

DESCRIPTION AND PHYSICAL PROPERTIES OF EARTH MATERIALS IN THE PORTSMOUTH-NORFOLK AREA, SOUTHEAST VIRGINIA

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DESCRIPTION OF UNITS

FEATURES AFFECTING AGRICULTURE AND ENGINEERING WORK (a)

UNIT	DESCRIPTION	TOPOGRAPHIC EXPRESSION AND ORIGIN	PRESENT USE VEGETATION TYPES	DRAINAGE CHARACTERISTICS	SOIL TYPES AND AGRICULTURAL ADAPTABILITY	ADAPTABILITY TO EARTH WORK IN WET PERIODS	FEASIBILITY FOR USE AS TOP SOIL	FEASIBILITY AS SOURCE MATERIALS (b)	FEASIBILITY FOR FOUNDATION MATERIALS (b) (c)
1. Sand and Gravel, Sand	Fine to coarse sand in places interbedded with varying amounts of gravel (pebble size). Thickness: 10' up to 50'; thickest under Charity Neck, Pungo, Oceana Ridges, Diamond Springs Escarpment, and Knotts Island. Thickness: 10'-15' in slopes adjacent to present drainage underlain by 20'-30' of silty clay and sand.	Material makes up parts of former barrier beach complexes and accounts for the N-S trending ridges and the E-W Diamond Springs Escarpment. Ridges rise 10'-15' above adjacent low areas. Material in slopes adjacent to present drainage are stream overflow deposits.	Virtually all urbanized, industrial, and residential with varying degrees of intensity. In southern half of the study area the unit is in intensive agriculture-multiple crops throughout year.	Excellent to well drained. Slight to no need for artificial drainage. Depth to seasonally high water table 2-4'.	Friable fine sandy loams. Excellent--Best and most productive agricultural lands in study area.	Good to Fair	High	High. Ridges of this unit are excellent source of gravel and sand. Good base course material, and source for aggregate when screened.	Very high
2. Silty Sand	Fine sand and silty sand. Thickness: 10' to 50'. Thickest under Charity Neck, Pungo, and Oceana Ridges, and Diamond Springs Escarpment.	Same as above	Same as above except a few areas still wooded.	Moderately well drained. Some areas require drainage ditches for cultivation. Depth to seasonally high water table 1 1/2'-2 1/2'.	Fine sandy and silty loams. Very high	Fair to Poor	High to Medium	High to Medium. Some of well sorted sands suitable for fill and construction material.	High
3. Sandy, Clayey Silt	Fine sandy clayey silt, to depth of 5' underlain by sticky clayey sand. Thickness: 20'-40'.	Most extensive unit in the study area and occupies broad extremely flat areas with elevations ranging from 10'-20' above sea level. Material is former lagoonal and offshore fine marine deposits.	Urbanized in north and in Norfolk and Portsmouth. Remainder more than 90% in cultivation. Remaining scattered areas undrained and wooded.	Fair to poor. Most of area requires deep drainage channels and intensive closely spaced lateral drainage ditches to make land cultivatable. Seasonally high water table at surface.	Fine silty loam with plastic, sticky clay subsoil. Very high to good if properly drained and limed. Fertilizer requirement high.	Not Adaptable	Medium to Low	Medium to Low. Some clayey material can be used for borrow.	Medium to Low
4. Silty Clay and Clay	Plastic silty clay and clay with some layers of sticky clayey sand. Thickness: 20'-40'.	Low lying poorly drained sites developed from fine grained offshore marine deposits.	As recently as the 1940's all areas were wooded. Now about 80% of unit has been reclaimed for agriculture. Wooded areas remaining support dense growths of black tupelo, loblolly pine, yellow poplar, sweetgum, red maple and willow oak. Thick underbrush of cane or reeds and briars.	Very poor. Requires deep drainage canals and intensive closely spaced lateral drainage ditches to make land cultivatable. Seasonally high water table at surface. Before drainage much of unit permanently wet.	Black, mucky fine silt loam with subsoil of sticky, plastic clay. High to medium adaptability for agriculture if adequately drained and limed. Fertilizer requirement high.	Not Adaptable	Low	Medium to Low. Some clays can be used for borrow.	Very poor to low.
4a. Silty Clay and Clay Forested wet lands	Same as above. By some is considered an extension of Dismal Swamp known locally as the "Green Sea"	Extensive extremely flat area east of Dismal Swamp and south of Albemarle and Chesapeake Canal. Developed from fine-grained, offshore marine deposits.	One small area beginning to be reclaimed - otherwise either wooded with same species as Unit 4 above. Where timbered or burned over comprises dense growth of briars, cane, myrtle, and honeysuckle.	Exceedingly poor. Intensive artificial drainage needed to reclaim. Under water except in long dry periods.	Black, mucky fine silt loam containing much humus. High to medium adaptability for agriculture if adequately drained and limed to reduce high acidity.	Not Adaptable	Low to very low because of high acidity. Medium feasibility when drained and limed.	Low to very low. Some clays might be used for borrow.	Very Low.
5. Deep Plastic Clay over Sand	4" plastic, sticky fine sandy clay over 4'-6" loose sticky sand, over 30' or more of silty clay.	Extremely flat areas 15'-20' in elevation bordering or near Dismal Swamp. A few small low areas 5'-10' in elevation between sand ridges west of Back Bay. Former offshore marine and lagoonal deposits.	Formerly swampy and wooded. Now nearly all drained and reclaimed. Some areas urbanized, others in agriculture.	Very poor. Requires deep drainage canals and closely spaced drainage ditches. Areas near Dismal Swamp were very difficult to drain. Seasonally high water table at surface.	Black, very fine silty clay loam with abundant humus. Subsoil is plastic, sticky, heavy clay loam. Very high to high when properly drained and limed.	Not Adaptable	Medium to Low	Low to very low. Some clays might be used for borrow.	Very Low.
6. Deep Mucky Peat of Dismal Swamp	3'-15' mucky peat underlain by 20'-30' silty clay and loose sticky sand. Peat ranges from a true peat in which plant species are easily recognized to a muck in which it is difficult to determine plant remains. Contains many partially decomposed logs and stumps.	Extremely flat area in western part with elevation 15'-20' above sea level.	Densely wooded except for burned over area in north. Trees are mainly red maple, ash, swamp oak, cypress, pine, poplar, beech, and varieties of gums. Contains a thick undergrowth of moss, sedges, ferns, cane, honeysuckle, myrtle, alder, holly, and gallberry. Forest provides habitat for a large variety of wildlife.	Very Poor. Seasonally high water table at surface. Except for prolonged dry periods much of Dismal Swamp has standing water.	Black, fine mucky organic soils extremely acid. Very low to nil for agriculture though could be drained with difficulty.	Not Adaptable	Low to very low.	Very low to nil.	Very low to nil.
