

HA–6–04: 2.11 mi west of eastern quadrangle border, 2.83 mi north of southern quadrangle border, on road through Gap Bay where road crosses the southeastern sand rim of the bay, 0.25 mi east-southeast of the Sampson and Pender County line, in southeastern 1/9th of map area (latitude 34.6663°N., longitude 78.1619°W.). Surface elevation 85 ft.

LITHOLOGY DEPTH IN FEET

Dune sand

Obtained subsurface sample of sand from rim at southeastern end of
Gap Bay for optically stimulated thermoluminescence (OSL) dating.
Sample yielded quartz blue-light OSL age of 8,575 ± 1,420 years B.P.
(Shannon Mahan, USGS, written commun., 2005)……..at 3

HA–7–04: 6.03 mi west of eastern quadrangle border, 1.63 mi north of southern quadrangle border, on northeastern side of unnumbered road, 0.1 mi southeast of junction of that road with North Carolina State Road 1100, 0.55 mi south-southwest of Royal Chapel, in southwestern 1/9th of map area (latitude 34.6487°N., longitude 78.2302°W.). Surface elevation 64 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand, fine to medium, silty; dark yellowish brown (10*YR* 4/2) over light yellowish brown (10*YR* 6/4) 0–1

Sand, fine, silty; dusky yellowish orange (10*YR* 5/6) grading at 4 ft to yellowish gray (5*Y* 8/1) 1–6

Sand, fine to medium, silty, dark-yellowish-orange (10*YR* 6/6) 6–8

Sand, medium to coarse, silty, pale-yellowish-brown (10*YR* 7/2); lower contact abrupt 8–13

---------- UNCONFORMITY ----------

Windsor Formation

Sand, very fine to fine, silty; dusky yellowish orange (10*YR* 5/6) with light-olive gray (5*Y* 5/2) mottles; cemented in top 1 in. 13–14

Sand, fine, silty, soft, thixotropic; yellowish orange (10*YR* 7/6) grading down to dark greenish yellow (10*Y* 6/4) 14–27

Silt, sandy (very fine), slightly clayey, olive-gray (5*Y* 4/2); grades down to fine, slightly silty, dark-greenish-gray (5*GY* 4/1) sand 27–42

Sand, very fine, clayey, dark-greenish-gray (5*GY* 4/1); sparse wood fragments 42–47

Coquina; cemented shell fragments; very hard; greenish gray (5*G* 6/1) 47–48

Sand, fine to medium, very shelly, dark-greenish-gray (5*GY* 4/1) 48–53

---------- UNCONFORMITY ----------

Tar Heel Formation(?)

Impenetrable hard bed ..... at 53

Base of Charles City Formation: **+51 ft above sea level**
Base of Windsor Formation: **+11 ft above sea level**

Bottomed on Tar Heel Formation?

HA–8–04: 6.80 mi west of eastern quadrangle border, 8.20 mi north of southern quadrangle border, on northwestern side of dirt road, 0.2 mi northeast of 146-ft spot elevation, 0.5 mi southeast of northwestern corner of quadrangle, in northwestern 1/9th of map area (latitude 34.7442°N., longitude 78.2437°W.). Surface elevation 146 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, well-sorted; pale yellowish brown (10*YR* 6/2) grading down to pale grayish orange (10*YR* 8/4)	0–1
Sand, fine, well-sorted; dark yellow (5*Y* 7/4) grading down to yellowish gray (5*Y* 8/1)	1–6
Sand, fine, slightly clayey and silty; denser than interval above; yellowish gray (5*Y* 8/1)	6–11
Sand; fine grading down to fine to medium; very pale yellowish brown (10*YR* 7/2)	11–28
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, medium to coarse, pale-grayish-orange (10*YR* 8/4); lower contact gradational	28–34
Sand; coarse to very coarse, with quartz granules and small pebbles up to 1 cm in diameter; yellowish orange (10*YR* 7/6) grading down to yellowish gray (5*Y* 8/1) at 41 ft	34–57
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, silty, clayey; pale grayish orange (10*YR* 7/4) grading down through dark yellowish gray (5*Y* 7/2) to dark yellowish orange (10*YR* 6/6)	57–61
Silt, very clayey, dense, dark-greenish-gray (5*GY* 3/1); interbedded with thin layers of very fine to fine sand; micaceous; locally abundant lignite	61–76

Base of dune sand: **+118 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+89 ft above sea level**

Bottomed in Tar Heel Formation

Hope Mills Quadrangle

HM–1–07: 4.19 mi west of eastern quadrangle border, 1.97 mi north of southern quadrangle border, on northwestern side of North Carolina State Road 1718, 0.68 mi west of North Carolina State Road 1718 overpass over Interstate 95, in south-central 1/9th of map area (latitude 34.9033°N., longitude 78.9463°W.). Surface elevation 167 ft.

LITHOLOGY — DEPTH, IN FEET

Dune sand

Sand, very fine to fine, silty; brownish gray (5*YR* 4/1) grading down to dusky yellowish orange (10*YR* 5/6) 0–1

Sand, very fine to medium, poorly sorted, silty; dusky yellowish orange (10*YR* 5/6) grading down to pale yellowish brown (10*YR* 6/2) 1–6

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, fine to coarse, poorly sorted, subangular to angular, silty; pale yellowish brown (10*YR* 6/2) grading down to very pale orange (10*YR* 8/2)..... 6–11

Sand; medium to coarse grading down to medium to very coarse; light pink (5*R* 8/4); scattered rounded and polished quartz pebbles up to 3 cm in diameter 11–22

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, dense, sticky; weathered to grayish orange (10*YR* 7/4) with pale-yellowish-brown (10*YR* 6/2) and dark-yellowish-orange (10*YR* 6/6) mottles; lower contact somewhat gradational..... 22–23

Clay, silty, dense, sticky, very tough, brownish-black (5*YR* 2/1) 23–26

Base of dune sand: **+161 ft above sea level**
Base of Varina Grove unit: **+145 ft above sea level**

Bottomed in Tar Heel Formation

HM–2–07: 6.40 mi west of eastern quadrangle border, 4.56 mi north of southern quadrangle border, on western rim of a Carolina bay, 0.07 mi southeast of North Carolina State Road 1115 and 0.27 mi northeast of intersection of North Carolina State Road 1115 and 1116, in west-central 1/9th of map area (latitude 34.9412°N., longitude 78.9872°W.). Surface elevation 190 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, medium to coarse, slightly silty; dark yellowish orange (10*YR* 6/6) grading down to dusky yellowish orange (10*YR* 5/6) 0–4

Sand; dominantly fine but up to medium; silty; clayey; grayish orange pink (5*YR* 6/2) with dark-reddish-brown (5*YR* 3/4) streaks grading down to pale yellowish brown (10*YR* 6/2) 4–6

Sand, medium to coarse, silty, sticky; medium pinkish gray (5*YR* 7/1) grading down to pale yellowish orange (10*YR* 8/6) in basal 3 in.; lower contact abrupt 6–9

Sand, very fine, clayey, silty, dense, stiff, very light gray (*N* 8); tough drilling 9–10.5

Sand, very fine, clean, slightly silty, pale-orange (10*YR* 8/8); much softer than interval above 10.5–11

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, fine to medium, subangular to angular, silty; yellowish orange (10*YR* 7/6) grading down to pale grayish orange (10*YR* 8/4) at 12 ft 11–27

Sand, fine to medium, subangular to angular, kaolinitic, yellowish-gray (5*Y* 8/1); occasional quartz granules and pebbles including a 2-cm-long discoid; silty clayballs between 30 and 31 ft 27–35

Sand, fine to medium grading down to medium to coarse; permeable; dark orange (10*YR* 6/8) grading down to yellowish orange (10*YR* 7/6) at 36 ft 35–39

Clay, silty, sticky, dense; medium yellowish brown (10*YR* 5/4) with medium-red (5*R* 4/6) mottles 39–40

Sand, fine to medium, silty, slightly clayey, dark-orange (10*YR* 6/8) 40–47

Sand, medium to very coarse, poorly sorted, slightly silty, transmissive, dark-red (5*R* 3/6) 47–49

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine, micaceous, orange (10*YR* 7/8) 49–49.5

Clay, silty, light-yellowish-brown (10*YR* 6/4) 49.5–50

Sand, fine, micaceous, dark-reddish-brown (10*R* 3/4) 50–61

Base of dune sand: **+179 ft above sea level**
Base of Varina Grove unit: **+141 ft above sea level**

Bottomed in Tar Heel Formation

HM–3–07: 2.02 mi west of eastern quadrangle border, 4.50 mi north of southern quadrangle border, on eastern side of unnumbered dirt road, 0.73 mi east-northeast of North Carolina State Road 2252 overpass over Interstate 95, in east-central 1/9th of map area (latitude 34.9403°N., longitude 78.9102°W.). Surface elevation 163 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand; dominantly fine but up to medium grained; clean;
soft, grayish orange (10*YR* 7/4) 0–1

Sand; dominantly fine but up to medium grained;
slightly silty; dark yellowish orange (10*YR* 6/6) 1–3

Sand; dominantly fine but up to medium-grained; clean;
pale grayish orange (10*YR* 8/4) 3–6

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, fine grading down to fine to medium; clayey; silty;
light brown (5*YR* 6/6) grading down to light olive gray
(5*Y* 6/1) with medium-reddish-brown (10*R* 4/8) mottles at 9 ft;
tough drilling 6–11

Sand, fine to medium, clayey, silty, subangular to angular,
pale-brown (5*YR* 5/2); tough drilling 11–16

Sand, medium to coarse, silty; reddish brown (10*R* 6/8)
grading down through pale reddish brown (10*R* 5/6) (17–18 ft)
to dark red (5*R* 3/6) 16–19

Sand, fine to medium, silty; yellowish orange (10*YR* 7/6)
grading to grayish orange pink (5*YR* 7/2) at 20 ft; 1-in.-thick,
pale-grayish-orange (10*YR* 8/4) layer at base with subrounded
to rounded quartz pebbles up to 3 cm in diameter 19–22

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, tough; top 6 in. weathered to medium
yellowish brown (10*YR* 5/4) then grades to dark brownish
gray (5*YR* 3/1) 22–26

Base of dune sand: **+157 ft above sea level**
Base of Varina Grove unit: **+141 ft above sea level**

Bottomed in Tar Heel Formation

HM–4–07: 3.59 mi west of eastern quadrangle border, 8.29 mi north of southern quadrangle border, on western side of CSX Railroad cut at top of bluff, 0.37 mi along railroad from top border of quadrangle, in north-central 1/9th of map area (latitude 34.9957°N., longitude 78.9380°W.). Surface elevation 188 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, very fine to fine, slightly silty, grayish-orange (10*YR* 7/4)	0–1
Sand, very fine to fine, slightly silty, dark-yellowish orange (10*YR* 6/6)	1–3
Sand, very fine to fine, clean; pale grayish orange (10*YR* 8/4) grading down to very pale grayish orange (10*YR* 9/4) at 6 ft	3–8
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, fine to medium, silty, clayey; dark yellowish orange (10*YR* 6/6) grading down through light yellowish brown (10*YR* 6/4) to medium yellowish brown (10*YR* 5/4); contains rounded quartz pebbles up to 1 cm in diameter	8–10
Sand, fine to medium, soft, clean, pale-yellowish-gray (5*Y* 9/1); possible filled paleo-groundhog burrow	10–11
Sand, very fine to dominantly fine, silty, clayey; sparse fine mica flakes; dark yellowish brown (10YR 4/2); lower contact gradational	11–14
Sand; very fine to fine grading down to fine to medium; silty; slightly clayey; micaceous; grayish orange (10*YR* 7/4)	14–23
Silt, clayey, sandy (very fine); yellowish orange (10*YR* 7/6) grading down rapidly to pale yellowish brown (10*YR* 6/2)	23–24
Sand; medium to coarse grading down to medium to very coarse; silty; soft; dark yellow (5*Y* 6/6)	24–33
Sand, fine to medium, silty, soft; pale yellowish gray (5*Y* 8/2) grading down at 34 ft to white (*N* 8); very kaolinitic; abundant large mica flakes	33–41
Sand; medium to coarse grading down in basal foot to medium to very coarse; poorly sorted, with subangular to subrounded quartz pebbles up to 1 cm in diameter; slightly silty; soft; yellowish orange (10*YR* 7/6)	41–44

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, dense, dark-gray (*N* 3); medium-light-gray (*N* 6), clean,
very fine quartz-sand laminae and scattered pyrite lumps 44–51

Base of dune sand: **+180 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+144 ft above sea level**

Bottomed in Tar Heel Formation

Ingold Quadrangle

IG–1–05: 3.39 mi west of eastern quadrangle border, 6.58 mi north of southern quadrangle border, behind abandoned house on northeastern side of North Carolina State Road 1004, 1.75 mi west-southwest of Union School, in north-central 1/9th of map area (latitude 34.8455°N., longitude 78.3093°W.). Surface elevation 130 ft.

LITHOLOGY DEPTH, IN FEET

Waccamaw Formation, Bahramsville unit

Sand, fine to medium, silty; very dark yellowish brown (10*YR* 3/2) grading down through light yellowish brown (10*YR* 6/4) to dusky yellowish orange (10*YR* 5/6) 0–1

Sand, fine to medium, silty, sparsely granular and pebbly, dusky-yellowish-orange (10*YR* 5/6); lower contact gradational 1–3

Sand, fine, silty, medium-reddish-brown (10*R* 4/6) 3–6

Sand, very fine to fine, silty, clayey, dense, medium-light-gray (*N* 6) 6–10.5

Silt, very clayey, dense, pale-olive-gray (5*Y* 7/1) 10.5–11

Sand, fine to coarse, poorly sorted, light-brown (5*YR* 5/6); sparse quartz granules and pebbles up to 0.7 cm in diameter 11–14

Silt, very clayey, sandy (very fine), pale-brown (5*YR* 6/6) 14–15

Sand, fine to coarse, poorly sorted, silty, soft, thixotropic; pale grayish orange (10*YR* 8/4) grading down to yellowish white (5*Y* 9/1) 15–21

Silt, sandy (very fine); pale yellowish orange (10*YR* 8/6) with medium-reddish-orange (10*R* 6/6) streaks 21–22

Sand, medium to very coarse, poorly sorted, silty, yellowish-orange (10*YR* 7/6) 22–25

Silt, clayey; pale yellowish orange (10*YR* 8/6) with medium-reddish-orange (10*R* 6/6) streaks 25–27

Sand, fine to coarse, poorly sorted, silty, yellowish-orange (10*YR* 7/6); abundant quartz pebbles up to 1 cm in diameter at base 27–33

---------- UNCONFORMITY ----------

Chowan River Formation, Coharie Member

Sand, fine, well-sorted, thixotropic; reddish orange (10*R* 5/6) grading down to pale yellow (5*Y* 8/6) 33–43

Silt, very clayey, dense; pale olive gray (5*Y* 6/2) with dark-reddish-brown (10*R* 3/4) mottles grading down to dark olive gray (5*Y* 3/1) 43–45

Sand; fine grading down to fine to medium; silty; light olive brown (5*Y* 5/4) 45–56

Sand, fine, silty, slightly clayey, yellowish-orange (10*YR* 7/6) 56–58

Sand, fine to medium, silty, light-olive-brown (5*Y* 5/4) 58–61

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, micaceous, clayey, sandy (very fine), very lignitic, medium-greenish-gray (5*G* 5/1)..... 61–62

Sand; fine to coarse, dominantly medium; pale grayish orange (10*YR* 8/4) 62–65.5

Silt, medium-greenish-gray (5*G* 5/1) 65.5–66

Base of Waccamaw Formation, Bahramsville unit: **+97 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+69 ft above sea level**

Bottomed in Tar Heel Formation

IG–2–05: 1.17 mi west of eastern quadrangle border, 3.67 mi north of southern quadrangle border, on hillcrest north of North Carolina State Road 1003, 0.25 mi north of Salem Church, in east-central 1/9th of map area (latitude 34.8033°N., longitude 78.2700°W.). Surface elevation 142 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine, clean, soft; yellowish brown (10*YR* 4/2) grading down to pale grayish orange (10*YR* 8/4) 0–1

Sand, fine to medium, subangular; dusky yellowish orange (10*YR* 5/6) grading down through pale grayish orange (10*YR* 8/4) (4–10 ft) and very pale orange (10*YR* 8/2) (10–12 ft) to grayish brown (5*YR* 3/2) 1–18

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine, silty, clayey; light brown (5*YR* 4/2) grading down to pale yellowish brown (10*YR* 6/2); denser than unit above 18–22

Silt, very clayey, dense and stiff; yellowish gray (5*Y* 8/1) with pale-grayish-orange (10*YR* 8/4) and pale-brown (5*YR* 6/6) streaks 22–28

Sand, fine to medium, silty, finely micaceous; yellowish orange (10*YR* 7/6) grading down to yellowish gray (5*Y* 8/1) 28–30

Sand; fine to medium, dominantly medium; slightly silty; light orange (10*YR* 7/2) grading down to yellowish gray (5*Y* 8/1) 30–35

Sand, medium to coarse, silty, yellowish-gray (5*Y* 8/1); scattered clayballs and quartz granules, lower contact somewhat gradational 35–39

Sand, medium to very coarse, poorly sorted, slightly silty, dark-yellowish-orange (10*YR* 6/6); lower contact abrupt 39–44

---------- UNCONFORMITY ----------

Chowan River Formation, Coharie Member

Sand; fine grading down though fine to medium to medium to coarse; thin, clayey silt layers at 46 ft and 48 ft; dark-yellowish-orange (10*YR* 6/8) sand and yellowish-gray (5*Y* 7/2), clayey silt layers with light-brown (5*YR* 5/6) streaks 44–50

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, yellowish-gray (5*Y* 7/2); thin
interbeds of very lignitic, yellowish orange (5*YR* 7/6), fine sand, ... 50–51

Base of dune sands: **+124 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+98 ft above sea level**
Base of Chowan River, Formation, Coharie Member: **+92 ft above sea level**

Bottomed in Tar Heel Formation

IG–3–05: 4.19 mi west of eastern quadrangle border, 0.95 mi north of southern quadrangle border, on eastern side of North Carolina State Highway 411, in south-central 1/9th of map area (latitude 34.7638°N., longitude 78.3230°W.). Surface elevation 65 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, fine to medium, clean, soft; yellowish brown (10*YR* 5/2) grading down to pale grayish orange (10*YR* 8/4)	0–5
Sand, fine to medium, clean, soft; dark yellowish orange (10*YR* 6/6) grading down to pale yellowish brown (10*YR* 6/2); abundant subrounded to rounded quartz pebbles up to 3 cm in diameter in basal foot	5–8
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand; very fine to fine interbedded with sandy (very fine) silt; dense; silt intervals sticky; yellowish orange (10*YR* 7/6) with yellowish-gray (5*Y* 7/2) mottles	8–11
Silt, very clayey, stiff, dense, dark-greenish-gray (5*GY* 3/1)	11–12
Sand, very fine to fine, silty, clayey, very micaceous, dark-greenish-gray (5*GY* 3/1)	12–18
Sand, fine to medium, micaceous, lignitic, medium-greenish-gray (5*GY* 5/1)	18–20
Silt, very clayey, massive, dense, lignitic, dark-greenish-gray (5*GY* 3/1)	20–21

Base of Charles City Formation: **+57 ft above sea level**

Bottomed in Tar Heel Formation

IG–4–05: 6.87 mi west of eastern quadrangle border, 3.20 mi north of southern quadrangle border, on southern side of North Carolina State Road 1135, 0.25 mi east of western quadrangle border, in west-central 1/9th of map area (latitude 34.7967°N., longitude 78.3700°W.). Surface elevation
75 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand, fine to coarse, subangular to subrounded, poorly sorted, clean; pale yellowish brown (10*YR* 6/2) grading down to pale grayish orange (10*YR* 8/4) 0–2

Sand, fine to coarse, poorly sorted, grayish-brown (5*YR* 3/2); contains subrounded quartz pebbles up to 1 cm in diameter 2–5

Sand, fine to medium, clayey, silty, sticky; denser than interval above; pale yellowish brown (10*YR* 6/2) 5–8

Sand, fine, silty; softer than interval above; dark yellowish brown (10*YR* 4/2); lower contact somewhat gradational 8–16.5

Gravel; quartz pebbles up to 1 cm in diameter in a matrix of coarse to very coarse sand; dark yellowish brown (10*YR* 4/2) 16.5–18

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, clayey, micaceous; grayish olive (10*Y* 4/2) grading rapidly down to dark greenish gray (5*GY* 4/1) 18–21

Base of Charles City Formation: **+57 ft above sea level**

Bottomed in Tar Heel Formation

IG–5–08: 3.72 mi west of eastern quadrangle border, 8.14 mi north of southern quadrangle border, on northeastern side of North Carolina State Road 1141, 0.21 mi west of intersection with North Carolina State Road 1142, in north-central 1/9th of map area (latitude 34.8681°N., longitude 78.3145°W.). Surface elevation 146 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, angular to subangular, silty; medium yellowish brown (10*YR* 5/4) over dark yellowish orange (10*YR* 6/6) (4–12 in.) 0–1

Sand, fine to medium, angular to subangular, slightly silty, soft; dark yellowish orange (10*YR* 6/6) grading down through pale grayish orange (10*YR* 8/4) (2–5 ft), light yellowish brown (10*YR* 6/4) (5–7 ft), and pale yellowish brown (10*YR* 7/6) (7–8 ft) to yellowish brown (10*YR* 5/2) 1–9

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine, silty, pale-yellowish-brown (10*YR* 6/2); stiffer than unit above; lower contact somewhat gradational 9–9.5

Sand, very fine to fine, very silty, slightly clayey; very fine mica flakes; yellowish brown (10*YR* 5/2) 9.5–11

Sand, fine, very clayey and silty, stiff, slightly sticky, yellowish-brown (10*YR* 5/2); lower contact gradational 11–16

Sand, fine, very silty, pale-pinkish-gray (5YR 9/1); lower contact gradational 16–18

Sand, fine to coarse, poorly sorted, silty, yellowish-orange (10*YR* 7/6); lower contact rapidly gradational 18–20

Sand, medium to very coarse, subangular to angular, poorly sorted; less than 1 percent very fine, dark, heavy minerals; slightly silty; transmissive; yellowish orange (10*YR* 7/6) grading down to yellowish gray (5*Y* 8/1) 20–21

Base of dune sands: **+137 ft above sea level**

Bottomed in Waccamaw Formation, Bahramsville unit

JE–1–07: 0.82 mi west of eastern quadrangle border, 7.36 mi north of southern quadrangle border, on southern side of unnumbered road 100 ft west of intersection with North Carolina State Road 1002, 0.1 mi northwest of China Grove Church, in northeastern 1/9th of map area (latitude 34.8567°N., longitude 78.6393°W.). Surface elevation 118 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, soft; dusky yellowish orange (10*YR* 4/2) grading down through pale orange (10*YR* 7/2) (0.5–1.5 ft) to dark yellowish orange (10*YR* 6/6)	0–2
Sand, fine to medium, silty; dark yellowish orange (10*YR* 6/6) grading down through light brown (5*YR* 5/6) and grayish orange (10*YR* 7/4) to grayish orange pink (5*YR* 7/2)	2–7
Sand; fine to medium, dominantly fine; slightly silty; softer than interval above; very light gray (*N* 8); lower contact abrupt	7–11
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, very clayey, dense, stiff, orange-pink (5*YR* 7/4)	11–12
Silt, very clayey, sandy (fine to medium), dense, very stiff; light gray (*N* 7) with grayish-orange (10*YR* 7/4) mottles	12–17
Sand, medium to coarse, angular to subangular, very clayey and silty, yellowish-orange (10*YR* 7/6); lower contact gradational	17–19
Sand, medium to coarse, angular to subangular, clayey, silty, orange (10*YR* 7/8)	19–22
Sand, medium to coarse, slightly silty, transmissive, yellowish-gray (5*Y* 8/1); lower contact gradational	22–30
Sand, medium to very coarse, poorly sorted; quartz granules abundant in basal 3 in.; pale orange (10*YR* 8/8) mingled with orange (10*YR* 8/7)	30–33
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, sticky, stiff; abundant fine mica flakes; dark gray (*N* 3)	33–37

Base of dune sand: **+107 ft above sea level**
Base of Windsor Formation: **+85 ft above sea level**

Bottomed in Tar Heel Formation

JE–2–07: 1.36 mi west of eastern quadrangle border, 7.35 mi north of southern quadrangle border, in field 0.11 mi northeast of unnumbered road, 1.0 mi west of intersection of unnumbered road with North Carolina State Road 1002 (intersection located 0.1 mi northwest of China Grove Church), in northeastern 1/9th of map area (latitude 34.8565°N., longitude 78.6483°W.). Surface elevation
102 ft.

LITHOLOGY DEPTH, IN FEET

Windsor Formation

Sand, fine to medium, slightly silty, soft; grayish brown (5*YR* 3/2) grading down through grayish orange (10*YR* 7/4) and dusky yellowish orange (10*YR* 5/6) to yellowish orange (10*YR* 7/6) 0–3

Sand, fine to medium, silty, slightly clayey; grades down to fine, very clayey, and silty; light yellowish brown (10*YR* 6/4) 3–6

Sand, fine to medium, silty, soft, medium-yellowish-brown (10*YR* 5/4); lower contact gradational 6–10

Sand, medium to very coarse, poorly sorted, silty, soft, medium-yellowish-brown (10YR 5/4); lower contact gradational 10–14

Sand, fine to medium, silty, soft, medium-yellowish-brown (10*YR* 5/4); lower contact gradational 14–19

Sand, medium to very coarse, poorly sorted, soft, light-olive-gray (5*Y* 6/1); abundant subrounded quartz pebbles up to 3 cm in diameter; silty and clayey in basal foot 19–22

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, stiff, dense; abundant fine mica flakes; dark olive gray (5*Y* 3/1) 22–25

Sand, fine, silty, slightly clayey, medium-olive-gray (5*Y* 3/2); fine to coarse mica flakes and scattered wood clasts; interbedded with dense clay layers 25–31

Base of Windsor Formation: **+80 ft above sea level**

Bottomed in Tar Heel Formation

JE–3–07: 6.23 mi west of eastern quadrangle border, 6.60 mi north of southern quadrangle border, on eastern side of North Carolina Highway 53, 0.20 mi north of Jerome and 0.88 mi north of intersection with North Carolina State Road 1327, in northwestern 1/9th of map area (latitude 34.8462°N., longitude 78.7340°W.). Surface elevation 104 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, dominantly fine, soft; dark yellowish brown (10*YR* 4/2) grading down to grayish orange (10*YR* 7/6)	0–1
Sand, fine to medium, dominantly fine, soft; yellowish orange (10*YR* 7/6) grading down through yellowish gray (5*Y* 8/1) (6–9 ft) and grayish orange pink (5*YR* 7/2) (9–10 ft) to very pale orange (10*YR* 8/2)	1–16
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, very fine, silty, clayey, moderately stiff, dark-brownish-gray (5*YR* 3/1)	16–19
Sand, fine; dark yellowish brown (10*YR* 3/2) grading down to grayish orange (10*YR* 7.5/4) at about 22 ft; root fragments	19–28
Silt, clayey, sandy (very fine), stiff; grades down to very fine to fine, silty, clayey sand; pale orange (10*YR* 7/2) in upper foot grading rapidly down to pale olive gray (5*Y* 7/1)	28–34
Sand; fine to medium grading down to medium to coarse; pale olive gray (5*Y* 7/1); rounded to subrounded quartz pebbles up to 1 cm in diameter; lower contact gradational	34–37
Sand, coarse to very coarse, pale-olive-gray (5*Y* 7/1); abundant subangular to subrounded quartz granules	37–38
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense; abundant fine mica flakes; dark olive gray (5*Y* 3/1)	38–41

Base of dune sand: **+88 ft above sea level**
Base of Windsor Formation: **+66 ft above sea level**

Bottomed in Tar Heel Formation

JE–4–07: 3.23 mi west of eastern quadrangle border, 3.69 mi north of southern quadrangle border, on northeastern side of North Carolina State Road 1327, 1.57 mi northwest of intersection with North Carolina State Road 1325, in central 1/9th of map area (latitude 34.8037°N., longitude 78.6812°W.). Surface elevation 101 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand; fine to medium, dominantly fine; slightly silty; grayish orange (10*YR* 7/4) grading down to dark yellowish orange (10*YR* 6/6)..... 0–1

Sand; fine to medium, dominantly fine; soft; yellowish gray (5*Y* 9/1) grading down through very pale yellowish brown (10*YR* 7/2) with dark-orange (10*YR* 6/8) mottles (2–3 ft) to pale pinkish gray (5*YR* 9/1)..... 1–8

Sand; fine to medium, dominantly fine; soft; slightly humic; medium yellowish brown (10*YR* 5/4); lower contact abrupt..... 8–22

---------- UNCONFORMITY ----------

Charles City Formation

Silt, sandy (very fine), clayey, micaceous; top 3 in. light olive gray (5*Y* 6/1), grades down to grayish brown (5*YR* 3/2)..... 22–25

Sand, fine to medium, silty, yellowish-brown (10*YR* 5/2); lower contact gradational..... 25–27

Sand; fine to coarse with coarse fraction subrounded; poorly sorted; slightly silty; yellowish gray (5*Y* 7/2); grades down to sand, medium to very coarse and granular; granules subangular to subrounded, very pale yellowish brown (10*YR* 7/2); kaolin ghosts of feldspar crystals in basal 2 ft..... 27–36

Sand, medium to very coarse, granular, poorly sorted, slightly kaolinitic, transmissive, yellowish-gray (5*Y* 7/1); sparse coarse, silvery mica; less than 1 percent very fine, dark, heavy minerals; about 10 percent of granular fraction composed of white feldspar..... 36–44

---------- UNCONFORMITY ----------

Windsor(?) Formation

Silt, very clayey, sandy (very fine), finely micaceous, greenish-gray (5*G* 6/1); lower contact gradational..... 44–57

Sand, very fine to fine, silty, variably clayey; abundant coarse, silvery mica; greenish gray (5*GY* 6/1)..... 57–67

Sand, medium to very coarse, subangular, poorly sorted,
pale-olive-gray (5*Y* 7/1); abundant subrounded
to rounded quartz pebbles up to 3 cm in diameter 67–71

Base of dune sand: **+79 ft above sea level**
Base of Charles City Formation: **+57 ft above sea level**

Bottomed in Windsor Formation (?)