7. Mucky Peat, shallow over sand	0'-6" partly decomposed organic matter, over 1'-2' mucky peat, over 3' loose fine sand, over 20'-30' silty clay and sticky sand.	Flat areas bordering Dismal Swamp.	Formerly wooded but areas of this unit being reclaimed.	Very Poor. Seasonally high water table 0'. Standing water at surface most of time until drained.	Black, fine mucky organic soils extremely acid. Low adaptability for agriculture after extensive artificial drainage.	Not Adaptable	Low to very low because of high acidity.	Very low to nil.	Very low to nil
8. Mucky Peat shallow over silty clay	Similar to deep mucky peat of Dismal Swamp except that peat is only 1'-2' thick.	Flat areas bordering Dismal Swamp	Wooded with species like rest of Dismal Swamp listed above for Unit 6.	Same as above. Will be extremely difficult to drain.	Black fine extremely acid mucky organic soils. Very low to nil for agriculture.	Not Adaptable	Low to very low because of high acidity.	Very low to nil.	Very low to nil
9. Mucky Peat, shallow over mixed stream Alluvium, mostly clay and silt.	1'-2' mucky peat over mixed stream alluvium mostly clay and silt with some sand. Alluvium in two major drainage ways, the Northwest and North Landing Rivers extends to a depth of about 50' (50' below sea level) at the Virginia-North Carolina border where the streams enter Currituck Sound, south of the mapped area.	Flat alluvial surfaces in the two main drainage ways and their tributaries. Streams descend from an elevation of 5'-10' to sea level where they enter Currituck Sound.	Forested wet lands containing an assemblage similar to Dismal Swamp described in 6 above.	Standing water at surface most of time.	Black mucky organic peat soil mixed with stream alluvium in subsurface. Not adaptable for agriculture.	Not Adaptable	Low to very low.	Not generally usable though some alluvium dredged for making new land.	Very Low.
10. Artificial Fill	Areas filled with waste rubble, and dredged material from ship channels off Hampton Roads and in the Elizabeth River to create ship berthing and warehouse facilities along Elizabeth River and to expand facilities on Norfolk-Portsmouth waterfront.	Filled peat areas, former streams and tidal marshes.	Commercial-transportation docking, ship handling and warehouse facilities.	Well drained	Mixed alluvium and earth and rubble fill. No natural soil profile developed. No agricultural use.	Not Applicable once made land completed and built up.	Not Applicable	Not Applicable	High to Medium Depending on age of fill, type of material, degree of compaction!
11. Coastal Beach and Dune Deposits	Grayish-yellow incoherent sand in coastal beach. Contains strata of clay and organic material. Except for the Virginia Beach area, the coastal beach includes wind-blown dunes and stabilized dunes. All sand of dunes contains appreciable silt. Dunes stabilized for a long time have developed a feeble soil profile with a loamy subsoil.	The coastal beach is a continuous gently sloping strip, in most places less than 100 yards wide, bordering the Atlantic Ocean and Chesapeake Bay. South of Virginia Beach the beach extends inland for about one mile. Dunes are of two types: (1) Those active and subjected to wind action and, (2) those stabilized by vegetation. Average elevation of the dunes is about 35' but they vary from a few feet to 100' on Cape Henry and in some places both extremes are found within a few hundred feet. South of Virginia Beach in vicinity of False Cape are many dunes 40'-50' high.	Mostly used for recreation. Active dunes mostly bare; in some places sparse vegetation of coarse bunch grass, live oak and myrtle. Stabilized dunes have stubby loblolly pine, dwarf live oak, myrtle and extensive coarse bunch grass. Beaches and dunes are being preserved to prevent incursion of storm waters on land and into North and Back Bays.	Well drained except low sand areas bordering Back Bay, an area known as "Wash Flats". This area is frequently inundated and drains slowly.	Mostly bare sand. Grassy areas of stabilized dunes furnish scant grazing otherwise no agricultural use.	Good	Very low. Beaches and dunes are being preserved to prevent incursion of storm waters on land and into North and Back Bays.	Coastal sand has been used as building and road sand, but principal use is recreational. Dune sand generally not suitable to build up Virginia Beach because of presence of silty material which is quickly removed by wave action if put on beach. Moreover, dunes are being preserved to prevent incursion of storm waters from Atlantic Ocean into North and Back Bays.	High to Medium.
12. Marsh Deposits	Silty clay with varying quantities of organic matter in various stages of decomposition. Sandy in a few places. Some areas have 3"-6" of sedge peat on surface. Inundated by fresh to slightly brackish water.	Low inundated areas in North and Back Bays, and along the North Landing and Northwest Rivers.	Recreation; wild fowl hunting. Scant grazing. Vegetation consists of cattails, celery grass, and reeds.	Wet lands	Organic & peaty soils. No agriculture use.	Not Adaptable	Not used	Not feasible	Not feasible
13. Tidal Marsh and Swamp Deposits	Gray to dark gray silty clay, muds, and organic matter in various stages of decomposition. Inundated by salt water tides.	Inundated areas bordering Lynnhaven Bay, Little Creek, and the Elizabeth River.	Not used for any purpose. Tidal marsh will not support cattle. Vegetation consists of dense growth of coarse grasses and reeds. Formerly more extensive-many areas now filled in for docking and warehouse facilities.	Wet lands	Thin organic soils. No agricultural use.	Not Adaptable	Not used	Not feasible	Not feasible
14. Fresh to Brackish Swamp Deposits	Silt and sandy alluvium	Three small fresh to slightly brackish swamps along east and south flowing drainage ways feeding North and Back Bays. Areas more extensive in past but now filled in.	Not used. Vegetation consists of red maple, swamp oak, ash, poplar, and sweetgum.	Wet lands	A few inches of dark organic soil over stream alluvium. No agricultural use.	Not Adaptable	Not used	Not feasible	Not feasible
14a. Cape Henry Swamp Deposits	Many narrow strips of stabilized dune sands, in many places less than 100' wide in large area of swamp. This soil profile developed on dunes. 3"-4" organic matter overlies white sand surface soil. Subsoil is loamy sand. Substratum is grayish-yellow loose sand. Much of swamp area has 2'-3' of peat at surface.	Dunes as much as 35'-40' high are crescentic in shape paralleling beach lines on Cape Henry and possibly represent old beach lines or sand bars.	Recreation. Seashore State Park. Vegetation: cypress, loblolly pine, swamp oak, poplar.	Dune areas well drained	Few inches of organic matter on dunes. No agricultural use.	Accessible dunes, good adaptability.	Not used	Medium to low. Dune sands could be used for fill but not suited to build up Virginia Beach because of fines in sand.	Dunes - High to medium.