JE–5–07: 0.67 mi west of eastern quadrangle border, 1.83 mi north of southern quadrangle border, 200 ft northeast of North Carolina State Road 1325, 0.45 mi west-northwest of 103-ft elevation benchmark station, in southeastern 1/9th of map area (latitude 34.7769°N., longitude 78.6367°W.). Surface elevation 100 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, silty; dusky yellowish brown (10*YR* 2/2) grading down through dark yellow (5*Y* 6/6) to light yellowish brown (10*YR* 6/4) (1–3 ft)	0–3
Sand, fine, clean, soft, pinkish-gray (5*YR* 8/1)	3–6
Sand, fine to medium, humic, soft; pale grayish orange (10*YR* 8/4) grading down to very dark yellowish brown (10*YR* 3/2) in basal foot	6–12
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, fine, silty, clayey, pale-yellowish-brown (10*YR* 6/2); much denser than unit above	12–16
Sand; fine to medium grading down to medium to very coarse; poorly sorted; slightly silty; pale yellowish gray (5*Y* 8/2) grading down to medium olive gray (5*Y* 5/1)	16–22
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine, silty, clayey, micaceous, dark-brownish-gray (5*YR* 3/1) to olive-gray (5*Y* 4/1); numerous clasts of wood	22–25
Peat, dark-brownish-gray (5*YR* 3/1)	25–25.5
Sand, fine, silty, clayey, micaceous, dark-brownish-gray (5*YR* 3/1) to olive-gray (5*Y* 4/1); sparse clasts of wood; silt and clay content decreases downward	25.5–36
Sand, fine, slightly silty, micaceous; dark greenish gray (5*G* 3/1) grading down to dark greenish gray (5*GY* 3/1); scattered clasts of wood; increasingly silty and clayey downward	36–52
Clay, silty, dense, dusky-greenish-gray (5*GY* 3/1); laminae of clean, very fine, angular, olive (10*Y* 5/2) sand,	52–53

Sand, fine, silty, clayey, micaceous, dusky-greenish-gray
(5*GY* 3/1); abundant wood fragments 53–56

Base of dune sand: **+88 ft above sea level**
Base of Windsor Formation: **+78 ft above sea level**

Bottomed in Tar Heel Formation

JE–6–07: 5.19 mi west of eastern quadrangle border, 1.40 mi north of southern quadrangle border, on northeastern side of North Carolina Highway 53, 0.47 mi north-northeast of 82-ft benchmark station, in southwest 1/9th of map area (latitude 34.7704°N., longitude 78.7157°W.). Surface elevation 83 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, clean, soft; 1 in. of pale-brown (5*YR* 5/2) topsoil, very pale orange (10*YR* 8/2) below	0–1
Sand, fine to medium, clean, soft; grayish orange pink (5*YR* 7/2) grading down through yellowish orange (10*YR* 7/6) (3–4 ft) and very pale orange (10*YR* 8/2) (4–9 ft) to medium yellow (5*Y* 7/6)	1–10
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, clayey, sandy (very fine), sticky but not dense; dark brownish gray (5*YR* 3/1) grading down through light gray (*N* 7) (10.5–12 ft) to light gray (*N* 7) with dark-yellow (5*Y* 6/6) mottles	10–16
Silt, clayey, sandy (very fine), stiff, dense, finely micaceous; light gray (*N* 7) with dark-yellow (5*Y* 6/6) mottles; grades downward to sand, very fine to fine, silty, clayey, dark yellow (5*Y* 6/6) with light-gray (*N* 7) mottles	16–23
Sand, fine to coarse, subangular to angular, poorly sorted, clean, pale-yellowish-brown (10*YR* 6/2); rounded quartz granules in basal 6 in.	23–29
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense, dark-brownish-gray (5*YR* 3/1); thinly laminated with laminae marked by coarse mica flakes; sparse black wood fragments	29–36

Base of dune sand:	**+73 ft above sea level**
Base of Charles City Formation:	**+54 ft above sea level**

Bottomed in Tar Heel Formation

Northeast Lumberton Quadrangle

NL–1–06: 1.78 mi west of eastern quadrangle border, 5.13 mi north of southern quadrangle border, on northern side of drainage ditch and 200 ft southwest of North Carolina State Road 1975, 0.33 mi east of junction of North Carolina State Roads 1975 and 1955, in east-central 1/9th of map area (latitude 34.6996°N., longitude 78.9061°W.). Surface elevation 146 ft.

LITHOLOGY — DEPTH, IN FEET

Varina Grove unit

Sand, fine, slightly silty and clayey; very dark yellowish brown (10*YR* 3/2) grading down to medium yellowish brown (10*YR* 5/4) 0–1

Sand, very fine to fine, silty, clayey, stiff, dense; pale yellowish brown (10*YR* 6/2) grading down through pale yellowish brown (10*YR* 6/2) with dark-yellowish-orange (10*YR* 6/6) mottles (2–4 ft) to pale yellowish brown (10*YR* 7/2) with dark-yellowish-orange (10*YR* 6/6) mottles 1–6

Sand, very fine, silty, clayey; pale yellowish orange (10*YR* 8/6) with yellowish-gray (5*Y* 8/1) streaks 6–11

Sand; very fine grading down to very fine to fine; silty; yellowish gray (5*Y* 7/2) grading down to yellowish gray (5*Y* 8/1) 11–14

Sand, fine to medium, silty, light-yellowish-brown (10*YR* 6/4) 14–18

Silt, sandy (very fine), very clayey, stiff, sticky; yellowish orange (10*YR* 7/6) grading down to light olive gray (5*Y* 6/1) 18–21

Sand, fine to medium, light-yellowish-brown (10*YR* 6/4) 21–28

Silt, sandy (very fine), light-olive-gray (5*Y* 6/1) 28–30

Sand, fine to coarse, poorly sorted, very clayey and silty, bluish-gray (5*B* 6/1) 30–31

---------- UNCONFORMITY ----------

Duplin Formation

Sand, fine to medium, silty, soft, micaceous; light olive gray (5*Y* 5/2) grading to medium light gray (*N* 6) at 34 ft 31–36

Sand, fine to medium, silty, soft, very micaceous, light-olive-gray (5*Y* 5/2) 36–36.5

Sand, fine to medium, silty, soft, micaceous, medium-light-gray (*N* 6) 36.5–42

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, sandy (very fine), dense, stiff, micaceous; medium olive gray (5*Y* 5/1) grading down to dark brownish gray (5*YR* 3/1); locally abundant black plant fragments 42–46

Base of Varina Grove unit: **+115 ft above sea level**
Base of Duplin Formation: **+104 ft above sea level**

Bottomed in Tar Heel Formation

NL–2–06: 3.88 mi west of eastern quadrangle border, 1.08 mi north of southern quadrangle border, on eastern side of road to cemetery located 0.08 mi south-southeast of North Carolina Highway 41 at junction of North Carolina Highway 41 and North Carolina State Road 1954, in south-central 1/9th of map area (latitude 34.6410°N., longitude 78.9427°W.). Surface elevation 158 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine, well-sorted, clean, soft; brownish black (5*YR* 2/1) grading rapidly to greenish yellow (10*Y* 7/2) at 3 in. 0–1

Sand, fine, well-sorted, slightly silty and clayey; pale yellowish brown (10*YR* 6/2) grading down through yellowish gray (5*Y* 7/1), dusky yellow (5*Y* 6/4), and grayish orange pink (5*YR* 6/2) to light yellowish brown (10*YR* 6/4) 1–7

Peat, sandy (very fine), greenish-black (5*GY* 1/1); abundant wood fragments* 7–18

---------- UNCONFORMITY ----------

Varina Grove unit

Sand; mostly fine but with scattered subrounded medium grains; silty; thixotropic; very dark yellowish orange (10*YR* 5/6); lower contact gradational 18–20

Sand, fine, silty, thixotropic; dark yellowish orange (10*YR* 6/6) grading down through pale grayish orange (10*YR* 7/6) (22 to 23 ft) to pale yellow (5*Y* 8/6) 20–24

Sand; very fine to fine, dominantly very fine; slightly silty; thixotropic; contains 1–2 percent very fine, dark, heavy minerals; pale yellow (5*Y* 8/6) grading down through pale orange (10*YR* 7/2) (29–30 ft), very pale orange (10*YR* 8/2) (30–40 ft), and yellowish orange (10*YR* 7/6) (40–42 ft) to dark yellowish orange (10*YR* 6/6) 24–43

---------- UNCONFORMITY ----------

Duplin Formation

Sand; fine with scattered subrounded to rounded medium grains; very silty; slightly clayey; light olive (5*Y* 5/2); lower contact gradational 43–47

Sand, fine to medium, very silty, slightly clayey; dark greenish gray (5*G* 4/2) grading down to greenish gray (5*GY* 6/1) at 51 ft; lower contact gradational 47–55

Sand, medium to coarse, dark-olive-gray (5*Y* 4/1);
scattered subrounded to rounded quartz granules
and pebbles up to 0.5 cm in diameter 55–57

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, sandy (very fine), dense, stiff, very micaceous;
bluish gray (5*B* 6/1) grading down to light bluish gray (5*B* 7/1) 57–58.5

Sand; fine to medium with scattered subrounded coarse grains;
feldspathic; slightly silty and clayey; light bluish gray (5*B* 7/1) 58.5–59

Silt, very clayey, sandy (very fine), dense, stiff, very micaceous,
light-olive-gray (5*Y* 6/1) 59–61

Base of dune sand: **+140 ft above sea level**
Base of Varina Grove unit: **+115 ft above sea level**
Base of Duplin Formation: **+101 ft above sea level**

Bottomed in Tar Heel Formation

*Wood fragment at base of peat yielded a radiocarbon age greater than 51,800 B.P.
(John P. McGeehin, USGS, written commun., 2007).

NL–3–06: 5.33 mi west of eastern quadrangle border, 3.71 mi north of southern quadrangle border, on northeastern side of abandoned house 0.10 mi south-southeast of junction of North Carolina State Roads 1529 and 1947, in west-central 1/9th of map area (latitude 34.6790°N., longitude 78.9683°W.). Surface elevation 139 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, yellowish-brown (10*YR* 5/2)	0–1
Peat, sandy (very fine), very dusky red (10*R* 2/2); bottoms in pine stump with turpentine odor	1–4
Sand, very fine, clayey, silty, stiff; dusky yellow (5*Y* 5/4) with pale-reddish-brown (10*R* 5/6) mottles	4–6
Sand, fine to medium, subangular to subrounded; clayey and silty grading down to silty; pale yellowish gray (5*Y* 8/2) grading down at 7 ft to bright reddish orange (10*R* 6/8)	6–11
Sand; fine to medium with scattered coarse to very coarse grains; subrounded to subangular; slightly silty; yellowish orange (10*YR* 7/6)	11–23
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine to medium, silty; light olive brown (5*Y* 5/6) grading down to grayish yellow (5*Y* 7/4) at 25 ft; shell fragments and lime-cemented nodules	23–27
Sand, fine to coarse, poorly sorted, silty; pale olive (10*Y* 6/2) grading to medium bluish gray (5*B* 5/1) at 28 ft; very shelly including *Mulinia congesta*; subrounded quartz granules abundant in basal 2 ft	27–35
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand; very fine to fine grading down to very fine to medium; subangular to angular; poorly sorted; silty; very micaceous; dense; light gray (*N* 7) grading down to greenish gray (5*GY* 6/1) at about 36 ft	35–38
Silt, very clayey, sandy (very fine), dense, stiff, carbonaceous; medium greenish gray (5*GY* 6/1) grading down to dark brownish gray (5*YR* 3/1); contains 0.5-cm-diameter waxy clayballs	38–41

Base of Varina Grove unit: **+116 ft above sea level**
Base of Duplin Formation: **+104 ft above sea level**

Bottomed in Tar Heel Formation

NL–4–06: 3.45 mi west of eastern quadrangle border, 7.20 mi north of southern quadrangle border, on eastern side of abandoned house 0.05 mi south-southwest of junction of North Carolina State Roads 1932 and 1977, in north-central 1/9th of map area (latitude 34.7296°N., longitude 78.9352°W.). Surface elevation 145 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to coarse, subangular to subrounded, silty, clayey; dusky yellow (5*Y* 6/4) grading down to dark yellowish orange (10*YR* 6/6)	0–1
Sand, fine to medium, subangular to subrounded, silty, clayey, stiff; dark yellowish orange (10*YR* 6/6) grading down to light gray (*N* 7) with light-yellowish-brown (10*YR* 6/4) mottles	1–6
Sand, fine to coarse, subangular to subrounded, silty, clayey, stiff, dense; brownish gray (5*YR* 4/1) grading down to grayish brown (5*YR* 4/2)	6–11
Sand; fine to medium grading down to medium to coarse; subangular to subrounded; slightly silty; grayish brown (5*YR* 4/2)	11–17
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine, well-sorted, silty, light-yellowish-orange (10*YR* 7/8); lower contact gradational	17–20
Sand, fine to coarse, poorly sorted, silty, bright-yellowish-orange (10*YR* 6/8); scattered clayballs up to 0.5 cm in diameter	20–21
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, silty, clayey, micaceous, medium-gray (*N* 5); lower contact gradational	21–24
Silt, very clayey, stiff, very dense, medium-gray (*N* 5)	24–26
Silt, very clayey, stiff, very dense, carbonaceous; greasy luster; dark brownish gray (5*YR* 3/1); lower contact gradational	26–28

Silt, very clayey, stiff, very dense, medium-olive-gray (5*Y* 5/1) 28–31

Base of Varina Grove unit: **+128 ft above sea level**
Base of Duplin Formation: **+124 ft above sea level**

Bottomed in Tar Heel Formation

Roseboro Quadrangle

RB–1–05: 1.21 mi west of eastern quadrangle border, 2.26 mi north of southern quadrangle border, on eastern side of North Carolina Highway 242, 1.4 mi south-southeast of Mill Creek Church, in southeast 1/9th of map area (latitude 34.9077°N., longitude 78.5212°W.). Surface elevation 135 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, clean; dusky yellowish brown (10*YR* 2/2) grading rapidly to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine to medium, silty; light yellowish brown (10*YR* 6/4) grading down through dark yellowish orange (10*YR* 6/6) (2–5 ft) and pale grayish orange (10*YR* 8/4) (5–17 ft) to orange (10*YR* 7/8)	1–18
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine); pale yellowish brown (10*YR* 6/2) grading down through pale yellowish gray (5*Y* 8/2) (18.5–26 ft) to yellowish orange (10*YR* 7/6)	18–29
Sand; very fine to fine grading down to medium to coarse; pale grayish orange (10*YR* 8/4) grading in basal foot to dark yellowish orange (10*YR* 6/6)	29–34
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, clayey, silty, micaceous, lignitic, stiff, dense; interbedded with clayey, very fine, sandy silt; dark greenish gray (5*GY* 3/1)	34–46

Base of dune sand: **+117 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+101 ft above sea level**

Bottomed in Tar Heel Formation

RB–2–05: 1.09 mi west of eastern quadrangle border, 7.15 mi north of southern quadrangle border, on southeastern side of North Carolina State Road 1401, 0.15 mi west-southwest of intersection of North Carolina State Road 1401 and 1002, in northeastern 1/9th of map area (latitude 34.9789°N., longitude 78.5187°W.). Surface elevation 132 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty, light-yellowish-brown (10*YR* 6/4)	0–1
Sand; very fine to fine grading down to fine to medium; clayey; silty; stiff; dense; light brown (5*YR* 6/6)	1–6
Sand, medium to very coarse, poorly sorted, granular, light-brown (5*YR* 56/6)	6–8
Silt, sandy (very fine), clayey, stiff; yellowish gray (5*Y* 8/1) grading down to dark yellowish orange (10*YR* 6/6) at 11 ft	8–15
Sand; very fine to fine grading down to fine to medium; yellowish orange (10*YR* 7/6); lower contact somewhat gradational	15–21
Sand, coarse to very coarse, pebbly; pale grayish orange (10*YR* 8/4) grading down to dark yellowish orange (10*YR* 6/6)	21–24
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, sandy (very fine); interbedded with very fine, silty sand; micaceous; lignitic; stiff; dark greenish gray (5*GY* 3/1)	24–31

Base of Waccamaw Formation, Bahramsville unit: **+108 ft above sea level**

Bottomed in Tar Heel Formation

RB–3–05: 3.54 mi west of eastern quadrangle border, 4.30 mi north of southern quadrangle border, on northeastern side of North Carolina State Road 1255 on western side of cemetery, 1.1 mi northwest of intersection of North Carolina State Road 1255 and 1246, in central 1/9th of map area (latitude 34.9375°N., longitude 78.5617°W.). Surface elevation 128 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty; dark yellowish brown (10*YR* 3/2) grading rapidly to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine to medium, silty; pale yellowish gray (5*Y* 8/2) grading down to dark yellowish orange 10*YR* 6/6)	1–5
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Silt, clayey, very fine to fine sandy, stiff, yellowish-gray (5*Y* 7/2)	5–6
Silt, clayey, sandy (very fine), stiff, dense; yellowish gray (5*Y* 8/1) with sparse reddish-brown (10*R* 5/6) mottles	6–13
Sand; fine to medium grading rapidly down to medium to coarse; pale yellowish gray (5*Y* 8/2) grading down through orange (10*YR* 7/8) (16–20 ft) and through light yellowish gray (5*Y* 8/1) (20–26 ft), returning to orange (10*YR* 7/8)	13–28
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, micaceous; upper 6 in. weathered to dark yellowish brown (10*YR* 4/2); dark greenish gray (5*GY* 3/1) below	28–31

Base of dune sand: **+123 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+100 ft above sea level**

Bottomed in Tar Heel Formation

RB–4–05: 5.84 mi west of eastern quadrangle border, 1.42 mi north of southern quadrangle border, on northeastern side of North Carolina State Road 2040 on western side of cemetery, 1.25 mi west of Beaver Dam School, in southwest 1/9th of map area (latitude 34.8956°N., longitude 78.6023°W.). Surface elevation 117 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, soft, humic, dusky-yellowish-brown (10*YR* 2/2) 0–1

Sand; fine to medium grading down to medium; soft; pale orange (10*YR* 7/2) grading down to light grayish brown (5*YR* 4/2) 1–5

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine, silty, clayey, very pale brown (5*YR* 6/2) 5–6

Silt, clayey, stiff and dense; dark grayish orange (10*YR* 5/6) grading down to dark grayish orange (10*YR* 5/6) with pale-yellowish-gray (5*Y* 8/2) mottles 6–11

Sand; very fine grading down through fine to medium and medium to coarse to medium to very coarse;, subangular to subrounded; silty; clayey; micaceous; yellowish orange (10*YR* 7/6) grading rapidly down through pale grayish orange (10*YR* 8/4) (23–24 ft) to orange (10*YR* 7/8); locally abundant quartz granules and small pebbles 11–26

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, clayey, micaceous, very lignitic, dark-greenish-gray (5*GY* 3/1); thin lenses of micaceous, fine sand below 29 ft 26–31

Base of dune sand: **+112 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+91 ft above sea level**

Bottomed in Tar Heel Formation

RB–5–05: 6.22 mi west of eastern quadrangle border, 7.48 mi north of southern quadrangle border, on southern side of power line south of (and parallel to) North Carolina Highway 24, 0.9 mi east of western quadrangle boundary, in northwest 1/9th of map area (latitude 34.9837°N., longitude 78.6089°W.). Surface elevation 145 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand; fine to medium grading down to medium to coarse; light yellowish brown (10*YR* 6/4) grading down through pale orange (10*YR* 7/2) to yellowish orange (10*YR* 7/6)..... 0–6

Sand, fine to medium; pale orange (10*YR* 7/2) grading down through yellowish orange (10*YR* 7/6) (8–10 ft), back to pale orange (10*YR* 7/2) (10–11 ft), and then to light yellowish brown (10*YR* 6/4) 6–13

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Silt, clayey, sandy (very fine), yellowish-gray (5*Y* 8/1)..... 13–21

Sand; very fine to fine grading down to medium to coarse; subangular; yellowish orange (10*YR* 7/6); lower contact somewhat gradational 21–24

Sand, medium to very coarse, subangular, poorly sorted, silty, yellowish-gray (5*Y* 8/1)..... 24–34

Sand, medium to very coarse, subangular, poorly sorted, silty; yellowish gray (5*Y* 8/1) grading down to grayish yellow (5*Y* 7/4); abundant rounded quartz granules and small pebbles..... 34–36

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, micaceous, sparsely lignitic, dense, sticky, dark-greenish-gray (5*GY* 3/1)..... 36–46

Base of dune sand: **+132 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+109 ft above sea level**

Bottomed in Tar Heel Formation

RB–6–08: 1.21 mi west of eastern quadrangle border, 2.26 mi north of southern quadrangle border, on southeastern side of dirt road, 0.05 mi northeast of North Carolina Highway 210 and 0.14 mi north of Evergreen Church, west-central 1/9th of map area (latitude 34.9492°N., longitude 78.6205°W.). Surface elevation 117 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, slightly silty, soft; light yellowish brown (10*YR* 6/4) grading down through dark yellowish orange (10*YR* 6/6) to dark yellowish orange (10*YR* 5/6); one large, subrounded, elongate quartz granule at base 0–5

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine to medium, silty, slightly clayey, dense, yellowish-orange (10*YR* 7/6); lower contact somewhat gradational 5–7

Sand, very fine to fine, very clayey, silty, stiff; very light gray (*N* 8) with light-brown (5*YR* 5/6) mottles; lower contact somewhat gradational 7–8

Sand, very fine to fine, very silty, slightly clayey; very light gray (*N* 8) grading down to pale yellowish gray (5*Y* 8/2) with dark-orange (10*YR* 6/8) mottles; lower contact somewhat gradational 8–9

Sand, fine to very coarse, subangular to angular, very poorly sorted, silty, soft; yellowish orange (10*YR* 7/6) with pale-grayish-orange (10*YR* 7/4) mottles 9–11

Sand, fine to coarse, subangular to angular, poorly sorted, silty, soft; yellowish orange (10*YR* 7/6) grading down to medium orange (10*YR* 7/8) at 13 ft; lower contact somewhat gradational 11–20

Sand, medium to very coarse, subangular to angular, poorly sorted, medium-orange (10*YR* 7/8); contains rounded to subrounded quartz pebbles up to 1 cm in diameter 20–22.5

Sand, fine, well-sorted; 2–5 percent very fine, dark, heavy mineral grains; pale yellowish gray (5*Y* 8/2) with pale-olive (10*Y* 6/2) streaks 22.5–23

Sand, medium to very coarse, subangular to angular, poorly sorted; medium orange (10*YR* 7/4) grading down through very pale orange (10*YR* 8/2) to bright orange (10*YR* 6/8); contains rounded to subrounded quartz pebbles up to 3 cm in diameter 23–25.5

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, very micaceous; weathered dark yellowish orange (10*YR* 6/6) at top, dark brownish gray (5*YR* 3/1) beneath; laminae of clean, very fine sand 25.5–26

Base of dune sand: **+112 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+91.5 ft above sea level**

Bottomed in Tar Heel Formation

RB–7–08: 2.38 mi west of eastern quadrangle border, 3.05 mi north of southern quadrangle border, at crest of small hill on southern side of unnumbered dirt road, 0.6 mi southeast of junction of unnumbered dirt road with North Carolina State Road 1246, on boundary between central and east-central 1/9th of map area (latitude 34.9192°N., longitude 78.5414°W.). Surface elevation 125 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, soft, dark-yellowish-orange (10*YR* 6/6); lower contact gradational	0–4
Sand; fine grading down to fine to medium, dominantly fine; soft; pale grayish orange (10*YR* 8/4)	4–11
Sand, fine to medium, soft, yellowish-orange (10*YR* 7/6)	11–12
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty, clayey, stiff, yellowish-orange (10*YR* 7/6); lower contact gradational	12–14
Sand, fine to coarse, poorly sorted, clayey, silty, stiff, pale-grayish-orange pink (5*YR* 8/2); clay and silt content decreases downward	14–21
Sand, medium to very coarse, poorly sorted, clayey, silty, dark-yellowish-orange (10*YR* 6/6); contains subangular to subrounded granules	21–22
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, dense, sticky, silty; weathered yellowish brown (10*YR* 5/2) at top but grades rapidly down to dark olive gray (5*Y* 3/1) at 22.5 ft; sparse fine mica and very fine quartz-sand laminae	22–25
Sand; fine to medium grading down to fine; silty; clayey; locally woody; abundant coarse mica; yellowish brown (10*YR* 5/2) grading down through yellowish brown (10*YR* 5/2) with streaks of medium orange (10*YR* 7/8) and bright orange (10*YR* 6/8) to all medium orange (10*YR* 7/8)	25–31

Base of dune sand: **+113 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+103 ft above sea level**

Bottomed in Tar Heel Formation

Rose Hill Quadrangle

RH–1–04: 1.55 mi west of eastern quadrangle border, 3.41 mi north of southern quadrangle border, on western side of road leading to old quarry, 0.3 mi south of North Carolina State Road 1148, 1.55 mi west of eastern quadrangle boundary, in east-central 1/9th of map area (latitude 34.7997°N., longitude 78.0273°W.). Surface elevation 70 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine to fine, silty, dark-yellowish-brown (10*YR* 3/2)	0–1
Sand, very fine, silty, clayey, dark-yellowish-orange (10*YR* 6/6)	1–5
Silt, clayey, sandy (very fine), yellowish-gray (5*Y* 8/1)	5–6
Sand, fine to medium, yellowish-gray (5*Y* 8/1); lower contact somewhat gradational	6–9
Sand, medium to coarse, slightly silty, medium-olive-gray (5*Y* 5/1)	9–16
---------- UNCONFORMITY ----------	
Castle Hayne Limestone	
Sand, fine to medium, silty, thixotropic, light-olive-brown (5*Y* 5/4); abundant shell fragments	16–17
Calcarenite, medium to coarse, weathered, soft, crumbly, light-yellowish-brown (10*YR* 6/4)	17–18
Calcarenite, medium to coarse, quartzose, soft, crumbly, light-greenish-gray (5*GY* 7/1); abundant shell fragments and echinoid spines; phosphate pebble 1 cm in diameter at base*	18–26
Calcarenite, fine, silty, medium-greenish-gray (5*GY* 5/1); medium to coarse quartz -sand grains in basal 6 in.	26–28
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, fine, silty, micaceous, dark-greenish-gray (5*GY* 3/1)	28–41

Sand, fine, silty, clayey, micaceous, sparsely
shelly, dark-greenish-gray (5*GY* 3/1) 41–46

Base of Charles City Formation: **+54 ft above sea level**
Base of Castle Hayne Limestone: **+42 ft above sea level**

Bottomed in Donoho Creek Formation

*Eocene calcareous nannofossil assemblage recovered at 23 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–2–04: 2.63 mi west of eastern quadrangle border, 7.44 mi north of southern quadrangle border, on eastern side of dirt road leading south from North Carolina State Road 1177, 0.3 mi south of southern end of Johnsons Lake dam, in north-central 1/9th of map area (latitude 34.8579°N., longitude 78.0459°W.). Surface elevation 100 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation, barrier sand facies	
Sand, medium, clean, medium-grayish-orange-pink (5*YR* 8/2)	0–1
Sand, fine to medium; yellowish brown (10*YR* 5/2) grading down through dusky brown (5*YR* 2/1) (2–5 ft) to dark yellowish brown (10*YR* 3/2)	1–6
Windsor Formation, back-barrier facies	
Sand, fine, silty, clayey, pale-olive-gray (5*Y* 7/1)	6–13
Sand, fine to medium, silty, clayey, medium-light-gray (*N* 6)	13–15
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, very fine, clayey, silty, light-olive-gray (5*Y* 6/1)	15–15.5
Sand, fine to medium, silty, clayey, massive, olive-gray (5*Y* 5/1); phosphate pebbles up to 2 cm in diameter at basal contact	15.5–39
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, dense, massive, light-olive-gray (5*Y* 5/2); contains sparse nodules	39–41

Base of Windsor Formation, barrier sand facies:	**+94 ft above sea level**
Base of Windsor Formation, back-barrier facies:	**+85 ft above sea level**
Base of Bladen Formation:	**+61 ft above sea level**

Bottomed in Tar Heel Formation

RH–3–04: 6.89 mi west of eastern quadrangle border, 3.84 mi north of southern quadrangle border, at abandoned home site on southeastern side of North Carolina State Road 1102, 0.05 mi south of intersection of North Carolina State Road 1102 and 1126, in west-central 1/9th of map area (latitude 34.8058°N., longitude 78.12005°W.). Surface elevation 90 ft.

LITHOLOGY	DEPTH, IN FEET
Artificial fill	0–1
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand; very fine to fine with minor medium to coarse grains; silty; clayey; stiff; dense; light brown (5*YR* 5/6) grading down through yellowish orange (10*YR* 5/6) (3–6 ft) to light brown (5*YR* 5/6); thin layers of very clayey silt at 9 ft and 14 ft	1–14
Sand, fine to medium, silty, soft, yellowish-orange (10*YR* 7/6); contains a light-olive-gray (5*Y* 5/2), very clayey silt lens at 18 ft	14–21
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, very fine to fine, silty, clayey, dense, dark-greenish-gray (5*GY* 4/1)	21–30
Sand; varies from fine to medium to medium to coarse; silty; clayey; dark greenish gray (5*GY* 4/1)	30–48
Sand, medium, silty, shelly, light-olive-gray (5*Y* 5/2); quartz granules and sparse phosphate sand*	48–51

Base of Windsor Formation: **+69 ft above sea level**

Bottomed in Bladen Formation

*Recovered Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 21 assemblage at 50 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–4–04: 3.90 mi west of eastern quadrangle border, 1.43 mi north of southern quadrangle border, on southern side of North Carolina State Road 1135, 0.35 mi west-southwest of Providence Church, in south-central 1/9th of map area (latitude 34.7710°N., longitude 78.0681°W.). Surface elevation 75 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine, silty, clayey; yellowish brown (10*YR* 5/6) grading down through light yellowish brown (10*YR* 6/4) (1–5 ft) to dark yellowish gray (5*Y* 7/1)	0–6
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand; fine to medium grading down to fine; slightly silty and clayey; grayish yellow (5*Y* 7/4) grading rapidly down to dark grayish olive green (5*GY* 2/2) at 7 ft	6–27
Sand, fine, silty, clayey, micaceous, dark-grayish-olive-green (5*GY* 2/2); sparsely shelly below 30 ft; pyrite nodules at 33 ft*	27–41

Base of Charles City Formation: **+69 ft above sea level**

Bottomed in Bladen Formation

*Recovered Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 21 assemblage at 33 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–5–04: 1.48 mi west of eastern quadrangle border, 8.07 mi north of southern quadrangle border, in field on western side of North Carolina State Road 1915, 0.25 mi northwest of bridge over Beaverdam Creek, in northeastern 1/9th of map area (latitude 34.8670°N., longitude 78.0255°W.). Surface elevation 80 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand; fine with scattered rounded, medium to coarse grains; slightly silty; yellowish orange (10*YR* 7/6)	0–1
Sand, fine; yellowish orange (10*YR* 7/6) grading down through dusky yellowish brown (10*YR* 2/2) (4–5 ft) to medium yellowish brown (10*YR* 5/4)	1–7
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, very fine to fine, very clayey and silty, sticky, soft, light-olive-gray (5*Y* 5/2)	7–10
Sand, fine, slightly silty and clayey, light-olive-gray (5*Y* 5/2)	10–14
Sand, very fine to fine, very silty and clayey, olive-gray (5*Y* 3/2)	14–16
Sand, fine, slightly silty and clayey, dark-greenish-gray (5*GY* 4/1); sparse wood chips	16–19
Sand, fine to medium, clayey, silty, dark-greenish-gray (5*GY* 4/1); sparse wood chips	19–21
Sand, fine to medium, dark-greenish-gray (5*GY* 4/1); interbedded with very clayey and silty, very fine sand; micaceous	21–30
---------- UNCONFORMITY ----------	
Castle Hayne Limestone	
Calcarenite, very fine, very clayey, dense, stiff, dark-greenish-gray (5*GY* 4/1); interbedded with scattered lenses of fine sand	30–39
Calcarenite, fine to medium, locally very clayey; chalky shells; dark greenish gray (5*GY* 4/1)	39–43

Calcarenite, very fine, dense, very clayey and silty, dark-greenish-gray (5*GY* 4/1); sparse rotten shells scattered throughout; sparse wood chips..... 43–51

Base of Charles City Formation: **+73 ft above sea level**
Base of Windsor Formation: **+50 ft above sea level**

Bottomed in Castle Hayne Limestone

RH–6–04: 1.12 mi west of eastern quadrangle border, 3.14 mi north of southern quadrangle border, on northern side of far northeastern end of dirt road, 0.05 mi west of Seaboard Railroad Line, 0.35 mi southeast of abandoned quarry, in east-central 1/9th of map area (latitude 34.7956°N., longitude 78.0190°W.). Surface elevation 74 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City and Windsor Formations (undivided)	
Sand, silty, dark-greenish-gray (5*G* 4/1); not logged in detail; sparsely shelly below 49 ft; abrupt basal contact	0–59
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, very fine, silty, clayey, shelly, olive-gray (5*Y* 4/2); contains lumps of limestone up to 5 cm in diameter; basal lag bed present	59–63
---------- UNCONFORMITY ----------	
Bladen Formation	
Calcarenite, fine, well-sorted, quartzose, sparsely shelly, dark-greenish-gray (5*GY* 4/1) to dark-grayish-green (5*GY* 4/2)	63–71

Base of Charles City Formation: **(not determined)**
Base of Windsor Formation: **+15 ft above sea level**
Base of Donoho Creek Formation: **+11 ft above sea level**

Bottomed in Bladen Formation

RH–7–04: 2.63 mi west of eastern quadrangle border, 7.44 mi north of southern quadrangle border, 0.5 mi west-southwest of RH–6–04 on southeastern side of road, in east-central 1/9th of map area (latitude 34.7923°N., longitude 78.0262°W.). Surface elevation 74 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand, silty; not logged in detail..... 0–23

---------- UNCONFORMITY ----------

Donoho Creek Formation

Sand; fine to medium, dominantly fine; grading down to medium to coarse at base; very calcareous; silty; clayey; very dense; dark olive gray (5*Y* 3/1)..... 23–41

Base of Charles City Formation: **+51 ft above sea level**

Bottomed in Donoho Creek Formation

RH–8–04: 1.31 mi west of eastern quadrangle border, 3.03 mi north of southern quadrangle border, 0.25 mi west-southwest of RH–6–04 on northwestern side of road, in east-central 1/9th of map area (latitude 34.7942°N., longitude 78.0227°W.). Surface elevation 74 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, silty and clayey; not logged in detail	0–13
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, dark-greenish-gray (5*G* 4/1)	13–17
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, fine to medium, silty, clayey, dense, dark-olive-gray (5*Y* 3/1)	17–26

Base of Charles City Formation: **+61 ft above sea level**
Base of Windsor Formation: **+57 ft above sea level**

Bottomed in Donoho Creek Formation

RH–9–04: 0.04 mi west of eastern quadrangle border, 3.23 mi north of southern quadrangle border, at northwestern corner of field, 1.05 mi east-northeast of RH–6–04, in east-central 1/9th of map area (latitude 34.7972°N., longitude 78.0006°W.). Surface elevation 76 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, silty and clayey; not logged in detail	0–10
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, sparsely shelly, dark-greenish-gray (5*G* 4/1)*	10–21
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, fine to coarse, poorly sorted, clayey, silty, dense, olive-gray (5*Y* 3/1.5); local pyrite nodules*	21–47
Sand, fine to coarse, poorly sorted, clayey, silty, dense, olive-gray (5*Y* 3/2); sparse shells and abundant limestone nodules reworked from unit below	47–48
---------- UNCONFORMITY ----------	
Bladen Formation	
Calcarenite, very fine; more clayey than unit above; dense; very fine mica and small pyrite nodules; olive gray (5*Y* 4/1) grading down to dark olive gray (5*Y* 3/2)*	48–51

Base of Charles City Formation:	**+66 ft above sea level**
Base of Windsor Formation:	**+55 ft above sea level**
Base of Donoho Creek Formation:	**+28 ft above sea level**

Bottomed in Bladen Formation

*Recovered calcareous nannofossils, including Pliocene to Pleistocene *Gephyrocapsa* at 19 ft, an Upper Cretaceous (Campanian) Zone CC 22a/b assemblage at 29 ft, and an Upper Cretaceous (Campanian) Zone CC 21 assemblage at 50 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–10–04: 0.69 mi west of eastern quadrangle border, 3.59 mi north of southern quadrangle border, at end of farm road shown on map on eastern side of U.S. Highway 117, 0.6 mi northeast of RH–6–04 and just south of closed 80-ft contour around small hill, in east-central 1/9th of map area (latitude 34.8023°N., longitude 78.0118°W.). Surface elevation 79 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand, silty and clayey; not logged in detail..... 0–13

---------- UNCONFORMITY ----------

Donoho Creek Formation

Sand, fine to coarse, poorly sorted, clayey, silty,
dense, olive-gray (5*Y* 3/1.5); local pyrite nodules..... 13–21

Base of Charles City Formation: **+66 ft above sea level**

Bottomed in Donoho Creek Formation

RH–11–04: 0.32 mi west of eastern quadrangle border, 5.64 mi north of southern quadrangle border, at site of old chicken coops on southern side of Island Creek, 0.7 mi east-northeast of lookout tower on northeastern side of Rose Hill, in east-central 1/9th of map area (latitude 34.8322°N., longitude 78.0056°W.). Surface elevation 86 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, silty and clayey; not logged in detail	0–13
Silt, clayey, dark-greenish-gray (5*G* 4/1)	13–17
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, fine to medium, clayey, silty, stiff, dark-olive-gray (5*Y* 3/1)	17–26

Base of Windsor Formation: **+69 ft above sea level**

Bottomed in Donoho Creek Formation

RH–12–04: 0.41 mi west of eastern quadrangle border, 6.03 mi north of southern quadrangle border, on northern side of abandoned house on northern side of Island Creek, 0.8 mi northeast of lookout tower on northeastern side of Rose Hill, in northeastern 1/9th of map area (latitude 34.8378°N., longitude 78.0069°W.). Surface elevation 87 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, silty and clayey; not logged in detail	0–13
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand; fine to medium grading down to medium to coarse; dark olive gray (5*Y* 3/1); shelly in basal foot, including thick oyster-shell fragment	13–19
---------- UNCONFORMITY ----------	
Bladen Formation	
Calcarenite, fine, clayey, dense, sparsely shelly, olive-gray (5*Y* 3/2)	19–36

Base of Windsor Formation: **+74 ft above sea level**
Base of Donoho Creek Formation: **+68 ft above sea level**

Bottomed in Bladen Formation

RH–13–04: 0.47 mi west of eastern quadrangle border, 5.91 mi north of southern quadrangle border, 0.15 mi south-southwest of RH–12–04, 300 ft west of upstream end of a small ponded segment of Island Creek, in northeastern 1/9th of map area (latitude 34.8359°N., longitude 78.0079°W.). Surface elevation 67 ft.

LITHOLOGY	DEPTH, IN FEET
Alluvium	
Sand, dark-olive-gray (5*Y* 3/1); not logged in detail	0–10
---------- UNCONFORMITY ----------	
Bladen Formation	
Calcarenite, fine, shelly, olive-gray (5*Y* 3/2)	10–31
Calcarenite, fine to medium, shelly, dark-green (5*G* 4/2); abundant quartz, glauconite, and phosphate sand	31–36
Calcarenite, fine, olive-gray (5*Y* 3/2)*	36–49
Calcarenite, fine, very shelly, olive-gray (5*Y* 3/2)	49–51

Base of alluvium: **+57 ft above sea level**

Bottomed in Bladen Formation

*Recovered an Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 21 assemblage at 40 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–14–04: 6.07 mi west of eastern quadrangle border, 3.07 mi north of southern quadrangle border, 0.05 mi east of junction of dirt road (at 81-ft spot elevation) with North Carolina State Road 1133, 1.35 mi northwest of Friendship Church, in west-central 1/9th of map area (latitude 34.7945°N., longitude 78.1062°W.). Surface elevation 80 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine to fine, varicolored; not logged in detail	0–11
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand; very fine to fine grading down to medium to coarse near base; finely micaceous; silty; clayey; dense; dark olive gray (5*Y* 3/1)	11–14
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, clayey, dense; glauconite sand abundant near top (probably in burrows from unit above); dark greenish gray (5*GY* 4/1) with dark-grayish-green (10*GY* 4/2), glauconite-rich areas	14–21
Sand, mostly fine; interbedded with very clayey silt; dense; tough; dark greenish gray (5*GY* 4/1); lignite in clayey silt in basal foot	21–41

Base of Charles City Formation: **+69 ft above sea level**
Base of Bladen Formation: **+66 ft above sea level**

Bottomed in Tar Heel Formation

RH–15–04: 6.00 mi west of eastern quadrangle border, 4.78 mi north of southern quadrangle border, 0.1 mi west of bridge over Taylors Creek on northern side of North Carolina State Road 1102, 0.8 mi east of Brices Crossroads, in west-central 1/9th of map area (latitude 34.8194°N., longitude 78.0874°W.). Surface elevation 72 ft.

LITHOLOGY	DEPTH, IN FEET
Tar Heel Formation	
Sand, fine, varicolored; no basal contact; probably residuum; not logged in detail	1–6
Sand, fine to medium, dark-grayish-green (10*GY* 4/2); clayey and lignitic in basal foot	6–21

Bottomed in Tar Heel Formation

RH–16–04: 0.98 mi west of eastern quadrangle border, 7.87 mi north of southern quadrangle border, at northeastern end of limestone quarry too new to be shown on map, 0.15 mi north-northeast of intersection of North Carolina State Road 1915 and 1911, in northeastern 1/9th of map area (latitude 34.8640°N., longitude 78.0170°W.). Surface elevation 80 ft.

LITHOLOGY — DEPTH, IN FEET

Disturbed earth 0–4

---------- UNCONFORMITY ----------

Charles City Formation

Sand, fine, dark-yellowish-brown (10*YR* 3/2);
contains abundant root fragments 4–6

Sand, fine, silty, slightly clayey; light grayish
olive (10*Y* 5/2) grading down through medium greenish
gray (5*GY* 5/1) to dark olive gray (5*Y* 2/2) 6–11

---------- UNCONFORMITY ----------

Castle Hayne Limestone

Calcarenite, fine to medium, medium-olive-gray
(5*Y* 5/1) 11–52

(Owner drilled site prior to opening pit and reports that
limestone extends down to depth of 90 ft) 52–90

---------- UNCONFORMITY ----------

Tar Heel Formation

(Owner reports that limestone is underlain by at least
4 ft of sandstone) 90–94

Base of Charles City Formation: **+69 ft above sea level**
Base of Castle Hayne Limestone: **-10 ft below sea level**

Bottomed in Tar Heel Formation

RH–17–04: 3.23 mi west of eastern quadrangle border, 4.53 mi north of southern quadrangle border, 0.2 mi beyond western-southwestern end of North Carolina State Road 1142, on northwestern side of road at western edge of field, 1.4 mi northwest of Lake Tut, in central 1/9th of map area (latitude 34.8158°N., longitude 78.0563°W.). Surface elevation 90 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, fine, humic, silty; dusky yellowish brown (10YR 3/2) grading down to dark yellowish brown (10YR 4/4)	0–1
Sand, fine, humic, silty, medium-brownish-gray (5YR 5/1); roots abundant in basal foot	1–4
Silt, sandy (very fine), clayey; grades down to very fine, silty sand; yellowish gray (5Y 8/1)	4–8
Sand, very fine, silty; grades down to fine to medium at base; orange pink (10R 6/4) grading down rapidly to yellowish orange (10YR 7/6) at 9 ft	8–18
Sand, fine, silty, shelly, pale-olive-gray (5Y 6/2)	18–20
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Calcarenite, fine, sparsely shelly; dark olive gray (5*Y* 3/1) grading down to dark greenish gray (5*GY* 4/1) at 40 ft*	20–51
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, dense, micaceous, lignitic; thin interbeds of fine sand; dark greenish gray (5*GY* 4/1)	51–55
Sand, very fine, silty, micaceous, dark-greenish-gray (5*GY* 4/1)	55–61

Base of Windsor Formation:	**+70 ft above sea level**
Base of Donoho Creek Formation:	**+39 ft above sea level**

Bottomed in Tar Heel Formation

*Recovered an Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 22 assemblage at 24 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

RH–18–04: 4.20 mi west of eastern quadrangle border, 6.95 mi north of southern quadrangle border, on northern side of North Carolina State Road 1123, 0.25 mi west-northwest of intersection of North Carolina State Road 1123 and 1103, 1.2 mi southwest of Johnsons Lake, in north-central 1/9th of map area (latitude 34.8507°N., longitude 78.0736°W.). Surface elevation 125 ft.

LITHOLOGY DEPTH, IN FEET

Waccamaw Formation, Bahramsville unit

Sand, fine, silty, grayish-yellow (5*Y* 8/4)..... 0–1

Sand, fine, silty; very fine, dark, heavy minerals below 4-ft depth; dark yellowish brown (10*YR* 4/2) grading down to pale grayish orange (5*YR* 8/2)..... 1–6

Sand; very fine to fine with scattered medium grains; thixotropic; pale yellowish brown (10*YR* 6/2); lower contact gradational..... 6–9

Silt, clayey, sandy (very fine), stiff, dense, very light gray (*N* 8)..... 9–11

Sand;fine grading down through fine to medium to medium to coarse; very light gray (*N* 8)..... 11–17

---------- UNCONFORMITY ----------

Duplin Formation

Sand, very fine, very silty; sparse shells in basal 4 ft; small quartz discoid 1 cm in maximum diameter on basal contact; pale brown (5*YR* 6/6) grading down through dark greenish gray (5*G* 3/1) (18–24 ft) to dark greenish gray (5*G* 4/1)..... 17–28

---------- UNCONFORMITY ----------

Bladen Formation

Calcarenite, fine, quartzose, olive-gray (5*Y* 4/1); much denser than unit above..... 28–41

Base of Waccamaw Formation, Bahramsville unit: +108 ft above sea level
Base of Duplin Formation: +97 ft above sea level

Bottomed in Bladen Formation

RH–19–08: 1.41 mi west of eastern quadrangle border, 6.18 mi north of southern quadrangle border, 100 ft north of northern side of North Carolina State Road 1147, 0.16 mi east of intersection of North Carolina State Road 1147 with U.S. Highway 117, in northeastern 1/9th of map area (latitude 34.8396°N., longitude 78.0242°W.). Surface elevation 100 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation, barrier sand facies	
Sand, fine, silty, clayey; dark yellowish brown (10*YR* 3/2) grading down to dark yellowish orange (10*YR* 6/6)	0–1
Sand, fine, silty, clayey, very dark yellowish orange (10*YR* 5/6); plinthite nodules at 5-ft depth	1–6
Sand, fine, slightly silty and clayey, thixotropic, grayish-orange (10*YR* 7/4)	6–7.5
Windsor Formation, back-barrier facies	
Sand, very fine, silty, clayey, stiff, sticky; yellowish gray (5*Y* 8/1) with moderate-reddish-brown (10*R* 4/6) streaks grading down to dark yellowish orange (10*YR* 6/6)	7.5–9
Sand, fine to medium, slightly silty, yellowish-orange (10*YR* 7/6)	9–16
Silt, very clayey, sandy (very fine); dark yellowish orange (10*YR* 6/6) grading down to pale olive brown (10*Y* 5/6)	16–18
Sand, very fine, silty, slightly clayey, light-yellowish-brown (10*YR* 6/4)	18–19
Sand, very fine, silty, slightly clayey, shelly, medium-greenish-gray (5*G* 5/1)*	19–24
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine, well-sorted, silty, clayey, micaceous, dark-olive-gray (5*Y* 3/1)	24–26

Base of Windsor Formation, barrier sand facies: **+92.5 ft above sea level**
Base of Windsor Formation, back barrier facies: **+76 ft above sea level**

Bottomed in Bladen Formation

*Mollusk taxa listed in appendix 3.

RH–20–08: 0.62 mi west of eastern quadrangle border, 1.0 mi north of southern quadrangle border, on northwestern side of right-angle bend in North Carolina State Road 1149, 0.30 mi southwest of main railroad crossing in Teachey, in southeastern 1/9th of map area (latitude 34.7645°N., longitude 78.0108°W.). Surface elevation 69 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand, very fine to fine, silty, clayey; olive gray (5*Y* 4/2) grading down through olive gray (5*Y* 4.5/2) (2–4 ft) and through light olive brown (5*Y* 5/4) (4–4.5 ft) back to olive gray (5*Y* 4/2)	1–6
Silt, very clayey, stiff, sticky; yellowish orange (10*YR* 5/6) with light-olive-gray (5*Y* 6/1) streaks grading to medium greenish gray (5*GY* 5/1)	6–9
Sand, very fine to fine, well-sorted, silty, medium-greenish-gray (5*GY* 5/1); contains approximately 1 percent very fine, dark, heavy minerals	9–11
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand; fine grading down to fine to medium, dominantly fine; silty; dark greenish gray (5*GY* 4/1); medium fraction subrounded to rounded*	11–23
Sand, fine, silty, variably clayey, micaceous, calcareous, dusky-greenish-gray (5*GY* 3/1); sparse thin oyster shells*	23–41

Base of Charles City Formation: **+58 ft above sea level**

Bottomed in Donoho Creek Formation

*Recovered an Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 22c(?) assemblage at 23 ft and a Zone CC 22a/b assemblage at 40 ft (Jean M. Self-Trail, USGS, oral commun., 2008).

RH–21–08: 7.18 mi west of eastern quadrangle border, 8.00 mi north of southern quadrangle border, 200 ft north of intersection of unnumbered dirt road and North Carolina State Road 1117, 0.05 mi east of western quadrangle border, in northwestern 1/9th of map area (latitude 34.8661°N., longitude 78.1240°W.). Surface elevation 118 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, clean, light-yellowish-brown (10*YR* 6/4)	0–1
Sand, fine, silty, clayey, dark-yellowish-orange (10*YR* 6/6)	1–3
Sand, fine, silty, slightly clayey, pale-yellowish-brown (10*YR* 6/2); lower contact gradational	3–6
Sand, fine to coarse, poorly sorted, silty; pale orange (10*YR* 7/2) grading down to very pale orange (10*YR* 8/2)	6–9
Sand, very fine to medium, poorly sorted, clayey, silty, stiff, sticky; dark yellowish orange (10*YR* 6/6) grading down to pale yellowish gray (5*Y* 8/2)	9–11
Sand, very fine to medium, poorly sorted, very silty, slightly clayey, yellowish-orange (10*YR* 7/6)	11–15
Sand; fine grading down to fine to medium; silty; clayey; medium orange (10*YR* 7/8)	15–17
Sand, fine to coarse, poorly sorted, silty, clayey, medium-brown (5*YR* 4/6); abundant rounded quartz granules	17–18
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine, silty, dark-yellowish-orange (10*YR* 6.5/6); grades down to very fine to fine, micaceous, silty, pale-brown (5*YR* 6/6) sand	18–31
Sand, very fine to fine, silty, micaceous, dark-olive-gray (5*Y* 3/1); grades down to very fine, clayey, silty, dark-olive-gray (5*Y* 3/1) sand; stringers of light-gray (*N* 7), very fine sand	31–41

Base of Waccamaw Formation, Bahramsville unit: **+100 ft above sea level**

Bottomed in Tar Heel Formation

Rowan Quadrangle

RO–1–08: 5.64 mi west of eastern quadrangle border, 0.99 mi north of southern quadrangle border, on western side of unnumbered dirt road 0.42 mi north-northwest of Salem Cemetery, in southwestern 1/9th of map area (latitude 34.5142°N., longitude 78.3476°W.). Surface elevation 50 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, slightly silty; pale yellowish brown (10*YR* 6/2) grading rapidly down to dark orange (10*YR* 6/8) 0–1

Sand, fine to medium, slightly silty, soft; pale grayish orange (10*YR* 8/4) grading down through brown (5*YR* 4/2) (1.5–2 ft), pale grayish orange pink (5*YR* 8/2) (2–2.5 ft), pale brown (5*YR* 6/2) (2.5–3.5 ft), yellowish brown (10*YR* 3/2) (3.5–6 ft), and medium brown (5*YR* 4/4) (6–8 ft) to medium brownish gray (5*YR* 5/1) 1–11

Sand; fine to medium, dominantly fine; slightly feldspathic; slightly silty; thixotropic; yellowish gray (5*Y* 7/2)..... 11–17

---------- UNCONFORMITY ----------

Shirley Formation

Sand; fine to medium with some coarse grains; angular to subangular; slightly micaceous; yellowish gray (5*Y* 7/2); subrounded to rounded quartz granules and pebbles up to 0.5 cm in diameter increasing in abundance downward 17–32

---------- UNCONFORMITY ----------

Chuckatuck Formation

Sand, very fine to fine, silty, clayey, micaceous, medium-olive-gray (5*Y* 5/1); wood fragments 32–36

Sand, dominantly very fine to fine, silty, very clayey, micaceous, stiff, dark-olive-gray (5*Y* 3/1); carbonized wood streaks 36–39

Silt, sandy (very fine), very clayey, dense, dark-olive-gray (5*Y* 3/1) 39–40

Sand, very fine to fine, silty, slightly clayey, dense; dark olive gray (5*Y* 3/1) grading down in basal foot to dark grayish green (10*G* 5/2); rounded, dusky-brown (5*YR* 2/2) wood clasts up to 3 cm in diameter concentrated at base 40–44

---------- UNCONFORMITY ----------

Bladen Formation

Sand, very fine, silty, very clayey; olive gray (5*Y* 4/1) grading down to pale olive gray (5*Y* 7/1) 44–45

Sand, very fine to fine, silty, clayey, slightly micaceous, dense, olive-gray (5*Y* 4/1) 45–46

Base of dune sand: **+33 ft above sea level**
Base of Shirley Formation: **+18 ft above sea level**
Base of Chuckatuck Formation: **+6 ft above sea level**

Bottomed in Bladen Formation

RO–2–08: 5.27 mi west of eastern quadrangle border, 4.71 mi north of southern quadrangle border, on southeastern corner of sharp turn in unnumbered dirt road, 0.56 mi west-southwest of the "C" in "Camp Bay" label on map, in west-central 1/9th of map area (latitude 34.5686°N., longitude 78.3501°W.). Surface elevation 45 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, subangular to subrounded, soft, slightly silty; pale brown (5*YR* 5/2) grading down to pale grayish orange (10*YR* 8/4) with dark-yellowish-orange (10*YR* 6/6) mottles 0–1