Virginia (Portsmouth-Norfolk area), superficial. 1:100,000. 1975. Sheet 2. 75-634. 75-634. 75-634.

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1. Coch, Nicholas K., 1965. Post-Miocene stratigraphy and morphology, inner Coastal Plain, southeastern Virginia: U. S. Office Naval Research, Geography Branch Tech. Rept. 6 (Contract N0WR 609 (40), Task Order NR 388-064), 97 p.
2. Henry, Elvin Francis, 1959. Soil survey, Norfolk County Virginia, U. S. Dept. Agr., Soil Conservation Service, Soil Survey, ser. 1953, no. 5, 53 p.
3. Oaks, R. O., Jr., 1964. Post-Miocene stratigraphy and morphology, outer Coastal Plain, southeastern Virginia: U. S. Office Naval Research, Geography Branch Tech. Rept. 5 (Contract N0WR 609 (40), Task Order NR 388-064), 240 p.
4. Simmons, C. S., and Shulkoos, Edward, 1945. Soil survey of Princess Anne County, Virginia, U. S. Dept. Agr. Div. of Soil Survey, Series 1939, no. 3, 57 p.

(a) Agricultural and engineering adaptability based on agricultural and engineering data from soils reports of Norfolk and Princess Anne Counties, Virginia (References 2 and 4) which cover entire area of study.

(b) Ratings are for general guidance only as units vary in composition. Specific feasibility should be based on field surveys and testing.

(c) Ratings are for subgrade and subbases.