Sand, fine to medium, subangular to subrounded, soft, slightly silty, yellowish-gray (5*Y* 7/4); abrupt basal contact 1–4

---------- UNCONFORMITY ----------

Shirley Formation

Sand; very fine to medium, dominantly fine; silty grading down to silty and clayey; dusky yellowish brown (10*YR* 2/2); roots 4–6

Sand, very fine to medium; medium fraction subrounded; humic; dusky yellowish brown (10*YR* 2/2); abundant dark–reddish-brown (5*YR* 3/4) roots 6–11

Sand, very fine to medium; fine fraction angular and medium fraction angular to subrounded; slightly silty; humic; medium brown (5*YR* 3.5/4) grading down to dark yellowish brown (10*YR* 3/2) 11–26

Sand, fine to coarse, angular to subangular, slightly silty; yellowish brown (10*YR* 5/2) grading down to olive gray (5*Y* 4/2); sparse subangular to subrounded quartz pebbles up to 1 cm in diameter 26–28

---------- UNCONFORMITY ----------

Bladen Formation

Silt, clayey, micaceous, dark-greenish-gray (5*GY* 3/1); interbedded with thin laminae of clean, very fine to fine sand 28–34

Sand, very fine, silty, micaceous, dark-greenish-gray (5*GY* 3/1); dusky-brown (5*YR* 2/2) wood clast at 35 ft 34–38

Sand, fine to coarse, subrounded, dark-greenish-gray (5*GY* 3/1); clayey and silty at top but cleaner downward; fine to medium glauconite grains; probably near base of unit 38–41

Base of dune sand: **+41 ft above sea level**
Base of Shirley Formation: **+17 ft above sea level**

Bottomed in Bladen Formation

RO–3–08: 5.26 mi west of eastern quadrangle border, 5.01 mi north of southern quadrangle border, on northern side of sharp bend in unnumbered dirt road, 0.18 mi north-northwest of the "C" in "Camp Bay" label on map, in west-central 1/9th of map area (latitude 34.5726°N., longitude 78.3417°W.). Surface elevation 67 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to medium, subangular to subrounded, clean, soft; dark yellowish brown (10*YR* 3/2) grading down through grayish orange pink (5*YR* 7/2) to dark yellowish brown (10*YR* 3/2) 0–2

Sand, fine to medium, subangular to subrounded, clean, soft, very humic; abundant roots; very dark red (10*YR* 1/2); lower contact gradational 2–11

Sand, fine to medium, subangular to subrounded, clean, soft, dark-yellowish-orange (10*YR* 6/5) 11–15

---------- UNCONFORMITY ----------

Chuckatuck Formation

Sand; very fine to fine, grades down to fine to medium; clayey; silty; slightly sticky; light olive gray (5*Y* 6/1) 15–18

Sand, very fine to medium, poorly sorted, clayey, silty, slightly sticky; brownish gray (5*YR* 4/1) intermingled with light olive gray (5*Y* 6/2); lower contact somewhat gradational 18–22

Sand, fine to very coarse, subangular to subrounded, very poorly sorted, clean to slightly silty, soft; light yellowish brown (10*YR* 6/4) grading down to pale yellowish brown (10*YR* 5/2) 22–26

Sand, medium to very coarse, poorly sorted, pale-yellowish-brown (10*YR* 5/2); subrounded quartz pebbles up to 1 cm in diameter increasingly abundant downward 26–31

---------- UNCONFORMITY ----------

Bladen Formation

Sand; very fine grading down to very fine to fine; clayey; silty; dark olive gray (5*Y* 3/1); lower contact somewhat gradational 31–39

Sand, very fine to fine, silty, clayey, micaceous,
dark-greenish-gray (5*GY* 4/1); scattered
dusky-yellowish-brown (10*YR* 2/2) lignite fragments 39–41

Base of dune sand: **+52 ft above sea level**
Base of Chuckatuck Formation: **+36 ft above sea level**

Bottomed in Bladen Formation

RO–4–08: 3.50 mi west of eastern quadrangle border, 6.93 mi north of southern quadrangle border, 100 ft southwest of North Carolina Highway 210, 1.68 mi due south of northern quadrangle border, in north-central 1/9th of map area (latitude 34.5989°N., longitude 78.3094°W.). Surface elevation 33 ft.

LITHOLOGY DEPTH, IN FEET

Shirley Formation

Sand, fine, well-sorted; scattered subrounded to rounded medium grains; slightly silty; micaceous; dark yellowish brown (10*YR* 4/2) grading rapidly down to pale grayish orange (10*YR* 8/4) 0–1

Sand, very fine to fine, silty, slightly clayey; dusky yellowish orange (10*YR* 5/6) grading down to dark yellowish orange (10*YR* 6/6); lower contact somewhat gradational 1–5

Sand, very fine, clayey, silty, stiff, sticky, yellowish-brown (10*YR* 5/2) 5–6

Sand, fine to coarse, poorly sorted, slightly silty; pale yellowish gray (5*Y* 8/2) grading down through dark orange (10*YR* 6/8) to brown (10*YR* 4/6) 6–9

Clay, silty, dark-orange (10*YR* 6/8); 2 in. thick ..... at 9

Sand, medium to coarse, clean; very pale orange (10*YR* 8/2) grading down to pale yellowish brown (10*YR* 6/2) 9–10

---------- UNCONFORMITY ----------

Chuckatuck Formation

Silt, clayey, sticky, woody; grayish brown (5*YR* 3/2) grading down to medium grayish brown (5*YR* 4/2); lower contact somewhat gradational 10–12

Sand, fine to medium, silty, soft, yellowish-brown (10*YR* 5/2); coarsens down to layer below 12–20

Sand, medium to very coarse, poorly sorted, yellowish-brown (10*YR* 5/2); gravelly with subrounded to rounded quartz pebbles up to 3 cm in diameter 20–23

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, dark-greenish-gray (5*GY* 4/1);
lumps of dusky-yellowish-brown (10*YR* 2/2) lignite 23–26

Base of Shirley Formation: **+23 ft above sea level**
Base of Chuckatuck Formation: **+10 ft above sea level**

Bottomed in Tar Heel Formation

RO–5–08: 2.12 mi west of eastern quadrangle border, 2.06 mi north of southern quadrangle border, at end of unnumbered dirt road 0.18 mi north of North Carolina State Road 1548, 0.47 mi northwest of intersection of North Carolina State Road 1548 and North Carolina Highway 210 in southeastern 1/9th of map area (latitude 34.5298°N., longitude 78.2867°W.). Surface elevation 35 ft.

LITHOLOGY	DEPTH, IN FEET
Shirley Formation	
Silt, sandy (very fine), clayey, stiff; yellowish brown (10*YR* 4/2) grading to yellowish orange (10*YR* 7/6)	0–1
Silt, very clayey, stiff, sticky, dense; dark yellowish orange (10*YR* 6/6) with yellowish-gray (5*Y* 7/2) mottles grading down to yellowish gray (5*Y* 7/2) with dark-yellowish-orange (10*YR* 6/6) mottles; lower contact somewhat gradational	1–7
Silt, very clayey, stiff, sticky, dense; pale yellowish gray (5*Y* 8/2) grading down to very pale brown (5*YR* 6/2)	7–9
Peat, silty, dusky-yellowish-brown (5*YR* 1/2); abundant wood fragments	9–11
Sand; fine to medium grading down to medium to coarse with rounded quartz granules and pebbles up to 0.5 cm in diameter; silty; soft; dark yellowish brown (10*YR* 3/2) grading down to dark yellowish brown (10*YR* 4/2)	11–23
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand; very fine to fine with scattered medium grains; silty; clayey; dark greenish gray (5*GY* 4/1); small lumps of clay	23–26

Base of Shirley Formation: **+12 ft above sea level**

Bottomed in Bladen Formation

RO–6–08: 2.28 mi west of eastern quadrangle border, 3.58 mi north of southern quadrangle border, 300 ft southwest of unnumbered road along northeast rim of Big Bay, 0.10 mi northwest of Moore Swamp Church, in east-central 1/9th of map area (latitude 34.5521°N., longitude 78.2898°W.). Surface elevation 58 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, soft; grayish brown (5*YR* 3/2) with yellowish-brown (10*YR* 5/2) mottles grading down to light yellowish brown (10*YR* 6/4) with dark-yellowish-brown (10*YR* 4/4) mottles	0–1
Sand, fine to medium, slightly silty, soft, humic; pale grayish orange (10*YR* 8/4) grading down through dark yellowish orange (10*YR* 6/6) (4–5 ft) to pale yellowish brown (10*YR* 7/2)	1–5.5
Sand, fine to medium, silty, very humic; dusky yellowish brown (10*YR* 2/2) grading down to dark yellowish brown (10*YR* 4/4)	5.5–8
---------- UNCONFORMITY ----------	
Chuckatuck Formation	
Sand, fine, silty, humic, yellowish-brown (10*YR* 3/2)	8–8.5
Sand, fine to medium, silty, humic; light yellowish brown (10*YR* 6/4) grading down through yellowish orange (10*YR* 7/6) (9–9.5 ft), dusky yellowish brown (10*YR* 2/2) (9.5–10 ft), and yellowish orange (10*YR* 7/6) (10–10.5 ft) to dusky yellowish brown (10*YR* 2/2)	8.5–11
Sand, fine to medium, clean; grades down to medium to very coarse; poorly sorted; scattered rounded and polished quartz granules; pale yellowish brown (10*YR* 7/2); basal 3 in. becomes silty and yellowish gray (5*Y* 8/1); contains rounded quartz pebbles up to 5 cm in diameter	11–17
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, very fine to fine, silty, clayey, micaceous, dense, slightly sticky, dusky-greenish-gray (5*GY* 3/1)	17–26

Base of dune sand: **+50 ft above sea level**
Base of Chuckatuck Formation: **+41 ft above sea level**

Bottomed in Bladen Formation

St. Pauls Quadrangle

SP–1–06: 5.79 mi west of eastern quadrangle border, 1.77 mi north of southern quadrangle border, on southern side of abandoned house at end of unnumbered dirt road, 0.26 mi southwest of 157-ft spot elevation at junction of unnumbered dirt road and North Carolina State Road 1939, in southwestern 1/9th of map area (latitude 34.7760°N., longitude 78.9764°W.). Surface elevation 157 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to medium, silty, clayey; dark yellowish brown (10*YR* 4/2) grading rapidly down to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine to medium, silty, clayey; pale yellowish brown (10*YR* 6/2) grading down to dark yellowish orange (10*YR* 6/6)	1–6
Sand, fine, silty; pale brownish gray (5*YR* 7/1) grading down to yellowish gray (5*Y* 8/1); basal 4 in. bright orange (10*YR* 6/8)	6–9
Sand, very fine to fine, silty, clayey, medium-dark-gray (*N* 4)	9–15
Sand, fine to medium, silty, soft, yellowish-gray (5*Y* 8/1); lower contact gradational	15–18
Sand, fine to coarse, subangular to subrounded, poorly sorted, soft, yellowish-gray (5*Y* 8/1); lower contact gradational	18–22
Sand, fine to coarse, poorly sorted, silty, clayey; very light gray (*N* 7.5) grading down through dark gray (*N* 3) to medium gray (*N* 5.5); contains subangular quartz pebbles up to 2 cm in maximum diameter	22–25
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, sandy (very fine), pale-olive-gray (5*Y* 6/2); subrounded wood clasts up to 2.5 cm in diameter	25–26
Silt, clayey, sandy (very fine), micaceous, carbonaceous, dense, stiff, brownish-gray (5*YR* 4/1); locally abundant wood and leaf fragments	26–31

Base of Varina Grove unit: **+132 ft above sea level**

Bottomed in Tar Heel Formation

SP–2–07: 1.17 mi west of eastern quadrangle border, 1.02 mi north of southern quadrangle border, 100 ft south-southwest of North Carolina State Road 1006, 0.04 mi west of intersection of North Carolina State Roads 1006 and 1928, along outer edge of southwestern rim of Powers Bay, in southeastern 1/9th of map area (latitude 34.7650°N., longitude 78.8951°W.). Surface elevation 149 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to medium, dominantly fine, silty; grayish brown (5*YR* 3/2) grading rapidly down to dark yellowish orange (10*YR* 6/6)	0–1
Sand, very fine to fine, silty, slightly clayey; dark yellowish orange (10*YR* 6/6) with pale-brownish-gray (5*YR* 7/1) mottles in basal foot	1–6
Sand, very fine to fine, clayey, silty, stiff, slightly sticky, yellowish-orange (10*YR* 7/6)	6–10
Sand, very fine to fine, silty, yellowish-gray (5*Y* 7/2)	10–11
Sand; very fine to fine grading down to fine to medium; silty; pale bluish gray (5*B* 8/1)	11–16
Sand; fine to medium grading down to medium to very coarse; poorly sorted; dark gray (*N* 3); subangular to subrounded quartz granules	16–18
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, very stiff, greasy, dense, medium-brownish-gray (5*YR* 5/1)	18–26

Base of Varina Grove unit: **+131 ft above sea level**

Bottomed in Tar Heel Formation

SP–3–07: 5.68 mi west of eastern quadrangle border, 7.32 mi north of southern quadrangle border, on northern side of unnumbered dirt road on eastern edge of field, 0.30 mi northeast of intersection of U.S. Highway 301 and North Carolina State Road 1726, in northwestern 1/9th of map area (latitude 34.8560°N., longitude 78.9744°W.). Surface elevation 175 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand; very fine to fine with scattered medium grains; silty; slightly clayey; pale grayish orange (10YR 8/4) grading rapidly down to dark yellowish orange (10YR 6/6) 0–1

Sand; very fine to fine with scattered medium grains; silty; clayey; dark yellowish orange (10YR 6/6) grading down to light brown (5YR 5/6) 1–7

Sand; very fine to fine with scattered medium grains; silty; clayey; pale reddish brown (10R 5/4) grading down to grayish orange pink (5YR 7/2) 7–11

Sand; very fine to fine with scattered medium grains grading down to fine to medium; silty; clayey; pale brown (5YR 7/4) 11–15

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, very fine, very clayey, silty, very stiff, dense; pale brownish gray (5*YR* 7/1) with light-reddish-brown (10*R* 5/6) mottles 15–18

Sand; fine to coarse, dominantly medium; poorly sorted; silty; pale brown (5*YR* 7/4); reddish-pink (5*R* 6/4) clayball or clay lens at 26 ft 18–32

Silt, very clayey, sandy (very fine), sticky, yellowish-orange (10*YR* 7/6) 32–33

Silt, sandy (very fine), slightly clayey; grades down through very fine to fine sand to fine sand; silty and slightly clayey; dark orange (10*YR* 6/8) 33–44

Sand, fine, silty, pale-yellowish-orange (10*YR* 8/6) 44–48

Sand; fine to medium, dominantly fine; clean; light reddish orange (10*R* 7/6) grading down to yellowish orange (10*YR* 7/6) at 49 ft; lower contact gradational 48–53

Sand, fine to coarse, dominantly medium, poorly sorted, clean; pale grayish orange (10*YR* 8/4) grading down in basal 6 in. to pale brown (5*YR* 6/6) 53–56.5

Silt, very clayey, sandy (very fine), pale-yellowish-brown (10*YR* 7/2) 56.5–57

Sand, medium to coarse, yellowish-gray (5*Y* 8/1); contains approximately 1 percent very fine, dark, heavy minerals 57–70

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium, silty, clayey, micaceous, dense, medium-gray (*N* 5); abundant fragments of wood and two carbonized logs 70–77

Clay, silty, greasy, very dense, dark-olive-gray (5*Y* 3/1); pyrite lumps up to 1 cm in diameter 77–81

Base of dune sand: **+160 ft above sea level**
Base of Varina Grove unit: **+105 ft above sea level**

Bottomed in Tar Heel Formation

SP–4–07: 3.09 mi west of eastern quadrangle border, 3.78 mi north of southern quadrangle border, 200 ft south of North Carolina State Road 1920, 0.57 mi east-southeast of intersection of North Carolina State Roads 1920 and 1919, 300 ft north of railroad tracks, in central 1/9th of map area (latitude 34.8047°N., longitude 78.9295°W.). Surface elevation 155 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand; fine to medium, dominantly fine; clean; grayish brown (5*YR* 3/2) grading down through grayish orange (10*YR* 7/4) (0.5–3.5 ft) to yellowish gray (5*Y* 8/1) 1–5

---------- UNCONFORMITY ----------

Varina Grove unit

Sand, fine, silty, slightly clayey, dusky-yellowish-orange (10*YR* 5/6) 5–6

Sand, fine, clayey, silty, light-brown (5*YR* 5/6) 6–9

Sand, fine to medium, very clayey and silty, stiff, sticky; medium gray (*N* 5), reddish brown (10*R* 4/8), and brownish gray (5*YR* 4/1) with yellowish-gray (5*Y* 8/1) mottles 9–13

Sand, fine, silty, pale-brown (5*YR* 7/4) 13–16

Sand; fine and fine to medium, interbedded; silty; yellowish orange (10*YR* 7/6) grading down to grayish orange (10*YR* 7/4) at 36 ft; pinkish gray (5*YR* 8/1) clayball at 36 ft 16–38

---------- UNCONFORMITY ----------

Chowan River Formation, Coharie Member

Sand, fine to medium, silty, very kaolinitic, micaceous, yellowish-gray (5*Y* 8/1) 38–54

Sand, fine to coarse, poorly sorted, slightly silty, kaolinititic, pinkish-gray (5*YR* 8/1) 54–56

Sand; fine grading down through medium to coarse then to fine; silty; very kaolinitic; micaceous; yellowish gray (5*Y* 8/1) 56–61

Sand; fine to medium grading down to fine to coarse; silty; kaolinitic; pinkish gray (5*YR* 8/1); lower contact somewhat gradational 61–71

Sand, medium to very coarse, poorly sorted, slightly silty, soft; medium red (5*R* 5/6) grading down in basal foot to light brown (5*YR* 5/6) 71–82

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, stiff, sticky, weathered; grayish orange pink (5*YR* 6/2) with yellowish-orange (10*YR* 7/6) mottles..... 82–83

Clay, silty, stiff, dense, olive-black (5*Y* 2/1); black carbonized wood fragments and lumps of pyrite..... 83–85

Sand, fine to medium, silty, slightly clayey, micaceous; dark yellowish brown (10*YR* 4/2) with scattered dark-gray (*N* 3) clay laminae 85–89

Sand, fine to medium, micaceous, medium-gray (*N* 5); carbonized wood fragments..... 89–91

Base of dune sand: +150 ft above sea level
Base of Varina Grove unit: +117 ft above sea level
Base of Chowan River Formation, Coharie Member: +73 ft above sea level

Bottomed in Tar Heel Formation

SP–5–07: 1.42 mi west of eastern quadrangle border, 6.99 mi north of southern quadrangle border, 50 ft south of North Carolina State Road 2257, 0.06 mi east-southeast of junction of North Carolina State Roads 2257 and 2252, in northeastern 1/9th of map area (latitude 34.8515°N., longitude 78.8996°W.). Surface elevation 160 ft.

LITHOLOGY DEPTH, IN FEET

Varina Grove unit

Sand; fine to medium, dominantly fine; clean; brownish gray (5*YR* 4/1) grading rapidly down to yellowish gray (5*Y* 7/2) 0–1

Sand, fine to medium, dominantly fine, silty, slightly clayey, stiff; dark yellowish orange (10*YR* 6/6) grading down to light yellowish brown (10*YR* 6/4) with light-gray (*N* 7.5) and light-brown (5*YR* 5/6) mottles 1–6

Sand; fine to medium grading down to medium to coarse; subangular; slightly silty and clayey; stiff; pale orange (105*YR* 8/8) grading down to pale grayish orange (10*YR* 8/4); lower contact gradational 6–11

Sand, fine to medium, subangular, silty, pale-grayish-orange-pink (5*YR* 7/4); lower contact gradational 11–16

Sand, medium to coarse, subangular, silty, very pale orange (10*YR* 8/2); lower contact gradational 16–20

Sand, medium to very coarse, poorly sorted, angular to subangular, very pale orange (10*YR* 8/2); rounded quartz pebbles up to 3 cm in diameter 20–22

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, dense, sticky; scattered mica flakes and black wood fragments; medium grayish pink (5*R* 7/2) with dark-yellowish-orange (10*YR* 6/6) mottles grading down through grayish orange pink (5*YR* 7/2) (24–26 ft) to dark gray (*N* 3) 22–29

Sand, fine to medium, silty, slightly micaceous, medium-dark-gray (*N* 4); black scattered wood fragments 29–36

Base of Varina Grove unit: **+138 ft above sea level**

Bottomed in Tar Heel Formation

Singletary Lake Quadrangle

SI–1–07: 6.10 mi west of eastern quadrangle border, 1.99 mi north of southern quadrangle border, on northern side of unnumbered dirt road, 50 ft west of North Carolina State Road 1715 and 0.77 mi north-northeast of junction of North Carolina State Roads 1715 and 1712, in southwestern 1/9th of map area (latitude 34.5290°N., longitude 78.4813°W.). Surface elevation 105 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine, clean, grayish-orange (10*YR* 7/4)	0–1
Sand, fine, slightly silty and clayey, stiff; yellowish orange (10*YR* 7/6) grading down to yellowish gray (5*Y* 7/2) at 4 ft	1–5
Sand, fine to medium, silty, yellowish-gray (5*Y* 7/2)	5–6
Sand, very fine to fine, silty; orange (10*YR* 7/8) with very light gray (*N* 8) blotches grading down through yellowish gray (5*Y* 8/1) (8.5–9 ft), grayish orange (10*YR* 7/4) (9–12 ft), and pinkish gray (5*YR* 8/1) (12–13 ft) to pale yellowish brown (10*YR* 6/2)	6–14
Waccamaw Formation, Bahramsville unit	
Silt, sandy (very fine), clayey, yellowish-orange (10*YR* 7/6)	14–15
Sand, very fine to fine; pinkish gray (5*YR* 8/1) grading down through pale yellowish orange (10*YR* 8/6) (16–19 ft) to yellowish orange (10*YR* 7/6)	15–23
Silt, very clayey, sandy (very fine); upper foot yellowish gray (5*Y* 7/2) grading rapidly down to medium gray (*N* 5)	23–44
Waccamaw Formation, James City Member	
Sand, fine to coarse, poorly sorted, very silty and clayey, stiff, medium-greenish-gray (5*GY* 5/1); scattered crumbly mollusk shells	44–46
Sand; medium to coarse grading down to fine to coarse; poorly sorted; medium light gray (*N* 6) grading down to medium olive gray (5*Y* 5/1); sparse shells, including oysters	46–51
Sand, very fine to fine, clayey, silty, medium-gray (*N* 5)	51–52.5
Sand, fine to coarse, light-gray (*N* 7); sparse shell fragments	52.5–53

---------- UNCONFORMITY ----------

Bladen Formation

Sand, very fine to fine, silty, clayey; top
3 in. yellowish gray (5*Y* 8/1) grading
down rapidly to dark brownish gray (5*YR* 3/1);
abundant fine mica; very fine sand-filled burrows
about 1 cm in diameter..... 53–56

Base of Waccamaw Formation, Moorings unit: **+99 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+61 ft above sea level**
Base of Waccamaw Formation, James City Member: **+52 ft above sea level**

Bottomed in Bladen Formation

SI–2–07: 4.27 mi west of eastern quadrangle border, 1.12 mi north of southern quadrangle border, on northern side of unnumbered dirt road, 100 ft east of junction of North Carolina State Road 1712 and North Carolina Highway 87, in south-central 1/9th of map area (latitude 34.5160°N., longitude 78.4493°W.). Surface elevation 123 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine, slightly silty; pale yellowish brown (10*YR* 6/2) grading down through pale grayish orange (10*YR* 8/4) (0.5–2 ft), very dark yellowish orange (10*YR* 5/6) (2–2.5 ft), and very pale orange (10*YR* 8/2) (2.5–3 ft) to yellowish orange (10*YR* 7/6); less than 1 percent very fine grained, dark, heavy minerals; lower contact gradational	0–8
Sand, fine, slightly silty; pale brown (5*YR* 5/2) grading down through grayish brown (5*YR* 3/2) (9–11 ft), dark brown (5*YR* 2/4), grayish orange pink (5*YR* 7/2), and dark brown (5*YR* 2/4) (11–13 ft) to yellowish gray (5*Y* 8/1); 1–2 percent very fine grained, dark, heavy minerals	8–16
Sand, fine to medium, subrounded; yellowish gray (5*Y* 8/1) with pale grayish orange (10*YR* 8/4) streaks in basal 3 ft; 1–2 percent very fine grained, dark, heavy minerals; lower contact gradational	16–29
Sand, medium to very coarse, subrounded to round, poorly sorted, pebbly, yellowish-orange (10*YR* 7/6)	29–30
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, sandy (very fine); wood fragment in top foot; light brown (5*YR* 5/6) grading down through pale yellowish brown (10*YR* 6/2) in upper foot, then medium light gray (*N* 6) grading down to medium light gray (*N* 6) with olive-black (5*Y* 2/1) mottles at 44 ft	30–52
Waccamaw Formation, James City Member	
Sand, fine to coarse, poorly sorted, silty, clayey; greenish gray (5*G* 6/1) grading down to medium gray (*N* 5); lower contact abrupt	52–61

---------- UNCONFORMITY ----------

Bladen Formation

Silt, very clayey, sandy (very fine), stiff, dark-
olive-gray (5*Y* 3/1), about 3 in. recovered..... at 61

Base of Waccamaw Formation, Moorings unit: **+93 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+71 ft above sea level**
Base of Waccamaw Formation, James City Member: **+62 ft above sea level**

Bottomed in Bladen Formation

SI–3–07: 1.58 mi west of eastern quadrangle border, 1.47 mi north of southern quadrangle border, on northwestern side of unnumbered dirt road (Wendell Drive), 0.57 mi northeast of junction of Wendell Drive and North Carolina Highway 53, in southeastern 1/9th of map area (latitude 34.5215°N., longitude 78.4021°W.). Surface elevation 41 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, subangular to subrounded; grayish brown (10*YR* 3/2) grading down through light brownish gray (5*YR* 6/1) to grayish orange (10*YR* 7/4)	0–1
Sand, fine to medium, subangular to subrounded; very pale orange (10*YR* 8/2) grading down through dusky yellow (5*Y* 6/4) (2–4 ft) to dusky brown (5*YR* 2/2)	1–6
Sand; very fine to fine, dominantly fine; subangular to subrounded; humic; medium brown (5*YR* 4/4)	6–12
---------- UNCONFORMITY ----------	
Alluvium	
Sand; medium to coarse grading down to medium to very coarse at 14 ft; poorly sorted with subrounded to rounded quartz pebbles up to 1 cm in diameter; medium yellowish brown (10*YR* 5/4)	12–21
Sand, medium to coarse, silty, olive-gray (5*Y* 4/1); contains detrital clasts of reworked Tar Heel Formation	21–36
Sand, medium to coarse, clean, greenish-gray (5*G* 6/1)	36–38
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, silty, clayey, micaceous, dense, olive-gray (5*Y* 4/1); abundant lumps of grayish-brown (5*YR* 3/2) and very dark orange (10*YR* 7/8) lignite; occasional thin layers of fine to medium sand and very clayey silt	38–46

Base of dune sand: **+29 ft above sea level**
Base of alluvium: **+3 ft above sea level**

Bottomed in Tar Heel Formation

SI–4–07: 3.49 mi west of eastern quadrangle border, 4.38 mi north of southern quadrangle border, 300 ft northeast of North Carolina Highway 53, 0.16 mi northwest of the "L" in "Lagoon" map label, in central 1/9th of map area (latitude 34.5633°N., longitude 78.4360°W.). Surface elevation 51 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, subangular to subrounded; grayish brown (5*YR* 3/2) grading down at 0.5 ft to grayish orange (10*YR* 7/4)	0–2.5
Sand; fine to medium grading down to fine; soft; dusky yellowish orange (10*YR* 5/6) grading down at 3 ft to very pale orange (10*YR* 8/2)	2.5–6
Sand, fine; pale grayish yellow (10*YR* 8/4) grading down through dusky yellowish orange (10*YR* 5/6) (7–8 ft) to dark yellowish orange (10*YR* 6/6)	6–11
---------- UNCONFORMITY ----------	
Older alluvium	
Paleosol, sand, very fine to fine, silty, clayey; 0.5-in.-thick zone of olive gray (5*Y* 4/2) over yellowish gray (5*Y* 7/2)	11–12
Sand, fine to coarse, poorly sorted, silty, yellowish-gray (5*Y* 8/1)	12–16
Sand; medium to coarse grading down to medium to very coarse; poorly sorted with granules of quartz; subrounded; yellowish gray (5*Y* 8/1)	16–24
---------- UNCONFORMITY ----------	
Shirley Formation	
Sand, fine, silty, light-olive-gray (5*Y* 6/1); more compacted than layers above; scattered wood fragments	24–33.5
Wood, dusky-yellow (5*Y* 6/4) to dark-reddish-brown (5*YR* 3/4); overlying 3-in.-thick layer of fine to medium, silty, pale-yellowish-brown (10*YR* 7/2) sand	33.5–34

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to coarse, poorly sorted; interbedded with silty clay; dense; dark olive gray (5*Y* 3/1); contains dark-brown (5*YR* 2/4) lignite 34–36

Base of dune sand: **+40 ft above sea level**
Base of older alluvium: **+27 ft above sea level**
Base of Shirley Formation: **+17 ft above sea level**

Bottomed in Tar Heel Formation

SI–5–07: 4.27 mi west of eastern quadrangle border, 1.12 mi north of southern quadrangle border, on eastern side of North Carolina Highway 53, 0.73 mi northwest of the first "S" in "Singletary Lake State Park" label on map, in northwestern 1/9th of map area (latitude 34.6055°N., longitude 78.4772°W.). Surface elevation 65 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine, subangular to subrounded, clean, soft; grayish brown (5*YR* 3/2) grading rapidly down to pale yellowish brown (10*YR* 7/2) 0–1

Sand, very fine to fine, variably silty, variably humic; grayish brown (5*YR* 3/2) grading down through yellowish brown (10*YR* 5/2) (1.5–2 ft), dusky brown (10*YR* 2/2) (2–2.5 ft), and pale pinkish gray (10*YR* 9/1) (2.5–3 ft) to dark brown (5*YR* 2/4) 1–6

Sand, fine to medium, subangular to subrounded, humic; medium brown (5*YR* 4/4) grading down through pale yellowish brown (10*YR* 6/2) to medium yellowish brown (10*YR* 5/4); very humic in basal foot 6–17

---------- UNCONFORMITY ----------

Chuckatuck Formation

Peat, sandy (very fine), woody, dark-brown (5*YR* 2/4) 17–19

Sand, very fine to fine; dark yellowish brown (10*YR* 4/4) grading down to pale yellowish gray (5*Y* 8/2) 19–20

Sand, very fine to fine, silty, clayey, very light gray (*N* 9) 20–21

Silt, clayey, sandy (very fine), very finely micaceous, greasy, light-greenish-gray (5*G* 7/1) 21–26

Sand; very fine to fine grading down to fine; subangular; slightly silty; slightly micaceous; pale olive gray (5*Y* 7/1); lower contact gradational 26–38

Sand; fine to medium grading down to medium to coarse; pale olive gray (5*Y* 7/1); quartz pebbles up to 1 cm in diameter 38–44

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty; very fine to fine sand-filled burrows 0.5 to 1 cm in diameter; interbedded with fine to medium sand; micaceous; dark olive gray (5*Y* 3/1) 44–46

Base of dune sand: **+48 ft above sea level**
Base of Chuckatuck Formation: **+21 ft above sea level**

Bottomed in Tar Heel Formation

SI–6–07: 1.92 mi west of eastern quadrangle border, 7.66 mi north of southern quadrangle border, on southwestern side of junction of two unnumbered dirt roads at 84-ft spot elevation, in northeastern 1/9th of map area (latitude 34.5160°N., longitude 78.4493°W.). Surface elevation 84 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand; fine to medium, dominantly fine; subangular to subround; pale grayish orange pink (5*YR* 7/2) over dark reddish brown (5*YR* 3/4)	0–1
Sand; fine to medium, dominantly fine; subangular to subrounded; humic; thixotropic; dusky brown (5*YR* 2/2) grading down to dark reddish brown (5*YR* 3/4) at 4 ft	1–10
Peat, dark-olive-brown (5*Y* 2/4); light-brown (5*YR* 5/6) wood pieces	10–14
Sand, fine to medium, mostly subrounded, humic; yellowish brown (10*YR* 5/2) grading down to dark yellowish brown (10*YR* 4/2) at 21 ft; upper part contains roots from peat bed above	14–25
---------- UNCONFORMITY ----------	
Chuckatuck Formation	
Silt, very clayey, sandy (very fine); medium gray (*N* 5) grading down to yellowish gray (5*Y* 8/1); lower contact gradational	25–30
Sand, very fine to fine, silty, clayey; yellowish gray (5*Y* 8/1) grading down to brownish gray (5*YR* 5/1); lower contact gradational	30–31
Sand, fine to medium, clean, thixotropic, yellowish-gray (5*Y* 8/1), lower contact gradational	31–36
Sand, medium to coarse, clean, thixotropic, yellowish-gray (5*Y* 8/1)	36–49
Sand; coarse to very coarse, dominantly very coarse; greenish gray (5*G* 7/1); abundant quartz pebbles up to 2 cm in diameter	49–53

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, clayey, micaceous, dense, sparsely lignitic; olive gray (5*Y* 4/1) grading down to light olive gray (5*Y* 6/1) 53–56

Base of dune sand: **+59 ft above sea level**
Base of Chuckatuck Formation: **+31 ft above sea level**

Bottomed in Tar Heel Formation

Southeast Lumberton Quadrangle

SL–1–06: 6.18 mi west of eastern quadrangle border, 6.34 mi north of southern quadrangle border, on northern side of public boat ramp parking area, under the "m" in "Public Boat Ramp" label on map, in northwestern 1/9th of map area (latitude 34.5921°N., longitude 78.9842°W.). Surface elevation 104 ft.

LITHOLOGY — DEPTH, IN FEET

Alluvium

Sand; fine to medium, dominantly fine; slightly silty; grayish orange (10*YR* 7/4) 0–1

Sand; fine to medium grading down to medium to coarse; coarse fraction subrounded; soft; yellowish gray (5*Y* 8/2) 1–6

Sand, coarse to very coarse, pebbly (including common discoids), dark-gray (*N* 3); worn shark tooth 6–7

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, clayey, stiff, dense; pinkish brown (5*YR* 6/2) grading down through olive gray (5*Y* 4/1) (9–11 ft) to light olive gray (5*Y* 6/1) 7–16

Sand, very fine to fine, silty, clayey, stiff, dense; yellowish gray (5*Y* 8/1) grading down to glauconitic and yellowish gray (5*Y* 6/2) below 18 ft; scattered rounded lumps of pyrite up to 1 cm in diameter at base 16–20

---------- UNCONFORMITY ----------

Sand, medium to coarse, subangular to subrounded, micaceous, slightly silty, feldspathic, light-gray (*N* 7) 20–26

Base of alluvium: **+97 ft above sea level**

Bottomed in Tar Heel Formation

SL–2–06: 6.42 mi west of eastern quadrangle border, 7.22 mi north of southern quadrangle border, on dirt lane 0.38 mi west-southwest of junction of North Carolina Highway 72 and North Carolina State Road 2115, in northwestern 1/9th of map area (latitude 34.6048°N., longitude 78.9868°W.). Surface elevation 143 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, silty; yellowish gray (5*Y* 6/2) with light-olive-gray (5*Y* 5/2) streaks grading at base to medium yellow (5*Y* 7/4)	0–1
Sand, very fine to fine, silty, grayish-orange (10*YR* 7/4)	1–2
Sand, very fine to fine, silty, clayey, stiff, dark-yellowish-orange (10*YR* 6/6)	2–3
Sand, very fine to fine, silty; yellowish gray (5*Y* 8/1) with dark-yellowish-orange (10*YR* 6/6) mottles	3–6
Sand, very fine to fine, silty; yellowish gray (5*Y* 8/1) with light-olive-gray (5*Y* 6/1) and dark-yellowish-orange (10*YR* 6/6) mottles	6–9
Silt, clayey, sandy (very fine), micaceous; medium light gray (*N* 6) grading down through light brown (5*YR* 5/6) to bright orange (10*YR* 6/8)	9–12
Sand, very fine, very silty, slightly clayey; light brown (5*YR* 5/6) grading down to medium gray (*N* 5)	12–14
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, very fine, very silty, slightly clayey, light-yellowish-brown (10*YR* 6/4); sparse shells (including *Mulinia*) and shell fragments	14–19
Sand; very fine to fine grading down to fine; silty; light olive gray (5*Y* 5/2); shells increasingly abundant downward (*Dinocardium*, oysters, and others)	19–36

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand; very fine to fine, dominantly fine;
clayey; silty; stiff; sticky; micaceous;
glauconitic near base; light olive gray
(5*Y* 6/1) 36–40

---------- UNCONFORMITY ----------

Sand, medium to coarse, feldspathic,
variably silty and clayey, dense,
light-brownish-gray (5*YR* 6/1) 40–46

Base of Varina Grove unit: **+129 ft above sea level**
Base of Duplin Formation: **+107 ft above sea level**

Bottomed in Tar Heel Formation

SL–3–06: 5.63 mi west of eastern quadrangle border, 0.95 mi north of southern quadrangle border, 0.06 mi north-northwest of unnumbered North Carolina State road, 0.22 mi west of 110-ft spot elevation at T-junction of unnumbered North Carolina State roads, in southwestern 1/9th of map area (latitude 34.5139°N., longitude 78.9731°W.). Surface elevation 108 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand; very fine to medium, dominantly very fine to fine; poorly sorted; clayey; dusky brown (5*YR* 2/2) grading down to light yellowish gray (5*Y* 6/2) with dark-yellowish-orange (10*YR* 6/6) mottles at 0.5 ft	0–2
Sand; very fine to fine grading down to very fine to medium; poorly sorted; silty; clayey; light brownish gray (5*YR* 6/1)	2–8
Sand; fine to medium grading down to medium to coarse; silty; light greenish gray (5*G* 8/1)	8–11
Sand, medium to coarse, silty; very pale yellowish brown (10*YR* 6/2) grading down through dark gray (*N* 3) (12–15 ft) to bright orange (10*YR* 6/8); abrupt basal contact	11–18
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, sandy (very fine), dense, stiff; medium gray (*N* 5) with greenish-gray (5*GY* 6/1) mottles grading down to light olive gray (5*Y* 6/1) at 20 ft	18–26

Base of Waccamaw Formation, Bahramsville unit: **+90 ft above sea level**

Bottomed in Tar Heel Formation

SL–4–06: 3.23 mi west of eastern quadrangle border, 5.76 mi north of southern quadrangle border, 100 ft east-northeast of house, 0.31 mi southwest of junction of North Carolina Road 1002 with North Carolina Highway 211, 50 ft north of border between central 1/9th and north central 1/9th of map area (latitude 34.5838°N., longitude 78.9314°W.). Surface elevation 122 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine to medium, silty, humic, dusky-brown (5*YR* 2/2)	0–1
Sand; fine to medium with scattered grains up to granule size; subangular to subrounded; slightly silty; slightly thixotropic; grayish orange pink (5*YR* 7/2)	1–6
Sand, fine, well-sorted, thixotropic, slightly silty; yellowish brown (10*YR* 4/4) grading to pale grayish orange (10*YR* 8/4) at 7 ft	6–11
Sand, fine, well-sorted, thixotropic, silty, soft, pale-yellowish-gray (5*Y* 8/2)	11–15
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, very pale orange (10*YR* 8/2); 3 in. thick	at 15
Sand, very fine to fine, silty, slightly clayey; light yellowish brown (10*YR* 6/4) grading down through olive gray (5*Y* 5/1) (16–18 ft) to humic medium dark gray (*N* 4)	15–24
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine to medium, silty, dark-olive-gray (5*Y* 3/1); abundant shell fragments and calcite-cemented nodules enclosing shell fragments; lower contact gradational	24–30
Sand, fine to medium, silty, medium-olive gray (5*Y* 5/1); about 50 percent of volume composed of shell fragments	30–39
Calcarenite, very fine, very silty; abundant shell fragments; greenish yellow (10*Y* 6/4); lower contact gradational	39–45
Calcarenite, silty; abundant fine to medium quartz sand and shell fragments, greenish yellow (10*Y* 6/4)	45–47

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, medium to coarse, granular, feldspathic, sparsely micaceous, slightly silty; tough and dense, but porous; greenish gray (5*GY* 6/1) 47–51

Base of Waccamaw Formation, Moorings unit: **+107 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+98 ft above sea level**
Base of Duplin Formation: **+75 ft above sea level**

Bottomed in Tar Heel Formation

SL–5–06: 1.40 mi west of eastern quadrangle border, 1.47 mi north of southern quadrangle border, along driveway to abandoned house, 50 ft east of North Carolina State Road 2121, 0.66 mi northeast of junction of North Carolina State Roads 2116 and 2121 (at 94-ft spot elevation), in southeastern 1/9th of map area (latitude 34.5214°N., longitude 78.8992°W.). Surface elevation 94 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand; fine to medium with scattered subrounded grains up to granule size; silty; humic; dusky brown (5*YR* 2/2) grading down to dark yellowish brown (10*YR* 4/2)	0–1
Sand, medium to very coarse, poorly sorted, slightly silty, soft; light yellowish brown (10*YR* 6/4) grading down to pinkish gray (5*YR* 7/1); subangular to subrounded quartz granules and pebbles up to 1 cm in diameter	1–4
Sand, very fine to fine, silty, clayey, dense, medium-brownish-gray (5*YR* 5/1)	4–6
Sand, medium to coarse, subangular, slightly silty, soft, light-grayish-orange-pink (5*YR* 8/2); lower contact somewhat gradational	6–12
Sand, coarse to very coarse, feldspathic, soft, pale-yellowish-brown (10*YR* 6/2); abundant subangular to subrounded quartz granules and pebbles up to 1 cm in diameter	12–16
Sand; medium to coarse grading down to coarse to very coarse; medium brownish gray (5*YR* 5/1)	16–21
Sand, medium to very coarse, poorly sorted, medium-brownish-gray (5*YR* 5/1); subangular to subrounded quartz granules and pebbles up to 2 cm in diameter and abundant fragments and wood chips	21–26
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, sandy (very fine), dense, stiff, medium-olive-gray (5*Y* 5/1)	26–31

Base of Windsor Formation: **+68 ft above sea level**

Bottomed in Tar Heel Formation

SL–6–06: 1.47 mi west of eastern quadrangle border, 7.72 mi north of southern quadrangle border, on eastern rim of bay 400 ft northeast of pipeline and 0.10 mi northwest of intersection of pipeline and North Carolina State Road 2106, in northeastern 1/9th of map area (latitude 34.6124°N., longitude 78.9005°W.). Surface elevation 144 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine, well-sorted, clean; dusky yellowish brown (10*YR* 2/2) grading down through dark yellowish gray (5*Y* 6/2) (0.5–2 ft) and yellowish orange (10*YR* 7/6) (3–4 ft) to grayish orange pink (5*YR* 6/2)	0–7
Sand, fine, well-sorted, thixotropic, very dark yellowish orange (10*YR* 4/6); lower contact gradational	7–14
Sand, fine, well-sorted, thixotropic, very humic, dusky-brown (5 *YR* 2/4)	14–18
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, sandy (very fine), soft, greasy; oily luster; medium gray (*N* 4.5) grading down through medium dark gray (*N* 4) to medium greenish gray (5*GY* 5/1)	18–35
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine; medium greenish gray (5*GY* 5/1) grading down to greenish gray (5*GY* 6/1) at 37 ft; abundant shell hash; lower contact gradational	35–39
Calcarenite, fine, very silty, pale-olive (10Y 7/2); abundant very fine to fine quartz sand; lower contact gradational	39–41
Calcarenite, fine to medium, silty, quartzose; black rounded phosphate pebbles up to 1 cm in diameter	41–42

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium, very silty and clayey,
stiff, dense, medium-brownish-gray (5*YR* 5/1);
upper foot contains burrows filled with
overlying lithology..... 42–46

Base of Waccamaw Formation, Moorings unit: **+126 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+109 ft above sea level**
Base of Duplin Formation: **+102 ft above sea level**

Bottomed in Tar Heel Formation

SL–7–06: 4.88 mi west of eastern quadrangle border, 5.81 mi north of southern quadrangle border, on southern side of unnumbered dirt road running west from North Carolina State Road 2116, on northeastern rim of unnamed bay 100 ft east of power line, in northwestern 1/9th of map area (latitude 34.5846°N., longitude 78.9603°W.). Surface elevation 138 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, fine, silty, slightly clayey; yellowish brown (10*YR* 5/2) grading down through pale grayish orange (10*YR* 8/4) to dark yellowish orange (10*YR* 6/6)	0–1
Sand, fine, silty, clayey; yellowish orange (10*YR* 7/6) with increasingly abundant yellowish-gray (5*Y* 7/2) mottles downward, and pale reddish brown (10*R* 5/6)	1–6
Sand, fine, well-sorted, soft, thixotropic; pale reddish brown (10*R* 5/6) grading down through pale yellowish gray (5*Y* 8/2) (7–9 ft) to pale brownish gray (5*YR* 7/1)	6–11
Sand, fine, well-sorted, soft, thixotropic; medium brown (5*YR* 4/4) grading down through dark grayish red (5*R* 3/2) (18–19 ft) to pale grayish red (5*R* 5/2)	11–21
Sand, very fine to fine, clayey, silty; very pale orange (10*YR* 8/2) grading down to yellowish gray (5*Y* 8/1)	21–23
Waccamaw Formation, Bahramsville unit	
Silt, clayey; medium reddish brown (10*R* 4/6) with yellowish orange (10*YR* 5/6) streaks grading rapidly down to olive gray (5*Y* 4/1) at 23.5 ft; very fine to fine (sandy) in upper foot; greasy texture below 24 ft; wood chips in basal foot	23–30
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, very fine to medium, poorly sorted, silty, yellowish-brown (10*YR* 5/2); sparse rounded, coarse grains	30–31

Base of Waccamaw Formation, Moorings unit: **+115 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+108 ft above sea level**

Bottomed in Duplin Formation

SL–8–06: 4.75 mi west of eastern quadrangle border, 4.40 mi north of southern quadrangle border, on western side of North Carolina State Road 2116, 0.23 mi north of the "o" in "Horse Bluff Landing" label on map, 50 ft east of the border between the central and west-central 1/9th of map area (latitude 34.5640°N., longitude 78.9577°W.). Surface elevation 103 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, silty, clayey, stiff; dusky yellowish brown (10*YR* 2/2) grading down through medium yellowish brown (10*YR* 5/4) and yellowish orange (10*YR* 7/6) to light yellowish brown (10*YR* 6/4) with dark-orange (10*YR* 8/6) mottles	0–1
Sand, fine, silty, clayey, pale-yellowish-brown (10*YR* 6/2)	1–2
Sand, fine to medium, clean; grayish orange pink (5*YR* 6/2) grading down to pale brown (5*YR* 5/2) at 5 ft	2–6
Sand, fine to medium, angular to subangular, silty, humic, dark-grayish-red (10*R* 3/2); lower contact gradational	6–10
Sand, medium to very coarse, angular to subangular, silty, humic, very dark reddish brown (10*R* 2/4)	10–21
Gravel; subrounded to rounded quartz pebbles up to 1 cm in diameter; medium to coarse quartz-sand matrix; very dark reddish brown (10*R* 2/4)	21–22
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine, well-sorted, silty, kaolinitic, micaceous, pale-yellowish-gray (5*Y* 8/2)	22–24

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to coarse, poorly sorted, silty, clayey,
micaceous, dense, stiff, medium-gray (*N* 5);
scattered subrounded quartz granules 24–25

Base of Waccamaw Formation, Bahramsville unit: **+81 ft above sea level**
Base of Duplin Formation: **+79 ft above sea level**

Bottomed in Tar Heel Formation

SL–9–06: 4.49 mi west of eastern quadrangle border, 0.40 mi north of southern quadrangle border, 50 ft west of western side of North Carolina Highway 72, at junction with North Carolina State Road 2121, in south-central 1/9th of map area (latitude 34.5060°N., longitude 78.9531°W.). Surface elevation 119 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine; dusky yellowish brown (10*YR* 3/2) grading down to dusky yellowish brown (10*YR* 2/2)	0–1
Sand, very fine to fine; abundant very fine, dark, heavy mineral grains; clean; yellowish orange (10*YR* 7/6) grading down through grayish yellow (5*Y* 7/4) (2–4 ft) to light pinkish gray (5*YR* 9/1)	1–6
Waccamaw Formation, Bahramsville unit	
Silt, very clayey, sandy (very fine), sticky, greasy; dark brownish black (5*YR* 3/1) grading down through light olive gray (5*Y* 6/1) (7–7.5 ft) and yellowish orange (10*YR* 7/6) (7.5–9 ft) to medium grayish brown (5*YR* 4/2)	6–14
Silt, clayey, sandy (very fine), light-olive-gray (5*Y* 6/1)	14–29
Sand, fine to coarse, subangular to angular, very silty; black wood chips in basal foot; bluish gray (5*B* 6/1)	29–35
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, clayey, sandy (very fine), very stiff, very dense, dark greenish gray (5*G* 4/1) with medium-gray (*N* 5) streaks	35–36

Base of Waccamaw Formation, Moorings unit: **+113 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+84 ft above sea level**

Bottomed in Tar Heel Formation

Tar Heel Quadrangle

TH–1–06: 0.59 mi west of eastern quadrangle border, 0.83 mi north of southern quadrangle border, on southwestern side of ditch, 0.10 mi west of North Carolina Highway 131, 0.11 mi southwest of junction of North Carolina Highway 131 and North Carolina State Road 1103 at 133-ft spot elevation, in southeastern 1/9th of map area (latitude 34.6371°N., longitude 78.7598°W.). Surface elevation 133 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine, silty, slightly clayey; medium olive brown (5*Y* 4/6) grading down to light yellowish brown (10*YR* 6/4)	0–1
Sand, very fine to fine, silty, clayey, light-olive-brown (5*Y* 5/4); lower contact gradational	1–3
Sand, very fine to fine, silty; medium yellowish orange (10*YR* 5/6) grading down to yellowish orange (10*YR* 7/6) with yellowish-gray (5*Y* 7/1) mottles	3–6
Sand, very fine to fine, silty; very light gray (*N* 8) grading to bright reddish brown (10*R* 5/9) at 8 ft	6–11
Sand, very fine to fine, clean, thixotropic; bright orange (10*YR* 5/8) grading down to pale yellowish gray (5*Y* 8/2) at 12 ft; 1–2 percent very fine, dark, heavy mineral grains	11–18
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine), greasy; very light gray (*N* 8) grading down through pale orange (10*YR* 8/8) (18.5–19 ft) and medium greenish gray (5*G* 5/1) (19.5–25 ft) to greenish gray (5*GY* 6/1)	18–29
Sand; fine to medium grading down to medium to coarse; greenish gray (5*GY* 6/1) grading down to dark bluish gray (5*B* 3/1); bone fragment on basal contact	29–33

---------- UNCONFORMITY ----------

Duplin Formation

Sand, very fine to fine, silty, clayey, finely micaceous, dense, dark-greenish-gray (5*G* 4/1); shell fragments and calcified burrow fillings* 33–36

Base of Waccamaw Formation, Moorings unit: **+115 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+100 ft above sea level**

Bottomed in Duplin Formation

*Sample from this interval contained fragments of marine dinoflagellates and one whole specimen of *Lingulodinium machaerophoram* (Paleocene to modern) (Lucy E. Edwards, USGS, oral commun., 2006).

TH–2–06: 1.08 mi west of eastern quadrangle border, 6.76 mi north of southern quadrangle border, on eastern side of unnumbered dirt road that runs south-southwest from North Carolina Highway 87, 0.27 mi southeast of 155-ft Wengert benchmark, in northeastern 1/9th of map area (latitude 34.7234°N., longitude 78.7686°W.). Surface elevation 152 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand; very fine to fine, dominantly fine; increasingly silty and clayey downward; finely micaceous; dark yellowish brown (10*YR* 4/2) grading down through light yellowish brown (10*YR* 6/4) to dark yellowish orange (10*YR* 6/6)	0–1
Sand, very fine to medium, poorly sorted, silty; light yellowish brown (10*YR* 6/4) grading down through yellowish gray (5*Y* 8/1) (3–5 ft) and yellowish gray (5*Y* 7/2) (5–11 ft) to pale yellowish brown (10*YR* 6/2); lower contact gradational	1–13
Sand, very fine to medium, poorly sorted, silty, thixotropic; light brown (10*YR* 5/4) grading down through reddish brown (10*R* 4/4) (14–15 ft), dusky reddish brown (10*R* 2/4) (15–17 ft), brown (5*YR* 5/4) (17–18 ft), and orange pink (5*YR* 7/4) (18–20 ft) to yellowish orange (10*YR* 7/6) with yellowish gray (5*Y* 8/1) streaks	13–21
Sand, very fine to fine, slightly silty, yellowish-gray (5*Y* 8/1); 1–2 percent very fine, dark, heavy mineral grains	21–24
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine); pinkish gray (5*YR* 8/1) grading down through dark yellowish orange (10*YR* 6/6) to greenish gray (5*GY* 6/1)	24–26
Sand, very fine to medium, poorly sorted, subangular to angular, silty, clayey, dark-bluish-gray (5*B* 4/1)	26–30
Silt, clayey, sandy (very fine), dark-bluish-gray (5*B* 4/1)	30–31
Sand; fine to medium grading down to medium to very coarse; poorly sorted; dark bluish gray (5*B* 4/1); subrounded quartz granules	31–40

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium; light olive gray (5*Y* 6/1) grading down through medium brownish gray (5*YR* 5/1) and medium gray (*N* 6) to light olive gray (5*Y* 6/1); lower contact abrupt..... 40–43

Silt, very clayey, sandy (very fine), dense, stiff, olive-gray (5*Y* 4/1)..... 43–46

Base of Waccamaw Formation, Moorings unit: **+128 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+112 ft above sea level**

Bottomed in Tar Heel Formation

TH–3–06: 6.13 mi west of eastern quadrangle border, 6.37 mi north of southern quadrangle border, on northeastern side of North Carolina State Road 1969, 0.43 mi northwest of bridge over Lewis Mill Branch, in northwestern 1/9th of map area (latitude 34.7174°N., longitude 78.8574°W.). Surface elevation 131 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine, well-sorted, clean, grayish-orange (10*YR* 7/4)	0–1
Sand, very fine, silty, slightly clayey, dark-yellowish-orange (10*YR* 6/6)	1–3
Sand, very fine, clayey, silty, very stiff, dense; very light olive gray (5*Y* 7/1) with medium-reddish-brown (10*R* 4/6) mottles below 4 ft	3–11
Sand, fine to medium, silty, bright-yellowish-orange (10*YR* 6/8); lower contact gradational	11–17
Sand; medium to coarse grading down to fine to coarse with scattered angular, very coarse grains; poorly sorted; silty; yellowish orange (10*YR* 8/7) grading down through pale yellowish orange (10*YR* 8/4) (19–21 ft), very pale orange (10*YR* 8/2) (21–23 ft), and yellowish gray (5*Y* 8/1) (23–23.5 ft) to pinkish gray (5*YR* 8/1)	17–25
Sand, fine to very coarse, very poorly sorted; very coarse fraction subrounded to rounded; silty, slightly clayey; dark gray (*N* 3) grading down through black (*N* 1) (26–27 ft) and medium dark gray (*N* 4) (27–29 ft) to medium gray (*N* 5)	25–32
Silt, clayey, sandy (very fine), stiff, finely micaceous, carbonaceous, medium-bluish-gray (5*B* 5/1)	32–32.5
Sand; fine to medium grading down to very fine to fine; silty; micaceous; dark gray (*N* 3) grading down to medium light gray (*N* 6) at 33 ft; lower contact gradational	32.5–39
Sand, fine to medium, silty, medium-light-gray (*N* 6)	39–42

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, sandy (very fine), stiff, dense; medium dark bluish gray (5*B* 4/1) grading down to dark gray (*N* 3); abundant fine, silvery mica and brown to black lignite containing numerous pyrite crystals 42–47

Sand, very fine to fine, silty, very micaceous; medium gray (*N* 5) grading down to medium bluish gray (5*B* 6/1) 47–51

Base of Varina Grove unit: **+89 ft above sea level**

Bottomed in Tar Heel Formation

TH–4–06: 4.74 mi west of eastern quadrangle border, 3.77 mi north of southern quadrangle border, at entrance to unnumbered dirt road running from eastern side of loop in North Carolina State Road 1967, 20 ft east of 134-ft spot elevation, 50 ft east of border between west-central and central 1/9th of map area (latitude 34.6797°N., longitude 78.8330°W.). Surface elevation 133 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand; very fine to fine, dominantly very fine; slightly silty; dusky yellow (5*Y* 6/4) grading down through dark yellowish orange (10*YR* 6/6) (1–2 ft) to yellowish orange (10*YR* 7/6) with pale-greenish-yellow (10*Y* 8/2) mottles	0–6
Sand; very fine to fine, dominantly very fine; slightly silty; yellowish gray (5*Y* 8/1) grading down through grayish orange (10*YR* 7/2) (7–9 ft) and grayish yellow (5*Y* 7/4) (9–11 ft) to brownish gray (5*YR* 4/1)	6–13
Sand, very fine to fine, silty, clayey, stiff, yellowish-gray (5*Y* 7/2)	13–14
Sand, very fine to fine, silty, soft, yellowish-brown (10*YR* 5/2); lower contact somewhat gradational	14–23
Sand, medium to coarse, silty; bright yellowish orange (10*YR* 7/8) grading down to yellowish orange (10*YR* 6/8); lower contact gradational	23–27
Sand, medium to very coarse, poorly sorted, silty, grayish-orange (10*YR* 7/4)	27–28
---------- UNCONFORMITY ----------	
Duplin Formation	
Silt, clayey, sandy (very fine), medium-yellow (5*Y* 7/6)	28–29
Sand, fine to medium, silty, dark-yellowish-orange (10*YR* 6/8)	29–33

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, sandy (very fine), finely micaceous, carbonaceous, stiff, dense; pale yellowish brown (10*YR* 6/2) grading rapidly down to brownish gray (5*YR* 5/1); lumps of pyrite up to 1 cm in diameter; grades down to very fine, silty, very micaceous, medium-gray (*N* 5) sand 33–39

Base of Varina Grove unit: **+105 ft above sea level**
Base of Duplin Formation: **+100 ft above sea level**

Bottomed in Tar Heel Formation

TH–5–06: 5.69 mi west of eastern quadrangle border, 0.66 mi north of southern quadrangle border, on southern side of unnumbered dirt road running southeastward from North Carolina State Road 2100 at 115-ft spot elevation, 0.10 mi east of cemetery, in southwestern 1/9th of map area (latitude 34.6362°N., longitude 78.8492°W.). Surface elevation 107 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand; very fine to coarse, dominantly fine; poorly sorted; coarse fraction subrounded; silty; medium yellowish brown (10*YR* 5/6)	0–1
Sand; fine to medium grading down to medium to coarse; silty; yellowish orange (10*YR* 7/6) grading down to medium brown (10*YR* 5/2)	1–6
---------- UNCONFORMITY ----------	
Varina Grove unit	
Silt, clayey, sandy (very fine), stiff; dark yellowish orange (10*YR* 6/6) grading down through pale reddish brown (10*R* 5/4) with yellowish-gray (5*Y* 7/2) streaks (6.25–8 ft), yellowish orange (10*YR* 7/6) (8–8.5 ft), and light olive gray (5*Y* 6/1) (8.5–13 ft) to olive gray (5*Y* 5/1) with pale-yellowish-brown (10*YR* 6/2) streaks	6–14
Sand, fine to medium, silty; dark yellowish orange (10*YR* 6/6) grading down to light yellowish brown (10*YR* 6/4) at 15 ft	14–18.5
Silt, sandy (very fine), clayey, pale-yellowish-brown (10*YR* 6/2)	18.5–19
Sand; fine to medium grading down to medium to very coarse; poorly sorted; subangular; subrounded quartz granules near base; silty; light yellowish brown (10*YR* 6/4)	19–24

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to coarse, poorly sorted,
feldspathic, micaceous, silty, kaolinitic,
dense; scattered subangular,
very coarse to granule-sized grains of
quartz; very pale orange (10*YR* 8/2)..... 24–26

Base of Windsor Formation: **+101 ft above sea level**
Base of Varina Grove unit: **+83 ft above sea level**

Bottomed in Tar Heel Formation

TH–6–06: 3.30 mi west of eastern quadrangle border, 2.32 mi north of southern quadrangle border, on southern side of unnumbered dirt road about 0.05 mi south of Allen Pocket Canal, 0.11 mi west-northwest of junction of the canal with North Carolina State Road 1101, in south-central 1/9th of map area (latitude 34.6588°N., longitude 78.8076°W.). Surface elevation 121 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, angular to subangular; grayish orange (10*YR* 7/4) grading down through yellowish orange (10*YR* 7/6) (1–3 ft) and pale greenish yellow (10*Y* 8/4) (3–5 ft) to pale yellowish gray (5*Y* 9/1)	0–7
Sand; fine to medium grading down to fine to coarse; silty; light yellowish brown (10*YR* 6/4) grading down through grayish orange (10*YR* 7/4) (7.33–9 ft) and light orange (10*YR* 7/8) (9–10 ft) to bright orange (10*YR* 6/8)	7–11
Sand, fine to coarse, subangular, silty, pale-yellowish-brown (10*YR* 7/2); lower contact somewhat gradational	11–18
Sand, fine to medium, subangular to subrounded, silty, light-grayish-brown (5*YR* 4/2); scattered subrounded to rounded coarse grains; lower contact gradational	18–23
Sand; fine grading down to fine to medium; angular to subangular; silty; light olive gray (5*Y* 6/1); lower contact gradational	23–25
Sand, medium to coarse, dark-olive-gray (5*Y* 3/1)	25–27
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand; fine to medium grading down to medium to very coarse; poorly sorted; subrounded to rounded; silty; clayey; kaolinitic; micaceous; dense; bluish gray (5*B* 6/1); wood fragment at base	27–29
Silt, clayey, sandy (very fine), dense; medium gray (*N* 5) grading down to medium bluish gray (5*B* 5/1) at 31 ft	29–33
Sand, very fine to fine, silty, slightly clayey, coarsely micaceous, medium bluish gray (5*B* 5/1)	33–36

Base of Waccamaw Formation, Bahramsville unit: **+94 ft above sea level**

Bottomed in Tar Heel Formation

TH–7–06: 0.41 mi west of eastern quadrangle border, 3.10 mi north of southern quadrangle border, 0.05 mi north-northwest of Allen Cemetery and 100 ft east of rim of unnamed Carolina bay, in east-central 1/9th of map area (latitude 34.6702°N., longitude 78.7567°W.). Surface elevation 141 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Moorings unit	
Sand, very fine to fine, silty; grayish yellow (5*Y* 7/4) grading down through very dark yellowish orange (10*YR* 5/6) (0.5–1 ft), dark yellowish orange (10*YR* 6/6) (1–4 ft), and grayish yellow (5*Y* 7/4) (4–6 ft) to light brown (5*YR* 5/4)	0–11
Sand, very fine to fine, very silty, soft, light-orange (10*YR* 7/8)	11–17
Waccamaw Formation, Bahramsville unit	
Silt, clayey, sandy (very fine); medium reddish orange (10*R* 6/6) grading down to medium orange pink (10*R* 7/4)	17–19
Sand, very fine to fine, dominantly fine, very silty, medium-orange-pink (10*R* 7/4)	19–20
Silt, clayey, yellowish-gray (5*Y* 8/1); 1 in. thick	at 20
Sand, very fine, silty, light-orange (10*YR* 7/8); lower contact gradational	20–24
Sand, very fine to fine, silty, pinkish-gray (5*YR* 8/1); lower contact gradational	24–27
Sand, fine to medium, slightly silty; yellowish gray (5*Y* 8/1) grading down through light brown (5*YR* 5/6) (29–30 ft) to yellowish orange (10*YR* 5/6)	27–31
Sand; fine to medium grading down to fine to very coarse; very poorly sorted; silty; very pale orange (10*YR* 8/2); lower contact gradational	31–41
Sand; fine to very coarse grading down to medium to very coarse; poorly sorted; subangular to subrounded; silty; yellowish gray (5*Y* 8/1); subrounded quartz granules and small pebbles	41–47

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, clayey,
micaceous, dense; yellowish gray
(5*Y* 8/1) grading down through bright orange
(10*YR* 6/8) (48–49 ft) to pale brown
(5*YR* 6/6) with pale-orange (10*YR* 8/8) streaks 47–51

Base of Waccamaw Formation, Moorings unit: +124 ft above sea level
Base of Waccamaw Formation, Bahramsville unit: +94 ft above sea level

Bottomed in Tar Heel Formation

TH–8–06: 3.86 mi west of eastern quadrangle border, 6.90 mi north of southern quadrangle border, along northwestern border of field 0.07 mi northeast of North Carolina State Road 1300, 0.39 mi northwest of junction of North Carolina State Roads 1300 and 1004 (at 134-ft spot elevation), in north-central 1/9th of map area (latitude 34.7252°N., longitude 78.8177°W.). Surface elevation 133 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty, light-olive-brown (5*Y* 6/6)	0–2
Sand; fine to medium grading down to very fine to fine; silty; yellowish gray (5*Y* 8/1)	2–6
Silt, clayey, sandy (very fine), stiff, yellowish-gray (5*Y* 8/1)	6–8
Sand, very fine to fine, slightly silty; yellowish gray (5*Y* 8/1) grading down through yellowish gray (5*Y* 7/1) back to yellowish gray (5*Y* 8/1)	8–12
Sand; fine to medium grading down through medium and coarse (16–19 ft) to medium to very coarse; poorly sorted; clean; angular to subangular; yellowish gray (5*Y* 8/1) grading down to pale orange (10*YR* 8/8) at 21 ft	12–22
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, fine to medium, silty, slightly clayey, dense; pale orange (10*YR* 7/2) grading down to grayish orange (10*YR* 7/4)	22–24
Silt, clayey, sandy (very fine); increasingly micaceous downward; stiff; greasy texture; light olive gray (5*Y* 6/1) grading down rapidly at 27.5 ft to dark gray (*N* 3); sparse wood fragments	24–28
Sand, very fine to fine, silty, abundantly micaceous; medium light gray (*N* 6) grading down to light gray (*N* 7); fragment of carbonized wood in basal foot	28–31

Base of Waccamaw Formation, Bahramsville unit: **+111 ft above sea level**

Bottomed in Tar Heel Formation

Tomahawk Quadrangle

TO–1–08: 1.75 mi west of eastern quadrangle border, 1.83 mi north of southern quadrangle border, along old railroad bed, 0.30 mi south-southeast of railroad bed crossing with North Carolina State Road 1007 at Kerr, in southeastern 1/9th of map area (latitude 34.6517°N., longitude 78.2805°W.). Surface elevation 77 ft.

LITHOLOGY DEPTH, IN FEET

Sand, fine to medium, clean, slightly humic, pale-yellowish-brown (10*YR* 6/2) (railroad bed fill)..... 0–2

---------- UNCONFORMITY ----------

Dune sand

Sand, fine to medium, clean, humic; dusky yellowish brown (10*YR* 1/2) grading down through dark yellowish brown (10*YR* 4/2) (2.5–3 ft), light yellowish brown (10*YR* 6/4) (3–4.5 ft), dark yellowish orange (10*YR* 6/6) (4.5–5 ft), and pale brown (5*YR* 6/2) (5–5.5 ft), to very dusky red (10*R* 2/2)..... 2–7

---------- UNCONFORMITY ----------

Charles City Formation

Sand, fine, silty, humic, dark-yellowish-brown (10*YR* 3/2)..... 7–8

Sand, fine, slightly silty; medium yellowish brown (10*YR* 5/4) grading down to dusky yellowish orange (10*YR* 5/6) at 9 ft..... 8–11

Sand, fine to medium, silty, dusky-yellowish-orange (10*YR* 5/6); lower contact gradational..... 11–16

Sand, medium to very coarse, granular, poorly sorted, dusky-yellowish-orange (10*YR* 5/6); coarse to granule fraction subrounded to rounded..... 16–19

Sand; fine to medium grading down to coarse to very coarse with scattered rounded and polished quartz granules; dark yellowish brown 10*YR* 4/4) grading down to very pale orange (10*YR* 8/2) at base..... 19–26

Sand; fine to coarse grading down to medium to very coarse; poorly sorted; silty; yellowish gray (5*Y* 8/1) grading down to pale yellowish brown (10*YR* 6/2) at 34 ft; locally gravelly with rounded quartz pebbles up to 7 cm in length; some clayballs in basal 2 ft..... 26–36

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, slightly silty and clayey, micaceous, dark-olive-gray (5*Y* 3/1); thin layers of dense, greenish-black (5*GY* 2/1), silty clay and fine, well-sorted, micaceous dark-greenish-gray (5*GY* 4/1), sand with very dusky red (10*R* 2/2) lignite fragments 36–41

Base of dune sand: **+70 ft above sea level**
Base of Charles City Formation: **+41 ft above sea level**

Bottomed in Tar Heel Formation

TO–2–08: 5.50 mi west of eastern quadrangle border, 3.07 mi north of southern quadrangle border, on northwestern side of unnumbered dirt road leading southwest from North Carolina Highway 210, 50 ft southwest of North Carolina Highway 210 and 0.34 mi west-northwest of 47-ft spot elevation point along North Carolina Highway 210, in west-central 1/9th of map area (latitude 34.6695°N., longitude 78.3461°W.). Surface elevation 60 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, clean, slightly humic; medium brown (5*YR* 4/4) grading down through grayish orange (10*YR* 7/4) (0.5–1 ft) and very pale orange (10*YR* 8/2) (1–4 ft) to dark yellowish orange (10*YR* 6/6)	0–5
---------- UNCONFORMITY ----------	
Chuckatuck Formation	
Sand, fine to medium, very silty, slightly clayey, yellowish-brown (10*YR* 5/2); much denser than unit above	5–6
Sand, fine to coarse, angular to subrounded, silty; grades down to medium to very coarse, gravelly with subangular to rounded quartz pebbles up to 2 cm in length; poorly sorted; yellowish brown (10*YR* 5/2) grading down through pale grayish orange (10*YR* 8/4) and very pale orange (10*YR* 8/2) to grayish orange (10*YR* 7/4)	6–15
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, very stiff, dense, dusky-greenish-gray (5*GY* 3/1); carbon streaks near base	15–18
Sand, fine to coarse, poorly sorted, angular to subangular, granular, silty, carbonaceous; dark greenish gray (5*GY* 3/1) with dark-yellowish-brown (10*YR* 3/2), carbonaceous streaks grading down to dark greenish gray (5*GY* 4/1); lens of dusky-greenish-gray (5*GY* 3/2), lignitic clay in basal foot; very dark yellowish brown (10*YR* 3/2) lignite	18–21

Base of dune sand:	**+55 ft above sea level**
Base of Chuckatuck Formation:	**+45 ft above sea level**

Bottomed in Tar Heel Formation

TO–3–08: 3.26 mi west of eastern quadrangle border, 4.85 mi north of southern quadrangle border, at junction of two unnumbered dirt roads where 98-ft spot elevation was taken, 0.28 mi northeast of 99-ft Dismal benchmark along old railroad line, in central 1/9th of map area (latitude 34.6955°N., longitude 78.3066°W.). Surface elevation 98 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, clean, humic; dusky yellowish brown (10*YR* 2/2) changing abruptly to pale yellowish brown (10*YR* 6/2) at 4 in	0–1
Sand, fine to medium, humic, dusky-yellowish-brown (10*YR* 2/2)	1–3
Peat with abundant wood fragments, dusky-yellowish-brown (10*YR* 2/2)*	3–4
Sand, fine to medium, silty, humic, dusky-yellowish-brown (10*YR* 2/2)	4–6
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, very fine, silty, tough, dense; medium brown (5*YR* 3/6) grading down to dark grayish yellow (5*Y* 7/4)	6–10
Sand, very fine to fine, silty, soft, light-yellowish-brown (10*YR* 6/4)	10–11
Sand; medium to very coarse with subrounded quartz pebbles up to 2 cm in length; poorly sorted; silty; soft; dark yellowish brown (10*YR* 4/4) grading down to dark yellowish brown (10*YR* 3/2); lower contact gradational	11–18
Sand, fine to medium, silty, soft, dark-yellowish-brown (10YR 3/2)	18–27
Sand; fine to coarse with subrounded quartz pebbles up to 1 cm in length; poorly sorted; silty; soft; pale yellowish brown (10*YR* 7/2)	27–38
Sand; very fine to coarse with abundant quartz granules and pebbles up to 1 cm in length; very poorly sorted; very clayey and silty; sticky; pale yellowish gray (5*Y* 9/1); thin layer of yellowish-gray (5*Y* 8/1), very clayey silt at 40 ft	38–46
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, silty, very micaceous, dense, greenish-gray (5*GY* 5/1)	46–49

Sand, very fine to fine, clayey, silty, dense, sticky, lignitic, olive-black (5*Y* 2/1); contains burrows filled with above lithology 49–49.5

Stopped on impenetrable bed or petrified log ..... at 49.5

Base of dune sand: **+92 ft above sea level**
Base of Windsor Formation: **+52 ft above sea level**

Bottomed in Tar Heel Formation

*Wood fragment in peat yielded a radiocarbon age greater than 51,800 B.P. (John P. McGeehin, USGS, written commun., 2008).

TO–4–08: 0.68 mi west of eastern quadrangle border, 6.37 mi north of southern quadrangle border, 100 ft north of North Carolina Highway 41, 0.55 mi west of 45-ft Billy benchmark, in northeastern 1/9th of map area (latitude 34.7173°N., longitude 78.2618°W.). Surface elevation 46 ft.

LITHOLOGY	DEPTH, IN FEET
Alluvium	
Sand, fine, well-sorted, silty, soft; medium yellowish brown (10*YR* 5/4) grading down to light yellowish brown (10*YR* 6/4)	0–1
Sand, fine, well-sorted, slightly silty, thixotropic; light yellowish brown (10*YR* 6/4) grading down through dark yellowish orange (10*YR* 6.5/6) to pale grayish orange pink (5*YR* 8/2); contains <1 percent very fine, dark, heavy mineral grains; lower contact somewhat gradational	1–6
Sand, medium to very coarse, poorly sorted, pale-grayish-orange-pink (5*YR* 8/2); abundant subrounded to rounded quartz pebbles up to 3 cm in length in basal foot	6–8
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, sandy (very fine), micaceous, stiff, dense, dark-olive-gray (5*Y* 3/1); wood and pyrite lumps; small burrows filled with clean, very fine sand; thin lenses of very fine sand in basal foot	8–11

Base of alluvium: **+38 ft above sea level**

Bottomed in Tar Heel Formation

TO–5–08: 1.75 mi west of eastern quadrangle border, 1.83 mi north of southern quadrangle border, 50 ft west of North Carolina State Road 1132 at entrance to unnumbered dirt road leading west-southwest from North Carolina State Road 1132, 200 ft south of 103-ft spot elevation, in northwestern 1/9th of map area (latitude 34.7371°N., longitude 78.3695°W.). Surface elevation 103 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine to medium, slightly silty, humic, light-grayish-brown (10*YR* 4/2)	0–1
Sand, fine to medium, clean, soft, dark-yellowish-orange (10*YR* 6.5/6)	1–2
Sand, fine to medium, slightly silty; dark yellowish orange (10*YR* 6.5/6) grading down through dark yellowish orange (10*YR* 6/6), light yellowish brown (10*YR* 6/4), and dark yellowish brown (10*YR* 4/2) to grayish orange pink (5*YR* 7/2)	2–17
Sand, fine to medium, slightly silty, humic; brownish black (10*YR* 1/2) grading down to dark reddish brown (5*YR* 3/4)	17–20
Sand; fine to medium, dominantly medium; pale brown (10YR 6/2) grading down to very humic and dusky yellowish brown (10*YR* 2/2)	20–22.5
Sand, very fine, silty, massive (loess?), light yellowish-brown (10*YR* 6/4)	22.5–23.5
---------- UNCONFORMITY ----------	
Windsor Formation	
Sand, medium to coarse, pale-yellowish-gray (5*Y* 8/2); contains subrounded to rounded quartz granules and <1 percent very fine, dark, heavy mineral grains	23.5–26
Sand, medium to coarse; pale grayish orange pink (5*YR* 8/2) grading down to pale yellowish brown (10*YR* 6/2) at 48 ft; subrounded to rounded quartz granules throughout; subrounded quartz pebbles up to 1 cm in diameter in basal foot	26–49

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, silty, micaceous, very stiff, dense, dark-olive-gray (5*Y* 3/1); large lump of pyrite..... 49–51

Base of dune sand: **+79.5 ft above sea level**
Base of Windsor Formation: **+54 ft above sea level**

Bottomed in Tar Heel Formation

Turkey Quadrangle

TU–1–04: 0.98 mi west of eastern quadrangle border, 4.97 mi north of southern quadrangle border, east of Carltons Mill Run and west of Buckhall Creek, on western side of North Carolina State Road 1108, 0.30 mi north-northwest of intersection of North Carolina State Roads 1108 and 1112, in east-central 1/9th of map area (latitude 34.9471°N., longitude 78.1416°W.). Surface elevation 120 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand; fine to medium with scattered fine grains of dark, heavy minerals; clean; dusky yellow (5*Y* 6/4) grading down to pale yellowish gray (5*Y* 8/2) at 1 ft	0–6
Sand, fine to coarse, poorly sorted, silty, slightly clayey, dark-yellowish-orange (10*YR* 6/6)	6–14
Silt, very clayey, yellowish-gray (5*Y* 7/2); 2 in. thick	at 14
Sand, fine, clean, thixotropic, yellowish-orange (10YR 7/6); contains <1 percent very fine, dark, heavy mineral grains; lower contact gradational	14–17
Sand, fine to coarse, poorly sorted, yellowish-gray (5*Y* 7/2)	17–19
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, sandy (very fine), clayey; pale reddish brown (10*R* 5/6) with yellowish-gray (5*Y* 7/2) streaks grading down to pale olive gray (5*Y* 6/2) at 21 ft	19–27
Silt, very clayey, carbonaceous, micaceous; variably interlayered dark brownish gray (5*YR* 3/1), dark yellowish green (5*GY* 4/4), and dark gray (*N* 8.5)	27–30
Sand, fine, silty, light-olive-brown (5*Y* 5/4)	30–33
Silt, very clayey, carbonaceous, micaceous; variably interlayered dark brownish gray (5*YR* 3/1), dark yellowish green (5*GY* 4/4), and dark gray (*N* 8.5); 1-in.-diameter pyrite nodule and some sand-filled burrows	33–45

Sand, fine to coarse, poorly sorted, very lignitic, dark-brownish-gray (5*YR* 3/1) 45–48

Silt, very clayey, dense, dark-gray (*N* 3.5) 48–51

Base of Waccamaw Formation, Bahramsville unit: **+101 ft above sea level**

Bottomed in Tar Heel Formation

TU–2–04: 3.78 mi west of eastern quadrangle border, 7.87 mi north of southern quadrangle border, in vacant lot on south side of North Carolina Highway 24, 0.45 mi west-southwest of intersection of North Carolina Highway 24 and North Carolina State Road 1911 in town of Turkey, in north-central 1/9th of map area (latitude 34.9895°N., longitude 78.1914°W.). Surface elevation 145 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine, well-sorted, clean; grayish yellow (5*Y* 7/4) grading down through dark yellowish orange (10*YR* 6/6) (3–3.5 ft), pale yellowish gray (5*Y* 8/2) (3.5–4 ft), and orange (10*YR* 5/6) (4–8 ft) to pale yellowish orange (10*YR* 8/6)	0–10
Silt, sandy (very fine), yellowish-gray (5Y 8/1); 4 in. thick	at 10
Sand, fine, silty, light-brown (5*YR* 5/6)	10–12
Sand; fine grading down to fine to medium; orange pink (5*YR* 7/4) grading down through yellowish orange (10*YR* 7/6) (14–16 ft) to dark yellowish orange (10*YR* 6/6)	12–18
Sand, fine to medium, silty, clayey, pale-yellowish-gray (5*Y* 8/2)	18–21
Sand, medium to coarse, silty, clayey, medium-yellowish-brown (10*YR* 5/4)	21–26
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, clayey, lignitic; much denser than unit above; medium dark gray (*N* 4)	26–27
Sand, fine to medium, silty; olive gray (5*Y* 3/2) grading down to medium gray (*N* 5); lower contact somewhat gradational	27–33
Sand, very fine to fine, clayey, silty, lignitic; abundant coarse mica; dark olive gray (5*Y* 3/1)	33–36

Base of Varina Grove unit: **+119 ft above sea level**

Bottomed in Tar Heel Formation

TU–3–04: 6.28 mi west of eastern quadrangle border, 4.18 mi north of southern quadrangle border, on southwestern side of North Carolina State Road 1932, 0.06 mi south-southeast of 134-ft spot elevation at intersection of North Carolina State Road 1932 with dirt road trending northeast, 1.3 mi northwest of intersection of North Carolina State Roads 1932 and 1004, in west-central 1/9th of map area (latitude 34.9357°N., longitude 78.2352°W.). Surface elevation 130 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, well-sorted, silty, slightly clayey; light yellowish brown (10*YR* 6/4) grading down to dark yellowish orange (10*YR* 6/6)	0–1
Sand; fine with scattered grains up to granule size; dark yellowish orange (10*YR* 6/6) grading down to reddish brown (10*R* 5/6)	1–4
Sand, very fine, silty, clayey; denser than interval above; yellowish gray (5*Y* 7/2) grading down to orange (10*YR* 5/6)	4–8
Sand, fine, silty, orange (10*YR* 5/6); lower contact gradational	8–11
Sand, fine to medium, silty, soft; orange (10*YR* 5/6) grading down to medium brown (5*YR* 4/6) at 14 ft	11–19
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, very clayey and silty, dense, stiff, micaceous; abundant wood fragments; light yellowish brown (10*YR* 6/4) in top 3 in., then grading down rapidly to dark olive gray (5*Y* 3/1)	19–21

Base of Waccamaw Formation, Bahramsville unit: **+111 ft above sea level**

Bottomed in Tar Heel Formation

TU–4–04: 4.76 mi west of eastern quadrangle border, 3.18 mi north of southern quadrangle border, in Six Runs Creek valley, 0.05 mi south of North Carolina State Road 1004 on dirt road (not on map) located 0.3 mi east of North Carolina State Road 1004 bridge over Six Runs Creek, in west-central 1/9th of map area (latitude 34.9213°N., longitude 78.2086°W.). Surface elevation 74 ft.

LITHOLOGY DEPTH, IN FEET

Alluvium

Sand, fine, well-sorted, silty; dark yellowish brown (10*YR* 4/4) grading down through medium olive brown (5*Y* 4/6) (1–3 ft) to light yellowish brown (10*YR* 6/4) 0–5

Sand; medium grading down through medium and coarse to coarse to very coarse and granular; slightly silty; soft; very pale orange (10*YR* 8/2) grading down to pale olive gray (5*Y* 7/1); rounded 1 cm pebble at base 5–16

---------- UNCONFORMITY ----------

Tar Heel Formation

Silt, very clayey, stiff, olive-gray (5*Y* 4/1) 16–18

Sand, fine to medium; abundant large mica flakes; sparsely lignitic; dark greenish gray (5*GY* 4/1) 18–24

Silt, very clayey, stiff, lignitic, olive-gray (5*Y* 4/1) 24–26

Base of alluvium: **+58 ft above sea level**

Bottomed in Tar Heel Formation

TU–5–04: 3.34 mi west of eastern quadrangle border, 1.82 mi north of southern quadrangle border, north of Stewarts Creek, on northern side of North Carolina State Road 1942 opposite dirt road leading southwest to cemetery, 0.7 mi east-southeast of junction of North Carolina State Roads 1942 and 1943, in south-central 1/9th of map area (latitude 34.9015°N., longitude 78.1835°W.). Surface elevation 104 ft.

LITHOLOGY	DEPTH, IN FEET
Windsor Formation	
Sand, fine, well-sorted; dark yellowish brown (10*YR* 4/2) grading down through light yellowish brown (10*YR* 6/4) to medium yellowish brown (10*YR* 5/4) with dark-yellowish-brown (10*YR* 4/2) mottles	0–1
Sand, fine, well-sorted, slightly silty; dark yellowish orange (10*YR* 6/6) grading down through light yellowish gray (5*Y* 8/4) (4–5 ft) and dark yellowish orange (10*YR* 6/6) (5–6 ft) to grayish orange pink (5*YR* 7/2)	1–9
Sand; medium to coarse, dominantly medium, with abundant rounded quartz granules and pebbles up to 2 cm in diameter; grayish orange pink (5*YR* 7/2)	9–11
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty; grayish orange (10*YR* 7/2) grading down through pale yellowish brown (10*YR* 6/2) (14–17 ft) and pale greenish yellow (10*Y* 8/2) (17–19 ft) to medium yellow (5*Y* 7/6)	11–21
Sand, fine to medium, dark-grayish-yellow (10*Y* 7/4)	21–24
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, micaceous, lignitic; orange (10*YR* 5/6) in upper 4 in. then grades rapidly to dark olive gray (5*Y* 3/1); lower contact gradational	24–28
Sand, very fine to fine, clayey, silty, very micaceous, dark-olive-gray (5*Y* 3/1)	28–31

Base of Windsor Formation: **+93 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+80 ft above sea level**

Bottomed in Tar Heel Formation

TU–6–08: 0.29 mi west of eastern quadrangle border, 7.38 mi north of southern quadrangle border, on southern side of unnumbered dirt road, 0.13 mi west-southwest of 145-ft spot elevation on North Carolina State Road 1111, in northeastern 1/9th of map area (latitude 34.9815°N., longitude 78.1325°W.). Surface elevation 138 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, silty, plinthitic, light-yellowish-brown (10*YR* 6/4)	0–1
Sand, very fine to fine, silty, clayey; light yellowish brown (10*YR* 6/4) grading down through dark yellowish orange (10*YR* 6/6) with pale-yellowish-gray (5*Y* 8/2) mottles and pale yellowish gray (5*Y* 8/2) with dark-yellowish-orange (10*YR* 6/6) mottles to pale yellowish brown (10*YR* 6/2)	1–6
Silt, very clayey, sandy (very fine), dense, sticky; yellowish orange (10*YR* 7/6) grading down to pale greenish gray (5*G* 9/1)	6–7
Sand, fine to coarse, poorly sorted, silty; clayey grading down to slightly clayey; pale greenish gray (5*G* 9/1)	7–11
Sand, fine to very coarse, very poorly sorted, granular, silty, pale-olive (10*Y* 6/2); lower contact somewhat gradational	11–16
Sand, fine to medium; contains 1–2 percent very fine, dark, heavy mineral grains; silty; light brown (5*YR* 5/6); granular in basal foot	16–19
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, fine to medium, silty, slightly clayey, micaceous, glauconitic; denser than unit above; dark grayish green (5*GY* 4/2) grading down through dark grayish yellow green (5*GY* 6/2) to dark greenish gray (5GY 3/1) in basal 2 ft	19–36
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, micaceous, stiff, very dense, olive-gray (5*Y* 4/2)	36–41

Base of Varina Grove unit: **+119 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+102 ft above sea level**

Bottomed in Tar Heel Formation

TU–7–08: 3.79 mi west of eastern quadrangle border, 4.42 mi north of southern quadrangle border, on southern side of unnumbered dirt road, 0.06 mi west of 147-ft spot elevation on North Carolina State Road 1004, in central 1/9th of map area (latitude 34.9357°N., longitude 78.2352°W.). Surface elevation 146 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, well-sorted, silty, increasingly clayey downward; yellowish brown (10*YR* 5/2) grading down through light yellowish brown (10*YR* 6/4) and dark yellowish orange (10*YR* 6/6) to yellowish gray (5*Y* 8/1)	0–2
Sand, fine, silty; denser than interval above; pale yellowish brown (10*YR* 7/2) grading to grayish orange (10*YR* 7/4) at 3 ft	2–4
Sand, fine, slightly silty, soft, pale-orange (10*YR* 7.5/2)	4–6
Sand, fine, soft, thixotropic; pale orange (10*YR* 7.5/2) grading down through very pale brown (5*YR* 6/2) (9–11 ft) to dusky yellowish brown (10*YR* 2/2)	6–15
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty, clayey, very pale brown (5*YR* 6/2); stiffer and denser than sand above	15–16
Sand; fine to medium grading down to fine to coarse; poorly sorted with scattered rounded quartz granules and small 0.5-cm-diameter pebbles in basal 2 ft; silty; slightly clayey; yellowish gray (5*Y* 8/1)	16–23
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, very fine to fine, silty, clayey, micaceous, slightly sticky; denser than unit above; dark orange (10*YR* 6/8) grading down through yellowish gray (5*Y* 7/2) (25–25.5 ft) to bright orange (10*YR* 7/8)	23–26

Base of dune sand: **+131 ft above sea level**
Base of Waccamaw Formation, Bahramsville unit: **+123 ft above sea level**

Bottomed in Chowan River Formation, Coharie Member

Wallace West Quadrangle

WW–1–04: 4.03 mi west of eastern quadrangle border, 4.40 mi north of southern quadrangle border, at entrance to dirt road on western side of North Carolina State Road 1301, at intersection with 67-ft spot elevation, in central 1/9th of map area (latitude 34.6891°N., longitude 78.0703°W.). Surface elevation 67 feet.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Charles City Formation	
Sand, very fine, slightly silty and clayey; dusky yellowish brown (10*YR* 2/2) on light olive gray (5*Y* 6/1)	1–2
Sand, very fine, clayey, silty; light yellowish brown (10*YR* 6/4) with light-olive-gray (5*Y* 6/1) mottles grading down through light brown (5*YR* 5/6) (5–6 ft) to yellowish orange (10*YR* 7/6) with light-olive-gray (5*Y* 6/1) mottles	2–7
Sand, fine, slightly silty and clayey, yellowish-gray (5*Y* 7/2)	7–11
Sand fine to medium grading down to fine; silty; greenish gray (5*GY* 6/1)	11–20
Silt, clayey, sandy (very fine), dark-greenish-gray (5*GY* 4/1)	20–22
Peat, dusky-yellowish-brown (10*YR* 2/2); wood fragments	22–23
Sand, fine, silty, olive-gray (5*Y* 4/2); sparse wood fragments at base	23–24
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, massive, medium-greenish-gray (5*G* 5/1); burrows at top filled with sand from unit above; no basal coarse lag bed, but scattered rounded quartz and phosphate pebbles up to 1 cm in diameter on basal contact	24–29

---------- UNCONFORMITY ----------

Bladen Formation

Sand; fine to medium grading down to fine,
silty; clayey grading down to very clayey;
olive gray (5*Y* 3/2); rounded pyrite nodule
2 cm in diameter at 38 ft 29–41

Base of Charles City Formation: **+43 ft above sea level**
Base of Windsor Formation: **+38 ft above sea level**

Bottomed in Bladen Formation

WW–2–04: 1.33 mi west of eastern quadrangle border, 7.59 mi north of southern quadrangle border, at southern end of dead-end road, 0.08 mi northwest of cemetery, 0.38 mi northwest of "P" in "PENDER CO." label on map, in northeastern 1/9th of map area (latitude 34.7353°N., longitude 78.0231°W.). Surface elevation 47 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–1
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand, fine to medium, silty, humic; dusky yellowish brown (10*YR* 2/2) grading down through pale yellowish brown (10*YR* 6/2), pale brownish gray (5*YR* 7/1), and medium olive gray (5*Y* 5/1) to dark olive gray (5*Y* 3/1)	1–6
Sand, fine to medium, poorly sorted; more angular than interval above; silty; humic; dark olive gray (*5Y* 3/1); silt and clay content increases downward	6–21
Sand, fine to medium, subangular to angular, poorly sorted, silty; interbedded with fine sand, clayey, silty, with sparse shells; dark olive gray (5*Y* 3/1)	21–36

Bottomed in Donoho Creek Formation

WW–3–04: 5.79 mi west of eastern quadrangle border, 6.40 mi north of southern quadrangle border, on dirt road 0.2 mi north-northwest of junction of North Carolina State Roads 1303 and 1001, in northwestern 1/9th of map area (latitude 34.7178°N., longitude 78.1012°W.). Surface elevation 72 ft.

LITHOLOGY DEPTH, IN FEET

Charles City Formation

Sand, very fine, silty, clayey; dark yellowish orange (10*YR* 6/6) grading down through light brown (5*YR* 5/6) (2–4 ft) to light brown (5*YR* 5/6) with yellowish-gray (5*Y* 7/2) mottles 0–6

Sand; very fine grading rapidly down to fine to medium; silty; yellowish orange (10*YR* 7/6) grading down to dark yellowish orange (10*YR* 6/6) 6–9

Silt, clayey, sandy (very fine), greasy-textured, very sticky, soft, medium-greenish-gray (5*G* 5/1) 9–22

---------- UNCONFORMITY ----------

Bladen Formation

Sand, fine to medium, silty, clayey, olive-gray (5*Y* 3/2); denser than unit above; sparsely shelly in basal 2 ft 22–26

Base of Charles City Formation: **+50 ft above sea level**

Bottomed in Bladen Formation

WW–4–04: 1.52 mi west of eastern quadrangle border, 2.48 mi north of southern quadrangle border, on northern side of North Carolina State Road 1319, 0.56 mi east-northeast of intersection of North Carolina State Roads 1319 and 1324, 1.43 mi east-northeast of the "a" in "Penderlea" label on map, in southeastern 1/9th of map area (latitude 34.6612°N., longitude 78.0259°W.). Surface elevation 67 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine, silty, clayey; dusky yellowish brown (10*YR* 2/2) on pale yellowish brown (10*YR* 6/2) with pale-olive-brown (5*Y* 6/6) mottles	0–1
Silt, clayey, sandy (very fine), stiff, dense; light brown (5*YR* 5/6) with pale-olive-gray (5*Y* 7/1) mottles; lower contact gradational	1–8
Sand, very fine, silty, pale-olive-gray (5*Y* 7/1)	8–11
Sand, very fine, silty, soft, yellowish-orange (10*YR* 7/6); lower contact gradational	11–14
Sand, fine, silty, yellowish-orange (10*YR* 7/6)	14–23
Sand, fine to medium, slightly silty, olive-gray (5*Y* 4/1)	23–38
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, very clayey, sandy (very fine), greasy, dark-greenish-gray (5*GY* 4/1)	38–41
Sand; fine to medium with dense clay-silt matrix; very dark greenish gray (5*GY* 3/1)	41–44
Sand, fine to medium, silty; softer than interval above; dark greenish gray (5*GY* 4/1)	44–46
---------- UNCONFORMITY ----------	
Donoho Creek Formation	
Sand; very fine to fine interbedded with fine to medium; silty; dark olive gray (5*Y* 3/1)	46–61

Base of Charles City Formation: **+29 ft above sea level**
Base of Windsor Formation: **+21 ft above sea level**

Bottomed in Donoho Creek Formation

WW–5–04: 6.30 mi west of eastern quadrangle border, 0.65 mi north of southern quadrangle border, on western side of U.S. Highway 421, 0.1 mi south of junction of U.S. Highway 421 and North Carolina Highway 11, in southwestern 1/9th of map area (latitude 34.6348°N., longitude 78.1097°W.). Surface elevation 57 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, very fine, silty, clayey, pale-olive-brown (5*Y* 6/6)	0–1
Silt, clayey, sandy (very fine), dense, stiff; pale olive brown (5*Y* 6/6) grading down through yellowish orange (10*YR* 7/6) (3–4 ft) to dark yellowish gray (5*Y* 7/1)	1–6
Sand, very fine, silty, dusky-yellow (5*Y* 6/4)	6–8
---------- UNCONFORMITY ----------	
Windsor Formation	
Silt, clayey, sandy (very fine), stiff, dense; medium yellowish brown (10*YR* 5/4) with pale-olive (10*Y* 6/2) mottles	8–9
Silt, clayey, stiff, dense; pale olive (10*Y* 6/2) with grayish-olive (10*Y* 4/2) mottles grading down through grayish green (5*G* 5/2) with greenish-gray (5*G* 6/1) mottles (13 to 23 ft) to dark greenish gray (5*G* 4/1)*	9–32
Sand, fine to medium, dark-greenish-gray (5*G* 4/1); pyrite pebbles and an oyster fragment on basal contact	32–33
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, silty, dark-olive-gray (5*Y* 2/2); clay content increases downward; scattered pyrite nodules; sparsely shelly below 38 ft	33–41

Base of Charles City Formation: **+49 ft above sea level**
Base of Windsor Formation: **+24 ft above sea level**

Bottomed in Bladen Formation

*Recovered Pleistocene calcareous nannofossil assemblage at 31 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

Warsaw South Quadrangle

WS–1–04: 5.06 mi west of eastern quadrangle border, 7.64 mi north of southern quadrangle border, 200 ft east of Seaboard Railroad, 1.0 mi south of northern quadrangle border, in northwestern 1/9th of map area (latitude 34.9860°N., longitude 78.0888°W.). Surface elevation 152 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine to medium, silty, humic, dusky-brown (5YR 2/2)	0–3
Sand; fine grading down to very fine; dark yellowish gray (5Y 6/2) grading down through dark yellowish brown (10YR 5/2) (4–5 ft) to dark grayish yellow (5Y 7/2)	3–7
Sand, very fine to fine, silty; dusky yellow (5Y 6/4) grading down through grayish orange (10YR 7/4) (9–11 ft) to dark yellowish orange (10YR 6/6)	7–12
Sand, very fine to fine, silty, clayey, orange-pink (10R 6/4)	12–18
Sand, fine, silty, clayey, grayish-orange-pink (10R 8/2)	18–21
Sand; fine to medium grading down to fine to very coarse; very poorly sorted; silty; clayey; medium greenish gray (5G 5/1); small clayball at 34 ft	21–36
Sand; medium grading down to medium to coarse; granular; medium grayish yellow (5Y 7/4)	36–38
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Clay, silty, dense, stiff, lignitic, very dark greenish gray (5*GY* 3/1); upper foot burrowed, filled with matrix from unit above	38–41

Base of Varina Grove unit: **+114 ft above sea level**

Bottomed in Tar Heel Formation

WS–2–04: 1.48 mi west of eastern quadrangle border, 8.56 mi north of southern quadrangle border, at entrance of dirt road on southern side of North Carolina State Road 1375, 200 ft south of northern quadrangle border, in northeastern 1/9th of map area (latitude 34.9999°N., longitude 78.0258°W.). Surface elevation 142 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, fine, well-sorted, clean, light-olive-brown (5*Y* 5/5)	0–1
Sand, fine, silty; yellowish orange (10*YR* 7/6) grading down to very light gray (*N* 8)	1–6
Sand, fine to medium, silty, slightly clayey; yellowish orange (10*YR* 7/6) grading down through dark yellowish orange (10*YR* 6/6) (11–16 ft) to light brown (7.5*YR* 5/6); lower contact somewhat gradational	6–18
Sand, fine to coarse, silty, light-grayish-orange (10*YR* 8/4); quartz pebbles and discoids up to 3 cm in diameter	18–20
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, very fine to fine with scattered medium grains, silty, clayey; light grayish orange (10*YR* 8/4) grading down to dark yellowish orange (10*YR* 5/6) at 25 ft	20–32
Sand, medium, silty, clayey, dark-yellowish-orange (10*YR* 5/6); flattened discoidal mudballs up to 2 cm in diameter reworked from bed below	32–34
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, dense, lignitic; overlies medium to coarse, lignitic sand; light grayish olive (10*Y* 5/2)	34–36

Base of Varina Grove unit: **+122 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+108 ft above sea level**

Bottomed in Tar Heel Formation

WS–3–04: 3.51 mi west of eastern quadrangle border, 4.73 mi north of southern quadrangle border, at southern end of North Carolina State Road 1907, on northern side of Interstate Route 40 and 1.12 mi south of junction of North Carolina State Roads 1907 and 1107, in central 1/9th of map area (latitude 34.9441°N., longitude 78.0615°W.). Surface elevation 110 ft.

LITHOLOGY	DEPTH, IN FEET
Road fill	0–2
---------- UNCONFORMITY ----------	
Alluvium	
Muck, odiferous, fine (sandy), silty, clayey; dusky yellowish brown (10*YR* 2/2) grading down to grayish brown (5*YR* 3/2)	2–6
Sand, fine, silty, clayey, grayish-brown (5*YR* 3/2); quartz granules concentrated at base	6–11
---------- UNCONFORMITY ----------	
Chowan River Formation, Coharie Member	
Sand, fine, dark-grayish-green (5*GY* 4/2); detrital mudballs and pyrite clasts up to 1 cm in diameter at base	11–15
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, dense, lignitic, medium-olive-gray (5*Y* 5/1)	15–21

Base of alluvium: **+99 ft above sea level**
Base of Chowan River Formation, Coharie Member: **+95 ft above sea level**

Bottomed in Tar Heel Formation

WS-4-04: 0.41 mi west of eastern quadrangle border, 2.59 mi north of southern quadrangle border, on dirt road 0.25 mi southwest of junction with North Carolina State Road 1923, 0.25 mi south-southwest of 130-ft spot elevation on North Carolina State Road 1923, in southeastern 1/9th of map area (latitude 34.9127°N., longitude 78.0070°W.). Surface elevation 113 ft.

LITHOLOGY DEPTH, IN FEET

Road fill 0–1

---------- UNCONFORMITY ----------

Waccamaw Formation, Bahramsville unit

Sand, fine, well-sorted, silty; grades down to fine, well-sorted, clean; dark yellowish orange (10*YR* 6/6) grading down to very light yellowish gray (5*Y* 9/1)..... 1–4

Sand, very fine, silty; denser than interval above; very light yellowish gray (5*Y* 9/1)..... 4–6

Silt, sandy (very fine), clayey, yellowish-gray (5*Y* 8/1) 6–15

Sand, very fine, silty, clayey; rapidly grades to fine to medium, silty sand; dark yellowish gray (5*Y* 6/2) 15–18

---------- UNCONFORMITY ----------

Castle Hayne Limestone

Calcarenite, fine, quartzose, silty, micaceous, medium-olive-gray (5*Y* 4/1); sparse shell fragments near base 18–33

Sand, fine to medium, silty, calcareous, shelly, pale-olive-gray (5*Y* 7/1); echinoid spines and bryozoans; abundant phosphate granules at base* 33–35

---------- UNCONFORMITY ----------

Bladen Formation

Clay, silty; sandy (very fine) grading down to very fine, clayey, silty sand; dark olive gray (5*Y* 3/1) 35–38

Sand, medium to coarse, glauconitic, silty, dark-olive-gray (5*Y* 3/1) to dark-grayish-green (5*G* 4/2)..... 38–44

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, fine to medium, clayey, dense, lignitic,
dark-olive-gray (5*Y* 3/1); locally abundant pyrite lumps 44–51

Base of Waccamaw Formation, Bahramsville unit: **+95 ft above sea level**
Base of Castle Hayne Limestone: **+78 ft above sea level**
Base of Bladen Formation: **+69 ft above sea level**

Bottomed in Tar Heel Formation

*Recovered poorly preserved Tertiary calcareous nannofossils at 34 ft
(Jean M. Self-Trail, USGS, oral commun., 2004).

WS–5–04: 5.60 mi west of eastern quadrangle border, 1.22 mi north of southern quadrangle border, along dirt road (not on map) 0.05 mi south-southwest of North Carolina State Road 1104, 0.38 mi southeast of 126-ft spot elevation on North Carolina State Road 1104, in southwestern 1/9th of map area (latitude 34.8930°N., longitude 78.0982°W.). Surface elevation 125 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium; silt content increases downward; dark yellowish brown (10*YR* 4/2) grading down through medium yellowish orange (10*YR* 7/6) to dark yellowish orange (10*YR* 6/6)	0–2
Sand, fine to medium, clean, thixotropic; light yellowish brown (10*YR* 6/4) grading down to yellowish gray (5*Y* 8/1)	2–6
Sand, very fine, clayey, silty, pale-orange (10*YR* 8/2)	6–7
Sand, fine to medium, thixotropic, pale-orange (10*YR* 8/2)	7–12
Sand, fine to medium, silty, clayey; denser than interval above; light olive gray (5*Y* 6/1) grading down to grayish orange pink (5*YR* 7/2)	12–18
Sand, fine to medium, clean, pale-orange (10*YR* 7/2)	18–21
Sand, medium, silty, thixotropic, humic, grayish-brown (5*YR* 3/2)	21–28
Peat, sandy, greasy, dusky-brown (5*YR* 1/2); scattered wood fragments	28–37
Sand, fine to medium, peaty, humic, thixotropic, dusky-brown (5*YR* 1/2)	37–41
Sand, fine to medium, silty, clayey, sticky, grayish-orange-pink (5*YR* 7/2)	41–42
Sand, fine to medium, soft, thixotropic, dusky-brown (5*YR* 1/2)	42–44
Sand, fine to medium, soft, kaolinitic, pale-brownish-gray (5*YR* 7/1)	44–62

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine, clayey, silty, dark-
yellow (5*Y* 6/6)..... 62–63

Sand, very fine to fine, silty, clayey;
olive gray (5*Y* 4/2) with
dark-yellowish-orange (10*YR* 6/6) streaks,
light olive brown (5*Y* 5/4), and
grayish green (10*GY* 5/2)..... 63–66

Base of Waccamaw Formation, Bahramsville unit: **+63 ft above sea level**

Bottomed in Tar Heel Formation

WS–6–04: 4.19 mi west of eastern quadrangle border, 0.16 mi north of southern quadrangle border, on southwestern side of Natural Well (erroneously shown on map without hachured contour lines to indicate a sinkhole), 0.16 mi north of southern quadrangle border and 0.3 mi southeast of North Carolina State Road 1003, in south-central 1/9th of map area (latitude 34.8775°N., longitude 78.0734°W.). Surface elevation 132 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine, well-sorted, clean; dark yellowish brown (10*YR* 4/2) over medium yellowish orange (10*YR* 7/6)	0–1
Sand; fine grading down to fine to medium with a minor coarse fraction; slightly silty; dark yellowish orange (10*YR* 6/6) grading down to very pale orange (10*YR* 8/2)	1–7
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine, silty, clayey; grayish orange (10*YR* 7/4) grading down through light brown (5*YR* 5/6) (8–8.5 ft) to dark greenish gray (5*GY* 4/1)	7–9
Silt, sandy (very fine), slightly clayey, very shelly, medium-greenish-gray (5*GY* 5/1)	9–15
---------- UNCONFORMITY ----------	
Castle Hayne Limestone	
Calcisiltite to fine calcarenite, silty, dark-grayish-yellow green (5GY 6/2); locally indurated into massive lumps*	15–46

Base of Waccamaw Formation, Bahramsville unit: **+125 ft above sea level**
Base of Duplin Formation: **+117 ft above sea level**

Bottomed in Castle Hayne Limestone

*Recovered Eocene calcareous nannofossils at 18 ft representing Zone NP 16 and at 39 ft representing Zone NP 16/17 (Jean M. Self-Trail, USGS, oral commun., 2004).

WS–7–04: 2.89 mi west of eastern quadrangle border, 0.87 mi north of southern quadrangle border, 0.05 mi east of U.S. Highway 117 and 0.1 mi southeast of the southern town border of Magnolia, in south-central 1/9th of map area (latitude 34.8877°N., longitude 78.0505°W.). Surface elevation 128 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, fine to medium, silty, slightly clayey; dusky yellowish brown (10*YR* 2/2) grading down to dark reddish brown (5*YR* 3/4)	0–1
Sand, fine to medium, silty, slightly clayey; dark yellowish brown (10*YR* 4/2) grading down to yellowish brown (10*YR* 5/2); lower contact gradational	1–7
Sand, fine to coarse, poorly sorted, silty; yellowish gray (5*Y* 8/1) grading down to light greenish gray (5*GY* 8/1)	7–14
---------- UNCONFORMITY ----------	
Varina Grove unit	
Sand, very fine to medium, poorly sorted; grades down to medium to coarse; clayey; slightly greasy texture; silty; medium dark gray (*N* 4); phosphate granules and quartz discoids up to 3 cm in diameter on basal contact	14–17
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand, fine to medium, very calcareous, sparsely shelly; grayish olive (10*YR* 4/2) grading down to olive gray (5*Y* 3/2)	17–21
Sand, fine to medium, calcareous, subangular to subrounded, clayey, silty, micaceous, dark-greenish-gray (5*GY* 3/1)	21–26

Base of Waccamaw Formation, Bahramsville unit: **+114 ft above sea level**
Base of Varina Grove unit: **+111 ft above sea level**

Bottomed in Bladen Formation

WS-8-04: 1.79 mi west of eastern quadrangle border, 1.39 mi north of southern quadrangle border, in vacant lot on south side of North Carolina State Road 1912, 0.15 mi west of intersection of North Carolina State Roads 1912 and 1911, in southeastern 1/9th of map area (latitude 34.8954°N., longitude 78.0312°W.). Surface elevation 120 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand; fine to medium, dominantly fine; clean; humic at top; olive black (5*Y* 2/1) grading down to pale yellowish brown (10*YR* 6/2)	0–1
Sand; fine to medium, dominantly fine; clean; dusky yellowish brown (10*YR* 2/2) grading down through dark yellowish brown (10*YR* 4/2) (3–4 ft) to pale yellowish brown (10*YR* 6/2)	1–6
Sand; fine to medium grading down to medium to coarse; light greenish gray (5*GY* 7/1) grading down to medium greenish gray (5*GY* 5/1)	6–12
---------- UNCONFORMITY ----------	
Duplin Formation	
Sand, fine, silty, greenish-gray (5*GY* 6/1); very shelly, including *Mulinia*	12–14
---------- UNCONFORMITY ----------	
Bladen Formation	
Calcarenite, quartzose, fine to medium; indurated at top; sparsely shelly; olive gray (5*Y* 4/1) grading down to dark olive gray (5*Y* 3/1) at 17 ft; sparsely micaceous in basal foot; lower contact abrupt with lag shell fragments and detrital nodules*	14–37
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine to fine, micaceous, silty, dark-olive-gray (5Y 3/1); sparse wood fragments	37–41

Base of Waccamaw Formation, Bahramsville unit:	**+108 ft above sea level**
Base of Duplin Formation:	**+106 ft above sea level**
Base of Bladen Formation:	**+83 ft above sea level**

Bottomed in Tar Heel Formation

*Recovered Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 21 assemblage at 35 ft (Jean M. Self-Trail, USGS, oral commun., 2004).

WS–9–04: 3.36 mi west of eastern quadrangle border, 3.52 mi north of southern quadrangle border, on western side of chicken coops, 0.1 mi west of North Carolina State Road 1909, 0.4 mi south-southwest of junction of North Carolina State Roads 1909 and 1927, in central 1/9th of map area (latitude 34.9265°N., longitude 78.0585°W.). Surface elevation 140 ft.

LITHOLOGY DEPTH, IN FEET

Varina Grove unit

Sand, very fine to fine, silty, slightly clayey; dark yellowish brown (10*YR* 4/2) over pale grayish orange (10*YR* 8/4)..... 0–1

Sand, fine, silty; dark yellowish orange (10*YR* 6/6) grading down through yellowish orange (10*YR* 7/6) to pale yellowish brown (10*YR* 7/2)..... 1–6

Sand, fine, silty, thixotropic; dark grayish yellow (5*Y* 7/4) grading down through grayish brown (5*YR* 3/2) (9–12 ft) and very pale brown (5*YR* 6/2) (12–15 ft) to very pale yellowish brown (10*YR* 6/2)..... 6–19

Sand; fine grading down to fine to medium; silty; clayey; very pale yellowish brown (10*YR* 6/2)..... 19–26

Sand, fine to medium, silty; yellowish gray (5*Y* 8/1) grading in basal foot to dusky yellow (5*Y* 6/4)..... 26–44

Sand, very fine to fine, silty, clayey; stiffer than interval above; dark yellowish orange (10*YR* 6/6)..... 44–45

---------- UNCONFORMITY ----------

Bladen Formation?

Impenetrable hard bed..... at 45

Base of Varina Grove unit: **+95 ft above sea level**

Bottomed on Bladen Formation?

WS–10–05: 5.18 mi west of eastern quadrangle border, 4.57 mi north of southern quadrangle border, on northwestern side of North Carolina State Road 1107, 1.15 mi southwest of Carroll, in west-central 1/9th of map area (latitude 34.9413°N., longitude 78.0908°W.). Surface elevation 139 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine to fine, silty, slightly clayey; dark yellowish brown (10*YR* 3/2) over light yellowish brown (10*YR* 6/4)	0–1
Sand, fine, silty; medium grayish pink (5*R* 7/2) grading down through yellowish gray (5*Y* 8/1) (4–8 ft) to yellowish orange (10*YR* 7/6)	1–10
Sand, very fine, silty, clayey, yellowish-orange (10*YR* 7/6)	10–11
Sand, very fine to fine, silty; very pale orange (10*YR* 8/2) grading to pale grayish orange (10*YR* 8/4) at about 17 ft	11–19
Sand, very fine to medium, poorly sorted, silty, clayey; dark yellowish orange (10*YR* 6/6) grading down through pale grayish orange pink (5*YR* 8/2) back to dark yellowish orange (10*YR* 6/6)	19–23
---------- UNCONFORMITY ----------	
Castle Hayne Limestone	
Calcarenite, very fine to fine; pale yellowish gray (5*Y* 8/2) grading down to greenish gray (5*GY* 6/1) intermingled with greenish yellow (10*Y* 7/2) at about 27 ft; shell fragments	23–31

Base of Varina Grove unit: **+116 ft above sea level**

Bottomed in Castle Hayne Limestone

WS–11–05: 4.19 mi west of eastern quadrangle border, 0.16 mi north of southern quadrangle border, on dirt road (not shown on map) 0.15 mi east-southeast of North Carolina State Road 1105, 0.40 mi southeast of North Carolina State Road 1105 bridge over Buckhall Creek and 0.65 mi north-northeast of junction of North Carolina State Roads 1105 and 1113, in northwestern 1/9th of map area (latitude 34.9596°N., longitude 78.1140°W.). Surface elevation 133 ft.

LITHOLOGY	DEPTH, IN FEET
Dune sand	
Sand, fine, soft; dark yellowish brown (10*YR* 3/2) overlying 1 ft of dark-yellowish-brown peat	0–6
---------- UNCONFORMITY ----------	
Waccamaw Formation, Bahramsville unit	
Sand, fine, slightly silty, thixotropic; dusky yellowish brown (10*YR* 2/2) grading down through dark yellowish brown (10*YR* 4/4) intermingled with light yellowish brown (10*YR* 6/4) to pale olive gray (5*Y* 7/1)	6–11
Sand, fine, slightly silty, thixotropic, grayish-yellow (5*Y* 7/4)	11–18
Sand, fine, slightly silty, thixotropic; pale olive (10*Y* 6/2) grading down through dusky yellow (5*Y* 6/4) (20–25 ft) and dark greenish gray (5*GY* 4/1) (25–27 ft) to dusky yellow green (5*GY* 5/2)	18–28
Sand, fine, micaceous, light-olive-brown (5*Y* 5/4); abundant very fine, dark, heavy mineral grains	28–29
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand, very fine, silty, clayey; dusky yellowish orange (10*YR* 5/6) with light-olive-gray (5*Y* 5/2) mottles	29–30
Sand, fine, micaceous, light-olive-brown (5*Y* 5/4)	30–35
Silt, very clayey, lignitic; dark greenish gray (5*GY* 4/1) with dusky-yellowish-orange (10*YR* 5/6) mottles	35–36

Base of Waccamaw Formation, Bahramsville unit: **+104 ft above sea level**

Bottomed in Tar Heel Formation

WS–12–08: 3.13 mi west of eastern quadrangle border, 7.53 mi north of southern quadrangle border, at edge of field 200 ft north of North Carolina State Road 1903, 0.22 mi west of intersection of North Carolina State Roads 1903 and 1904, in north-central 1/9th of map area (latitude 34.9845°N., longitude 78.0552°W.). Surface elevation 142 ft.

LITHOLOGY	DEPTH, IN FEET
Varina Grove unit	
Sand, very fine, silty, clayey; dark yellowish brown (10*YR* 3/2) overlying light yellowish brown (10*YR* 6/4)	0–1
Sand, very fine to fine, silty, clayey; light olive gray (5*Y* 6/1) with grayish-orange (10*YR* 7/4) and light-brown (5*YR* 5/6) streaks	1–5
Sand; fine grading down to fine to medium; silty; light olive gray (5*Y* 6/1) with grayish-orange (10*YR* 7/4) and light-brown (5*YR* 5/6) streaks grading down to dark greenish gray (5*GY* 3/1) at 12 ft	5–18
Sand, fine to coarse, poorly sorted, very clayey and silty, dusky-greenish-gray (5*GY* 3/1)	18–22
Sand, medium to coarse, dusky-greenish-gray (5*GY* 3/1); abundant rounded quartz pebbles up to 6 cm long,	22–23
---------- UNCONFORMITY ----------	
Duplin Formation	
Coquina; mollusk shells in very fine to fine silty sand matrix; greenish gray (5*GY* 6/1)	23–32
---------- UNCONFORMITY ----------	
Bladen Formation	
Sand; very fine to fine grading down to fine and well-sorted; silty; calcareous; dark greenish gray (5*GY* 3/1); quartz and phosphate granules and pebbles up to 0.5 cm in diameter on basal contact*	32–39

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine to fine, silty, slightly clayey,
calcareous, dark-greenish-gray (5*GY* /3/1)..... 39–41

Base of Varina Grove unit: **+119 ft above sea level**
Base of Duplin Formation: **+110 ft above sea level**
Base of Bladen Formation: **+103 ft above sea level**

Bottomed in Tar Heel Formation

*Recovered poorly preserved Upper Cretaceous (Campanian) calcareous nannofossil Zone CC 20–23 assemblage at 35 ft (Jean M. Self-Trail, USGS, oral commun., 2008).

WS–13–08: 5.92 mi west of eastern quadrangle border, 3.23 mi north of southern quadrangle border, 50 ft southwest of North Carolina State Road 1107 along dirt road that leads southwest from 138-ft spot elevation on North Carolina State Road 1107, in west-central 1/9th of map area (latitude 34.8775°N., longitude 78.07348°W.). Surface elevation 138 ft.

LITHOLOGY	DEPTH, IN FEET
Waccamaw Formation, Bahramsville unit	
Sand, very fine to fine, silty, slightly clayey; grayish brown (5*Y* 3/2) grading down through pale yellowish brown (10*YR* 6/2) (4–6 in.) to dark yellowish brown (10*YR* 3/2)	0–1
Sand; very fine to fine grading down to fine; silty; olive gray (5*Y* 4/2) grading to grayish orange pink (5*YR* 7/2) at 4 ft	1–6
Sand, fine to medium, silty, slightly clayey, pale-olive-gray (5*Y* 7/1)	6–11
Sand, fine to coarse, poorly sorted, very silty and clayey, sticky, dark-olive-gray (5*Y* 3/1)	11–16
---------- UNCONFORMITY ----------	
Duplin Formation	
Coquina, with very fine to fine quartz sand matrix; olive gray (5*Y* 4/1); shells include *Dinocardium*	16–20
Calcarenite, very shelly; interbedded with coquina with silty very fine quartz-sand matrix; grayish yellow (5*Y* 7/4) grading down to dark yellowish gray (5*Y* 6/2) at 26 ft; black quartz discoid 2 cm in diameter in basal foot	20–32
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Sand; fine grading down to fine to medium; silty; slightly clayey; micaceous; very dark greenish gray (5*GY* 3/1)	32–41

Base of Waccamaw Formation, Bahramsville unit: **+122 ft above sea level**
Base of Duplin Formation: **+106 ft above sea level**

Bottomed in Tar Heel Formation

White Lake Quadrangle

WL–1–07: 0.61 mi west of eastern quadrangle border, 4.73 mi north of southern quadrangle border, 50 ft north of North Carolina Highway 41 on right side of driveway to abandoned house, 0.17 mi west of where power line crosses North Carolina Highway 41, in east-central 1/9th of map area (latitude 34.6937°N., longitude 78.3856°W.). Surface elevation 77 ft.

LITHOLOGY — DEPTH, IN FEET

Charles City Formation

Sand, very fine to fine, very silty, slightly clayey; medium yellowish brown (10*YR* 5/2) grading rapidly down through light grayish orange (10*YR* 8/4) to dark yellowish orange (10*YR* 6/6) 0–1

Silt, very clayey, sandy (very fine); light grayish orange (10*YR* 8/4) with dark-yellowish-orange (10*YR* 6/6) streaks grading down to dark reddish brown (10*R* 3/6) intermingled with yellowish gray (5*Y* 7/2) and dark yellowish orange (10*YR* 6/6) at 4 ft 1–6

Sand, fine to medium, silty; dark reddish brown (10*R* 3/6) intermingled with yellowish gray (5*Y* 7/2) and dark yellowish orange (10*YR* 6/6) 6–9

Sand; fine to medium grading down to medium to coarse; yellowish gray (5*Y* 8/1); subrounded to rounded below 15 ft 9–17.5

Sand; medium to coarse with subangular to subrounded quartz pebbles up to 2 cm in diameter; dark yellowish orange (10*YR* 6/6); lower contact abrupt 17.5–18

---------- UNCONFORMITY ----------

Tar Heel Formation

Clay, sandy (very fine), silty, stiff, dense, slightly micaceous, sparsely lignitic, dark-olive-gray (5*Y* 3/1); contains a single 5-mm-thick layer of fine to medium quartz sand 18–21

Base of Charles City Formation: **+59 ft above sea level**

Bottomed in Tar Heel Formation

WL–2–07: 3.79 mi west of eastern quadrangle border, 6.92 mi north of southern quadrangle border, along abandoned loop of North Carolina Highway 210, 20 ft northwest of 90-ft benchmark, along eastern margin of Reedy Branch Bay, in north-central 1/9th of map area (latitude 34.7255°N., longitude 78.4412°W.). Surface elevation 90 ft.

LITHOLOGY DEPTH, IN FEET

Dune sand

Sand, fine to coarse, poorly sorted, subrounded, soft, variably humic; brownish gray (5YR 4/1) grading down through very pale orange (10YR 8/2) (0.5–1 ft), pale yellowish brown (10YR 7/2) (1–2 ft), and dusky brown (5YR 2/2) (2–2.5 ft) to olive gray (5Y 4/2)..... 0–3

---------- UNCONFORMITY ----------

Carolina Bay fill

Silt, very fine to fine sandy, clayey, light-olive-gray (5*Y* 6/1) 3–6

Sand, very fine to medium, dominantly fine, poorly sorted, silty; brownish gray (5*YR* 5/1) grading down through grayish brown (5*YR* 3/2) to light olive gray (5*Y* 5/2) 6–11

---------- UNCONFORMITY ----------

Charles City Formation

Silt, very clayey, greasy, sandy (very fine); tree roots; upper 1 ft olive gray (5*Y* 4/2) grading rapidly down to grayish yellow (5*Y* 7/4)..... 11–15

Sand; fine to medium grading down to medium to very coarse; poorly sorted; pale olive gray (5*Y* 6/2) grading down to grayish yellow (5*Y* 7/4) at about 18 ft..... 15–27

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand, very fine, silty, clayey, lignitic, micaceous, stiff, dense, olive-gray (5*Y* 4/1) 27–30

Sand, fine to medium, light-olive-gray (5*Y* 6/1) 30–31

Sand, very fine to fine, clayey, silty, carbonaceous; very dark dusky red (*10R* 2/2) with thin interbeds of very dark dusky red lignite and silty, dense clays and thin interbeds of light-olive-gray (5*Y* 6.5/1), fine to medium sand 31–46

Base of dune sand: **+87 ft above sea level**
Base of bay fill: **+79 ft above sea level**
Base of Charles City Formation: **+63 ft above sea level**

Bottomed in Tar Heel Formation

WL–3–07: 3.42 mi west of eastern quadrangle border, 1.15 mi north of southern quadrangle border, 200 ft north of unnumbered dirt road, 0.3 mi south of the "P" in "Mill Pond" label on map, in south-central 1/9th of map area (latitude 34.6419°N., longitude 78.4344°W.). Surface elevation 85 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand; fine to medium, dominantly fine; subrounded to rounded; clean; soft; pale yellowish brown (10*YR* 7/2) on dusky brown (5*YR* 2/2); lower contact gradational	0–2
Sand; fine to medium, dominantly fine; subrounded to rounded; clean; soft; very humic; dark brown (5*YR* 2/4); roots	2–8
Sand, fine, subangular to subrounded, humic; medium brown (5*YR* 4/4) grading down to light yellowish brown (10*YR* 6/4)	8–15
Silt, very clayey, sandy (very fine), sticky; light olive gray (5*Y* 6/1) grading down to brownish gray (5*YR* 5/1)	15–16
Peat, dark brown (5*YR* 2/4) grading down to grayish brown (5*YR* 3/2); abundant light-brown (5*YR* 6/6) wood	16–21
Sand, fine to medium, subangular to subrounded, humic, slightly silty; upper foot dark yellowish gray (5*Y* 6/2) then grades down rapidly to medium yellowish brown (10*YR* 5/4)	21–26
Sand, fine to medium, dominantly fine, subangular to subrounded, humic, slightly silty, thixotropic, medium-yellowish-brown (10*YR* 5/4)	26–30
---------- UNCONFORMITY ----------	
Charles City Formation	
Silt, very clayey, sandy (very fine), sticky, light-olive-gray (5*Y* 5/2); lower contact somewhat gradational	30–39
Sand, fine to medium, light-olive-gray (5Y 5/2)	39–40
(No recovery, fell off stem)	40–44

---------- UNCONFORMITY ----------

Tar Heel Formation

Sand; fine to medium grading down to medium to coarse; clayey; silty; micaceous; stiff; dense; olive gray (5*Y* 4/1); sparse light-olive-brown (5*Y* 5/6) to dusky-yellowish-brown (10*YR* 2/2) lignite 44–46

Base of dune sand: **+55 ft above sea level**
Base of Charles City Formation: **+41 ft above sea level**

Bottomed in Tar Heel Formation

WL–4–07: 5.31 mi west of eastern quadrangle border, 4.27 mi north of southern quadrangle border, along unnumbered dirt road, 1.10 mi east of junction of U.S. Highway 701 and North Carolina State Road 1519, in west-central 1/9th of map area (latitude 34.6869°N., longitude 78.4676°W.). Surface elevation 72 ft.

LITHOLOGY	DEPTH, IN FEET
Charles City Formation	
Sand, fine to medium, subangular to subrounded, silty; dark yellowish brown (10*YR* 4/4) grading down through grayish orange (10*YR* 7/4) (0.5–1 ft), medium yellowish brown (10*YR* 5/4) (1–1.5 ft), and medium brown (5*YR* 3/6) (1.5–2.5 ft) to yellowish gray (5*Y* 7/2)	0–3
Sand, fine to medium, subangular to subrounded, clean, pale-grayish-orange-pink (5*YR* 8/2)	3–6
Sand, fine to medium, subangular to subrounded, slightly silty; pale olive gray (5*Y* 7/1) grading down to brownish gray (5*YR* 5/1) at 9 ft	6–10
Sand, very fine to fine, silty, clayey, yellowish-gray (*5Y* 7/2)	10–10.5
Sand, fine to medium, silty, clayey; varicolored, including light yellowish brown (10*YR* 6/4), brownish gray (5*YR* 5/2), dusky brown (5*YR* 2/2), pale olive gray (5*Y* 7/1), and light yellowish gray (5*Y* 8/2); lower contact gradational	10.5–18
Sand; medium to very coarse, dominantly medium to coarse; very poorly sorted; slightly silty; yellowish gray (5*Y* 7/2); scattered rounded quartz granules and pebbles up to 0.5 cm in length; lower contact gradational	18–28
Sand, coarse to very coarse; gravelly with subrounded to rounded quartz pebbles up to 1 cm in length; silty; olive gray (5*Y* 5/1)	28–32
---------- UNCONFORMITY ----------	
Tar Heel Formation	
Silt, very clayey, sandy (very fine), micaceous, olive-gray (5*Y* 4/1); 3-in.-thick piece of dark-brown (5*YR* 2/4) lignite and 6-in.-thick layer of light-olive-gray (5*Y* 5/2), fine to medium, micaceous sand	32–36

Base of Charles City Formation: **+40 ft above sea level**

Bottomed in Tar Heel Formation

Appendix 2. Supplementary Basement Data

Basement elevation (in feet)	Latitude	Longitude	Well name	Data source
-48	34.9917°N.	78.9583°W.	CD–T–3–XX	Lawrence and Hoffman (1993).
-98	34.9875°N.	78.7542°W.	CD–T–3–81	Lawrence and Hoffman (1993).
-106	34.9327°N.	78.7392°W.	Cedar Creek Fire Tower Station	North Carolina Geological Survey (2010).
-110	34.9877°N.	78.7548°W.	Seabrook School Station	North Carolina Geological Survey (2010).
-114	34.8825°N.	78.6575°W.	Bushy Lake Station	North Carolina Geological Survey (2010).
-127	34.9581°N.	78.8519°W.	Howard Williams	North Carolina Geological Survey (2010).
-127	34.9581°N.	78.8519°W.	CD–T–9–74	Lawrence and Hoffman (1993).
-134	34.9733°N.	78.8500°W.	Jim Dozer	North Carolina Geological Survey (2010).
-136	34.9869°N.	78.8311°W.	Bill Devault	North Carolina Geological Survey (2010).
-141	34.9525°N.	78.9156°W.	CT–T–7–74	Lawrence and Hoffman (1993).
-206	4.9936°N.	78.3719°W.	SA–T–2–84	Lawrence and Hoffman (1993)
-211	34.8436°N.	78.8383°W.	DuPont Corporation	North Carolina Geological Survey (2010).
-258	34.9994°N.	78.34083°W.	SA–T–1–86	Lawrence and Hoffman (1993).
-279	34.8111°N.	78.3969°W.	Garland	Trapp (1992).
-289	34.9881°N.	78.3150°W.	Town of Clinton	North Carolina Geological Survey (2010).

Appendix 2. Supplementary Basement Data—Continued

Basement elevation (in feet)	Latitude	Longitude	Well name	Data source
-303	34.9753°N.	78.3083°W.	Town of Clinton	North Carolina Geological Survey (2010).
-313	34.9889°N.	78.1894°W.	Turkey Station	North Carolina Geological Survey (2010).
-366	34.6456°N.	78.6444°W.	West Point Pepperell	North Carolina Geological Survey (2010).
-371	34.6329°N.	78.6205°W.	Town of Elizabethtown	North Carolina Geological Survey (2010).
-372	34.8536°N.	78.2625°W.	Six Runs Station	North Carolina Geological Survey (2010).
-373	34.6478°N.	78.7309°W.	Dublin Station	North Carolina Geological Survey (2010).
-385	34.5700°N.	78.9339°W.	VPI–2	Lawrence and Hoffman (1993).
-388	34.9283°N.	78.0639°W.	DP–OT–1–69	Lawrence and Hoffman (1993).
-410	34.6553°N.	78.5225°W.	White Lake Prison Station	North Carolina Geological Survey (2010).
-415	34.6500°N.	78.5183°W.	BL–T–1–81	Lawrence and Hoffman (1993).
-432	34.5417°N.	78.7917°W.	Town of Bladenboro Test Well	North Carolina Geological Survey (2010).
-463	34.5517°N.	78.5261°W.	BL–244/BL–C–1–2003	Unpublished result from deepening U.S. Geological Survey core hole BL–244 in 2004.
-470	34.5068°N.	78.7543°W.	Bladenboro Station	North Carolina Geological Survey (2010).
-480	34.8481°N.	78.0217°W.	DP–T–1–82	Lawrence and Hoffman (1993).
-544	34.6069°N.	78.2422°W.	Ivanhoe Research Station	Trapp (1992).

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
Pelecypoda					
Abra aequalis				X	
Amusium mortoni			X		
Anadara aequicostata				X	
Anadara callicestosa	X				
Anadara improcera	X		X	X	X
Anadara lienosa	X				
Anadara ovalis					X
Anadara propatula	X				
Anadara transversa					X
Argopecten comparilis	X				
Astarte concentrica	X		X		
Bornia triangula				X	
Carolinapecten eboreus		X	X	X	X
Carditamera arata	X			X	
Chama corticosa	X	X			
Chama emmonsi	X	X	X		
Chione cribraria	X				
Chione latilirata	X	X	X		
Clinocardium acutilaqueatum	X				
Clinocardium virginianum	X				
Clinocardium sp.		X			
Corbula cuneata			X		
Crassostrea virginica	X			X	X
Crepidula aculeata aculeata	X				

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
		Pelecypoda—continued			
Crepidula aculeata costata	X				
Crepidula cymbaeformis		X			
Crepidula fornicata	X				
Crepidula plana	X	X			
Crucibulum grandis	X				
Ctena speciosa		?	?		
Cumingia subtellinoides				X	
Cyathodonta dalli		X			
Diplodonta acclinis				X	
Divaricella quadrisulcata				X	
Donax cuneola				X	
Dosinia acetabula	X				
Dosinia elegans				X	
Ensis directus	X			X	
Ensis sp.			X		X
Eucrassatella kauffmani	X				
Eucrassatella virginica			X		
Florimetis magnoliana	X				
Gemma magna				X	
Glycymeris americana	X			X	
Glycymeris americana quinquerugata		X	X		
Glycymeris subovata	X	X	X	X	
Glycymeris subovata var. hummi				X	
Gouldia metastriata	X				

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
Pelecypoda—continued					
Macrocallista albraria		X			
Macrocallista greeni				X	
Mercenaria campechiensis campechiensis				X	
Mercenaria corrugata	X				
Merceneria tridachnoides	X				
Merceneria sp.			X		
Modiolus gigas			X		
Mulinia congesta		X	X		X
Mulinia lateralis				X	X
Noetia carolinensis				X	
Noetia limula				X	
Nucula proxima				X	
Nucula taphria				X	
Nuculana acuta				X	
Nuculana hypsoma					X
Nuculana sp.					X
Ostrea compressirostra			X	X	X
Ostrea sculpturata	X			X	
Panopea reflexa	X				
Parvilucina crenulata				X	
Parvilucina multilineata				X	
Parvilucina (Cavilinga) trisulcata				X	
Pecten hemicyclicus	X				
Placunanomia plicata (thick form)				X	

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
Pelecypoda—continued					
Pleuromeris decemcostata					X
Pleuromeris tridentata	X				
Plicatula marginata	X	X	X	X	
Pododesmus sp.	X				
Pseudomiltha anodonta				X	
Quadrilatera adamsi				X	
Raeta plicatella				X	
Rangia clathrodonta				X	
Semele carinata		X		X	
Sphenia dubia				X	
Spisula confraga	X				
Strigilla mirabilis				X	
Tagelus plebeius				X	
Yoldia laevis				X	
Gastropoda					
Busycon contrarium				X	
Busycon excavatum				X	
Busycon incile	X				
Busycon maximum maximum				X	
Busycon maximum filosum	X				
Busycon sp.		X			X
Caecum compactum				X	
Caecum johnsoni				X	
Calliostoma lapidosum	X				

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
Gastropoda—continued					
Calyptraea centralis	X				
Conus marylandicus	X				
Conus adversarius	X				
Crassispira virginiana		X			
Crepidula fornicata				X	
Crepidula sp.					X
Crucibulum scutellatum	X				
Cyclostremiscus obliquestriatus				X	
Cymatosyrinx lunata	X			X	
Diodora sp.	X				
Drillia impressa		X			
Epitonium rupicolum				X	
Eupleura caudata				X	
Euspira sayana	X				
Fusinus exilis exilis	X				
Fusinus exilis burnsii	X				
Hesperisternia filicata	?				
Ilyanassa porcina	X				
Littorina irrorata carolinensis				X	
Lunatia interna			X		
Mitrella lunata				X	
Nassarius quadrulatus	X	X		X	
Oliva canaliculata	X	X			
Olivella mutica	X	X		X	

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
Gastropoda—continued					
Petaloconchus sculpturatus	X	X	X		
Polinices duplicatus			X		
Prunum limatulum	X	X	X	X	X
Prunum virginianum		X			
Ptychosalpinx multirugata	X				
Ptychosalpinx tuomeyi		X			
Scalaspira sp.					**?**
Serpulorbis granifera	X				
Skenea harrisii				X	
Tectonatica pusilla				X	
Teinostoma nana				X	
Terebra blakei	X				
Terebra emmonsii emmonsii	X				
Terebra emmonsii grayi	X				
Terebra emmonsii hamptonensis	X				
Terebra sp.		X			X
Triplofusus gigantea	X				
Turritella alticostata	**?**				
Turritella fluxionalis	X				
Turritella virginica	X				
Turritella sp.		X	X		
Urosalpinx lepidota	X			X	

Appendix 3. Fossil Mollusk and Vertebrate Taxa Recovered in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Lumber River[1] (Duplin Formation)	Locality WS–12[1] (Duplin Formation)	Locality WS–13[1] (Duplin Formation)	Elizabethtown beds[2]	Locality RH–19[1] (Waccamaw Formation)
		Selachii			
Squalicorax kaupi[3]	X	X			
Squalicorax pristodontus[3]	X				

[1]Collection reposited with the North Carolina Museum of Natural Sciences, Raleigh, N.C., under accession number 12351.

[2]Faunal list compiled by Campbell (1993), which also provides a comprehensive list of species from elsewhere in the Duplin and Waccamaw Formations.

[3]Specimens reworked into base of Duplin Formation from Tar Heel Formation below.

Appendix 4. Upper Cretaceous Fossil Vertebrate Taxa Reported by Miller (1966, 1967, 1968), Baird and Horner (1979), and Robb (1989) From Phoebus Landing in the Elizabethtown 1:100,000-Scale Quadrangle

Taxon	Affinity
Chondrichthyes	
Hybodus montanensis	Hybodont shark
Ischyrhiza mira	Ganopristine shark
Odontaspis samhammeri	Sand shark
Scapanorhynchus texanus	Goblin shark
Squalicorax kaupi	Crow shark
Squalicorax pristodontus	Crow shark
Squatina hassei	Angel shark
Synodontaspis holmdelensis	Sand shark
Brachyrhizodus wichitaensis	Cow-nosed ray
Rhombodus levis	Primitive ray
Ischyodus cf. I. bifurcatus	Ratfish
Osteichthyes	
Albula sp.	Bonefish
Anomoeodus phaseolus	Pycnodont fish
Cylindracanthus ornatus	Affinity uncertain
Enchodus cf. E. petrosus	Primitive salmon
Lepisosteidae indet.	Garfish
Paralbula casei	Primitive ladyfish
Saurodon sp.	Osteoglossomorph fish
Stephanodus sp.	Triggerfish
Xiphactinus audax	Primitive tarpon
Reptilia	
Adocus sp.	Soft-shell turtle
Bothremys barberi	Side-neck turtle

Appendix 4. Upper Cretaceous Fossil Vertebrate Taxa Reported by Miller (1966, 1967, 1968), Baird and Horner (1979), and Robb (1989) From Phoebus Landing in the Elizabethtown 1:100,000-Scale Quadrangle—Continued

Taxon	Affinity
Reptilia—continued	
Brachychampsa sp.	Alligatorid crocodilian
cf. Thoracosaurus neocessariensis	Gavialid crocodilian
Deinosuchus rugosus	Alligatorid crocodilian
Dryptosaurus sp.	Theropod dinosaur
Hadrosaurinae indet.	Medium-sized hadrosaur
Halosaurus sp.	Mosasaur
Hypsibema crassicauda	Giant hadrosaur
Leidyosuchus cf. L. formidabilis	Alligatorid crocodilian
Ornithomimus sp.	Theropod dinosaur
Platecarpus sp.	Mosasaur
Prognathodon sp.	Mosasaur
Taphrosphys dares	Side-neck turtle
Trionyx halophilus	Soft-shell turtle
Tylosaurus sp.	Mosasaur

Manuscript approved on May 5, 2011.
For more information about this publication, contact
Chief, Eastern Geology and Paleoclimate Science Center
U.S. Geological Survey
12201 Sunrise Valley Drive, MS 926A
Reston, VA 20192
Edited by Elizabeth D. Koozmin and Lyn K. Osburn
Layout by Cathy Y. Knutson
Online Posting by Cathy Y. Knutson